IXYS

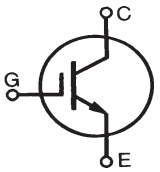
Preliminary Technical Information

GenX3™ 600V IGBTs

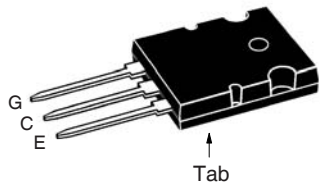
IXGK320N60B3
IXGX320N60B3

V_{CES} = 600V
I_{C90} = 320A
$V_{CE(sat)} \leq$ 1.6V

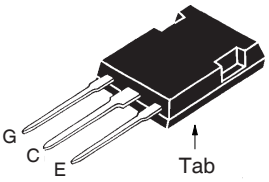
Medium-Speed Low-Vsat PT IGBTs for 5-40 kHz Switching



TO-264 (IXGK)



PLUS247 (IXGX)



G = Gate E = Emitter
C = Collector 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 (Chip Capability)	500	A
I_{C90}	T_C = 90°C	320	A
I_{LRMS}	Terminal Current Limit	160	A
I_{CM}	T_C = 25°C, 1ms	1200	A
SSOA (RBSOA)	V_{GE}= 15V, T_{VJ} = 125°C, R_G = 1Ω Clamped Inductive Load	I_{CM} = 320 $V_{CE} \leq V_{CES}$	A V
P_C	T_C = 25°C	1700	W
T_J		-55 ... +150	°C
T_{JM}		150	°C
T_{stg}		-55 ... +150	°C
T_L	Maximum Lead Temperature for Soldering	300	°C
T_{SOLD}	1.6 mm (0.062 in.) from Case for 10	260	°C
M_d	Mounting Torque (IXGK)	1.13/10	Nm/lb.in.
F_C	Mounting Force (IXGX)	20..120/4.5..27	N/lb.
Weight	TO-264	10	g
	PLUS247	6	g

Symbol	Test Conditions (T_J = 25°C, Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.	
BV_{CES}	I_C = 1mA, V_{GE} = 0V	600			V
$V_{GE(th)}$	I_C = 4mA, V_{CE} = V_{GE}	3.0		5.0	V
I_{CES}	V_{CE} = V_{CES}, V_{GE} = 0V			75	μA
	T_J = 125°C			2	mA
I_{GES}	V_{CE} = 0V, V_{GE} = ± 20V			±400	nA
$V_{CE(sat)}$	I_C = 100A, V_{GE} = 15V, Note 1		1.4	1.6	V
	I_C = 320A		2.0		V

Features

- Optimized for Low Conduction and Switching Losses
- High Current Capability
- Square RBSOA

Advantages

- High Power Density
- Low Gate Drive Requirement

Applications

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

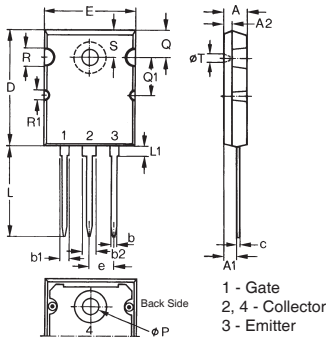
Symbol	Test Conditions (T_J = 25°C, Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.	
g_{fs}	I_C = 60A, V_{CE} = 10V, Note 1	70	125		S
C_{ies}	V_{CE} = 25V, V_{GE} = 0V, f = 1MHz		18		nF
C_{oes}			960		pF
C_{res}			130		pF
Q_g	I_C = 320A, V_{GE} = 15V, V_{CE} = 0.5 • V_{CES}		585		nC
Q_{ge}			105		nC
Q_{gc}			215		nC
$t_{d(on)}$	**Inductive Load, T_J = 25°C** I_C = 100A, V_{GE} = 15V V_{CE} = 0.8 • V_{CES}, R_G = 1Ω		44		ns
t_{ri}			66		ns
E_{on}			2.7		mJ
$t_{d(off)}$			250		ns
t_{fi}			165		ns
E_{off}			3.5	5.0	mJ
$t_{d(on)}$	**Inductive Load, T_J = 125°C** I_C = 100A, V_{GE} = 15V V_{CE} = 0.8 • V_{CES}, R_G = 1Ω		40		ns
t_{ri}			67		ns
E_{on}			3.5		mJ
$t_{d(off)}$			330		ns
t_{fi}			265		ns
E_{off}			5.4		mJ
R_{thJC}				0.073	°C/W
R_{thCS}			0.15		°C/W

Note 1. Pulse test, t ≤ 300µs, duty cycle, d ≤ 2%.

