

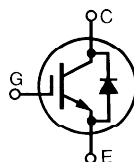
## High Voltage, High Gain BIMOSFET™ Monolithic Bipolar MOS Transistor

### IXBA10N300HV IXBH10N300HV

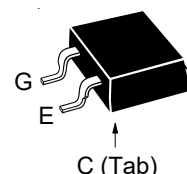
$$V_{CES} = 3000V$$

$$I_{C110} = 10A$$

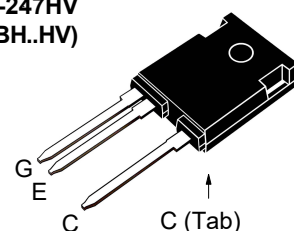
$$V_{CE(sat)} \leq 2.8V$$



TO-263HV  
(IXBA..HV)



TO-247HV  
(IXBH..HV)



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

| 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          |
| $I_{C25}$                                    | $T_C = 25^\circ C$                                                                             | 34                    | A          |
| $I_{C110}$                                   | $T_C = 110^\circ C$                                                                            | 10                    | A          |
| $I_{CM}$                                     | $T_C = 25^\circ C$ , 1ms                                                                       | 88                    | A          |
| <b>SSOA</b><br><b>(RBSOA)</b>                | $V_{GE} = 15V$ , $T_{VJ} = 125^\circ C$ , $R_G = 10\Omega$<br>Clamped Inductive Load           | $I_{CM} = 80$<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                    | $\mu s$    |
| $P_c$                                        | $T_C = 25^\circ C$                                                                             | 180                   | 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 (0.062 in.) 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-247HV)                                                                     | 1.13/10               | Nm/lb.in   |
| <b>Weight</b>                                | TO-263HV                                                                                       | 2.5                   | g          |
|                                              | TO-247HV                                                                                       | 6.0                   | g          |

### Features

- 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.                      |
| <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>500 $\mu A$ |
| <b><math>I_{GES}</math></b>     | $V_{CE} = 0V$ , $V_{GE} = \pm 20V$                                  |                       |            | $\pm 100$ nA              |
| <b><math>V_{CE(sat)}</math></b> | $I_C = 10A$ , $V_{GE} = 15V$ , Note 1<br>$T_J = 125^\circ C$        |                       | 2.2<br>2.7 | 2.8 V<br>V                |

| Symbol Test Conditions<br>( $T_J = 25^\circ\text{C}$ Unless Otherwise Specified) |                                                                                                                                                             | Characteristic Values |      |                    |
|----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|------|--------------------|
|                                                                                  |                                                                                                                                                             | Min.                  | Typ. | Max.               |
| $g_{fs}$                                                                         | $I_C = 10\text{A}, V_{CE} = 10\text{V}$ , Note 1                                                                                                            | 6                     | 11   | S                  |
| $C_{ies}$                                                                        | $V_{CE} = 25\text{V}, V_{GE} = 0\text{V}, f = 1\text{MHz}$                                                                                                  |                       | 1044 | pF                 |
| $C_{oes}$                                                                        |                                                                                                                                                             |                       | 42   | pF                 |
| $C_{res}$                                                                        |                                                                                                                                                             |                       | 14   | pF                 |
| $Q_g$                                                                            | $I_C = 10\text{A}, V_{GE} = 15\text{V}, V_{CE} = 1000\text{V}$                                                                                              |                       | 46   | nC                 |
| $Q_{ge}$                                                                         |                                                                                                                                                             |                       | 5    | nC                 |
| $Q_{gc}$                                                                         |                                                                                                                                                             |                       | 20   | nC                 |
| $t_{d(on)}$                                                                      | <b>Resistive Switching Times, <math>T_J = 25^\circ\text{C}</math></b><br>$I_C = 10\text{A}, V_{GE} = 15\text{V}$<br>$V_{CE} = 960\text{V}, R_G = 10\Omega$  |                       | 36   | ns                 |
| $t_r$                                                                            |                                                                                                                                                             |                       | 340  | ns                 |
| $t_{d(off)}$                                                                     |                                                                                                                                                             |                       | 100  | ns                 |
| $t_f$                                                                            |                                                                                                                                                             |                       | 1850 | ns                 |
| $t_{d(on)}$                                                                      | <b>Resistive Switching Times, <math>T_J = 125^\circ\text{C}</math></b><br>$I_C = 10\text{A}, V_{GE} = 15\text{V}$<br>$V_{CE} = 960\text{V}, R_G = 10\Omega$ |                       | 40   | ns                 |
| $t_r$                                                                            |                                                                                                                                                             |                       | 765  | ns                 |
| $t_{d(off)}$                                                                     |                                                                                                                                                             |                       | 120  | ns                 |
| $t_f$                                                                            |                                                                                                                                                             |                       | 2010 | ns                 |
| $R_{thJC}$                                                                       | TO-247HV                                                                                                                                                    |                       | 0.69 | $^\circ\text{C/W}$ |
| $R_{thCS}$                                                                       |                                                                                                                                                             |                       |      | $^\circ\text{C/W}$ |

