N-Channel JFETs

PRODUCT SUMMARY				
Part Number	$V_{GS(off)}$ (V)	$V_{(BR)GSS}$ Min (V)	g_{fs} Min (mS)	I_{DSS} Min (mA)
2N4416	−≤6	−30	4.5	5
2N4416A	−2.5 to −6	−35	4.5	5
SST4416	−≤6	−30	4.5	5

FEATURES

- Excellent High-Frequency Gain: 2N4416/A, Gps 13 dB (typ) @ 400 MHz
- Very Low Noise: 3 dB (typ) @ 400 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

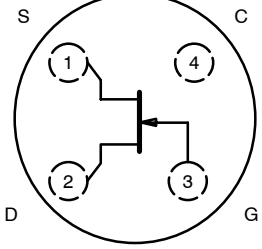
- High-Frequency Amplifier/Mixer
- Oscillator
- Sample-and-Hold
- Very Low Capacitance Switches

DESCRIPTION

The 2N4416/2N4416A/SST4416 n-channel JFETs are designed to provide high-performance amplification at high frequencies.

The TO-206AF (TO-72) hermetically-sealed package is available with full military processing (see Military Information.) The TO-236 (SOT-23) package provides a low-cost option and is available with tape-and-reel options (see Packaging Information). For similar products in the TO-226AA (TO-92) package, see the J304/305 data sheet.

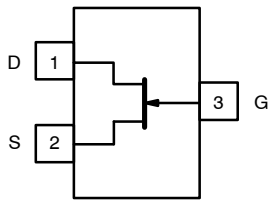
TO-206AF
(TO-72)



Top View

2N4416
2N4416A

TO-236
(SOT-23)



Top View

SST4416 (H1)*

*Marking Code for TO-236

For applications information see AN104.

ABSOLUTE MAXIMUM RATINGS

Gate-Drain, Gate-Source Voltage :
(2N/SST4416) . . . . . –30 V
(2N4416A) . . . . . –35 V
Gate Current . . . . . 10 mA
Lead Temperature . . . . . 300 °C
Storage Temperature : (2N Prefix) . . . . . –65 to 200 °C
(SST Prefix) . . . . . –65 to 150°C
Operating Junction Temperature . . . . . –55 to 150 °C
Power Dissipation : (2N Prefix)[a] . . . . . 300 mW
(SST Prefix)[b] . . . . . 350 mW

Notes
a. Derate 2.4 mW/°C above 25°C
b. Derate 2.8 mW/°C above 25°C

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.

SPECIFICATIONS (T_A = 25°C UNLESS NOTED)

Parameter	Symbol	Test Conditions	Typ[a]	Limits 2N4416 Min	2N4416 Max	2N4416A Min	2N4416A Max	SST4416 Min	SST4416 Max	Unit
Static										
Gate-Source Breakdown Voltage	$V_{(BR)GSS}$	I_G = –1 μA , V_{DS} = 0 V	–36	–30		–35		–30		V
Gate-Source Cutoff Voltage	$V_{GS(off)}$	V_{DS} = 15 V, I_D = 1 nA	–3		–6	–2.5	–6		–6	V
Saturation Drain Current[b]	I_{DSS}	V_{DS} = 15 V, V_{GS} = 0 V	10	5	15	5	15	5	15	mA
Gate Reverse Current	I_{GSS}	V_{GS} = –20 V, V_{DS} = 0 V (2N)	–2		–100		–100			pA
		T_A = 150°C	–4		–100		–100			nA
		V_{GS} = –15 V, V_{DS} = 0 V (SST)	–0.002						–1	nA
		T_A = 125°C	–0.6							nA
Gate Operating Current	I_G	V_{DG} = 10 V, I_D = 1 mA	–20							pA
Drain Cutoff Current[c]	$I_{D(off)}$	V_{DS} = 10 V, V_{GS} = –6 V	2							pA
Drain-Source On-Resistance[c]	$r_{DS(on)}$	V_{GS} = 0 V, I_D = 300 μA	150							Ω
Gate-Source Forward Voltage[c]	$V_{GS(F)}$	I_G = 1 mA , V_{DS} = 0 V	0.7							V
Dynamic										
Common-Source Forward Transconductance[b]	g_{fs}	V_{DS} = 15 V, V_{GS} = 0 V f = 1 kHz	6	4.5	7.5	4.5	7.5	4.5	7.5	mS
Common-Source Output Conductance[b]	g_{os}		15		50		50		50	μS
Common-Source Input Capacitance	C_{iss}	V_{DS} = 15 V, V_{GS} = 0 V f = 1 MHz	2.2		4		4			pF
Common-Source Reverse Transfer Capacitance	C_{rss}		0.7		0.8		0.8			pF
Common-Source Output Capacitance	C_{oss}		1		2		2			pF
Equivalent Input Noise Voltage[c]	$\overline{e}_n$	V_{DS} = 10 V, V_{GS} = 0 V f = 1 kHz	6							nV/√Hz

