Microsemi

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TECHNICAL DATA SHEET

RADIATION HARDENED N-CHANNEL MOSFET

Reference MIL-PRF-19500/614

DEVICES

2N7381

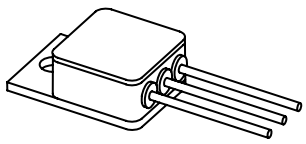
LEVELS

JANSM (3K RAD(Si))
JANSD (10K RAD(Si))
JANSR (100K RAD(Si))
JANSF (300K RAD(Si))

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

Parameters / Test Conditions	Symbol	Value	Unit
Drain – Source Voltage	V_{DS}	200	Vdc
Gate – Source Voltage	V_{GS}	± 20	Vdc
Continuous Drain Current T_C = +25°C	I_{D1}	9.4	Adc
Continuous Drain Current T_C = +100°C	I_{D2}	6.0	Adc
Max. Power Dissipation	P_{tl}	75 (1)	W
Drain to Source On State Resistance	$R_{ds(on)}$	0.40 (2)	Ω
Operating & Storage Temperature	T_{op}, T_{stg}	-55 to +150	°C

Note: (1) Derated Linearly by 0.6 W/°C for T_C > +25°C
(2) V_{GS} = 12Vdc, I_D = 6.0A



TO-257AA
JANSR2N7381, JANSF2N7381
See Figure 1

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

Parameters / Test Conditions	Symbol	Min.	Max.	Unit
Drain-Source Breakdown Voltage V_{GS} = 0V, I_D = 1mAdc	$V_{(BR)DSS}$	200		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} = 160V V_{GS} = 0V, V_{DS} = 160V, T_j = +125°C	I_{DSS1} I_{DSS2}		25 0.25	µAdc mAdc
Static Drain-Source On-State Resistance V_{GS} = 12V, I_D = 6.0A pulsed V_{GS} = 12V, I_D = 9.4A pulsed T_j = +125°C V_{GS} = 12V, I_D = 6.0A pulsed	$r_{DS(on)1}$ $r_{DS(on)2}$ $r_{DS(on)3}$		0..40 0.49 0.75	Ω Ω Ω
Diode Forward Voltage V_{GS} = 0V, I_D = 9.4A 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 = 9.4A V_{DS} = 100V	 $Q_{g(on)}$ Q_{gs} Q_{gd}		 50 10 25	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 = 9.4A, V_{GS} = 12Vdc, Gate drive impedance = 7.5Ω, V_{DD} = 100Vdc	 $t_{d(on)}$ t_r $t_{d(off)}$ t_f		 25 50 70 60	ns
Diode Reverse Recovery Time	di/dt ≤ 100A/µs, V_{DD} ≤ 30V, I_F = 9.4A	t_{rr}		460	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	$V_{(BR)DSS}$	200		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} = 160V MSR V_{GS} = 0V, V_{DS} = 160V MSF	I_{DSS1}		 25 50	µAdc
Static Drain-Source On-State Voltage V_{GS} = 12V, I_D = 6.0A pulsed MSR V_{GS} = 12V, I_D = 6.0A pulsed MSF	$V_{DS(on)}$		 2.4 3.18	Vdc
Diode Forward Voltage V_{GS} = 0V, I_D = 9.4A 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 (160V) conditions.

