



# HPZR series

## 4.1 W high power voltage regulator diodes

Rev. 4 — 10 March 2023

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:  $\leq 4.1 \text{ W}$  @  $T_{sp} = 75 \text{ }^\circ\text{C}$ , measured zero lead length
- Tolerance series: Approximately  $\pm 5 \%$
- Working voltage range: nominal 5.6 V to 75 V
- ESD maximum rating 30 kV according IEC 61000-4-2 (contact discharge)

### 3. Applications

- Low-current general regulation functions

### 4. Quick reference data

Table 1. Quick reference data

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

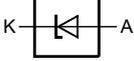
[1] Pulse test:  $t_p \leq 300 \text{ } \mu\text{s}$ ;  $\delta \leq 0.02$

[2] DC Power Dissipation @  $T_{sp} = 75 \text{ }^\circ\text{C}$ , measured zero lead length

[3] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated, mounting pad for cathode  $1 \text{ cm}^2$

## 5. Pinning information

Table 2. Pinning

Pin	Symbol	Description		Simplified outline	Graphic symbol
1	K	cathode	[1]		 006aaa152
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-C5V6	LM	HPZR-C15	M3	HPZR-C39	MF
HPZR-C6V7	LN	HPZR-C17	M4	HPZR-C42	MG
HPZR-C7V0	LP	HPZR-C18	M5	HPZR-C47	MH
HPZR-C7V6	LR	HPZR-C19	M6	HPZR-C50	MJ
HPZR-C8V2	LS	HPZR-C20	M7	HPZR-C53	MK
HPZR-C8V8	LT	HPZR-C21	M8	HPZR-C56	ML
HPZR-C9V4	LU	HPZR-C23	M9	HPZR-C60	MM
HPZR-C10	LV	HPZR-C26	MA	HPZR-C63	MN
HPZR-C11	LW	HPZR-C28	MB	HPZR-C68	MP
HPZR-C12	LX	HPZR-C30	MC	HPZR-C70	MR
HPZR-C13	LY	HPZR-C33	MD	HPZR-C75	MS
HPZR-C14	M2	HPZR-C35	ME	-	-

## 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; $t_p \leq 100 \mu s$	-	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	$T_{amb} \leq 25 \text{ }^\circ\text{C}$	[1]	-	568	mW
			[2]	-	962	mW
			[3]	-	1786	mW
		$T_{sp} \leq 75 \text{ }^\circ\text{C}$	[4]	-	4100	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 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  $1 \text{ cm}^2$ .

[3] Device mounted on ceramic PCB,  $\text{Al}_2\text{O}_3$ , standard footprint.

[4] DC Power Dissipation @  $T_{sp} = 75 \text{ }^\circ\text{C}$ , measured zero lead length

**Table 6. ESD maximum ratings**

Symbol	Parameter	Conditions	Min	Max	Unit
<b>Per diode</b>					
$V_{ESD}$	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
<b>Per diode</b>	
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<sup>2</sup>.

[3] Device mounted on ceramic PCB, Al<sub>2</sub>O<sub>3</sub>, standard footprint.

[4] Soldering point of cathode tab.

## 10. Characteristics

Table 9. Characteristics

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
$V_F$	forward voltage	$I_F = 100\text{ mA}$	[1]	-	-	1	V

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

Table 10. Characteristics per type; HPZR-C5V6 to HPZR-C8V2

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

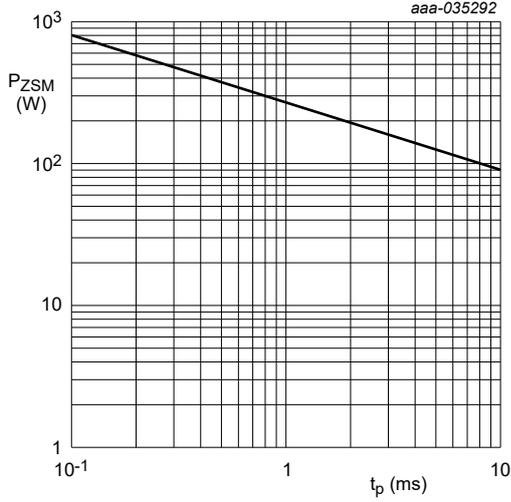
HPZR -Cxxx	Working voltage $V_Z$ (V) $I_Z = 10\text{ mA}$		Reverse current $I_R$ ( $\mu\text{A}$ )		Differential resistance $R_Z$ ( $\Omega$ ) $I_Z = 20\text{ mA}$
	Min	Max	Max	$V_R$ (V)	Max
5V6	5.20	6.00	600	3.3	63.60
6V7	6.40	7.00	400	5.0	42.40
7V0	6.67	7.37	400	6.0	4.77
7V6	7.22	7.98	250	6.5	11.60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

