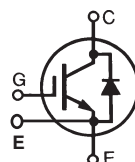


XPT™ 650V IGBT GenX3™ w/ Diode

IXYN120N65B3D1

Extreme Light Punch through
IGBT for 10-30kHz Switching

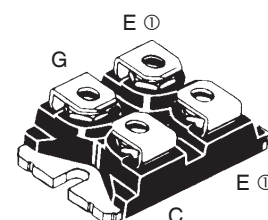


$$\begin{aligned} V_{CES} &= 650V \\ I_{C110} &= 120A \\ V_{CE(sat)} &\leq 1.90V \\ t_{fi(typ)} &= 107ns \end{aligned}$$

Symbol	Test Conditions	Maximum Ratings	
V_{CES}	$T_J = 25^\circ\text{C}$ to 175°C	650	V
V_{CGR}	$T_J = 25^\circ\text{C}$ to 175°C , $R_{GE} = 1M\Omega$	650	V
V_{GES}	Continuous	± 20	V
V_{GEM}	Transient	± 30	V
I_{C25}	$T_C = 25^\circ\text{C}$ (Chip Capability)	250	A
I_{LRMS}	Terminal Current Limit	200	A
I_{C110}	$T_C = 110^\circ\text{C}$	120	A
I_{F110}	$T_C = 110^\circ\text{C}$	86	A
I_{CM}	$T_C = 25^\circ\text{C}$, 1ms	770	A
I_A	$T_C = 25^\circ\text{C}$	60	A
E_{AS}	$T_C = 25^\circ\text{C}$	1	J
SSOA (RBSOA)	$V_{GE} = 15V$, $T_{VJ} = 150^\circ\text{C}$, $R_G = 2\Omega$ Clamped Inductive Load	$I_{CM} = 240$ $V_{CE} \leq V_{CES}$	A
t_{sc} (SCSOA)	$V_{GE} = 15V$, $V_{CE} = 400V$, $T_J = 150^\circ\text{C}$ $R_G = 82\Omega$, Non Repetitive	8	μs
P_C	$T_C = 25^\circ\text{C}$	830	W
T_J		-55 ... +175	$^\circ\text{C}$
T_{JM}		175	$^\circ\text{C}$
T_{stg}		-55 ... +175	$^\circ\text{C}$
TV_{ISOL}	50/60Hz $I_{ISOL} \leq 1mA$	$t = 1min$ $t = 1s$	2500 3000 V~ V~
M_d	Mounting Torque Terminal Connection Torque	1.5/13 1.3/11.5	Nm/lb.in Nm/lb.in
Weight		30	g

Symbol	Test Conditions ($T_J = 25^\circ\text{C}$, Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
BV_{CES}	$I_C = 250\mu A$, $V_{GE} = 0V$	650		V
$V_{GE(th)}$	$I_C = 250\mu A$, $V_{CE} = V_{GE}$	3.5		6.0 V
I_{CES}	$V_{CE} = V_{CES}$, $V_{GE} = 0V$ $T_J = 150^\circ\text{C}$			25 μA 1.5 mA
I_{GES}	$V_{CE} = 0V$, $V_{GE} = \pm 20V$			± 100 nA
$V_{CE(sat)}$	$I_C = 100A$, $V_{GE} = 15V$, Note 1 $T_J = 150^\circ\text{C}$		1.55 1.77	1.90 V V

SOT-227B, miniBLOC
E153432



G = Gate, C = Collector, E = Emitter
① either emitter terminal can be used as
Main or Kelvin Emitter

Features

- International Standard Package
- miniBLOC, with Aluminium Nitride Isolation
- 2500V~ Isolation Voltage
- Optimized for 10-30kHz Switching
- Square RBSOA
- Avalanche Rated
- Short Circuit Capability
- High Current Handling Capability
- Anti-Parallel Fast Diode

Advantages

- High Power Density
- Low Gate Drive Requirement

Applications

- Power Inverters
- UPS
- Motor Drives
- SMPS
- PFC Circuits
- Battery Chargers
- Welding Machines
- Lamp Ballasts

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

g_{fs}	I _C = 60A, V _{CE} = 10V, Note 1	35	58	S
C_{ies}	V _{CE} = 25V, V _{GE} = 0V, f = 1MHz		6900	pF
C_{oes}			586	pF
C_{res}			146	pF
Q_{g(on)}	I _C = 120A, V _{GE} = 15V, V _{CE} = 0.5 • V _{CES}		250	nC
Q_{ge}			52	nC
Q_{gc}			110	nC
t_{d(on)}	Inductive load, T_J = 25°C I _C = 50A, V _{GE} = 15V V _{CE} = 400V, R _G = 2Ω Note 2		30	ns
t_{ri}			28	ns
E_{on}			1.34	mJ
t_{d(off)}			168	ns
t_{fi}			107	ns
E_{off}			1.50	mJ
t_{d(on)}	Inductive load, T_J = 150°C I _C = 50A, V _{GE} = 15V V _{CE} = 400V, R _G = 2Ω Note 2		30	ns
t_{ri}			30	ns
E_{on}			2.60	mJ
t_{d(off)}			226	ns
t_{fi}			196	ns
E_{off}			2.20	mJ
R_{thJC}				0.18 °C/W
R_{thCS}			0.05	°C/W

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

V_F	I _F = 100A, V _{GE} = 0V, Note 1	T _J = 150°C	1.7	2.70 V
				V
I_{rr}	I _F = 100A, V _{GE} = 0V, -di _F /dt = 700A/μs, V _R = 400V	T _J = 150°C	45	A
t_{rr}		T _J = 150°C	156	ns
R_{thJC}				0.38 °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.

