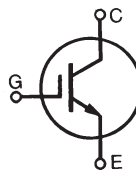


XPT™ 600V IGBTs GenX3™

IXXA50N60B3
IXXP50N60B3
IXXH50N60B3

V_{CES} = 600V
I_{C110} = 50A
V_{CE(sat)} ≤ 1.80V

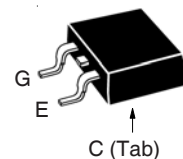
Extreme Light Punch Through
IGBT for 5-30 kHz Switching



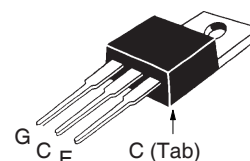
Symbol	Test Conditions	Maximum Ratings	
V _{CES}	T _J = 25°C to 175°C	600	V
V _{CGR}	T _J = 25°C to 175°C, R _{GE} = 1MΩ	600	V
V _{GES}	Continuous	±20	V
V _{GEM}	Transient	±30	V
I _{C25}	T _C = 25°C	120	A
I _{C110}	T _C = 110°C	50	A
I _{CM}	T _C = 25°C, 1ms	200	A
I _A	T _C = 25°C	25	A
E _{AS}	T _C = 25°C	200	mJ
SSOA (RBSOA)	V _{GE} = 15V, T _{VJ} = 150°C, R _G = 5Ω Clamped Inductive Load	I _{CM} = 100 @V _{CE} ≤ V _{CES}	A
t _{sc} (SCSOA)	V _{GE} = 15V, V _{CE} = 360V, T _J = 150°C R _G = 22Ω, Non Repetitive	10	μs
P _C	T _C = 25°C	600	W
T _J		-55 ... +175	°C
T _{JM}		175	°C
T _{stg}		-55 ... +175	°C
T _L	Maximum Lead Temperature for Soldering	300	°C
T _{SOLD}	1.6 mm (0.062in.) from Case for 10s	260	°C
F _C	Mounting Force (TO-263)	10..65 / 2.2..14.6	N/lb.
M _d	Mounting Torque (TO-220 & TO-247)	1.13 / 10	Nm/lb.in.
Weight	TO-263	2.5	g
	TO-220	3.0	g
	TO-247	6.0	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}	3.5		V
I_{CES}	V _{CE} = V _{CES} , V _{GE} = 0V T _J = 150°C			25 μA 2 mA
I_{GES}	V _{CE} = 0V, V _{GE} = ±20V			±100 nA
V_{CE(sat)}	I _C = 36A, V _{GE} = 15V, Note 1 T _J = 150°C		1.55 1.80	V V

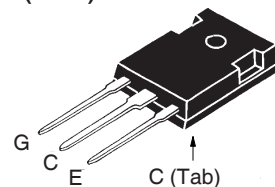
TO-263 (IXXA)



TO-220 (IXXP)



TO-247 (IXXH)



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

Features

- Optimized for 5-30kHz Switching
- Square RBSOA
- Avalanche Capability
- Short Circuit Capability
- International Standard Packages

Advantages

- High Power Density
- 175°C Rated
- Extremely Rugged
- Low Gate Drive Requirement
- Easy to Parallel

Applications

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

Symbol Test Conditions

($T_J = 25^\circ\text{C}$ Unless Otherwise Specified)

