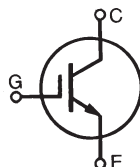


### GenX3™ 1200V IGBTs

### IXGK82N120A3 IXGX82N120A3

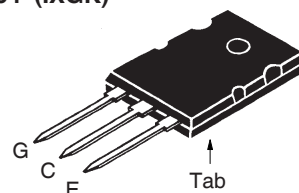
$$\begin{aligned} V_{CES} &= 1200V \\ I_{C110} &= 82A \\ V_{CE(sat)} &\leq 2.05V \end{aligned}$$

Ultra-Low-V<sub>sat</sub> PT IGBTs for  
up to 3kHz Switching

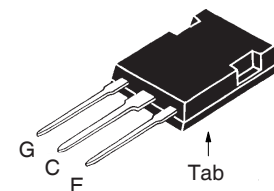


| Symbol                        | Test Conditions                                                                           | Maximum Ratings                         |                  |
|-------------------------------|-------------------------------------------------------------------------------------------|-----------------------------------------|------------------|
| $V_{CES}$                     | $T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$                                           | 1200                                    | V                |
| $V_{CGR}$                     | $T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$ , $R_{GE} = 1M\Omega$                     | 1200                                    | V                |
| $V_{GES}$                     | Continuous                                                                                | $\pm 20$                                | V                |
| $V_{GEM}$                     | Transient                                                                                 | $\pm 30$                                | V                |
| $I_{C25}$                     | $T_C = 25^\circ\text{C}$ ( Chip Capability )                                              | 260                                     | A                |
| $I_{C110}$                    | $T_C = 110^\circ\text{C}$                                                                 | 82                                      | A                |
| $I_{LRMS}$                    | $T_C = 25^\circ\text{C}$ (Lead RMS Limit)                                                 | 120                                     | A                |
| $I_{CM}$                      | $T_C = 25^\circ\text{C}$ , 1ms                                                            | 580                                     | A                |
| <b>SSOA</b><br><b>(RBSOA)</b> | $V_{GE} = 15V$ , $T_{VJ} = 125^\circ\text{C}$ , $R_G = 2\Omega$<br>Clamped Inductive Load | $I_{CM} = 164$<br>@ $0.8 \cdot V_{CES}$ | A                |
| $P_C$                         | $T_C = 25^\circ\text{C}$                                                                  | 1250                                    | W                |
| $T_J$                         |                                                                                           | -55 ... +150                            | $^\circ\text{C}$ |
| $T_{JM}$                      |                                                                                           | 150                                     | $^\circ\text{C}$ |
| $T_{stg}$                     |                                                                                           | -55 ... +150                            | $^\circ\text{C}$ |
| $T_L$                         | Maximum Lead Temperature for Soldering                                                    | 300                                     | $^\circ\text{C}$ |
| $T_{SOLD}$                    | 1.6 mm (0.062 in.) from Case for 10                                                       | 260                                     | $^\circ\text{C}$ |
| $M_d$                         | Mounting Torque ( IXGK )                                                                  | 1.13/10                                 | Nm/lb.in.        |
| $F_C$                         | Mounting Force ( IXGX )                                                                   | 20..120/4.5..27                         | N/lb.            |
| <b>Weight</b>                 | TO-264                                                                                    | 10                                      | g                |
|                               | PLUS247                                                                                   | 6                                       | g                |

TO-264 (IXGK)



PLUS247™ (IXGX)



G = Gate                      E = Emitter  
C = Collector                Tab = Collector

#### Features

- Optimized for Low Conduction Losses
- 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

