BAS21QC-Q

High-voltage switching diode

29 January 2025 **Product data sheet**

1. General description

High-voltage switching diode, encapsulated in an ultra small DFN1412D-3 (SOT8009, JEDEC MO340-CA) leadless Surface-Mounted Device (SMD) plastic package with side-wettable flanks.

2. Features and benefits

- High switching speed: $t_{rr} \leq 50$ ns
- Low leakage current
- High reverse voltage: $V_R \leq 200$ V
- Low capacitance: $C_d \leq 5$ pF
- Leadless ultra small SMD plastic package
- Low package height of 0.5 mm
- Suitable for Automatic Optical Inspection (AOI) of solder joint
- Qualified according to AEC-Q101 and recommended for use in automotive applications

3. Applications

- High-speed switching
- General-purpose switching
- Voltage clamping
- Reverse polarity protection

4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
I_F	forward current	$T_j = 25$ °C	[1]	-	-	250	mA
V_R	reverse voltage			-	-	200	V
V_F	forward voltage	$I_F = 200$ mA; $T_j = 25$ °C		-	-	1.25	V
V_{RRM}	repetitive peak reverse voltage	$T_j = 25$ °C		-	-	250	V
I_R	reverse current	$V_R = 200$ V; $T_j = 25$ °C		-	-	100	nA
t_{rr}	reverse recovery time	$I_F = 30$ mA; $I_R = 30$ mA; $R_L = 100$ Ω; $I_{R(meas)} = 3$ mA; $T_{amb} = 25$ °C		-	-	50	ns

[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided 70 µm copper, tin-plated and standard footprint.

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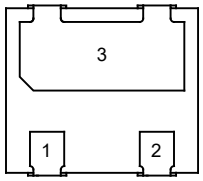
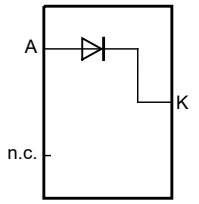
5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	A	anode	 Transparent top view **DFN1412D-3 (SOT8009)**	 *aaa-021941*
2	n.c.	not connected		
3	K	cathode		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BAS21QC-Q	DFN1412D-3	plastic, leadless ultra small outline package with side-wettable flanks (SWF); 3 terminals; 0.8 mm pitch; 1.4 mm x 1.2 mm x 0.48 mm body	SOT8009

7. Marking

Table 4. Marking codes

Type number	Marking code
BAS21QC-Q	9Q

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8. Limiting values

Table 5. Limiting values

In accordance with the Absolute Maximum Rating Sytem (IEC 60134)

Symbol	Parameter	Conditions		Min	Max	Unit
V_{RRM}	repetitive peak reverse voltage	T_j = 25 °C		-	250	V
V_R	reverse voltage			-	200	V
I_F	forward current		[1]	-	250	mA
I_{FSM}	non-repetitive peak forward current	t_p = 50 µs; square wave; $T_{j(init)}$ = 25 °C		-	14.1	A
		t_p = 10 ms; square wave; $T_{j(init)}$ = 25 °C		-	1.8	A
I_{FRM}	repetitive peak forward current	$t_p \leq$ 1 ms; $\delta \leq$ 0.25		-	625	mA
P_{tot}	total power dissipation	$T_{amb} \leq$ 25 °C	[1]	-	440	mW
			[2]	-	750	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 70 µm copper, tin-plated and standard footprint.
[2] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided 70 µm copper, tin-plated and mounting pad for cathode 1 cm^2.

