



SZMM5Z series

Voltage regulator diodes

Rev. 1 — 10 December 2020

Product data sheet

1. General description

General-purpose Zener diodes in an SOD523 (SC-79) ultra small flat lead Surface-Mounted Device (SMD) plastic package.

2. Features and benefits

- Non-repetitive peak reverse power dissipation: ≤ 40 W
- Total power dissipation: ≤ 300 mW
- Tolerance series: $\pm 2\%$
- Wide working voltage range: nominal 2.4 V to 36 V
- Low differential resistance
- AEC-Q101 qualified

3. Applications

- General regulation functions

4. Quick reference data

Table 1. Quick reference data

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-----------|---|----------------|-----|-----|-----|------|
| V_F | forward voltage | $I_F = 100$ mA | [1] | - | 1.1 | V |
| P_{ZSM} | non-repetitive peak reverse power dissipation | | [2] | - | 40 | W |

[1] Pulse test: $t_p \leq 300$ μ s; $\delta \leq 0.02$

[2] $t_p = 100$ μ s; square wave; $T_j = 25$ °C before surge

5. Pinning information

Table 2. Pinning

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|-----|--------|-------------|--------------------|----------------|
| 1 | K | cathode[1] | | |
| 2 | A | anode | | |

[1] The marking bar indicates the cathode.

6. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|---|---------|--|---------|
| | Name | Description | Version |
| SZMM5Z2V4T5G to SZMM5Z36VT5G ^[1] | SC-79 | plastic surface-mounted package; 2 leads | SOD523 |

[1] The series consists of 29 types with nominal working voltages from 2.4 V to 36 V.

7. Marking

Table 4. Marking Codes

| Type number | Marking Code | Type number | Marking Code |
|--------------|--------------|--------------|--------------|
| SZMM5Z2V4T5G | C1 | SZMM5Z10VT5G | E6 |
| SZMM5Z2V7T5G | C2 | SZMM5Z11VT5G | E7 |
| SZMM5Z3V0T5G | C3 | SZMM5Z12VT5G | E8 |
| SZMM5Z3V3T5G | C4 | SZMM5Z13VT5G | E9 |
| SZMM5Z3V6T5G | C5 | SZMM5Z15VT5G | E0 |
| SZMM5Z3V9T5G | C6 | SZMM5Z16VT5G | EA |
| SZMM5Z4V3T5G | C7 | SZMM5Z18VT5G | EB |
| SZMM5Z4V7T5G | C8 | SZMM5Z20VT5G | EC |
| SZMM5Z5V1T5G | C9 | SZMM5Z22VT5G | ED |
| SZMM5Z5V6T5G | C0 | SZMM5Z24VT5G | EE |
| SZMM5Z6V2T5G | E1 | SZMM5Z27VT5G | EF |
| SZMM5Z6V8T5G | E2 | SZMM5Z30VT5G | EG |
| SZMM5Z7V5T5G | E3 | SZMM5Z33VT5G | EH |
| SZMM5Z8V2T5G | E4 | SZMM5Z36VT5G | EK |
| SZMM5Z9V1T5G | E5 | - | - |

8. Limiting values

Table 5. Limiting values

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

| Symbol | Parameter | Conditions | Min | Max | Unit |
|-----------|---|--|-----|------|------------------|
| I_F | forward current | | - | 200 | mA |
| P_{ZSM} | non-repetitive peak reverse power dissipation | $t_p = 100 \mu\text{s}$; square wave; $T_{amb} = 25 \text{ }^\circ\text{C}$; prior to surge | - | 40 | W |
| P_{tot} | total power dissipation | $T_{amb} = 25 \text{ }^\circ\text{C}$ | [1] | 300 | mW |
| T_j | junction temperature | | - | 150 | $^\circ\text{C}$ |
| T_{amb} | ambient temperature | | -55 | +150 | $^\circ\text{C}$ |
| T_{stg} | storage temperature | | -65 | +150 | $^\circ\text{C}$ |

[1] Device mounted on an FR4 Printed-Circuit Board (PCB) with approximately 35 mm^2 Cu area at cathode tab

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] | - | - | 350 | K/W |
| $R_{th(j-sp)}$ | thermal resistance from junction to solder point | [2] | - | - | 65 | K/W |

