HPZR-Q series

High power voltage regulator diodes

Rev. 2 — 12 September 2022 Objective data sheet

1. General description

Low-current 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: ≤ 1154 mW
- Tolerance series: Approximately ±5 %
- Working voltage range: nominal 5.6 V to 75 V
- ESD maximum rating 30 kV according IEC 61000-4-2 (contact discharge)
- Qualified according to AEC-Q101 and recommended for use in automotive applications

3. Applications

- Low-currect general regulation functions

4. Quick reference data

Table 1. Quick reference data

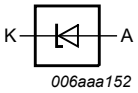
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_F	forward voltage	I_F = 100 mA	[1]	-	-	1	V
P_{ZSM}	non-repetitive peak power dissipation	square wave; $t_p \leq 100$ µs		-	-	800	W
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	[2]	-	-	1154	mW

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

[2] 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-Q 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-Q	LM	HPZR-C15-Q	M3	HPZR-C39-Q	MF
HPZR-C6V7-Q	LN	HPZR-C17-Q	M4	HPZR-C42-Q	MG
HPZR-C7V0-Q	LP	HPZR-C18-Q	M5	HPZR-C47-Q	MH
HPZR-C7V6-Q	LR	HPZR-C19-Q	M6	HPZR-C50-Q	MJ
HPZR-C8V2-Q	LS	HPZR-C20-Q	M7	HPZR-C53-Q	MK
HPZR-C8V8-Q	LT	HPZR-C21-Q	M8	HPZR-C56-Q	ML
HPZR-C9V4-Q	LU	HPZR-C23-Q	M9	HPZR-C60-Q	MM
HPZR-C10-Q	LV	HPZR-C26-Q	MA	HPZR-C63-Q	MN
HPZR-C11-Q	LW	HPZR-C28-Q	MB	HPZR-C68-Q	MP
HPZR-C12-Q	LX	HPZR-C30-Q	MC	HPZR-C70-Q	MR
HPZR-C13-Q	LY	HPZR-C33-Q	MD	HPZR-C75-Q	MS
HPZR-C14-Q	M2	HPZR-C35-Q	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; $t_p \leq 100$ 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]	-	682	mW
			[2]	-	1154	mW
			[3]	-	2143	mW
T_j	junction temperature			-	175	°C
T_{amb}	ambient temperature			-55	+175	°C
T_{stg}	storage temperature			-65	+175	°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.

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-C5V6-Q to HPZR-C8V2-Q

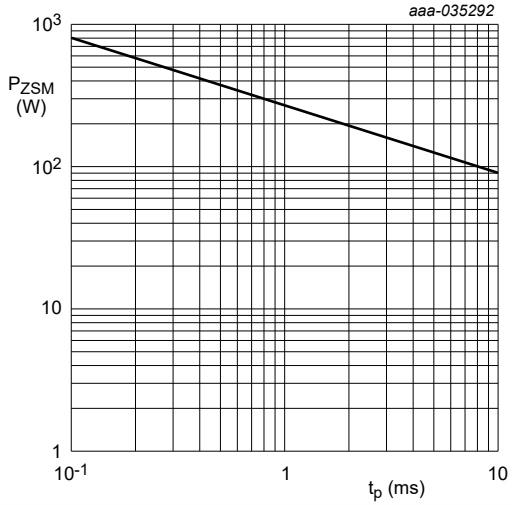
T_j = 25 °C unless otherwise specified.

