IXYS

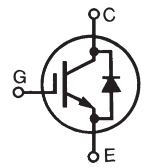
Advance Technical Information

High Voltage XPT™ IGBT w/ Diode

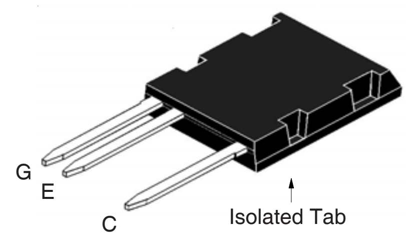
IXYL40N250CV1

V_{CES}	=	2500V
I_{C110}	=	40A
$V_{CE(sat)}$	≤	4.0V
$t_{fi(typ)}$	=	134ns

(Electrically Isolated Tab)



ISOPLUS i5-Pak™



G = Gate E = Emitter
C = Collector

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	80	A
I_{C110}	T_C = 110°C	40	A
I_{F110}	T_C = 110°C	23	A
I_{CM}	T_C = 25°C, 1ms	380	A
SSOA (RBSOA)	V_{GE} = 15V, T_{VJ} = 150°C, R_G = 1Ω Clamped Inductive Load	I_{CM} = 80 1500	A V
P_C	T_C = 25°C	577	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 (0.062in.) from Case for 10s	260	°C
F_C	Mounting Force	40..120 / 9..27	N/lb
V_{ISOL}	50/60 Hz, RM, t = 1min	2500	V~
Weight		8	g

Features

- Silicon Chip on Direct-Copper Bond (DCB) Substrate
- Isolated Mounting Surface
- 4500V~ Electrical Isolation
- High Voltage Package
- High Blocking Voltage
- High Peak Current Capability
- Low Saturation Voltage

Symbol	Test Conditions (T_J = 25°C, Unless Otherwise Specified)		Characteristic Values 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
	V_{CE} = 0.8 • V_{CES}	T_J = 125°C			5	mA
I_{GES}	V_{CE} = 0V, V_{GE} = ±20V				±100	nA
$V_{CE(sat)}$	I_C = 40A, V_{GE} = 15V, Note 1			3.2	4.0	V
		T_J = 150°C		4.4		V

Advantages

- Low Gate Drive Requirement
- High Power Density

Applications

- UPS
- Motor Drives
- SMPS
- PFC Circuits
- High Frequency Power Inverters

Symbol	Test Conditions (T_J = 25°C Unless Otherwise Specified)	Min.	Typ.	Max.	
g_{fs}	I_C = 40A, V_{CE} = 10V, Note 1	24	42		S
R_{Gi}	Gate Input Resistance		2.2		Ω
C_{ies}	V_{CE} = 25V, V_{GE} = 0V, f = 1MHz		5470		pF
C_{oes}			280		pF
C_{res}			74		pF
$Q_{g(on)}$	I_C = 40A, V_{GE} = 15V, V_{CE} = 0.5 • V_{CES}		270		nC
Q_{ge}			28		nC
Q_{gc}			110		nC
$t_{d(on)}$	**Inductive load, T_J = 25°C**		21		ns
t_{ri}	I_C = 40A, V_{GE} = 15V		22		ns
E_{on}	V_{CE} = 0.5 • V_{CES}, R_G = 1Ω		11.7		mJ
$t_{d(off)}$	Note 2		200		ns
t_{fi}			134		ns
E_{off}			6.9		mJ
$t_{d(on)}$	**Inductive load, T_J = 150°C**		21		ns
t_{ri}	I_C = 40A, V_{GE} = 15V		22		ns
E_{on}	V_{CE} = 0.5 • V_{CES}, R_G = 1Ω		14.7		mJ
$t_{d(off)}$	Note 2		255		ns
t_{fi}			250		ns
E_{off}			11.5		mJ
R_{thJC}				0.26	°C/W
R_{thCS}			0.15		°C/W

Reverse Sonic Diode (FRD)

Symbol	Test Conditions (T_J = 25°C Unless Otherwise Specified)	Min.	Typ.	Max.	
V_F	I_F = 40A, V_{GE} = 0V, Note 1			4.0	V
	T_J = 150°C		3.4		V
I_{RM}	I_F = 40A, V_{GE} = 0V, T_J = 150°C		52		A
t_{rr}	$-di_F/dt$ = 600A/μs, V_R = 1200V		210		ns
R_{thJC}				0.83	°C/W

Notes:

1. Pulse test, t ≤ 300μs, duty cycle, d ≤ 2%.
2. 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 @ $T_J = 25^oC$

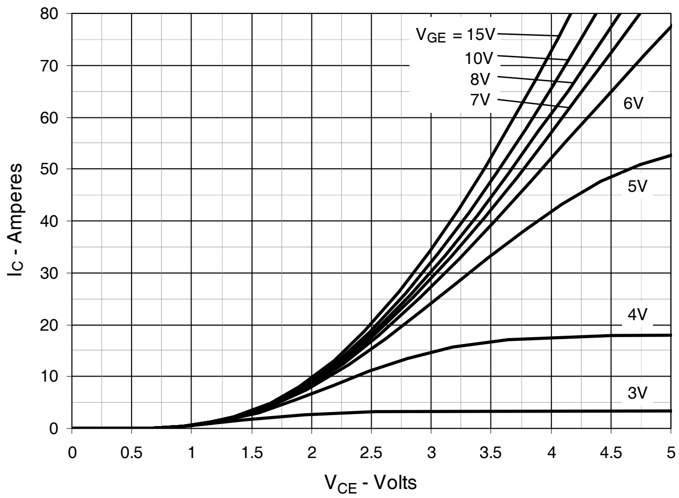


Fig. 2. Extended Output Characteristics @ $T_J = 25^oC$

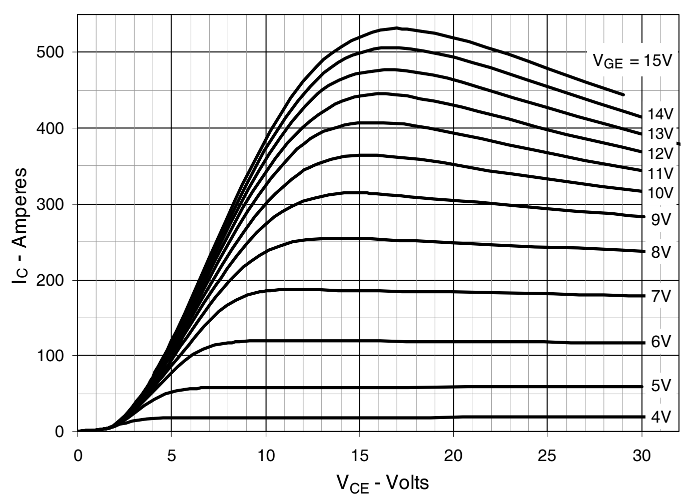


Fig. 3. Output Characteristics @ $T_J = 150^oC$

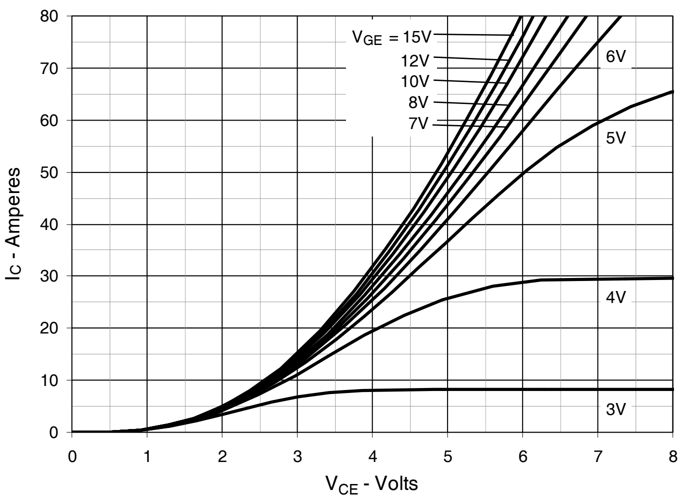