## Reverse Diode

| Symbol Test Conditions<br>( $T_J = 25^\circ\text{C}$ Unless Otherwise Specified) |                                                                                                                      | Characteristic Values |      |               |
|----------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|-----------------------|------|---------------|
|                                                                                  |                                                                                                                      | Min.                  | Typ. | Max.          |
| $V_F$                                                                            | $I_F = 10\text{A}, V_{GE} = 0\text{V}$                                                                               |                       |      | 2.7 V         |
| $t_{rr}$                                                                         | $I_F = 5\text{A}, V_{GE} = 0\text{V}, -di_F/dt = 100\text{A}/\mu\text{s}$<br>$V_R = 100\text{V}, V_{GE} = 0\text{V}$ |                       | 1.6  | $\mu\text{s}$ |
| $I_{RM}$                                                                         |                                                                                                                      |                       | 23   | A             |
| $Q_{RM}$                                                                         |                                                                                                                      |                       | 18.6 | $\mu\text{C}$ |

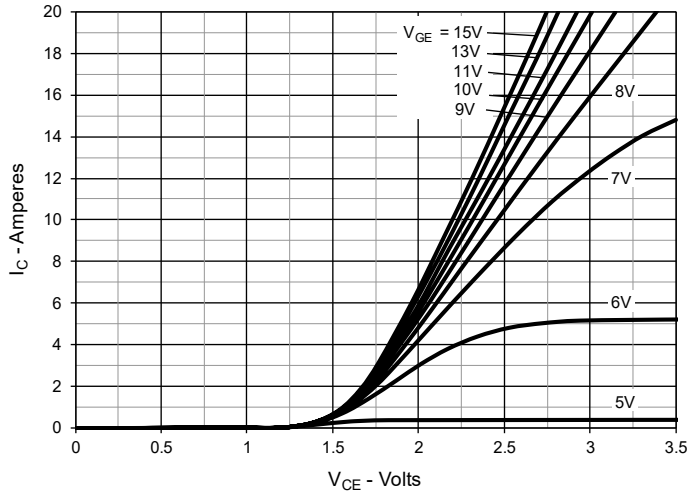
Note 1: Pulse test,  $t \leq 300\mu\text{s}$ , duty cycle,  $d \leq 2\%$ .

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

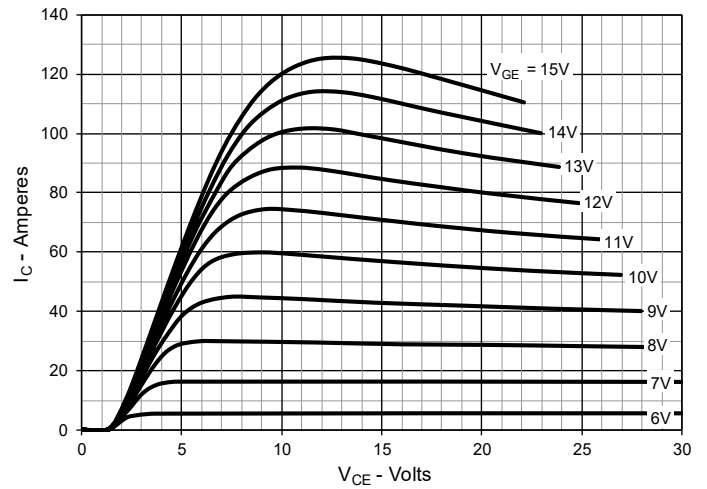
IXYS MOSFETs and IGBTs are covered by one or more of the following U.S. patents:

|           |           |           |           |              |              |              |              |              |             |
|-----------|-----------|-----------|-----------|--------------|--------------|--------------|--------------|--------------|-------------|
| 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    |             |

