



Standard Rectifier

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

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

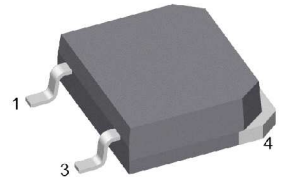
$V_F = 1.23 \text{ V}$

Phase leg

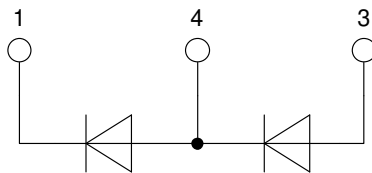
Part number

DSP45-12AZ

Marking on Product: DSP45-12AZ



Backside: anode/cathode



Features / Advantages:

- Planar passivated chips
- Very low leakage current
- Very low forward voltage drop
- Improved thermal behaviour
- High commutation robustness
- High surge capability

Applications:

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

Package: TO-268AA (D3Pak-HV)

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

Disclaimer Notice

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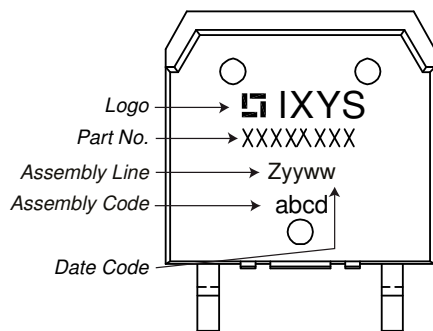


| Rectifier | | | | Ratings | | | |
|------------|--|---|------------------------------|---------|------|---------------|-------------------|
| Symbol | Definition | Conditions | min. | typ. | max. | Unit | |
| V_{RSM} | max. non-repetitive reverse blocking voltage | | | | 1300 | V | |
| V_{RRM} | max. repetitive reverse blocking voltage | | | | 1200 | V | |
| I_R | reverse current | $V_R = 1200\text{ V}$ | | | 40 | μA | |
| | | $V_R = 1200\text{ V}$ | | | 1.5 | mA | |
| V_F | forward voltage drop | $I_F = 45\text{ A}$ | | | 1.26 | V | |
| | | $I_F = 90\text{ A}$ | | | 1.52 | V | |
| | | $I_F = 45\text{ A}$ | $T_{VJ} = 150^\circ\text{C}$ | | | 1.23 | V |
| | | $I_F = 90\text{ A}$ | $T_{VJ} = 150^\circ\text{C}$ | | | 1.57 | V |
| I_{FAV} | average forward current | $T_C = 130^\circ\text{C}$ 180° sine | | | 45 | A | |
| V_{F0} | threshold voltage | } for power loss calculation only | | | 0.86 | V | |
| r_F | slope resistance | | | | 7.8 | m Ω | |
| R_{thJC} | thermal resistance junction to case | | | | 0.55 | K/W | |
| R_{thCH} | thermal resistance case to heatsink | | | 0.15 | | K/W | |
| P_{tot} | total power dissipation | | | | 270 | W | |
| I_{FSM} | max. forward surge current | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$ | $T_{VJ} = 45^\circ\text{C}$ | | | 480 | A |
| | | $t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$ | $V_R = 0\text{ V}$ | | | 520 | A |
| | | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$ | $T_{VJ} = 150^\circ\text{C}$ | | | 410 | A |
| | | $t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$ | $V_R = 0\text{ V}$ | | | 440 | A |
| I^2t | value for fusing | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$ | $T_{VJ} = 45^\circ\text{C}$ | | | 1.15 | kA ² s |
| | | $t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$ | $V_R = 0\text{ V}$ | | | 1.13 | kA ² s |
| | | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$ | $T_{VJ} = 150^\circ\text{C}$ | | | 840 | A ² s |
| | | $t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$ | $V_R = 0\text{ V}$ | | | 805 | A ² s |
| C_J | junction capacitance | $V_R = 400\text{ V}; f = 1\text{ MHz}$ | $T_{VJ} = 25^\circ\text{C}$ | | 19 | pF | |



| Package TO-268AA (D3Pak-HV) | | | 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 |
| Weight | | | | 4 | | g |
| F_C | mounting force with clip | | 20 | | 120 | N |
| $d_{Spp/App}$ | creepage distance on surface / striking distance through air | terminal to terminal | 9.4 | | | mm |
| $d_{Spb/Apb}$ | | terminal to backside | 5.6 | | | mm |

