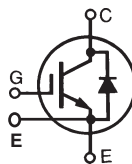


### High Voltage XPT™ IGBT w/ Diode

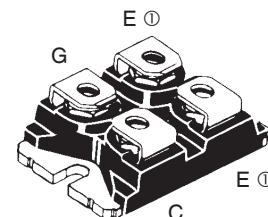
### IXYN30N170CV1



$$\begin{aligned} V_{CES} &= 1700V \\ I_{C110} &= 30A \\ V_{CE(sat)} &\leq 4.0V \\ t_{fi(typ)} &= 95ns \end{aligned}$$

SOT-227B, miniBLOC

 E153432



G = Gate, C = Collector, E = Emitter

① either emitter terminal can be used as Main or Kelvin Emitter

| Symbol                        | Test Conditions                                                                                    | Maximum Ratings        |                      |
|-------------------------------|----------------------------------------------------------------------------------------------------|------------------------|----------------------|
| $V_{CES}$                     | $T_J = 25^\circ\text{C}$ to $175^\circ\text{C}$                                                    | 1700                   | V                    |
| $V_{CGR}$                     | $T_J = 25^\circ\text{C}$ to $175^\circ\text{C}$ , $R_{GE} = 1\text{M}\Omega$                       | 1700                   | V                    |
| $V_{GES}$                     | Continuous                                                                                         | $\pm 20$               | V                    |
| $V_{GEM}$                     | Transient                                                                                          | $\pm 30$               | V                    |
| $I_{C25}$                     | $T_C = 25^\circ\text{C}$                                                                           | 80                     | A                    |
| $I_{C110}$                    | $T_C = 110^\circ\text{C}$                                                                          | 30                     | A                    |
| $I_{F110}$                    | $T_C = 110^\circ\text{C}$                                                                          | 33                     | A                    |
| $I_{CM}$                      | $T_C = 25^\circ\text{C}$ , 1ms                                                                     | 270                    | A                    |
| <b>SSOA</b><br><b>(RBSOA)</b> | $V_{GE} = 15\text{V}$ , $T_{VJ} = 150^\circ\text{C}$ , $R_G = 2.7\Omega$<br>Clamped Inductive Load | $I_{CM} = 120$<br>1360 | A<br>V               |
| $P_C$                         | $T_C = 25^\circ\text{C}$                                                                           | 680                    | W                    |
| $T_J$                         |                                                                                                    | -55 ... +175           | $^\circ\text{C}$     |
| $T_{JM}$                      |                                                                                                    | 175                    | $^\circ\text{C}$     |
| $T_{stg}$                     |                                                                                                    | -55 ... +175           | $^\circ\text{C}$     |
| $V_{ISOL}$                    | 50/60Hz $t = 1\text{min}$<br>$I_{ISOL} \leq 1\text{mA}$ $t = 1\text{s}$                            | 2500<br>3000           | 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                    |

#### Features

- International Standard Package
- miniBLOC, with Aluminium Nitride Isolation
- 2500V~ Isolation Voltage
- Anti-Parallel Diode
- High Voltage Package
- High Blocking Voltage
- Low Saturation Voltage

#### Advantages

- Low Gate Drive Requirement
- High Power Density

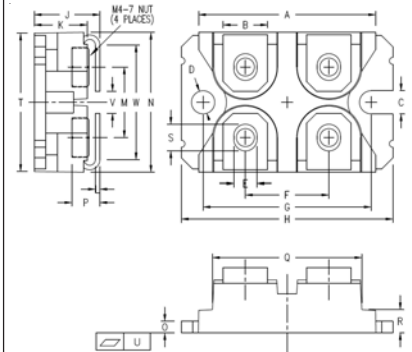
#### Applications

- Switch-Mode and Resonant-Mode Power Supplies
- Uninterruptible Power Supplies (UPS)
- Laser Generators
- Capacitor Discharge Circuits
- AC Switches

| Symbol        | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified)      | Characteristic Values |            |                          |
|---------------|----------------------------------------------------------------------------------|-----------------------|------------|--------------------------|
|               |                                                                                  | Min.                  | Typ.       | Max.                     |
| $BV_{CES}$    | $I_C = 250\mu\text{A}$ , $V_{GE} = 0\text{V}$                                    | 1700                  |            | V                        |
| $V_{GE(th)}$  | $I_C = 250\mu\text{A}$ , $V_{CE} = V_{GE}$                                       | 3.0                   |            | 5.0 V                    |
| $I_{CES}$     | $V_{CE} = 0.8 \cdot V_{CES}$ , $V_{GE} = 0\text{V}$<br>$T_J = 125^\circ\text{C}$ |                       |            | 25 $\mu\text{A}$<br>4 mA |
| $I_{GES}$     | $V_{CE} = 0\text{V}$ , $V_{GE} = \pm 20\text{V}$                                 |                       |            | $\pm 100$ nA             |
| $V_{CE(sat)}$ | $I_C = 30\text{A}$ , $V_{GE} = 15\text{V}$ , Note 1<br>$T_J = 150^\circ\text{C}$ |                       | 3.5<br>4.6 | V<br>V                   |