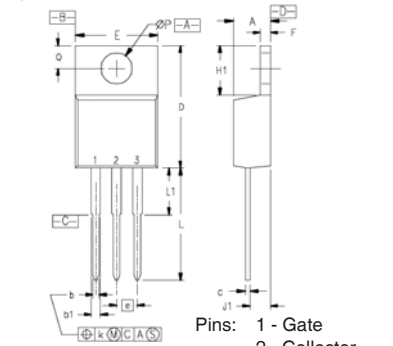
Characteristic Values

		Min.	Typ.	Max.	
g_{fs}	$I_C = 36\text{A}, V_{CE} = 10\text{V}$, Note 1	12	19		S
C_{ies}	$V_{CE} = 25\text{V}, V_{GE} = 0\text{V}, f = 1\text{MHz}$		2230		pF
C_{oes}			195		pF
C_{res}			44		pF
$Q_{g(on)}$	$I_C = 36\text{A}, V_{GE} = 15\text{V}, V_{CE} = 0.5 \cdot V_{CES}$		70		nC
Q_{ge}			16		nC
Q_{gc}			29		nC
$t_{d(on)}$	Inductive load, $T_J = 25^\circ\text{C}$ $I_C = 36\text{A}, V_{GE} = 15\text{V}$ $V_{CE} = 360\text{V}, R_G = 5\Omega$ Note 2		27		ns
t_{ri}			40		ns
E_{on}			0.67		mJ
$t_{d(off)}$			100	150	ns
t_{fi}			135		ns
E_{off}		0.74	1.20	mJ	
$t_{d(on)}$	Inductive load, $T_J = 150^\circ\text{C}$ $I_C = 36\text{A}, V_{GE} = 15\text{V}$ $V_{CE} = 360\text{V}, R_G = 5\Omega$ Note 2		30		ns
t_{ri}			45		ns
E_{on}			1.40		mJ
$t_{d(off)}$			130		ns
t_{fi}			190		ns
E_{off}		1.20		mJ	
R_{thJC}				0.25	$^\circ\text{C/W}$
R_{thCS}	TO-247		0.21		$^\circ\text{C/W}$
	TO-220		0.50		$^\circ\text{C/W}$

Notes:

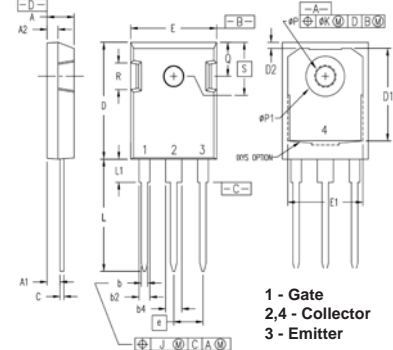
1. Pulse test, $t \leq 300\mu\text{s}$, duty cycle, $d \leq 2\%$.
2. Switching times & energy losses may increase for higher V_{CE} (clamp), T_J or R_G .

TO-220 Outline



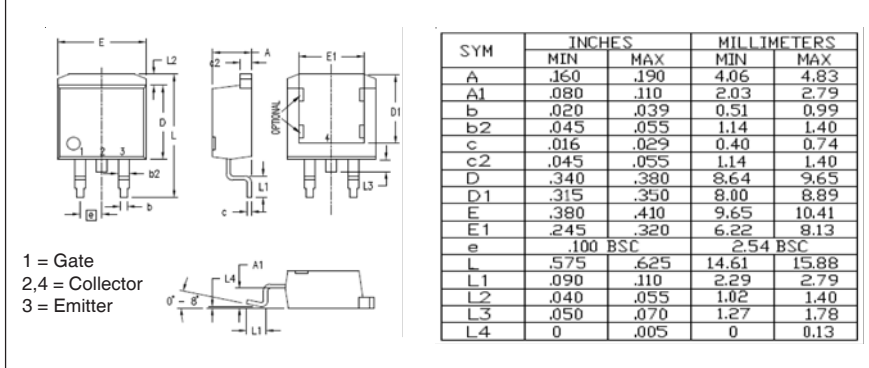
SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.170	.190	4.32	4.83
b	.025	.040	0.64	1.02
b1	.045	.065	1.15	1.65
c	.014	.022	0.35	0.56
D	.580	.630	14.73	16.00
E	.390	.420	9.91	10.66
e	.100 BSC		2.54 BSC	
F	.045	.055	1.14	1.40
H1	.230	.270	5.85	6.85
J1	.090	.110	2.29	2.79
k	0	.015	0	0.38
L	.500	.550	12.70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

TO-247 Outline



Dim.	Millimeter		Inches	
	min	max	min	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
$\varnothing P$	3.55	3.65	0.140	0.144
$\varnothing P1$	-	7.39	-	0.290
Q	5.38	6.19	0.212	0.244
S	6.14 BSC		0.242 BSC	

TO-263 Outline



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

IXYS MOSFETs and IGBTs are covered by one or more of the following U.S. patents:

4,835,592	4,931,844	5,049,961	5,237,481	6,162,665	6,404,065 B1	6,683,344	6,727,585	7,005,734 B2	7,157,338B2
4,860,072	5,017,508	5,063,307	5,381,025	6,259,123 B1	6,534,343	6,710,405 B2	6,759,692	7,063,975 B2	
4,881,106	5,034,796	5,187,117	5,486,715	6,306,728 B1	6,583,505	6,710,463	6,771,478 B2	7,071,537	

