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# N-Channel JFETs

PRODUCT SUMMARY				
Part Number	V <sub>GS(off)</sub> (V)	V <sub>(BR)GSS</sub> Min (V)	g <sub>fs</sub> Min (mS)	I <sub>DSS</sub> 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<sub>V</sub> = 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

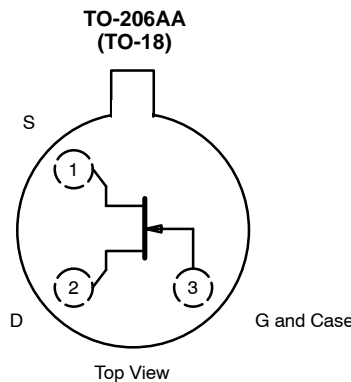
### APPLICATIONS

- 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.



### 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 ( <sup>1</sup> / <sub>16</sub> " from case for 10 sec.)	300°C
Power Dissipation <sup>a</sup>	300 mW

Notes  
a. Derate 2 mW/°C above 25°C

For applications information see AN102 and AN106.



SPECIFICATIONS FOR 2N4338 AND 2N4339 (T <sub>A</sub> = 25 °C UNLESS OTHERWISE NOTED)								
Parameter	Symbol	Test Conditions	Typ <sup>a</sup>	Limits				Unit
				2N4338		2N4339		
				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	-57	-50		-50		V
Gate-Source Cutoff Voltage	V <sub>GS(off)</sub>	V <sub>DS</sub> = 15 V, I <sub>D</sub> = 0.1 μA		-0.3	-1	-0.6	-1.8	
Saturation Drain Current <sup>b</sup>	I <sub>DSS</sub>	V <sub>DS</sub> = 15 V, V <sub>GS</sub> = 0 V		0.2	0.6	0.5	1.5	mA
Gate Reverse Current	I <sub>GSS</sub>	V <sub>GS</sub> = -30 V, V <sub>DS</sub> = 0 V T <sub>A</sub> = 150 °C	-2		-100		-100	pA
			-4		-100		-100	nA
Gate Operating Current <sup>b</sup>	I <sub>G</sub>	V <sub>DG</sub> = 15 V, I <sub>D</sub> = 0.1 mA	-2					pA
Drain Cutoff Current	I <sub>D(off)</sub>	V <sub>DS</sub> = 15 V, V <sub>GS</sub> = -5 V	2		50		50	
Gate-Source Forward Voltage <sup>c</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> = 15 V, V <sub>GS</sub> = 0 V, f = 1 kHz		0.6	1.8	0.8	2.4	mS
Common-Source Output Conductance	g <sub>os</sub>					5		15
Drain-Source On-Resistance	r <sub>ds(on)</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = 0 V, f = 1 kHz			2500		1700	Ω
Common-Source Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> = 15 V, V <sub>GS</sub> = 0 V, f = 1 MHz	5		7		7	pF
Common-Source Reverse Transfer Capacitance	C <sub>rss</sub>		1.5		3		3	
Equivalent Input Noise Voltage <sup>c</sup>	e <sub>n</sub>	V <sub>DS</sub> = 10 V, V <sub>GS</sub> = 0 V, f = 1 kHz	6					nV/ √Hz
Noise Figure	NF	V <sub>DS</sub> = 15 V, V <sub>GS</sub> = 0 V f = 1 kHz, R <sub>G</sub> = 1 MΩ			1		1	dB

SPECIFICATIONS FOR 2N4340 AND 2N4341 (T <sub>A</sub> = 25 °C UNLESS OTHERWISE NOTED)								
Parameter	Symbol	Test Conditions	Typ <sup>a</sup>	Limits				Unit
				2N4340		2N4341		
				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	-57	-50		-50		V
Gate-Source Cutoff Voltage	V <sub>GS(off)</sub>	V <sub>DS</sub> = 15 V, I <sub>D</sub> = 0.1 μA		-1	-3	-2	-6	
Saturation Drain Current <sup>b</sup>	I <sub>DSS</sub>	V <sub>DS</sub> = 15 V, V <sub>GS</sub> = 0 V		1.2	3.6	3	9	mA
Gate Reverse Current	I <sub>GSS</sub>	V <sub>GS</sub> = -30 V, V <sub>DS</sub> = 0 V T <sub>A</sub> = 150 °C	-2		-100		-100	pA
			-4		-100		-100	nA
Gate Operating Current <sup>b</sup>	I <sub>G</sub>	V <sub>DG</sub> = 15 V, I <sub>D</sub> = 0.1 mA	-2					pA
Drain Cutoff Current	I <sub>D(off)</sub>	V <sub>DS</sub> = 15 V	V <sub>GS</sub> = -5 V	2		50		
			V <sub>GS</sub> = -10 V	3			70	
Gate-Source Forward Voltage	V <sub>GS(F)</sub>	I <sub>G</sub> = 1 mA, V <sub>DS</sub> = 0 V	0.7					V



