IXYS

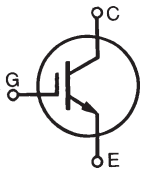
Advance Technical Information

XPT™ 650V IGBT GenX3™

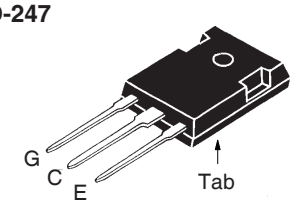
IXYH120N65C3

V_{CES} = 650V
I_{C110} = 120A
$V_{CE(sat)}$ ≤ 2.8V
$t_{fi(typ)}$ = 46ns

Extreme Light Punch Through
IGBT for 20-60kHz Switching



TO-247



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

Symbol	Test Conditions	Maximum Ratings	
V_{CES}	T_J = 25°C to 175°C	650	V
V_{CGR}	T_J = 25°C to 175°C, R_{GE} = 1MΩ	650	V
V_{GES}	Continuous	±20	V
V_{GEM}	Transient	±30	V
I_{C25}	T_C = 25°C (Chip Capability)	260	A
I_{LRMS}	Terminal Current Limit	160	A
I_{C110}	T_C = 110°C	120	A
I_{CM}	T_C = 25°C, 1ms	620	A
I_A	T_C = 25°C	60	A
E_{AS}	T_C = 25°C	1	J
SSOA (RBSOA)	V_{GE} = 15V, T_{VJ} = 150°C, R_G = 2Ω Clamped Inductive Load	I_{CM} = 240 $V_{CE} \leq V_{CES}$	A
t_{sc} (SCSOA)	V_{GE} = 15V, V_{CE} = 400V, T_J = 150°C R_G = 82Ω, Non Repetitive	8	μs
P_C	T_C = 25°C	1360	W
T_J		-55 ... +175	°C
T_{JM}		175	°C
T_{stg}		-55 ... +175	°C
T_L	Maximum Lead Temperature for Soldering	300	°C
T_{SOLD}	1.6 mm (0.062in.) from Case for 10s	260	°C
M_d	Mounting Torque	1.13/10	Nm/lb.in
Weight		6	g

Symbol	Test Conditions (T_J = 25°C, Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.	
BV_{CES}	I_C = 250μA, V_{GE} = 0V	650			V
$V_{GE(th)}$	I_C = 250μA, V_{CE} = V_{GE}	3.5		6.0	V
I_{CES}	V_{CE} = V_{CES}, V_{GE} = 0V			25	μA
	T_J = 150°C			750	μA
I_{GES}	V_{CE} = 0V, V_{GE} = ±20V			±100	nA
$V_{CE(sat)}$	I_C = 100A, V_{GE} = 15V, Note 1		2.3	2.8	V
	T_J = 150°C		2.8		V

Features

- Optimized for 20-60kHz Switching
- Square RBSOA
- Avalanche Rated
- Short Circuit Capability
- High Current Handling Capability
- International Standard Package

