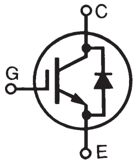
IXYS Advance Technical Information

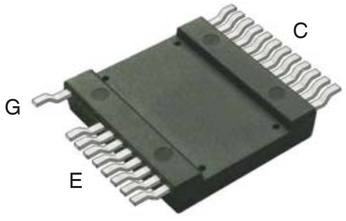
High Voltage XPT™ IGBT w/ Diode

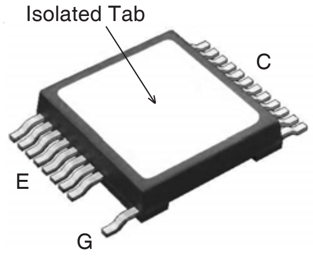
MMIX1Y25N250CV1

V_{CES} = 2500V
I_{C110} = 18A
$V_{CE(sat)} \leq$ 4.0V

(Electrically Isolated Tab)







G = Gate
C = Collector
E = Emitter

Symbol	Test Conditions	Maximum Ratings	
V_{CES}	T_J = 25°C to 175°C	2500	V
V_{CGR}	T_J = 25°C to 175°C, R_{GE} = 1MΩ	2500	V
V_{GES}	Continuous	±20	V
V_{GEM}	Transient	±30	V
I_{C25}	T_C = 25°C	36	A
I_{C110}	T_C = 110°C	18	A
I_{F110}	T_C = 110°C	14	A
I_{CM}	T_C = 25°C, 1ms	270	A
SSOA	V_{GE} = 15V, T_{VJ} = 150°C, R_G = 5Ω	I_{CM} = 100	A
(RBSOA)	Clamped Inductive Load	1500	V
P_C	T_C = 25°C	230	W
T_J		-55 ... +175	°C
T_{JM}		175	°C
T_{stg}		-55 ... +175	°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	Characteristic Values			
(T_J = 25°C, Unless Otherwise Specified)		Min.	Typ.	Max.	
BV_{CES}	I_C = 250μA, V_{GE} = 0V	2500			V
$V_{GE(th)}$	I_C = 250μA, V_{CE} = V_{GE}	3.0		5.0	V
I_{CES}	V_{CE} = V_{CES}, V_{GE} = 0V			25	μA
	Note 2, T_J = 100°C		100		μA
I_{GES}	V_{CE} = 0V, V_{GE} = ± 20V			±100	nA
$V_{CE(sat)}$	I_C = 25A, V_{GE} = 15V, Note 1		3.4	4.0	V
	T_J = 150°C		4.7		V

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°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			3.5	V
	T_J = 150°C		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 Ices 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.

