

# High Voltage Depletion Mode Power MOSFET

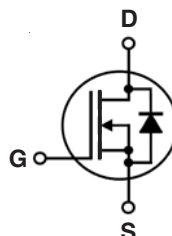
## IXTA3N100D2HV

$$V_{DSX} = 1000V$$

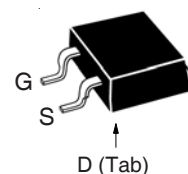
$$I_{D(on)} \geq 3A$$

$$R_{DS(on)} \leq 6\Omega$$

N-Channel



TO-263HV  
(IXTA..HV)



| Symbol     | Test Conditions                        | Maximum Ratings    |             |
|------------|----------------------------------------|--------------------|-------------|
| $V_{DSX}$  | $T_J = 25^{\circ}C$ to $150^{\circ}C$  | 1000               | V           |
| $V_{GSX}$  | Continuous                             | $\pm 20$           | V           |
| $V_{GSM}$  | Transient                              | $\pm 30$           | V           |
| $P_D$      | $T_C = 25^{\circ}C$                    | 125                | 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                | $^{\circ}C$ |
| $T_{SOLD}$ | 1.6 mm (0.062in.) from Case for 10s    | 260                | $^{\circ}C$ |
| $M_d$      | Mounting Force                         | 10..65 / 2.2..14.6 | N/lb        |
| Weight     |                                        | 2.5                | g           |

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

### Features

- High Blocking Voltage
- Normally ON Mode
- High Voltage package

### Advantages

- Easy to Mount
- Space Savings
- High Power Density

### Applications

- Audio Amplifiers
- Start-Up Circuits
- Protection Circuits
- Ramp Generators
- Current Regulators
- Active Loads

| Symbol         | Test Conditions<br>( $T_J = 25^{\circ}C$ , Unless Otherwise Specified) | Characteristic Values |      |                         |
|----------------|------------------------------------------------------------------------|-----------------------|------|-------------------------|
|                |                                                                        | Min.                  | Typ. | Max.                    |
| $BV_{DSX}$     | $V_{GS} = -5V, I_D = 250\mu A$                                         | 1000                  |      | V                       |
| $V_{GS(off)}$  | $V_{DS} = 25V, I_D = 250\mu A$                                         | - 2.5                 |      | - 4.5 V                 |
| $I_{GSX}$      | $V_{GS} = \pm 20V, V_{DS} = 0V$                                        |                       |      | $\pm 100$ nA            |
| $I_{DSX(off)}$ | $V_{DS} = V_{DSX}, V_{GS} = -5V$<br>$T_J = 125^{\circ}C$               |                       |      | 5 $\mu A$<br>50 $\mu A$ |
| $R_{DS(on)}$   | $V_{GS} = 0V, I_D = 1.5A$ , Note 1                                     |                       |      | 6 $\Omega$              |
| $I_{D(on)}$    | $V_{GS} = 0V, V_{DS} = 50V$ , Note 1                                   | 3                     |      | A                       |

