BAV99QC-Q

Dual series high-speed switching diodes

5 May 2021 **Product data sheet**

1. General description

Dual series high-speed switching diodes, encapsulated in an ultra small DFN1412D-3 (SOT8009) leadless Surface-Mounted Device (SMD) plastic package with side-wettable flanks .

2. Features and benefits

- High switching speed: $t_{rr} \leq 4$ ns
- Low leakage current
- Reverse voltage $V_R \leq 100$ V
- Low capacitance $C_d \leq 2$ pF
- Ultra small SMD plastic package
- Low package height of 0.5 mm
- Suitable for Automatic Optical Inspection (AOI) of solder joint
- Smaller footprint compared to conventional leaded SMD packages
- Qualified according to AEC-Q101 and recommended for use in automotive applications

3. Applications

- High-speed switching
- General-purpose switching
- Reverse polarity protection
- Space restricted applications

4. Quick reference data

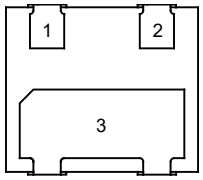
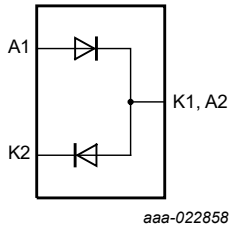
Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Per diode							
I_F	forward current	single diode loaded; T_{amb} = 25 °C	[1]	-	-	215	mA
V_R	reverse voltage	T_j = 25 °C		-	-	100	V
I_R	reverse current	V_R = 80 V; pulsed; T_j = 25 °C		-	-	0.5	µA
t_{rr}	reverse recovery time	I_F = 10 mA; I_R = 10 mA; $I_{R(meas)}$ = 1 mA; R_L = 100 Ω; T_{amb} = 25 °C		-	-	4	ns

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

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	A1	anode (diode 1)	 Bottom view **DFN1412D-3 (SOT8009)**	
2	K2	cathode (diode 2)		
3	K1, A2	cathode (diode 1) and anode (diode 2)		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BAV99QC-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
BAV99QC-Q	9A

8. Limiting values

Table 5. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions		Min	Max	Unit
Per diode						
V_R	reverse voltage	T_j = 25 °C		-	100	V
I_F	forward current	single diode loaded; T_{amb} = 25 °C	[1]	-	215	mA
		double diode loaded; T_{amb} = 25 °C	[1]	-	125	mA
I_{FRM}	repetitive peak forward current	$t_p \leq$ 0.5 ms; $\delta \leq$ 0.25; T_j = 25 °C		-	500	mA
I_{FSM}	non-repetitive peak forward current	$t_p \leq$ 1 µs; square wave; $T_{j(init)}$ = 25 °C		-	4	A
		$t_p \leq$ 1 ms; square wave; $T_{j(init)}$ = 25 °C		-	1	A
		$t_p \leq$ 1 s; square wave; $T_{j(init)}$ = 25 °C		-	0.5	A
Per device; one diode loaded						
P_{tot}	total power dissipation	$T_{amb} \leq$ 25 °C	[1]	-	335	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.

9. Thermal characteristics

Table 6. Thermal characteristics

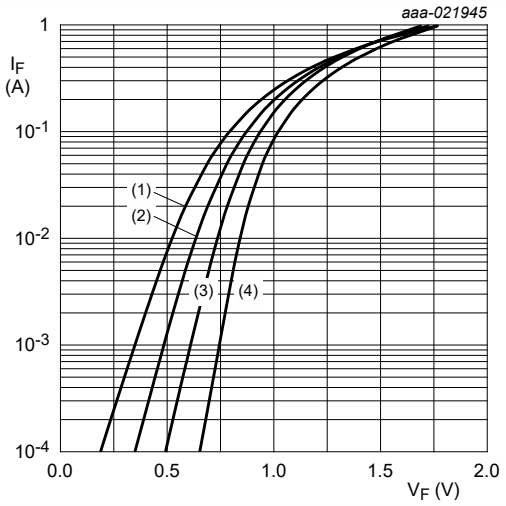
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	375	K/W

