PZU84 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: ± 2 % and approximately ± 5 %
- Wide working voltage range: nominal 2.4 V to 51 V (E24 range)
- PZU84-B5V1 to -C10: Very low dynamic impedances at low currents, very low leakage current, hard breakdown knee
- PZU84-B11 to -C51: Intentional minor rise of leakage current for optimized fast switching and noise reduction [Ref. AN90031]

3. Applications

- General regulation functions

4. Quick reference data

Table 1. Quick reference data

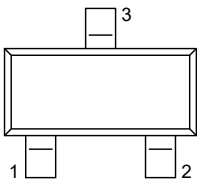
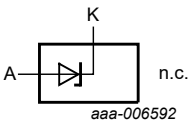
T_{amb} = 25 °C unless otherwise specified.

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_F	forward voltage	I_F = 10 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: tp ≤ 300 µs; δ ≤ 0.02
[2] Device mounted on a FR4 PCB, single-sided 70 µm copper, tin-plated and standard footprint.
[3] t_p = 100 µs; square wave; T_j = 25 °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 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 ±2 % and approximately ±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	%RC	PZU84-B15	%RY	PZU84-C2V4	H4%	PZU84-C15	%LU
PZU84-B3V0	%RD	PZU84-B16	%RZ	PZU84-C2V7	H5%	PZU84-C16	%LV
PZU84-B3V3	%RE	PZU84-B18	S4%	PZU84-C3V0	H6%	PZU84-C18	%LX
PZU84-B3V6	%RF	PZU84-B20	S5%	PZU84-C3V3	%HV	PZU84-C20	%LY
PZU84-B3V9	%RG	PZU84-B22	%SJ	PZU84-C3V6	%HX	PZU84-C22	%LZ
PZU84-B4V3	%RH	PZU84-B24	%SK	PZU84-C3V9	%HY	PZU84-C24	%M2
PZU84-B4V7	%RJ	PZU84-B27	%SL	PZU84-C4V3	%HZ	PZU84-C27	%MM
PZU84-B5V1	%RK	PZU84-B30	%SM	PZU84-C4V7	%JJ	PZU84-C30	%MQ
PZU84-B5V6	%RL	PZU84-B33	%SN	PZU84-C5V1	%JQ	PZU84-C33	N4%
PZU84-B6V2	%RM	PZU84-B36	%SP	PZU84-C5V6	%JS	PZU84-C36	NB%
PZU84-B6V8	%RN	PZU84-B39	%SQ	PZU84-C6V2	%JT	PZU84-C39	%NN
PZU84-B7V5	%RP	PZU84-B43	%SR	PZU84-C6V8	%KQ	PZU84-C43	%NP
PZU84-B8V2	%RQ	PZU84-B47	%SS	PZU84-C7V5	%KU	PZU84-C47	%NQ
PZU84-B9V1	%RR	PZU84-B51	%ST	PZU84-C8V2	%KV	PZU84-C51	%NU
PZU84-B10	%RS	-	-	PZU84-C9V1	%KY	-	-
PZU84-B11	%RT	-	-	PZU84-C10	%LJ	-	-
PZU84-B12	%RU	-	-	PZU84-C11	%LQ	-	-
PZU84-B13	%RV	-	-	PZU84-C12	%LS	-	-
PZU84-B14	%RX	-	–	PZU84-C13	%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 °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 µs; square wave; T_j = 25 °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 °C unless otherwise specified.

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

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

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

T_j = 25 °C unless otherwise specified.

