



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

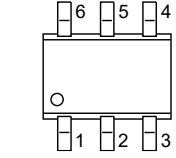
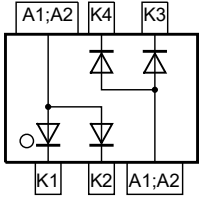
4. Quick reference data

Table 1. Quick reference data

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|------------------|-----------------------|---|-----|-----|-----|------|
| Per diode | | | | | | |
| 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; $I_{R(meas)} = 1$ 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-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 |
|-------------------|-------------------------------------|---|-----|-----|-----|------|
| 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

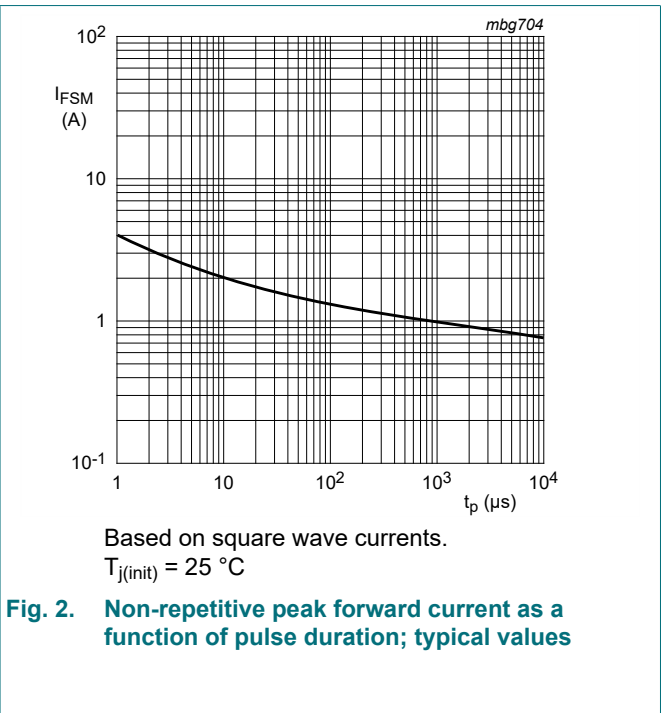
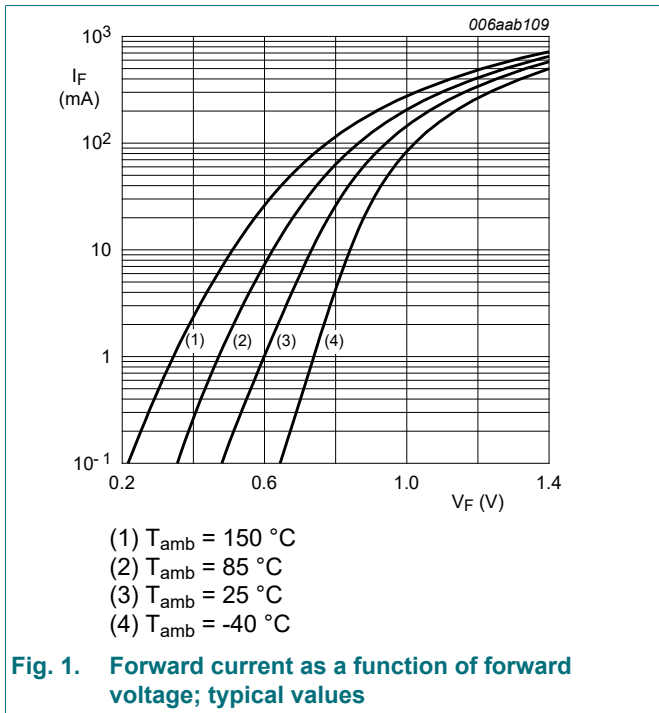
Table 6. Thermal characteristics

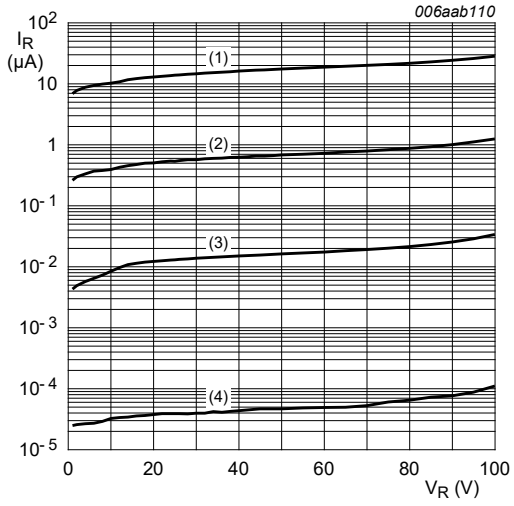
| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|------------------------------|--|------------|--|-----|-----|-----|------|
| $R_{\text{th}(j\text{-sp})}$ | thermal resistance from junction to solder point | | | - | - | 255 | K/W |

