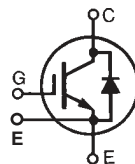


XPT™ 600V IGBT GenX3™ w/ Sonic Diode

IXXN200N60C3H1



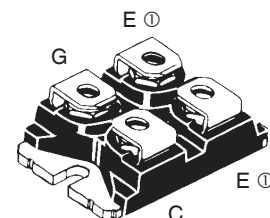
$$\begin{aligned} V_{CES} &= 600V \\ I_{C110} &= 98A \\ V_{CE(sat)} &\leq 2.1V \\ t_{fi(typ)} &= 80ns \end{aligned}$$

Extreme Light Punch Through
IGBT for 20-60kHz Switching

SOT-227B

E153432

| Symbol | Test Conditions | Maximum Ratings | |
|-------------------------------|---|---|--------------------------|
| V_{CES} | $T_J = 25^\circ\text{C}$ to 150°C | 600 | V |
| V_{CGR} | $T_J = 25^\circ\text{C}$ to 150°C , $R_{GE} = 1M\Omega$ | 600 | V |
| V_{GES} | Continuous | ± 20 | V |
| V_{GEM} | Transient | ± 30 | V |
| I_{C25} | $T_C = 25^\circ\text{C}$ (Chip Capability) | 200 | A |
| I_{C110} | $T_C = 110^\circ\text{C}$ | 98 | A |
| I_{F110} | $T_C = 110^\circ\text{C}$ | 30 | A |
| I_{CM} | $T_C = 25^\circ\text{C}$, 1ms | 1000 | A |
| I_A | $T_C = 25^\circ\text{C}$ | 100 | A |
| E_{AS} | $T_C = 25^\circ\text{C}$ | 1 | J |
| SSOA (RBSOA) | $V_{GE} = 15V$, $T_{VJ} = 150^\circ\text{C}$, $R_G = 1\Omega$ Clamped Inductive Load | $I_{CM} = 400$ @ $V_{CE} \leq V_{CES}$ | A |
| t_{sc} (SCSOA) | $V_{GE} = 15V$, $V_{CE} = 360V$, $T_J = 150^\circ\text{C}$ $R_G = 10\Omega$, Non Repetitive | 10 | μs |
| P_C | $T_C = 25^\circ\text{C}$ | 780 | 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 $I_{ISOL} \leq 1mA$ | $t = 1min$ $t = 1s$ | 2500 3000 V~ V~ |
| M_d | Mounting Torque Terminal Connection Torque | 1.5/13 1.3/11.5 | Nm/lb.in. Nm/lb.in. |
| Weight | | 30 | g |



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

Features

- Silicon Chip on Direct-Copper Bond (DCB) Substrate
- miniBLOC, with Aluminium Nitride Isolation
- Optimized for Low Switching Losses
- Isolated Mounting Surface
- Anti-Parallel Sonic Diode
- 2500V~ Electrical Isolation
- Optimized for 20-60kHz Switching
- Avalanche Rated
- Short Circuit Capability
- Very High Current Capability
- Square RBSOA

Advantages

- High Power Density
- Low Gate Drive Requirement

Applications

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

| Symbol | Test Conditions ($T_J = 25^\circ\text{C}$, Unless Otherwise Specified) | Characteristic Values | | |
|---------------|---|-----------------------|--------------|--------------------------|
| | | Min. | Typ. | Max. |
| BV_{CES} | $I_C = 250\mu\text{A}$, $V_{GE} = 0V$ | 600 | | V |
| $V_{GE(th)}$ | $I_C = 250\mu\text{A}$, $V_{CE} = V_{GE}$ | 3.5 | | 6.0 V |
| I_{CES} | $V_{CE} = V_{CES}$, $V_{GE} = 0V$ Note 1, $T_J = 125^\circ\text{C}$ | | | 50 μA 3 mA |
| I_{GES} | $V_{CE} = 0V$, $V_{GE} = \pm 20V$ | | | ± 200 nA |
| $V_{CE(sat)}$ | $I_C = 100A$, $V_{GE} = 15V$, Note 1 $T_J = 150^\circ\text{C}$ | | 1.60 1.93 | V V |

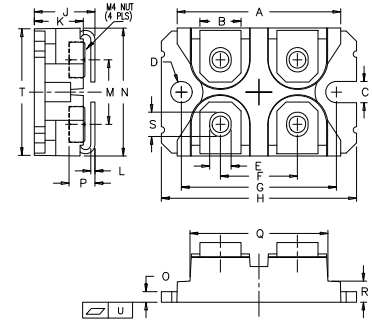
Symbol Test Conditions

($T_J = 25^\circ\text{C}$ Unless Otherwise Specified)

