

# J309, J310

Preferred Device

## JFET VHF/UHF Amplifiers

### N-Channel — Depletion

#### Features

- Pb-Free Packages are Available\*

#### MAXIMUM RATINGS

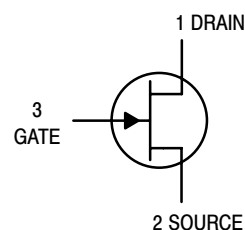
| Rating                                                                                   | Symbol    | Value       | Unit                       |
|------------------------------------------------------------------------------------------|-----------|-------------|----------------------------|
| Drain-Source Voltage                                                                     | $V_{DS}$  | 25          | Vdc                        |
| Gate-Source Voltage                                                                      | $V_{GS}$  | 25          | Vdc                        |
| Forward Gate Current                                                                     | $I_{GF}$  | 10          | mA dc                      |
| 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.



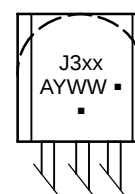
ON Semiconductor®

<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 ( $T_A = 25^\circ\text{C}$ 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<br>( $V_{GS} = -15 \text{ Vdc}$ , $V_{DS} = 0$ , $T_A = 25^\circ\text{C}$ )<br>( $V_{GS} = -15 \text{ Vdc}$ , $V_{DS} = 0$ , $T_A = +125^\circ\text{C}$ ) | $I_{GSS}$           | -<br>-        | -<br>-         | -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                          |
| <b>ON CHARACTERISTICS</b>                                                                                                                                                      |                     |               |                |                |                              |
| Zero-Gate-Voltage Drain Current <sup>(1)</sup><br>( $V_{DS} = 10 \text{ Vdc}$ , $V_{GS} = 0$ )                                                                                 | $I_{DSS}$           | 12<br>24      | -<br>-         | 30<br>60       | mAdc                         |
| Gate-Source Forward Voltage<br>( $V_{DS} = 0$ , $I_G = 1.0 \text{ mAdc}$ )                                                                                                     | $V_{GS(f)}$         | -             | -              | 1.0            | Vdc                          |
| <b>SMALL-SIGNAL CHARACTERISTICS</b>                                                                                                                                            |                     |               |                |                |                              |
| Common-Source Input Conductance<br>( $V_{DS} = 10 \text{ Vdc}$ , $I_D = 10 \text{ mAdc}$ , $f = 100 \text{ MHz}$ )                                                             | $\text{Re}(y_{is})$ | -<br>-        | 0.7<br>0.5     | -<br>-         | mmhos                        |
| Common-Source Output Conductance<br>( $V_{DS} = 10 \text{ Vdc}$ , $I_D = 10 \text{ mAdc}$ , $f = 100 \text{ MHz}$ )                                                            | $\text{Re}(y_{os})$ | -             | 0.25           | -              | mmhos                        |
| Common-Gate Power Gain<br>( $V_{DS} = 10 \text{ Vdc}$ , $I_D = 10 \text{ mAdc}$ , $f = 100 \text{ MHz}$ )                                                                      | $G_{pg}$            | -             | 16             | -              | dB                           |
| Common-Source Forward Transconductance<br>( $V_{DS} = 10 \text{ Vdc}$ , $I_D = 10 \text{ mAdc}$ , $f = 100 \text{ MHz}$ )                                                      | $\text{Re}(y_{fs})$ | -             | 12             | -              | mmhos                        |
| Common-Gate Input Conductance<br>( $V_{DS} = 10 \text{ Vdc}$ , $I_D = 10 \text{ mAdc}$ , $f = 100 \text{ MHz}$ )                                                               | $\text{Re}(y_{ig})$ | -             | 12             | -              | mmhos                        |
| Common-Source Forward Transconductance<br>( $V_{DS} = 10 \text{ Vdc}$ , $I_D = 10 \text{ mAdc}$ , $f = 1.0 \text{ kHz}$ )                                                      | $g_{fs}$            | 10000<br>8000 | -<br>-         | 20000<br>18000 | $\mu\text{mhos}$             |
| Common-Source Output Conductance<br>( $V_{DS} = 10 \text{ Vdc}$ , $I_D = 10 \text{ mAdc}$ , $f = 1.0 \text{ kHz}$ )                                                            | $g_{os}$            | -             | -              | 250            | $\mu\text{mhos}$             |
| Common-Gate Forward Transconductance<br>( $V_{DS} = 10 \text{ Vdc}$ , $I_D = 10 \text{ mAdc}$ , $f = 1.0 \text{ kHz}$ )                                                        | $g_{fg}$            | -<br>-        | 13000<br>12000 | -<br>-         | $\mu\text{mhos}$             |
| Common-Gate Output Conductance<br>( $V_{DS} = 10 \text{ Vdc}$ , $I_D = 10 \text{ mAdc}$ , $f = 1.0 \text{ kHz}$ )                                                              | $g_{og}$            | -<br>-        | 100<br>150     | -<br>-         | $\mu\text{mhos}$             |
| Gate-Drain Capacitance<br>( $V_{DS} = 0$ , $V_{GS} = -10 \text{ Vdc}$ , $f = 1.0 \text{ MHz}$ )                                                                                | $C_{gd}$            | -             | 1.8            | 2.5            | pF                           |
| Gate-Source Capacitance<br>( $V_{DS} = 0$ , $V_{GS} = -10 \text{ Vdc}$ , $f = 1.0 \text{ MHz}$ )                                                                               | $C_{gs}$            | -             | 4.3            | 5.0            | pF                           |
| <b>FUNCTIONAL CHARACTERISTICS</b>                                                                                                                                              |                     |               |                |                |                              |
| 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             | -              | $\text{nV}/\sqrt{\text{Hz}}$ |

