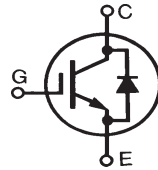


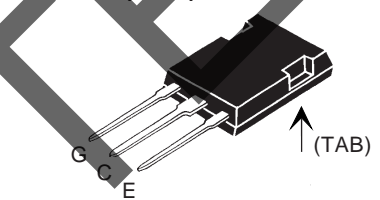
# High Voltage IGBT with Diode

## IXGX 32N170AH1

$V_{CES} = 1700 \text{ V}$   
 $I_{C25} = 32 \text{ A}$   
 $V_{CE(sat)} = 5.0 \text{ V}$   
 $t_{fi(typ)} = 50 \text{ ns}$



PLUS247 (IXGX)



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

Symbol	Test Conditions	Maximum Ratings	
$V_{CES}$	$T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$	1700	V
$V_{CGR}$	$T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$ ; $R_{GE} = 1 \text{ M}\Omega$	1700	V
$V_{GES}$	Continuous	$\pm 20$	V
$V_{GEM}$	Transient	$\pm 30$	V
$I_{C25}$	$T_C = 25^\circ\text{C}$	32	A
$I_{C90}$	$T_C = 90^\circ\text{C}$	21	A
$I_{F90}$		18	A
$I_{CM}$	$T_C = 25^\circ\text{C}$ , 1 ms	110	A
<b>SSOA (RBSOA)</b>	$V_{GE} = 15 \text{ V}$ , $T_{VJ} = 125^\circ\text{C}$ , $R_G = 5\Omega$ Clamped inductive load	$I_{CM} = 70$ @ $0.8 V_{CES}$	A
$t_{SC}$	$T_J = 125^\circ\text{C}$ , $V_{CE} = 1200 \text{ V}$ ; $V_{GE} = 15 \text{ V}$ , $R_G = 10\Omega$	10	$\mu\text{s}$
$P_C$	$T_C = 25^\circ\text{C}$	350	W
$T_J$		-55 ... +150	$^\circ\text{C}$
$T_{JM}$		150	$^\circ\text{C}$
$T_{stg}$		-55 ... +150	$^\circ\text{C}$
$F_C$	Mounting force with clip	22...130/5...30	N/lb
Maximum lead temperature for soldering 1.6 mm (0.062 in.) from case for 10 s		300	$^\circ\text{C}$
<b>Weight</b>		6	g

### Features

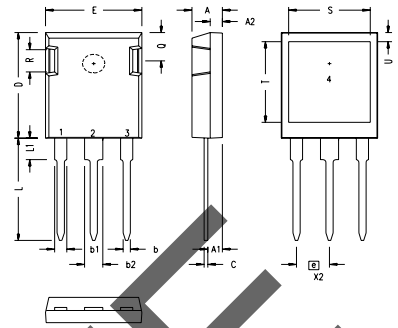
- High current handling capability
- MOS Gate turn-on - drive simplicity
- Rugged NPT structure
- Molding epoxies meet UL 94 V-0 flammability classification

### 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

Symbol	Test Conditions	Characteristic Values ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)		
		min.	typ.	max.
$BV_{CES}$	$I_C = 1 \text{ mA}$ , $V_{GE} = 0 \text{ V}$	1700		V
$V_{GE(th)}$	$I_C = 250 \mu\text{A}$ , $V_{CE} = V_{GE}$	3.0		V
$I_{CES}$	$V_{CE} = 0.8 \cdot V_{CES}$ $V_{GE} = 0 \text{ V}$		$T_J = 25^\circ\text{C}$ $T_J = 125^\circ\text{C}$ Note 1	100 $\mu\text{A}$ 3 mA
$I_{GES}$	$V_{CE} = 0 \text{ V}$ , $V_{GE} = \pm 20 \text{ V}$			$\pm 100 \text{ nA}$
$V_{CE(sat)}$	$I_C = I_{C90}$ , $V_{GE} = 15 \text{ V}$	$T_J = 25^\circ\text{C}$ $T_J = 125^\circ\text{C}$		4.0 V 4.8 V