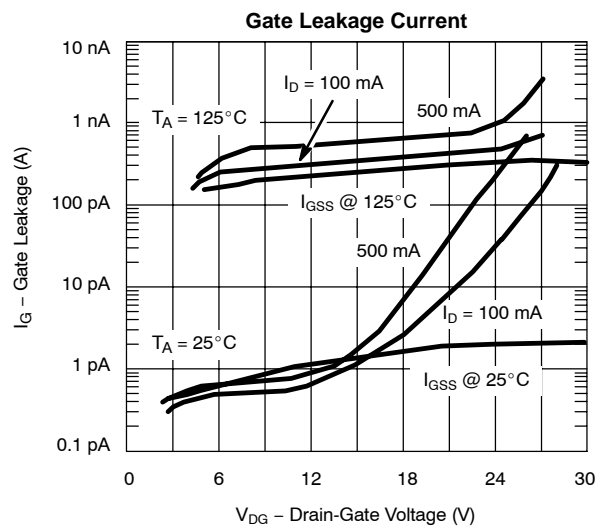
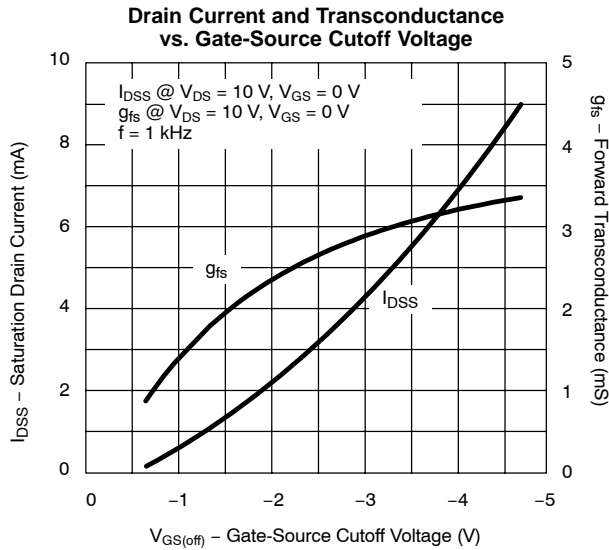
SPECIFICATIONS FOR 2N4340 AND 2N4341 (T <sub>A</sub> = 25 °C UNLESS OTHERWISE NOTED)								
Parameter	Symbol	Test Conditions	Typ <sup>a</sup>	Limits				Unit
				2N4340		2N4341		
				Min	Max	Min	Max	
<b>Dynamic</b>								
Common-Source Forward Transconductance	$g_{fs}$	$V_{DS} = 15\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ kHz}$		1.3	3	2	4	mS
Common-Source Output Conductance	$g_{os}$				30		60	$\mu\text{S}$
Drain-Source On-Resistance	$r_{ds(on)}$	$V_{DS} = 0\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ kHz}$			1500		800	$\Omega$
Common-Source Input Capacitance	$C_{iss}$	$V_{DS} = 15\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	5		7		7	pF
Common-Source Reverse Transfer Capacitance	$C_{rss}$				1.5		3	
Equivalent Input Noise Voltage <sup>c</sup>	$\bar{e}_n$	$V_{DS} = 10\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ kHz}$	6					nV/ $\sqrt{\text{Hz}}$
Noise Figure	NF	$V_{DS} = 15\text{ V}, V_{GS} = 0\text{ V}$ $f = 1\text{ kHz}, R_G = 1\text{ M}\Omega$			1		1	dB

