IXYS

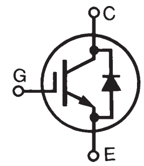
Preliminary Technical Information

GenX3™ 1200V IGBTs w/ Diode

IXGK50N120C3H1
IXGX50N120C3H1

V_{CES} = 1200V
I_{C100} = 50A
$V_{CE(sat)}$ ≤ 4.2V
$t_{fi(typ)}$ = 64ns

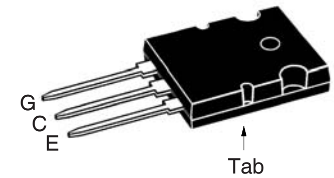
High-Speed PT IGBTs for 20 - 50 kHz Switching



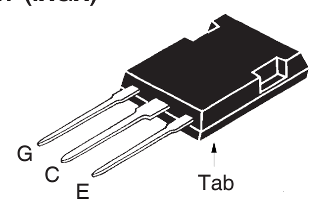
Symbol	Test Conditions	Maximum Ratings	
V_{CES}	T_J = 25°C to 150°C	1200	V
V_{CGR}	T_J = 25°C to 150°C, R_{GE} = 1MΩ	1200	V
V_{GES}	Continuous	±20	V
V_{GEM}	Transient	±30	V
I_{C25}	T_C = 25°C (Chip Capability)	95	A
I_{C100}	T_C = 100°C	50	A
I_{F110}	T_C = 110°C	58	A
I_{CM}	T_C = 25°C, 1ms	240	A
I_A	T_C = 25°C	40	A
E_{AS}	T_C = 25°C	750	mJ
SSOA (RBSOA)	V_{GE}= 15V, T_J = 125°C, R_G = 3Ω Clamped Inductive Load	I_{CM} = 100 $V_{CE} \leq V_{CES}$	A
P_C	T_C = 25°C	460	W
T_J		-55 ... +150	°C
T_{JM}		150	°C
T_{stg}		-55 ... +150	°C
T_L	Maximum Lead Temperature for Soldering	300	°C
T_{SOLD}	1.6 mm (0.062 in.) from Case for 10	260	°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.
Weight	TO-264	10	g
	PLUS247	6	g

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

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

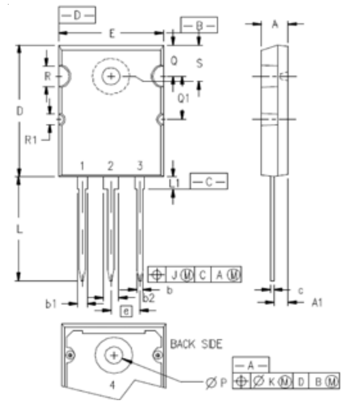
Applications

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

© 2012 IXYS CORPORATION, All Rights Reserved

Symbol	Test Conditions (T$_J$ = 25°C, Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.	
g_{fs}	I_C = 40A, V_{CE} = 10V, Note 2	24	40		S
C_{ies}	V_{CE} = 25V, V_{GE} = 0V, f = 1MHz		4250		pF
C_{oes}			455		pF
C_{res}			120		pF
Q_g	I_C = 50A, V_{GE} = 15V, V_{CE} = 0.5 • V_{CES}		196		nC
Q_{ge}			24		nC
Q_{gc}			84		nC
$t_{d(on)}$	**Inductive load, T_J = 25°C**		31		ns
t_{ri}	I_C = 40A, V_{GE} = 15V		36		ns
E_{on}	V_{CE} = 0.5 • V_{CES}, R_G = 2Ω		2.0		mJ
$t_{d(off)}$	Note 3		123		ns
t_{fi}			64		ns
E_{off}			0.63	1.2	mJ
$t_{d(on)}$	**Inductive load, T_J = 125°C**		23		ns
t_{ri}	I_C = 40A, V_{GE} = 15V		37		ns
E_{on}	V_{CE} = 0.5 • V_{CES}, R_G = 2Ω		3.0		mJ
$t_{d(off)}$	Note 3		170		ns
t_{fi}			315		ns
E_{off}			2.1		mJ
R_{thJC}				0.27	°C/W
R_{thCK}			0.15		°C/W

TO-264 Outline



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

SYM	INCHES MIN	INCHES MAX	MILLIMETERS MIN	MILLIMETERS 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	.215BSC		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

Reverse Diode (SONIC-FRD)

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

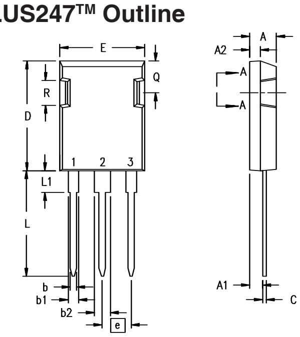
Notes:

1. Part must be heatsunk for high-temp I_{CES} measurement.
2. Pulse test, t ≤ 300µs, duty cycle, d ≤ 2%.
3. Switching times & energy loses 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.

