BAS21PG-Q

Dual isolated high-voltage switching diode

3 May 2024 Product data sheet

1. General description

Dual high-voltage switching diode encapsulated in a very small SOT353 (SC-88A) Surface-Mounted Device (SMD) plastic package.

2. Features and benefits

- High switching speed: $t_{rr} \leq 50$ ns
- Low leakage current
- Reverse voltage $V_R \leq 200$ V
- Low capacitance: $C_d \leq 2$ pF
- Very small SMD plastic package
- Qualified according to AEC-Q101 and recommended for use in automotive applications

3. Applications

- High-speed switching at high voltage
- High-voltage general-purpose switching
- Voltage clamping
- Reverse polarity protection

4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Per diode							
I_F	forward current	$T_j = 25$ °C; single diode loaded		-	-	225	mA
V_R	reverse voltage	$T_j = 25$ °C		-	-	250	V
I_R	reverse current	$V_R = 200$ V; $T_j = 25$ °C		-	25	100	nA
t_{rr}	reverse recovery time	$I_F = 10$ mA; $I_R = 10$ mA; $I_{R(meas)} = 1$ mA; $R_L = 100$ Ω; $T_j = 25$ °C		-	-	50	ns

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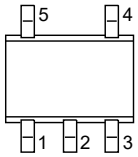
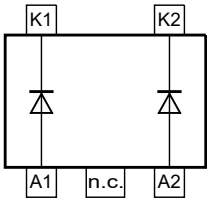
5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	A1	anode diode 1	 TSSOP5 (SOT353)	 aaa-018440
2	n.c.	not connected		
3	A2	anode diode 2		
4	K2	cathode diode 2		
5	K1	cathode diode 1		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BAS21PG-Q	TSSOP5	plastic, surface-mounted package; 5 leads; 0.65 mm pitch; 2.1 mm x 1.25 mm x 0.95 mm body	SOT353

7. Marking

Table 4. Marking codes

Type number	Marking code[1]
BAS21PG-Q	PG%

[1] % = placeholder for manufacturing site code

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		-	250	V
I_F	forward current	T_j = 25 °C; single diode loaded		-	225	mA
		T_j = 25 °C; double diode loaded		-	125	mA
I_{FRM}	repetitive peak forward current	$t_p \leq$ 1 ms; δ = 25 %; T_j = 25 °C		-	625	mA
I_{FSM}	non-repetitive peak forward current	t_p = 1 µs; square wave; $T_{j(init)}$ = 25 °C		-	9	A
		t_p = 100 µs; square wave; $T_{j(init)}$ = 25 °C		-	3	A
		t_p = 10 ms; square wave; $T_{j(init)}$ = 25 °C		-	1.7	A
Per device; one diode loaded						
P_{tot}	total power dissipation	$T_{amb} \leq$ 25 °C	[1]	-	255	mW
			[2]	-	290	mW
T_j	junction temperature			-	150	°C
T_{amb}	ambient temperature			-55	150	°C
T_{stg}	storage temperature			-65	150	°C