Notes

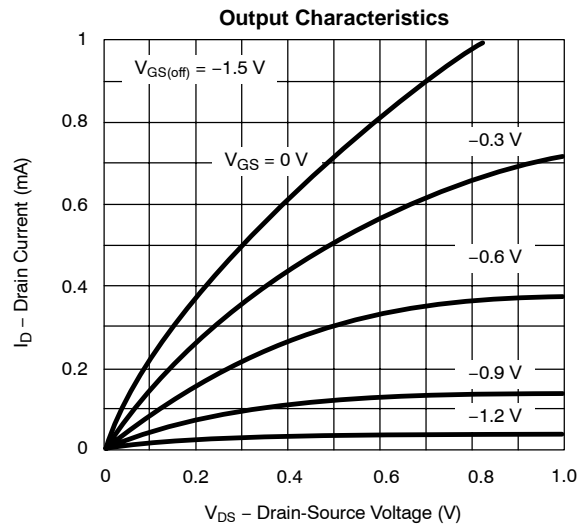
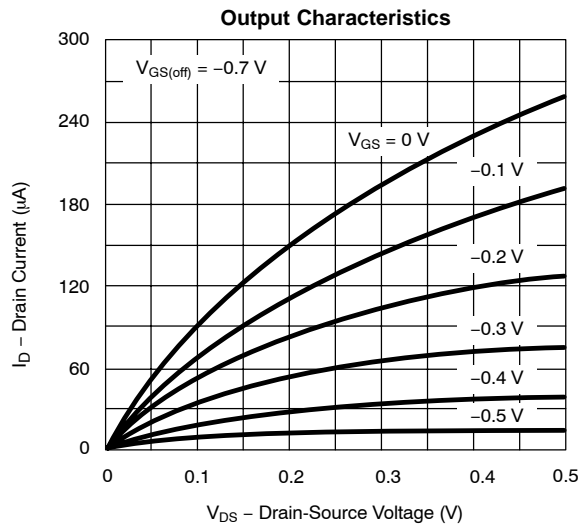
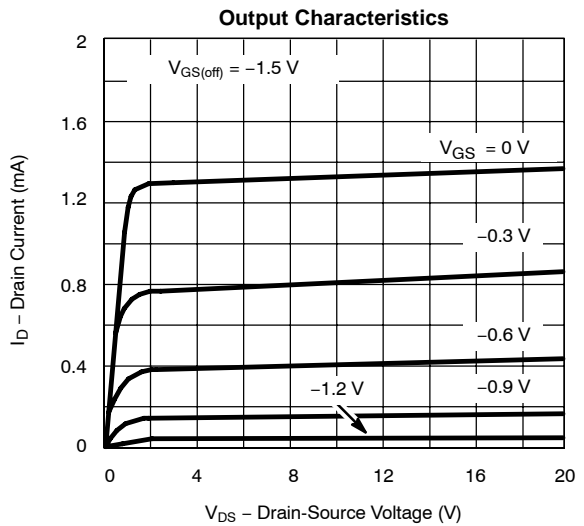
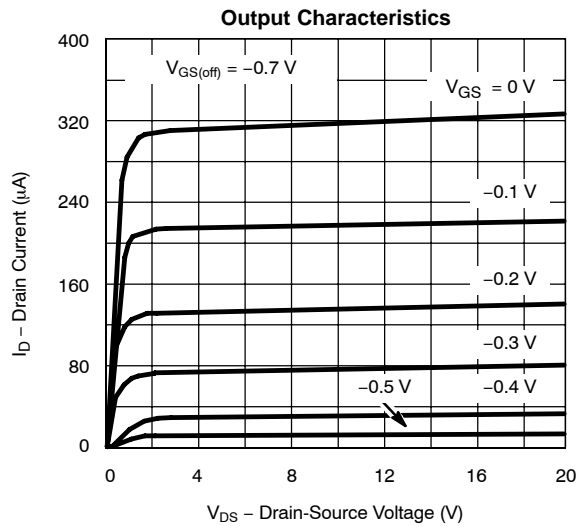
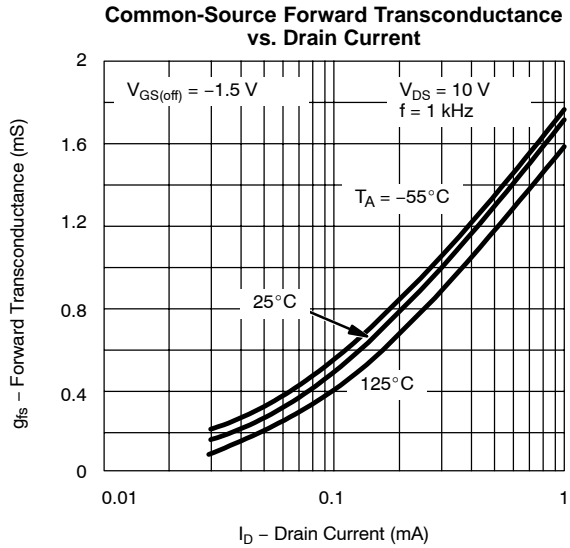
