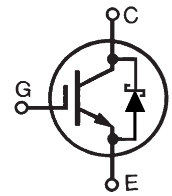
IXYS

Preliminary Technical Information

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

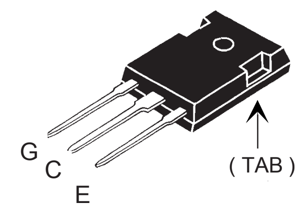
IXGH48N60B3C1

V_{CES}	=	600V
I_{C110}	=	48A
$V_{CE(sat)}$	≤	1.8V
$t_{fi(typ)}$	=	116ns



Medium Speed Low Vsat PT IGBT 5 - 40 kHz Switching

TO-247



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

Symbol	Test Conditions	Maximum Ratings	
V_{CES}	T_C = 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	280	A
SSOA (RBSOA)	V_{GE} = 15V, T_{VJ} = 125°C, R_G = 5Ω Clamped Inductive Load	I_{CM} = 120 @ ≤ 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
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	600			V
$V_{GE(th)}$	I_C = 250µA, V_{CE} = V_{GE}	3.0		5.0	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 = 32A, V_{GE} = 15V, Note 1			1.8	V

Features

- Optimized for Low Conduction and Switching Losses
- Square RBSOA
- Anti-Parallel Schottky Diode
- International Standard Package

Advantages

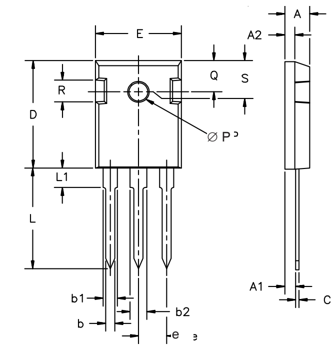
- High Power Density
- Low Gate Drive Requirement

Applications

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

Symbol	Test Conditions (T_J = 25°C Unless Otherwise Specified)	Min.	Typ.	Max.	Unit
g_{fs}	I_C = 30A, V_{CE} = 10V, Note 1	28	46		S
C_{ies}	V_{CE} = 25V, V_{GE} = 0V, f = 1MHz		3980		pF
C_{oes}			190		pF
C_{res}			45		pF
Q_g	I_C = 40A, V_{GE} = 15V, V_{CE} = 0.5 • V_{CES}		115		nC
Q_{ge}			21		nC
Q_{gc}			40		nC
$t_{d(on)}$	**Inductive Load, T_J = 25°C**		22		ns
t_{ri}			26		ns
E_{on}	I_C = 30A, V_{GE} = 15V		0.45		mJ
$t_{d(off)}$	V_{CE} = 480V, R_G = 5Ω		130	200	ns
t_{fi}	Note 2		116	200	ns
E_{off}			0.66	1.20	mJ
$t_{d(on)}$	**Inductive Load, T_J = 125°C**		22		ns
t_{ri}			26		ns
E_{on}	I_C = 30A, V_{GE} = 15V		0.50		mJ
$t_{d(off)}$	V_{CE} = 480V, R_G = 5Ω		190		ns
t_{fi}	Note 2		157		ns
E_{off}			1.30		mJ
R_{thJC}				0.42	°C/W
R_{thCS}			0.21		°C/W

TO-247 (IXGH) Outline



Dim.	Millimeter Min.	Millimeter Max.	Inches Min.	Inches 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
S	6.15	BSC	242	BSC

Reverse Diode (SiC)

Symbol	Test Conditions (T_J = 25°C Unless Otherwise Specified)	Min.	Typ.	Max.	Unit
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 cycle, 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.

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Fig. 1. Output Characteristics @ 25ºC

