



BAW56S

High-speed switching diode

1 July 2022

Product data sheet

1. General description

High-speed switching diode, encapsulated in a very small SOT363 (SC-88) Surface-Mounted Device (SMD) plastic package.

2. Features and benefits

- High switching speed: $t_{rr} \leq 4$ ns
- Low capacitance: $C_d \leq 2$ pF
- Low leakage current
- Reverse voltage: $V_R \leq 90$ V
- Very small SMD plastic packages

3. Applications

- High-speed switching
- General-purpose switching

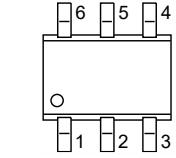
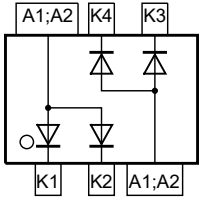
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Per diode						
I_R	reverse current	$V_R = 80$ V; $T_{amb} = 25$ °C	-	-	0.5	μ A
V_R	reverse voltage		-	-	90	V
t_{rr}	reverse recovery time	$I_F = 10$ mA; $I_R = 10$ mA; $R_L = 100$ Ω ; $I_{R(meas)} = 1$ mA; $T_{amb} = 25$ °C	-	-	4	ns

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K1	cathode (diode 1)	 <p>TSSOP6 (SOT363)</p>	 <p>006aab102</p>
2	K2	cathode (diode 2)		
3	A3; A4	common anode (diode 3 and diode 4)		
4	K3	cathode (diode 3)		
5	K4	cathode (diode 4)		
6	A1; A2	common anode (diode 1 and diode 2)		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BAW56S	TSSOP6	plastic, surface-mounted package; 6 leads; 0.65 mm pitch; 2.1 mm x 1.25 mm x 0.95 mm body	SOT363

7. Marking

Table 4. Marking codes

Type number	Marking code[1]
BAW56S	A1%

[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_{RRM}	repetitive peak reverse voltage			-	90	V
V_R	reverse voltage			-	90	V
I_F	forward current	$T_s = 60\text{ °C}$		-	250	mA
I_{FSM}	non-repetitive peak forward current	$t_p = 1\ \mu\text{s}$; square wave; $T_{j(\text{init})} = 25\text{ °C}$		-	4	A
		$t_p = 1\ \text{ms}$; square wave; $T_{j(\text{init})} = 25\text{ °C}$		-	1	A
		$t_p = 1\ \text{s}$; square wave; $T_{j(\text{init})} = 25\text{ °C}$		-	0.5	A
I_{FRM}	repetitive peak forward current			-	500	mA
P_{tot}	total power dissipation	$T_s = 60\text{ °C}$	[1]	-	350	mW
Per device						
I_F	forward current	$T_s = 60\text{ °C}$		-	100	mA
T_j	junction temperature			-	150	°C
T_{amb}	ambient temperature			-65	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

