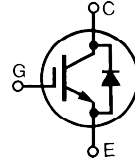


# High Voltage, High Gain BIMOSFET™ Monolithic Bipolar MOS Transistor

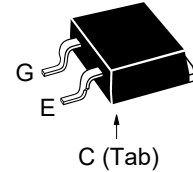
## IXBA14N300HV IXBT14N300HV IXBH14N300HV

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

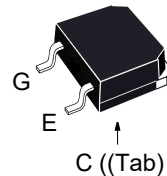


| Symbol                                       | Test Conditions  | Maximum Ratings        |            |
|--|--|------------------------|------------|
| $V_{CES}$                                    | $T_C = 25^\circ C$ to $150^\circ C$  | 3000                   | V          |
| $V_{CGR}$                                    | $T_J = 25^\circ C$ 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          |

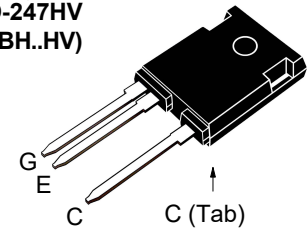
TO-263HV  
(IXBA..HV)



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

| Symbol Test Conditions<br>( $T_J = 25^\circ\text{C}$ Unless Otherwise Specified) |   | Characteristic Values |      |                         |
|--|---|-----------------------|------|-------------------------|
|  |   | Min.                  | Typ. | Max.                    |
| $g_{fs}$   | $I_C = 14\text{A}, V_{CE} = 10\text{V}$ , Note 1  | 8                     | 13   | S                       |
| $C_{ies}$  | $V_{CE} = 25\text{V}, V_{GE} = 0\text{V}, f = 1\text{MHz}$  |                       | 1275 | pF                      |
| $C_{oes}$  |   |                       | 50   | pF                      |
| $C_{res}$  |   |                       | 18   | pF                      |
| $Q_g$  | $I_C = 14\text{A}, V_{GE} = 15\text{V}, V_{CE} = 1500\text{V}$  |                       | 62   | nC                      |
| $Q_{ge}$   |   |                       | 7    | nC                      |
| $Q_{gc}$   |   |                       | 30   | nC                      |
| $t_{d(on)}$  | <b>Resistive Switching Times, <math>T_J = 25^\circ\text{C}</math></b><br>$I_C = 14\text{A}, V_{GE} = 15\text{V}$<br>$V_{CE} = 960\text{V}, R_G = 20\Omega$  |                       | 40   | ns                      |
| $t_r$  |   |                       | 380  | ns                      |
| $t_{d(off)}$   |   |                       | 166  | ns                      |
| $t_f$  |   |                       | 1900 | ns                      |
| $t_{d(on)}$  | <b>Resistive Switching Times, <math>T_J = 125^\circ\text{C}</math></b><br>$I_C = 14\text{A}, V_{GE} = 15\text{V}$<br>$V_{CE} = 960\text{V}, R_G = 20\Omega$ |                       | 64   | ns                      |
| $t_r$  |   |                       | 746  | ns                      |
| $t_{d(off)}$   |   |                       | 180  | ns                      |
| $t_f$  |   |                       | 1730 | ns                      |
| $R_{thJC}$   | TO-247HV  |                       |      | 0.62 $^\circ\text{C/W}$ |
| $R_{thCS}$   |   |                       | 0.21 | $^\circ\text{C/W}$      |