| Symbol       | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified)                                                                 | Characteristic Values |      |                        |
|--------------|---------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|------|------------------------|
|              |                                                                                                                                             | Min.                  | Typ. | Max.                   |
| $g_{fs}$     | $V_{DS} = 30\text{V}$ , $I_D = 1.5\text{A}$ , Note 1                                                                                        | 1.2                   | 2.0  | S                      |
| $C_{iss}$    | $V_{GS} = -10\text{V}$ , $V_{DS} = 25\text{V}$ , $f = 1\text{MHz}$                                                                          |                       | 1020 | pF                     |
| $C_{oss}$    |                                                                                                                                             |                       | 68   | pF                     |
| $C_{rss}$    |                                                                                                                                             |                       | 17   | pF                     |
| $t_{d(on)}$  | <b>Resistive Switching Times</b><br>$V_{GS} = \pm 5\text{V}$ , $V_{DS} = 500\text{V}$ , $I_D = 1.5\text{A}$<br>$R_G = 3.3\Omega$ (External) |                       | 27   | ns                     |
| $t_r$        |                                                                                                                                             |                       | 67   | ns                     |
| $t_{d(off)}$ |                                                                                                                                             |                       | 34   | ns                     |
| $t_f$        |                                                                                                                                             |                       | 40   | ns                     |
| $Q_{g(on)}$  | $V_{GS} = 5\text{V}$ , $V_{DS} = 500\text{V}$ , $I_D = 1.5\text{A}$                                                                         |                       | 37.5 | nC                     |
| $Q_{gs}$     |                                                                                                                                             |                       | 4.4  | nC                     |
| $Q_{gd}$     |                                                                                                                                             |                       | 21.2 | nC                     |
| $R_{thJC}$   |                                                                                                                                             |                       |      | 1.0 $^\circ\text{C/W}$ |

## Safe-Operating-Area Specification

| Symbol | Test Conditions                                                                             | Characteristic Values |      |      |
|--------|---------------------------------------------------------------------------------------------|-----------------------|------|------|
|        |                                                                                             | Min.                  | Typ. | Max. |
| SOA    | $V_{DS} = 800\text{V}$ , $I_D = 94\text{mA}$ , $T_C = 75^\circ\text{C}$ , $T_p = 5\text{s}$ | 75                    |      | W    |

