



S1DR

200 V, 1 A high power density, standard switching time PN-rectifier

10 January 2018

Product data sheet

1. General description

High power density, standard switching time PN-rectifier with high-efficiency planar technology, encapsulated in a small and flat lead SOD123W Surface-Mounted Device (SMD) plastic package.

2. Features and benefits

- Forward current $I_F \leq 1$ A
- Reverse voltage $V_R \leq 200$ V
- Standard switching time
- Low forward voltage
- Low reverse current
- Low inductance
- Small and flat lead SMD plastic package
- Package high typ. 1 mm
- High power capability due to clip-bond technology
- Planar die design
- Capable for reflow and wave soldering

3. Applications

- General-purpose rectification
- Reverse polarity protection
- Standard switching applications

4. Quick reference data

Table 1. Quick reference data


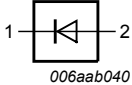
| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-------------|---------------------------------|---|-----|------|-----|---------|
| $I_{F(AV)}$ | average forward current | $\delta = 0.5$; $f = 20$ kHz; square wave; $T_{sp} \leq 140$ °C | - | - | 1 | A |
| V_{RRM} | repetitive peak reverse voltage | $T_j = 25$ °C | - | - | 200 | V |
| V_R | reverse voltage | | - | - | 200 | V |
| V_F | forward voltage | $I_F = 1$ A; pulsed; $T_j = 25$ °C | [1] | 880 | 960 | mV |
| | | $I_F = 1$ A; pulsed; $T_j = 125$ °C | [1] | 750 | 830 | mV |
| I_R | reverse current | $V_R = 200$ V; pulsed; $T_j = 25$ °C | [1] | 0.1 | 200 | nA |
| | | $V_R = 200$ V; pulsed; $T_j = 125$ °C | [1] | 0.03 | 20 | μ A |

[1] Very short pulse, in order to maintain a stable junction temperature.

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5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|-----|--------|-------------|---|--|
| 1 | K | cathode |  CFP3 (SOD123W) |  006aab040 |
| 2 | A | anode | | |

6. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|-------------|---------|--|---------|
| | Name | Description | Version |
| S1DR | CFP3 | plastic, surface mounted package; 2 terminals; 2.6 mm x 1.7 mm x 1 mm body | SOD123W |

7. Marking

Table 4. Marking codes

| Type number | Marking code |
|-------------|--------------|
| S1DR | KS |

8. Limiting values

Table 5. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

| Symbol | Parameter | Conditions | | Min | Max | Unit |
|-------------|-------------------------------------|---|-----|-----|------|------|
| V_{RRM} | repetitive peak reverse voltage | $T_j = 25\text{ °C}$ | | - | 200 | V |
| V_R | reverse voltage | | | - | 200 | V |
| V_{RMS} | RMS voltage | | | - | 140 | V |
| I_F | forward current | $\delta = 1$; $T_{sp} \leq 135\text{ °C}$ | | - | 1.4 | A |
| $I_{F(AV)}$ | average forward current | $\delta = 0.5$; $f = 20\text{ kHz}$; square wave; $T_{sp} \leq 140\text{ °C}$ | | - | 1 | A |
| I_{FSM} | non-repetitive peak forward current | $t_p = 8.3\text{ ms}$; $T_{j(\text{init})} = 25\text{ °C}$; single half sine wave (applied at rated load condition) | | - | 25 | A |
| P_{tot} | total power dissipation | $T_{amb} \leq 25\text{ °C}$ | [1] | - | 735 | mW |
| | | | [2] | - | 1.19 | W |
| T_j | junction temperature | | | - | 150 | °C |
| T_{amb} | ambient temperature | | | -55 | 150 | °C |
| T_{stg} | storage temperature | | | -65 | 150 | °C |

[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm².

