Three Phase Rectifier Bridge

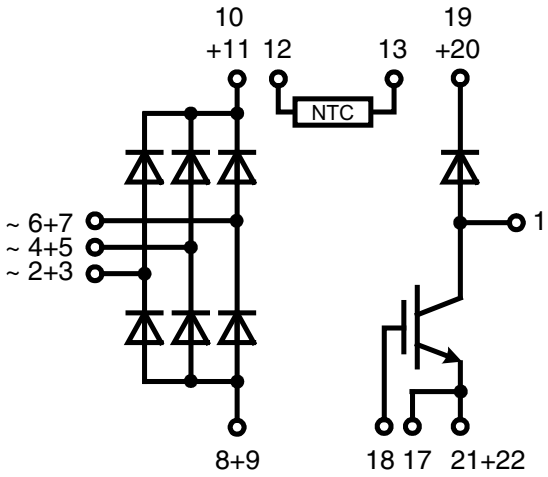
with IGBT and Fast Recovery Diode
for Braking System

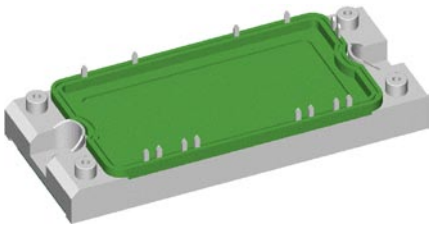
Rectifier Diode	Fast Recovery Diode	IGBT
V_{RRM} = 2200 V	V_{CES} = 1800 V	V_{CES} = 1700 V
$I_{DAVM100}$ = 150 A	I_{C80} = 33 A	I_{C80} = 80 A
I_{FSM45} = 1000 A	V_{F125} = 3.11 V	V_{CE125} = 3.0 V

Preliminary data

Part name (Marking on product)

VUB135-22NO1





E72873

Pin configuration see outlines.

Features:

- Soldering connections for PCB mounting
- Convenient package outline
- Thermistor

Application:

- Drive Inverters with brake system

Package:

- 2 functions in one package
- Easy to mount with two screws
- Suitable for wave soldering
- High temperature and power cycling capability
- UL registered, E72873

IGBT

Symbol	Definitions	Conditions		Ratings min.	typ.	max.	Unit
V_{CES}	*collector emitter voltage*		T_{VJ} = 25°C to 150°C			1700	V
V_{GES}	*max. DC gate voltage*	continuous		-20		+20	V
V_{GEM}	*max. transient collector gate voltage*	transient		-30		+30	V
I_{C25}	*collector current*		T_C = 25°C			113	A
I_{C80}			T_C = 80°C			80	A
P_{tot}	*total power dissipation*		T_C = 25°C			445	W
$V_{CE(sat)}$	*collector emitter saturation voltage*	I_C = 75 A; V_{GE} = 15 V	T_{VJ} = 25°C			2.13	V
			T_{VJ} = 125°C			3	V
$V_{GE(th)}$	*gate emitter threshold voltage*	I_C = 3 mA; V_{GE} = V_{CE}	T_{VJ} = 25°C	5.2		6.4	V
I_{CES}	*collector emitter leakage current*	V_{CE} = V_{CES}; V_{GE} = 0 V	T_{VJ} = 25°C			0.6	mA
			T_{VJ} = 125°C			tbd	mA
I_{GES}	*gate emitter leakage current*	V_{CE} = 0 V; V_{GE} = ±20 V				400	nA
C_{ies}	*input capacitance*	V_{CE} = 25 V; V_{GE} = 0 V; f = 1 MHz			6640		pF
$Q_{G(on)}$	*total gate charge*	V_{CE} = 900 V; V_{GE} = 15 V; I_C = 75 A			tbd		nC
$t_{d(on)}$	*turn-on delay time*	inductive load V_{CE} = 900 V; I_C = 75 A V_{GE} = ±15 V; R_G = 18 Ω	T_{VJ} = 125°C		220		ns
t_r	*current rise time*				100		ns
$t_{d(off)}$	*turn-off delay time*				880		ns
t_f	*current fall time*				200		ns
E_{on}	*turn-on energy per pulse*				30		mJ
E_{off}	*turn-off energy per pulse*				25		mJ
I_{CM}	*reverse bias safe operating area*	RBSOA; V_{GE} = ±15 V; R_G = 18 Ω; L = 100 µH			150		A
V_{CEK}		clamped inductive load;	T_{VJ} = 125°C		≤ V_{CES}-L_S·d_i/dt		V
t_{SC} (SCSOA)	*short circuit safe operating area*	V_{CE} = 900 V; V_{GE} = ±15 V; R_G = 18 Ω; non-repetitive	T_{VJ} = 125°C			10	µs
R_{thJC}	*thermal resistance junction to case*	(per IGBT)				0.28	K/W
R_{thCH}	*thermal resistance case to heatsink*				0.1		K/W

