



# BAV23QA

## Dual common cathode high-voltage switching diode

9 April 2018

Product data sheet

## 1. General description

Dual common cathode high-voltage switching diode, encapsulated in a leadless ultra small DFN1010D-3 (SOT1215) Surface-Mounted Device (SMD) plastic package with visible and solderable side pads.

## 2. Features and benefits

- High switching speed:  $t_{rr} \leq 50$  ns
- Low leakage current:  $I_R \leq 100$  nA
- High reverse voltage:  $V_R \leq 200$  V
- Low capacitance:  $C_d \leq 2$  pF
- Ultra small and leadless SMD plastic package
- Low package height of 0.37 mm
- Suitable for Automatic Optical Inspection (AOI) of solder joint
- AEC-Q101 qualified

## 3. Applications

- High-speed switching
- General-purpose switching
- Voltage clamping
- Reverse polarity protection

## 4. Quick reference data

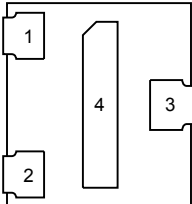
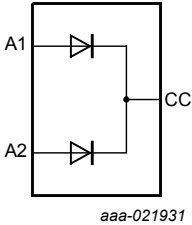
Table 1. Quick reference data

| Symbol           | Parameter                       | Conditions                                                                               |     | Min | Typ | Max  | Unit |
|------------------|---------------------------------|------------------------------------------------------------------------------------------|-----|-----|-----|------|------|
| <b>Per diode</b> |                                 |                                                                                          |     |     |     |      |      |
| $I_F$            | forward current                 | single diode loaded; $T_j = 25$ °C                                                       | [1] | -   | -   | 330  | mA   |
| $V_R$            | reverse voltage                 | $T_j = 25$ °C                                                                            |     | -   | -   | 200  | V    |
| $V_{RRM}$        | repetitive peak reverse voltage |                                                                                          |     | -   | -   | 250  | V    |
| $V_F$            | forward voltage                 | $I_F = 200$ mA; $t_p \leq 300$ $\mu$ s; $\delta \leq 0.02$ ; $T_j = 25$ °C               |     | -   | -   | 1.25 | V    |
| $I_R$            | reverse current                 | $V_R = 200$ V; pulsed; $T_j = 25$ °C                                                     |     | -   | -   | 100  | nA   |
| $t_{rr}$         | reverse recovery time           | $I_F = 30$ mA; $I_R = 30$ mA; $R_L = 100$ $\Omega$ ; $I_{R(meas)} = 3$ mA; $T_j = 25$ °C |     | -   | -   | 50   | ns   |

[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided 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) |  <p>Transparent top view<br/>DFN1010D-3 (SOT1215)</p> |  |
| 2   | A2     | anode (diode 2) |                                                                                                                                        |                                                                                     |
| 3   | CC     | common cathode  |                                                                                                                                        |                                                                                     |
| 4   | CC     | common cathode  |                                                                                                                                        |                                                                                     |

6. Ordering information

Table 3. Ordering information

| Type number | Package    |                                                                                                                      |         |
|-------------|------------|----------------------------------------------------------------------------------------------------------------------|---------|
|             | Name       | Description                                                                                                          | Version |
| BAV23QA     | DFN1010D-3 | plastic, thermal enhanced ultra thin small outline package; 3 terminals; 0.75 mm pitch; 1.1 mm x 1 mm x 0.37 mm body | SOT1215 |

7. Marking

Table 4. Marking codes

| Type number | Marking code |
|-------------|--------------|
| BAV23QA     | X 010        |