| Symbol Test Conditions                             |                                                                                                                                                                     | Characteristic Values |      |           |
|----------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|------|-----------|
| (T <sub>J</sub> = 25°C Unless Otherwise Specified) |                                                                                                                                                                     | Min.                  | Typ. | Max.      |
| <b>g<sub>fs</sub></b>                              | I <sub>C</sub> = 30A, V <sub>CE</sub> = 10V, Note 1                                                                                                                 | 17                    | 28   | S         |
| <b>R<sub>Gi</sub></b>                              | Gate Input Resistance                                                                                                                                               |                       | 2.8  | Ω         |
| <b>C<sub>ies</sub></b>                             | V <sub>CE</sub> = 25V, V <sub>GE</sub> = 0V, f = 1MHz                                                                                                               |                       | 3100 | pF        |
| <b>C<sub>oes</sub></b>                             |                                                                                                                                                                     |                       | 210  | pF        |
| <b>C<sub>res</sub></b>                             |                                                                                                                                                                     |                       | 55   | pF        |
| <b>Q<sub>g(on)</sub></b>                           | I <sub>C</sub> = 30A, V <sub>GE</sub> = 15V, V <sub>CE</sub> = 0.5 • V <sub>CES</sub>                                                                               |                       | 150  | nC        |
| <b>Q<sub>ge</sub></b>                              |                                                                                                                                                                     |                       | 15   | nC        |
| <b>Q<sub>gc</sub></b>                              |                                                                                                                                                                     |                       | 65   | nC        |
| <b>t<sub>d(on)</sub></b>                           | Inductive load, T <sub>J</sub> = 25°C<br>I <sub>C</sub> = 30A, V <sub>GE</sub> = 15V<br>V <sub>CE</sub> = 0.5 • V <sub>CES</sub> , R <sub>G</sub> = 2.7Ω<br>Note 3  |                       | 16   | ns        |
| <b>t<sub>ri</sub></b>                              |                                                                                                                                                                     |                       | 33   | ns        |
| <b>E<sub>on</sub></b>                              |                                                                                                                                                                     |                       | 3.6  | mJ        |
| <b>t<sub>d(off)</sub></b>                          |                                                                                                                                                                     |                       | 143  | ns        |
| <b>t<sub>fi</sub></b>                              |                                                                                                                                                                     |                       | 95   | ns        |
| <b>E<sub>off</sub></b>                             |                                                                                                                                                                     |                       | 1.8  | mJ        |
| <b>t<sub>d(on)</sub></b>                           | Inductive load, T <sub>J</sub> = 150°C<br>I <sub>C</sub> = 30A, V <sub>GE</sub> = 15V<br>V <sub>CE</sub> = 0.5 • V <sub>CES</sub> , R <sub>G</sub> = 2.7Ω<br>Note 3 |                       | 16   | ns        |
| <b>t<sub>ri</sub></b>                              |                                                                                                                                                                     |                       | 33   | ns        |
| <b>E<sub>on</sub></b>                              |                                                                                                                                                                     |                       | 5.5  | mJ        |
| <b>t<sub>d(off)</sub></b>                          |                                                                                                                                                                     |                       | 193  | ns        |
| <b>t<sub>fi</sub></b>                              |                                                                                                                                                                     |                       | 134  | ns        |
| <b>E<sub>off</sub></b>                             |                                                                                                                                                                     |                       | 3.5  | mJ        |
| <b>R<sub>thJC</sub></b>                            |                                                                                                                                                                     |                       |      | 0.22 °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   | 1.489  | 1.505 | 37.80       | 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   |
| V   | .130   | .180  | 3.30        | 4.57  |
| W   | .780   | .830  | 19.81       | 21.08 |

## Reverse Diode (FRED)

| (T <sub>J</sub> = 25°C, Unless Otherwise Specified) |                                                                                                                               | Characteristic Value |      |          |
|-----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|----------------------|------|----------|
| Symbol                                              | Test Conditions                                                                                                               | Min.                 | Typ. | Max.     |
| <b>V<sub>F</sub></b>                                | I <sub>F</sub> = 30A, V <sub>GE</sub> = 0V, Note 1<br>T <sub>J</sub> = 150°C                                                  |                      | 3.7  | 3.5 V    |
| <b>I<sub>RM</sub></b>                               | I <sub>F</sub> = 30A, V <sub>GE</sub> = 0V, -di <sub>F</sub> /dt = 500A/μs,<br>V <sub>R</sub> = 1200V, T <sub>J</sub> = 150°C |                      | 32   | A        |
| <b>t<sub>rr</sub></b>                               |                                                                                                                               |                      | 175  | ns       |
| <b>R<sub>thJC</sub></b>                             |                                                                                                                               |                      |      | 0.43°C/W |

