Three Phase Rectifier Bridge

with IGBT and Fast Recovery Diode
for Braking System

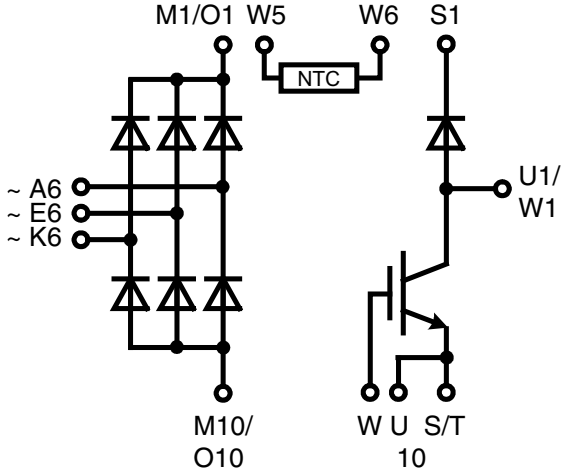
Rectifier Diode	Fast Recov. Diode	IGBT
V_{RRM} = 1200 V 1600 V	V_{CES} = 1200 V	V_{CES} = 1200 V
I_{DAVM} = 188 A	V_F = 2.7 V	I_{C80} = 125 A
I_{FSM} = 1100 A	I_{FSM} = 200 A	V_{CEsat} = 2.2 V

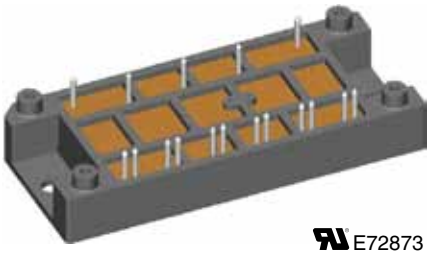
Preliminary data

Part name (Marking on product)

VUB160-12NO2(T)
VUB160-16NO2(T)

(T) = NTC optional





E72873

Pin configuration see outlines.

Features:

- Soldering connections for PCB mounting
- Isolation voltage 3600 V~
- Ultrafast diode
- Convenient package outline
- Optional NTC

Application:

- Drive Inverters with brake system

Package:

- Two 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			1200	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*	DC	T_C = 25°C			177	A
I_{C80}		DC	T_C = 80°C			125	A
P_{tot}	*total power dissipation*		T_C = 25°C			690	W
$V_{CE(sat)}$	*collector emitter saturation voltage*	I_C = 75 A; V_{GE} = 15 V	T_{VJ} = 25°C			2.2	V
$V_{GE(th)}$	*gate emitter threshold voltage*	I_C = 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			0.2	mA
			T_{VJ} = 125°C			1	mA
C_{ies}	*input capacitance*	V_{CE} = 25 V; V_{GE} = 0 V; f = 1 MHz			7.4		nF
$t_{d(on)}$	*turn-on delay time*	inductive load	T_{VJ} = 125°C		330		ns
$t_{d(off)}$	*turn-off delay time*	V_{CE} = 600 V; I_C = 75 A			750		ns
E_{on}	*turn-on energy per pulse*	V_{GE} = ±15 V; R_G = 10 Ω; L = 100 µH			12		mJ
E_{off}	*turn-off energy per pulse*				10		mJ
I_{CM}	*reverse bias safe operating area*	RBSOA; V_{GE} = ±15 V; R_G = 10 Ω; L = 100 µH			350		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 = 10 Ω; non-repetitive	T_{VJ} = 125°C			10	µs
RBSOA	*reverse bias safe operating area*	V_{CE} = 1200 V; V_{GE} = ±15 V; R_G = 10 Ω; L = 100 µH; clamped inductive load	T_{VJ} = 125°C			200	A
R_{thJC}	*thermal resistance junction to case*					0.18	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. repetitive reverse voltage*		T_{VJ} = 150°C			1200	V
I_{FAV}	*average forward current*	rect.; d = 0.5	T_C = 80°C			34	A
I_{FRMS}	*rms forward current*	rect.; d = 0.5	T_C = 80°C			48	A
I_{FSM}	*max. surge forward current*	t = 10 ms	T_{VJ} = 45°C			200	A
		t = 10 ms	T_{VJ} = 150°C			180	A
P_{tot}	*total power dissipation*		T_C = 25°C			140	W
V_{F0}	*threshold voltage*		T_{VJ} = 150°C			1.3	V
r_F	*slope resistance*	for power loss calculation only				15	mΩ
V_F	*forward voltage*	I_F = 30 A	T_{VJ} = 25°C			2.7	V
I_R	*reverse current*	V_R = V_{RRM}	T_{VJ} = 25°C			0.5	mA
			T_{VJ} = 125°C			1	mA
I_{RM}	*reverse recovery current*	I_F = 50 A; V_R = 100 V; di_F/dt = -100 A/µs			8	12	A
t_{rr}	*reverse recovery time*	I_F = 1 A; V_R = 30 V; di_F/dt = -100 A/µs			40	60	ns
R_{thJC}	*thermal resistance junction to case*					0.9	K/W
R_{thCH}	*thermal resistance case to heatsink*				0.3		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			1200	V
						1600	V
I_R	*reverse current*	$V_R = V_{RRM}$	T_{VJ} = 25°C			0.3	mA
			T_{VJ} = 150°C			5	mA
V_F	*forward voltage*	I_F = 150 A	T_{VJ} = 25°C			1.46	V
$I_{D(AV)M}$	*max. average DC output current*	rectangular; d = $^1/_3$; bridge	T_C = 80°C			188	A
V_{F0}	*threshold voltage*		T_{VJ} = 150°C			0.87	V
r_F	*slope resistance*	*for power loss calculation only*				4	mΩ
R_{thJC}	*thermal resistance junction to case*	per diode	T_{VJ} = 25°C			0.6	K/W
R_{thCH}	*thermal resistance case to heatsink*		T_{VJ} = 25°C		0.2		K/W
P_{tot}	*total power dissipation*		T_{VJ} = 25°C			160	W
I_{FSM}	*max. forward surge current*	t = 10 ms (50Hz)	T_{VJ} = 45°C			1100	A
		V_R = 0 V	T_{VJ} = 150°C			960	A
I^2t	*value for fusing*	t = 10 ms (50Hz)	T_{VJ} = 45°C			6050	A^2s
		V_R = 0 V	T_{VJ} = 150°C			4610	A^2s

