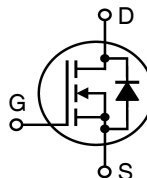


# X-Class HiPerFET™ Power MOSFET

**IXFT32N100XHV**  
**IXFH32N100X**  
**IXFK32N100X**

**$V_{DSS} = 1000V$**   
 **$I_{D25} = 32A$**   
 **$R_{DS(on)} \leq 220m\Omega$**

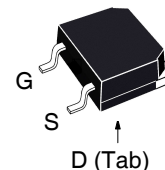
N-Channel Enhancement Mode  
Avalanche Rated



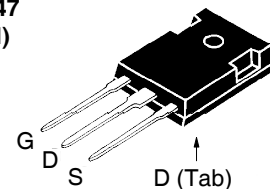
| Symbol        | Test Conditions                                                     | Maximum Ratings |             |
|---------------|---------------------------------------------------------------------|-----------------|-------------|
| $V_{DSS}$     | $T_J = 25^{\circ}C$ to $150^{\circ}C$                               | 1000            | V           |
| $V_{DGR}$     | $T_J = 25^{\circ}C$ to $150^{\circ}C$ , $R_{GS} = 1M\Omega$         | 1000            | V           |
| $V_{GSS}$     | Continuous                                                          | $\pm 30$        | V           |
| $V_{GSM}$     | Transient                                                           | $\pm 40$        | V           |
| $I_{D25}$     | $T_C = 25^{\circ}C$                                                 | 32              | A           |
| $I_{DM}$      | $T_C = 25^{\circ}C$ , Pulse Width Limited by $T_{JM}$               | 64              | A           |
| $I_A$         | $T_C = 25^{\circ}C$                                                 | 16              | A           |
| $E_{AS}$      | $T_C = 25^{\circ}C$                                                 | 2               | J           |
| $dv/dt$       | $I_S \leq I_{DM}$ , $V_{DD} \leq V_{DSS}$ , $T_J \leq 150^{\circ}C$ | 50              | V/ns        |
| $P_D$         | $T_C = 25^{\circ}C$                                                 | 890             | 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 Torque (TO-247 & TO-264)                                   | 1.13 / 10       | Nm/lb.in    |
| <b>Weight</b> | TO-268HV                                                            | 4               | g           |
|               | TO-247                                                              | 6               | g           |
|               | TO-264                                                              | 10              | g           |

| Symbol       | Test Conditions<br>( $T_J = 25^{\circ}C$ , Unless Otherwise Specified) | Characteristic Values |      |                    |
|--------------|------------------------------------------------------------------------|-----------------------|------|--------------------|
|              |                                                                        | Min.                  | Typ. | Max.               |
| $BV_{DSS}$   | $V_{GS} = 0V$ , $I_D = 1mA$                                            | 1000                  |      | V                  |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = 4mA$                                        | 3.5                   |      | 6.0 V              |
| $I_{GSS}$    | $V_{GS} = \pm 30V$ , $V_{DS} = 0V$                                     |                       |      | $\pm 100$ nA       |
| $I_{DSS}$    | $V_{DS} = V_{DSS}$ , $V_{GS} = 0V$<br>$T_J = 125^{\circ}C$             |                       |      | 50 $\mu A$<br>3 mA |
| $R_{DS(on)}$ | $V_{GS} = 10V$ , $I_D = 0.5 \cdot I_{D25}$ , Note 1                    |                       |      | 220 m $\Omega$     |

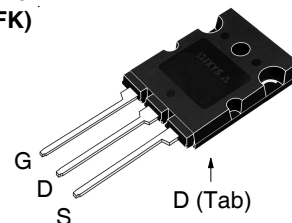
TO-268HV  
(IXFT..HV)



TO-247  
(IXFH)



TO-264  
(IXFK)



