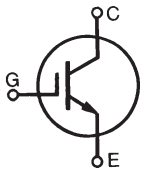
IXYS

Advance Technical Information

650V XPT™ IGBT GenX3™

IXYH100N65A3

V_{CES} = 650V
I_{C110} = 100A
$V_{CE(sat)}$ ≤ 1.80V
$t_{fi(typ)}$ = 86ns



Low-Vsat IGBT
for up to 5kHz Switching

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)	240	A
I_{C110}	T_C = 110°C	100	A
I_{CM}	T_C = 25°C, 1ms	480	A
I_A	T_C = 25°C	50	A
E_{AS}	T_C = 25°C	830	mJ
SSOA (RBSOA)	V_{GE} = 15V, T_{VJ} = 150°C, R_G = 2Ω Clamped Inductive Load	I_{CM} = 200 @ $V_{CE} \leq V_{CES}$	A
t_{sc} (SCSOA)	V_{GE} = 15V, V_{CE} = 360V, T_J = 150°C R_G = 82Ω, Non Repetitive	8	μs
P_C	T_C = 25°C	470	W
T_J		-55 ... +175	°C
T_{JM}		175	°C
T_{stg}		-55 ... +175	°C
TT_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

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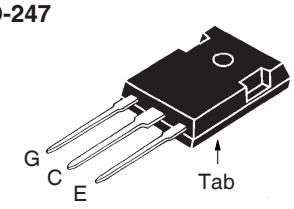


G = Gate C = Collector
E = Emitter Tab = Collector

Features

- Optimized for up to 5kHz Switching
- Square RBSOA
- Avalanche Rated
- Short Circuit Capability
- High Current Handling Capability

Advantages

- High Power Density
- Low Gate Drive Requirement

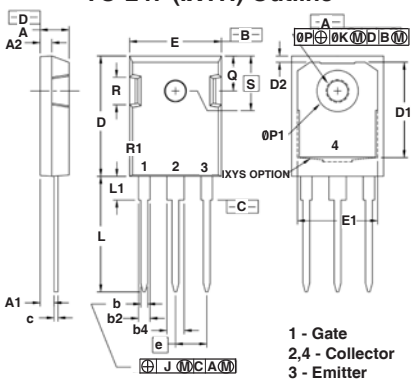
Applications

- UPS
- Motor Drives
- SMPS
- PFC Circuits
- Battery Chargers
- Low Frequency Power Inverters
- AC Switches

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 = 125°C			500	μA
I_{GES}	V_{CE} = 0V, V_{GE} = ±20V			±100	nA
$V_{CE(sat)}$	I_C = 70A, V_{GE} = 15V, Note 1		1.50	1.80	V
	T_J = 150°C		1.65		V

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	32	58	S
C_{ies}	V_{CE} = 25V, V_{GE} = 0V, f = 1MHz		4780	pF
C_{oes}			290	pF
C_{res}			103	pF
Q_g	I_C = 70A, V_{GE} = 15V, V_{CE} = 0.5 • V_{CES}		178	nC
Q_{ge}			31	nC
Q_{gc}			78	nC
$t_{d(on)}$	**Inductive load, T_J = 25°C**		24	ns
t_{ri}	I_C = 50A, V_{GE} = 15V		64	ns
E_{on}	V_{CE} = 400V, R_G = 2Ω		3.15	mJ
$t_{d(off)}$	Note 2		174	ns
t_{fi}			86	ns
E_{off}			2.20	mJ
$t_{d(on)}$	**Inductive load, T_J = 150°C**		23	ns
t_{ri}	I_C = 50A, V_{GE} = 15V		64	ns
E_{on}	V_{CE} = 400V, R_G = 2Ω		4.00	mJ
$t_{d(off)}$	Note 2		234	ns
t_{fi}			225	ns
E_{off}			3.70	mJ
R_{thJC}				0.18 °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.

