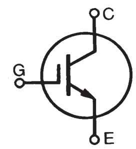
IXYS

GenX3™ 600V IGBT

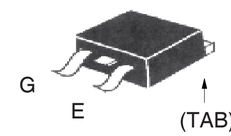
IXGA48N60A3
IXGH48N60A3
IXGP48N60A3

Ultra Low Vsat PT IGBT for
up to 5kHz switching

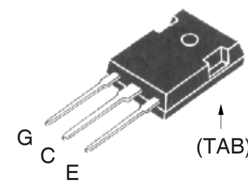


V_{CES}	=	600V
I_{C110}	=	48A
$V_{CE(sat)}$	≤	1.35V

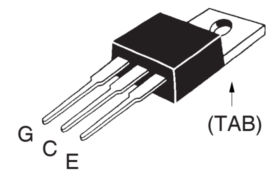
TO-263 (IXGA)



TO-247 (IXGH)



TO-220 (IXGP)



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_{C110}	T_C = 110°C	48	A
I_{CM}	T_C = 25°C, 1ms	300	A
SSOA (RBSOA)	V_{GE} = 15V, T_{VJ} = 125°C, R_G = 5Ω Clamped inductive load @ ≤ 600V	I_{CM} = 96	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 (TO-247 & TO-220)	1.13/10	Nm/lb.in.
Weight	TO-247 TO-220 TO-263	6.0 3.0 2.5	g 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		600			V
$V_{GE(th)}$	I_C = 250µA, V_{CE} = V_{GE}		3.0		5.0	V
I_{CES}	V_{CE} = V_{CES}				25	µA
	V_{GE} = 0V	T_J = 125°C			250	µA
I_{GES}	V_{CE} = 0V, V_{GE} = ± 20V				±100	nA
$V_{CE(sat)}$	I_C = 32A, V_{GE} = 15V, Note 1			1.18	1.35	V

Features

- Optimized for low conduction losses
- International standard packages

Advantages

- High power density
- Low gate drive requirement

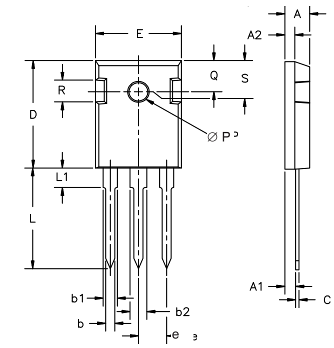
Applications

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

Symbol	Test Conditions (T_J = 25°C unless otherwise specified)	Characteristic Values Min.	Typ.	Max.	
g_{fs}	I_C = 32A, V_{CE} = 10V, Note 1	30	48		S
C_{ies}	V_{CE} = 25V, V_{GE} = 0V, f = 1MHz		3190		pF
C_{oes}			175		pF
C_{res}			43		pF
Q_g	I_C = 32A, V_{GE} = 15V, V_{CE} = 0.5 • V_{CES}		110		nC
Q_{ge}			21		nC
Q_{gc}			42		nC
$t_{d(on)}$	**Inductive Load, T_J = 25°C**		25		ns
t_{ri}	I_C = 32A, V_{GE} = 15V		30		ns
E_{on}	V_{CE} = 480V, R_G = 5Ω		0.95		mJ
$t_{d(off)}$			334		ns
t_{fi}			224		ns
E_{off}			2.90		mJ
$t_{d(on)}$	**Inductive Load, T_J = 25°C**		24		ns
t_{ri}	I_C = 32A, V_{GE} = 15V		30		ns
E_{on}	V_{CE} = 480V, R_G = 5Ω		1.97		mJ
$t_{d(off)}$			545		ns
t_{fi}			380		ns
E_{off}			5.60		mJ
R_{thJC}				0.42	°C/W
R_{thCS}	(TO-247)		0.25		°C/W
	(TO-220)		0.50		°C/W

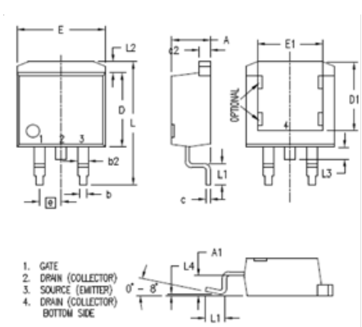
Note 1: Pulse test, t ≤ 300μs; duty cycle, d ≤ 2%.

