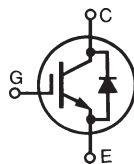


HiPerFAST™ IGBTs B2-Class High Speed w/ Diode

IXGA16N60B2D1
IXGP16N60B2D1
IXGH16N60B2D1

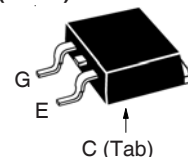
$V_{CES} = 600V$
 $I_{C110} = 16A$
 $V_{CE(sat)} \leq 1.95V$
 $t_{fi(typ)} = 70ns$



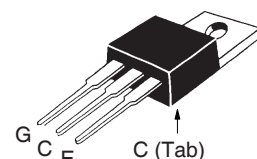
Symbol	Test Conditions	Maximum Ratings	
V_{CES}	$T_J = 25^{\circ}C$ to $150^{\circ}C$	600	V
V_{CGR}	$T_J = 25^{\circ}C$ to $150^{\circ}C$, $R_{GE} = 1M\Omega$	600	V
V_{GES}	Continuous	± 20	V
V_{GEM}	Transient	± 30	V
I_{C25}	$T_C = 25^{\circ}C$ (Chip Capability)	40	A
I_{C110}	$T_C = 110^{\circ}C$	16	A
I_{F110}	$T_C = 110^{\circ}C$	11	A
I_{CM}	$T_C = 25^{\circ}C$, 1ms	100	A
SSOA (RBSOA)	$V_{GE} = 15V$, $T_J = 125^{\circ}C$, $R_G = 22\Omega$ Clamped Inductive load	$I_{CM} = 32$ $V_{CE} \leq V_{CES}$	A
P_C	$T_C = 25^{\circ}C$	150	W
T_J		-55 ... +150	$^{\circ}C$
T_{JM}		150	$^{\circ}C$
T_{stg}		-55 ... +150	$^{\circ}C$
M_d	Mounting Torque (TO-220 & TO-247)	1.13/10	Nm/lb.in.
F_C	Mounting Force (TO-263)	10..65 / 2.2..14.6	N/lb.
T_L	Maximum Lead Temperature for Soldering	300	$^{\circ}C$
T_{SOLD}	1.6mm (0.062 in.) from Case for 10s	260	$^{\circ}C$
Weight	TO-263	2.5	g
	TO-220	3.0	g
	TO-247	6.0	g

Symbol	Test Conditions ($T_J = 25^{\circ}C$, Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
$V_{GE(th)}$	$I_C = 250\mu A$, $V_{CE} = V_{GE}$	3.0		5.5 V
I_{CES}	$V_{CE} = V_{CES}$, $V_{GE} = 0V$ $T_J = 125^{\circ}C$			25 μA 1 mA
I_{GES}	$V_{CE} = 0V$, $V_{GE} = \pm 20V$			± 100 nA
$V_{CE(sat)}$	$I_C = 12A$, $V_{GE} = 15V$, Note1 $T_J = 125^{\circ}C$		1.65	1.95 V V

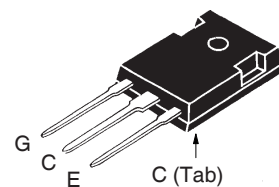
TO-263 AA (IXGA)



TO-220AB (IXGP)



TO-247 (IXGH)



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

Features

- Optimized for Low Conduction and Switching Losses
- Square RBSOA
- Anti-Parallel Ultra Fast Diode
- 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