10. Characteristics

Table 7. Characteristics

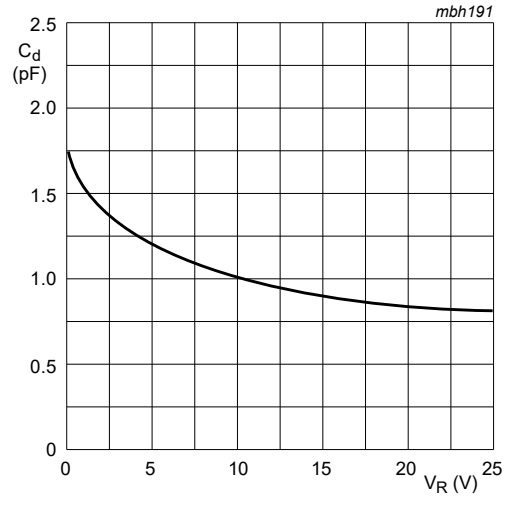
| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|------------------|-------------------------------|---|-----|-----|------|---------------|
| Per diode | | | | | | |
| V_F | forward voltage | $I_F = 1 \text{ mA}; t_p \leq 300 \text{ }\mu\text{s}; \delta \leq 0.02;$ pulsed; $T_{amb} = 25 \text{ }^\circ\text{C}$ | - | - | 715 | mV |
| | | $I_F = 10 \text{ mA}; t_p \leq 300 \text{ }\mu\text{s}; \delta \leq 0.02;$ pulsed; $T_{amb} = 25 \text{ }^\circ\text{C}$ | - | - | 855 | mV |
| | | $I_F = 50 \text{ mA}; t_p \leq 300 \text{ }\mu\text{s}; \delta \leq 0.02;$ pulsed; $T_{amb} = 25 \text{ }^\circ\text{C}$ | - | - | 1 | V |
| | | $I_F = 150 \text{ mA}; t_p \leq 300 \text{ }\mu\text{s}; \delta \leq 0.02;$ pulsed; $T_{amb} = 25 \text{ }^\circ\text{C}$ | - | - | 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 | 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 | $V_R = 0 \text{ V}; f = 1 \text{ MHz}; T_{amb} = 25 \text{ }^\circ\text{C}$ | - | - | 2 | pF |
| t_{rr} | reverse recovery time | $I_F = 10 \text{ mA}; I_R = 10 \text{ mA}; R_L = 100 \text{ }\Omega;$ $I_{R(\text{meas})} = 1 \text{ mA}; T_{amb} = 25 \text{ }^\circ\text{C}$ | - | - | 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) $T_{\text{amb}} = -40^\circ\text{C}$

