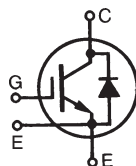


# 1200V XPT™ IGBT GenX3™ w/ Diode

## IXYN100N120C3H1

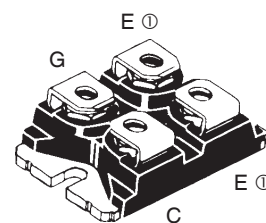
High-Speed IGBT  
for 20-50 kHz Switching



$$\begin{aligned} V_{CES} &= 1200V \\ I_{C110} &= 62A \\ V_{CE(sat)} &\leq 3.5V \\ t_{fi(typ)} &= 110ns \end{aligned}$$

| Symbol                        | Test Conditions                                                                           | Maximum Ratings                           |                          |
|-------------------------------|-------------------------------------------------------------------------------------------|-------------------------------------------|--------------------------|
| $V_{CES}$                     | $T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$                                           | 1200                                      | V                        |
| $V_{CGR}$                     | $T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$ , $R_{GE} = 1M\Omega$                     | 1200                                      | V                        |
| $V_{GES}$                     | Continuous                                                                                | $\pm 20$                                  | V                        |
| $V_{GEM}$                     | Transient                                                                                 | $\pm 30$                                  | V                        |
| $I_{C25}$                     | $T_C = 25^\circ\text{C}$ (Chip Capability)                                                | 134                                       | A                        |
| $I_{C110}$                    | $T_C = 110^\circ\text{C}$                                                                 | 62                                        | A                        |
| $I_{F110}$                    | $T_C = 110^\circ\text{C}$                                                                 | 42                                        | A                        |
| $I_{CM}$                      | $T_C = 25^\circ\text{C}$ , 1ms                                                            | 440                                       | A                        |
| $I_A$                         | $T_C = 25^\circ\text{C}$                                                                  | 50                                        | A                        |
| $E_{AS}$                      | $T_C = 25^\circ\text{C}$                                                                  | 1.2                                       | J                        |
| <b>SSOA</b><br><b>(RBSOA)</b> | $V_{GE} = 15V$ , $T_{VJ} = 125^\circ\text{C}$ , $R_G = 1\Omega$<br>Clamped Inductive Load | $I_{CM} = 200$<br>$@ V_{CE} \leq V_{CES}$ | A                        |
| $P_C$                         | $T_C = 25^\circ\text{C}$                                                                  | 690                                       | W                        |
| $T_J$                         |                                                                                           | -55 ... +150                              | $^\circ\text{C}$         |
| $T_{JM}$                      |                                                                                           | 150                                       | $^\circ\text{C}$         |
| $T_{stg}$                     |                                                                                           | -55 ... +150                              | $^\circ\text{C}$         |
| $V_{ISOL}$                    | 50/60Hz<br>$I_{ISOL} \leq 1mA$                                                            | $t = 1min$<br>$t = 1s$                    | 2500<br>3000<br>V~<br>V~ |
| $M_d$                         | Mounting Torque<br>Terminal Connection Torque                                             | 1.5/13<br>1.3/11.5                        | Nm/lb.in.<br>Nm/lb.in.   |
| <b>Weight</b>                 |                                                                                           | 30                                        | g                        |

SOT-227B, miniBLOC  
E153432



G = Gate, C = Collector, E = Emitter  
① either emitter terminal can be used as  
Main or Kelvin Emitter

### Features

- Optimized for Low Switching Losses
- Square RBSOA
- Isolation Voltage 2500V~
- Anti-Parallel Ultra Fast Diode
- Positive Thermal Coefficient of  $V_{ce(sat)}$
- Avalanche Rated
- High Current Handling Capability
- International Standard Package

### Advantages

- High Power Density
- Low Gate Drive Requirement

### Applications

- High Frequency Power Inverters
- UPS
- Motor Drives
- SMPS
- PFC Circuits
- Battery Chargers
- Welding Machines
- Lamp Ballasts

| Symbol        | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified) | Characteristic Values |      |                    |
|---------------|-----------------------------------------------------------------------------|-----------------------|------|--------------------|
|               |                                                                             | Min.                  | Typ. | Max.               |
| $BV_{CES}$    | $I_C = 250\mu A$ , $V_{GE} = 0V$                                            | 1200                  |      | V                  |
| $V_{GE(th)}$  | $I_C = 250\mu A$ , $V_{CE} = V_{GE}$                                        | 3.0                   |      | 5.0 V              |
| $I_{CES}$     | $V_{CE} = V_{CES}$ , $V_{GE} = 0V$<br>$T_J = 125^\circ\text{C}$             |                       |      | 50 $\mu A$<br>3 mA |
| $I_{GES}$     | $V_{CE} = 0V$ , $V_{GE} = \pm 20V$                                          |                       |      | $\pm 100$ nA       |
| $V_{CE(sat)}$ | $I_C = 100A$ , $V_{GE} = 15V$ , Note 1<br>$T_J = 125^\circ\text{C}$         | 2.9<br>3.9            |      | 3.5 V<br>V         |

## Symbol Test Conditions

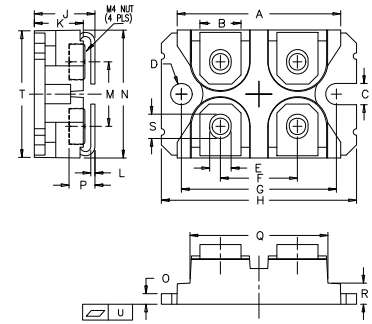
(T<sub>J</sub> = 25°C Unless Otherwise Specified)

