

## Standard Rectifier

$$V_{RRM} = 2 \times 1600 \text{ V}$$

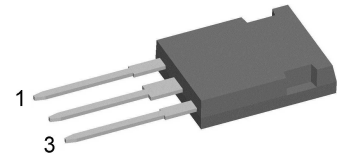
$$I_{FAV} = 45 \text{ A}$$

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


Phase leg

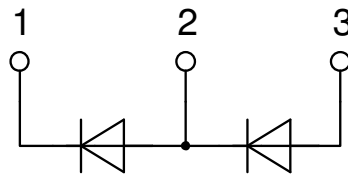
Part number

**DSP45-16AR**



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

### Terms Conditions of usage:

The data contained in this product data sheet is exclusively intended for technically trained staff. The user will have to evaluate the suitability of the product for the intended application and the completeness of the product data with respect to his application. The specifications of our components may not be considered as an assurance of component characteristics. The information in the valid application- and assembly notes must be considered. Should you require product information in excess of the data given in this product data sheet or which concerns the specific application of your product, please contact the sales office, which is responsible for you.

Due to technical requirements our product may contain dangerous substances. For information on the types in question please contact the sales office, which is responsible for you.

Should you intend to use the product in aviation, in health or live endangering or life support applications, please notify. For any such application we urgently recommend

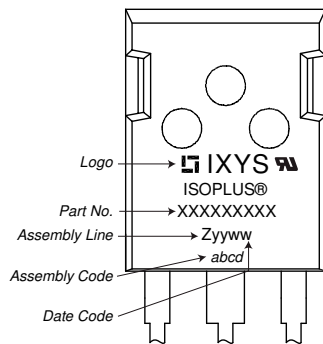
- to perform joint risk and quality assessments;

- the conclusion of quality agreements;

- to establish joint measures of an ongoing product survey, and that we may make delivery dependent on the realization of any such measures.

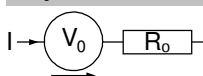
| Rectifier  |  |   |                         | Ratings |      |                   |  |
|------------|--|---|-------------------------|---------|------|-------------------|--|
| Symbol     | Definition                                   | Conditions  | min.                    | typ.    | max. | Unit              |  |
| $V_{RSM}$  | max. non-repetitive reverse blocking voltage | $T_{VJ} = 25^{\circ}C$                            |                         |         | 1700 | V                 |  |
| $V_{RRM}$  | max. repetitive reverse blocking voltage     | $T_{VJ} = 25^{\circ}C$                            |                         |         | 1600 | V                 |  |
| $I_R$      | reverse current                              | $V_R = 1600\text{ V}$                             | $T_{VJ} = 25^{\circ}C$  |         | 40   | $\mu A$           |  |
|            |  | $V_R = 1600\text{ V}$                             | $T_{VJ} = 150^{\circ}C$ |         | 1.5  | mA                |  |
| $V_F$      | forward voltage drop                         | $I_F = 45\text{ A}$                               | $T_{VJ} = 25^{\circ}C$  |         | 1.26 | V                 |  |
|            |  | $I_F = 90\text{ A}$                               |                         |         | 1.57 | V                 |  |
|            |  | $I_F = 45\text{ A}$                               | $T_{VJ} = 150^{\circ}C$ |         | 1.23 | V                 |  |
|            |  | $I_F = 90\text{ A}$                               |                         |         | 1.66 | V                 |  |
| $I_{FAV}$  | average forward current                      | $T_C = 100^{\circ}C$<br>180° sine                 | $T_{VJ} = 175^{\circ}C$ |         | 45   | A                 |  |
| $V_{FO}$   | threshold voltage                            | } for power loss calculation only                 | $T_{VJ} = 175^{\circ}C$ |         | 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          |   |                         | 0.25    |      | K/W               |  |
| $P_{tot}$  | total power dissipation                      |   | $T_C = 25^{\circ}C$     |         | 165  | W                 |  |
| $I_{FSM}$  | max. forward surge current                   | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$  | $T_{VJ} = 45^{\circ}C$  |         | 480  | A                 |  |
|            |  | $t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$ | $V_R = 0\text{ V}$      |         | 520  | A                 |  |
|            |  | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$  | $T_{VJ} = 150^{\circ}C$ |         | 410  | A                 |  |
|            |  | $t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$ | $V_R = 0\text{ V}$      |         | 440  | A                 |  |
| $I^2t$     | value for fusing                             | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$  | $T_{VJ} = 45^{\circ}C$  |         | 1.15 | kA <sup>2</sup> s |  |
|            |  | $t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$ | $V_R = 0\text{ V}$      |         | 1.13 | kA <sup>2</sup> s |  |
|            |  | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$  | $T_{VJ} = 150^{\circ}C$ |         | 840  | A <sup>2</sup> s  |  |
|            |  | $t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$ | $V_R = 0\text{ V}$      |         | 805  | A <sup>2</sup> s  |  |
| $C_J$      | junction capacitance                         | $V_R = 400\text{ V}; f = 1\text{ MHz}$            | $T_{VJ} = 25^{\circ}C$  |         | 18   | pF                |  |

| Package ISOPLUS247 |  | 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>      |  |                      |      | 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 | 2.7  |      |      | mm   |
| $d_{Spb/Apb}$      |  | terminal to backside | 4.1  |      |      | mm   |
| $V_{ISOL}$         | isolation voltage  | t = 1 second         | 3600 |      |      | V    |
|                    |  | t = 1 minute         | 3000 |      |      | V    |

