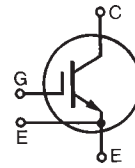


$$V_{CES} = 600V$$

$$I_{C25} = 400A$$

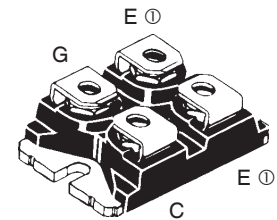
$$V_{CE(sat)} \leq 1.25V$$

Ultra-Low-V<sub>sat</sub> PT IGBT for  
up to 5kHz Switching



| Symbol                        | Test Conditions   | Maximum Ratings                         |            |
|-------------------------------|---|---|------------|
| $V_{CES}$                     | $T_J = 25^\circ C$ to $150^\circ C$   | 600                                     | V          |
| $V_{CGR}$                     | $T_J = 25^\circ C$ to $150^\circ C$ , $R_{GE} = 1M\Omega$                             | 600                                     | V          |
| $V_{GES}$                     | Continuous  | $\pm 20$                                | V          |
| $V_{GEM}$                     | Transient   | $\pm 30$                                | V          |
| $I_{C25}$                     | $T_C = 25^\circ C$ (Chip Capability)  | 400                                     | A          |
| $I_{C110}$                    | $T_C = 110^\circ C$   | 190                                     | A          |
| $I_{LRMS}$                    | Terminal Current Limit  | 200                                     | A          |
| $I_{CM}$                      | $T_C = 25^\circ C$ , 1ms  | 800                                     | A          |
| <b>SSOA</b><br><b>(RBSOA)</b> | $V_{GE} = 15V$ , $T_{VJ} = 125^\circ C$ , $R_G = 0.5\Omega$<br>Clamped Inductive Load | $I_{CM} = 400$<br>@ $0.8 \cdot V_{CES}$ | A          |
| $P_C$                         | $T_C = 25^\circ C$  | 830                                     | W          |
| $T_J$                         |   | -55 ... +150                            | $^\circ C$ |
| $T_{JM}$                      |   | 150                                     | $^\circ C$ |
| $T_{stg}$                     |   | -55 ... +150                            | $^\circ C$ |
| $V_{ISOL}$                    | 50/60Hz   | t = 1min                                | 2500 V~    |
|                               | $I_{ISOL} \leq 1mA$   | t = 1s                                  | 3000 V~    |
| $M_d$                         | Mounting Torque   | 1.5/13                                  | Nm/lb.in.  |
|                               | Terminal Connection Torque (M4)   | 1.3/11.5                                | Nm/lb.in.  |
| <b>Weight</b>                 |   | 30                                      | g          |

SOT-227B, miniBLOC  
E153432



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

### Features

- Optimized for Low Conduction losses
- Square RBSOA
- High Current Capability
- Isolation Voltage 3000 V~
- International Standard Package

### Advantages

- High Power Density
- Low Gate Drive Requirement

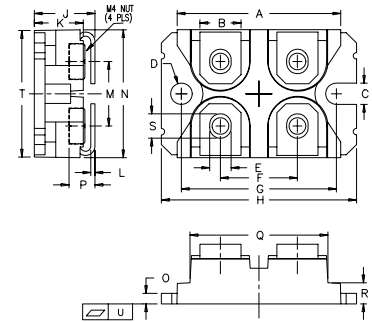
### Applications

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

| Symbol        | Test Conditions<br>( $T_J = 25^\circ C$ , Unless Otherwise Specified) | Characteristic Values |      |              |
|---------------|---|-----------------------|------|--------------|
|               |   | Min.                  | Typ. | Max.         |
| $BV_{CES}$    | $I_C = 1mA$ , $V_{GE} = 0V$   | 600                   |      | V            |
| $V_{GE(th)}$  | $I_C = 4mA$ , $V_{CE} = V_{GE}$                                       | 3.0                   |      | 5.0 V        |
| $I_{CES}$     | $V_{CE} = V_{CES}$ , $V_{GE} = 0V$<br>$T_J = 125^\circ C$             |                       |      | 250 $\mu A$  |
|               |   |                       |      | 2.5 mA       |
| $I_{GES}$     | $V_{CE} = 0V$ , $V_{GE} = \pm 20V$                                    |                       |      | $\pm 400$ nA |
| $V_{CE(sat)}$ | $I_C = 100A$ , $V_{GE} = 15V$ , Note 1<br>$I_C = 400A$                | 1.05                  | 1.25 | V            |
|               |   | 1.55                  |      | V            |