## Characteristic Values

Min. Typ. Max.

|                           |                                                                                                                                                                    |      |       |      |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-------|------|
| <b>g<sub>fs</sub></b>     | I <sub>C</sub> = 60A, V <sub>CE</sub> = 10V, Note 1                                                                                                                | 30   | 52    | S    |
| <b>C<sub>ies</sub></b>    | V <sub>CE</sub> = 25V, V <sub>GE</sub> = 0V, f = 1MHz                                                                                                              |      | 6000  | pF   |
| <b>C<sub>oes</sub></b>    |                                                                                                                                                                    |      | 353   | pF   |
| <b>C<sub>res</sub></b>    |                                                                                                                                                                    |      | 130   | pF   |
| <b>Q<sub>g(on)</sub></b>  | I <sub>C</sub> = 100A, V <sub>GE</sub> = 15V, V <sub>CE</sub> = 0.5 • V <sub>CES</sub>                                                                             |      | 270   | nC   |
| <b>Q<sub>ge</sub></b>     |                                                                                                                                                                    |      | 50    | nC   |
| <b>Q<sub>gc</sub></b>     |                                                                                                                                                                    |      | 93    | nC   |
| <b>t<sub>d(on)</sub></b>  | Inductive load, T <sub>J</sub> = 25°C<br>I <sub>C</sub> = 100A, V <sub>GE</sub> = 15V<br>V <sub>CE</sub> = 0.5 • V <sub>CES</sub> , R <sub>G</sub> = 1Ω<br>Note 2  |      | 32    | ns   |
| <b>t<sub>ri</sub></b>     |                                                                                                                                                                    |      | 90    | ns   |
| <b>E<sub>on</sub></b>     |                                                                                                                                                                    |      | 6.50  | mJ   |
| <b>t<sub>d(off)</sub></b> |                                                                                                                                                                    |      | 123   | ns   |
| <b>t<sub>fi</sub></b>     |                                                                                                                                                                    |      | 110   | ns   |
| <b>E<sub>off</sub></b>    |                                                                                                                                                                    |      | 2.90  | mJ   |
| <b>t<sub>d(on)</sub></b>  | Inductive load, T <sub>J</sub> = 125°C<br>I <sub>C</sub> = 100A, V <sub>GE</sub> = 15V<br>V <sub>CE</sub> = 0.5 • V <sub>CES</sub> , R <sub>G</sub> = 1Ω<br>Note 2 |      | 32    | ns   |
| <b>t<sub>ri</sub></b>     |                                                                                                                                                                    |      | 90    | ns   |
| <b>E<sub>on</sub></b>     |                                                                                                                                                                    |      | 10.10 | mJ   |
| <b>t<sub>d(off)</sub></b> |                                                                                                                                                                    |      | 140   | ns   |
| <b>t<sub>fi</sub></b>     |                                                                                                                                                                    |      | 125   | ns   |
| <b>E<sub>off</sub></b>    |                                                                                                                                                                    |      | 3.55  | mJ   |
| <b>R<sub>thJC</sub></b>   |                                                                                                                                                                    |      | 0.18  | °C/W |
| <b>R<sub>thCS</sub></b>   |                                                                                                                                                                    | 0.05 |       | °C/W |

## SOT-227B miniBLOC (IXYN)



| SYM | INCHES |       | MILLIMETERS |       |
|-----|--------|-------|-------------|-------|
|     | MIN    | MAX   | MIN         | MAX   |
| A   | 1.240  | 1.255 | 31.50       | 31.88 |
| B   | .307   | .323  | 7.80        | 8.20  |
| C   | .161   | .169  | 4.09        | 4.29  |
| D   | .161   | .169  | 4.09        | 4.29  |
| E   | .161   | .169  | 4.09        | 4.29  |
| F   | .587   | .595  | 14.91       | 15.11 |
| G   | 1.186  | 1.193 | 30.12       | 30.30 |
| H   | 1.496  | 1.505 | 38.00       | 38.23 |
| J   | .460   | .481  | 11.68       | 12.22 |
| K   | .351   | .378  | 8.92        | 9.60  |
| L   | .030   | .033  | 0.76        | 0.84  |
| M   | .496   | .506  | 12.60       | 12.85 |
| N   | .990   | 1.001 | 25.15       | 25.42 |
| O   | .078   | .084  | 1.98        | 2.13  |
| P   | .195   | .235  | 4.95        | 5.97  |
| Q   | 1.045  | 1.059 | 26.54       | 26.90 |
| R   | .155   | .174  | 3.94        | 4.42  |
| S   | .186   | .191  | 4.72        | 4.85  |
| T   | .968   | .987  | 24.59       | 25.07 |
| U   | -.002  | .004  | -0.05       | 0.1   |

## Reverse Diode (FRED)

## 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> = 60A, V <sub>GE</sub> = 0V, Note 1<br>T <sub>J</sub> = 125°C                                                   | 1.9 | 2.7  | V    |
| <b>I<sub>RM</sub></b>   | I <sub>F</sub> = 60A, V <sub>GE</sub> = 0V,<br>-di <sub>F</sub> /dt = 700A/μs, V <sub>R</sub> = 600V<br>T <sub>J</sub> = 125°C | 41  |      | A    |
| <b>t<sub>rr</sub></b>   |                                                                                                                                | 420 |      | ns   |
| <b>R<sub>thJC</sub></b> |                                                                                                                                |     | 0.42 | °C/W |

