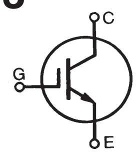
IXYS

Preliminary Technical Information

GenX3™ 1200V IGBT

IXGA24N120C3
IXGH24N120C3
IXGP24N120C3

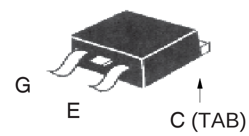
High speed PT IGBTs for 10-50kHz Switching



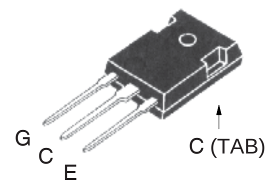
V_{CES} = 1200V
I_{C25} = 48A
$V_{CE(sat)}$ ≤ 4.2V
$t_{fi(typ)}$ = 110ns

Symbol	Test Conditions	Maximum Ratings	
V_{CES}	T_J = 25°C to 150°C	1200	V
V_{CGR}	T_J = 25°C to 150°C, R_{GE} = 1MΩ	1200	V
V_{GES}	Continuous	±20	V
V_{GEM}	Transient	±30	V
I_{C25}	T_C = 25°C	48	A
I_{C100}	T_C = 100°C	24	A
I_{CM}	T_C = 25°C, 1ms	96	A
I_A	T_C = 25°C	20	A
E_{AS}	T_C = 25°C	250	mJ
SSOA (RBSOA)	V_{GE}= 15V, T_J = 125°C, R_G = 5Ω Clamped inductive load @V_{CE} ≤ 1200V	I_{CM} = 48	A
P_C	T_C = 25°C	250	W
T_J		-55 ... +150	°C
T_{JM}		150	°C
T_{stg}		-55 ... +150	°C
M_d	Mounting torque	1.13/10	Nm/lb.in.
T_L	Maximum lead temperature for soldering	300	°C
T_{SOLD}	1.6mm (0.062 in.) from case for 10s	260	°C
Weight	TO-263	2.5	g
	TO-247	6.0	g
	TO-220	3.0	g

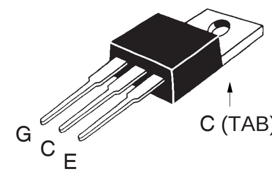
TO-263 (IXGA)



TO-247 (IXGH)



TO-220 (IXGP)



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

Symbol	Test Conditions (T_J = 25°C, unless otherwise specified)		Characteristic Values Min.	Typ.	Max.	
BV_{CES}	I_C = 250µA, V_{GE} = 0V		1200			V
$V_{GE(th)}$	I_C = 250µA, V_{CE} = V_{GE}		2.5		5.0	V
I_{CES}	V_{CE} = V_{CES}				100	µA
	V_{GE} = 0V	T_J = 125°C			1.5	mA
I_{GES}	V_{CE} = 0V, V_{GE} = ±20V				±100	nA
$V_{CE(sat)}$	I_C = 20A, V_{GE} = 15V, Note 2			3.6	4.2	V
		T_J = 125°C		3.1		V

Features

- International standard packages: JEDEC TO-247AD
- MOS Gate turn-on
  - drive simplicity
- Avalanche rated

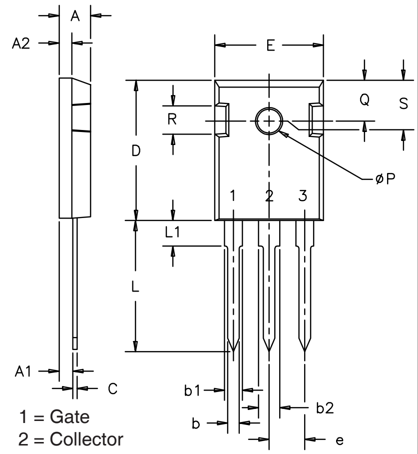
Applications

- AC motor speed control
- DC servo and robot drives
- DC choppers
- Uninterruptible power supplies (UPS)
- Switch-mode and resonant-mode power supplies

