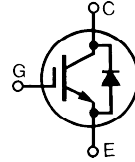


# High Voltage, High Gain BIMOSFET™ Monolithic Bipolar MOS Transistor

**IXBA14N300HV**  
**IXBT14N300HV**  
**IXBH14N300HV**

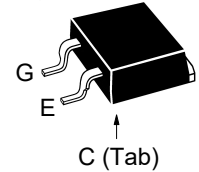
**$V_{CES} = 3000V$**   
 **$I_{C110} = 14A$**   
 **$V_{CE(sat)} \leq 2.7V$**



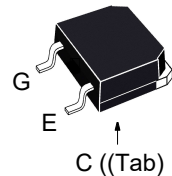
| Symbol                                       | Test Conditions                                                                                | Maximum Ratings        |            |
|----------------------------------------------|------------------------------------------------------------------------------------------------|------------------------|------------|
| $V_{CES}$                                    | $T_C = 25^\circ C$ to $150^\circ C$                                                            | 3000                   | V          |
| $V_{CGR}$                                    | $T_J = 25^\circ C$ to $150^\circ C$ , $R_{GE} = 1M\Omega$                                      | 3000                   | V          |
| $V_{GES}$                                    | Continuous                                                                                     | $\pm 20$               | V          |
| $V_{GEM}$                                    | Transient                                                                                      | $\pm 30$               | V          |
| $I_{C25}$                                    | $T_C = 25^\circ C$                                                                             | 38                     | A          |
| $I_{C110}$                                   | $T_C = 110^\circ C$                                                                            | 14                     | A          |
| $I_{CM}$                                     | $T_C = 25^\circ C$ , 1ms                                                                       | 120                    | A          |
| <b>SSOA</b><br><b>(RBSOA)</b>                | $V_{GE} = 15V$ , $T_{VJ} = 125^\circ C$ , $R_G = 20\Omega$<br>Clamped Inductive Load           | $I_{CM} = 120$<br>1500 | A<br>V     |
| <b><math>T_{SC}</math></b><br><b>(SCSOA)</b> | $V_{GE} = 15V$ , $T_J = 125^\circ C$ ,<br>$R_G = 82\Omega$ , $V_{CE} = 1500V$ , Non-Repetitive | 10                     | $\mu s$    |
| $P_C$                                        | $T_C = 25^\circ C$                                                                             | 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                    | $^\circ C$ |
| $T_{SOLD}$                                   | Plastic Body for 10s                                                                           | 260                    | $^\circ C$ |
| $F_C$                                        | Mounting Force (TO-263HV)                                                                      | 10..65 / 2.2..14.6     | N/lb       |
| $M_d$                                        | Mounting Torque (TO-247HV)                                                                     | 1.13/10                | Nm/lb.in   |
| <b>Weight</b>                                | TO-263HV                                                                                       | 2.5                    | g          |
|                                              | TO-268HV                                                                                       | 4.0                    | g          |
|                                              | TO-247HV                                                                                       | 6.0                    | g          |

| Symbol                          | Test Conditions<br>( $T_J = 25^\circ C$ Unless Otherwise Specified) | Characteristic Values |            |                           |
|---------------------------------|---------------------------------------------------------------------|-----------------------|------------|---------------------------|
|                                 |                                                                     | Min.                  | Typ.       | Max.                      |
| <b><math>BV_{CES}</math></b>    | $I_C = 250\mu A$ , $V_{GE} = 0V$                                    | 3000                  |            | V                         |
| <b><math>V_{GE(th)}</math></b>  | $I_C = 250\mu A$ , $V_{CE} = V_{GE}$                                | 3.0                   |            | 5.0 V                     |
| <b><math>I_{CES}</math></b>     | $V_{CE} = 0.8 \cdot V_{CES}$ , $V_{GE} = 0V$<br>$T_J = 125^\circ C$ |                       |            | 25 $\mu A$<br>750 $\mu A$ |
| <b><math>I_{GES}</math></b>     | $V_{CE} = 0V$ , $V_{GE} = \pm 20V$                                  |                       |            | $\pm 100$ nA              |
| <b><math>V_{CE(sat)}</math></b> | $I_C = 14A$ , $V_{GE} = 15V$ , Note 1<br>$T_J = 125^\circ C$        |                       | 2.2<br>2.7 | V<br>V                    |

