6 Lake Street, Lawrence, MA 01841
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TECHNICAL DATA SHEET

RADIATION HARDENED N-CHANNEL MOSFET

Qualified per MIL-PRF-19500/603

DEVICES

2N7394 2N7394U

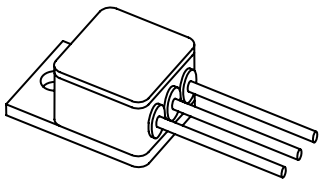
LEVELS

MSR (100K RAD(Si))
MSF (300K RAD(Si))
SPACE Equivalents

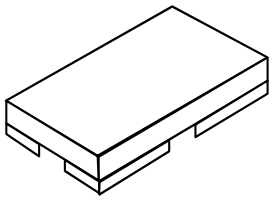
ABSOLUTE MAXIMUM RATINGS *(T_C = +25°C unless otherwise noted)*

Parameters / Test Conditions	Symbol	Value	Unit
Drain – Source Voltage	V_{DS}	60	Vdc
Gate – Source Voltage	V_{GS}	± 20	Vdc
Continuous Drain Current T_C = +25°C	I_{D1}	35.0	Adc
Continuous Drain Current T_C = +100°C	I_{D2}	30.0	Adc
Max. Power Dissipation	P_{tl}	150 (1)	W
Drain to Source On State Resistance	$R_{ds(on)}$	0.027 (2)	Ω
Operating & Storage Temperature	T_{op}, T_{stg}	-55 to +150	°C

Note: (1) Derated Linearly by 1.2 W/°C for T_C > +25°C
(2) V_{GS} = 12Vdc, I_D = 30.0A



TO-254AA
MSR2N7394, MSF2N7394
See Figure 1



U-PKG (SMD-1)
(TO-267AB)
MSR2N7394U, MSF2N7394U
See Figure 2

PRE-IRRADIATION ELECTRICAL CHARACTERISTICS *(T_A = +25°C, unless otherwise noted)*

Parameters / Test Conditions	Symbol	Min.	Max.	Unit
OFF CHARACTERTICS				
Drain-Source Breakdown Voltage V_{GS} = 0V, I_D = 1mAdc	$V_{(BR)DSS}$	60		Vdc
Gate-Source Voltage (Threshold) $V_{DS} \geq V_{GS}$, I_D = 1.0mA $V_{DS} \geq V_{GS}$, I_D = 1.0mA, T_j = +125°C $V_{DS} \geq V_{GS}$, I_D = 1.0mA, T_j = -55°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} = ±20V, V_{DS} = 0V V_{GS} = ±20V, V_{DS} = 0V, T_j = +125°C	 I_{GSS1} I_{GSS2}		 ±100 ±200	nAdc
Drain Current V_{GS} = 0V, V_{DS} = 48V V_{GS} = 0V, V_{DS} = 60V, T_j = +125°C V_{GS} = 0V, V_{DS} = 48V, T_j = +125°C	 I_{DSS1} I_{DSS2} I_{DSS3}		 25 1.0 0.25	 µAdc mAdc mAdc
Static Drain-Source On-State Resistance V_{GS} = 12V, I_D = 30.0A pulsed V_{GS} = 12V, I_D = 35.0A pulsed T_j = +125°C V_{GS} = 12V, I_D = 30.0A pulsed	 $r_{DS(on)1}$ $r_{DS(on)2}$ $r_{DS(on)3}$		 0.027 0.030 0.060	 Ω Ω Ω
Diode Forward Voltage V_{GS} = 0V, I_D = 35.0A pulsed	V_{SD}		1.4	Vdc

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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	V_{GS} = 12V, I_D = 35.0A V_{DS} = 30V	 $Q_{g(on)}$ Q_{gs} Q_{gd}		 200 60 75	nC

SWITCHING CHARACTERISTICS

Parameters / Test Conditions		Symbol	Min.	Max.	Unit
Switching time tests: Turn-on delay time Rinse time Turn-off delay time Fall time	I_D = 35.0A, V_{GS} = 12Vdc, Gate drive impedance = 2.35Ω, V_{DD} = 50Vdc	 $t_{d(on)}$ t_r $t_{d(off)}$ t_f		 27 100 75 75	ns
Diode Reverse Recovery Time	di/dt ≤ 100A/µs, V_{DD} ≤ 30V, I_F = 35.0A	t_{rr}		280	ns

POST-IRRADIATION ELECTRICAL CHARACTERISTICS (3) *(T_A = +25°C, unless otherwise noted)*

