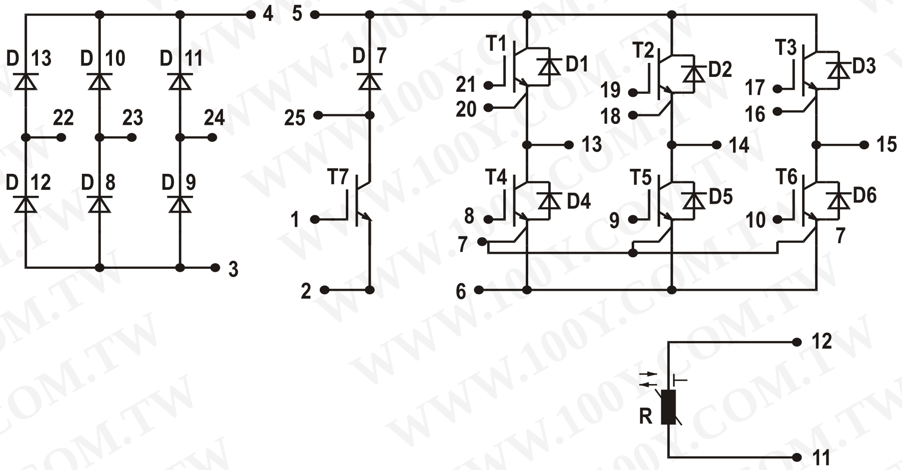
Converter - Brake - Inverter Module (CBI 1)
NPT IGBT

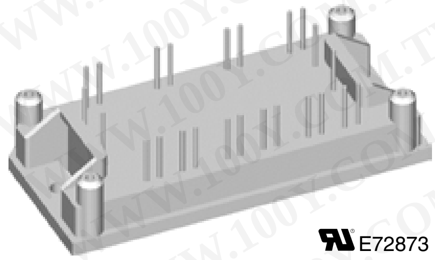
Three Phase Rectifier	Brake Chopper	Three Phase Inverter
V_{RRM} = 1600 V	V_{CES} = 600 V	V_{CES} = 600 V
I_{DAVM25} = 95 A	I_{C25} = 12 A	I_{C25} = 25 A
I_{FSM} = 250 A	$V_{CE(sat)}$ = 2.25 V	$V_{CE(sat)}$ = 2.0 V

Preliminary data

Part name (Marking on product)

MUBW20-06A6K





E72873

Pin configuration see outlines.

Features:

- High level of integration - only one power semiconductor module required for the whole drive
- Inverter with NPT 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 insu lated copper base plate and soldering pins for PCB mounting
- Temperature sense included

Application:

AC motor drives with

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

Package:

- UL registered
- Industry standard E1-pack

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

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Ouput Inverter T1 - T6

Symbol	Definitions	Conditions		min.	typ.	max.	Unit
				Ratings			
V_{CES}	collector emitter voltage		T_{VJ} = 25°C to 150°C			600	V
V_{GES} V_{GEM}	max. DC gate voltage max. transient collector gate voltage	continuous transient				±20 ±30	V V
I_{C25} I_{C80}	collector current		T_C = 25°C T_C = 80°C			25 17	A A
P_{tot}	total power dissipation		T_C = 25°C			85	W
$V_{CE(sat)}$	collector emitter saturation voltage	I_C = 15 A; V_{GE} = 15 V	T_{VJ} = 25°C T_{VJ} = 125°C		2.0 2.3	2.4	V V
$V_{GE(th)}$	gate emitter threshold voltage	I_C = 0.4 mA; V_{GE} = V_{CE}	T_{VJ} = 25°C	4.5		6.5	V
I_{CES}	collector emitter leakage current	V_{CE} = V_{CES}; V_{GE} = 0 V	T_{VJ} = 25°C T_{VJ} = 125°C		 1.3	0.6	mA mA
I_{GES}	gate emitter leakage current	V_{CE} = 0 V; V_{GE} = ±20 V				100	nA
C_{ies}	input capacitance	V_{CE} = 25 V; V_{GE} = 0 V; f = 1 MHz			800		pF
$Q_{G(on)}$	total gate charge	V_{CE} = 300 V; V_{GE} = 15 V; I_C = 15 A			57		nC
$t_{d(on)}$ t_r $t_{d(off)}$ t_f E_{on} E_{off}	turn-on delay time current rise time turn-off delay time current fall time turn-on energy per pulse turn-off energy per pulse	inductive load V_{CE} = 300 V; I_C = 15 A V_{GE} = ±15 V; $R_{G(on)}$ = 39 Ω $R_{G(off)}$ = 22 Ω	T_{VJ} = 125°C		30 25 160 50 0.42 0.44		ns ns ns ns mJ mJ
I_{CM}	reverse bias safe operating area	RBSOA; V_{GE} = ±15 V; R_G = 68 Ω L = 100 µH; clamped induct. load V_{CEmax} = V_{CES} - L_S·di/dt	T_{VJ} = 125°C		30		A
t_{SC} (SCSOA)	short circuit safe operating area	V_{CE} = 600 V; V_{GE} = ±15 V; R_G = 68 Ω; non-repetitive	T_{VJ} = 125°C		10		µs
R_{thJC}	thermal resistance junction to case	(per IGBT)				1.5	K/W
R_{thCH}	thermal resistance case to heatsink	(per IGBT)			0.55		K/W