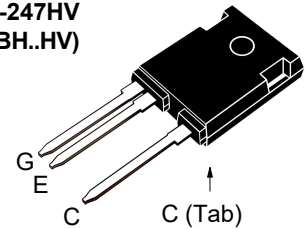
**TO-263HV**  
**(IXBA..HV)**



**TO-268HV**  
**(IXBT..HV)**



**TO-247HV**  
**(IXBH..HV)**



G = Gate      C = Collector  
E = Emitter    Tab = Collector

## Features

- High Voltage Packages
- High Blocking Voltage
- Anti-Parallel Diode
- Low Conduction Losses

## Advantages

- Low Gate Drive Requirement
- High Power Density

## Applications

- Switch-Mode and Resonant-Mode Power Supplies
- Uninterruptible Power Supplies (UPS)
- Laser Generators
- Capacitor Discharge Circuits
- AC Switches

## Symbol Test Conditions

(T<sub>J</sub> = 25°C Unless Otherwise Specified)

## Characteristic Values

Min. Typ. Max.

|                           |                                                                                                                                                        |   |      |      |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|---|------|------|
| <b>g<sub>fs</sub></b>     | I <sub>C</sub> = 14A, V <sub>CE</sub> = 10V, Note 1                                                                                                    | 8 | 13   | S    |
| <b>C<sub>ies</sub></b>    | V <sub>CE</sub> = 25V, V <sub>GE</sub> = 0V, f = 1MHz                                                                                                  |   | 1275 | pF   |
| <b>C<sub>oes</sub></b>    |                                                                                                                                                        |   | 50   | pF   |
| <b>C<sub>res</sub></b>    |                                                                                                                                                        |   | 18   | pF   |
| <b>Q<sub>g</sub></b>      | I <sub>C</sub> = 14A, V <sub>GE</sub> = 15V, V <sub>CE</sub> = 1500V                                                                                   |   | 62   | nC   |
| <b>Q<sub>ge</sub></b>     |                                                                                                                                                        |   | 7    | nC   |
| <b>Q<sub>gc</sub></b>     |                                                                                                                                                        |   | 30   | nC   |
| <b>t<sub>d(on)</sub></b>  | <b>Resistive Switching Times, T<sub>J</sub> = 25°C</b><br>I <sub>C</sub> = 14A, V <sub>GE</sub> = 15V<br>V <sub>CE</sub> = 960V, R <sub>G</sub> = 20Ω  |   | 40   | ns   |
| <b>t<sub>r</sub></b>      |                                                                                                                                                        |   | 380  | ns   |
| <b>t<sub>d(off)</sub></b> |                                                                                                                                                        |   | 166  | ns   |
| <b>t<sub>f</sub></b>      |                                                                                                                                                        |   | 1900 | ns   |
| <b>t<sub>d(on)</sub></b>  | <b>Resistive Switching Times, T<sub>J</sub> = 125°C</b><br>I <sub>C</sub> = 14A, V <sub>GE</sub> = 15V<br>V <sub>CE</sub> = 960V, R <sub>G</sub> = 20Ω |   | 64   | ns   |
| <b>t<sub>r</sub></b>      |                                                                                                                                                        |   | 746  | ns   |
| <b>t<sub>d(off)</sub></b> |                                                                                                                                                        |   | 180  | ns   |
| <b>t<sub>f</sub></b>      |                                                                                                                                                        |   | 1730 | ns   |
| <b>R<sub>thJC</sub></b>   | TO-247HV                                                                                                                                               |   | 0.62 | °C/W |
| <b>R<sub>thCS</sub></b>   |                                                                                                                                                        |   |      | °C/W |

## Reverse Diode

## Symbol Test Conditions

(T<sub>J</sub> = 25°C Unless Otherwise Specified)

## Characteristic Values

Min. Typ. Max.

