

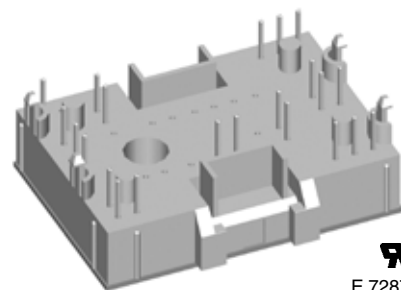
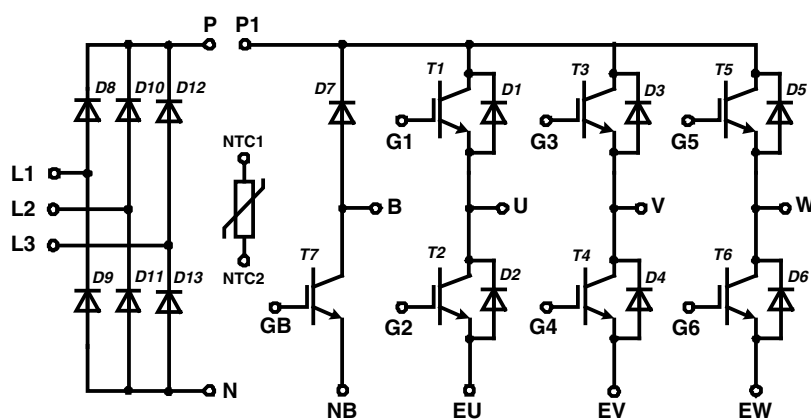
Converter - Brake - Inverter Module

Trench IGBT

Single Phase Rectifier	Brake Chopper	Three Phase Inverter
$V_{RRM} = 1600 \text{ V}$	$V_{CES} = 600 \text{ V}$	$V_{CES} = 600 \text{ V}$
$I_{DAVM25} = 90 \text{ A}$	$I_{C25} = 29 \text{ A}$	$I_{C25} = 29 \text{ A}$
$I_{FSM} = 270 \text{ A}$	$V_{CE(sat)} = 2.1 \text{ V}$	$V_{CE(sat)} = 2.1 \text{ V}$

Part name (Marking on product)

MITA30WB600TMH



E 72873

Pin configuration see outlines.

Features:

- High level of integration - only one power semiconductor module required for the whole drive
- Inverter with Trench IGBTs
 - low saturation voltage
 - positive temperature coefficient
 - fast switching
 - short tail current
- Epitaxial free wheeling diodes with hiperfast soft reverse recovery
- Temperature sense included

Application:

- AC motor drives
- Pumps, Fans
- Washing machines
- Air-conditioning system
- Inverter and power supplies

Package:

- "Mini" package
- Assembly height is 17 mm
- Insulated base plate
- Pins suitable for wave soldering and PCB mounting
- Assembly clips available
 - IXKU 5-505 screw clamp
 - IXRB 5-506 click clamp
- UL registered E72873

