IXYS

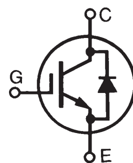
Preliminary Technical Information

XPT™ 600V IGBT GenX3™ w/Diode

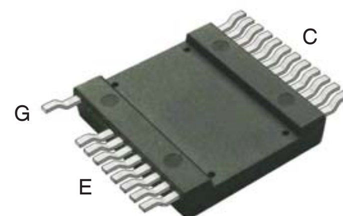
MMIX1X200N60B3H1

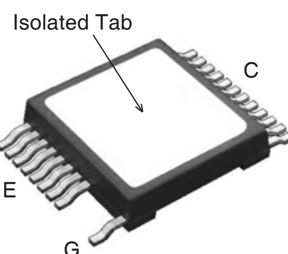
(Electrically Isolated Tab)

Extreme Light Punch Through IGBT for 10-30kHz Switching



V_{CES}	=	600V
I_{C110}	=	72A
$V_{CE(sat)}$	≤	1.7V
$t_{fi(typ)}$	=	110ns





G = Gate E = Emitter
C = Collector

Symbol	Test Conditions	Maximum Ratings	
V_{CES}	T_J = 25°C to 150°C	600	V
V_{CGR}	T_J = 25°C to 150°C, R_{GE} = 1MΩ	600	V
V_{GES}	Continuous	±20	V
V_{GEM}	Transient	±30	V
I_{C25}	T_C = 25°C (Chip Capability)	175	A
I_{C110}	T_C = 110°C	72	A
I_{F110}	T_C = 110°C	28	A
I_{CM}	T_C = 25°C, 1ms	1000	A
I_A	T_C = 25°C	100	A
E_{AS}	T_C = 25°C	1	J
SSOA (RBSOA)	V_{GE} = 15V, T_{VJ} = 150°C, R_G = 1Ω Clamped Inductive Load	I_{CM} = 400 @$V_{CE} \leq V_{CES}$	A
t_{sc} **(SCSOA)**	V_{GE} = 15V, V_{CE} = 360V, T_J = 150°C R_G = 10Ω, Non Repetitive	10	μs
P_C	T_C = 25°C	520	W
T_J		-55 ... +150	°C
T_{JM}		150	°C
T_{stg}		-55 ... +150	°C
T_L	Maximum Lead Temperature for Soldering	300	°C
T_{SOLD}	1.6 mm (0.062 in.) from Case for 10	260	°C
V_{ISOL}	50/60Hz, 1 minute	2500	V~
F_C	Mounting Force	50..200/11..45	N/lb.
Weight		8	g

Symbol	Test Conditions (T_J = 25°C, Unless Otherwise Specified)	Min.	Typ.	Max.	
BV_{CES}	I_C = 250μA, V_{GE} = 0V	600			V
$V_{GE(th)}$	I_C = 250μA, V_{CE} = V_{GE}	3.5		6.0	V
I_{CES}	V_{CE} = V_{CES}, V_{GE} = 0V			50	μA
	Note 2, T_J = 150°C			3	mA
I_{GES}	V_{CE} = 0V, V_{GE} = ±20V			±200	nA
$V_{CE(sat)}$	I_C = 100A, V_{GE} = 15V, Note 1		1.40	1.70	V
	T_J = 150°C		1.58		V

Features

- Silicon Chip on Direct-Copper Bond (DCB) Substrate
- Isolated Mounting Surface
- 2500V~ Electrical Isolation
- Optimized for Low Conduction and Switching Losses
- Avalanche Rated
- Short Circuit Capability
- Very High Current Capability
- Square RBSOA

Advantages

- High Power Density
- Low Gate Drive Requirement

Applications

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

© 2013 IXYS CORPORATION, All Rights Reserved

Symbol	Test Conditions ($T_J = 25°C$ Unless Otherwise Specified)	Min.	Typ.	Max.	
g_{fs}	$I_C = 60A$, $V_{CE} = 10V$, Note 1	27	45		S
C_{ies}	$V_{CE} = 25V$, $V_{GE} = 0V$, f = 1MHz		9970		pF
C_{oes}			570		pF
C_{res}			183		pF
$Q_{g(on)}$	$I_C = 200A$, $V_{GE} = 15V$, $V_{CE} = 0.5 \bullet V_{CES}$		315		nC
Q_{ge}			98		nC
Q_{gc}			130		nC
$t_{d(on)}$	**Inductive load, $T_J = 25°C$**		48		ns
t_{ri}	$I_C = 100A$, $V_{GE} = 15V$		100		ns
E_{on}	$V_{CE} = 360V$, $R_G = 1\Omega$		2.85		mJ
$t_{d(off)}$	Note 3		160		ns
t_{fi}			110		ns
E_{off}			2.90	4.40	mJ
$t_{d(on)}$	**Inductive load, $T_J = 150°C$**		46		ns
t_{ri}	$I_C = 100A$, $V_{GE} = 15V$		94		ns
E_{on}	$V_{CE} = 360V$, $R_G = 1\Omega$		4.40		mJ
$t_{d(off)}$	Note 3		180		ns
t_{fi}			215		ns
E_{off}			3.45		mJ
R_{thJC}				0.24	°C/W
R_{thCS}			0.05		°C/W