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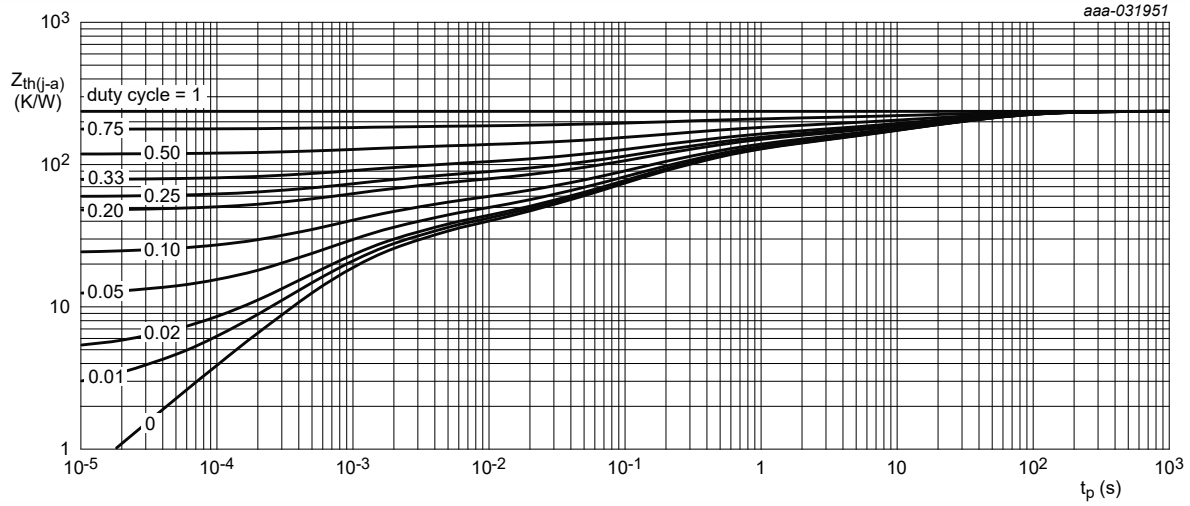
9. Thermal characteristics

Table 6. Thermal characteristics

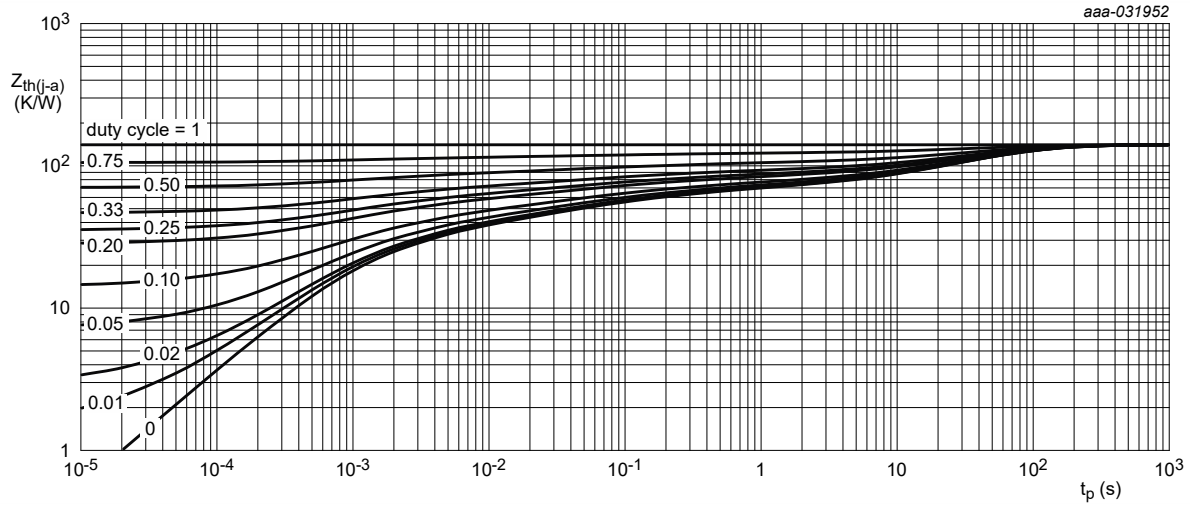
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	In free air	[1]	-	-	285	K/W
			[2]	-	-	160	K/W

[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided 70 µm copper, tin-plated and standard footprint.
[2] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided 70 µm copper, tin-plated and mounting pad for cathode 1 cm^2.