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

10. Characteristics

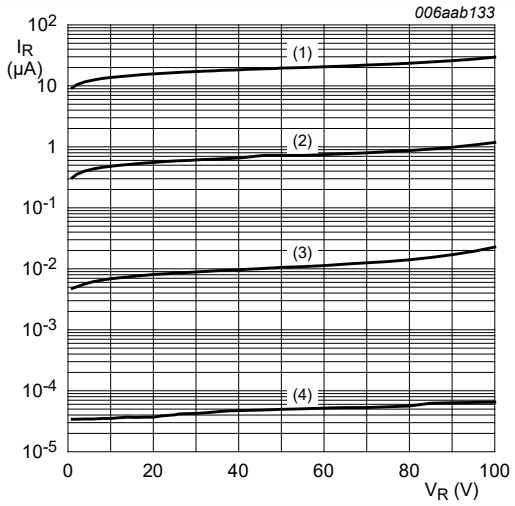
Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Per diode							
V_F	forward voltage	I_F = 1 mA; $t_p \leq$ 300 µs; $\delta \leq$ 0.02; pulsed; T_j = 25 °C		-	-	715	mV
		I_F = 10 mA; $t_p \leq$ 300 µs; $\delta \leq$ 0.02; pulsed; T_j = 25 °C		-	-	855	mV
		I_F = 50 mA; $t_p \leq$ 300 µs; $\delta \leq$ 0.02; pulsed; T_j = 25 °C		-	-	1	V
		I_F = 150 mA; $t_p \leq$ 300 µs; $\delta \leq$ 0.02; pulsed; T_j = 25 °C		-	-	1.25	V
I_R	reverse current	V_R = 80 V; pulsed; T_j = 25 °C		-	-	0.5	µA
		V_R = 25 V; pulsed; T_j = 150 °C		-	-	30	µA
		V_R = 80 V; pulsed; T_j = 150 °C		-	-	150	µA
C_d	diode capacitance	V_R = 0 V; f = 1 MHz; T_{amb} = 25 °C		-	-	1.5	pF
t_{rr}	reverse recovery time	I_F = 10 mA; I_R = 10 mA; $I_{R(meas)}$ = 1 mA; R_L = 100 Ω; T_{amb} = 25 °C		-	-	4	ns
V_{FRM}	peak forward recovery voltage	I_F = 10 mA; T_j = 25 °C; t_r = 20 ns		-	-	1.75	V



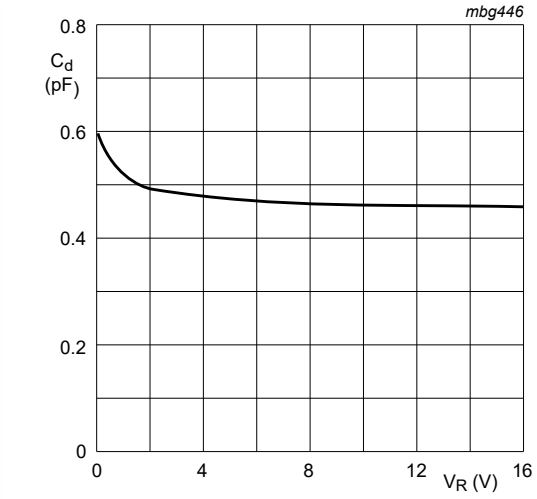
(1) T_j = 150 °C
(2) T_j = 85 °C
(3) T_j = 25 °C
(4) T_j = −40 °C

Fig. 1. Forward current as a function of forward voltage; typical values



(1) T_{amb} = 150 °C
(2) T_{amb} = 85 °C
(3) T_{amb} = 25 °C
(4) T_{amb} = -40 °C

