

**X-Class HiPERFET  
Power MOSFET**
**IXFA8N85XHV  
IXFP8N85X  
IXFQ8N85X**

$$V_{DSS} = 850V$$

$$I_{D25} = 8A$$

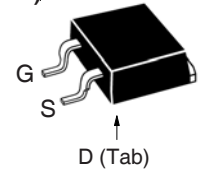
$$R_{DS(on)} \leq 850m\Omega$$

N-Channel Enhancement Mode

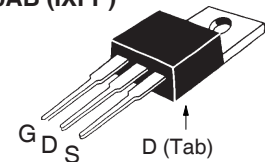


| Symbol        | Test Conditions  | Maximum Ratings   |            |
|---------------|--|-------------------|------------|
| $V_{DSS}$     | $T_J = 25^\circ C$ to $150^\circ C$                                | 850               | V          |
| $V_{DGR}$     | $T_J = 25^\circ C$ to $150^\circ C$ , $R_{GS} = 1M\Omega$          | 850               | V          |
| $V_{GSS}$     | Continuous   | $\pm 30$          | V          |
| $V_{GSM}$     | Transient  | $\pm 40$          | V          |
| $I_{D25}$     | $T_C = 25^\circ C$   | 8                 | A          |
| $I_{DM}$      | $T_C = 25^\circ C$ , Pulse Width Limited by $T_{JM}$               | 16                | A          |
| $I_A$         | $T_C = 25^\circ C$   | 4                 | A          |
| $E_{AS}$      | $T_C = 25^\circ C$   | 300               | mJ         |
| $dv/dt$       | $I_S \leq I_{DM}$ , $V_{DD} \leq V_{DSS}$ , $T_J \leq 150^\circ C$ | 50                | V/ns       |
| $P_D$         | $T_C = 25^\circ C$   | 200               | 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               | $^\circ C$ |
| $F_C$         | Mounting Force (TO-263HV)  | 10.65 / 2.2..14.6 | N/lb       |
| $M_d$         | Mounting Torque (TO-220 & TO-3P)                                   | 1.13 / 10         | Nm/lb.in   |
| <b>Weight</b> | TO-263HV   | 2.5               | g          |
|               | TO-220   | 3.0               | g          |
|               | TO-3P  | 5.5               | g          |

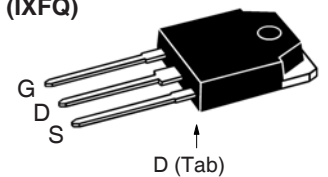
TO-263HV (IXFA)



TO-220AB (IXFP)



TO-3P (IXFQ)



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

**Features**

- International Standard Packages
- High Voltage Package
- Low  $R_{DS(ON)}$  and  $Q_G$
- Avalanche Rated
- Low Package Inductance

**Advantages**

- High Power Density
- Easy to Mount
- Space Savings

**Applications**

- Switch-Mode and Resonant-Mode Power Supplies
- DC-DC Converters
- PFC Circuits
- AC and DC Motor Drives
- Robotics and Servo Controls

| Symbol       | Test Conditions<br>( $T_J = 25^\circ C$ , Unless Otherwise Specified) | Characteristic Values |      |                           |
|--------------|---|-----------------------|------|---------------------------|
|              |   | Min.                  | Typ. | Max.                      |
| $BV_{DSS}$   | $V_{GS} = 0V$ , $I_D = 250\mu A$                                      | 850                   |      | 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>$T_J = 125^\circ C$             |                       |      | 10 $\mu A$<br>750 $\mu A$ |
| $R_{DS(on)}$ | $V_{GS} = 10V$ , $I_D = 4A$ , Note 1                                  |                       |      | 850 m $\Omega$            |

