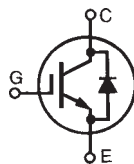


1200V XPT™ IGBT GenX3™ w/ Diode

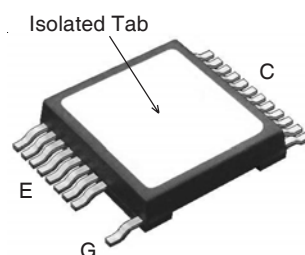
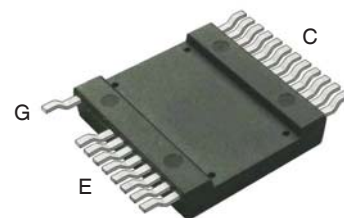
MMIX1Y100N120C3H1

High-Speed IGBT
for 20-50 kHz Switching



$$\begin{aligned} V_{CES} &= 1200V \\ I_{C110} &= 40A \\ V_{CE(sat)} &\leq 3.5V \\ t_{fi(typ)} &= 110ns \end{aligned}$$

Symbol	Test Conditions	Maximum Ratings	
V_{CES}	$T_J = 25^\circ\text{C}$ to 150°C	1200	V
V_{CGR}	$T_J = 25^\circ\text{C}$ to 150°C , $R_{GE} = 1M\Omega$	1200	V
V_{GES}	Continuous	± 20	V
V_{GEM}	Transient	± 30	V
I_{C25}	$T_C = 25^\circ\text{C}$ (Chip Capability)	92	A
I_{C110}	$T_C = 110^\circ\text{C}$	40	A
I_{F110}	$T_C = 110^\circ\text{C}$	34	A
I_{CM}	$T_C = 25^\circ\text{C}$, 1ms	440	A
I_A	$T_C = 25^\circ\text{C}$	50	A
E_{AS}	$T_C = 25^\circ\text{C}$	1.2	J
SSOA (RBSOA)	$V_{GE} = 15V$, $T_{VJ} = 125^\circ\text{C}$, $R_G = 1\Omega$ Clamped Inductive Load	$I_{CM} = 200$ $@ V_{CE} \leq V_{CES}$	A
P_C	$T_C = 25^\circ\text{C}$	400	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	300	$^\circ\text{C}$
T_{SOLD}	1.6 mm (0.062 in.) from Case for 10	260	$^\circ\text{C}$
V_{ISOL}	50/60Hz, 1 minute	2500	V~
F_C	Mounting Force	50..200/11..45	N/lb.
Weight		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 ($T_J = 25^\circ\text{C}$, Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
BV_{CES}	$I_C = 250\mu\text{A}$, $V_{GE} = 0V$	1200		V
$V_{GE(th)}$	$I_C = 250\mu\text{A}$, $V_{CE} = V_{GE}$	3.0		5.0 V
I_{CES}	$V_{CE} = V_{CES}$, $V_{GE} = 0V$ Note 2, $T_J = 125^\circ\text{C}$			50 μA 3 mA
I_{GES}	$V_{CE} = 0V$, $V_{GE} = \pm 20V$			± 100 nA
$V_{CE(sat)}$	$I_C = 100A$, $V_{GE} = 15V$, Note 1 $T_J = 125^\circ\text{C}$	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}	$I_C = 60\text{A}, V_{CE} = 10\text{V}, \text{Note } 1$	30	52	S
C_{ies}	$V_{CE} = 25\text{V}, V_{GE} = 0\text{V}, f = 1\text{MHz}$		6000	pF
C_{oes}			353	pF
C_{res}			130	pF
$Q_{g(on)}$	$I_C = 100\text{A}, V_{GE} = 15\text{V}, V_{CE} = 0.5 \cdot V_{CES}$		270	nC
Q_{ge}			50	nC
Q_{gc}			93	nC
$t_{d(on)}$	Inductive load, $T_J = 25^\circ\text{C}$ $I_C = 100\text{A}, V_{GE} = 15\text{V}$ $V_{CE} = 0.5 \cdot V_{CES}, R_G = 1\Omega$ Note 3		32	ns
t_{ri}			90	ns
E_{on}			6.50	mJ
$t_{d(off)}$			123	ns
t_{fi}			110	ns
E_{off}			2.90	5.00 mJ
$t_{d(on)}$	Inductive load, $T_J = 125^\circ\text{C}$ $I_C = 100\text{A}, V_{GE} = 15\text{V}$ $V_{CE} = 0.5 \cdot V_{CES}, R_G = 1\Omega$ Note 3		32	ns
t_{ri}			90	ns
E_{on}			10.10	mJ
$t_{d(off)}$			140	ns
t_{fi}			125	ns
E_{off}			3.55	mJ
R_{thJC}			0.05	0.31°C/W
R_{thCS}			30	$^\circ\text{C/W}$
R_{thJA}				$^\circ\text{C/W}$