PLUS247™ Outline



Terminals: 1 - Gate
2 - Collector
3 - Emitter

Dim.	Millimeter Min.	Millimeter Max.	Inches Min.	Inches Max.
A	4.83	5.21	.190	.205
A_1	2.29	2.54	.090	.100
A_2	1.91	2.16	.075	.085
b	1.14	1.40	.045	.055
b_1	1.91	2.13	.075	.084
b_2	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 4,860,072 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 @ 25ºC

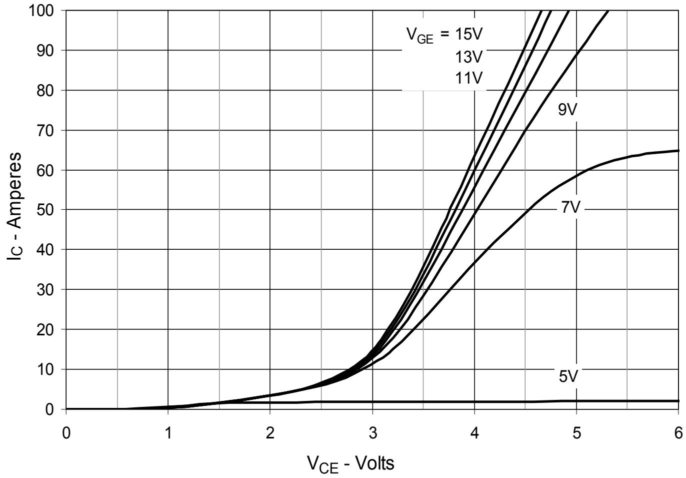


