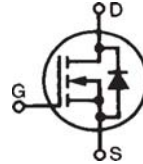


## High Voltage Power MOSFET

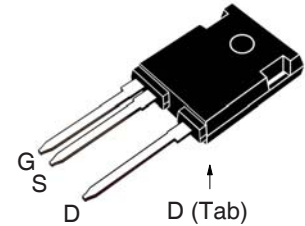
## IXTH05N250P3HV

$$\begin{aligned} V_{DSS} &= 2500V \\ I_{D25} &= 0.50A \\ R_{DS(on)} &\leq 110\Omega \end{aligned}$$

N-Channel Enhancement Mode



TO-247HV



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

| Symbol     | Test Conditions                                                   | Maximum Ratings |                  |
|------------|-------------------------------------------------------------------|-----------------|------------------|
| $V_{DSS}$  | $T_J = 25^\circ\text{C to } 150^\circ\text{C}$                    | 2500            | V                |
| $V_{DGR}$  | $T_J = 25^\circ\text{C to } 150^\circ\text{C}, R_{GS} = 1M\Omega$ | 2500            | V                |
| $V_{GSS}$  | Continuous                                                        | $\pm 20$        | V                |
| $V_{GSM}$  | Transient                                                         | $\pm 30$        | V                |
| $I_{D25}$  | $T_C = 25^\circ\text{C}$                                          | 0.50            | A                |
| $I_{D110}$ | $T_C = 110^\circ\text{C}$                                         | 0.33            | A                |
| $I_{DM}$   | $T_C = 25^\circ\text{C}$ , Pulse Width Limited by $T_{JM}$        | 1.00            | A                |
| $P_D$      | $T_C = 25^\circ\text{C}$                                          | 104             | W                |
| $T_J$      |                                                                   | - 55 ... +150   | $^\circ\text{C}$ |
| $T_{JM}$   |                                                                   | 150             | $^\circ\text{C}$ |
| $T_{stg}$  |                                                                   | - 55 ... +150   | $^\circ\text{C}$ |
| $T_L$      | Maximum Lead Temperature for Soldering                            | 300             | $^\circ\text{C}$ |
| $T_{SOLD}$ | 1.6 mm (0.062in.) from Case for 10s                               | 260             | $^\circ\text{C}$ |
| $M_d$      | Mounting Torque                                                   | 1.13/10         | Nm/lb.in         |
| Weight     |                                                                   | 6               | g                |

### Features

- High Blocking Voltage
- High Voltage Package

### Advantages

- Easy to Mount
- Space Savings
- High Power Density

### Applications

- High Voltage Power Supplies
- Capacitor Discharge Applications
- Pulse Circuits
- Laser and X-Ray Generation Systems

| Symbol       | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified) | Characteristic Values |      |                           |
|--------------|-----------------------------------------------------------------------------|-----------------------|------|---------------------------|
|              |                                                                             | Min.                  | Typ. | Max.                      |
| $BV_{DSS}$   | $V_{GS} = 0V, I_D = 250\mu A$                                               | 2500                  |      | V                         |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = 250\mu A$                                           | 2.0                   |      | 4.0 V                     |
| $I_{GSS}$    | $V_{GS} = \pm 20V, V_{DS} = 0V$                                             |                       |      | $\pm 100$ nA              |
| $I_{DSS}$    | $V_{DS} = 0.8 \cdot V_{DSS}, V_{GS} = 0V$<br>$T_J = 125^\circ\text{C}$      |                       |      | 10 $\mu A$<br>250 $\mu A$ |
| $R_{DS(on)}$ | $V_{GS} = 10V, I_D = 0.25A$ , Note 1                                        |                       |      | 110 $\Omega$              |