Characteristic Values

| | | Min. | Typ. | Max. | |
|--------------|--|------|------|------|--------------------|
| g_{fs} | $I_C = 60\text{A}, V_{CE} = 10\text{V}, \text{Note 1}$ | 20 | 35 | | S |
| C_{ies} | $V_{CE} = 25\text{V}, V_{GE} = 0\text{V}, f = 1\text{MHz}$ | | 9900 | | pF |
| C_{oes} | | | 570 | | pF |
| C_{res} | | | 185 | | pF |
| $Q_{g(on)}$ | $I_C = 200\text{A}, V_{GE} = 15\text{V}, V_{CE} = 0.5 \cdot V_{CES}$ | | 315 | | nC |
| Q_{ge} | | | 134 | | nC |
| Q_{gc} | | | 98 | | nC |
| $t_{d(on)}$ | Inductive load, $T_J = 25^\circ\text{C}$ $I_C = 100\text{A}, V_{GE} = 15\text{V}$ $V_{CE} = 360\text{V}, R_G = 1\Omega$ Note 2 | | 47 | | ns |
| t_{ri} | | | 100 | | ns |
| E_{on} | | | 3.0 | | mJ |
| $t_{d(off)}$ | | | 125 | | ns |
| t_{fi} | | | 80 | | ns |
| E_{off} | | 1.7 | | 2.6 | mJ |
| $t_{d(on)}$ | Inductive load, $T_J = 150^\circ\text{C}$ $I_C = 100\text{A}, V_{GE} = 15\text{V}$ $V_{CE} = 360\text{V}, R_G = 1\Omega$ Note 2 | | 47 | | ns |
| t_{ri} | | | 96 | | ns |
| E_{on} | | | 4.0 | | mJ |
| $t_{d(off)}$ | | | 150 | | ns |
| t_{fi} | | | 90 | | ns |
| E_{off} | | 2.1 | | mJ | |
| R_{thJC} | | | | 0.16 | $^\circ\text{C/W}$ |
| R_{thCS} | | 0.05 | | | $^\circ\text{C/W}$ |

SOT-227B miniBLOC (IXXN)



| 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 Sonic Diode (FRD)

Symbol Test Conditions

($T_J = 25^\circ\text{C}$ Unless Otherwise Specified)

Characteristic Values

| | | Min. | Typ. | Max. | |
|------------|--|------|------|------|--------------------|
| V_F | $I_F = 100\text{A}, V_{GE} = 0\text{V}, \text{Note 1}$ | | | 2.5 | V |
| | $T_J = 150^\circ\text{C}$ | | 2.3 | | V |
| I_{RM} | $I_F = 100\text{A}, V_{GE} = 0\text{V},$ $-di_F/dt = 1500\text{A}/\mu\text{s}, V_R = 300\text{V}$ | | 95 | | A |
| t_{rr} | | | 100 | | ns |
| R_{thJC} | | | | 0.70 | $^\circ\text{C/W}$ |

Notes:

1. Pulse test, $t \leq 300\mu\text{s}$, duty cycle, $d \leq 2\%$.
2. Switching times & energy losses may increase for higher $V_{CE}(\text{Clamp})$, T_J or R_G .

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 7,157,338 B2
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 @ $T_J = 25^\circ\text{C}$

