HPZR series

4.1 W high power voltage regulator diodes

Rev. 5 — 18 January 2024 **Product data sheet**

1. General description

High power voltage regulator diodes in a CFP3 (SOD123W) small and flat lead low-profile Surface-Mounted Device (SMD) plastic package.

2. Features and benefits

- Total power dissipation: ≤ 4.1 W @ T_{sp} = 75 °C, measured zero lead length
- Tolerance series: Approximately ±5 %
- Working voltage range: nominal 3.0 V to 75 V
- ESD maximum rating 30 kV according IEC 61000-4-2 (contact discharge)

3. Applications

- Low-currect general regulation functions

4. Quick reference data

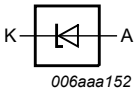
Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_F	forward voltage	I_F = 100 mA	[1]	-	-	1	V
P_{ZSM}	non-repetitive peak power dissipation	square wave; t_p ≤ 100 µs		-	-	800	W
P_{tot}	total power dissipation	T_{sp} ≤ 75 °C	[2]	-	-	4100	mW
		T_{amb} ≤ 25 °C	[3]	-	-	962	mW

[1] Pulse test: t_p ≤ 300 µs; δ ≤ 0.02
[2] DC Power Dissipation @ Tsp = 75 °C, measured zero lead length
[3] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated, mounting pad for cathode 1 cm^2

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
HPZR series	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	Type number	Marking code	Type number	Marking code
HPZR-C3V0	NB	HPZR-C10	LV	HPZR-C30	MC
HPZR-C3V3	NC	HPZR-C11	LW	HPZR-C33	MD
HPZR-C3V6	MU	HPZR-C12	LX	HPZR-C35	ME
HPZR-C3V9	MV	HPZR-C13	LY	HPZR-C39	MF
HPZR-C4V3	MW	HPZR-C14	M2	HPZR-C42	MG
HPZR-C4V7	MX	HPZR-C15	M3	HPZR-C47	MH
HPZR-C5V1	MY	HPZR-C17	M4	HPZR-C50	MJ
HPZR-C5V6	LM	HPZR-C18	M5	HPZR-C53	MK
HPZR-C6V7	LN	HPZR-C19	M6	HPZR-C56	ML
HPZR-C7V0	LP	HPZR-C20	M7	HPZR-C60	MM
HPZR-C7V6	LR	HPZR-C21	M8	HPZR-C63	MN
HPZR-C8V2	LS	HPZR-C23	M9	HPZR-C68	MP
HPZR-C8V8	LT	HPZR-C26	MA	HPZR-C70	MR
HPZR-C9V4	LU	HPZR-C28	MB	HPZR-C75	MS

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			-	400	mA
P_{ZSM}	non-repetitive peak power dissipation	square wave; $t_p \leq 100$ µs		-	800	W
I_{FSM}	non-repetitive peak forward current	single half-sine wave; $t_p = 8.3$ ms		-	50	A
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	[1]	-	568	mW
			[2]	-	962	mW
			[3]	-	1786	mW
		$T_{sp} \leq 75$ °C	[4]	-	4100	mW
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 cm^2.
[3] Device mounted on ceramic PCB, Al_2O_3, standard footprint.
[4] DC Power Dissipation @ Tsp = 75 °C, measured zero lead length

Table 6. ESD maximum ratings

Symbol	Parameter	Conditions		Min	Max	Unit
Per diode						
V_{ESD}	electrostatic discharge voltage	IEC 61000-4-2 (contact discharge)	[1] [2]	-	30	kV

[1] Device stressed with ten non-repetitive ElectroStatic Discharge (ESD) pulses.
[2] Soldering point of cathode tab.

Table 7. ESD standard compliance

Test and measurement	Conditions
Per diode	
IEC 61000-4-2; level 4 (ESD)	> 15 kV (air); > 8 kV (contact)
MIL-STD-883; class 3 (human body model)	> 8 kV

9. Thermal characteristics

Table 8. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	220	K/W
			[2]	-	-	130	K/W
			[3]	-	-	70	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point		[4]	-	-	18	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 cm^2.
[3] Device mounted on ceramic PCB, Al_2O_3, standard footprint.
[4] Soldering point of cathode tab.

10. Characteristics

Table 9. Characteristics

T_j = 25 °C unless otherwise specified.