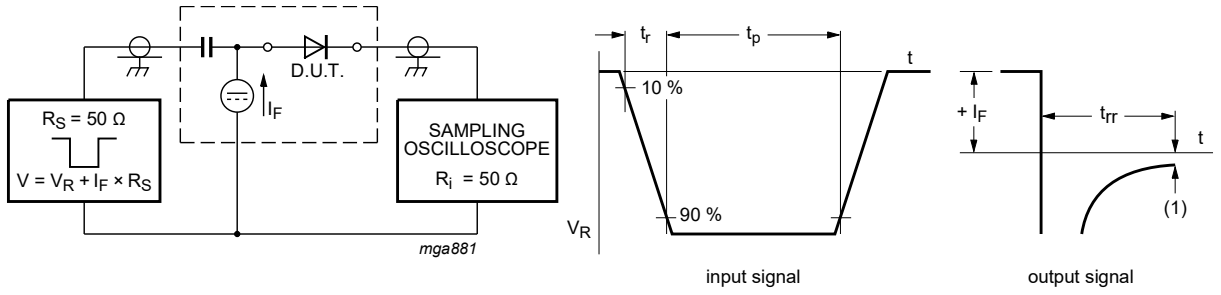
Fig. 2. Reverse current as a function of reverse voltage; typical values



