

### N-Channel JFETs

**2N4117A PN4117A SST4117**  
**2N4118A PN4118A SST4118**  
**2N4119A PN4119A SST4119**

| PRODUCT SUMMARY |                          |                              |                          |                           |
|-----------------|--------------------------|------------------------------|--------------------------|---------------------------|
| Part Number     | V <sub>GS(off)</sub> (V) | V <sub>(BR)GSS</sub> Min (V) | g <sub>fs</sub> Min (μS) | I <sub>DSS</sub> Min (μA) |
| 4117            | -0.6 to -1.8             | -40                          | 70                       | 30                        |
| 4118            | -1 to -3                 | -40                          | 80                       | 80                        |
| 4119            | -2 to -6                 | -40                          | 100                      | 200                       |

#### FEATURES

- Ultra-Low Leakage: 0.2 pA
- Very Low Current/Voltage Operation
- Ultrahigh Input Impedance
- Low Noise

#### BENEFITS

- Insignificant Signal Loss/Error Voltage with High-Impedance Source
- Low Power Consumption (Battery)
- Maximum Signal Output, Low Noise
- High Sensitivity to Low-Level Signals

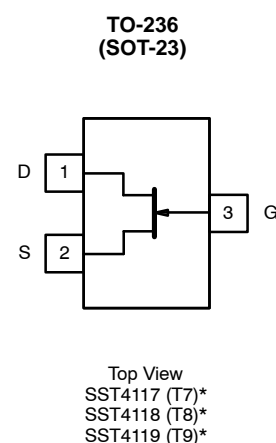
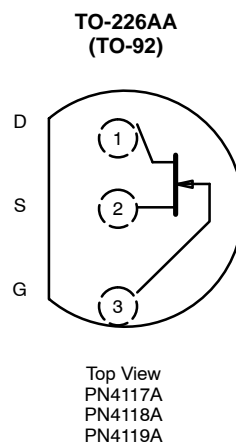
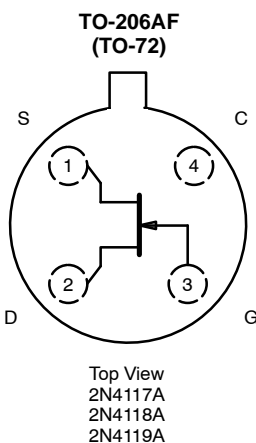
#### APPLICATIONS

- High-Impedance Transducer Amplifiers
- Smoke Detector Input
- Infrared Detector Amplifier
- Precision Test Equipment

#### DESCRIPTION

The 2N/PN/SST4117A series of n-channel JFETs provide ultra-high input impedance. These devices are specified with a 1-pA limit and typically operate at 0.2 pA. This makes them perfect choices for use as high-impedance sensitive front-end amplifiers.

The hermetically sealed TO-206AF package allows full military processing per MIL-S-19500 (see Military Information). The TO-226A (TO-92) plastic package provides a low-cost option. The TO-236 (SOT-23) package provides surface-mount capability. Both the PN and SST series are available in tape-and-reel for automated assembly (see Packaging Information).



\*Marking Code for TO-236

For applications information see AN105.



### ABSOLUTE MAXIMUM RATINGS

|                                  |                               |
|----------------------------------|-------------------------------|
| Gate-Source/Gate-Drain Voltage   | -40V                          |
| Forward Gate Current             | 50 mA                         |
| Storage Temperature :            | (2N Prefix) -65 to 175°C      |
|                                  | (PN, SST Prefix) -55 to 150°C |
| Operating Junction Temperature : | (2N Prefix) -55 to 175°C      |
|                                  | (PN, SST Prefix) -55 to 150°C |

|  |                                      |
|--|--------------------------------------|
| Lead Temperature ( <sup>1</sup> / <sub>16</sub> " from case for 10 sec.) | 300°C                                |
| Power Dissipation (case 25°C) :  | (2N Prefix) <sup>a</sup> 300 mW      |
|  | (PN, SST Prefix) <sup>b</sup> 350 mW |

