

# MMBFJ309L, MMBFJ310L, SMMBFJ309L, SMMBFJ310L

## JFET - VHF/UHF Amplifier Transistor

### N-Channel

#### Features

- Drain and Source are Interchangeable
- S Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

#### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Drain-Source Voltage	$V_{DS}$	25	Vdc
Gate-Source Voltage	$V_{GS}$	25	Vdc
Gate Current	$I_G$	10	mAdc

#### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Total Device Dissipation FR-5 Board, (Note 1) $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	225 1.8	mW mW/ $^\circ\text{C}$
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	556	$^\circ\text{C}/\text{W}$
Junction and Storage Temperature	$T_J, T_{stg}$	-55 to +150	$^\circ\text{C}$

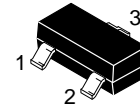
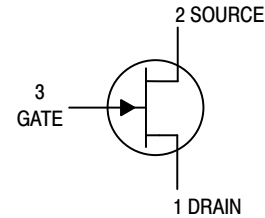
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. FR-5 = 1.0 x 0.75 x 0.062 in.



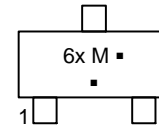
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SOT-23 (TO-236)  
CASE 318  
STYLE 10

#### MARKING DIAGRAM



6x = Device Code

x = U for MMBFJ309L, SMMBFJ309L

x = T for MMBFJ310L, SMMBFJ310L

M = Date Code\*

▪ = Pb-Free Package

(Note: Microdot may be in either location)

\*Date Code orientation and/or overbar may vary depending upon manufacturing location.

#### ORDERING INFORMATION

Device	Package	Shipping†
MMBFJ309LT1G, SMMBFJ309LT1G	SOT-23 (Pb-Free)	3,000 / Tape & Reel
MMBFJ310LT1G, SMMBFJ310LT1G	SOT-23 (Pb-Free)	3,000 / Tape & Reel
SMMBFJ310LT3G	SOT-23 (Pb-Free)	10,000 / Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

# MMBFJ309L, MMBFJ310L, SMMBFJ309L, SMMBFJ310L

## ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
<b>OFF CHARACTERISTICS</b>					
Gate-Source Breakdown Voltage ( $I_G = -1.0 \mu\text{Adc}$ , $V_{DS} = 0$ )	$V_{(BR)GSS}$	-25	-	-	Vdc
Gate Reverse Current ( $V_{GS} = -15 \text{Vdc}$ ) ( $V_{GS} = -15 \text{Vdc}$ , $T_A = 125^\circ\text{C}$ )	$I_{GSS}$	-	-	-1.0 -1.0	nAdc $\mu\text{Adc}$
Gate Source Cutoff Voltage ( $V_{DS} = 10 \text{Vdc}$ , $I_D = 1.0 \text{nAdc}$ )	$V_{GS(off)}$	-1.0 -2.0	-	-4.0 -6.5	Vdc
					MMBFJ309 MMBFJ310, SMMBFJ310
<b>ON CHARACTERISTICS</b>					
Zero-Gate-Voltage Drain Current ( $V_{DS} = 10 \text{Vdc}$ , $V_{GS} = 0$ )	$I_{DSS}$	12 24	-	30 60	mAdc
					MMBFJ309 MMBFJ310, SMMBFJ310
Gate-Source Forward Voltage ( $I_G = 1.0 \text{mAdc}$ , $V_{DS} = 0$ )	$V_{GS(f)}$	-	-	1.0	Vdc
<b>SMALL-SIGNAL CHARACTERISTICS</b>					
Forward Transfer Admittance ( $V_{DS} = 10 \text{Vdc}$ , $I_D = 10 \text{mAdc}$ , $f = 1.0 \text{kHz}$ )	$ Y_{fs} $	8.0	-	18	mmhos
Output Admittance ( $V_{DS} = 10 \text{Vdc}$ , $I_D = 10 \text{mAdc}$ , $f = 1.0 \text{kHz}$ )	$ y_{os} $	-	-	250	$\mu\text{mhos}$
Input Capacitance ( $V_{GS} = -10 \text{Vdc}$ , $V_{DS} = 0 \text{Vdc}$ , $f = 1.0 \text{MHz}$ )	$C_{iss}$	-	-	5.0	pF
Reverse Transfer Capacitance ( $V_{GS} = -10 \text{Vdc}$ , $V_{DS} = 0 \text{Vdc}$ , $f = 1.0 \text{MHz}$ )	$C_{rss}$	-	-	2.5	pF
Equivalent Short-Circuit Input Noise Voltage ( $V_{DS} = 10 \text{Vdc}$ , $I_D = 10 \text{mAdc}$ , $f = 100 \text{Hz}$ )	$\bar{e}_n$	-	10	-	$\text{nV}/\sqrt{\text{Hz}}$

