

MM3Z12VT1GX Datasheet

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DiGi Electronics Part Number	MM3Z12VT1GX-DG
Manufacturer	Nexperia USA Inc.
Manufacturer Product Number	MM3Z12VT1GX
Description	VOLTAGE REGULATOR DIODES
Detailed Description	Zener Diode 12 V 300 mW ±5% Surface Mount SOD-323

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Manufacturer Product Number:

MM3Z12VT1GX

Series:

MM3Z

Voltage - Zener (Nom) (Vz):

12 V

Power - Max:

300 mW

Current - Reverse Leakage @ Vr:

100 nA @ 9 V

Operating Temperature:

150°C (TJ)

Package / Case:

SC-76, SOD-323

Manufacturer:

Nexperia USA Inc.

Product Status:

Active

Tolerance:

±5%

Impedance (Max) (Zzt):

10 Ohms

Voltage - Forward (Vf) (Max) @ If:

1.1 V @ 100 mA

Mounting Type:

Surface Mount

Supplier Device Package:

SOD-323

Environmental & Export classification

RoHS Status:

ROHS3 Compliant

REACH Status:

REACH Unaffected

HTSUS:

8541.10.0050

Moisture Sensitivity Level (MSL):

1 (Unlimited)

ECCN:

EAR99



MM3Z series

Voltage regulator diodes

Rev. 2 — 21 February 2023

Product data sheet

1. General description

General-purpose Zener diodes in a very small SOD323 (SC-76) 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: Approximately $\pm 5\%$
- Wide working voltage range: nominal 2.4 V to 75 V
- Low differential resistance

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
MM3Z2V4T1G to MM3Z75VT1G ^[1]	SC-76	plastic surface-mounted package; 2 leads	SOD323

[1] The series consists of 37 types with nominal working voltages from 2.4 V to 75 V.

7. Marking

Table 4. Marking Codes

Type number	Marking Code	Type number	Marking Code
MM3Z2V4T1G	X8	MM3Z15VT1G	VV
MM3Z2V7T1G	X9	MM3Z16VT1G	VZ
MM3Z3V0T1G	XT	MM3Z18VT1G	X4
MM3Z3V3T1G	XW	MM3Z20VT1G	XC
MM3Z3V6T1G	XZ	MM3Z22VT1G	XG
MM3Z3V9T1G	ME	MM3Z24VT1G	XM
MM3Z4V3T1G	MM	MM3Z27VT1G	DK
MM3Z4V7T1G	MS	MM3Z30VT1G	DL
MM3Z5V1T1G	MW	MM3Z33VT1G	DM
MM3Z5V6T1G	LF	MM3Z36VT1G	DN
MM3Z6V2T1G	LL	MM3Z39VT1G	DP
MM3Z6V8T1G	LR	MM3Z43VT1G	DR
MM3Z7V5T1G	LV	MM3Z47VT1G	DS
MM3Z8V2T1G	LZ	MM3Z51VT1G	DT
MM3Z9V1T1G	CU	MM3Z56VT1G	DU
MM3Z10VT1G	VA	MM3Z62VT1G	DV
MM3Z11VT1G	VE	MM3Z68VT1G	DW
MM3Z12VT1G	VK	MM3Z75VT1G	DX
MM3Z13VT1G	VP	-	-

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), single-sided copper, tin-plated and standard footprint.

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]	-	-	415	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point	[2]	-	-	110	K/W