[1] Device mounted on an FR4 Printed-Circuit Board (PCB) with approximately 35 mm^2 Cu area at cathode tab

[2] Soldering point of cathode tab

10. Characteristics

Table 7. Electrical characteristics

$T_j = 25 \text{ }^\circ\text{C}$ unless otherwise specified.

| Symbol | Parameter | Conditions | Max | Unit | |
|--------|-----------------|------------------------|-----|------|---|
| V_F | forward voltage | $I_F = 10 \text{ mA}$ | [1] | 0.9 | V |
| | | $I_F = 100 \text{ mA}$ | [1] | 1.1 | V |

[1] Pulse test: $t_p \leq 300 \mu\text{s}$; $\delta \leq 0.02$

Table 8. Electrical characteristics per type: SZMM5Z2V4T5G to SZMM5Z24VT5G

 $T_j = 25\text{ °C}$ unless otherwise specified.

| SZMM5ZxxxT5G | Working voltage V_Z (V) | | Reverse current I_R (μ A) | | Differential resistance r_{diff} (Ω) | | Temperature coefficient S_Z (mV/K) | | Diode capacitance C_d (pF)[1] |
|--------------|------------------------------|-------|-------------------------------------|-----------|--|---------------------|---|------|------------------------------------|
| | $I_Z = 5\text{ mA}$ | | Max | V_R (V) | $I_Z = 1\text{ mA}$ | $I_Z = 5\text{ mA}$ | $I_Z = 5\text{ mA}$ | | |
| | Min | Max | | | Max | Max | Min | Max | |
| 2V4 | 2.35 | 2.45 | 50.0 | 1.0 | 400 | 100 | -3.5 | 0 | 450 |
| 2V7 | 2.65 | 2.75 | 20.0 | 1.0 | 450 | 100 | -3.5 | 0 | 440 |
| 3V0 | 2.94 | 3.06 | 10.0 | 1.0 | 500 | 95 | -3.5 | 0 | 425 |
| 3V3 | 3.23 | 3.37 | 5.0 | 1.0 | 500 | 95 | -3.5 | 0 | 410 |
| 3V6 | 3.53 | 3.67 | 5.0 | 1.0 | 500 | 90 | -3.5 | 0 | 390 |
| 3V9 | 3.82 | 3.98 | 3.0 | 1.0 | 500 | 90 | -3.5 | 0 | 370 |
| 4V3 | 4.21 | 4.39 | 3.0 | 1.0 | 600 | 90 | -3.5 | 0 | 350 |
| 4V7 | 4.61 | 4.79 | 3.0 | 2.0 | 500 | 80 | -3.5 | 0.2 | 325 |
| 5V1 | 5.00 | 5.20 | 2.0 | 2.0 | 480 | 60 | -2.7 | 1.2 | 300 |
| 5V6 | 5.49 | 5.71 | 1.0 | 2.0 | 400 | 40 | -2.0 | 2.5 | 275 |
| 6V2 | 6.08 | 6.32 | 3.0 | 4.0 | 150 | 10 | 0.4 | 3.7 | 250 |
| 6V8 | 6.66 | 6.94 | 2.0 | 4.0 | 80 | 15 | 1.2 | 4.5 | 215 |
| 7V5 | 7.35 | 7.65 | 1.0 | 5.0 | 80 | 10 | 2.5 | 5.3 | 170 |
| 8V2 | 8.04 | 8.36 | 0.7 | 5.0 | 80 | 10 | 3.2 | 6.2 | 150 |
| 9V1 | 8.92 | 9.28 | 0.5 | 6.0 | 100 | 10 | 3.8 | 7.0 | 120 |
| 10V | 9.80 | 10.20 | 0.2 | 7.0 | 150 | 10 | 4.5 | 8.0 | 110 |
| 11V | 10.78 | 11.22 | 0.1 | 8.0 | 150 | 10 | 5.4 | 9.0 | 110 |
| 12V | 11.76 | 12.24 | 0.1 | 8.0 | 150 | 10 | 6.0 | 10.0 | 105 |
| 13V | 12.74 | 13.26 | 0.1 | 8.0 | 170 | 10 | 7.0 | 11.0 | 105 |
| 15V | 14.70 | 15.30 | 0.05 | 10.5 | 200 | 15 | 9.2 | 13.0 | 100 |
| 16V | 15.68 | 16.32 | 0.05 | 11.2 | 200 | 40 | 10.4 | 14.0 | 90 |
| 18V | 17.64 | 18.36 | 0.05 | 12.6 | 225 | 45 | 12.4 | 16.0 | 80 |
| 20V | 19.60 | 20.40 | 0.05 | 14.0 | 225 | 55 | 14.4 | 18.0 | 70 |
| 22V | 21.56 | 22.44 | 0.05 | 15.4 | 250 | 55 | 16.4 | 20.0 | 60 |
| 24V | 23.52 | 24.48 | 0.05 | 16.8 | 250 | 70 | 18.4 | 22.0 | 55 |