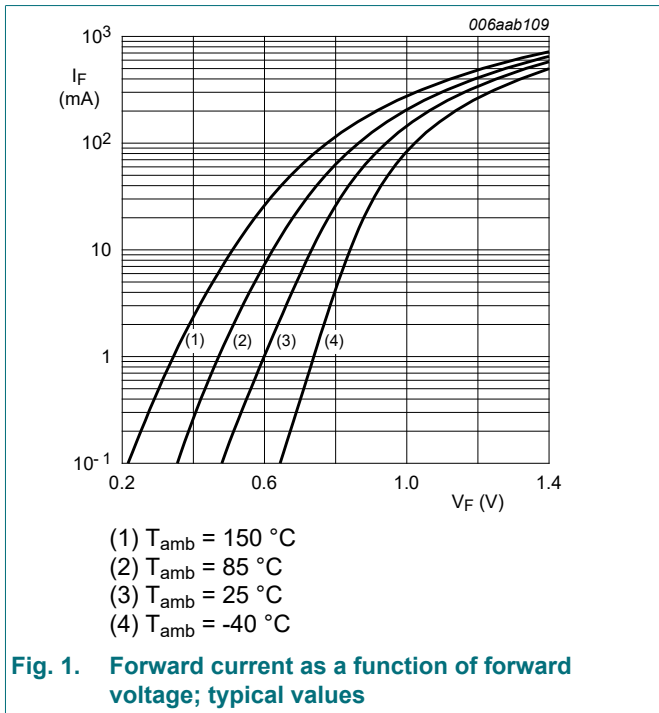
Table 6. Thermal characteristics

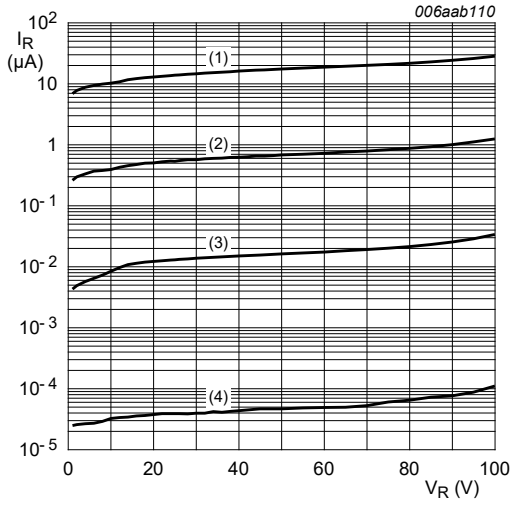
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{\text{th}(j\text{-sp})}$	thermal resistance from junction to solder point			-	-	255	K/W

10. Characteristics

Table 7. Characteristics

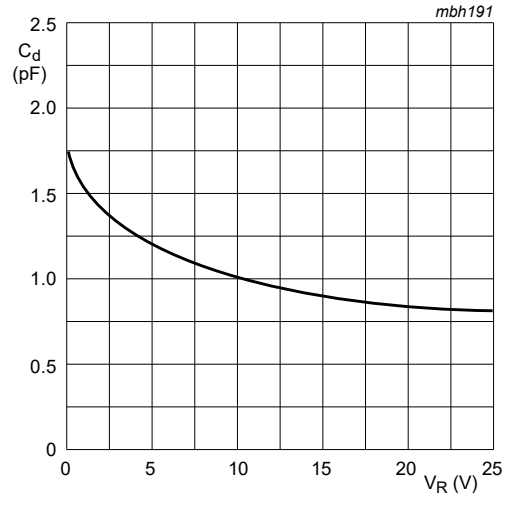
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Per diode						
V_F	forward voltage	$I_F = 1 \text{ mA}; t_p \leq 300 \text{ }\mu\text{s}; \delta \leq 0.02;$ pulsed; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	715	mV
		$I_F = 10 \text{ mA}; t_p \leq 300 \text{ }\mu\text{s}; \delta \leq 0.02;$ pulsed; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	855	mV
		$I_F = 50 \text{ mA}; t_p \leq 300 \text{ }\mu\text{s}; \delta \leq 0.02;$ pulsed; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	1	V
		$I_F = 150 \text{ mA}; t_p \leq 300 \text{ }\mu\text{s}; \delta \leq 0.02;$ pulsed; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	1.25	V
I_R	reverse current	$V_R = 25 \text{ V}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	30	nA
		$V_R = 80 \text{ V}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	0.5	μA
		$V_R = 25 \text{ V}; T_j = 150 \text{ }^\circ\text{C}$	-	-	30	μA
		$V_R = 80 \text{ V}; T_j = 150 \text{ }^\circ\text{C}$	-	-	150	μA
C_d	diode capacitance	$V_R = 0 \text{ V}; f = 1 \text{ MHz}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	2	pF
t_{rr}	reverse recovery time	$I_F = 10 \text{ mA}; I_R = 10 \text{ mA}; R_L = 100 \text{ }\Omega;$ $I_{R(\text{meas})} = 1 \text{ mA}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	4	ns
V_{FRM}	peak forward recovery voltage	$I_F = 10 \text{ mA}; t_r = 20 \text{ ns}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	1.75	V





- (1) $T_{amb} = 150^\circ\text{C}$
- (2) $T_{amb} = 85^\circ\text{C}$
- (3) $T_{amb} = 25^\circ\text{C}$
- (4) $T_{amb} = -40^\circ\text{C}$

