# N-Channel JFETs

| PRODUCT SUMMARY | | | | |
|---|---|---|---|---|
| Part Number | $V_{GS(off)}$ (V) | $V_{(BR)GSS}$ Min (V) | $g_{fs}$ Min (mS) | $I_{DSS}$ Max (mA) |
| 2N4338 | −0.3 to −1 | −50 | 0.6 | 0.6 |
| 2N4339 | −0.6 to −1.8 | −50 | 0.8 | 1.5 |
| 2N4340 | −1 to −3 | −50 | 1.3 | 3.6 |
| 2N4341 | −2 to −6 | −50 | 2 | 9 |

## FEATURES

- Low Cutoff Voltage: 2N4338 <1 V
- High Input Impedance
- Very Low Noise
- High Gain: $A_V$ = 80 @ 20 μA

## BENEFITS

- Full Performance from Low-Voltage Power Supply: Down to 1 V
- Low Signal Loss/System Error
- High System Sensitivity
- High-Quality Low-Level Signal Amplification

## APPLICATIONS

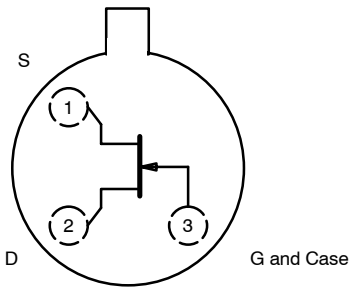
- High-Gain, Low-Noise Amplifiers
- Low-Current, Low-Voltage Battery-Powered Amplifiers
- Infrared Detector Amplifiers
- Ultrahigh Input Impedance Pre-Amplifiers

## DESCRIPTION

The 2N4338/4339/4340/4341 n-channel JFETs are designed for sensitive amplifier stages at low- to mid-frequencies. Low cut-off voltages accommodate low-level power supplies and low leakage for improved system accuracy.

The TO-206AA (TO-18) package is hermetically sealed and suitable for military processing (see Military Information). For similar products in TO-226AA (TO-92) and TO-236 (SOT-23) packages, see the J/SST201 series data sheet.

**TO-206AA**
**(TO-18)**




Top View

## ABSOLUTE MAXIMUM RATINGS

Gate-Source/Gate-Drain Voltage . . . . . −50 V
Forward Gate Current . . . . . 50 mA
Storage Temperature . . . . . −65 to 200°C
Operating Junction Temperature . . . . . −55 to 175°C

Lead Temperature ($^1/_{16}$" from case for 10 sec.) . . . . . 300°C
Power Dissipation[a] . . . . . 300 mW

Notes
a. Derate 2 mW/°C above 25°C

For applications information see AN102 and AN106.