**Product Marking**


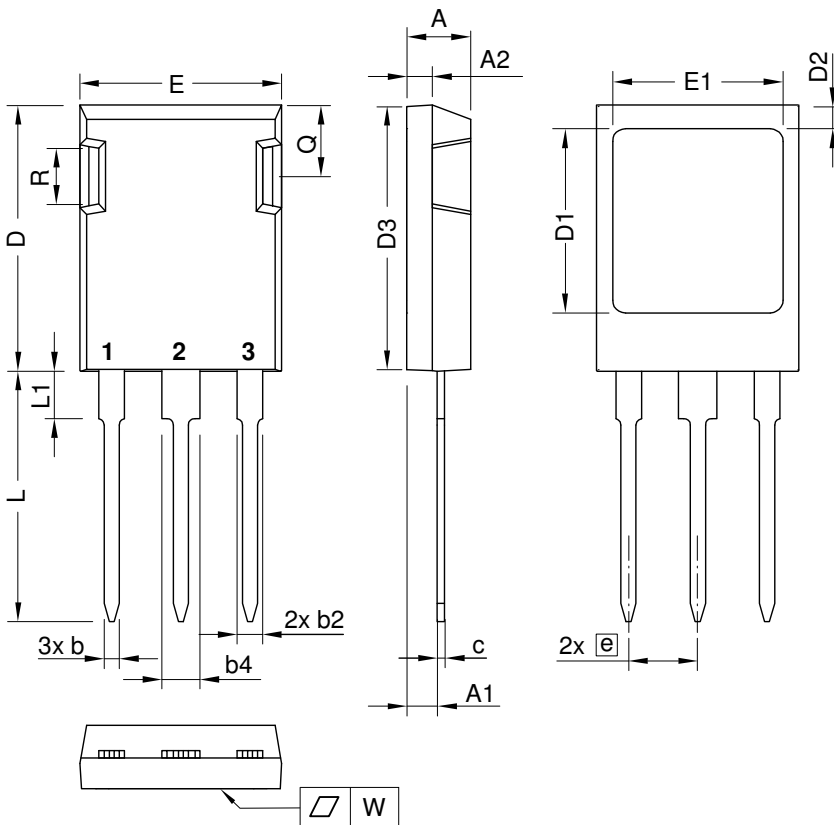
| Ordering | Ordering Number | Marking on Product | Delivery Mode | Quantity | Code No. |
|----------|-----------------|--------------------|---------------|----------|----------|
| Standard | DSP45-16AR      | DSP45-16AR         | Tube          | 30       | 496561   |

| Similar Part | Package                | Voltage class |
|--------------|------------------------|---------------|
| DSP45-16A    | TO-247AD (3)           | 1600          |
| DSP45-16AZ   | TO-268AA (D3Pak) (2HV) | 1600          |
| DSP45-12A    | TO-247AD (3)           | 1200          |
| DSP45-12AZ   | TO-268AA (D3Pak) (2HV) | 1200          |
| DSP45-18A    | TO-247AD (3)           | 1800          |

**Equivalent Circuits for Simulation**
*\* on die level*
 $T_{VJ} = 175\text{ °C}$ 

**Rectifier**

|              |                    |      |    |
|--------------|--------------------|------|----|
| $V_{0\ max}$ | threshold voltage  | 0.81 | V  |
| $R_{0\ max}$ | slope resistance * | 6.5  | mΩ |

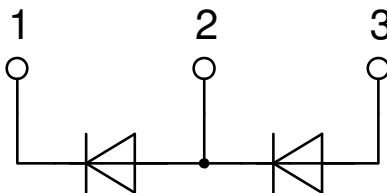
## Outlines ISOPLUS247



| 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    | 5.45 BSC   |       | 0.215 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