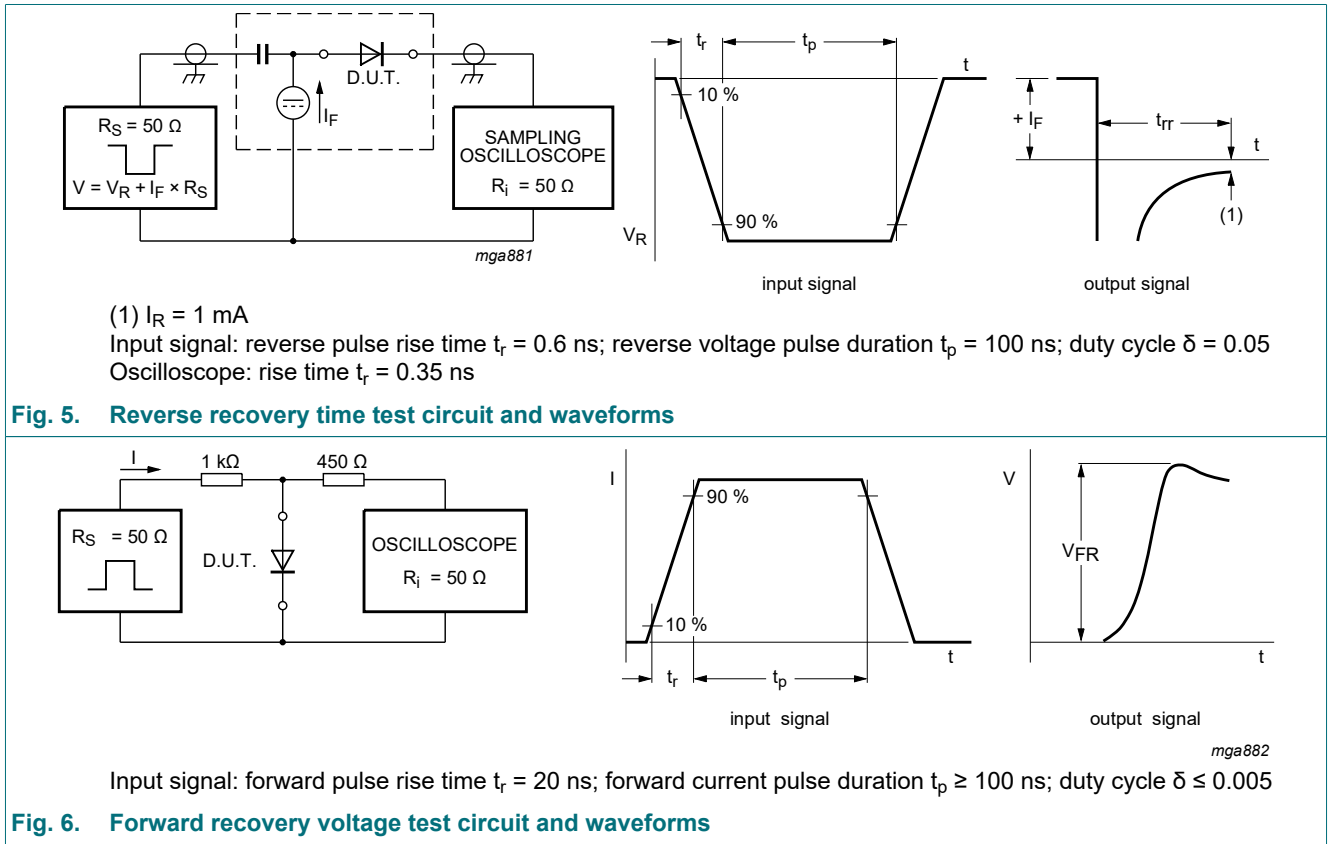
Fig. 3. Reverse current as a function of reverse voltage; typical values