Output Inverter D1 - D6

Symbol	Definitions	Conditions		min.	typ.	max.	Unit
				Ratings			
V_{RRM}	max. repetitve reverse voltage		T_{VJ} = 150°C			600	V
I_{F25} I_{F80}	forward current		T_C = 25°C T_C = 80°C			36 24	A A
V_F	forward voltage	I_F = 15 A; V_{GE} = 0 V	T_{VJ} = 25°C T_{VJ} = 125°C		 1.5	2.1	V V
I_{RM} t_{rr} $E_{rec(off)}$	max. reverse recovery current reverse recovery time reverse recovery energy	V_R = 300 V di_F/dt = -400 A/µs I_F = 15 A; V_{GE} = 0 V	T_{VJ} = 100°C		14 80 tbd		A ns µJ
R_{thJC}	thermal resistance junction to case	(per diode)				1.6	K/W
R_{thCH}	thermal resistance case to heatsink	(per diode)			0.55		K/W

T_C = 25°C unless otherwise stated

Brake Chopper T7

Symbol	Definitions	Conditions		Ratings min.	typ.	max.	Unit
V_{CES}	*collector emitter voltage*		T_{VJ} = 25°C to 150°C			600	V
V_{GES} V_{GEM}	*max. DC gate voltage* *max. transient collector gate voltage*	continuous transient				±20 ±30	V V
I_{C25} I_{C80}	*collector current*		T_C = 25°C T_C = 80°C			11 8	A A
P_{tot}	*total power dissipation*		T_C = 25°C			50	W
$V_{CE(sat)}$	*collector emitter saturation voltage*	I_C = 10 A; V_{GE} = 15 V	T_{VJ} = 25°C T_{VJ} = 125°C		2.65 3.1	3.3	V V
$V_{GE(th)}$	*gate emitter threshold voltage*	I_C = 0.2 mA; V_{GE} = V_{CE}	T_{VJ} = 25°C	4.5		6.5	V
I_{CES}	*collector emitter leakage current*	V_{CE} = V_{CES}; V_{GE} = 0 V	T_{VJ} = 25°C T_{VJ} = 125°C		 0.7	0.1	mA mA
I_{GES}	*gate emitter leakage current*	V_{CE} = 0 V; V_{GE} = ±20 V				120	nA
C_{ies}	*input capacitance*	V_{CE} = 25 V; V_{GE} = 0 V; f = 1 MHz			220		pF
$Q_{G(on)}$	*total gate charge*	V_{CE} = 300 V; V_{GE} = 15 V; I_C = 6 A			32		nC
$t_{d(on)}$ t_r $t_{d(off)}$ t_f E_{on} E_{off}	*turn-on delay time* *current rise time* *turn-off delay time* *current fall time* *turn-on energy per pulse* *turn-off energy per pulse*	inductive load V_{CE} = 300 V; I_C = 8 A V_{GE} = ±15 V; $R_{G(on)}$ = 54 Ω $R_{G(off)}$ = 22 Ω	T_{VJ} = 125°C		20 10 110 30 0.21 0.26		ns ns ns ns mJ mJ
I_{CM}	*reverse bias safe operating area*	RBSOA; V_{GE} = ±15 V; R_G = 54 Ω L = 100 µH; clamped induct. load V_{CEmax} = V_{CES} - L_S·di/dt	T_{VJ} = 125°C		18		A
t_{SC} **(SCSOA)**	*short circuit safe operating area*	V_{CE} = 600 V; V_{GE} = ±15 V; R_G = 54 Ω; non-repetitive	T_{VJ} = 125°C		10		µs
R_{thJC}	*thermal resistance junction to case*	(per IGBT)				2.75	K/W
R_{thCH}	*thermal resistance case to heatsink*	(per IGBT)			0.9		K/W