Reverse Diode (FRED)

Symbol	Test Conditions ($T_J = 25°C$ Unless Otherwise Specified)	Min.	Typ.	Max.	
V_F	$I_F = 100A$, $V_{GE} = 0V$, Note 1			2.5	V
	$T_J = 150°C$		2.3		V
I_{RM}	$I_F = 100A$, $V_{GE} = 0V$, $T_J = 150°C$		95		A
t_{rr}	$-di_F/dt = 1500A/\mu s$, $V_R = 300V$		100		ns
R_{thJC}				0.83	°C/W

Notes:

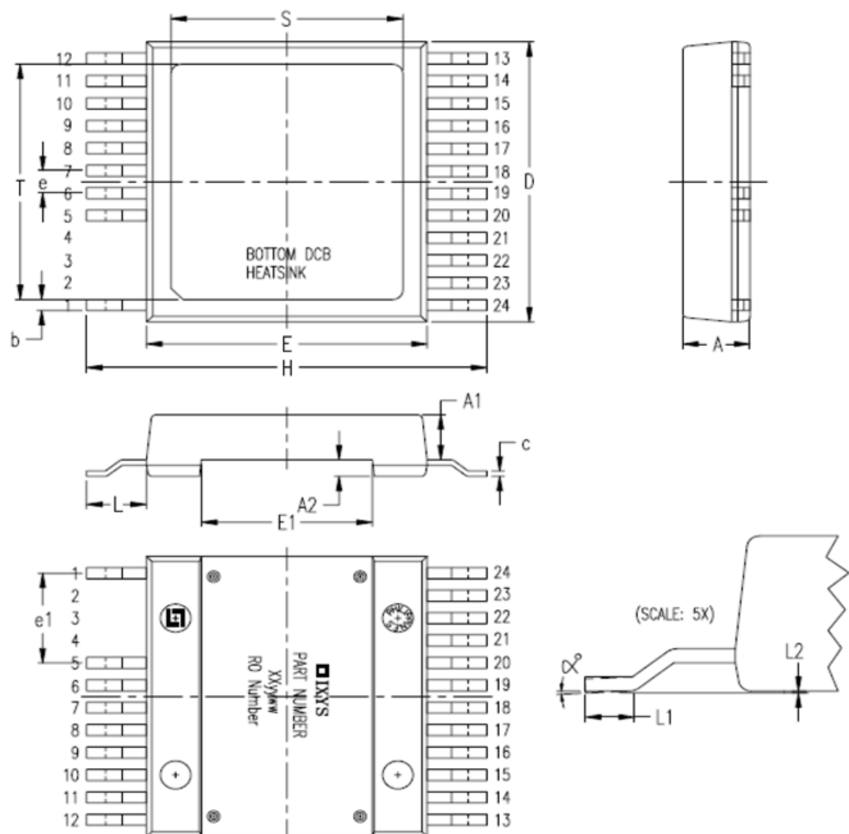
1. Pulse test, $t \leq 300\mu s$, duty cycle, $d \leq 2\%$.
2. Part must be heatsunk for high-temp I_{CES} measurement.
3. Switching times & energy losses may increase for higher V_{CE}(Clamp), T_J or R_G.

PRELIMANARY 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.

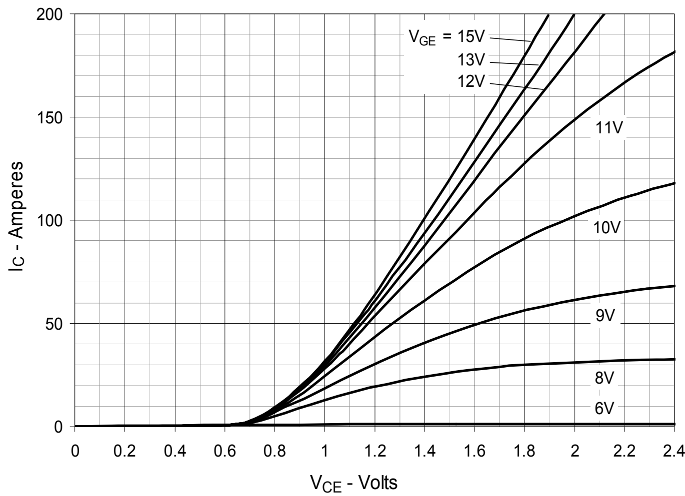
IXYS MOSFETs and IGBTs are covered by one or more of the following U.S. patents: 4,835,592 4,931,844 5,049,961 5,237,481 6,162,665 6,404,065 B1 6,683,344 6,727,585 7,005,734 B2 7,157,338B2 4,860,072 5,017,508 5,063,307 5,381,025 6,259,123 B1 6,534,343 6,710,405 B2 6,759,692 7,063,975 B2 4,881,106 5,034,796 5,187,117 5,486,715 6,306,728 B1 6,583,505 6,710,463 6,771,478 B2 7,071,537

