

High Voltage XPT™ IGBT w/ Diode

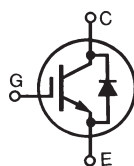
MMIX1Y25N250CV1

$$V_{CES} = 2500V$$

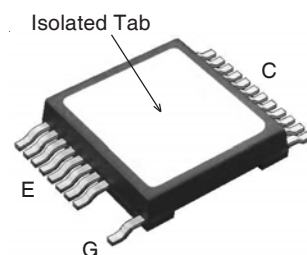
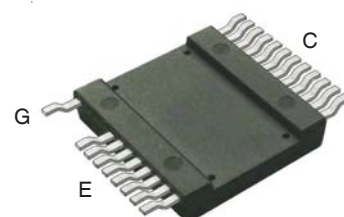
$$I_{C110} = 18A$$

$$V_{CE(sat)} \leq 4.0V$$

(Electrically Isolated Tab)



Symbol	Test Conditions	Maximum Ratings	
V_{CES}	$T_J = 25^\circ\text{C}$ to 175°C	2500	V
V_{CGR}	$T_J = 25^\circ\text{C}$ to 175°C , $R_{GE} = 1\text{M}\Omega$	2500	V
V_{GES}	Continuous	± 20	V
V_{GEM}	Transient	± 30	V
I_{C25}	$T_C = 25^\circ\text{C}$	36	A
I_{C110}	$T_C = 110^\circ\text{C}$	18	A
I_{F110}	$T_C = 110^\circ\text{C}$	14	A
I_{CM}	$T_C = 25^\circ\text{C}$, 1ms	270	A
SSOA (RBSOA)	$V_{GE} = 15V$, $T_{VJ} = 150^\circ\text{C}$, $R_G = 5\Omega$	$I_{CM} = 100$	A
	Clamped Inductive Load	1500	V
P_C	$T_C = 25^\circ\text{C}$	230	W
T_J		-55 ... +175	$^\circ\text{C}$
T_{JM}		175	$^\circ\text{C}$
T_{stg}		-55 ... +175	$^\circ\text{C}$
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
C = Collector

E = Emitter

Features

- Silicon Chip on Direct-Copper Bond (DCB) Substrate
- Isolated Heatsink Surface
- 2500V~ Electrical Isolation
- Anti-Parallel Diode
- High Current Handling Capability

Advantages

- High Power Density
- Low Gate Drive Requirement

Applications

- Switch-Mode and Resonant-Mode Power Supplies
- Uninterruptible Power Supplies (UPS)
- Laser Generators
- Capacitor Discharge Circuits
- AC Switches

Symbol	Test Conditions ($T_J = 25^\circ\text{C}$, Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
BV_{CES}	$I_C = 250\mu\text{A}$, $V_{GE} = 0V$	2500		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, $T_J = 100^\circ\text{C}$		100	25 μA μA
I_{GES}	$V_{CE} = 0V$, $V_{GE} = \pm 20V$			± 100 nA
$V_{CE(sat)}$	$I_C = 25A$, $V_{GE} = 15V$, Note 1 $T_J = 150^\circ\text{C}$		3.4 4.7	4.0 V V

Symbol Test Conditions(T_J = 25°C Unless Otherwise Specified)**Characteristic Values****Min. Typ. Max.**

g_{fs}	I _C = 25A, V _{CE} = 10V, Note 1	16	27	S
R_{Gi}	Gate Input Resistance		2.8	Ω
C_{ies}	V _{CE} = 25V, V _{GE} = 0V, f = 1MHz		3060	pF
C_{oes}			166	pF
C_{res}			43	pF
Q_{g(on)}	I _C = 25A, V _{GE} = 15V, V _{CE} = 0.5 • V _{CES}		147	nC
Q_{ge}			16	nC
Q_{gc}			68	nC
t_{d(on)}	Inductive load, T_J = 25°C I _C = 25A, V _{GE} = 15V V _{CE} = 0.5 • V _{CES} , R _G = 5Ω Note 3		15	ns
t_{ri}			34	ns
E_{on}			8.3	mJ
t_{d(off)}			230	ns
t_{fi}			246	ns
E_{off}			7.3	mJ
t_{d(on)}	Inductive load, T_J = 150°C I _C = 25A, V _{GE} = 15V V _{CE} = 0.5 • V _{CES} , R _G = 5Ω Note 3		18	ns
t_{ri}			33	ns
E_{on}			11.0	mJ
t_{d(off)}			225	ns
t_{fi}			350	ns
E_{off}			10.5	mJ
R_{thJC}				0.65 °C/W
R_{thCS}		0.15		°C/W

Reverse Sonic Diode (FRD)**Symbol Test Conditions**(T_J = 25°C Unless Otherwise Specified)**Characteristic Values****Min. Typ. Max.**

V_F	I _F = 25A, V _{GE} = 0V, Note 1	T _J = 150°C		3.5	V
			3.1		V
I_{RM}	I _F = 25A, V _{GE} = 0V, T _J = 150°C -di _F /dt = 500A/μs, V _R = 1200V		38		A
t_{rr}			185		ns
R_{thJC}				0.86	°C/W

Notes:

1. Pulse test, t ≤ 300μs, duty cycle, d ≤ 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.

ADVANCE 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.