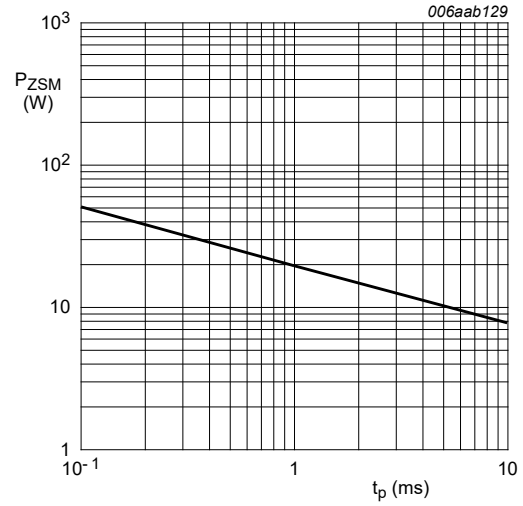
PZU84-xxx	Sel	Working voltage V_Z (V)		Differential resistance r_{dif} (Ω)		Reverse current I_R (µA)		Temperature coefficient S_Z (mV/K)		Diode capacitance C_d (pF)
		I_Z = 5 mA		I_Z = 0.5 mA	I_Z = 5 mA			I_Z = 5 mA		f = 1 MHz V_R = 0 V
		Min	Max	Max	Max	Max	V_R (V)	Min	Max	Max
2V4	C	2.30	2.60	1000	100	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	Sel	Working voltage V_Z (V)		Differential resistance r_{dif} (Ω)		Reverse current I_R (µA)		Temperature coefficient S_Z (mV/K)		Diode capacitance C_d (pF)
		I_Z = 5 mA		I_Z = 0.5 mA	I_Z = 5 mA			I_Z = 5 mA		f = 1 MHz V_R = 0 V
		Min	Max	Max	Max	Max	V_R (V)	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 to PZU84-C51

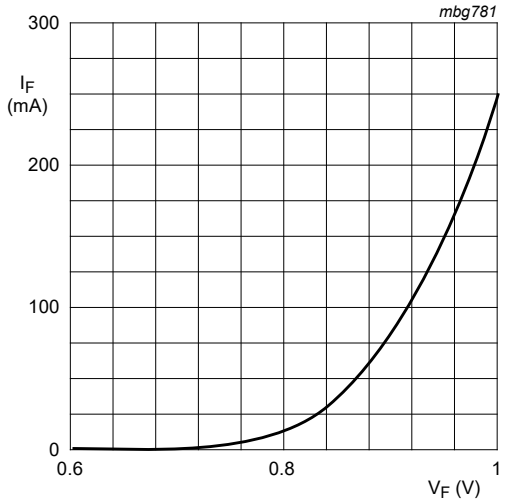
T_j = 25 °C unless otherwise specified.

PZU84-xxx	Sel	Working voltage V_Z (V)		Differential resistance r_{dif} (Ω)		Reverse current I_R (µA)		Temperature coefficient S_Z (mV/K)		Diode capacitance C_d (pF)
		I_Z = 2 mA		I_Z = 0.5 mA	I_Z = 2 mA			I_Z = 2 mA		f = 1 MHz V_R = 0 V
		Min	Max	Max	Max	Max	V_R (V)	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							



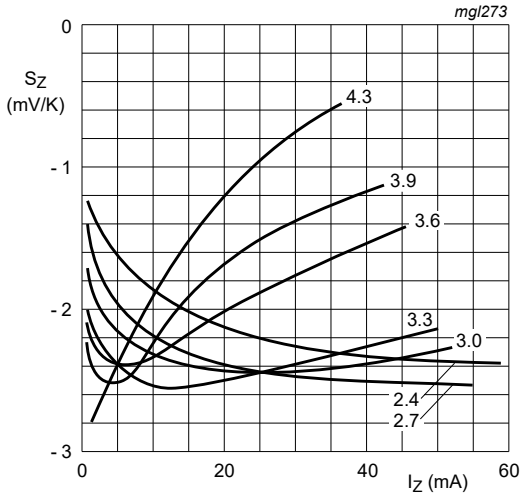
T_j = 25 °C (prior to surge)

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



T_j = 25 °C

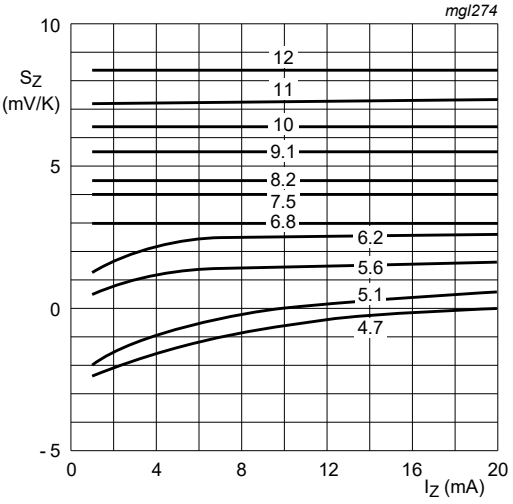
Fig. 2. Forward current as a function of forward voltage; typical values