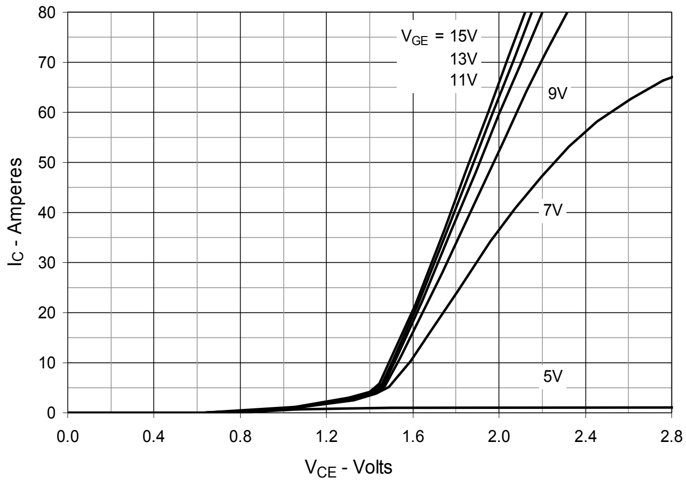

Fig. 2. Extended Output Characteristics @ 25ºC

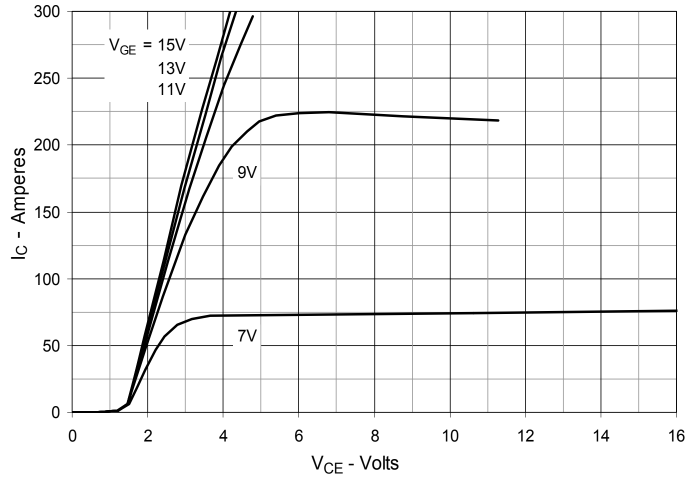

Fig. 3. Output Characteristics @ 125ºC

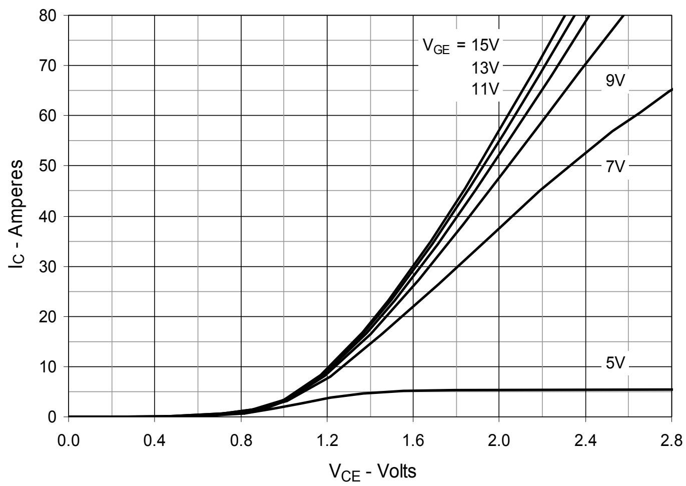

Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

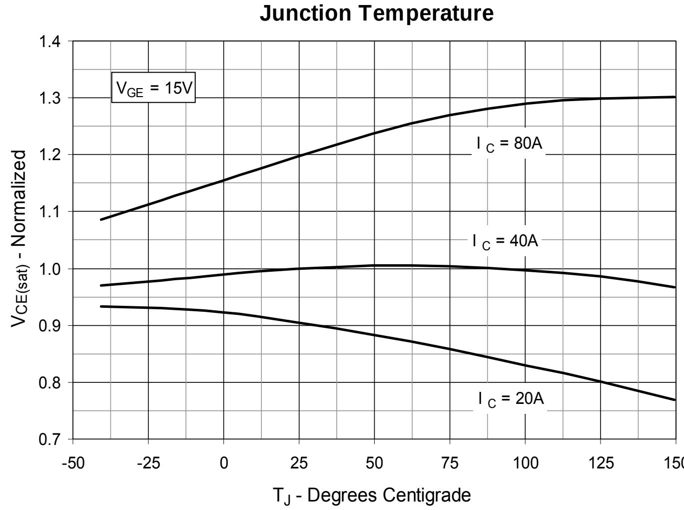

Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

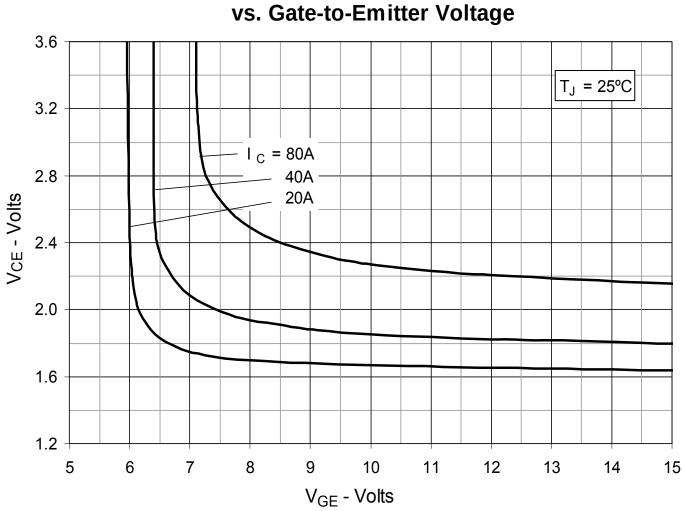

Fig. 6. Input Admittance

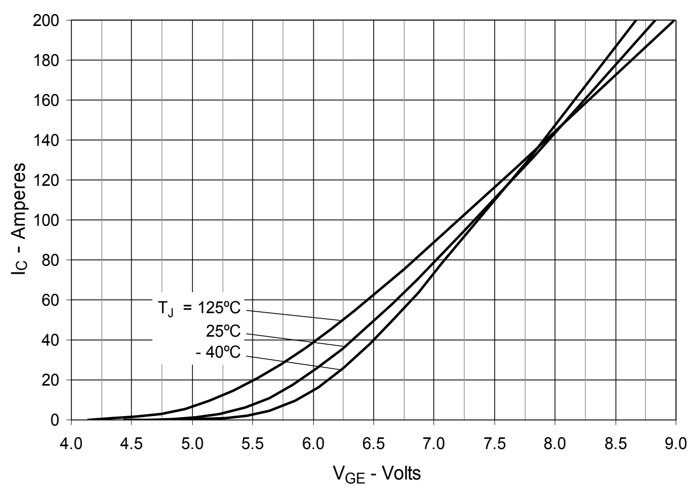

Fig. 7. Transconductance

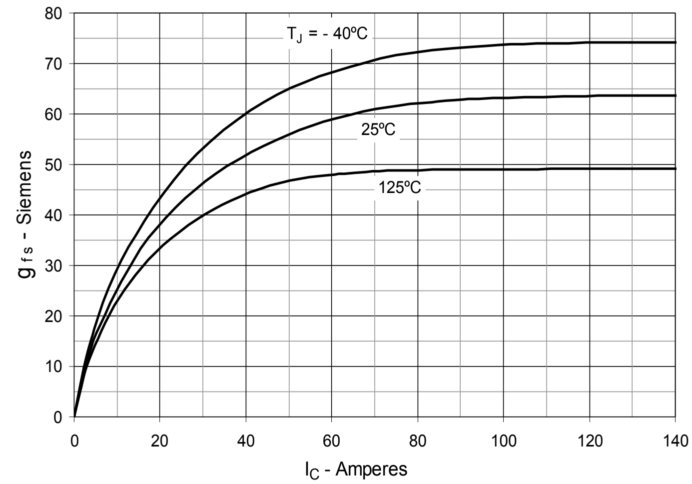

Fig. 8. Gate Charge

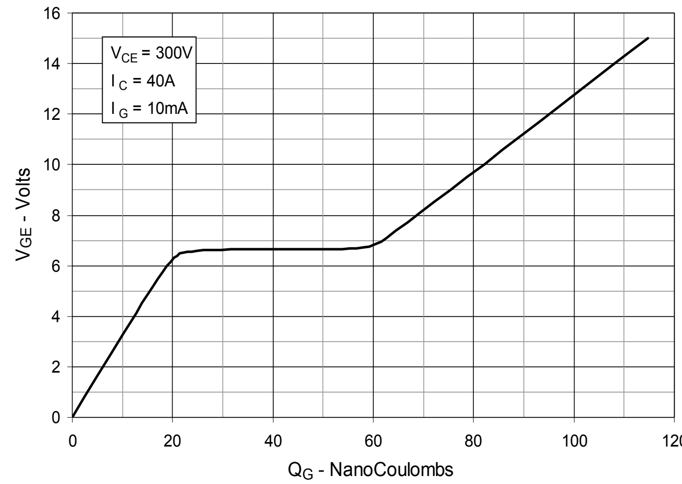

Fig. 9. Capacitance

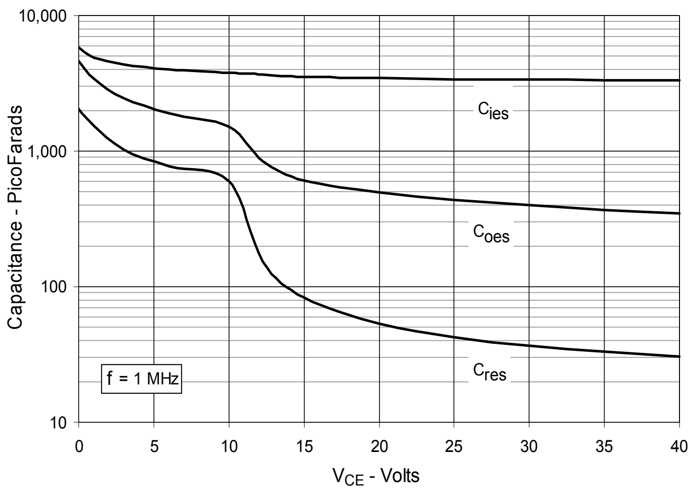

