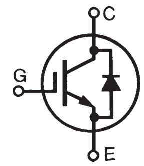
Advance Technical Information

# GenX3™ 600V IGBT w/Diode

# IXGK72N60A3H1
# IXGX72N60A3H1

| | | |
|---|---|---|
| $V_{CES}$ | = | 600V |
| $I_{C110}$ | = | 72A |
| $V_{CE(sat)}$ | ≤ | 1.35V |
| $t_{fi(typ)}$ | = | 250ns |

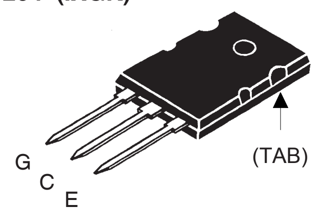
Ultra-Low Vsat PT IGBTs for up to 5kHz Switching



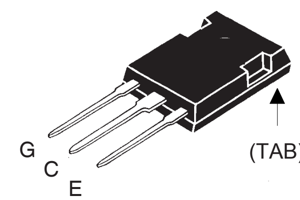

| Symbol | Test Conditions | Maximum Ratings | |
|---|---|---|---|
| $V_{CES}$ | $T_J$ = 25°C to 150°C | 600 | V |
| $V_{CGR}$ | $T_J$ = 25°C to 150°C, $R_{GE}$ = 1MΩ | 600 | V |
| $V_{GES}$ | Continuous | ±20 | V |
| $V_{GEM}$ | Transient | ±30 | V |
| $I_{C25}$ | $T_C$ = 25°C (Limited by Leads) | 75 | A |
| $I_{C110}$ | $T_C$ = 110°C | 72 | A |
| $I_{F110}$ | $T_C$ = 110°C | 68 | A |
| $I_{CM}$ | $T_C$ = 25°C, 1ms | 400 | A |
| **SSOA** | $V_{GE}$ = 15V, $T_{VJ}$ = 125°C, $R_G$ = 3Ω | $I_{CM}$ = 150 | A |
| **(RBSOA)** | Clamped Inductive Load | @ $V_{CE}$ ≤ 600 | V |
| $P_C$ | $T_C$ = 25°C | 540 | W |
| $T_J$ | | -55 ... +150 | °C |
| $T_{JM}$ | | 150 | °C |
| $T_{stg}$ | | -55 ... +150 | °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. |
| $T_L$ | Maximum Lead Temperature for Soldering | 300 | °C |
| $T_{SOLD}$ | 1.6mm (0.062 in.) from Case for 10s | 260 | °C |
| **Weight** | TO-264 | 10 | g |
| | PLUS247 | 6 | g |

| Symbol | Test Conditions | Characteristic Values | | | |
|---|---|---|---|---|---|
| ($T_J$ = 25°C, Unless Otherwise Specified) | | Min. | Typ. | Max. | |
| $V_{GE(th)}$ | $I_C$ = 250μA, $V_{CE}$ = $V_{GE}$ | 3.0 | | 5.0 | V |
| $I_{CES}$ | $V_{CE}$ = $V_{CES}$, $V_{GE}$ = 0V | | | 300 | μA |
| | $T_J$ = 125°C | | | 5 | mA |
| $I_{GES}$ | $V_{CE}$ = 0V, $V_{GE}$ = ±20V | | | ±100 | nA |
| $V_{CE(sat)}$ | $I_C$ = 60A, $V_{GE}$ = 15V, Note 1 | | | 1.35 | V |

**TO-264 (IXGK)**




**PLUS247 (IXGX)**




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

### Features

- Optimized for Low Conduction Losses
- Square RBSOA
- Anti-Parallel Ultra Fast Diode
- International Standard Packages

### Advantages

- High Power Density
- Low Gate Drive Requirement

### Applications

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

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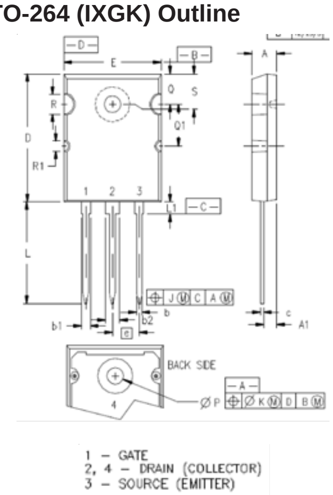
| Symbol | Test Conditions ($T_J$ = 25°C, Unless Otherwise Specified) | Characteristic Values Min. | Typ. | Max. |
|---|---|---|---|---|
| $g_{fs}$ | $I_C$ = 60A, $V_{CE}$ = 10V, Note 1 | 48 | 75 | S |
| $C_{ies}$ | $V_{CE}$ = 25V, $V_{GE}$ = 0V, f = 1MHz | | 6600 | pF |
| $C_{oes}$ | | | 360 | pF |
| $C_{res}$ | | | 80 | pF |
| $Q_g$ | $I_C$ = 60A, $V_{GE}$ = 15V, $V_{CE}$ = 0.5 • $V_{CES}$ | | 230 | nC |
| $Q_{ge}$ | | | 40 | nC |
| $Q_{gc}$ | | | 80 | nC |
| $t_{d(on)}$ | **Inductive load, $T_J$ = 25°C** | | 31 | ns |
| $t_{ri}$ | $I_C$ = 50A, $V_{GE}$ = 15V | | 34 | ns |
| $E_{on}$ | $V_{CE}$ = 480V, $R_G$ = 3Ω | | 1.4 | mJ |
| $t_{d(off)}$ | | | 320 | ns |
| $t_{fi}$ | | | 250 | ns |
| $E_{off}$ | | | 3.5 | mJ |
| $t_{d(on)}$ | **Inductive load, $T_J$ = 125°C** | | 29 | ns |
| $t_{ri}$ | $I_C$ = 50A, $V_{GE}$ = 15V | | 34 | ns |
| $E_{on}$ | $V_{CE}$ = 480V, $R_G$ = 3Ω | | 2.6 | mJ |
| $t_{d(off)}$ | | | 510 | ns |
| $t_{fi}$ | | | 375 | ns |
| $E_{off}$ | | | 6.5 | mJ |
| $R_{thJC}$ | | | | 0.23 °C/W |
| $R_{thCS}$ | | | 0.15 | °C/W |