PRELIMINARY TECHNICAL INFORMATION

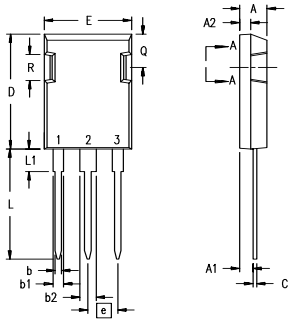
The product presented herein is under development. The Technical Specifications offered are derived from data gathered during objective characterizations of preliminary engineering lots; but also may yet contain some information supplied during a pre-production design evaluation. IXYS reserves the right to change limits, test conditions, and dimensions without notice.

TO-264 AA (IXGK) Outline



Dim.	Millimeter Min.	Max.	Inches Min.	Max.
A	4.82	5.13	.190	.202
A1	2.54	2.89	.100	.114
A2	2.00	2.10	.079	.083
b	1.12	1.42	.044	.056
b1	2.39	2.69	.094	.106
b2	2.90	3.09	.114	.122
c	0.53	0.83	.021	.033
D	25.91	26.16	1.020	1.030
E	19.81	19.96	.780	.786
e	5.46 BSC		.215 BSC	
J	0.00	0.25	.000	.010
K	0.00	0.25	.000	.010
L	20.32	20.83	.800	.820
L1	2.29	2.59	.090	.102
P	3.17	3.66	.125	.144
Q	6.07	6.27	.239	.247
Q1	8.38	8.69	.330	.342
R	3.81	4.32	.150	.170
R1	1.78	2.29	.070	.090
S	6.04	6.30	.238	.248
T	1.57	1.83	.062	.072

PLUS247™ (IXGX) Outline



Terminals: 1 - Gate
2 - Collector
3 - Emitter

Dim.	Millimeter Min.	Max.	Inches Min.	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

IXYS Reserves the Right to Change Limits, Test Conditions, and Dimensions.