### Notes:

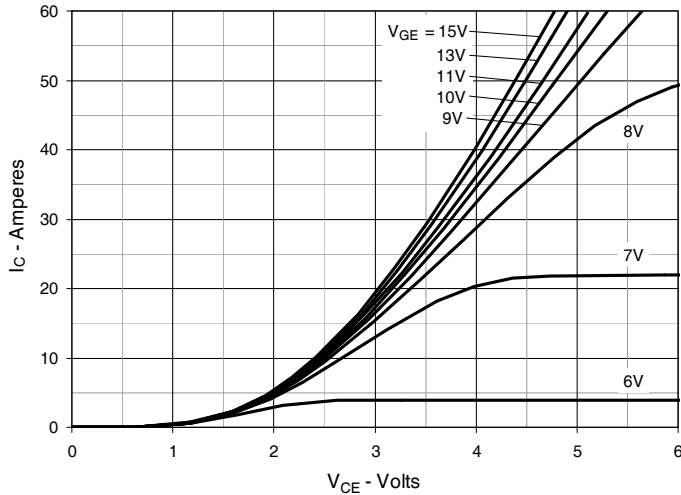
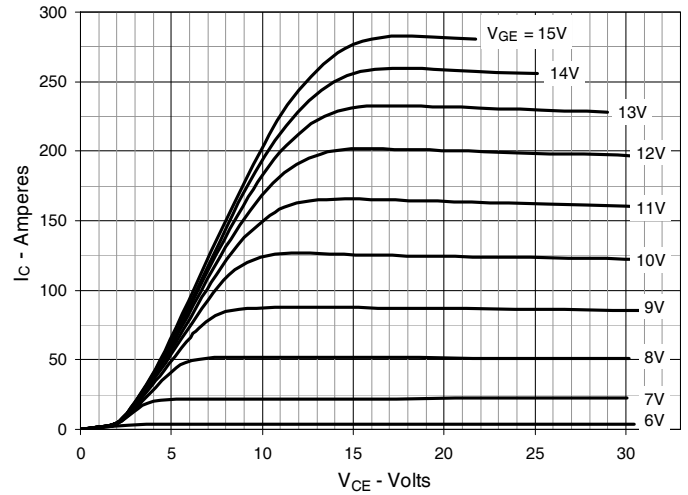
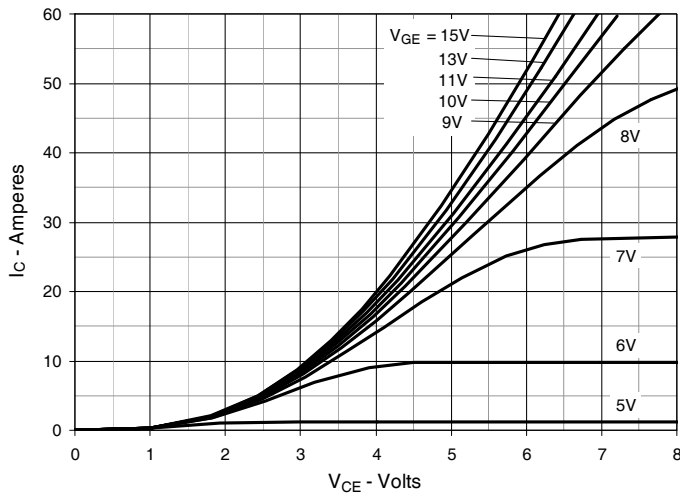
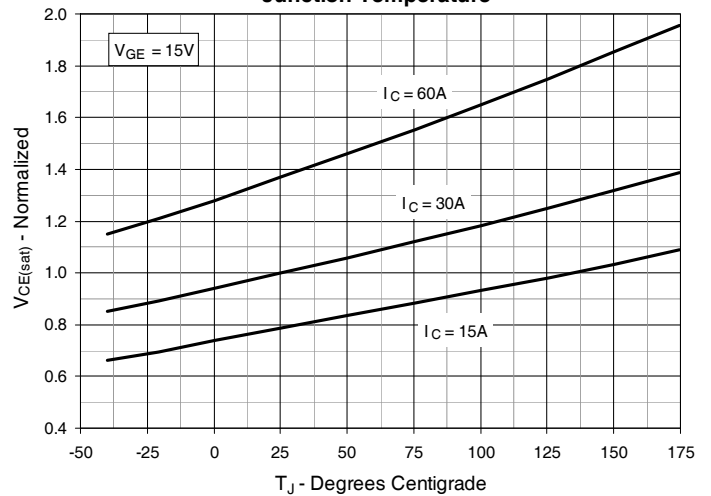
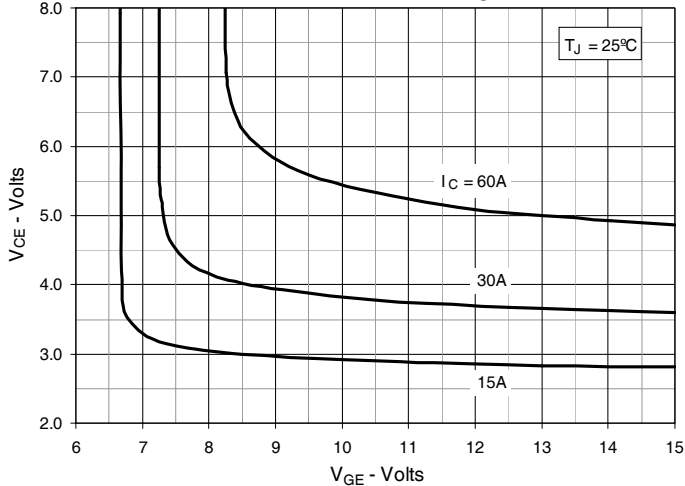
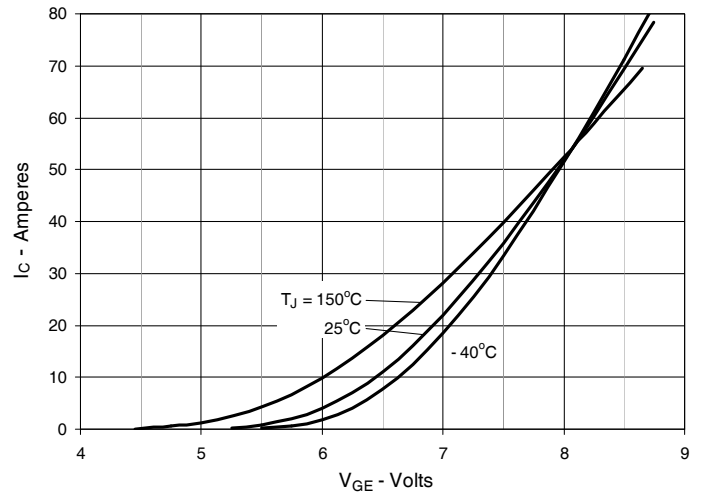
1. Pulse test, t ≤ 300μs, duty cycle, d ≤ 2%.
2. Switching times & energy losses may increase for higher V<sub>CE</sub>(clamp), T<sub>J</sub> or R<sub>G</sub>.