### Reverse Diode

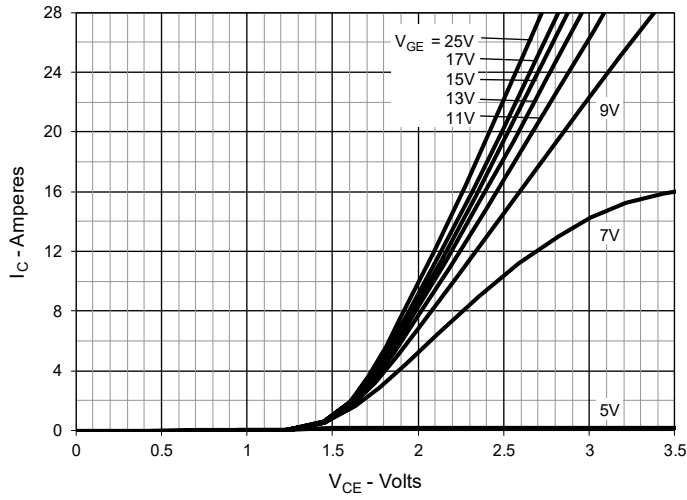
| Symbol Test Conditions<br>( $T_J = 25^\circ\text{C}$ Unless Otherwise Specified) |   | Characteristic Values |      |               |
|--|---|-----------------------|------|---------------|
|  |   | Min.                  | Typ. | Max.          |
| $V_F$  | $I_F = 14\text{A}, V_{GE} = 0\text{V}$                                    |                       |      | 2.7 V         |
| $t_{rr}$   | $I_F = 7\text{A}, V_{GE} = 0\text{V}, -di_F/dt = 100\text{A}/\mu\text{s}$ |                       | 1.4  | $\mu\text{s}$ |
| $I_{RM}$   |   |                       | 23   | A             |
| $Q_{RM}$   | $V_R = 100\text{V}, V_{GE} = 0\text{V}$                                   |                       | 16   | $\mu\text{C}$ |

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

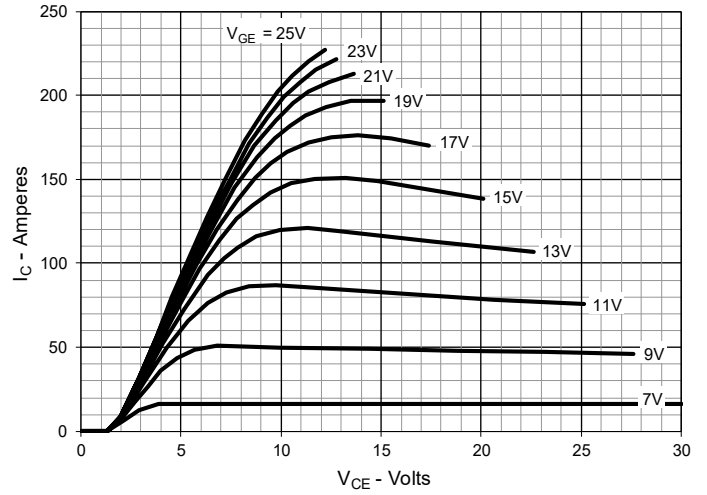
Littelfuse reserves the right to change limits, test conditions and dimensions.

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

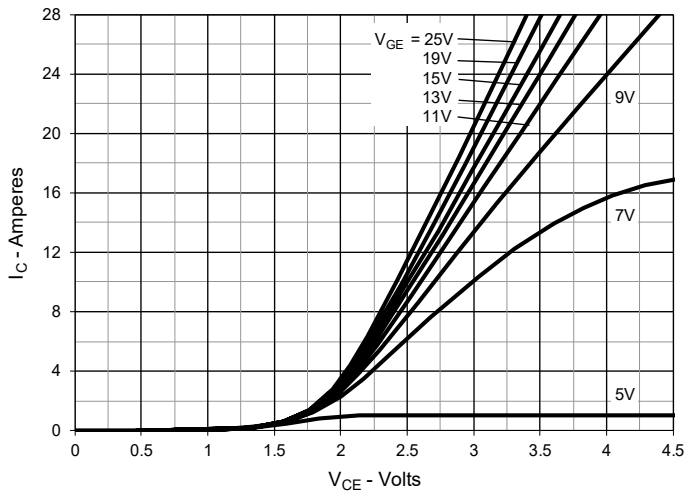
**Fig. 1. Output Characteristics @  $T_J = 25^\circ\text{C}$**



