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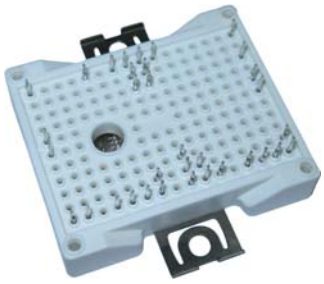
XPT IGBT Module

3~ Rectifier	Brake Chopper	3~ Inverter
V_{RRM} = 1600 V	V_{CES} = 1200 V	V_{CES} = 1200 V
I_{DAV} = 105 A	I_{C25} = 28 A	I_{C25} = 43 A
I_{FSM} = 320 A	$V_{CE(sat)}$ = 1.8 V	$V_{CE(sat)}$ = 1.8 V

6-Pack + 3~ Rectifier Bridge & Brake Unit + NTC

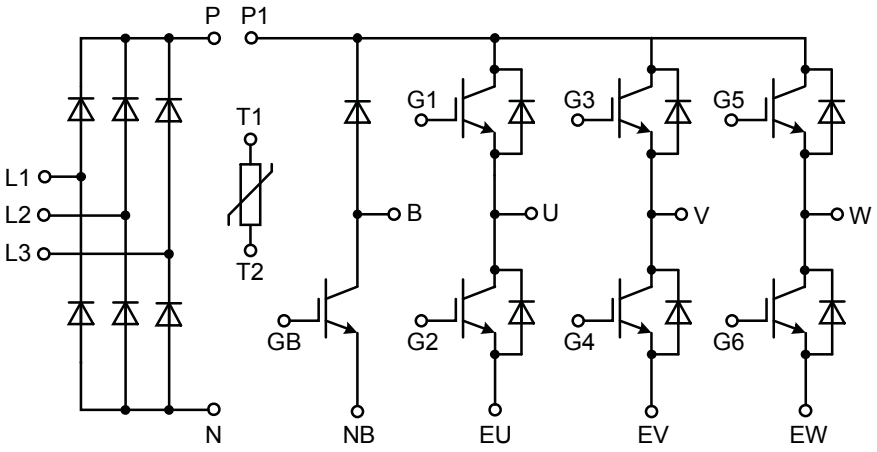
Part number

MIXA30WB1200TMI



Backside: isolated

pending



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 µsec.
  - very low gate charge
  - low EMI
  - square RBSOA @ 3x Ic
- Thin wafer technology combined with the XPT design results in a competitive low VCE(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: MiniPack2B

- Industry standard outline
- RoHS compliant
- Epoxy meets UL 94V-0

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Rectifier

Symbol	Definition	Conditions		Ratings min.	typ.	max.	Unit
V_{RSM}	*max. non-repetitive reverse blocking voltage*		T_{VJ} = 25°C			1700	V
V_{RRM}	*max. repetitive reverse blocking voltage*		T_{VJ} = 25°C			1600	V
I_R	*reverse current, drain current*	V_R = 1600 V	T_{VJ} = 25°C			20	µA
		V_R = 1600 V	T_{VJ} = 125°C			tbd	mA
V_F	*forward voltage drop*	I_F = 30 A	T_{VJ} = 25°C			1.23	V
		I_F = 60 A					V
		I_F = 30 A	T_{VJ} = 125 °C			1.19	V
		I_F = 60 A					V
I_{DAV}	*bridge output current*	T_C = 80°C	T_{VJ} = 150°C			105	A
		rectangular d = ⅓					
V_{F0}	*threshold voltage* } *for power loss calculation only*		T_{VJ} = 150°C			0.90	V
r_F	*slope resistance* }					10	mΩ
R_{thJC}	*thermal resistance junction to case*					1.1	K/W
R_{thCH}	*thermal resistance case to heatsink*				0.35		K/W
P_{tot}	*total power dissipation*		T_C = 25°C			110	W
I_{FSM}	*max. forward surge current*	t = 10 ms; (50 Hz), sine	T_{VJ} = 45°C			320	A
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			345	A
		t = 10 ms; (50 Hz), sine	T_{VJ} = 150°C			270	A
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			295	A
I^2t	*value for fusing*	t = 10 ms; (50 Hz), sine	T_{VJ} = 45°C			510	A²s
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			495	A²s
		t = 10 ms; (50 Hz), sine	T_{VJ} = 150°C			365	A²s
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			360	A²s
C_J	*junction capacitance*	V_R = 400 V; f = 1 MHz	T_{VJ} = 25°C		10		pF