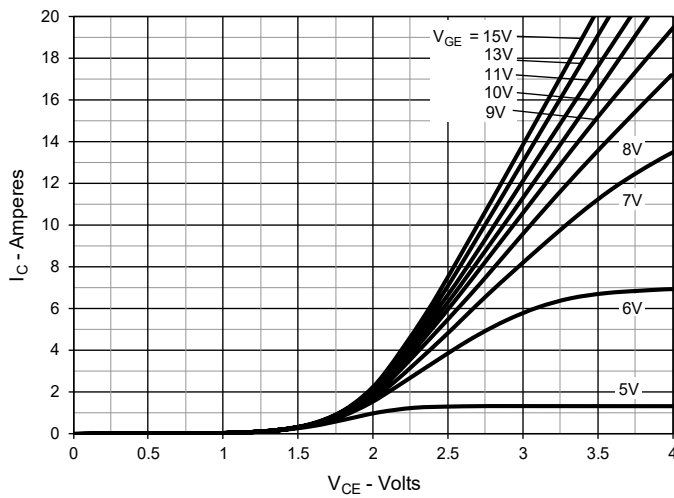
**Fig. 1. Output Characteristics @  $T_J = 25^\circ\text{C}$**



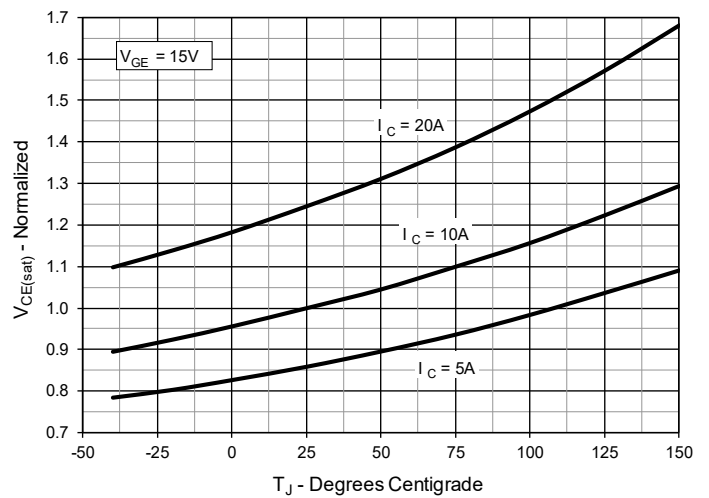
**Fig. 2. Extended Output Characteristics @  $T_J = 25^\circ\text{C}$**



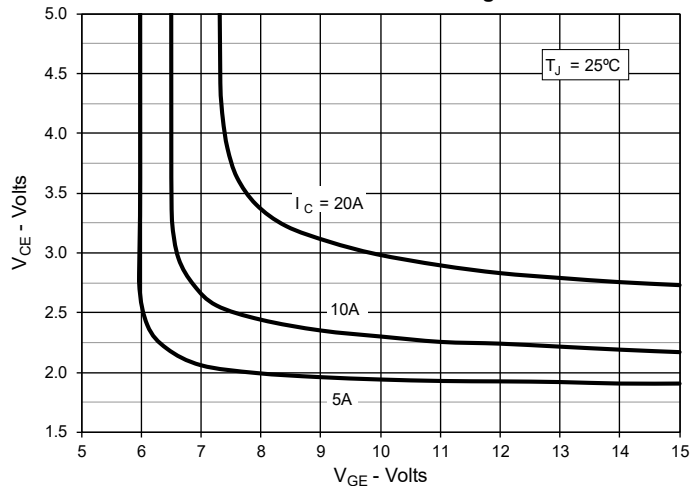
**Fig. 3. Output Characteristics @  $T_J = 125^\circ\text{C}$**



