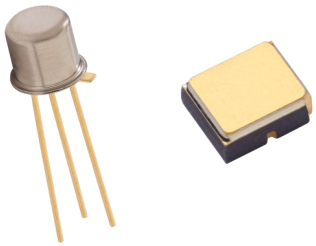
2N4856 - 2N4861 Series

N Channel JFET

Rev. V2

Features

- Available in JAN, JANTX and JANTXV per MIL-PRF-19500/385
- Applications include Choppers, Commutators, Analog Switches and Current Limiters
- Low error voltage
- High Radiation Tolerance
- High Speed Analog Circuit Performance
- TO-18 and UB packages



Electrical Characteristics (T_A = 25°C unless otherwise specified)

Parameter	Test Conditions	Symbol	Units	Min.	Max.
Gate - Source Breakdown Voltage	I_G = -1.0 µA dc; V_{DS} = 0 2N4856, 2N4857, 2N4858 2N4859, 2N4860, 2N4861	$V_{(BR)GSS}$	V dc	— 	-40 -30
Gate Reverse Current	V_{DS} = 0; 2N4856, 2N4857, 2N4858 V_{GS} = -20 V dc 2N4859, 2N4860, 2N4861 V_{GS} = -15 V dc	I_{GSS1}	nA dc	—	-0.25 -0.25
Drain Current Cutoff	V_{DS} = 15 V dc; V_{GS} = -10 V dc	$I_{D(off)}$ [1]	nA dc		0.25
Drain Current Zero-Gate Voltage	V_{DS} = 15 V dc; V_{GS} = 0 2N4856, 2N4859 2N4857, 2N4860 2N4858, 2N4861	I_{DSS}	mA dc	50 20 8	175 100 80
Drain - Source On-State Voltage	V_{GS} = 0 2N4856, 2N4859 I_D = 20 mA dc 2N4857, 2N4860 I_D = 10 mA dc 2N4858, 2N4861 I_D = 5 mA dc	$V_{DS(on)}$	V dc		0.75 0.50 0.50
Gate - Source Off-State Voltage	V_{DS} = 15 V dc; I_D = 0.5 nA dc 2N4856, 2N4859 2N4857, 2N4860 2N4858, 2N4861	$V_{GS(off)}$	V dc	-4 -2 -0.8	-10 -6 -4
Static Drain To Source On-State Resistance	V_{GS} = 0; I_D = 1.0 mA dc; 2N4856, 2N4859 2N4857, 2N4860 2N4858, 2N4861	$r_{ds(on)}$	Ω	—	25 40 60

Electrical Characteristics (T_A = 25°C unless otherwise specified)

Parameter	Test Conditions	Symbol	Units	Min.	Max.
Small-Signal Common-Source, Short-Circuit Input Capacitance	V_{DS} = 0, V_{GS} = -10V; f = 1 MHz; C_1 = .1 µF, C_2 = 20.1 µF; L_1 = L_2 = ≥ 500 µH	C_{iss}	pF	—	18
Small-Signal Common-Source, Short-Circuit Reverse Transfer Capacitance	V_{DS} = 0, V_{GS} = -10V; f = 1 MHz; C_1 = .1 µF, L_1 = L_2 = ≥ 500 µH	C_{rss}	pF		8
Turn-On Delay Time	See figure 3 of MIL-PRF-19500/385 2N4856, 2N4859 2N4857, 2N4860 2N4858, 2N4861	$t_{d(on)}$	ns		6 6 10
Rise Time	See figure 3 of MIL-PRF-19500/385 2N4856, 2N4859 2N4857, 2N4860 2N4858, 2N4861	t_r	ns		3 4 10
Turn-Off Delay Time	See figure 3 of MIL-PRF-19500/385 2N4856, 2N4859 2N4857, 2N4860 2N4858, 2N4861	$t_{d(off)}$	ns		25 50 100

Electrical Characteristics (T_A = 150°C unless otherwise specified)