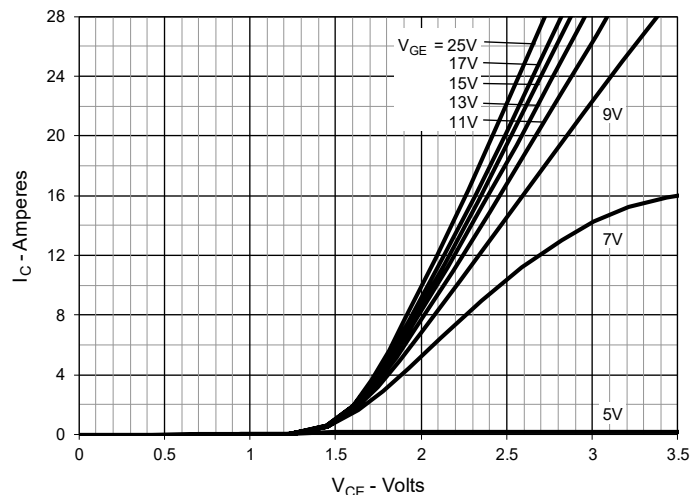
|                       |                                                                                                                          |  |     |    |
|-----------------------|--------------------------------------------------------------------------------------------------------------------------|--|-----|----|
| <b>V<sub>F</sub></b>  | I <sub>F</sub> = 14A, V <sub>GE</sub> = 0V                                                                               |  | 2.7 | V  |
| <b>t<sub>rr</sub></b> | I <sub>F</sub> = 7A, V <sub>GE</sub> = 0V, -di <sub>F</sub> /dt = 100A/μs<br>V <sub>R</sub> = 100V, V <sub>GE</sub> = 0V |  | 1.4 | μs |
| <b>I<sub>RM</sub></b> |                                                                                                                          |  | 23  | A  |
| <b>Q<sub>RM</sub></b> |                                                                                                                          |  | 16  | μC |

Note 1: Pulse test, t ≤ 300μs, duty cycle, d ≤ 2%.

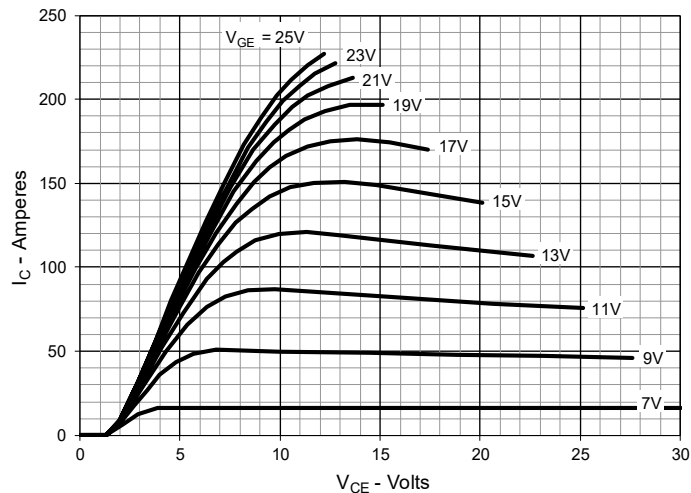
Littelfuse reserves the right to change limits, test conditions and dimensions.

|                                                                                  |           |           |           |           |              |              |              |              |              |             |
|----------------------------------------------------------------------------------|-----------|-----------|-----------|-----------|--------------|--------------|--------------|--------------|--------------|-------------|
| 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 | 7,157,338B2 |
|                                                                                  | 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    |             |

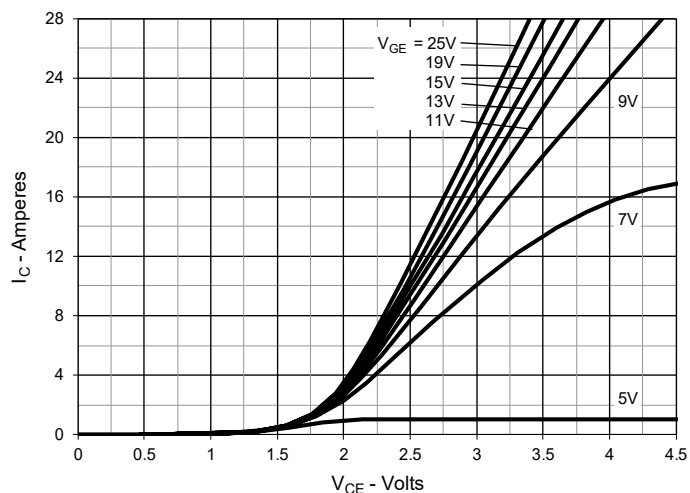
**Fig. 1. Output Characteristics @  $T_J = 25^\circ\text{C}$**