## Notes:

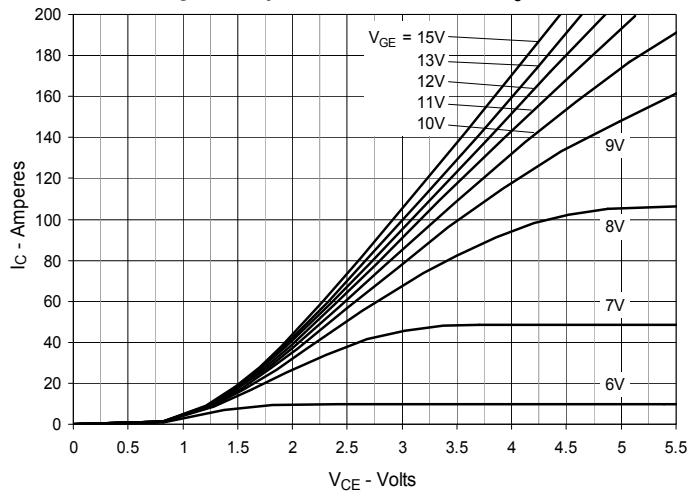
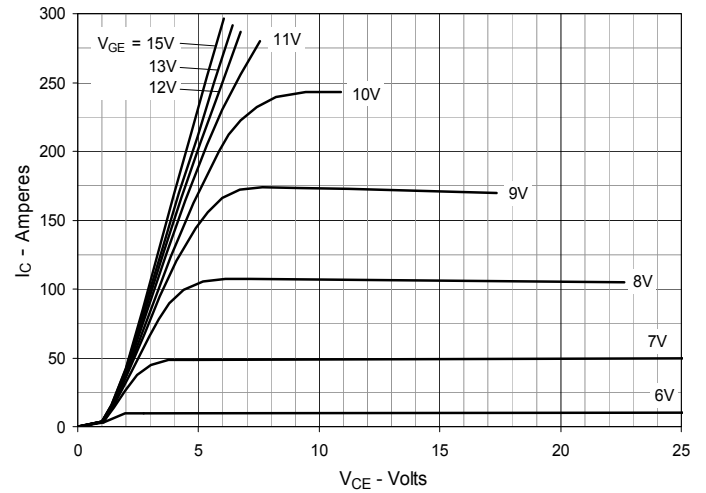
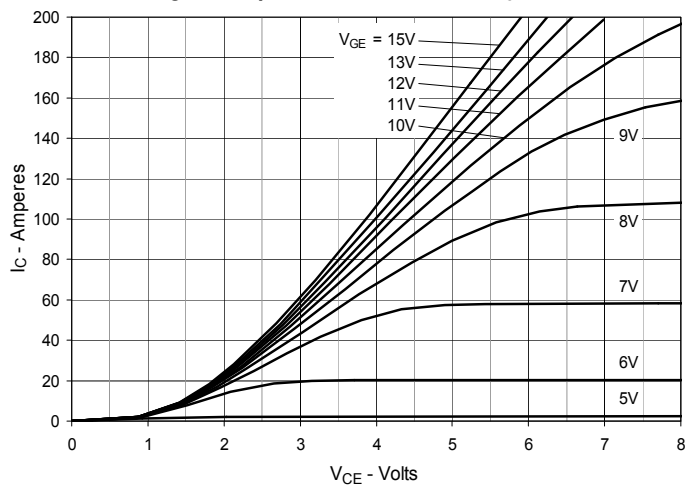
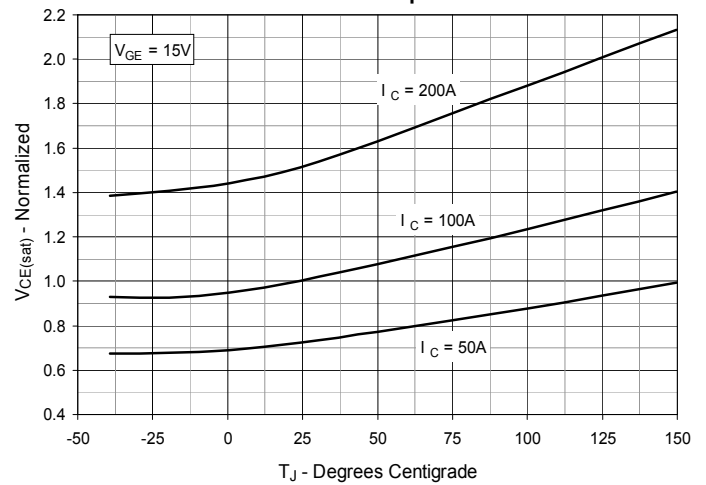
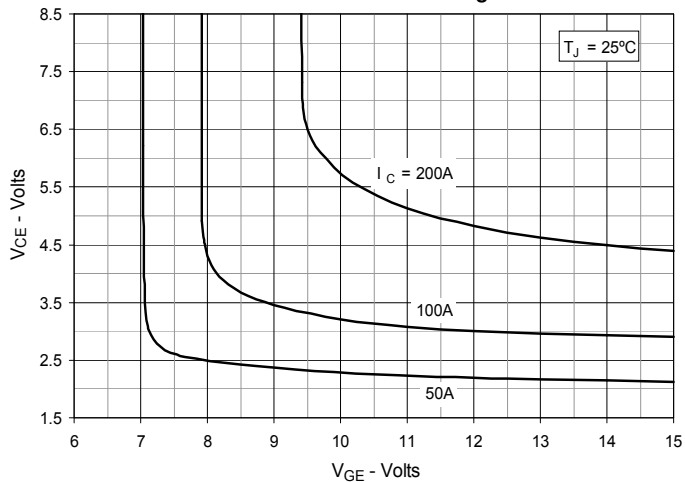
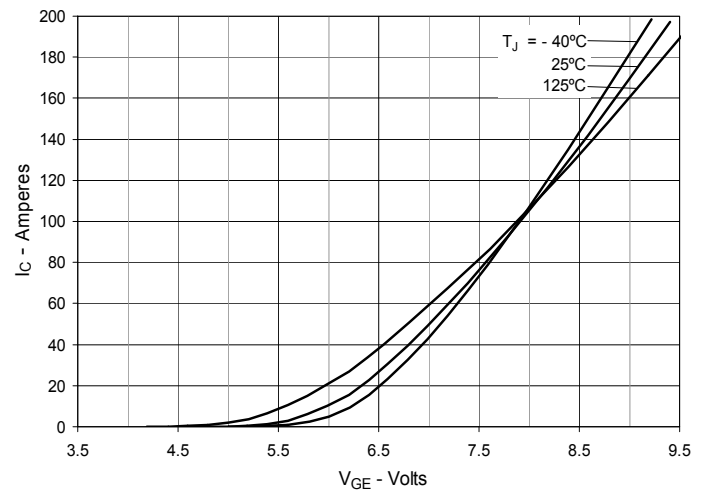
1. Pulse test, t ≤ 300μs, duty cycle, d ≤ 2%.
2. Switching times & energy losses may increase for higher V<sub>CE</sub>(clamp), T<sub>J</sub> or R<sub>G</sub>.

