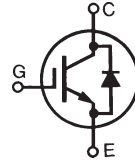


**GenX3™ 1200V  
IGBTs w/ Diode**
**IXGK50N120C3H1  
IXGX50N120C3H1**
**High-Speed PT IGBTs  
for 20 - 50 kHz Switching**


$$V_{CES} = 1200V$$

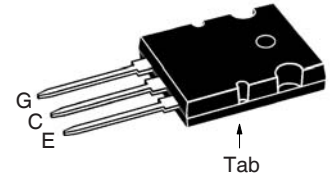
$$I_{C100} = 50A$$

$$V_{CE(sat)} \leq 4.2V$$

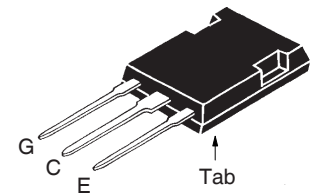
$$t_{fi(typ)} = 64ns$$

Symbol	Test Conditions	Maximum Ratings	
$V_{CES}$	$T_J = 25^\circ C$ to $150^\circ C$	1200	V
$V_{CGR}$	$T_J = 25^\circ C$ to $150^\circ C$ , $R_{GE} = 1M\Omega$	1200	V
$V_{GES}$	Continuous	$\pm 20$	V
$V_{GEM}$	Transient	$\pm 30$	V
$I_{C25}$	$T_C = 25^\circ C$ ( Chip Capability )	95	A
$I_{C100}$	$T_C = 100^\circ C$	50	A
$I_{F110}$	$T_C = 110^\circ C$	58	A
$I_{CM}$	$T_C = 25^\circ C$ , 1ms	240	A
$I_A$	$T_C = 25^\circ C$	40	A
$E_{AS}$	$T_C = 25^\circ C$	750	mJ
<b>SSOA</b>	$V_{GE} = 15V$ , $T_J = 125^\circ C$ , $R_G = 3\Omega$	$I_{CM} = 100$	A
<b>(RBSOA)</b>	Clamped Inductive Load	$V_{CE} \leq V_{CES}$	
$P_C$	$T_C = 25^\circ C$	460	W
$T_J$		-55 ... +150	$^\circ C$
$T_{JM}$		150	$^\circ C$
$T_{stg}$		-55 ... +150	$^\circ C$
$T_L$	Maximum Lead Temperature for Soldering	300	$^\circ C$
$T_{SOLD}$	1.6 mm (0.062 in.) from Case for 10	260	$^\circ C$
$M_d$	Mounting Torque ( IXGK )	1.13/10	Nm/lb.in.
$F_C$	Mounting Force ( IXGX )	20..120/4.5..14.6	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 Switching Losses
- Square RBSOA
- High Avalanche Capability
- Avalanche Rated
- Anti-Parallel Ultra Fast Diode
- International Standard Packages

**Advantages**

- High Power Density
- Low Gate Drive Requirement

**Applications**

- High Frequency Power Inverters
- UPS
- Motor Drives
- SMPS
- PFC Circuits
- Battery Chargers
- Welding Machines
- Lamp Ballasts

Symbol	Test Conditions ( $T_J = 25^\circ C$ , Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
$V_{GE(th)}$	$I_C = 250\mu A$ , $V_{CE} = V_{GE}$	3.0		5.0 V
$I_{CES}$	$V_{CE} = V_{CES}$ , $V_{GE} = 0V$ Note 1, $T_J = 125^\circ C$			250 $\mu A$ 14 mA
$I_{GES}$	$V_{CE} = 0V$ , $V_{GE} = \pm 20V$			$\pm 100$ nA
$V_{CE(sat)}$	$I_C = 40A$ , $V_{GE} = 15V$ , Note 2 $T_J = 125^\circ C$		2.6	4.2 V