Fig. 1. Output Characteristics @ $T_J = 25^oC$

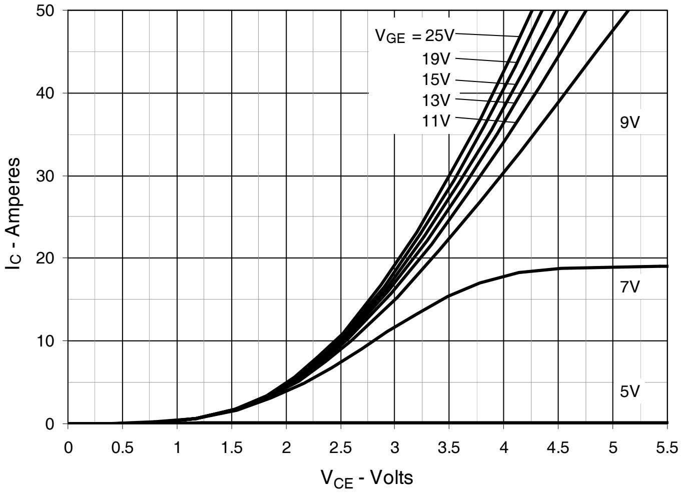


Fig. 2. Extended Output Characteristics @ $T_J = 25^oC$

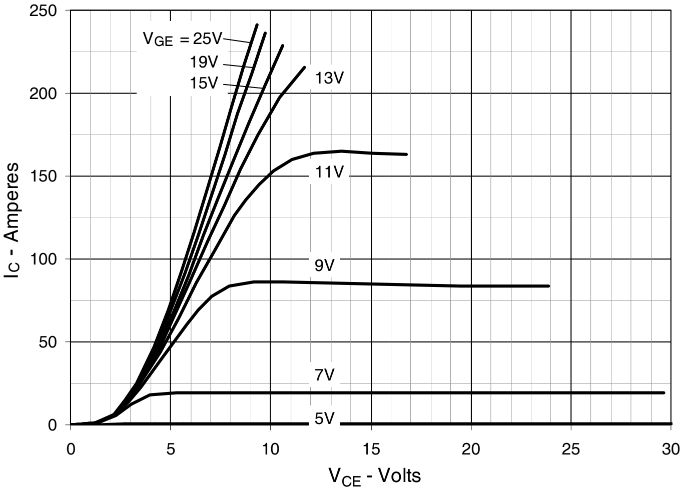


Fig. 3. Output Characteristics @ $T_J = 150^oC$

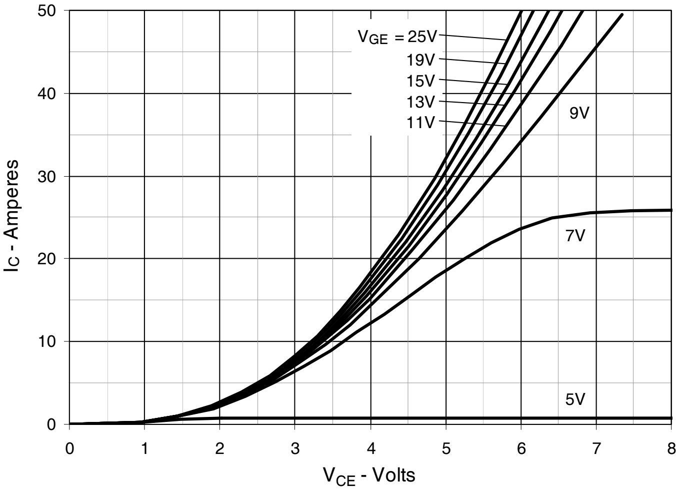


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

