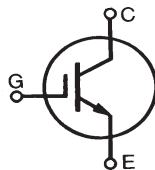


GenX3™ 1200V IGBT

IXGH50N120C3

High speed PT IGBTs for 20 - 50 kHz switching



$$V_{CES} = 1200V$$

$$I_{C110} = 50A$$

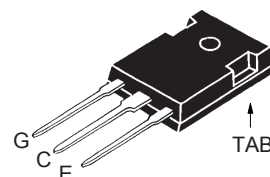
$$V_{CE(sat)} \leq 4.2V$$

$$t_{fi(typ)}^{OE(sat)} = 64ns$$

Symbol	Test Conditions	Maximum Ratings	
V_{CES}	$T_J = 25^{\circ}\text{C}$ to 150°C	1200	V
V_{CGR}	$T_J = 25^{\circ}\text{C}$ to 150°C , $R_{GE} = 1\text{M}\Omega$	1200	V
V_{GES}	Continuous	± 20	V
V_{GEM}	Transient	± 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
SSOA	$V_{GE} = 15\text{V}$, $T_J = 125^{\circ}\text{C}$, $R_G = 3\Omega$	$I_{CM} = 100$	A
(RBSOA)	Clamped inductive load @ $V_{CE} \leq 1200\text{V}$		
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	$^{\circ}\text{C}$
Weight		6	g

Symbol (T _J = 25°C, unless otherwise specified)	Test Conditions	Characteristic Values		
		Min.	Typ.	Max.
B _{CES}	I _C = 250μA, V _{GE} = 0V	1200		V
V _{GE(th)}	I _C = 250μA, V _{CE} = V _{GE}	3.0		5.0 V
I _{CES}	V _{CE} = V _{CES} V _{GE} = 0V T _J = 125°C			100 μA 2 mA
I _{GES}	V _{CE} = 0V, V _{GE} = ±20V			±100 nA
V _{CE(sat)}	I _C = 40A, V _{GE} = 15V, Note 1 T _J = 125°C		2.6	4.2 V V

TO-247 (IXGH)



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

Features

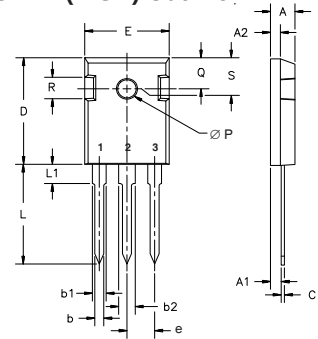
- International standard packages: JEDEC TO-247AD
- IGBT and anti-parallel FRED in one package
- MOS Gate turn-on
 - drive simplicity

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.
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
$t_{d(on)}$	Inductive load, $T_J = 25^\circ\text{C}$ $I_C = 40\text{A}$, $V_{GE} = 15\text{V}$ $V_{CE} = 600\text{V}$, $R_G = 2\Omega$ 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
$t_{d(on)}$	Inductive load, $T_J = 125^\circ\text{C}$ $I_C = 40\text{A}$, $V_{GE} = 15\text{V}$ $V_{CE} = 600\text{V}$, $R_G = 2\Omega$ 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 $^\circ\text{C/W}$
R_{thCK}			0.21	$^\circ\text{C/W}$

TO-247 (IXGH) Outline



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

Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	4.7	5.3	.185	.209
A ₁	2.2	2.54	.087	.102
A ₂	2.2	2.6	.059	.098
b	1.0	1.4	.040	.055
b ₁	1.65	2.13	.065	.084
b ₂	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.

