



# RF MANUAL 18TH EDITION

Application and design manual for **High Performance** RF products

June 2014



SECURE CONNECTIONS  
FOR A SMARTER WORLD



# Release new levels of RF performance

At NXP, we are committed to innovation in RF. Our dedication to best-in-class technology means we're always working to develop smart solutions that help you take the next step in RF. Every solution we offer builds on 50 years of RF leadership, ensuring that you get higher efficiency, smaller footprints, and faster time-to-market. We also have an established supplier infrastructure with dedicated manufacturing capacity, so you can be certain we are a partner for the long term.

## Technology leadership

We leverage leading-edge process technologies for higher performance (SiGe:C, GaN, LDMOS), and our leadless WL-CSP packages enable smaller, more efficient designs. We offer proven RF solutions, with a leading portfolio of options for RF power, RF small-signal, and RF transceivers.

## Comprehensive support

We build on decades of RF leadership and expertise. You can rely on our dedicated application experts to help you solve your design challenges, so you can create a clear competitive advantage.

## 50 years of RF innovation

- ▶ Introduced first RF wideband transistors in the 1960s
- ▶ Recognized as a technology leader for more than 35 years
- ▶ First with fully integrated, silicon-based MMICs and ICs for satellite LNB
- ▶ Best-in-class LDMOS technology since 2004

## Key supplier to industry leaders

- ▶ 4 in 10 smartphones introduced in 2013 have an NXP GPS LNA
- ▶ Leading supplier of RF silicon tuners for DTV/STB/CMTS
- ▶ #2 in RF wideband transistors
- ▶ Industry leading RF power technology and application solutions

## What's new?

This 18<sup>th</sup> edition of the RF Manual highlights several important applications, including small-cell base stations, optical mini- and midi-node systems for broadband TV signals, cable modems, GPS for mobile health and fitness, GPS for L2 and L5 bands, RF energy, and ISM up to 1600 MHz.

We've added a number of new product lines, such as broadband amplifiers for TV and satellite systems, along with an upstream VGA for DOCSIS 3.0 and a VSAT downconverter. Also new are next-generation devices and enhanced products in several categories, including 8th generation (Gen8) LDMOS transistors, GPS LNAs, LNAs for wireless infrastructure, satellite downconverters, CATV power doublers, Over-Molded Plastic (OMP) RF power transistors, GaN power amplifiers, and low-power wireless microcontrollers.

## How to use the RF Manual

This document is a resource that lets you explore our RF portfolio. There are several ways to approach the information:

### Chapter 1 – Products by application

Chapter 1 discusses trends and requirements for particular applications, and lists the products we recommend for target systems.

### Chapter 2 – By NXP technology

Chapter 2 describes the special process and packaging technologies that position us as a leader in RF.

### Chapter 3 – By product category

Chapter 3 lists products by function, with detailed specs for easy comparison.

### Chapter 4 – By design resource

Chapter 4 summarizes the design-support resources that help make it easy to design with our products and reduce time-to-market.

## RF Manual web page

[www.nxp.com/rfmanual](http://www.nxp.com/rfmanual)

## More design support

We've expanded the section on design support, adding the most recent tools, documents, materials, and links that make design-in easier. We also provide links our RF community, a growing online engineer-to-engineer community for RF small-signal design that lets you collaborate, get technical support, and share ideas with other developers.

[www.nxp.com/RFcommunity](http://www.nxp.com/RFcommunity)

### Chapter 5 – By competitor type number

Chapter 5 holds a sorted listing of competitor devices, so you can easily find the NXP equivalent of a product from another manufacturer.

### Chapter 6 – By shipping format

Chapter 6 describes how we ship our RF products, with the quantities included for each packing format.

### Chapter 8 – By online resource

Chapter 8 lists web links that can help you answer a question, learn more about a product, or place an order.

### Chapter 9 – By NXP type number

Chapter 9 provides an alphanumeric listing of all NXP products covered in this manual, so you can quickly find the details for a specific product.

Chapter 7 – lists all used abbreviations in the manual.

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RELEASE THE  
POSSIBILITIES

**ENHANCING** RF PERFORMANCE

NXP is committed to providing **best-in-class** RF solutions that help you reach new levels of performance for a smarter world.

# 1. Products by application

## 1.1 Wireless communication infrastructure

### 1.1.1 Base stations (all cellular standards and frequencies)

#### RF power transistors for base stations

NXP is the fastest growing supplier of LDMOS transistors for cellular infrastructure, leading the WCDMA and LTE markets. Our promise is unprecedented performance combined with best-in-class application support and constant innovation. Our design and manufacturing technologies ensure the best PA manufacturing yields in the industry. Our 8<sup>th</sup> generation LDMOS RF transistors offer the best solutions for all cellular frequency bands. With the current industry focus on cost reduction, we complement our product portfolio with OMP and MMIC product families, which combine high performance with low cost.

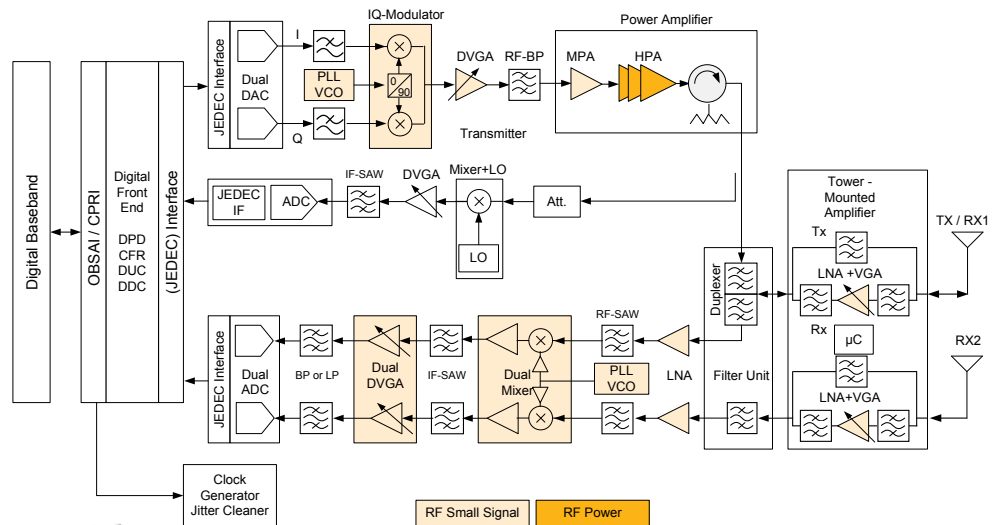
#### New: Single Package Asymmetric Doherty (PAD) Transistors and MMICs

PAD devices offer the highest efficiency, smallest footprint, and best cost-effectiveness, and can deliver P1dB power levels up to 460 W. These products are DPD-friendly and show excellent video bandwidth. The wide product portfolio covers frequency bands from 1800 to 2700 MHz and average power levels from 2 to 80 W. Discrete single-stage transistors and asymmetric MMICs are available to suit most applications, from picocells to macrocells.

#### RF components for transmit line-ups and receive chains

As a global leader in RF technology and component design, NXP Semiconductors offers a complete portfolio of RF products, from low- to high-power signal conditioning, that delivers advanced performance and helps simplify your design and the development process. Our solutions range from discretes and amplifiers (LNA, VGA, MPA) to mixers/oscillators.

#### Application diagram of base station showing Tx, Rx, and Tx feedback functions



Tx functions are in the upper region, Rx in the lower, and Tx feedback in the middle.



#### Product highlight: LDMOS 2-stage power MMIC BLM7G22S-60PBG

MMICs have two main applications: drivers in macro base-station power amplifiers (generally in Class-AB), and final stages in small cells (generally in Doherty configuration). For Doherty applications, asymmetric MMICs are preferred as they increase the efficiency in backoff. As drivers, symmetric

MMICs are often preferred, for more linearity. We are pleased to offer both configurations thanks to a flexible architecture that enables quick sampling of different variants. The BLM7G22S-60PBG is a dual path 2-stage power MMIC. This device is perfectly suited as a general-purpose driver in the frequency range from 2100 to 2200 MHz.



## Recommended products

Function	Product	f <sub>min</sub> (MHz)	f <sub>max</sub> (MHz)	P1dB (W)	Type
HPA	Driver	700	2200	5	BLP7G22-05
		700	2200	10	BLP7G22-10
		700	2700	5	BLP8G27-05*
		700	2700	10	BLP8G27-10*
		3400	3600	10	BLF6G38-10(G)
	Driver/final	700	1000	45	BLP8G10S-45P(G)
		2300	2700	40	BLF6G27L(S)-40P
		3400	3800	25	BLF6G38(LS)-25
	Final	3400	3800	50	BLF6G38(LS)-50
		720	960	140	BLP7G07S-140P
		720	960	160	BLF6H10L(S)-160
		720	960	300	BLF8G10LS-300P
		820	960	270	BLF8G10LS-270W
		920	960	140	BLP7G09S-140P(G)*
		925	960	160	BLF8G10LS-160V
		1805	2025	80	BLP8G20LS-80P*
		1805	2170	60	BLC8G20LS-60AV*
		1427	2170	90	BLF7G20L(S)-90P
		1805	2025	160	BLP8G21S-160PV
		1805	1990	170	BLF8G19LS-170BV
		1805	1990	200	BLF8G20LS-200V
		1805	1990	310	BLC8G20LS-310AV*
		2000	2200	140	BLF8G22LS-140
		2000	2200	160	BLF8G22LS-160BV
		2110	2170	220	BLF8G22LS-220
		2110	2170	270	BLF8G22LS-270
		2110	2170	310	BLC8G22LS-360AV*
		2300	2700	60	BLC8G27LS-60AV*
		2300	2700	75	BLF7G27L(S)-90P
		2300	2400	100	BLF7G24L(S)-100
		2300	2400	240	BLF8G24LS-240AV
		2300	2400	160	BLF7G24L(S)-160P
		2300	2400	200	BLF8G24L(S)-200PN
		2500	2700	100	BLF8G27LS-100
		2500	2700	100	BLF8G27LS-100V
		2500	2700	100	BLF8G27LS-100P
		2500	2700	140	BLF8G27LS-140

\* Check status in section 3.1, as this type is not yet released for mass production  
For the complete product selection please see section 3.7.1

Function	Product	f <sub>min</sub> (MHz)	f <sub>max</sub> (MHz)	P1dB (W)	Type
HPA	Final	2600	2700	140	BLF8G27LS-140V
		2500	2700	140	BLC8G27LS-140AV*
		2500	2700	160	BLC8G27LS-160AV
		2300	2400	245	BLF8G27LS-245AV
		3400	3800	75	BLF8G38LS-75V
	Integrated Doherty	3400	3600	100	BLF6G38(LS)-100
		2010	2025	50 <sup>(1)</sup>	BLD6G21L(S)-50
		2110	2170	50 <sup>(1)</sup>	BLD6G22L(S)-50
	MMIC	720	960	30	BLM8G0710S-30PB(G)*
		1800	2200	40	BLM8G1822S-40PB(G)
		1800	2200	40	BLM8G1822S-40AB(G)*
		1800	2200	40	BLM8G1822S-60PB(G)*
		1800	2200	40	BLM8G1822S-80AB(G)*
		2000	2200	60	BLM7G22S-60PB(G)
		2200	2400	30	BLM7G24S-30B

<sup>(1)</sup> P3dB

## Doherty amplifier technology for state-of-the art wireless infrastructure

In order to achieve the highest efficiencies currently possible, NXP combines its latest generations of LDMOS technology with the Doherty concept. We offer the world's first fully integrated Doherty transistor but also reference designs for very efficient, high-power, discrete 2- and 3-way Doherty amplifiers.

The world's first fully integrated Doherty transistor looks like an ordinary Class-AB transistor but contains a splitter, main and peak devices, delay lines, and a combiner integrated inside the package. With the ease of design of an ordinary Class-AB transistor, it also provides significant space and cost savings. It is ideally suited for space-constrained applications like small-cell base stations and antenna arrays.



### Product highlight 3-way Doherty BLF8G22LS-160BV

A 3-way Doherty design based on three BLF8G22LS-160BV devices achieves 48% efficiency at 49 dBm (80 W) average output power and 15.0 dB gain with a 2-carrier W-CDMA signal. It has a peak power capability (P3dB) of 57 dBm (500 W) at 28 V supply voltage. This design covers the W-CDMA standard for band one (2.11 - 2.17 GHz) operation and is tailored to very high peak power and volume manufacturing with high yields without tuning. Additional features are enhanced video bandwidth and an auto-biasing function.

## Recommended products

Function	Product		Package	Type
Discrete attenuator	RF diode	PIN diode	SOT753	BAP64Q
			SOT753	BAP70Q
			Various*	BAP64

Function	Product		Package	Type
LNA	RF transistor	SiGe:C transistor	SOT343F	BFU725F/N1
				BFU690F
				BFU730F
				BFU760F
				BFU790F
	MMIC	SiGe:C MMIC	SOT650	BGU7051
				BGU7052
			SOT1327	BGU7053
				BGU8051
				BGU8052
LNA + bypass + VGA	MMIC	SiGe:C MMIC	SOT1301	BGU8053
				BGU7060
				BGU7061
				BGU7062
				BGU7063
				BGU7073
BGU7075				

Function	Product	Gain range	Package	Type
Single VGA	MMIC	30 dB	SOT617	BGA7210
		18.5 dB		BGA7204

Function	Product	Gain range	Package	Type
Dual VGA	MMIC	24 dB	SOT617	BGA7350
		28 dB		BGA7351

Function	Product	PL <sub>(1dB)</sub> @ 940 MHz	Package	Type
MPA	MMIC	24 dBm	SOT89	BGA7024
		28 dBm		BGA7027
		25 dBm	SOT908	BGA7124
		28 dBm		BGA7127
		30 dBm		BGA7130

Function	Product	Frequency	Package	Type
Dual mixer	MMIC	0.7 - 1.2 GHz	SOT1092	BGX7220
		1.7 - 2.7 GHz		BGX7221

Function	Product	Output power	Package	Type
IQ modulator	MMIC	0 dBm	SOT616	BGX7100
		4 dBm		BGX7101

\* SOD523, SOD323, SOT23, and SOT323

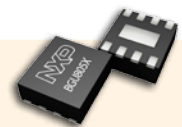
For the complete product selection please see sections 3.2.2, 3.4.1, and 3.4.2

### Product highlight: Integrated multi-stage base-station LNAs with lowest NF BGU706x



By integrating a bypass LNA, an analog VGA, and a second LNA in one design, these SiGe:C BiCMOS LNAs deliver the industry's lowest noise figure of 0.9 dB for a receive chain in silicon, while saving up to 80% in component count. Additionally, the analog gain control up to 35 dB, RF input power overdrive of 10 to 15 dBm, and high linearity make them very suitable in small cell sizes.

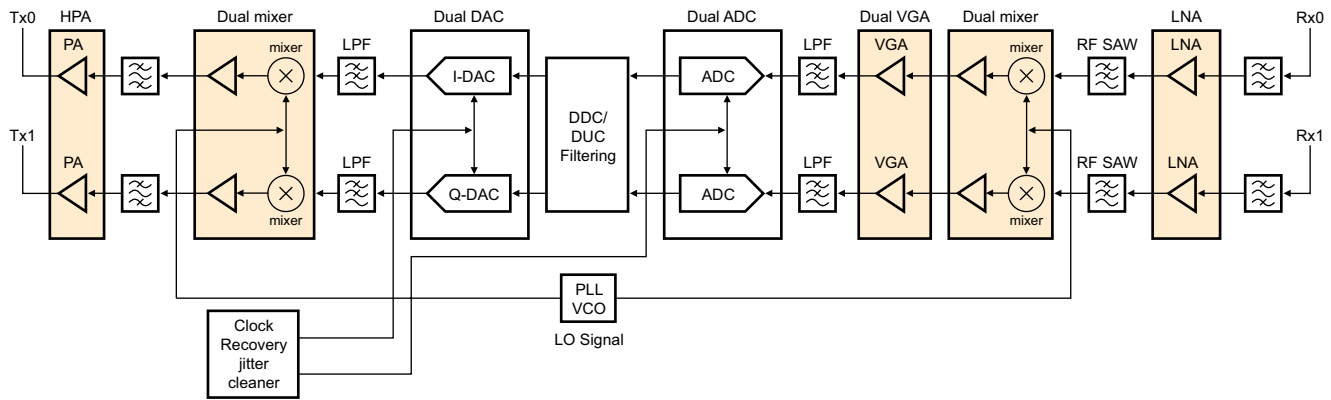
### Product highlight: Base-station LNAs with ultra-low noise BGU805x



The BGU8051, BGU8052, and BGU8053 SiGe:C BiCMOS LNAs are designed to support high-performance communications systems from 900 up to 5000 MHz. Key enablers of maintaining sensitivity, even in adverse signal conditions, are high linearity (37dB OIP3), ultra low noise figures (e.g. 0.4 dB), and wideband S11<20 dB behavior. These ultra-low amplifiers enable 2G/3G/4G macro and micro base-station performance at unsurpassed value.

## 1.1.2 Repeater

### Application diagram of the components used in a repeater system



### Recommended products

Function	Product	$f_{min}$ (MHz)	$f_{max}$ (MHz)	P1dB (W)	Package	Type
HPA	Driver	700	2200	10	SOT1179	BLP7G22-10
		2300	2700	10	SOT975	BLF6G27-10(G)
	Driver/final	700	1000	45	SOT1223/4	BLP8G10S-45P(G)
		1450	1550	40	SOT1135	BLF6G15L(S)-40RN
		1800	2000	45	SOT608	BLF6G20(S)-45
		1800	2200	60	SOT1223/4	BLP8G22S-60P(G)*
		2110	2170	40	SOT1121	BLF6G22L(S)-40P
		2500	2700	40	SOT1121	BLF6G27L(S)-40P
		3400	3800	50	SOT502	BLF6G38(LS)-50
		2010	2025	50	SOT1130	BLD6G21L(S)-50
Integrated Doherty		2110	2170	50	SOT1130	BLD6G22L(S)-50

Function	Product	$P_{L(1\text{ dB})}$ @ 940 MHz	Package	Type	Function	Product	Frequency range	Package	Type
MPA	MMIC	24 dBm	SOT89	BGA7024	Dual mixer	MMIC	1.7 - 2.7 GHz	SOT1092	BGX7220
		28 dBm		BGA7027			0.7 - 1.2 GHz		

Function	Product	Gain range	Package	Type	Function	Product	Package	Type
Dual VGA	MMIC	24 dB	SOT617	BGA7350	LNA	SiGe:C MMIC	SOT650	BGU7051
				28 dB				BGA7351
		BGA7352						BGU7053
		BGU8051						
LNA	SiGe:C MMIC	SOT1327	BGU8052					
			BGU8053					
			BGU7060					
			BGU7061					
			BGU7062					
LNA + bypass + VGA	SiGe:C MMIC	SOT1301	BGU7063					
			BGU7073					
			BGU7075					
			BGU7075					

\* Check status in section 3.1, as this type is not yet released for mass production  
For the complete product selection please see sections 3.4.1, 3.4.2, and 3.7.1

### Product highlight:

#### MMIC dual down-mixer BGX7221



The BGX7221 combines a pair of high-performance, high-linearity down-mixers for use in receivers that have a common local oscillator used with, for example, main and diversity paths. The device covers frequency bands from 1700 to 2700 MHz with an extremely flat behavior.

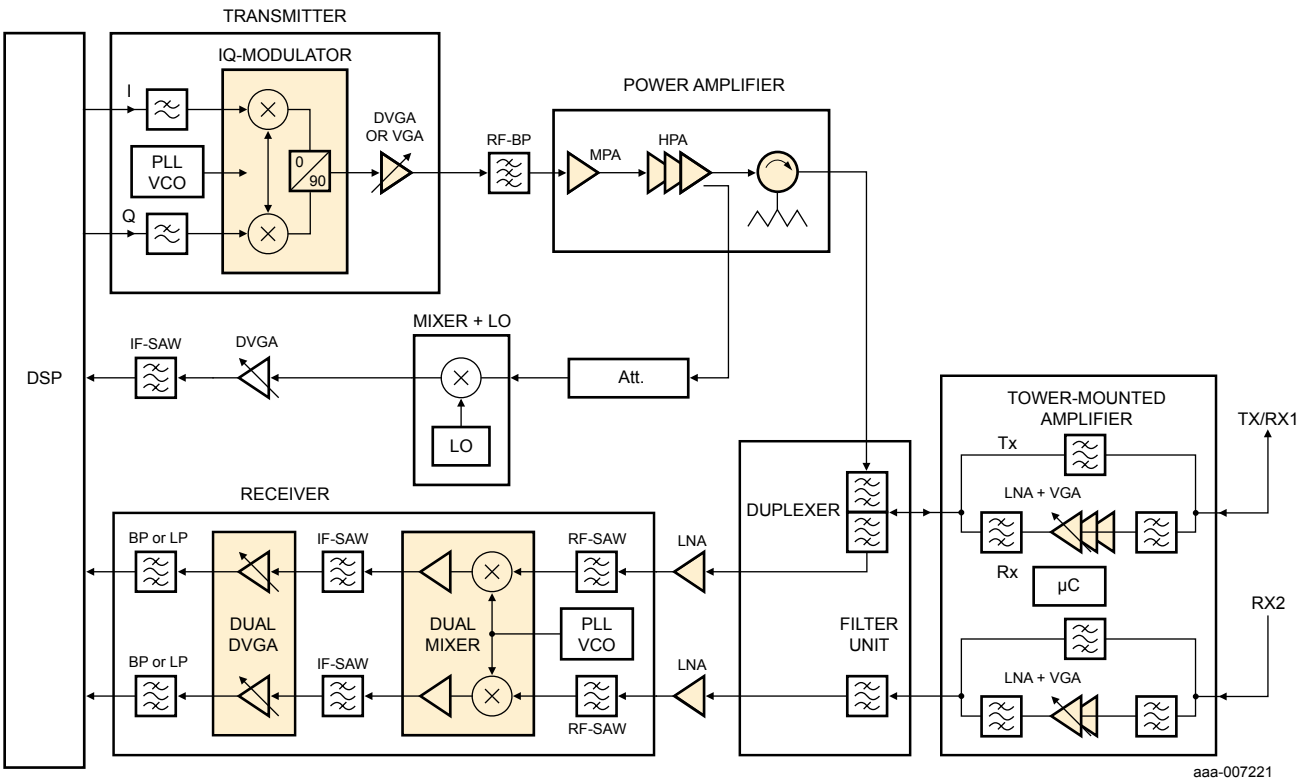
### Features

- ▶ 8.5 dB conversion gain over all bands
- ▶ 13 dBm input, 1 dB compression point
- ▶ 25.5 dBm input third-order intercept point
- ▶ 10 dB (typ) small-signal noise figure
- ▶ Integrated active biasing
- ▶ Single +5 V supply operation
- ▶ Power-down per mixer with hardware control pins
- ▶ Low bias current in power-down mode
- ▶ Matched 50  $\Omega$  single-ended RF and LO input impedances
- ▶ ESD protection at all pins

### 1.1.3 Small cells

With the explosion of cellular data usage and the limited number of sites available for new macro base stations, operators have to find new ways of offering high data rates and excellent quality of service. One of the options is to complement the macro network with small cells, known as picocells (1 to 2 W average) and microcells (5 to 20 W average). NXP offers and develops several types of solutions to the small-cell PAs designer, optimized for performance, integration, or cost.

#### Application diagram of a typical small-cell line-up



#### Product highlight: Power transistor BLP7G22-10

The BLP7G22-10 is a 10 W plastic LDMOS power transistor for base-station applications. This cost-effective, wideband device has an ultra-small footprint and covers all base-station frequencies from 700 to 2700 MHz. It operates in a supply range from 12 to 30 V.



#### Features

- ▶ High efficiency
- ▶ Excellent ruggedness
- ▶ Designed for broadband operation
- ▶ Excellent thermal stability
- ▶ High power gain
- ▶ Integrated ESD protection
- ▶ Complies with Directive 2002/95/EC, regarding Restriction of Hazardous Substances (RoHS)

## Recommended products

Function	Product	Output power	Package	Type
IQ modulator	MMIC	0 dBm	SOT616	BGX7100
		4 dBm		BGX7101

Function	Product	Gain range	Package	Type
Single VGA	MMIC	30 dB	SOT617	BGA7210
		18.5 dB		BGA7204

Function	Product	$P_{L(f)}$ @ 940 MHz	Package	Type
MPA	MMIC	24 dBm	SOT89	BGA7024
		28 dBm		BGA7027

Function	Product	$f_{min}$ (MHz)	$f_{max}$ (MHz)	P1dB (W)	Package	Type
HPA	Final 1-2 W	700	2700	5	SOT1179	BLP7G22-05
		700	2700	10	SOT1179	BLP7G22-10
	Dual-stage final 1-2 W	1800	2200	12@24V, 20@28V	SOT1212	BLM7G1822S-12
	Final 1-2 W	700	2200	10	SOT538	BLF6G21-10(G)
		2300	2700	10	SOT975	BLF6G27-10(G)
		3400	3800	10	SOT975	BLF6G38-10(G)
	Final 5-12 W	700	1000	45	SOT1223/4	BLP8G10S-45P(G)
		1800	2200	60	SOT1223/4	BLP8G22S-60P(G)*
		2500	2700	60	SOT1121	BLF6G27L(S)-40P
		3400	3800	50	SOT502	BLF6G38(LS)-50
	ID final 5-12 W	2010	2025	50	SOT1130	BLD6G21L(S)-50
		2110	2170	50	SOT1130	BLD6G22L(S)-50
	Dual-stage final 5-12 W	1800	2200	40	SOT1211	BLM7G1822S-40PB(G)*
		2000	2200	60	SOT1212	BLM7G22S-60PB(G)
	Dual-stage asymmetric final 5-12 W	1800	2200	50	SOT1212	BLM7G1822S-50AB(G)*
		1800	2200	80	SOT1212	BLM7G1822S-80AB(G)*

Function	Product	Package	Type
LNA	SiGe:C MMIC	SOT650	BGU7051
			BGU7052
			BGU7053
		SOT1327	BGU8051
			BGU8052
LNA + bypass + VGA	SiGe:C	SOT1301	BGU8053
			BGU7060
			BGU7061
			BGU7062
			BGU7063
			BGU7073
			BGU7075

Function	Product	Frequency range	Package	Type
Dual mixer	MMIC	1.7 - 2.7 GHz	SOT1092	BGX7220
		0.7 - 1.2 GHz		BGX7221

Function	Product	Gain range	Package	Type
Dual VGA	MMIC	24 dB	SOT617	BGA7350
		28 dB		BGA7351

\* Check status in section 3.1, as this type is not yet released for mass production  
For the complete product selection please see sections 3.4.1, 3.4.2, and 3.7.1



### Product highlight: Digital VGAs BGA7204 and BGA7210

These 6-bit digital VGAs offer high linearity (35 dBm @ 2.2-2.8 GHz) and high output power (23 dBm @ 2.2-2.8 GHz) across a large bandwidth without external matching. Smart routing with no connection crosses simplifies design and decreases footprint by 25%. The unique power-save mode can effectively reduce the current consumption in TDD systems up to 45%. The BGA7210 adds flexible current distribution across its two amplifiers, depending on the attenuation state, to save current.

### Features

- ▶ Internally matched for 50  $\Omega$ 
  - BGA7204 = 0.4 to 2.75 GHz
  - BGA7210 = 0.7 to 3.8 GHz
- ▶ High maximum power gain
  - BGA7204 = 18.5 dB
  - BGA7210 = 30 dB
- ▶ Attenuation range of 31.5 dB, 0.5 dB step size (6 bit)
- ▶ Fast switching power-save mode (power-down pin)
- ▶ Simple control interfaces (SPI)
- ▶ ESD protection on all pins (HBM 4 kV; CDM 2 kV)

## 1.2 Broadband communication infrastructure

NXP is one of the world's largest suppliers of CATV products, offering optical receivers, power doublers, push-pulls, reverse amplifiers, and CATV MMICs.

### Highly efficient line-up of 1 GHz GaAs modules for sustainable CATV networks

NXP high-gain power doublers CGD104xHi and push-pulls CGY104x are designed for 1 GHz "sustainable networks". These high-performance GaAs devices enable extended bandwidth and higher data rates. They deliver increased network capacity and make way for high-end services like HDTV, VoIP, and digital simulcasting.

### Connecting people, protecting your network: NXP's CATV C-family for the Chinese SARFT standard

Specially designed for the Chinese Hybrid Fiber Coax (HFC) infrastructure, NXP's CATV C-family offers a total solution for cable TV networks. It is both flexible enough for connecting rural communities as part of China's "Connecting to Every Village" program and powerful enough for upgrading major cities from analog to high-end digital services. All C-family devices are compliant with the Chinese State Administration for Radio, Film and Television (SARFT) standard, and cover most HFC applications from 550 MHz to 1 GHz.

### C-family application information

NXP C-family by application								
Application	BGY588C	BGE788C	CGY888C	BGD712C	BGO807C BGO807CE	CGD942C CGD944C	CGD982LC CGD985LC	CGD982HCi CGD985HCi CGD987HCi
Optical node				•	•	•	•	•
Optical receiver				•	•	•	•	•
Distribution amplifier			•	•		•	•	•
Line-extender amplifier			•	•		•	•	•
Terminating amplifier	•	•	•					

For the complete product selection please see section 3.6



#### Product highlight:

#### MMIC wideband amplifiers with internal biasing BGA302x

These are MPAs, specifically designed as the output stage for high-linearity CATV optical mini- and midi-nodes. They operate over a frequency range of 40 to 1200 MHz, and are housed in a lead-free HSO8 package.

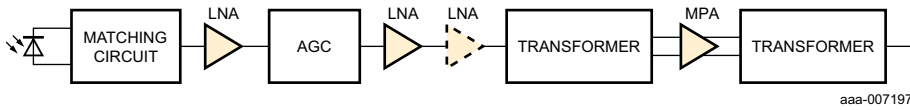
#### Features

- ▶ Internally biased
- ▶ Flat gain between 40 and 1200 MHz
- ▶ High linearity with an IP3o of 46 dBm and an IP2o of 75 dBm
- ▶ High gain output 1dB compression point of 30 dBm
- ▶ 75  $\Omega$  input and output impedance
- ▶ Icc (total) can be controlled between 175 and 350 mA

## 1.2.1 Optical mini- and midi-node line-up

NXP provides a complete system solution for optical mini- midi-node line-ups. These systems take the broadband TV signal from an optical network and amplify the signal onto a coaxial distribution network in a home or apartment building.

### Application diagram of an MMIC broadband amplifier for TV and distribution systems



### NXP delivers all the components for optical mini- and midi-node line-ups, for fiber-to-apartment applications:

- ▶ BGA301x input stages are LNAs that keep overall noise low
- ▶ BGA302x MPAs deliver high output power with excellent overall performance
- ▶ The BAP70Q PIN diode enables an adjustable gain control circuit

### Recommended products

Function	Product	Frequency range MHz	Gain (dB)	NF (dB)	Package	Type
LNA	MMIC	40 - 1006	12	3.1	SOT89	BGA3012
			15	2.5		BGA3015
			18	2.2		BGA3018

Function	Product	Frequency range MHz	Gain (dB)	IP3 (dBm)	IP2 (dBm)	P1dB (dBm)	Package	Type
MPA	MMIC	40 -1200	16	46	75	30	SOT786-2	BGA3021
			18					BGA3022
			20					BGA3023



#### Product highlight:

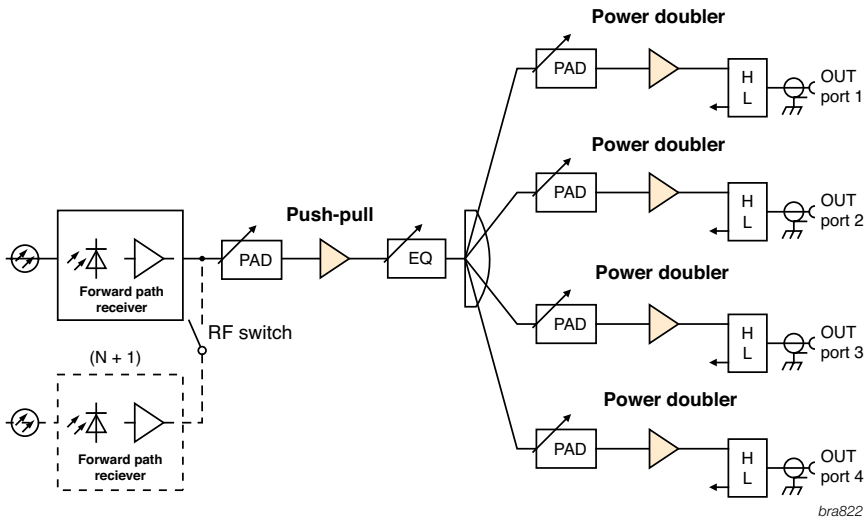
#### Extreme-broadband amplifiers BGA301x

The BGA3012, BGA3015, and BGA3018 are extreme-broadband amplifiers that deliver 12, 15, and 18 dB of gain from 40 to 1006 MHz, while providing outstanding linearity performance. These amplifiers can also be used as a return path amplifier from 5 to 300 MHz, or in a combined TV and satellite system from 40 to 2600 MHz. At the low end of the frequency band, these amplifiers outperform competitors!

GaAs devices in noise figure performance by 5 dB and in input power rating by more than 20 dB, while offering a superior ESD rating of 2 kV and a larger supply voltage operating range of 5 to 8 V. These amplifiers are very well suited for various broadband TV distribution system applications, such as FFTH, home gateways, and set-top boxes.

## 1.2.2 CATV optical node with multiple OUT ports for Chinese SARFT standard

### Application diagram of a CATV optical node with multiple OUT ports for Chinese SARFT standard



### Recommended products

Function	Product	Frequency	Package	Type
RF forward receiver	Forward path receiver	870 MHz	SOT115	BGO807C
			SOT115	BGO807CE

Function	Product	Frequency	Gain (dB)	Type
RF pre-amplifier	Push-pulls	870 MHz	18 - 19	BGY885A
			21 - 22	BGY887
			34.5 - 36.5	CGY888C

Function	Product	Frequency	Gain (dB)	Type
RF power amplifier	Power doublers	870 MHz	22 - 24	CGD942C
			24 - 26	CGD944C
			22 - 24	CGD982HCi
		1003 MHz	23.5 - 25.5	CGD985HCi
			26 - 28	CGD987HCi
			22 - 24	CGD982LC
		24 - 26	CGD9825LC	
RF power amplifier	Low-current power doubler	1000 MHz	22-24	CGD1042L

For the complete product selection please see section 3.6



#### Product highlight:

#### CATV power doublers CGD982LC, CDG985LC, CGD1042L

The market is asking for more environmental products, products, and these 1 GHz power doubler modules use 17% less power consumption than the original products (365 mA). They are ideal for use in line extenders and trunk amplifiers.

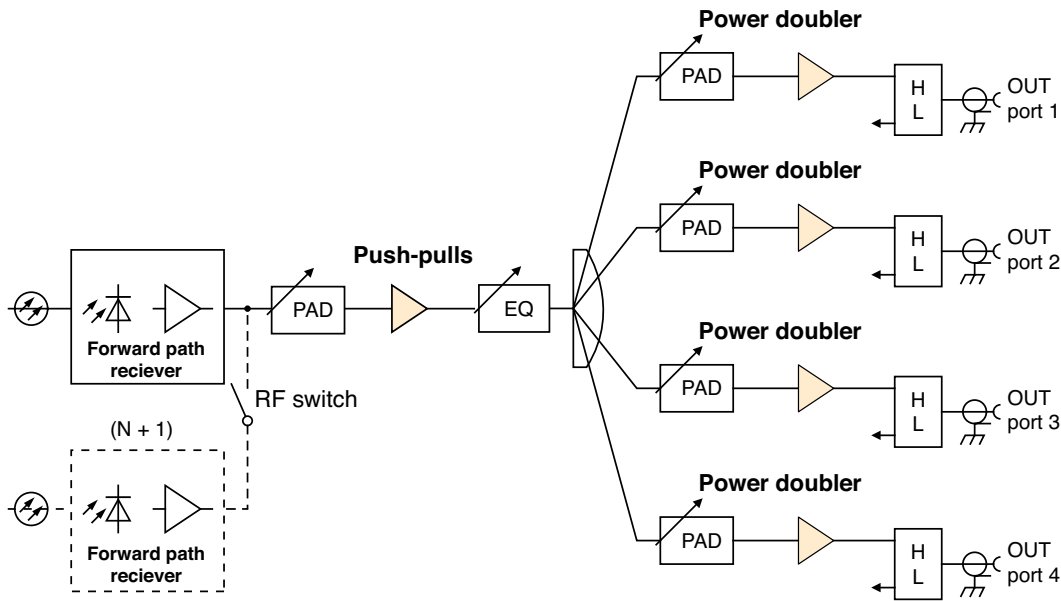
#### Features

- ▶ Gain compensation over temperature
- ▶ Excellent linearity
- ▶ Rugged construction
- ▶ Optimized for PAL D loading
- ▶ Unconditionally stable
- ▶ Superior levels of ESD protection
- ▶ Extremely low noise
- ▶ Adjustable supply current
- ▶ Excellent return loss properties
- ▶ Complies with Directive 2002/95/EC, regarding RoHs



## 1.2.3 CATV optical node with multiple OUT ports for 1 GHz networks

### Application diagram of CATV optical node with multiple OUT ports for 1 GHz networks



### Recommended products

Function	Product	Frequency	Package	Type
RF forward receiver	Forward path receiver	870 MHz	SOT115	BGO807C
			SOT115	BGO807CE

Function	Product	Frequency	Gain (dB)	Type
RF pre-amplifier	Push-pulls	1 GHz	23 - 24.5	CGY1043
			27 - 28.5	CGY1047
			32 - 34	CGY1032

Function	Product	Frequency	Gain (dB)	Type
RF power amplifier	Power doublers	1 GHz	22 - 23.5	CGD1042Hi
			23.5 - 25.5	CGD1044Hi
			26.5 - 28	CGD1046Hi
RF power amplifier	Low-current power doublers	1 GHz	22 - 24	CGD1042L

For the complete product selection please see section 3.6



### Product highlight:

#### Power doublers CGD104xH(i) and push-pulls CBY104x

The NXP power doublers CGD104xH and CGD104xHi are ideal for use in line extenders and trunk amplifiers. They support fiber deep-optical-node applications (N+0/1/2), delivering the highest output power on the market today. The GaAs HFET die process delivers high gain, excellent CTB and CSO ratings, and lower current.

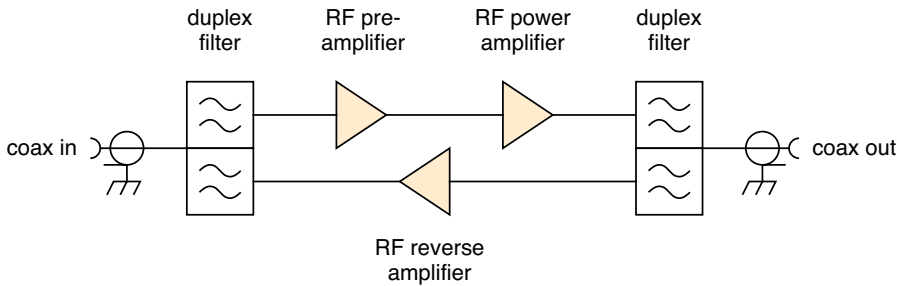
The new NXP CGY104x push-pull family is the first line-up on the market to combine very low noise, best-in-class distortion parameters, and low "carbon footprint" capabilities.

It delivers the best performance for the lowest power consumption, so it reduces operating expenses and CO2 emissions.

All of NXP's 1 GHz solutions are designed for durability and offer superior ruggedness, an extended temperature range, high-power overstress capabilities, and extremely high ESD levels. As a result, they also reduce the cost of ownership.

## 1.2.4 CATV electrical (line extenders)

### Application diagram of a CATV line extender



### Recommended products

Function	Product	Frequency	Gain (dB)	Type
RF pre-amplifier	Push-pulls	550 MHz	33.5 - 35.5	BGY588C
			33.2 - 35.2	BGE788C
			18 - 19	BGY785A
		750 MHz	21 - 22	BGY787
			18 - 19	BGY885A
			21 - 22	BGY887
		870 MHz	33.5 - 34.5	BGY888
			34.5 - 36.5	CGY888C
			18 - 19	BGY1085A
		1003 MHz	21 - 22.5	CGY1041
			23 - 24.5	CGY1043
			27 - 28.5	CGY1047
29 - 31	CGY1049			
32 - 34	CGY1032			

Function	Product	Frequency	Gain (dB)	Type
RF reverse amplifier	Reverse hybrids	5 - 75 MHz	29.2 - 30.8	BGY68
		5 - 120 MHz	24.5 - 25.5	BGY66B
		5 - 200 MHz	23.5 - 24.5	BGY67A

Function	Product	Frequency	Gain (dB)	Type
RF power amplifier	Power doublers	750 MHz	18.2 - 18.8	BGD712
			18.2 - 18.8	BGD712C
			20 - 20.6	BGD714
		870 MHz	18.2 - 18.8	BGD812
			19.7 - 20.3	BGD814
			22 - 23	CGD942C
		1003 MHz	24 - 26	CGD944C
			22 - 24	CGD1042H
			24 - 26	CGD1044H
			19.5 - 22	CGD1040Hi
			22 - 23.5	CGD1042Hi
			23.5 - 25.5	CGD1044Hi
			26 - 28	CGD1046Hi
			22 - 24	CGD982HCi
			23.5 - 25.5	CGD985HCi
			26 - 28	CGD987HCi
			22 - 24	CGD982LC
			24 - 26	CGD9825LC
22 - 24	CGD1042L			

All available in SOT115 package

For the complete product selection please see section 3.6



#### Product highlight:

#### GaAs high-output power doubler CGD1046Hi

Capable of supporting high output power, the CGD1046Hi is primarily designed for use in fiber deep-optical-node applications (N+1/2/3). This 1 GHz hybrid amplifier solution offers an extended temperature range, high-power overstress capabilities in case of surges, and high ESD levels. The result is a low cost of ownership, with durability and superior ruggedness.

#### Features

- ▶ High output power
- ▶ High power gain for power doublers
- ▶ Extremely low noise
- ▶ Dark Green products
- ▶ GaAs HFET dies for high-end applications
- ▶ Rugged construction
- ▶ Superior levels of ESD protection
- ▶ Integrated ringwave protection
- ▶ Optimized for digital channel loading
- ▶ Temperature-compensated gain response
- ▶ Optimized heat management
- ▶ Excellent temperature resistance

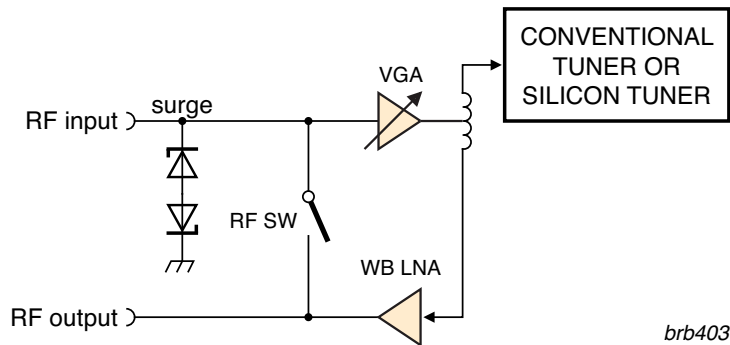
## 1.3 TV and satellite

### 1.3.1 Network Interface Module (NIM) for TV reception

#### Make a high-performance active splitter in a NIM tuner with the BGU703x/BGU704x

Today's TV tuners require complicated signal handling and benefit from flexibility in design. The front-end of a TV signal receiver is no longer just a tuned receiver, but has evolved into an RF network interface module (NIM) with tuned demodulators, active splitters, and remodulators. The active splitter requires an LNA with excellent linearity. NXP has developed two new series of LNA/VGA MMICs (BGU703x/BGU704x), designed especially for high linearity (P3O of 29 dBm) in low-noise applications such as an active splitter in a NIM tuner. The BGU703x family operates at a supply voltage of 5 V and is intended for use with normal can tuners. The BGU704x family operates at 3.3 V and works seamlessly with our Si tuner ICs, which also operate at 3.3 V.

#### Application diagram of an STB input stage with improved NF performance using the BGU703x and BGU704x



#### Recommended products

Function	Product	V <sub>cc</sub> (V)	Gain (dB)	Package	Type	
VGA	MMIC	5	10	SOT363	BGU7031	
			10	SOT363	BGU7032	
		5	-2	SOT363	BGU7033	
			10			
			5	-2	SOT363	BGU7041
			10	SOT363	BGU7042	
		3.3	MMIC	-2	SOT363	BGU7044
				14	SOT363	BGU7045
				14	SOT363	BGU7045
				-2	SOT363	BGU7045

Function	Product	Package	Type	
RF switch / PLT switch	MOSFET	5 V silicon RF switch	SOT23	BF1107
			SOT143B	BF1108
			SOT143R	BF1108R
			SOT343	BF1108W
			SOT343R	BF1108WR
		3.3 V silicon RF switch	SOT143B	BF1118
			SOT143R	BF1118R
			SOT343	BF1118W
			SOT343R	BF1118WR

For the complete product selection please see sections 3.4.1 and 3.5.2



#### Product highlight:

#### VGAs for TVs/STBs BGU703x and BGU704x

Designed for high linearity and low noise, these 3.3 and 5 V wideband VGAs support multi-tuner applications in TVs, DVR/PVRs, and STBs operating between 40 MHz and 1 GHz. A unique programmable gain with bypass mode compensates for tuner switch signal loss (important in multi-tuner systems), and improves overall system performance by 7 to 10 dB.

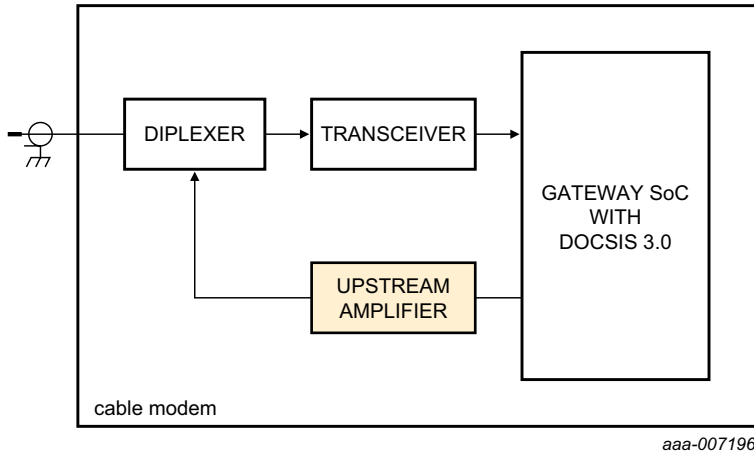
#### Features

- ▶ Flat gain between 40 MHz and 1 GHz
- ▶ Output power at 1 dB gain compression ( $P_{L(1\text{ dB})}$ ) ranging from 9 to 14 dBm
- ▶ Noise figure as low as 2.8 dB
- ▶ High linearity with an OIP3 of 29 dBm
- ▶ 75  $\Omega$  input and output impedance
- ▶ Power-down during bypass mode
- ▶ ESD protection >2 kV HBM, >1.5 kV CDM on all pins

### 1.3.2 Cable modem based on DOCSIS 3.0

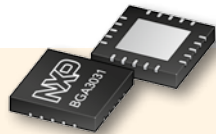
DOCSIS, the cable-modem standard from the CableLabs research consortium, supports IP traffic over digital cable TV channels. The BGA3031 addresses the need for a high-performance amplifier in the upstream path, and exceeds the requirements of the DOCSIS 3.0 standard.

#### Application diagram of a DOCSIS cable modem system with the BGA3031 upstream amplifier



#### Recommended products

Function	Product	Package	Type
Upstream VGA for DOCSIS 3.0	MMIC	SOT662	BGA3031



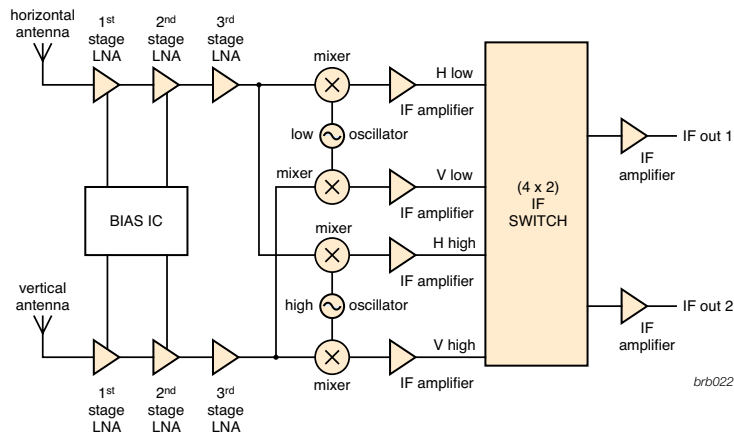
#### Product highlight: DOCSIS 3.0 plus upstream amplifier BGA3031

The BGA3031 MMIC is an upstream amplifier meeting the Data Over Cable Service Interface Specifications (DOCSIS 3.0) operating from 5 to 85 MHz is designed for cable modems, CATV STBs, and VoIP modems. It provides a 58 dB gain control range in 1 dB increments with high incremental accuracy. At maximum gain setting, it delivers 34 dB of voltage gain and superior linear performance. It supports high output voltage levels up to 67 dBmV with low distortion and

output noise levels. It is housed in a 20-pin leadless HVQFN package (5 x 5 mm). The BGA3031 is capable of transmitting 1 to 8 64-QAM and 1 to 8 QPSK modulated carriers while meeting the DOCSIS 3.0 ACLR specification under DOCSIS 3.0 + 4 dB conditions.

### 1.3.3 Satellite outdoor unit, twin LNB with discrete components

#### Application diagram of a twin LNB with discrete components



#### Recommended products

Function	Product		Package	Type
1 <sup>st</sup> stage LNA	RF transistor	SiGe:C transistor	SOT343F	BFU915
				BFU710F
2 <sup>nd</sup> and 3 <sup>rd</sup> stage LNA	RF transistor	SiGe:C transistor	SOT343F	BFU730F BFU915

Function	Product		Package	Type
Oscillator	RF bipolar transistor	Wideband transistor	SOT343	BFG424W
			SOT343F	BFG424F
	RF transistor	SiGe:C transistor	SOT343F	BFU660F
				BFU710F BFU730F

Function	Product		Package	Type
IF switch	RF diode	PIN diode	Various	BAP64*
			Various	BAP51*
			Various	BAP1321*
			Various	BAP50*
			Various	BAP63*

Function	Product		Package	Type
1 <sup>st</sup> stage IF amplifier	MMIC	IF gain block	SOT363	BGA2800
			SOT363	BGA2801
			SOT363	BGA2802
			SOT363	BGA2803
			SOT363	BGA2815
			SOT363	BGA2850
			SOT363	BGA2851
			SOT363	BGA2866
	RF bipolar transistor	Wideband transistor	SOT343	BFG424W
			SOT343F	BFG424F

\* Also available in ultra-small leadless package SOD882D  
For the complete product selection please see sections 3.2.1, 3.3.1, and 3.4.1

Function	Product		Package	Type
Output stage IF amplifier	MMIC	IF gain block	SOT363	BGA2800
			SOT363	BGA2801
			SOT363	BGA2815
			SOT363	BGA2816
			SOT363	BGA2818
			SOT363	BGA2865
			SOT363	BGA2866
			SOT363	BGA2867
			SOT363	BGA2870
			SOT363	BGA2874
		SOT363	BGM1014	
	RF bipolar transistor	Wideband transistor	SOT343	BFG325
2 <sup>nd</sup> stage LNA	RF transistor	SiGe:C	SOT343F	BFU710F BFU730F

Function	Product		Package	Type
Mixer	RF transistor	SiGe:C transistor	SOT343F	BFU710F BFU730F

#### Product highlight: IF gain blocks BGA28xx



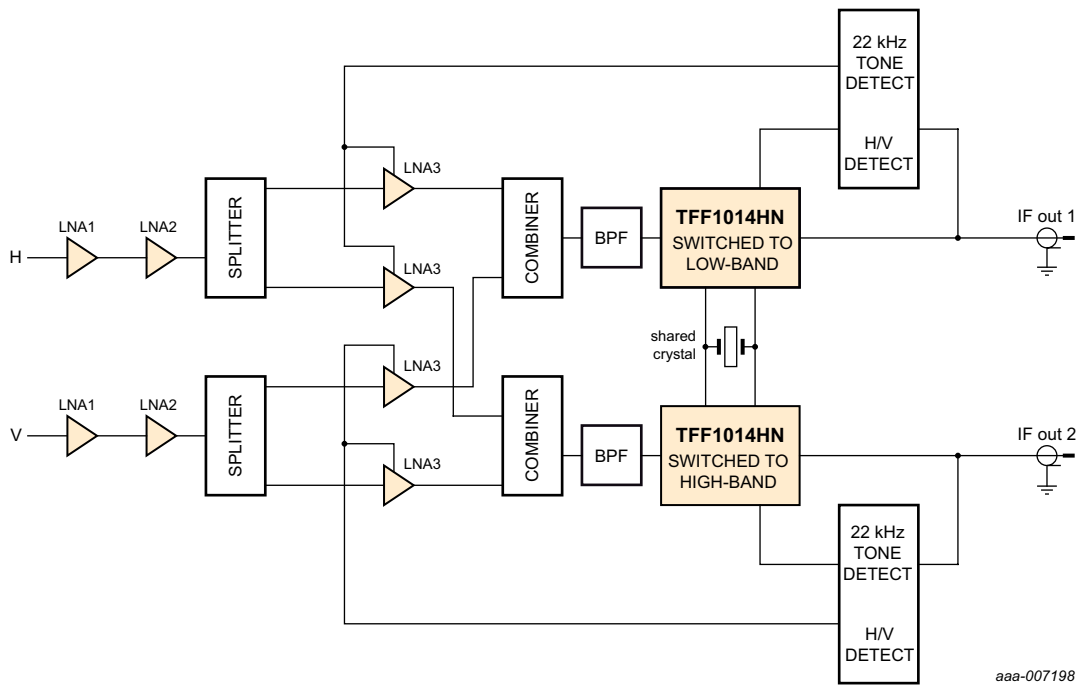
These MMIC wideband amplifiers are equipped with internal matching circuitry and are housed in a 6-pin SOT363 plastic SMD package.

#### Features

- ▶ No output inductor necessary when used at the output stage
- ▶ Internally matched to 50 Ω
- ▶ Reverse isolation > 30 dB up to 2 GHz
- ▶ Good linearity with low second- and third-order products
- ▶ Unconditionally stable ( $K > 1$ )

### 1.3.4 Satellite outdoor unit, twin LNB with integrated mixer/oscillator/downconverter

#### Application diagram of a twin LNB based on the TFF101x



Products by application

#### Recommended products

Function	Product		Package	Type
1 <sup>st</sup> stage LNA	RF transistor	SiGe:C transistor	SOT343F	BFU915
2 <sup>nd</sup> and 3 <sup>rd</sup> stage LNA	RF transistor	SiGe:C transistor	SOT343F	BFU710F
				BFU730F
				BFU915

Function	Product	Package	Type
Mixer/oscillator/downconverter	RF IC	SOT763	TFF1012HN
			TFF1013HN
			TFF1014HN

For the complete product selection please see sections 3.3.1 and 3.4.3



#### Product highlight: Industry's lowest-power integrated Ku-band downconverters TFF101xHN

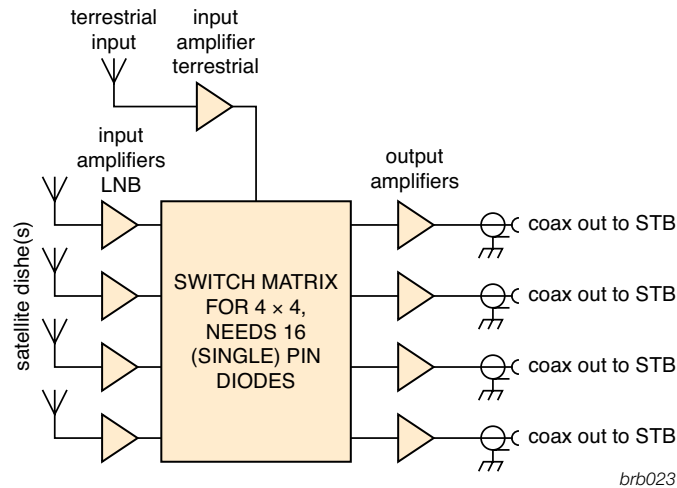
These Universal DVB-S compliant Ku-band downconverters consume about 50% less current (52 mA) than other integrated solutions. They are fully integrated (PLL synthesizer/mixer/IF gain block) and RF tested – which results in significantly decreased manufacturing time. Stability of the local oscillator is guaranteed, which improves overall system reliability over temperature and time, and eliminates the need for manual alignment in production.

#### Features

- ▶ Ultra-low current consumption ( $I_{CC} = 52 \text{ mA}$ )
- ▶ Low phase noise (1.5° RMS typ)
- ▶ Integration bandwidth from 10 kHz to 13 MHz
- ▶ Small PCB footprint
  - DHVQFN16 package (2.5 x 3.5 x 0.85 mm)
  - Only seven external components
  - No inductors necessary

## 1.3.5 Satellite multi-switch box - 4 x 4 (up to 16 x 16)/DiSEqC/SMATV

### Application diagram of a satellite multi-switch box



### Recommended products

Function	Product		Package	Type
Input amplifier terrestrial	MMIC	General-purpose MPA	SOT89	BGA6289
				BGA6489
				BGA6589
				BGA7024
				BGA3012
				BGA3015
			SOT908	BGA3018
			BGA7124	

Function	Product		Package	Type	
Input amplifier LNB	MMIC	General-purpose amplifier	SOT363	BGA2771	
			SOT363	BGA2866	
			SOT363	BGA2867	
			SOT363	BGA2818	
			SOT343	BFG325	
			SOT343	BFG425W	
	RF bipolar transistor	Wideband transistor	SOT143	BFG520	
			SOT143	BFG540	
			SiGe:C transistor	SOT343F	BFU660F
					BFU725F/N1
					BFU730F

Function	Product		Package	Type	
Switch matrix	RF diode	PIN diode	Various	BAP50*	
				BAP51*	
				BAP63*	
				BAP64*	
				BAP70*	
				BAP1321*	
	RF transistor	SiGe:C transistor	SOT343F	BFU725F/N1	
					BFU730F

\* Also available in ultra-small leadless package SOD882D



#### Product highlight:

#### NPN wideband SiGe RF transistor BFU730F

The BFU730F is part of the family of 6th (Si) and 7th (SiGe:C) generation RF transistors and can be used to perform nearly any RF function. These next-generation wideband transistors offer the best RF noise figure versus gain performance, drawing the lowest current. This performance allows for better signal reception at low power and enables RF receivers to operate more robustly in noisy environments.

