

High Voltage IGBT Low $V_{CE(sat)}$

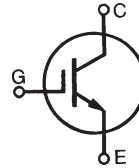
IXGH 40N120A2 IXGT 40N120A2

$$V_{CES} = 1200 \text{ V}$$

$$I_{C25} = 75 \text{ A}$$

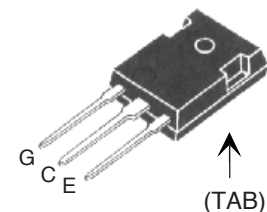
$$V_{CE(sat)} \leq 2.0 \text{ V}$$

Preliminary Data Sheet

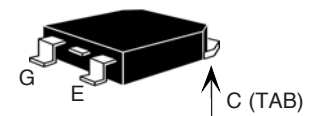


Symbol	Test Conditions	Maximum Ratings	
V_{CES}	$T_J = 25^\circ\text{C}$ to 150°C	1200	V
V_{CES}	$T_J = 25^\circ\text{C}$ to 150°C	1200	V
V_{GES}	Continuous	± 20	V
V_{GEM}	Transient	± 30	V
I_{C25}	$T_C = 25^\circ\text{C}$, IGBT chip capability	75	A
I_{C110}	$T_C = 110^\circ\text{C}$	40	A
I_{CM}	$T_J \leq 150^\circ\text{C}$, $t_p < 300 \mu\text{s}$	160	A
SSOA	$V_{GE} = 15 \text{ V}$, $T_{VJ} = 150^\circ\text{C}$, $R_G = 5 \Omega$	$I_{CM} = 80$	A
(RBSOA)	Clamped inductive load, $V_{CE} < 960 \text{ V}$		
P_C	$T_C = 25^\circ\text{C}$	360	W
T_J		-55 ... +150	$^\circ\text{C}$
T_{JM}		150	$^\circ\text{C}$
T_{stg}		-55 ... +150	$^\circ\text{C}$
T_L	Maximum lead temperature for soldering 1.6 mm (0.062 in.) from case for 10 seconds	300	$^\circ\text{C}$
T_{SOLD}	Plastic body for 10 seconds	260	$^\circ\text{C}$
M_d	Mounting torque (ixgh)	1.3/10	Nm/lb.in.
Weight	(IXGH)	6.0	g
	(IXGT)	4.0	g

TO-247 (IXFH)



TO-268 (IXGT)



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

Features

- International standard packages
- Low $V_{CE(sat)}$
 - for minimum on-state conduction losses
- MOS Gate turn-on
 - drive simplicity

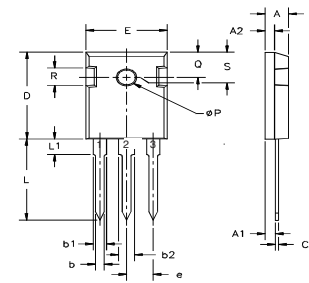
Applications

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

Symbol	Test Conditions ($T_J = 25^\circ\text{C}$ unless otherwise specified)	Characteristic Values		
		Min.	Typ.	Max.
$V_{GE(th)}$	$I_C = 1 \text{ mA}$, $V_{GE} = 0 \text{ V}$	1200		V
$V_{GE(th)}$	$I_C = 250 \mu\text{A}$, $V_{CE} = V_{GE}$	3.0		5.0 V
I_{CES}	$V_{CE} = V_{CES}$ $V_{GE} = 0 \text{ V}$			50 μA 1 mA $T_J = 125^\circ\text{C}$
I_{GES}	$V_{CE} = 0 \text{ V}$, $V_{GE} = \pm 20 \text{ V}$			$\pm 100 \text{ nA}$
$V_{CE(sat)}$	$I_C = I_{C110}$, $V_{GE} = 15 \text{ V}$			2.0 V