| Symbol        | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified) | Characteristic Values |              |                            |
|---------------|-----------------------------------------------------------------------------|-----------------------|--------------|----------------------------|
|               |                                                                             | Min.                  | Typ.         | Max.                       |
| $BV_{CES}$    | $I_C = 250\mu\text{A}$ , $V_{CE} = 0V$                                      | 1200                  |              | V                          |
| $V_{GE(th)}$  | $I_C = 1\text{mA}$ , $V_{CE} = V_{GE}$                                      | 3.0                   |              | 5.0 V                      |
| $I_{CES}$     | $V_{CE} = V_{CES}$ , $V_{GE} = 0V$<br>Note 1, $T_J = 125^\circ\text{C}$     |                       |              | 50 $\mu\text{A}$<br>2.5 mA |
| $I_{GES}$     | $V_{CE} = 0V$ , $V_{GE} = \pm 20V$                                          |                       |              | $\pm 100$ nA               |
| $V_{CE(sat)}$ | $I_C = I_{C110}$ , $V_{GE} = 15V$ , Note 2<br>$T_J = 125^\circ\text{C}$     |                       | 1.83<br>1.95 | 2.05 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 2                                                                                                 | 40                    | 66   | S                       |
| $C_{ies}$    | $V_{CE} = 25\text{V}$ , $V_{GE} = 0\text{V}$ , $f = 1\text{ MHz}$                                                                                   |                       | 7700 | pF                      |
| $C_{oes}$    |                                                                                                                                                     |                       | 520  | pF                      |
| $C_{res}$    |                                                                                                                                                     |                       | 190  | pF                      |
| $Q_{g(on)}$  | $I_C = I_{C110}$ , $V_{GE} = 15\text{V}$ , $V_{CE} = 0.5 \cdot V_{CES}$                                                                             |                       | 340  | nC                      |
| $Q_{ge}$     |                                                                                                                                                     |                       | 54   | nC                      |
| $Q_{gc}$     |                                                                                                                                                     |                       | 146  | nC                      |
| $t_{d(on)}$  | Inductive load, $T_J = 25^\circ\text{C}$<br>$I_C = 80\text{A}$ , $V_{GE} = 15\text{V}$<br>$V_{CE} = 0.5 \cdot V_{CES}$ , $R_G = 2\Omega$<br>Note 3  |                       | 34   | ns                      |
| $t_{ri}$     |                                                                                                                                                     |                       | 75   | ns                      |
| $E_{on}$     |                                                                                                                                                     |                       | 5.5  | mJ                      |
| $t_{d(off)}$ |                                                                                                                                                     |                       | 265  | ns                      |
| $t_{fi}$     |                                                                                                                                                     |                       | 780  | ns                      |
| $E_{off}$    |                                                                                                                                                     |                       | 12.5 | 20.0 mJ                 |
| $t_{d(on)}$  | Inductive load, $T_J = 125^\circ\text{C}$<br>$I_C = 80\text{A}$ , $V_{GE} = 15\text{V}$<br>$V_{CE} = 0.5 \cdot V_{CES}$ , $R_G = 2\Omega$<br>Note 3 |                       | 32   | ns                      |
| $t_{ri}$     |                                                                                                                                                     |                       | 77   | ns                      |
| $E_{on}$     |                                                                                                                                                     |                       | 6.7  | mJ                      |
| $t_{d(off)}$ |                                                                                                                                                     |                       | 340  | ns                      |
| $t_{fi}$     |                                                                                                                                                     |                       | 1250 | ns                      |
| $E_{off}$    |                                                                                                                                                     |                       | 22.5 | mJ                      |
| $R_{thJC}$   |                                                                                                                                                     |                       |      | 0.10 $^\circ\text{C/W}$ |
| $R_{thCK}$   |                                                                                                                                                     |                       | 0.15 | $^\circ\text{C/W}$      |

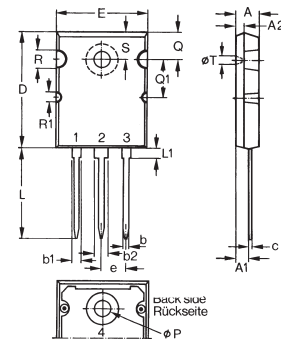
## Notes:

1. Part must be heatsunk for high-temp  $I_{CES}$  measurement.
2. Pulse test,  $t \leq 300\mu\text{s}$ , duty cycle,  $d \leq 2\%$ .
3. Switching times & energy losses may increase for higher  $V_{CE}(\text{Clamp})$ ,  $T_J$  or  $R_G$ .

