

GENERAL DESCRIPTION

The SGM6611 family includes the SGM6611A and the SGM6611B. The SGM6611 is a fully-integrated synchronous boost converter. The 2.7V to 12V operating input voltage is suitable for single-cell or two-cell Li-Ion/Polymer batteries. This device is capable to provide 7A continuous switch current and an output voltage range of 4.5V to 12.6V. It also has an adjustable switching frequency ranging from 200kHz to 2.2MHz.

The SGM6611 family has two operation modes, the pulse width modulation (PWM) mode and pulse frequency modulation (PFM). The SGM6611 family adopts the PWM mode at moderate to heavy load. The PFM mode is applied at light load by SGM6611A to improve the efficiency. However, the SGM6611B still adopts the PWM mode to prevent the device from low switching frequency faults. The protection features include output over-voltage protection at 13.2V, cycle-by-cycle over-current protection and thermal shutdown. The device also involves the functions of 4ms built-in soft-start and adjustable switch peak current limit.

The SGM6611A and SGM6611B are both available in a Green TQFN-2×2.5-11L package.

FEATURES

- **2.7V to 12V Input Voltage Range**
- **4.5V to 12.6V Output Voltage Range**
- **Up to 90% Efficiency**
($V_{IN} = 3.3V$, $V_{OUT} = 9V$, $I_{OUT} = 2A$)
- **Adjustable Peak Current Limit up to 9.5A for High Pulse Current**
- **Adjustable Switching Frequency: 200kHz to 2.2MHz**
- **4ms Built-in Soft-Start Time**
- **PFM Operation Mode at Light Load (SGM6611A)**
- **Forced PWM Operation Mode at Light Load (SGM6611B)**
- **Internal Output Over-Voltage Protection at 13.2V**
- **Over-Current Protection**
- **Thermal Shutdown**
- **Available in a Green TQFN-2×2.5-11L Package**

APPLICATIONS

Portable POS Machine
Bluetooth Speaker
E-Cigarette
Fast-Charging Power Bank

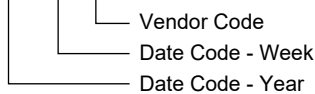
PACKAGE/ORDERING INFORMATION

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM6611A	TQFN-2×2.5-11L	-40°C to +85°C	SGM6611AYTQV11G/TR	6611A XXXXX	Tape and Reel, 3000
SGM6611B	TQFN-2×2.5-11L	-40°C to +85°C	SGM6611BYTQV11G/TR	6611B XXXXX	Tape and Reel, 3000

MARKING INFORMATION

NOTE: XXXXX = Date Code and Vendor Code.

XXXXX



Green (RoHS & HSF): SG Micro Corp defines "Green" to mean Pb-Free (RoHS compatible) and free of halogen substances. If you have additional comments or questions, please contact your SGMICRO representative directly.

ABSOLUTE MAXIMUM RATINGS

BOOT Voltage	-0.3V to $V_{SW} + 6V$
VIN, SW, FSW, VOUT Voltages	-0.3V to 14.5V
EN, VCC, COMP, ILIM, FB Voltages	-0.3V to 6V
Package Thermal Resistance	
TQFN-2×2.5-11L, θ_{JA}	60°C/W
Junction Temperature	+150°C
Storage Temperature Range	-65°C to +150°C
Lead Temperature (Soldering, 10s)	+260°C
ESD Susceptibility	
HBM	1500V
MM	300V
CDM	1000V

RECOMMENDED OPERATING CONDITIONS

Input Voltage Range	2.7V to 12V
Output Voltage Range	4.5V to 12.6V
Inductance, Effective Value, L	0.47 μ H to 10 μ H
Input Capacitance, Effective Value, C_{IN}	10 μ F (MIN)
Output Capacitance, Effective Value, C_{OUT}	10 μ F to 1000 μ F
Operating Junction Temperature Range	-40°C to +125°C
Operating Ambient Temperature Range	-40°C to +85°C

OVERSTRESS CAUTION

Stresses beyond those listed in Absolute Maximum Ratings may cause permanent damage to the device. Exposure to absolute maximum rating conditions for extended periods may affect reliability. Functional operation of the device at any conditions beyond those indicated in the Recommended Operating Conditions section is not implied.