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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 @ $T_J = 25^\circ\text{C}$

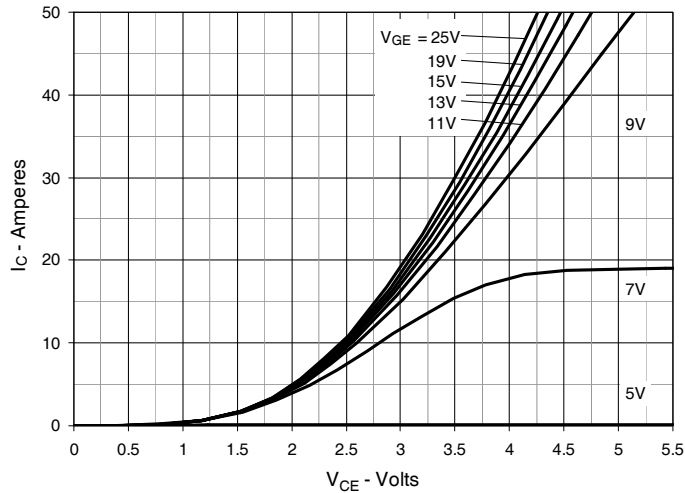


Fig. 2. Extended Output Characteristics @ $T_J = 25^\circ\text{C}$

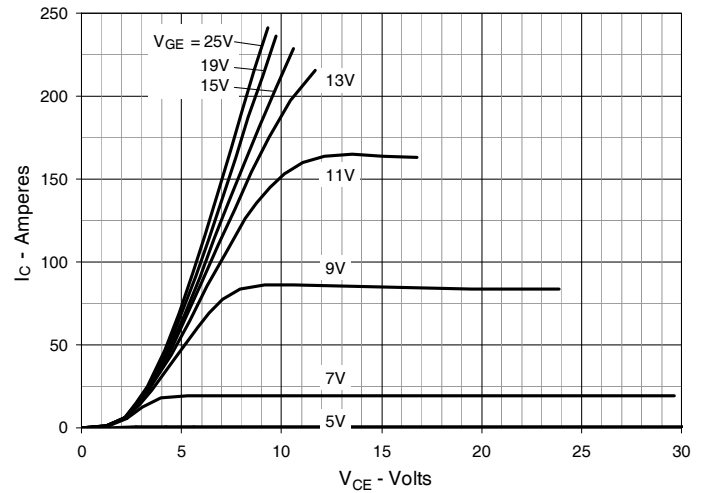


Fig. 3. Output Characteristics @ $T_J = 150^\circ\text{C}$

