

## Standard Rectifier

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

$$I_{FAV} = 25 \text{ A}$$

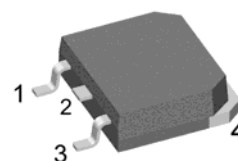
$$V_F = 1,16 \text{ V}$$

Phase leg

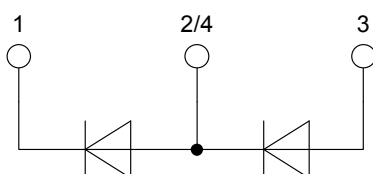
Part number

**DSP25-16AT**

Marking on Product: DSP25-16AT



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-268AA (D3Pak)

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

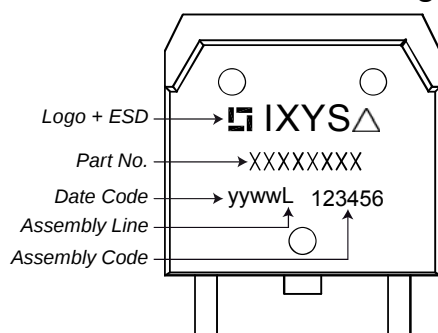
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| Rectifier  |                                              |                                          |                                | Ratings |      |      |                  |
|------------|----------------------------------------------|------------------------------------------|--------------------------------|---------|------|------|------------------|
| 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                         | $I_F = 25\text{ A}$                      | $T_{VJ} = 25^{\circ}\text{C}$  |         |      | 1,23 | V                |
|            |                                              | $I_F = 50\text{ A}$                      |                                |         |      | 1,47 | V                |
|            |                                              | $I_F = 25\text{ A}$                      | $T_{VJ} = 150^{\circ}\text{C}$ |         |      | 1,16 | V                |
|            |                                              | $I_F = 50\text{ A}$                      |                                |         |      | 1,50 | V                |
| $I_{FAV}$  | average forward current                      | $T_C = 135^{\circ}\text{C}$<br>180° sine | $T_{VJ} = 175^{\circ}\text{C}$ |         |      | 25   | A                |
| $V_{F0}$   | threshold voltage                            | } for power loss calculation only        | $T_{VJ} = 175^{\circ}\text{C}$ |         |      | 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          |                                          |                                |         | 0,15 |      | K/W              |
| $P_{tot}$  | total power dissipation                      |                                          | $T_C = 25^{\circ}\text{C}$     |         |      | 160  | W                |
| $I_{FSM}$  | max. forward surge current                   | $t = 10\text{ ms; (50 Hz), sine}$        | $T_{VJ} = 45^{\circ}\text{C}$  |         |      | 300  | A                |
|            |                                              | $t = 8,3\text{ ms; (60 Hz), sine}$       | $V_R = 0\text{ V}$             |         |      | 325  | A                |
|            |                                              | $t = 10\text{ ms; (50 Hz), sine}$        | $T_{VJ} = 150^{\circ}\text{C}$ |         |      | 255  | A                |
|            |                                              | $t = 8,3\text{ ms; (60 Hz), sine}$       | $V_R = 0\text{ V}$             |         |      | 275  | A                |
| $I^2t$     | value for fusing                             | $t = 10\text{ ms; (50 Hz), sine}$        | $T_{VJ} = 45^{\circ}\text{C}$  |         |      | 450  | A <sup>2</sup> s |
|            |                                              | $t = 8,3\text{ ms; (60 Hz), sine}$       | $V_R = 0\text{ V}$             |         |      | 440  | A <sup>2</sup> s |
|            |                                              | $t = 10\text{ ms; (50 Hz), sine}$        | $T_{VJ} = 150^{\circ}\text{C}$ |         |      | 325  | A <sup>2</sup> s |
|            |                                              | $t = 8,3\text{ ms; (60 Hz), sine}$       | $V_R = 0\text{ V}$             |         |      | 315  | A <sup>2</sup> s |
| $C_J$      | junction capacitance                         | $V_R = 400\text{ V; } f = 1\text{ MHz}$  | $T_{VJ} = 25^{\circ}\text{C}$  |         | 10   |      | pF               |

| Package TO-268AA (D3Pak) |                              |              | 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>            |                              |              |         | 5    |      | g    |
| $F_c$                    | mounting force with clip     |              | 20      |      | 120  | N    |

## Product Marking



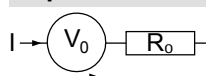
| Ordering    | Ordering Number | Marking on Product | Delivery Mode | Quantity | Code No. |
|-------------|-----------------|--------------------|---------------|----------|----------|
| Standard    | DSP25-16AT-TUB  | DSP25-16AT         | Tube          | 30       | 509755   |
| Alternative | DSP25-16AT-TRL  | DSP25-16AT         | Tape & Reel   | 400      | 509974   |