Fig. 1. Output Characteristics @ $T_J = 25^\circ\text{C}$

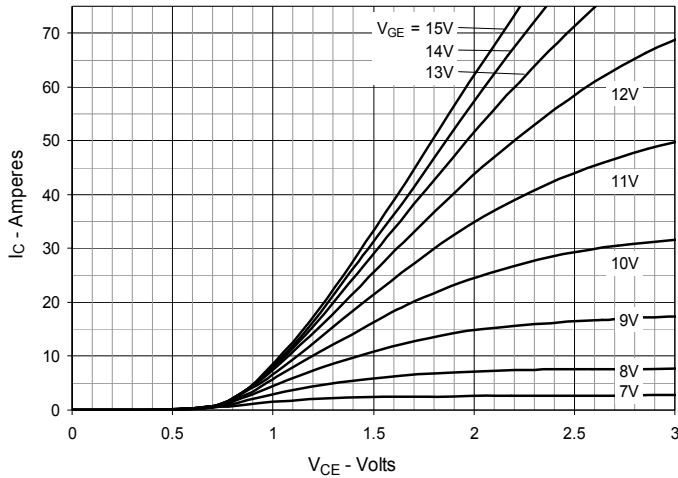


Fig. 2. Extended Output Characteristics @ $T_J = 25^\circ\text{C}$

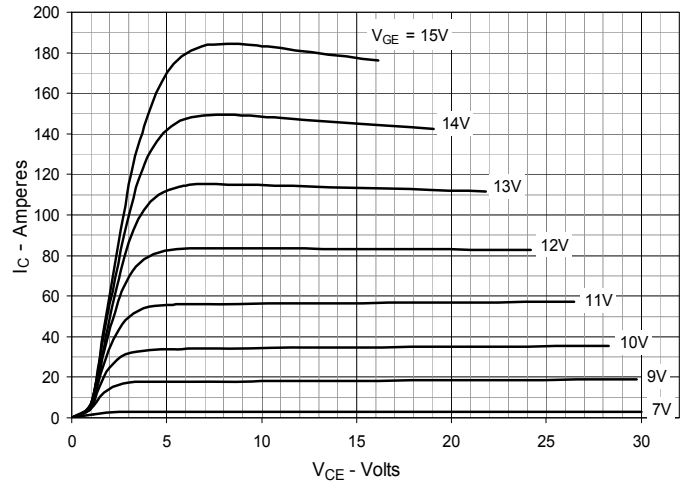


Fig. 3. Output Characteristics @ $T_J = 150^\circ\text{C}$

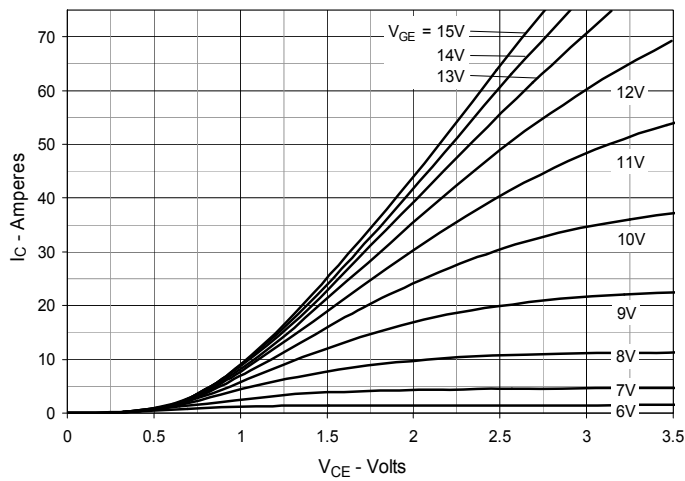


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