Symbol	Test Conditions ($T_J = 25^\circ\text{C}$ unless otherwise specified)	Characteristic Values		
		Min.	Typ.	Max.
g_{fs}	$I_C = I_{C110}, V_{CE} = 10\text{ V}$	28	40	S
$I_{C(ON)}$	$V_{GE} = 10\text{ V}, V_{CE} = 10\text{ V}$		195	A
C_{ies}	$V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}, f = 1\text{ MHz}$		3150	pF
C_{oes}			165	pF
C_{res}			70	pF
Q_g	$I_C = I_{C110}, V_{GE} = 15\text{ V}, V_{CE} = 0.5 V_{CES}$		136	nC
Q_{ge}			19	nC
Q_{gc}			54	nC
$t_{d(on)}$	Inductive load, $T_J = 25^\circ\text{C}$		22	ns
t_{ri}	$I_C = I_{C110}, V_{GE} = 15\text{ V}$		41	ns
$t_{d(off)}$	$V_{CE} = 0.8 V_{CES}, R_G = 2\ \Omega$	420	800	ns
t_{fi}		800	1200	ns
E_{off}		15	25	mJ
$t_{d(on)}$	Inductive load, $T_J = 125^\circ\text{C}$		19	ns
t_{ri}	$I_C = I_{C110}, V_{GE} = 15\text{ V}$		36	ns
E_{on}	$V_{CE} = 0.8 V_{CES}, R_G = 2\ \Omega$		3.5	mJ
$t_{d(off)}$		730		ns
t_{fi}		1570		ns
E_{off}		35		mJ
R_{thJC}			0.35	K/W
R_{thCS}	(TO-247)		0.25	K/W

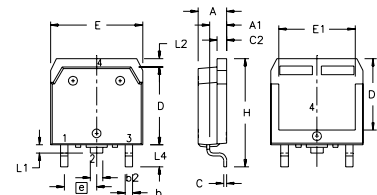
TO-247 AD Outline



Terminals: 1 - Gate 2 - Drain
3 - Source Tab - Drain

Dim.	Millimeter		Inches	
	Min.	Max.	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
L ₁		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-268 Outline (IXGT)



Terminals: 1 - Gate 2 - Drain
3 - Source Tab - Drain

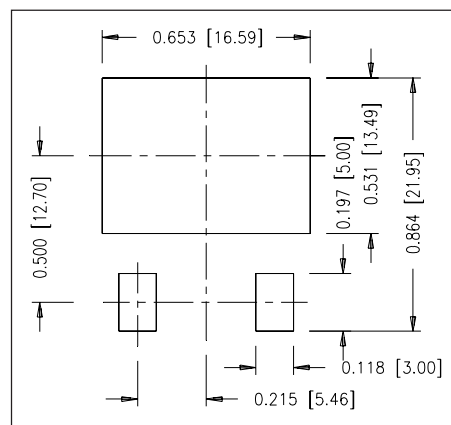
SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.193	.201	4.90	5.10
A ₁	.106	.114	2.70	2.90
A ₂	.001	.010	0.02	0.25
b	.045	.057	1.15	1.45
b ₂	.075	.083	1.90	2.10
C	.016	.026	0.40	0.65
C ₂	.057	.063	1.45	1.60
D	.543	.551	13.80	14.00
D ₁	.488	.500	12.40	12.70
E	.624	.632	15.85	16.05
E ₁	.524	.535	13.30	13.60
e		.215 BSC		5.45 BSC
H	.736	.752	18.70	19.10
L	.094	.106	2.40	2.70
L ₁	.047	.055	1.20	1.40
L ₂	.039	.045	1.00	1.15
L ₃		.010 BSC		0.25 BSC
L ₄	.150	.161	3.80	4.10

Note 1: Pulse test, $t \leq 300\ \mu\text{s}$, duty cycle $\leq 2\%$

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 subjective pre-production design evaluation. IXYS reserves the right to change limits, test conditions, and dimensions without notice.

TO-268: Min. Recommended Footprint



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

IXYS MOSFETs and IGBTs are covered by 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
one or more of the following U.S. patents: 4,850,072 5,017,508 5,063,307 5,381,025 6,259,123 B1 6,534,343 6,710,405B2 6,759,692
4,881,106 5,034,796 5,187,117 5,486,715 6,306,728 B1 6,583,505 6,710,463