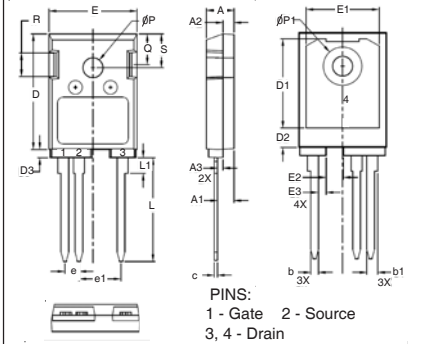
| Symbol       | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified)                                                             | Characteristic Values |      |                       |
|--------------|-----------------------------------------------------------------------------------------------------------------------------------------|-----------------------|------|-----------------------|
|              |                                                                                                                                         | Min.                  | Typ. | Max.                  |
| $g_{fs}$     | $V_{DS} = 60\text{V}$ , $I_D = 0.25\text{A}$ , Note 1                                                                                   | 0.19                  | 0.32 | S                     |
| $C_{iss}$    | $V_{GS} = 0\text{V}$ , $V_{DS} = 25\text{V}$ , $f = 1\text{MHz}$                                                                        |                       | 303  | pF                    |
| $C_{oss}$    |                                                                                                                                         |                       | 24   | pF                    |
| $C_{rss}$    |                                                                                                                                         |                       | 6    | pF                    |
| $t_{d(on)}$  | <b>Resistive Switching Times</b><br>$V_{GS} = 10\text{V}$ , $V_{DS} = 50\text{V}$ , $I_D = 0.50\text{A}$<br>$R_G = 10\Omega$ (External) |                       | 11   | ns                    |
| $t_r$        |                                                                                                                                         |                       | 20   | ns                    |
| $t_{d(off)}$ |                                                                                                                                         |                       | 23   | ns                    |
| $t_f$        |                                                                                                                                         |                       | 21   | ns                    |
| $Q_{g(on)}$  | $V_{GS} = 10\text{V}$ , $V_{DS} = 1.1\text{kV}$ , $I_D = 0.5 \cdot I_{D25}$                                                             |                       | 10.5 | nC                    |
| $Q_{gs}$     |                                                                                                                                         |                       | 1.3  | nC                    |
| $Q_{gd}$     |                                                                                                                                         |                       | 7.2  | nC                    |
| $R_{thJC}$   |                                                                                                                                         | 0.21                  |      | $1.2^\circ\text{C/W}$ |
| $R_{thCS}$   |                                                                                                                                         |                       |      | $^\circ\text{C/W}$    |

## Source-Drain Diode

| Symbol   | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified)     | Characteristic Values |      |               |
|----------|---------------------------------------------------------------------------------|-----------------------|------|---------------|
|          |                                                                                 | Min.                  | Typ. | Max.          |
| $I_S$    | $V_{GS} = 0\text{V}$ , Note 1                                                   |                       |      | 0.5 A         |
| $I_{SM}$ | Repetitive, pulse Width Limited by $T_{JM}$                                     |                       |      | 2.0 A         |
| $V_{SD}$ | $I_F = I_S$ , $V_{GS} = 0\text{V}$ , Note 1                                     |                       |      | 1.5 V         |
| $t_{rr}$ | $I_F = 0.5\text{A}$ , $-di/dt = 100\text{A}/\mu\text{s}$<br>$V_R = 100\text{V}$ |                       | 1.2  | $\mu\text{s}$ |
| $Q_{RM}$ |                                                                                 |                       | 7.0  | $\mu\text{C}$ |
| $I_{RM}$ |                                                                                 |                       | 12.2 | A             |

