

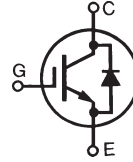
**High Voltage
XPT™ IGBT
w/ Diode**
**IXYK30N170CV1
IXYX30N170CV1**

$$V_{CES} = 1700V$$

$$I_{C110} = 30A$$

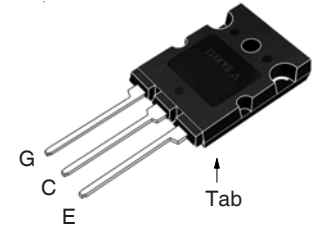
$$V_{CE(sat)} \leq 4.0V$$

$$t_{fi(typ)} = 95ns$$

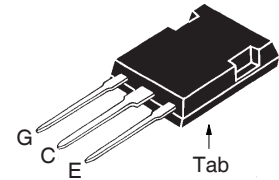


| Symbol | Test Conditions | Maximum Ratings | |
|-------------------------|---|------------------------|------------|
| V_{CES} | $T_J = 25^\circ C$ to $175^\circ C$ | 1700 | V |
| V_{CGR} | $T_J = 25^\circ C$ to $175^\circ C$, $R_{GE} = 1M\Omega$ | 1700 | V |
| V_{GES} | Continuous | ± 20 | V |
| V_{GEM} | Transient | ± 30 | V |
| I_{C25} | $T_C = 25^\circ C$ | 100 | A |
| I_{C110} | $T_C = 110^\circ C$ | 30 | A |
| I_{F110} | $T_C = 110^\circ C$ | 38 | A |
| I_{CM} | $T_C = 25^\circ C$, 1ms | 250 | A |
| SSOA (RBSOA) | $V_{GE} = 15V$, $T_{VJ} = 150^\circ C$, $R_G = 2.7\Omega$ Clamped Inductive Load | $I_{CM} = 120$ 1360 | A V |
| P_C | $T_C = 25^\circ C$ | 937 | W |
| T_J | | -55 ... +175 | $^\circ C$ |
| T_{JM} | | 175 | $^\circ C$ |
| T_{stg} | | -55 ... +175 | $^\circ C$ |
| T_L | Maximum Lead Temperature for Soldering | 300 | $^\circ C$ |
| T_{SOLD} | 1.6 mm (0.062in.) from Case for 10s | 260 | $^\circ C$ |
| M_d | Mounting Torque (TO-264) | 1.13/10 | Nm/lb.in |
| F_C | Mounting Force (PLUS247) | 20..120 / 4.5..27 | N/lb |
| Weight | TO-264 | 10 | g |
| | PLUS247 | 6 | g |

TO-264 (IXYK)



PLUS247 (IXYX)



G = Gate D = Collector
S = Emitter Tab = Collector

Features

- International Standard Packages
- High Voltage Package
- High Blocking Voltage
- 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

| Symbol | Test Conditions ($T_J = 25^\circ C$, Unless Otherwise Specified) | Characteristic Values | | |
|---------------|---|-----------------------|------------|--------------------|
| | | Min. | Typ. | Max. |
| BV_{CES} | $I_C = 250\mu A$, $V_{GE} = 0V$ | 1700 | | V |
| $V_{GE(th)}$ | $I_C = 250\mu A$, $V_{CE} = V_{GE}$ | 3.0 | | V |
| I_{CES} | $V_{CE} = 0.8 \cdot V_{CES}$, $V_{GE} = 0V$ $T_J = 125^\circ C$ | | | 25 μA 4 mA |
| I_{GES} | $V_{CE} = 0V$, $V_{GE} = \pm 20V$ | | | ± 100 nA |
| $V_{CE(sat)}$ | $I_C = 30A$, $V_{GE} = 15V$, Note 1 $T_J = 150^\circ C$ | | 3.5 4.6 | V V |

| Symbol Test Conditions | | Characteristic Values | | |
|--|---|-----------------------|------|-----------|
| (T _J = 25°C Unless Otherwise Specified) | | Min. | Typ. | Max. |
| g_{fs} | I _C = 30A, V _{CE} = 10V, Note 1 | 17 | 28 | S |
| R_{Gi} | Gate Input Resistance | | 2.8 | Ω |
| C_{ies} | V _{CE} = 25V, V _{GE} = 0V, f = 1MHz | | 3100 | pF |
| C_{oes} | | | 210 | pF |
| C_{res} | | | 55 | pF |
| Q_{g(on)} | I _C = 30A, V _{GE} = 15V, V _{CE} = 0.5 • V _{CES} | | 150 | nC |
| Q_{ge} | | | 15 | nC |
| Q_{gc} | | | 65 | nC |
| t_{d(on)} | Inductive load, T_J = 25°C I _C = 30A, V _{GE} = 15V V _{CE} = 0.5 • V _{CES} , R _G = 2.7Ω Note 2 | | 16 | ns |
| t_{ri} | | | 33 | ns |
| E_{on} | | | 3.6 | mJ |
| t_{d(off)} | | | 143 | ns |
| t_{fi} | | | 95 | ns |
| E_{off} | | | 1.8 | mJ |
| t_{d(on)} | Inductive load, T_J = 150°C I _C = 30A, V _{GE} = 15V V _{CE} = 0.5 • V _{CES} , R _G = 2.7Ω Note 2 | | 16 | ns |
| t_{ri} | | | 33 | ns |
| E_{on} | | | 5.5 | mJ |
| t_{d(off)} | | | 193 | ns |
| t_{fi} | | | 134 | ns |
| E_{off} | | | 3.5 | mJ |
| R_{thJC} | | | | 0.16 °C/W |
| R_{thCS} | | | 0.15 | °C/W |

