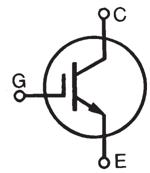
# HiPerFAST™ IGBT

## IXGP 30N60B2

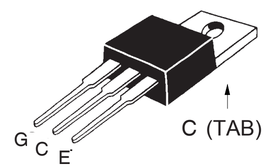
| | | |
|---|---|---|
| $V_{CES}$ | = | 600 V |
| $I_{C25}$ | = | 70 A |
| $V_{CE(sat)}$ | < | 1.8 V |
| $t_{fi\,typ}$ | = | 82 ns |

**Optimized for 10-25 KHz hard switching and up to 150 KHz resonant switching**




| Symbol | Test Conditions | Maximum Ratings | |
|---|---|---|---|
| $V_{CES}$ | $T_J$ = 25°C to 150°C | 600 | V |
| $V_{CGR}$ | $T_J$ = 25°C to 150°C; $R_{GE}$ = 1 MΩ | 600 | V |
| $V_{GES}$ | Continuous | ±20 | V |
| $V_{GEM}$ | Transient | ±30 | V |
| $I_{C25}$ | $T_C$ = 25°C (limited by leads) | 70 | A |
| $I_{C110}$ | $T_C$ = 110°C | 30 | A |
| $I_{CM}$ | $T_C$ = 25°C, 1 ms | 150 | A |
| **SSOA (RBSOA)** | $V_{GE}$ = 15 V, $T_{VJ}$ = 125°C, $R_G$ = 10 Ω<br>Clamped inductive load @ ≤ 600 V | $I_{CM}$ = 60 | A |
| $P_C$ | $T_C$ = 25°C | 190 | W |
| $T_J$ | | -55 ... +150 | °C |
| $T_{JM}$ | | 150 | °C |
| $T_{stg}$ | | -55 ... +150 | °C |
| Maximum lead temperature for soldering 1.6 mm (0.062 in.) from case for 10 s | | 300 | °C |
| $M_d$ | Mounting torque | 1.13/10Nm/lb.in. | |
| **Weight** | | 4 | g |

**TO-220 (IXSP)**




G = Gate, C = Collector,
E = Emitter, TAB = Collector

**Features**

- Medium frequency IGBT
- Square RBSOA
- High current handling capability
- MOS Gate turn-on
  - drive simplicity

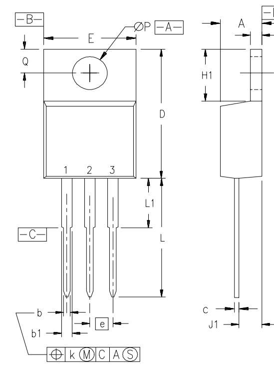
**Applications**

- PFC circuits
- Uninterruptible power supplies (UPS)
- Switched-mode and resonant-mode power supplies
- AC motor speed control
- DC servo and robot drives
- DC choppers

**Characteristic Values** ($T_J$ = 25°C, unless otherwise specified)

| Symbol | Test Conditions | | min. | typ. | max. | |
|---|---|---|---|---|---|---|
| $V_{GE(th)}$ | $I_C$ = 250 µA, $V_{CE}$ = $V_{GE}$ | | 2.5 | | 5.0 | V |
| $I_{CES}$ | $V_{CE}$ = $V_{CES}$<br>$V_{GE}$ = 0 V | $T_J$ = 25°C<br>$T_J$ = 150°C | | | 50<br>1 | µA<br>mA |
| $I_{GES}$ | $V_{CE}$ = 0 V, $V_{GE}$ = ±20 V | | | | ±100 | nA |
| $V_{CE(sat)}$ | $I_C$ = 24 A, $V_{GE}$ = 15 V | $T_J$ = 25°C | | | 1.8 | V |