Symbol	Test Conditions ( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
$g_{fs}$	$I_C = 40\text{A}$ , $V_{CE} = 10\text{V}$ , Note 2	24	40	S
$C_{ies}$	$V_{CE} = 25\text{V}$ , $V_{GE} = 0\text{V}$ , $f = 1\text{MHz}$		4250	pF
$C_{oes}$			455	pF
$C_{res}$			120	pF
$Q_g$	$I_C = 50\text{A}$ , $V_{GE} = 15\text{V}$ , $V_{CE} = 0.5 \cdot V_{CES}$		196	nC
$Q_{ge}$			24	nC
$Q_{gc}$			84	nC
$t_{d(on)}$	<b>Inductive load, <math>T_J = 25^\circ\text{C}</math></b> $I_C = 40\text{A}$ , $V_{GE} = 15\text{V}$ $V_{CE} = 0.5 \cdot V_{CES}$ , $R_G = 2\Omega$ Note 3		31	ns
$t_{ri}$			36	ns
$E_{on}$			2.0	mJ
$t_{d(off)}$			123	ns
$t_{fi}$			64	ns
$E_{off}$			0.63	mJ
$t_{d(on)}$	<b>Inductive load, <math>T_J = 125^\circ\text{C}</math></b> $I_C = 40\text{A}$ , $V_{GE} = 15\text{V}$ $V_{CE} = 0.5 \cdot V_{CES}$ , $R_G = 2\Omega$ Note 3		23	ns
$t_{ri}$			37	ns
$E_{on}$			3.0	mJ
$t_{d(off)}$			170	ns
$t_{fi}$			315	ns
$E_{off}$			2.1	mJ
$R_{thJC}$				0.27 °C/W
$R_{thCK}$		0.15		°C/W

### Reverse Diode (SONIC-FRD)

Symbol	Test Conditions ( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
$V_F$	$I_F = 50\text{A}$ , $V_{GE} = 0\text{V}$ , Note 1 $T_J = 125^\circ\text{C}$		2.1	2.4 V 2.3 V
$I_{RM}$	$I_F = 50\text{A}$ , $V_{GE} = 0\text{V}$ , $-di_F/dt = 2500\text{A}/\mu\text{s}$ , $V_R = 800\text{V}$		50	A
$t_{rr}$			75	ns
$R_{thJC}$				0.30 °C/W

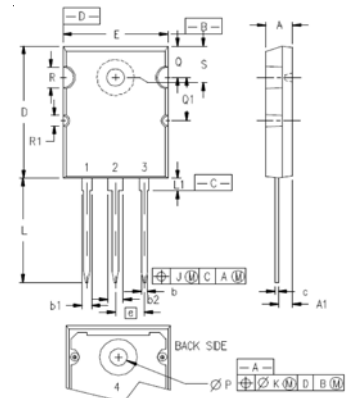
Notes:

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

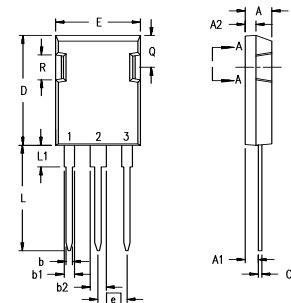
### TO-264 Outline



Terminals: 1 = Gate  
2,4 = Collector  
3 = Emitter

SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.185	.209	4.70	5.31
A1	.102	.118	2.59	3.00
b	.037	.055	0.94	1.40
b1	.087	.102	2.21	2.59
b2	.110	.126	2.79	3.20
c	.017	.029	0.43	0.74
D	1.007	1.047	25.58	26.59
E	.760	.799	19.30	20.29
e	.215 BSC		5.46 BSC	
J	.000	.010	0.00	0.25
K	.000	.010	0.00	0.25
L	.779	.842	19.79	21.39
L1	.087	.102	2.21	2.59
ØP	.122	.138	3.10	3.51
Q	.240	.256	6.10	6.50
Q1	.330	.346	8.38	8.79
ØR	.155	.187	3.94	4.75
ØR1	.085	.093	2.16	2.36
S	.243	.253	6.17	6.43