IXYS Reserves the Right to Change Limits, Test Conditions, and Dimensions.

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

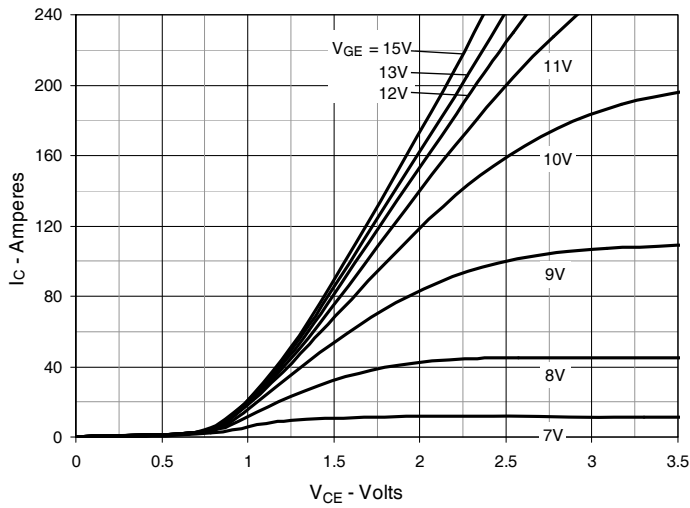


Fig. 2. Extended Output Characteristics @ $T_J = 25^\circ\text{C}$

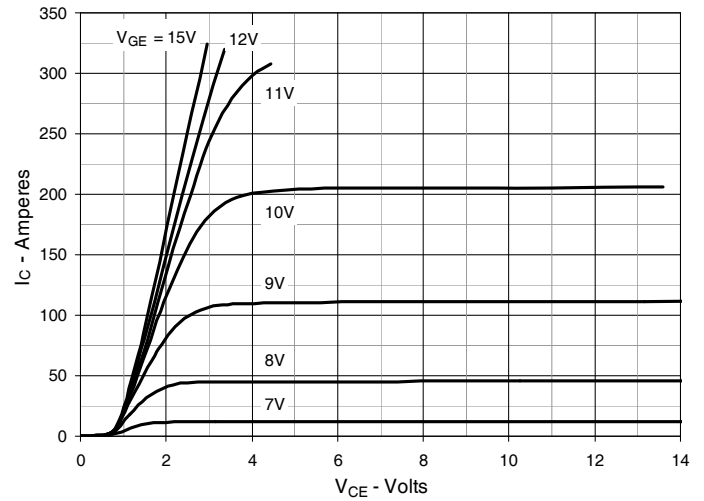


Fig. 3. Output Characteristics @ $T_J = 150^\circ\text{C}$

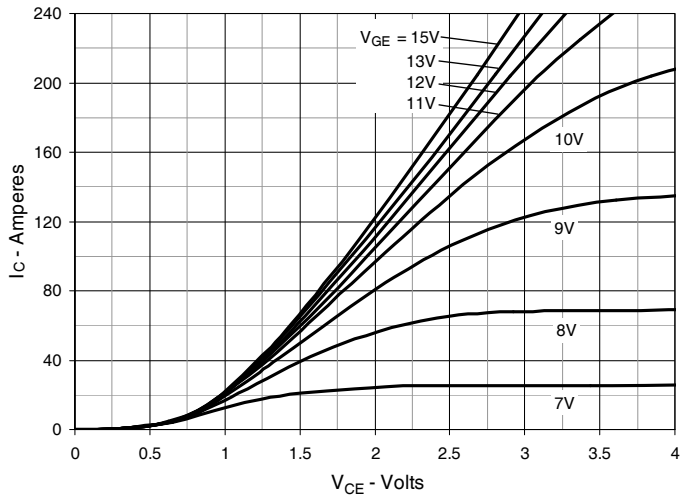


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

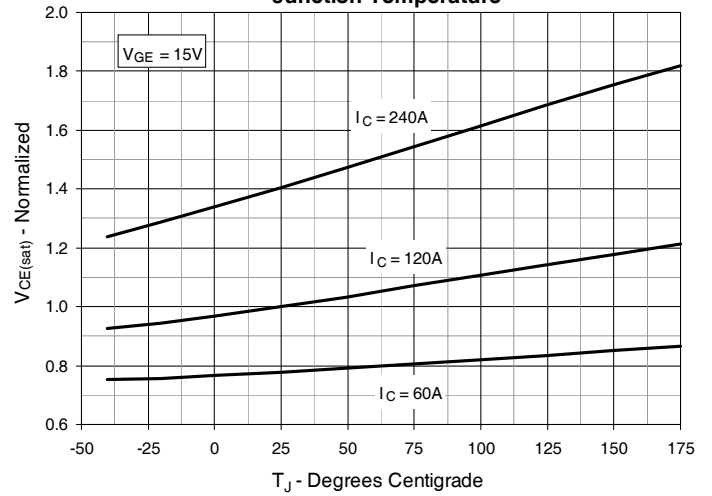


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