### Reverse Diode (FRED)

| Symbol | Test Conditions ($T_J$ = 25°C, Unless Otherwise Specified) | Characteristic Values Min. | Typ. | Max. | |
|---|---|---|---|---|---|
| $V_F$ | $I_F$ = 60A, $V_{GE}$ = 0V, Note 1 | | 1.6 | 2.0 | V |
| | $T_J$ = 150°C | | 1.4 | 1.8 | V |
| $I_{RM}$ | $I_F$ = 60A, $V_{GE}$ = 0V, $T_J$ = 100°C | | 8.3 | | A |
| $t_{rr}$ | $I_F$ = 60A, -di/dt = 200A/μs, $V_R$ = 300V | | 140 | | ns |
| $R_{thJC}$ | | | | 0.3 °C/W | |

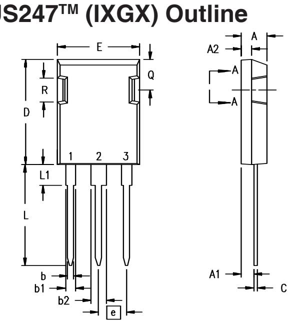
Note 1: Pulse Test, t ≤ 300μs, Duty Cycle, d ≤ 2%.

### TO-264 (IXGK) Outline




| DIM | INCHES MIN | MAX | MILLIMETERS MIN | MAX |
|---|---|---|---|---|
| A | 0.185 | 0.209 | 4.70 | 5.31 |
| A1 | 0.102 | 0.118 | 2.59 | 3.00 |
| b | 0.037 | 0.055 | 0.94 | 1.40 |
| b1 | 0.087 | 0.102 | 2.21 | 2.59 |
| b2 | 0.110 | 0.126 | 2.79 | 3.20 |
| c | 0.017 | 0.029 | 0.43 | 0.74 |
| D | 1.007 | 1.047 | 25.58 | 26.59 |
| E | 0.760 | 0.799 | 19.30 | 20.29 |
| e | .215 BSC | | 5.46 BSC | |
| J | 0.000 | 0.010 | 0.00 | 0.25 |
| K | 0.000 | 0.010 | 0.00 | 0.25 |
| L | 0.779 | 0.842 | 19.79 | 21.39 |
| L1 | 0.087 | 0.102 | 2.21 | 2.59 |
| ØP | 0.122 | 0.138 | 3.10 | 3.51 |
| Q | 0.240 | 0.256 | 6.10 | 6.50 |
| Q1 | 0.330 | 0.346 | 8.38 | 8.79 |
| ØR | 0.155 | 0.187 | 3.94 | 4.75 |
| ØR1 | 0.085 | 0.093 | 2.16 | 2.36 |
| S | 0.243 | 0.253 | 6.17 | 6.43 |

### PLUS247™ (IXGX) Outline



Terminals: 1 - Gate, 2 - Drain (Collector), 3 - Source (Emitter), 4 - Drain (Collector)

| Dim. | Millimeter Min. | Max. | Inches Min. | Max. |
|---|---|---|---|---|
| A | 4.83 | 5.21 | .190 | .205 |
| $A_1$ | 2.29 | 2.54 | .090 | .100 |
| $A_2$ | 1.91 | 2.16 | .075 | .085 |
| b | 1.14 | 1.40 | .045 | .055 |
| $b_1$ | 1.91 | 2.13 | .075 | .084 |
| $b_2$ | 2.92 | 3.12 | .115 | .123 |
| C | 0.61 | 0.80 | .024 | .031 |
| D | 20.80 | 21.34 | .819 | .840 |
| E | 15.75 | 16.13 | .620 | .635 |
| e | 5.45 BSC | | .215 BSC | |
| L | 19.81 | 20.32 | .780 | .800 |
| L1 | 3.81 | 4.32 | .150 | .170 |
| Q | 5.59 | 6.20 | .220 | 0.244 |
| R | 4.32 | 4.83 | .170 | .190 |

## ADVANCE 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.

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IXYS MOSFETs and IGBTs are covered by one or moreof the following U.S. patents: 4,835,592 4,850,072 4,881,106 4,931,844 5,017,508 5,034,796 5,049,961 5,063,307 5,187,117 5,237,481 5,381,025 5,486,715 6,162,665 6,259,123 B1 6,306,728 B1 6,404,065 B1 6,534,343 6,583,505 6,683,344 6,710,405 B2 6,710,463 6,727,585 6,759,692 6,771,478 B2 7,005,734 B2 7,063,975 B2 7,071,537 7,157,338B2

