

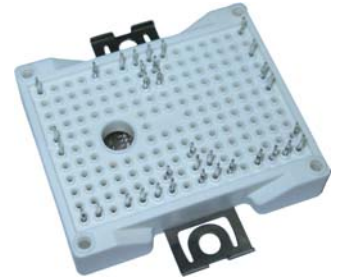
# XPT IGBT Module

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

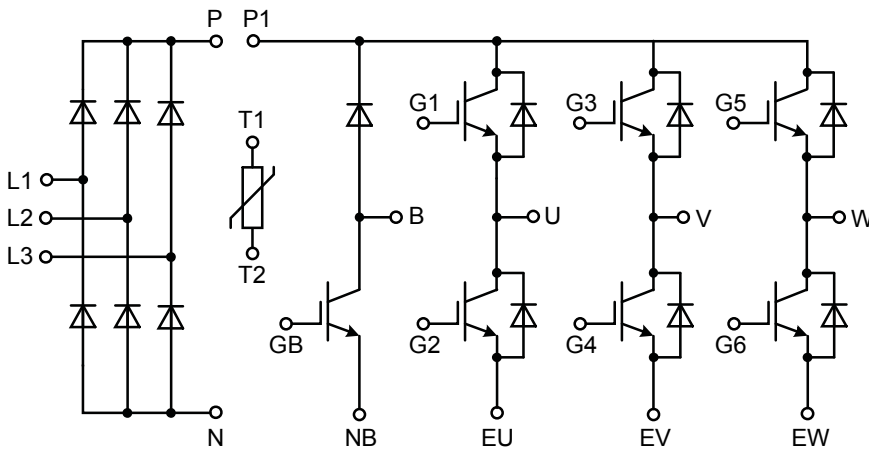
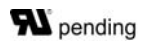
6-Pack + 3~ Rectifier Bridge & Brake Unit + NTC

Part number

**MIXA30WB1200TMI**



Backside: isolated



### 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  $\mu\text{sec}$ .
  - very low gate charge
  - low EMI
  - square RBSOA @ 3x  $I_c$
- 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: MiniPack2B

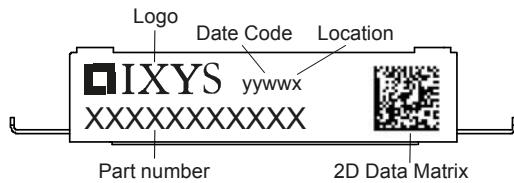
- Industry standard outline
- RoHS compliant
- Epoxy meets UL 94V-0

Rectifier				Ratings				
Symbol	Definition	Conditions		min.	typ.	max.	Unit	
$V_{RSM}$	max. non-repetitive reverse blocking voltage					1700	V	
$V_{RRM}$	max. repetitive reverse blocking voltage					1600	V	
$I_R$	reverse current, drain current	$V_R = 1600$ V	$T_{VJ} = 25^\circ\text{C}$			20	$\mu\text{A}$	
		$V_R = 1600$ V	$T_{VJ} = 125^\circ\text{C}$			tbid	mA	
$V_F$	forward voltage drop	$I_F = 30$ A	$T_{VJ} = 25^\circ\text{C}$			1.23	V	
							V	
		$I_F = 60$ A	$T_{VJ} = 125^\circ\text{C}$			1.19	V	
							V	
$I_{DAV}$	bridge output current	$T_C = 80^\circ\text{C}$ rectangular	$T_{VJ} = 150^\circ\text{C}$			105	A	
								$d = \frac{1}{3}$
$V_{FO}$	threshold voltage			$T_{VJ} = 150^\circ\text{C}$		0.90	V	
$r_F$	slope resistance						10	m $\Omega$
$R_{thJC}$	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			$T_C = 25^\circ\text{C}$		110	W	
$I_{FSM}$	max. forward surge current	$t = 10$ ms; (50 Hz), sine	$T_{VJ} = 45^\circ\text{C}$			320	A	
								$t = 8,3$ ms; (60 Hz), sine
		$t = 10$ ms; (50 Hz), sine	$T_{VJ} = 150^\circ\text{C}$				270	A
$I^2t$	value for fusing	$t = 10$ ms; (50 Hz), sine	$T_{VJ} = 45^\circ\text{C}$			510	A <sup>2</sup> s	
								$t = 8,3$ ms; (60 Hz), sine
		$t = 10$ ms; (50 Hz), sine	$T_{VJ} = 150^\circ\text{C}$				365	A <sup>2</sup> s
$C_J$	junction capacitance	$V_R = 400$ V; $f = 1$ MHz		$T_{VJ} = 25^\circ\text{C}$		10	pF	

