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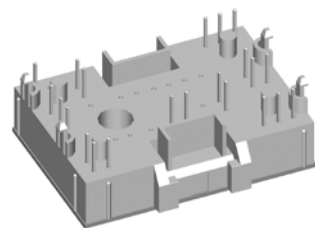
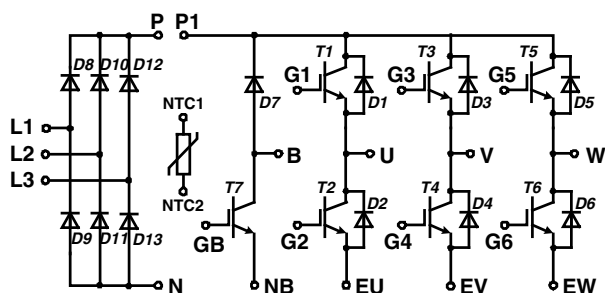
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Advanced Technical Information

**MITA15WB1200TMH**

# Converter - Brake - Inverter Module

## Trench IGBT



Pin configuration see outlines.

Three Phase Rectifier	Brake Chopper	Three Phase Inverter
$V_{RRM} = 1600\text{ V}$	$V_{CES} = 1200\text{ V}$	$V_{CES} = 1200\text{ V}$
$I_{DAVM25} = 90\text{ A}$	$I_{C25} = 30\text{ A}$	$I_{C25} = 30\text{ A}$
$I_{FSM} = 300\text{ A}$	$V_{CE(sat)} = 1.8\text{ V}$	$V_{CE(sat)} = 1.8\text{ V}$

### Input Rectifier Bridge D8 - D13

Symbol	Conditions	Maximum Ratings	
$V_{RRM}$		1600	V
$I_{FAV}$	$T_C = 80^\circ\text{C}$ ; sine $180^\circ$	22	A
$I_{DAVM}$	bridge output current; $T_C = 80^\circ\text{C}$ ; rect.; $d = 1/3$	62	A
$I_{FSM}$	$T_{VJ} = 25^\circ\text{C}$ ; $t = 10\text{ ms}$ ; sine 50 Hz	300	A
$P_{tot}$	$T_C = 25^\circ\text{C}$	50	W

Symbol	Conditions	Characteristic Values				
		(T <sub>VJ</sub> = 25°C, unless otherwise specified)				
		min.	typ.	max.		
$V_F$	$I_F = 30\text{ A}$	$T_{VJ} = 25^\circ\text{C}$		1.3	1.6	V
		$T_{VJ} = 125^\circ\text{C}$		1.4		V
$I_R$	$V_R = V_{RRM}$	$T_{VJ} = 25^\circ\text{C}$			0.01	mA
		$T_{VJ} = 125^\circ\text{C}$		0.3		mA
$R_{thJC}$	(per diode)				2.1	K/W
$R_{thCH}$			0.7			K/W

### Application: AC motor drives with

- Input from single or three phase grid
- Three phase synchronous or asynchronous motor
- electric braking operation

### 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 and soft reverse recovery
- Industry standard package with insulated copper base plate and soldering pins for PCB mounting
- Temperature sense included

Output Inverter T1 - T6			
Symbol	Conditions	Maximum Ratings	
$V_{CES}$	$T_{VJ} = 25^{\circ}\text{C}$ to $150^{\circ}\text{C}$	1200	V
$V_{GES}$	Continuous	$\pm 20$	V
$V_{GEM}$	Transient	$\pm 30$	V
$I_{C25}$	$T_C = 25^{\circ}\text{C}$	30	A
$I_{C80}$	$T_C = 80^{\circ}\text{C}$	21	A
<b>RBSOA</b>	$V_{GE} = \pm 15\text{ V}$ ; $R_G = 75\ \Omega$ ; $T_{VJ} = 125^{\circ}\text{C}$ Clamped inductive load; $L = 100\ \mu\text{H}$	$I_{CM} = 30$ $V_{CEK} \leq V_{CES}$	A
<b>t<sub>SC</sub> (SCSOA)</b>	$V_{CE} = 720\text{ V}$ ; $V_{GE} = \pm 15\text{ V}$ ; $R_G = 75\ \Omega$ $T_{VJ} = 125^{\circ}\text{C}$ ; non-repetitive	10	$\mu\text{s}$
<b>P<sub>tot</sub></b>	$T_C = 25^{\circ}\text{C}$	120	W

