

## Standard Rectifier

$$V_{RRM} = 2 \times 800V$$

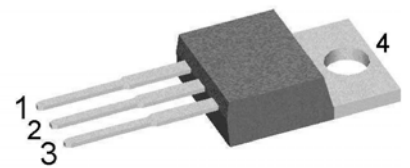
$$I_{FAV} = 8A$$

$$V_F = 1.08V$$

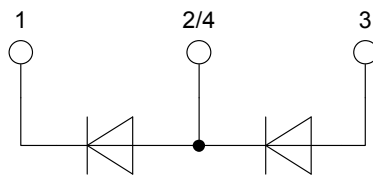
Phase leg

Part number

DSP8-08A



Backside: anode/cathode



### Features / Advantages:

- Planar passivated chips
- Very low leakage current
- Very low forward voltage drop
- Improved thermal behaviour

### Applications:

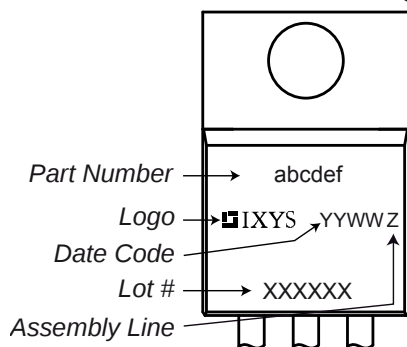
- Diode for main rectification
- For single and three phase bridge configurations

### Package: TO-220

- Industry standard outline
- RoHS compliant
- Epoxy meets UL 94V-0

| Rectifier  |                                              |                                                      |                                | Ratings                        |      |      |                  |
|------------|----------------------------------------------|------------------------------------------------------|--------------------------------|--------------------------------|------|------|------------------|
| Symbol     | Definition                                   | Conditions                                           |                                | min.                           | typ. | max. | Unit             |
| $V_{RSM}$  | max. non-repetitive reverse blocking voltage | $T_{VJ} = 25^{\circ}\text{C}$                        |                                |                                |      | 900  | V                |
| $V_{RRM}$  | max. repetitive reverse blocking voltage     | $T_{VJ} = 25^{\circ}\text{C}$                        |                                |                                |      | 800  | V                |
| $I_R$      | reverse current, drain current               | $V_R = 800\text{ V}$                                 | $T_{VJ} = 25^{\circ}\text{C}$  |                                |      | 10   | $\mu\text{A}$    |
|            |                                              | $V_R = 800\text{ V}$                                 | $T_{VJ} = 150^{\circ}\text{C}$ |                                |      | 0.2  | mA               |
| $V_F$      | forward voltage drop                         | $I_F = 8\text{ A}$                                   | $T_{VJ} = 25^{\circ}\text{C}$  |                                |      | 1.16 | V                |
|            |                                              | $I_F = 16\text{ A}$                                  |                                |                                |      | 1.35 | V                |
|            |                                              | $I_F = 8\text{ A}$                                   | $T_{VJ} = 150^{\circ}\text{C}$ |                                |      | 1.08 | V                |
|            |                                              | $I_F = 16\text{ A}$                                  |                                |                                |      | 1.34 | V                |
| $I_{FAV}$  | average forward current                      | $T_C = 160^{\circ}\text{C}$<br>rectangular $d = 0.5$ | $T_{VJ} = 175^{\circ}\text{C}$ |                                |      | 8    | A                |
| $V_{FO}$   | threshold voltage                            | } for power loss calculation only                    |                                | $T_{VJ} = 175^{\circ}\text{C}$ |      | 0.79 | V                |
| $r_F$      | slope resistance                             |                                                      |                                |                                |      | 33   | m $\Omega$       |
| $R_{thJC}$ | thermal resistance junction to case          |                                                      |                                |                                |      | 1.5  | K/W              |
| $R_{thCH}$ | thermal resistance case to heatsink          |                                                      |                                |                                | 0.50 |      | K/W              |
| $P_{tot}$  | total power dissipation                      | $T_C = 25^{\circ}\text{C}$                           |                                |                                |      | 100  | W                |
| $I_{FSM}$  | max. forward surge current                   | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$     | $T_{VJ} = 45^{\circ}\text{C}$  |                                |      | 120  | A                |
|            |                                              | $t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$    | $V_R = 0\text{ V}$             |                                |      | 130  | A                |
|            |                                              | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$     | $T_{VJ} = 150^{\circ}\text{C}$ |                                |      | 100  | A                |
|            |                                              | $t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$    | $V_R = 0\text{ V}$             |                                |      | 110  | A                |
| $I^2t$     | value for fusing                             | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$     | $T_{VJ} = 45^{\circ}\text{C}$  |                                |      | 72   | A <sup>2</sup> s |
|            |                                              | $t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$    | $V_R = 0\text{ V}$             |                                |      | 70   | A <sup>2</sup> s |
|            |                                              | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$     | $T_{VJ} = 150^{\circ}\text{C}$ |                                |      | 50   | A <sup>2</sup> s |
|            |                                              | $t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$    | $V_R = 0\text{ V}$             |                                |      | 50   | A <sup>2</sup> s |
| $C_J$      | junction capacitance                         | $V_R = 400\text{ V}$ $f = 1\text{ MHz}$              | $T_{VJ} = 25^{\circ}\text{C}$  |                                | 4    |      | pF               |