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

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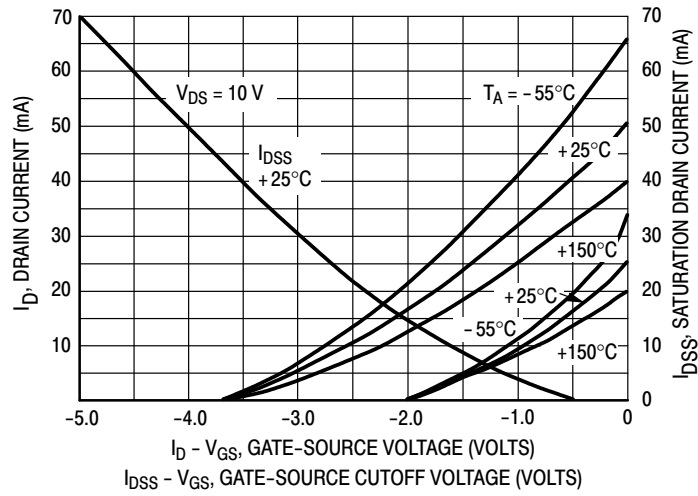


Figure 1. Drain Current and Transfer Characteristics versus Gate-Source Voltage

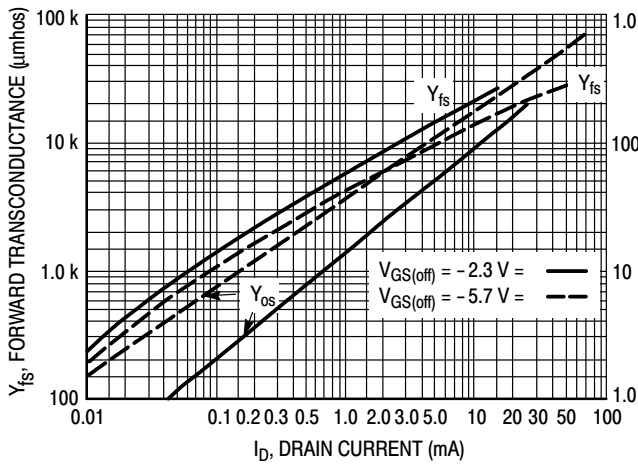


Figure 2. Common-Source Output Admittance and Forward Transconductance versus Drain Current