[1] $f = 1\text{ MHz}$; $V_R = 0\text{ V}$

Table 9. Electrical characteristics per type: SZMM5Z27VT5G to SZMM5Z36VT5G

$T_j = 25\text{ }^\circ\text{C}$ unless otherwise specified.

| SZMM5ZxxxT5G | Working voltage V_Z (V) | | Reverse current I_R (μA) | | Differential resistance r_{diff} (Ω) | | Temperature coefficient S_Z (mV/K) | | Diode capacitance C_d (pF)[1] |
|--------------|---------------------------|-------|---|-----------|--|---------------------|--------------------------------------|------|---------------------------------|
| | $I_Z = 2\text{ mA}$ | | Max | V_R (V) | $I_Z = 0.5\text{ mA}$ | $I_Z = 2\text{ mA}$ | $I_Z = 2\text{ mA}$ | | |
| | Min | Max | | | Max | Max | Min | Max | |
| 27V | 26.46 | 27.54 | 0.05 | 18.9 | 300 | 80 | 21.4 | 25.3 | 50 |
| 30V | 29.40 | 30.60 | 0.05 | 21.0 | 300 | 80 | 24.4 | 29.4 | 50 |
| 33V | 32.34 | 33.66 | 0.05 | 23.1 | 325 | 80 | 27.4 | 33.4 | 45 |
| 36V | 35.28 | 36.72 | 0.05 | 25.2 | 350 | 90 | 30.4 | 37.4 | 45 |

[1] $f = 1\text{ MHz}$; $V_R = 0\text{ V}$

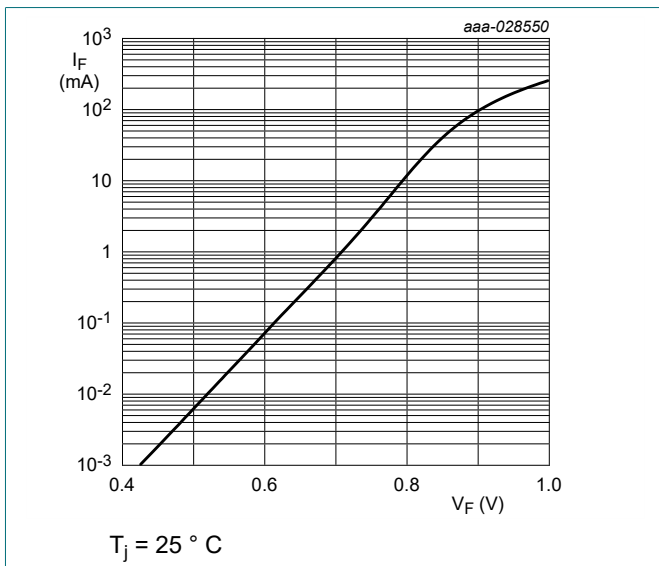


Fig. 1. Forward current as a function of forward voltage; typical values (SZMM5Z27V4T5G)

