

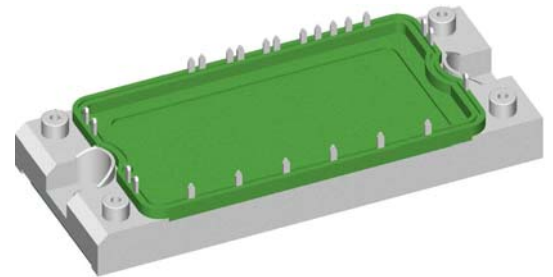
XPT IGBT Module

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

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

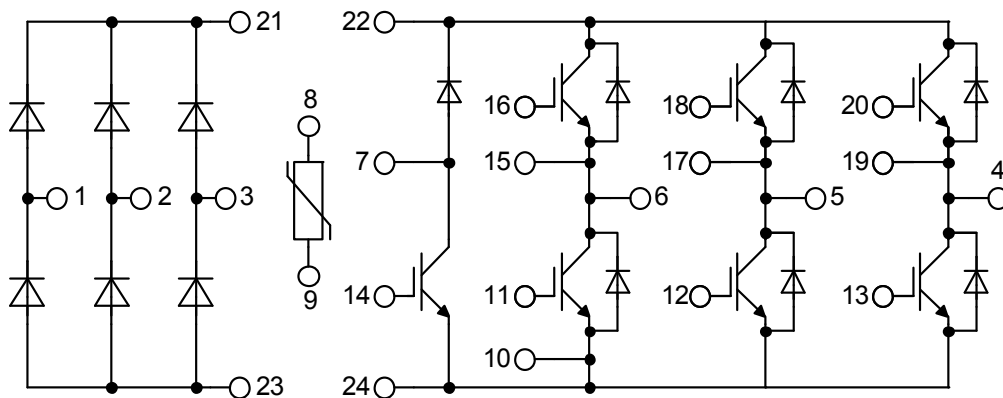
Part number

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 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: E2-Pack

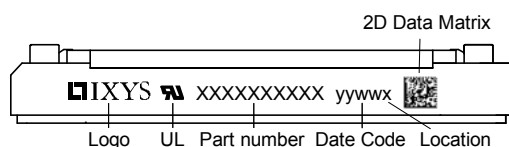
- Isolation Voltage: 3600 V~
- Industry standard outline
- RoHS compliant
- Soldering pins for PCB mounting
- Height: 17 mm
- Base plate: DCB ceramic
- Reduced weight
- Advanced power cycling

Rectifier				Ratings			
Symbol	Definition	Conditions		min.	typ.	max.	Unit
V_{RSM}	max. non-repetitive reverse blocking voltage	$T_{VJ} = 25^{\circ}\text{C}$				1700	V
V_{RRM}	max. repetitive reverse blocking voltage	$T_{VJ} = 25^{\circ}\text{C}$				1600	V
I_R	reverse current	$V_R = 1600\text{ V}$	$T_{VJ} = 25^{\circ}\text{C}$			20	μA
		$V_R = 1600\text{ V}$	$T_{VJ} = 125^{\circ}\text{C}$			3	mA
V_F	forward voltage drop	$I_F = 50\text{ A}$	$T_{VJ} = 25^{\circ}\text{C}$			1.23	V
		$I_F = 100\text{ A}$				1.43	V
		$I_F = 50\text{ A}$	$T_{VJ} = 125^{\circ}\text{C}$			1.18	V
		$I_F = 100\text{ A}$				1.45	V
I_{DAV}	bridge output current	$T_C = 80^{\circ}\text{C}$	$T_{VJ} = 150^{\circ}\text{C}$			139	A
		rectangular $d = \frac{1}{3}$					
V_{FO}	threshold voltage	} for power loss calculation only		$T_{VJ} = 150^{\circ}\text{C}$		0.88	V
r_F	slope resistance					5.7	m Ω
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	$T_C = 25^{\circ}\text{C}$				139	W
I_{FSM}	max. forward surge current	$t = 10\text{ ms; (50 Hz), sine}$	$T_{VJ} = 45^{\circ}\text{C}$			550	A
		$t = 8,3\text{ ms; (60 Hz), sine}$	$V_R = 0\text{ V}$			595	A
		$t = 10\text{ ms; (50 Hz), sine}$	$T_{VJ} = 150^{\circ}\text{C}$			470	A
		$t = 8,3\text{ ms; (60 Hz), sine}$	$V_R = 0\text{ V}$			505	A
I^2t	value for fusing	$t = 10\text{ ms; (50 Hz), sine}$	$T_{VJ} = 45^{\circ}\text{C}$			1.52	kA ² s
		$t = 8,3\text{ ms; (60 Hz), sine}$	$V_R = 0\text{ V}$			1.48	kA ² s
		$t = 10\text{ ms; (50 Hz), sine}$	$T_{VJ} = 150^{\circ}\text{C}$			1.11	kA ² s
		$t = 8,3\text{ ms; (60 Hz), sine}$	$V_R = 0\text{ V}$			1.06	kA ² s
C_J	junction capacitance	$V_R = 600\text{ V; } f = 1\text{ MHz}$		$T_{VJ} = 25^{\circ}\text{C}$		tbd	pF

