IXYS

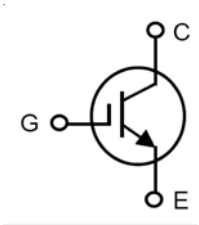
Preliminary Technical Information

XPT™ 650V IGBT GenX4™

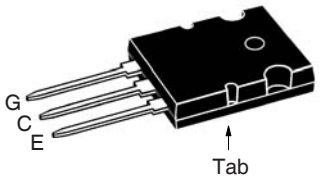
IXXK200N65B4
IXXX200N65B4

V_{CES} = 650V
I_{C110} = 200A
$V_{CE(sat)}$ ≤ 1.7V
$t_{fi(typ)}$ = 80ns

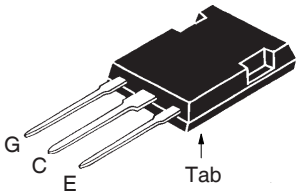
Extreme Light Punch Through
IGBT for 10-30kHz Switching



TO-264 (IXXK)



PLUS247 (IXXX)



G = Gate E = Emitter
C = Collector 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)	480	A
I_{LRMS}	Lead Current Limit	160	A
I_{C110}	T_C = 110°C	200	A
I_{CM}	T_C = 25°C, 1ms	1100	A
SSOA (RBSOA)	V_{GE} = 15V, T_{VJ} = 150°C, R_G = 1Ω Clamped Inductive Load	I_{CM} = 400 @ $V_{CE} \leq V_{CES}$	A
t_{sc} (SCSOA)	V_{GE} = 15V, V_{CE} = 360V, T_J = 150°C R_G = 10Ω, Non Repetitive	10	µs
P_C	T_C = 25°C	1630	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 (TO-264)	1.13/10	Nm/lb.in
F_C	Mounting Force (PLUS247)	20..120 /4.5..27	N/lb
Weight	TO-264 PLUS247	10 6	g 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}	4.0		6.5	V
I_{CES}	V_{CE} = V_{CES}, V_{GE} = 0V			25	µA
	T_J = 150°C			2	mA
I_{GES}	V_{CE} = 0V, V_{GE} = ±20V			±200	nA
$V_{CE(sat)}$	I_C = 160A, V_{GE} = 15V, Note 1		1.4	1.7	V
	T_J = 150°C		1.6		V

Features

- Optimized for 10-30kHz Switching
- Square RBSOA
- Short Circuit Capability
- International Standard Packages
- High Current Handling Capability

Advantages

- High Power Density
- Low Gate Drive Requirement

Applications

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

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	54	90		S
C_{ies}	V_{CE} = 25V, V_{GE} = 0V, f = 1MHz		11.25		nF
C_{oes}			670		pF
C_{res}			390		pF
$Q_{g(on)}$	I_C = 200A, V_{GE} = 15V, V_{CE} = 0.5 • V_{CES}		553		nC
Q_{ge}			110		nC
Q_{gc}			253		nC
$t_{d(on)}$	**Inductive load, T_J = 25°C**		62		ns
t_{ri}	I_C = 100A, V_{GE} = 15V		76		ns
E_{on}	V_{CE} = 400V, R_G = 1Ω		4.40		mJ
$t_{d(off)}$	Note 2		245		ns
t_{fi}			80		ns
E_{off}			2.20	3.50	mJ
$t_{d(on)}$	**Inductive load, T_J = 150°C**		54		ns
t_{ri}	I_C = 100A, V_{GE} = 15V		65		ns
E_{on}	V_{CE} = 400V, R_G = 1Ω		5.55		mJ
$t_{d(off)}$	Note 2		236		ns
t_{fi}			110		ns
E_{off}			2.54		mJ
R_{thJC}				0.092	°C/W
R_{thCS}			0.15		°C/W

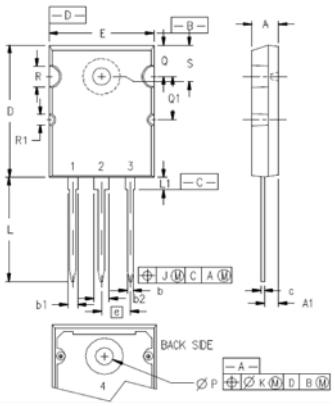
Notes:

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.