9. Thermal characteristics

Table 6. Thermal characteristics

| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|----------------|--|-------------|-----|-----|-----|-----|------|
| $R_{th(j-a)}$ | thermal resistance from junction to ambient | in free air | [1] | - | - | 170 | K/W |
| | | | [2] | - | - | 105 | K/W |
| $R_{th(j-sp)}$ | thermal resistance from junction to solder point | | [3] | - | - | 15 | K/W |

[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm².

[3] Soldering point of cathode tab.

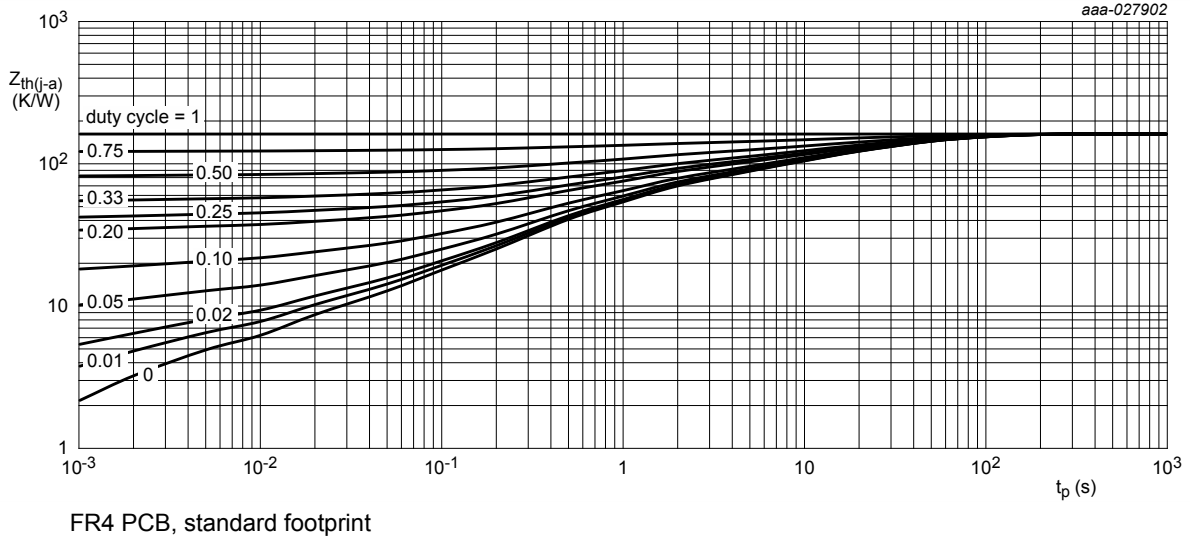


Fig. 1. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

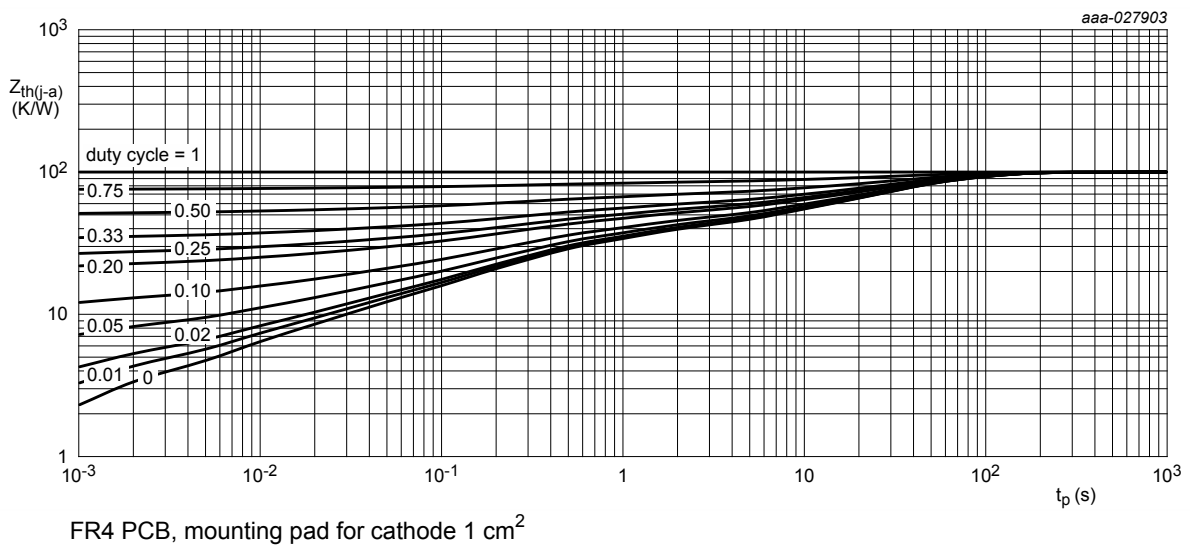


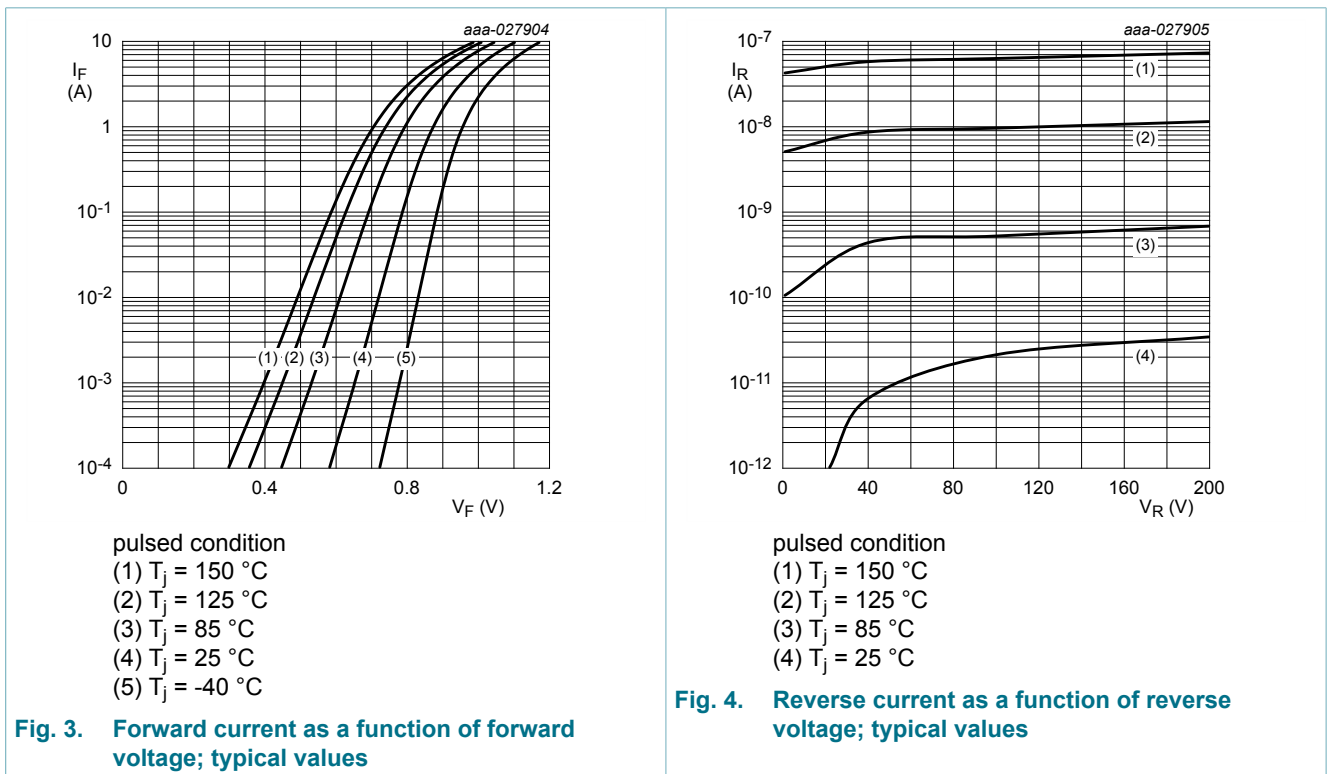
Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

