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	$-\leq 6$	–30	4.5	5
2N4416A	–2.5 to –6	–35	4.5	5
SST4416	$-\leq 6$	–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

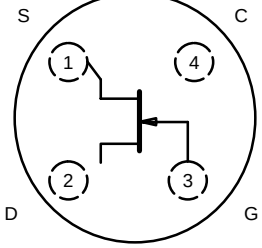
- High-Frequency Amplifier/Mixer
- Oscillator
- Sample-and-Hold
- Very Low Capacitance Switches

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.

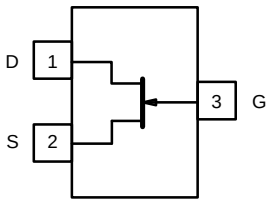
TO-206AF
(TO-72)



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

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 = 1 mA	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							$nV/\sqrt{Hz}$

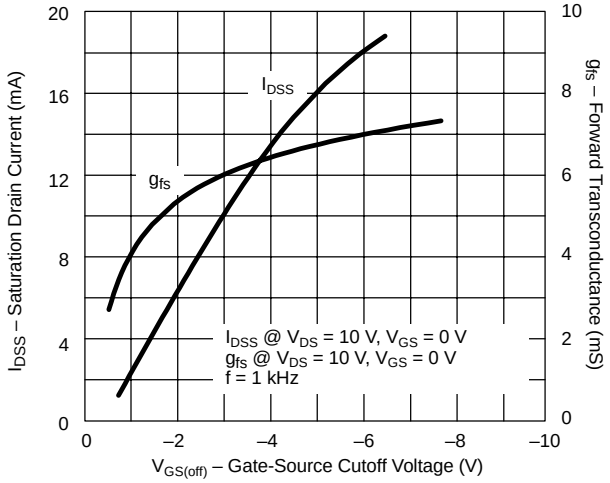
HIGH-FREQUENCY SPECIFICATIONS FOR 2N4416/2N4416A (T_A = 25°C UNLESS NOTED)

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	g_{iss}	V_{DS} = 15 V, V_{GS} = 0 V		100		1,000	µS
Common Source Input Susceptance	b_{iss}			2,500		10,000	
Common Source Output Conductance	g_{oss}			75		100	
Common Source Output Susceptance	b_{oss}			1,000		4,000	
Common Source Forward Transconductance	g_{fs}				4,000		
Common-Source Power Gain	G_{ps}	V_{DS} = 15 V, I_D = 5 mA	18		10		dB
Noise Figure	NF	R_G = 1 kΩ		2		4	

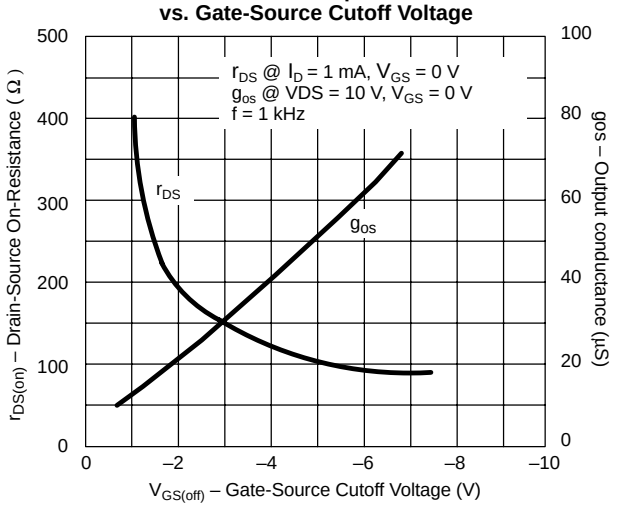
Notes
a. Typical values are for DESIGN AID ONLY, not guaranteed nor subject to production testing. NH
b. Pulse test: PW ≤ 300 µs duty cycle ≤ 3%.
c. This parameter not registered with JEDEC.