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_F	forward voltage	I_F = 100 mA	[1]	-	-	1	V

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

Table 10. Characteristics per type; HPZR-C3V0 to HPZR-C5V1

T_j = 25 °C unless otherwise specified.

HPZR -Cxxx	Working voltage V_Z (V) I_Z = 100 mA		Reverse current I_R (µA)		Differential resistance R_Z (Ω) I_Z = 100 mA
	Min	Max	Max	V_R (V)	Max
3V0	2.80	3.20	80	1.0	8.0
3V3	3.10	3.50	60	1.0	8.0
3V6	3.40	3.80	16	1.0	8.0
3V9	3.70	4.10	11	1.0	8.0
4V3	4.00	4.60	8.5	1.0	7.0
4V7	4.40	5.00	1.1	1.0	7.0
5V1	4.80	5.40	0.75	1.0	6.0

Table 11. Characteristics per type; HPZR-C5V6 to HPZR-C8V2

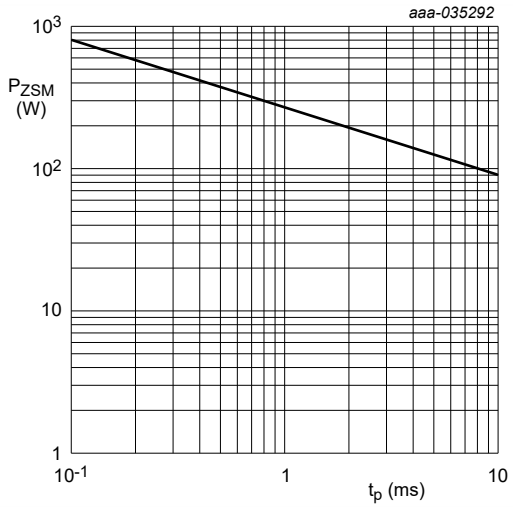
T_j = 25 °C unless otherwise specified.

HPZR -Cxxx	Working voltage V_Z (V) I_Z = 10 mA		Reverse current I_R (µA)		Differential resistance R_Z (Ω) I_Z = 20 mA
	Min	Max	Max	V_R (V)	Max
5V6	5.20	6.00	600	3.3	63.60
6V7	6.40	7.00	400	5.0	42.40
7V0	6.67	7.37	400	6.0	4.77
7V6	7.22	7.98	250	6.5	11.60
8V2	7.78	8.60	100	7.0	13.25

Table 12. Characteristics per type; HPZR-C8V8 to HPZR-C75

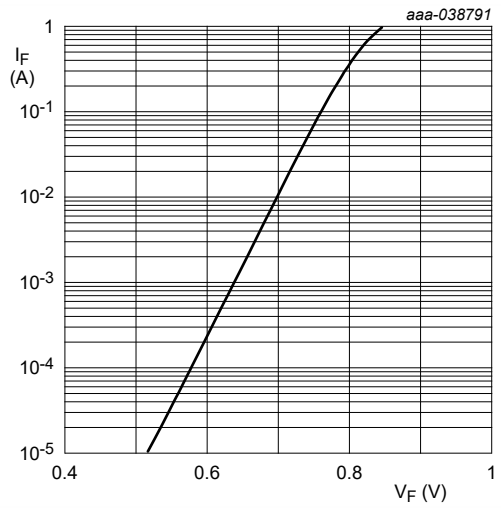
T_j = 25 °C unless otherwise specified.

HPZR -Cxxx	Working voltage V_Z (V) I_Z = 1 mA		Reverse current I_R (µA)		Differential resistance R_Z (Ω) I_Z = 20 mA
	Min	Max	Max	V_R (V)	Max
8V8	8.33	9.21	50	7.5	14.84
9V4	8.89	9.83	25	8.0	16.43
10	9.44	10.40	10	8.5	18.02
11	10.00	11.10	5	9.0	19.61
12	11.10	12.30	2.5	10.0	21.20
13	12.20	13.50	2.5	11.0	22.79
14	13.30	14.70	2.5	12	24.38
15	14.40	15.90	0.1	13	25.97
17	15.60	17.20	0.1	14	27.56
18	16.70	18.50	0.1	15	29.15
19	17.80	19.70	0.1	16	30.74
20	18.90	20.90	0.1	17	32.33
21	20.00	22.10	0.1	18	33.92
23	22.20	24.50	0.1	20	35.51
26	24.40	26.90	0.1	22	36.57
28	26.70	29.50	0.1	24	37.10
30	28.90	31.90	0.1	26	40.28
33	31.10	34.40	0.1	28	43.46
35	33.30	36.80	0.1	30	46.64
39	36.70	40.60	0.1	33	49.82
42	40.00	44.20	0.1	36	53.00
47	44.40	49.10	0.1	40	56.18
50	47.80	52.80	0.1	43	59.36
53	50.00	55.30	0.1	45	62.54
56	53.30	58.90	0.1	48	65.72
60	56.70	62.70	0.1	51	68.90
63	60.00	66.30	0.1	54	72.08
68	64.40	71.20	0.1	58	75.26
70	66.70	73.70	0.1	60	76.32
75	71.10	78.60	0.1	64	77.38



