

# Standard Rectifier

$$V_{RRM} = 1600 \text{ V}$$

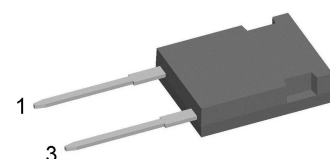
$$I_{FAV} = 45 \text{ A}$$

$$V_F = 1.23 \text{ V}$$

## Single Diode

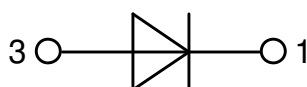
Part number

**DSI45-16AR**



Backside: isolated

 E72873



### 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: ISOPLUS247

- Isolation Voltage: 3600 V~
- Industry standard outline
- RoHS compliant
- Epoxy meets UL 94V-0
- Soldering pins for PCB mounting
- Backside: DCB ceramic
- Reduced weight
- Advanced power cycling

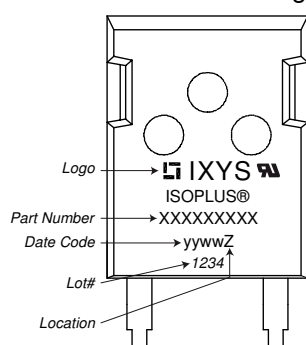
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| Rectifier  |                                              |                                                   |                                | Ratings |      |      |                   |
|------------|----------------------------------------------|---------------------------------------------------|--------------------------------|---------|------|------|-------------------|
| Symbol     | Definition                                   | Conditions                                        |                                | min.    | typ. | max. | Unit              |
| $V_{RSM}$  | max. non-repetitive reverse blocking voltage | $T_{VJ} = 25^{\circ}\text{C}$                     |                                |         |      | 1700 | V                 |
| $V_{RRM}$  | max. repetitive reverse blocking voltage     | $T_{VJ} = 25^{\circ}\text{C}$                     |                                |         |      | 1600 | V                 |
| $I_R$      | reverse current                              | $V_R = 1600\text{ V}$                             | $T_{VJ} = 25^{\circ}\text{C}$  |         |      | 40   | $\mu\text{A}$     |
|            |                                              | $V_R = 1600\text{ V}$                             | $T_{VJ} = 150^{\circ}\text{C}$ |         |      | 1.5  | mA                |
| $V_F$      | forward voltage drop                         | $I_F = 45\text{ A}$                               | $T_{VJ} = 25^{\circ}\text{C}$  |         |      | 1.26 | V                 |
|            |                                              | $I_F = 90\text{ A}$                               |                                |         |      | 1.57 | V                 |
|            |                                              | $I_F = 45\text{ A}$                               | $T_{VJ} = 150^{\circ}\text{C}$ |         |      | 1.23 | V                 |
|            |                                              | $I_F = 90\text{ A}$                               |                                |         |      | 1.66 | V                 |
| $I_{FAV}$  | average forward current                      | $T_C = 100^{\circ}\text{C}$<br>sine $180^{\circ}$ | $T_{VJ} = 175^{\circ}\text{C}$ |         |      | 45   | A                 |
| $V_{F0}$   | threshold voltage                            | } for power loss calculation only                 | $T_{VJ} = 175^{\circ}\text{C}$ |         |      | 0.81 | V                 |
| $r_F$      | slope resistance                             |                                                   |                                |         |      | 9.1  | m $\Omega$        |
| $R_{thJC}$ | thermal resistance junction to case          |                                                   |                                |         |      | 0.9  | K/W               |
| $R_{thCH}$ | thermal resistance case to heatsink          |                                                   |                                |         | 0.3  |      | K/W               |
| $P_{tot}$  | total power dissipation                      |                                                   | $T_C = 25^{\circ}\text{C}$     |         |      | 165  | W                 |
| $I_{FSM}$  | max. forward surge current                   | $t = 10\text{ ms; (50 Hz), sine}$                 | $T_{VJ} = 45^{\circ}\text{C}$  |         |      | 480  | A                 |
|            |                                              | $t = 8,3\text{ ms; (60 Hz), sine}$                | $V_R = 0\text{ V}$             |         |      | 520  | A                 |
|            |                                              | $t = 10\text{ ms; (50 Hz), sine}$                 | $T_{VJ} = 150^{\circ}\text{C}$ |         |      | 410  | A                 |
|            |                                              | $t = 8,3\text{ ms; (60 Hz), sine}$                | $V_R = 0\text{ V}$             |         |      | 440  | A                 |
| $I^2t$     | value for fusing                             | $t = 10\text{ ms; (50 Hz), sine}$                 | $T_{VJ} = 45^{\circ}\text{C}$  |         |      | 1.15 | kA <sup>2</sup> s |
|            |                                              | $t = 8,3\text{ ms; (60 Hz), sine}$                | $V_R = 0\text{ V}$             |         |      | 1.13 | kA <sup>2</sup> s |
|            |                                              | $t = 10\text{ ms; (50 Hz), sine}$                 | $T_{VJ} = 150^{\circ}\text{C}$ |         |      | 840  | A <sup>2</sup> s  |
|            |                                              | $t = 8,3\text{ ms; (60 Hz), sine}$                | $V_R = 0\text{ V}$             |         |      | 805  | A <sup>2</sup> s  |
| $C_J$      | junction capacitance                         | $V_R = 400\text{ V; } f = 1\text{ MHz}$           | $T_{VJ} = 25^{\circ}\text{C}$  |         | 18   |      | pF                |