10. Characteristics

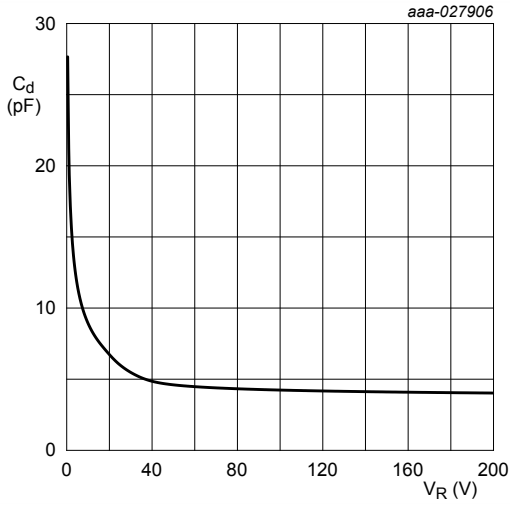
Table 7. Characteristics

| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|-------------|---------------------------------------|---|-----|-----|------|-----|---------------|
| $V_{(BR)R}$ | reverse breakdown voltage | $I_R = 100 \mu\text{A}$; pulsed; $T_j = 25 \text{ }^\circ\text{C}$ | [1] | 200 | - | - | V |
| V_F | forward voltage | $I_F = 1 \text{ A}$; pulsed; $T_j = 25 \text{ }^\circ\text{C}$ | [1] | - | 880 | 960 | mV |
| | | $I_F = 1 \text{ A}$; pulsed; $T_j = 125 \text{ }^\circ\text{C}$ | [1] | - | 750 | 830 | mV |
| I_R | reverse current | $V_R = 200 \text{ V}$; pulsed; $T_j = 25 \text{ }^\circ\text{C}$ | [1] | - | 0.1 | 200 | nA |
| | | $V_R = 200 \text{ V}$; pulsed; $T_j = 125 \text{ }^\circ\text{C}$ | [1] | - | 0.03 | 20 | μA |
| C_d | diode capacitance | $V_R = 4 \text{ V}$; $f = 1 \text{ MHz}$; $T_j = 25 \text{ }^\circ\text{C}$ | | - | 12 | - | pF |
| t_{rr} | reverse recovery time ; step recovery | $I_F = 0.5 \text{ A}$; $I_R = 1 \text{ A}$; $I_{R(\text{meas})} = 0.25 \text{ A}$; $T_j = 25 \text{ }^\circ\text{C}$ | | - | - | 1.8 | μs |

[1] Very short pulse, in order to maintain a stable junction temperature.

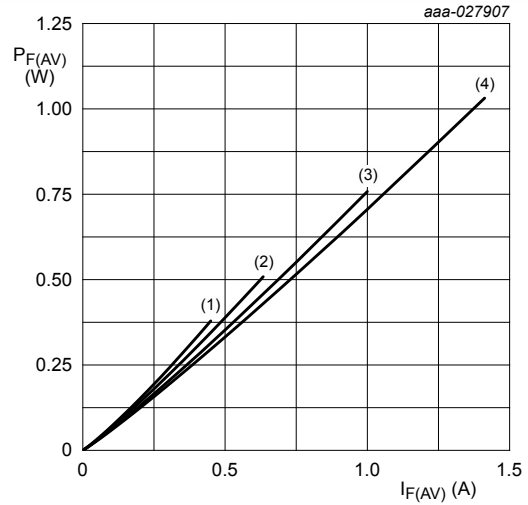


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$f = 1 \text{ MHz}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$

