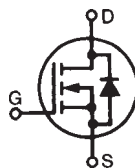


## Polar™ Power MOSFET

Enhancement Mode  
Avalanche Rated

**IXTA14N60P**  
**IXTP14N60P**  
**IXTQ14N60P**

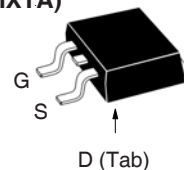
$V_{DSS} = 600V$   
 $I_{D25} = 14A$   
 $R_{DS(on)} \leq 550m\Omega$



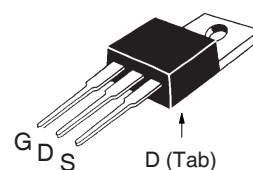
| Symbol     | Test Conditions                                           | Maximum Ratings |            |
|------------|-----------------------------------------------------------|-----------------|------------|
| $V_{DSS}$  | $T_J = 25^\circ C$ to $150^\circ C$                       | 600             | V          |
| $V_{DGR}$  | $T_J = 25^\circ C$ to $150^\circ C$ , $R_{GS} = 1M\Omega$ | 600             | V          |
| $V_{GSS}$  | Continuous                                                | $\pm 30$        | V          |
| $V_{GSM}$  | Transient                                                 | $\pm 40$        | V          |
| $I_{D25}$  | $T_C = 25^\circ C$                                        | 14              | A          |
| $I_{DM}$   | $T_C = 25^\circ C$ , pulse width limited by $T_{JM}$      | 42              | A          |
| $I_A$      | $T_C = 25^\circ C$                                        | 14              | A          |
| $E_{AS}$   | $T_C = 25^\circ C$                                        | 900             | mJ         |
| $P_D$      | $T_C = 25^\circ C$                                        | 300             | W          |
| $T_J$      |                                                           | -55 ... +150    | $^\circ C$ |
| $T_{JM}$   |                                                           | 150             | $^\circ C$ |
| $T_{stg}$  |                                                           | -55 ... +150    | $^\circ C$ |
| $T_L$      | Maximum Lead Temperature for Soldering                    | 300             | $^\circ C$ |
| $T_{SOLD}$ | Plastic Body for 10s                                      | 260             | $^\circ C$ |
| $M_d$      | Mounting torque (TO-220 & TO-3P)                          | 1.13/10         | Nm/lb.in.  |
| Weight     | TO-263                                                    | 2.5             | g          |
|            | TO-220                                                    | 3.0             | g          |
|            | TO-3P                                                     | 5.5             | g          |

| Symbol       | Test Conditions<br>( $T_J = 25^\circ C$ , unless otherwise specified) | Characteristic Values |      |                          |
|--------------|-----------------------------------------------------------------------|-----------------------|------|--------------------------|
|              |                                                                       | Min.                  | Typ. | Max.                     |
| $BV_{DSS}$   | $V_{GS} = 0V$ , $I_D = 250\mu A$                                      | 600                   |      | V                        |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = 250\mu A$                                  | 3.0                   |      | 5.5 V                    |
| $I_{GSS}$    | $V_{GS} = \pm 30V$ , $V_{DS} = 0V$                                    |                       |      | $\pm 100$ nA             |
| $I_{DSS}$    | $V_{DS} = V_{DSS}$ , $V_{GS} = 0V$<br>$T_J = 125^\circ C$             |                       |      | 5 $\mu A$<br>100 $\mu A$ |
| $R_{DS(on)}$ | $V_{GS} = 10V$ , $I_D = 0.5 \cdot I_{D25}$ , Note 1                   | 450                   | 550  | m $\Omega$               |

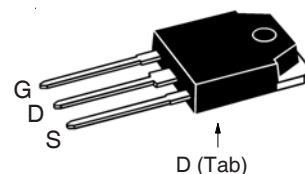
TO-263 AA (IXTA)



TO-220AB (IXTP)



TO-3P (IXTQ)



G = Gate      D = Drain  
S = Source    Tab = Drain

### Features

- International Standard Packages
- Fast Intrinsic Rectifier
- Avalanche Rated
- Low  $R_{DS(on)}$  and  $Q_G$
- Low Package Inductance