Advantages

- High Power Density
- Low Gate Drive Requirement

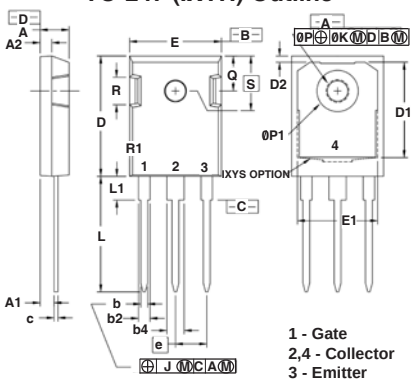
Applications

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

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Symbol	Test Conditions (T_J = 25°C Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.
g_{fs}	I_C = 60A, V_{CE} = 10V, Note 1	40	68	S
C_{ies}	V_{CE} = 25V, V_{GE} = 0V, f = 1MHz		6900	pF
C_{oes}			376	pF
C_{res}			140	pF
$Q_{g(on)}$	I_C = 120A, V_{GE} = 15V, V_{CE} = 0.5 • V_{CES}		265	nC
Q_{ge}			50	nC
Q_{gc}			110	nC
$t_{d(on)}$	**Inductive load, T_J = 25°C**		28	ns
t_{ri}	I_C = 50A, V_{GE} = 15V		29	ns
E_{on}	V_{CE} = 400V, R_G = 2Ω		1.25	mJ
$t_{d(off)}$	Note 2		127	ns
t_{fi}			46	ns
E_{off}			0.50	mJ
$t_{d(on)}$	**Inductive load, T_J = 150°C**		27	ns
t_{ri}	I_C = 50A, V_{GE} = 15V		30	ns
E_{on}	V_{CE} = 400V, R_G = 2Ω		2.45	mJ
$t_{d(off)}$	Note 2		156	ns
t_{fi}			60	ns
E_{off}			0.70	mJ
R_{thJC}				0.11 °C/W
R_{thCS}			0.21	°C/W

TO-247 (IXYH) Outline



1 - Gate
2,4 - Collector
3 - Emitter

Dim.	Millimeter min	Millimeter max	Inches min	Inches max
A	4.70	5.30	0.185	0.209
A1	2.21	2.59	0.087	0.102
A2	1.50	2.49	0.059	0.098
b	0.99	1.40	0.039	0.055
b2	1.65	2.39	0.065	0.094
b4	2.59	3.43	0.102	0.135
c	0.38	0.89	0.015	0.035
D	20.79	21.45	0.819	0.845
D1	13.07	-	0.515	-
D2	0.51	1.35	0.020	0.053
E	15.48	16.24	0.610	0.640
E1	13.45	-	0.53	-
E2	4.31	5.48	0.170	0.216
e	5.45 BSC		0.215 BSC	
L	19.80	20.30	0.078	0.800
L1	-	4.49	-	0.177
Ø P	3.55	3.65	0.140	0.144
Ø P1	-	7.39	-	0.290
Q	5.38	6.19	0.212	0.244
S	6.14 BSC		0.242 BSC	

Notes:

1. Pulse test, t ≤ 300µs, duty cycle, d ≤ 2%.
2. Switching times & energy losses may increase for higher V_{CE}(clamp), T_J or R_G.

ADVANCE TECHNICAL INFORMATION

The product presented herein is under development. The Technical Specifications offered are derived from a subjective evaluation of the design, based upon prior knowledge and experience, and constitute a "considered reflection" of the anticipated result. 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 4,860,072 4,881,106 4,931,844 5,017,508 5,034,796 5,049,961 5,063,307 5,187,117 5,237,481 5,381,025 5,486,715 6,162,665 6,259,123 B1 6,306,728 B1 6,404,065 B1 6,534,343 6,583,505 6,683,344 6,710,405 B2 6,710,463 6,727,585 6,759,692 6,771,478 B2 7,005,734 B2 7,063,975 B2 7,071,537 7,157,338B2