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

## Features

- International Standard Packages
- 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<br>(T <sub>J</sub> = 25°C, Unless Otherwise Specified) | Test Conditions                                                                                                                                                                 | Characteristic Values                                            |      |           |
|---------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|------|-----------|
|                                                               |                                                                                                                                                                                 | Min.                                                             | Typ. | Max       |
| <b>g<sub>fs</sub></b>                                         | V <sub>DS</sub> = 20V, I <sub>D</sub> = 16A, Note 1                                                                                                                             | 14                                                               | 23   | S         |
| <b>R<sub>Gi</sub></b>                                         | Gate Input Resistance                                                                                                                                                           |                                                                  | 0.6  | Ω         |
| <b>C<sub>iss</sub></b>                                        | V <sub>GS</sub> = 0V, V <sub>DS</sub> = 25V, f = 1MHz                                                                                                                           |                                                                  | 4075 | pF        |
| <b>C<sub>oss</sub></b>                                        |                                                                                                                                                                                 |                                                                  | 520  | pF        |
| <b>C<sub>rss</sub></b>                                        |                                                                                                                                                                                 |                                                                  | 10   | pF        |
| <b>Effective Output Capacitance</b>                           |                                                                                                                                                                                 |                                                                  |      |           |
| <b>C<sub>o(er)</sub></b>                                      | Energy related                                                                                                                                                                  | V <sub>GS</sub> = 0V<br>V <sub>DS</sub> = 0.8 • V <sub>DSS</sub> | 140  | pF        |
| <b>C<sub>o(tr)</sub></b>                                      | Time related                                                                                                                                                                    |                                                                  | 585  | pF        |
| <b>t<sub>d(on)</sub></b>                                      | <b>Resistive Switching Times</b><br>V <sub>GS</sub> = 10V, V <sub>DS</sub> = 0.5 • V <sub>DSS</sub> , I <sub>D</sub> = 0.5 • I <sub>D25</sub><br>R <sub>G</sub> = 2Ω (External) |                                                                  | 29   | ns        |
| <b>t<sub>r</sub></b>                                          |                                                                                                                                                                                 |                                                                  | 12   | ns        |
| <b>t<sub>d(off)</sub></b>                                     |                                                                                                                                                                                 |                                                                  | 80   | ns        |
| <b>t<sub>f</sub></b>                                          |                                                                                                                                                                                 |                                                                  | 12   | ns        |
| <b>Q<sub>g(on)</sub></b>                                      | V <sub>GS</sub> = 10V, V <sub>DS</sub> = 0.5 • V <sub>DSS</sub> , I <sub>D</sub> = 0.5 • I <sub>D25</sub>                                                                       |                                                                  | 130  | nC        |
| <b>Q<sub>gs</sub></b>                                         |                                                                                                                                                                                 |                                                                  | 27   | nC        |
| <b>Q<sub>gd</sub></b>                                         |                                                                                                                                                                                 |                                                                  | 70   | nC        |
| <b>R<sub>thJC</sub></b>                                       |                                                                                                                                                                                 |                                                                  |      | 0.14 °C/W |
| <b>R<sub>thCS</sub></b>                                       | TO-247                                                                                                                                                                          |                                                                  | 0.21 | °C/W      |
|                                                               | TO-264P                                                                                                                                                                         |                                                                  | 0.15 | °C/W      |

#### Source-Drain Diode

| Symbol   | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified)    | Characteristic Values |      |               |
|----------|--------------------------------------------------------------------------------|-----------------------|------|---------------|
|          |                                                                                | Min.                  | Typ. | Max           |
| $I_S$    | $V_{GS} = 0\text{V}$                                                           |                       |      | 32 A          |
| $I_{SM}$ | Repetitive, pulse Width Limited by $T_{JM}$                                    |                       |      | 128 A         |
| $V_{SD}$ | $I_F = I_S$ , $V_{GS} = 0\text{V}$ , Note 1                                    |                       |      | 1.4 V         |
| $t_{rr}$ | $I_F = 16\text{A}$ , $-di/dt = 100\text{A}/\mu\text{s}$<br>$V_R = 100\text{V}$ |                       | 200  | ns            |
| $Q_{RM}$ |                                                                                |                       | 1.5  | $\mu\text{C}$ |
| $I_{RM}$ |                                                                                |                       | 15   | A             |

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

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   | 6,404,065B1 | 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   |             |