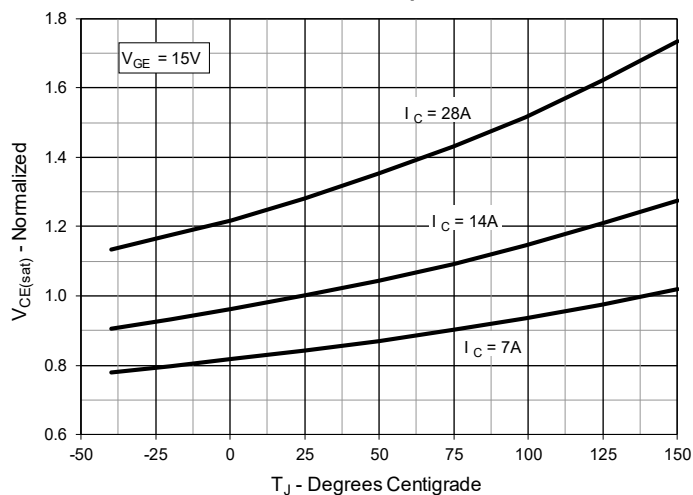
**Fig. 2. Extended Output Characteristics @  $T_J = 25^\circ\text{C}$**



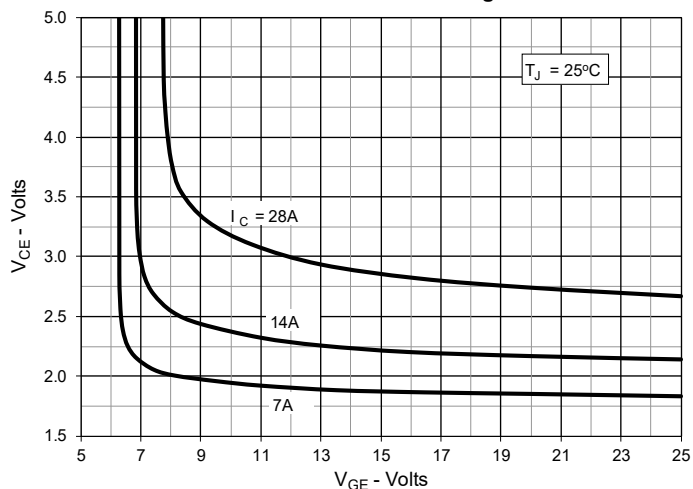
**Fig. 3. Output Characteristics @  $T_J = 125^\circ\text{C}$**



