



## N-Channel JFETs

Island Labs

**J308      SST308      U309**  
**J309      SST309      U310**  
**J310      SST310**

| <b>PRODUCT SUMMARY</b> |                   |                       |                   |                    |
|------------------------|-------------------|-----------------------|-------------------|--------------------|
| Part Number            | $V_{GS(off)}$ (V) | $V_{(BR)GSS}$ Min (V) | $g_{fs}$ Min (mS) | $I_{DSS}$ Min (mA) |
| J308                   | -1 to -6.5        | -25                   | 8                 | 12                 |
| J309                   | -1 to -4          | -25                   | 10                | 12                 |
| J310                   | -2 to -6.5        | -25                   | 8                 | 24                 |
| SST308                 | -1 to -6.5        | -25                   | 8                 | 12                 |
| SST309                 | -1 to -4          | -25                   | 10                | 12                 |
| SST310                 | -2 to -6.5        | -25                   | 8                 | 24                 |
| U309                   | -1 to -4          | -25                   | 10                | 12                 |
| U310                   | -2.5 to -6        | -25                   | 10                | 24                 |

### FEATURES

- Excellent High Frequency Gain: Gps 11.5 dB @ 450 MHz
- Very Low Noise: 2.7 dB @ 450 MHz
- Very Low Distortion
- High ac/dc Switch Off-Isolation

### BENEFITS

- Wideband High Gain
- Very High System Sensitivity
- High Quality of Amplification
- High-Speed Switching Capability
- High Low-Level Signal Amplification

### APPLICATIONS

- High-Frequency Amplifier/Mixer
- Oscillator
- Sample-and-Hold
- Very Low Capacitance Switches

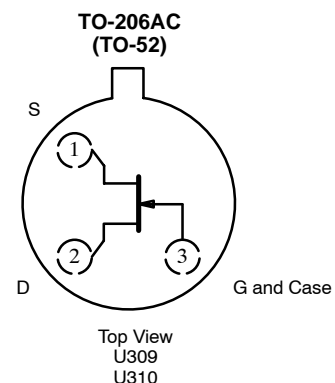
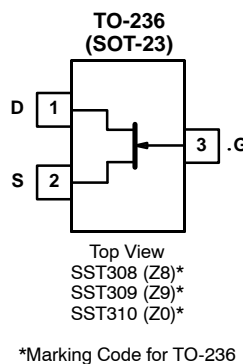
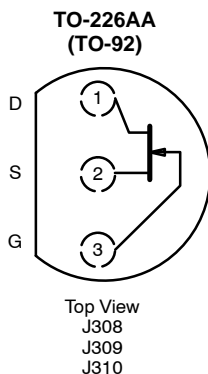
### DESCRIPTION

The J/SST/U308 series offers superb amplification characteristics. Of special interest is its high-frequency performance. Even at 450 MHz, this series offers high power gain at low noise.

Low-cost J series TO-226AA (TO-92) packaging supports automated assembly with tape-and-reel options. The SST series TO-236 (SOT-23) package provides surface-mount capabilities

and is available with tape-and-reel options. The U series hermetically-sealed TO-206AC (TO-52) package supports full military processing. (See Military and Packaging Information for further details.)

For similar dual products packaged in the TO-78, see the U430/431 data sheet.



For applications information see AN104.

### ABSOLUTE MAXIMUM RATINGS

|  |                        |              |
|--|------------------------|--------------|
| Gate-Drain, Gate-Source Voltage                | .....                  | -25 V        |
| Gate Current :                                 | (J/SST Prefixes) ..... | 10 mA        |
|  | (U Prefix) .....       | 20 mA        |
| Lead Temperature (1/16" from case for 10 sec.) | .....                  | 300°C        |
| Storage Temperature :                          | (J/SST Prefixes) ..... | -55 to 150°C |
|  | (U Prefix) .....       | -65 to 175°C |

|                                |                                     |              |
|--------------------------------|-------------------------------------|--------------|
| Operating Junction Temperature | .....                               | -55 to 150°C |
| Power Dissipation :            | (J/SST Prefixes) <sup>a</sup> ..... | 350 mW       |
|                                | (U Prefix) <sup>b</sup> .....       | 500 mW       |

