BZX38450-Q series

Low-current voltage regulator diodes

Rev. 4 — 16 July 2024 Product data sheet

1. General description

Low-current voltage regulator diodes in a small SOD323 (SC-76) Surface-Mounted Device (SMD) plastic package.

2. Features and benefits

- Total power dissipation: ≤ 300 mW
- Two tolerance series: ± 2 % and approximately ± 5 %
- Working voltage range: nominal 1.8 V to 51 V
- Specified at a low test current (50 µA), ideal for low bias and portable battery-powered applications
- BZX38450-B11-Q to -C51-Q: Intentional minor rise of leakage current for optimized fast switching and noise reduction [AN90031]
- Qualified according to AEC-Q101 and recommended for use in automotive applications

3. Applications

- Low-current general regulation functions

4. Quick reference data

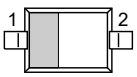
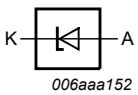
Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_F	forward voltage	I_F = 10 mA	[1]	-	-	0.9	V
P_{tot}	total power dissipation	T_{amb} ≤ 25 °C	[2]	-	-	300	mW

[1] Pulse test: t_p ≤ 300 µs; δ ≤ 0.02
[2] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.

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
BZX38450-Q series	SC-76	plastic, surface-mounted package; 2 leads; 1.3 mm pitch; 1.7 mm x 1.25 mm x 0.95 mm body	SOD323

7. Marking

Table 4. Marking Codes

Type number	Marking code	Type number	Marking code	Type number	Marking code	Type number	Marking code
BZX38450-B1V8-Q	8S	BZX38450-B10-Q	9E	BZX38450-C1V8-Q	6R	BZX38450-C10-Q	7K
BZX38450-B2V0-Q	8T	BZX38450-B11-Q	9F	BZX38450-C2V0-Q	6S	BZX38450-C11-Q	7M
BZX38450-B2V2-Q	8U	BZX38450-B12-Q	9G	BZX38450-C2V2-Q	6T	BZX38450-C12-Q	7N
BZX38450-B2V4-Q	8V	BZX38450-B13-Q	9H	BZX38450-C2V4-Q	6U	BZX38450-C13-Q	7P
BZX38450-B2V7-Q	8W	BZX38450-B15-Q	9J	BZX38450-C2V7-Q	6V	BZX38450-C15-Q	7Q
BZX38450-B3V0-Q	8X	BZX38450-B16-Q	9K	BZX38450-C3V0-Q	6W	BZX38450-C16-Q	7R
BZX38450-B3V3-Q	8Y	BZX38450-B18-Q	9L	BZX38450-C3V3-Q	6X	BZX38450-C18-Q	7S
BZX38450-B3V6-Q	8Z	BZX38450-B20-Q	9M	BZX38450-C3V6-Q	6Y	BZX38450-C20-Q	7T
BZX38450-B3V9-Q	82	BZX38450-B22-Q	9N	BZX38450-C3V9-Q	6Z	BZX38450-C22-Q	7U
BZX38450-B4V3-Q	83	BZX38450-B24-Q	9P	BZX38450-C4V3-Q	7A	BZX38450-C24-Q	7V
BZX38450-B4V7-Q	84	BZX38450-B27-Q	9R	BZX38450-C4V7-Q	7B	BZX38450-C27-Q	7W
BZX38450-B5V1-Q	85	BZX38450-B30-Q	9S	BZX38450-C5V1-Q	7C	BZX38450-C30-Q	7X
BZX38450-B5V6-Q	86	BZX38450-B33-Q	9T	BZX38450-C5V6-Q	7D	BZX38450-C33-Q	7Y
BZX38450-B6V2-Q	87	BZX38450-B36-Q	9U	BZX38450-C6V2-Q	7E	BZX38450-C36-Q	7Z
BZX38450-B6V8-Q	89	BZX38450-B39-Q	9V	BZX38450-C6V8-Q	7F	BZX38450-C39-Q	8A
BZX38450-B7V5-Q	9B	BZX38450-B43-Q	9W	BZX38450-C7V5-Q	7G	BZX38450-C43-Q	8B
BZX38450-B8V2-Q	9C	BZX38450-B47-Q	9X	BZX38450-C8V2-Q	7H	BZX38450-C47-Q	8C
BZX38450-B9V1-Q	9D	BZX38450-B51-Q	9Y	BZX38450-C9V1-Q	7J	BZX38450-C51-Q	8D