Symbol	Test Conditions (T_J = 25°C, unless otherwise specified)	Characteristic Values Min.	Typ.	Max.	
g_{fs}	I_C = 24A, V_{CE} = 10V, Note 2	10	17		S
C_{ies}	V_{CE} = 25V, V_{GE} = 0V, f = 1MHz		1900		pF
C_{oes}			125		pF
C_{res}			52		pF
Q_g	I_C = 24A, V_{GE} = 15V, V_{CE} = 0.5 • V_{CES}		79		nC
Q_{ge}			12		nC
Q_{gc}			36		nC
$t_{d(on)}$	**Inductive load, T_J = 25°C**		16		ns
t_{ri}	I_C = 20A, V_{GE} = 15V		27		ns
E_{on}	V_{CE} = 600V, R_G = 5Ω		1.16		mJ
$t_{d(off)}$	Note 1		93		ns
t_{fi}			110		ns
E_{off}			0.47	0.85	mJ
$t_{d(on)}$	**Inductive load, T_J = 125°C**		16		ns
t_{ri}	I_C = 20A, V_{GE} = 15V		35		ns
E_{on}	V_{CE} = 600V, R_G = 5Ω		2.18		mJ
$t_{d(off)}$	Note 1		125		ns
t_{fi}			305		ns
E_{off}			1.18	2.00	mJ
R_{thJC}				0.50	°C/W
R_{thCK}	TO-220		0.50		°C/W
	TO-247		0.21		°C/W

Notes: 1. Switching times may increase for V_{CE} (Clamp) > 0.8 • V_{CES}, higher T_J or increased R_G.
2. Pulse test, t ≤ 300μs; duty cycle, d ≤ 2%.

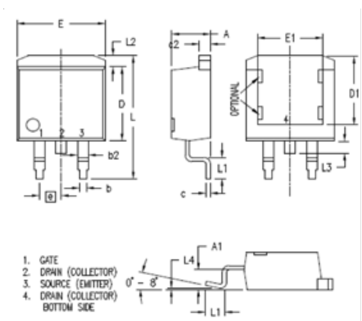
TO-247 (IXGH) AD Outline



1 = Gate
2 = Collector
3 = Emitter
Tab = Collector

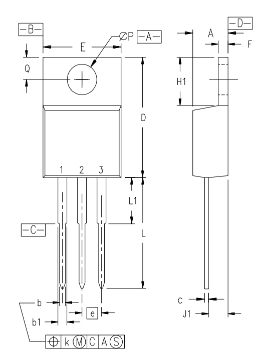
SYM	INCHES MIN	INCHES MAX	MILLIMETERS MIN	MILLIMETERS MAX
A	.185	.209	4.7	5.3
A_1	.087	.102	2.2	2.54
A_2	.059	.098	2.2	2.6
b	.040	.055	1.0	1.4
b_1	.065	.084	1.65	2.13
b_2	.113	.123	2.87	3.12
C	.016	.031	.4	.8
D	.819	.845	20.80	21.46
E	.610	.640	15.75	16.26
e	.215 BSC		5.45 BSC	
L	.780	.800	19.81	20.32
L1		.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	

TO-263 (IXGA) Outline



SYM	INCHES MIN	INCHES MAX	MILLIMETERS MIN	MILLIMETERS 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	INCHES MAX	MILLIMETERS MIN	MILLIMETERS 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
Q	.100	.125	2.54	3.18

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.