| Symbol       | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified) | Characteristic Values                       |      |                    |
|--------------|---|---|------|--------------------|
|              |   | Min.  | Typ. | Max.               |
| $g_{fs}$     | $I_C = 60\text{A}$ , $V_{CE} = 10\text{V}$ , Note 1                         | 85  | 140  | S                  |
| $C_{ies}$    | $V_{CE} = 25\text{V}$ , $V_{GE} = 0\text{V}$ , $f = 1\text{MHz}$            |   | 32   | nF                 |
| $C_{oes}$    |   |   | 1450 | pF                 |
| $C_{res}$    |   |   | 66   | pF                 |
| $Q_{g(on)}$  | $I_C = 100\text{V}$ , $V_{GE} = 15\text{V}$ , $V_{CE} = 0.5 \cdot V_{CES}$  |   | 870  | nC                 |
| $Q_{ge}$     |   |   | 120  | nC                 |
| $Q_{gc}$     |   |   | 300  | nC                 |
| $t_{d(on)}$  | <b>Resistive load, <math>T_J = 25^\circ\text{C}</math></b>                  |   | 25   | ns                 |
| $t_r$        |   | $I_C = 100\text{A}$ , $V_{GE} = 15\text{V}$ | 95   | ns                 |
| $t_{d(off)}$ | $V_{CE} = 400\text{V}$ , $R_G = 0.5\Omega$                                  |   | 170  | ns                 |
| $t_f$        |   |   | 270  | ns                 |
| $t_{d(on)}$  | <b>Resistive load, <math>T_J = 125^\circ\text{C}</math></b>                 |   | 27   | ns                 |
| $t_r$        |   | $I_C = 100\text{A}$ , $V_{GE} = 15\text{V}$ | 97   | ns                 |
| $t_{d(off)}$ | $V_{CE} = 400\text{V}$ , $R_G = 0.5\Omega$                                  |   | 190  | ns                 |
| $t_f$        |   |   | 650  | ns                 |
| $R_{thJC}$   |   |   | 0.15 | $^\circ\text{C/W}$ |
| $R_{thCK}$   |   | 0.05  |      | $^\circ\text{C/W}$ |

## SOT-227B miniBLOC (IXGN)



| 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   |

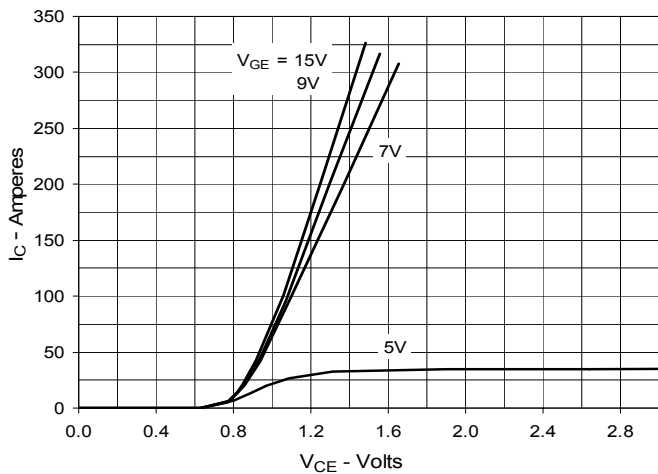
Note 1. Pulse test,  $t \leq 300\mu\text{s}$ ; duty cycle,  $d \leq 2\%$ .