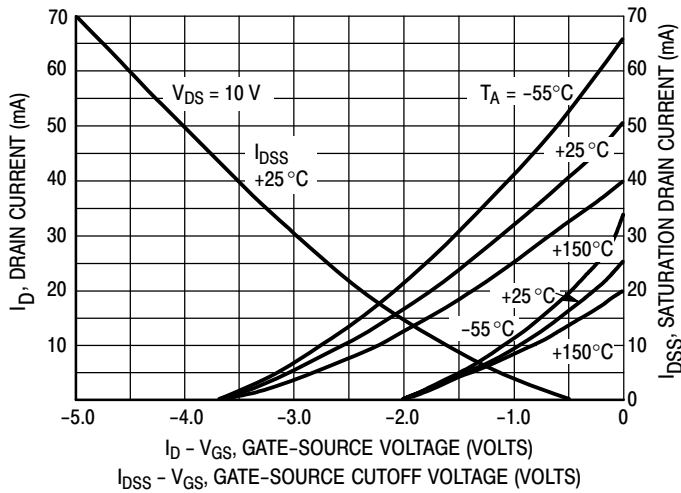
1. Pulse Test: Pulse Width  $\leq 300 \mu\text{s}$ , Duty Cycle  $\leq 3.0\%$ .

# J309, J310

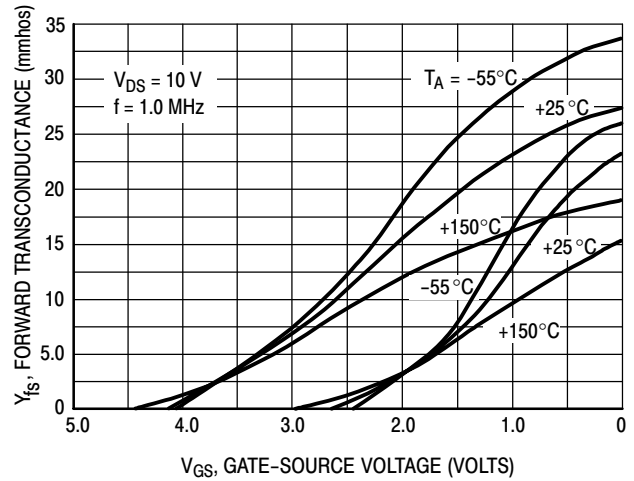
## ORDERING INFORMATION

| Device    | Package            | Shipping <sup>†</sup>        |
|-----------|--------------------|------------------------------|
| 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) |                              |

