

# Standard Rectifier

| 3~<br>Rectifier |          |
|-----------------|----------|
| $V_{RRM}$       | = 1200 V |
| $I_{DAV}$       | = 30 A   |
| $I_{FSM}$       | = 150 A  |

## 3~ Rectifier Bridge

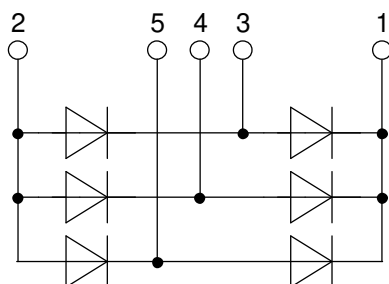
Part number

**FUO22-12N**



Backside: isolated

 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 single and three phase bridge configurations

### Package: i4-Pac

- Isolation Voltage: 3000 V~
- Industry convenient outline
- RoHS compliant
- Epoxy meets UL 94V-0
- Soldering pins for PCB mounting
- Backside: DCB ceramic
- Reduced weight
- Advanced power cycling

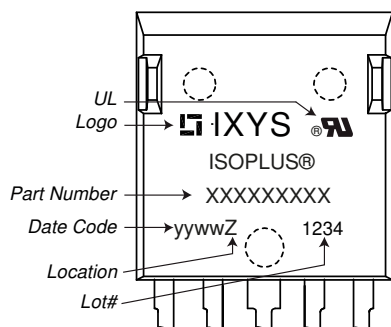
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| Rectifier  |                                              |                                                   |                                                     | Ratings                        |      |      |                  |
|------------|----------------------------------------------|---------------------------------------------------|-----------------------------------------------------|--------------------------------|------|------|------------------|
| Symbol     | Definition                                   | Conditions                                        |                                                     | min.                           | typ. | max. | Unit             |
| $V_{RSM}$  | max. non-repetitive reverse blocking voltage | $T_{VJ} = 25^{\circ}\text{C}$                     |                                                     |                                |      | 1300 | V                |
| $V_{RRM}$  | max. repetitive reverse blocking voltage     | $T_{VJ} = 25^{\circ}\text{C}$                     |                                                     |                                |      | 1200 | V                |
| $I_R$      | reverse current                              | $V_R = 1200\text{ V}$                             | $T_{VJ} = 25^{\circ}\text{C}$                       |                                |      | 10   | $\mu\text{A}$    |
|            |                                              | $V_R = 1200\text{ V}$                             | $T_{VJ} = 150^{\circ}\text{C}$                      |                                |      | 1    | mA               |
| $V_F$      | forward voltage drop                         | $I_F = 10\text{ A}$                               | $T_{VJ} = 25^{\circ}\text{C}$                       |                                |      | 1.20 | V                |
|            |                                              | $I_F = 30\text{ A}$                               |                                                     |                                |      | 1.62 | V                |
|            |                                              | $I_F = 10\text{ A}$                               | $T_{VJ} = 150^{\circ}\text{C}$                      |                                |      | 1.12 | V                |
|            |                                              | $I_F = 30\text{ A}$                               |                                                     |                                |      | 1.73 | V                |
| $I_{DAV}$  | bridge output current                        | $T_C = 120^{\circ}\text{C}$<br>rectangular        | $T_{VJ} = 175^{\circ}\text{C}$<br>$d = \frac{1}{3}$ |                                |      | 30   | A                |
| $V_{F0}$   | threshold voltage                            | } for power loss calculation only                 |                                                     | $T_{VJ} = 175^{\circ}\text{C}$ |      | 0.81 | V                |
| $r_F$      | slope resistance                             |                                                   |                                                     |                                |      | 31   | m $\Omega$       |
| $R_{thJC}$ | thermal resistance junction to case          |                                                   |                                                     |                                |      | 3    | K/W              |
| $R_{thCH}$ | thermal resistance case to heatsink          |                                                   |                                                     |                                | 0.2  |      | K/W              |
| $P_{tot}$  | total power dissipation                      | $T_C = 25^{\circ}\text{C}$                        |                                                     |                                |      | 50   | W                |
| $I_{FSM}$  | max. forward surge current                   | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$  | $T_{VJ} = 45^{\circ}\text{C}$                       |                                |      | 150  | A                |
|            |                                              | $t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$ | $V_R = 0\text{ V}$                                  |                                |      | 160  | A                |
|            |                                              | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$  | $T_{VJ} = 150^{\circ}\text{C}$                      |                                |      | 130  | A                |
|            |                                              | $t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$ | $V_R = 0\text{ V}$                                  |                                |      | 140  | A                |
| $I^2t$     | value for fusing                             | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$  | $T_{VJ} = 45^{\circ}\text{C}$                       |                                |      | 115  | A <sup>2</sup> s |
|            |                                              | $t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$ | $V_R = 0\text{ V}$                                  |                                |      | 105  | A <sup>2</sup> s |
|            |                                              | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$  | $T_{VJ} = 150^{\circ}\text{C}$                      |                                |      | 85   | A <sup>2</sup> s |
|            |                                              | $t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$ | $V_R = 0\text{ V}$                                  |                                |      | 82   | A <sup>2</sup> s |
| $C_J$      | junction capacitance                         | $V_R = 400\text{ V}; f = 1\text{ MHz}$            |                                                     |                                | 4    |      | pF               |