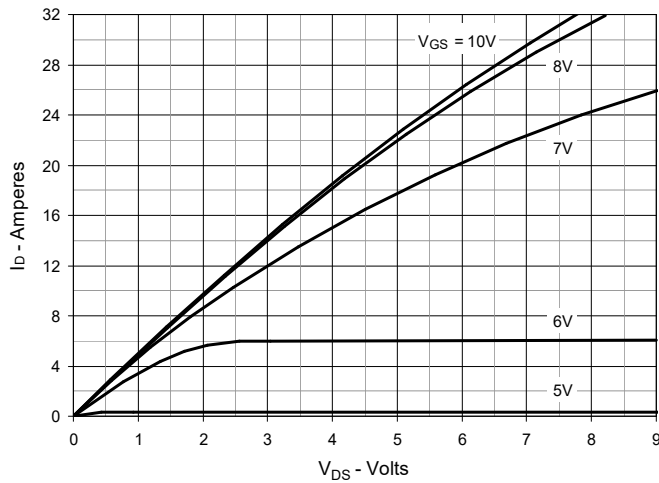
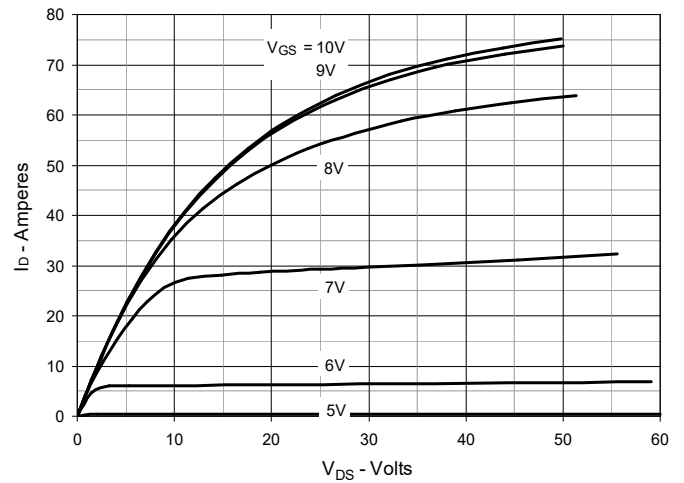
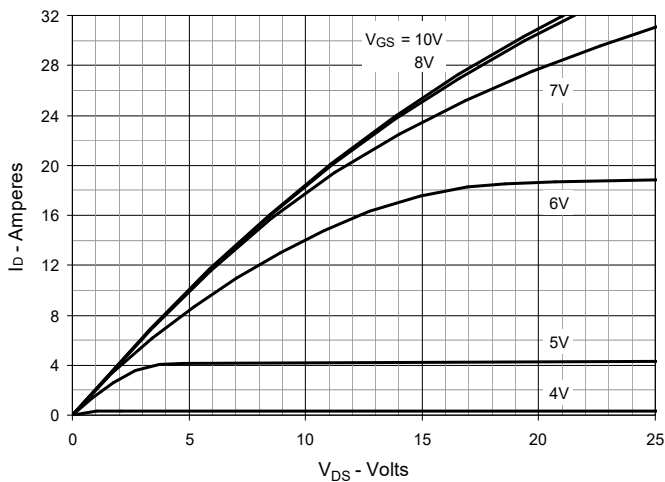
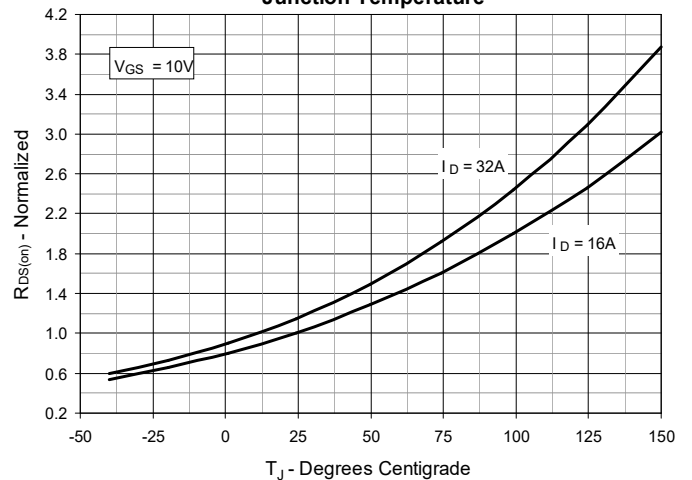
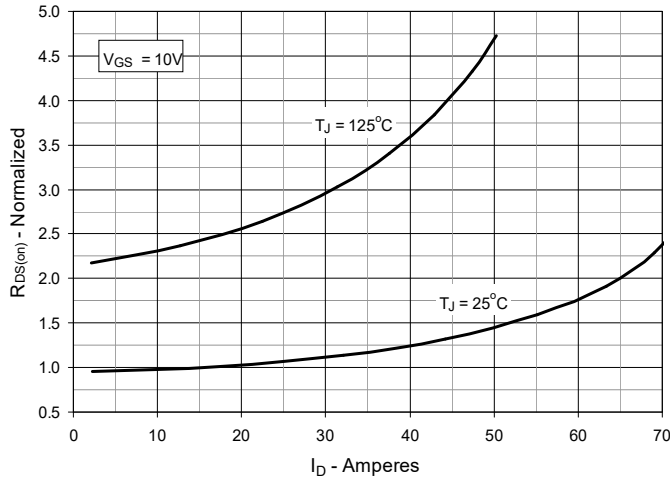
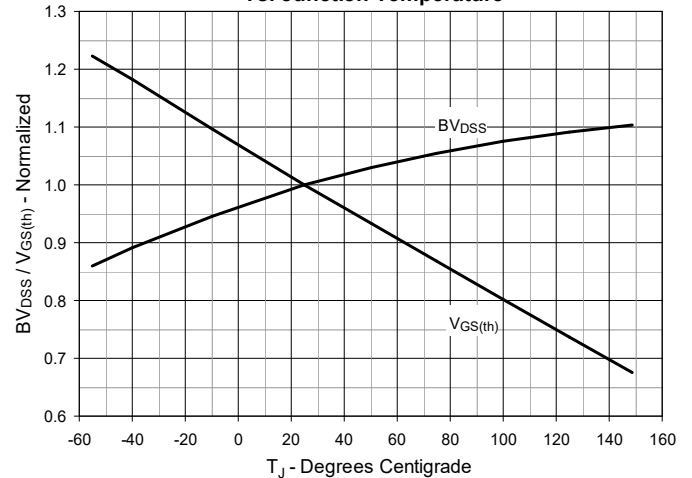
**Fig. 1. Output Characteristics @  $T_J = 25^\circ\text{C}$** 