Fig. 10. Reverse-Bias Safe Operating Area

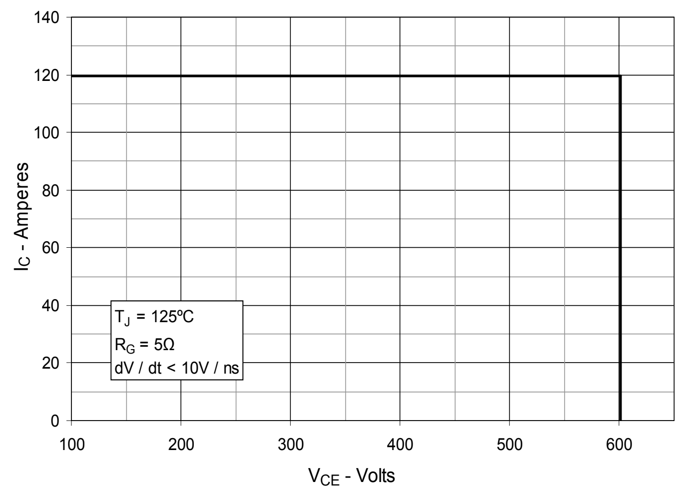

Fig. 11. Maximum Transient Thermal Impedance for IGBT

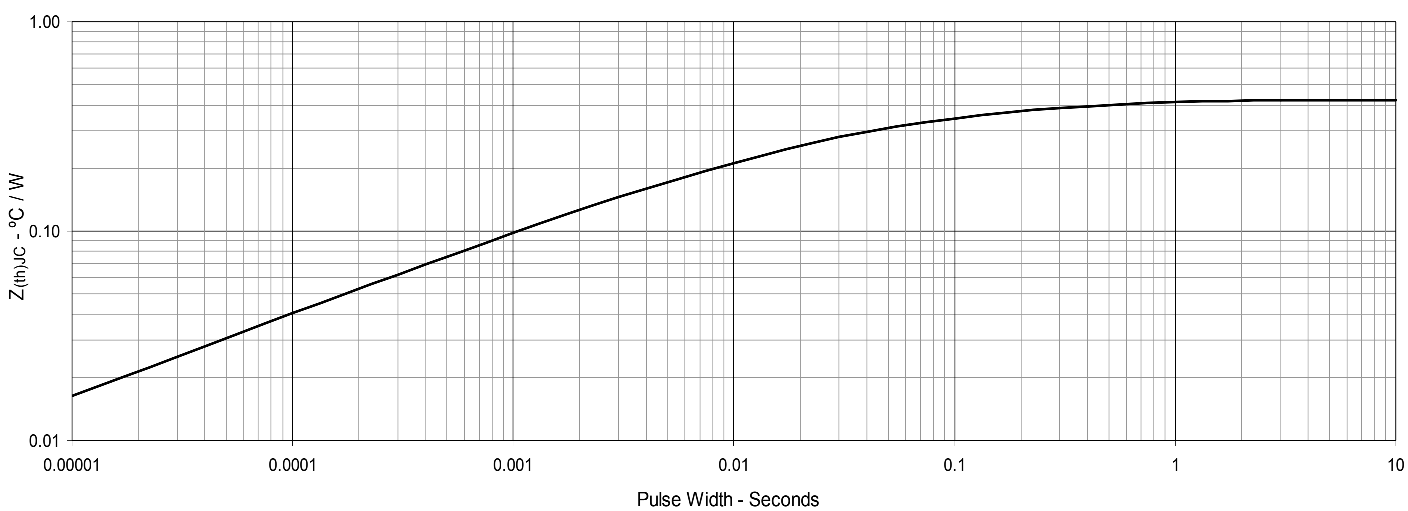

Fig. 12. Inductive Switching Energy Loss vs. Gate Resistance

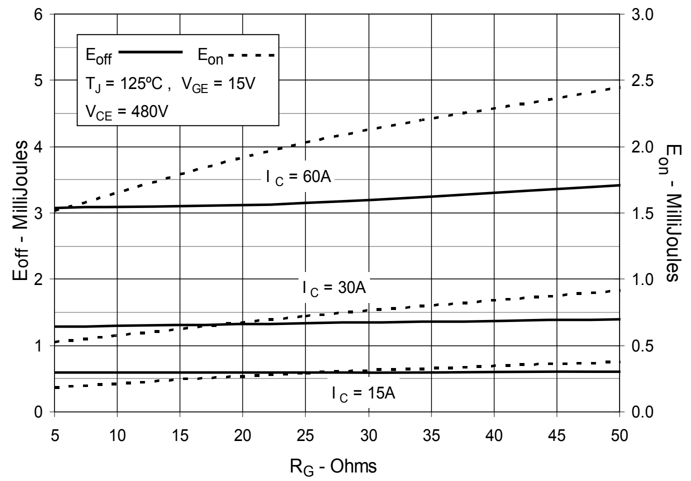