Symbol	Test Conditions ($T_J = 25^\circ\text{C}$, Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
g_{fs}	$I_C = 12\text{A}$, $V_{CE} = 10\text{V}$, Note 1	8		S
C_{ies}	$V_{CE} = 25\text{V}$, $V_{GE} = 0\text{V}$, $f = 1\text{MHz}$		675	pF
C_{oes}			70	pF
C_{res}			20	pF
$Q_{g(on)}$	$I_C = 12\text{A}$, $V_{GE} = 15\text{V}$, $V_{CE} = 0.5 \cdot V_{CES}$		24	nC
Q_{ge}			5	nC
Q_{gc}			13	nC
$t_{d(on)}$	Inductive load, $T_J = 25^\circ\text{C}$ $I_C = 12\text{A}$, $V_{GE} = 15\text{V}$ $V_{CE} = 400\text{V}$, $R_G = 22\Omega$ Note 2		18	ns
t_{ri}			20	ns
E_{on}			0.16	mJ
$t_{d(off)}$			73	ns
t_{fi}			70	ns
E_{off}			0.12	0.22 mJ
$t_{d(on)}$	Inductive load, $T_J = 125^\circ\text{C}$ $I_C = 12\text{A}$, $V_{GE} = 15\text{V}$ $V_{CE} = 400\text{V}$, $R_G = 22\Omega$ Note 2		17	ns
t_{ri}			20	ns
E_{on}			0.26	mJ
$t_{d(off)}$			140	ns
t_{fi}			125	ns
E_{off}			0.38	mJ
R_{thJC}	TO-220 TO-247			0.83 $^\circ\text{C/W}$
R_{thCK}			0.50 0.21	$^\circ\text{C/W}$ $^\circ\text{C/W}$

Reverse Diode (FRED)

Symbol	Test Conditions ($T_J = 25^\circ\text{C}$, Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
V_F	$I_F = 10\text{A}$, $V_{GE} = 0\text{V}$, Note 1 $T_J = 125^\circ\text{C}$		1.7	3.0 V V
I_{RM}	$I_F = 12\text{A}$, $V_{GE} = 0\text{V}$, $-di_F/dt = 100\text{A}/\mu\text{s}$, $V_R = 100\text{V}$, $T_J = 125^\circ\text{C}$		2.5	A
t_{rr}			110	ns
t_{rr}	$I_F = 1\text{A}$, $V_{GE} = 0\text{V}$, $-di_F/dt = 100\text{A}/\mu\text{s}$, $V_R = 30\text{V}$		30	ns
R_{thJC}				2.5 $^\circ\text{C/W}$

Notes:

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

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	

1. Gate
2. Collector
3. Emitter
4. Collector

Bottom Side

Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	4.06	4.83	.160	.190
b	0.51	0.99	.020	.039
b2	1.14	1.40	.045	.055
c	0.40	0.74	.016	.029
c2	1.14	1.40	.045	.055
D	8.64	9.65	.340	.380
D1	8.00	8.89	.380	.320
E	9.65	10.41	.380	.405
E1	6.22	8.13	.270	.320
e	2.54	BSC	.100	BSC
L	14.61	15.88	.575	.625
L1	2.29	2.79	.090	.110
L2	1.02	1.40	.040	.055
L3	1.27	1.78	.050	.070
L4	0	0.13	0	.005

Technical drawing of a three-needle sewing machine foot. The drawing includes a side view (left) and a top view (right). The side view shows the foot's profile with dimensions: B (width at the top), E (width of the foot body), A (width of the needle holder), Q (height of the needle holder), D (total height), L (total length), L_1 (length of the foot body), and C (width of the needle holder). The top view shows the foot's base with dimensions: D (width), A (width of the needle holder), H_1 (height of the needle holder), L (total length), L_1 (length of the foot body), C (width of the needle holder), b (width of the needle holder), b_1 (width of the needle holder), and J_1 (width of the needle holder). The drawing also includes labels for the foot type: $\Phi k M C I A (S)$ and $\Phi k M C I A (S)$.

