



# PZU84-Q series

Zener voltage regulator diodes

Rev. 4 — 16 August 2024

Product data sheet

## 1. General description

General-purpose Zener diodes in a small SOT23 Surface-Mounted Device (SMD) plastic package.

## 2. Features and benefits

- Two tolerance series:  $\pm 2\%$  and approximately  $\pm 5\%$
- Wide working voltage range: nominal 2.4 V to 51 V (E24 range)
- PZU84-B5V1-Q to -C10-Q: Very low dynamic impedances at low currents, very low leakage current, hard breakdown knee
- PZU84-B11-Q to -C51-Q: Intentional minor rise of leakage current for optimized fast switching and noise reduction [Ref. [AN90031](#)]
- Qualified according to AEC-Q101 and recommended for use in automotive applications

## 3. Applications

- General regulation functions

## 4. Quick reference data

Table 1. Quick reference data

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_F$	forward voltage	$I_F = 10\text{ mA}$ [1]	-	-	0.9	V
$P_{tot}$	total power dissipation	[2]	-	-	250	mW
$P_{ZSM}$	non-repetitive peak reverse power dissipation	[3]	-	-	40	W

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

[2] Device mounted on a FR4 PCB, single-sided 70  $\mu\text{m}$  copper, tin-plated and standard footprint.

[3]  $t_p = 100\text{ }\mu\text{s}$ ; square wave;  $T_j = 25\text{ }^{\circ}\text{C}$  prior to surge.

## 5. Pinning information

Table 2. Pinning

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	A	anode		
2	n.c.	not connected		
3	K	cathode		

## 6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PZU84-Q series [1]	SOT23	plastic, surface-mounted package; 3 terminals; 1.9 mm pitch; 2.9 mm x 1.3 mm x 1 mm body	SOT23

[1] The series includes 34 breakdown voltages with nominal working voltages from 2.4 V to 51 V and  $\pm 2\%$  and approximately  $\pm 5\%$  tolerances.

## 7. Marking

Table 4. Marking Codes

Type number	Marking code	Type number	Marking code	Type number	Marking code	Type number	Marking code
PZU84-B2V7-Q	%RC	PZU84-B15-Q	%RY	PZU84-C2V4-Q	H4%	PZU84-C15-Q	%LU
PZU84-B3V0-Q	%RD	PZU84-B16-Q	%RZ	PZU84-C2V7-Q	H5%	PZU84-C16-Q	%LV
PZU84-B3V3-Q	%RE	PZU84-B18-Q	S4%	PZU84-C3V0-Q	H6%	PZU84-C18-Q	%LX
PZU84-B3V6-Q	%RF	PZU84-B20-Q	S5%	PZU84-C3V3-Q	%HV	PZU84-C20-Q	%LY
PZU84-B3V9-Q	%RG	PZU84-B22-Q	%SJ	PZU84-C3V6-Q	%HX	PZU84-C22-Q	%LZ
PZU84-B4V3-Q	%RH	PZU84-B24-Q	%SK	PZU84-C3V9-Q	%HY	PZU84-C24-Q	%M2
PZU84-B4V7-Q	%RJ	PZU84-B27-Q	%SL	PZU84-C4V3-Q	%HZ	PZU84-C27-Q	%MM
PZU84-B5V1-Q	%RK	PZU84-B30-Q	%SM	PZU84-C4V7-Q	%JJ	PZU84-C30-Q	%MQ
PZU84-B5V6-Q	%RL	PZU84-B33-Q	%SN	PZU84-C5V1-Q	%JQ	PZU84-C33-Q	N4%
PZU84-B6V2-Q	%RM	PZU84-B36-Q	%SP	PZU84-C5V6-Q	%JS	PZU84-C36-Q	NB%
PZU84-B6V8-Q	%RN	PZU84-B39-Q	%SQ	PZU84-C6V2-Q	%JT	PZU84-C39-Q	%NN
PZU84-B7V5-Q	%RP	PZU84-B43-Q	%SR	PZU84-C6V8-Q	%KQ	PZU84-C43-Q	%NP
PZU84-B8V2-Q	%RQ	PZU84-B47-Q	%SS	PZU84-C7V5-Q	%KU	PZU84-C47-Q	%NQ
PZU84-B9V1-Q	%RR	PZU84-B51-Q	%ST	PZU84-C8V2-Q	%KV	PZU84-C51-Q	%NU
PZU84-B10-Q	%RS	-	-	PZU84-C9V1-Q	%KY	-	-
PZU84-B11-Q	%RT	-	-	PZU84-C10-Q	%LJ	-	-
PZU84-B12-Q	%RU	-	-	PZU84-C11-Q	%LQ	-	-
PZU84-B13-Q	%RV	-	-	PZU84-C12-Q	%LS	-	-
PZU84-B14-Q	%RX	-	-	PZU84-C13-Q	%LT	-	-