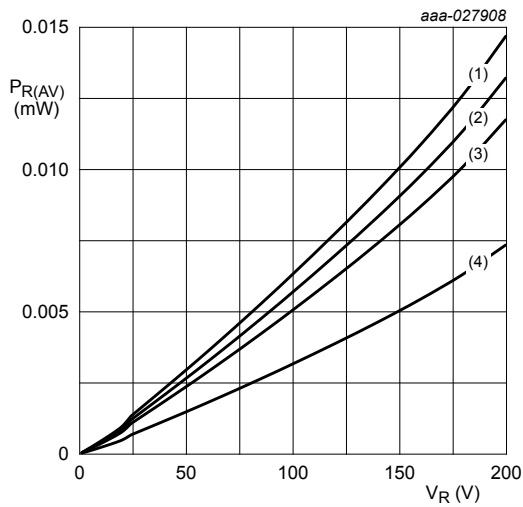
Fig. 5. Diode capacitance as a function of reverse voltage; typical values



$T_j = 150 \text{ }^\circ\text{C}$

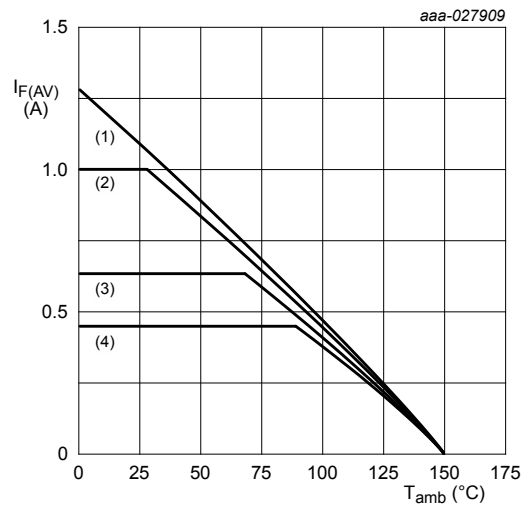
- (1) $\delta = 0.1$
- (2) $\delta = 0.2$
- (3) $\delta = 0.5$
- (4) $\delta = 1$; DC

Fig. 6. Average forward power dissipation as a function of average forward current; typical values



- $T_j = 150 \text{ }^\circ\text{C}$
- (1) $\delta = 1$; DC
- (2) $\delta = 0.9$
- (3) $\delta = 0.8$
- (4) $\delta = 0.5$

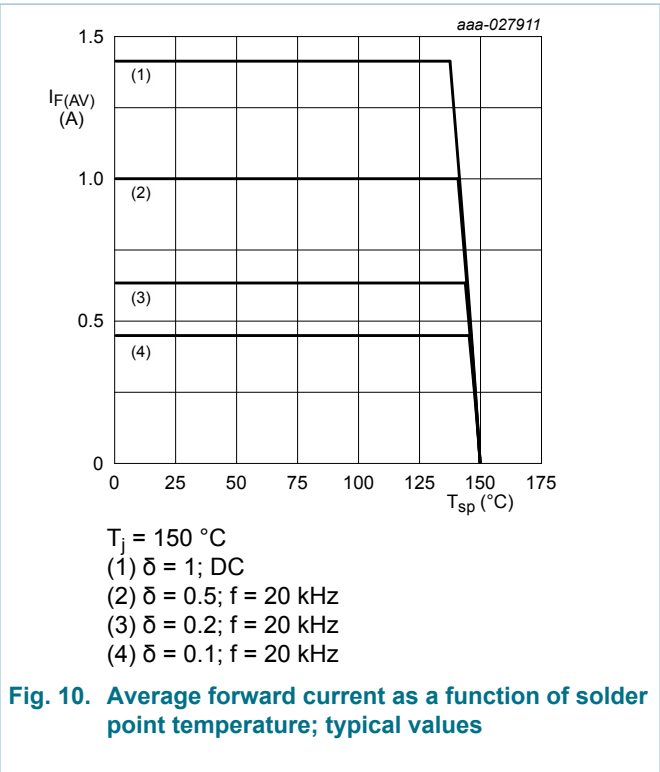
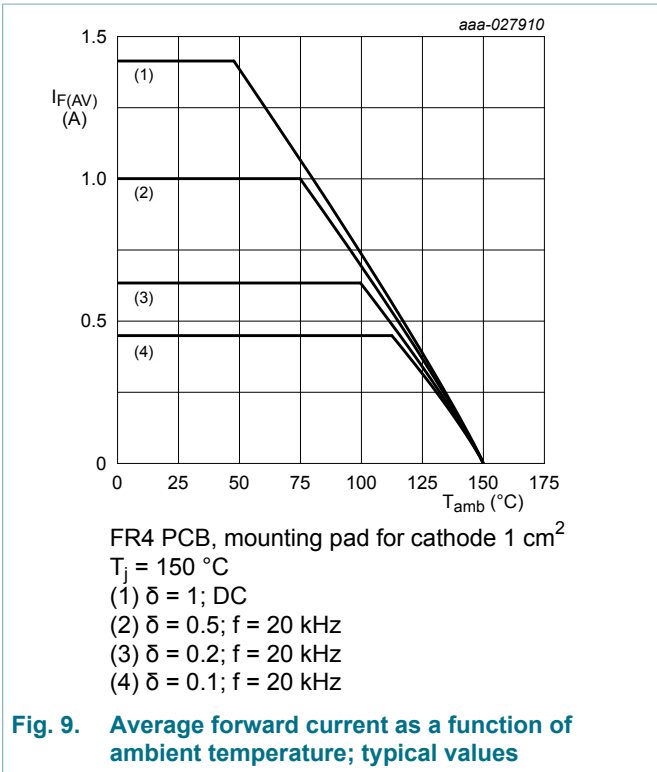
Fig. 7. Average reverse power dissipation as a function of reverse voltage; typical values



