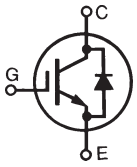
IXYS

Advance Technical Information

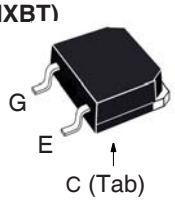
# High Voltage, High Gain BIMOSFET™ Monolithic Bipolar MOS Transistor

# IXBT16N360HV
# IXBH16N360HV

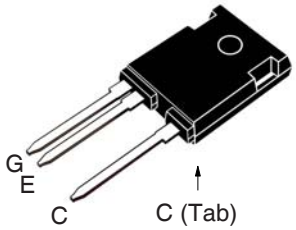
$V_{CES}$ = 3600V
$I_{C110}$ = 16A
$V_{CE(sat)} \leq$ 3.0V




TO-268HV (IXBT)




TO-247HV (IXBH)




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

| Symbol | Test Conditions | Maximum Ratings | |
|---|---|---|---|
| $V_{CES}$ | $T_J$ = 25°C to 150°C | 3600 | V |
| $V_{CGR}$ | $T_J$ = 25°C to 150°C, $R_{GE}$ = 1MΩ | 3600 | V |
| $V_{GES}$ | Continuous | ± 20 | V |
| $V_{GEM}$ | Transient | ± 30 | V |
| $I_{C25}$ | $T_C$ = 25°C | 48 | A |
| $I_{C110}$ | $T_C$ = 110°C | 16 | A |
| $I_{CM}$ | $T_C$ = 25°C, 1ms | 72 | A |
| **SSOA (RBSOA)** | $V_{GE}$ = 15V, $T_{VJ}$ = 125°C, $R_G$ = 25Ω<br>Clamped Inductive Load | $I_{CM}$ = 60<br>$V_{CES} \leq$ 1500 | A<br>V |
| $T_{SC}$ (SCSOA) | $V_{GE}$ = 15V, $T_J$ = 125°C,<br>$R_G$ = 82Ω, $V_{CE}$ = 1500V, Non-Repetitive | 10 | μs |
| $P_C$ | $T_C$ = 25°C | 270 | W |
| $T_J$ | | -55 ... +150 | °C |
| $T_{JM}$ | | 150 | °C |
| $T_{stg}$ | | -55 ... +150 | °C |
| $T_L$ | Maximum Lead Temperature for Soldering | 300 | °C |
| $T_{SOLD}$ | Plastic Body for 10s | 260 | °C |
| $M_d$ | Mounting Torque (TO-247HV) | 1.13/10 | Nm/lb.in |
| **Weight** | TO-268HV | 4 | g |
| | TO-247HV | 6 | g |

| Symbol | Test Conditions ($T_J$ = 25°C Unless Otherwise Specified) | Characteristic Values Min. | Typ. | Max. | |
|---|---|---|---|---|---|
| $BV_{CES}$ | $I_C$ = 250μA, $V_{GE}$ = 0V | 3600 | | | V |
| $V_{GE(th)}$ | $I_C$ = 250μA, $V_{CE}$ = $V_{GE}$ | 3.0 | | 5.0 | V |
| $I_{CES}$ | $V_{CE}$ = $V_{CES}$, $V_{GE}$ = 0V | | | 10 | μA |
| | $T_J$ = 125°C | | | 500 | μA |
| $I_{GES}$ | $V_{CE}$ = 0V, $V_{GE}$ = ± 20V | | | ±100 | nA |
| $V_{CE(sat)}$ | $I_C$ = 16A, $V_{GE}$ = 15V, Note 1 | | 2.5 | 3.0 | V |
| | $T_J$ = 125°C | | 3.1 | | V |

## Features

- High Voltage Packages
- High Blocking Voltage
- High Peak Current Capability
- Low Saturation Voltage