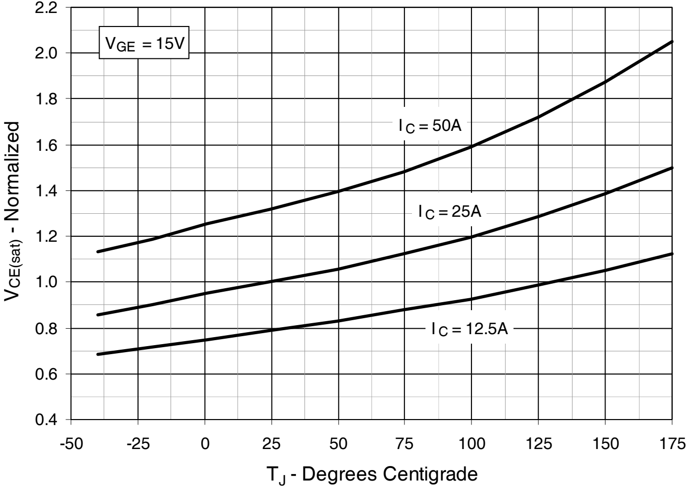


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

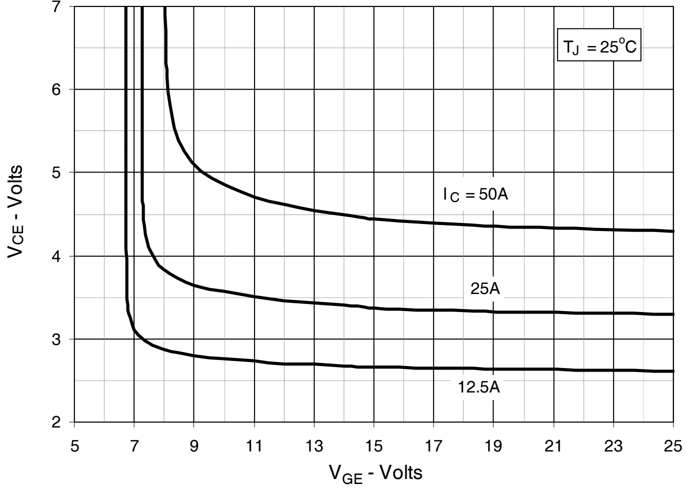


Fig. 6. Input Admittance

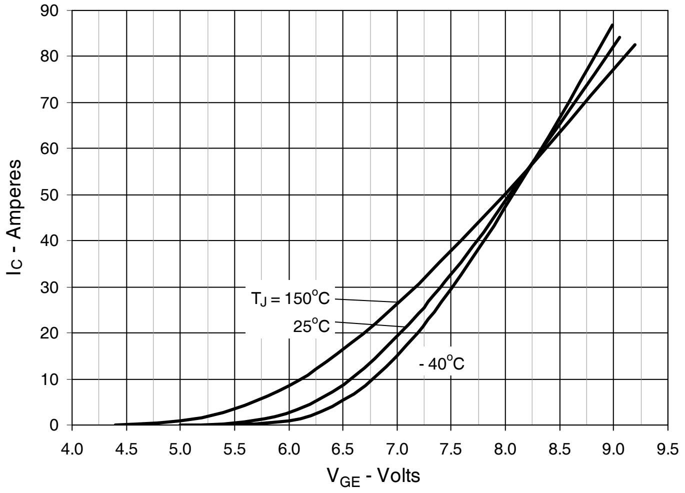


Fig. 7. Transconductance

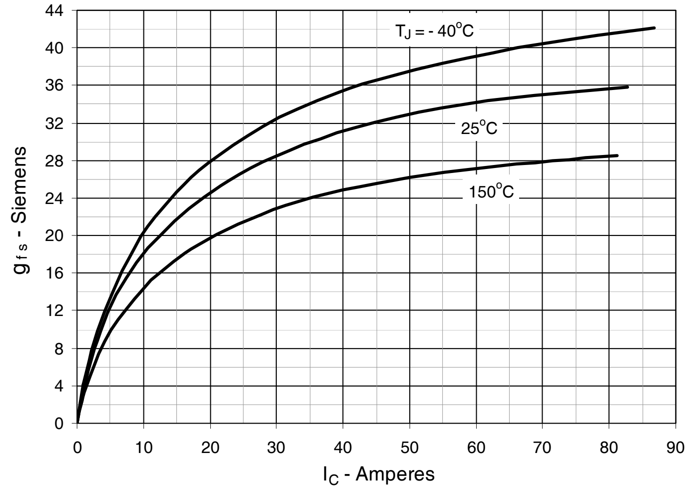


Fig. 8. Gate Charge