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
@ 25°C

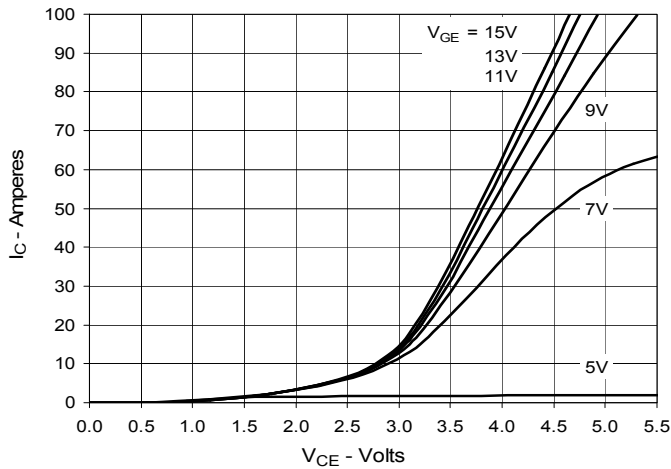


Fig. 2. Extended Output Characteristics
@ 25°C

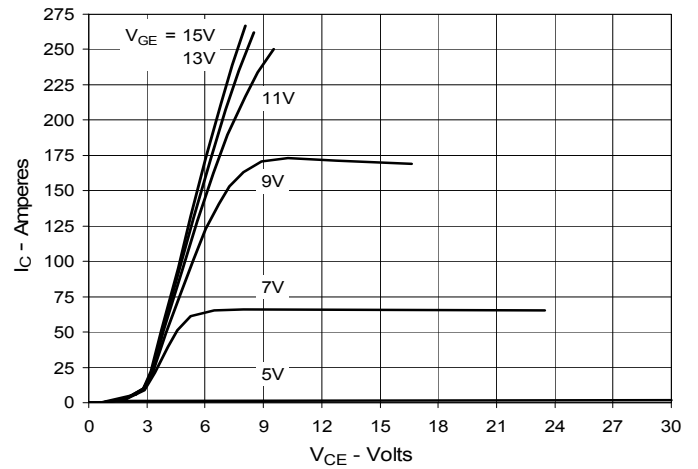


Fig. 3. Output Characteristics
@ 125°C

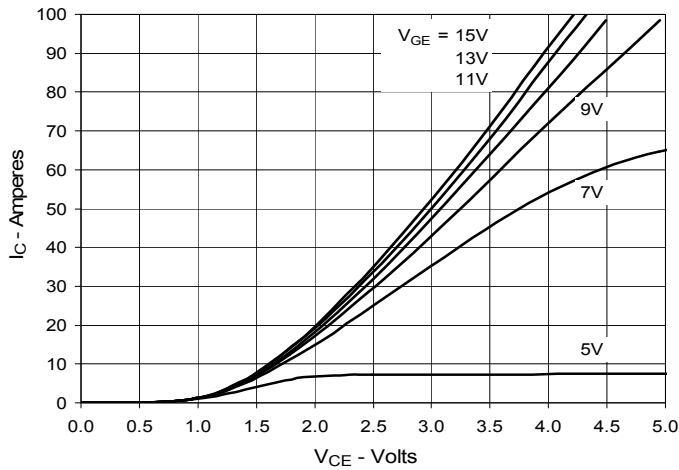