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

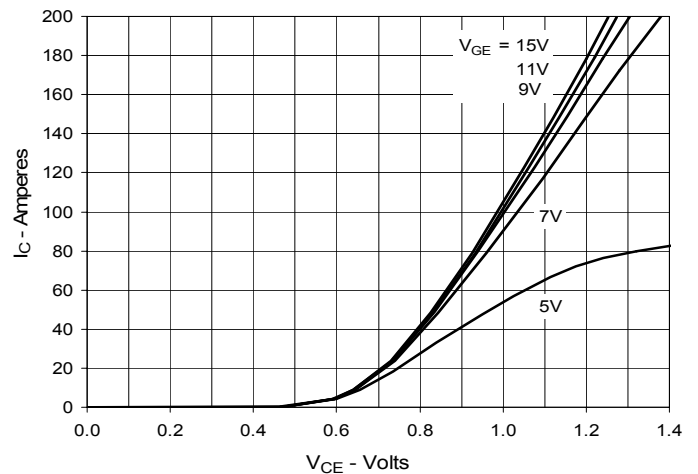
IXYS MOSFETs and IGBTs are covered by one or more of the following U.S. patents:

|           |           |           |           |              |              |              |              |              |             |
|-----------|-----------|-----------|-----------|--------------|--------------|--------------|--------------|--------------|-------------|
| 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 |
| 4,850,072 | 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    |             |

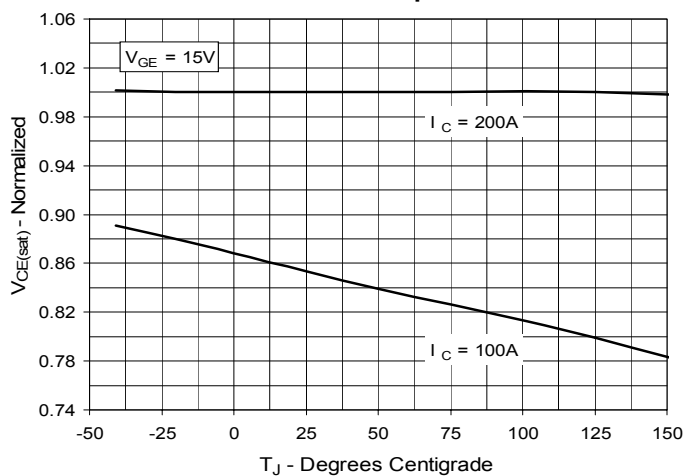
**Fig. 1. Extended Output Characteristics @ 25°C**



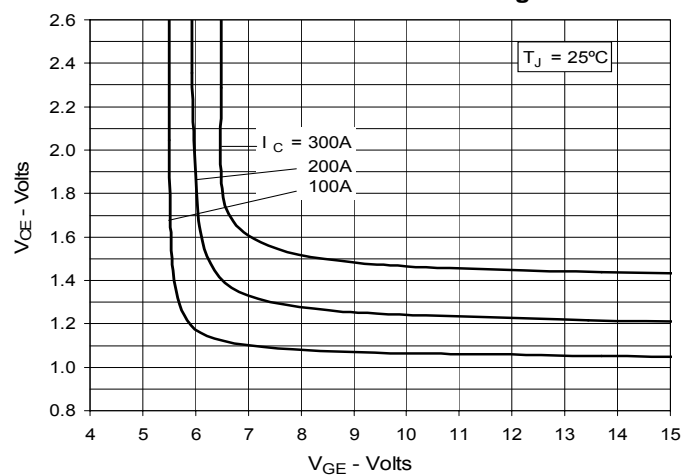
**Fig. 2. Output Characteristics @ 125°C**



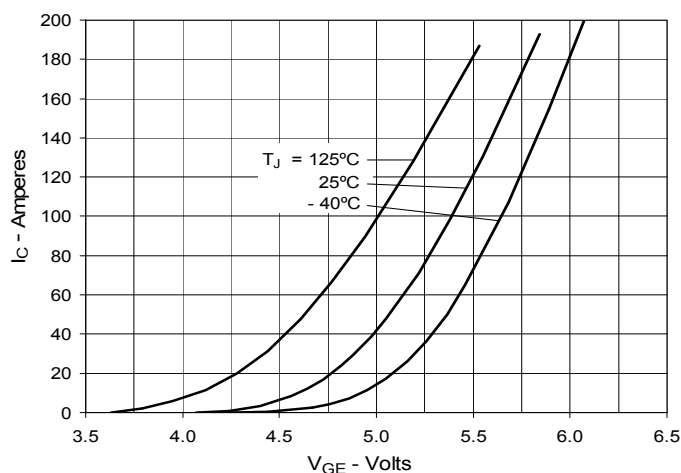
**Fig. 3. Dependence of  $V_{CE(sat)}$  on Junction Temperature**