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Brake IGBT				Ratings			
Symbol	Definition	Conditions		min.	typ.	max.	Unit
V_{CES}	*collector emitter voltage*		T_{VJ} = 25°C			1200	V
V_{GES}	*max. DC gate voltage*					±20	V
V_{GEM}	*max. transient gate emitter voltage*					±30	V
I_{C25}	*collector current*		T_C = 25°C			28	A
I_{C80}			T_C = 80°C			20	A
P_{tot}	*total power dissipation*		T_C = 25°C			100	W
$V_{CE(sat)}$	*collector emitter saturation voltage*	I_C = 15 A; V_{GE} = 15 V	T_{VJ} = 25°C		1.8	2.1	V
			T_{VJ} = 125°C		2.1		V
$V_{GE(th)}$	*gate emitter threshold voltage*	I_C = 0.6 mA; V_{GE} = V_{CE}	T_{VJ} = 25°C	5.4	5.9	6.5	V
I_{CES}	*collector emitter leakage current*	V_{CE} = V_{CES}; V_{GE} = 0 V	T_{VJ} = 25°C			0.1	mA
			T_{VJ} = 125°C		0.1		mA
I_{GES}	*gate emitter leakage current*	V_{GE} = ±20 V				500	nA
$Q_{G(on)}$	*total gate charge*	V_{CE} = 600 V; V_{GE} = 15 V; I_C = 15 A			48		nC
$t_{d(on)}$	*turn-on delay time*				70		ns
t_r	*current rise time*				40		ns
$t_{d(off)}$	*turn-off delay time*	inductive load	T_{VJ} = 125°C		250		ns
t_f	*current fall time*	V_{CE} = 600 V; I_C = 15A			100		ns
E_{on}	*turn-on energy per pulse*	V_{GE} = ±15 V; R_G = 56 Ω			1.6		mJ
E_{off}	*turn-off energy per pulse*				1.7		mJ
RBSOA	*reverse bias safe operating area*	V_{GE} = ±15 V; R_G = 56 Ω	T_{VJ} = 125°C				
I_{CM}		V_{CEK} = 1200 V				45	A
SCSOA	*short circuit safe operating area*						
t_{SC}	*short circuit duration*	V_{CE} = 900 V; V_{GE} = ±15 V	T_{VJ} = 125°C			10	µs
I_{SC}	*short circuit current*	R_G = 56 Ω; non-repetitive			60		A
R_{thJC}	*thermal resistance junction to case*					1.26	K/W
R_{thCH}	*thermal resistance case to heatsink*						K/W

Brake Diode							
V_{RRM}	*max. repetitive reverse voltage*		T_{VJ} = 25°C			1200	V
I_{F25}	*forward current*		T_C = 25°C			18	A
I_{F80}			T_C = 80°C			12	A
V_F	*forward voltage*	I_F = 10 A	T_{VJ} = 25°C			2.20	V
			T_{VJ} = 125°C		2.20		V
I_R	*reverse current*	V_R = V_{RRM}	T_{VJ} = 25°C			0.1	mA
			T_{VJ} = 125°C			0.2	mA
Q_{rr}	*reverse recovery charge*	V_R = 600 V			1.3		µC
I_{RM}	*max. reverse recovery current*	$-di_F/dt$ = 250 A/µs	T_{VJ} = 125°C		10.5		A
t_{rr}	*reverse recovery time*	I_F = 10 A			350		ns
E_{rec}	*reverse recovery energy*				0.4		mJ
R_{thJC}	*thermal resistance junction to case*					2.5	K/W
R_{thCH}	*thermal resistance case to heatsink*				0.83		K/W

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Inverter IGBT

Symbol	Definition	Conditions		Ratings min.	typ.	max.	Unit
V_{CES}	*collector emitter voltage*		T_{VJ} = 25°C			1200	V
V_{GES}	*max. DC gate voltage*					±20	V
V_{GEM}	*max. transient gate emitter voltage*					±30	V
I_{C25}	*collector current*		T_C = 25°C			43	A
I_{C80}			T_C = 80°C			30	A
P_{tot}	*total power dissipation*		T_C = 25°C			150	W
$V_{CE(sat)}$	*collector emitter saturation voltage*	I_C = 25A; V_{GE} = 15 V	T_{VJ} = 25°C		1.8	2.1	V
			T_{VJ} = 125°C		2.1		V
$V_{GE(th)}$	*gate emitter threshold voltage*	I_C = 1 mA; V_{GE} = V_{CE}	T_{VJ} = 25°C	5.4	5.9	6.5	V
I_{CES}	*collector emitter leakage current*	V_{CE} = V_{CES}; V_{GE} = 0 V	T_{VJ} = 25°C			0.15	mA
			T_{VJ} = 125°C		0.3		mA
I_{GES}	*gate emitter leakage current*	V_{GE} = ±20 V				500	nA
$Q_{G(on)}$	*total gate charge*	V_{CE} = 600 V; V_{GE} = 15 V; I_C = 25 A			76		nC
$t_{d(on)}$	*turn-on delay time*				70		ns
t_r	*current rise time*				40		ns
$t_{d(off)}$	*turn-off delay time*	inductive load	T_{VJ} = 125°C		250		ns
t_f	*current fall time*	V_{CE} = 600 V; I_C = 25 A			100		ns
E_{on}	*turn-on energy per pulse*	V_{GE} = ±15 V; R_G = 39 Ω			2.5		mJ
E_{off}	*turn-off energy per pulse*				3		mJ
RBSOA	*reverse bias safe operating area*	V_{GE} = ±15 V; R_G = 39 Ω	T_{VJ} = 125°C				
I_{CM}		V_{CEmax} = 1200 V				75	A
SCSOA	*short circuit safe operating area*	V_{CEmax} = 1200 V					
t_{SC}	*short circuit duration*	V_{CE} = 900 V; V_{GE} = ±15 V	T_{VJ} = 125°C			10	µs
I_{SC}	*short circuit current*	R_G = 39 Ω; non-repetitive			100		A
R_{thJC}	*thermal resistance junction to case*					0.84	K/W
R_{thCH}	*thermal resistance case to heatsink*				0.28		K/W