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

## TO-247HV (IXTH) Outline



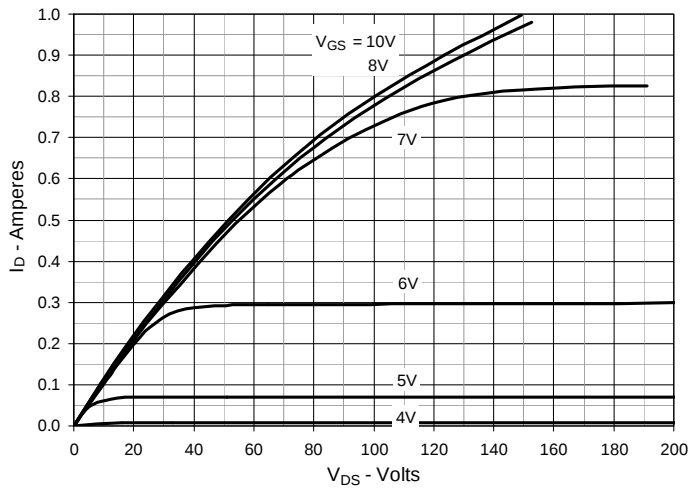
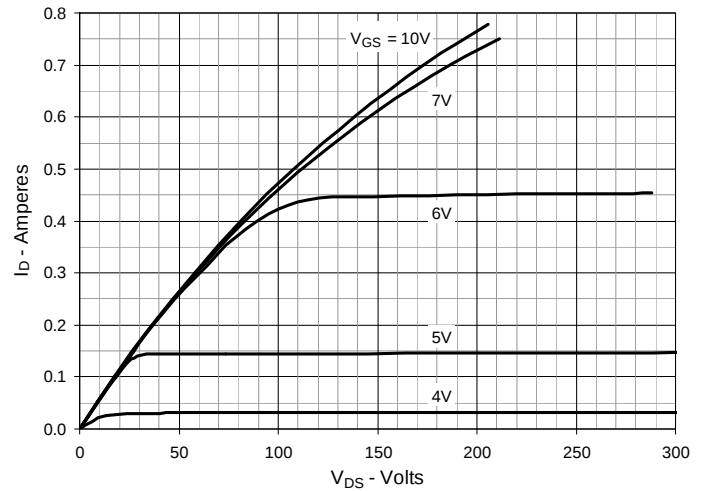
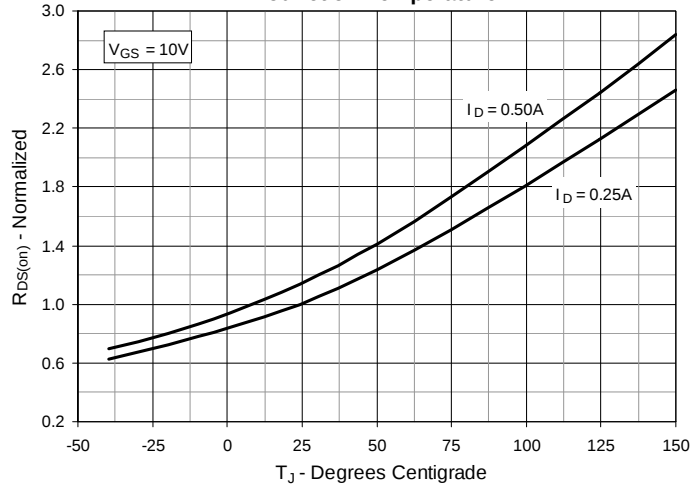
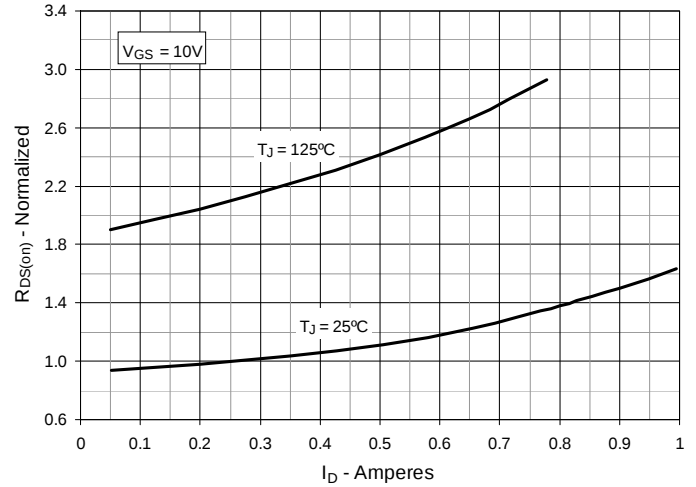
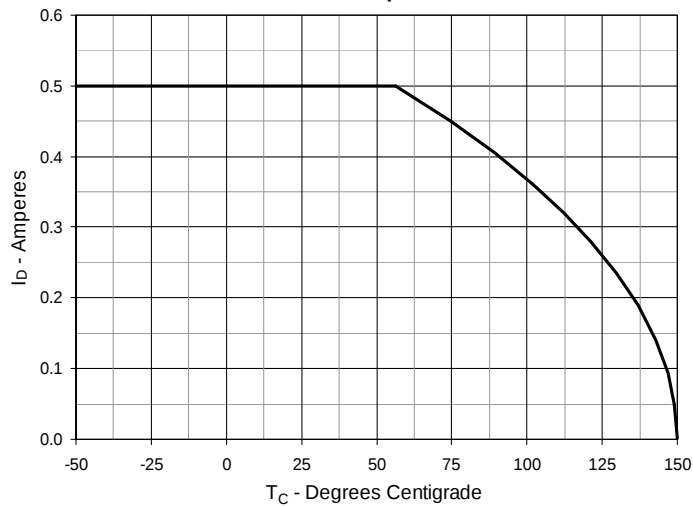
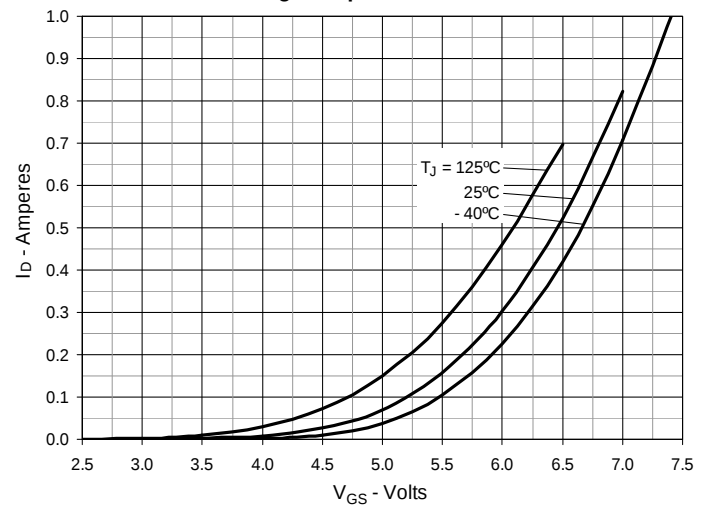
| SYM | INCHES |      | MILLIMETERS |       |
|-----|--------|------|-------------|-------|
|     | MIN    | MAX  | MIN         | MAX   |
| A   | .193   | .201 | 4.90        | 5.10  |
| A1  | .114   | .122 | 2.90        | 3.10  |
| A2  | .075   | .083 | 1.90        | 2.10  |
| A3  | .035   | .043 | 0.90        | 1.10  |
| b   | .053   | .059 | 1.35        | 1.50  |
| b1  | .075   | .083 | 1.90        | 2.10  |
| c   | .022   | .030 | 0.55        | 0.75  |
| D   | .819   | .843 | 20.80       | 21.40 |
| D1  | .638   | .646 | 16.20       | 16.40 |
| D2  | .134   | .146 | 3.40        | 3.70  |
| D3  | .055   | .063 | 1.40        | 1.60  |
| E   | .622   | .638 | 15.80       | 16.20 |
| E1  | .520   | .528 | 13.20       | 13.40 |
| E2  | .118   | .126 | 3.00        | 3.20  |
| E3  | .051   | .059 | 1.30        | 1.50  |
| e   | .100   | BSC  | 2.54        | BSC   |
| e1  | .300   | BSC  | 7.62        | BSC   |
| L   | .732   | .748 | 18.60       | 19.00 |
| L1  | .106   | .118 | 2.70        | 3.00  |
| ØP  | .138   | .142 | 3.50        | 3.60  |
| ØP1 | .272   | .280 | 6.90        | 7.10  |
| Q   | .216   | .224 | 5.50        | 5.70  |
| R   | .165   | .169 | 4.20        | 4.30  |
| S   | .240   | .248 | 6.10        | 6.30  |

