2N4856A/4857A/4858A

N-Channel JFETs

Product Summary

Part Number	$V_{GS(off)}$ (V)	$V_{(BR)GSS}$ Min (V)	I_{DSS} Min (mA)	$r_{DS(on)}$ Max (Ω)	$I_{D(off)}$ Typ (pA)	t_{ON} Typ (ns)
2N4856A	–4 to –10	–40	50	25	5	4
2N4857A	–2 to –6	–40	20	40	5	4
2N4858A	–0.8 to –4	–40	8	60	5	4

Features

- Low On-Resistance: 2N4856A <25 Ω
- Fast Switching—t_{ON}: 4 ns
- High Off-Isolation—$I_{D(off)}$: 5 pA
- Low Capacitance: 3 pF
- Low Insertion Loss

Benefits

- Low Error Voltage
- High-Speed Analog Circuit Performance
- Negligible "Off-Error," Excellent Accuracy
- Good Frequency Response
- Eliminates Additional Buffering

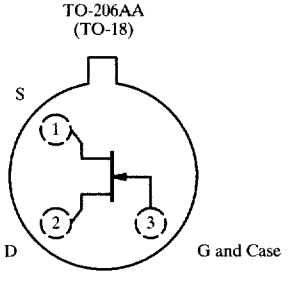
Applications

- Analog Switches
- Choppers
- Sample-and-Hold
- Normally "On" Switches
- Current Limiters

Description

The 2N4856A/4857A/4858A all-purpose JFET analog switches offer low on-resistance, low capacitance, good isolation, and fast switching.

Hermetically-sealed TO-206AA (TO-18) packaging allows full military processing (see Military Information). For similar products in TO-226AA (TO-92) and SOT-23 packages, see the J/SST111 series data sheet. For similar duals, see the 2N5564/5565/5566 data sheet.



Absolute Maximum Ratings

Gate-Drain, Gate-Source Voltage : (2N4856A-58A) ..... –40 V
Gate Current ..... 50 mA
Lead Temperature ($^1/_{16}$" from case for 10 seconds) ..... 300 °C
Storage Temperature ..... –65 to 200°C
Operating Junction Temperature ..... –55 to 200°C
Power Dissipation[a] ..... 1.8 W

Notes
a. Derate 10 mW/°C for $T_C > 25°C$

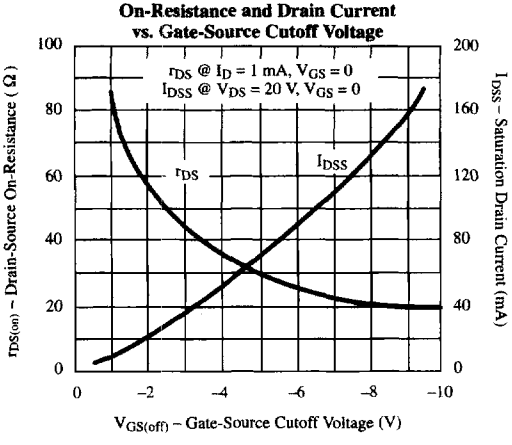
Updates to this data sheet may be obtained via facsimile by calling Siliconix FaxBack, 1-408-970-5600. Please request FaxBack document #70243.

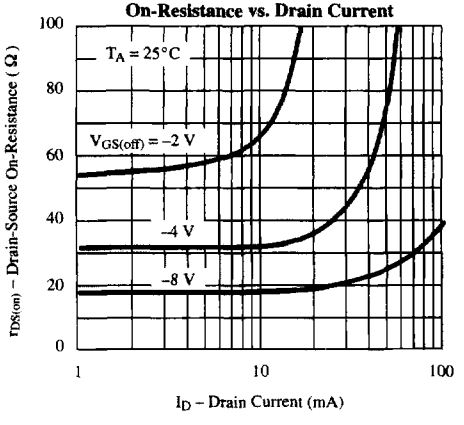
Specifications[a]