**PRELIMINARY TECHNICAL INFORMATION**

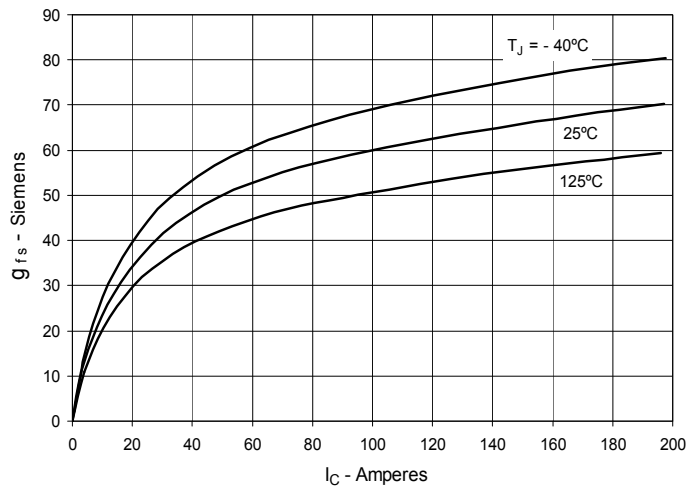
The product presented herein is under development. The Technical Specifications offered are derived from a subjective evaluation of the design, based upon prior knowledge and experience, and constitute a "considered reflection" of the anticipated result. IXYS reserves the right to change limits, test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

## IXYS Reserves the Right to Change Limits, Test Conditions, and Dimensions.

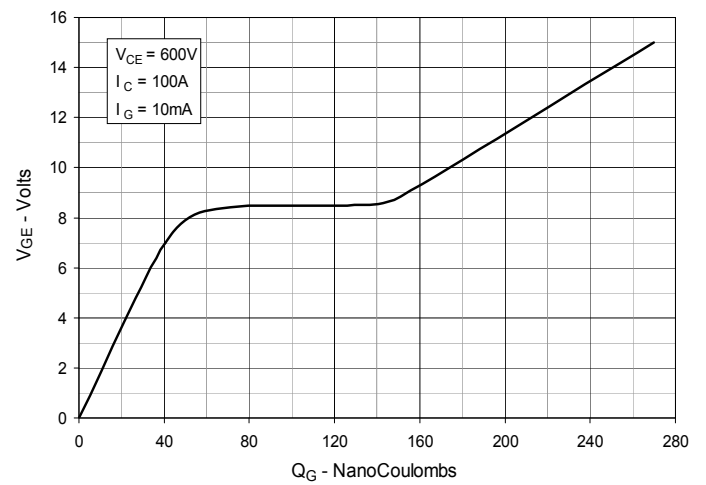
|                                                                                  |           |           |           |           |              |              |              |              |              |             |
|----------------------------------------------------------------------------------|-----------|-----------|-----------|-----------|--------------|--------------|--------------|--------------|--------------|-------------|
| 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    | 6,404,065 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**