### PLUS247™ Outline



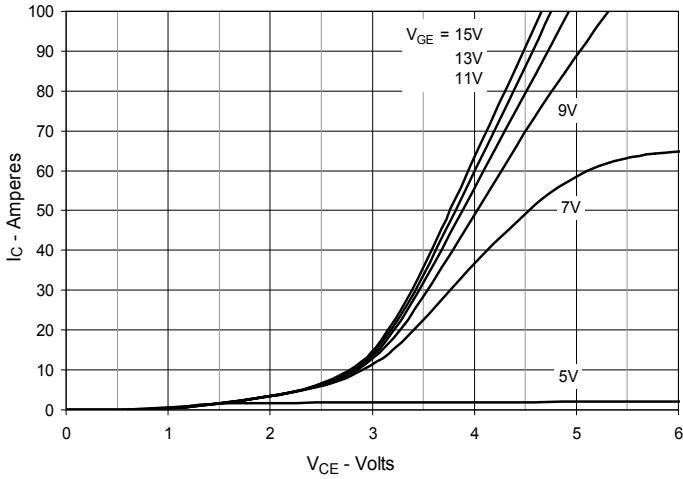
Terminals: 1 - Gate  
2 - Collector  
3 - Emitter

Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	4.83	5.21	.190	.205
A <sub>1</sub>	2.29	2.54	.090	.100
A <sub>2</sub>	1.91	2.16	.075	.085
b	1.14	1.40	.045	.055
b <sub>1</sub>	1.91	2.13	.075	.084
b <sub>2</sub>	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

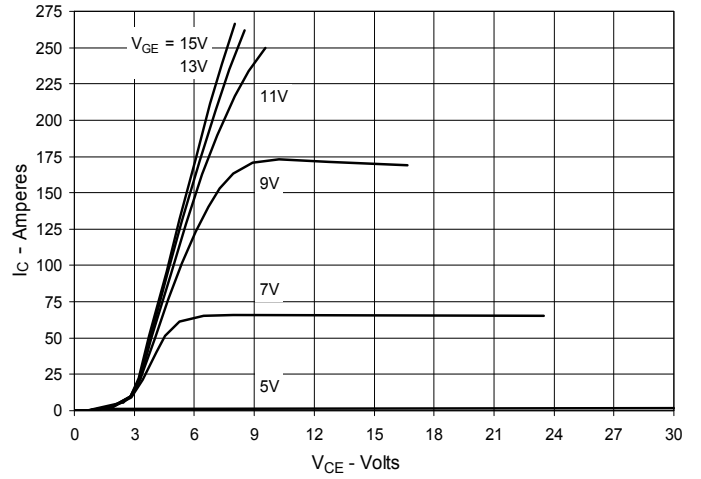
IXYS Reserves the Right to Change Limits, Test Conditions, and Dimensions.

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

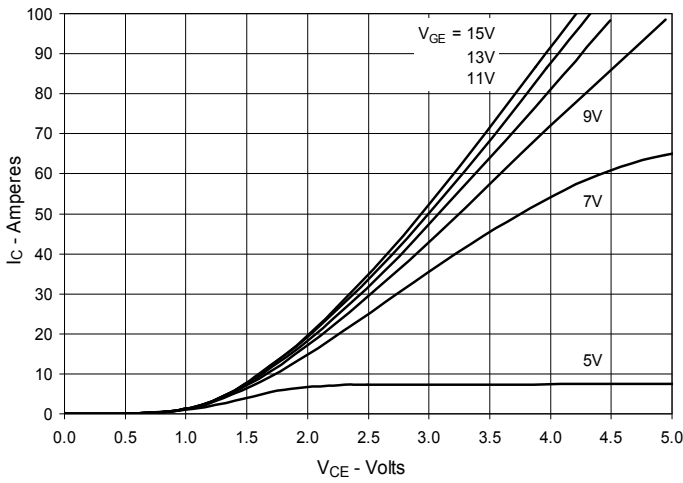
**Fig. 1. Output Characteristics @ 25°C**