Brake Chopper D7

Symbol	Definitions	Conditions		Ratings min.	typ.	max.	Unit
V_{RRM}	*max. repetitive reverse voltage*		T_{VJ} = 150°C			600	V
I_{F25} I_{F80}	*forward current*		T_C = 25°C T_C = 80°C			21 14	A A
V_F	*forward voltage*	I_F = 10 A; V_{GE} = 0 V	T_{VJ} = 25°C T_{VJ} = 125°C		 1.25	2.1	V V
I_R	*reverse current*	V_R = V_{RRM}	T_{VJ} = 25°C T_{VJ} = 125°C		 0.2	0.06	mA mA
I_{RM} t_{rr}	*max. reverse recovery current* *reverse recovery time*	V_R = 100 V; I_F = 12 A di_F/dt = -100 A/µs	T_{VJ} = 100°C		3.5 80		A ns
R_{thJC}	*thermal resistance junction to case*	(per diode)				2.5	K/W
R_{thCH}	*thermal resistance case to heatsink*	(per diode)			0.85		K/W

T_C = 25°C unless otherwise stated

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Input Rectifier Bridge D8 - D13

Symbol	Definitions	Conditions		Maximum Ratings	
V_{RRM}	*max. repetitive reverse voltage*			1600	V
I_{FAV}	*average forward current*	sine 180°	T_C = 80°C	23	A
I_{DAVM}	*max. average DC output current*	rectangular; d = $^1/_3$; bridge	T_C = 80°C	65	A
I_{FSM}	*max. surge forward current*	t = 10 ms; sine 50 Hz	T_C = 25°C	250	A
P_{tot}	*total power dissipation*		T_C = 25°C	65	W

Symbol	Conditions			Characteristic Values			
				min.	typ.	max.	
V_F	*forward voltage*	I_F = 30 A	T_{VJ} = 25°C		1.1	1.45	V
			T_{VJ} = 125°C		1.2		V
I_R	*reverse current*	$V_R = V_{RRM}$	T_{VJ} = 25°C			0.02	mA
			T_{VJ} = 125°C		0.4		mA
R_{thJC}	*thermal resistance junction to case*	(per diode)	T_{VJ} = 25°C			1.9	K/W
R_{thCH}	*thermal resistance case to heatsink*	(per diode)			0.65		K/W

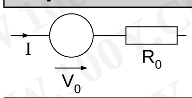
Temperature Sensor NTC

Symbol	Definitions	Conditions		Ratings min.	typ.	max.	Unit
R_{25}	*resistance*		T_C = 25°C	4.45	4.7	5.0	kΩ
$B_{25/85}$					3510		K

Module

Symbol	Definitions	Conditions	Ratings min.	typ.	max.	Unit
T_{VJ}	*operating temperature*		-40		125	°C
T_{VJM}	*max. virtual junction temperature*				150	°C
T_{stg}	*storage temperature*		-40		125	°C
V_{ISOL}	*isolation voltage*	$I_{ISOL} \leq$ 1 mA; 50/60 Hz			2500	V~
M_d	*mounting torque*	(M4)	2.0		2.2	Nm
d_S	*creep distance on surface*		12.7			mm
d_A	*strike distance through air*		12.7			mm
Weight				40		g

Equivalent Circuits for Simulation



Symbol	Definitions	Conditions		Ratings min.	typ.	max.	Unit
V_0	*rectifier diode*	D8 - D13	T_{VJ} = 125°C		0.90		V
R_0					12		mΩ
V_0	*IGBT*	T1 - T6	T_{VJ} = 125°C		1.0		V
R_0					70		mΩ
V_0	*free wheeling diode*	D1 - D6	T_{VJ} = 125°C		1.25		V
R_0					13		mΩ
V_0	*IGBT*	T7	T_{VJ} = 125°C		1.4		V
R_0					150		mΩ
V_0	*free wheeling diode*	D7	T_{VJ} = 125°C		1.25		V
R_0					26		mΩ