Fig. 1. Output Characteristics @ T_J = 25ºC

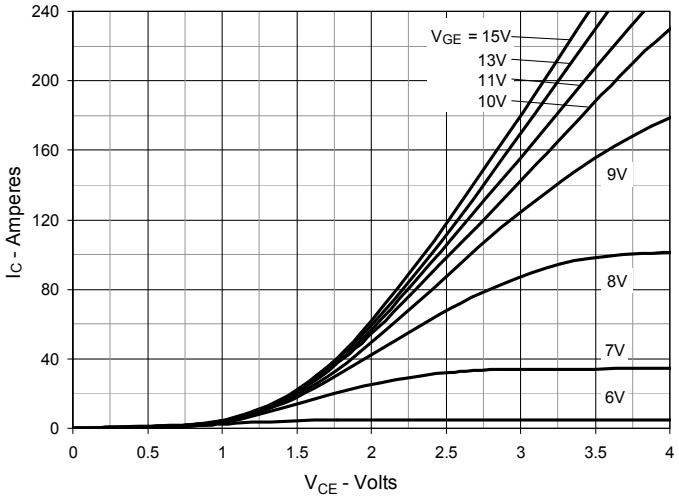


Fig. 2. Extended Output Characteristics @ T_J = 25ºC

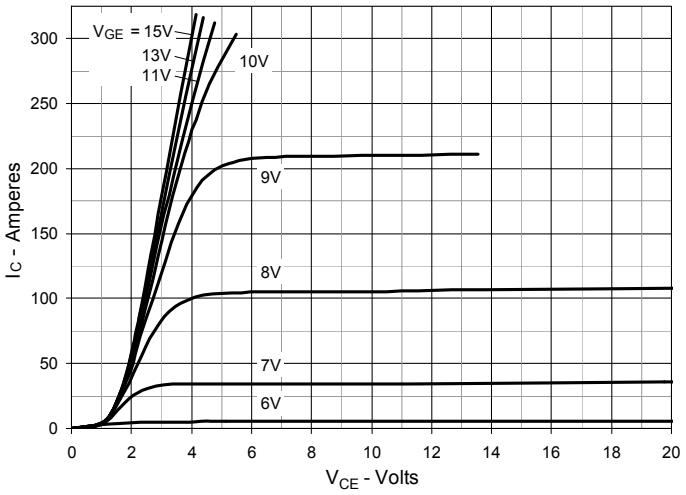


Fig. 3. Output Characteristics @ T_J = 150ºC

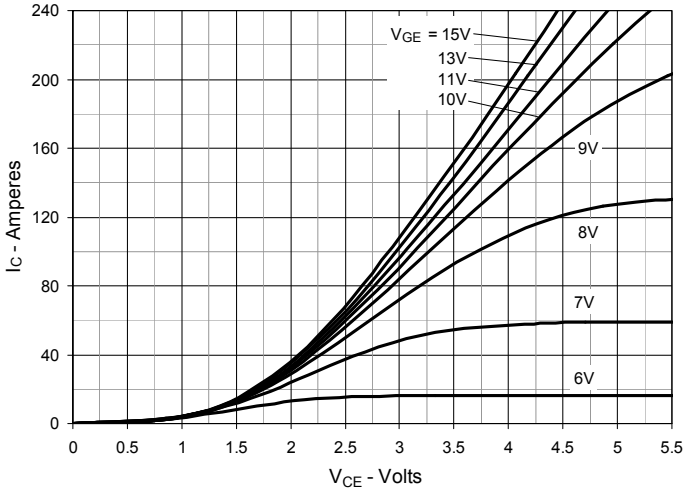