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	16	30	S
$C_{ies}$	$V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}, f = 1\text{ MHz}$		3670	pF
$C_{oes}$			185	pF
$C_{res}$			44	pF
$Q_g$	$I_C = I_{C90}, V_{GE} = 15\text{ V}, V_{CE} = 0.5 V_{CES}$		157	nC
$Q_{ge}$			25	nC
$Q_{gc}$			57	nC
$t_{d(on)}$	<b>Inductive load, <math>T_J = 25^\circ\text{C}</math></b>		27	ns
$t_{ri}$	$I_C = I_{C25}, V_{GE} = 15\text{ V}$		50	ns
$E_{on}$	$R_G = 2.7\ \Omega, V_{CE} = 0.5 V_{CES}$		4.1	mJ
$t_{d(off)}$			270	500 ns
$t_{fi}$			50	100 ns
$E_{off}$			1.25	2.5 mJ
$t_{d(on)}$	<b>Inductive load, <math>T_J = 125^\circ\text{C}</math></b>		27	ns
$t_{ri}$	$I_C = I_{C25}, V_{GE} = 15\text{ V}$		47	ns
$E_{on}$	$R_G = 2.7\ \Omega, V_{CE} = 0.5 V_{CES}$		5.2	mJ
$t_{d(off)}$			280	ns
$t_{fi}$			82	ns
$E_{off}$			1.7	mJ
$R_{thJC}$				0.35 K/W
$R_{thCK}$			0.15	K/W

**PLUS247 Outline (IXGX)**


SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.190	.205	4.83	5.21
A1	.090	.100	2.29	2.54
A2	.075	.085	1.91	2.16
b	.045	.055	1.14	1.40
b1	.075	.084	1.91	2.13
b2	.115	.123	2.92	3.12
C	.024	.031	0.61	0.80
D	.819	.840	20.80	21.34
E	.620	.635	15.75	16.13
e	.215 BSC		5.45 BSC	
L	.780	.800	19.81	20.32
L1	.150	.170	3.81	4.32
Q	.220	.244	5.59	6.20
R	.170	.190	4.32	4.83
S	.520	.540	13.21	13.72
T	.620	.640	15.75	16.26
U	.065	.080	1.65	2.03

- 1 - GATE
- 2 - DRAIN (COLLECTOR)
- 3 - SOURCE (EMITTER)
- 4 - NO CONNECTION

NOTE: This drawing will meet all dimensions requirement of JEDEC outline TO-247AD except screw hole.

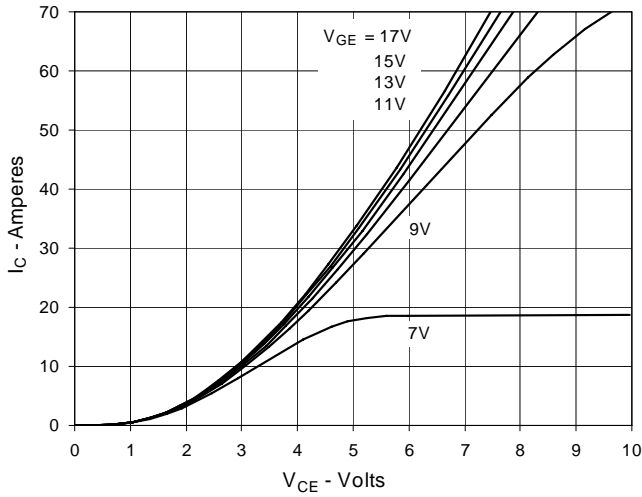
Symbol	Test Conditions	Characteristic Values ( $T_J = 25^\circ\text{C}$ unless otherwise specified)		
		Min.	Typ.	Max.
$V_F$	$I_F = 60\text{ A}, V_{GE} = 0\text{ V}$ , Pulse test, $t \leq 300\ \mu\text{s}$ , duty cycle $d \leq 2\%$		2.4	2.7 V
	$T_J = 150^\circ\text{C}$		2.4	V
$I_{RM}$	$I_F = 60\text{ A}, V_{GE} = 0\text{ V}, -di_F/dt = 600\text{ A}/\mu\text{s}$		50	A
	$V_R = 1200\text{ V}$		55	A
$t_{rr}$			150	ns
	$T_J = 125^\circ\text{C}$		350	ns
$R_{thJC}$				0.35 K/W

