

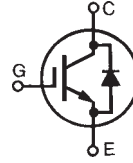
**1200V XPT™ IGBT  
GenX3™ w/ Diode**
**MMIX1Y100N120C3H1**

$$V_{CES} = 1200V$$

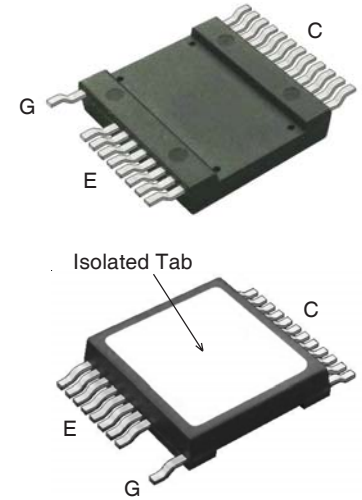
$$I_{C110} = 40A$$

$$V_{CE(sat)} \leq 3.5V$$

$$t_{fi(typ)} = 110ns$$


 High-Speed IGBT  
for 20-50 kHz Switching

Symbol	Test Conditions	Maximum Ratings	
$V_{CES}$	$T_J = 25^\circ C$ to $150^\circ C$	1200	V
$V_{CGR}$	$T_J = 25^\circ C$ to $150^\circ C$ , $R_{GE} = 1M\Omega$	1200	V
$V_{GES}$	Continuous	$\pm 20$	V
$V_{GEM}$	Transient	$\pm 30$	V
$I_{C25}$	$T_C = 25^\circ C$ (Chip Capability)	92	A
$I_{C110}$	$T_C = 110^\circ C$	40	A
$I_{F110}$	$T_C = 110^\circ C$	34	A
$I_{CM}$	$T_C = 25^\circ C$ , 1ms	440	A
$I_A$	$T_C = 25^\circ C$	50	A
$E_{AS}$	$T_C = 25^\circ C$	1.2	J
<b>SSOA</b> <b>(RBSOA)</b>	$V_{GE} = 15V$ , $T_{VJ} = 125^\circ C$ , $R_G = 1\Omega$ Clamped Inductive Load	$I_{CM} = 200$ $@V_{CE} \leq V_{CES}$	A
$P_C$	$T_C = 25^\circ C$	400	W
$T_J$		-55 ... +150	$^\circ C$
$T_{JM}$		150	$^\circ C$
$T_{stg}$		-55 ... +150	$^\circ C$
$T_L$	Maximum Lead Temperature for Soldering	300	$^\circ C$
$T_{SOLD}$	1.6 mm (0.062 in.) from Case for 10	260	$^\circ C$
$V_{ISOL}$	50/60Hz, 1 minute	2500	V~
$F_C$	Mounting Force	50..200/11..45	N/lb.
<b>Weight</b>		8	g


 G = Gate                      E = Emitter  
C = Collector

**Features**

- Optimized for Low Switching Losses
- Silicon Chip on Direct-Copper Bond (DCB) Substrate
- Isolated Mounting Surface
- 2500V~ Electrical Isolation
- Square RBSOA
- Isolation Voltage 2500V~
- Anti-Parallel Ultra Fast Diode
- Positive Thermal Coefficient of  $V_{ce(sat)}$
- Avalanche Rated
- High Current Handling Capability
- International Standard Package

**Advantages**

- High Power Density
- Low Gate Drive Requirement

**Applications**

- High Frequency Power Inverters
- UPS
- Motor Drives
- SMPS
- PFC Circuits
- Battery Chargers
- Welding Machines
- Lamp Ballasts

Symbol	Test Conditions ( $T_J = 25^\circ C$ , Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
$BV_{CES}$	$I_C = 250\mu A$ , $V_{GE} = 0V$	1200		V
$V_{GE(th)}$	$I_C = 250\mu A$ , $V_{CE} = V_{GE}$	3.0		V
$I_{CES}$	$V_{CE} = V_{CES}$ , $V_{GE} = 0V$ Note 2, $T_J = 125^\circ C$			50 $\mu A$ 3 mA
$I_{GES}$	$V_{CE} = 0V$ , $V_{GE} = \pm 20V$			$\pm 100$ nA
$V_{CE(sat)}$	$I_C = 100A$ , $V_{GE} = 15V$ , Note 1 $T_J = 125^\circ C$		2.9 3.9	3.5 V V

Symbol	Test Conditions ( $T_J = 25^\circ\text{C}$ Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
$g_{fs}$	$I_C = 60\text{A}, V_{CE} = 10\text{V}$ , Note 1	30	52	S
$C_{ies}$ $C_{oes}$ $C_{res}$	$V_{CE} = 25\text{V}, V_{GE} = 0\text{V}, f = 1\text{MHz}$		6000	pF
			353	pF
			130	pF
$Q_{g(on)}$ $Q_{ge}$ $Q_{gc}$	$I_C = 100\text{A}, V_{GE} = 15\text{V}, V_{CE} = 0.5 \cdot V_{CES}$		270	nC
			50	nC
			93	nC
$t_{d(on)}$ $t_{ri}$ $E_{on}$ $t_{d(off)}$ $t_{fi}$ $E_{off}$	<b>Inductive load, <math>T_J = 25^\circ\text{C}</math></b> $I_C = 100\text{A}, V_{GE} = 15\text{V}$ $V_{CE} = 0.5 \cdot V_{CES}, R_G = 1\Omega$ Note 3		32	ns
			90	ns
			6.50	mJ
			123	ns
			110	ns
			2.90	5.00 mJ
$t_{d(on)}$ $t_{ri}$ $E_{on}$ $t_{d(off)}$ $t_{fi}$ $E_{off}$	<b>Inductive load, <math>T_J = 125^\circ\text{C}</math></b> $I_C = 100\text{A}, V_{GE} = 15\text{V}$ $V_{CE} = 0.5 \cdot V_{CES}, R_G = 1\Omega$ Note 3		32	ns
			90	ns
			10.10	mJ
			140	ns
			125	ns
			3.55	mJ
$R_{thJC}$ $R_{thCS}$ $R_{thJA}$			0.31 $^\circ\text{C/W}$ 0.05 $^\circ\text{C/W}$ 30 $^\circ\text{C/W}$	