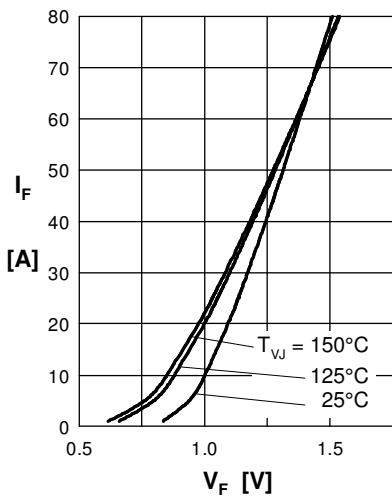


Fig. 1 Forward current versus voltage drop per diode

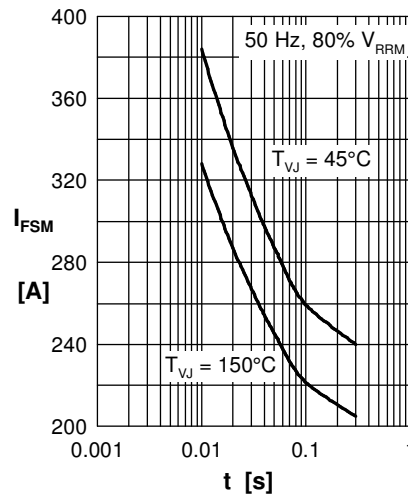


Fig. 2 Surge overload current

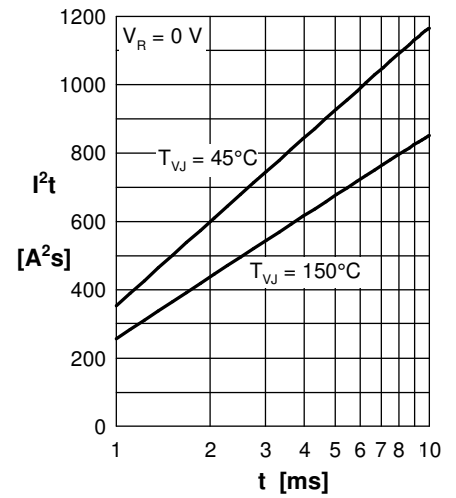


Fig. 3  $I^2t$  versus time per diode

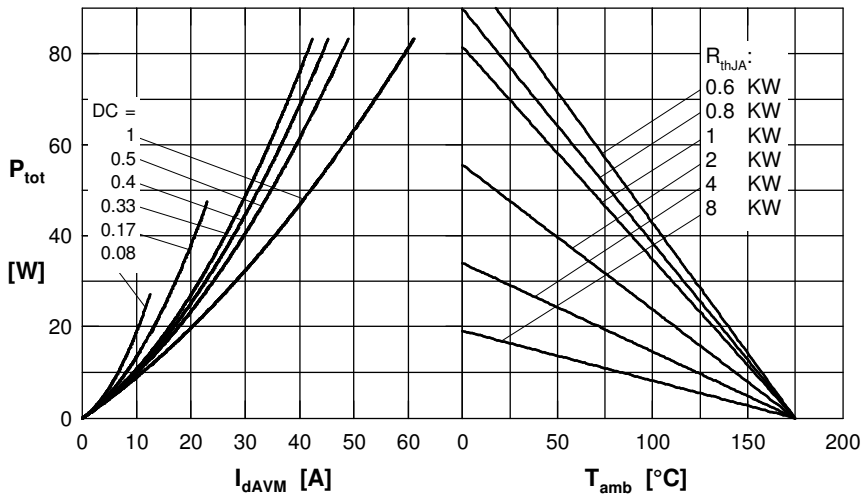


Fig. 4 Power dissipation vs. direct output current & ambient temperature

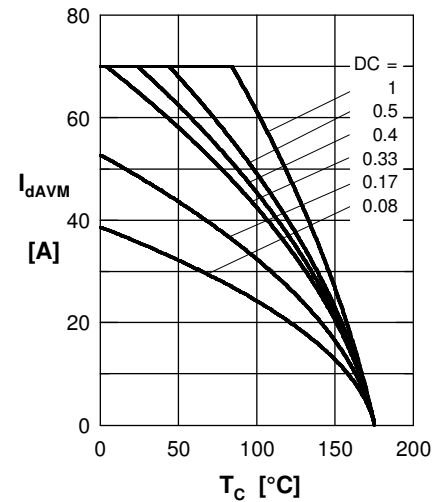


Fig. 5 Max. forward current vs. case temperature

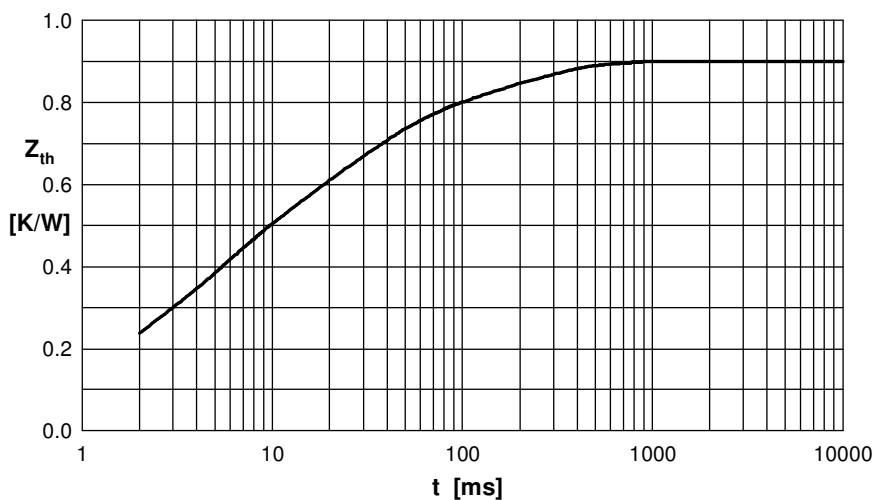


Fig. 6 Transient thermal impedance junction to case

| 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           |