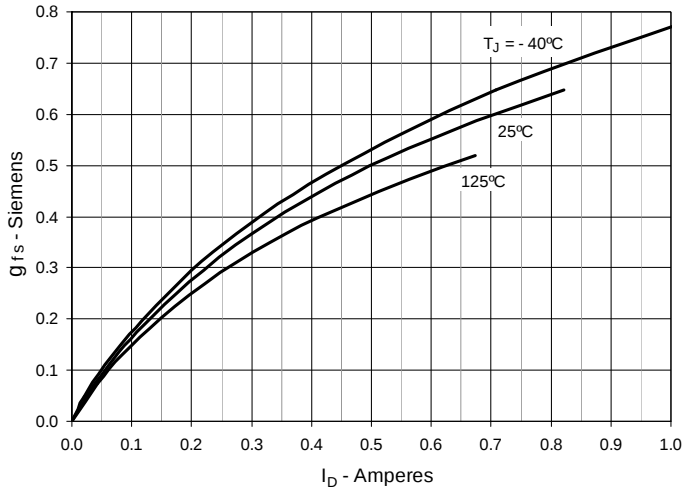
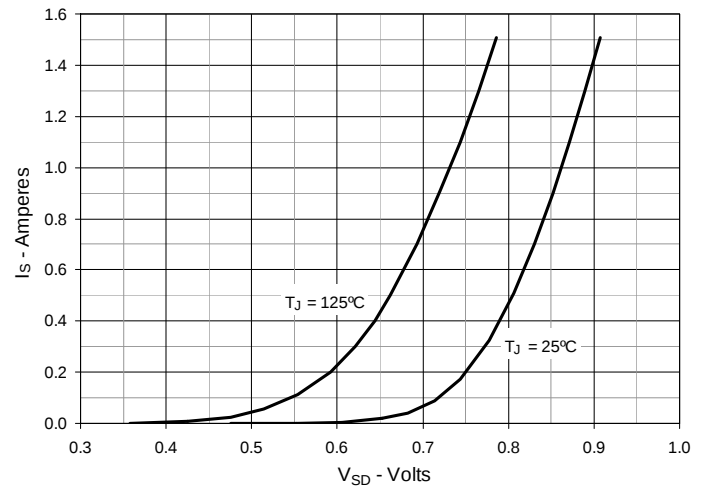
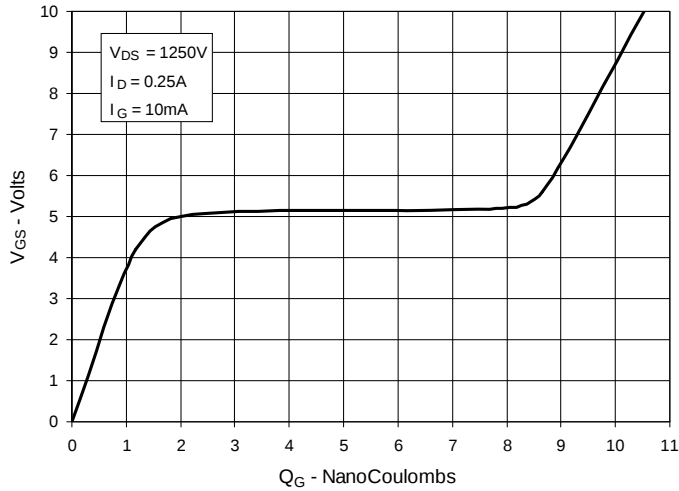
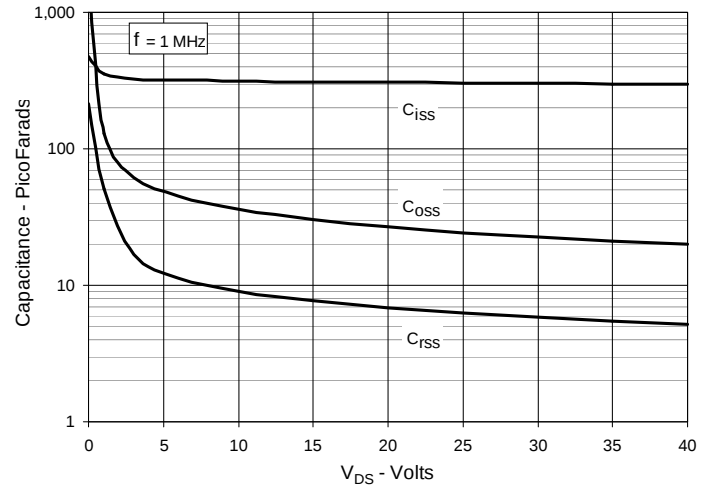
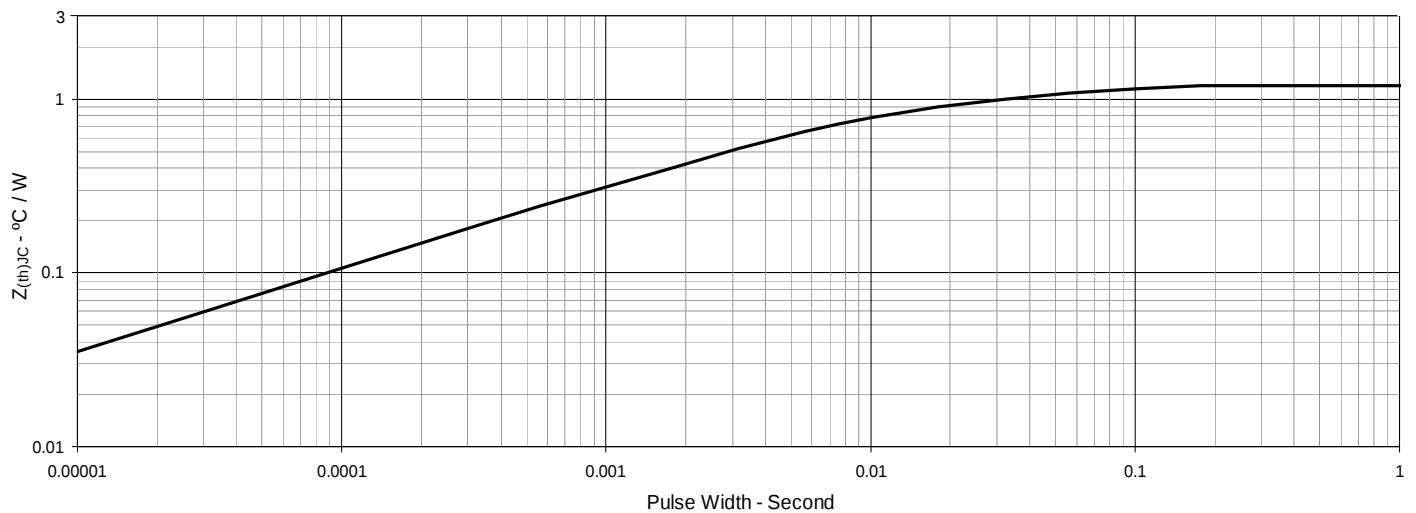
## ADVANCE TECHNICAL INFORMATION

