

## N-Channel JFETs

<b>PRODUCT SUMMARY</b>				
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,  $G_{ps}$  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

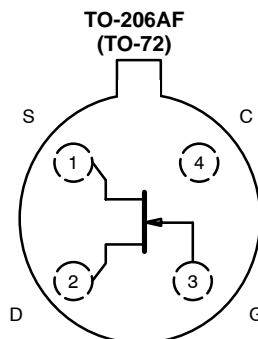
### APPLICATIONS

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

### DESCRIPTION

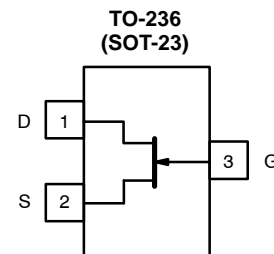
The 2N4416/2N4416A/SST4416 n-channel JFETs are designed to provide high-performance amplification at high frequencies.

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.



Top View

2N4416  
2N4416A



Top View

SST4416 (H1)\*

\*Marking Code for TO-236

For applications information see AN104.



Vishay Siliconix

## ABSOLUTE MAXIMUM RATINGS

Gate-Drain, Gate-Source Voltage :	Operating Junction Temperature . . . . .	-55 to 150 °C
(2N/SST4416) . . . . .	Power Dissipation :	(2N Prefix) <sup>a</sup> . . . . . 300 mW
(2N4416A) . . . . .	(SST Prefix) <sup>b</sup> . . . . .	350 mW
Gate Current . . . . .	Notes	
. . . . .	a. Derate 2.4 mW/°C above 25°C	
Lead Temperature . . . . .	b. Derate 2.8 mW/°C above 25°C	
. . . . .		
Storage Temperature :		
(2N Prefix) . . . . .		
(SST Prefix) . . . . .		

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 <sub>A</sub> = 25 °C UNLESS NOTED)										
Parameter	Symbol	Test Conditions	Typ <sup>a</sup>	Limits						Unit
				2N4416		2N4416A		SST4416		
				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	-36	-30		-35		-30		V
Gate-Source Cutoff Voltage	V <sub>GS(off)</sub>	V <sub>DS</sub> = 15 V, I <sub>D</sub> = 1 nA	-3		-6	-2.5	-6		-6	
Saturation Drain Current <sup>b</sup>	I <sub>DSS</sub>	V <sub>DS</sub> = 15 V, V <sub>GS</sub> = 0 V	10	5	15	5	15	5	15	mA
Gate Reverse Current	I <sub>GSS</sub>	V <sub>GS</sub> = -20 V, V <sub>DS</sub> = 0 V (2N)	-2		-100		-100			pA
		T <sub>A</sub> = 150°C	-4		-100		-100			
		V <sub>GS</sub> = -15 V, V <sub>DS</sub> = 0 V (SST)	-0.002						-1	nA
T <sub>A</sub> = 125°C	-0.6									
Gate Operating Current	I <sub>G</sub>	V <sub>DG</sub> = 10 V, I <sub>D</sub> = 1 mA	-20							pA
Drain Cutoff Current <sup>c</sup>	I <sub>D(off)</sub>	V <sub>DS</sub> = 10 V, V <sub>GS</sub> = -6 V	2							
Drain-Source On-Resistance <sup>c</sup>	r <sub>DS(on)</sub>	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 300 μA	150							Ω
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 <sup>b</sup>	g <sub>fs</sub>	V <sub>DS</sub> = 15 V, V <sub>GS</sub> = 0 V f = 1 kHz	6	4.5	7.5	4.5	7.5	4.5	7.5	mS
Common-Source Output Conductance <sup>b</sup>	g <sub>os</sub>		15		50		50		50	μS
Common-Source Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> = 15 V, V <sub>GS</sub> = 0 V f = 1 MHz	2.2		4		4			pF
Common-Source Reverse Transfer Capacitance	C <sub>rss</sub>		0.7		0.8		0.8			
Common-Source Output Capacitance	C <sub>oss</sub>		1		2		2			
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