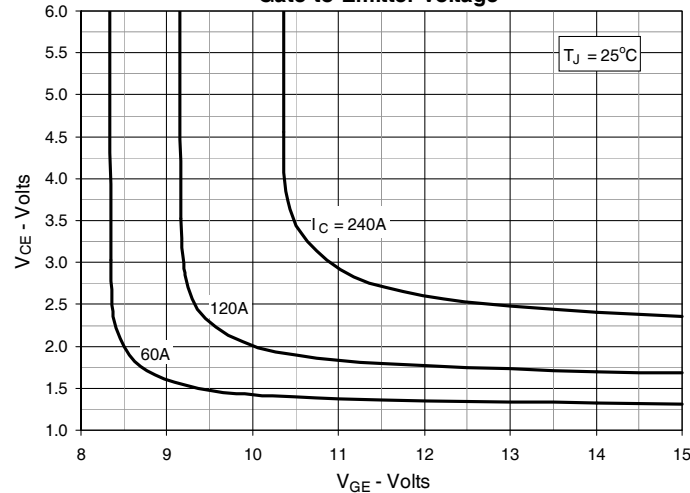


Fig. 6. Input Admittance

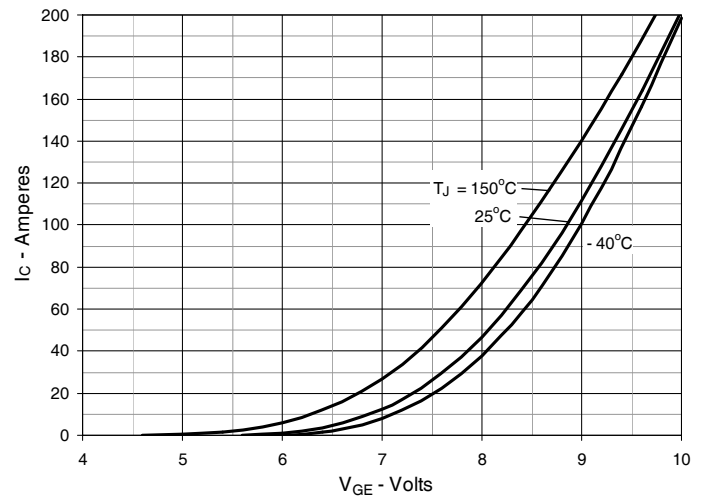


Fig. 7. Transconductance

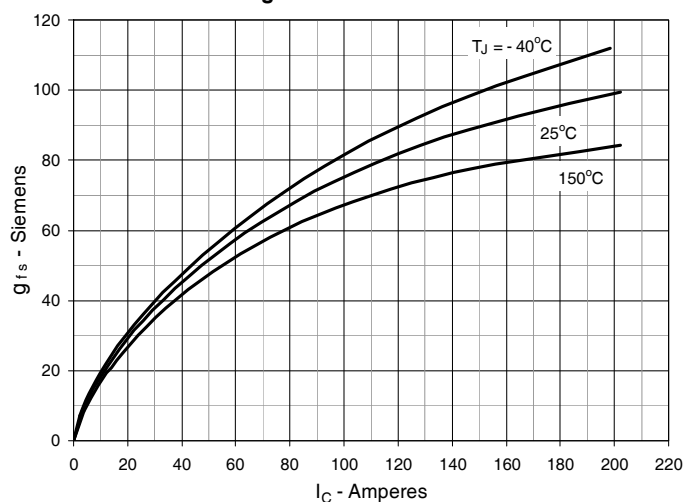


Fig. 8. Gate Charge

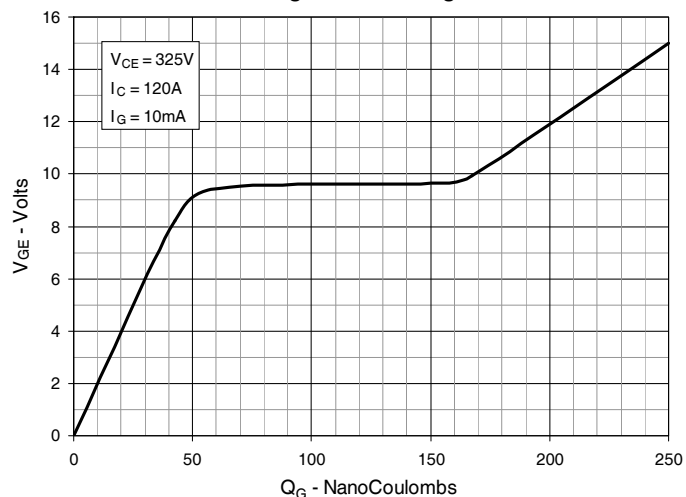


Fig. 9. Capacitance

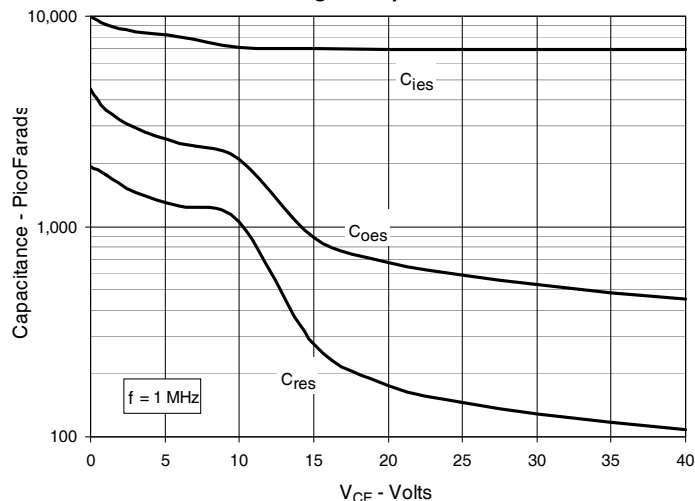


Fig. 10. Reverse-Bias Safe Operating Area

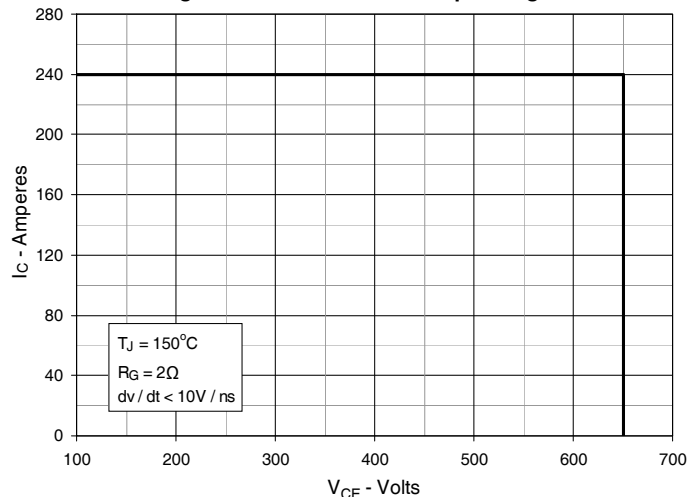


Fig. 11. Forward-Bias Safe Operating Area

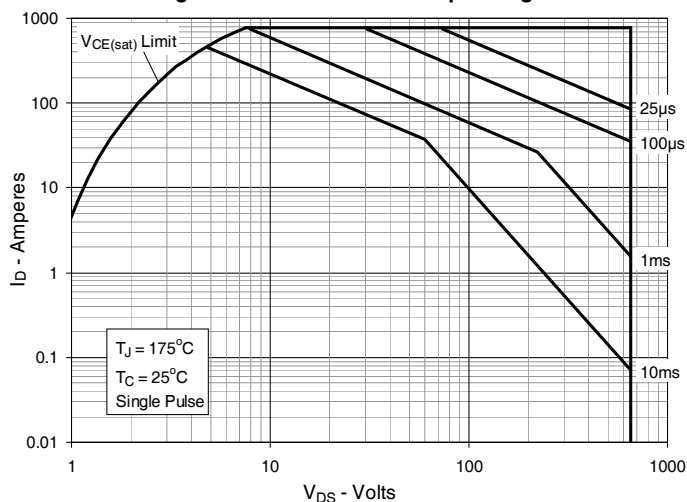


Fig. 12. Maximum Transient Thermal Impedance (IGBT)