| Package ISOPLUS247   |                                                              |                      |                                         | Ratings |      |      |      |
|----------------------|--------------------------------------------------------------|----------------------|-----------------------------------------|---------|------|------|------|
| Symbol               | Definition                                                   | Conditions           |                                         | min.    | typ. | max. | Unit |
| I <sub>RMS</sub>     | RMS current                                                  | per terminal         |                                         |         |      | 70   | A    |
| T <sub>VJ</sub>      | virtual junction temperature                                 |                      |                                         | -40     |      | 175  | °C   |
| T <sub>op</sub>      | operation temperature                                        |                      |                                         | -40     |      | 150  | °C   |
| T <sub>stg</sub>     | storage temperature                                          |                      |                                         | -40     |      | 150  | °C   |
| Weight               |                                                              |                      |                                         |         | 6    |      | g    |
| F <sub>C</sub>       | mounting force with clip                                     |                      |                                         | 20      |      | 120  | N    |
| d <sub>Spp/App</sub> | creepage distance on surface   striking distance through air | terminal to terminal |                                         | 5.4     |      |      | mm   |
| d <sub>Spb/Apb</sub> |                                                              | terminal to backside |                                         | 4.1     |      |      | mm   |
| V <sub>ISOL</sub>    | isolation voltage                                            | t = 1 second         | 50/60 Hz, RMS; I <sub>ISOL</sub> ≤ 1 mA | 3600    |      |      | V    |
|                      |                                                              | t = 1 minute         |                                         | 3000    |      |      | V    |

### Product Marking



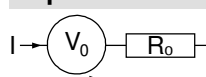
| Ordering | Ordering Number | Marking on Product | Delivery Mode | Quantity | Code No. |
|----------|-----------------|--------------------|---------------|----------|----------|
| Standard | DSI45-16AR      | DSI45-16AR         | Tube          | 30       | 480428   |

| Similar Part | Package      | Voltage class |
|--------------|--------------|---------------|
| DSI45-16A    | TO-247AD (2) | 1600          |
| DSI45-12A    | TO-247AD (2) | 1200          |
| DSI45-08A    | TO-247AD (2) | 800           |

