2N4856 JAN/JANTX/JANTXV Series

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

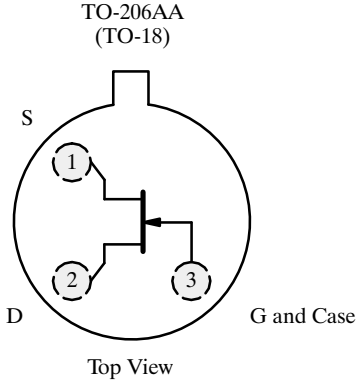
Applications

- 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.



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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[a] for 2N4856, 2N4857 and 2N4858

Parameter	Symbol	Test Conditions	Typ[b]	Limits 2N4856 Min	Limits 2N4856 Max	Limits 2N4857 Min	Limits 2N4857 Max	Limits 2N4858 Min	Limits 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	V
Saturation Drain Current[c]	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[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
		V_{GS} = 0 V, I_D = 10 mA	0.35				0.5			V
		V_{GS} = 0 V, I_D = 20 mA	0.5		0.75					V
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_{DG} = 20 V, I_D = 1 mA, f = 1 kHz	6							mS
Common-Source Output Conductance[d]	g_{os}	V_{DG} = 20 V, I_D = 1 mA, f = 1 kHz	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}	V_{DS} = 0 V, V_{GS} = −10 V, f = 1 MHz	3		8		8		8	pF
Equivalent Input Noise Voltage[d]	$\bar{e}_n$	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	V_{DD} = 10 V, $V_{GS(H)}$ = 0 V, See Switching Circuit	2		3		4		10	ns
Turn-Off Time	t_{OFF}	V_{DD} = 10 V, $V_{GS(H)}$ = 0 V, See Switching Circuit	13		25		50		100	ns

Specifications[a] for 2N4859, 2N4860 and 2N4861

Parameter	Symbol	Test Conditions	Typ[b]	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	V
Saturation Drain Current[c]	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[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
		$V_{GS} = 0$ V, $I_D = 10$ mA	0.35				0.5			V
		$V_{GS} = 0$ V, $I_D = 20$ mA	0.5		0.75					V
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[d]	g_{fs}	$V_{DG} = 20$ V, $I_D = 1$ mA, f = 1 kHz	6							mS
Common-Source Output Conductance[d]	g_{os}	$V_{DG} = 20$ V, $I_D = 1$ mA, f = 1 kHz	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}	$V_{DS} = 0$ V, $V_{GS} = -10$ V, f = 1 MHz	3		8		8		8	pF
Equivalent Input Noise Voltage[d]	$\bar{e}_n$	$V_{DG} = 10$ 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	$V_{DD} = 10$ V, $V_{GS(H)} = 0$ V, See Switching Circuit	2		3		4		10	ns
Turn-Off Time	t_{OFF}	$V_{DD} = 10$ V, $V_{GS(H)} = 0$ V, See Switching Circuit	19		25		50		100	ns

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.

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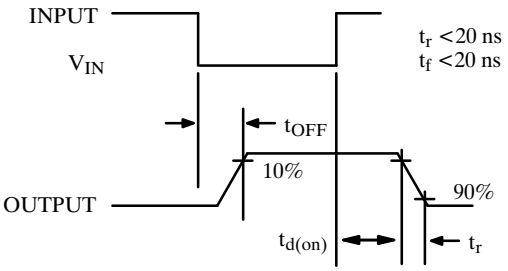
Switching Time Test Circuit

	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