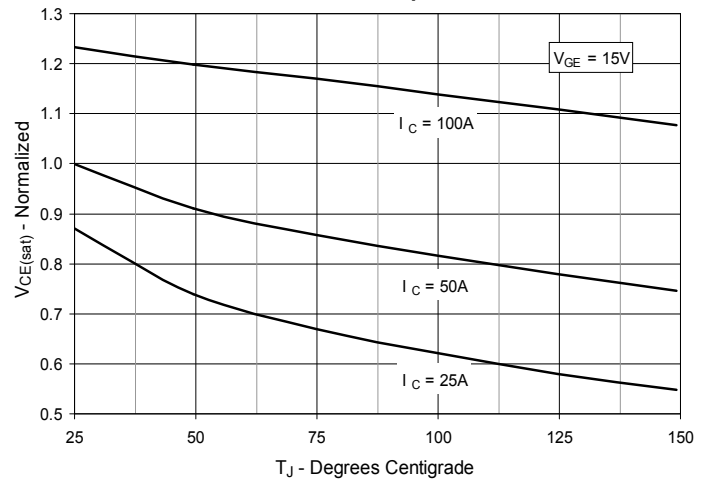
**Fig. 2. Extended Output Characteristics @ 25°C**



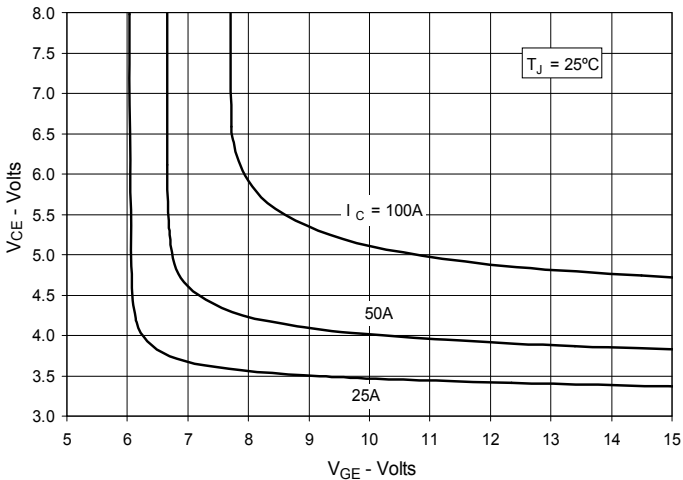
**Fig. 3. Output Characteristics @ 125°C**