**Reverse Diode (Sonic-FRD)**

Symbol	Test Conditions ( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
$V_F$	$I_F = 60\text{A}, V_{GE} = 0\text{V}$ , Note 1 $T_J = 125^\circ\text{C}$		1.9	2.7 V V
$I_{RM}$ $t_{rr}$	$I_F = 60\text{A}, V_{GE} = 0\text{V}, T_J = 125^\circ\text{C}$ $-di_F/dt = 700\text{A}/\mu\text{s}, V_R = 600\text{V}$		41	A
			420	ns
$R_{thJC}$				0.54 $^\circ\text{C/W}$

**Notes:**

1. Pulse test,  $t \leq 300\mu\text{s}$ , duty cycle,  $d \leq 2\%$ .
2. Part must be heatsunk for high-temp  $I_{CES}$  measurement.
3. Switching times & energy losses may increase for higher  $V_{CE}(\text{Clamp})$ ,  $T_J$  or  $R_G$ .

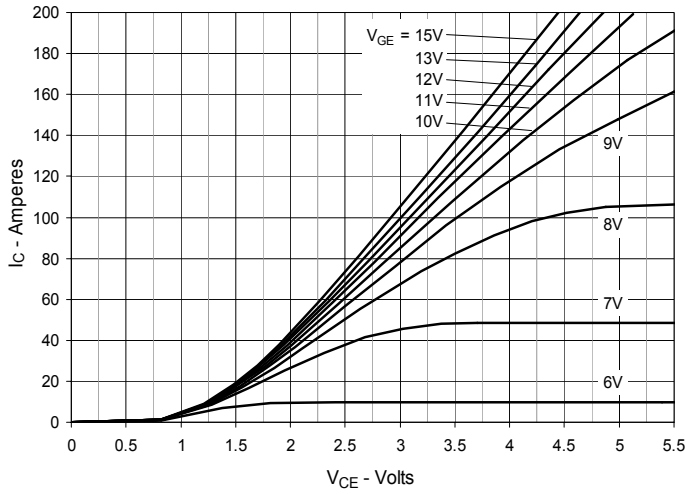
**PRELIMINARY TECHNICAL INFORMATION**

The product presented herein is under development. The Technical Specifications offered are derived from a subjective evaluation of the design, based upon prior knowledge and experience, and constitute a "considered reflection" of the anticipated result. IXYS reserves the right to change limits, test conditions, and dimensions without notice.

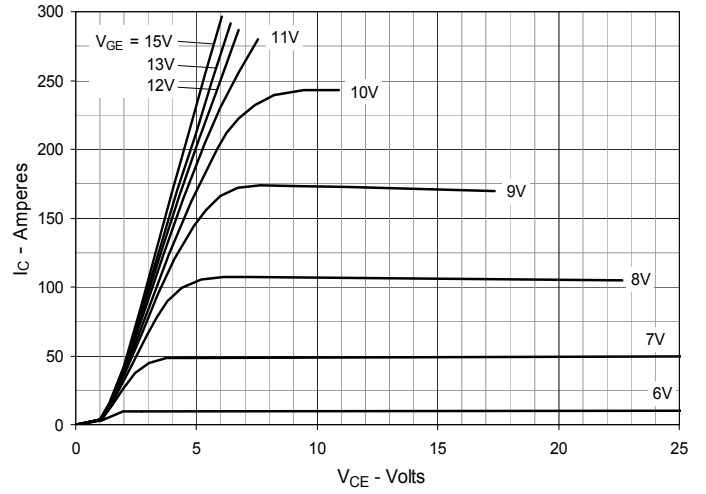
IXYS Reserves the Right to Change Limits, Test Conditions, and Dimensions.

IXYS MOSFETs and IGBTs are covered	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
by one or more of the following U.S. patents:	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	

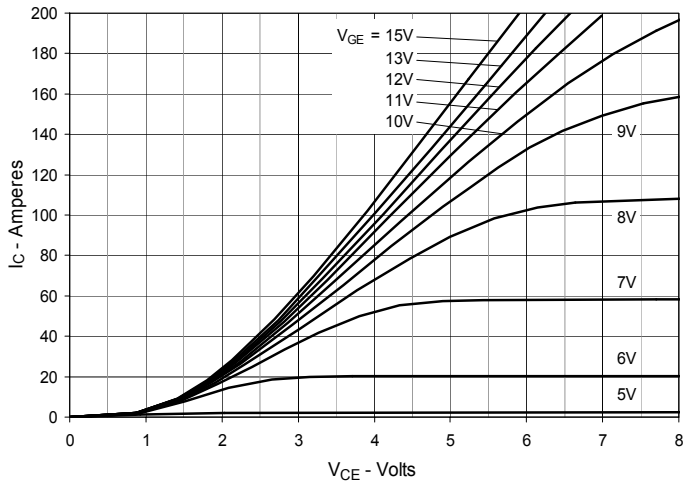
**Fig. 1. Output Characteristics @  $T_J = 25^\circ\text{C}$**