Inverter Diode

Symbol	Definition	Conditions		Ratings min.	typ.	max.	Unit
V_{RRM}	*max. repetitive reverse voltage*		T_{VJ} = 25°C			1200	V
I_{F25}	*forward current*		T_C = 25°C			41	A
I_{F80}			T_C = 80°C			27	A
V_F	*forward voltage*	I_F = 30A	T_{VJ} = 25°C			2.20	V
			T_{VJ} = 125°C		1.90		V
I_R	*reverse current*	V_R = V_{RRM}	T_{VJ} = 25°C			*	mA
	* not applicable, see Ices value above		T_{VJ} = 125°C		*		mA
Q_{rr}	*reverse recovery charge*				3.5		µC
I_{RM}	*max. reverse recovery current*	V_R = 600 V			30		A
t_{rr}	*reverse recovery time*	-di_F/dt = 600 A/µs	T_{VJ} = 125°C		350		ns
E_{rec}	*reverse recovery energy*	I_F = 30 A; V_{GE} = 0 V			0.9		mJ
R_{thJC}	*thermal resistance junction to case*					1.2	K/W
R_{thCH}	*thermal resistance case to heatsink*				0.4		K/W

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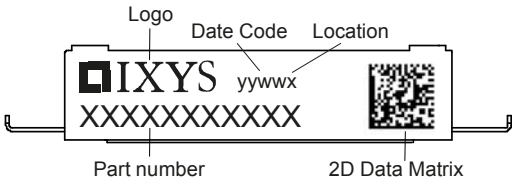
Package MiniPack2B				Ratings			
Symbol	Definition	Conditions		min.	typ.	max.	Unit
I_{RMS}	*RMS current*	per terminal					A
T_{stg}	*storage temperature*			-40		125	°C
T_{VJ}	*virtual junction temperature*			-40		150	°C
Weight					39		g
M_D	*mounting torque*			2		2.2	Nm
$d_{Spp/App}$	*creepage distance on surface | striking distance through air*	*terminal to terminal*	6.3	5.0			mm
$d_{Spb/Apb}$		*terminal to backside*	11.5	10.0			mm
V_{ISOL}	*isolation voltage*	t = 1 second	50/60 Hz, RMS; I_{ISOL} ≤ 1 mA	3000			V
		t = 1 minute		2500			V
$R_{pin-chip}$	*resistance pin to chip*	$V = V_{CEsat} + 2 \cdot R \cdot I_C$ resp. $V = V_F + 2 \cdot R \cdot I_F$			6		mΩ
T_{vjm}	*max. virtual junction temperature*					175	°C



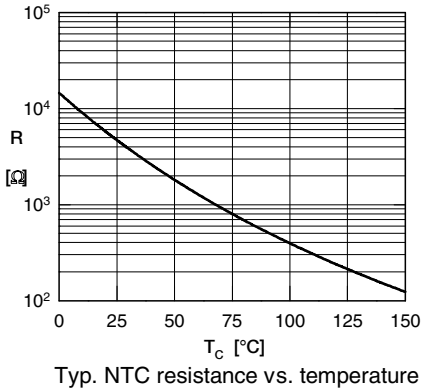
Part number

M = Module
I = IGBT
X = XPT IGBT
A = Gen 1 / std
30 = Current Rating [A]
WB = 6-Pack + 3~ Rectifier Bridge & Brake Unit
1200 = Reverse Voltage [V]
T = Thermistor \ Temperature sensor
MI = MiniPack2B

Ordering	Part Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	MIXA30WB1200TMI	MIXA30WB1200TMI	Box	6	511570