Function	Product		Package	Type	
Output amplifier	MMIC	General-purpose MPA	SOT89	BGA6289	
				BGA6489	
				BGA6589	
				BGA7024	
				BGA3012	
				BGA3015	
	RF bipolar transistor	General-purpose amplifier	SOT908	BGA3018	
			SOT363	BGM1011	
			SOT363	BGA2869	
			Wideband transistor	SOT223	BFG135
				SOT223	BFG 591
				SOT223	BFG198
				SOT143	BFG540
SiGe:C transistor	SOT343F	BFU725F/N1			
		BFU730F			

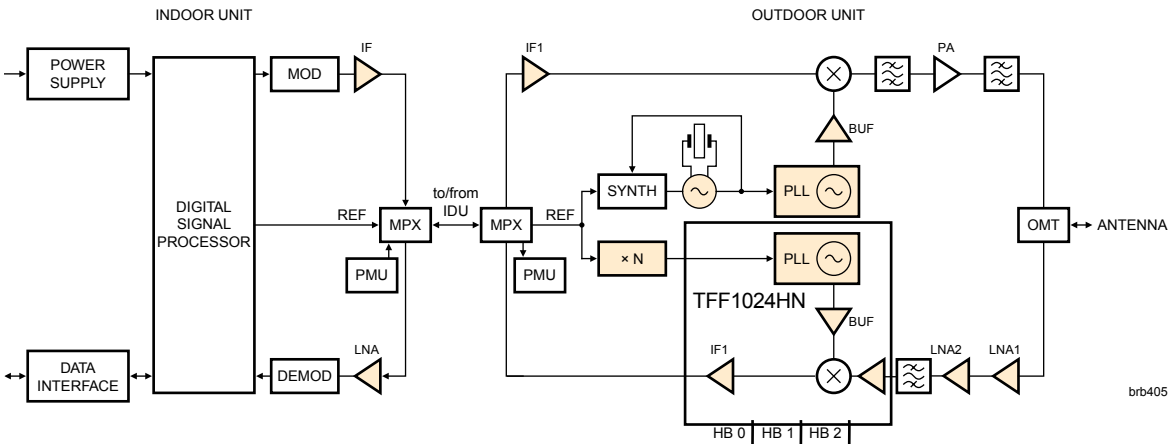
For the complete product selection please see sections 3.2.2, 3.3.1, and 3.4.1

#### Features

- ▶ Operates at 2.3 GHz
- ▶ High maximum power gain ( $G_p$ ) of 17.6 dB
- ▶ Noise figure (NF) of 0.8 dB
- ▶ Input 1dB gain compression ( $P_{1dB}$ ) of -15 dBm
- ▶ Input third-order intercept point  $IP_3$  of +4.7 dBm

### 1.3.6 VSAT with integrated mixer/oscillator/downconverter

#### Application diagram of a VSAT using a flexible TFF1024HN downconverter



brb405

#### Recommended products

##### Indoor unit

Function	Product	Package	Type	
IF	MMIC	IF gain block	SOT363	BGA2714
				BGA2748
				BGA2771
				BGA2800
				BGA2801
				BGA2815
				BGA2816
BGM1012				

Function	Product	Package	Type	
LNA	RF transistor	SiGe:C transistor	SOT343F	BFU710F
				BFU725F/N1
				BFU730F
				BFU915

Function	Product	Package	Type
Mixer / oscillator / downconverter	RF IC	SOT763	TFF1024HN

For the complete product selection please see sections 3.3.1 and 3.4.4



#### Product highlight:

##### Downconverter with PLL/VCO for VSAT TFF1024HN

This VSAT Ku-band downconverter consumes about 35% less current (60 mA) than other integrated solutions. It's fully integrated (PLL synthesizer/mixer/IF gain block) and RF tested – which results in significantly decreased manufacturing time. Unlike dielectric resonance oscillators, which are mechanical components, the PLL-based TFF1024HN guarantees stable performance over lifetime and temperature, enabling high Quality of Service for end-users. This downconverter operates at eight of the most-used Ku sub-bands using only one crystal.

#### Features

- ▶ Switched LO frequency
  - Eight selectable frequencies from 9.75 to 11.30 GHz
  - More LO frequencies obtainable with different Xtal values
- ▶ Ultra-low current consumption ( $I_{CC} = 60 \text{ mA}$ )
- ▶ Low phase noise (1.0° RMS typ)
  - 10 kHz - 13 MHz integration bandwidth
- ▶ Flat gain over frequency (< 2 dBpp)
- ▶ High linearity of > 16 dBm IP3o
- ▶ High P1dBo > 6 dBm



## Recommended products

### Outdoor unit

Function	Product		Package	Type
IF	MMIC	IF gain block	SOT363	BGA2800
				BGA2801
				BGA2815
				BGA2816
				BGA2850
				BGA2865
				BGA2866
				BGM1014
				BGM1013
				BGM1012
BGA2714				

Function	Product		Package	Type
LNA2	RF transistor	SiGe:C transistor	SOT343F	BFU610F
				BFU630F
				BFU660F
				BFU690F
				BFU710F
				BFU725F/N1
				BFU730F
				BFU760F
				BFU790F
				BGU7003
	MMIC	SiGe:C MMIC	SOT891	

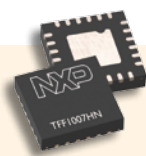
Function	Product		Package	Type
PLL	RF IC	SiGe:C IC	SOT616	TFF1003HN
			SOT763	TFF1007HN
				TFF1024HN

Function	Product		Package	Type
Oscillator	RF transistor	Wideband transistor	SOT343R	BFG424W
				BFG425W
	RF transistor	SiGe:C transistor	SOT343F	BFU610F
				BFU630F
				BFU660F
				BFU690F
				BFU710F
				BFU725F/N1
				BFU730F
				BFU760F
				BFU790F

Function	Product		Package	Type
Buffer	RF transistor	SiGe:C transistor	SOT343F	BFU610F
				BFU630F
				BFU660F
				BFU690F
				BFU710F
				BFU725F/N1
				BFU730F
				BFU760F
				BFU790F

\* 8 different types with LO ranges: 7-15 GHz, see 3.4.4

For the complete product selection please see sections 3.3.1 and 3.4.4



### Product highlight: Low phase-noise LO generator for VSAT TFF1007HN

The TFF1007HN is a Ku-band frequency generator intended for low phase-noise LO circuits for Ku-band VSAT transmitters and transceivers. The specified phase noise complies with IESS-308 from Intelsat.

### Features

- ▶ Divider settings: 64
- ▶ Input signal 230.46 to 234.38 MHz
- ▶ Internally stabilized voltage references for loop filter and output power level
- ▶ LO generator with VCO range: 14.75 to 15 GHz
- ▶ Output level -4 dBm minimum
- ▶ Phase noise compliant with IESS-308 (Intelsat)
- ▶ Third- or fourth-order PLL

## 1.4 Broadcast

### LDMOS solutions from the industry leader for all segments of the broadcast market

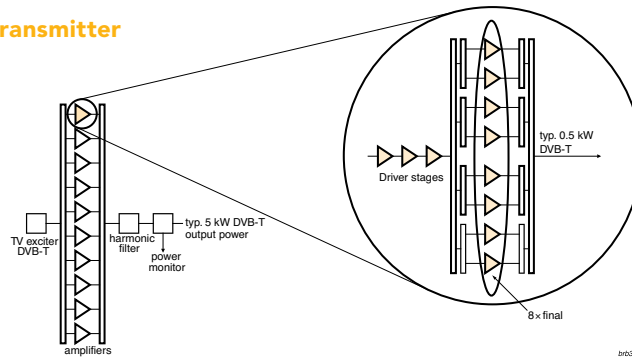
#### UWB Doherty for UHF-TV

The UHF TV market is taking a step in a new direction with the adoption of Ultra-WideBand (UWB) Doherty amplifiers using NXP's existing benchmark LDMOS transistors. With the need to deliver Greener (ie lower energy-consuming) systems matched with the ability to broadcast ever-richer content, incremental improvements soon run out. There comes a time when a step-change is needed in approach, and for the UHF market that means UWB Doherty. Previously, NXP has led the way in the mass adoption of narrowband LDMOS Doherty amplifiers for the base-station market, and now is the time to take a new direction with a range of UWB Doherty solutions to cover the 470 to 860 MHz band used for UHF transmitters.

#### VHF, FM, and analog TV markets

NXP's commitment to the broadcast market is second to none. We enabled the market to transition to and then reap the benefits of LDMOS-based solutions, and that will continue for many years into the future. We will also continue to support our legacy products through the customer product life-cycles. We recently enhanced our offering with a full range of eXtremely Rugged (XR) products suited for broadcast. We are also developing a range of Over-Molded Plastic (OMP) parts for the lower-power, more cost-sensitive markets.

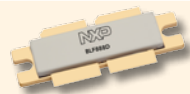
#### Application diagram of a TV transmitter



#### Recommended products

Function	Product	$f_{min}$ (MHz)	$f_{max}$ (MHz)	P1dB (W)	Package	Type
HPA	Driver	10	500	20	SOT467C	BLF571
		1	1400	35	SOT467C	BLF642
	Final	1	1000	100	SOT467	BLF871(S)
		1	1000	140	SOT467	BLF881(S)
		1	1500	160	SOT1223-1	BLP15M7160P*
		1	1500	200	SOT1121	BLF647P(S)
		10	600	350	SOT1121	BLF183XR(S)*
		470	860	350	SOT1121	BLF884P(S)
		470	860	500	SOT539	BLF879P(S)
		470	806	600	SOT539	BLF888D(S)*
		470	860	600	SOT539	BLF888A(S)
		470	860	650	SOT539	BLF888B(S)
	10	600	700	SOT1214	BLF184XR(S)	
	10	128	1200	SOT539A	BLF178P	
10	600	1400	SOT539	BLF188XR(S)		

\* Check status in section 3.1, as this type is not yet released for mass production  
For the complete product selection please see section 3.7.2



#### Product highlight:

##### Power transistor BLF888D

Designed for broadcast Doherty transmitter applications, including broadcast transmitters in the UHF band and digital broadcasting systems, this 600 W LDMOS RF power transistor delivers excellent ruggedness and is ideally suited for use in digital and analog environments.

#### Features

- ▶ High efficiency
- ▶ High power gain
- ▶ Excellent ruggedness (VSWR > 40:1 through all phases)
- ▶ Excellent thermal stability
- ▶ integrated ESD protection



**LEADING** IN ADVANCED RF SOLUTIONS

We're **trusted** by the world's top businesses. That is why four in ten smart phones introduced in 2013 have an NXP GPS LNA.

**RELEASE  
EXCELLENCE**

## 1.5 Wireless connectivity

### 1.5.1 GPS for smartphones and tablets: high linearity

BGU600x/700x/800x LNAs are designed to improve the linearity, noise figure, and reception of GPS signals, including GloNass and Compass, while offering the smallest footprint in the market. As the industry's first GPS LNAs to dynamically suppress strong cellular, Bluetooth, and WLAN transmit signals, the NXP BGU700x/800x series offers the best reception for weak GPS signals, delivering an improvement of 10 dB or better IP3 under -40 to -20 dBm jamming conditions, while the noise figure remains below 1 dB. Requiring only one external component, the BGU700x/800x LNAs save up to 70% in PCB size and 10% in component cost.

GPS is a standard feature in a wide range of consumer products, from smartphones and tablets to digital still cameras, watches, electric cars, and more. GPS signal power levels are weak and below the noise floor at -155 dBm. In many of these products, especially smartphones and tablets, strong transmitters such as Bluetooth, WLAN, and cellular can drive the GPS LNA into compression. When the GPS LNA is in compression, it has lower gain, which causes poor GPS reception; it also generates inter-modulation products and harmonics from the transmitter signals, capable of overpowering weak signals and leading to loss of GPS reception.

The BGU700x/800x series use adaptive biasing to immediately detect any output power from jammers, and compensate by temporarily increasing the current. As a result, optimal GPS signal reception is maintained for as long as possible. Each device in the BGU700x/800x series requires only one input-matching inductor and an optional one supply decoupling capacitor to complete the design. This creates a very compact design and lowers the bill of materials.

#### Features

- ▶ Low noise figure of 0.55 dB
- ▶ System-optimized gain from 16 to 19 dB
- ▶ Low supply current of 3.1 mA
- ▶ High out-of-band IP3 of 9 dBm
- ▶ Requires only one input matching inductor and an optional supply decoupling capacitor
- ▶ AEC-Q100 qualified (BGU7004, BGU7008) for highest reliability in harsh conditions
- ▶ World's smallest 6-bump Wafer Level Chip Scale Package (WLCSP) 0.65 x 0.44 x 0.2 mm
- ▶ Small 6-pin leadless package (1.1 x 0.7 x 0.37 mm)

Footprint on PCB						
	NXP	NXP	NXP	Competitor A	Competitor B	Competitor C
Package (mm)	0.65 x 0.44	1.1 x 0.7	1.1 x 0.9	1.1 x 0.7	1.26 x 0.86	1.13 x 1.1
Number of external components	1	1	2	3	6	9
Footprint (mm <sup>2</sup> )	1.82	2.48	3.95	4.88	8.85	12.66



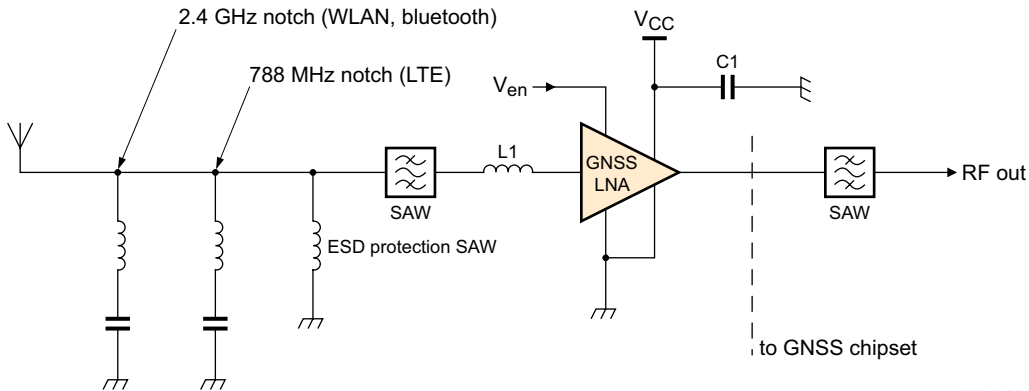
#### Product highlight: GPS LNA BGU8019

This flexible device adapts to evolving architectures in radios and smartphones. Designed for low power consumption, it gives optimized performance when jammers from co-existing cellular and connectivity transmitters occur. At low jamming power levels it delivers 18.5 dB gain at a noise figure of 0.55 dB. The BGU8109 requires only one external matching inductor.

#### Features

- ▶ Smallest 6-pin leadless package (1.1 x 0.7 x 0.37 mm)
- ▶ Covers full GNSS L1 band, from 1559 to 1610 MHz
- ▶ Noise figure = 0.55 dB
- ▶ Gain 18.5 dB
- ▶ High 1 dB compression point of -7 dBm
- ▶ High out-of-band IP3i of 6 dBm
- ▶ Supply voltage 1.5 to 3.1 V
- ▶ Power-down mode current consumption < 1 uA
- ▶ Optimized performance at low supply current of 4.4 mA
- ▶ Integrated, temperature-stabilized bias for easy design

**Application diagram of a GNSS LNA with pre- and post-SAWs, implemented as discretes, for 788 MHz (LTE) and 2.4 GHz (WLAN) suppression**



aaa-007041

**Recommended products**

Function	Product	Package	Type	
LNA	MMIC	SiGe:C MMIC	BGU6005	
			BGU7004	
			BGU7005	
			BGU7007	
			BGU7008	
			BGU6009	
			SOT1230	BGU8009
				BGU8011
			SOT1232	BGU8019
			WL-CSP	BGU8004

For automotive applications, the BGU7004 and BGU7008 have been qualified against AEC-Q100 and operate in even the harshest environments, such as the car body.

For the complete product selection please see section 3.4.1

**Product highlight:  
GPS LNA in WL-CSP BGU8004**

Housed in a WL-CSP that measures just 0.65 x 0.44 x 0.2mm, this compact device requires only one external matching inductor.



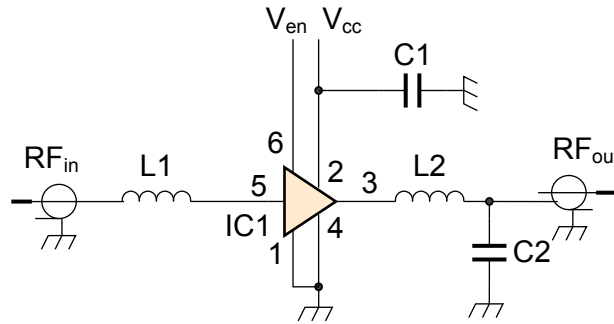
**Features**

- ▶ WL-CSP (0.65 x 0.44 x 0.2 mm) with 6 solder bumps and bump pitch of 0.22 mm
- ▶ Covers full GNSS L1 band, from 1559 to 1610 MHz
- ▶ Noise figure (NF) = 0.65 dB
- ▶ Gain = 17 dB
- ▶ High 1 dB compression point of -7.5 dBm
- ▶ High out-of-band IP3 of 6 dBm
- ▶ Supply voltage 1.5 to 3.1 V
- ▶ Power-down mode current consumption < 1 μA
- ▶ Very low supply current of 3.4 mA
- ▶ Integrated, temperature-stabilized bias for easy design
- ▶ Requires only one input matching inductor

## 1.5.2 GPS L2 and L5 bands

For professional applications, the L2 and L5 GPS bands are gaining interest. All BGU700x/BGU800x products can be easily matched to the L2 and L5 bands.

**Application diagram of GNSS LNA, showing value of input matching inductor (L2) and output matching optimized via L2/C2**



### Recommended products

Function	Product	Package	Type
LNA	MMIC	SiGe:C MMIC	BGU6005
			BGU7004
			BGU7005
			BGU7007
			BGU7008
			BGU6009
			BGU8009
			BGU8011
			BGU8019
			BGU8004

For automotive applications, the BGU7004 and BGU7008 have been qualified against AEC-Q100 and operate in even the harshest environments, such as the car body.

For the complete product selection please see section 3.4.1

### Product highlight:

#### Basic GPS LNAs BGU6005 and BGU6009

Aimed at entry-level smartphones, these devices are housed in easy-to-solder packages.



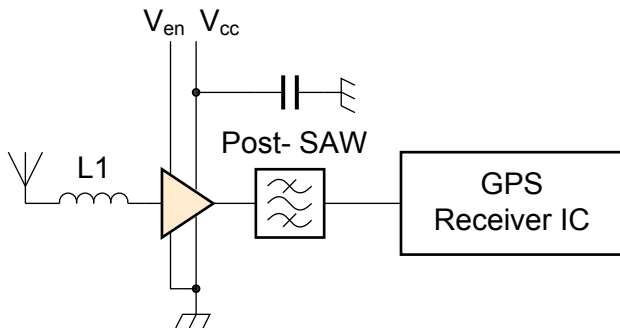
### Features

- ▶ BGU6005 in SOT886 (1.0 x 1.45 x 0.5 mm), BGU6009 in SOT1230 (1.1 x 0.9 x 0.47 mm)
- ▶ Covers full GNSS L1 band, from 1559 to 1610 MHz
- ▶ Noise figure (NF) = 0.85 dB
- ▶ Gain = 17.5 dB
- ▶ High 1 dB compression point of -6 dBm
- ▶ High out-of-band IP3 of 6 dBm
- ▶ Supply voltage 1.5 to 3.1 V
- ▶ Power-down mode current consumption < 1  $\mu$ A
- ▶ Optimized performance at low supply current of 4.8 mA
- ▶ Integrated, temperature-stabilized bias for easy design
- ▶ Requires only one input matching inductor

### 1.5.3 Wearable health and fitness: low current

In wearable health and fitness applications like smart watches, low current is critical but linearity requirements can be relaxed since the only relevant on-board jammers are Bluetooth and 2.4 GHz WLAN. For these low-current applications, NXP offers the BGU8010, which requires only 3 mA of current and has a gain of 16 dB.

**Application diagram for wearable health and fitness device, showing the input-match inductor (L1) and a post-SAW**



This application consists of the input match inductor L1 and a post SAW. Because no strong jammer signals are present, a pre-SAW is unnecessary.

#### Recommended products

Function	Product	Package	Type	
LNA	MMIC	SiGe:C MMIC	SOT891	BGU7003
			SOT886	BGU7003W
				BGU6101
			SOT1209	BGU6102
				BGU6104
	SOT1230	BGU8010		

For the complete product selection please see section 3.4.1

#### Product highlight:

##### Low-current GPS LNA BGU8010

Designed for very low power consumption, the BGU8010 delivers optimal performance even when exposed to jammers from coexisting cellular and connectivity transmitters.



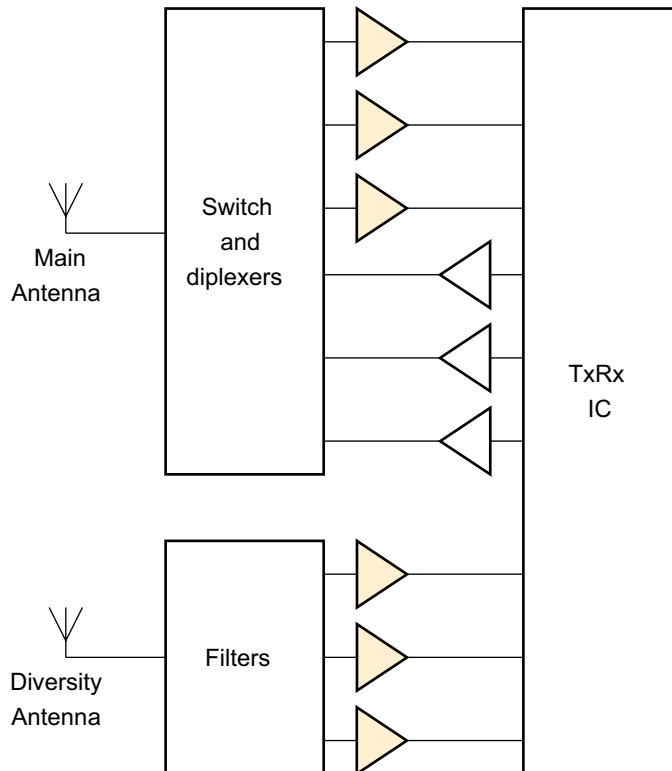
#### Features

- ▶ Covers full GNSS L1 band, from 1559 to 1610 MHz
- ▶ Noise figure (NF) = 0.85 dB
- ▶ Gain 16.1 dB
- ▶ Input 1 dB compression point of -9 dBm
- ▶ Out-of-band IP3i of 3 dBm
- ▶ Supply voltage 1.5 to 3.1 V
- ▶ Optimized performance at low supply current of 3.1 mA
- ▶ Power-down mode current consumption < 1 mA

## 1.5.4 LTE LNA

### Application diagram of an LTE LNA in a mobile phone

While LTE/4G offers consumers much higher data rates (up to 300 Mbit/s) compared to UMTS/3G, LTE smartphones are more complex because they need more antennas, are used for multiple cellular and connectivity frequencies, and require additional switches and diplexers. BGU8x1 LTE LNAs increase the receive sensitivity of LTE Main and Diversity receivers by offering system-optimized gain, low noise figure, and high third-order linearity. As a result, LTE smartphone users enjoy higher and more consistent data rates. These features also mean the BGU8x1 gives RF designers more options, as they can amplify the LTE signal close to the antenna and decrease line losses, something that is especially important for large tablet and combination phone/tablet ("phablet") form factors. BGU8x1 LTE LNAs are available for Low (BGU8L1), Mid (BGU8M1) and High (BGU8H1) cellular bands.



### Recommended products

Function	Product		Package	Type
LNA	RF	MMIC	SOT1232	BGU8L1
				BGU8M1
				BGU8H1

### Product highlight:

#### LTE LNAs with bypass BGU8x1

The BGU8x1 devices adapt to the changing co-habitation environment of an ever increasing number of radios in smartphones. Designed for low power consumption, they give optimized performance when jammers from co-existing cellular and connectivity transmitters occur. At low jamming power levels they deliver 13 dB gain at a noise figure of 0.7 dB. During high power levels, they temporarily increase their bias current to improve sensitivity. The BGU8x1 require only one external matching inductor.



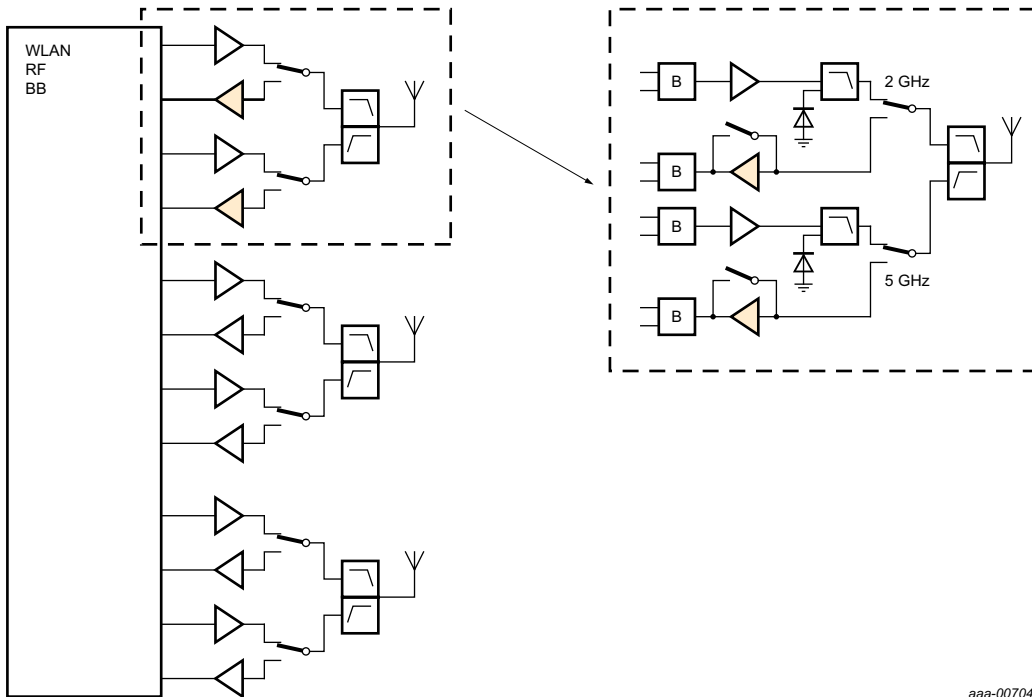
### Features

- ▶ Smallest 6-pin leadless package (1.1 mm x 0.7 mm x 0.37mm)
- ▶ Cover all bands with a Low (from 728 to 960 MHz), Mid (from 1800 to 2200 MHz) and High (from 2300 to 2690 MHz)
- ▶ Noise Figure (NF) = 0.7 dB
- ▶ Optimized gain of 13 dB
- ▶ High 1 dB compression point of -1 dBm
- ▶ High in-band IP3i of 8 dBm
- ▶ Supply voltage 1.5 V to 3.1 V
- ▶ Power-down mode current consumption < 1  $\mu$ A
- ▶ Optimized performance at supply current of 5 mA
- ▶ Require only one input matching inductor



## 1.5.5 WLAN: access points and routers, fixed consumer electronics

### Application diagram for WLAN



aaa-007042

### Recommended products

Function	Product		Package	Type
LNA	RF transistor	SiGe:C transistor	SOT343F	BFU730F
				BFU768F
	RF	MMIC	SOT1189	BFU730LX
				BGU7224
			BGU7258	

For the complete product selection please see section 3.4.1



### Product highlight:

#### WLAN LNAs with bypass BGU7224 and BGU7258

These fully integrated LNAs enable IEEE802.11b/g/n/ac WLANs and ISM applications in the 2.4 GHz band. Manufactured in our high-performance QUBiC4x SiGe:C technology, they combine best-in-class gain, noise figure, linearity, and efficiency with the process stability and ruggedness that SiGe technology is known for.

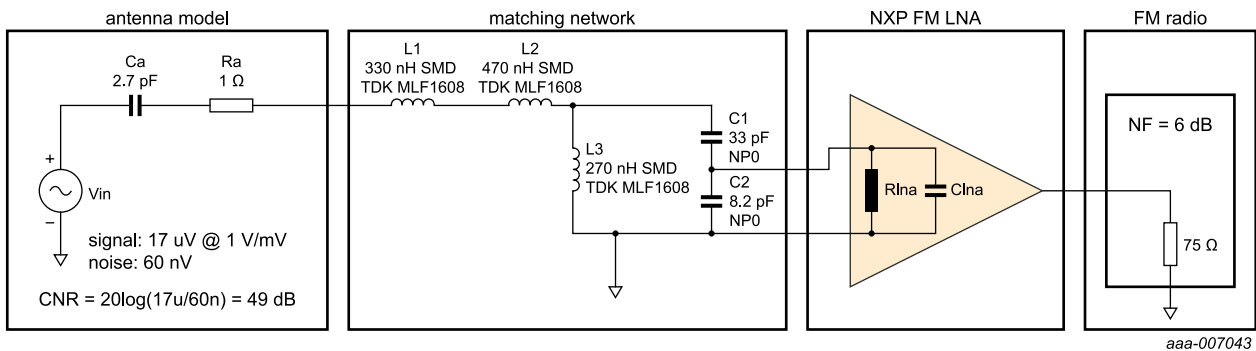
### Features

- ▶ Fully integrated, high-performance LNA with built-in bypass (no external matching or DC blocking required)
- ▶ 1.0 dB noise figure with low current consumption of 12 mA
- ▶ Low bypass current of 1  $\mu$ A
- ▶ Single-supply operation from 3.0 to 3.6 V
- ▶ Integrated, temperature-stabilized bias network
- ▶ High ESD protection of 2 kV HBM on all pins
- ▶ Ultra-small QFN-style package (1.6 x 1.6 x 0.5 mm, 0.5 mm pitch), MSL 1 at 260 °C

## 1.5.6 FM radio

In mobile phones, our FM LNAs amplify the weak signal-solving impedance mismatch between embedded antennas and the FM radio receiver, offering best-in-class performance and making it possible to listen to FM radio without a headset. With most mobile phones, users can listen only to FM radio via the headset, which also serves as the antenna. The FM RF signal is picked up by the FM receiver while the audio is sent to the speaker by the audio amplifier. By using the headset as a quarter wave length antenna of 75 cm, there is maximum signal pick-up as the antenna is used at the resonance frequency. Also, the antenna output is matched to the FM receiver's input for maximum power transfer. An embedded antenna allows users to listen to FM radio without using the headset, which gives them more freedom to do something else at the same time or listen to the radio together with friends or family. The embedded antenna is about the same size as the handset, around 10 cm. The resonance frequency is higher than the FM band and the antenna cannot couple directly to the FM receiver due to impedance mismatch.

### Application diagram for an FM radio



The NXP FM LNA serves as an interface that buffers the received voltage from high input to low output impedance, while adding minimal noise to maintain signal integrity. Aside from delivering best-in-class performance (for a demonstration, visit [www.youtube.com/watch?v=IxSAPVLTRTw](http://www.youtube.com/watch?v=IxSAPVLTRTw)), our FM LNAs come in three different current-optimized versions, for 1, 2, and 4 mA operation, to allow for system-optimized gain and linearity. NXP FM LNAs can be operated from a 1.5 to 5 V supply, and offer the lowest external component count, while still enabling matching to any high-impedance antenna. This gives designers maximum flexibility.

### Recommended products

Function	Product		Package	Type
LNA	MMIC	SiGe:C MMIC	SOT1209	BGU6101
				BGU6102
			SOT886	BGU6104
				BGU7003W

For the complete product selection please see section 3.4.1



#### Product highlight:

#### MMIC wideband amplifier BGU6102

The BGU6102 is an unmatched MMIC featuring an integrated bias-enable function and a wide supply voltage. It is part of a family of three products (BGU6101, BGU6102, BGU6104), and is optimized for 2 mA operation.

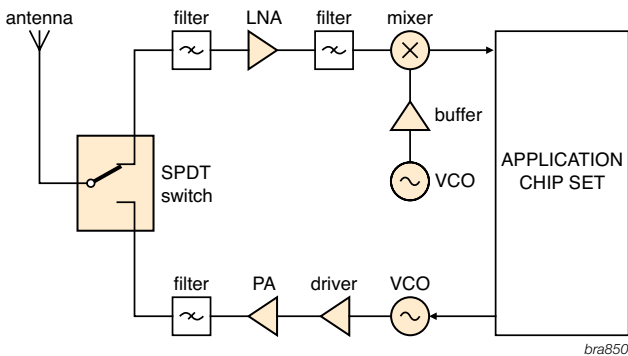
#### Features

- ▶ Applicable between 40 MHz and 4 GHz
- ▶ High-ohmic FM LNA: 13 dB gain and 1.0 dB NF at 100 MHz
- ▶ 50  $\Omega$  FM LNA: 15 dB gain and 1.3 dB NF at 100 MHz
- ▶ Integrated, temperature-stabilized bias for easy design
- ▶ Bias current configurable with external resistor
- ▶ Power-down mode current consumption < 6  $\mu$ A
- ▶ ESD protection > 1 kV HBM on all pins
- ▶ Supply voltage from 1.5 to 5 V

## 1.5.7 Generic RF front-end

In a typical RF front-end, RF signals are received and transmitted anywhere in the range of DC to 20 GHz. Our entire portfolio of wideband SiGe amplifiers can be used for high-speed, low-noise applications along this entire spectrum. Because our wideband transistors are so versatile, they are used in a broad range of functions and are an especially good choice for cost-sensitive applications that also need flexibility. In LNA applications, they support GPS, satellite radio, cordless phones, and WLAN. They also enable oscillators and drivers in consumer, ISM, and automotive applications. Many designers use varicap diodes principally as voltage-variable capacitors, with the diode function a secondary option, but these devices are ideally suited for use as VCOs in ISM-band applications.

### Application diagram of a typical RF front-end interface



### Recommended products

Function	Product	Package	Type
SPDT switch	RF diode	Bandswitch diode	SOD523 BA891
		SOD323 BA591	
	PIN diode	Various	BAP51*
		Various	BAP1321*

Function	Product	Package	Type	
LNA	RF bipolar transistor	Wideband transistor	SOT23 PBR951	
			SOT323 PRF957	
			SOT323 PRF947	
		SiGe:C transistor	SOT343F	BFU610F
				BFU630F
				BFU660F
	BFU690F			
	BFU710F			
	BFU725F/N1			
	BFU730F			
	MMIC	Low-noise wideband ampl.	SOT1209	BGU6101
				BGU6102
				BGU6104

Function	Product	Package	Type
Driver	RF bipolar transistor	Wideband transistor	SOT323 PRF957
		SOT23 PBR951	
	MMIC	Gen-purp wideband amp	SOT363 BGA2771
		SOT363 BGA2866	

\* Also available in ultra-small leadless package SOD882D

Function	Product	Package	Type
Mixer	RF bipolar transistor	Wideband transistor	SOT343 BFG410W
		SOT343 BFG425W	
		SOT343 BFG480W	
	MMIC	Linear mixer	SOT363 BGA2022

Function	Product	Package	Type
Buffer	RF bipolar transistor	Wideband transistor	SOT23 PBR951
			SOT323 PRF957
			SOT323 PRF947
			SOT416 PRF949

Function	Product	Package	Type
Power amplifier	MMIC	General-purpose wideband amplifier	SOT89 BGA6289
			BGA6489
			BGA6589
			BGA7024
			BGA7027

Function	Product	Package	Type
VCO	Varicap diodes	VCO varicap diodes	SOD523 BB181
		SOD323 BB156	

For the complete product selection please see sections 3.2.1, 3.2.2, 3.3.1, and 3.4.1

### Product highlight:

#### NPN wideband SiGe RF transistor BFG730F

The BFG730F is part of the family of 6th (Si) and 7th (SiGe:C) generation RF transistors and can be used to perform nearly any RF function. These wideband transistors offer the best RF noise figure versus gain performance, drawing the lowest current. This performance allows for better signal reception at low power and enables RF receivers to operate more robustly in noisy environments.



### Features

- ▶ Operates at 2.3 GHz
- ▶ High maximum power gain (Gp) of 17.6 dB
- ▶ Noise figure (NF) of 0.8 dB
- ▶ Input 1dB gain compression (Pi(1dB)) of -15 dBm
- ▶ Input third-order intercept point IP3I of +4.7 dBm

## Recently introduced products

Function	Product	Package	Type	
LNA or driver or VCO	RF bipolar transistor	Wideband transistor	SOT323	BFU520W
				BFU530W
				BFU550W
			SOT23	BFU520A
				BFU530A
				BFU550A
			SOT143	BFU520
				BFU530
				BFU550
			SOT143X	BFU520X
				BFU530X
				BFU550X
			SOT143XR	BFU520XR
				BFU530XR
				BFU550XR
			SOT89	BFU580Q
BFU590Q				
SOT223	BFU580G			
	BFU590G			
SOT363	BFU520Y			

For the complete product selection please see section 3.3.1



### Product highlight:

#### PNP wideband Si RF transistor BFU520x

Supporting broadband amplifiers up to 2 GHz, LNAs for ISM applications, and ISM-band oscillators, the BFU520X delivers high speed and low noise in a plastic, 4-in, dual-emitter SOT143B package.

### Features

- ▶ Low-noise, high-breakdown RF transistor
- ▶ AEC-Q101 qualified
- ▶ Minimum noise figure (NFmin) = 0.7 dB at 900 MHz
- ▶ Maximum stable gain of 20 dB at 900 MHz
- ▶ 11 GHz fT silicon technology

## 1.6 Automotive

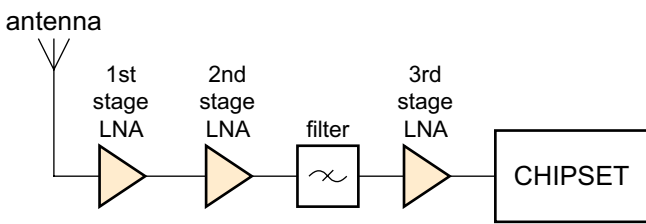
NXP is very active in the automotive market and is present in nearly every automotive applications that uses RF. The examples in this section provide evidence that our portfolio covers all the key RF functions typically used in actual cars.

We recently expanded our portfolio by adding the BFU5x0 series, a new generation of best-in-class, AEC-Q101 qualified wideband transistors. Each BFU5x0 device has a different drain current and is available in up to six different packages, ranging from very small to ultra-small. Overall, the series delivers ultra-low noise, very high breakdown voltage, and a maximum stable gain of 18 dB at 900 MHz.

### 1.6.1 SDARS and HD radio

In a Satellite Digital Service (SDARS) system equipped with an active-antenna LNA, a BFU730F wideband transistor can drive the first stage in a three-stage SIRIUS LNA chain, while the BFU690F can drive the second and third stages.

#### Application diagram of an SDARS Active Antenna LNA - 2320-2332.5 (SIRIUS, 3 Stages)



001aan958

#### Recommended products

Function	Product		Package	Type
1st stage LNA	RF transistor	SiGe:C transistor	SOT343F	BFU730F
Function	Product		Package	Type
2nd stage LNA	MMIC	General-purpose wideband amplifier	SOT343F	BFU690F
			SOT363	BGA2869
				BGA2851
BGA2803				
Function	Product		Package	Type
3rd stage LNA	RF transistor	Si/SiGe:C transistor	SOT343F	BFU690F
				BFU725F/N1
				BFU790F

For the complete product selection please see section 3.3.1

Function	Product		Package	Type
LNA or Driver or VCO	RF bipolar transistor	Wideband transistor	SOT323	BFU520W
				BFU530W
				BFU550W
			SOT23	BFU520A
				BFU530A
				BFU550A
			SOT143	BFU520
				BFU530
				BFU550
			SOT143X	BFU520X
				BFU530X
				BFU550X
			SOT143XR	BFU520XR
				BFU530XR
				BFU550XR
SOT89	BFU580Q			
	BFU590Q			
SOT223	BFU580G			
	BFU590G			
SOT363	BFU520Y			

For the complete product selection please see section 3.3.1



#### Product highlight:

#### NPN wideband silicon RF transistors BFU5xx

The BFU5xx transistor family is designed for applications up to 2 GHz such as communication, and automotive and industrial equipment. Due to the high gain at low supply current, these devices are also a good choice for battery-powered systems. All are available in multiple, small form-factor packages that ease design-in.

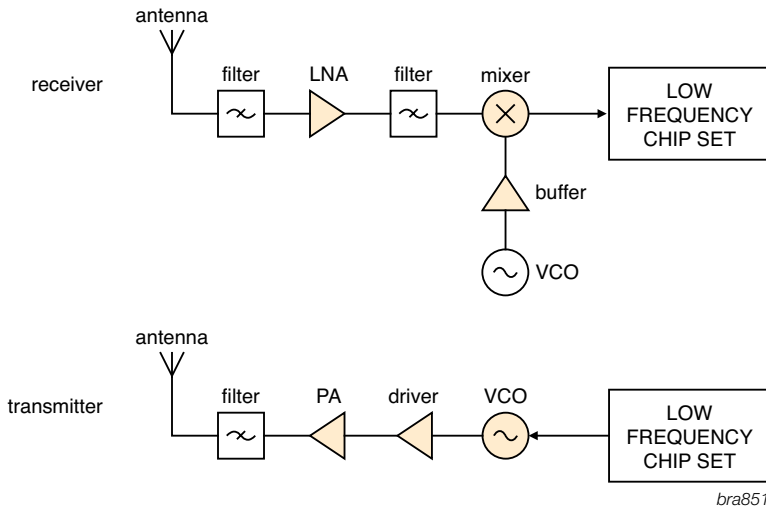
#### Features

- ▶ Low-noise, high-breakdown RF transistor
- ▶ AEC-Q101 qualified
- ▶ Minimum noise figure (NF<sub>min</sub>) = 0.7 dB at 900 MHz
- ▶ Maximum stable gain of 18 dB at 900 MHz
- ▶ 11 GHz fT silicon technology

## 1.6.2 Remote Keyless Entry (RKE), RF generic front-end with dedicated antenna for reception and transmission

With an RKE system, drivers can lock or unlock a vehicle by using a key fob equipped with a transmitter that sends data to a receiver in the vehicle. In the Tx chain, the driver and PA play major roles in ensuring a long range and accurate transmission. In the Rx chain, a discrete LNA is often used to insure efficiency and security. We offer a wide selection of VCOs, drivers, and PAs that let the designer build the right configuration for their applications.

### Application diagram of a remote keyless entry system



### Recommended products

Function	Product		Package	Type
LNA	RF bipolar transistor	Wideband transistor	SOT23	PBR951
			SOT323	PRF957
			SOT323	PRF947
	MMIC	Low-noise wideband ampl.	SOT1209	BGU6101
				BGU6102
	SiGe:C MMIC	SOT886	BGU7003W	
Function	Product		Package	Type
Driver	RF bipolar transistor	Wideband transistor	SOT323	PRF957
			SOT23	PBR951
	MMIC	Gen-purp wideband amp	SOT363	BGA2771
			SOT363	BGA2866
Function	Product		Package	Type
VCO	Varicap diodes	VCO varicap diodes	SOD323	BB170
			SOD323	BB174
			SOD523	BB191
			SOD323	BB156

\* AEC-Q101 qualified (some limitations apply)

For the complete product selection please see sections 3.2.1, 3.3.1, and 3.4.1



### Product highlight: Varicap diodes as VCOs

Varicap diodes are principally used as voltage-variable capacitors, with their diode function a secondary option, but they're ideal for use as VCOs in ISM-band applications.

### Features

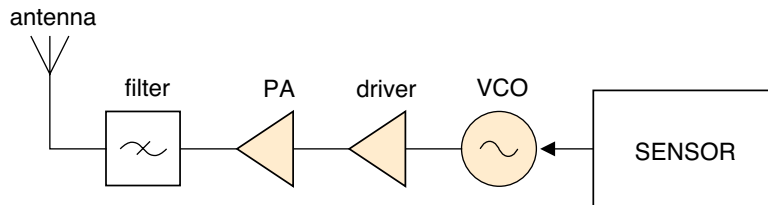
- ▶ Excellent linearity
- ▶ Excellent matching
- ▶ Very low series resistance
- ▶ High capacitance ratio

## 1.6.3 Tire-pressure monitoring system

### Application diagram of a tire-pressure monitoring system

Tire-pressure monitoring systems use a transmitter similar to that of an RKE system (see section 1.6.2). Range and accuracy are a must, so discrete drivers and/or PAs are mandatory. NXP offers a wide selection of VCOs, drivers, and PAs that support these requirements.

### Application diagram of a tire-pressure monitoring system



brb216

### Recommended products

Function	Product	Package	Type	
PA	RF bipolar transistor	Wideband transistor	SOT23	BFR92A
			SOT323	BFR92AW
			SOT23	BFR94A*
			SOT323	BFR93AW
			SOT323	BFR94AW*

Function	Product	Package	Type	
Driver	RF bipolar transistor	Wideband transistor	SOT323	PRF957
			SOT23	PBR951
	MMIC	Amplifier	SOT363	BGA2031/1
		Gen-purp wideband amp	SOT363	BGA2771
			SOT363	BGA2866

Function	Product	Package	Type	
VCO	Varicap diodes	VCO varicap diodes	SOD323	BB171
			SOD323	BB156

\* AEC-Q101 qualified (some limitations apply)

For the complete product selection please see sections 3.2.1, 3.3.1, and 3.4.1

### Product highlight:

#### MMIC wideband amplifier BGU6101

The BGU6101 is an unmatched MMIC featuring an integrated bias-enable function and a wide supply voltage. It is part of a family of three products (BGU6101, BGU6102, BGU6104), and is optimized for 2 mA operation.



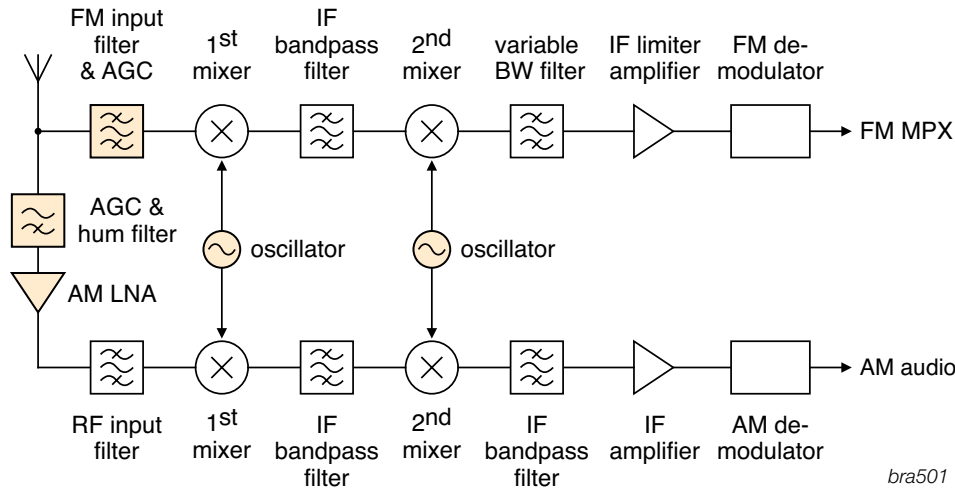
### Features

- ▶ Applicable between 40 MHz and 6 GHz
- ▶ 13 dB gain and 0.8 dB NF at 450 MHz
- ▶ 50 Ω FM LNA: 15 dB gain and 1.4 dB NF at 100 MHz
- ▶ Integrated, temperature-stabilized bias for easy design
- ▶ Bias current configurable with external resistor
- ▶ Power-down mode current consumption < 1 μA
- ▶ ESD protection > 1 kV HBM on all pins

## 1.6.4 Car radio receiver (CREST ICs: TEF6862HL)

The discrete devices used in typical multimode car radio receivers are also applicable to the very small can tuners that enable a higher level of integration. Our portfolio, which includes JFETs, varicaps, and PIN diodes, support the design of advanced applications that use FM, AM, and digital radio.

### Application diagram of a multimode car radio receiver



bra501

### Recommended products

Function	Product	Package	Type	
AM LNA	RF transistor	JFET	SOT23	BF862
FM input filter and AGC	RF diode	Varicap diode	SOT23	BB201*
			SOT23	BB207
	PIN diode	SOD523	BAP70-02	
		SOD323	BAP70-03	

Function	Product	Package	Type	
AGC and hum filter	RF diode	PIN diode	SOT363	BAP70AM

Function	Product	Package	Type	
Oscillator	RF diode	Varicap diode	SOD323	BB156
			SOD523	BB208-02

\*OIRT band

For the complete product selection please see sections 3.2.1, 3.2.2, and 3.5.1

### Product highlight: JFET BF862



Our tuning portfolio contains advanced products for car radio reception applications and in-vehicle media platforms. The NXP devices for this application ensure excellent reception quality and ease of design-in. Performance is demonstrated in reference designs. The high-performance junction FET BF862 is specially designed for AM radio amplifiers.

### Features

- ▶ High transition frequency and optimized input capacitance for excellent sensitivity
- ▶ High transfer admittance resulting in high gain
- ▶ Housed in versatile, easy-to-use SOT23 package



## 1.7 Industrial, Scientific, and Medical (ISM) and RF energy

Our portfolio supports all RF frequencies, - power levels, - control functionality, and interconnectivity standards (i.e. Internet of Things) required for operation in ISM applications.

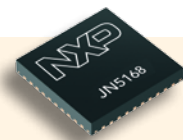
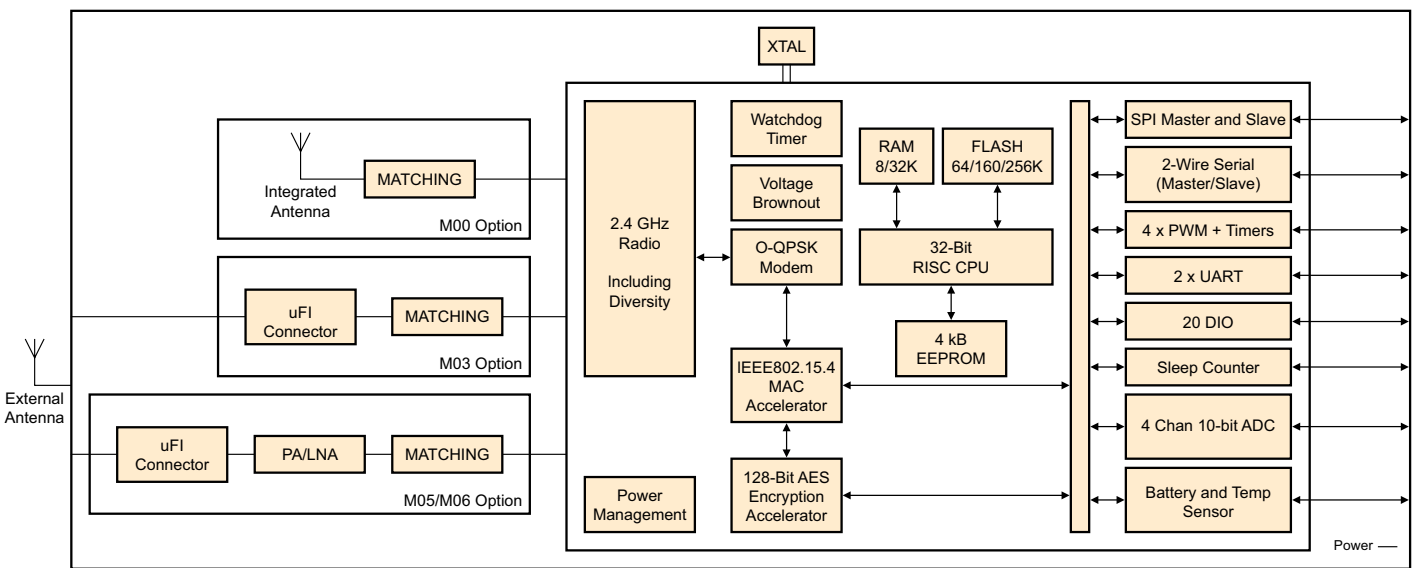
To help drive the expansion of RF energy within the ISM band, we offer solid-state RF power solutions that replace traditional magnetrons and, by working closely with our customers, enable completely new applications. Long product lifetimes in harsh operating environments make efficiency and ruggedness particularly important in this segment. We use state-of-the-art process technology to meet these requirements, which leads to an industry leading portfolio of eXtremely Rugged (XR) LD MOS products.

### 1.7.1 Wireless microcontrollers IEEE802.15.4/ZigBee

#### Wireless microcontrollers for the Internet of Things (IoT)

Our wireless network solutions provide all the necessary hardware and software components to develop applications that use ZigBee PRO, RF4CE, JenNet-IP, or IEEE802.15.4. Our JN516x wireless microcontroller chips provide the optimum hardware platform for building wireless network nodes, and combine high-performance processing and radio communications. We also supply JN516x wireless microcontrollers mounted on modules, and an evaluation kit for use with custom applications. The JN516x architecture includes a rich mix of on-chip peripherals, such as a 2-wire I2C port, an SPI port that can operate as either master or slave, a four-channel ADC with battery monitor, and a temperature sensor. Each device can also support a large switch matrix of up to 100 elements or a 20-key capacitive touchpad.

#### Application diagram of an ultra low-power, high-performance microcontroller



#### Product highlight: Wireless microcontrollers JN516x

The JN516x series is a range of ultra low-power, high-performance wireless microcontrollers supporting JenNet-IP, ZigBee PRO, and RF4CE networking stacks to facilitate the development of home automation, smart energy, light link, and remote-control applications. They feature an enhanced 32-bit RISC processor with embedded Flash and EEPROM memory, and offer high coding efficiency through variable width instructions, a multi-stage instruction pipeline,

and low-power operation with programmable clock speeds. They also include a 2.4 GHz IEEE802.15.4-compliant transceiver and a comprehensive mix of analog and digital peripherals. Three memory configurations are available to suit different applications. The best-in-class operating current of 15 mA, with a 0.6µA sleep timer mode, gives excellent battery life and allows operation direct from a coin cell.

## Products

- ▶ JN5161-001: 64kB Flash, 8kB RAM for RF4CE and IEEE802.15.4 applications
- ▶ N5164-001: 160kB Flash, 32kB RAM for RF4CE, JenNet-IP and IEEE802.15.4 applications
- ▶ JN5168-001: 256kB Flash, 32kB RAM for ZigBee PRO, RF4CE, JenNet-IP and IEEE802.15.4 applications
- ▶ JN5168-001-M00, JN5168-001-M03, JN5168-001-M05, and JN5168-001-M06 modules

## Features

- ▶ Ultra low-power MCU together with a single-chip IEEE802.15.4-compliant radio transceiver to run stack and application
- ▶ Very low-current solution for long battery life (10+ years)
- ▶ Supports multiple network stacks
- ▶ Enhanced 32-bit RISC processor for high performance and low power
- ▶ A rich mix of analog and digital peripherals
- ▶ Standard- and high-power modules
- ▶ Software Development Kit (SDK) with JenNet-IP and ZigBee network stacks

## Software

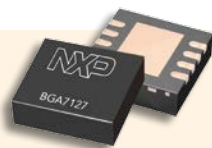
A selection of network protocol stacks, based on the IEEE802.15.4 standard, support wireless connectivity. These include JenNet-IP and ZigBee Smart Energy, Light Link, Home Automation and Remote Control, which are provided as a set of software libraries. ZigBee is used for applications where interoperability is required. JenNet-IP, which is suitable for all proprietary applications, provides IPv6 connectivity to the end node.

## JN516x-EK001 evaluation kit



### Product highlight: MMIC MPA BGA7127

The BGA7127 MMIC is a one-stage driver amplifier offered in a low-cost, ultra-small SOT908 leadless package. It delivers 27 dBm output power at 1 dB gain compression, and superior performance for various narrowband-tuned application circuits at frequencies up to 2700 MHz.



### Features

- ▶ Operating range: 400 to 2700 MHz
- ▶ 16 dB small signal gain at 2 GHz
- ▶ 27 dBm output power at 1 dB gain compression
- ▶ Integrated active biasing
- ▶ Single-supply operation from 3.3 or 5 V
- ▶ Simple quiescent current adjustment
- ▶ 1  $\mu$ A shutdown mode

## 1.7.2 RF power for ISM up to 1600 MHz

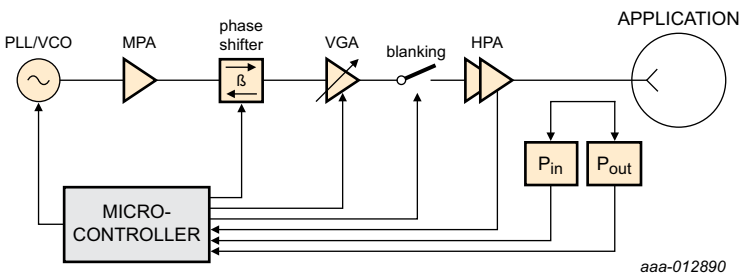
### Field-proven LDMOS

In ISM, RF power supports a wide range of applications – from high-powered gas lasers to particle accelerators, plasma generators, and medical imaging – and these systems frequently use custom RF amplifiers and RF energy from solid-state sources. Our portfolio includes field-proven LDMOS devices that help developers create ISM systems that deliver high performance and a long lifetime.

### Expanding XR

Of all the RF power applications, ISM presents some of the most severe requirements for ruggedness. To meet these requirements, designers are moving away from VDMOS transistors and using newer LDMOS transistors instead. NXP has been a leader in LDMOS from the beginning, and our recently developed XR technology enables devices that deliver a clear advantage in ruggedness. Our growing portfolio of XR devices and our new OMP devices, which combine high performance with low cost, are just two examples of how we help customers stay ahead in ISM.

### Application diagram of ISM system



### Recommended products

Function	Product	Package	Type	Function	Product	Package	Type	
Oscillator	RF transistor	SOT143	BFG520	MPA	MMIC	SOT89	BGA6289	
		SOT23	BFR520				BGA6489	
		SOT323	BFR92AW				BGA6589	
		SOT323	BFR93AW				SOT908	BGA7124
		SOT323	BFS520				SOT89	BGA7024
		SOT343	BFG520W				SOT908	BGA7127
		SOT363	BFM520				SOT89	BGA7027
		SOT416	BFR520T				SOT908	BGA7130

Function	$f_{\min-max}$ (MHz)	P1dB (W)	Reference
HPA XR	0 - 500	5 - 1400	For the complete product selection see section 3.7.2
HPA	0 - 1600	5 - 600	For the complete product selection see section 3.7.2

### Product highlight:

#### Power transistors BLF188XR(S)

This is a 1400 W extreme rugged LDMOS power transistor for broadcast and industrial applications, capable of providing an outstanding 1600 W of peak output power. It can operate as high as 60 V and still pass extreme ruggedness testing. The BLF188XR can be used in a Class-C mode of operation, and offers several enhancements that make it easy to design in and tune in multiple applications, including ISM and broadcast transmitter applications.