Fig. 1. Output Characteristics @ T_J = 25ºC

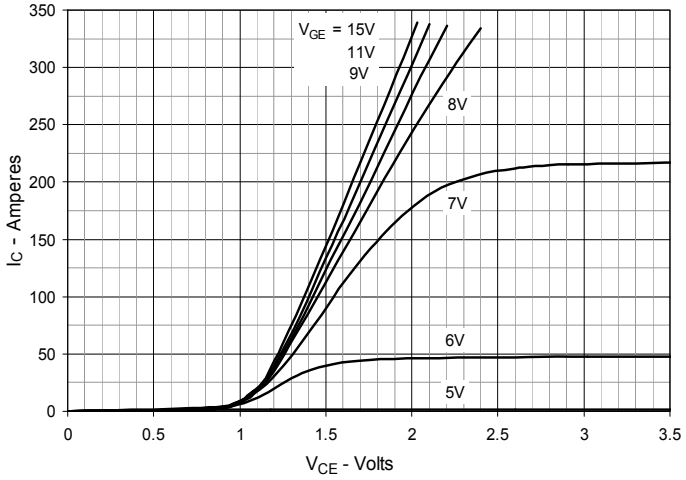


Fig. 2. Output Characteristics @ T_J = 125ºC

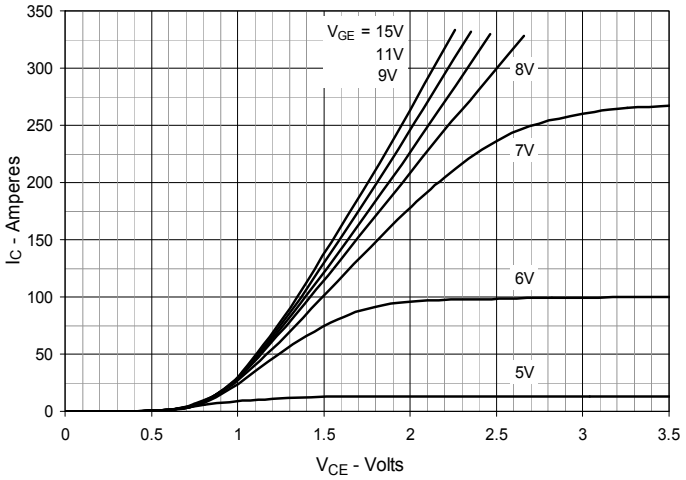


Fig. 3. Dependence of $V_{CE(sat)}$ on Junction Temperature

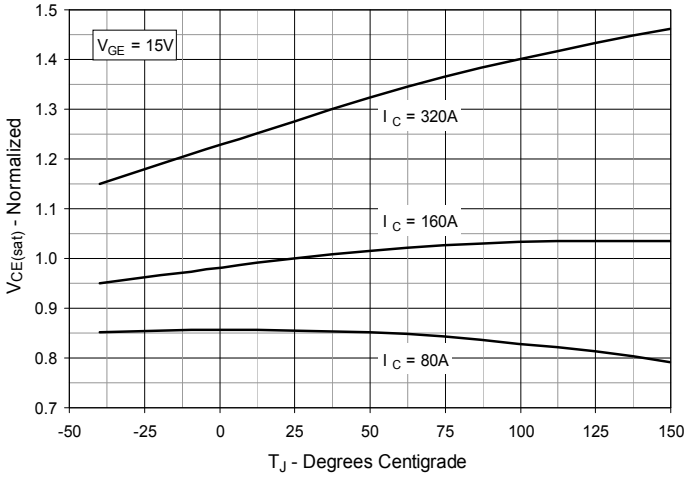


Fig. 4. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