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

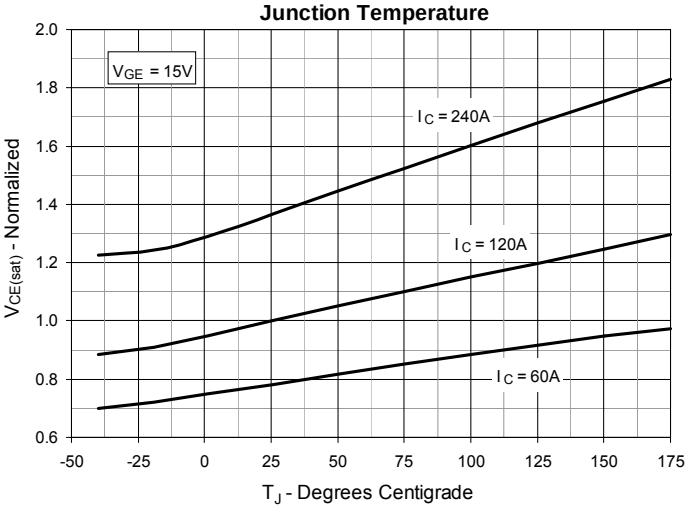


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

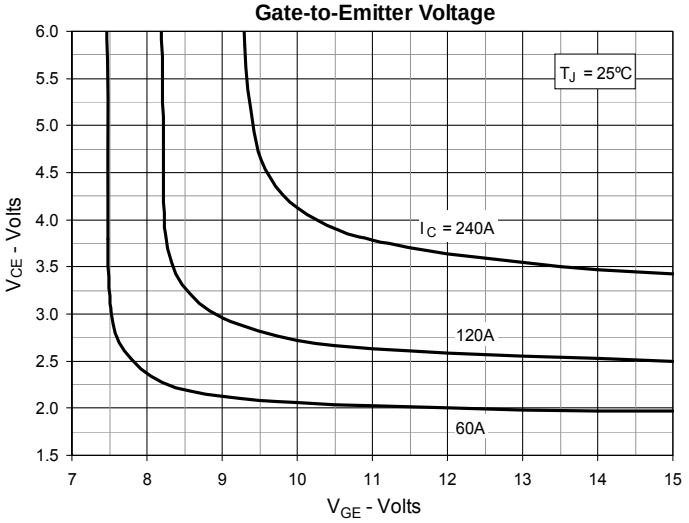
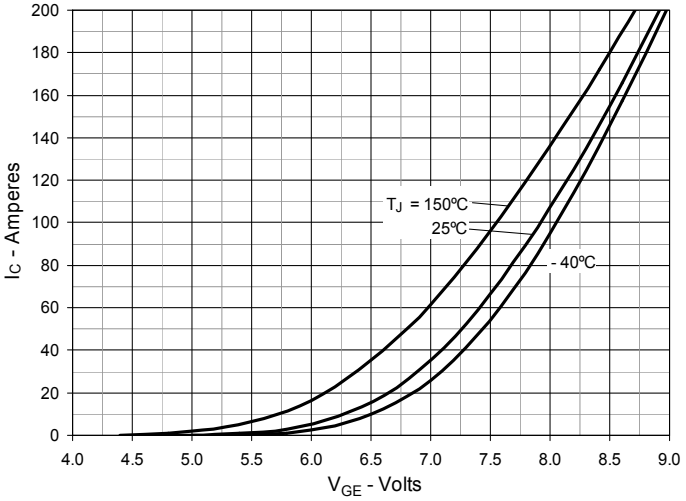