Brake IGBT				Ratings			
Symbol	Definition	Conditions	min.	typ.	max.	Unit	
$V_{CES}$	collector emitter voltage	$T_{VJ} = 25^{\circ}\text{C}$			1200	V	
$V_{GES}$	max. DC gate voltage				$\pm 20$	V	
$V_{GEM}$	max. transient gate emitter voltage				$\pm 30$	V	
$I_{C25}$	collector current	$T_C = 25^{\circ}\text{C}$			28	A	
$I_{C80}$		$T_C = 80^{\circ}\text{C}$			20	A	
$P_{tot}$	total power dissipation	$T_C = 25^{\circ}\text{C}$			100	W	
$V_{CE(sat)}$	collector emitter saturation voltage	$I_C = 15\text{ A}; V_{GE} = 15\text{ V}$			1.8	V	
					2.1	V	
$V_{GE(th)}$	gate emitter threshold voltage	$I_C = 0.6\text{ mA}; V_{GE} = V_{CE}$	5.4	5.9	6.5	V	
$I_{CES}$	collector emitter leakage current	$V_{CE} = V_{CES}; V_{GE} = 0\text{ V}$			0.1	mA	
					0.1	mA	
$I_{GES}$	gate emitter leakage current	$V_{GE} = \pm 20\text{ V}$			500	nA	
$Q_{G(on)}$	total gate charge	$V_{CE} = 600\text{ V}; V_{GE} = 15\text{ V}; I_C = 15\text{ A}$		48		nC	
$t_{d(on)}$	turn-on delay time	inductive load $V_{CE} = 600\text{ V}; I_C = 15\text{ A}$ $V_{GE} = \pm 15\text{ V}; R_G = 56\ \Omega$	$T_{VJ} = 125^{\circ}\text{C}$		70	ns	
$t_r$	current rise time				40	ns	
$t_{d(off)}$	turn-off delay time				250	ns	
$t_f$	current fall time				100	ns	
$E_{on}$	turn-on energy per pulse				1.6	mJ	
$E_{off}$	turn-off energy per pulse				1.7	mJ	
<b>RBSOA</b>	reverse bias safe operating area	$V_{GE} = \pm 15\text{ V}; R_G = 56\ \Omega$					
$I_{CM}$		$V_{CEK} = 1200\text{ V}$			45	A	
<b>SCSOA</b>	short circuit safe operating area						
$t_{SC}$	short circuit duration	$V_{CE} = 900\text{ V}; V_{GE} = \pm 15\text{ V}$			10	$\mu\text{s}$	
$I_{SC}$	short circuit current	$R_G = 56\ \Omega$ ; non-repetitive		60		A	
$R_{thJC}$	thermal resistance junction to case				1.26	K/W	
$R_{thCH}$	thermal resistance case to heatsink					K/W	
<b>Brake Diode</b>							
$V_{RRM}$	max. repetitive reverse voltage				1200	V	
$I_{F25}$	forward current				18	A	
$I_{F80}$					12	A	
$V_F$	forward voltage	$I_F = 10\text{ A}$			2.20	V	
					2.20	V	
$I_R$	reverse current	$V_R = V_{RRM}$			0.1	mA	
					0.2	mA	
$Q_{rr}$	reverse recovery charge	$V_R = 600\text{ V}$ $-di_F/dt = 250\text{ A}/\mu\text{s}$ $I_F = 10\text{ A}$	$T_{VJ} = 125^{\circ}\text{C}$		1.3	$\mu\text{C}$	
$I_{RM}$	max. reverse recovery current				10.5	A	
$t_{rr}$	reverse recovery time				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	