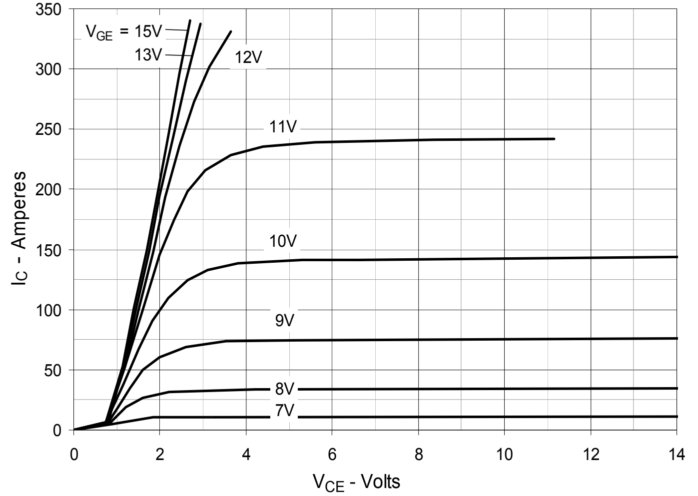


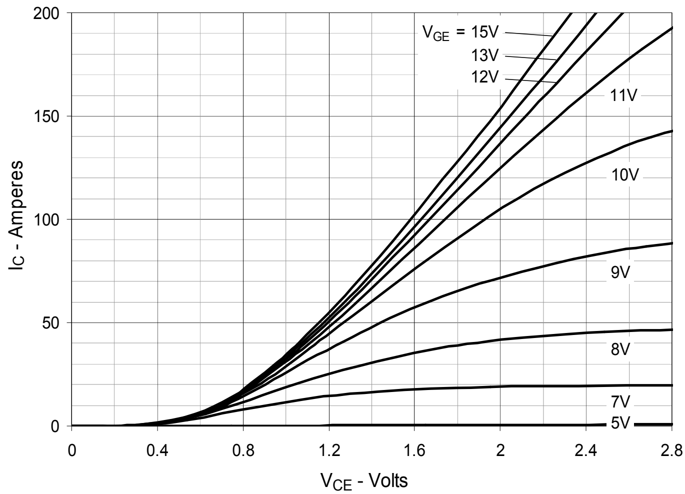
SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.209	.224	5.30	5.70
A1	.154	.161	3.90	4.10
A2	.055	.063	1.40	1.60
b	.035	.045	0.90	1.15
c	.018	.026	0.45	0.65
D	.976	.994	24.80	25.25
E	.898	.915	22.80	23.25
E1	.543	.559	13.80	14.20
e	.079 BSC		2.00 BSC	
e1	.315 BSC		8.00 BSC	
H	1.272	1.311	32.30	33.30
L	.181	.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°

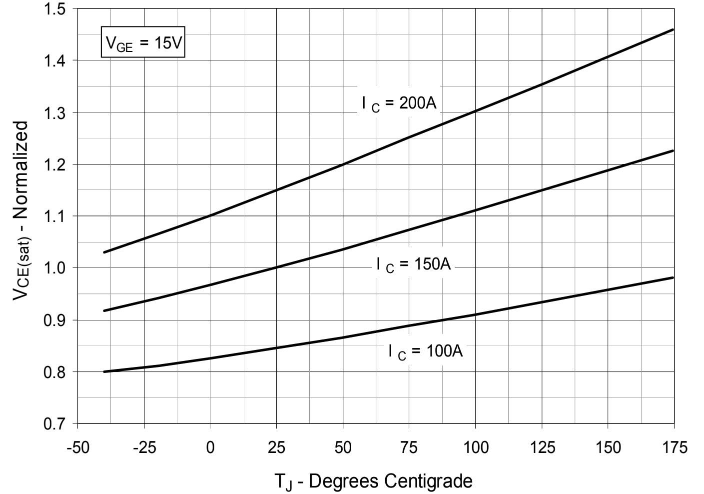
PIN: 1 = Gate
5-12 = Emitter
13-24 = Collector

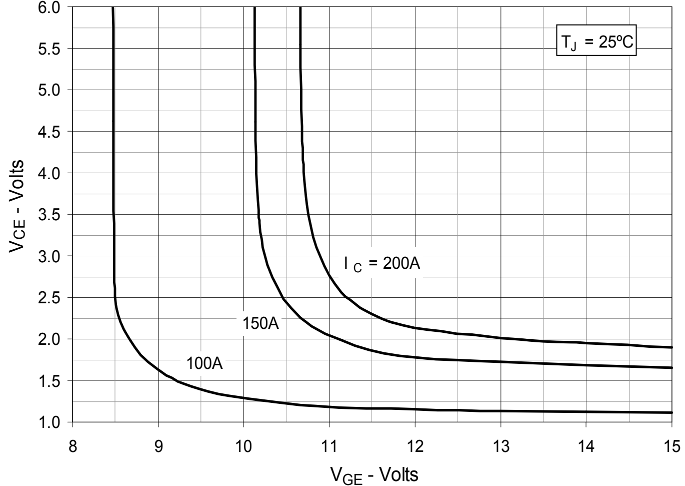
© 2013 IXYS CORPORATION, All Rights Reserved