| Symbol | Test Conditions | Characteristic Values ($T_J$ = 25°C, unless otherwise specified) min. | typ. | max. | |
|---|---|---|---|---|---|
| $g_{fs}$ | $I_C$ = 24 A; $V_{CE}$ = 10 V, Pulse test, t ≤ 300 µs, duty cycle ≤ 2 % | 18 | 26 | | S |
| $C_{ies}$ | $V_{CE}$ = 25 V, $V_{GE}$ = 0 V, f = 1 MHz | | 1500 | | pF |
| $C_{oes}$ | | | 115 | | pF |
| $C_{res}$ | | | 40 | | pF |
| $Q_g$ | $I_C$ = 24 A, $V_{GE}$ = 15 V, $V_{CE}$ = 300 V | | 66 | | nC |
| $Q_{ge}$ | | | 9 | | nC |
| $Q_{gc}$ | | | 22 | | nC |
| $t_{d(on)}$ | **Inductive load, $T_J$ = 25°C** | | 13 | | ns |
| $t_{ri}$ | $I_C$ = 24 A, $V_{GE}$ = 15 V | | 15 | | ns |
| $t_{d(off)}$ | $V_{CE}$ = 400 V, $R_G$ = 5 Ω | | 110 | 200 | ns |
| $t_{fi}$ | | | 82 | 150 | ns |
| $E_{off}$ | | | 0.32 | 0.6 | mJ |
| $t_{d(on)}$ | **Inductive load, $T_J$ = 125°C** | | 13 | | ns |
| $t_{ri}$ | $I_C$ = 24 A, $V_{GE}$ = 15 V | | 17 | | ns |
| $E_{on}$ | $V_{CE}$ = 400 V, $R_G$ = 5 Ω | | 0.22 | | mJ |
| $t_{d(off)}$ | | | 200 | | ns |
| $t_{fi}$ | | | 150 | | ns |
| $E_{off}$ | | | 0.9 | | mJ |
| $R_{thJC}$ | | | | 0.65 | K/W |
| $R_{thCH}$ | | | 0.25 | | K/W |




Pins: 1 - Gate 2 - Drain
3 - Source 4 - Drain

| SYM | INCHES MIN | INCHES MAX | MILLIMETERS MIN | MILLIMETERS MAX |
|---|---|---|---|---|
| A | .170 | .190 | 4.32 | 4.83 |
| b | .025 | .040 | 0.64 | 1.02 |
| b1 | .045 | .065 | 1.15 | 1.65 |
| c | .014 | .022 | 0.35 | 0.56 |
| D | .580 | .630 | 14.73 | 16.00 |
| E | .390 | .420 | 9.91 | 10.66 |
| e | .100 BSC | | 2.54 BSC | |
| F | .045 | .055 | 1.14 | 1.40 |
| H1 | .230 | .270 | 5.85 | 6.85 |
| J1 | .090 | .110 | 2.29 | 2.79 |
| k | 0 | .015 | 0 | 0.38 |
| L | .500 | .550 | 12.70 | 13.97 |
| L1 | .110 | .230 | 2.79 | 5.84 |
| ØP | .139 | .161 | 3.53 | 4.08 |
| Q | .100 | .125 | 2.54 | 3.18 |