Pins: 1 - Gate 2 - Collector
3 - Emitter

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
ØP	.139	.161	3.53	4.08
O	.100	.125	2.54	3.18

1 = Gate
2 = Collector

SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.185	.209	4.7	5.3
A ₁	.087	.102	2.2	2.54
A ₂	.059	.098	2.2	2.6
b	.040	.055	1.0	1.4
b ₁	.065	.084	1.65	2.13
b ₂	.113	.123	2.87	3.12
C	.016	.031	.4	.8
D	.819	.845	20.80	21.46
E	.610	.640	15.75	16.26
e	.215	BSC	5.45	BSC
L	.780	.800	19.81	20.32
L ₁		.177		4.50
ØP	.140	.144	3.55	3.65
Q	.212	.244	5.4	6.2
R	.170	.216	4.32	5.49
S	.242	BSC	6.15	BSC

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

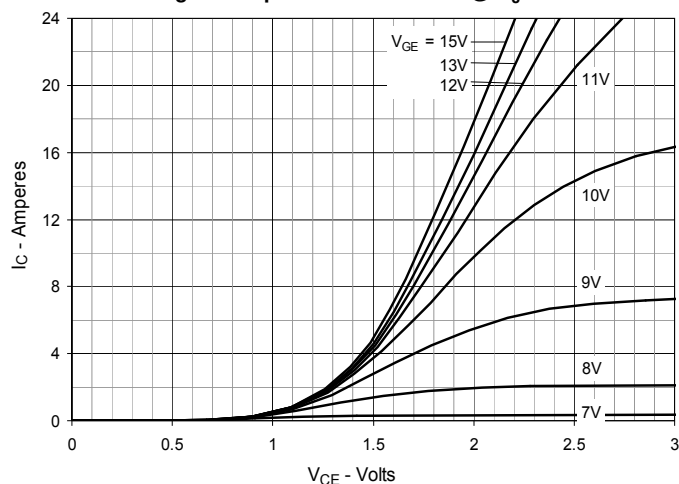


Fig. 2. Extended Output Characteristics @ $T_J = 25^\circ\text{C}$

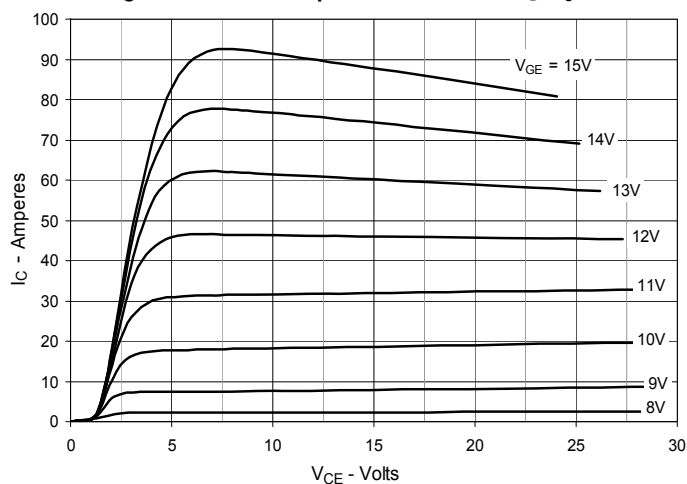


Fig. 3. Output Characteristics @ $T_J = 125^\circ\text{C}$