Table 11. Characteristics per type; HPZR-C8V8 to HPZR-C75

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

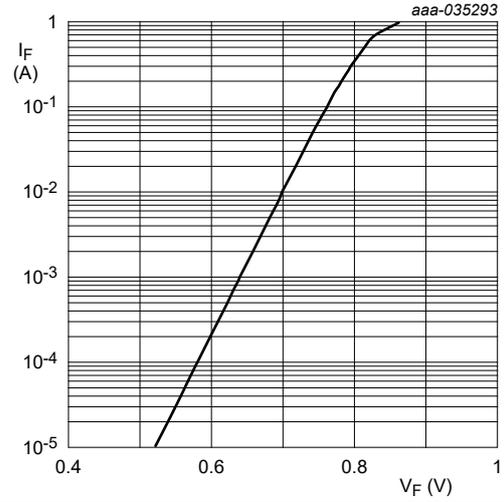
HPZR -Cxxx	Working voltage $V_Z$ (V) $I_Z = 1\text{ mA}$		Reverse current $I_R$ ( $\mu\text{A}$ )		Differential resistance $R_Z$ ( $\Omega$ ) $I_Z = 20\text{ mA}$
	Min	Max	Max	$V_R$ (V)	Max
8V8	8.33	9.21	50	7.5	14.84
9V4	8.89	9.83	25	8.0	16.43
10	9.44	10.40	10	8.5	18.02
11	10.00	11.10	5	9.0	19.61
12	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

4.1 W high power voltage regulator diodes



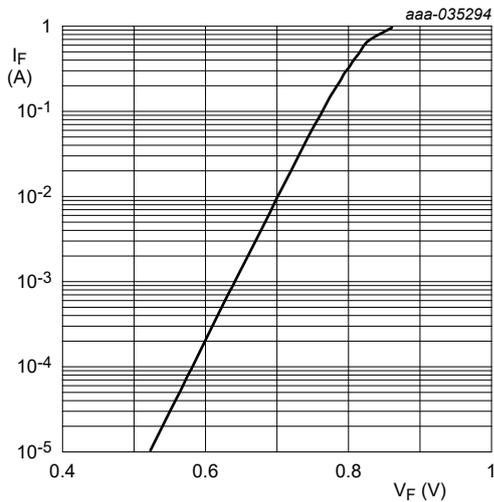
(1)  $T_j = 25\text{ }^\circ\text{C}$  (before surge)