Fig. 4. Dependence of $V_{CE(sat)}$ on
Junction Temperature

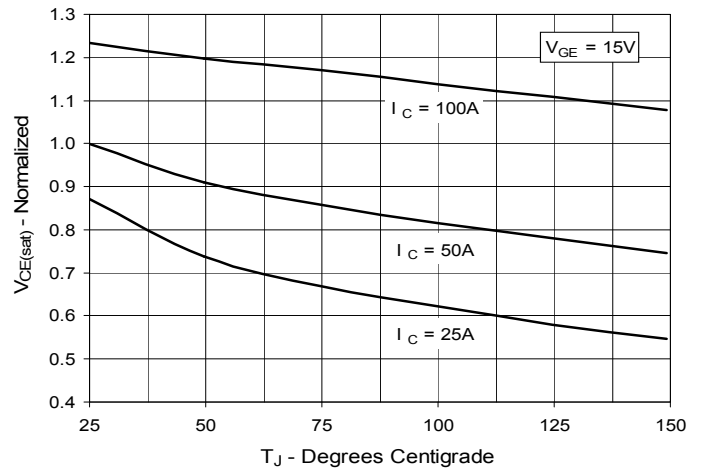


Fig. 5. Collector-to-Emitter Voltage
vs. Gate-to-Emitter Voltage

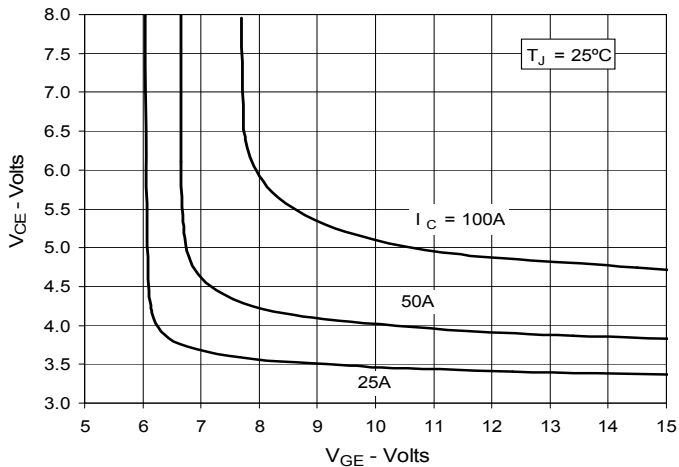


Fig. 6. Input Admittance