Fig. 13. Inductive Switching Energy Loss vs. Collector Current

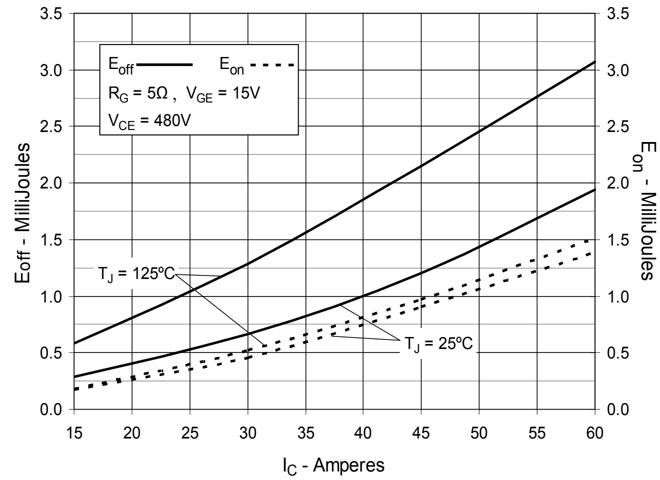

Fig. 14. Inductive Switching Energy Loss vs. Junction Temperature

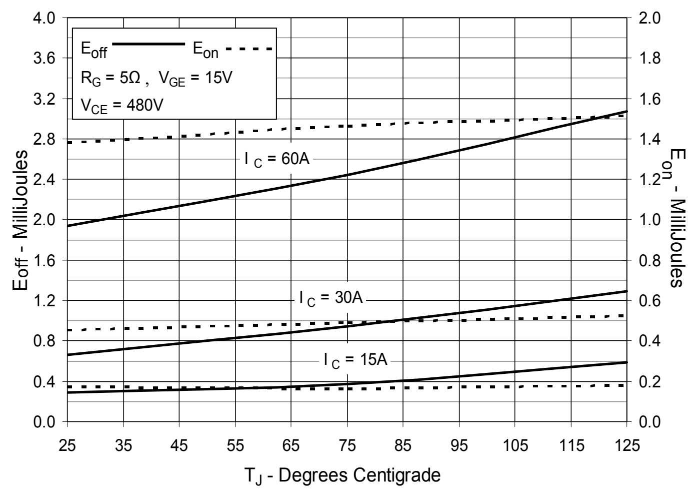

Fig. 15. Inductive Turn-off Switching Times vs. Gate Resistance

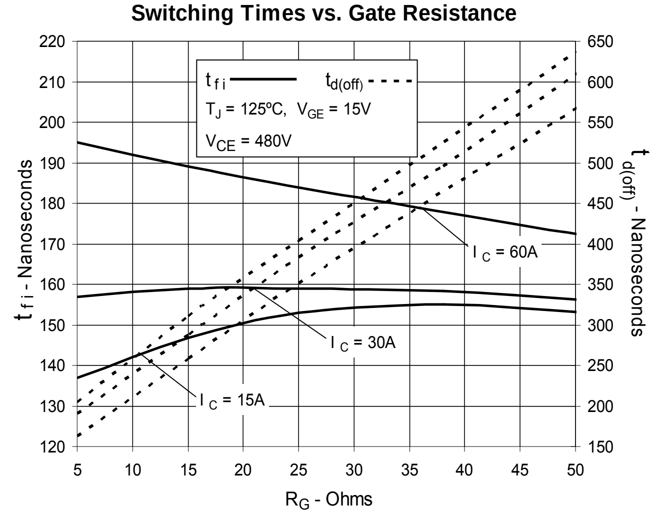