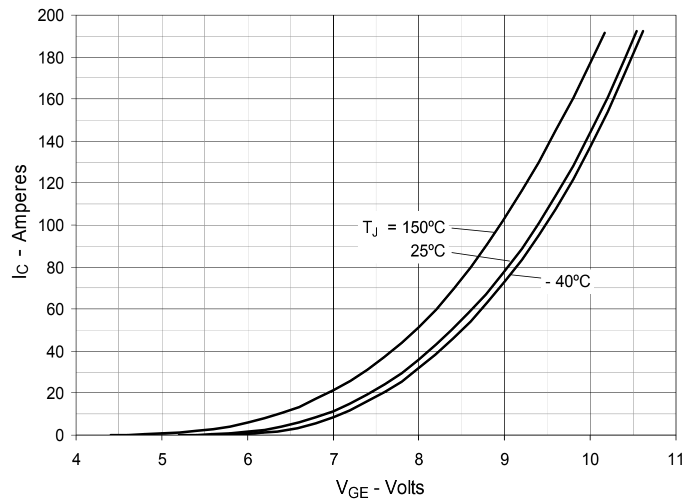




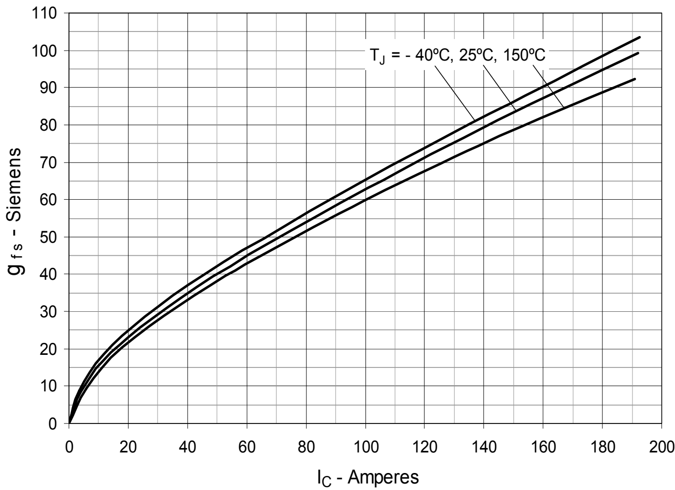


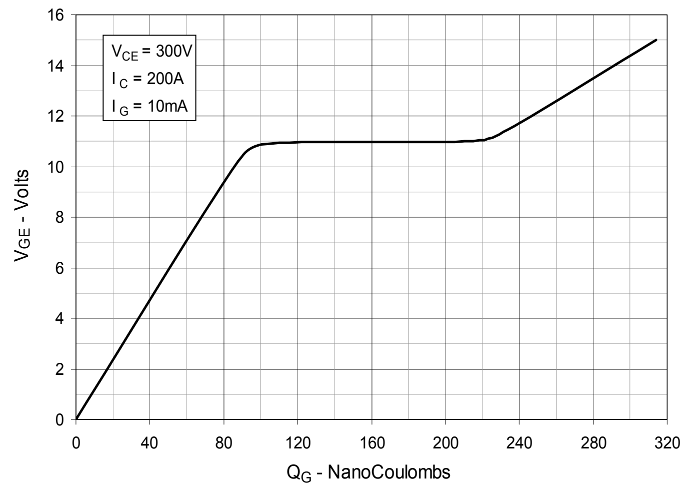


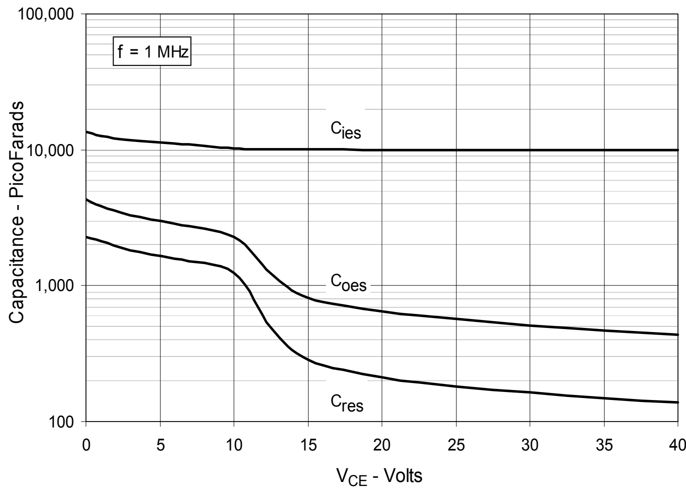


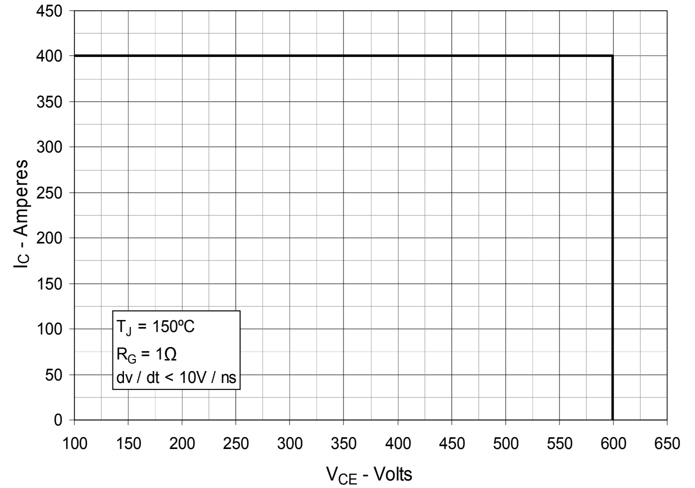


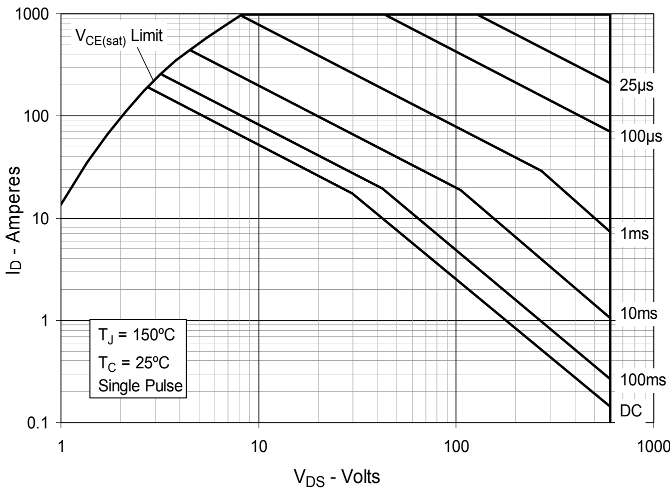
IXYS Reserves the Right to Change Limits, Test Conditions, and Dimensions.

