

Three Phase Rectifier Bridge

with IGBT and Fast Recovery Diode
for Braking System

| Rectifier Diode | Fast Recov. Diode | IGBT |
|--|---------------------------|----------------------------|
| $V_{RRM} = 1200\text{ V}$ 1600 V | $V_{CES} = 1200\text{ V}$ | $V_{CES} = 1200\text{ V}$ |
| $I_{DAVM} = 188\text{ A}$ | $V_F = 2.7\text{ V}$ | $I_{C80} = 100\text{ A}$ |
| $I_{FSM} = 1100\text{ A}$ | $I_{FSM} = 200\text{ A}$ | $V_{CEsat} = 2.1\text{ V}$ |

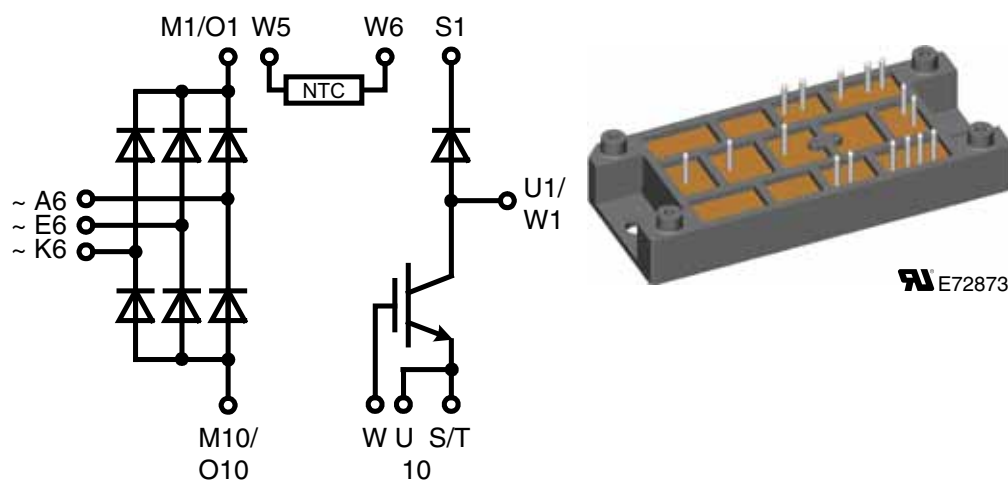
Preliminary data

Part name (Marking on product)

VUB120-12NO2(T)

VUB120-16NO2(T)