Reverse Diode (Sonic-FRD)

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

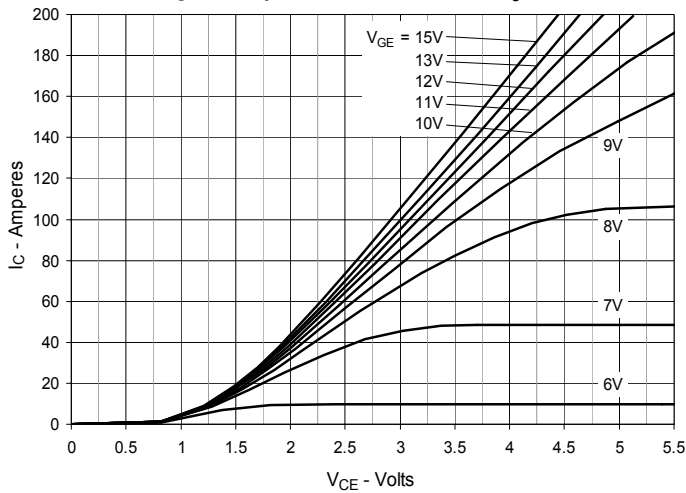
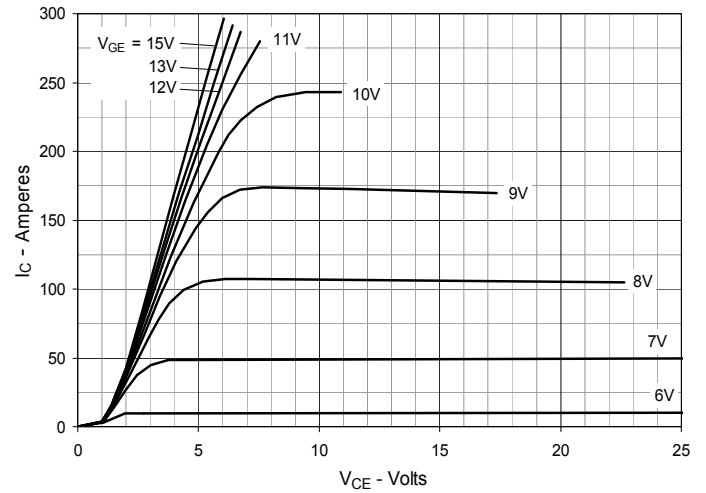
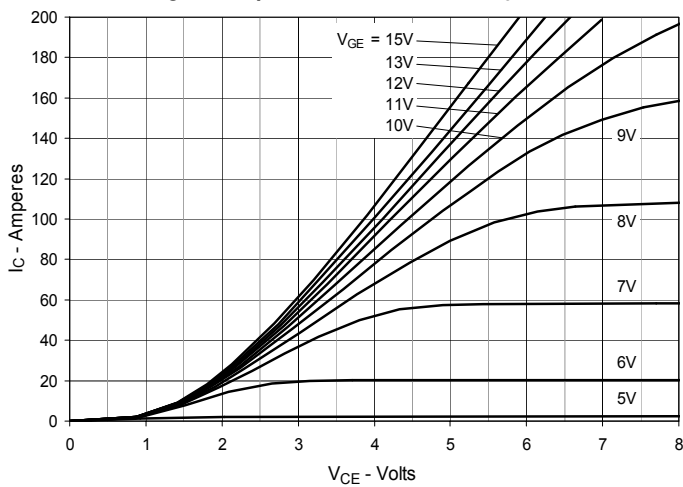
