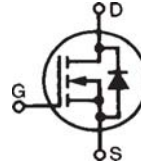


## High Voltage Power MOSFET

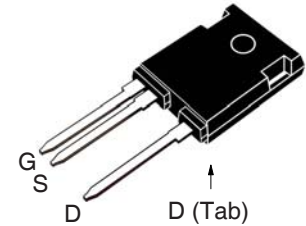
## IXTH04N300P3HV

$$\begin{aligned} V_{DSS} &= 3000V \\ I_{D25} &= 0.40A \\ R_{DS(on)} &\leq 190\Omega \end{aligned}$$

N-Channel Enhancement Mode



TO-247HV



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

| Symbol     | Test Conditions                                                   | Maximum Ratings |                  |
|------------|-------------------------------------------------------------------|-----------------|------------------|
| $V_{DSS}$  | $T_J = 25^\circ\text{C to } 150^\circ\text{C}$                    | 3000            | V                |
| $V_{DGR}$  | $T_J = 25^\circ\text{C to } 150^\circ\text{C}, R_{GS} = 1M\Omega$ | 3000            | V                |
| $V_{GSS}$  | Continuous                                                        | $\pm 20$        | V                |
| $V_{GSM}$  | Transient                                                         | $\pm 30$        | V                |
| $I_{D25}$  | $T_C = 25^\circ\text{C}$                                          | 0.40            | A                |
| $I_{D110}$ | $T_C = 110^\circ\text{C}$                                         | 0.24            | A                |
| $I_{DM}$   | $T_C = 25^\circ\text{C}$ , Pulse Width Limited by $T_{JM}$        | 0.80            | 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.                      |
| $BV_{DSS}$   | $V_{GS} = 0V, I_D = 250\mu A$                                               | 3000                  |      | 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 $\mu A$ |
| $R_{DS(on)}$ | $V_{GS} = 10V, I_D = 0.20A$ , Note 1                                        |                       |      | 190 $\Omega$              |

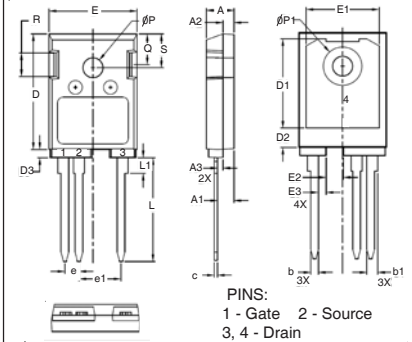
| Symbol       | Test Conditions<br>( $T_J = 25^{\circ}\text{C}$ , Unless Otherwise Specified)                                                           | Characteristic Values |      |                          |
|--------------|-----------------------------------------------------------------------------------------------------------------------------------------|-----------------------|------|--------------------------|
|              |                                                                                                                                         | Min.                  | Typ. | Max.                     |
| $g_{fs}$     | $V_{DS} = 60\text{V}$ , $I_D = 0.20\text{A}$ , Note 1                                                                                   | 0.17                  | 0.28 | S                        |
| $C_{iss}$    | $V_{GS} = 0\text{V}$ , $V_{DS} = 25\text{V}$ , $f = 1\text{MHz}$                                                                        |                       | 283  | pF                       |
| $C_{oss}$    |                                                                                                                                         |                       | 18   | pF                       |
| $C_{rss}$    |                                                                                                                                         |                       | 5    | pF                       |
| $t_{d(on)}$  | <b>Resistive Switching Times</b><br>$V_{GS} = 10\text{V}$ , $V_{DS} = 50\text{V}$ , $I_D = 0.40\text{A}$<br>$R_G = 10\Omega$ (External) |                       | 12   | ns                       |
| $t_r$        |                                                                                                                                         |                       | 20   | ns                       |
| $t_{d(off)}$ |                                                                                                                                         |                       | 35   | ns                       |
| $t_f$        |                                                                                                                                         |                       | 26   | ns                       |
| $Q_{g(on)}$  | $V_{GS} = 10\text{V}$ , $V_{DS} = 1.5\text{kV}$ , $I_D = 0.5 \cdot I_{D25}$                                                             |                       | 13.0 | nC                       |
| $Q_{gs}$     |                                                                                                                                         |                       | 1.0  | nC                       |
| $Q_{gd}$     |                                                                                                                                         |                       | 8.7  | 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                                                   |                       |      | 0.4 A         |
| $I_{SM}$ | Repetitive, pulse Width Limited by $T_{JM}$                                     |                       |      | 1.6 A         |
| $V_{SD}$ | $I_F = I_S$ , $V_{GS} = 0\text{V}$ , Note 1                                     |                       |      | 1.5 V         |
| $t_{rr}$ | $I_F = 0.4\text{A}$ , $-di/dt = 100\text{A}/\mu\text{s}$<br>$V_R = 100\text{V}$ |                       | 1.1  | $\mu\text{s}$ |
| $Q_{RM}$ |                                                                                 |                       | 6.2  | $\mu\text{C}$ |
| $I_{RM}$ |                                                                                 |                       | 11.2 | A             |