### Equivalent Circuits for Simulation

\* on die level

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



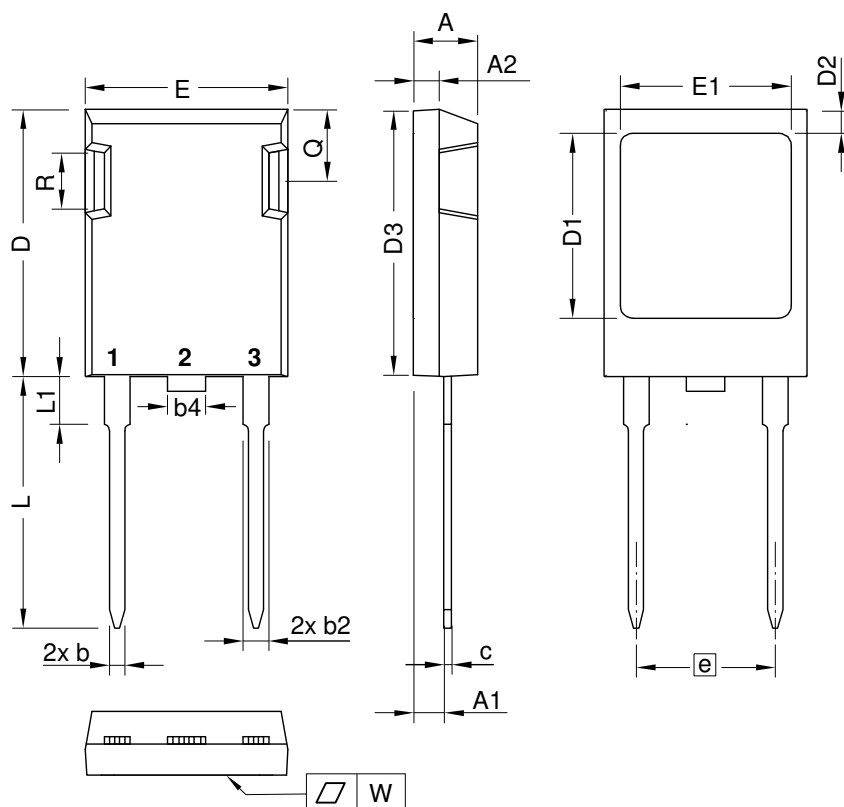
**Rectifier**

$V_{0\max}$  threshold voltage 0.81

V

$R_{0\max}$  slope resistance \* 6.5

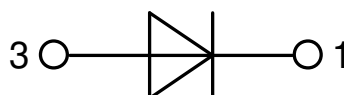
mΩ

**Outlines ISOPLUS247**


| Dim. | Millimeter |       | Inches |       |
|------|------------|-------|--------|-------|
|      | min        | max   | min    | max   |
| A    | 4.83       | 5.21  | 0.190  | 0.205 |
| A1   | 2.29       | 2.54  | 0.090  | 0.100 |
| A2   | 1.91       | 2.16  | 0.075  | 0.085 |
| b    | 1.14       | 1.40  | 0.045  | 0.055 |
| b2   | 1.91       | 2.20  | 0.075  | 0.087 |
| b4   | 2.92       | 3.24  | 0.115  | 0.128 |
| c    | 0.61       | 0.83  | 0.024  | 0.033 |
| D    | 20.80      | 21.34 | 0.819  | 0.840 |
| D1   | 15.75      | 16.26 | 0.620  | 0.640 |
| D2   | 1.65       | 2.15  | 0.065  | 0.085 |
| D3   | 20.30      | 20.70 | 0.799  | 0.815 |
| E    | 15.75      | 16.13 | 0.620  | 0.635 |
| E1   | 13.21      | 13.72 | 0.520  | 0.540 |
| e    | 10.90      | BSC   | 0.429  | BSC   |
| L    | 19.81      | 20.60 | 0.780  | 0.811 |
| L1   | 3.81       | 4.38  | 0.150  | 0.172 |
| Q    | 5.59       | 6.20  | 0.220  | 0.244 |
| R    | 4.25       | 5.50  | 0.167  | 0.217 |
| W    | -          | 0.10  | -      | 0.004 |

Die konvexe Form des Substrates ist typ. < 0.04 mm über der Kunststoffoberfläche der Bauteilunterseite  
 The convex bow of substrate is typ. < 0.04 mm over plastic surface level of device bottom side

Die Gehäuseabmessungen entsprechen dem Typ TO-247 AD gemäß JEDEC außer Schraubloch und  $L_{max}$ .  
 This drawing will meet all dimensions requirement of JEDEC outline TO-247 AD except screw hole and except  $L_{max}$ .