T_j = 25 °C to 150 °C

V_Z = 2.4 V to 4.3 V

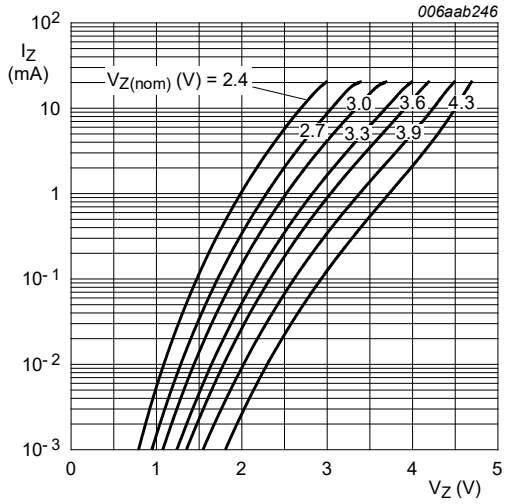
Fig. 3. Temperature coefficient as a function of working current; typical values



T_j = 25 °C to 150 °C

V_Z = 4.7 V to 12 V

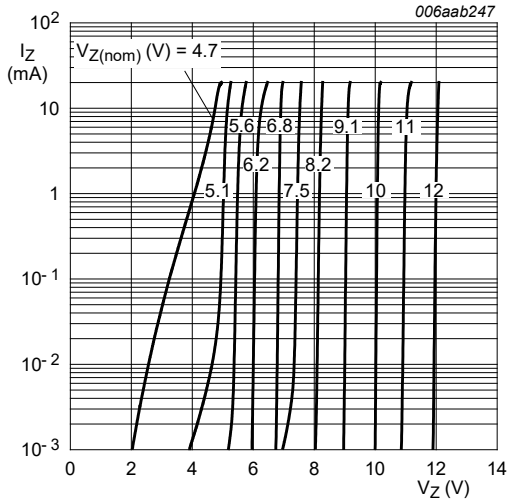
Fig. 4. Temperature coefficient as a function of working current; typical values



T_j = 25 °C

V_Z = 2.4 V to 4.3 V

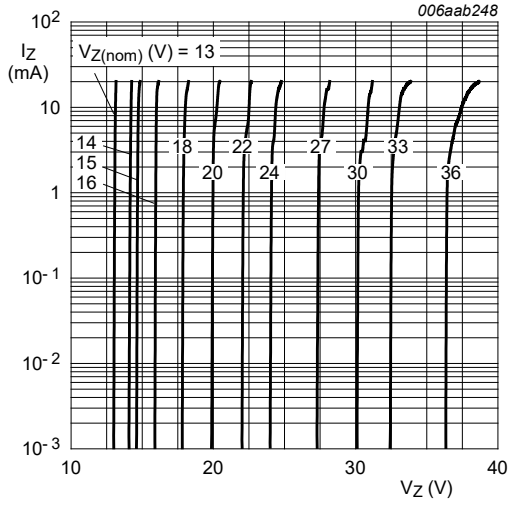
Fig. 5. Working current as a function of working voltage; typical values