HPZR -Cxxx-Q	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 11. Characteristics per type; HPZR-C8V8-Q to HPZR-C75-Q

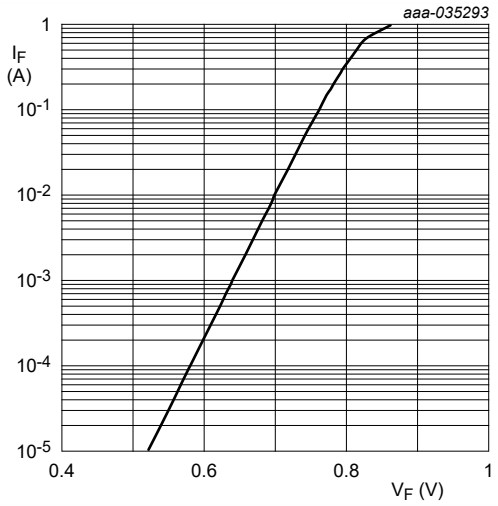
T_j = 25 °C unless otherwise specified.

HPZR -Cxxx-Q	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



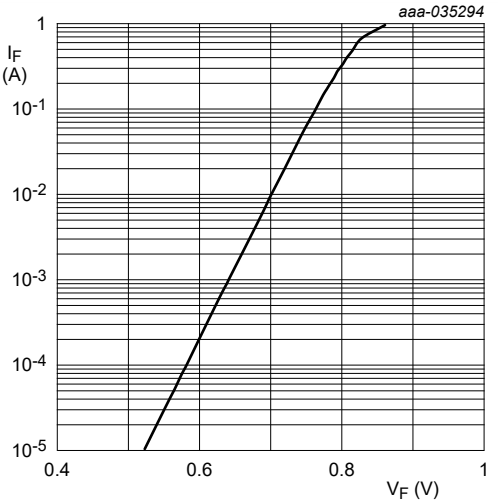
(1) T_j = 25 °C (before surge)

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



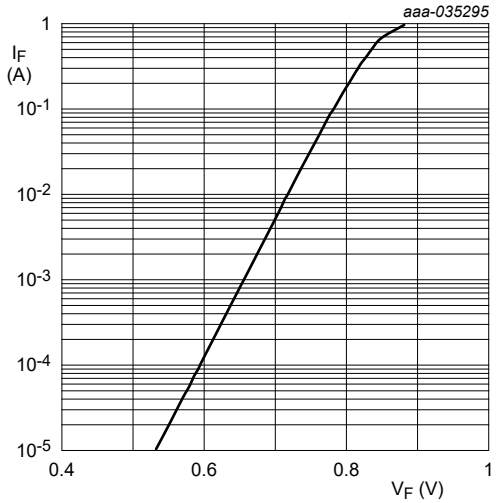
T_j = 25 °C

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



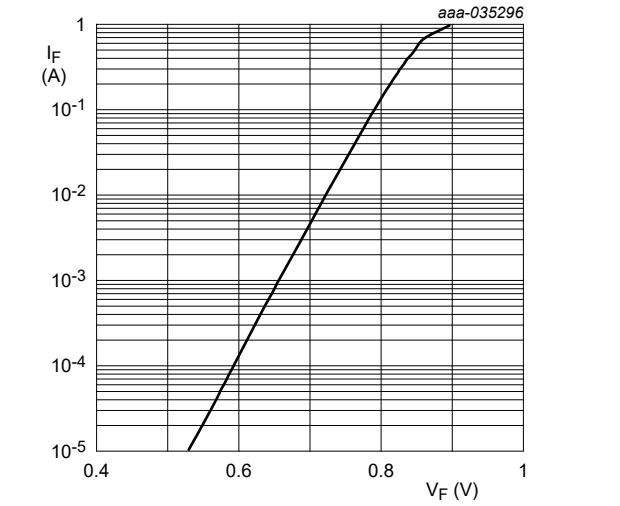
T_j = 25 °C

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



T_j = 25 °C

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



T_j = 25 °C

Fig. 5. Forward current as a function of forward voltage; typical values (HPZR-C68-Q)

