

tentative

XPT IGBT

$$V_{CES} = 650V$$

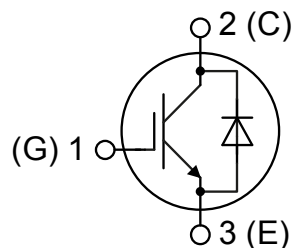
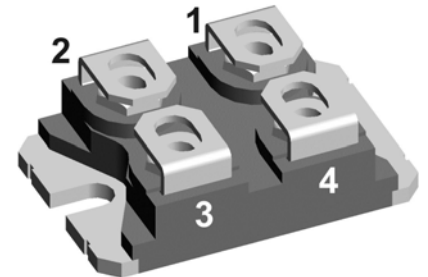
$$I_{C25} = 75A$$

$$V_{CE(sat)} = 1.5V$$

Trench IGBT (medium speed)
Copack

Part number

IXD75IF650NA



Features / Advantages:

- Easy paralleling due to the positive temperature coefficient of the on-state voltage
- Rugged XPT design (Xtreme light Punch Through) results in:
 - short circuit rated for 10 μ sec.
 - very low gate charge
 - low EMI
 - square RBSOA @ 2x I_C
- Thin wafer technology combined with the XPT design results in a competitive low $V_{CE(sat)}$
- SONIC™ diode
 - fast and soft reverse recovery
 - low operating forward voltage

Applications:

- AC motor drives
- Solar inverter
- Medical equipment
- Uninterruptible power supply
- Air-conditioning systems
- Welding equipment
- Switched-mode and resonant-mode power supplies
- Inductive heating, cookers
- Pumps, Fans

Package: SOT-227B (minibloc)

- Isolation Voltage: 3000 V~
- Industry standard outline
- RoHS compliant
- Epoxy meets UL 94V-0

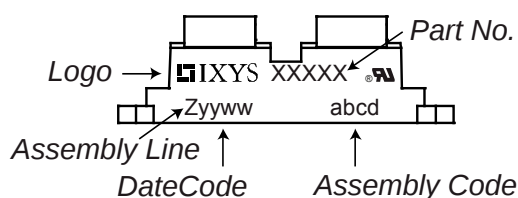
IGBT				Ratings			
Symbol	Definition	Conditions		min.	typ.	max.	Unit
V _{CES}	collector emitter voltage	T _{VJ} = 25°C				650	V
V _{GES}	max. DC gate voltage					20	V
V _{GEM}	max. transient gate emitter voltage					tbd	V
I _{C25}	collector current	T _C = 25°C				75	A
I _{C100}		T _C = 100°C				tbd	A
P _{tot}	total power dissipation	T _C = 25°C				tbd	W
V _{CE(sat)}	collector emitter saturation voltage	I _C = 75A; V _{GE} = 15 V	T _{VJ} = 25°C T _{VJ} = 150°C		1.5 1.75	1.7	V V
V _{GE(th)}	gate emitter threshold voltage	I _C = 1.2mA; V _{GE} = V _{CE}	T _{VJ} = 25°C	5	5.8	6.5	V
I _{CES}	collector emitter leakage current	V _{CE} = V _{CES} ; V _{GE} = 0 V	T _{VJ} = 25°C T _{VJ} = 150°C			0.1	mA mA
I _{GES}	gate emitter leakage current	V _{GE} = ±20 V				500	nA
Q _{G(on)}	total gate charge	V _{CE} = 300 V; V _{GE} = 15 V; I _C = 75 A			130		nC
t _{d(on)}	turn-on delay time	inductive load V _{CE} = 300V; I _C = 75A V _{GE} = ±15 V; R _G = 10 Ω	T _{VJ} = 150°C		25		ns
t _r	current rise time				45		ns
t _{d(off)}	turn-off delay time				120		ns
t _f	current fall time				40		ns
E _{on}	turn-on energy per pulse				1.1		mJ
E _{off}	turn-off energy per pulse				1.7		mJ
RBSOA	reverse bias safe operating area	V _{GE} = ±15 V; R _G = 10 Ω V _{CEmax} = 650V	T _{VJ} = 150°C			150	A
I _{CM}							
SCSOA	short circuit safe operating area	V _{CEmax} = 360 V V _{CE} = 360 V; V _{GE} = ±15 V R _G = 10 Ω; non-repetitive	T _{VJ} = 150°C			10	μs A
t _{sc}	short circuit duration						
I _{sc}	short circuit current						
R _{thJC}	thermal resistance junction to case					tbd	K/W
R _{thCH}	thermal resistance case to heatsink				0.10		K/W
Diode							
V _{RRM}	max. repetitive reverse voltage	T _{VJ} = 25°C				650	V
I _{F25}	forward current	T _C = 25°C				tbd	A
I _{F100}		T _C = 100°C				tbd	A
V _F	forward voltage	I _F = 75A	T _{VJ} = 25°C T _{VJ} = 125°C		1.80	2.00	V V
I _R	reverse current	V _R = V _{RRM}	T _{VJ} = 25°C T _{VJ} = 125°C			0.15	mA mA
Q _{rr}	reverse recovery charge	V _R = 300 V -di _F /dt = 1200 A/μs I _F = 75A; V _{GE} = 0 V	T _{VJ} = 125°C		7		μC
I _{RM}	max. reverse recovery current				55		A
t _{rr}	reverse recovery time				100		ns
E _{rec}	reverse recovery energy				1.5		mJ
R _{thJC}	thermal resistance junction to case					1	K/W
R _{thCH}	thermal resistance case to heatsink				0.10		K/W