**Fig. 4. Dependence of VCE(sat) on Junction Temperature**



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



**Fig. 6. Input Admittance**

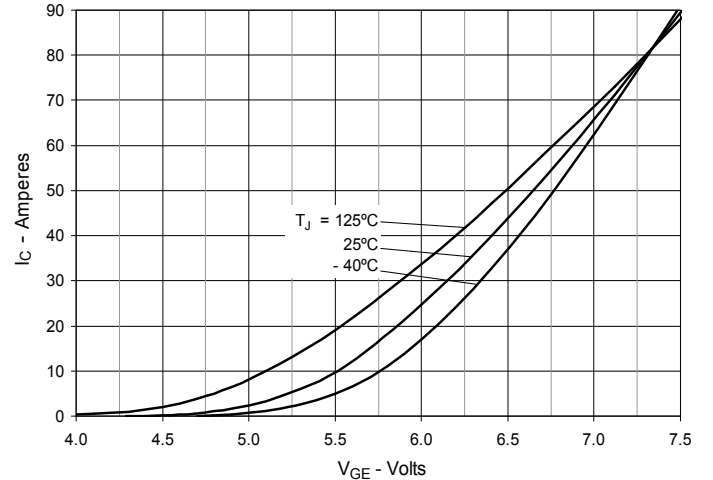


Fig. 7. Transconductance

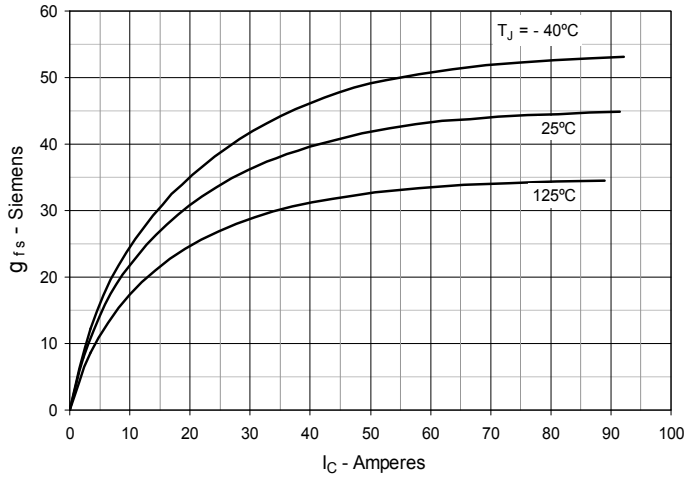


Fig. 8. Gate Charge

