

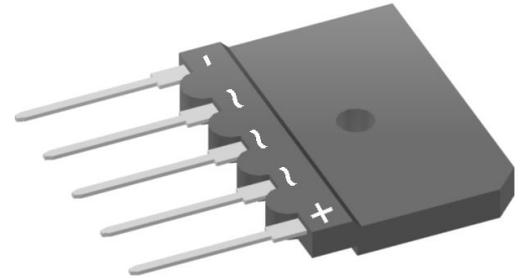
# Standard Rectifier

|                         |          |
|-------------------------|----------|
| <b>3~<br/>Rectifier</b> |          |
| $V_{RRM}$               | = 1200 V |
| $I_{DAV}$               | = 40 A   |
| $I_{FSM}$               | = 370 A  |

## 3~ Rectifier Bridge

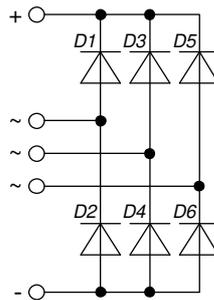
Part number

**GUO40-12NO1**



Backside: isolated

 E72873



### Features / Advantages:

- Low forward voltage drop
- Planar passivated chips
- Easy to mount with one screw
- Space and weight savings

### Applications:

- Supplies for DC power equipment
- Input rectifiers for PWM inverter
- Battery DC power supplies
- Field supply for DC motors

### Package: GUPP

- Isolation Voltage: 2500 V~
- Industry standard outline
- RoHS compliant
- Epoxy meets UL 94V-0
- Soldering pins for PCB mounting
- Base plate: Plastic overmolded tab
- Reduced weight

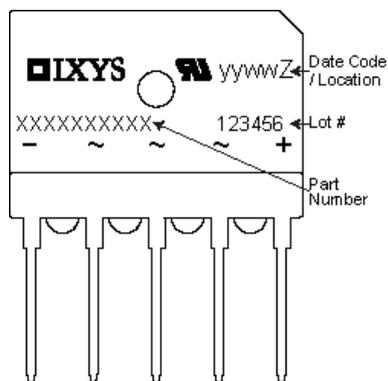
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| Rectifier  |  |   |   | Ratings                     |      |      |                  |
|------------|--|---|---|-----------------------------|------|------|------------------|
| Symbol     | Definition                                   | Conditions                              |   | min.                        | typ. | max. | Unit             |
| $V_{RSM}$  | max. non-repetitive reverse blocking voltage |   |   |                             |      | 1300 | V                |
| $V_{RRM}$  | max. repetitive reverse blocking voltage     |   |   |                             |      | 1200 | V                |
| $I_R$      | reverse current                              | $V_R = 1200$ V                          | $T_{VJ} = 25^\circ\text{C}$                       |                             |      | 40   | $\mu\text{A}$    |
|            |  | $V_R = 1200$ V                          | $T_{VJ} = 150^\circ\text{C}$                      |                             |      | 1.5  | mA               |
| $V_F$      | forward voltage drop                         | $I_F = 10$ A                            | $T_{VJ} = 25^\circ\text{C}$                       |                             |      | 1.06 | V                |
|            |  | $I_F = 30$ A                            |   |                             |      | 1.28 | V                |
|            |  | $I_F = 10$ A                            | $T_{VJ} = 150^\circ\text{C}$                      |                             |      | 0.92 | V                |
|            |  | $I_F = 30$ A                            |   |                             |      | 1.23 | V                |
| $I_{DAV}$  | bridge output current                        | $T_C = 90^\circ\text{C}$<br>rectangular | $T_{VJ} = 175^\circ\text{C}$<br>$d = \frac{1}{3}$ |                             |      | 40   | A                |
| $V_{FO}$   | threshold voltage                            | } for power loss calculation only       |   |                             |      | 0.74 | V                |
| $r_F$      | slope resistance                             |   |   |                             |      | 16.3 | m $\Omega$       |
| $R_{thJC}$ | thermal resistance junction to case          |   |   |                             |      | 4.3  | K/W              |
| $R_{thCH}$ | thermal resistance case to heatsink          |   |   |                             | 0.5  |      | K/W              |
| $P_{tot}$  | total power dissipation                      |   |   | $T_C = 25^\circ\text{C}$    |      | 35   | W                |
| $I_{FSM}$  | max. forward surge current                   | $t = 10$ ms; (50 Hz), sine              | $T_{VJ} = 45^\circ\text{C}$                       |                             |      | 370  | A                |
|            |  | $t = 8,3$ ms; (60 Hz), sine             | $V_R = 0$ V                                       |                             |      | 400  | A                |
|            |  | $t = 10$ ms; (50 Hz), sine              | $T_{VJ} = 150^\circ\text{C}$                      |                             |      | 315  | A                |
|            |  | $t = 8,3$ ms; (60 Hz), sine             | $V_R = 0$ V                                       |                             |      | 340  | A                |
| $I^2t$     | value for fusing                             | $t = 10$ ms; (50 Hz), sine              | $T_{VJ} = 45^\circ\text{C}$                       |                             |      | 685  | A <sup>2</sup> s |
|            |  | $t = 8,3$ ms; (60 Hz), sine             | $V_R = 0$ V                                       |                             |      | 665  | A <sup>2</sup> s |
|            |  | $t = 10$ ms; (50 Hz), sine              | $T_{VJ} = 150^\circ\text{C}$                      |                             |      | 495  | A <sup>2</sup> s |
|            |  | $t = 8,3$ ms; (60 Hz), sine             | $V_R = 0$ V                                       |                             |      | 480  | A <sup>2</sup> s |
| $C_J$      | junction capacitance                         | $V_R = 400$ V; $f = 1$ MHz              |   | $T_{VJ} = 25^\circ\text{C}$ |      | 10   | pF               |