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			-	250	mA
P_{ZSM}	non-repetitive peak reverse power dissipation	t_p = 100 µs; square wave; T_j = 25 °C; prior to surge		-	40	W
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	[1]	-	300	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 Printed-Circuit Board (PCB), single sided copper, tin-plated and standard footprint.

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]	-	-	415	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point		[2]	-	-	110	K/W

[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single sided copper, tin-plated and standard footprint.
[2] Soldering point of cathode tab

10. Characteristics

Table 7. Electrical characteristics

T_j = 25 °C unless otherwise specified.

Symbol	Parameter	Conditions		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. Electrical characteristics per type: BZX38450-B1V8-Q to BZX38450-C36-Q

T_j = 25 °C unless otherwise specified.

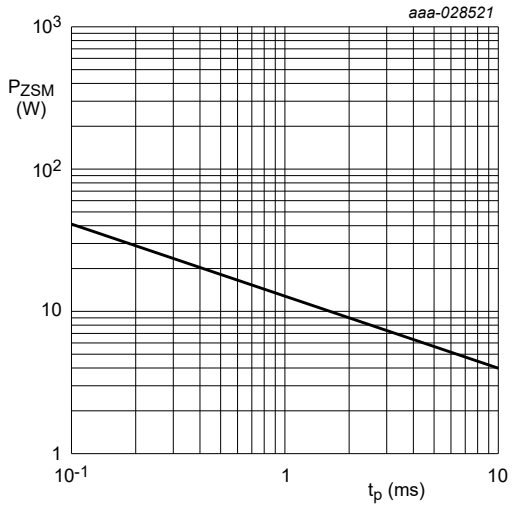
BZX38450-xxx-Q	Sel.	Working voltage V_Z (V)		Differential resistance r_{diff} (Ω)		Reverse current I_R (μA)		Temperature coefficient S_Z (mV/K)		Diode capacitance C_d (pF)
		I_Z = 50 μA		I_Z = 1 mA	I_Z = 5 mA			I_Z = 5 mA		f = 1 MHz V_R = 0 V
		Min	Max	Max	Max	Max	V_R (V)	Min	Max	Max
1V8	B	1.76	1.84	600	100	7.5	1.0	-3.5	0	220
	C	1.71	1.89							
2V0	B	1.96	2.04	600	100	7	1.0	-3.5	0	220
	C	1.88	2.12							
2V2	B	2.15	2.25	600	100	4	1.0	-3.5	0	210
	C	2.09	2.31							
2V4	B	2.35	2.45	600	100	2	1.0	-3.5	0	200
	C	2.28	2.52							
2V7	B	2.65	2.75	600	100	1	1.0	-3.5	0	190
	C	2.565	2.835							
3V0	B	2.94	3.06	600	100	0.8	1.0	-3.5	0.2	170
	C	2.85	3.15							
3V3	B	3.23	3.37	600	100	7.5	1.5	-3.5	1.2	160
	C	3.13	3.47							
3V6	B	3.53	3.67	600	95	7.5	2.0	-3.5	1.2	160
	C	3.42	3.78							
3V9	B	3.82	3.98	600	95	5.0	2.0	-2.7	2.5	150
	C	3.70	4.10							
4V3	B	4.21	4.39	600	95	4.0	2.0	-2.7	2.5	150
	C	4.09	4.52							
4V7	B	4.61	4.79	600	80	5.0	3.0	-2.7	2.5	140
	C	4.47	4.94							
5V1	B	5.00	5.20	500	60	5.0	3.0	-2.0	3.7	130
	C	4.85	5.36							
5V6	B	5.49	5.71	400	40	2.0	4.0	-2.0	3.7	120
	C	5.32	5.88							
6V2	B	6.08	6.32	160	10	1.0	5.0	0.4	4.5	110
	C	5.89	6.51							
6V8	B	6.66	6.94	80	15	0.1	5.1	1.2	4.5	100
	C	6.46	7.14							
7V5	B	7.35	7.65	80	15	0.1	5.7	2.5	5.3	150
	C	7.13	7.88							
8V2	B	8.04	8.36	80	15	0.1	6.2	3.2	6.2	150
	C	7.79	8.61							
9V1	B	8.92	9.28	100	15	0.1	6.9	3.8	7.0	150
	C	8.65	9.56							
10	B	9.80	10.20	150	20	0.1	7.6	4.5	8.0	90
	C	9.50	10.50							