(T) = NTC optional



E72873

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 | | $T_{VJ} = 25^{\circ}\text{C}$ 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 | | $T_C = 25^{\circ}\text{C}$ | 140 | A |
| I_{C80} | | DC | | $T_C = 80^{\circ}\text{C}$ | 100 | A |
| P_{tot} | total power dissipation | | | $T_C = 25^{\circ}\text{C}$ | 140 | W |
| $V_{CE(sat)}$ | collector emitter saturation voltage | $I_C = 50\text{ A}; V_{GE} = 15\text{ V}$ | | $T_{VJ} = 25^{\circ}\text{C}$ | 2.1 | V |
| $V_{GE(th)}$ | gate emitter threshold voltage | $I_C = 4\text{ mA}; V_{GE} = V_{CE}$ | 4.5 | $T_{VJ} = 25^{\circ}\text{C}$ | 6.5 | V |
| I_{CES} | collector emitter leakage current | $V_{CE} = V_{CES}; V_{GE} = 0\text{ V}$ | | $T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = 125^{\circ}\text{C}$ | 0.2 1 | mA mA |
| C_{ies} | input capacitance | $V_{CE} = 25\text{ V}; V_{GE} = 0\text{ V}; f = 1\text{ MHz}$ | | | 7.4 | nF |
| $t_{d(on)}$ | turn-on delay time | inductive load $V_{CE} = 600\text{ V}; I_C = 50\text{ A}$ $V_{GE} = \pm 15\text{ V}; R_G = 15\ \Omega; L = 100\ \mu\text{H}$ | $T_{VJ} = 125^{\circ}\text{C}$ | | 170 | ns |
| $t_{d(off)}$ | turn-off delay time | | 680 | ns | | |
| E_{on} | turn-on energy per pulse | | 11 | mJ | | |
| E_{off} | turn-off energy per pulse | | 8 | mJ | | |
| I_{CM} | reverse bias safe operating area | RBSOA; $V_{GE} = \pm 15\text{ V}; R_G = 10\ \Omega; L = 100\ \mu\text{H}$ | $T_{VJ} = 125^{\circ}\text{C}$ | | 280 | A |
| V_{CEK} | | clamped inductive load; | $\leq V_{CES} - L_S \cdot di/dt$ | | | V |
| t_{SC} (SCSOA) | short circuit safe operating area | $V_{CE} = 900\text{ V}; V_{GE} = \pm 15\text{ V};$ $R_G = 15\ \Omega; \text{non-repetitive}$ | $T_{VJ} = 125^{\circ}\text{C}$ | | 10 | μs |
| RBSOA | reverse bias safe operating area | $V_{CE} = 1200\text{ V}; V_{GE} = \pm 15\text{ V};$ $R_G = 15\ \Omega; L = 100\ \mu\text{H}; \text{clamped inductive load}$ | $T_{VJ} = 125^{\circ}\text{C}$ | | 150 | A |
| R_{thJC} | thermal resistance junction to case | | | | 0.22 | 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 | | $T_{VJ} = 150^{\circ}\text{C}$ | | 1200 | V | |
| I_{FAV} | average forward current | rect.; $d = 0.5$ | $T_C = 80^{\circ}\text{C}$ | | 34 | A | |
| I_{FRMS} | rms forward current | rect.; $d = 0.5$ | $T_C = 80^{\circ}\text{C}$ | | 48 | A | |
| I_{FSM} | max. surge forward current | $t = 10\text{ ms}$ | $T_{VJ} = 45^{\circ}\text{C}$ | | 200 | A | |
| | | $t = 10\text{ ms}$ | $T_{VJ} = 150^{\circ}\text{C}$ | | 180 | A | |
| P_{tot} | total power dissipation | | $T_C = 25^{\circ}\text{C}$ | | 140 | W | |
| V_{F0} | threshold voltage | | $T_{VJ} = 150^{\circ}\text{C}$ | | 1.3 | V | |
| r_F | slope resistance | for power loss calculation only | | | 15 | $\text{m}\Omega$ | |
| V_F | forward voltage | $I_F = 30\text{ A}$ | $T_{VJ} = 25^{\circ}\text{C}$ | | 2.7 | V | |
| I_R | reverse current | $V_R = V_{RRM}$ | $T_{VJ} = 25^{\circ}\text{C}$ | | 0.5 | mA | |
| | | | $T_{VJ} = 125^{\circ}\text{C}$ | | 1 | mA | |
| I_{RM} | reverse recovery current | $I_F = 50\text{ A}; V_R = 100\text{ V}; di_F/dt = -100\text{ A}/\mu\text{s}$ | | | 8 | 12 | A |
| t_{rr} | reverse recovery time | $I_F = 1\text{ A}; V_R = 30\text{ V}; di_F/dt = -100\text{ A}/\mu\text{s}$ | | | 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 | |

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

Rectifier Diode

| Symbol | Conditions | Ratings | | | Unit |
|--------------|-------------------------------------|---|---|--------------|--------------------------------------|
| | | min. | typ. | max. | |
| V_{RRM} | max. repetitive reverse voltage | | | 1200 1600 | V V |
| I_R | reverse current | $V_R = V_{RRM}$ | $T_{VJ} = 25^\circ\text{C}$ $T_{VJ} = 150^\circ\text{C}$ | 0.3 5 | mA mA |
| V_F | forward voltage | $I_F = 150\text{ A}$ | $T_{VJ} = 25^\circ\text{C}$ | 1.46 | V |
| $I_{D(AV)M}$ | max. average DC output current | rectangular; $d = 1/3$; bridge | $T_C = 80^\circ\text{C}$ | 188 | A |
| V_{F0} | threshold voltage | | $T_{VJ} = 150^\circ\text{C}$ | 0.87 | V |
| r_F | slope resistance | for power loss calculation only | | 4 | m Ω |
| R_{thJC} | thermal resistance junction to case | per diode | $T_{VJ} = 25^\circ\text{C}$ | 0.6 | K/W |
| R_{thCH} | thermal resistance case to heatsink | | $T_{VJ} = 25^\circ\text{C}$ | 0.2 | K/W |
| P_{tot} | total power dissipation | | $T_{VJ} = 25^\circ\text{C}$ | 160 | W |
| I_{FSM} | max. forward surge current | $t = 10\text{ ms (50Hz)}$ $V_R = 0\text{ V}$ | $T_{VJ} = 45^\circ\text{C}$ $T_{VJ} = 150^\circ\text{C}$ | 1100 960 | A A |
| I^2t | value for fusing | $t = 10\text{ ms (50Hz)}$ $V_R = 0\text{ V}$ | $T_{VJ} = 45^\circ\text{C}$ $T_{VJ} = 150^\circ\text{C}$ | 6050 4610 | A ² s A ² s |

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 | k Ω |
| $B_{25/85}$ | | | | | 3375 | | K |