**Fig. 1. Output Characteristics @ 25ºC**

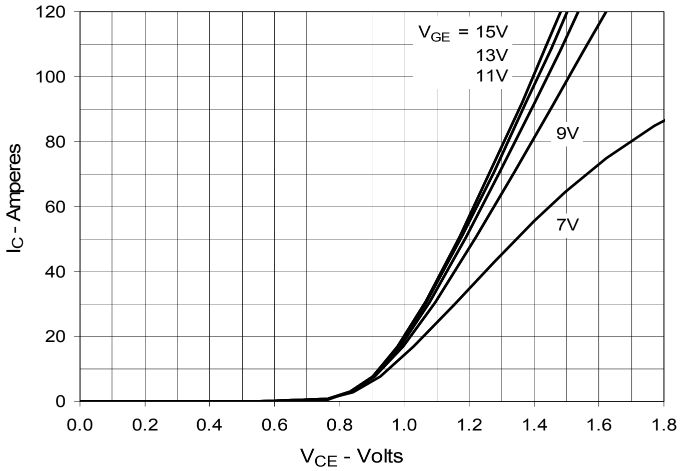


**Fig. 2. Extended Output Characteristics @ 25ºC**

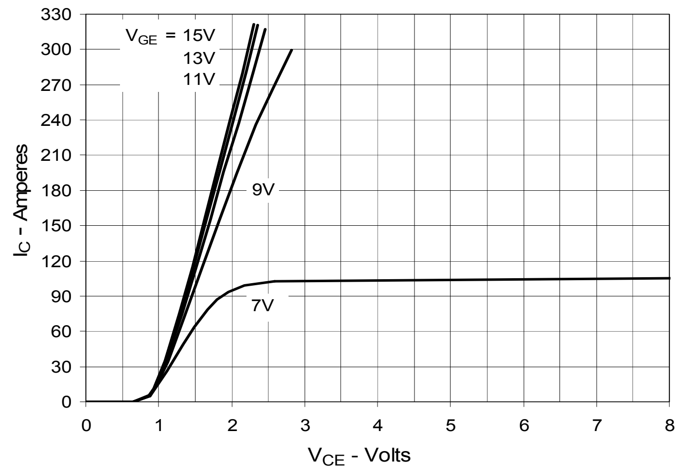


**Fig. 3. Output Characteristics @ 125ºC**

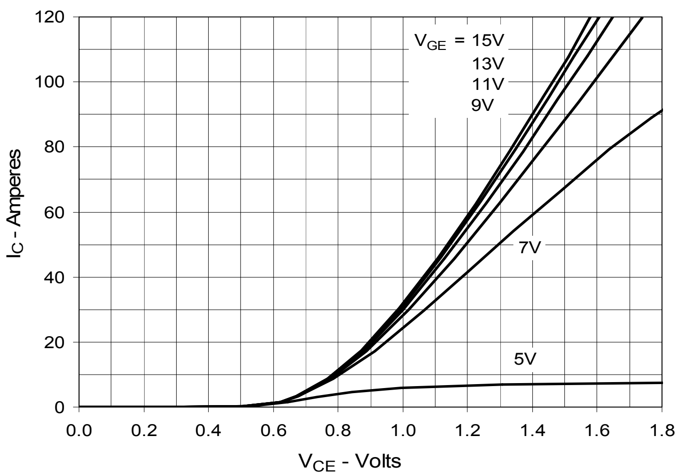


**Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature**

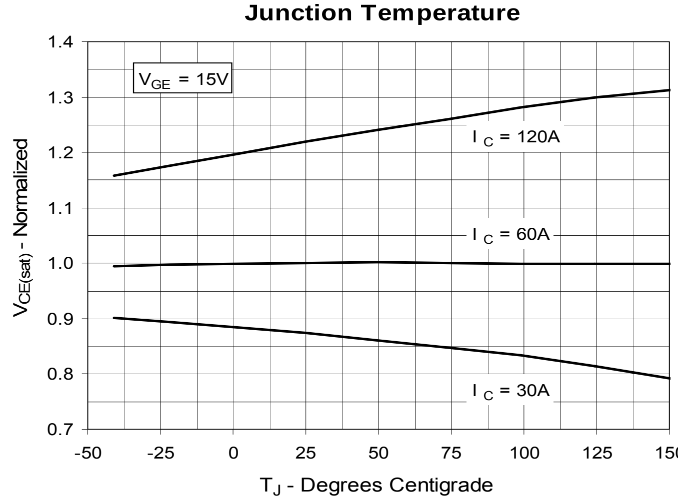


**Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage**

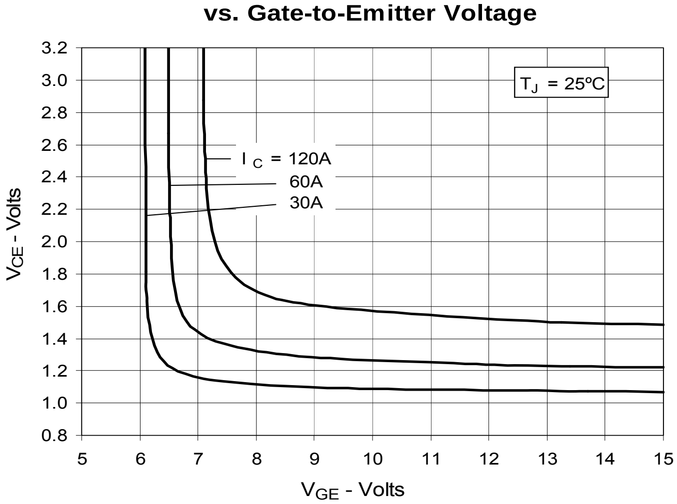


**Fig. 6. Input Admittance**

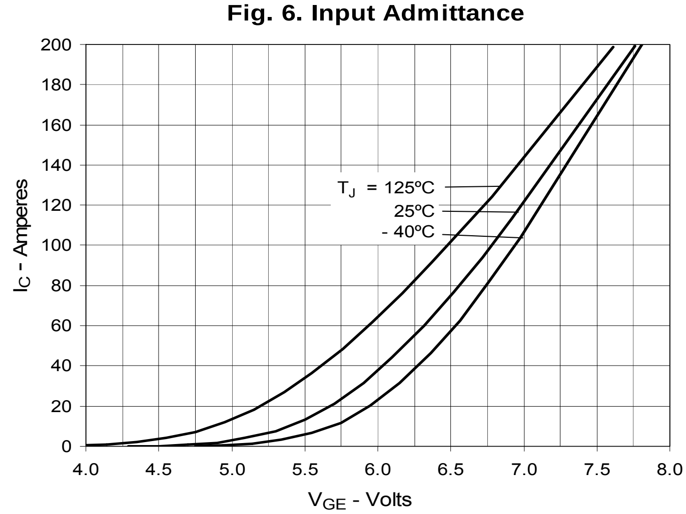


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**Fig. 7. Transconductance**

