

RADIATION HARDENED P-CHANNEL MOSFET

Qualified per MIL-PRF-19500/630

DEVICES
2N7389
2N7389U
LEVELS
JANSR(100K RAD(Si))
JANSF(300K RAD(Si))
ABSOLUTE MAXIMUM RATINGS ($T_C = +25^\circ\text{C}$ unless otherwise noted)

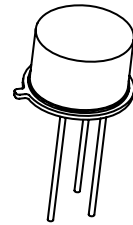
Parameters / Test Conditions	Symbol	Value	Unit
Drain – Source Voltage	V_{DS}	-100	Vdc
Gate – Source Voltage	V_{GS}	± 20	Vdc
Continuous Drain Current $T_C = +25^\circ\text{C}$	I_{D1}	-6.5	A _{dc}
Continuous Drain Current $T_C = +100^\circ\text{C}$	I_{D2}	-4.1	A _{dc}
Max. Power Dissipation	P_{tl}	25 ⁽¹⁾	W
Drain to Source On State Resistance	$R_{ds(on)}$	0.3 ⁽²⁾	Ω
Operating & Storage Temperature	T_{op}, T_{stg}	-55 to +150	$^\circ\text{C}$

Note: (1) Derated Linearly by 0.2 W/ $^\circ\text{C}$ for $T_C > +25^\circ\text{C}$

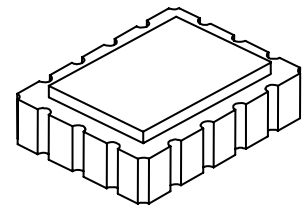
(2) $V_{GS} = -12\text{Vdc}$, $I_D = -4.1\text{A}$

PRE-IRRADIATION ELECTRICAL CHARACTERISTICS ($T_A = +25^\circ\text{C}$, unless otherwise noted)

Parameters / Test Conditions	Symbol	Min.	Max.	Unit
Drain-Source Breakdown Voltage $V_{GS} = 0\text{V}$, $I_D = -1\text{mA}$	$V_{(BR)DSS}$	-100		Vdc
Gate-Source Voltage (Threshold) $V_{DS} \geq V_{GS}$, $I_D = -1.0\text{mA}$ $V_{DS} \geq V_{GS}$, $I_D = -1.0\text{mA}$, $T_j = +125^\circ\text{C}$ $V_{DS} \geq V_{GS}$, $I_D = -1.0\text{mA}$, $T_j = -55^\circ\text{C}$	$V_{GS(th)1}$ $V_{GS(th)2}$ $V_{GS(th)3}$	-2.0 -1.0	-4.0 -5.0	Vdc
Gate Current $V_{GS} = \pm 20\text{V}$, $V_{DS} = 0\text{V}$ $V_{GS} = \pm 20\text{V}$, $V_{DS} = 0\text{V}$, $T_j = +125^\circ\text{C}$	I_{GSS1} I_{GSS2}		± 100 ± 200	nA _{dc}
Drain Current $V_{GS} = 0\text{V}$, $V_{DS} = -80\text{V}$ $V_{GS} = 0\text{V}$, $V_{DS} = -80\text{V}$, $T_j = +125^\circ\text{C}$	I_{DSS1} I_{DSS2}		-25 -0.25	μA _{dc} mA _{dc}
Static Drain-Source On-State Resistance $V_{GS} = -12\text{V}$, $I_D = -4.1\text{A}$ pulsed $V_{GS} = -12\text{V}$, $I_D = -6.5\text{A}$ pulsed $T_j = +125^\circ\text{C}$ $V_{GS} = -12\text{V}$, $I_D = -4.1\text{A}$ pulsed	$r_{DS(on)1}$ $r_{DS(on)2}$ $r_{DS(on)3}$		0.3 0.35 0.54	Ω Ω Ω
Diode Forward Voltage $V_{GS} = 0\text{V}$, $I_D = -6.5\text{A}$ pulsed	V_{SD}		-3.0	Vdc



