

# J309, J310

Preferred Device

## JFET VHF/UHF Amplifiers

### N-Channel — Depletion

#### Features

- Pb-Free Packages are Available\*

#### MAXIMUM RATINGS

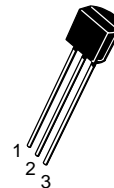
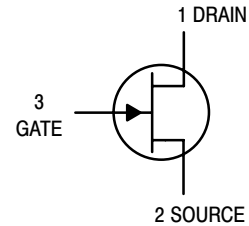
| Rating   | Symbol    | Value       | Unit                       |
|--|-----------|-------------|----------------------------|
| Drain-Source Voltage   | $V_{DS}$  | 25          | Vdc                        |
| Gate-Source Voltage  | $V_{GS}$  | 25          | Vdc                        |
| Forward Gate Current   | $I_{GF}$  | 10          | mA <sub>dc</sub>           |
| Total Device Dissipation @ $T_A = 25^\circ\text{C}$<br>Derate above = $25^\circ\text{C}$ | $P_D$     | 350<br>2.8  | mW<br>mW/ $^\circ\text{C}$ |
| Junction Temperature Range   | $T_J$     | -65 to +125 | $^\circ\text{C}$           |
| Storage Temperature Range  | $T_{stg}$ | -65 to +150 | $^\circ\text{C}$           |

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.



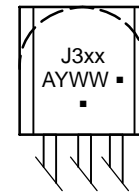
ON Semiconductor®

<http://onsemi.com>



TO-92  
CASE 29-11  
STYLE 5

#### MARKING DIAGRAM



J3xx = Device Code  
xx = 09 or 10  
A = Assembly Location  
Y = Year  
WW = Work Week  
▪ = Pb-Free Package

(Note: Microdot may be in either location)

#### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 3 of this data sheet.

**Preferred** devices are recommended choices for future use and best overall value.

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

# J309, J310

## ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C unless otherwise noted)

| Characteristic   | Symbol               | Min           | Typ            | Max            | Unit         |
|--|----------------------|---------------|----------------|----------------|--------------|
| <b>OFF CHARACTERISTICS</b>   |                      |               |                |                |              |
| Gate–Source Breakdown Voltage<br>(I <sub>G</sub> = –1.0 μAdc, V <sub>DS</sub> = 0)   | V <sub>(BR)GSS</sub> | –25           | –              | –              | Vdc          |
| Gate Reverse Current<br>(V <sub>GS</sub> = –15 Vdc, V <sub>DS</sub> = 0, T <sub>A</sub> = 25°C)<br>(V <sub>GS</sub> = –15 Vdc, V <sub>DS</sub> = 0, T <sub>A</sub> = +125°C) | I <sub>GSS</sub>     | –             | –              | –1.0<br>–1.0   | nAdc<br>μAdc |
| Gate Source Cutoff Voltage<br>(V <sub>DS</sub> = 10 Vdc, I <sub>D</sub> = 1.0 nAdc)  | V <sub>GS(off)</sub> | –1.0<br>–2.0  | –              | –4.0<br>–6.5   | Vdc          |
| <b>ON CHARACTERISTICS</b>  |                      |               |                |                |              |
| Zero–Gate–Voltage Drain Current <sup>(1)</sup><br>(V <sub>DS</sub> = 10 Vdc, V <sub>GS</sub> = 0)  | I <sub>DSS</sub>     | 12<br>24      | –              | 30<br>60       | mAdc         |
| Gate–Source Forward Voltage<br>(V <sub>DS</sub> = 0, I <sub>G</sub> = 1.0 mAdc)  | V <sub>GS(f)</sub>   | –             | –              | 1.0            | Vdc          |
| <b>SMALL–SIGNAL CHARACTERISTICS</b>  |                      |               |                |                |              |
| Common–Source Input Conductance<br>(V <sub>DS</sub> = 10 Vdc, I <sub>D</sub> = 10 mAdc, f = 100 MHz)   | Re(y <sub>is</sub> ) | –             | 0.7<br>0.5     | –              | mmhos        |
| Common–Source Output Conductance<br>(V <sub>DS</sub> = 10 Vdc, I <sub>D</sub> = 10 mAdc, f = 100 MHz)  | Re(y <sub>os</sub> ) | –             | 0.25           | –              | mmhos        |
| Common–Gate Power Gain<br>(V <sub>DS</sub> = 10 Vdc, I <sub>D</sub> = 10 mAdc, f = 100 MHz)  | G <sub>pg</sub>      | –             | 16             | –              | dB           |
| Common–Source Forward Transconductance<br>(V <sub>DS</sub> = 10 Vdc, I <sub>D</sub> = 10 mAdc, f = 100 MHz)  | Re(y <sub>fs</sub> ) | –             | 12             | –              | mmhos        |
| Common–Gate Input Conductance<br>(V <sub>DS</sub> = 10 Vdc, I <sub>D</sub> = 10 mAdc, f = 100 MHz)   | Re(y <sub>ig</sub> ) | –             | 12             | –              | mmhos        |
| Common–Source Forward Transconductance<br>(V <sub>DS</sub> = 10 Vdc, I <sub>D</sub> = 10 mAdc, f = 1.0 kHz)  | g <sub>fs</sub>      | 10000<br>8000 | –              | 20000<br>18000 | μmhos        |
| Common–Source Output Conductance<br>(V <sub>DS</sub> = 10 Vdc, I <sub>D</sub> = 10 mAdc, f = 1.0 kHz)  | g <sub>os</sub>      | –             | –              | 250            | μmhos        |
| Common–Gate Forward Transconductance<br>(V <sub>DS</sub> = 10 Vdc, I <sub>D</sub> = 10 mAdc, f = 1.0 kHz)  | g <sub>fg</sub>      | –             | 13000<br>12000 | –              | μmhos        |
| Common–Gate Output Conductance<br>(V <sub>DS</sub> = 10 Vdc, I <sub>D</sub> = 10 mAdc, f = 1.0 kHz)  | g <sub>og</sub>      | –             | 100<br>150     | –              | μmhos        |
| Gate–Drain Capacitance<br>(V <sub>DS</sub> = 0, V <sub>GS</sub> = –10 Vdc, f = 1.0 MHz)  | C <sub>gd</sub>      | –             | 1.8            | 2.5            | pF           |
| Gate–Source Capacitance<br>(V <sub>DS</sub> = 0, V <sub>GS</sub> = –10 Vdc, f = 1.0 MHz)   | C <sub>gs</sub>      | –             | 4.3            | 5.0            | pF           |
| <b>FUNCTIONAL CHARACTERISTICS</b>  |                      |               |                |                |              |
| Equivalent Short–Circuit Input Noise Voltage<br>(V <sub>DS</sub> = 10 Vdc, I <sub>D</sub> = 10 mAdc, f = 100 Hz)   | $\bar{e}_n$          | –             | 10             | –              | nV/√Hz       |