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

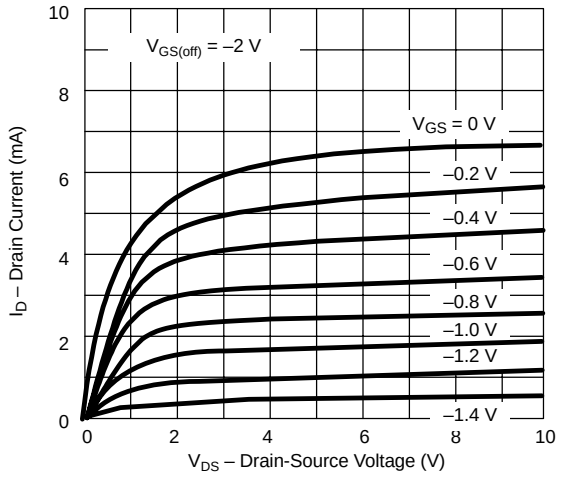
Drain Current and Transconductance vs. Gate-Source Cutoff Voltage



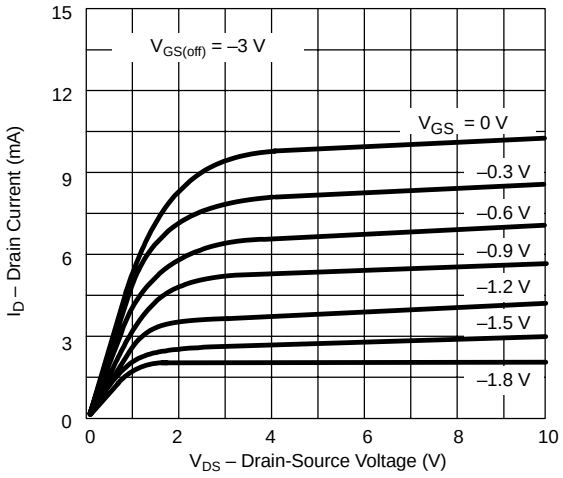
On-Resistance and Output Conductance vs. Gate-Source Cutoff Voltage



Output Characteristics

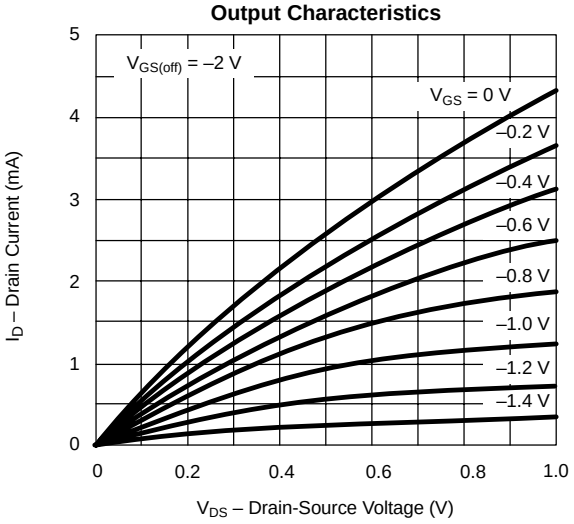


Output Characteristics

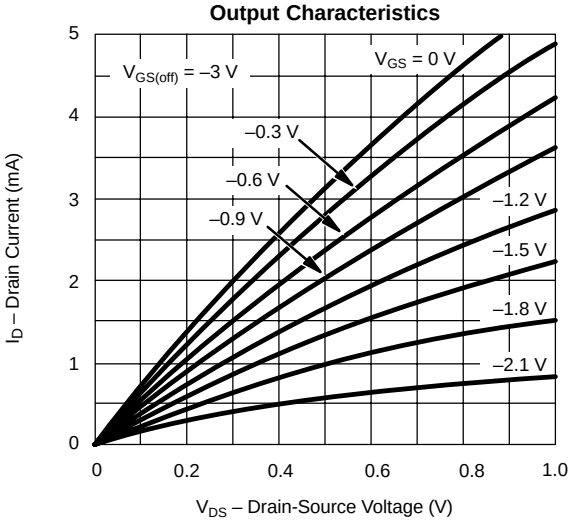


TYPICAL CHARACTERISTICS (T_A = 25°C UNLESS OTHERWISE NOTED)