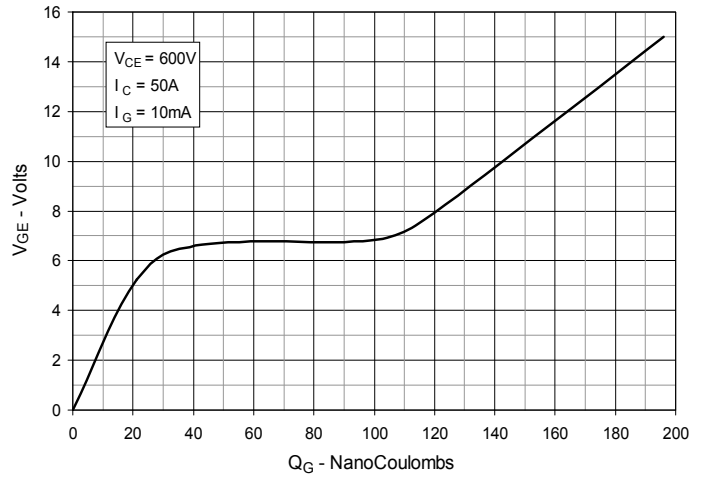


Fig. 9. Capacitance

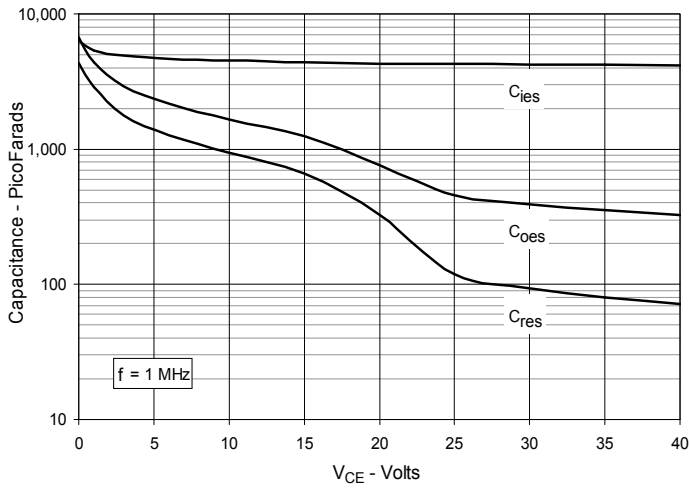


Fig. 10. Reverse-Bias Safe Operating Area

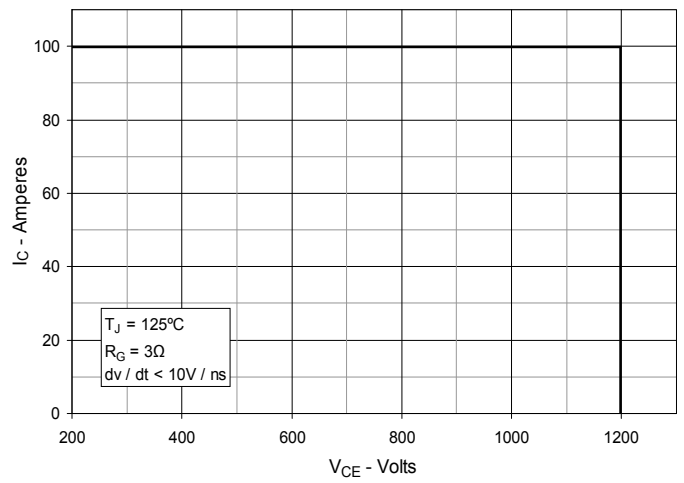
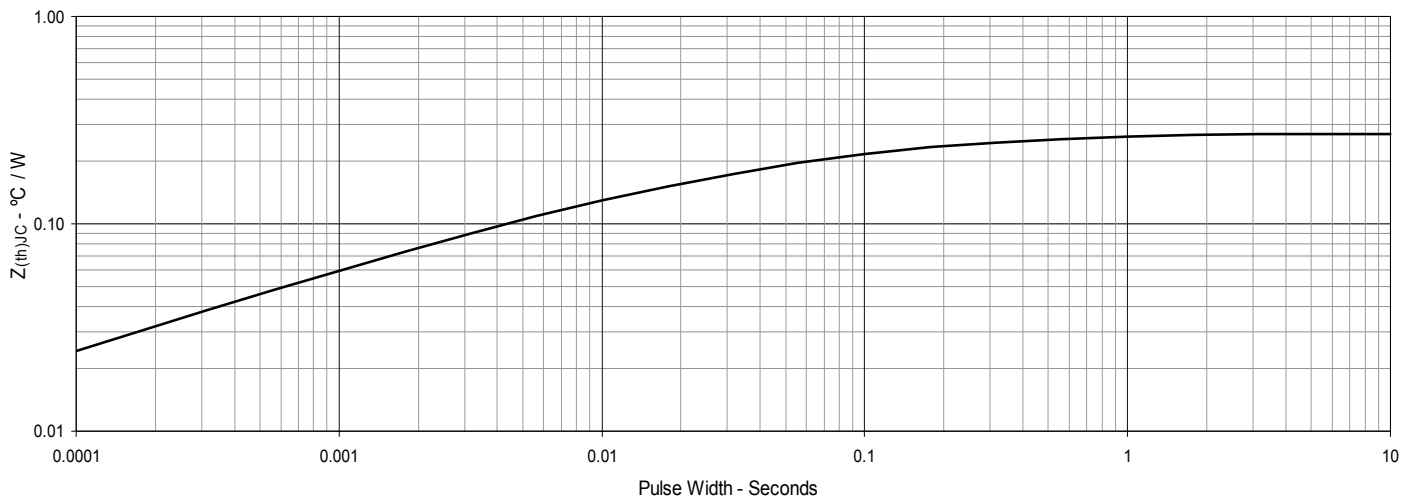
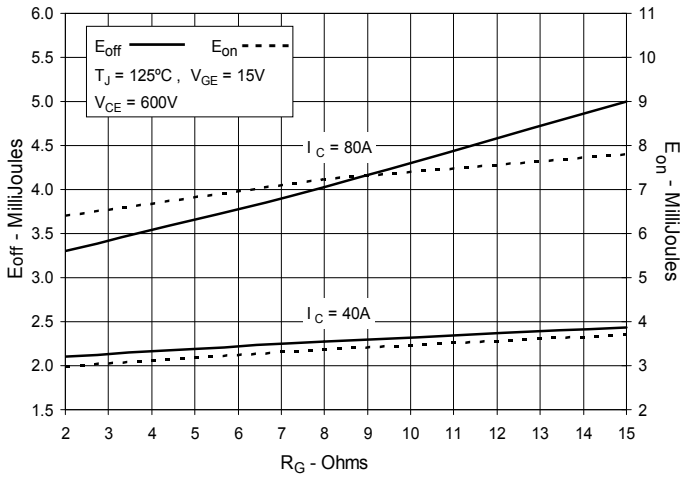