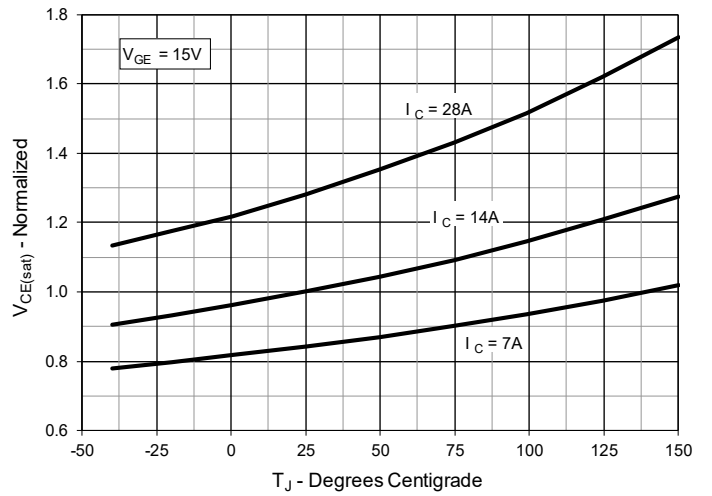
**Fig. 2. Extended Output Characteristics @  $T_J = 25^\circ\text{C}$**



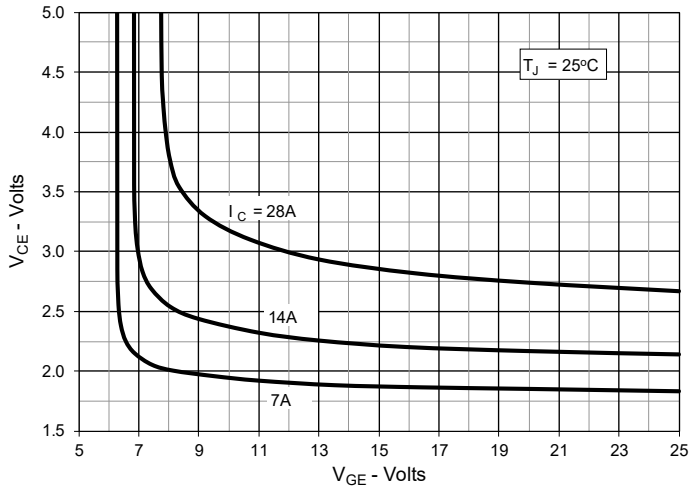
**Fig. 3. Output Characteristics @  $T_J = 125^\circ\text{C}$**