Fig. 6. Input Admittance



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Fig. 7. Transconductance

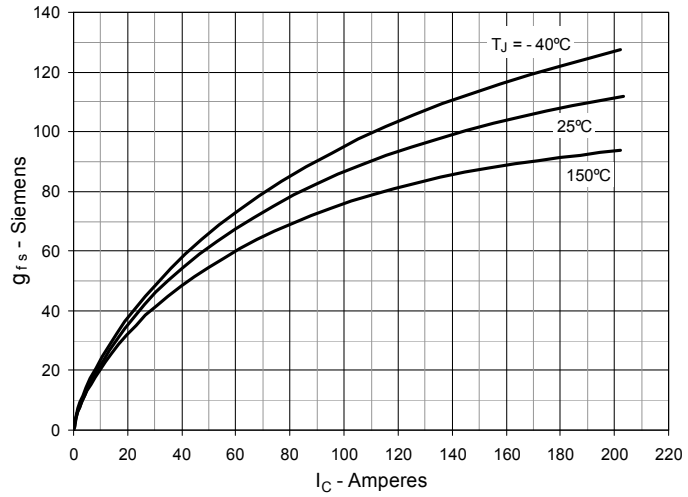


Fig. 8. Gate Charge

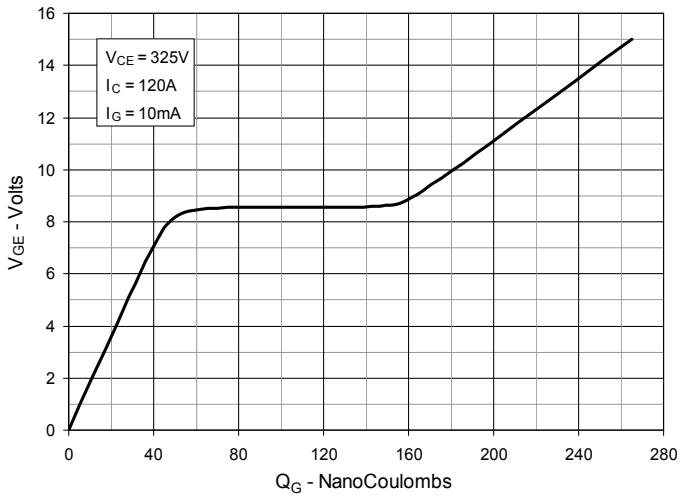


Fig. 9. Capacitance

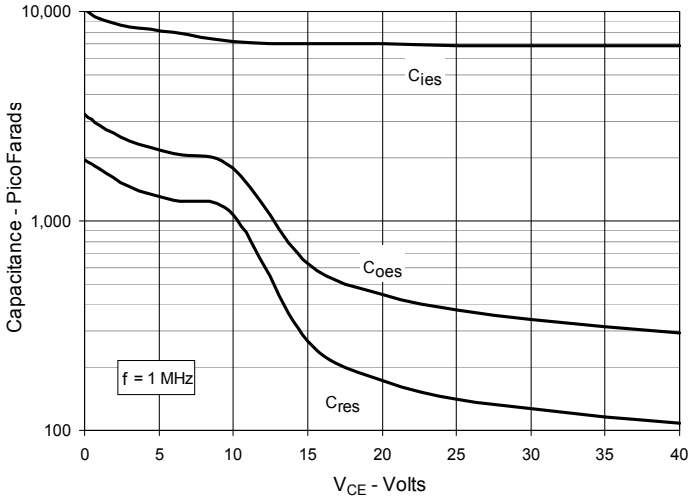


Fig. 10. Reverse-Bias Safe Operating Area