## PRELIMINARY TECHNICAL INFORMATION

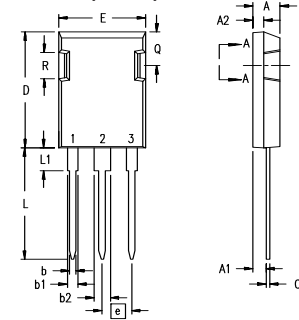
The product presented herein is under development. The Technical Specifications offered are derived from data gathered during objective characterizations of preliminary engineering lots; but also may yet contain some information supplied during a pre-production design evaluation. IXYS reserves the right to change limits, test conditions, and dimensions without notice.

## TO-264 AA (IXGK) Outline



| Dim. | Millimeter        |       | Inches |       |
|------|-------------------|-------|--------|-------|
|      | Min.              | Max.  | Min.   | Max.  |
| A    | 4.82              | 5.13  | .190   | .202  |
| A1   | 2.54              | 2.89  | .100   | .114  |
| A2   | 2.00              | 2.10  | .079   | .083  |
| b    | 1.12              | 1.42  | .044   | .056  |
| b1   | 2.39              | 2.69  | .094   | .106  |
| b2   | 2.90              | 3.09  | .114   | .122  |
| c    | 0.53              | 0.83  | .021   | .033  |
| D    | 25.91             | 26.16 | 1.020  | 1.030 |
| E    | 19.81             | 19.96 | .780   | .786  |
| e    | 5.46 BSC .215 BSC |       |        |       |
| J    | 0.00              | 0.25  | .000   | .010  |
| K    | 0.00              | 0.25  | .000   | .010  |
| L    | 20.32             | 20.83 | .800   | .820  |
| L1   | 2.29              | 2.59  | .090   | .102  |
| P    | 3.17              | 3.66  | .125   | .144  |
| Q    | 6.07              | 6.27  | .239   | .247  |
| Q1   | 8.38              | 8.69  | .330   | .342  |
| R    | 3.81              | 4.32  | .150   | .170  |
| R1   | 1.78              | 2.29  | .070   | .090  |
| S    | 6.04              | 6.30  | .238   | .248  |
| T    | 1.57              | 1.83  | .062   | .072  |

## PLUS247™ (IXGX) Outline



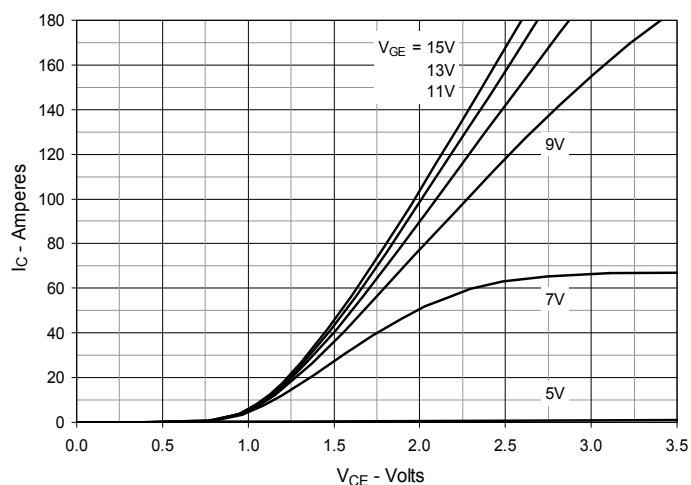
Terminals: 1 - Gate  
2 - Drain (Collector)  
3 - Source (Emitter)

| Dim. | Millimeter        |       | Inches |       |
|------|-------------------|-------|--------|-------|
|      | Min.              | Max.  | Min.   | Max.  |
| A    | 4.83              | 5.21  | .190   | .205  |
| A1   | 2.29              | 2.54  | .090   | .100  |
| A2   | 1.91              | 2.16  | .075   | .085  |
| b    | 1.14              | 1.40  | .045   | .055  |
| b1   | 1.91              | 2.13  | .075   | .084  |
| b2   | 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  |