**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  $I_D = 16\text{A}$  Value vs. Junction Temperature**

**Fig. 5.  $R_{DS(on)}$  Normalized to  $I_D = 16\text{A}$  Value vs. Drain Current**

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


Fig. 7. Maximum Drain Current vs. Case Temperature

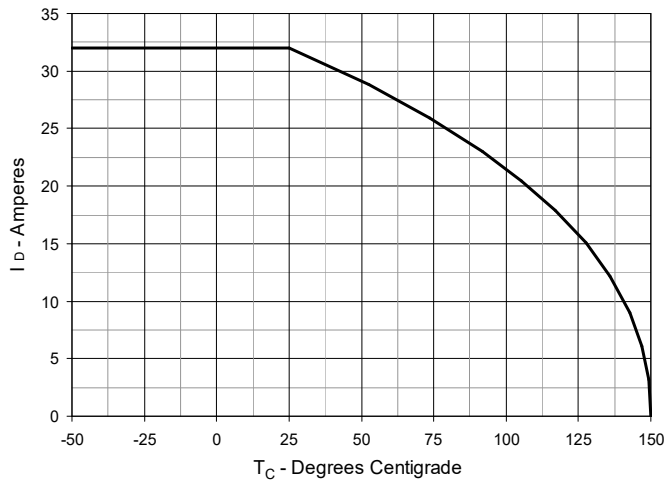


Fig. 8. Input Admittance

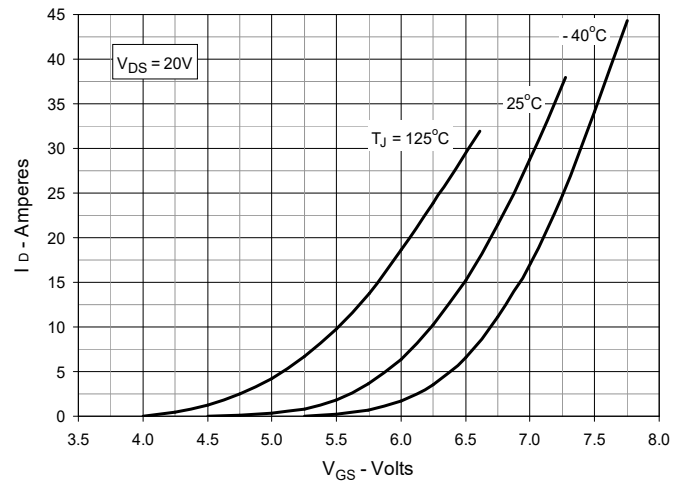


Fig. 9. Transconductance

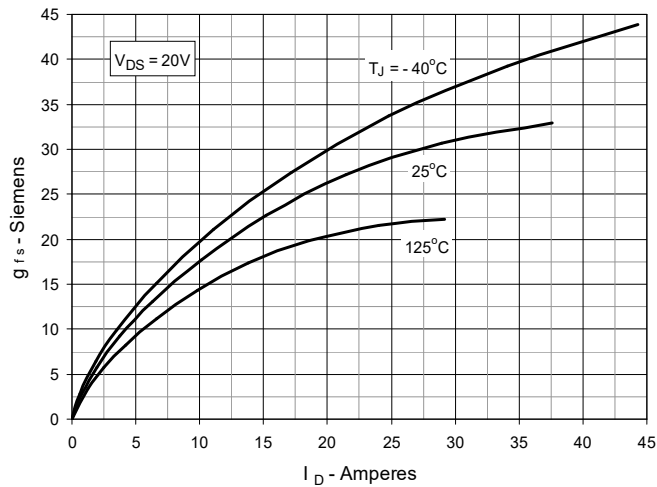


Fig. 10. Forward Voltage Drop of Intrinsic Diode

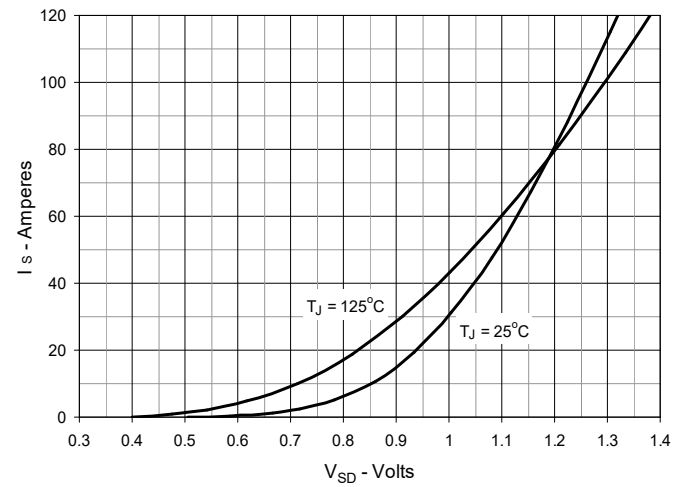


Fig. 11. Gate Charge

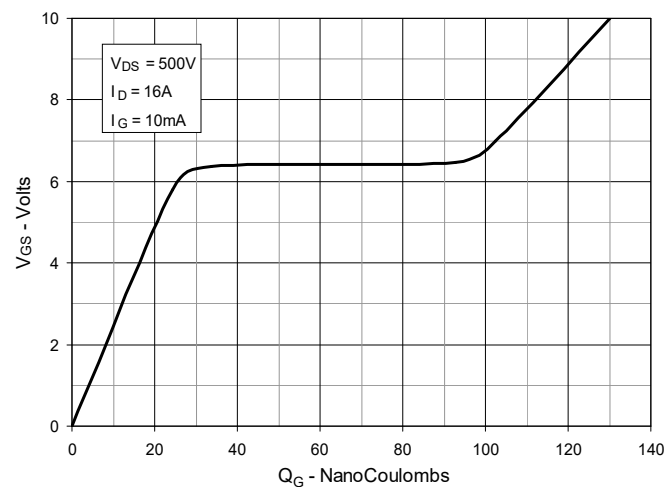


