

# High Efficiency Standard Rectifier

$$V_{RRM} = 2 \times 800 \text{ V}$$

$$I_{FAV} = 5 \text{ A}$$

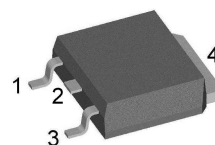
$$V_F = 1.12 \text{ V}$$

Phase leg

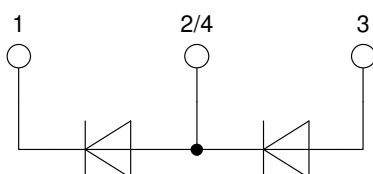
Part number

**DLA5P800UC**

Marking on Product: M5RLUP



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-252 (DPak)

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

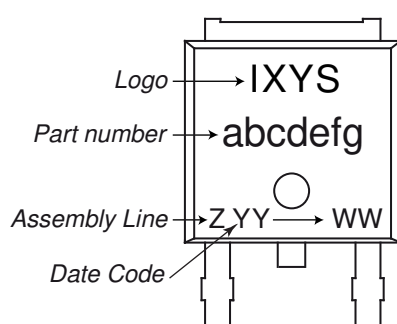
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| Rectifier  |                                              |                                                   |                                | Ratings |      |      |                  |
|------------|----------------------------------------------|---------------------------------------------------|--------------------------------|---------|------|------|------------------|
| Symbol     | Definition                                   | Conditions                                        |                                | min.    | typ. | max. | Unit             |
| $V_{RSM}$  | max. non-repetitive reverse blocking voltage | $T_{VJ} = 25^{\circ}\text{C}$                     |                                |         |      | 900  | V                |
| $V_{RRM}$  | max. repetitive reverse blocking voltage     | $T_{VJ} = 25^{\circ}\text{C}$                     |                                |         |      | 800  | V                |
| $I_R$      | reverse current                              | $V_R = 800\text{ V}$                              | $T_{VJ} = 25^{\circ}\text{C}$  |         |      | 5    | $\mu\text{A}$    |
|            |                                              | $V_R = 800\text{ V}$                              | $T_{VJ} = 150^{\circ}\text{C}$ |         |      | 0.05 | mA               |
| $V_F$      | forward voltage drop                         | $I_F = 5\text{ A}$                                | $T_{VJ} = 25^{\circ}\text{C}$  |         |      | 1.18 | V                |
|            |                                              | $I_F = 10\text{ A}$                               |                                |         |      | 1.38 | V                |
|            |                                              | $I_F = 5\text{ A}$                                | $T_{VJ} = 150^{\circ}\text{C}$ |         |      | 1.12 | V                |
|            |                                              | $I_F = 10\text{ A}$                               |                                |         |      | 1.41 | V                |
| $I_{FAV}$  | average forward current                      | $T_C = 155^{\circ}\text{C}$<br>180° sine          | $T_{VJ} = 175^{\circ}\text{C}$ |         |      | 5    | A                |
| $V_{F0}$   | threshold voltage                            | } for power loss calculation only                 | $T_{VJ} = 175^{\circ}\text{C}$ |         |      | 0.82 | V                |
| $r_F$      | slope resistance                             |                                                   |                                |         |      | 58   | m $\Omega$       |
| $R_{thJC}$ | thermal resistance junction to case          |                                                   |                                |         |      | 2.5  | K/W              |
| $R_{thCH}$ | thermal resistance case to heatsink          |                                                   |                                |         | 0.5  |      | K/W              |
| $P_{tot}$  | total power dissipation                      |                                                   | $T_C = 25^{\circ}\text{C}$     |         |      | 60   | W                |
| $I_{FSM}$  | max. forward surge current                   | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$  | $T_{VJ} = 45^{\circ}\text{C}$  |         |      | 70   | A                |
|            |                                              | $t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$ | $V_R = 0\text{ V}$             |         |      | 76   | A                |
|            |                                              | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$  | $T_{VJ} = 150^{\circ}\text{C}$ |         |      | 60   | A                |
|            |                                              | $t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$ | $V_R = 0\text{ V}$             |         |      | 64   | A                |
| $I^2t$     | value for fusing                             | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$  | $T_{VJ} = 45^{\circ}\text{C}$  |         |      | 25   | A <sup>2</sup> s |
|            |                                              | $t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$ | $V_R = 0\text{ V}$             |         |      | 24   | A <sup>2</sup> s |
|            |                                              | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$  | $T_{VJ} = 150^{\circ}\text{C}$ |         |      | 18   | A <sup>2</sup> s |
|            |                                              | $t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$ | $V_R = 0\text{ V}$             |         |      | 17   | A <sup>2</sup> s |
| $C_J$      | junction capacitance                         | $V_R = 400\text{ V}; f = 1\text{ MHz}$            | $T_{VJ} = 25^{\circ}\text{C}$  |         | 1    |      | pF               |