- 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  $d \leq 2\%$

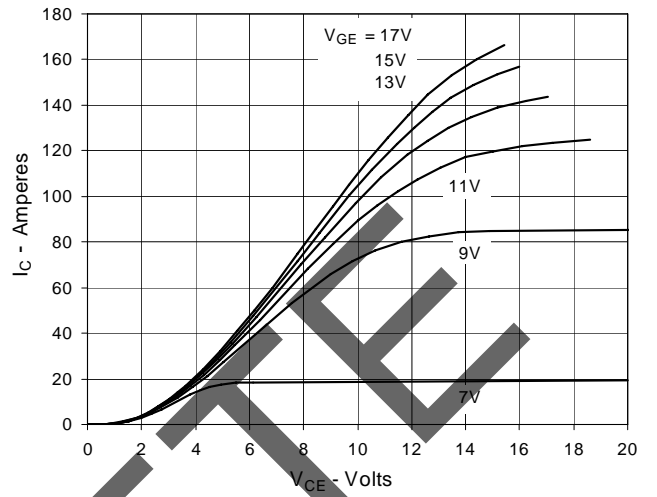
IXYS reserves the right to change limits, test conditions, and dimensions.

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

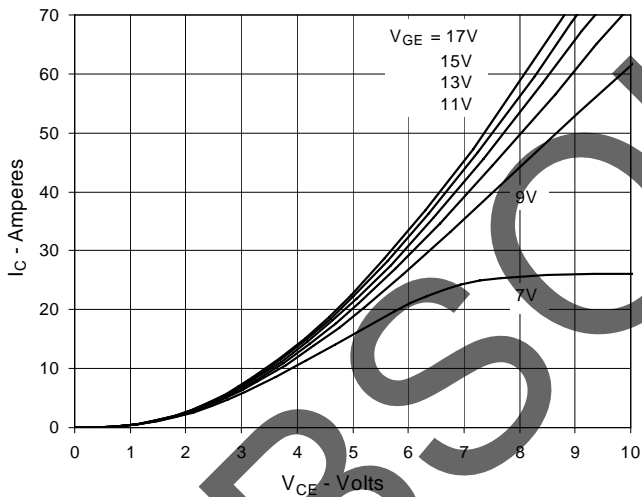
**Fig. 1. Output Characteristics @ 25°C**



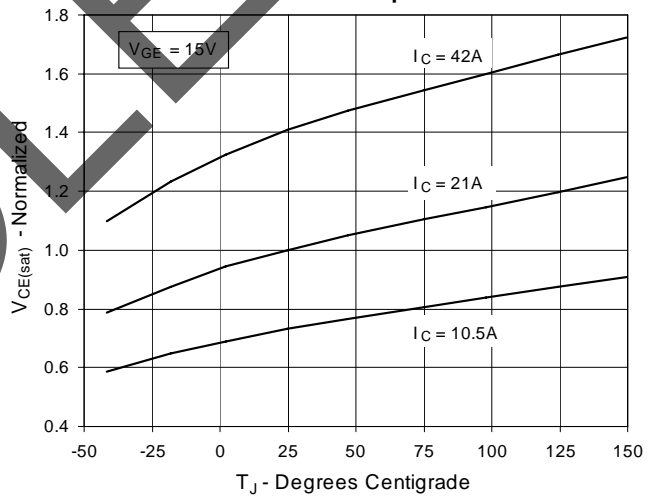
**Fig. 2. Extended Output Characteristics @ 25°C**



