



Standard Rectifier

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

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

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

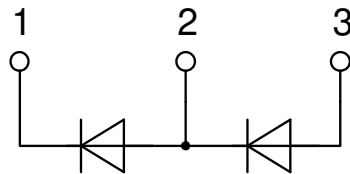
Phase leg

Part number

DSP45-16A



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

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| Rectifier | | | | Ratings | | | |
|------------|--|--|------------------------------|---------|------|-------------------|---|
| Symbol | Definition | Conditions | min. | typ. | max. | Unit | |
| V_{RSM} | max. non-repetitive reverse blocking voltage | | | | 1700 | V | |
| V_{RRM} | max. repetitive reverse blocking voltage | | | | 1600 | V | |
| I_R | reverse current | $V_R = 1600$ V | | | 40 | μ A | |
| | | $V_R = 1600$ V | | | 1.5 | mA | |
| V_F | forward voltage drop | $I_F = 45$ A | | | 1.26 | V | |
| | | $I_F = 90$ A | | | 1.57 | V | |
| | | $I_F = 45$ A | $T_{VJ} = 150^\circ\text{C}$ | | | 1.23 | V |
| | | $I_F = 90$ A | $T_{VJ} = 150^\circ\text{C}$ | | | 1.66 | 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 | | | 0.81 | V | |
| r_F | slope resistance | | | | 9.1 | m Ω | |
| R_{thJC} | thermal resistance junction to case | | | | 0.55 | K/W | |
| R_{thCH} | thermal resistance case to heatsink | | | 0.3 | | K/W | |
| P_{tot} | total power dissipation | | | | 270 | W | |
| I_{FSM} | max. forward surge current | t = 10 ms; (50 Hz), sine | $T_{VJ} = 45^\circ\text{C}$ | | 480 | A | |
| | | t = 8,3 ms; (60 Hz), sine | $V_R = 0$ V | | 520 | A | |
| | | t = 10 ms; (50 Hz), sine | $T_{VJ} = 150^\circ\text{C}$ | | 410 | A | |
| | | t = 8,3 ms; (60 Hz), sine | $V_R = 0$ V | | 440 | A | |
| I^2t | value for fusing | t = 10 ms; (50 Hz), sine | $T_{VJ} = 45^\circ\text{C}$ | | 1.15 | kA ² s | |
| | | t = 8,3 ms; (60 Hz), sine | $V_R = 0$ V | | 1.13 | kA ² s | |
| | | t = 10 ms; (50 Hz), sine | $T_{VJ} = 150^\circ\text{C}$ | | 840 | A ² s | |
| | | t = 8,3 ms; (60 Hz), sine | $V_R = 0$ V | | 805 | A ² s | |
| C_J | junction capacitance | $V_R = 400$ V; f = 1 MHz | $T_{VJ} = 25^\circ\text{C}$ | | 18 | pF | |



| Package TO-247 | | | 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 | | | | 6 | | g |
| M_D | mounting torque | | 0.8 | | 1.2 | Nm |
| F_C | mounting force with clip | | 20 | | 120 | N |

Product Marking

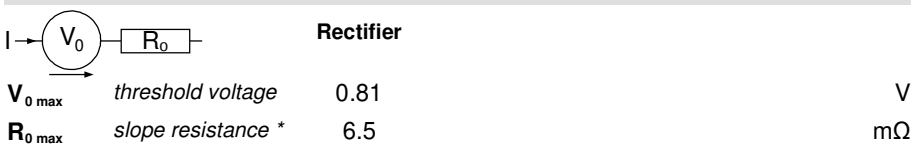


| Ordering | Ordering Number | Marking on Product | Delivery Mode | Quantity | Code No. |
|----------|-----------------|--------------------|---------------|----------|----------|
| Standard | DSP45-16A | DSP45-16A | Tube | 30 | 480665 |

| Similar Part | Package | Voltage class |
|--------------|------------------------|---------------|
| DSP45-16AZ | TO-268AA (D3Pak) (2HV) | 1600 |
| DSP45-16AR | ISOPLUS247 (3) | 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 $T_{VJ} = 175^{\circ}C$





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 | | 5.38 | |
| 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

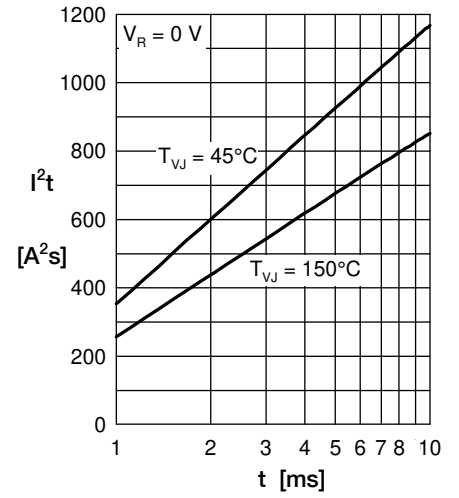


Fig. 3 I^2t versus time per diode



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

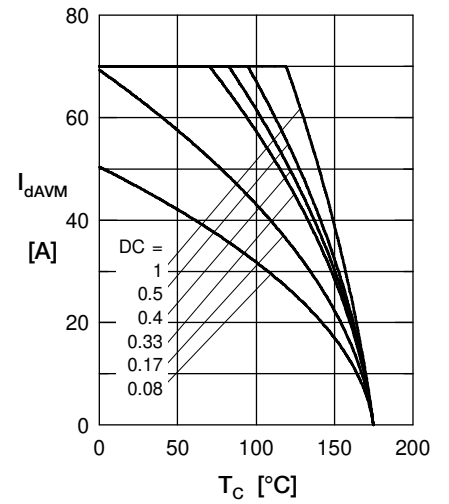


Fig. 5 Max. forward current vs. case temperature

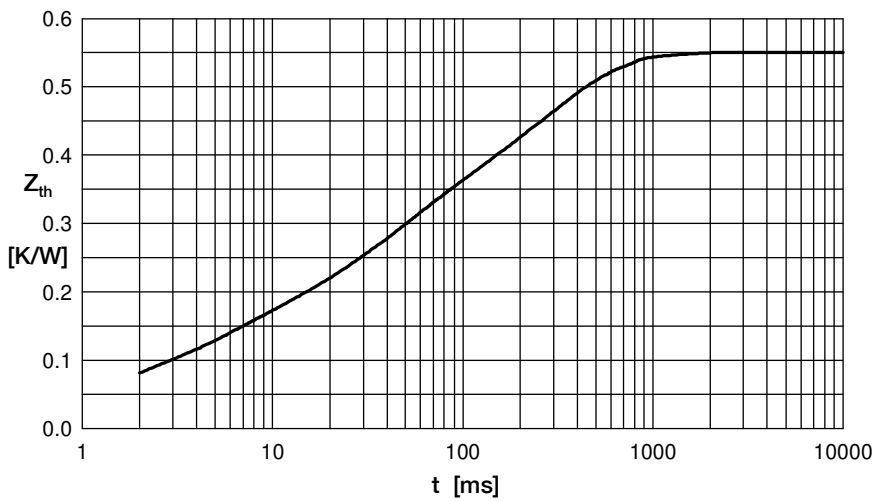


Fig. 6 Transient thermal impedance junction to case

| 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 |