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

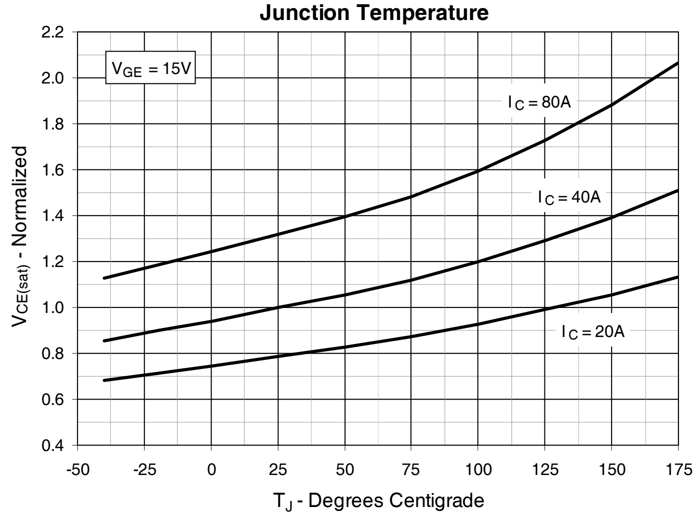


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

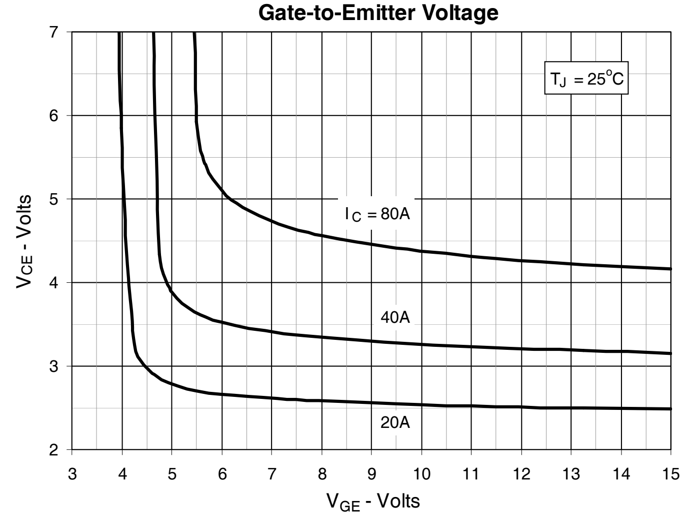


Fig. 6. Input Admittance

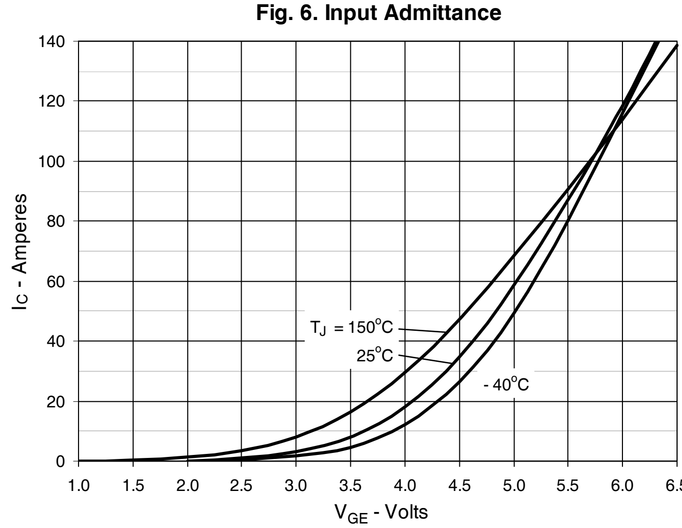


Fig. 7. Transconductance

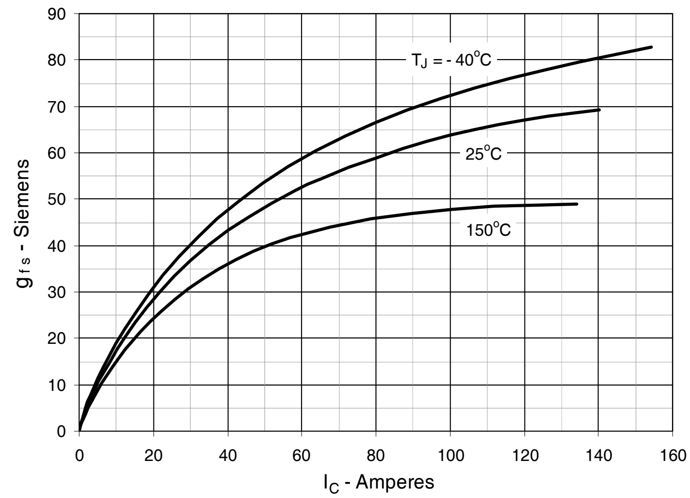


Fig. 8. Gate Charge

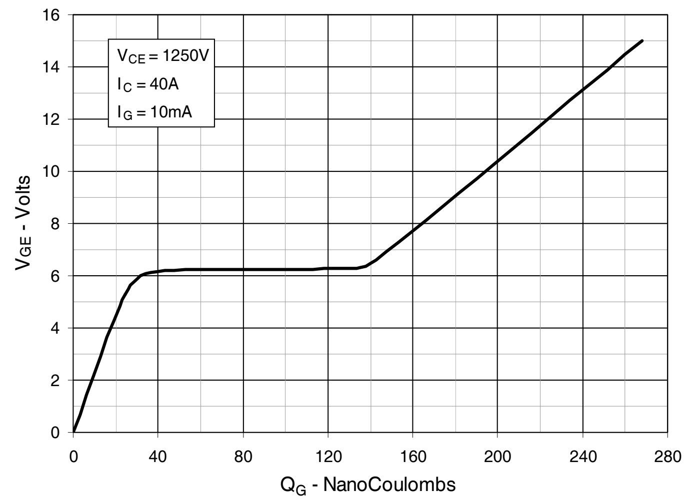