## SPECIFICATIONS FOR 2N4338 AND 2N4339 ($T_A$ = 25°C UNLESS OTHERWISE NOTED)

| Parameter | Symbol | Test Conditions | Typ[a] | Limits 2N4338 Min | Limits 2N4338 Max | Limits 2N4339 Min | Limits 2N4339 Max | Unit |
|---|---|---|---|---|---|---|---|---|
| **Static** | | | | | | | | |
| Gate-Source Breakdown Voltage | $V_{(BR)GSS}$ | $I_G$ = –1 μA , $V_{DS}$ = 0 V | –57 | –50 | | –50 | | V |
| Gate-Source Cutoff Voltage | $V_{GS(off)}$ | $V_{DS}$ = 15 V, $I_D$ = 0.1 μA | | –0.3 | –1 | –0.6 | –1.8 | V |
| Saturation Drain Current[b] | $I_{DSS}$ | $V_{DS}$ = 15 V, $V_{GS}$ = 0 V | | 0.2 | 0.6 | 0.5 | 1.5 | mA |
| Gate Reverse Current | $I_{GSS}$ | $V_{GS}$ = –30 V, $V_{DS}$ = 0 V | –2 | | –100 | | –100 | pA |
| | | $T_A$ = 150°C | –4 | | –100 | | –100 | nA |
| Gate Operating Current[b] | $I_G$ | $V_{DG}$ = 15 V, $I_D$ = 0.1 mA | –2 | | | | | pA |
| Drain Cutoff Current | $I_{D(off)}$ | $V_{DS}$ = 15 V, $V_{GS}$ = –5 V | 2 | | 50 | | 50 | pA |
| Gate-Source Forward Voltage[c] | $V_{GS(F)}$ | $I_G$ = 1 mA , $V_{DS}$ = 0 V | 0.7 | | | | | V |
| **Dynamic** | | | | | | | | |
| Common-Source Forward Transconductance | $g_{fs}$ | $V_{DS}$ = 15 V, $V_{GS}$ = 0 V, f = 1 kHz | | 0.6 | 1.8 | 0.8 | 2.4 | mS |
| Common-Source Output Conductance | $g_{os}$ | | | | 5 | | 15 | μS |
| Drain-Source On-Resistance | $r_{ds(on)}$ | $V_{DS}$ = 0 V, $V_{GS}$ = 0 V, f = 1 kHz | | | 2500 | | 1700 | Ω |
| Common-Source Input Capacitance | $C_{iss}$ | $V_{DS}$ = 15 V, $V_{GS}$ = 0 V, f = 1 MHz | 5 | | 7 | | 7 | pF |
| Common-Source Reverse Transfer Capacitance | $C_{rss}$ | | 1.5 | | 3 | | 3 | pF |
| Equivalent Input Noise Voltage[c] | $\overline{e}_n$ | $V_{DS}$ = 10 V, $V_{GS}$ = 0 V, f = 1 kHz | 6 | | | | | $\frac{nV}{\sqrt{Hz}}$ |
| Noise Figure | NF | $V_{DS}$ = 15 V, $V_{GS}$ = 0 V<br>f = 1 kHz, $R_G$ = 1 MΩ | | | 1 | | 1 | dB |

## SPECIFICATIONS FOR 2N4340 AND 2N4341 ($T_A$ = 25°C UNLESS OTHERWISE NOTED)

| Parameter | Symbol | Test Conditions | Typ[a] | Limits 2N4340 Min | Limits 2N4340 Max | Limits 2N4341 Min | Limits 2N4341 Max | Unit |
|---|---|---|---|---|---|---|---|---|
| **Static** | | | | | | | | |
| Gate-Source Breakdown Voltage | $V_{(BR)GSS}$ | $I_G$ = –1 μA , $V_{DS}$ = 0 V | –57 | –50 | | –50 | | V |
| Gate-Source Cutoff Voltage | $V_{GS(off)}$ | $V_{DS}$ = 15 V, $I_D$ = 0.1 μA | | –1 | –3 | –2 | –6 | V |
| Saturation Drain Current[b] | $I_{DSS}$ | $V_{DS}$ = 15 V, $V_{GS}$ = 0 V | | 1.2 | 3.6 | 3 | 9 | mA |
| Gate Reverse Current | $I_{GSS}$ | $V_{GS}$ = –30 V, $V_{DS}$ = 0 V | –2 | | –100 | | –100 | pA |
| | | $T_A$ = 150°C | –4 | | –100 | | –100 | nA |
| Gate Operating Current[b] | $I_G$ | $V_{DG}$ = 15 V, $I_D$ = 0.1 mA | –2 | | | | | pA |
| Drain Cutoff Current | $I_{D(off)}$ | $V_{DS}$ = 15 V, $V_{GS}$ = –5 V | 2 | | 50 | | | pA |
| | | $V_{DS}$ = 15 V, $V_{GS}$ = –10 V | 3 | | | | 70 | pA |
| Gate-Source Forward Voltage | $V_{GS(F)}$ | $I_G$ = 1 mA , $V_{DS}$ = 0 V | 0.7 | | | | | V |