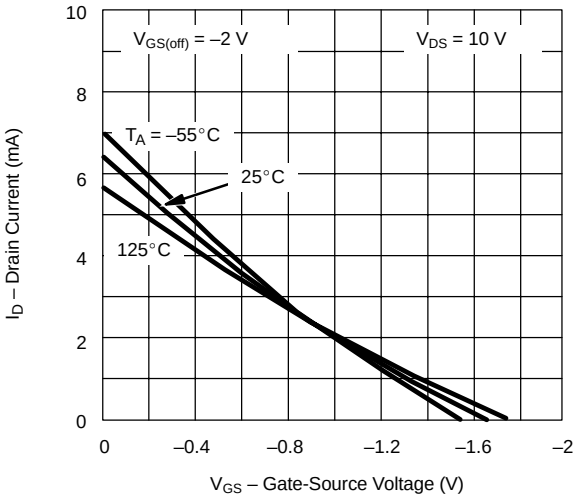
Output Characteristics



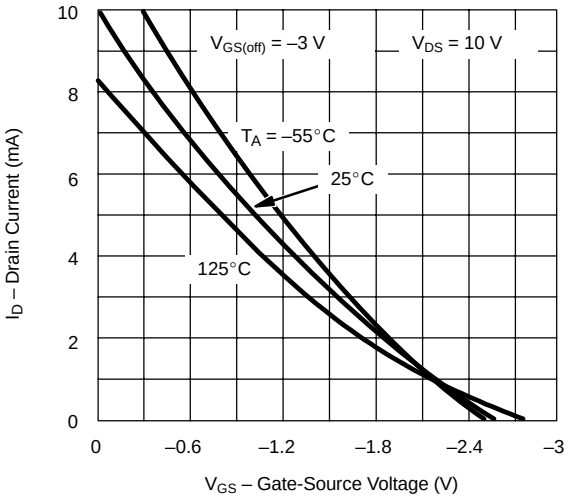
Output Characteristics



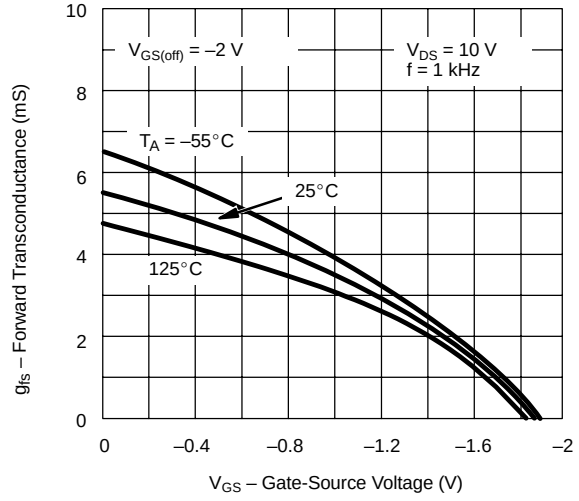
Transfer Characteristics



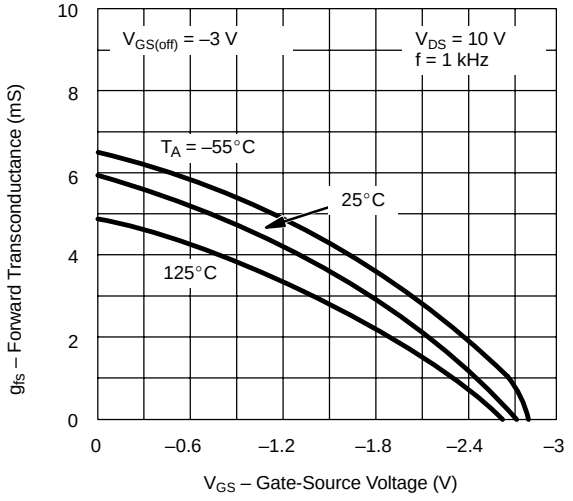
Transfer Characteristics



Transconductance vs. Gate-Source Voltage

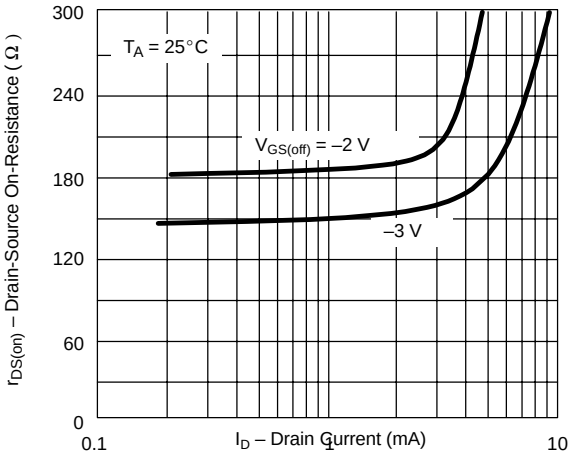


Transconductance vs. Gate-Source Voltgage

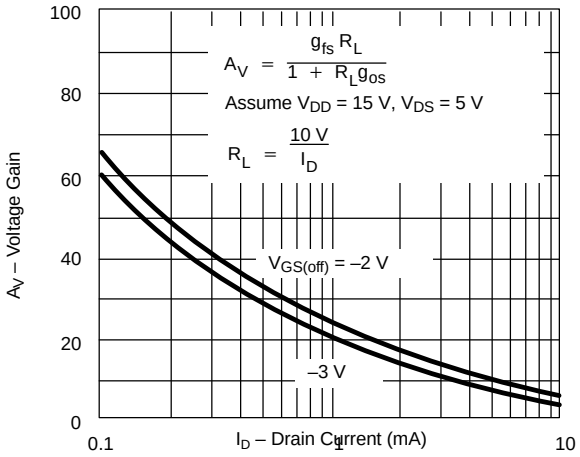


TYPICAL CHARACTERISTICS (T_A = 25°C UNLESS OTHERWISE NOTED)