Parameter	Test Conditions	Symbol	Units	Min.	Max.
Gate Reverse Current 2N4856, 2N4857, 2N4858 2N4859, 2N4860, 2N4861	V_{DS} = 0 V_{GS} = -20 V dc V_{GS} = -15 V dc	I_{GSS2}	µA dc	—	-0.5 -0.5
Drain Current	V_{DS} = 15 V dc; VGS = -10V dc	$I_{D(off)2}$	µA dc	—	0.5

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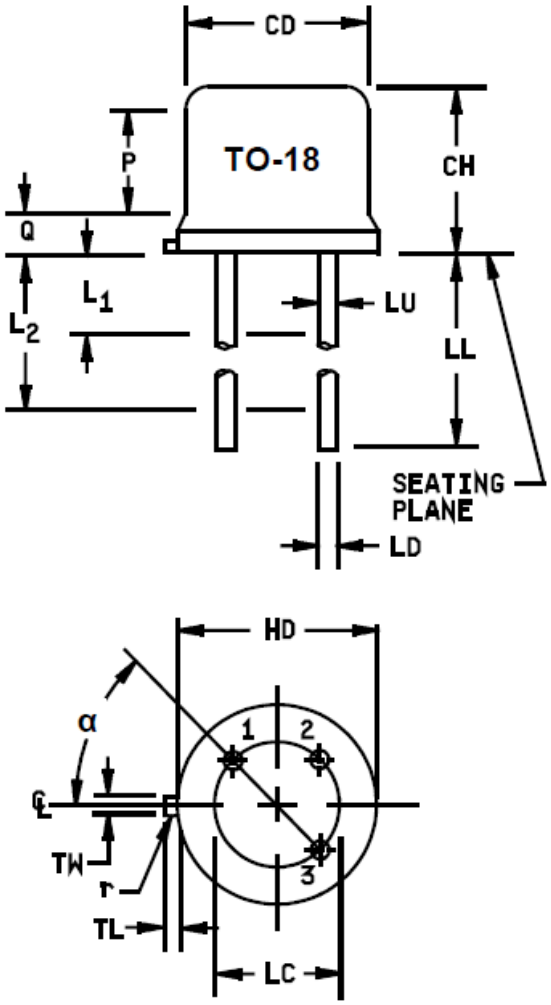
Absolute Maximum Ratings (25°C unless otherwise specified) (1)

Ratings	Symbol	Value
Voltage Drain-Gate Breakdown 2N4856, 2N4857, 2N4858 2N4859, 2N4860, 2N4861	V_{DS}, V_{DG}	40 V dc 30 V dc
Voltage Gate-Source Breakdown 2N4856, 2N4857, 2N4858 2N4859, 2N4860, 2N4861	V_{GS}	-40 V dc -30 V dc
Gate Current	I_G	50 mA dc
Maximum Power Dissipation @ T_A = +25°C (2) @ T_C = +25°C (3)	P_T	0.36 W, 0.40 W UB (4) 1.8 W
Junction and Storage Temperature Range	T_J,T_{STG}	-65°C to +200°C
Thermal Resistance, Junction To Ambient	$R_{\theta JA}$	486 °C/W 325 °C/W (UB package)
Thermal Resistance, Junction To Case	$R_{\theta JC}$	0.097 °C/mW

(1) These characteristics applicable to all package styles, unless otherwise noted.
(2) Derate linearly 2.06 mW/°C for T_A > +25°C
(3) Derate linearly 10.3 mW/°C for T_C > +25°C
(4) Derate linearly 3.08 mW/°C for T_C > +70°C

Outline Drawing TO-18

Symbol	Dimensions				Note
	Inches		Millimeters		
	Min	Max	Min	Max	
CD	.178	.195	4.52	4.95	5
CH	.170	.210	4.32	5.33	
HD	.209	.230	5.31	5.84	4, 5
LC	.100 TP		2.54 TP		6
LD	.016	.021	0.41	0.53	7,8
LL	.500	.750	12.70	19.05	7,8
LU	.016	.019	0.41	0.48	7,8
L_1		.050		1.27	7,8
L_2	.250		6.35		7,8
P	.100		2.54		
Q		.030		0.76	5
TL	.028	.048	0.71	1.22	3,4
TW	.036	.046	0.91	1.17	
r		.010		0.25	3, 10
* α	45° TP		45° TP		6