## 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

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# IXYS

**IXBT16N360HV**
**IXBH16N360HV**

| Symbol | Test Conditions ($T_J$ = 25°C Unless Otherwise Specified) | Characteristic Values Min. | Typ. | Max. | |
|---|---|---|---|---|---|
| $g_{fs}$ | $I_C$ = 16A, $V_{CE}$ = 10V, Note 1 | 7 | 12 | | S |
| $C_{ies}$ | $V_{CE}$ = 25V, $V_{GE}$ = 0V, f = 1MHz | | 1116 | | pF |
| $C_{oes}$ | | | 60 | | pF |
| $C_{res}$ | | | 25 | | pF |
| $Q_{g(on)}$ | $I_C$ = 16A, $V_{GE}$ = 15V, $V_{CE}$ = 1.5KV | | 65 | | nC |
| $Q_{ge}$ | | | 7 | | nC |
| $Q_{gc}$ | | | 30 | | nC |
| $t_{d(on)}$ | **Resistive load, $T_J$ = 25°C** | | 30 | | ns |
| $t_r$ | $I_C$ = 16A, $V_{GE}$ = 15V | | 260 | | ns |
| $t_{d(off)}$ | $V_{CE}$ = 1.5KV, $R_G$ = 25Ω | | 184 | | ns |
| $t_f$ | | | 110 | | ns |
| $t_{d(on)}$ | **Resistive load, $T_J$ = 125°C** | | 36 | | ns |
| $t_r$ | $I_C$ = 16A, $V_{GE}$ = 15V | | 385 | | ns |
| $t_{d(off)}$ | $V_{CE}$ = 1.5KV, $R_G$ = 25Ω | | 190 | | ns |
| $t_f$ | | | 115 | | ns |
| $R_{thJC}$ | | | | 0.46 | °C/W |
| $R_{thCS}$ | TO-247HV | | 0.21 | | °C/W |

**Reverse Diode**

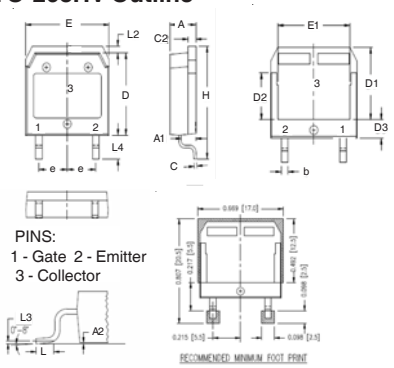
| Symbol | Test Conditions ($T_J$ = 25°C Unless Otherwise Specified) | Characteristic Values Min. | Typ. | Max | |
|---|---|---|---|---|---|
| $V_F$ | $I_F$ = 16A, $V_{GE}$ = 0V, Note 1 | | | 3.5 | V |
| $t_{rr}$ | $I_F$ = 16A, $V_{GE}$ = 0V, $-di_F/dt$ = 100A/μs | | 620 | | ns |
| $I_{RM}$ | $V_R$ = 100V, $V_{GE}$ = 0V | | 21.5 | | A |
| $Q_{RM}$ | | | 6.7 | | μC |

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

**ADVANCE TECHNICAL INFORMATION**

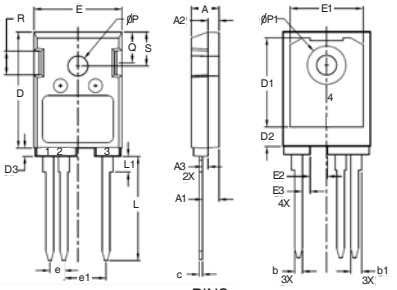
The product presented herein is under development. The Technical Specifications offered are derived from a subjective evaluation of the design, based upon prior knowledge and experience, and constitute a "considered reflection" of the anticipated result. IXYS reserves the right to change limits, test conditions, and dimensions without notice.

**TO-268HV Outline**




| SYM | INCHES MIN | INCHES MAX | MILLIMETER MIN | MILLIMETER 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 | |
| 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 Outline**




| SYM | INCHES MIN | INCHES MAX | MILLIMETERS MIN | MILLIMETERS 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 | .732 | .748 | 18.60 | 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 |

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 4,860,072 4,881,106 4,931,844 5,017,508 5,034,796 5,049,961 5,063,307 5,187,117 5,237,481 5,381,025 5,486,715 6,162,665 6,259,123 B1 6,306,728 B1 6,404,065 B1 6,534,343 6,583,505 6,683,344 6,710,405 B2 6,710,463 6,727,585 6,759,692 6,771,478 B2 7,005,734 B2 7,063,975 B2 7,071,537 7,157,338B2