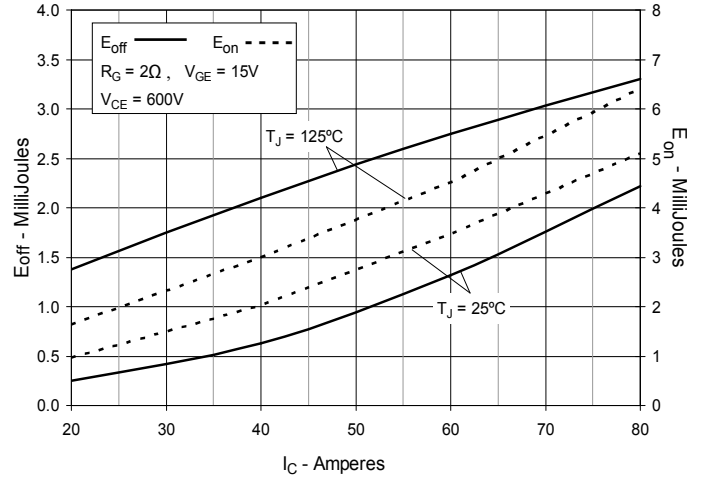
Fig. 11. Maximum Transient Thermal Impedance



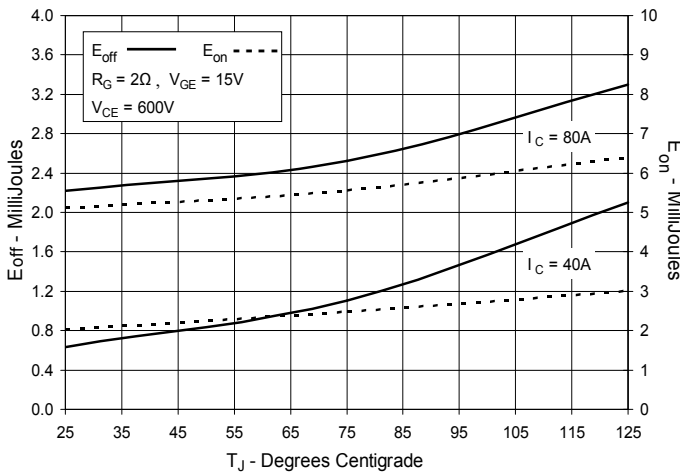
**Fig. 12. Inductive Switching  
 Energy Loss vs. Gate Resistance**



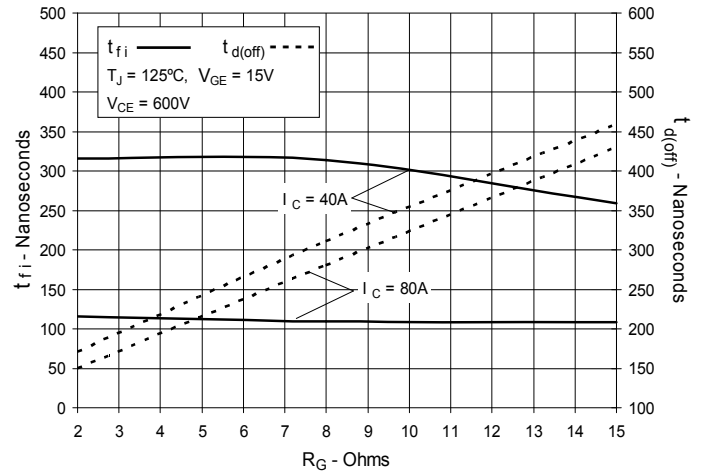
**Fig. 13. Inductive Switching  
 Energy Loss vs. Collector Current**



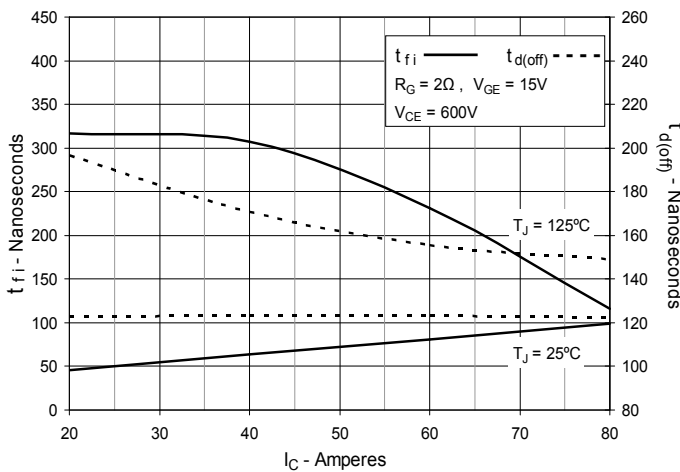
**Fig. 14. Inductive Switching  
 Energy Loss vs. Junction Temperature**