### Features

- ▶ Easy power control
- ▶ Integrated EDS protection
- ▶ Excellent ruggedness
- ▶ High efficiency
- ▶ Excellent thermal stability

### 1.7.3 RF power for the ISM 2.45GHz band

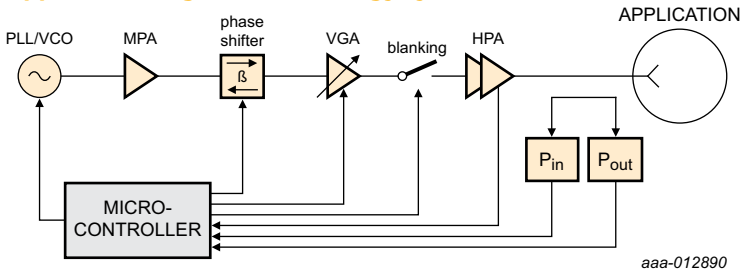
#### Solid-state RF for robust, highly efficient, and controllable energy

The band between 2400 and 2500 MHz has for a long time, been used around the world for a variety of RF applications, but especially microwave ovens. Since the 2.45 GHz band can be freely used worldwide, developers are looking for new ways to take advantage of its availability. Many of these new applications are using solid-state RF power generators as robust, highly efficient, and controllable sources of energy. NXP offers a complete product portfolio, which, together with performance, integration and industry leading system support, make these solutions commercially viable.

#### A prerequisite: Dedicated 2.45 GHz LDMOS transistors

Dedicated transistors are a prerequisite in this arena, and we offer a range of LDMOS based power transistors just for the 2.45 GHz segment. Optimized for performance in this band, our dedicated LDMOS transistors help designers move quickly from concept to production.

#### Application diagram of RF energy system



In a typical ISM application, a small-signal generator – built using an RF synthesizer, a variable gain amplifier (VGA), and RF switch, and an optional phase shifter – is followed by an high power amplifier (HPA) that delivers the necessary output power level. A feedback mechanism that uses a coupler or detector can easily be added. This kind of generator can be built using discrete components, but also lends itself to integration. Stay tuned for more news about the integration by NXP.

#### Recommended products

Function	Product	Package	Type	Function	Product	Package	Type	
Oscillator	RF transistor	SOT343F	BFU630F	MPA	MMIC	SOT89	BGA6289	
			BFU660F				BGA6489	
			BFU690F				BGA6589	
			BFU730F				SOT908	BGA7124
			BFU760F				SOT89	BGA7024
			BFU790F				SOT908	BGA7127
				SOT89	BGA7027			
				SOT908	BGA7130			

Function	Product	f <sub>min</sub> (MHz)	f <sub>max</sub> (MHz)	P1dB (W)	Package	Type
HPA	Driver	10	2500	5.5	SOT1179	BLP25M705
		10	2500	5.5	SOT1179	BLP25M710
	Final	2400	2500	100	SOT502	BLF2425M7L(S)100*
		2400	2500	140	SOT502	BLF2425M7L(S)140
		2400	2500	180	SOT539	BLF2425M6L(S)180P
		2400	2500	250	SOT539	BLF2425M7L(S)250P

\* Check status in section 3.1, as this type is not yet released for mass production  
For the complete product selection please see sections 3.3.1, 3.4.1, and 3.7.2

#### Product highlight:

#### Power transistor BLF2425M7L(S)250P



This is a 250 W push-pull LDMOS transistor in a thermally enhanced ceramic package for applications in the range of 2400 to 2500 MHz. The BLF2425M7L(S)250P uses NXP's Gen7 LDMOS technology to deliver best-in-class power density, achieving 51% efficiency and 15 dB gain from a 28 V supply. It enables a wide range of RF applications, including cooking, lighting, heating, drying, ignition, and ablation.

#### Features

- ▶ High efficiency (51%) and high gain (15 dB) in continuous wave (CW) operation
- ▶ Excellent ruggedness in fault conditions (VSWR >10:1)
- ▶ Low thermal resistance and excellent thermal stability
- ▶ Optimized for 2.45 GHz operation
- ▶ Available in eared (bolt-down) and earless (surface-mount) versions

DRIVING RF TO THE **NEXT LEVEL**

Our **commitment** to innovation results in providing best-in-class RF solutions for a smarter world.

RELEASE THE  
POTENTIAL

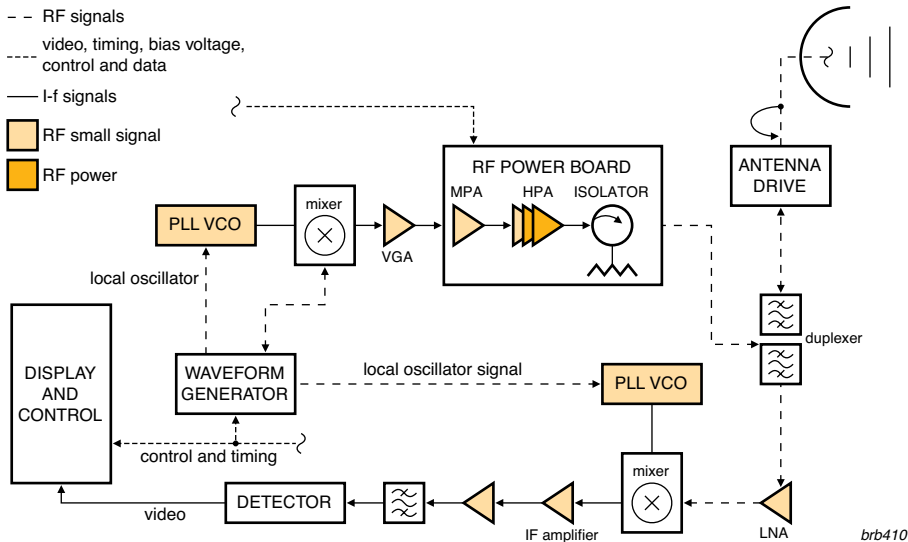


## 1.8 Aerospace and defense

### 1.8.1 Microwave products for L- and S-band radar and avionics applications

For more than three decades, we have led in providing high-performance RF technologies for microwave applications. The company has built a strong position in the field of RF small-signal and power transistors for microwave amplifiers with best-in-class Si devices and processing technologies. We were the first semiconductor company to supply S-band transistors (2700 to 3500 MHz) based on LDMOS. To further strengthen our position for the future, we are also developing new high-power and high-bandwidth technologies based GaN material (see section 2.3 for more details on GaN).

#### Application diagram for microwave application



#### Recommended product

Function	Product	$f_{\min}$ (MHz)	$f_{\max}$ (MHz)	P1dB (W)	Package	Type
HPA	Driver	500	1400	25	SOT467C	BLL6H0514-25
		2700	3500	30	SOT1135	BLS6G2735L(S)-30
	Final	500	1400	130	SOT1135	BLL6H0514L(S)-130
		1030	1090	200	SOT502	BLA6G1011L(S)-200RG
		1200	1400	250	SOT502	BLL6H1214L(S)-250
		1200	1400	250	SOM039	BLL6H1214P2S-250*
		2700	2900	350	SOT539	BLS7G2729L(S)-350P
		3100	3500	350	SOT539	BLS7G3135L(S)-350P
		960	1215	500	SOT634A	BLA6H0912-500
		1200	1400	500	SOT539A	BLL6H1214-500
		1030	1090	600	SOT539A	BLA6H1011-600

\* Check status in section 3.1, as this type is not yet released for mass production  
For the complete product selection please see section 3.7.3



#### Product highlight:

#### Power transistor BLS7G3135L(S)-350P

The BLS6G2735L(S)-30 is a 50 W LDMOS power transistor intended for radar applications in the range of 3.1 to 3.5 GHz.

#### Features

- ▶ Easy power control
- ▶ Integrated ESD protection
- ▶ High flexibility with respect to pulse formats
- ▶ Excellent ruggedness
- ▶ High efficiency
- ▶ Excellent thermal stability
- ▶ Designed for broadband operation (3.1 to 3.5 GHz)
- ▶ Internally matched for ease of use

Type number	Product	f <sub>min</sub> (MHz)	f <sub>max</sub> (MHz)	P1dB (W)	Matching	Test signal performance					
						VDS (V)	P <sub>1</sub> (W)	η <sub>D</sub> (%)	G <sub>p</sub> (dB)	Test signal	Package version
CLF1G0060(S)-10*	Driver	0	6000	10	-	50	10	33.2	17	Pulsed	SOT1227
CLF1G0060(S)-30*		0	6000	30	-	50	30	59	15.9	Pulsed	SOT1227
CLF1G0035(S)-50*	Driver/final	0	3500	50	-	50	50	49	13	Pulsed	SOT467
CLF1G0035(S)-100*	Final	0	3500	100	-	50	100	59.5	13.9	Pulsed	SOT467
CLF1G0035(S)-100P*		0	3500	100	-	50	100	50.1	12.7	Pulsed	SOT1228
CLF1G0035(S)-200P*		0	3500	200	-	50	200	43.5	11.5	Pulsed	SOT1228

\* Check status in section 3.1, as this type is not yet released for mass production  
For the complete product selection please see section 3.7.4

Function	Product		Package	Type
LNA and mixer	RF transistor	SiGe:C transistor	SOT343F	BFU710F
				BFU725F/N1
				BFU730F

Function	Product		Package	Type
IF amplifier	MMIC	MMIC	SOT363	BGA2800
				BGA2801
				BGA2815
				BGA2816
				BGA2850
				BGA2865
		BGA2866		
		BGM1014		
		BGM1013		
		BGM1012		
		General-purpose wideband amplifiers		

Function	Product		Package	Type
PLL/VCO LO generator	RF IC	SiGe:C IC	SOT616	TFF1003HN
				TFF1007HN

Function	Product	Gain range	Package	Type
Single VGA	MMIC	31 dB	SOT617	BGA7210
				BGA7204

Function	Product	Gain range	Package	Type
Dual VGA	MMIC	24 dB 28 dB	SOT617	BGA7350
				BGA7351
				BGA7352

Function	Product	P <sub>L(1 dB)</sub> @ 940 MHz	Package	Type
MPA	MMIC	24 dBm	SOT89	BGA7024
		28 dBm		BGA7027
		25 dBm	SOT908	BGA7124
		28 dBm		BGA7127
		30 dBm		BGA7130

For the complete product selection please see sections 3.3.1, 3.4.1, and 3.4.5



### Product highlight: IF gain blocks BGA28xx

The BGA28xx IF gain blocks are silicon MMIC wideband amplifiers with internal matching circuitry in a 6-pin SOT363 plastic SMD package.

### Features

- ▶ No output inductor necessary when used at the output stage
- ▶ Internally matched to 50 Ω
- ▶ Reverse isolation > 30 dB up to 2 GHz
- ▶ Good linearity with low second order







RELEASE  
IMAGINATION

**INSPIRING** RF SOLUTIONS

Our broad portfolio and **collaborative** approach help you advance your RF designs for a smarter world.

## 2. Technologies

### 2.1 Looking for a leader in SiGe:C? You just found us!

NXP's QUBiC4 BiCMOS SiGe:C technology enables future generations of RF products – including low-noise amplifiers, medium-power amplifiers, and local oscillator (LO) generators – to operate at higher performance levels, including higher frequency and higher integration. Use cases include increasing the performance of base stations, mobile phones, and other mobile platforms, along with equipment for communications infrastructure. The QUBiC4 process also helps speed satellite tracking and better connectivity with GPS signals for GPS systems, enhances satellite, WLAN, and microwave radio applications, and strengthens performance in radar, and more.

#### Excellent RF signal quality and more functionality in one design

Silicon-germanium (SiGe) process technology-based QUBiC4 offers high RF performance at a competitive cost, while ensuring excellence in signal quality via robust, highly integrated functionalities and value-added solutions. This in-house process builds on mature processes that have been in mass production since 2002. The QUBiC4 process can integrate more functionality onto devices at a smaller footprint and with greater reliability and manufacturing efficiency, offering a clear competitive advantage to our customers.

#### More than an alternative

QUBiC4 delivers several benefits. It achieves RF performance comparable to GaAs for linearity, noise figure, and phase noise. It also provides higher robustness and reliable design (active ESD protection), and offers the option to integrate dense analog circuitry and digital control on the same mixed-signal IC. SiGe also offers lower DC power consumption. It allows wireless equipment manufacturers to add more functionality onto devices with less space, at a competitive cost, and with greater reliability and manufacturing efficiency. With QUBiC4, customers can speed their migration from GaAs technology to silicon by enabling cutting-edge, low-noise performance and IP availability.

QUBiC4 comes in four variants (QUBiC4+, QUBiC Gen7RF, QUBiC Gen8RF, and the newly released QUBiC Gen9RF), each with its own optimization for specific application areas.

#### QUBiC4+

The QUBiC4+ process features 0.25  $\mu\text{m}$  CMOS with five metal layers for integration of dense digital logic-based smart functionality, a rich set of active and passive devices for

high-frequency mixed-signal designs, including thick top metal layers for high-quality inductors. The device set includes 35 GHz fT NPNs with 3.8 V breakdown voltage ( $BV_{ce0}$ ) and low noise figure ( $NF < 1.1 \text{ dB @ } 2 \text{ GHz}$ ), 5 GHz fT VPNNs, a 28 GHz high-voltage NPN with 5.9 V breakdown voltage, differential and single-ended varicaps with Q-factor  $> 30$ , scalable inductors with Q-factor  $> 20$ , 800 MHz FT lateral PNNs, 0.25  $\mu\text{m}$  CMOS, 137, 220, and 12 to 2000  $\Omega/\text{sq}$ . poly and active resistors, a 270  $\Omega/\text{sq}$ . SiCr thin film resistor, a 5.7 fF/ $\mu\text{m}^2$  oxide capacitor and a 5 fF/ $\mu\text{m}^2$  MIM capacitor, one to six fF/ $\mu\text{m}^2$  oxide capacitors and various other devices including L-PNNs, isolated NMOS, 3.3 V CMOS and RF-CMOS transistors capacitor. The QUBiC4+ process is silicon-based and ideal for applications up to 5 GHz (fT = 35 GHz,  $NF < 1.1 \text{ dB @ } 2 \text{ GHz}$ ), as well as for medium-power QUBiC4X.

#### QUBiC Gen7RF

The QUBiC4X process is a SiGe:C-based extension of the QUBiC4 process for high-frequency mixed-signal designs and offers a rich set of transistor devices, including a 110 GHz fT NPN with 2.0 V breakdown voltage and very low noise figure ( $NF < 1.0 \text{ dB @ } 10 \text{ GHz}$ ), 0.25  $\mu\text{m}$  CMOS, a variety of resistors, a 5.7 fF/ $\mu\text{m}^2$  oxide capacitor, and a 5 fF/ $\mu\text{m}^2$  MIM capacitor. QUBiC4x is ideal for applications that typically operate at up to 30 GHz such as wireless infrastructure, satellite communications, and point-to-point or wireless connectivity.

#### QUBiC Gen8RF

The QUBiC4Xi process further enhances the QUBiC4X process. It offers 200 GHz fT NPNs and offers ultra-low noise figure ( $NF < 0.6 \text{ dB @ } 10 \text{ GHz}$ ), 0.25  $\mu\text{m}$  CMOS, several resistors, a 5.7 fF/ $\mu\text{m}^2$  oxide capacitor and a 5 fF/ $\mu\text{m}^2$  MIM capacitor. QUBiC4xi is ideal for applications operating at high frequencies ( $> 20 \text{ GHz}$ ), such as wireless infrastructure point-to-point, car radar, and aerospace.

A recent process update provides high-power devices for use in high output power and high linearity applications. This Extended High Voltage device combines high breakdown capabilities with high speed. The BV\_CEO is increased to 5.5 V and the BV\_CBO equals 18 V.

#### **QUBIC4 Gen9RF**

The latest release of the QUBIC family provides best-in-class noise figures at millimeter wave frequencies. The latest generation is optimized for NFmin, which is measured at 0.27 dB @ 2GHz, 0.35 dB @ 5GHz, 0.49 dB @ 10GHz.

## 2.2 Best-in-class LDMOS to drive any RF power application

LDMOS (Laterally Diffused Metal Oxide Semiconductor) is the dominant device technology used in high-power RF amplifiers for frequencies ranging from 10 MHz to 3.8 GHz. LDMOS offers significant advantages over silicon bipolar transistors, including very high ruggedness and efficiency, high gain, and compatibility with low-cost packaging platforms. LDMOS also offers a strong cost advantage combined with a large industrial base versus other technologies such as GaN HBT.

NXP's LDMOS technology platforms are designed for devices that run from supply voltages in the range of 28 to 50 V, with outstanding efficiency, power, and ruggedness. The technology draws on NXP's heritage of proven product and technology innovation in RF, which spans over 35 years. Now in their 8th-generation, our LDMOS devices deliver record performance up to 3.8 GHz and can be used to, for example, help wireless network operators realize best-in-class efficiencies for wireless base stations and hence reduce operating costs.

The next generation, Gen9, is currently being sampled for base station applications and will be in full production in the middle of 2014. It has been optimized for LTE and takes efficiency yet one step further, with modulated efficiencies in the range of 50% at 2.6 GHz and an even target performance increase at 3.4 to 3.8 GHz.

### Advanced processes and architectures

These high efficiencies are achieved by combining LDMOS devices with specific amplifier circuit designs such as Doherty. The technology enables Doherty amplifiers with higher power, higher efficiencies, lower memory effects and better pre-distortion capabilities. Doherty amplifiers are available fully integrated into a single transistor package, so engineers do not need to worry about the intricate design of such a circuit. All splitters, delay lines, and combiners are already included, so design-in is similar to that of a Class-AB circuit.

### Higher power densities and ruggedness

For the aerospace and defense, broadcast, and ISM markets, NXP uses the proven Gen6 & Gen7 LDMOS platforms for devices fine-tuned to the specific needs required by these applications. For example, the Gen6 technology has been re-optimized for 42 to 50 V operation with the Gen6HV process, and then improved further as Gen6XR to enable devices with extreme ruggedness, ruggedness, on par with legacy VDMOS technology. The Gen6XR process is essential for ISM applications, which often suffer from severe mismatch conditions, since Gen6XR enables products that withstand these mismatches without compromising the RF performance.

Historically, the broadcast market has led the way in terms of power demands. NXP has risen to this challenge, time and again, with a succession of LDMOS products that set new milestones in terms of power density. These products clearly demonstrate the strengths of NXP's LDMOS to deliver new levels of consistency in power distribution over a die, and also in production, from batch to batch and year to year.

The improvements in LDMOS technology have enabled the aerospace and defense radar markets to migrate from designs using Si bipolar power transistors to LDMOS. LDMOS RF performance now equals Si bipolar in most respects and exceeds it in the remaining few. LDMOS is also an easier technology to apply and has significant cost-of-ownership benefits in these markets. In these markets, NXP has raised the bar for LDMOS with 350 W S-band devices in the range of 2.7 to 3.5 GHz.

### Benefits

- ▶ Competitive products to fit all applications covered by LDMOS
- ▶ Continuous technology improvements to keep pace with market needs
- ▶ Dedicated technology nodes designed around specific application requirements

### Features

- ▶ Gen8/9 with enhanced VBW performance for 28-32 V base station, aerospace, and defense applications
- ▶ Gen6XR for 42-50 V ISM applications requiring extreme ruggedness
- ▶ Gen6HV for 42-50 V high power density broadcast applications

## 2.3 Gallium-Nitride (GaN): Gain a clear advantage as NXP takes GaN mainstream

With 35+ years of experience delivering RF power transistors, NXP leads the industry in offering GaN RF power devices through a secure and reliable mainstream supply chain for wireless infrastructure, Industrial Scientific & Medical (ISM), and aerospace and defense applications.

NXP's first-generation GaN process technology features best-in-class linearity while at the same time allowing designers to maintain power, ruggedness, and efficiency. This enables an uncompromised amplifier design that can minimize component count and reduce amplifier footprint.

Our leading back-end assembly facility consistently leverages the high power density of GaN into smaller and more broadband circuitry. Through a broad portfolio of high-performance GaN and LDMOS products, NXP offers you an unbiased choice in enabling optimized designs for your application.

### Key features

- ▶ High frequencies, bandwidth up to 6 GHz
- ▶ High efficiencies
- ▶ Excellent linearity
- ▶ High power density
- ▶ High thermal conductivity
- ▶ Operation at higher temperatures, without loss of reliability (250 °C compared to 225 °C for Si LDMOS)
- ▶ Excellent ruggedness

### Applications

- ▶ Commercial wireless infrastructure (base stations)
- ▶ Radar systems
- ▶ Broadband and narrowband general-purpose amplifiers
- ▶ Public mobile radios
- ▶ ISM applications
- ▶ Jammers
- ▶ Test instrumentation
- ▶ EMC testing

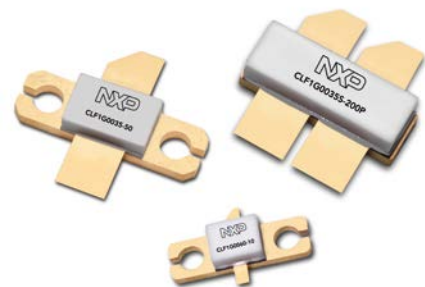
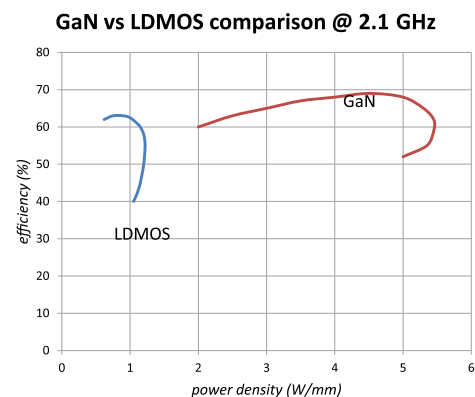
### Setting new performance boundaries for RF power amplifiers

GaN products are termed High-Electron Mobility Transistors (HEMT), a name that captures one of the intrinsic benefits of GaN – the high electron drift velocity. However, these transistors are depletion-mode devices, so they are normally on and require a negative gate bias to switch them off. This biasing is not straightforward, so NXP also has a tried-and-tested bias circuit available.

A further advantage of GaN is that it is a very strong semiconductor material, so it's capable of withstanding very high temperatures. NXP's GaN transistors are specified to a maximum temperature of 250 °C, compared to 225 °C for Si LDMOS. With such high temperature capability, there is a greater need to have packages capable of exploiting this feature. For this, customers benefit from NXP's 35-year legacy in RF power products.

Simply put, GaN technology makes a step increase in efficiency and power density performance over Si LDMOS in several applications (see figure). It is expected, by independent market analyst firms, that GaN product sales will grow into new application areas beyond aerospace and defense applications. This growth needs to be supported by mainstream RF Power companies such as NXP, who have invested in GaN technology for years.

Currently, NXP is releasing a portfolio of GaN products using its industrial base that brings customers excellence in product reliability, performance, and a high degree of confidence in the supply chain. As we like to say, we are taking GaN mainstream.



## 2.4 High-performance, small-size packaging

NXP's high-performance, small-size packaging enabled by NXP's leadless package platform and WL-CSP technology

### RF small-signal packaging is driven by two major trends which partly overlap

- ▶ Lower parasitics for better RF performance
- ▶ Smaller form factors for portable applications

### To cope with these trends, NXP uses several approaches

- ▶ For non-space-restricted applications, the use of flat-pack packages instead of gull-wing versions reduces the parasitic impedance because of shorter lead length (e.g. SOT343F instead of SOT343). This results in better RF performance in the Ku and Ka bands (13 to 20 GHz).



SOT343



SOT343F



SOT1230



SOT1223

- ▶ For space-restricted applications there are two routes to reduce the form factor and parasitics:
  - Leadless package platform
  - Wafer-Level Chip-Scale Package (WL-CSP) technology

The **leadless package platform** (>25 variants already released) is highly flexible with respect to package size, package height, and I/O pitch. For example, the 6-pin packages range in size from 1.45 x 1 x 0.5 mm with 0.5 mm pitch to 0.8 x 0.8 x 0.35 mm with 0.3 mm pitch.

Because of the compact size of the design, wire lengths and parasitic impedance are also restricted. The absence of leads further reduces the inductance.

**Wafer-Level Chip-Scale Package technology** is ideal for RF functions where the I/O pitch fits within the chip area. With smaller designs (and thus little effective chip area), it is more difficult to apply these on board due to smaller I/O pitches. Such small functions can now be flipped inside the SOT1232 package and still be mounted like a normal leadless package with 0.4mm pitch.

The absence of wires gives the lowest parasitic inductance available.



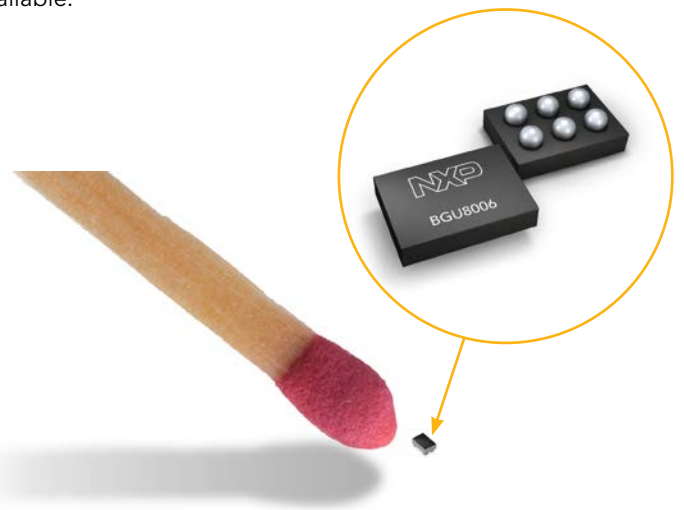
SOT886



SOT891



SOT1208



0.65 x 0.44 x 0.29 mm (including 0.09 mm balls)  
5 I/Os @ 0.22 mm pitch

## 2.5 RF power transistor packages

Packaging is an important element contributing to both the cost-effectiveness and performance of an RF power transistor. With peak powers ranging from 5 watts to over 1 kW, it is obvious that a whole family of packages is needed to cover all applications. Depending on what trade-off between performance and cost is needed, air-cavity or over-molded plastic packages can be used.

### Air-cavity packages

The traditional package for RF power transistors is the air-cavity package with a ceramic lid. The flange (or heatsink) material has evolved over the years and the most commonly used material today is CPC (Cu/Mo70Cu/Cu), a laminate of copper and copper-molybdenum. This material has been selected for its thermal properties, providing a low  $R_{th}$  (compared to the Cu-W used earlier) as well as a good CTE (thermal expansion coefficient) match with the silicon used for the active dies and the internal matching capacitors.

The package is made of three parts: flange, ringframe, and lid. The flange is brazed with the ringframe at high temperature and the resulting component is known as a header. Active and passive dies are then soldered to the flange and wire bonds are used to create the matching circuits and the connections with the leads. The transistor is then closed by gluing the lid on top and the final step consists of testing the product for compliance to specification.

### Air-Cavity Ceramic (ACC) packages

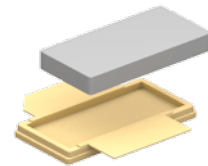
Air-cavity ceramic packages have proven their reliability and performance over the years, and exist in a variety of sizes and power levels. They present a number of advantages but also some disadvantages. They are assembled one by one, thereby demanding a high handling time, and the brazing of the ringframe with the flange creates stress and distortions. Also, each package variation (such as additional leads, or shorter leads) demands the creation of a unique header and there are limited economies of scale.



SOT608



SOT1120



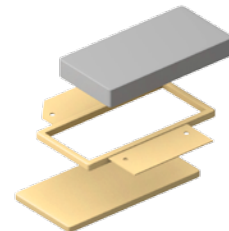
ACC package structure



SOT1121



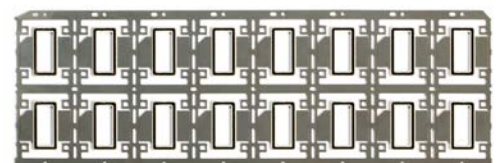
SOT539



The three components of an ACP transistor:  
CPC flange, polymer ringframe, polymer lid

### Air-Cavity Plastic (ACP) packages

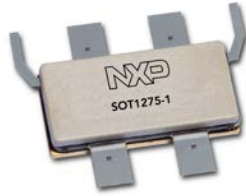
In order to circumvent these limitations while keeping the performance advantages of an air-cavity package, NXP has introduced a new family of packages known as Air-Cavity Plastic (ACP). Their structure is similar to ACC but the lid and the ringframe are made of polymers instead of ceramic. This enables the ringframe to be glued to the flange rather than brazed and reduces the stress and distortions of the flange. This in turn allows the use of thinner matching capacitors, reducing RF losses both at the gate and the drain. The result is higher gain and efficiency compared to ACC.



A strip of ACP transistors

In addition, the assembly process uses strips rather than individual headers, reducing handling time and allowing more variation in lead shape and length while simplifying logistics. In a nutshell, ACP packages provide more performance at a reduced cost.

NXP produces ACP packages in the SOT502 and SOT539 package formats and a number of variants are already in volume production, including the two shown below.



SOT1275



SOT1251

### Over-Molded Plastic (OMP) packages

A third transistor package family is used for cost-sensitive applications: OMP. Its structure is similar to that of an integrated circuit, with a copper flange and a molded body, but discrete wire bonds are often used in the matching network for improved RF performance. OMP packages are declined in a number of outlines, from the HVQFN package used for low-power drivers to the SOT502 format of packages used for drivers, MMICs, and discretes.



HVQFN



MMIC



Driver



Discrete final

Discrete finals now come very close in performance (gain, efficiency, VBW) and power to air-cavity transistors. However for high-performance applications where the last percentage and decible matter, air cavity remains the package of choice.

In conclusion, the wide range of packages offered by NXP enables you to select the right device optimized for your precise application and allows to find the best compromise between cost and performance.



## ENHANCING RF PERFORMANCE

NXP has a **proven** record in delivering the best RF performance. That is why half of all satellite solutions use NXP components. RF for a smarter world.

RELEASE  
PERFORMANCE



# 3. Products by function

NXP RF product catalog:

<http://www.nxp.com/rf>

## 3.1 New products

DEV = in DEvelopment

CQS = Customer Qualification Samples

RFS = Released For Supply

Type	Application/description	Expected status June 2014	Planned release	Section
<b>NEW: SiGe:C LNAs (for e.g. GPS)</b>				
BGU6005	GPS LNA, 17.5 dB gain	RFS	Released	3.4.1
BGU6009	GPS LNA, 17.5 dB gain	RFS	Released	3.4.1
BGU8004	GPS LNA, 17 dB gain	RFS	Released	3.4.1
BGU8019	GPS LNA, 18.5 dB gain	RFS	Released	3.4.1
<b>NEW: MMIC broadband amplifiers for TV and distribution systems</b>				
BGA3021	Extreme broadband amplifier, 16 dB gain, SOIC8	DEV	Q3 2014	3.4.1
BGA3 022	Extreme broadband amplifier, 18 dB gain, SOIC8	DEV	Q3 2015	3.4.1
BGA3023	Extreme broadband amplifier, 20 dB gain, SOIC8	DEV	Q3 2016	3.4.1
<b>NEW: Upstream VGA for DOCSIS 3.0</b>				
BGA3031	5 - 85 MHz high-linearity variable-gain amplifier, 58 dB gain range	RFS	Released	3.4.1
<b>NEW: LNAs for WLAN</b>				
BGU7224	2.4 GHz LNA for WLAN, 802.11b/g/n	RFS	Released	3.4.1
BGU7258	5.8 GHz LNA for WLAN, 802.11a/n/ac	RFS	Released	3.4.1
<b>NEW: LNAs for LTE</b>				
BGU8L1	LNA from 0.7 to 1 GHz, 0.7 dB NF	RFS	Released	3.4.1
BGU8M1	LNA from 1.8 to 2.2 GHz, 0.8 dB NF	RFS	Released	3.4.1
BGU8H1	LNA from 2.3 to 2.7 GHz, 0.9 dB NF	RFS	Released	3.4.1
<b>NEW: LNAs for wireless infrastructures</b>				
BGU7062N2	Variable gain high-linearity LNA 1.8 GHz, 0.77 dB NF	RFS	Released	3.4.1
BGU7073	Variable gain high-linearity LNA 1.9 GHz, 0.77 dB NF	CQS	Q2 2014	3.4.1
BGU7075	Variable gain high-linearity LNA 2.5 GHz, 1.05 dB NF	CQS	Q2 2014	3.4.1
<b>NEW: Downconverters for satellite</b>				
TFF1024HN	Downconverter with PLL/VCO for VSAT, eight different Ku sub-bands with one crystal	CQS	Q2 2014	3.4.1
TFF1012HN	Downconverter with PLL/VCO for satellite LNBS	RFS	Released	3.4.1
<b>NEW: CATV power doublers</b>				
CGD982LC	1 GHz power doubler, from 22 to 24 dB, 48 dBmV	RFS	Released	3.6.3
CGD985LC	1 GHz power doubler, from 24 to 26 dB, 48 dBmV	RFS	Released	3.6.3
CGD1042L	1 GHz power doubler, from 22 to 24 dB, 54 dBmV	RFS	Released	3.6.3

**NEW: RF wideband transistors for DC - 2 GHz application**

Type	Application/description	Expected status June 2014	Planned release	Section
BFU520W	RF transistor, high-speed, High-breakdown, LNA, Driver or VCO application, SOT323	RFS	Released	3.3.1
BFU530W	RF transistor, high-speed, High-breakdown, LNA, Driver or VCO application, SOT323	RFS	Released	3.3.1
BFU550W	RF transistor, high-speed, High-breakdown, LNA, Driver or VCO application, SOT323	RFS	Released	3.3.1
BFU520A	RF transistor, high-speed, High-breakdown, LNA, Driver or VCO application, SOT23	RFS	Released	3.3.1
BFU530A	RF transistor, high-speed, High-breakdown, LNA, Driver or VCO application, SOT23	RFS	Released	3.3.1
BFU550A	RF transistor, high-speed, High-breakdown, LNA, Driver or VCO application, SOT23	RFS	Released	3.3.1
BFU520	RF transistor, high-speed, High-breakdown, LNA, Driver or VCO application, SOT143	RFS	Released	3.3.1
BFU530	RF transistor, high-speed, High-breakdown, LNA, Driver or VCO application, SOT143	RFS	Released	3.3.1
BFU550	RF transistor, high-speed, High-breakdown, LNA, Driver or VCO application, SOT143	RFS	Released	3.3.1
BFU520X	RF transistor, high-speed, High-breakdown, LNA, Driver or VCO application, SOT143X	RFS	Released	3.3.1
BFU530X	RF transistor, high-speed, High-breakdown, LNA, Driver or VCO application, SOT143X	RFS	Released	3.3.1
BFU550X	RF transistor, high-speed, High-breakdown, LNA, Driver or VCO application, SOT143X	RFS	Released	3.3.1
BFU520XR	RF transistor, high-speed, High-breakdown, LNA, Driver or VCO application, SOT143R	RFS	Released	3.3.1
BFU530XR	RF transistor, high-speed, High-breakdown, LNA, Driver or VCO application, SOT143R	RFS	Released	3.3.1
BFU550XR	RF transistor, high-speed, High-breakdown, LNA, Driver or VCO application, SOT143R	RFS	Released	3.3.1
BFU580Q	RF transistor, high-speed, High-breakdown, LNA, Driver or VCO application, SOT89	RFS	Released	3.3.1
BFU590Q	RF transistor, high-speed, High-breakdown, LNA, Driver or VCO application, SOT89	RFS	Released	3.3.1
BFU580G	RF transistor, high-speed, High-breakdown, LNA, Driver or VCO application, SOT223	RFS	Released	3.3.1
BFU590G	RF transistor, high-speed, High-breakdown, LNA, Driver or VCO application, SOT223	RFS	Released	3.3.1
BFU520Y	RF transistor, high-speed, High-breakdown, LNA, Driver or VCO application, SOT363	RFS	Released	3.3.1

**NEW: RF power transistors for base stations**

Type	Application/description	Expected status June 2014	Planned release	Section
BLP8G0727S-05	QFN Driver	DEV	Q4 2014	3.7.1
BLP8G0727S-10	QFN Driver	DEV	Q4 2014	3.7.1
BLM8G0710S-15PB(G)	MMIC for Basestations	DEV	Q4 2014	3.7.1
BLP6H10S-10	High Voltage driver	DEV	Q2 2014	3.7.1
BLM8G0710S-30PB(G)	MMIC for Basestations	DEV	Q4 2014	3.7.1
BLM8G0710S-45AB(G)	MMIC for Basestations	DEV	Q1 2015	3.7.1
BLF6H10LS-150	High Voltage final	DEV	Q4 2014	3.7.1
BLP8G10S-200(G)W	OMP Transistor for Basestations	DEV	Q1 2015	3.7.1
BLP8G10S-270(G)W	OMP Transistor for Basestations	DEV	Q1 2015	3.7.1
BLF6H10LS-300P	High Voltage final	DEV	Q4 2014	3.7.1
BLC8G10LS-310AV	ACP PAD for Basestations	DEV	Q4 2014	3.7.1
BLC8G10LS-450AV	ACP PAD for Basestations	DEV	Q4 2014	3.7.1
BLM7G1822S-20PB(G)	MMIC for Basestations	DEV	Q2 2014	3.7.1
BLM7G1822S-40AB(G)	MMIC for Basestations	DEV	Q4 2014	3.7.1
BLM7G1822S-60PB(G)	MMIC for Basestations	DEV	Q1 2015	3.7.1
BLM7G1822S-80AB(G)	MMIC for Basestations	CQS	Q4 2014	3.7.1
BLP8G20S-80P	OMP Transistor for Basestations	DEV	Q3 2014	3.7.1
BLF8G20LS-140(G)V	Ceramic Transistor for Basestations	DEV	Q2 2014	3.7.1
BLF8G22LS-160(G)V	Ceramic Transistor for Basestations	DEV	Q3 2014	3.7.1
BLF8G20LS-160V	Ceramic Transistor for Basestations	RFS	Released	3.7.1
BLP8G21S-160PV	OMP Transistor for Basestations	RFS	Released	3.7.1
BLP8G22S-200(G)W	OMP Transistor for Basestations	DEV	Q1 2015	3.7.1
BLF8G20LS-210(G)V	Ceramic Transistor for Basestations	DEV	Q2 2014	3.7.1
BLC8G22LS-100AV	ACP PAD for Basestations	DEV	Q4 2014	3.7.1
BLP8G1822S-100A(G)W	OMP Transistor for Basestations	DEV	Q1 2015	3.7.1
BLC8G21LS-160AV	ACP PAD for Basestations	DEV	Q3 2014	3.7.1
BLP8G1822S-160A(G)W	OMP Transistor for Basestations	DEV	Q1 2015	3.7.1
BLP8G1822S-210A(G)W	OMP Transistor for Basestations	DEV	Q4 2014	3.7.1
BLC8G20LS-310AV	ACP PAD for Basestations	DEV	Q3 2014	3.7.1
BLC8G22LS-360AV	ACP PAD for Basestations	DEV	Q3 2014	3.7.1
BLC8G20LS-360AV	ACP PAD for Basestations	DEV	Q3 2014	3.7.1
BLC8G20LS-400AV	ACP PAD for Basestations	DEV	Q3 2014	3.7.1
BLC8G22LS-450AV	ACP PAD for Basestations	DEV	Q3 2014	3.7.1
BLP8G2327S-20	QFN Driver	DEV	Q1 2015	3.7.1
BLF8G24LS-100(G)V	Ceramic Transistor for Basestations	RES	Released	3.7.1
BLF8G27LS-100(G)V	Ceramic Transistor for Basestations	RES	Released	3.7.1
BLC8G27LS-210PV	ACP Transistor for Basestations	DEV	Q3 2014	3.7.1
BLC8G27LS-60AV	ACP PAD for Basestations	DEV	Q3 2014	3.7.1
BLC8G27LS-100AV	ACP PAD for Basestations	DEV	Q2 2014	3.7.1
BLC8G27LS-140AV	ACP PAD for Basestations	DEV	Q2 2014	3.7.1

**NEW: RF power transistors for base stations**

Type	Application/description	Expected status June 2014	Planned release	Section
BLC9G27LS-150AV	ACP PAD for Basestations	DEV	Q3 2014	3.7.1
BLC8G27LS-180AV	ACP PAD for Basestations	DEV	Q3 2014	3.7.1
BLC8G27LS-200AV	ACP PAD for Basestations	DEV	Q3 2014	3.7.1
BLC8G24LS-240AV	ACP PAD for Basestations	CQS	Q2 2014	3.7.1
BLC8G27LS-240AV	ACP PAD for Basestations	DEV	Q2 2014	3.7.1
BLC8G27LS-245AV	ACP PAD for Basestations	DEV	Q2 2014	3.7.1
BLC8G27LS-310AV	ACP PAD for Basestations	DEV	Q4 2014	3.7.1
BLF8G38LS-75V	Ceramic Transistor for Basestations	RFS	Released	3.7.1
BLC9G38LS-100AV	ACP PAD for Basestations	DEV	Q3 2014	3.7.1
BLC9G38LS-160AV	ACP PAD for Basestations	DEV	Q1 2015	3.7.1

**NEW: RF power LDMOS transistors for 1 - 1600 MHz (UHF/VHF/ISM)**

BLF10M6(LS)135	Ceramic LDMOS transistor for broadcast & ISM applications	RFS	Released	3.7.2
BLF10M6(LS)160	Ceramic LDMOS transistor for broadcast & ISM applications	RFS	Released	3.7.2
BLF188XR(S)	XR ceramic push-pull LDMOS transistor for broadcast & ISM applications	RFS	Released	3.7.2
BLF2425M7L(S)100	Ceramic LDMOS transistor for broadcast & ISM applications	RFS	Released	3.7.2
BLF2425M8L(S)140	Ceramic LDMOS transistor for broadcast & ISM applications	RFS	Released	3.7.2
BLF644P	Ceramic LDMOS transistor for broadcast & ISM applications	RFS	Released	3.7.2
BLF647P(S)	Ceramic LDMOS transistor for broadcast & ISM applications	RFS	Released	3.7.2
BLF888D(S)	Ceramic High Voltage LDMOS transistor for UHF broadcast applications	RFS	Released	3.7.2
BLP05M7200	Broadband OMP LDMOS transistor for broadcast & ISM applications	RFS	Released	3.7.2
BLP10H603	Broadband OMP LDMOS transistor for broadcast & ISM applications	DEV	Q3 2014	3.7.2
BLP10H605	Broadband OMP LDMOS transistor for broadcast & ISM applications	DEV	Q3 2014	3.7.2
BLP10H610	Broadband OMP LDMOS transistor for broadcast & ISM applications	DEV	Q2 2014	3.7.2
BLP15M7160P	Gen7 OMP LDMOS transistor for broadcast & ISM applications	RFS	Released	3.7.2
BLP25M705	Gen7 OMP LDMOS driver transistor for broadcast & ISM applications	RFS	Released	3.7.2
BLP25M710	Gen7 OMP LDMOS driver transistor for broadcast & ISM applications	RFS	Released	3.7.2

**NEW: RF power LDMOS transistors for Avionics**

BLA6H0912L(S)-1000	Gen6 high-voltage ceramic LDMOS transistor for avionics applications	DEV	Q4 2014	3.7.3
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**NEW: RF power LDMOS transistors for L-band**

BLL6H1214P2S-250	Gen6 high voltage 2-stage LDMOS pallet for L-band applications	DEV	Q4 2014	3.7.3
BLL6G1214L(S)-250	Gen6 ceramic LDMOS transistor for L-band applications	RFS	Released	3.7.3
BLL6H1214LS-500	Gen6 high-voltage ceramic LDMOS transistor for L-band applications	RFS	Released	3.7.3

**NEW: RF power LDMOS transistors for S-band**

BLS7G2729L(S)-350P	Gen7 ceramic push-pull LDMOS transistor for S-band radar applications	RFS	Released	3.7.3
BLS7G3135L(S)-350P	Gen7 ceramic push-pull LDMOS transistor for S-band radar applications	RFS	Released	3.7.3

**NEW: Gallium Nitride (GaN) RF power amplifiers**

CLF1G0035(S)-50	Gen1 ceramic GaN broadband amplifier	DEV	Q3 2014	3.7.4
CLF1G0035(S)-100	Gen1 ceramic GaN broadband amplifier	DEV	Q3 2014	3.7.4
CLF1G0035(S)-100P	Gen1 ceramic GaN push-pull broadband amplifier	DEV	Q3 2014	3.7.4
CLF1G0035(S)-200P	Gen1 ceramic GaN push-pull broadband amplifier	DEV	Q3 2014	3.7.4
CLF1G0060(S)-10	Gen1 ceramic GaN broadband driver amplifier	DEV	Q3 2014	3.7.4
CLF1G0060(S)-30	Gen1 ceramic GaN broadband driver amplifier	DEV	Q3 2014	3.7.4

## 3.2 RF diodes

### 3.2.1 Varicap diodes

Varicap selection guide on [www.nxp.com/varicaps](http://www.nxp.com/varicaps)  
Easy-to-use parametric filters help you choose the right varicap for your design.

#### Why choose NXP's varicap diodes:

- ▶ Reference designs for TV and radio tuning
- ▶ Direct matching process
- ▶ Small tolerances
- ▶ Short lead time
- ▶ Complete portfolio covering broad range of frequencies and packages (including leadless)
- ▶ Reliable volume supply

#### VCO and FM radio tuning varicap diodes

Type	Package	Number of diodes	Config	@ f = 1 MHz												r <sub>s</sub> typ	r <sub>s</sub> max	@ f =
				C <sub>d</sub> min	C <sub>d</sub> typ	C <sub>d</sub> max	@ V <sub>R</sub> =	C <sub>d</sub> min	C <sub>d</sub> typ	C <sub>d</sub> max	@ V <sub>R</sub> =	C <sub>d1</sub> /C <sub>d2</sub>	C <sub>d1</sub> /C <sub>d2</sub>	@ V1 =	@ V2 =			
				(pF)	(pF)	(pF)	(V)	(pF)	(pF)	(pF)	(V)	min	max	(V)	(V)			
BB145B	SOD523	1	SG	6.4	-	7.2	1	2.55	-	2.95	4	2.2	-	1	4	-	0.6	470
BB156	SOD323	1	SG	14.4	16	17.6	1	4.2	4.8	5.4	7.5	2.7	3.9	1	7.5	0.4	0.7	470
BB201	SOT23	2	CC	89	95	102	1	25.5	27.6	29.7	7.5	3.1	3.8	1	7.5	0.25	0.5	100
BB202 <sup>^</sup>	SOD523	1	SG	28.2	-	33.5	0.2	7.2	-	11.2	2.3	2.5	-	0.2	2.3	0.35	0.6	100
BB207*	SOT23	2	CC	76	81	86	1	25.5	27.6	29.7	7.5	2.6	3.3	1	7.5	0.2	0.4	100
BB208-02*	SOD523	1	SG	19.9	-	23.2	1	4.5	-	5.4	7.5	3.7	5.2	1	7.5	0.35	0.5	100
BB208-03*	SOD323	1	SG	19.9	-	23.2	1	4.5	-	5.4	7.5	3.7	5.2	1	7.5	0.35	0.5	100

\* Includes special design for FM car radio (CREST-IC:TEF6860)

<sup>^</sup> Includes special design for mobile phone tuner ICs

Type of connection:

CC = common cathode

SG = single

#### UHF varicap diodes

Type	Package	@ f = 1 MHz										r <sub>s</sub> typ	r <sub>s</sub> max	@ f =	@ C <sub>d</sub> =	ΔC <sub>d</sub> /C <sub>d</sub>	@ V <sub>1</sub> =	@ V <sub>2</sub> =	@ N <sub>s</sub> =
		C <sub>d</sub> min	C <sub>d</sub> typ	C <sub>d</sub> max	@ V <sub>R</sub> =	C <sub>d1</sub> /C <sub>d2</sub>	C <sub>d1</sub> /C <sub>d2</sub>	C <sub>d1</sub> /C <sub>d2</sub>	@ V <sub>1</sub> =	@ V <sub>2</sub> =									
		(pF)	(pF)	(pF)	(V)	min	typ	max	(V)	(V)	(Ω)								
Unmatched																			
<b>BB174</b>	SOD523	1.951	2.1	2.225	28	8.45	9	10.9	1	28	0.6	0.75	470	9	2	1	28	10	
BB174LX	SOD882D	1.95	2.1	2.22	28	8.45	9	10.9	1	28	0.65	-	470	30	2	1	28	5	
Unmatched																			
BB135	SOD323	1.7	-	2.1	28	8.9	-	12	0.5	28	-	0.75	470	9	-	-	-	-	

**Bold** = highly recommended product

## VHF varicap diodes

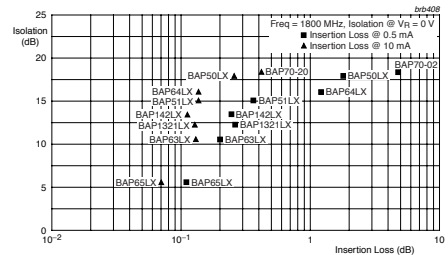
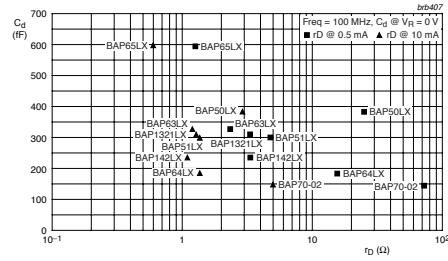
Type	Package	@ f = 1 MHz										r <sub>s</sub> typ	r <sub>s</sub> max	@ f =	@ C <sub>d</sub> =	ΔC <sub>d</sub> /C <sub>d</sub>	@ V <sub>1</sub> =	@ V <sub>2</sub> =	@ N <sub>i</sub> =
		C <sub>d</sub> min	C <sub>d</sub> typ	C <sub>d</sub> max	@ V <sub>R</sub>	C <sub>d1</sub> /C <sub>d2</sub>	C <sub>d1</sub> /C <sub>d2</sub>	C <sub>d1</sub> /C <sub>d2</sub>	@ V <sub>1</sub>	@ V <sub>2</sub>									
		(pF)	(pF)	(pF)	(V)	min	typ	max	(V)	(V)									
Unmatched																			
BB170	SOD323	2.4	2.6	2.75	28	14.5	15	-	1	28	-	0.9	100	12	2	0.5	28	10	
BB171	SOD323	2.48	2.7	2.89	28	20.6	22	-	1	28	1	1.2	100	30	2	1	28	10	
BB172	SOD323	2.361	2.6	2.754	28	13.5	15	-	1	28	0.65	0.8	100	30	2	1	28	10	
BB173	SOD523	2.361	2.6	2.754	28	13.5	15	-	1	28	0.65	0.8	100	30	2	1	28	10	
BB173LX	SOD882D	2.36	2.6	2.75	28	13.5	15	-	1	28	0.7	-	470	30	2	1	28	5	
BB175	SOD523	2.48	2.7	2.89	28	20.6	22	-	1	28	1	1.2	100	30	2	1	28	10	
BB131	SOD323	0.7	-	1.055	28	12	-	16	0.5	28	-	3	470	9	-	-	-	-	
BB181	SOD523	0.7	-	1.055	28	12	-	16	0.5	28	-	3	470	9	-	-	-	-	
BBY40	SOT23	4.3	-	6	25	5	-	6.5	3	25	-	0.7	200	25	-	-	-	-	

## 3.2.2 PIN diodes

PIN diode selection guide on [www.nxp.com/pindiodes](http://www.nxp.com/pindiodes)  
Easy-to-use parametric filters help you choose the right PIN diode for your design.