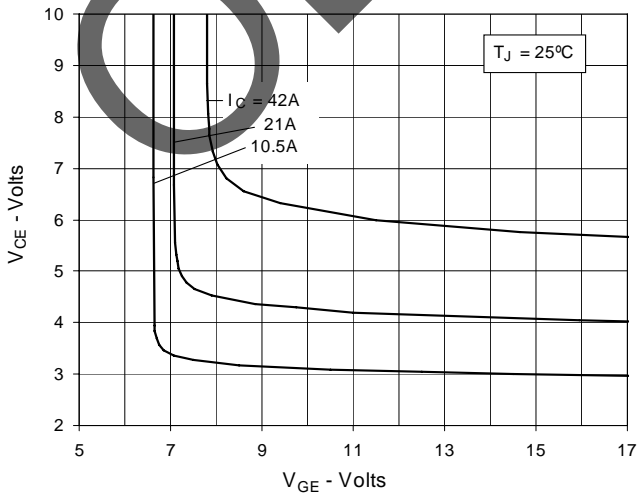
**Fig. 3. Output Characteristics @ 125°C**



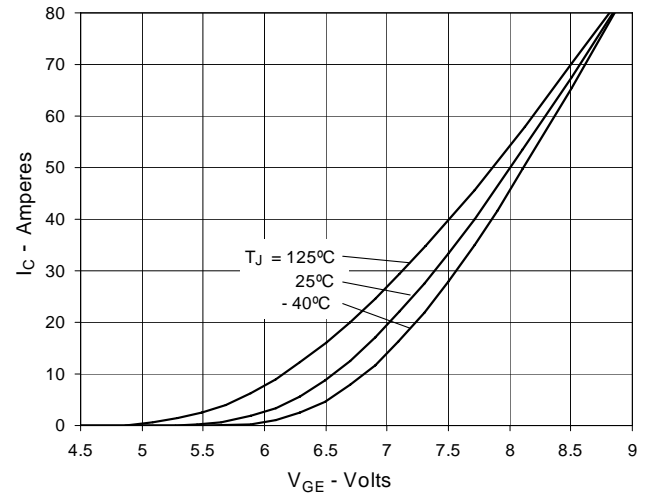
**Fig. 4. Dependence of  $V_{CE(sat)}$  on Junction Temperature**



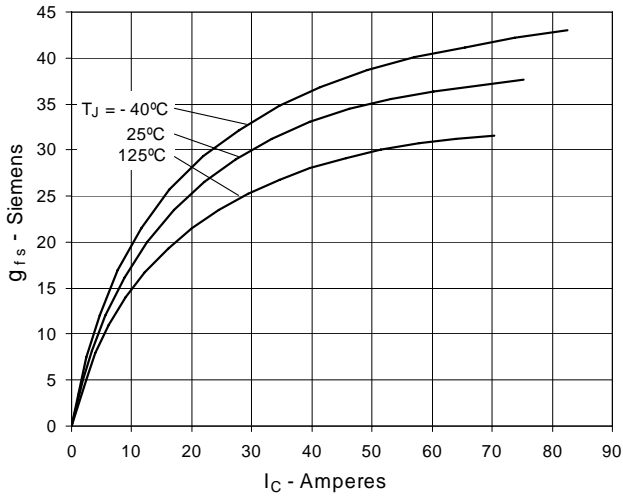
**Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage**



