

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

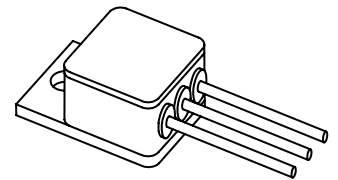
ABSOLUTE MAXIMUM RATINGS ($T_C = +25^\circ\text{C}$ unless otherwise noted)

Parameters / Test Conditions	Symbol	Value	Unit
Drain – Source Voltage	V_{DS}	60	Vdc
Gate – Source Voltage	V_{GS}	± 20	Vdc
Continuous Drain Current $T_C = +25^\circ\text{C}$	I_{D1}	35.0	A _{dc}
Continuous Drain Current $T_C = +100^\circ\text{C}$	I_{D2}	30.0	A _{dc}
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	$^\circ\text{C}$

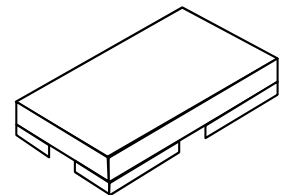
Note: (1) Derated Linearly by 1.2 W/ $^\circ\text{C}$ for $T_C > +25^\circ\text{C}$
 (2) $V_{GS} = 12\text{Vdc}$, $I_D = 30.0\text{A}$

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

Parameters / Test Conditions	Symbol	Min.	Max.	Unit
OFF CHARACTERISTICS				
Drain-Source Breakdown Voltage $V_{GS} = 0\text{V}$, $I_D = 1\text{mA}$	$V_{(BR)DSS}$	60		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 $V_{GS} = 0\text{V}$, $V_{DS} = 48\text{V}$ $V_{GS} = 0\text{V}$, $V_{DS} = 60\text{V}$, $T_j = +125^\circ\text{C}$ $V_{GS} = 0\text{V}$, $V_{DS} = 48\text{V}$, $T_j = +125^\circ\text{C}$	I_{DSS1} I_{DSS2} I_{DSS3}		25 1.0 0.25	μA _{dc} mA _{dc} mA _{dc}
Static Drain-Source On-State Resistance $V_{GS} = 12\text{V}$, $I_D = 30.0\text{A}$ pulsed $V_{GS} = 12\text{V}$, $I_D = 35.0\text{A}$ pulsed $T_j = +125^\circ\text{C}$ $V_{GS} = 12\text{V}$, $I_D = 30.0\text{A}$ 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 $V_{GS} = 0\text{V}$, $I_D = 35.0\text{A}$ pulsed	V_{SD}		1.4	Vdc



TO-254AA
MSR2N7394, MSF2N7394
 See Figure 1



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

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}		200 60 75	nC
		$V_{GS} = 12V, I_D = 35.0A$ $V_{DS} = 30V$		

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		27 100 75 75	ns
		$I_D = 35.0A, V_{GS} = 12Vdc,$ Gate drive impedance = $2.35\Omega,$ $V_{DD} = 50Vdc$		
Diode Reverse Recovery Time	t_{rr}		280	ns
		$di/dt \leq 100A/\mu s, V_{DD} \leq 30V,$ $I_F = 35.0A$		

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

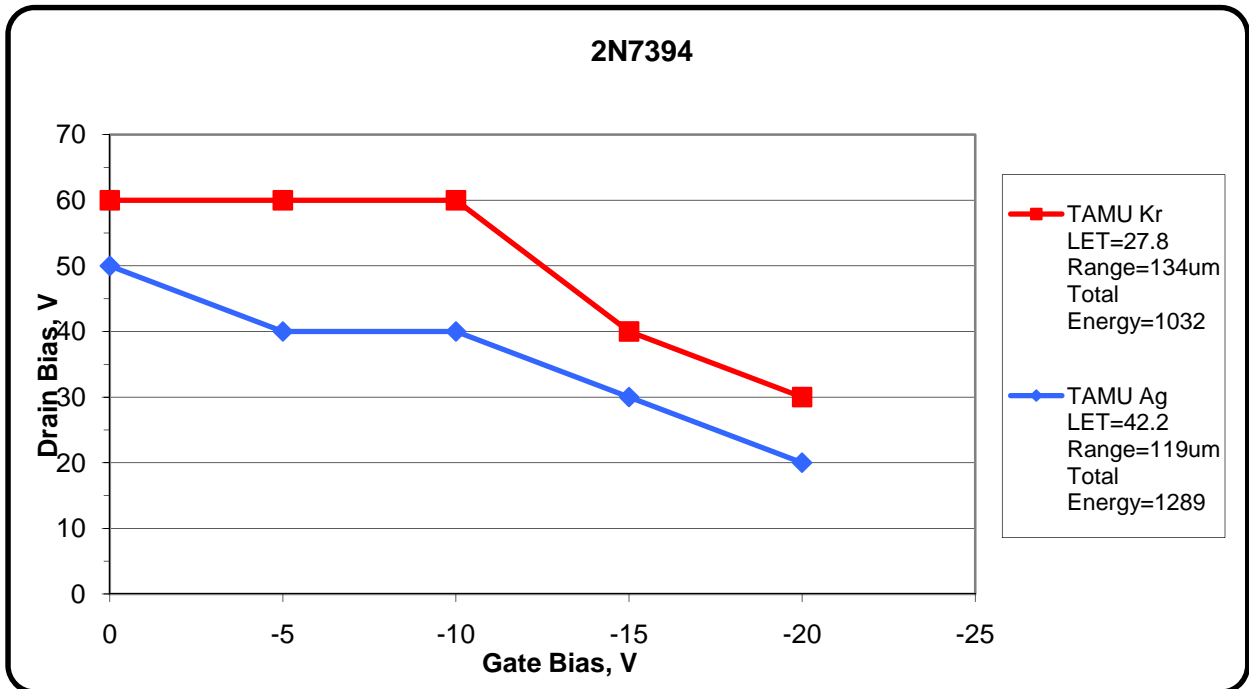
Parameters / Test Conditions	Symbol	Min.	Max.	Unit
Drain-Source Breakdown Voltage $V_{GS} = 0V, I_D = 1mA$	$V_{(BR)DSS}$	60		Vdc
Gate-Source Voltage (Threshold) $V_{DS} \geq V_{GS}, I_D = 1.0mA$ MSR $V_{DS} \geq V_{GS}, I_D = 1.0mA$ MSF	$V_{GS(th)1}$ $V_{GS(th)1}$	2.0 1.25	4.0 4.5	Vdc
Gate Current $V_{GS} = \pm 20V, V_{DS} = 0V$	I_{GSS1}		± 100	nAdc
Drain Current $V_{GS} = 0V, V_{DS} = 48V$ MSR $V_{GS} = 0V, V_{DS} = 48V$ MSF	I_{DSS1}		25 50	μ Adc
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.