Fig. 2. Extended Output Characteristics @ 25ºC

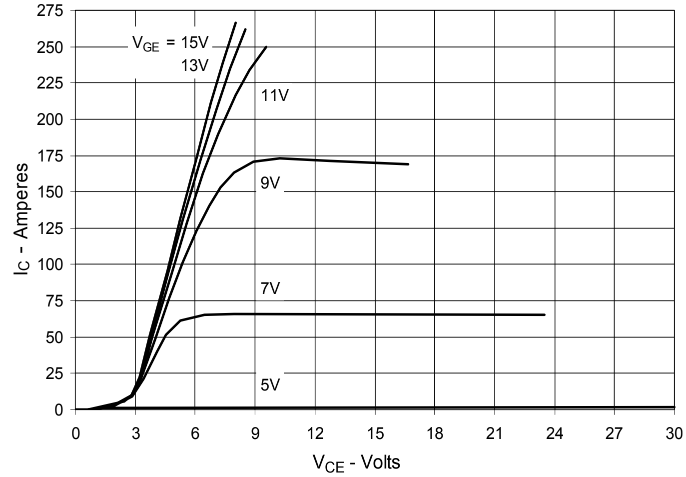


Fig. 3. Output Characteristics @ 125ºC

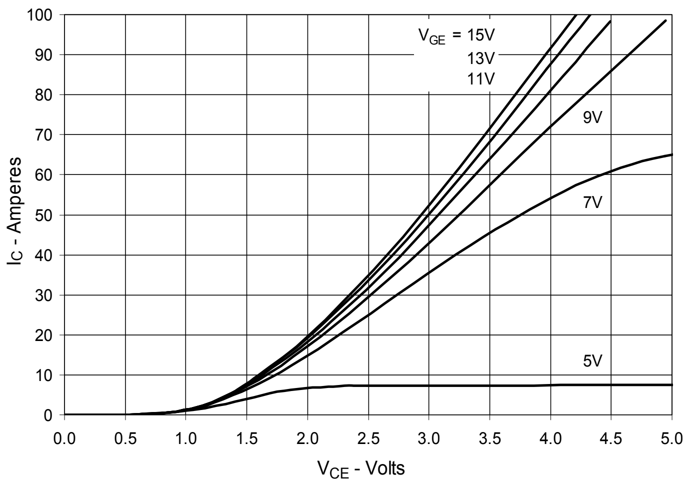


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

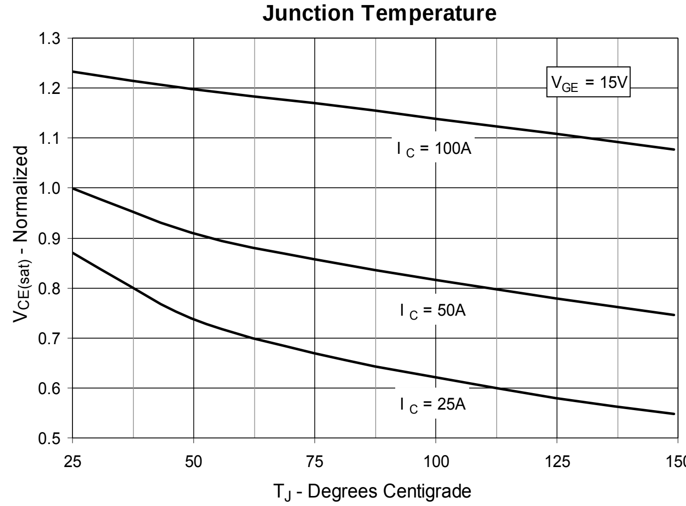


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

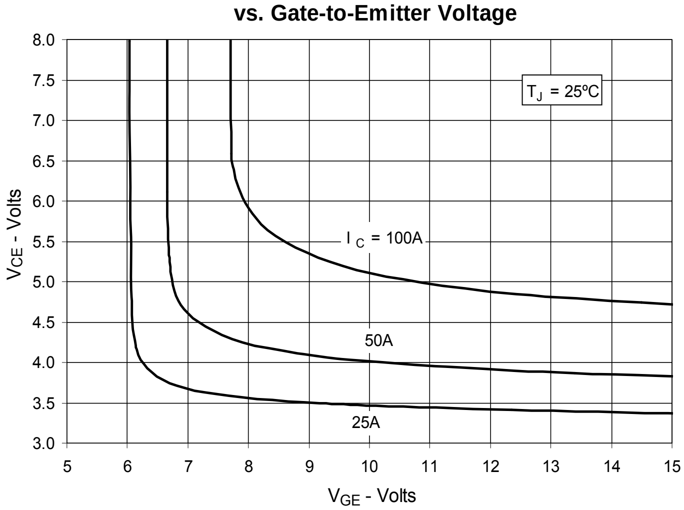
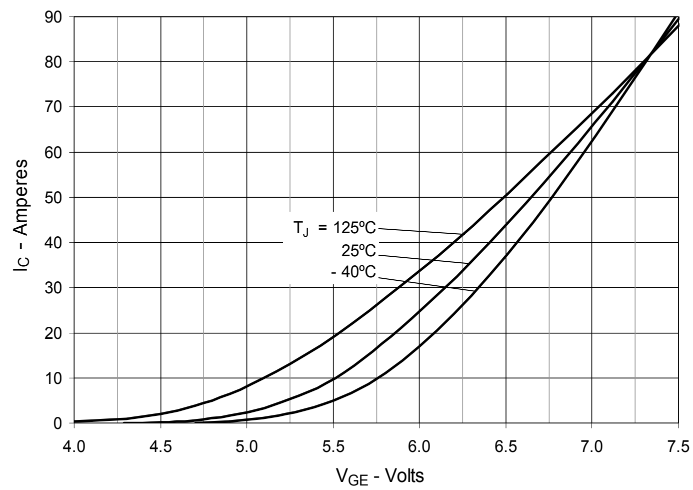