Symbol	Conditions	Characteristic Values				
		(T <sub>VJ</sub> = 25°C, unless otherwise specified)				
		min.	typ.	max.		
$V_{CE(sat)}$	$I_C = 15\text{ A}$ ; $V_{GE} = 15\text{ V}$ ; $T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = 125^{\circ}\text{C}$		1.8 2.1	2.2	V V	
$V_{GE(th)}$	$I_C = 0.5\text{ mA}$ ; $V_{GE} = V_{CE}$	5		6.5	V	
$I_{CES}$	$V_{CE} = V_{CES}$ ; $V_{GE} = 0\text{ V}$ ; $T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = 125^{\circ}\text{C}$		0.8	0.6	mA mA	
$I_{GES}$	$V_{CE} = 0\text{ V}$ ; $V_{GE} = \pm 20\text{ V}$			150	nA	
$t_{d(on)}$ $t_r$ $t_{d(off)}$ $t_f$ $E_{on}$ $E_{off}$	Inductive load, $T_{VJ} = 125^{\circ}\text{C}$ $V_{CE} = 600\text{ V}$ ; $I_C = 15\text{ A}$ $V_{GE} = \pm 15\text{ V}$ ; $R_G = 75\ \Omega$		90		ns	
				50		ns
				520		ns
				90		ns
				2.1		mJ
				1.5		mJ
$C_{ies}$	$V_{CE} = 25\text{ V}$ ; $V_{GE} = 0\text{ V}$ ; $f = 1\text{ MHz}$		1100		pF	
$Q_{gon}$	$V_{CE} = 600\text{ V}$ ; $V_{GE} = 15\text{ V}$ ; $I_C = 15\text{ A}$		150		nC	
$R_{thJC}$ $R_{thCH}$	(per IGBT)		0.35	1.1	K/W K/W	

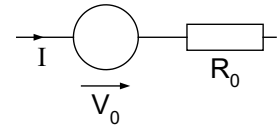
Output Inverter D1 - D6			
Symbol	Conditions	Maximum Ratings	
$I_{F25}$	$T_C = 25^{\circ}\text{C}$	24	A
$I_{F80}$	$T_C = 80^{\circ}\text{C}$	16	A

Symbol	Conditions	Characteristic Values			
		min.	typ.	max.	
$V_F$	$I_F = 10\text{ A}$ ; $V_{GE} = 0\text{ V}$ ; $T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = 125^{\circ}\text{C}$		1.5	2.4	V V
$I_{RM}$ $t_{rr}$	$V_R = 600\text{ V}$ ; $di_F/dt = -400\text{ A}/\mu\text{s}$ $I_F = 10\text{ A}$ ; $V_{GE} = 0\text{ V}$ ; $T_{VJ} = 125^{\circ}\text{C}$		16		A
				125	
$R_{thJC}$ $R_{thCH}$	(per diode)		0.55	1.6	K/W K/W

Equivalent Circuits for Simulation

Conduction



D8 - D13

Rectifier Diode (typ. at  $T_J = 125^{\circ}\text{C}$ )  
 $V_0 = 0.90\text{ V}$ ;  $R_0 = 12\text{ m}\Omega$

T1 - T6 / D1 - D6

IGBT (typ. at  $V_{GE} = 15\text{ V}$ ;  $T_J = 125^{\circ}\text{C}$ )  
 $V_0 = 0.9\text{ V}$ ;  $R_0 = 80\text{ m}\Omega$

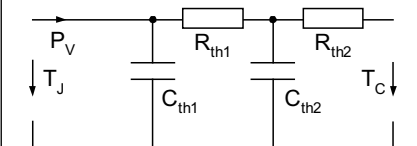
Free Wheeling Diode (typ. at  $T_J = 125^{\circ}\text{C}$ )  
 $V_0 = 1.35\text{ V}$ ;  $R_0 = 41\text{ m}\Omega$

T7 / D7

IGBT (typ. at  $V_{GE} = 15\text{ V}$ ;  $T_J = 125^{\circ}\text{C}$ )  
 $V_0 = 0.9\text{ V}$ ;  $R_0 = 80\text{ m}\Omega$

Free Wheeling Diode (typ. at  $T_J = 125^{\circ}\text{C}$ )  
 $V_0 = 1.45\text{ V}$ ;  $R_0 = 63\text{ m}\Omega$

Thermal Response



D8 - D13

Rectifier Diode (typ.)  
 $C_{th1} = tbd\text{ J/K}$ ;  $R_{th1} = tbd\text{ K/W}$   
 $C_{th2} = tbd\text{ J/K}$ ;  $R_{th2} = tbd\text{ K/W}$

T1 - T6 / D1 - D6

IGBT (typ.)  
 $C_{th1} = tbd\text{ J/K}$ ;  $R_{th1} = tbd\text{ K/W}$   
 $C_{th2} = tbd\text{ J/K}$ ;  $R_{th2} = tbd\text{ K/W}$