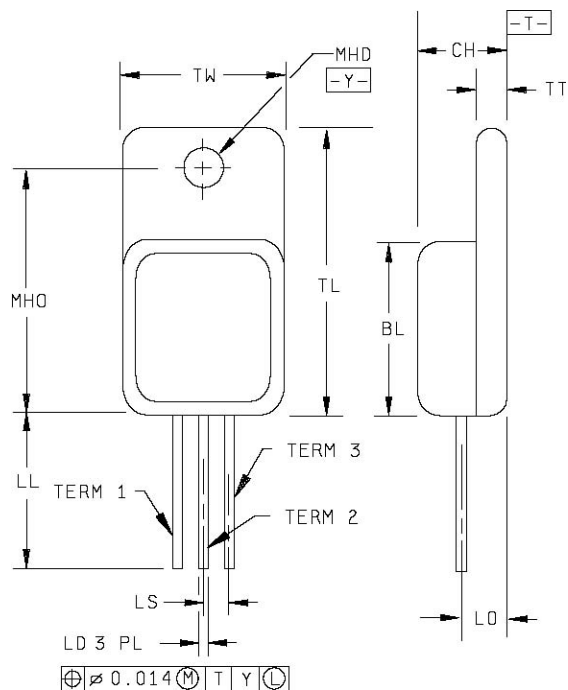
Single Event Effect (SEE) Characteristics:

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.

PACKAGE DIMENSIONS

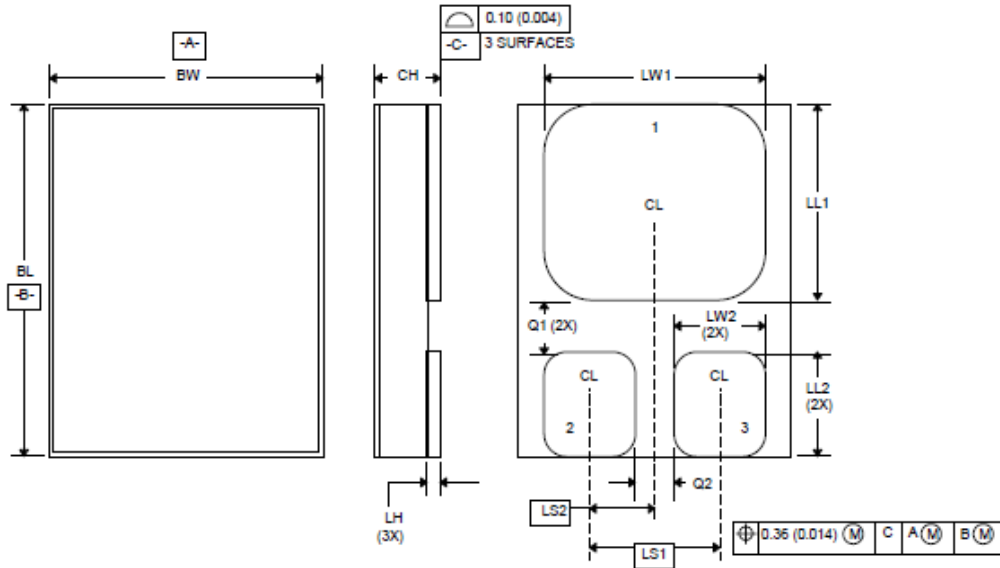


Symbol	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
BL	.535	.545	13.59	13.84
CH	.249	.260	6.32	6.60
LD	.035	.045	0.89	1.14
LL	.510	.570	12.95	14.48
LO	.150 BSC		3.81 BSC	
LS	.150 BSC		3.81 BSC	
MHD	.139	.149	3.53	3.78
MHO	.665	.685	16.89	17.40
TL	.790	.800	20.07	20.32
TT	.040	.050	1.02	1.27
TW	.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 $\varnothing x$ symbology.
5. All terminals are isolated from case.

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



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 ϕ x 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)