Temperature Sensor NTC

Symbol	Definition	Conditions	min.	typ.	max.	Unit
R_{25}	*resistance*	T_{VJ} = 25°	4.75	5	5.25	kΩ
$B_{25/50}$	*temperature coefficient*			3375		K

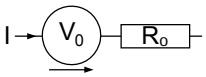


Typ. NTC resistance vs. temperature

Equivalent Circuits for Simulation

* on die level

T_{VJ} = 150°C



		Rectifier	Brake IGBT	Brake Diode	Inverter IGBT	Inverter Diode	
$V_{0\,max}$	*threshold voltage*	0.9	1.1	1.25	1.1	1.25	V
$R_{0\,max}$	*slope resistance **	10	86	90	55	30	mΩ

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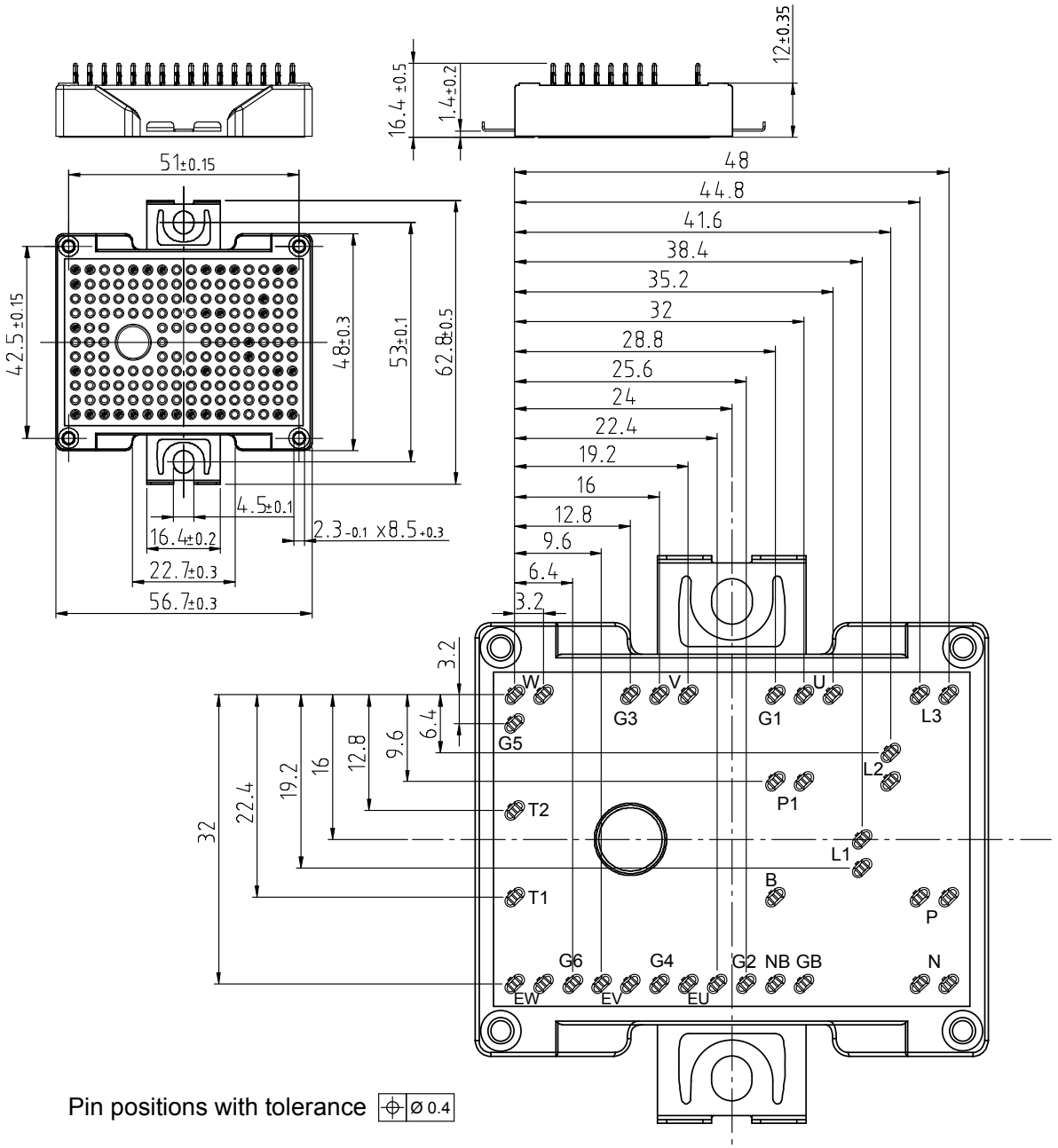
Outlines MiniPack2B



Pin positions with tolerance ⌖ | Ø 0.4