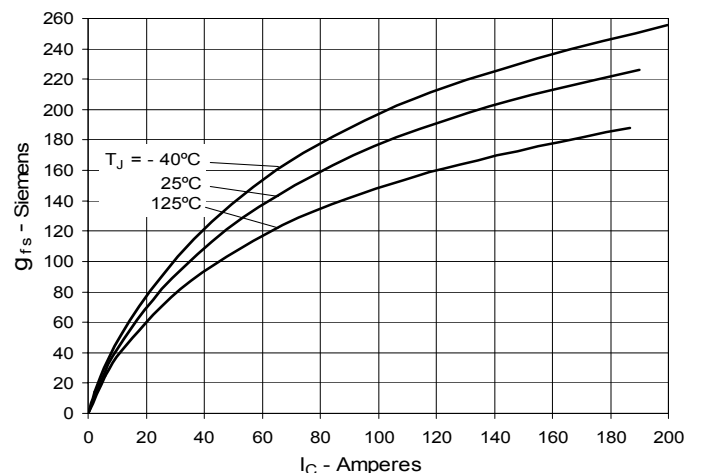
**Fig. 4. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage**



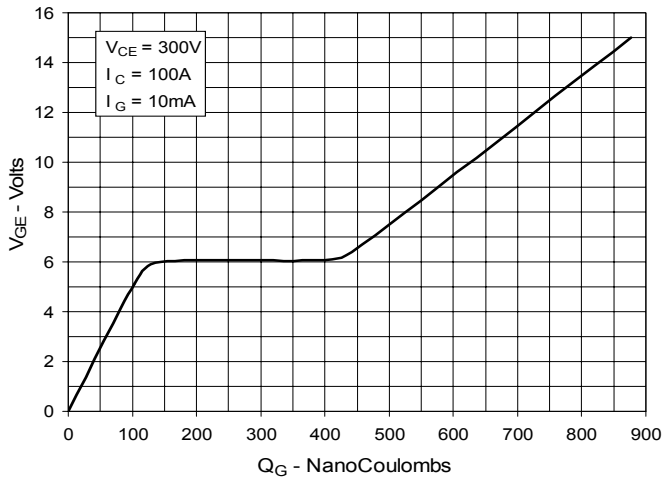
**Fig. 5. Input Admittance**



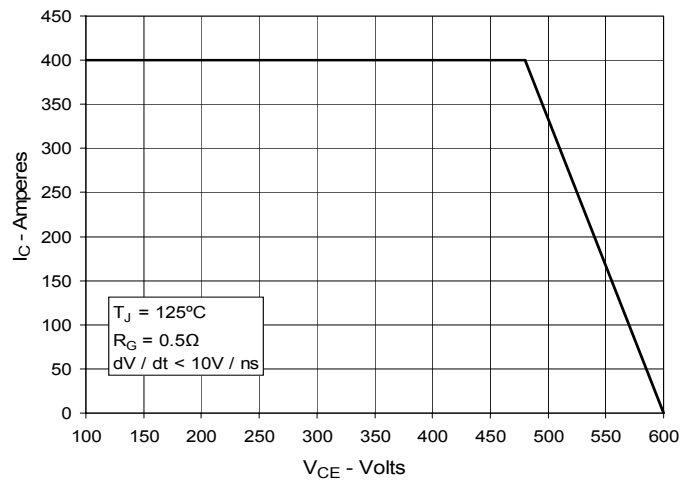
**Fig. 6. Transconductance**



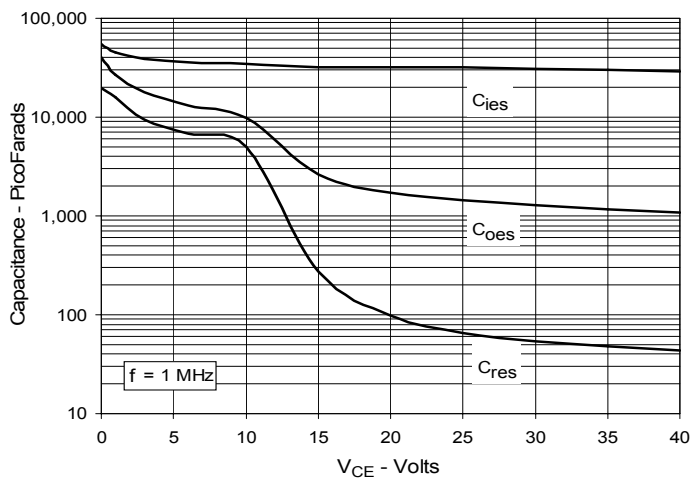