Fig. 16. Inductive Turn-off Switching Times vs. Collector Current

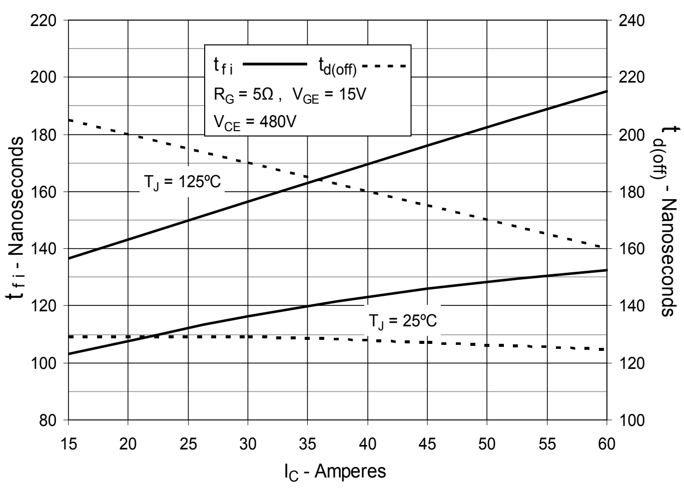

Fig. 17. Inductive Turn-off Switching Times vs. Junction Temperature

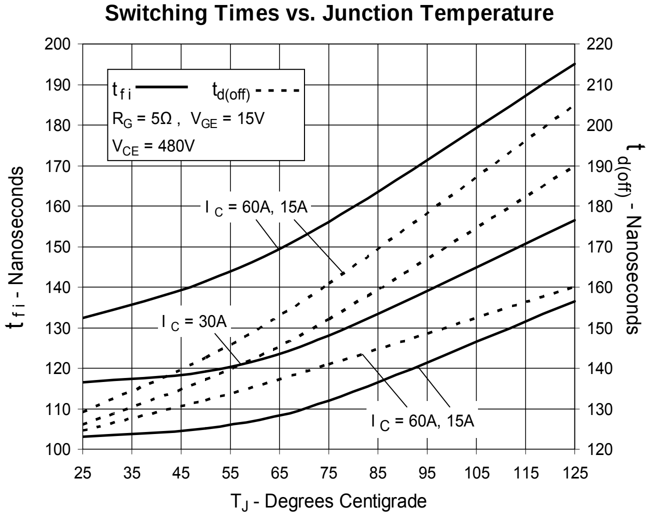

Fig. 18. Inductive Turn-on Switching Times vs. Gate Resistance

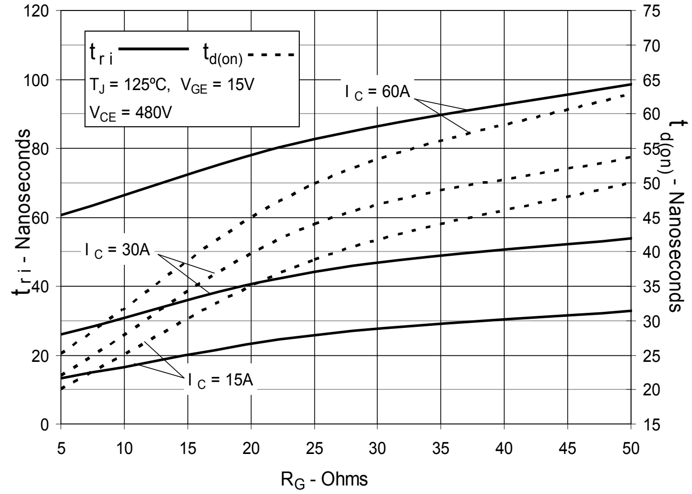

Fig. 19. Inductive Turn-on Switching Times vs. Collector Current