FR4 PCB, single-sided 70 µm copper, standard footprint

Fig. 1. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values



FR4 PCB, single-sided 70 µm copper, 1 cm^2

Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

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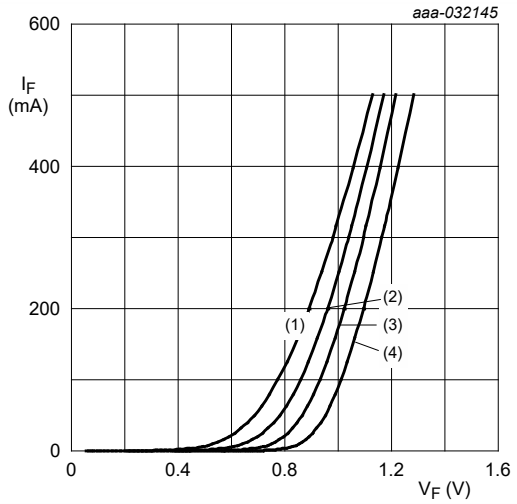
10. Characteristics

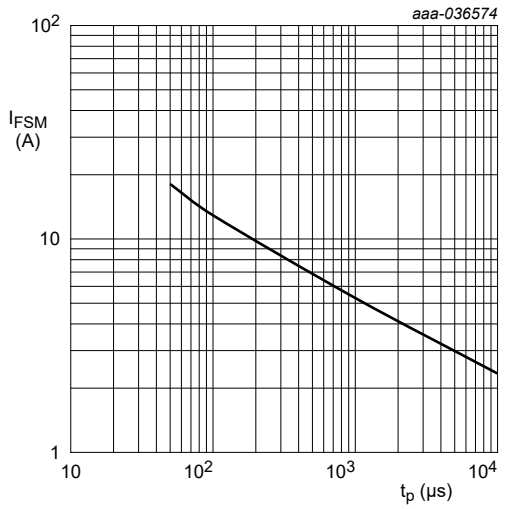
Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_F	forward voltage	I_F = 100 mA; T_j = 25 °C		-	-	1	V
		I_F = 200 mA; T_j = 25 °C		-	-	1.25	V
I_R	reverse current	V_R = 200 V; T_j = 25 °C		-	-	100	nA
		V_R = 200 V; T_j = 150 °C		-	-	100	µA
C_d	diode capacitance	V_R = 0 V; f = 1 MHz; T_{amb} = 25 °C		-	-	5	pF
t_{rr}	reverse recovery time	I_F = 30 mA; I_R = 30 mA; R_L = 100 Ω; $I_{R(meas)}$ = 3 mA; T_{amb} = 25 °C		-	-	50	ns



(1) T_j = 150° C
(2) T_j = 85° C
(3) T_j = 25° C
(4) T_j = -40° C

Fig. 3. Forward current as a function of forward voltage; typical values



Based on square wave currents.
$T_{j(init)}$ = 25 °C

Fig. 4. Non-repetitive peak forward current as a function of pulse duration; typical values

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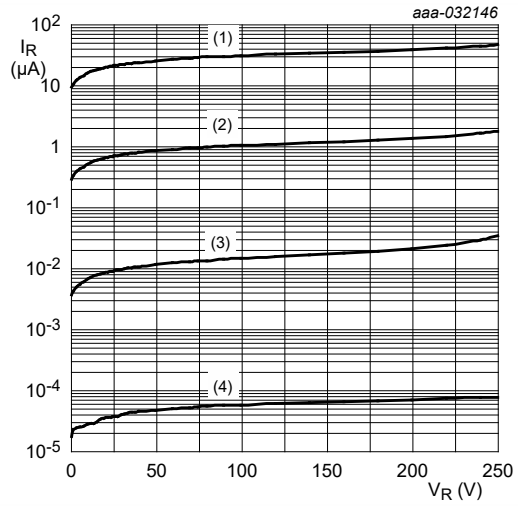
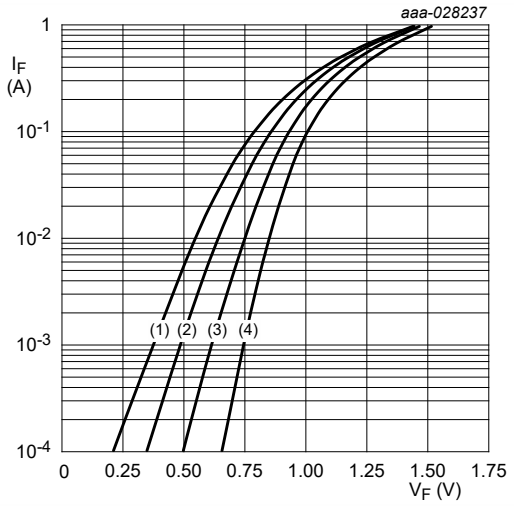