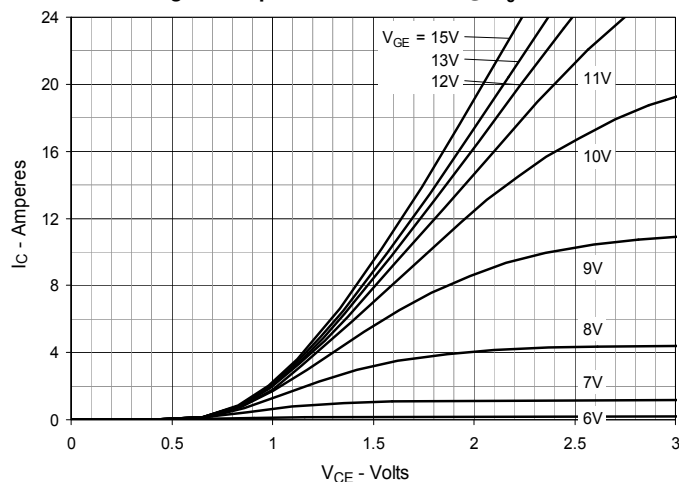


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

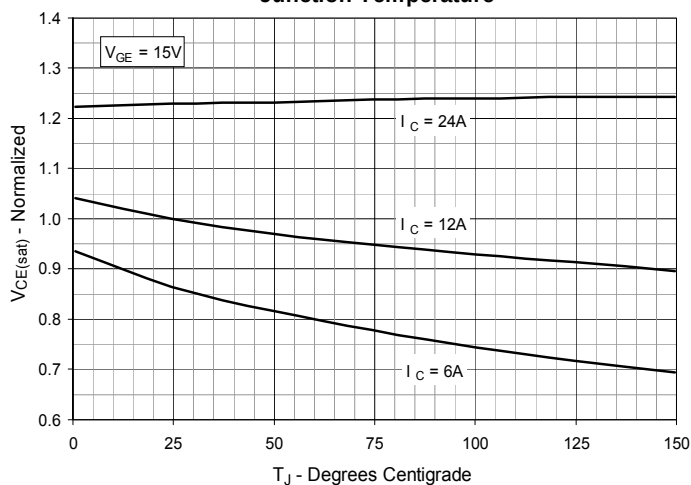


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

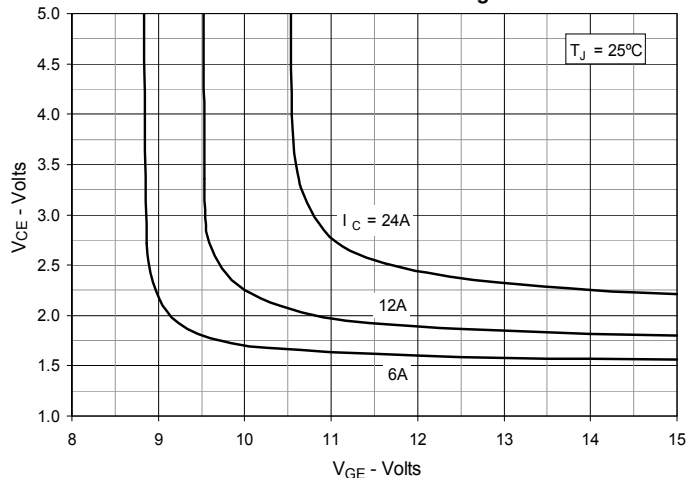


Fig. 6. Input Admittance

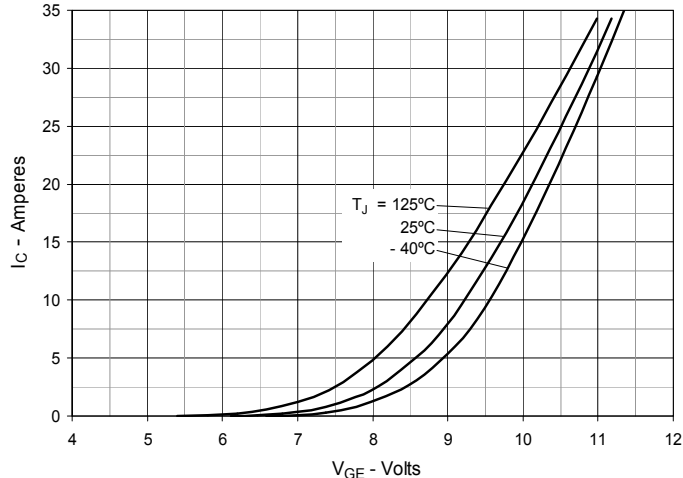


Fig. 7. Transconductance

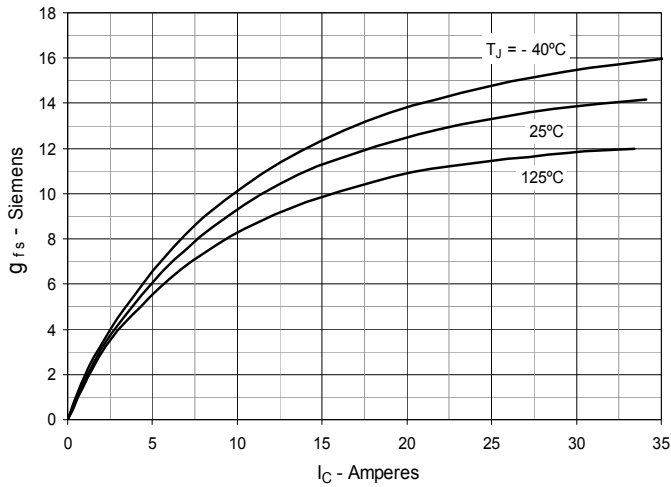


Fig. 8. Gate Charge