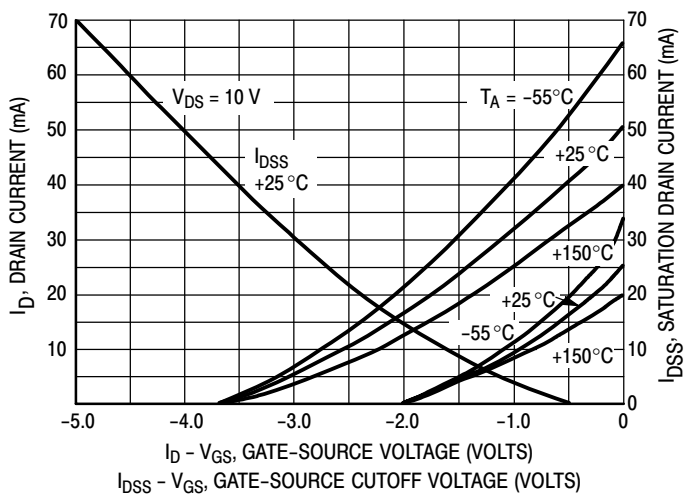
1. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 3.0%.

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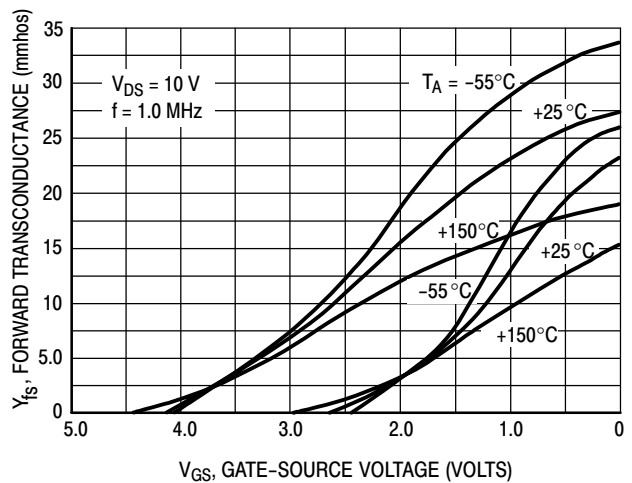
## ORDERING INFORMATION

| Device    | Package            | Shipping†                    |
|-----------|--------------------|------------------------------|
| J309      | TO-92              | 1000 Units / Bulk            |
| J309G     | TO-92<br>(Pb-Free) |                              |
| J310      | TO-92              | 1000 Units / Bulk            |
| J310G     | TO-92<br>(Pb-Free) |                              |
| J310RLRP  | TO-92              | 2000 Units / Tape & Ammo Box |
| J310RLRPG | TO-92<br>(Pb-Free) |                              |
| J310ZL1   | TO-92              | 2000 Units / Tape & Ammo Box |
| J310ZL1G  | TO-92<br>(Pb-Free) |                              |