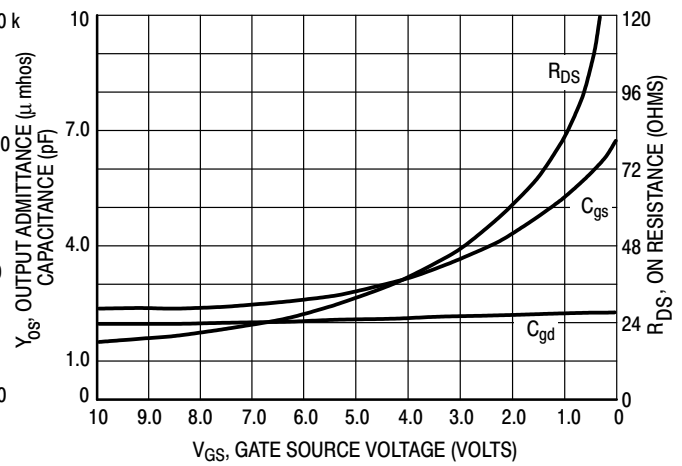


Figure 3. On Resistance and Junction Capacitance versus Gate-Source Voltage

MMBFJ309L, MMBFJ310L, SMMBFJ309L, SMMBFJ310L

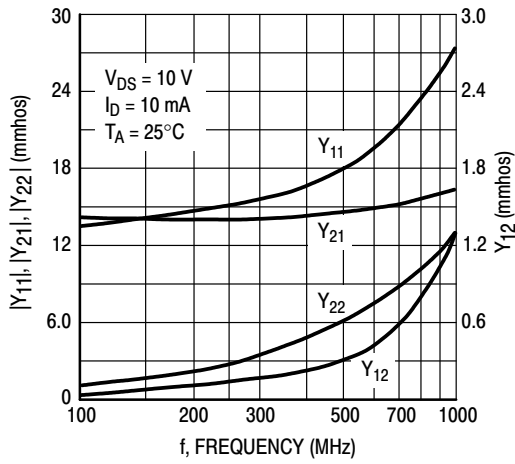


Figure 4. Common-Gate Y Parameter Magnitude versus Frequency

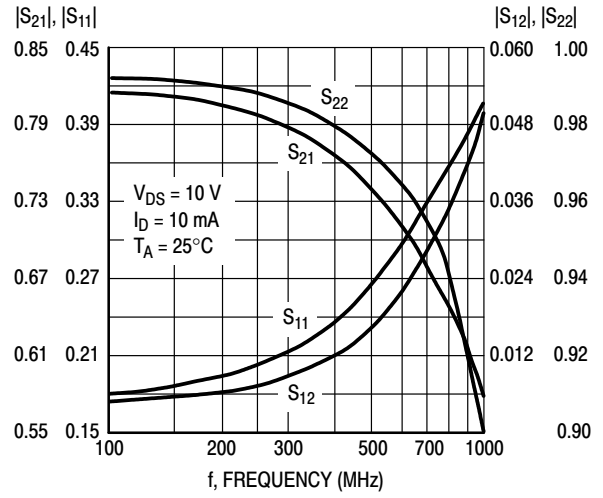


Figure 5. Common-Gate S Parameter Magnitude versus Frequency

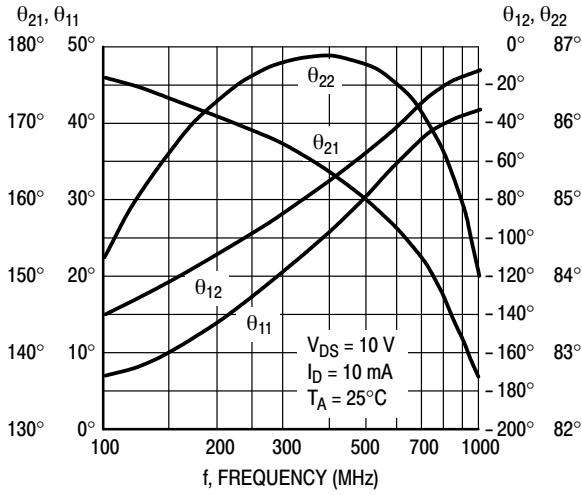


Figure 6. Common-Gate Y Parameter Phase-Angle versus Frequency

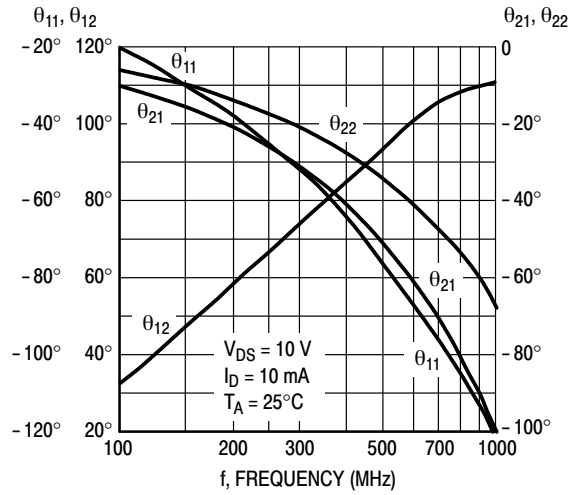
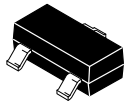