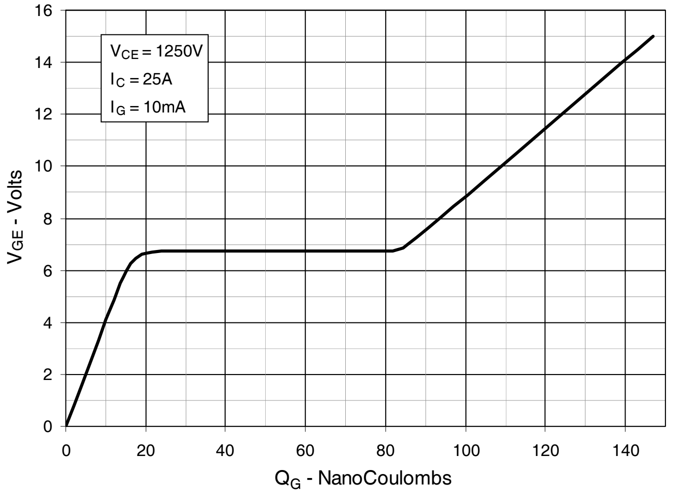


Fig. 9. Capacitance

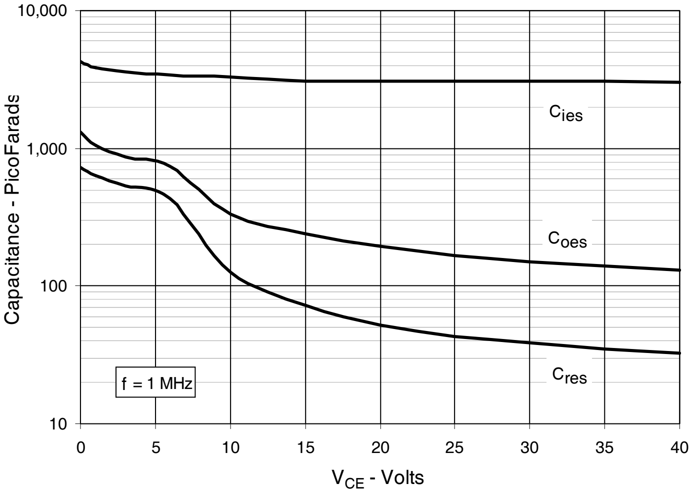


Fig. 10. Reverse-Bias Safe Operating Area

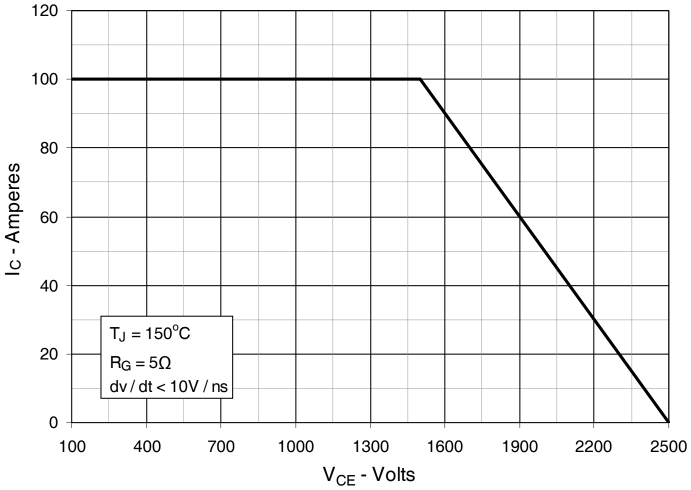


Fig. 11. Forward-Bias Safe Operating Area

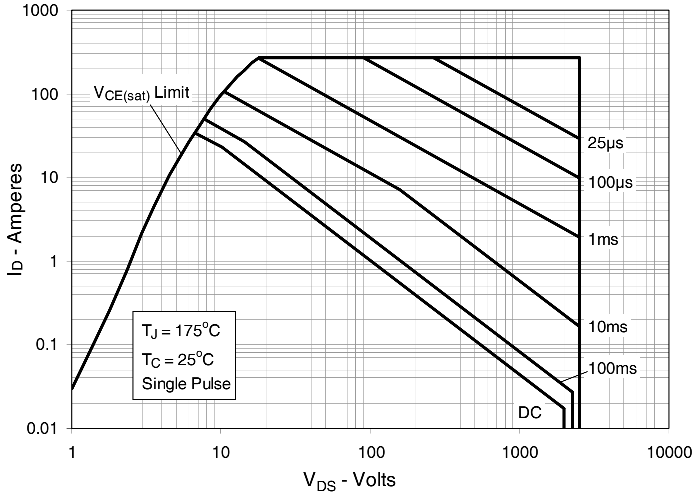


Fig. 12. Maximum Transient Thermal Impedance (IGBT)