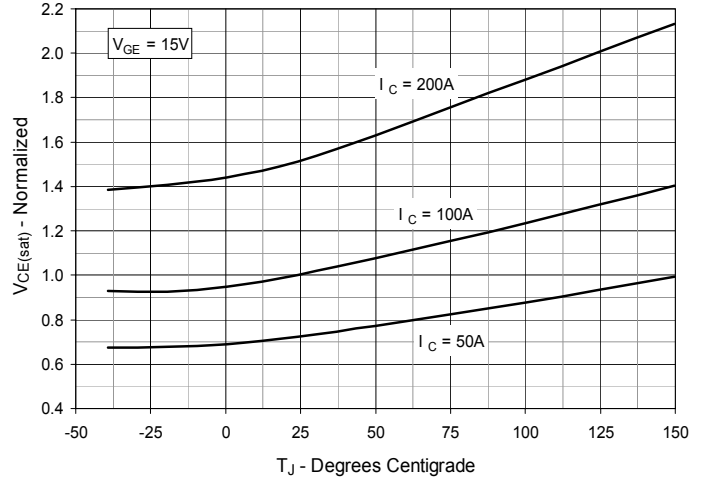
**Fig. 2. Extended Output Characteristics @  $T_J = 25^\circ\text{C}$**



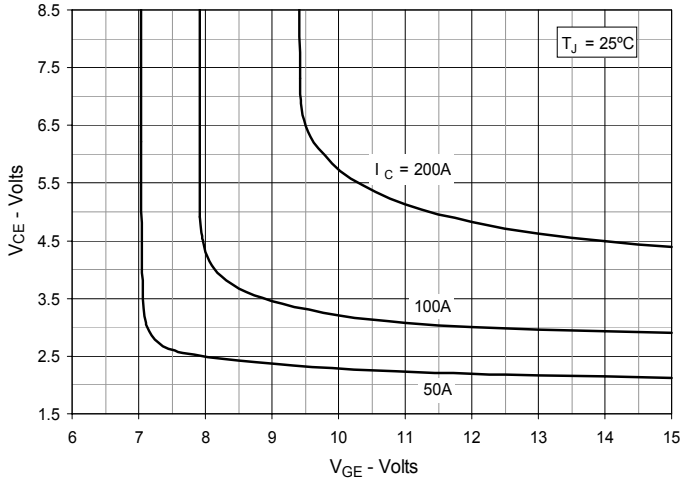
**Fig. 3. Output Characteristics @  $T_J = 125^\circ\text{C}$**



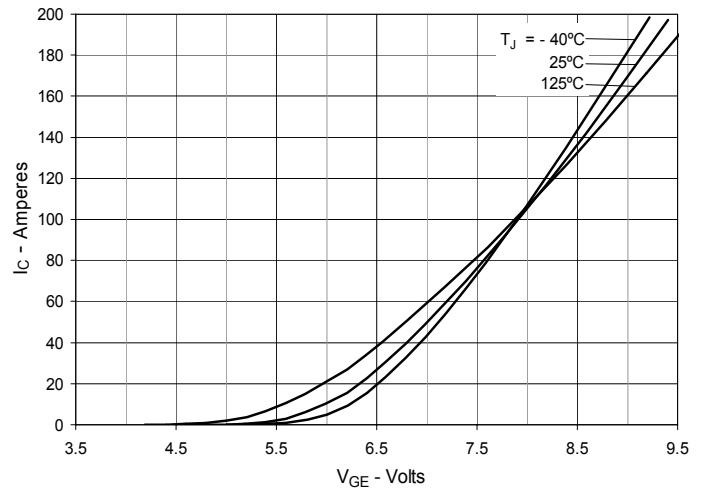
**Fig. 4. Dependence of  $V_{CE(sat)}$  on Junction Temperature**



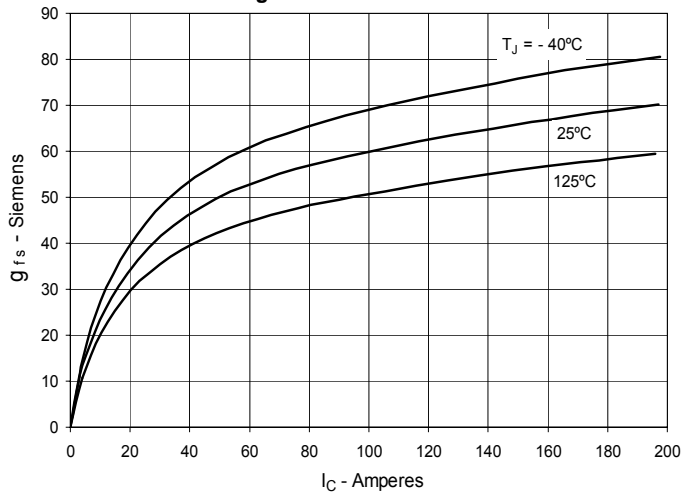
**Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage**