Reverse Diode (FRED)

| Symbol Test Conditions | | Characteristic Value | | |
|---|---|----------------------|------|----------|
| (T _J = 25°C, Unless Otherwise Specified) | | Min. | Typ. | Max. |
| V_F | I _F = 30A, V _{GE} = 0V, Note 1 | | | 3.5 V |
| I_{RM} | I _F = 30A, V _{GE} = 0V, -di _F /dt = 500A/μs, V _R = 1200V, T _J = 150°C | | 3.7 | V |
| t_{rr} | | | 32 | A |
| R_{thJC} | | | | 0.36°C/W |

Notes:

1. Pulse test, t ≤ 300μs, duty cycle, d ≤ 2%.
2. Switching times & energy losses may increase for higher V_{CE}(clamp), T_J or R_G.

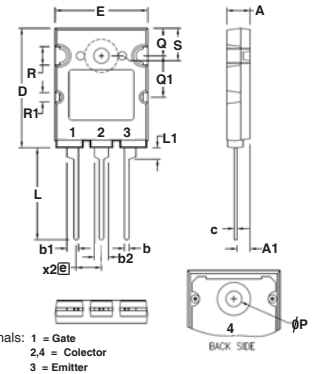
PRELIMINARY TECHNICAL INFORMATION

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 | 7,157,338B2 |
| | 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 | |

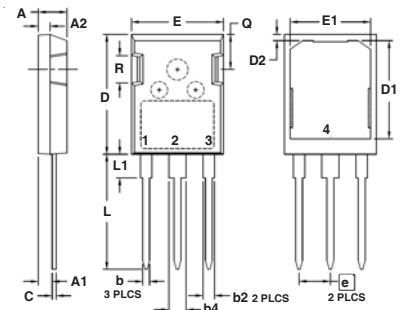
TO-264 Outline



Terminals: 1 = Gate
2,4 = Collector
3 = Emitter

| SYM | INCHES | | MILLIMETERS | |
|-----|---------|-------|-------------|-------|
| | MIN | MAX | MIN | MAX |
| A | .185 | .209 | 4.70 | 5.30 |
| A1 | .102 | .118 | 2.60 | 3.00 |
| b | .035 | .049 | 0.90 | 1.25 |
| b1 | .091 | .106 | 2.30 | 2.70 |
| b2 | .110 | .126 | 2.80 | 3.20 |
| c | .020 | .033 | 0.50 | 0.85 |
| D | 1.012 | 1.035 | 25.70 | 26.30 |
| E | .776 | .799 | 19.70 | 20.30 |
| e | .215BSC | | 5.46 BSC | |
| L | .768 | .807 | 19.50 | 20.50 |
| L1 | .091 | .106 | 2.30 | 2.70 |
| φP | .122 | .138 | 3.10 | 3.50 |
| Q | .228 | .244 | 5.80 | 6.20 |
| Q1 | .346 | .362 | 8.80 | 9.20 |
| φR | .150 | .165 | 3.80 | 4.20 |
| φR1 | .071 | .087 | 1.80 | 2.20 |
| S | .228 | .244 | 5.80 | 6.20 |

PLUS 247™ Outline



Terminals: 1 - Gate
2,4 - Collector
3 - Emitter

| SYM | INCHES | | MILLIMETERS | |
|-----|----------|------|-------------|-------|
| | MIN | MAX | MIN | MAX |
| A | .190 | .205 | 4.83 | 5.21 |
| A1 | .090 | .100 | 2.29 | 2.54 |
| A2 | .075 | .085 | 1.91 | 2.16 |
| b | .045 | .055 | 1.14 | 1.40 |
| b2 | .075 | .087 | 1.91 | 2.20 |
| b4 | .115 | .126 | 2.92 | 3.20 |
| C | .024 | .031 | 0.61 | 0.80 |
| D | .819 | .840 | 20.80 | 21.34 |
| D1 | .650 | .690 | 16.51 | 17.53 |
| D2 | .035 | .050 | 0.89 | 1.27 |
| E | .620 | .635 | 15.75 | 16.13 |
| E1 | .520 | .560 | 13.08 | 14.22 |
| e | .215 BSC | | 5.45 BSC | |
| L | .780 | .810 | 19.81 | 20.57 |
| L1 | .150 | .170 | 3.81 | 4.32 |
| Q | .220 | .244 | 5.59 | 6.20 |
| R | .170 | .190 | 4.32 | 4.83 |