BZX38450-xxx-Q	Sel.	Working voltage V_Z (V)		Differential resistance r_{diff} (Ω)		Reverse current I_R (μA)		Temperature coefficient S_Z (mV/K)		Diode capacitance C_d (pF)
		I_Z = 50 μA		I_Z = 1 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
11	B	10.80	11.20	150	20	0.05	8.4	5.4	9.0	85
	C	10.45	11.55							
12	B	11.80	12.20	150	25	0.05	9.1	6.0	10	85
	C	11.40	12.60							
13	B	12.70	13.30	170	30	0.05	9.8	7.0	11	80
	C	12.35	13.65							
15	B	14.70	15.30	200	30	0.05	11.4	9.2	13	75
	C	14.25	15.75							
16	B	15.70	16.30	200	40	0.05	12.1	10.4	14	75
	C	15.20	16.80							
18	B	17.60	18.40	225	45	0.05	13.6	12.4	16	70
	C	17.10	18.90							
20	B	19.60	20.40	225	55	0.05	15.2	14.4	18	60
	C	19.00	21.00							
22	B	21.60	22.40	250	55	0.05	16.7	16.4	20	60
	C	20.90	23.10							
24	B	23.50	24.50	250	70	0.05	18.2	18.4	22	55
	C	22.80	25.20							
27	B	26.50	27.50	300	80	0.05	20.4	21.4	25.3	50
	C	25.65	28.35							
30	B	29.40	30.60	300	80	0.05	22.8	24.4	29.4	50
	C	28.50	31.50							
33	B	32.30	33.70	325	80	0.05	25.0	27.4	33.4	45
	C	31.35	34.65							
36	B	35.30	36.70	350	90	0.05	27.3	30.4	37.4	45
	C	34.20	37.80							

Table 9. Electrical characteristics per type: BZX38450-B39-Q to BZX38450-C51-Q

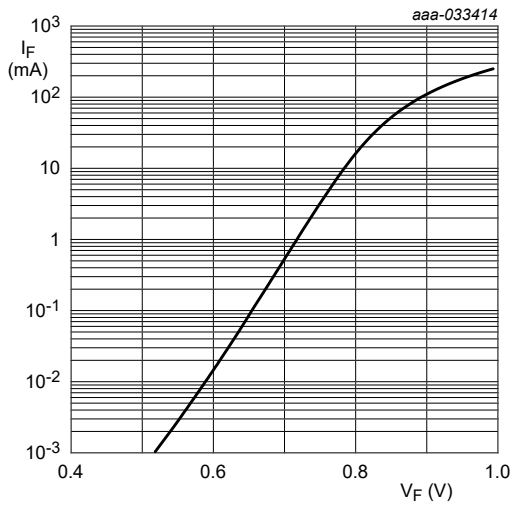
T_j = 25 °C unless otherwise specified.