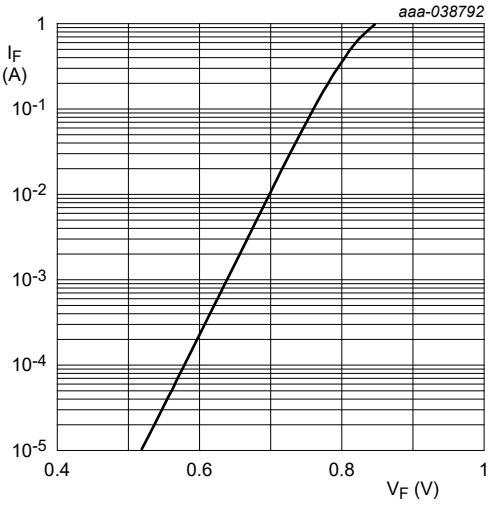
(1) T_j = 25 °C (before surge)

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



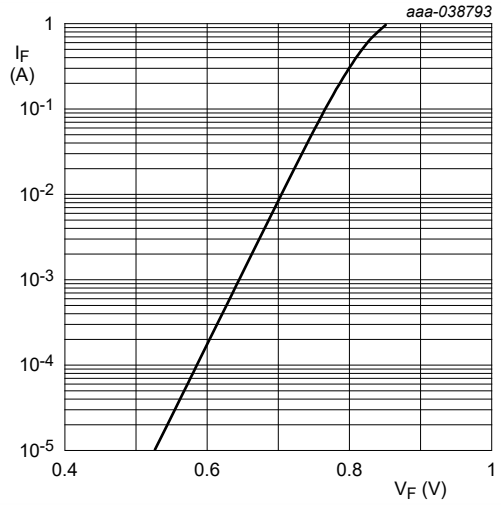
T_j = 25 °C

Fig. 2. Forward current as a function of forward voltage; typical values (HPZR-C3V0)



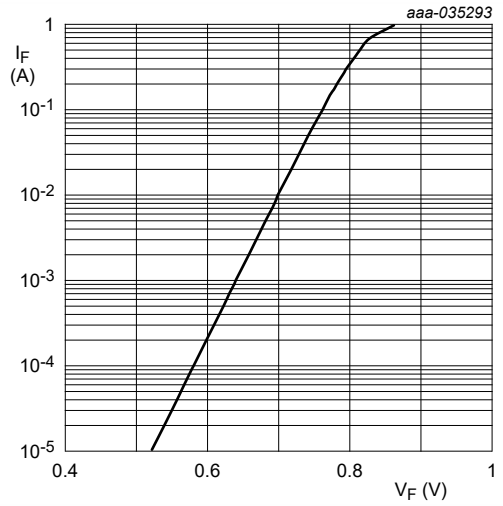
T_j = 25 °C

Fig. 3. Forward current as a function of forward voltage; typical values (HPZR-C3V3)



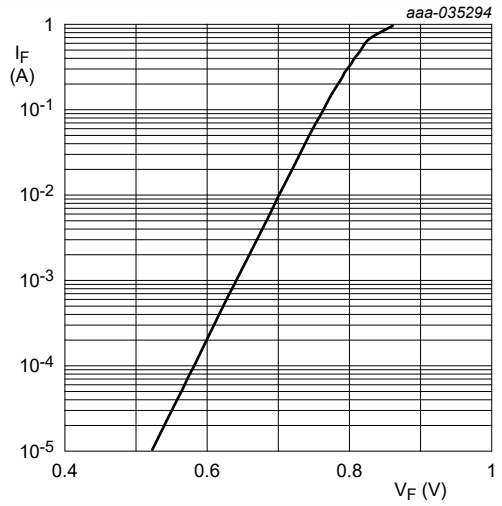
T_j = 25 °C

Fig. 4. Forward current as a function of forward voltage; typical values (HPZR-C5V1)