Fig. 12. Capacitance

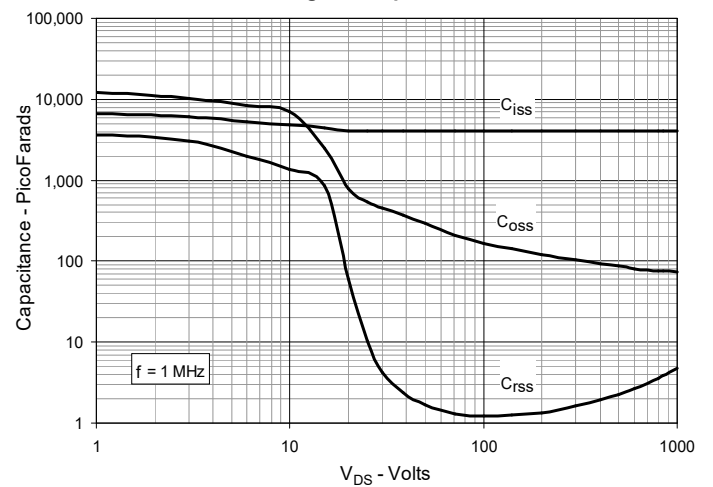


Fig. 13. Output Capacitance Stored Energy

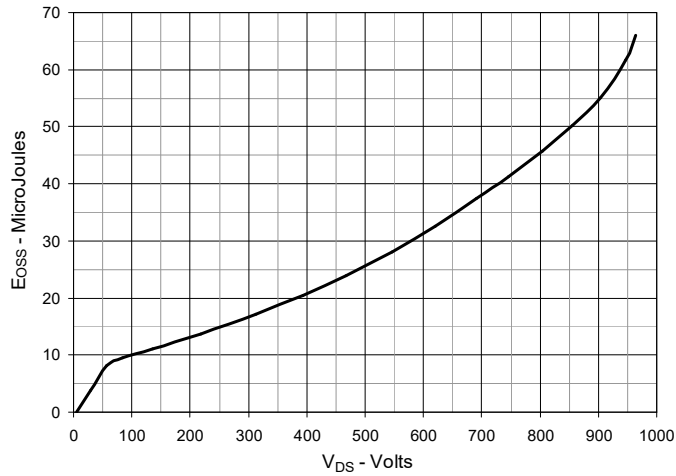


Fig. 14. Forward-Bias Safe Operating Area

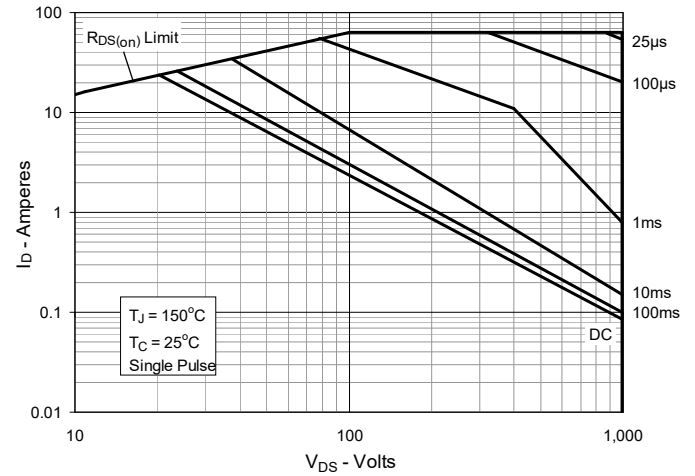
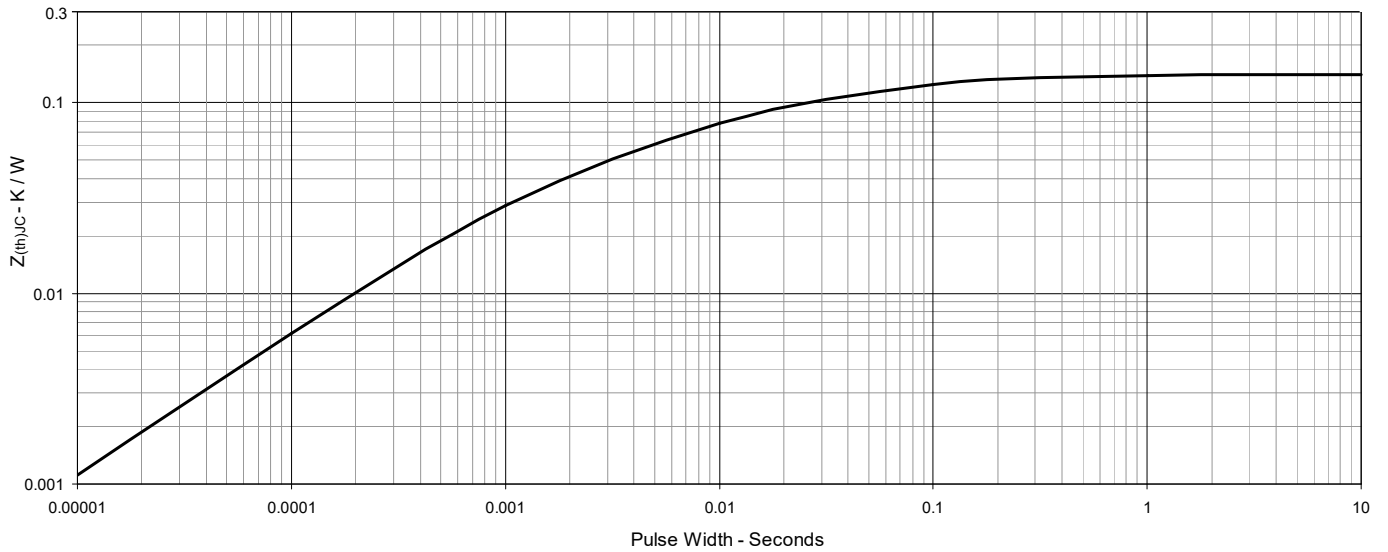
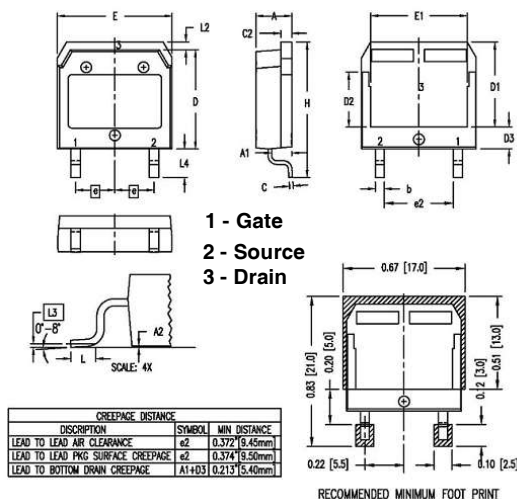