| Package GUPF  |  | Ratings              |                                     |      |      |      |
|---------------|--|----------------------|-------------------------------------|------|------|------|
| Symbol        | Definition   | Conditions           | min.                                | typ. | max. | Unit |
| $I_{RMS}$     | RMS current  | per terminal         |                                     |      | 70   | A    |
| $T_{VJ}$      | virtual junction temperature                                 |                      | -40                                 |      | 175  | °C   |
| $T_{op}$      | operation temperature  |                      | -40                                 |      | 150  | °C   |
| $T_{stg}$     | storage temperature  |                      | -40                                 |      | 150  | °C   |
| <b>Weight</b> |  |                      |                                     | 8.5  |      | g    |
| $M_D$         | mounting torque  |                      | 0.8                                 |      | 1.2  | Nm   |
| $F_C$         | mounting force with clip                                     |                      | 20                                  |      | 120  | N    |
| $d_{Spp/App}$ | creepage distance on surface   striking distance through air | terminal to terminal | 6.7                                 | 5.4  |      | mm   |
| $d_{Spb/Apb}$ |  | terminal to backside | 10.0                                | 8.0  |      | mm   |
| $V_{ISOL}$    | isolation voltage  | t = 1 second         |                                     | 2500 |      | V    |
|               |  | t = 1 minute         | 50/60 Hz, RMS; $I_{ISOL} \leq 1$ mA | 2100 |      | V    |
| $R_{thJA}$    | thermal resistance junction to ambient                       |                      |                                     | 50   |      | K/W  |



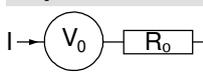
| Ordering | Ordering Number | Marking on Product | Delivery Mode | Quantity | Code No. |
|----------|-----------------|--------------------|---------------|----------|----------|
| Standard | GUO40-12NO1     | GUO40-12NO1        | Tube          | 14       | 514892   |

| Similar Part | Package | Voltage class |
|--------------|---------|---------------|
| DNA40U2200GU | GUPF    | 2200          |
| DMA40U1800GU | GUPF    | 1800          |
| GUO40-16NO1  | GUPF    | 1600          |
| GUO40-08NO1  | GUPF    | 800           |