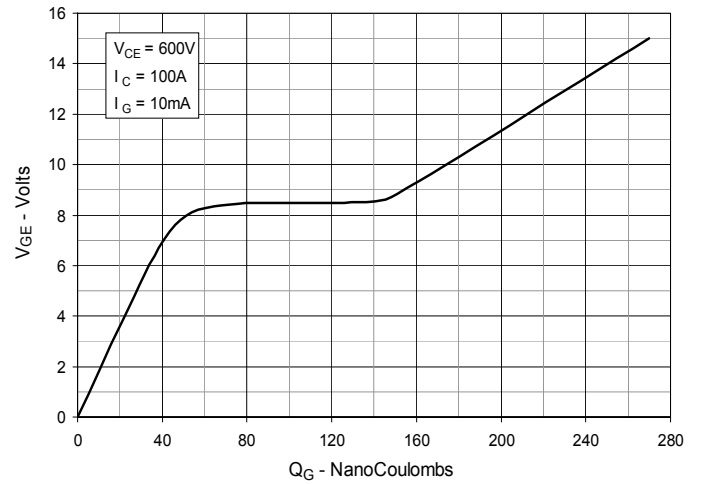
**Fig. 6. Input Admittance**



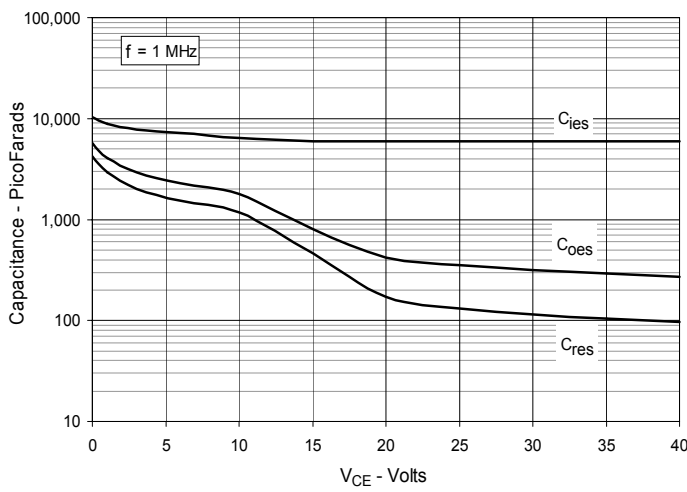
**Fig. 7. Transconductance**



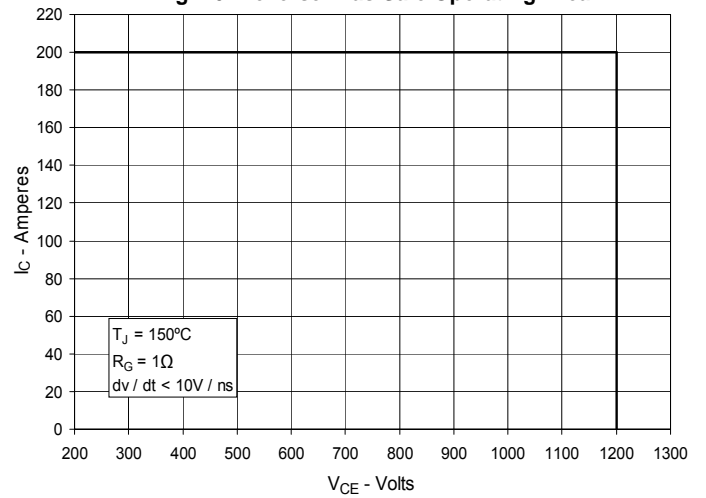
**Fig. 8. Gate Charge**



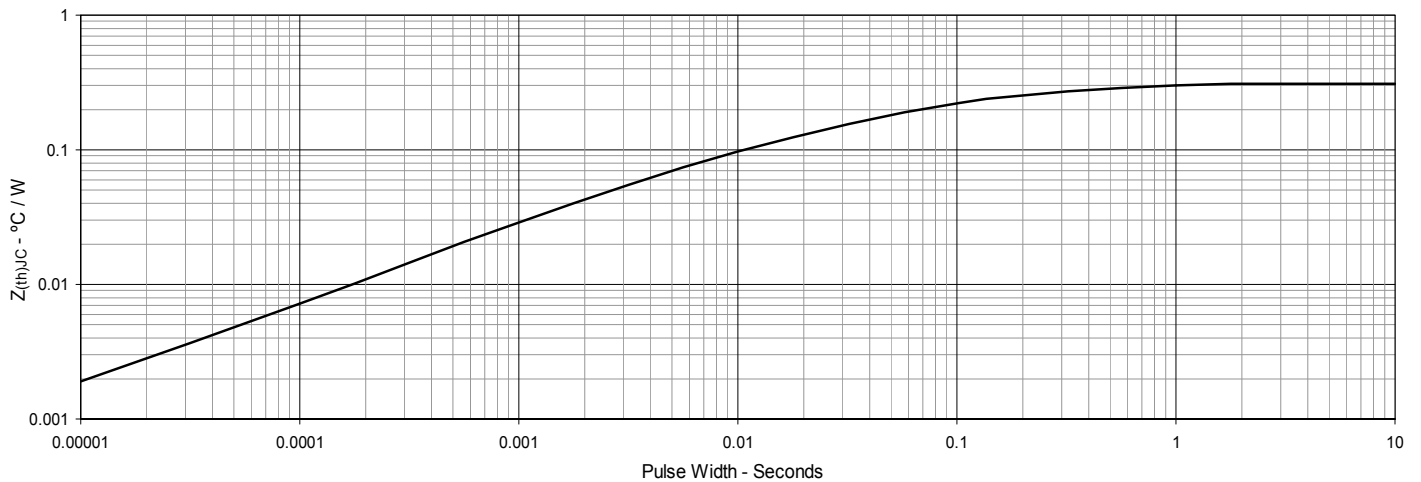
**Fig. 9. Capacitance**



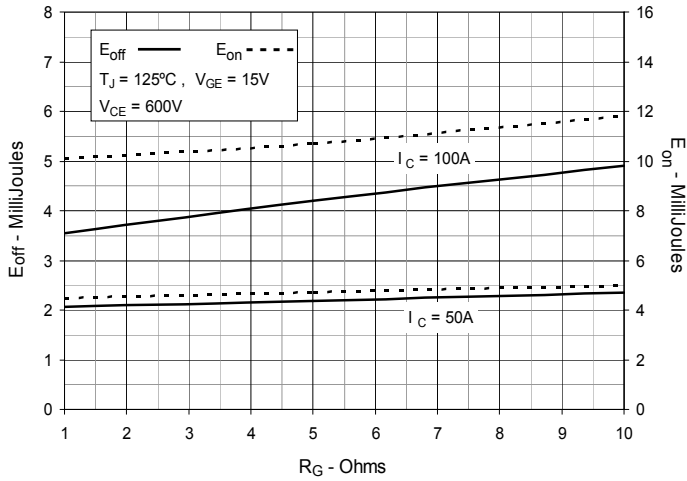