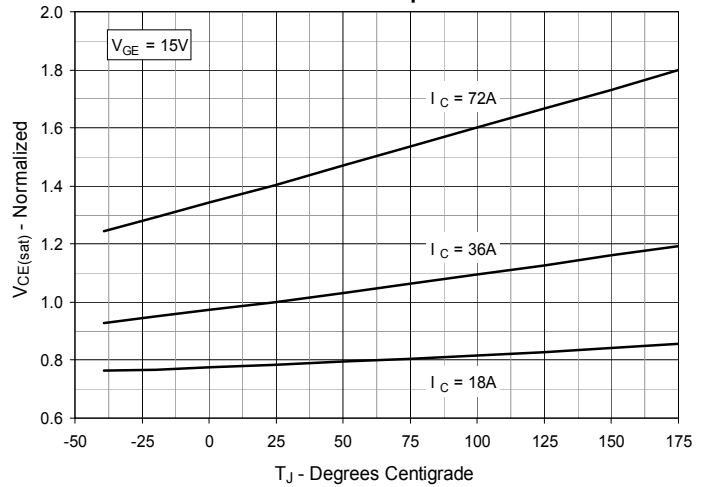


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

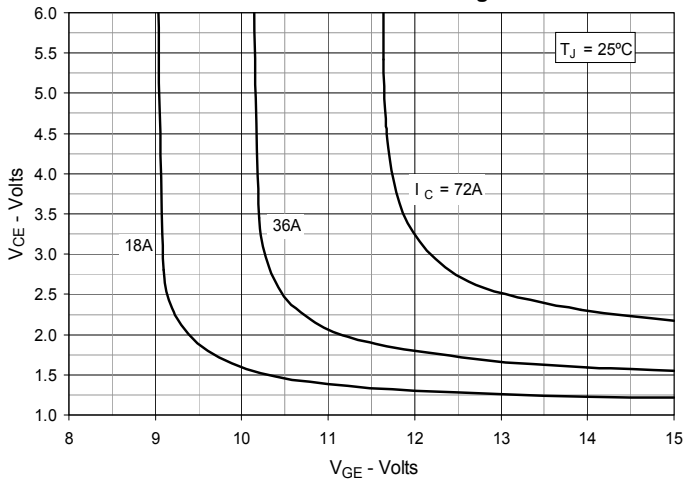


Fig. 6. Input Admittance

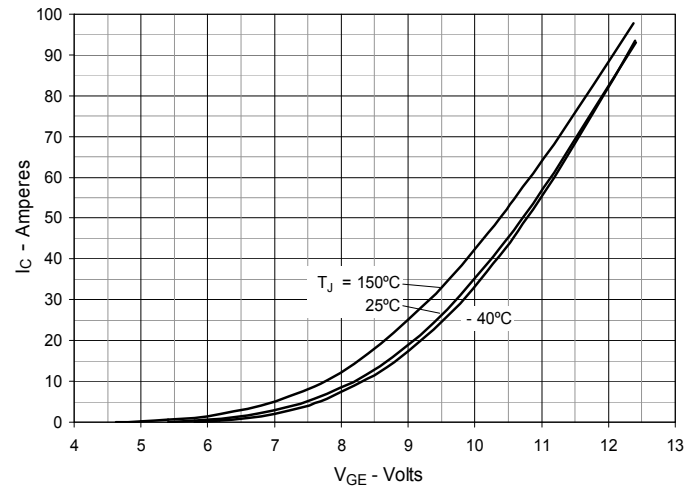


Fig. 7. Transconductance

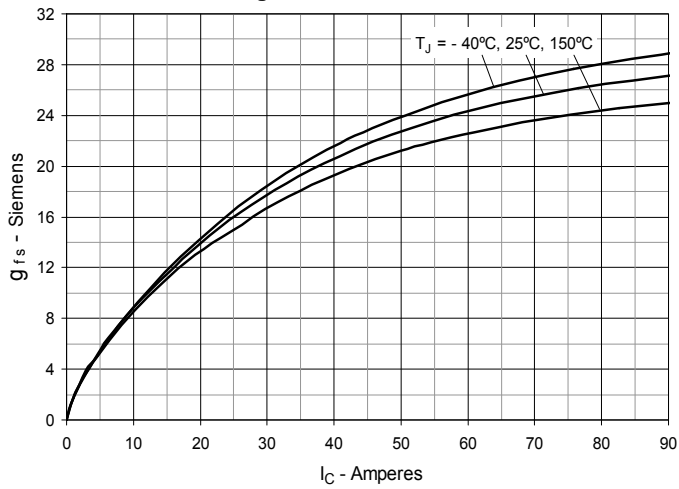


Fig. 8. Gate Charge