## Source-Drain Diode

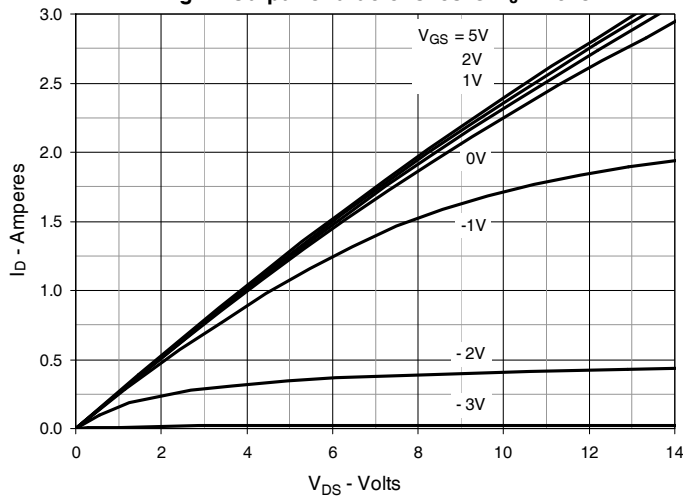
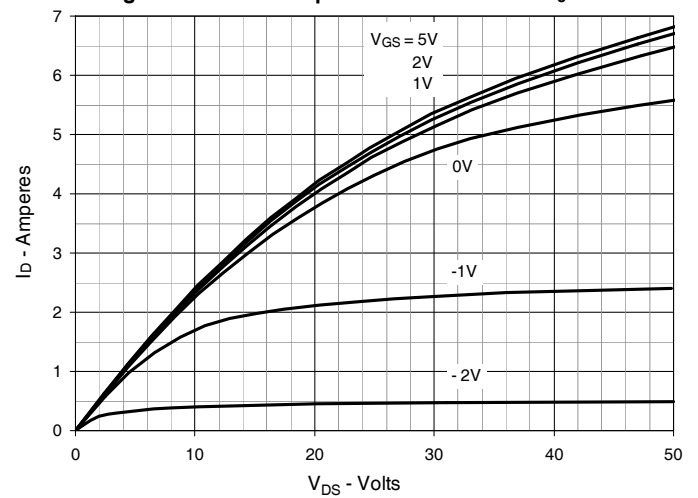
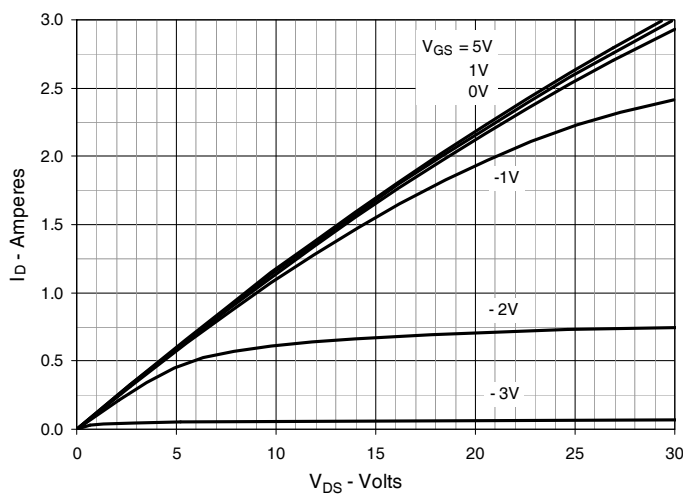
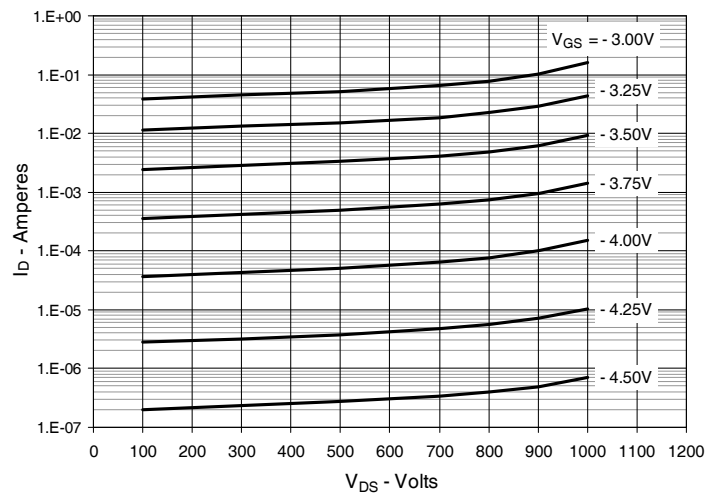
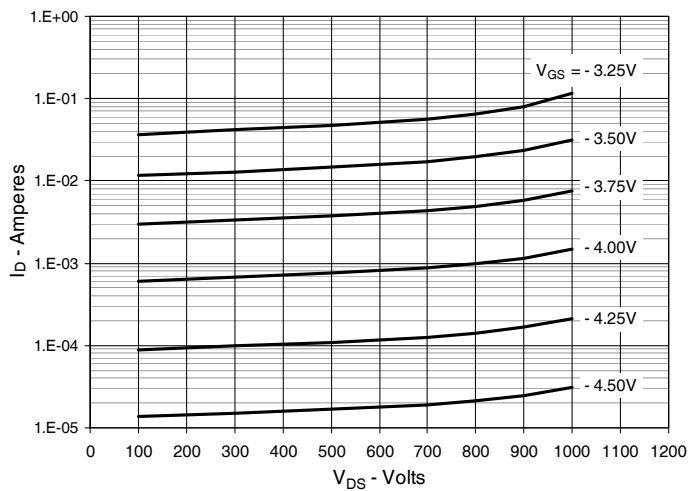
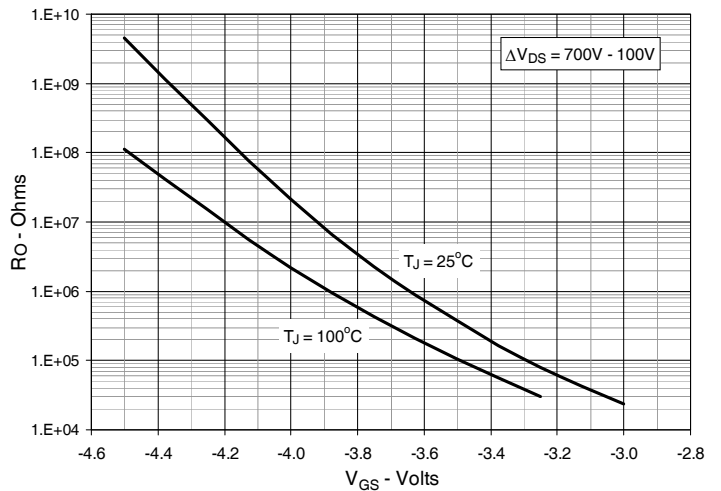
| Symbol   | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified)                            | Characteristic Values |      |               |
|----------|--------------------------------------------------------------------------------------------------------|-----------------------|------|---------------|
|          |                                                                                                        | Min.                  | Typ. | Max.          |
| $V_{SD}$ | $I_F = 3\text{A}$ , $V_{GS} = -10\text{V}$ , Note 1                                                    |                       | 0.8  | 1.3 V         |
| $t_{rr}$ | $I_F = 3\text{A}$ , $-di/dt = 100\text{A}/\mu\text{s}$<br>$V_R = 100\text{V}$ , $V_{GS} = -10\text{V}$ |                       | 970  | ns            |
| $I_{RM}$ |                                                                                                        |                       | 12.7 | A             |
| $Q_{RM}$ |                                                                                                        |                       | 6.16 | $\mu\text{C}$ |