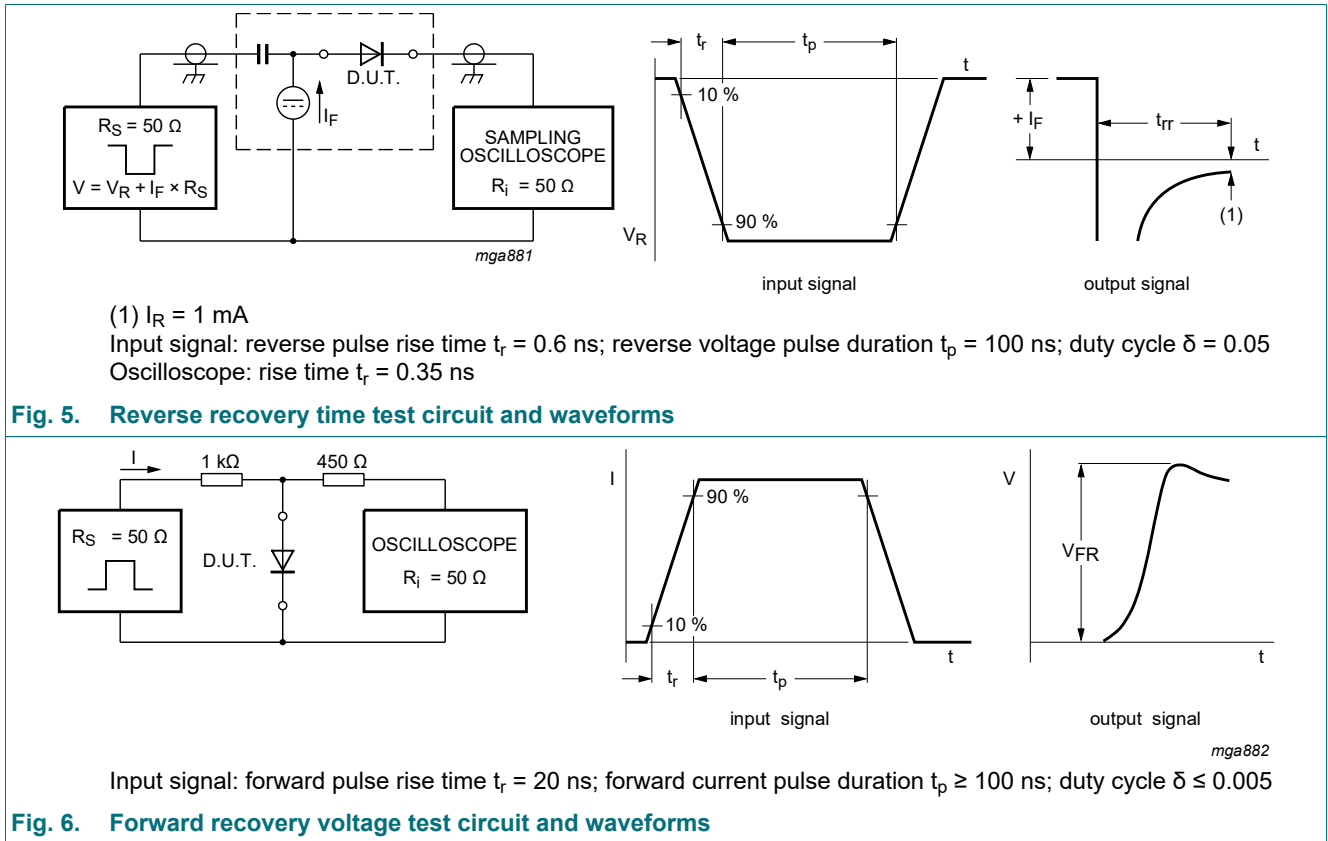
Fig. 3. Reverse current as a function of reverse voltage; typical values