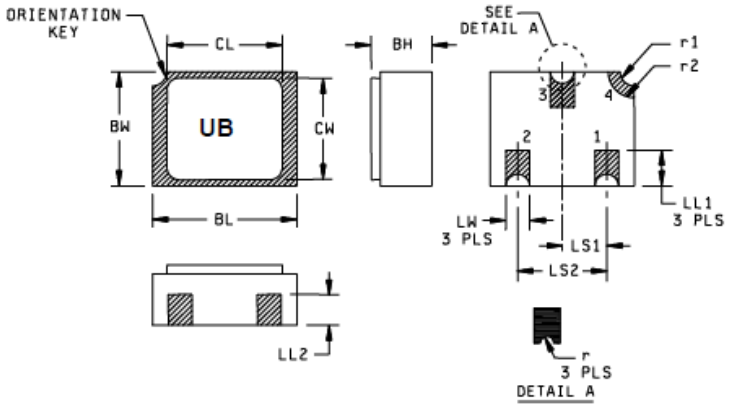


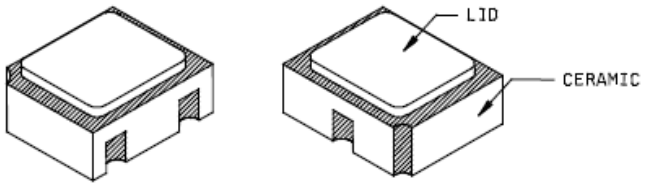
NOTES:

1. Dimension are in inches.
2. Millimeters are given for general information only.
3. Beyond r (radius) maximum, TL shall be held for a minimum length of .011 (0.28 mm).
4. Dimension TL measured from maximum HD.
5. Body contour optional within zone defined by HD, CD, and Q.
* 6. Leads at gauge plane .054 +.001 -.000 inch (1.37 +0.03 -0.00 mm) below seating plane shall be within .007 inch (0.18 mm) radius of true position (TP) at maximum material condition (MMC) relative to tab at MMC.
7. Dimension LU applies between L_1 and L_2. Dimension LD applies between L_2 and LL minimum. Diameter is uncontrolled in L_1 and beyond LL minimum.
8. All three leads.
9. The gate shall be internally connected to the case.
10. Dimension r (radius) applies to both inside corners of tab.
11. In accordance with ASME Y14.5M, diameters are equivalent to ϕx symbology.
12. Lead 1 = source, lead 2 = drain, lead 3 = gate.

* FIGURE 1. Physical dimensions TO-18.

Outline Drawing UB





Ltr.	Dimensions				Note	Ltr.	Dimensions				Note
	Inches		Millimeters				Inches		Millimeters		
	Min	Max	Min	Max			Min	Max	Min	Max	
BH	.046	.056	1.17	1.42		LS1	.035	.040	0.89	1.02	
BL	.115	.128	2.92	3.25		LS2	.071	.079	1.80	2.01	
BW	.085	.108	2.16	2.74		LW	.016	.024	0.41	0.61	
CL		.128		3.25		r		.008		0.20	
CW		.108		2.74		r1		.012		0.31	
LL1	.022	.038	0.56	0.96		r2		.022		0.56	
LL2	.017	.035	0.43	0.89							

NOTES:
1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. Hatched areas on package denote metallized areas.
4. Lid material: Kovar.
5. Pad 1 = Drain, Pad 2 = Source, Pad 3 = Gate, Pad 4 = Shielding connected to the lid.
6. In accordance with ASME Y14.5M, diameters are equivalent to ϕx symbology.

* FIGURE 2. Physical dimensions for surface mount.