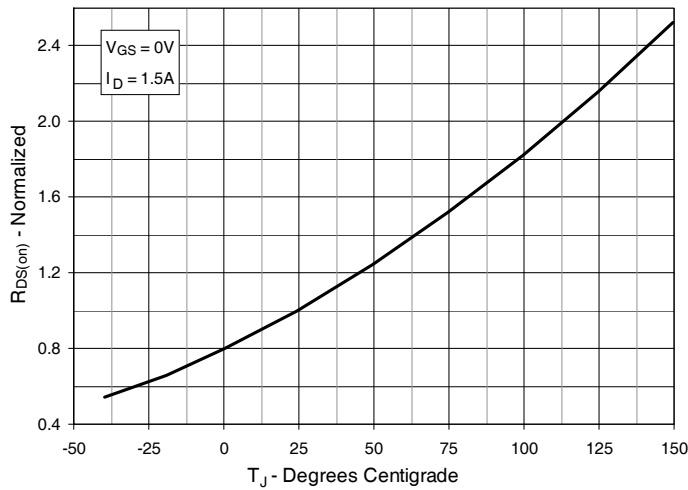
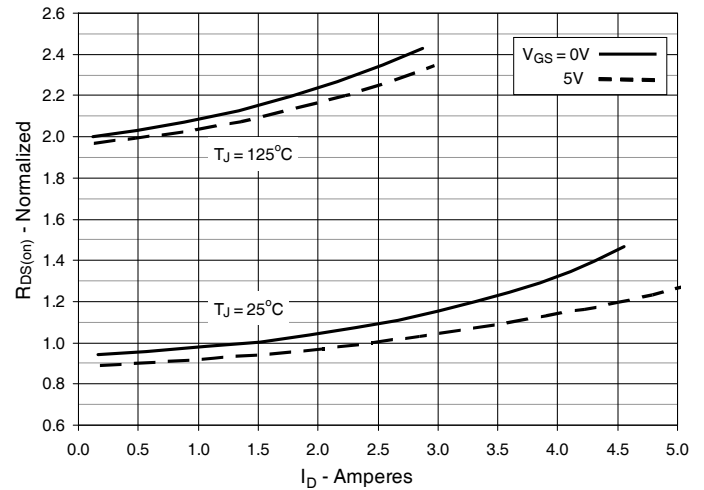
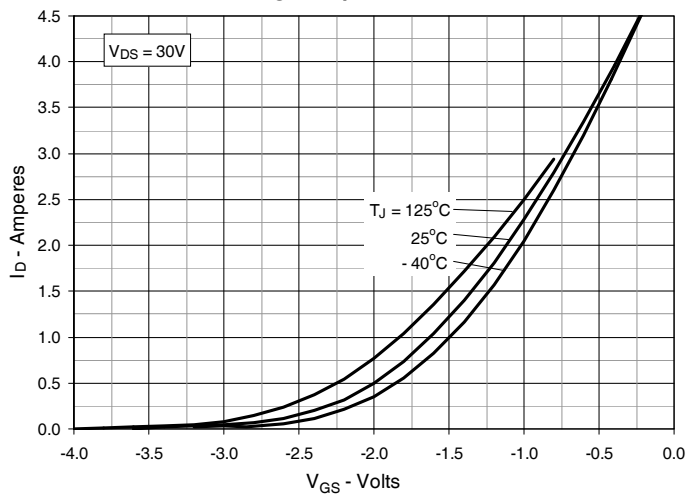
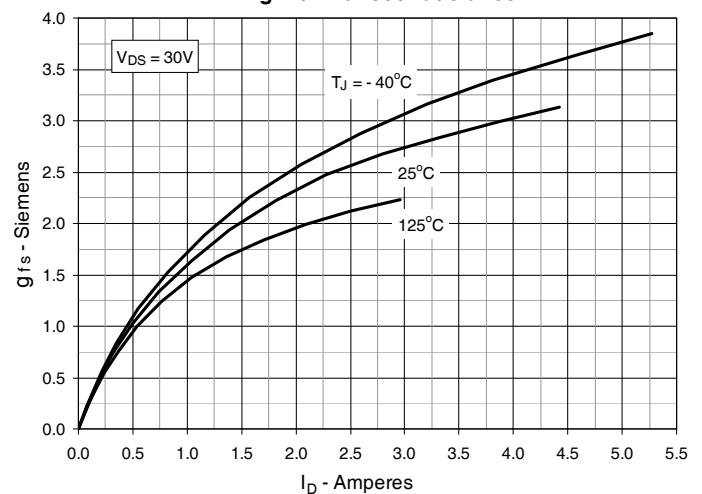