#### Notes

- Derate 2.8 mW/°C above 25°C
- Derate 4 mW/°C above 25°C

### SPECIFICATIONS FOR J/SST308, J/SST309 AND J/SST310 (T<sub>A</sub> = 25°C UNLESS NOTED)

| Parameter                                  | Symbol               | Test Conditions  | Typ <sup>a</sup> | Limits   |      |          |     |          |      | Unit       |    |
|--|----------------------|--|------------------|----------|------|----------|-----|----------|------|------------|----|
|  |                      |  |                  | J/SST308 |      | J/SST309 |     | J/SST310 |      |            |    |
|  |                      |  |                  | Min      | Max  | Min      | Max | Min      | Max  |            |    |
| <b>Static</b>                              |                      |  |                  |          |      |          |     |          |      |            |    |
| Gate-Source Breakdown Voltage              | V <sub>(BR)GSS</sub> | I <sub>G</sub> = -1 μA, V <sub>DS</sub> = 0 V                  | -35              | -25      |      | -25      |     | -25      |      | V          |    |
| Gate-Source Cutoff Voltage                 | V <sub>GS(off)</sub> | V <sub>DS</sub> = 10 V, I <sub>D</sub> = 1 nA                  |                  | -1       | -6.5 | -1       | -4  | -2       | -6.5 | V          |    |
| Saturation Drain Current <sup>b</sup>      | I <sub>DSS</sub>     | V <sub>DS</sub> = 10 V, V <sub>GS</sub> = 0 V                  |                  | 12       | 60   | 12       | 30  | 24       | 60   | mA         |    |
| Gate Reverse Current                       | I <sub>GSS</sub>     | V <sub>GS</sub> = -15 V, V <sub>DS</sub> = 0 V                 | -0.002           |          | -1   |          | -1  |          | -1   | nA         |    |
|  |                      | T <sub>A</sub> = 125°C   | -0.001           |          | -1   |          | -1  |          | -1   | μA         |    |
| Gate Operating Current                     | I <sub>G</sub>       | V <sub>DG</sub> = 9 V, I <sub>D</sub> = 10 mA                  | -15              |          |      |          |     |          |      | pA         |    |
| Drain-Source On-Resistance                 | r <sub>DS(on)</sub>  | V <sub>GS</sub> = 0 V, I <sub>D</sub> = 1 mA                   | 35               |          |      |          |     |          |      | Ω          |    |
| Gate-Source Forward Voltage                | V <sub>GS(F)</sub>   | I <sub>G</sub> = 10 mA<br>V <sub>DS</sub> = 0 V                | J                | 0.7      | 1    |          | 1   |          | 1    | V          |    |
| <b>Dynamic</b>                             |                      |  |                  |          |      |          |     |          |      |            |    |
| Common-Source Forward Transconductance     | g <sub>fs</sub>      | V <sub>DS</sub> = 10 V, I <sub>D</sub> = 10 mA<br>f = 1 kHz    | 14               | 8        |      | 10       |     | 8        |      | mS         |    |
| Common-Source Output Conductance           | g <sub>os</sub>      |  |                  | 110      |      | 250      |     | 250      |      | 250        | μS |
| Common-Source Input Capacitance            | C <sub>iss</sub>     | V <sub>DS</sub> = 10 V<br>V <sub>GS</sub> = -10 V<br>f = 1 MHz | J                | 4        |      | 5        |     | 5        |      | 5          | pF |
|  |                      |  | SST              | 4        |      |          |     |          |      |            |    |
| Common-Source Reverse Transfer Capacitance | C <sub>rss</sub>     |  | J                | 1.9      |      | 2.5      |     | 2.5      |      | 2.5        |    |
|  |                      |  | SST              | 1.9      |      |          |     |          |      |            |    |
| Equivalent Input Noise Voltage             | e <sub>n</sub>       | V <sub>DS</sub> = 10 V, I <sub>D</sub> = 10 mA<br>f = 100 Hz   | 6                |          |      |          |     |          |      | nV/<br>√Hz |    |
| <b>High Frequency</b>                      |                      |  |                  |          |      |          |     |          |      |            |    |
| Common-Gate Forward Transconductance       | g <sub>fg</sub>      | V <sub>DS</sub> = 10 V<br>I <sub>D</sub> = 10 mA               | f = 105 MHz      | 14       |      |          |     |          |      |            | mS |
|  |                      |  | f = 450 MHz      | 13       |      |          |     |          |      |            |    |
| Common-Gate Output Conductance             | g <sub>og</sub>      |  | f = 105 MHz      | 0.16     |      |          |     |          |      |            |    |
|  |                      |  | f = 450 MHz      | 0.55     |      |          |     |          |      |            |    |
| Common-Gate Power Gain <sup>c</sup>        | G <sub>pg</sub>      |  | f = 105 MHz      | 16       |      |          |     |          |      |            | dB |
|  |                      |  | f = 450 MHz      | 11.5     |      |          |     |          |      |            |    |
| Noise Figure                               | NF                   |  | f = 105 MHz      | 1.5      |      |          |     |          |      |            |    |
|  |                      |  | f = 450 MHz      | 2.7      |      |          |     |          |      |            |    |

#### Notes

- Typical values are for DESIGN AID ONLY, not guaranteed nor subject to production testing.
- Pulse test: PW ≤ 300 μs duty cycle ≤ 3%.
- Gain (G<sub>pg</sub>) measured at optimum input noise match.