**Fig. 1. Output Characteristics @ $T_J$ = 25°C**

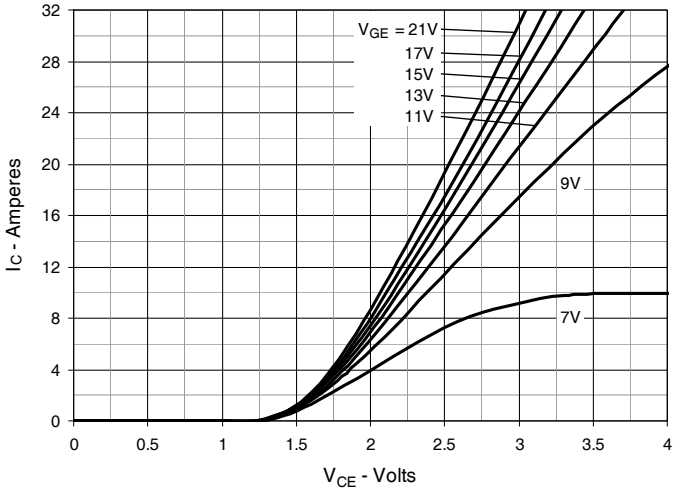



**Fig. 2. Extended Output Characteristics @ $T_J$ = 25°C**

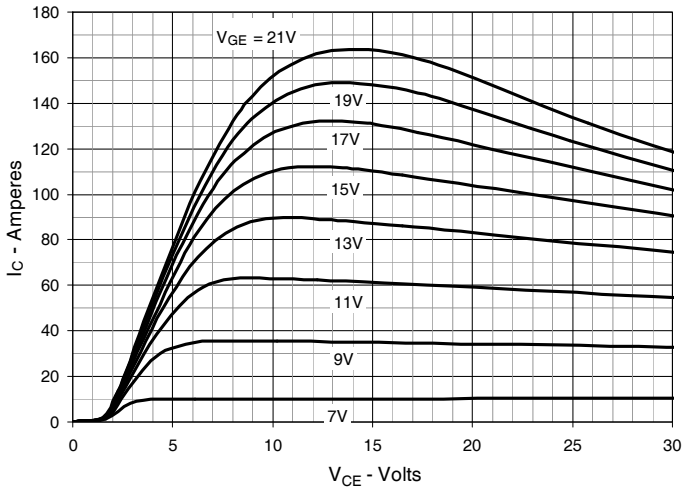



**Fig. 3. Output Characteristics @ $T_J$ = 125°C**

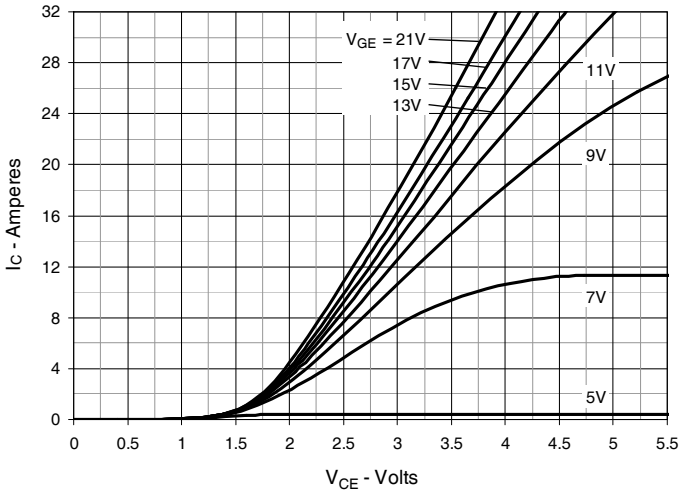



**Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature**

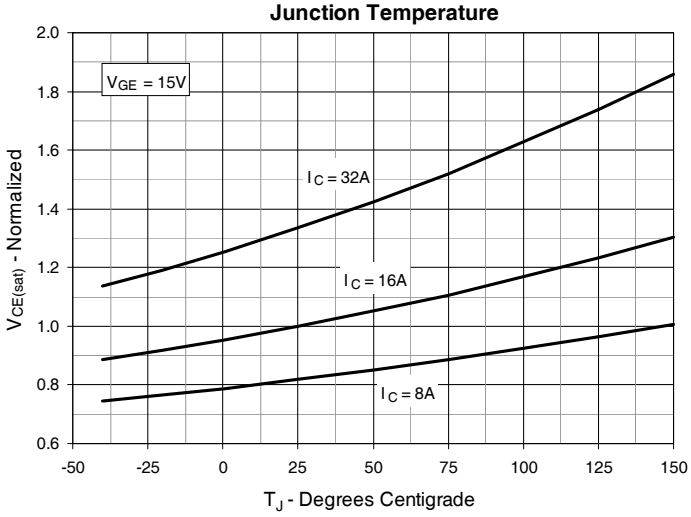



**Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage**

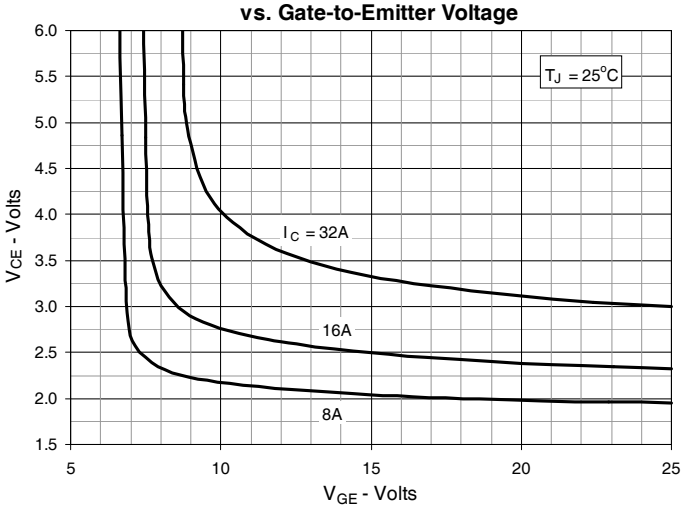
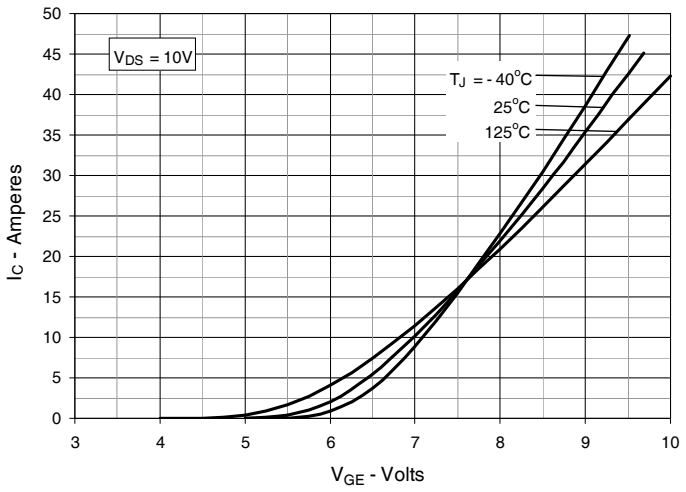



**Fig. 6. Input Admittance**




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**Fig. 7. Transconductance**