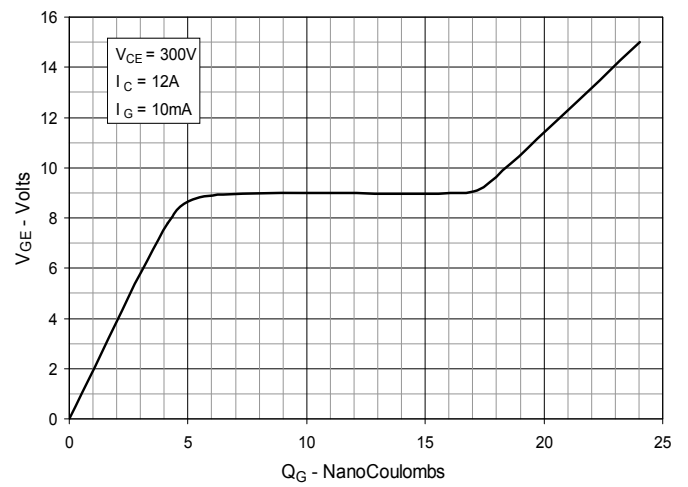


Fig. 9. Capacitance

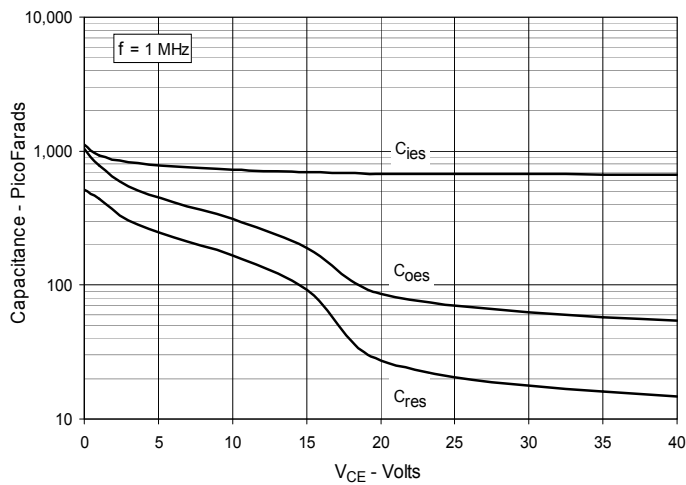


Fig. 10. Reverse-Bias Safe Operating Area

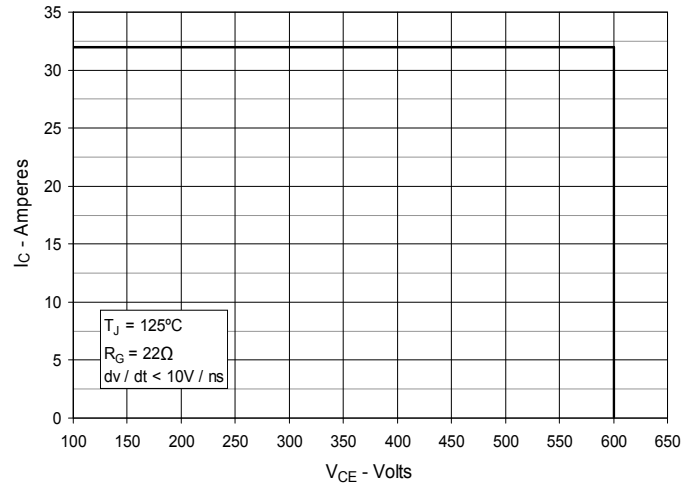


Fig. 11. Maximum Transient Thermal Impedance

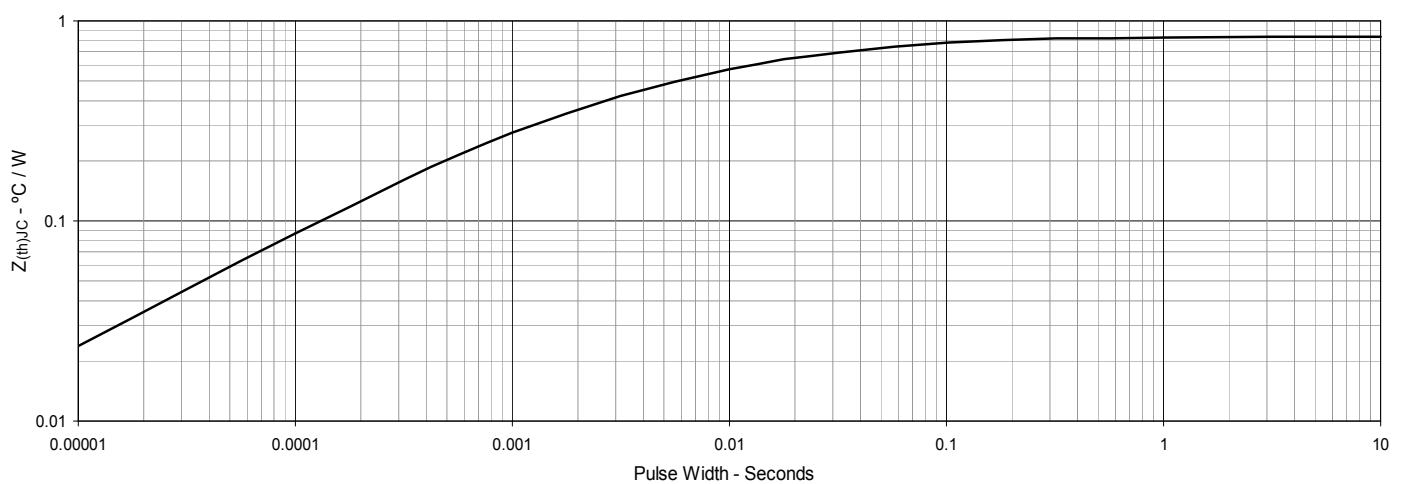


Fig. 12. Inductive Switching Energy Loss vs. Gate Resistance

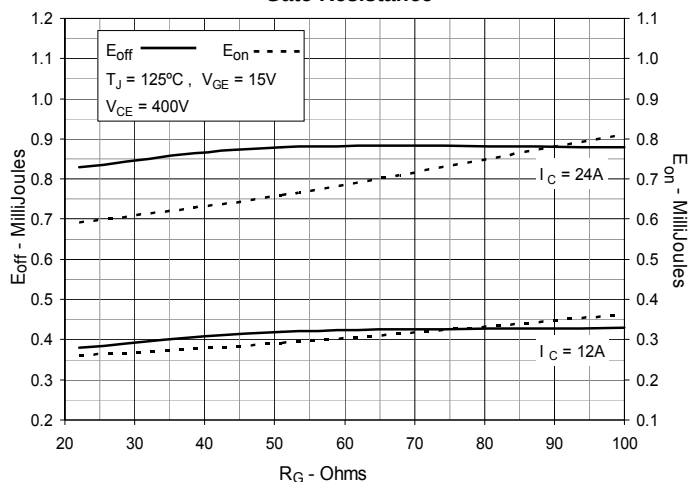