Brake IGBT				Ratings			
Symbol	Definition	Conditions		min.	typ.	max.	Unit
V_{CES}	collector emitter voltage	$T_{VJ} = 25^{\circ}\text{C}$				600	V
V_{GES}	max. DC gate voltage					± 20	V
V_{GEM}	max. transient gate emitter voltage					± 30	V
I_{C25}	collector current	$T_C = 25^{\circ}\text{C}$				29	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	$I_C = 20\text{ A}; V_{GE} = 15\text{ V}$	$T_{VJ} = 25^{\circ}\text{C}$		2	2.5	V
			$T_{VJ} = 125^{\circ}\text{C}$		2.15		V
$V_{GE(th)}$	gate emitter threshold voltage	$I_C = 0.5\text{ mA}; V_{GE} = V_{CE}$	$T_{VJ} = 25^{\circ}\text{C}$	4.5	5.5	6.5	V
I_{CES}	collector emitter leakage current	$V_{CE} = V_{CES}; V_{GE} = 0\text{ V}$	$T_{VJ} = 25^{\circ}\text{C}$			0.1	mA
			$T_{VJ} = 125^{\circ}\text{C}$		0.1		mA
I_{GES}	gate emitter leakage current	$V_{GE} = \pm 20\text{ V}$				500	nA
$Q_{G(on)}$	total gate charge	$V_{CE} = 300\text{ V}; V_{GE} = 15\text{ V}; I_C = 20\text{ A}$			65		nC
$t_{d(on)}$	turn-on delay time	inductive load $V_{CE} = 300\text{ V}; I_C = 20\text{ A}$ $V_{GE} = \pm 15\text{ V}; R_G = 47\text{ }\Omega$	$T_{VJ} = 125^{\circ}\text{C}$		50		ns
t_r	current rise time				55		ns
$t_{d(off)}$	turn-off delay time				300		ns
t_f	current fall time				30		ns
E_{on}	turn-on energy per pulse				0.92		mJ
E_{off}	turn-off energy per pulse				0.68		mJ
RBSOA	reverse bias safe operating area	$V_{GE} = \pm 15\text{ V}; R_G = 47\text{ }\Omega$	$T_{VJ} = 125^{\circ}\text{C}$				
I_{CM}		$V_{CEK} = 600\text{ V}$				40	A
SCSOA	short circuit safe operating area						
t_{sc}	short circuit duration	$V_{CE} = 360\text{ V}; V_{GE} = \pm 15\text{ V}$	$T_{VJ} = 125^{\circ}\text{C}$			10	μs
I_{sc}	short circuit current	$R_G = 47\text{ }\Omega$; 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		$T_{VJ} = 25^{\circ}\text{C}$			600	V
I_{F25}	forward current		$T_C = 25^{\circ}\text{C}$			23	A
I_{F80}			$T_C = 80^{\circ}\text{C}$			16	A
V_F	forward voltage	$I_F = 20\text{ A}$	$T_{VJ} = 25^{\circ}\text{C}$			2.00	V
			$T_{VJ} = 125^{\circ}\text{C}$		1.80		V
I_R	reverse current	$V_R = V_{RRM}$	$T_{VJ} = 25^{\circ}\text{C}$			0.05	mA
			$T_{VJ} = 125^{\circ}\text{C}$			1	mA
Q_{rr}	reverse recovery charge	$V_R = 300\text{ V}$ $-di_F/dt = 400\text{ A}/\mu\text{s}$ $I_F = 20\text{ A}$	$T_{VJ} = 125^{\circ}\text{C}$		1.7		μC
I_{RM}	max. reverse recovery current				18		A
t_{rr}	reverse recovery time				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