## 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
$P_{tot}$	total power dissipation	$T_{amb} = 25\text{ °C}$	[1]	-	250	mW
$P_{ZSM}$	non-repetitive peak reverse power dissipation		[2]	-	40	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 a FR4 PCB, single-sided 70 µm copper, tin-plated and standard footprint.

[2]  $t_p = 100\text{ µs}$ ; square wave;  $T_j = 25\text{ °C}$  prior to surge.

## 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]	-	-	500	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point	[2]	-	-	330	K/W

[1] Device mounted on a FR4 PCB, single-sided 70 µm copper, tin-plated and standard footprint.

[2] Soldering point of cathode tab.

## 10. Characteristics

**Table 7. Characteristics**

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

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

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

Table 8. Characteristics per type; PZU84-C2V4-Q to PZU84-C36-Q

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

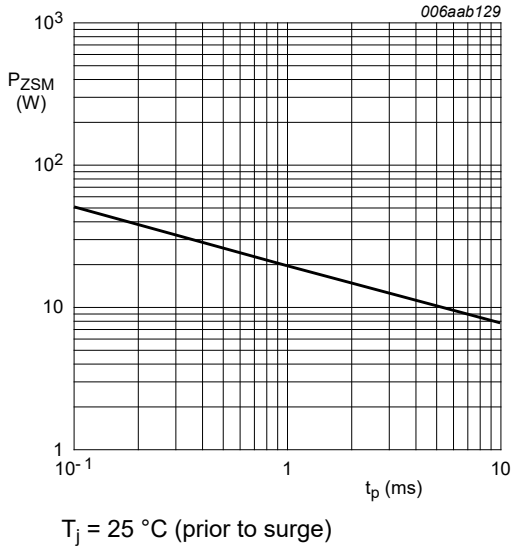
PZU84-xxx-Q	Sel	Working voltage $V_Z$ (V)		Differential resistance $r_{dif}$ ( $\Omega$ )		Reverse current $I_R$ ( $\mu$ A)		Temperature coefficient $S_Z$ (mV/K)		Diode capacitance $C_d$ (pF)
		$I_Z = 5\text{ mA}$		$I_Z = 0.5\text{ mA}$	$I_Z = 5\text{ mA}$	Max	$V_R$ (V)	$I_Z = 5\text{ mA}$		$f = 1\text{ MHz}$ $V_R = 0\text{ V}$
		Min	Max	Max	Max			Min	Max	Max
2V4	C	2.30	2.60	1000	100	50	1.0	-3.5	0.0	450
2V7	B	2.65	2.90	1000	100	20	1.0	-3.5	0.0	440
	C	2.50	2.90							
3V0	B	2.95	3.20	1000	95	10	1.0	-3.5	0.0	425
	C	2.80	3.20							
3V3	B	3.25	3.50	1000	95	5	1.0	-3.5	0.0	410
	C	3.10	3.50							
3V6	B	3.55	3.80	1000	90	5	1.0	-3.5	0.0	390
	C	3.40	3.80							
3V9	B	3.87	4.10	1000	90	3	1.0	-3.5	0.0	370
	C	3.70	4.10							
4V3	B	4.15	4.34	1000	90	3	1.0	-3.5	0.0	350
	C	4.01	4.48							
4V7	B	4.55	4.75	800	80	2	1.0	-3.5	0.2	325
	C	4.42	4.90							
5V1	B	4.98	5.20	250	60	2	1.5	-2.7	1.2	300
	C	4.80	5.40							
5V6	B	5.49	5.73	100	40	1	2.5	-2.0	2.5	275
	C	5.31	5.92							
6V2	B	6.06	6.33	80	30	0.5	3.0	0.4	3.7	250
	C	5.86	6.53							
6V8	B	6.65	6.93	60	20	0.5	3.5	1.2	4.5	215
	C	6.47	7.14							
7V5	B	7.28	7.60	60	10	0.5	4	2.5	5.3	170
	C	7.06	7.84							
8V2	B	8.02	8.36	60	10	0.5	5	3.2	6.2	150
	C	7.76	8.64							
9V1	B	8.85	9.23	60	10	0.5	6	3.8	7.0	120
	C	8.56	9.55							
10	B	9.77	10.21	60	10	0.1	7	4.5	8.0	110
	C	9.45	10.55							
11	B	10.76	11.22	60	10	0.1	8	5.4	9.0	108
	C	10.44	11.56							
12	B	11.74	12.24	80	10	0.1	9	6.0	10.0	105
	C	11.42	12.60							
13	B	12.91	13.49	80	10	0.1	10	7.0	11.0	103
	C	12.47	13.96							
14	B	13.70	14.30	80	10	0.1	11	8.0	12.5	101