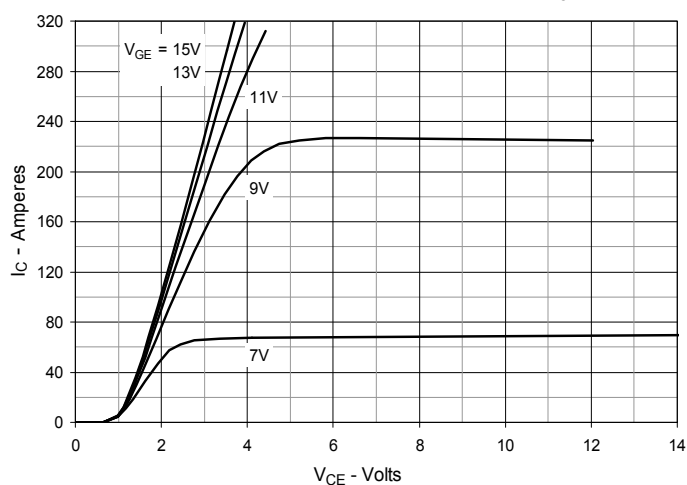
IXYS Reserves the Right to Change Limits, Test Conditions, and Dimensions.

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

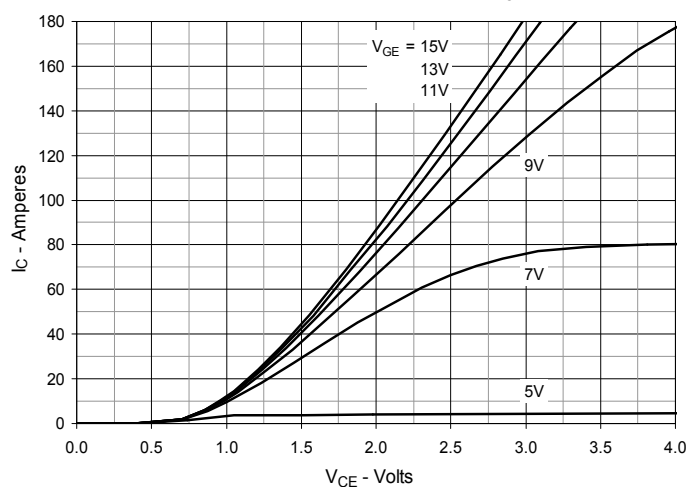
**Fig. 1. Output Characteristics @  $T_J = 25^\circ\text{C}$**



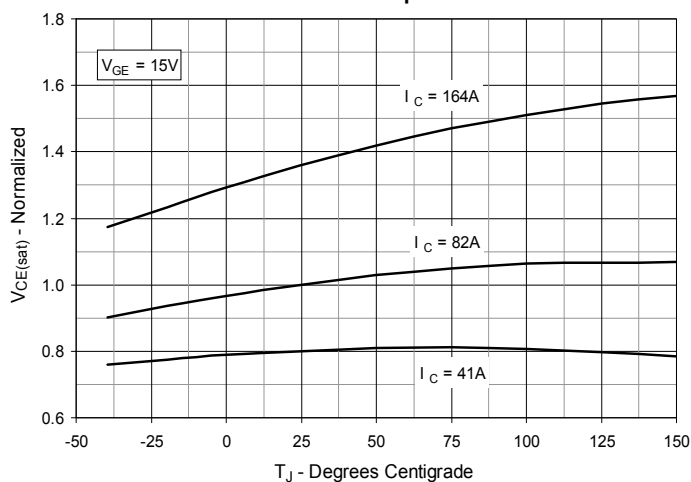
**Fig. 2. Extended Output Characteristics @  $T_J = 25^\circ\text{C}$**



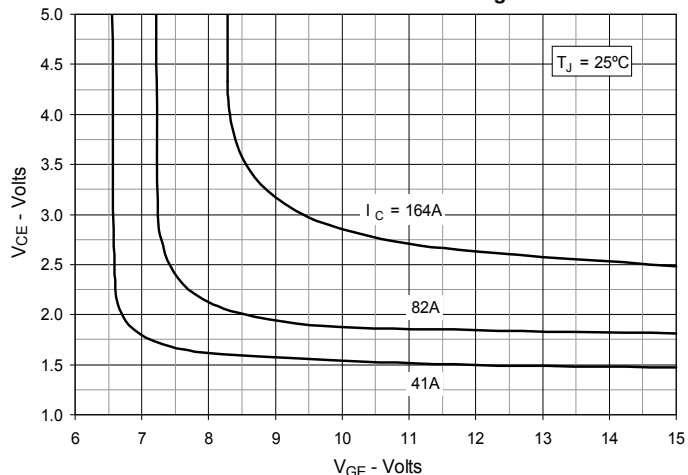
**Fig. 3. Output Characteristics @  $T_J = 125^\circ\text{C}$**