Fig. 6. Input Admittance



© 2012 IXYS CORPORATION, All Rights Reserved

Fig. 7. Transconductance

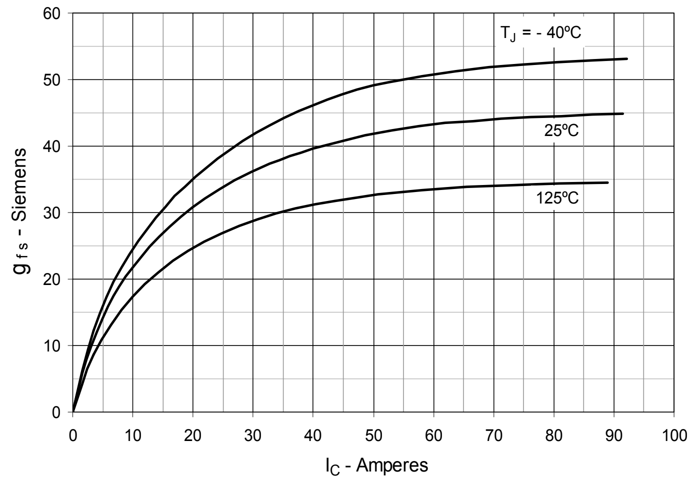


Fig. 8. Gate Charge

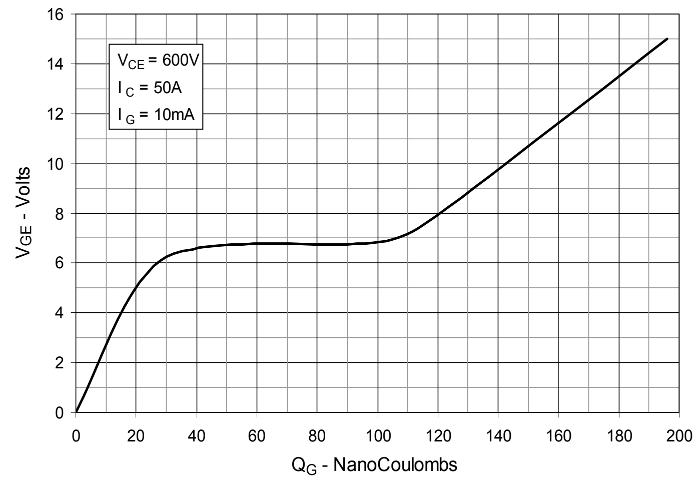


Fig. 9. Capacitance

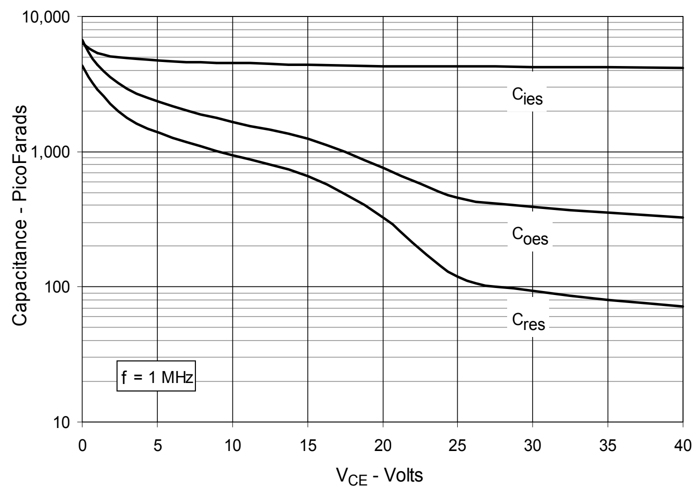


Fig. 10. Reverse-Bias Safe Operating Area

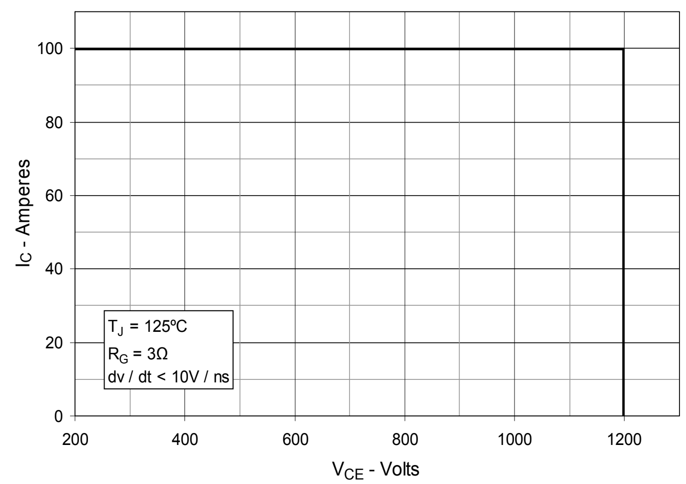
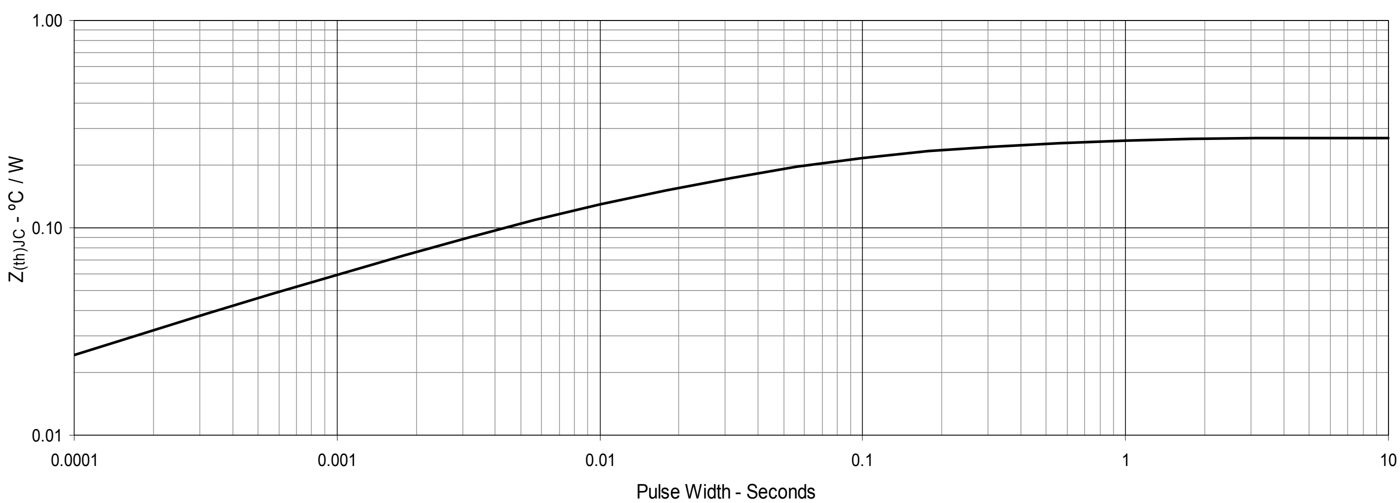