| Package i4-Pac |                                                              |                      | Ratings |      |      |      |
|----------------|--------------------------------------------------------------|----------------------|---------|------|------|------|
| Symbol         | Definition                                                   | Conditions           | min.    | typ. | max. | Unit |
| $I_{RMS}$      | RMS current                                                  | per terminal         |         |      | 35   | A    |
| $T_{VJ}$       | virtual junction temperature                                 |                      | -55     |      | 175  | °C   |
| $T_{op}$       | operation temperature                                        |                      | -55     |      | 150  | °C   |
| $T_{stg}$      | storage temperature                                          |                      | -55     |      | 150  | °C   |
| <b>Weight</b>  |                                                              |                      |         | 6    |      | g    |
| $F_c$          | mounting force with clip                                     |                      | 20      |      | 120  | N    |
| $d_{Spp/App}$  | creepage distance on surface / striking distance through air | terminal to terminal | 1.7     |      |      | mm   |
| $d_{Spb/Apb}$  |                                                              | terminal to backside | 5.1     |      |      | mm   |
| $V_{ISOL}$     | isolation voltage                                            | t = 1 second         | 3000    |      |      | V    |
|                |                                                              | t = 1 minute         | 2500    |      |      | V    |

## Product Marking



| Ordering | Ordering Number | Marking on Product | Delivery Mode | Quantity | Code No. |
|----------|-----------------|--------------------|---------------|----------|----------|
| Standard | FUO22-12N       | FUO22-12N          | Tube          | 25       | 492426   |