| Package TO-252 (DPak) |                              |              | Ratings |      |      |      |
|-----------------------|------------------------------|--------------|---------|------|------|------|
| Symbol                | Definition                   | Conditions   | min.    | typ. | max. | Unit |
| $I_{RMS}$             | RMS current                  | per terminal |         |      | 20   | A    |
| $T_{VJ}$              | virtual junction temperature |              | -55     |      | 175  | °C   |
| $T_{op}$              | operation temperature        |              | -55     |      | 150  | °C   |
| $T_{stg}$             | storage temperature          |              | -55     |      | 150  | °C   |
| <b>Weight</b>         |                              |              |         | 0.3  |      | g    |
| $F_c$                 | mounting force with clip     |              | 20      |      | 60   | N    |

### Product Marking



### Part description

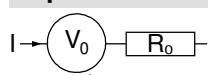
D = Diode  
 L = Low Voltage Standard Rectifier  
 A = (up to 1200V)  
 5 = Current Rating [A]  
 P = Phase leg  
 800 = Reverse Voltage [V]  
 UC = TO-252AA (DPak)

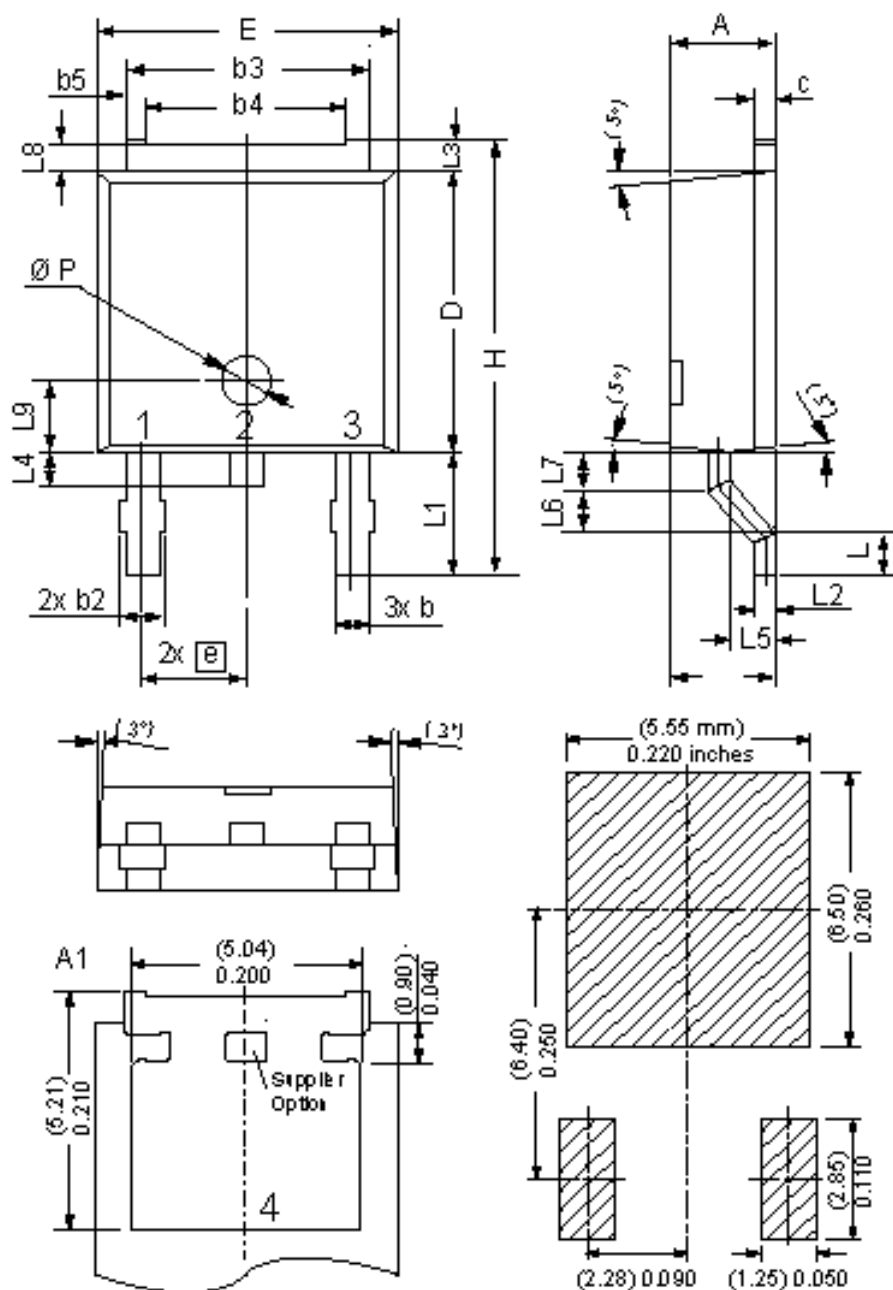
| Ordering    | Ordering Number | Marking on Product | Delivery Mode | Quantity | Code No. |
|-------------|-----------------|--------------------|---------------|----------|----------|
| Standard    | DLA5P800UC-TRL  | M5RLUP             | Tape & Reel   | 2500     | 511574   |
| Alternative | DLA5P800UC-TUB  | M5RLUP             | Tube          | 70       | 523442   |

### Equivalent Circuits for Simulation

\* on die level

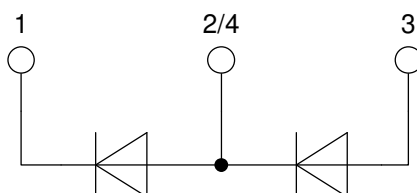
$T_{VJ} = 175\text{ °C}$

|                                                                                     |                    |                  |    |
|-------------------------------------------------------------------------------------|--------------------|------------------|----|
|  |                    | <b>Rectifier</b> |    |
| $V_{0\text{ max}}$                                                                  | threshold voltage  | 0.82             | V  |
| $R_{0\text{ max}}$                                                                  | slope resistance * | 55               | mΩ |