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

[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: MM3Z2V4T1G to MM3Z24VT1G

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

MM3ZxxxT1G	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]
	$I_Z = 5\text{ mA}$		Max	V_R (V)	$I_Z = 0.5\text{ mA}$	$I_Z = 5\text{ mA}$	$I_Z = 5\text{ mA}$		
	Min	Max			Max	Max	Min	Max	
2V4	2.30	2.60	50.0	1.0	1000	100	-3.5	0	450
2V7	2.50	2.90	20.0	1.0	1000	100	-3.5	0	440
3V0	2.80	3.20	10.0	1.0	1000	95	-3.5	0	425
3V3	3.10	3.50	5.0	1.0	1000	95	-3.5	0	410
3V6	3.40	3.80	5.0	1.0	1000	90	-3.5	0	390
3V9	3.70	4.10	3.0	1.0	1000	90	-3.5	0	370
4V3	4.01	4.48	3.0	1.0	1000	90	-3.5	0	350
4V7	4.42	4.90	2.0	1.0	800	80	-3.5	0.2	325
5V1	4.84	5.37	2.0	1.5	250	60	-2.7	1.2	300
5V6	5.31	5.92	1.0	2.5	100	40	-2.0	2.5	275
6V2	5.86	6.53	0.5	3.0	80	30	0.4	3.7	250
6V8	6.47	7.14	0.5	3.5	60	20	1.2	4.5	215
7V5	7.06	7.84	0.5	4.0	60	10	2.5	5.3	170
8V2	7.76	8.64	0.5	5.0	60	10	3.2	6.2	150
9V1	8.56	9.55	0.5	6.0	60	10	3.8	7.0	120
10V	9.45	10.55	0.1	7.0	60	10	4.5	8.0	110
11V	10.44	11.56	0.1	8.0	60	10	5.4	9.0	108
12V	11.42	12.60	0.1	9.0	80	10	6.0	10.0	105
13V	12.47	13.96	0.1	10.0	80	10	7.0	11.0	103
15V	13.84	15.52	0.05	11.0	80	15	9.2	13.0	99
16V	15.37	17.09	0.05	12.0	80	20	10.4	14.0	97
18V	16.94	19.03	0.05	13.0	80	20	12.4	16.0	93
20V	18.86	21.08	0.05	15.0	100	20	14.4	18.0	88
22V	20.88	23.17	0.05	17.0	100	25	16.4	20.0	84
24V	22.93	25.57	0.05	19.0	120	30	18.4	22.0	80

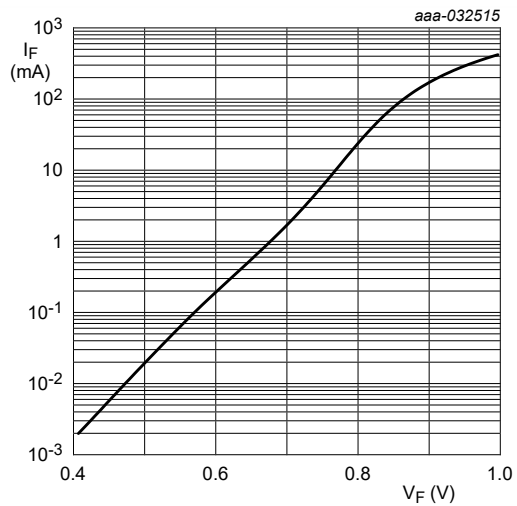
[1] $f = 1\text{ MHz}$; $V_R = 0\text{ V}$

Table 9. Electrical characteristics per type: MM3Z27VT1G to MM3Z75VT1G

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

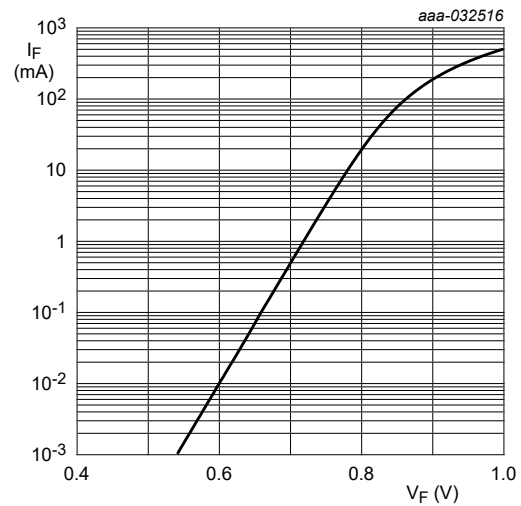
MM3ZxxxT1G	Working voltage V_Z (V)		Reverse current I_R (μ A)		Differential resistance r_{diff} (Ω)		Temperature coefficient S_Z (mV/K)		Diode capacitance C_d (pF)[1]
	$I_Z = 2\text{ mA}$		Max	V_R (V)	$I_Z = 0.5\text{ mA}$	$I_Z = 2\text{ mA}$	$I_Z = 2\text{ mA}$		
	Min	Max			Max	Max	Min	Max	
27V	25.10	28.90	0.05	18.9	300	80	21.4	25.3	50
30V	28.00	32.00	0.05	21.0	300	80	24.4	29.4	50
33V	31.00	35.00	0.05	23.1	325	80	27.4	33.4	45
36V	34.00	38.00	0.05	25.2	350	90	30.4	37.4	45
39V	37.00	41.00	0.05	27.3	350	130	33.4	41.2	45
43V	40.00	46.00	0.05	30.1	375	150	37.6	46.6	40
47V	44.00	50.00	0.05	32.9	375	170	42.0	51.8	40
51V	48.00	54.00	0.05	35.7	400	180	46.6	57.2	40
56V	52.00	60.00	0.05	39.2	425	200	52.2	63.8	40
62V	58.00	66.00	0.05	43.4	450	215	58.8	71.6	35
68V	64.00	72.00	0.05	47.6	475	240	65.6	79.8	35
75V	70.00	79.00	0.05	52.5	500	255	73.4	88.6	35