Fig. 15. Maximum Transient Thermal Impedance



### TO-268HV Outline

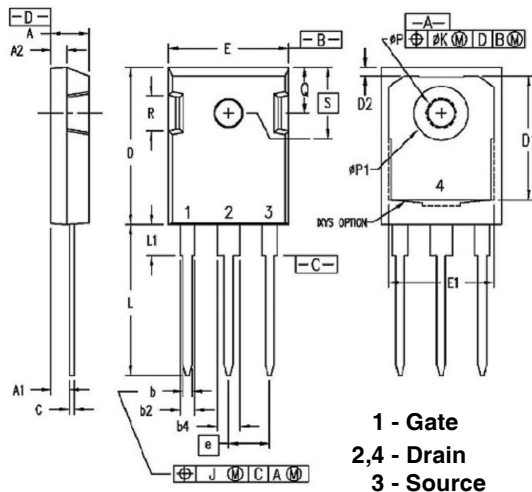


| SYM  | INCHES |      | MILLIMETER |       |
|------|--------|------|------------|-------|
|      | MIN    | MAX  | MIN        | MAX   |
| A    | .193   | .201 | 4.90       | 5.10  |
| A1   | .106   | .114 | 2.70       | 2.90  |
| A2   | .001   | .010 | 0.02       | 0.25  |
| b    | .045   | .057 | 1.15       | 1.45  |
| C    | .016   | .026 | 0.40       | 0.65  |
| C2   | .057   | .063 | 1.45       | 1.60  |
| D    | .543   | .551 | 13.80      | 14.00 |
| D1   | .465   | .476 | 11.80      | 12.10 |
| D2   | .295   | .307 | 7.50       | 7.80  |
| D3   | .114   | .126 | 2.90       | 3.20  |
| E    | .624   | .632 | 15.85      | 16.05 |
| E1   | .524   | .535 | 13.30      | 13.60 |
| e    | .215   | BSC  | 5.45       | BSC   |
| (e2) | .374   | .386 | 9.50       | 9.80  |
| H    | .736   | .752 | 18.70      | 19.10 |
| L    | .067   | .079 | 1.70       | 2.00  |
| L2   | .039   | .045 | 1.00       | 1.15  |
| L3   | .010   | BSC  | 0.25       | BSC   |
| L4   | .150   | .161 | 3.80       | 4.10  |

#### NOTE:

1. This drawing meets all dimensions requirement of JEDEC outlines TO-268AA except L dimension.
2. All metal surface are matte pure tin plated except trimmed area.
3. L3 is Gauge plane to measure L.
4. These dimension do not include mold flash and they will not exceed 0.005[0.13] per side.