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Package SOT-227B (minibloc)				Ratings			
Symbol	Definition	Conditions		min.	typ.	max.	Unit
I_{RMS}	RMS current	per terminal ¹⁾				150	A
T_{VJ}	virtual junction temperature			-40		175	°C
T_{op}	operation temperature			-40		150	°C
T_{stg}	storage temperature			-40		150	°C
Weight					30		g
M_D	mounting torque			1.1		1.5	Nm
M_T	terminal torque			1.1		1.5	Nm
$d_{Spp/App}$	creepage distance on surface striking distance through air	terminal to terminal	10.5	3.2			mm
$d_{Spb/Apb}$		terminal to backside	8.6	6.8			mm
V_{ISOL}	isolation voltage	t = 1 second		3000			V
		t = 1 minute	50/60 Hz, RMS; $I_{ISOL} \leq 1$ mA	2500			V

¹⁾ I_{RMS} is typically limited by the pin-to-chip resistance (1); or by the current capability of the chip (2). In case of (1) and a product with multiple pins for one chip-potential, the current capability can be increased by connecting the pins as one contact.

Product Marking



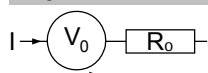
Part number

I = IGBT
 X = XPT IGBT
 D = Trench 1 / std
 75 = Current Rating [A]
 IF = Copack
 650 = Reverse Voltage [V]
 NA = SOT-227B (minibloc)

Ordering	Part Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	IXD75IF650NA	IXD75IF650NA	Tube	10	513716