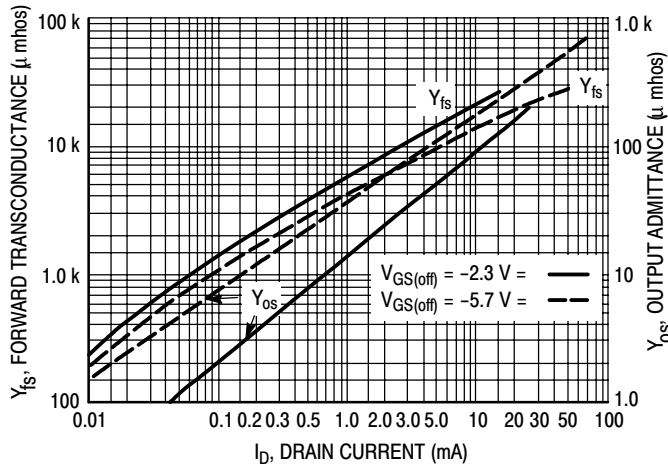
<sup>†</sup>For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.



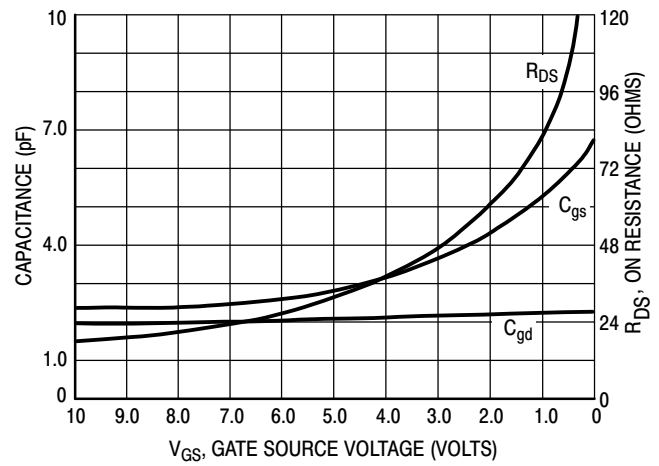
**Figure 1. Drain Current and Transfer Characteristics versus Gate-Source Voltage**



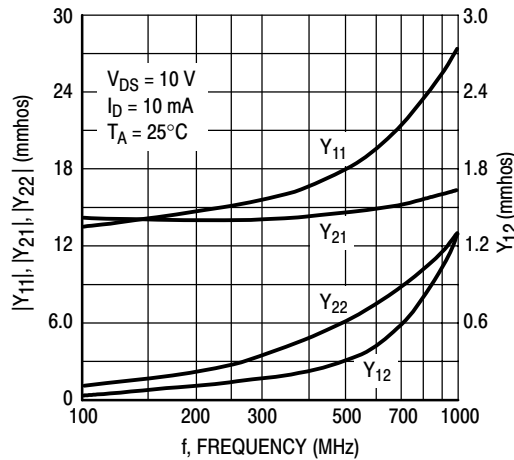
**Figure 2. Forward Transconductance versus Gate-Source Voltage**



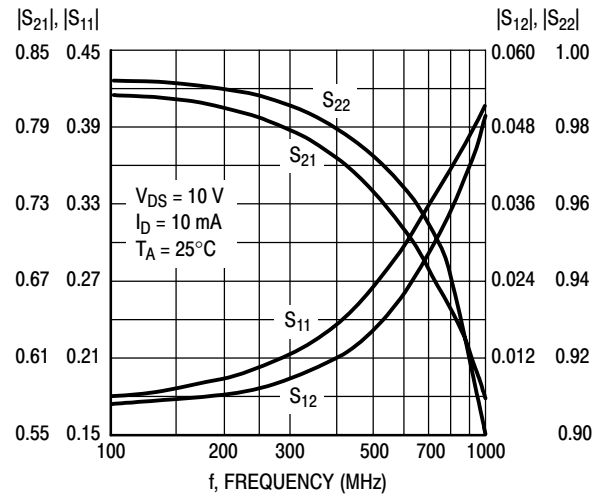
**Figure 3. Common-Source Output Admittance and Forward Transconductance versus Drain Current**