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

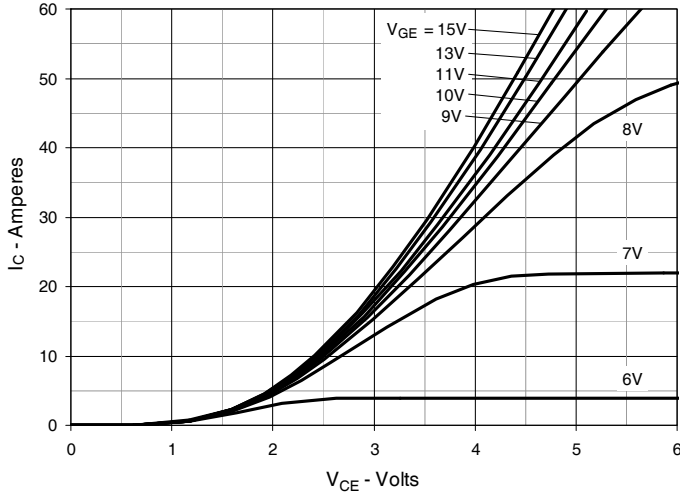


Fig. 2. Extended Output Characteristics @ $T_J = 25^\circ\text{C}$

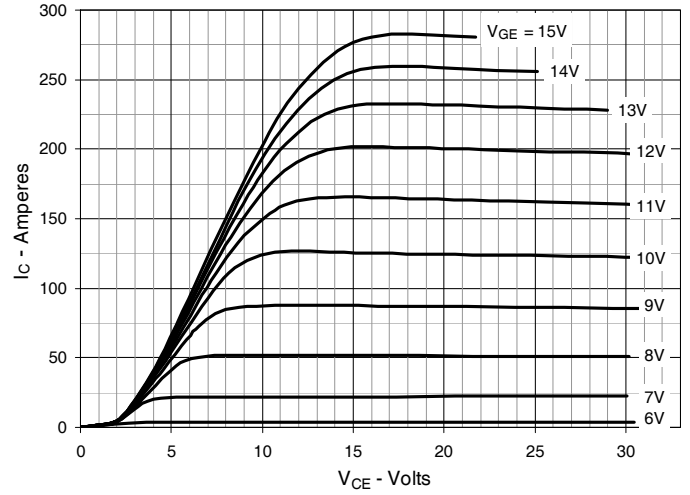


Fig. 3. Output Characteristics @ $T_J = 150^\circ\text{C}$

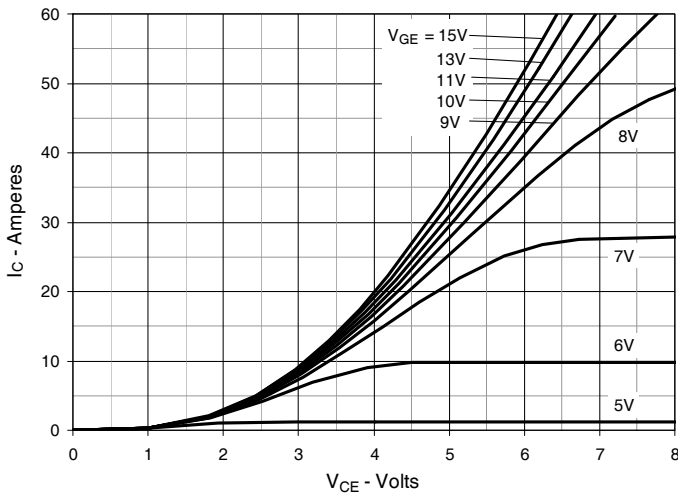


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

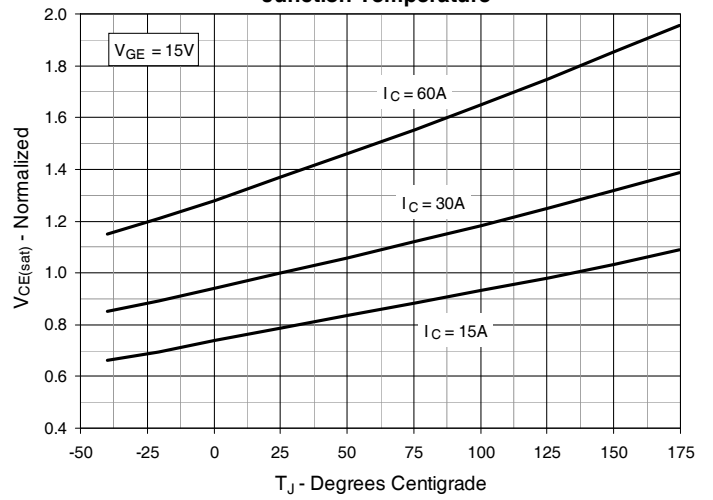


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