Fast Recovery Diode

Symbol	Definitions	Conditions		Ratings min.	typ.	max.	Unit
V_{RRM}	*max. repetitve reverse voltage*		T_{VJ} = 150°C			1800	V
I_{FAV}	*average forward current*		T_C = 80°C			33	A
V_{F0}	*threshold voltage*		T_{VJ} = 150°C			2.09	V
r_F	*slope resistance*	*for power loss calculation only*				17	mΩ
V_F	*forward voltage*	I_F = 60 A	T_{VJ} = 25°C			3.05	V
			T_{VJ} = 125°C			3.11	V
I_R	*reverse current*	V_R = V_{RRM}	T_{VJ} = 25°C			0.1	mA
			T_{VJ} = 125°C			6	mA
I_{RM}	*max. reverse recovery current*	V_R = 1200 V di_F/dt = -400 A/µs	T_{VJ} = 100°C		40		A
t_{rr}	*reverse recovery time*	I_F = 60 A			tbd		ns
R_{thJC}	*thermal resistance junction to case*	(per diode)				0.65	K/W
R_{thCH}	*thermal resistance case to heatsink*				0.25		K/W

T_C = 25°C unless otherwise stated

Rectifier Diode

Symbol	Conditions			Ratings min.	typ.	max.	
V_{RRM}	*max. repetitive reverse voltage*		T_{VJ} = 25°C			2200	V
I_R	*reverse current*	$V_R = V_{RRM}$	T_{VJ} = 25°C			0.1	mA
			T_{VJ} = 125°C			2	mA
V_F	*forward voltage*	I_F = 150 A	T_{VJ} = 25°C			1.85	V
			T_{VJ} = 125°C			1.96	V
$I_{D(AV)M}$	*max. average DC output current*	rectangular; d = $^1/_3$; bridge	T_C = 100°C			150	A
V_{F0}	*threshold voltage*		T_{VJ} = 150°C			0.87	V
r_F	*slope resistance*	*for power loss calculation only*				6.5	mΩ
R_{thJC}	*thermal resistance junction to case*		T_{VJ} = 25°C			0.5	K/W
R_{thCH}	*thermal resistance case to heatsink*		T_{VJ} = 25°C			0.1	K/W
T_{VJ}	*virtual junction temperature*			-40		125	°C
P_{tot}	*total power dissipation*		T_{VJ} = 25°C			250	W
I_{FSM}	*max. forward surge current*	t = 10 ms (50Hz)	T_{VJ} = 45°C			1000	A
		V_R = 0 V	T_{VJ} = 150°C			870	A
I^2t	*value for fusing*	t = 10 ms (50Hz)	T_{VJ} = 45°C			5000	A
		V_R = 0 V	T_{VJ} = 150°C			3780	A

Temperature Sensor NTC

Symbol	Definitions	Conditions		Ratings min.	typ.	max.	Unit
R_{25}	*resistance*		T_C = 25°C	4.75	5.0	5.25	kΩ
$B_{25/85}$					3375		K