NZB



| SPECIFICATIONS FOR U309 AND U310 (T <sub>A</sub> = 25 °C UNLESS NOTED) |                      |  |                  |        |       |      |       |            |
|--|----------------------|--|------------------|--------|-------|------|-------|------------|
| Parameter  | Symbol               | Test Conditions  | Typ <sup>a</sup> | Limits |       |      |       | Unit       |
|  |                      |  |                  | U309   |       | U310 |       |            |
|  |                      |  |                  | Min    | Max   | Min  | Max   |            |
| <b>Static</b>  |                      |  |                  |        |       |      |       |            |
| Gate-Source Breakdown Voltage  | V <sub>(BR)GSS</sub> | I <sub>G</sub> = -1 μA, V <sub>DS</sub> = 0 V                | -35              | -25    |       | -25  |       | V          |
| Gate-Source Cutoff Voltage   | V <sub>GS(off)</sub> | V <sub>DS</sub> = 10 V, I <sub>D</sub> = 1 nA                |                  | -1     | -4    | -2.5 | -6    | V          |
| Saturation Drain Current <sup>b</sup>                                  | I <sub>DSS</sub>     | V <sub>DS</sub> = 10 V, V <sub>GS</sub> = 0 V                |                  | 12     | 30    | 24   | 60    | mA         |
| Gate Reverse Current   | I <sub>GSS</sub>     | V <sub>GS</sub> = -15 V, V <sub>DS</sub> = 0 V               | -0.002           |        | -0.15 |      | -0.15 | nA         |
|  |                      | T <sub>A</sub> = 125 °C                                      | -0.001           |        | -0.15 |      | -0.15 | μA         |
| Gate Operating Current   | I <sub>G</sub>       | V <sub>DG</sub> = 9 V, I <sub>D</sub> = 10 mA                | -15              |        |       |      |       | pA         |
| Drain-Source On-Resistance   | r <sub>DS(on)</sub>  | V <sub>GS</sub> = 0 V, I <sub>D</sub> = 1 mA                 | 35               |        |       |      |       | Ω          |
| Gate-Source Forward Voltage  | V <sub>GS(F)</sub>   | I <sub>G</sub> = 10 mA, V <sub>DS</sub> = 0 V                | 0.7              |        | 1     |      | 1     | V          |
| <b>Dynamic</b>   |                      |  |                  |        |       |      |       |            |
| Common-Source Forward Transconductance                                 | g <sub>fs</sub>      | V <sub>DS</sub> = 10 V, I <sub>D</sub> = 10 mA<br>f = 1 kHz  | 14               | 10     |       | 10   |       | mS         |
| Common-Source Output Conductance                                       | g <sub>os</sub>      |  | 110              |        | 250   |      | 250   | μS         |
| Common-Source Input Capacitance  | C <sub>iss</sub>     | V <sub>DS</sub> = 10 V, V <sub>GS</sub> = -10 V<br>f = 1 MHz | 4                |        | 5     |      | 5     | pF         |
| Common-Source Reverse Transfer Capacitance                             | C <sub>rss</sub>     |  | 1.9              |        | 2.5   |      | 2.5   |            |
| Equivalent Input Noise Voltage   | e <sub>n</sub>       | V <sub>DS</sub> = 10 V, I <sub>D</sub> = 10 mA<br>f = 100 Hz | 6                |        |       |      |       | nV/<br>√Hz |
| <b>High Frequency</b>  |                      |  |                  |        |       |      |       |            |
| Common-Gate Forward Transconductance                                   | g <sub>fg</sub>      | V <sub>DS</sub> = 10 V<br>I <sub>D</sub> = 10 mA             | f = 105 MHz      | 14     |       |      |       | mS         |
|  |                      |  | f = 450 MHz      | 13     |       |      |       |            |
| Common-Gate Output Conductance   | g <sub>og</sub>      |  | f = 105 MHz      | 0.16   |       |      |       |            |
|  |                      |  | f = 450 MHz      | 0.55   |       |      |       |            |
| Common-Gate Power Gain <sup>c, d</sup>                                 | G <sub>pg</sub>      |  | f = 105 MHz      | 16     | 14    |      | 14    | dB         |
|  |                      |  | f = 450 MHz      | 11.5   | 10    |      | 10    |            |
| Noise Figure <sup>d</sup>  | NF                   |  | f = 105 MHz      | 1.5    |       | 2    | 2     |            |
|  |                      |  | f = 450 MHz      | 2.7    |       | 3.5  | 3.5   |            |