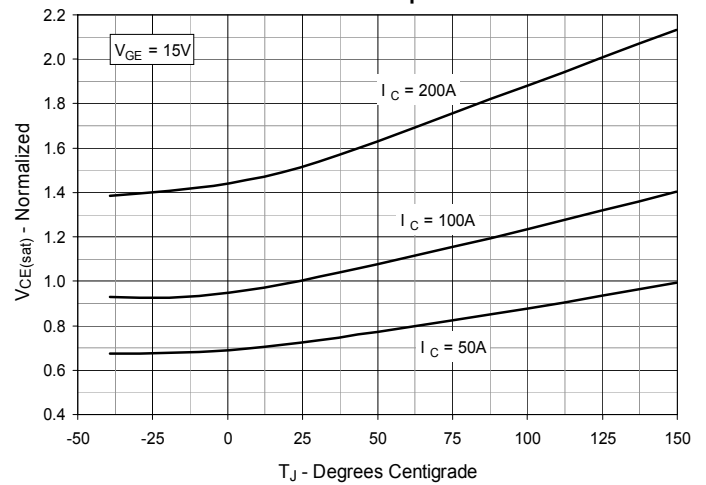
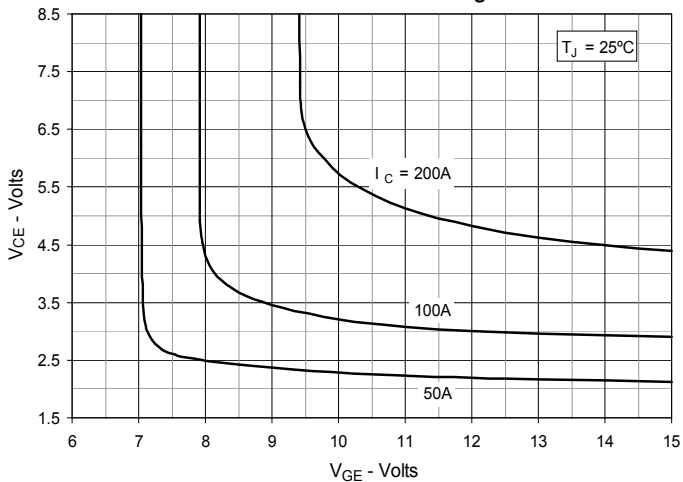
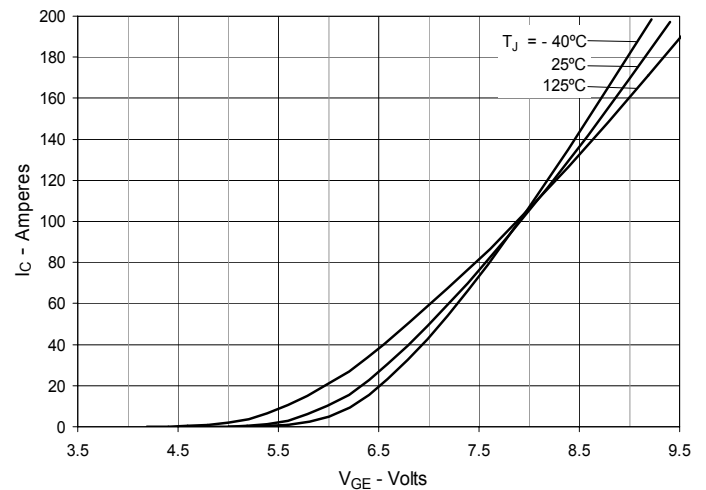
Fig. 1. Output Characteristics @ $T_J = 25^\circ\text{C}$