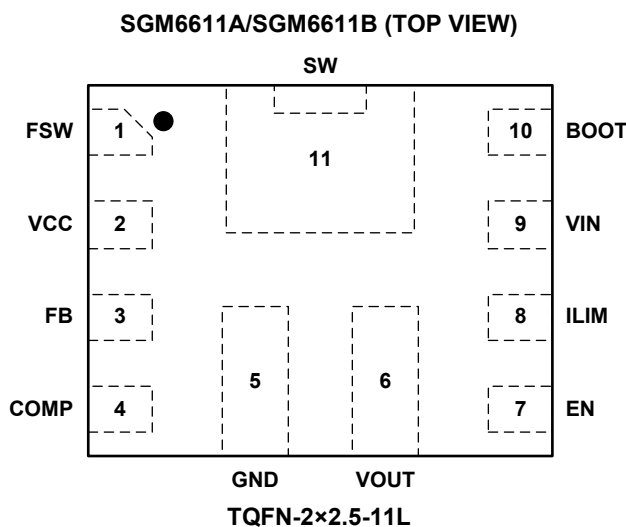
ESD SENSITIVITY CAUTION

This integrated circuit can be damaged if ESD protections are not considered carefully. SGMICRO recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage. ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because even small parametric changes could cause the device not to meet the published specifications.

DISCLAIMER

SG Micro Corp reserves the right to make any change in circuit design, or specifications without prior notice.

PIN CONFIGURATION



PIN DESCRIPTION

PIN	NAME	I/O	FUNCTION
1	FSW	I	The switching frequency is programmed by a resistor between this pin and the GND pin.
2	VCC	O	Output of the Internal Regulator. The VCC pin connects a ceramic capacitor (> 1.0 μ F) to ground.
3	FB	I	Output Voltage Feedback.
4	COMP	O	Output of the Internal Error Amplifier. Connect a loop compensation network between this pin and the GND pin.
5	GND	-	Ground.
6	VOUT	O	Boost Converter Output.
7	EN	I	Enable Logic Input. Logic high makes the circuit enabled, and logic low makes it disabled and the device enters shutdown mode.
8	ILIM	O	Adjustable Switch Peak Current Limit. Connect an external resistor between this pin and the GND pin.
9	VIN	I	IC Power Supply Input.
10	BOOT	O	Power Supply for High-side MOSFET Gate Driver. Strongly recommend to connect a capacitor between this pin and the SW pin.
11	SW	I	Switching Node Pin. Connect to the drain of the internal low-side power MOSFET and the source of the internal high-side power MOSFET.

NOTE: I = input, O = output.

