

Standard Rectifier Module

| | |
|-------------------------|----------|
| 1~ Rectifier | |
| V_{RRM} | = 1600 V |
| I_{DAV} | = 55 A |
| I_{FSM} | = 300 A |

1~ Rectifier Bridge

Part number

VBO54-16NO7



 E72873



Features / Advantages:

- Package with DCB ceramic
- Improved temperature and power cycling
- Planar passivated chips
- Very low forward voltage drop
- Very low leakage current

Applications:

- Diode for main rectification
- For one phase bridge configurations
- Supplies for DC power equipment
- Input rectifiers for PWM inverter
- Battery DC power supplies
- Field supply for DC motors

Package: ECO-PAC1

- Isolation Voltage: 3000 V~
- Industry standard outline
- RoHS compliant
- Soldering pins for PCB mounting
- Height: 9 mm
- Base plate: DCB ceramic
- Reduced weight
- Advanced power cycling

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| Rectifier | | | | Ratings | | | |
|------------|--|---------------------------|---------|------------------------------|------|-----------------------------------|------------------|
| Symbol | Definition | Conditions | | min. | typ. | max. | Unit |
| V_{RSM} | max. non-repetitive reverse blocking voltage | | | | | 1700 | V |
| V_{RRM} | max. repetitive reverse blocking voltage | | | | | 1600 | V |
| I_R | reverse current | $V_R = 1600$ V | | $T_{VJ} = 25^\circ\text{C}$ | | 40 | μA |
| | | $V_R = 1600$ V | | $T_{VJ} = 150^\circ\text{C}$ | | 1.5 | mA |
| V_F | forward voltage drop | $I_F = 20$ A | | $T_{VJ} = 25^\circ\text{C}$ | | 1.15 | V |
| | | $I_F = 40$ A | | | | 1.34 | V |
| | | $I_F = 20$ A | | $T_{VJ} = 125^\circ\text{C}$ | | 1.12 | V |
| | | $I_F = 40$ A | | | | 1.32 | V |
| I_{DAV} | bridge output current | $T_C = 105^\circ\text{C}$ | | $T_{VJ} = 150^\circ\text{C}$ | | 55 | A |
| | | rectangular | d = 0.5 | | | | |
| V_{FO} | threshold voltage | | | $T_{VJ} = 150^\circ\text{C}$ | | 0.82 | V |
| r_F | slope resistance | | | | | 12.2 | m Ω |
| | | | | | | } for power loss calculation only | |
| R_{thJC} | thermal resistance junction to case | | | | | 1.1 | K/W |
| R_{thCH} | thermal resistance case to heatsink | | | | 0.4 | | K/W |
| P_{tot} | total power dissipation | | | $T_C = 25^\circ\text{C}$ | | 110 | W |
| I_{FSM} | max. forward surge current | t = 10 ms; (50 Hz), sine | | $T_{VJ} = 45^\circ\text{C}$ | | 300 | A |
| | | t = 8,3 ms; (60 Hz), sine | | $V_R = 0$ V | | 325 | A |
| | | t = 10 ms; (50 Hz), sine | | $T_{VJ} = 150^\circ\text{C}$ | | 255 | A |
| | | t = 8,3 ms; (60 Hz), sine | | $V_R = 0$ V | | 275 | A |
| I^2t | value for fusing | t = 10 ms; (50 Hz), sine | | $T_{VJ} = 45^\circ\text{C}$ | | 450 | A ² s |
| | | t = 8,3 ms; (60 Hz), sine | | $V_R = 0$ V | | 440 | A ² s |
| | | t = 10 ms; (50 Hz), sine | | $T_{VJ} = 150^\circ\text{C}$ | | 325 | A ² s |
| | | t = 8,3 ms; (60 Hz), sine | | $V_R = 0$ V | | 315 | A ² s |
| C_J | junction capacitance | $V_R = 400$ V; f = 1 MHz | | $T_{VJ} = 25^\circ\text{C}$ | | 10 | pF |



| Package ECO-PAC1 | | Ratings | | | | |
|------------------|--|----------------------|------|------|------|------|
| Symbol | Definition | Conditions | min. | typ. | max. | Unit |
| I_{RMS} | RMS current | per terminal | | | 100 | A |
| T_{VJ} | virtual junction temperature | | -40 | | 150 | °C |
| T_{op} | operation temperature | | -40 | | 125 | °C |
| T_{stg} | storage temperature | | -40 | | 125 | °C |
| Weight | | | | 19 | | g |
| M_D | mounting torque | | 1.4 | | 2 | Nm |
| $d_{Spp/App}$ | creepage distance on surface / striking distance through air | terminal to terminal | 6.0 | | | mm |
| $d_{Spb/Apb}$ | | terminal to backside | 10.0 | | | mm |
| V_{ISOL} | isolation voltage | t = 1 second | 3000 | | | V |
| | | t = 1 minute | 2500 | | | V |



| Ordering | Ordering Number | Marking on Product | Delivery Mode | Quantity | Code No. |
|-------------|-----------------|--------------------|---------------|----------|----------|
| Standard | VBO54-16NO7 | VBO54-16NO7 | Box | 25 | 479551 |
| Alternative | VBO54-16NO7 | VBO54-16NO7 | Tube | 13 | 521602 |