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 $V_{DS(sat)}$ on Junction Temperature

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

Fig. 6. Input Admittance


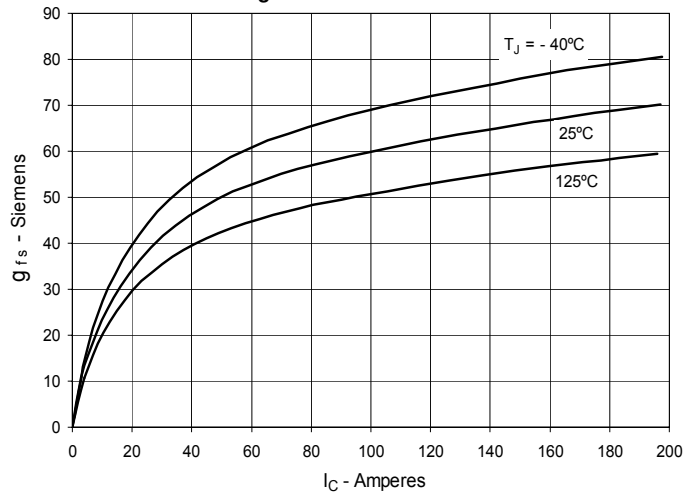
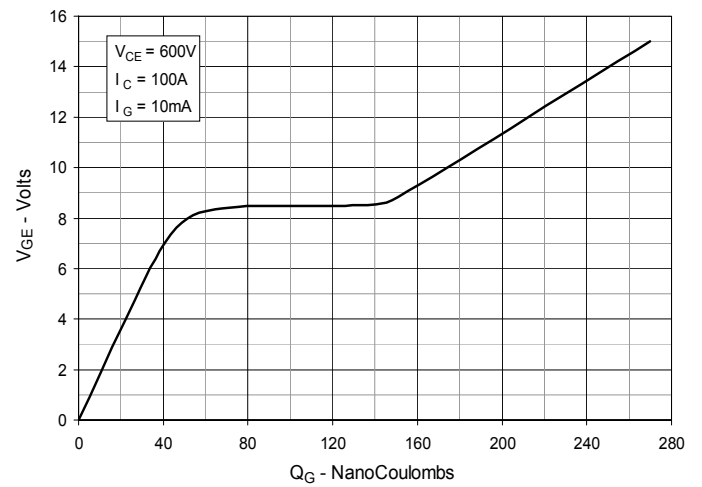
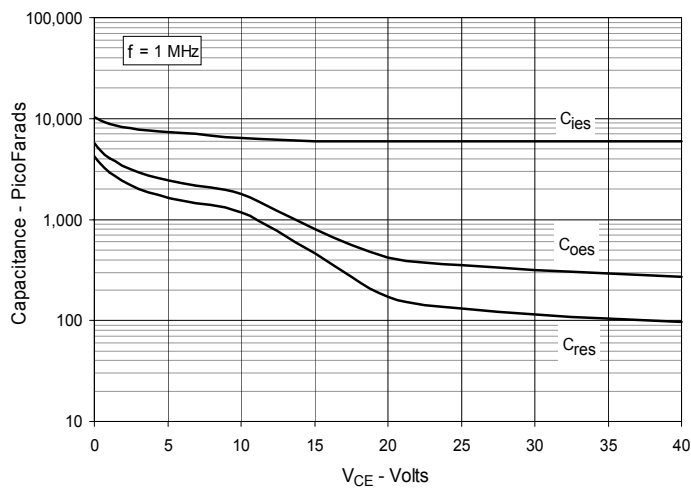
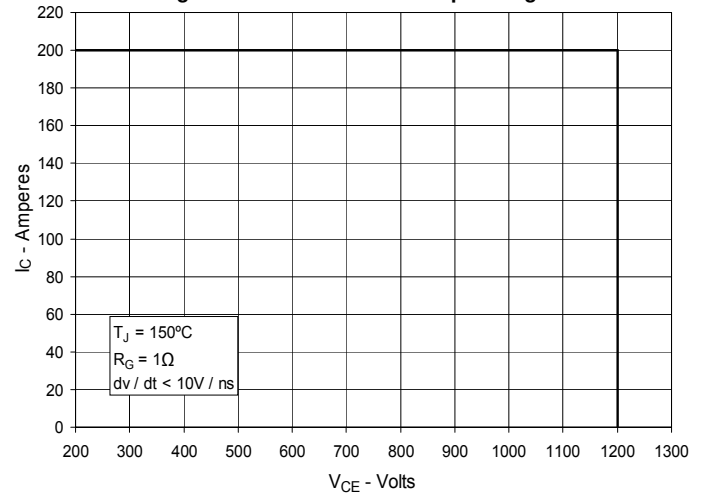
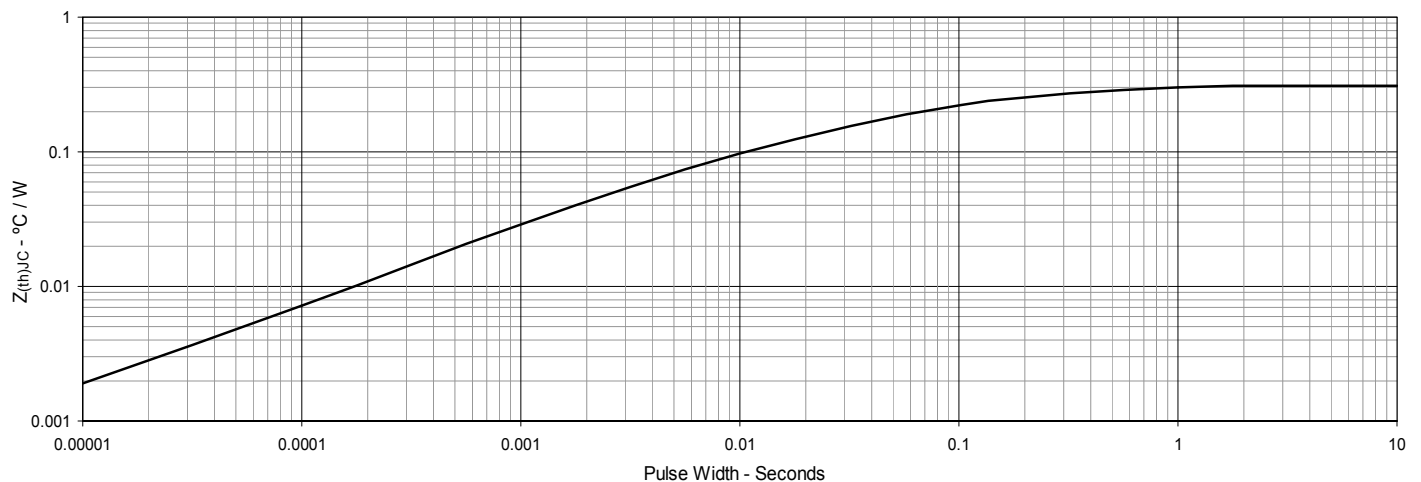
Fig. 7. Transconductance