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



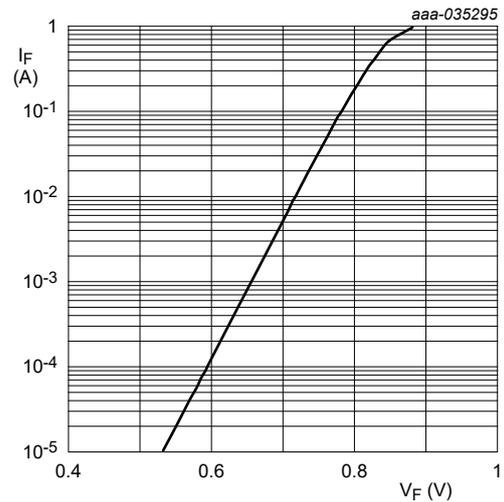
$T_j = 25\text{ }^\circ\text{C}$

**Fig. 2. Forward current as a function of forward voltage; typical values (HPZR-C5V6)**



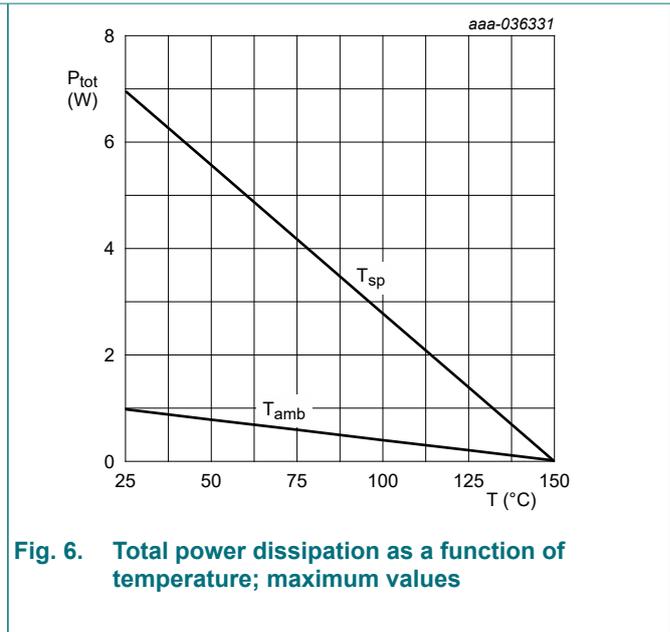
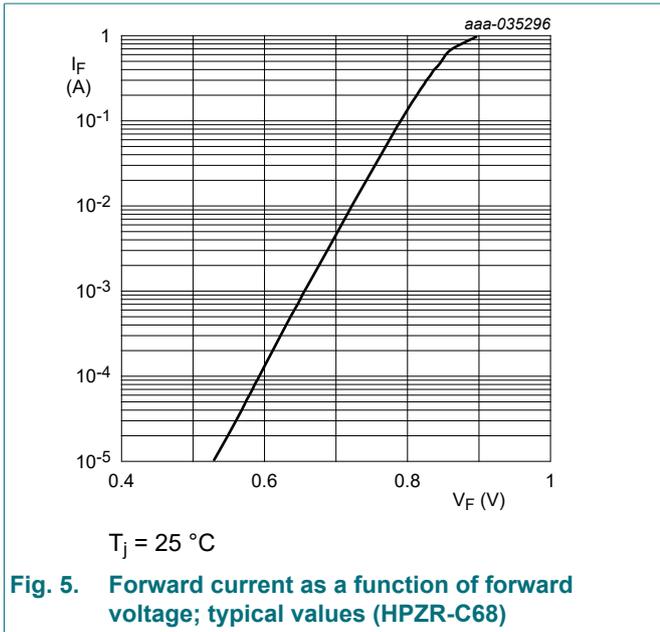
$T_j = 25\text{ }^\circ\text{C}$

