



### N-Channel JFETs

PRODUCT SUMMARY						
Part Number	V <sub>GS(off)</sub> (V)	V <sub>(BR)GSS</sub> Min (V)	I <sub>DSS</sub> Min (mA)	r <sub>DS(on)</sub> Max (Ω)	I <sub>D(off)</sub> Typ (pA)	t <sub>ON</sub> 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<sub>ON</sub>: 4 ns
- High Off-Isolation—I<sub>D(off)</sub>: 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

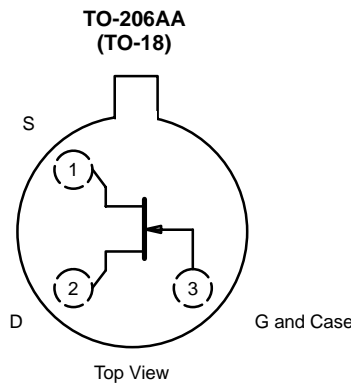
#### APPLICATIONS

- 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<sup>a</sup> ..... 1.8 W

#### Notes

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

### SPECIFICATIONS ( $T_A = 25$ °C UNLESS OTHERWISE NOTED)

Parameter	Symbol	Test Conditions	Typ <sup>a</sup>	Limits						Unit
				2N4856A		2N4857A		2N4858A		
				Min	Max	Min	Max	Min	Max	
<b>Static</b>										
Gate-Source Breakdown Voltage	$V_{(BR)GSS}$	$I_G = -1 \mu A, V_{DS} = 0 V$	-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	
Saturation Drain Current <sup>b</sup>	$I_{DSS}$	$V_{DS} = 15 V, V_{GS} = 0 V$		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
Gate Operating Current <sup>c</sup>	$I_G$	$V_{DG} = 15 V, I_D = 10 mA$	-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
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 <sup>c</sup>	$r_{DS(on)}$	$V_{GS} = 0 V, I_D = 1 mA$			25		40		60	Ω
Gate-Source Forward Voltage <sup>c</sup>	$V_{GS(F)}$	$I_G = 1 mA, V_{DS} = 0 V$	0.7							V
<b>Dynamic</b>										
Common-Source Forward Transconductance <sup>c</sup>	$g_{fs}$	$V_{DS} = 20 V, I_D = 1 mA$ $f = 1 kHz$	6							mS
	$g_{os}$		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 <sup>c</sup>	$\bar{e}_n$	$V_{DS} = 10 V, I_D = 10 mA$ $f = 1 kHz$	3							nV/ √Hz
<b>Switching</b>										
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	