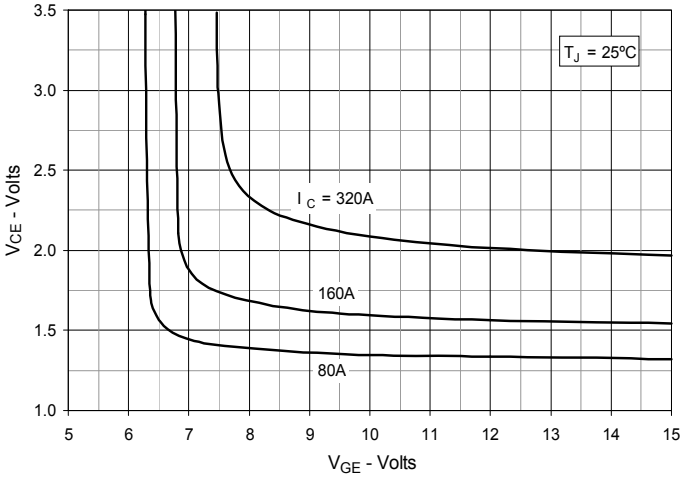


Fig. 5. Input Admittance

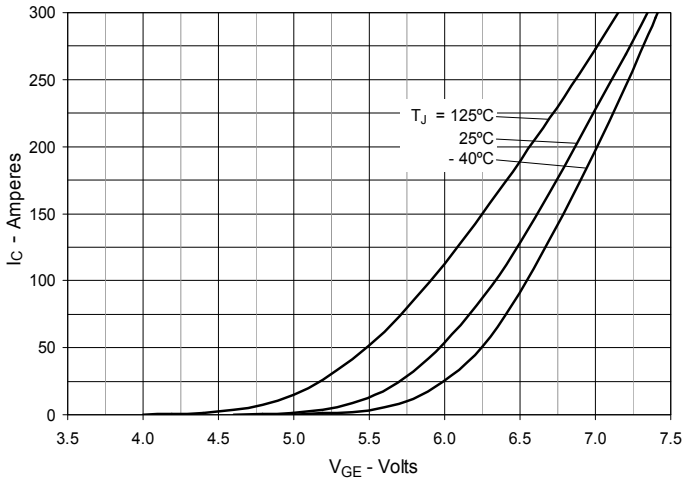


Fig. 6. Transconductance

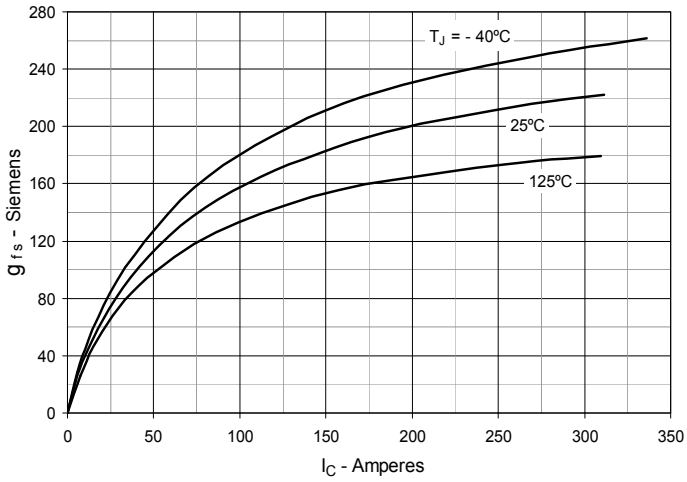


Fig. 7. Gate Charge

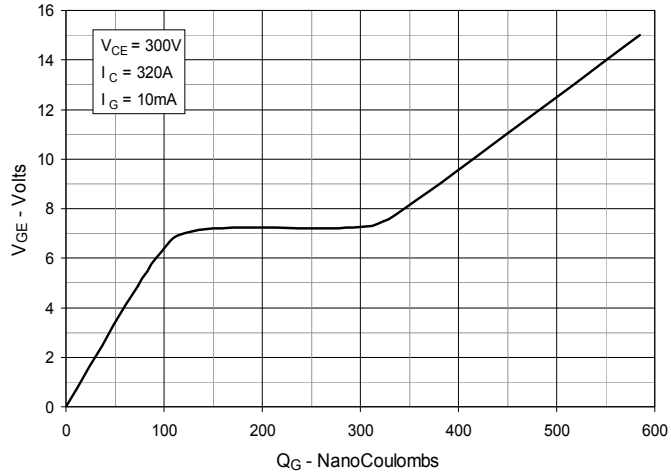


Fig. 8. Capacitance

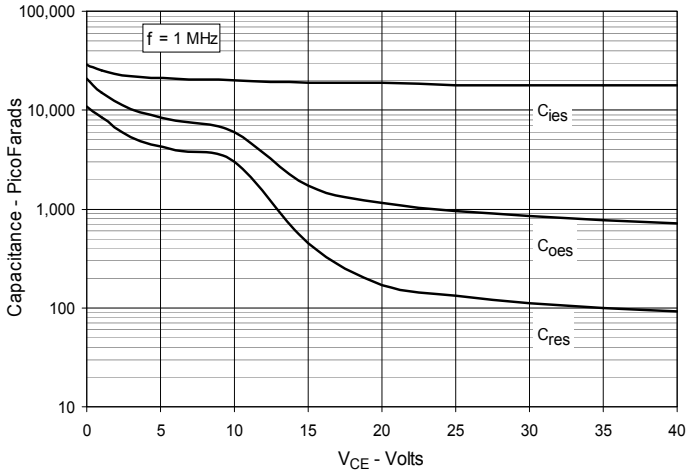


Fig. 9. Reverse-Bias Safe Operating Area