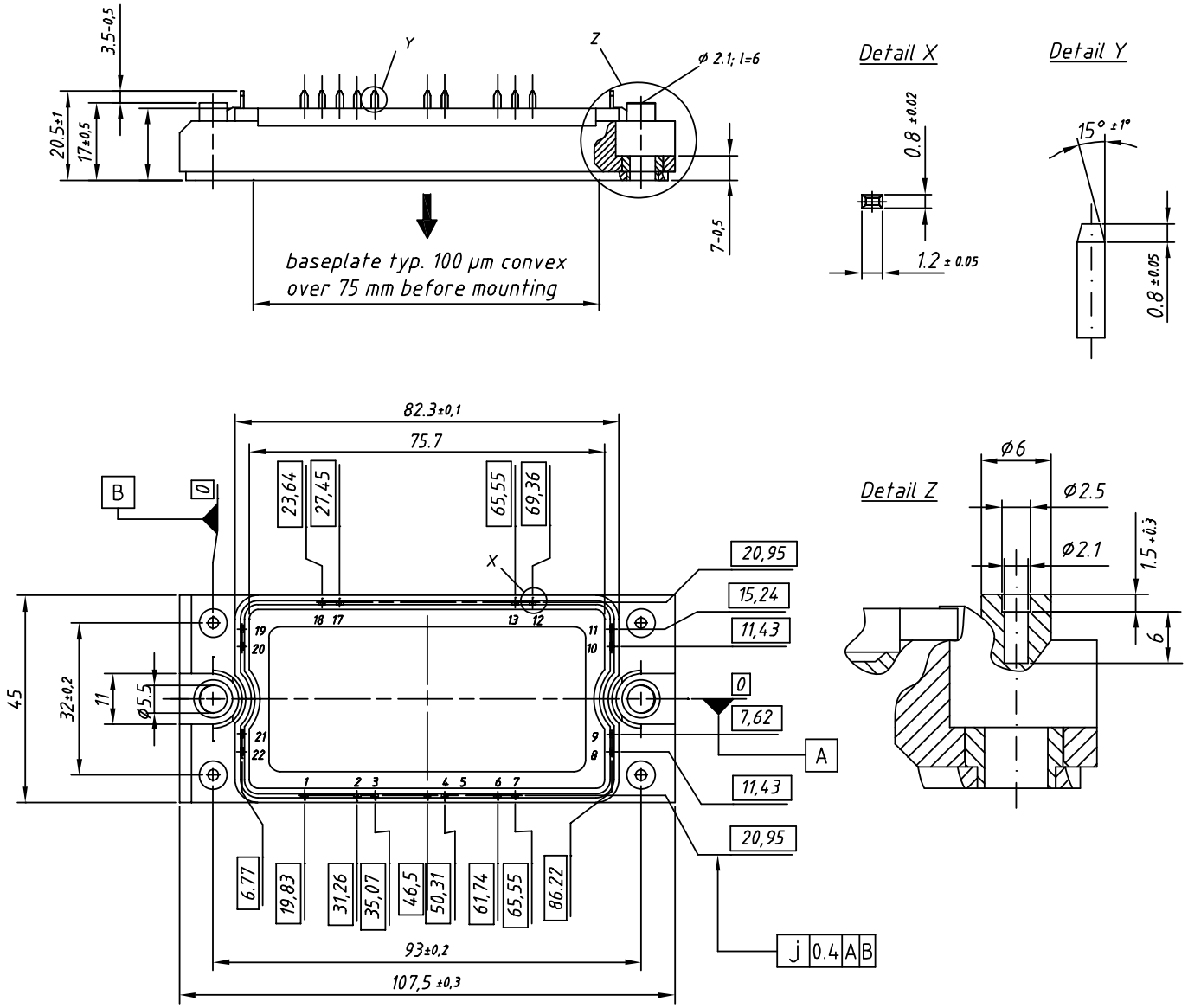
Module

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;	t = 1 min.			3000	V~
			t = 1 s			3600	V~
M_d	*mounting torque*	(M5)		2.7		3.3	Nm
d_S	*creep distance on surface*			12.7			mm
d_A	*strike distance through air*			9.6			mm
a	*maximum allowable acceleration*			50			m/s^2
Weight					180		g

T_C = 25°C unless otherwise stated

Outline Drawing

Dimensions in mm (1 mm = 0.0394“)



Product Marking

Ordering	Part Name	Marking on Product	Delivering Mode	Base Qty	Ordering Code
Standard	VUB 135-22NO1	VUB135-22NO1	Box	6	503948