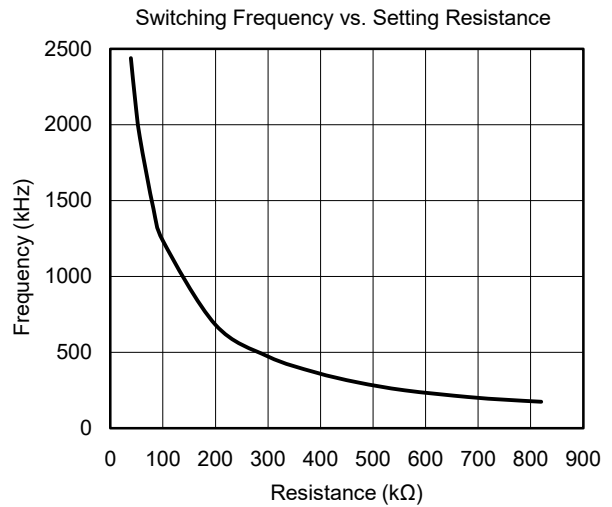
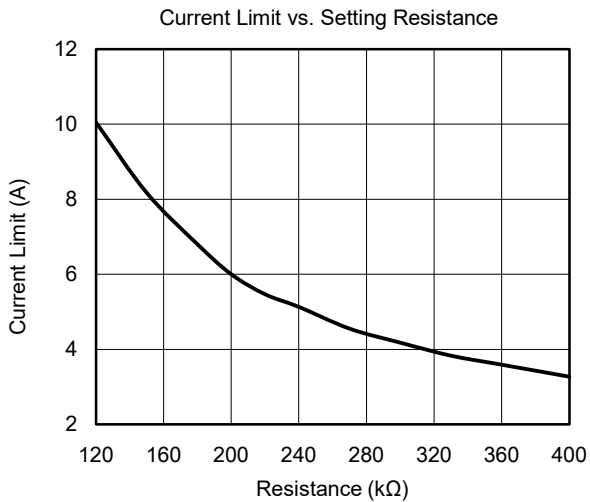
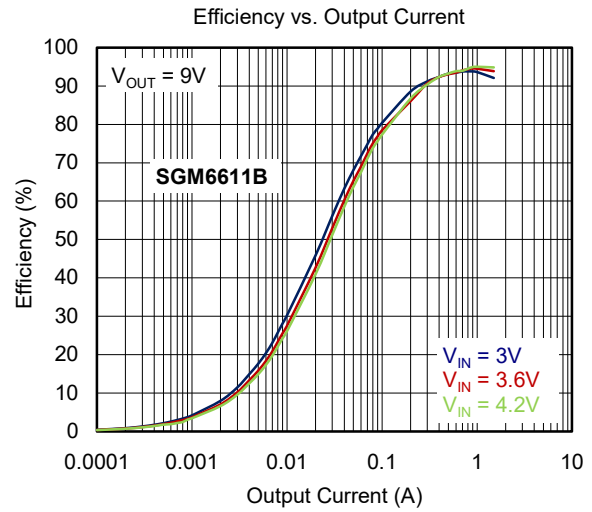
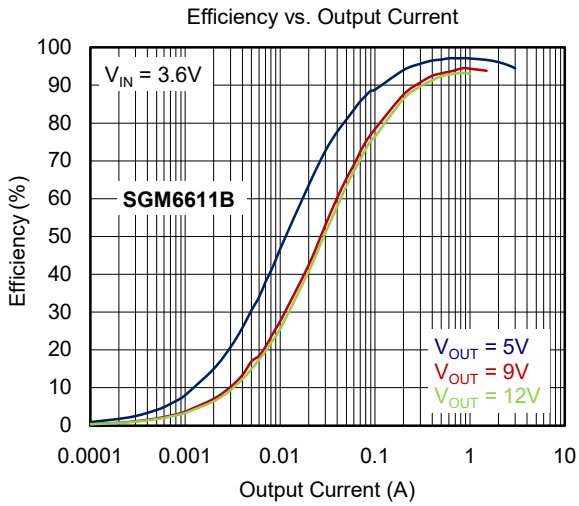
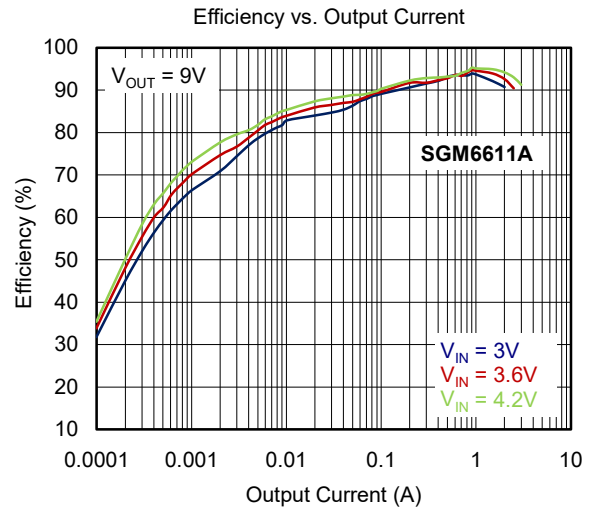
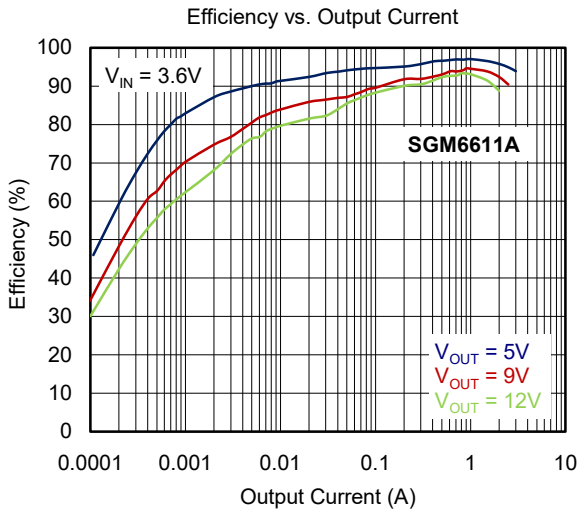
ELECTRICAL CHARACTERISTICS