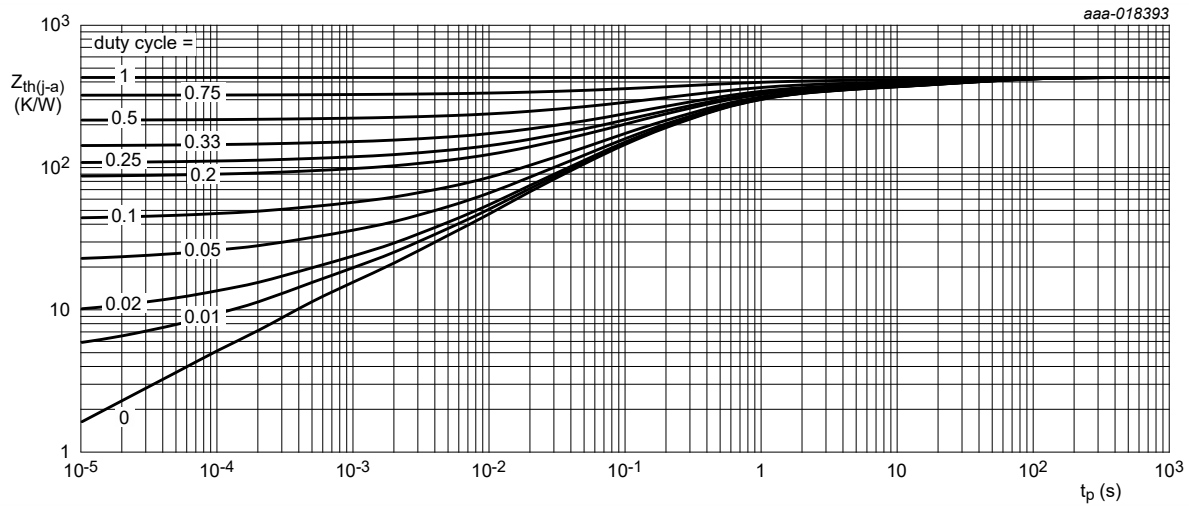
[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.
[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm².

9. Thermal characteristics

Table 6. Thermal characteristics

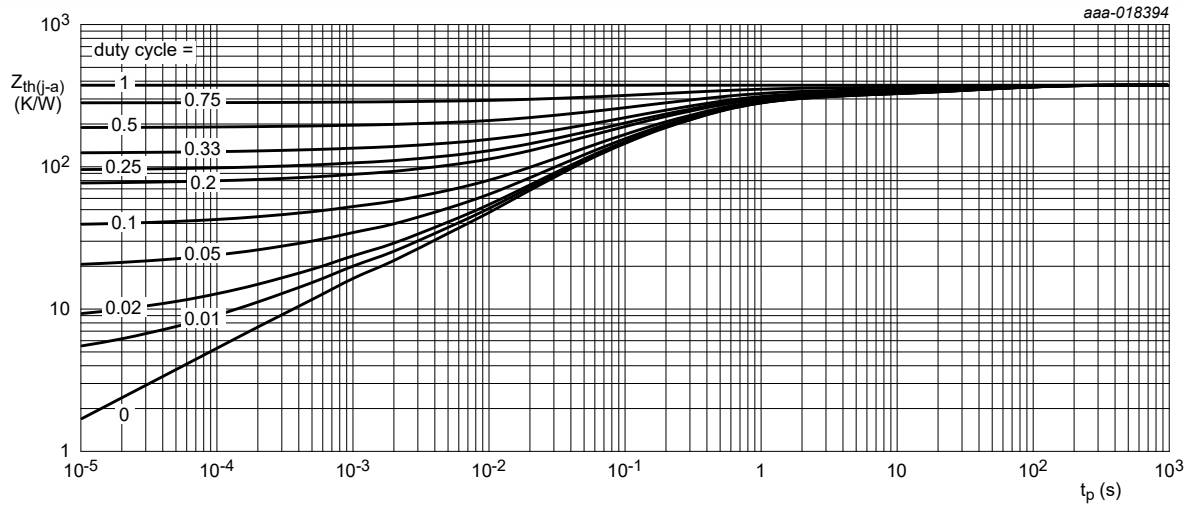
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient		[1]	-	-	495	K/W
			[2]	-	-	430	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point		[3]	-	-	95	K/W

[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 cm².
[3] Soldering point of cathode tab.