TO-247 (IXGH) Outline



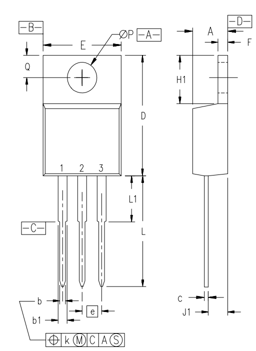
Dim.	Millimeter Min.	Max.	Inches Min.	Max.
A	4.7	5.3	.185	.209
A_1	2.2	2.54	.087	.102
A_2	2.2	2.6	.059	.098
b	1.0	1.4	.040	.055
b_1	1.65	2.13	.065	.084
b_2	2.87	3.12	.113	.123
C	.4	.8	.016	.031
D	20.80	21.46	.819	.845
E	15.75	16.26	.610	.640
e	5.20	5.72	0.205	0.225
L	19.81	20.32	.780	.800
L1		4.50		.177
∅P	3.55	3.65	.140	.144
Q	5.89	6.40	0.232	0.252
R	4.32	5.49	.170	.216
S	6.15	BSC	242	BSC

TO-263 (IXGA) Outline



SYM	INCHES MIN	MAX	MILLIMETERS MIN	MAX
A	.160	.190	4.06	4.83
A1	.080	.110	2.03	2.79
b	.020	.039	0.51	0.99
b2	.045	.055	1.14	1.40
c	.016	.029	0.40	0.74
c2	.045	.055	1.14	1.40
D	.340	.380	8.64	9.65
D1	.315	.350	8.00	8.89
E	.380	.410	9.65	10.41
E1	.245	.320	6.22	8.13
e	.100 BSC		2.54 BSC	
L	.575	.625	14.61	15.88
L1	.090	.110	2.29	2.79
L2	.040	.055	1.02	1.40
L3	.050	.070	1.27	1.78
L4	0	.005	0	0.13

TO-220 (IXGP) Outline



Pins: 1 - Gate 2 - Drain
3 - Source 4 - Drain

SYM	INCHES MIN	MAX	MILLIMETERS MIN	MAX
A	.170	.190	4.32	4.83
b	.025	.040	0.64	1.02
b1	.045	.065	1.15	1.65
c	.014	.022	0.35	0.56
D	.580	.630	14.73	16.00
E	.390	.420	9.91	10.66
e	.100 BSC		2.54 BSC	
F	.045	.055	1.14	1.40
H1	.230	.270	5.85	6.85
J1	.090	.110	2.29	2.79
k	0	.015	0	0.38
L	.500	.550	12.70	13.97
L1	.110	.230	2.79	5.84
∅P	.139	.161	3.53	4.08
Q	.100	.125	2.54	3.18

IXYS reserves the right to change limits, test conditions and dimensions.