**Fig. 3. Forward current as a function of forward voltage; typical values (HPZR-C7V0)**

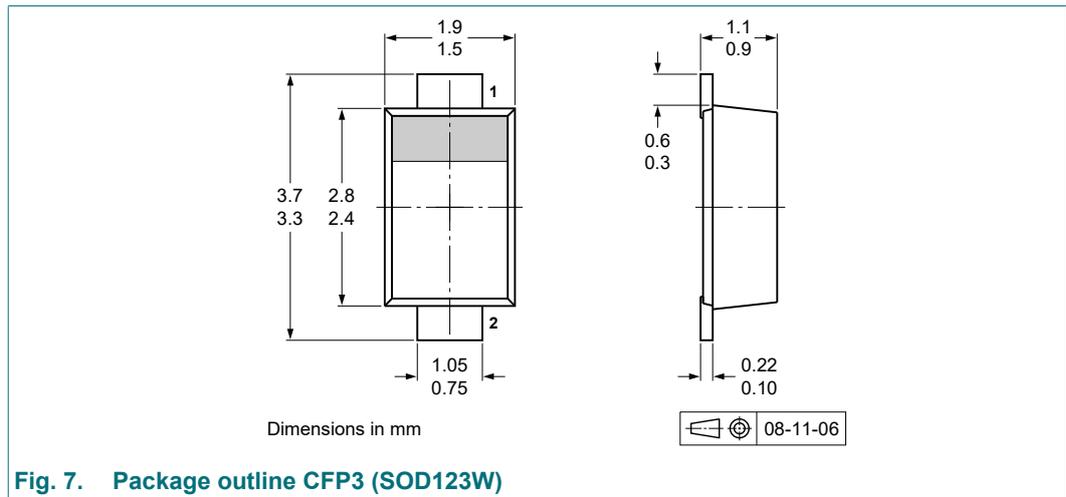


$T_j = 25\text{ }^\circ\text{C}$

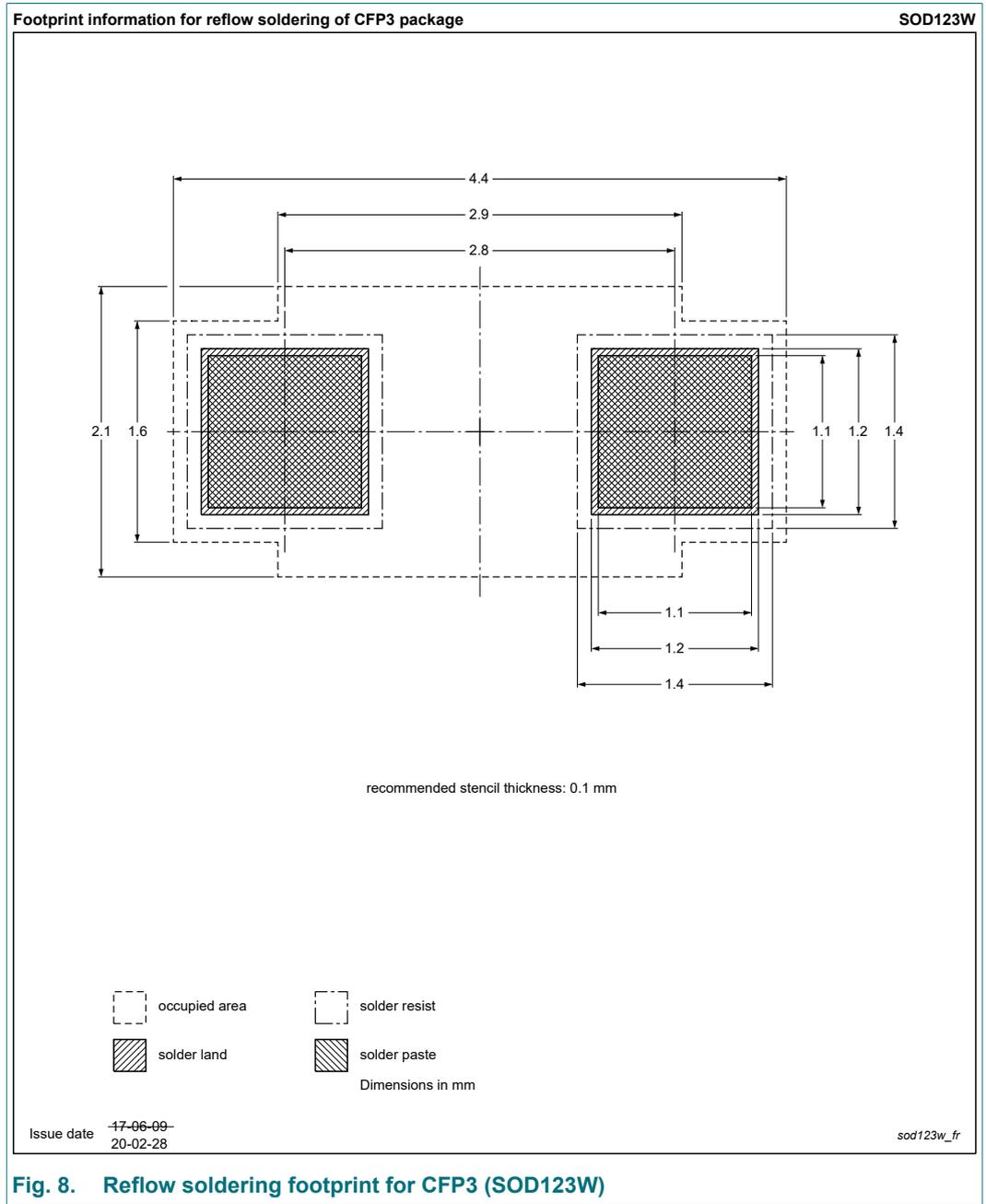
**Fig. 4. Forward current as a function of forward voltage; typical values (HPZR-C8V2)**