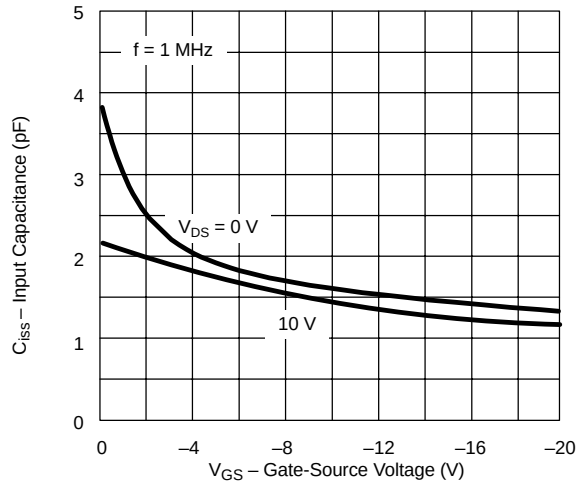
On-Resistance vs. Drain Current



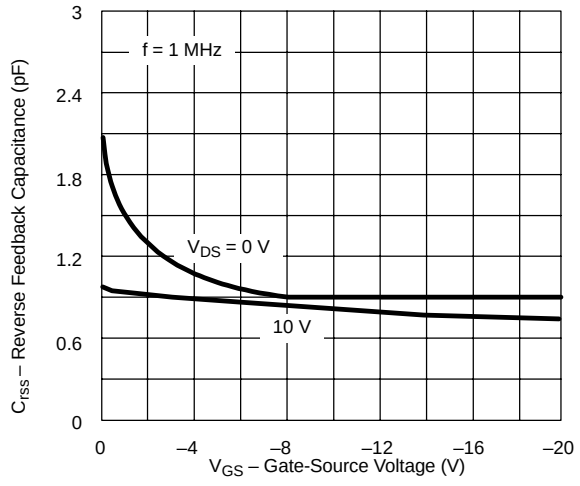
Circuit Voltage Gain vs. Drain Current



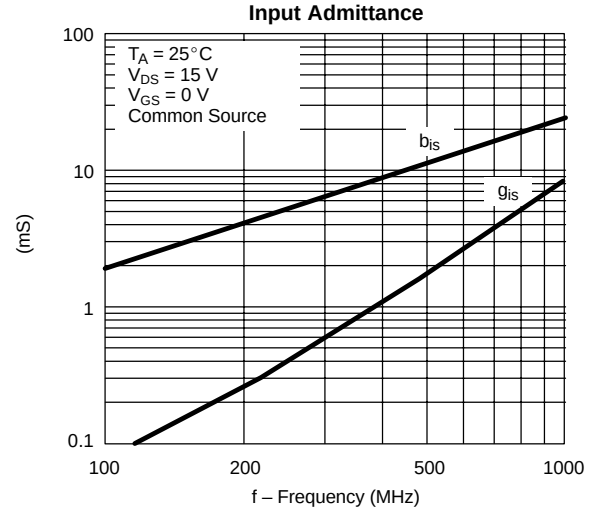
Common-Source Input Capacitance vs. Gate-Source Voltage