Product Marking



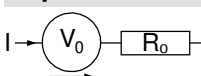
| Ordering | Ordering Number | Marking on Product | Delivery Mode | Quantity | Code No. |
|-------------|-----------------|--------------------|---------------|----------|----------|
| Standard | DSP45-12AZ-TUB | DSP45-12AZ | Tube | 30 | 514134 |
| Alternative | DSP45-12AZ-TRL | DSP45-12AZ | Tape & Reel | 400 | 524061 |

| Similar Part | Package | Voltage class |
|--------------|------------------------|---------------|
| DSP45-16AZ | TO-268AA (D3Pak) (2HV) | 1600 |
| DSP45-12A | TO-247AD (3) | 1200 |
| DSP45-16A | TO-247AD (3) | 1600 |
| DSP45-16AR | ISOPLUS247 (3) | 1600 |
| DSP45-18A | TO-247AD (3) | 1800 |

Equivalent Circuits for Simulation

* on die level

$T_{VJ} = 175\text{ °C}$

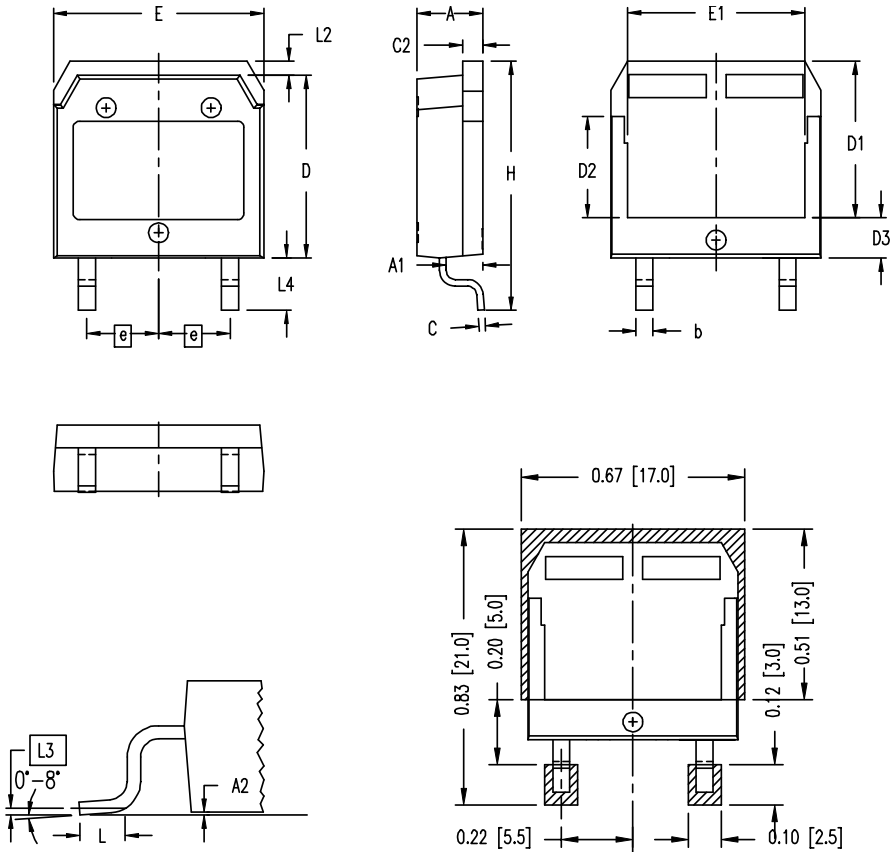


Rectifier

| | | | |
|--------------|--------------------|------|----|
| $V_{0\ max}$ | threshold voltage | 0.86 | V |
| $R_{0\ max}$ | slope resistance * | 6.5 | mΩ |