Equivalent Circuits for Simulation

* on die level

 $T_{VJ} = 175^{\circ}\text{C}$ 

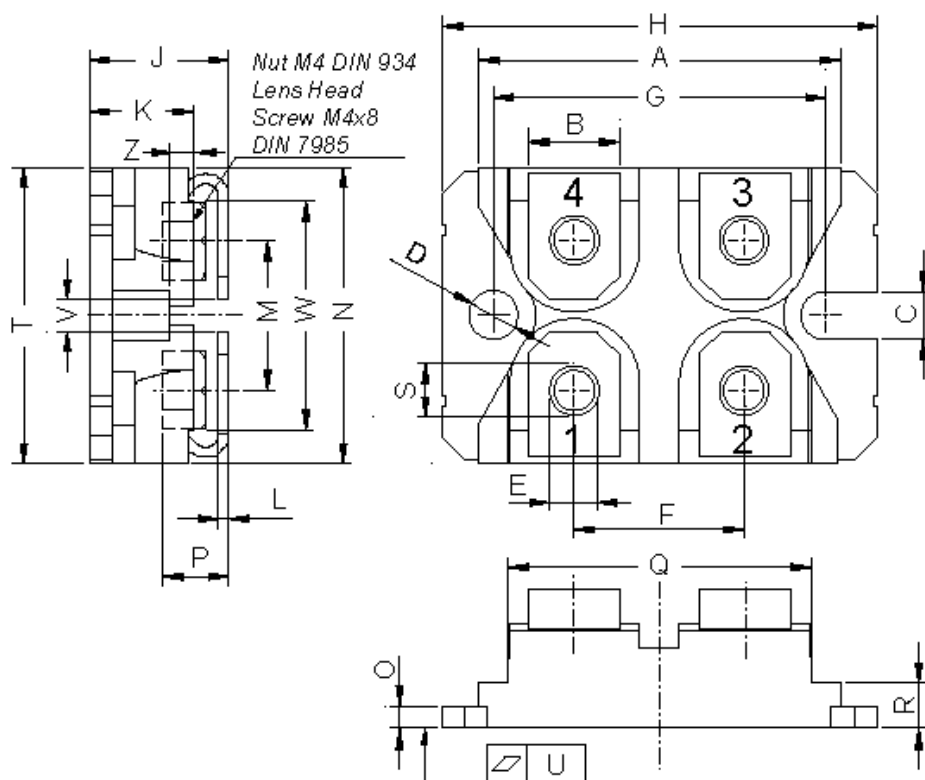
$V_{0\max}$ threshold voltage

V

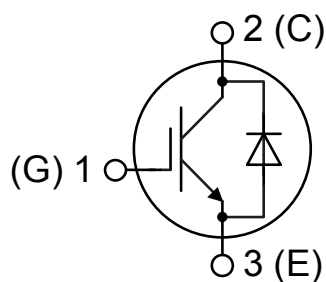
$R_{0\max}$ slope resistance *

mΩ

Outlines SOT-227B (minibloc)



Dim.	Millimeter		Inches	
	min	max	min	max
A	31.50	31.88	1.240	1.255
B	7.80	8.20	0.307	0.323
C	4.09	4.29	0.161	0.169
D	4.09	4.29	0.161	0.169
E	4.09	4.29	0.161	0.169
F	14.91	15.11	0.587	0.595
G	30.12	30.30	1.186	1.193
H	37.80	38.23	1.488	1.505
J	11.68	12.22	0.460	0.481
K	8.92	9.60	0.351	0.378
L	0.74	0.84	0.029	0.033
M	12.50	13.10	0.492	0.516
N	25.15	25.42	0.990	1.001
O	1.95	2.13	0.077	0.084
P	4.95	6.20	0.195	0.244
Q	26.54	26.90	1.045	1.059
R	3.94	4.42	0.155	0.167
S	4.55	4.85	0.179	0.191
T	24.59	25.25	0.968	0.994
U	-0.05	0.10	-0.002	0.004
V	3.20	5.50	0.126	0.217
W	19.81	21.08	0.780	0.830
Z	2.50	2.70	0.098	0.106