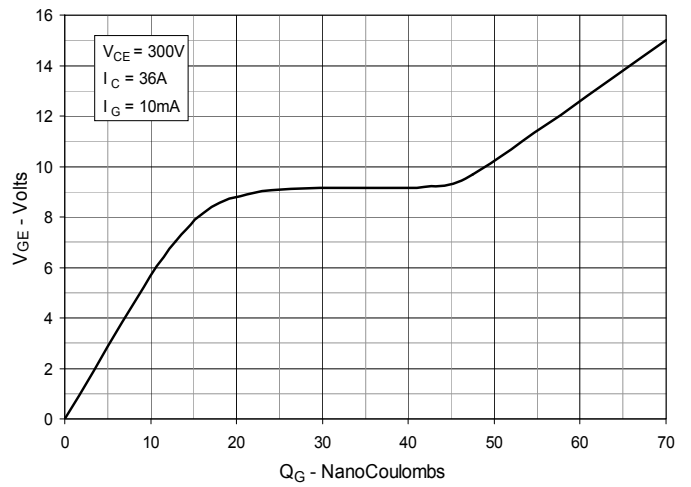


Fig. 9. Capacitance

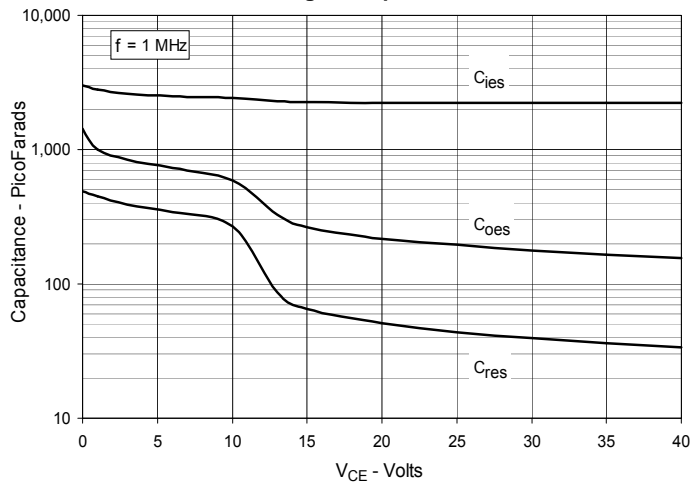


Fig. 10. Reverse-Bias Safe Operating Area

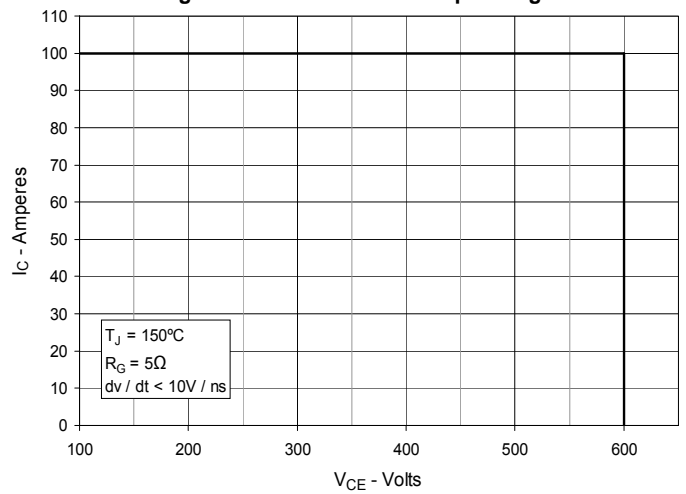


Fig. 11. Forward-Bias Safe Operating Area

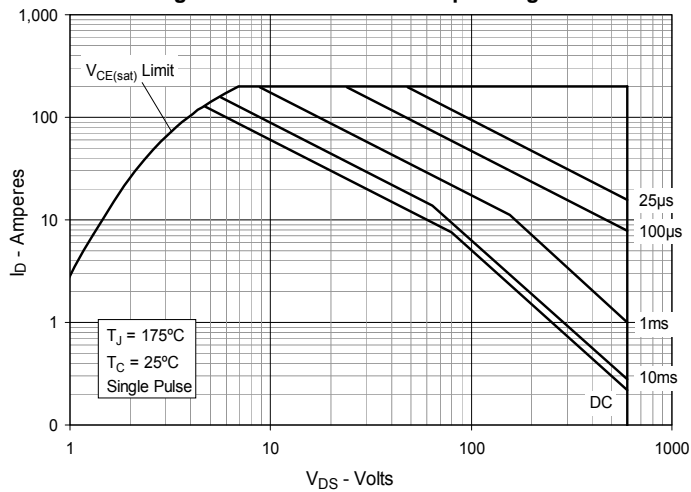


Fig. 12. Maximum Transient Thermal Impedance

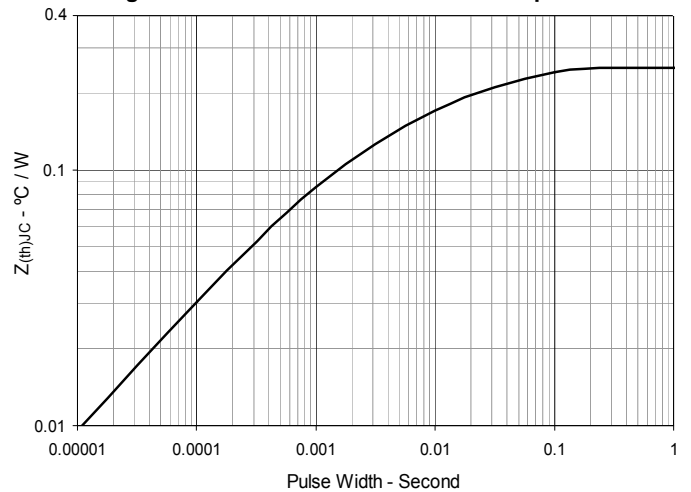