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



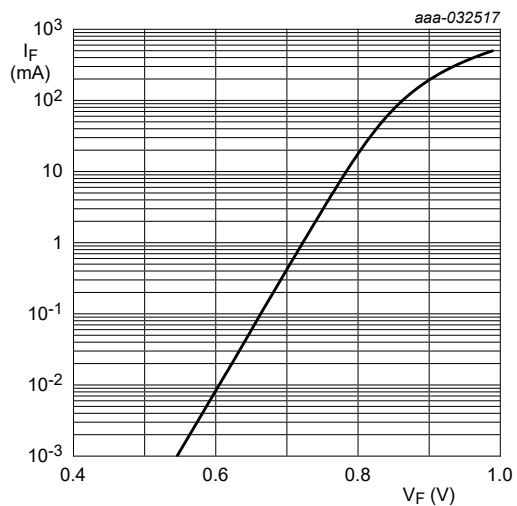
$T_j = 25^\circ\text{C}$

Fig. 1. Forward current as a function of forward voltage; typical values (MM3Z2V4T1G)



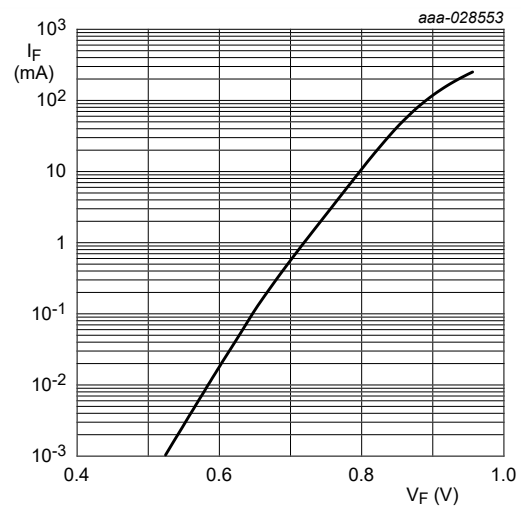
$T_j = 25^\circ\text{C}$

Fig. 2. Forward current as a function of forward voltage; typical values (MM3Z6V8T1G)



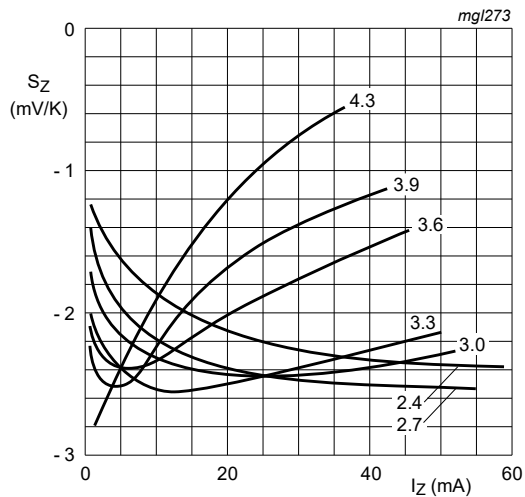
$T_j = 25^\circ\text{C}$

Fig. 3. Forward current as a function of forward voltage; typical values (MM3Z7V5T1G)