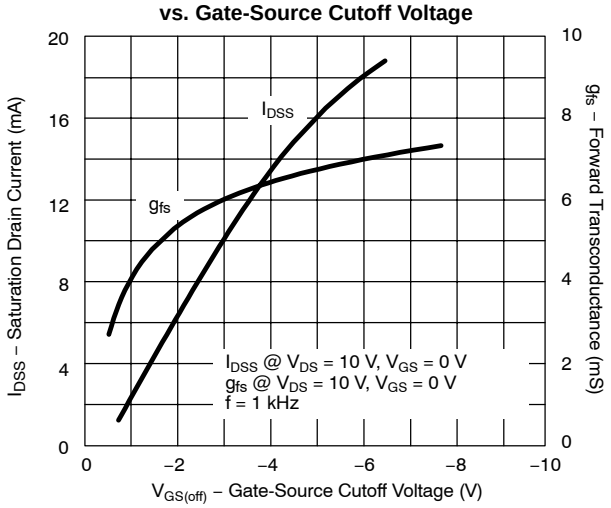
HIGH-FREQUENCY SPECIFICATIONS FOR 2N4416/2N4416A (T_A = 25°C UNLESS NOTED)

Parameter	Symbol	Test Conditions	Limits 100 MHz Min	Limits 100 MHz Max	Limits 400 MHz Min	Limits 400 MHz Max	Unit
Common Source Input Conductance[d]	g_{iss}	V_{DS} = 15 V, V_{GS} = 0 V		100		1,000	µS
Common Source Input Susceptance[d]	b_{iss}			2,500		10,000	
Common Source Output Conductance[d]	g_{oss}			75		100	
Common Source Output Susceptance[d]	b_{oss}			1,000		4,000	
Common Source Forward Transconductance[d]	g_{fs}				4,000		
Common-Source Power Gain[d]	G_{ps}	V_{DS} = 15 V, I_D = 5 mA	18		10		dB
Noise Figure[d]	NF	R_G = 1 kΩ		2		4	

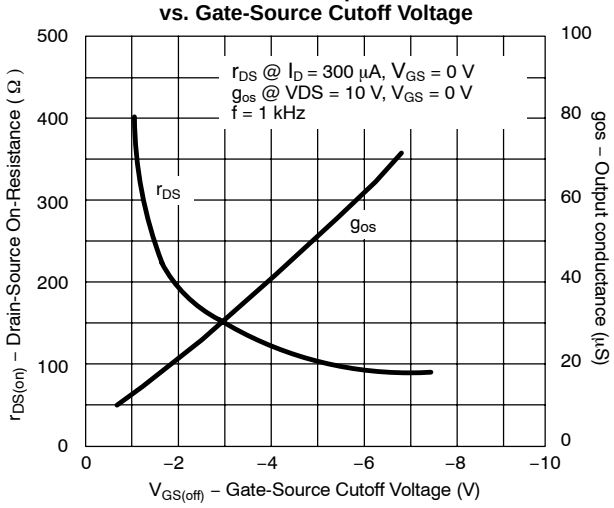
Notes
a. Typical values are for DESIGN AID ONLY, not guaranteed nor subject to production testing. NH
b. Pulse test: PW ≤ 300 µs duty cycle ≤ 3%.
c. This parameter not registered with JEDEC.
d. Not a production test.

