

High Voltage IGBT

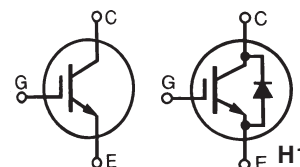
IXGH 16N170A
IXGT 16N170A
IXGH 16N170AH1
IXGT 16N170AH1

$V_{CES} = 1700 \text{ V}$
 $I_{C25} = 16 \text{ A}$
 $V_{CE(sat)} = 5.0 \text{ V}$
 $t_{fi(typ)} = 70 \text{ ns}$

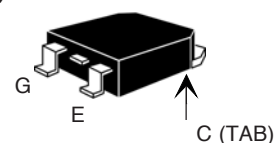
Preliminary Data Sheet

Symbol	Test Conditions	Maximum Ratings	
V_{CES}	$T_J = 25^\circ\text{C}$ to 150°C	1700	V
V_{CGR}	$T_J = 25^\circ\text{C}$ to 150°C ; $R_{GE} = 1 \text{ M}\Omega$	1700	V
V_{GES}	Continuous	± 20	V
V_{GEM}	Transient	± 30	V
I_{C25}	$T_C = 25^\circ\text{C}$	16	A
I_{C90}	$T_C = 90^\circ\text{C}$	11	A
I_{F90}	$T_C = 90^\circ\text{C}$, Diode	17	A
I_{CM}	$T_C = 25^\circ\text{C}$, 1 ms	40	A
SSOA (RBSOA)	$V_{GE} = 15 \text{ V}$, $T_{VJ} = 125^\circ\text{C}$, $R_G = 10\Omega$ Clamped inductive load	$I_{CM} = 40$ @ $0.8 V_{CES}$	A
t_{SC}	$T_J = 125^\circ\text{C}$, $V_{CE} = 1200 \text{ V}$; $V_{GE} = 15 \text{ V}$, $R_G = 22\Omega$	10	μs
P_C	$T_C = 25^\circ\text{C}$	190	W
T_J		-55 ... +150	$^\circ\text{C}$
T_{JM}		150	$^\circ\text{C}$
T_{stg}		-55 ... +150	$^\circ\text{C}$
M_d	Mounting torque (M3)	TO-247	1.13/10Nm/lb.in.
Maximum lead temperature for soldering 1.6 mm (0.062 in.) from case for 10 s		300	$^\circ\text{C}$
Plastic body for 10s		260	$^\circ\text{C}$
Weight	TO-247	6	g
	TO-268	4	g

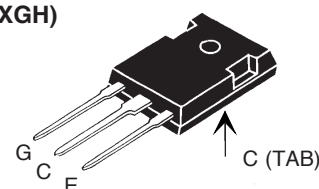
Symbol	Test Conditions	Characteristic Values		
		(T _J = 25°C, unless otherwise specified)		
		min.	typ.	max.
BV_{CES}	$I_C = 250 \mu\text{A}$, $V_{GE} = 0 \text{ V}$	1700		V
$V_{GE(th)}$	$I_C = 250 \mu\text{A}$, $V_{CE} = V_{GE}$	3.0		V
I_{CES}	$V_{CE} = 0.8 \cdot V_{CES}$	16N170A	50	μA
	$V_{GE} = 0 \text{ V}$, Note 1	16N170AH1	100	μA
	$T_J = 125^\circ\text{C}$	16N170A	750	μA
		16N170AH1	1.5	mA
I_{GES}	$V_{CE} = 0 \text{ V}$, $V_{GE} = \pm 20 \text{ V}$		± 100	nA
$V_{CE(sat)}$	$I_C = I_{C90}$, $V_{GE} = 15 \text{ V}$		4.0	V
	$T_J = 125^\circ\text{C}$		4.8	V



TO-268 (IXGT)



TO-247 (IXGH)



G = Gate
E = Emitter

C = Collector,
TAB = Collector

Features

- High blocking voltage
- High current handling capability
- MOS Gate turn-on - drive simplicity
- Rugged NPT structure
- Molding epoxies meet UL 94 V-0 flammability classification
- SONIC-FRD™ fast recovery copack diode
- International standard packages JEDEC TO-268 and JEDEC TO-247 AD