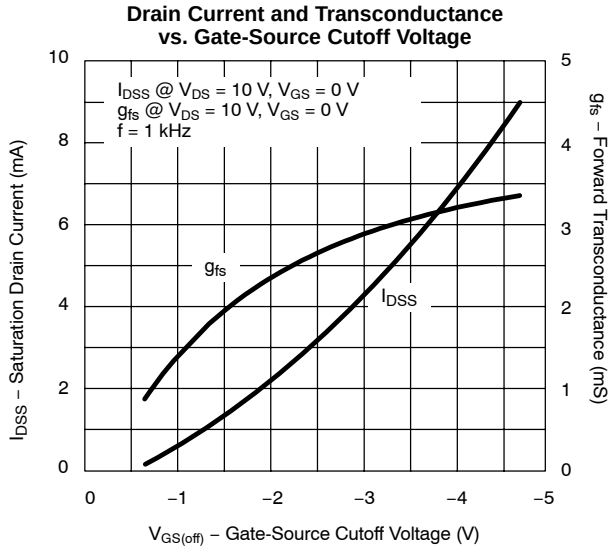
## SPECIFICATIONS FOR 2N4340 AND 2N4341 ($T_A$ = 25°C UNLESS OTHERWISE NOTED)

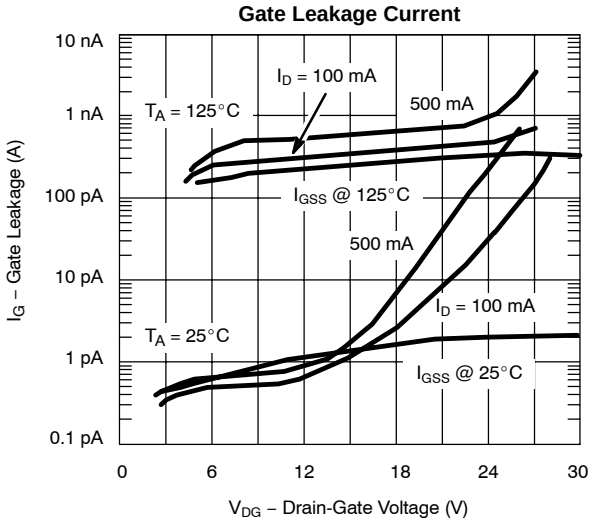
| Parameter | Symbol | Test Conditions | Typ[a] | Limits 2N4340 Min | Limits 2N4340 Max | Limits 2N4341 Min | Limits 2N4341 Max | Unit |
|---|---|---|---|---|---|---|---|---|
| **Dynamic** | | | | | | | | |
| Common-Source Forward Transconductance | $g_{fs}$ | $V_{DS}$ = 15 V, $V_{GS}$ = 0 V, f = 1 kHz | | 1.3 | 3 | 2 | 4 | mS |
| Common-Source Output Conductance | $g_{os}$ | | | | 30 | | 60 | μS |
| Drain-Source On-Resistance | $r_{ds(on)}$ | $V_{DS}$ = 0 V, $V_{GS}$ = 0 V, f = 1 kHz | | | 1500 | | 800 | Ω |
| Common-Source Input Capacitance | $C_{iss}$ | $V_{DS}$ = 15 V, $V_{GS}$ = 0 V, f = 1 MHz | 5 | | 7 | | 7 | pF |
| Common-Source Reverse Transfer Capacitance | $C_{rss}$ | | 1.5 | | 3 | | 3 | |
| Equivalent Input Noise Voltage[c] | $\overline{e}_n$ | $V_{DS}$ = 10 V, $V_{GS}$ = 0 V, f = 1 kHz | 6 | | | | | nV/√Hz |
| Noise Figure | NF | $V_{DS}$ = 15 V, $V_{GS}$ = 0 V f = 1 kHz, $R_G$ = 1 MΩ | | | 1 | | 1 | dB |

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. This parameter not registered with JEDEC.

NPA

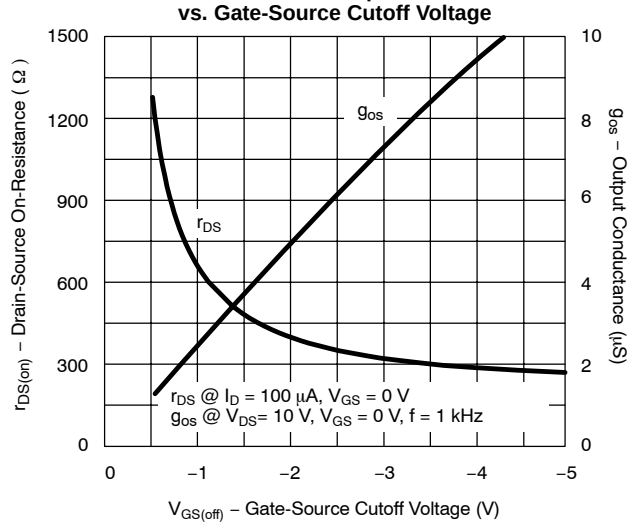
## TYPICAL CHARACTERISTICS ($T_A$ = 25°C UNLESS OTHERWISE NOTED)