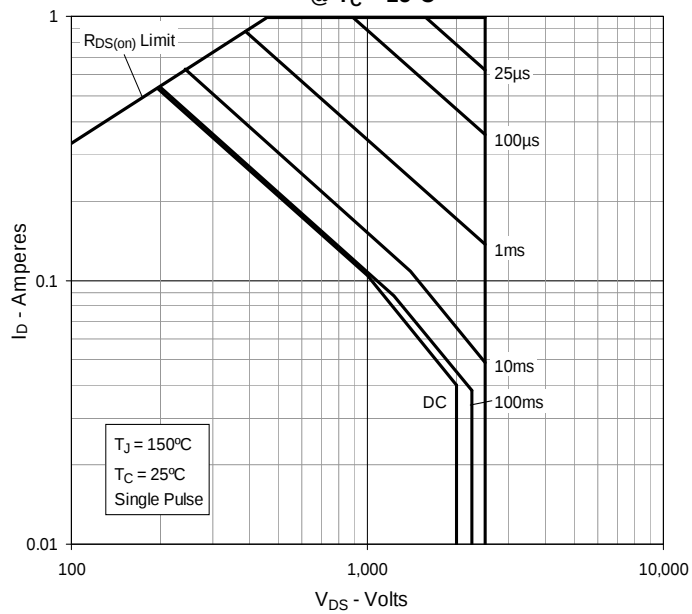
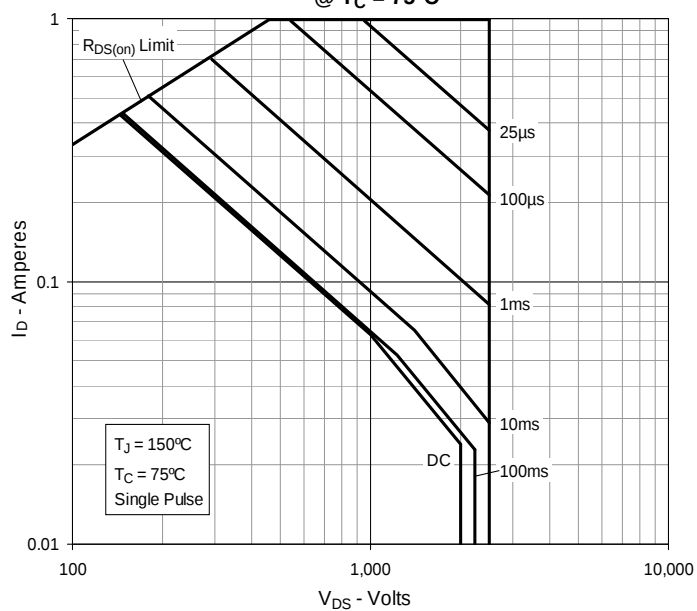
The product presented herein is under development. The Technical Specifications offered are derived from a subjective evaluation of the design, based upon prior knowledge and experience, and constitute a "considered reflection" of the anticipated result. IXYS reserves the right to change limits, test conditions, and dimensions without notice.