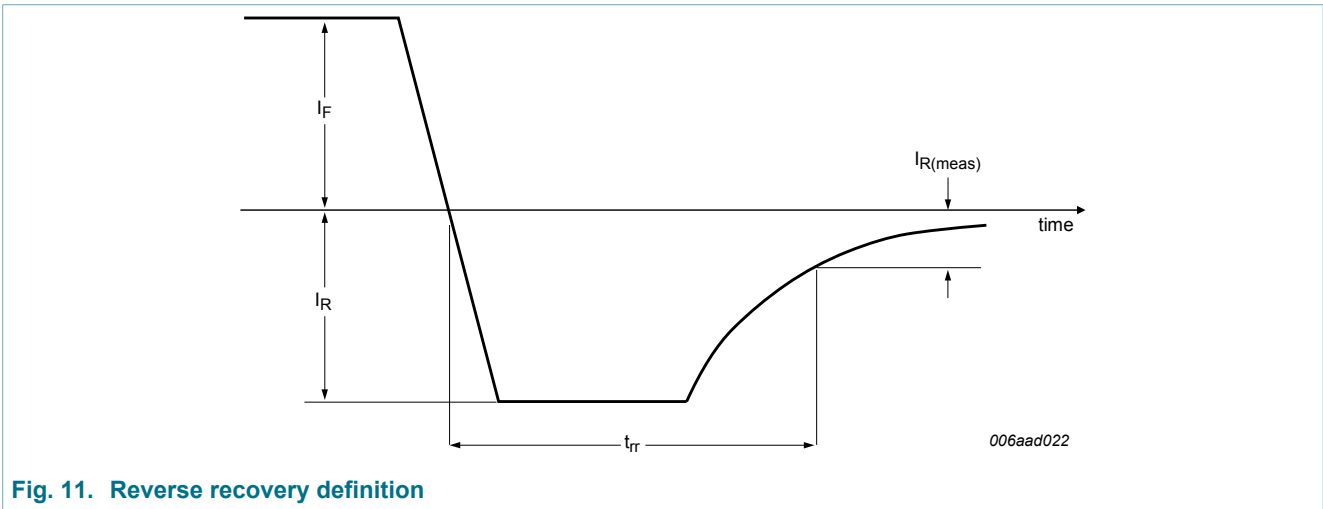
FR4 PCB, standard footprint

- $T_j = 150 \text{ }^\circ\text{C}$
- (1) $\delta = 1$; DC
- (2) $\delta = 0.5$; $f = 20 \text{ kHz}$
- (3) $\delta = 0.2$; $f = 20 \text{ kHz}$
- (4) $\delta = 0.1$; $f = 20 \text{ kHz}$