PZU84-xxx-Q	Sel	Working voltage $V_Z$ (V)		Differential resistance $r_{dif}$ ( $\Omega$ )		Reverse current $I_R$ ( $\mu$ A)		Temperature coefficient $S_Z$ (mV/K)		Diode capacitance $C_d$ (pF)
		$I_Z = 5$ mA		$I_Z = 0.5$ mA	$I_Z = 5$ mA	Max	$V_R$ (V)	$I_Z = 5$ mA		$f = 1$ MHz $V_R = 0$ V
		Min	Max	Max	Max			Min	Max	Max
15	B	14.34	14.98	80	15	0.05	11	9.2	13.0	99
	C	13.84	15.52							
16	B	15.85	16.51	80	20	0.05	12	10.4	14.0	97
	C	15.37	17.09							
18	B	17.56	18.35	80	20	0.05	13	12.4	16.0	93
	C	16.94	19.03							
20	B	19.52	20.39	100	20	0.05	15	14.4	18.0	88
	C	18.86	21.08							
22	B	21.54	22.47	100	25	0.05	17	16.4	20.0	84
	C	20.88	23.17							
24	B	23.72	24.78	120	30	0.05	19	18.4	22.0	80
	C	22.93	25.57							
27	B	26.50	27.50	150	40	0.05	21	21.4	25.3	73
	C	25.10	28.90							
30	B	29.40	30.60	200	40	0.05	23	24.4	29.4	66
	C	28.00	32.00							
33	B	32.34	33.66	250	40	0.05	25	27.4	33.4	60
	C	31.00	35.00							
36	B	35.30	36.70	300	60	0.05	27	30.4	37.4	59
	C	34.00	38.00							

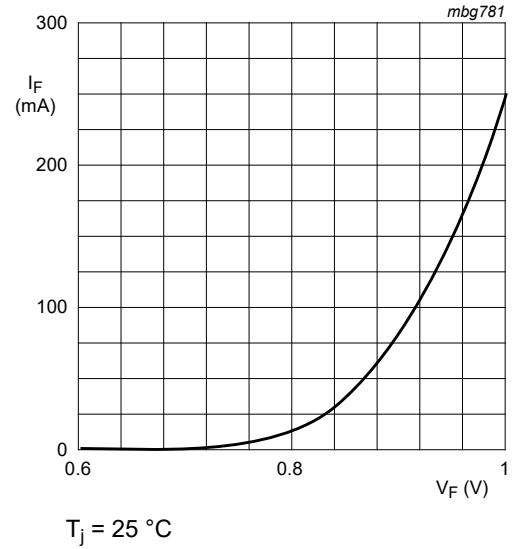
Table 9. Characteristics per type; PZU84-B39-Q to PZU84-C51-Q

$T_j = 25$  °C unless otherwise specified.