Fig. 11. Maximum Transient Thermal Impedance



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

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

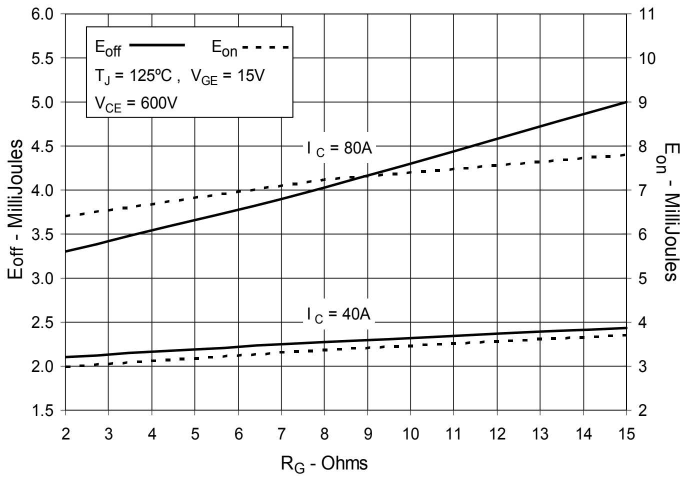


Fig. 13. Inductive Switching Energy Loss vs. Collector Current

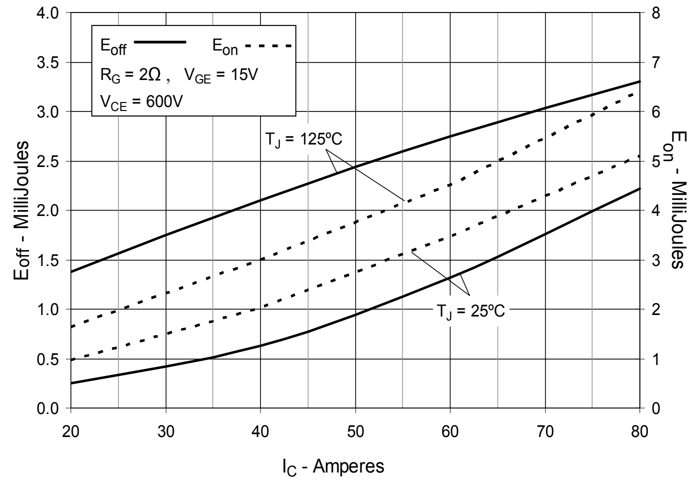