BZX38450-xxx-Q	Sel.	Working voltage V_Z (V)		Differential resistance r_{diff} (Ω)		Reverse current I_R (μA)		Temperature coefficient S_Z (mV/K)		Diode capacitance C_d (pF)
		I_Z = 50 μA		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	29.6	33.4	41.2	45
	C	37.05	40.95							
43	B	42.10	43.90	375	150	0.05	32.6	37.6	46.6	40
	C	40.85	45.15							
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							



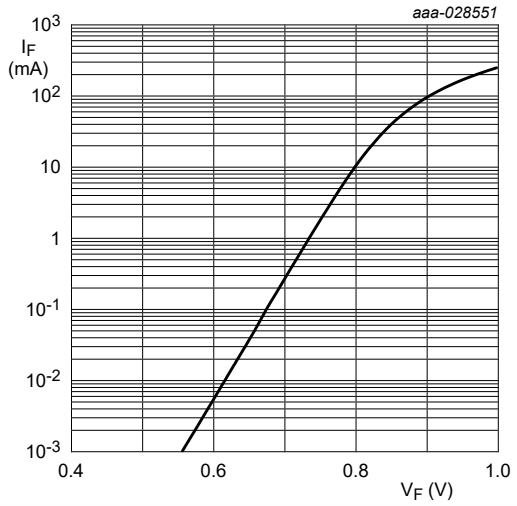
T_j = 25 °C (before surge)

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



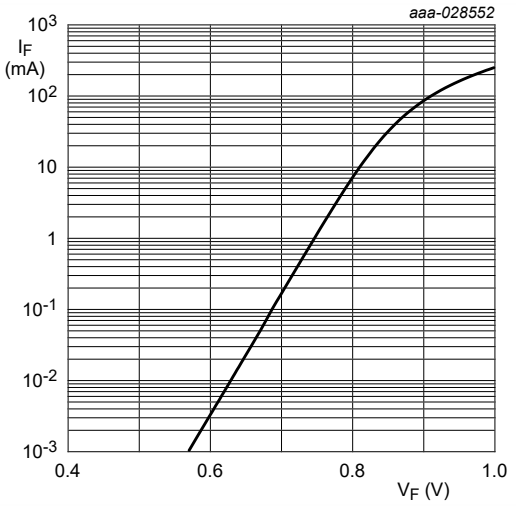
T_j = 25 °C

Fig. 2. Forward current as a function of forward voltage; typical values (BZX38450-B/C1V8-Q)



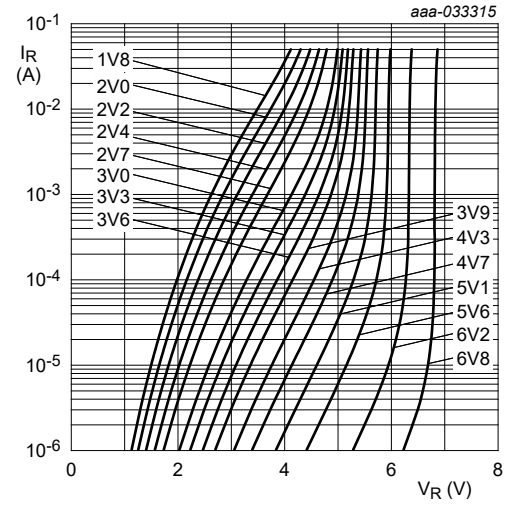
T_j = 25 °C

Fig. 3. Forward current as a function of forward voltage; typical values (BZX38450-B/C6V8-Q)