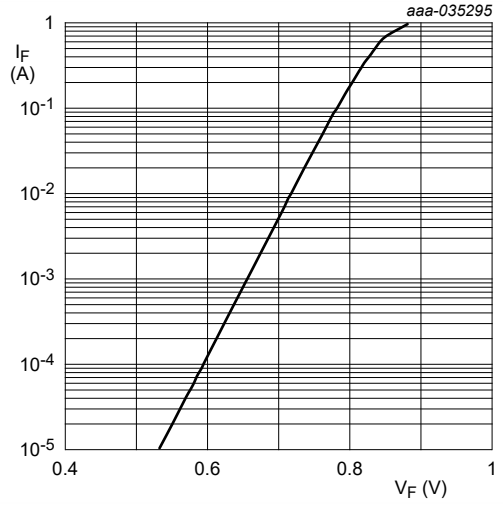
T_j = 25 °C

Fig. 5. Forward current as a function of forward voltage; typical values (HPZR-C5V6)



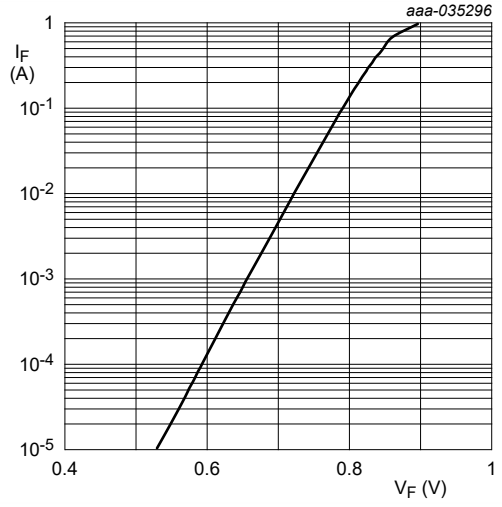
T_j = 25 °C

Fig. 6. Forward current as a function of forward voltage; typical values (HPZR-C7V0)



T_j = 25 °C

Fig. 7. Forward current as a function of forward voltage; typical values (HPZR-C8V2)



T_j = 25 °C

Fig. 8. Forward current as a function of forward voltage; typical values (HPZR-C68)

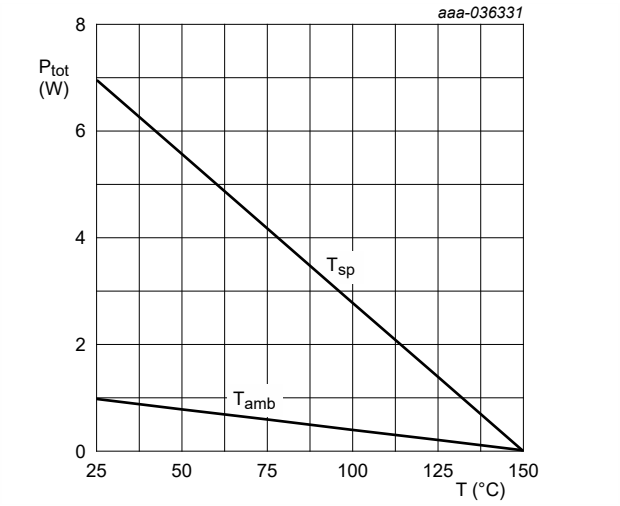


Fig. 9. Total power dissipation as a function of temperature; maximum values

11. Package outline

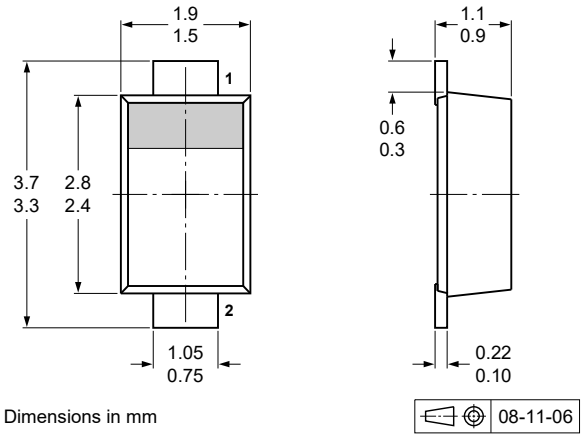


Fig. 10. Package outline CFP3 (SOD123W)