Fig. 1. Output Characteristics @ 25ºC

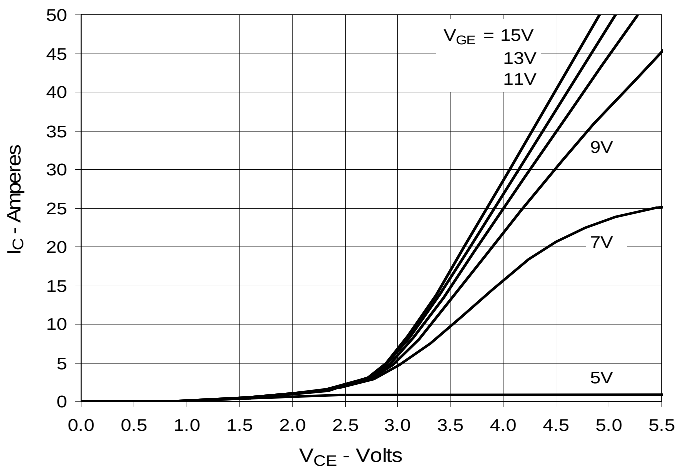


Fig. 2. Extended Output Characteristics @ 25ºC

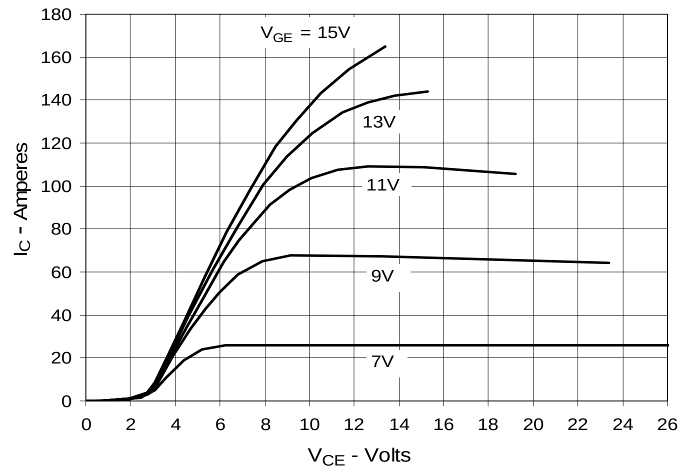


Fig. 3. Output Characteristics @ 125ºC

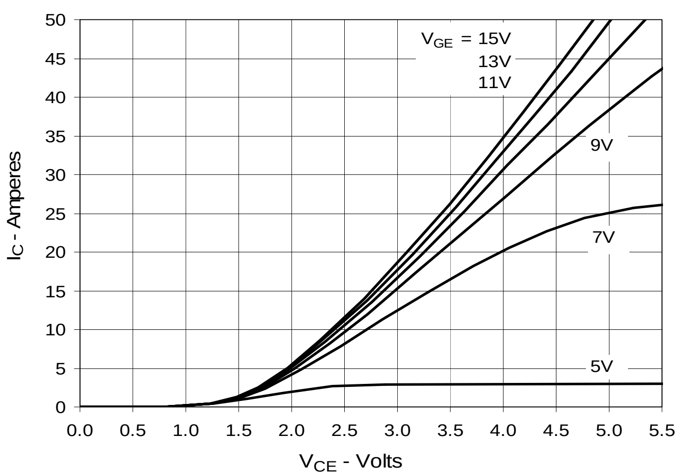