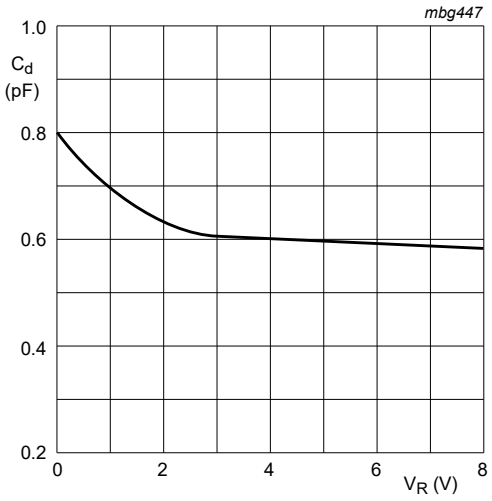
(1) T_j = 150° C
(2) T_j = 85° C
(3) T_j = 25° C
(4) T_j = -40° C

Fig. 5. Reverse current as a function of reverse voltage; typical values



(1) T_j = 150° C
(2) T_j = 85° C
(3) T_j = 25° C
(4) T_j = -40° C

Fig. 6. Forward current as a function of forward voltage; typical values; (logarithmic scale)



f = 1 MHz
T_j = 25 °C

Fig. 7. Diode capacitance as a function of reverse voltage; typical values

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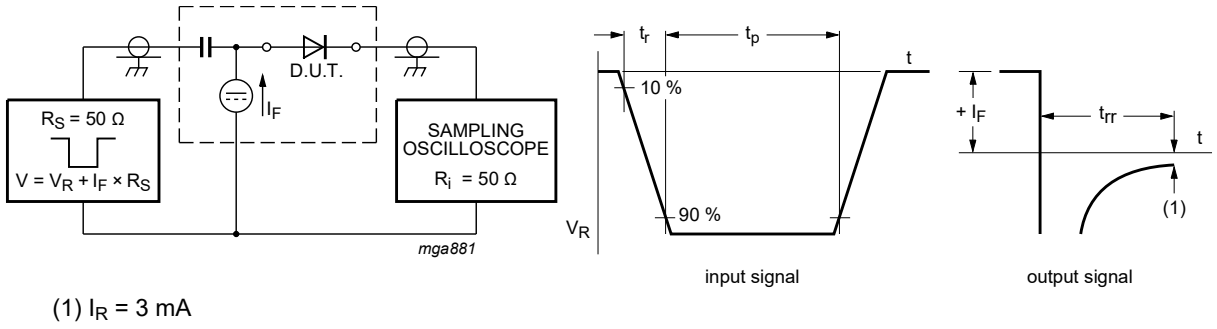
11. Test information



(1) I_R = 3 mA

Fig. 8. Reverse recovery time test circuit and waveforms

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

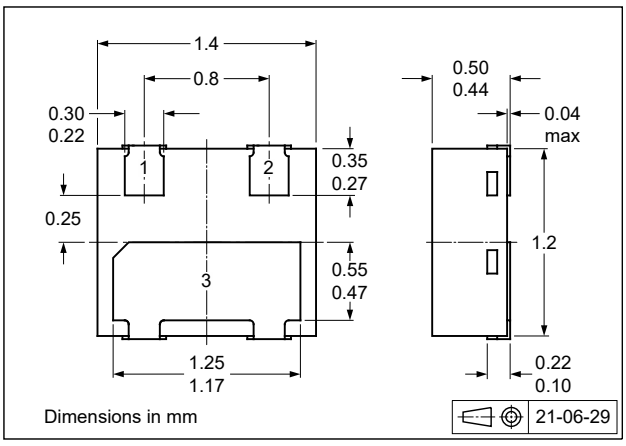


Fig. 9. Package outline DFN1412D-3 (SOT8009)