f = 1 MHz; T_{amb} = 25 °C

Fig. 3. Diode capacitance as a function of reverse voltage; typical values

11. Test information



(1) I_R = 1 mA

Fig. 4. Reverse recovery time test circuit and waveforms

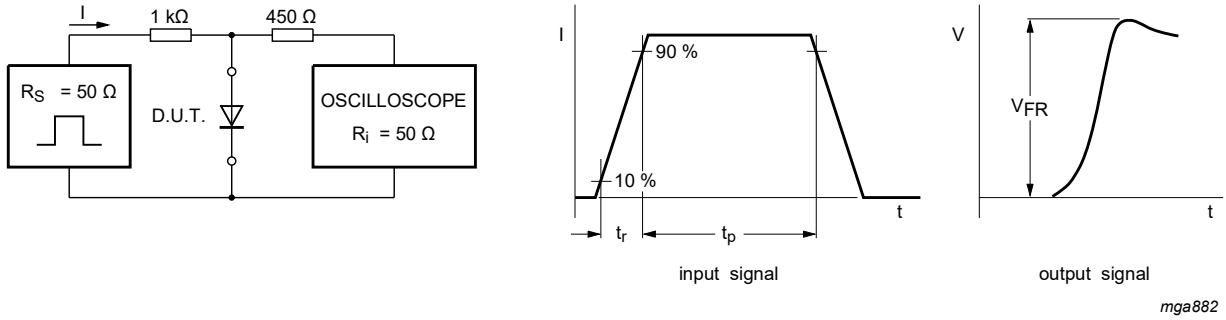


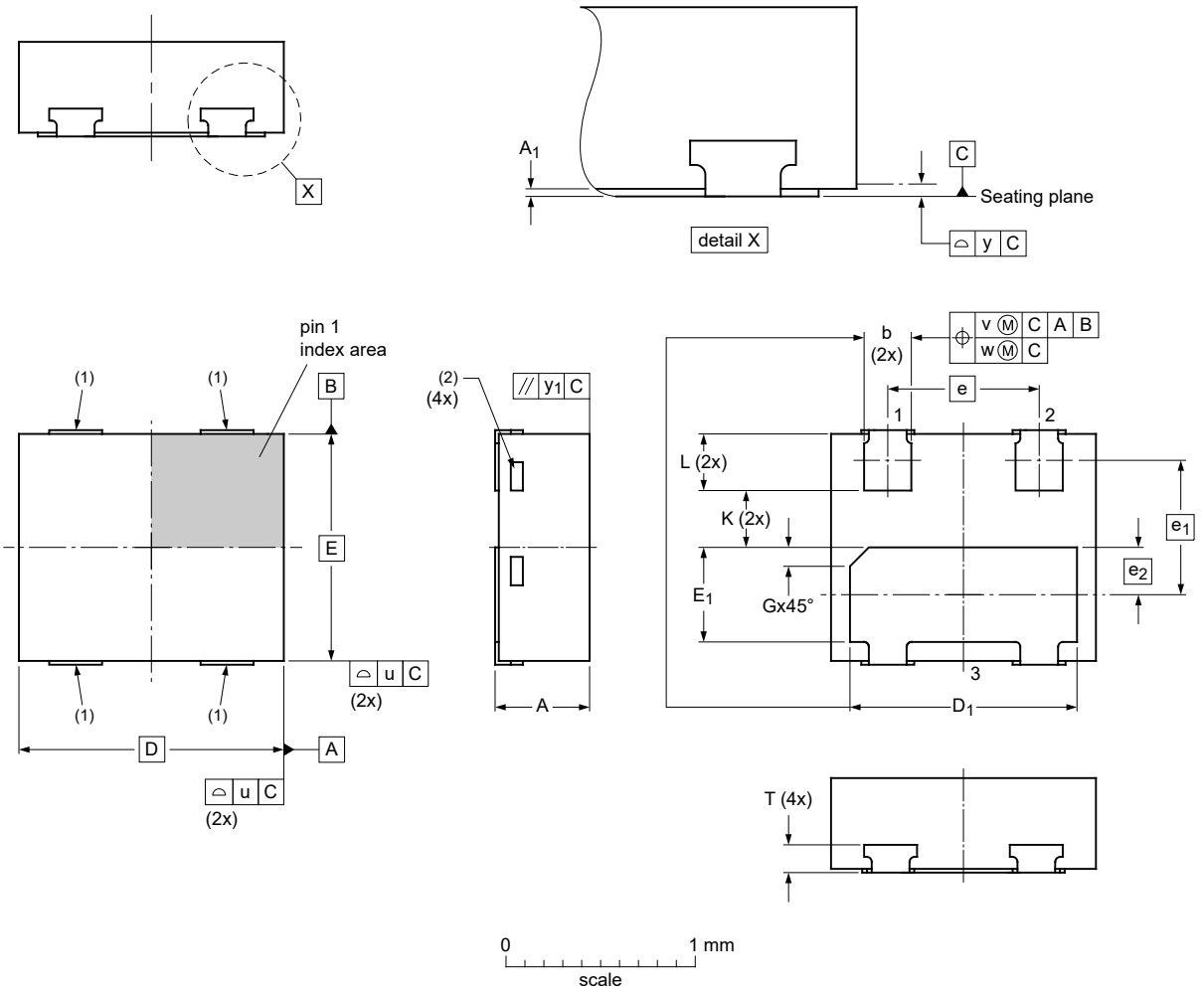
Fig. 5. Forward recovery voltage test circuit and waveforms

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

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**



Dimensions (mm are the original dimensions)

Unit	A	A_1	b	D	D_1	E	E_1	e	e_1	e_2	G	K	L	T	u	v	w	y	y1
max	0.50	0.04	0.30		1.25		0.55						0.35	0.22					
mm nom	0.47		0.25	1.4	1.20	1.2	0.50	0.8	0.71	0.26	0.09 (ref)		0.30	0.16	0.05	0.1	0.05	0.05	0.05
min	0.44		0.22		1.17		0.47					0.25	0.27	0.10					

Note
1. Side Wettable Flank, protrusion max. 0.02 mm.
2. Visible depend upon used manufacturing technology.
Dimension A and T are including plating thickness.

sot8009_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT8009		MO-340CA				~~19-12-06~~ 20-12-13

Fig. 6. Package outline DFN1412D-3 (SOT8009)