TO-205AF
(modified TO-39)
JANSR2N7389, JANSF2N7389
 See Figure 1



18 PIN LEADLESS CHIP
CARRIER
JANSR2N7389U, JANSF2N7389U
 See Figure 2

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DYNAMIC CHARACTERISTICS

Parameters / Test Conditions	Symbol	Min.	Max.	Unit
Gate Charge: On-State Gate Charge Gate to Source Charge Gate to Drain Charge	$Q_{g(on)}$ Q_{gs} Q_{gd}		45 10 25	nC
		$V_{GS} = -12V, I_D = -6.5A$ $V_{DS} = -50V$		

SWITCHING CHARACTERISTICS

Parameters / Test Conditions	Symbol	Min.	Max.	Unit
Switching time tests: Turn-on delay time Rinse time Turn-off delay time Fall time	$t_{d(on)}$ t_r $t_{d(off)}$ t_f		30 50 70 70	ns
		$I_D = -6.5A, V_{GS} = -12Vdc,$ Gate drive impedance = $7.5\Omega,$ $V_{DD} = -50Vdc$		
Diode Reverse Recovery Time	t_{rr}		250	ns
		$di/dt \leq -100A/\mu s, V_{DD} \leq -50V,$ $I_F = -6.5A$		

POST-IRRADIATION ELECTRICAL CHARACTERISTICS (3) ($T_A = +25^\circ C$, unless otherwise noted)

Parameters / Test Conditions	Symbol	Min.	Max.	Unit
Drain-Source Breakdown Voltage $V_{GS} = 0V, I_D = -1mA$	$V_{(BR)DSS}$	-100		Vdc
Gate-Source Voltage (Threshold) $V_{DS} \geq V_{GS}, I_D = -1.0mA$ JANSR $V_{DS} \geq V_{GS}, I_D = -1.0mA$ JANSF	$V_{GS(th)1}$ $V_{GS(th)1}$	-2.0 -2.0	-4.0 -5.0	Vdc
Gate Current $V_{GS} = \pm 20V, V_{DS} = 0V$	I_{GSS1}		± 100	nA dc
Drain Current $V_{GS} = 0V, V_{DS} = -80V$	I_{DSS1}		-25	μA dc
Static Drain-Source On-State Voltage $V_{GS} = -12V, I_D = -4.1A$ pulsed	$V_{DS(on)}$		1.23	Vdc
Diode Forward Voltage $V_{GS} = 0V, I_D = -6.5A$ pulsed	V_{SD}		-3.0	Vdc

Note:

- (3) Post-Irradiation Electrical Characteristics apply to devices subjected to Steady State Total Dose Irradiation testing in accordance with MIL-STD-750 Method 1019. Separate samples are tested for VGS bias (12V), and VDS bias (80V) conditions.

