

High Voltage XPT™ IGBT w/ Diode

IXYL40N250CV1

$$V_{CES} = 2500V$$

$$I_{C110} = 40A$$

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

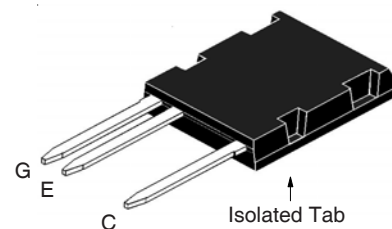
$$t_{fi(typ)} = 134ns$$



(Electrically Isolated Tab)

Symbol	Test Conditions	Maximum Ratings	
V_{CES}	$T_J = 25^\circ C$ to $175^\circ C$	2500	V
V_{CGR}	$T_J = 25^\circ C$ to $175^\circ C$, $R_{GE} = 1M\Omega$	2500	V
V_{GES}	Continuous	± 20	V
V_{GEM}	Transient	± 30	V
I_{C25}	$T_C = 25^\circ C$	80	A
I_{C110}	$T_C = 110^\circ C$	40	A
I_{F110}	$T_C = 110^\circ C$	23	A
I_{CM}	$T_C = 25^\circ C$, 1ms	380	A
SSOA (RBSOA)	$V_{GE} = 15V$, $T_{VJ} = 150^\circ C$, $R_G = 1\Omega$ Clamped Inductive Load	$I_{CM} = 80$ 1500	A V
P_C	$T_C = 25^\circ C$	577	W
T_J		-55 ... +175	$^\circ C$
T_{JM}		175	$^\circ C$
T_{stg}		-55 ... +175	$^\circ C$
T_L	Maximum Lead Temperature for Soldering	300	$^\circ C$
T_{SOLD}	1.6 mm (0.062in.) from Case for 10s	260	$^\circ C$
F_C	Mounting Force	40..120 / 9..27	N/lb
V_{ISOL}	50/60 Hz, RM, t = 1min	2500	V~
Weight		8	g

ISOPLUS i5-Pak™



G = Gate
C = Collector

E = Emitter

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

Advantages

- Low Gate Drive Requirement
- High Power Density

Applications

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

Symbol	Test Conditions ($T_J = 25^\circ C$, Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
BV_{CES}	$I_C = 250\mu A$, $V_{GE} = 0V$	2500		V
$V_{GE(th)}$	$I_C = 250\mu A$, $V_{CE} = V_{GE}$	3.0		5.0 V
I_{CES}	$V_{CE} = V_{CES}$, $V_{GE} = 0V$ $V_{CE} = 0.8 \cdot V_{CES}$ $T_J = 125^\circ C$			25 μA 5 mA
I_{GES}	$V_{CE} = 0V$, $V_{GE} = \pm 20V$			± 100 nA
$V_{CE(sat)}$	$I_C = 40A$, $V_{GE} = 15V$, Note 1 $T_J = 150^\circ C$		3.2 4.4	V V

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

Reverse Sonic Diode (FRD)

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

Notes:

1. Pulse test, $t \leq 300\mu\text{s}$, duty cycle, $d \leq 2\%$.
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.

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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	

