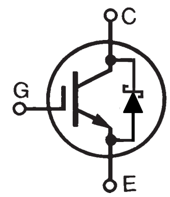
Preliminary Technical Information

GenX3™ 600V IGBT w/ SiC Anti-Parallel Diode

IXGH48N60C3C1

V_{CES}	=	600V
I_{C110}	=	48A
$V_{CE(sat)}$	≤	2.5V
$t_{fi(typ)}$	=	38ns

High Speed PT IGBT for 40 - 100kHz Switching



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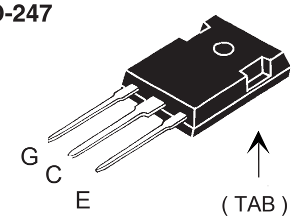


G = Gate C = Collector
E = Emitter TAB = Collector

Symbol	Test Conditions	Maximum Ratings	
V_{CES}	T_J = 25°C to 150°C	600	V
V_{CGR}	T_J = 25°C to 150°C, R_{GE} = 1MΩ	600	V
V_{GES}	Continuous	±20	V
V_{GEM}	Transient	±30	V
I_{C25}	T_C = 25°C (Limited by Leads)	75	A
I_{C110}	T_C = 110°C	48	A
I_{F110}	T_C = 110°C	20	A
I_{CM}	T_C = 25°C, 1ms	250	A
I_A	T_C = 25°C	30	A
E_{AS}	T_C = 25°C	300	mJ
SSOA (RBSOA)	V_{GE} = 15V, T_{VJ} = 125°C, R_G = 3Ω Clamped Inductive Load	I_{CM} = 100 @ ≤ V_{CES}	A
P_C	T_C = 25°C	300	W
T_J		-55 ... +150	°C
T_{JM}		150	°C
T_{stg}		-55 ... +150	°C
T_L	1.6mm (0.062 in.) from Case for 10s	300	°C
T_{SOLD}	Plastic Body for 10 Seconds	260	°C
F_C	Mounting Torque	1.13/10	Nm/lb.in
Weight		6	g

Features

- Optimized for Low Switching Losses
- Square RBSOA
- Anti-Parallel Schottky Diode
- Fast Switching
- Avalanche Rated
- International Standard Package

Advantages

- High Power Density
- Low Gate Drive Requirement

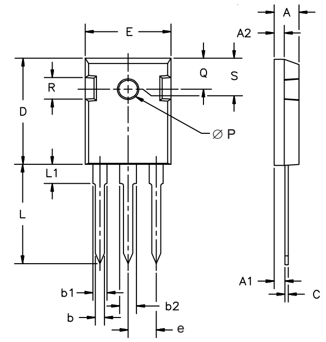
Applications

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

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		5.5	V
I_{CES}	V_{CE} = V_{CES}, V_{GE} = 0V			50	μA
	T_J = 125°C			1.75	mA
I_{GES}	V_{CE} = 0V, V_{GE} = ±20V			±100	nA
$V_{CE(sat)}$	I_C = 30A, V_{GE} = 15V, Note 1		2.3	2.5	V
	T_J = 125°C		1.8		V

Symbol	Test Conditions ($T_J = 25°C$, Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.	
g_{fs}	I_C = 30A, V_{CE} = 10V, Note 1	20	30		S
C_{ies}	V_{CE} = 25V, V_{GE} = 0V, f = 1MHz		2120		pF
C_{oes}			420		pF
C_{res}			50		pF
Q_g	I_C = 30A, V_{GE} = 15V, V_{CE} = 0.5 • V_{CES}		77		nC
Q_{ge}			16		nC
Q_{gc}			32		nC
$t_{d(on)}$	**Inductive Load, T_J = 25°C**		19		ns
t_{ri}	I_C = 30A, V_{GE} = 15V		25		ns
E_{on}	V_{CE} = 400V, R_G = 3Ω		0.33		mJ
$t_{d(off)}$	Note 2		60	100	ns
t_{fi}			38		ns
E_{off}			0.23	0.42	mJ
$t_{d(on)}$	**Inductive Load, T_J = 125°C**		19		ns
t_{ri}	I_C = 30A, V_{GE} = 15V		28		ns
E_{on}	V_{CE} = 400V, R_G = 3Ω		0.37		mJ
$t_{d(off)}$	Note 2		92		ns
t_{fi}			95		ns
E_{off}			0.57		mJ
R_{thJC}				0.42	°C/W
R_{thCS}			0.21		°C/W