FR4 PCB, standard footprint

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



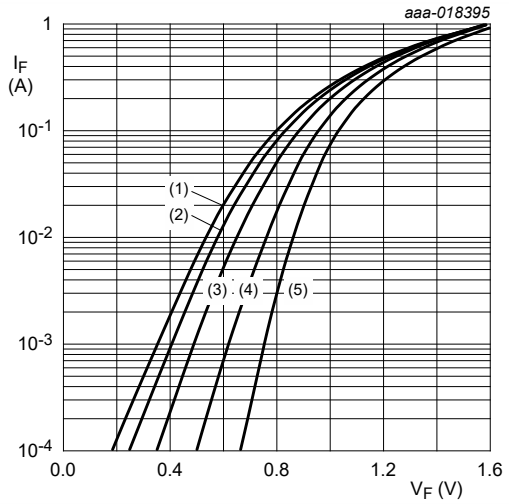
FR4 PCB, mounting pad for cathode 1 cm²

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

10. Characteristics

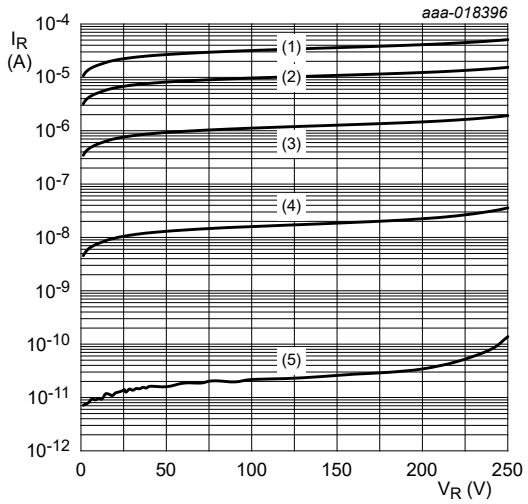
Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Per diode							
$V_{(BR)R}$	reverse breakdown voltage	I_R = 100 µA; T_j = 25 °C		250	-	-	V
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		-	25	100	nA
		V_R = 200 V; T_j = 150 °C		-	40	-	µA
C_d	diode capacitance	V_R = 0 V; f = 1 MHz; T_j = 25 °C		-	0.8	2	pF
t_{rr}	reverse recovery time	I_F = 10 mA; I_R = 10 mA; $I_{R(meas)}$ = 1 mA; R_L = 100 Ω; T_j = 25 °C		-	-	50	ns



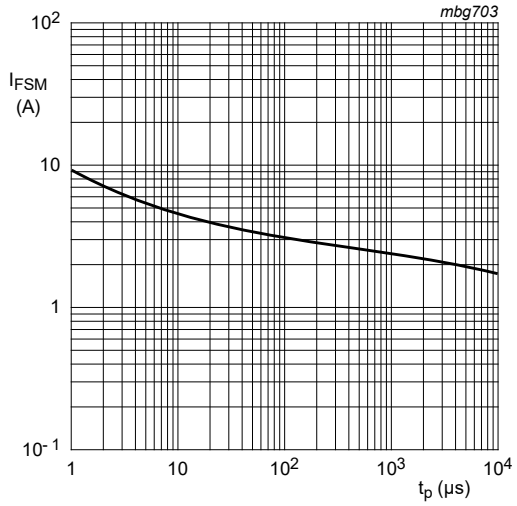
(1) T_j = 150 °C
(2) T_j = 125 °C
(3) T_j = 85 °C
(4) T_j = 25 °C
(5) T_j = −40 °C

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



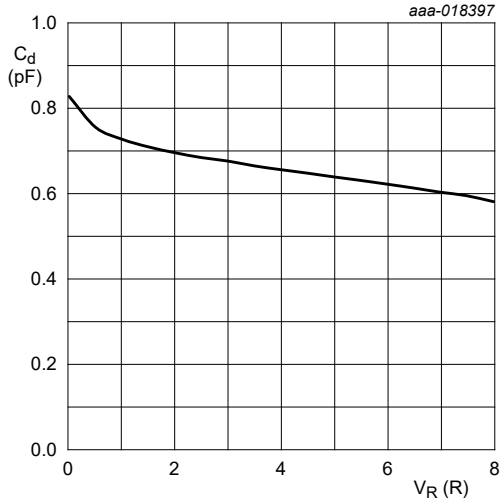
(1) T_j = 150 °C
(2) T_j = 125 °C
(3) T_j = 85 °C
(4) T_j = 25 °C
(5) T_j = −40 °C