Fig. 13. Inductive Switching Energy Loss vs. Gate Resistance

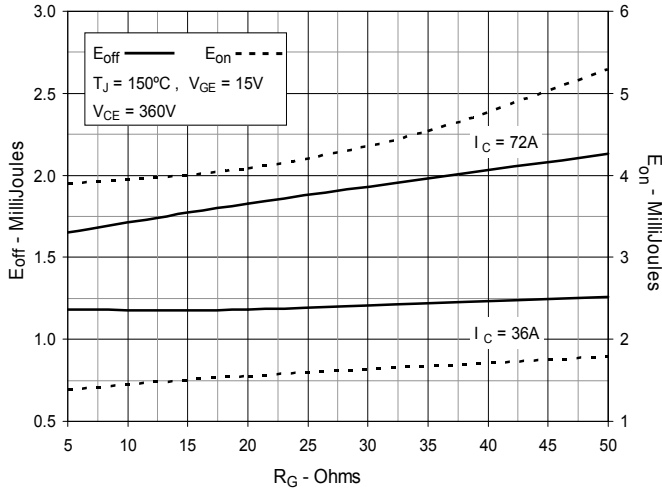


Fig. 14. Inductive Switching Energy Loss vs. Collector Current

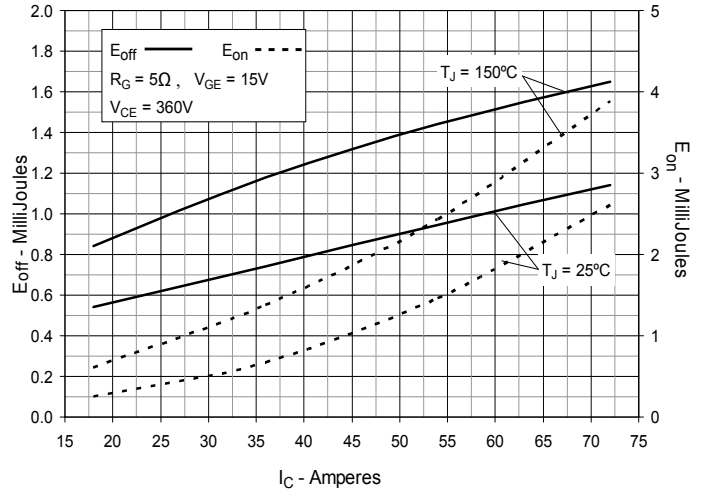


Fig. 15. Inductive Switching Energy Loss vs. Junction Temperature

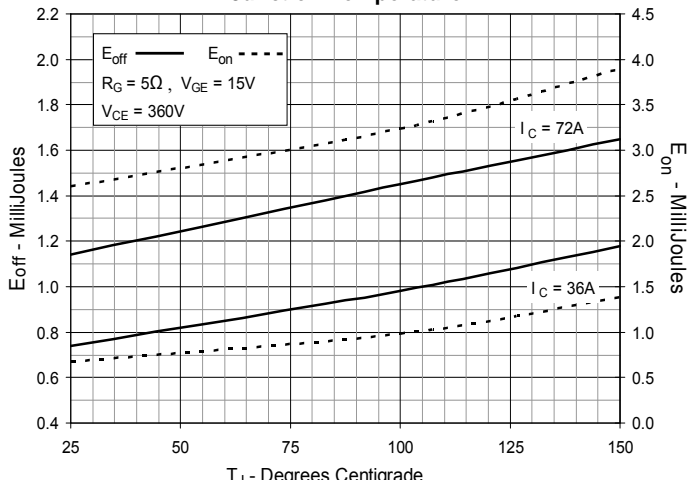