Fig. 8. Average forward current as a function of ambient temperature; typical values



11. Test information



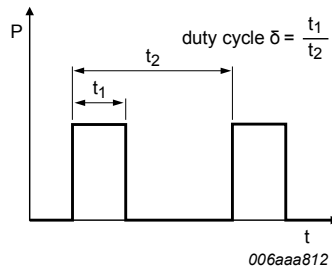


Fig. 12. Duty cycle definition

The current ratings for the typical waveforms are calculated according to the equations: $I_{F(AV)} = I_M \times \delta$ with I_M defined as peak current, $I_{RMS} = I_{F(AV)}$ at DC, and $I_{RMS} = I_M \times \sqrt{\delta}$ with I_{RMS} defined as RMS current.

12. Package outline

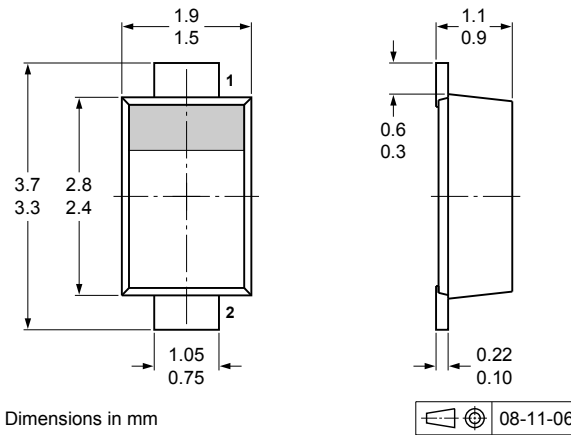


Fig. 13. Package outline CFP3 (SOD123W)

13. Soldering

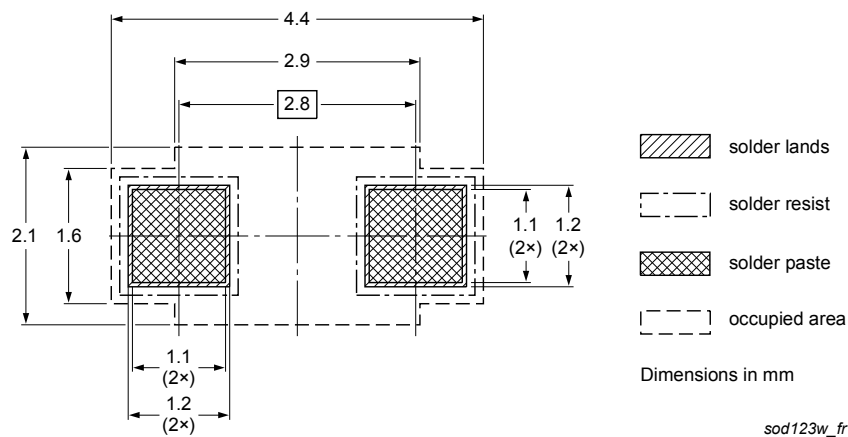


Fig. 14. Reflow soldering footprint for CFP3 (SOD123W)