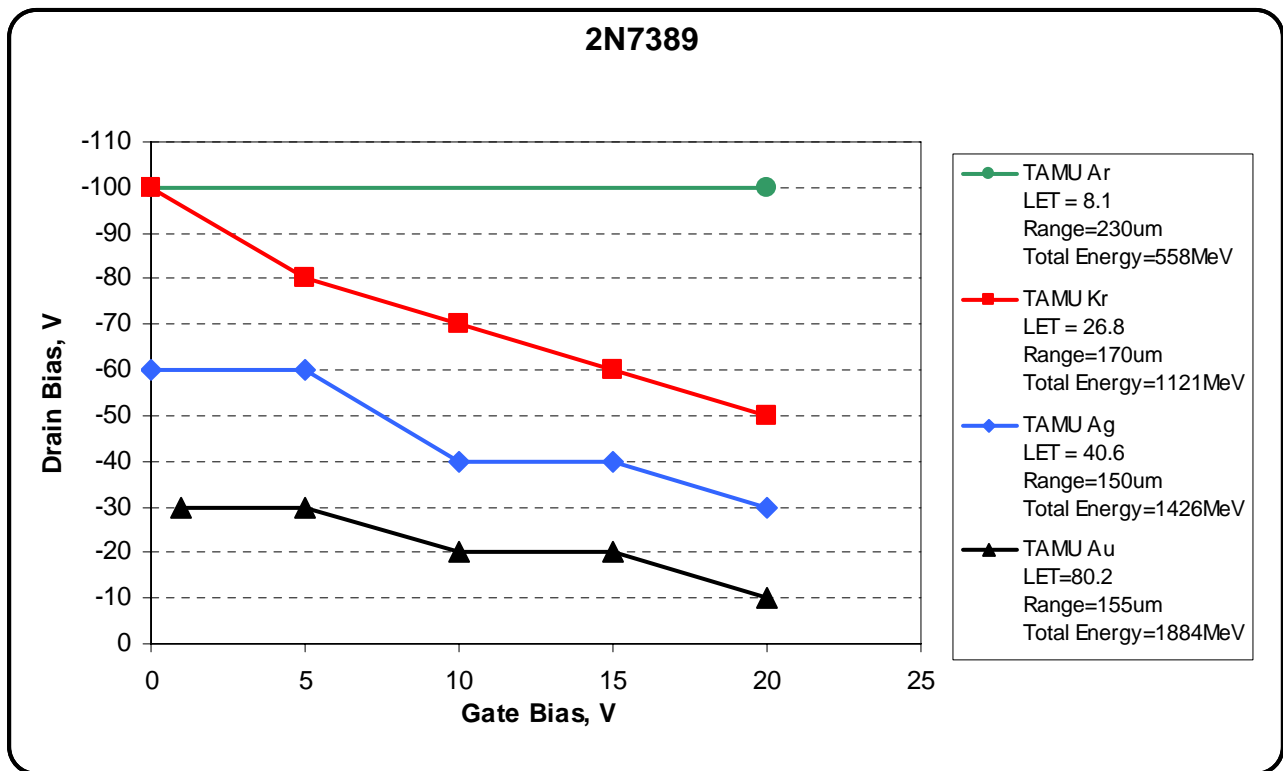
6 Lake Street, Lawrence, MA 01841
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Single Event Effect (SEE) Characteristics:

Heavy Ion testing of the 2N7389 device has been characterized at the Texas A&M cyclotron. The following SOA curve has been established using the elements, LET, range, and Total Energy conditions as shown:

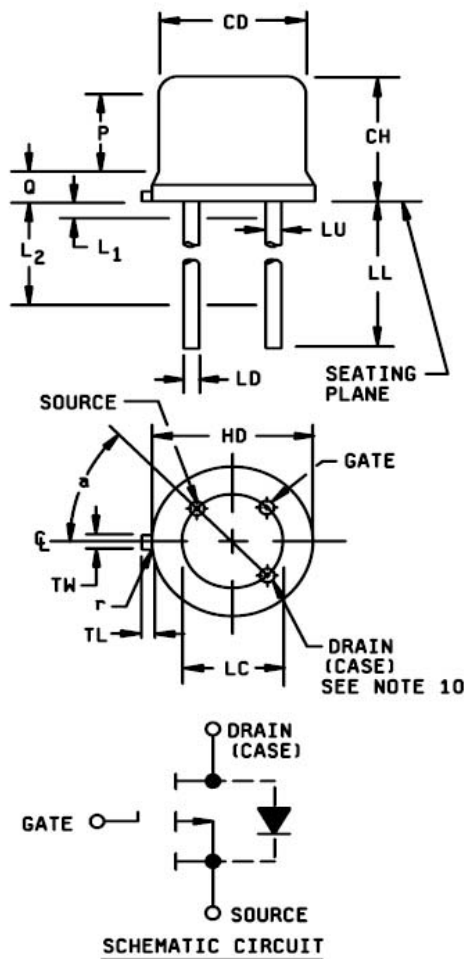


It should be noted that total energy levels are considered to be a factor in SEE characterization. Comparisons to other datasets should not be based on LET alone. Please consult factory for more information.

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Figure 1: Case Outline and Pin Configuration for JANSR2N7389 & JANSF2N7389



Ltr	Dimensions				Notes
	Inches		Millimeters		
	Min	Max	Min	Max	
CD	.305	.335	7.75	8.51	
CH	.160	.180	4.06	4.57	
HD	.335	.370	8.51	9.39	
LC	.200 TP		5.08 TP		6
LD	.016	.021	0.41	0.53	7, 8
LL	.500	.750	12.7	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		5
Q		.050		1.27	4
r		.010		0.25	9
TL	.029	.045	0.74	1.14	3
TW	.028	.034	0.71	0.86	2
α	45° TP		45° TP		6

NOTES:

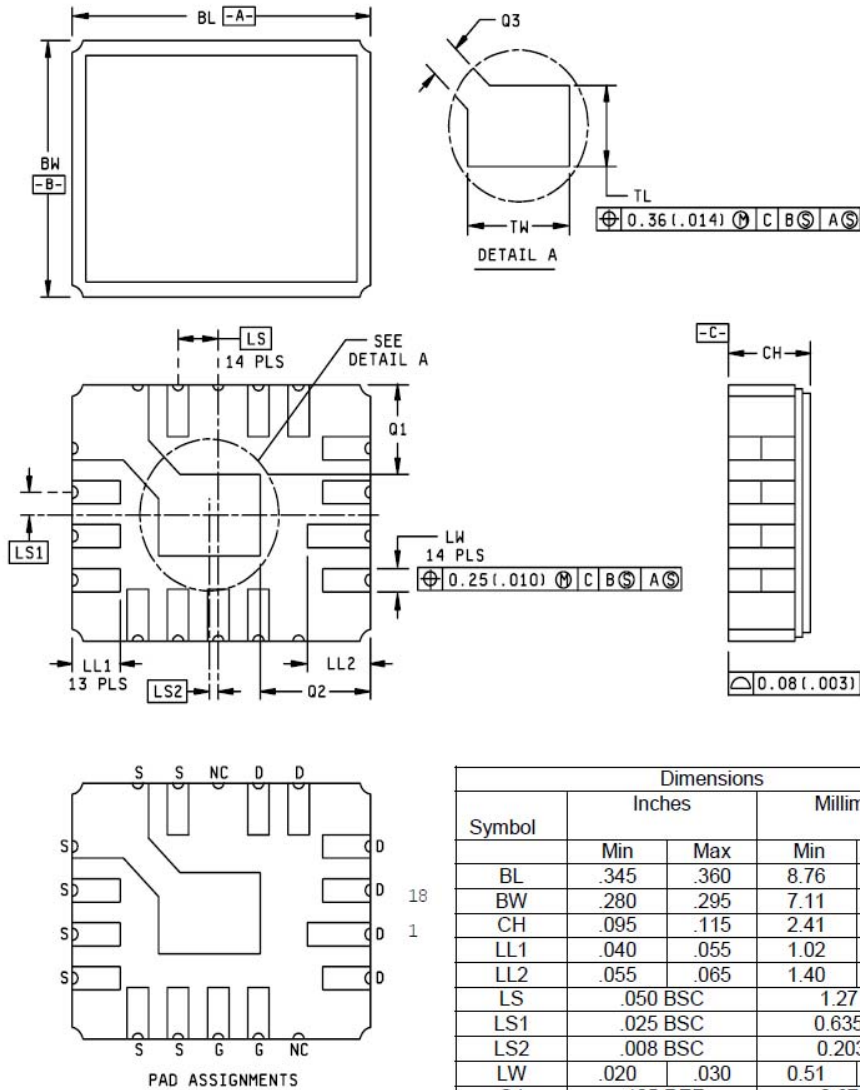
1. Dimensions are in inches. Millimeters are given for general information only.
2. Beyond radius (r) maximum, TW shall be held for a minimum length of .011 (0.28 mm).
3. Dimension TL measured from maximum HD.
4. Outline in this zone is not controlled.
5. Dimension CD shall not vary more than .010 (0.25 mm) in zone P. This zone is controlled for automatic handling.
6. Leads at gauge plane .054 +.001, -.000 (1.37 +0.03, -0.00 mm) below seating plane shall be within .007 (0.18 mm) radius of true position (TP) at maximum material condition (MMC) relative to tab at MMC.
7. LU applies between L₁ and L₂. LD applies between L₂ and LL minimum. Diameter is uncontrolled in L₁ and beyond LL minimum.
8. All three leads.
9. Radius (r) applies to both inside corners of tab.
10. Drain is electrically connected to the case.
11. In accordance with ASME Y14.5M, diameters are equivalent to φx symbology.

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Figure 2: Case Outline and Pin Configuration for JANSR2N7389U & JANSF2N7389U



NOTES:

1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. In accordance with ASME Y14.5M, diameters are equivalent to ϕx symbology.