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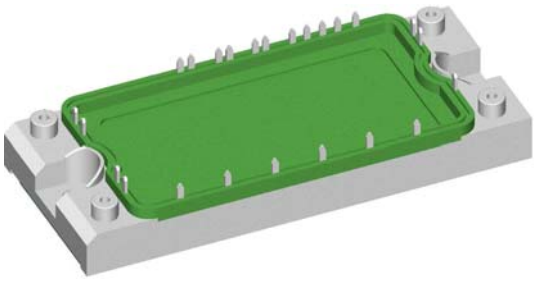
XPT IGBT Module

3~ Rectifier			Brake Chopper			3~ Inverter		
V_{RRM} =	1600	V	V_{CES} =	600	V	V_{CES} =	650	V
I_{DAV} =	139	A	I_{C25} =	29	A	I_{C25} =	64	A
I_{FSM} =	550	A	$V_{CE(sat)}$ =	2	V	$V_{CE(sat)}$ =	1.6	V

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

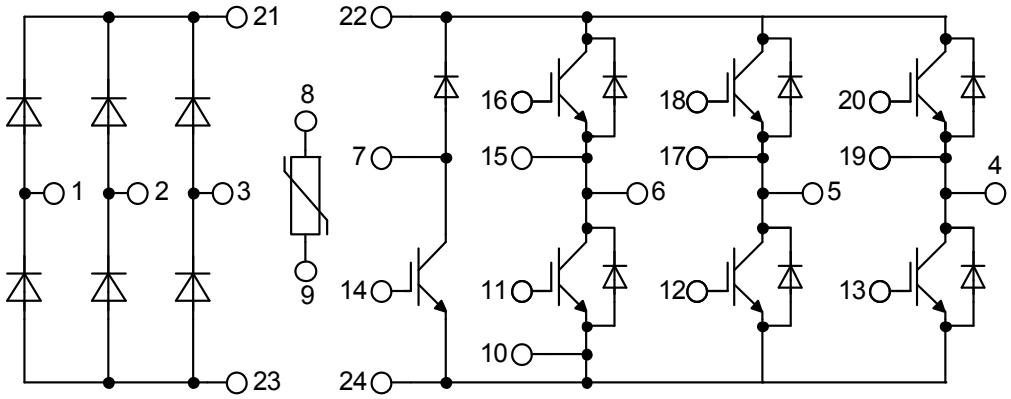
Part number

MIXA50WB600TED



Backside: isolated

E72873



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: E2-Pack

- Isolation Voltage: 3600 V~
- Industry standard outline
- RoHS compliant
- Soldering pins for PCB mounting
- Height: 17 mm
- Base plate: DCB ceramic
- Reduced weight
- Advanced power cycling

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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*	V_R = 1600 V	T_{VJ} = 25°C			20	µA
		V_R = 1600 V	T_{VJ} = 125°C			3	mA
V_F	*forward voltage drop*	I_F = 50 A	T_{VJ} = 25°C			1.23	V
		I_F = 100 A				1.43	V
		I_F = 50 A	T_{VJ} = 125 °C			1.18	V
		I_F = 100 A				1.45	V
I_{DAV}	*bridge output current*	T_C = 80°C	T_{VJ} = 150°C			139	A
		rectangular d = ⅓					
V_{F0}	*threshold voltage* } *for power loss calculation only*		T_{VJ} = 150°C			0.88	V
r_F	*slope resistance* }					5.7	mΩ
R_{thJC}	*thermal resistance junction to case*					0.9	K/W
R_{thCH}	*thermal resistance case to heatsink*				0.10		K/W
P_{tot}	*total power dissipation*		T_C = 25°C			139	W
I_{FSM}	*max. forward surge current*	t = 10 ms; (50 Hz), sine	T_{VJ} = 45°C			550	A
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			595	A
		t = 10 ms; (50 Hz), sine	T_{VJ} = 150°C			470	A
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			505	A
I^2t	*value for fusing*	t = 10 ms; (50 Hz), sine	T_{VJ} = 45°C			1.52	kA²s
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			1.48	kA²s
		t = 10 ms; (50 Hz), sine	T_{VJ} = 150°C			1.11	kA²s
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			1.06	kA²s
C_J	*junction capacitance*	V_R = 600 V; f = 1 MHz	T_{VJ} = 25°C		tbd		pF