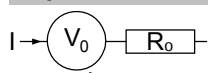
| Package TO-220 |                              |              | Ratings |      |      |      |
|----------------|------------------------------|--------------|---------|------|------|------|
| Symbol         | Definition                   | Conditions   | min.    | typ. | max. | Unit |
| $I_{RMS}$      | RMS current                  | per terminal |         |      | 25   | A    |
| $T_{stg}$      | storage temperature          |              | -55     |      | 150  | °C   |
| $T_{vj}$       | virtual junction temperature |              | -55     |      | 175  | °C   |
| Weight         |                              |              |         | 2    |      | g    |
| $M_D$          | mounting torque              |              | 0.4     |      | 0.6  | Nm   |
| $F_c$          | mounting force with clip     |              | 20      |      | 60   | N    |

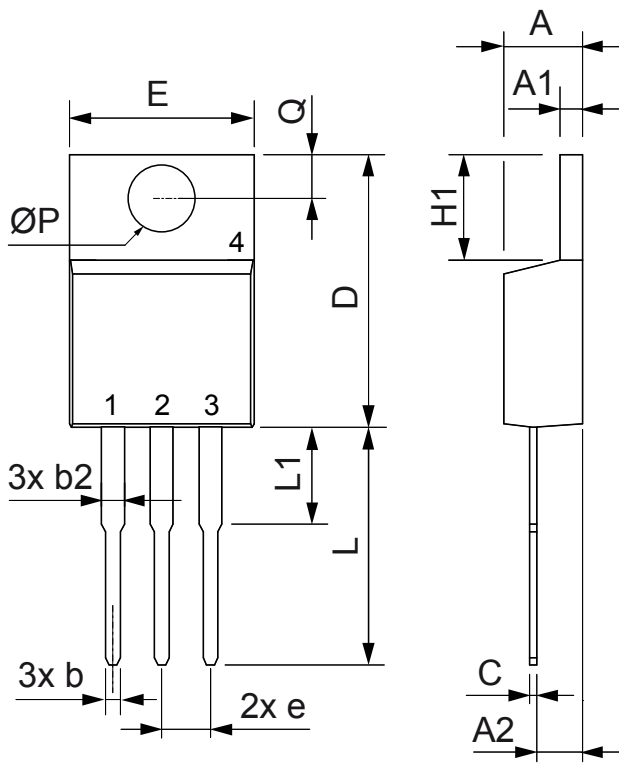
**Product Marking**


| Ordering | Part Number | Marking on Product | Delivery Mode | Quantity | Code No. |
|----------|-------------|--------------------|---------------|----------|----------|
| Standard | DSP8-08A    | DSP8-08A           | Tube          | 50       | 465054   |

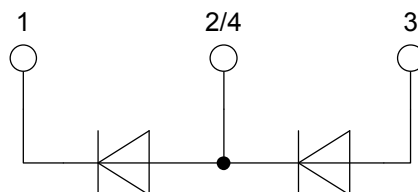
| Similar Part | Package              | Voltage class |
|--------------|----------------------|---------------|
| DSP8-08S     | TO-263AB (D2Pak) (2) | 800           |
| DSP8-08AS    | TO-263AA (D2Pak) (3) | 800           |
| DSP8-12A     | TO-220AB (3)         | 1200          |
| DSP8-12AC    | ISOPLUS220AB (3)     | 1200          |
| DSP8-12S     | TO-263AB (D2Pak) (2) | 1200          |
| DSP8-12AS    | TO-263AA (D2Pak) (3) | 1200          |