12. Soldering

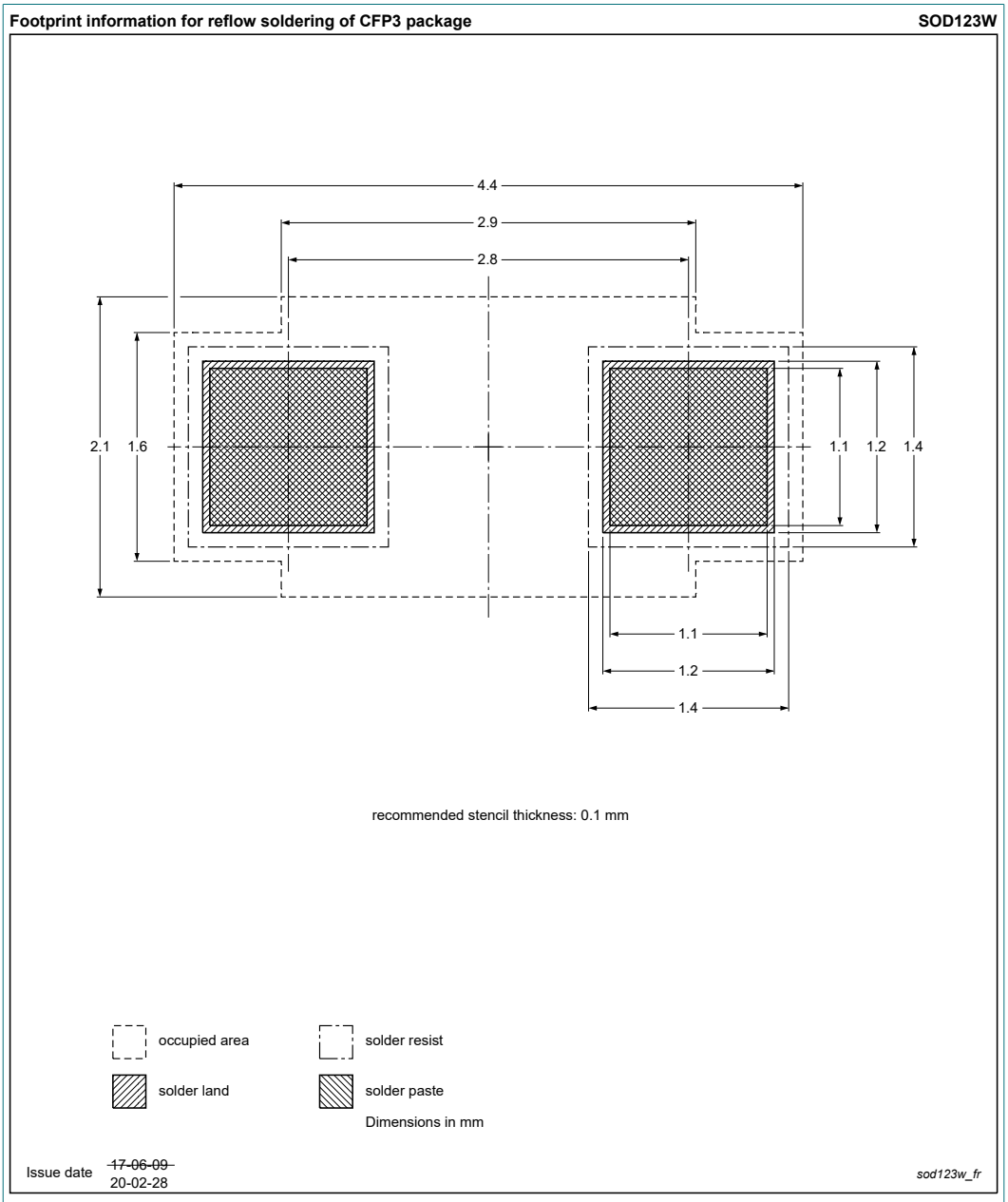


Fig. 11. Reflow soldering footprint for CFP3 (SOD123W)