TO-247 AD Outline



Dim.	Millimeter Min.	Max.	Inches 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
∅P	3.55	3.65	.140	.144
Q	5.89	6.40	0.232	0.252
R	4.32	5.49	.170	.216

Reverse Diode (SiC)

Symbol	Test Conditions ($T_J = 25°C$, Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.	
V_F	I_F = 20A, V_{GE} = 0V, Note 1		1.65	2.10	V
	T_J = 125°C		1.80		V
R_{thJC}				0.90	°C/W

Notes
1. Pulse test, t ≤ 300μs, duty c ycle, d ≤ 2%.
2. Switching times & energy losses 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.

Fig. 1. Output Characteristics @ 25ºC

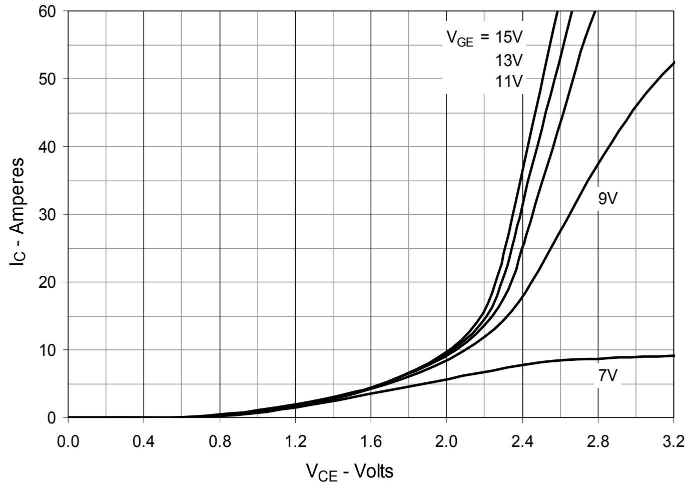


Fig. 2. Extended Output Characteristics @ 25ºC

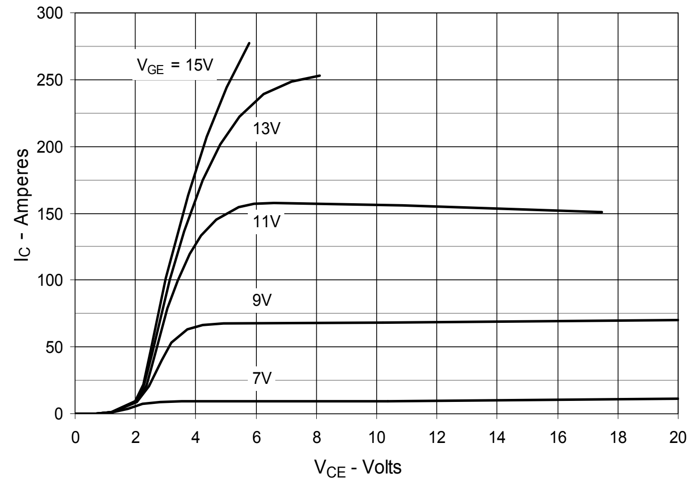


Fig. 3. Output Characteristics @ 125ºC