**Fig. 4. Dependence of  $V_{CE(sat)}$  on Junction Temperature**



**Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage**



**Fig. 6. Input Admittance**

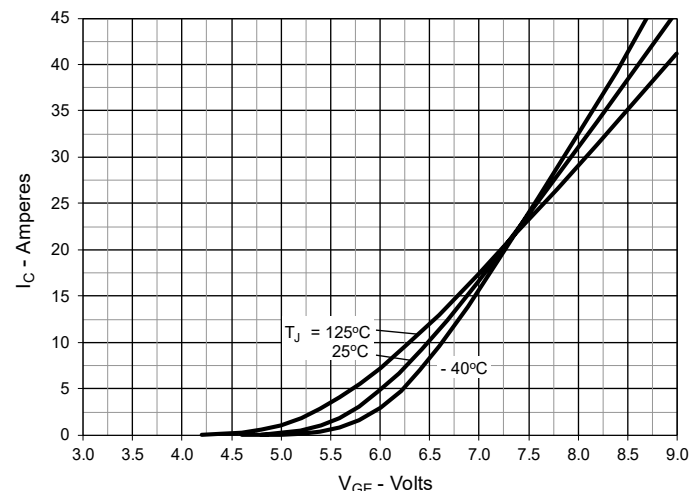


Fig. 7. Transconductance

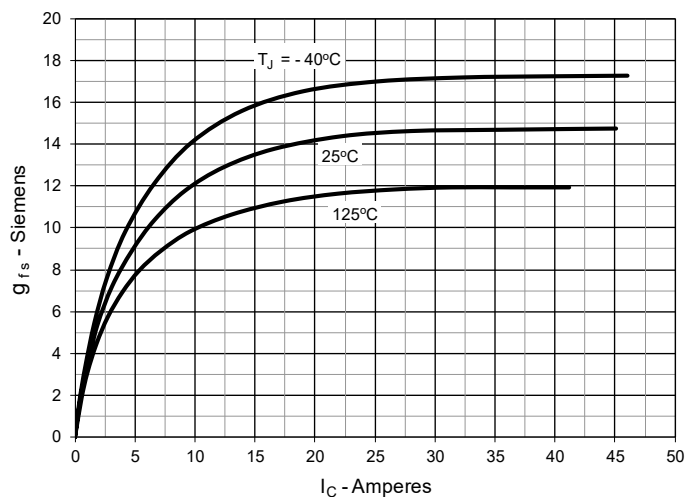


Fig. 8. Forward Voltage Drop of Intrinsic Diode