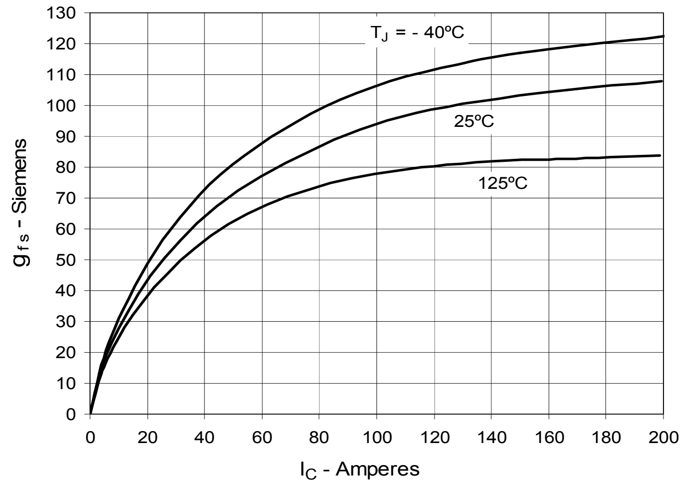



**Fig. 8. Gate Charge**

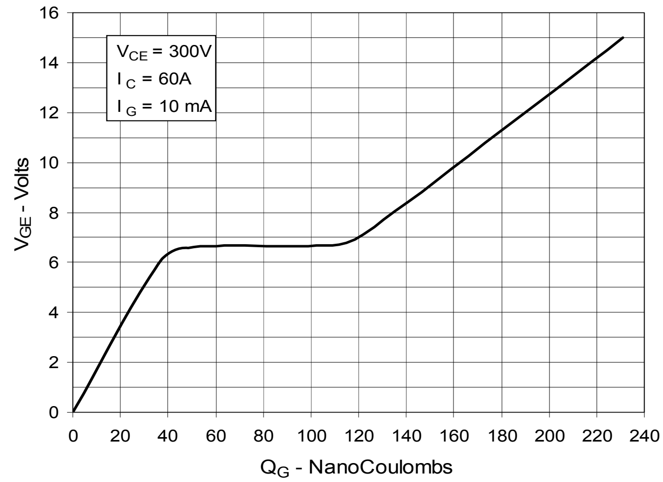



**Fig. 9. Capacitance**

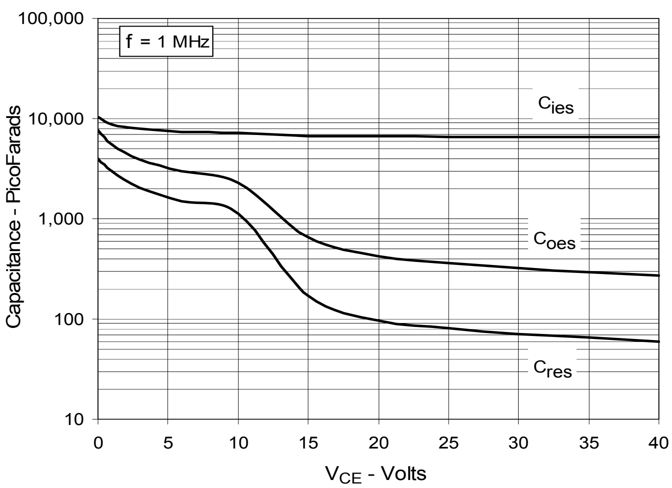



**Fig. 10. Reverse-Bias Safe Operating Area**