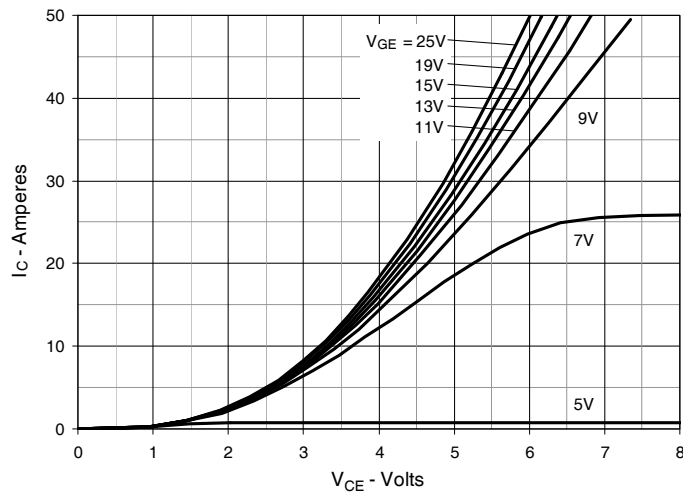


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

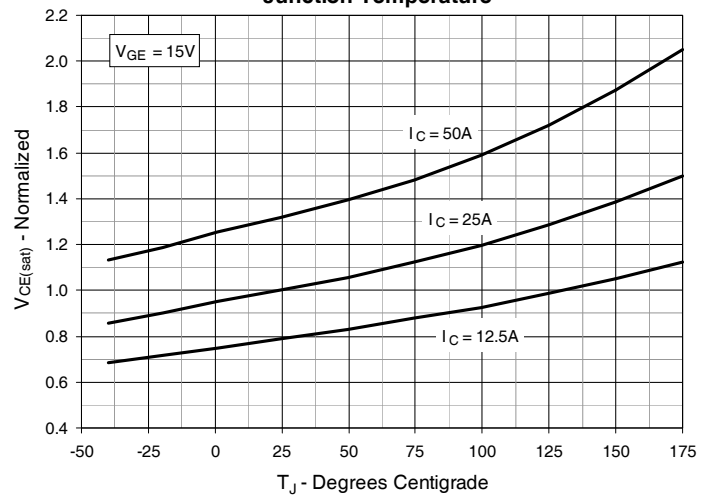


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

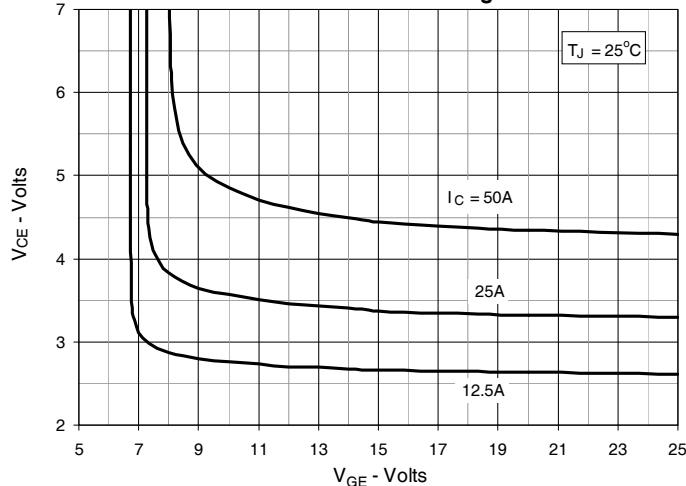


Fig. 6. Input Admittance

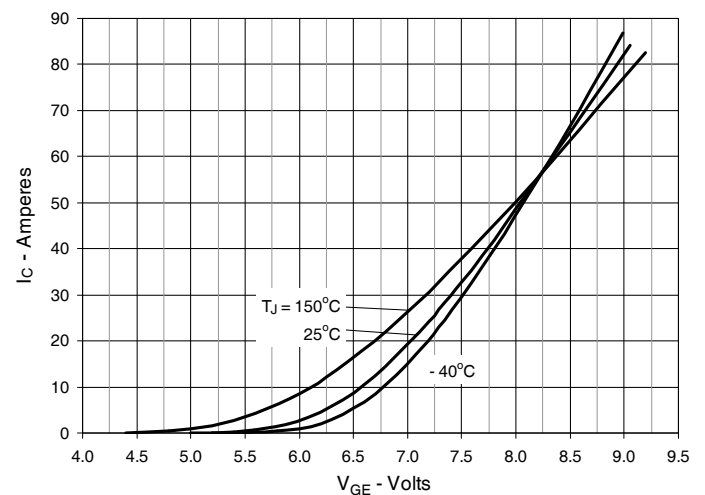


Fig. 7. Transconductance

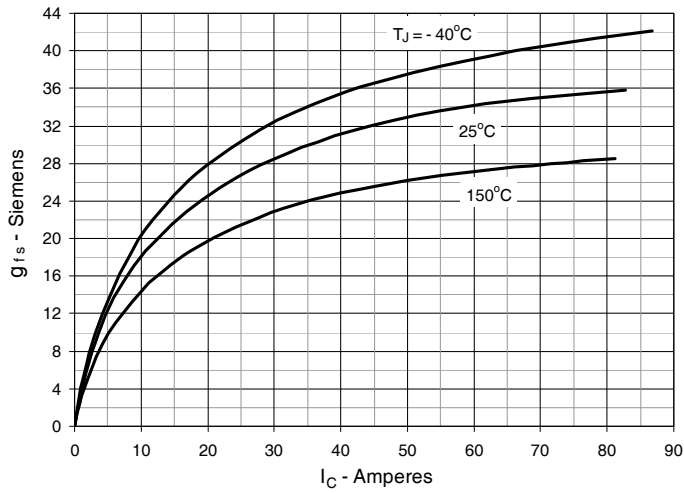