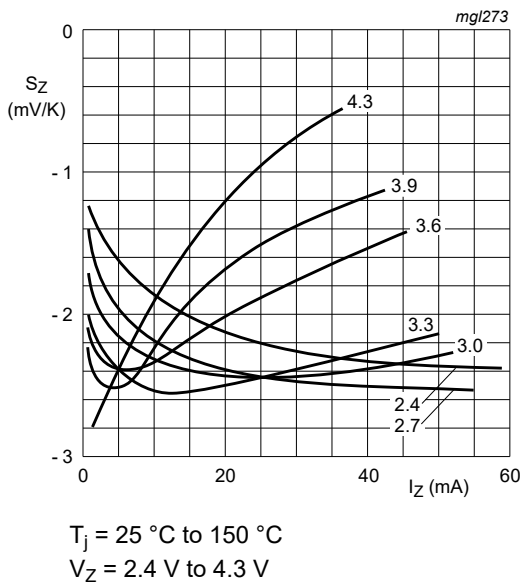
PZU84-xxx-Q	Sel	Working voltage $V_Z$ (V)		Differential resistance $r_{dif}$ ( $\Omega$ )		Reverse current $I_R$ ( $\mu$ A)		Temperature coefficient $S_Z$ (mV/K)		Diode capacitance $C_d$ (pF)
		$I_Z = 2$ mA		$I_Z = 0.5$ mA	$I_Z = 2$ mA	Max	$V_R$ (V)	$I_Z = 2$ mA		$f = 1$ MHz $V_R = 0$ V
		Min	Max	Max	Max			Min	Max	Max
39	B	38.20	39.80	350	130	0.05	27.3	33.4	41.2	45
	C	37.00	41.00							
43	B	42.10	43.90	375	150	0.05	30.1	37.6	46.6	40
	C	40.00	46.00							
47	B	46.10	47.90	375	170	0.05	32.9	42.0	51.8	40
	C	44.00	50.00							
51	B	50.00	52.00	400	180	0.05	35.7	46.6	57.2	40
	C	48.00	54.00							



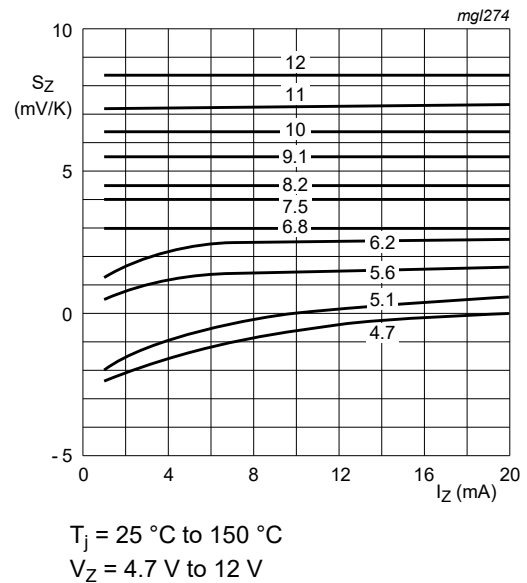
**Fig. 1. Non-repetitive peak reverse power dissipation as a function of pulse duration; typical values**



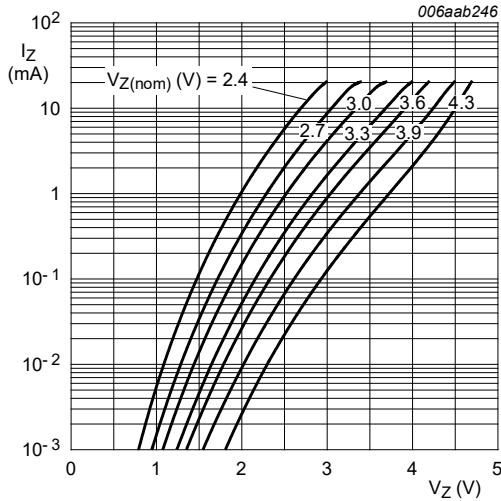
**Fig. 2. Forward current as a function of forward voltage; typical values**