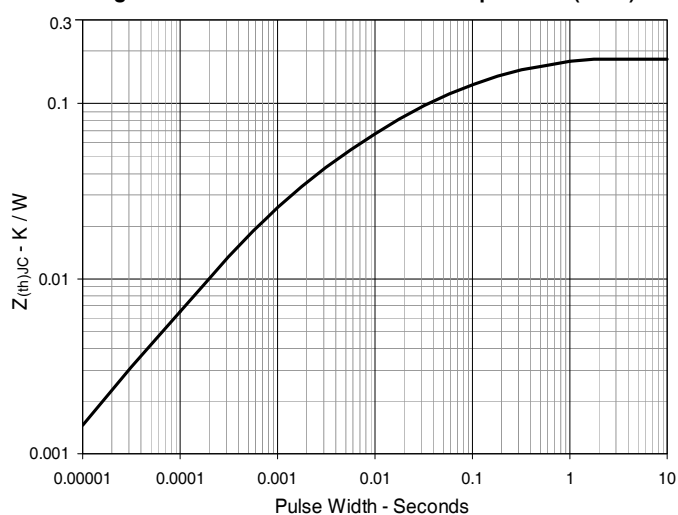


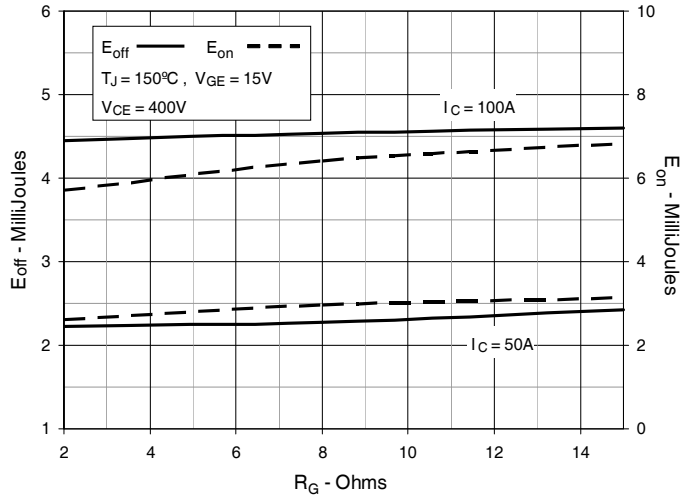
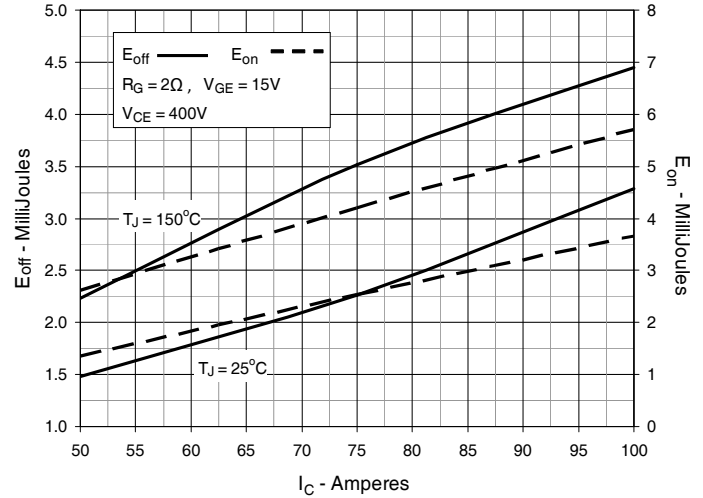
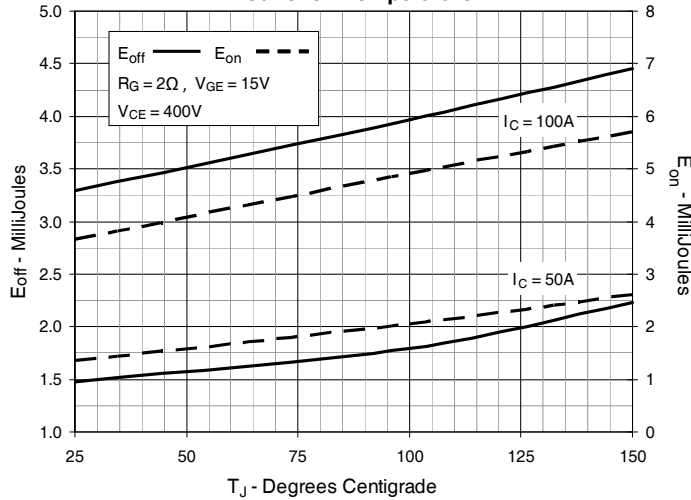