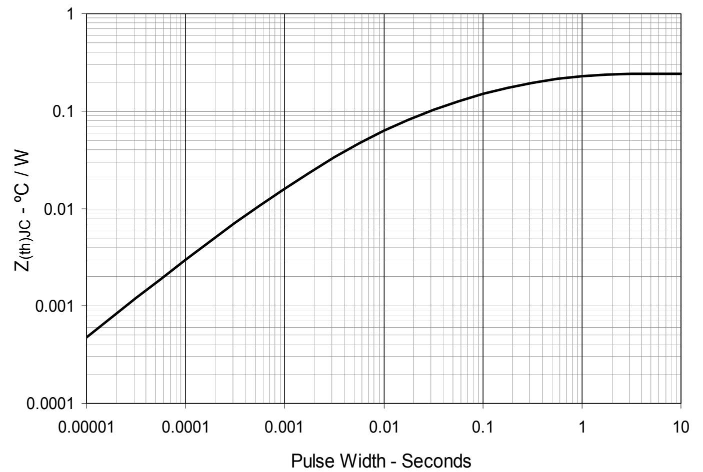




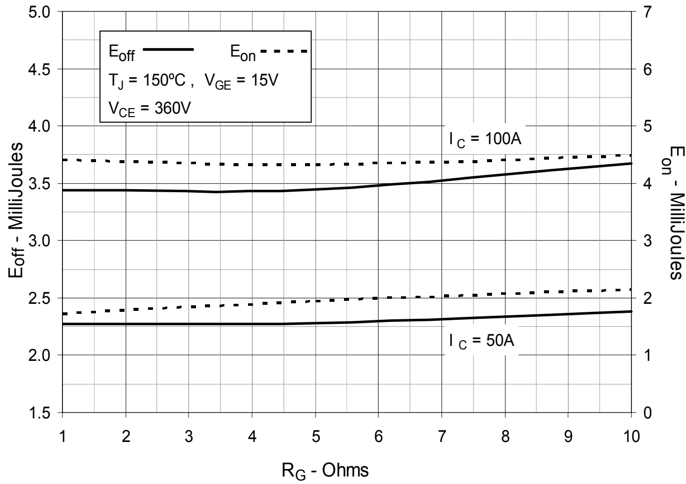


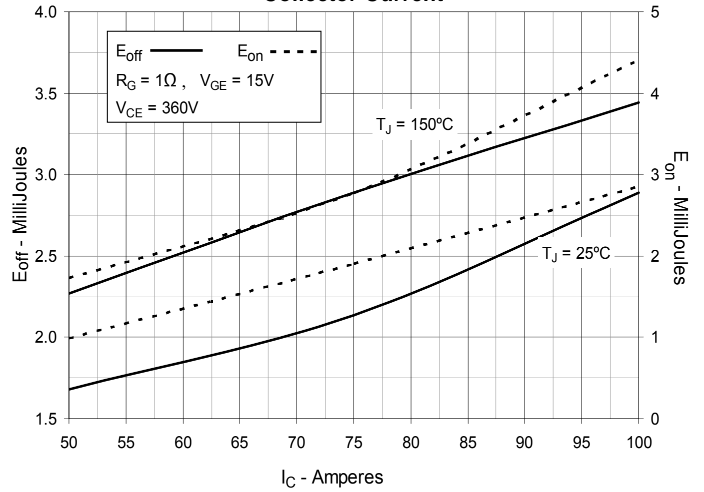


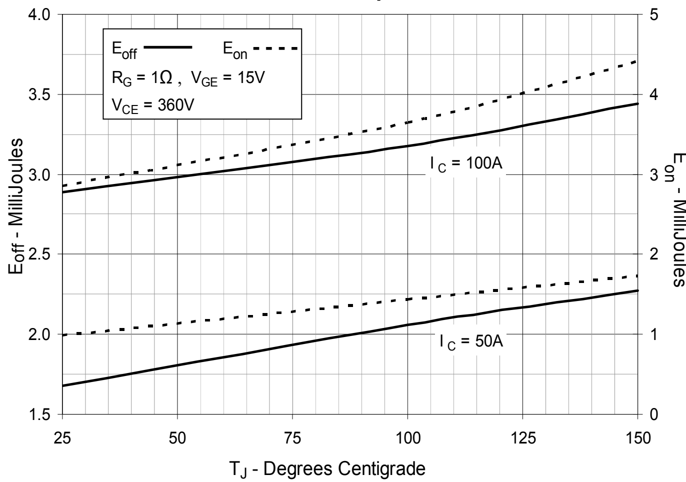


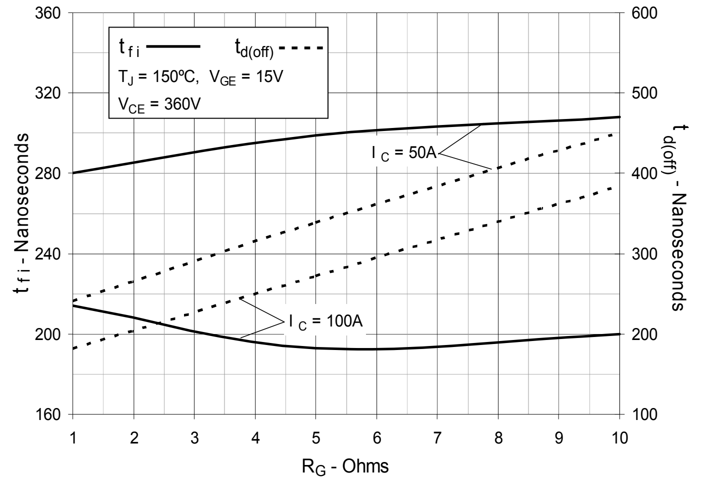