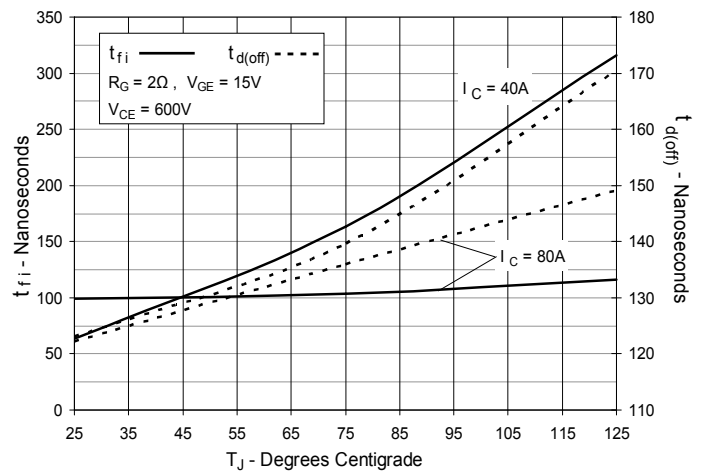
**Fig. 15. Inductive Turn-off  
 Switching Times vs. Gate Resistance**



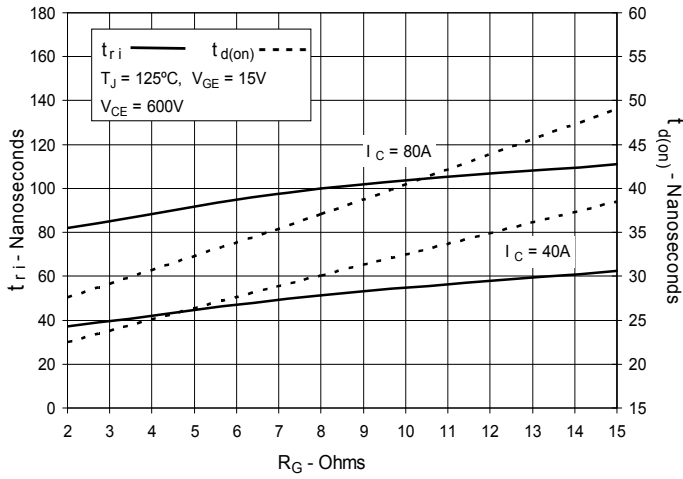
**Fig. 16. Inductive Turn-off  
 Switching Times vs. Collector Current**



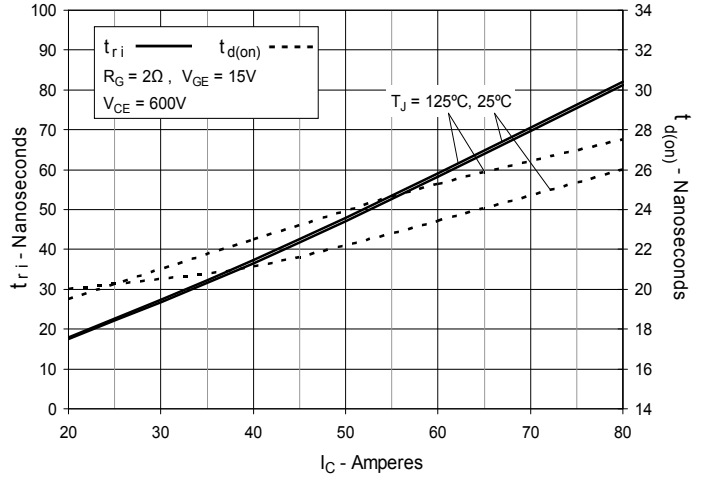
**Fig. 17. Inductive Turn-off  
 Switching Times vs. Junction Temperature**



**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**