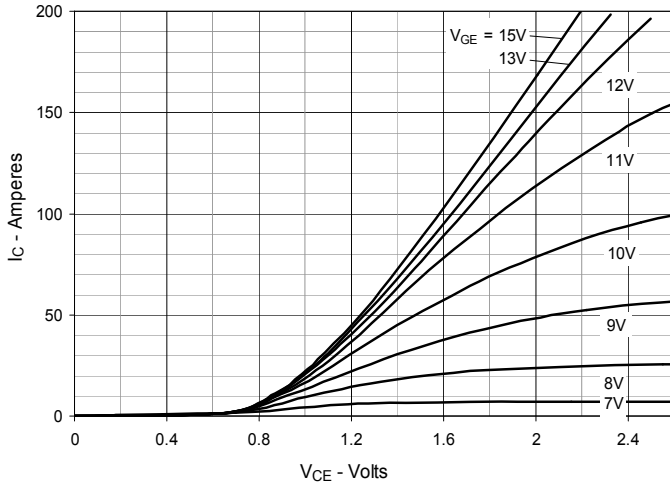


Fig. 2. Extended Output Characteristics @ $T_J = 25^\circ\text{C}$

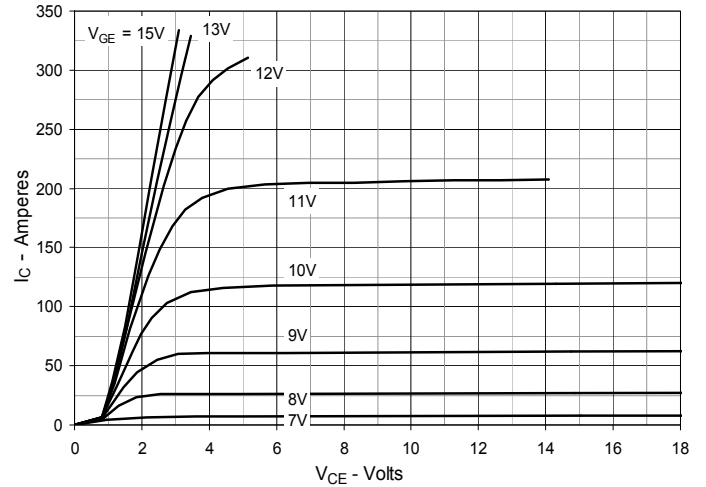


Fig. 3. Output Characteristics @ $T_J = 150^\circ\text{C}$

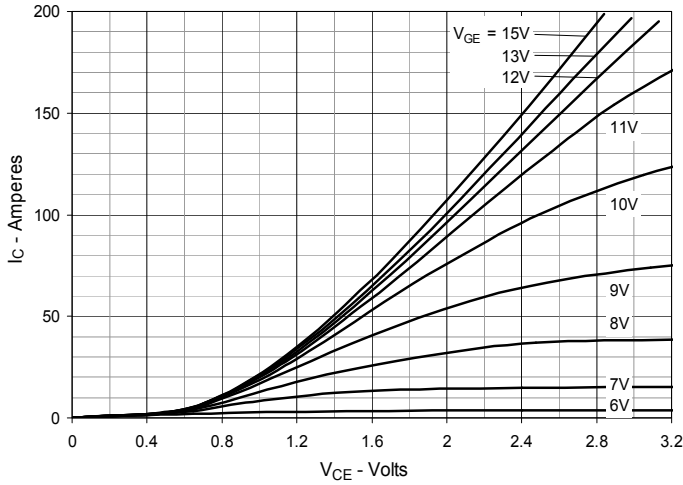