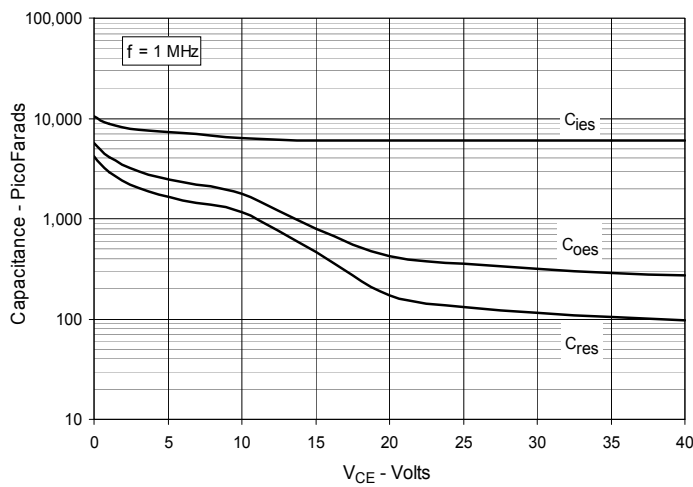
**Fig. 7. Transconductance**



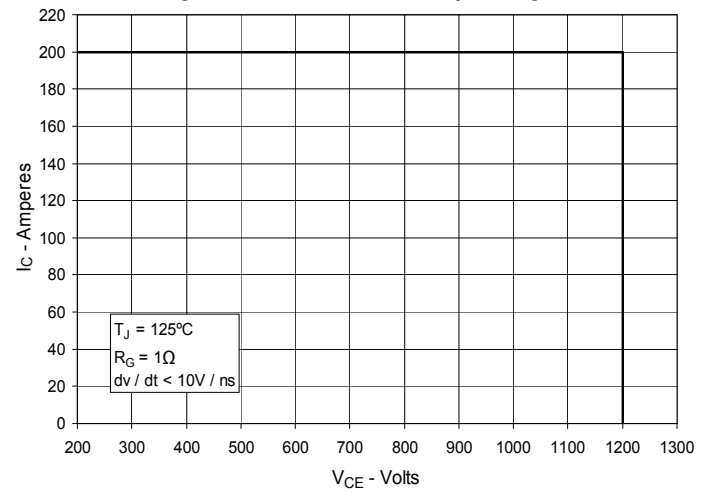
**Fig. 8. Gate Charge**



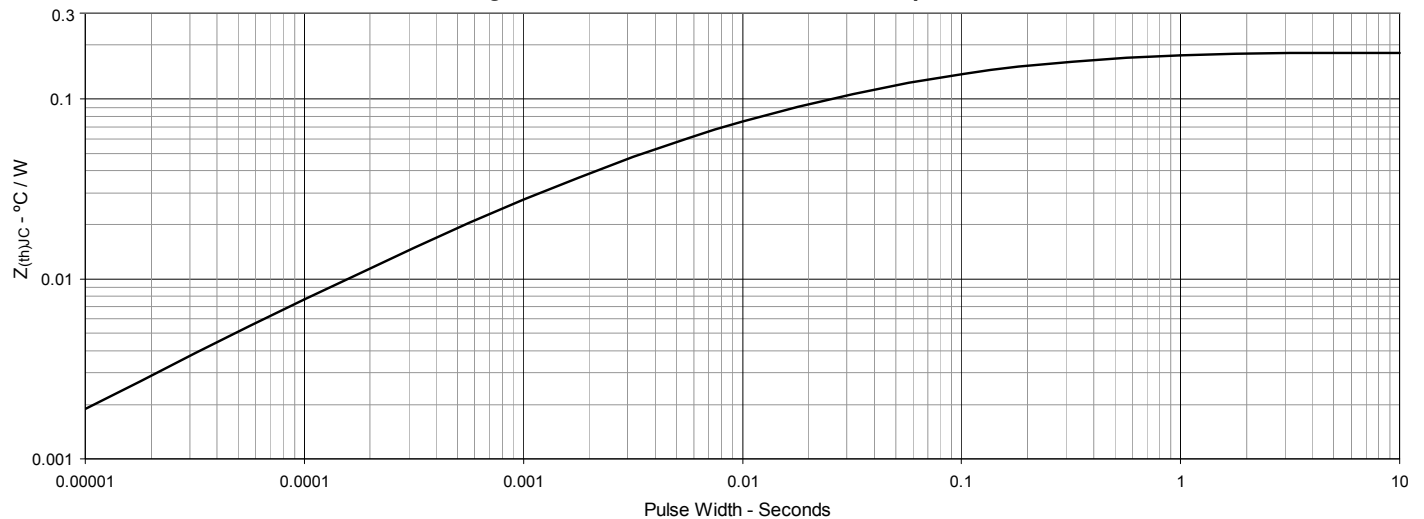
**Fig. 9. Capacitance**



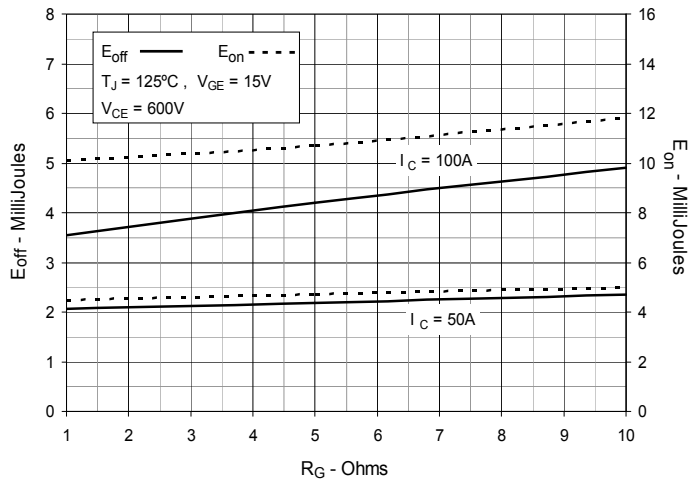
**Fig. 10. Reverse-Bias Safe Operating Area**