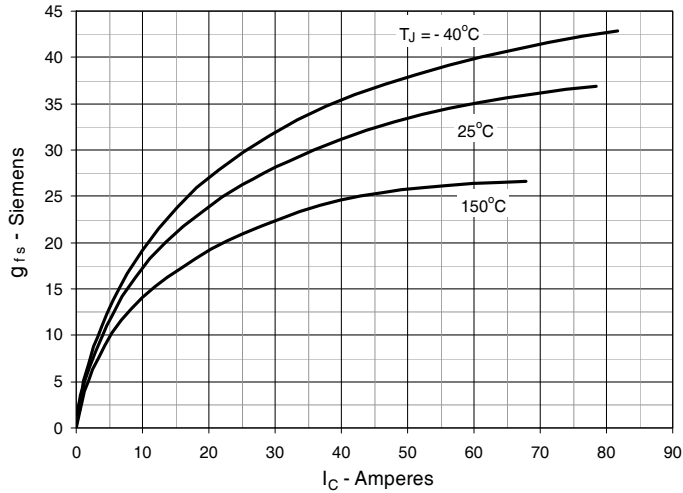
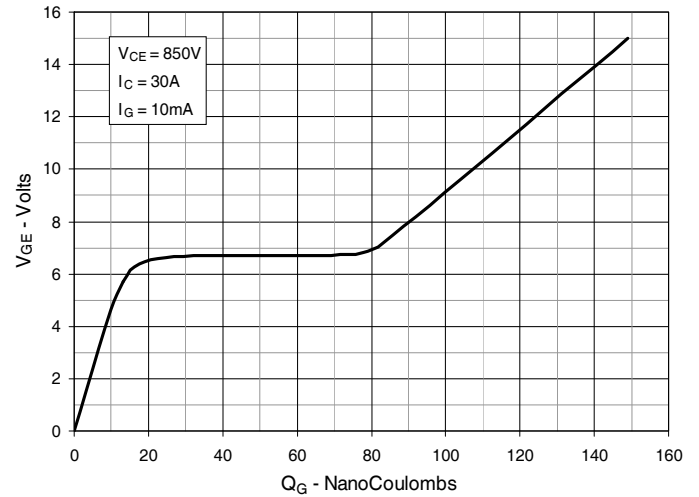
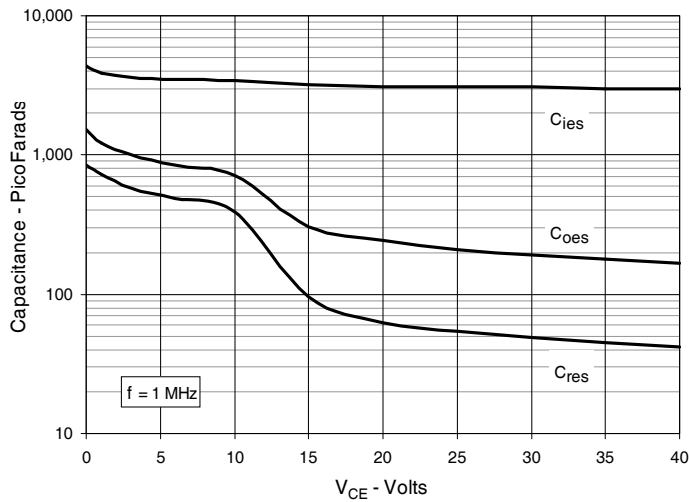
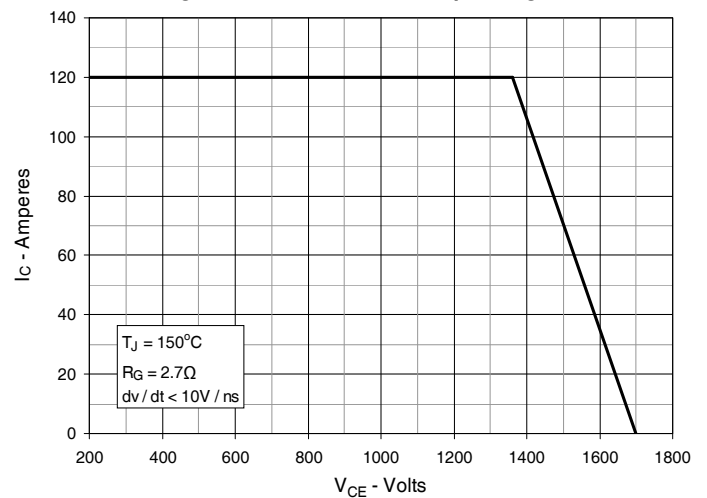
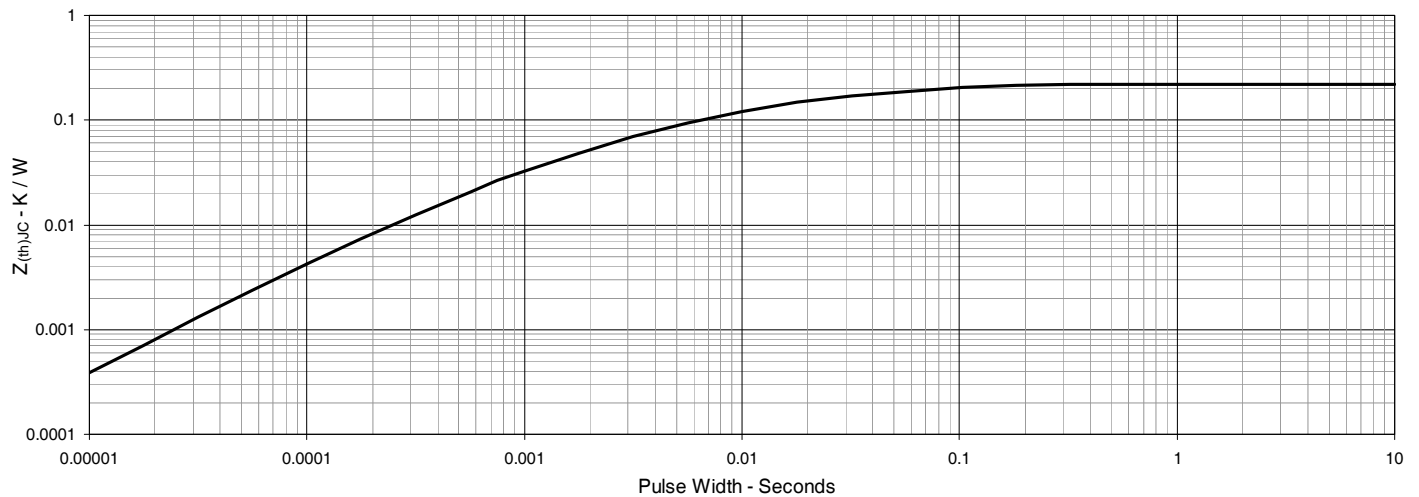
## PRELIMINARY TECHNICAL INFORMATION