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

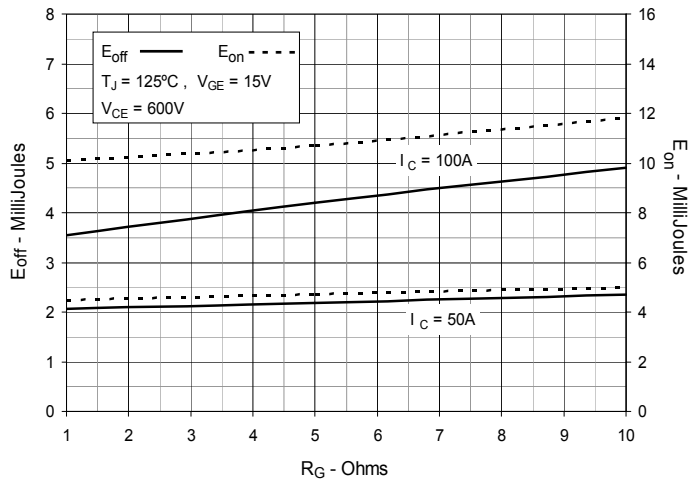


Fig. 13. Inductive Switching Energy Loss vs. Collector Current

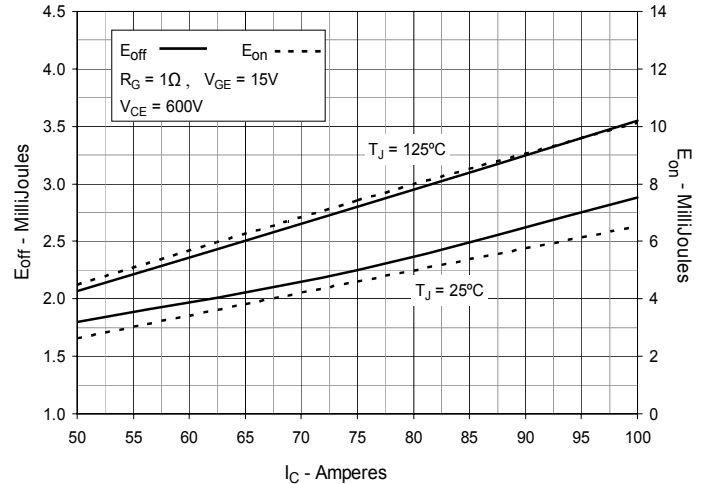


Fig. 14. Inductive Switching Energy Loss vs. Junction Temperature

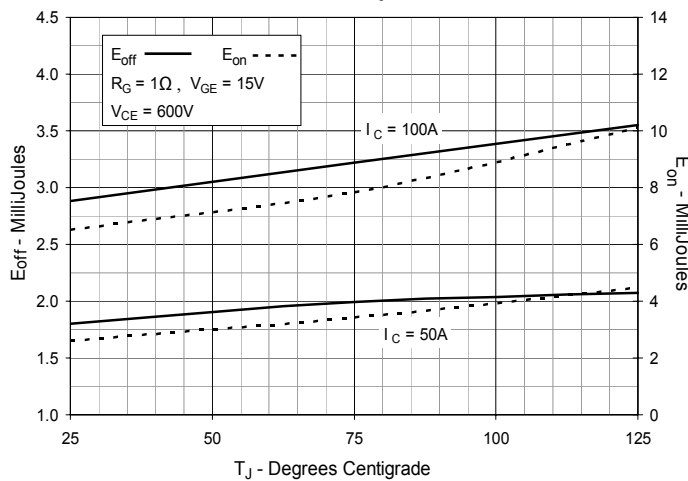


Fig. 15. Inductive Turn-off Switching Times vs. Gate Resistance