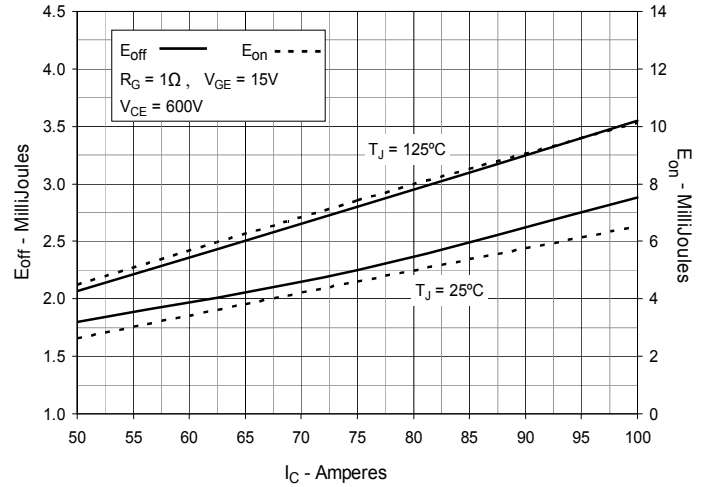
**Fig. 11. Maximum Transient Thermal Impedance**



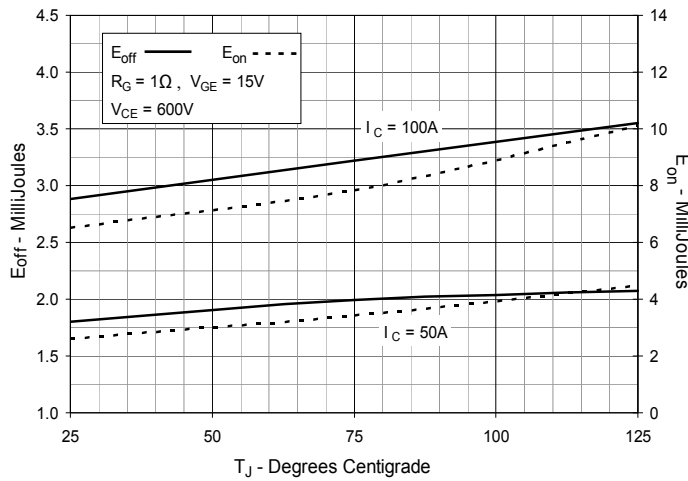
**Fig. 12. Inductive Switching Energy Loss vs. Gate Resistance**



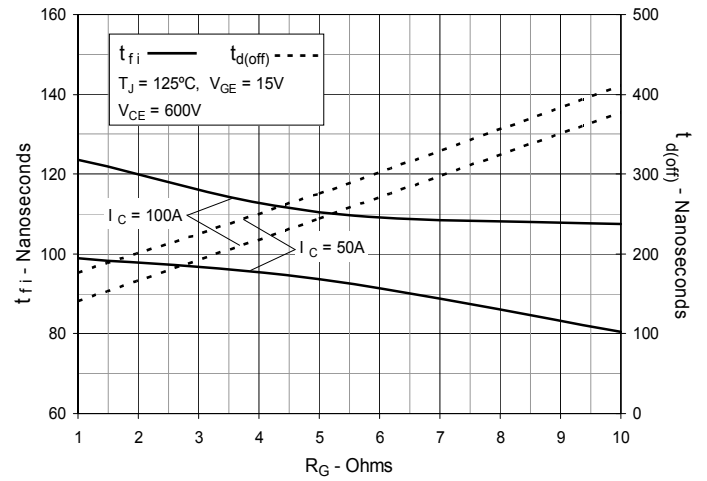
**Fig. 13. Inductive Switching Energy Loss vs. Collector Current**



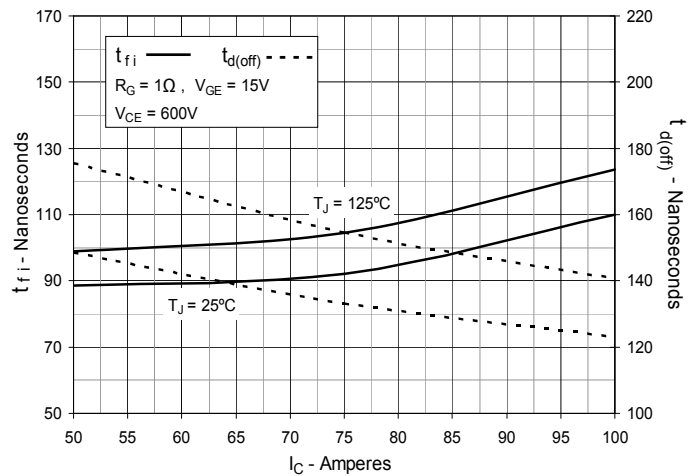
**Fig. 14. Inductive Switching Energy Loss vs. Junction Temperature**