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

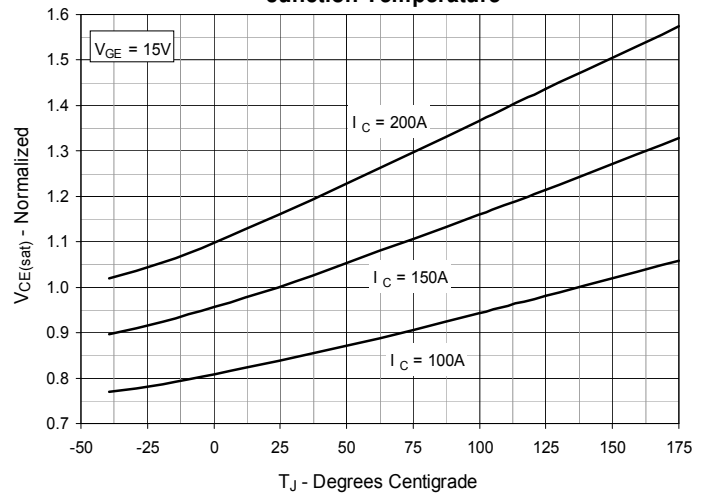


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

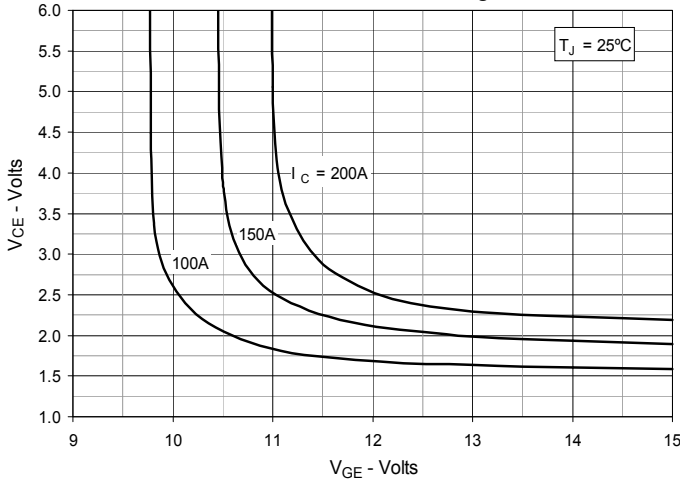


Fig. 6. Input Admittance

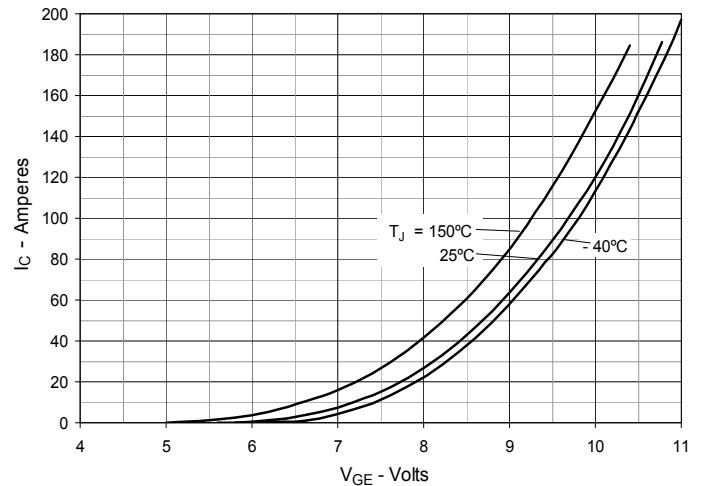