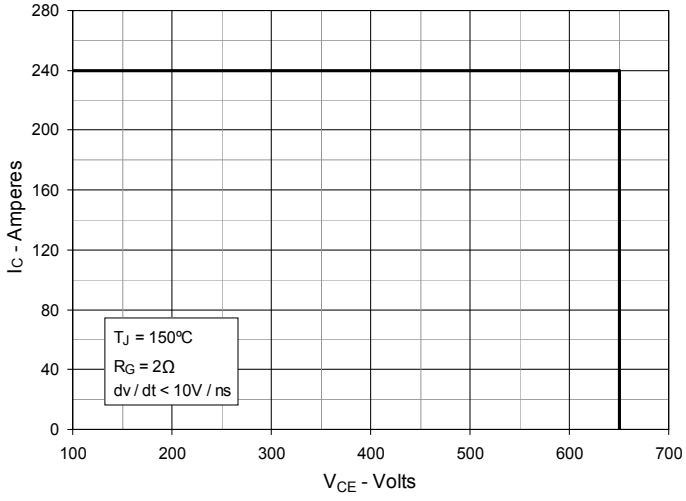


Fig. 11. Forward-Bias Safe Operating Area

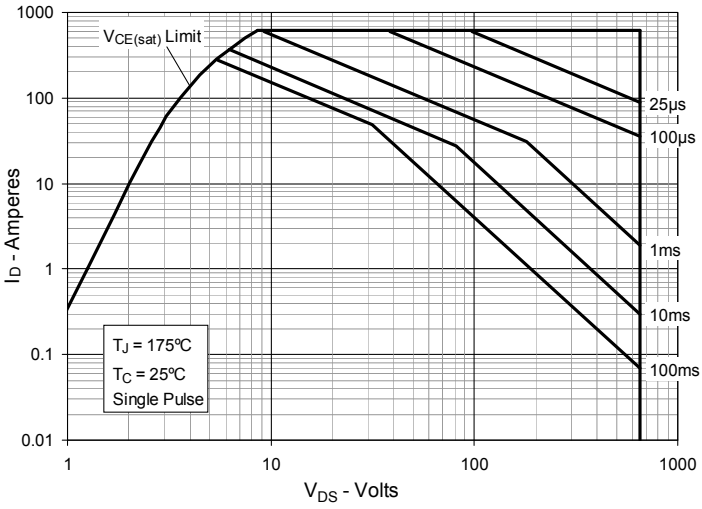
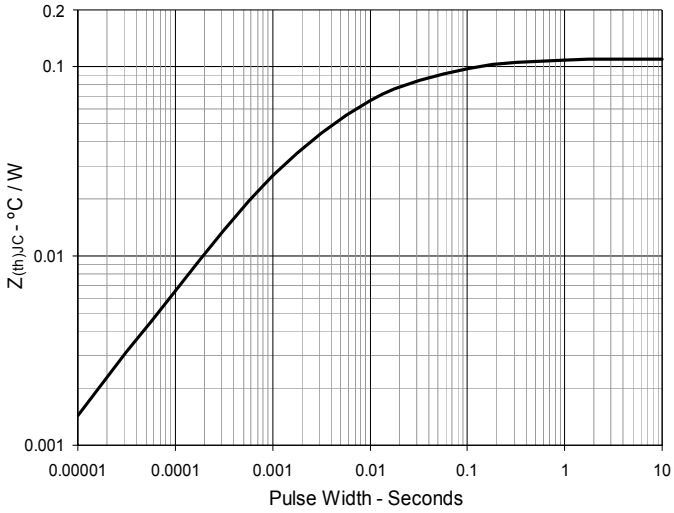


Fig. 12. Maximum Trasient thermal Impedance



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Fig. 13. Inductive Switching Energy Loss vs. Gate Resistance