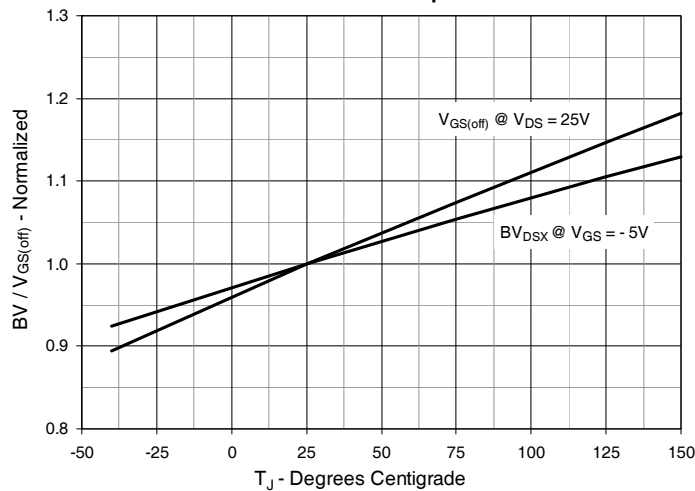
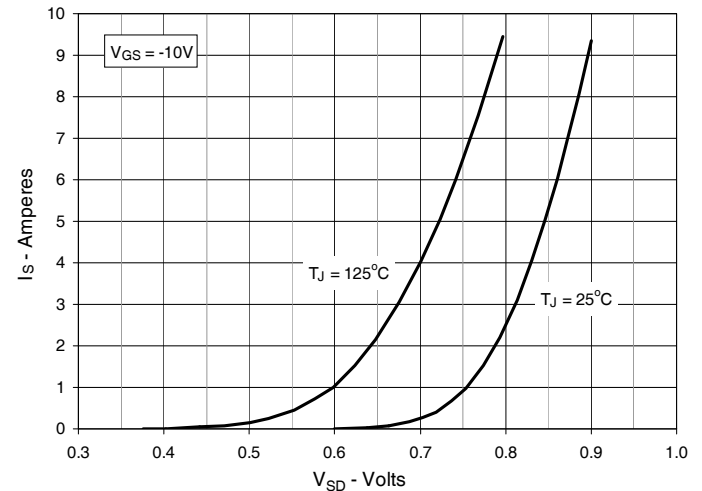
Note 1. Pulse test,  $t \leq 300\mu\text{s}$ , duty cycle,  $d \leq 2\%$ .