Fig. 9. Capacitance

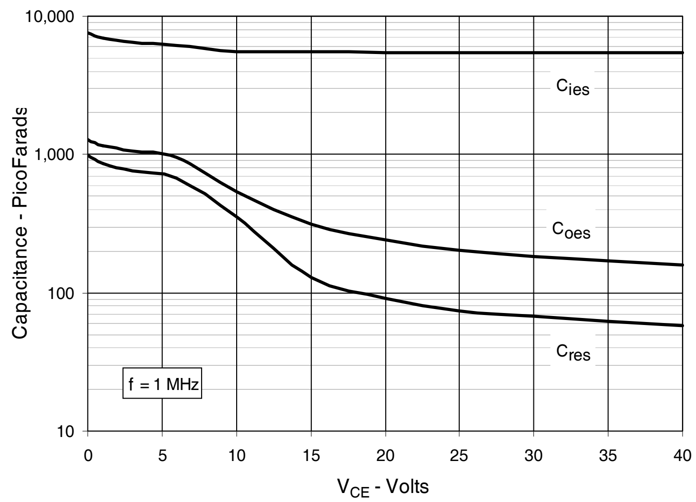


Fig. 10. Reverse-Bias Safe Operating Area

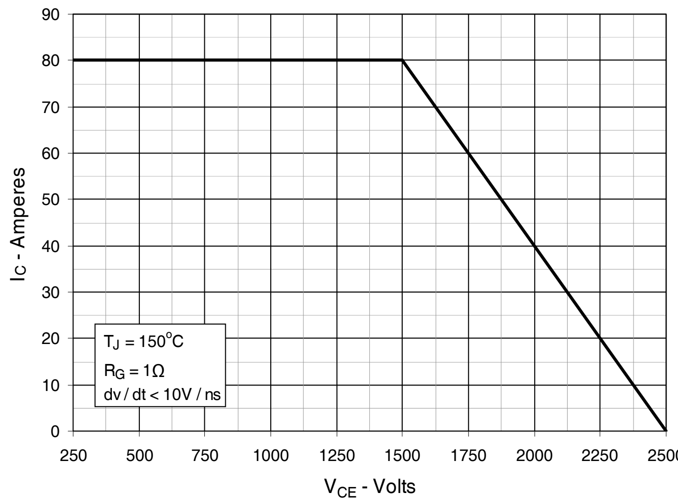


Fig. 11. Maximum Transient Thermal Impedance

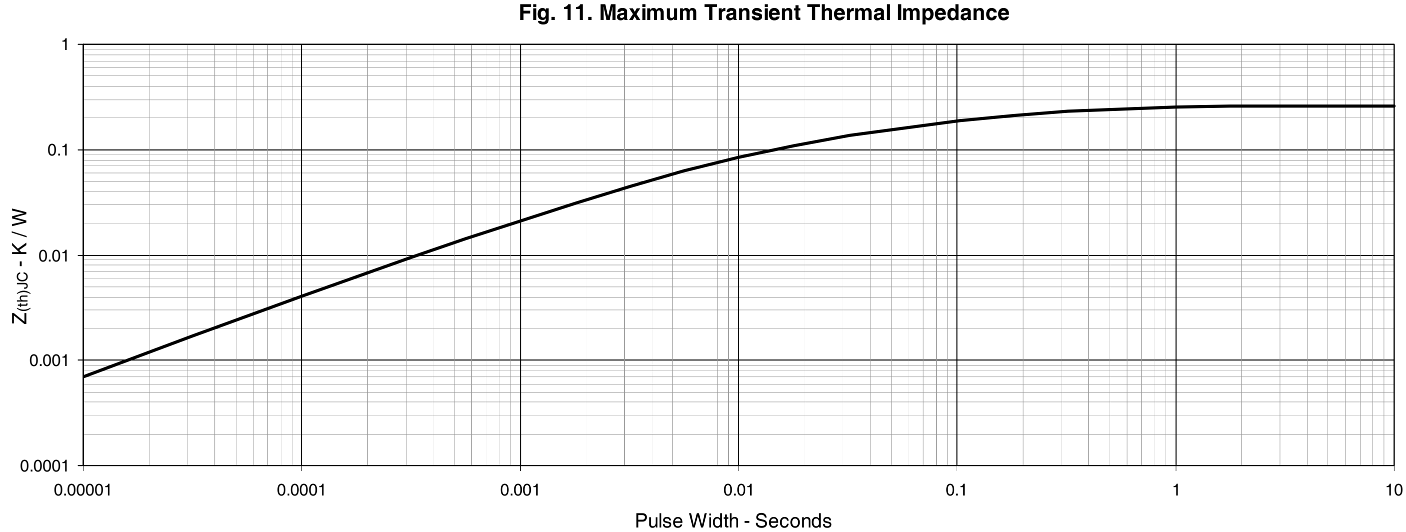


Fig. 12. Inductive Switching Energy Loss vs. Gate Resistance

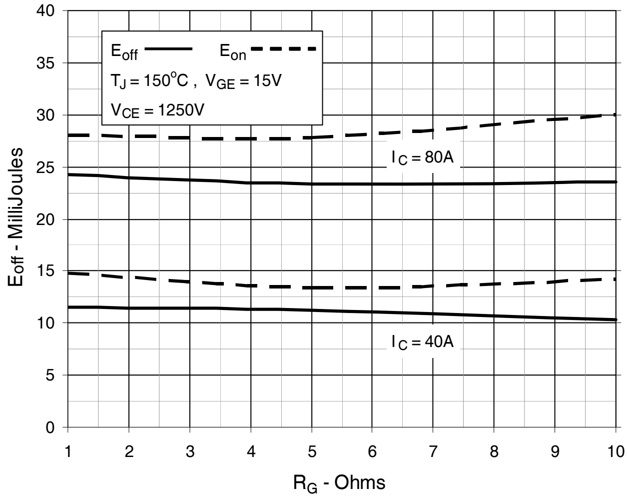