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13. Soldering

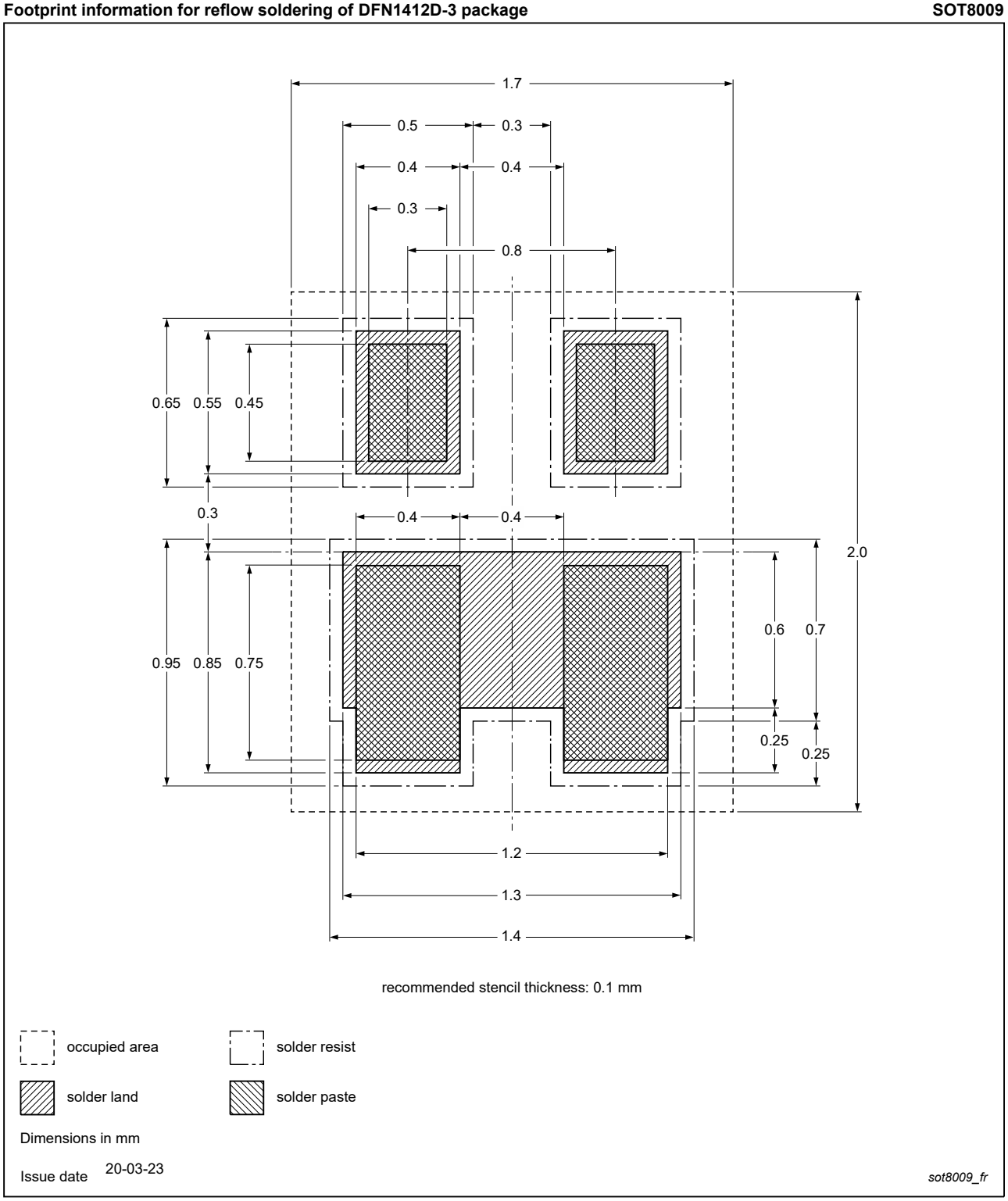

Fig. 10. Reflow soldering footprint for DFN1412D-3 (SOT8009)

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14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
BAS21QC-Q v.3	20250129	Product data sheet	-	BAS21QC-Q v.2
Modifications:	• Limiting values: I_{FSM} values changed • Characteristics: Fig. 4 added			
BAS21QC-Q v.2	20210504	Product data sheet	-	BAS21QC-Q v.1
BAS21QC-Q v.1	20210221	Product data sheet	-	-

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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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