Fig. 1. Output Characteristics @ 25ºC

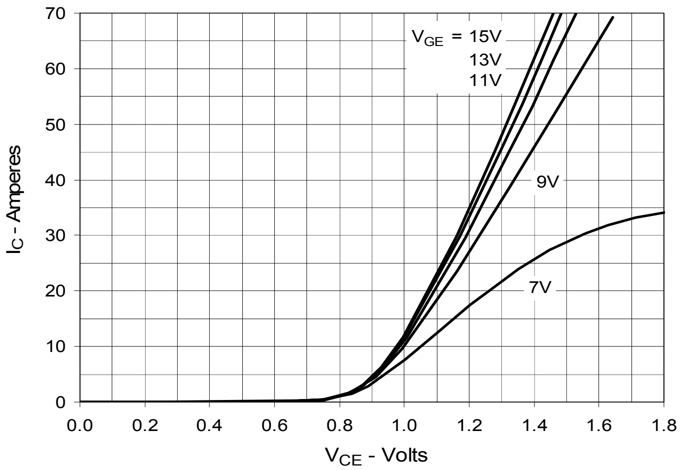


Fig. 2. Extended Output Characteristics @ 25ºC

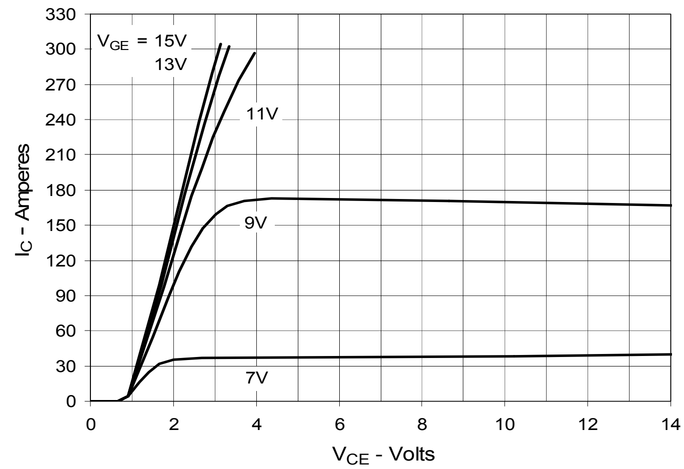


Fig. 3. Output Characteristics @ 125ºC

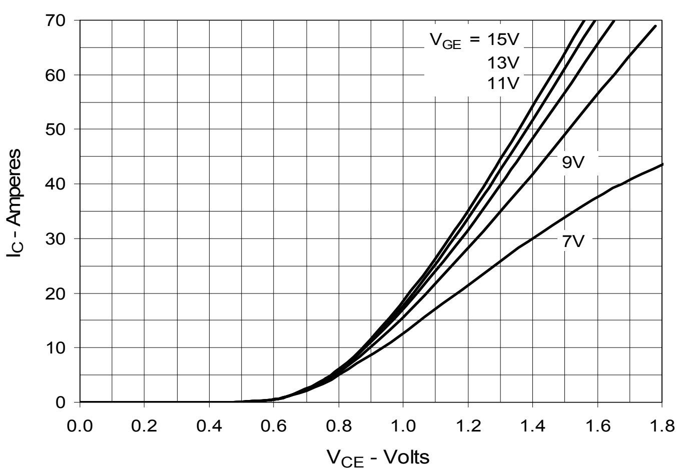


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

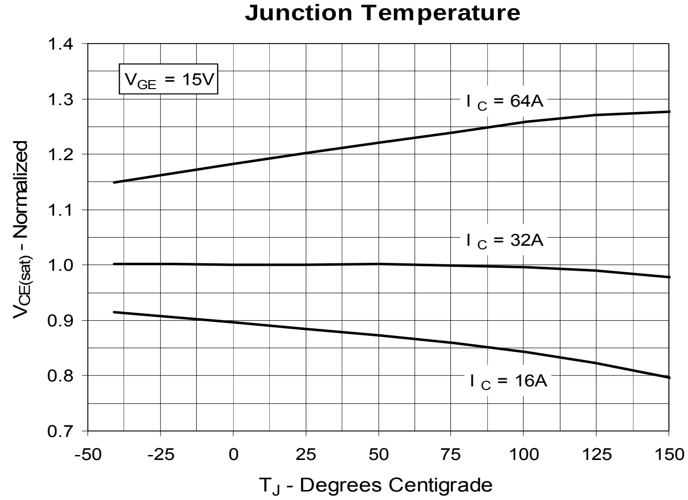