Fig. 1. Output Characteristics
@ 25°C

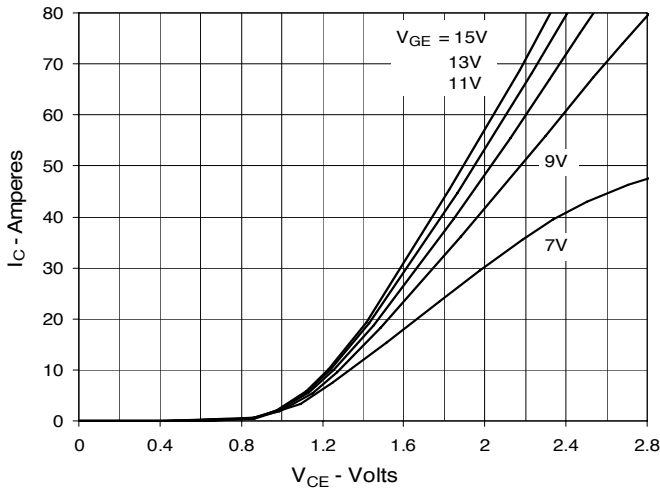


Fig. 2. Extended Output Characteristics
@ 25°C

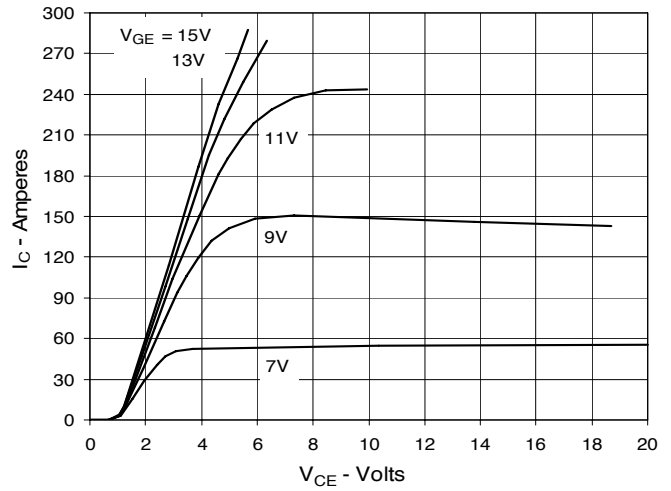


Fig. 3. Output Characteristics
@ 125°C

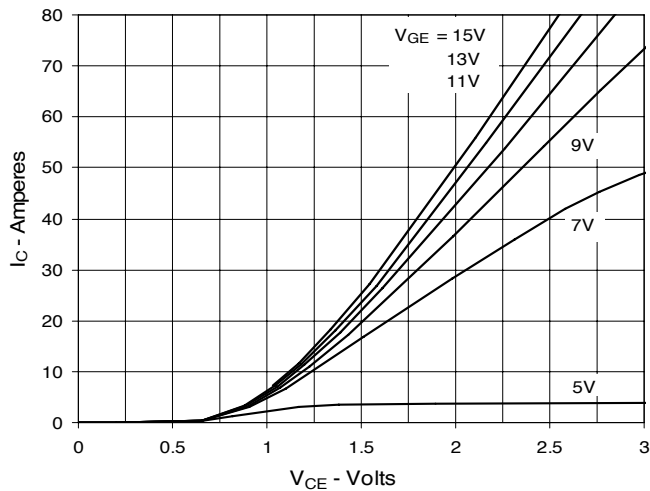


Fig. 4. Dependence of VCE(sat) on Junction Temperature