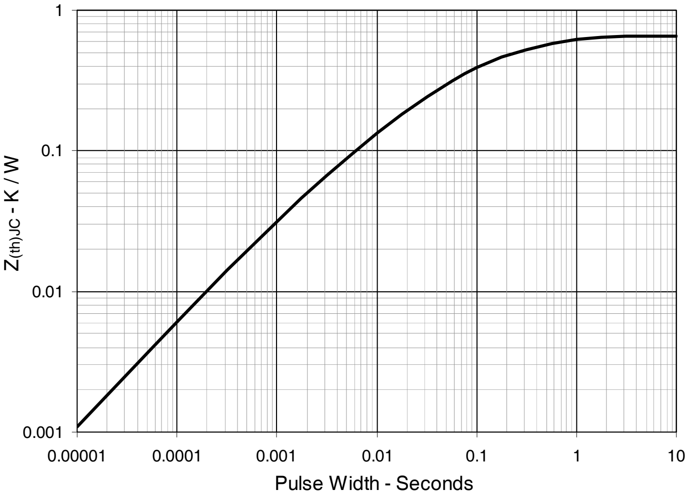


Fig. 13. Inductive Switching Energy Loss vs. Gate Resistance

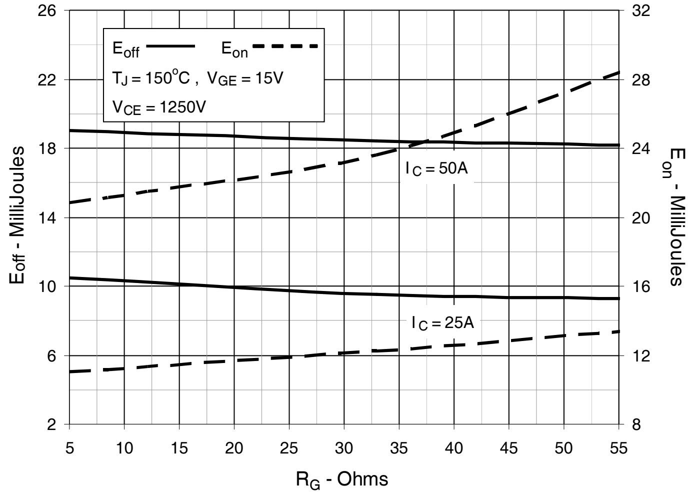


Fig. 14. Inductive Switching Energy Loss vs. Collector Current

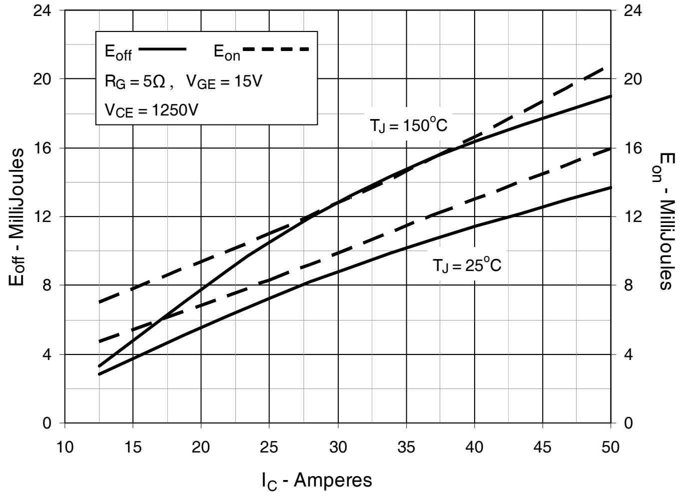


Fig. 15. Inductive Switching Energy Loss vs. Junction Temperature

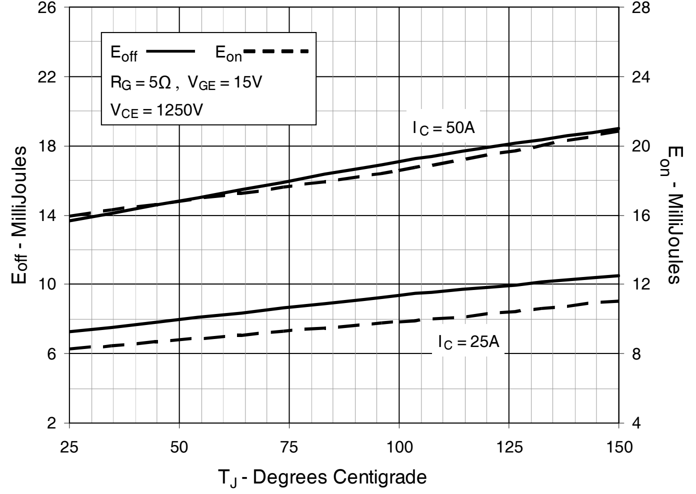


Fig. 16. Inductive Turn-off Switching Times vs. Gate Resistance