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

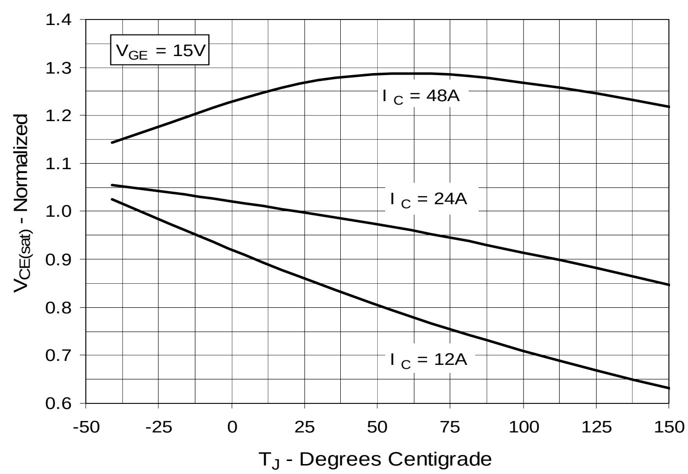


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

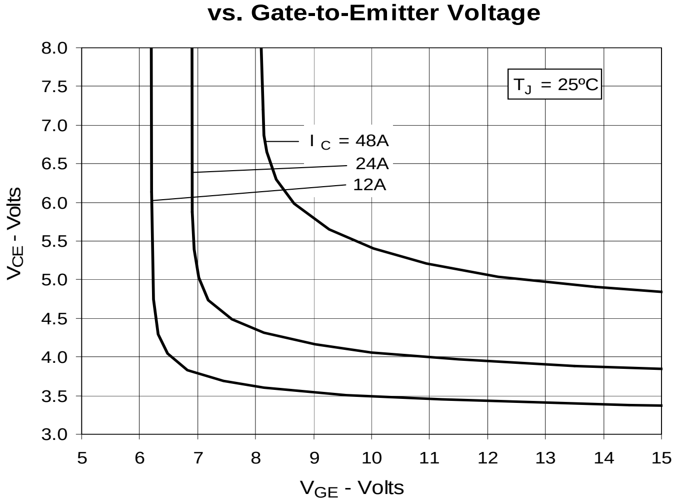


Fig. 6. Input Admittance

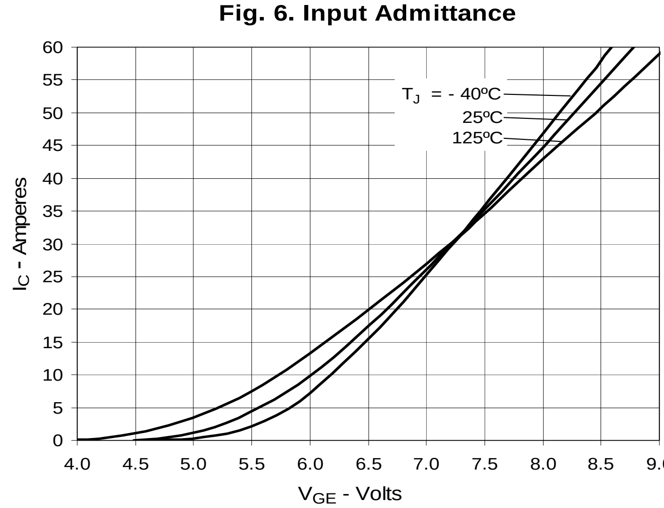


Fig. 7. Transconductance