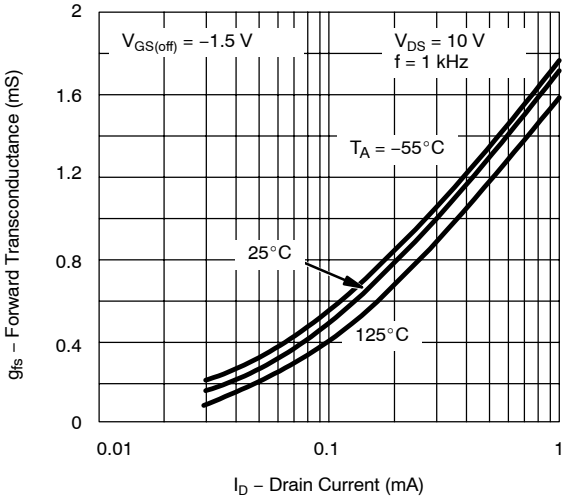



## TYPICAL CHARACTERISTICS ($T_A$ = 25°C UNLESS OTHERWISE NOTED)

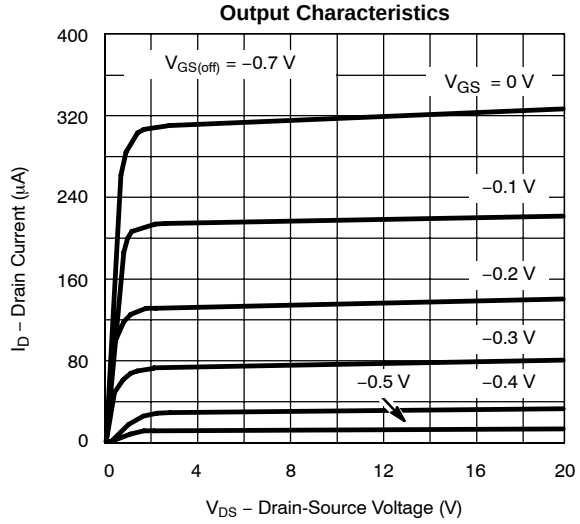
**On-Resistance and Output Conductance vs. Gate-Source Cutoff Voltage**