## 11. Package outline



12. Soldering



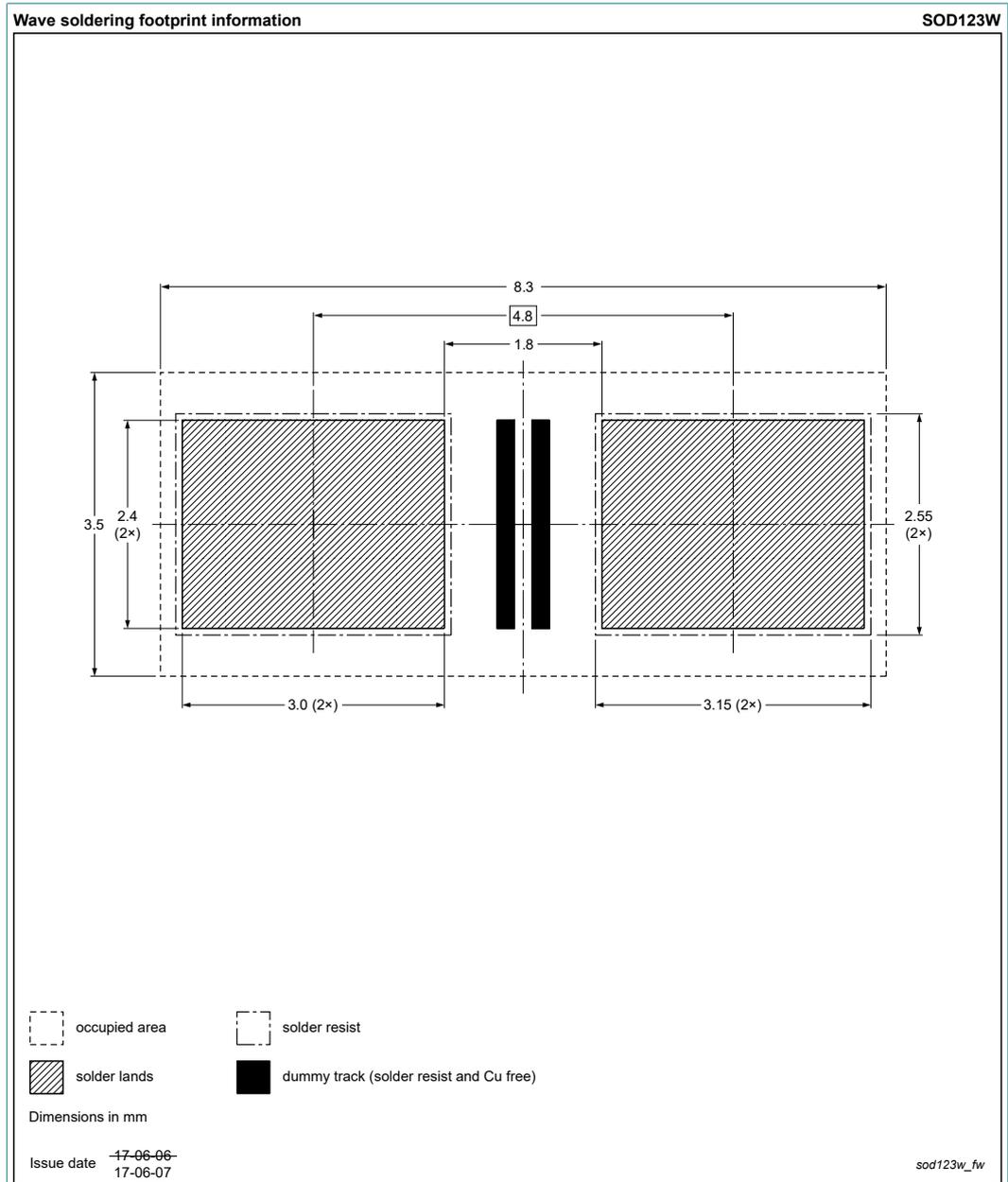


Fig. 9. Wave soldering footprint for CFP3 (SOD123W)

## 13. Revision history

Table 12. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
HPZR_SER v.4	20230310	Product data sheet	-	HPZR_SER v.3
Modifications:	<ul style="list-style-type: none"><li>Limiting values: <math>P_{tot}</math> value added</li><li>Characteristics: Figure 6 added</li></ul>			
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.

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- [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.....	2
6. Ordering information.....	2
7. Marking.....	2
8. Limiting values.....	3
9. Thermal characteristics.....	4
10. Characteristics.....	4
11. Package outline.....	7
12. Soldering.....	8
13. Revision history.....	10
14. Legal information.....	11

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