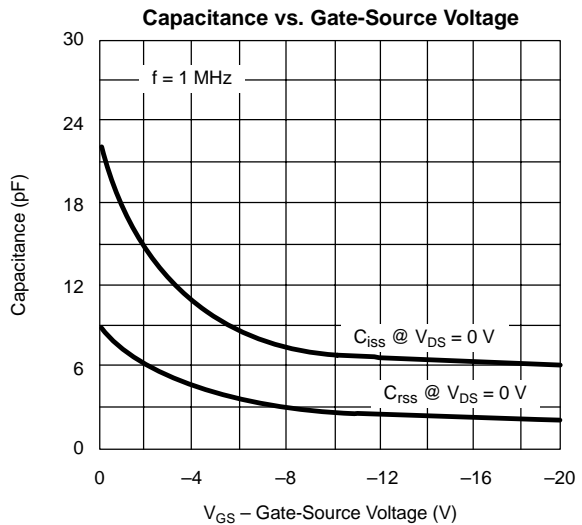
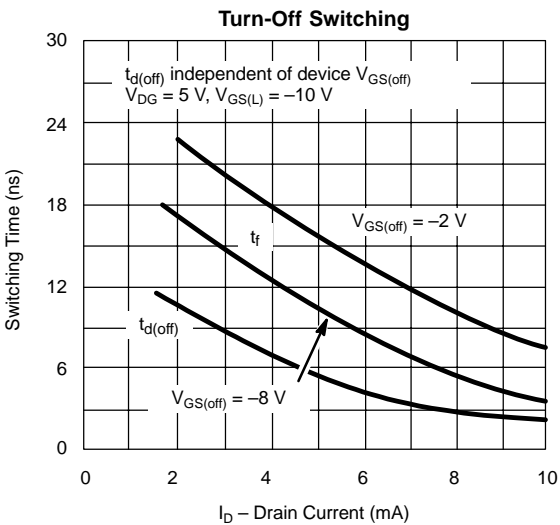
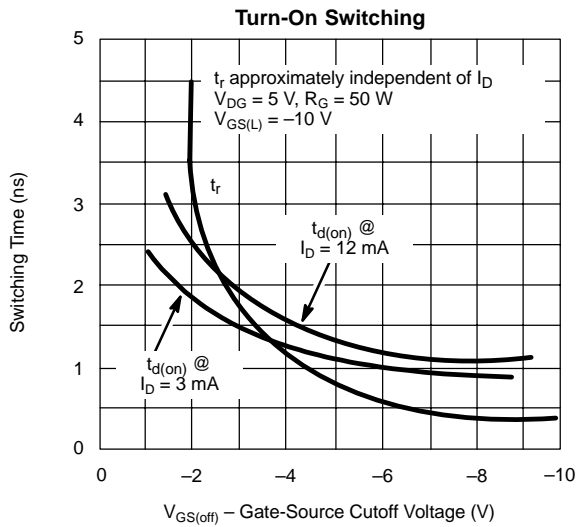
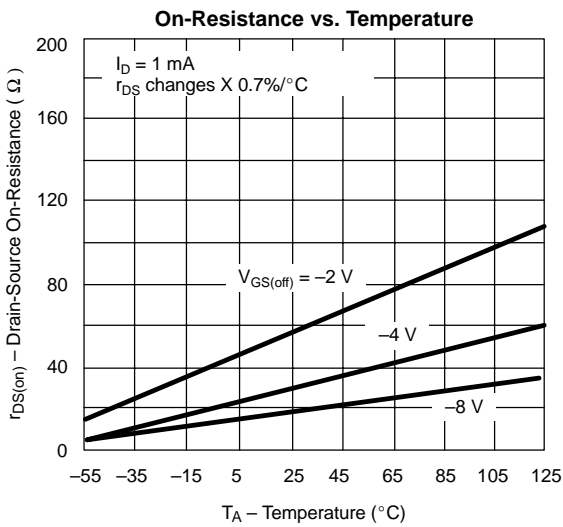
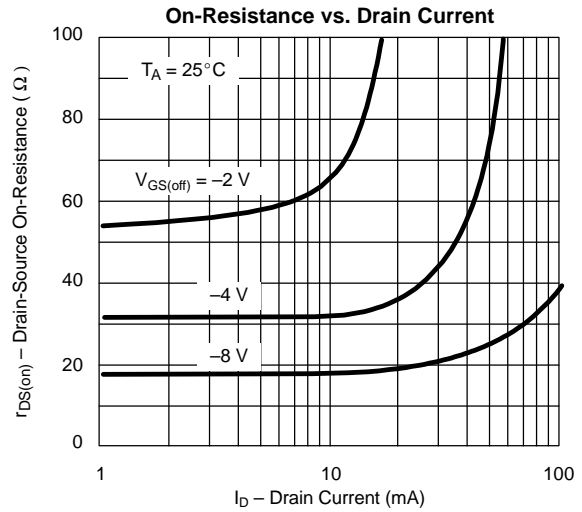
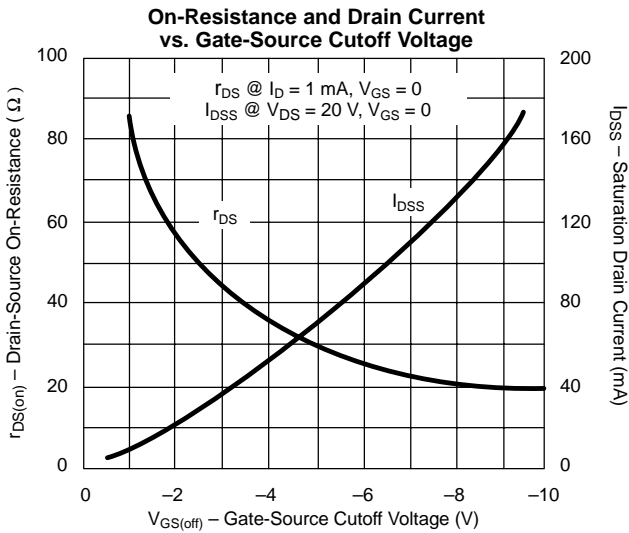
#### Notes