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

## Equivalent Circuits for Simulation

\* on die level

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



Rectifier

$V_{0 \max}$  threshold voltage

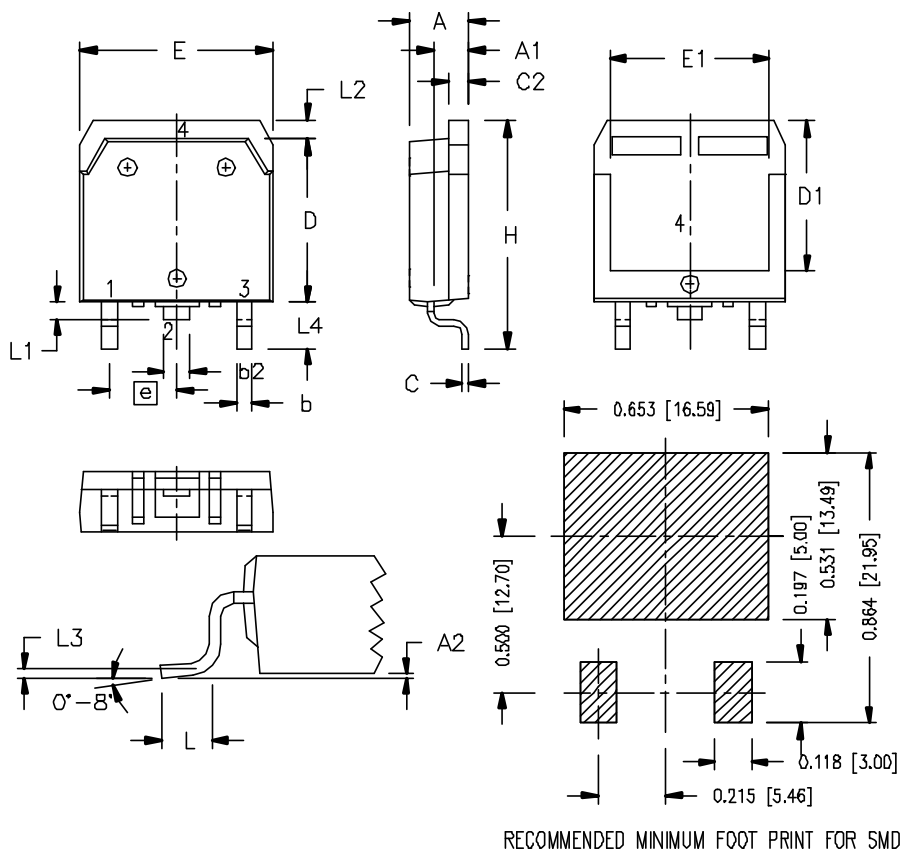
0,81

V

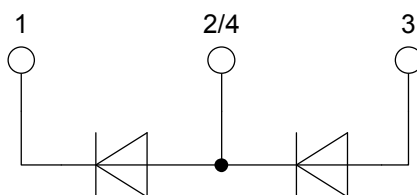
$R_{0 \max}$  slope resistance \*

11,2

mΩ

**Outlines TO-268AA (D3Pak)**


| Dim. | Millimeter |       | Inches    |       |
|------|------------|-------|-----------|-------|
|      | min        | max   | min       | max   |
| A    | 4.90       | 5.10  | 0.193     | 0.201 |
| A1   | 2.70       | 2.90  | 0.106     | 0.114 |
| A2   | 0.02       | 0.25  | 0.001     | 0.100 |
| b    | 1.15       | 1.45  | 0.045     | 0.057 |
| b2   | 1.90       | 2.10  | 0.075     | 0.083 |
| C    | 0.40       | 0.65  | 0.016     | 0.026 |
| C2   | 1.45       | 1.60  | 0.057     | 0.063 |
| D    | 13.80      | 14.00 | 0.543     | 0.551 |
| D1   | 12.40      | 12.70 | 0.488     | 0.500 |
| E    | 15.85      | 16.05 | 0.624     | 0.632 |
| E1   | 13.30      | 13.60 | 0.524     | 0.535 |
| e    | 5.45 BSC   |       | 0.215 BSC |       |
| H    | 18.70      | 19.10 | 0.736     | 0.752 |
| L    | 2.40       | 2.70  | 0.094     | 0.106 |
| L1   | 1.20       | 1.40  | 0.047     | 0.055 |
| L2   | 1.00       | 1.15  | 0.039     | 0.045 |
| L3   | 0.25 BSC   |       | 0.100 BSC |       |
| L4   | 3.80       | 4.10  | 0.150     | 0.161 |