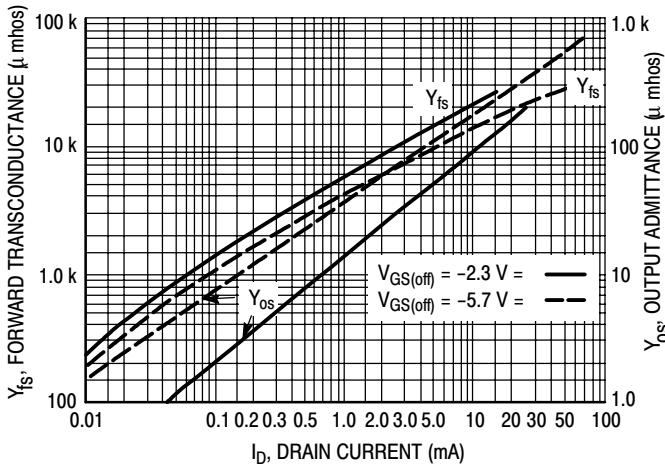
†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.



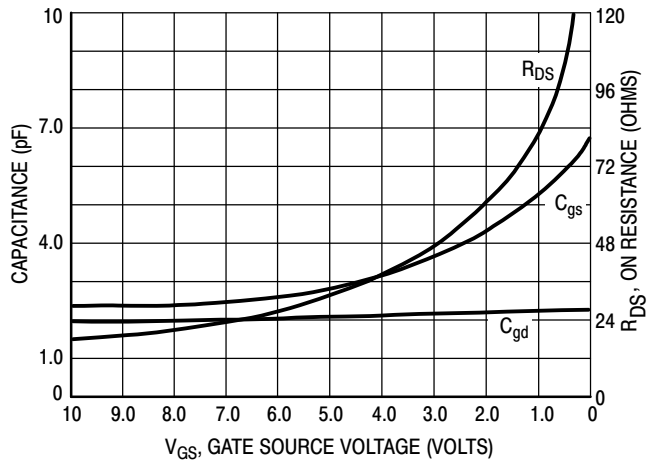
**Figure 1. Drain Current and Transfer Characteristics versus Gate-Source Voltage**



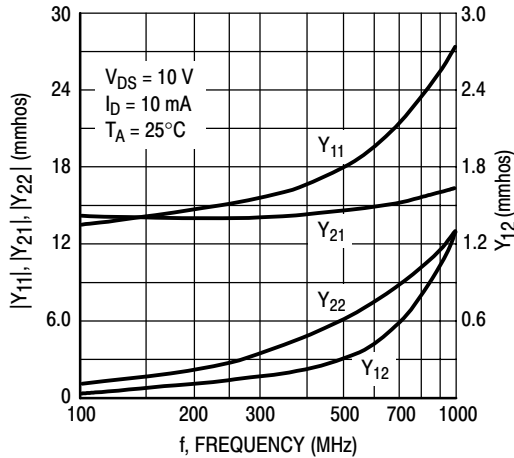
**Figure 2. Forward Transconductance versus Gate-Source Voltage**



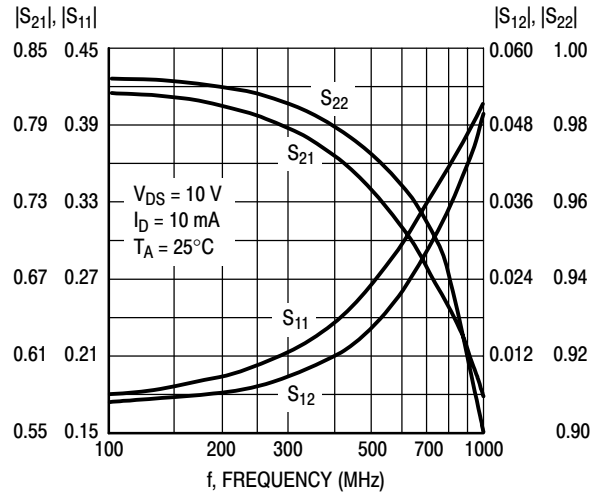
**Figure 3. Common-Source Output Admittance and Forward Transconductance versus Drain Current**