Fig. 8. Gate Charge

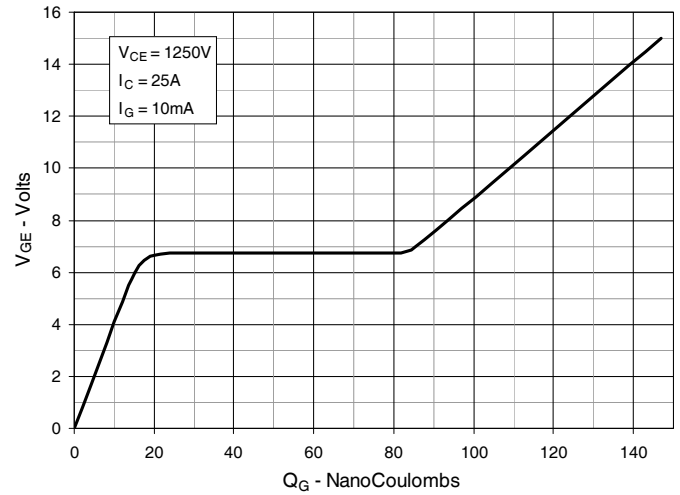


Fig. 9. Capacitance

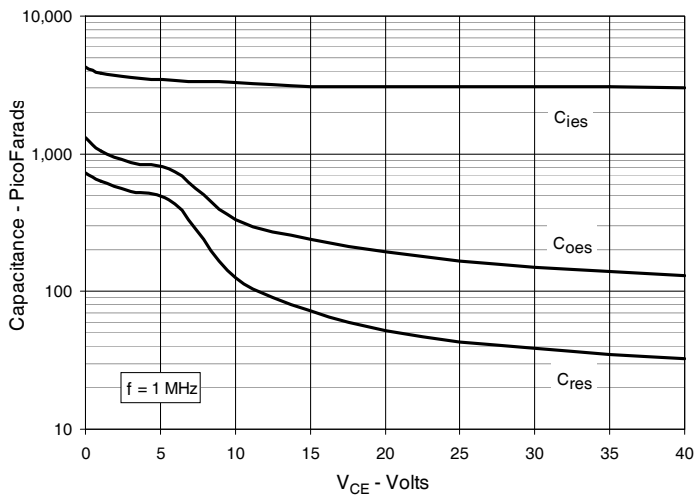


Fig. 10. Reverse-Bias Safe Operating Area

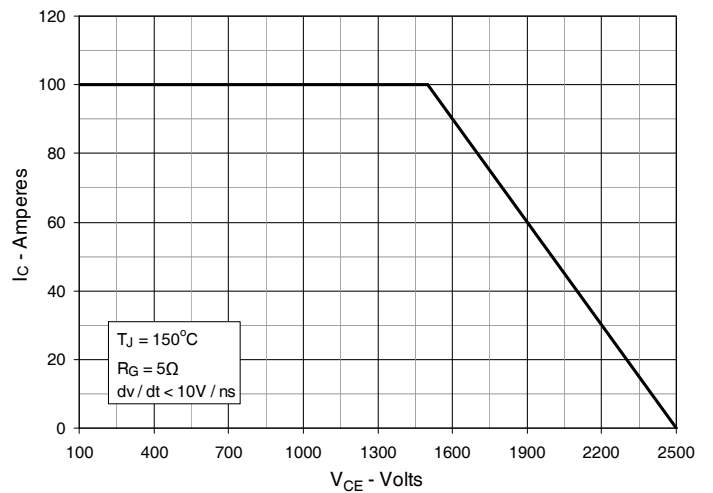


Fig. 11. Forward-Bias Safe Operating Area

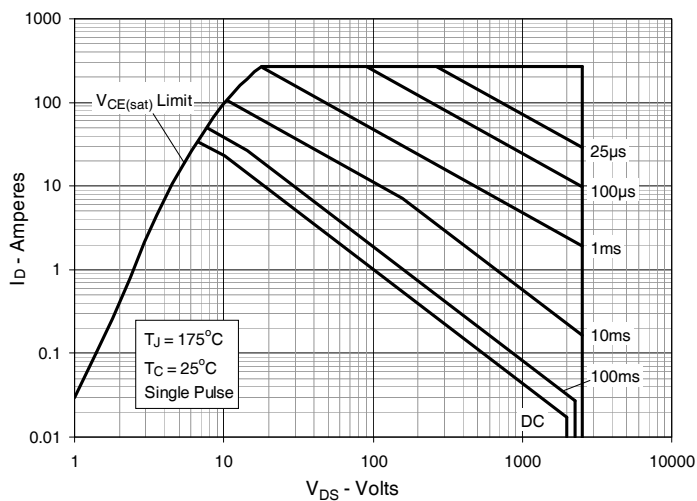


Fig. 12. Maximum Transient Thermal Impedance (IGBT)