### Why choose NXP's PIN diodes:

- ▶ Broad portfolio
- ▶ Unrivalled performance
- ▶ Short lead time
- ▶ Low series inductance
- ▶ Low insertion loss
- ▶ Low capacitance



For more information: [www.nxp.com/pindiodes](http://www.nxp.com/pindiodes)

### PIN diodes: typical r<sub>D</sub> @ 1 mA ≤ 2, switching diodes

Type	Package	Number of diodes	Config	V <sub>R</sub> max (V)	IF max (mA)	@ f = 100 MHz						@ f = 1 MHz				
						@ IF = 0.5 mA		@ IF = 1 mA		@ IF = 10 mA		@ V <sub>R</sub> = 0 V		@ V <sub>R</sub> = 1 V		@ V <sub>R</sub> = 20 V
						r <sub>D</sub> typ (Ω)	r <sub>D</sub> max (Ω)	r <sub>D</sub> typ (Ω)	r <sub>D</sub> max (Ω)	r <sub>D</sub> typ (Ω)	r <sub>D</sub> max (Ω)	C <sub>d</sub> typ (pF)	C <sub>d</sub> typ (pF)	C <sub>d</sub> max (pF)	C <sub>d</sub> typ (pF)	C <sub>d</sub> max (pF)
BAP65LX	SOD882D	1	SG	30	100	-	-	0.94	-	0.49	0.9	0.61	0.48	0.85	0.37	-
BAP65-02	SOD523	1	SG	30	100	-	-	1	-	0.56	0.9	0.65	0.55	0.9	0.375	-
BAP65-03	SOD323	1	SG	30	100	-	-	1	-	0.56	0.9	0.65	0.55	0.9	0.375	-
BAP65-05	SOT23	2	CC	30	100	-	-	1	-	0.56	0.9	0.7	0.575	0.9	0.425	-
BAP65-05W	SOT323	2	CC	30	100	-	-	1	-	0.56	0.9	0.7	0.575	0.9	0.425	-
BAP63LX	SOD882D	1	SG	50	100	2.3	3.3	1.87	3	1.19	1.8	0.34	0.29	-	0.24	0.3
BAP63-02	SOD523	1	SG	50	100	2.5	3.5	1.95	3	1.17	1.8	0.36	0.32	-	0.25	0.32
BAP63-03	SOD323	1	SG	50	100	2.5	3.5	1.95	3	1.17	1.8	0.4	0.35	-	0.27	0.32
BAP63-05W	SOT323	2	CC	50	100	2.5	3.5	1.95	3	1.17	1.8	0.4	0.35	-	0.3	0.35

### PIN diode: selection on isolation and insertion loss in SOD882D

Type	ISL (isolation)			IL (Insertion loss)											
	f = 900 MHz	f = 1800 MHz	f = 2450 MHz	f = 900 MHz				f = 1800 MHz				f = 2450 MHz			
	VR = 0 V	VR = 0 V	VR = 0 V	IF = 0.5 mA	IF = 1 mA	IF = 10 mA	IF = 100 mA	IF = 0.5 mA	IF = 1 mA	IF = 10 mA	IF = 100 mA	IF = 0.5 mA	IF = 1 mA	IF = 10 mA	IF = 100 mA
BAP65LX	10	5.5	3.9	0.09	0.06	0.06	0.05	0.09	0.07	0.07	0.06	0.1	0.08	0.08	0.07
BAP63LX	15.9	10.5	8.3	0.2	0.17	0.12	0.11	0.2	0.17	0.13	0.11	0.21	0.19	0.15	0.15
BAP55LX	19	14	12	0.24	0.17	0.08	0.05	0.25	0.18	0.09	0.07	0.26	0.19	0.1	0.08
BAP142LX	18	13	11	0.24	0.18	0.1	0.07	0.24	0.19	0.11	0.09	0.25	0.25	0.12	0.1
BAP51LX	19	15	13	0.36	0.25	0.12	0.9	0.36	0.26	0.14	0.1	0.38	0.27	0.15	0.12
BAP64LX	22	16	14	1.22	0.22	0.12	0.09	1.21	0.23	0.13	0.1	1.22	0.24	0.15	0.11
BAP50LX	20.3	17.9	16.5	1.82	1.07	0.25	-	1.8	1.06	0.26	-	1.81	1.08	0.27	-

**Bold** = highly recommended product

SG = single  
SR = series

CC = common cathode  
CA = common anode

**PIN diodes: typical  $r_D$  @ 1 mA = 2.2 - 2.4, switching diodes**

Type	Package	Number of diodes	Config	$V_R$ max (V)	IF max (mA)	@ f = 100 MHz						@ f = 1 MHz				
						@ IF = 0.5 mA		@ IF = 1 mA		@ IF = 10 mA		@ $V_R = 0$ V	@ $V_R = 1$ V		@ $V_R = 20$ V	
						$r_D$ typ ( $\Omega$ )	$r_D$ max ( $\Omega$ )	$r_D$ typ ( $\Omega$ )	$r_D$ max ( $\Omega$ )	$r_D$ typ ( $\Omega$ )	$r_D$ max ( $\Omega$ )	$C_d$ typ (pF)	$C_d$ typ (pF)	$C_d$ max (pF)	$C_d$ typ (pF)	$C_d$ max (pF)
<b>BAP55LX</b>	SOD882D	1	SG	50	100	3.3	4.5	2.2	3.3	0.8	1.2	0.28	0.23	-	0.18	0.28
BAP1321-02	SOD523	1	SG	60	100	3.4	5	2.4	3.6	1.2	1.8	0.4	0.35	0.45	0.25	0.32
BAP1321-03	SOD323	1	SG	60	100	3.4	5	2.4	3.6	1.2	1.8	0.4	0.35	0.45	0.25	0.32
BAP1321-04	SOT23	2	SR	60	100	3.4	5	2.4	3.6	1.2	1.8	0.42	0.375	0.45	0.275	0.325
<b>BAP1321LX</b>	SOD882D	1	SG	60	100	3.3	5	2.4	3.6	1.2	1.8	0.32	0.27	0.38	0.21	0.28
<b>BAP142LX</b>	SOD882D	1	SG	50	100	3.3	5	2.4	3.6	1	1.8	0.25	0.22	-	0.16	0.26

**PIN diodes: typical  $r_D$  @ 1 mA = 3.2 - 3.6, switching diodes**

Type	Package	Number of diodes	Config	$V_R$ max (V)	IF max (mA)	@ f = 100 MHz						@ f = 1 MHz				
						@ IF = 0.5 mA		@ IF = 1 mA		@ IF = 10 mA		@ $V_R = 0$ V	@ $V_R = 1$ V		@ $V_R = 20$ V	
						$r_D$ typ ( $\Omega$ )	$r_D$ max ( $\Omega$ )	$r_D$ typ ( $\Omega$ )	$r_D$ max ( $\Omega$ )	$r_D$ typ ( $\Omega$ )	$r_D$ max ( $\Omega$ )	$C_d$ typ (pF)	$C_d$ typ (pF)	$C_d$ max (pF)	$C_d$ typ (pF)	$C_d$ max (pF)
<b>BAP51LX</b>	SOD882D	1	SG	60	100	4.9	9	3.2	6.5	1.4	2.5	0.3	0.22	0.4	0.17	0.3
BAP51-02	SOD523	1	SG	60	50	5.5	9	3.6	6.5	1.5	2.5	0.4	0.3	0.55	0.2	0.35
BAP51-03	SOD323	1	SG	50	50	5.5	9	3.6	6.5	1.5	2.5	0.4	0.3	0.55	0.2	0.35
BAP51-04W	SOT323	2	SR	50	50	5.5	9	3.6	6.5	1.5	2.5	0.4	0.3	0.55	0.2	0.35
BAP51-05W	SOT323	2	CC	50	50	5.5	9	3.6	6.5	1.5	2.5	0.4	0.3	0.55	0.2	0.35
BAP51-06W	SOT323	2	CA	50	50	5.5	-	3.6	-	2	-	0.4	0.3	-	0.2	-

**PIN diodes: typical  $r_D$  @ 1 mA = 10, attenuator/switching diodes**

Type	Package	Number of diodes	Config	$V_R$ max (V)	IF max (mA)	@ f = 100 MHz						@ f = 1 MHz				
						@ IF = 0.5 mA		@ IF = 1 mA		@ IF = 10 mA		@ $V_R = 0$ V	@ $V_R = 1$ V		@ $V_R = 20$ V	
						$r_D$ typ ( $\Omega$ )	$r_D$ max ( $\Omega$ )	$r_D$ typ ( $\Omega$ )	$r_D$ max ( $\Omega$ )	$r_D$ typ ( $\Omega$ )	$r_D$ max ( $\Omega$ )	$C_d$ typ (pF)	$C_d$ typ (pF)	$C_d$ max (pF)	$C_d$ typ (pF)	$C_d$ max (pF)
<b>BAP64Q</b>	SOT753	4	SR	100	100	20	40	10	20	2	3.8	0.52	0.37	-	0.23	0.35
BAP64-02	SOD523	1	SG	175	100	20	40	10	20	2	3.8	0.48	0.35	-	0.23	0.35
BAP64-03	SOD323	1	SG	175	100	20	40	10	20	2	3.8	0.48	0.35	-	0.23	0.35
BAP64-04	SOT23	2	SR	175	100	20	40	10	20	2	3.8	0.52	0.37	-	0.23	0.35
BAP64-04W	SOT323	2	SR	100	100	20	40	10	20	2	3.8	0.52	0.37	-	0.23	0.35
BAP64-05	SOT23	2	CC	175	100	20	40	10	20	2	3.8	0.52	0.37	-	0.23	0.35
BAP64-05W	SOT323	2	CC	100	100	20	40	10	20	2	3.8	0.52	0.37	-	0.23	0.35
BAP64-06	SOT23	2	CA	175	100	20	40	10	20	2	3.8	0.52	0.37	-	0.23	0.35
BAP64-06W	SOT323	2	CA	100	100	20	40	10	20	2	3.8	0.52	0.37	-	0.23	0.35
<b>BAP64LX^</b>	SOD882D	1	SG	60	100	31	50	16	26	2.6	4.4	0.48	0.34	-	0.17*	0.3*

^ = attenuator / switching diode \* = @ VR = 20 V

**PIN diodes: typical  $r_D$  @ 1 mA = 14 - 16, attenuator diodes**

Type	Package	Number of diodes	Config	$V_R$ max (V)	IF max (mA)	@ f = 100 MHz						@ f = 1 MHz				
						@ IF = 0.5 mA		@ IF = 1 mA		@ IF = 10 mA		@ $V_R = 0$ V	@ $V_R = 1$ V		@ $V_R = 5$ V	
						$r_D$ typ ( $\Omega$ )	$r_D$ max ( $\Omega$ )	$r_D$ typ ( $\Omega$ )	$r_D$ max ( $\Omega$ )	$r_D$ typ ( $\Omega$ )	$r_D$ max ( $\Omega$ )	$C_d$ typ (pF)	$C_d$ typ (pF)	$C_d$ max (pF)	$C_d$ typ (pF)	$C_d$ max (pF)
BAP50-02	SOD523	1	SG	50	50	25	40	14	25	3	5	0.4	0.3	0.55	0.22	0.35
BAP50-03	SOD323	1	SG	50	50	25	40	14	25	3	5	0.4	0.3	0.55	0.2	0.35
BAP50-04	SOT23	2	SR	50	50	25	40	14	25	3	5	0.45	0.35	0.6	0.3	0.5
BAP50-04W	SOT323	2	SR	50	50	25	40	14	25	3	5	0.45	0.35	0.6	0.3	0.5
BAP50-05	SOT23	2	CC	50	50	25	40	14	25	3	5	0.45	0.3	0.5	0.35	0.6
BAP50-05W	SOT323	2	CC	50	50	25	40	14	25	3	5	0.45	0.35	0.6	0.3	0.5
<b>BAP50LX</b>	SOD882D	1	SG	50	50	26	40	14	25	3	5	0.4	0.28	0.55	0.19	0.35

**PIN diodes: typical  $r_D$  @ 1 mA = 40, attenuator diodes**

Type	Package	Number of diodes	Config	$V_R$ max (V)	IF max (mA)	@ f = 100 MHz						@ f = 1 MHz				
						@ IF = 0.5 mA		@ IF = 1 mA		@ IF = 10 mA		@ $V_R = 0$ V	@ $V_R = 1$ V		@ $V_R = 20$ V	
						$r_D$ typ ( $\Omega$ )	$r_D$ max ( $\Omega$ )	$r_D$ typ ( $\Omega$ )	$r_D$ max ( $\Omega$ )	$r_D$ typ ( $\Omega$ )	$r_D$ max ( $\Omega$ )	$C_d$ typ (pF)	$C_d$ typ (pF)	$C_d$ max (pF)	$C_d$ max (pF)	$C_d$ typ (pF)
<b>BAP70Q</b>	SOT753	4	SR	50	100	77	100	40	50	5.4	7	0.6	0.43	-	0.25	0.3
<b>BAP70-02</b>	SOD523	1	SG	50	100	77	100	40	50	5.4	7	0.57	0.4	-	0.2	0.25
<b>BAP70-03</b>	SOD323	1	SG	50	100	77	100	40	50	5.4	7	0.57	0.4	-	0.2	0.25
BAP70-04W	SOT323	2	SR	50	100	77	100	40	50	5.4	7	0.6	0.43	-	0.25	0.3
BAP70-05	SOT23	2	CC	50	100	77	100	40	50	5.4	7	0.6	0.43	-	0.25	0.3
<b>BAP70AM</b>	SOT363	4	SR	50	100	77	100	40	50	5.4	7	0.57	0.4	-	0.2	0.25

**Bold** = highly recommended product

SG = single  
SR = series

CC = common cathode  
CA = common anode

### 3.2.3 Band-switch diodes

Band-switch diode selection guide on [www.nxp.com/products/diodes](http://www.nxp.com/products/diodes)  
Easy-to-use parametric filters help you choose the right Band-switch diode for your design.

#### Why choose NXP's band-switch diodes:

- ▶ Reliable volume supplier
- ▶ Short lead time
- ▶ Low series inductance
- ▶ Low insertion loss
- ▶ Low capacitance
- ▶ High reverse isolation

Type	Package	$V_R$ max (V)	IF max (mA)	$r_D$ max ( $\Omega$ )	@ IF = (mA)	@ f = (MHz)	$C_d$ max (pF)	@ $V_R$ = (V)	@ f = (MHz)
BA591	SOD323	35	100	0.7	3	100	0.9	3	1
BA891	SOD523	35	100	0.7	3	100	0.9	3	1
BAT18	SOT23	35	100	0.7	5	200	1	20	1

### 3.2.4 Schottky diodes

Schottky diode selection guide on [www.nxp.com/rfschottkydiodes](http://www.nxp.com/rfschottkydiodes)  
Easy-to-use parametric filters help you choose the right Schottky diode for your design.

#### Why choose NXP's Schottky diodes:

- ▶ Low diode capacitance
- ▶ Low forward voltage
- ▶ Single- and triple-isolated diode
- ▶ Small package

#### Applications

- ▶ Digital applications:
  - Ultra high-speed switching
  - Clamping circuits
- ▶ RF applications:
  - Diode ring mixer
  - RF detector
  - RF voltage doubler

#### Low-capacitance Schottky diodes

Type	Package	Configuration	$V_R$ max. (V)	$I_F$ max. (mA)	$V_F$ max. (mV)	$C_D$ max. (pF)
<b>BAT17</b>	SOT23	Single	4	30	450 @ IF = 1 mA	1 @ VR = 0 V
<b>PMBD353</b>	SOT23	Dual-series	4	30	450 @ IF = 1 mA	1 @ VR = 0 V
PMBD354^	SOT23	Dual-series	4	30	450 @ IF = 1 mA	1 @ VR = 0 V
1PS76SB17	SOD323	Single	4	30	450 @ IF = 1 mA	1 @ VR = 0 V
<b>1PS66SB17</b>	SOT666	Triple-isolated	4	30	450 @ IF = 1 mA	1 @ VR = 0 V
1PS79SB17	SOD523	Single	4	30	450 @ IF = 1 mA	1 @ VR = 0 V
1PS88SB82	SOT363	Triple-isolated	15	30	340 @ IF = 1 mA	1 @ VR = 0 V
1PS70SB82	SOT323	Single	15	30	340 @ IF = 1 mA	1 @ VR = 0 V
<b>1PS70SB84</b>	SOT323	Dual-series	15	30	340 @ IF = 1 mA	1 @ VR = 0 V
1PS70SB85	SOT323	Dual c.c	15	30	340 @ IF = 1 mA	1 @ VR = 0 V
1PS70SB86	SOT323	Dual c.a.	15	30	340 @ IF = 1 mA	1 @ VR = 0 V
1PS66SB82	SOT666	Triple-isolated	15	30	340 @ IF = 1 mA	1 @ VR = 0 V
1PS10SB82	SOD882	Single	15	30	340 @ IF = 1 mA	1 @ VR = 0 V

**Bold** = highly recommended product    ^ Diodes have matched capacitance



## 3.3 RF bipolar transistors

### 3.3.1 Wideband transistors

RF wideband transistor selection guide on [www.nxp.com/rftransistors](http://www.nxp.com/rftransistors)  
Easy-to-use parametric filters help you choose the right RF wideband transistor for your design.

#### Why choose NXP's wideband transistors:

- ▶ Broad portfolio (1<sup>st</sup> - 7<sup>th</sup> generation)
- ▶ Short lead time
- ▶ Smallest packages
- ▶ Volume delivery

#### Wideband transistors

The  $f_T$ - $I_C$  curve represents transition frequency ( $f_T$ ) characteristics as a function of collector current ( $I_C$ ) for the seven generations of RF wideband transistors. A group of transistors having the same  $I_C$  and similar  $f_T$  represents a curve. The curve number matches the products in the selection tables of this section (third column of each table), detailing their RF characteristics.

#### Wideband transistor line-ups by frequency

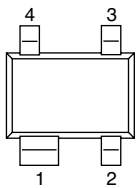
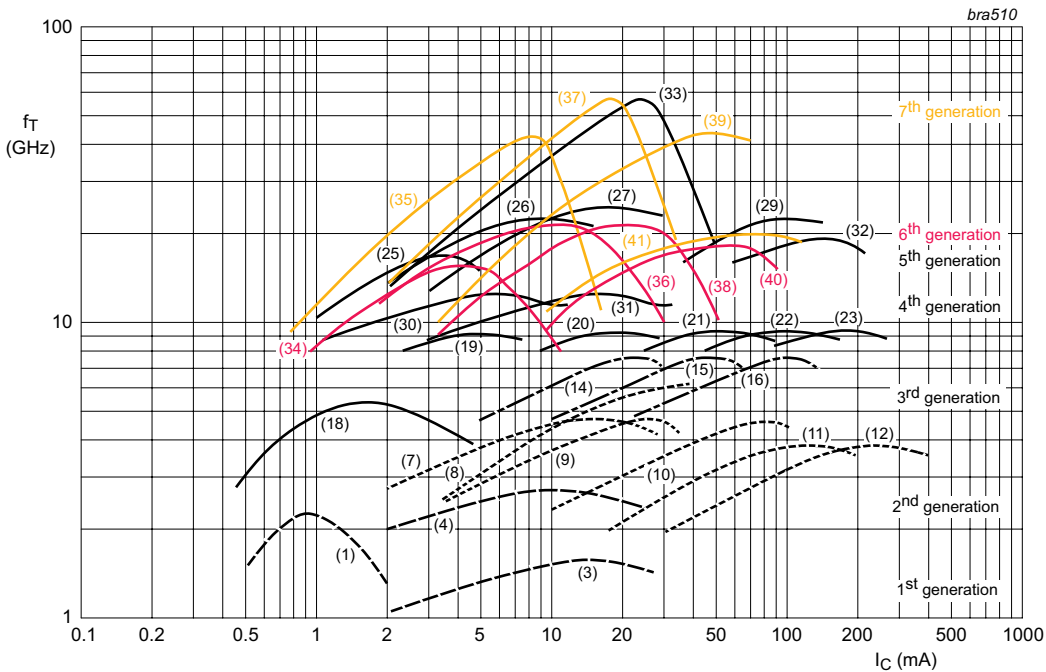


Figure 1

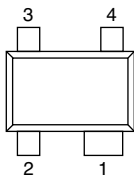


Figure 2

Pin	Description
Type (Figure 1)	
1	Collector
2	Base
3	Emitter
4	Emitter
Type/X (Figure 1)	
1	Collector
2	Emitter
3	Base
4	Emitter
Type/XR (Figure 2)	
1	Collector
2	Emitter
3	Base
4	Emitter

## Wideband transistors

Function	LNAs, mixers, frequency multipliers, buffers			High-linearity, high-output amplifiers and drivers			Oscillators			
	Frequency range	<6 GHz	6 – 12 GHz	12 – 18 GHz	<6 GHz	6 – 12 GHz	12 – 18 GHz	<6 GHz	6 – 12 GHz	12 – 18 GHz
	Band Type	L, S, C	X, Ku low	Ku high, Ka	L, S, C	X, Ku low	Ku high	L, S, C	X, Ku low	Ku high, Ka
BFU610F		•	•							•
BFU630F		•	•		•			•		•
BFU660F		•			•			•		
BFU690F		•			•			•	•	
BFU725F/N1		•	•	•	•	•		•		•
BFU710F		•	•	•	•			•		•
BFU730F		•	•	•	•		•	•		•
BFU760F		•	•		•	•		•		
BFU790F		•			•			•		

Red = application note available on NXP.com

## RF power transistors for portable equipment (VHF)

Type	Package	V <sub>CEO</sub> (max) (V)	I <sub>C</sub> (max) (mA)	P <sub>tot</sub> (max) (mW)	Polarity	GUM (typ) (dB)	@ f = (MHz)	@ I <sub>C</sub> = (mA)	@ V <sub>CE</sub> = (V)
BLT50	SOT223	10	500	2000	NPN	-	-	-	-
BLT70	SOT223H	8	250	2100	NPN	-	-	-	-
BLT80	SOT223	10	250	2000	NPN	-	-	-	-
BLT81	SOT223	9.5	500	2000	NPN	-	-	-	-

## RF wideband transistors generations 1 to 3

Type	Generation	Curve	Package	f <sub>T</sub> (typ) (GHz)	V <sub>CEO</sub> (max) (V)	I <sub>C</sub> (max) (mA)	P <sub>tot</sub> (max) (mW)	Polarity	GUM (typ) (dB)	@ f = (MHz)	@ I <sub>C</sub> = (mA)	@ V <sub>CE</sub> = (V)	GUM (typ) (dB)	@ f = (MHz)	@ I <sub>C</sub> = (mA)	@ V <sub>CE</sub> = (V)	NF (typ) (dB)	@ f = (MHz)	@ I <sub>C</sub> = (mA)	@ V <sub>CE</sub> = (V)	NF (typ) (dB)	@ f = (MHz)	@ I <sub>C</sub> = (mA)	@ V <sub>CE</sub> = (V)
BFS17	1	3	SOT23	1	15	25	300	NPN	-	-	-	-	-	-	-	-	4.5	500	2	5	-	-	-	-
<b>BFS17W</b>	1	3	SOT323	1.6	15	50	300	NPN	-	-	-	-	-	-	-	-	4.5	500	2	5	-	-	-	-
BFT25	1	1	SOT23	2.3	5	6.5	30	NPN	18	500	1	1	12	800	1	1	3.8	500	1	1	-	-	-	-
BFG31	2	10	SOT223	5	-15	-100	1000	PNP	16	500	-70	-10	12	800	-70	-10	-	-	-	-	-	-	-	-
BFG35	2	11	SOT223	4	18	150	1000	NPN	15	500	100	10	11	800	100	10	-	-	-	-	-	-	-	-
BFG92A/X	2	7	SOT143B	5	15	25	400	NPN	16	1000	15	10	11	2000	15	10	2	1000	5	10	3	2000	5	10
BFG97	2	10	SOT223	5.5	15	100	1000	NPN	16	500	70	10	12	800	70	10	-	-	-	-	-	-	-	-
BFQ149	2	10	SOT89	5	-15	-100	1000	PNP	12	500	-50	-10	-	-	-	-	3.75	500	-50	-10	-	-	-	-
BFQ18A	2	11	SOT89	4	18	150	1000	NPN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BFQ19	2	10	SOT89	5.5	15	100	1000	NPN	11.5	500	50	10	7.5	800	50	10	3.3	500	50	10	-	-	-	-
BFR106	2	10	SOT23	5	15	100	500	NPN	-	-	-	-	11.5	800	30	6	3.5	800	30	6	-	-	-	-
BFR92A	2	7	SOT23	5	15	25	300	NPN	14	1000	15	10	8	2000	15	10	3	2000	5	10	2.1	1000	5	10
<b>BFR92AW</b>	2	7	SOT323	5	15	25	300	NPN	14	1000	15	10	8	2000	15	10	2	1000	5	10	3	2000	5	10
BFS17A	2	4	SOT23	2.8	15	25	300	NPN	-	-	-	-	13.5	800	14	10	2.5	800	2	5	-	-	-	-
BFS25A	2	18	SOT323	5	5	6.5	32	NPN	-	-	-	-	13	1000	0.5	1	1.8	1000	1	1	-	-	-	-
BFT25A	2	18	SOT23	5	5	6.5	32	NPN	-	-	-	-	15	1000	0.5	1	1.8	1000	0.5	1	-	-	-	-
BFT92	2	7	SOT23	5	-15	-25	300	PNP	18	500	-14	-10	-	-	-	-	2.5	500	-5	-10	-	-	-	-
BFT92W	2	7	SOT323	4	-15	-35	300	PNP	17	500	-15	-10	11	1000	-15	-10	2.5	500	-5	-10	3	1000	-5	-10
BFT93	2	9	SOT23	5	-12	-35	300	PNP	16.5	500	-30	-5	-	-	-	-	2.4	500	-10	-5	-	-	-	-
BFT93W	2	9	SOT323	4	-12	-50	300	PNP	15.5	500	-30	-5	10	1000	-30	-5	2.4	500	-10	-5	3	1000	-10	-5
BFG135	3	16	SOT223	7	15	150	1000	NPN	16	500	100	10	12	800	100	10	-	-	-	-	-	-	-	-
BFG198	3	15	SOT223	8	10	100	1000	NPN	18	500	50	8	15	800	50	8	-	-	-	-	-	-	-	-
BFG590/X	3	22	SOT143B	5	15	200	400	NPN	13	900	80	4	7.5	2000	80	4	-	-	-	-	-	-	-	-
BFG591	3	22	SOT223	7	15	200	2000	NPN	13	900	70	12	7.5	2000	70	12	-	-	-	-	-	-	-	-
BFG67	3	14	SOT143B	8	10	50	380	NPN	17	1000	15	8	10	2000	15	8	1.7	1000	15	8	2.5	2000	5	8
BFG67/X	3	14	SOT143B	8	10	50	380	NPN	17	1000	15	8	10	2000	15	8	1.7	1000	15	8	2.5	2000	5	8
BFQ591	3	22	SOT89	7	15	200	2250	NPN	11	900	70	12	5.5	2000	70	12	-	-	-	-	-	-	-	-
BFG67W	3	14	SOT323	8	10	50	300	NPN	13	1000	15	8	8	2000	15	8	1.3	1000	5	8	2.7	2000	15	8
BFR93A	3	8	SOT23	6	12	35	300	NPN	13	1000	30	8	7	2000	30	8	1.9	1000	5	8	3	2000	5	8
<b>BFR94A^</b>	3	8	SOT23	6	15	25	300	NPN	14	1000	15	10	8	2000	15	10	2.1	1000	5	10	3	2000	10	8
BFR93AR	3	8	SOT23	6	12	35	300	NPN	13	1000	30	8	7	2000	30	8	1.9	1000	5	8	3	2000	5	8
<b>BFR93AW</b>	3	8	SOT323	5	12	35	300	NPN	13	1000	30	8	8	2000	30	8	1.5	1000	5	8	2.1	2000	5	8
<b>BFR94AW^</b>	3	8	SOT323	5	15	25	300	NPN	14	1000	15	10	8	2000	15	10	2.0	1000	5	10	3	2000	10	8

**Bold** = highly recommended product ^ AEC-Q101 qualified (some limitations apply)

## RF wideband transistors generations 4 and 4.5

Type	Generation	Curve	Package	f <sub>T</sub> (typ) (GHz)	V <sub>CEO</sub> (max) (V)	I <sub>C</sub> (max) (mA)	P <sub>tot</sub> (max) (mW)	Polarity	GUM (typ) (dB)	@ f = (MHz)	@ I <sub>C</sub> = (mA)	@ V <sub>CE</sub> = (V)	NF (typ) (dB)	@ f = (MHz)	@ I <sub>C</sub> = (mA)	@ V <sub>CE</sub> = (V)	NF (typ) (dB)	@ f = (MHz)	@ I <sub>C</sub> = (mA)	@ V <sub>CE</sub> = (V)	PL(1dB) (typ) (dBmW)	@ V <sub>CE</sub> = (V)	@ f = (MHz)	@ I <sub>C</sub> = (mA)	IP3 (typ) (dBm)	@ IC = (mA)	@ VCE = (V)
BFG505	4	19	SOT143B	9	15	18	150	NPN	13	2000	5	6	1.6	900	5	6	1.9	2000	1.25	6	4	6	900	5	10	5	6
BFG505/X	4	19	SOT143B	9	15	18	150	NPN	13	2000	5	6	1.6	900	5	6	1.9	2000	1.25	6	4	6	900	5	10	5	6
BFG505W	4	19	SOT343N	9	15	18	500	NPN	12	2000	5	6	1.6	900	5	6	1.9	2000	1.25	6	4	6	900	5	10	5	6
BFG505W/X	4	19	SOT343N	9	15	18	500	NPN	12	2000	5	6	1.6	900	5	6	1.9	2000	1.25	6	4	6	900	5	10	5	6
BFG505W/XR	4	19	SOT343R	9	15	18	500	NPN	12	2000	5	6	1.6	900	5	6	1.9	2000	1.25	6	4	6	900	5	10	5	6
BFG520	4	20	SOT143B	9	15	70	300	NPN	13	2000	20	6	1.6	900	20	6	1.9	2000	5	6	17	6	900	20	26	20	6
BFG520/X	4	20	SOT143B	9	15	70	300	NPN	13	2000	20	6	1.6	900	20	6	1.9	2000	5	6	17	6	900	20	26	20	6
BFG520/XR	4	20	SOT143R	9	15	70	300	NPN	13	2000	20	6	1.6	900	20	6	1.9	2000	5	6	17	6	900	20	26	20	6
BFG520W	4	20	SOT343N	9	15	70	500	NPN	11	2000	20	6	1.1	900	5	6	1.85	2000	5	6	17	6	900	20	26	20	6
BFG520W/X	4	20	SOT343N	9	15	70	500	NPN	11	2000	20	6	1.1	900	5	6	1.85	2000	5	6	17	6	900	20	26	20	6
BFG540	4	21	SOT143B	9	15	120	400	NPN	11	2000	40	8	1.3	900	10	8	2.1	2000	10	8	21	8	900	40	34	40	8
BFG540/X	4	21	SOT143B	9	15	120	400	NPN	11	2000	40	8	1.3	900	10	8	2.1	2000	10	8	21	8	900	40	34	40	8
BFG540/XR	4	21	SOT143R	9	15	120	400	NPN	11	2000	40	8	1.3	900	10	8	2.1	2000	10	8	21	8	900	40	34	40	8
BFG540W	4	21	SOT343N	9	15	120	500	NPN	10	2000	40	8	1.3	900	10	8	2.1	2000	10	8	21	8	900	40	34	40	8
BFG540W/X	4	21	SOT343N	9	15	120	500	NPN	10	2000	40	8	1.3	900	10	8	2.1	2000	10	8	21	8	900	40	34	40	8
BFG540W/XR	4	21	SOT343R	9	15	120	500	NPN	10	2000	40	8	1.3	900	10	8	2.1	2000	10	8	21	8	900	40	34	40	8
BFG541	4	21	SOT223	9	15	120	650	NPN	9	2000	40	8	1.3	900	10	8	2.1	2000	10	8	21	8	900	40	34	40	8
BFM505	4	19	SOT363A	9	8	18	500	NPN	10	2000	5	3	1.1	900	1	3	1.9	2000	5	3	-	-	-	-	-	-	-
BFM520	4	20	SOT363A	9	8	70	1000	NPN	9	2000	20	3	1.2	900	5	3	1.9	2000	5	3	-	-	-	-	-	-	-
BFQ540	4	21	SOT89	9	15	120	1,200	NPN	-	-	-	-	1.9	900	40	8	-	-	-	-	-	-	-	-	-	-	-
BFQ67	4	14	SOT23	8	10	50	300	NPN	8	2000	15	8	1.7	1000	15	8	2.7	2000	15	8	-	-	-	-	-	-	-
BFR505	4	19	SOT23	9	15	18	150	NPN	10	2000	5	6	1.2	900	5	6	1.9	2000	5	6	4	6	900	5	10	5	6
BFR505T	4	19	SOT416	9	15	18	150	NPN	10	2000	5	6	1.2	900	1.25	6	1.9	2000	1.25	6	5	6	900	5	10	5	6
BFR520	4	20	SOT23	9	15	70	300	NPN	9	2000	20	6	1.1	900	5	6	1.9	2000	5	6	17	6	900	20	26	20	6
BFR520T	4	20	SOT416	9	15	70	150	NPN	9	2000	20	6	1.1	900	5	6	1.9	2000	5	6	17	6	900	20	26	20	6
BFR540	4	21	SOT23	9	15	120	500	NPN	7	2000	40	8	1.3	900	10	8	2.1	2000	10	8	21	8	900	40	34	40	8
BFS505	4	19	SOT323	9	15	18	150	NPN	10	2000	5	6	1.2	900	1.25	6	1.9	2000	1.25	6	4	6	900	5	10	5	6
BFS520	4	20	SOT323	9	15	70	300	NPN	9	2000	20	6	1.1	900	5	6	1.9	2000	5	6	17	6	900	20	26	20	6
BFS540	4	21	SOT323	9	15	120	500	NPN	8	2000	40	8	1.3	900	10	8	2.1	2000	10	8	21	8	900	40	34	40	8
PBR941	4	20	SOT23	8	10	50	360	NPN	9.5	2000	15	6	1.4	1000	5	6	2	2000	5	6	-	-	-	-	-	-	-
PBR951	4	21	SOT23	8	10	100	365	NPN	8	2000	30	6	1.3	1000	5	6	2	2000	5	6	-	-	-	-	-	-	-
PRF947	4	20	SOT323	8.5	10	50	250	NPN	10	2000	15	6	1.5	1000	5	6	2.1	2000	5	6	-	-	-	-	-	-	-
PRF949	4	20	SOT416	9	10	50	150	NPN	10	2000	15	6	1.5	1000	5	6	2.1	2000	5	6	-	-	-	-	-	-	-
PRF957	4	21	SOT323	8.5	10	100	270	NPN	9.2	2000	30	6	1.3	1000	5	6	1.8	2000	5	6	-	-	-	-	-	-	-

## RF wideband transistors generations 5 to 7

Type	Generation	Curve	Package	f <sub>T</sub> (typ) (GHz)	V <sub>CEO</sub> (max) (V)	I <sub>C</sub> (max) (mA)	P <sub>tot</sub> (max) (mW)	Polarity	GUM (typ) (dB)	@ f = (MHz)	@ I <sub>C</sub> = (mA)	@ V <sub>CE</sub> = (V)	NF (typ) (dB)	@ f = (MHz)	@ I <sub>C</sub> = (mA)	@ V <sub>CE</sub> = (V)	NF (typ) (dB)	@ f = (MHz)	@ I <sub>C</sub> = (mA)	@ V <sub>CE</sub> = (V)	PL(1dB) (typ) (dBmW)	@ V <sub>CE</sub> = (V)	@ f = (MHz)	@ I <sub>C</sub> = (mA)	IP3 (typ) (dBm)	@ IC = (mA)	@ VCE = (V)
BFG21W	5	32	SOT343R	-	4.5	500	600	NPN	10	1900	1	3.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BFG403W	5	25	SOT343R	17	4.5	3.6	16	NPN	22	2000	3	2	1	900	1	2	1.6	2000	1	2	5	1	900	10	6	1	1
BFG410W	5	26	SOT343R	22	4.5	12	54	NPN	21	2000	10	2	0.9	900	1	2	1.2	2000	1	2	5	2	2000	10	15	10	2
BFG424F	5	27	SOT343F	25	4.5	30	135	NPN	23	2000	25	2	0.8	900	2	2	1.2	2000	2	2	12	2	2000	25	22	25	2
BFG424W	5	27	SOT343R	25	4.5	30	135	NPN	22	2000	25	2	0.8	900	2	2	1.2	2000	2	2	12	2	2000	25	22	25	2
BFG425W	5	27	SOT343R	25	4.5	30	135	NPN	20	2000	25	2	0.8	900	2	2	1.2	2000	2	2	12	2	2000	25	22	25	2
BFG480W	5	29	SOT343R	21	4.5	250	360	NPN	16	2000	80	2	1.2	900	8	2	1.8	2000	8	2	20	3.6	2000	1	28	80	2
BFU610F	6	34	SOT343F	40	5	10	50	NPN	21	5800	8	2	0.75	2400	1	2	1.4	5800	1	2	-	-	-	-	14	8	5
BFU630F	6	36	SOT343F	40	5	30	130	NPN	28	2400	25	2	0.58	1500	5	2	0.73	2400	5	2	-	-	-	-	23	25	5
BFU660F	6	38	SOT343F	40	5	70	200	NPN	28.5	1500	60	2	0.6	1500	20	2	0.75	2400	20	2	-	-	-	-	30	60	5
BFU690F	6	40	SOT343F	40	5	100	300	NPN	25.6	1500	90	2	0.7	1500	50	2	0.9	2400	50	2	-	-	-	-	35	90	5
BFU710F	7	35	SOT343F	70	2.8	10	30	NPN	16.5	12000	8	2	0.9	5800	2	2	1.5	12000	2	2	-	-	-	-	14.5	8	2
BFU725F/N1	7	37	SOT343F	70	2.8	40	136	NPN	18	5800	25	2	0.47	2400	5	2	0.7	5800	5	2	8	2	5800	25	19	25	2
BFU730F	7	33	SOT343F	70	2.8	30	130	NPN	18.5	5800	25	2	0.56	2400	5	2	0.8	5800	5	2	-	-	-	-	20.5	25	2
BFU730LX	7	-	SOT883C	53	3.0	160	NPN	13.3	5800	25	2	0.55	2400	5	2	0.8	5800	5	2	-	-	-	-	26	12.4	2.3	
BFU760F	7	39	SOT343F	70	2.8	70	220	NPN	25	2400	60	2	0.5	1500	20	2	0.6	2400	20	2	-	-	-	-	23	60	2
BFU790F	7	41	SOT343F	70	2.8	100	250	NPN	20.4	2400	90	2	0.56	1500	50	2	0.7	2400	50	2	-	-	-	-	24	90	2
BFU768F	7	39	SOT343F	70	2.8	70	220	NPN	13	5800	10.8	2.1	0.5	2400	10.8	2.1	0.7	5800	10.8	2.1	5	2.1	5800	10.8	19	10.8	2.1

**Bold** = highly recommended product

## RF wideband transistors for DC - 2 GHz application

Type	Package	$f_T$ (typ)(GHz)	$h_{FE}$ (typ)	$V_{CE0}$ (max)(V)	$V_{CE5}$ (max)(V)	$V_{EBO}$ (max)(V)	$I_C$ (max)(mA)	$P_{tot}$ (max)(mW)	$C_{p(max)}$ (typ)(dB)	@ $f =$ (MHz)	@ $I_C =$ (mA)	@ $V_{CE} =$ (V)	$G_{p(max)}$ (typ)(dB)	@ $f =$ (MHz)	@ $I_C =$ (mA)	@ $V_{CE} =$ (V)	NF <sub>min</sub> (typ)(dB)	@ $f =$ (MHz)	@ $I_C =$ (mA)	@ $V_{CE} =$ (V)	NF <sub>min</sub> (typ)(dB)	@ $f =$ (MHz)	@ $I_C =$ (mA)	@ $V_{CE} =$ (V)	$P_{1(dB,500)}$ (typ)(dBm)	@ $f =$ (MHz)	@ $I_C =$ (mA)	@ $V_{CE} =$ (V)	IP3 <sub>0.500</sub> (typ)(dBm)	@ $f =$ (MHz)	@ $I_C =$ (mA)	@ $V_{CE} =$ (V)
<b>BFU520W</b>	SOT323	10	95	12	24	2	30	450	23	433	5	8	19	900	5	8	0.7	433	5	8	0.8	900	5	8	7	900	10	8	17	900	10	8
<b>BFU530W</b>		11	95	12	24	2	40	450	24	433	10	8	19	900	10	8	0.8	433	10	8	0.9	900	10	8	10	900	15	8	20	900	15	8
<b>BFU550W</b>		11	95	12	24	2	50	450	24	433	15	8	18	900	15	8	0.9	433	15	8	0.9	900	15	8	14	900	25	8	23	900	25	8
<b>BFU520A</b>	SOT23	10	95	12	24	2	30	450	23	433	5	8	18	900	5	8	0.7	433	5	8	0.8	900	5	8	7	900	10	8	17	900	10	8
<b>BFU530A</b>		11	95	12	24	2	40	450	23	433	10	8	18	900	10	8	0.8	433	10	8	0.9	900	10	8	10	900	15	8	20	900	15	8
<b>BFU550A</b>		11	95	12	24	2	50	450	24	433	15	8	18	900	15	8	0.9	433	15	8	1.0	900	15	8	14	900	25	8	23	900	25	8
<b>BFU520</b>	SOT143	11	95	12	24	2	30	450	20	900	5	8	17	1800	5	8	0.8	900	5	8	0.9	1800	5	8	7	1800	10	8	17	1800	10	8
<b>BFU530</b>		11	95	12	24	2	40	450	21	900	10	8	17	1800	10	8	0.9	900	10	8	1.0	1800	10	8	10	1800	15	8	19	1800	15	8
<b>BFU550</b>		11	95	12	24	2	50	450	21	900	15	8	15	1800	15	8	1.0	900	15	8	1.1	1800	15	8	13	1800	25	8	23	1800	25	8
<b>BFU520X</b>	SOT143X	11	95	12	24	2	30	450	20	900	5	8	17	1800	5	8	0.8	900	5	8	0.9	1800	5	8	10	1800	10	8	20	1800	10	8
<b>BFU530X</b>		11	95	12	24	2	40	450	21	900	10	8	17	1800	10	8	0.9	900	10	8	1.0	1800	10	8	10	1800	15	8	20	1800	15	8
<b>BFU550X</b>		11	95	12	24	2	50	450	22	900	15	8	16	1800	15	8	1.0	900	15	8	1.1	1800	15	8	14	1800	25	8	23	1800	25	8
<b>BFU520XR</b>	SOT143XR	11	95	12	24	2	30	450	20	900	5	8	17	1800	5	8	0.8	900	5	8	0.9	1800	5	8	7	1800	10	8	17	1800	10	8
<b>BFU530XR</b>		11	95	12	24	2	40	450	21	900	10	8	17	1800	10	8	0.9	900	10	8	1.0	1800	10	8	10	1800	15	8	19	1800	15	8
<b>BFU550XR</b>		11	95	12	24	2	50	450	22	900	15	8	16	1800	15	8	1.0	900	15	8	1.1	1800	15	8	13	1800	25	8	23	1800	25	8
<b>BFU580Q</b>	SOT89	11	95	12	24	2	60	1000	20	433	20	8	14	900	20	8	1.0	433	20	8	1.1	900	20	8	15	900	30	8	25	900	30	8
<b>BFU590Q</b>		8	95	12	24	2	200	2000	18	433	50	8	11	900	50	8	-	433	50	8	-	900	50	8	22	900	80	8	32	900	80	8
<b>BFU580G</b>	SOT223	11	95	12	24	2	60	1000	22	433	20	8	16	900	20	8	1.0	433	20	8	1.1	900	20	8	15	900	30	8	24	900	30	8
<b>BFU590G</b>		9	95	12	24	2	200	2000	20	433	50	8	13	900	50	8	-	433	50	8	-	900	50	8	22	900	80	8	31	900	80	8
<b>BFU520Y</b>	SOT363	10	95	12	24	2	30	450	23	433	5	8	19	900	5	8	0.7	433	5	8	0.8	900	5	8	7	900	10	8	17	900	10	8

**Bold** = highly recommended product





## LNAs for wireless infrastructure (50 Ω)

Type	Package	@ V <sub>CC</sub>	@ I <sub>CC</sub>	f <sub>range</sub>	f <sub>range</sub>	G <sub>ass</sub>	NF	P <sub>L(1dB)</sub>	IP <sub>3O</sub>	RL <sub>in</sub>	RL <sub>out</sub>
		[typ]	[typ]	[min]	[max]	[typ]	[typ]	[typ]	[typ]	[typ]	[typ]
		(V)	(mA)	(MHz)	(MHz)	(dB)	(dB)	(dBm)	(dBm)	(dB)	(dB)
BGU7051	SOT650-1	3.3	65	500	750	23.5	0.6	17	32	27.5	18
				750	850	21.5	0.63	16.5	32	26	17.5
				900	1500	21	0.65	16.5	33	24.5	18
BGU7052	SOT650-1	3.3	80	1500	1750	21.5	0.76	15.5	37	23	22
				1850	1900	20	0.76	14.5	35.5	23	22
				1950	2500	19.7	0.79	14.5	35	22	21
BGU7053	SOT650-1	3.3	90	2300	2500	18.5	0.85	13.5	36	23	19.5
				2700	2800	17.5	0.9	13	36	26	23
BGU7060	SOT1301AA	5	200	700	800	3	21	11	25.5	20	19
						12	15	7.5	22.5	20	19
						18	7.2	-7	4.5	20	19
						35	1	-12.5	2.5	24	19
BGU7061	SOT1301AA	5	200	800	950	3	21	11	25.5	20	19
						12	15	7.5	22.5	20	19
						18	7.2	-7	4.5	20	19
						35	1	-12.5	2.5	24	19
BGU7062	SOT1301AA	5	185	1710	1785	3	20.6	10.7	25.6	23	16
						12	15	5.4	21	23	16
						18	9.3	-7	3.4	23	16
						35	0.98	-12.8	1	26	16
BGU7062N2	SOT1301AA1	5	215	1710	1785	3	22.1	10.9	30		
						17	10.5	5.8	20.9	22	17.3
						18	5.95	-6.1	4.6		
						35	0.94	-12.3	1	23.5	17.5
BGU7063	SOT1301AA	5	190 230	1920	1980	18	6.4	-6.4	5.4	35	15
						35	1.05	-12.5	0.9	31	15
						3	20.3	11.5	22.8		
BGU7073	SOT1301AA3	5	229	1920	1980	17	10.2	5.8	18.1	23.3	15.6
						18	6.2	-4.7	5.8		
						35	1	-12.1	0.7	23.8	17.5
BGU7075	SOT1301AA3	5		2500	2570	3	20	10.3	22.2		
						17	10	9.5	17.7	19	16
						18	6	-5.9	4.6		
						35	1.2	-12.2	-0.4	23	18
BGU8051	SOT1327	5	50	500	900						
				900	900	18	0.43	19.3	41	27	20
				900	1500						
BGU8052	SOT1327	5	47	1500	1900						
				1900	1900	18	0.52	19	39	27	12
				1900	2300						
BGU8053	SOT1327	5	51	2300	2500						
				2500	2500	18	0.63	20	39	23	12
				2500	5000						

## VGAs for wireless infrastructure

Type	Package	Type	@ V <sub>CC</sub>	@ I <sub>CC</sub>	f <sub>range</sub>	f <sub>range</sub>	G <sub>p</sub> @ minimum attenuation	Attenuation range	NF	P <sub>L(1dB)</sub>	IP <sub>3O</sub>
			[typ]	[typ]	[min]	[max]	(dB)	(dB)	[typ]	[typ]	[typ]
			(V)	(mA)	(MHz)	(MHz)			(dB)	(dBm)	(dBm)
<b>BGA7204</b>	SOT617-3	Single	5	115	400	700	18.5	31.5	7	21	38
			5	115	700	1450	18.5	31.5	6.5	21	37.5
			5	115	1450	2100	17.5	30.5	6.5	20.5	36
			5	115	2100	2750	16.5	30	7	20	34
<b>BGA7210</b>	SOT617-3	Single	5	185	700	1400	30	31.5	6.5	21	39
			5	185	1400	1700	29.5	31.5	6.5	21	37
			5	185	1700	2200	29	31.5	6.5	21	35
			5	185	2200	2800	28	30.5	7	23	35
5	185	3400	3800	26	29.5	8	19	27			
BGA7350	SOT617-1	Dual	5	245	50	250	18.5	24	6	17	43
<b>BGA7351</b>	SOT617-1	Dual	5	280	50	250	22	28	6	16.5	46

**Bold** = highly recommended product

## Extreme broadband amplifiers

Type	Package	Frequency range	@ V <sub>cc</sub>	@ I <sub>cc</sub>	Gain	NF	P1dB	OIP3	OIP2
			[typ]	[typ]					
		MHz	(V)	(mA)	(dB)	(dB)	(dBm)	(dBm)	(dBm)
BGA3012	SOT89	40 - 1006	8	110	12	3.1	21.5	40	60
			5	70	12	2.9	18.0	36	54
		5 - 300	8	110	12	3.0	23.0	40	60
			5	70	12	2.9	17.0	40	55
BGA3015	SOT89	40 - 1006	8	110	15	2.5	22.5	40	60
			5	70	15	2.3	18.0	36	55
		5 - 300	8	110	15	2.3	24.0	40	60
			5	70	15	2.3	18.0	40	55
BGA3018	SOT89	40 - 1006	8	120	18	2.1	23.5	40	60
			5	75	18	2.2	18.0	36	54
		5 - 300	8	120	18	1.9	25.0	40	60
			5	75	18	1.9	20.0	36	54
BGA3021	SOIC8	40 - 1200	8	350	16	6	29.5	46	75
			8	175	16	4.5	22.5	37	60
			5	175	16	4.5	22.5	37	60
BGA3022	SOIC8	40 - 1200	8	350	16	5.5	30	46	75
			8	175	18	5.5	30	46	75
			5	175	20	5	30	46	75
BGA3023	SOIC8	40 - 1200	8	350	20	5	30	45.5	75
			8	175	20	3.5	23.5	37	60
			5	175	20	3.5	23.5	37	60

## General-purpose medium power amplifier

Type	Package	@ V <sub>cc</sub>	@ I <sub>cc</sub>	Frequency range	RF input frequency	Gain	P <sub>L(1dB)</sub>	IP <sub>3o</sub>	NF
		[typ]	[typ]	[min]	[max]	[typ]	[typ]	[typ]	[typ]
		(V)	(mA)	(MHz)	(MHz)	(dB)	(dBm)	(dBm)	(dB)
BGA6289	SOT89	4.1	84	100-3000	900	15.0	17.0	31.0	3.5
					1800	13.0	15.0	28.0	3.7
BGA6489	SOT89	5.1	78	100-3000	900	20.0	20.0	33.0	3.1
					1800	16.0	17.0	30.0	3.3
BGA6589	SOT89	4.8	81	100-3000	900	22.0	21.0	33.0	3
					1800	17.0	20.0	32.0	3.3
BGA7024	SOT89	5	110	400 - 2700	940	22.0	24.0	37.5	2.9
					1960	16.0	25.5	38.0	3.7
					2140	15.0	25.5	38.0	3.7
					2445	14.0	24.5	37.5	4.0
BGA7027	SOT89	5	165	400 - 2700	940	19.0	29.0	41.5	2.6
					1960	11.5	27.5	43.0	3.8
					2140	11.0	28.0	42.5	3.9
BGA7124	SOT908	5	140	400 - 2700	940	23.0	25.0	38.5	5.2
					1960	16.5	24.5	38.0	4.6
					2140	16.0	24.5	37.5	4.8
					2445	14.0	23.5	36.0	5.4
BGA7127	SOT908	5	180	400 - 2700	940	20.0	27.5	41.5	3.1
					1960	13.0	28.5	42.5	4.5
					2140	12.0	28.0	42.0	4.6
					2445	10.5	27.5	41.5	4.7
BGA7130	SOT908	5	450	400 - 2700	750	18.0	30.0	43.0	5.0
					2140	10.0	30.0	44.0	5.0
BGA6130	SOT908	3.6	70	400 - 2700	434	17.0	28.0	29.5	4.5
					915	14.0	29.0	30.0	4.0

## Upstream VGA for DOCSIS 3.0

Type	Package	Type	@ V <sub>cc</sub>	@ I <sub>cc</sub>	f <sub>range</sub>	f <sub>range</sub>	Gp @ minimum attenuation	Attenuation range	NF	P <sub>L(1dB)</sub>	IMD3 @ 64 dBmV
			[typ]	[typ]	[min]	[max]	(dB)	(dB)	[typ]	[typ]	[typ]
			(V)	(mA)	(MHz)	(MHz)			(dBmV)	(dBc)	
BGA3031	SOT662	Single	5	310	5	85	34	58	3.5	74	-70

**Bold** = highly recommended product

<sup>(1)</sup> Gain = GP, power gain <sup>(2)</sup> DG = gain control range



## 2-stage variable-gain linear amplifier

Type	Package	@		Frequency range	@ 900 MHz				@ 1900 MHz				Limits		
		V <sub>s</sub>	I <sub>s</sub>		Gain <sup>(1)</sup>	DG <sup>(2)</sup>	P <sub>1dB</sub>	ACPR	Gain <sup>(1)</sup>	DG <sup>(2)</sup>	P <sub>1dB</sub>	ACPR	V <sub>s</sub>	I <sub>s</sub>	P <sub>tot</sub>
		(V)	(mA)		(dB)	(dB)	(dBm)	(dBc)	(dB)	(dB)	(dBm)	(dBc)	(V)	(mA)	(mW)
BGA2031/1	SOT363	3	51	800 - 2500	24	62	11	49	23	56	13	49	3.3	77	200

<sup>(1)</sup> Gain = GP, power gain    <sup>(2)</sup> DG = gain control range

## Wideband linear mixer

Type	Package	@		RF input	IF output	@ 880 MHz			@ 1900 MHz			Limits		
		V <sub>s</sub>	I <sub>s</sub>	Frequency range	Frequency range	NF	Gain <sup>(1)</sup>	OIP3	NF	Gain <sup>(1)</sup>	OIP3	V <sub>s</sub>	I <sub>s</sub>	P <sub>tot</sub>
		(V)	(mA)	range	range	(dB)	(dB)	(dBm)	(dB)	(dB)	(dBm)	(V)	(mA)	(mW)
BGA2022	SOT363	3	6	800 - 2500	50 - 500	9	5	4	9	6	10	4	10	40

<sup>(1)</sup> Gain = GP, power gain

## 3.4.2 Wireless infrastructure ICs

### IQ modulators for wireless infrastructure

Type	Package	@ V <sub>cc</sub>	@ I <sub>cc</sub>	f <sub>lo</sub> range	f <sub>lo</sub>	P <sub>o</sub>	BW <sub>mod</sub>	Nflr(o) *	P <sub>L(1dB)</sub>	IP2 <sub>o</sub>	IP3 <sub>o</sub>	SBS	CF
		[typ]	[typ]			[typ]	[typ]	[typ]	[typ]	[typ]	[typ]	[typ]	[typ]
		(V)	(mA)	(MHz)	(MHz)	(dBm)	(MHz)	(dBm/Hz)	(dBm)	(dBm)	(dBm)	(dBc)	(dBm)
BGX7100	SOT616-3	5	165	400 - 4000	750	-0.2	400	-159 / -158.5	11.5	71	29	55	-55
			165		910			-159 / -158.5	11.5	72	29	49	-55
			173		1840			-158.5 / -158	11.5	69	27	47	-50
			173		1960			-158.5 / -158	11.5	72.5	27	49	-48
			178		2140			-158.5 / -158	11.5	74	27	51	-45
			178		2650			-158 / -158	11.5	62	26	60	-45
			184		3650			-158 / -158	11.5	60	25	53	-43
BGX7101	SOT616-3	5	172	400 - 4000	750	4	650	-159 / -158.5	12	71	28	63	-51
			172		910			-159 / -158.5	12	75	28	49	-57
			180		1840			-158.5 / -158	12	71	27	55	-50
			180		1960			-158.5 / -158	12	72	27	57	-47
			178		2140			-158.5 / -158	12	75	27	63	-45
			182		2650			-158 / -158	12	65	26	50	-45
			188		3650			-158 / -158	12	65	25	57	-42

\* Without modulation/with modulation

### Dual mixers for wireless infrastructure

Type	Package	@ V <sub>cc</sub>	@ I <sub>cc</sub>	RF input frequency	RF input frequency	Local oscillator frequency	Local oscillator frequency	Second-order spurious rejection 2RF-2LO	NFSSB single-sideband	IP3 <sub>i</sub>	G <sub>conv</sub>
		[typ]	[typ]	[min]	[max]	[min]	[max]	[max]	[typ]	[typ]	[typ]
		(V)	(mA)	(MHz)	(MHz)	(MHz)	(MHz)	(dBc)	(dB)	(dBm)	(dB)
<b>BGX7220</b>	SOT1092-2	5	330	700	950	500	1150	-60	10	26	8
<b>BGX7221</b>	SOT1092-2	5	365	1400	2700	1500	2500	-60	10	25.5	8.5

**Bold** = highly recommended product

### 3.4.3 Satellite LNB RF ICs

#### Downconverter with PLL/VCO

Type	Package	Input freq range	V <sub>cc</sub>	I	G <sub>conv</sub>	NF	OIP3	LO Freq	Integrated phase noise density (degrees RMS)
			(V)	(mA)	(dB)	(dB)	(dBm)	(GHz)	
TFF1012HN	SOT763-1	10.7 - 12.75	5	56	30	8	17	9.75 / 10.6	1.5
TFF1013HN	SOT763-1	10.7 - 12.75	5	56	34	8	17	9.75 / 10.6	1.5
TFF1014HN	SOT763-1	10.7 - 12.75	5	52	36	7	13	9.75 / 10.6	1.5
TFF1015HN	SOT763-1	10.7 - 12.75	5	52	39	7	13	9.75 / 10.6	1.5
TFF1017HN	SOT763-1	10.7 - 12.75	5	52	42	7	13	9.75 / 10.6	1.5
TFF1018HN	SOT763-1	10.7 - 12.75	5	52	45	7	13	9.75 / 10.6	1.5

### 3.4.4 VSAT LNB RF ICs

#### Downconverter with PLL/VCO for VSAT

Type	Package	Input freq range	V <sub>cc</sub>	I	G <sub>conv</sub>	NF	OIP3	LO Freq	Integrated phase noise density (degrees RMS)
			(V)	(mA)	(dB)	(dB)	(dBm)	(GHz)	
TFF1024HN	SOT763-1	10.7 - 12.75	5	54	30	7	16	9.75 / 11.3	1

### 3.4.5 Low-noise LO generators for VSAT and general microwave applications

#### Why choose NXP's low-noise LO generators:

- ▶ Lowest total cost of ownership
- ▶ Alignment-free concept
- ▶ Easy circuit design-in
- ▶ Improved LO stability

#### Low-noise LO generators for VSAT applications

Type	Package	f <sub>IN(REF)</sub> (MHz)	V <sub>cc</sub>	I <sub>cc</sub>	PLL phase noise @ N=64, @ 100 kHz Max (dBc/Hz)	PLL f <sub>o(RF)</sub> (GHz)	Output buffer		Input
			Typ	Typ			Po	RL <sub>out(RF)</sub>	S <sub>i</sub>
			(V)	(mA)			Typ	Max	Min
TFF1003HN	SOT616	50 - 815	3.3	100	-92	12.8 - 13.05	-5	-10	-10
TFF1007HN	SOT616	230.46 - 234.38	3.3	100	-104	14.62 - 15	-3	-10	-10

#### Low-noise LO generators for general microwave applications

Type	Package	f <sub>IN(REF)</sub> (MHz)	V <sub>cc</sub>	I <sub>cc</sub>	PLL phase noise @ N=64		PLL			Output buffer		Input	Frequency band
			Typ	Typ	@ 100 kHz @ 10 MHz		fo(RF)			Po	RL <sub>out(RF)</sub>	S <sub>i</sub>	
			(V)	(mA)	(dBc/Hz)	(dBc/Hz)	Min	Typ	Max	Typ	Max	Min	
			(V)	(mA)	(dBc/Hz)	(dBc/Hz)	(GHz)	(GHz)	(GHz)	(dBm)	(dB)	(dBm)	
TFF11088HN	SOT616	34 - 562	3.3	100	-95	-131	8.59	8.79	8.99	-5	-10	-10	X
TFF11092HN	SOT616	35 - 588	3.3	100	-95	-131	8.99	9.2	9.41	-5	-10	-10	X
TFF11096HN	SOT616	37 - 616	3.3	100	-95	-131	9.41	9.63	9.85	-5	-10	-10	X
TFF11101HN	SOT616	39 - 633	3.3	100	-95	-131	9.92	10.02	10.13	-3	-10	-10	X
TFF11132HN	SOT616	51 - 846	3.3	100	-95	-131	12.9	13.2	13.5	-5	-10	-10	Ku
TFF11139HN	SOT616	53 - 886	3.3	100	-95	-131	13.54	13.85	14.17	-5	-10	-10	Ka
TFF11142HN	SOT616	55 - 901	3.3	100	-95	-131	14.13	14.27	14.42	-4	-10	-10	X
TFF11145HN	SOT616	55 - 927	3.3	100	-95	-131	14.17	14.5	14.83	-5	-10	-10	Ka

**Bold** = highly recommended product

## 3.5 RF MOS transistors

### 3.5.1 JFETs

JFET selection guide on [www.nxp.com/rffets](http://www.nxp.com/rffets)

Easy-to-use parametric filters help you choose the right junction field-effect transistor for your design.

#### Why choose NXP's JFETs:

- ▶ Reliable volume supplier
- ▶ Short lead time
- ▶ Broad portfolio

#### N-channel junction field-effect transistors for switching

Type	Package	V <sub>DS</sub> (V)	I <sub>G</sub> (mA)	Characteristics										
				I <sub>DSS</sub> (mA)		V <sub>GSoff</sub> (V)		R <sub>DS(on)</sub> (Ω)	C <sub>rs</sub> (pF)		t <sub>on</sub> (ns)		t <sub>off</sub> (ns)	
				min	max	min	max	max	min	max	typ	max	typ	max
BSR56	SOT23	40	50	50	-	4	10	25	-	5	-	-	-	25
BSR57	SOT23	40	50	20	100	2	6	40	-	5	-	-	-	50
BSR58	SOT23	40	50	8	80	0.8	4	60	-	5	-	-	-	100
PMBFJ108	SOT23	25	50	80	-	3	10	8	-	15	4	-	6	-
PMBFJ109	SOT23	25	50	40	-	2	6	12	-	15	4	-	6	-
PMBFJ110	SOT23	25	50	10	-	0.5	4	18	-	15	4	-	6	-
PMBFJ111	SOT23	40	50	20	-	3	10	30	-	3 (typ)	13	-	35	-
PMBFJ112	SOT23	40	50	5	-	1	5	50	-	3 (typ)	13	-	35	-
PMBFJ113	SOT23	40	50	2	-	0.5	3	100	-	3 (typ)	13	-	35	-
PMBF4391	SOT23	40	50	50	150	4	10	30	-	3.5	-	15	-	20
PMBF4392	SOT23	40	50	25	75	2	5	60	-	3.5	-	15	-	35
PMBF4393	SOT23	40	50	5	30	0.5	3	100	-	3.5	-	15	-	50

#### P-channel junction field-effect transistors for switching

Type	Package	V <sub>DS</sub> (V)	I <sub>G</sub> (mA)	Characteristics										
				I <sub>DSS</sub> (mA)		V <sub>GSoff</sub> (V)		R <sub>DS(on)</sub> (Ω)	C <sub>rs</sub> (pF)		t <sub>on</sub> (ns)		t <sub>off</sub> (ns)	
				min	max	min	max	max	min	max	typ	max	typ	max
PMBFJ174	SOT23	30	50	20	135	5	10	85	4 (typ)		7	-	15	-
PMBFJ175	SOT23	30	50	7	70	3	6	125	4 (typ)		15	-	30	-
PMBFJ176	SOT23	30	50	2	35	1	4	250	4 (typ)		35	-	35	-
PMBFJ177	SOT23	30	50	1.5	20	0.8	2.25	300	4 (typ)		45	-	45	-

#### N-channel junction field-effect transistors for general RF applications

Type	Package	V <sub>DS</sub> (V)	I <sub>G</sub> (mA)	Characteristics									
				I <sub>DSS</sub> (mA)		V <sub>GSoff</sub> (V)		Y <sub>fs</sub>   (mS)		C <sub>rs</sub> (pF)			
				min	max	min	max	min	max	min	max		
<b>DC, LF, and HF amplifiers</b>													
BF545A	SOT23	30	10	2	6.5	0.4	7.5	3	6.5	0.8	-	-	-
BF545B	SOT23	30	10	6	15	0.4	7.5	3	6.5	0.8	-	-	-
BF545C	SOT23	30	10	12	25	0.4	7.5	3	6.5	0.8	-	-	-
BF556A	SOT23	30	10	3	7	0.5	7.5	4.5	-	0.8	-	-	-
<b>Pre-amplifiers for AM tuners in car radios</b>													
BF861A	SOT23	25	10	2	6.5	0.2	1.0	12	20	2.1	2.7	-	-
BF861B	SOT23	25	10	6	15	0.5	1.5	16	25	2.1	2.7	-	-
BF861C	SOT23	25	10	12	25	0.8	2	20	30	2.1	2.7	-	-
<b>BF862</b>	SOT23	20	10	10	25	0.3	2	35	-	typ. 1.9	-	-	-
<b>RF stages FM portables, car radios, main radios, and mixer stages</b>													
BF510 <sup>(1)</sup>	SOT23	20	10	0.7	3	typ. 0.8	-	-	2.5	0.4	0.5	-	-
BF511 <sup>(1)</sup>	SOT23	20	10	2.5	7	typ. 1.5	-	-	4	0.4	0.5	-	-
BF512 <sup>(1)</sup>	SOT23	20	10	6	12	typ. 2.2	-	-	6	0.4	0.5	-	-
BF513 <sup>(1)</sup>	SOT23	20	10	10	18	typ. 3	-	-	7	0.4	0.5	-	-
<b>Low-level general-purpose amplifiers</b>													
BFR30	SOT23	25	5	4	10	< 5	-	1	4	1.5	-	-	-
BFR31	SOT23	25	5	1	5	< 2.5	-	1.5	4.5	1.5	-	-	-
<b>General-purpose amplifiers</b>													
<b>BFT46</b>	SOT23	25	5	0.2	1.5	< 1.2	-	> 1	-	1.5	-	-	-
<b>AM input stages UHF/VHF amplifiers</b>													
PMBFJ308	SOT23	25	50	12	60	1	6.5	-	> 10	1.3	2.5	-	-
PMBFJ309	SOT23	25	50	12	30	1	4	-	> 10	1.3	2.5	-	-
PMBFJ310	SOT23	25	50	24	60	2	6.5	-	> 10	1.3	2.5	-	-
PMBFJ620	SOT363	25	50	24	60	2	6.5	10	-	1.3	2.5	-	-

**Bold** = highly recommended product <sup>(1)</sup> Asymmetrical

## 3.5.2 MOSFETs

RF MOSFET selection guide on [www.nxp.com/rffets](http://www.nxp.com/rffets)

Easy-to-use parametric filters help you choose the right RF MOSFET for your design.