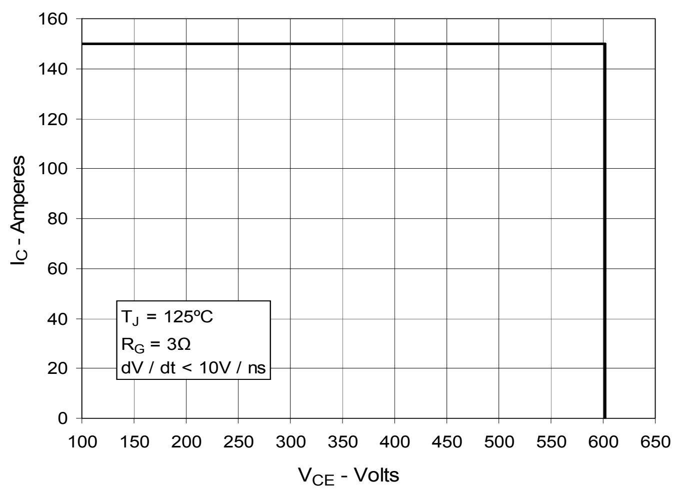
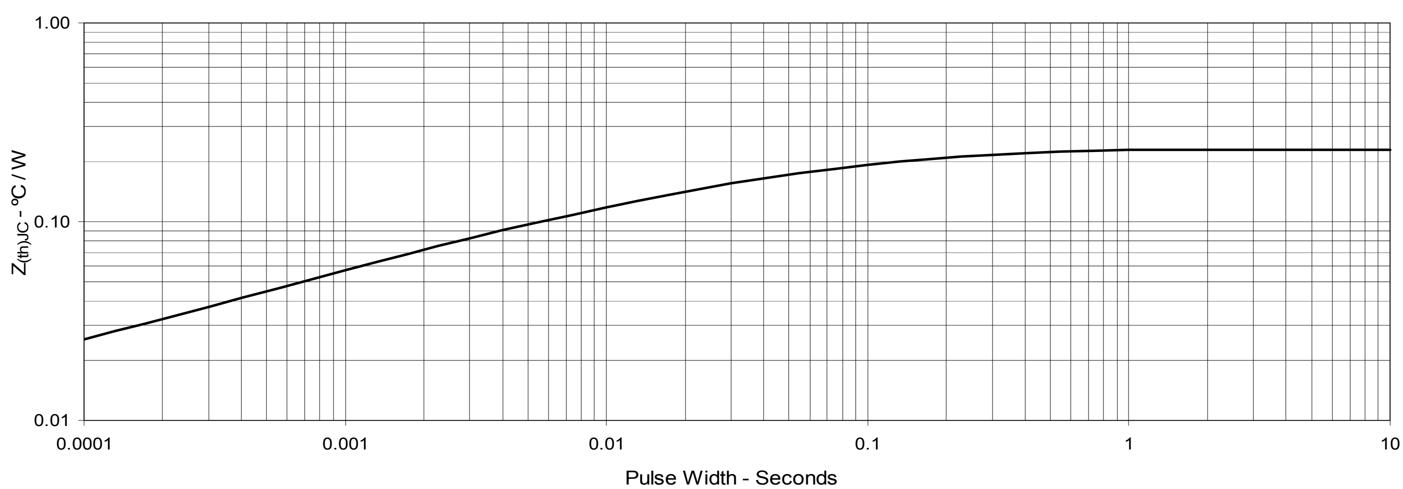



**Fig. 11. Maximum Transient Thermal Impedance**

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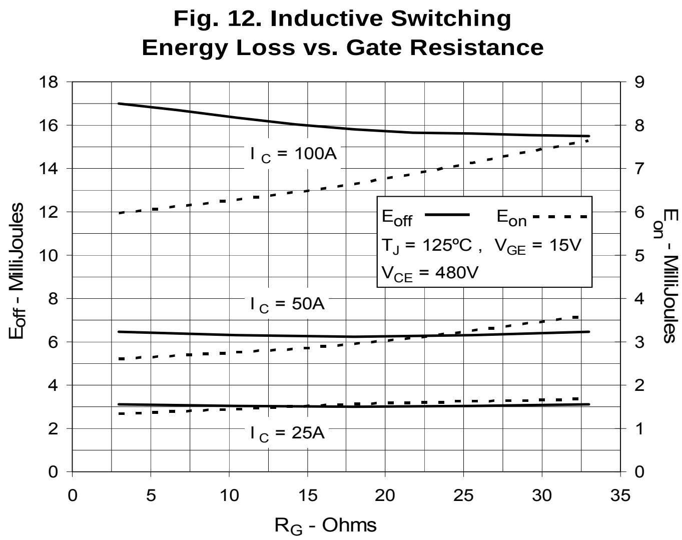