**Fig. 10. Reverse-Bias Safe Operating Area**



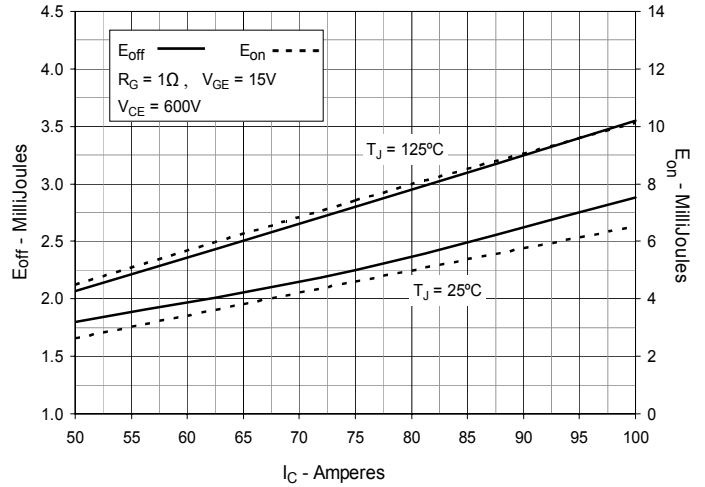
**Fig. 11. Maximum Transient Thermal Impedance**



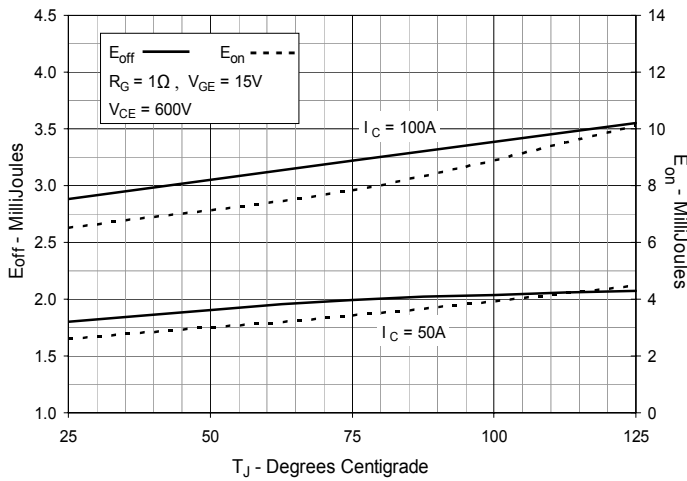
**Fig. 12. Inductive Switching Energy Loss vs. Gate Resistance**



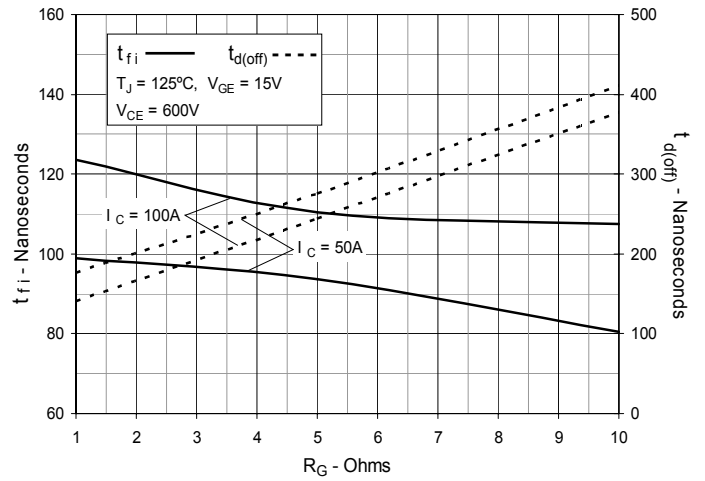
**Fig. 13. Inductive Switching Energy Loss vs. Collector Current**