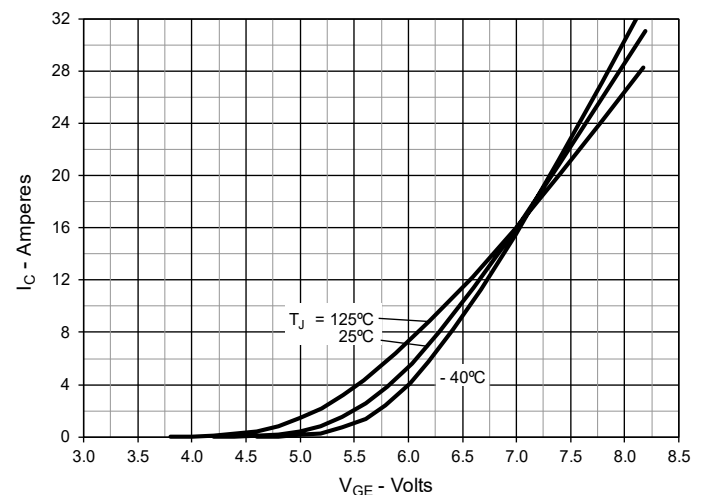
**Fig. 4. Dependence of  $V_{CE(sat)}$  on Junction Temperature**



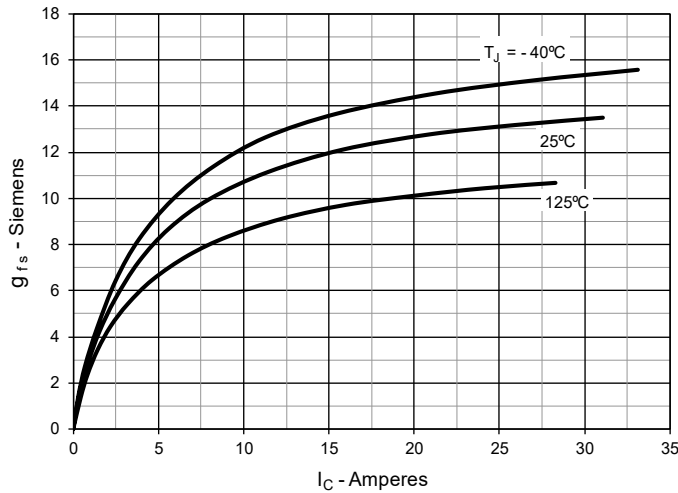
**Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage**