(V_{IN} = 2.7V to 5.5V, V_{OUT} = 9V, Full = -40°C to +85°C, typical values are at T_A = +25°C, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	TEMP	MIN	TYP	MAX	UNITS
Power Supply							
Input Voltage Range	V _{IN}		Full	2.7		12	V
VIN Under-Voltage Lockout Threshold	V _{IN_UVLO}	V _{IN} rising	+25°C		2.5	2.62	V
		V _{IN} falling			2.4		
VIN Under-Voltage Lockout Hysteresis	V _{IN_HYS}		+25°C		100		mV
VCC Regulation	V _{CC}	I _{CC} = 2mA, V _{IN} = 8V	+25°C		5		V
VCC Under-Voltage Lockout Threshold	V _{CC_UVLO}	V _{CC} falling	+25°C		2.1		V
Operating Quiescent Current	VIN Pin	IC enabled, no load, V _{FB} = 1.3V, V _{OUT} = 12V	+25°C		0.23	0.4	μA
	VOOUT Pin				90	130	
Shutdown Current into the VIN Pin	I _{SHDN}	IC disabled	+25°C		0.6	1.1	μA
Output							
Output Voltage Range	V _{OUT}		Full	4.5		12.6	V
Reference Voltage at the FB Pin	V _{REF}	PWM mode	Full	1.181	1.205	1.229	V
		PFM mode	+25°C		1.207		
Leakage Current into the FB Pin	I _{FB_LKG}	V _{FB} = 1.2V	+25°C		10	100	nA
Output Over-Voltage Protection Threshold	V _{OVP}	V _{OUT} rising	Full	12.95	13.2	13.55	V
Output Over-Voltage Protection Hysteresis	V _{OVP_HYS}	V _{OUT} falling below V _{OVP}	+25°C		0.15		V
Soft Startup Time	t _{SS}	C _{OUT} (effective) = 47μF, I _{OUT} = 0A	+25°C		4		ms
Error Amplifier							
COMP Pin Sink Current	I _{SINK}	V _{FB} = V _{REF} + 100mV, V _{COMP} = 1.2V	+25°C		120		μA
COMP Pin Source Current	I _{SOURCE}	V _{FB} = V _{REF} - 100mV, V _{COMP} = 1.2V	+25°C		15		μA
High Clamp Voltage at the COMP Pin	V _{CCLPH}	V _{FB} = 1.1V, R _{ILIM} = 127kΩ	+25°C		2.0		V
Low Clamp Voltage at the COMP Pin	V _{CCLPL}	V _{FB} = 1.3V, R _{ILIM} = 127kΩ	+25°C		0.4		V
Error Amplifier Transconductance	G _{EA}	V _{COMP} = 1.2V	+25°C		135		μS
Power Switch							
High-side MOSFET On-Resistance	R _{DS(ON)}	V _{CC} = 5V	+25°C		27	34	mΩ
Low-side MOSFET On-Resistance		V _{CC} = 5V	+25°C		15	20	mΩ
Switching Frequency							
Switching Frequency	f _{SW}	R _{FREQ} = 301kΩ	+25°C	440	470	500	kHz
		R _{FREQ} = 46.4kΩ	+25°C		2200		
Minimum On-Time	t _{ON_MIN}	V _{CC} = 5V	+25°C		120		ns
Current Limit							
Switch Peak Current Limit (SGM6611A)	I _{LIM}	R _{ILIM} = 127kΩ	+25°C	8.5	9.5	10.8	A
Reference Voltage at the ILIM Pin	V _{ILIM}		+25°C		1.205		V
EN Logic Input							
EN Logic High Threshold	V _{ENH}		Full	1.2			V
EN Logic Low Threshold	V _{ENL}		Full			0.4	V
EN Pull-Down Resistor	R _{EN}		+25°C		800		kΩ
Thermal Shutdown							
Thermal Shutdown Threshold	T _{SD}	T _A rising			160		°C
Thermal Shutdown Hysteresis	T _{SD_HYS}	T _A falling below T _{SD}			20		°C