| Symbol  | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified)   | Characteristic Values                                  |      |                         |    |
|---|---|--|------|-------------------------|----|
|   |   | Min.   | Typ. | Max                     |    |
| $g_{fs}$                                      | $V_{DS} = 10\text{V}, I_D = 4\text{A}$ , Note 1   | 2.7  | 4.5  | S                       |    |
| $R_{Gi}$                                      | Gate Input Resistance   |  | 3    | $\Omega$                |    |
| $C_{iss}$<br>$C_{oss}$<br>$C_{rss}$           | } $V_{GS} = 0\text{V}, V_{DS} = 25\text{V}, f = 1\text{MHz}$  |  | 654  | pF                      |    |
|   |   |  |      | 714                     | pF |
|   |   |  |      | 11                      | pF |
| <b>Effective Output Capacitance</b>           |   |  |      |                         |    |
| $C_{o(er)}$                                   | Energy related  | } $V_{GS} = 0\text{V}$<br>$V_{DS} = 0.8 \cdot V_{DSS}$ | 40   | pF                      |    |
| $C_{o(tr)}$                                   | Time related  |  | 120  | pF                      |    |
| $Q_{g(on)}$<br>$Q_{gs}$<br>$Q_{gd}$           | } $V_{GS} = 10\text{V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 4\text{A}$  |  | 17.0 | nC                      |    |
|   |   |  |      | 3.6                     | nC |
|   |   |  |      | 10.0                    | nC |
| $t_{d(on)}$<br>$t_r$<br>$t_{d(off)}$<br>$t_f$ | } <b>Resistive Switching Times</b><br>$V_{GS} = 10\text{V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 4\text{A}$<br>$R_G = 10\Omega$ (External) |  | 15   | ns                      |    |
|   |   |  |      | 25                      | ns |
|   |   |  |      | 32                      | ns |
|   |   |  |      | 23                      | ns |
| $R_{thJC}$                                    |   |  |      | 0.63 $^\circ\text{C/W}$ |    |
| $R_{thCS}$                                    | TO-220  |  | 0.50 | $^\circ\text{C/W}$      |    |
|   | TO-3P   |  | 0.21 | $^\circ\text{C/W}$      |    |

**Source-Drain Diode**

| Symbol                           | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified)  | Characteristic Values |      |       |               |
|----------------------------------|--|-----------------------|------|-------|---------------|
|                                  |  | Min.                  | Typ. | Max   |               |
| $I_S$                            | $V_{GS} = 0\text{V}$   |                       |      | 8 A   |               |
| $I_{SM}$                         | Repetitive, pulse Width Limited by $T_{JM}$                                  |                       |      | 32 A  |               |
| $V_{SD}$                         | $I_F = I_S, V_{GS} = 0\text{V}$ , Note 1                                     |                       |      | 1.4 V |               |
| $t_{rr}$<br>$Q_{RM}$<br>$I_{RM}$ | } $I_F = 4\text{A}, -di/dt = 100\text{A}/\mu\text{s}$<br>$V_R = 100\text{V}$ |                       | 125  | ns    |               |
|                                  |  |                       |      | 1.1   | $\mu\text{C}$ |
|                                  |  |                       |      | 18.0  | A             |

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

**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.

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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   | 6,404,065B1 | 6,683,344   | 6,727,585   | 7,005,734B2 | 7,157,338B2 |
|  | 4,860,072 | 5,017,508 | 5,063,307 | 5,381,025 | 6,259,123B1 | 6,534,343   | 6,710,405B2 | 6,759,692   | 7,063,975B2 |             |
|  | 4,881,106 | 5,034,796 | 5,187,117 | 5,486,715 | 6,306,728B1 | 6,583,505   | 6,710,463   | 6,771,478B2 | 7,071,537   |             |

