

## Standard Rectifier

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

$$I_{FAV} = 25A$$

$$V_F = 1.16V$$

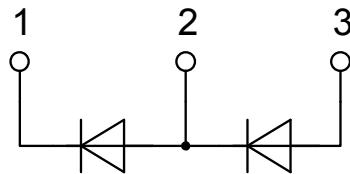
Phase leg

Part number

DSP25-16A



Backside: anode/cathode



### Features / Advantages:

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

### Applications:

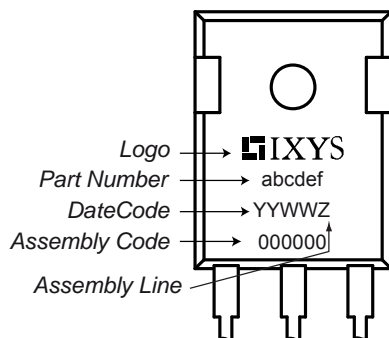
- Diode for main rectification
- For single and three phase bridge configurations

### Package: TO-247

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

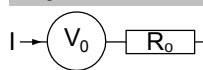
| Rectifier  |  |                                     |                         | Ratings |      |                  |
|------------|--|-------------------------------------|-------------------------|---------|------|------------------|
| Symbol     | Definition                                   | Conditions                          | min.                    | typ.    | max. | Unit             |
| $V_{RSM}$  | max. non-repetitive reverse blocking voltage | $T_{VJ} = 25^{\circ}C$              |                         |         | 1700 | V                |
| $V_{RRM}$  | max. repetitive reverse blocking voltage     | $T_{VJ} = 25^{\circ}C$              |                         |         | 1600 | V                |
| $I_R$      | reverse current, drain current               | $V_R = 1600 V$                      | $T_{VJ} = 25^{\circ}C$  |         | 40   | $\mu A$          |
|            |  | $V_R = 1600 V$                      | $T_{VJ} = 150^{\circ}C$ |         | 1.5  | mA               |
| $V_F$      | forward voltage drop                         | $I_F = 25 A$                        | $T_{VJ} = 25^{\circ}C$  |         | 1.23 | V                |
|            |  | $I_F = 50 A$                        |                         |         | 1.47 | V                |
|            |  | $I_F = 25 A$                        | $T_{VJ} = 150^{\circ}C$ |         | 1.16 | V                |
|            |  | $I_F = 50 A$                        |                         |         | 1.50 | V                |
| $I_{FAV}$  | average forward current                      | $T_C = 135^{\circ}C$<br>180° sine   | $T_{VJ} = 175^{\circ}C$ |         | 25   | A                |
| $V_{FO}$   | threshold voltage                            | } for power loss calculation only   | $T_{VJ} = 175^{\circ}C$ |         | 0.81 | V                |
| $r_F$      | slope resistance                             |                                     |                         |         | 13.8 | 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                      |                                     | $T_C = 25^{\circ}C$     |         | 160  | W                |
| $I_{FSM}$  | max. forward surge current                   | $t = 10 \text{ ms; (50 Hz), sine}$  | $T_{VJ} = 45^{\circ}C$  |         | 300  | A                |
|            |  | $t = 8,3 \text{ ms; (60 Hz), sine}$ | $V_R = 0 V$             |         | 325  | A                |
|            |  | $t = 10 \text{ ms; (50 Hz), sine}$  | $T_{VJ} = 150^{\circ}C$ |         | 255  | A                |
|            |  | $t = 8,3 \text{ ms; (60 Hz), sine}$ | $V_R = 0 V$             |         | 275  | A                |
| $I^2t$     | value for fusing                             | $t = 10 \text{ ms; (50 Hz), sine}$  | $T_{VJ} = 45^{\circ}C$  |         | 450  | A <sup>2</sup> s |
|            |  | $t = 8,3 \text{ ms; (60 Hz), sine}$ | $V_R = 0 V$             |         | 440  | A <sup>2</sup> s |
|            |  | $t = 10 \text{ ms; (50 Hz), sine}$  | $T_{VJ} = 150^{\circ}C$ |         | 325  | A <sup>2</sup> s |
|            |  | $t = 8,3 \text{ ms; (60 Hz), sine}$ | $V_R = 0 V$             |         | 315  | A <sup>2</sup> s |
| $C_J$      | junction capacitance                         | $V_R = 400 V; f = 1 \text{ MHz}$    | $T_{VJ} = 25^{\circ}C$  |         | 10   | pF               |

| Package TO-247 |                              |              | Ratings |      |      |      |
|----------------|------------------------------|--------------|---------|------|------|------|
| Symbol         | Definition                   | Conditions   | min.    | typ. | max. | Unit |
| $I_{RMS}$      | RMS current                  | per terminal |         |      | 70   | A    |
| $T_{stg}$      | storage temperature          |              | -55     |      | 150  | °C   |
| $T_{vj}$       | virtual junction temperature |              | -40     |      | 175  | °C   |
| <b>Weight</b>  |                              |              |         | 6    |      | g    |
| $M_D$          | mounting torque              |              | 0.8     |      | 1.2  | Nm   |
| $F_C$          | mounting force with clip     |              | 20      |      | 120  | N    |

