

N-Channel JFETs

2N4856JAN	2N4856JANTX	2N4856JANTXV
2N4857JAN	2N4857JANTX	2N4857JANTXV
2N4858JAN	2N4858JANTX	2N4858JANTXV
2N4859JAN	2N4859JANTX	2N4859JANTXV
2N4860JAN	2N4860JANTX	2N4860JANTXV
2N4861JAN	2N4861JANTX	2N4861JANTXV

PRODUCT SUMMARY					
Part Number	V _{GS(off)} (V)	V _{(BR)GSS} Min (V)	r _{DS(on)} Max (Ω)	I _{D(off)} Max (pA)	t _{ON} Typ (ns)
2N4856	-4 to -10	-40	25	250	9
2N4857	-2 to -6	-40	40	250	10
2N4858	-0.8 to -4	-40	60	250	20
2N4859	-4 to -10	-30	25	250	9
2N4860	-2 to -6	-30	40	250	10
2N4861	-0.8 to -4	-30	60	250	20

FEATURES

- Low On-Resistance: 2N4856 <25 Ω
- Fast Switching—t_{ON}: 4 ns
- High Off-Isolation—I_{D(off)}: 5 pA
- Low Capacitance: 3 pF
- Low Insertion Loss
- N-Channel Majority Carrier FET

BENEFITS

- Low Error Voltage
- High-Speed Analog Circuit Performance
- Negligible “Off-Error,” Excellent Accuracy
- Good Frequency Response, Low Glitches
- Eliminates Additional Buffering
- High Radiation Tolerance

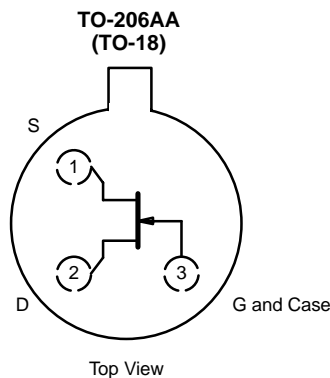
APPLICATIONS

- Analog Switches
- Choppers
- Sample-and-Hold
- Normally “On” Switches
- Current Limiters

DESCRIPTION

The 2N4856JAN/JANTX/JANTXV 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 TO-236 (SOT-23) packages, see the J/SST111 series data sheet. For similar duals, see the 2N5564/5565/5566 data sheet.



2N4856JAN/JANTX/JANTXV Series



Vishay Siliconix

ABSOLUTE MAXIMUM RATINGS

Gate-Drain, Gate-Source Voltage :	
(2N4856-58)	-40 V
(2N4859-61)	-30 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	-65 to 200°C
Power Dissipation ^a	1800 mW

Notes
a. Derate 10.3 mW/°C to T_C > 25°C

SPECIFICATIONS FOR 2N4856, 2N4857 AND 2N4858 (T_A = 25 °C UNLESS NOTED)

Parameter	Symbol	Test Conditions	Typ ^a	Limits						Unit
				2N4856		2N4857		2N4858		
				Min	Max	Min	Max	Min	Max	
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	
Saturation Drain Current ^b	I _{DSS}	V _{DS} = 15 V, V _{GS} = 0 V		50	175	20	100	8	80	mA
Gate Reverse Current	I _{GSS}	V _{GS} = -20 V, V _{DS} = 0 V		-5		-250		-250		pA
			T _A = 150°C	-13		-500		-500		nA
Gate Operating Current ^c	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
			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 ^c	r _{DS(on)}	V _{GS} = 0 V, I _D = 1 mA			25		40		60	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 ^c	g _{fs}	V _{DG} = 20 V, I _D = 1 mA f = 1 kHz	6							mS
Common-Source Output Conductance ^c	g _{os}		25							μS
Common-Source Input Capacitance	C _{iss}	V _{DS} = 0 V, V _{GS} = -10 V f = 1 MHz	7		18		18		18	pF
Common-Source Reverse Transfer Capacitance	C _{rss}		3		8		8		8	
Equivalent Input Noise Voltage ^c	\bar{e}_n	V _{DG} = 10 V, I _D = 10 mA f = 1 kHz	3							nV/ √Hz
Switching										
Turn-On Time	t _{d(on)}	V _{DD} = 10 V, V _{GS(H)} = 0 V See Switching Circuit	2		6		6		10	ns
	t _r		2		3		4		10	
Turn-Off Time	t _{OFF}		13		25		50		100	