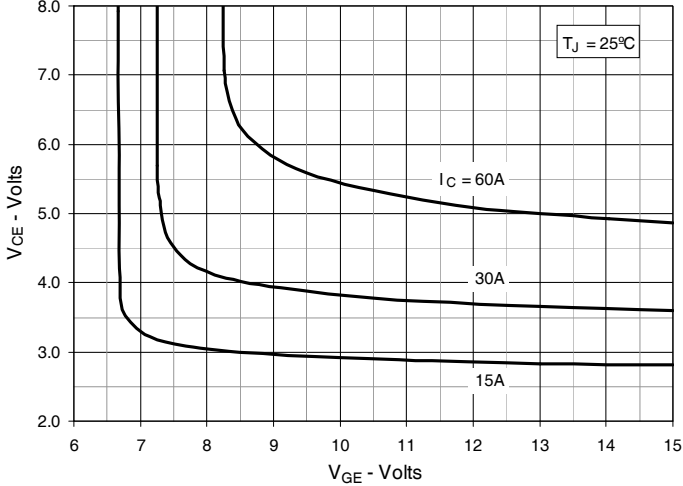


Fig. 6. Input Admittance

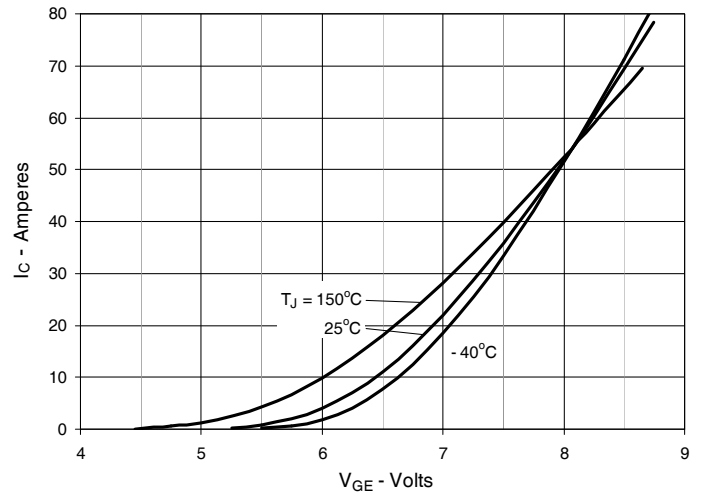


Fig. 7. Transconductance

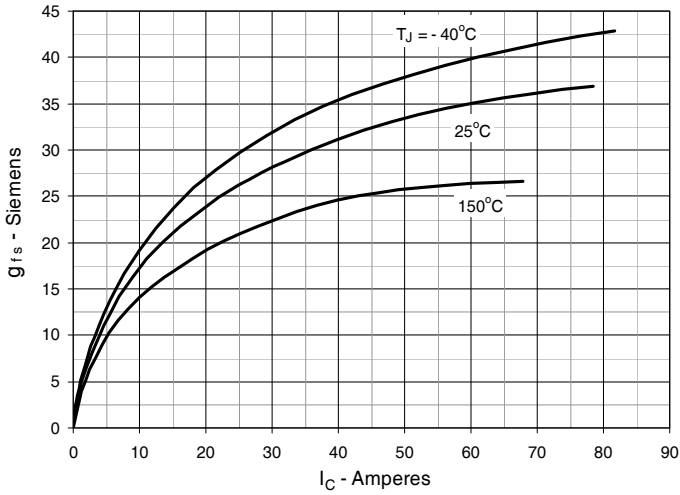


Fig. 8. Gate Charge

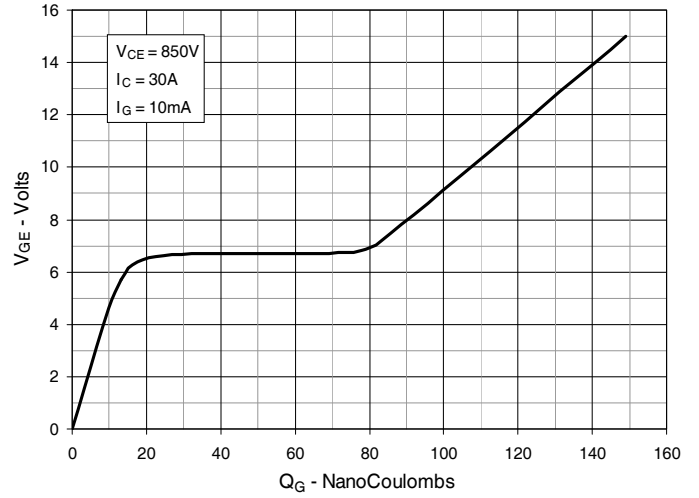


Fig. 9. Capacitance

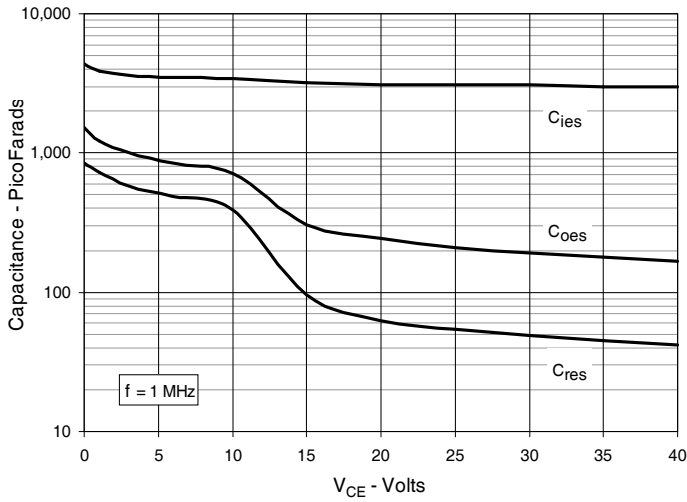


Fig. 10. Reverse-Bias Safe Operating Area

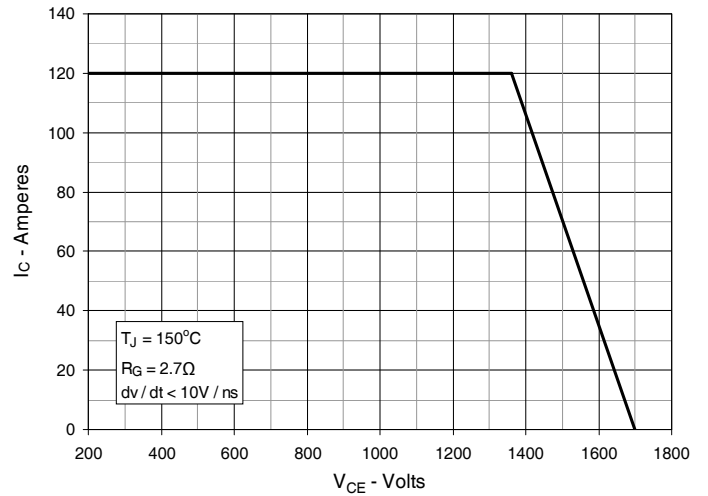


Fig. 11. Maximum Transient Thermal Impedance (IGBT)