PRELIMANARY TECHNICAL INFORMATION

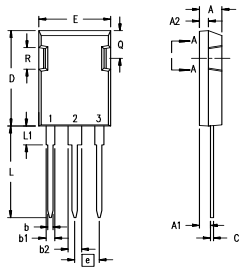
The product presented herein is under development. The Technical Specifications offered are derived from a subjective evaluation of the design, based upon prior knowledge and experience, and constitute a "considered reflection" of the anticipated result. IXYS reserves the right to change limits, test conditions, and dimensions without notice.

TO-264 Outline



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

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

Fig. 1. Output Characteristics @ T_J = 25ºC

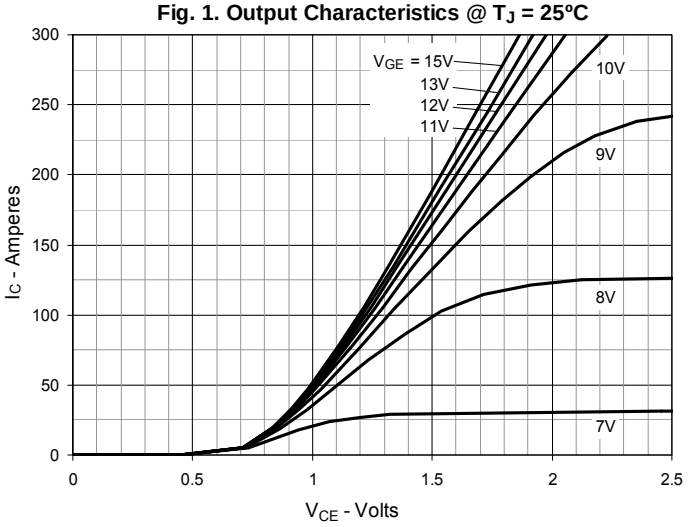


Fig. 2. Extended Output Characteristics @ T_J = 25ºC

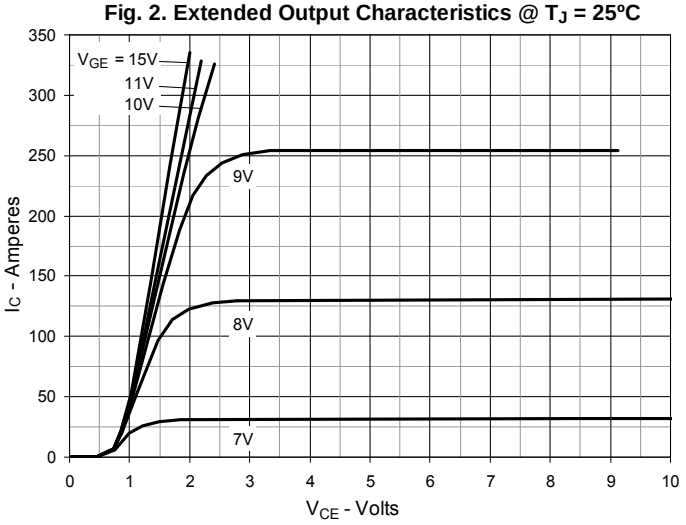


Fig. 3. Output Characteristics @ T_J = 150ºC