**Fig. 1. Output Characteristics @ 25 Deg. C**

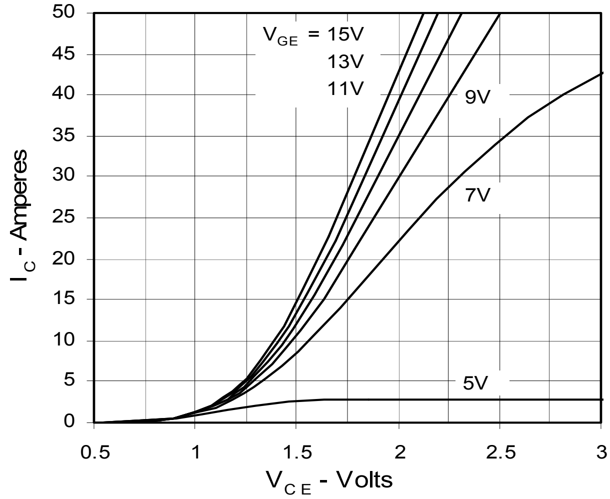



**Fig. 2. Extended Output Characteristics @ 25 deg. C**

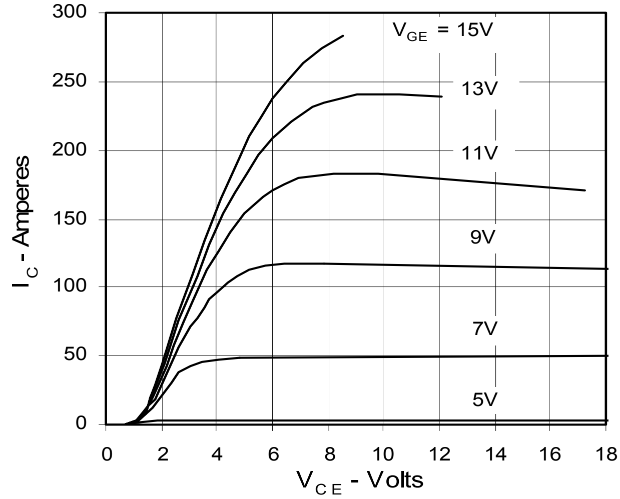



**Fig. 3. Output Characteristics @ 125 Deg. C**

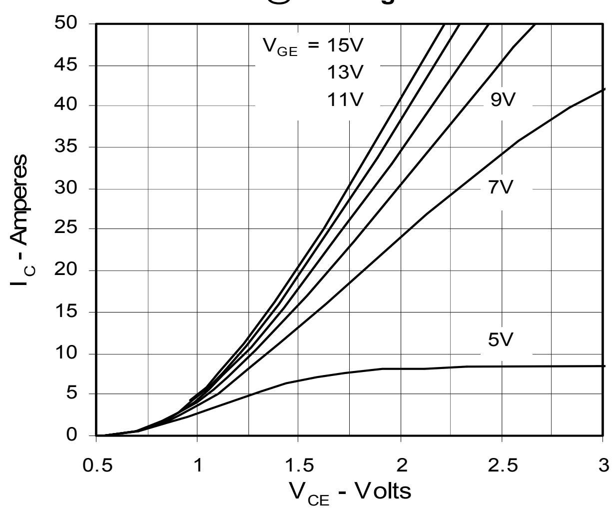



**Fig. 4. Dependence of $V_{CE(sat)}$ on Temperature**

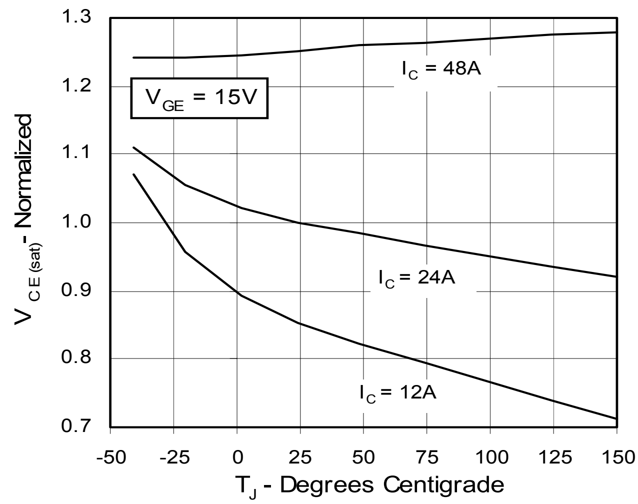



**Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter voltage**

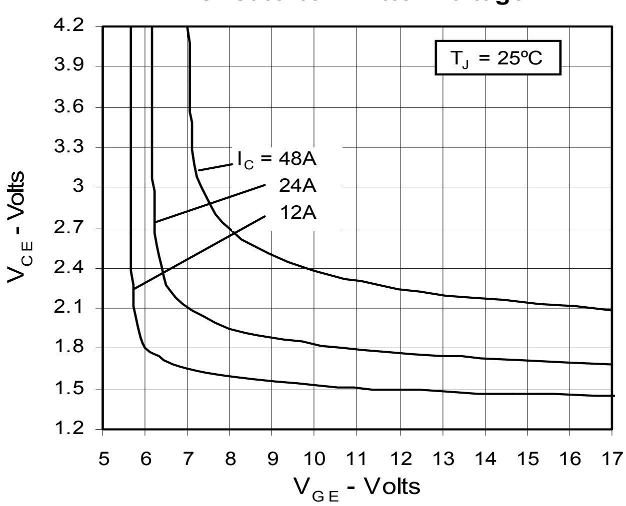



**Fig. 6. Input Admittance**

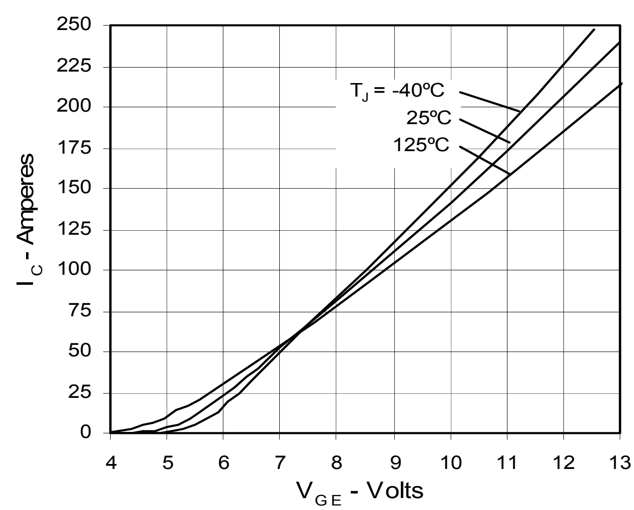


**Fig. 7. Transconductance**

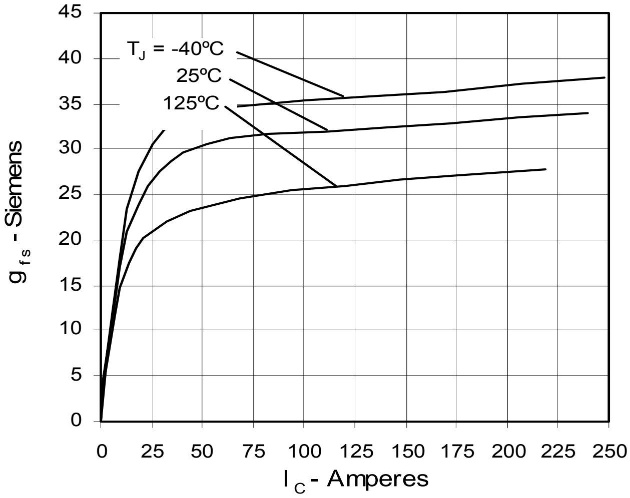



**Fig. 8. Dependence of Turn-Off Energy on $R_G$**

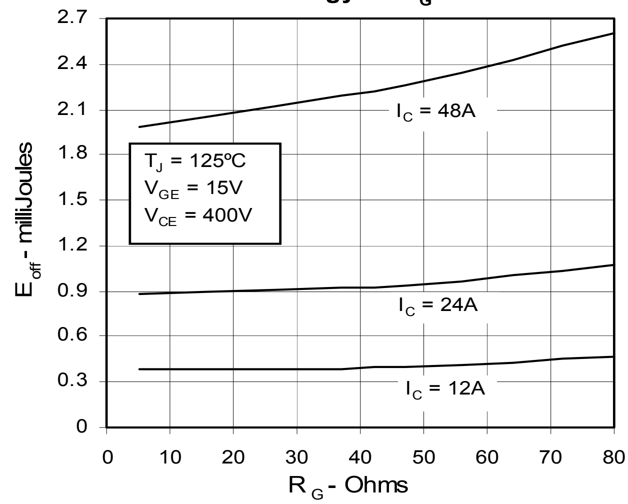