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.

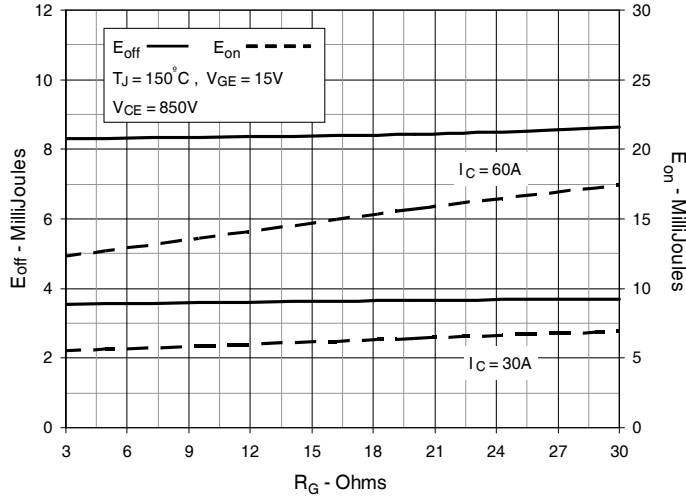
IXYS Reserves the Right to Change Limits, Test Conditions, and Dimensions.

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

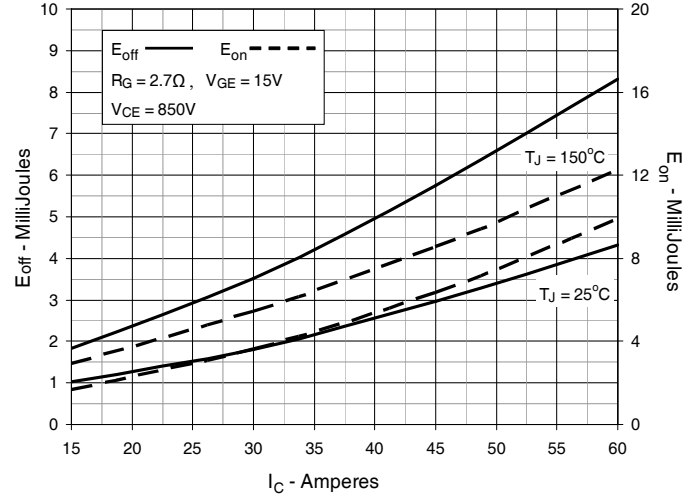
**Fig. 1. Output Characteristics @  $T_J = 25^\circ\text{C}$** 