### Advantages

- High Power Density
- Easy to Mount
- Space Savings

### Applications

- Switch-Mode and Resonant-Mode Power Supplies
- DC-DC Converters
- Laser Drivers
- AC and DC Motor Drives
- Robotics and Servo Controls

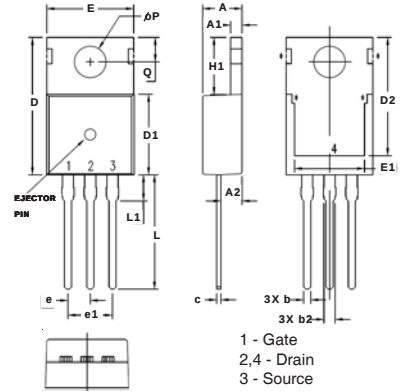
| Symbol       | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified)                                                                         | Characteristic Values |      |                         |
|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|------|-------------------------|
|              |                                                                                                                                                     | Min.                  | Typ. | Max.                    |
| $g_{fs}$     | $V_{DS} = 20\text{V}$ , $I_D = 0.5 \cdot I_{D25}$ , Note 1                                                                                          | 7                     | 13   | S                       |
| $C_{iss}$    | $V_{GS} = 0\text{V}$ , $V_{DS} = 25\text{V}$ , $f = 1\text{MHz}$                                                                                    |                       | 2500 | pF                      |
| $C_{oss}$    |                                                                                                                                                     |                       | 215  | pF                      |
| $C_{rss}$    |                                                                                                                                                     |                       | 13   | pF                      |
| $t_{d(on)}$  | <b>Resistive Switching Times</b><br>$V_{GS} = 10\text{V}$ , $V_{DS} = 0.5 \cdot V_{DSS}$ , $I_D = 0.5 \cdot I_{D25}$<br>$R_G = 10\Omega$ (External) |                       | 23   | ns                      |
| $t_r$        |                                                                                                                                                     |                       | 27   | ns                      |
| $t_{d(off)}$ |                                                                                                                                                     |                       | 70   | ns                      |
| $t_f$        |                                                                                                                                                     |                       | 26   | ns                      |
| $Q_{g(on)}$  | $V_{GS} = 10\text{V}$ , $V_{DS} = 0.5 \cdot V_{DSS}$ , $I_D = 0.5 \cdot I_{D25}$                                                                    |                       | 36   | nC                      |
| $Q_{gs}$     |                                                                                                                                                     |                       | 16   | nC                      |
| $Q_{gd}$     |                                                                                                                                                     |                       | 12   | nC                      |
| $R_{thJC}$   |                                                                                                                                                     |                       |      | 0.42 $^\circ\text{C/W}$ |
| $R_{thCS}$   | (TO-220)                                                                                                                                            |                       | 0.50 | $^\circ\text{C/W}$      |
|              | (TO-3P)                                                                                                                                             |                       | 0.25 | $^\circ\text{C/W}$      |

## Source-Drain Diode

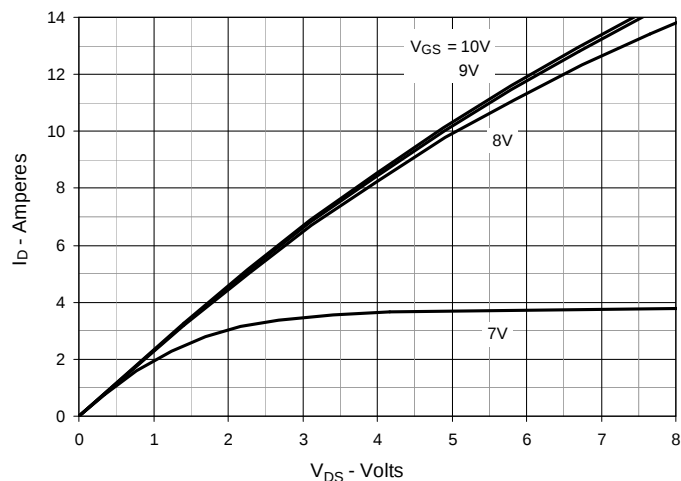
| Symbol   | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified)                           | Characteristic Values |      |       |
|----------|-------------------------------------------------------------------------------------------------------|-----------------------|------|-------|
|          |                                                                                                       | Min.                  | Typ. | Max.  |
| $I_S$    | $V_{GS} = 0\text{V}$                                                                                  |                       |      | 14 A  |
| $I_{SM}$ | Repetitive, pulse width limited by $T_{JM}$                                                           |                       |      | 42 A  |
| $V_{SD}$ | $I_F = I_S$ , $V_{GS} = 0\text{V}$ , Note 1                                                           |                       |      | 1.5 V |
| $t_{rr}$ | $I_F = 14\text{A}$ , $-di/dt = 100\text{A}/\mu\text{s}$<br>$V_R = 100\text{V}$ , $V_{GS} = 0\text{V}$ |                       | 500  | ns    |