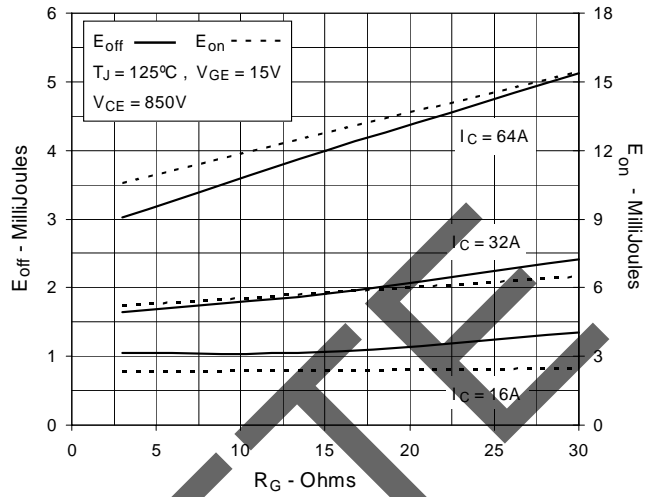
**Fig. 6. Input Admittance**



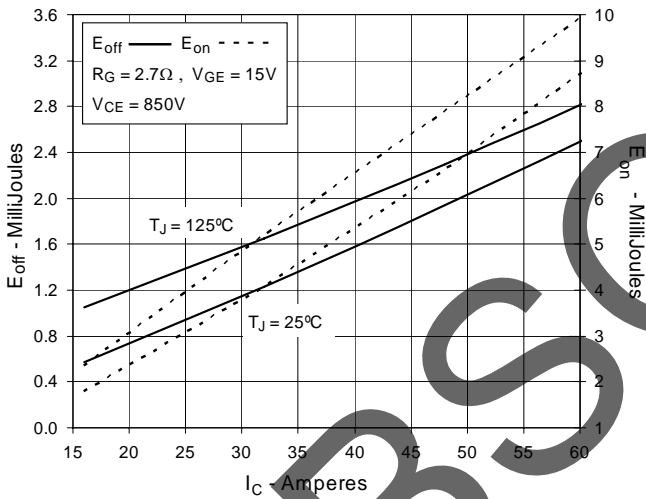
**Fig. 7. Transconductance**



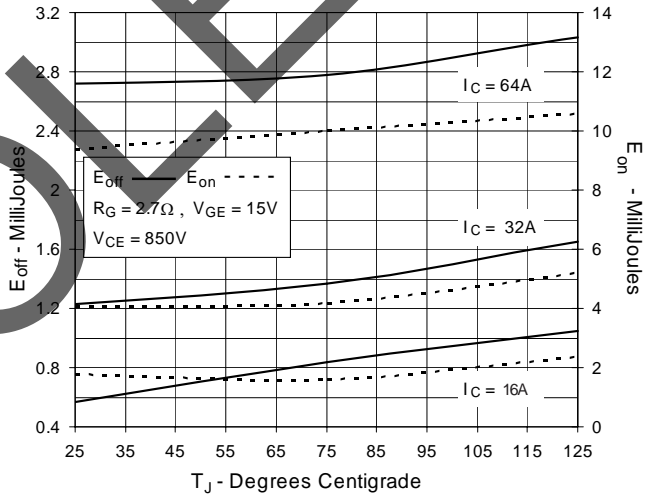
**Fig. 8. Inductive Switching Energy Loss vs. Gate Resistance**



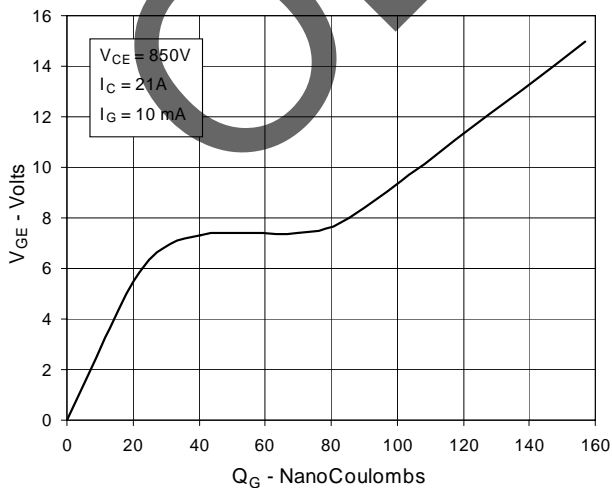
**Fig. 9. Inductive Switching Energy Loss vs. Collector Current**