Free Wheeling Diode (typ.)  
 $C_{th1} = tbd\text{ J/K}$ ;  $R_{th1} = tbd\text{ K/W}$   
 $C_{th2} = tbd\text{ J/K}$ ;  $R_{th2} = tbd\text{ K/W}$

**Brake Chopper T7**

Symbol	Conditions	Maximum Ratings	
$V_{CES}$	$T_{VJ} = 25^{\circ}\text{C}$ to $150^{\circ}\text{C}$	1200	V
$V_{GES}$	Continuous	$\pm 20$	V
$V_{GEM}$	Transient	$\pm 30$	V
$I_{C25}$	$T_C = 25^{\circ}\text{C}$	30	A
$I_{C80}$	$T_C = 80^{\circ}\text{C}$	20	A
<b>RBSOA</b>	$V_{GE} = \pm 15\text{ V}$ ; $R_G = 75\ \Omega$ ; $T_{VJ} = 125^{\circ}\text{C}$ Clamped inductive load; $L = 100\ \mu\text{H}$	$I_{CM} = 30$ $V_{CEK} \leq V_{CES}$	A
<b><math>t_{SC}</math> (SCSOA)</b>	$V_{CE} = 720\text{ V}$ ; $V_{GE} = \pm 15\text{ V}$ ; $R_G = 75\ \Omega$ $T_{VJ} = 125^{\circ}\text{C}$ ; non-repetitive	10	$\mu\text{s}$
$P_{tot}$	$T_C = 25^{\circ}\text{C}$	120	W

**Symbol Conditions**
**Characteristic Values**

 ( $T_{VJ} = 25^{\circ}\text{C}$ , unless otherwise specified)

		min.	typ.	max.		
$V_{CE(sat)}$	$I_C = 15\text{ A}$ ; $V_{GE} = 15\text{ V}$ ; $T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = 125^{\circ}\text{C}$		1.8 2.1	2.2	V V	
$V_{GE(th)}$	$I_C = 0.5\text{ mA}$ ; $V_{GE} = V_{CE}$	5		6.5	V	
$I_{CES}$	$V_{CE} = V_{CES}$ ; $V_{GE} = 0\text{ V}$ ; $T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = 125^{\circ}\text{C}$		0.5	0.5	mA mA	
$I_{GES}$	$V_{CE} = 0\text{ V}$ ; $V_{GE} = \pm 20\text{ V}$			150	nA	
$t_{d(on)}$ $t_r$ $t_{d(off)}$ $t_f$ $E_{on}$ $E_{off}$	Inductive load, $T_{VJ} = 125^{\circ}\text{C}$ $V_{CE} = 600\text{ V}$ ; $I_C = 15\text{ A}$ $V_{GE} = \pm 15\text{ V}$ ; $R_G = 75\ \Omega$		90 50 520 90		ns ns ns ns	
				2.1 1.5		mJ mJ
$C_{ies}$		$V_{CE} = 25\text{ V}$ ; $V_{GE} = 0\text{ V}$ ; $f = 1\text{ MHz}$		1100		pF
$Q_{Gon}$		$V_{CE} = 600\text{ V}$ ; $V_{GE} = 15\text{ V}$ ; $I_C = 15\text{ A}$		150		nC
$R_{thJC}$ $R_{thCH}$		(per IGBT)		0.35	1.1	K/W K/W

**Brake Chopper D7**

Symbol	Conditions	Maximum Ratings	
$V_{RRM}$	$T_{VJ} = 25^{\circ}\text{C}$ to $150^{\circ}\text{C}$	1200	V
$I_{F25}$	$T_C = 25^{\circ}\text{C}$	15	A
$I_{F80}$	$T_C = 80^{\circ}\text{C}$	10	A

**Symbol Conditions**
**Characteristic Values**

		min.	typ.	max.	
$V_F$	$I_F = 10\text{ A}$ ; $V_{GE} = 0\text{ V}$ ; $T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = 125^{\circ}\text{C}$		2.0	3.1	V V
$I_R$	$V_R = V_{RRM}$ $T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = 125^{\circ}\text{C}$		0.2	0.06	mA mA
$I_{RM}$ $t_{rr}$	$V_R = 600\text{ V}$ ; $di_F/dt = -400\text{ A}/\mu\text{s}$ $I_F = 10\text{ A}$ ; $T_{VJ} = 125^{\circ}\text{C}$		13 100		A ns
$R_{thJC}$ $R_{thCH}$			0.85	2.5	K/W K/W