Inverter IGBT				Ratings			
Symbol	Definition	Conditions	min.	typ.	max.	Unit	
$V_{CES}$	collector emitter voltage	$T_{VJ} = 25^{\circ}\text{C}$			1200	V	
$V_{GES}$	max. DC gate voltage				$\pm 20$	V	
$V_{GEM}$	max. transient gate emitter voltage				$\pm 30$	V	
$I_{C25}$	collector current	$T_C = 25^{\circ}\text{C}$			43	A	
$I_{C80}$		$T_C = 80^{\circ}\text{C}$			30	A	
$P_{tot}$	total power dissipation	$T_C = 25^{\circ}\text{C}$			150	W	
$V_{CE(sat)}$	collector emitter saturation voltage	$I_C = 25\text{A}; V_{GE} = 15\text{V}$		1.8	2.1	V	
				2.1		V	
$V_{GE(th)}$	gate emitter threshold voltage	$I_C = 1\text{mA}; V_{CE} = V_{CE}$	5.4	5.9	6.5	V	
$I_{CES}$	collector emitter leakage current	$V_{CE} = V_{CES}; V_{GE} = 0\text{V}$			0.15	mA	
					0.3	mA	
$I_{GES}$	gate emitter leakage current	$V_{GE} = \pm 20\text{V}$			500	nA	
$Q_{G(on)}$	total gate charge	$V_{CE} = 600\text{V}; V_{GE} = 15\text{V}; I_C = 25\text{A}$		76		nC	
$t_{d(on)}$	turn-on delay time	inductive load $V_{CE} = 600\text{V}; I_C = 25\text{A}$ $V_{GE} = \pm 15\text{V}; R_G = 39\Omega$	$T_{VJ} = 125^{\circ}\text{C}$		70	ns	
$t_r$	current rise time				40	ns	
$t_{d(off)}$	turn-off delay time				250	ns	
$t_f$	current fall time				100	ns	
$E_{on}$	turn-on energy per pulse				2.5	mJ	
$E_{off}$	turn-off energy per pulse				3	mJ	
<b>RBSOA</b>	reverse bias safe operating area	$V_{GE} = \pm 15\text{V}; R_G = 39\Omega$	$T_{VJ} = 125^{\circ}\text{C}$				
$I_{CM}$		$V_{CEmax} = 1200\text{V}$			75	A	
<b>SCSOA</b>	short circuit safe operating area	$V_{CEmax} = 1200\text{V}$	$T_{VJ} = 125^{\circ}\text{C}$				
$t_{sc}$	short circuit duration	$V_{CE} = 900\text{V}; V_{GE} = \pm 15\text{V}$			10	$\mu\text{s}$	
$I_{sc}$	short circuit current	$R_G = 39\Omega; \text{non-repetitive}$		100		A	
$R_{thJC}$	thermal resistance junction to case				0.84	K/W	
$R_{thCH}$	thermal resistance case to heatsink			0.28		K/W	
<b>Inverter Diode</b>							
$V_{RRM}$	max. repetitive reverse voltage		$T_{VJ} = 25^{\circ}\text{C}$		1200	V	
$I_{F25}$	forward current		$T_C = 25^{\circ}\text{C}$		41	A	
$I_{F80}$			$T_C = 80^{\circ}\text{C}$		27	A	
$V_F$	forward voltage	$I_F = 30\text{A}$	$T_{VJ} = 25^{\circ}\text{C}$		2.20	V	
			$T_{VJ} = 125^{\circ}\text{C}$	1.90		V	
$I_R$	reverse current	$V_R = V_{RRM}$	$T_{VJ} = 25^{\circ}\text{C}$		*	mA	
	* not applicable, see Ices value above		$T_{VJ} = 125^{\circ}\text{C}$		*	mA	
$Q_{rr}$	reverse recovery charge	$V_R = 600\text{V}$ $-di_F/dt = 600\text{A}/\mu\text{s}$ $I_F = 30\text{A}; V_{GE} = 0\text{V}$	$T_{VJ} = 125^{\circ}\text{C}$		3.5	$\mu\text{C}$	
$I_{RM}$	max. reverse recovery current				30	A	
$t_{rr}$	reverse recovery time				350	ns	
$E_{rec}$	reverse recovery energy				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	

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
<b>Weight</b>				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	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	$T_{vj} = 25^\circ$	4.75	5	5.25	kΩ
$B_{25/50}$	temperature coefficient			3375		K

### Equivalent Circuits for Simulation

\* on die level

$T_{vj} = 150^\circ\text{C}$

		Rectifier	Brake IGBT	Brake Diode	Inverter IGBT	Inverter Diode	
$V_0$	threshold voltage	0.9	1.1	1.25	1.1	1.25	V
$R_0$	slope resistance *	10	86	90	55	30	mΩ