**Fig. 3. Temperature coefficient as a function of working current; typical values**

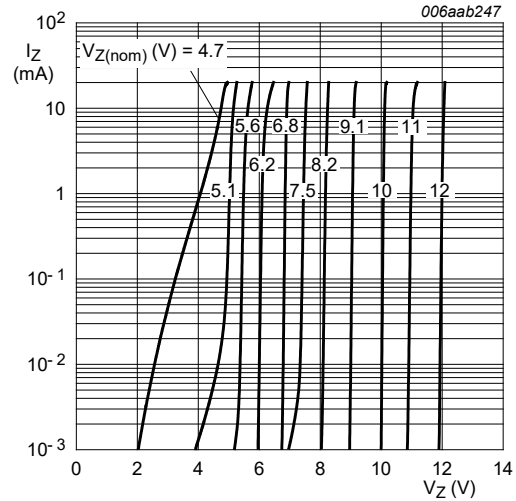


**Fig. 4. Temperature coefficient as a function of working current; typical values**



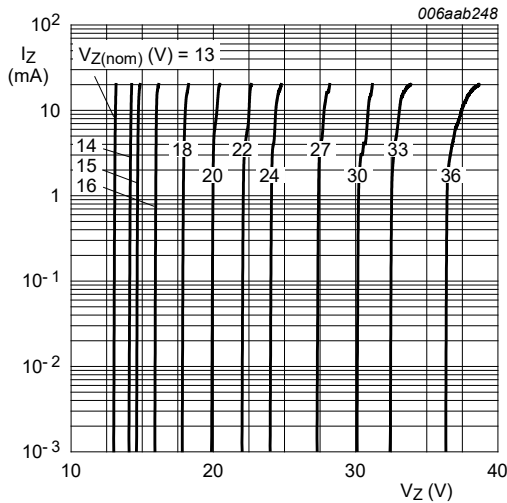
$T_j = 25\text{ }^\circ\text{C}$   
 $V_Z = 2.4\text{ V to }4.3\text{ V}$

**Fig. 5. Working current as a function of working voltage; typical values**



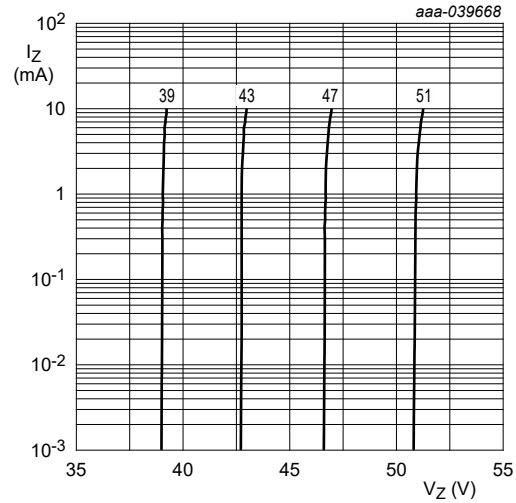
$T_j = 25\text{ }^\circ\text{C}$   
 $V_Z = 4.7\text{ V to }12\text{ V}$