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

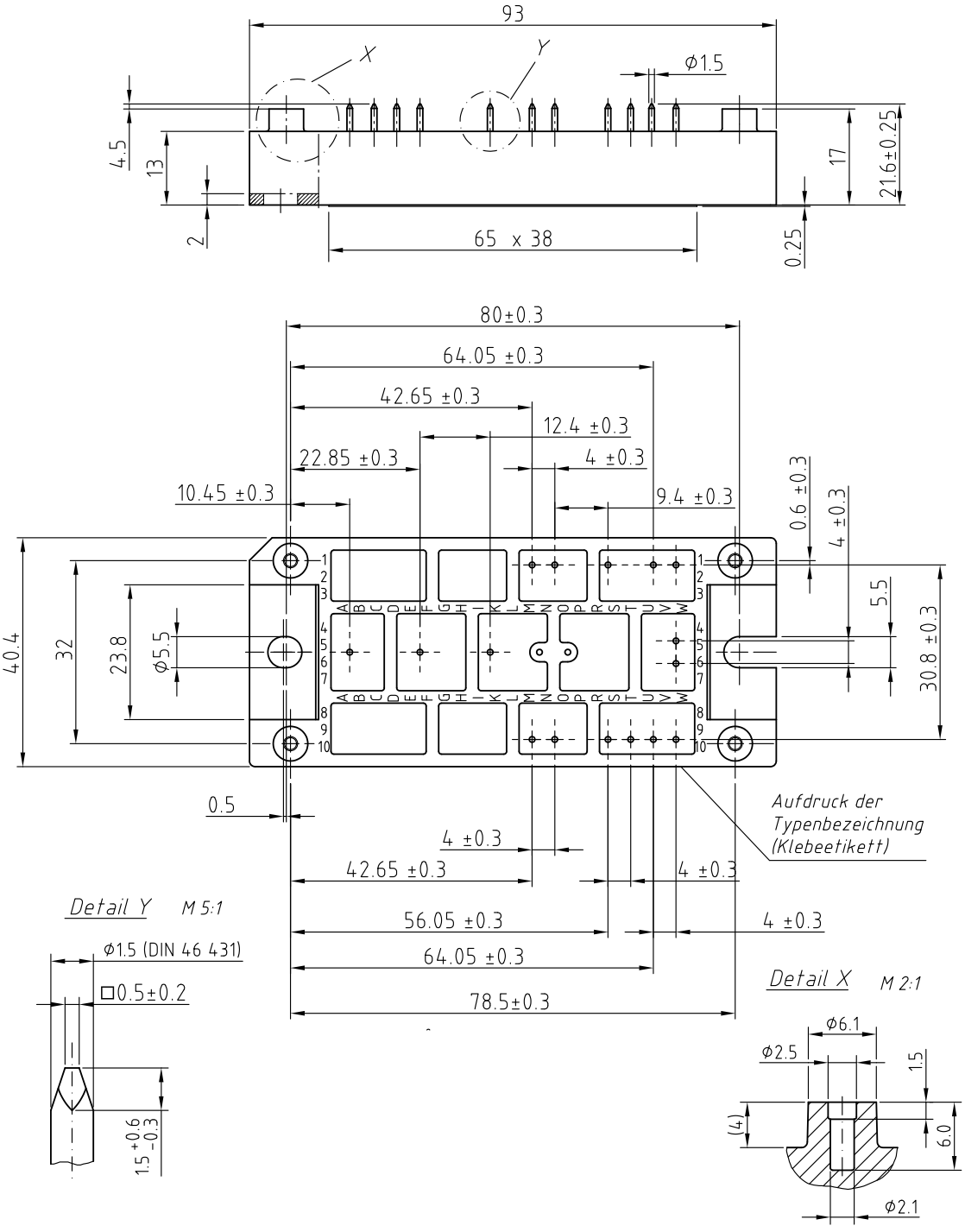
Module

Symbol	Definitions	Conditions		Ratings min.	typ.	max.	Unit
T_{VJ}	*operating temperature*			-40		150	°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)		2.0		2.5	Nm
d_S	*creep distance on surface*			12.7			mm
d_A	*strike distance through air*			9.4			mm
a	*maximum allowable acceleration*			50			m/s^2
Weight					80		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 160-12NO2	VUB160-12NO2	Box	6	495972
Standard	VUB 160-16NO2	VUB160-16NO2	Box	6	495980
+NTC	VUB 160-12NO2T	VUB160-12NO2	Box	6	499706
+NTC	VUB 160-16NO2T	VUB160-16NO2	Box	6	499722

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

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