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

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

**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)**


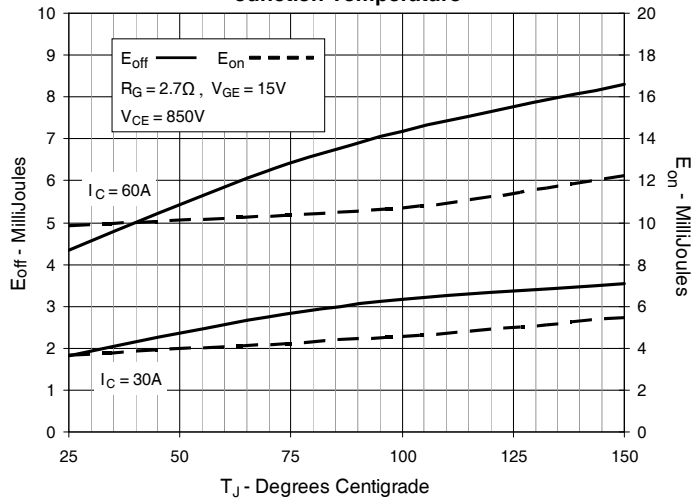
**Fig. 12. Inductive Switching Energy Loss vs. Gate Resistance**



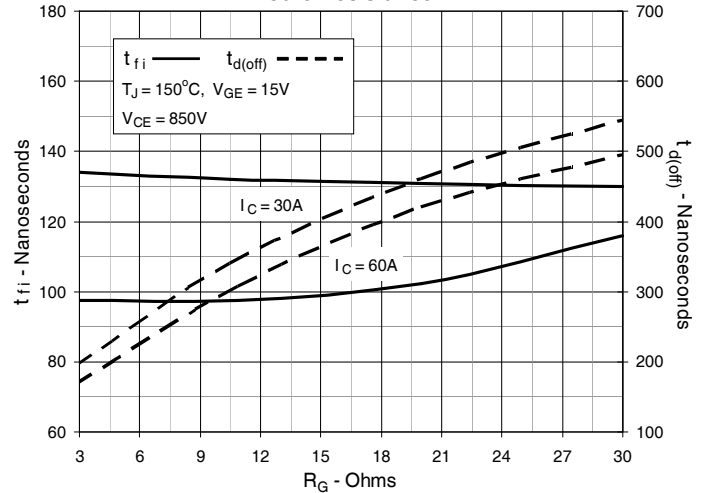
**Fig. 13. Inductive Switching Energy Loss vs. Collector Current**



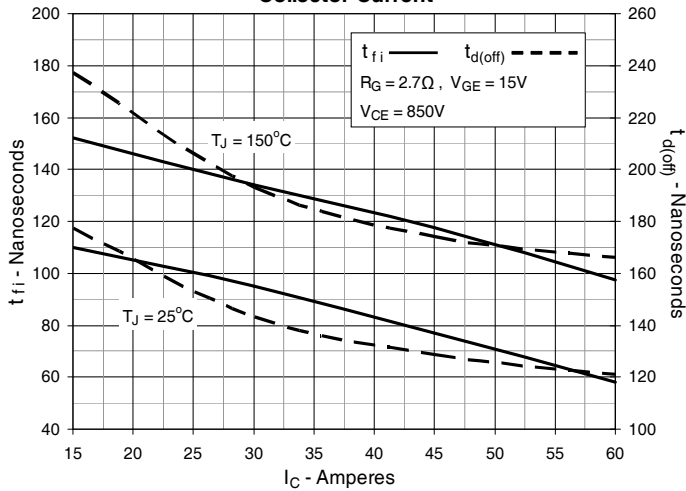
**Fig. 14. Inductive Switching Energy Loss vs. Junction Temperature**



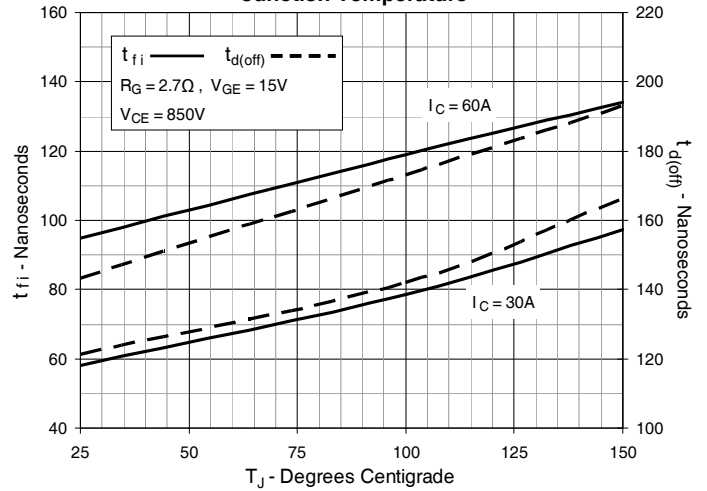
**Fig. 15. Inductive Turn-off Switching Times vs. Gate Resistance**