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

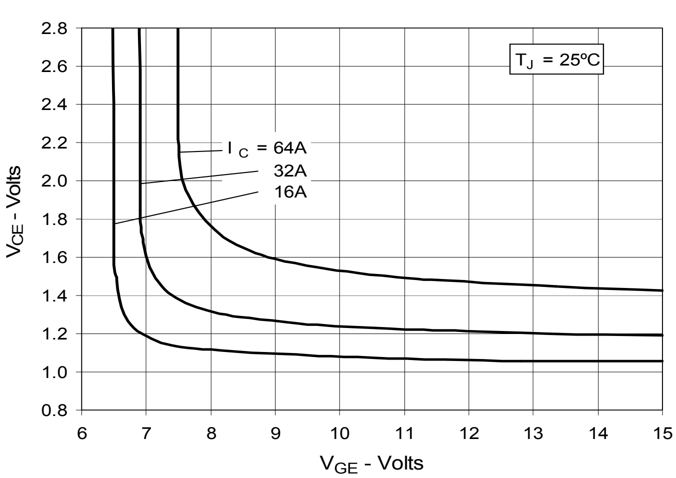


Fig. 6. Input Admittance

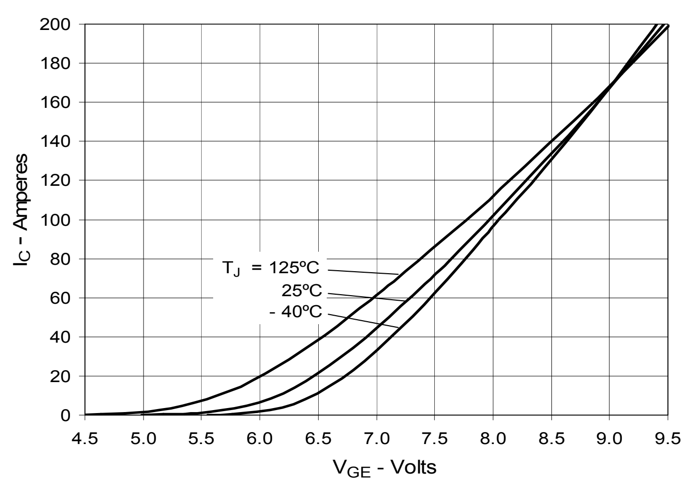


Fig. 7. Transconductance

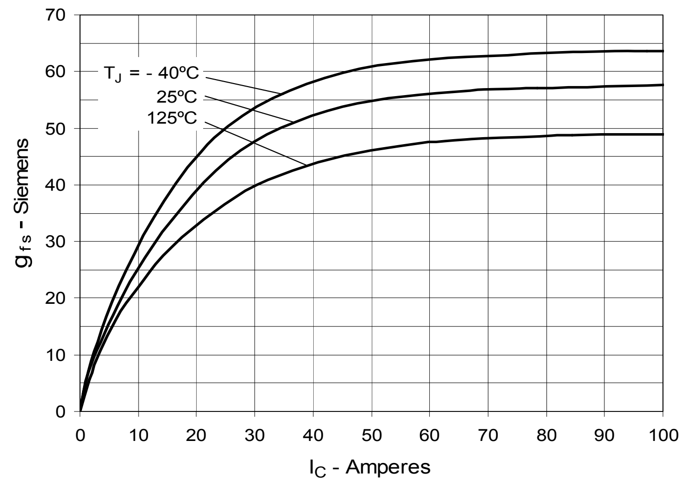


Fig. 8. Gate Charge

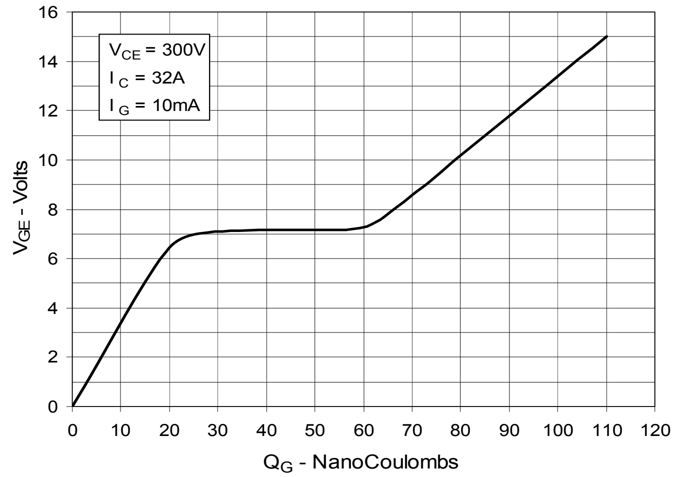


Fig. 9. Capacitance