Applications

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

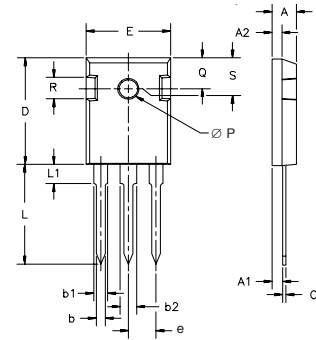
Advantages

- High power density
- Suitable for surface mounting
- Easy to mount with 1 screw, (isolated mounting screw hole)

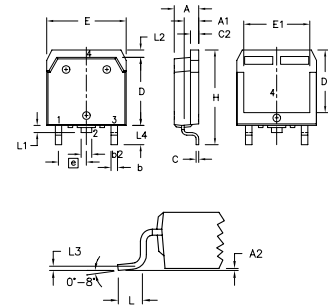
Symbol	Test Conditions	Characteristic Values ($T_J = 25^\circ\text{C}$ unless otherwise specified)		
		min.	typ.	max.
g_{fs}	$I_C = I_{C25}, V_{CE} = 10\text{ V}$ Note 2	7	13	S
C_{ies}	$V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}, f = 1\text{ MHz}$	16N170A 16N170AH1	1620	pF
C_{oes}			83	pF
C_{res}			110	pF
Q_g	$I_C = I_{C90}, V_{GE} = 15\text{ V}, V_{CE} = 0.5 V_{CES}$		31	pF
Q_{ge}			83	nC
Q_{gc}			10	nC
$t_{d(on)}$	Inductive load, $T_J = 25^\circ\text{C}$ $I_C = I_{C25}, V_{GE} = 15\text{ V}, R_G = 10\ \Omega$ $V_{CE} = 0.5 V_{CES}$, Note 3		36	ns
t_{ri}			57	ns
$t_{d(off)}$			160	300 ns
t_{fi}			70	150 ns
E_{off}			0.85	1.5 mJ
$t_{d(on)}$			38	ns
t_{ri}	Inductive load, $T_J = 125^\circ\text{C}$ $I_C = I_{C25}, V_{GE} = 15\text{ V}, R_G = 10\ \Omega$ $V_{CE} = 0.5 V_{CES}$, Note 3	16N170A 16N170AH1	59	ns
E_{on}			1.5	mJ
			2.5	mJ
$t_{d(off)}$			175	ns
t_{fi}			155	ns
E_{off}			2.0	mJ
R_{thJC}	(TO-247)			0.65 KW
R_{thCK}			0.25	KW

Reverse Diode (FRED)		Characteristic Values ($T_J = 25^\circ\text{C}$ unless otherwise specified)		
Symbol	Test Conditions	min.	typ.	max.
V_F	$I_F = 20\text{ A}, V_{GE} = 0\text{ V}$, Note 2		2.5	2.9 V
	$T_J = 125^\circ\text{C}$		2.5	V
t_{rr}	$I_F = 20\text{ A}, V_{GE} = 0\text{ V}, -di_F/dt = 450\text{ A}/\mu\text{s}$ $V_R = 1200\text{ V}$		230	ns
	$T_J = 125^\circ\text{C}$		400	ns
I_{RM}			23	A
	$T_J = 125^\circ\text{C}$		27	A
R_{thJC}				0.9 KW

- Notes: 1. Device must be heatsunk for high temperature leakage current measurements to avoid thermal runaway.
2. Pulse test, $t \leq 300\ \mu\text{s}$, duty cycle $\leq 2\%$
3. Switching times may increase for $V_{CE}(\text{Clamp}) > 0.8 \cdot V_{CES}$, higher T_J or increased R_G .