## Equivalent Circuits for Simulation

\* on die level

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



Rectifier

$V_{0\max}$  threshold voltage 0.81

V

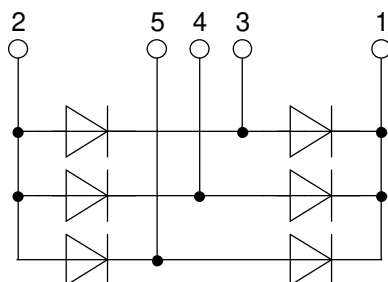
$R_{0\max}$  slope resistance \* 28

mΩ

**Outlines i4-Pac**


| Dim. | Millimeter |       | Inches    |       |
|------|------------|-------|-----------|-------|
|      | min        | max   | min       | max   |
| A    | 4.83       | 5.21  | 0.190     | 0.205 |
| A1   | 2.59       | 3.00  | 0.102     | 0.118 |
| A2   | 1.17       | 2.16  | 0.046     | 0.085 |
| b    | 1.14       | 1.40  | 0.045     | 0.055 |
| b2   | 1.47       | 1.73  | 0.058     | 0.068 |
| b4   | 2.54       | 2.79  | 0.100     | 0.110 |
| c    | 0.51       | 0.74  | 0.020     | 0.029 |
| D    | 20.80      | 21.34 | 0.819     | 0.840 |
| D1   | 14.99      | 15.75 | 0.590     | 0.620 |
| D2   | 1.65       | 2.03  | 0.065     | 0.080 |
| D3   | 20.30      | 20.70 | 0.799     | 0.815 |
| E    | 19.56      | 20.29 | 0.770     | 0.799 |
| E1   | 16.76      | 17.53 | 0.660     | 0.690 |
| e    | 3.81 BSC   |       | 0.150 BSC |       |
| L    | 19.81      | 21.34 | 0.780     | 0.840 |
| L1   | 2.11       | 2.59  | 0.083     | 0.102 |
| Q    | 5.33       | 6.20  | 0.210     | 0.244 |
| R    | 2.54       | 4.57  | 0.100     | 0.180 |
| W    | -          | 0.10  | -         | 0.004 |

Die konvexe Form des Substrates ist typ. < 0.05 mm über der Kunststoffoberfläche der Bauteilunterseite  
 The convexbow of substrate is typ. < 0.05 mm over plastic surface level of device bottom side