IXYS Reserves the Right to Change Limits, Test Conditions, and Dimensions.

|                                                                                  |           |           |           |           |              |              |              |              |              |              |
|----------------------------------------------------------------------------------|-----------|-----------|-----------|-----------|--------------|--------------|--------------|--------------|--------------|--------------|
| IXYS MOSFETs and IGBTs are covered by one or more of the following U.S. patents: | 4,835,592 | 4,931,844 | 5,049,961 | 5,237,481 | 6,162,665    | 6,404,065 B1 | 6,683,344    | 6,727,585    | 7,005,734 B2 | 7,157,338 B2 |
|                                                                                  | 4,860,072 | 5,017,508 | 5,063,307 | 5,381,025 | 6,259,123 B1 | 6,534,343    | 6,710,405 B2 | 6,759,692    | 7,063,975 B2 |              |
|                                                                                  | 4,881,106 | 5,034,796 | 5,187,117 | 5,486,715 | 6,306,728 B1 | 6,583,505    | 6,710,463    | 6,771,478 B2 | 7,071,537    |              |

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

**Fig. 2. Output Characteristics @  $T_J = 125^\circ\text{C}$** 

**Fig. 3.  $R_{DS(on)}$  Normalized to  $I_D = 0.25\text{A}$  Value vs. Junction Temperature**

**Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = 0.25\text{A}$  Value vs. Drain Current**

**Fig. 5. Maximum Drain Current vs. Case Temperature**

**Fig. 6. Input Admittance**


**Fig. 7. Transconductance**

**Fig. 8. Forward Voltage Drop of Intrinsic Diode**

**Fig. 9. Gate Charge**

**Fig. 10. Capacitance**

**Fig. 11. Maximum Transient Thermal Impedance**


**Fig. 12. Forward-Bias Safe Operating Area**
**@  $T_C = 25^\circ\text{C}$** 

**Fig. 13. Forward-Bias Safe Operating Area**
**@  $T_C = 75^\circ\text{C}$** 




---

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).