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

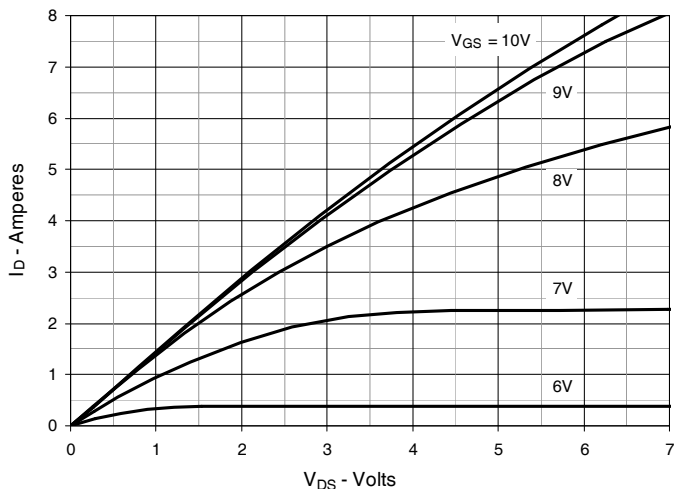


Fig. 2. Extended Output Characteristics @  $T_J = 25^\circ\text{C}$

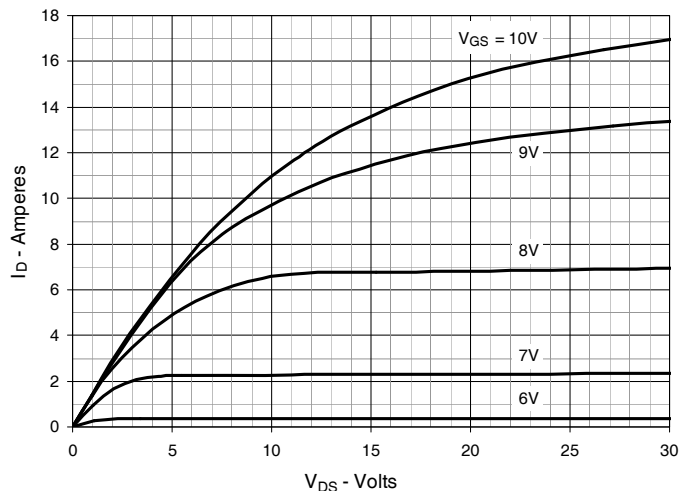


Fig. 3. Output Characteristics @  $T_J = 125^\circ\text{C}$

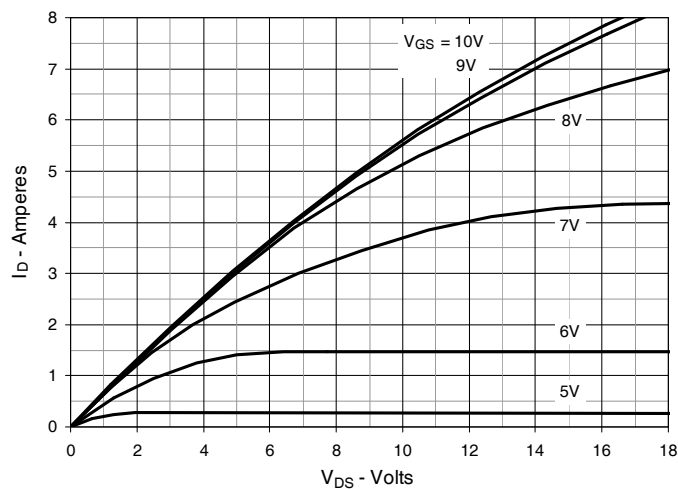


Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = 4\text{A}$  Value vs. Junction Temperature