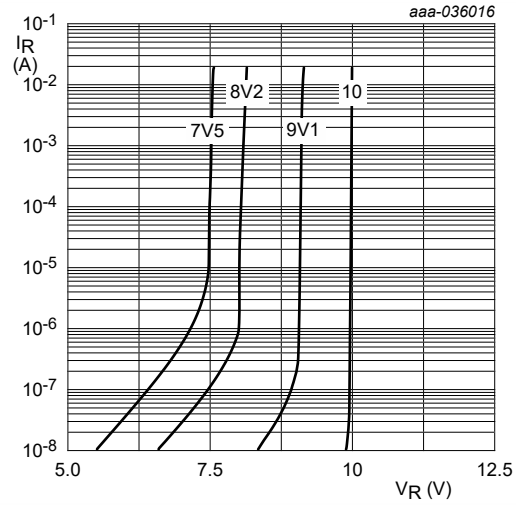
T_j = 25 °C

Fig. 4. Forward current as a function of forward voltage; typical values (BZX38450-B/C7V5-Q)



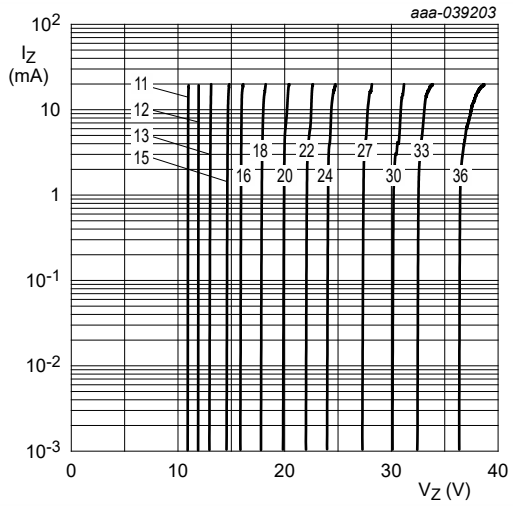
T_{amb} = 25 °C

Fig. 5. Reverse current as a function of reverse voltage; typical values (BZX38450-B/C1V8-Q to BZX38450-B/C6V8-Q)



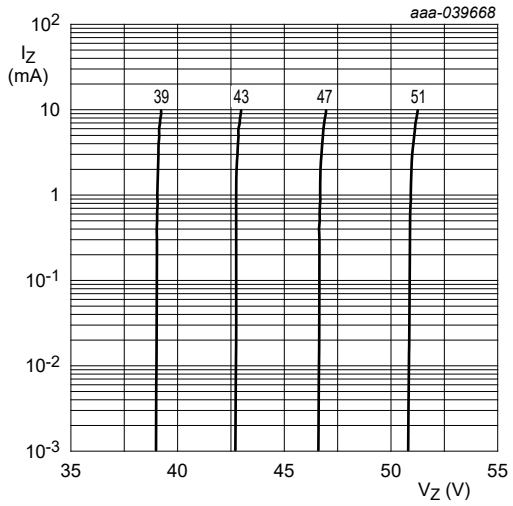
T_{amb} = 25 °C

Fig. 6. Reverse current as a function of reverse voltage; typical values (BZX38450-B/C7V5-Q to BZX38450-B/C10-Q)



T_{amb} = 25 °C

Fig. 7. Reverse current as a function of reverse voltage; typical values (BZX38450-B/C11-Q to BZX38450-B/C36-Q)



T_{amb} = 25 °C

Fig. 8. Reverse current as a function of reverse voltage; typical values (BZX38450-B/C39-Q to BZX38450-B/C51-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

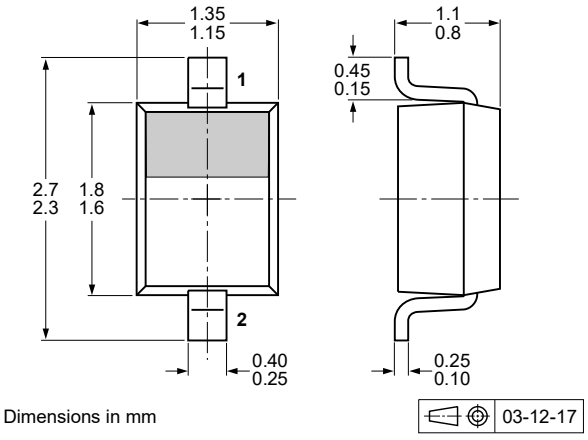


Fig. 9. Package outline SOD323 (SC-76)