Fig. 13. Inductive Switching Energy Loss vs. Collector Current

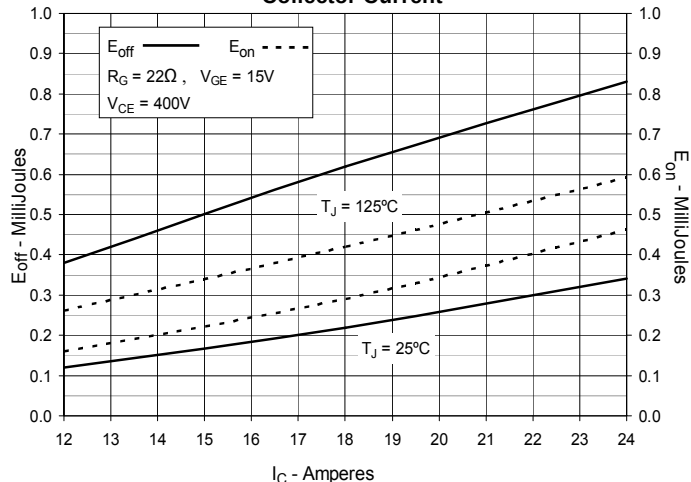


Fig. 14. Inductive Switching Energy Loss vs. Junction Temperature

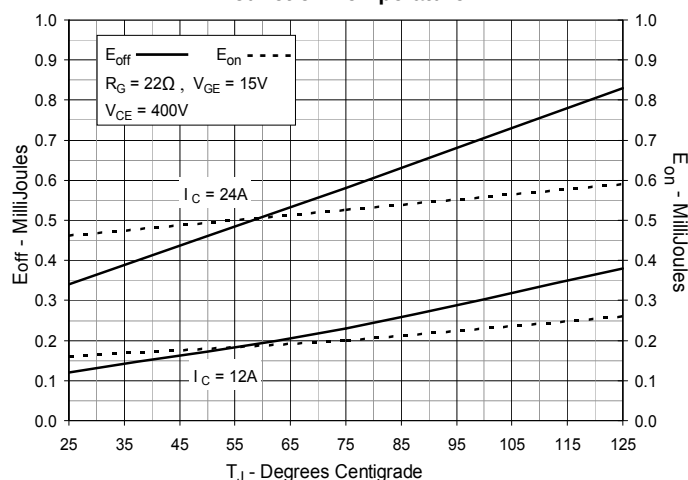


Fig. 15. Inductive Turn-off Switching Times vs. Gate Resistance

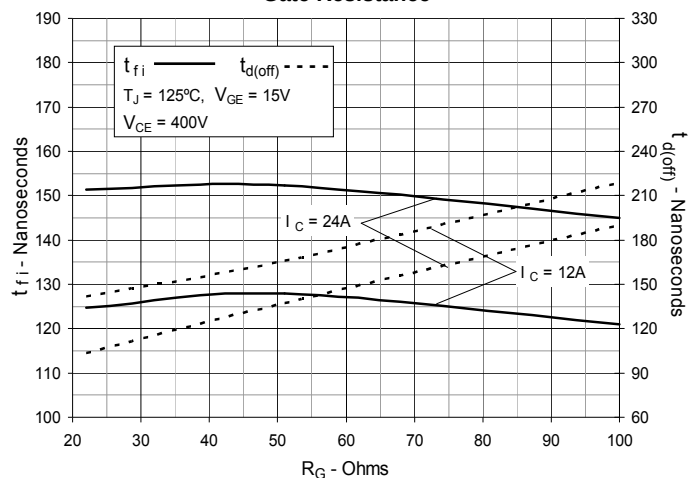


Fig. 16. Inductive Turn-off Switching Times vs. Collector Current

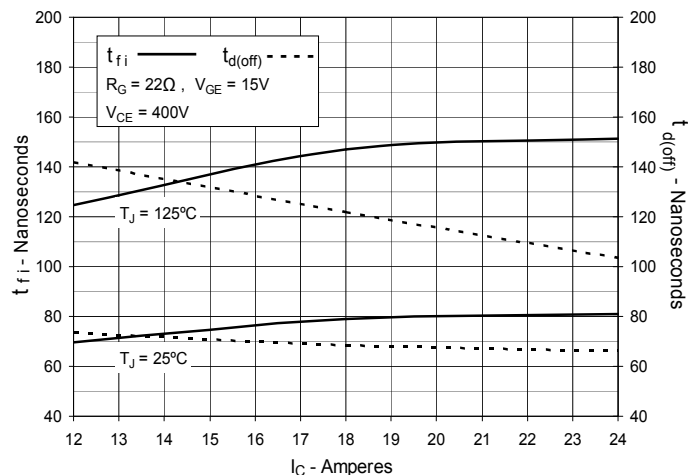