Fig. 14. Inductive Switching Energy Loss vs. Junction Temperature

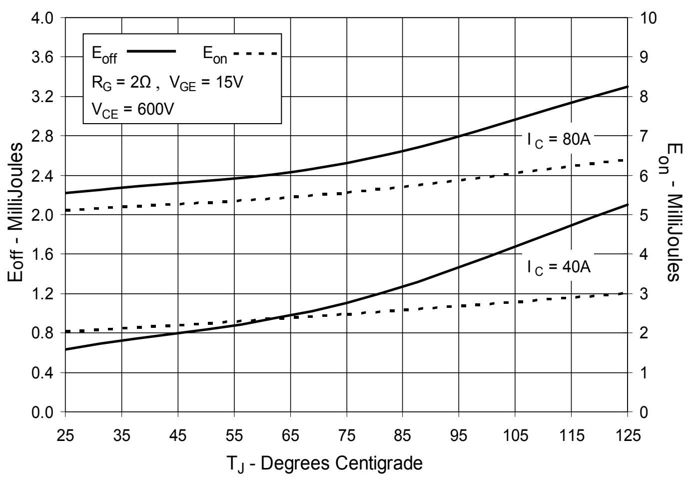


Fig. 15. Inductive Turn-off Switching Times vs. Gate Resistance

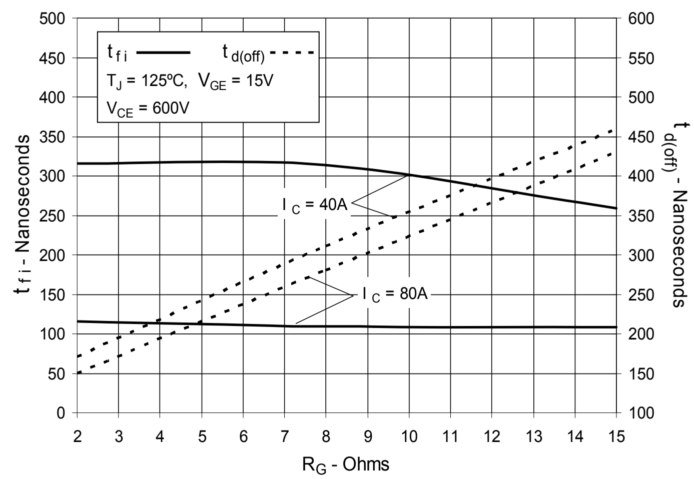


Fig. 16. Inductive Turn-off Switching Times vs. Collector Current

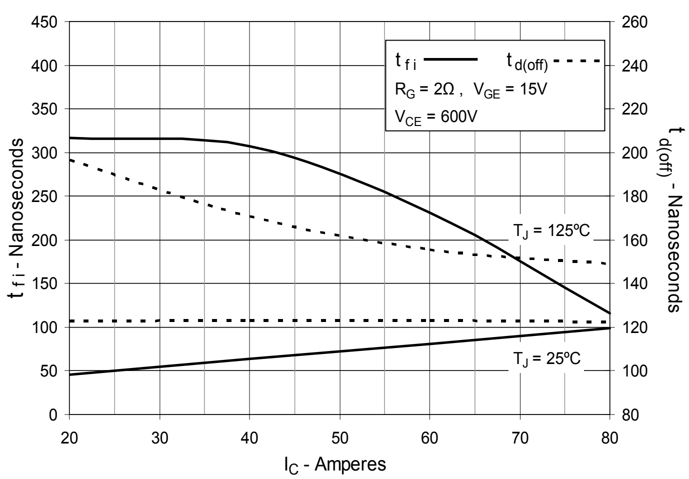
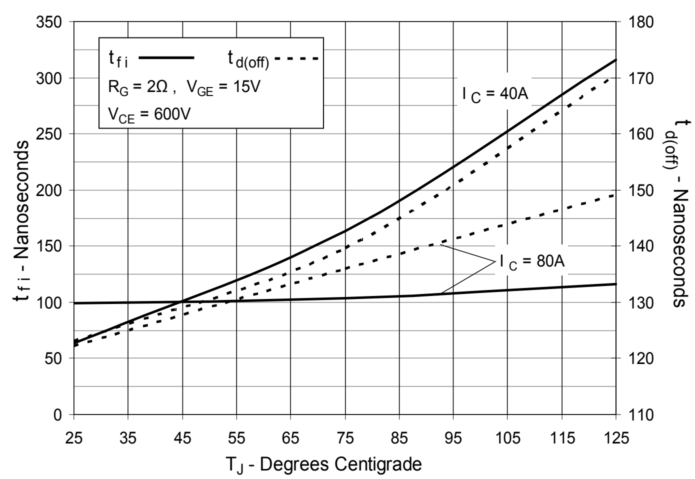