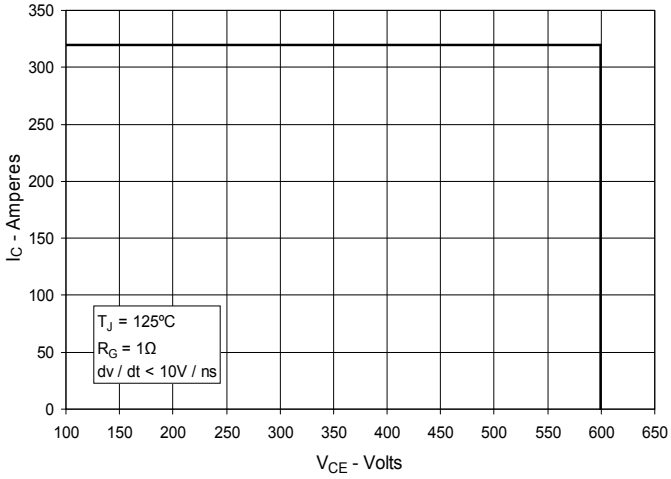


Fig. 10. Maximum Transient Thermal Impedance

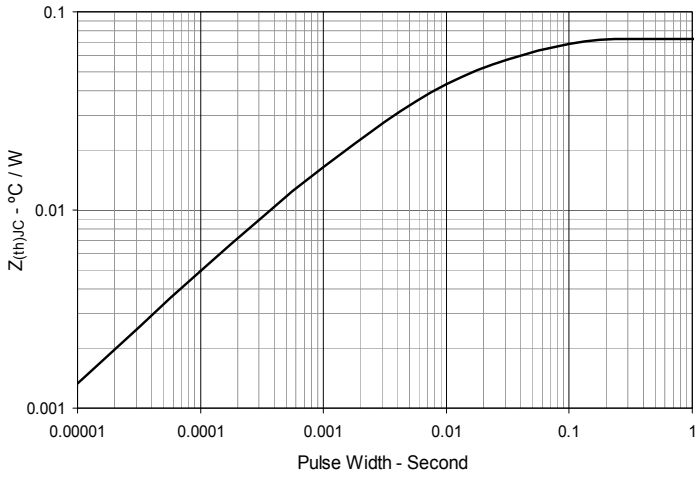


Fig. 11. Inductive Switching Energy Loss vs. Gate Resistance

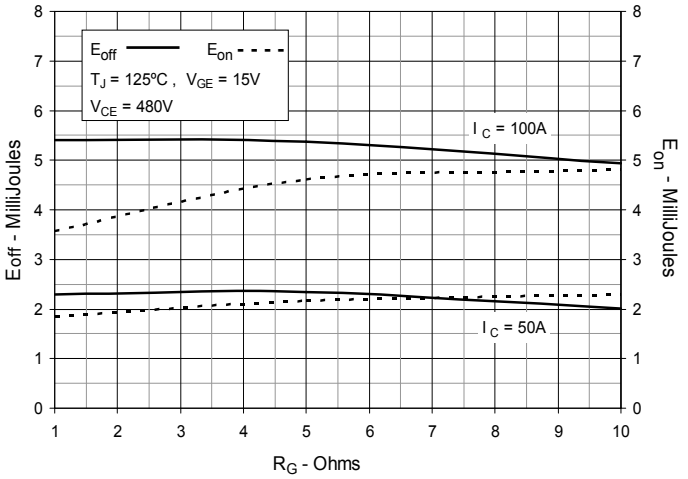


Fig. 12. Inductive Switching Energy Loss vs. Collector Current

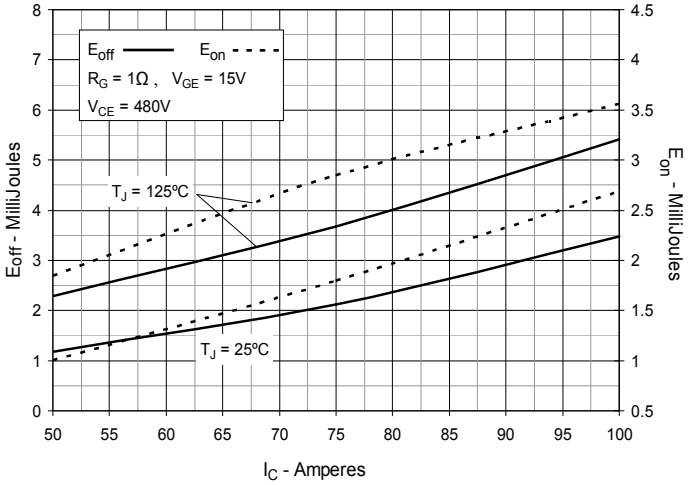