Fig. 17. Inductive Turn-off Switching Times vs. Junction Temperature

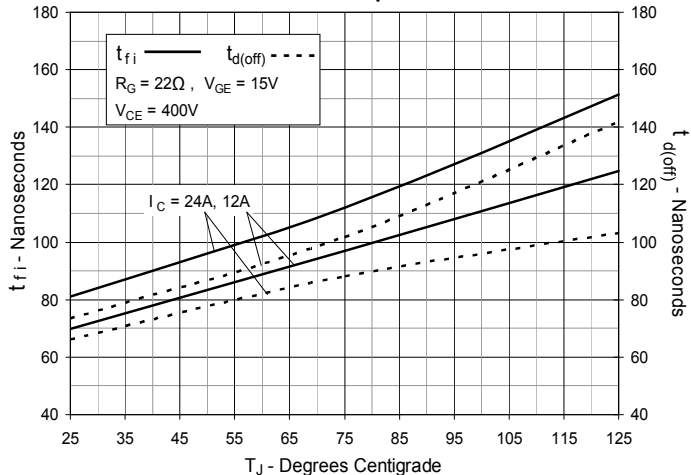


Fig. 18. Inductive Turn-on Switching Times vs. Gate Resistance

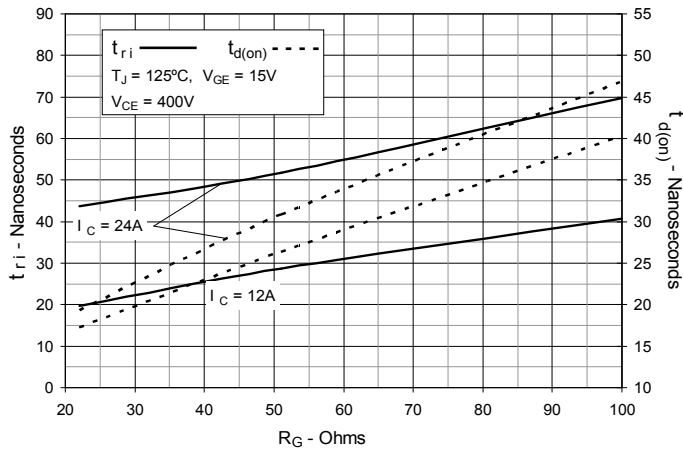


Fig. 19. Inductive Turn-on Switching Times vs. Collector Current

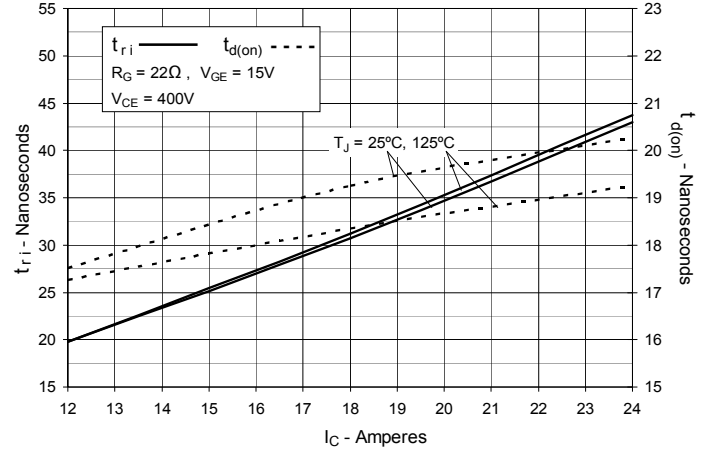


Fig. 20. Inductive Turn-on Switching Times vs. Junction Temperature

