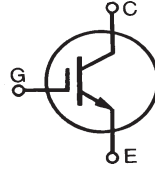
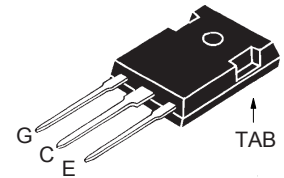


**GenX3™ 1200V IGBT**
**IXGH50N120C3**
**High speed PT IGBTs  
for 20 - 50 kHz switching**


$$\begin{aligned}
 V_{CES} &= 1200V \\
 I_{C110} &= 50A \\
 V_{CE(sat)} &\leq 4.2V \\
 t_{fi(typ)} &= 64ns
 \end{aligned}$$

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
$I_{C25}$	$T_C = 25^\circ\text{C}$ (limited by leads)	75	A
$I_{C110}$	$T_C = 110^\circ\text{C}$	50	A
$I_{CM}$	$T_C = 25^\circ\text{C}$ , 1ms	250	A
$I_A$	$T_C = 25^\circ\text{C}$	40	A
$E_{AS}$	$T_C = 25^\circ\text{C}$	750	mJ
<b>SSOA</b> <b>(RBSOA)</b>	$V_{GE} = 15V$ , $T_J = 125^\circ\text{C}$ , $R_G = 3\Omega$ Clamped inductive load @ $V_{CE} \leq 1200V$	$I_{CM} = 100$	A
$P_C$	$T_C = 25^\circ\text{C}$	460	W
$T_J$		-55 ... +150	$^\circ\text{C}$
$T_{JM}$		150	$^\circ\text{C}$
$T_{stg}$		-55 ... +150	$^\circ\text{C}$
$M_d$	Mounting torque	1.13 / 10	Nm/lb.in.
$T_L$	Maximum lead temperature for soldering	300	$^\circ\text{C}$
$T_{SOLD}$	1.6mm (0.062 in.) from case for 10s	260	$^\circ\text{C}$
<b>Weight</b>		6	g

**TO-247 (IXGH)**


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

**Features**

- International standard packages: JEDEC TO-247AD
- IGBT and anti-parallel FRED in one package
- MOS Gate turn-on - drive simplicity

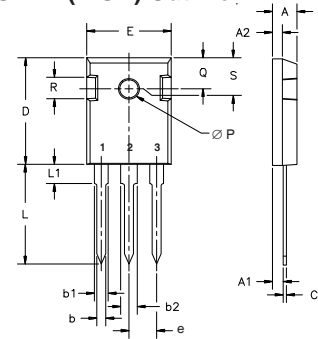
**Applications**

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

Symbol	Test Conditions ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)	Characteristic Values		
		Min.	Typ.	Max.
$BV_{CES}$	$I_C = 250\mu\text{A}$ , $V_{GE} = 0V$	1200		V
$V_{GE(th)}$	$I_C = 250\mu\text{A}$ , $V_{CE} = V_{GE}$	3.0		5.0 V
$I_{CES}$	$V_{CE} = V_{CES}$ $V_{GE} = 0V$ $T_J = 125^\circ\text{C}$			100 $\mu\text{A}$ 2 mA
$I_{GES}$	$V_{CE} = 0V$ , $V_{GE} = \pm 20V$			$\pm 100$ nA
$V_{CE(sat)}$	$I_C = 40A$ , $V_{GE} = 15V$ , Note 1 $T_J = 125^\circ\text{C}$		2.6	4.2 V 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 1	24	40	S
$C_{ies}$	$V_{CE} = 25\text{V}, V_{GE} = 0\text{V}, f = 1\text{MHz}$		4190	pF
$C_{oes}$			330	pF
$C_{res}$			130	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> $I_C = 40\text{A}, V_{GE} = 15\text{V}$ $V_{CE} = 600\text{V}, R_G = 2\Omega$ Note 1		20	ns
$t_{ri}$			34	ns
$E_{on}$			2.2	mJ
$t_{d(off)}$			123	ns
$t_{fi}$			64	ns
$E_{off}$		0.63	1.2	mJ
$t_{d(on)}$	<b>Inductive load, <math>T_J = 125^\circ\text{C}</math></b> $I_C = 40\text{A}, V_{GE} = 15\text{V}$ $V_{CE} = 600\text{V}, R_G = 2\Omega$ Note 1		20	ns
$t_{ri}$			35	ns
$E_{on}$			4.3	mJ
$t_{d(off)}$			170	ns
$t_{fi}$			315	ns
$E_{off}$		2.1	mJ	
$R_{thJC}$				0.27 °C/W
$R_{thCK}$		0.21		°C/W