**Outlines TO-252 (DPak)**


| Dim | Millimeters |       | Inches    |       |
|-----|-------------|-------|-----------|-------|
|     | min         | max   | min       | max   |
| A   | 2.20        | 2.40  | 0.087     | 0.094 |
| A1  | 2.10        | 2.50  | 0.083     | 0.098 |
| b   | 0.66        | 0.86  | 0.026     | 0.034 |
| b2  | -           | 0.96  | -         | 0.038 |
| b3  | 5.04        | 5.64  | 0.198     | 0.222 |
| b4  | 4.34 BSC    |       | 0.171 BSC |       |
| b5  | 0.50 BSC    |       | 0.020 BSC |       |
| c   | 0.40        | 0.86  | 0.016     | 0.034 |
| D   | 5.90        | 6.30  | 0.232     | 0.248 |
| E   | 6.40        | 6.80  | 0.252     | 0.268 |
| e   | 2.10        | 2.50  | 0.083     | 0.098 |
| H   | 9.20        | 10.10 | 0.362     | 0.398 |
| L   | 0.55        | 1.28  | 0.022     | 0.050 |
| L1  | 2.50        | 2.90  | 0.098     | 0.114 |
| L2  | 0.40        | 0.60  | 0.016     | 0.024 |
| L3  | 0.50        | 0.90  | 0.020     | 0.035 |
| L4  | 0.60        | 1.00  | 0.024     | 0.039 |
| L5  | 0.82        | 1.22  | 0.032     | 0.048 |
| L6  | 0.79        | 0.99  | 0.031     | 0.039 |
| L7  | 0.81        | 1.01  | 0.032     | 0.040 |
| L8  | 0.40        | 0.80  | 0.016     | 0.031 |
| L9  | 1.50 BSC    |       | 0.059 BSC |       |
| Ø P | 1.00 BSC    |       | 0.039 BSC |       |

Recommended  
min. foot print



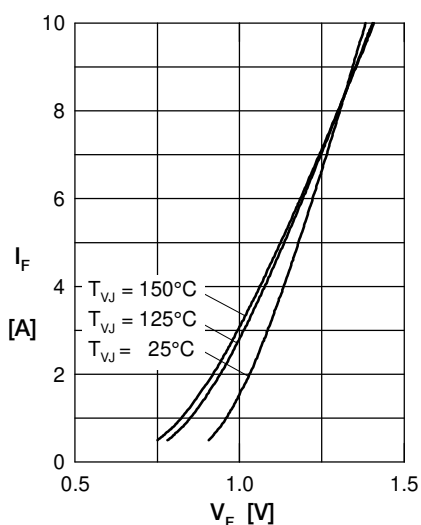
**Rectifier**


Fig. 1 Forward current versus voltage drop

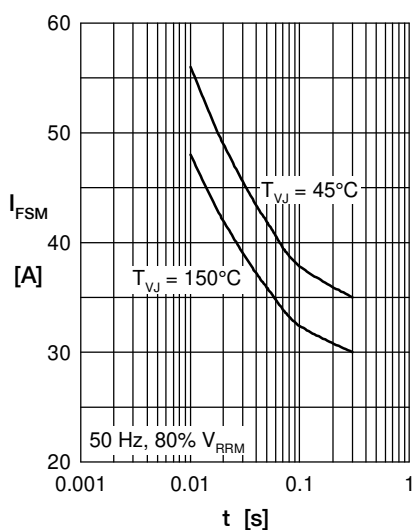


Fig. 2 Surge overload current

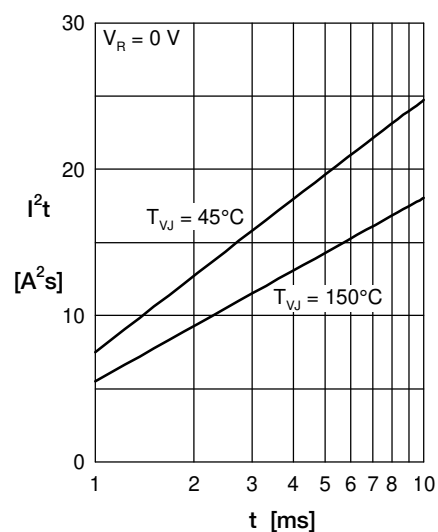
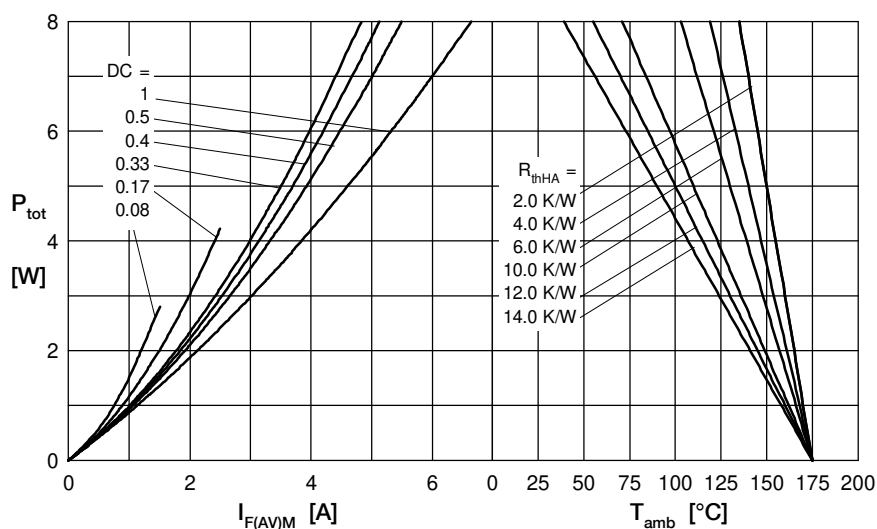