T_C = 25°C unless otherwise stated

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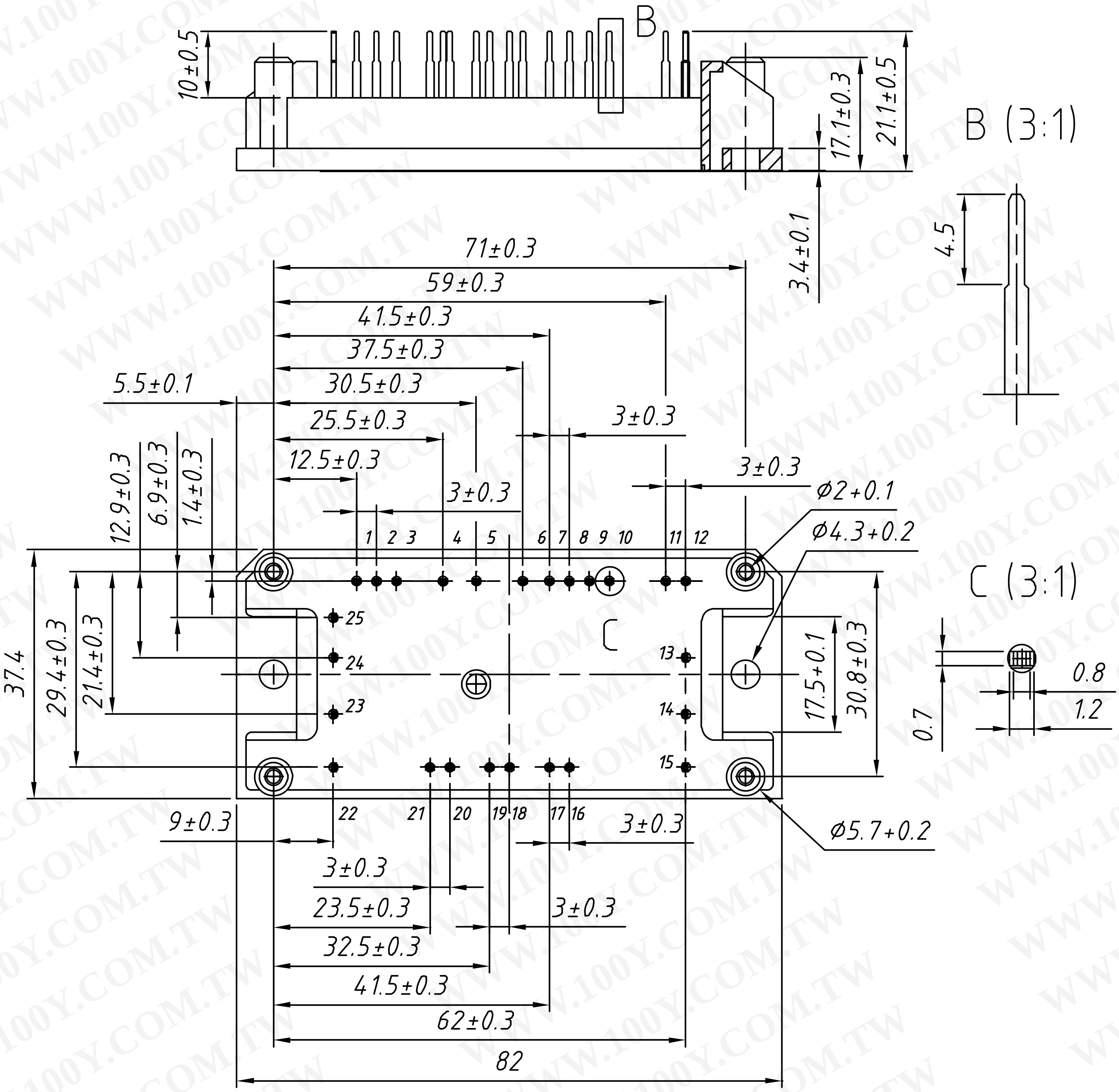
Outline Drawing Dimensions in mm (1 mm = 0.0394")



Product Marking

Ordering	Part Name	Marking on Product	Delivering Mode	Base Qty	Ordering Code
Standard	MUBW 20-06A6K	MUBW20-06A6K	Box	10	500 103

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