Inverter IGBT				Ratings			
Symbol	Definition	Conditions		min.	typ.	max.	Unit
V_{CES}	collector emitter voltage	$T_{VJ} = 25^{\circ}\text{C}$				650	V
V_{GES}	max. DC gate voltage					± 20	V
V_{GEM}	max. transient gate emitter voltage					± 30	V
I_{C25}	collector current	$T_C = 25^{\circ}\text{C}$				64	A
I_{C80}		$T_C = 80^{\circ}\text{C}$				43	A
P_{tot}	total power dissipation	$T_C = 25^{\circ}\text{C}$				156	W
$V_{CE(sat)}$	collector emitter saturation voltage	$I_C = 50\text{A}; V_{GE} = 15\text{V}$	$T_{VJ} = 25^{\circ}\text{C}$		1.6	1.8	V
			$T_{VJ} = 125^{\circ}\text{C}$		1.9		V
$V_{GE(th)}$	gate emitter threshold voltage	$I_C = 0.8\text{mA}; V_{GE} = V_{CE}$	$T_{VJ} = 25^{\circ}\text{C}$	4	4.8	5.5	V
I_{CES}	collector emitter leakage current	$V_{CE} = V_{CES}; V_{GE} = 0\text{V}$	$T_{VJ} = 25^{\circ}\text{C}$			0.1	mA
			$T_{VJ} = 125^{\circ}\text{C}$		0.1		mA
I_{GES}	gate emitter leakage current	$V_{GE} = \pm 20\text{V}$				500	nA
$Q_{G(on)}$	total gate charge	$V_{CE} = 300\text{V}; V_{GE} = 15\text{V}; I_C = 50\text{A}$			70		nC
$t_{d(on)}$	turn-on delay time	inductive load $V_{CE} = 300\text{V}; I_C = 50\text{A}$ $V_{GE} = \pm 15\text{V}; R_G = 15\Omega$	$T_{VJ} = 125^{\circ}\text{C}$		30		ns
t_r	current rise time				50		ns
$t_{d(off)}$	turn-off delay time				100		ns
t_f	current fall time				40		ns
E_{on}	turn-on energy per pulse				1.2		mJ
E_{off}	turn-off energy per pulse				1.7		mJ
RBSOA	reverse bias safe operating area	$V_{GE} = \pm 15\text{V}; R_G = 15\Omega$	$T_{VJ} = 125^{\circ}\text{C}$				
I_{CM}		$V_{CEmax} = 650\text{V}$				100	A
SCSOA	short circuit safe operating area	$V_{CEmax} = 650\text{V}$	$T_{VJ} = 125^{\circ}\text{C}$				
t_{SC}	short circuit duration	$V_{CE} = 360\text{V}; V_{GE} = \pm 15\text{V}$				10	μs
I_{SC}	short circuit current	$R_G = 15\Omega$; 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							
V_{RRM}	max. repetitive reverse voltage		$T_{VJ} = 25^{\circ}\text{C}$			650	V
I_{F25}	forward current		$T_C = 25^{\circ}\text{C}$			50	A
I_{F80}			$T_C = 80^{\circ}\text{C}$			41	A
V_F	forward voltage	$I_F = 50\text{A}$	$T_{VJ} = 25^{\circ}\text{C}$			2.00	V
			$T_{VJ} = 125^{\circ}\text{C}$		1.80		V
I_R	reverse current	$V_R = V_{RRM}$	$T_{VJ} = 25^{\circ}\text{C}$			0.1	mA
			$T_{VJ} = 125^{\circ}\text{C}$		0.5		mA
Q_{rr}	reverse recovery charge	$V_R = 300\text{V}$ $-di_F/dt = 900\text{A}/\mu\text{s}$ $I_F = 50\text{A}; V_{GE} = 0\text{V}$	$T_{VJ} = 125^{\circ}\text{C}$		4.5		μC
I_{RM}	max. reverse recovery current				45		A
t_{rr}	reverse recovery time				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

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/Abp}		terminal to backside	12.0			mm
V _{ISOL}	isolation voltage	t = 1 second	3600			V
		t = 1 minute	3000			V
			50/60 Hz, RMS; I _{ISOL} ≤ 1 mA			



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

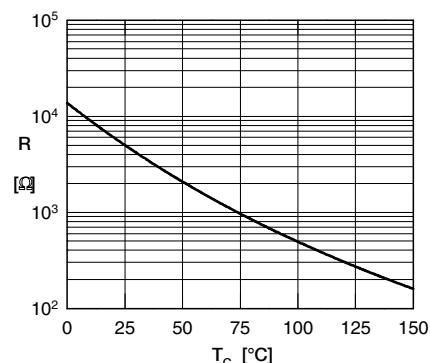
Symbol	Definition	Conditions	min.	typ.	max.	Unit
R_{25}	resistance	$T_{VJ} = 25^\circ$	4.75	5	5.25	k Ω
$B_{25/50}$	temperature coefficient			3375		K

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	0.86	1.2	1.2	1.1	1.2	V
R_0	slope resistance *	5.1	83	44	21	17.4	m Ω



Outlines E2-Pack