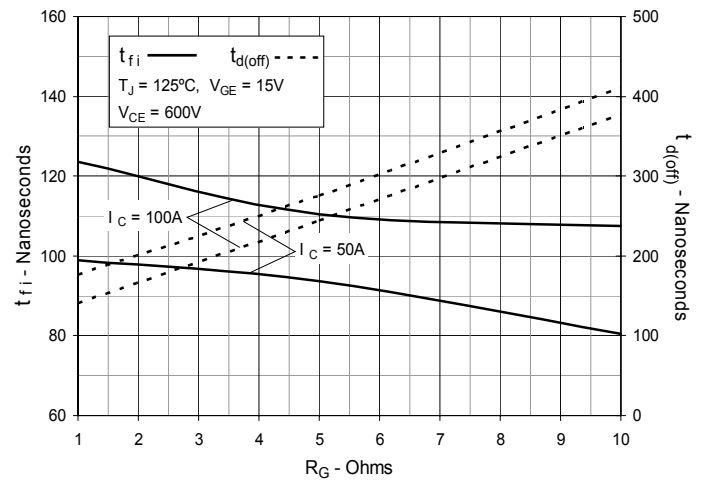


Fig. 16. Inductive Turn-off Switching Times vs. Collector Current

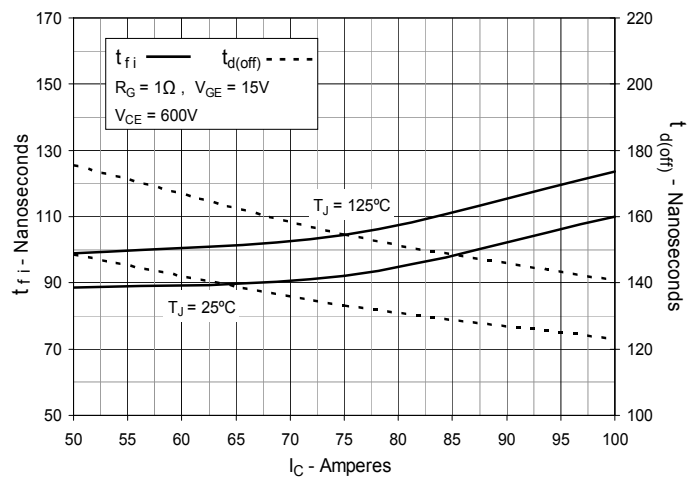


Fig. 17. Inductive Turn-off Switching Times vs. Junction Temperature

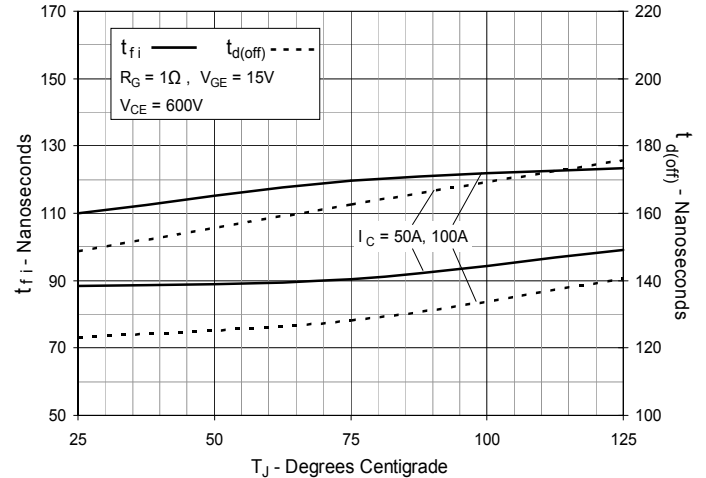


Fig. 18. Inductive Turn-on Switching Times vs. Gate Resistance

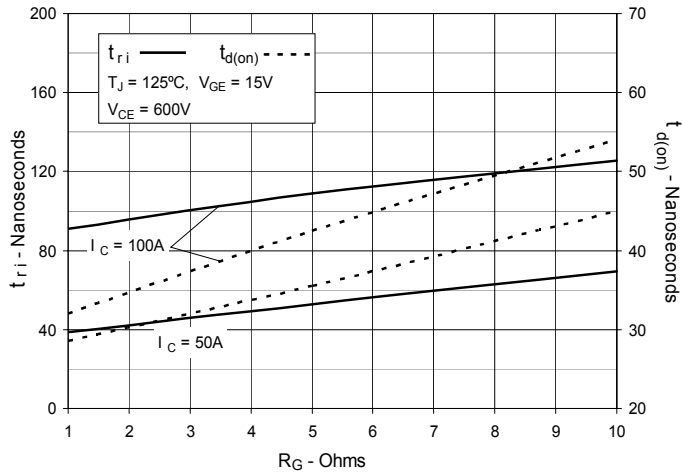