Figure 7. S Parameter Phase-Angle versus Frequency

# MECHANICAL CASE OUTLINE

## PACKAGE DIMENSIONS

ON Semiconductor®



**SOT-23 (TO-236)**  
CASE 318-08  
ISSUE AS

DATE 30 JAN 2018

SCALE 4:1

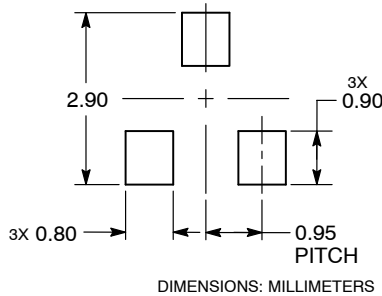


**NOTES:**

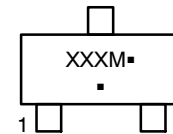
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF THE BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.89	1.00	1.11	0.035	0.039	0.044
A1	0.01	0.06	0.10	0.000	0.002	0.004
b	0.37	0.44	0.50	0.015	0.017	0.020
c	0.08	0.14	0.20	0.003	0.006	0.008
D	2.80	2.90	3.04	0.110	0.114	0.120
E	1.20	1.30	1.40	0.047	0.051	0.055
e	1.78	1.90	2.04	0.070	0.075	0.080
L	0.30	0.43	0.55	0.012	0.017	0.022
L1	0.35	0.54	0.69	0.014	0.021	0.027
HE	2.10	2.40	2.64	0.083	0.094	0.104
T	0°	---	10°	0°	---	10°

**RECOMMENDED SOLDERING FOOTPRINT**



**GENERIC MARKING DIAGRAM\***



XXX = Specific Device Code  
M = Date Code  
▪ = Pb-Free Package

\*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "▪", may or may not be present.

- |   |   |   |  |
|---|---|---|--|
| STYLE 1 THRU 5:<br>CANCELLED                                | STYLE 6:<br>PIN 1. BASE<br>2. EMITTER<br>3. COLLECTOR       | STYLE 7:<br>PIN 1. EMITTER<br>2. BASE<br>3. COLLECTOR       | STYLE 8:<br>PIN 1. ANODE<br>2. NO CONNECTION<br>3. CATHODE |
| STYLE 9:<br>PIN 1. ANODE<br>2. ANODE<br>3. CATHODE          | STYLE 10:<br>PIN 1. DRAIN<br>2. SOURCE<br>3. GATE           | STYLE 11:<br>PIN 1. ANODE<br>2. CATHODE<br>3. CATHODE-ANODE | STYLE 12:<br>PIN 1. CATHODE<br>2. CATHODE<br>3. ANODE      |
| STYLE 13:<br>PIN 1. SOURCE<br>2. DRAIN<br>3. GATE           | STYLE 14:<br>PIN 1. CATHODE<br>2. GATE<br>3. ANODE          | STYLE 15:<br>PIN 1. GATE<br>2. CATHODE<br>3. ANODE          | STYLE 16:<br>PIN 1. ANODE<br>2. CATHODE<br>3. CATHODE      |
| STYLE 17:<br>PIN 1. NO CONNECTION<br>2. ANODE<br>3. CATHODE | STYLE 18:<br>PIN 1. NO CONNECTION<br>2. CATHODE<br>3. ANODE | STYLE 19:<br>PIN 1. CATHODE<br>2. ANODE<br>3. CATHODE-ANODE | STYLE 20:<br>PIN 1. CATHODE<br>2. ANODE<br>3. GATE         |
| STYLE 21:<br>PIN 1. GATE<br>2. SOURCE<br>3. DRAIN           | STYLE 22:<br>PIN 1. RETURN<br>2. OUTPUT<br>3. INPUT         | STYLE 23:<br>PIN 1. ANODE<br>2. ANODE<br>3. CATHODE         | STYLE 24:<br>PIN 1. GATE<br>2. DRAIN<br>3. SOURCE          |
| STYLE 25:<br>PIN 1. ANODE<br>2. CATHODE<br>3. GATE          | STYLE 26:<br>PIN 1. CATHODE<br>2. ANODE<br>3. NO CONNECTION | STYLE 27:<br>PIN 1. CATHODE<br>2. CATHODE<br>3. CATHODE     | STYLE 28:<br>PIN 1. ANODE<br>2. ANODE<br>3. ANODE          |

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