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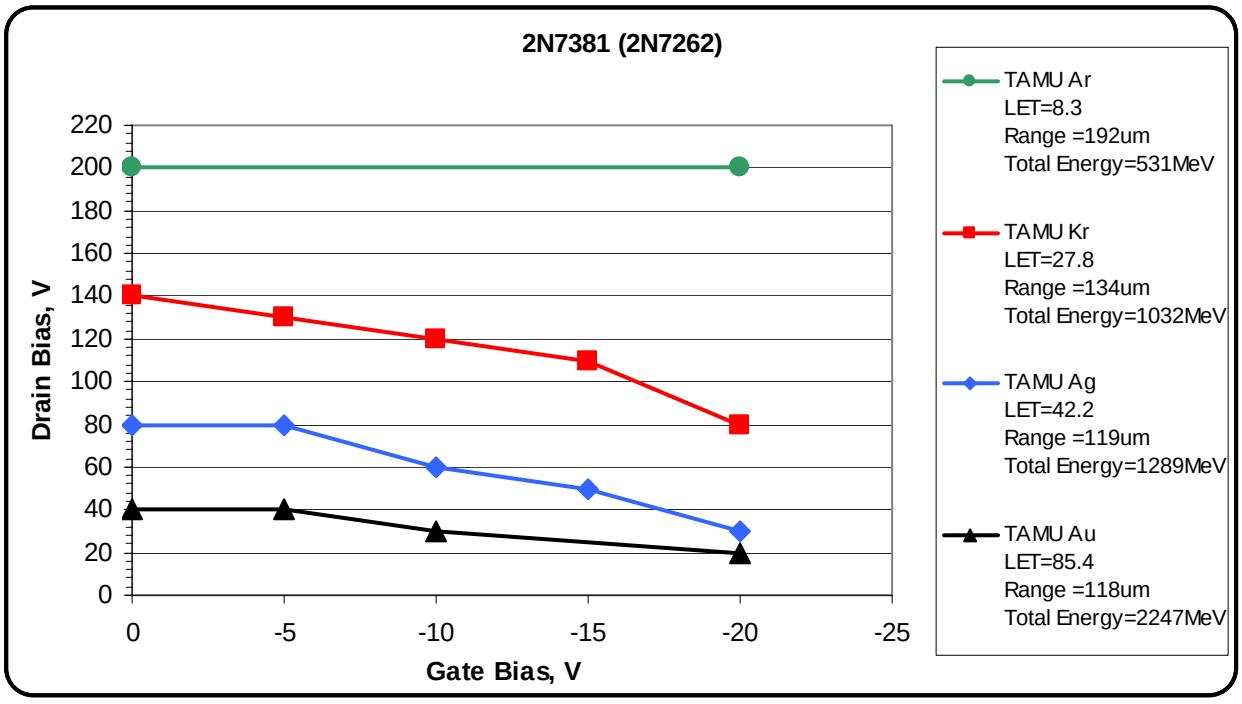
Single Event Effect (SEE) Characteristics:

Heavy Ion testing of the 2N7381 device was completed by similarity of die structure to the 2N7262. The 2N7262 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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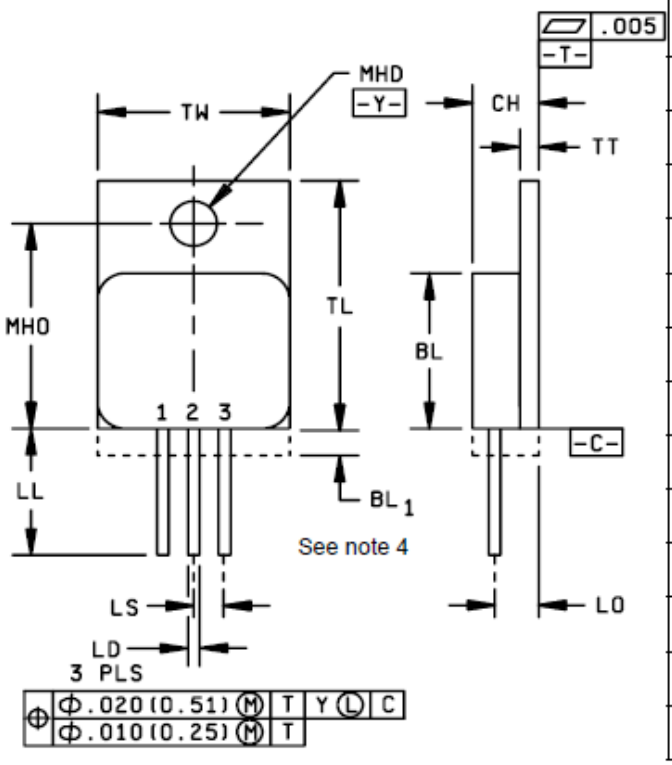

Ltr	Inches		Millimeters	
	Min	Max	Min	Max
BL	.410	.430	10.41	10.92
BL_1		.028		0.71
CH	.190	.200	4.83	5.08
LD	.025	.035	0.64	0.89
LL	.500	.625	12.70	15.28
LO	.120 BSC		3.05 BSC	
LS	.100 BSC		2.54 BSC	
MHD	.140	.150	3.56	3.81
MHO	.527	.537	13.39	13.64
TL	.645	.665	16.38	16.89
TT	.035	.045	0.89	1.14
TW	.410	.420	10.41	10.67
Term 1	Drain			
Term 2	Source			
Term 3	Gate			

NOTES:
1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. All terminals are isolated from case.
4. This area is for the lead feed-through eyelets (configuration is optional, but will not extend beyond this zone).
5. In accordance with ASME Y14.5M, diameters are equivalent to ϕx symbology.

Figure 1: Case Outline and Pin Configuration for JANSR2N7381 & JANSF2N7381