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

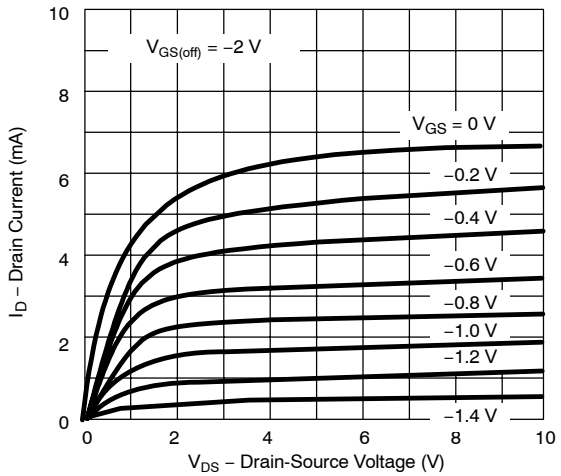
Drain Current and Transconductance vs. Gate-Source Cutoff Voltage



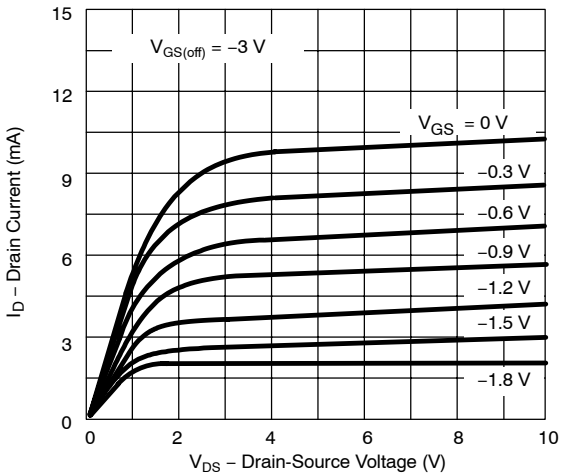
On-Resistance and Output Conductance vs. Gate-Source Cutoff Voltage



Output Characteristics

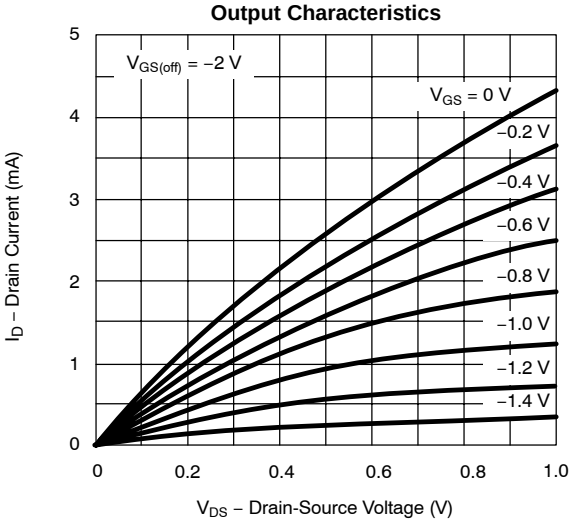


Output Characteristics

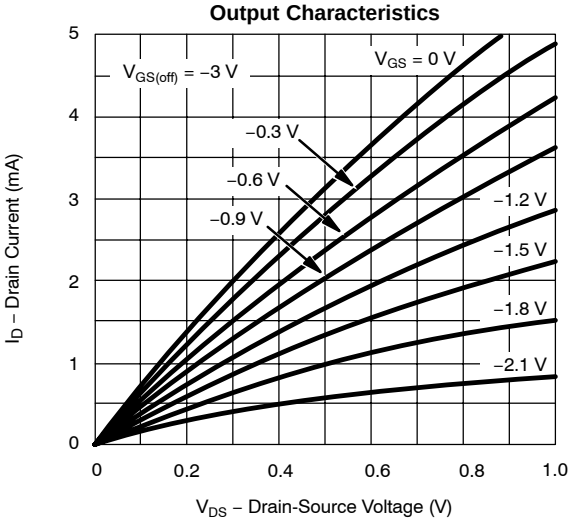


TYPICAL CHARACTERISTICS (T_A = 25°C UNLESS OTHERWISE NOTED)