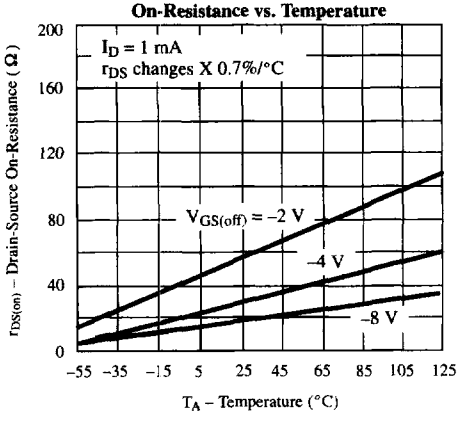
Parameter	Symbol	Test Conditions	Typ[b]	Limits 2N4856A Min	2N4856A Max	2N4857A Min	2N4857A Max	2N4858A Min	2N4858A Max	Unit
Static										
Gate-Source Breakdown Voltage	$V_{(BR)GSS}$	I_G = –1 µA, V_{DS} = 0 V	–55	–40		–40		–40		V
Gate-Source Cutoff Voltage	$V_{GS(off)}$	V_{DS} = 15 V, I_D = 0.5 nA		–4	–10	–2	–6	–0.8	–4	V
Saturation Drain Current[c]	I_{DSS}	V_{DS} = 15 V, V_{GS} = 0 V		50		20	100	8	80	mA
Gate Reverse Current	I_{GSS}	V_{GS} = –20 V, V_{DS} = 0 V	–5		–250		–250		–250	pA
		T_A = 150°C	–13		–500		–500		–500	nA
Gate Operating Current[d]	I_G	V_{DG} = 15 V, I_D = 10 mA	–5							pA
Drain Cutoff Current	$I_{D(off)}$	V_{DS} = 15 V, V_{GS} = –10 V	5		250		250		250	pA
		T_A = 150°C	13		500		500		500	nA
Drain-Source On-Voltage	$V_{DS(on)}$	V_{GS} = 0 V, I_D = 5 mA	0.25						0.5	V
		I_D = 10 mA	0.35				0.5			
		I_D = 20 mA	0.5		0.75					
Drain-Source On-Resistance[d]	$r_{DS(on)}$	V_{GS} = 0 V, I_D = 1 mA			25		40		60	Ω
Gate-Source Forward Voltage[d]	$V_{GS(F)}$	I_G = 1 mA, V_{DS} = 0 V	0.7							V
Dynamic										
Common-Source Forward Transconductance[d]	g_{fs}	V_{DS} = 20 V, I_D = 1 mA, f = 1 kHz	6							mS
Common-Source Output Conductance[d]	g_{os}		25							µS
Drain-Source On-Resistance	$r_{ds(on)}$	V_{GS} = 0 V, I_D = 0 mA, f = 1 kHz			25		40		60	Ω
Common-Source Input Capacitance	C_{iss}	V_{DS} = 0 V, V_{GS} = –10 V, f = 1 MHz	7		10		10		10	pF
Common-Source Reverse Transfer Capacitance	C_{rss}		3		4		3.5		3.5	
Equivalent Input Noise Voltage[d]	$\bar{e}_n$	V_{DS} = 10 V, I_D = 10 mA, f = 1 kHz	3							$\frac{nV}{\sqrt{Hz}}$
Switching										
Turn-On Time	$t_{d(on)}$	V_{DD} = 10 V, V_{GSH} = 0 V, See Switching Circuit	2		5		6		8	ns
	t_r		2		3		4		8	
Turn-Off Time	t_{OFF}		12		20		40		80	

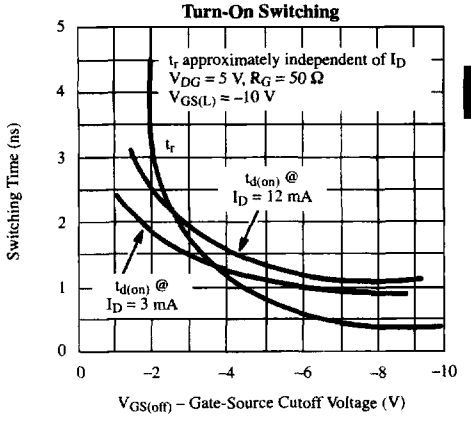
Notes
a. T_A = 25°C unless otherwise noted. NCB
b. Typical values are for DESIGN AID ONLY, not guaranteed nor subject to production testing.
c. Pulse test: PW ≤ 100 µs duty cycle ≤ 10%.
d. This parameter not registered with JEDEC.