TO-247 (IXGH) Outline



Terminals: 1 - Gate      2 - Drain  
3 - Source      Tab - Drain

Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	4.7	5.3	.185	.209
A <sub>1</sub>	2.2	2.54	.087	.102
A <sub>2</sub>	2.2	2.6	.059	.098
b	1.0	1.4	.040	.055
b <sub>1</sub>	1.65	2.13	.065	.084
b <sub>2</sub>	2.87	3.12	.113	.123
C	.4	.8	.016	.031
D	20.80	21.46	.819	.845
E	15.75	16.26	.610	.640
e	5.20	5.72	0.205	0.225
L	19.81	20.32	.780	.800
L1		4.50		.177
ØP	3.55	3.65	.140	.144
Q	5.89	6.40	0.232	0.252
R	4.32	5.49	.170	.216
S	6.15	BSC	242	BSC

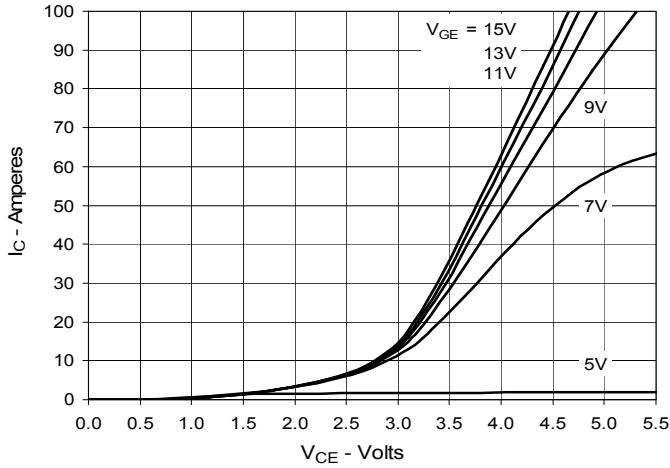
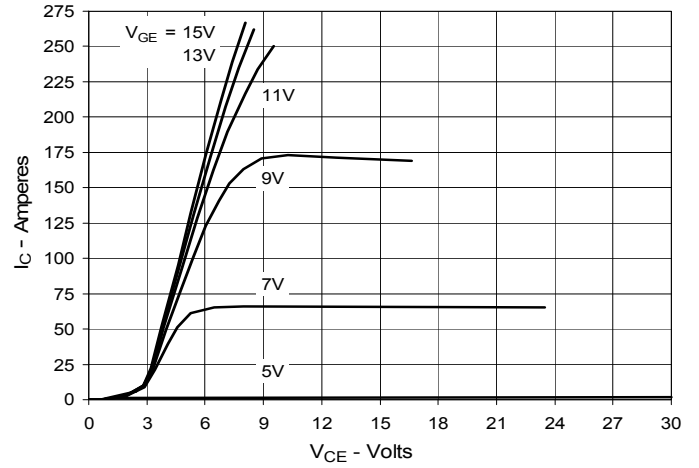
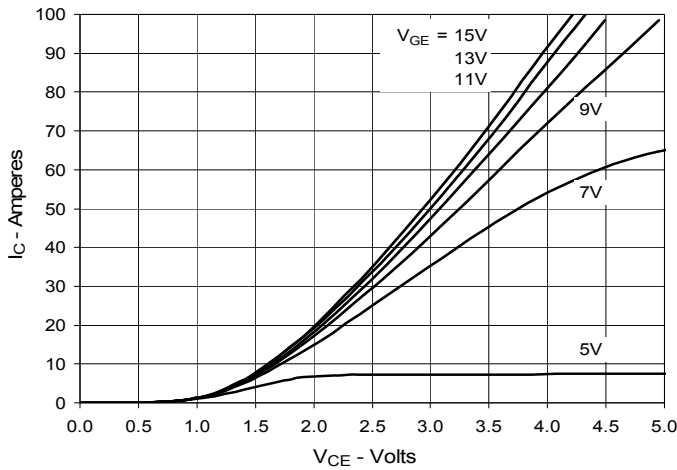
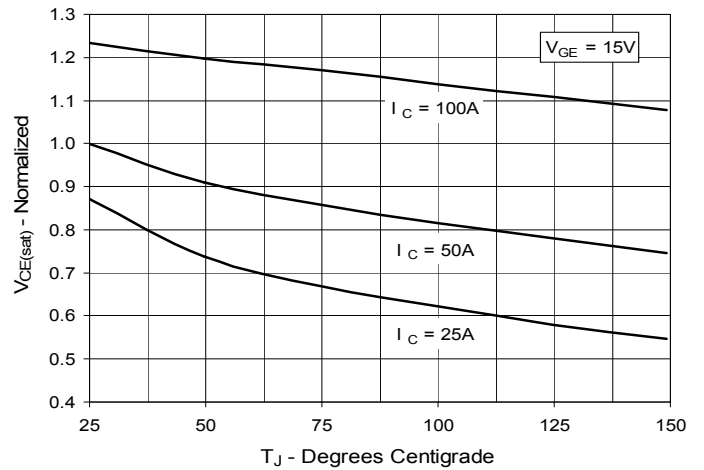
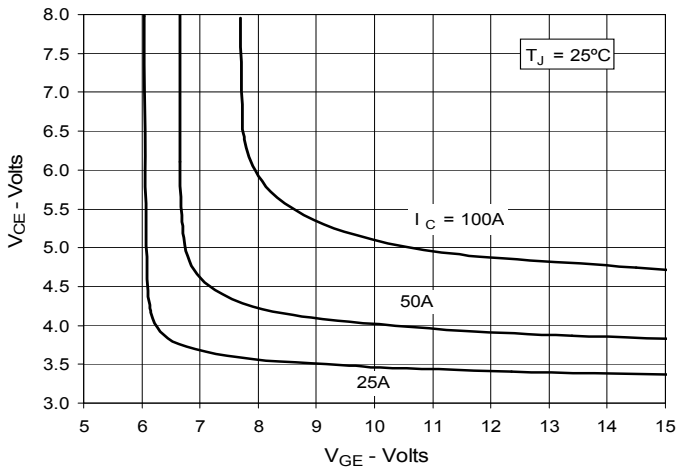
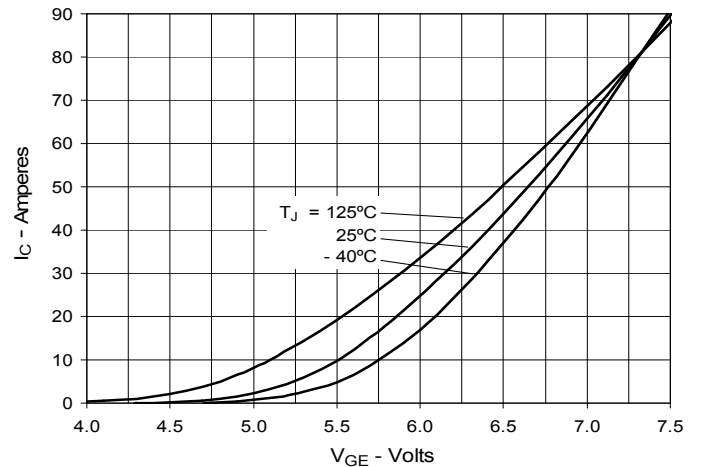
Notes: 1. Pulse test,  $t \leq 300\mu\text{s}$ ; duty cycle,  $d \leq 2\%$ .