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

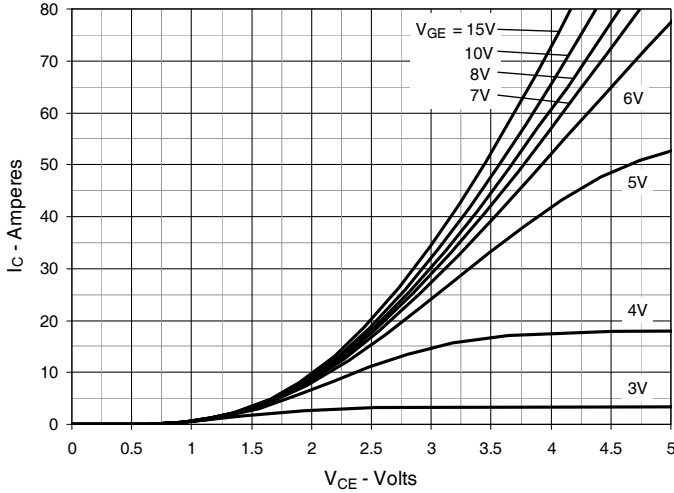


Fig. 2. Extended Output Characteristics @ $T_J = 25^\circ\text{C}$

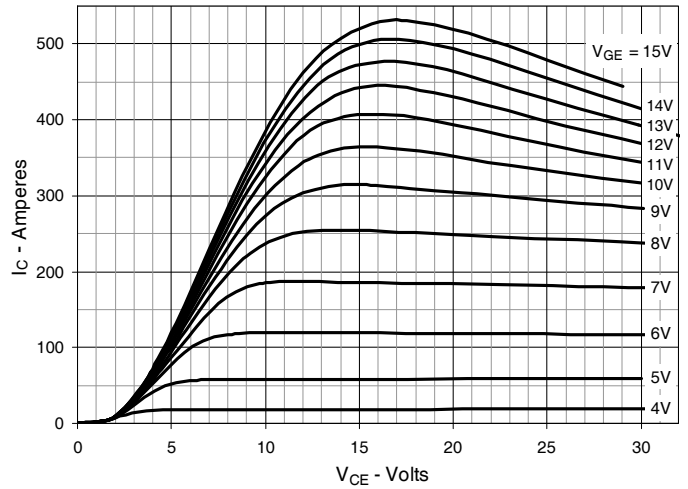


Fig. 3. Output Characteristics @ $T_J = 150^\circ\text{C}$