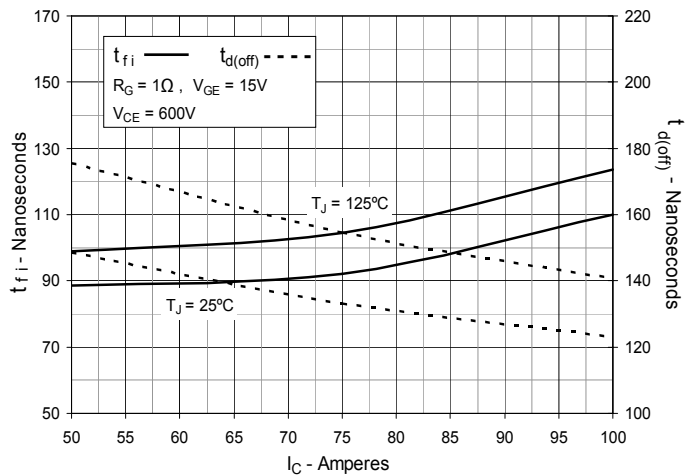
**Fig. 14. Inductive Switching Energy Loss vs. Junction Temperature**



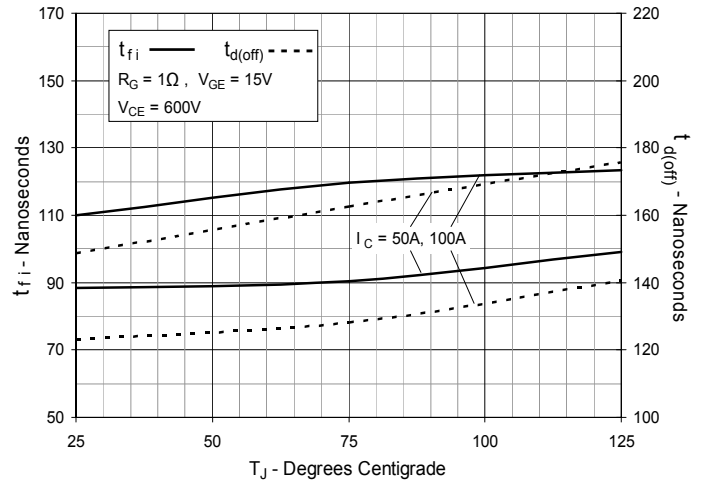
**Fig. 15. Inductive Turn-off Switching Times vs. Gate Resistance**



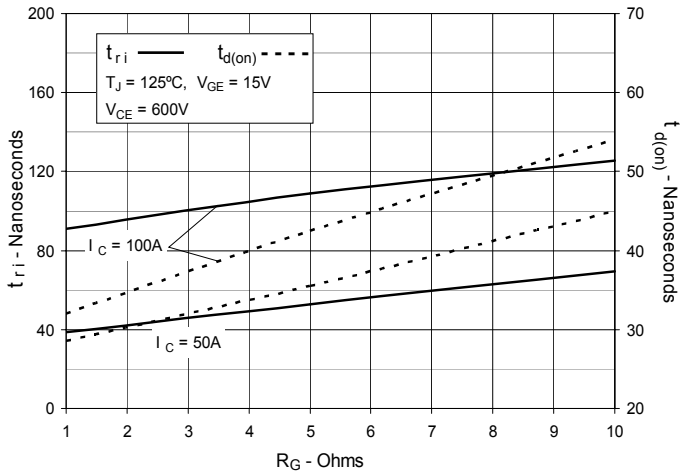
**Fig. 16. Inductive Turn-off Switching Times vs. Collector Current**



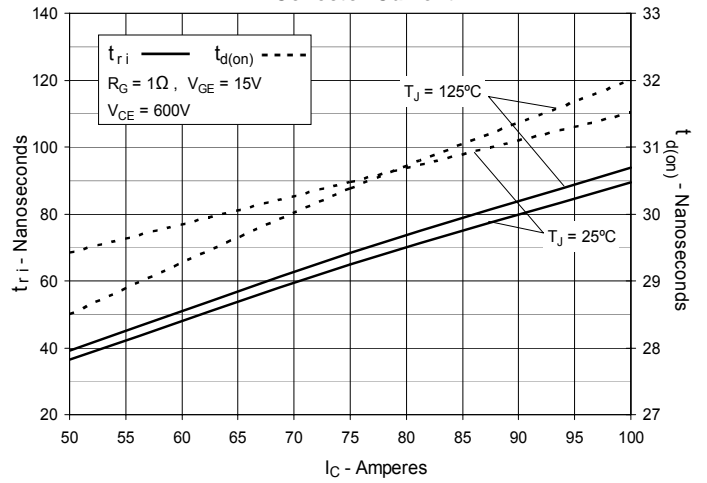
**Fig. 17. Inductive Turn-off Switching Times vs. Junction Temperature**



