

Standard Rectifier

$$V_{RRM} = 2 \times 1200V$$

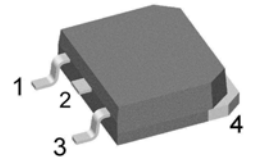
$$I_{FAV} = 25A$$

$$V_F = 1.16V$$

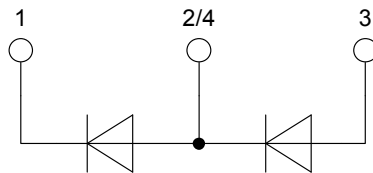
Phase leg

Part number

DSP25-12AT



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

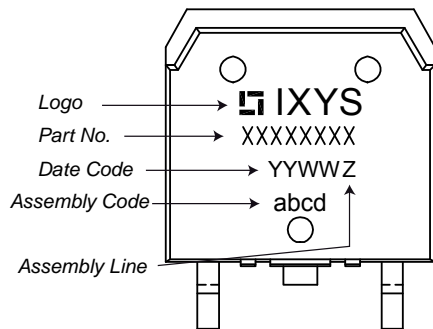
Package: TO-268AA (D3Pak)

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

| Rectifier | | | Ratings | | | |
|------------|--|-------------------------------------|-------------------------|------|------|------------------|
| Symbol | Definition | Conditions | min. | typ. | max. | Unit |
| V_{RSM} | max. non-repetitive reverse blocking voltage | $T_{VJ} = 25^{\circ}C$ | | | 1300 | V |
| V_{RRM} | max. repetitive reverse blocking voltage | $T_{VJ} = 25^{\circ}C$ | | | 1200 | V |
| I_R | reverse current, drain current | $V_R = 1200 V$ | $T_{VJ} = 25^{\circ}C$ | | 40 | μA |
| | | $V_R = 1200 V$ | $T_{VJ} = 150^{\circ}C$ | | 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 | $T_C = 135^{\circ}C$ 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 Ω |
| 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 | | $T_C = 25^{\circ}C$ | | 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 ² s |
| | | $t = 8,3 \text{ ms; (60 Hz), sine}$ | $V_R = 0 V$ | | 440 | A ² s |
| | | $t = 10 \text{ ms; (50 Hz), sine}$ | $T_{VJ} = 150^{\circ}C$ | | 325 | A ² s |
| | | $t = 8,3 \text{ ms; (60 Hz), sine}$ | $V_R = 0 V$ | | 315 | A ² s |
| C_J | junction capacitance | $V_R = 400 V; f = 1 \text{ MHz}$ | $T_{VJ} = 25^{\circ}C$ | | 10 | pF |

| Package TO-268AA (D3Pak) | | | 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 |
| Weight | | | | 5 | | g |
| F_C | mounting force with clip | | 20 | | 120 | N |

Product Marking



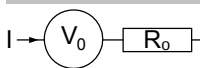
| Ordering | Part Number | Marking on Product | Delivery Mode | Quantity | Code No. |
|----------|-------------|--------------------|---------------|----------|----------|
| Standard | DSP25-12AT | DSP25-12AT | Tube | 30 | 403089 |