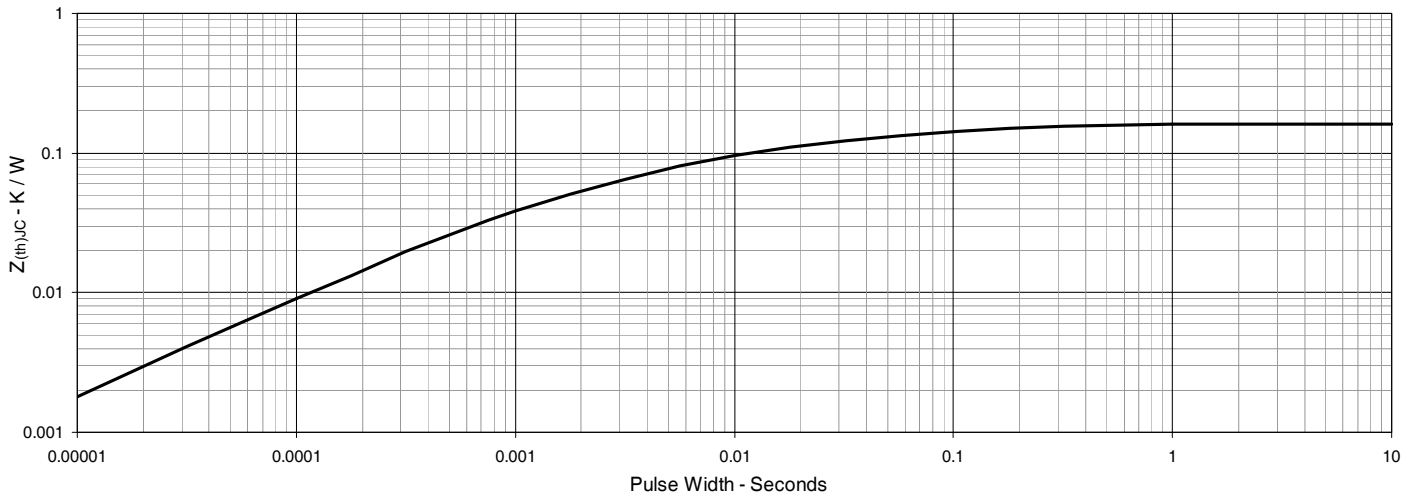


Fig. 12. Inductive Switching Energy Loss vs. Gate Resistance

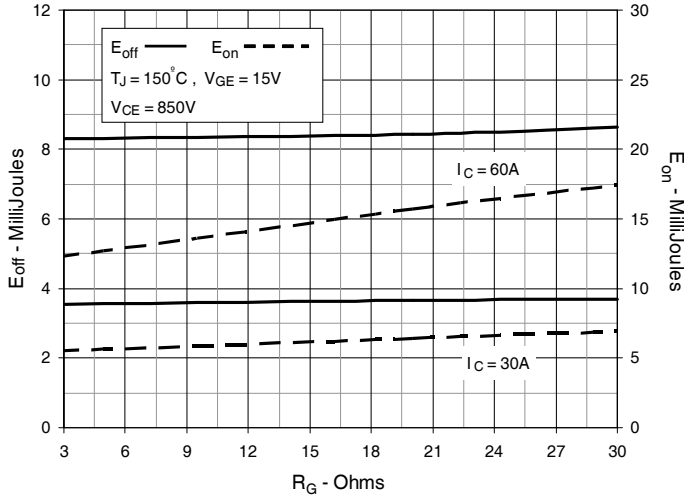


Fig. 13. Inductive Switching Energy Loss vs. Collector Current

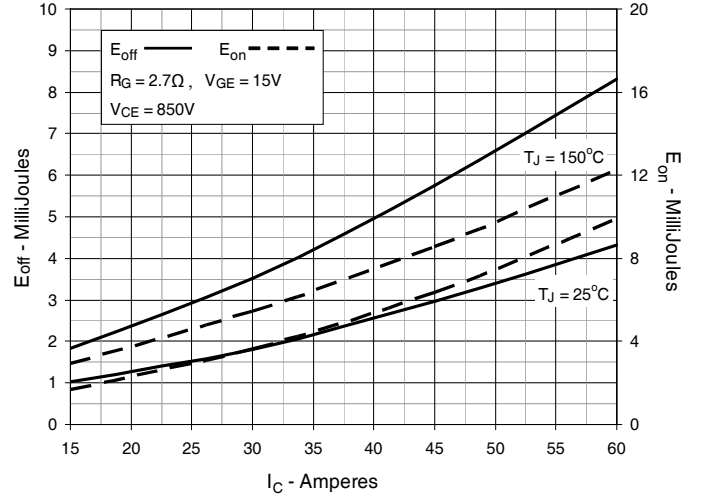


Fig. 14. Inductive Switching Energy Loss vs. Junction Temperature

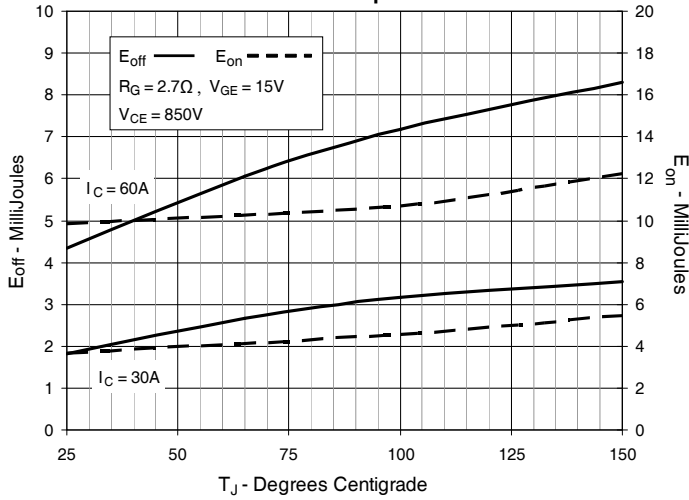