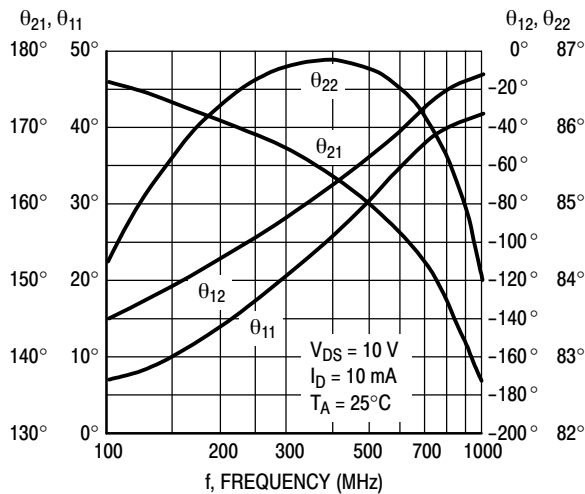
**Figure 4. On Resistance and Junction Capacitance versus Gate-Source Voltage**



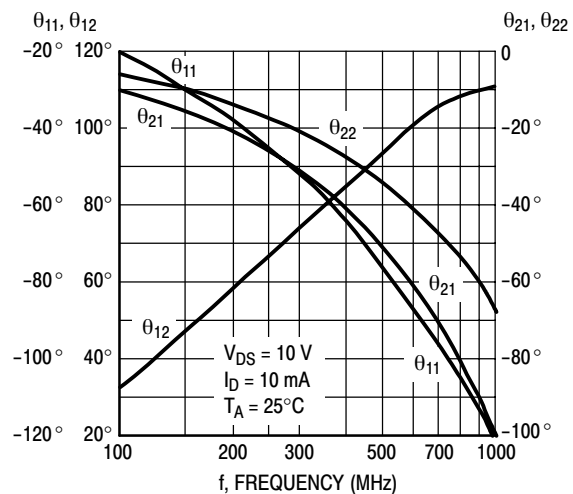
**Figure 5. Common-Gate Y Parameter Magnitude versus Frequency**



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



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

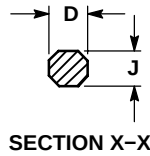
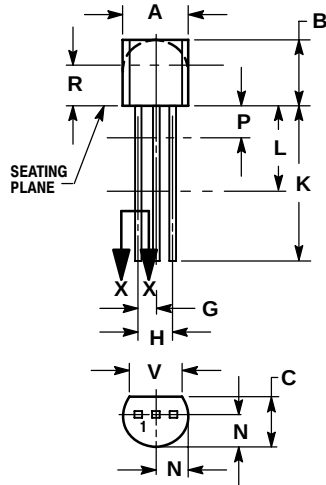


**Figure 8. S Parameter Phase-Angle versus Frequency**

# J309, J310

## 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

ON Semiconductor and  are registered trademarks of Semiconductor Components Industries, LLC (SCILLC). SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. "Typical" parameters which may be provided in SCILLC data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that SCILLC was negligent regarding the design or manufacture of the part. SCILLC is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

## PUBLICATION ORDERING INFORMATION

### LITERATURE FULFILLMENT:

Literature Distribution Center for ON Semiconductor  
P.O. Box 61312, Phoenix, Arizona 85082-1312 USA  
Phone: 480-829-7710 or 800-344-3860 Toll Free USA/Canada  
Fax: 480-829-7709 or 800-344-3867 Toll Free USA/Canada  
Email: [orderlit@onsemi.com](mailto:orderlit@onsemi.com)

N. American Technical Support: 800-282-9855 Toll Free  
USA/Canada

Japan: ON Semiconductor, Japan Customer Focus Center  
2-9-1 Kamimeguro, Meguro-ku, Tokyo, Japan 153-0051  
Phone: 81-3-5773-3850

ON Semiconductor Website: <http://onsemi.com>

Order Literature: <http://www.onsemi.com/litorder>

For additional information, please contact your local Sales Representative.