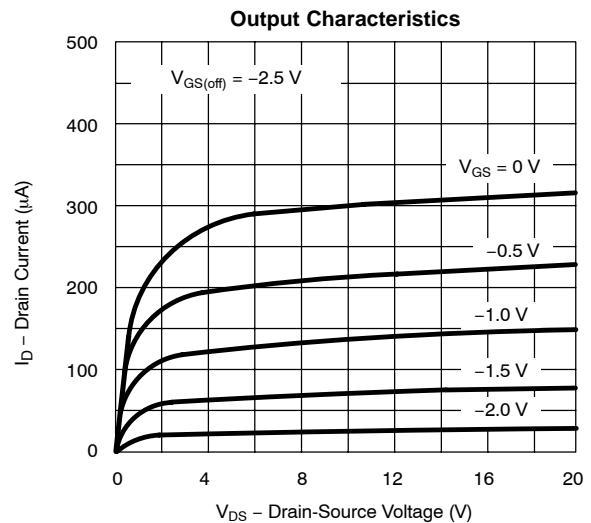
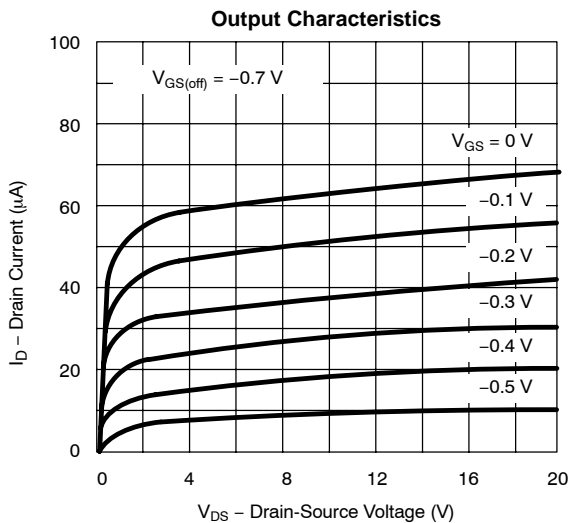
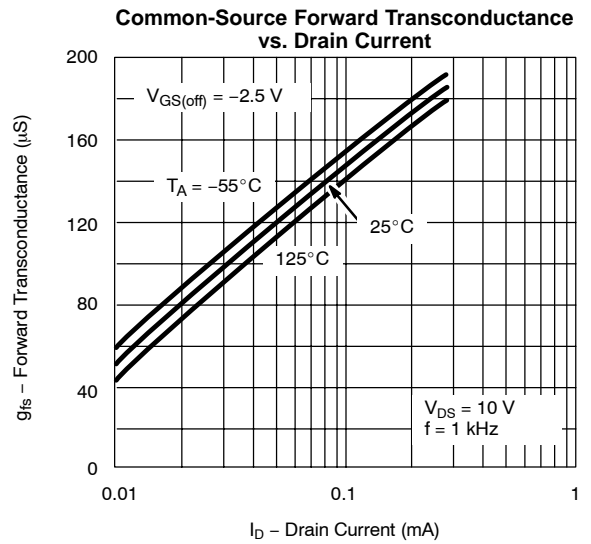
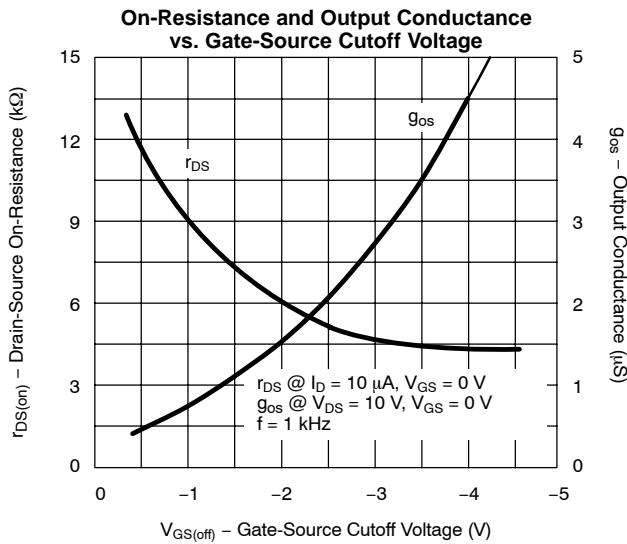