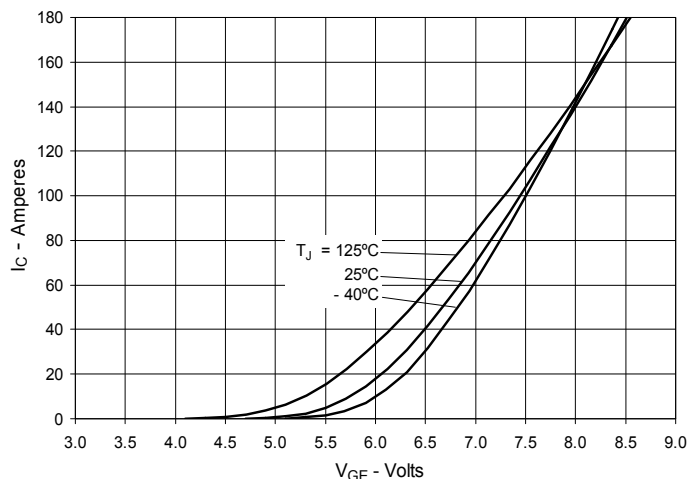
**Fig. 4. Dependence of  $V_{CE(sat)}$  on Junction Temperature**



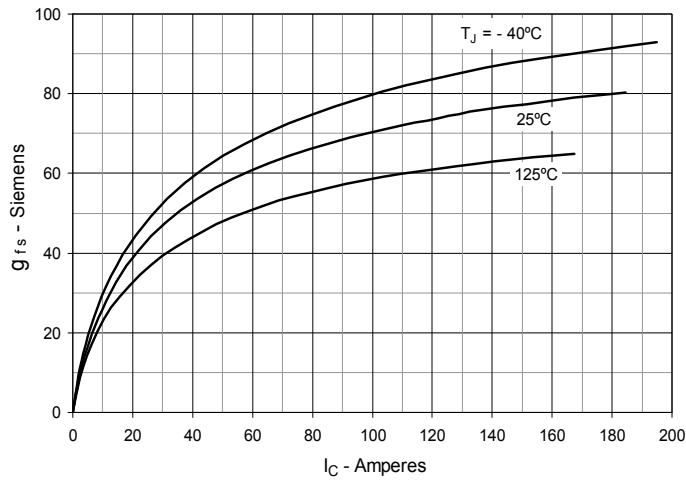
**Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage**