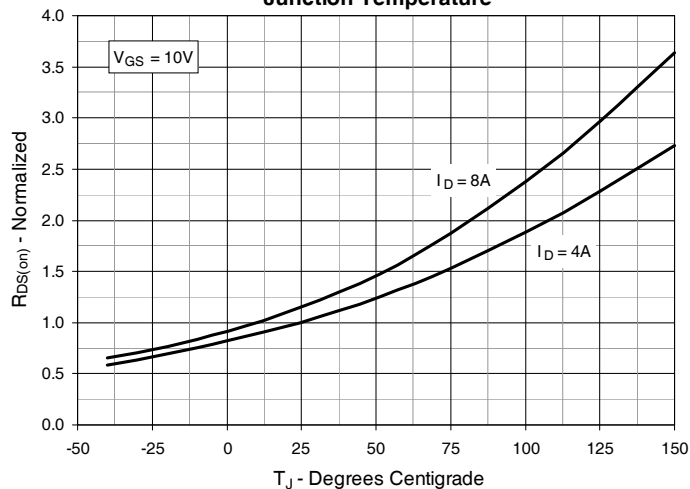


Fig. 5.  $R_{DS(on)}$  Normalized to  $I_D = 4\text{A}$  Value vs. Drain Current

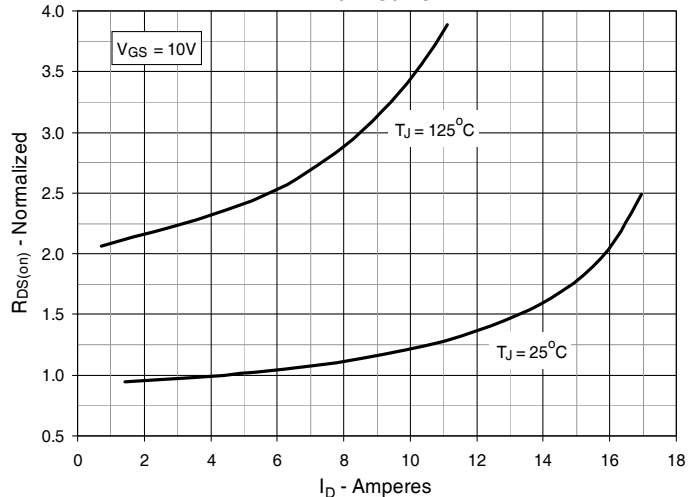


Fig. 6. Normalized Breakdown & Threshold Voltages vs. Junction Temperature