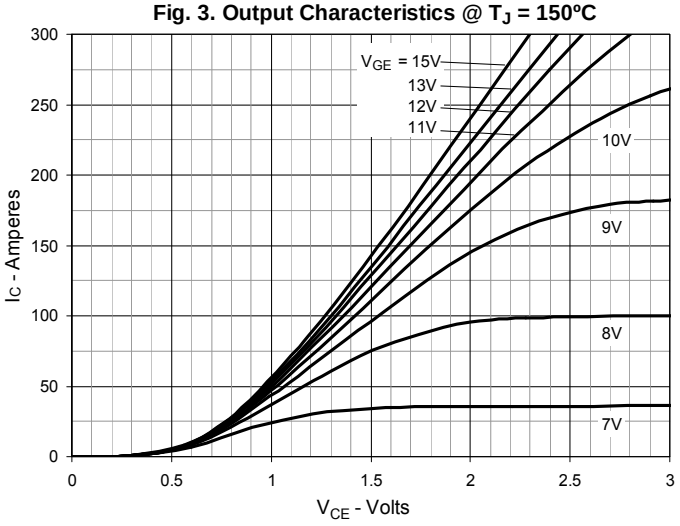


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

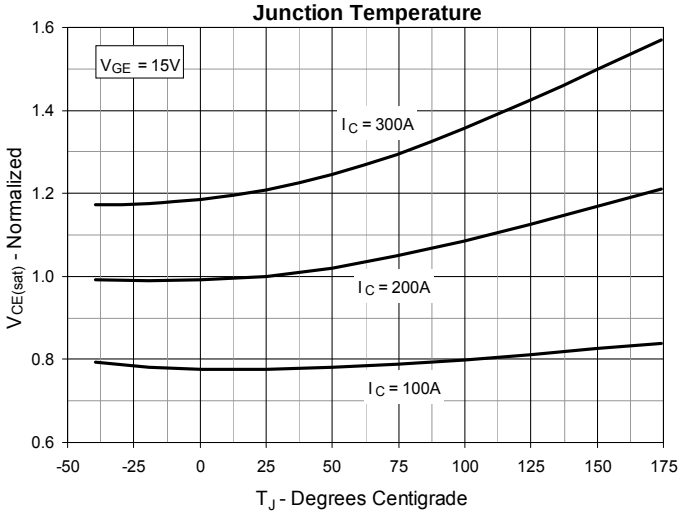


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

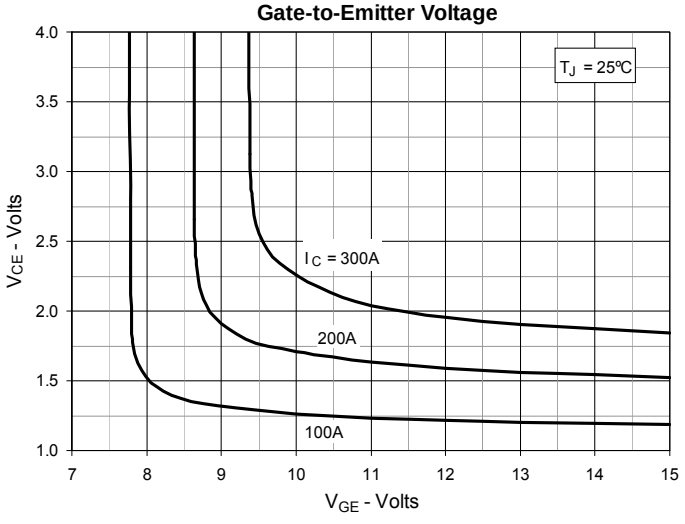


Fig. 6. Input Admittance

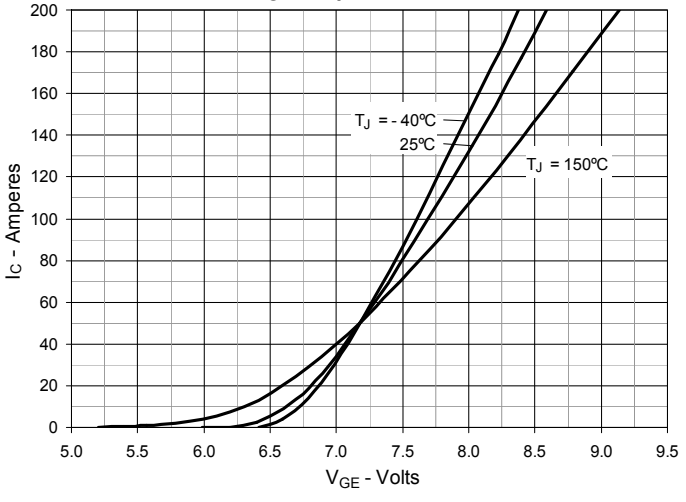


Fig. 7. Transconductance

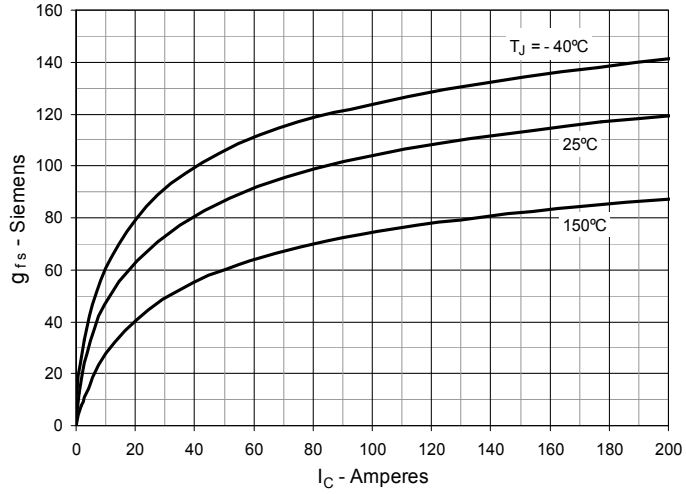


Fig. 8. Gate Charge