### Why choose NXP's MOSFETs:

- ▶ Reference designs for TV tuning
- ▶ Short lead time
- ▶ Broad portfolio
- ▶ Smallest packages
- ▶ 2-in-1 FETs for tuner applications
- ▶ Reliable volume supply
- ▶ Highest performing MOSFETs for TV tuning



### N-channel, single MOSFETs for switching

Type	Package	V <sub>DS</sub> (V)	Characteristics														MODE	
			I <sub>b</sub>		I <sub>DSS</sub>		V <sub>GS(th)</sub>		R <sub>DS(on)</sub>	C <sub>rs</sub>		t <sub>on</sub>		t <sub>off</sub>		S <sub>21(on)</sub>   <sub>2</sub>		S <sub>21(off)</sub>   <sub>2</sub>
			(mA)	(mA)	(mA)	(mA)	(V)	(V)	(Ω)	(pF)	(pF)	(ns)	(ns)	(ns)	(ns)	(dB)		(dB)
<b>BSS83</b>	SOT143	10	50	-	-	0.1	2	45		typ.0.6	-	1	-	5	-	-	Enh.	
Silicon RF Switches																		
<b>BF1107</b>	SOT23	3	10	-	100	-	7	20	-	-	-	-	-	-	2.5	30	Depl.	
<b>BF1108</b>	SOT143B	3	10	-	100	-	7	20	-	-	-	-	-	-	3	30	Depl.	
<b>BF1108R</b>	SOT143R	3	10	-	100	-	7	20	-	-	-	-	-	-	3	30	Depl.	
<b>BF1108W</b>	SOT343	3	10	-	100	-	7	20	-	-	-	-	-	-	3	30	Depl.	
<b>BF1108WR</b>	SOT343R	3	10	-	100	-	7	20	-	-	-	-	-	-	3	30	Depl.	
<b>BF1118</b>	SOT143B	3	10	-	100	-	7	22	-	-	-	-	-	-	3	30	Depl.	
<b>BF1118R</b>	SOT143R	3	10	-	100	-	7	22	-	-	-	-	-	-	3	30	Depl.	
<b>BF1118W</b>	SOT343	3	10	-	100	-	7	22	-	-	-	-	-	-	3	30	Depl.	
<b>BF1118WR</b>	SOT343R	3	10	-	100	-	7	22	-	-	-	-	-	-	3	30	Depl.	

**Bold** = highly recommended product

### N-channel, dual-gate MOSFETs

Type	Package	V <sub>DS</sub> (V)	I <sub>b</sub> (mA)	Characteristics											VHF	UHF	
				I <sub>DSX</sub>		V <sub>GS(th)</sub>		Y <sub>fs</sub>		C <sub>is</sub>	C <sub>os</sub>	F @ 800 MHz					
				(mA)	(mA)	(V)	(V)	(mS)	(mS)	(pF)	(pF)	(dB)					
With external bias																	
<b>BF908</b>	SOT143	12	40	3	27	-	-2	36	50	3.1	1.7	1.5	X	X			
<b>BF908R</b>	SOT143R	12	40	3	27	-	-2	36	50	3.1	1.7	1.5	X	X			
<b>BF908WR</b>	SOT343R	12	40	3	27	-	-2	36	50	3.1	1.7	1.5	X	X			
<b>BF991</b>	SOT143	20	20	4	25	-	-2.5	10	-	2.1	1.1	1	X	-			
<b>BF992</b>	SOT143	20	40	-	-	-	-1.3	20	-	4	2	1.2 <sup>(1)</sup>	X	-			
<b>BF994S</b>	SOT143	20	30	4	20	-	-2.5	15	-	2.5	1	1 <sup>(1)</sup>	X	-			
<b>BF996S</b>	SOT143	20	30	4	20	-	-2.5	15	-	2.3	0.8	1.8	-	X			
<b>BF998</b>	SOT143	12	30	2	18	-	-2.0	21	-	2.1	1.05	1	X	X			
<b>BF998R</b>	SOT143R	12	30	2	18	-	-2.0	21	-	2.1	1.05	1	X	X			
<b>BF998WR</b>	SOT343R	12	30	2	18	-	-2.5	22	-	2.1	1.05	1	X	X			
Fully internal bias																	
<b>BF1105R</b>	SOT343R	7	30	8	16	-	0.3	2	25	-2.2 <sup>(3)</sup>	1.2 <sup>(2)</sup>	1.7	X	X			

<sup>(1)</sup> @ 200 MHz

<sup>(2)</sup> COSS

<sup>(3)</sup> Cig

## 3.6 RF modules

CATV module selection guide on [www.nxp.com/catv](http://www.nxp.com/catv)  
Easy-to-use parametric filters help you choose the right CATV module for your design.

### Why choose NXP's RF modules:

- ▶ Excellent linearity, stability, and reliability
- ▶ Rugged construction
- ▶ Extremely low noise
- ▶ High power gain
- ▶ Low total cost of ownership

### CATV types for Chinese (C-types) and 1 GHz GaAs HFET line-ups

The C-types are specially designed for the Chinese market, customized for two major governmental projects. The GaAs HFET family includes a complete 1 GHz line-up for high-end applications around the world.

### C-types (China)

- ▶ CATV push-pulls, section 3.6.1: BGY588C, BGE788C, CGY888C
- ▶ CATV power doublers, section 3.6.3: BGD712C, CGD982HCi, CGD985HCi, CGD987HCi, CGD982LC, CGD985LC
- ▶ CATV optical receivers, section 3.6.4: BGO807C, BGO807CE

### 1 GHz GaAs HFET high-end hybrids

- ▶ CATV push-pulls, section 3.6.2: CGY1032, CGY1041, CGY1043, CGY1047, CGY1049
- ▶ CATV power doublers, section 3.6.3: CGD1040Hi, CGD1042Hi, CGD1044Hi, CGD1046Hi, CGD1042H, CGD1044H

### 3.6.1 CATV push-pulls

Type	Frequency range (MHz) <sup>(1)</sup>	Gain (dB)	Slope (dB)	FL (dB) <sup>(2)</sup>	RL <sub>IN</sub> /RL <sub>OUT</sub> (dB)	CTB (dB) <sup>(3)</sup>	X <sub>mod</sub> (dB) <sup>(3)</sup>	CSO (dB) <sup>(3)</sup>	@ Ch	@ Vo (dBmV)	NF @ f <sub>max</sub> (dB)	I <sub>tot</sub> (mA)
BGY588C	40 - 550	33.5 - 35.5	0.2 - 1.7	0.5	16 / 16	-57		-62	77	44	8	345
BGY785A	40 - 750	18 - 19	0 - 2	0.1	20 / 20	-54.5	-57.5	-62	110	44	6	225
BGE788C		33.2 - 35.2	0.3 - 2.3	0.6	16 / 16	-49		-52	110	44	8	325
BGY787		21 - 22	0 - 1.5	0.2	20 / 20	-54.5	-54	-57.5	110	44	5	220
BGE787B		28.5 - 29.5	0.2 - 2.2	0.45	20 / 20	-48	-52	-56	110	44	6.5	340
BGE885	40 - 870	16.5 - 17.5	0.2 - 1.2	0.5	14 / 14						8	240
BGX885N		16.5 - 17.5	0.2 - 1.4	0.3	20 / 20						8	240
BGY885A		18 - 19	0 - 2	0.2	20 / 20	-65	-65	-67	49	44	6	225
BGY887		21 - 22	0.2 - 2	0.2	20 / 20	-64.5	-64.5	-67.5	49	44	5	220
CGY888C		34.5 - 36.5	1.5	0.25	20 / 20	-65	-72	-63	112	44	4	280
BGY835C		33.5 - 34.5	0.5 - 2.5	0.5	20 / 20	-60		-55	49	44	7	340
BGY887B		28.5 - 29.5	0.5 - 2.5	0.5	20 / 20	-60	-60	-60	49	44	6.5	340
BGY888		33.5 - 34.5	0.5 - 2.5	0.2	20 / 20	-63.5	-63	-64	49	44	5.5	325

### 3.6.2 CATV push-pulls 1 GHz

Type	Frequency range (MHz) <sup>(1)</sup>	Gain (dB)	Slope (dB)	FL (dB) <sup>(1)</sup>	RL <sub>IN</sub> /RL <sub>OUT</sub> (dB)	CTB (dB) <sup>(3)</sup>	X <sub>mod</sub> (dB) <sup>(3)</sup>	CSO (dB) <sup>(3)</sup>	@ Ch	@ Vo (dBmV)	NF @ f <sub>max</sub> (dB)	I <sub>tot</sub> (mA)
<b>CGY1041</b>	40 - 1003	21 - 22.5	1.2 - 2.7	0.9	20 / 18	-62	-58	-64	79 NTSC channels + 75 digital channels	44	4.3	265
<b>CGY1043</b>		23 - 24.5	1.2 - 2.7	0.9	20 / 18	-62	-58	-64	79 NTSC channels + 75 digital channels	44	4.2	265
<b>CGY1047</b>		27 - 28.5	1.5 - 2.5	0.8	20 / 18	-64	-60	-66	79 NTSC channels + 75 digital channels	44	4.5	250
<b>CGY1049</b>		29 - 31	0.85 - 2.35	0.85	20 / 18	-62	-58	-64	79 NTSC channels + 75 digital channels	44	4.5	265
<b>CGY1032</b>		32 - 34	1.05 - 2.55	0.85	20 / 18	-62	-58	-64	79 NTSC channels + 75 digital channels	44	4.4	265
BGY1085A		18 - 19	0 - 2	0.3	20 / 20	-53	-54	-56	150	40	7.5	240

**Bold** = highly recommended product

<sup>(1)</sup> Frequency range: minimum and maximum frequency in MHz at which data are characterized (@ Ch / @ Vo)

<sup>(2)</sup> FL is flatness of frequency response

<sup>(3)</sup> The number of channels and the output voltage at which CTB, Xmod, CSO, IMD2, and IMD3 are characterized, are @ fmax

<sup>(4)</sup> S is minimum responsivity of optical receivers

### 3.6.3 CATV power doublers

Type	Frequency range (MHz) <sup>(1)</sup>	Gain (dB)	Slope (dB)	FL (dB) <sup>(1)</sup>	RL <sub>IN</sub> /RL <sub>OUT</sub> (dB)	CTB (dB) <sup>(3)</sup>	X <sub>mod</sub> (dB) <sup>(3)</sup>	CSO (dB) <sup>(3)</sup>	@ Ch	@ Vo (dBmV)	NF @ f <sub>max</sub> (dB)	I <sub>tot</sub> (mA)
BGD712	40 - 750	18.2 - 18.8	0.5 - 1.5	0.35	17 / 17	-62	-63	-63	112	44	7	395
BGD712C		18.2 - 18.8	0.5 - 1.5	0.35	17 / 17	-62	-63	-63	112	44	7	410
BGD714		20 - 20.6	0.5 - 1.5	0.35	23 / 23	-61	-62	-62	112	44	7	395
BGD812	40 - 870	18.2 - 18.8	0.4 - 1.4	0.5	25 / 23	-57	-62	-58	132	44	7.5	395
BGD814		19.7 - 20.3	0.5 - 1.5	0.5	25 / 24	-56	-61	-57	132	44	7.5	395
BGD816L		21.2 - 21.8	0.5 - 1.5	0.5	22 / 25	-55	-58	-56	132	44	7.5	360
CGD942C		22 - 24	1 - 2	0.5	20 / 20	-66	-66	-66	98	48	3.5	450
CGD944C		24 - 26	1 - 2	0.5	20 / 20	-66	-66	-66	98	48	3.5	450
CGD1040HI		19.5 - 22	0.5 - 2	1	20 / 20	-70	-66	-76	79	58.4	5.5	440
CGD1042HI	22 - 23.5	0.5 - 2	1	20 / 20	-70	-65	-75	79	58.4	5.5	440	
CGD1044HI	23.5 - 25.5	0.5 - 2	1	20 / 20	-70	-64	-75	79	58.4	5	440	
CGD1046HI	26.5 - 28	0.7 - 2.2	1	20 / 20	-75	-68	-70	79	56.4	5	450	
CGD1042H	22 - 24	1.5	0.5	20 / 21	-75	-67	-76	79	59	5	450	
CGD1044H	24 - 26	1	0.5	20 / 21	-75	-67	-76	79	59	5	450	
CGD982HCI	22 - 24	0.5 - 2	1	20 / 20	-66	-68	-69	98	48	5.5	440	
CGD985HCI	23.5 - 25.5	0.5 - 2	1	20 / 20	-66	-68	-69	98	48	5	440	
CGD987HCI	26 - 28	0.7 - 2	1	20 / 20	-66	-68	-66	98	48	5	440	
CGD982LC	22 - 24	0.5 - 2	0.8	20 / 20	-65	-60	-70	98	48	6.5	365	
CGD985LC	24 - 26	0.5 - 2	0.8	20 / 20	-65	-60	-70	98	48	6.5	365	
CGD1042L	22 - 24	0.5 - 2	0.8	20 / 20	-75	-68	-77	79	54	6.5	375	

### 3.6.4 CATV optical receivers

Type	Frequency range (MHz) <sup>(1)</sup>	S (V/W) <sup>(4)</sup>	Slope (dB)	FL (dB) <sup>(1)</sup>	RL <sub>OUT</sub> (dB)	IMD3 (dB) <sup>(3)</sup>	IMD2 (dB) <sup>(3)</sup>	@ f <sub>measured</sub> (MHz)	@ P <sub>(lopt)</sub> (mW)	NF @ f <sub>max</sub> (dB)	I <sub>tot</sub> (mA)	Connectors
BGO807C	40 - 870	750	0 - 2	1	11	-71	-55	854.5	1	8.5	205	FC and SC
BGO807CE		750	0 - 2	1	11	-69	-53	854.5	1	8.5	205	FC and SC

### 3.6.5 CATV reverse hybrids

Type	Frequency range (MHz) <sup>(1)</sup>	Gain (dB)	Slope (dB)	FL (dB) <sup>(1)</sup>	RL <sub>IN</sub> /RL <sub>OUT</sub> (dB)	CTB (dB) <sup>(3)</sup>	X <sub>mod</sub> (dB) <sup>(3)</sup>	CSO (dB) <sup>(3)</sup>	@ Ch	@ Vo (dBmV)	NF @ f <sub>max</sub> (dB)	I <sub>tot</sub> (mA)
BGY68	5 - 75	29.2 - 30.8	-0.2 - 0.5	0.2	20 / 20	-68	-60		4	50	3.5	135
BGY66B	5 - 120	24.5 - 25.5	-0.2 - 0.5	0.2	20 / 20	-66	-54		14	48	5	135
BGY67	5 - 200	21.5 - 22.5	-0.2 - 0.5	0.2	20 / 20	-67	-60		22	50	5.5	215
BGY67A		23.5 - 24.5	-0.2 - 0.5	0.2	20 / 20	-67	-59		22	50	5.5	215
BGR269		34.5 - 35.5	-0.2 - 0.6	0.5	20 / 20	-57	-50	-66	28	50	5.5	160

**Bold** = highly recommended product

<sup>(1)</sup> Frequency range: minimum and maximum frequency in MHz at which data are characterized (@ Ch / @ Vo)

<sup>(2)</sup> FL is flatness of frequency response

<sup>(3)</sup> The number of channels and the output voltage at which CTB, X<sub>mod</sub>, CSO, IMD2, and IMD3 are characterized, are @ f<sub>max</sub>

<sup>(4)</sup> S is minimum responsivity of optical receivers





### 3.7.1.2 1.3 - 1.7 GHz transistors

Type number	Product	f <sub>min</sub> (MHz)	f <sub>max</sub> (MHz)	P1dB (W)	Matching	Test signal performance					
						VDS (V)	P <sub>L</sub> (W)	η <sub>o</sub> (%)	G <sub>p</sub> (dB)	Test signal	Package
BLP7G22-05	Driver	700	2700	5	-	28	1	23	16	2-c WCDMA	SOT1179
BLF6G21-10G		1	2200	10	-	28	0.7	15	18.5	2-c WCDMA	SOT538
BLP7G22-10		700	2700	10	-	28	2	25	17.4	2-c WCDMA	SOT1179
BLF6G15L-40(B)RN	Driver/Final	1450	1550	40	I/O	28	2.5	13	22	2-c WCDMA	SOT1112
BLF7G15LS-200	Final	1450	1550	200	I/O	28	50	29	19.5	2-c WCDMA	SOT502
BLF6G15L(S)-250PBRN		1450	1550	250	I/O	28	60	34	18.5	2-c WCDMA	SOT1110
BLF7G15LS-300P		1450	1550	300	I/O	28	85	31	18	2-c WCDMA	SOT539

### 3.7.1.3 1.8 - 2.0 GHz transistors

Type number	Product	f <sub>min</sub> (MHz)	f <sub>max</sub> (MHz)	P1dB (W)	Matching	Test signal performance					
						VDS (V)	P <sub>L</sub> (W)	η <sub>o</sub> (%)	G <sub>p</sub> (dB)	Test signal	Package
BLF6G21-10G	Driver	1	2200	10	-	28	0.7	15	18.5	2-c WCDMA	SOT538
BLM7G1822S-20PB(G)*	MMIC	1805	2170	20	I/O	28	0.5	12	31.5	2-c WCDMA	SOT1212
BLM7G1822S-40PB(G)		1805	2170	40	I/O	28	4	12	31.5	2-c WCDMA	SOT1211
BLF6G20(S)-45	Driver/final	1800	2000	45	I/O	28	2.5	14	19.2	2-c WCDMA	SOT608
BLF6G20LS-75		1800	2000	75	I/O	28	6.3	37.5	19	GSM EDGE	SOT502
BLF7G20L(S)-90P	Final	1427	2170	90	I/O	28	84	41	19.5	GSM EDGE	SOT1121
BLF6G20(LS)-110		1800	2000	110	I/O	28	25	32	19	2-c WCDMA	SOT502
BLF6G20LS-140		1800	2000	140	I/O	28	35.5	30	16.5	2-c WCDMA	SOT502
BLF7G20LS-140P		1800	2000	140	I/O	28	12.5	41	17.5	GSM EDGE	SOT1121
BLF8G20LS-140(G)V*		1805	1990	140	I/O	28	35	30	18	2-c WCDMA	SOT1244
BLF8G20LS-160V*		1800	2000	160	I/O	28	35.5	34	20	2-c WCDMA	SOT1239
BLF8G19LS-170BV		1800	1990	170	I/O	32	60	32	18	2-c WCDMA	SOT1120
BLF6G20-180PN		1800	2000	180	I/O	32	50	29.5	18	2-c WCDMA	SOT539
BLF7G20L(S)-200		1805	1990	200	I/O	28	55	33	18	2-c WCDMA	SOT502
BLF8G20LS-200V		1800	2000	200	I/O	28	55	33	17.5	2-c WCDMA	SOT1120
BLF8G20LS-210(G)V*	1805	1990	210	I/O	28	50	25	18.5	2-c WCDMA	SOT1244	
BLF8G20LS-220	1800	2000	220	I/O	28	55	34	18.9	2-c WCDMA	SOT502	
BLF8G20L(S)-230V	1800	2000	230	I/O	28	55	31.7	18	2-c WCDMA	SOT1239	

### 3.7.1.4 2.0 - 2.2 GHz transistors

Type number	Product	f <sub>min</sub> (MHz)	f <sub>max</sub> (MHz)	P1dB (W)	Matching	Test signal performance					
						VDS (V)	P <sub>L</sub> (W)	η <sub>o</sub> (%)	G <sub>p</sub> (dB)	Test signal	Package
BLP7G22-05	Driver	700	2700	5	-	28	1	23	16	2-c WCDMA	SOT1179
BLF6G21-10G		1	2200	10	-	28	0.7	15	18.5	2-c WCDMA	SOT538
BLP7G22-10		700	2700	10	-	28	2	25	17.4	2-c WCDMA	SOT1179
<b>BLM7G1822S-20PB(G)</b>	MMIC	1805	2170	20	I/O	28	0.5	12	31.5	2-c WCDMA	SOT1211
BLM6G22-30(G)		2100	2200	30	I/O	28	2	9	29.5	2-c WCDMA	SOT822
BLM7G24S-30BG	Driver/final	2100	2400	30	I/O	28	16	11.3	31.5	2-c WCDMA	SOT1212
BLF6G22L-40BN		2000	2200	40	I/O	28	2.5	16	19	2-c WCDMA	SOT1112
BLF6G22L-40P		2110	2170	40	I/O	28	13.5	30	19	2-c WCDMA	SOT1121
BLF6G22LS-40BN		2000	2200	40	I/O	28	2.5	16	18.5	2-c WCDMA	SOT1112
BLF6G22LS-40P		2110	2170	40	I/O	28	13.5	30	19	2-c WCDMA	SOT1121
BLM7G1822S-40PB(G)		1805	2170	40	I/O	28	4	12	31.5	2-c WCDMA	SOT1211
BLF6G22-45		2000	2200	45	I/O	28	2.5	13	18.5	2-c WCDMA	SOT608
BLD6G21L(S)-50		2010	2025	50	O	28	8	43	14.5	TD-SCDMA	SOT1130
BLD6G22L(S)-50		2110	2170	50	I/O	28	8	40	14	TD-SCDMA	SOT1130
BLM7G22S-60PB(G)		2100	2200	60	I/O	28	32	11.3	31.5	2-c WCDMA	SOT1212
BLF6G22LS-100	Final	2000	2200	100	I/O	28	25	29	18.2	2-c WCDMA	SOT502
BLF7G22L(S)-100P		2000	2200	100	I/O	28	20	28.5	19.1	2-c WCDMA	SOT1121
BLF6G22L(S)-130		2000	2200	130	I/O	28	30	28.5	17	2-c WCDMA	SOT502
BLF7G22LS-130		2000	2200	130	I/O	28	30	32	18.5	2-c WCDMA	SOT502
BLF8G22LS-140		2000	2200	140	I/O	28	33	32.5	18.5	2-c WCDMA	SOT502
BLF7G21L-160P		1800	2050	160	I/O	28	45	34	18	2-c WCDMA	SOT1121
BLF7G21LS-160(P)		1800	2050	160	I/O	28	45	34	18	2-c WCDMA	SOT1121
BLF7G22L-160		2000	2200	160	I/O	28	43	30	18	2-c WCDMA	SOT502
BLF8G22L(S)-160BV		2000	2200	160	I/O	32	55	32	18	2-c WCDMA	SOT1120
BLP8G21S-160PV		1880	2025	160	I/O	28	20	30	17.5	2-c WCDMA	SOT1221
BLF6G22-180PN	2000	2200	180	I/O	32	50	27.5	17.5	2-c WCDMA	SOT539	
BLF6G22LS-180RN	2000	2200	180	I/O	30	50	25	16	2-c WCDMA	SOT502	
BLF7G22L(S)-200	2110	2170	200	I/O	28	55	31	18.5	2-c WCDMA	SOT502	
BLF8G22LS-200(G)V	2110	2170	200	I/O	28	55	29	19	2-c WCDMA	SOT1244	
BLF8G22LS-220	2110	2170	220	I/O	28	55	33	17	2-c WCDMA	SOT502	
BLF8G22LS-240	2110	2170	240	I/O	28	55	28.5	19	2-c WCDMA	SOT502	
BLF7G22L(S)-250P	2110	2170	250	I/O	28	70	31	18.5	2-c WCDMA	SOT539	
BLF8G22LS-270	2110	2170	270	I/O	28	80	30	17.7	2-c WCDMA	SOT502	
BLF8G22LS-270(G)V	2110	2170	270	I/O	28	50	29	17.3	2-c WCDMA	SOT1244	

**Bold** = highly recommended product

\* Check status in section 3.1, as this type is not yet released for mass production



### 3.7.1.5 2.3 - 2.4 GHz transistors

Type number	Product	f <sub>min</sub> (MHz)	f <sub>max</sub> (MHz)	P1dB (W)	Matching	Test signal performance					
						VDS (V)	P <sub>L</sub> (W)	η <sub>D</sub> (%)	G <sub>P</sub> (dB)	Test signal	Package
BLP7G22-05	Driver	700	2700	5	-	28	1	23	16	2-c WCDMA	SOT1179
BLP7G22-10		700	2700	10	-	28	2	25	17.4	2-c WCDMA	SOT1179
BLM7G24S-30BG	MMIC	2100	2400	30	I/O	28	1.6	11.3	31.5	2-c WCDMA	SOT1212
BLF7G24L(S)-100	Final	2300	2400	100	I/O	28	20	27	18	NCDMA/IS95	SOT502
BLF8G24LS-100(G)V*		2300	2400	100	I/O	28	25	30	18	2-c WCDMA	SOT1244
BLF7G24L(S)-140		2300	2400	140	I/O	28	30	26.5	18.5	NCDMA/IS95	SOT502
<b>BLF8G24LS-150(G)V</b>		2300	2400	150	I/O	28	45	30	18	2-c WCDMA	SOT1244
BLF7G24L(S)-160P		2300	2400	160	I/O	28	30	27.5	18.5	NCDMA/IS95	SOT539
<b>BLF8G24L-200P</b>		2300	2400	200	I/O	28	60	32	17.2	1-c WCDMA	SOT539
BLF8G24LS-200P(N)		2300	2400	200	I/O	28	60	32	17.2	1-c WCDMA	SOT539
BLC8G24LS-240AV*		2300	2400	240	I/O	30	63	45	15	1-c WCDMA	SOT1252

### 3.7.1.6 2.5 - 2.7 GHz transistors

Type number	Product	f <sub>min</sub> (MHz)	f <sub>max</sub> (MHz)	P1dB (W)	Matching	Test signal performance					
						VDS (V)	P <sub>L</sub> (W)	η <sub>D</sub> (%)	G <sub>P</sub> (dB)	Test signal	Package
BLF6G27-10(G)	Driver	2300	2700	10	I	28	22.5	20	19	NCDMA/IS95	SOT975
BLF6G27L(S)-40P	Driver/final	2500	2700	40	I/O	28	20	37	17.5	1-c WCDMA	SOT1121
BLF6G27(S)-45		2500	2700	45	I/O	28	7	24	18	NCDMA/IS95	SOT608
BLF6G27L(S)-50BN	Final	2500	2700	50	I/O	28	3	14.5	16.5	2-c WCDMA	SOT1112
BLF7G27L(S)-75P		2300	2700	75	I/O	28	12	26	17	NCDMA/IS95	SOT1121
BLF7G27L(S)-90P		2500	2700	90	I/O	28	16	29	18.5	NCDMA/IS95	SOT1121
<b>BLC8G27LS-100AV*</b>		2490	2690	100	I/O	28	17	45	15.5	1-c WCDMA	SOT1275
BLF6G27-100		2500	2700	100	I/O	28	14	23	16.5	1-c WCDMA	SOT502
BLF7G27L(S)-100		2500	2700	100	I/O	28	20	28	18	NCDMA/IS95	SOT502
<b>BLF8G27LS-100</b>		2500	2700	100	I/O	28	25	28	17	2-c WCDMA	SOT502
BLF8G27LS-100P(GV)		2500	2700	100	I/O	28	25	33	18	1-c WCDMA	SOT1121
BLF8G27LS-100V		2500	2700	100	I/O	28	25	28	17	2-c WCDMA	SOT1244
BLF7G27L(S)-140		2500	2700	140	I/O	28	30	22	16.5	NCDMA/IS95	SOT502
BLF8G27LS-140(V)		2500	2700	140	I/O	32	32	32	17.4	2-c WCDMA	SOT502
BLF7G27L(S)-150P		2500	2700	150	I/O	28	30	26	16.5	NCDMA/IS95	SOT539
BLF8G27LS-150(G)V		2500	2700	150	I/O	28	45	30	18	2-c WCDMA	SOT1244
BLC8G27LS-160AV		2496	2690	160	I/O	28	32	43	14.5	1-c WCDMA	SOT1275
BLF7G27L-200PB		2600	2700	200	I/O	32	65	29	16.5	2-c WCDMA	SOT1110
BLC8G27LS-240AV*		2500	2700	240	I/O	28	56	45	15.5	1-c WCDMA	SOT1252

### 3.7.1.7 3.5 - 3.8 GHz transistors

Type number	Product	f <sub>min</sub> (MHz)	f <sub>max</sub> (MHz)	P1dB (W)	Matching	Test signal performance					
						VDS (V)	P <sub>L</sub> (W)	η <sub>D</sub> (%)	G <sub>P</sub> (dB)	Test signal	Package
BLF6G38-10G	Driver	3400	3600	10	I	28	2	20	14	NCDMA/IS95	SOT975
BLF6G38(S)-25	Driver/final	3400	3800	25	I/O	28	4.5	24	15	NCDMA/IS95	SOT608
BLF6G38(LS)-50		3400	3800	50	I/O	28	9	23	14	NCDMA/IS95	SOT502
<b>BLF8G38LS-75V*</b>	Final	3400	3800	75	I/O	30	20	26	15.5	1-c WCDMA	SOT1239
BLF6G38(LS)-100		3400	3600	100	I/O	28	18.5	21.5	13	NCDMA/IS95	SOT502

**Bold** = highly recommended product

\* Check status in section 3.1, as this type is not yet released for mass production

### 3.7.1.8 Power LDMOS Doherty designs

Freq band (MHz)	PPEAK (dBm)	POUT-AVG (dBm)	VDS (V)	Gain (dB)	Drain efficiency (%)	Type	Main transistor	Peak transistor
<b>758 - 803 MHz</b>								
773 - 803	50.5	41.5	28	17.1	39	SYM	1/2 BLP7G10LS-140P	1/2 BLP7G10LS-140P
773 - 803	52.2	44.5	28	17.8	46.5	SYM	1/2 BLP7G07LS-140P	1/2 BLP7G07LS-140P
758 - 803	55	48.4	28	16.5	49	SYM	BLP7G10LS-140P	BLP7G10LS-140P
758 - 803	55.6	48.4	28	17.8	47	SYM	BLF8G10LS-160	BLF8G10LS-160
<b>728 - 821 MHz</b>								
728 - 768	51.7	45	28	19	48	SYM	1/2 BLP7G10LS-140P	1/2 BLP7G10LS-140P
790 - 821	55.5	47	28	19	42	SYM	1/2 BLF6G10L(S)-260PRN	1/2 BLF6G10L(S)-260PRN
728 - 768	48.3	41	28	19	45	SYM	1/2 BLP8G10S-45P	1/2 BLP8G10S-45P
790 - 821	57.2	49.5	32	20	42	SYM	BLF6G10LS-200RN	BLF6G10LS-200RN
728 - 768	58	50	32	20.5	47	SYM	BLF6G10LS-200RN	BLF6G10LS-200RN
790 - 821	55.7	47.9	28	19.3	44	SYM	1/2 BLF8G10L-300P	1/2 BLF8G10L-300P
728 - 768	56	47.7	28	19.4	44	SYM	1/2 BLF8G10L-300P	1/2 BLF8G10L-300P
<b>790 - 960 MHz</b>								
790 - 960	55.4	47	50	18.5	40	SYM	BLF6H10L-160	BLF6H10L-160
<b>869 - 960 MHz</b>								
925 - 960	46	35.5	30	20	38	SYM	BLP7G22S-10	BLP7G22S-10
925 - 960	48	40	28	17	47	SYM	1/2 BLP8G10S-45P	1/2 BLP8G10S-45P
869 - 960	55.8	48	50	18.7	42	SYM	BLF6H10L-160	BLF6H10L-160
925 - 960	57.4	49	50	16.8	49	3-WAY	BLF6H10L-160	2xBLF6H10L-160
920 - 960	46	38	28	24	51	SYM	BLF6G21-10G	BLF6G21-10G
869 - 894	52	44	28	20	48	SYM	BLF6G10S-45	BLF6G10S-45
869 - 894	52.7	44.5	28	15	50	3-WAY	BLF6G10S-45	2x BLF6G10S-45
920 - 960	54.7	47.5	28	17.3	48	SYM	BLF6G10LS-135RN	BLF6G10LS-135RN
920 - 960	55.2	48	30	16.9	46.3	SYM	BLF8G10LS-160V	BLF8G10LS-160V
920 - 960	55.1	47.1	28	20.5	44	SYM	1/2 BLF6G10L(S)-260PRN	1/2 BLF6G10L(S)-260PRN
920 - 960	55.5	48	28	16.5	48.5	SYM	1/2 BLF8G10L-300P	1/2 BLF8G10L-300P
920 - 960	56.2	48	28	18.5	40	SYM	BLF6G10LS-135RN	BLF6G10LS-135RN
920 - 960	56.6	50	30	18.8	44.5	SYM	BLF6G10LS-200RN	BLF6G10LS-200RN
920 - 960	57.1	49	30	16.1	46.7	ASYM	BLF8G10LS-160	BLF7G10LS-250
920 - 960	57.1	49	28	15	48	ASYM	BLF8G10LS-160	2xBLF8G10LS-160
920 - 960	57.3	49.3	30	16	50	ASYM	BLF8G10LS-160	BLF7G10LS-250
869 - 894	57.5	50.8	30	18	48.8	ASYM	BLF6G10LS-200RN	BLF7G10LS-250
925 - 960	57.7	49.7	28	20.5	40	SYM / MPPM	BLF6G10L(S)-260PRN	BLF6G10L(S)-260PRN
869 - 894	57.9	52	28	18.2	50.1	SYM/MMPP	BLF6G10LS-260PRN	BLF6G10LS-260PRN
869 - 894	58	50	32	20.5	46	SYM	BLF6G10-200RN	BLF6G10-200RN
925 - 960	58.9	50.9	32	22	47	SYM / MMPP	BLF6G10L(S)-260PRN	BLF6G10L(S)-260PRN
920 - 960	57	49.2	28	15.8	48	SYM	BLF7G10LS-250	BLF7G10LS-250
869 - 894	57.2	49.3	28	16.5	49.5	SYM	BLF7G10LS-250	BLF7G10LS-250
869 - 894	59.2	50.4	28	16	52	ASYM	BLF7G10LS-250	BLF7G10LS-250X2
920 - 960	43	36	28	24.3	38	CLASS AB	BLP7G22-10P	
869 - 894	58.9	52	28	16.1	49.1	ASYM	BLF6G10LS-200RN	2xBLF7G10LS-250
869 - 895	58.5	50.5	28	16.4	49	SYM	BLF8G10LS-270	BLF8G10LS-270
869 - 895	57.3	49	28	17	46	SYM	BLF7G10LS-250	BLF7G10LS-250
869 - 895	51.5	44	28	16.6	46	SYM	1/2 BLP7G10LS-140P	1/2 BLP7G10LS-140P
869 - 895	59.9	52	28	15.2	580	ASYM	BLF8G10LS-270	2xBLF8G10LS-270
920-960	56.4	49.3	28	15.1	47	SYM	1/2 BLF8G09LS-400PW	1/2 BLF8G09LS-400PW
869-895	57.1	49.5	28	16	46	SYM	1/2 BLF8G10LS-400PGV	1/2 BLF8G10LS-400PGV
860-895	47.5	39.2	28	18	47	SYM	1/2 BLP8G10LS-45P	1/2 BLP8G10LS-45P
<b>1476 - 1555 MHz</b>								
1526 - 1555	56.6	48.6	28	18.4	42	SYM	BLF7G15LS-200	BLF7G15LS-200
1476 - 1511	58.1	49.6	28	16	42	ASYM	BLF7G15LS-200	BLF7G15LS-300P
1476 - 1511	58.6	50.6	32	16.5	42	SYM	BLF6G15LS-250PBRN	BLF6G15LS-250PBRN
<b>1805 - 1880 MHz (DCS)</b>								
1845 - 1880	52.6	45	28	14.5	46.5	SYM	1/2 BLF7G21LS-160P	1/2 BLF7G21LS-160P
1805 - 1880	48	40	28	15.4	42.4	SYM	1/2 BLF6G22LS-40P	1/2 BLF6G22LS-40P
1805 - 1880	50	42.8	28	15.8	48	SYM	1/2 BLF7G20LS-90P	1/2 BLF7G20LS-90P
1805 - 1880	52.5	44.5	28	16	44	SYM	1/2 BLF7G21LS-160P	1/2 BLF7G21LS-160P
1805 - 1880	55	49	28	15.5	47	SYM	BLF7G21LS-160	BLF7G21LS-160
1805 - 1880	55.4	47.5	31	16.3	49	ASYM	BLF7G20LS-90P	BLF7G21LS-160
1805 - 1880	55.5	47	28	16	41	SYM	1/2 BLF7G20L(S)-250P	1/2 BLF7G20L(S)-250P
1805 - 1880	56.1	48.1	30	15.2	48	ASYM	BLF7G20LS-90P	BLF7G20LS-200
<b>2300 - 2400 MHz (WiBRO/LTE)</b>								
2300 - 2400	49.5	42	28	14.6	44	SYM	1/2 BLF7G27L(S)-75P	1/2 BLF7G27L(S)-75P

Freq band (MHz)	PPEAK (dBm)	POUT-AVG (dBm)	VDS (V)	Gain (dB)	Drain efficiency (%)	Type	Main transistor	Peak transistor
1805 - 1881	56.2	49	28	15	52.3	ASYM	BLF8G19LS-170BV	BLF8G20LS-220
1805 - 1880	57.1	49	28	14.3	45.1	ASYM	BLF7G21LS-160	2x BLF7G21LS-160
1805 - 1880	57.5	49.5	30	16	42	SYM	BLF7G20LS-200	BLF7G20LS-200
1805 - 1880	57.5	50.5	28	14	48	ASYM	BLF7G20LS-200	BLF7G20LS-250P
1805 - 1880	58.2	50	28	16	42	SYM MPPM	BLF7G20LS-250P	BLF7G20LS-250P
1805 - 1880	58.6	51	28	16	47.6	3-WAY	BLF7G20LS-200	2x BLF7G20LS-200
1805 - 1880	54	47	28	16	49	SYM	BLF6G20LS-110V	BLF6G20LS-110
1805 - 1880	56.2	49.3	28	15	47.5	SYM	BLF8G20LS-200V	BLF8G20LS-200V
1805 - 1880	56.5	49	28	32	45.5	E-SYM	BLF6G21-10G + BLF7G20LS-200	BLF6G21-10G + BLF7G20LS-200
1805 - 1880	57.8	50.4	30	16	41.5	SYM	BLF7G20LS-250P	BLF7G20LS-250P
1805 - 1880	57.3	50	28	15.7	48	ASYM	BLF8G20LS-200V	BLF7G20LS-250P
1805 - 1880	57.3	50.5	30	17	50	ASYM	BLF8G20LS-220	BLF8G20LS-220
1805 - 1880	58.2	50.5	28	14.2	50	ASYM	BLF8G20LS-220	2XBLF8G20LS-220
<b>1930 - 1990 MHz (PCS)</b>								
1930 - 1990	53	45	28	16.5	40	SYM	BLF6G20-75	BLF6G20-75
1930 - 1990	54.2	47.4	28	16.6	47.7	SYM	BLF6G20LS-110	BLF6G20LS-110
1930 - 1990	54.3	47.4	28	16.7	48.2	SYM	BLF6G20LS-110	BLF6G20LS-110
1930 - 1990	55.2	47.2	28	16	40	SYM	1/2 BLF7G20LS-250P	1/2 BLF7G20LS-250P
1930 - 1990	55.5	47.5	28	14.5	46	ASYM	BLF7G20LS-90P	BLF7G20LS-200
1930 - 1990	55.7	49	28	14.5	48	ASYM	BLF7G21LS-160	BLF7G20LS-200
1930 - 1990	56	48	31	15.3	38	SYM	BLF6G20LS-140	BLF6G20LS-140
1930 - 1990	56	48	28	14.8	45	ASYM	BLF7G20LS-140P	BLF7G20LS-200
1930 - 1990	57	49	30	17.2	41	SYM	BLF7G20LS-200	BLF7G20LS-200
1930 - 1990	57	49.5	28	15.1	46	ASYM	BLF7G21LS-160	2x BLF7G21LS-160
1930 - 1990	58.2	50	28	16	40	SYM	BLF7G20LS-250P	BLF7G20LS-250P
1930 - 1990	56.8	49.1	28	32	42.3	E-SYM	BLF6G21-10G + BLF7G20LS-200	BLF6G10-G + BLF7G20LS-200
1930 - 1990	58.5	50.5	30	15.7	43	3-WAY	BLF7G20LS-200	2x BLF7G20LS-200
1930 - 1990	57.3	50.5	30	17	50	ASYM	BLF8G20LS-220	BLF8G20LS-220
1930 - 1990	57.3	50	28	16.2	44	ASYM	BLF8G20LS-200V	BLF7G20LS-250P
1930 - 1990	58.5	50.7	32	15.9	44	3-WAY	BLF8G19LS-170BV	2x BLF8G19LS-170BV
1930 - 1990	55.3	47.5	28	16.8	46	ASYM	BLF8G20LS-260A_main	BLF8G20LS-260A_peak
<b>1805 - 2025 MHz (TD-SCDMA)</b>								
2010 - 2025	47	39	28	14.4	41	SYM	BLD6G21L(S)-50	BLD6G21L(S)-50
1880 - 2025	50	42	28	17	46	SYM	1/2 BLF7G20L(S)-90P	1/2 BLF7G20L(S)-90P
2010 - 2025	50	42	28	17.2	47.2	SYM	1/2 BLF7G20L(S)-90P	1/2 BLF7G20L(S)-90P
1805 - 2050	52	44.5	28	15.2	41.5	SYM	1/2 BLF7G21LS-160P	1/2 BLF7G21LS-160P
1880 - 1920	52.5	44.5	28	16	44	SYM	1/2 BLF7G21LS-160P	1/2 BLF7G21LS-160P
2010 - 2025	52.2	44	28	15.6	43	SYM	1/2 BLF7G21LS-160P	1/2 BLF7G21LS-160P
<b>2110 - 2170 MHz (UMTS/LTE)</b>								
2110 - 2170	55.8	48	28	16	41	SYM	BLP7G22LS-140P	BLP7G22LS-140P
2110 - 2170	47	39	28	13	38	SYM	BLD6G22L(S)-50	BLD6G22L(S)-50
2110 - 2170	48.3	40	28	17	44	SYM	1/2 BLF6G22LS-40P	1/2 BLF6G22LS-40P
2110 - 2170	48.5	40.5	28	17.2	46	SYM	1/2 BLF6G22L-40P	1/2 BLF6G22L-40P
2110 - 2170	50	42	28	17	42	SYM	1/2 BLF7G22LS-100P	1/2 BLF7G22LS-100P
2110 - 2170	49	40.5	28	28	34	SYM	1/2 BLM7G22S-60PBG	1/2 BLM7G22S-60PBG
2110 - 2170	49	40.5	28	28	34	SYM	1/2 BLM7G22S-60PBG	1/2 BLM7G22S-60PBG
2110 - 2170	54.7	46.5	28	16.5	43	SYM	BLF6G22LS-100	BLF6G22LS-100
2110 - 2170	54.9	47	28	17	43	SYM	BLF7G22L(S)-130	BLF7G22L(S)-130
2110 - 2170	55	46.7	28	16	43	SYM	BLF8G22LS-140	BLF8G22LS-140
2110 - 2170	55	47	28	17	43	SYM	1/2 BLF7G22LS-250P	1/2 BLF7G22LS-250P
2110 - 2170	55	47	28	15.5	38	SYM	BLF6G22L(S)-130	BLF6G22L(S)-130
2110 - 2170	55.5	46.4	28	15	43	ASYM	BLF7G22L(S)-130	BLF7G22L(S)-200
2110 - 2171	55.6	49	28	15	52	ASYM	BLF8G22LS-140	BLF8G22LS-220
2110 - 2170	55.7	49	28	14.5	47	ASYM	BLF7G22LS-130	BLF7G22LS-200
2110 - 2170	55.9	47.9	28	17.3	42	SYM	BLF7G22LS-160	BLF7G22LS-160
2110 - 2170	56	48	30	16	47	ASYM	BLF8G22LS-310A_main	BLF8G22LS-310A_peak
2110 - 2170	56	48	30	15.8	45	ASYM	BLF8G22LS-310AV_main	BLF8G22LS-310AV_peak
2110 - 2170	56	48	28	15	48	3-WAY	BLF7G22L(S)-130	2x BLF7G22L(S)-130
2110 - 2170	56.5	48.5	28	16.2	41	SYM	BLF7G22L(S)-200	BLF7G22L(S)-200
2110 - 2170	57	49	32	14.5	41	ASYM	BLF6G22-100	BLF6G22-180PN
2110 - 2170	57.2	49.2	28	16	47	3-WAY	BLF7G22LS-160	2x BLF7G22L(S)-160
2110 - 2170	58	50	32	15	40	SYM	BLF6G22-180PN	BLF6G22-180PN
2110 - 2170	56.8	50.5	28	30	49	E-SYM	BLF6G21-10G + BLF8G22LS-220	BLF6G21-10G + BLF8G22LS-220
2110 - 2170	56.5	49	28	14.2	46	ASYM	BLF7G22LS-160	BLF7G22LS-200
2110 - 2170	57.6	50	28	17.2	40	SYM	BLF8G22LS-200V	BLF8G22LS-200V
2110 - 2170	58	50	32	17.5	40	SYM	BLF7G22LS-250P	BLF7G22LS-250P

Freq band (MHz)	PPEAK (dBm)	POUT-AVG (dBm)	VDS (V)	Gain (dB)	Drain efficiency (%)	Type	Main transistor	Peak transistor
2300 - 2400	53	45	28	15	42.3	SYM	1/2 BLF7G24LS-160P	1/2 BLF7G24LS-160P
2300 - 2400	54.1	47	28	15.5	45	SYM	BLF7G24LS-100	BLF7G24LS-100
2300 - 2400	56.2	48.5	30	15	40	SYM	BLF7G24LS-140	BLF7G24LS-140
2300 - 2400	56.8	48.5	30	15	42	ASYM	BLF7G24LS-100	BLF7G24LS-100 X2
2300 - 2400	55	47.5	28	15.2	44	ASYM	BLF7G24LS-100	BLF7G24LS-140
2300 - 2400	50.6	42	28	15.4	38.4	SYM	1/2 BLF7G27LS-90P	1/2 BLF7G27LS-90P
2300 - 2400	51.1	41.5	30	15.7	34.4	SYM	1/2 BLF7G27LS-90P	1/2 BLF7G27LS-90P
2300 - 2400	51.1	42.5	31	15.5	36.8	SYM	1/2 BLF7G27LS-90P	1/2 BLF7G27LS-90P
2300 - 2401	56.8	49	28	15.5	42.1	SYM	BLF8G24LS-200P	BLF8G24LS-200P
<b>2500 - 2700 MHz (WiMAX/LTE)</b>								
2620 - 2690	46.9	39	28	14.6	46.2	ASYM	BLF6G27-10G	1/2 BLF6G27LS-40P
2580 - 2620	48.2	40	28	14.4	41	SYM	1/2 BLF6G27LS-40P	1/2 BLF6G27LS-40P
2620 - 2690	48.2	40	28	14.6	44	SYM	1/2 BLF6G27LS-40P	1/2 BLF6G27LS-40P
2570 - 2620	49.5	42	28	15	43	SYM	1/2 BLF7G27LS(S)-75P	1/2 BLF7G27LS(S)-75P
2570 - 2620	49.8	42	28	13.9	39	SYM	1/2 BLF7G27LS-90PG	1/2 BLF7G27LS-90PG
2500 - 2700	50	42	28	15	37.5	SYM	BLF6G27S-45	BLF6G27S-45
2500 - 2700	50.3	42.3	28	14.5	39	SYM	1/2 BLF7G27LS-90P	1/2 BLF7G27LS-90P
2500 - 2600	52	44	28	14	40	ASYM	BLF6G27-45	2x BLF6G27-45
2600 - 2700	52	44	28	14	40	ASYM	BLF6G27-45	2x BLF6G27-45
2600 - 2700	52	44	28	14	40	ASYM	BLF6G27-45	BLF6G27(LS)-100
2500 - 2700	52.5	44.5	28	14	38	SYM	1/2 BLF7G27LS-150P	1/2 BLF7G27LS-150P
2570 - 2620	54.1	47	28	15.2	43	SYM	BLF7G27LS-100	BLF7G27LS-100
2530 - 2630	53	45	28	14	43	ASYM	BLF8G27LS160AV_main	BLF8G27LS160AV_peak
2500 - 2700	54	46	28	13	44.5	ASYM	BLF8G27LS-200AV_main	BLF8G27LS-200AV_peak
2620 - 2690	55.2	47.2	30	15	41	ASYM	BLF7G27LS-100	BLF7G27LS-140
2620 - 2690	57.5	48	28	13	37	ASYM	BLF8G27LS-140G	BLF8G27LS-140G x2
2545 - 2660	54	46.5	28	15.2	45	SYM	BLF8G27LS-100V	BLF8G27LS-100V
2570 - 2620	51.1	43	28	14.2	44.5	SYM	1/2BLF8G27LS-100P	1/2BLF8G27LS-100P
2570 - 2620	55.4	47	28	15	40.4	ASYM	BLF7G27LS-100	BLF7G27LS-140
2545 - 2575	55.3	47.5	28	15.4	43.7	ASYM	BLF7G27LS-100	BLF7G27LS-140
2620 - 2690	54.9	47	28	15.2	41.9	ASYM	BLF7G27LS-100	BLF7G27LS-140
2620 - 2690	55	47.5	30	15.7	43.5	ASYM	BLF7G27LS-100	BLF7G27LS-140
2570 - 2620	55.9	48	32	15.6	41	ASYM	BLF7G27LS-100	BLF7G27LS-140
2620 - 2690	56	48	32	15.6	40	ASYM	BLF7G27LS-100	BLF7G27LS-140
2545 - 2630	53.8	44.9	28	14.1	34.4	SYM	1/2 BLF7G27L-200PB	1/2 BLF7G27L-200PB
2620 - 2690	54.8	45	32	17	19	SYM	1/2 BLF7G27L-200PB	1/2 BLF7G27L-200PB
2620 - 2690	56.17	47.6	32	15.2	33	SYM	BLF7G27L-135	BLF7G27L-135
2620 - 2690	56.2	48	32	15.2	39.1	SYM	BLF8G27LS-140V	BLF8G27LS-140V
2496 - 2690	55.3	47	28	13.6	41.5	ASYM	BLF8G27LS-100GV	BLF8G27LS-150GV
2620 - 2690	58.8	50.2	29	13.4	42.5	ASYM	BLF8G27LS-200PGV	BLF8G27LS-200GV (2X)
<b>3300 - 3800 MHz (WiMAX)</b>								
3500 - 3700	52	45	28	10	30	ASYM	BLF6G38LS-50	BLF6G38LS-100
3400 - 3600	51	43	28	11.5	32	SYM	BLF6G38-50	BLF6G38-50
3400 - 3600	46	39	28	12.3	36	SYM	BLF6G38S-10G	BLF6G38S-10G

Products by function

### 3.7.1.9 Single Package Asymmetric Doherty (PAD) power transistors

Type	Product	f <sub>min</sub> (MHz)	f <sub>max</sub> (MHz)	P1dB (W)	Matching	VDS (V)	P <sub>L</sub> (W)	η <sub>D</sub> (%)	G <sub>o</sub> (dB)	Test signal	Package
BLC8G10LS-310AV*	ACP PAD	800	1000	310	I/O	28	tbd	tbd	tbd	2-c WCDMA	SOT1251
BLC8G10LS-450AV*	ACP PAD	800	1000	450	I/O	28	tbd	tbd	tbd	2-c WCDMA	SOT1251
BLC8G22LS-100AV*	ACP PAD	2000	2200	100	I/O	28	tbd	tbd	tbd	2-c WCDMA	SOT1275
BLP8G1822S-100A(G)W*	OMP PAD	1800	2200	100	I/O	28	tbd	tbd	tbd	2-c WCDMA	SOT1221
BLC8G21LS-160AV*	ACP PAD	2000	2100	160	I/O	28	22	47	15	2-c WCDMA	SOT1275
BLP8G1822S-160A(G)W*	OMP PAD	1800	2200	160	I/O	28	tbd	tbd	tbd	2-c WCDMA	SOT1221
BLP8G1822S-210A(G)W*	OMP PAD	1800	2200	210	I/O	28	tbd	tbd	tbd	2-c WCDMA	SOT1221
BLF8G20LS-260A	Ceramic PAD	1800	1900	260	I/O	28	50	44	15.5	2-c WCDMA	SOT1121
BLC8G20LS-310AV*	ACP PAD	1800	1900	310	I/O	28	56	45	17	2-c WCDMA	SOT1251
BLC8G22LS-360AV*	ACP PAD	2100	2200	360	I/O	28	tbd	tbd	tbd	2-c WCDMA	SOT1251
BLC8G20LS-360AV*	ACP PAD	1800	1900	400	I/O	28	tbd	tbd	tbd	2-c WCDMA	SOT1251
BLC8G20LS-400AV*	ACP PAD	1800	1900	400	I/O	32	85	45	14.9	2-c WCDMA	SOT1258
BLC8G22LS-450AV*	ACP PAD	2100	2200	450	I/O	30	83	45	14.5	2-c WCDMA	SOT1258
BLC8G27LS-60AV*	ACP PAD	2500	2700	60	I/O	28	9	50	16	2-c WCDMA	SOT1275
BLC8G27LS-100AV*	ACP PAD	2500	2700	100	I/O	28	17	45	15.5	2-c WCDMA	SOT1275
BLC8G27LS-140AV*	ACP PAD	2500	2700	140	I/O	28	28	44	14.5	2-c WCDMA	SOT1275
BLC8G27LS-160AV	ACP PAD	2500	2700	160	I/O	28	30	29	18	2-c WCDMA	SOT1275
BLC9G27LS-150AV*	ACP PAD	2500	2700	160	I/O	28	28.2	45	14.5	2-c WCDMA	SOT1275
BLC8G27LS-180AV*	ACP PAD	2500	2700	180	I/O	28	32	43	14.3	2-c WCDMA	SOT1275
BLC8G27LS-200AV*	ACP PAD	2500	2700	200	I/O	28	40	43	13.5	2-c WCDMA	SOT1275
BLC8G24LS-240AV*	ACP PAD	2300	2400	240	I/O	28	63	29	18	2-c WCDMA	SOT1252
BLC8G27LS-240AV*	ACP PAD	2500	2700	240	I/O	28	56	45	15.5	2-c WCDMA	SOT1252

**Bold** = highly recommended product

\* Check status in section 3.1, as this type is not yet released for mass production

### 3.7.1.9 Single Package Asymmetric Doherty (PAD) power transistors (continued)

Type	Product	f <sub>min</sub> (MHz)	f <sub>max</sub> (MHz)	P1dB (W)	Matching	VDS (V)	P <sub>L</sub> (W)	η <sub>D</sub> (%)	G <sub>p</sub> (dB)	Test signal	Package
BLC8G27LS-245AV*	ACP PAD	2500	2700	245	I/O	28	56	43	14.5	2-c WCDMA	SOT1251
BLC8G27LS-310AV*	ACP PAD	2500	2700	310	I/O	28	tbd	tbd	tbd	2-c WCDMA	SOT1258
BLC9G38LS-100AV*	ACP PAD	3400	3800	100	I/O	28	tbd	tbd	tbd	2-c WCDMA	SOT1275
BLC9G38LS-160AV*	ACP PAD	3400	3800	160	I/O	28	tbd	tbd	tbd	2-c WCDMA	SOT1275

### 3.7.1.10 OMP power transistors

Type	Product	f <sub>min</sub> (MHz)	f <sub>max</sub> (MHz)	P1dB (W)	Matching	VDS (V)	P <sub>L</sub> (W)	η <sub>D</sub> (%)	G <sub>p</sub> (dB)	Test signal	Package
BLP7G22-05	Driver	700	2200	5	-	28	1	26	17	2-c WCDMA	SOT1179
<b>BLP7G22-10</b>		700	2200	10	-	28	2	26	17	2-c WCDMA	SOT1179
BLP8G10S-45P(G)	Driver/final	700	1000	45	I/O	28	2.5	21.4	21.5	2-c WCDMA	SOT1223/4
BLP8G22S-60P(G)		1800	2200	60	I/O	28	4	20	18	2-c WCDMA	SOT1223/4
<b>BLP7G07S-140P</b>	Final	700	900	140	O	28	35	28	19	2-c WCDMA	SOT1223
BLP7G09S-140P(G)*		900	1000	140	O	28	35	28	19	2-c WCDMA	SOT1223/4
<b>BLP8G21S-160PV</b>		1800	2025	160	I/O	28	45	33	18	2-c WCDMA	SOT1223
BLP8G10S-200P(G)*		700	1000	200	I/O	28	40	28.5	20	2-c WCDMA	SOT1223/4

### 3.7.1.11 MMIC power transistors

Type	Product	f <sub>min</sub> (MHz)	f <sub>max</sub> (MHz)	P1dB (W)	Matching	VDS (V)	P <sub>L</sub> (W) <sup>(1)</sup>	η <sub>D</sub> (%)	G <sub>p</sub> (dB)	Test signal	Package
<b>BLM8G0710S-15PB(G)*</b>	MMIC	700	1000	15	I/O	28	1.5	45	32	1-c WCDMA	SOT1212
<b>BLM8G0710S-30PB(G)*</b>		700	1000	30	I/O	28	3.0	45	32	1-c WCDMA	SOT1212
BLM8G0710S-45AB(G)*		700	1000	45	I/O	28	3.0	45	32	1-c WCDMA	SOT1212
BLM7G1822S-20PB(G)*		1800	2200	20	I/O	28	2.0	23.5	32	1-c WCDMA	SOT1212
BLM7G1822S-40AB(G)*		1800	2200	40	I/O	28	2.0 / 4.0	23.5	31.5	1-c WCDMA	SOT1212
<b>BLM7G1822S-40PB(G)</b>		1800	2200	40	I/O	28	4.0	25	31.5	1-c WCDMA	SOT1212
BLM7G1822S-60PB(G)*		1800	2200	60	I/O	28	3.0	23	31	1-c WCDMA	SOT1212
BLM7G22S-60PB(G)		2100	2200	60	I/O	28	1.6	11	31.5	1-c WCDMA	SOT1212
BLM7G1822S-80AB(G)*		1800	2200	80	I/O	28	4.0 / 8.0	23	31	1-c WCDMA	SOT1212
BLM7G24S-30B(G)		2100	2400	30	I/O	28	3.0	11.3	31.5	1-c WCDMA	SOT1212

<sup>(1)</sup> P<sub>L</sub> per section

### 3.7.1.12 Small-cell power transistors

Part Number	Type	f <sub>min</sub> (MHz)	f <sub>max</sub> (MHz)	P1dB (W)	Matching	VDS (V)	P <sub>L</sub> (W)	η <sub>D</sub> (%)	G <sub>p</sub> (dB)	Test signal	Package
BLP8G0727S-05	OMP driver	700	2700	5	-	28	tbd	tbd	tbd	2-c WCDMA	SOT1179
BLP8G0727S-10	OMP driver	700	2700	10	-	28	tbd	tbd	tbd	2-c WCDMA	SOT1179
BLM8G0710S-15PB(G)	OMP MMIC	700	1000	15	I/O	28	tbd	tbd	32	2-c WCDMA	SOT1212
BLP6H10S-10	High Voltage driver	700	1000	10	-	28	tbd	tbd	tbd	2-c WCDMA	SOT1179
BLM8G0710S-30PB(G)	OMP MMIC	700	1000	30	I/O	28	tbd	tbd	32	2-c WCDMA	SOT1212
BLM8G0710S-45AB(G)	OMP MMIC PAD	700	1000	45	I/O	28	tbd	tbd	32	2-c WCDMA	SOT1212
BLP8G10S-45P(G)	OMP Discrete	700	1000	45	I/O	28	2.5	19.8	20.8	2-c WCDMA	SOT1224
BLP7G22-05	OMP driver	700	2200	5	-	28	1	23	16	2-c WCDMA	SOT1179
BLP7G22-10	OMP driver	700	2200	10	-	28	2	25	17.4	2-c WCDMA	SOT1179
BLF6G21-10G	Ceramic Discrete	700	2200	10	I/O	28	0.7	15	18.5	2-c WCDMA	SOT975
BLM7G1822S-20PB(G)	OMP MMIC	1800	2200	20	I/O	28	0.5	12	31	2-c WCDMA	SOT1212
BLF6G22LS-40P	Ceramic Discrete	2110	2170	40	I/O	28	13.5	30	19	2-c WCDMA	SOT1224
BLM7G1822S-40AB(G)	OMP MMIC PAD	1800	2200	40	I/O	28	tbd	tbd	31	2-c WCDMA	SOT1212
BLM7G1822S-40PB(G)	OMP MMIC	1800	2200	40	I/O	28	4	12	31.5	2-c WCDMA	SOT1212
BLF6G20S-45	Ceramic Discrete	1800	2000	45	I/O	28	2.5	14	19.2	2-c WCDMA	SOT608
BLM7G1822S-60PB(G)	OMP MMIC	1800	2200	60	I/O	28	tbd	tbd	31	2-c WCDMA	SOT1212
BLM7G22S-60PB(G)	OMP MMIC	2100	2200	60	I/O	28	32	11.3	31.5	2-c WCDMA	SOT1212
BLM7G1822S-80AB(G)	OMP MMIC PAD	1800	2200	80	I/O	28	tbd	tbd	30	2-c WCDMA	SOT1212
BLF6G27-10G	Ceramic Discrete	2300	2700	10	I	28	2	25	22.5	2-c WCDMA	SOT975
BLP8G2327S-20	QFN driver	2300	2700	20	I/O	28	tbd	tbd	tbd	2-c WCDMA	QFN
BLM7G24S-30B(G)	OMP MMIC	2100	2400	30	I/O	28	tbd	tbd	31.5	2-c WCDMA	SOT1212
BLF6G27LS-40P	Ceramic Discrete	2500	2700	40	I/O	28	20	37	17.5	2-c WCDMA	SOT1121
BLF7G27LS-75P	Ceramic Discrete	2300	2700	75	I/O	28	12	26	17	2-c WCDMA	SOT1121
BLC8G27LS-60AV	ACP PAD	2300	2700	60	I/O	28	9	50	16	2-c WCDMA	SOT1275
BLF6G38-10G	Ceramic Discrete	3400	3800	10	I	28	2	20	14	2-c WCDMA	SOT975
BLF6G38S-25	Ceramic Discrete	3400	3800	25	I/O	28	4.5	24	15	2-c WCDMA	SOT608
BLF6G38LS-50	Ceramic Discrete	3400	3800	50	I/O	28	9	23	14	2-c WCDMA	SOT502
BLF8G38LS-75V	Ceramic Discrete	3400	3800	75	I/O	28	20	26	15.5	2-c WCDMA	SOT1239

**Bold** = highly recommended product

\* Check status in section 3.1, as this type is not yet released for mass production

### 3.7.1.13 High-voltage power transistors

Type	Product	$f_{min}$ (MHz)	$f_{max}$ (MHz)	P1dB (W)	Matching	VDS (V)	$P_L$ (W)	$\eta_D$ (%)	$G_P$ (dB)	Test signal	Package
BLP6H10S-10	Driver	729	960	10	-	50	tbd	tbd	tbd	2-c WCDMA	SOT1179
BLF6H10L(S)-160	Final	729	960	160	-	50	38	34	20	2-c WCDMA	SOT467

### 3.7.2 RF power transistors for broadcast/ISM applications

#### Why choose NXP's RF power transistors for broadcast/ISM applications:

- ▶ Highest power
- ▶ Best ruggedness
- ▶ Best broadband performance
- ▶ Best-in-class design support
- ▶ Very low thermal resistance design for unrivalled reliability

NXP's leading LDMOS technologies, together with advanced package concepts, enable power amplifiers that deliver best-in-class performance. We offer the industry's highest power and best ruggedness for all broadcast technologies. Our portfolio includes transistors for Ultra High Frequency (UHF), Very High Frequency (VHF), and High Frequency (HF) applications, and covers ISM frequency bands.

