



# BAW56S-Q

## High-speed switching diode

18 June 2021

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
- Qualified according to AEC-Q101 and recommended for use in automotive applications

### 3. Applications

- High-speed switching
- General-purpose switching

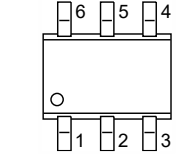
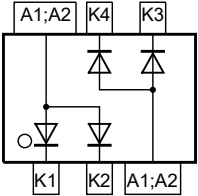
### 4. Quick reference data

Table 1. Quick reference data

| Symbol           | Parameter             | Conditions  | Min | Typ | Max | Unit |
|------------------|-----------------------|---|-----|-----|-----|------|
| <b>Per diode</b> |                       |   |     |     |     |      |
| $I_R$            | reverse current       | $V_R = 80$ V; $T_{amb} = 25$ °C   | -   | -   | 0.5 | µA   |
| $V_R$            | reverse voltage       |   | -   | -   | 90  | V    |
| $t_{rr}$         | reverse recovery time | $I_F = 10$ mA; $I_R = 10$ mA; $R_L = 100$ Ω;<br>$I_{R(meas)} = 1$ 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><b>TSSOP6 (SOT363)</b></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-Q    | 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-Q    | 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 |
|-------------------|-------------------------------------|---|-----|-----|-----|------|
| <b>Per diode</b>  |                                     |   |     |     |     |      |
| $V_{RRM}$         | 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   |
| $P_{\text{tot}}$  | total power dissipation             | $T_s = 60\text{ °C}$  | [1] | -   | 350 | mW   |
| <b>Per device</b> |                                     |   |     |     |     |      |
| $I_F$             | forward current                     | $T_s = 60\text{ °C}$  |     | -   | 100 | mA   |
| $T_j$             | junction temperature                |   |     | -   | 150 | °C   |
| $T_{\text{amb}}$  | ambient temperature                 |   |     | -65 | 150 | °C   |
| $T_{\text{stg}}$  | 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

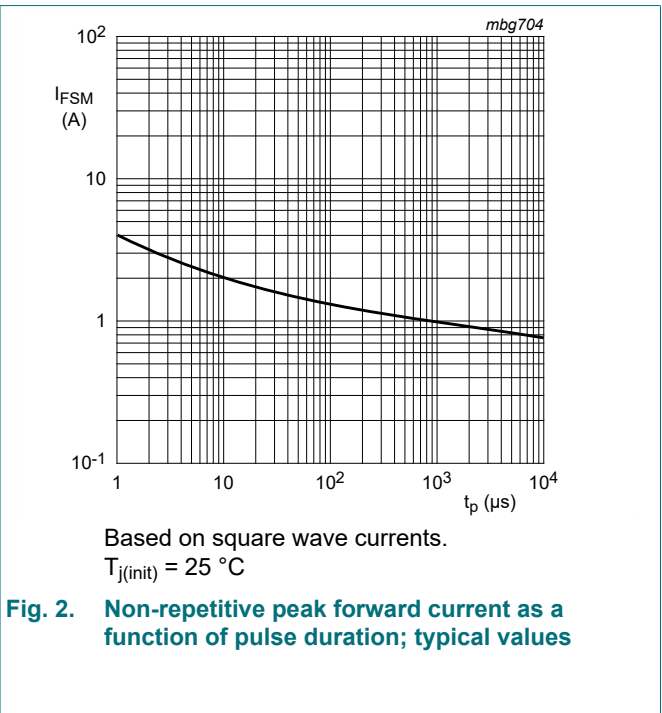
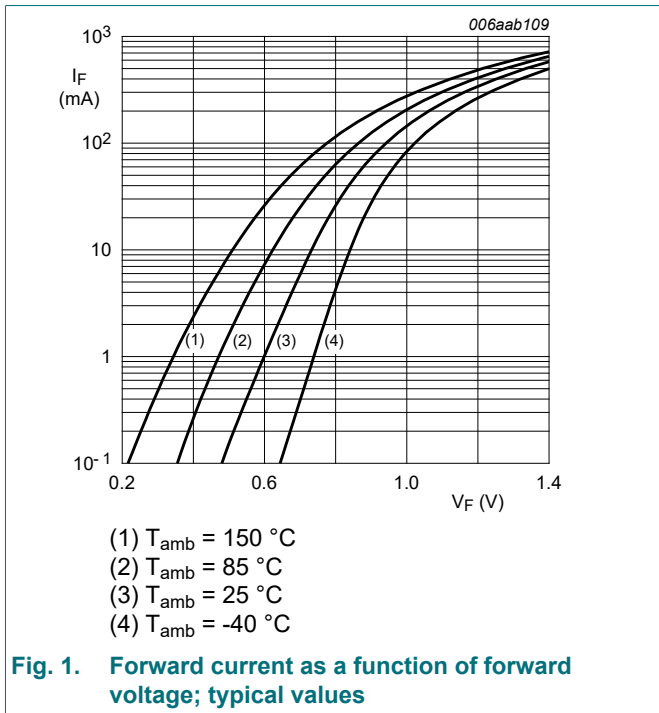
**Table 6. Thermal characteristics**