Fig. 13. Inductive Switching Energy Loss vs. Collector Current

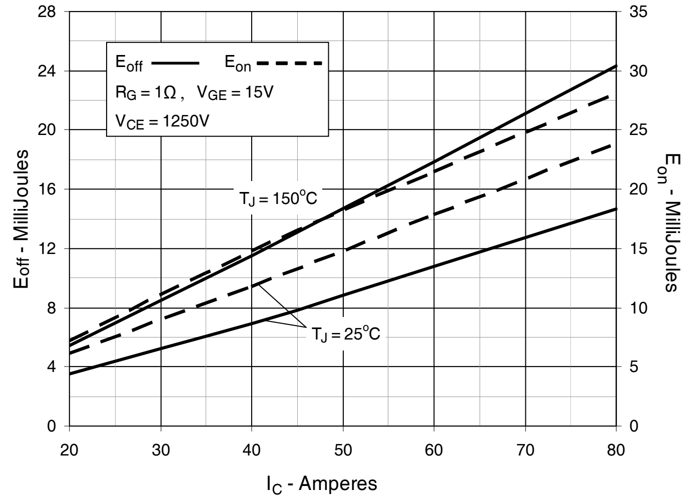


Fig. 14. Inductive Switching Energy Loss vs. Junction Temperature

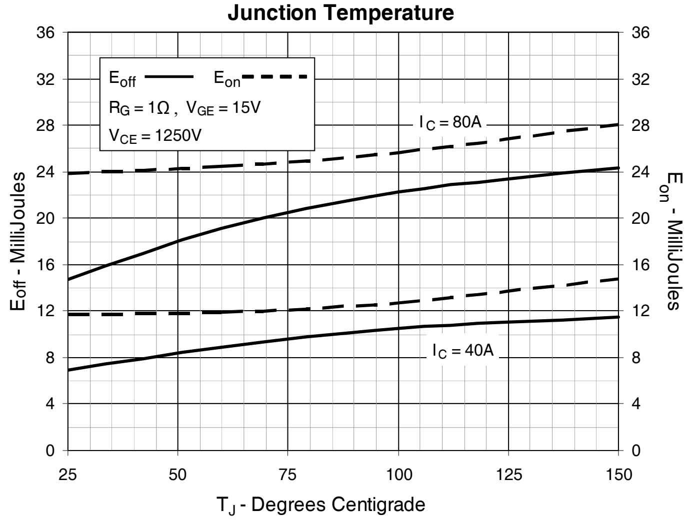


Fig. 15. Inductive Turn-off Switching Times vs. Gate Resistance

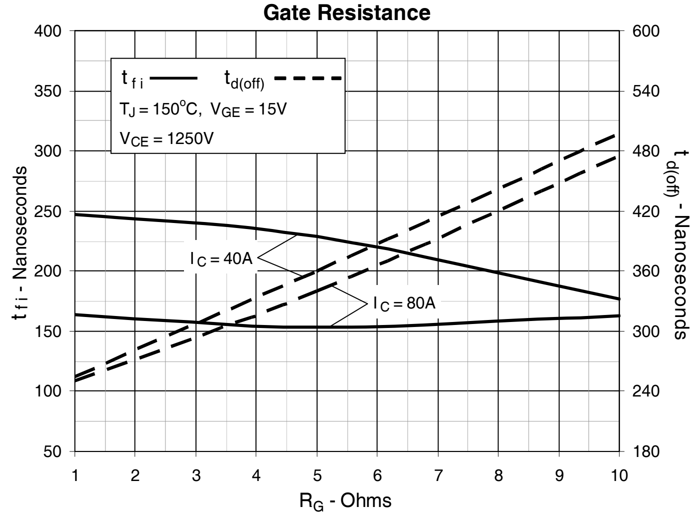


Fig. 16. Inductive Turn-off Switching Times vs. Collector Current