**Equivalent Circuits for Simulation**

\* on die level

$T_{VJ} = 175^{\circ}\text{C}$

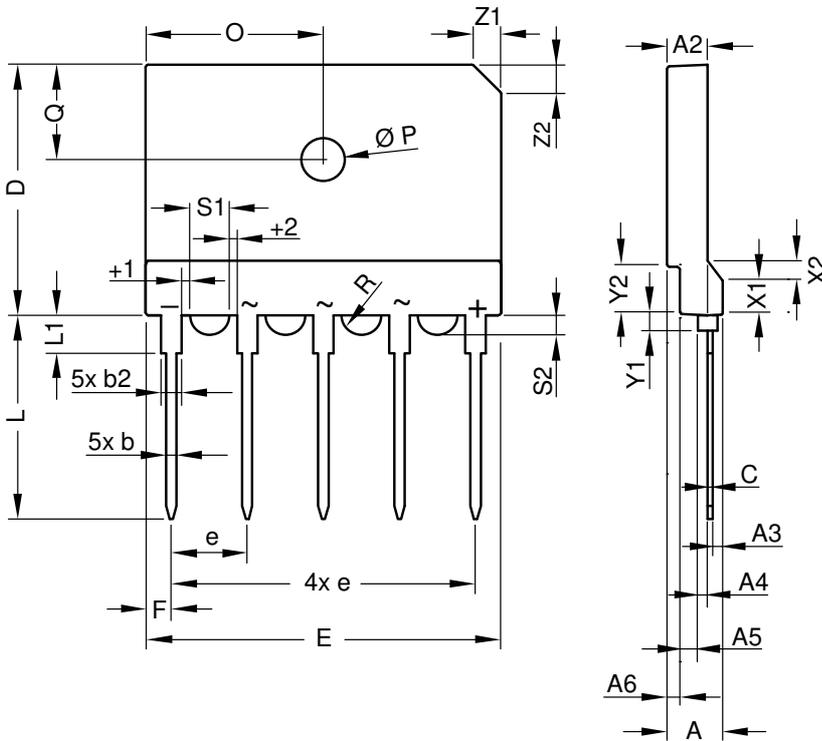


Rectifier

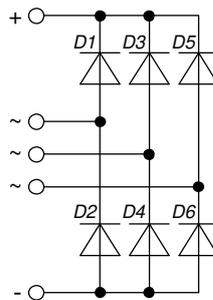
|              |                    |      |    |
|--------------|--------------------|------|----|
| $V_{0\ max}$ | threshold voltage  | 0.74 | V  |
| $R_{0\ max}$ | slope resistance * | 13.7 | mΩ |