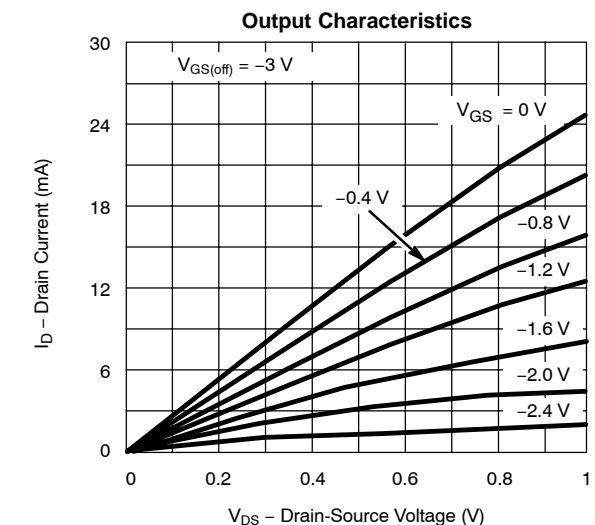
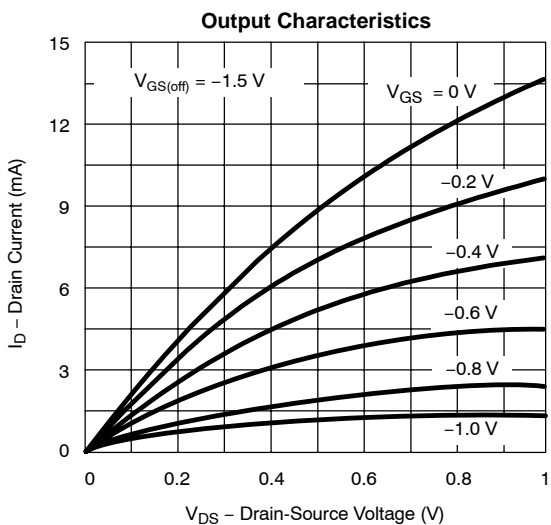
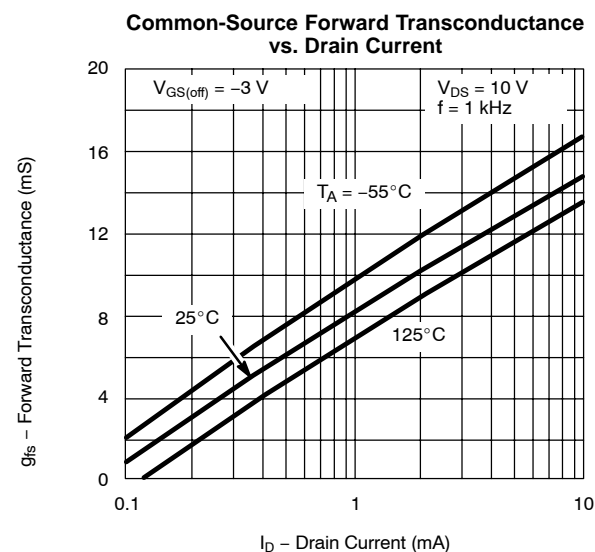