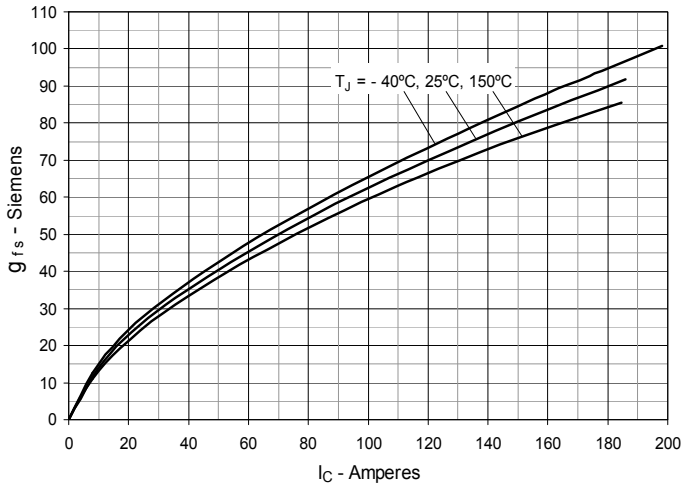
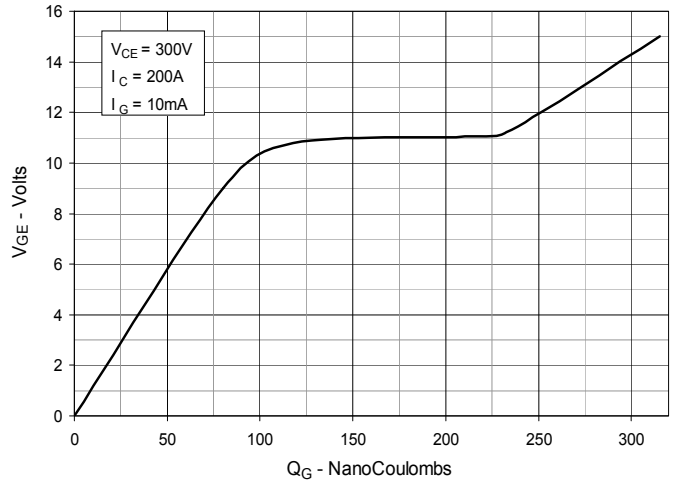
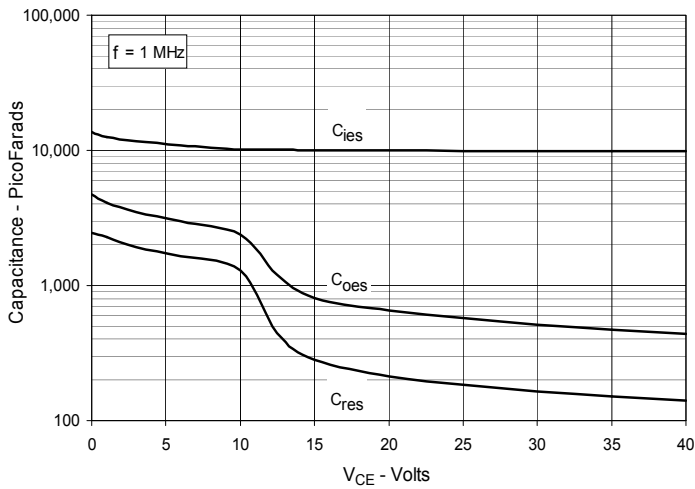
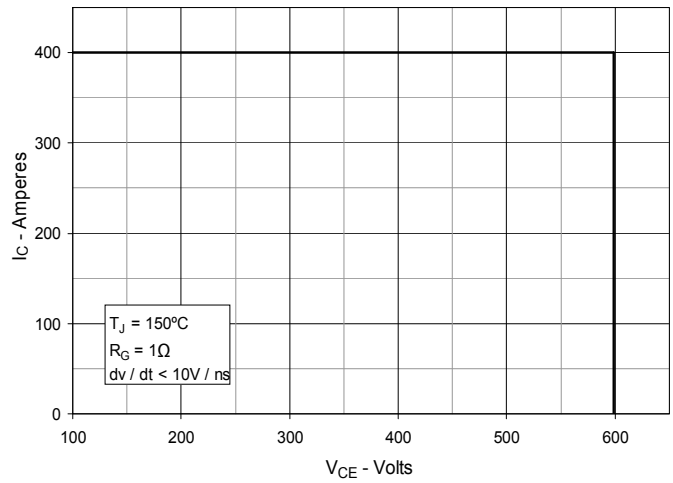
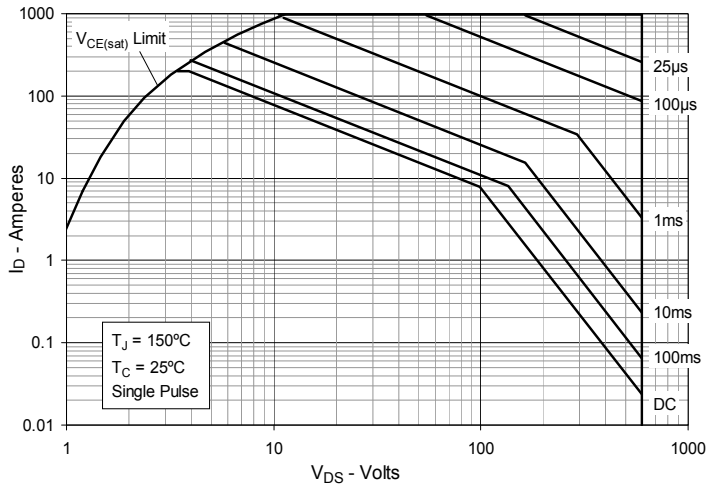
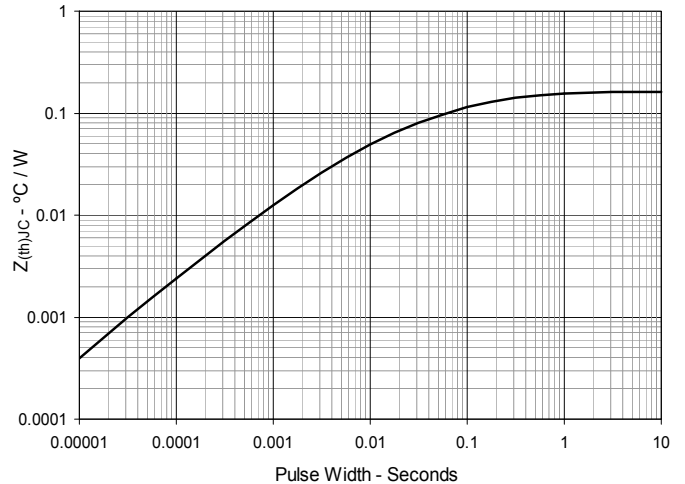
Fig. 7. Transconductance