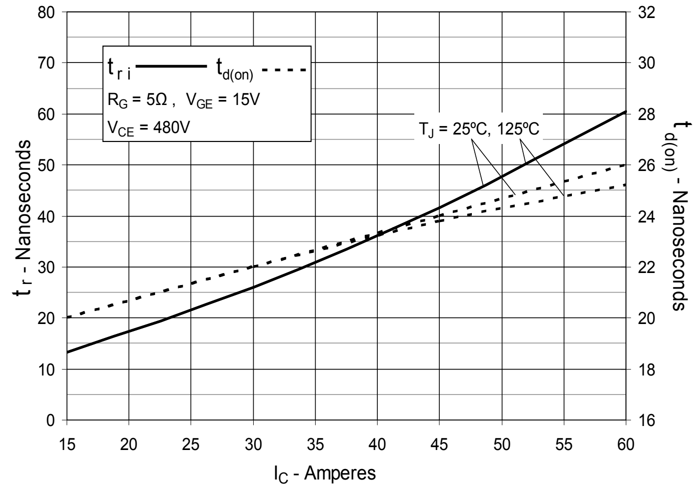

Fig. 20. Inductive Turn-on Switching Times vs. Junction Temperature

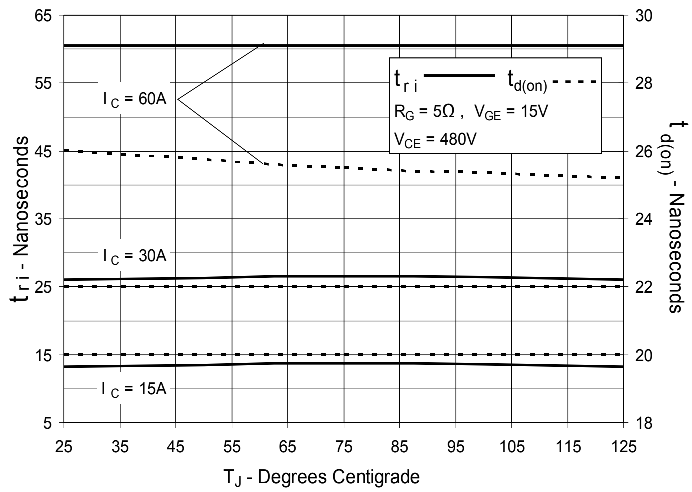

Fig. 21. Forward Current vs. Forward Voltage

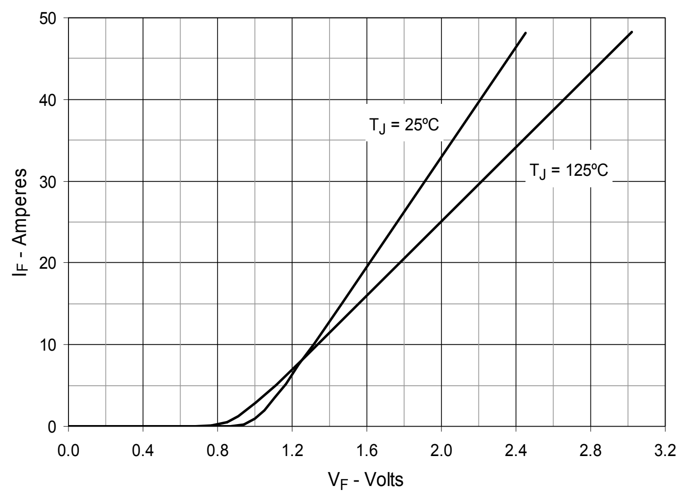

Fig. 22. Maximum Transient Thermal Impedance for Diodes