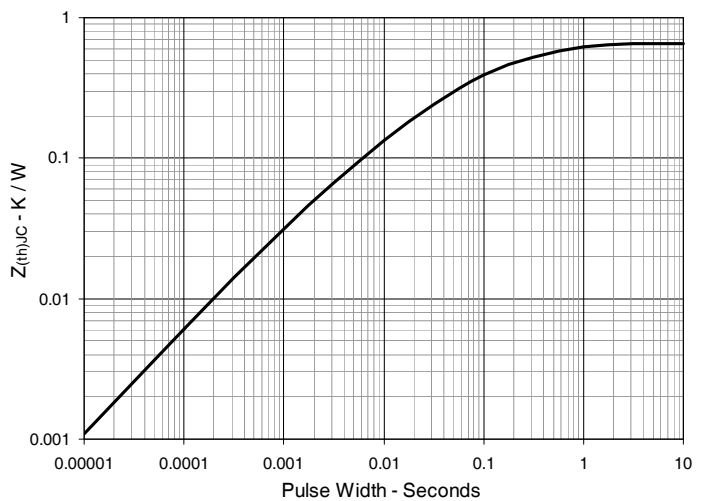


Fig. 13. Inductive Switching Energy Loss vs. Gate Resistance

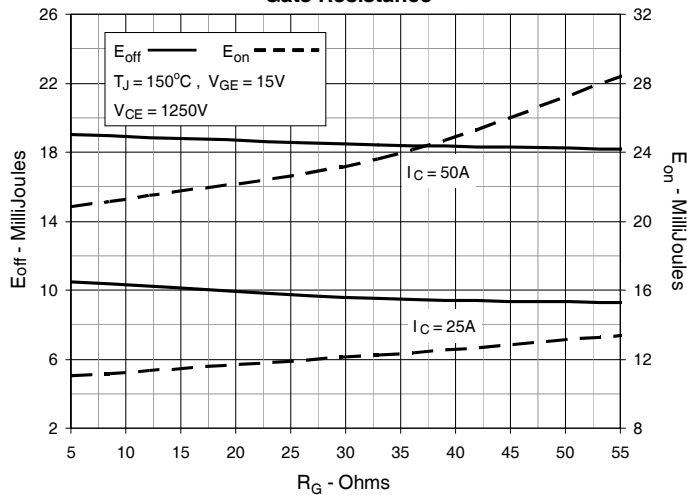


Fig. 14. Inductive Switching Energy Loss vs. Collector Current

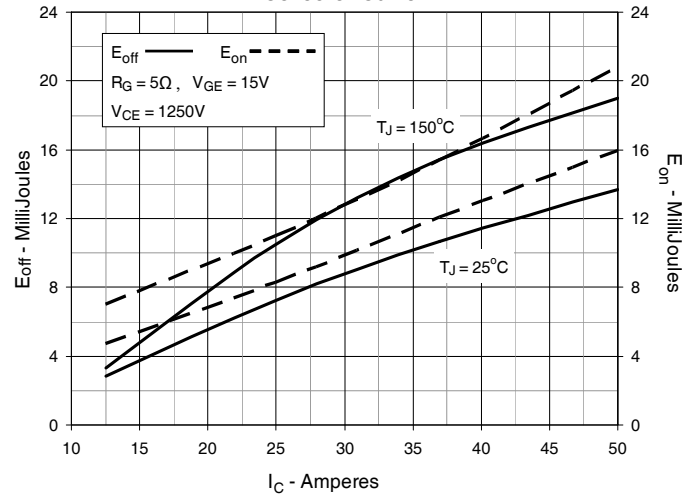


Fig. 15. Inductive Switching Energy Loss vs. Junction Temperature

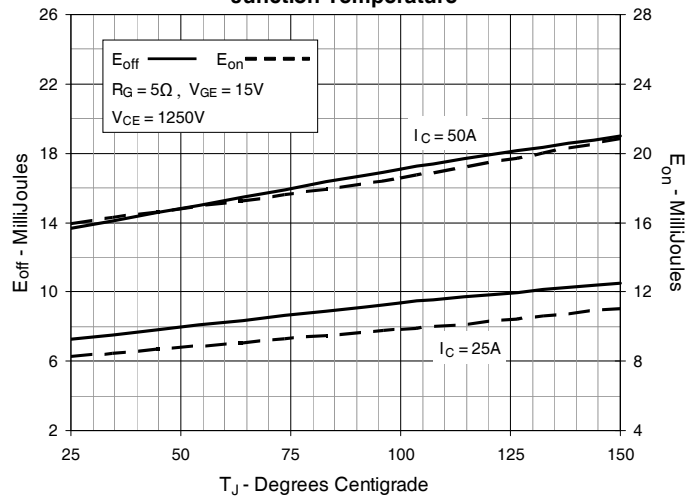


Fig. 16. Inductive Turn-off Switching Times vs. Gate Resistance

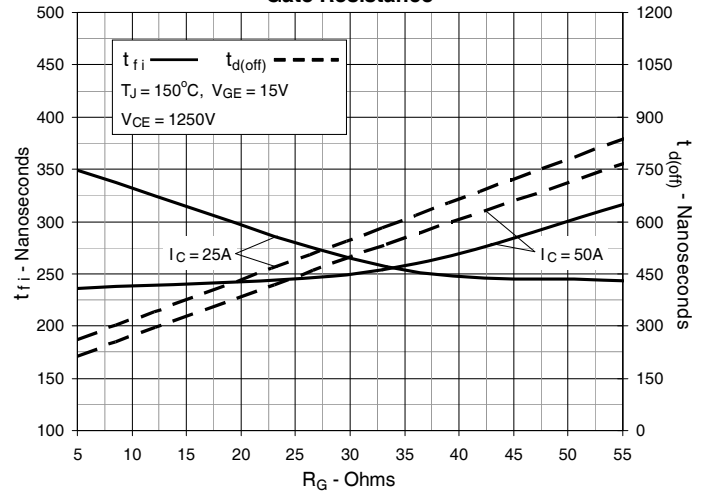