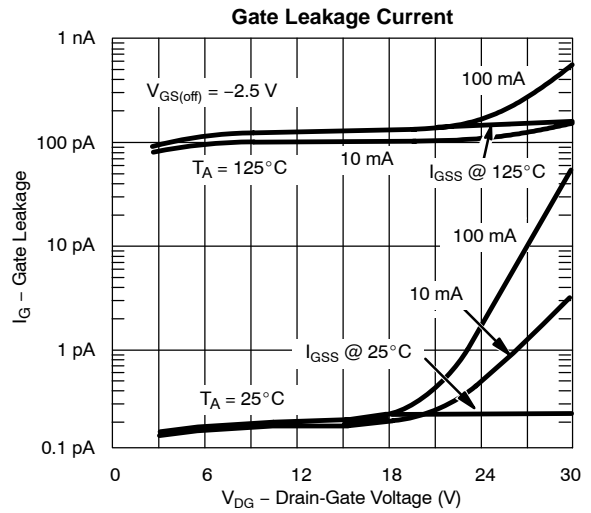
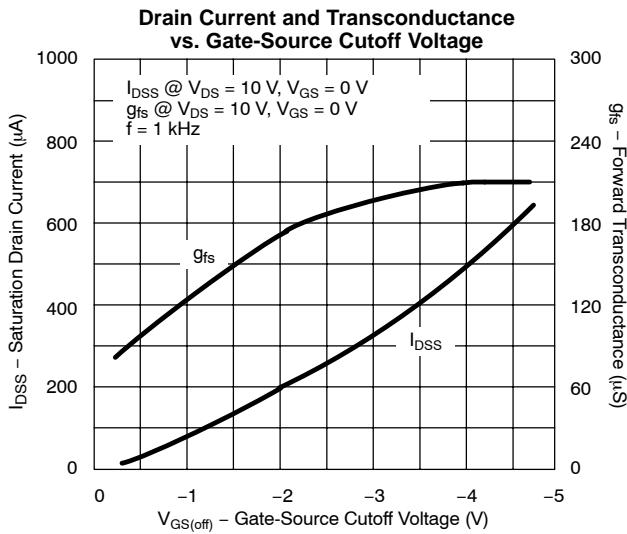
- Notes  
a. Derate 2 mW/°C above 25°C  
b. Derate 2.8 mW/°C above 25°C