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

## TO-247HV (IXTH) Outline



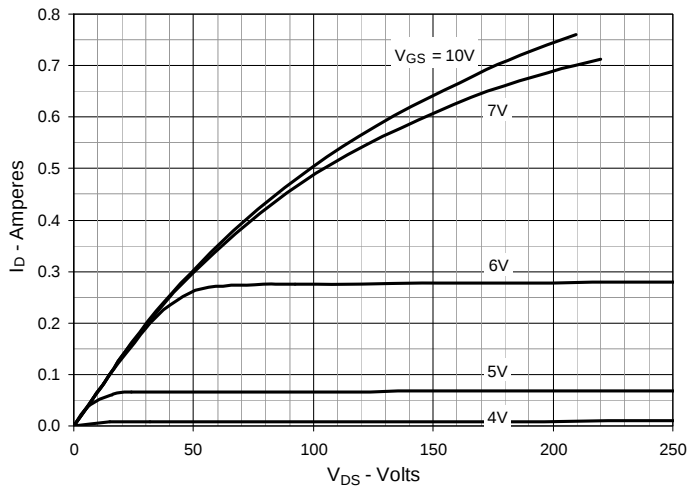
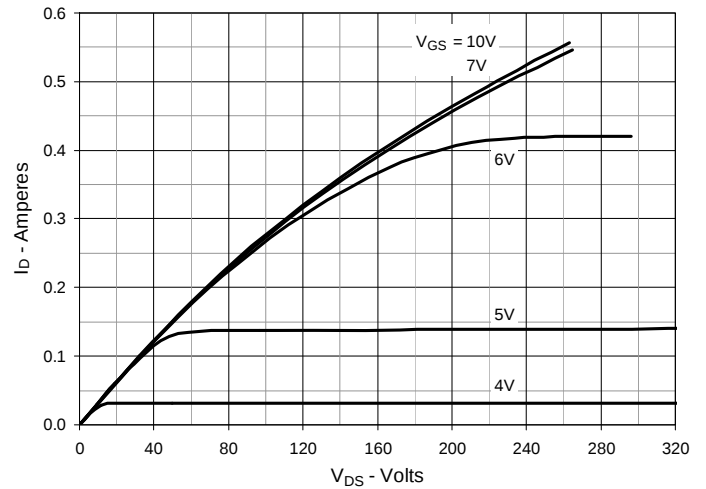
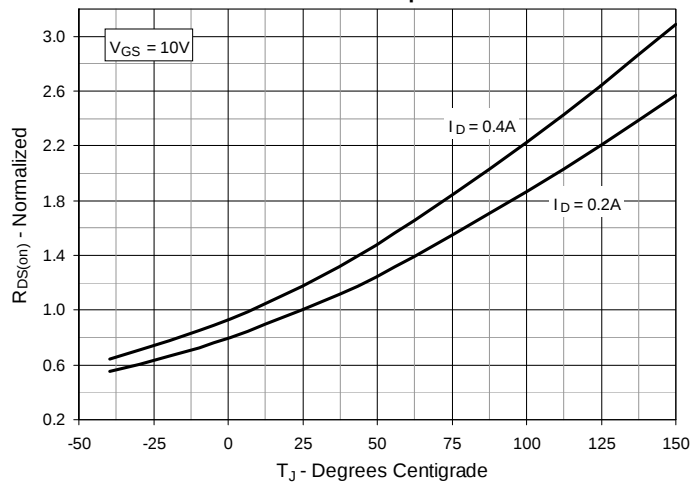
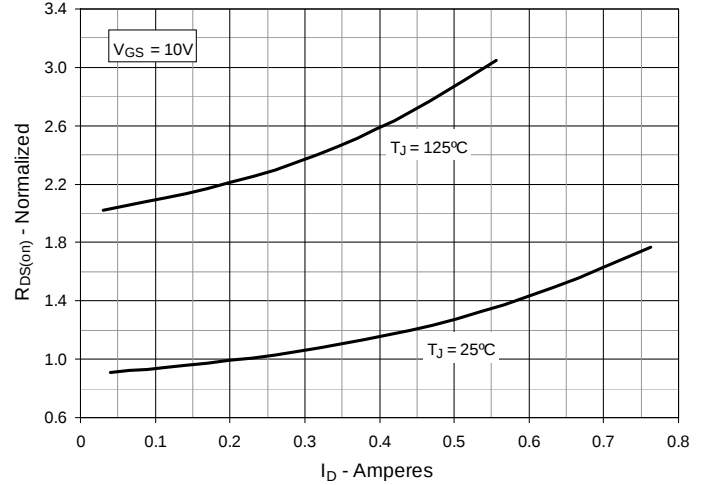
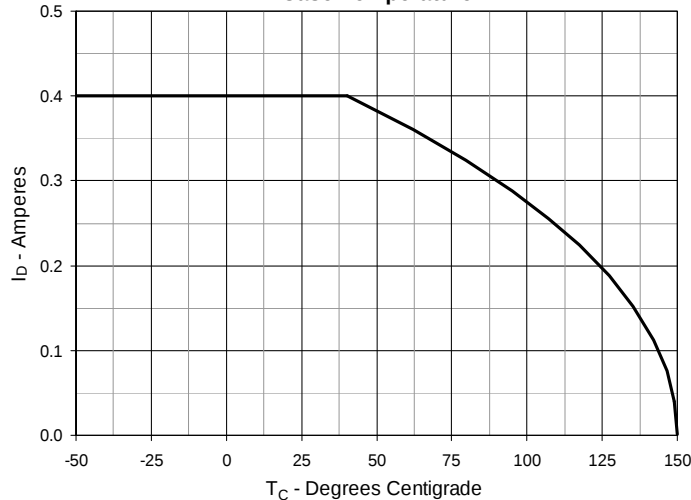
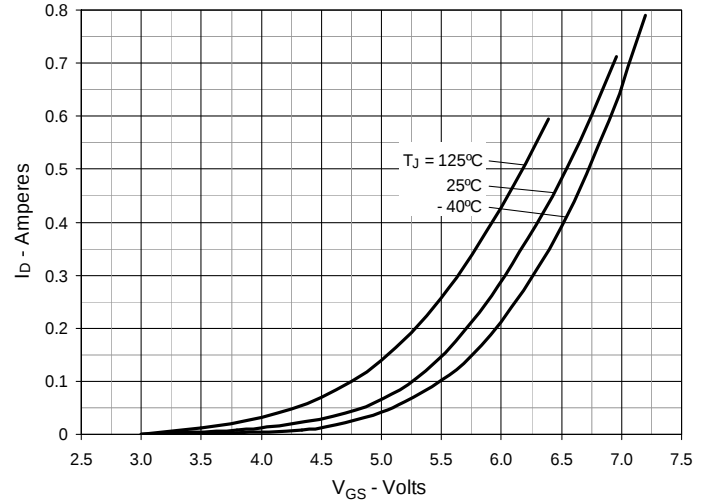
| SYM | INCHES |      | MILLIMETERS |       |
|-----|--------|------|-------------|-------|
|     | MIN    | MAX  | MIN         | MAX   |
| A   | .193   | .201 | 4.90        | 5.10  |
| A1  | .114   | .122 | 2.90        | 3.10  |
| A2  | .075   | .083 | 1.90        | 2.10  |
| A3  | .035   | .043 | 0.90        | 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  |