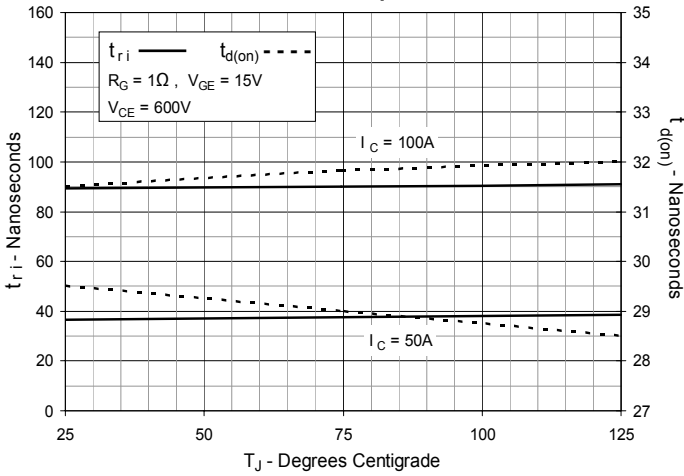
**Fig. 18. Inductive Turn-on Switching Times vs. Gate Resistance**



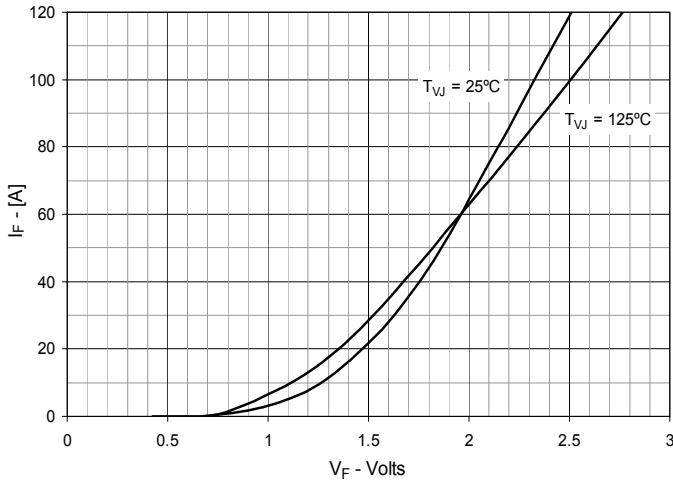
**Fig. 19. Inductive Turn-on Switching Times vs. Collector Current**



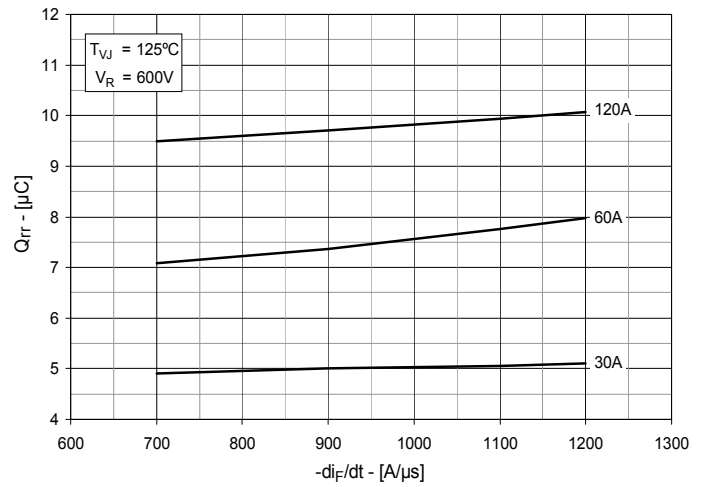
**Fig. 20. Inductive Turn-on Switching Times vs. Junction Temperature**



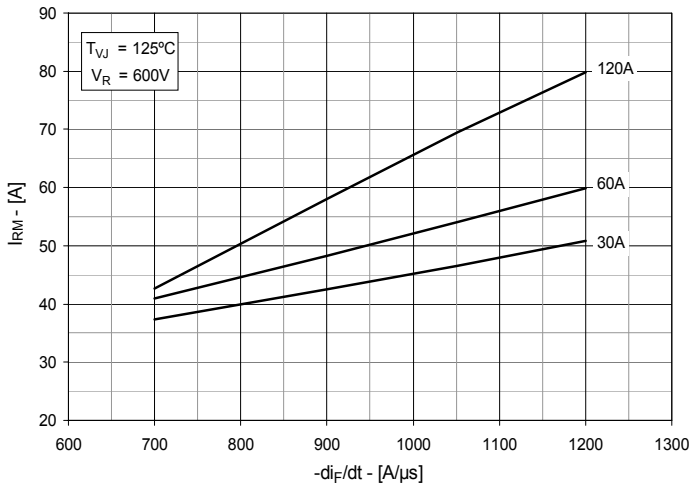
**Fig. 21. Typ. Forward Characteristics**



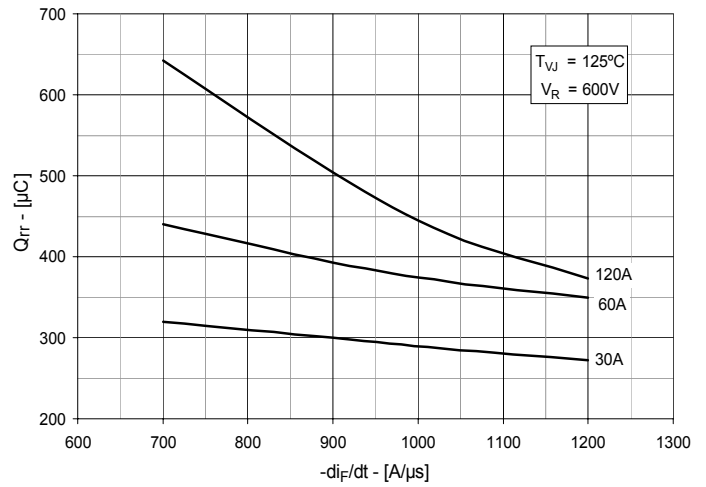
**Fig. 22. Typ. Reverse Recovery Charge  $Q_{rr}$  vs.  $-di_F/dt$**