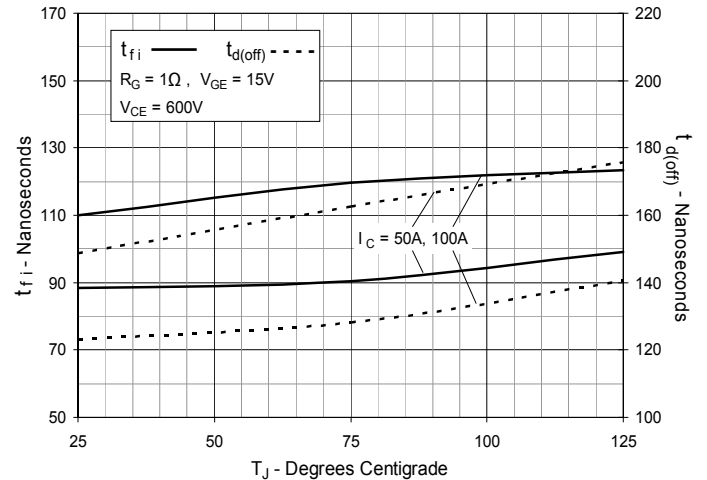
**Fig. 15. Inductive Turn-off Switching Times vs. Gate Resistance**



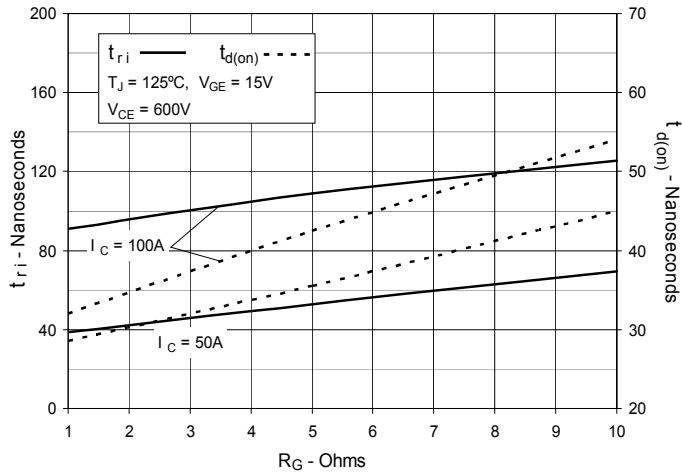
**Fig. 16. Inductive Turn-off Switching Times vs. Collector Current**



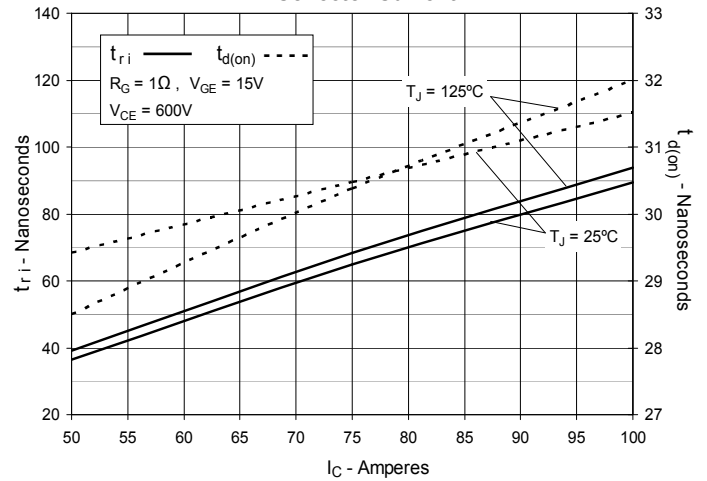
**Fig. 17. Inductive Turn-off Switching Times vs. Junction Temperature**



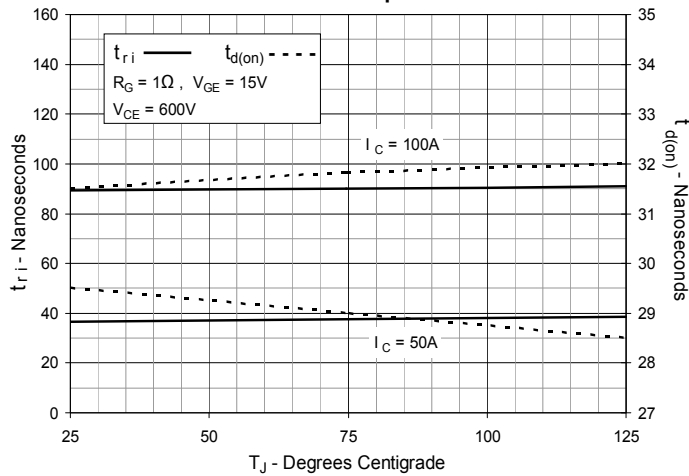
**Fig. 18. Inductive Turn-on Switching Times vs. Gate Resistance**



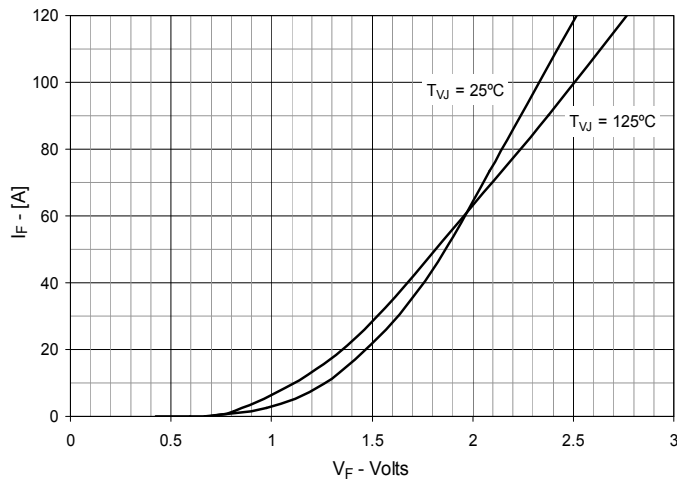
**Fig. 19. Inductive Turn-on Switching Times vs. Collector Current**