**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**

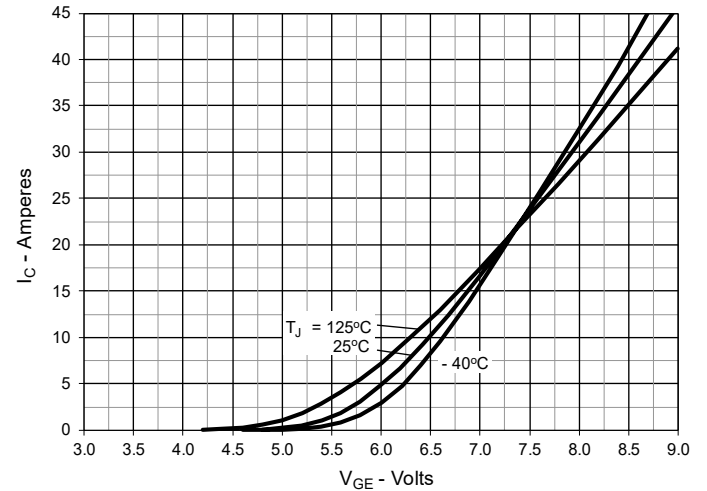


Fig. 7. Transconductance

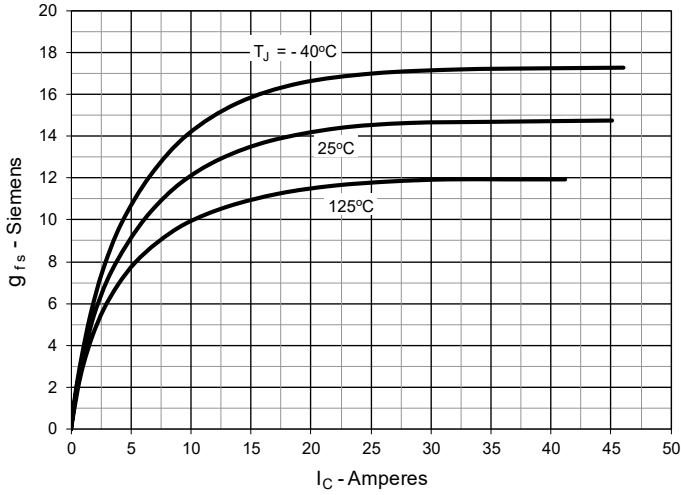


Fig. 8. Forward Voltage Drop of Intrinsic Diode

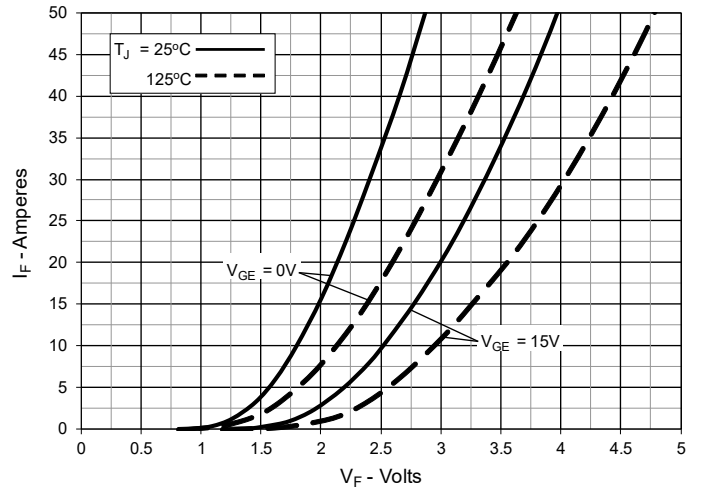


Fig. 9. Gate Charge