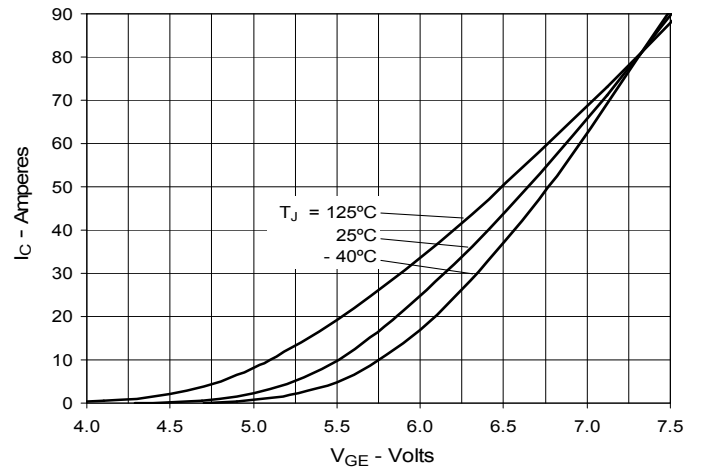
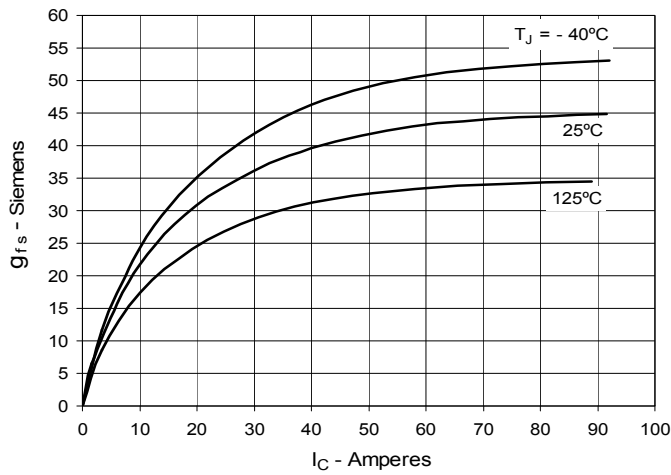
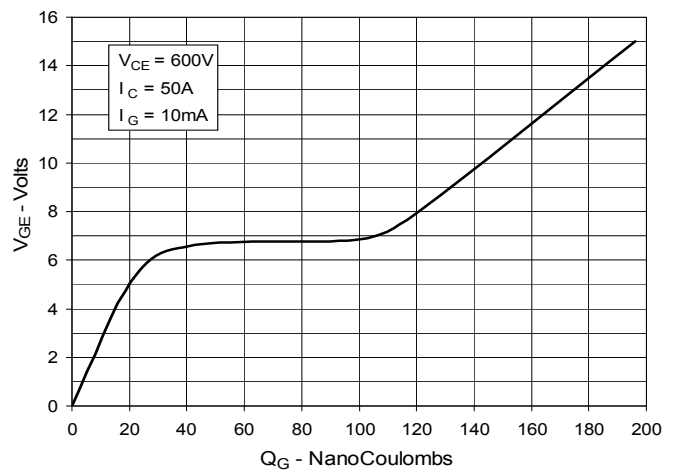
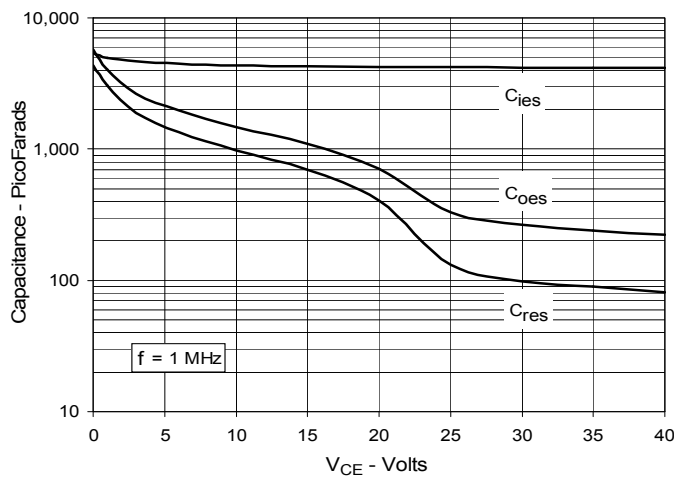
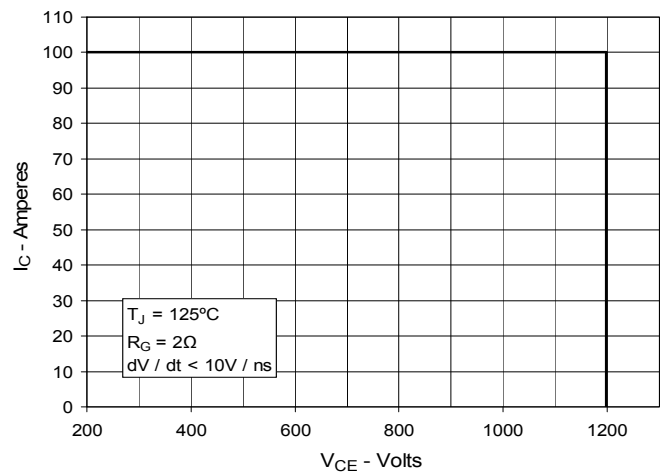
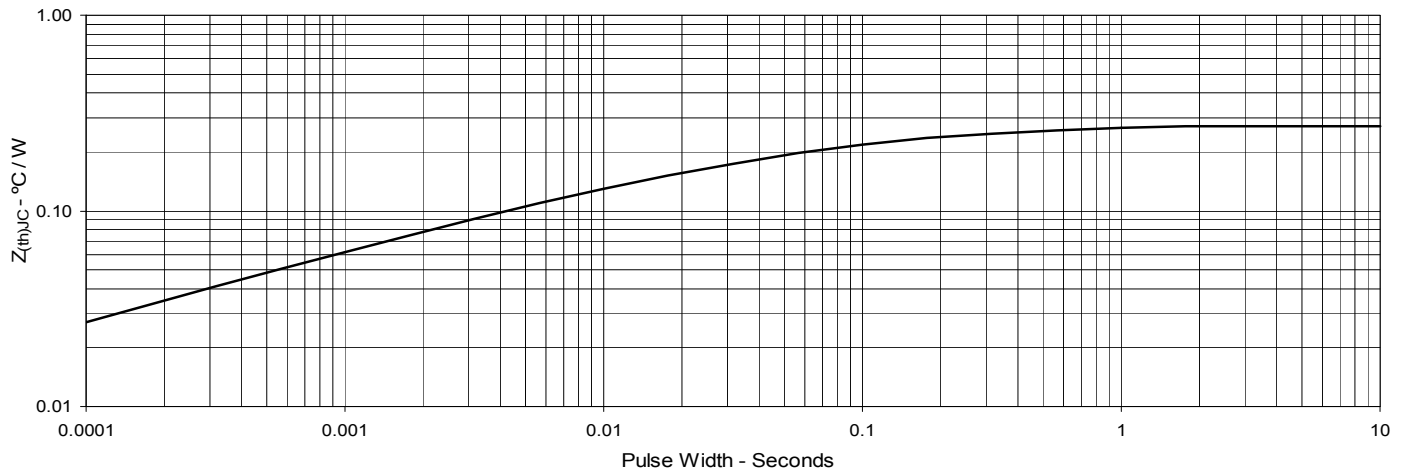
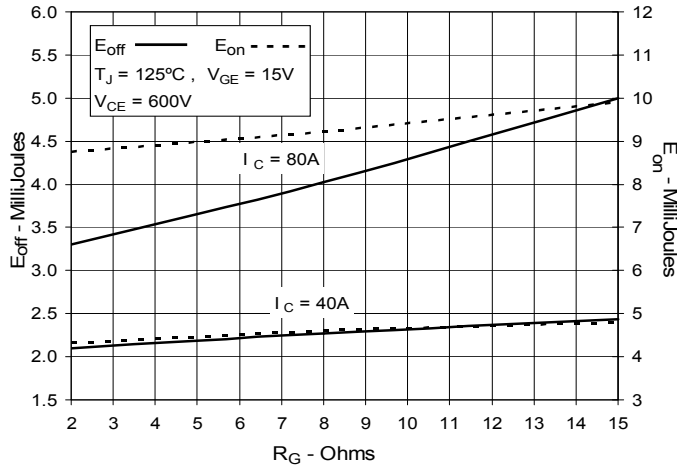