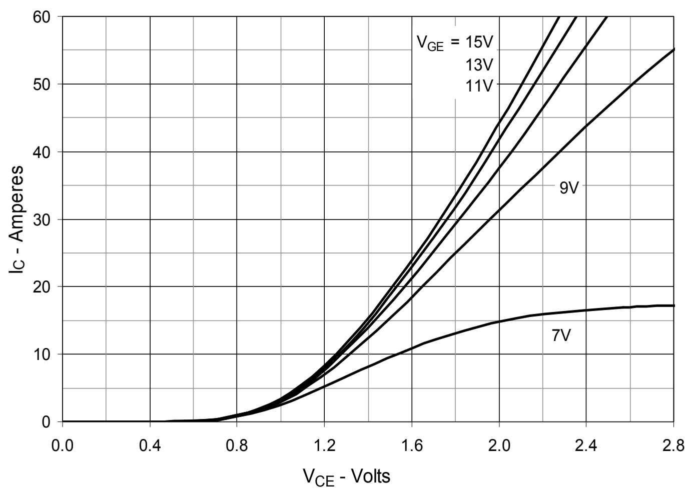


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

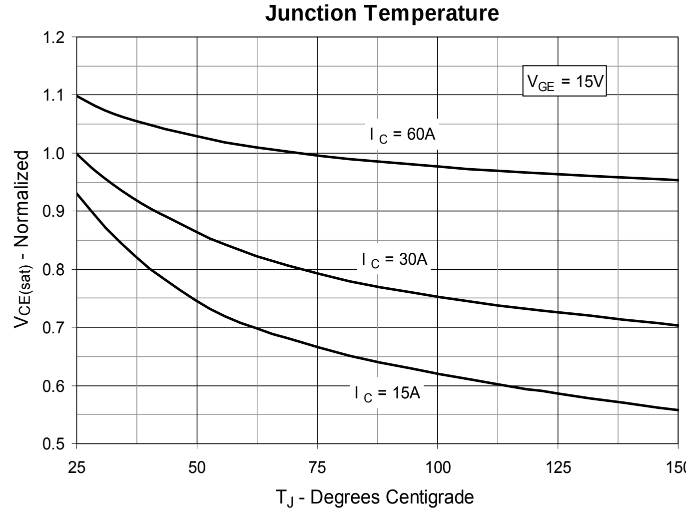


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

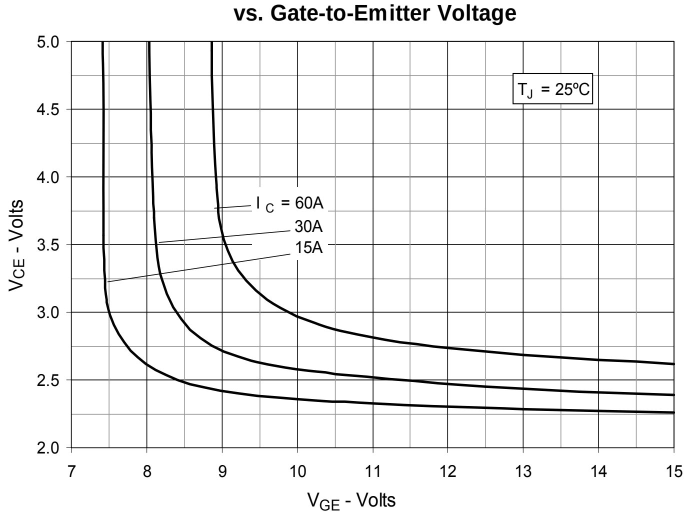


Fig. 6. Input Admittance

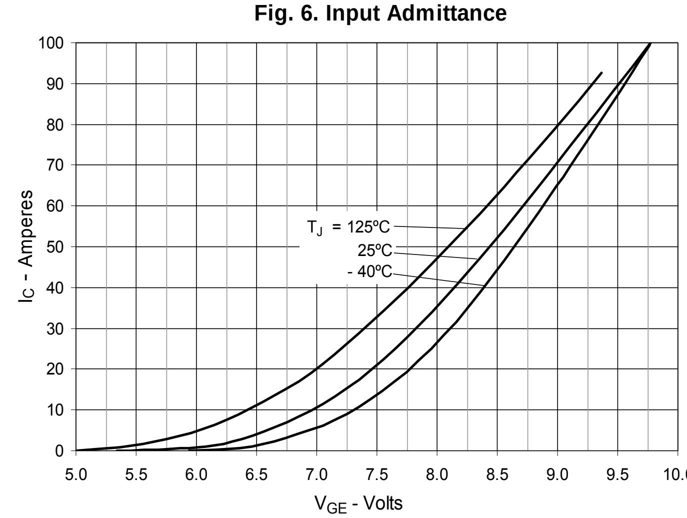


Fig. 7. Transconductance