### PRELIMINARY TECHNICAL INFORMATION

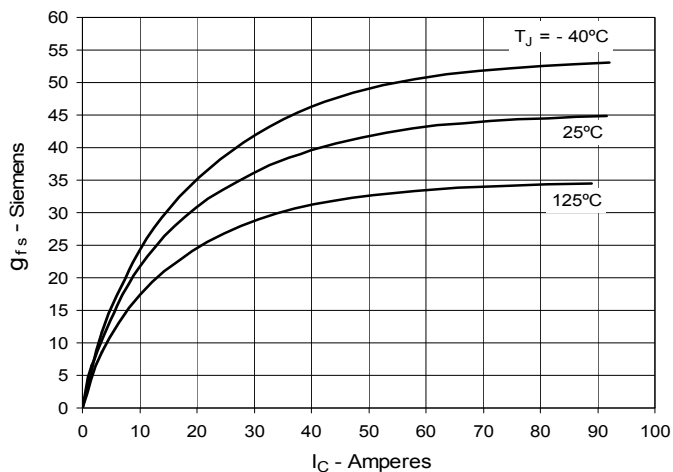
The product presented herein is under development. The Technical Specifications offered are derived from data gathered during objective characterizations of preliminary engineering lots; but also may yet contain some information supplied during a pre-production design evaluation. IXYS reserves the right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

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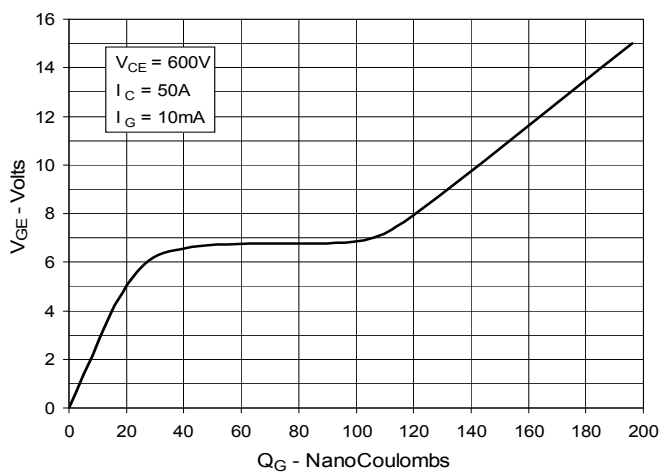
IXYS MOSFETs and IGBTs are covered 4,835,592 4,931,844 5,049,961 5,237,481 6,162,665 6,404,065 B1 6,683,344 6,727,585 7,005,734 B2 7,157,338B2  
by one or more of the following U.S. patents: 4,850,072 5,017,508 5,063,307 5,381,025 6,259,123 B1 6,534,343 6,710,405 B2 6,759,692 7,063,975 B2  
4,881,106 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  
@ 25°C**