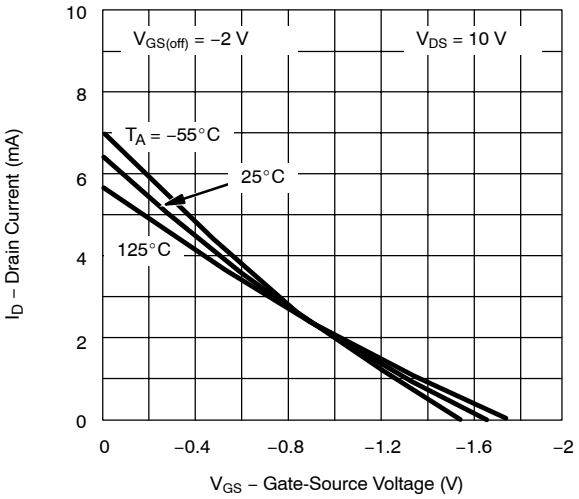
Output Characteristics



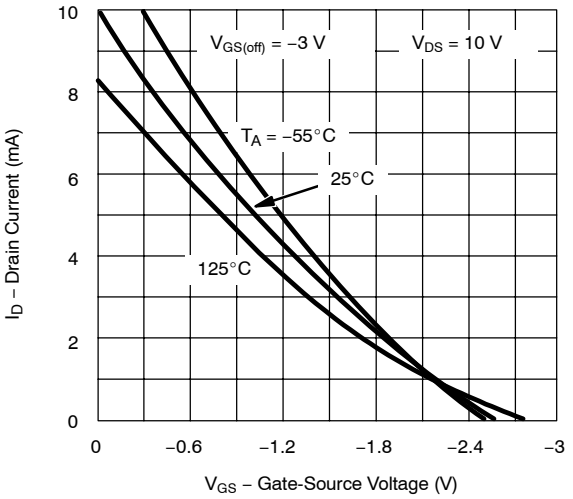
Output Characteristics



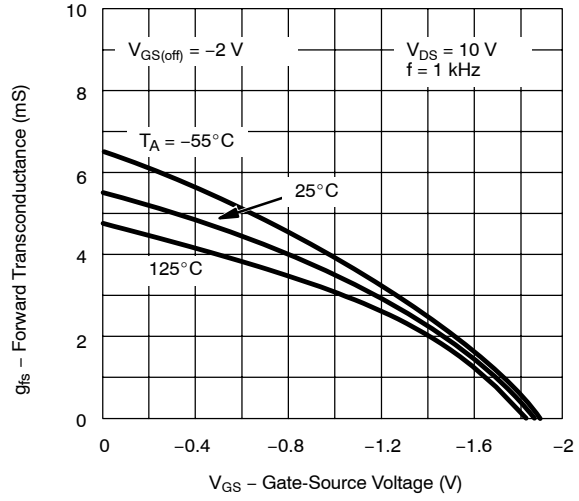
Transfer Characteristics



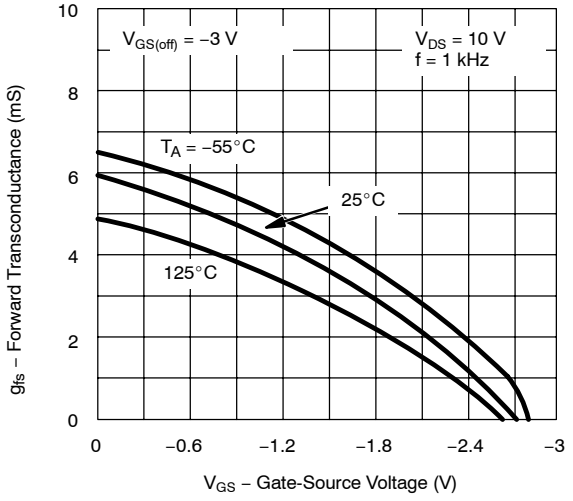
Transfer Characteristics



Transconductance vs. Gate-Source Voltage

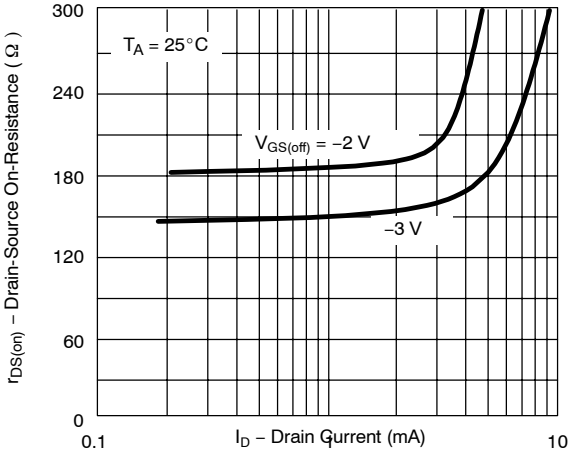


Transconductance vs. Gate-Source Voltgage

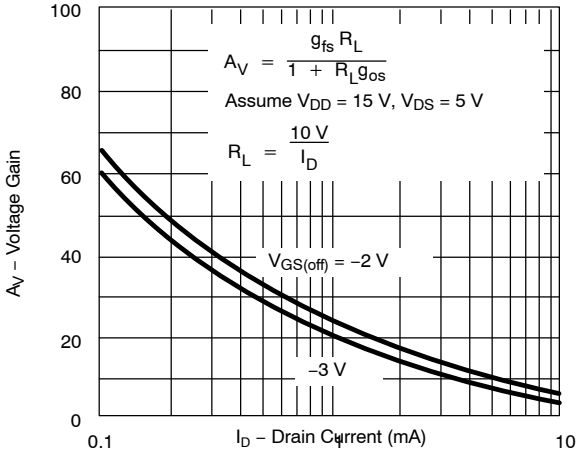


TYPICAL CHARACTERISTICS (T_A = 25°C UNLESS OTHERWISE NOTED)