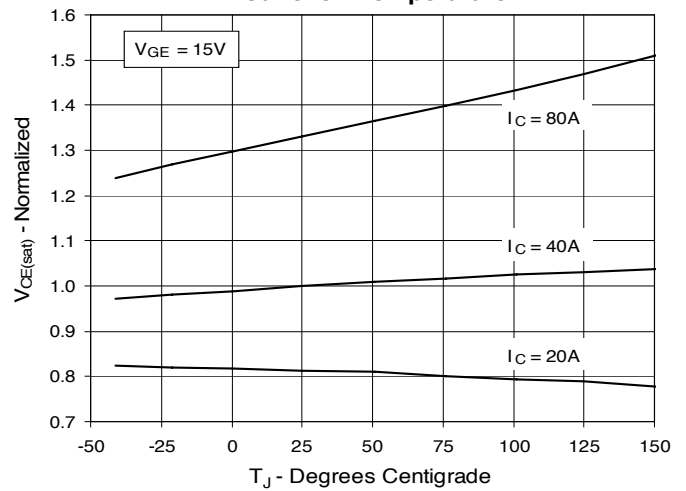


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

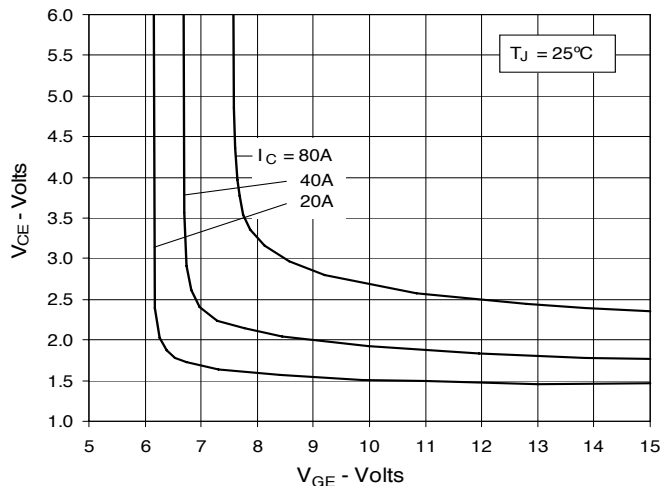


Fig. 6. Input Admittance

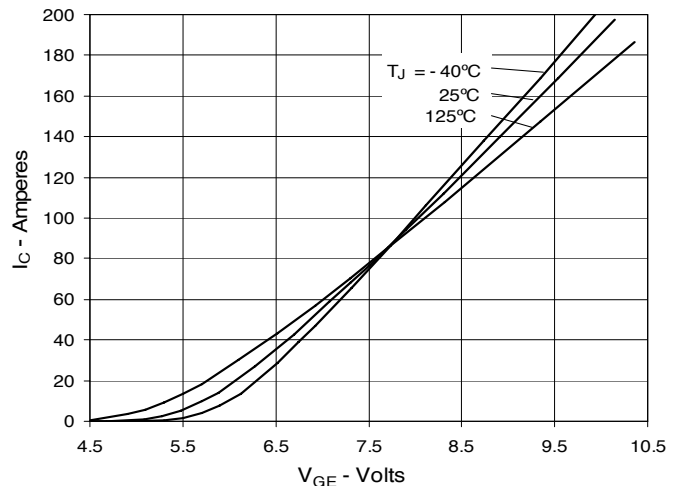


Fig. 7. Transconductance

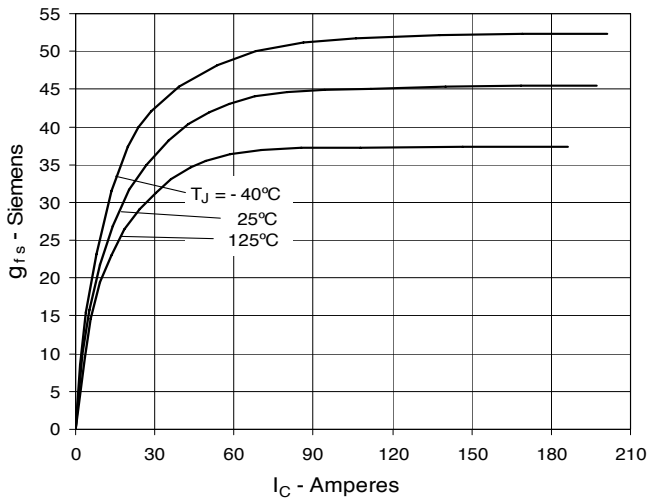


Fig. 8. Inductive Turn-off Switching Times vs. Gate Resistance