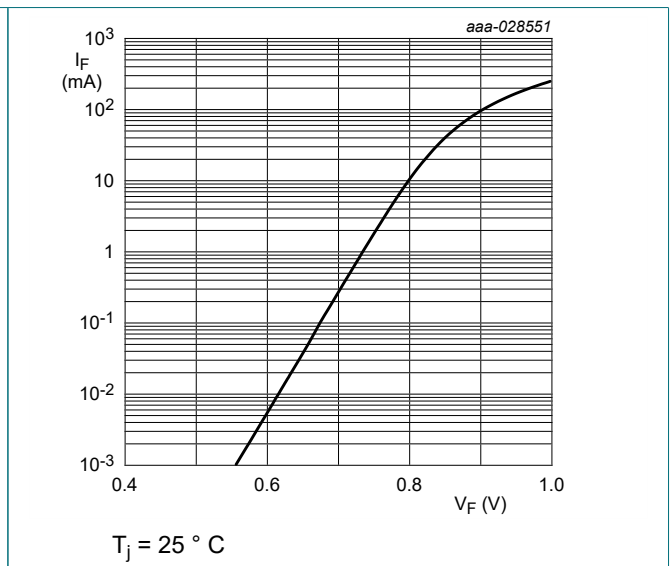


Fig. 2. Forward current as a function of forward voltage; typical values (SZMM5Z26V8T5G)

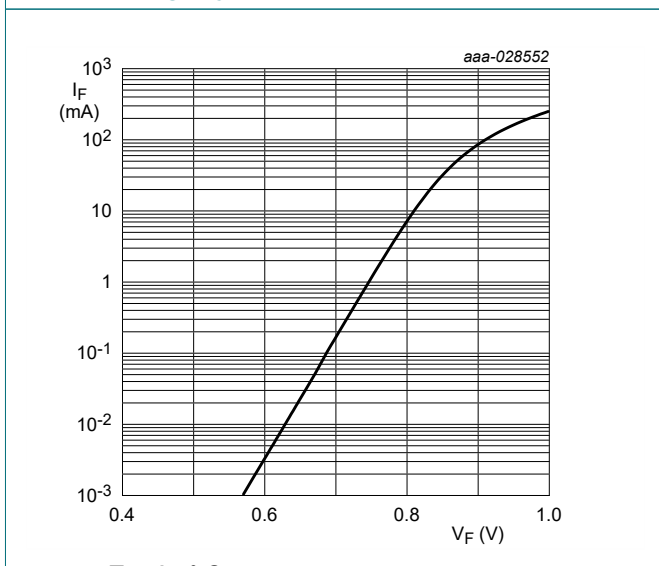


Fig. 3. Forward current as a function of forward voltage; typical values (SZMM5Z27V5T5G)

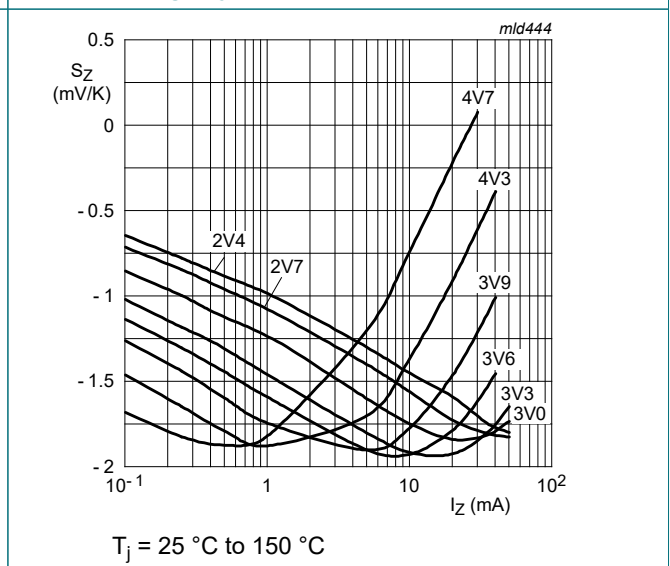
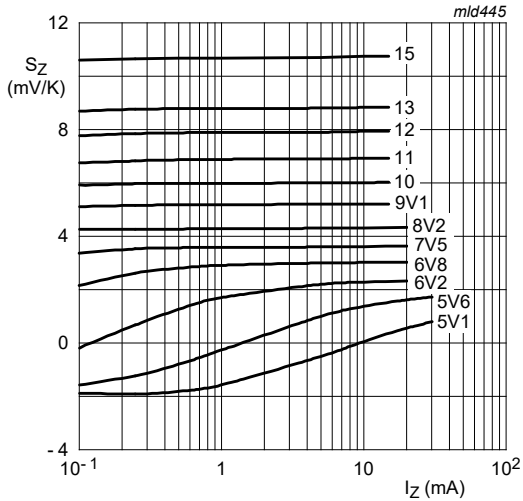
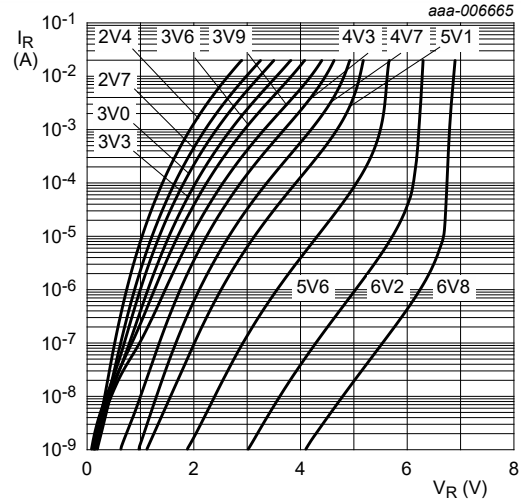