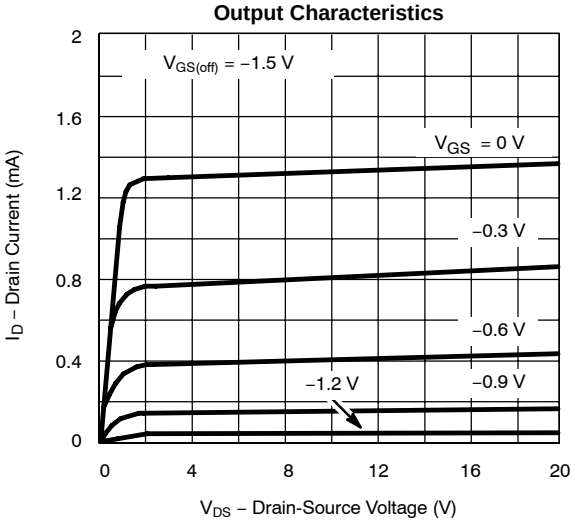

**Common-Source Forward Transconductance vs. Drain Current**



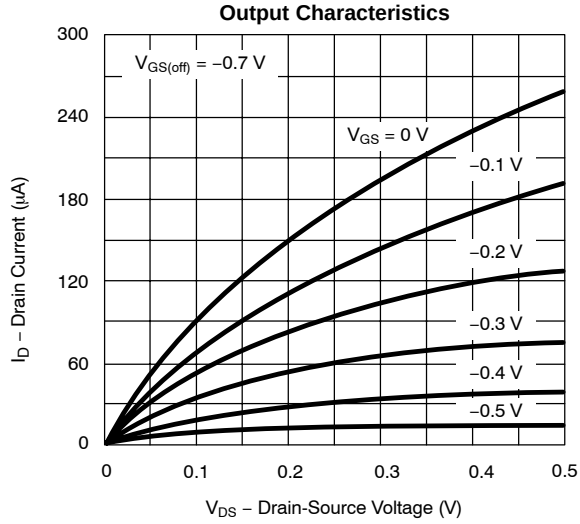

**Output Characteristics**



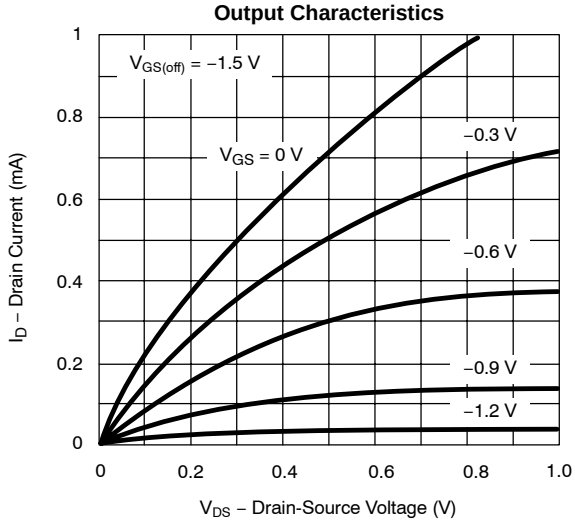

**Output Characteristics**




**Output Characteristics**

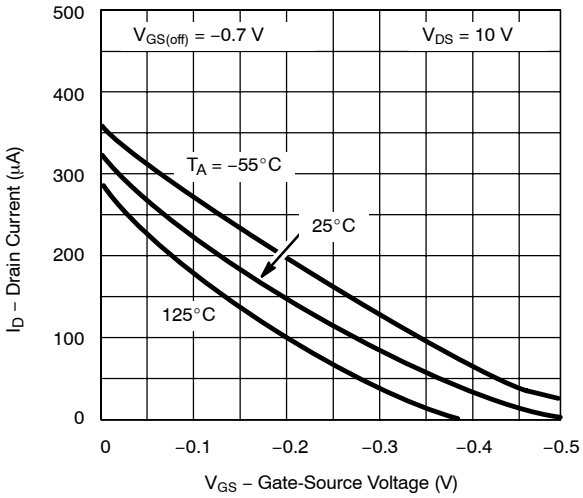



**Output Characteristics**

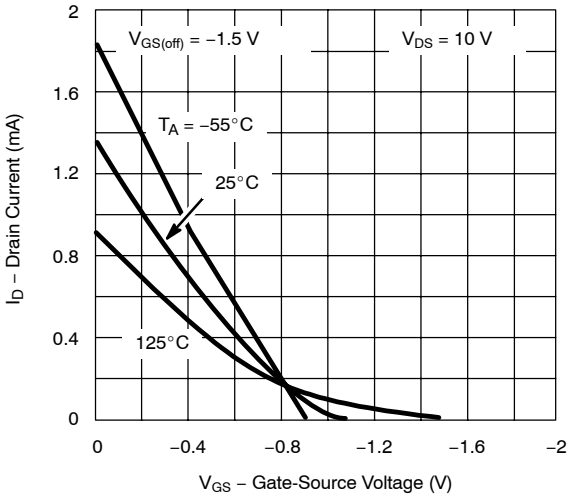


## TYPICAL CHARACTERISTICS ($T_A$ = 25°C UNLESS OTHERWISE NOTED)

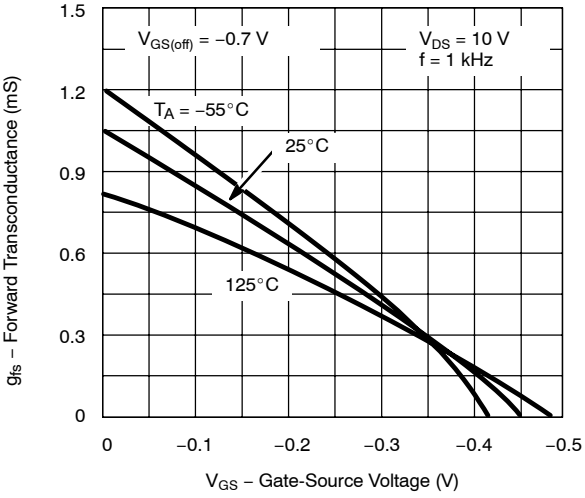