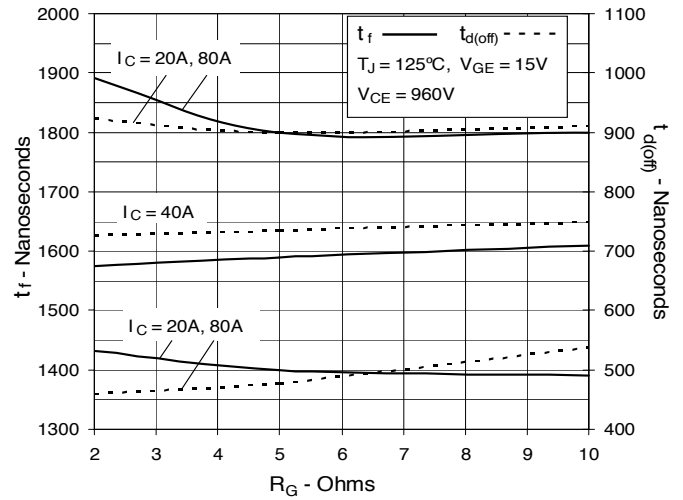


Fig. 9. Inductive Turn-off Switching Times vs. Collector Current

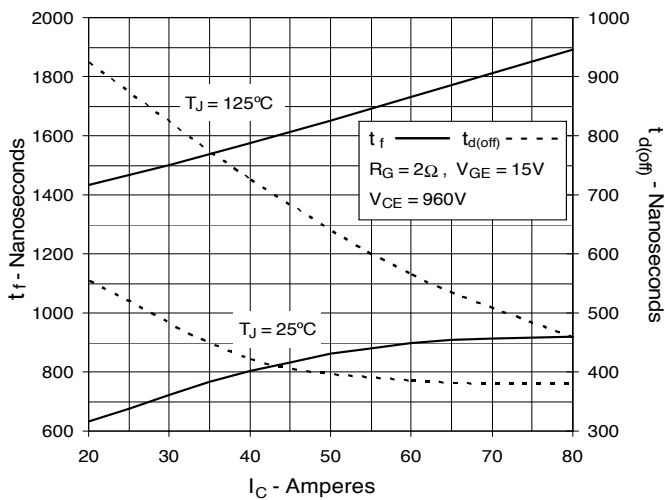


Fig. 10. Inductive Turn-off Switching Times vs. Junction Temperature

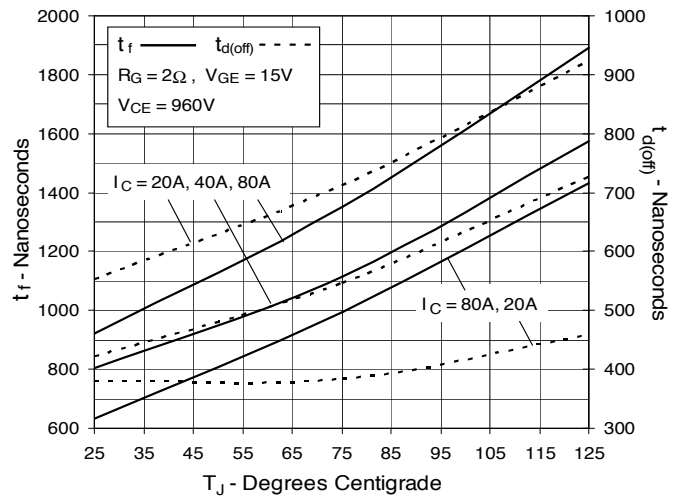


Fig. 11. Inductive Turn-on Switching Times vs. Gate Resistance