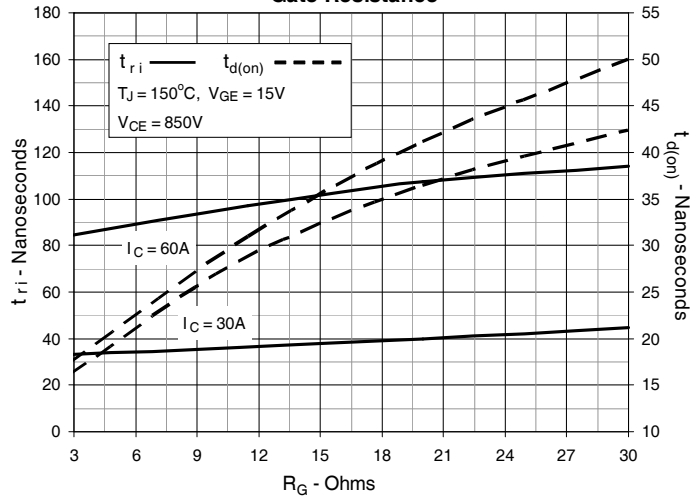
**Fig. 16. Inductive Turn-off Switching Times vs. Collector Current**



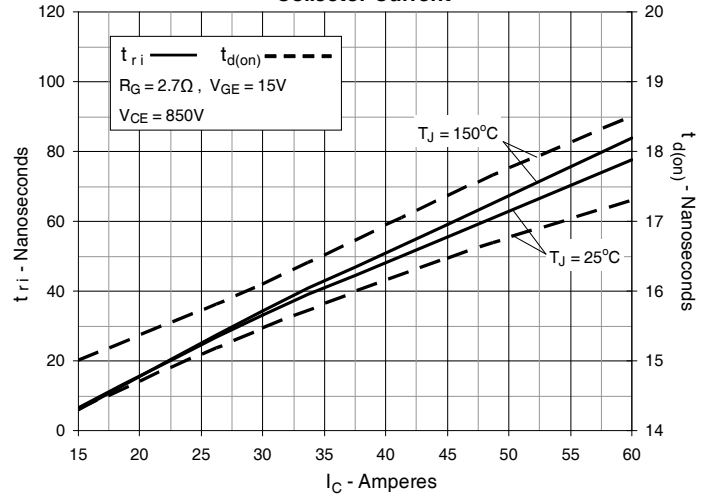
**Fig. 17. Inductive Turn-off Switching Times vs. Junction Temperature**



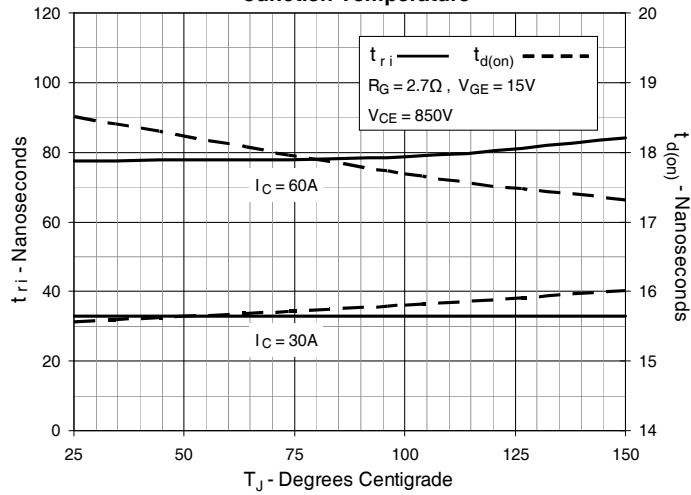
**Fig. 18. Inductive Turn-on Switching Times vs. Gate Resistance**