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

Equivalent Circuits for Simulation

* on die level

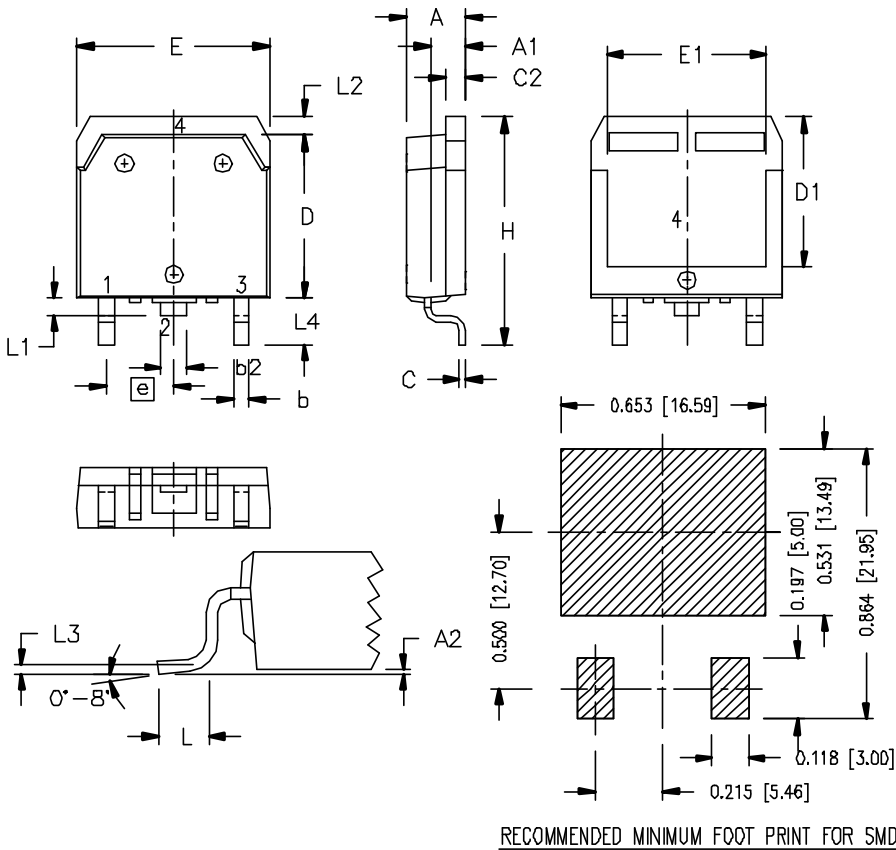
$T_{vj} = 175^{\circ}C$



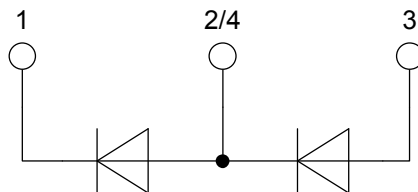
Rectifier

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

Outlines TO-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

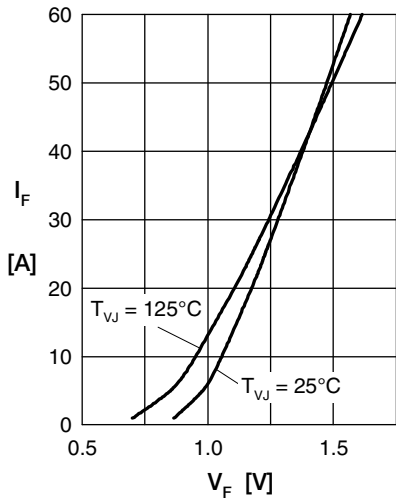


Fig. 1 Forward current versus voltage drop per diode

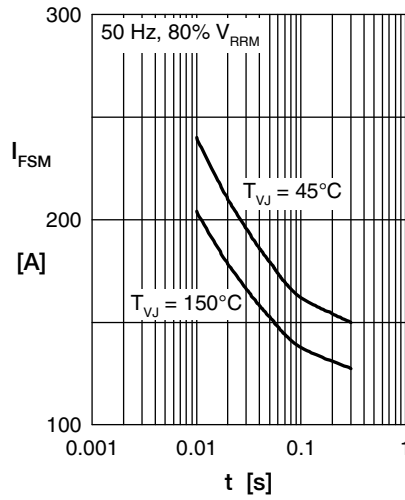