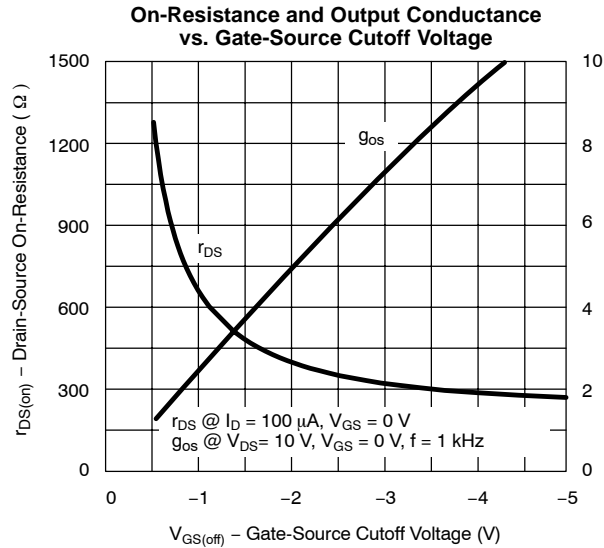
- a. Typical values are for DESIGN AID ONLY, not guaranteed nor subject to production testing.
- b. Pulse test: PW ≤ 300 μs, duty cycle ≤ 3%.
- c. This parameter not registered with JEDEC.