IGBT

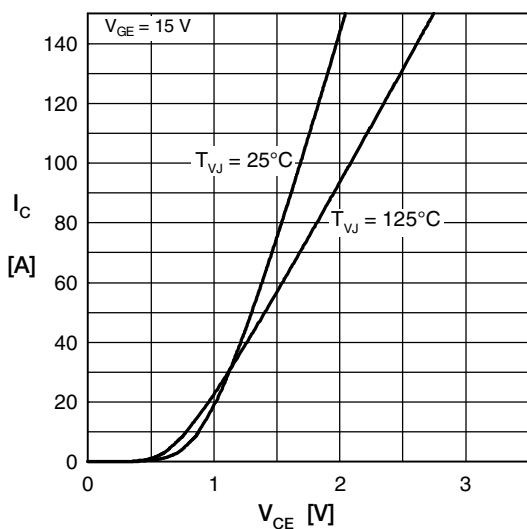


Fig. 1 Typ. output characteristics

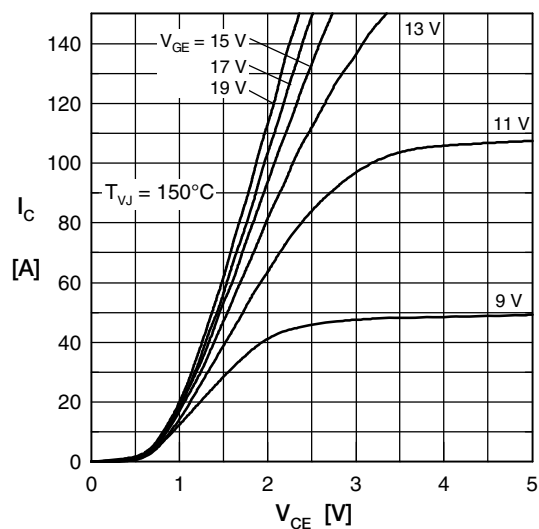


Fig. 2 Typ. output characteristics

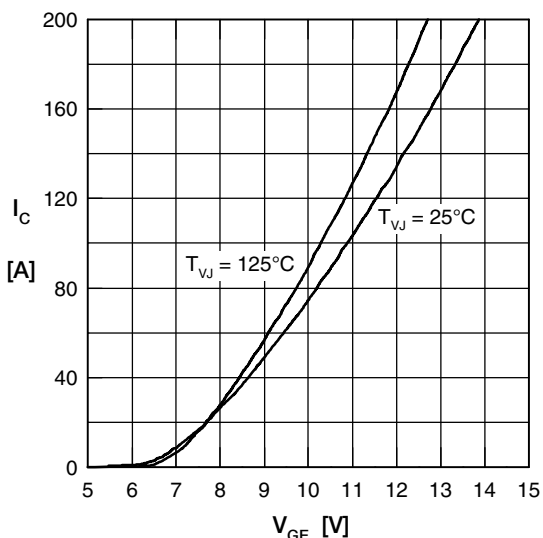


Fig. 3 Typ. transfer characteristics

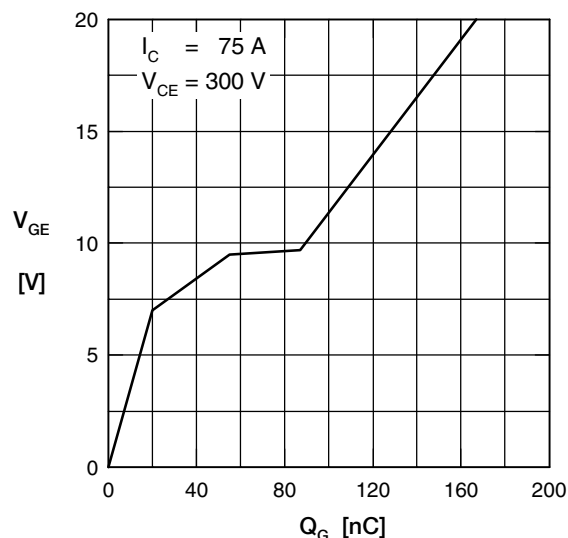


Fig. 4 Typ. turn-on gate charge

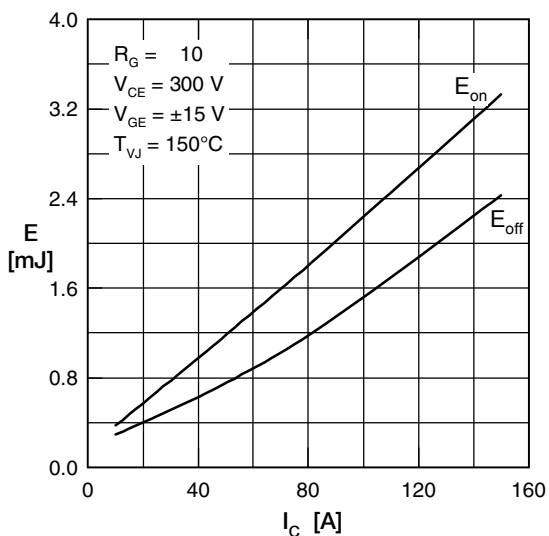