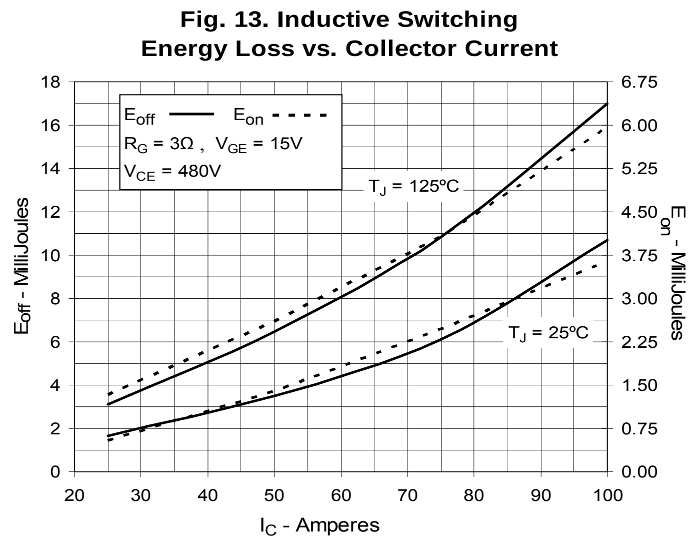


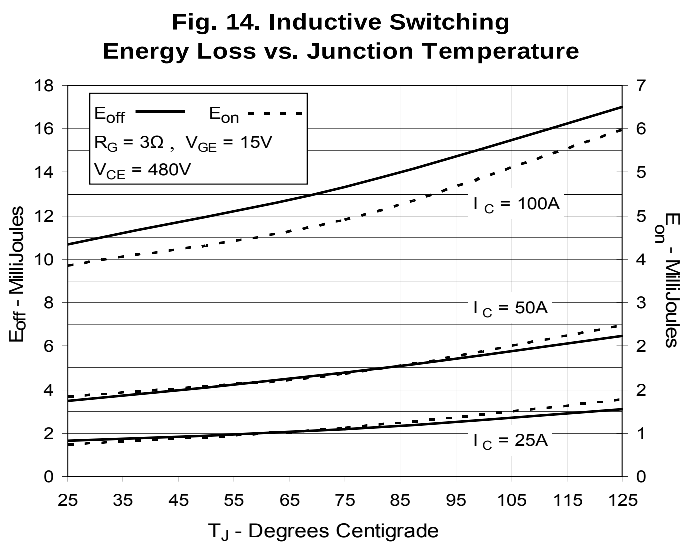


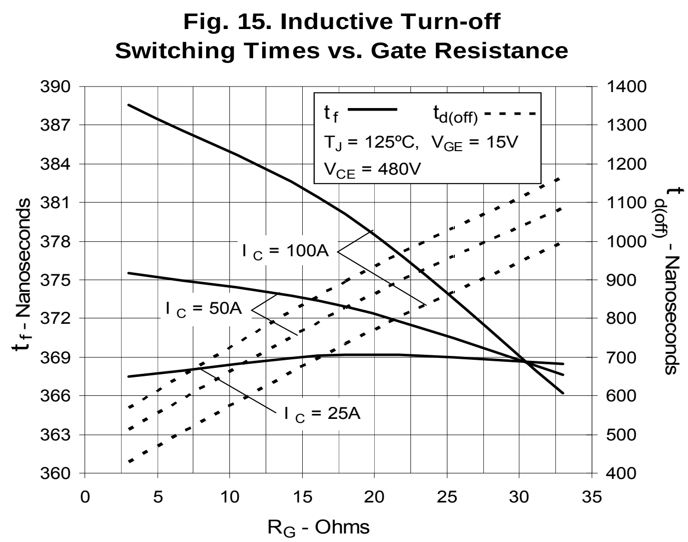


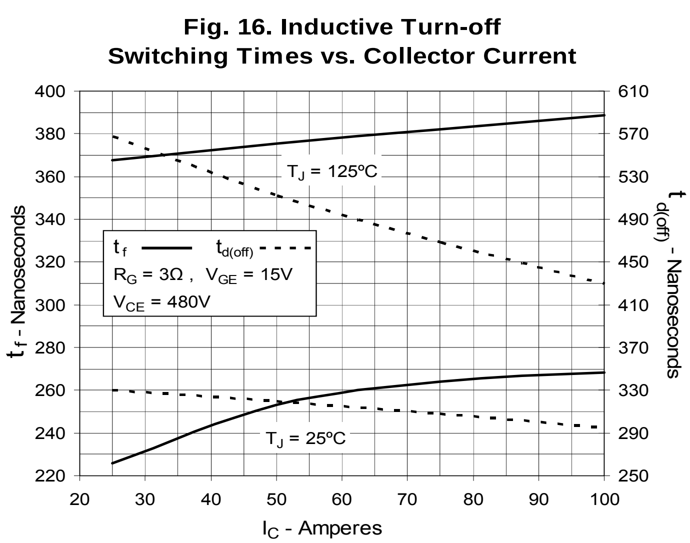


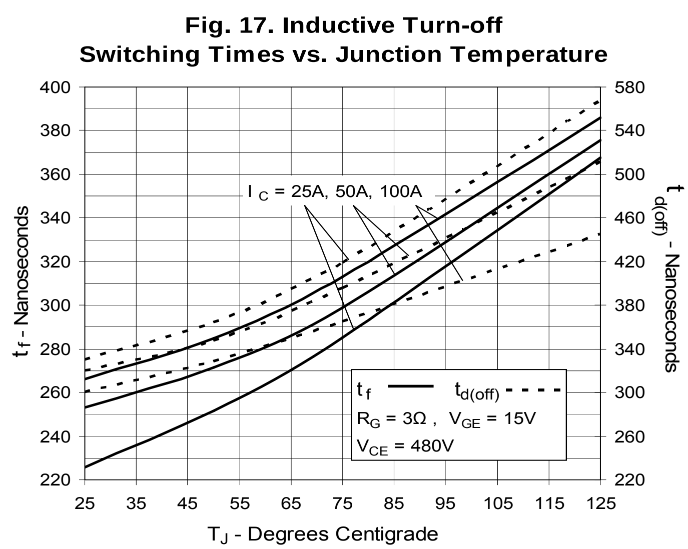


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**Fig. 18. Inductive Turn-on Switching Times vs. Gate Resistance**