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

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

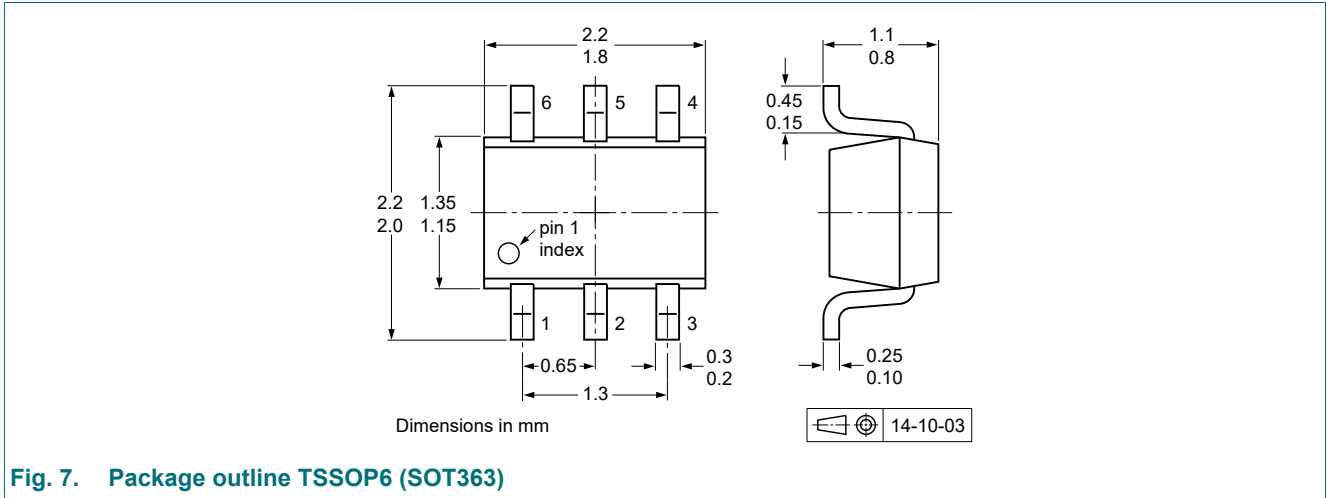
11. Test information



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



13. Soldering

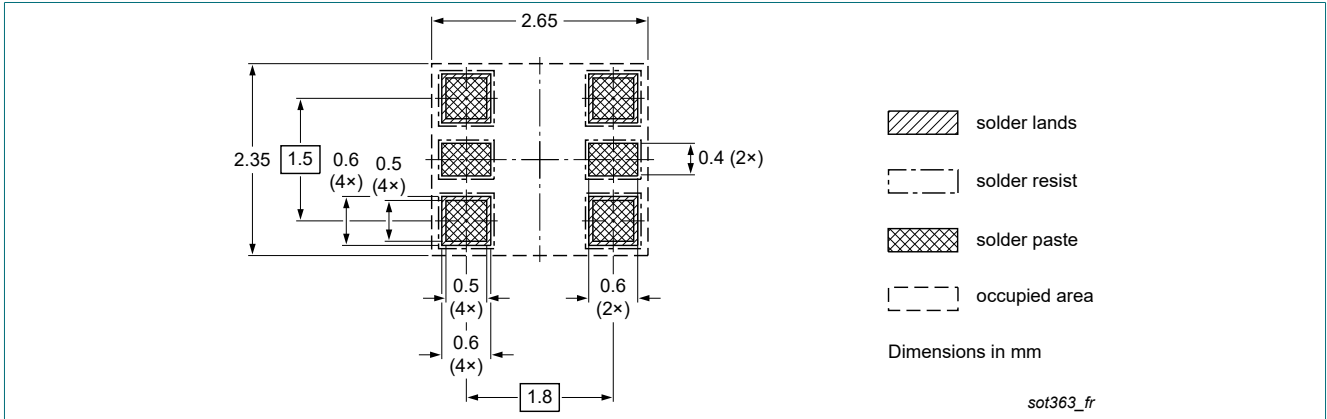


Fig. 8. Reflow soldering footprint for TSSOP6 (SOT363)

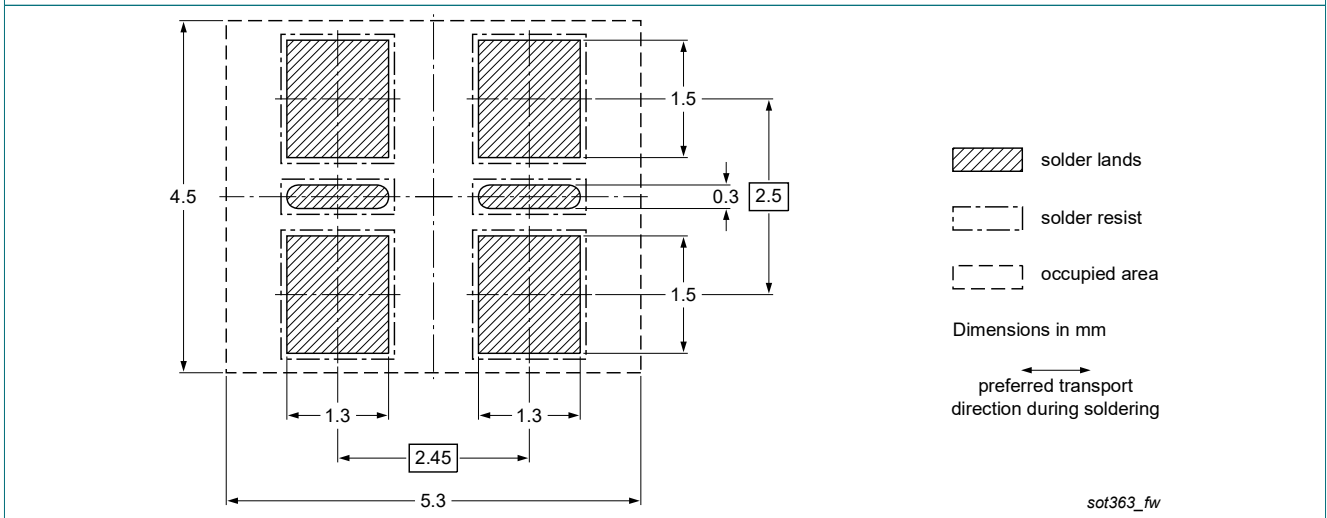


Fig. 9. Wave soldering footprint for TSSOP6 (SOT363)

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. |

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