

## RADIATION HARDENED P-CHANNEL MOSFET

Qualified per MIL-PRF-19500/615

### DEVICES

# 2N7382

### LEVELS

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

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

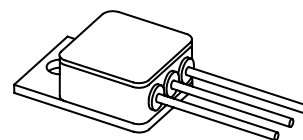
| Parameters / Test Conditions                           | Symbol            | Value              | Unit             |
|--------------------------------------------------------|-------------------|--------------------|------------------|
| Drain – Source Voltage                                 | $V_{DS}$          | -100               | Vdc              |
| Gate – Source Voltage                                  | $V_{GS}$          | $\pm 20$           | Vdc              |
| Continuous Drain Current<br>$T_C = +25^\circ\text{C}$  | $I_{D1}$          | -11.0              | Adc              |
| Continuous Drain Current<br>$T_C = +100^\circ\text{C}$ | $I_{D2}$          | -7.0               | Adc              |
| Max. Power Dissipation                                 | $P_{tl}$          | 75 <sup>(1)</sup>  | W                |
| Drain to Source On State Resistance                    | $R_{ds(on)}$      | 0.3 <sup>(2)</sup> | $\Omega$         |
| Operating & Storage Temperature                        | $T_{op}, T_{stg}$ | -55 to +150        | $^\circ\text{C}$ |

**Note:** (1) Derated Linearly by 0.6 W/ $^\circ\text{C}$  for  $T_C > +25^\circ\text{C}$

(2)  $V_{GS} = -12\text{Vdc}$ ,  $I_D = -7.0\text{A}$

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

| Parameters / Test Conditions                                                                                                                                                                                                                   | Symbol                                          | Min.         | Max.                   | Unit                             |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|--------------|------------------------|----------------------------------|
| Drain-Source Breakdown Voltage<br>$V_{GS} = 0\text{V}$ , $I_D = -1\text{mA}$                                                                                                                                                                   | $V_{(BR)DSS}$                                   | -100         |                        | Vdc                              |
| Gate-Source Voltage (Threshold)<br>$V_{DS} \geq V_{GS}$ , $I_D = -1.0\text{mA}$<br>$V_{DS} \geq V_{GS}$ , $I_D = -1.0\text{mA}$ , $T_j = +125^\circ\text{C}$<br>$V_{DS} \geq V_{GS}$ , $I_D = -1.0\text{mA}$ , $T_j = -55^\circ\text{C}$       | $V_{GS(th)1}$<br>$V_{GS(th)2}$<br>$V_{GS(th)3}$ | -2.0<br>-1.0 | -4.0<br>-5.0           | Vdc                              |
| Gate Current<br>$V_{GS} = \pm 20\text{V}$ , $V_{DS} = 0\text{V}$<br>$V_{GS} = \pm 20\text{V}$ , $V_{DS} = 0\text{V}$ , $T_j = +125^\circ\text{C}$                                                                                              | $I_{GSS1}$<br>$I_{GSS2}$                        |              | $\pm 100$<br>$\pm 200$ | nAdc                             |
| Drain Current<br>$V_{GS} = 0\text{V}$ , $V_{DS} = -80\text{V}$<br>$V_{GS} = 0\text{V}$ , $V_{DS} = -80\text{V}$ , $T_j = +125^\circ\text{C}$                                                                                                   | $I_{DSS1}$<br>$I_{DSS2}$                        |              | -25<br>-0.25           | $\mu\text{Adc}$<br>mAdc          |
| Static Drain-Source On-State Resistance<br>$V_{GS} = -12\text{V}$ , $I_D = -7.0\text{A}$ pulsed<br>$V_{GS} = -12\text{V}$ , $I_D = -11.0\text{A}$ pulsed<br>$T_j = -125^\circ\text{C}$<br>$V_{GS} = -12\text{V}$ , $I_D = -7.0\text{A}$ pulsed | $r_{DS(on)1}$<br>$r_{DS(on)2}$<br>$r_{DS(on)3}$ |              | 0.3<br>0.35<br>0.54    | $\Omega$<br>$\Omega$<br>$\Omega$ |
| Diode Forward Voltage<br>$V_{GS} = 0\text{V}$ , $I_D = -11.0\text{A}$ pulsed                                                                                                                                                                   | $V_{SD}$                                        |              | -3.0                   | Vdc                              |