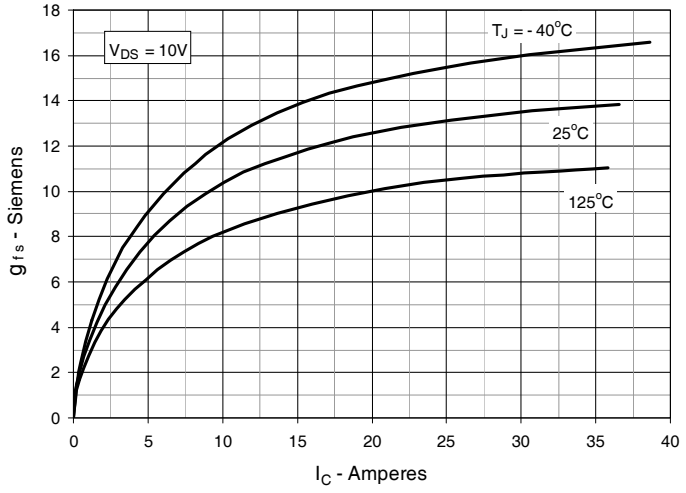



**Fig. 8. Forward Voltage Drop of Intrinsic Diode**

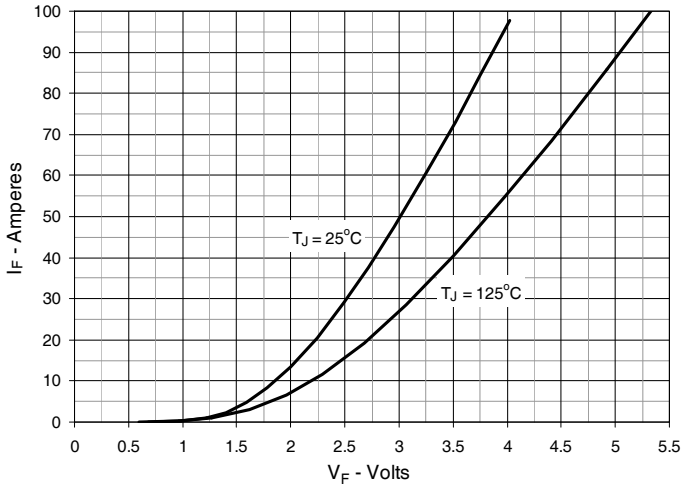



**Fig. 9. Gate Charge**

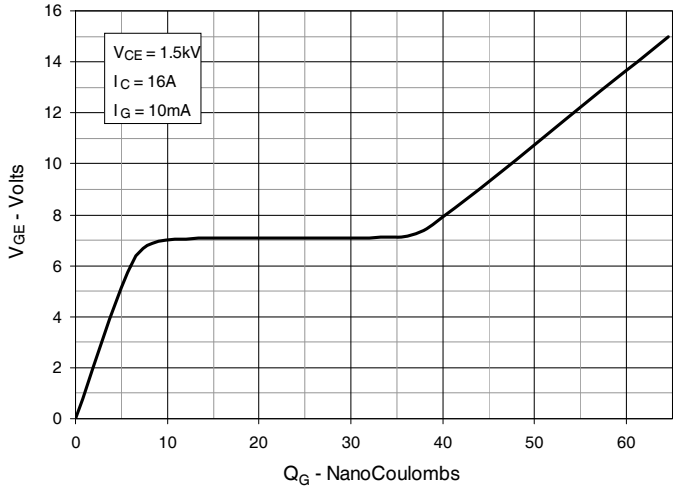



**Fig. 10. Capacitance**

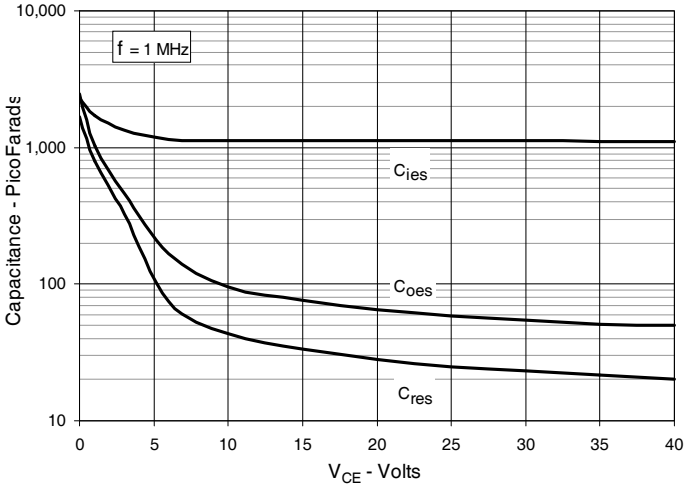



**Fig. 11. Reverse-Bias Safe Operating Area**

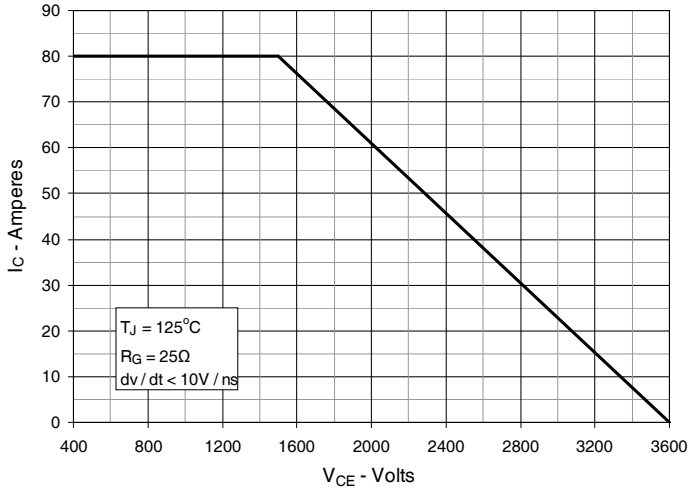
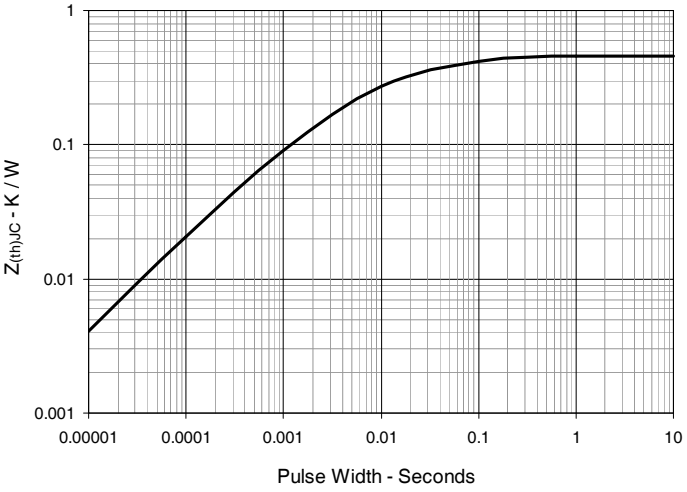