13. Soldering

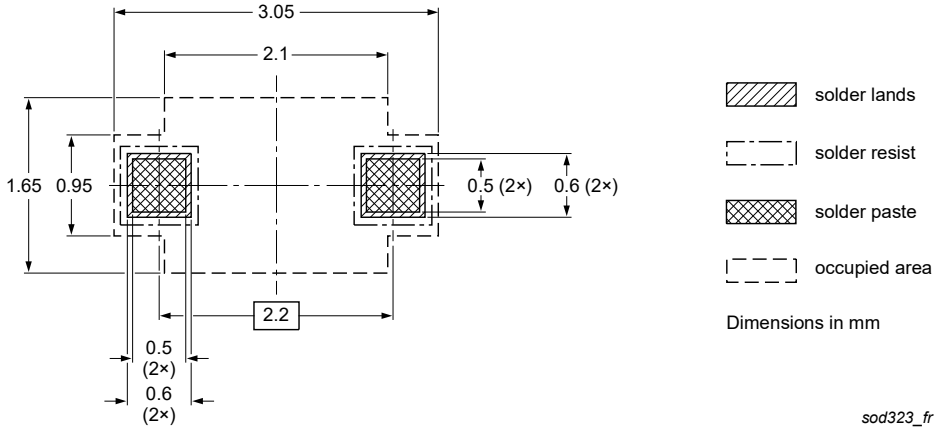


Fig. 10. Reflow soldering footprint for SOD323 (SC-76)

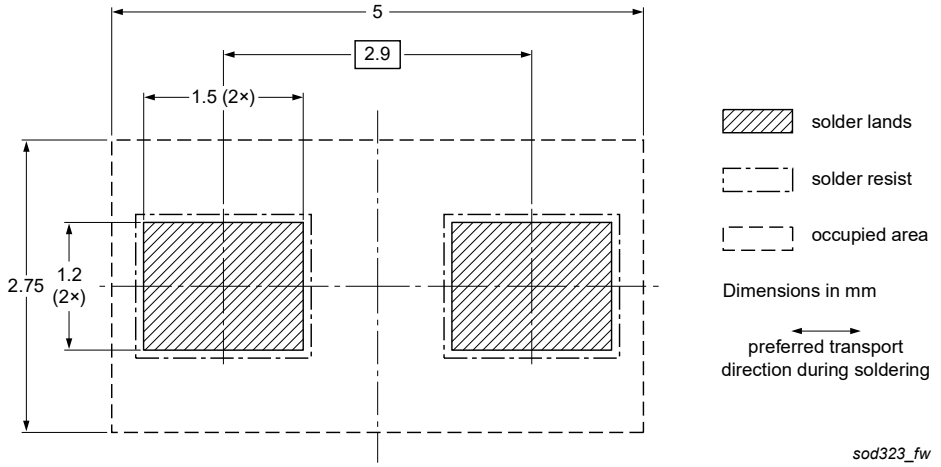


Fig. 11. Wave soldering footprint for SOD323 (SC-76)

14. Revision history

Table 10. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BZX38450-Q_SER v.4	20240716	Product data sheet	-	BZX38450-Q_SER v.3
Modifications:	• B and C selections up to 51 V added			
BZX38450-Q_SER v.3	20230118	Product data sheet	-	BZX38450-Q_SER v.2
BZX38450-Q_SER v.2	20210825	Product data sheet	-	BZX38450-Q_SER v.1
BZX38450-Q_SER v.1	20210427	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".
[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the internet at https://www.nexperia.com.

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