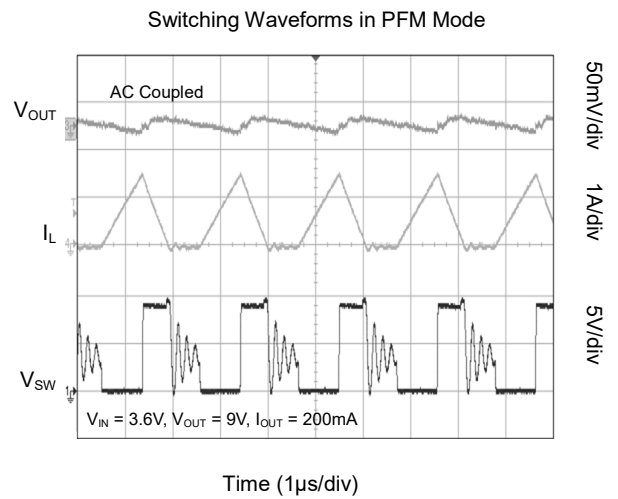
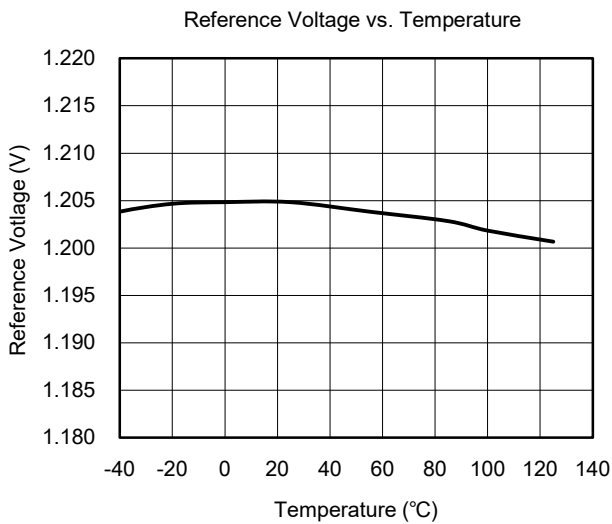
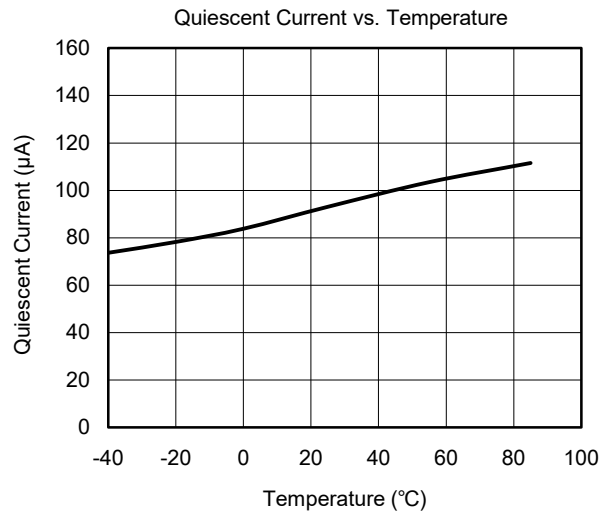
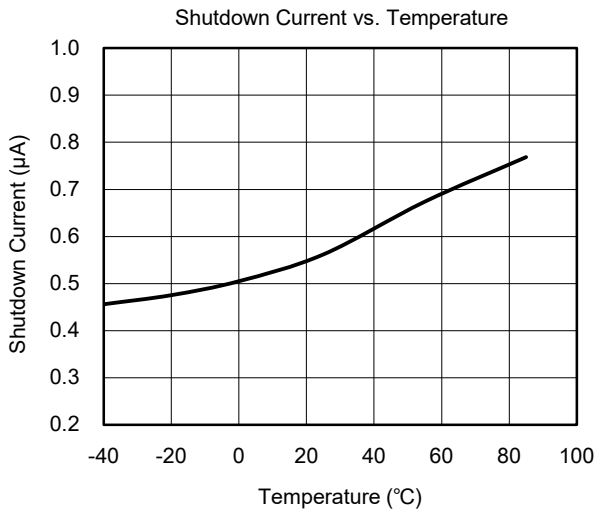
TYPICAL PERFORMANCE CHARACTERISTICS

At $T_A = +25^\circ\text{C}$, $V_{IN} = 3.6\text{V}$, $V_{OUT} = 9\text{V}$, unless otherwise noted.