**Fig. 12. Maximum Transient Thermal Impedance**




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

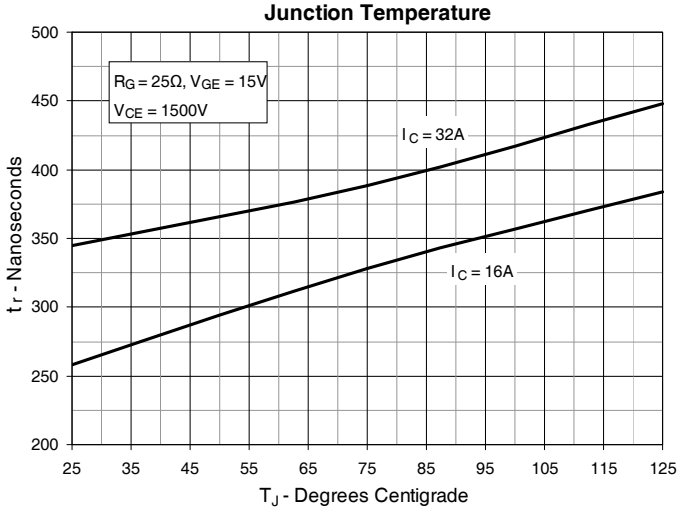



**Fig. 14. Resistive Turn-on Rise Time vs. Collector Current**

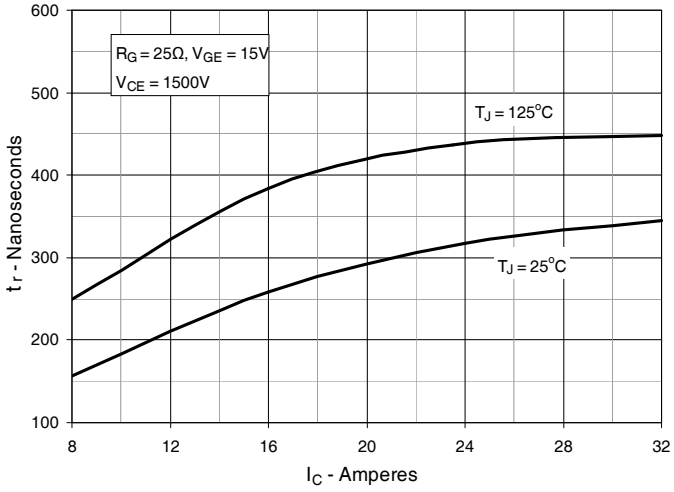



**Fig. 15. Resistive Turn-on Switching Times vs. Gate Resistance**