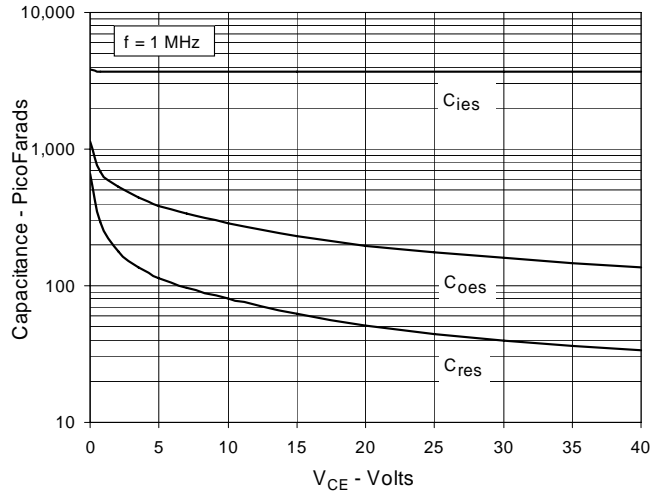
**Fig. 10. Inductive Switching Energy Loss vs. Junction Temperature**



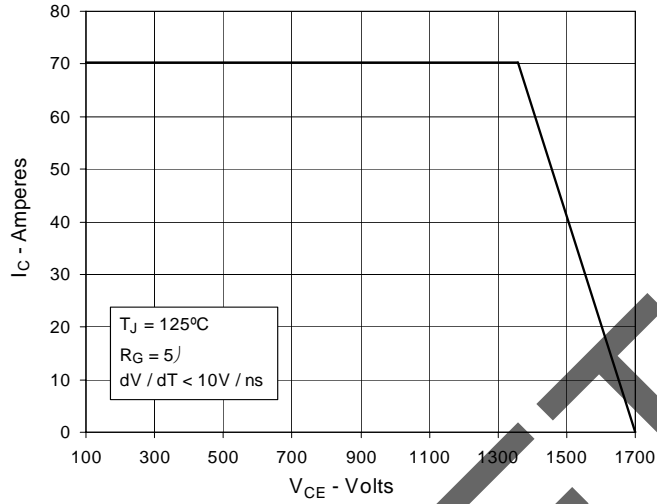
**Fig. 11. Gate Charge**



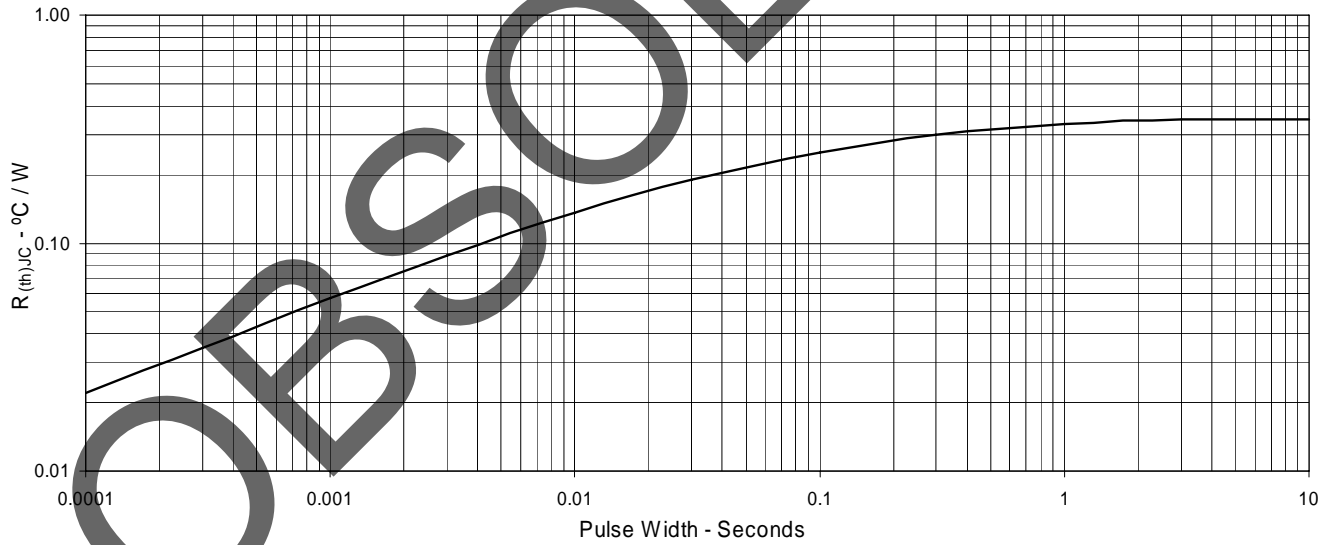
**Fig. 12. Capacitance**



**Fig. 13. Reverse-Bias Safe Operating Area**



**Fig. 14. Maximum Transient Thermal Resistance**



**Fast Recovery Diode Curves**

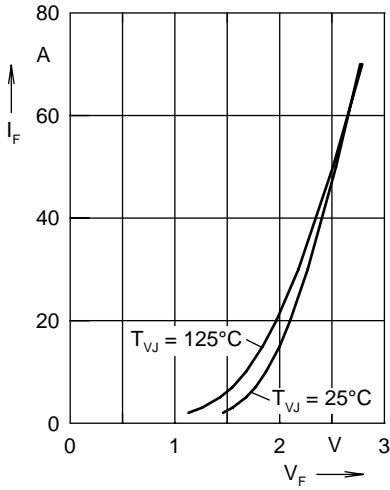