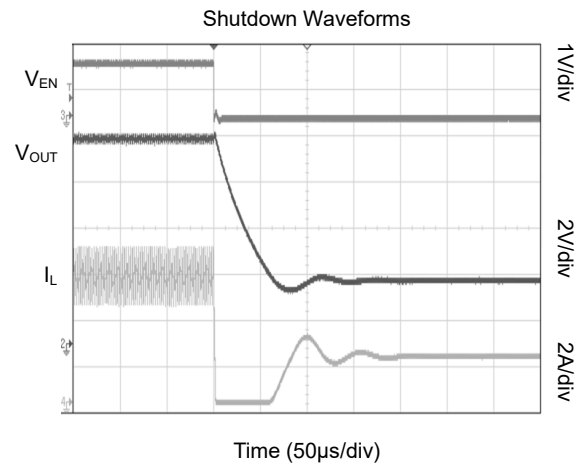
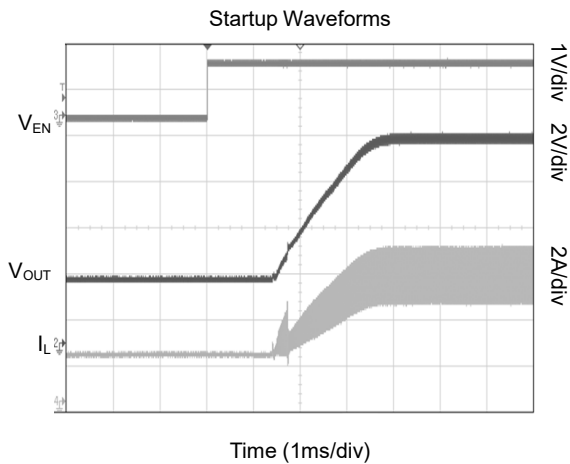
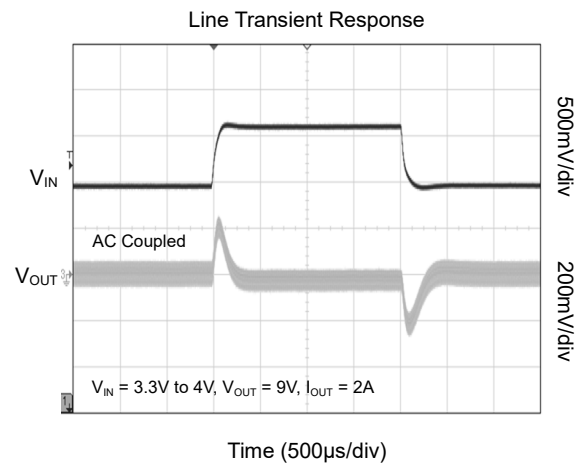
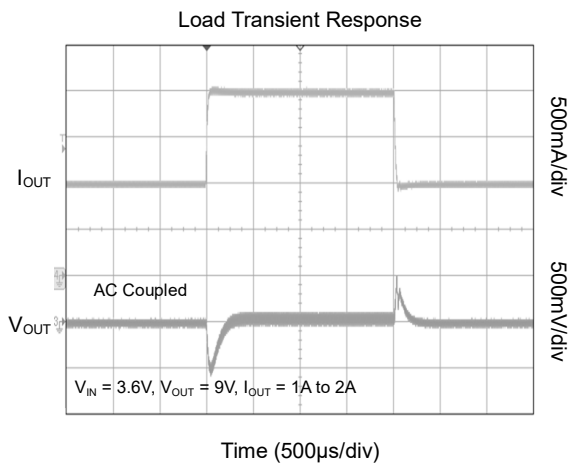
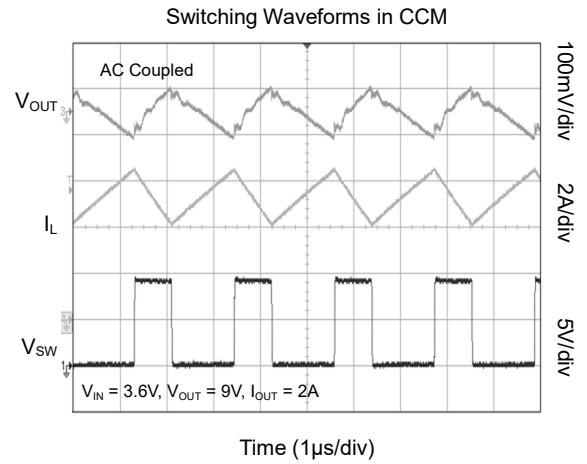
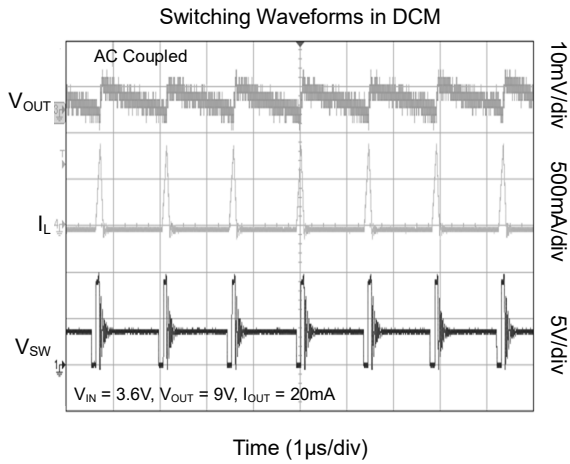
TYPICAL PERFORMANCE CHARACTERISTICS (continued)