**Fig. 7. Gate Charge**



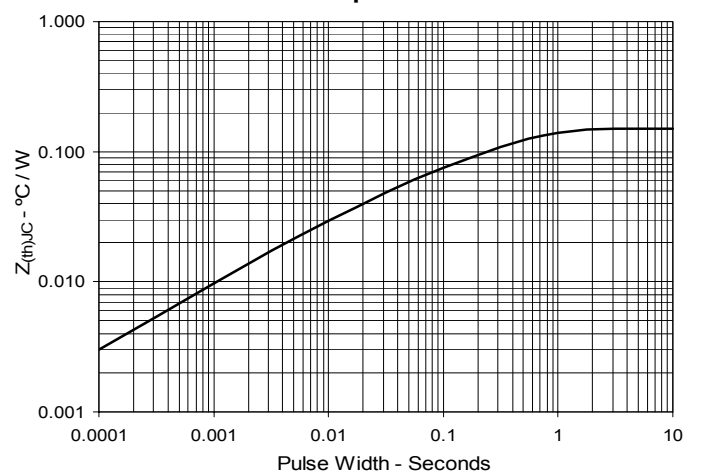
**Fig. 8. Reverse-Bias Safe Operating Area**



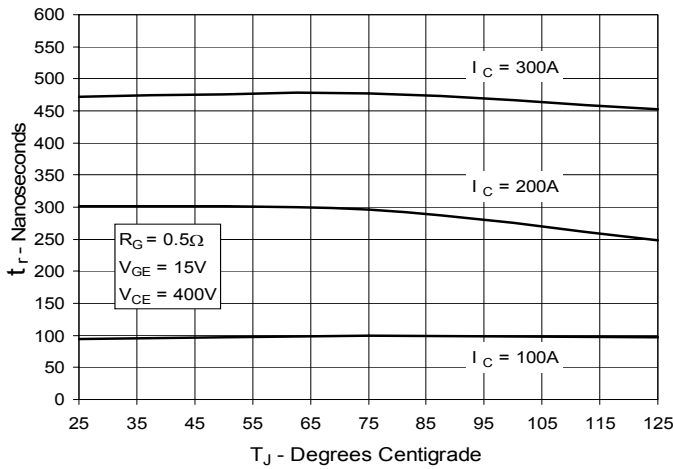
**Fig. 9. Capacitance**



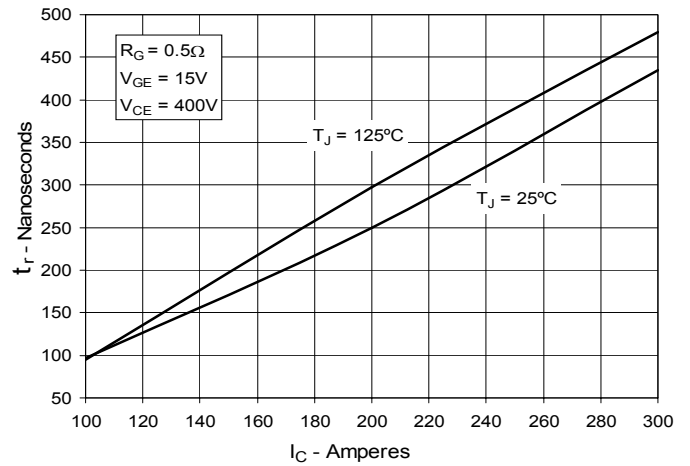
**Fig. 10. Maximum Transient Thermal Impedance**