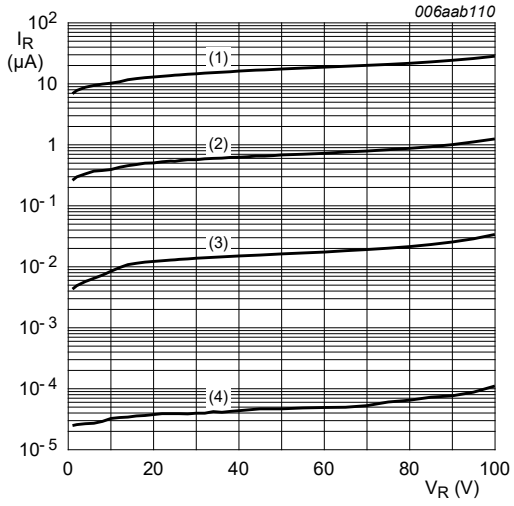
| Symbol                       | Parameter  | Conditions |  | Min | Typ | Max | Unit |
|------------------------------|--|------------|--|-----|-----|-----|------|
| $R_{\text{th}(j\text{-sp})}$ | thermal resistance from junction to solder point |            |  | -   | -   | 255 | K/W  |

## 10. Characteristics

Table 7. Characteristics

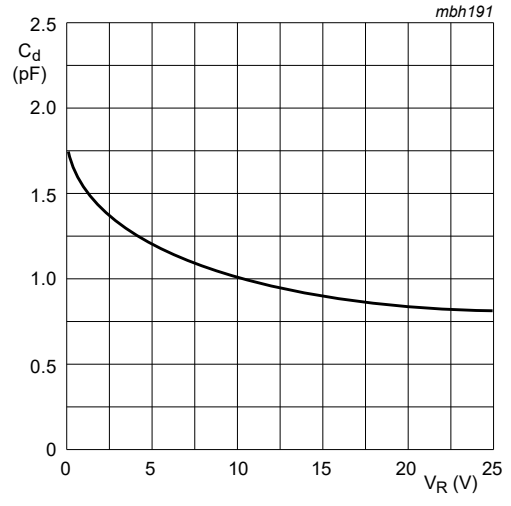
| Symbol           | Parameter                     | Conditions  | Min | Typ | Max  | Unit          |
|------------------|-------------------------------|---|-----|-----|------|---------------|
| <b>Per diode</b> |                               |   |     |     |      |               |
| $V_F$       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