Note 1: Pulse test,  $t \leq 300\mu\text{s}$ ; duty cycle,  $d \leq 2\%$ .

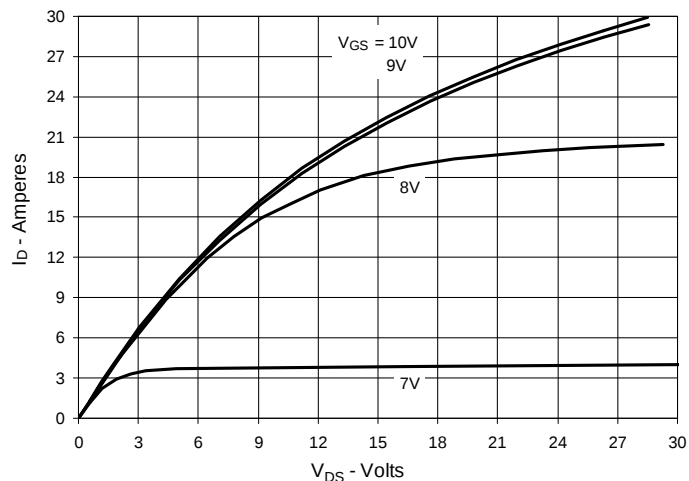
## TO-220 Outline



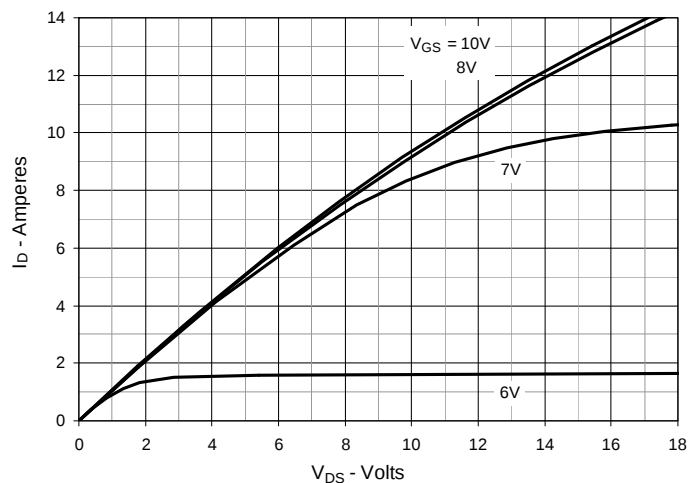
**Fig. 1. Output Characteristics @  $T_J = 25^\circ\text{C}$**



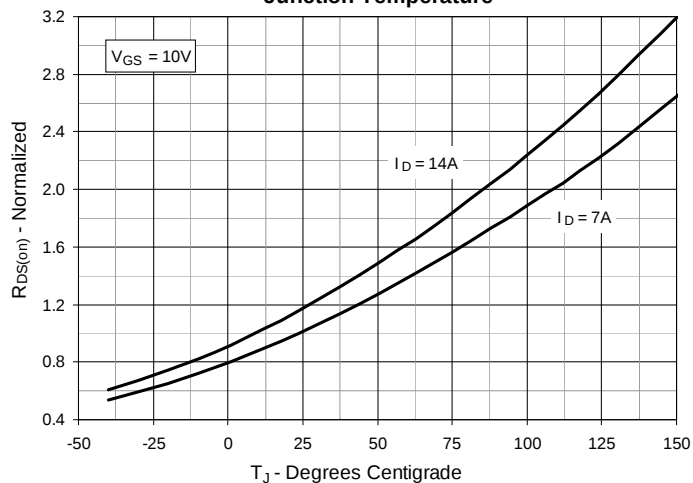
**Fig. 2. Extended Output Characteristics @  $T_J = 25^\circ\text{C}$**