**Outlines GUPF**



| Dim.              | Millimeter |       |       | Inches    |       |       |
|-------------------|------------|-------|-------|-----------|-------|-------|
|                   | min        | typ.  | max   | min       | typ.  | max   |
| A                 | 5.40       | 5.50  | 5.60  | 0.213     | 0.217 | 0.221 |
| A2                | 3.90       | 4.00  | 4.10  | 0.154     | 0.158 | 0.162 |
| A3                | 0.95       | 1.00  | 1.10  | 0.037     | 0.039 | 0.043 |
| A4                | 0.95       | 1.00  | 1.05  | 0.037     | 0.039 | 0.041 |
| A5                | 1.60       | 1.70  | 1.80  | 0.063     | 0.067 | 0.071 |
| A6                | 1.25       | 1.30  | 1.35  | 0.049     | 0.051 | 0.053 |
| b                 | 0.95       | 1.00  | 1.05  | 0.037     | 0.039 | 0.041 |
| b2                | 1.95       | 2.00  | 2.05  | 0.077     | 0.079 | 0.081 |
| C                 | 0.45       | 0.50  | 0.55  | 0.018     | 0.020 | 0.022 |
| D                 | 24.80      | 25.00 | 25.20 | 0.977     | 0.985 | 0.993 |
| E                 | 34.70      | 35.00 | 35.30 | 1.367     | 1.379 | 1.391 |
| e                 | BSC 7.50   |       |       | BSC 0.296 |       |       |
| F                 | 2.40       | 2.50  | 2.60  | 0.095     | 0.099 | 0.102 |
| L                 | 20.30      | 20.40 | 20.50 | 0.800     | 0.804 | 0.808 |
| L1                | 3.70       | 3.75  | 3.80  | 0.146     | 0.148 | 0.150 |
| O                 | 17.40      | 17.50 | 17.60 | 0.686     | 0.690 | 0.693 |
| ØP                | 4.10       | 4.20  | 4.30  | 0.162     | 0.165 | 0.169 |
| Q                 | 9.20       | 9.30  | 9.40  | 0.362     | 0.366 | 0.370 |
| $\frac{\phi}{2}R$ |            | 1.77  |       |           | 0.070 |       |
| s1                | 3.45       | 3.50  | 3.55  | 0.136     | 0.138 | 0.140 |
| s2                | 1.45       | 1.50  | 1.55  | 0.057     | 0.059 | 0.061 |
| t1                | 0.95       | 1.00  | 1.05  | 0.037     | 0.039 | 0.041 |
| t2                | 0.95       | 1.00  | 1.05  | 0.037     | 0.039 | 0.041 |
| x1                | 3.20       | 3.30  | 3.40  | 0.126     | 0.130 | 0.134 |
| x2                | 1.90       | 2.00  | 2.10  | 0.075     | 0.079 | 0.083 |
| y1                | 1.60       | 1.65  | 1.70  | 0.063     | 0.065 | 0.067 |
| y2                | 4.65       | 4.70  | 4.75  | 0.183     | 0.185 | 0.187 |
| z1                | 2.80       | 2.90  | 3.00  | 0.110     | 0.114 | 0.118 |