**Transfer Characteristics**



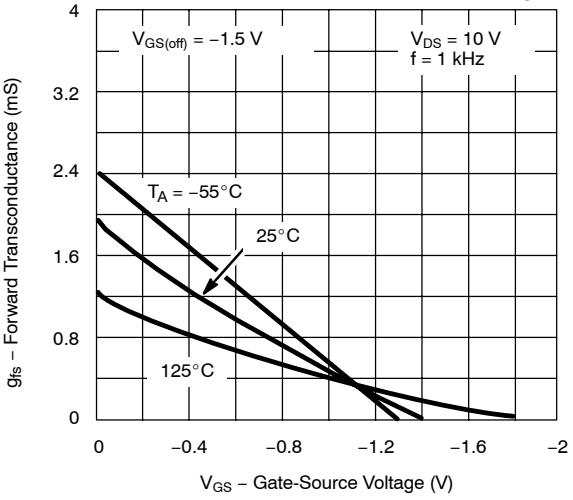

**Transfer Characteristics**



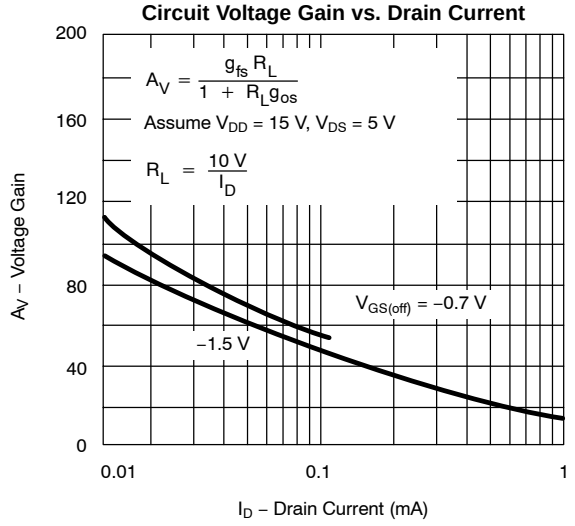

**Transconductance vs. Gate-Source Voltage**



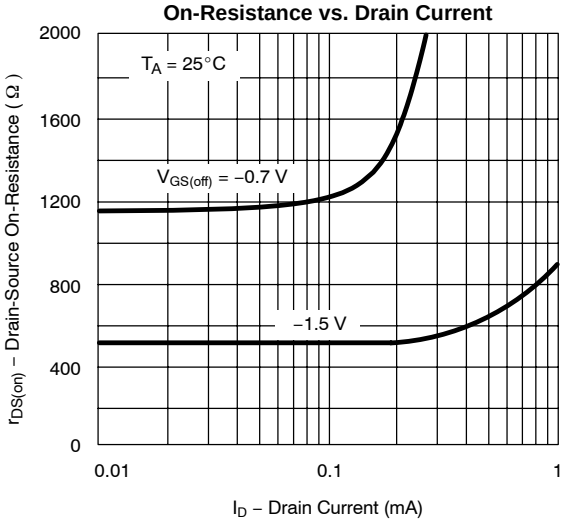

**Transconductance vs. Gate-Source Voltage**




**Circuit Voltage Gain vs. Drain Current**

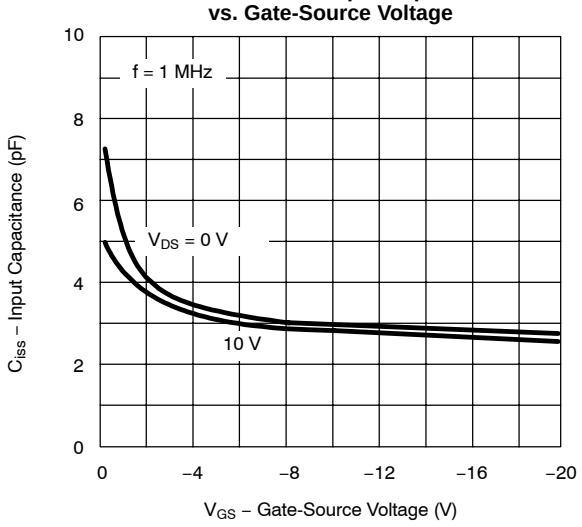



**On-Resistance vs. Drain Current**

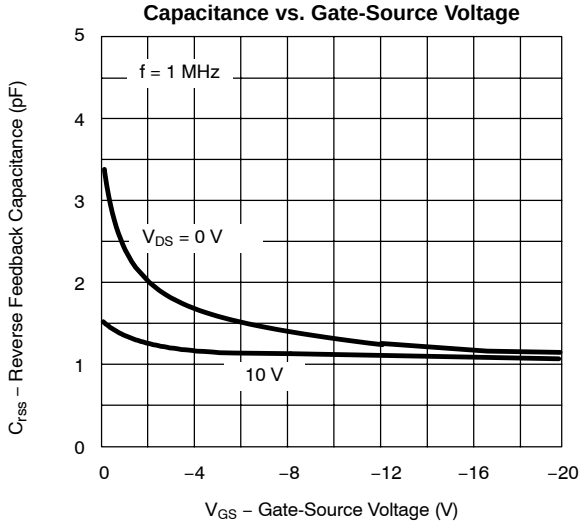