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

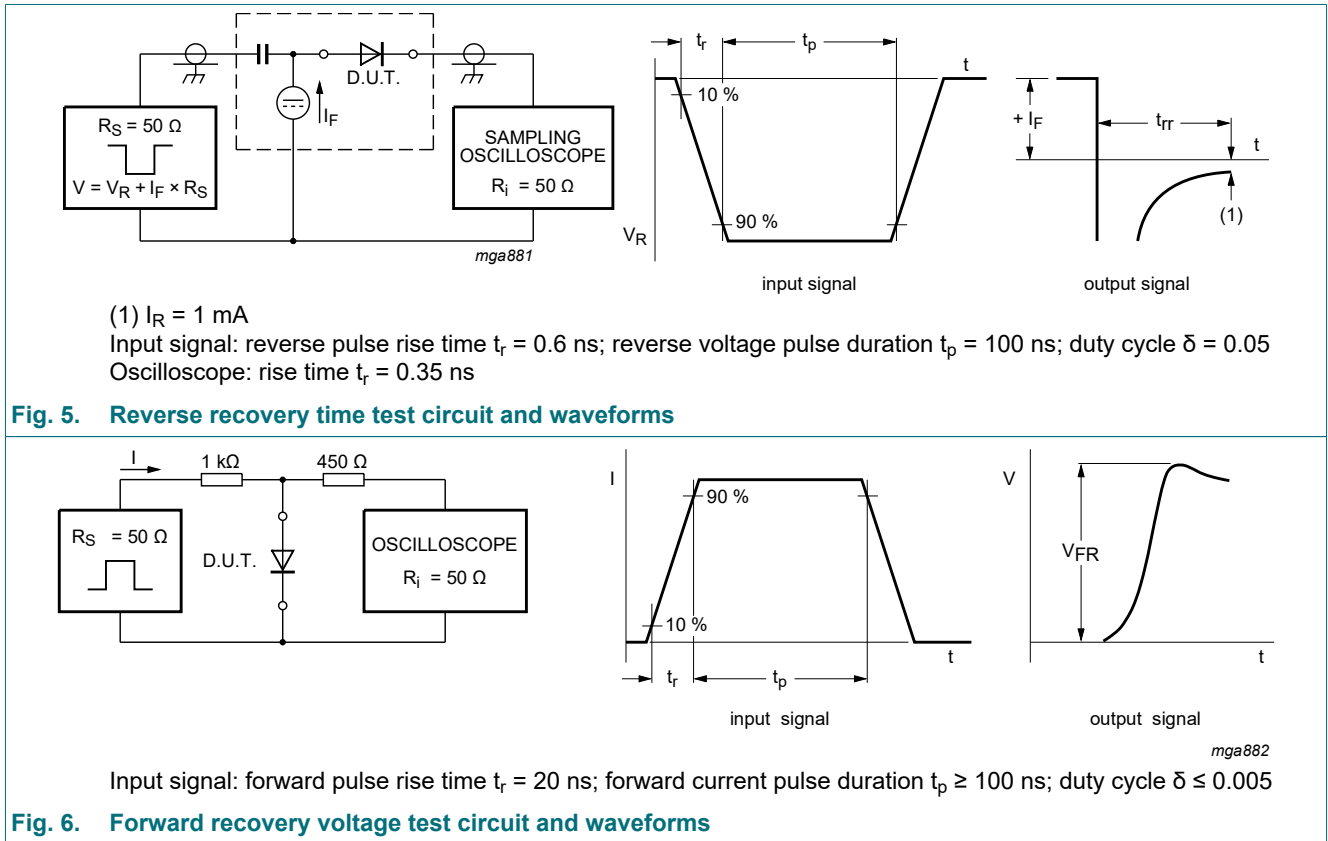
**Fig. 3. Reverse current as a function of reverse voltage; typical values**



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

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

### 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

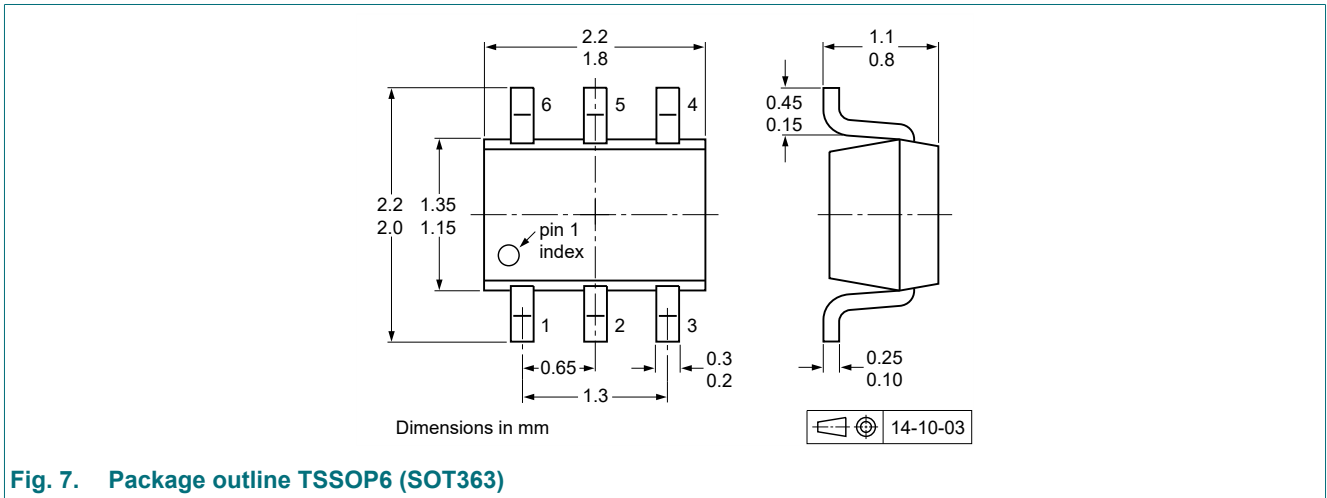


Fig. 7. Package outline TSSOP6 (SOT363)