NPA

**TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C UNLESS OTHERWISE NOTED)**



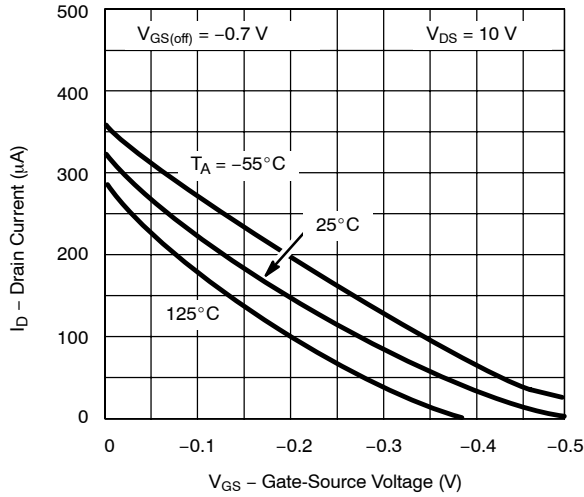
**TYPICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$  UNLESS OTHERWISE NOTED)**



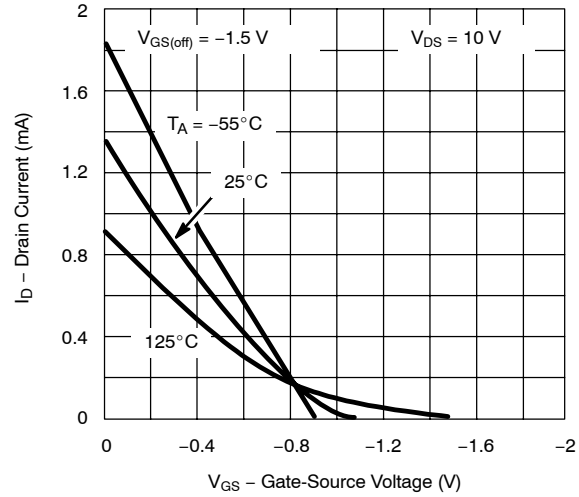


**TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25°C UNLESS OTHERWISE NOTED)**

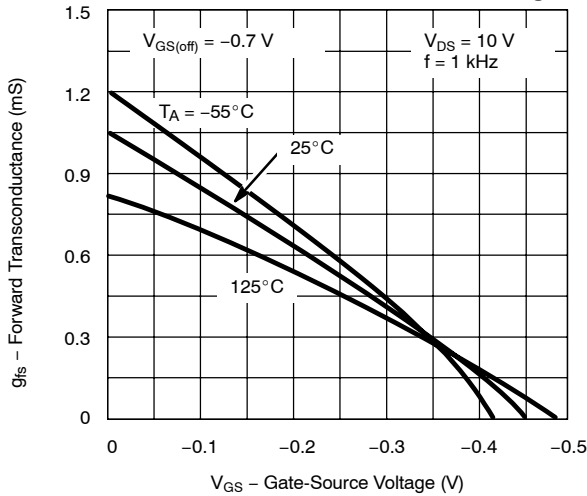
**Transfer Characteristics**



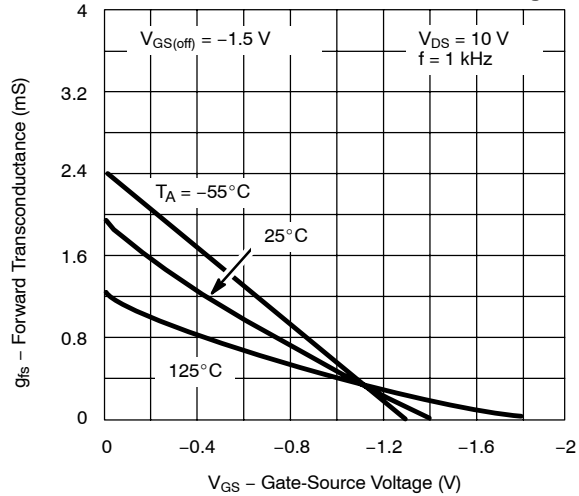
**Transfer Characteristics**



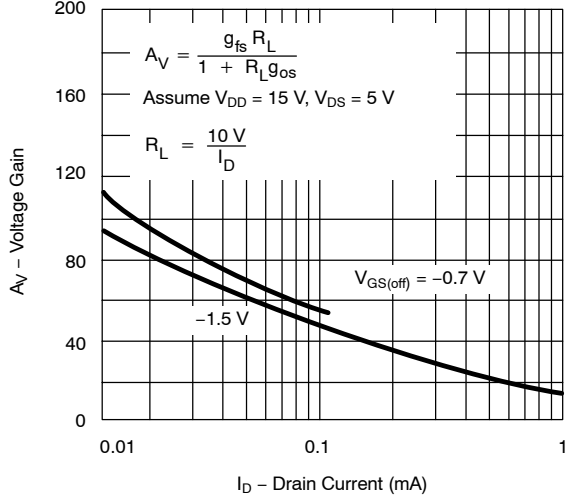
**Transconductance vs. Gate-Source Voltage**



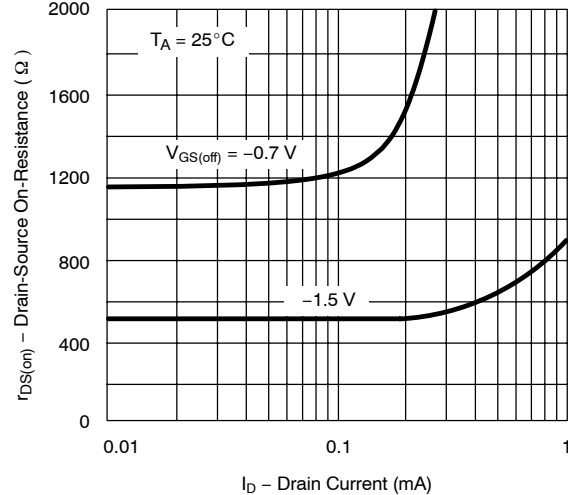
**Transconductance vs. Gate-Source Voltage**