Fig. 17. Inductive Turn-off Switching Times vs. Collector Current

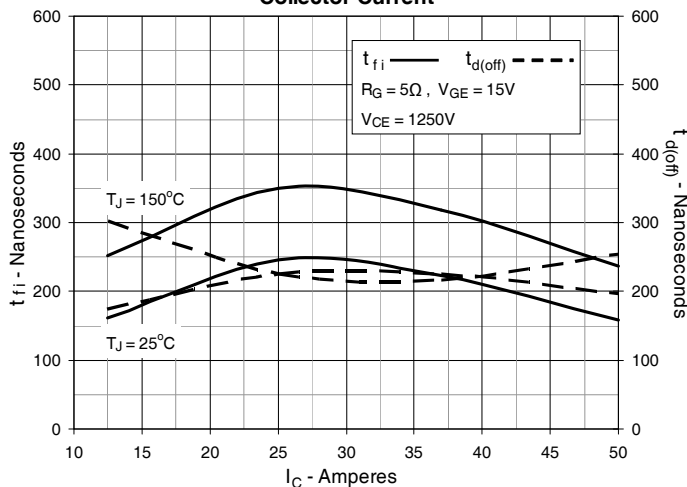


Fig. 18. Inductive Turn-off Switching Times vs. Junction Temperature

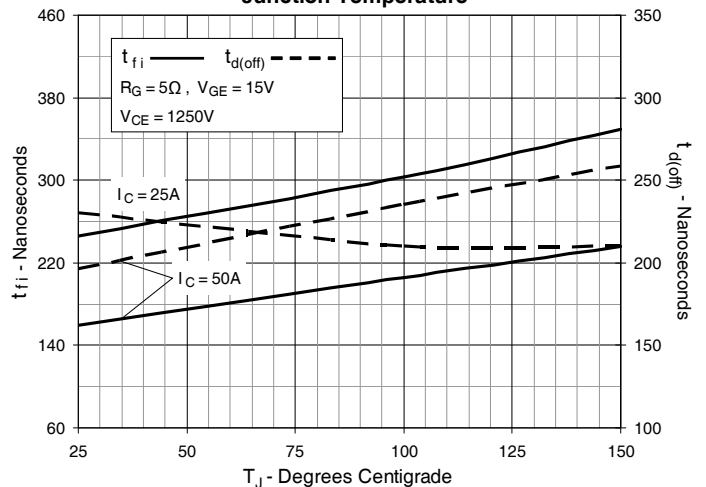


Fig. 19. Inductive Turn-on Switching Times vs. Gate Resistance

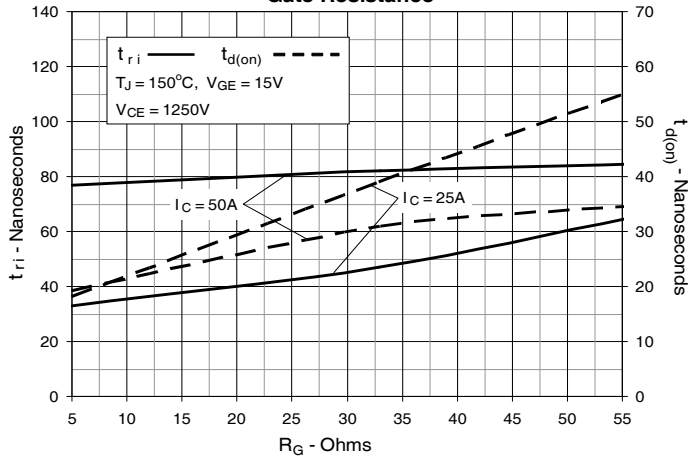


Fig. 20. Inductive Turn-on Switching Times vs. Collector Current

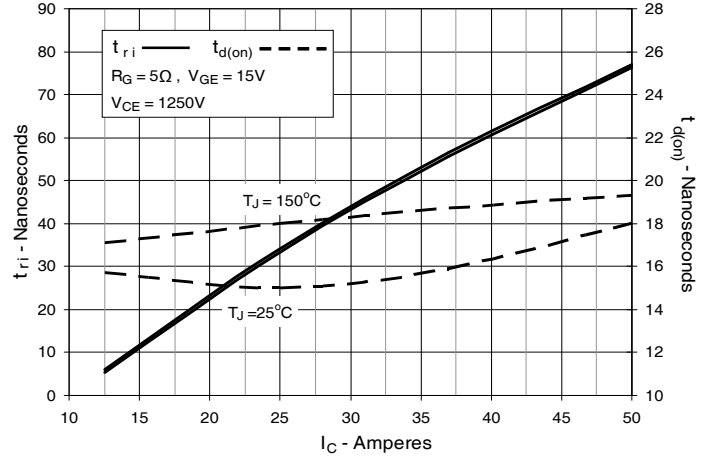