#### 3.7.2.1 1-500 MHz (UHF/VHF/HF/ISM) LDMOS transistors

Type number	Product	$f_{min}$ (MHz)	$f_{max}$ (MHz)	P1dB (W)	Matching	Test signal performance					
						VDS (V)	$P_L$ (W)	$\eta_D$ (%)	$G_P$ (dB)	Test signal	Package version
BLP10H605*	Driver	10	1400	5	-	50	5	59.6	22.4	CW	SOT1352
BLP10H610*		10	1400	10	-	50	10	58	18	CW	SOT1352
BLF571		10	500	20	-	50	20	70	27.5	CW	SOT467
BLF871(S)		1	1000	100	-	40	100	60	21	CW	SOT467
BLF881(S)		1	1000	140	-	50	140	49	21	CW	SOT467
BLP05M7200	Final	425	450	200	-	28	210	77	21	CW	SOT1138
BLF573(S)		10	500	300	-	50	300	70	27.2	CW	SOT502
BLF174XR(S)		10	128	600	-	50	600	73	29	Pulsed RF	SOT1214
BLF574		10	500	600	-	50	500	70	26.5	CW	SOT539
BLF574XR(S)		10	500	600	-	50	600	74.7	24	Pulsed RF	SOT1214
BLF184XR(S)		10	600	700	-	50	700	73.5	23.9	Pulsed RF	SOT1214
BLF178P		10	128	1200	-	50	1200	75	28.5	Pulsed RF	SOT539
BLF578		10	500	1200	-	50	1000	75	26	CW	SOT539
BLF178XR(S)		10	128	1400	-	50	1400	72	28	Pulsed RF	SOT539
BLF188XR(S)		10	600	1400	-	50	1200	73	24.4	Pulsed RF	SOT539
BLF578XR(S)		10	500	1400	-	50	1400	69	23.5	Pulsed RF	SOT539

Products by function

#### 3.7.2.2 470-860 MHz (UHF) LDMOS transistors

Type number	Product	$f_{min}$ (MHz)	$f_{max}$ (MHz)	P1dB (W)	Matching	Test signal performance					
						VDS (V)	$P_L$ (W)	$\eta_D$ (%)	$G_P$ (dB)	Test signal	Package version
BLF571	Driver	10	500	20	-	50	20	70	27.5	CW	SOT467
BLF642		1	1400	35	-	32	35	63	19	CW	SOT467
BLF871(S)		1	1000	100	-	40	100	60	21	CW	SOT467
BLF881(S)		1	1000	140	-	50	1400	49	21	CW	SOT467
BLF884P(S)	Final	470	860	300	I	50	150	46	21	CW	SOT1121
BLF879P(S)		470	860	500	I	42	200	47	21	CW	SOT539
BLF888A(S)		470	860	600	I	50	250	31	20	DVB-T	SOT539
BLF888D(S)		470	806	600	I	50	134	40	17	DVB-T	SOT539
BLF888B(S)		470	860	650	I	50	250	33	21	DVB-T	SOT539

#### 3.7.2.3 2.45 GHz ISM LDMOS transistors

Type number	Product	$f_{min}$ (MHz)	$f_{max}$ (MHz)	P1dB (W)	Matching	Test signal performance					
						VDS (V)	$P_L$ (W)	$\eta_D$ (%)	$G_P$ (dB)	Test signal	Package version
BLP25M705	Driver	10	2500	5	-	28	5	23	16	Pulsed RF	SOT1179
BLP25M710		10	2500	10	-	28	10	23	16	Pulsed RF	SOT1179
BLF25M612(G)		2400	2500	12	I	28	12	60	19	CW	SOT975
BLF2425M7L(S)100	Final	2300	2400	100	I/O	28	100	27	18	1-c WCDMA	SOT502
BLF2425M7L(S)140		2400	2500	140	I/O	28	140	52	18.5	CW	SOT502
BLF2425M8L(S)140		2400	2500	140	I/O	28	140	56	19	CW	SOT502
BLF2425M6L(S)180P		2400	2500	180	I/O	28	180	53.5	13.3	CW	SOT539
<b>BLF2425M7L(S)250P</b>		2400	2500	250	I/O	28	250	51	15	CW	SOT539

**Bold** = highly recommended product

\* Check status in section 3.1, as this type is not yet released for mass production

### 3.7.2.4 1-1600 MHz (UHF/VHF/HF/ISM) LDMOS transistors

Type number	Product	f <sub>min</sub> (MHz)	f <sub>max</sub> (MHz)	P1dB (W)	Matching	Test signal performance					
						VDS (V)	P <sub>L</sub> (W)	η <sub>D</sub> (%)	G <sub>p</sub> (dB)	Test signal	Package version
BLP10H605*	Driver	10	1400	5	-	50	5	59.6	22.4	CW	SOT1352
BLP25M705		10	2500	5	-	28	5	23	16	Pulsed RF	SOT1179
BLF640		10	2200	10	-	28	5	31	19.3	1-c WCDMA	SOT538
BLP10H610*		10	1400	10	-	50	10	58	18	CW	SOT1352
BLP25M710		10	2500	10	-	28	10	23	16	Pulsed RF	SOT1179
BLF571		10	500	20	-	50	20	70	27.5	CW	SOT467
BLF642	Driver/final	1	1400	35	-	32	35	63	19	CW	SOT467
BLF644P		10	1300	70	-	32	90	66	23.5	CW	SOT1228
BLF645	Final	1	1400	100	-	32	100	56	18	CW	SOT540
BLF871(S)		1	1000	100	-	40	100	60	21	CW	SOT467
BLF10M6(LS)135		700	1000	135	I	28	40	28	21	2-c WCDMA	SOT502
BLF881(S)		1	1000	140	-	50	140	49	21	CW	SOT467
BLF10M6(LS)160		700	1000	160	I	32	40	27	22.5	2-c WCDMA	SOT502
BLP15M7160P		10	1500	160	-	28	160	59.7	19.4	CW	SOT1223
BLF10M6(LS)200		700	1000	200	I	28	40	28.5	20	2-c WCDMA	SOT502
<b>BLF647P(S)</b>		10	1500	200	-	32	75	70	18	Pulsed RF	SOT1121
BLF6G13L(S)-250P		1300	1300	250	I	50	250	56	17	CW	SOT1121
BLF6G15L(S)-500H		1400	1500	500	I/O	50	65	19	16	DVB-T	SOT539
BLF10H6600P(S)		400	1000	600	I	50	250	46	20.8	CW	SOT539

### 3.7.3 RF power transistors for aerospace and defense

#### Device naming conventions for RF power transistors for aerospace and defense

B	L	S	6	G	2731	L	S	-120	G
option: gullwing shaped leads									
P: push-pull device									
R: enhanced ruggedness									
P1dB power									
S: earless package									
P: pallet									
flange material									
L = CPC									
frequency band (in 100 MHz; here: 2700-3100)									
G: standard LDMOS (≤ 28 V)									
H: high voltage LDMOS (50 V)									
LDMOS technology generation									
A: avionics frequency band operation									
L: L-Band frequency operation									
S: S-Band frequency operation									
L: high-frequency power transistor									
B: semiconductor die made of Si									

#### Why choose NXP's microwave RF power transistors

- ▶ High gain
- ▶ High efficiency
- ▶ Highest reliability
- ▶ Improved pulse droop and insertion phase
- ▶ Improved ruggedness - overdrive without risk to +5 dB
- ▶ Reduces component count and helps simplify L- and S-band radar design
- ▶ Uses non-toxic, RoHS-compliant packages

#### 3.7.3.1 Avionics LDMOS transistors

Type number	Product	f <sub>min</sub> (MHz)	f <sub>max</sub> (MHz)	P1dB (W)	Matching	Test signal performance					
						VDS (V)	P <sub>L</sub> (W)	η <sub>D</sub> (%)	G <sub>p</sub> (dB)	Test signal	Package version
BLL6H0514-25	Driver	500	1400	25	-	50	25	50	19	Pulsed RF	SOT467C
BLA6G1011-200R		1030	1090	200	I	28	200	65	20	Pulsed RF	SOT502A
BLA6G1011L(S)-200RG	Final	1030	1090	200	I	28	200	65	20	Pulsed RF	SOT502A
BLA6H0912-500		960	1215	500	I/O	50	450	50	17	Pulsed RF	SOT634A
BLA6H1011-600		1030	1090	600	I	48	600	52	17	Pulsed RF	SOT539A
BLF988(S)		500	1000	600	I	50	600	58	19.8	Pulsed RF	SOT539A
<b>BLU6H0410L(S)-600P</b>		400	900	600	I	50	600	58	20	Pulsed RF	SOT539B
BLA6H0912L(S)-1000*		960	1215	1000	I	50	1000	50	15.5	Pulsed RF	SOT539A

**Bold** = highly recommended product

\* Check status in section 3.1, as this type is not yet released for mass production

### 3.7.3.2 L-band LDMOS transistors

Type number	Product	f <sub>min</sub> (MHz)	f <sub>max</sub> (MHz)	P1dB (W)	Matching	Test signal performance					
						VDS (V)	P <sub>L</sub> (W)	η <sub>D</sub> (%)	G <sub>p</sub> (dB)	Test signal	Package version
BLL6H0514-25	Driver	500	1400	25	-	50	25	50	19	Pulsed RF	SOT467
BLL6H0514L(S)-130	Final	500	1400	130	I	50	130	50	17	Pulsed RF	SOT1135
BLL6G1214L(S)-250		1200	1400	250	I/O	36	250	45	15	Pulsed RF	SOT502
BLL6H1214L(S)-250		1200	1400	250	I/O	50	250	55	17	Pulsed RF	SOT502
BLL6H1214-500		1200	1400	500	I/O	50	500	50	17	Pulsed RF	SOT539
BLL6H1214LS-500		1200	1400	500	I/O	50	500	50	17	Pulsed RF	SOT539
BLL6H1214P2S-250*		1200	1400	250	I/O @ 50 Ω	45	250	48	27	Pulsed RF	SOM039

### 3.7.3.3 S-band LDMOS transistors

Type number	Product	f <sub>min</sub> (MHz)	f <sub>max</sub> (MHz)	P1dB (W)	Matching	Test signal performance					
						VDS (V)	P <sub>L</sub> (W)	η <sub>D</sub> (%)	G <sub>p</sub> (dB)	Test signal	Package version
BLS6G2731-6G	Driver	2700	3100	6	I	32	6	33	15	Pulsed RF	SOT975
BLS6G3135(S)-20		3100	3500	20	I/O	32	20	45	15.5	Pulsed RF	SOT608
<b>BLS6G2735L(S)-30</b>		2700	3500	30	I/O	32	35	50	13	Pulsed RF	SOT1135
BLS7G2325L-105	Final	2300	2500	105	I/O	30	110	55	16.5	Pulsed RF	SOT502
BLS6G2731(S)-120		2700	3100	120	I/O	32	120	48	13.5	Pulsed RF	SOT502
BLS6G3135(S)-120		3100	3500	120	I/O	32	120	43	11	Pulsed RF	SOT502
BLS6G2731S-130		2700	3100	130	I/O	32	130	50	12	Pulsed RF	SOT922
BLS6G2933S-130		2900	3300	130	I/O	32	130	47	12.5	Pulsed RF	SOT922
BLS7G2933S-150		2900	3300	150	I/O	32	150	47	13.5	Pulsed RF	SOT922
BLS7G2730L(S)-200P		2700	3000	200	I/O	32	220	48	12	Pulsed RF	SOT539
BLS7G3135LS-200		3100	3500	200	I/O	32	200	43	12	Pulsed RF	SOT502
<b>BLS7G2729L(S)-350P</b>		2700	2900	350	I/O	32	350	50	13	Pulsed RF	SOT539
<b>BLS7G3135L(S)-350P</b>		3100	3500	350	I/O	32	350	43	12	Pulsed RF	SOT539

### 3.7.4 Gallium Nitride (GaN) RF power amplifiers

#### Device naming conventions for GaN RF power amplifiers

C	L	F	1G	0040	S	50	P
P: push-pull indicator, P = push-pull type; no P means single-ended transistor							
2 to 1500: nominal P3dB in Watts: eg 50 = 50 W							
S: earless type, S = earless; no S means eared package							
35 to 60: upper frequency, 10x GHz value: 35 = 3.5 GHz; 60 = 6.0 GHz							
00 to 40: lower frequency, 10x GHz value: 00 = 0 GHz or DC; 40 = 4.0 GHz							
1G: technology generation: 1G = 1st generation							
F: package style: F = ceramic, P = overmolded plastic							
L: high-frequency power transistor							
C: primary material identifier: C = wide band-gap compound materials, eg GaN							

Type number	Product	f <sub>min</sub> (MHz)	f <sub>max</sub> (MHz)	P1dB (W)	Matching	Test signal performance					
						VDS (V)	P <sub>L</sub> (W)	η <sub>D</sub> (%)	G <sub>p</sub> (dB)	Test signal	Package version
<b>CLF1G0060(S)-10*</b>	Driver	0	6000	10	-	50	10	33.2	17	Pulsed	SOT1227
<b>CLF1G0060(S)-30*</b>		0	6000	30	-	50	30	59	15.9	Pulsed	SOT1227
<b>CLF1G0035(S)-50*</b>	Driver/final	0	3500	50	-	50	50	49	13	Pulsed	SOT467
<b>CLF1G0035(S)-100*</b>	Final	0	3500	100	-	50	100	59.5	13.9	Pulsed	SOT467
<b>CLF1G0035(S)-100P*</b>		0	3500	100	-	50	100	50.1	12.7	Pulsed	SOT1228
<b>CLF1G0035(S)-200P*</b>		0	3500	200	-	50	200	43.5	11.5	Pulsed	SOT1228

**Bold** = highly recommended product

\* Check status in section 3.1, as this type is not yet released for mass production



### 3.8 Wireless microcontroller chipsets and modules

Type	Module/ single chip	Application	TX power	Receiver sensitivity	TX current	RX current	Operating voltage	Form factor
JN5148-001-M00	Module	2.4 - 2.4835 GHz JenNet & IEEE802.15.4	+2.5 dBm	-95 dBm	15 mA	17.5 mA	2.3 - 3.6 V	Integral antenna 18 x 32 mm
JN5148-001-M03	Module	2.4 - 2.4835 GHz JenNet & IEEE802.15.4	+2.5 dBm	-95 dBm	15 mA	17.5 mA	2.3 - 3.6 V	U.FL connector 18 x 30 mm
JN5148-001-M04	Module	2.4 - 2.4835 GHz JenNet & IEEE802.15.4	+20 dBm	-98 dBm	110mA	23 mA	2.7 - 3.6 V	U.FL connector 18 x 41 mm
JN5148-J01	Single chip	2.4 - 2.4835 GHz JenNet - IP	+2.5 dBm	-95 dBm	15 mA	17.5 mA	2.3 - 3.6 V	8 x 8 mm QFN56
JN5148-001	Single chip	2.4 - 2.4835 GHz JenNet & IEEE802.15.4	+2.5 dBm	-95 dBm	15 mA	17.5 mA	2.3 - 3.6 V	8 x 8 mm QFN56
JN5148-Z01	Single chip	2.4 - 2.4835 GHz ZigBee PRO	+2.5 dBm	-95 dBm	15 mA	17.5 mA	2.3 - 3.6 V	8 x 8 mm QFN56
JN5161-001	Single chip	2.4 - 2.4835 GHz RF4CE & IEEE802.15.4	+2.5 dBm	-95 dBm	15 mA	17 mA	2.3 - 3.6 V	6 x 6 mm QFN40
JN5164-001	Single chip	2.4 - 2.4835 GHz JenNet - IP & RF4CE & IEEE802.15.4	+2.5 dBm	-95 dBm	15 mA	17 mA	2.3 - 3.6 V	6 x 6 mm QFN40
JN5168-001	Single chip	2.4 - 2.4835 GHz JenNet - IP & ZigBee & RF4CE & IEEE802.15.4	+2.5 dBm	-95 dBm	15 mA	17 mA	2.3 - 3.6 V	6 x 6 mm QFN40
JN5168-001-M00	Module	2.4 - 2.4835 GHz JenNet - IP & ZigBee & RF4CE & IEEE802.15.4	+2.5 dBm	-95 dBm	15 mA	17 mA	2.3 - 3.6 V	Integral antenna 16 x 30 mm
JN5168-001-M03	Module	2.4 - 2.4835 GHz JenNet - IP & ZigBee & RF4CE & IEEE802.15.4	+2.5 dBm	-95 dBm	15 mA	17 mA	2.3 - 3.6 V	UFL connector 16 x 21 mm
JN5168-001-M05	Module	2.4 - 2.4835 GHz JenNet - IP & ZigBee & RF4CE & IEEE802.15.4	+9.5 dBm	-96 dBm	35 mA	22 mA	2.3 - 3.6 V	UFL connector 16 x 30 mm
JN5168-001-M06	Module	2.4 - 2.4835 GHz JenNet - IP & ZigBee & RF4CE & IEEE802.15.4	+22 dBm	-100 dBm	175 mA	22 mA	2.3 - 3.6 V	UFL connector 16 x 30 mm
JN516X-EK001	Evaluation kit	2.4 - 2.4835 GHz JenNet - IP & ZigBee & RF4CE & IEEE802.15.4	n/a	n/a	n/a	n/a	n/a	n/a





RELEASE  
EXPERIENCE

BUILDING ON DECADES OF RF **LEADERSHIP**

Our application **experts** work with you to solve any design challenge to help you realize a clear competitive advantage.

# 4. Design support

This chapter guides you through the available tools, documents, materials, and links that ease the design-in of our products.

## 4.1 Explore NXP's RF portfolio

Beyond this RF Manual, you can learn about NXP's broad RF portfolio through the NXP Technical Academy, various webinars, and the NXP channel on YouTube.

The NXP Technical Academy is the place to find training modules that introduce you to our products and applications, watch hands-on trainings, and even get certified. The training modules can be viewed on mobile devices as well [elearning.nxp.com](http://elearning.nxp.com).

NXP provides RF webinars on a regular basis. [www.nxp.com/news/meet-nxp/webinars-and-podcasts.html#rf](http://www.nxp.com/news/meet-nxp/webinars-and-podcasts.html#rf)

On NXP's YouTube channel [www.youtube.com/user/nxpsemiconductors](http://www.youtube.com/user/nxpsemiconductors), there are short videos that explain NXP's portfolio, application information, tips and tricks to optimize your system's performance, and more.

## 4.2 Product selection on NXP.com

Every RF product has its own webpage on the NXP website. Pages can be accessed in several ways: by product tree, by application area, or via cross-reference search. Or, simply type 'nxp <product>' in the Google search bar.

### Product tree and parametric search

Our online product tree ([www.nxp.com/products/rf](http://www.nxp.com/products/rf)) categorizes the product by function. The parametric search tool allows you to refine the selection based on performance requirements.

### Application area

To find out what NXP offers in each application area, use the Explore Application section of the NXP website.

### Cross-reference

NXP maintains a cross-reference of competitor products and NXP alternatives. This list can be searched online via the search tool bar on the NXP website or off-line by installing the X-Reference Tool.

## 4.3 Product evaluation

NXP offers a broad range of support material for evaluating RF products and optimizing the performance of your application.

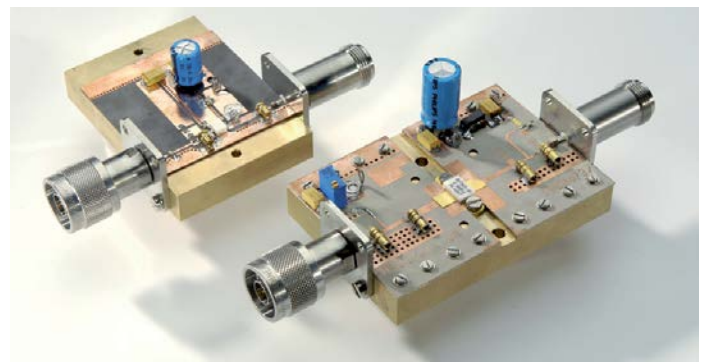
### Data sheets and application notes

The first chapter of this RF Manual includes application diagrams, recommended type numbers, and product highlights. More in-depth application information is available in the second chapter, in product data sheets or in the Application Notes section of the NXP website [www.nxp.com/products/all\\_appnotes](http://www.nxp.com/products/all_appnotes).

### Simulation tools

To help you evaluate our products in your specific application, NXP offers various simulation tools, including small-signal touchstone S-parameters and parametric models that let you customize the biasing conditions. The parametric models are based on best-in-class Mextram models and RFLDMOS models developed by Philips Research, a recognized leader in physics-based models. The parametric models fully support AC, DC, S-parameter, harmonic balance, and time-domain simulations. These models allow designers to assess the performance of complex systems at an early stage of the development process.

The models are available for Advanced Design System (ADS), Microwave Office (MWO), Genesys, and Ansoft Designer. Spice versions of the parametric models, which can be used with almost any commercial design tool, are also available.



### Customer evaluation kits and samples

Several kits are available for product evaluation. Boards are provided with industry-standard RF connectors to facilitate measurements and design-in. The features and contents of each kit are described on the NXP website and are listed on the corresponding product page. On the Customer Evaluation Kits page you can also find support materials, such as the latest user manuals and software updates. You can order small quantities of all products to build and evaluate prototypes. To obtain a kit or order samples, please contact your local NXP representative or authorized distributor.



## 4.4 RF Power Lifetime Calculator

The RF Power Lifetime Calculator enables an interactive estimation of our LDMOS device lifetime. Median-Time-to-Failure (MTF), the time that 50% of the population has failed, is calculated as a function of Junction Temperature of the device, assuming electromigration as the wear-out failure mechanism. This allows our customers to optimize the thermal characteristics of their projects to generate an optimal system level solution.

The online selection and calculation process also eliminates the need to browse through large amounts of product information to quickly find a specific RF Power transistor and its performance characteristics.

The RF Power Lifetime Calculator is available at the NXP Design Portal [www.nxp.com/design-portal/mtf.html](http://www.nxp.com/design-portal/mtf.html) and is linked to product pages.

## 4.5 RF small signal community

Our online community is an engineer-to-engineer space that lets RF small-signal enthusiasts collaborate, get technical support, and share ideas. Have a question? Want to discuss the topics you face in your day-to-day life as an RF engineer? This is the place. NXP's own RF small-signal experts are part of the community, so you can be sure you're connecting with people who know their stuff.

Visit [www.nxp.com/RFcommunity](http://www.nxp.com/RFcommunity)

## 4.6 Additional design-in support

If you need additional design-in support, please contact your local NXP sales representative or authorized distributor. You can also submit a question using the web form on the NXP website.

## 4.7 Application notes

Application	Description	Filename
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### Product category: RF power transistors

General applications	Mounting and Soldering of RF transistors	AN10896
General applications	Bias module for 50 V GaN demonstration boards	AN11130
General applications	Life-time requirements of NXP HVSON12 plastic drivers	AN11198
General applications	TTL bias switching	AN11226
General applications	Life-time requirements of NXP Semiconductors HVSON12 high-voltage (50 V) plastic drivers	AN11520
Broadcast	Broadband DVB-T UHF power amplifier with BLF888	AN10869
ISM and broadcast	Using BLF574 in the 88 - 108 MHz FM band	AN10714
ISM and broadcast	Using BLF578 in the 88 to 108 MHz FM band	AN10800
ISM and broadcast	174 to 230 MHz DVB-T power amplifier with BLF578	AN10858
ISM and broadcast	Dependency of BLF578 gate bias voltage on temperature	AN10882
ISM and broadcast	174 to 230 MHz DVB-T power amplifier with BLF881	AN10945
ISM and broadcast	1805 to 1880 MHz asymmetrical Doherty amplifier with BLF7G20LS-90P and BLF7G21LS-160P	AN10951
ISM and broadcast	BLF645 10 to 600 MHz 120 W amplifier	AN10953
ISM and broadcast	BLF578 demo for 352 MHz 1 kW CW power	AN10967
ISM and broadcast	Broadband DVB-T UHF power amplifier with BLF888A	AN11062
ISM and broadcast	Using BLF574 in the 88 - 108 MHz FM band	AN10714
ISM and broadcast	Using BLF578 in the 88 to 108 MHz FM band	AN10800

## Application notes (continued)

Application	Description	Filename
ISM and broadcast	174 to 230 MHz DVB-T power amplifier with BLF578	AN10858
ISM and broadcast	Broadband DVB-T UHF power amplifier with BLF888	AN10869
ISM and broadcast	Dependency of BLF578 gate bias voltage on temperature	AN10882
ISM and broadcast	174 to 230 MHz DVB-T power amplifier with BLF881	AN10945
ISM and broadcast	BLF645 10 to 600 MHz 120 W amplifier	AN10953
ISM and broadcast	BLF578 demo for 352 MHz 1 kW CW power	AN10967
ISM and broadcast	Broadband DVB-T UHF power amplifier with BLF888A	AN11062
Wireless communication infrastructure	Doherty RF performance using BLF6G20-230PRN	AN10847
Wireless communication infrastructure	Doherty RF performance analysis using BLF7G22LS-130	AN10885
Wireless communication infrastructure	BLF7G20LS-200 Doherty 1.805 - 1.88 GHz RF power amplifier	AN10921
Wireless communication infrastructure	1.5 GHz Doherty power amplifier for base station applications using BLF6G15L-250PBRN	AN10923
Wireless communication infrastructure	2.5 to 2.7 GHz Doherty power amplifier using BLF7G27LS-150P	AN10933
Wireless communication infrastructure	1930 to 1990 MHz Doherty amplifier using BLF7G20LS-200	AN10944
Wireless communication infrastructure	Doherty RF performance analysis using BLF7G22LS-130	AN10885
Wireless communication infrastructure	BLF7G20LS-200 Doherty 1.805 - 1.88 GHz RF power amplifier	AN10921
Wireless communication infrastructure	1.5 GHz Doherty power amplifier for base station applications using BLF6G15L-250PBRN	AN10923
Wireless communication infrastructure	2.5 to 2.7 GHz Doherty power amplifier using BLF7G27LS-150P	AN10933
Wireless communication infrastructure	1930 to 1990 MHz Doherty amplifier using BLF7G20LS-200	AN10944
Wireless communication infrastructure	1805 to 1880 MHz asymmetrical Doherty amplifier with BLF7G20LS-90P and BLF7G21LS-160P	AN10951
Wireless connectivity	Doherty RF performance using BLF6G20-230PRN	AN10847

### Product category: mixer / modulator

TV and Satalite	Universal Single LNB with TFF101x FIMOD IC	AN11144
Wireless communication infrastructure	BGX7221 evaluation board application note	AN10998
Wireless communication infrastructure	BGX7100 evaluation board application note	AN11014
Wireless communication infrastructure	BGX7220 evaluation board application note	AN11132
Wireless communication infrastructure	BGX7101 evaluation board application note	AN11189

### Product category: RF small signal amplifiers

Aerospace and defense	Replacing HMC625 by NXP BGA7204	AN11135
General applications	Reducing the Spurs at RF_out caused by the biasing choke during fast switching on and off in TDD system	AN11152

Application	Description	Filename
Broadband communication infrastructure	Mounting and soldering recommendations for CATV modules	AN10376
Broadband communication infrastructure	CGY1047 - 1 GHz, 27 dB gain GaAs push-pull amplifier	AN10848
Broadband communication infrastructure	BGA301x Wideband Variable gain amplifier application	AN11228
Broadband communication infrastructure	BGA301x - 40 MHz to 1006 MHz push-pull application	AN11299
Broadband communication infrastructure, TV and Satalite	CATV push-pull amplifier UGY1088 MMIC	AN11104
Broadband communication infrastructure, TV and Satalite	BGA3012 - 1 GHz 12 dB gain wideband amplifier MMIC	AN11220
Broadband communication infrastructure, TV and Satalite	BGA3015 - 1 GHz 15 dB gain wideband amplifier MMIC	AN11221
Broadband communication infrastructure, TV and Satalite	BGA3018 - 1 GHz 18 dB gain wideband amplifier MMIC	AN11222
Broadband communication infrastructure, TV and Satalite	BGA3012 - 5 MHz to 300 MHz 12 dB reverse amplifier application	AN11293
Broadband communication infrastructure, TV and Satalite	BGA3015 - 5 MHz to 300 MHz 15 dB reverse amplifier application	AN11294
Broadband communication infrastructure, TV and Satalite	BGA3018 - 5 MHz to 300 MHz 18 dB reverse amplifier application	AN11295
Broadband communication infrastructure, TV and Satalite	BGA3018 - 40 MHz to 2600 MHz wideband amplifier application	AN11296
TV and Satalite	Set-Top Box LNAs BGU703X and BGU704X	AN11209
TV and Satalite, wireless connectivity	CMMB LNA with BGU7003, 400 to 800 MHz	AN11097
TV and Satalite, wireless connectivity, automotive	BGU7003 400 MHz and 900 MHz application	AN11072
TV and Satalite, wireless connectivity, automotive	BGU7003 LNA application for GPS L2 band	AN11086
TV and Satalite, wireless connectivity, automotive	BGU7003 1900 to 2100 MHz LNA application	AN11148
TV and Satalite, wireless connectivity, automotive	2.62 ~ 2.69GHz LNA by using BGU7003	AN11481
Wireless communication infrastructure	BGU7063 evaluation board application note	AN11171
Wireless communication infrastructure	1900 MHz low noise, high linearity amplifier using BGU8052	AN11416
Wireless communication infrastructure	900 MHz low noise, high linearity amplifier using BGU8051	AN11417
Wireless communication infrastructure	2500 MHz low noise, high linearity amplifier using BGU8053	AN11418

## Application notes (continued)

Application	Description	Filename
Wireless communication infrastructure, aerospace and defense	BGA7210 Operation Frequency Extension Down to 400 MHz	AN11251
Wireless communication infrastructure, ISM, broadcasting, aerospace and defense	Application Note for the BGA7130 EVB 865 - 880 MHz	AN11190
Wireless communication infrastructure, ISM, broadcasting, aerospace and defense	Application Note for the BGA7130 EVB 1930 - 1995 MHz	AN11191
Wireless connectivity	High Linearity Low Noise 2.4-2.5GHz WiFi LNA with ON5096	AN11283
Wireless connectivity	BGU8007/BGU7005 Matching Options for Improved LTE Jammer Immunity	AN11068
Wireless connectivity	BGU7007 GPS front end evaluation board	AN11101
Wireless connectivity	Externally-matched 900 MHz LNA using BGU7005	AN11103
Wireless connectivity	Low Noise Fast Turn ON/OFF 5-5.9GHz WiFi LNA with BFU768F	AN11184
Wireless connectivity	Low Noise Fast Turn ON/OFF 2.4-2.5GHz WiFi LNA with BFU768F	AN11185
Wireless connectivity	BGU8009 GNSS LNA evaluation board	AN11288
Wireless connectivity	BGU8009 GNSS front-end evaluation board	AN11317
Wireless connectivity	BGU8010 GNSS LNA evaluation board	AN11336

Application	Description	Filename
Wireless connectivity	BGU8011 GNSS LNA evaluation board	AN11337
Wireless connectivity	BGU8011 GNSS front-end evaluation board	AN11338
Wireless connectivity	BGU8009/BGU7005 L2 and L5 Band LNA application	AN11353
Wireless connectivity	BGU8009 Matching Options for 850 MHz / 2400 MHz Jammer Immunity	AN11357
Wireless connectivity	BGU8019 and BGU8019W GNSS LNA evaluation board	AN11368
Wireless connectivity	BGU8004 GNSS LNA evaluation board	AN11369
Wireless connectivity	NXP GPS LNA - GPS LNA voltage supply via a coax cable coming from the GPS receiver	AN11420
Wireless connectivity, automotive	High Ohmic FM LNA for embedded Antenna in Portable applications with BGU7003W	AN11034
Wireless connectivity, automotive	50 Ohm FM LNA for embedded Antenna in Portable applications with BGU7003W	AN11035
Wireless connectivity, automotive	50 Ohm FM LNA for embedded Antenna in Portable applications with BGU6102	AN11090
Wireless connectivity, automotive	Ohmic FM LNA for embedded Antenna in Portable applications with BGU6102	AN11091
Wireless connectivity and ISM	BGU8006 GNSS LNA evaluation board	AN11230
Wireless connectivity and ISM	BGU8006 GNSS front end evaluation board	AN11284

## 4.8 Simulation models

### 4.8.1 Simulation models for RF power devices

Updates of this overview are available in PDF format at:

[http://www.nxp.com/wcm\\_documents/models/RFPower\\_Model\\_Overview.pdf](http://www.nxp.com/wcm_documents/models/RFPower_Model_Overview.pdf)

#### Overview of RF power models

Type	ADS model			Microwave Office model		S-parameter data	
	ADS 2009	ADS 2011	ADS 2012	Library manual	Simulation example		
BLA0912-250						36 V, 150 mA	
BLA6G1011-200R	Available			Available			
BLA6H0912-500	Available			Available			
BLA6H0912L-1000	Available	Available		Available			
BLA6H1011-600	Available			Available			
BLC8G24LS-240AV	Available						
BLC8G27LS-160AV	Available						
BLC8G27LS-240AV	Available						
BLD6G22L-50	Available			Available			
BLD6G22LS-50	Available			Available			
BLF1043						28 V, 50 mA	
BLF1046						28 V, 300 mA	
BLF145						14 V, 250 mA	28 V, 250 mA
BLF147						14 V, 1000 mA	28 V, 1000 mA
BLF174XR	Available			Available			
BLF174XRS	Available			Available			
BLF175						25 V, 150 mA	50 V, 150 mA
BLF177						25 V, 100 mA	50 V, 100 mA
BLF178XR	Available			Available			
BLF178XRS	Available			Available			
BLF184XR	Available			Available			
BLF184XRS	Available			Available			
BLF188XR	Available	Available		Available			
BLF188XRS	Available	Available		Available			
BLF202						6.25 V, 20 mA	12.5 V, 20 mA
BLF242						14 V, 10 mA	28 V, 10 mA
BLF2425M7L140	Available						
BLF2425M7L250P	Available	Available		Available			
BLF2425M7LS140	Available						
BLF2425M7LS250P	Available	Available		Available			
BLF2425M8L140	Available						
BLF2425M8LS140	Available						
BLF244						12.5 V, 25 mA	14 V, 25 mA
BLF245						12.5 V, 50 mA	14 V, 50 mA
BLF246						14 V, 50 mA	14 V, 100 mA
BLF248						14 V, 250 mA	28 V, 250 mA
BLF278						25 V, 500 mA	50 V, 500 mA
BLF346						14 V, 3000 mA	28 V, 3000 mA
BLF368						14 V, 250 mA	16 V, 250 mA
BLF369	Available						



## Overview of RF power models (continued)

Type	ADS model			Microwave Office model		S-parameter data	
	ADS 2009	ADS 2011	ADS 2012	Library manual	Simulation example		
BLF3G21-30						26 V, 450 mA	
BLF368						14 V, 250 mA	16 V, 250 mA
BLF369	Available						
BLF3G21-30						26 V, 450 mA	
BLF3G21-6	Available						
BLF404						6.25 V, 50 mA	12.5 V, 50 mA
BLF521						6.25 V, 10 mA	12.5 V, 10 mA
BLF542						14 V, 10 mA	14 V, 50 mA
BLF544						14 V, 40 mA	28 V, 40 mA
BLF548						14 V, 160 mA	28 V, 160 mA
BLF571	Available	Available		Available			
BLF573	Available			Available			
BLF573S	Available			Available			
BLF574	Available			Available			
BLF574XR	Available			Available			
BLF574XRS	Available			Available			
BLF578	Available	Available		Available			
BLF578XR	Available			Available			
BLF578XRS	Available			Available			
BLF642	Available			Available			
BLF644P	Available			Available			
BLF645	Available			Available			
BLF647P	Available	Available					
BLF647PS	Available	Available					
BLF6G10-200RN	Available						
BLF6G10-45	Available			Available			
BLF6G10L-260PRN	Available						
BLF6G10L-40BRN	Available						
BLF6G10LS-135RN	Available			Available			
BLF6G10LS-200RN	Available						
BLF6G10LS-260PRN	Available						
BLF6G10S-45	Available			Available			
BLF6G13L-250P	Available			Available			
BLF6G13LS-250P	Available			Available			
BLF6G15L-250PBRN	Available						
BLF6G15L-40BRN	Available						
BLF6G15L-500H	Available						
BLF6G15LS-500H	Available						
BLF6G20-230PRN	Available						
BLF6G20-45	Available			Available			
BLF6G20LS-180RN	Available						
BLF6G20S-45	Available			Available			
BLF6G21-10G	Available			Available			
BLF6G22-45	Available			Available			
BLF6G22L-40P	Available			Available			
BLF6G22LS-180RN	Available						

## Overview of RF power models (continued)

Type	ADS model			Microwave Office model		S-parameter data	
	ADS 2009	ADS 2011	ADS 2012	Library manual	Simulation example		
BLF6G22LS-40P	Available			Available			
BLF6G22S-45	Available			Available			
BLF6G27-10	Available						
BLF6G27-10G	Available			Available			
BLF6G27-45	Available			Available			
BLF6G27-75	Available						
BLF6G27L-40P	Available			Available			
BLF6G27LS-135	Available						
BLF6G27LS-40P	Available			Available			
BLF6G27LS-75	Available						
BLF6G27S-45	Available			Available			
BLF6G38-10	Available						
BLF6G38-100	Available						
BLF6G38-10G	Available			Available			
BLF6G38-25	Available			Available			
BLF6G38-50	Available			Available			
BLF6G38LS-100	Available						
BLF6G38LS-50	Available			Available			
BLF6G38S-25	Available			Available			
BLF6H10L-160	Available			Available			
BLF6H10LS-160	Available			Available			
BLF7G10L-250	Available	Available					
BLF7G10LS-250	Available	Available					
BLF7G15LS-200	Available						
BLF7G15LS-300P	Available						
BLF7G20L-200	Available			Available			
BLF7G20L-250P	Available			Available			
BLF7G20L-90P	Available			Available			
BLF7G20LS-140P	Available						
BLF7G20LS-200	Available			Available			
BLF7G20LS-250P	Available			Available			
BLF7G20LS-90P	Available			Available			
BLF7G21L-160P	Available						
BLF7G21LS-160P	Available						
BLF7G22L-100P	Available						
BLF7G22L-130	Available			Available			
BLF7G22L-160	Available						
BLF7G22L-200	Available			Available			
BLF7G22L-250P	Available						
BLF7G22LS-100P	Available						
BLF7G22LS-130	Available			Available			
BLF7G22LS-160	Available						
BLF7G22LS-200	Available			Available			
BLF7G22LS-250P	Available						
BLF7G24L-100	Available						
BLF7G24L-140	Available						

## Overview of RF power models (continued)

Type	ADS model			Microwave Office model		S-parameter data	
	ADS 2009	ADS 2011	ADS 2012	Library manual	Simulation example		
BLF7G24L-160P	Available						
BLF7G24LS-100	Available						
BLF7G24LS-140	Available						
BLF7G24LS-160P	Available						
BLF7G27L-100	Available			Available			
BLF7G27L-140	Available	Available		Available			
BLF7G27L-150P	Available						
BLF7G27L-200PB	Available						
BLF7G27L-75P	Available						
BLF7G27L-90P	Available			Available			
BLF7G27LS-100	Available			Available			
BLF7G27LS-140	Available	Available		Available			
BLF7G27LS-150P	Available						
BLF7G27LS-75P	Available						
BLF7G27LS-90P	Available			Available			
BLF871	Available			Available			
BLF871S	Available			Available			
BLF878	Available			Available			
BLF879P	Available			Available			
BLF879PS	Available			Available			
BLF881	Available			Available			
BLF881S	Available			Available			
BLF884P	Available			Available (separate from library)			
BLF884PS	Available			Available (separate from library)			
BLF888	Available						
BLF888A	Available			Available			
BLF888AS	Available			Available			
BLF8G09LS-270GW	Available						
BLF8G09LS-270W	Available						
BLF8G10L-160		Available					
BLF8G10LS-160		Available					
BLF8G10LS-160V	Available						
BLF8G10LS-270	Available	Available					
BLF8G10LS-270GV	Available						
BLF8G19LS-170BV	Available						
BLF8G20LS-200V				Available			
BLF8G20LS-220	Available						
BLF8G20LS-230V	Available						
BLF8G20LS-260A	Available						
BLF8G20LS-400PGV	Available						
BLF8G22LS-140	Available						
BLF8G22LS-200GV	Available						
BLF8G22LS-220	Available						
BLF8G22LS-240	Available			Available			
BLF8G22LS-270GV	Available						
BLF8G24L-200P		Available					

Overview of RF power models (continued)

Type	ADS model			Microwave Office model		S-parameter data	
	ADS 2009	ADS 2011	ADS 2012	Library manual	Simulation example		
BLF8G24LS-200P		Available					
BLF8G27LS-100	Available						
BLF8G27LS-100GV	Available	Available					
BLF8G27LS-100V	Available						
BLF8G27LS-140	Available						
BLF8G27LS-140V	Available	Available					
BLF8G27LS-150GV	Available	Available					
BLF8G38LS-75V	Available						
BLF988				Available (separate from library)			
BLF988S				Available (separate from library)			
BLL6H0514-25	Available			Available			
BLL6H0514L-130	Available			Available			
BLL6H0514LS-130	Available			Available			
BLL6H1214-500	Available						
BLF8G10LS-300P	Available						
BLL6H1214L-250	Available			Available			
BLL6H1214LS-250	Available			Available			
BLL6H1214LS-500	Available						
BLM6G10-30	Available						
BLM6G22-30	Available						
BLM7G1822S-40PBG	Available	Available	Available				
BLM7G22S-60PBG	Available						
BLP15M7160P	Available			Available			
BLP25M705	Available						
BLP25M710	Available						
BLP7G07S-140P	Available			Available			
BLP7G22-05	Available						
BLP7G22-10	Available	Available					
BLP8G10S-45PG	Available						
BLP8G21S-160PV	Available						
BLS6G2731-6G	Available						
BLS6G2731S-130	Available			Available			
BLS6G2735L-30	Available						
BLS6G2735LS-30	Available						
BLS6G3135-20	Available						
BLS6G3135S-120	Available			Available			
BLS6G3135S-20	Available						
BLS7G2729L-350P	Available						
BLS7G2729LS-350P	Available						
BLS7G2730L-200P	Available						
BLS7G2730LS-200P	Available						
BLS7G2933S-150	Available						
BLS7G3135L-350P	Available						
BLS7G3135LS-200	Available						
BLS7G3135LS-350P	Available						
CLF1G0035-100	Available	Available		Available			50 V, 330 mA

Design support

## Overview of RF power models (continued)

Type	ADS model			Microwave Office model		S-parameter data	
	ADS 2009	ADS 2011	ADS 2012	Library manual	Simulation example		
CLF1G0035-100P	Available	Available		Available			50 V, 340 mA
CLF1G0035-50	Available	Available		Available			50 V, 150 mA
CLF1G0035S-100	Available	Available		Available			50 V, 330 mA
CLF1G0035S-100P	Available	Available		Available			50 V, 340 mA
CLF1G0035S-50	Available	Available		Available			50 V, 150 mA
CLF1G0060-10	Available	Available		Available			50 V, 20 mA
CLF1G0060-30	Available	Available		Available			50 V, 50 mA
CLF1G0060S-10	Available	Available		Available			50 V, 20 mA
CLF1G0060S-30	Available	Available		Available			50 V, 50 mA

## 4.8.2 Simulation models for RF bipolar wideband transistors

Wideband transistors	Demo board	Attached to PIP / model page			Supported simulators				
		S-parameters	Spice model	Mextram model	Device model	S-parameters	Spice model	Mextram model	Device model
BFG67		√	√			ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BFG67/X			√			-	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BFG10			√			-	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BFG10W			√			-	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BFG10W/X			√			-	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BFG135		√	√			ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BFG198		√	√			-	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BFG21W	√	√	√			ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BFG25A/X		√	√			ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BFG25AW/X			√			ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BFG31		√	√			ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BFG35		√	√			ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BFG310/XR		√	√			ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BFG310W/XR		√	√			ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BFG325/XR		√	√			ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BFG325W/XR		√	√			ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BFG403W		√	√			ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BFG410W	√	√	√			ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BFG424F		√	√			ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BFG424W	√	√	√			ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BFG425W	√	√	√			ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BFG480W	√	√	√			ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BFG505		√	√			ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BFG505/X			√			-	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BFG505W/X			√			-	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BFG520		√	√			ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BFG520W		√	√			ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BFG520X			√			-	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BFG520/XR			√			-	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BFG540		√	√			ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BFG540/X			√			-	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BFG540/XR			√			-	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BFG540W		√	√			ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BFG541		√	√			ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BFG590		√	√			ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BFG590/X			√			-	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BFG591		√	√			ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-

Simulation models for RF bipolar wideband transistors (continued)

Wideband transistors	Demo board	Attached to PIP / model page				Supported simulators			
		S-parameters	Spice model	Mextram model	Device model	S-parameters	Spice model	Mextram model	Device model
BFG92A/X			√			-	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BFG93A		√	√			ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BFG94		√	√			ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BFG97		√	√			ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BFM505		√	√			ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BFM520		√	√			ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BFQ149		√	√			ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BFG18A		√	√			ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BFQ19		√	√			ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BFQ540			√			-	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BFQ67		√	√			ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BFQ67W		√	√			ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BFR106		√	√			ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BFR505		√	√			ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BFR505T			√			-	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BFR520		√	√		Microwave Office	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BFR540		√	√			ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BFR92A		√	√			ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BFR92AW		√	√			ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BFR93A		√	√			ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BFR93AW		√	√			ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BFS17		√	√			ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BFS17A		√	√			ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BFS17W		√	√			ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BFS25A		√	√			ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BFS505		√	√			ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BFS520		√	√			ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BFS540		√	√			ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BFT25		√				ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-	-
BFT25A		√	√			ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BFT92		√	√			ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BFT92W		√	√			ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BFT93		√	√			ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BFT93W		√	√			ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BFU520	√	√	√	√		ADS 2011	-	ADS 2011	-
BFU520A	√	√	√	√		ADS 2011	-	ADS 2011	-
BFU520W	√	√	√	√		ADS 2011	-	ADS 2011	-
BFU520X	√	√	√	√		ADS 2011	-	ADS 2011	-
BFU520XR	√	√	√	√		ADS 2011	-	ADS 2011	-
BFU520Y	√	√	√	√		ADS 2011	-	ADS 2011	-
BFU530	√	√	√	√		ADS 2011	-	ADS 2011	-
BFU530A	√	√	√	√		ADS 2011	-	ADS 2011	-
BFU530W	√	√	√	√		ADS 2011	-	ADS 2011	-
BFU530X	√	√	√	√		ADS 2011	-	ADS 2011	-
BFU530XR	√	√	√	√		ADS 2011	-	ADS 2011	-
BFU550	√	√	√	√		ADS 2011	-	ADS 2011	-
BFU550A	√	√	√	√		ADS 2011	-	ADS 2011	-
BFU550W	√	√	√	√		ADS 2011	-	ADS 2011	-
BFU550X	√	√	√	√		ADS 2011	-	ADS 2011	-
BFU550XR	√	√	√	√		ADS 2011	-	ADS 2011	-
BFU580G	√	√	√	√		ADS 2011	-	ADS 2011	-
BFU580Q	√	√	√	√		ADS 2011	-	ADS 2011	-
BFU590G	√	√	√	√		ADS 2011	-	ADS 2011	-

Design support

### 4.8.3 Simulation models for RF MOSFET transistors

Wideband transistors	Attached to PIP / model page					Supported simulators				
	Demo board	S-parameters	Spice model	Mextram model	Device model	S-parameters	Spice model	Mextram model	Device model	
BFU590Q	√	√	√	√		ADS 2011	-	ADS 2011	-	
BFU725F	√	√	√			ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-	
BFU725F/N1	√	√	√			ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-	
BFU610F	√	√	√	√		ADS 2009, ADS 2011	ADS 2009, ADS 2011, Microwave Office	ADS 2009, ADS 2011, Microwave Office	-	
BFU630F	√	√	√	√		ADS 2009, ADS 2011	ADS 2009, ADS 2011, Microwave Office	ADS 2009, ADS 2011, Microwave Office	-	
BFU660F	√	√	√	√		ADS 2009, ADS 2011	ADS 2009, ADS 2011, Microwave Office	ADS 2009, ADS 2011, Microwave Office	-	
BFU690F	√	√	√	√		ADS 2009, ADS 2011	ADS 2009, ADS 2011, Microwave Office	ADS 2009, ADS 2011, Microwave Office	-	
BFU710F	√	√	√	√		ADS 2009, ADS 2011	ADS 2009, ADS 2011, Microwave Office	ADS 2009, ADS 2011, Microwave Office	-	
BFU730F	√	√	√	√		ADS 2009, ADS 2011	ADS 2009, ADS 2011, Microwave Office	ADS 2009, ADS 2011, Microwave Office	-	
BFU730LX	√	√		√		ADS 2011	ADS 2011	ADS 2011	-	
BFU760F	√	√	√	√		ADS 2009, ADS 2011	ADS 2009, ADS 2011, Microwave Office	ADS 2009, ADS 2011, Microwave Office	-	
BFU790F	√	√	√	√		ADS 2009, ADS 2011	ADS 2009, ADS 2011, Microwave Office	ADS 2009, ADS 2011, Microwave Office	-	
PBR941		√	√			ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-	
PBR951		√	√			ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-	
PRF947		√	√			ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-	
PRF949		√	√			ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-	
PRF957		√	√			ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-	
BF1211		√				ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-	-	
BF1211R		√				ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-	-	
BF1211WR		√				ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-	-	
BF1212		√				ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-	-	
BF1212R		√				ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-	-	
BF1212WR		√				ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-	-	
BF511		√				ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-	-	
BF513		√				ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-	-	
BF862		√	√			ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-	-	
BF904			√			-	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-	
BF908			√			-	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-	
BF909			√			-	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-	
BF998			√			-	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-	
BGA2001	√	√				ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-	-	

## 4.8.4 Simulation models for RF MMIC amplifiers

Wideband transistors	Demo board	Attached to PIP / model page			Supported simulators				
		S-parameters	Spice model	Mextram model	Device model	S-parameters	Spice model	Mextram model	Device model
BGA2002	√					-	-	-	-
BGA2003	√	√				ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-	-
BGA2711	√	√				ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-	-
BGA2748	√	√				ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-	-
BGA2771	√	√				ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-	-
BGA2776	√	√				ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-	-
BGA2709	√	√				ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-	-
BGA2712	√	√				ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-	-
BGA2714	√					-	-	-	-
BGA2715	√	√				ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-	-
BGA2716	√	√				ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-	-
BGA2717		√				ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-	-
BGA2011	√	√				ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-	-
BGA2012	√	√				ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-	-
BGA2031	√					-	-	-	-
BGA6289	√	√				ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-	-
BGA6489	√	√				ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-	-
BGA6589	√	√				ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-	-
BGA2800	√	√				ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-	-
BGA2801	√	√				ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-	-
BGA2815	√	√				ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-	-
BGA2816	√	√				ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-	-
BGA2850	√	√				ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-	-
BGA2865	√	√				ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-	-
BGA6130	√			√		-	-	-	ADS 2011
BGA2866	√	√				ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-	-
BGA3012	√	√		√		ADS 2011			ADS 2011
BGA3015	√	√		√		ADS 2011			ADS 2011
BGA3018	√	√		√		ADS 2011			ADS 2011
BGA7024	√	√				-	-	-	-
BGA7027	√	√				-	-	-	-
BGA7124	√	√				-	-	-	-
BGA7127	√	√				-	-	-	-
BGA7130	√			√		-	-	-	ADS 2011
BGM1011	√	√				ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-	-
BGM1012	√	√				ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-	-
BGM1013	√	√				ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-	-
BGM1014	√	√				ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-	-
BGU3012	√					ADS 2011	-	-	-
BGU3015	√					ADS 2011	-	-	-
BGU3018	√					ADS 2011	-	-	-
BGU6102	√					-	-	-	-
BGU7031	√					-	-	-	-
BGU7032	√					-	-	-	-
BGU7033	√					-	-	-	-
BGU7041	√					-	-	-	-
BGU7042	√					-	-	-	-
BGU7044	√					-	-	-	-
BGU7045	√					-	-	-	-
BGU7050	√					-	-	-	-
BGU7051	√					-	-	-	-
BGU7052	√					-	-	-	-
BGU7053	√					-	-	-	-
BGU7061	√					-	-	-	-
BGU7062	√					-	-	-	-
BGU7063	√					-	-	-	-