Output Inverter T1 - T6

Symbol	Definitions	Conditions	Ratings			Unit
			min.	typ.	max.	
V_{CES}	collector emitter voltage		$T_{VJ} = 150^{\circ}\text{C}$		600	V
V_{GES}	max. DC gate voltage	continuous			± 20	V
V_{GEM}	max. transient collector gate voltage	transient			± 30	V
I_{C25}	collector current		$T_C = 25^{\circ}\text{C}$		40	A
I_{C80}			$T_C = 80^{\circ}\text{C}$		27	A
P_{tot}	total power dissipation		$T_C = 25^{\circ}\text{C}$		90	W
$V_{CE(sat)}$	collector emitter saturation voltage	$I_C = 30\text{ A}; V_{GE} = 15\text{ V}$	$T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = 125^{\circ}\text{C}$	1.5 1.7	1.8 1.9	V V
$V_{GE(th)}$	gate emitter threshold voltage	$I_C = 0.45\text{ A}; V_{GE} = V_{CE}$	$T_{VJ} = 25^{\circ}\text{C}$	5	6.5	V
I_{CES}	collector emitter leakage current	$V_{CE} = V_{CES}; V_{GE} = 0\text{ V}$	$T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = 125^{\circ}\text{C}$	1.8 2	2.25 5	mA mA
I_{GES}	gate emitter leakage current	$V_{GE} = \pm 20\text{ V}$			300	nA
C_{ies}	input capacitance	$V_{CE} = 25\text{ V}; V_{GE} = 0\text{ V}; f = 1\text{ MHz}$		1630		pF
$Q_{G(on)}$	total gate charge	$V_{CE} = 300\text{ V}; V_{GE} = 15\text{ V}; I_C = 10\text{ A}$		300		nC
$t_{d(on)}$	turn-on delay time	inductive load $V_{CE} = 600\text{ V}; I_C = 30\text{ A}$ $V_{GE} = \pm 15\text{ V}; R_G = 15\ \Omega$	$T_{VJ} = 25^{\circ}\text{C}$	tdb		ns
t_r	current rise time			tdb		ns
$t_{d(off)}$	turn-off delay time			tdb		ns
t_f	current fall time			tdb		ns
E_{on}	turn-on energy per pulse			tdb		mJ
E_{off}	turn-off energy per pulse			tdb		mJ
$t_{d(on)}$	turn-on delay time	inductive load $V_{CE} = 600\text{ V}; I_C = 30\text{ A}$ $V_{GE} = \pm 15\text{ V}; R_G = 15\ \Omega$	$T_{VJ} = 125^{\circ}\text{C}$	20		ns
t_r	current rise time			20		ns
$t_{d(off)}$	turn-off delay time			160		ns
t_f	current fall time			60		ns
E_{on}	turn-on energy per pulse			0.65		mJ
E_{off}	turn-off energy per pulse			0.75		mJ
RBSOA	reverse bias safe operating area	$V_{GE} = \pm 15\text{ V}; R_G = 15\ \Omega; I_C = 60\text{ A}$	$T_{VJ} = 125^{\circ}\text{C}$	$V_{CEK} \leq V_{CES} - L_S \cdot di/dt$		V
t_{SC} (SCSOA)	short circuit safe operating area	$V_{CE} = 360\text{ V}; V_{GE} = \pm 15\text{ V};$ $R_G = 15\ \Omega; t_p = 10\ \mu\text{s};$ non-repetitive	$T_{VJ} = 125^{\circ}\text{C}$	10		μs
R_{thJC}	thermal resistance junction to case	(per IGBT)		0.5	1.4	K/W
R_{thCH}	thermal resistance case to heatsink					K/W

Output Inverter D1 - D6

Symbol	Definitions	Conditions	Ratings			Unit
			min.	typ.	max.	
V_{RRM}	max. repetitive reverse voltage		$T_{VJ} = 150^{\circ}\text{C}$		600	V
I_{F25}	forward current		$T_C = 25^{\circ}\text{C}$		69	A
I_{F80}			$T_C = 80^{\circ}\text{C}$		46	A
V_F	forward voltage	$I_F = 30\text{ A}; V_{GE} = 0\text{ V}$	$T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = 125^{\circ}\text{C}$	1.2	1.7 1.4	V V
Q_{rr}	reverse recovery charge	$V_R = \text{tdb V}$ $di_F/dt = \text{tdb A}/\mu\text{s}$ $I_F = \text{tdb A}; V_{GE} = 0\text{ V}$	$T_{VJ} = 125^{\circ}\text{C}$	tdb		μC
I_{RM}	max. reverse recovery current			tdb		A
t_{rr}	reverse recovery time			tdb		ns
E_{rec}	reverse recovery energy			tdb		μJ
R_{thJC}	thermal resistance junction to case	(per diode)		0.3	0.9	K/W
R_{thCH}	thermal resistance case to heatsink					K/W