Fig. 1. Output Characteristics @ T_J = 25°C

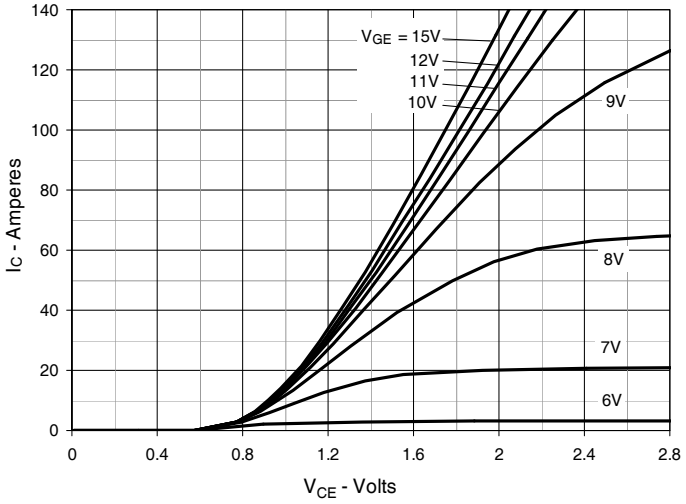


Fig. 2. Extended Output Characteristics @ T_J = 25°C

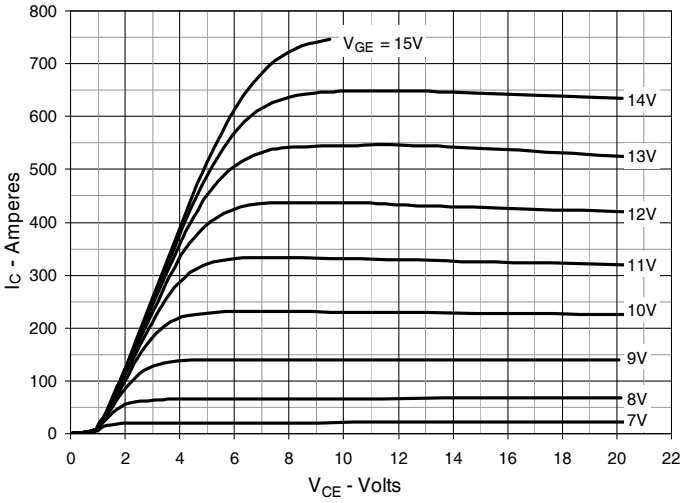


Fig. 3. Output Characteristics @ T_J = 150°C

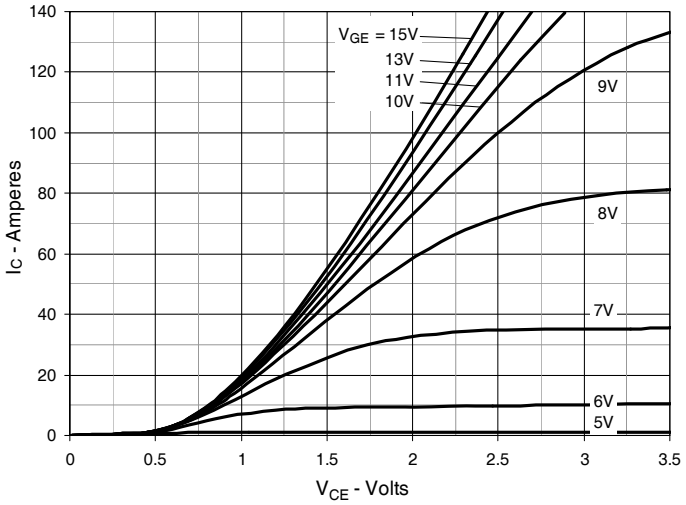


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