Fig. 19. Inductive Turn-on Switching Times vs. Collector Current

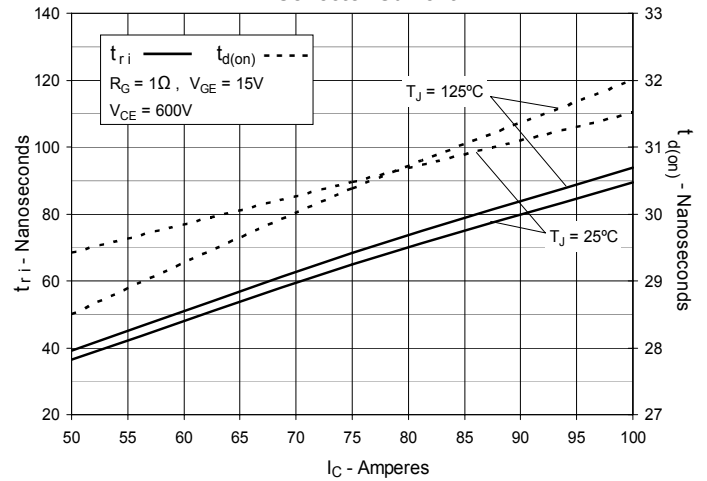


Fig. 20. Inductive Turn-on Switching Times vs. Junction Temperature

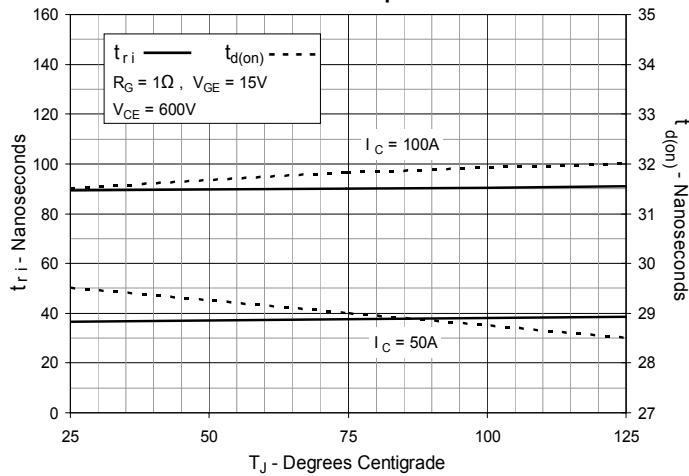
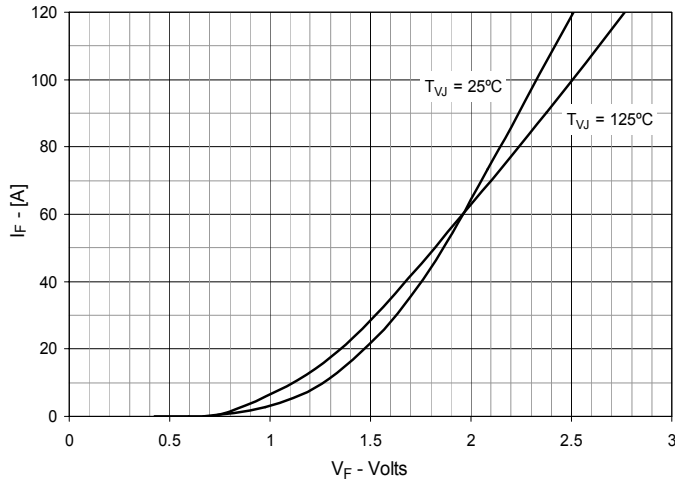
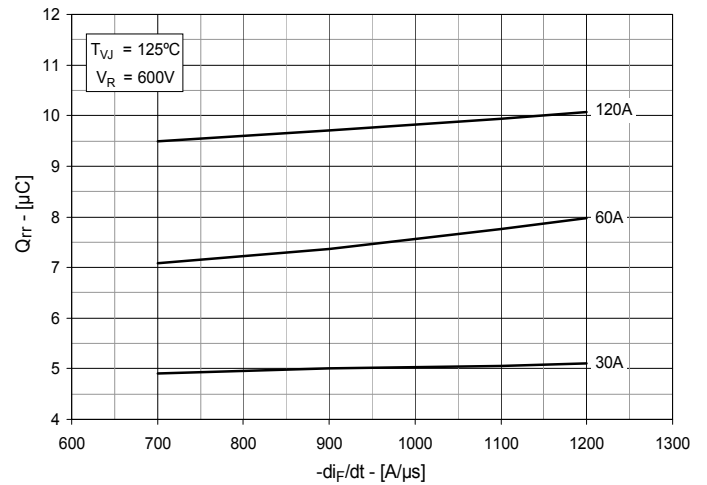
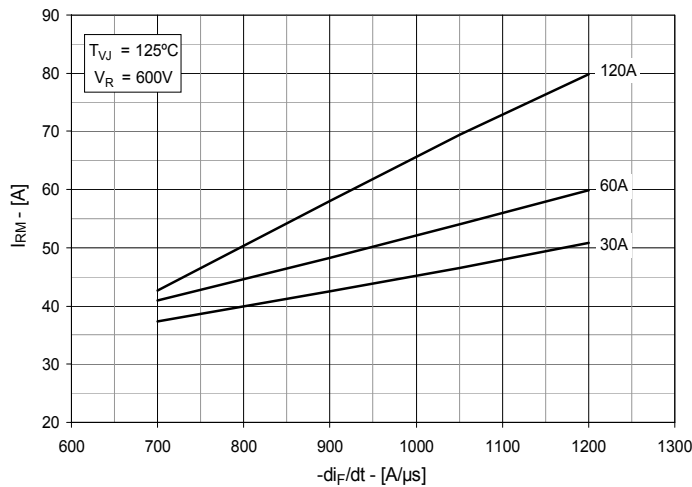
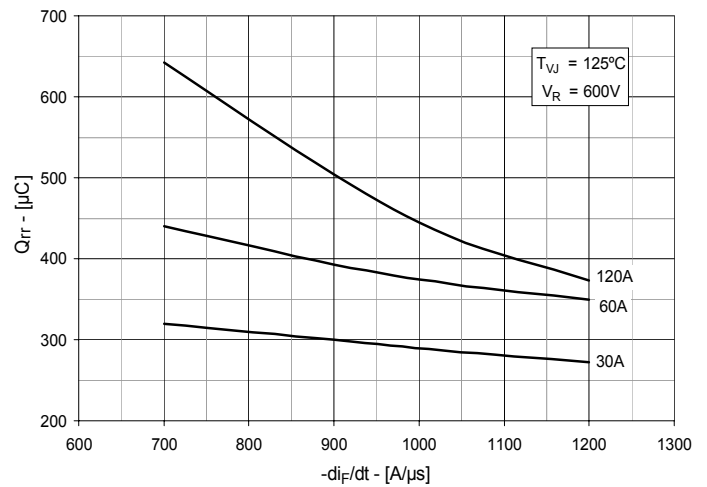