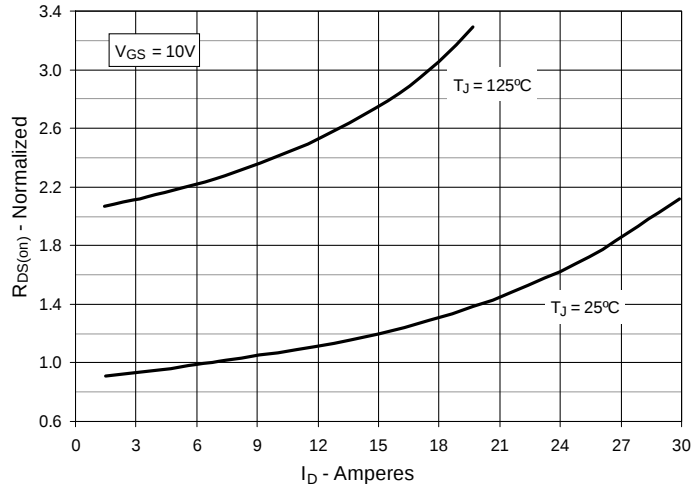
**Fig. 3. Output Characteristics @  $T_J = 125^\circ\text{C}$**



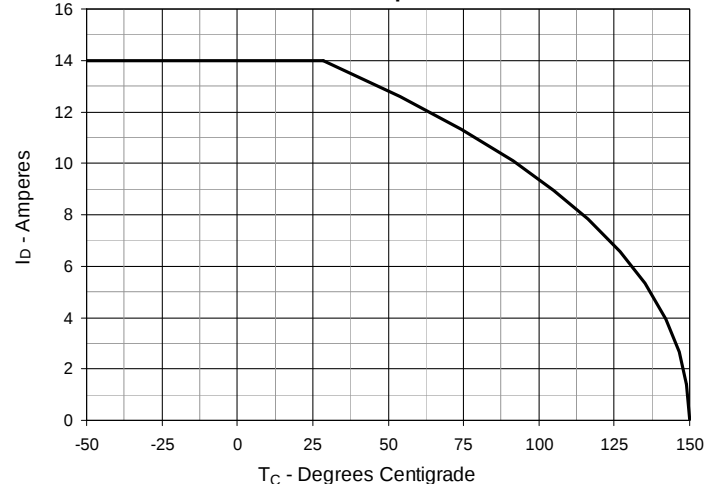
**Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = 7\text{A}$  Value vs. Junction Temperature**



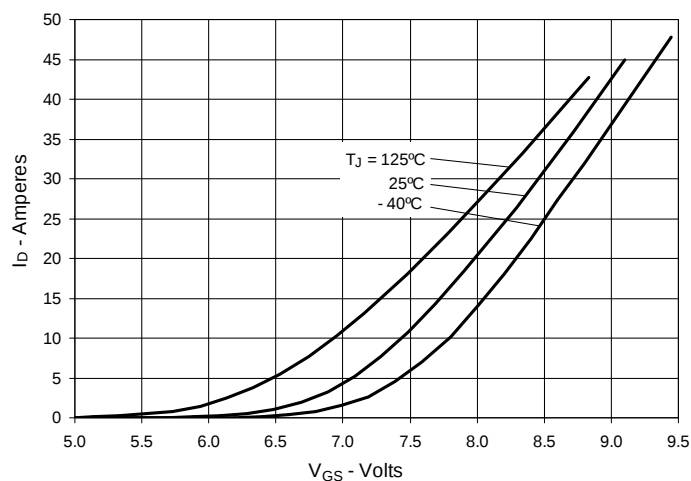
**Fig. 5.  $R_{DS(on)}$  Normalized to  $I_D = 7\text{A}$  Value vs. Drain Current**