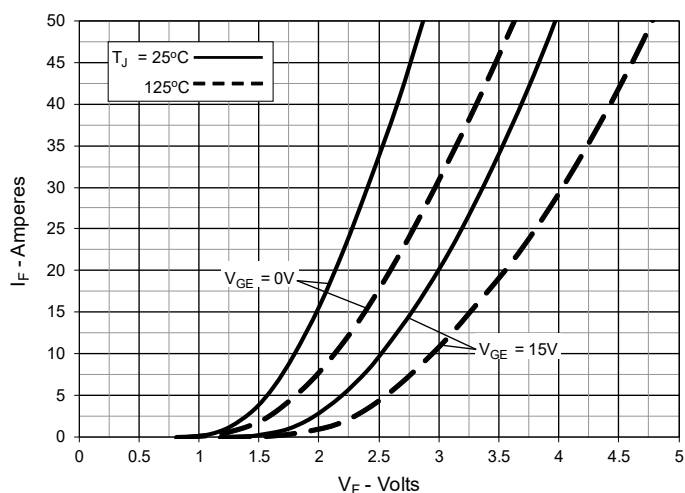


Fig. 9. Gate Charge

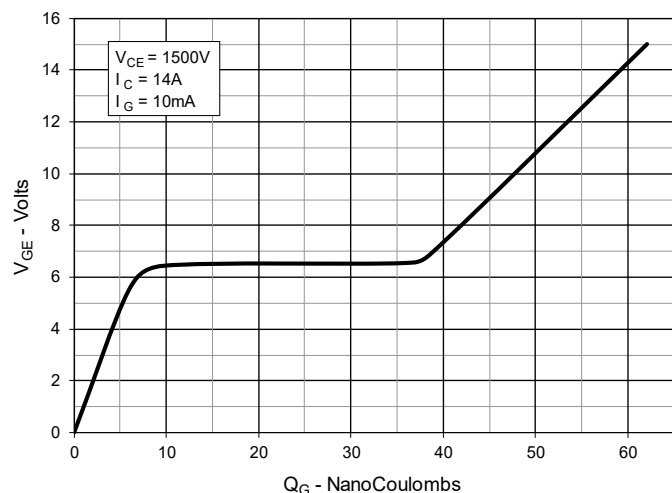


Fig. 10. Capacitance

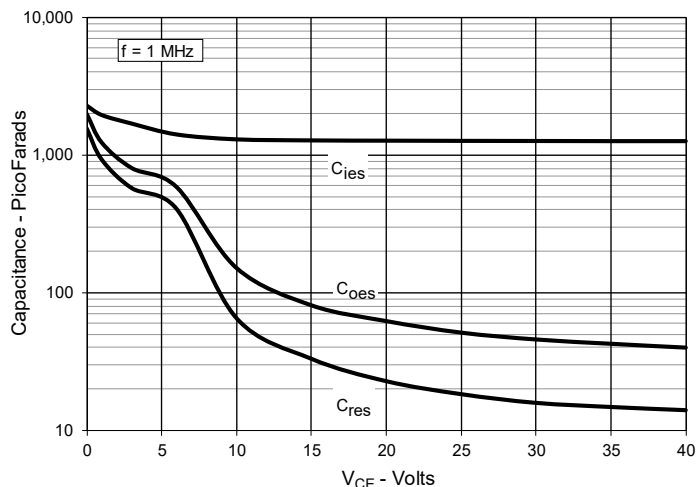


Fig. 11. Reverse-Bias Safe Operating Area

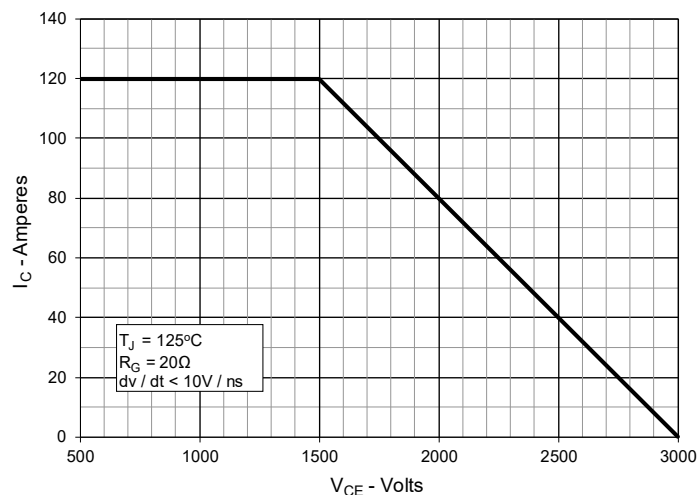
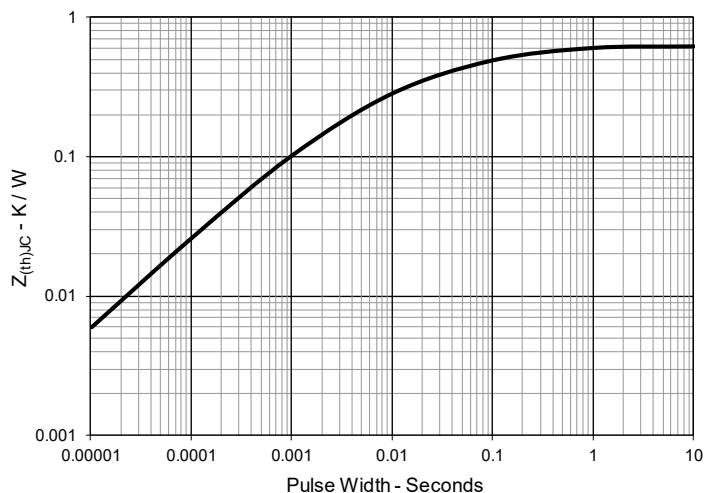
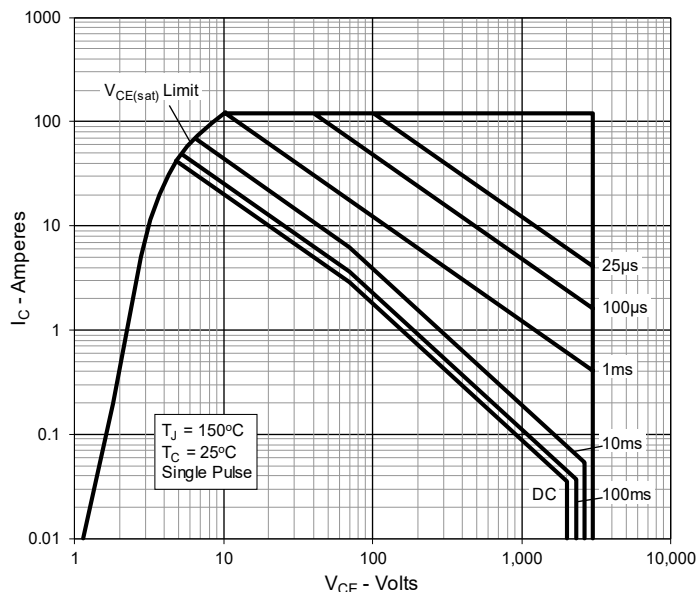