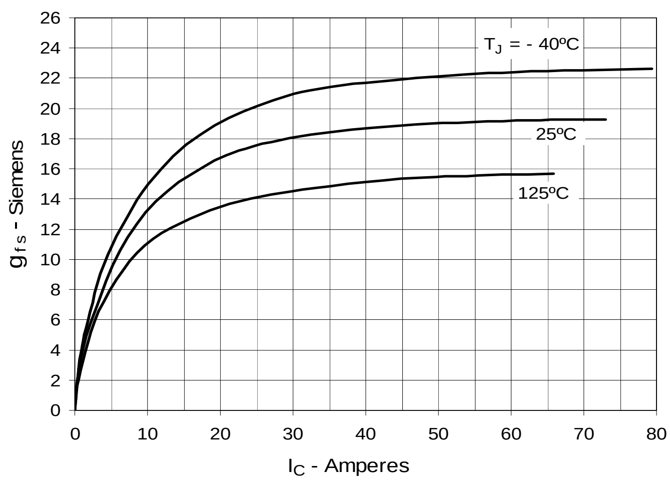


Fig. 8. Gate Charge

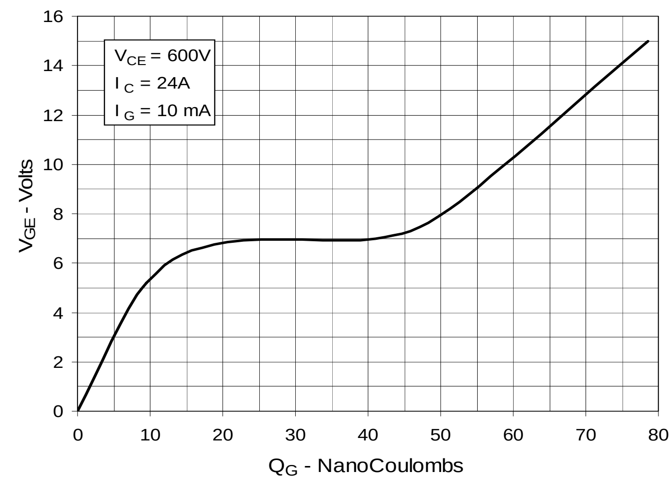


Fig. 9. Capacitance

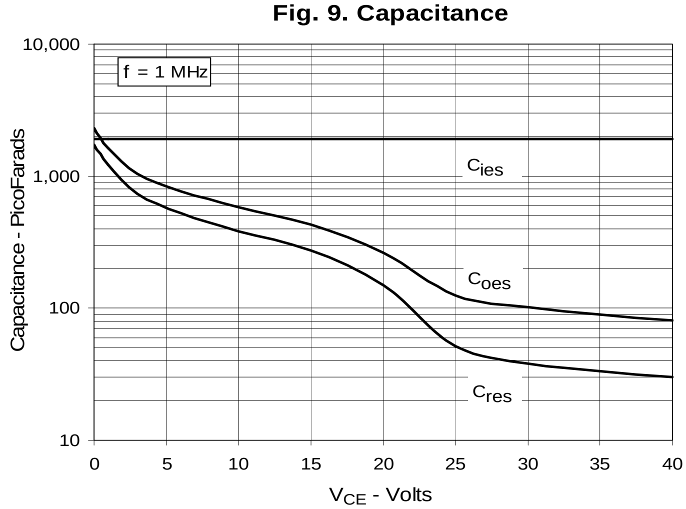


Fig. 10. Reverse-Bias Safe Operating Area

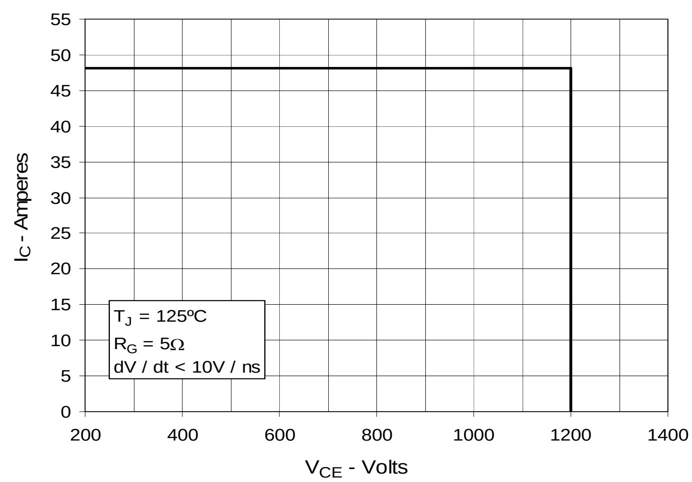
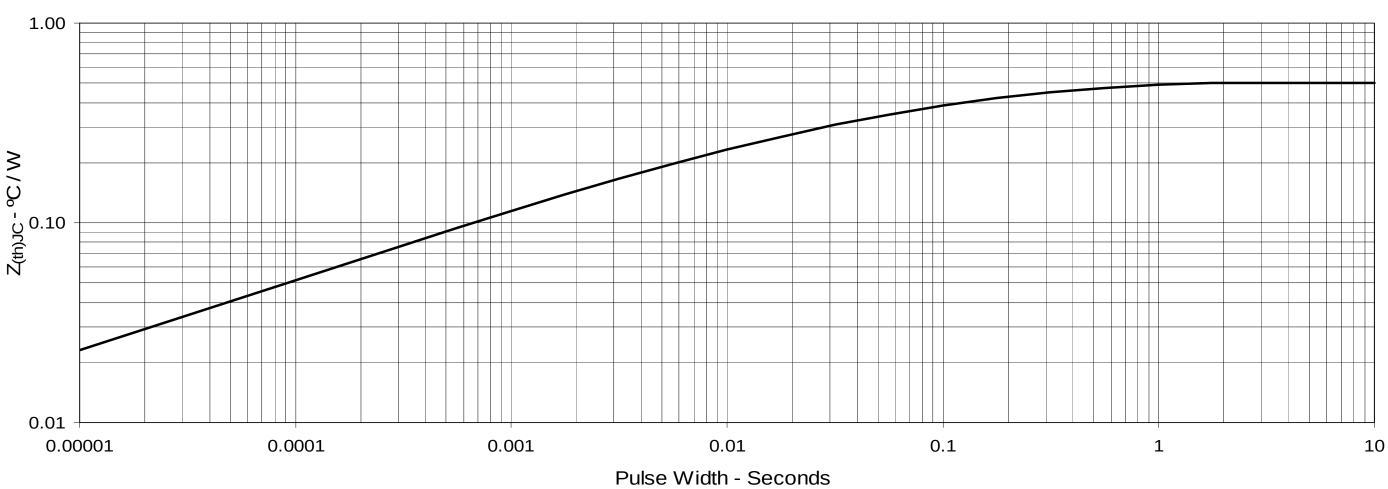