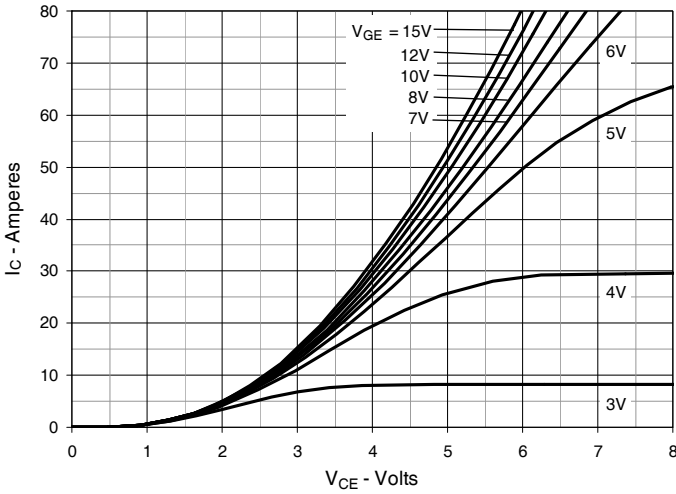


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

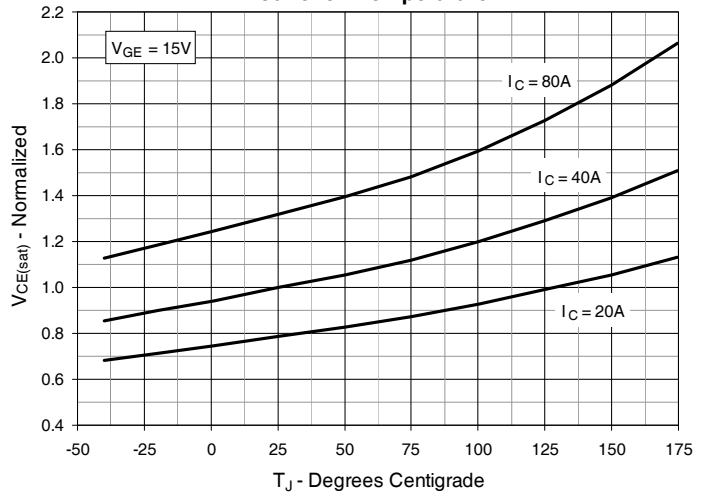


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

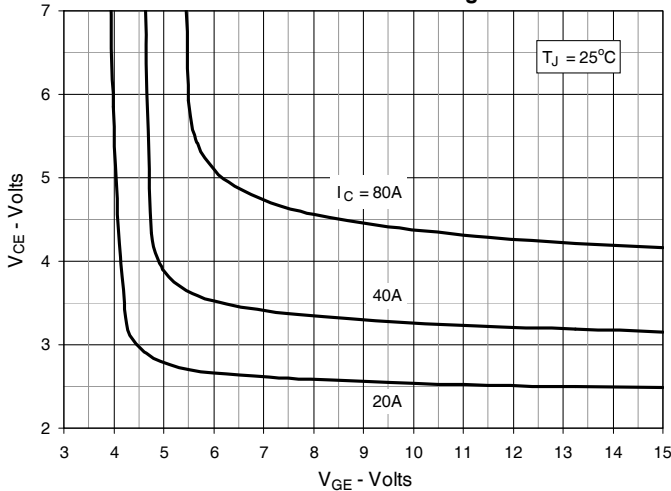


Fig. 6. Input Admittance