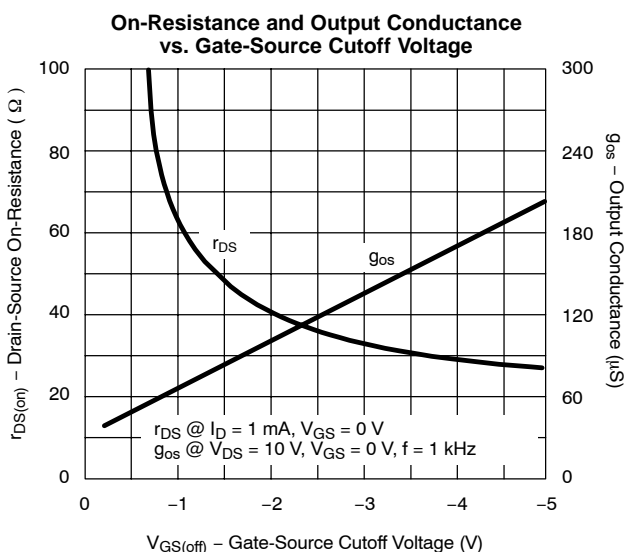
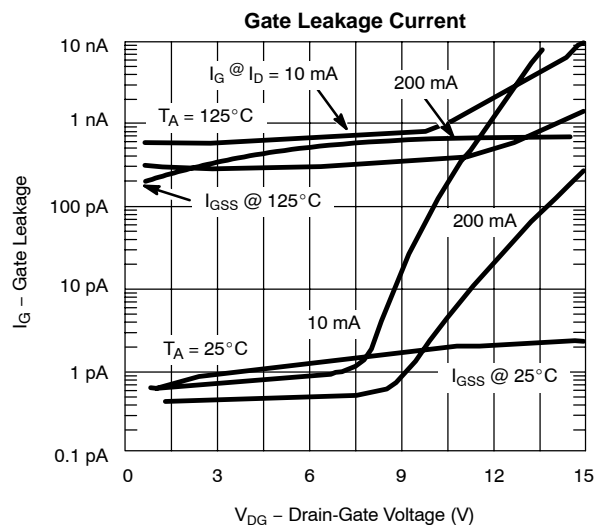
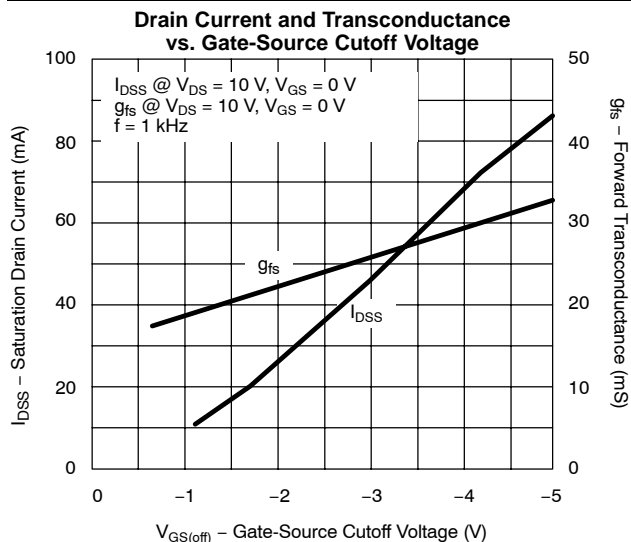
Notes