Fig. 21. Inductive Turn-on Switching Times vs. Junction Temperature

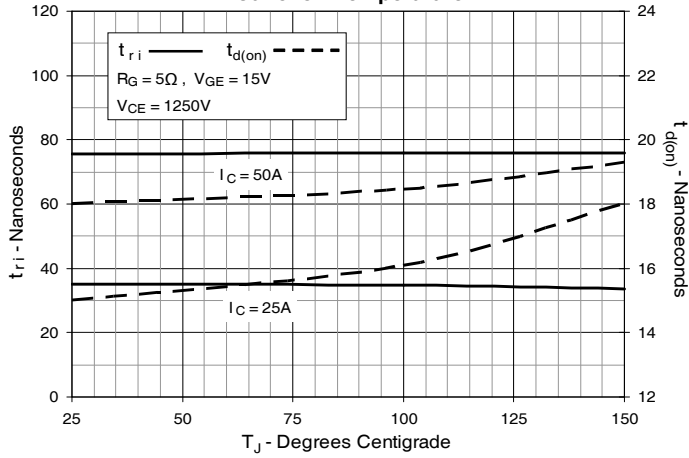


Fig. 22. Diode Forward Characteristics

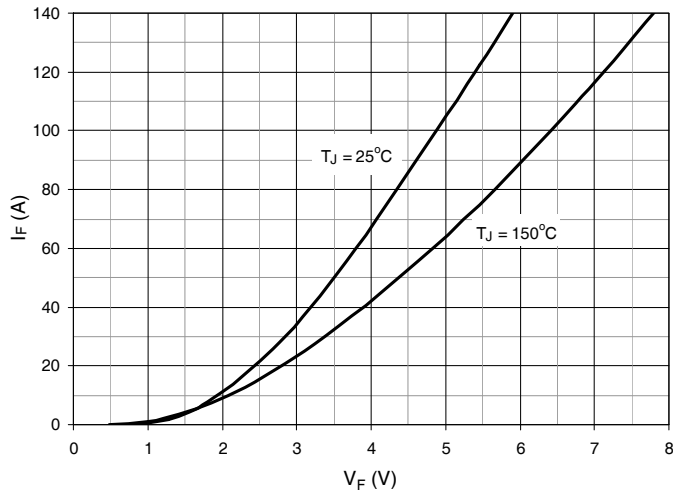


Fig. 23. Reverse Recovery Charge vs. $-di_F/dt$

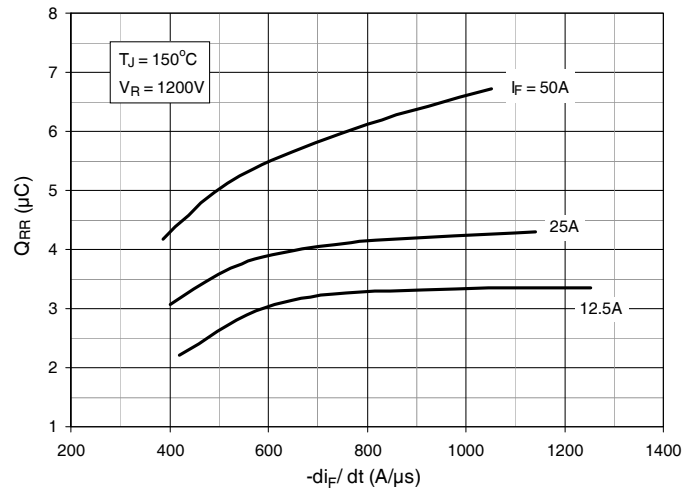


Fig. 24. Reverse Recovery Current vs. $-di_F/dt$

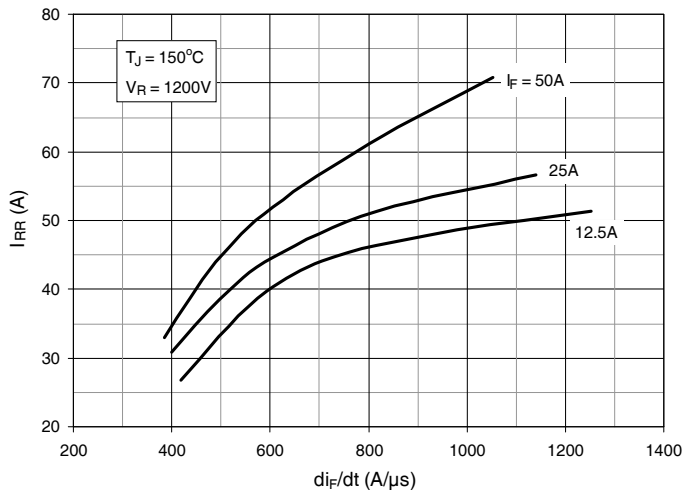


Fig. 25. Reverse Recovery Time vs. $-di_F/dt$

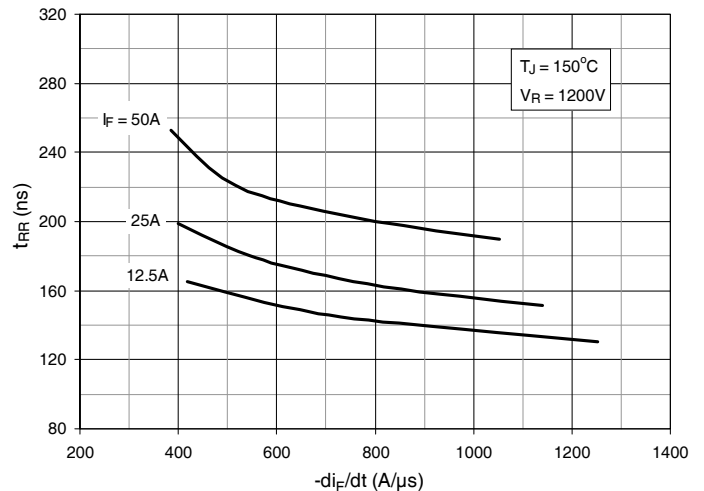