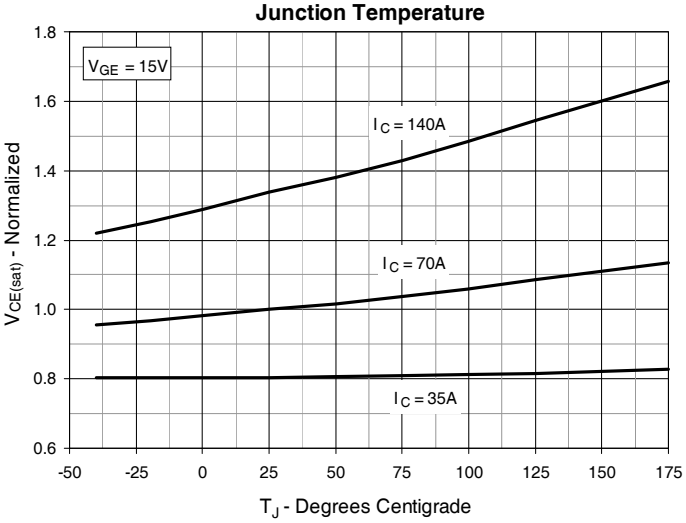


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

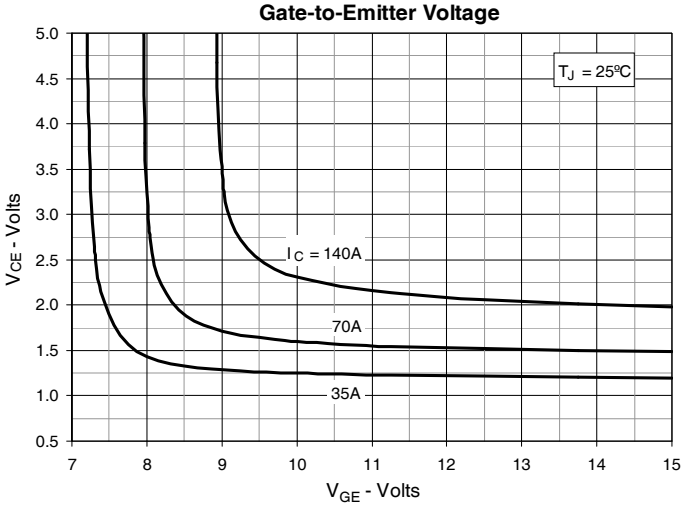


Fig. 6. Input Admittance

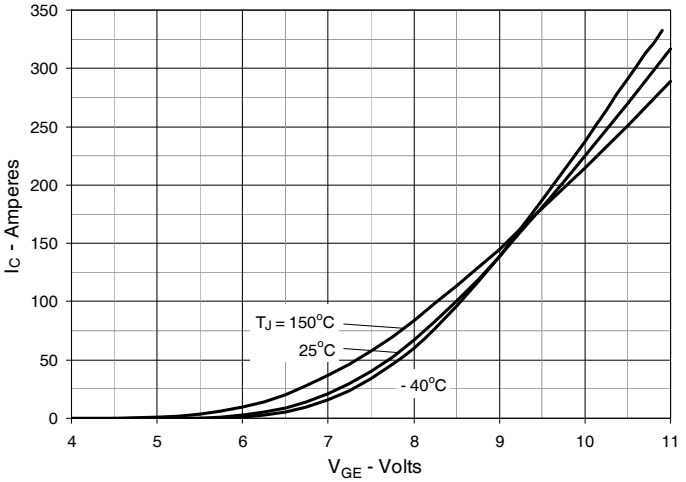


Fig. 7. Transconductance

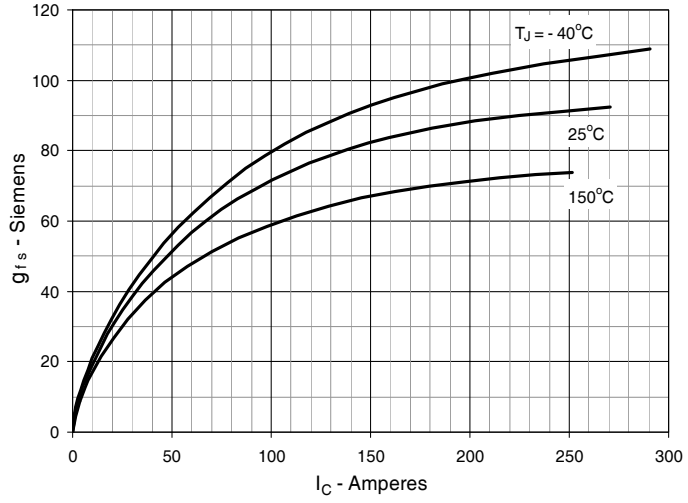


Fig. 8. Gate Charge