### 13. Soldering

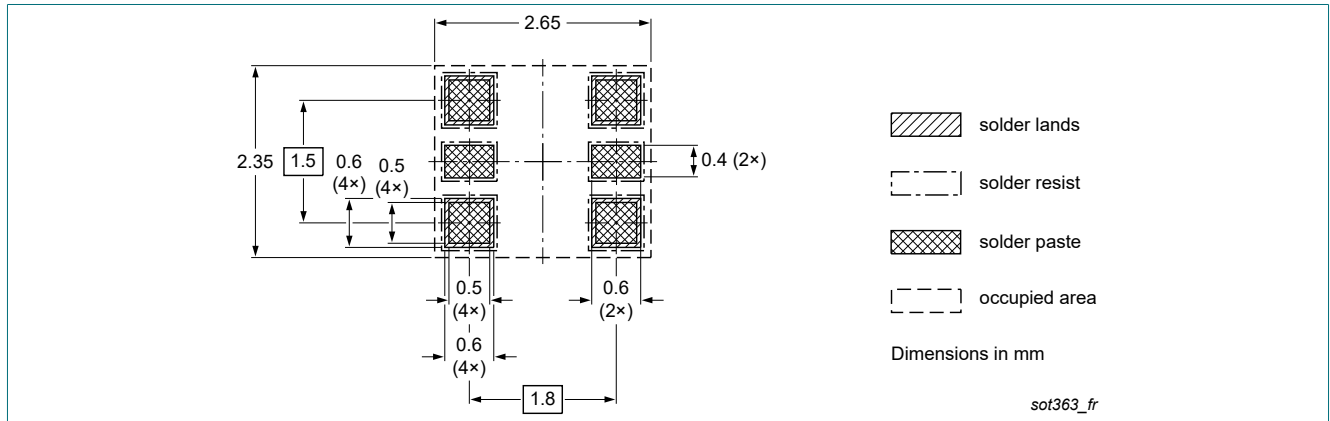


Fig. 8. Reflow soldering footprint for TSSOP6 (SOT363)

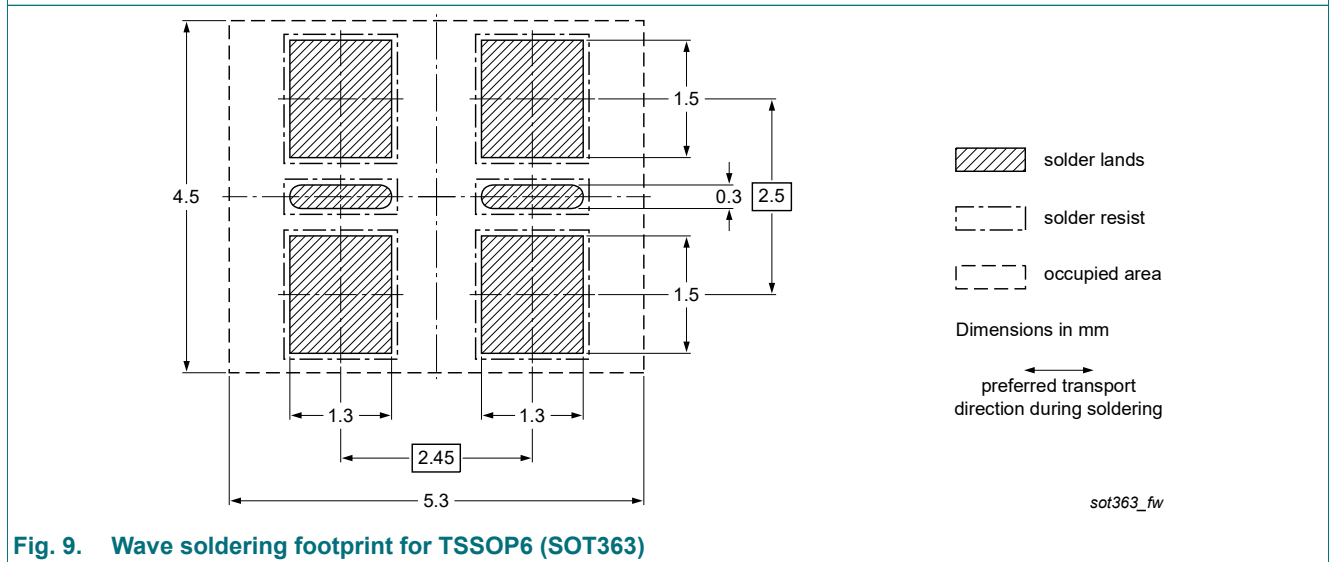


Fig. 9. Wave soldering footprint for TSSOP6 (SOT363)



# 14. Revision history

Table 8. Revision history

| Data sheet ID | Release date | Data sheet status  | Change notice | Supersedes |
|---------------|--------------|--------------------|---------------|------------|
| BAW56S-Q v.1  | 20210618     | 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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