- a. Typical values are for DESIGN AID ONLY, not guaranteed nor subject to production testing.
- b. Pulse test: PW ≤ 300 μs duty cycle ≤ 3%.
- c. Gain (G<sub>pg</sub>) measured at optimum input noise match.
- d. Not a production test.

NZB

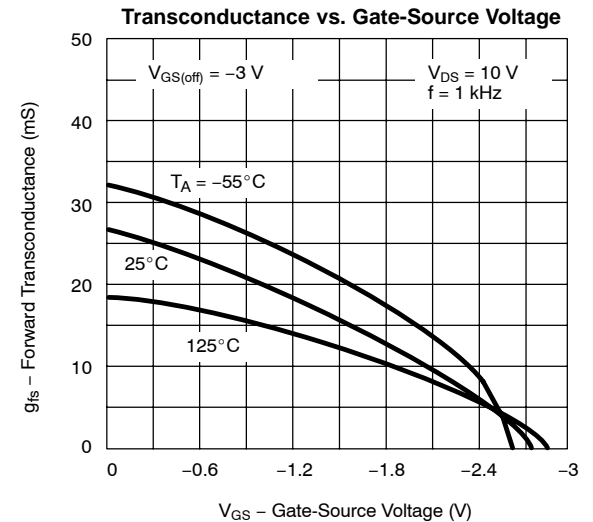
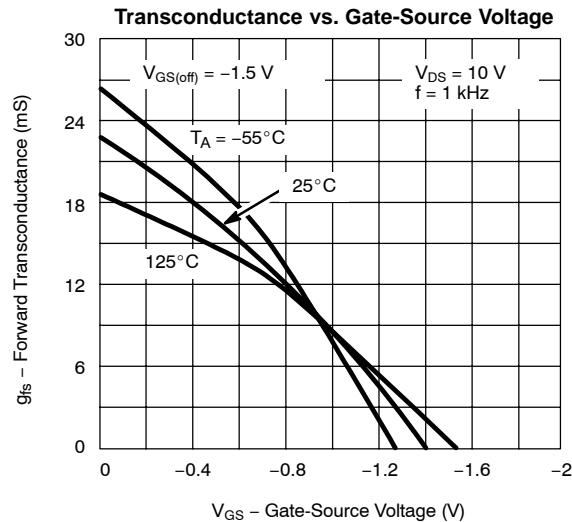
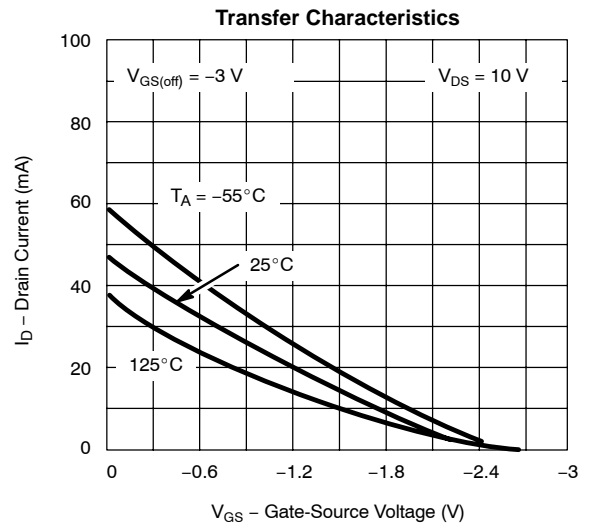
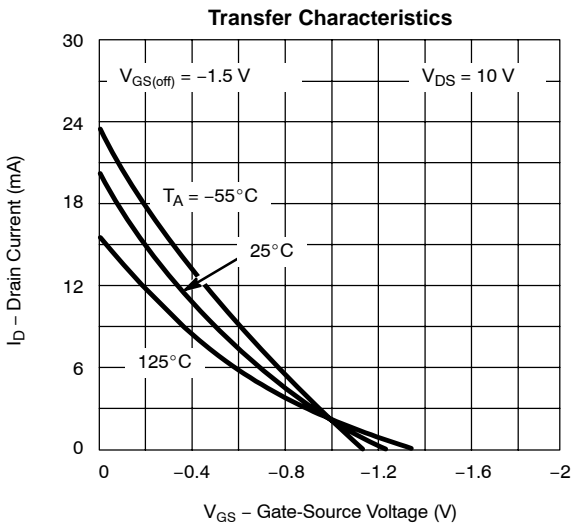
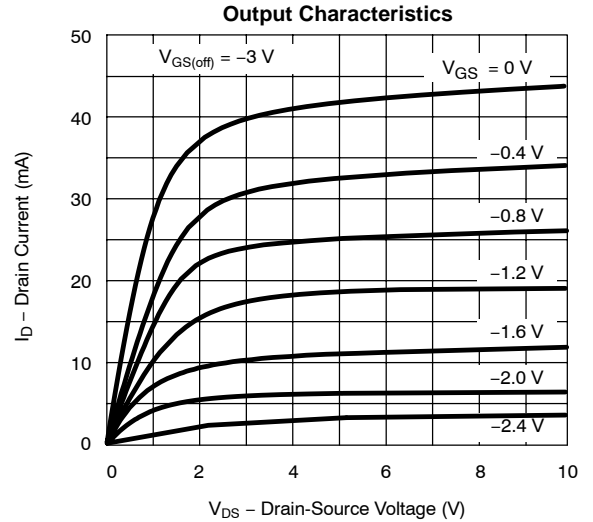
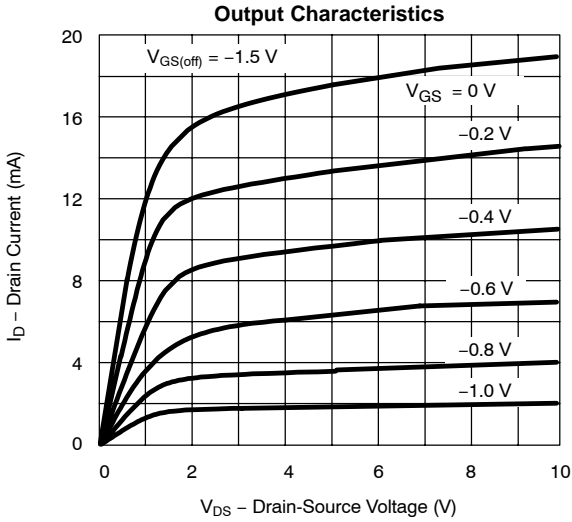
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

### TYPICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)

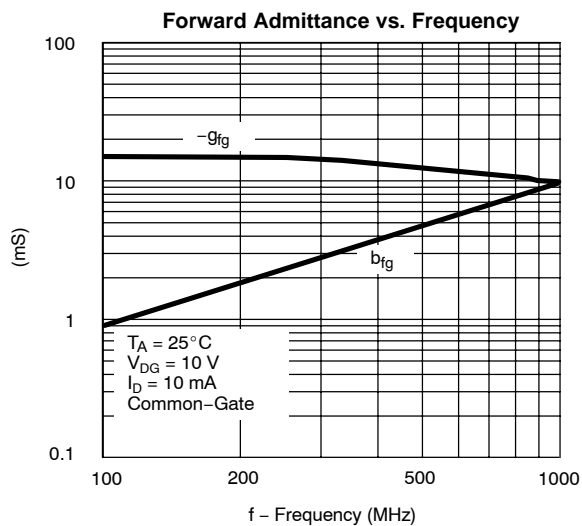
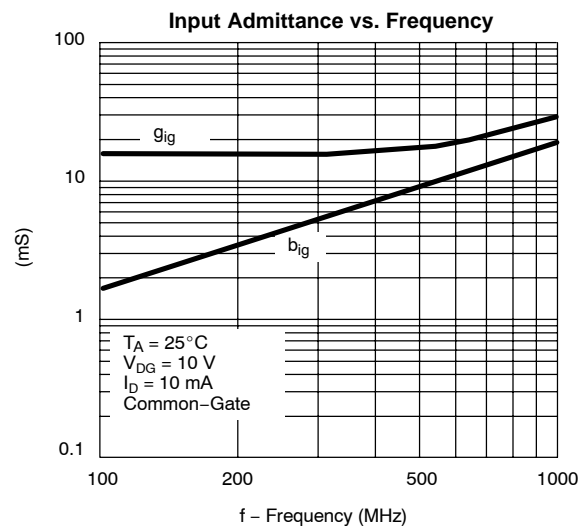
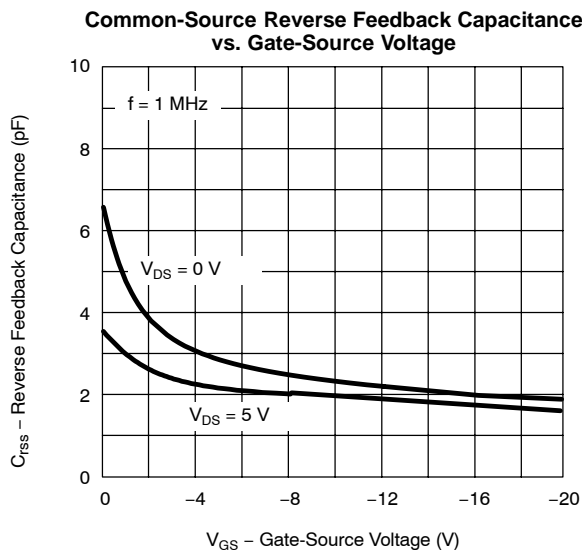
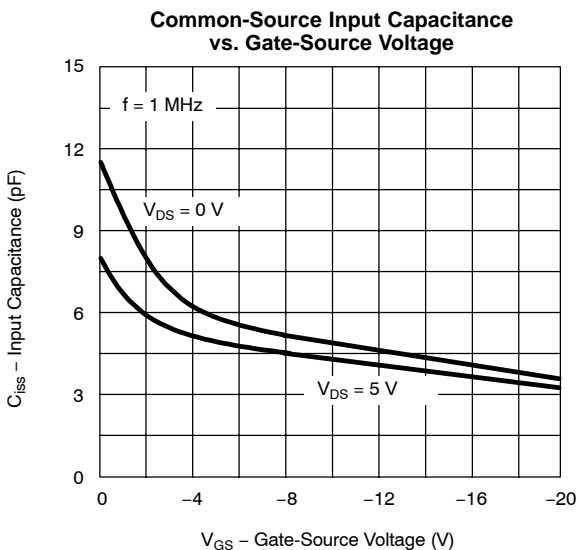
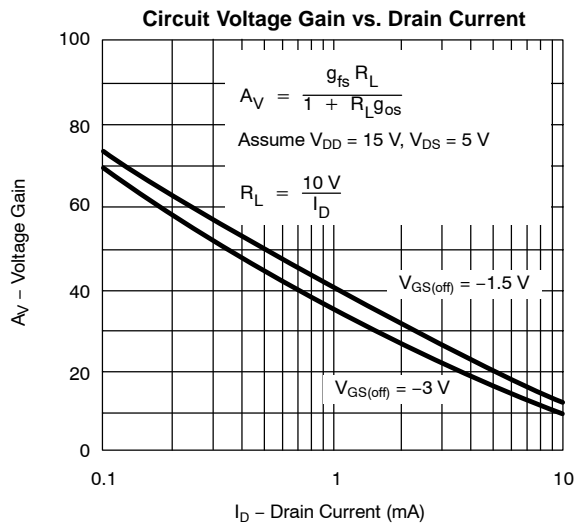
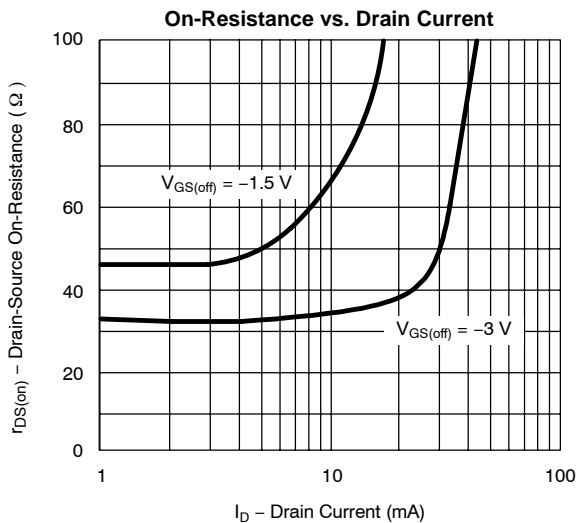