Fig. 17. Inductive Turn-off Switching Times vs. Junction Temperature



© 2012 IXYS CORPORATION, All Rights Reserved

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

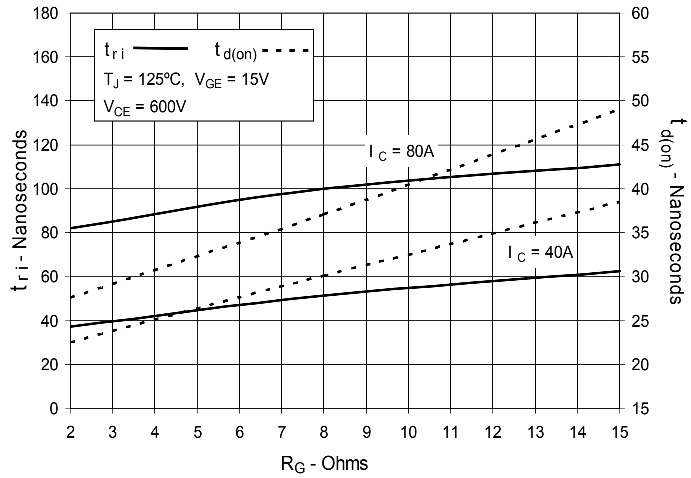


Fig. 19. Inductive Turn-on Switching Times vs. Collector Current

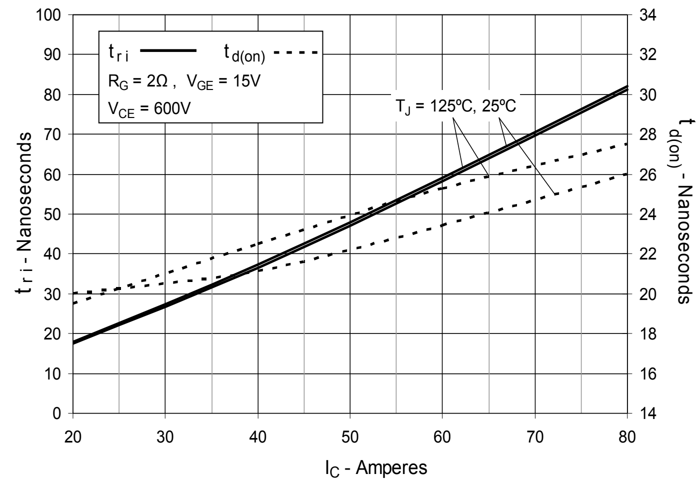
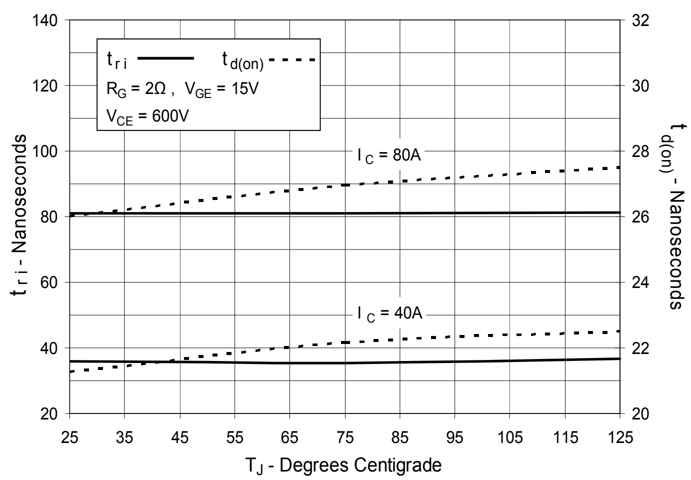


Fig. 20. Inductive Turn-on Switching Times vs. Junction Temperature



IXYS
A Littelfuse Technology

Disclaimer Notice - Information furnished is believed to be accurate and reliable. However, users should independently evaluate the suitability of and test each product selected for their own applications. Littelfuse products are not designed for, and may not be used in, all applications. Read complete Disclaimer Notice at www.littelfuse.com/disclaimer-electronics.