**Fig. 6. Working current as a function of working voltage; typical values**



$T_j = 25\text{ }^\circ\text{C}$   
 $V_Z = 13\text{ V to }36\text{ V}$

**Fig. 7. Working current as a function of working voltage; typical values**



$T_j = 25\text{ }^\circ\text{C}$   
 $V_Z = 39\text{ V to }51\text{ V}$

**Fig. 8. Working current as a function of working voltage; typical values**

## 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

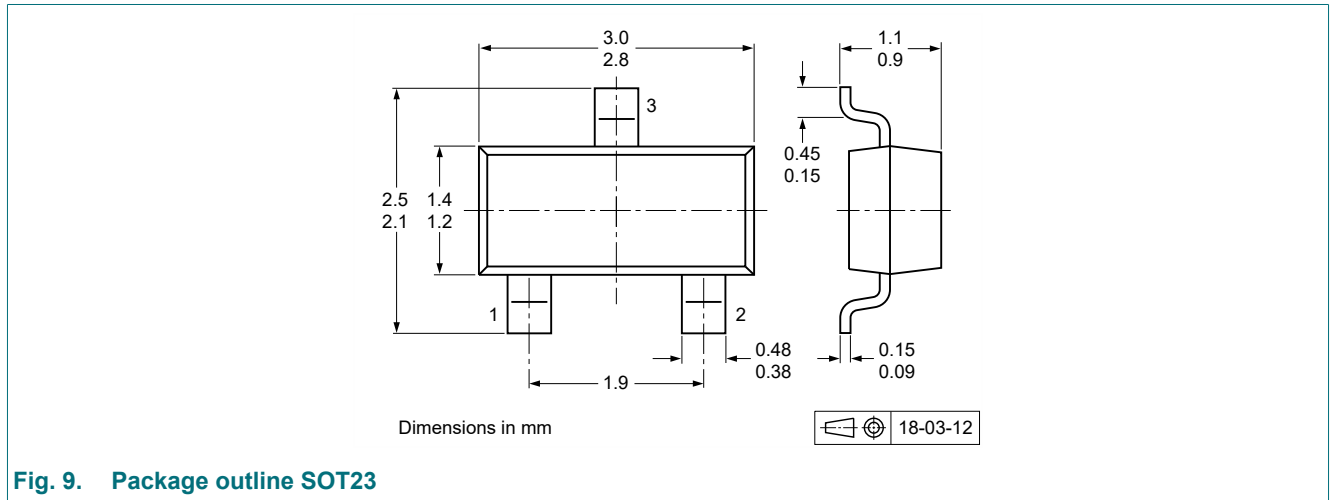


Fig. 9. Package outline SOT23

## 13. Soldering

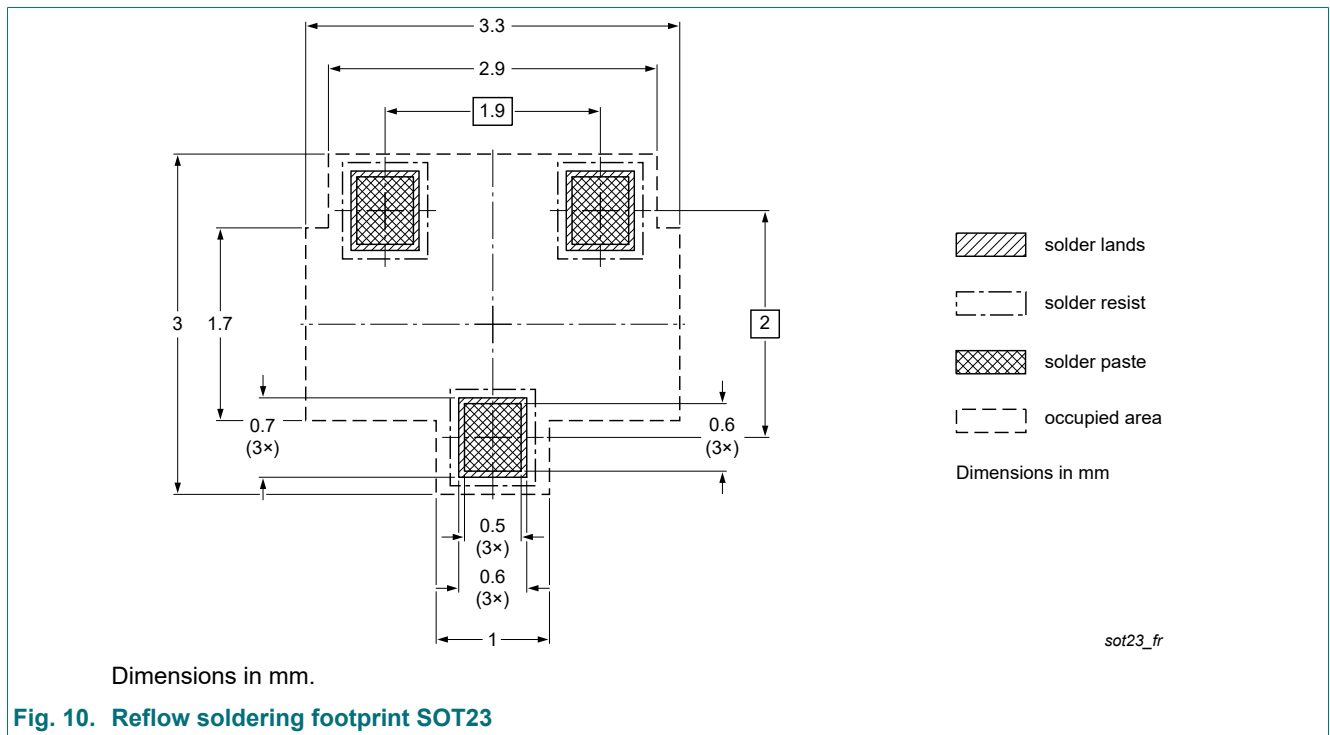
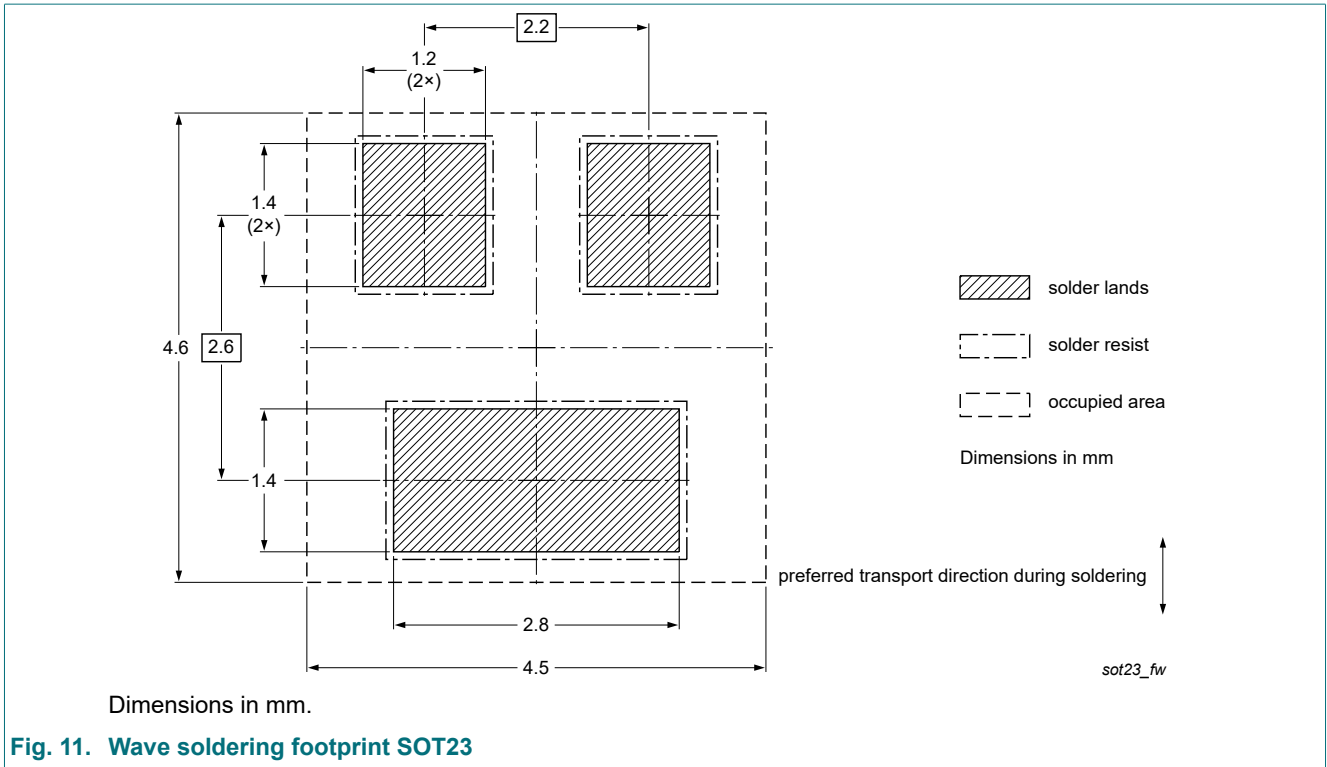


Fig. 10. Reflow soldering footprint SOT23





## 14. Revision history

**Table 10. Revision history**

Document ID	Release date	Data sheet status	Change notice	Supersedes
PZU84-Q_SER v.4	20240816	Product data sheet	-	PZU84-Q_SER v.3
Modifications:	• Subtitle of data sheet adapted			
PZU84-Q_SER v.3	20240802	Product data sheet	-	PZU84-Q_SER v.2
PZU84-Q_SER v.2	2024mmdd	Product data sheet	-	PZU84-Q_SER v.1
PZU84-Q_SER v.1	20240528	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.
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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Date of release: 16 August 2024

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