Parameters / Test Conditions	Symbol	Min.	Max.	Unit
Drain-Source Breakdown Voltage V_{GS} = 0V, I_D = 1mAdc	$V_{(BR)DSS}$	60		Vdc
Gate-Source Voltage (Threshold) $V_{DS} \geq V_{GS}$, I_D = 1.0mA MSR $V_{DS} \geq V_{GS}$, I_D = 1.0mA MSF	$V_{GS(th)1}$ $V_{GS(th)1}$	2.0 1.25	4.0 4.5	Vdc
Gate Current V_{GS} = ±20V, V_{DS} = 0V	I_{GSS1}		±100	nAdc
Drain Current V_{GS} = 0V, V_{DS} = 48V MSR V_{GS} = 0V, V_{DS} = 48V MSF	I_{DSS1}		25 50	µAdc
Static Drain-Source On-State Voltage V_{GS} = 12V, I_D = 30.0A pulsed MSR V_{GS} = 12V, I_D = 30.0A pulsed MSF	$V_{DS(on)}$		0.81 1.2	Vdc
Diode Forward Voltage V_{GS} = 0V, I_D = 35.0A pulsed	V_{SD}		1.4	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.

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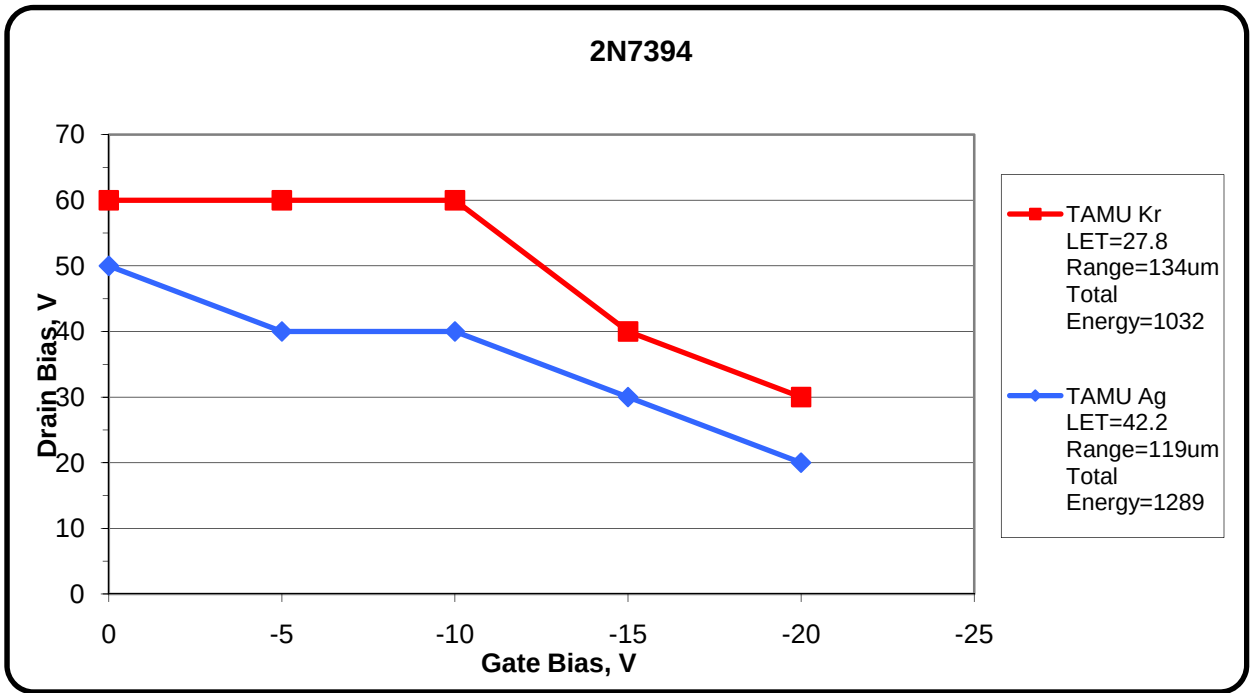
Single Event Effect (SEE) Characteristics:

Heavy Ion testing of the 2N7394 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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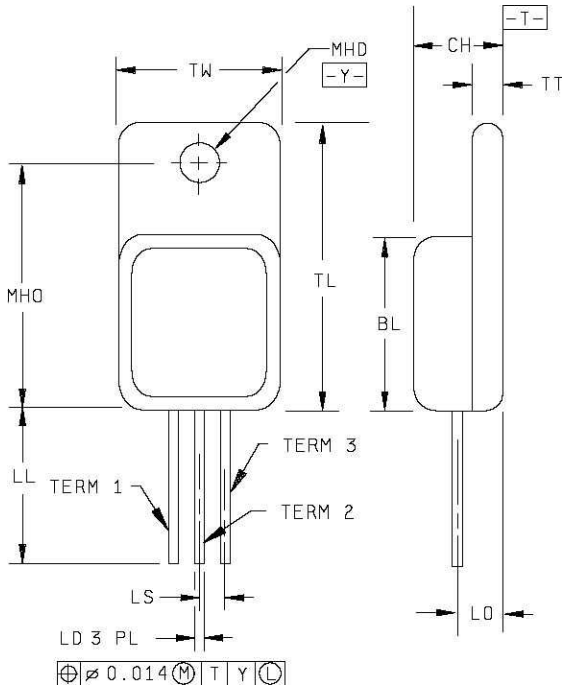
PACKAGE DIMENSIONS



Symbol	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
BL	.535	.545	13.59	13.84
CH	.249	.260	6.32	6.60
LD	.035	.045	0.89	1.14
LL	.510	.570	12.95	14.48
LO	.150 BSC		3.81 BSC	
LS	.150 BSC		3.81 BSC	
MHD	.139	.149	3.53	3.78
MHO	.665	.685	16.89	17.40
TL	.790	.800	20.07	20.32
TT	.040	.050	1.02	1.27
TW	.535	.545	13.59	13.84
Term 1	Drain			
Term 2	Source			
Term 3	Gate			

NOTES:

1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. Refer to applicable symbol list.
4. In accordance with ASME Y14.5M, diameters are equivalent to φx symbology.
5. All terminals are isolated from case.

FIGURE 1. Physical dimensions for TO-254AA (2N7268, 2N7269, 2N7270, and 2N7394).

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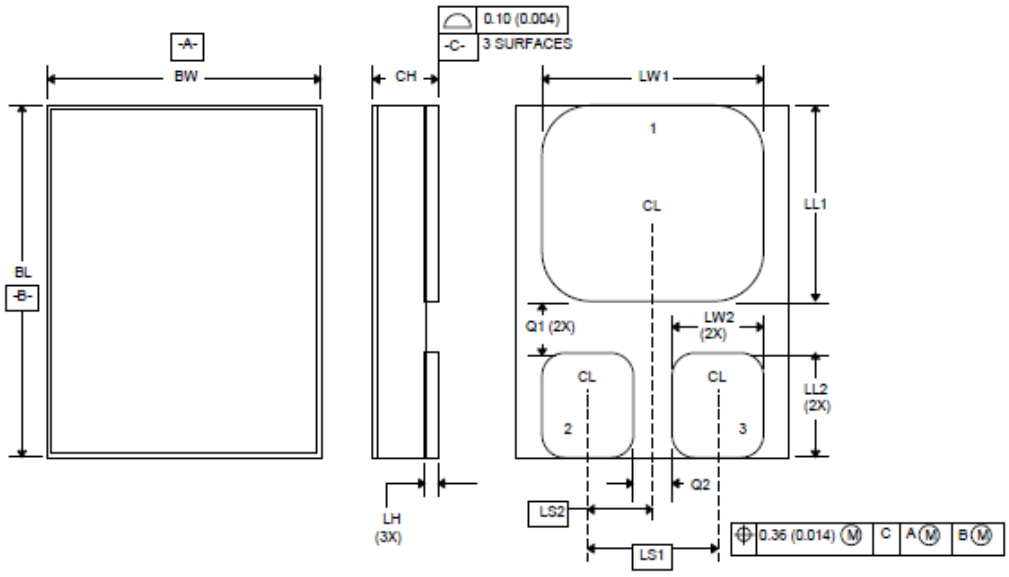

NOTES:

1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. The lid shall be electrically isolated from the drain, gate and source.
4. In accordance with ASME Y14.5M, diameters are equivalent to ϕx symbology.

Symbol	Dimensions			
	SMD-1			
	Inches		Millimeters	
	Min	Max	Min	Max
BL	.620	.630	15.75	16.00
BW	.445	.455	11.30	11.56
CH		.142		3.60
LH	.010	.020	0.26	0.50
LL_1	.410	.420	10.41	10.67
LL_2	.152	.162	3.86	4.11
LS_1	.210 BSC		5.33 BSC	
LS_2	.105 BSC		2.67 BSC	
LW_1	.370	.380	9.40	9.65
LW_2	.135	.145	3.43	3.68
Q_1	.030		0.76	
Q_2	.035		0.89	
Term 1	Drain			
Term 2	Gate			
Term 3	Source			

FIGURE 2. - Dimensions and configuration of surface mount package outline, TO-276AC (2N7268U, 2N7269U, 2N7270U, AND 2N7394U)