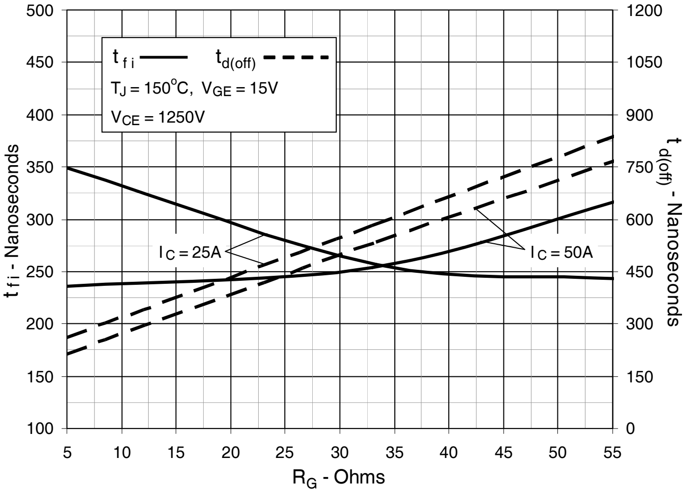


Fig. 17. Inductive Turn-off Switching Times vs. Collector Current

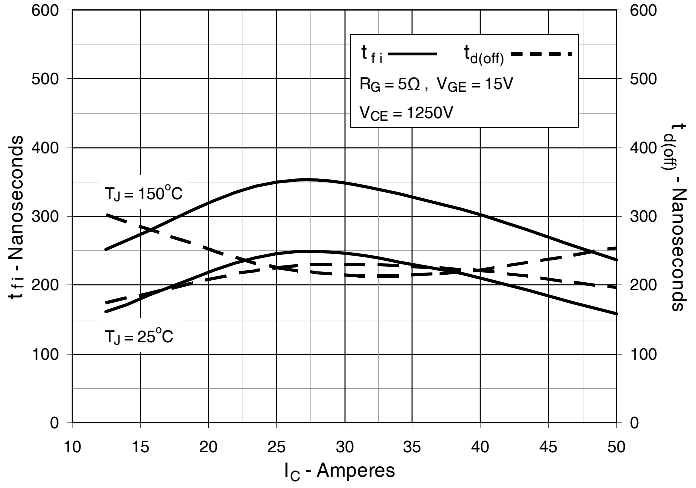


Fig. 18. Inductive Turn-off Switching Times vs. Junction Temperature

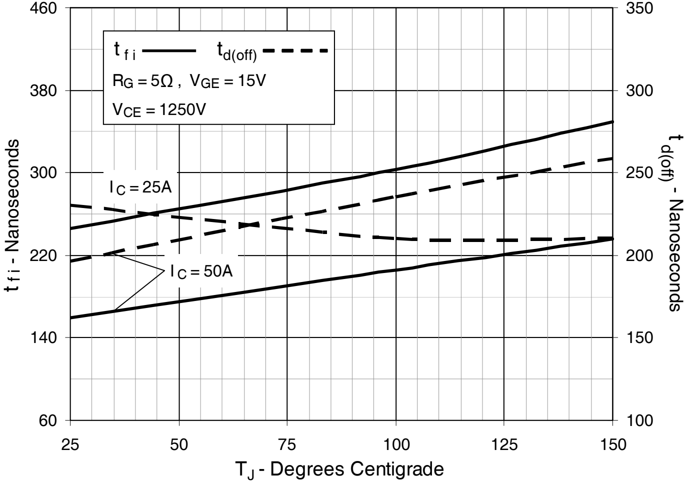


Fig. 19. Inductive Turn-on Switching Times vs. Gate Resistance

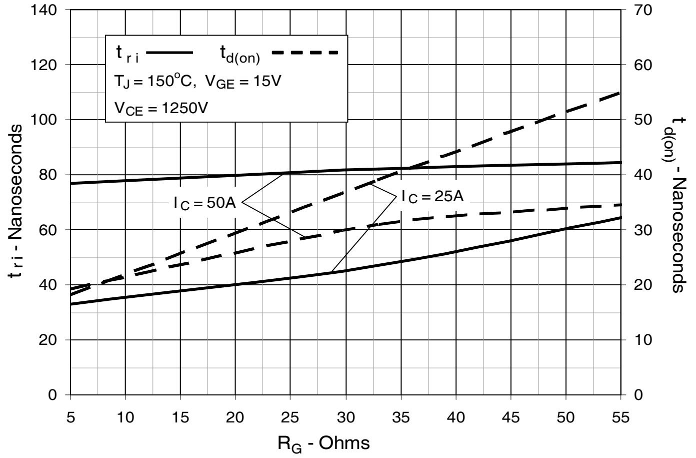


Fig. 20. Inductive Turn-on Switching Times vs. Collector Current