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

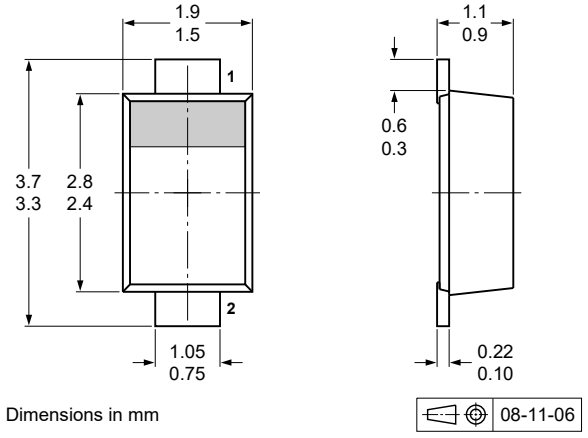


Fig. 6. Package outline CFP3 (SOD123W)

13. Soldering

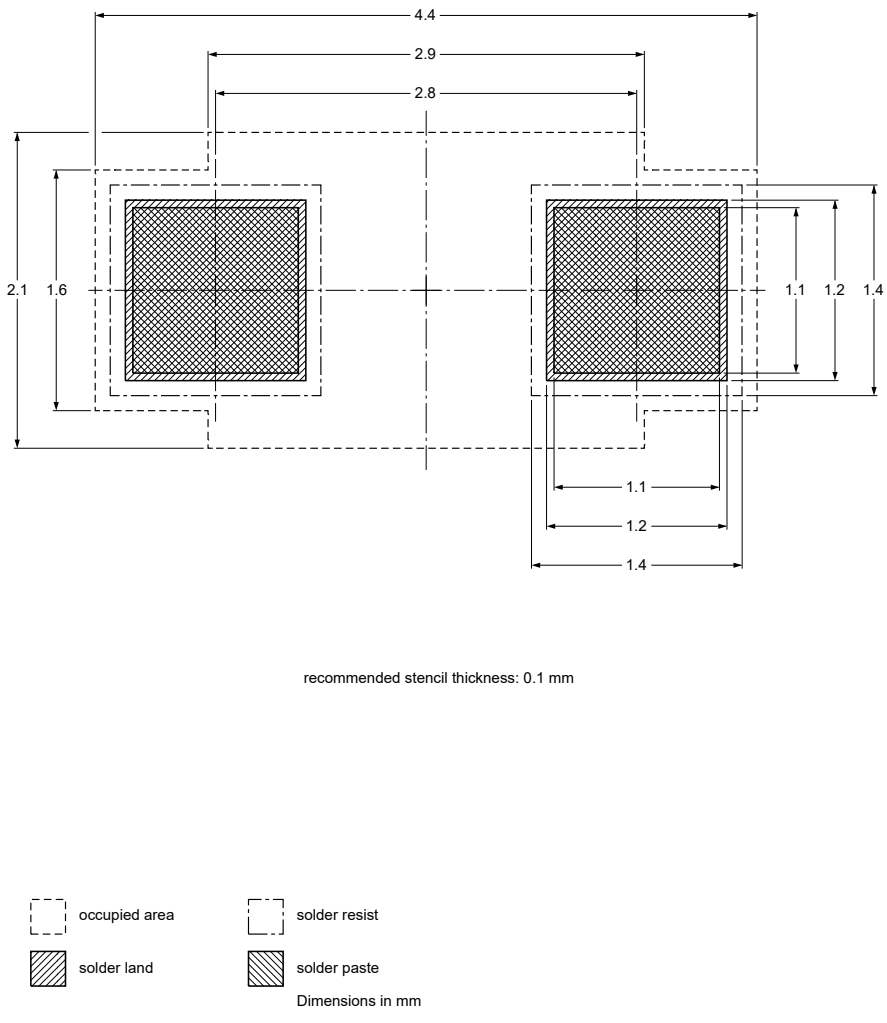


Fig. 7. Reflow soldering footprint for CFP3 (SOD123W)