Fig. 11. Maximum Transient Thermal Impedance



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

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

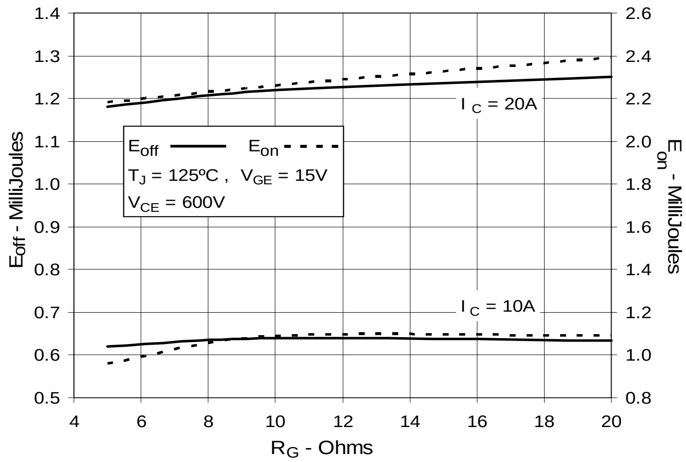


Fig. 13. Inductive Switching Energy Loss vs. Collector Current

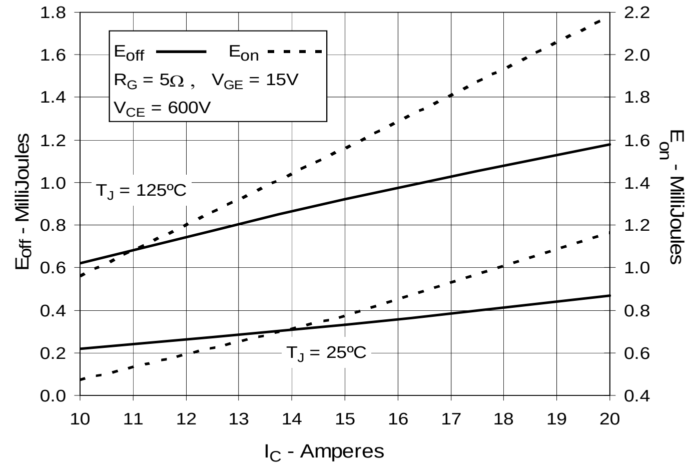


Fig. 14. Inductive Switching Energy Loss vs. Junction Temperature

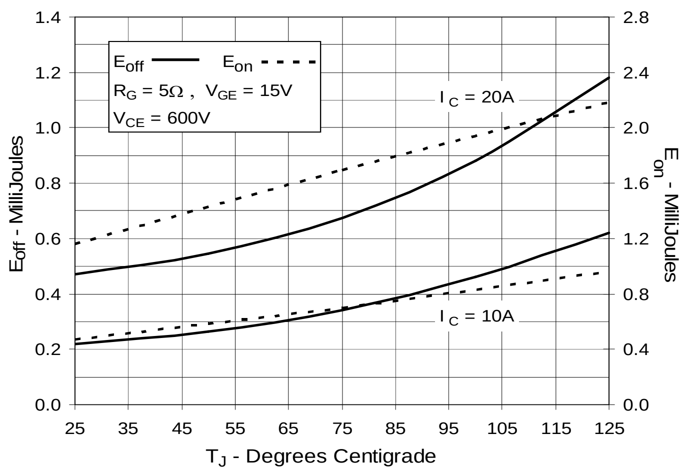


Fig. 15. Inductive Turn-off Switching Times vs. Gate Resistance

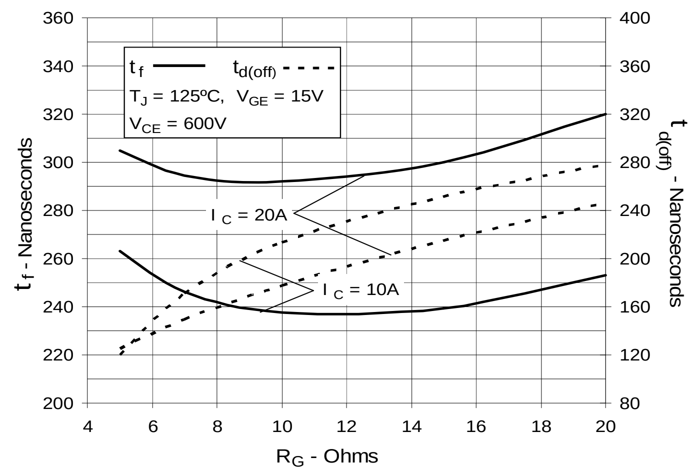