Fig. 26. Dynamic Parameters Q_{RR} , I_{RR} vs. Junction Temperature

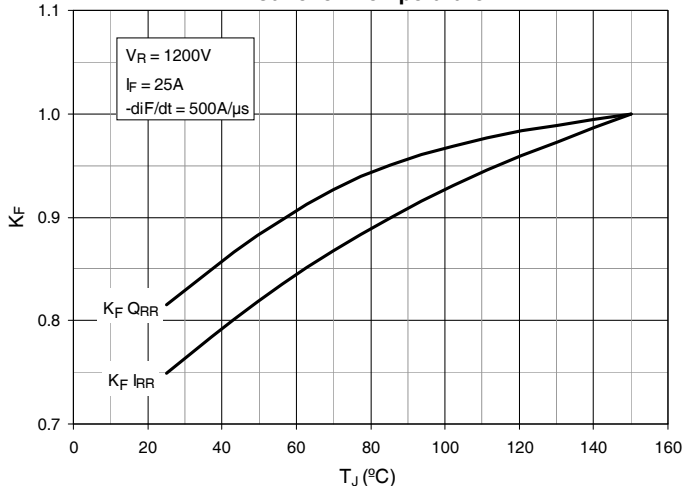
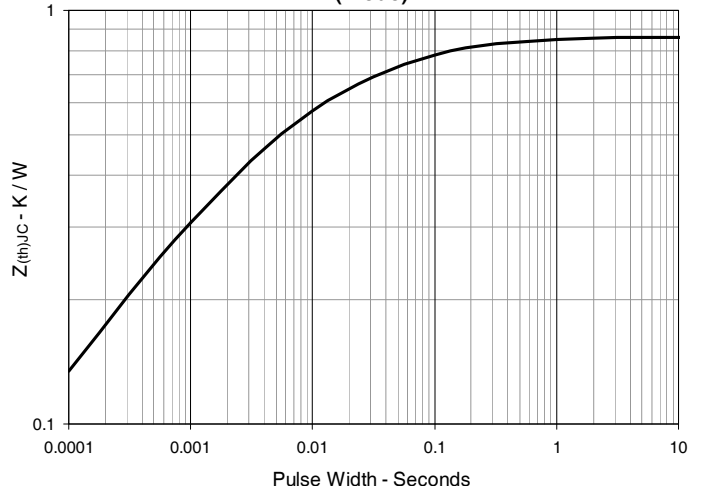
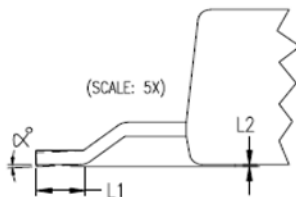
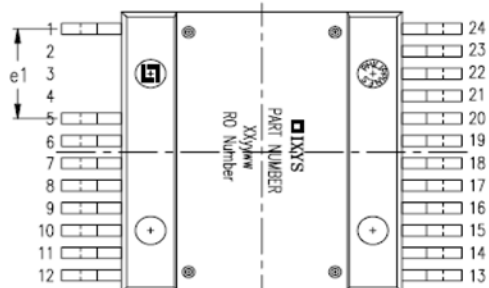
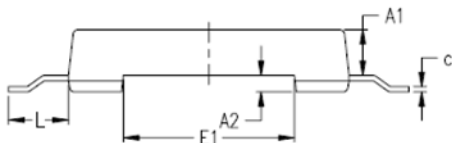
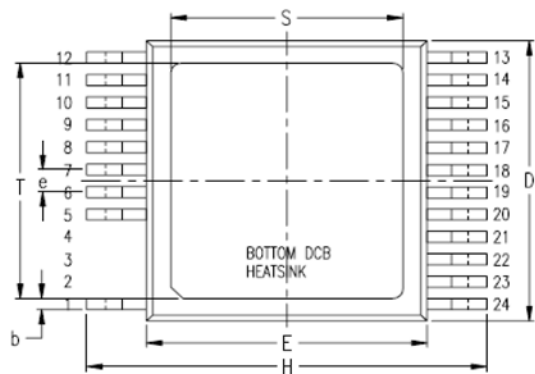


Fig. 27. Maximum Transient Thermal Impedance (Diode)



Package Outline



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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