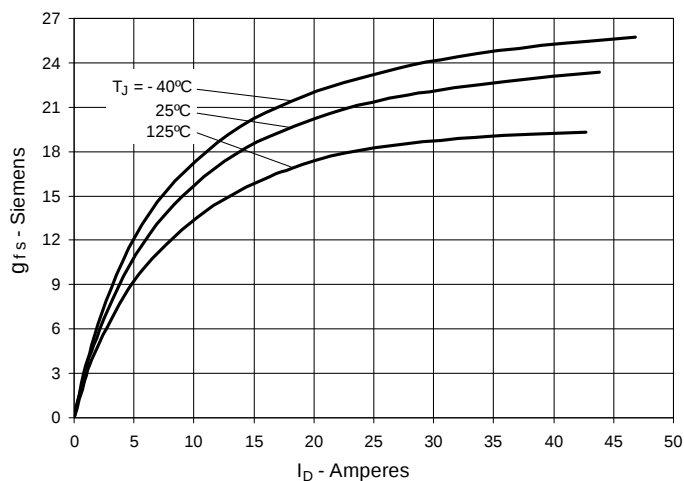
**Fig. 6. Maximum Drain Current vs. Case Temperature**



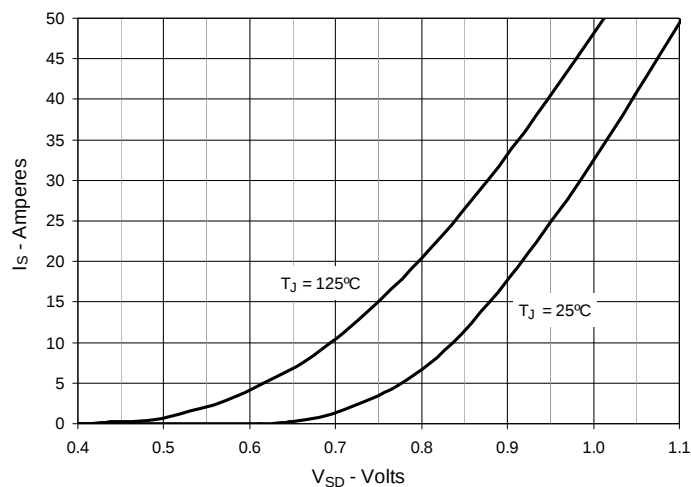
**Fig. 7. Input Admittance**



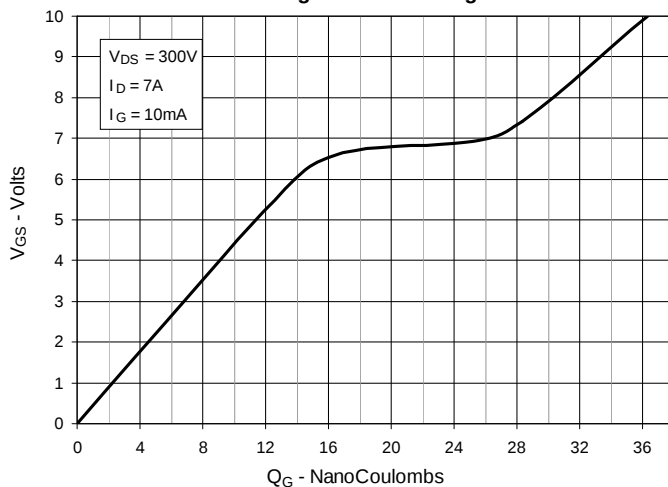
**Fig. 8. Transconductance**



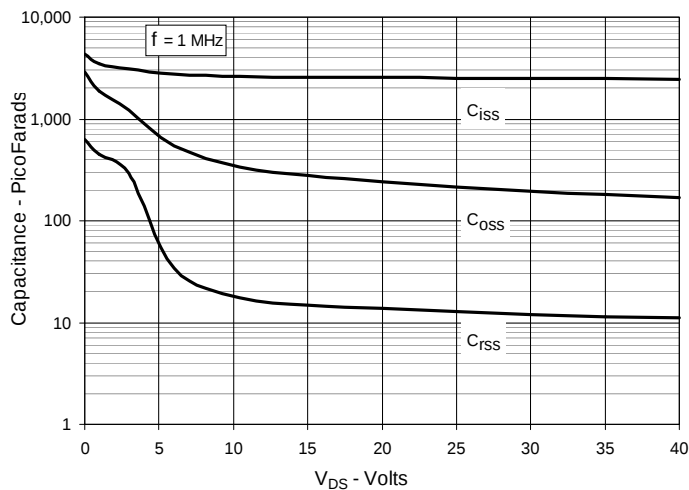
**Fig. 9. Forward Voltage Drop of Intrinsic Diode**