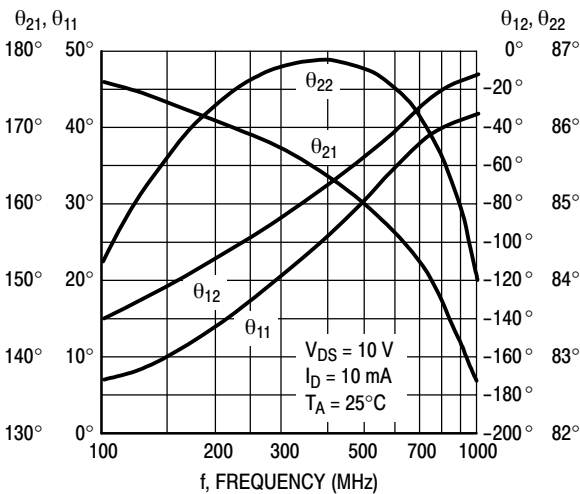
**Figure 4. On Resistance and Junction Capacitance versus Gate-Source Voltage**



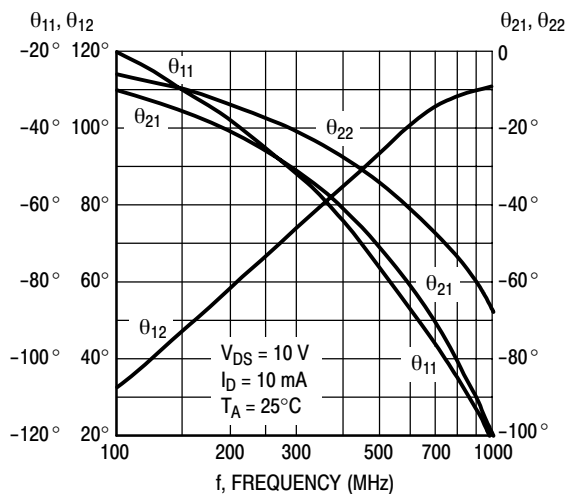
**Figure 5. Common-Gate Y Parameter Magnitude versus Frequency**



**Figure 6. Common-Gate S Parameter Magnitude versus Frequency**



**Figure 7. Common-Gate Y Parameter Phase-Angle versus Frequency**

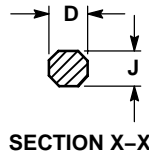
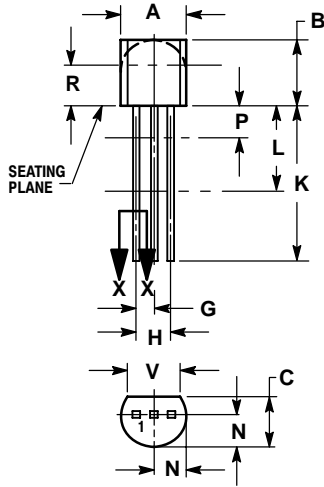


**Figure 8. S Parameter Phase-Angle versus Frequency**

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## PACKAGE DIMENSIONS

### TO-92 (TO-226) CASE 29-11 ISSUE AL



**NOTES:**

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.
4. LEAD DIMENSION IS UNCONTROLLED IN P AND BEYOND DIMENSION K MINIMUM.

| DIM | INCHES |       | MILLIMETERS |       |
|-----|--------|-------|-------------|-------|
|     | MIN    | MAX   | MIN         | MAX   |
| A   | 0.175  | 0.205 | 4.45        | 5.20  |
| B   | 0.170  | 0.210 | 4.32        | 5.33  |
| C   | 0.125  | 0.165 | 3.18        | 4.19  |
| D   | 0.016  | 0.021 | 0.407       | 0.533 |
| G   | 0.045  | 0.055 | 1.15        | 1.39  |
| H   | 0.095  | 0.105 | 2.42        | 2.66  |
| J   | 0.015  | 0.020 | 0.39        | 0.50  |
| K   | 0.500  | ---   | 12.70       | ---   |
| L   | 0.250  | ---   | 6.35        | ---   |
| N   | 0.080  | 0.105 | 2.04        | 2.66  |
| P   | ---    | 0.100 | ---         | 2.54  |
| R   | 0.115  | ---   | 2.93        | ---   |
| V   | 0.135  | ---   | 3.43        | ---   |

**STYLE 5:**

1. DRAIN
2. SOURCE
3. GATE

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