**Fig. 9. Dependence of Turn-Off Energy on $I_C$**

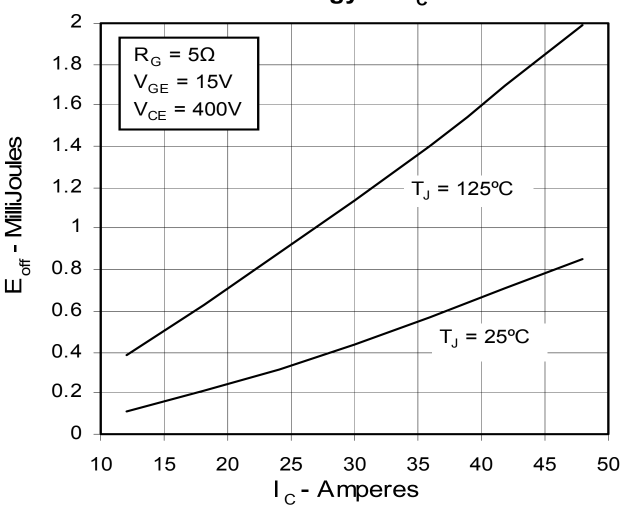



**Fig. 10. Dependence of Turn-Off Energy on Temperature**

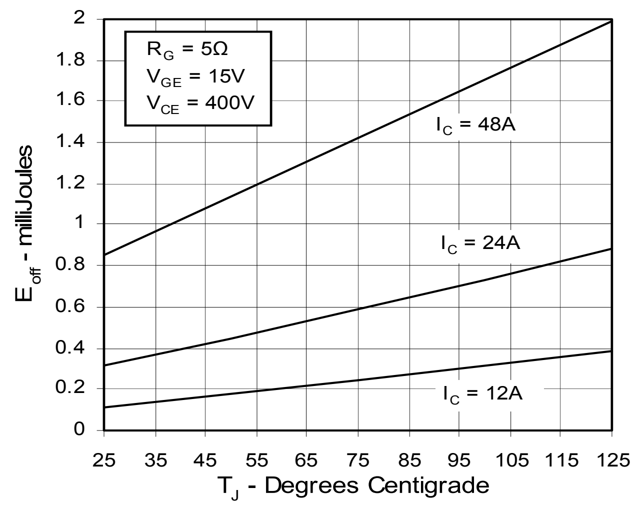



**Fig. 11. Dependence of Turn-Off Switching Time on $R_G$**

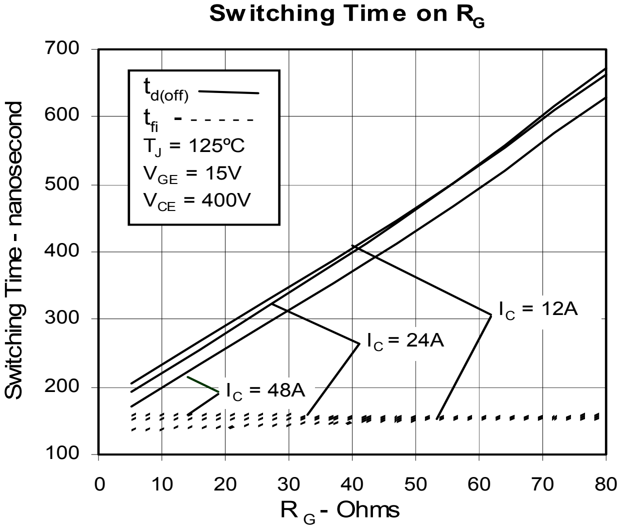
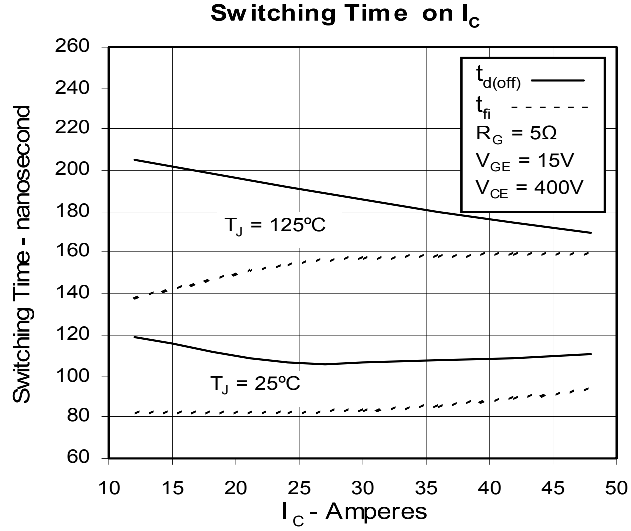