Fig. 16. Inductive Turn-off Switching Times vs. Gate Resistance

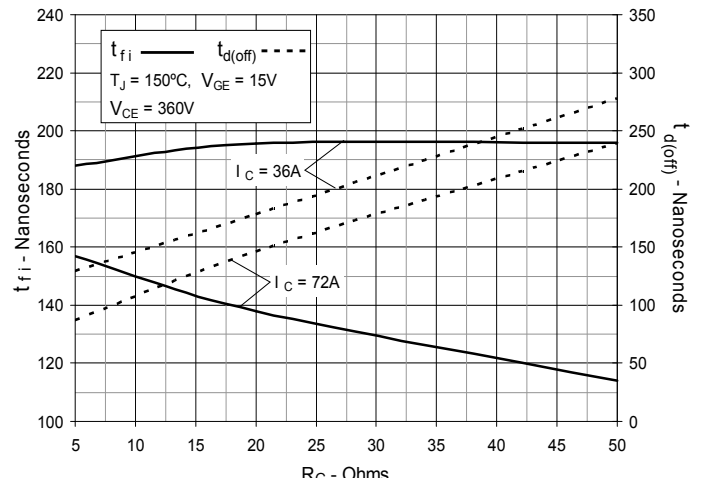


Fig. 17. Inductive Turn-off Switching Times vs. Collector Current

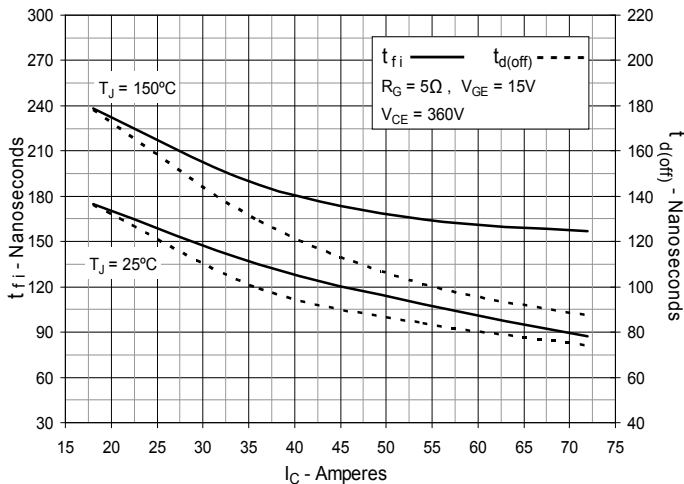


Fig. 18. Inductive Turn-off Switching Times vs. Junction Temperature

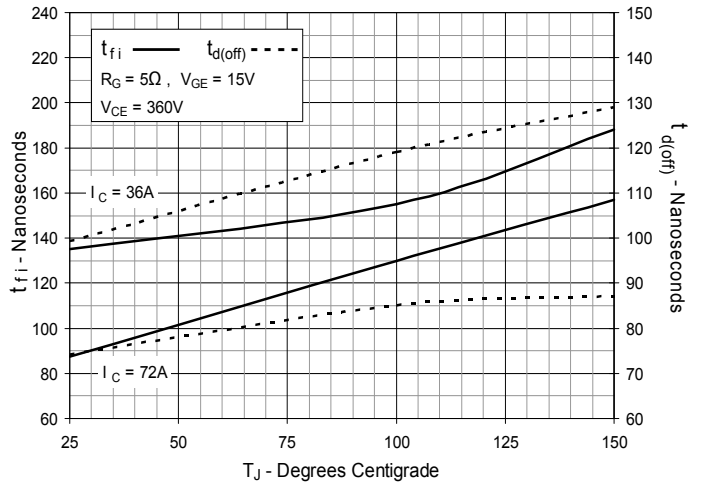


Fig. 19. Inductive Turn-on Switching Times vs. Gate Resistance