Equivalent Circuits for Simulation

* on die level

$T_{VJ} = 150^{\circ}C$

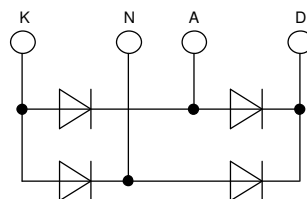
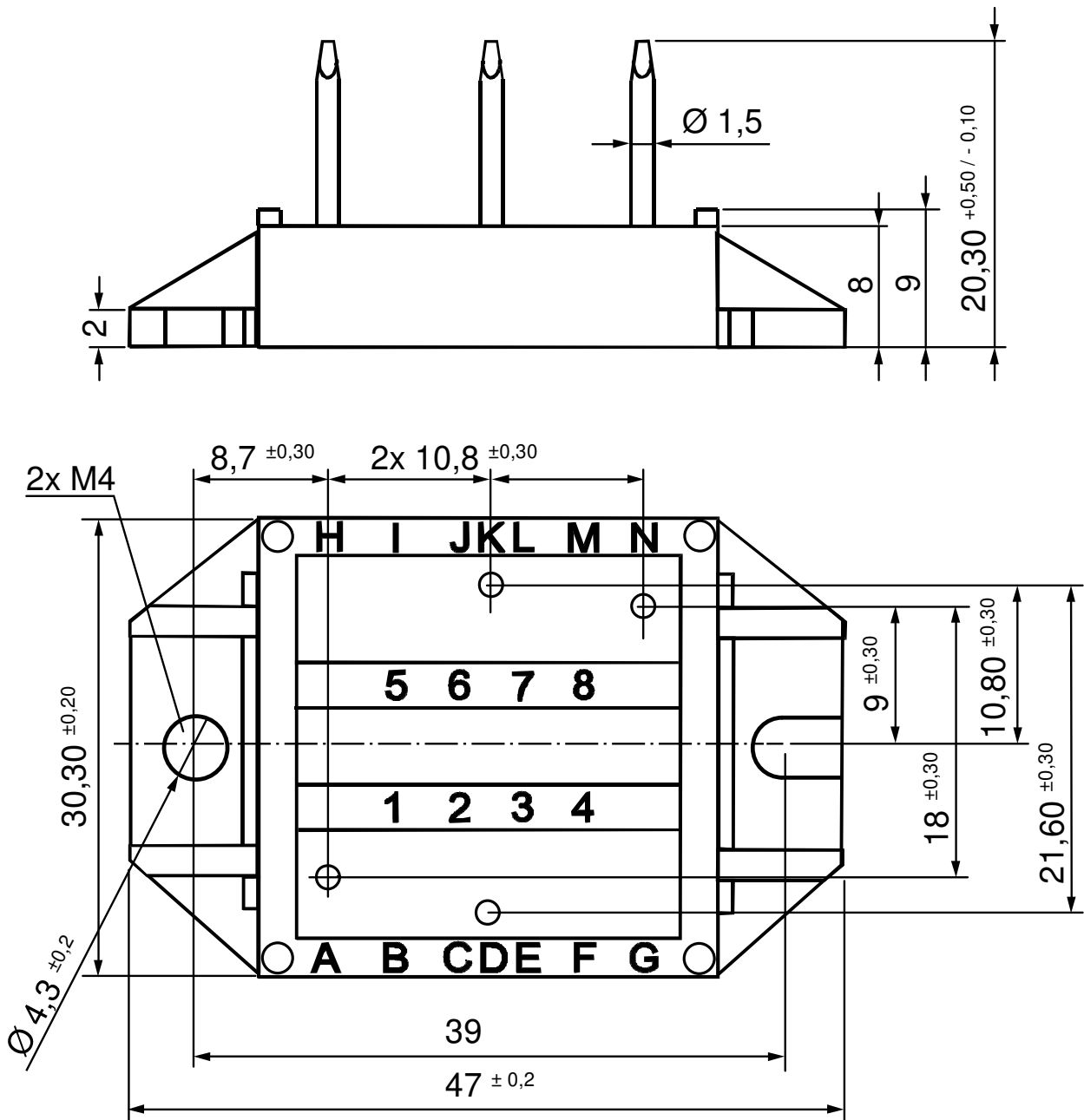


Rectifier

| | | | |
|--------------|--------------------|------|----|
| $V_{0\ max}$ | threshold voltage | 0.82 | V |
| $R_{0\ max}$ | slope resistance * | 11 | mΩ |



Outlines ECO-PAC1





Rectifier



Fig. 1 Forward current versus voltage drop per diode



Fig. 2 Surge overload current



Fig. 3 I^2t versus time per diode



Fig. 4 Power dissipation vs. direct output current & ambient temperature



Fig. 5 Max. forward current vs. case temperature



Fig. 6 Transient thermal impedance junction to case

Constants for Z_{thJC} calculation:

| i | R_{th} (K/W) | t_i (s) |
|---|----------------|-----------|
| 1 | 0.05070 | 0.004 |
| 2 | 0.163 | 0.0025 |
| 3 | 0.2805 | 0.0035 |
| 4 | 0.363 | 0.02 |
| 5 | 0.2228 | 0.15 |