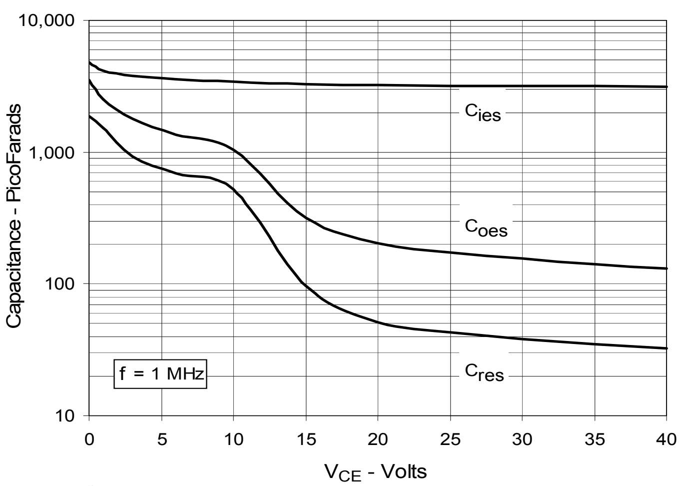


Fig. 10. Reverse-Bias Safe Operating Area

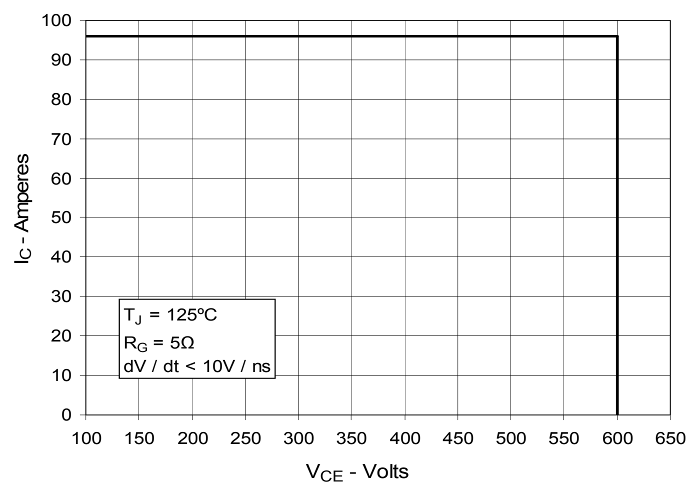


Fig. 11. Maximum Transient Thermal Impedance

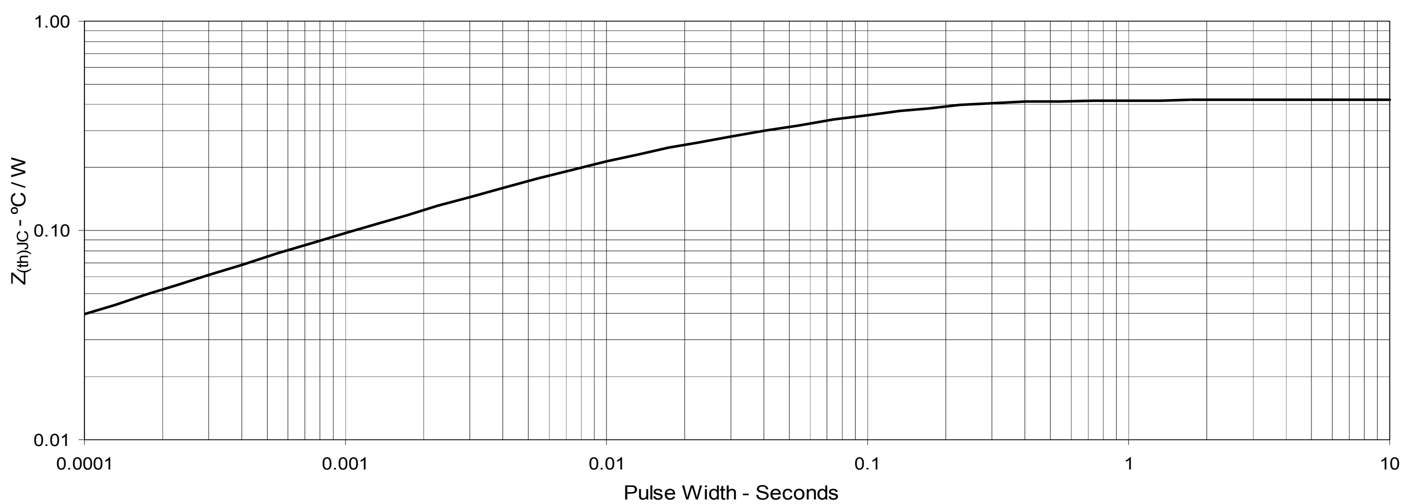


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Fig. 12. Inductive Switching Energy Loss vs. Gate Resistance