13. Soldering

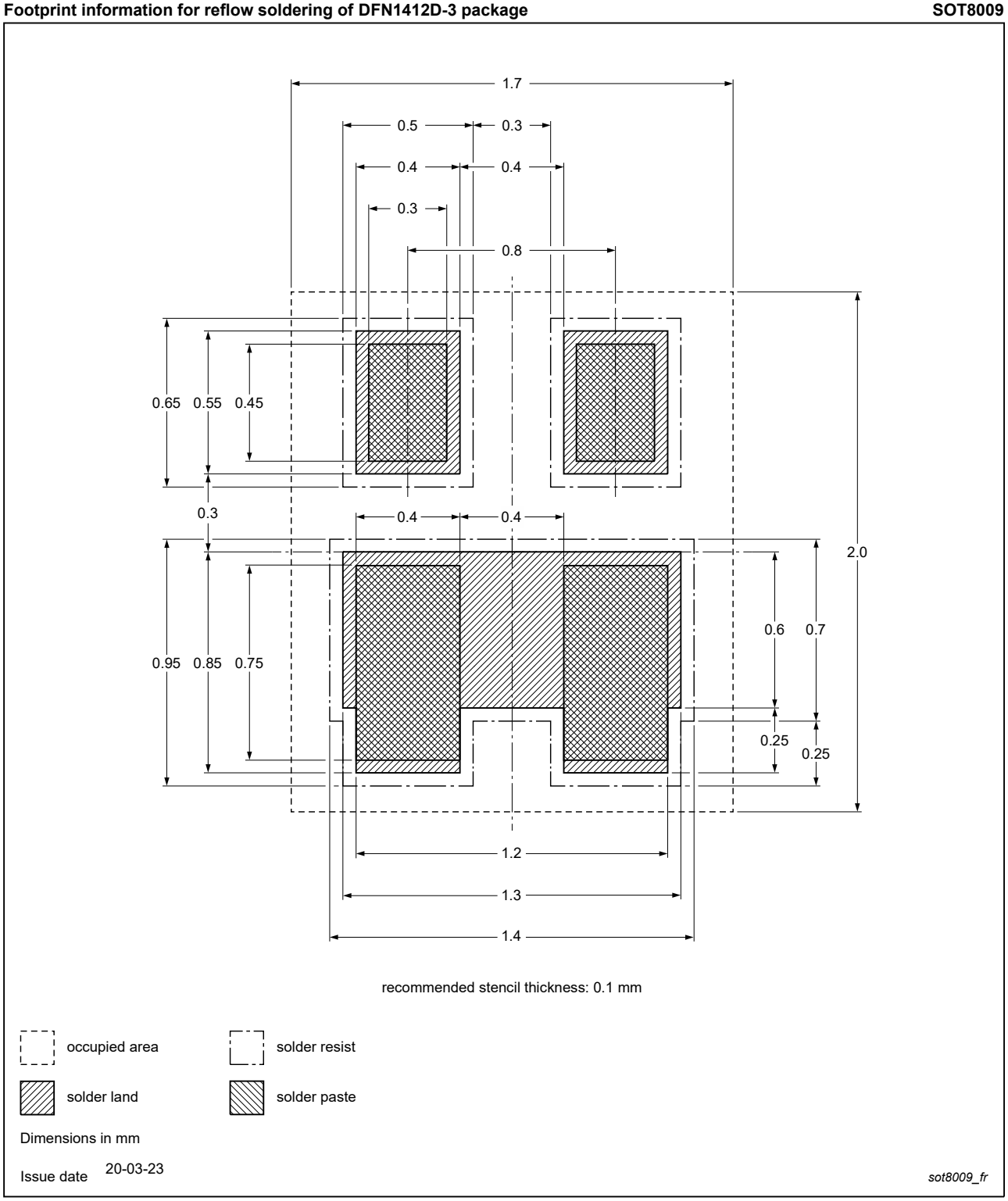


Fig. 7. Reflow soldering footprint for DFN1412D-3 (SOT8009)

14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
BAV99QC-Q v.2	20210505	Product data sheet	-	BAV99QC-Q v.1
Modifications:	• Features and benefits: added recommendation for automotive applications			
BAV99QC-Q v.1	20210221	Product 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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