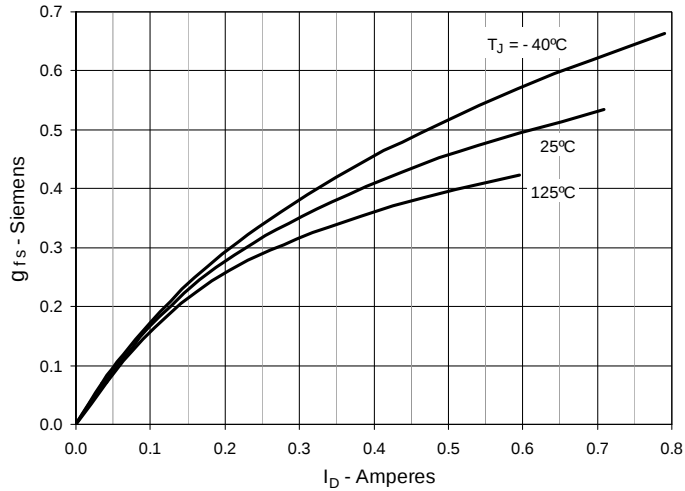
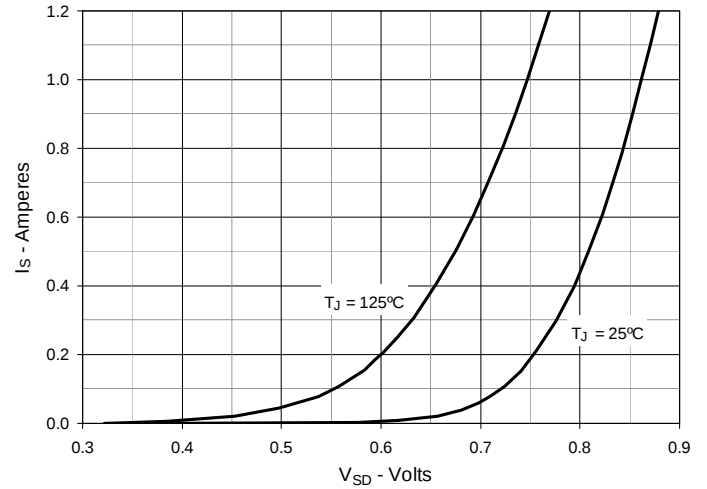
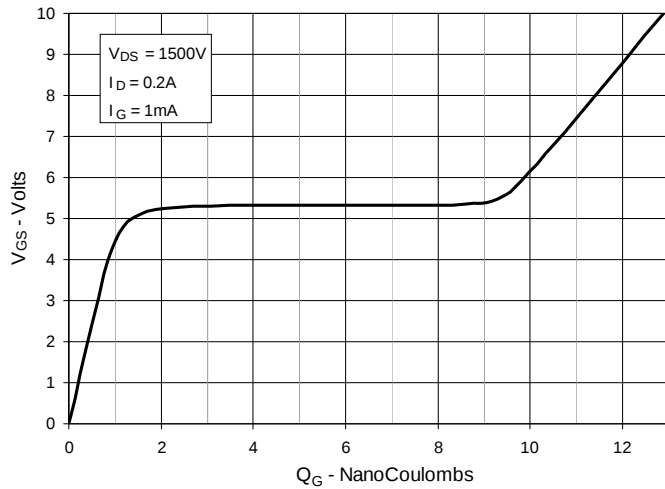
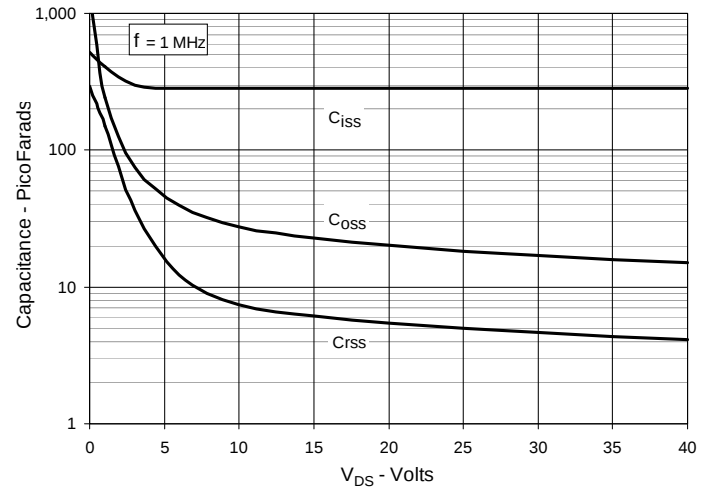
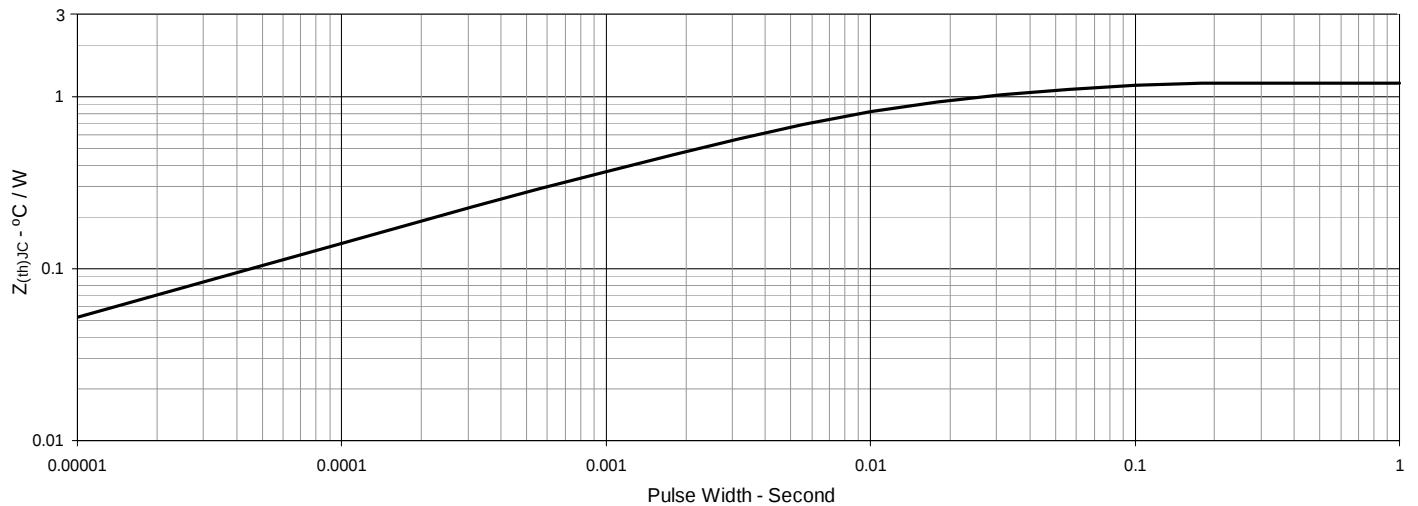
## ADVANCE TECHNICAL INFORMATION