$f = 1\text{ MHz}$
 $T_{amb} = 25^\circ\text{C}$

Fig. 4. Diode capacitance as a function of reverse voltage; typical values

11. Test information



(1) $I_R = 1 \text{ mA}$
 Input signal: reverse pulse rise time $t_r = 0.6 \text{ ns}$; reverse voltage pulse duration $t_p = 100 \text{ ns}$; duty cycle $\delta = 0.05$
 Oscilloscope: rise time $t_r = 0.35 \text{ ns}$

Fig. 5. Reverse recovery time test circuit and waveforms

Fig. 6. Forward recovery voltage test circuit and waveforms

Input signal: forward pulse rise time $t_r = 20 \text{ ns}$; forward current pulse duration $t_p \geq 100 \text{ ns}$; duty cycle $\delta \leq 0.005$

12. Package outline

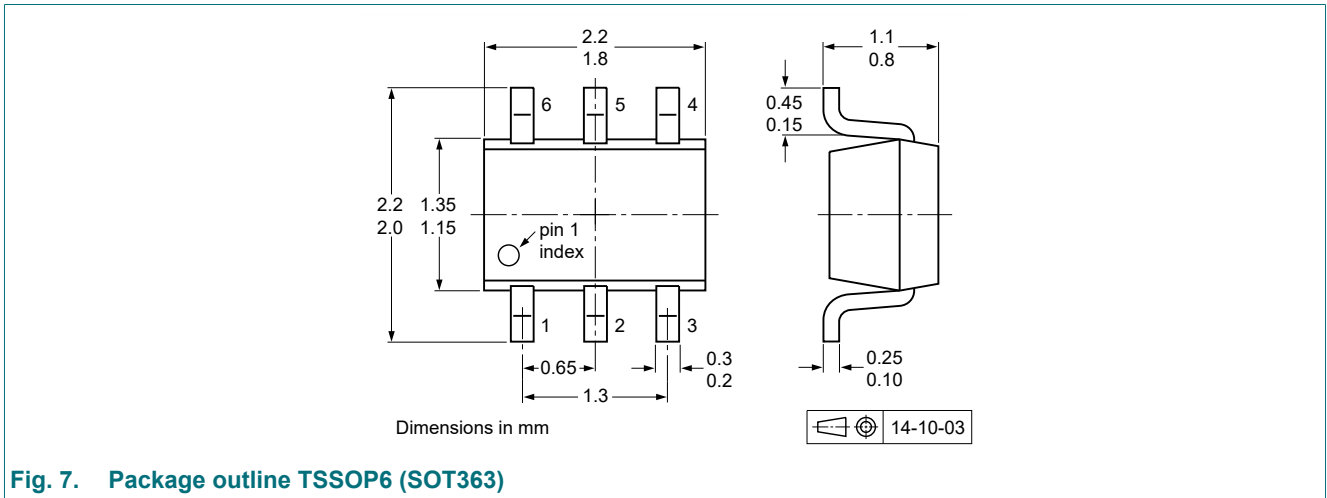


Fig. 7. Package outline TSSOP6 (SOT363)