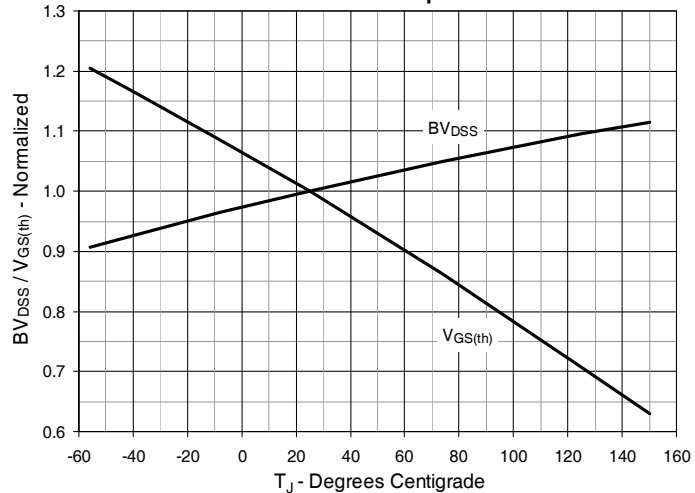


Fig. 7. Maximum Drain Current vs. Case Temperature

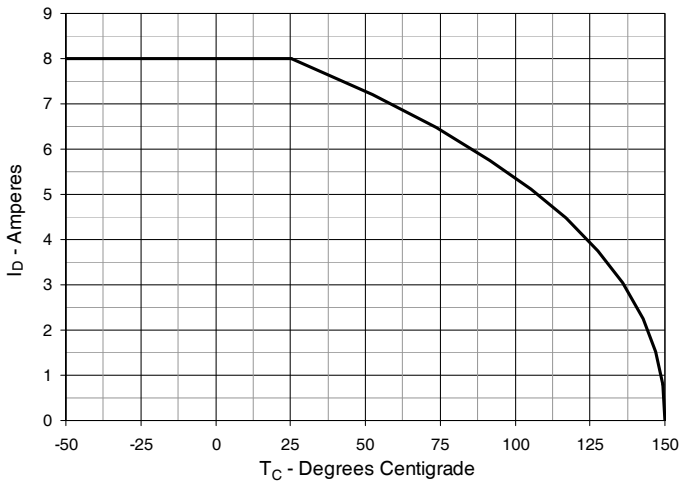


Fig. 8. Input Admittance

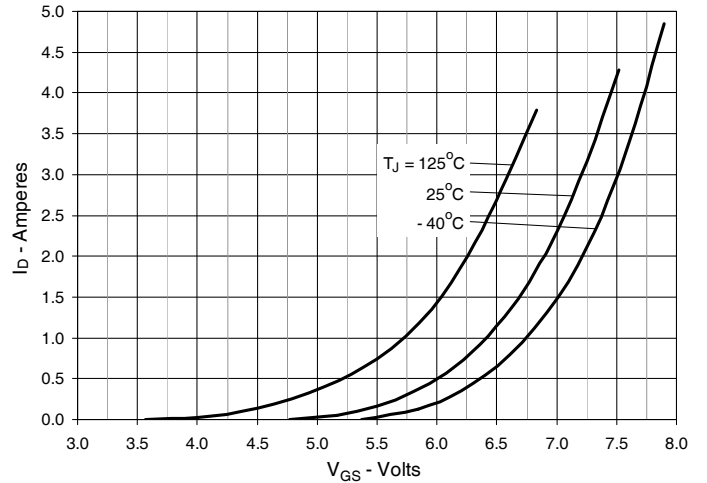


Fig. 9. Transconductance