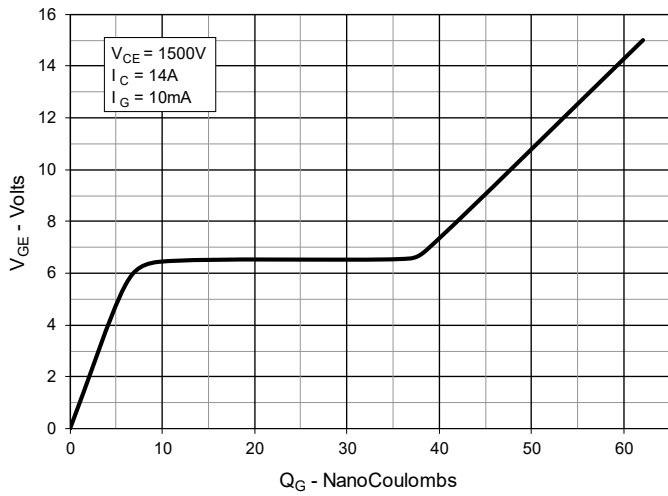


Fig. 10. Capacitance

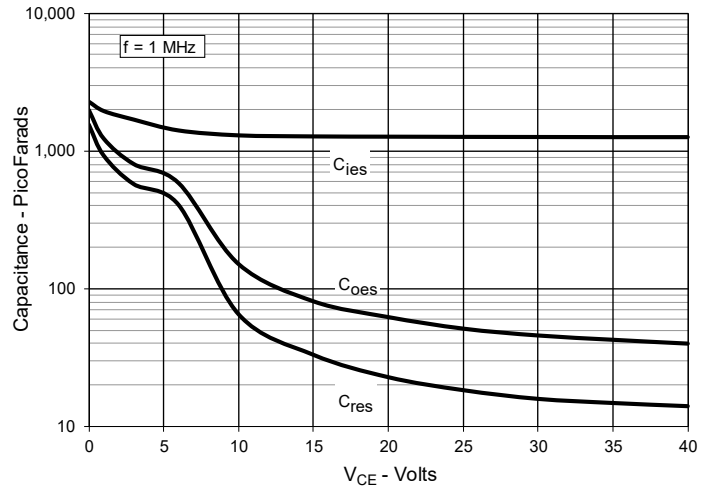


Fig. 11. Reverse-Bias Safe Operating Area

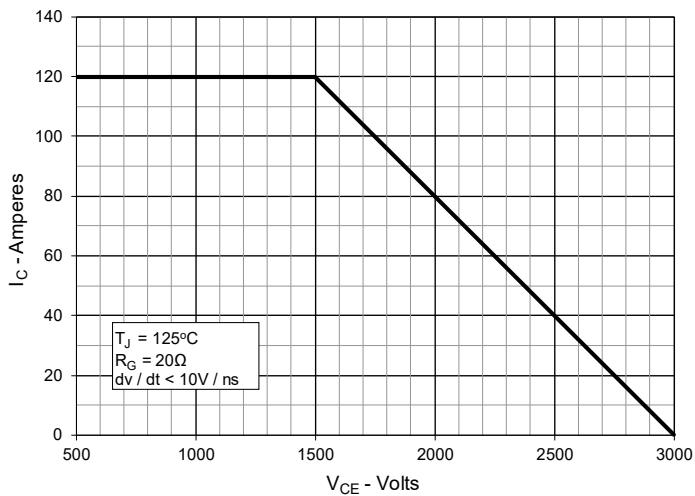
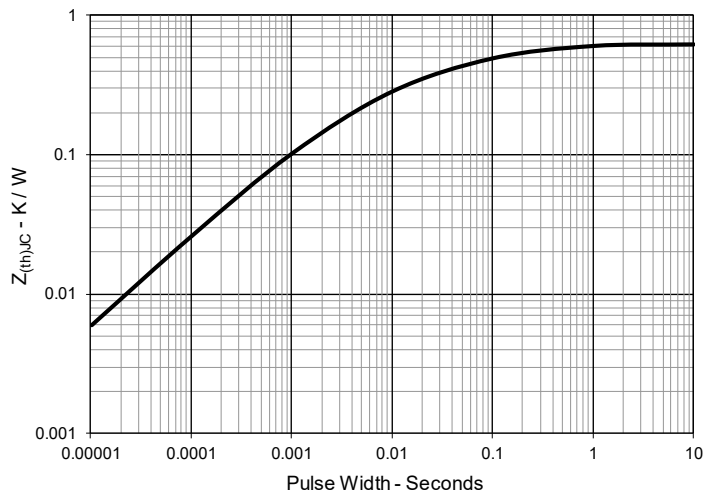
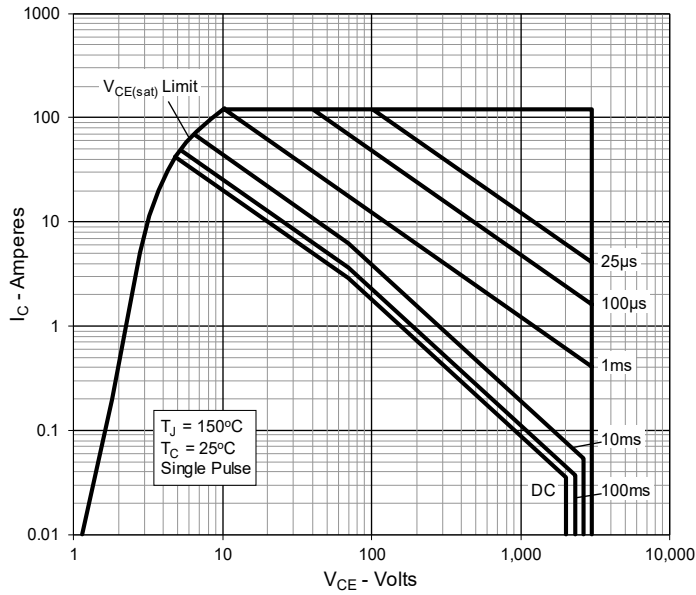