| SPECIFICATIONS (T <sub>A</sub> = 25°C UNLESS OTHERWISE NOTED) |                      |  |                  |        |      |      |     |      |     |            |    |
|---|----------------------|--|------------------|--------|------|------|-----|------|-----|------------|----|
| Parameter   | Symbol               | Test Conditions  | Typ <sup>a</sup> | Limits |      |      |     |      |     | Unit       |    |
|   |                      |  |                  | 4117   |      | 4118 |     | 4119 |     |            |    |
|   |                      |  |                  | 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                              | -70              | -40    |      | -40  |     | -40  |     | V          |    |
| Gate-Source Cutoff Voltage                                    | V <sub>GS(off)</sub> | V <sub>DS</sub> = 10 V, I <sub>D</sub> = 1 nA                              |                  | -0.6   | -1.8 | -1   | -3  | -2   | -6  |            |    |
| Saturation Drain Current                                      | I <sub>DSS</sub>     | V <sub>DS</sub> = 10 V, V <sub>GS</sub> = 0 V                              |                  | 30     | 90   | 80   | 240 | 200  | 600 | μA         |    |
| Gate Reverse Current  | I <sub>GSS</sub>     | V <sub>GS</sub> = -20 V<br>V <sub>DS</sub> = 0 V                           | 2N               | -0.2   |      | -1   |     | -1   |     | pA         |    |
|   |                      | V <sub>GS</sub> = -20 V<br>V <sub>DS</sub> = 0 V<br>T <sub>A</sub> = 150°C |                  | -0.4   |      | -2.5 |     | -2.5 |     | nA         |    |
|   |                      | V <sub>GS</sub> = -10 V<br>V <sub>DS</sub> = 0 V                           | PN               | -0.2   |      | -1   |     | -1   |     | pA         |    |
|   |                      |  | SST              | -0.2   |      | -10  |     | -10  |     | pA         |    |
|   |                      | V <sub>GS</sub> = -10 V<br>V <sub>DS</sub> = 0 V<br>T <sub>A</sub> = 100°C | PN/SST           | -0.03  |      | -2.5 |     | -2.5 |     | nA         |    |
| Gate Operating Current <sup>b</sup>                           | I <sub>G</sub>       | V <sub>DG</sub> = 15 V, I <sub>D</sub> = 30 μA                             | -0.2             |        |      |      |     |      |     | pA         |    |
| Drain Cutoff Current <sup>b</sup>                             | I <sub>D(off)</sub>  | V <sub>DS</sub> = 10 V, V <sub>GS</sub> = -8 V                             | 0.2              |        |      |      |     |      |     |            |    |
| Gate-Source Forward Voltage <sup>b</sup>                      | V <sub>GS(F)</sub>   | I <sub>G</sub> = 1 mA, V <sub>DS</sub> = 0 V                               | 0.7              |        |      |      |     |      |     | V          |    |
| <b>Dynamic</b>  |                      |  |                  |        |      |      |     |      |     |            |    |
| Common-Source Forward Transconductance                        | g <sub>fs</sub>      | V <sub>DS</sub> = 10 V, V <sub>GS</sub> = 0 V<br>f = 1 kHz                 |                  | 70     | 210  | 80   | 250 | 100  | 330 | μS         |    |
| Common-Source Output Conductance                              | g <sub>os</sub>      |  |                  |        |      | 3    |     | 5    |     |            | 10 |
| Common-Source Input Capacitance                               | C <sub>iss</sub>     | V <sub>DS</sub> = 10 V<br>V <sub>GS</sub> = 0 V<br>f = 1 MHz               | 2N/PN            | 1.2    |      | 3    |     | 3    |     | 3          | pF |
|   |                      |  | SST              | 1.2    |      |      |     |      |     |            |    |
| Common-Source Reverse Transfer Capacitance                    | C <sub>rss</sub>     |  | 2N/PN            | 0.3    |      | 1.5  |     | 1.5  |     | 1.5        |    |
|   |                      |  | SST              | 0.3    |      |      |     |      |     |            |    |
| Equivalent Input Noise Voltage <sup>b</sup>                   | e <sub>n</sub>       | V <sub>DS</sub> = 10 V, V <sub>GS</sub> = 0 V<br>f = 1 kHz                 | 15               |        |      |      |     |      |     | nV/<br>√Hz |    |