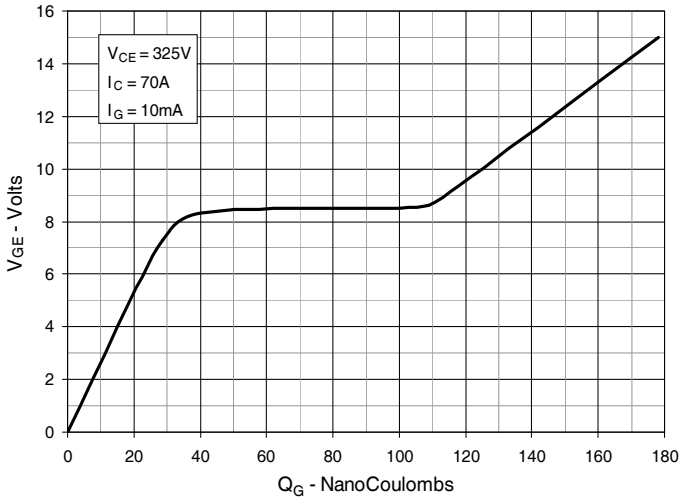


Fig. 9. Capacitance

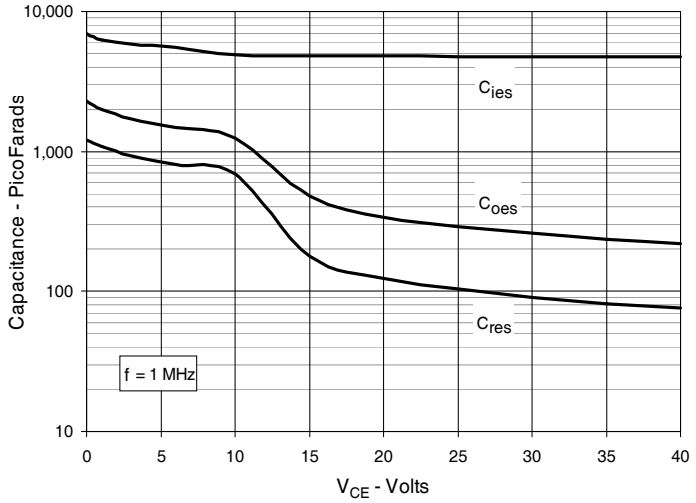


Fig. 10. Reverse-Bias Safe Operating Area

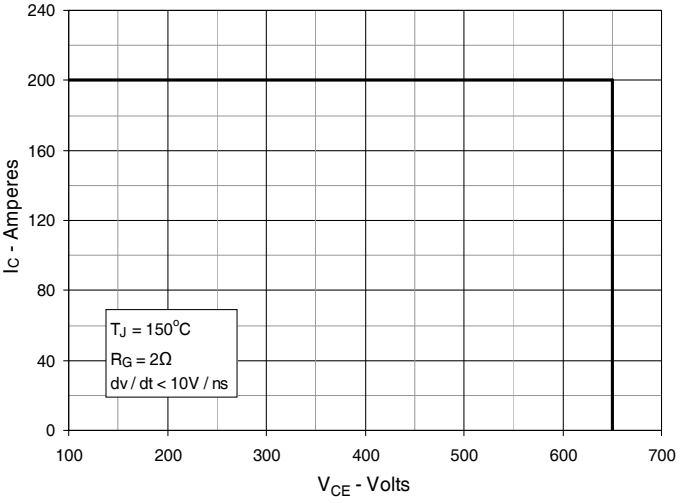


Fig. 11. Forward-Bias Safe Operating Area

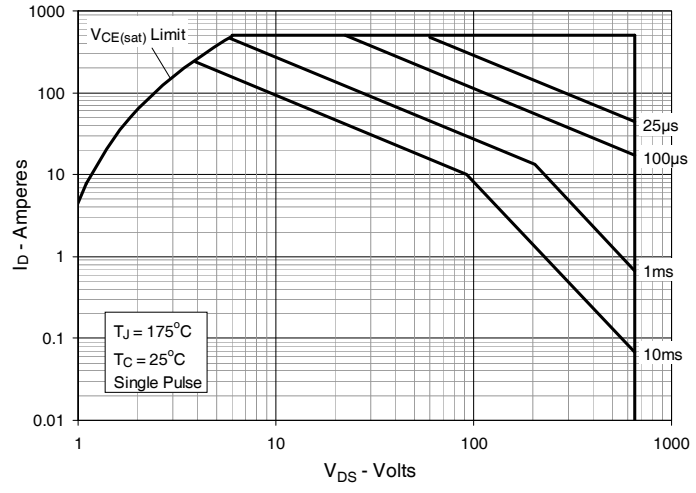


Fig. 12. Maximum Transient Thermal Impedance (IGBT)