TO-247 AD Outline


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
ØP	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


Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	4.9	5.1	.193	.201
A ₁	2.7	2.9	.106	.114
A ₂	.02	.25	.001	.010
b	1.15	1.45	.045	.057
b ₂	1.9	2.1	.075	.083
C	.4	.65	.016	.026
D	13.80	14.00	.543	.551
E	15.85	16.05	.624	.632
E ₁	13.3	13.6	.524	.535
e	5.45	BSC	.215	BSC
H	18.70	19.10	.736	.752
L	2.40	2.70	.094	.106
L ₁	1.20	1.40	.047	.055
L ₂	1.00	1.15	.039	.045
L ₃		0.25 BSC		.010 BSC
L ₄	3.80	4.10	.150	.161

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
	4,850,072	5,017,508	5,063,307	5,381,025	6,259,123 B1	6,534,343	6,710,405 B2	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	6,771,478 B2

Fig. 1. Output Characteristics
@ 25 °C

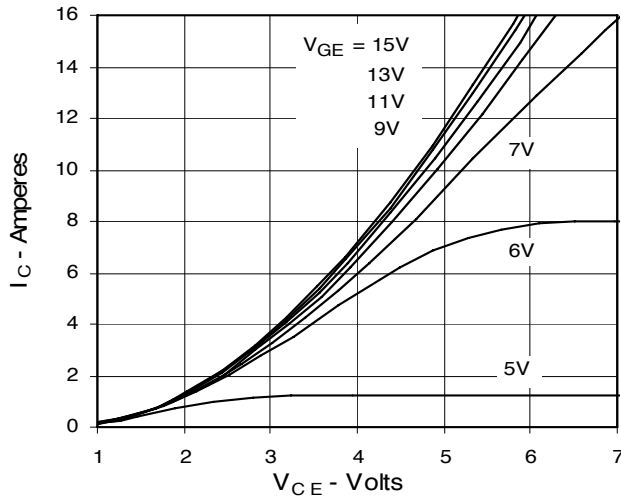


Fig. 2. Extended Output Characteristics
@ 25 °C

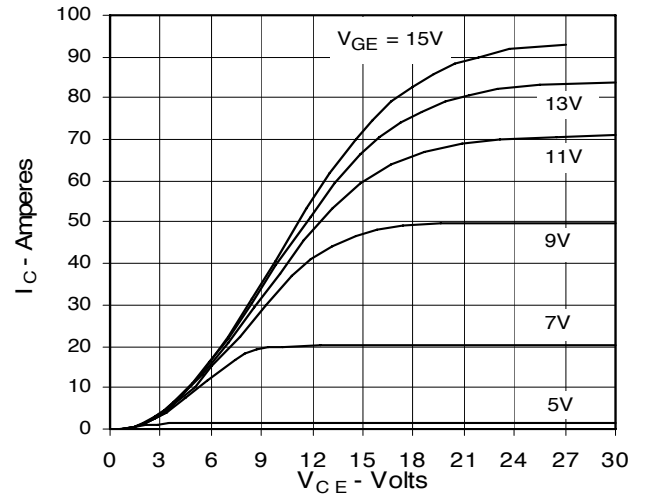