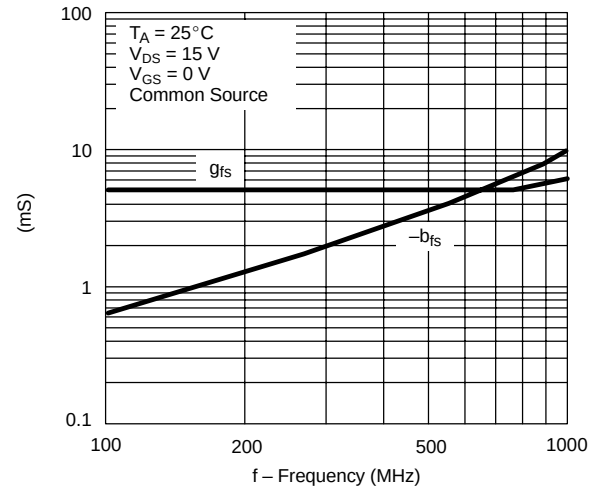
Common-Source Reverse Feedback Capacitance vs. Gate-Source Voltage



Input Admittance

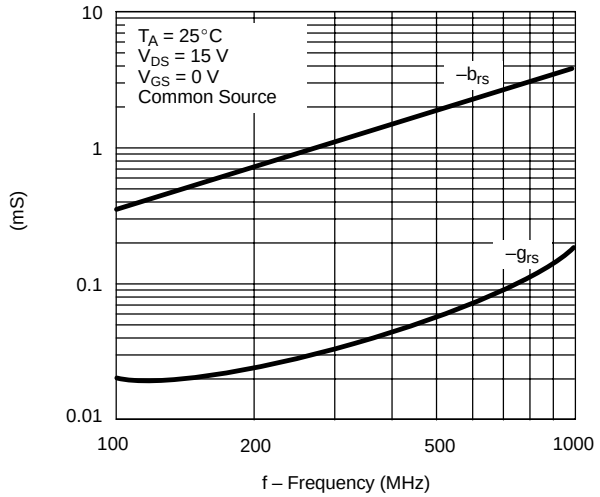


Forward Admittance

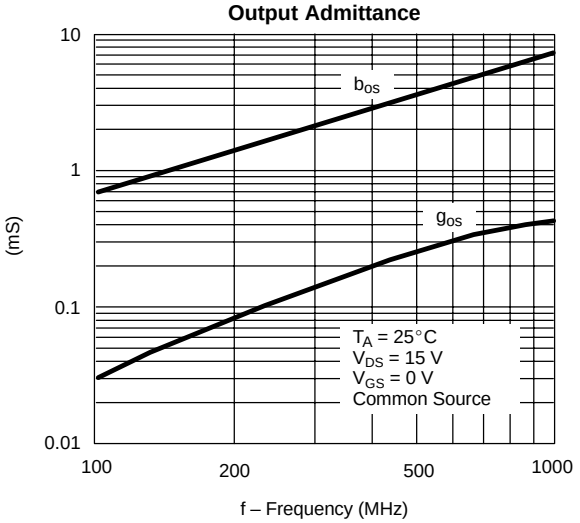


TYPICAL CHARACTERISTICS (T_A = 25°C UNLESS OTHERWISE NOTED)