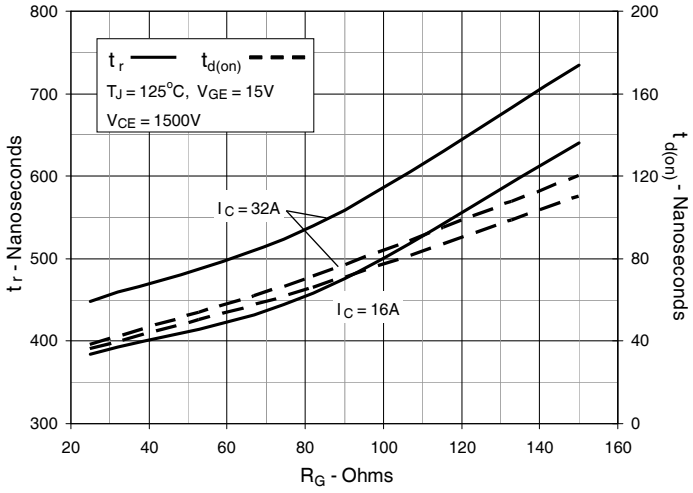



**Fig. 16. Resistive Turn-off Switching Times vs. Junction Temperature**

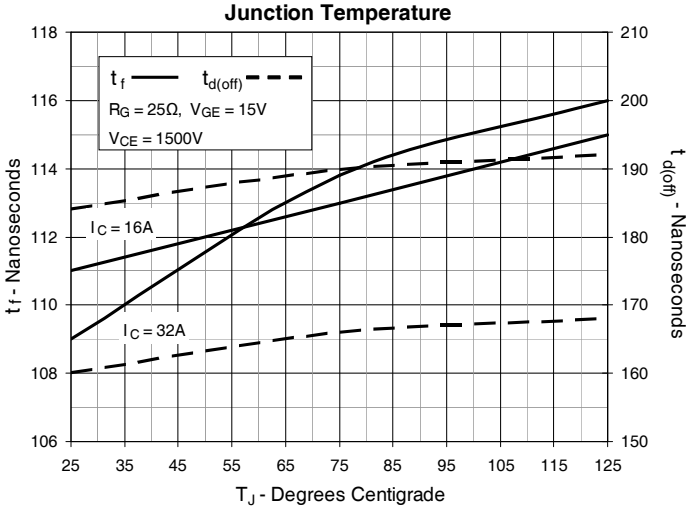



**Fig. 17. Resistive Turn-off Switching Times vs. Collector Current**

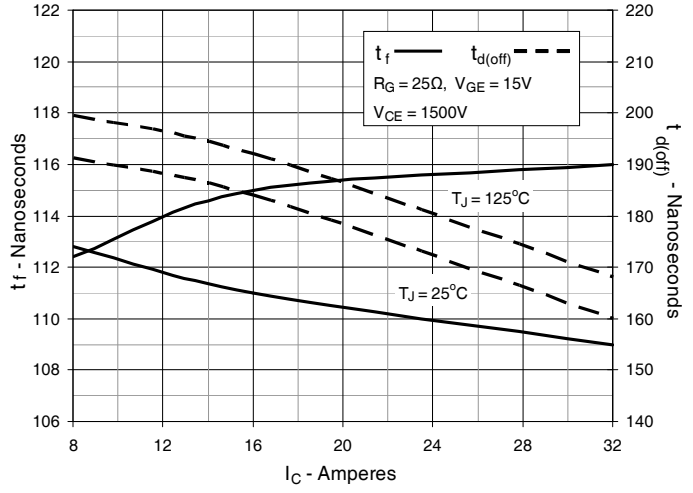
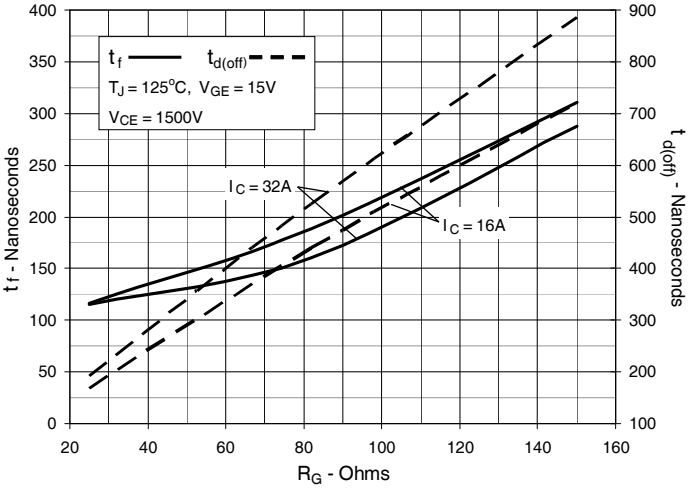