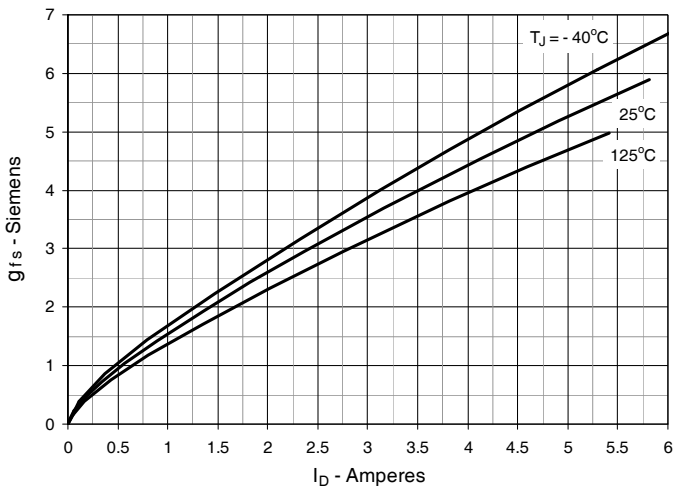


Fig. 10. Forward Voltage Drop of Intrinsic Diode

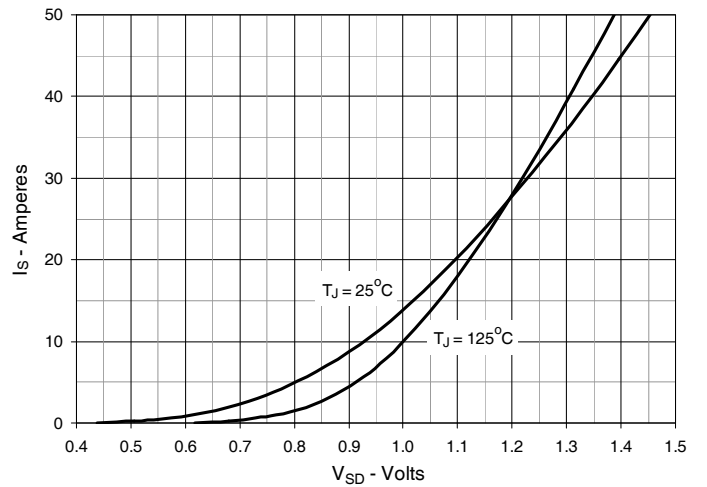


Fig. 11. Gate Charge

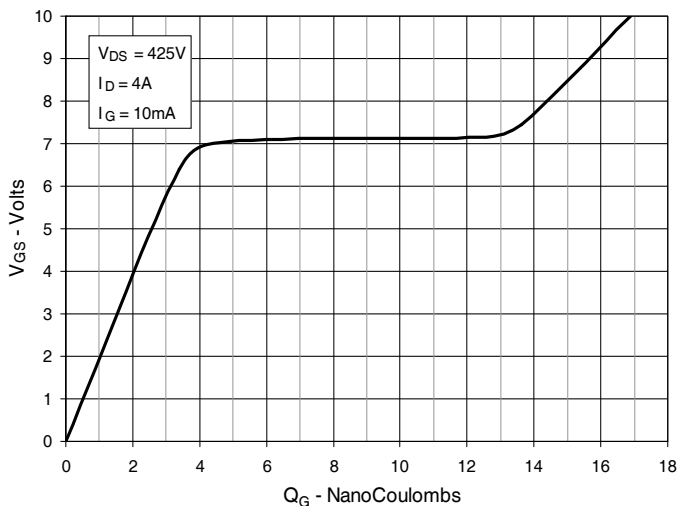


Fig. 12. Capacitance

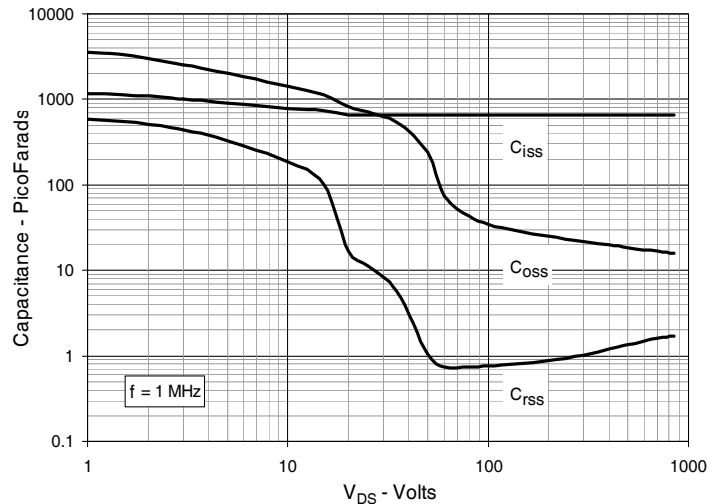