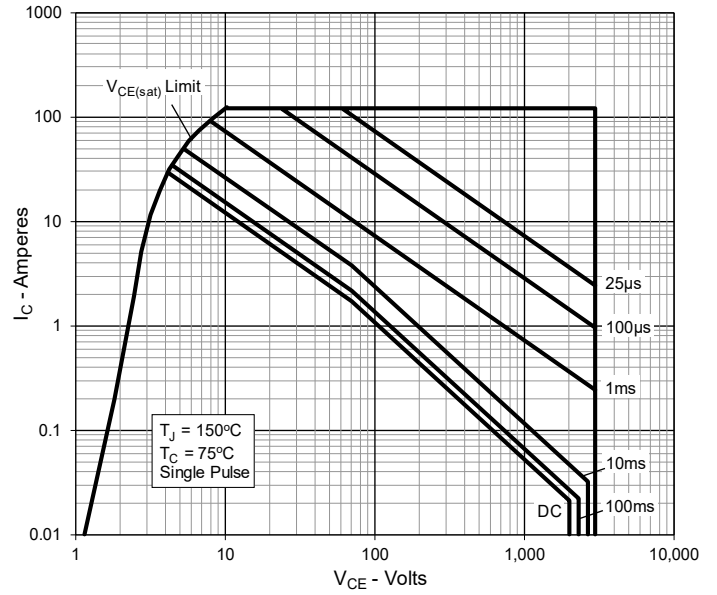
Fig. 12. Maximum Transient Thermal Impedance



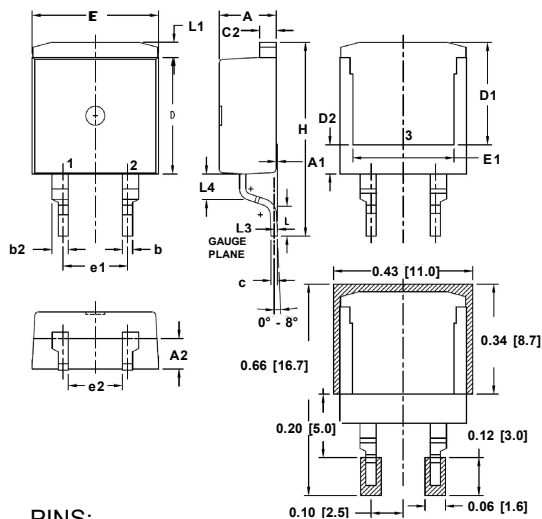
**Fig. 13. Forward-Bias Safe Operating Area  
@  $T_C = 25^\circ\text{C}$**



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



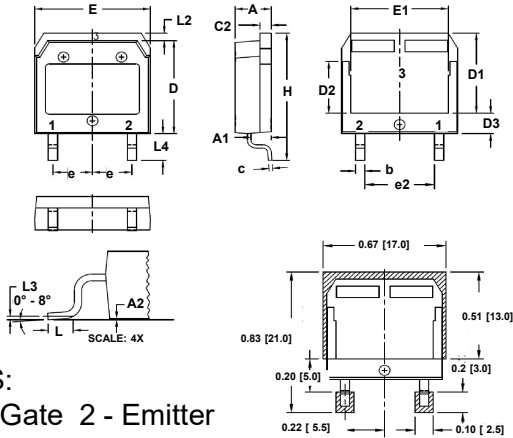
**TO-263HV Outline**



**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

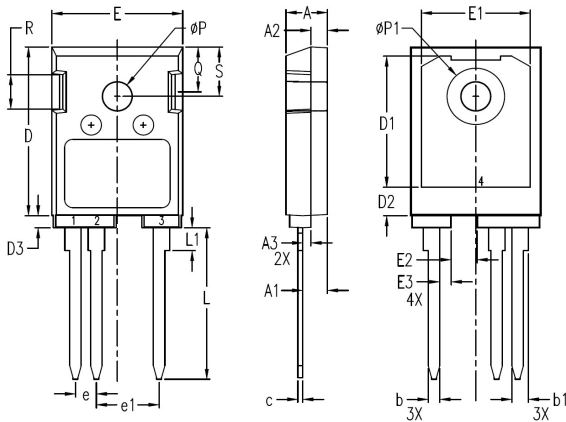


PINS:

- 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  |



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