 $T_C = 25^{\circ}\text{C}$ unless otherwise stated

Brake T7

Symbol	Definitions	Conditions	Ratings			Unit
			min.	typ.	max.	
V_{CES}	collector emitter voltage	$T_{VJ} = 150^{\circ}\text{C}$			600	V
V_{GES}	max. DC gate voltage	continuous			± 20	V
V_{GEM}	max. transient collector gate voltage	transient			± 30	V
I_{C25}	collector current	$T_C = 25^{\circ}\text{C}$			40	A
I_{C80}		$T_C = 80^{\circ}\text{C}$			27	A
P_{tot}	total power dissipation	$T_C = 25^{\circ}\text{C}$			90	W
$V_{CE(sat)}$	collector emitter saturation voltage	$I_C = 30\text{ A}; V_{GE} = 15\text{ V}$			1.5	V
					1.7	V
$V_{GE(th)}$	gate emitter threshold voltage	$I_C = 0.45\text{ A}; V_{GE} = V_{CE}$	5		6.5	V
I_{CES}	collector emitter leakage current	$V_{CE} = V_{CES}; V_{GE} = 0\text{ V}$			2	mA
					4	mA
I_{GES}	gate emitter leakage current	$V_{GE} = \pm 20\text{ V}$			300	nA
C_{ies}	input capacitance	$V_{CE} = 25\text{ V}; V_{GE} = 0\text{ V}; f = 1\text{ MHz}$			1630	pF
$Q_{G(on)}$	total gate charge	$V_{CE} = 300\text{ V}; V_{GE} = 15\text{ V}; I_C = 10\text{ A}$			300	nC
$t_{d(on)}$	turn-on delay time	inductive load $V_{CE} = 600\text{ V}; I_C = 30\text{ A}$ $V_{GE} = \pm 15\text{ V}; R_G = 15\ \Omega$	$T_{VJ} = 25^{\circ}\text{C}$		tdb	ns
t_r	current rise time				tdb	ns
$t_{d(off)}$	turn-off delay time				tdb	ns
t_f	current fall time				tdb	ns
E_{on}	turn-on energy per pulse				tdb	mJ
E_{off}	turn-off energy per pulse				tdb	mJ
$t_{d(on)}$	turn-on delay time	inductive load $V_{CE} = 600\text{ V}; I_C = 30\text{ A}$ $V_{GE} = \pm 15\text{ V}; R_G = 15\ \Omega$	$T_{VJ} = 125^{\circ}\text{C}$		20	ns
t_r	current rise time				20	ns
$t_{d(off)}$	turn-off delay time				160	ns
t_f	current fall time				60	ns
E_{on}	turn-on energy per pulse				0.65	mJ
E_{off}	turn-off energy per pulse				0.75	mJ
RBSOA	reverse bias safe operating area	$V_{GE} = \pm 15\text{ V}; R_G = 15\ \Omega; I_C = 60\text{ A}$	$T_{VJ} = 125^{\circ}\text{C}$		$V_{CEK} \leq V_{CES} - L_S \cdot di/dt$	V
t_{SC} (SCSOA)	short circuit safe operating area	$V_{CE} = 360\text{ V}; V_{GE} = \pm 15\text{ V};$ $R_G = 15\ \Omega; t_p = 10\ \mu\text{s};$ non-repetitive	$T_{VJ} = 125^{\circ}\text{C}$	10		A
R_{thJC}	thermal resistance junction to case	(per IGBT)			1.4	K/W
R_{thCH}	thermal resistance case to heatsink			0.45		K/W

Brake Chopper D7

Symbol	Definitions	Conditions	Ratings			Unit
			min.	typ.	max.	
V_{RRM}	max. repetitive reverse voltage	$T_{VJ} = 150^{\circ}\text{C}$			600	V
I_{F25}	forward current	$T_C = 25^{\circ}\text{C}$			22	A
I_{F80}		$T_C = 80^{\circ}\text{C}$			14	A
V_F	forward voltage	$I_F = 30\text{ A}; V_{GE} = 0\text{ V}$			1.65	V
					1.60	V
I_R	reverse current	$V_R = V_{RRM}$			50	μA
					0.2	mA
Q_{rr}	reverse recovery charge	$V_R = 300\text{ V}$ $di_F/dt = -400\text{ A}/\mu\text{s}$ $I_F = 10\text{ A}; V_{GE} = 0\text{ V}$	$T_{VJ} = 125^{\circ}\text{C}$		tdb	μC
I_{RM}	max. reverse recovery current				11	A
t_{rr}	reverse recovery time				80	ns
E_{rec}	reverse recovery energy				tdb	μJ
R_{thJC}	thermal resistance junction to case	(per diode)			2.5	K/W
R_{thCH}	thermal resistance case to heatsink			0.85		K/W

 $T_C = 25^{\circ}\text{C}$ unless otherwise stated

IXYS reserves the right to change limits, test conditions and dimensions.