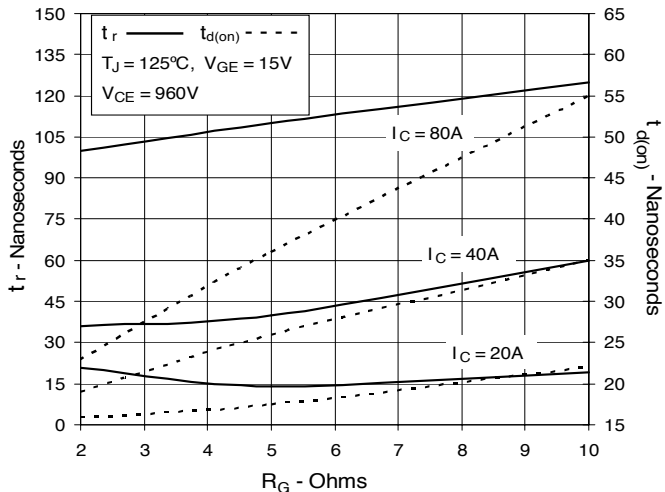


Fig. 12. Inductive Turn-on Switching Times vs. Collector Current

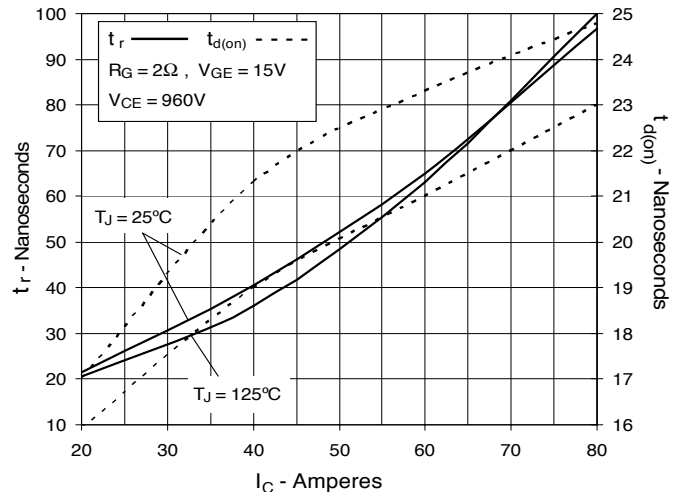


Fig. 13. Inductive Turn-on Switching Times vs. Junction Temperature

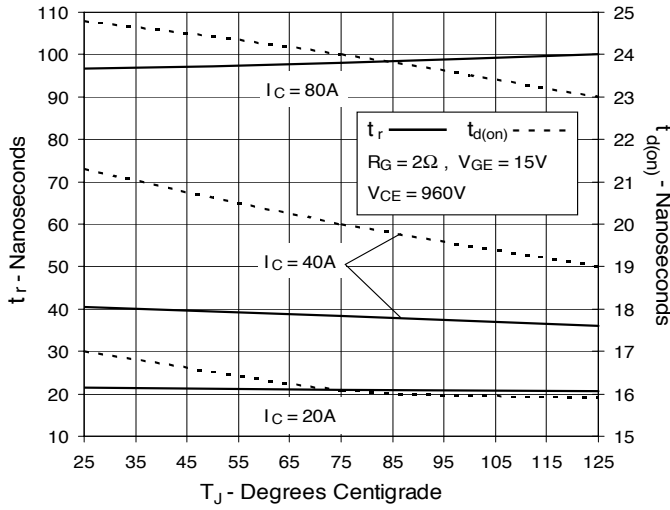


Fig. 14. Gate Charge