- a. Typical values are for DESIGN AID ONLY, not guaranteed nor subject to production testing.
- b. Pulse test:  $PW \leq 100 \mu s$  duty cycle  $\leq 10\%$ .
- c. This parameter not registered with JEDEC.

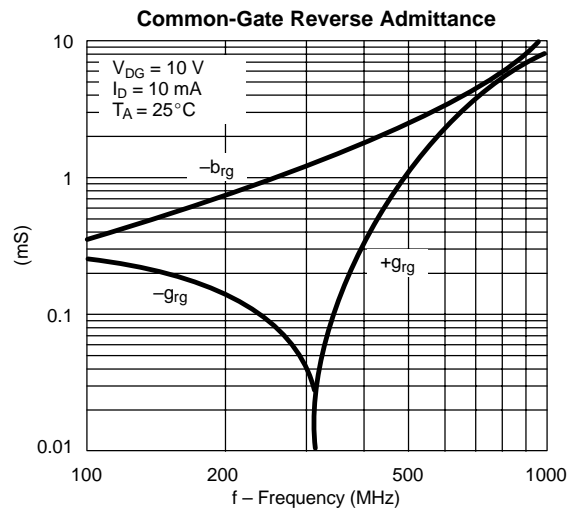
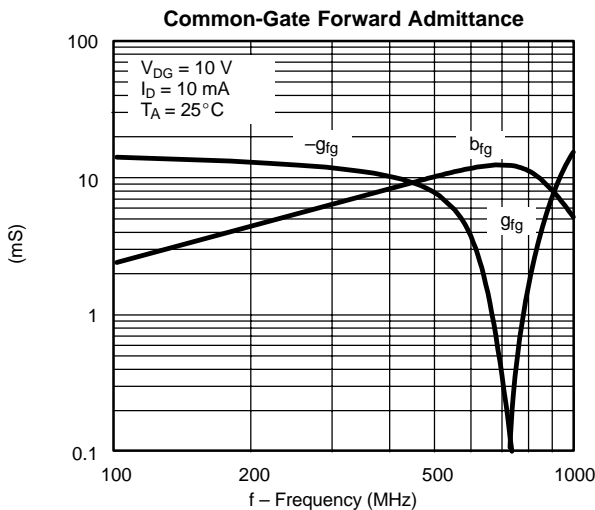
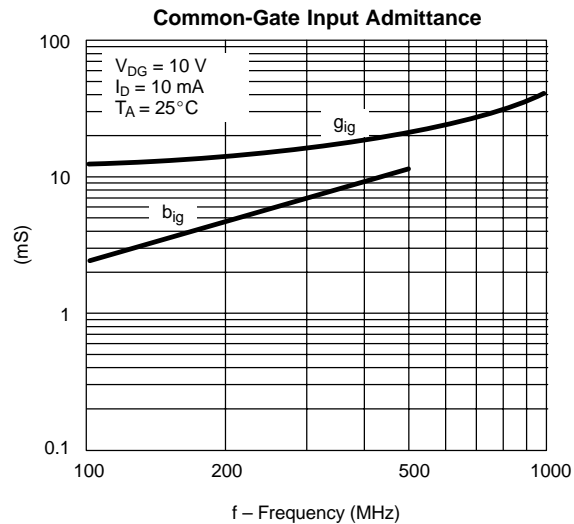
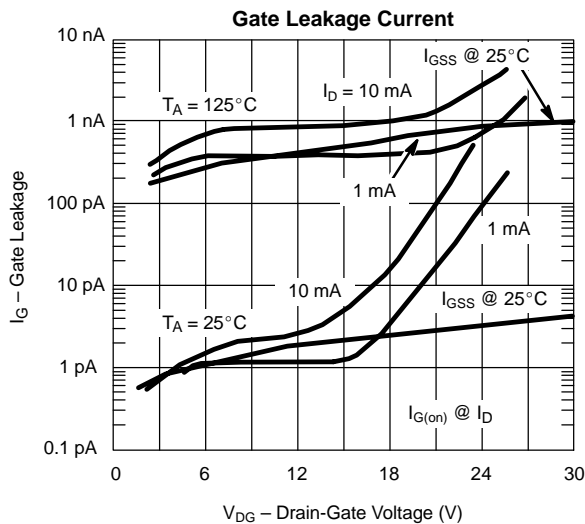
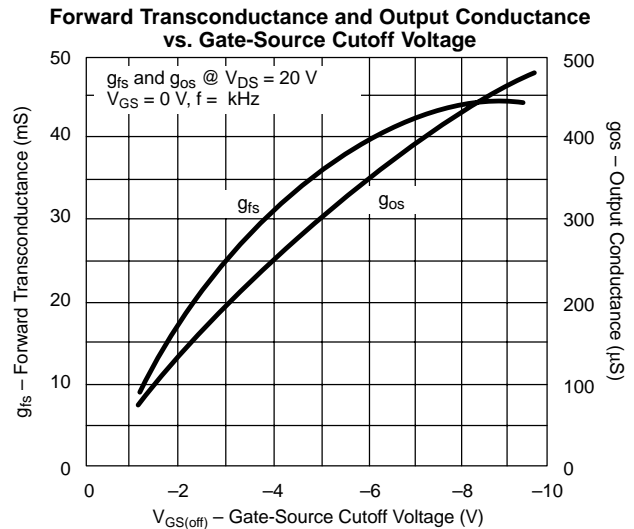
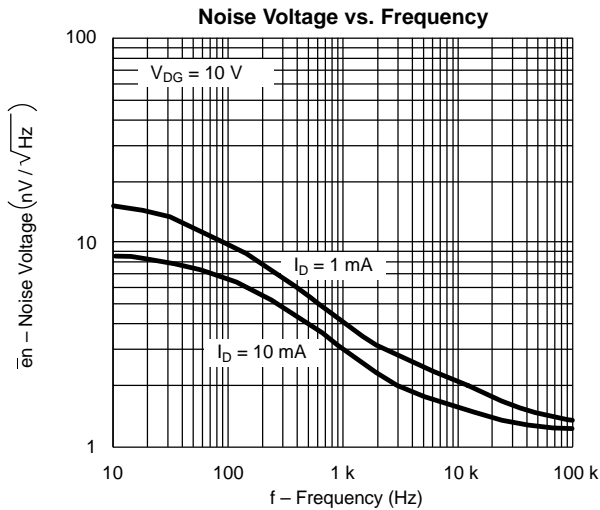
NCB