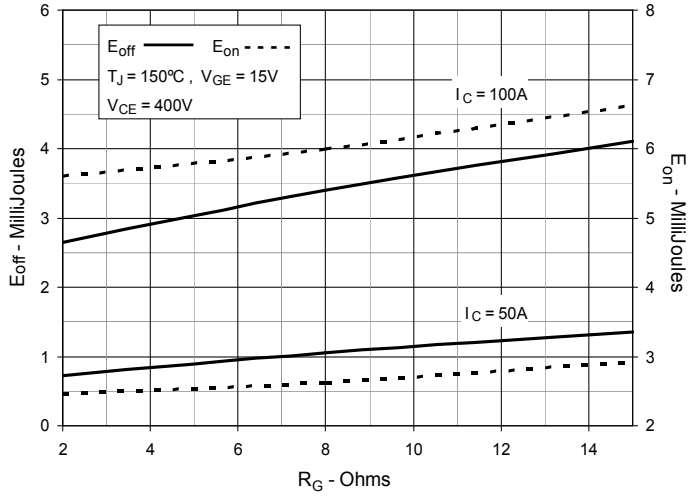


Fig. 14. Inductive Switching Energy Loss vs. Collector Current

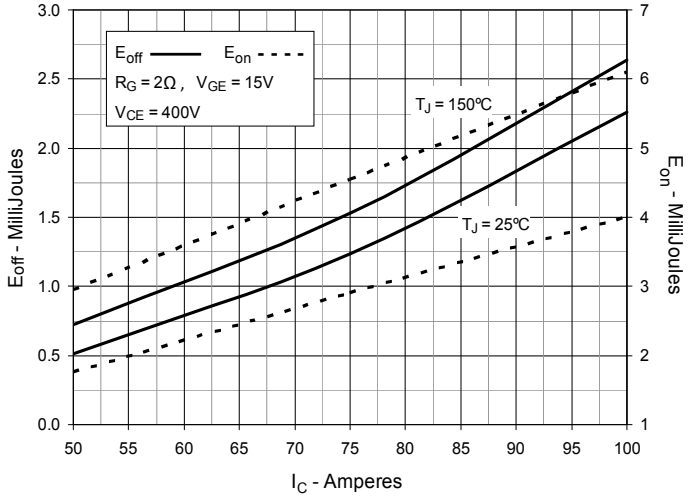


Fig. 15. Inductive Switching Energy Loss vs. Junction Temperature

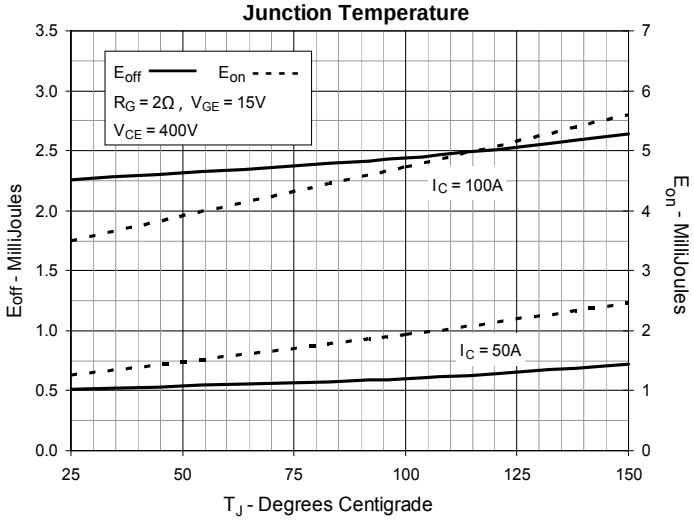


Fig. 16. Inductive Turn-off Switching Times vs. Gate Resistance

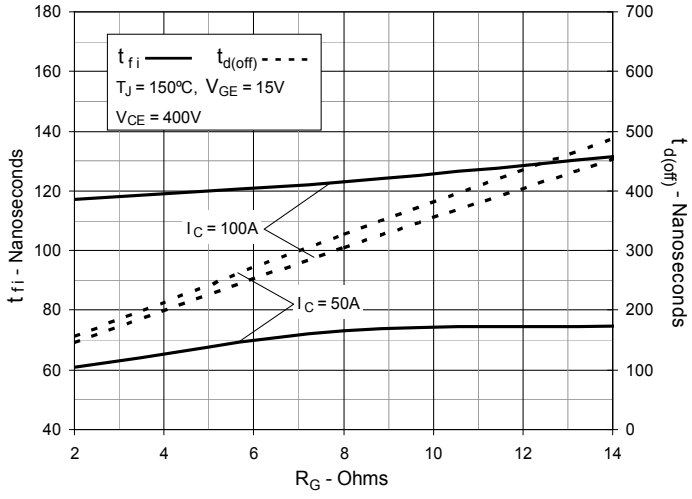


Fig. 17. Inductive Turn-off Switching Times vs. Collector Current

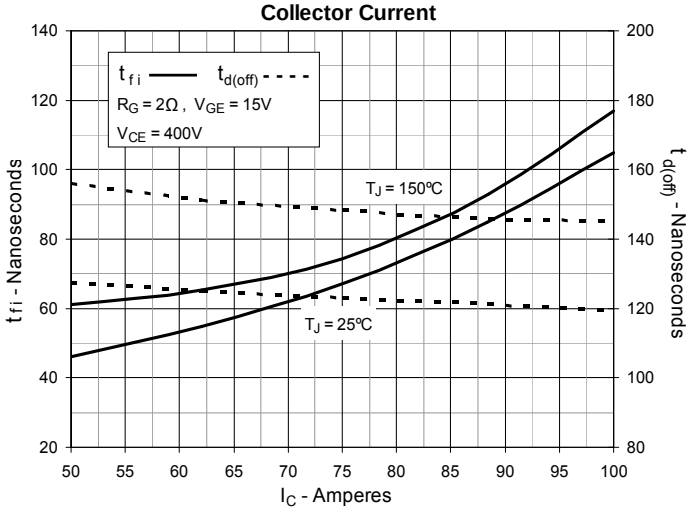
