

# MMBFJ309L, MMBFJ310L, SMMBFJ310L



**ON Semiconductor®**

<http://onsemi.com>

## JFET - VHF/UHF Amplifier Transistor

### N-Channel

#### Features

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

#### MAXIMUM RATINGS

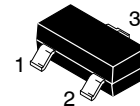
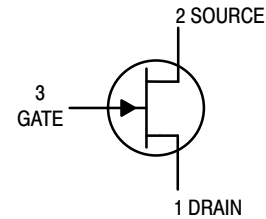
| Rating               | Symbol   | Value | Unit |
|----------------------|----------|-------|------|
| Drain-Source Voltage | $V_{DS}$ | 25    | Vdc  |
| Gate-Source Voltage  | $V_{GS}$ | 25    | Vdc  |
| Gate Current         | $I_G$    | 10    | mAdc |

#### THERMAL CHARACTERISTICS

| Characteristic   | Symbol          | Max         | Unit                       |
|--|-----------------|-------------|----------------------------|
| Total Device Dissipation FR-5 Board,<br>(Note 1) $T_A = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$           | 225<br>1.8  | mW<br>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 | $^\circ\text{C}$           |

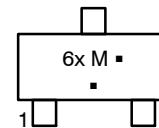
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

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



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

#### MARKING DIAGRAM



- 6x = Device Code
- x = U for MMBFJ309L
- 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  | SOT-23<br>(Pb-Free) | 3,000 / Tape &<br>Reel  |
| MMBFJ310LT1G  | SOT-23<br>(Pb-Free) | 3,000 / Tape &<br>Reel  |
| SMMBFJ310LT1G | SOT-23<br>(Pb-Free) | 3,000 / Tape &<br>Reel  |
| SMMBFJ310LT3G | SOT-23<br>(Pb-Free) | 10,000 / Tape &<br>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.

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

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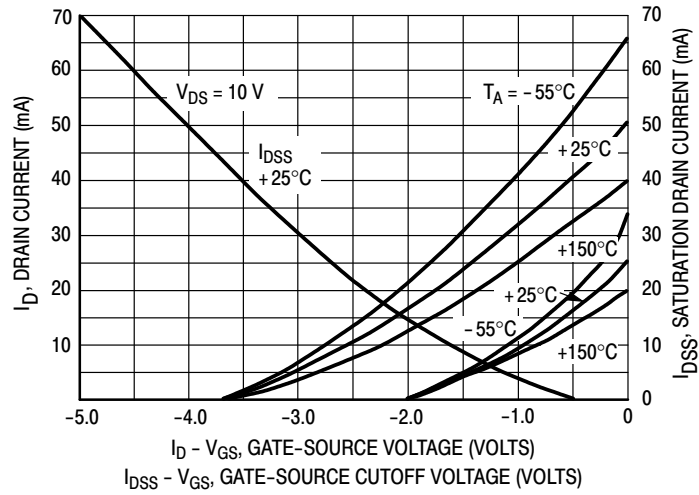


Figure 1. Drain Current and Transfer Characteristics versus Gate-Source Voltage

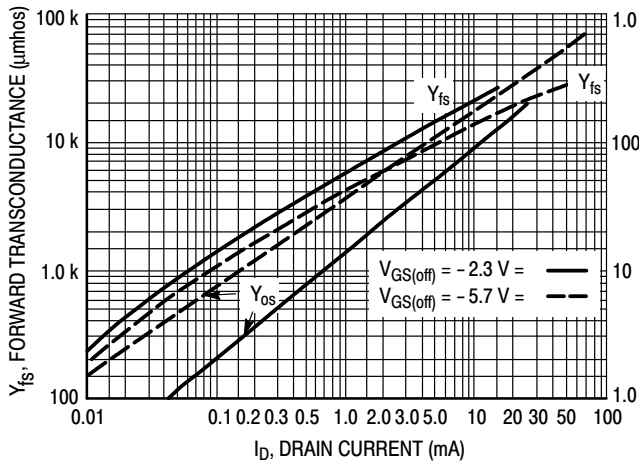


Figure 2. Common-Source Output Admittance and Forward Transconductance versus Drain Current

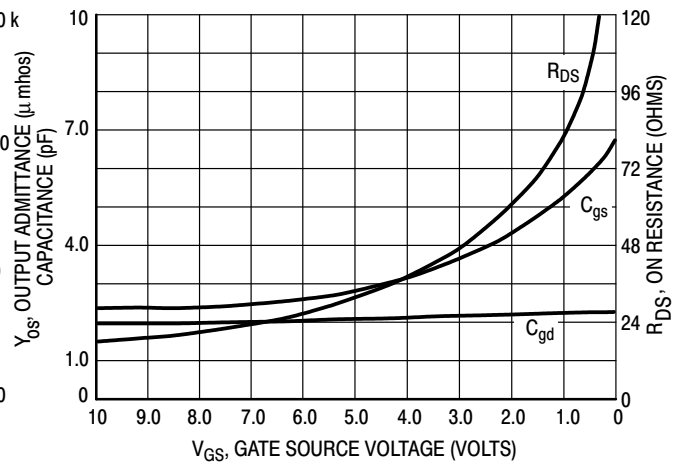
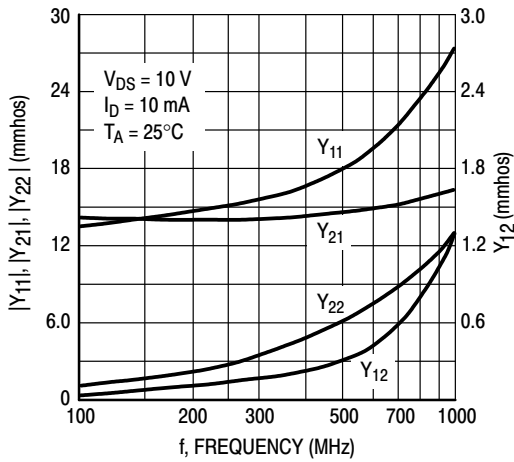