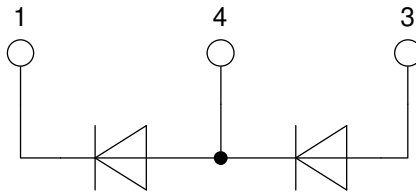


Outlines TO-268AA (D3Pak-HV)



| 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 | 0.010 |
| b | 1.15 | 1.45 | 0.045 | 0.057 |
| 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 | 11.80 | 12.10 | 0.465 | 0.476 |
| D2 | 7.50 | 7.80 | 0.295 | 0.307 |
| D3 | 2.90 | 3.20 | 0.114 | 0.126 |
| E | 15.85 | 16.05 | 0.624 | 0.632 |
| E1 | 13.30 | 13.60 | 0.524 | 0.535 |
| e | 5.450 BSC | | 0.215 BSC | |
| H | 18.70 | 19.10 | 0.736 | 0.752 |
| L | 1.70 | 2.00 | 0.067 | 0.079 |
| L2 | 1.00 | 1.15 | 0.039 | 0.045 |
| L3 | 0.250 BSC | | 0.010 BSC | |
| L4 | 3.80 | 4.10 | 0.150 | 0.161 |

RECOMMENDED MINIMUM FOOT PRINT





Rectifier