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

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


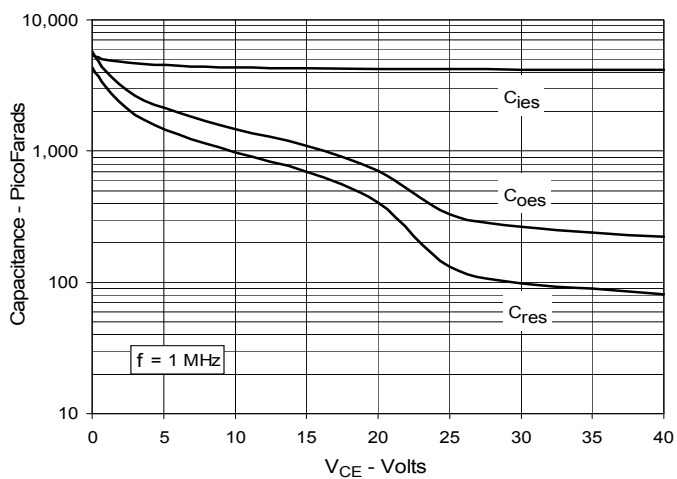
**Fig. 7. Transconductance**



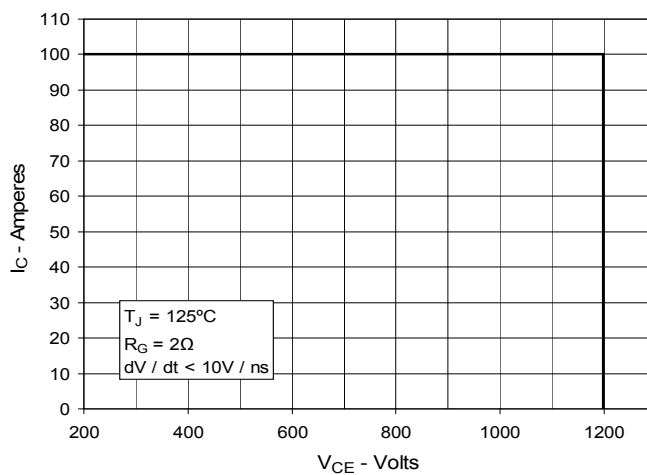
**Fig. 8. Gate Charge**



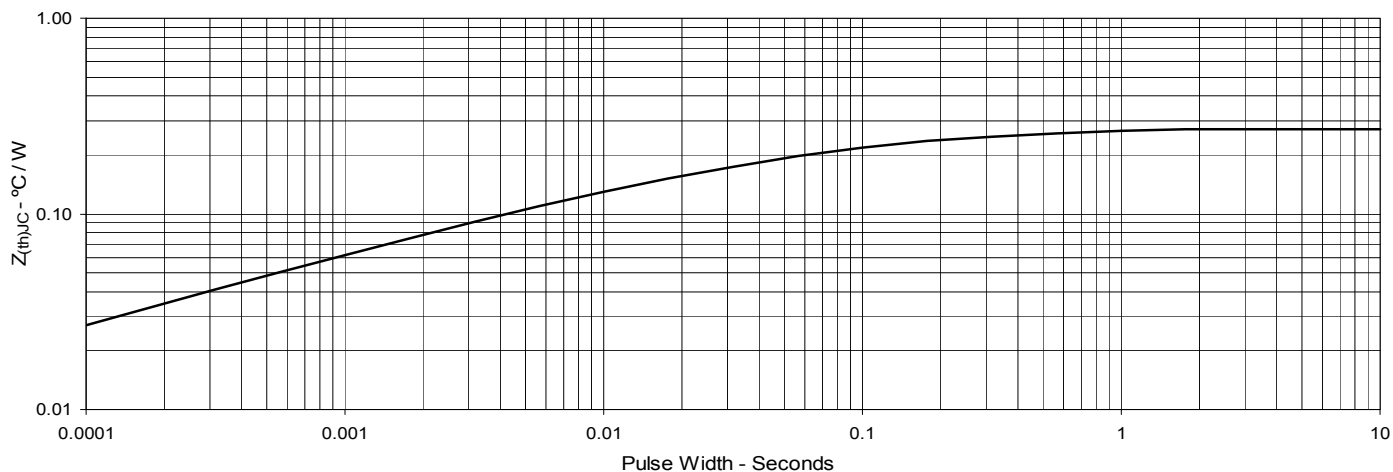