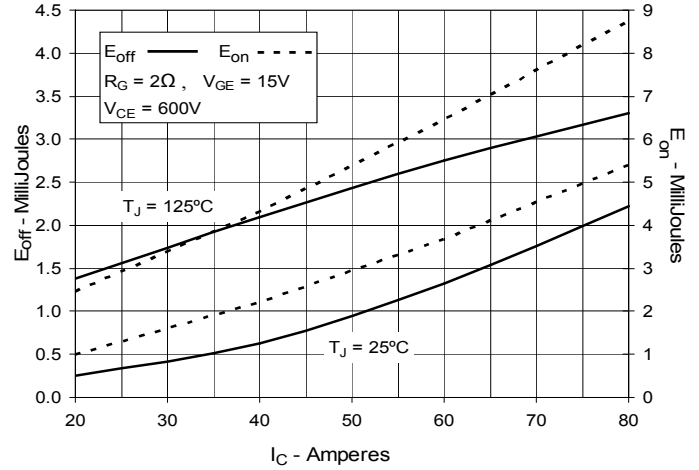
Fig. 7. Transconductance

Fig. 8. Gate Charge

Fig. 9. Capacitance

Fig. 10. Reverse-Bias Safe Operating Area

Fig. 11. Maximum Transient Thermal Impedance


IXYS reserves the right to change limits, test conditions, and dimensions.