Fig. 16. Inductive Turn-off Switching Times vs. Collector Current

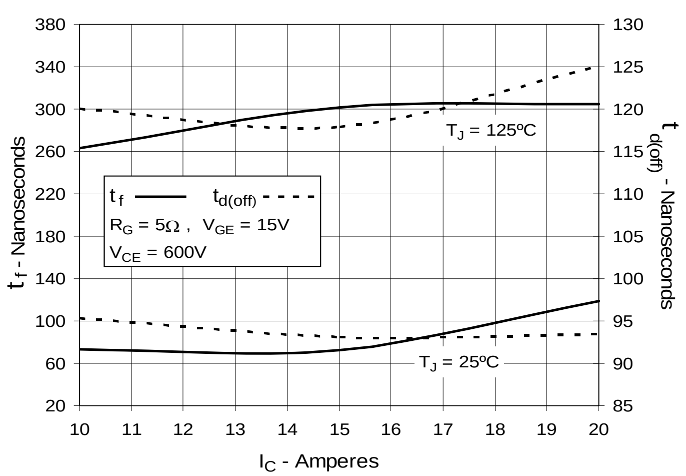


Fig. 17. Inductive Turn-off Switching Times vs. Junction Temperature

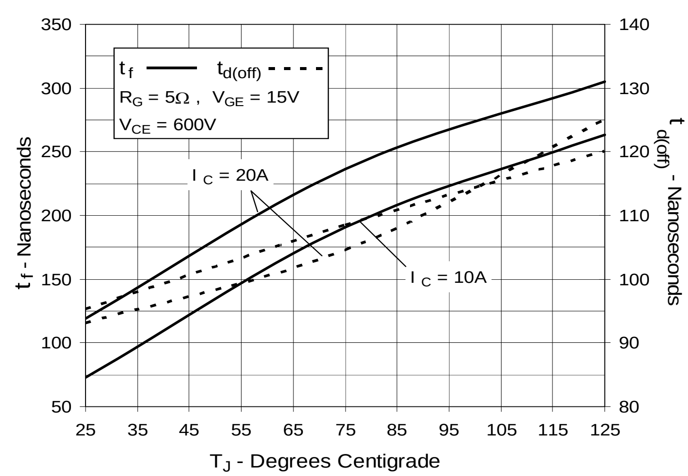


Fig. 18. Inductive Turn-on Switching Times vs. Gate Resistance

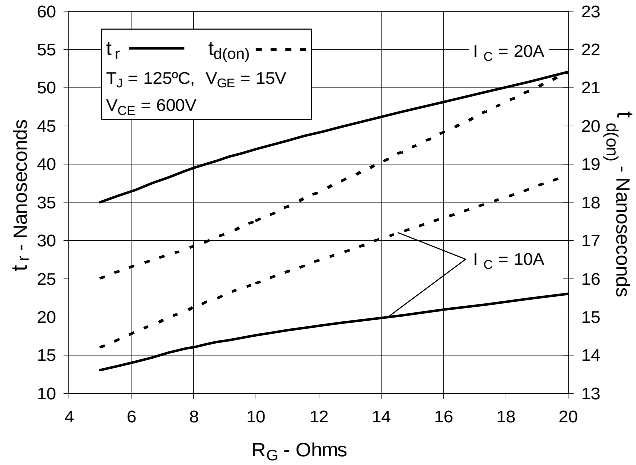


Fig. 19. Inductive Turn-on Switching Times vs. Collector Current

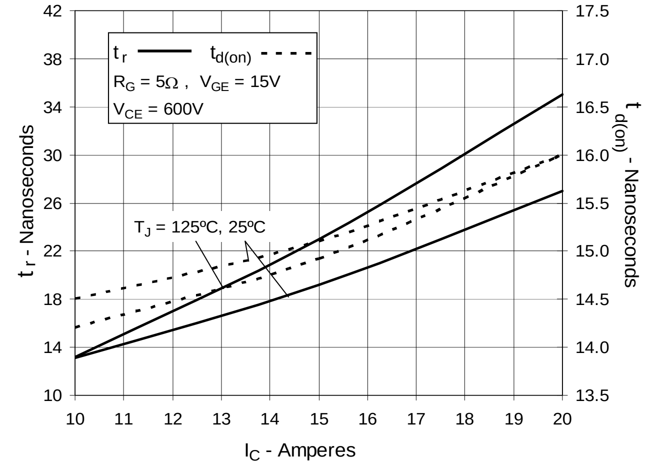


Fig. 20. Inductive Turn-on Switching Times vs. Junction Temperature