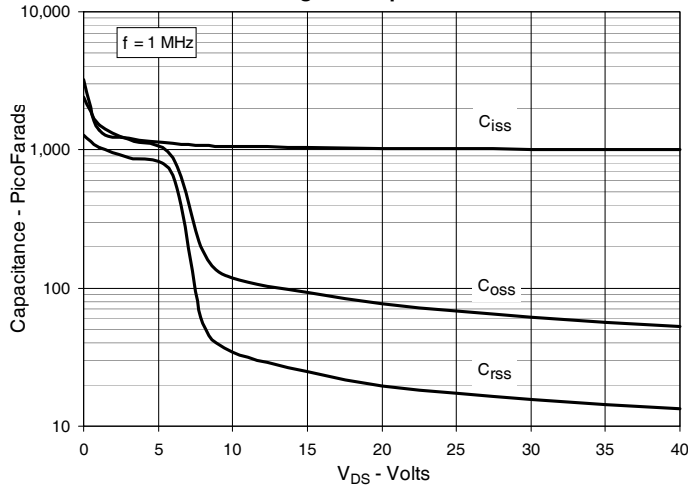
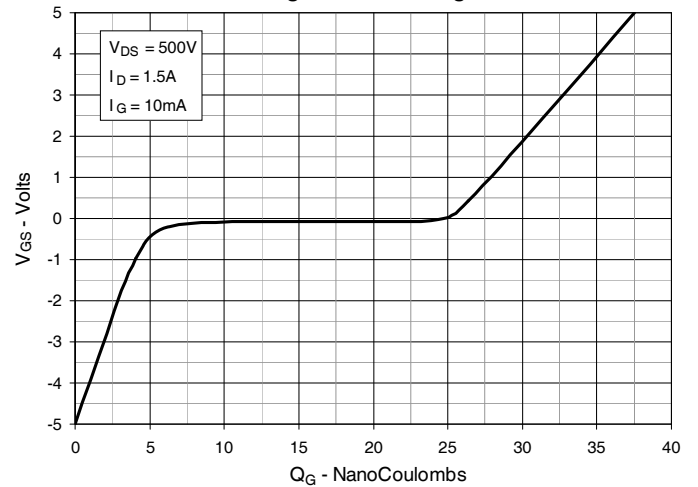
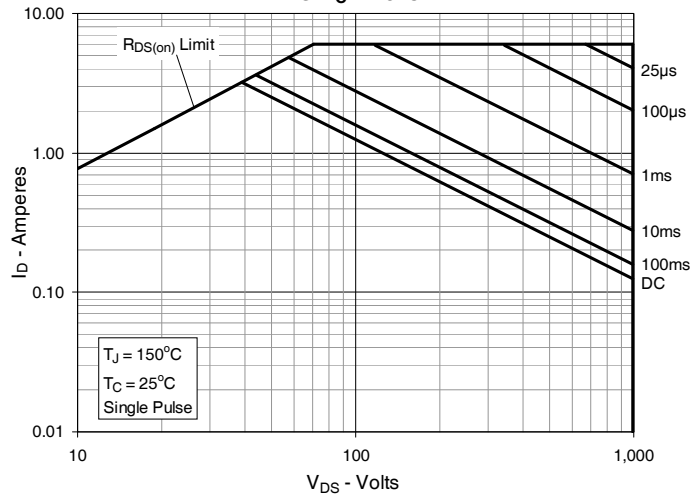
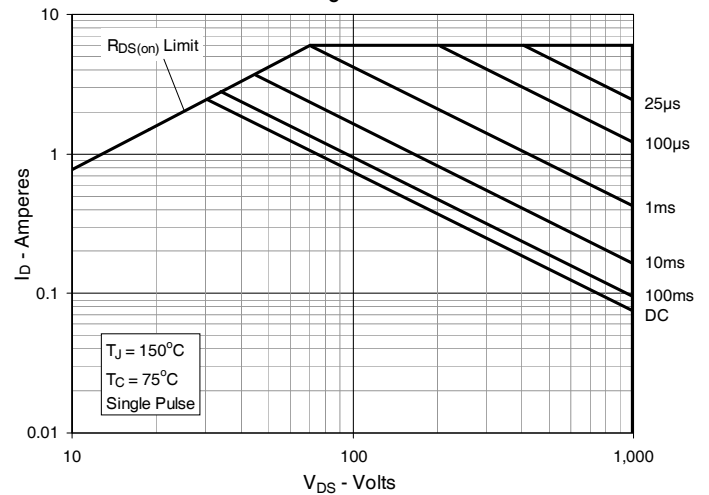
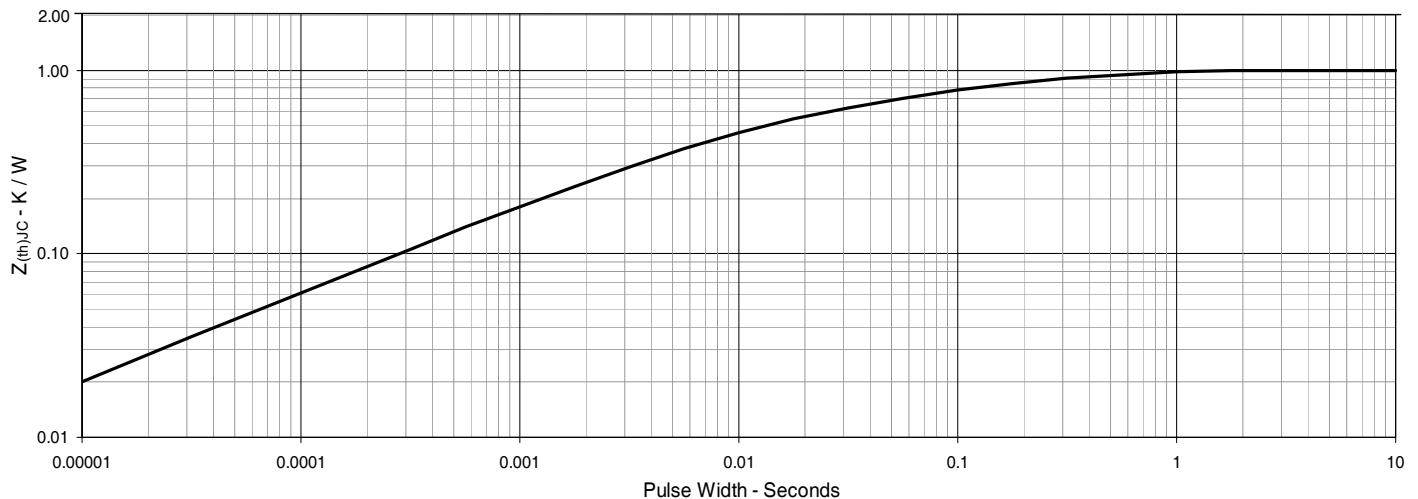
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IXYS MOSFETs and IGBTs are covered by one or more of the following U.S. patents:

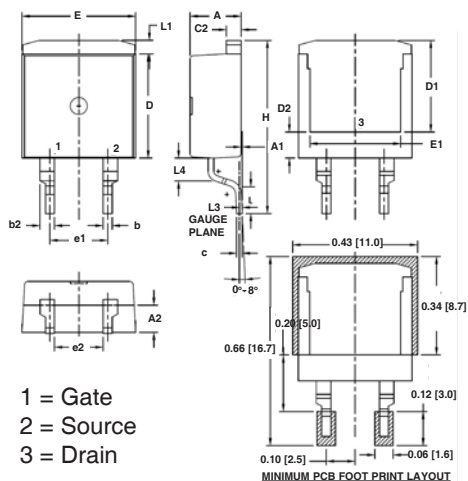
|           |           |           |           |              |              |              |              |              |             |
|-----------|-----------|-----------|-----------|--------------|--------------|--------------|--------------|--------------|-------------|
| 4,835,592 | 4,931,844 | 5,049,961 | 5,237,481 | 6,162,665    | 6,404,065 B1 | 6,683,344    | 6,727,585    | 7,005,734 B2 | 7,157,338B2 |
| 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. Extended Output Characteristics @  $T_J = 25^\circ\text{C}$** 

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

**Fig. 4. Drain Current @  $T_J = 25^\circ\text{C}$** 

**Fig. 5. Drain Current @  $T_J = 100^\circ\text{C}$** 

**Fig. 6. Dynamic Resistance vs. Gate Voltage**


**Fig. 7. Normalized  $R_{DS(on)}$  vs. Junction Temperature**

**Fig. 8.  $R_{DS(on)}$  Normalized to  $I_D = 1.5A$  Value vs. Drain Current**

**Fig. 9. Input Admittance**

**Fig. 10. Transconductance**

**Fig. 11. Breakdown and Threshold Voltages vs. Junction Temperature**

**Fig. 12. Forward Voltage Drop of Intrinsic Diode**


**Fig. 13. Capacitance**

**Fig. 14. Gate Charge**

**Fig. 15. Forward-Bias Safe Operating Area  
@  $T_C = 25^\circ C$** 

**Fig. 16. Forward-Bias Safe Operating Area  
@  $T_C = 75^\circ C$** 

**Fig. 17. Maximum Transient Thermal Impedance**


## TO-263HV Outline



| SYM  | INCHES |      | MILLIMETER |       |
|------|--------|------|------------|-------|
|      | MIN    | MAX  | MIN        | MAX   |
| A    | .170   | .185 | 4.30       | 4.70  |
| A1   | .000   | .008 | 0.00       | 0.20  |
| A2   | .091   | .098 | 2.30       | 2.50  |
| b    | .028   | .035 | 0.70       | 0.90  |
| b2   | .046   | .054 | 1.18       | 1.38  |
| C    | .018   | .024 | 0.45       | 0.60  |
| C2   | .049   | .055 | 1.25       | 1.40  |
| D    | .354   | .370 | 9.00       | 9.40  |
| D1   | .311   | .327 | 7.90       | 8.30  |
| D2   | .083   | .098 | 2.10       | 2.50  |
| E    | .386   | .402 | 9.80       | 10.20 |
| E1   | .307   | .323 | 7.80       | 8.20  |
| e1   | .200   | BSC  | 5.08       | BSC   |
| (e2) | .163   | .174 | 4.13       | 4.43  |
| H    | .591   | .614 | 15.00      | 15.60 |
| L    | .079   | .102 | 2.00       | 2.60  |
| L1   | .039   | .055 | 1.00       | 1.40  |
| L3   | .010   | BSC  | 0.254      | BSC   |
| (L4) | .071   | .087 | 1.80       | 2.20  |