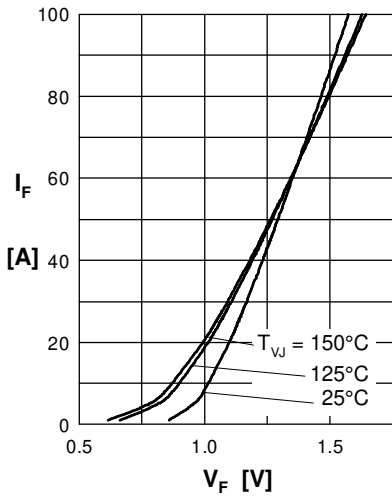


Fig. 1 Forward current versus voltage drop per diode

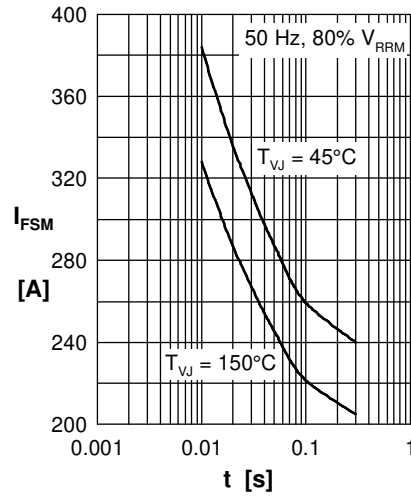


Fig. 2 Surge overload current

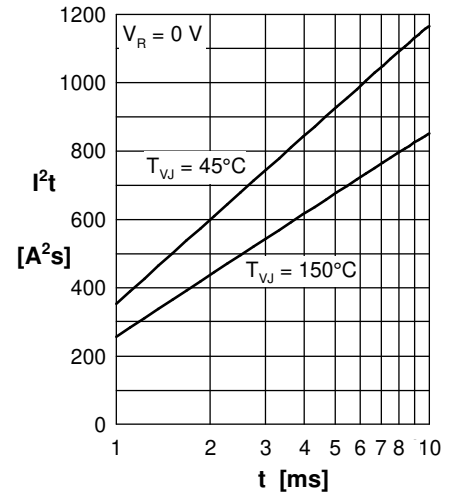


Fig. 3 I^2t versus time per diode

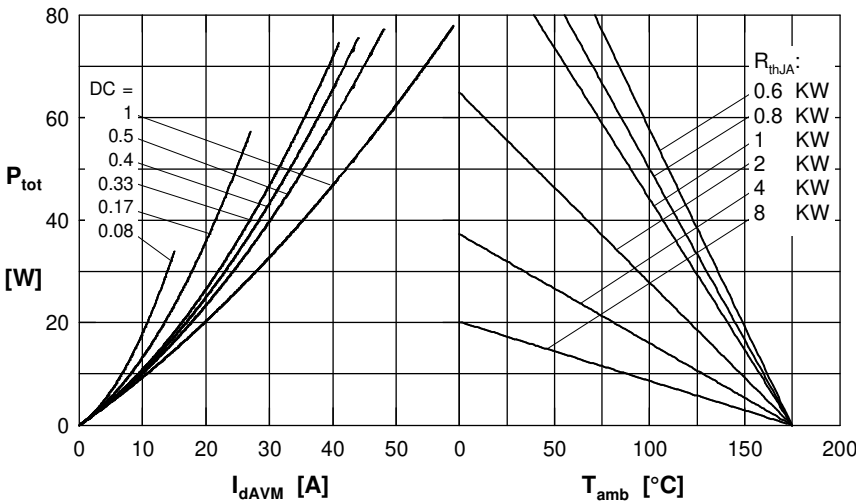


Fig. 4 Power dissipation vs. direct output current & ambient temperature

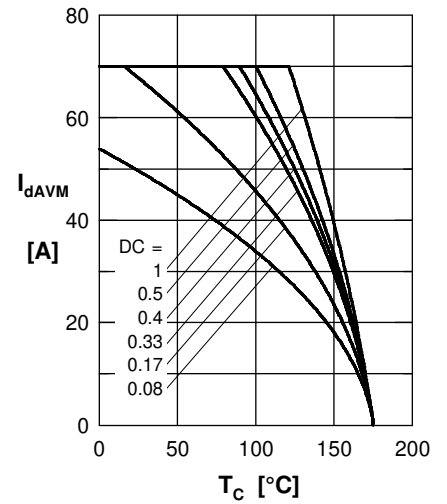


Fig. 5 Max. forward current vs. case temperature

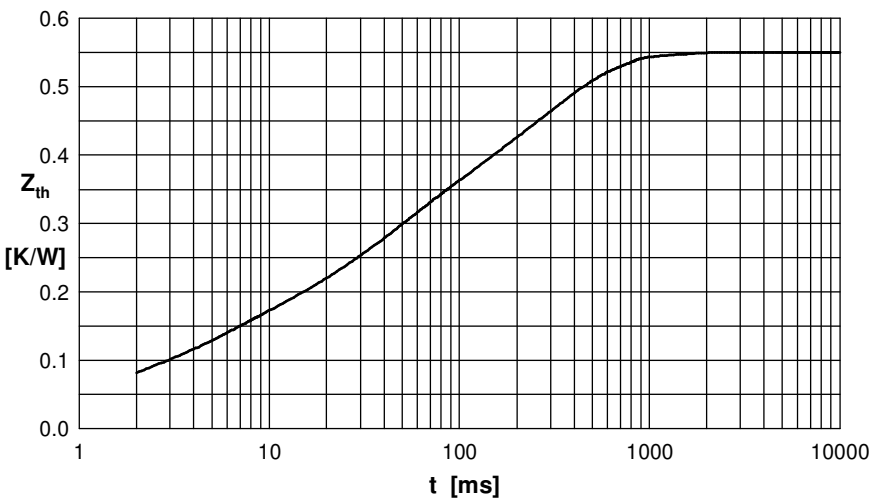


Fig. 6 Transient thermal impedance junction to case

| i | R _i | t _i |
|---|----------------|----------------|
| 1 | 0.033 | 0.0006 |
| 2 | 0.095 | 0.0039 |
| 3 | 0.164 | 0.033 |
| 4 | 0.258 | 0.272 |