Fig. 4. Reverse current as a function of reverse voltage; typical values



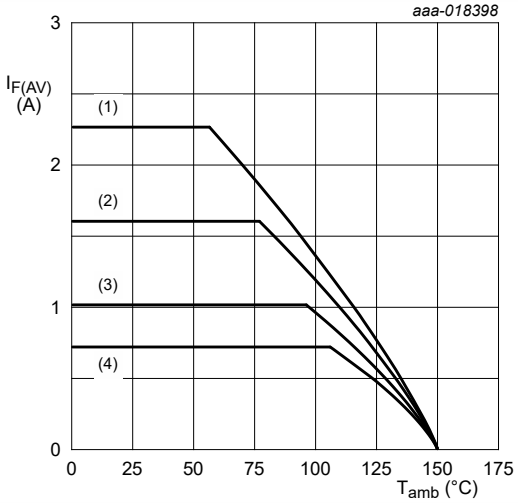
Based on square wave currents.
$T_{j(init)}$ = 25 °C

Fig. 5. Non-repetitive peak forward current as a function of pulse duration; maximum values



f = 1MHz; T_{amb} = 25 °C

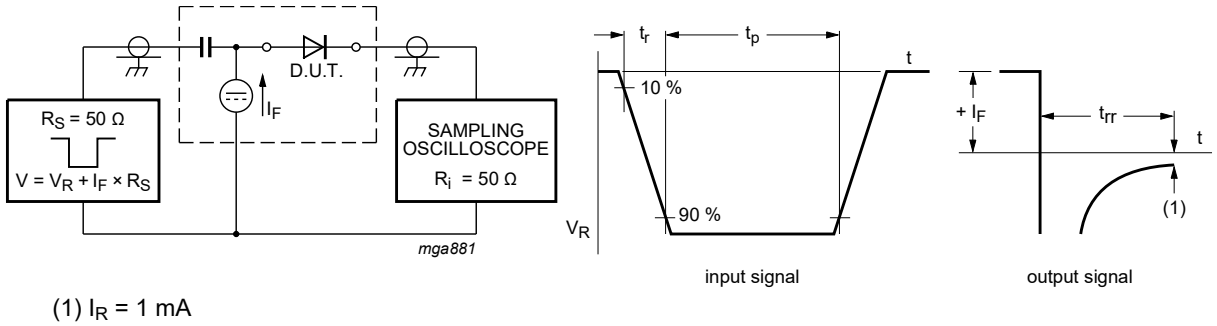
Fig. 6. Diode capacitance as a function of reverse voltage; typical values



FR4 PCB, standard footprint; one diode loaded
(1) δ = 1
(2) δ = 0.5
(3) δ = 0.2
(4) δ = 0.1

Fig. 7. Average forward current as a function of ambient temperature; typical values

11. Test information



(1) I_R = 1 mA

Fig. 8. Reverse recovery time: test circuit and waveforms

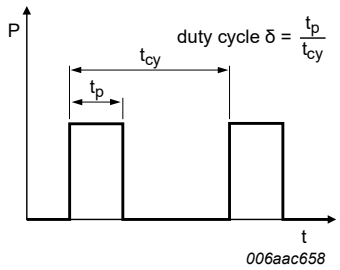


Fig. 9. Duty cycle definition

The current ratings for the typical waveforms are calculated according to the equations: $I_{F(AV)} = I_M \times \delta$ with I_M defined as peak current, $I_{RMS} = I_{F(AV)}$ at DC, and $I_{RMS} = I_M \times \sqrt{\delta}$ with I_{RMS} defined as RMS current.