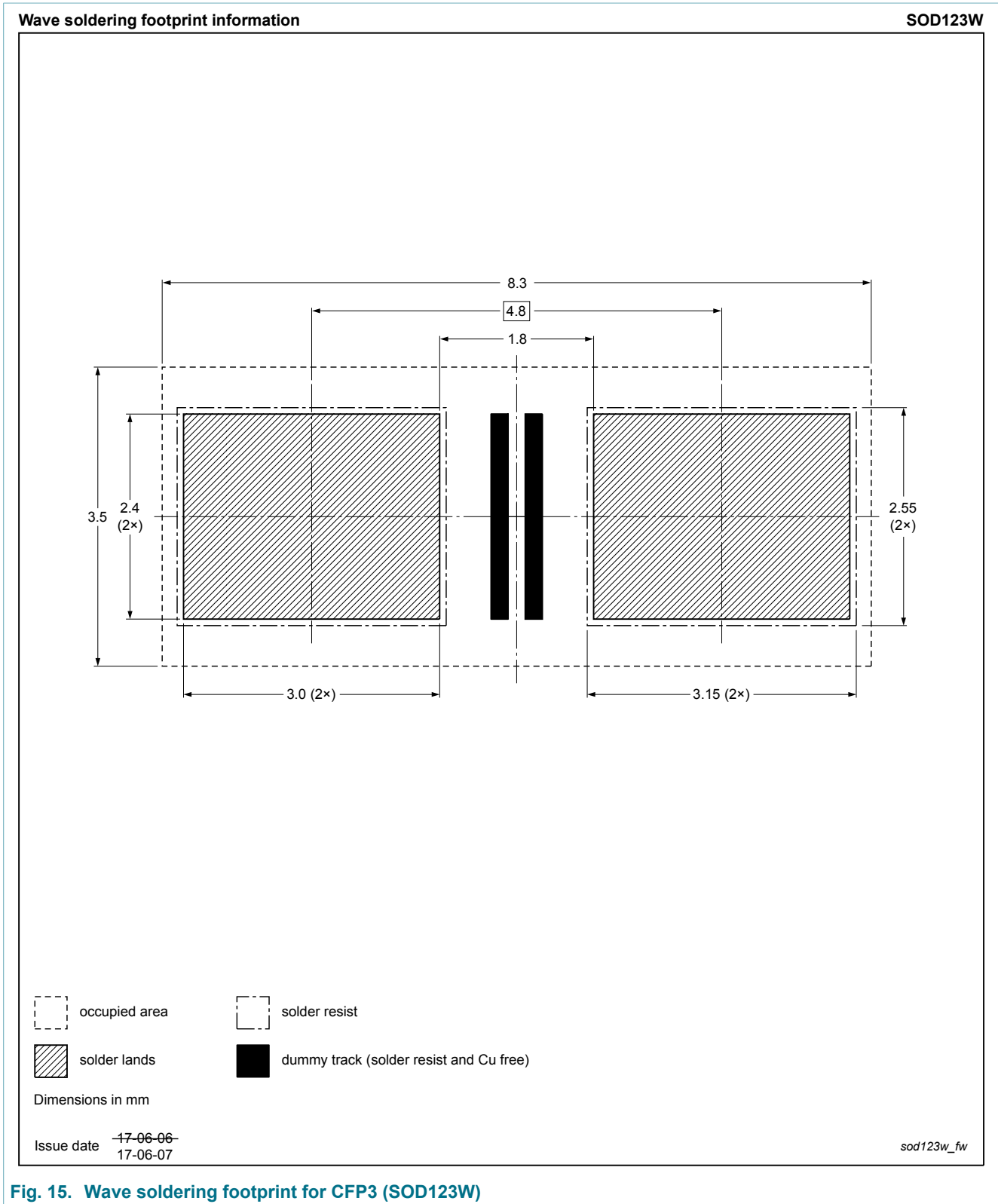


Fig. 15. Wave soldering footprint for CFP3 (SOD123W)

14. Revision history

Table 8. Revision history

| Data sheet ID | Release date | Data sheet status | Change notice | Supersedes |
|---------------|--------------|--------------------|---------------|------------|
| S1DR v.1 | 20180110 | Product data sheet | - | - |

15. Legal information

Data sheet status

| Document status [1][2] | Product status [3] | Definition |
|--------------------------------|--------------------|---|
| Objective [short] data sheet | Development | This document contains data from the objective specification for product development. |
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