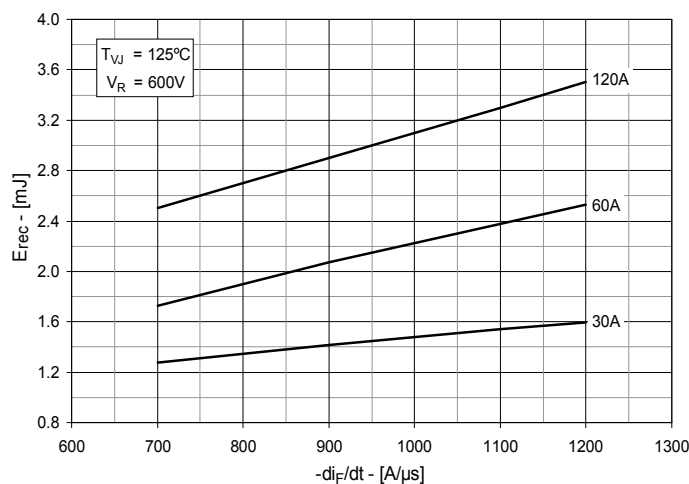
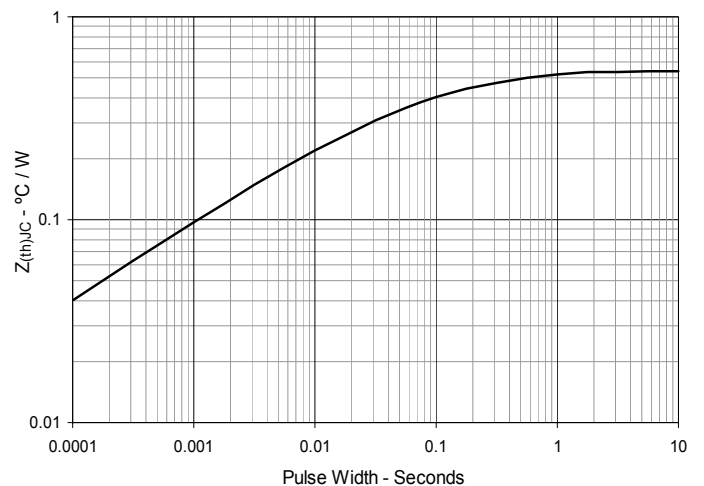
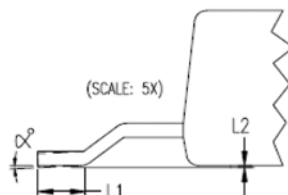
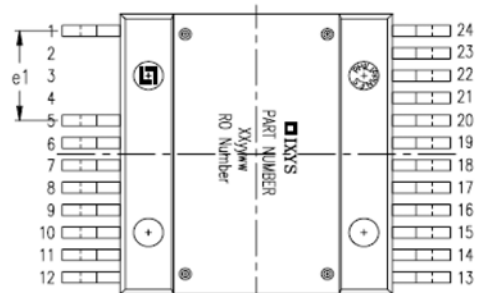
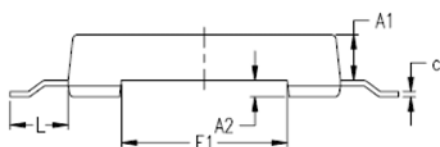
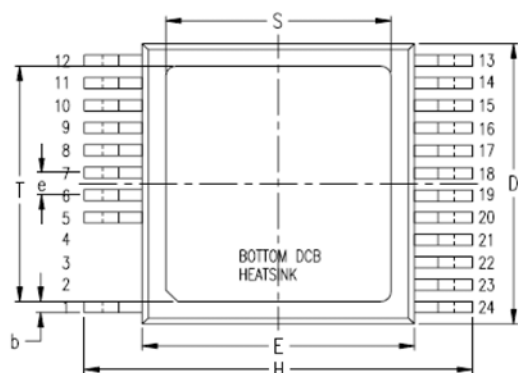


Fig. 21. Typ. Forward Characteristics

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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