**Fig. 9. Capacitance**



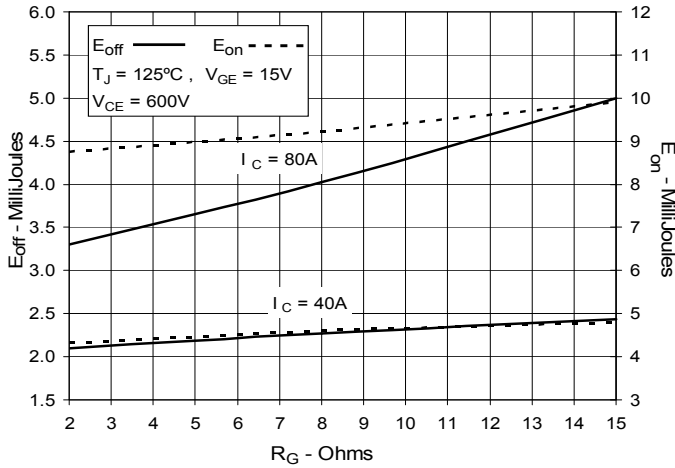
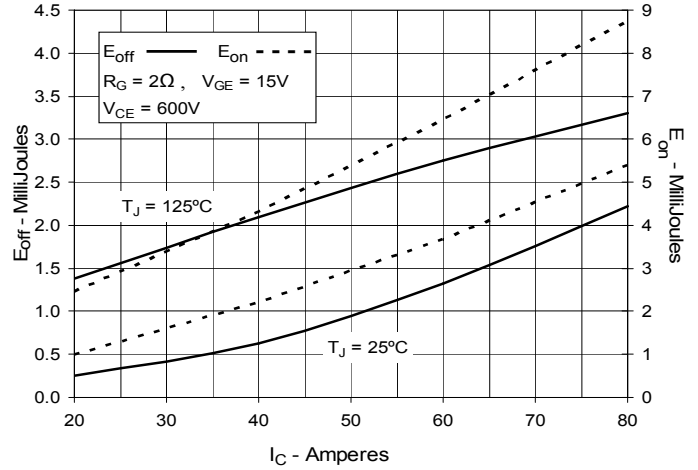
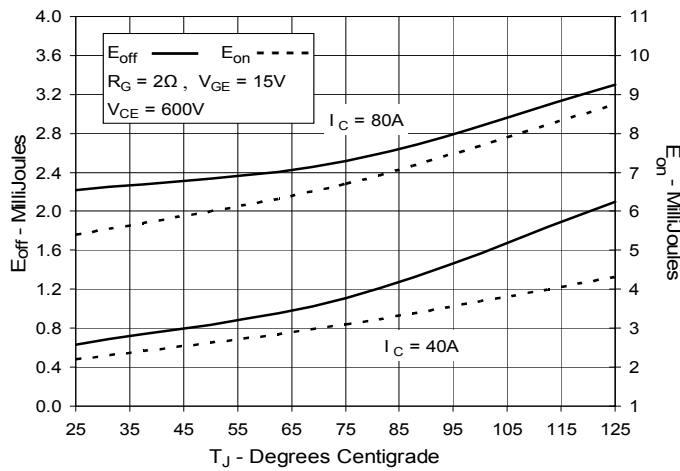
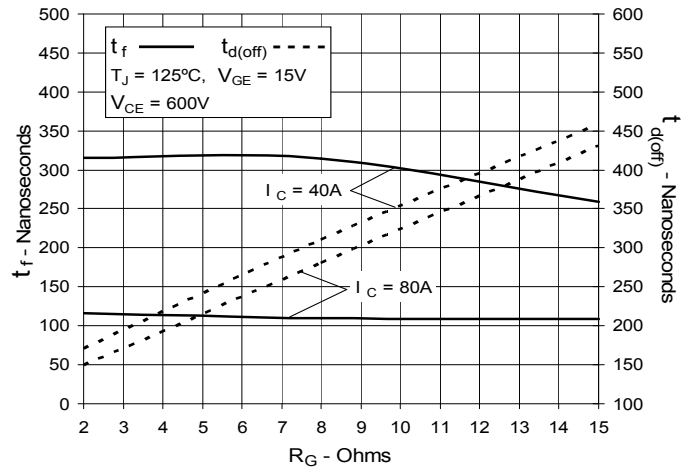
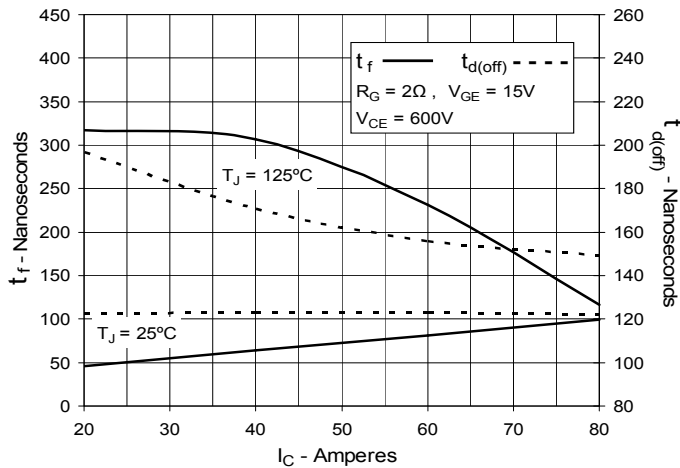
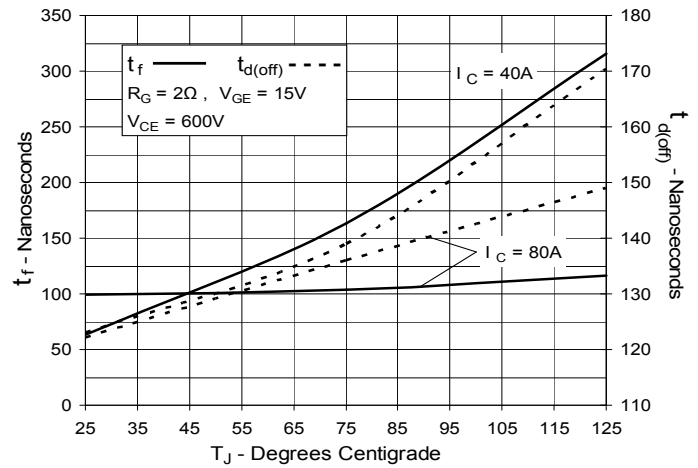
**Fig. 10. Reverse-Bias Safe Operating Area**