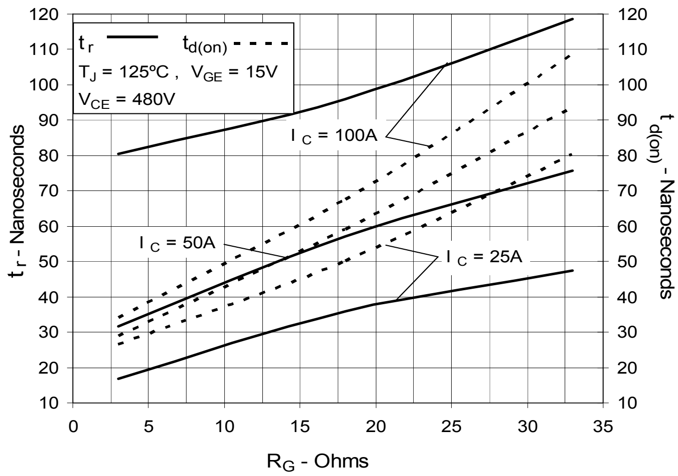



**Fig. 19. Inductive Turn-on Switching Times vs. Collector Current**

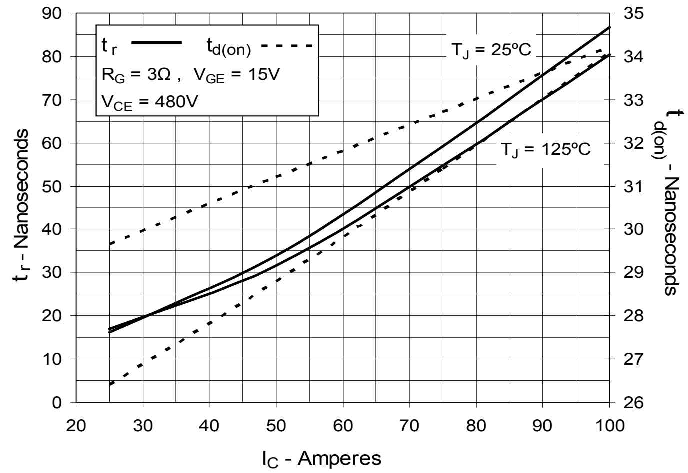
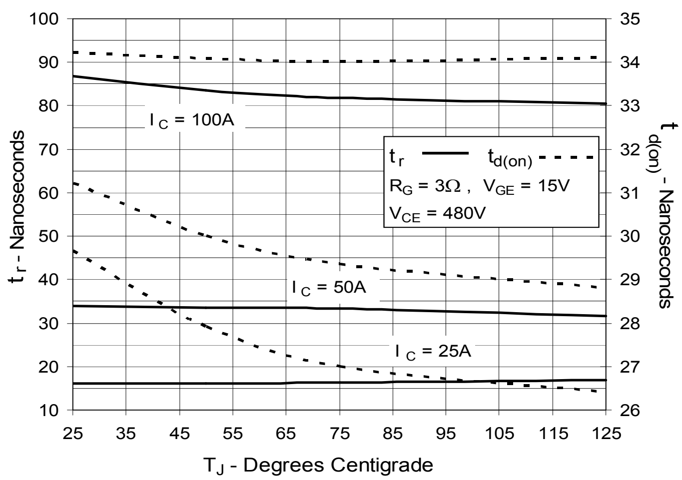



**Fig. 20. Inductive Turn-on Switching Times vs. Junction Temperature**

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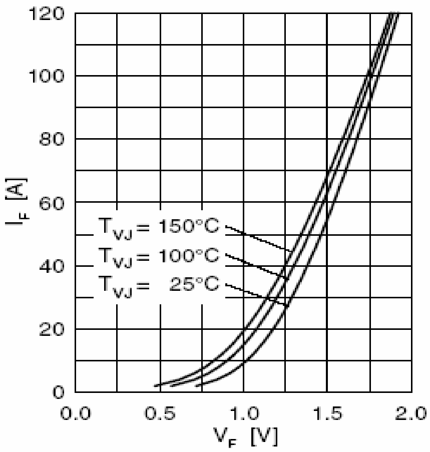