**HIGH-FREQUENCY SPECIFICATIONS FOR 2N4416/2N4416A (T<sub>A</sub> = 25 °C UNLESS NOTED)**

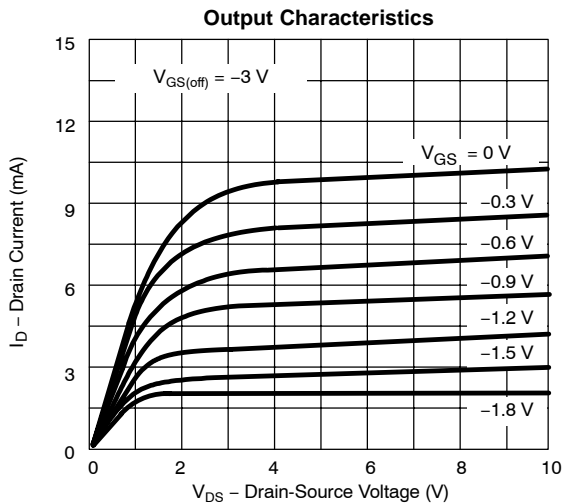
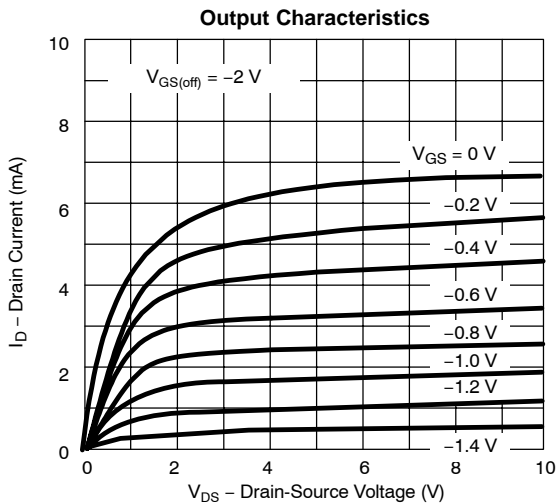
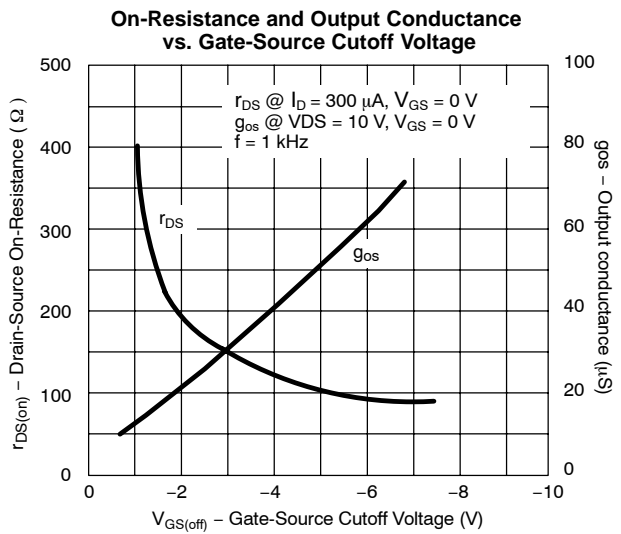
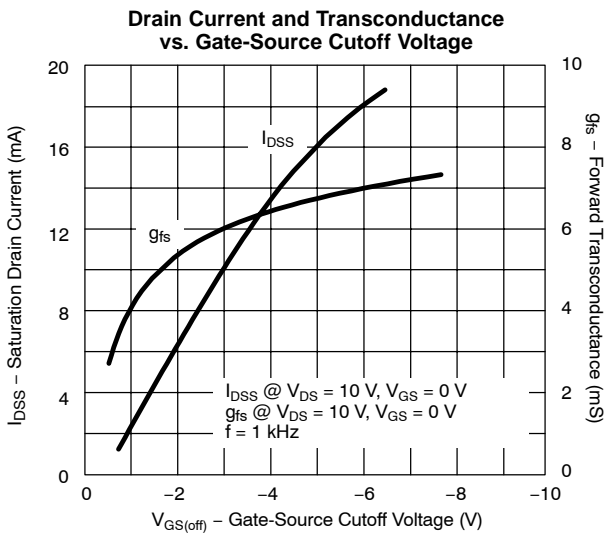
Parameter	Symbol	Test Conditions	Limits				Unit
			100 MHz		400 MHz		
			Min	Max	Min	Max	
Common Source Input Conductance <sup>d</sup>	$g_{iss}$	$V_{DS} = 15\text{ V}, V_{GS} = 0\text{ V}$		100		1,000	$\mu\text{S}$
Common Source Input Susceptance <sup>d</sup>	$b_{iss}$			2,500		10,000	
Common Source Output Conductance <sup>d</sup>	$g_{oss}$			75		100	
Common Source Output Susceptance <sup>d</sup>	$b_{oss}$			1,000		4,000	
Common Source Forward Transconductance <sup>d</sup>	$g_{fs}$				4,000		
Common-Source Power Gain <sup>d</sup>	$G_{ps}$	$V_{DS} = 15\text{ V}, I_D = 5\text{ mA}$	18		10		dB
Noise Figure <sup>d</sup>	NF	$R_G = 1\text{ k}\Omega$		2		4	