T_j = 25 °C

V_Z = 4.7 V to 12 V

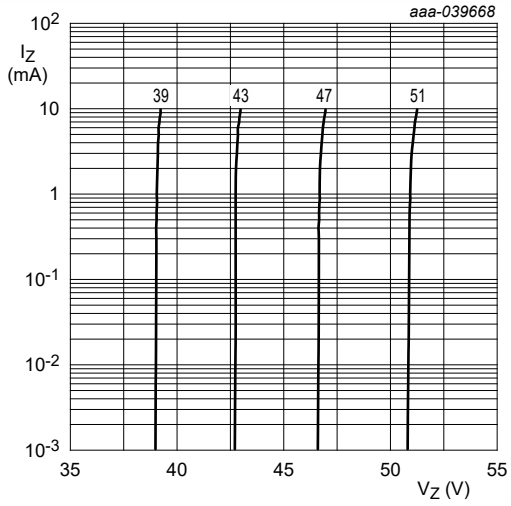
Fig. 6. Working current as a function of working voltage; typical values



T_j = 25 °C

V_Z = 13 V to 36 V

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



T_j = 25 °C

V_Z = 39 V to 51 V

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

11. Package outline

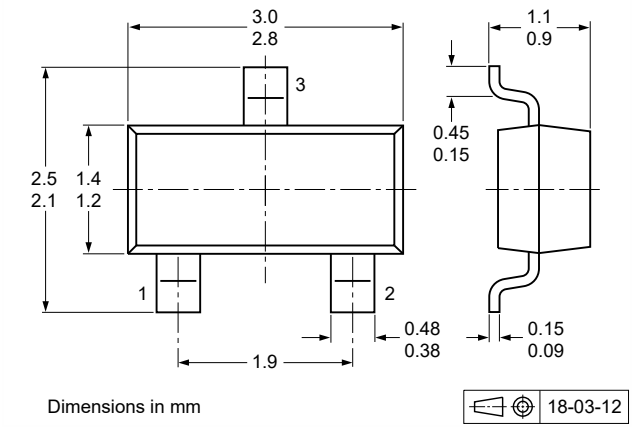
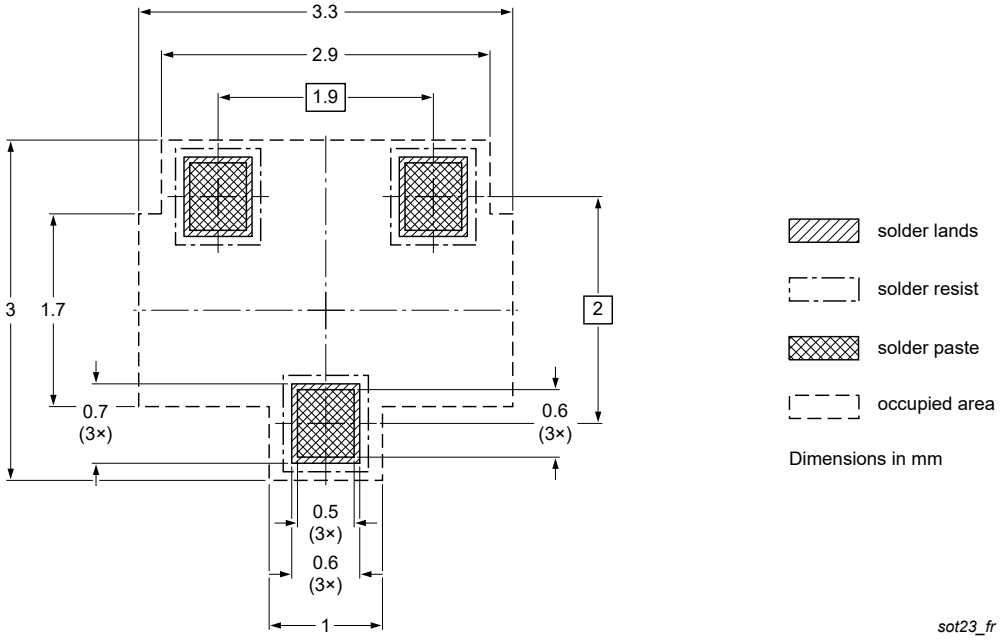