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Input Rectifier Bridge D8 - D11

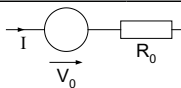
Symbol	Definitions	Conditions	Ratings			Unit
			min.	typ.	max.	
V_{RRM}	max. repetitive reverse voltage		$T_{VJ} = 25^{\circ}\text{C}$		1600	V
I_{FAV}	average forward current	sine 180°	$T_C = 80^{\circ}\text{C}$		31	A
I_{DAVM}	max. average DC output current	rect.; $d = 1/3$	$T_C = 80^{\circ}\text{C}$		89	A
I_{FSM}	max. forward surge current	$t = 10$ ms; sine 50 Hz	$T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = 125^{\circ}\text{C}$		320 280	A A
I^2t	I^2t value for fusing	$t = 10$ ms; sine 50 Hz	$T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = 125^{\circ}\text{C}$		510 390	A^2s A^2s
P_{tot}	total power dissipation		$T_C = 25^{\circ}\text{C}$		80	W
V_F	forward voltage	$I_F = 30$ A	$T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = 125^{\circ}\text{C}$	1.2 1.1	1.50 1.21	V V
I_R	reverse current	$V_R = V_{RRM}$	$T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = 125^{\circ}\text{C}$	20 1.5		μA mA
R_{thJC}	thermal resistance junction to case	(per diode)		0.45	1.4	K/W
R_{thCH}	thermal resistance case to heatsink	(per diode)				K/W

Temperature Sensor NTC

Symbol	Definitions	Conditions	Ratings			Unit	
			min.	typ.	max.		
R_{25}	resistance		$T_C = 25^{\circ}\text{C}$	4.75	5.0	5.25	$\text{k}\Omega$
$B_{25/50}$					3375		K

Module

Symbol	Definitions	Conditions	Ratings			Unit
			min.	typ.	max.	
T_{VJ}	operating temperature		-40		125	$^{\circ}\text{C}$
T_{VJM}	max. virtual junction temperature				150	$^{\circ}\text{C}$
T_{stg}	storage temperature		-40		125	$^{\circ}\text{C}$
V_{ISOL}	isolation voltage	$I_{ISOL} \leq 1$ mA; 50/60 Hz			2500	V~
CTI	comparative tracking index			-		
F_C	mounting force		40		80	N
d_S	creep distance on surface		12.7			mm
d_A	strike distance through air		12			mm
Weight				35		g

Equivalent Circuits for Simulation


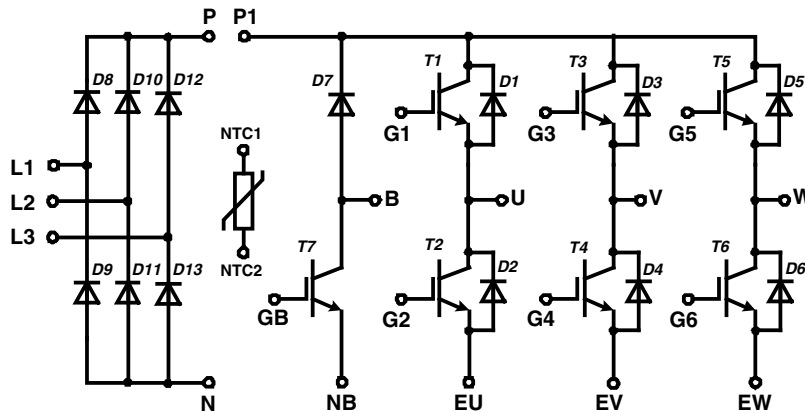
Symbol	Definitions	Conditions	Ratings			Unit
			min.	typ.	max.	
V_0 R_0	rectifier diode	D8 - D13	$T_{VJ} = 125^{\circ}\text{C}$	0.9 9		V $\text{m}\Omega$
V_0 R_0	IGBT	T1 - T6	$T_{VJ} = 125^{\circ}\text{C}$	0.9 20		V $\text{m}\Omega$
V_0 R_0	free wheeling diode	D1 - D6	$T_{VJ} = 125^{\circ}\text{C}$	1.05 7		V $\text{m}\Omega$
V_0 R_0	IGBT	T7	$T_{VJ} = 125^{\circ}\text{C}$	0.9 20		V $\text{m}\Omega$
V_0 R_0	free wheeling diode	D7	$T_{VJ} = 125^{\circ}\text{C}$	1.25 25		V $\text{m}\Omega$