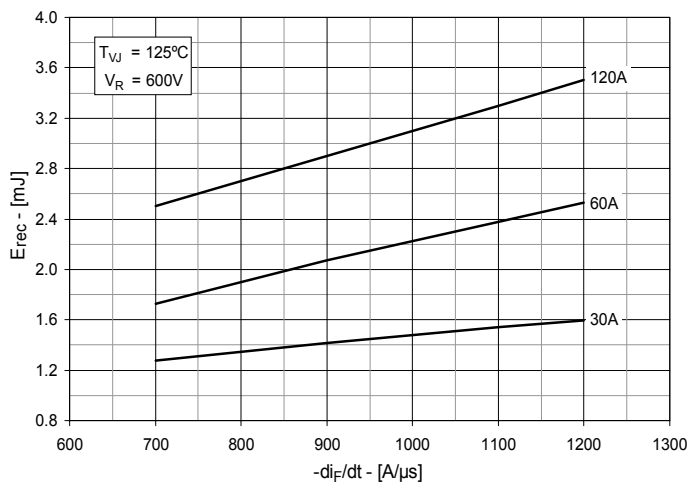
**Fig. 23. Typ. Peak Reverse Current  $I_{RM}$  vs.  $-di_F/dt$**



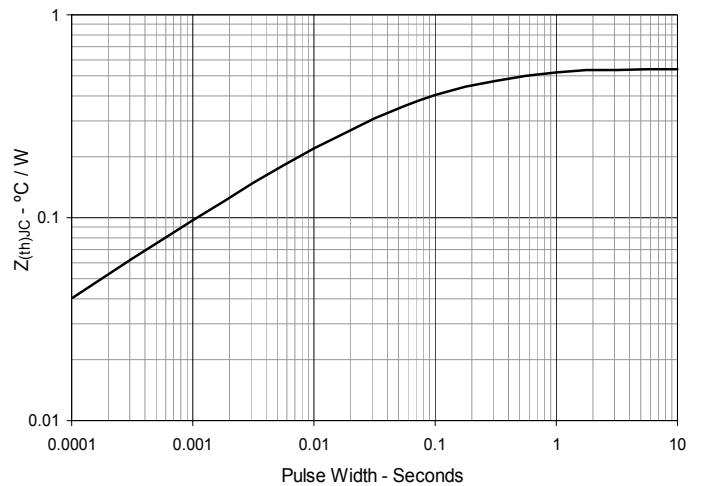
**Fig. 24. Typ. Recovery Time  $t_{rr}$  vs.  $-di_F/dt$**

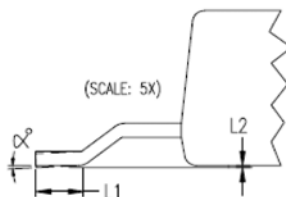
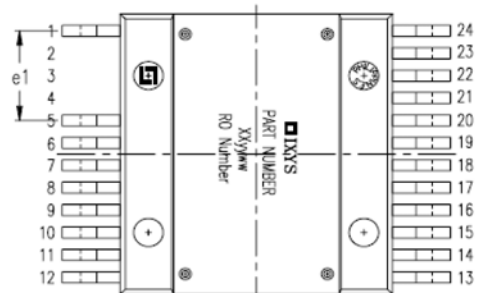
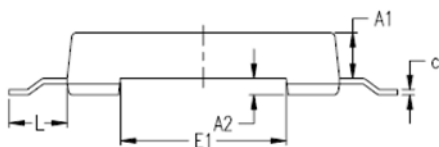
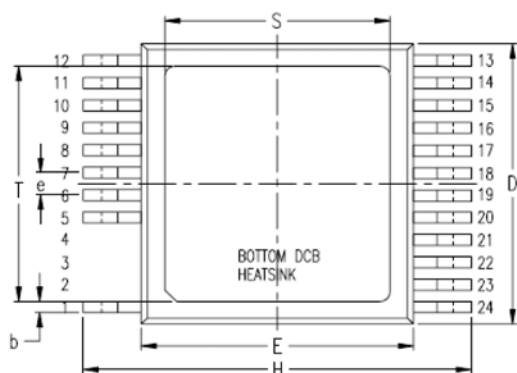


**Fig. 25. Typ. Recovery Energy  $E_{rec}$  vs.  $-di_F/dt$**



**Fig. 26. Maximum Transient Thermal Impedance**





SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.209	.224	5.30	5.70
A1	.154	.161	3.90	4.10
A2	.055	.063	1.40	1.60
b	.035	.045	0.90	1.15
c	.018	.026	0.45	0.65
D	.976	.994	24.80	25.25
E	.898	.915	22.80	23.25
E1	.543	.559	13.80	14.20
e	.079 BSC		2.00 BSC	
e1	.315 BSC		8.00 BSC	
H	1.272	1.311	32.30	33.30
L	.181	.209	4.60	5.30
L1	.051	.067	1.30	1.70
L2	.000	.006	0.00	0.15
S	.736	.760	18.70	19.30
T	.815	.839	20.70	21.30
α	0	4°	0	4°

**PIN:** 1 = Gate  
 5-12 = Emitter  
 13-24 = Collector





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