Fig. 3. Output Characteristics
@ 125 °C

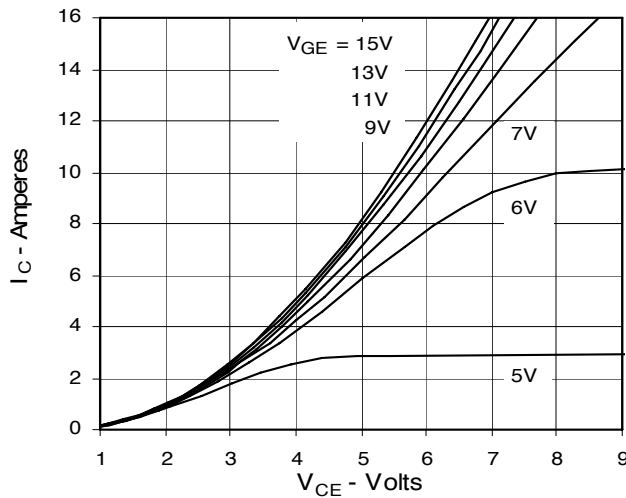


Fig. 4. Dependence of $V_{CE(sat)}$ on Temperature

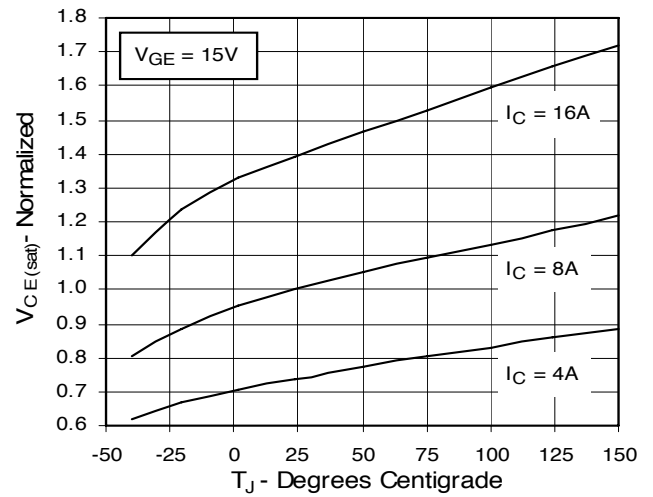


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter voltage

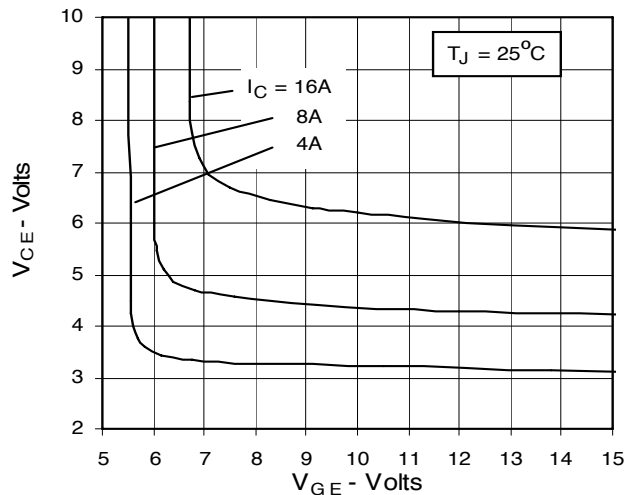


Fig. 6. Input Admittance

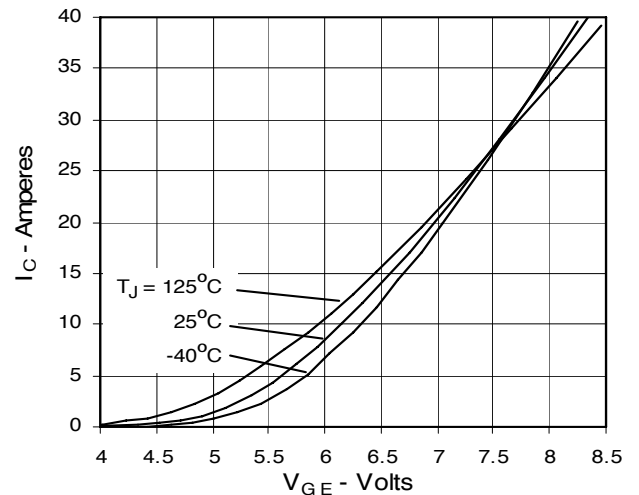


Fig. 7. Transconductance

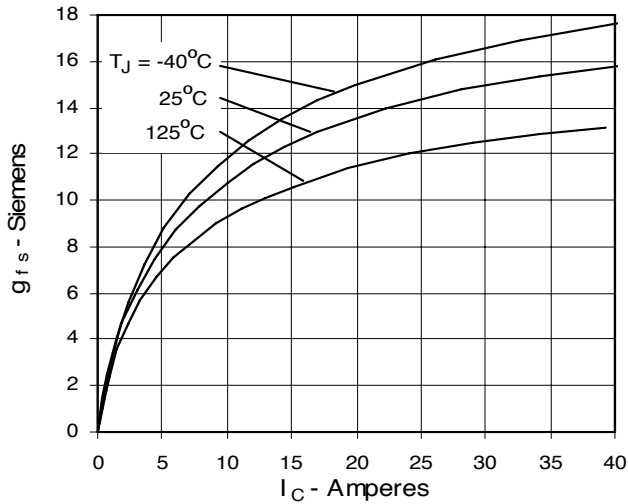


Fig. 8. Dependence of Turn-off Energy Loss on R_G