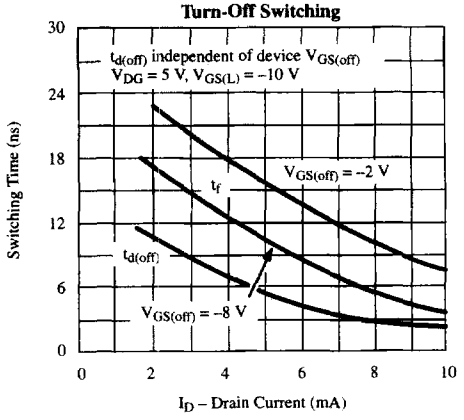
Typical Characteristics

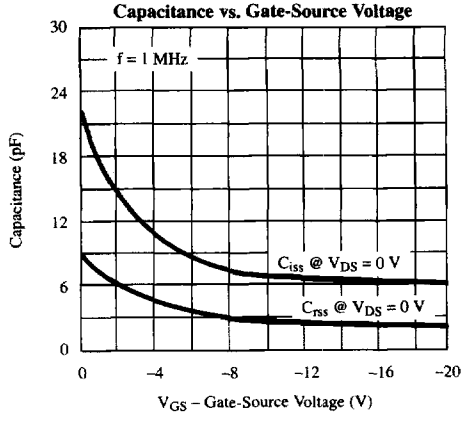








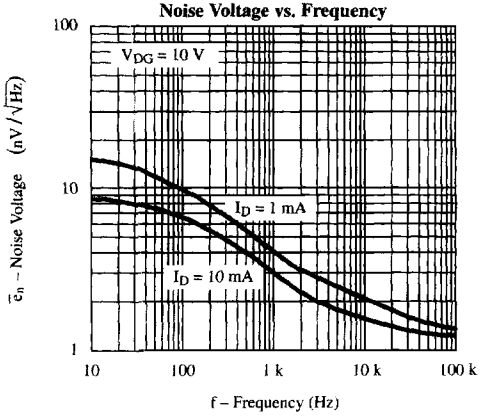




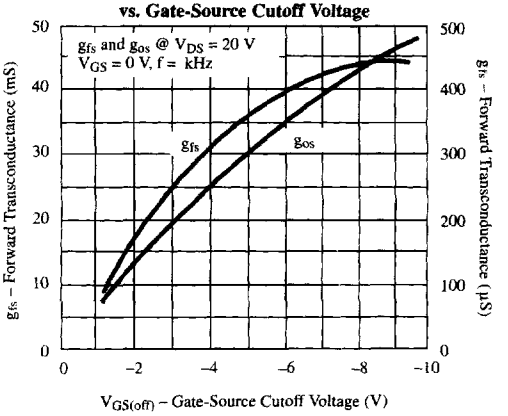
7 N-Channel JFETs

Typical Characteristics (Cont'd)

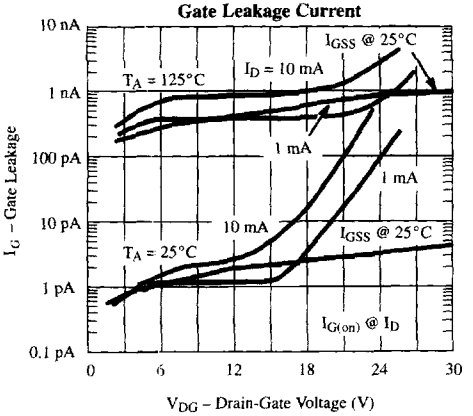
Noise Voltage vs. Frequency



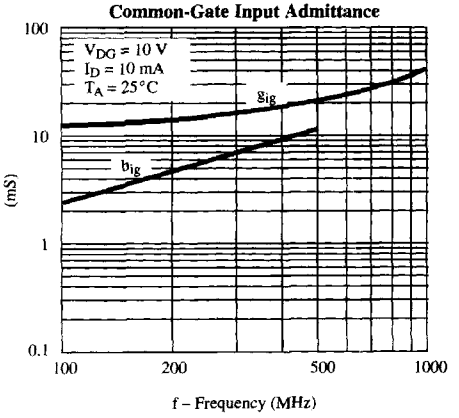
Forward Transconductance and Output Conductance vs. Gate-Source Cutoff Voltage