Fig. 5 Typ. switching energy vs. collector current

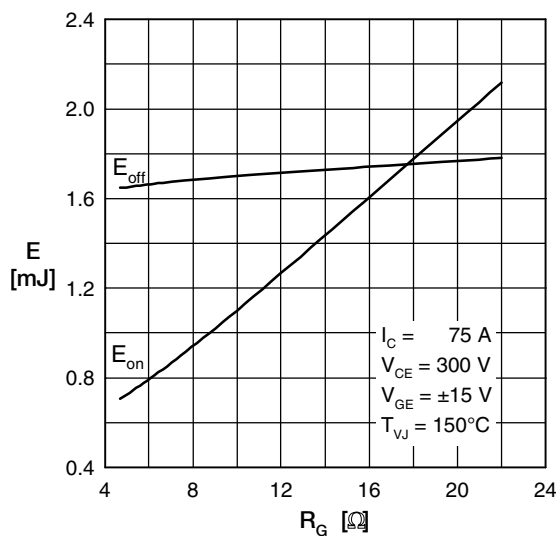
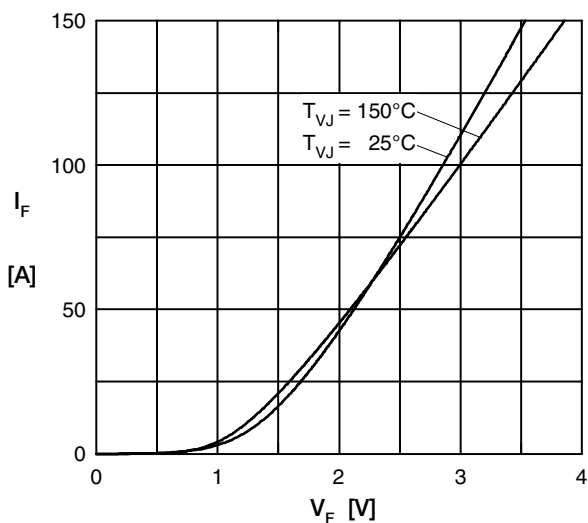
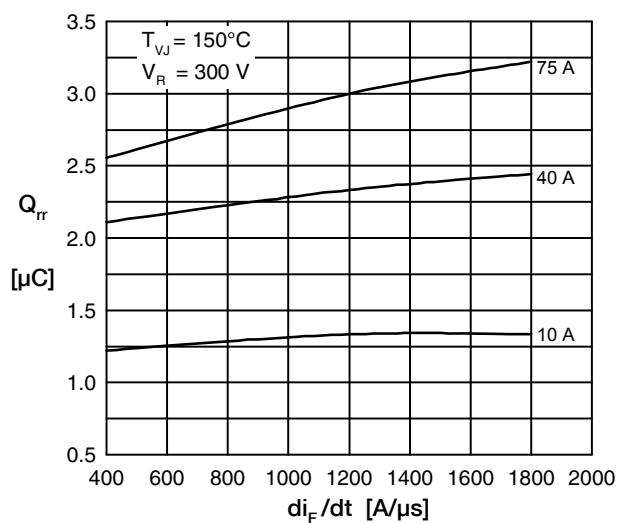
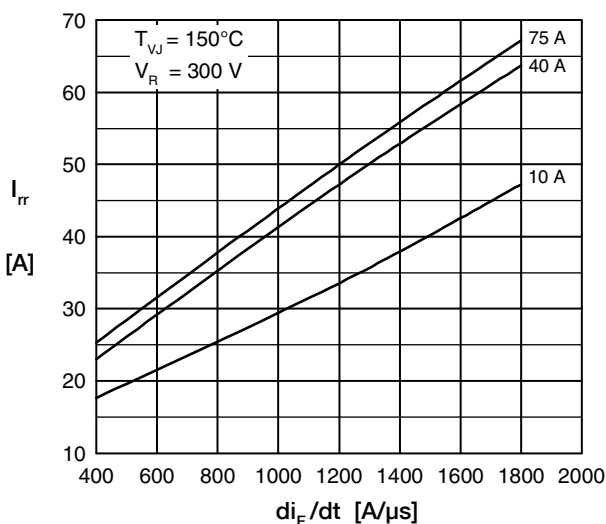
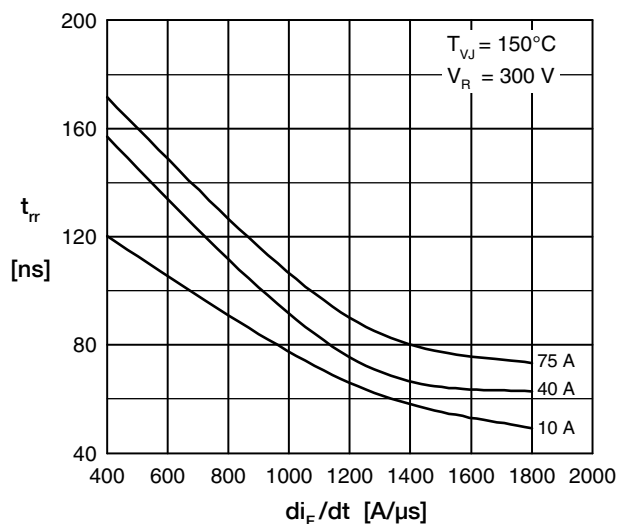
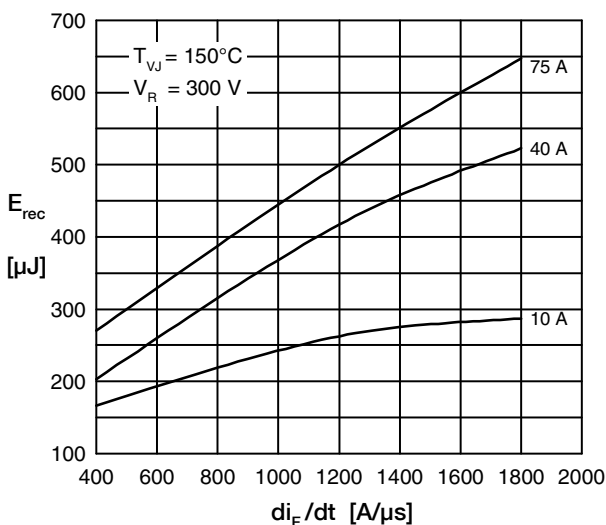
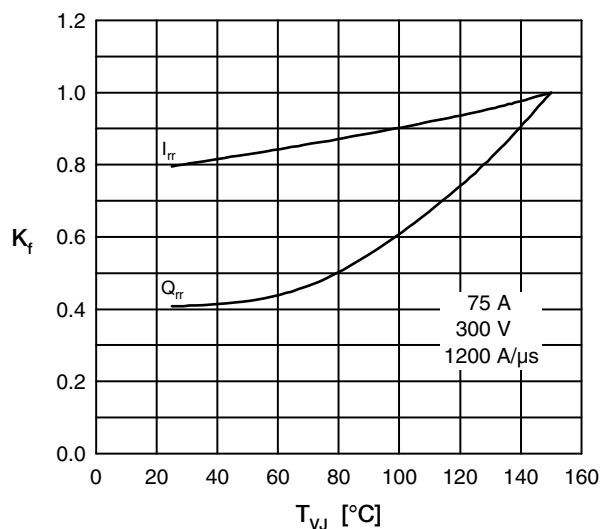


Fig. 6 Typ. switching energy vs. gate resistance

Diode

Fig. 1 Typ. Forward current versus V_F Fig. 2 Typ. reverse recov.charge Q_{rr} vs. di/dt Fig. 3 Typ. peak reverse current I_{RM} vs. di/dt Fig. 4 Typ. recovery time t_{rr} versus di/dt Fig. 5 Typ. recovery energy E_{rec} versus di/dt Fig. 6 Dynamic parameters Q_{rr} , I_{rr} vs. T_{VJ}



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