Fig. 13. Output Capacitance Stored Energy

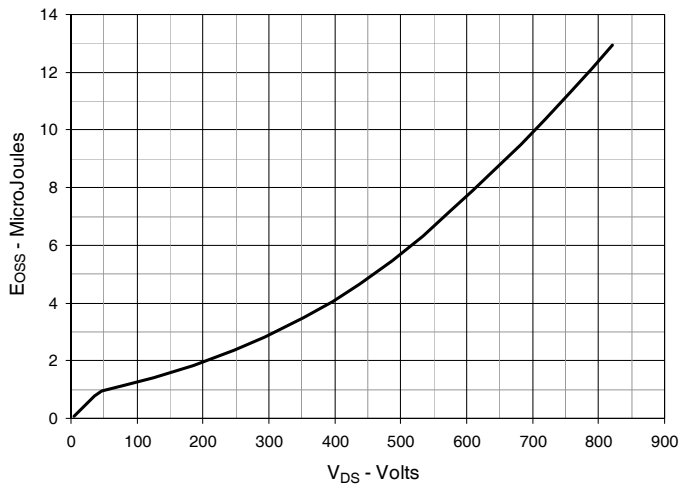


Fig. 14. Forward-Bias Safe Operating Area

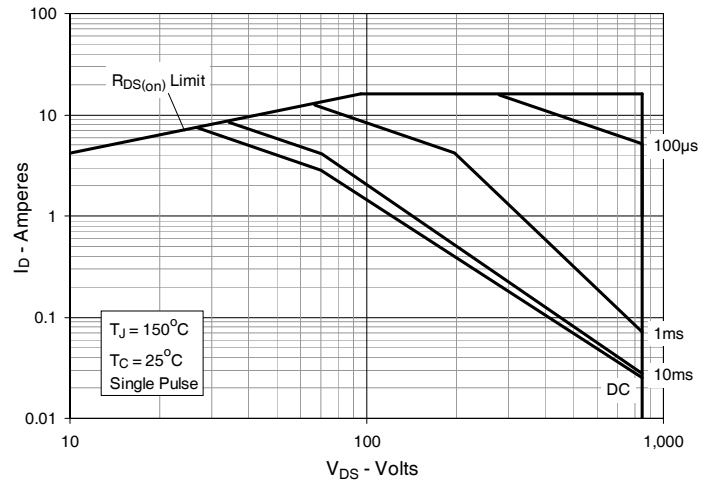
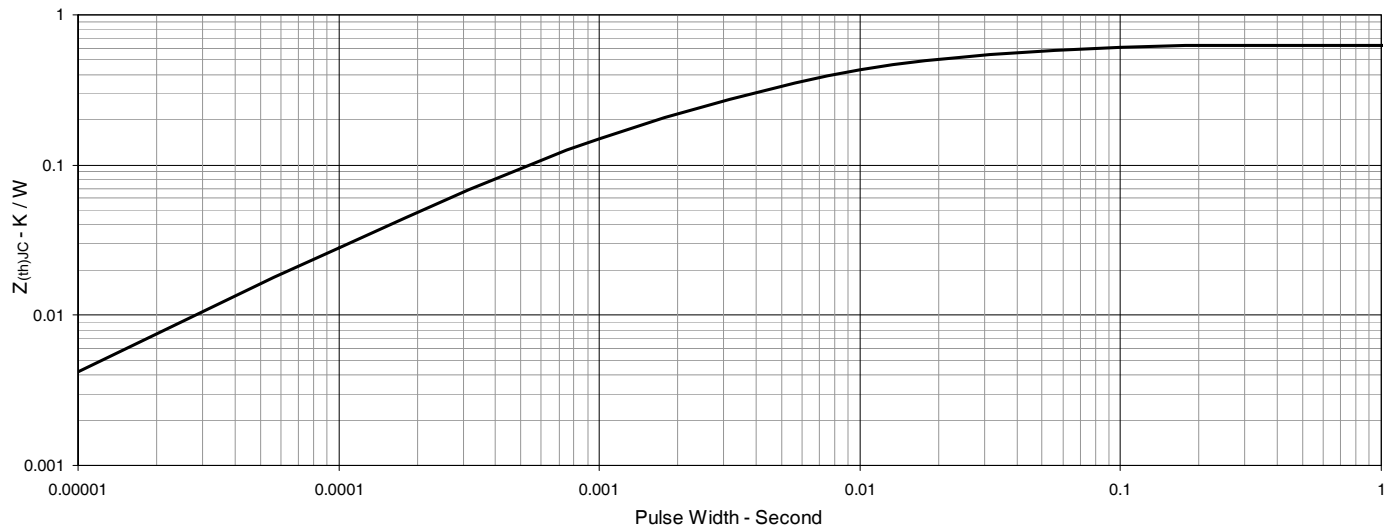
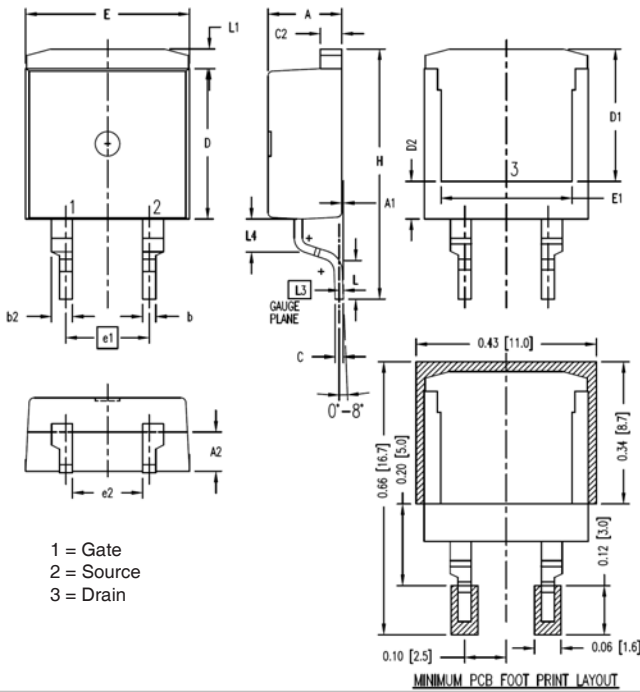