SPECIFICATIONS FOR 2N4859, 2N4860 AND 2N4861 (T _A = 25 °C UNLESS NOTED)											
Parameter	Symbol	Test Conditions	Typ ^a	Limits						Unit	
				2N4859		2N4860		2N4861			
				Min	Max	Min	Max	Min	Max		
Static											
Gate-Source Breakdown Voltage	V _{(BR)GSS}	I _G = -1 μA, V _{DS} = 0 V	-55	-30		-30		-30		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 ^b	I _{DSS}	V _{DS} = 15 V, V _{GS} = 0 V		50	175	20	100	8	80	mA	
Gate Reverse Current	I _{GSS}	V _{GS} = -15 V, V _{DS} = 0 V		-5		-250		-250		-250	pA
			T _A = 150 °C	-13		-500		-500		-500	nA
Gate Operating Current ^c	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		
			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		
				I _D = 10 mA	0.35			0.5			
				I _D = 20 mA	0.5	0.75					
Drain-Source On-Resistance	r _{DS(on)}	V _{GS} = 0 V, I _D = 1 mA			25		40		60	Ω	
Gate-Source Forward Voltage	V _{GS(F)}	I _G = 1 mA, V _{DS} = 0 V	0.7							V	
Dynamic											
Common-Source Forward Transconductance ^c	g _{fs}	V _{DG} = 20 V, I _D = 1 mA f = 1 kHz	6							mS	
Common-Source Output Conductance ^c	g _{os}		25							μS	
Common-Source Input Capacitance	C _{iss}	V _{DS} = 0 V, V _{GS} = -10 V f = 1 MHz	7	18		18		18		pF	
Common-Source Reverse Transfer Capacitance	C _{rss}		3	8		8		8			
Equivalent Input Noise Voltage ^c	e _n	V _{DG} = 10 V, I _D = 10 mA f = 1 kHz	3							nV/ √Hz	
Switching											
Turn-On Time	t _{d(on)}	V _{DD} = 10 V, V _{GS(H)} = 0 V See Switching Circuit	2	6		6		10		ns	
	t _r		2	3		4		10			
Turn-Off Time	t _{OFF}		19	25		50		100			

Notes

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

NCB

SWITCHING TIME TEST CIRCUIT			
	4856/4859	4857/4860	4858/4861
$V_{GS(L)}$	-10 V	-6 V	-4 V
R_L^*	464 Ω	953 Ω	1910 Ω
$I_{D(on)}$	20 mA	10 mA	5 mA

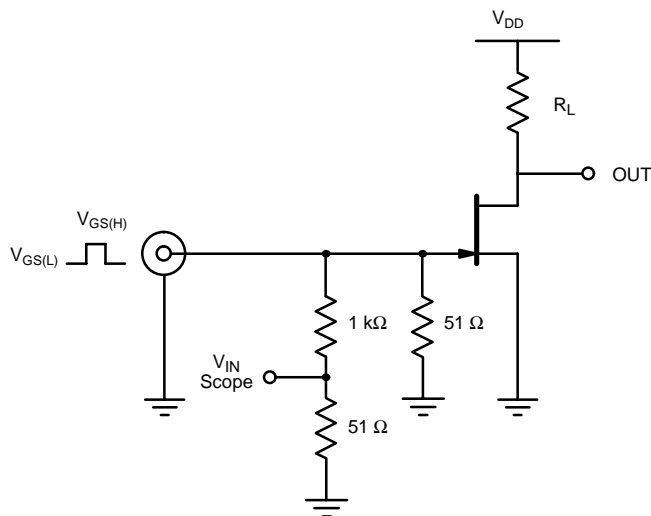
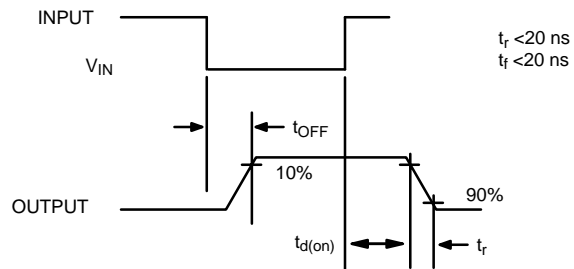
*Non-inductive

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 M Ω
 Input Capacitance 1.5 pF





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