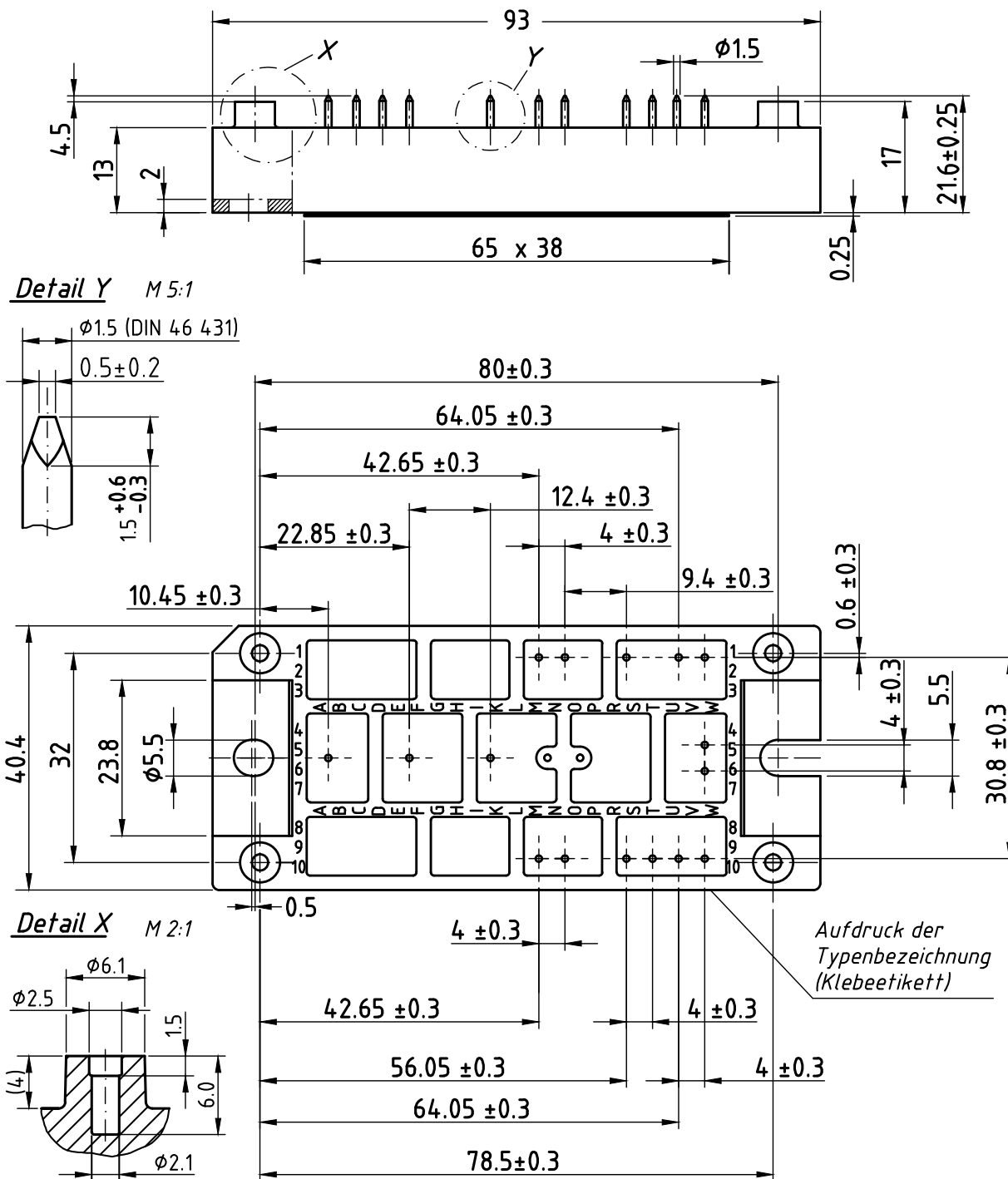
Module

| Symbol | Definitions | Conditions | Ratings | | | Unit |
|---------------|-----------------------------------|---|---------|------|--------------|------------------|
| | | | min. | typ. | max. | |
| T_{VJ} | operating temperature | | -40 | | 150 | $^\circ\text{C}$ |
| T_{VJM} | max. virtual junction temperature | | | | 150 | $^\circ\text{C}$ |
| T_{stg} | storage temperature | | -40 | | 125 | $^\circ\text{C}$ |
| V_{ISOL} | isolation voltage | $I_{ISOL} \leq 1\text{ mA}; 50/60\text{ Hz};$ | | | 3000 3600 | V~ 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 |

 $T_C = 25^\circ\text{C}$ 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 120-12NO2 | VUB120-12NO2 | Box | 6 | 495956 |
| Standard | VUB 120-16NO2 | VUB120-16NO2 | Box | 6 | 495964 |
| +NTC | VUB 120-12NO2T | VUB120-12NO2 | Box | 6 | 499592 |
| +NTC | VUB 120-16NO2T | VUB120-16NO2 | Box | 6 | 499714 |