Fig. 2 Surge overload current

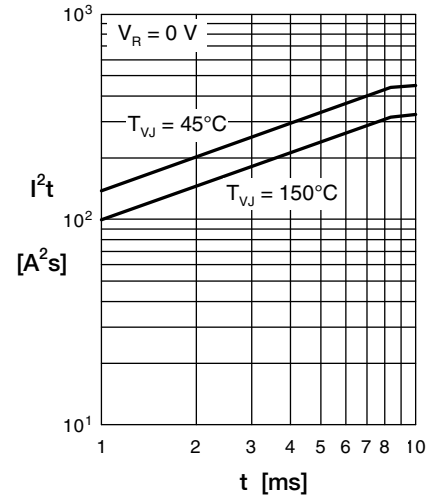


Fig. 3 I^2t versus time per diode

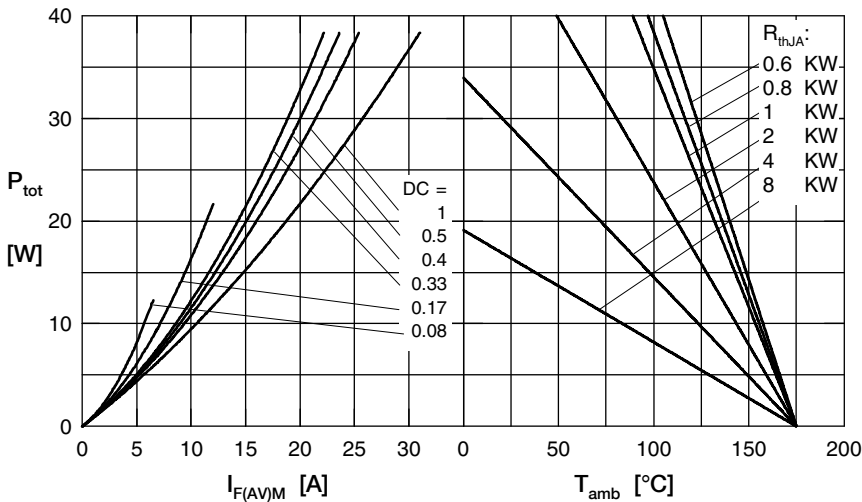


Fig. 4 Power dissipation vs. direct output current and ambient temperature

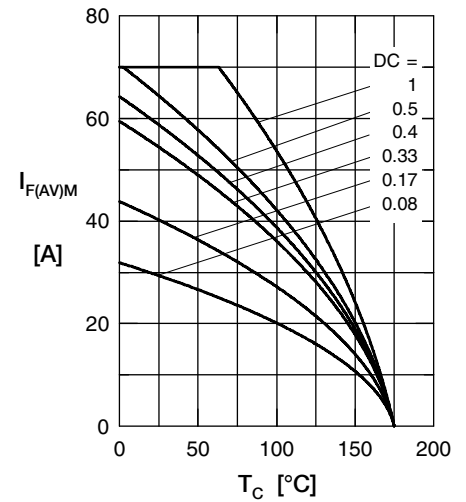


Fig. 5 Max. forward current vs. case temperature

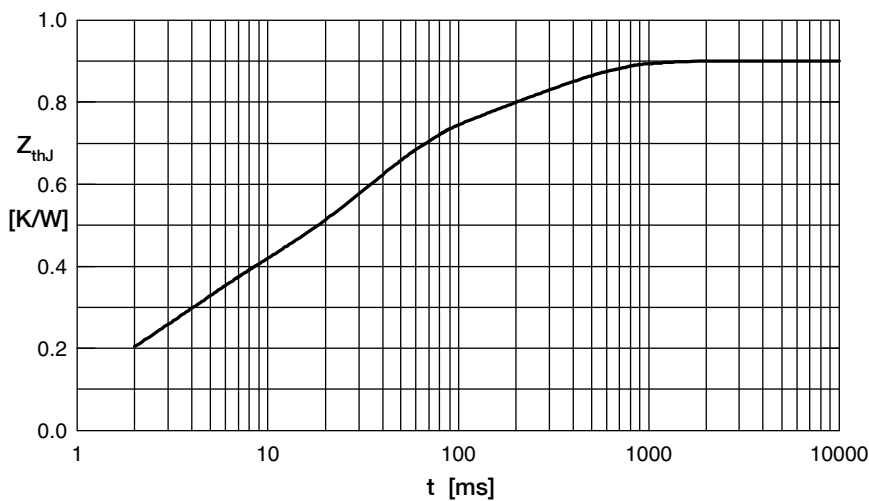


Fig. 6 Transient thermal impedance junction to case

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 |