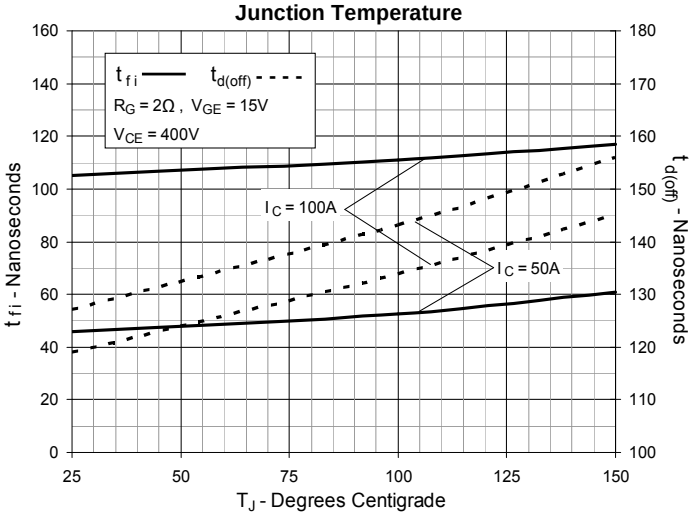


Fig. 18. Inductive Turn-off Switching Times vs. Junction Temperature



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Fig. 19. Inductive Turn-on Switching Times vs. Gate Resistance

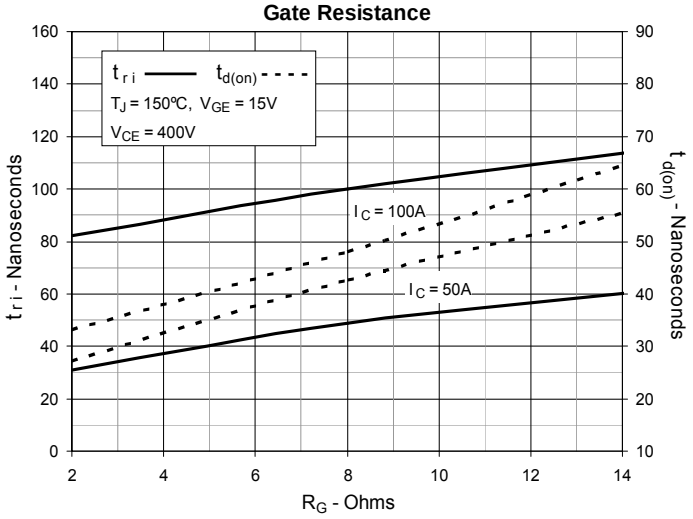


Fig. 20. Inductive Turn-on Switching Times vs. Collector Current

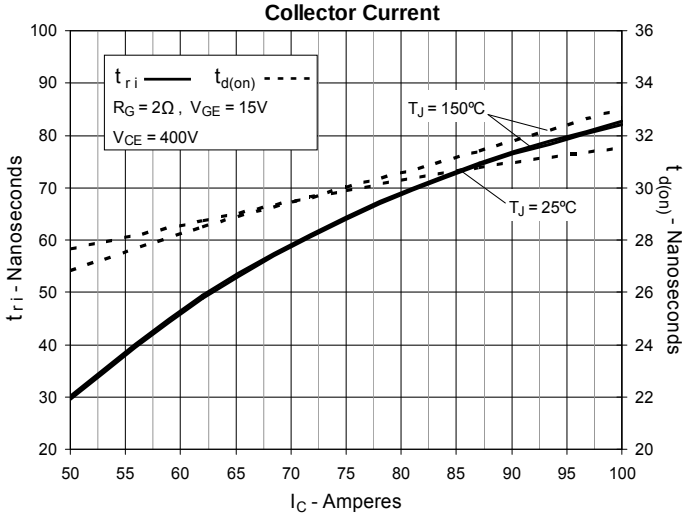


Fig. 21. Inductive Turn-on Switching Times vs. Junction Temperature