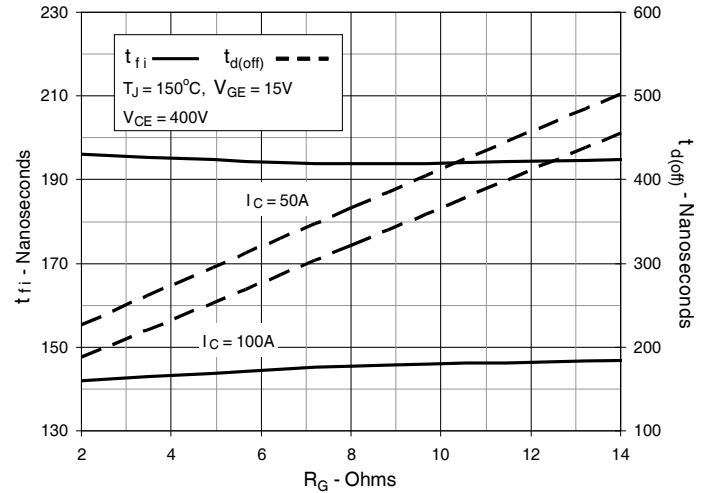
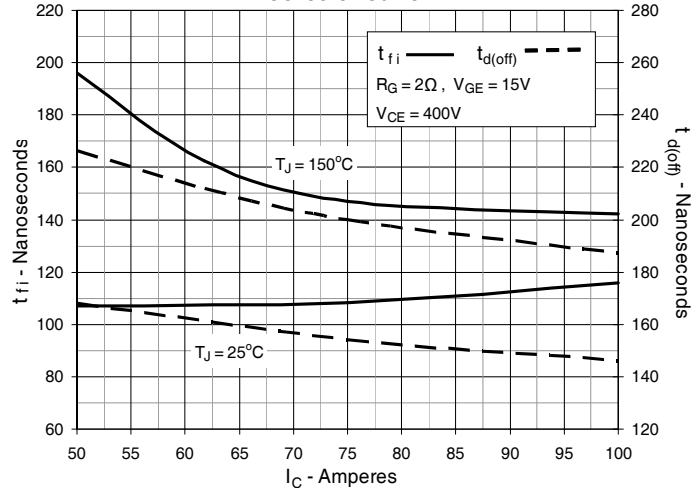
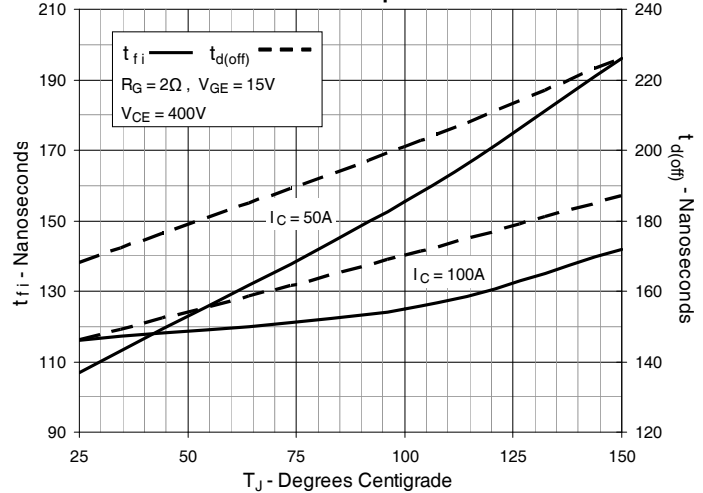
Fig. 13. Inductive Switching Energy Loss vs. Gate Resistance