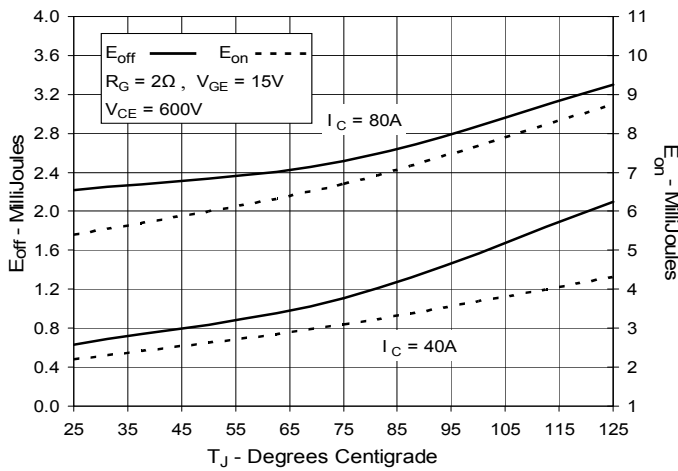
**Fig. 12. Inductive Switching
Energy Loss vs. Gate Resistance**



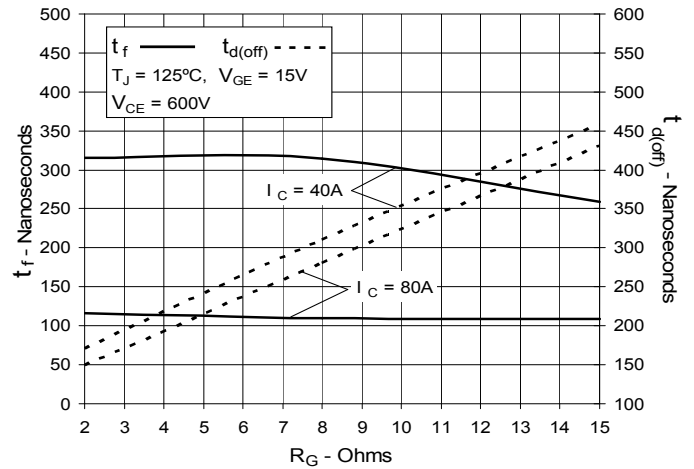
**Fig. 13. Inductive Switching
Energy Loss vs. Collector Current**



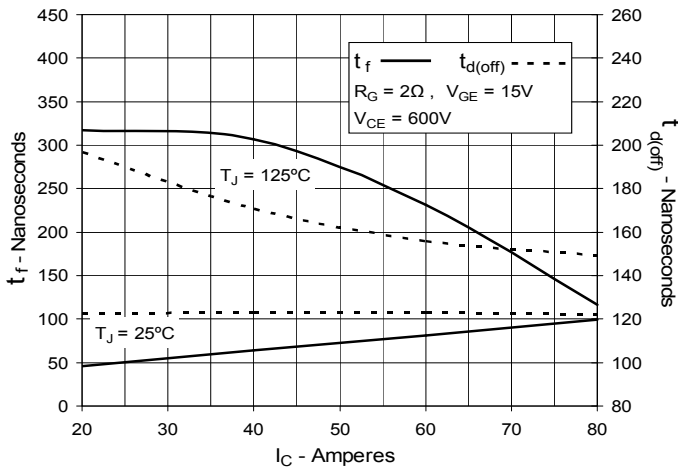
**Fig. 14. Inductive Switching
Energy Loss vs. Junction Temperature**



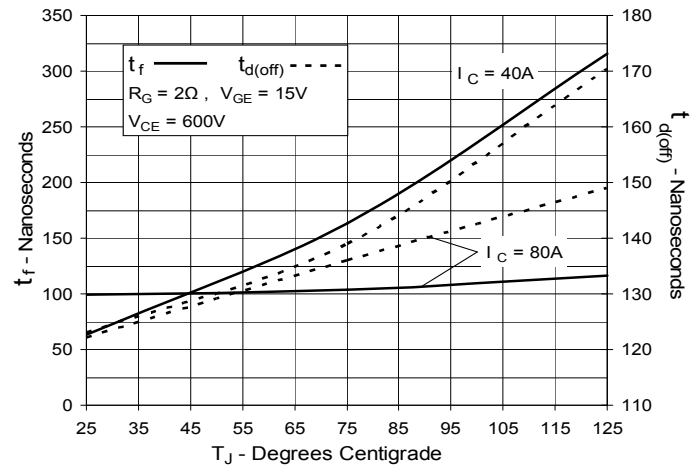
**Fig. 15. Inductive Turn-off
Switching Times vs. Gate Resistance**