Fig. 21 Forward current $I_F$ vs. $V_F$

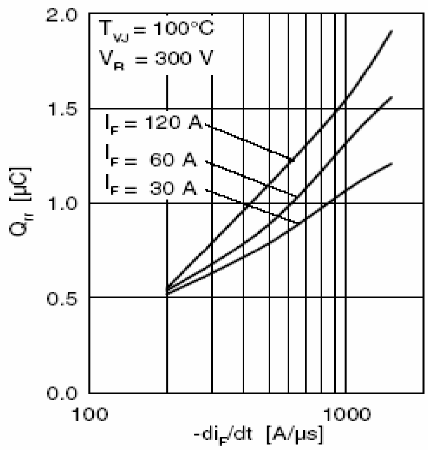


Fig. 22 Typ. reverse recovery charge $Q_{rr}$

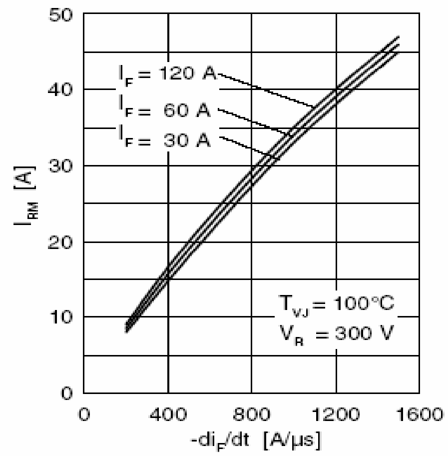


Fig. 23 Typ. peak reverse current $I_{RM}$

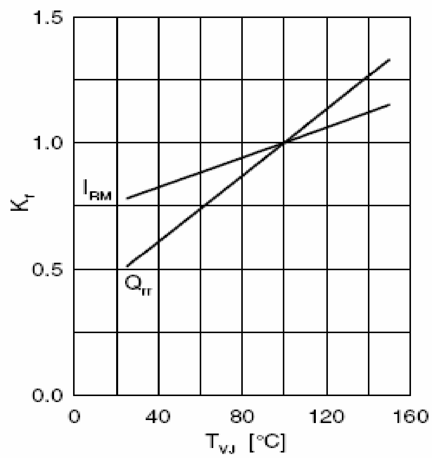


Fig. 24 Typ. dynamic parameters $Q_{rr}$, $I_{RM}$

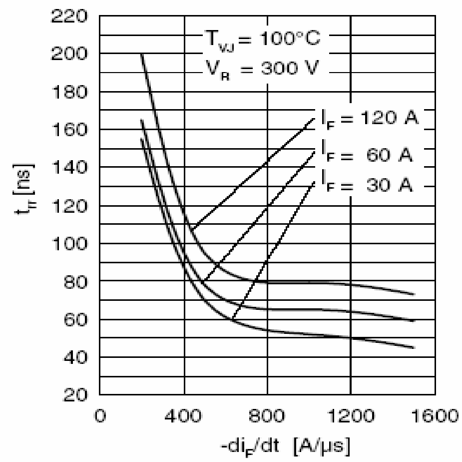


Fig. 25 Typ. recovery time $t_{rr}$

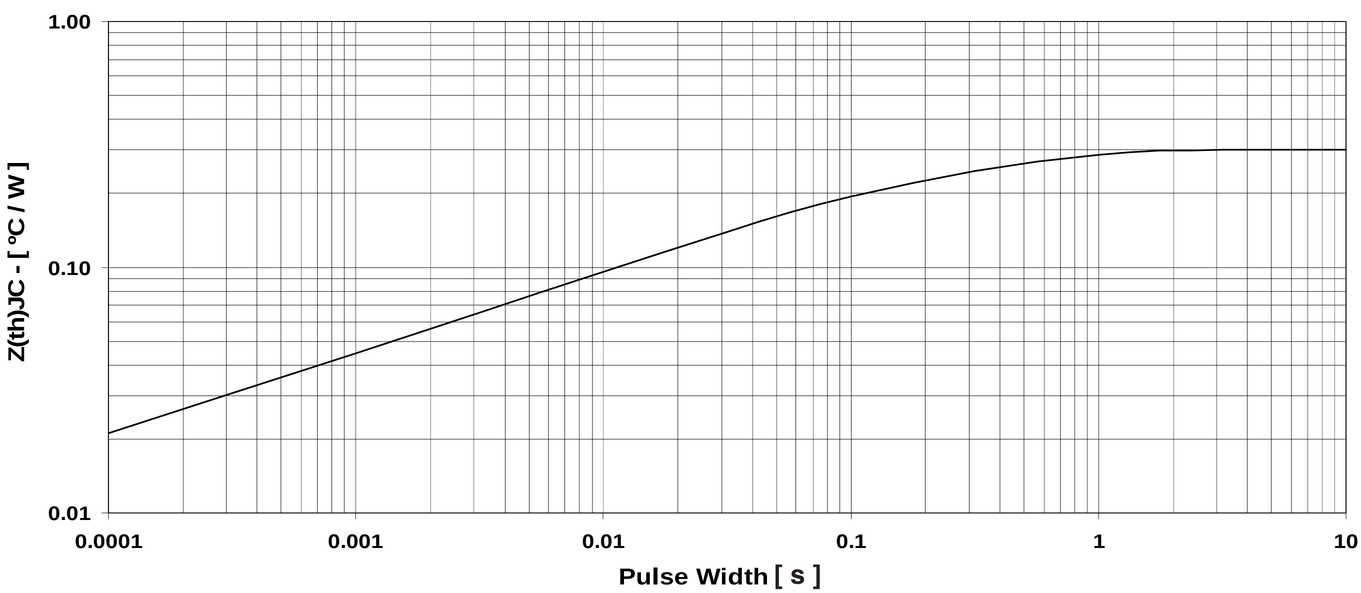


**Fig. 26 Maximum transient thermal impedance junction to case (for diode)**

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Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits,General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.


### Как с нами связаться

**Телефон:** 8 (812) 309 58 32 (многоканальный)
**Факс:** 8 (812) 320-02-42
**Электронная почта:** org@eplast1.ru
**Адрес:** 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.