Fig. 8. Gate Charge

Fig. 9. Capacitance

Fig. 10. Reverse-Bias Safe Operating Area

Fig. 11. Forward-Bias Safe Operating Area

Fig. 12. Maximum Transient Thermal Impedance


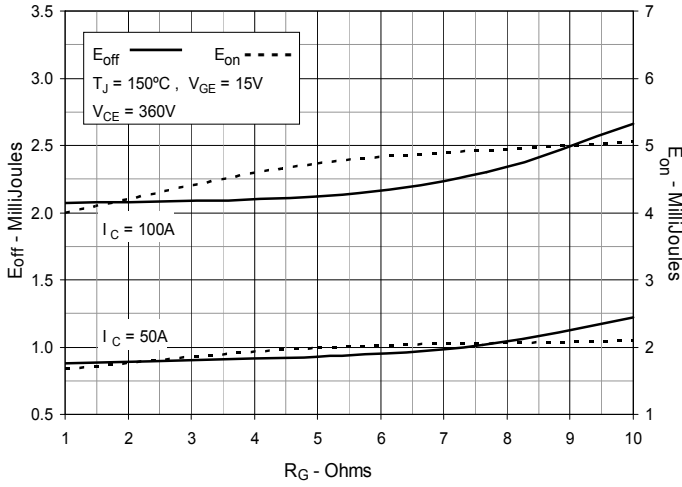
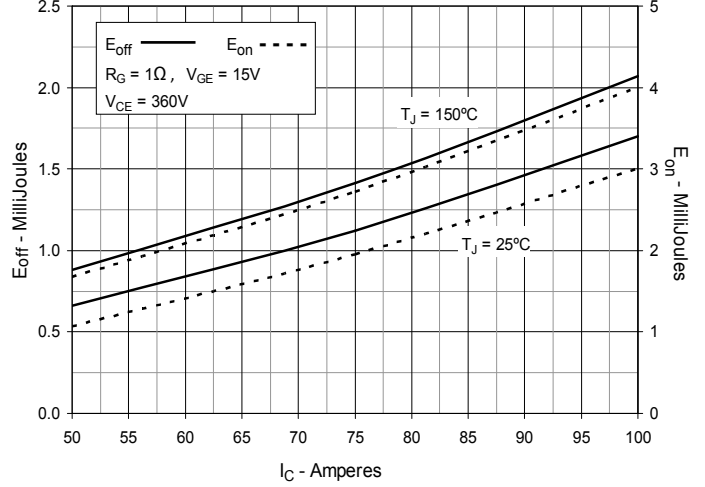
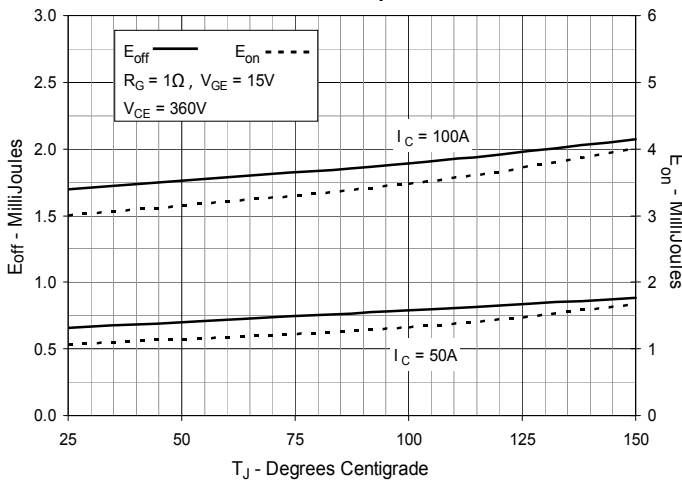
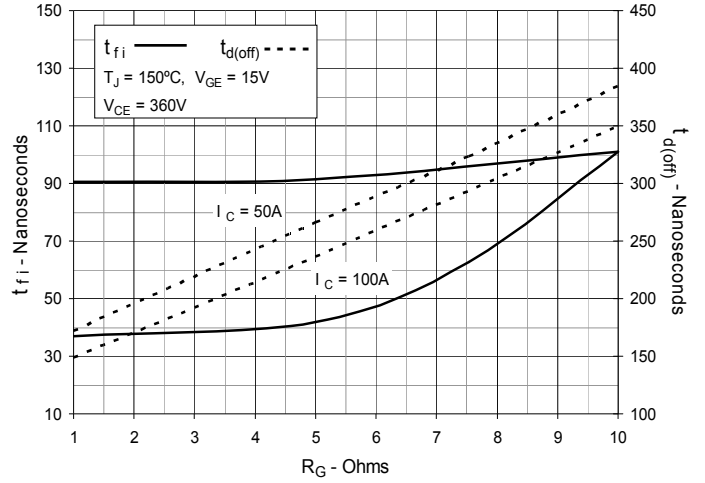
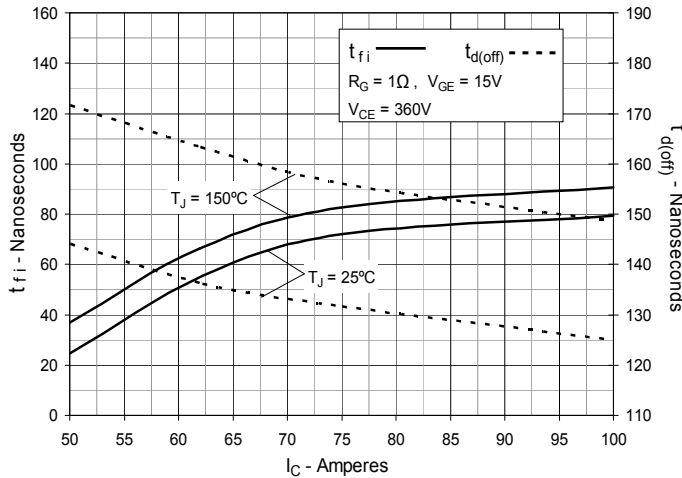
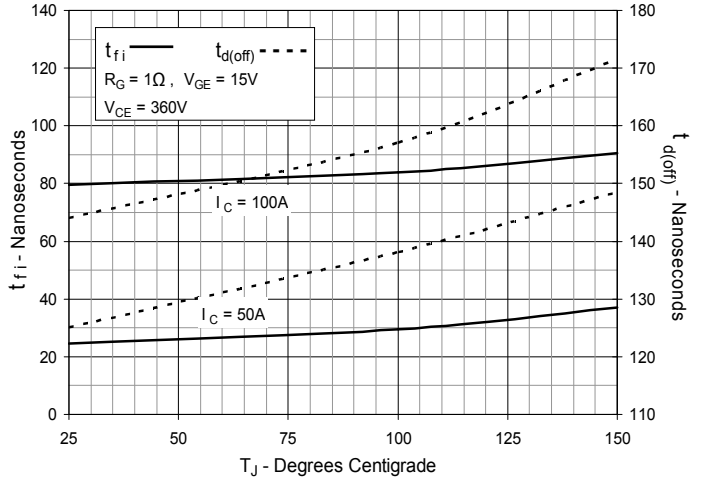
Fig. 13. Inductive Switching Energy Loss vs. Gate Resistance