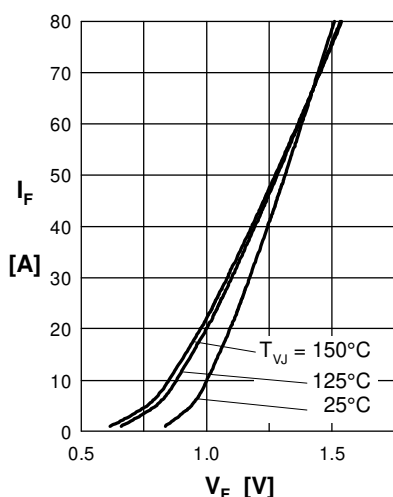
**Rectifier**


Fig. 1 Forward current versus voltage drop per diode

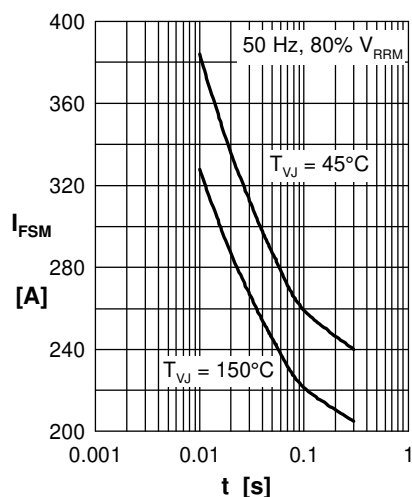


Fig. 2 Surge overload current

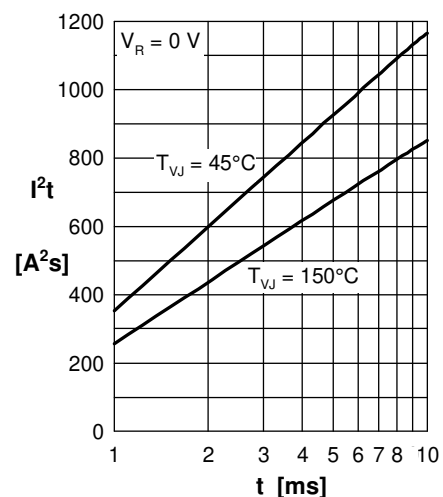
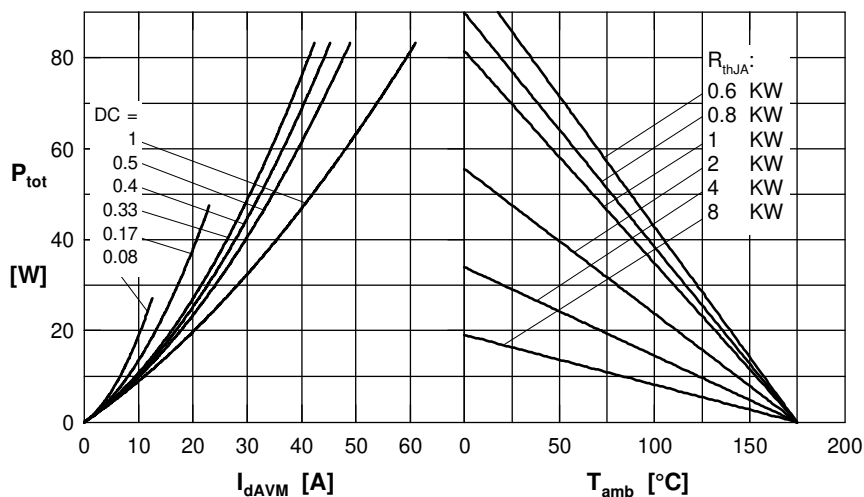

 Fig. 3  $I^2t$  versus time per diode


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

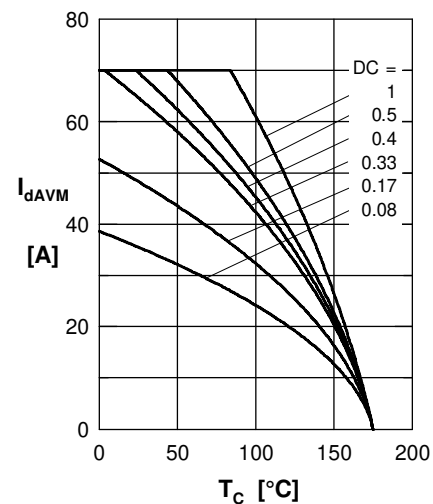


Fig. 5 Max. forward current vs. case temperature

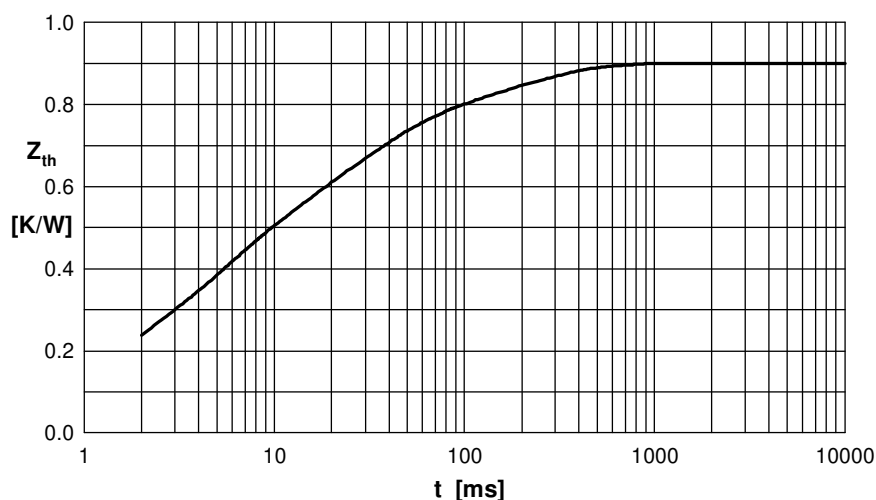


Fig. 6 Transient thermal impedance junction to case

| i | R <sub>i</sub> | t <sub>i</sub> |
|---|----------------|----------------|
| 1 | 0.0607         | 0.0004         |
| 2 | 0.123          | 0.00256        |
| 3 | 0.2305         | 0.045          |
| 4 | 0.323          | 0.0242         |
| 5 | 0.1628         | 0.18           |