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

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**Temperature Sensor NTC**

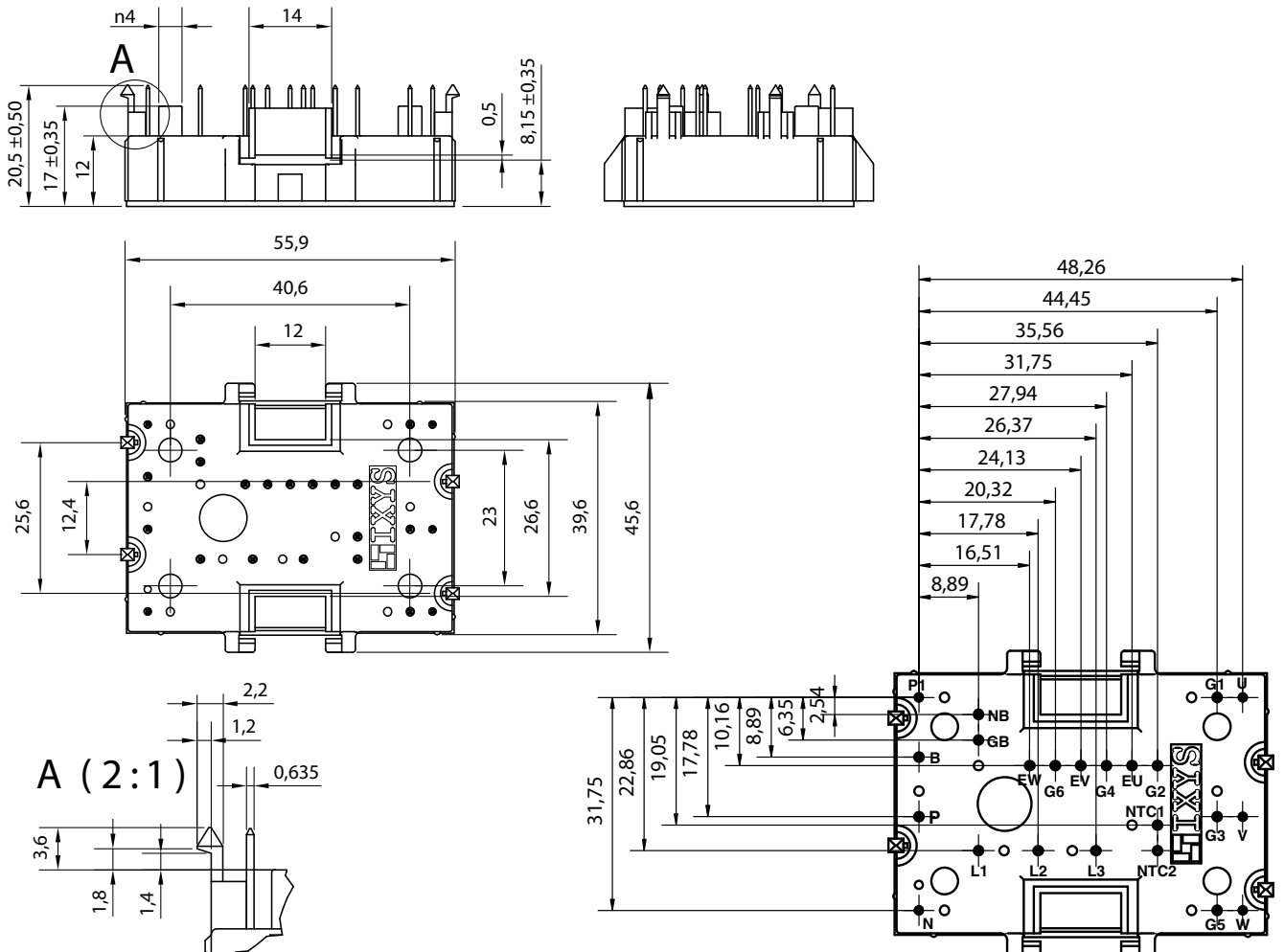
Symbol	Conditions	Characteristic Values			
		min.	typ.	max.	
$R_{25}$	$T = 25^{\circ}\text{C}$	4.75	5.0	5.25	k $\Omega$
$B_{25/50}$			3375		K

**Module**

Symbol	Conditions	Maximum Ratings	
$T_{VJ}$	Operating	-40...+125	$^{\circ}\text{C}$
$T_{VJM}$		150	$^{\circ}\text{C}$
$T_{stg}$		-40...+125	$^{\circ}\text{C}$
$V_{ISOL}$	$I_{ISOL} \leq 1 \text{ mA}; 50/60 \text{ Hz}$	2500	V~
$F_C$	Mounting force	40...80	N

Symbol	Conditions	Characteristic Values		
		min.	typ.	max.
$d_s$	Creepage distance (towards heatsink)	12.7		mm
$d_A$		12		mm
<b>Weight</b>			35	g

Dimensions in mm (1 mm = 0.0394")



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