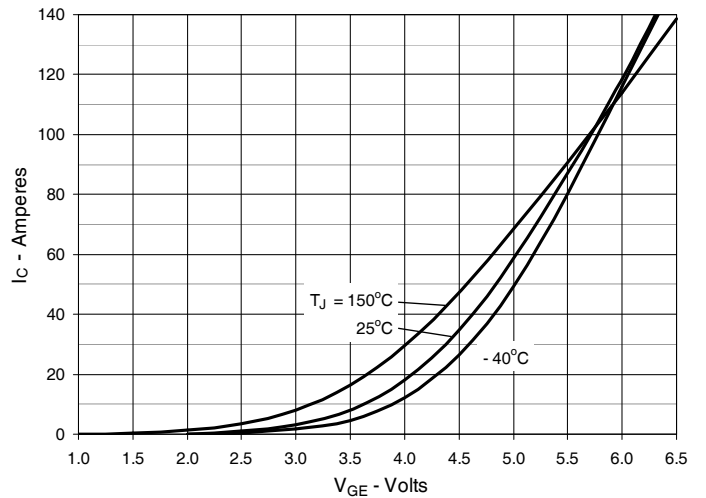


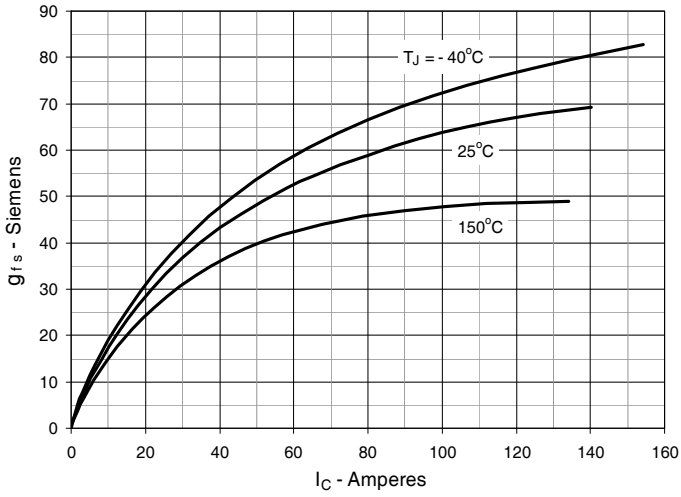
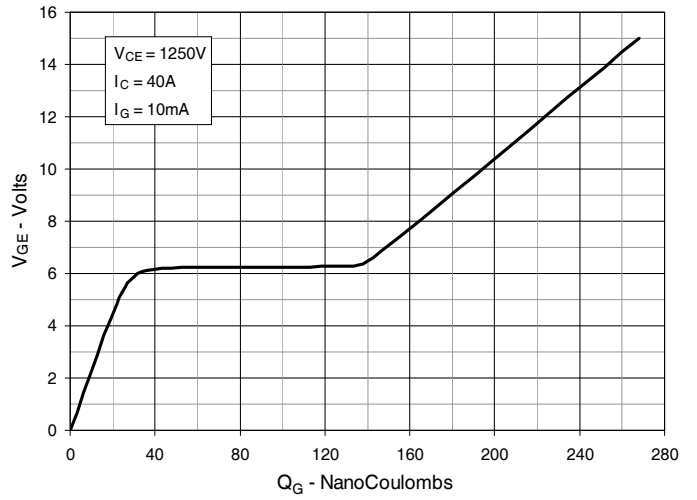
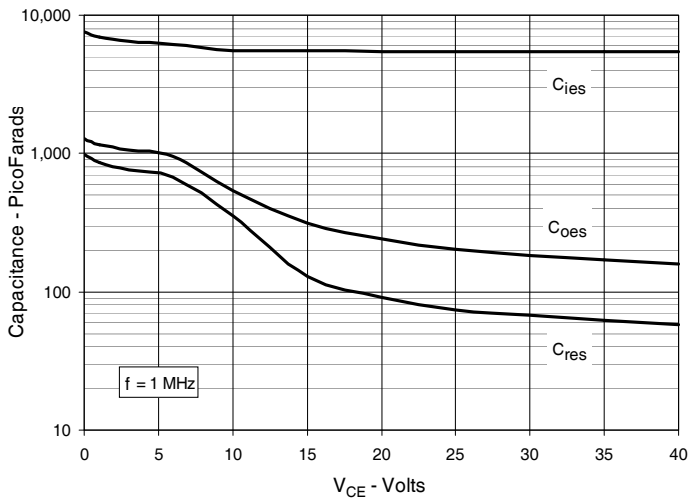
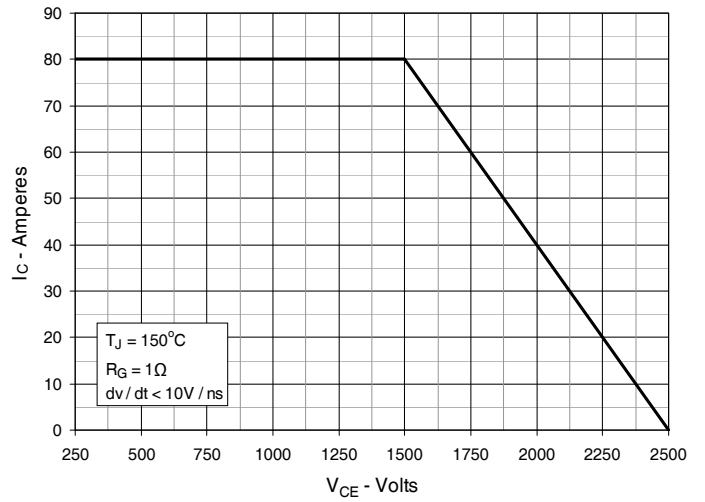
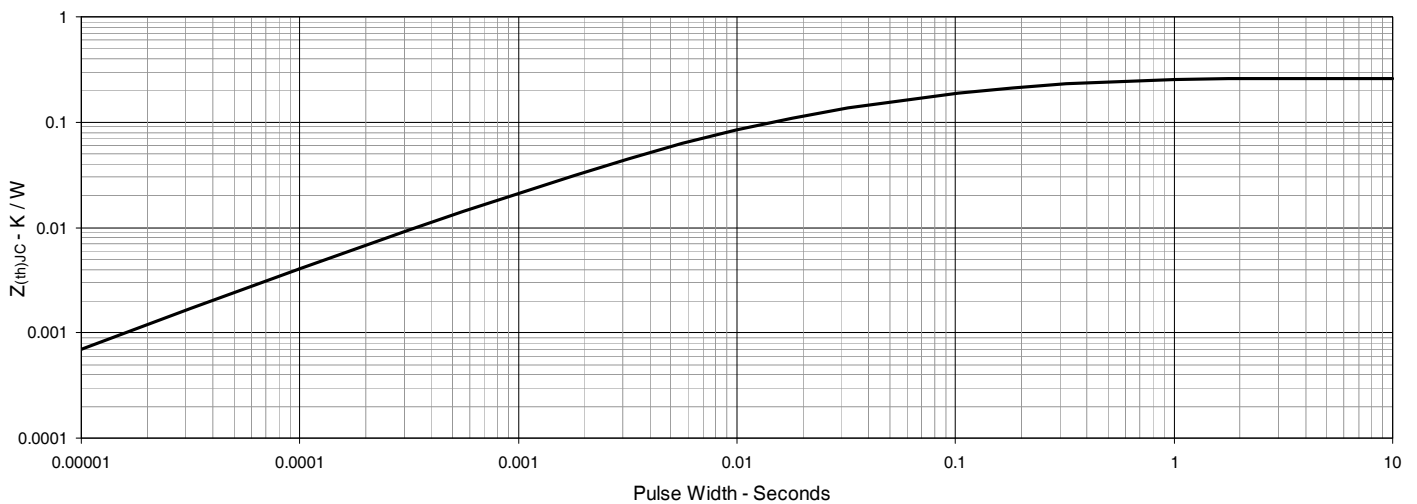
Fig. 7. Transconductance