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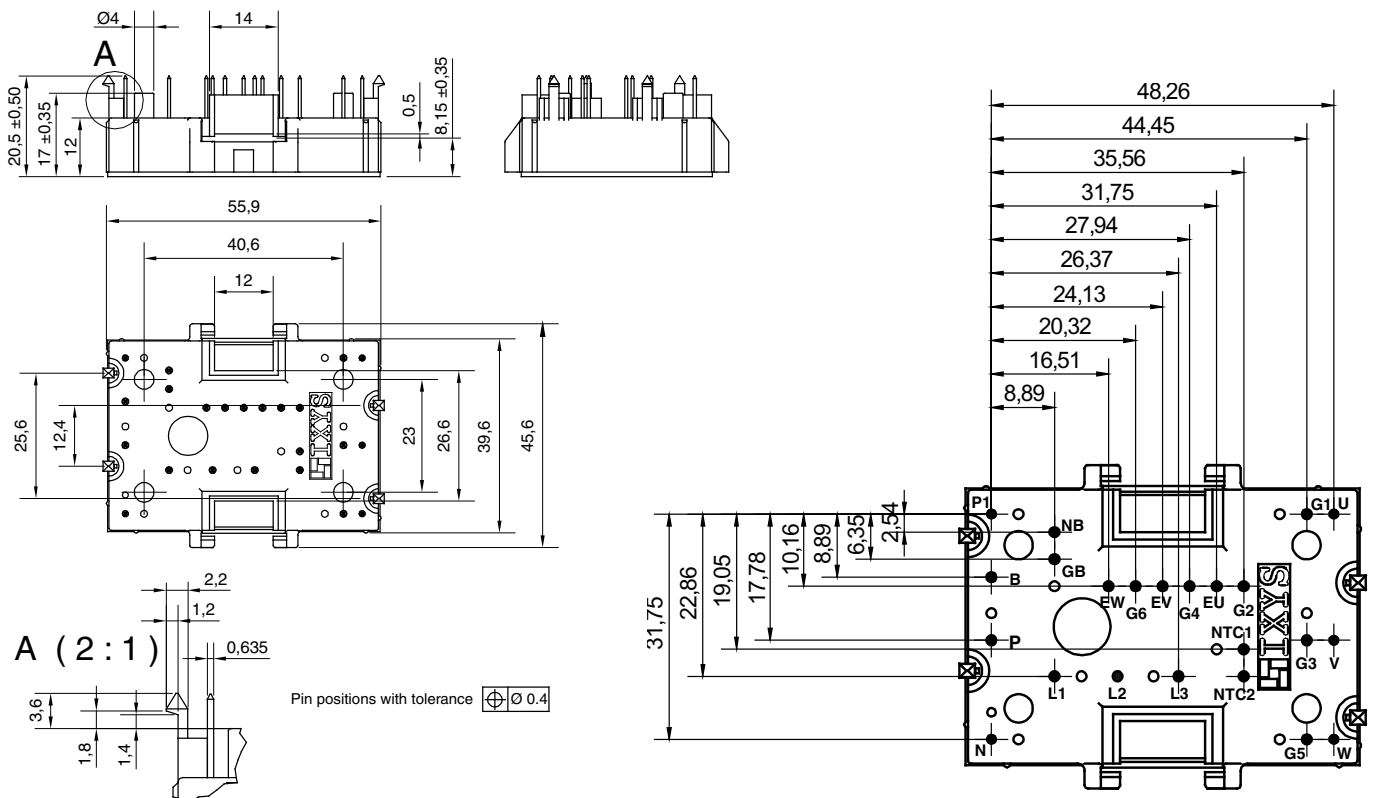
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Circuit Diagram

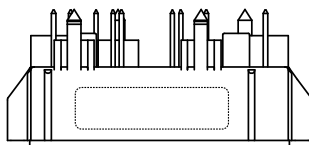


Outline Drawing

Dimensions in mm (1 mm = 0.0394")



Product Marking



Part number

- M = Module
- I = IGBT
- T = Standard trench
- A = Gen 1 / std
- 30 = Current Rating [A]
- WB = 6-Pack + 3- Rectifier Bridge & Brake Unit
- 600 = Reverse Voltage [V]
- T = NTC
- MH = MiniPack2

Ordering	Part Name	Marking on Product	Delivering Mode	Base Qty	Ordering Code
Standard	MITA 30 WB 600 TMH	MITA30WB600TMH	Box	20	505721