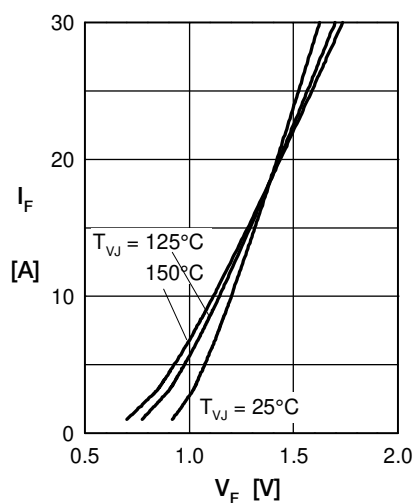
**Rectifier**


Fig. 1 Forward current versus voltage drop per diode

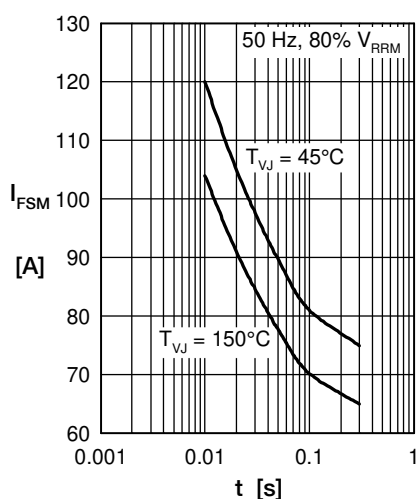


Fig. 2 Surge overload current

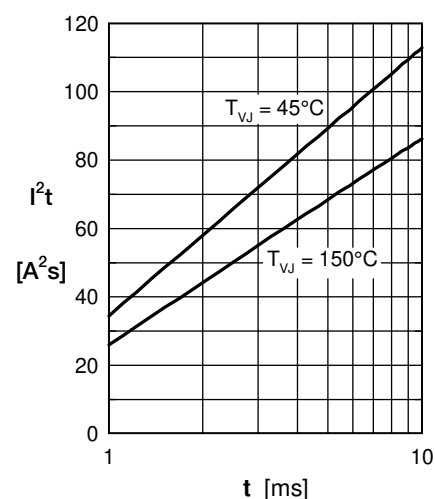
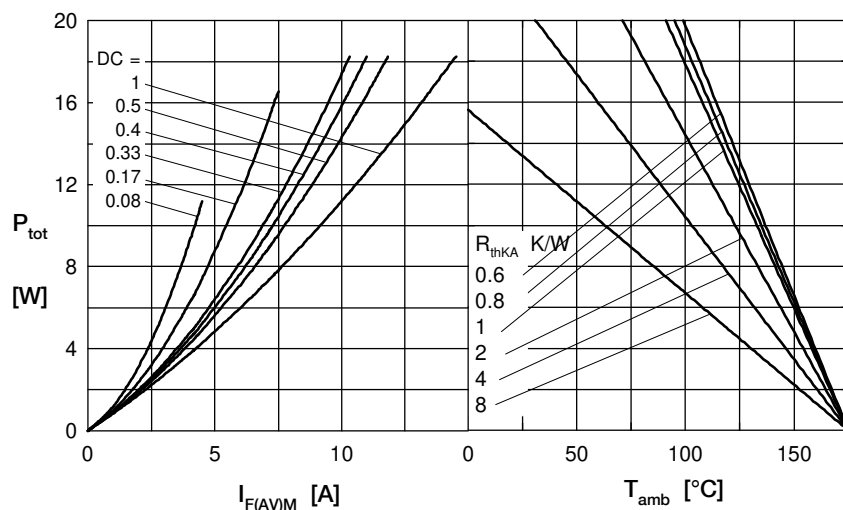

 Fig. 3  $I^2t$  versus time per diode


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

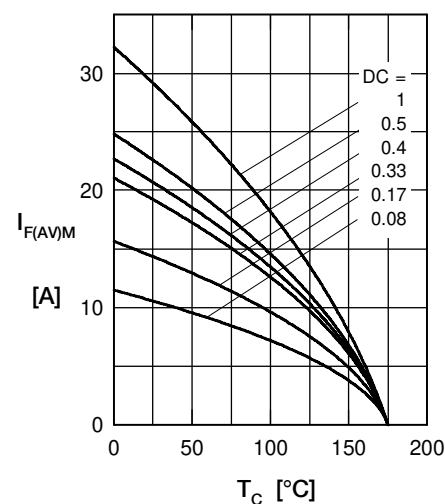


Fig. 5 Max. forward current vs. case temperature

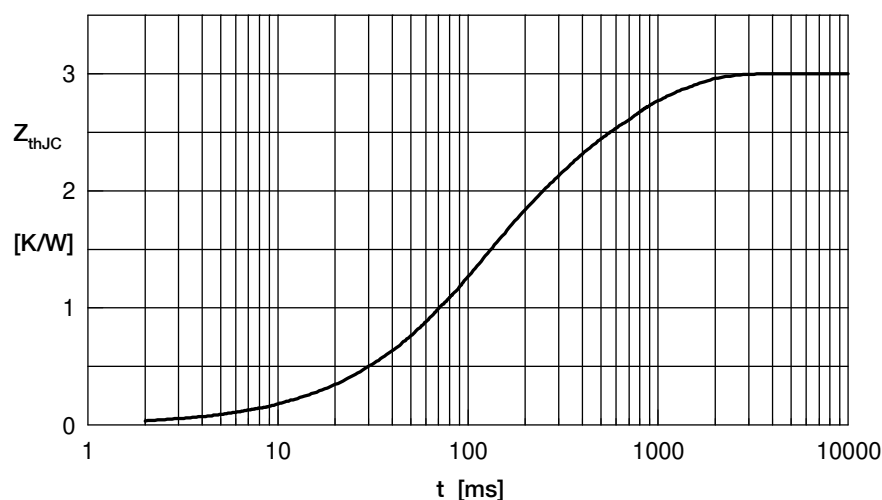


Fig. 6 Transient thermal impedance junction to case

 Constants for  $Z_{thJC}$  calculation:

| i | $R_{thi}$ (K/W) | $t_i$ (s) |
|---|-----------------|-----------|
| 1 | 1.359           | 0.1015    |
| 2 | 0.3286          | 0.1026    |
| 3 | 0.4651          | 0.4919    |
| 4 | 0.8473          | 0.62      |