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


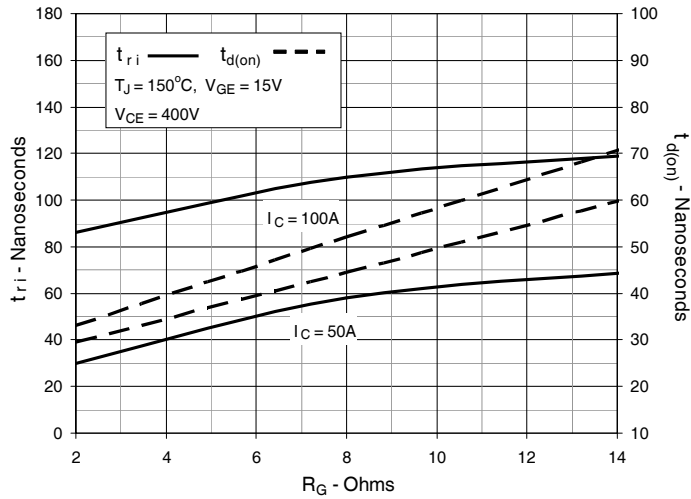
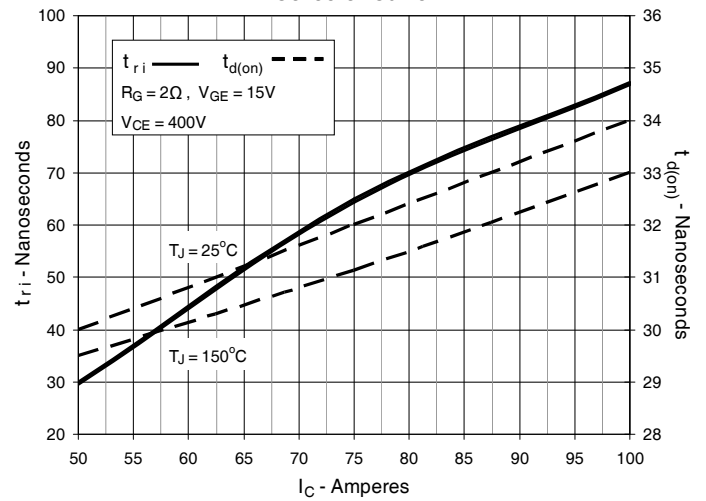
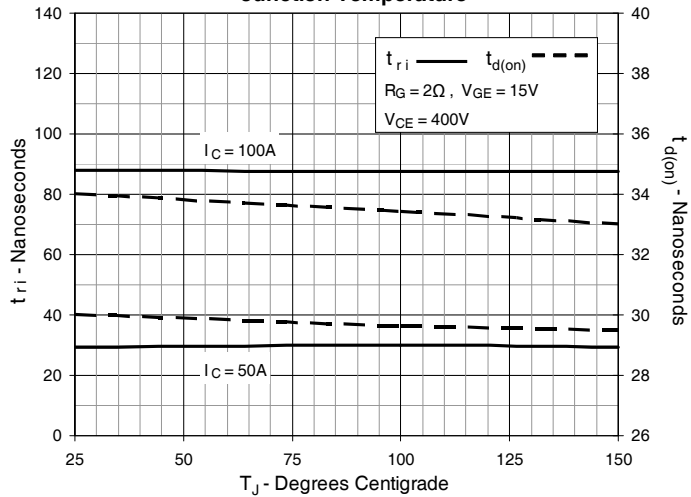
Fig. 19. Inductive Turn-on Switching Times vs. Gate Resistance