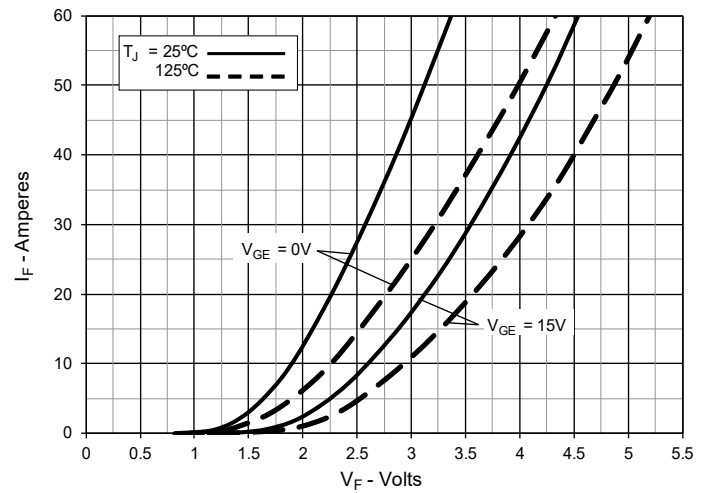
**Fig. 6. Input Admittance**



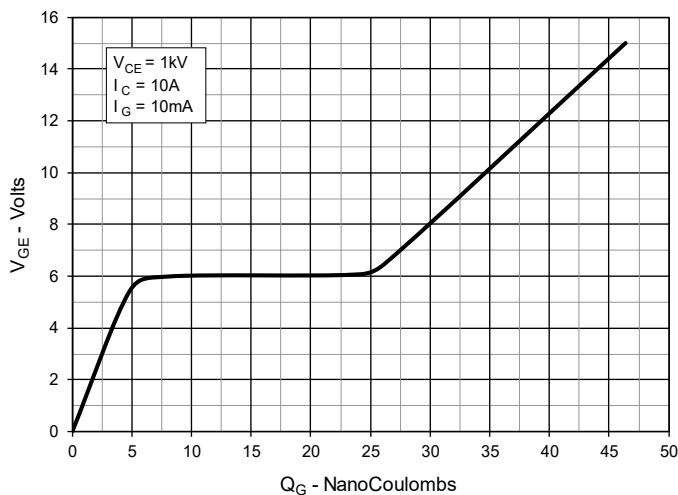
**Fig. 7. Transconductance**



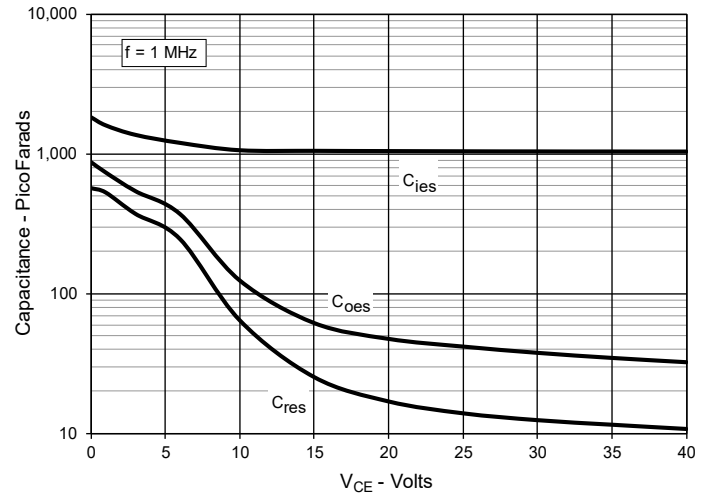
**Fig. 8. Forward Voltage Drop of Intrinsic Diode**