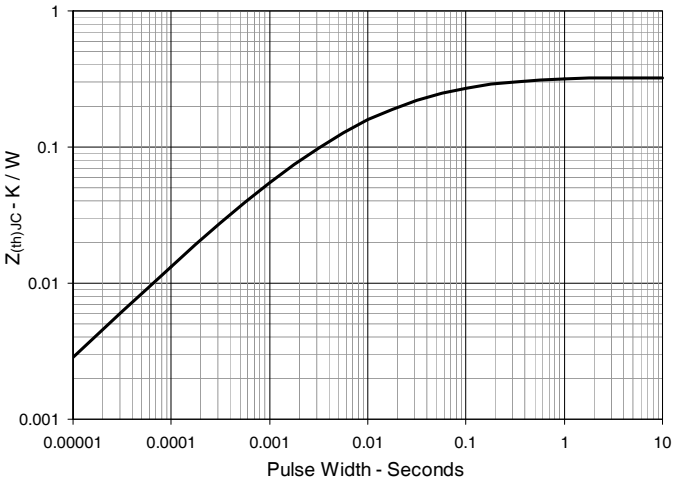


Fig. 13. Inductive Switching Energy Loss vs. Gate Resistance

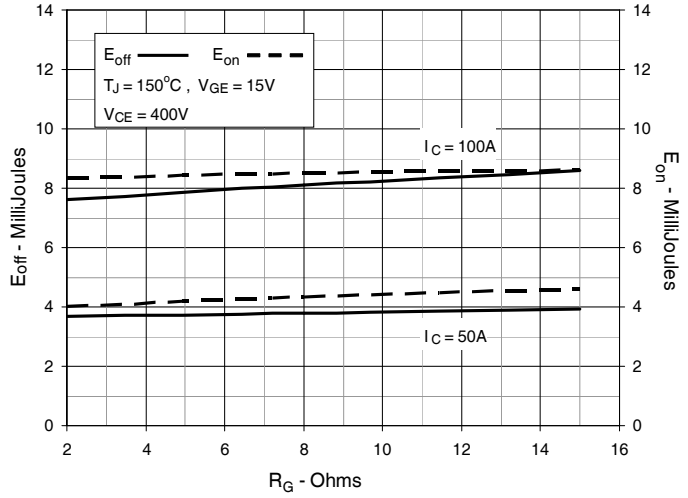


Fig. 14. Inductive Switching Energy Loss vs. Collector Current

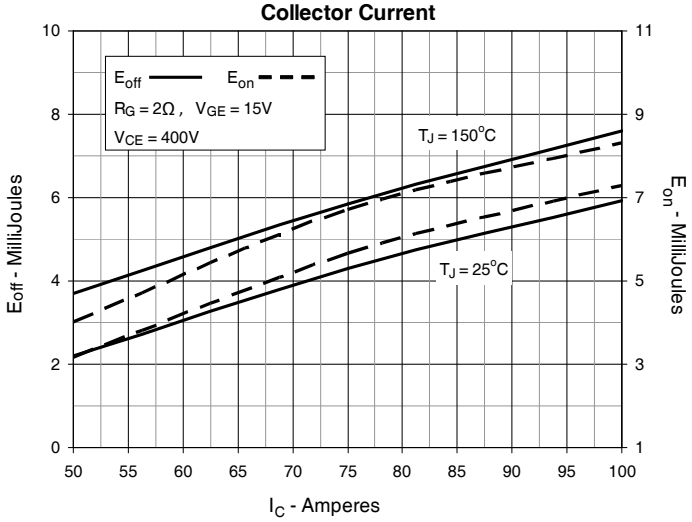


Fig. 15. Inductive Switching Energy Loss vs. Junction Temperature