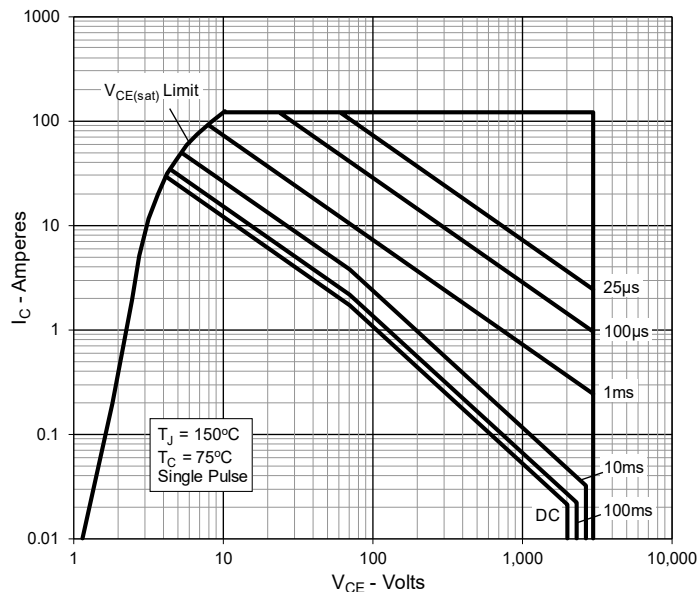
Fig. 12. Maximum Transient Thermal Impedance



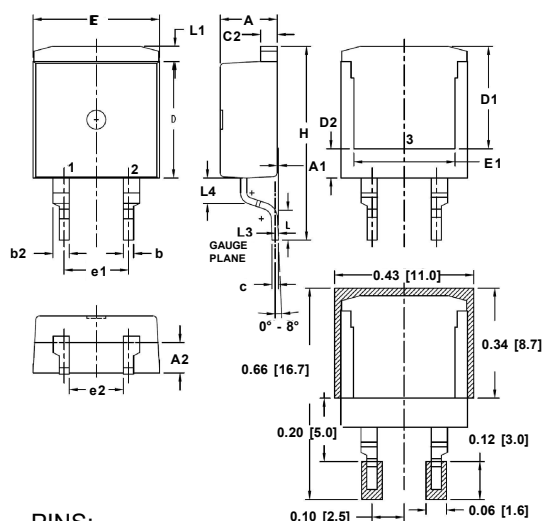
**Fig. 13. Forward-Bias Safe Operating Area  
@  $T_C = 25^\circ\text{C}$**



**Fig. 14. Forward-Bias Safe Operating Area  
@  $T_C = 75^\circ\text{C}$**



**TO-263HV Outline**

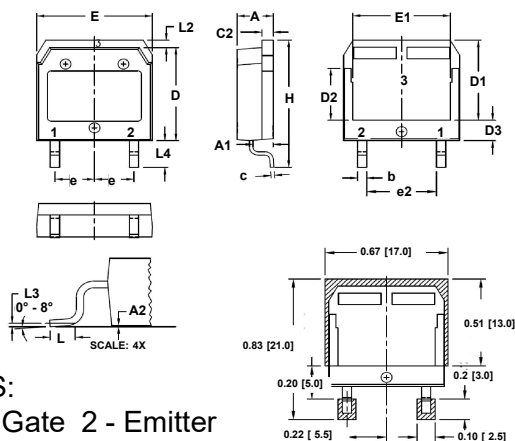


**PINS:**

- 1 - Gate 2 - Emitter
- 3 - Collector

| 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  |

## TO-268HV

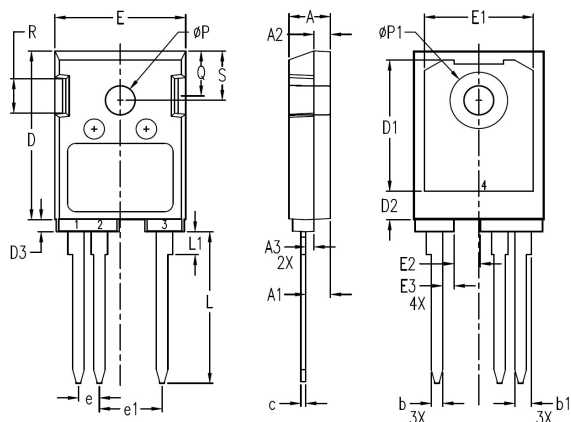


PINS:

- 1 - Gate 2 - Emitter  
3 - Collector

| 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  |

## TO-247HV



PINS:

- 1 - Gate 2 - Emitter  
3,4 - Collector

| 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   | .724   | .748 | 18.40       | 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  |