At $T_A = +25^\circ\text{C}$, $V_{IN} = 3.6\text{V}$, $V_{OUT} = 9\text{V}$, unless otherwise noted.



TYPICAL PERFORMANCE CHARACTERISTICS (continued)

At $T_A = +25^\circ\text{C}$, $V_{IN} = 3.6\text{V}$, $V_{OUT} = 9\text{V}$, unless otherwise noted.



PCB LAYOUT

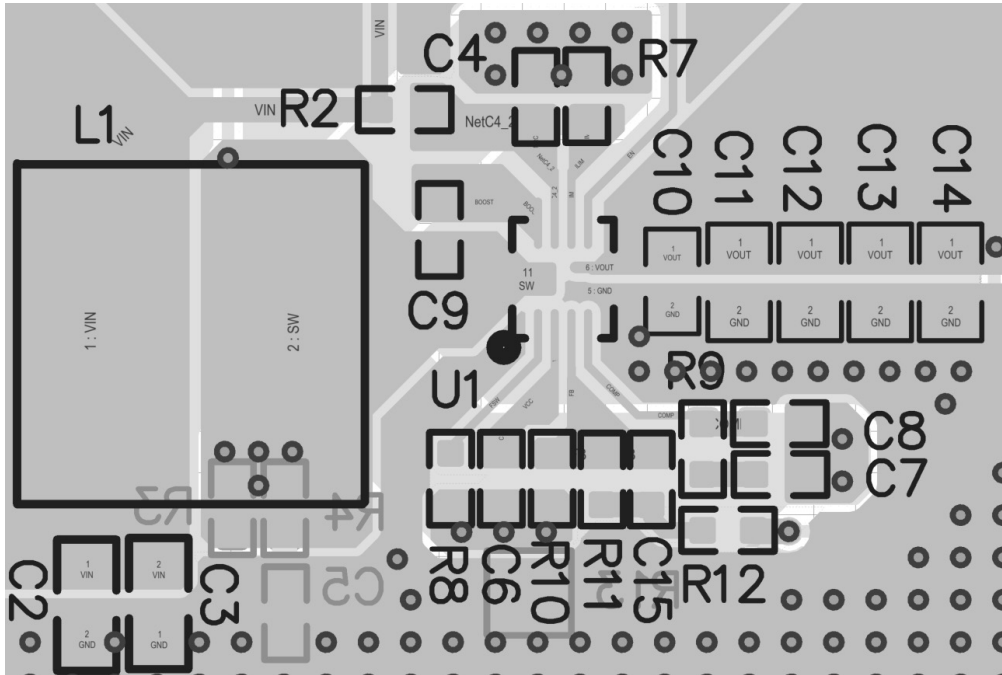


Figure 1. Layout Example

REVISION HISTORY

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

OCTOBER 2021 – REV.A.2 to REV.A.3	Page
Updated the Enable and Disable section	9
Added the Figure 5. Layout Example	15