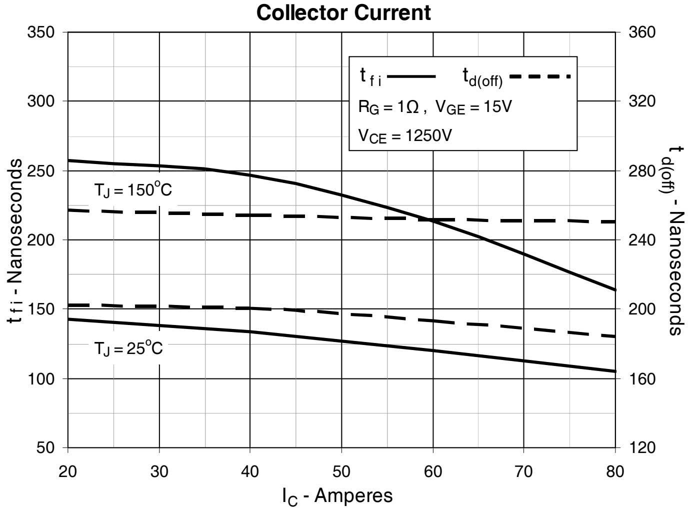


Fig. 17. Inductive Turn-off Switching Times vs. Junction Temperature

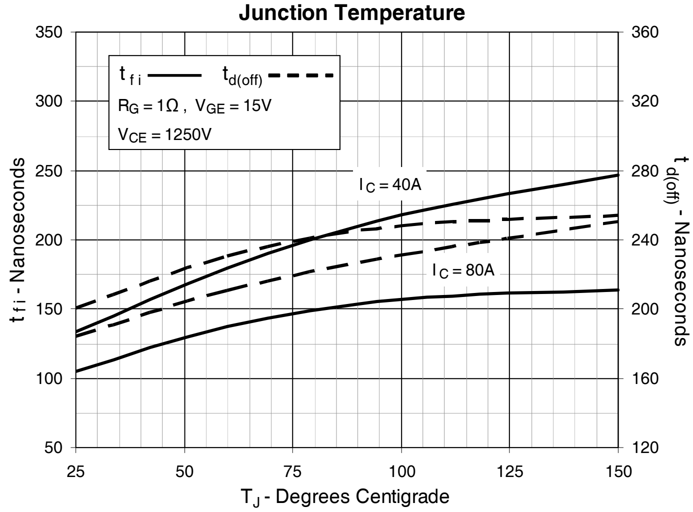


Fig. 18. Inductive Turn-on Switching Times vs. Gate Resistance

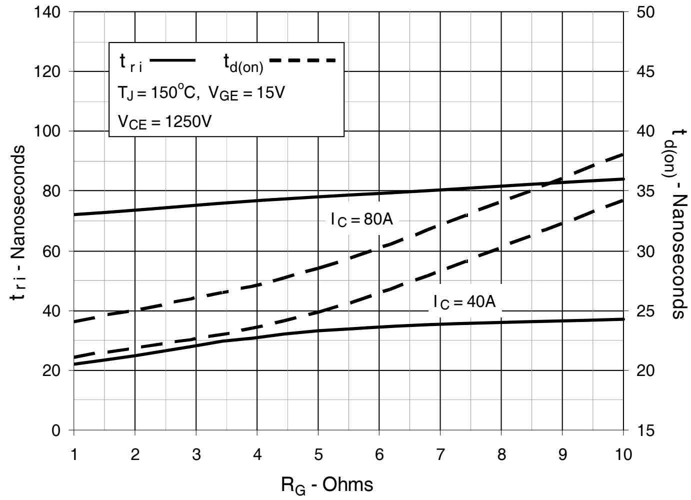


Fig. 19. Inductive Turn-on Switching Times vs. Collector Current