Fig. 8. Gate Charge

Fig. 9. Capacitance

Fig. 10. Reverse-Bias Safe Operating Area

Fig. 11. Maximum Transient Thermal Impedance


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

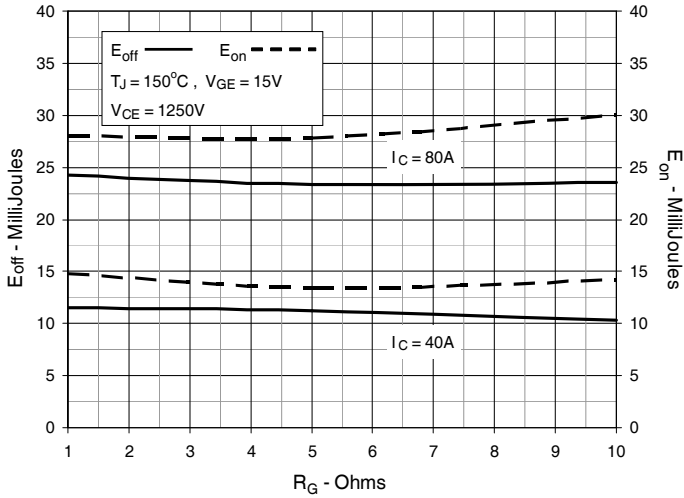


Fig. 13. Inductive Switching Energy Loss vs. Collector Current

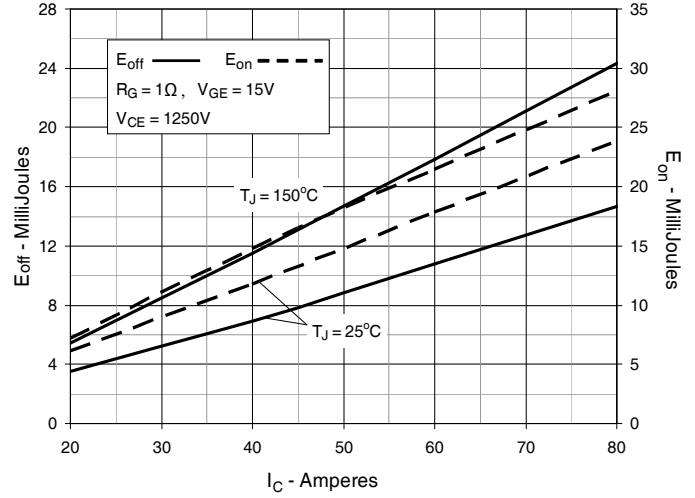