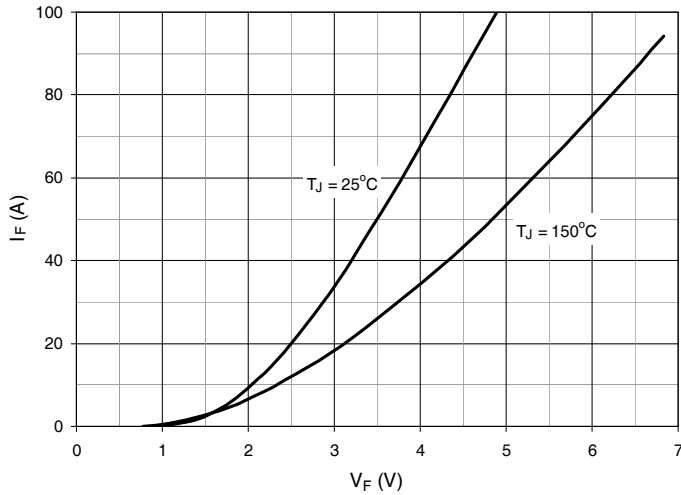
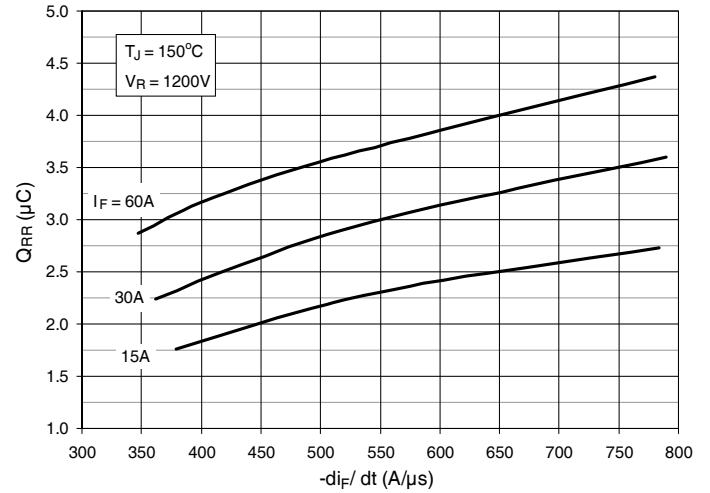
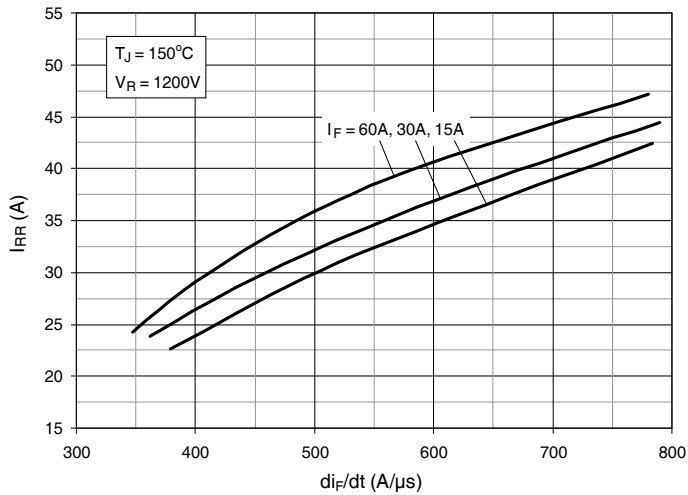
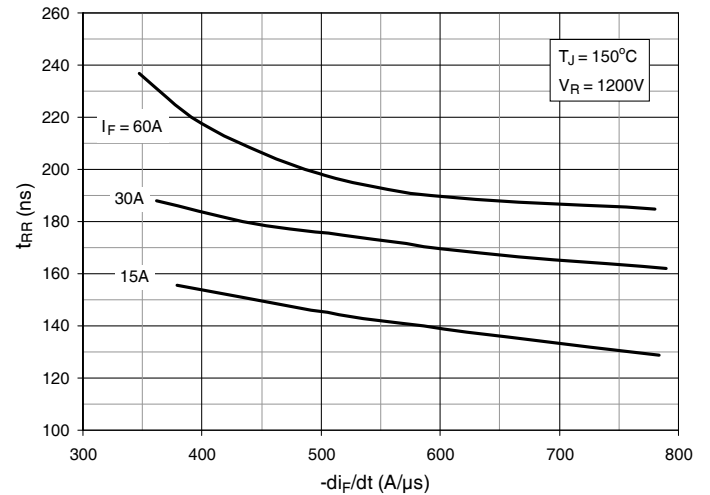
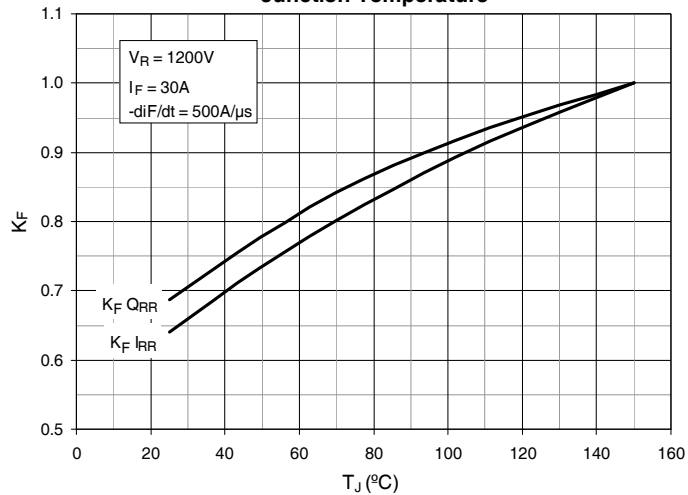
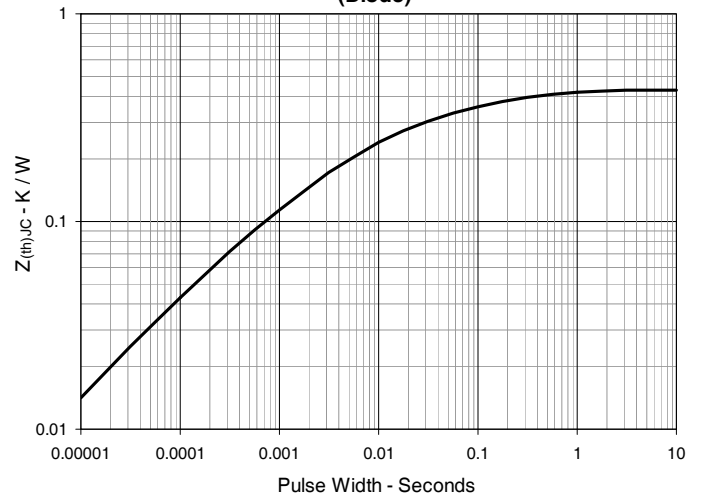


**Fig. 19. Inductive Turn-on Switching Times vs. Collector Current**



**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)**




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