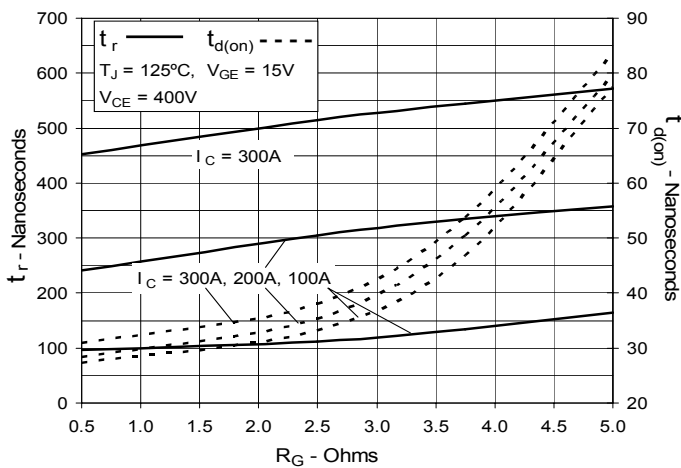
**Fig. 11. Resistive Turn-on Rise Time vs. Junction Temperature**



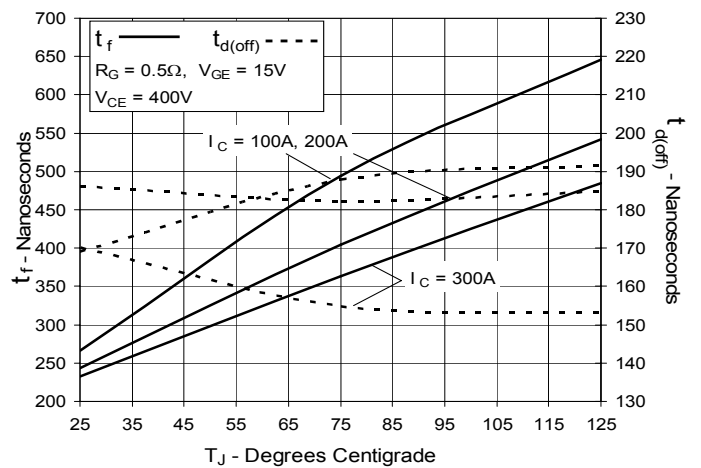
**Fig. 12. Resistive Turn-on Rise Time vs. Collector Current**



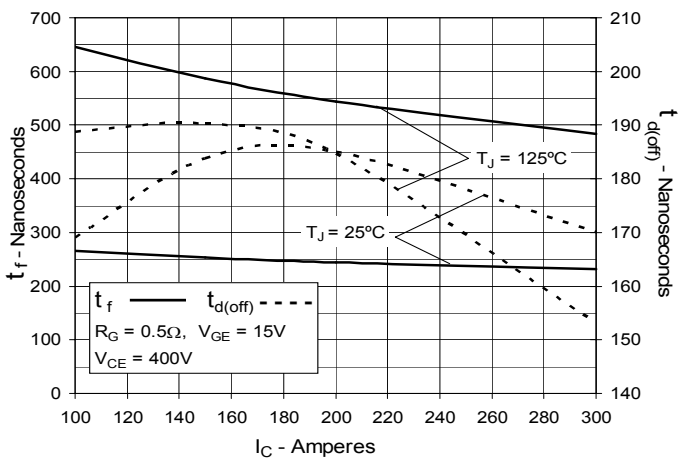
**Fig. 13. Resistive Turn-on Switching Times vs. Gate Resistance**



**Fig. 14. Resistive Turn-off Switching Times vs. Junction Temperature**



**Fig. 15. Resistive Turn-off Switching Times vs. Collector Current**



**Fig. 16. Resistive Turn-off Switching Times vs. Gate Resistance**