Notes

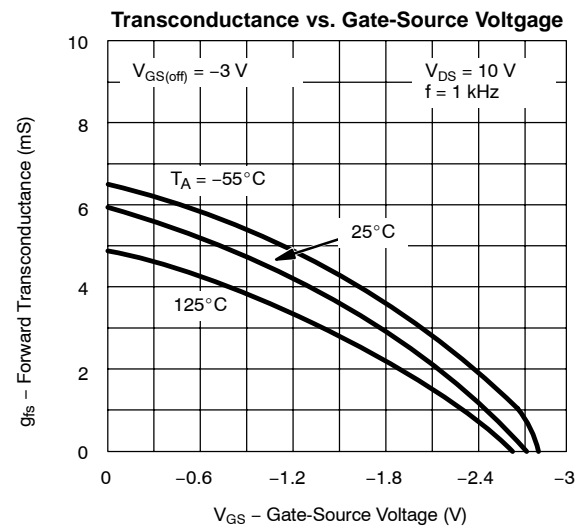
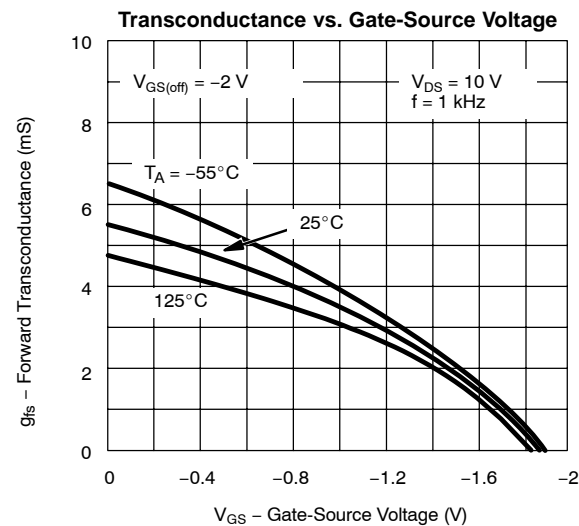
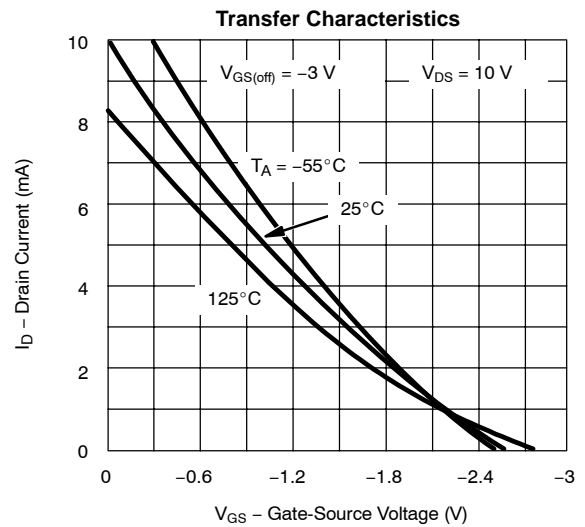
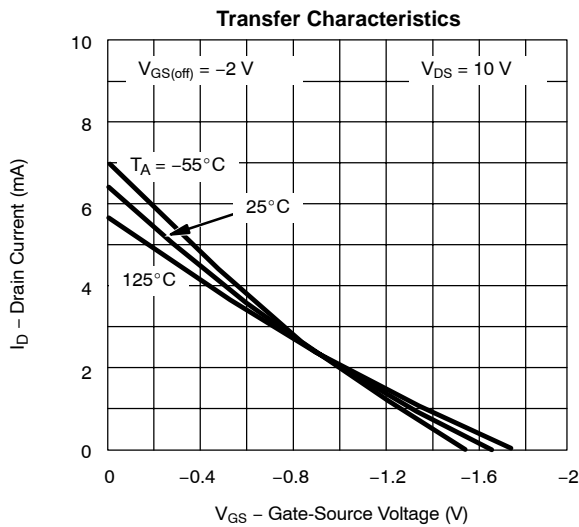
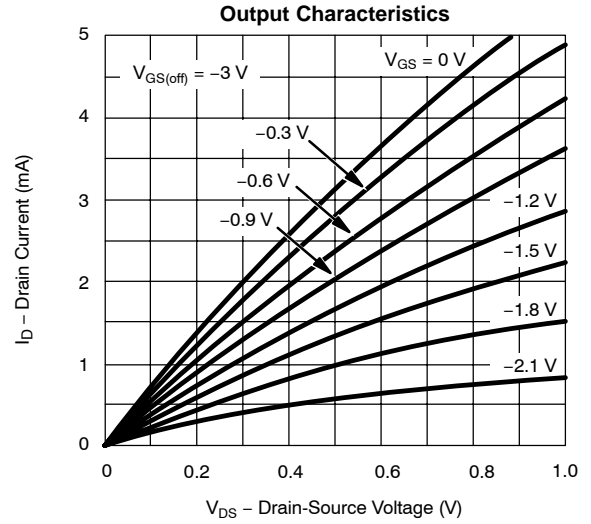
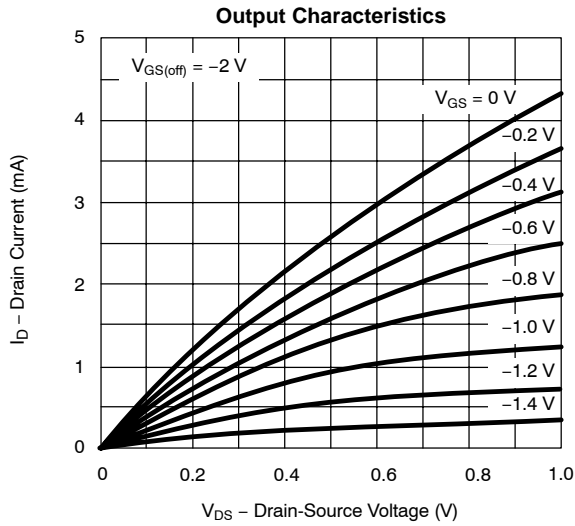
- a. Typical values are for DESIGN AID ONLY, not guaranteed nor subject to production testing.
- b. Pulse test:  $PW \leq 300\ \mu\text{s}$  duty cycle  $\leq 3\%$ .
- c. This parameter not registered with JEDEC.
- d. Not a production test.