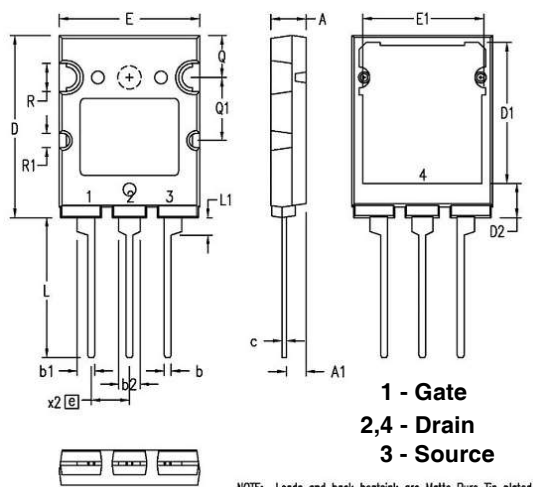
### TO-247 Outline



| SYM | INCHES |      | MILLIMETERS |       |
|-----|--------|------|-------------|-------|
|     | MIN    | MAX  | MIN         | MAX   |
| A   | .190   | .205 | 4.83        | 5.21  |
| A1  | .090   | .100 | 2.29        | 2.54  |
| A2  | .075   | .085 | 1.91        | 2.16  |
| b   | .045   | .055 | 1.14        | 1.40  |
| b2  | .075   | .087 | 1.91        | 2.20  |
| b4  | .115   | .126 | 2.92        | 3.20  |
| C   | .024   | .031 | 0.61        | 0.80  |
| D   | .819   | .840 | 20.80       | 21.34 |
| D1  | .650   | .690 | 16.51       | 17.53 |
| D2  | .035   | .050 | 0.89        | 1.27  |
| E   | .620   | .635 | 15.75       | 16.13 |
| E1  | .545   | .565 | 13.84       | 14.35 |
| e   | .215   | BSC  | 5.45        | BSC   |
| J   | --     | .010 | --          | 0.25  |
| K   | --     | .025 | --          | 0.64  |
| L   | .780   | .810 | 19.81       | 20.57 |
| L1  | .150   | .170 | 3.81        | 4.32  |
| øP  | .140   | .144 | 3.55        | 3.65  |
| øP1 | .275   | .290 | 6.99        | 7.37  |
| Q   | .220   | .244 | 5.59        | 6.20  |
| R   | .170   | .190 | 4.32        | 4.83  |
| S   | .242   | BSC  | 6.15        | BSC   |

NOTE: This drawing will meet all dimensions requirement of JEDEC outlines TO-247 AD (R-PSIP-F3)

### TO-264 Outline



| SYM | INCHES |       | MILLIMETERS |       |
|-----|--------|-------|-------------|-------|
|     | MIN    | MAX   | MIN         | MAX   |
| A   | .185   | .209  | 4.70        | 5.30  |
| A1  | .102   | .118  | 2.60        | 3.00  |
| b   | .035   | .049  | 0.90        | 1.25  |
| b1  | .091   | .106  | 2.30        | 2.70  |
| b2  | .110   | .126  | 2.80        | 3.20  |
| c   | .020   | .033  | 0.50        | 0.85  |
| D   | 1.012  | 1.035 | 25.70       | 26.30 |
| D1  | .783   | .799  | 19.90       | 20.30 |
| D2  | .185   | .205  | 4.70        | 5.20  |
| E   | .776   | .799  | 19.70       | 20.30 |
| E1  | .661   | .677  | 16.80       | 17.20 |
| e   | .215   | BSC   | 5.46        | BSC   |
| L   | .768   | .807  | 19.50       | 20.50 |
| L1  | .091   | .106  | 2.30        | 2.70  |
| Q   | .228   | .244  | 5.80        | 6.20  |
| Q1  | .346   | .362  | 8.80        | 9.20  |
| øR  | .150   | .165  | 3.80        | 4.20  |
| øR1 | .071   | .087  | 1.80        | 2.20  |

NOTE: Leads and back heatsink are Matte Pure Tin plated.



**IXFT32N100XHV**

**IXFH32N100X**

**IXFK32N100X**



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