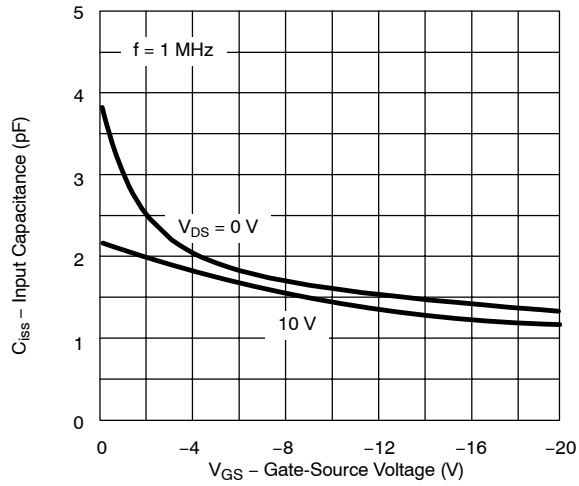
On-Resistance vs. Drain Current



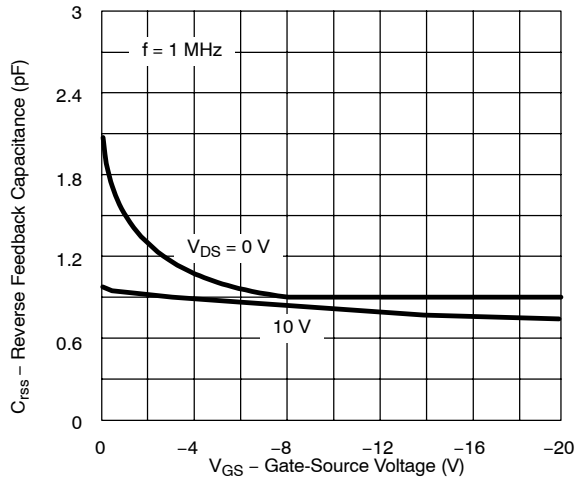
Circuit Voltage Gain vs. Drain Current



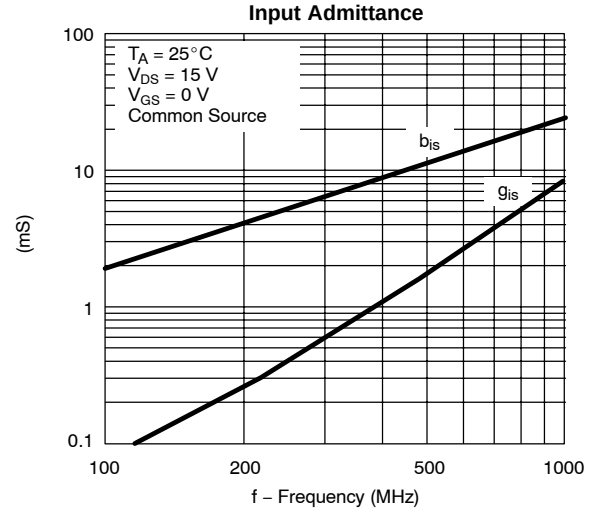
Common-Source Input Capacitance vs. Gate-Source Voltage