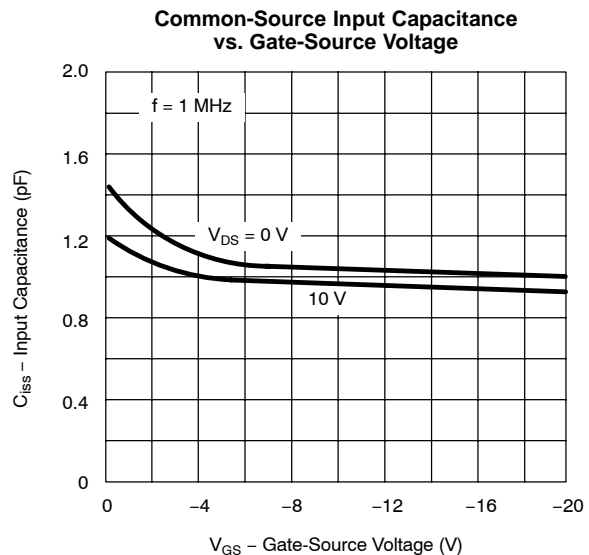
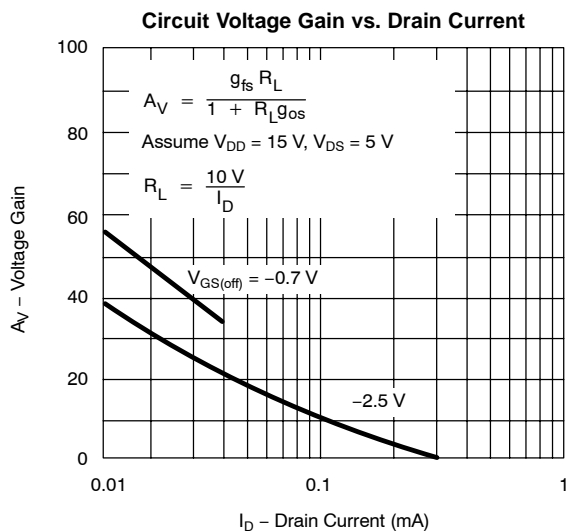
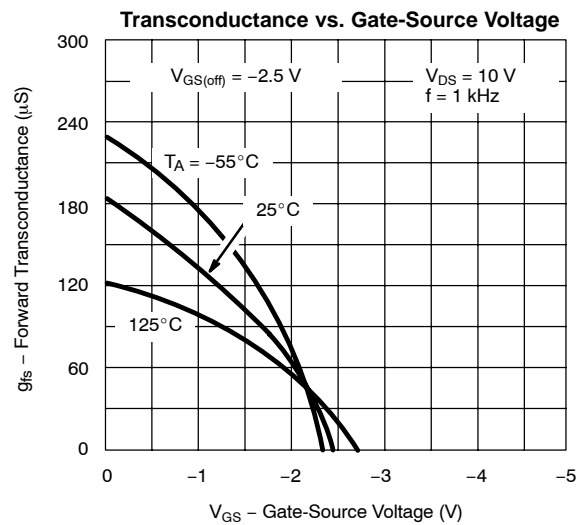
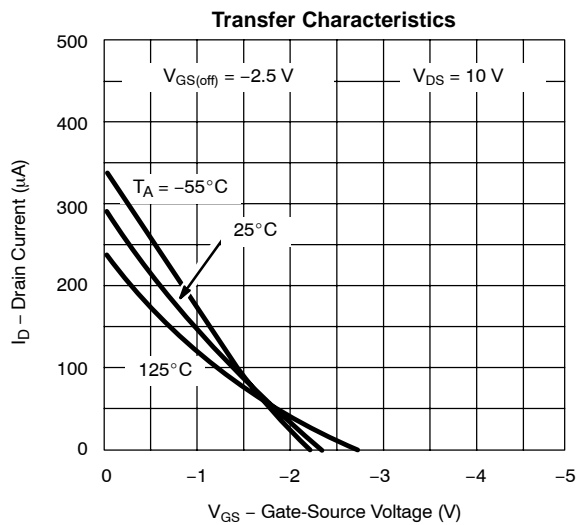
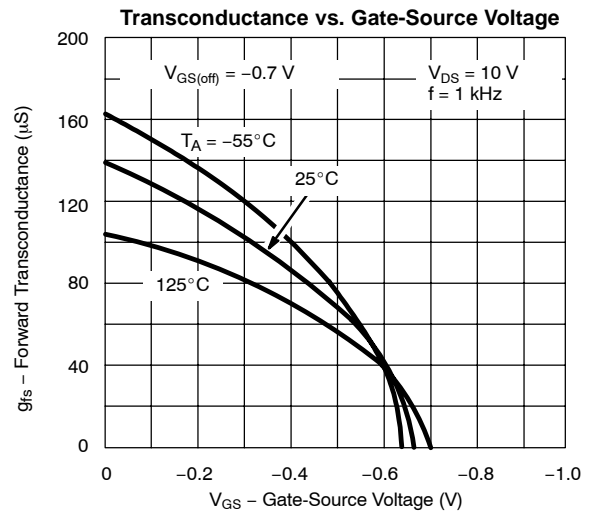
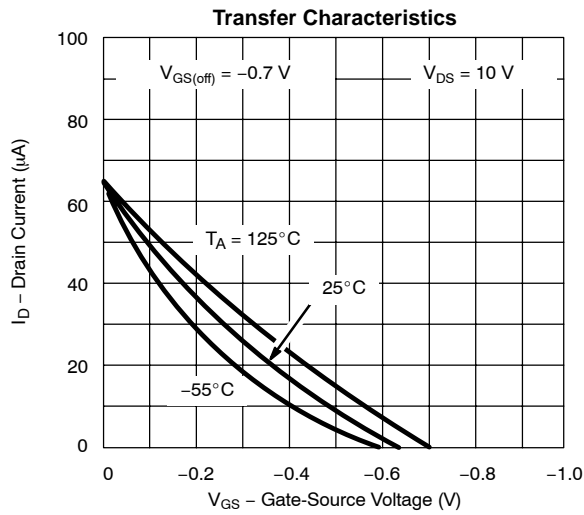
- Notes  
a. Typical values are for DESIGN AID ONLY, not guaranteed nor subject to production testing.  
b. This parameter not registered with JEDEC.