**Fig. 10. Gate Charge**



**Fig. 11. Capacitance**



**Fig. 12. Forward-Bias Safe Operating Area**

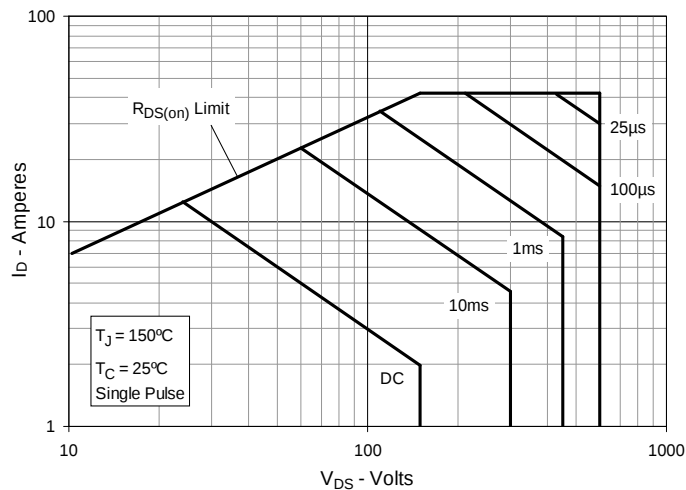
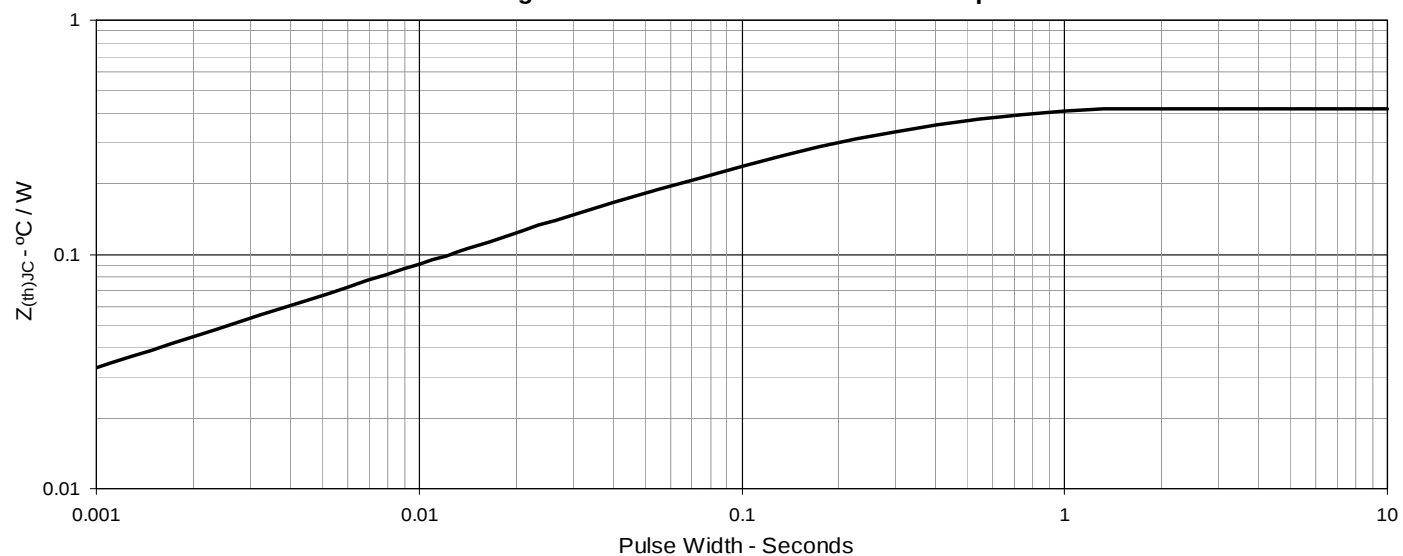


Fig. 13. Maximum Transient Thermal Impedance





---

Disclaimer Notice - Information furnished is believed to be accurate and reliable. However, users should independently evaluate the suitability of and test each product selected for their own applications. Littelfuse products are not designed for, and may not be used in, all applications. Read complete Disclaimer Notice at [www.littelfuse.com/disclaimer-electronics](http://www.littelfuse.com/disclaimer-electronics).