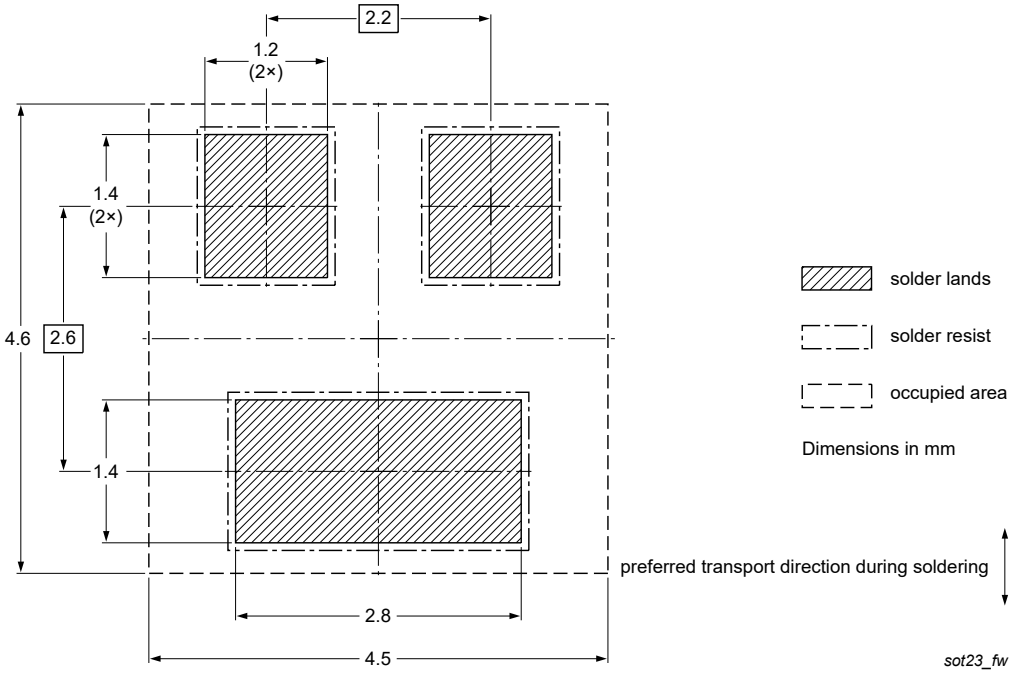
Fig. 9. Package outline SOT23

12. Soldering



Dimensions in mm.

Fig. 10. Reflow soldering footprint SOT23



Dimensions in mm.

Fig. 11. Wave soldering footprint SOT23

13. Revision history

Table 10. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PZU84_SER v.4	20240816	Product data sheet	-	PZU84_SER v.3
Modifications:	• Subtitle of data sheet adapted			
PZU84_SER v.3	20240802	Product data sheet	-	PZU84_SER v.2
PZU84_SER v.2	2024mmdd	Product data sheet	-	PZU84_SER v.1
PZU84_SER v.1	20240528	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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PZU84-C3V9R PZU84-C2V7R PZU84-B3V3R PZU84-C3V0R PZU84-B3V9R PZU84-C3V6R PZU84-C13R PZU84-C27R PZU84-B5V1R PZU84-B15R PZU84-B30R PZU84-C16R PZU84-C7V5R PZU84-B6V8R PZU84-B27R PZU84-C6V8R PZU84-B33R PZU84-C18R PZU84-C30R PZU84-B4V3R PZU84-B2V7R PZU84-B7V5R PZU84-C3V3R PZU84-B12R PZU84-B11R PZU84-B22R PZU84-B24R PZU84-C24R PZU84-C5V1R PZU84-B13R PZU84-C12R PZU84-C15R PZU84-B14R PZU84-B3V6R PZU84-C11R PZU84-C10R PZU84-B3V0R PZU84-C33R PZU84-B4V7R PZU84-C4V3R PZU84-B8V2R PZU84-C20R PZU84-C6V2R PZU84-B5V6R PZU84-C2V4R PZU84-C5V6R PZU84-C22R PZU84-B9V1R PZU84-C36R PZU84-C4V7R PZU84-B20R PZU84-C9V1R PZU84-B36R PZU84-B10R PZU84-B18R PZU84-B16R PZU84-C8V2R PZU84-C39R PZU84-B6V2R PZU84-C51R PZU84-B47R PZU84-C43R PZU84-B51R PZU84-B43R PZU84-C47R PZU84-B39R