Fig. 14. Inductive Switching Energy Loss vs. Collector Current

Fig. 15. Inductive Switching Energy Loss vs. Junction Temperature

Fig. 16. Inductive Turn-off Switching Times vs. Gate Resistance

Fig. 17. Inductive Turn-off Switching Times vs. Collector Current

Fig. 18. Inductive Turn-off Switching Times vs. Junction Temperature


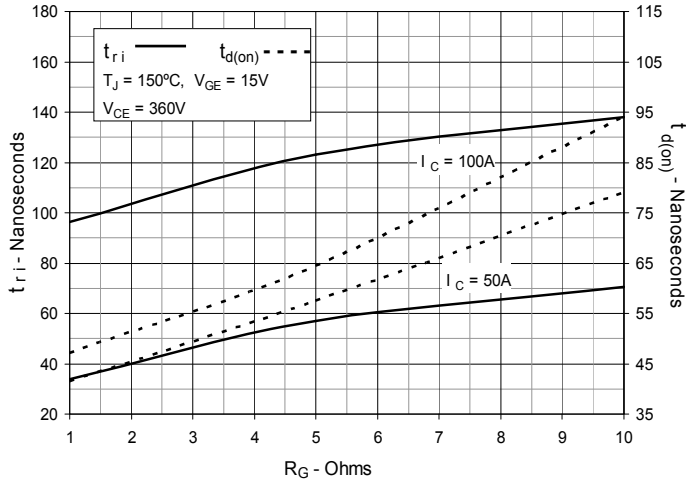
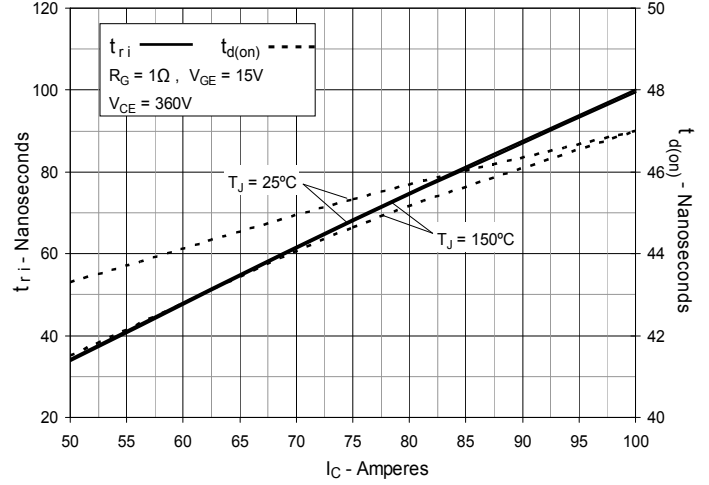
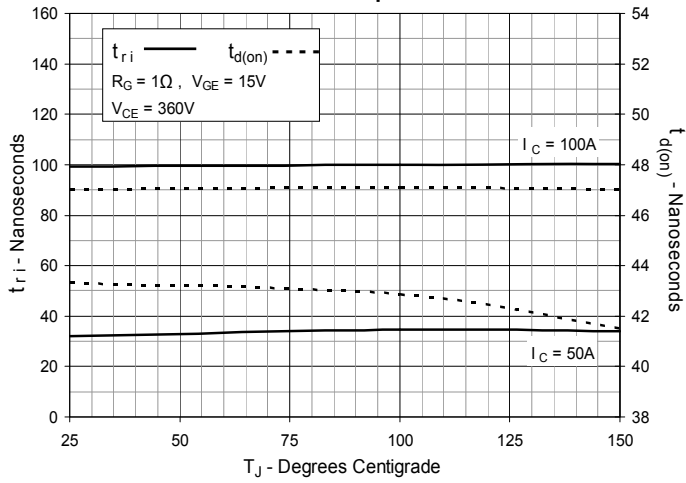
Fig. 19. Inductive Turn-on Switching Times vs. Gate Resistance