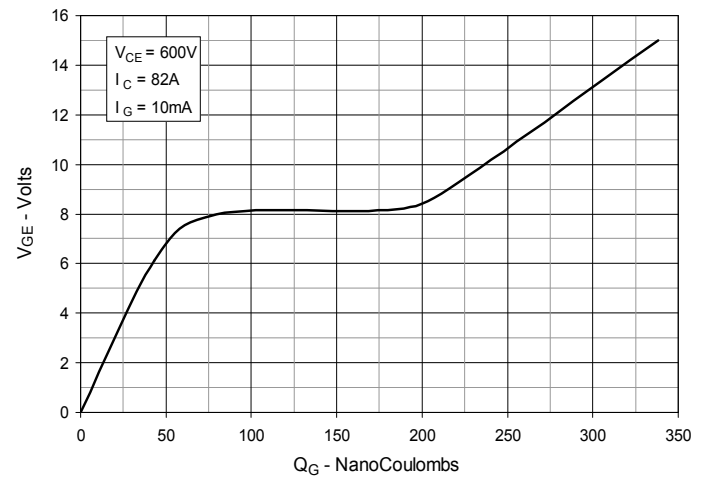
**Fig. 6. Input Admittance**



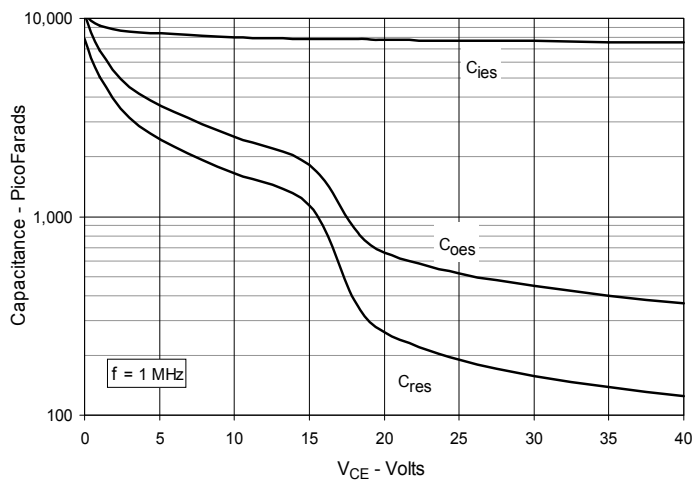
**Fig. 7. Transconductance**



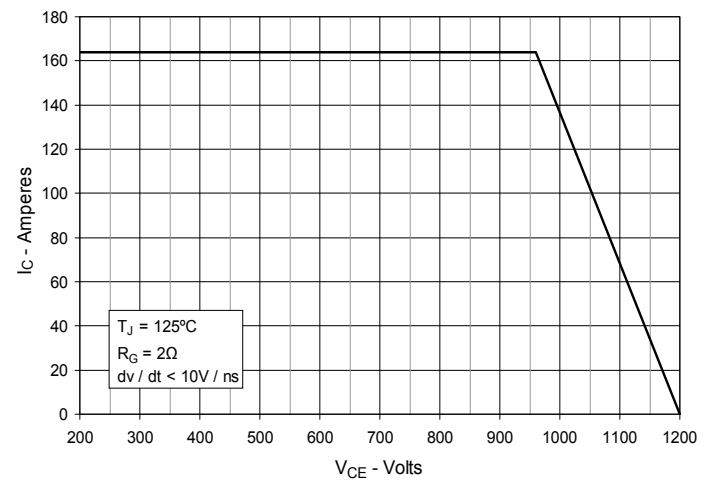
**Fig. 8. Gate Charge**



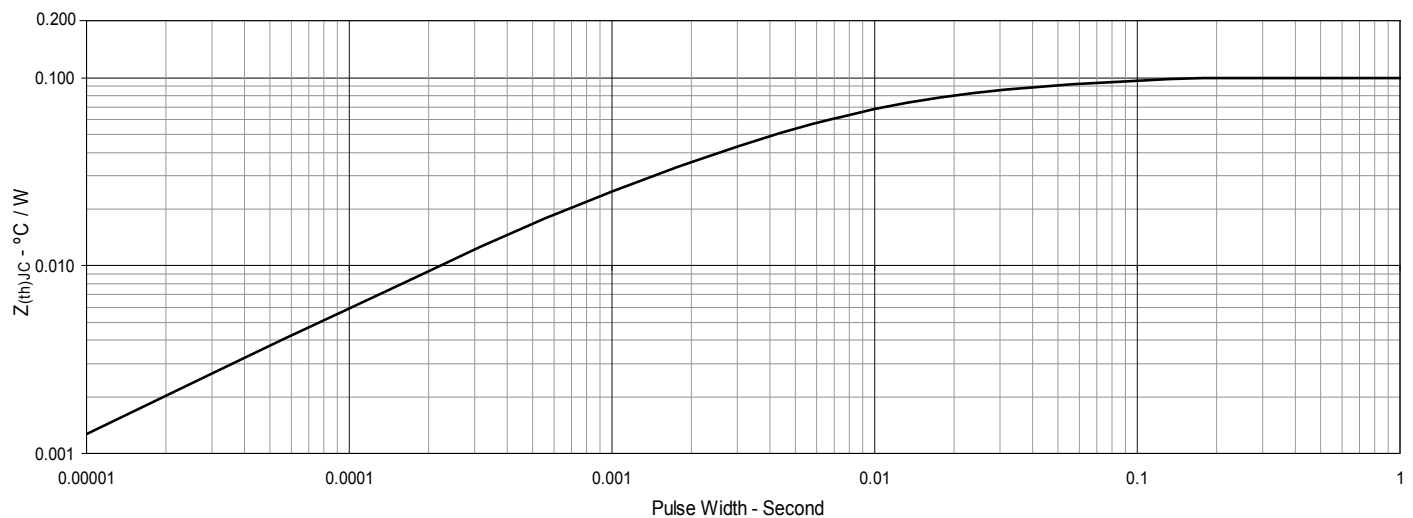