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

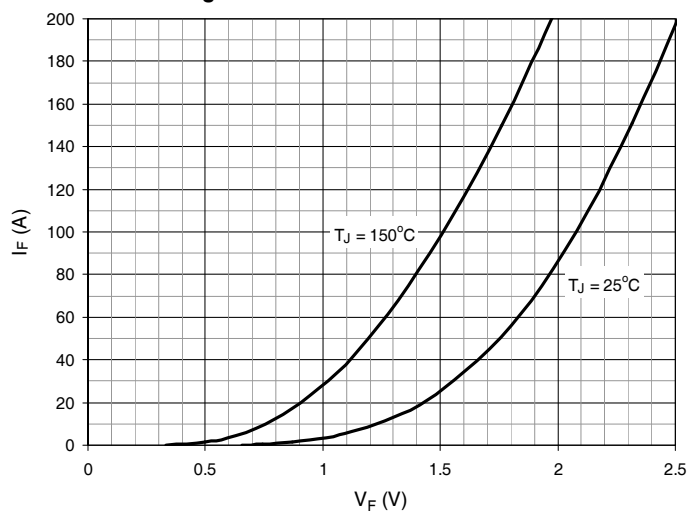
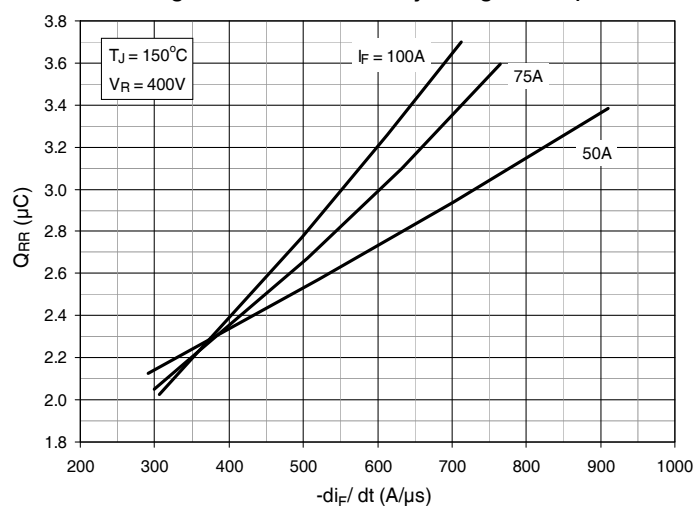
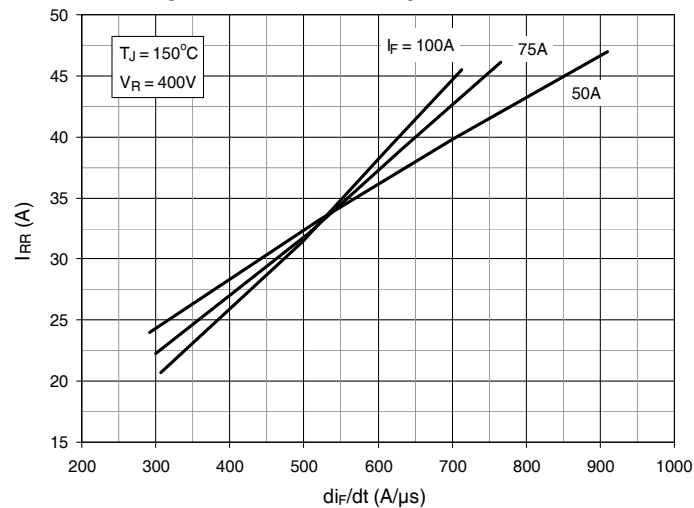
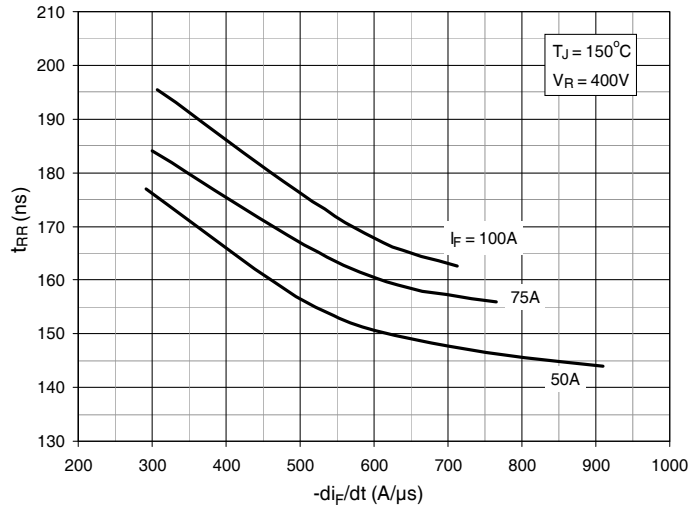
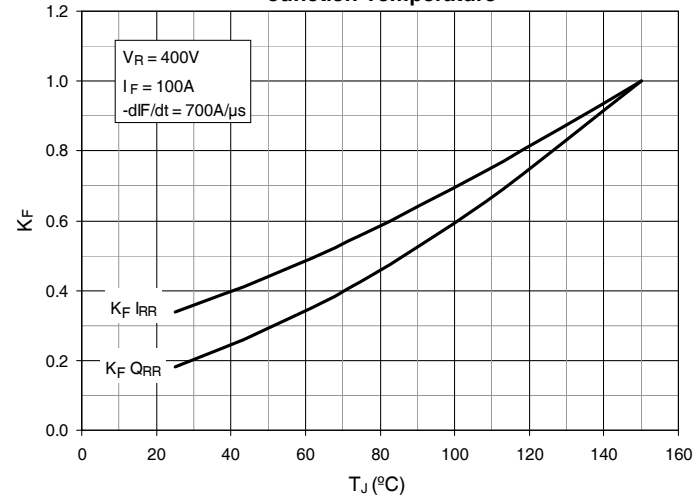
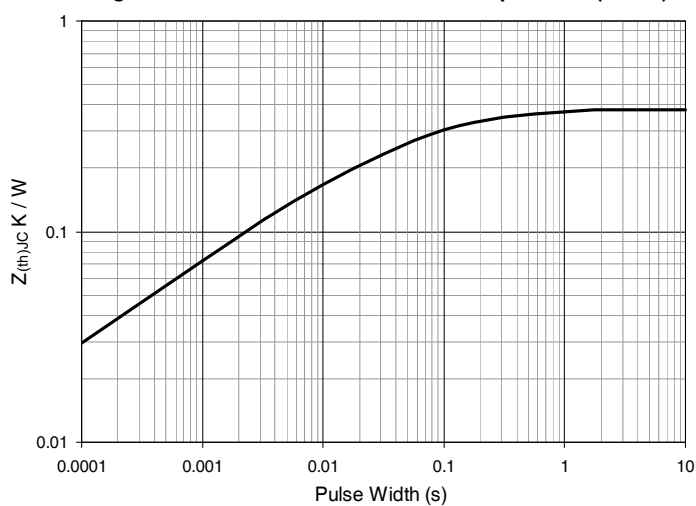
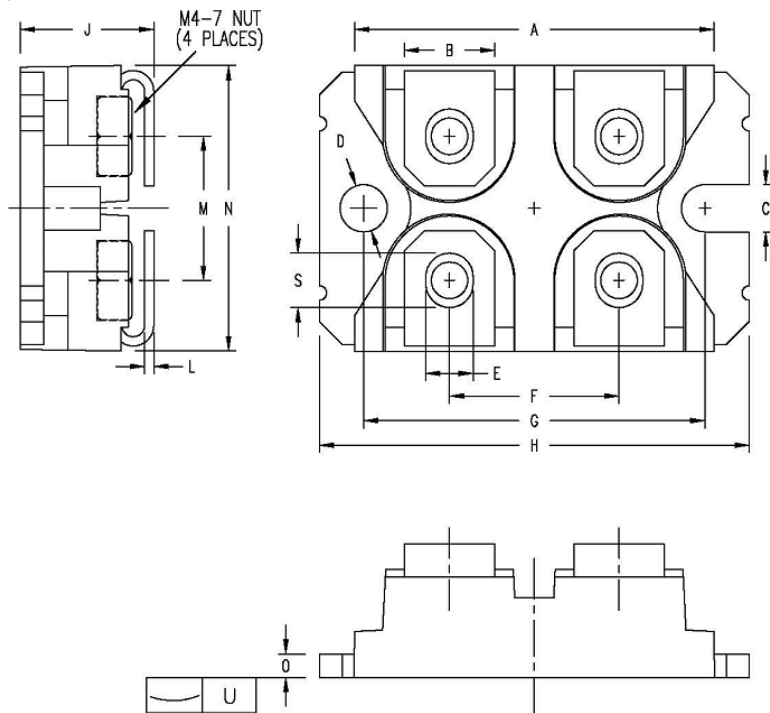
Fig. 23. Reverse Recovery Charge vs. $-di_F/dt$ Fig. 24. Reverse Recovery Current vs. $-di_F/dt$ Fig. 25. Reverse Recovery Time vs. $-di_F/dt$ Fig. 26. Dynamic Parameters Q_{RR} , I_{RR} vs. Junction Temperature

Fig. 27. Maximum Transient Thermal Impedance (Diode)



SOT-227B miniBLOC (IXYN)


SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	1.224	1.260	31.10	32.00
B	.303	.327	7.70	8.30
C	.161	.173	4.10	4.40
D	.161	.173	4.10	4.40
E	.161	.173	4.10	4.40
F	.587	.598	14.90	15.20
G	1.181	1.201	30.00	30.50
H	1.488	1.508	37.80	38.30
J	.461	.484	11.70	12.30
L	.030	.033	0.75	0.85
M	.492	.512	12.50	13.00
N	.984	1.004	25.00	25.50
O	.075	.087	1.90	2.20
S	.181	.193	4.60	4.90
U	.000	.005	0.00	0.13

- NUT MATERIAL:
STANDARD – Low carbon steel with Ni plating.
OPTIONAL – Brass Nut is available.
PART NUMBER–BN
- ALL METAL SURFACE ARE PRE NI PLATED EXCEPT TRIM AREA.