Fig. 14. Inductive Switching Energy Loss vs. Junction Temperature

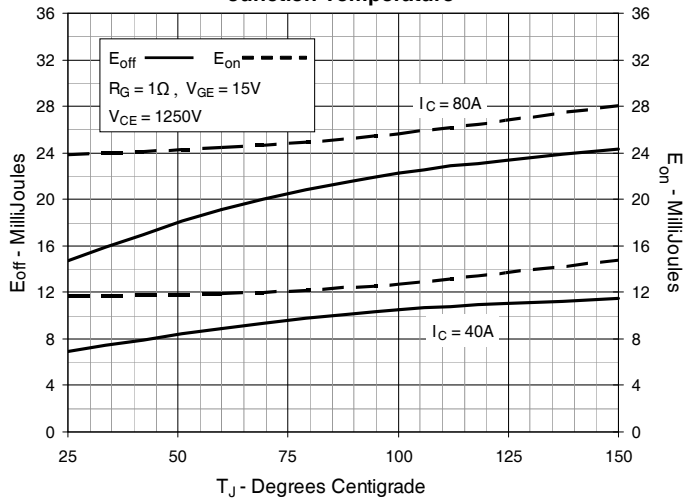


Fig. 15. Inductive Turn-off Switching Times vs. Gate Resistance

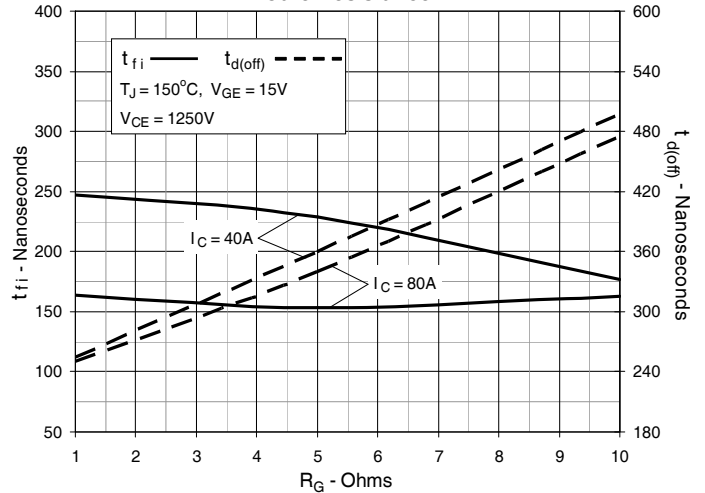


Fig. 16. Inductive Turn-off Switching Times vs. Collector Current

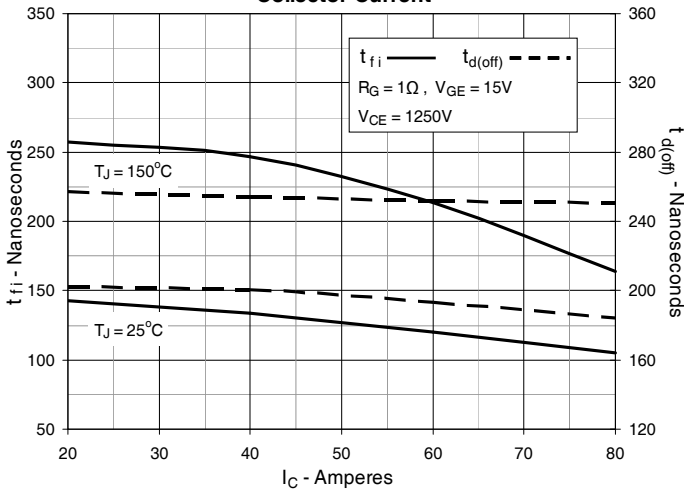