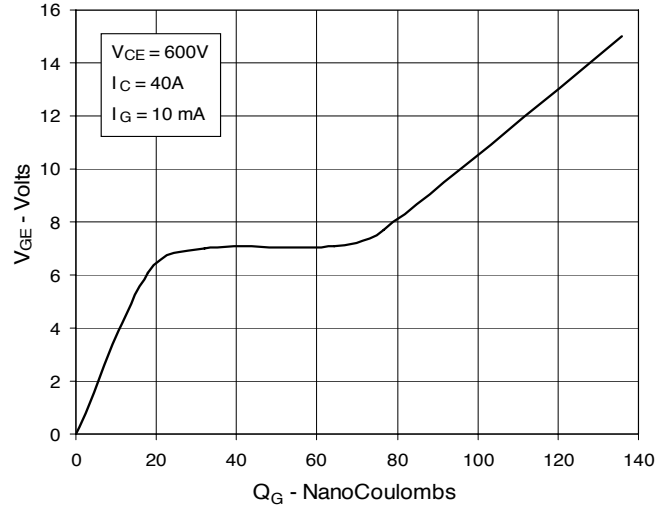


Fig. 15. Capacitance

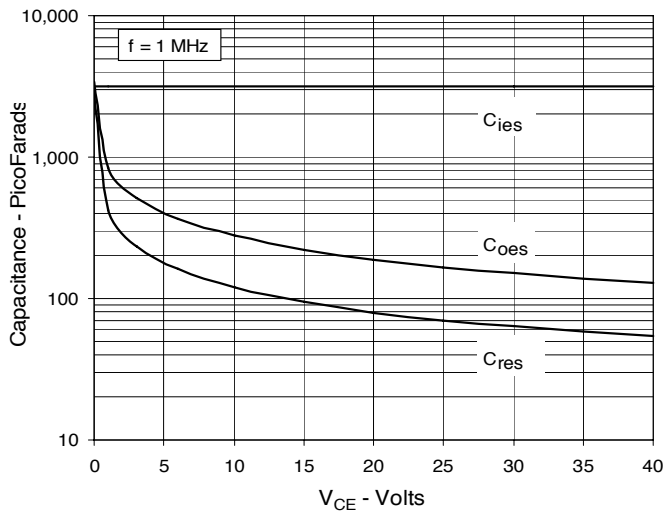


Fig. 16. Reverse-Bias Safe Operating Area

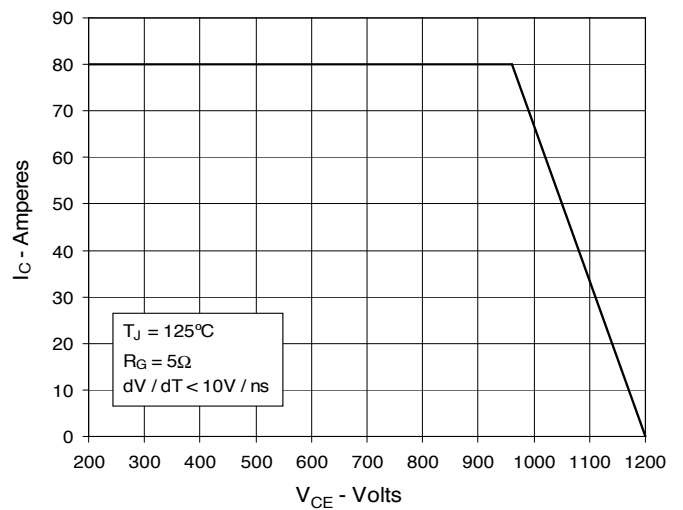
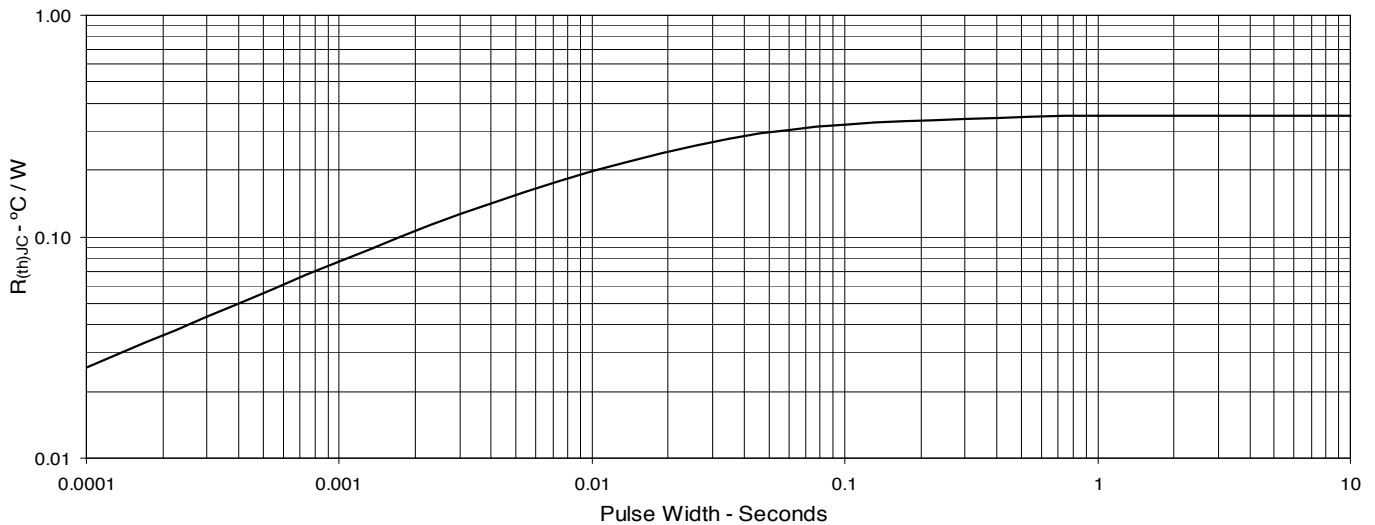


Fig. 17. Maximum Transient Thermal Resistance





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