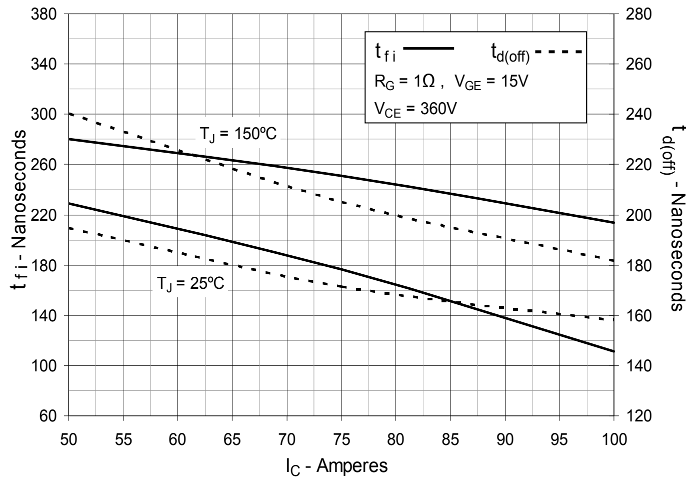
© 2013 IXYS CORPORATION, All Rights Reserved

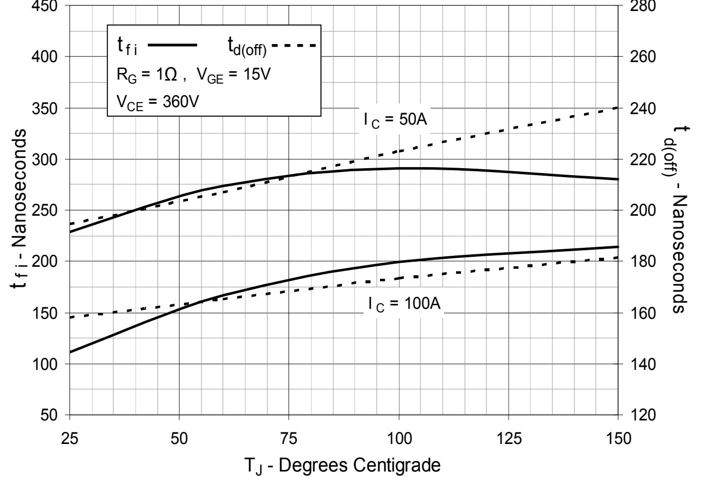












IXYS Reserves the Right to Change Limits, Test Conditions, and Dimensions.