Fig. 20. Inductive Turn-on Switching Times vs. Collector Current

Fig. 21. Inductive Turn-on Switching Times vs. Junction Temperature


Fig. 22. Typ. Forward characteristics

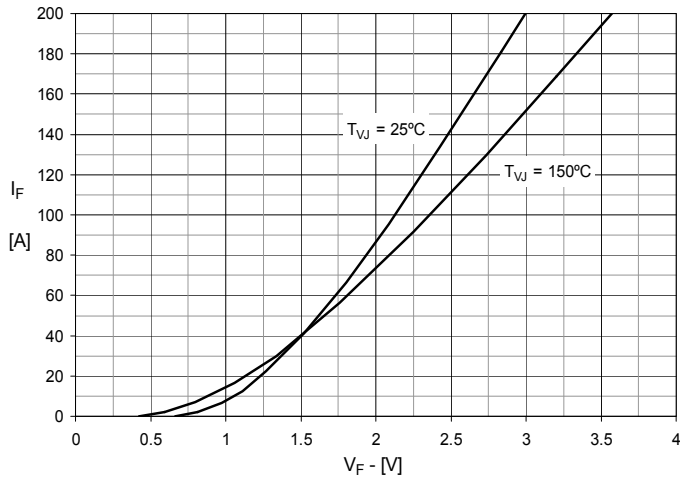


Fig. 23. Typ. Reverse Recovery Charge Q_{rr} vs. $-di_F/dt$

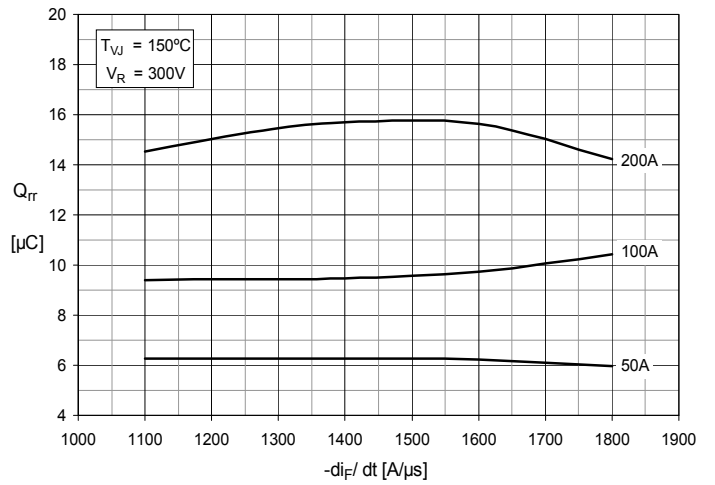


Fig. 24. Typ. Peak Reverse Current I_{RM} vs. $-di_F/dt$

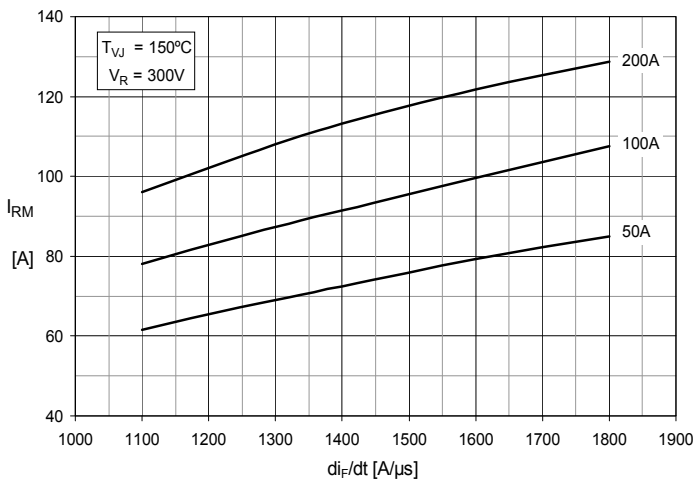


Fig. 25. Typ. Recovery Time t_{rr} vs. $-di_F/dt$

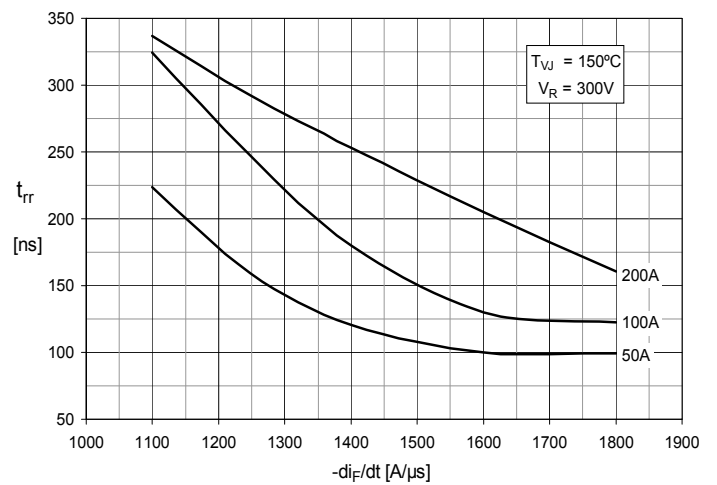
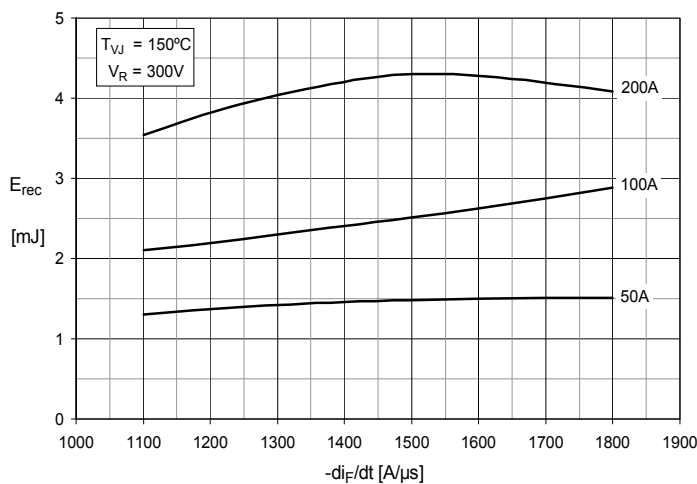


Fig. 26. Typ. Recovery Energy E_{rec} vs. $-di_F/dt$





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