**Equivalent Circuits for Simulation**
*\* on die level*
 $T_{vj} = 175^{\circ}\text{C}$ 

|                                                                                     |                    |                  |    |
|-------------------------------------------------------------------------------------|--------------------|------------------|----|
|  |                    | <b>Rectifier</b> |    |
| $V_{0\max}$                                                                         | threshold voltage  | 0.79             | V  |
| $R_{0\max}$                                                                         | slope resistance * | 30               | mΩ |

**Outlines TO-220**


| Dim.            | Millimeter |       | Inches |       |
|-----------------|------------|-------|--------|-------|
|                 | Min.       | Max.  | Min.   | Max.  |
| A               | 4.32       | 4.82  | 0.170  | 0.190 |
| A1              | 1.14       | 1.39  | 0.045  | 0.055 |
| A2              | 2.29       | 2.79  | 0.090  | 0.110 |
| b               | 0.64       | 1.01  | 0.025  | 0.040 |
| b2              | 1.15       | 1.65  | 0.045  | 0.065 |
| C               | 0.35       | 0.56  | 0.014  | 0.022 |
| D               | 14.73      | 16.00 | 0.580  | 0.630 |
| E               | 9.91       | 10.66 | 0.390  | 0.420 |
| e               | 2.54       | BSC   | 0.100  | BSC   |
| H1              | 5.85       | 6.85  | 0.230  | 0.270 |
| L               | 12.70      | 13.97 | 0.500  | 0.550 |
| L1              | 2.79       | 5.84  | 0.110  | 0.230 |
| $\varnothing P$ | 3.54       | 4.08  | 0.139  | 0.161 |
| Q               | 2.54       | 3.18  | 0.100  | 0.125 |