13. Soldering

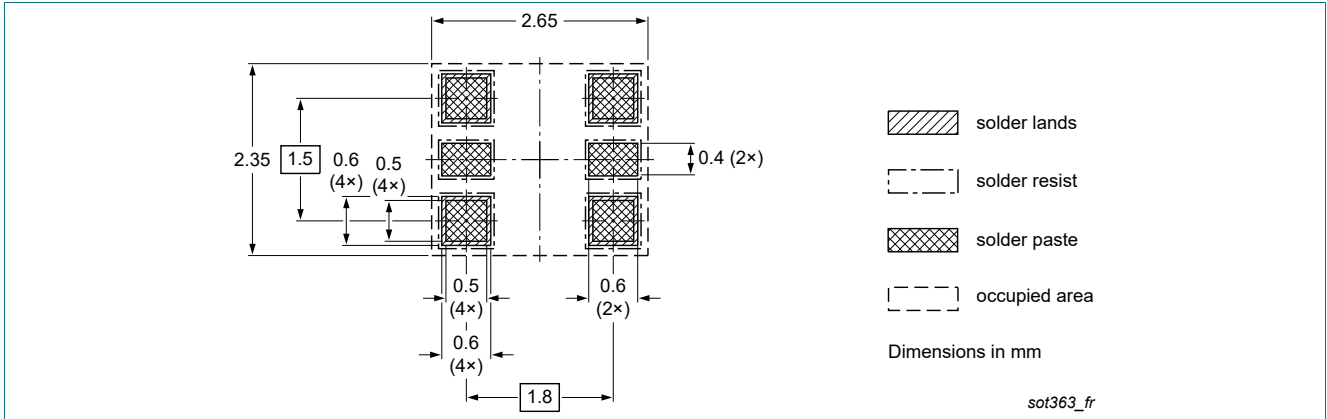


Fig. 8. Reflow soldering footprint for TSSOP6 (SOT363)

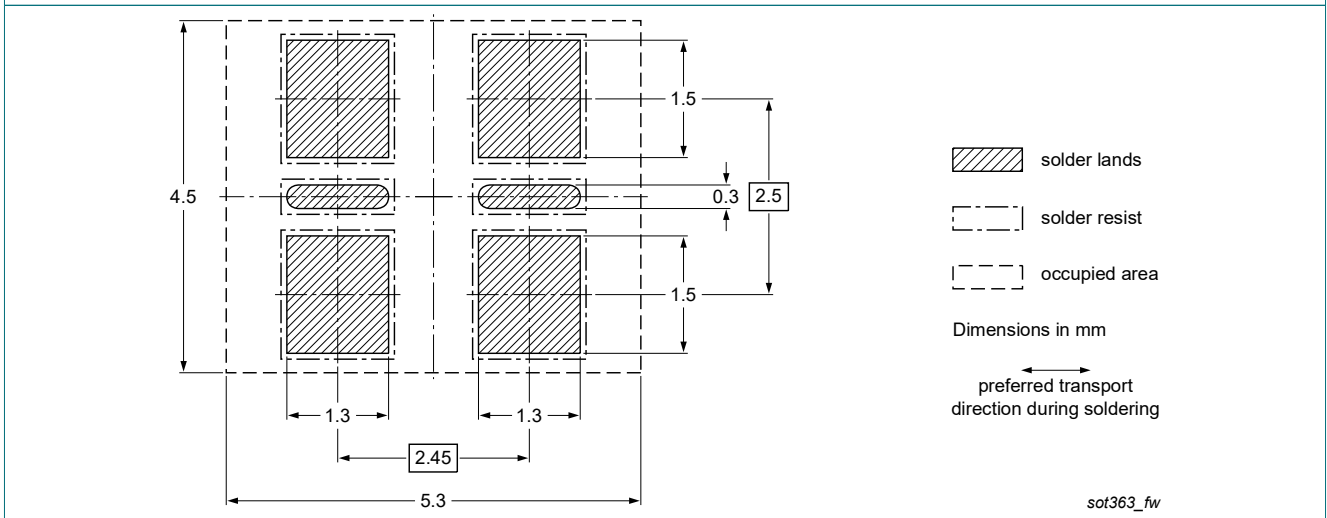


Fig. 9. Wave soldering footprint for TSSOP6 (SOT363)

14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
BAW56S v.7	20220701	Product data sheet	-	BAV756S_BAW56_SERv.6
Modification:	<ul style="list-style-type: none"> Family data sheet reduced to single type data sheet. Product(s) changed to non-automotive qualification. Please refer to nexperia.com for automotive (-Q) product alternative(s). Packing information removed. 			
BAV756S_BAW56_SERv.6	20150318	Product data sheet	-	BAV756S_BAW56_SER_5
BAV756S_BAW56_SER_5	20071126	Product data sheet	-	BAV756S_2 BAW56_4 BAW56S_2 BAW56T_2 BAW56W_4
BAV756S_2	19971021	Product specification	-	BAV756S_1
BAW56_4	20030325	Product specification	-	BAW56_3
BAW56S_2	19971021	Product specification	-	BAW56S_1
BAW56T_2	19971219	Product specification	-	-
BAW56W_4	19990511	Product specification	-	BAW56W_3

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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