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

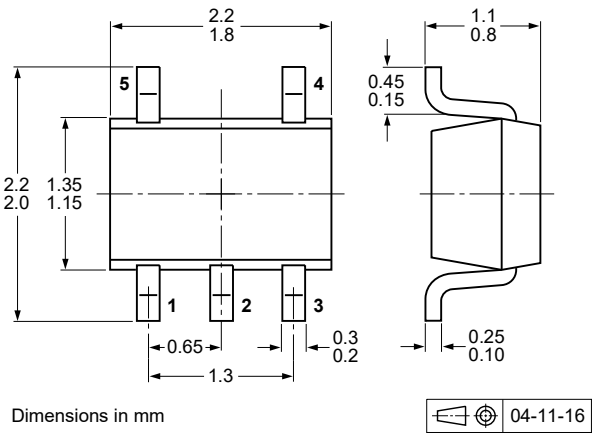


Fig. 10. Package outline TSSOP5 (SOT353)

13. Soldering

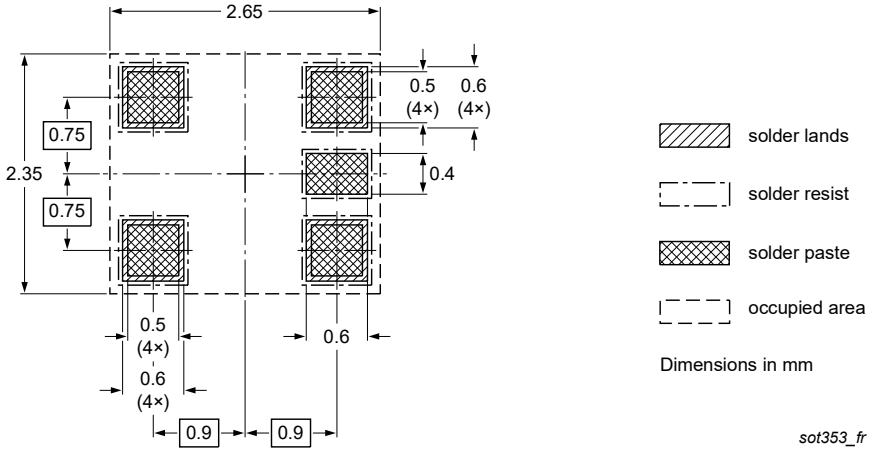


Fig. 11. Reflow soldering footprint for TSSOP5 (SOT353)

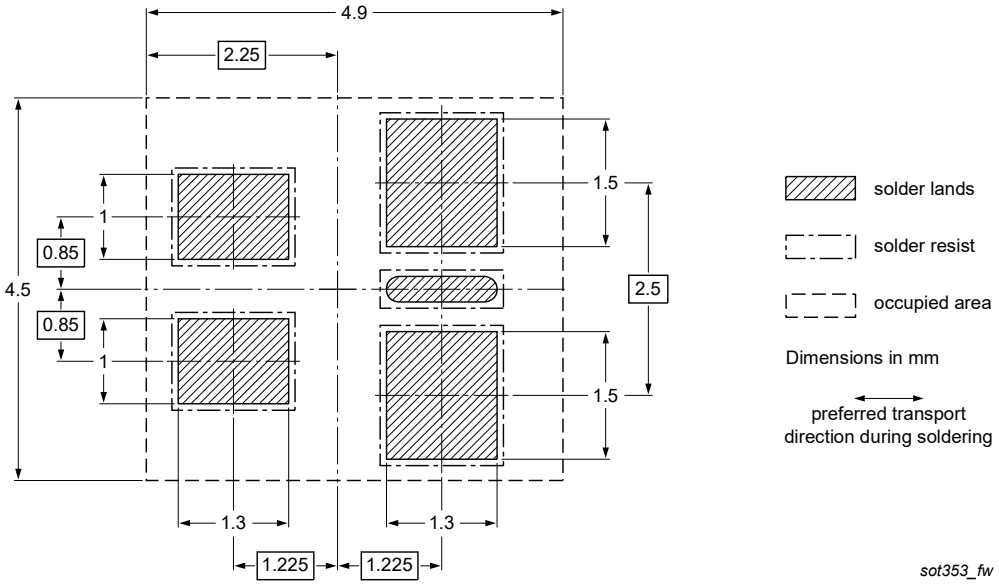


Fig. 12. Wave soldering footprint for TSSOP5 (SOT353)

14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
BAS21PG-Q v.2	20240503	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.

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[2] The term 'short data sheet' is explained in section "Definitions".
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