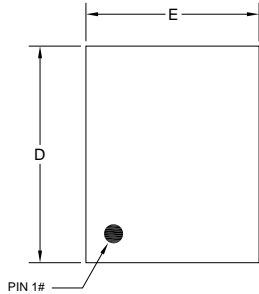
APRIL 2021 – REV.A.1 to REV.A.2	Page
Updated Loop Stability section	14

MARCH 2021 – REV.A to REV.A.1	Page
Updated Package Outline Dimensions section	17

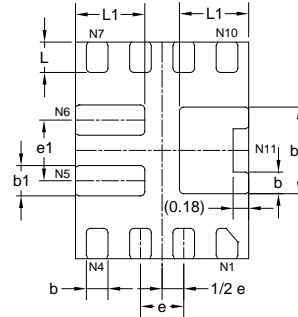
Changes from Original (JULY 2018) to REV.A	
Changed from product preview to production data.....	All

PACKAGE OUTLINE DIMENSIONS

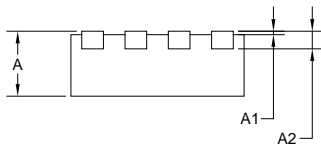
TQFN-2x2.5-11L



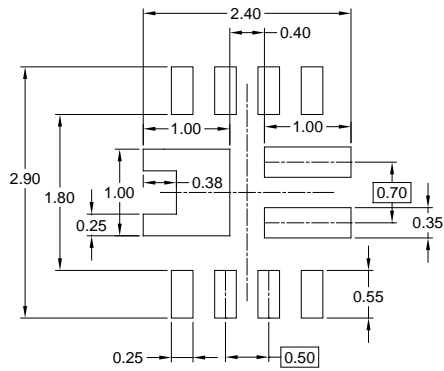
TOP VIEW



BOTTOM VIEW



SIDE VIEW



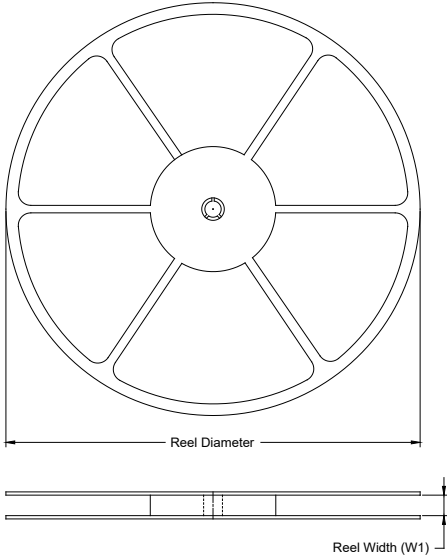
RECOMMENDED LAND PATTERN (Unit: mm)

Symbol	Dimensions In Millimeters		
	MIN	MOD	MAX
A	0.700	0.750	0.800
A1	0.000	0.020	0.050
A2	0.203 REF		
D	2.400	2.500	2.600
E	1.900	2.000	2.100
e	0.500 BSC		
e1	0.700 BSC		
b	0.200	0.250	0.300
b1	0.300	0.350	0.400
b2	0.950	1.000	1.050
L	0.300	0.350	0.400
L1	0.750	0.800	0.850

NOTE: This drawing is subject to change without notice.

TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



NOTE: The picture is only for reference. Please make the object as the standard.

KEY PARAMETER LIST OF TAPE AND REEL

Package Type	Reel Diameter	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P0 (mm)	P1 (mm)	P2 (mm)	W (mm)	Pin1 Quadrant
TQFN-2x2.5-11L	7"	9.5	2.20	2.70	0.95	4.0	4.0	2.0	8.0	Q2

000001

PACKAGE INFORMATION

CARTON BOX DIMENSIONS



NOTE: The picture is only for reference. Please make the object as the standard.

KEY PARAMETER LIST OF CARTON BOX

Reel Type	Length (mm)	Width (mm)	Height (mm)	Pizza/Carton
7" (Option)	368	227	224	8
7"	442	410	224	18

DD0002