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

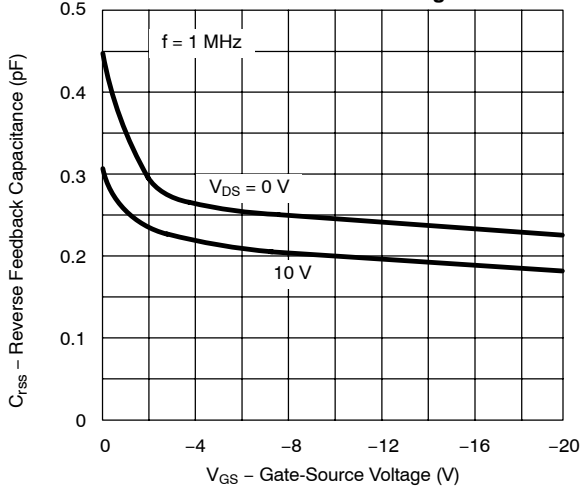


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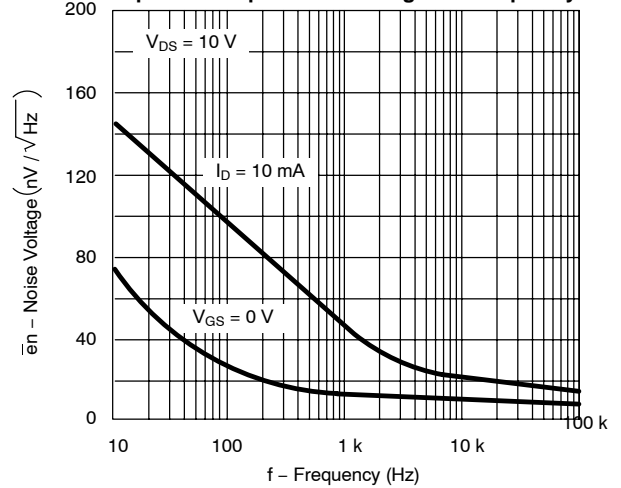


**TYPICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$  UNLESS OTHERWISE NOTED)**

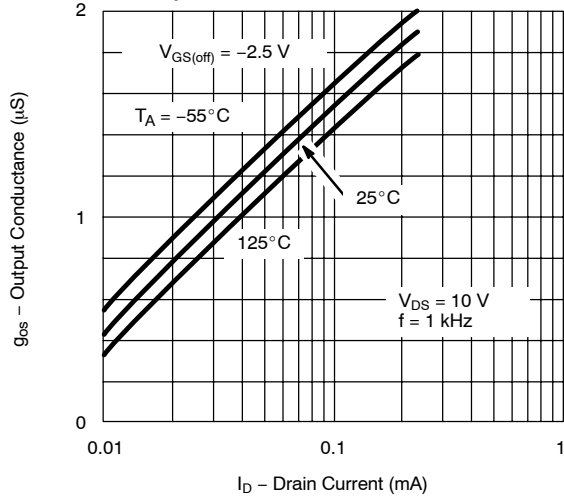
**Common-Source Reverse Feedback Capacitance vs. Gate-Source Voltage**



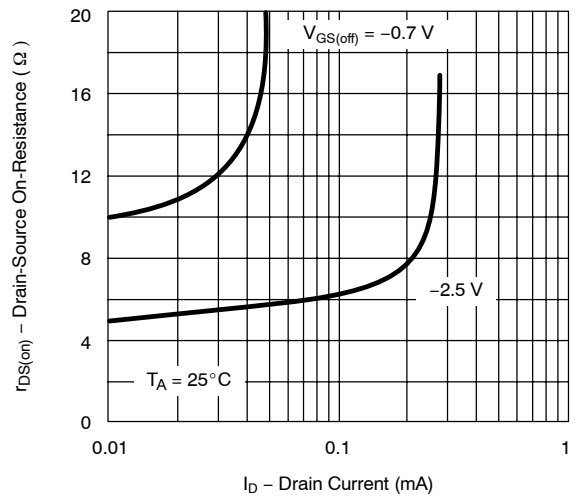
**Equivalent Input Noise Voltage vs. Frequency**



**Output Conductance vs. Drain Current**



**On-Resistance vs. Drain Current**





## Disclaimer

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