Fig. 19. Inductive Turn-on Switching Times vs. Gate Resistance

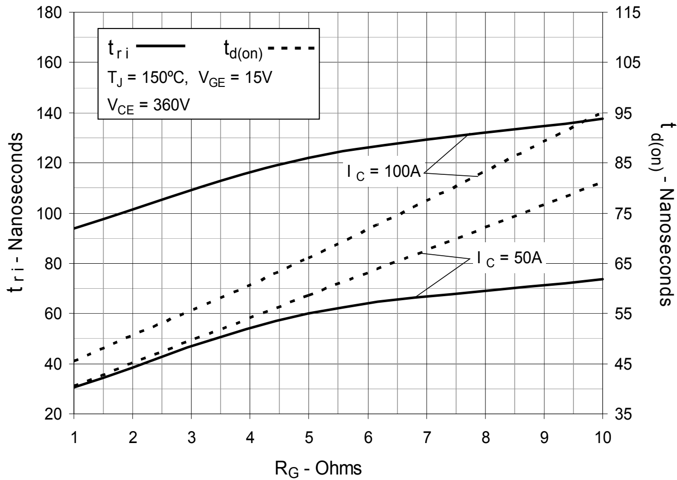


Fig. 20. Inductive Turn-on Switching Times vs. Collector Current

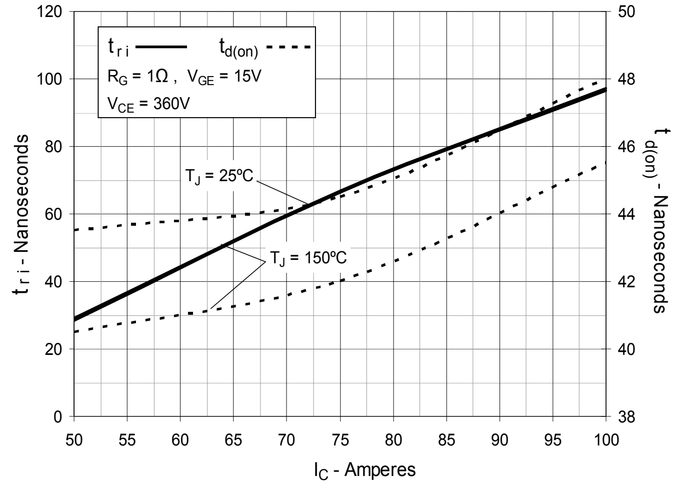
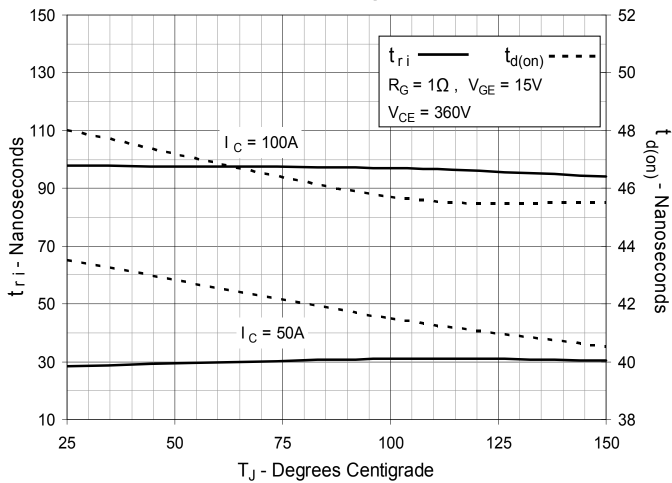