Fig. 15. Inductive Turn-off Switching Times vs. Gate Resistance

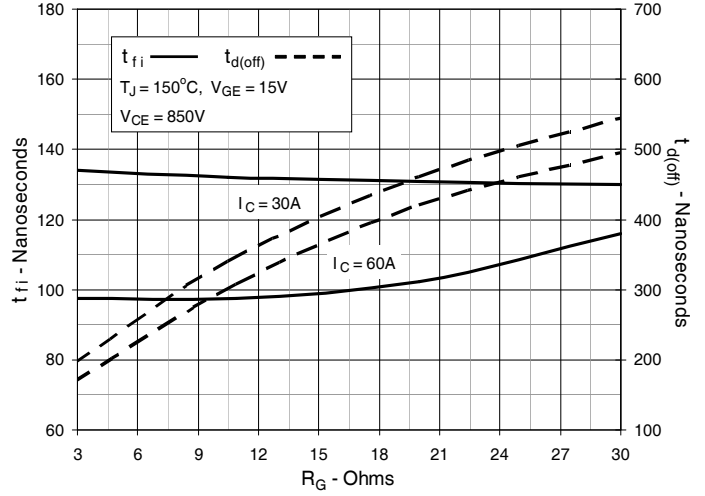


Fig. 16. Inductive Turn-off Switching Times vs. Collector Current

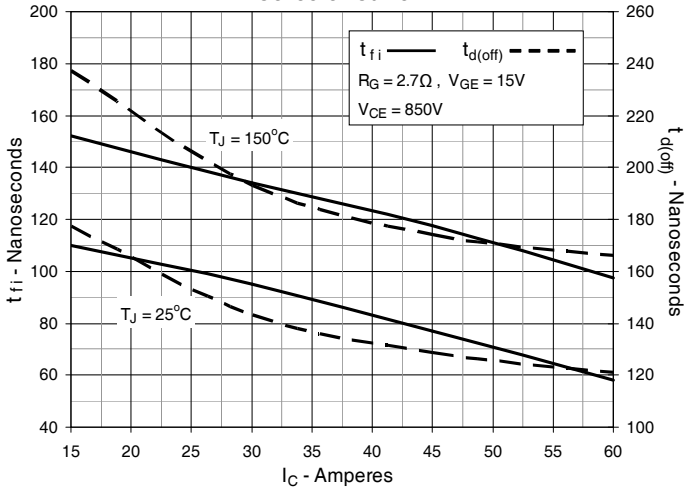


Fig. 17. Inductive Turn-off Switching Times vs. Junction Temperature

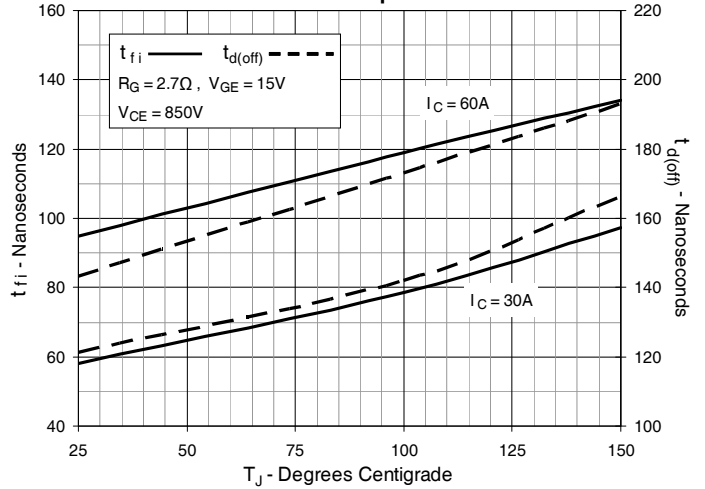


Fig. 18. Inductive Turn-on Switching Times vs. Gate Resistance