## Rectifier

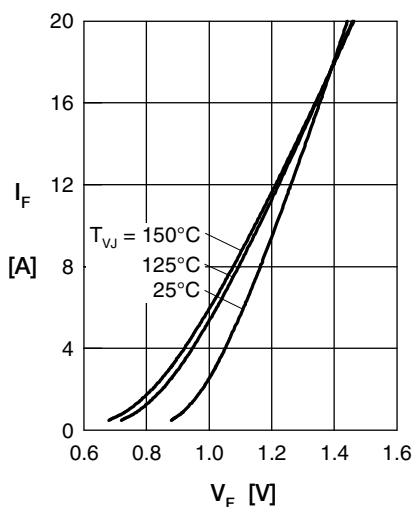


Fig. 1 Forward current versus voltage drop per diode

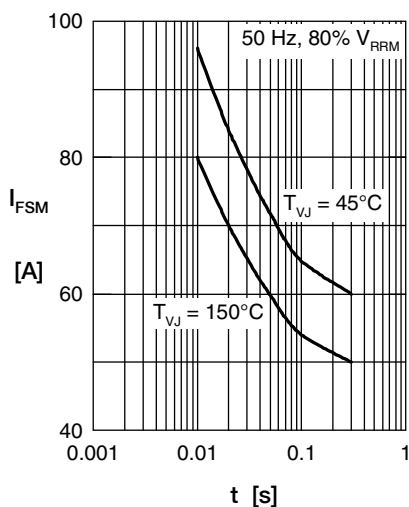


Fig. 2 Surge overload current

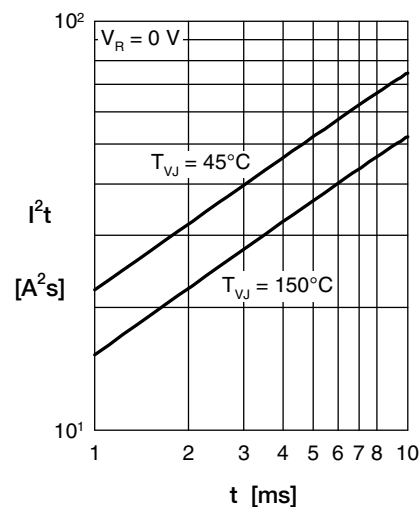


Fig. 3  $I^2t$  versus time per diode

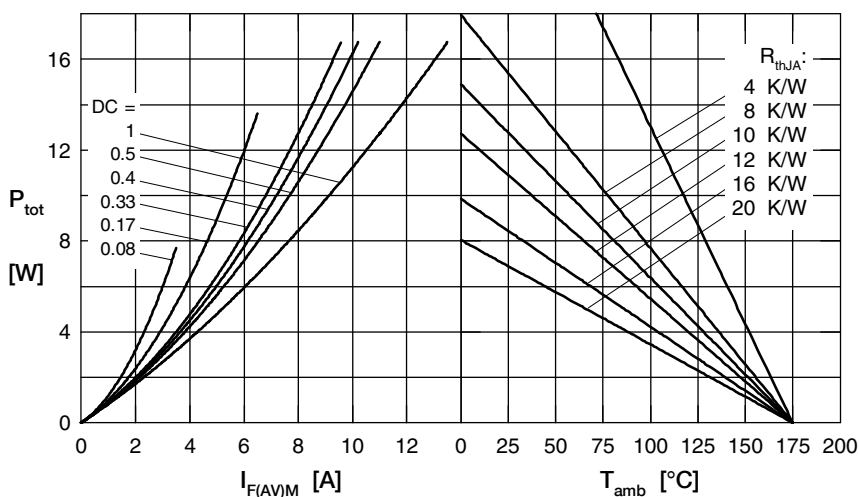


Fig. 4 Power dissipation vs. direct output current and ambient temperature

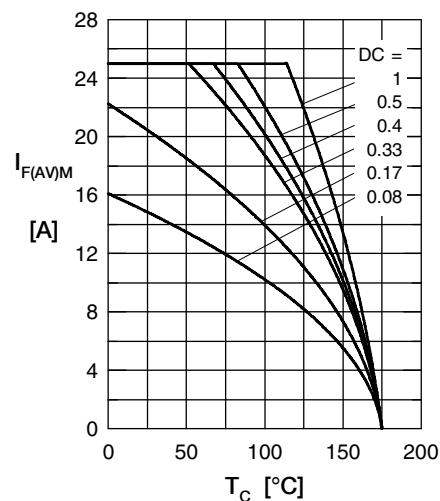


Fig. 5 Max. forward current vs. case temperature

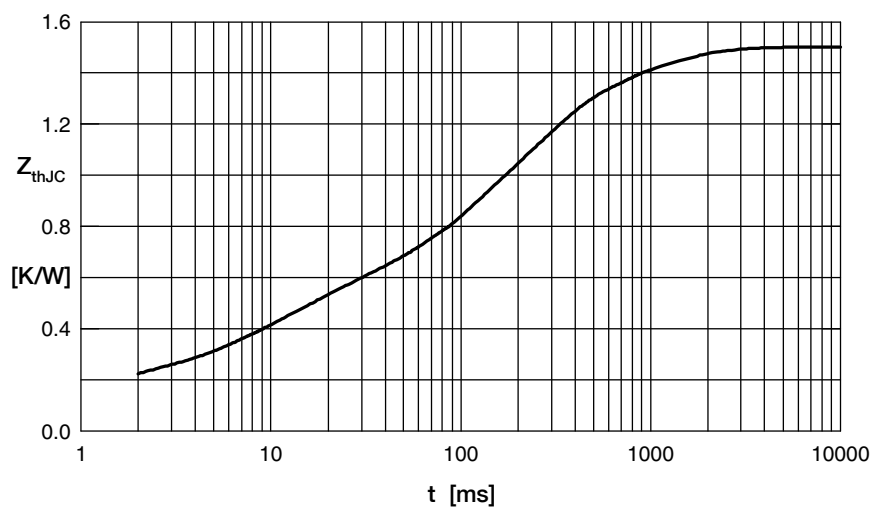


Fig. 6 Transient thermal impedance junction to case

Constants for  $Z_{thJC}$  calculation:

| i | $R_{thi}$ (K/W) | $t_i$ (s) |
|---|-----------------|-----------|
| 1 | 0.155           | 0.0005    |
| 2 | 0.332           | 0.0095    |
| 3 | 0.713           | 0.17      |
| 4 | 0.3             | 0.8       |
| 5 | 0.00001         | 0.00001   |