**Fig. 9. Capacitance**



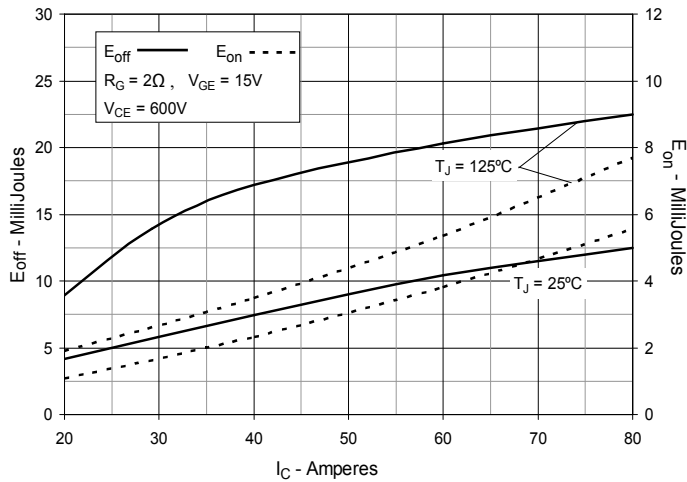
**Fig. 10. Reverse-Bias Safe Operating Area**



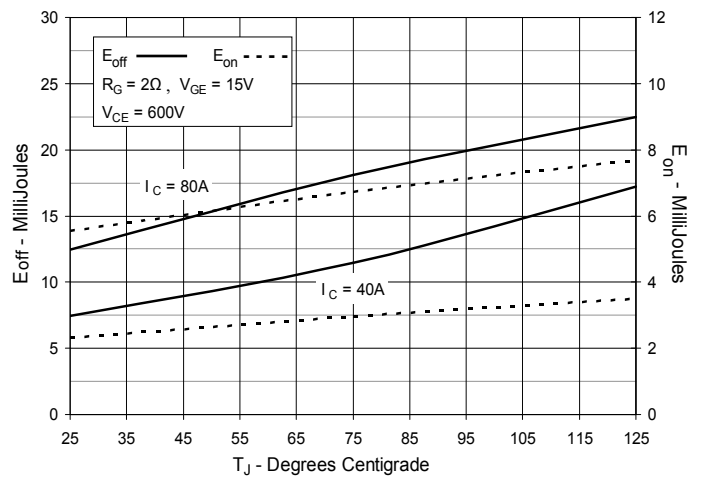
**Fig. 11. Maximum Transient Thermal Impedance**



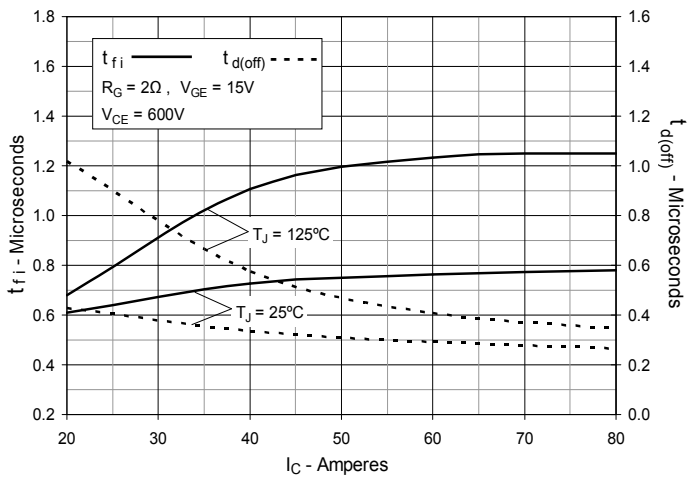
**Fig. 12. Inductive Switching  
Energy Loss vs. Collector Current**