**Product Marking**


| Ordering | Part Number | Marking on Product | Delivery Mode | Quantity | Code No. |
|----------|-------------|--------------------|---------------|----------|----------|
| Standard | DSP25-16A   | DSP25-16A          | Tube          | 30       | 463612   |

| Similar Part | Package              | Voltage class |
|--------------|----------------------|---------------|
| DSP25-16AR   | ISOPLUS247 (3)       | 1600          |
| DSP25-16AT   | TO-268AA (D3Pak) (2) | 1600          |
| DSP25-12A    | TO-247AD (3)         | 1200          |
| DSP25-12AT   | TO-268AA (D3Pak) (2) | 1200          |

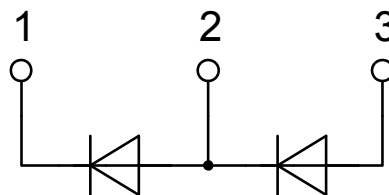
**Equivalent Circuits for Simulation**
*\* on die level*
 $T_{vj} = 175^{\circ}C$ 

**Rectifier**

|              |                    |      |    |
|--------------|--------------------|------|----|
| $V_{0\ max}$ | threshold voltage  | 0.81 | V  |
| $R_{0\ max}$ | slope resistance * | 11.2 | mΩ |

## Outlines TO-247



| Sym. | Inches    |       | Millimeter |       |
|------|-----------|-------|------------|-------|
|      | min.      | max.  | min.       | max.  |
| A    | 0.185     | 0.209 | 4.70       | 5.30  |
| A1   | 0.087     | 0.102 | 2.21       | 2.59  |
| A2   | 0.059     | 0.098 | 1.50       | 2.49  |
| D    | 0.819     | 0.845 | 20.79      | 21.45 |
| E    | 0.610     | 0.640 | 15.48      | 16.24 |
| E2   | 0.170     | 0.216 | 4.31       | 5.48  |
| e    | 0.215 BSC |       | 5.46 BSC   |       |
| L    | 0.780     | 0.800 | 19.80      | 20.30 |
| L1   | -         | 0.177 | -          | 4.49  |
| Ø P  | 0.140     | 0.144 | 3.55       | 3.65  |
| Q    | 0.212     | 0.244 | 5.38       | 6.19  |
| S    | 0.242 BSC |       | 6.14 BSC   |       |
| b    | 0.039     | 0.055 | 0.99       | 1.40  |
| b2   | 0.065     | 0.094 | 1.65       | 2.39  |
| b4   | 0.102     | 0.135 | 2.59       | 3.43  |
| c    | 0.015     | 0.035 | 0.38       | 0.89  |
| D1   | 0.515     | -     | 13.07      | -     |
| D2   | 0.020     | 0.053 | 0.51       | 1.35  |
| E1   | 0.530     | -     | 13.45      | -     |
| Ø P1 | -         | 0.29  | -          | 7.39  |