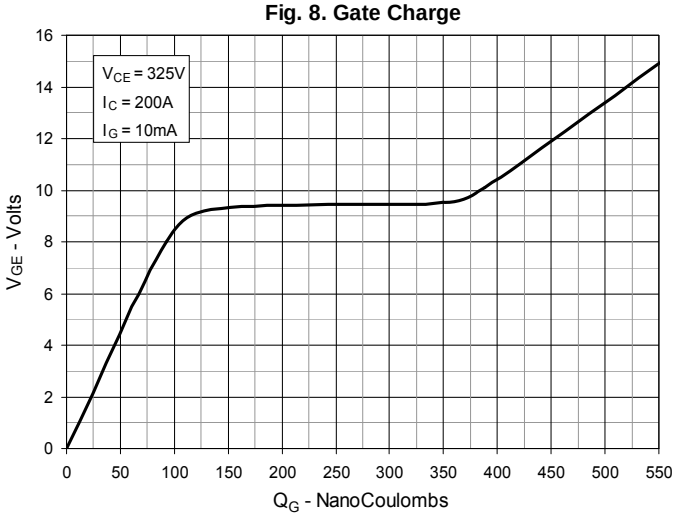


Fig. 9. Capacitance

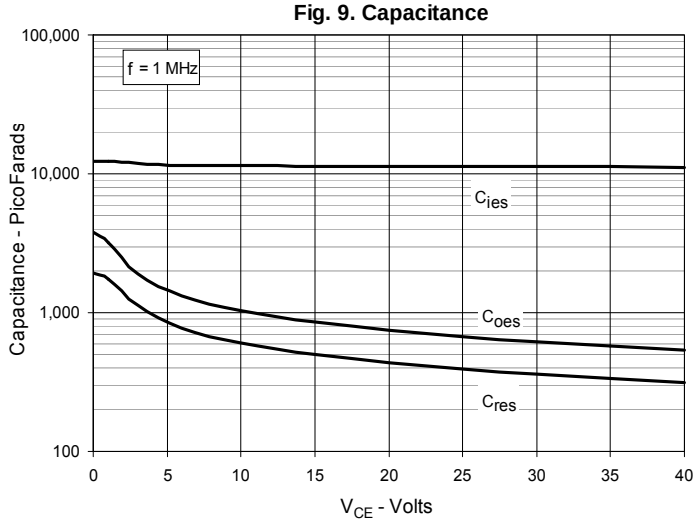


Fig. 10. Reverse-Bias Safe Operating Area

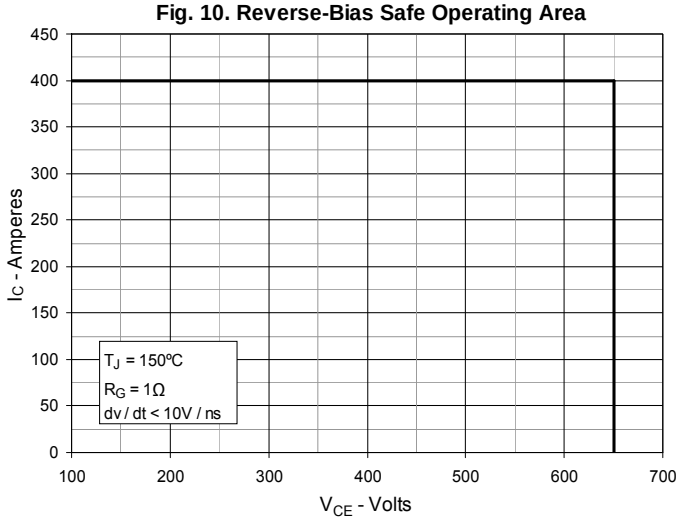


Fig. 11. Maximum Transient Thermal Impedance

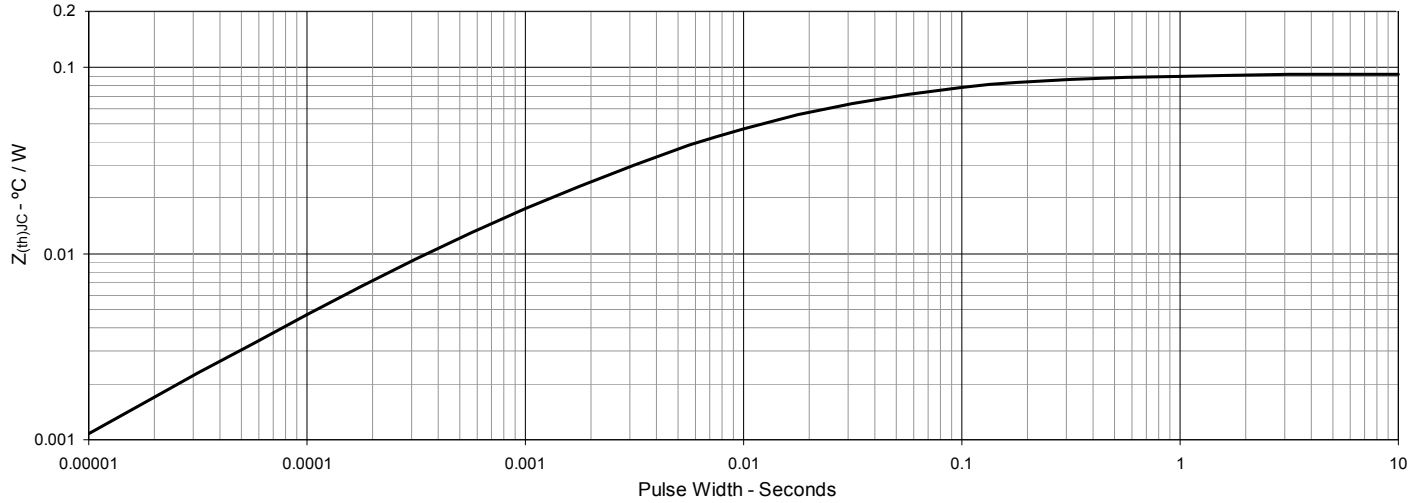


Fig. 12. Inductive Switching Energy Loss vs. Gate Resistance

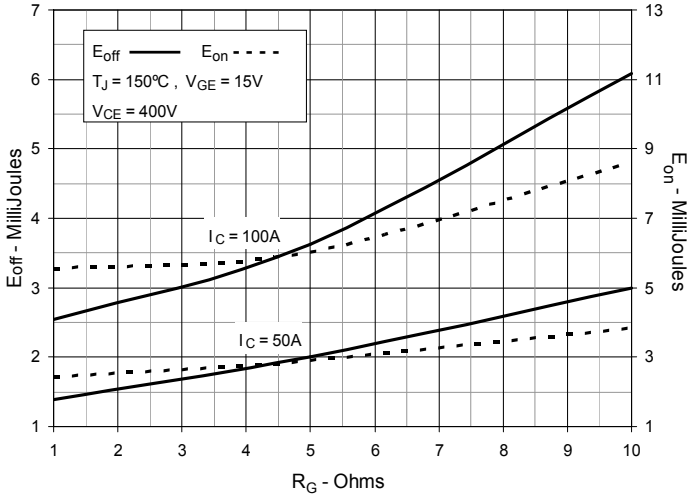