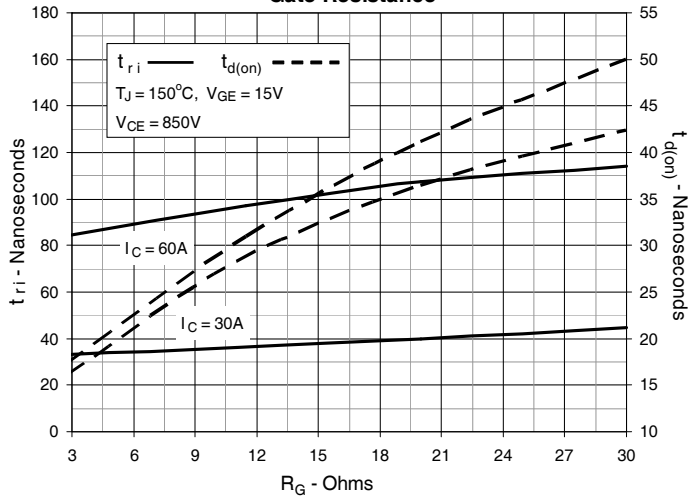


Fig. 19. Inductive Turn-on Switching Times vs. Collector Current

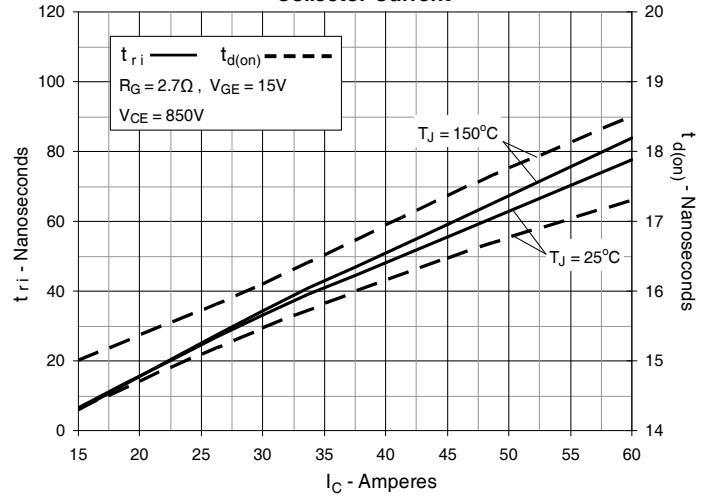


Fig. 20. Inductive Turn-on Switching Times vs. Junction Temperature

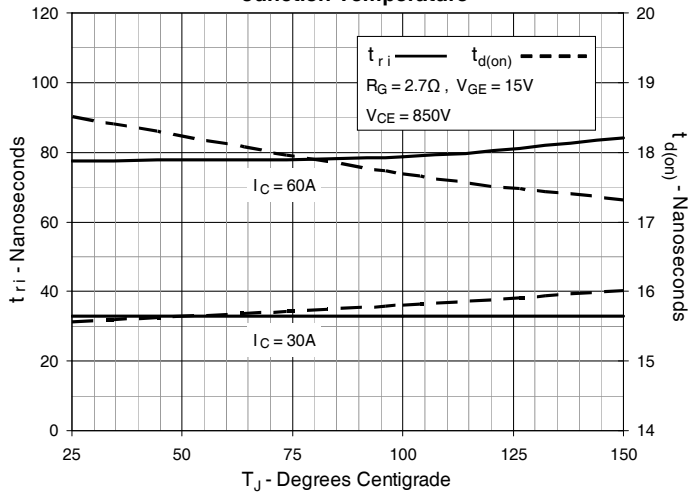


Fig. 21. Diode Forward Characteristics

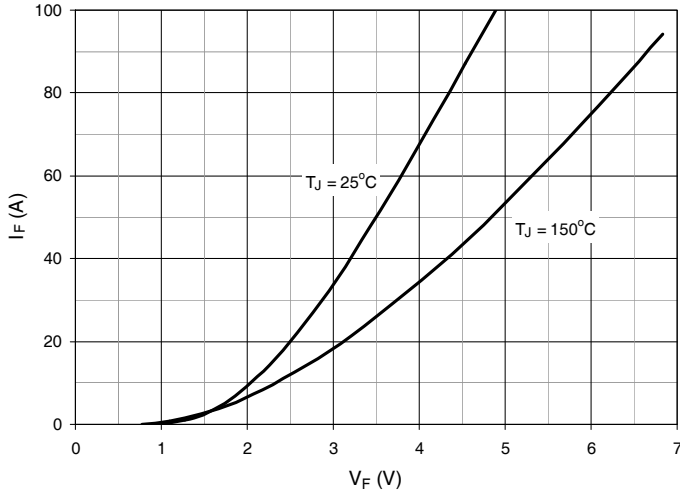


Fig. 22. Reverse Recovery Charge vs. $-di_F/dt$