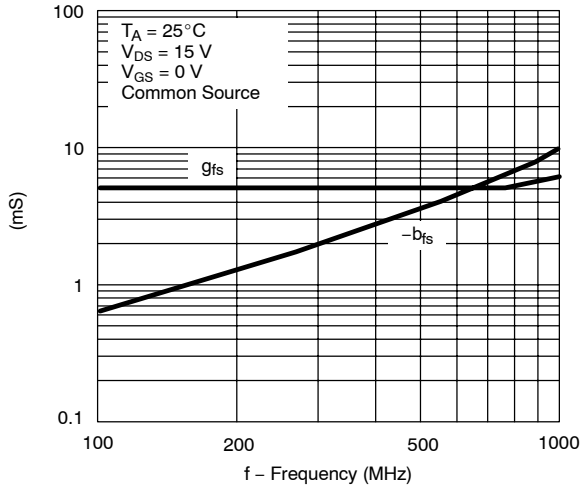
Common-Source Reverse Feedback Capacitance vs. Gate-Source Voltage



Input Admittance

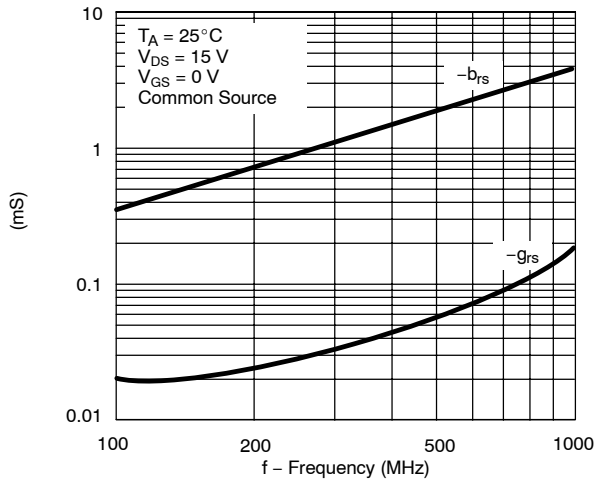


Forward Admittance

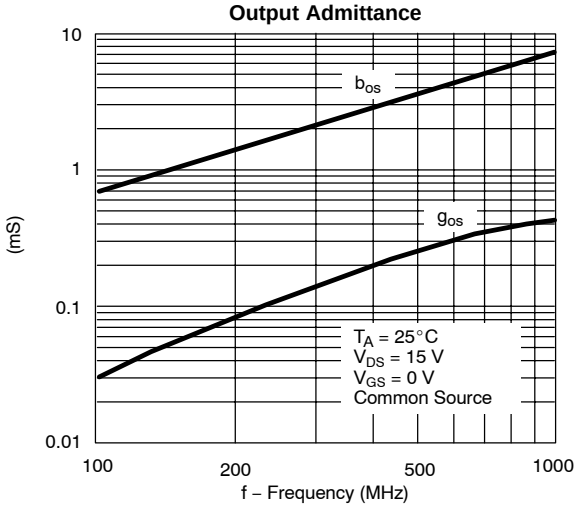


TYPICAL CHARACTERISTICS (T_A = 25°C UNLESS OTHERWISE NOTED)