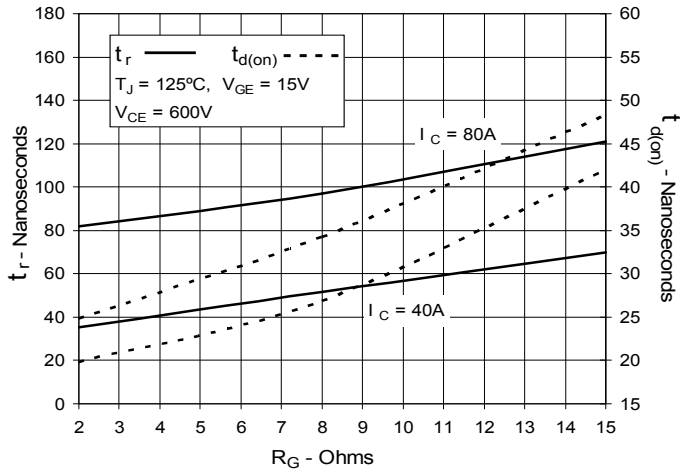
**Fig. 11. Maximum Transient Thermal Impedance**



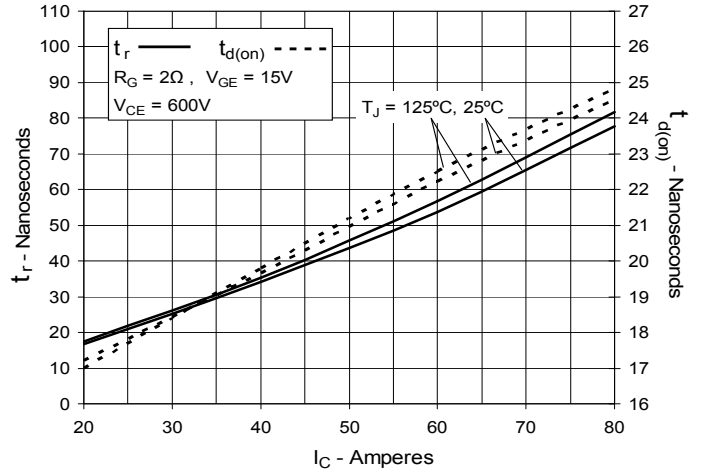
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**Fig. 12. Inductive Switching  
Energy Loss vs. Gate Resistance**

**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**


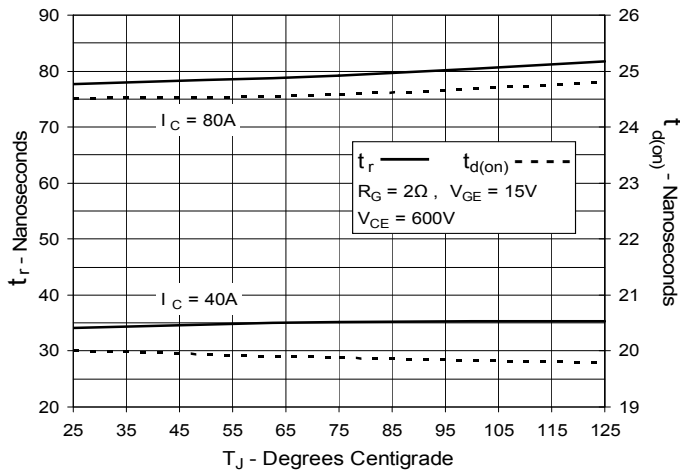
**Fig. 18. Inductive Turn-on  
Switching Times vs. Gate Resistance**



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



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





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