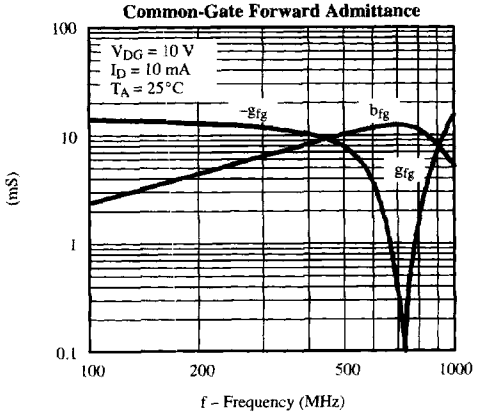
Gate Leakage Current



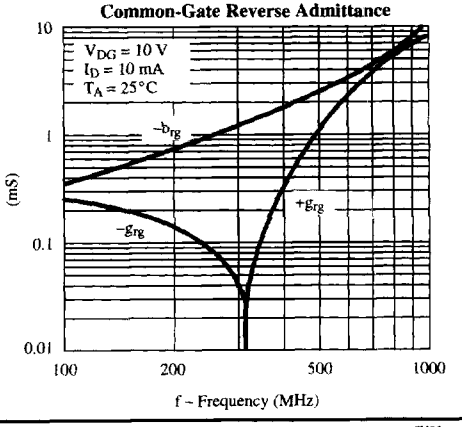
Common-Gate Input Admittance



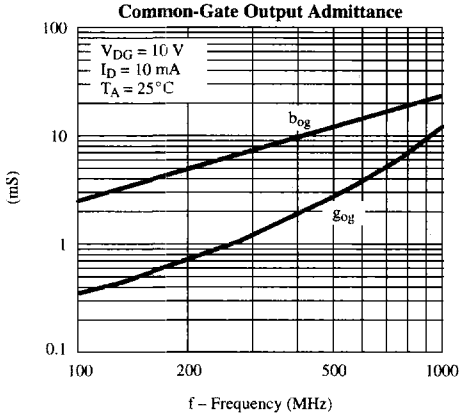
Common-Gate Forward Admittance

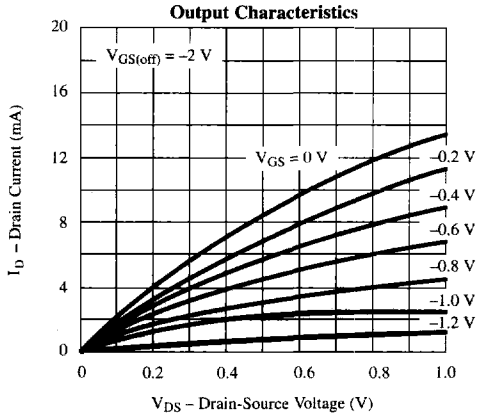


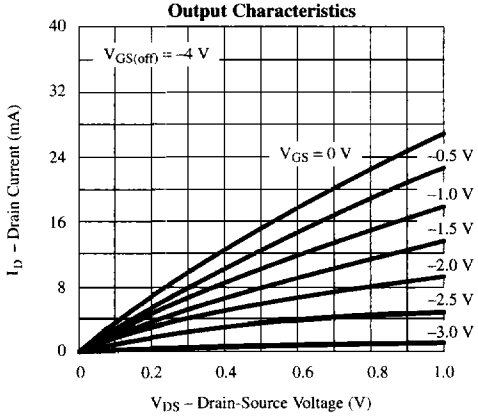
Common-Gate Reverse Admittance

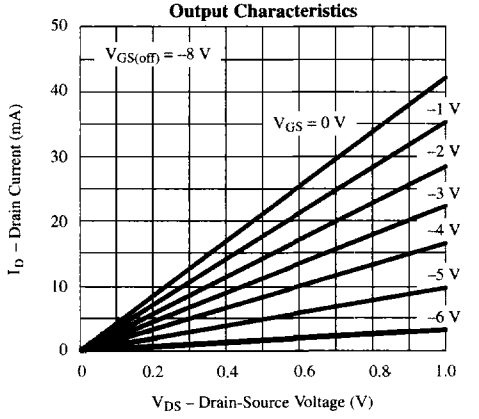


Typical Characteristics (Cont'd)









Switching Time Test Circuit

	2N4856A	2N4857A	2N4858A
$V_{GS(L)}$	–10 V	–6 V	–4 V
R_L*	464 Ω	953 Ω	1910 Ω
$I_{D(on)}$	20 mA	10 mA	5 mA

*Non-inductive

Input Pulse

Rise Time < 1 ns
Fall Time < 1 ns
Pulse Width 100 ns
PRF 1 MHz

Sampling Scope

Rise Time 0.4 ns
Input Resistance 10 MΩ
Input Capacitance 1.5 pF