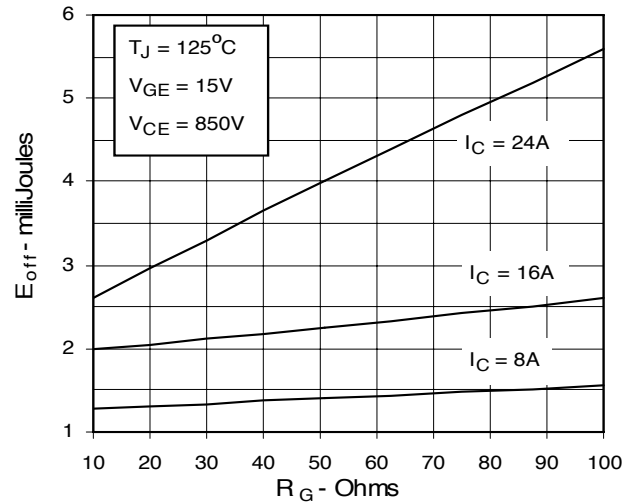


Fig. 9. Dependence of Turn-Off Energy Loss on I_C

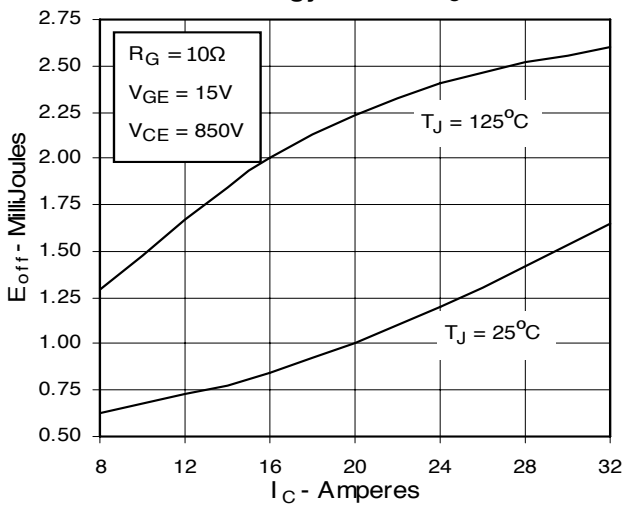


Fig. 10. Dependence of Turn-off Energy Loss on Temperature

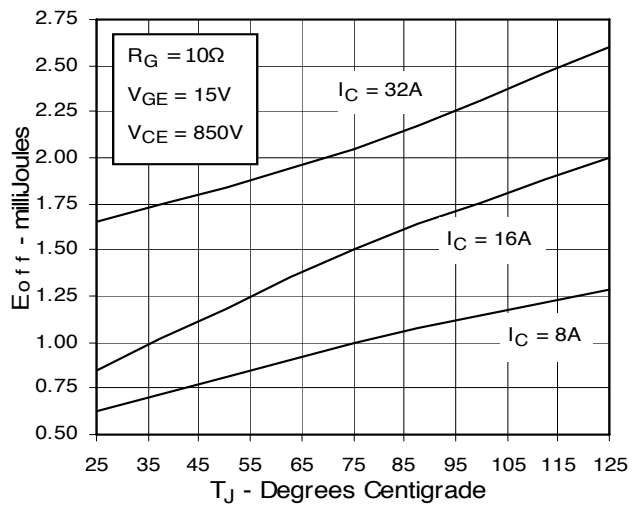


Fig. 11. Dependence of Turn-off Switching Time on R_G

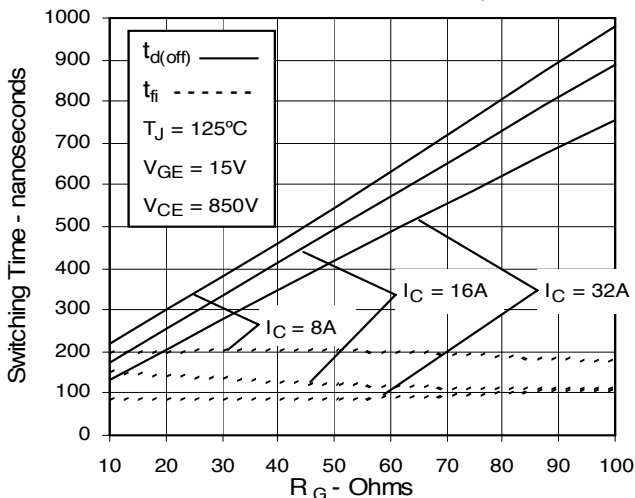


Fig. 12. Dependence of Turn-off Switching Time on I_C

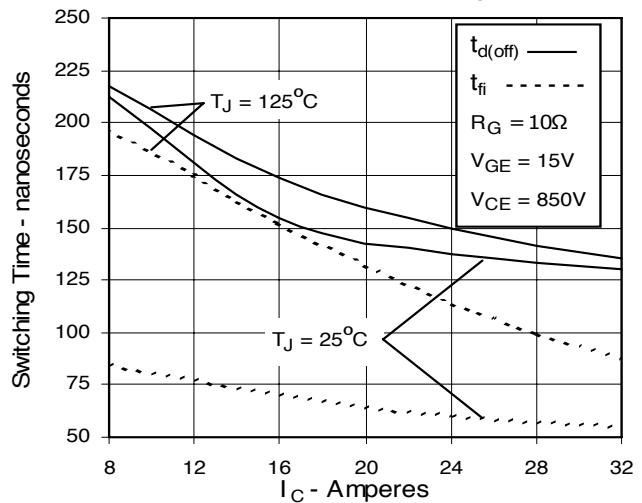