Fig. 15 Typ. forward current  $I_F$  versus  $V_F$

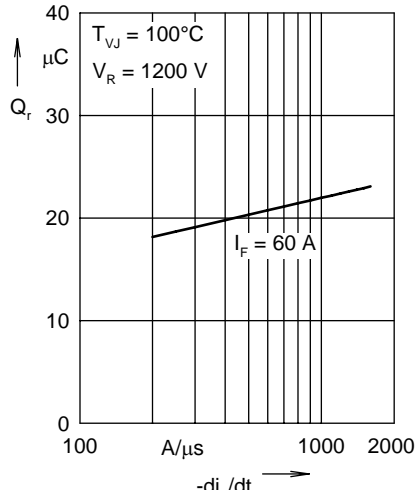


Fig. 16 Typ. reverse recovery charge  $Q_r$  versus  $-di_F/dt$

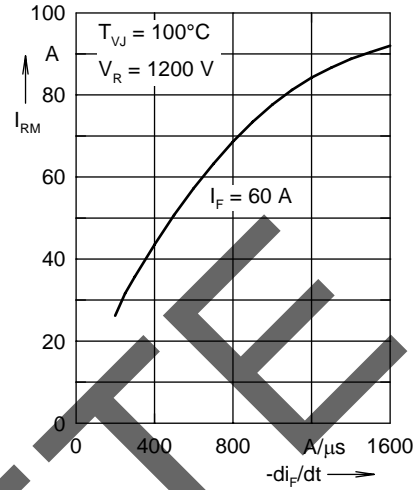


Fig. 17 Typ. peak reverse current  $I_{RM}$  versus  $-di_F/dt$

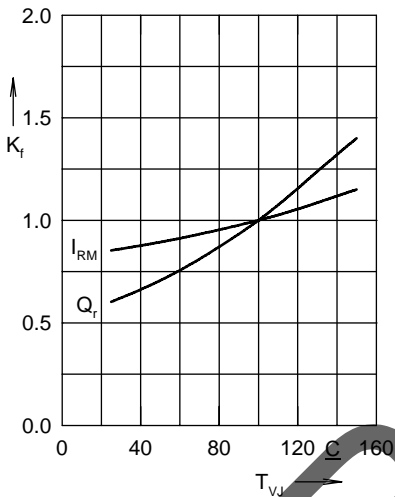


Fig. 18 Dynamic parameters  $K_f$ ,  $I_{RM}$  versus  $T_{VJ}$

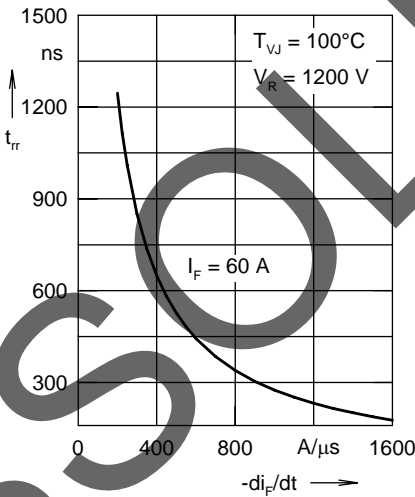