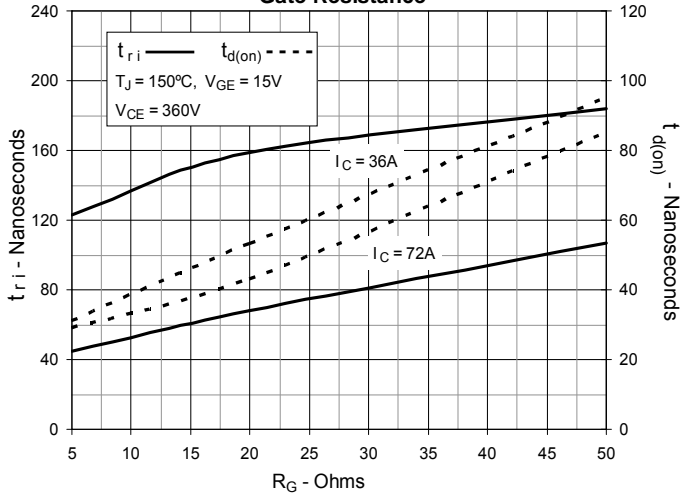


Fig. 20. Inductive Turn-on Switching Times vs. Collector Current

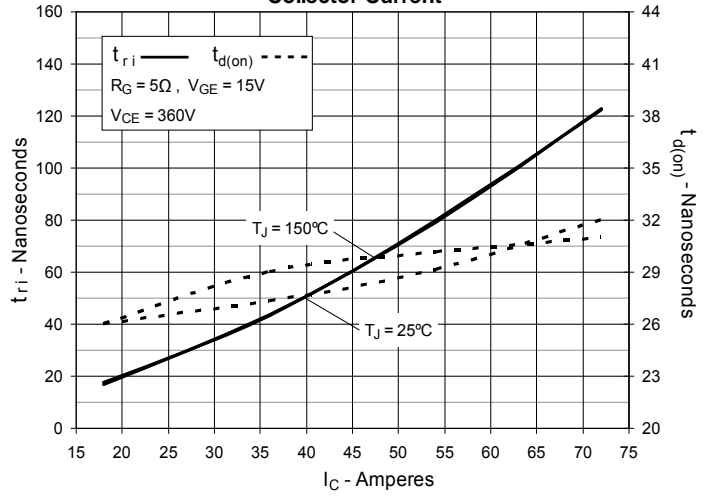
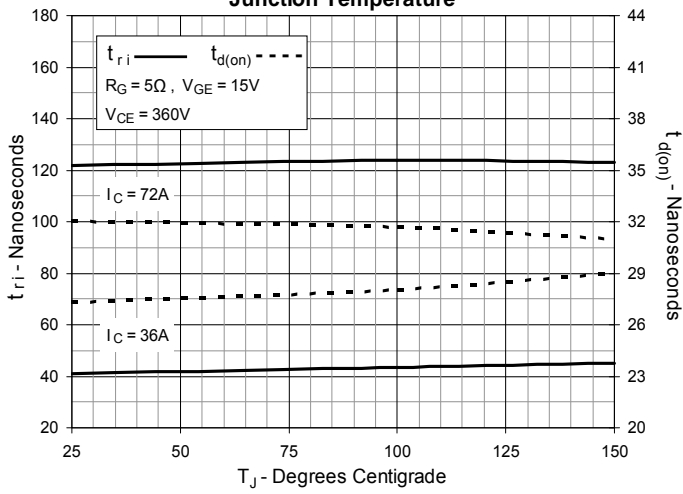


Fig. 21. Inductive Turn-on Switching Times vs. Junction Temperature





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