TO-257AA  
JANSM2N7382, JANS D2N7382,  
JANSR2N7382, JANSF2N7382  
See Figure 1

## RADIATION HARDENED P-CHANNEL MOSFET

Qualified per MIL-PRF-19500/615

### DYNAMIC CHARACTERISTICS

| Parameters / Test Conditions | Symbol      | Min. | Max. | Unit |
|------------------------------|-------------|------|------|------|
| Gate Charge:                 |             |      |      |      |
| On-State Gate Charge         | $Q_{g(on)}$ |      | 45   | nC   |
| Gate to Source Charge        | $Q_{gs}$    |      | 10   |      |
| Gate to Drain Charge         | $Q_{gd}$    |      | 25   |      |

$V_{GS} = -12V$ ,  $I_D = -11.0A$   
 $V_{DS} = -50V$

### SWITCHING CHARACTERISTICS

| Parameters / Test Conditions | Symbol       | Min. | Max. | Unit |
|------------------------------|--------------|------|------|------|
| Switching time tests:        |              |      |      |      |
| Turn-on delay time           | $t_{d(on)}$  |      | 30   | ns   |
| Rinse time                   | $t_r$        |      | 50   |      |
| Turn-off delay time          | $t_{d(off)}$ |      | 70   |      |
| Fall time                    | $t_f$        |      | 70   |      |
| Diode Reverse Recovery Time  | $t_{rr}$     |      | 250  | ns   |

$I_D = -11.0A$ ,  $V_{GS} = -12Vdc$ ,  
Gate drive impedance =  $7.5\Omega$ ,  
 $V_{DD} = -50Vdc$   
 $di/dt \leq -100A/\mu s$ ,  $V_{DD} \leq -50V$ ,  
 $I_F = -11.0A$

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

| Parameters / Test Conditions                                                                                                  | Symbol                         | Min.         | Max.         | Unit       |
|-------------------------------------------------------------------------------------------------------------------------------|--------------------------------|--------------|--------------|------------|
| Drain-Source Breakdown Voltage<br>$V_{GS} = 0V$ , $I_D = -1mA$                                                                | $V_{(BR)DSS}$                  | -100         |              | Vdc        |
| Gate-Source Voltage (Threshold)<br>$V_{DS} \geq V_{GS}$ , $I_D = -1.0mA$ JANSR<br>$V_{DS} \geq V_{GS}$ , $I_D = -1.0mA$ JANSF | $V_{GS(th)1}$<br>$V_{GS(th)1}$ | -2.0<br>-2.0 | -4.0<br>-5.0 | Vdc        |
| Gate Current<br>$V_{GS} = \pm 20V$ , $V_{DS} = 0V$                                                                            | $I_{GSS1}$                     |              | $\pm 100$    | nAdc       |
| Drain Current<br>$V_{GS} = 0V$ , $V_{DS} = -80V$                                                                              | $I_{DSS1}$                     |              | -25          | $\mu A$ dc |
| Static Drain-Source On-State Resistance<br>$V_{GS} = -12V$ , $I_D = -7.0A$ pulsed                                             | $r_{DS(on)}$                   |              | 0.30         | $\Omega$   |
| Diode Forward Voltage<br>$V_{GS} = 0V$ , $I_D = -11.0A$ pulsed                                                                | $V_{SD}$                       |              | -3.0         | Vdc        |

Note:

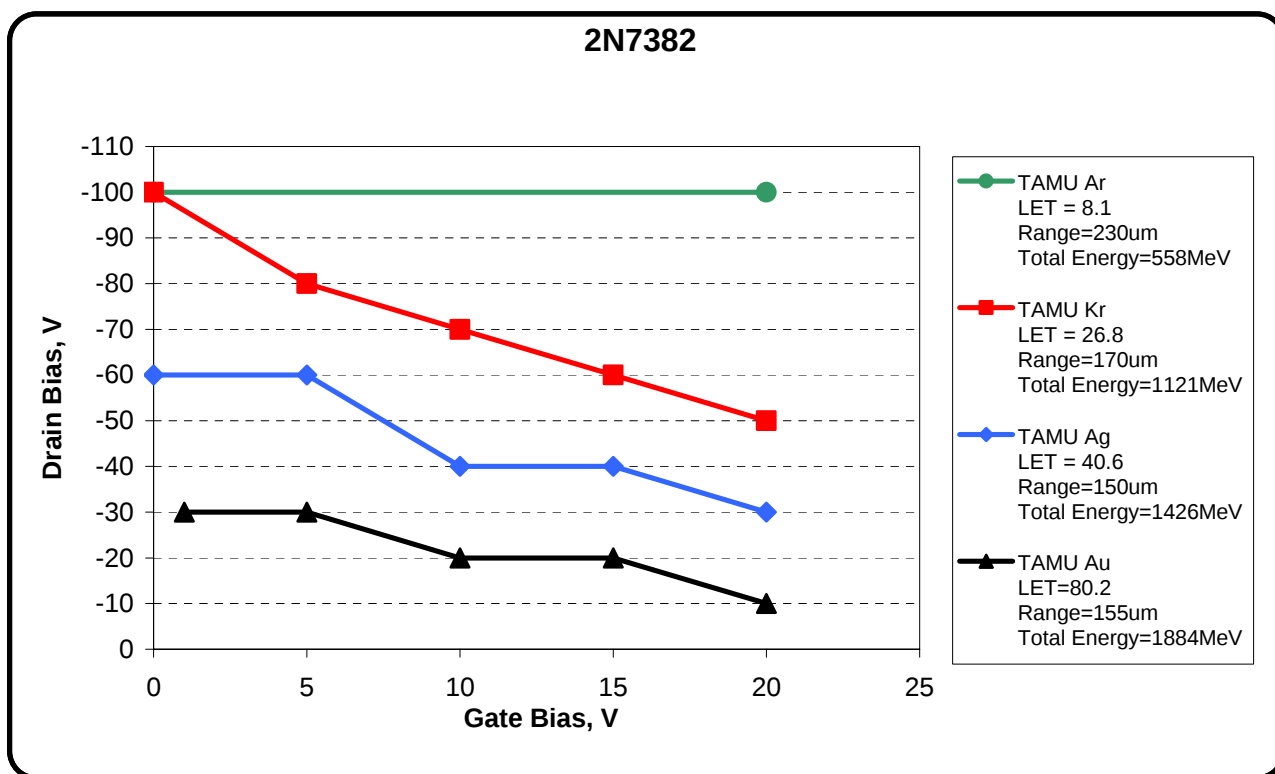
- (3) Post-Irradiation Electrical Characteristics apply to devices subjected to Steady State Total Dose Irradiation testing in accordance with MIL-STD-750 Method 1019. Separate samples are tested for VGS bias (12V), and VDS bias (80V) conditions.

## RADIATION HARDENED P-CHANNEL MOSFET

Qualified per MIL-PRF-19500/615

### Single Event Effect (SEE) Characteristics:

Heavy Ion testing of the 2N7382 device was completed by similarity of die structure to the 2N7389. The 2N7389 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:

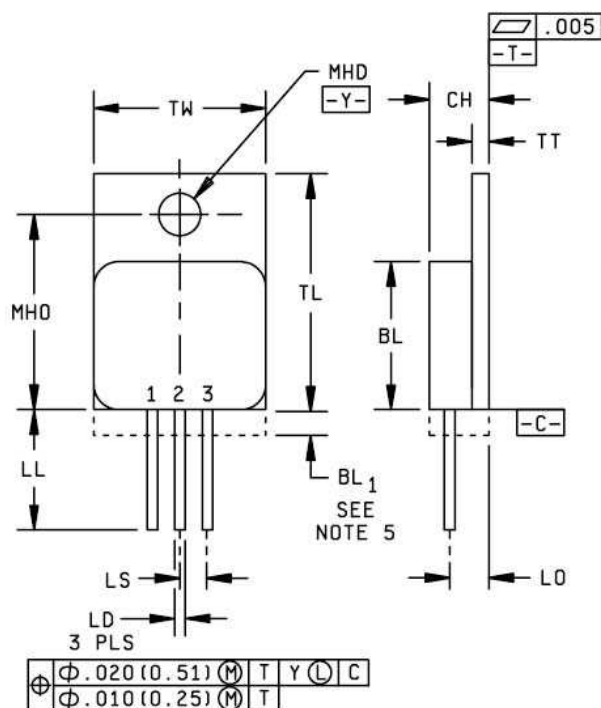


It should be noted that total energy levels are considered to be a factor in SEE characterization. Comparisons to other datasets should not be based on LET alone. Please consult factory for more information.

## RADIATION HARDENED P-CHANNEL MOSFET

Qualified per MIL-PRF-19500/615

**Figure 1: Case Outline and Pin Configuration for JANSM2N7382, JANSD2N7382, JANSR2N7382 & JANSF2N7382**



| Ltr    | Dimensions |      |             |       |
|--------|------------|------|-------------|-------|
|        | Inches     |      | Millimeters |       |
|        | Min        | Max  | Min         | Max   |
| BL     | .410       | .430 | 10.41       | 10.92 |
| BL1    |            | .028 |             | 0.71  |
| CH     | .190       | .200 | 4.83        | 5.08  |
| LD     | .025       | .035 | 0.64        | 0.89  |
| LL     | .500       | .625 | 12.70       | 15.88 |
| 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-thru eyelets (configuration is optional, but will not extend beyond this zone).
5. In accordance with ASME Y14.5M, diameters are equivalent to  $\phi$ x symbology.