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Brake IGBT				Ratings			
Symbol	Definition	Conditions		min.	typ.	max.	Unit
V_{CES}	*collector emitter voltage*		T_{VJ} = 25°C			600	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			29	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 = 20 A; V_{GE} = 15 V	T_{VJ} = 25°C		2	2.5	V
			T_{VJ} = 125°C		2.15		V
$V_{GE(th)}$	*gate emitter threshold voltage*	I_C = 0.5 mA; V_{GE} = V_{CE}	T_{VJ} = 25°C	4.5	5.5	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} = 300 V; V_{GE} = 15 V; I_C = 20 A			65		nC
$t_{d(on)}$	*turn-on delay time*				50		ns
t_r	*current rise time*				55		ns
$t_{d(off)}$	*turn-off delay time*	inductive load	T_{VJ} = 125°C		300		ns
t_f	*current fall time*	V_{CE} = 300 V; I_C = 20 A			30		ns
E_{on}	*turn-on energy per pulse*	V_{GE} = ±15 V; R_G = 47 Ω			0.92		mJ
E_{off}	*turn-off energy per pulse*				0.68		mJ
RBSOA	*reverse bias safe operating area*	V_{GE} = ±15 V; R_G = 47 Ω	T_{VJ} = 125°C				
I_{CM}		V_{CEK} = 600 V				40	A
SCSOA	*short circuit safe operating area*						
t_{SC}	*short circuit duration*	V_{CE} = 360 V; V_{GE} = ±15 V	T_{VJ} = 125°C			10	µs
I_{SC}	*short circuit current*	R_G = 47 Ω; non-repetitive			80		A
R_{thJC}	*thermal resistance junction to case*					1.26	K/W
R_{thCH}	*thermal resistance case to heatsink*				0.10		K/W

Brake Diode							
V_{RRM}	*max. repetitive reverse voltage*		T_{VJ} = 25°C			600	V
I_{F25}	*forward current*		T_C = 25°C			23	A
I_{F80}			T_C = 80°C			16	A
V_F	*forward voltage*	I_F = 20 A	T_{VJ} = 25°C			2.00	V
			T_{VJ} = 125°C		1.80		V
I_R	*reverse current*	V_R = V_{RRM}	T_{VJ} = 25°C			0.05	mA
			T_{VJ} = 125°C			1	mA
Q_{rr}	*reverse recovery charge*	V_R = 300 V			1.7		µC
I_{RM}	*max. reverse recovery current*	-di_F/dt = 400 A/µs	T_{VJ} = 125°C		18		A
t_{rr}	*reverse recovery time*	I_F = 20 A			150		ns
E_{rec}	*reverse recovery energy*				0.3		mJ
R_{thJC}	*thermal resistance junction to case*					2.4	K/W
R_{thCH}	*thermal resistance case to heatsink*				0.10		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			650	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			64	A
I_{C80}			T_C = 80°C			43	A
P_{tot}	*total power dissipation*		T_C = 25°C			156	W
$V_{CE(sat)}$	*collector emitter saturation voltage*	I_C = 50A; V_{GE} = 15 V	T_{VJ} = 25°C		1.6	1.8	V
			T_{VJ} = 125°C		1.9		V
$V_{GE(th)}$	*gate emitter threshold voltage*	I_C = 0.8mA; V_{GE} = V_{CE}	T_{VJ} = 25°C	4	4.8	5.5	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} = 300 V; V_{GE} = 15 V; I_C = 50 A			70		nC
$t_{d(on)}$	*turn-on delay time*				30		ns
t_r	*current rise time*				50		ns
$t_{d(off)}$	*turn-off delay time*	inductive load	T_{VJ} = 125°C		100		ns
t_f	*current fall time*	V_{CE} = 300 V; I_C = 50 A			40		ns
E_{on}	*turn-on energy per pulse*	V_{GE} = ±15 V; R_G = 15 Ω			1.2		mJ
E_{off}	*turn-off energy per pulse*				1.7		mJ
RBSOA	*reverse bias safe operating area*	V_{GE} = ±15 V; R_G = 15 Ω	T_{VJ} = 125°C				
I_{CM}		V_{CEmax} = 650 V				100	A
SCSOA	*short circuit safe operating area*	V_{CEmax} = 650 V					
t_{SC}	*short circuit duration*	V_{CE} = 360 V; V_{GE} = ±15 V	T_{VJ} = 125°C			10	µs
I_{SC}	*short circuit current*	R_G = 15 Ω; non-repetitive			200		A
R_{thJC}	*thermal resistance junction to case*					0.8	K/W
R_{thCH}	*thermal resistance case to heatsink*				0.10		K/W