## Simulation models for RF MMIC amplifiers (continued)

Wideband transistors	Demo board	Attached to PIP / model page				Supported simulators			
		S-parameters	Spice model	Mextram model	Device model	S-parameters	Spice model	Mextram model	Device model
BGU7064	√					-	-	-	-
BGU7003	√	√				-	-	-	-
BGU7003W	√					-	-	-	-
BGU7004	√	√				ADS 2011	-	-	-
BGU7005	√	√			√	ADS 2011	-	-	ADS 2011
BGU7007	√	√			√	ADS 2011	-	-	ADS 2011
BGU8006	√	√			√	ADS 2011	-	-	ADS 2011
BGU8007	√	√				ADS 2011	-	-	-
BGU8009	√	√			√	ADS 2011	-	-	ADS 2011

## 4.8.5 Simulation models for RF varicap diodes

Varicap	Demo board	Attached to PIP/ model page				Supported simulators			
		S-parameters	Spice model	Mextram model	Device model	S-parameters	Spice model	Mextram model	Device model
BB145B			√			-	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BB156			√			-	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BB201			√			-	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BB202			√			-	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BB207			√			-	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-
BB208-2			√			-	ADS 2009, ADS 2011, Microwave Office, Ansoft Designer	-	-

# 5. Cross-references and replacements

NXP cross-references:

<http://www.nxp.com/xref/nxp?typenumber>

NXP end-of-life listings:

<http://www.nxp.com/products/eol/>

## 5.1 Cross-references: manufacturer types versus NXP types

In alphabetical order by manufacturer type

Abbreviations:

A & D	Aerospace and Defense
Broadcast/ISM	Broadcast/Industrial, Scientific, Medical
BS diode	Band Switch Diode
CATV OR	CATV Optical Receiver
CATV PD	CATV Power Doubler
CATV PPA	CATV Push-Pull Amplifier
CATV PPA/HG	CATV Push-Pull Amplifier High Gain
CATV RA	CATV Reverse Amplifier
FET	Field-Effect Transistor
LNA	Low-Noise Amplifier
MMIC	Monolithic Microwave Integrated Circuit
PIN diode	P-type, Intrinsic, N-type diode
Varicap	Varicap Diode
WB trs 1-4	Wideband transistor generation 1-4
WB trs 5-7	Wideband transistor generation 5-7

Manufacturer type	Manufacturer	NXP type	Product family
1SS314	Toshiba	BA591	BS diode
1SS356	ROHM	BA591	BS diode
1SS390	ROHM	BA891	BS diode
1SV172	Toshiba	BAP50-04	PIN diode
1SV215	Toshiba	BB172	Varicap
1SV228	Toshiba	BB201	Varicap
1SV231	Toshiba	BB171	Varicap
1SV232	Toshiba	BB170	Varicap
1SV233	Sanyo	BAP70-03	PIN diode
1SV234	Sanyo	BAP64-04	PIN diode
1SV239	Toshiba	BB145B	Varicap
1SV241	Sanyo	BAP64-02	PIN diode
1SV246	Sanyo	BAP64-04W	PIN diode
1SV247	Sanyo	BAP70-02	PIN diode
1SV248	Sanyo	BAP50-02	PIN diode
1SV249	Sanyo	BAP50-04W	PIN diode
1SV250	Sanyo	BAP50-03	PIN diode
1SV251	Sanyo	BAP50-04	PIN diode
1SV252	Toshiba	BAP50-04W	PIN diode
1SV263	Sanyo	BAP50-02	PIN diode
1SV264	Sanyo	BAP50-04W	PIN diode
1SV266	Sanyo	BAP50-03	PIN diode
1SV267	Sanyo	BAP50-04	PIN diode
1SV269	Toshiba	BB170	Varicap
1SV270	Toshiba	BB156	Varicap
1SV271	Toshiba	BAP50-03	PIN diode
1SV284	Toshiba	BB156	Varicap
1SV288	Toshiba	BB171	Varicap
1SV294	Sanyo	BAP70-03	PIN diode
1SV305	Toshiba	BB202	Varicap
1SV307	Toshiba	BAP51-03	PIN diode
1SV308	Toshiba	BAP51-02	PIN diode

Manufacturer type	Manufacturer	NXP type	Product family
1T363A	Sony	BB172	Varicap
1T368A	Sony	BB170	Varicap
1T369	Sony	BB171	Varicap
1T379	Sony	BB131	Varicap
1T397	Sony	BB171	Varicap
1T399	Sony	BB170	Varicap
2F1G20DS	RFHIC	CGD1040Hi	CATV PD
2F1G20DS	RFHIC	CGD1042H	CATV PD
2F1G20P	RFHIC	CGY1041	CATV PP
2F1G22DS	RFHIC	CGD1042H	CATV PD
2F1G22DS	RFHIC	CGD1042Hi	CATV PD
2F1G22DS	RFHIC	CGD982HCi	CATV PD
2F1G23P	RFHIC	CGY1041	CATV PP
2F1G23P	RFHIC	CGY1043	CATV PP
2F1G24D	RFHIC	CGD1044Hi	CATV PD
2F1G24D	RFHIC	CGD985HCi	CATV PD
2F1G24DS	RFHIC	CGD1044H	CATV PD
2F722DS	RFHIC	BGD816L	CATV PD
2F8718P	RFHIC	BGY885A	CATV PP
2F8719DS	RFHIC	BGD812	CATV PD
2F8720DS	RFHIC	BGD814	CATV PD
2F8723P	RFHIC	BGY887	CATV PP
2F8734P	RFHIC	CGY888C	CATV PP
2N4856	Standard	BSR56	FET
2N4857	Standard	BSR57	FET
2N4858	Standard	BSR58	FET
2SA1977(NE97733)	Renesas	BFT93	WB trs 1-4
2SA1978(NE97833)	Renesas	BFT93	WB trs 1-4
2SC2735	Renesas	BFU530W	WB trs 1-4
2SC3356	Renesas	BFR540 / BFU550A	WB trs 1-4
2SC3356	Renesas	BFU590Q	WB trs 1-4
2SC3357	Renesas	BFU580Q	WB trs 1-4

Cross-references & replacements

Manufacturer type	Manufacturer	NXP type	Product family
25C3357	Renesas	BFU590Q	WB trs 1-4
25C3583(NE68133)	Renesas	BFU520A	WB trs 1-4
25C3585(NE68033)	Renesas	BFU520A	WB trs 1-4
25C4093(NE85639E)	Renesas	BFU550A	WB trs 1-4
25C4094	NEC	BFU520XR	WB trs 1-4
25C4094	Renesas	BFU520XR	WB trs 1-4
25C4095	NEC	BFU520XR	WB trs 1-4
25C4095	Renesas	BFU520XR	WB trs 1-4
25C4182	NEC	BFU530W	WB trs 1-4
25C4182	Renesas	BFU530W	WB trs 1-4
25C4184	NEC	BFU530W	WB trs 1-4
25C4184	Renesas	BFU530W	WB trs 1-4
25C4185	NEC	BFU530W	WB trs 1-4
25C4185	Renesas	BFU530W	WB trs 1-4
25C4186	NEC	BFU520W	WB trs 1-4
25C4186	Renesas	BFU520W	WB trs 1-4
25C4226	NEC	BFU550W	WB trs 1-4
25C4226	Renesas	BFU550W	WB trs 1-4
25C4227	NEC	BFU530W	WB trs 1-4
25C4227	Renesas	BFU530W	WB trs 1-4
25C4228	NEC	BFU520W	WB trs 1-4
25C4228	Renesas	BFU520W	WB trs 1-4
25C4247	Toshiba	BFR92AW	WB trs 1-4
25C4248	Toshiba	BFR92AW	WB trs 1-4
25C4315	Toshiba	BFG520/XR	WB trs 1-4
25C4320	Toshiba	BFG520/XR	WB trs 1-4
25C4321	Toshiba	BFG67W	WB trs 1-4
25C4325	Toshiba	BFS505	WB trs 1-4
25C4394	Toshiba	PRF957	WB trs 1-4
25C4536	NEC	BFU580Q	WB trs 1-4
25C4536	Renesas	BFU580Q	WB trs 1-4
25C4537	Renesas	BFU530W	WB trs 1-4
25C4537	Renesas	BFU530W	WB trs 1-4
25C4570(NE58130)	Renesas	BFU520W	WB trs 1-4
25C4571(NE58230)	Renesas	BFU530W	WB trs 1-4
25C4592	Renesas	BFU520XR	WB trs 1-4
25C4592	Renesas	BFU520XR	WB trs 1-4
25C4593	Renesas	BFU520W	WB trs 1-4
25C4593	Renesas	BFU520W	WB trs 1-4
25C4703	NEC	BFU580Q	WB trs 1-4
25C4703	Renesas	BFU580Q	WB trs 1-4
25C4784	Renesas	BFU520W	WB trs 1-4
25C4784	Renesas	BFU520W	WB trs 1-4
25C4807	Renesas	BFU590Q	WB trs 1-4
25C4807	Renesas	BFU590Q	WB trs 1-4
25C4842	Toshiba	BFG540W/XR	WB trs 1-4
25C4899	Renesas	BFU520W	WB trs 1-4
25C4899	Renesas	BFU520W	WB trs 1-4
25C4900	Renesas	BFU520XR	WB trs 1-4
25C4900	Renesas	BFU520XR	WB trs 1-4
25C4901	Renesas	BFU520W	WB trs 1-4
25C4901	Renesas	BFU520W	WB trs 1-4
25C4926	Renesas	BFG520/XR	WB trs 5-7
25C4957(NE68539E)	Renesas	BFU520/X	WB trs 1-4
25C4988	Renesas	BFU580Q	WB trs 1-4
25C4988	Renesas	BFU580Q	WB trs 1-4
25C5004(NE58219)	Renesas	PRF949	WB trs 1-4
25C5006	Renesas	BFR520T	WB trs 5-7
25C5006-T1-A	NEC	BFR520T	WB trs 1-4
25C5007(NE68119)	Renesas	PRF949	WB trs 1-4
25C5008(NE68019)	Renesas	PRF949	WB trs 1-4
25C5010(NE68519)	Renesas	BFR520T	WB trs 1-4
25C5011	NEC	BFU550W	WB trs 1-4
25C5011	Renesas	BFU550W	WB trs 1-4
25C5012	NEC	BFU550W	WB trs 1-4
25C5012	Renesas	BFU550W	WB trs 1-4
25C5013(NE68018)	Renesas	BFG425W	WB trs 5-7
25C5015(NE68518)	Renesas	BFG425W	WB trs 5-7
25C5065	Toshiba	PRF957	WB trs 1-4
25C5085	Toshiba	PRF957	WB trs 1-4
25C5087	Toshiba	BFG520/XR	WB trs 1-4
25C5088	Toshiba	BFG540W/XR	WB trs 1-4
25C5090	Toshiba	BFS520	WB trs 1-4
25C5092	Toshiba	BFG520/XR	WB trs 1-4
25C5095	Toshiba	BFS505	WB trs 1-4
25C5107	Toshiba	BFS505	WB trs 1-4
25C5180(NE68618)	Renesas	BFG410W	WB trs 5-7
25C5181(NE68619)	Renesas	BFG410W	WB trs 5-7
25C5185(NE68718)	Renesas	BFG425W	WB trs 5-7
25C5186(NE68719)	Renesas	BFG425W	WB trs 5-7
25C5288(NE68939)	Renesas	BGA7024	WB trs 1-4
25C5289(NE69039)	Renesas	BGA7027	WB trs 1-4
25C5336	Renesas	BFU590Q	WB trs 1-4

Manufacturer type	Manufacturer	NXP type	Product family
25C5337(NE461M02)	Renesas	BFU550A	WB trs 1-4
25C5338(NE462M02)	Renesas	BFU550A	WB trs 1-4
25C5369(NE696M01)	Renesas	BFU520W	WB trs 1-4
25C5454(NE67739)	Renesas	BFU520	WB trs 1-4
25C5455(NE67839)	Renesas	BFU520	WB trs 1-4
25C5463	Toshiba	BFG67W	WB trs 1-4
25C5507(NE661M04)	Renesas	BFU610F	WB trs 5-7
25C5508	Renesas	BFU668F	WB trs 5-7
25C5508	Renesas	BFU668F	WB trs 5-7
25C5508-T2-A	NEC	BFG424F	WB trs 5-7
25C5509(NE663M04)	Renesas	BFU690F	WB trs 5-7
25C5593	Renesas	BFG410W	WB trs 5-7
25C5593	Renesas	BFG410W	WB trs 5-7
25C5594	Renesas	BFG425W	WB trs 5-7
25C5594	Renesas	BFG425W	WB trs 5-7
25C5606(NE66219)	Renesas	BFR520T	WB trs 1-4
25C5623	Renesas	BFG410W	WB trs 5-7
25C5623	Renesas	BFG410W	WB trs 5-7
25C5624	Renesas	BFG425W	WB trs 5-7
25C5624	Renesas	BFG425W	WB trs 5-7
25C5631	Renesas	BFU580Q	WB trs 1-4
25C5631	Renesas	BFU580Q	WB trs 1-4
25C5704(NE662M16)	Renesas	BFU630F	WB trs 5-7
25C5750(NE67718)	Renesas	BFU660F	WB trs 5-7
25C5751(NE677M04)	Renesas	BFU660F	WB trs 5-7
25C5752(NE67818)	Renesas	BFU660F	WB trs 5-7
25C5753(NE678M04)	Renesas	BFU660F	WB trs 5-7
25C5754(NE664M04)	Renesas	BGA7027	WB trs 1-4
25C5772	Renesas	BFG520XR	WB trs 5-7
25C5787(NE894M13)	Renesas	BFU630F	WB trs 5-7
25C5800-T1-A	NEC	BFU530W	WB trs 1-4
25C5801(NE851M13)	Renesas	BFU530A	WB trs 1-4
25C5820	Renesas	BFU630F	WB trs 5-7
25C6023	Sanyo	BFG424W	WB trs 5-7
25K163-K	Renesas	J113	FET
25K163-L	Renesas	J113	FET
25K163-M	Renesas	J113	FET
25K163-N	Renesas	J113	FET
25K210BL	Renesas	PMBFJ309	FET
25K210BL	Renesas	PMBFJ309	FET
25K370BL	Renesas	J109	FET
25K370GR	Renesas	J109	FET
25K370V	Renesas	J109	FET
25K381	Renesas	J113	FET
25K43	Renesas	J113	FET
25K435	Renesas	J113	FET
25K508	Renesas	PMBFJ308	FET
25K508	Renesas	PMBFJ308	FET
35K290	Renesas	BF998WR	FET
AD8376	Analog Devices	BGA7350	MMIC
AD8376	Analog Devices	BGA7351	MMIC
ADL5354	Analog Devices	BGX7221	MMIC
ADL5356	Analog Devices	BGX7221	MMIC
ADL5358	Analog Devices	BGX7220	MMIC
ADL5372	Analog Devices	BGX7101	MMIC
ADL5375	Analog Devices	BGX7101	MMIC
ADL5812	Analog Devices	BGX7221	MMIC
ADRF660x	Analog Devices	BGX7211	MMIC
AFT09S282NR3	Freescale	BLF8G09LS-270GW	Base station
AFT18S230SR3	Freescale	BLF8G20LS-200V	Base station
AFT18S230SR3	Freescale	BLF8G20LS-210GV	Base station
AFT18S290-13SR3	Freescale	BLF6G20-230PRN	Base station
AFT20P140-4WGNR3	Freescale	BLF6G20LS-110	Base station
AFT20P140-4WNR3	Freescale	BLF6G20-110	Base station
AFT20P140-4WNR3	Freescale	BLP8G21S-160PV	Base station
AFT21S230SR3	Freescale	BLF8G22LS-200GV	Base station
AFT23H200-4S2LR6	Freescale	BLC8G24LS-240AV	Base station
AFT26H160-4S4R3	Freescale	BLC8G27LS-160AV	Base station
AFT26H200W03SR6	Freescale	BLF7G27LS-150P	Base station
AFT26H250-24SR6	Freescale	BLC8G27LS-240AV	Base station
AFT26P100-4WSR3	Freescale	BLF7G27LS-90P	Base station
AFT26P100-4WSR3	Freescale	BLF8G27LS-100	Base station
AH118	TriQuint	BGA7024	MMIC
AH118	TriQuint	BGA7124	MMIC
AH125	TriQuint	BGA7127	MMIC
AH125	TriQuint	BGA7027	MMIC
AH125	TriQuint	BGA7127	MMIC
AH215	TriQuint	BGA7130	MMIC
AN26112A	Panasonic	BGU7045	MMIC
AN26120A	Panasonic	BGU7042	MMIC
AN26122A	Panasonic	BGU7045	MMIC
BA592	Infineon	BA591	BS diode
BA595	Infineon	BAP51-03	PIN diode



Manufacturer type	Manufacturer	NXP type	Product family
	Infineon	BGU8007	MMIC
BGA825L56	Infineon	BGU8011	MMIC
BGA915	Infineon	BGU7005	MMIC
BGA925	Infineon	BGU8011	MMIC
BGB707	Infineon	BGU6102	MMIC
BGB717	Infineon	BGU6102	MMIC
BIC701M	Renesas	BF1105R	FET
BIC702M	Renesas	BF1105R	FET
BSR111	Standard	PMBFJ111	FET
BSR112	Standard	PMBFJ112	FET
BSR113	Standard	PMBFJ113	FET
BSR174	Standard	PMBFJ174	FET
BSR175	Standard	PMBFJ175	FET
BSR176	Standard	PMBFJ176	FET
BSR177	Standard	PMBFJ177	FET
CA901	Standard	BGX885N	CATV PPA
CA901A	Standard	BGX885N	CATV PPA
CMM6004-SC	Mimix	BGA7024	MMIC
CMM6004-SC	Mimix	BGA7124	MMIC
CMM6004-SC	Mimix	BGA7124	MMIC
CMM6004-SC	Mimix	BGA7204	MMIC
CMY91	Infineon	BGA2022	MMIC
CMY91	Infineon	BGA2022	WB trs 1-4
CXE1089Z	RF Micro	BGA6489	MMIC
CXE1089Z	RF Micro	BGA6589	MMIC
D10040180GT	RF Micro	CGD1042H	CATV PD
D10040180GTH	RF Micro	CGD1042H	CATV PD
D10040200GT	RF Micro	CGD1042H	CATV PD
D10040200GTH	RF Micro	CGD1042H	CATV PD
D10040200P1	RF Micro	CGD1042H	CATV PD
D10040200PH1	RF Micro	CGD1042H	CATV PD
D10040220GT	RF Micro	CGD1042H	CATV PD
D10040220GTH	RF Micro	CGD1042H	CATV PD
D10040230P1	RF Micro	CGD1042H	CATV PD
D10040230PH1	RF Micro	CGD1042H	CATV PD
D10040240GT	RF Micro	CGD1044H	CATV PD
D10040240GTH	RF Micro	CGD1044H	CATV PD
D10040250GT	RF Micro	CGD1044H	CATV PD
D10040250GTH	RF Micro	CGD1044H	CATV PD
D10040270GT	RF Micro	CGD1044H	CATV PD
D10040270GTH	RF Micro	CGD1044H	CATV PD
D10040270GTL	RF Micro	CGD1044H	CATV PD
D8740180GT	RF Micro	CGD942C	CATV PD
D8740180GTH	RF Micro	CGD942C	CATV PD
D8740220GT	RF Micro	CGD942C	CATV PD
D8740220GTH	RF Micro	CGD942C	CATV PD
D8740240GT	RF Micro	CGD944C	CATV PD
D8740240GTH	RF Micro	CGD944C	CATV PD
D8740250GT	RF Micro	CGD944C	CATV PD
D8740250GTH	RF Micro	CGD944C	CATV PD
D8740270GT	RF Micro	CGD944C	CATV PD
D8740270GTH	RF Micro	CGD944C	CATV PD
D8740320GT	RF Micro	CGY888C	CATV PP
D8740320GTH	RF Micro	CGY888C	CATV PP
EC2C03C	Sanyo	BB145B	Varicap
FSD273TA	Skyworks	BB170	Varicap
HBFP0405	Agilent	BFG410W	WB trs 5-7
HBFP0420	Agilent	BFG425W	WB trs 5-7
HBFP0450	Agilent	BFG480W	WB trs 5-7
HMC454ST89E	Hittite	BGA7027	MMIC
HMC454ST89E	Hittite	BGA7127	MMIC
HMC617LP3	Hittite	BGU7051	MMIC
HMC618LP3	Hittite	BGU7052	MMIC
HMC625	Hittite	BGA7204	MMIC
HMC667LP2	Hittite	BGU7053	MMIC
HSC277	Renesas	BA891	BS diode
HSMP3800	Agilent	BAP70-03	PIN diode
HSMP3802	Agilent	BAP50-04	PIN diode
HSMP3804	Agilent	BAP50-05	PIN diode
HSMP3810	Agilent	BAP50-03	PIN diode
HSMP3814	Agilent	BAP50-05	PIN diode
HSMP381B	Agilent	BAP50-03	PIN diode
HSMP381C	Agilent	BAP50-05	PIN diode
HSMP381F	Agilent	BAP64-05W	PIN diode
HSMP3820	Agilent	BAP1321-03	PIN diode
HSMP3822	Agilent	BAP1321-04	PIN diode
HSMP3830	Agilent	BAP64-03	PIN diode
HSMP3832	Agilent	BAP64-04	PIN diode
HSMP3833	Agilent	BAP64-06	PIN diode
HSMP3834	Agilent	BAP64-05	PIN diode
HSMP3860	Agilent	BAP50-03	PIN diode
HSMP3862	Agilent	BAP50-04	PIN diode
HSMP3864	Agilent	BAP50-05	PIN diode

Manufacturer type	Manufacturer	NXP type	Product family
HSMP386B	Agilent	BAP50-02	PIN diode
HSMP386E	Agilent	BAP50-04W	PIN diode
HSMP386L	Agilent	BAP50-05W	PIN diode
HSMP3880	Agilent	BAP51-03	PIN diode
HSMP3890	Agilent	BAP51-03	PIN diode
HSMP3892	Agilent	BAP64-04	PIN diode
HSMP3894	Agilent	BAP64-05	PIN diode
HSMP3895	Agilent	BAP51-02	PIN diode
HSMP389B	Agilent	BAP51-02	PIN diode
HSMP389C	Agilent	BAP64-04	PIN diode
HSMP389F	Agilent	BAP51-05W	PIN diode
HVB14S	Renesas	BAP50-04W	PIN diode
HVB190S	Renesas	BAP70-04W	PIN diode
HVC131	Renesas	BAP65-02	PIN diode
HVC131	Renesas	BAP65-02	PIN diode
HVC132	Renesas	BAP51-02	PIN diode
HVC132	Renesas	BAP51-02	PIN diode
HVC190	Renesas	BAP50-02	PIN diode
HVC200A	Renesas	BB173	Varicap
HVC202A	Renesas	BB174	Varicap
HVC202B	Renesas	BB174	Varicap
HVC300A	Renesas	BB175	Varicap
HVC300B	Renesas	BB175	Varicap
HVC306A	Renesas	BB173	Varicap
HVC306B	Renesas	BB173	Varicap
HVC350B	Renesas	BB208-02	Varicap
HVC355B	Renesas	BB145B	Varicap
HVC355B	Renesas	BB145B	Varicap
HVC358B	Renesas	BB208-02	Varicap
HVC359	Renesas	BB202	Varicap
HVC359	Renesas	BB202	Varicap
HVC363A	Renesas	BB173, BB178	Varicap
HVC365	Renesas	BB202	Varicap
HVC368B	Renesas	BB208-02	Varicap
HVC375B	Renesas	BB208-02	Varicap
HVC376B	Renesas	BB198	Varicap
HVC376B	Renesas	BB202	Varicap
HVC376B	Renesas	BB202	Varicap
HVC383B	Renesas	BB208-02	Varicap
HVD131KRF-E	Renesas	BAP1321-02	PIN diode
HVD131KRF-E	Renesas	BAP65-02,	
HVD132	Renesas	BAP51-02	PIN diode
HVD132	Renesas	BAP51-02	PIN diode
HVD142AKRF-E	Renesas	BAP1321-02	PIN diode
HVD144AKRF-E	Renesas	BAP63-02	PIN diode
HVD145KRF-E	Renesas	BAP1321-02	PIN diode
HVD147KRF-E	Renesas	BAP1321-02	PIN diode
HVD355B	Renesas	BB145B	Varicap
HVL142AKRF-E	Renesas	BAP55LX, BAP1321LX	PIN diode
HVL144AKRF-E	Renesas	BAP65LX, BAP1321LX	PIN diode
HVL147KRF-E	Renesas	BAP55LX	PIN diode
HVL358C	Renesas	BB174LX	Varicap
HVL368C	Renesas	BB174LX	Varicap
HVL375C	Renesas	BB174LX	Varicap
HVM14	Renesas	BAP70-05	PIN diode
HVM14S	Renesas	BAP50-04	PIN diode
HVM14SR	Renesas	BAP50-04	PIN diode
HVM187S	Renesas	BAP50-04	PIN diode
HVM187WK	Renesas	BAP50-05	PIN diode
HVU131	Renesas	BAP65-03	PIN diode
HVU131	Renesas	BAP65-03	PIN diode
HVU132	Renesas	BAP51-03	PIN diode
HVU132	Renesas	BAP51-03	PIN diode
HVU187	Renesas	BAP70-02	PIN diode
HVU300A	Renesas	BB171	Varicap
HVU300A	Renesas	BB171	Varicap
HVU307	Renesas	BB170	Varicap
HVU307	Renesas	BB170	Varicap
HVU315	Renesas	BB170	Varicap
HVU315	Renesas	BB170	Varicap
HVU316	Renesas	BB131	Varicap
HVU316	Renesas	BB131	Varicap
HVU350B	Renesas	BB156	Varicap
HVU355B	Renesas	BB131	Varicap
HVU359	Renesas	BB172	Varicap
HVU363A	Renesas	BB170	Varicap
HVU363A	Renesas	BB172	Varicap
HVU363B	Renesas	BB170	Varicap
HVU363B	Renesas	BB170	Varicap
HVU383B	Renesas	BB208-03	Varicap

Manufacturer type	Manufacturer	NXP type	Product family
INA-51063	Agilent	BGA2001	MMIC
JDP2501E	Toshiba	BAP65-02	PIN diode
JDP2501U	Toshiba	BAP65-03	PIN diode
JDP2502AFS	Toshiba	BAP51-02	PIN diode
JDP2502AS	Toshiba	BAP51-03	PIN diode
JDP2502T	Toshiba	BAP63-02	PIN diode
JDP2504E	Toshiba	BAP50-02	PIN diode
JDS2503S	Toshiba	BA891	BS diode
KP2310R	TOKO	BAP64-04W	PIN diode
KTK920	KEC	BF1108	FET
KTK920BT	KEC	BF1108	FET
KTK920T	KEC	BF1108R	FET
LF2802A	M/A-com	BLF6G10L-40BRN	Base station
LTC5590	Linear Tech	BGX7220	MMIC
LTC5591	Linear Tech	BGX7221	MMIC
LTC5592	Linear Tech	BGX7221	MMIC
MA2SV01	Renesas	BB202	Varicap
MA2SV01	Renesas	BB202	Varicap
MA357	Panasonic	BB172	Varicap
MA366	Panasonic	BB170	Varicap
MA368	Panasonic	BB131	Varicap
MA4CP101A	Panasonic	BAP65-03	PIN diode
MA4P274-1141	Panasonic	BAP51-03	PIN diode
MA4P275-1141	Panasonic	BAP65-03	PIN diode
MA4P275CK-287	Panasonic	BAP65-05	PIN diode
MA4P277-1141	Panasonic	BAP70-03	PIN diode
MA4P278-287	Panasonic	BAP70-03	PIN diode
MA4P789-1141	Panasonic	BAP1321-03	PIN diode
MA4P789ST-287	Panasonic	BAP1321-04	PIN diode
MAGX-000912-500L00	M/A-com	BLA6H0912-500	A&D
MAGX-001090-600L00	M/A-com	BLA6H1011-600	A&D
MAGX-001214-250L00	M/A-com	BLL6H1214L-250	A&D
MAGX-001214-500L00	M/A-com	BLL6H1214-500	A&D
MAGX-002731-030L00	M/A-com	CLF1G0060-30	Broadband
MAGX-003135-030L00	M/A-com	CLF1G0060-30	Broadband
MAGX-003135-120L00	M/A-com	BLS6G3135-120	A&D
MAPP-002729-300M00	M/A-com	BLS7G2729L-350P	A&D
MAPR-002729-170M00	M/A-com	BLS7G2730L-200P	A&D
MAPR-002731-115M00	M/A-com	BLS6G2731-120	A&D
MAX19985A	Maxim	BGX7220	MMIC
MAX19995	Maxim	BGX7221	MMIC
MAX2634	Maxim	BGU6102	MMIC
MAX2657	Maxim	BGU8007	MMIC
MAX2658	Maxim	BGU7005	MMIC
MAX2659	Maxim	BGU7005	MMIC
MAX2667	Maxim	BGU8007	MMIC
MAX2687	Maxim	BGU7005	MMIC
MAX2694	Maxim	BGU7005	MMIC
MC-7831	Renesas	BGY885A	CATV PP
MC-7831-HA	Renesas	CGY1041	CATV PP
MC-7832	Renesas	BGY887	CATV PP
MC-7832-HA	Renesas	CGY1041	CATV PP
MC-7833	Renesas	CGY1043	CATV PP
MC-7836	Renesas	BGY887B	CATV PP
MC-7836	Renesas	CGY1047	CATV PP
MC-7846	Renesas	CGD942C	CATV PD
MC-7847	Renesas	CGD944C	CATV PD
MC-7882	Renesas	CGD982LC	CATV PD
MC-7883	Renesas	CGD982LC	CATV PD
MC-7884	Renesas	CGD985LC	CATV PD
MC-7891	Renesas	CGD1040Hi	CATV PD
MC-7893	Renesas	CGD1042L	CATV PD
MC-7894	Renesas	CGD985LC	CATV PD
MC-7896	Renesas	CGD1046Hi	CATV PD
MC7712	Renesas	BGY785A	CATV PPA
MC7716	Renesas	BGY787	CATV PPA
MC7722	Renesas	BGY785A	CATV PPA
MC7726	Renesas	BGY787	CATV PPA
MC7831-HA	Renesas	BGY1085A	CATV PP
MC7832-HA	Renesas	CGY1041	CATV PP
MC7852	Renesas	BGY885A	CATV PPA
MC7866	Renesas	BGD816L	CATV PD
MC7893	Renesas	CGD1042Hi	CATV PD

Manufacturer type	Manufacturer	NXP type	Product family
MC7893	Renesas	CGD982HCi	CATV PD
MC7894	Renesas	CGD1044Hi	CATV PD
MC7894	Renesas	CGD985HCi	CATV PD
MC7896	Renesas	CGD1046Hi	CATV PD
MC7896	Renesas	CGD987HCi	CATV PD
MCH4009	Sanyo	BFG424F	WB trs 5-7
MD7IC2012GNNR1	Freescale	BLM7G1822S-40PBG	Base station
MD7IC2012NR1	Freescale	BLM7G1822S-40PB	Base station
MD8IC925GNNR1	Freescale	BLP8G10S-45PG	Base station
MD8IC925NNR1	Freescale	BLP8G10S-45P	Base station
MGA-633P8	Avago	BGU8051	LNA
MGA-633P8	Avago	BGU8052	LNA
MGA631P8	Avago	BGU7051	MMIC
MGA632P8	Avago	BGU7052	MMIC
MGA632P8	Avago	BGU7053	MMIC
MHW10186N	Freescale	BGY1085A	CATV PP
MHW10236N	Freescale	CGY1043	CATV PP
MHW10247AN	Freescale	CGD1044H	CATV PD
MHW10276N	Freescale	CGY1047	CATV PP
MHW1224	Freescale	BGY67	CATV RA
MHW1244	Freescale	BGY67A	CATV RA
MHW1253LA	Freescale	BGY67A	CATV RA
MHW1254L	Freescale	BGY68	CATV RA
MHW1254LA	Freescale	BGY68	CATV RA
MHW1304L	Freescale	BGY68	CATV RA
MHW1304LA	Freescale	BGY68	CATV RA
MHW1304LAN	Freescale	BGY68	CATV RA
MHW1346	Freescale	BGY67A	CATV RA
MHW1353LA	Freescale	BGY67A	CATV RA
MHW1354LA	Freescale	BGY68	CATV RA
MHW7182B	Freescale	BGY785A	CATV PPA
MHW7182C	Freescale	BGY785A	CATV PPA
MHW7185C2	Freescale	BGD712	CATV PD
MHW7185CL	Freescale	BGD712	CATV PD
MHW7205C	Freescale	BGD714	CATV PD
MHW7205CL	Freescale	BGD714	CATV PD
MHW7205CLN	Freescale	BGD714	CATV PD
MHW8182B	Freescale	BGY885A	CATV PPA
MHW8182C	Freescale	BGY885A	CATV PPA
MHW8182CN	Freescale	BGY885A	CATV PP
MHW8185	Freescale	BGD814	CATV PD
MHW8185L	Freescale	BGD812	CATV PD
MHW8188AN	Freescale	CGD942C	CATV PD
MHW8205	Freescale	BGD814	CATV PD
MHW820L	Freescale	BGD814	CATV PD
MHW8222BN	Freescale	BGY887	CATV PP
MHW8227A	Freescale	CGD942C	CATV PD
MHW8227AN	Freescale	CGD942C	CATV PD
MHW8247A	Freescale	CGD944C	CATV PPA
MHW8247AN	Freescale	CGD944C	CATV PD
MHW8292	Freescale	BGY887B	CATV PPA
MHW8342	Freescale	BGY888	CATV PPA
MHW8342N	Freescale	CGY888C	CATV PP
MHW9182B	Freescale	BGY1085A	CATV PPA
MHW9182C	Freescale	BGY1085A	CATV PPA
MHW9182CN	Freescale	BGY1085A	CATV PP
MHW9186	Freescale	BGY885A	CATV PPA
MHW9186A	Freescale	BGY885A	CATV PPA
MHW9187N	Freescale	CGD942C	CATV PD
MHW9188AN	Freescale	CGD942C	CATV PD
MHW9188N	Freescale	CGD942C	CATV PD
MHW9227AN	Freescale	CGD942C	CATV PD
MHW9242A	Freescale	CGD1042H	CATV PD
MHW9247	Freescale	CGD944C	CATV PD
MHW9247A	Freescale	CGD944C	CATV PD
MHW9247AN	Freescale	CGD944C	CATV PD
MHW9247N	Freescale	CGD944C	CATV PD
MHWJ7185A	Freescale	BGD712	CATV PD
MHWJ7205A	Freescale	BGD714	CATV PD
MHWJ9182	Freescale	BGY1085A	CATV PPA
MMBF4391	Freescale	PMBF4391	FET
MMBF4392	Freescale	PMBF4392	FET
MMBF4393	Freescale	PMBF4393	FET
MMBF4860	Freescale	PMBFJ112	FET
MMBF5484	Freescale	BFR31	FET
MMBFJ113	Freescale	PMBFJ113	FET
MMBFJ174	Freescale	PMBFJ174	FET
MMBFJ175	Freescale	PMBFJ175	FET
MMBFJ176	Freescale	PMBFJ176	FET
MMBFJ177	Freescale	PMBFJ177	FET
MMBFJ308	Freescale	PMBFJ308	FET
MMBFJ309	Freescale	PMBFJ309	FET

Manufacturer type	Manufacturer	NXP type	Product family
MMBFJ310	Freescale	PMBFJ310	FET
MMBFU310	Freescale	PMBFJ310	FET
MMBR5031L	Freescale	BFS17	WB trs 1-4
MMBR5179L	Freescale	BFS17A	WB trs 1-4
MMBR571L	Freescale	PBR951	WB trs 1-4
MMBR901L	Freescale	BFR92A	WB trs 1-4
MMBR911L	Freescale	BFR93A	WB trs 1-4
MMBR920L	Freescale	BFR93A	WB trs 1-4
MMBR931L	Freescale	BFT25A	WB trs 1-4
MMBR941BL	Freescale	PBR941	WB trs 1-4
MMBR941L	Freescale	PBR941	WB trs 1-4
MMBR951AL	Freescale	PBR951	WB trs 1-4
MMBR951L	Freescale	PBR951	WB trs 1-4
MMBV105GLT1	ON Semi	BB156	Varicap
MMBV109LT1	ON Semi	BB170	Varicap
MMG2001NT1	Freescale	BGD816L	CATV PD
MMG2001T1	Freescale	BGD816L	CATV PD
MMG3004NT1	Freescale	BGA7027	MMIC
MMG3004NT1	Freescale	BGA7127	MMIC
MMG3014	Freescale	BGA7024	MMIC
MMG3014	Freescale	BGA7124	MMIC
MMG3014	Freescale	BGA7204	MMIC
MMRF1005HR5	Freescale	BLL6H1214L-250	A&D
MMRF1005HSR5	Freescale	BLL6H1214L-250	A&D
MMRF1006HR5	Freescale	BLF578	Broadcast/ISM
MMRF1007HR5	Freescale	BLA6H0912L-1000	A&D
MMRF1007HSR5	Freescale	BLA6H0912L-1000	A&D
MMRF1009HR5	Freescale	BLA6H0912-500	A&D
MRF151G	M/A-com	BLF573	Broadcast/ISM
MRF577	Freescale	PRF957	WB trs 1-4
MRF6P24190HR6	Freescale	BLF2425M6L180P	Broadcast/ISM
MRF6P24190HR6	Freescale	BLF2425M7L250P	Broadcast/ISM
MRF6P24190HSR6	Freescale	BLF2425M6L180P	Broadcast/ISM
MRF6P24190HSR6	Freescale	BLF2425M7L250P	Broadcast/ISM
MRF6P27160HR6	Freescale	BLF7G27L-150P	Base station
MRF6S18060NBR1	Freescale	BLF6G20LS-75	Base station
MRF6S18060NR1	Freescale	BLF6G20-75	Base station
MRF6S21050LR3	Freescale	BLD6G22L-50	Base station
MRF6S21050LSR3	Freescale	BLD6G22LS-50	Base station
MRF6S21100HR3	Freescale	BLF7G22L-100P	Base station
MRF6S21100HSR3	Freescale	BLF7G22LS-100P	Base station
MRF6S21140HR3	Freescale	BLF6G22LS-130	Base station
MRF6S21190HR3	Freescale	BLF6G22-180PN	Base station
MRF6S21190HR3	Freescale	BLF7G22L-200	Base station
MRF6S21190HSR3	Freescale	BLF8G22LS-220	Base station
MRF6S21190HSR3	Freescale	BLF7G22LS-200	Base station
MRF6S21190HSR3	Freescale	BLF8G22LS-240	Base station
MRF6S24140HR3	Freescale	BLF2425M7L140	Broadcast/ISM
MRF6S24140HR3	Freescale	BLF2425M8L140	Broadcast/ISM
MRF6S24140HSR3	Freescale	BLF2425M7LS140	Broadcast/ISM
MRF6S24140HSR3	Freescale	BLF2425M8LS140	Broadcast/ISM
MRF6S27015GNR1	Freescale	BLF6G27-10G	Base station
MRF6S27015NR1	Freescale	BLF6G27-10	Base station
MRF6S27085HSR3	Freescale	BLF8G27LS-140	Base station
MRF6V13250HR5	Freescale	BLF6G13L-250P	Broadcast/ISM
MRF6V13250HSR5	Freescale	BLF6G13LS-250P	Broadcast/ISM
MRF6V2010NR1	Freescale	BLF571	Broadcast/ISM
MRF6VP11KHR6	Freescale	BLF178P	Broadcast/ISM
MRF6VP3450HR5	Freescale	BLF879P	Broadcast/ISM
MRF6VP3450HR6	Freescale	BLF879P	Broadcast/ISM
MRF6VP3450HSR5	Freescale	BLF879PS	Broadcast/ISM
MRF6VP3450HSR6	Freescale	BLF879PS	Broadcast/ISM
MRF7P20040HR3	Freescale	BLD6G21L-50	Base station
MRF7P20040HSR3	Freescale	BLD6G21LS-50	Base station
MRF7S15100HSR3	Freescale	BLF7G15LS-200	Base station

Manufacturer type	Manufacturer	NXP type	Product family
MRF7S21150HR3	Freescale	BLF7G22L-160	Base station
MRF7S21150HSR3	Freescale	BLF6G22LS-180RN	Base station
MRF7S21150HSR3	Freescale	BLF7G22LS-160	Base station
MRF7S35120HSR3	Freescale	BLS6G3135S-120	A&D
MRF7S38010HSR3	Freescale	BLF6G38-10G	Base station
MRF7S38075HR3	Freescale	BLF6G38-50	Base station
MRF7S38075HSR3	Freescale	BLF6G38LS-50	Base station
MRF8HP21080HR3	Freescale	BLF6G22L-40P	Base station
MRF8HP21080HSR3	Freescale	BLF6G22LS-40P	Base station
MRF8P20160HSR3	Freescale	BLF6G20LS-140	Base station
MRF8P23160WHR3	Freescale	BLF7G24L-100	Base station
MRF8P23160WHR3	Freescale	BLF7G24L-160P	Base station
MRF8P23160WHR3	Freescale	BLF8G24L-200P	Base station
MRF8P23160WHSR3	Freescale	BLF7G24LS-100	Base station
MRF8P23160WHSR3	Freescale	BLF7G24LS-160P	Base station
MRF8P23160WHSR3	Freescale	BLF8G24LS-200P	Base station
MRF8P26080HR3	Freescale	BLF6G27L-40P	Base station
MRF8P26080HSR3	Freescale	BLF6G27-100	Base station
MRF8P26080HSR3	Freescale	BLF6G27LS-40P	Base station
MRF8P29300HR6	Freescale	BLS7G2729L-350P	A&D
MRF8P29300HSR6	Freescale	BLS7G2729LS-350P	A&D
MRF8S18210WHSR3	Freescale	BLF6G20-180PN	Base station
MRF8S18210WHSR3	Freescale	BLF8G20LS-220	Base station
MRF8S21100HSR3	Freescale	BLF6G22LS-100	Base station
MRF8S21120HR3	Freescale	BLF7G22L-130	Base station
MRF8S21120HSR3	Freescale	BLF7G22LS-130	Base station
MRF8S21140HSR3	Freescale	BLF8G22LS-140	Base station
MRF8S26120HR3	Freescale	BLF7G27L-100	Base station
MRF8S26120HSR3	Freescale	BLF7G27LS-100	Base station
MRF8S8260HSR3	Freescale	BLF8G10LS-270	Base station
MRF8S9200NR3	Freescale	BLF6G10LS-200RN	Base station
MRF8S9260HR3	Freescale	BLF7G10L-250	Base station
MRF8S9260HSR3	Freescale	BLF7G10LS-250	Base station
MRF9030LR1	Freescale	BLF642	Broadcast/ISM
MRF9060LR1	Freescale	BLF645	Broadcast/ISM
MRF917	Freescale	BFQ67W	WB trs 1-4
MRF927	Freescale	BFS25A	WB trs 1-4
MRF9411L	Freescale	BFG520/X	WB trs 1-4
MRF947	Freescale	BFS520	WB trs 1-4
MRF947A	Freescale	PRF947	WB trs 1-4
MRF9511L	Freescale	BFG540/X	WB trs 1-4
MRF957	Freescale	PRF957	WB trs 1-4
MRFE6VP5600HR6	Freescale	BLF174XR	Broadcast/ISM
MRFE6VP5600HR6	Freescale	BLF184XR	Broadcast/ISM
MRFE6VP5600HR6	Freescale	BLF574	Broadcast/ISM
MRFE6VP5600HSR6	Freescale	BLF174XRS	Broadcast/ISM
MRFE6VP5600HSR6	Freescale	BLF184XRS	Broadcast/ISM
MRFE6VP5600HSR6	Freescale	BLF574XRS	Broadcast/ISM
MRFE6VP61K25HR5/R6	Freescale	BLF188XR	Broadcast/ISM
MRFE6VP61K25HR6/R5	Freescale	BLF178XR	Broadcast/ISM
MRFE6VP61K25HS/R5	Freescale	BLF178XRS	Broadcast/ISM
MRFE6VP61K25HS/R5	Freescale	BLF188XRS	Broadcast/ISM
MRFE6VP61K25HS/R6	Freescale	BLF188XRS	Broadcast/ISM
MRFE6VP6300HR3	Freescale	BLF573	Broadcast/ISM
MRFE6VP6300HSR3	Freescale	BLF573S	Broadcast/ISM
MRFE6VP8600HR6	Freescale	BLF10H6600P	Broadcast/ISM
MRFE6VP8600HR6	Freescale	BLF888A	Broadcast/ISM
MRFE6VP8600HR6	Freescale	BLF988	A&D
MRFE6VP8600HR6	Freescale	BLU6H0410L-600P	A&D
MRFE6VP8600HSR6	Freescale	BLF10H6600PS	Broadcast/ISM
MRFE6VP8600HSR6	Freescale	BLF888AS	Broadcast/ISM
MRFE6VP8600HSR6	Freescale	BLF988S	A&D
MRFE6VP8600HSR6	Freescale	BLU6H0410LS-600P	A&D
MT4S200T	Toshiba	BFG424W	WB trs 5-7





Manufacturer type	Manufacturer	NXP type	Product family
S8740190	RF Micro	BGY885A	CATV PP
S8740190	Standard	BGD812	CATV PD
S8740200P	RF Micro	BGY887	CATV PP
S8740220	Standard	BGD814	CATV PD
S8740220GT	RF Micro	BGY887	CATV PP
S8740220P	RF Micro	BGY887	CATV PP
S8740230	Standard	BGD816L	CATV PD
S8740240GT	RF Micro	BGY887	CATV PP
S8740240P	RF Micro	BGY887	CATV PP
S8740240P12	RF Micro	BGY887	CATV PP
S8740340	RF Micro	CGY888C	CATV PP
S8740340PT	RF Micro	CGY888C	CATV PP
SGA8343Z	Sirenza	BFG425W	WB trs 5-7
SKY65048	Skyworks	BGU7051	MMIC
SKY65066	Skyworks	BGU7053	MMIC
SKY65084	Skyworks	BGU7052	MMIC
SKY67101-396LF	Skyworks	BGU8051	LNA
SMA3101	Sanyo	BGA2851	MMIC
SMA3103	Sanyo	BGA2867	MMIC
SMA3107	Sanyo	BGA2803	MMIC
SMA3109	Sanyo	BGA2817	MMIC
SMA3111	Sanyo	BGA2851	MMIC
SMP1302-004	Skyworks	BAP50-05	PIN diode
SMP1302-005	Skyworks	BAP50-04	PIN diode
SMP1302-011	Skyworks	BAP50-03	PIN diode
SMP1302-074	Skyworks	BAP50-05W	PIN diode
SMP1302-075	Skyworks	BAP50-04W	PIN diode
SMP1302-079	Skyworks	BAP50-02	PIN diode
SMP1304-001	Skyworks	BAP70-03	PIN diode
SMP1304-011	Skyworks	BAP70-03	PIN diode
SMP1307-001	Skyworks	BAP70-03	PIN diode
SMP1307-011	Skyworks	BAP70-03	PIN diode
SMP1320-004	Skyworks	BAP65-05	PIN diode
SMP1320-011	Skyworks	BAP65-03	PIN diode
SMP1320-074	Skyworks	BAP65-05W	PIN diode
SMP1321-001	Skyworks	BAP1321-03	PIN diode
SMP1321-005	Skyworks	BAP1321-04	PIN diode
SMP1321-011	Skyworks	BAP1321-03	PIN diode
SMP1321-075	Skyworks	BAP1321-04	PIN diode
SMP1321-079	Skyworks	BAP1321-02	PIN diode
SMP1322-004	Skyworks	BAP65-05	PIN diode
SMP1322-011	Skyworks	BAP65-03	PIN diode
SMP1322-074	Skyworks	BAP65-05W	PIN diode
SMP1322-079	Skyworks	BAP65-02	PIN diode
SMP1340-011	Skyworks	BAP63-03	PIN diode
SMP1340-079	Skyworks	BAP63-02	PIN diode
SMP1352-011	Skyworks	BAP64-03	PIN diode
SMP1352-079	Skyworks	BAP64-02	PIN diode
SMV1235-004	Skyworks	BB181	Varicap
SMV1236-004	Skyworks	BB156	Varicap
SPF-5122Z	RF Micro	BGU7051	LNA
SPF-5122Z	RF Micro	BGU7052	LNA
SPF-5122Z	RF Micro	BGU7053	LNA
SST111	Standard	PMBFJ111	FET
SST112	Standard	PMBFJ112	FET
SST113	Standard	PMBFJ113	FET
SST174	Standard	PMBFJ174	FET
SST175	Standard	PMBFJ175	FET
SST176	Standard	PMBFJ176	FET
SST177	Standard	PMBFJ177	FET
SST201	Standard	BFT46	FET
SST202	Standard	BFR31	FET
SST203	Standard	BFR30	FET
SST308	Standard	PMBFJ308	FET
SST309	Standard	PMBFJ309	FET
SST310	Standard	PMBFJ310	FET
SST4391	Standard	PMBF4391	FET
SST4392	Standard	PMBF4392	FET
SST4393	Standard	PMBF4393	FET
SST4856	Standard	BSR56	FET
SST4857	Standard	BSR57	FET
SST4859	Standard	BSR56	FET
SST4860	Standard	BSR57	FET
SST4861	Standard	BSR58	FET
SXA-389B	RF Micro	BGA7124	MMIC
SXB-4089	RF Micro	BGA7027	MMIC
T1G4004532-FL	TriQuint	CLF1G0035-50	Broadband
T1G4012036-FL	TriQuint	CLF1G0035-100	Broadband
T2G4003532-FL	TriQuint	CLF1G0060-30	Broadband
TMPF4091	Standard	PMBF4391	FET
TMPF4092	Standard	PMBF4392	FET
TMPF4093	Standard	PMBF4393	FET
TMPF4391	Standard	PMBF4391	FET

Manufacturer type	Manufacturer	NXP type	Product family
TMPF4392	Standard	PMBF4392	FET
TMPF4393	Standard	PMBF4393	FET
TMPFB246A	Standard	BSR56	FET
TMPFB246B	Standard	BSR57	FET
TMPFB246C	Standard	BSR58	FET
TMPFJ111	Standard	PMBFJ111	FET
TMPFJ112	Standard	PMBFJ112	FET
TMPFJ113	Standard	PMBFJ113	FET
TMPFJ174	Standard	PMBFJ174	FET
TMPFJ175	Standard	PMBFJ175	FET
TMPFJ176	Standard	PMBFJ176	FET
TMPFJ177	Standard	PMBFJ177	FET
TQP3M9005	TriQuint	BGU8052	LNA
TRF370315	TI	BGX7101	MMIC
TRF370417	TI	BGX7101	MMIC
TRF3705	TI	BGX7101	MMIC
UPA800T	Renesas	BFM520	WB trs 1-4
UPA801T	Renesas	BFM520	WB trs 1-4
UPA802T	Renesas	BFM520	WB trs 1-4
UPA804T	Renesas	BFM520	WB trs 1-4
UPA806T	Renesas	BFM520	WB trs 1-4
UPA807T	Renesas	BFM520	WB trs 1-4
UPA808T	Renesas	BFM520	WB trs 1-4
UPA810T	Renesas	BFM520	WB trs 1-4
UPA811T	Renesas	BFM520	WB trs 1-4
UPA812T	Renesas	BFM520	WB trs 1-4
UPA813T	Renesas	BFM520	WB trs 1-4
UPA828TD	Renesas	BFM520	WB trs 1-4
UPA831TD	Renesas	BFM520	WB trs 1-4
UPA860TD	Renesas	BFM520	WB trs 1-4
UPA861TD	Renesas	BFM520	WB trs 1-4
UPA862TD	Renesas	BFM520	WB trs 1-4
UPA863TD	Renesas	BFM520	WB trs 1-4
UPA869TD	Renesas	BFM520	WB trs 1-4
UPA873TD	Renesas	BFM520	WB trs 1-4
UPA895TD	Renesas	BFM520	WB trs 1-4
UPC2709	Renesas	BGA2709	MMIC
UPC2711	Renesas	BGA2711	MMIC
UPC2712	Renesas	BGA2712	MMIC
UPC2745	Renesas	BGA2001	MMIC
UPC2746	Renesas	BGA2001	MMIC
UPC2748	Renesas	BGA2748	MMIC
UPC2771	Renesas	BGA2771	MMIC
UPC3224	Renesas	BGA2851	MMIC
UPC3226	Renesas	BGA2867	MMIC
UPC3227	Renesas	BGA2851	MMIC
UPC3240	Renesas	BGA2802	MMIC
UPC3241	Renesas	BGA2817	MMIC
UPC8112	Renesas	BGA2022	MMIC
UPC8230TU	Renesas	BGU7007	MMIC
UPC8236T6N	Renesas	BGU8007	MMIC
UPD5740T6N	Renesas	BGU7045	MMIC
UPD5756T6N	Renesas	BGU7045	MMIC

## 5.2 Cross-references: NXP discontinued types versus NXP replacement types

In alphabetical order by discontinued type

Abbreviations:

BS diode	Band-Switch diode
CATV	Community Antenna Television System
FET	Field-Effect transistor
PIN diode	P-type, Intrinsic, N-type diode
RFP trs	RF Power transistor
Varicap	Variable capacitance diode
WB trs	WideBand transistor

NXP discontinued type	Product family NXP	Replacement type NXP
BA792	BS diode	BA591
BAP1321LX	PIN diode	BAP1321-02
BAP142L	PIN diode	BAP142LX
BAP51-01	PIN diode	BAP51LX
BAP51L	PIN diode	BAP51LX
BAP55L	PIN diode	BAP55LX
BB145	Varicap	BB145B
BB145B-01	Varicap	BB145B
BB148	Varicap	BB170
BB151	Varicap	BB135
BB152	Varicap	BB171
BB153	Varicap	BB172
BB181LX	Varicap	BB181
BB202LX	Varicap	BB202
BB804	Varicap	BB207
BBY42	Varicap	BBY40
BF245A	FET	BF545A
BF245B	FET	BF545B
BF245C	FET	BF545C
BF556B	FET	BF556A
BF556C	FET	BF556A
BF689K	WB trs	BFS17
BF763	WB trs	BFS17
BF851A	FET	BF861A
BF851C	FET	BF861C
BF992/01	FET	BF992
BFC505	WB trs	BFM505
BFC520	WB trs	BFM520
BFET505	WB trs	BFM505
BFET520	WB trs	BFM520
BFG17A	WB trs	BFS17A
BFG197	WB trs	BFG198
BFG197/X	WB trs	BFG198
BFG410W/CA	WB trs	BFG410W
BFG425W/CA	WB trs	BFG425W
BFG505/XR	WB trs	BFG505/X
BFG505W/XR	WB trs	BFG505
BFG520W/XR	WB trs	BFG520W/X
BFG590/XR	WB trs	BFG590/X
BFG67/XR	WB trs	BFG67
BFQ34/01	WB trs	BFG35
BFR92	WB trs	BFR92A
BFR92AR	WB trs	BFR92A

























NXP discontinued type	Product family NXP	Replacement type NXP
BFR92AT	WB trs	BFR92AW
BFR93	WB trs	BFR92A
BFR93AT	WB trs	BFR93AW
BFR93R	WB trs	BFR93A
BFS17/FD	WB trs	BFS17
BFU510	WB trs	BFU725F/N1
BFU540	WB trs	BFU725F/N1
BFU725F	WB trs	BFU725F/N1
BGA2031	WB trs	BGA2031/1
BGA2717	MMIC	BGA2851
BGD712	CATV	BGD812
BGD712C	CATV	BGD812
BGD714	CATV	BGD814
BGD802	CATV	BGD812
BGD802N	CATV	BGD812
BGD802N/07	CATV	BGD812
BGD804	CATV	BGD814
BGD804N	CATV	BGD814
BGD804N/02	CATV	BGD814
BGD902	CATV	BGD812
BGD902L	CATV	BGD812
BGD904	CATV	BGD814
BGD904L	CATV	BGD814
BGD906	CATV	CGD942C
BGE787B	CATV	BGE888C
BGE788	CATV	BGE788C
BGO807C	CATV	BGO807C/FCO
BGO807CE	CATV	BGO807CE/SCO
BGO827	CATV	BGO807CE/FCO
BGO827/SCO	CATV	BGO807CE/SCO
BGQ34/01	WB trs	BFG35
BGU2003	WB trs	BGA2003
BGX885/02	CATV	BGX885N
BGY1085A/07	CATV	BGY1085A
BGY585A	CATV	BGY785A
BGY588N	CATV	BGY588C
BGY66B/04	CATV	BGY66B
BGY67	CATV	BGY67A
BGY67A/04	CATV	BGY67A
BGY67A/14	CATV	BGY67A
BGY68/01	CATV	BGY68
BGY685A	CATV	BGY785A
BGY685AD	CATV	BGY785A





