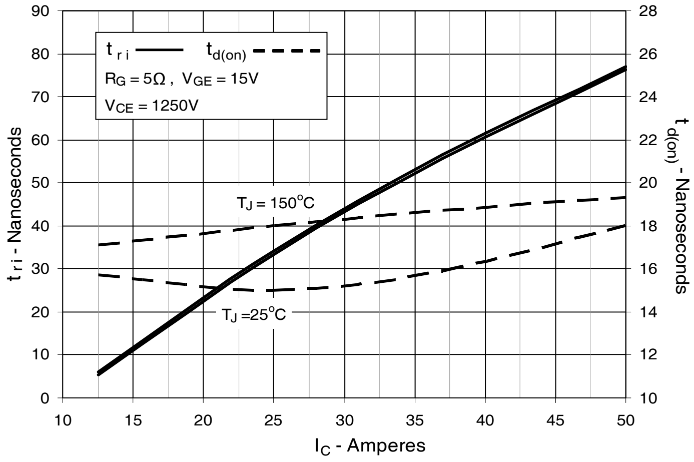


Fig. 21. Inductive Turn-on Switching Times vs. Junction Temperature

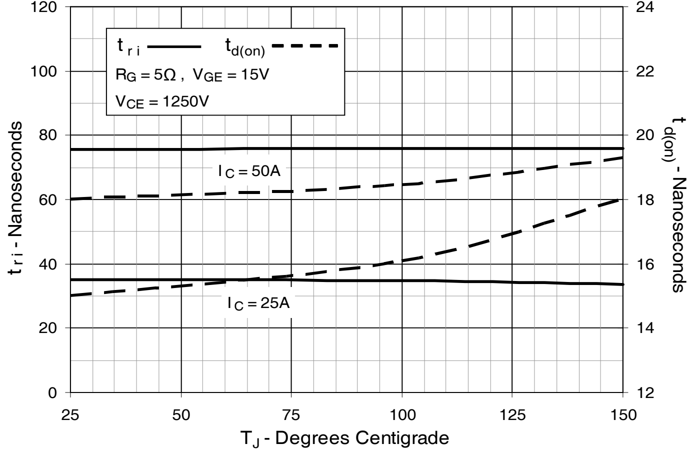


Fig. 22. Diode Forward Characteristics

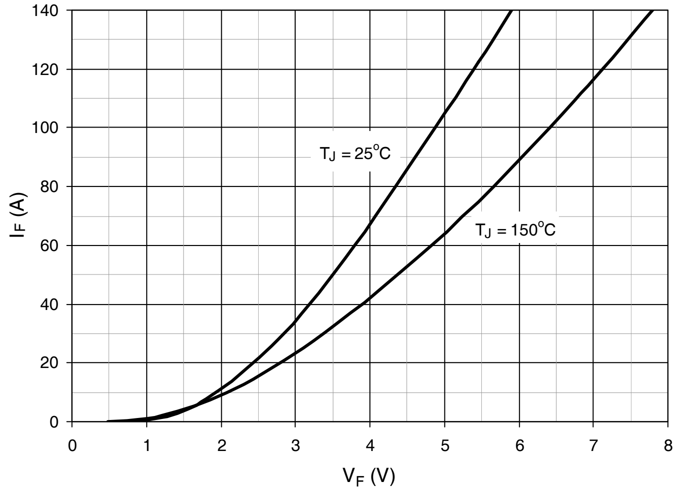


Fig. 23. Reverse Recovery Charge vs. -di_F/dt

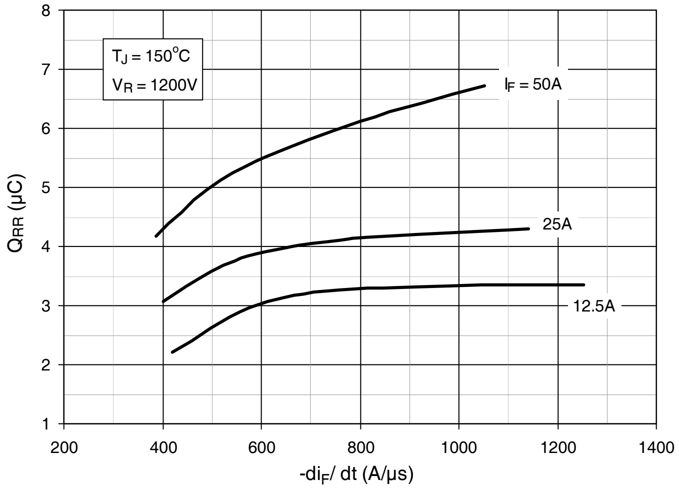


Fig. 24. Reverse Recovery Current vs. -di_F/dt

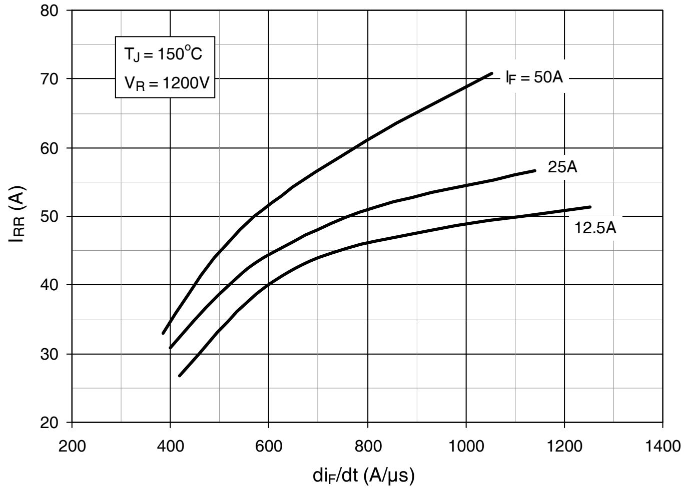


Fig. 25. Reverse Recovery Time vs. -di_F/dt