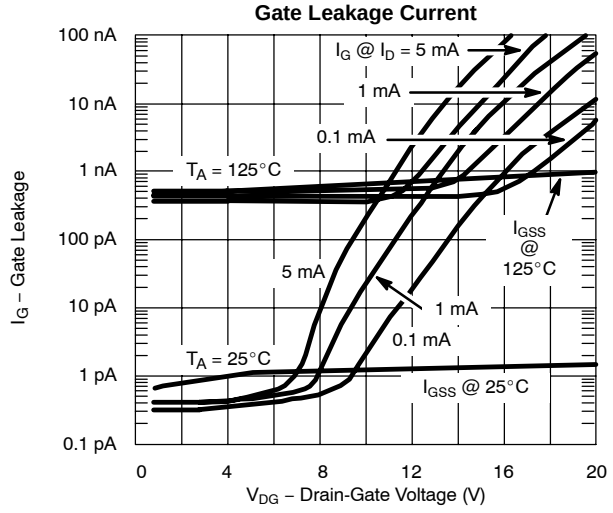
Reverse Admittance



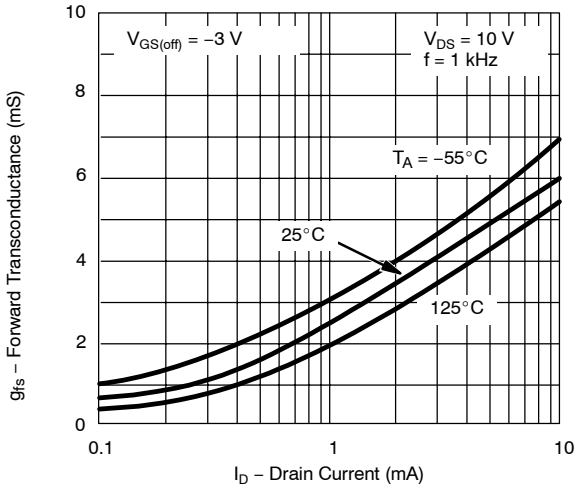
Output Admittance



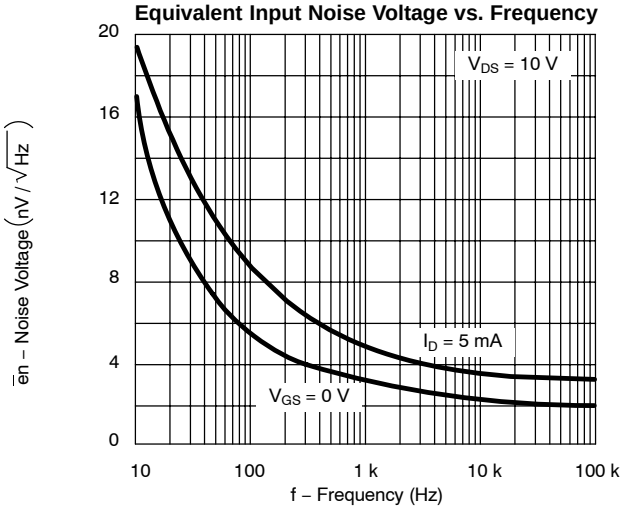
Gate Leakage Current



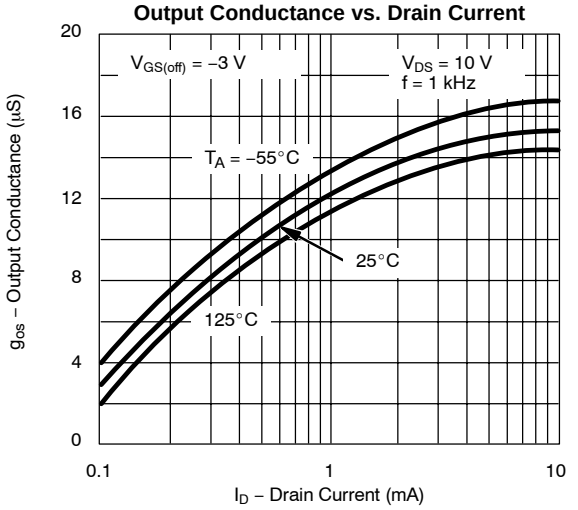
Common-Source Forward Transconductance vs. Drain Current



Equivalent Input Noise Voltage vs. Frequency



Output Conductance vs. Drain Current



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