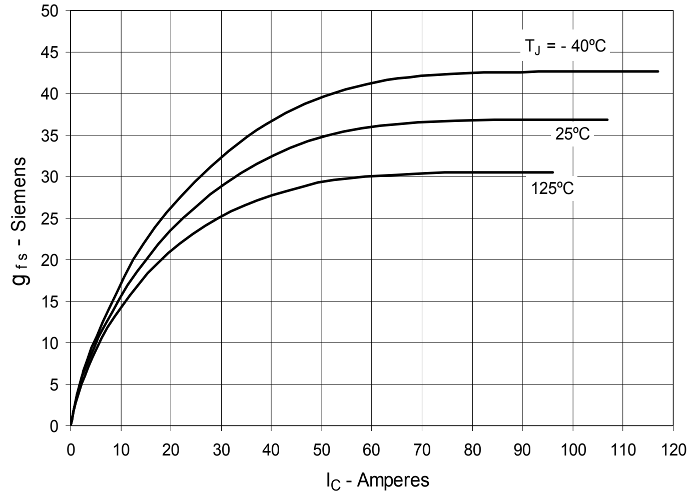


Fig. 8. Gate Charge

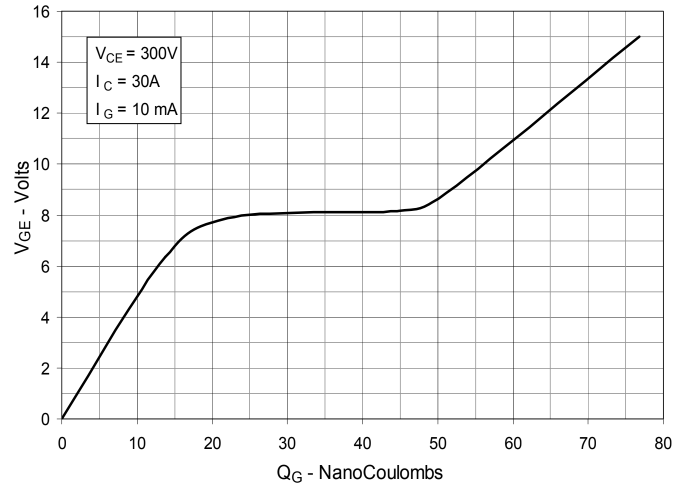


Fig. 9. Capacitance

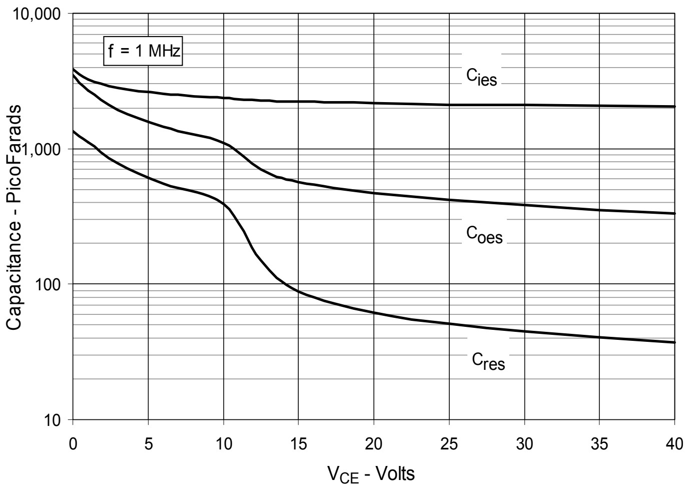


Fig. 10. Reverse-Bias Safe Operating Area

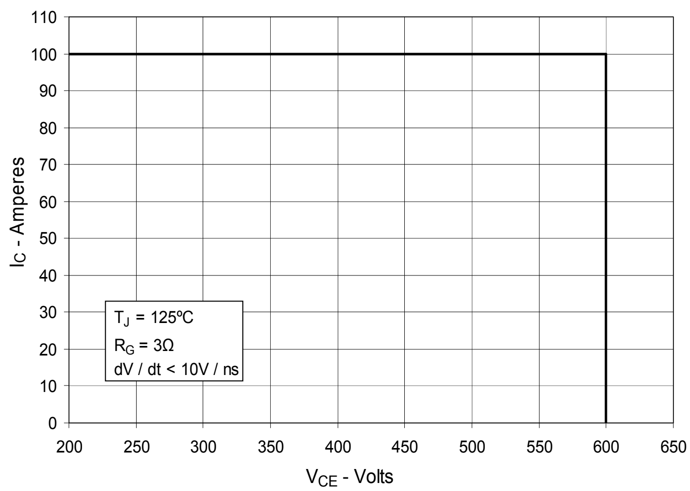


Fig. 11. Maximum Transient Thermal Impedance

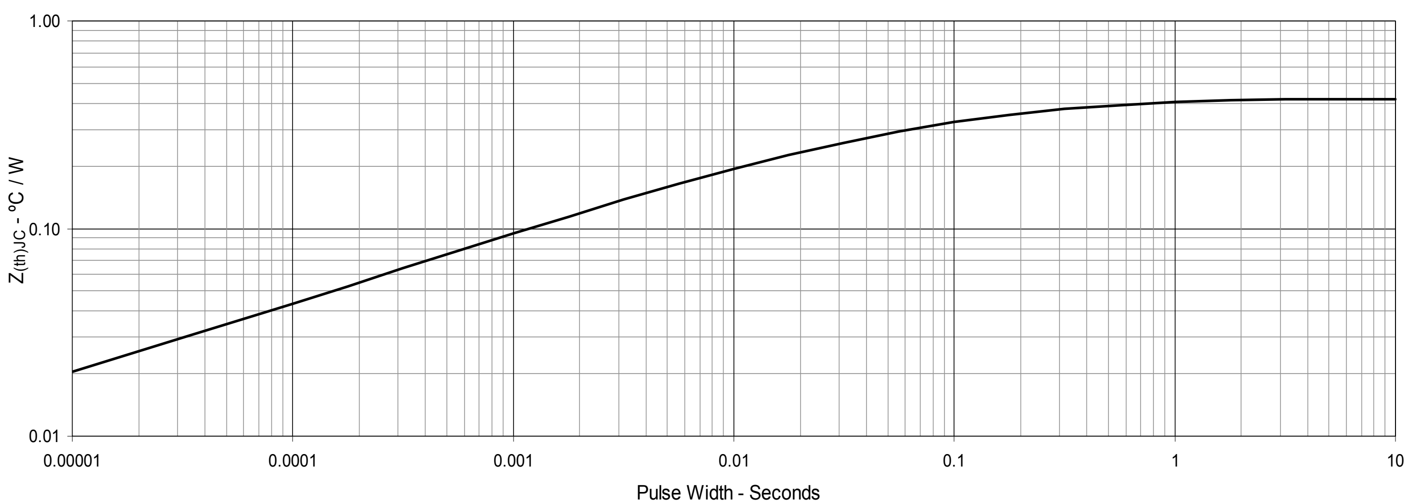


Fig. 12. Inductive Switching Energy Loss vs. Gate Resistance