Fig. 21. Inductive Turn-on Switching Times vs. Junction Temperature



© 2013 IXYS CORPORATION, All Rights Reserved

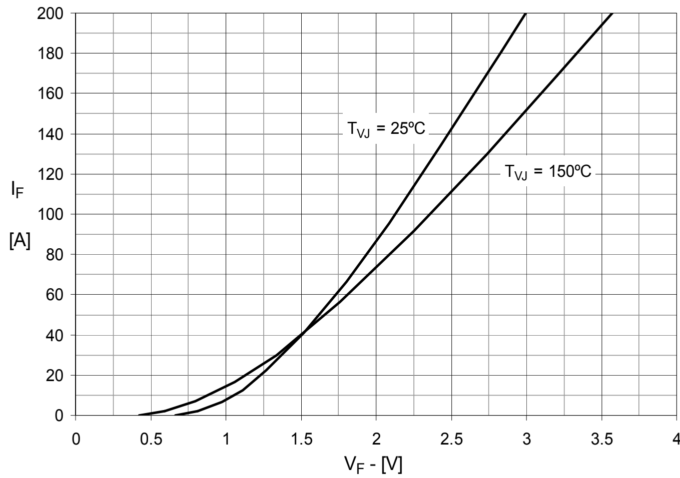


Fig. 22. Typ. Forward characteristics

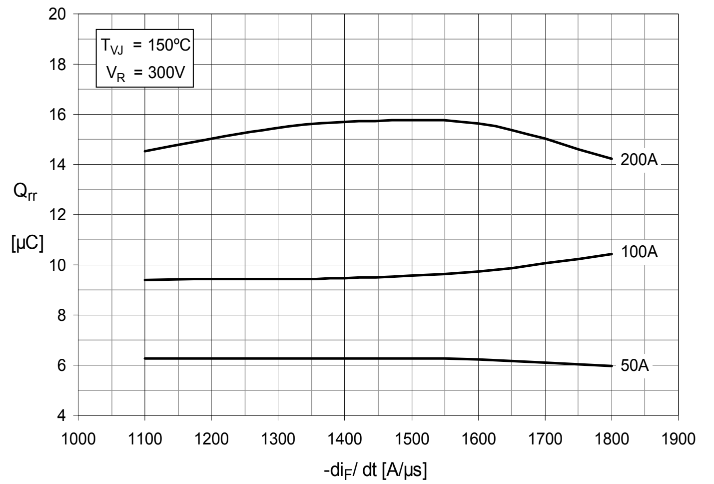


Fig. 23. Typ. Reverse Recovery Charge Q_{rr} vs. $-di_F/dt$

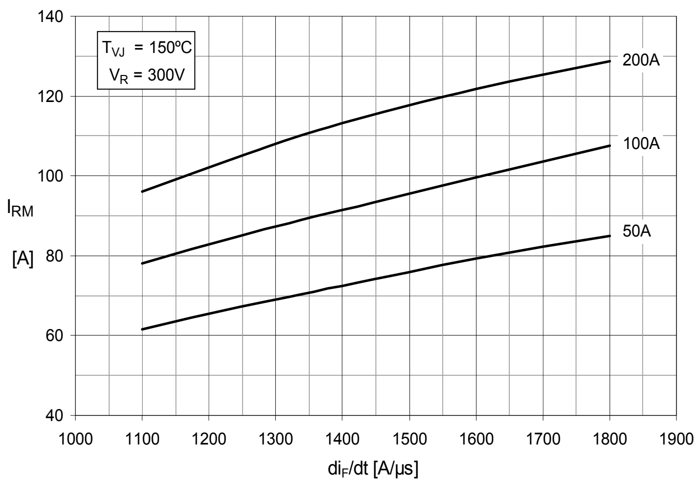


Fig. 24. Typ. Peak Reverse Current I_{RM} vs. $-di_F/dt$

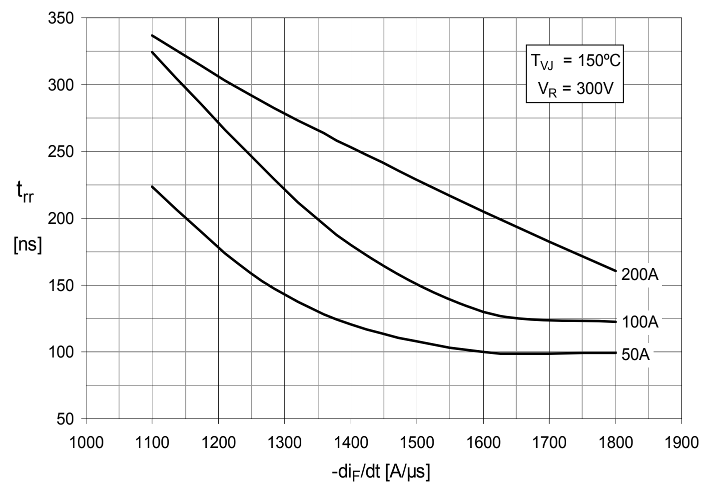


Fig. 25. Typ. Recovery Time t_{rr} vs. $-di_F/dt$

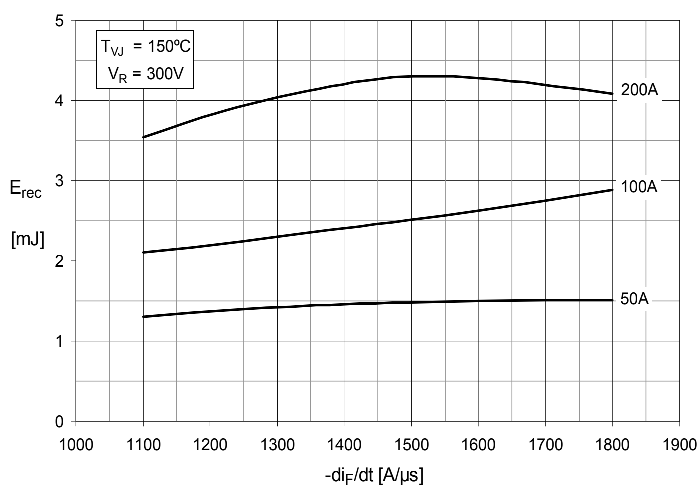


Fig. 26. Typ. Recovery Energy E_{rec} vs. $-di_F/dt$

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

Disclaimer Notice - Information furnished is believed to be accurate and reliable. However, users should independently evaluate the suitability of and test each product selected for their own applications. Littelfuse products are not designed for, and may not be used in, all applications. Read complete Disclaimer Notice at www.littelfuse.com/disclaimer-electronics.