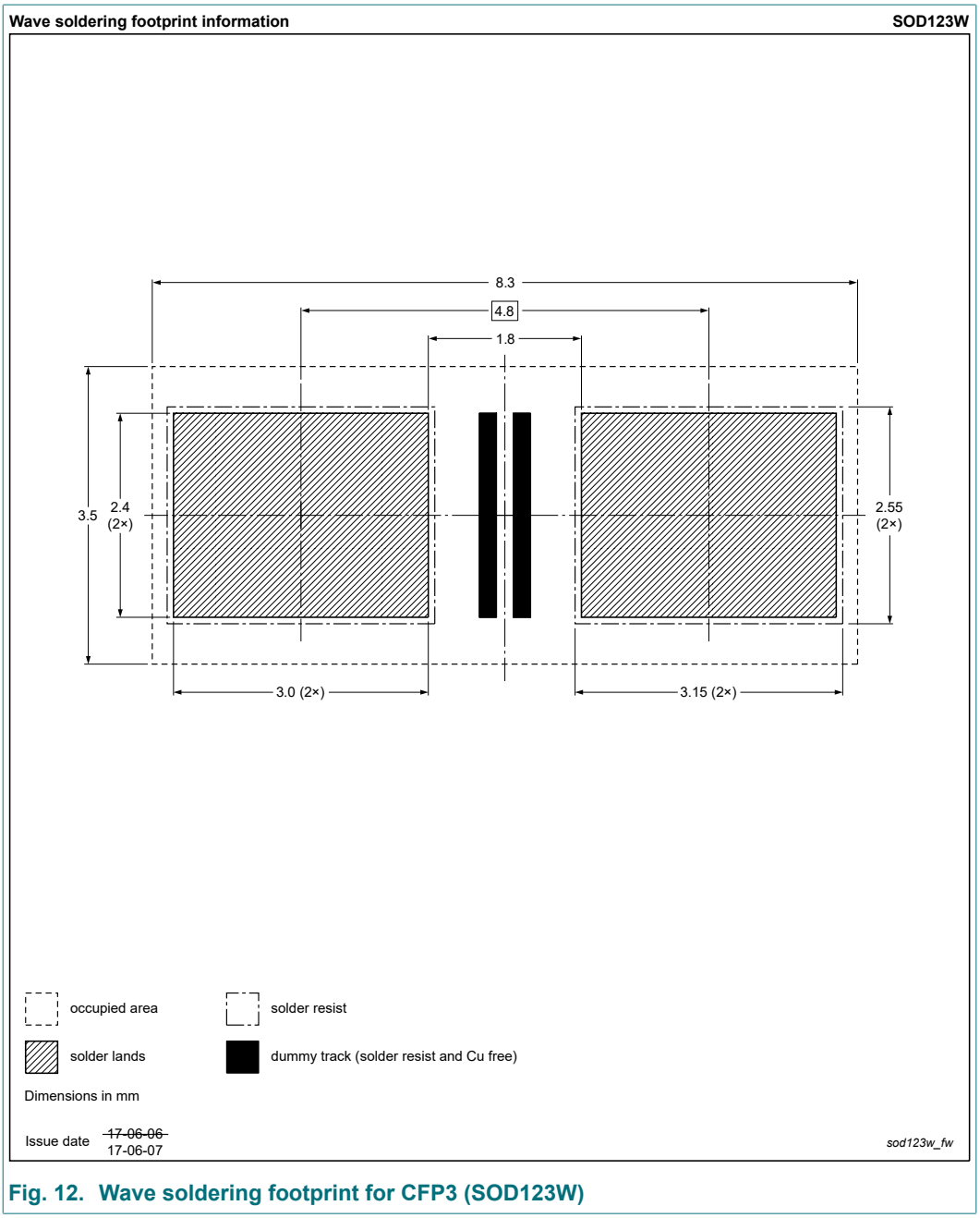


Fig. 12. Wave soldering footprint for CFP3 (SOD123W)

13. Revision history

Table 13. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
HPZR_SER v.5	20240118	Product data sheet	-	HPZR_SER v.4
Modifications:	• Added working voltages 3V0 to 5V1			
HPZR_SER v.4	20230310	Product data sheet	-	HPZR_SER v.3
HPZR_SER v.3	20230216	Product data sheet	-	HPZR_SER v.2
HPZR_SER v.2	20220912	Product data sheet	-	HPZR_SER v.1
HPZR_SER v.1	20220520	Objective 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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