Figure 3. On Resistance and Junction Capacitance versus Gate-Source Voltage

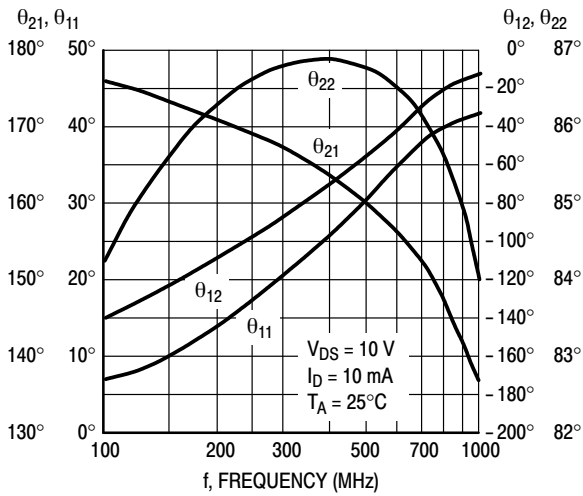
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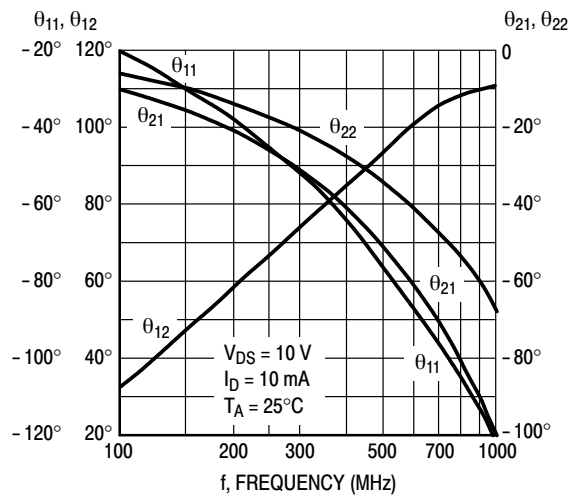
**Figure 4. Common-Gate Y Parameter Magnitude versus Frequency**



**Figure 5. Common-Gate S Parameter Magnitude versus Frequency**



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

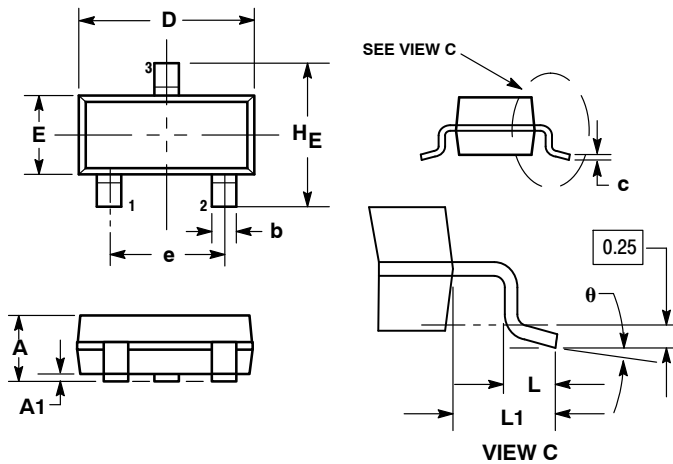


**Figure 7. S Parameter Phase-Angle versus Frequency**

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## PACKAGE DIMENSIONS

### SOT-23 (TO-236) CASE 318-08 ISSUE AP

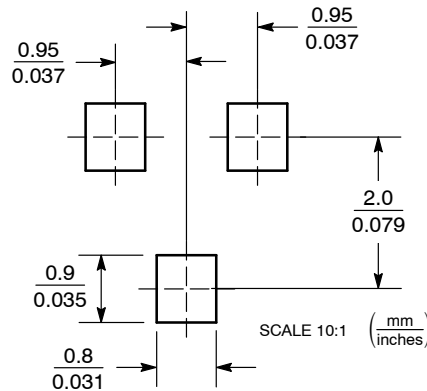


- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: INCH.
  3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
  4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

| DIM | MILLIMETERS |      |      | INCHES |       |       |
|-----|-------------|------|------|--------|-------|-------|
|     | MIN         | NOM  | MAX  | MIN    | NOM   | MAX   |
| A   | 0.89        | 1.00 | 1.11 | 0.035  | 0.040 | 0.044 |
| A1  | 0.01        | 0.06 | 0.10 | 0.001  | 0.002 | 0.004 |
| b   | 0.37        | 0.44 | 0.50 | 0.015  | 0.018 | 0.020 |
| c   | 0.09        | 0.13 | 0.18 | 0.003  | 0.005 | 0.007 |
| 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 | 0.081 |
| L   | 0.10        | 0.20 | 0.30 | 0.004  | 0.008 | 0.012 |
| L1  | 0.35        | 0.54 | 0.69 | 0.014  | 0.021 | 0.029 |
| HE  | 2.10        | 2.40 | 2.64 | 0.083  | 0.094 | 0.104 |
| θ   | 0°          | ---  | 10°  | 0°     | ---   | 10°   |

- STYLE 10:  
PIN 1. DRAIN  
2. SOURCE  
3. GATE

### SOLDERING FOOTPRINT\*



\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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