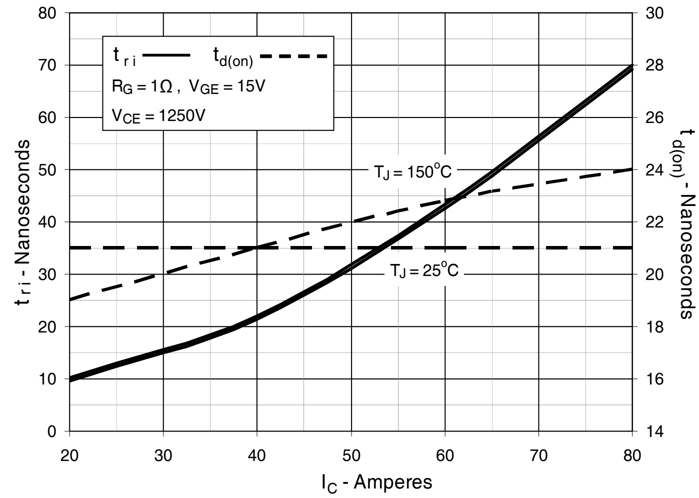


Fig. 20. Inductive Turn-on Switching Times vs. Junction Temperature

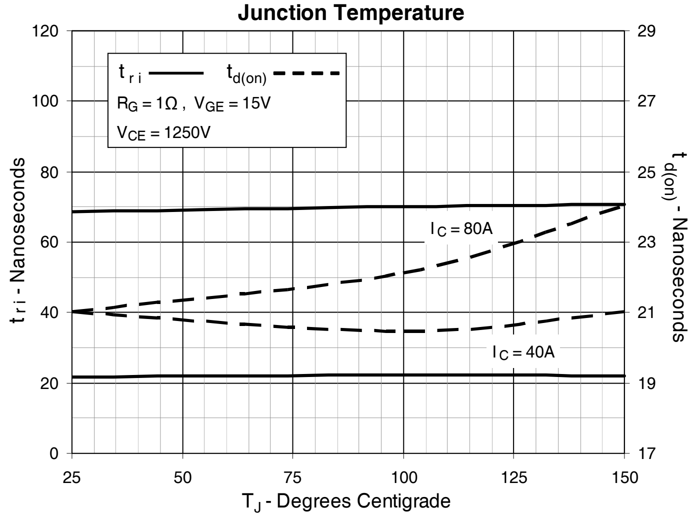


Fig. 21. Diode Forward Characteristics

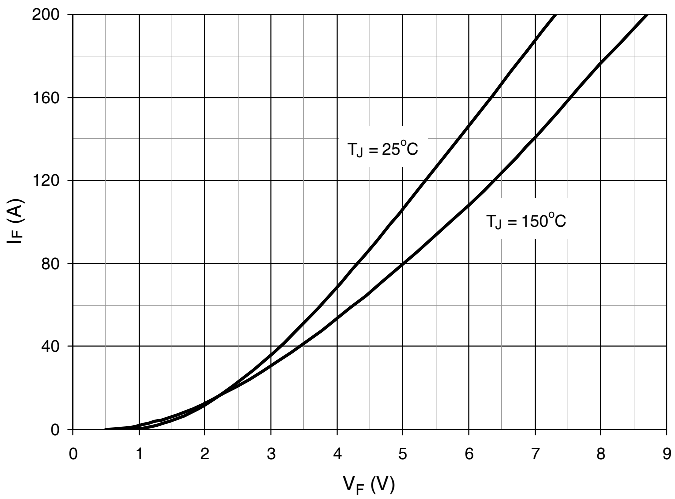


Fig. 22. Reverse Recovery Charge vs. -di$_F$/dt

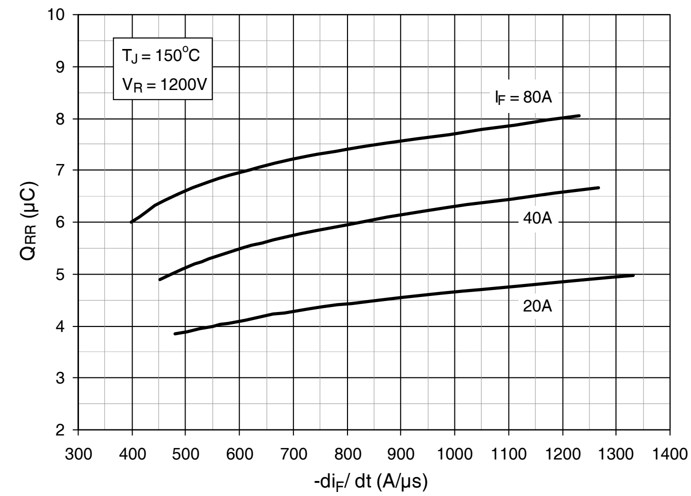


Fig. 23. Reverse Recovery Current vs. -di$_F$/dt