## Rectifier

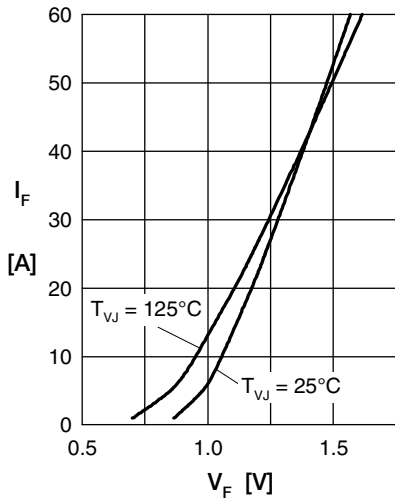


Fig. 1 Forward current versus voltage drop per diode

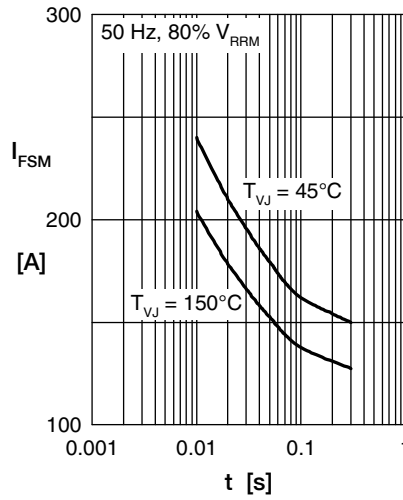


Fig. 2 Surge overload current

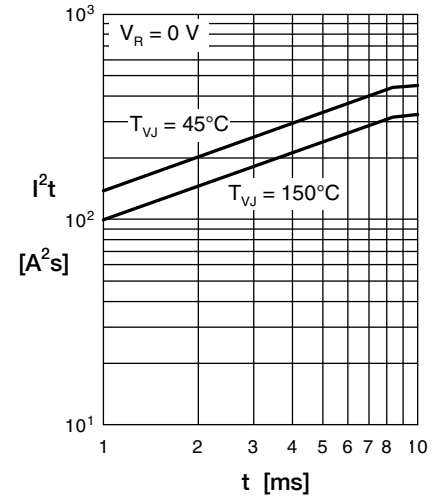


Fig. 3  $I^2t$  versus time per diode

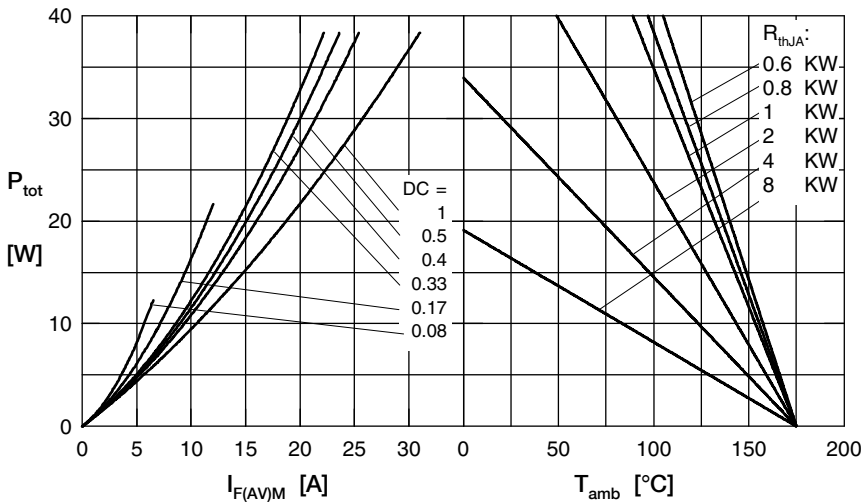


Fig. 4 Power dissipation vs. direct output current and ambient temperature

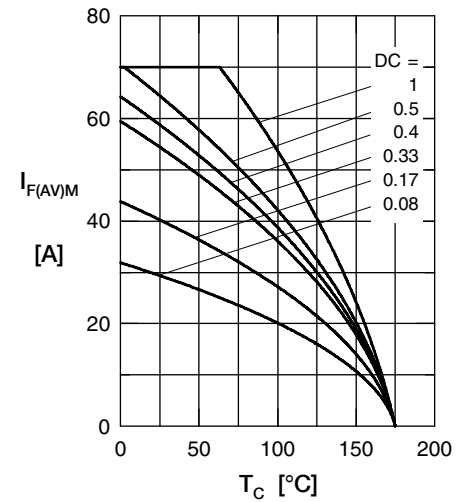


Fig. 5 Max. forward current vs. case temperature

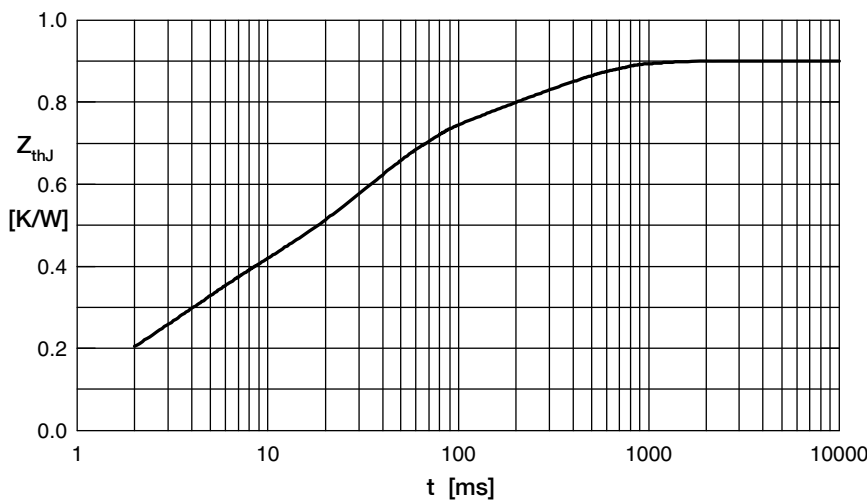


Fig. 6 Transient thermal impedance junction to case

Constants for  $Z_{thJC}$  calculation:

| i | $R_{thi}$ (K/W) | $t_i$ (s) |
|---|-----------------|-----------|
| 1 | 0.03            | 0.0004    |
| 2 | 0.08            | 0.002     |
| 3 | 0.2             | 0.003     |
| 4 | 0.39            | 0.03      |
| 5 | 0.2             | 0.29      |