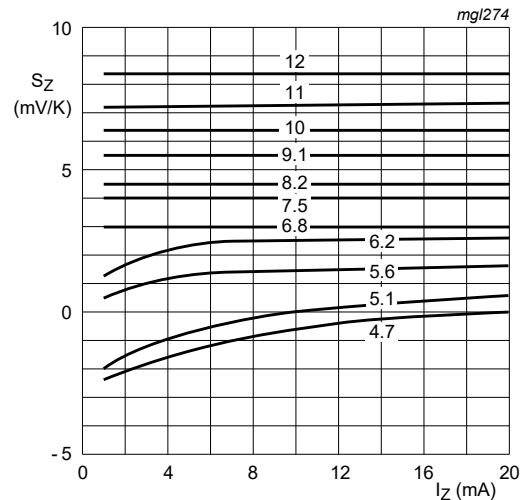
$T_j = 25^\circ\text{C}$

Fig. 4. Forward current as a function of forward voltage; typical values (MM3Z75VT1G)



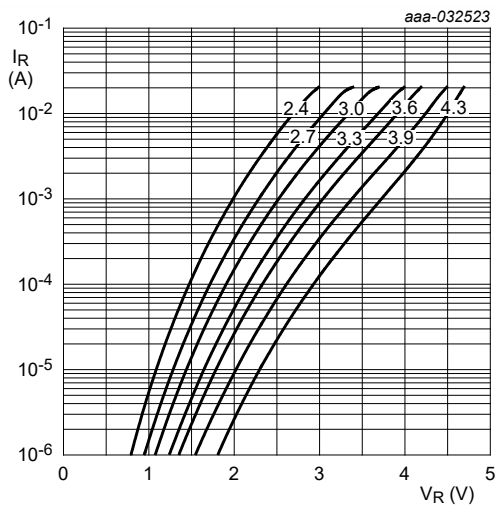
$T_j = 25\text{ °C to }150\text{ °C}$
 $V_Z = 2.4\text{ V to }4.3\text{ V}$

Fig. 5. Temperature coefficient as a function of working current; typical values (MM3Z2V4T1G to 4V3T1G)



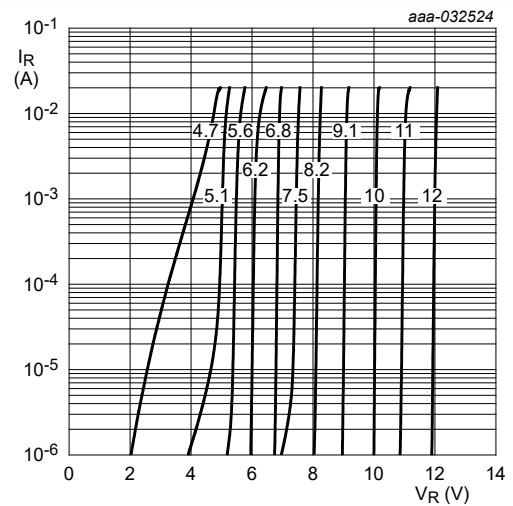
$T_j = 25\text{ °C to }150\text{ °C}$
 $V_Z = 4.7\text{ V to }12\text{ V}$

Fig. 6. Temperature coefficient as a function of working current; typical values (MM3Z4V7T1G to 12VT1G)



$T_j = 25\text{ °C}$

Fig. 7. Reverse current as a function of reverse voltage; typical values (MM3Z2V4T1G to 4V3T1G)



$T_j = 25\text{ °C}$

Fig. 8. Reverse current as a function of reverse voltage; typical values (MM3Z4V7T1G to 12VT1G)