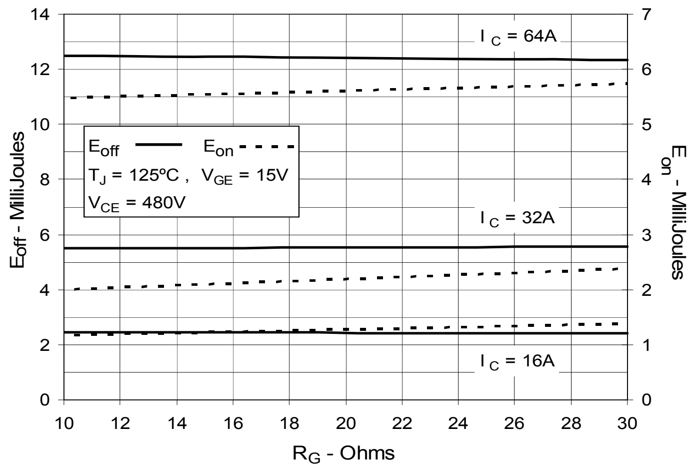


Fig. 13. Inductive Switching Energy Loss vs. Collector Current

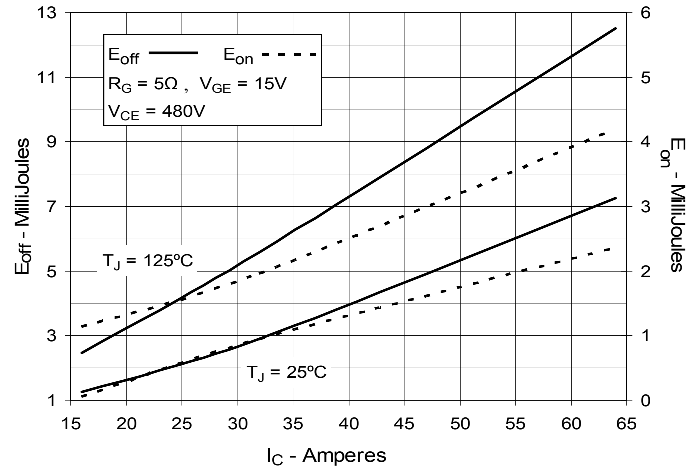


Fig. 14. Inductive Switching Energy Loss vs. Junction Temperature

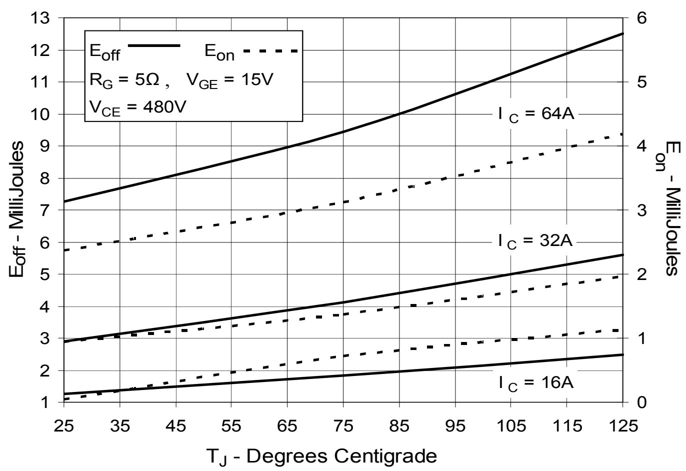


Fig. 15. Inductive Turn-off Switching Times vs. Gate Resistance