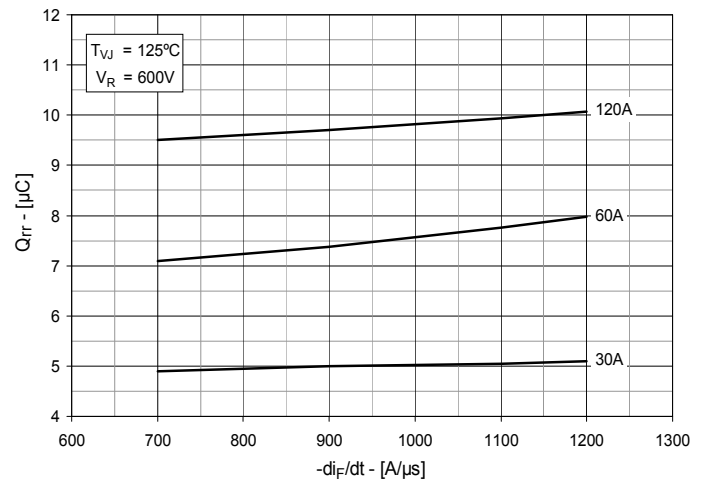
**Fig. 20. Inductive Turn-on Switching Times vs. Junction Temperature**



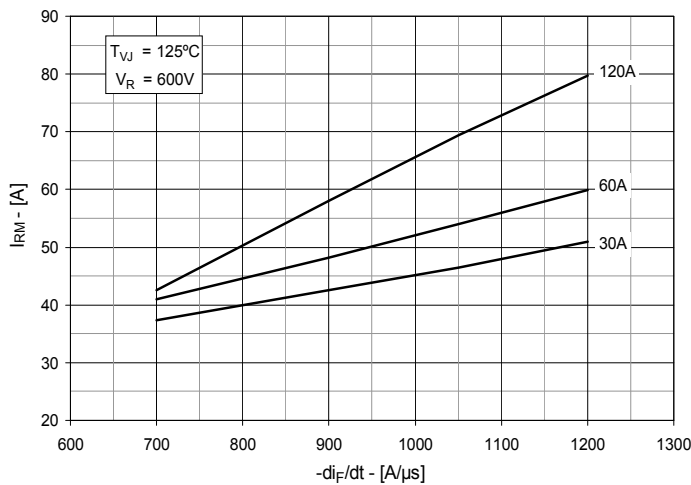
**Fig. 21. Typ. Forward Characteristics**



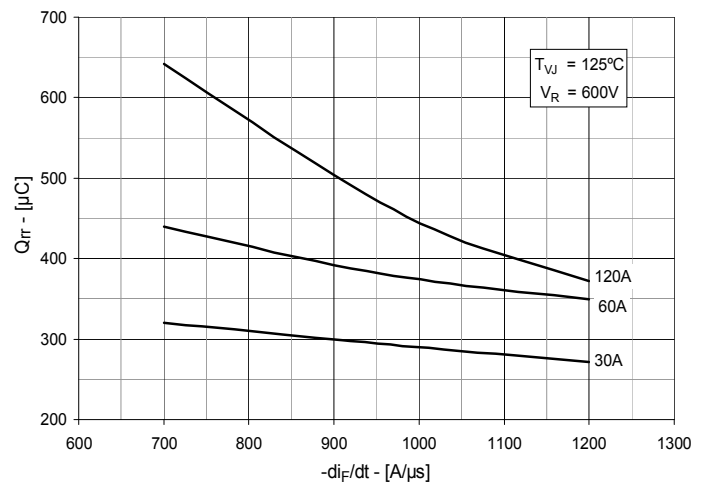
**Fig. 22. Typ. Reverse Recovery Charge  $Q_{rr}$  vs.  $-di_F/dt$**



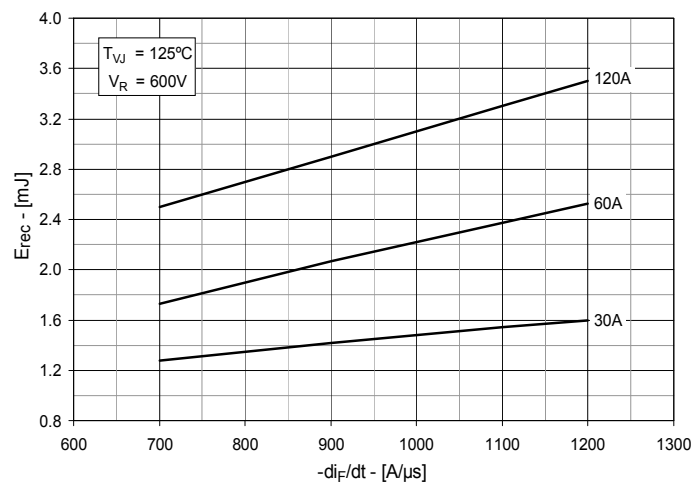
**Fig. 23. Typ. Peak Reverse Current  $I_{RM}$  vs.  $-di_F/dt$**



**Fig. 24. Typ. Recovery Time  $t_{rr}$  vs.  $-di_F/dt$**



**Fig. 25. Typ. Recovery Energy  $E_{rec}$  vs.  $-di_F/dt$**



**Fig. 26. Maximum Transient Thermal Impedance**