NXP discontinued type	Product family NXP	Replacement type NXP
BGY685AL	CATV	BGY785A
BGY785A/07	CATV	BGY785A
BGY785A/09	CATV	BGY785A
BGY785AD	CATV	BGY785A
BGY785AD/06	CATV	BGY785A
BGY785AD/8M	CATV	BGY885A
BGY883	CATV	BGY885A
BGY887/02	CATV	BGY887
BLA0912-250	RFP trs	BLA6H0912-500
BLA0912-250R	RFP trs	BLA6H0912-500
BLA1011-10	RFP trs	BLL6H0514-25
BLA1011-2	RFP trs	BLL6H0514-25
BLA1011-200	RFP trs	BLA6G1011-200R
BLA1011-200H	RFP trs	BLA6G1011-200R
BLA1011-200R	RFP trs	BLA6G1011-200R
BLA1011-200R	RFP trs	BLA6G1011-200R
BLA1011-300	RFP trs	BLA6G1011-200R/ BLA6H1011-600
BLA1011S-200	RFP trs	BLA6G1011-200R
BLA1011S-200R	RFP trs	BLA6G1011LS-200RG
BLA1011S-200R	RFP trs	BLA6G1011-200R
BLC6G10LS-160RN	RFP trs	BLF8G10LS-160
BLF1043	RFP trs	BLF640/BLP25M710
BLF145	RFP trs	BLF642/BLP15M630
BLF147	RFP trs	BLF647P/BLP15M7160P
BLF175	RFP trs	BLP10H850/BLF642/ BLP15M630
BLF177	RFP trs	BLF572XR/BLP05H6200P
BLF177C	RFP trs	BLF572XR/BLP05H6200P
BLF177CR	RFP trs	BLF572XR/BLP05H6200P
BLF177R	RFP trs	BLF572XR/BLP05H6200P
BLF202	RFP trs	BLP10L703
BLF2043F	RFP trs	BLF640/BLP25M710
BLF242	RFP trs	BLP15M705
BLF244	RFP trs	BLF571
BLF245	RFP trs	BLF642/BLP15M630
BLF245B	RFP trs	BLF642/BLP15M630
BLF246	RFP trs	BLP15M660P
BLF246B	RFP trs	BLP15M660P
BLF248	RFP trs	BLF573XR
BLF278	RFP trs	BLF573XR
BLF278/01	RFP trs	BLF573XR
BLF278C	RFP trs	BLF573XR
BLF346	RFP trs	BLF642/BLP15M630
BLF368	RFP trs	BLF573XR
BLF369	RFP trs	BLF574XR
BLF404	RFP trs	BLP10L705
BLF521	RFP trs	BLP10L703
BLF542	RFP trs	BLP15M705
BLF544	RFP trs	BLF642/BLF571/ BLP15M630
BLF546	RFP trs	BLP15M660P
BLF548	RFP trs	BLF647P/BLP15M7150P
BLF647	RFP trs	BLF647P/BLP15M7150P/ BLP10H6120P
BLF647A	RFP trs	BLF647P/BLP15M7150P/ BLP10H6120P
BLF6G20LS-180RN	RFP trs	BLF7G20LS-200
BLF872	RFP trs	BLF888A
BLL1214-250	RFP trs	BLL6G1214L-250/ BLL6H1214L-250
BLL1214-250RI	RFP trs	BLL6G1214L-250/ BLL6H1214L-250
BLL1214-35	RFP trs	BLL6H0514-25
































NXP discontinued type	Product family NXP	Replacement type NXP
BLL1214-35I	RFP trs	BLL6H0514-25
BLS2731-110	RFP trs	BLS6G2731-120/ BLS6G2731S-130
BLS2731-110T	RFP trs	BLS6G2731-120/ BLS6G2731S-130
BLS2731-20	RFP trs	BLS2735L-30
BLS2731-50	RFP trs	BLS2735L-30
BLS2933-100	RFP trs	BLF6G2933S-130
BLS3135-50L	RFP trs	BLS6G2735L-30
BLS3135-65I	RFP trs	BLS6G2735L-30/ BLS6G3135-20
CGD1042	CATV	CGD1042H
CGD1044	CATV	CGD1044H
CGD914	CATV	CGD1042H
CGY887A	CATV	CGY1043
CGY887B	CATV	CGY1047
GD923	CATV	CGD942C
J108	FET	PMBFJ108
J109	FET	PMBFJ109
J110	FET	PMBFJ110
J111	FET	PMBFJ111
J112	FET	PMBFJ112
J113	FET	PMBFJ113
J174	FET	PMBFJ174
J175	FET	PMBFJ175
J176	FET	PMBFJ176
J177	FET	PMBFJ177
MX0912B251Y	RFP trs	BLL6G1214L-250/ BLL6H1214L-250
MX0912B351Y	RFP trs	BLL6G1214L-250/ BLL6H1214L-250/ BLL6H1214-500
MZ0912B100Y	RFP trs	BLL6H0514L-130
MZ0912B50Y	RFP trs	BLL6H0514-25
OM7650	CATV	BGY588C
OM7670	CATV	BGE788C
ON4402H	RFP trs	BLF572XR/BLP05H6200P
ON4739	RFP trs	BLP15M660P
ON4831-2	CATV	BGY885A
ON4876	CATV	BGY1085A
ON5040	RFP trs	BLF572XR/BLP05H6200P
PMBT3640/AT	WB trs	BFS17
PN4392	FET	PMBF4392
PN4393	FET	PMBF4393
RX1214B130YI	RFP trs	BLL6H0514L-130
RX1214B170WI	RFP trs	BL6H0514L-130/ BLL6G1214L-250/ BLL6H1214L-250
RX1214B280YH	RFP trs	BLL6G1214L-250/ BLL6H1214L-250/ BLL6H1214-500
RX1214B300Y	RFP trs	BLL6G1214L-250/ BLL6H1214L-250/ BLL6H1214-500
RX1214B300YI	RFP trs	BLL6G1214L-250/ BLL6H1214L-250/ BLL6H1214-500
RX1214B80WI	RFP trs	BLL6H0514L-130
RZ1214B35YI	RFP trs	BLL6H0514-25
TFF1004HN	Satellite	TFF1014HN













# 6. Packing and packaging information

## 6.1 Packing quantities per package with relevant ordering codes

	Package	Package dimensions L x W x H (mm)	Packing quantity	Product 12NC ending	Packing method	Type		
	SOD323/SC-76	1.7 x 1.25 x 0.9	3,000	115	8 mm tape and reel			
			10,000	135	8 mm tape and reel			
	SOD523/SC-79	1.2 x 0.8 x 0.6	3,000	115	8 mm tape and reel			
			10,000	135	8 mm tape and reel			
			8,000	315	2 mm pitch tape and reel			
			20,000	335	2 mm pitch tape and reel			
	SOD882D	1.0 x 0.6 x 0.4	10,000	315	Reel			
	SOT23	2.9 x 1.3 x 0.9	3,000	215	8 mm tape and reel			
			10,000	235	8 mm tape and reel			
	SOT54	4.6 x 3.9 x 5.1	5,000	112	Bulk, delta pinning			
			5,000	412	Bulk, straight leads			
			10,000	116	Tape and reel, wide pitch			
			10,000	126	Tape ammpack, wide pitch			
	SOT89/SC-62	4.5 x 2.5 x 1.5	1,000	115	12 mm tape and reel			
			4,000	135	12 mm tape and reel			
	SOT115	44.5 x 13.65 x 20.4	100	112	4 tray/box		Plastic	
	SOT121B	24.8 x 6.4 x 6.7	40	112	Blister, tray		Air-cavity ceramic	
	SOT143(N/R)	2.9 x 1.3 x 0.9	3,000	215	8 mm tape and reel			
			10,000	235	8 mm tape and reel			
	SOT223/SC-73	6.7 x 3.5 x 1.6	1,000	115	12 mm tape and reel			
			4,000	135	12 mm tape and reel			
	SOT262A	34 x 9.8 x 5.4	60	112	Blister, tray	Air-cavity ceramic		
	SOT307	10 x 10 x 1.75	1,500	518	13" tape and reel dry pack			
			96	551	1 tray dry pack			
			480	557	5 tray dry pack			
	SOT323/SC-70	2.0 x 1.25 x 0.9	3,000	115	8 mm tape and reel			
			10,000	135	8 mm tape and reel			
	SOT341	5.3 x 10.2 x 2.0	1,000	118	13" tape and reel			
			658	112	Tube			
	SOT343(N/R)	2.0 x 1.25 x 0.9	3,000	115	8 mm tape and reel			
			10,000	135	8 mm tape and reel			
	SOT343F	2.1 x 1.25 x 0.7	3,000	115	8 mm tape and reel			
	SOT360	6.5 x 4.4 x 0.9	2,500	118	16 mm tape and reel			
	SOT363/SC-88	2.0 x 1.25 x 0.9	3,000	115	8 mm tape and reel			
			10,000	135	8 mm tape and reel			
	SOT401	5 x 5 x 1.4	2,000	118	13" tape and reel			
			360	151	1 tray			
	SOT403	5.0 x 4.4 x 0.9	2,500	118	12 mm tape and reel			
	SOT416/SC-75	1.6 x 0.8 x 0.75	3,000	115	8 mm tape and reel			
	SOT467B	9.7 x 5.8 x 4.3	60	112	Blister, tray			
			400	118	Tape and reel			
	SOT467C	20.3 x 5.8 x 4.3	60	112	Blister, tray		Air-cavity ceramic	
	SOT502A	34.0 x 9.8 x 4.1	60	112	Blister, tray			
			300	135	Reel			
			100	118	Tape and reel			

	Package	Package dimensions L x W x H (mm)	Packing quantity	Product 12NC ending	Packing method	Type
	SOT502B	20.6 x 9.8 x 4.1	60	112	Blister, tray Tape and reel	Air-cavity ceramic
			100	118		
	SOT502C	20.6 x 9.8 x 4.1	60	112	Blister, tray	
	SOT502D	34 x 9.8 x 4.1	60	112	Blister, tray	
	SOT502E	20.6 x 9.8 x 4.1	60	112	Blister, tray	
			100	118	Blister, tray	
			24	127	Tube	
			96	127	Tube	
	SOT538A	5.5 x 4.1 x 2.2	500	112	Blister, tray	
	SOT539A	41.2 x 10.2 x 4.5	60	112	Blister, tray	
			300	135	Reel	
			100	118	Tape and reel	
	SOT539B	32.3 x 10.2 x 4.5	60	112	Blister, tray	
	SOT540A	34.0 x 9.8 x 5.4	60	112	Blister, tray	
	SOT608A	20.3 x 10.2 x 4.2	60	112	Blister, tray	
			100	118	Tape and reel	
			300	135	Reel	
	SOT608B	10.2 x 10.16 x 4.2	60	112	Blister, tray	
			300	135	Tape and reel	
	SOT616	4.0 x 4.0 x 0.85	6,000	118	12 mm tape and reel	
			1,500	115	8 mm tape and reel	
			100	551	Tray	
	SOT617	5 x 5 x 0.85	6,000	118	Tape and reel	
	SOT618	6 x 6 x 0.85	4,000	118	13" tape and reel	
			1,000	515	7" tape and reel dry pack	
			490	551	1 tray dry pack	
			2,450	157	5 tray	
	SOT634A	34 x 13.7 x 4.3	60	112	Blister, tray	
	SOT638	14 x 14 x 1	1,000	518	13" tape and reel dry pack	
			90	551	1 tray dry pack	
			450	557	5 tray dry pack	
	SOT650-1	3.0 x 3.0 x 0.85	6,000	118	Reel	
	SOT666	1.6 x 1.2 x 0.7	4,000	115	8 mm tape and reel	
	SOT684	8 x 8 x 0.85	1,000	518	13" tape and reel dry pack	
			260	151	1 tray	
			260	551	1 tray dry pack	
			1,300	157	5 tray dry pack	
	SOT724	8.7 x 3.9 x 1.47	2,500	118	16 mm tape and reel	
	SOT753	2.9 x 1.5 x 1.0	3,000	125	8 mm tape and reel	
	SOT763-1	2.5 x 3.5 x 0.85	3,000	115	Reel	
			6,000	135	Reel	
	SOT778	6.0 x 6.0 x 0.85	490	551	Tray	
			4,000	518	Multiple trays	
	SOT822-1	15.9 x 11 x 3.4	180	127	Tube	
	SOT834-1	15.9 x 11 x 3.4	180	127	Tube	
	SOT883	1.0 x 0.6 x 0.5	3,000	115	8 mm tape and reel	
	SOT886	1.45 x 1.0 x 0.5	5,000	115	8 mm tape and reel	
	SOT891	1.0 x 1.0 x 0.5	5,000	132	8 mm tape and reel	
	SOT908	3.0 x 3.0 x 0.85	6,000	118	12 mm tape and reel	Air-cavity ceramic

	Package	Package dimensions L x W x H (mm)	Packing quantity	Product 12NC ending	Packing method	Type
	SOT922-1	17.6 x 9.4 x 3.9	60	112	Blister, tray	Air-cavity ceramic
	SOT975B	7.1 x 6.9 x 3.3	180	112	Blister, tray	
			100	118	Tape and reel	
	SOT975C	7.1 x 6.9 x 3.3	180	112	Blister, tray	
			100	118	Tape and reel	
	SOT979A	41.2 x 10.2 x 5.3	60	112	Blister, tray	
	SOT1110A	41.2 x 10.2 x 4.9	60	112	Blister, tray	
	SOT1110B	32.3 x 10.2 x 4.9	60	112	Blister, tray	
	SOT1112A	20.3 x 9.8 x 4.2	60	112	Blister, tray	
	SOT1112B	9.8 x 9.8 x 4.2	60	112	Blister, tray	
	SOT1120A	34.0 x 9.8 x 4.1	60	112	Blister, tray	
			100	118	Tape and reel	
	SOT1120B	20.6 x 9.8 x 4.1	60	112	Blister, tray	
			100	118	Tape and reel	
	SOT1121A	34.0 x 9.8 x 4.1	60	112	Blister, tray	
			100	118	Tape and reel	
	SOT1121B	20.6 x 9.8 x 4.1	60	112	Blister, tray	
			100	118	Tape and reel	
	SOT1121C	20.6 x 9.8 x 4.1	24	127	Blister, tray	
			96	127	Blister, tray	
	SOT1130A	20.3 x 9.8 x 4.2	60	112	Blister, tray	
	SOT1130B	9.8 x 9.8 x 4.2	60	112	Blister, tray	
	SOT1135A	20.3 x 9.8 x 4.1	60	112	Blister, tray	
			100	118	Reel	
	SOT1135B	9.8 x 9.8 x 4.2	60	112	Blister, tray	
	SOT1138-1	20.6 x 10 x 3.6	100	118	Tape and reel	
	SOT1179-1	6.0 x 4.0 x 0.9	500	135	Tape and reel	
	SOT1198-1	10.0 x 5.5 x 0.8	1,000	115	Tape and reel	Plastic (OMP)
	SOT1204-1	20.6 x 10 x 3.6	100	118	Tape and reel	
	SOT1209	2 x 1.3 x 0.35	5,000	147	8 mm tape and reel	
	SOT1230	1.1 x 0.0 x 0.37	5,000	115	Reel	
	SOT1242B	32.2 x 10 x 4.9	100	115	Tape and reel	
			15	127	Tube	
			60	127	Tube	
	SOT1242C	32.2 x 10.2 x 4.9	100	115	Tape and reel	Air-cavity ceramic
			15	127	Tube	
			60	127	Tube	
	SOT1244B	20.6 x 9.8 x 4.1	60	112	Blister, tray, tape and reel	
			100	118	Blister, tray, tape and reel	
	SOT1244C	20.6 x 9.8 x 4.1	100	118	Tape and reel	
			24	127	Tube	
			96	127	Tube	
	SOT1211-1	20.6 x 10 x 3.6	100	118	Tape and reel	Plastic (OMP)
	SOT1212-1	20.6 x 10 x 3.6	100	118	Tape and reel	
	SOT1214A	34 x 9.8 x 4.1	60	112	Blister, tray	Air-cavity ceramic
	SOT1214B	20.6 x 9.8 x 4.1	60	112	Blister, tray	

	Package	Package dimensions L x W x H (mm)	Packing quantity	Product 12NC ending	Packing method	Type
	SOT1221-1	20.6 x 10 x 3.6	100	118	Tape and reel	Plastic (OMP)
	SOT1222-1	20.6 x 10 x 3.6	100	118	Tape and reel	
	SOT1223-1	20.6 x 10 x 3.6	100	118	Tape and reel	
	SOT1224-1	20.6 x 10 x 3.6	100	118	Tape and reel	
	SOT1227A	14 x 4.1 x 2.9	60	112	Blister, tray	Air-cavity ceramic
	SOT1227B	5.1 x 4.1 x 2.9	60	112	Blister, tray	
	SOT1228A	29 x 5.8 x 4.7	60	112	Blister, tray	
	SOT1228B	17.3 x 5.8 x 4.7	60	112	Blister, tray	
	SOT1247B	32.3 x 10.2 x 4.9	60	112	Blister, tray	
			100	118	Tape and reel	
	SOT1250-1	32.3 x 10.2 x 4.5	60	112	Blister, tray	Air-cavity ceramic
			100	118	Tape and reel	
	SOT1251-1	32.3 x 10.2 x 4.5	60	112	Blister, tray	
			100	118	Tape and reel	
	SOT1252-1	32.3 x 10.2 x 4.5	60	112	Blister, tray	
			100	118	Tape and reel	
	SOT1270-1	20.6 x 9.8 x 4.1	60	112	Blister, tray	
			100	118	Tape and reel	
	SOT1271-1	20.6 x 9.8 x 4.1	60	112	Blister, tray	
			100	118	Tape and reel	
	SOT1272-1	20.6 x 9.8 x 4.1	60	112	Blister, tray	
			100	118	Tape and reel	
	SOT1273-1	20.6 x 9.8 x 4.1	60	112	Blister, tray	
			100	118	Tape and reel	
	SOT1274-1	20.6 x 9.8 x 4.1	60	112	Blister, tray	
			100	118	Tape and reel	
	SOT1275-1	20.6 x 9.8 x 4.1	60	112	Blister, tray	
			100	118	Tape and reel	

## 6.2 Marking codes

In general, device marking includes the part number, some manufacturing information, and the NXP logo. If packages are too small for the full-length part number, a shorter, coded part number – marking code – is used (where % = placeholder for manufacturing site code). The full-length part number is always printed on the packing label on the box or bulk-pack in which the devices are supplied.

p = made in Hong Kong

t = made in Malaysia

W = made in China

Marking code	Type	Package	Marking code	Type	Package	Marking code	Type	Package
7	BA891	SOD523	1001			A2%	BGA2022	SOT363
2550	BLP25M705	SOT1179	0101	BAP63LX	SOD882D	A3	BAP64-03	SOD323
%13	BB207	SOT23	1001			A3%	BGA2003	SOT343
%1V	BFR93AW/DG	SOT323	1001	BAP65LX	SOD882D	A3%	BGA2031/1	SOT363
%1W	BAP51-05W	SOT323	1001			A5	BAP51-03	SOD323
%3A	BGA6289	SOT89	1001	BB187LX	SOD882D	A5%	BGA2011	SOT363
%4A	BGA6489	SOT89	1111			A6%	BGA2012	SOT363
%5A	BGA6589	SOT89	1111	BAP64LX	SOD882D	A8	BAP50-03/A	SOD323
%6G	PMBF4393	SOT23	1111			A8	BAP50-03	SOD323
%6J	PMBF4391	SOT23	1011	BAP55LX/A	SOD882D	A8%	PMBFJ620	SOT363
%6K	PMBF4392	SOT23	1111			A9	BAP70-03/A	SOD323
%6K	BGA7024	SOT89	1101	BAP55LX	SOD882D	A9	BAP70-03	SOD323
%6L	BGA7027	SOT89	1A	BGU6101	SOT1209	AC	BGU7005	SOT886
%6N	ON5088	SOT343	1B	BGU6102	SOT1209	B	BGU8010	SOT1230
%6S	PMBFJ176	SOT23	1C	BGU6104	SOT1209	B1000	BLP10H610	SOT1352
%6W	PMBFJ175	SOT23	1C%	BAP50-05	SOT23	B1025	BLP10H603	SOT1352
%6W	BGA3012	SOT89	1N%	BAP70-04W/A	SOT323	B1050	BLP10H605	SOT1352
%6X	PMBFJ174	SOT23	1N%	BAP70-04W	SOT323	B1500	BLP15M710	SOT1179
%6X	BGA3015	SOT89	20%	BF545A	SOT23	B1550	BLP15M705	SOT1179
%6Y	PMBFJ177	SOT23	21%	BF545B	SOT23	B2250	BLP7G22-05	SOT1179
%6Y	BGA3018	SOT89	22%	BF545C	SOT23	B2500	BLP25M710	SOT1179
%7N	ON5087	SOT343	24%	BF556A	SOT23	B3	BGU7003	SOT891
%8N	ON5089	SOT343	28%	BF861A	SOT23	B5%	BSR12	SOT23
%E7	BGA2800	SOT363	29%	BF861B	SOT23	B6	BGU7007	SOT886
%E8	BGA2801	SOT363	2A%	BF862	SOT23	B7	BGU7008	SOT886
%E9	BGA2815	SOT363	30%	BF861C	SOT23	B7%	BFU725F/N1	SOT343
%ED	BGA2866	SOT363	31%	BFR505	SOT23	B7%	BGA2716	SOT363
%M1	BF908	SOT143	32%	BFR520	SOT23	BA%	BGA2714	SOT363
%M2	BF908R	SOT143	33%	BFR540	SOT23	BC%	BFQ591	SOT89
%M9	BS583	SOT143	34%	BFT25A	SOT23	BFG135	BFG135	SOT223
%MA	BF991	SOT143	38%	PMBFJ108	SOT23	BFG198	BFG198	SOT223
%MB	BF992	SOT143	39%	PMBFJ109	SOT23	BFG31	BFG31	SOT223
%MC	BF904	SOT143	40%	PMBFJ110	SOT23	BFG35	BFG35	SOT223
%ME	BFG505	SOT143	41%	PMBFJ111	SOT23	BFG541	BFG541	SOT223
%MF	BFG520	SOT143	42%	PMBFJ112	SOT23	BFG591	BFG591	SOT223
%MG	BFG540	SOT143	47%	PMBFJ113	SOT23	BFG97	BFG97	SOT223
%MK	BFG505/X	SOT143	48%	PMBFJ308	SOT23	BFU580	BFU580G	SOT223
%ML	BFG520/X	SOT143	49%	PMBFJ309	SOT23	BFU590	BFU590G	SOT223
%MM	BFG540/X	SOT143	4H	BB170	SOD323	BLT50	BLT50	SOT223
%MM	ON4832	SOT143	4J	BB171	SOD323	BLT70	BLT70	SOT223
%MN	BFG590/X	SOT143	4K	BB172	SOD323	BLT80	BLT80	SOT223
%MP	BFG520/XR	SOT143	4K%	BAP64-04	SOT23	BLT81	BLT81	SOT223
%MP	ON4973	SOT143	4L%	BAP50-04	SOT23	C	BGU8011	SOT1230
%MR	BFG540/XR	SOT143	4W%	BAP64-04W	SOT323	C2%	BGM1012	SOT363
%MV	BFG67/X	SOT143	50%	PMBFJ310	SOT23	C4%	BGM1013	SOT363
%TA	BFU520	SOT143	5K%	BAP64-05	SOT23	C5%	BGM1014	SOT363
%TB	BFU530	SOT143	5W%	BAP64-05W	SOT323	CE	BB173	SOD523
%TC	BFU550	SOT143	6F%	BAP1321-04	SOT23	CF	BB174	SOD523
%TE	BFU520X	SOT143	6K%	BAP64-06	SOT23	CH	BB175	SOD523
%TF	BFU530X	SOT143	6L%	BAP70-04	SOT23	D	BGU8L1	SOT1232
%TG	BFU550X	SOT143	6W%	BAP50-04W	SOT323	D1	BGU6005/N2	SOT886
%TJ	BFU520XR	SOT143	7K%	BAP65-05	SOT23	D1%	BFU610F	SOT343
%TK	BFU530XR	SOT143	8K%	BAP70-05	SOT23	D2	BAP63-03	SOD323
%TL	BFU550XR	SOT143	8K%	BAP70-05/A	SOT23	D2%	BFU630F	SOT343
%VA	BGU7041	SOT363	A	BGU8009	SOT1230	D3	BAP65-03	SOD323
%VB	BGU7042	SOT363	A	BGU8019	SOT1232	D3%	BFU660F	SOT343
10%	BAT18	SOT23	A1	BA591	SOD323	D4%	BFU690F	SOT343
1001			A1	BB208-02	SOD523	D5%	BFU710F	SOT343
0010	BAP142LX	SOD882D	A1	BAP64Q	SOT753	D6%	BFU730F	SOT343
1001			A1%	BGA2001	SOT343	D7%	BFU760F	SOT343
0011	BAP50LX	SOD882D	A2	BB208-03	SOD323	D8%	BFU790F	SOT343
1001			A2	BAP70Q	SOT753	D9%	BFG425W/DG/B2	SOT343
0100	BAP51LX	SOD882D	A2%	BGA2002	SOT343	E	BGU8M1	SOT1232



Marking code	Type	Package
E1%	BFS17	SOT23
E1%	BFS17W	SOT323
E2%	BFS17A	SOT23
E2%	ON5023	SOT23
E2%	BGA2712	SOT363
E3%	BGA2709	SOT363
F	BGU6009/N2	SOT1230
F	BGU8H1	SOT1232
F1%	BFU910F	SOT343
F2%	BFU915F	SOT343
F3%	BFU920F	SOT343
F4%	BFU930F	SOT343
F5%	BFU960F	SOT343
F6%	BFU990F	SOT343
FB	BFQ19	SOT89
FF	BFQ18A	SOT89
FG	BFQ149	SOT89
G2%	BGA2711	SOT363
G3%	BGA2748	SOT363
G4%	BGA2771	SOT363
HV%	BFU570A	SOT23
HW%	BFU550A	SOT23
HY%	BFU530A	SOT23
HZ%	BFU520A	SOT23
JR	BB156/DG/B2	SOD323
JS	BAP64-03/DG/B2/A	SOD323
JS	BAP64-03/DG/B2	SOD323
K1	BAP51-02	SOD523
K2	BAP51-05W	SOD523
K4	BAP50-02	SOD523
K5	BAP63-02	SOD523
K6	BAP65-02	SOD523
K7	BAP1321-02	SOD523
K8	BAP70-02/A	SOD523
K8	BAP70-02	SOD523
L2	BB202	SOD523
LB%	PBR941B	SOT23
LJ%	BGU7044	SOT363
LK%	BGU7045	SOT363
LP%	BGA2867	SOT363
LR%	BGA2874	SOT363
LS%	BGA2817	SOT363
M1%	BFR30	SOT23
M2%	BFR31	SOT23
M26	BF908	SOT143
M27	BF908R	SOT143
M3%	BFT46	SOT23
M4%	BSR56	SOT23
M5%	BSR57	SOT23
M6%	BSR58	SOT23
M74	BSS83	SOT143
M91	BF991	SOT143
M92	BF992	SOT143
MA%	BGA2802	SOT363
MB%	BF998WR	SOT343
MB%	BGA2803	SOT363
MC%	BGA2851	SOT363
MD%	BF908WR	SOT343
MD%	BGA2869	SOT363
MG%	BF994S	SOT143
MH%	BF996S	SOT143
MO%	BF998	SOT143
MO%	BF998R	SOT143
MO4	BF904	SOT143
MS%	BFR92A/DG/B2	SOT23
MT%	BF862/DG/B2	SOT23
N	BB181	SOD523
N0	BFR505T	SOT416
N0%	BFS505	SOT323
N0%	BFM505	SOT363
N2	BFR520T	SOT416
N2%	BFS520	SOT323
N2%	ON5030	SOT323
N2%	BFM520	SOT363
N3%	BFG520W	SOT343
N33	BFG505	SOT143
N36	BFG520	SOT143
N37	BFG540	SOT143

Marking code	Type	Package
N39	BFG505/X	SOT143
N4	BFQ540	SOT89
N4%	BFS540	SOT323
N4%	BFG520W/X	SOT343
N42	BFG520/X	SOT143
N43	BFG540/X	SOT143
N43	ON4832	SOT143
N44	BFG590/X	SOT143
N48	BFG520/XR	SOT143
N49	BFG540/XR	SOT143
N6%	BFS25A	SOT323
N7%	BFG540W/X	SOT343
N8%	BFG540W/XR	SOT343
N9%	BFG540W	SOT343
N9%	BAP70AM	SOT363
N9%	BAP70AM/A	SOT363
NA%	BF1105R	SOT143
ND%	BFG424W	SOT343
NE%	BFG424F	SOT343
NG%	BF1108	SOT143
NG%	BF1108/L	SOT143
NH%	BF1108R	SOT143
NL%	BFR94A	SOT23
none	BFR540	SOT143
ON5046	ON5046	SOT223
P1	BB131	SOD323
P1%	BFG21W	SOT343
P2%	BFR92A	SOT23
P2%	BFR92AW	SOT323
P3%	BFG403W	SOT343
P4%	BFG410W	SOT343
P5	BB135	SOD323
P5%	BFG425W	SOT343
P6%	BFG48 0W	SOT343
PF	BB156	SOD323
R2%	BFR93A	SOT23
R2%	BFR93AW	SOT323
R7%	BFR106	SOT23
R8%	BFG93A	SOT143
S	BAP64-02	SOD523
S2%	BBY40	SOT23
S3%	BF1107	SOT23
S58	BFU580Q	SOT89
S59	BFU590Q	SOT89
S6%	BF510	SOT23
S7%	BF511	SOT23
S8%	BF512	SOT23
S9%	BF513	SOT23
SC%	BB201	SOT23
SC%	BGU7031	SOT363
SD%	BGU7032	SOT363
SE%	BGU7033	SOT363
TA%	BGA2818	SOT363
UW	BGU7003W	SOT886
UY	BGU7004	SOT886
UZ	BGU8007	SOT886
V0%	PBR941	SOT23
V0%	PRF947	SOT323
V1%	BFT25	SOT23
V12	BFG67/X	SOT143
V2%	BFQ67	SOT23
V2%	BFQ67W	SOT323
V3%	BFG67	SOT143
V4%	BAP64-06W	SOT323
V6%	BAP65-05W	SOT323
V8	BAP1321-03	SOD323
VB%	BF1118W	SOT343
VC%	BF1118	SOT143
VC%	BF1118WR	SOT343
VD%	BF1118R	SOT143
W1%	BFT92	SOT23
W1%	BFT92W	SOT323
W2%	PBR951	SOT23
W2%	PRF957	SOT323
W4%	BAP50-05W/A	SOT323
W4%	BAP50-05W	SOT323
W6%	BAP51-04W	SOT323
W7%	BAP51-06W	SOT323
W9%	BAP63-05W	SOT323
WB%	BFU520Y	SOT363

Marking code	Type	Package
X1%	BFT93	SOT23
X1%	BFT93W	SOT323
XG%	BFR94AW	SOT323
Y3	BAP70-02/DG/B2/A	SOD523
Y3	BAP70-02/DG/B2	SOD523
Y4	BAP64-02/DG/B2/A	SOD523
Y4	BAP64-02/DG/B2	SOD523
YC%	BGA2870	SOT363
Z	BB145B	SOD523
ZA%	BFU520W	SOT323
ZA%	BFU668F	SOT343
ZB%	BFU530W	SOT323
ZB%	BFU768F	SOT343
ZC%	BFU550W	SOT323
ZD	BFU730LX	SOT883
ZD%	BFU570W	SOT323
ZE%	ON5096	SOT343

# 7. Abbreviations

AGC	Automatic Gain Control	MC-GSM	Multi-Carrier GSM
AM	Amplitude Modulation	MHz	MegaHertz
ASYM	ASYMmetrical design of Doherty (main and peak devices are different)	MIM	Metal Insulator Metal
BiCMOS	Bipolar Complementary Metal-Oxide Semiconductor	MMIC	Monolithic Microwave Integrated Circuit
BS diode	Band-Switch diode	MMPP	Main and Peak devices realized separately in halves of push-pull transistor
BPF	Band Pass Filter	MPPM	Main and Peak device realized in same push-pull transistor (2 times)
CATV	Community Antenna Television	MOSFET	Metal-Oxide-Semiconductor Field-Effect Transistor
CATV PD	CATV Power Doubler	MPA	Medium Power Amplifier
CATV PPA	CATV Push-Pull Amplifier	NF	Noise Figure
CATV PPA/HG	CATV Push-Pull Amplifier / High Gain	NIM	Network Interface Module
CATV RA	CATV Reverse Amplifier	OIRT	Organisation Internationale de Radiodiffusion et de Télévision
CATV OR	CATV Optical Receiver	OMP	Over-Molded Plastic
CDMA	Code Division Multiple Access	PA	Power Amplifier
CFR	Crest Factor Reduction	PAD	Single-Package Asymmetric Doherty
CMMB	Chinese Multimedia Mobile Broadcasting	PIN diode	P-type, Intrinsic, N-type diode
CMOS	Complementary Metal Oxide Semiconductor	PLL	Phase-Locked Loop
Config	Configuration	QFN	Quad Flat No-leads
CQS	Customer Qualification Samples	QUBiC	QQuality BiCMOS
CSO	Composite Second Order beat	RF	Radio Frequency
CTB	Composite Triple Beat	RFP trs	RF Power transistor
CW	Continuous Waveform	RFS	Release For Supply
dB	decibel	RF4CE	Radio Frequency for Consumer Electronics
DDC	Digital Down-Conversion	RKE	Remote Keyless Entry
DEV	DEvelopment	RoHS	Restriction of Hazardous Substances
DiSEqC	Digital Satellite Equipment Control	Rx	Receive
DOCSIS	Data Over Cable Service Interface Specification	SARFT	State Administration For Radio, Film, and Television
DPD	Digital Pre-Distortion	SAW	Surface Acoustic Wave
DSP	Digital-Signal Processor	SDARS	Satellite Digital Audio Radio Service
DUC	Digital Up-Conversion	SDK	Software Development Kit
DVB	Digital Video Broadcasting	SiGe:C	Silicon Germanium Carbon
EDGE	Enhanced Data Rates for GSM Evolution	SMATV	Satellite Master Antenna Television
ESD	ElectroStatic Discharge	SMD	Surface-Mounted Device
FET	Field-Effect Transistor	SOD	Small-Outline Diode
FM	Frequency Modulation	SOM	Small-Outline Module
Freq	Frequency	SOT	Small-Outline Transistor
GaAs	Gallium Arsenide	SPDT	Single Pole, Double Throw
GaN	Gallium Nitride	STB	Set-Top Box
Gen	Generation	SYM	SYMmetrical design of Doherty (main and peak devices are the same type of transistor)
GHz	GigaHertz	TDD	Time-Division Duplexing
GNSS	Global Navigation Satellite System	TDMA	Time Division Multiple Access
GPS	Global Positioning System	TD-SCDMA	Time Division-Synchronous Code Division Multiple Access
GSM	Global System for Mobile communications	TTL	Transistor-Transistor Logic
HBM	Human Body Model	Tx	Transmit
HD	High-Definition	µA	microAmp
HDTV	High-Definition Television	UHF	Ultra High Frequency (470-860 MHz)
HF	High Frequency (3-30 MHz)	UMTS	Universal Mobile Telecommunications System
HFC	Hybrid Fiber Coax	UWB	Ultra-WideBand
HFET	Heterostructure Field-Effect Transistor	V	Volt
HPA	High Power Amplifier	Varicap	Variable capacitance diode
HVQFN	Plastic thermally enhanced Very thin Quad Flat pack No leads	VCO	Voltage-Controlled Oscillator
IC	Integrated Circuit	VDMOS	Vertical Double-diffused Metal Oxide Semiconductor
IEEE	Institute of Electrical and Electronics Engineers	VGA	Variable-Gain Amplifier
IF	Intermediate Frequency	VHF	Very High Frequency (30-300 MHz)
IoT	Internet of Things	VoIP	Voice over Internet Protocol
IP	Internet Protocol	VSAT	Very Small Aperture Terminal
IQ	I/Q data (digital)	W	Watt
ISM	Industrial, Scientific, Medical - reserved frequency bands	WB trs 1-4	Wideband transistor generation 1-4
JFET	Junction Field-Effect Transistor	WB trs 5-7	Wideband transistor generation 5-7
kW	kiloWatt	WCDMA	Wideband Code Division Multiple Access
LDMOS	Laterally Diffused Metal-Oxide-Semiconductor	WiFi	Wireless Fidelity
LNA	Low-Noise Amplifier	WiMAX	Worldwide interoperability for Microwave Access
LNB	Low-Noise Block	WLAN	Wireless Local Area Network
LO	Local Oscillator	WL-CSP	Wafer-Level Chip-Scale Package
LPF	Low Pass Filter	XR	eXtremely Rugged
LTE	Long-Term Evolution		
mA	milliAmp		

# 8. Contacts and web links

How to contact your authorized distributor or local NXP representative.

## Authorized distributors

Asia Pacific:

[http://www.nxp.com/profile/sales/asia\\_pacific\\_dist](http://www.nxp.com/profile/sales/asia_pacific_dist)

Europe/Africa/Middle East:

[http://www.nxp.com/profile/sales/europe\\_dist](http://www.nxp.com/profile/sales/europe_dist)

North America:

[http://www.nxp.com/profile/sales/northamerica\\_dist](http://www.nxp.com/profile/sales/northamerica_dist)

## Local NXP offices

Asia Pacific:

[http://www.nxp.com/profile/sales/asia\\_pacific](http://www.nxp.com/profile/sales/asia_pacific)

Europe/Africa/Middle East:

<http://www.nxp.com/profile/sales/europe>

North America:

<http://www.nxp.com/profile/sales/northamerica>

## Web links

NXP Semiconductors:

<http://www.nxp.com>

NXP RF Manual web page:

<http://www.nxp.com/rfmanual>

NXP RF products:

<http://www.nxp.com/rf>

NXP application notes:

<http://www.nxp.com/technical-support-portal>

NXP cross-references:

<http://www.nxp.com/xref/nxp/>

NXP's online design tools:

<http://www.nxp.com/design-portal>

NXP packaging:

<http://www.nxp.com/package>

NXP end-of-life:

<http://www.nxp.com/products/eol>

NXP quality handbook:

<http://www.standardics.nxp.com/quality/handbook>

NXP literature:

<http://www.nxp.com/products/discretes/documentation>

NXP sales offices and distributors:

<http://www.nxp.com/profile/sales>

Need additional support? Contact NXP Helpdesk:

[rfp.helpdesk@nxp.com](mailto:rfp.helpdesk@nxp.com)

# 9. Product index

Type	Portfolio chapter	Type	Portfolio chapter	Type	Portfolio chapter	Type	Portfolio chapter
1PS10SB82	3.2.4	BB156	3.2.1	BFG505	3.3.1	BFU520W	3.3.1
1PS66SB17	3.2.4	BB170	3.2.1	BFG505/X	3.3.1	BFU520X	3.3.1
1PS66SB82	3.2.4	BB171	3.2.1	BFG505W	3.3.1	BFU520XR	3.3.1
1PS70SB82	3.2.4	BB172	3.2.1	BFG505W/X	3.3.1	BFU520Y	3.3.1
1PS70SB84	3.2.4	BB173	3.2.1	BFG505W/XR	3.3.1	BFU530	3.3.1
1PS70SB85	3.2.4	BB173LX	3.2.1	BFG520	3.3.1	BFU530A	3.3.1
1PS70SB86	3.2.4	BB174(LX)	3.2.1	BFG520/X	3.3.1	BFU530W	3.3.1
1PS76SB17	3.2.4	BB175	3.2.1	BFG520/XR	3.3.1	BFU530X	3.3.1
1PS79SB17	3.2.4	BB181	3.2.1	BFG520W/(X)	3.3.1	BFU530XR	3.3.1
1PS88SB82	3.2.4	BB201	3.2.1	BFG540	3.3.1	BFU550(A)	3.3.1
BA591	3.2.3	BB202	3.2.1	BFG540/X	3.3.1	BFU550W	3.3.1
BA891	3.2.3	BB207	3.2.1	BFG540/XR	3.3.1	BFU550X	3.3.1
BAP1321-02	3.2.2	BB208-02	3.2.1	BFG540W	3.3.1	BFU550XR	3.3.1
BAP1321-03	3.2.2	BB208-03	3.2.1	BFG540W/X	3.3.1	BFU580G	3.3.1
BAP1321-04	3.2.2	BBY40	3.2.1	BFG540W/XR	3.3.1	BFU580Q	3.3.1
BAP1321LX	3.2.2	BF1105R	3.5.2	BFG541	3.3.1	BFU590G	3.3.1
BAP142LX	3.2.2	BF1107	3.5.2	BFG590/X	3.3.1	BFU590Q	3.3.1
BAP50-02	3.2.2	BF1108	3.5.2	BFG591	3.3.1	BFU610F	3.3.1
BAP50-03	3.2.2	BF1108R	3.5.2	BFG67	3.3.1	BFU630F	3.3.1
BAP50-04	3.2.2	BF1108W	3.5.2	BFG67/X	3.3.1	BFU660F	3.3.1
BAP50-04W	3.2.2	BF1108WR	3.5.2	BFG92A/X	3.3.1	BFU690F	3.3.1
BAP50-05(W)	3.2.2	BF1118	3.5.2	BFG97	3.3.1	BFU710F	3.3.1
BAP50LX	3.2.2	BF1118R	3.5.2	BFM505	3.3.1	BFU725F/N1	3.3.1
BAP51-02	3.2.2	BF1118W	3.5.2	BFM520	3.3.1	BFU730F	3.3.1
BAP51-03	3.2.2	BF1118WR	3.5.2	BFQ149	3.3.1	BFU730LX	3.3.1
BAP51-04W	3.2.2	BF510	3.5.1	BFQ18A	3.3.1	BFU760F	3.3.1
BAP51-05W	3.2.2	BF511	3.5.1	BFQ19	3.3.1	BFU768F	3.3.1
BAP51-06W	3.2.2	BF512	3.5.1	BFQ540	3.3.1	BFU790F	3.3.1
BAP51LX	3.2.2	BF513	3.5.1	BFQ591	3.3.1	BGA2001	3.4.1
BAP55LX	3.2.2	BF545A	3.5.1	BFQ67	3.3.1	BGA2002	3.4.1
BAP63-02	3.2.2	BF545B	3.5.1	BFQ67W	3.3.1	BGA2003	3.4.1
BAP63-03	3.2.2	BF545C	3.5.1	BFR106	3.3.1	BGA2011	3.4.1
BAP63-05W	3.2.2	BF556A	3.5.1	BFR30	3.5.1	BGA2012	3.4.1
BAP63LX	3.2.2	BF861A	3.5.1	BFR31	3.5.1	BGA2022	3.4.1
BAP64-02	3.2.2	BF861B	3.5.1	BFR505	3.3.1	BGA2031/1	3.4.1
BAP64-03	3.2.2	BF861C	3.5.1	BFR505T	3.3.1	BGA2709	3.4.1
BAP64-04(W)	3.2.2	BF862	3.5.1	BFR520	3.3.1	BGA2712	3.4.1
BAP64-05(W)	3.2.2	BF908	3.5.2	BFR520T	3.3.1	BGA2714	3.4.1
BAP64-06(W)	3.2.2	BF908(W)R	3.5.2	BFR540	3.3.1	BGA2715	3.4.1
BAP64LX	3.2.2	BF991	3.5.2	BFR92A(W)	3.3.1	BGA2716	3.4.1
BAP64Q	3.2.2	BF992	3.5.2	BFR93A	3.3.1	BGA2748	3.4.1
BAP65-02	3.2.2	BF994S	3.5.2	BFR93AR	3.3.1	BGA2776	3.4.1
BAP65-03	3.2.2	BF996S	3.5.2	BFR93AW	3.3.1	BGA2800	3.4.1
BAP65-05(W)	3.2.2	BF998	3.5.2	BFR94A	3.3.1	BGA2801	3.4.1
BAP65LX	3.2.2	BF998(W)R	3.5.2	BFR94AW	3.3.1	BGA2802	3.4.1
BAP70-02	3.2.2	BFG135	3.3.1	BFS17(A)	3.3.1	BGA2803	3.4.1
BAP70-03	3.2.2	BFG198	3.3.1	BFS17W	3.3.1	BGA2815	3.4.1
BAP70-04W	3.2.2	BFG21W	3.3.1	BFS25A	3.3.1	BGA2817	3.4.1
BAP70-05	3.2.2	BFG31	3.3.1	BFS505	3.3.1	BGA2818	3.4.1
BAP70AM	3.2.2	BFG35	3.3.1	BFS520	3.3.1	BGA2851	3.4.1
BAP70Q	3.2.2	BFG403W	3.3.1	BFS540	3.3.1	BGA2866	3.4.1
BAT17	3.2.4	BFG410W	3.3.1	BFT25(A)	3.3.1	BGA2867	3.4.1
BAT18	3.2.3	BFG424F	3.3.1	BFT46	3.5.1	BGA2869	3.4.1
BB131	3.2.1	BFG424W	3.3.1	BFT92(W)	3.3.1	BGA2870	3.4.1
BB135	3.2.1	BFG425W	3.3.1	BFT93(W)	3.3.1	BGA2874	3.4.1
BB145B	3.2.1	BFG480W	3.3.1	BFU520(A)	3.3.1	BGA3012	3.4.1

Type	Portfolio chapter	Type	Portfolio chapter	Type	Portfolio chapter	Type	Portfolio chapter
BGA3015	3.4.1	BGU7224	3.4.1	BLF574	3.7.2.1	BLF7G22LS-130	3.7.1.4
BGA3018	3.4.1	BGU7258	3.4.1	BLF574XR(S)	3.7.2.1	BLF7G24L(S)-100	3.7.1.5
BGA3021	3.4.1	BGU8004	3.4.1	BLF578	3.7.2.1	BLF7G24L(S)-140	3.7.1.5
BGA3022	3.4.1	BGU8006	3.4.1	BLF578XR(S)	3.7.2.1	BLF7G24L(S)-160P	3.7.1.5
BGA3023	3.4.1	BGU8007	3.4.1	BLF640	3.7.2.4	BLF7G27L(S)-100	3.7.1.6
BGA3031	3.4.1	BGU8009	3.4.1	BLF642	3.7.2.2	BLF7G27L(S)-140	3.7.1.6
BGA6130	3.4.1	BGU8010	3.4.1	BLF644P	3.7.2.4	BLF7G27L(S)-150P	3.7.1.6
BGA6289	3.4.1	BGU8011	3.4.1	BLF645	3.7.2.4	BLF7G27L(S)-75P	3.7.1.6
BGA6489	3.4.1	BGU8019	3.4.1	BLF647P(S)	3.7.2.4	BLF7G27L(S)-90P	3.7.1.6
BGA6589	3.4.1	BGU8051	3.4.1	BLF6G10(S)-45	3.7.1.1	BLF7G27L-200PB	3.7.1.6
BGA7024	3.4.1	BGU8052	3.4.1	BLF6G10-200RN	3.7.1.1	BLF871(S)	3.7.2.1
BGA7027	3.4.1	BGU8053	3.4.1	BLF6G10L(S)-260PRN	3.7.1.1	BLF879P(S)	3.7.2.2
BGA7124	3.4.1	BGX7100	3.4.2	BLF6G10L-40BRN	3.7.1.1	BLF881(S)	3.7.2.1
BGA7127	3.4.1	BGX7101	3.4.2	BLF6G10LS-135RN	3.7.1.1	BLF884P(S)	3.7.2.2
BGA7130	3.4.1	BGX7220	3.4.2	BLF6G10LS-160RN	3.7.1.1	BLF888A(S)	3.7.2.2
BGA7204	3.4.1	BGX885N	3.6.1	BLF6G10LS-200RN	3.7.1.1	BLF888B(S)	3.7.2.2
BGA7210	3.4.1	BGY1085A	3.6.2	BLF6G13L(S)-250P	3.7.2.4	BLF888D(S)	3.7.2.2
BGA7350	3.4.1	BGY588C	3.6.1	BLF6G15L(S)-250PBRN	3.7.1.2	BLF8G09LS-270(G)W	3.7.1.1
BGA7351	3.4.1	BGY66B	3.6.5	BLF6G15L-40(B)RN	3.7.1.2	BLF8G09LS-400P(G)W	3.7.1.1
BGD712	3.6.3	BGY67(A)	3.6.5	BLF6G20(LS)-110	3.7.1.3	BLF8G10L(S)-160	3.7.1.1
BGD712C	3.6.3	BGY68	3.6.5	BLF6G20(S)-45	3.7.1.3	BLF8G10LS-160V	3.7.1.1
BGD714	3.6.3	BGY785A	3.6.1	BLF6G20-180PN	3.7.1.3	BLF8G10LS-270	3.7.1.1
BGD812	3.6.3	BGY787	3.6.1	BLF6G20LS-140	3.7.1.3	BLF8G10LS-270(G)V	3.7.1.1
BGD814	3.6.3	BGY835C	3.6.1	BLF6G20LS-75	3.7.1.3	BLF8G10LS-300P	3.7.1.1
BGD816L	3.6.3	BGY885A	3.6.1	BLF6G21-10G	3.7.1.1	BLF8G19LS-170BV	3.7.1.3
BGE787B	3.6.1	BGY887	3.6.1	BLF6G22-180PN	3.7.1.4	BLF8G20LS-140(G)V	3.7.1.3
BGE788C	3.6.1	BGY887B	3.6.1	BLF6G22-45	3.7.1.4	BLF8G20LS-160V	3.7.1.3
BGE885	3.6.1	BGY888	3.6.1	BLF6G22L(S)-130	3.7.1.4	BLF8G20LS-200V	3.7.1.3
BGM1012	3.4.1	BLA6G1011-200R	3.7.3.1	BLF6G22L(S)-40P	3.7.1.12	BLF8G20LS-210(G)V	3.7.1.3
BGM1013	3.4.1	BLA6G1011L(S)-200RG	3.7.3.1	BLF6G22L-40BN	3.7.1.4	BLF8G20LS-220	3.7.1.3
BGM1014	3.4.1	BLA6H0912-500	3.7.3.1	BLF6G22L-40P	3.7.1.4	BLF8G20LS-260A	3.7.1.9
BGO807C	3.6.4	BLA6H0912L(S)-1000	3.7.3.1	BLF6G22LS-100	3.7.1.4	BLF8G22L(S)-160BV	3.7.1.4
BGO807CE	3.6.4	BLA6H1011-600	3.7.3.1	BLF6G22LS-180RN	3.7.1.4	BLF8G22LS-140	3.7.1.4
BGR269	3.6.5	BLC8G20LS-400AV	3.7.1.9	BLF6G22LS-40BN	3.7.1.4	BLF8G22LS-200(G)V	3.7.1.4
BGU6005	3.4.1	BLC8G22LS-450AV	3.7.1.9	BLF6G22LS-40P	3.7.1.4	BLF8G22LS-220	3.7.1.4
BGU6009	3.4.1	BLC8G22LS-60AV	3.7.1.12	BLF6G27(S)-45	3.7.1.6	BLF8G22LS-240	3.7.1.4
BGU6101	3.4.1	BLC8G24LS-240A	3.7.1.9	BLF6G27-10(G)	3.7.1.6	BLF8G22LS-270	3.7.1.4
BGU6102	3.4.1	BLC8G24LS-240AV	3.7.1.5	BLF6G27-100	3.7.1.6	BLF8G22LS-270(G)V	3.7.1.4
BGU6104	3.4.1	BLC8G27LS-100AV	3.7.1.6	BLF6G27L(S)-40P	3.7.1.6	BLF8G24L-200P	3.7.1.5
BGU7003(W)	3.4.1	BLC8G27LS-160AV	3.7.1.6	BLF6G27L(S)-50BN	3.7.1.6	BLF8G24LS-100(G)V	3.7.1.5
BGU7004	3.4.1	BLC8G27LS-240AV	3.7.1.6	BLF6G38(LS)-100	3.7.1.7	BLF8G24LS-150(G)V	3.7.1.5
BGU7005	3.4.1	BLC8G27LS-60AV	3.7.1.12	BLF6G38(LS)-50	3.7.1.7	BLF8G24LS-200P(N)	3.7.1.5
BGU7007	3.4.1	BLD6G21L(S)-50	3.7.1.4	BLF6G38(S)-25	3.7.1.7	BLF8G27LS-100	3.7.1.6
BGU7008	3.4.1	BLF10H6600P(S)	3.7.2.4	BLF6G38-10(G)	3.7.1.12	BLF8G27LS-100P(GV)	3.7.1.6
BGU7031	3.4.1	BLF10M6(LS)135	3.7.2.4	BLF6G38-10G	3.7.1.7	BLF8G27LS-100V	3.7.1.6
BGU7032	3.4.1	BLF10M6(LS)160	3.7.2.4	BLF6G38LS-25	3.7.1.12	BLF8G27LS-140(V)	3.7.1.6
BGU7033	3.4.1	BLF10M6(LS)200	3.7.2.4	BLF6G38LS-50	3.7.1.12	BLF8G27LS-150(G)V	3.7.1.6
BGU7041	3.4.1	BLF174XR(S)	3.7.2.1	BLF6H10L(S)-160	3.7.1.1	BLF8G38LS-75V	3.7.1.7
BGU7042	3.4.1	BLF178P	3.7.2.1	BLF7G10L(S)-250	3.7.1.1	BLF988(S)	3.7.3.1
BGU7044	3.4.1	BLF178XR(S)	3.7.2.1	BLF7G15LS-200	3.7.1.2	BLL6G1214L(S)-250	3.7.3.2
BGU7045	3.4.1	BLF184XR(S)	3.7.2.1	BLF7G15LS-300P	3.7.1.2	BLL6H0514-25	3.7.3.1
BGU7051	3.4.1	BLF188XR(S)	3.7.2.1	BLF7G20L(S)-200	3.7.1.3	BLL6H0514L(S)-130	3.7.3.2
BGU7052	3.4.1	BLF2425M6L(S)180P	3.7.2.3	BLF7G20L(S)-90P	3.7.1.3	BLL6H1214-500	3.7.3.2
BGU7053	3.4.1	BLF2425M7L(S)100	3.7.2.3	BLF7G20LS-140P	3.7.1.3	BLL6H1214L(S)-250	3.7.3.2
BGU7060	3.4.1	BLF2425M7L(S)140	3.7.2.3	BLF7G21L-160P	3.7.1.4	BLL6H1214LS-500	3.7.3.2
BGU7061	3.4.1	BLF2425M7L(S)250P	3.7.2.3	BLF7G21LS-160(P)	3.7.1.4	BLL6H1214P2S-250	3.7.3.2
BGU7062(N2)	3.4.1	BLF2425M8L(S)140	3.7.2.3	BLF7G22L(S)-100P	3.7.1.4	BLM6G10-30(G)	3.7.1.1
BGU7063	3.4.1	BLF25M612(G)	3.7.2.3	BLF7G22L(S)-200	3.7.1.4	BLM6G22-30(G)	3.7.1.4
BGU7073	3.4.1	BLF571	3.7.2.1	BLF7G22L(S)-250P	3.7.1.4	BLM7G1822-10	3.7.1.12
BGU7075	3.4.1	BLF573(S)	3.7.2.1	BLF7G22L-160	3.7.1.4	BLM7G1822S-20PB(G)	3.7.1.4

Type	Portfolio chapter	Type	Portfolio chapter	Type	Portfolio chapter	Type	Portfolio chapter
BLM7G1822S-40AB(G)	3.7.1.12	BLS6G2735L(S)-30	3.7.3.3	CGD982LC	3.6.3	PMBFJ174	3.5.1
BLM7G1822S-40PB(G)	3.7.1.3	BLS6G2933S-130	3.7.3.3	CGD985HCI	3.6.3	PMBFJ175	3.5.1
BLM7G1822S-60PB(G)	3.7.1.12	BLS6G3135(S)-120	3.7.3.3	CGD985LC	3.6.3	PMBFJ176	3.5.1
BLM7G1822S-80AB(G)	3.7.1.12	BLS6G3135(S)-20	3.7.3.3	CGD987HCI	3.6.3	PMBFJ177	3.5.1
BLM7G22S-60PB(G)	3.7.1.4	BLS7G2325L-105	3.7.3.3	CGY1032	3.6.2	PMBFJ308	3.5.1
BLM7G2325-10	3.7.1.12	BLS7G2729L(S)-350P	3.7.3.3	CGY1041	3.6.2	PMBFJ309	3.5.1
BLM7G24S-30BG	3.7.1.4	BLS7G2730L(S)-200P	3.7.3.3	CGY1043	3.6.2	PMBFJ310	3.5.1
BLM8G0710S-30PB(G)	3.7.1.12	BLS7G2933S-150	3.7.3.3	CGY1047	3.6.2	PMBFJ620	3.5.1
BLP05M7200	3.7.2.1	BLS7G3135L(S)-350P	3.7.3.3	CGY1049	3.6.2	PRF947	3.3.1
BLP10H605	3.7.2.1	BLS7G3135LS-200	3.7.3.3	CGY888C	3.6.1	PRF949	3.3.1
BLP10H610	3.7.2.1	BLT50	3.3.1	CLF1G0035(S)-100	3.7.4	PRF957	3.3.1
BLP15M7160P	3.7.2.4	BLT70	3.3.1	CLF1G0035(S)-100P	3.7.4	TFF1003HN	3.4.5
BLP25M705	3.7.2.3	BLT80	3.3.1	CLF1G0035(S)-200P	3.7.4	TFF1007HN	3.4.5
BLP25M710	3.7.2.3	BLT81	3.3.1	CLF1G0035(S)-50	3.7.4	TFF1012HN	3.4.3
BLP7G07S-140P	3.7.1.1	BLU6H0410L(S)-600P	3.7.3.1	CLF1G0060(S)-10	3.7.4	TFF1013HN	3.4.3
BLP7G09S-140P(G)	3.7.1.10	BSR56	3.5.1	CLF1G0060(S)-30	3.7.4	TFF1014HN	3.4.3
BLP7G22-05	3.7.1.1	BSR57	3.5.1	PBR941	3.3.1	TFF1015HN	3.4.3
BLP7G22-10	3.7.1.1	BSR58	3.5.1	PBR951	3.3.1	TFF1017HN	3.4.3
BLP8G10S-200P(G)	3.7.1.10	BSS83	3.5.2	PMBD353	3.2.4	TFF1018HN	3.4.3
BLP8G10S-45P(G)	3.7.1.1	CGD1040HI	3.6.3	PMBD354	3.2.4	TFF1024HN	3.4.4
BLP8G1822S-60P(G)	3.7.1.12	CGD1042H	3.6.3	PMBF4391	3.5.1	TFF11088HN	3.4.5
BLP8G21S-160PV	3.7.1.4	CGD1042HI	3.6.3	PMBF4392	3.5.1	TFF11092HN	3.4.5
BLP8G22S-250V	3.7.1.10	CGD1042L	3.6.3	PMBF4393	3.5.1	TFF11096HN	3.4.5
BLP8G22S-60P(G)	3.7.1.10	CGD1044H	3.6.3	PMBFJ108	3.5.1	TFF11101HN	3.4.5
BLP8G27-10	3.7.1.12	CGD1044HI	3.6.3	PMBFJ109	3.5.1	TFF11132HN	3.4.5
BLP8G27-20	3.7.1.12	CGD1046HI	3.6.3	PMBFJ110	3.5.1	TFF11139HN	3.4.5
BLS6G2731(S)-120	3.7.3.3	CGD942C	3.6.3	PMBFJ111	3.5.1	TFF11142HN	3.4.5
BLS6G2731-6G	3.7.3.3	CGD944C	3.6.3	PMBFJ112	3.5.1	TFF11145HN	3.4.5
BLS6G2731S-130	3.7.3.3	CGD982HCI	3.6.3	PMBFJ113	3.5.1		





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