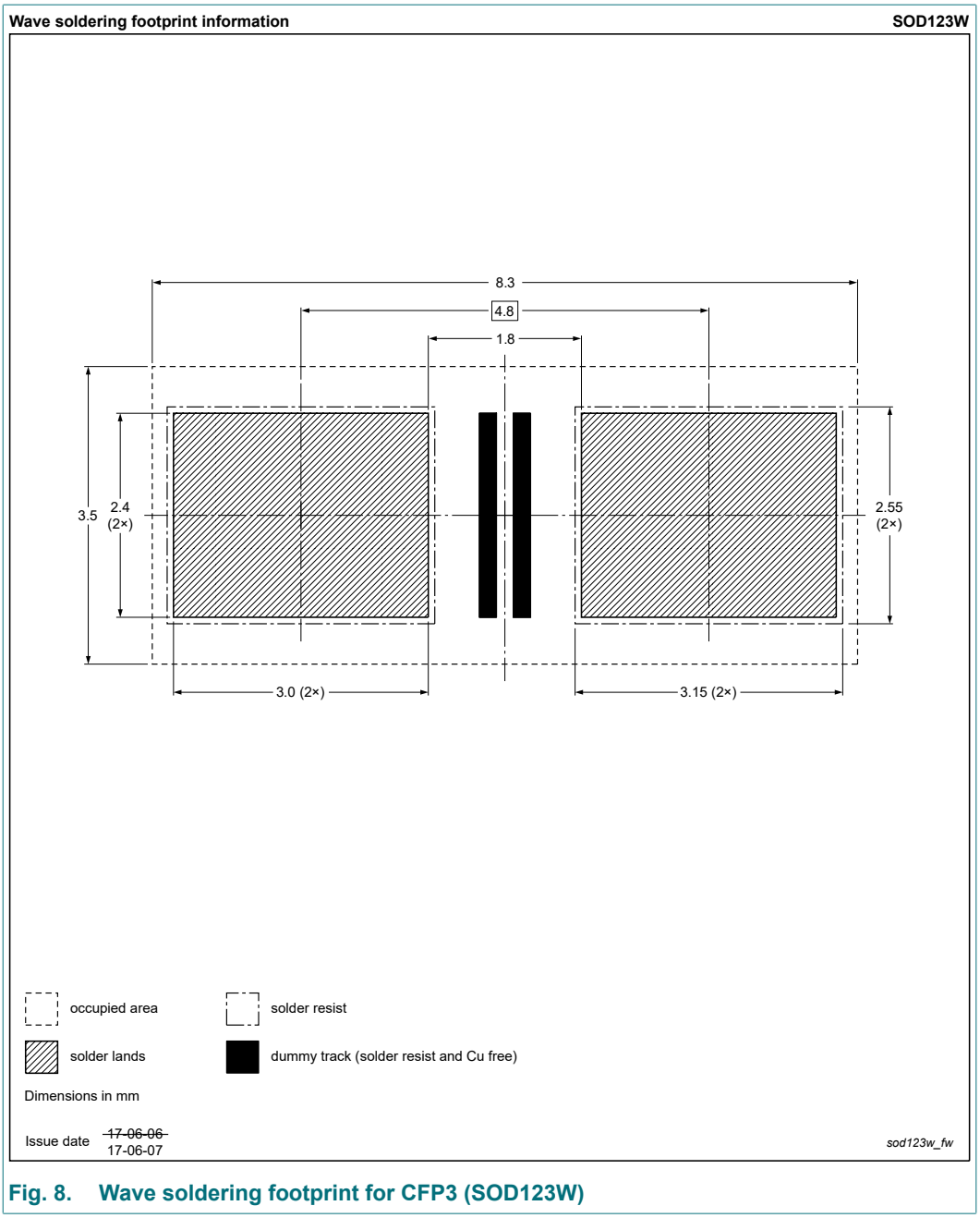


Fig. 8. Wave soldering footprint for CFP3 (SOD123W)

14. Revision history

Table 12. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
HPZR-Q_SER v.1	20220912	Product data sheet	-	HPZR-Q_SER v.1
Modifications:	• Product status changed			
HPZR-Q_SER v.1	20220520	Objective 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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