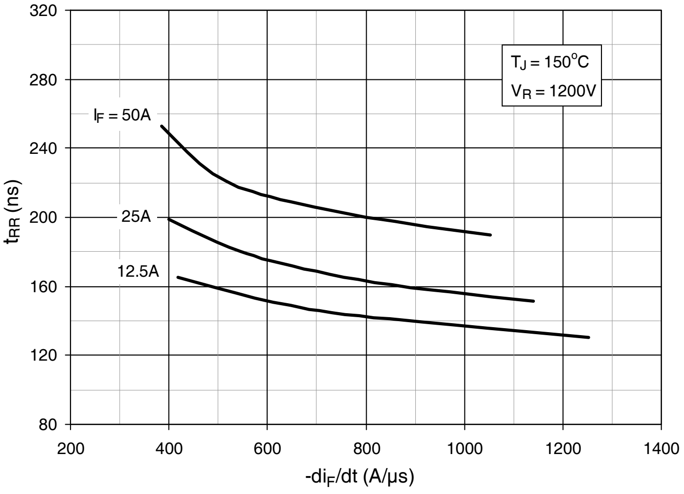


Fig. 26. Dynamic Parameters Q_{RR}, I_{RR} vs. Junction Temperature

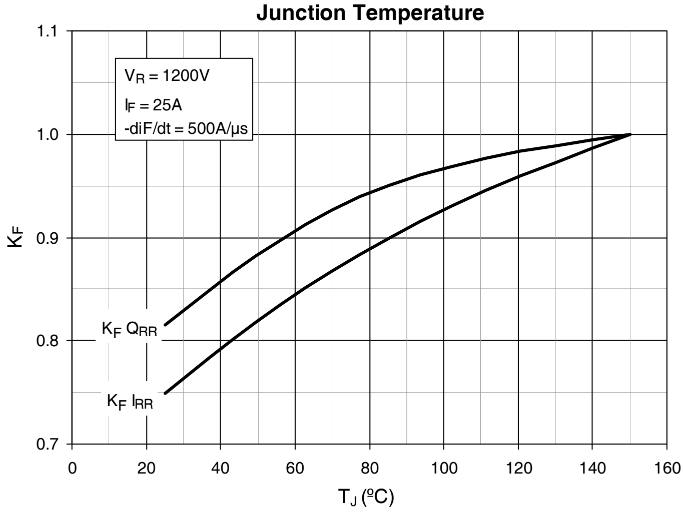
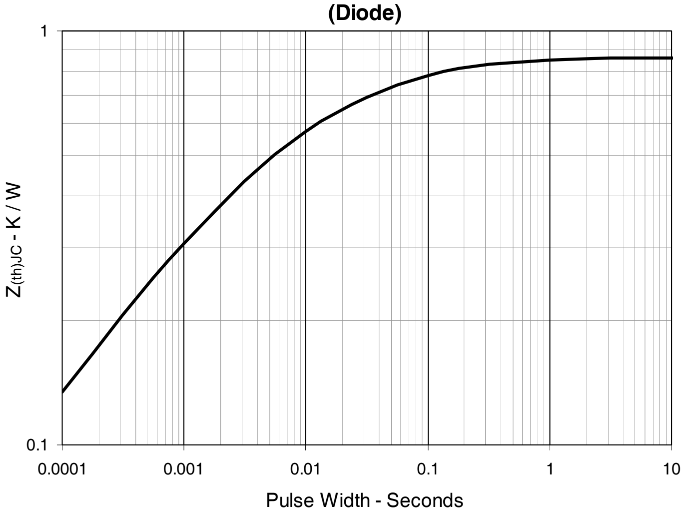
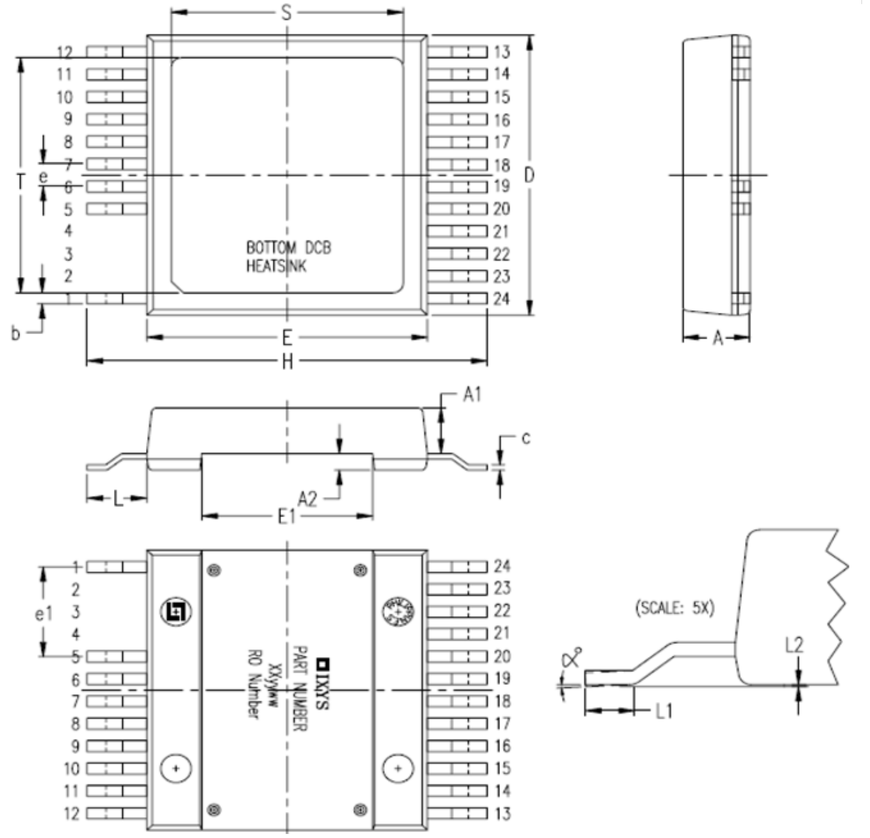


Fig. 27. Maximum Transient Thermal Impedance (Diode)



IXYS REF: MMIX1_25N250CV1(7T) 4-17-17-B

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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