Fig. 17. Inductive Turn-off Switching Times vs. Junction Temperature

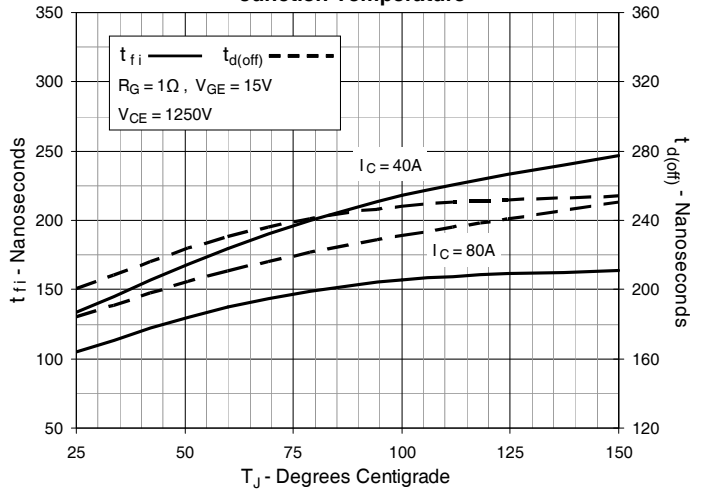


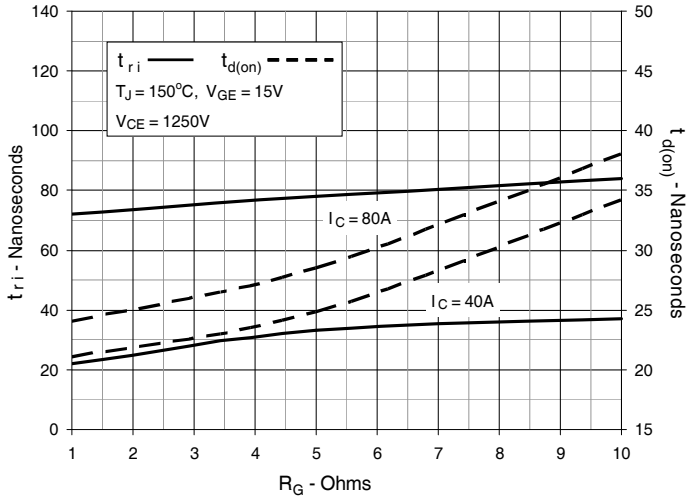
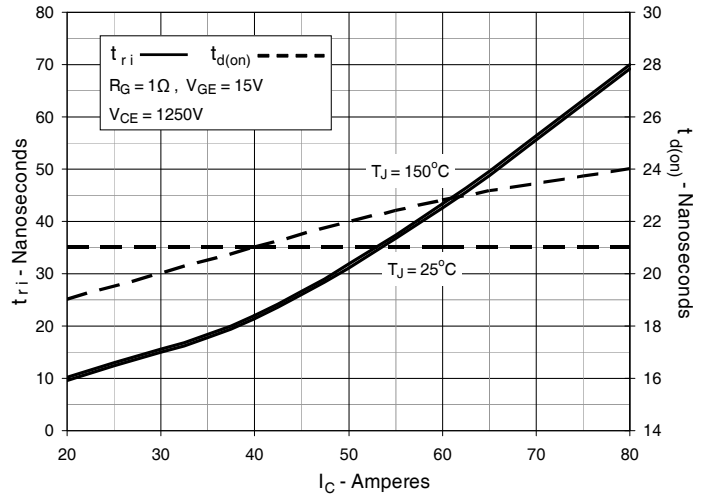
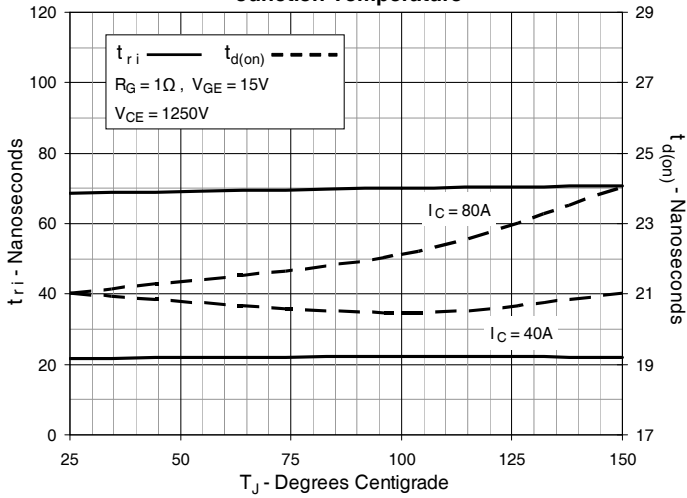
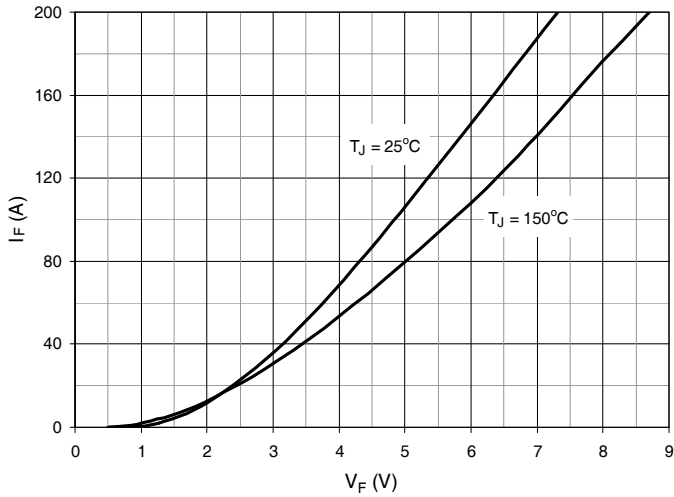
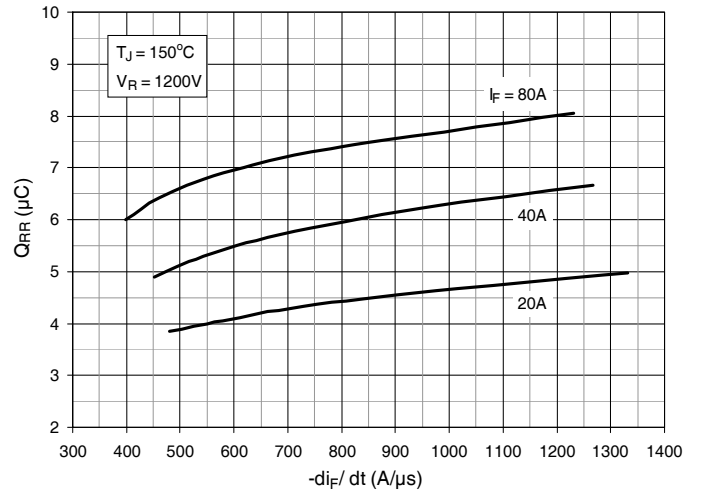
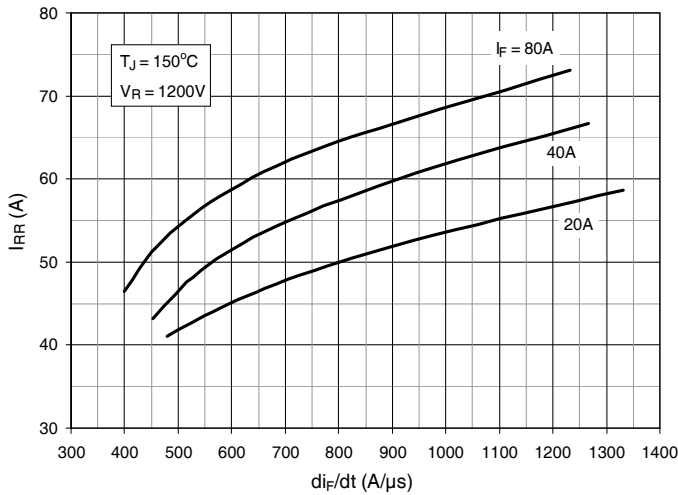