Fig. 13. Inductive Switching Energy Loss vs. Junction Temperature

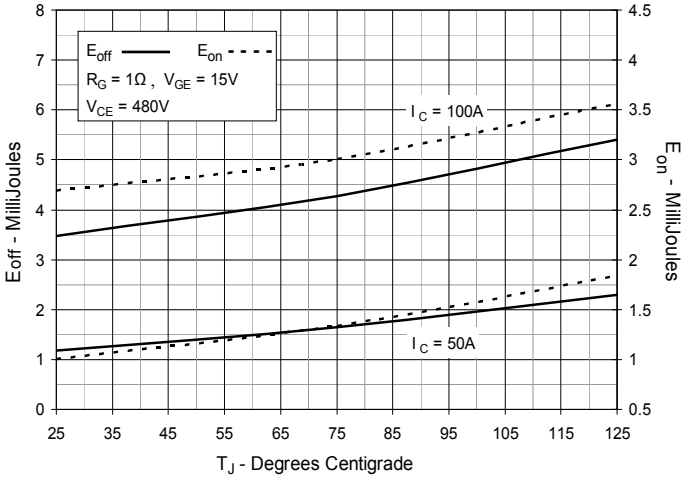


Fig. 14. Inductive Turn-off Switching Times vs. Gate Resistance

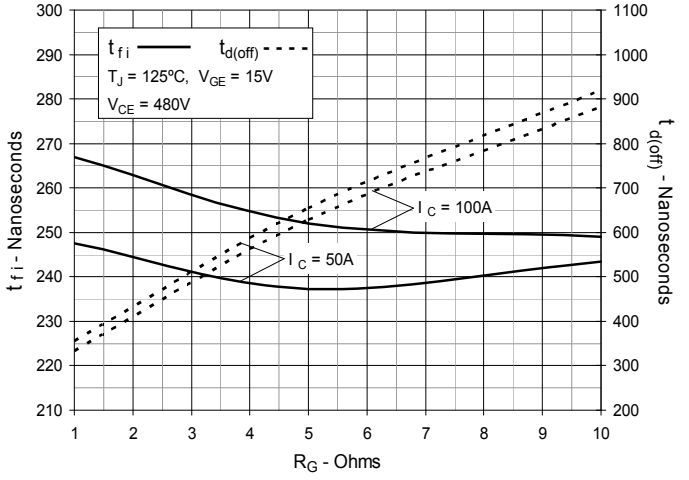


Fig. 15. Inductive Turn-off Switching Times vs. Collector Current

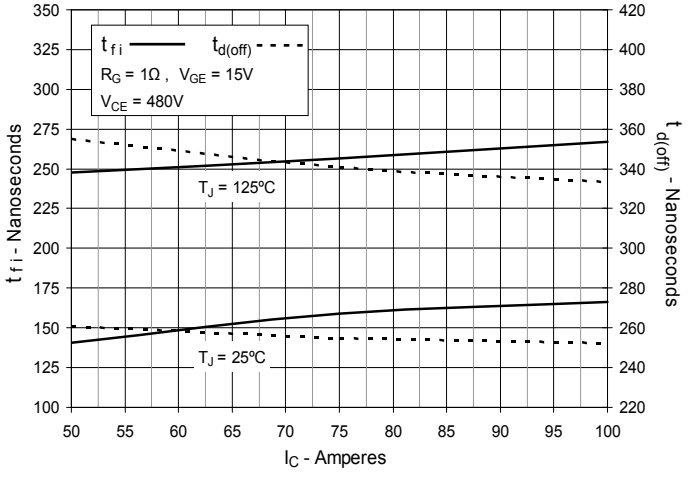


Fig. 16. Inductive Turn-off Switching Times vs. Junction Temperature