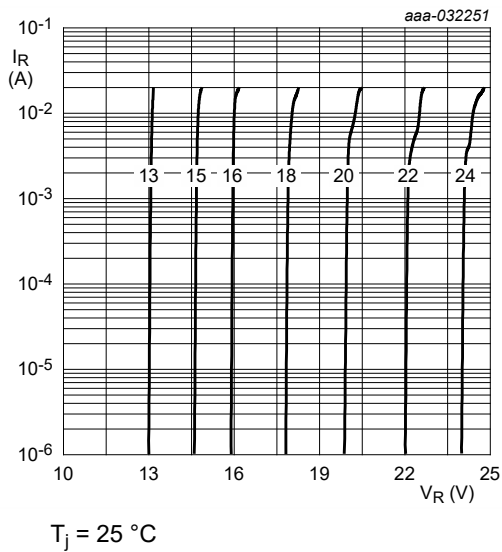


Fig. 9. Reverse current as a function of reverse voltage; typical values (MM3Z13VT1G to 24VT1G)

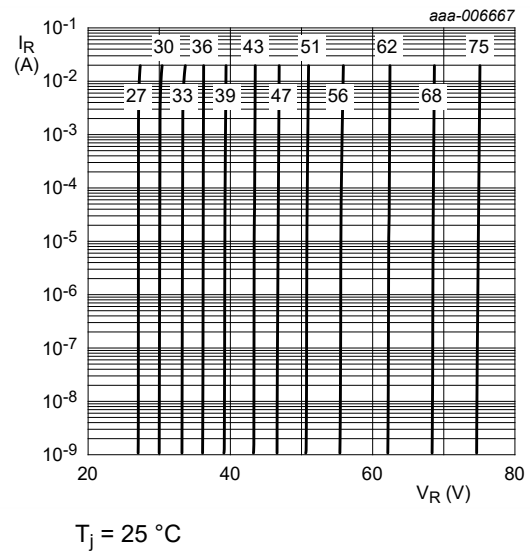


Fig. 10. Reverse current as a function of reverse voltage; typical values (MM3Z27VT1G to 75VT1G)

11. Package outline

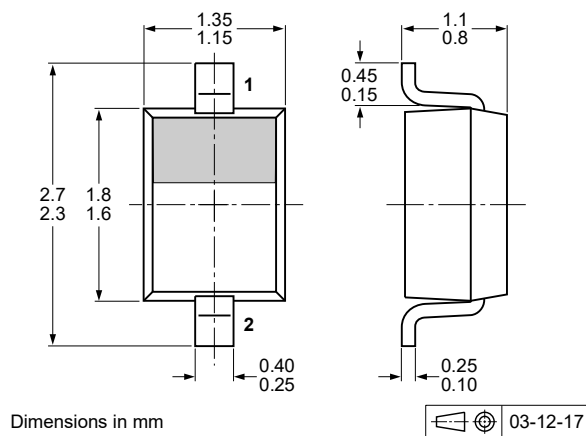


Fig. 11. Package outline SOD323 (SC-76)