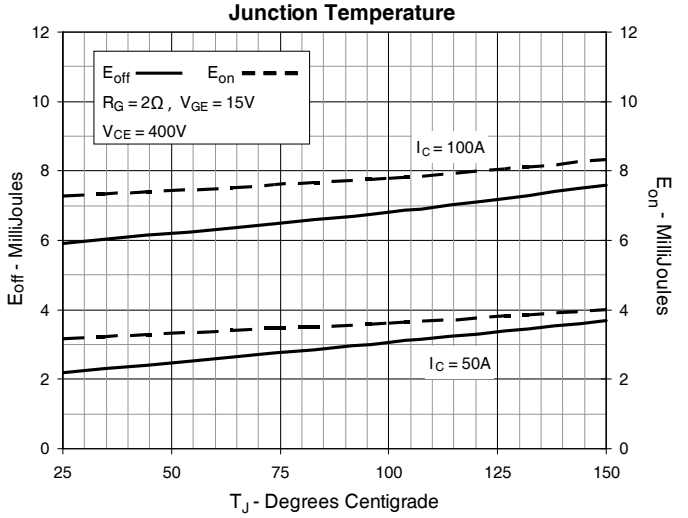


Fig. 16. Inductive Turn-off Switching Times vs. Gate Resistance

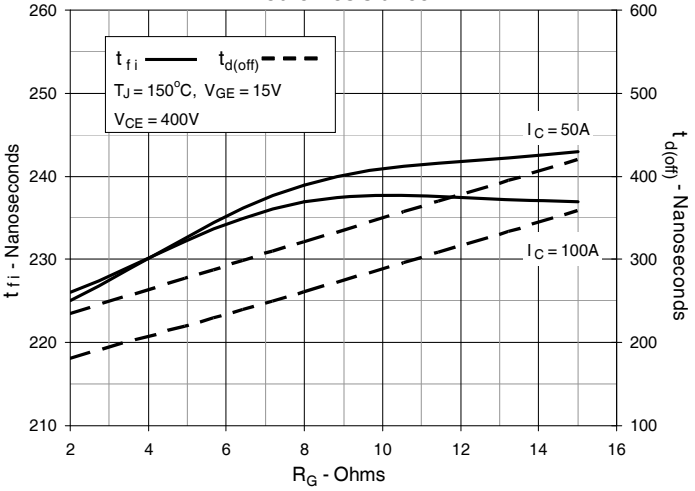


Fig. 17. Inductive Turn-off Switching Times vs. Collector Current

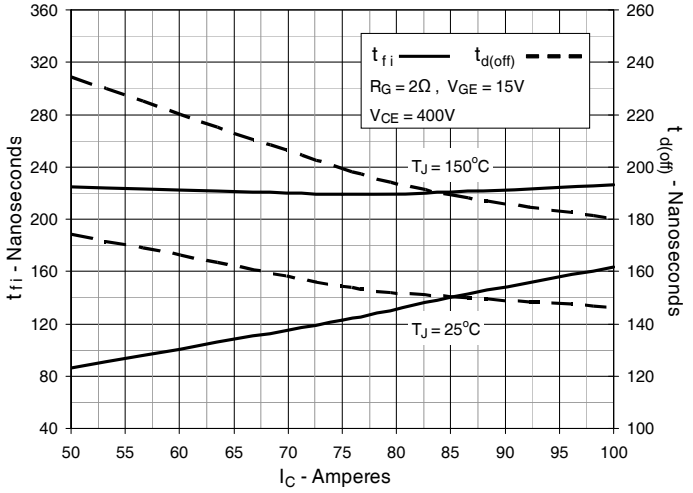


Fig. 18. Inductive Turn-off Switching Times vs. Junction Temperature