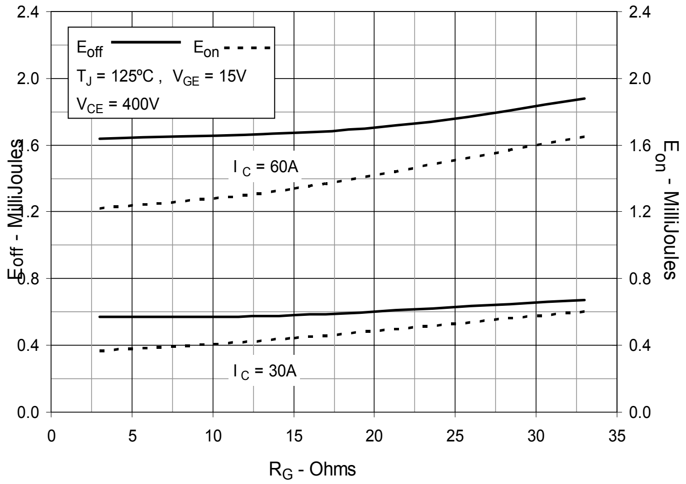


Fig. 13. Inductive Switching Energy Loss vs. Collector Current

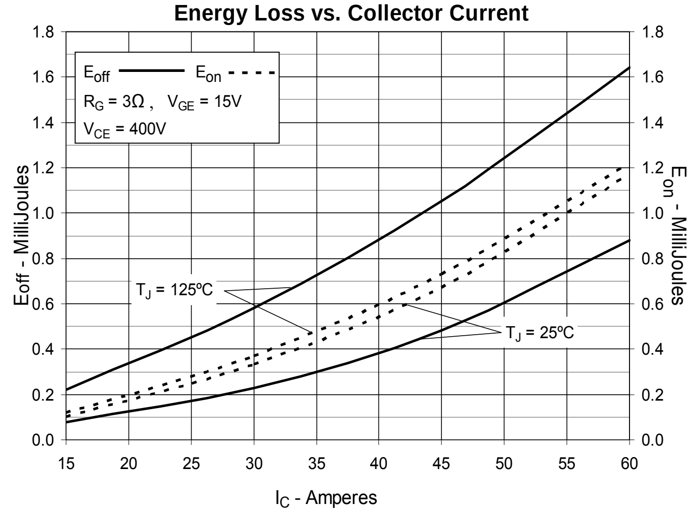


Fig. 14. Inductive Switching Energy Loss vs. Junction Temperature

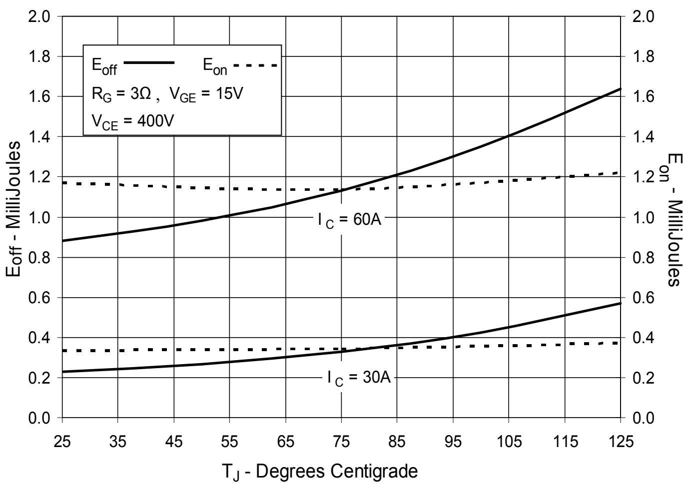


Fig. 15. Inductive Turn-off Switching Times vs. Gate Resistance