Fig. 15. Maximum Transient Thermal Impedance

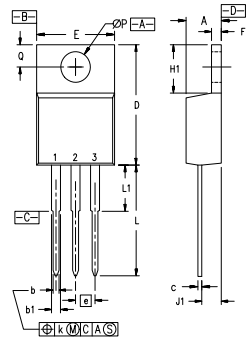


**TO-263HV Outline**



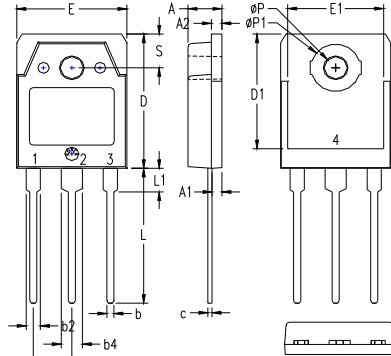
| SYM  | INCHES   |      | MILLIMETER |       |
|------|----------|------|------------|-------|
|      | MIN      | MAX  | MIN        | MAX   |
| A    | .170     | .185 | 4.30       | 4.70  |
| A1   | .000     | .008 | 0.00       | 0.20  |
| A2   | .091     | .098 | 2.30       | 2.50  |
| b    | .028     | .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  |
| 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  |

**TO-220 Outline**



| SYM | INCHES   |      | MILLIMETERS |       |
|-----|----------|------|-------------|-------|
|     | MIN      | MAX  | MIN         | MAX   |
| A   | .170     | .190 | 4.32        | 4.83  |
| b   | .025     | .040 | 0.64        | 1.02  |
| b1  | .045     | .065 | 1.15        | 1.65  |
| c   | .014     | .022 | 0.35        | 0.56  |
| D   | .580     | .630 | 14.73       | 16.00 |
| E   | .390     | .420 | 9.91        | 10.66 |
| e   | .100 BSC |      | 2.54 BSC    |       |
| F   | .045     | .055 | 1.14        | 1.40  |
| H1  | .230     | .270 | 5.85        | 6.85  |
| J1  | .090     | .110 | 2.29        | 2.79  |
| k   | 0        | .015 | 0           | 0.38  |
| L   | .500     | .550 | 12.70       | 13.97 |
| L1  | .110     | .230 | 2.79        | 5.84  |
| ØP  | .139     | .161 | 3.53        | 4.08  |
| Q   | .100     | .125 | 2.54        | 3.18  |

**TO-3P Outline**



Pins: 1 - Gate 2 - Drain  
3 - Source 4 - Drain

| SYM | INCHES   |      | MILLIMETERS |       |
|-----|----------|------|-------------|-------|
|     | MIN      | MAX  | MIN         | MAX   |
| A   | .185     | .193 | 4.70        | 4.90  |
| A1  | .051     | .059 | 1.30        | 1.50  |
| A2  | .057     | .065 | 1.45        | 1.65  |
| b   | .035     | .045 | 0.90        | 1.15  |
| b2  | .075     | .087 | 1.90        | 2.20  |
| b4  | .114     | .126 | 2.90        | 3.20  |
| c   | .022     | .031 | 0.55        | 0.80  |
| D   | .780     | .791 | 19.80       | 20.10 |
| D1  | .665     | .677 | 16.90       | 17.20 |
| E   | .610     | .622 | 15.50       | 15.80 |
| E1  | .531     | .539 | 13.50       | 13.70 |
| e   | .215 BSC |      | 5.45 BSC    |       |
| L   | .779     | .795 | 19.80       | 20.20 |
| L1  | .134     | .142 | 3.40        | 3.60  |
| ØP  | .126     | .134 | 3.20        | 3.40  |
| ØP1 | .272     | .280 | 6.90        | 7.10  |
| S   | .193     | .201 | 4.90        | 5.10  |

All metal area are tin plated.