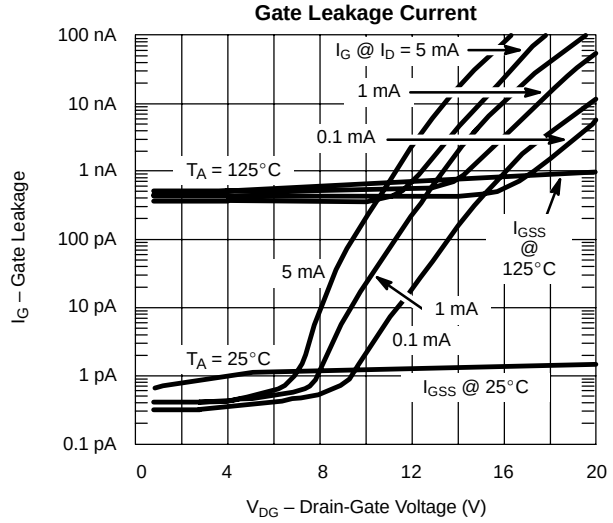
Reverse Admittance



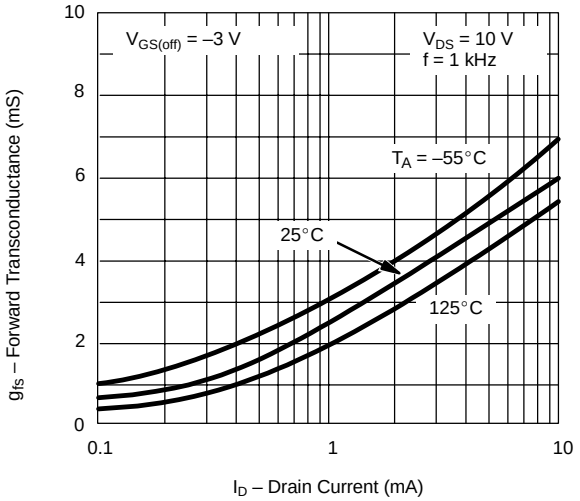
Output Admittance



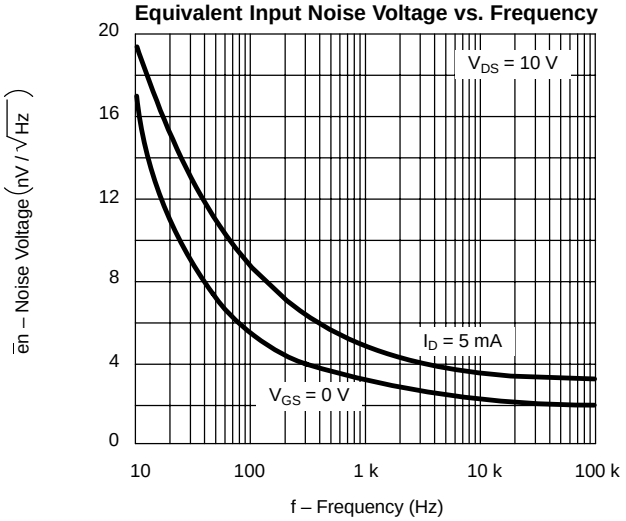
Gate Leakage Current



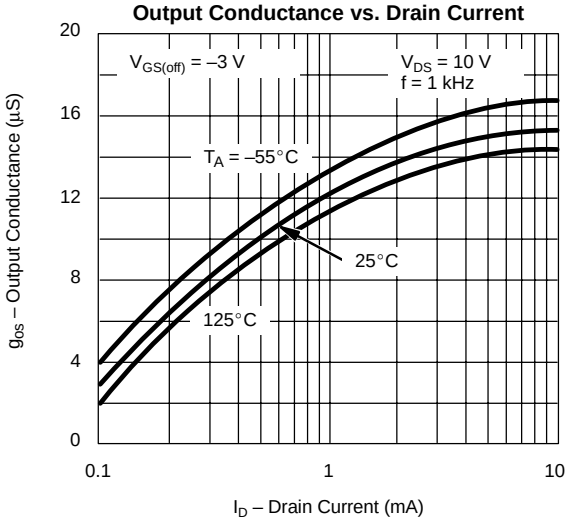
Common-Source Forward Transconductance vs. Drain Current



Equivalent Input Noise Voltage vs. Frequency



Output Conductance vs. Drain Current



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