**Fig. 12. Dependence of Turn-Off Switching Time on $I_C$**




IXYS reserves the right to change limits, test conditions, and dimensions.

Fig. 13. Dependence of Turn-Off Switching Time on Temperature

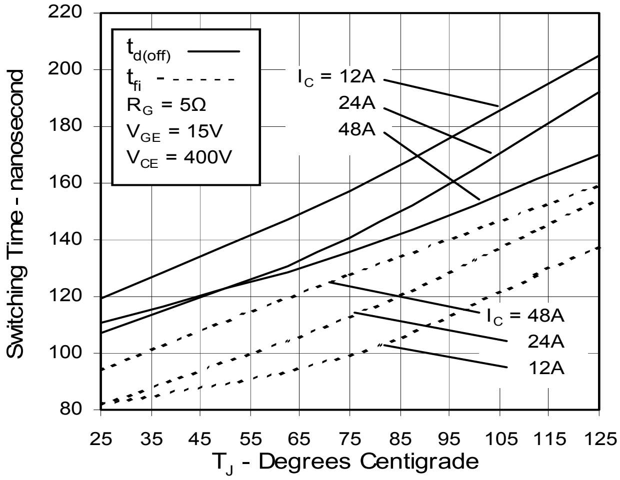



Fig. 14. Gate Charge

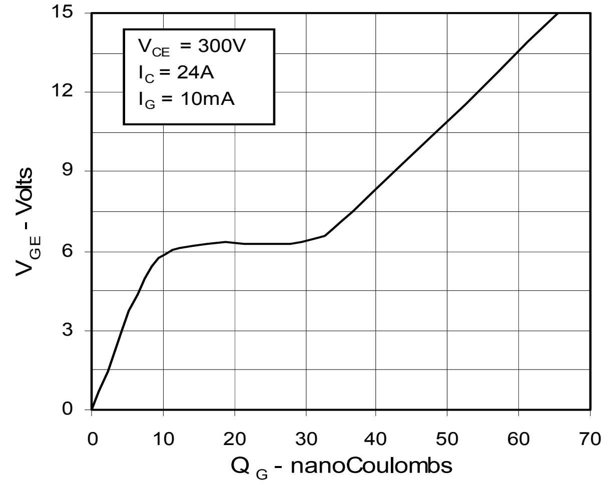



Fig. 15. Capacitance

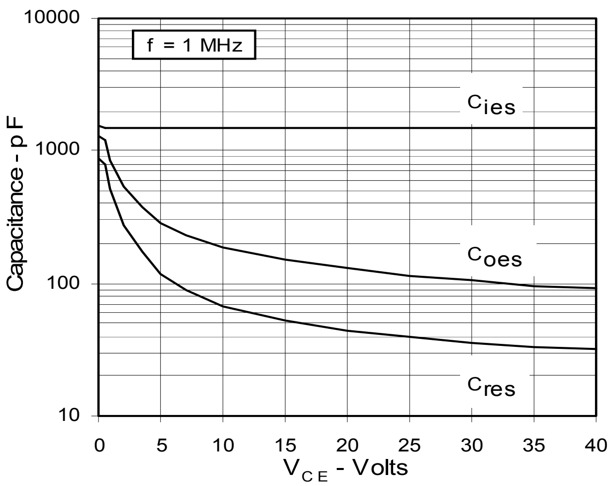



Fig. 16. Maximum Transient Thermal Resistance