Inverter Diode

Symbol	Definition	Conditions		Ratings min.	typ.	max.	Unit
V_{RRM}	*max. repetitive reverse voltage*		T_{VJ} = 25°C			650	V
I_{F25}	*forward current*		T_C = 25°C			50	A
I_{F80}			T_C = 80°C			41	A
V_F	*forward voltage*	I_F = 50A	T_{VJ} = 25°C			2.00	V
			T_{VJ} = 125°C		1.80		V
I_R	*reverse current*	V_R = V_{RRM}	T_{VJ} = 25°C			0.1	mA
			T_{VJ} = 125°C		0.5		mA
Q_{rr}	*reverse recovery charge*	V_R = 300 V			4.5		µC
I_{RM}	*max. reverse recovery current*	-di_F/dt = 900 A/µs	T_{VJ} = 125°C		45		A
t_{rr}	*reverse recovery time*	I_F = 50A; V_{GE} = 0 V			150		ns
E_{rec}	*reverse recovery energy*				1		mJ
R_{thJC}	*thermal resistance junction to case*					1.2	K/W
R_{thCH}	*thermal resistance case to heatsink*				0.10		K/W

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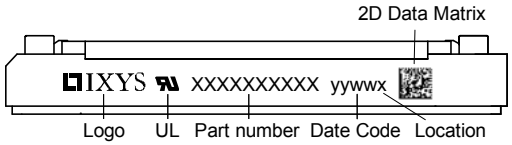
Package E2-Pack				Ratings			
Symbol	Definition	Conditions		min.	typ.	max.	Unit
I_{RMS}	*RMS current*	per terminal				200	A
T_{VJ}	*virtual junction temperature*			-40		150	°C
T_{op}	*operation temperature*			-40		125	°C
T_{stg}	*storage temperature*			-40		125	°C
Weight					176		g
M_D	*mounting torque*			3		6	Nm
$d_{Spp/App}$	*creepage distance on surface | striking distance through air*		*terminal to terminal*	6.0			mm
$d_{Spb/Apb}$			*terminal to backside*	12.0			mm
V_{ISOL}	*isolation voltage*	t = 1 second	50/60 Hz, RMS; I_{ISOL} ≤ 1 mA	3600			V
		t = 1 minute		3000			V



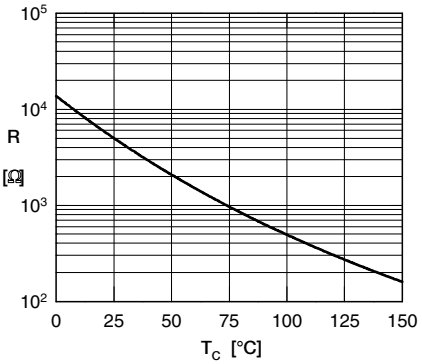
Part description

M = Module
I = IGBT
X = XPT IGBT
A = Gen 1 / std
50 = Current Rating [A]
WB = 6-Pack + 3~ Rectifier Bridge & Brake Unit
600 = Reverse Voltage [V]
T = Thermistor \ Temperature sensor
ED = E2-Pack

Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	MIXA50WB600TED	MIXA50WB600TED	Box	6	511094

Temperature Sensor NTC

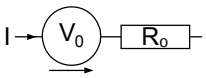
Symbol	Definition	Conditions	min.	typ.	max.	Unit
R_{25}	*resistance*	T_{VJ} = 25°	4.75	5	5.25	kΩ
$B_{25/50}$	*temperature coefficient*			3375		K



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*	0.86	1.2	1.2	1.1	1.2	V
$R_{0\,max}$	*slope resistance **	5.1	83	44	21	17.4	mΩ

Outlines E2-Pack