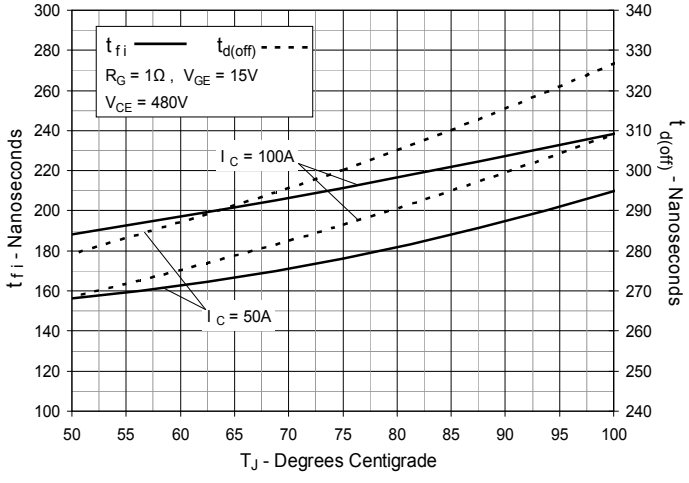


Fig. 17. Inductive Turn-on Switching Times vs. Gate Resistance

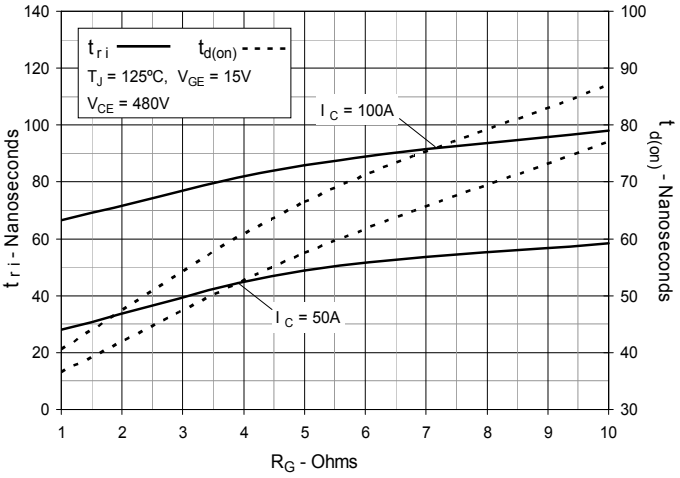


Fig. 18. Inductive Turn-on Switching Times vs. Collector Current

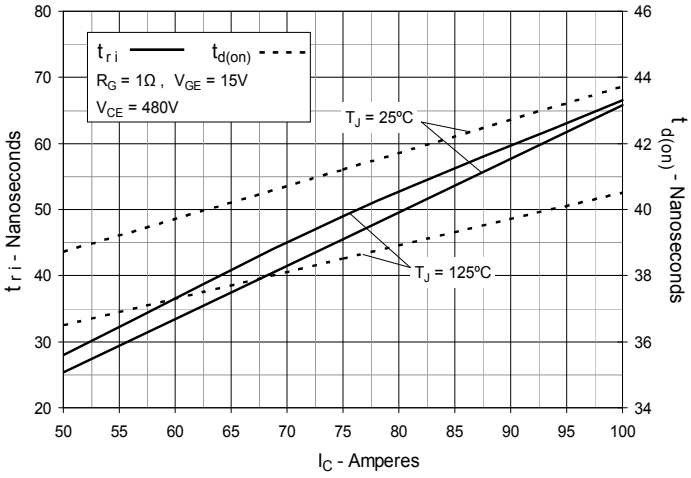


Fig. 19. Inductive Turn-on Switching Times vs. Junction Temperature