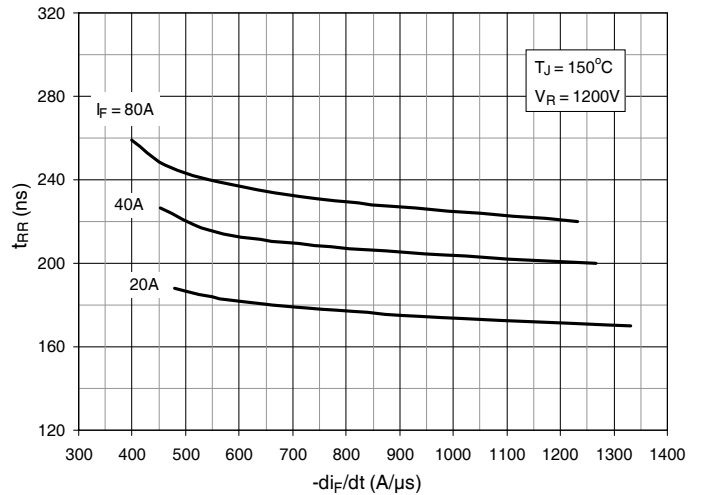
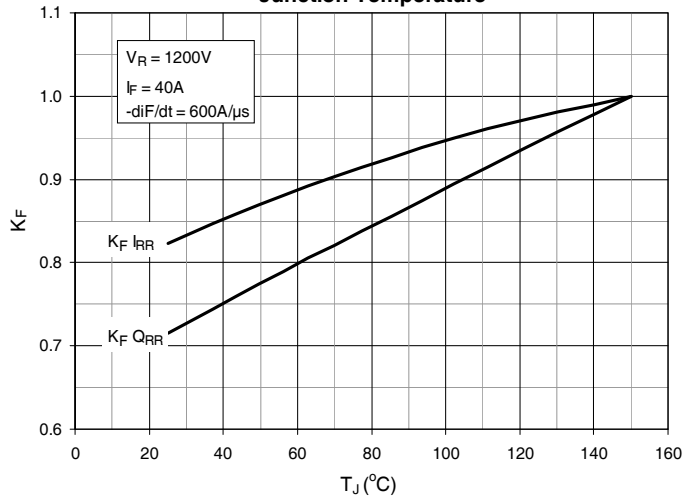
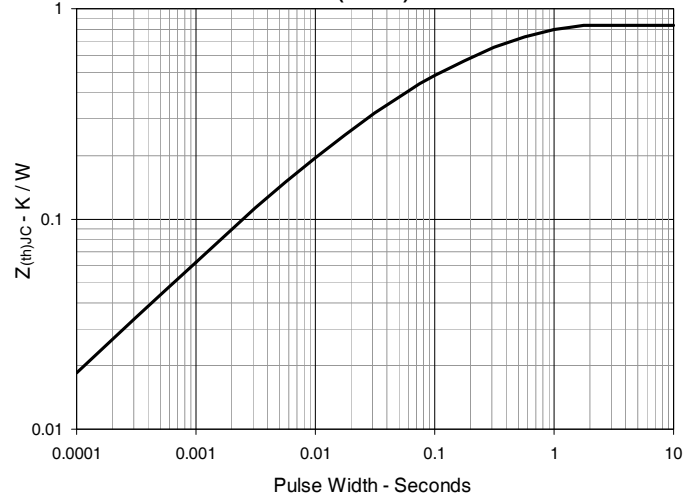
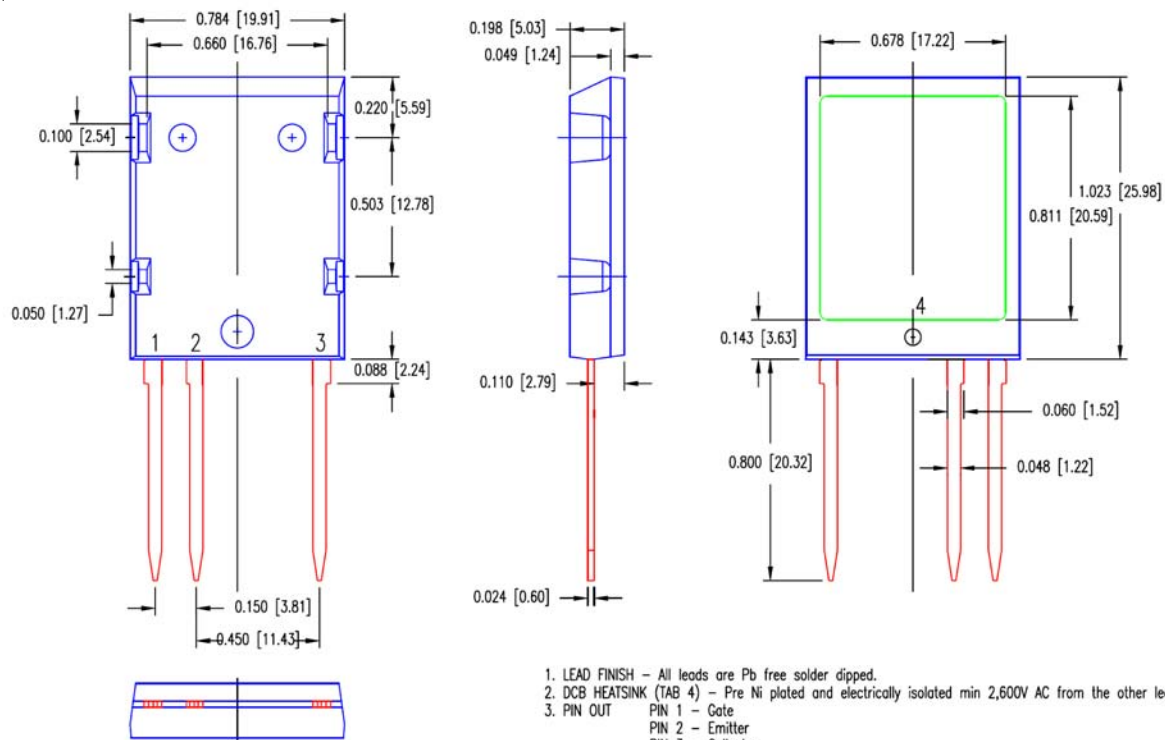
Fig. 18. Inductive Turn-on Switching Times vs. Gate Resistance

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




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