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

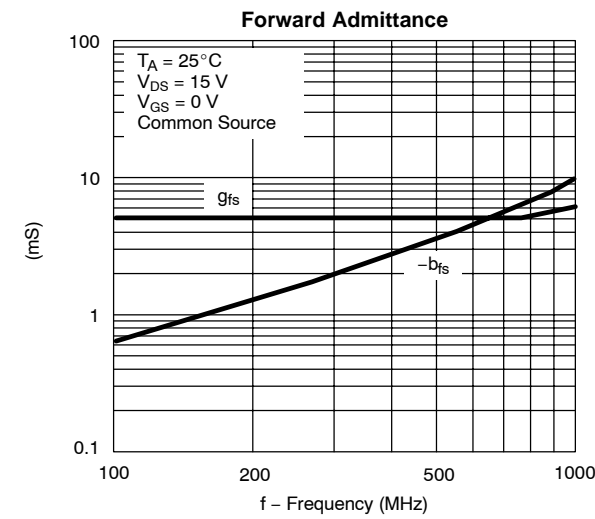
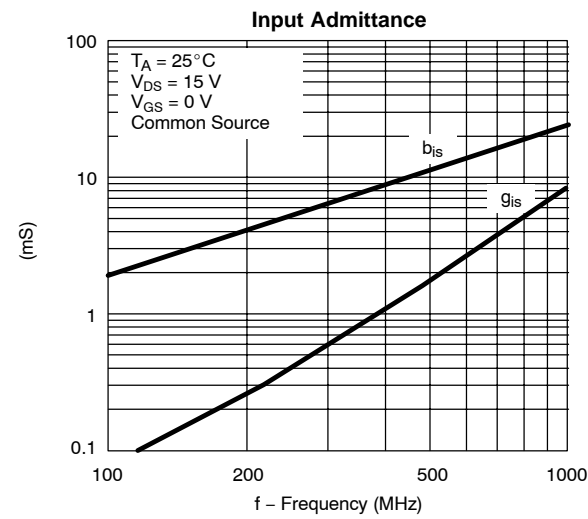
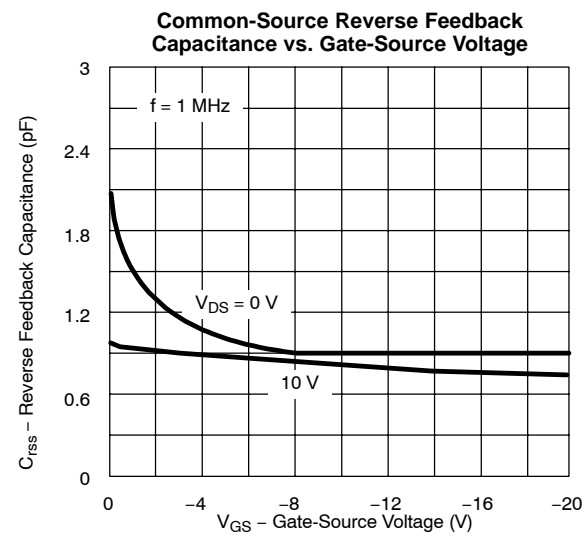
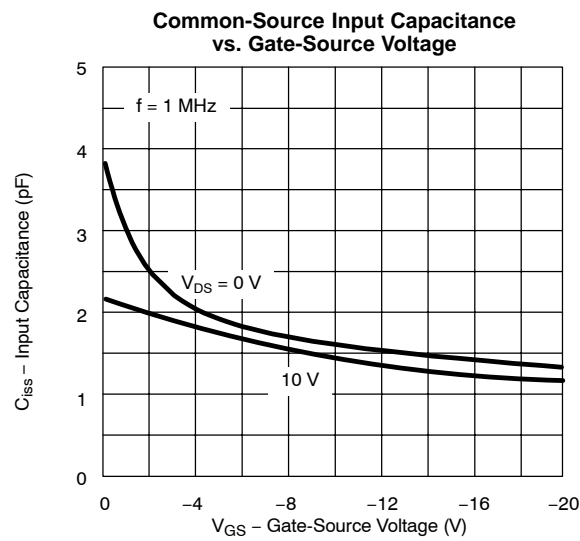
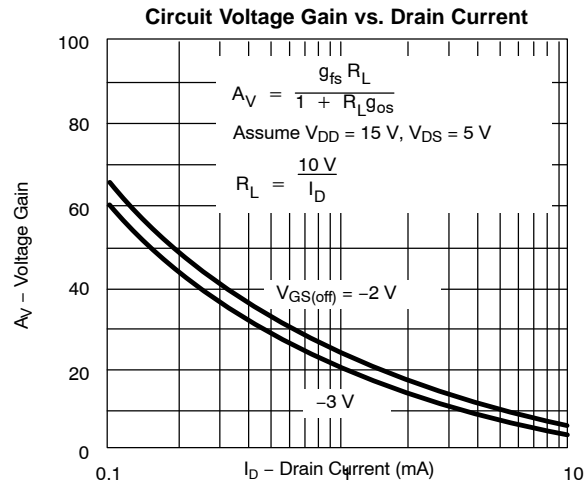
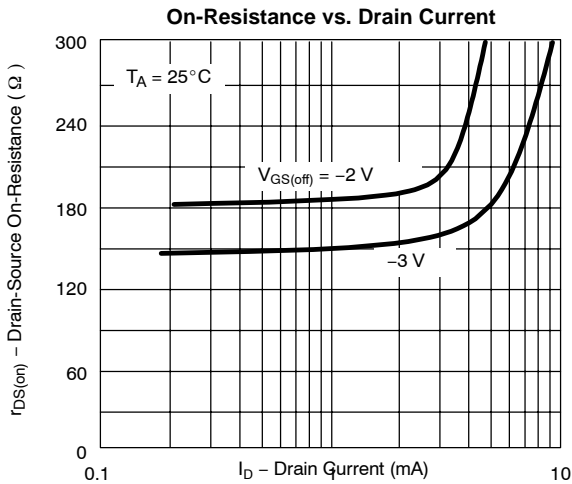


**TYPICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$  UNLESS OTHERWISE NOTED)**

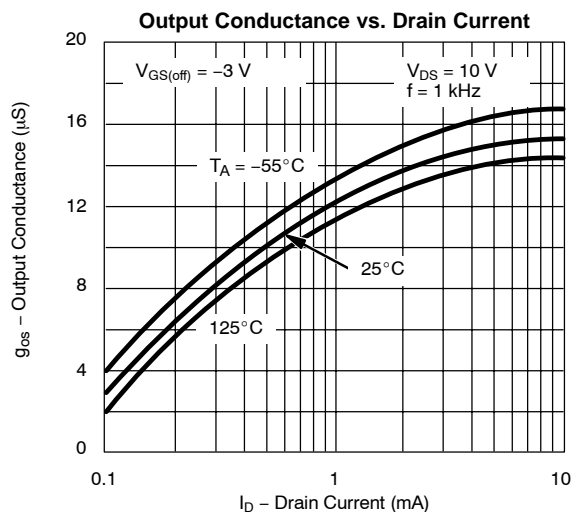
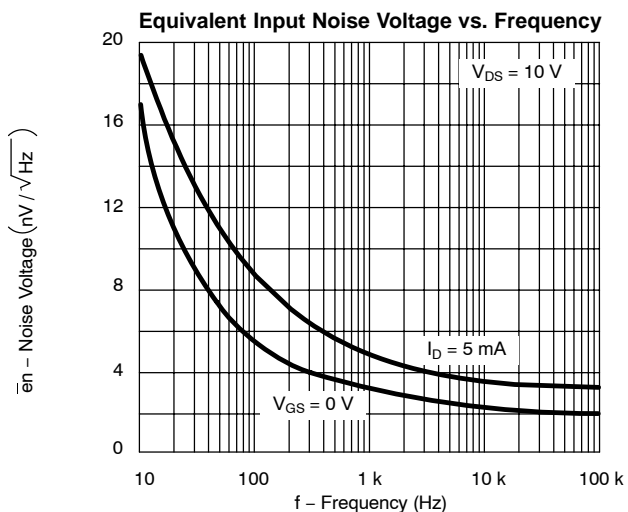
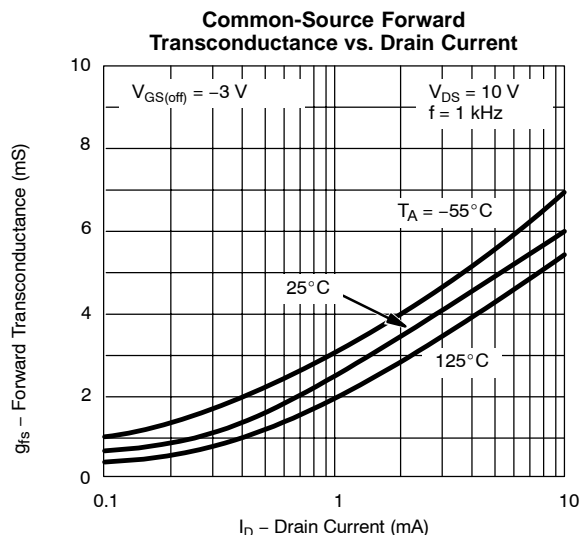
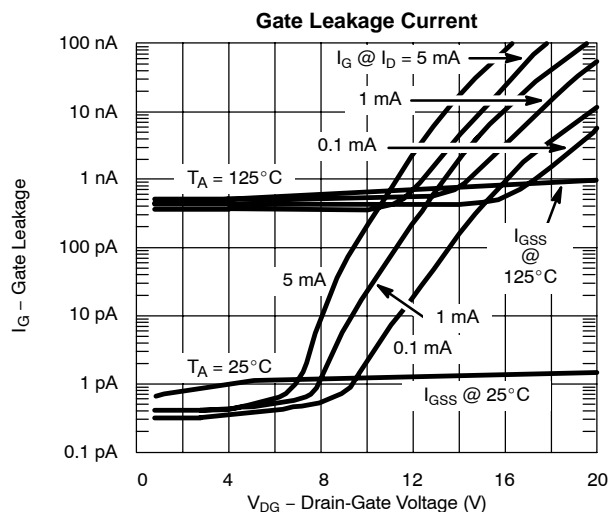
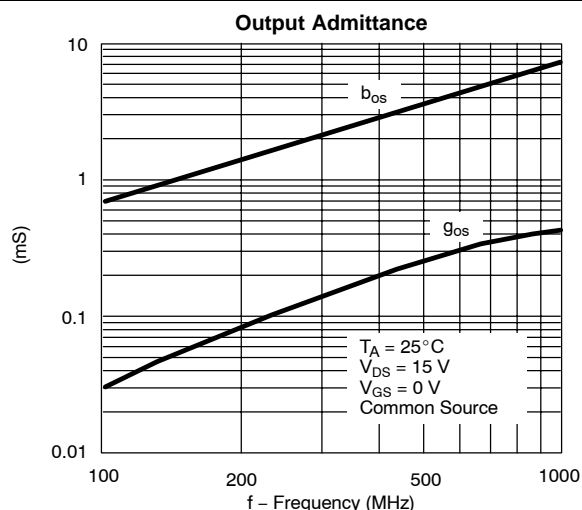
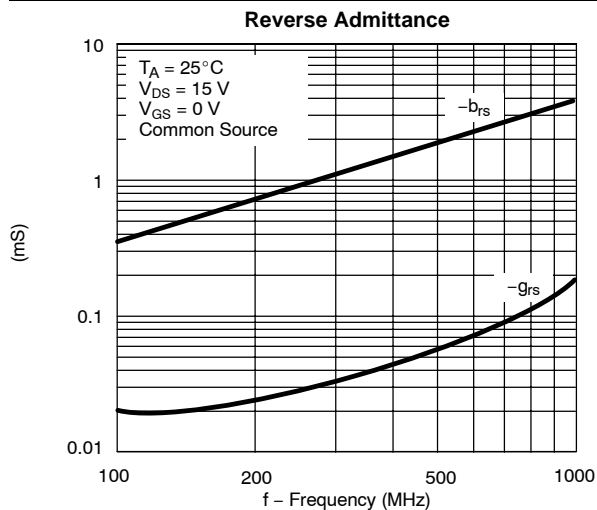




**TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25°C UNLESS OTHERWISE NOTED)**



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



Vishay Siliconix maintains worldwide manufacturing capability. Products may be manufactured at one of several qualified locations. Reliability data for Silicon Technology and Package Reliability represent a composite of all qualified locations. For related documents such as package/tape drawings, part marking, and reliability data, see <http://www.vishay.com/ppg?70242>.



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