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

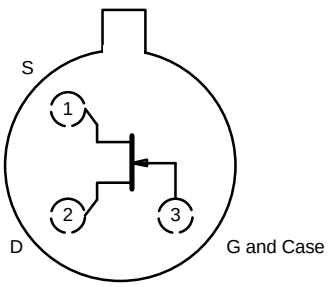
- Analog Switches
- Choppers
- Sample-and-Hold
- Normally “On” Switches
- Current Limiters

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.

TO-206AA (TO-18)



Top View

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 2N4856 Min	2N4856 Max	2N4857 Min	2N4857 Max	2N4858 Min	2N4858 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	
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		–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	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[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]	$\overline{e}_n$	V_{DG} = 10 V, I_D = 10 mA, f = 1 kHz	3							$nV/\sqrt{Hz}$
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 2N4859 Min	2N4859 Max	2N4860 Min	2N4860 Max	2N4861 Min	2N4861 Max	Unit
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	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	$r_{DS(on)}$	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]	$\overline{e}_n$	V_{DG} = 10 V, I_D = 10 mA, f = 1 kHz	3							$nV/\sqrt{Hz}$
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 MΩ
Input Capacitance 1.5 pF