Fig. 19 Typ. recovery time  $t_{tr}$  versus  $-di_F/dt$

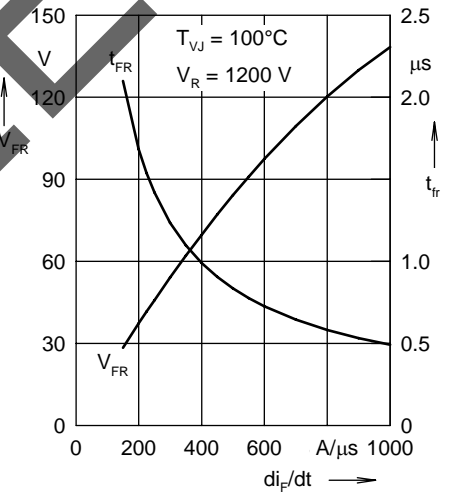


Fig. 20 Typ. peak forward voltage  $V_{FR}$  and  $t_{fr}$  versus  $di_F/dt$

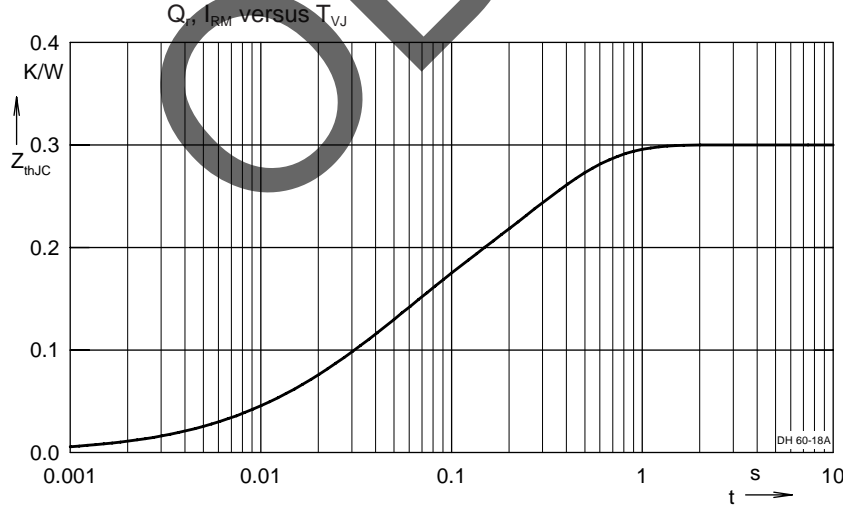


Fig. 21 Transient thermal resistance junction to case

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

Note: Fig. 16 to Fig. 20 shows typical values



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