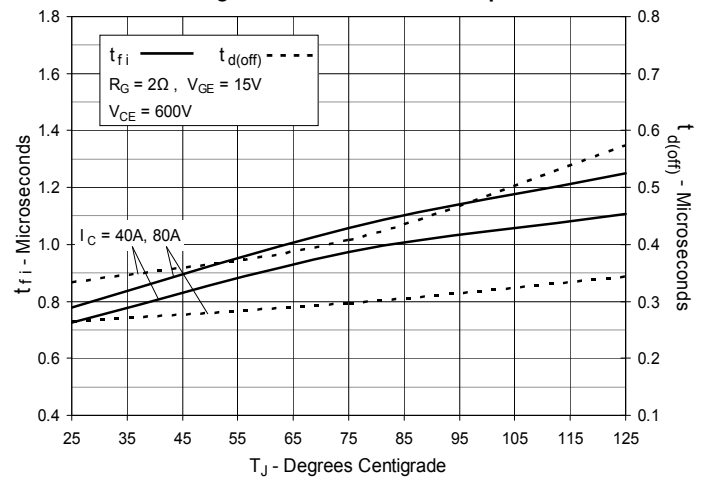
**Fig. 13. Inductive Switching  
Energy Loss vs. Junction Temperature**



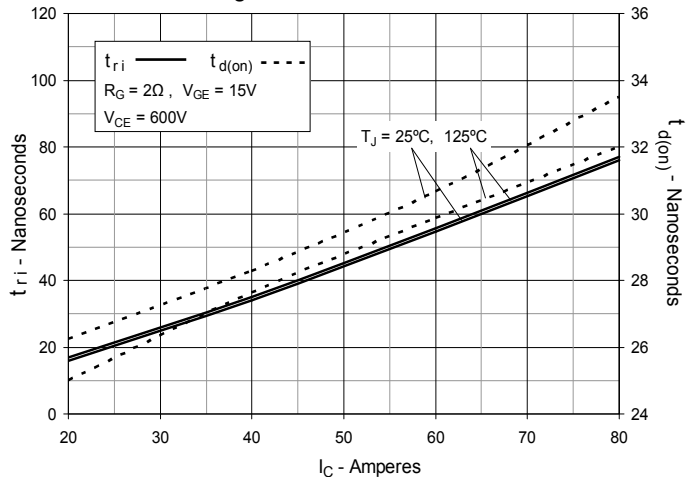
**Fig. 14. Inductive Turn-off  
Switching Times vs. Collector Current**



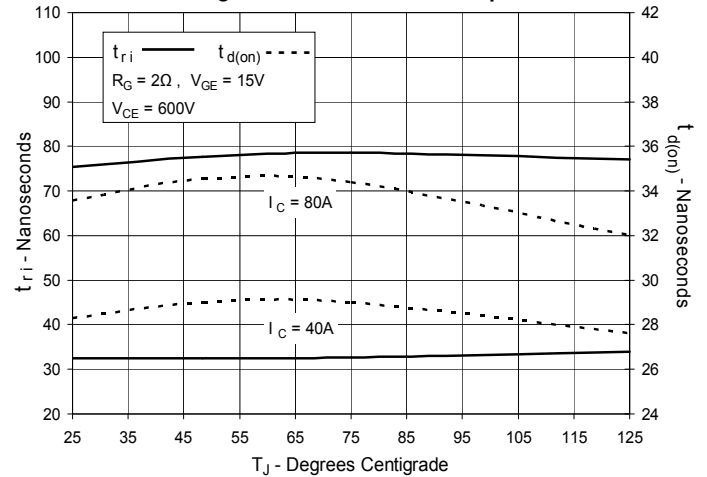
**Fig. 15. Inductive Turn-off  
Switching Times vs. Junction Temperature**



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



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





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