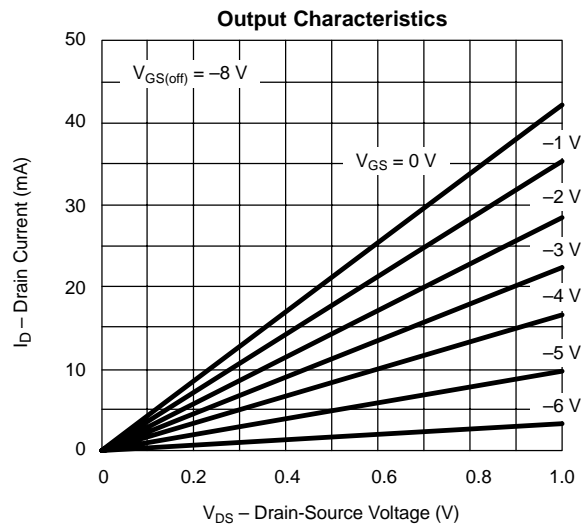
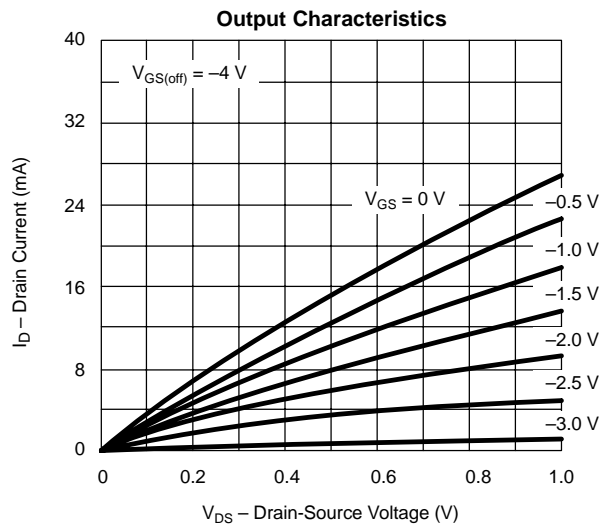
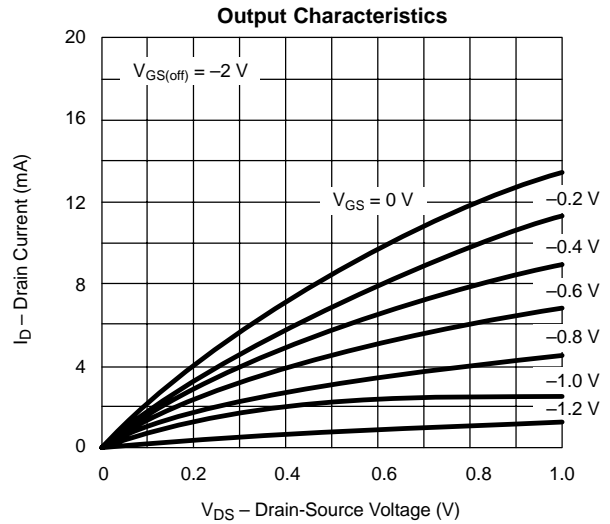
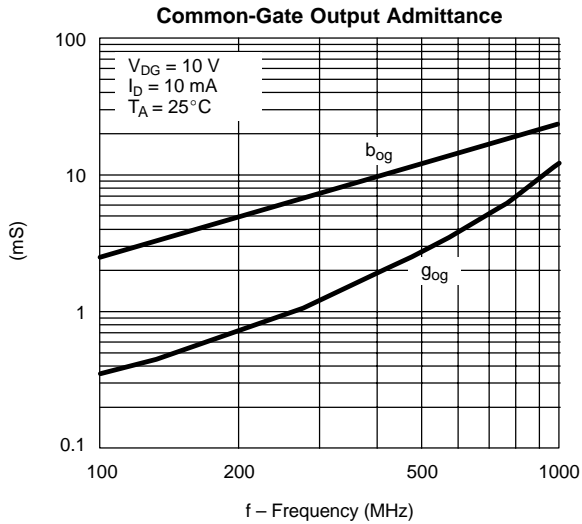
**TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25°C UNLESS OTHERWISE NOTED)**



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



### SWITCHING TIME TEST CIRCUIT

	2N4856A	2N4857A	2N4858A
$V_{GS(L)}$	-10 V	-6 V	-4 V
$R_L^*$	464 $\Omega$	953 $\Omega$	1910 $\Omega$
$I_{D(on)}$	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 M $\Omega$   
 Input Capacitance 1.5 pF