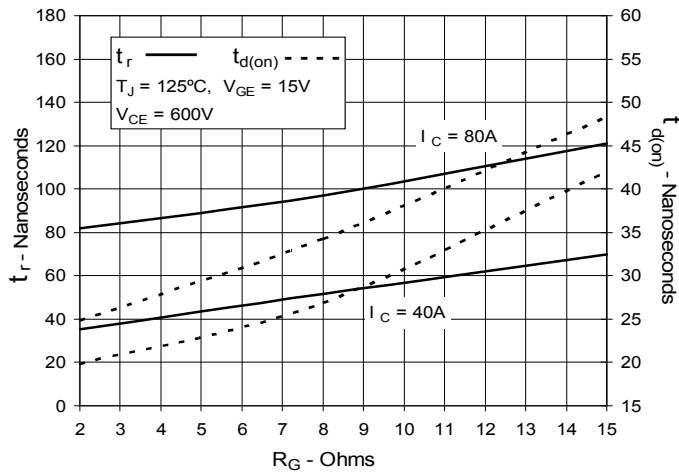
**Fig. 16. Inductive Turn-off
Switching Times vs. Collector Current**



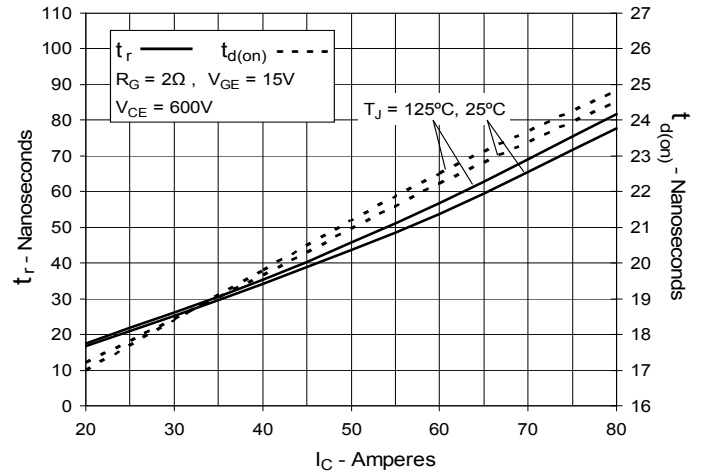
**Fig. 17. Inductive Turn-off
Switching Times vs. Junction Temperature**



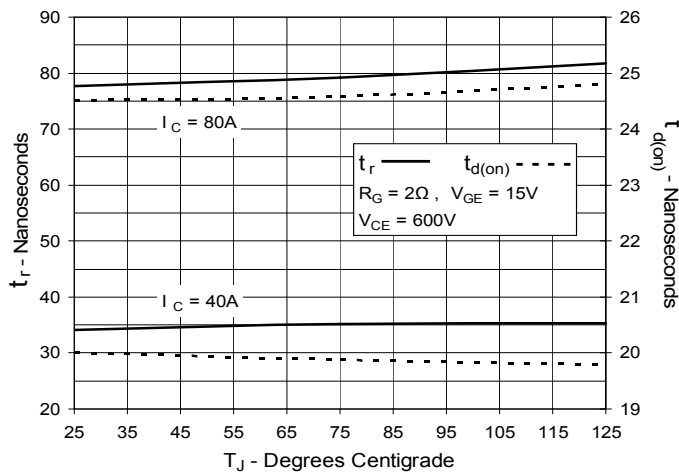
**Fig. 18. Inductive Turn-on
Switching Times vs. Gate Resistance**



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



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





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