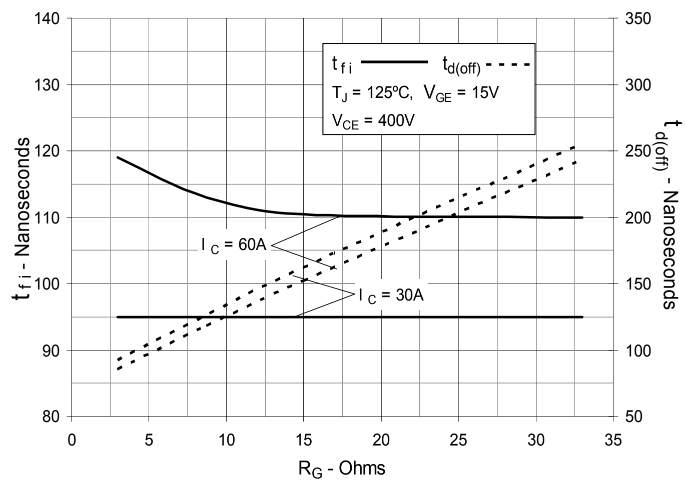


Fig. 16. Inductive Turn-off Switching Times vs. Collector Current

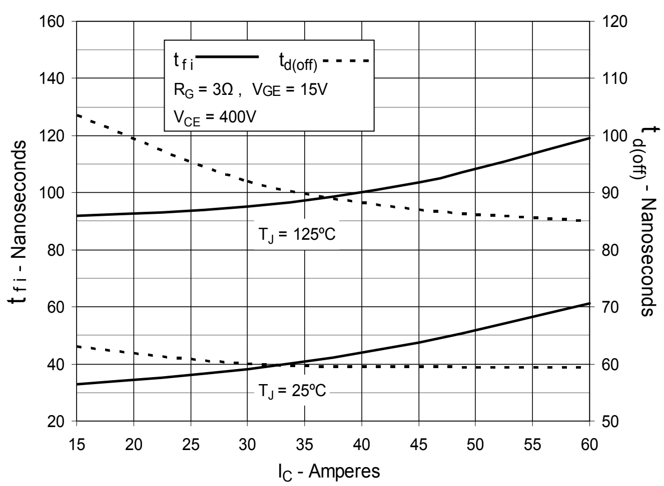


Fig. 17. Inductive Turn-off Switching Times vs. Junction Temperature

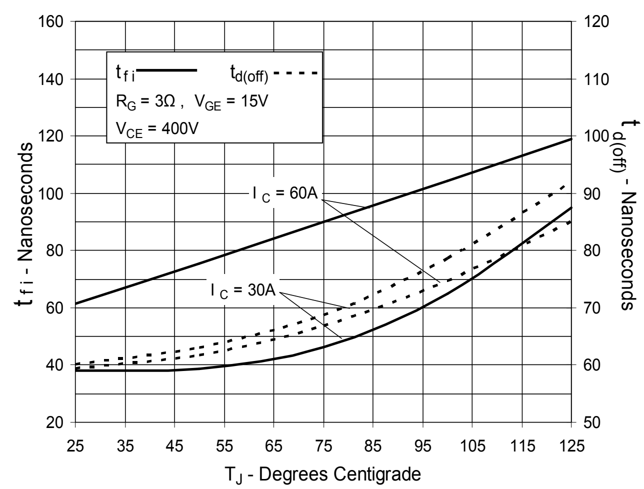


Fig. 18. Inductive Turn-on Switching Times vs. Gate Resistance

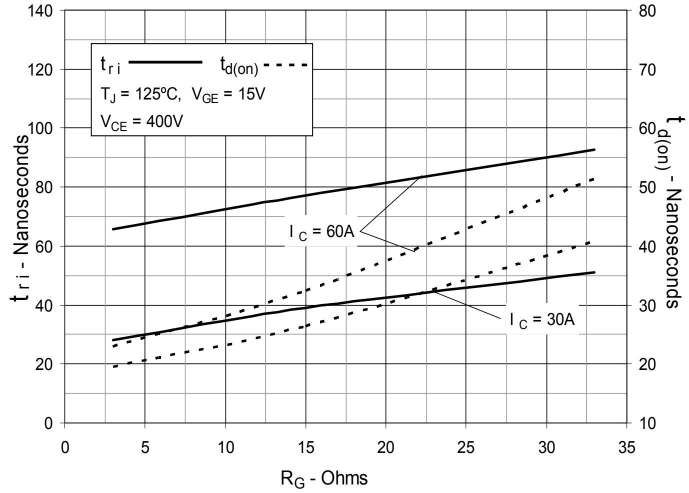