12. Soldering

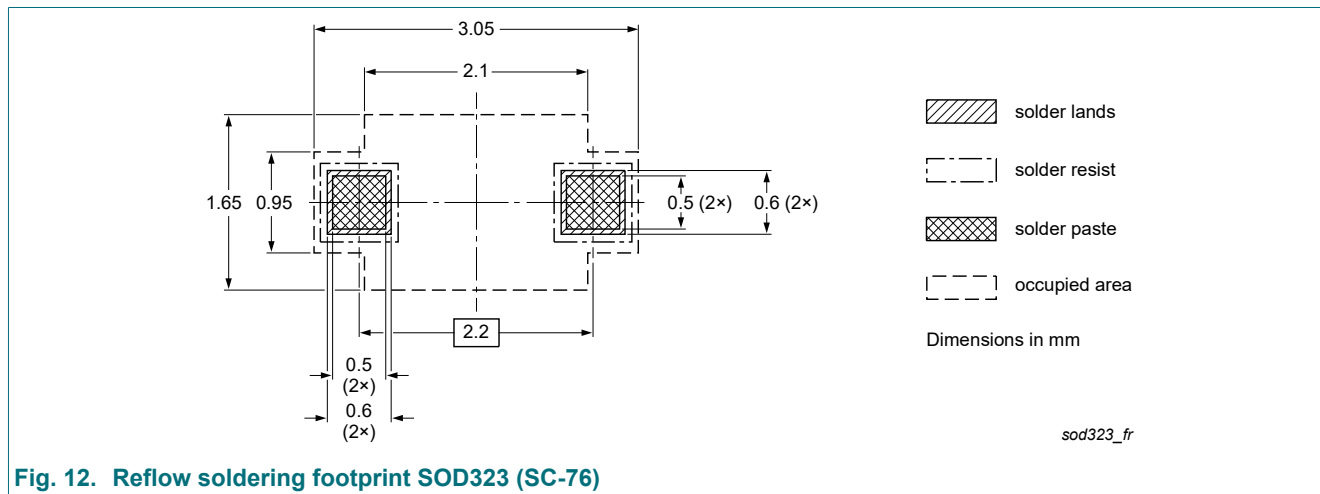


Fig. 12. Reflow soldering footprint SOD323 (SC-76)

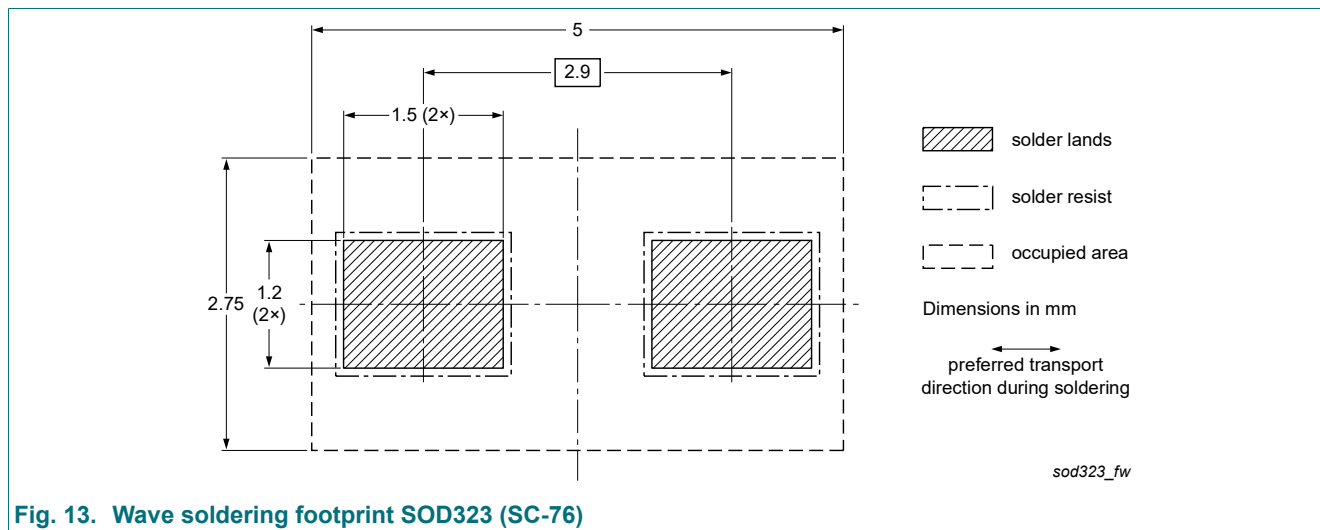


Fig. 13. Wave soldering footprint SOD323 (SC-76)

13. Revision history

Table 10. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
MM3Z_SER v.2	20230221	Product data sheet	-	MM3Z_SER v.1
Modifications:	• Limiting values: Tolerance changed			
MM3Z_SER v.1	20210407	Product data sheet	-	-

14. 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.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

- [1] Please consult the most recently issued document before initiating or completing a design.
- [2] The term 'short data sheet' is explained in section "Definitions".
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Contents

1. General description.....	1
2. Features and benefits.....	1
3. Applications.....	1
4. Quick reference data.....	1
5. Pinning information.....	1
6. Ordering information.....	2
7. Marking.....	2
8. Limiting values.....	3
9. Thermal characteristics.....	3
10. Characteristics.....	3
11. Package outline.....	8
12. Soldering.....	9
13. Revision history.....	10
14. Legal information.....	11

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