Fig. 13. Inductive Switching Energy Loss vs. Collector Current

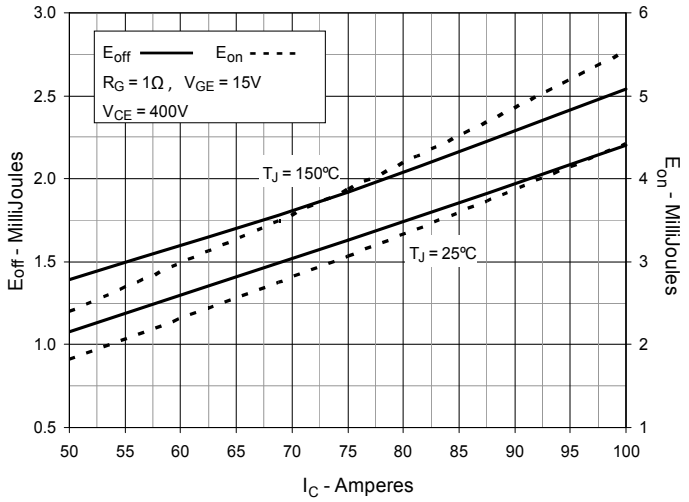


Fig. 14. Inductive Switching Energy Loss vs. Junction Temperature

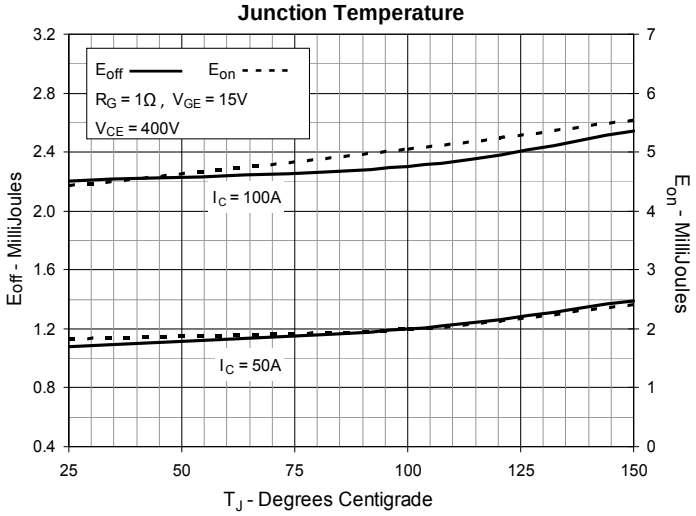


Fig. 15. Inductive Turn-off Switching Times vs. Gate Resistance

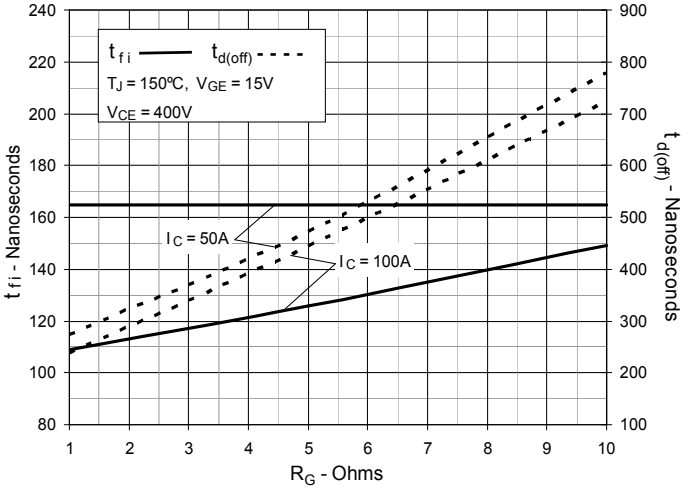


Fig. 16. Inductive Turn-off Switching Times vs. Collector Current

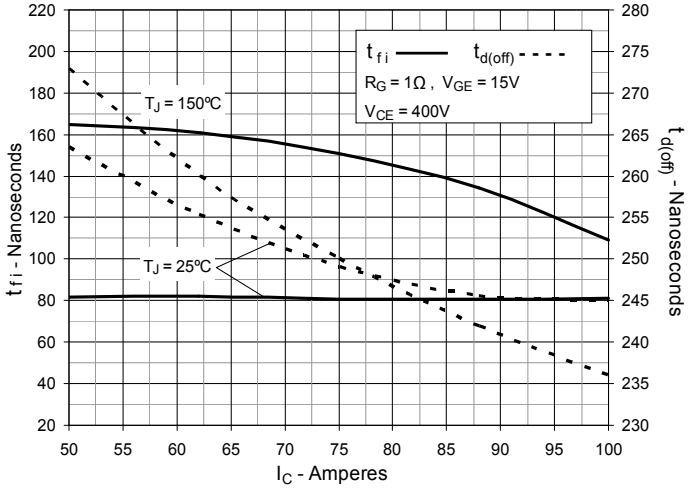