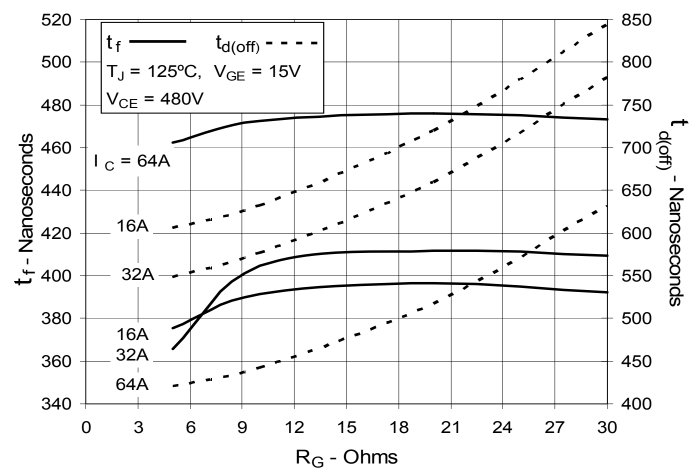


Fig. 16. Inductive Turn-off Switching Times vs. Collector Current

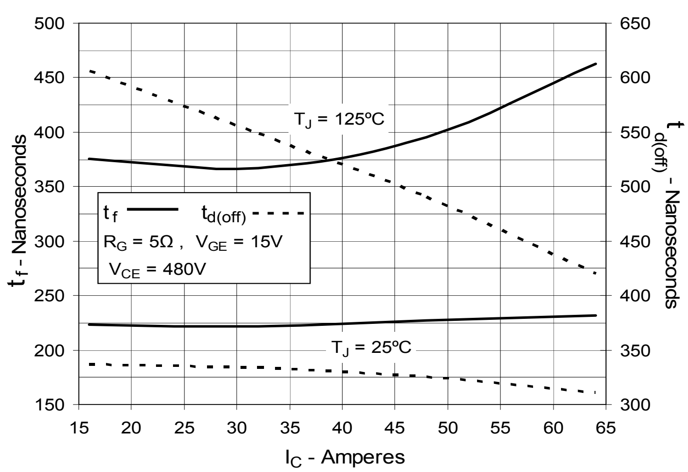


Fig. 17. Inductive Turn-on Switching Times vs. Junction Temperature

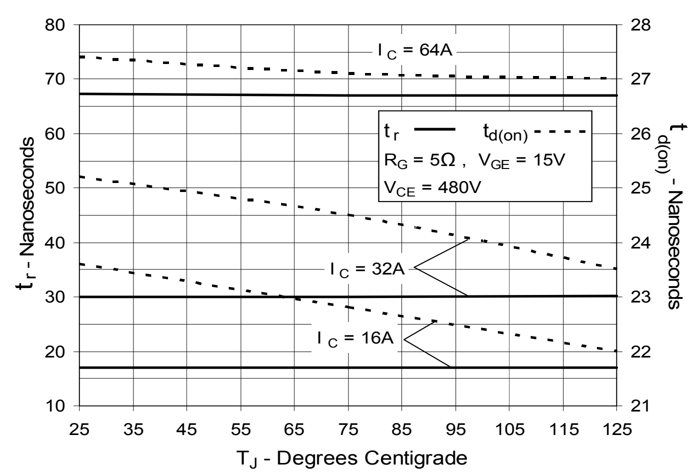


Fig. 18. Inductive Turn-on Switching Times vs. Gate Resistance