Fig. 19. Inductive Turn-on Switching Times vs. Collector Current

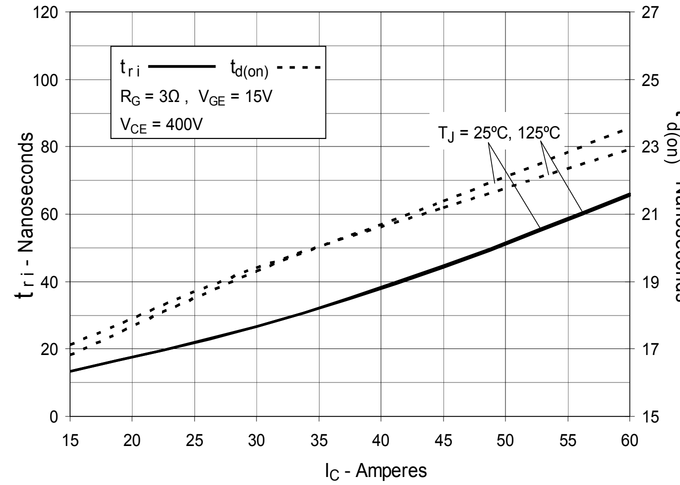


Fig. 20. Inductive Turn-on Switching Times vs. Junction Temperature

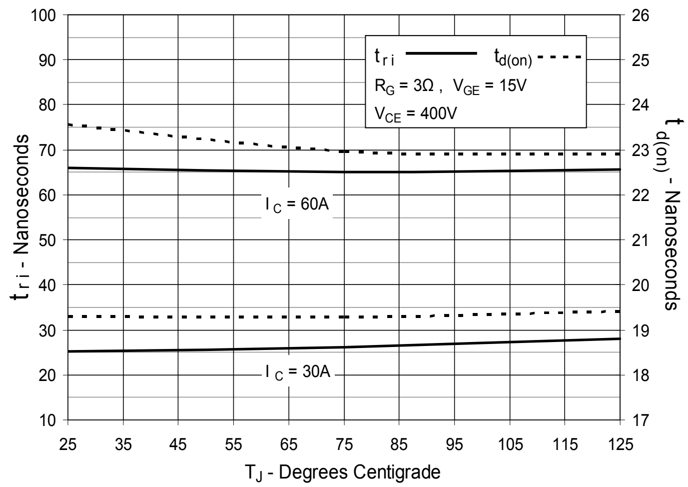


Fig. 21. Forward Current vs. Forward Voltage

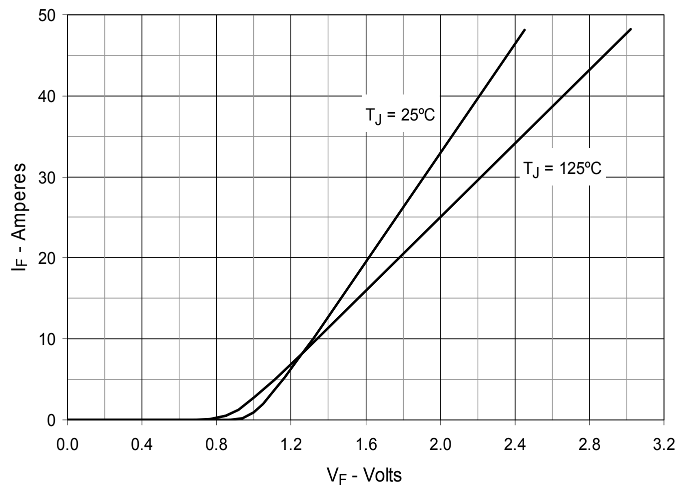


Fig. 22. Maximum Transient Thermal Impedance for Diode