**Fig. 18. Resistive Turn-off Switching Times vs. Gate Resistance**




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**Fig. 19. Forward-Bias Safe Operating Area @ $T_C$ = 25°C**

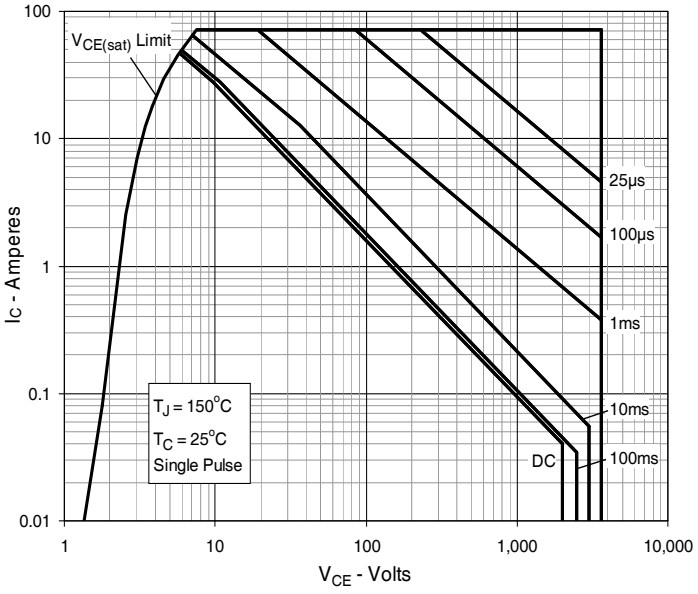
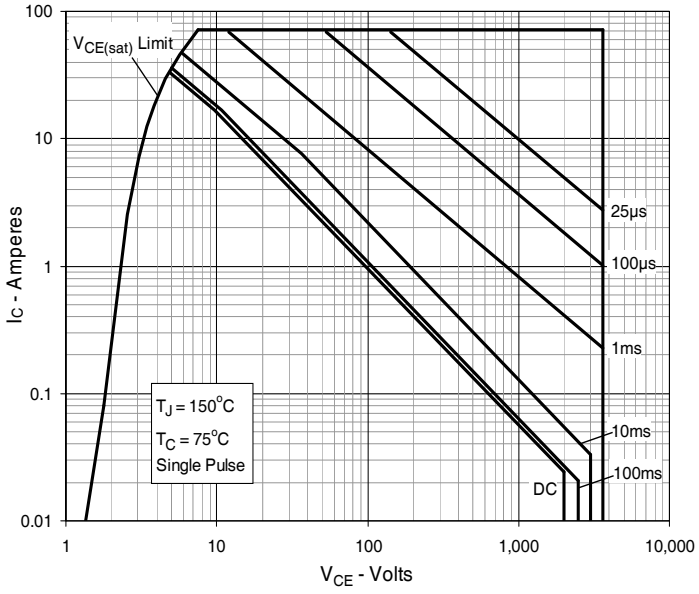



**Fig. 20. Forward-Bias Safe Operating Area @ $T_C$ = 75°C**






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