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.

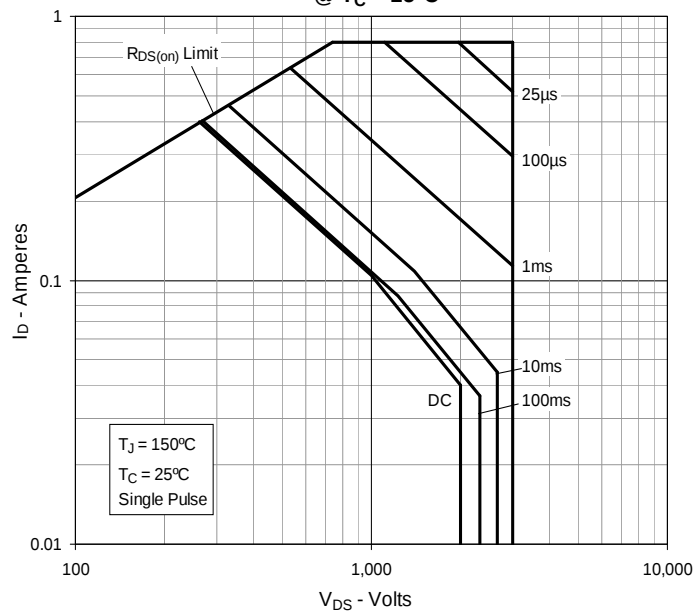
IXYS Reserves the Right to Change Limits, Test Conditions, and Dimensions.

|                                                                                  |           |           |           |           |              |              |              |              |              |              |
|----------------------------------------------------------------------------------|-----------|-----------|-----------|-----------|--------------|--------------|--------------|--------------|--------------|--------------|
| 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    |              |

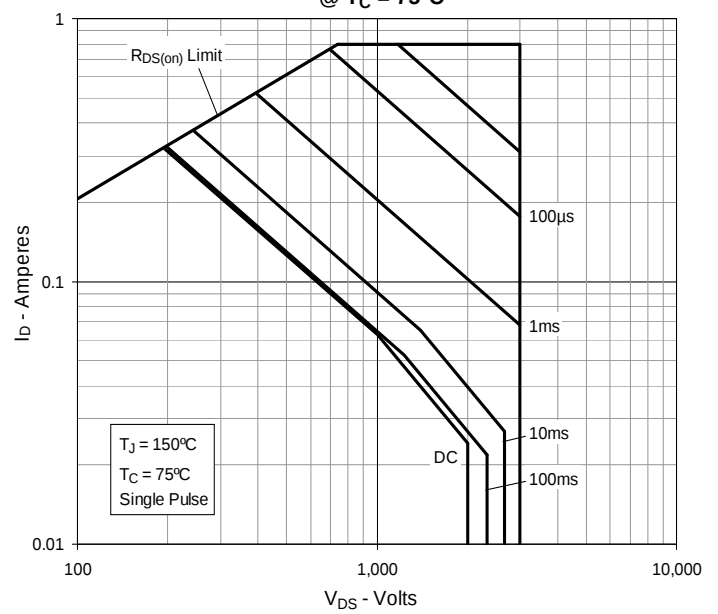
**Fig. 1. Output Characteristics @  $T_J = 25^\circ\text{C}$** 

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

**Fig. 3.  $R_{DS(on)}$  Normalized to  $I_D = 0.2\text{A}$  Value vs. Junction Temperature**

**Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = 0.2\text{A}$  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**  
@  $T_C = 75^\circ\text{C}$





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