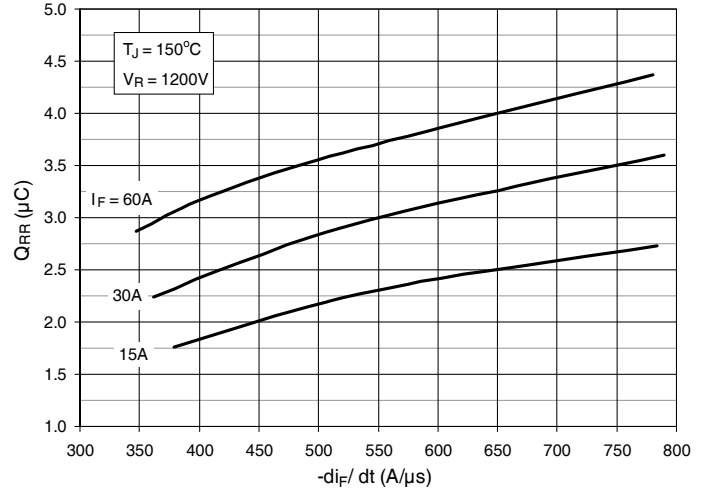


Fig. 23. Reverse Recovery Current vs. $-di_F/dt$

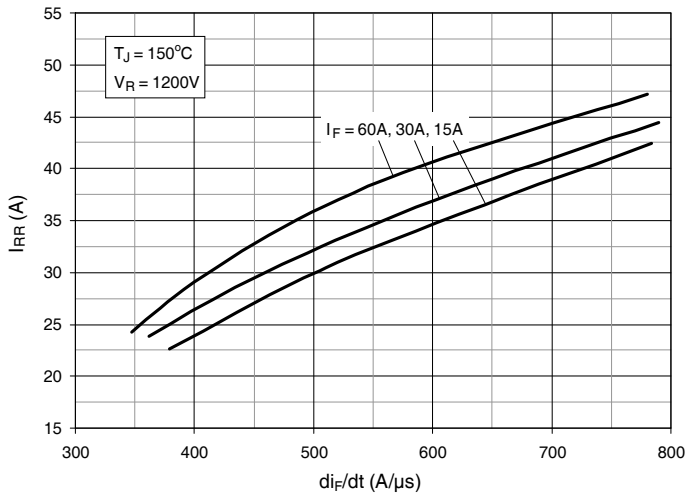


Fig. 24. Reverse Recovery Time vs. $-di_F/dt$

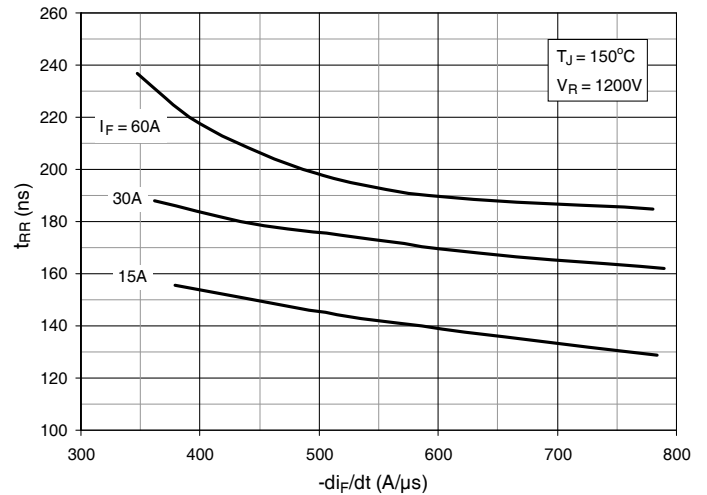


Fig. 25. Dynamic Parameters Q_{RR} , I_{RR} vs. Junction Temperature

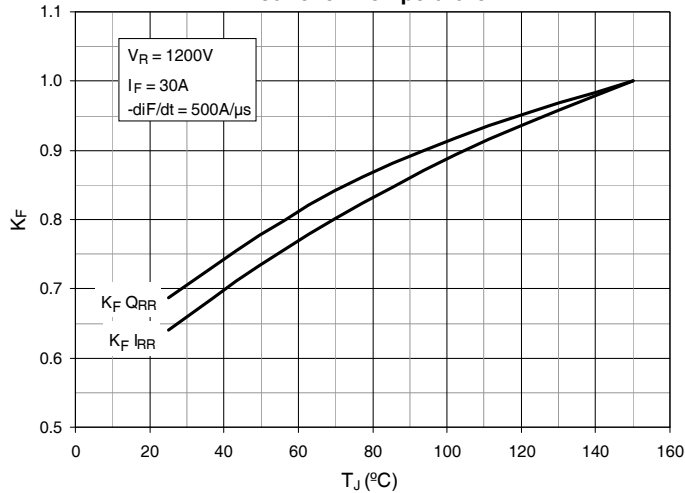


Fig. 26. Maximum Transient Thermal Impedance (Diode)