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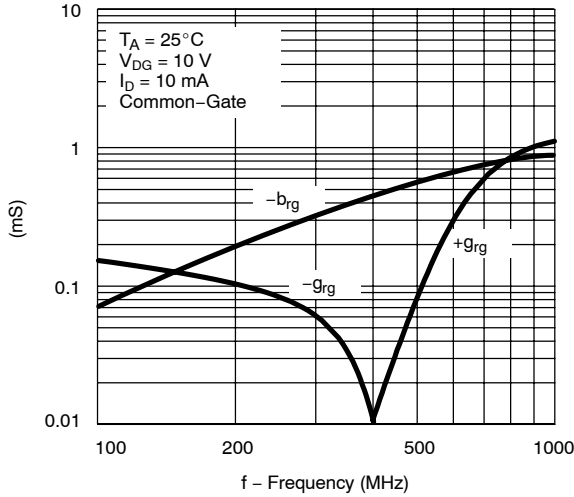
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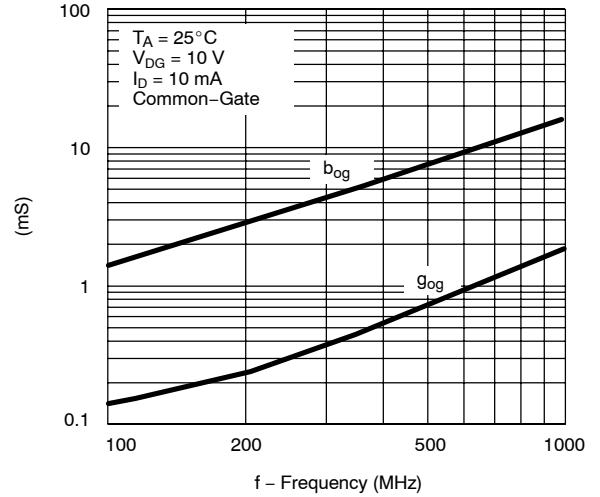


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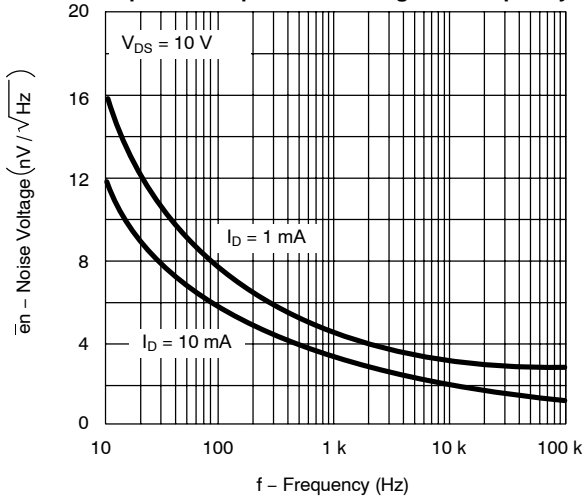
Reverse Admittance vs. Frequency



Output Admittance vs. Frequency



Equivalent Input Noise Voltage vs. Frequency



Output Conductance vs. Drain Current