**Rectifier**

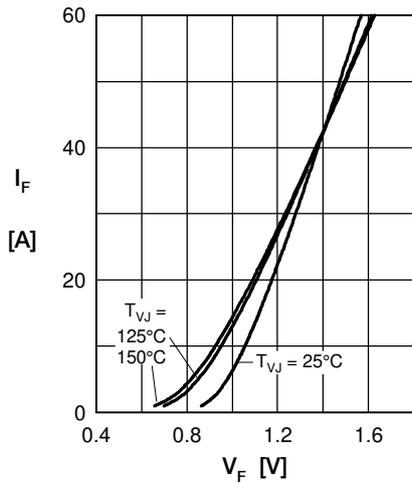


Fig. 1 Forward current vs. voltage drop per diode

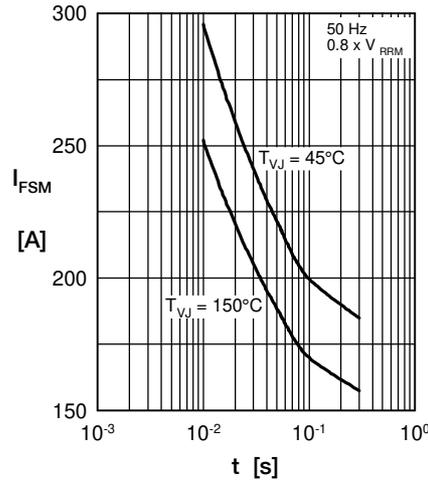


Fig. 2 Surge overload current vs. time per diode

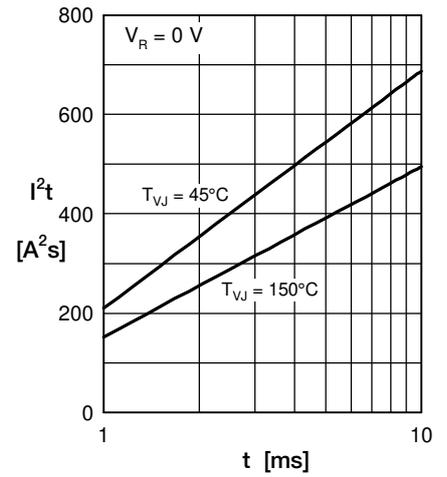


Fig. 3  $I^2t$  vs. time per diode

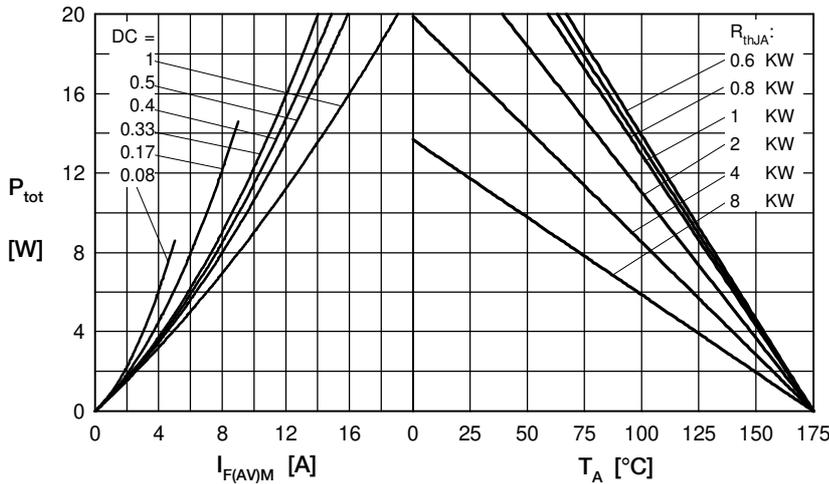


Fig. 4 Power dissipation vs. forward current and ambient temperature per diode

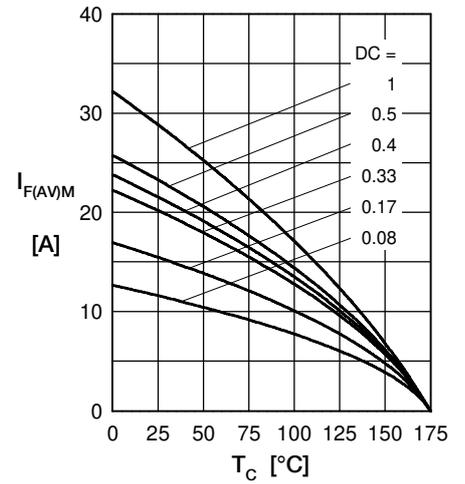


Fig. 5 Max. forward current vs. case temperature per diode

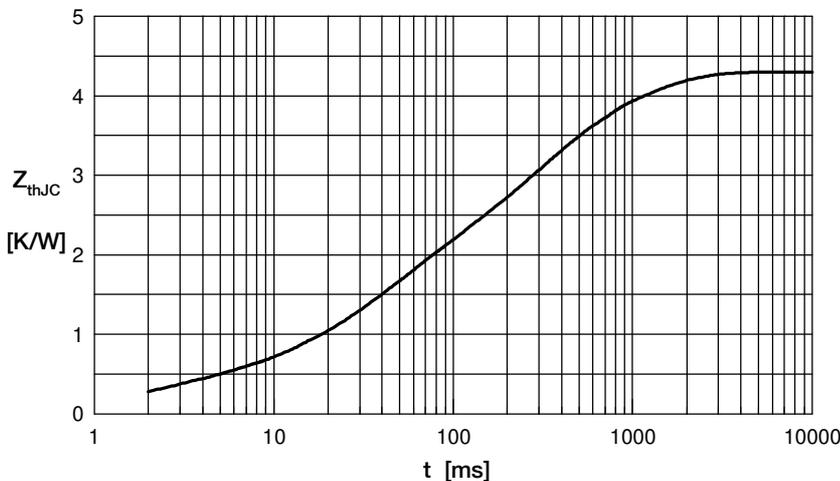


Fig. 6 Transient thermal impedance junction to case vs. time per diode

Constants for  $Z_{thJC}$  calculation:

| i | $R_{th}$ (K/W) | $t_i$ (s) |
|---|----------------|-----------|
| 1 | 0.302          | 0.002     |
| 2 | 1.252          | 0.032     |
| 3 | 1.582          | 0.227     |
| 4 | 1.164          | 0.820     |