## TYPICAL CHARACTERISTICS ($T_A$ = 25°C UNLESS OTHERWISE NOTED)

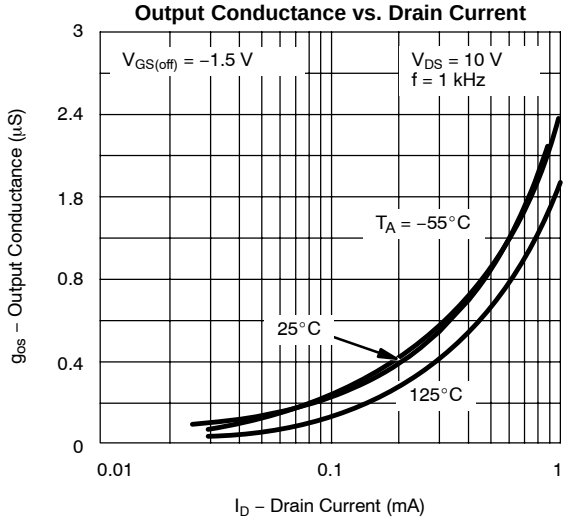
**Common-Source Input Capacitance vs. Gate-Source Voltage**



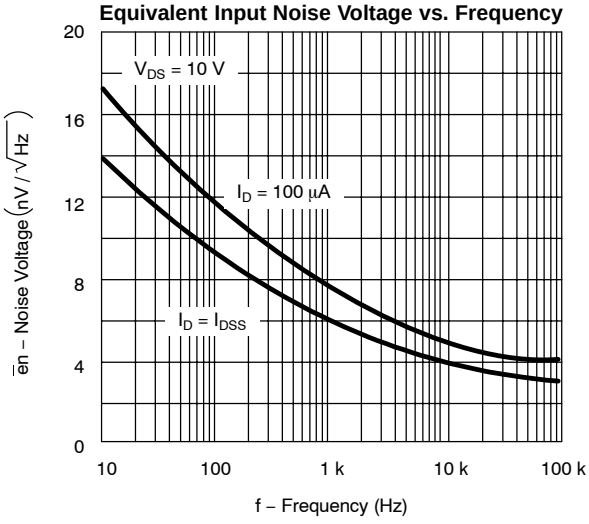

**Common-Source Reverse Feedback Capacitance vs. Gate-Source Voltage**




**Output Conductance vs. Drain Current**




**Equivalent Input Noise Voltage vs. Frequency**



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