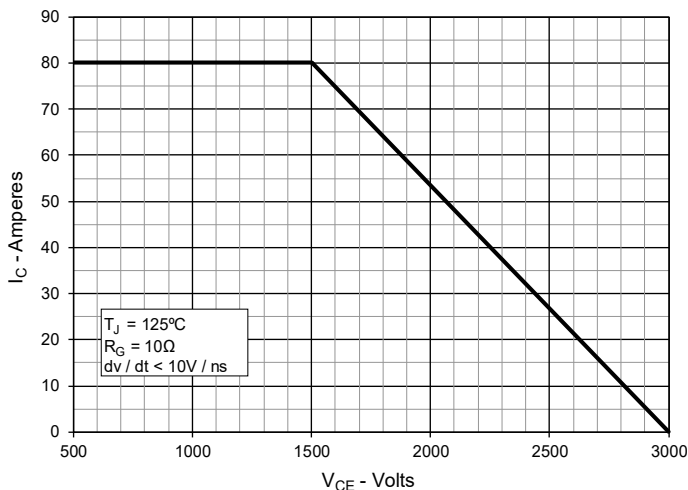
**Fig. 9. Gate Charge**



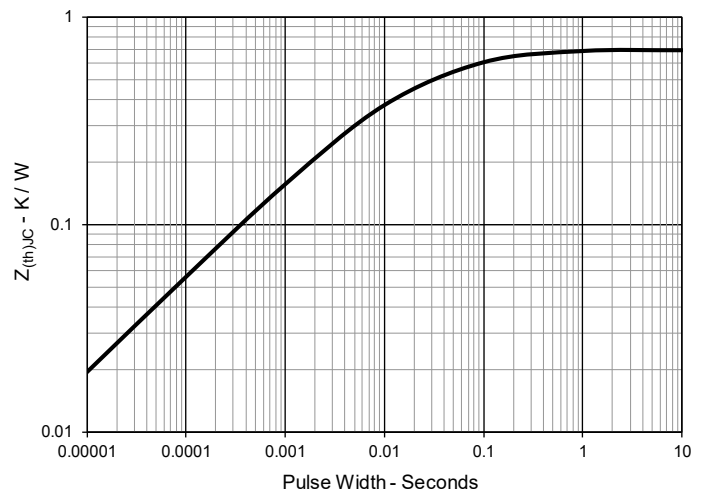
**Fig. 10. Capacitance**

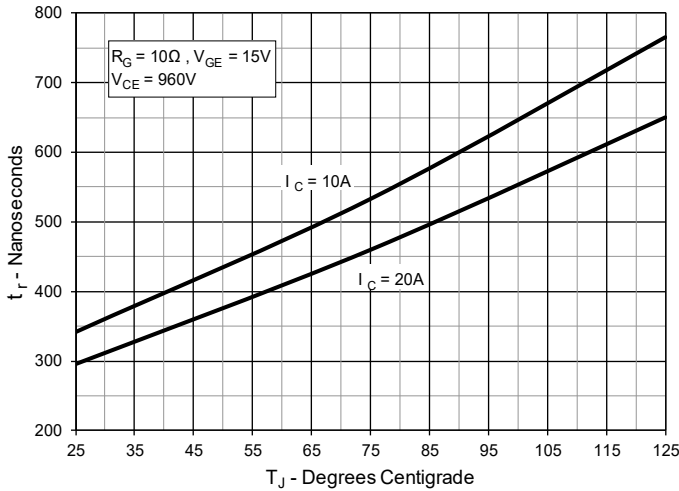