Fig. 4. Temperature coefficient as a function of working current; typical values (SZMM5Z27V4T5G to 4V7T5G)



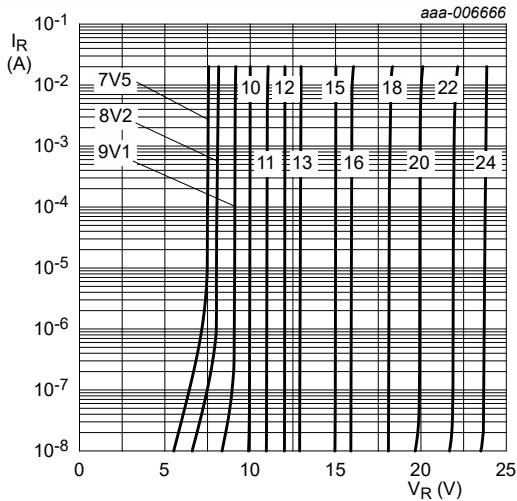
$T_j = 25\text{ }^\circ\text{C}$ to $150\text{ }^\circ\text{C}$

Fig. 5. Temperature coefficient as a function of working current; typical values (SZMM5Z5V1T5G to 15VT5G)



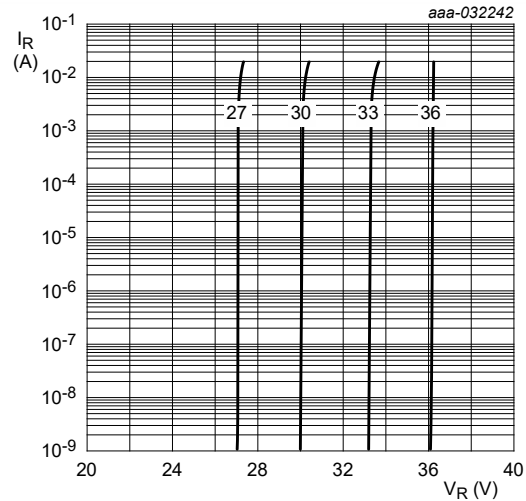
$T_j = 25\text{ }^\circ\text{C}$

Fig. 6. Reverse current as a function of reverse voltage; typical values (SZMM5Z2V4T5G to 6V8T5G)



$T_j = 25\text{ }^\circ\text{C}$

Fig. 7. Reverse current as a function of reverse voltage; typical values (SZMM5Z7V5T5G to 24VT5G)



$T_j = 25\text{ }^\circ\text{C}$

Fig. 8. Reverse current as a function of reverse voltage; typical values (SZMM5Z27VT5G to 36VT5G)

11. Test information

Quality information

This product has been qualified in accordance with the Automotive Electronics Council (AEC) standard Q101 - Stress test qualification for discrete semiconductors, and is suitable for use in automotive applications.