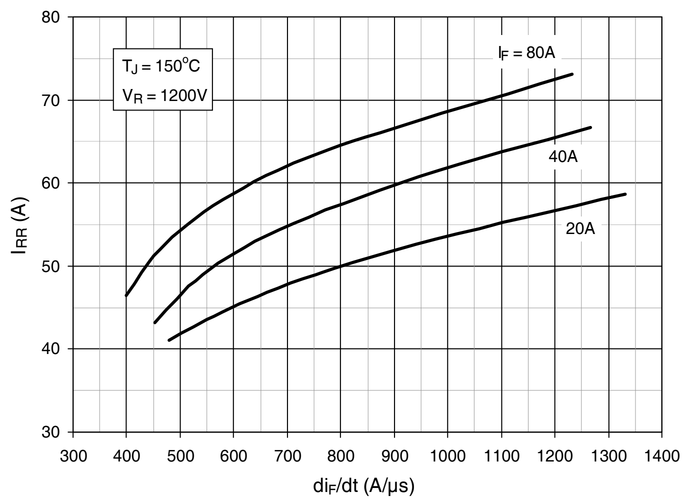


Fig. 24. Reverse Recovery Time vs. -di$_F$/dt

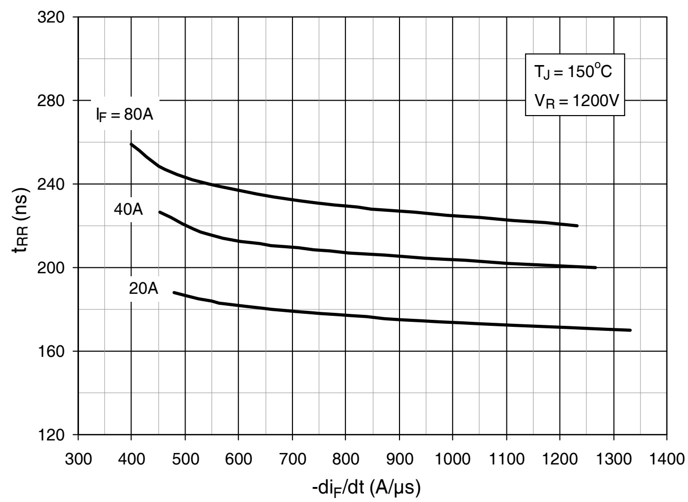


Fig. 25. Dynamic Parameters Q$_{RR}$, I$_{RR}$ vs. Junction Temperature

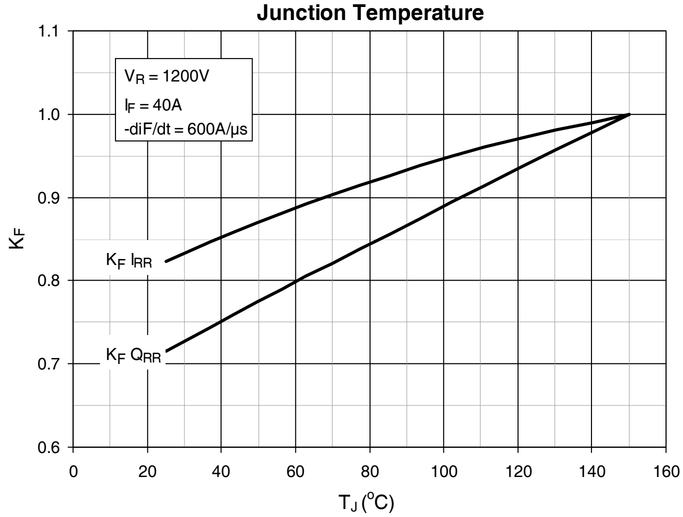
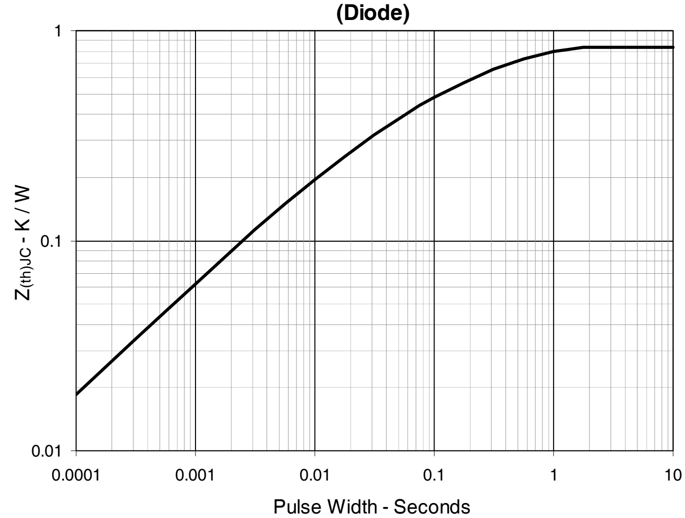


Fig. 26. Maximum Transient Thermal Impedance (Diode)



ISOPLUS i5-Pak™ (IXYL) Outline