 Fig. 3  $I^2t$  versus time


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

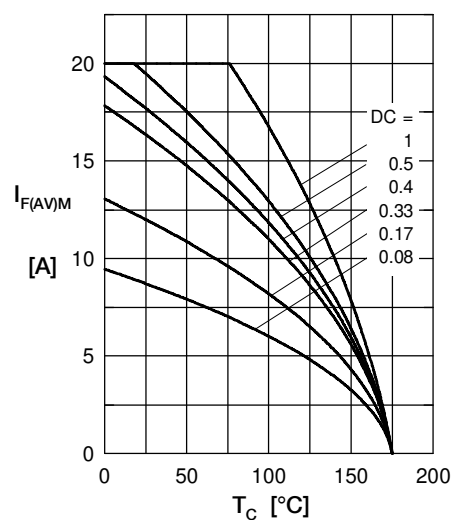


Fig. 5 Max. forward current vs. case temperature

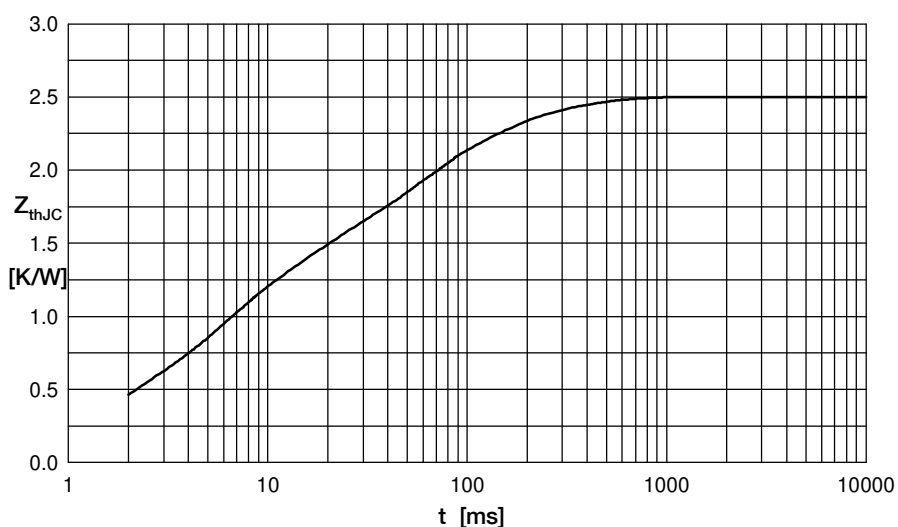


Fig. 6 Transient thermal impedance junction to case

 Constants for  $Z_{thJC}$  calculation:

| i | $R_{thi}$ (K/W) | $t_i$ (s) |
|---|-----------------|-----------|
| 1 | 1.1             | 0.005     |
| 2 | 0.06            | 0.0003    |
| 3 | 0.2             | 0.045     |
| 4 | 0.4             | 0.2       |
| 5 | 0.74            | 0.05      |