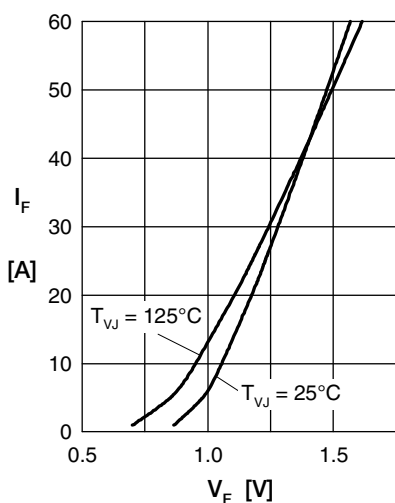
**Rectifier**


Fig. 1 Forward current versus voltage drop per diode

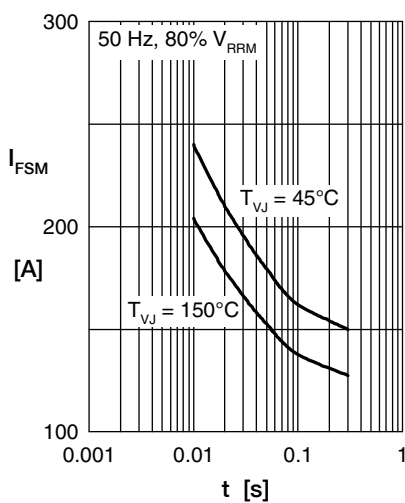


Fig. 2 Surge overload current

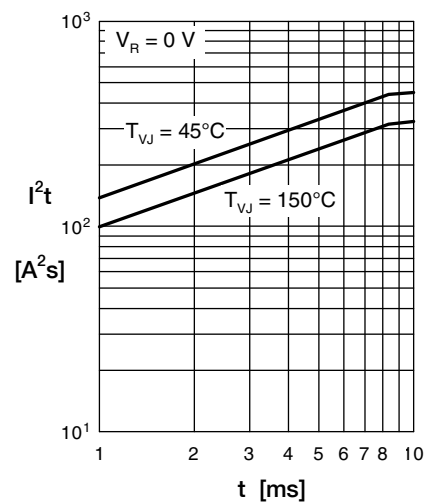
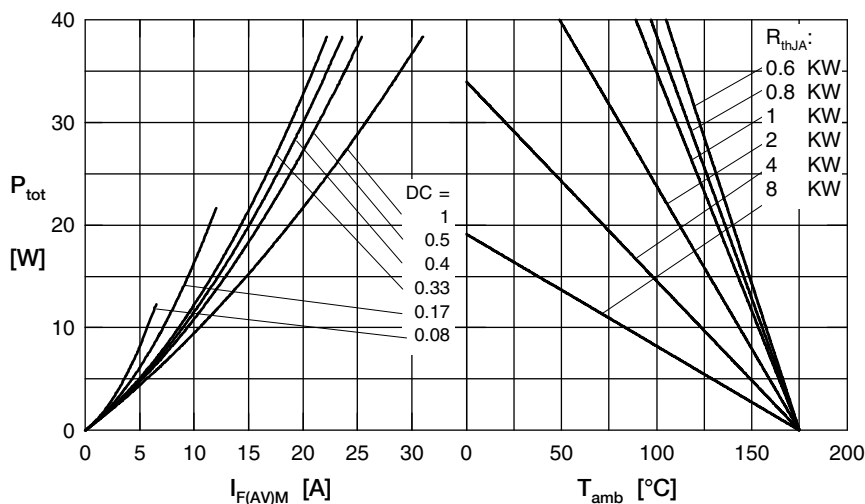

 Fig. 3  $I^2t$  versus time per diode


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

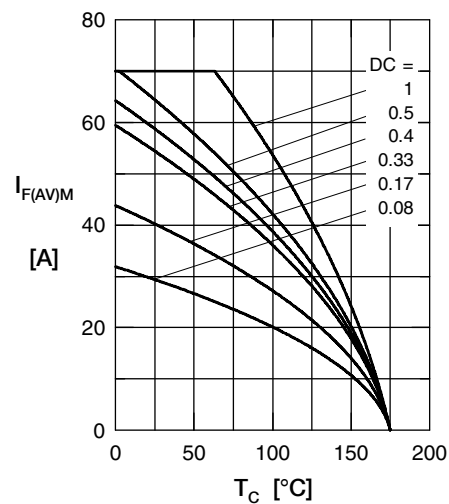


Fig. 5 Max. forward current vs. case temperature

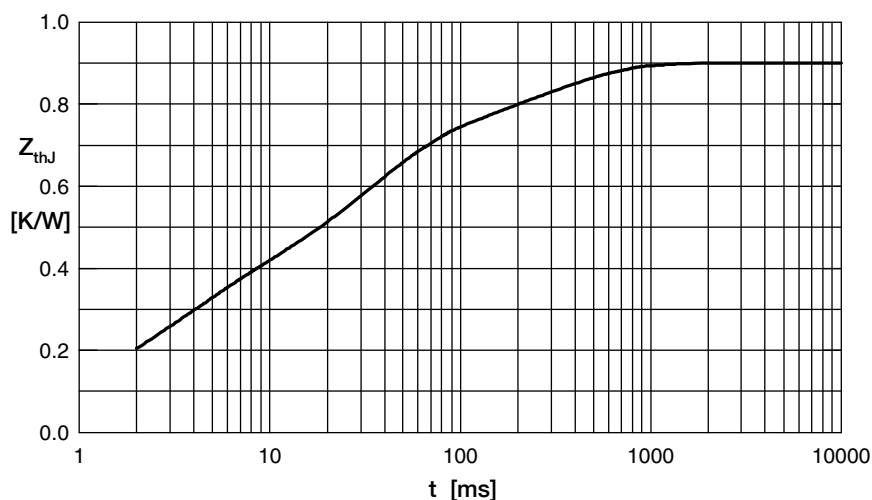


Fig. 6 Transient thermal impedance junction to case

 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      |