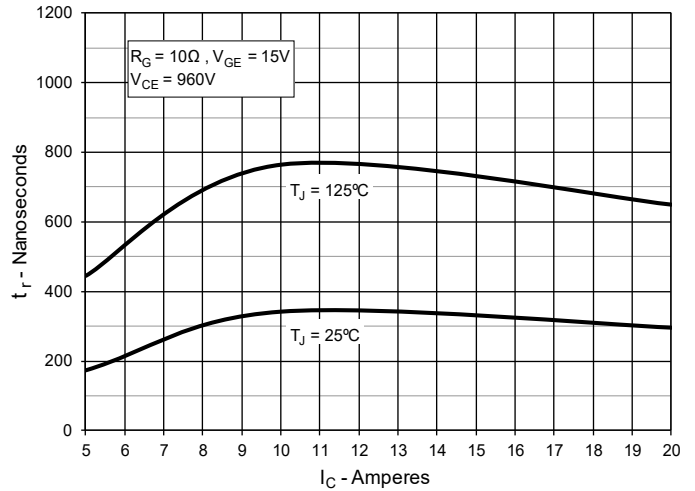
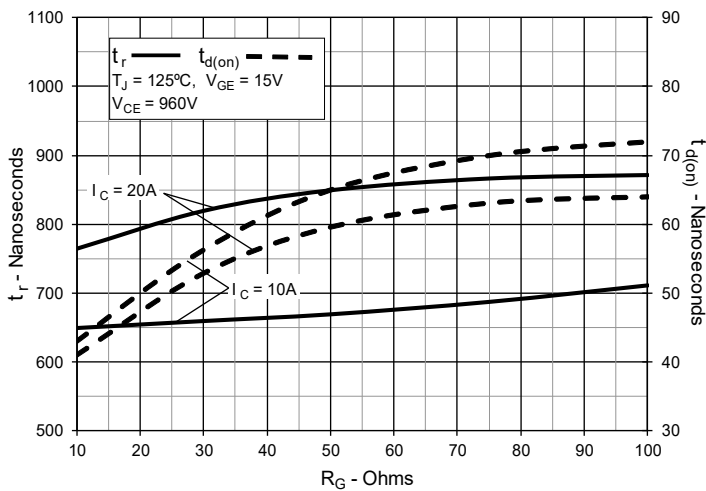
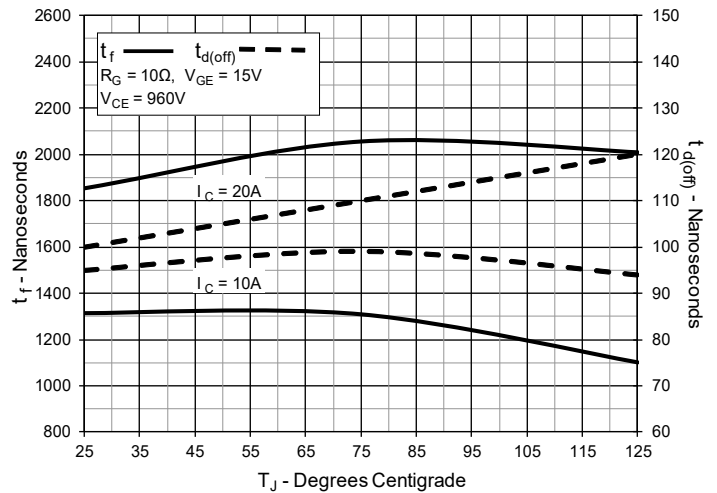
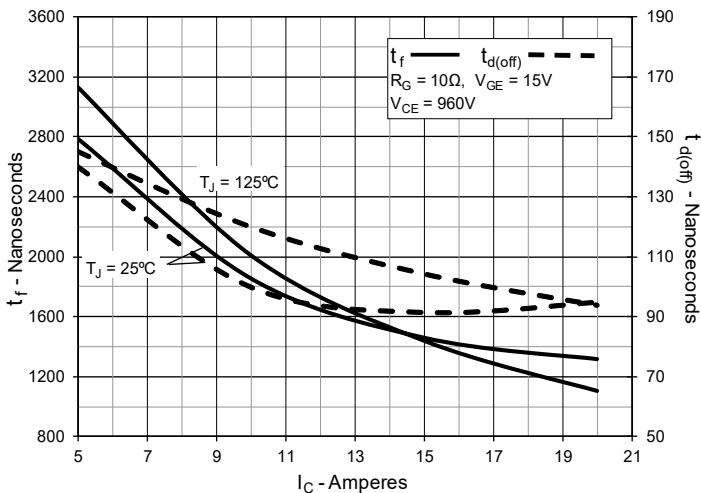
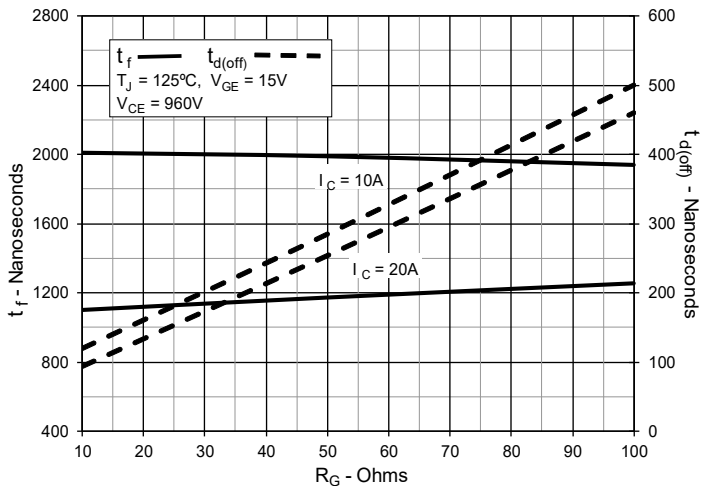