**Circuit Voltage Gain vs. Drain Current**

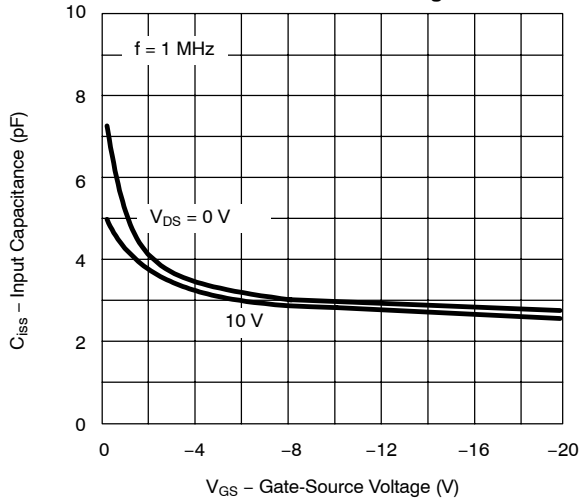


**On-Resistance vs. Drain Current**

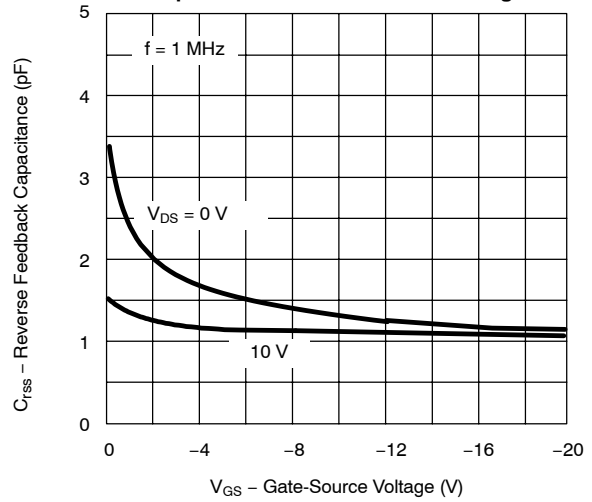


**TYPICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$  UNLESS OTHERWISE NOTED)**

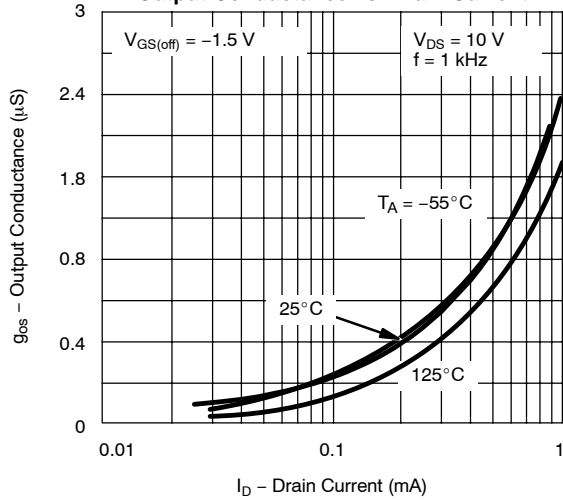
**Common-Source Input Capacitance vs. Gate-Source Voltage**



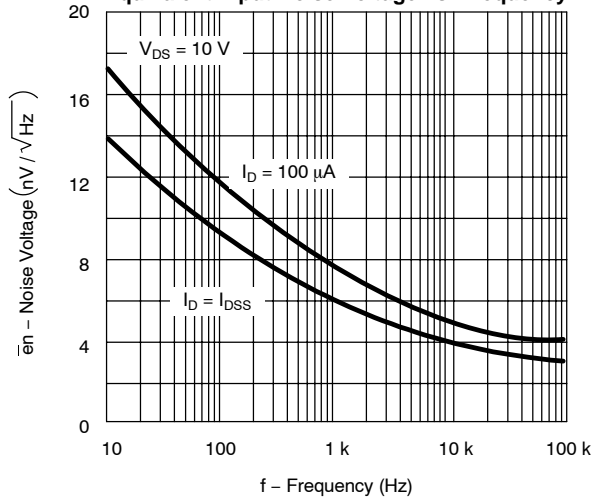
**Common-Source Reverse Feedback Capacitance vs. Gate-Source Voltage**



**Output Conductance vs. Drain Current**



**Equivalent Input Noise Voltage vs. Frequency**





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