Fig. 13. Dependence of Turn-off Switching Time on Temperature

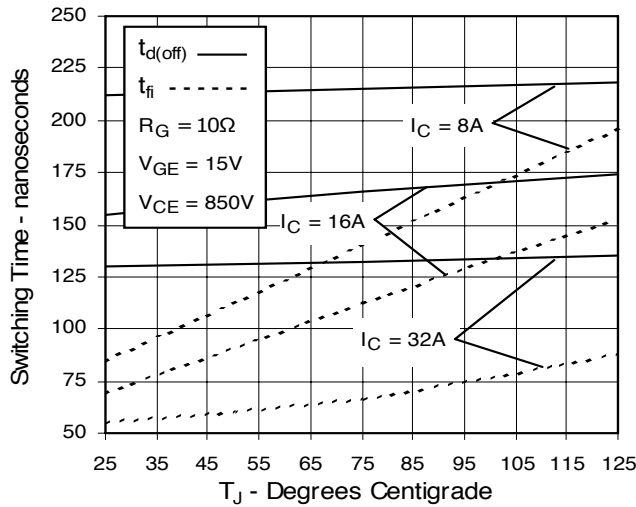


Fig. 14. Gate Charge

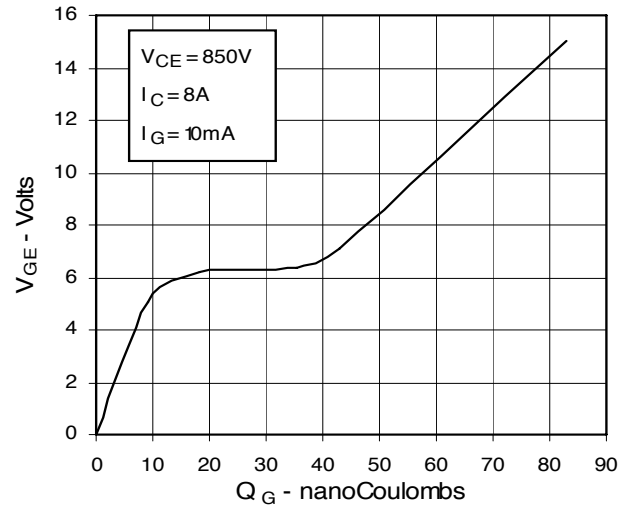


Fig. 15. Capacitance

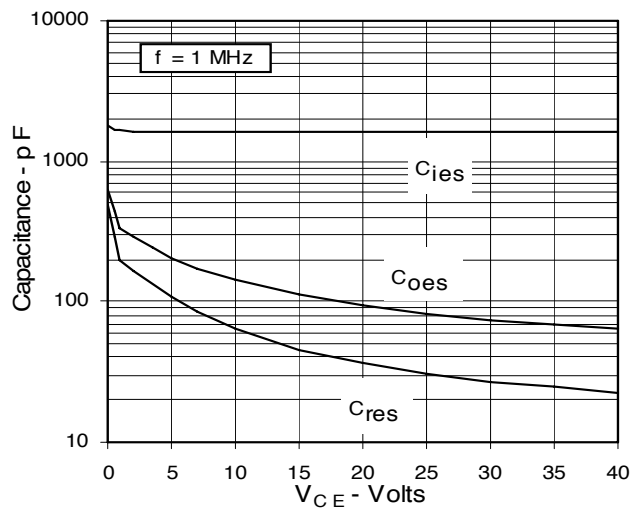


Fig. 16. Reverse-Bias Safe Operating Area

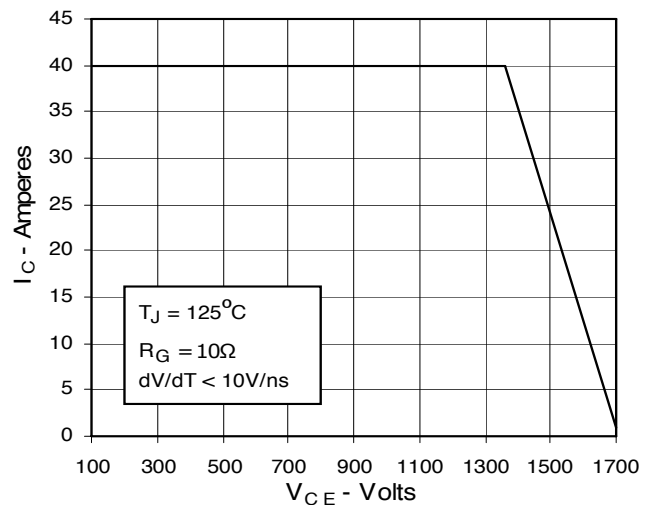
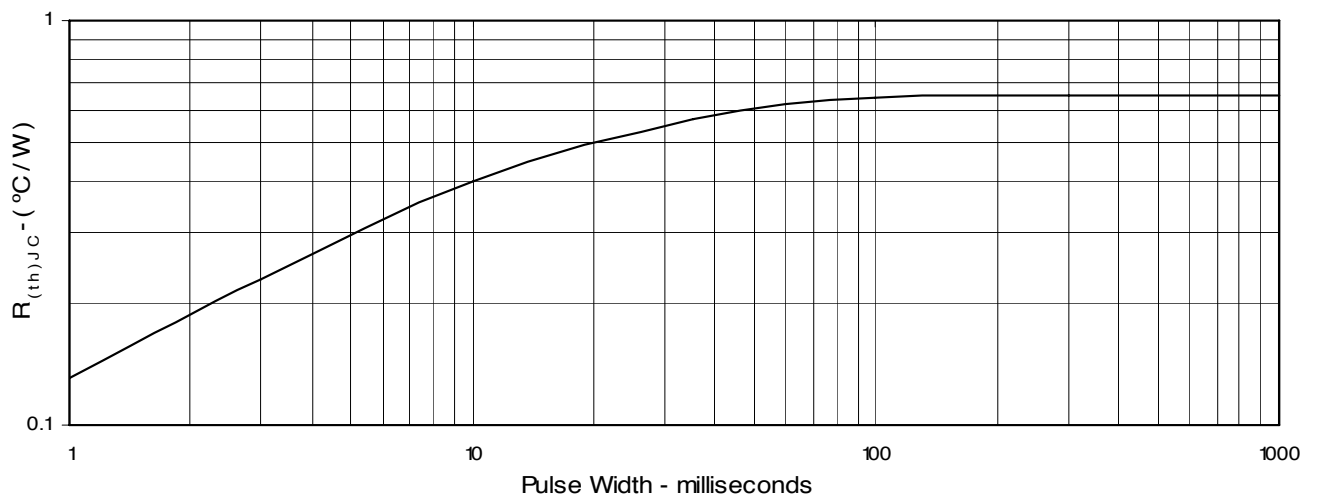


Fig. 17. Maximum Transient Thermal Resistance



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.