12. Package outline

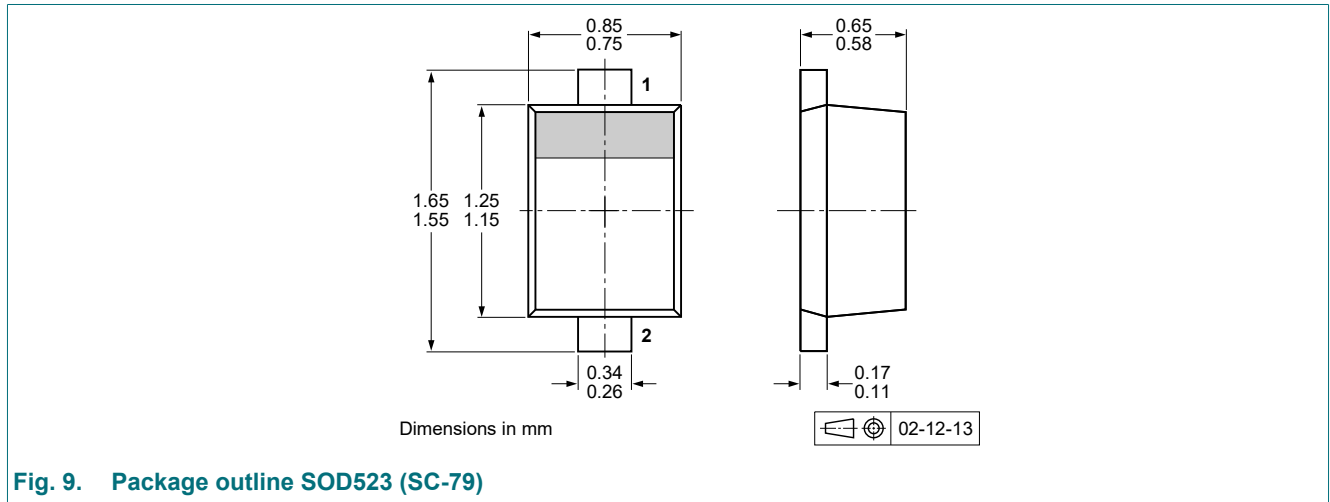


Fig. 9. Package outline SOD523 (SC-79)

13. Soldering

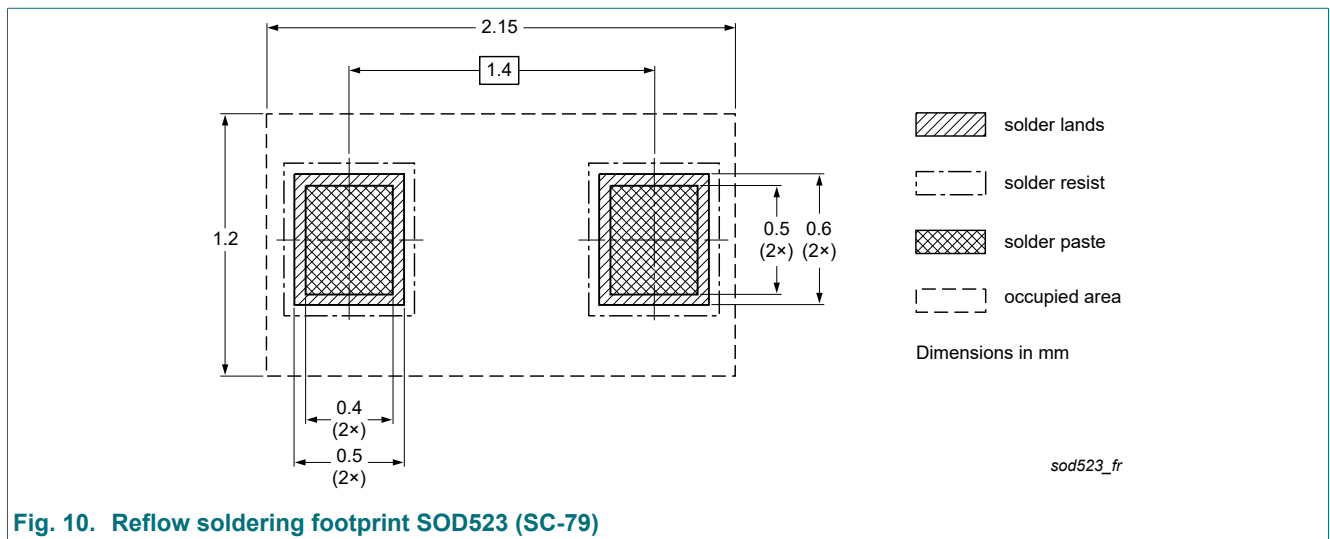


Fig. 10. Reflow soldering footprint SOD523 (SC-79)

14. Revision history

Table 10. Revision history

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|----------------|--------------|--------------------|---------------|------------|
| SZMM5Z_SER v.1 | 20201210 | 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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