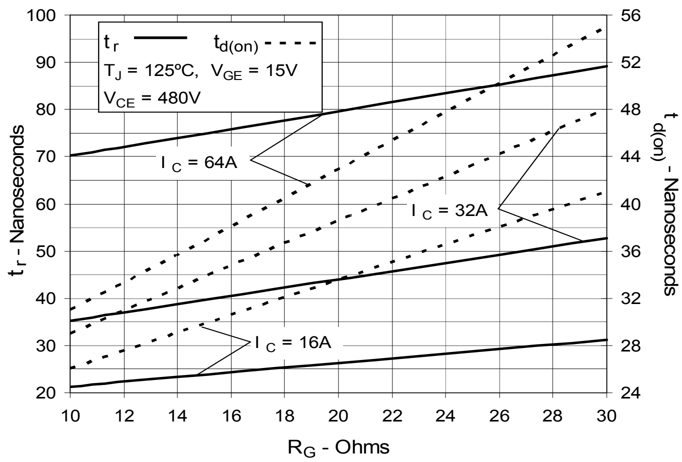


Fig. 19. Inductive Turn-on Switching Times vs. Collector Current

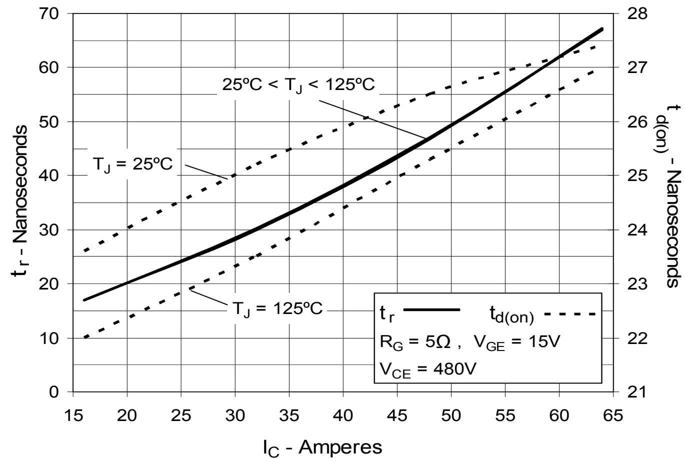
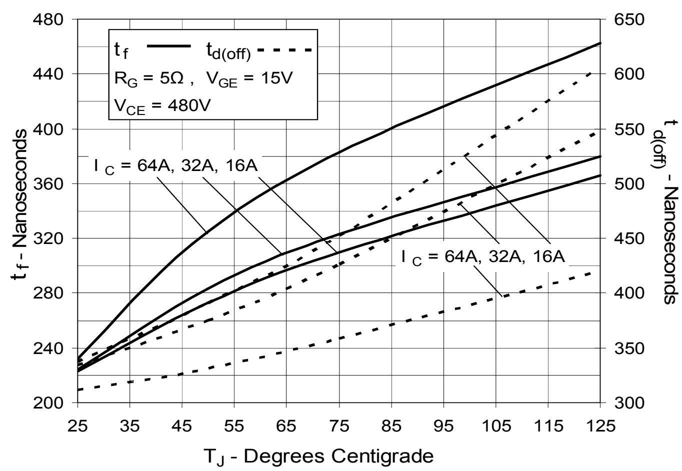


Fig. 20. Inductive Turn-off Switching Times vs. Junction Temperature



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