Fig. 17. Inductive Turn-off Switching Times vs. Junction Temperature

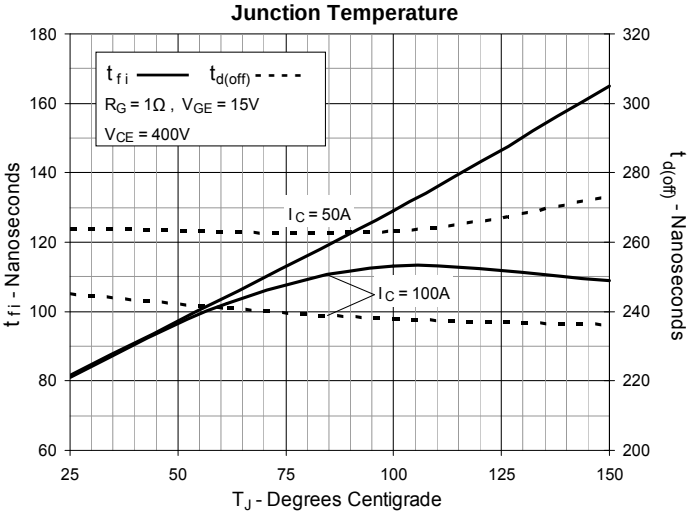


Fig. 18. Inductive Turn-on Switching Times vs. Gate Resistance

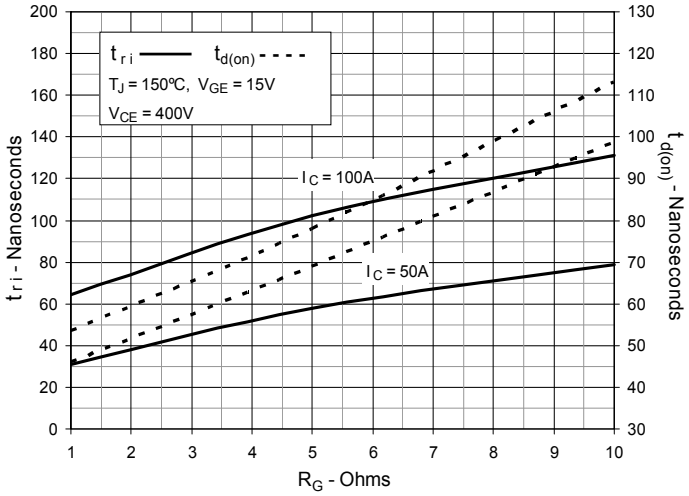


Fig. 19. Inductive Turn-on Switching Times vs. Collector Current

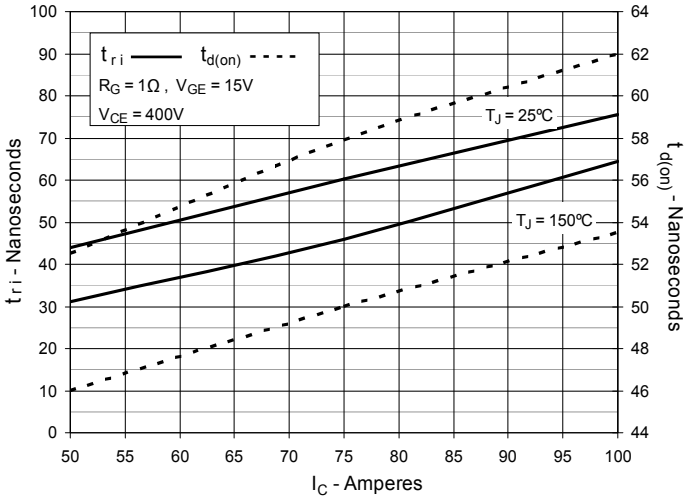


Fig. 20. Inductive Turn-on Switching Times vs. Junction Temperature