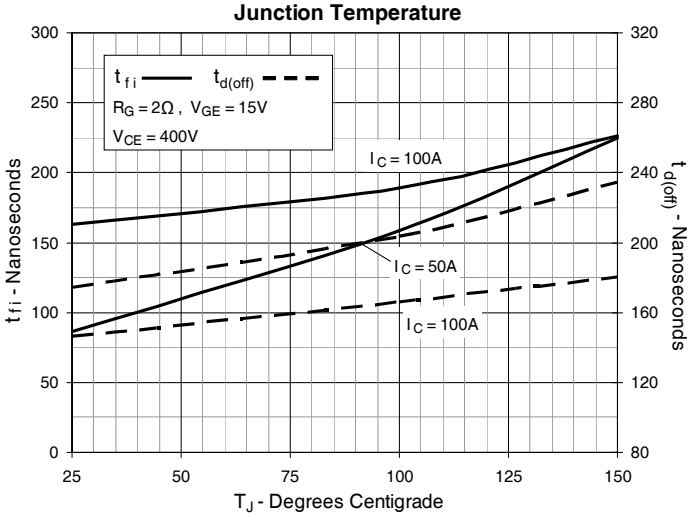


Fig. 19. Inductive Turn-on Switching Times vs. Gate Resistance

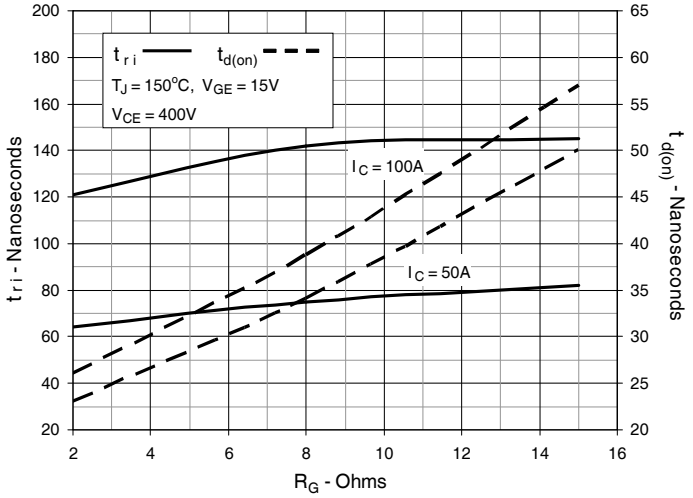


Fig. 20. Inductive Turn-on Switching Times vs. Collector Current

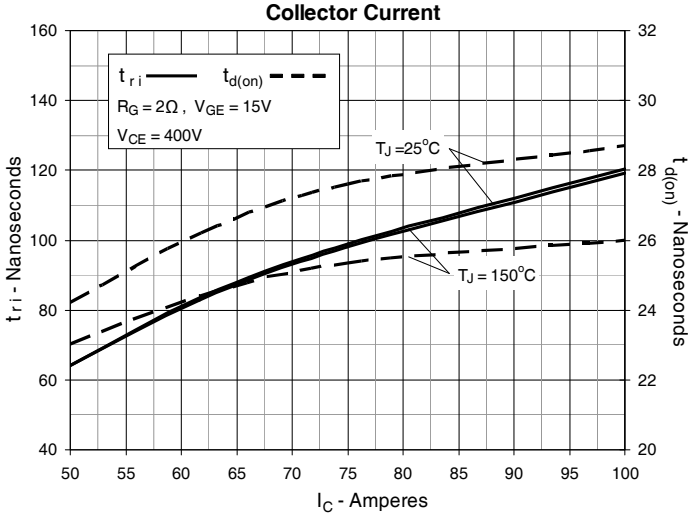


Fig. 21. Inductive Turn-on Switching Times vs. Junction Temperature