**Fig. 11. Reverse-Bias Safe Operating Area**

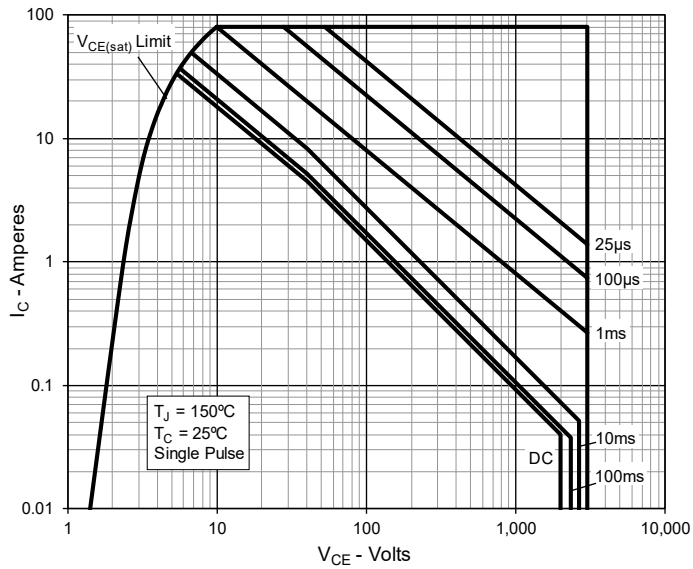


**Fig. 12. Maximum Transient Thermal Impedance**

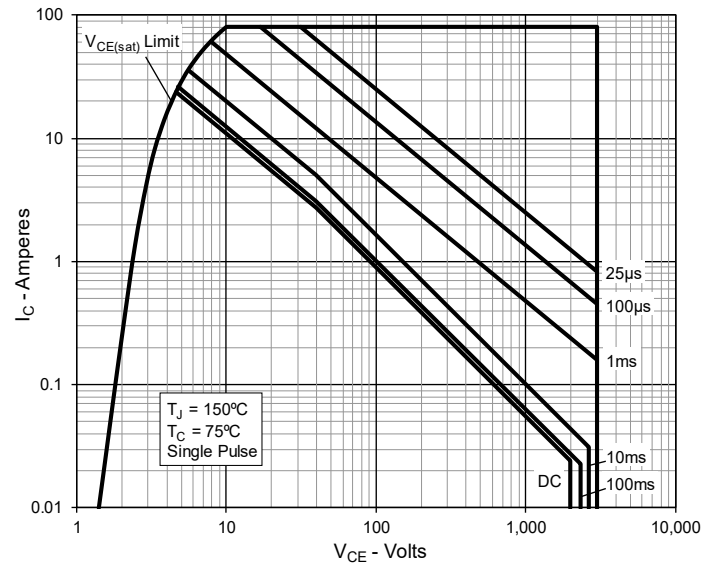


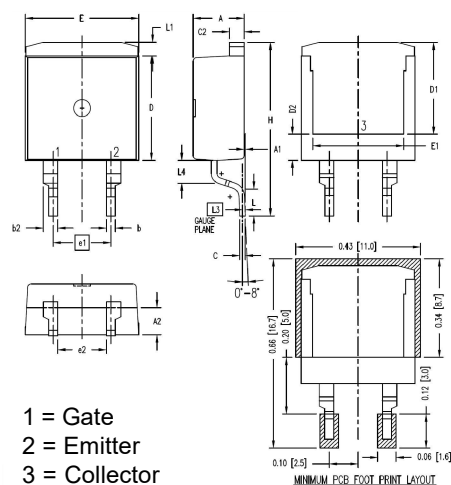
**Fig. 13. Resistive Turn-on Rise Time vs. Junction Temperature**

**Fig. 14. Resistive Turn-on Rise Time vs. Collector Current**

**Fig. 15. Resistive Turn-on Switching Times vs. Gate Resistance**

**Fig. 16. Resistive Turn-off Switching Times vs. Junction Temperature**

**Fig. 17. Resistive Turn-off Switching Times vs. Collector Current**

**Fig. 28. Resistive Turn-off Switching Times vs. Gate Resistance**


**Fig. 19. Forward-Bias Safe Operating Area**  
**@  $T_C = 25^\circ\text{C}$**

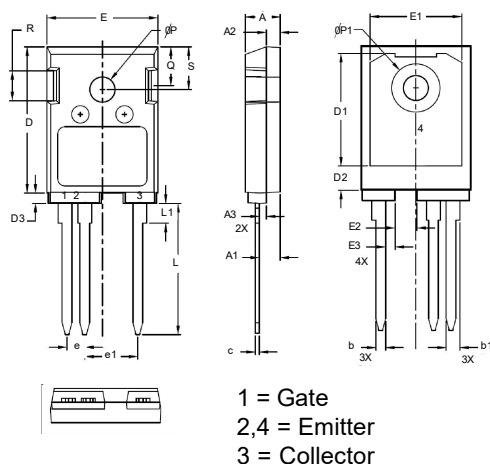


**Fig. 20. Forward-Bias Safe Operating Area**  
**@  $T_C = 75^\circ\text{C}$**



**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  |

**TO-247HV Outline**


| 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  |