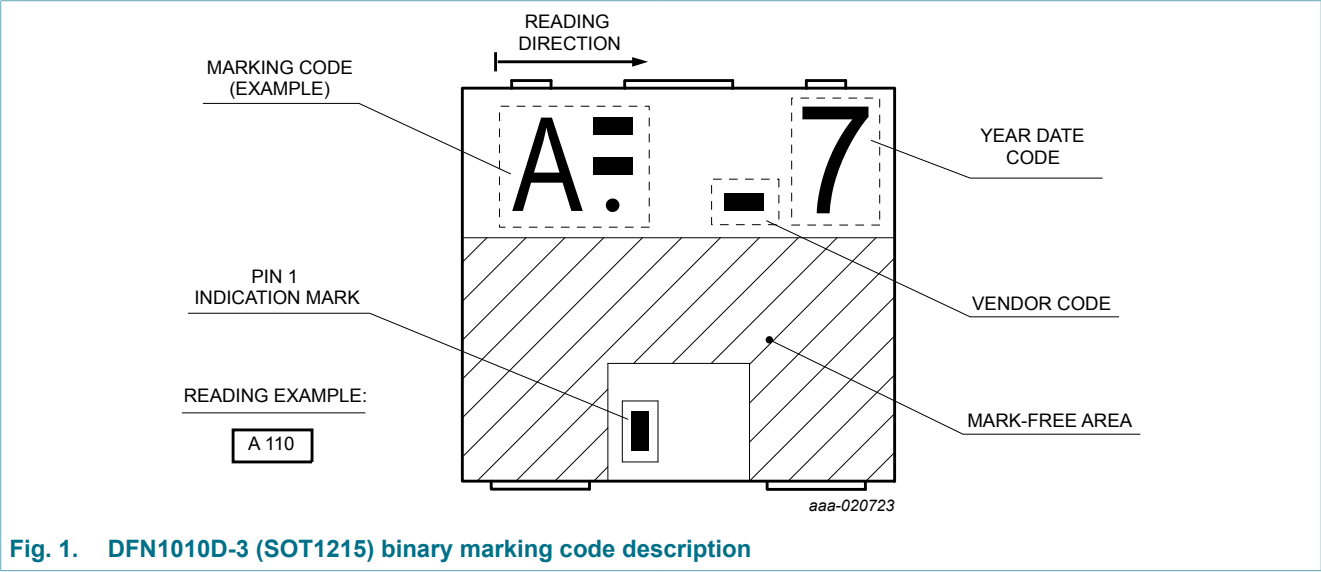


Fig. 1. DFN1010D-3 (SOT1215) binary marking code description

## 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     | $T_j = 25\text{ }^{\circ}\text{C}$                                                               |     | -   | 250 | V                  |
| $V_R$                               | reverse voltage                     |                                                                                                  |     | -   | 200 | V                  |
| $I_F$                               | forward current                     | single diode loaded; $T_j = 25\text{ }^{\circ}\text{C}$                                          | [1] | -   | 330 | mA                 |
|                                     |                                     | double diode loaded; $T_j = 25\text{ }^{\circ}\text{C}$                                          | [1] | -   | 190 | mA                 |
| $I_{FSM}$                           | non-repetitive peak forward current | $t_p = 1\text{ }\mu\text{s}$ ; $T_{j(\text{init})} = 25\text{ }^{\circ}\text{C}$ ; square wave   |     | -   | 9   | A                  |
|                                     |                                     | $t_p = 100\text{ }\mu\text{s}$ ; $T_{j(\text{init})} = 25\text{ }^{\circ}\text{C}$ ; square wave |     | -   | 3   | A                  |
|                                     |                                     | $t_p = 10\text{ ms}$ ; $T_{j(\text{init})} = 25\text{ }^{\circ}\text{C}$ ; square wave           |     | -   | 1.7 | A                  |
| $I_{FRM}$                           | repetitive peak forward current     | $t_p \leq 1\text{ ms}$ ; $\delta \leq 0.25$                                                      |     | -   | 900 | mA                 |
| <b>Per device, one diode loaded</b> |                                     |                                                                                                  |     |     |     |                    |
| $P_{\text{tot}}$                    | total power dissipation             | $T_{\text{amb}} \leq 25\text{ }^{\circ}\text{C}$                                                 | [1] | -   | 350 | mW                 |
|                                     |                                     |                                                                                                  | [2] | -   | 610 | mW                 |
| $T_j$                               | junction temperature                |                                                                                                  |     | -   | 150 | $^{\circ}\text{C}$ |
| $T_{\text{amb}}$                    | ambient temperature                 |                                                                                                  |     | -55 | 150 | $^{\circ}\text{C}$ |
| $T_{\text{stg}}$                    | storage temperature                 |                                                                                                  |     | -65 | 150 | $^{\circ}\text{C}$ |

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

[2] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated mounting pad for cathode  $1\text{ cm}^2$ .

## 9. Thermal characteristics

**Table 6. Thermal characteristics**

| Symbol                | Parameter                                        | Conditions  |     | Min | Typ | Max | Unit |
|-----------------------|--------------------------------------------------|-------------|-----|-----|-----|-----|------|
| $R_{\text{th(j-a)}}$  | thermal resistance from junction to ambient      | In free air | [1] | -   | -   | 355 | K/W  |
|                       |                                                  |             | [2] | -   | -   | 205 | K/W  |
| $R_{\text{th(j-sp)}}$ | thermal resistance from junction to solder point |             | [3] | -   | -   | 45  | 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  $1\text{ cm}^2$ .

[3] Soldering point of cathode tab.

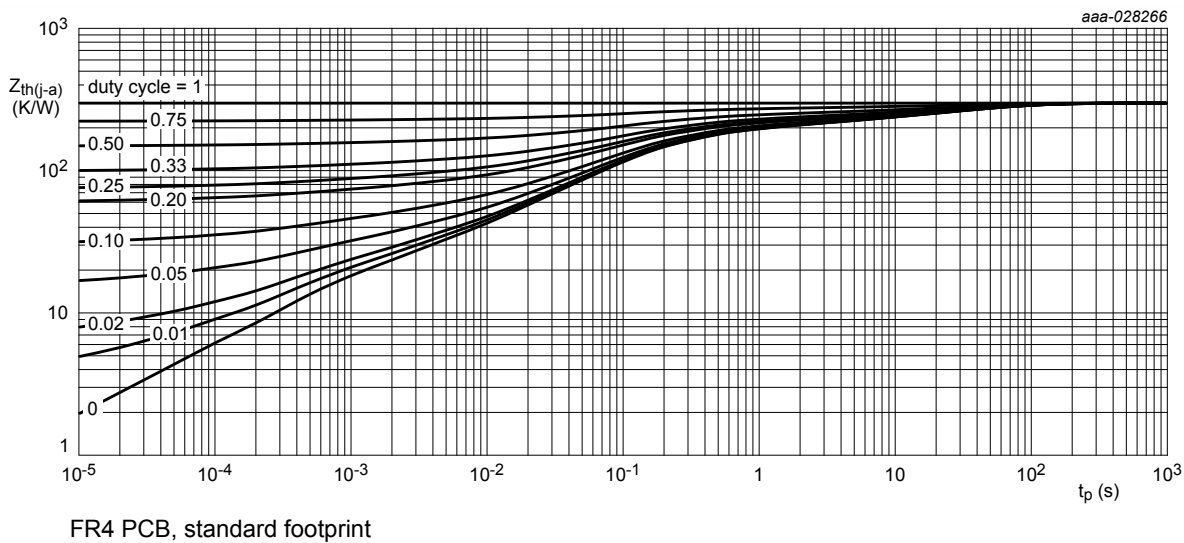


Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

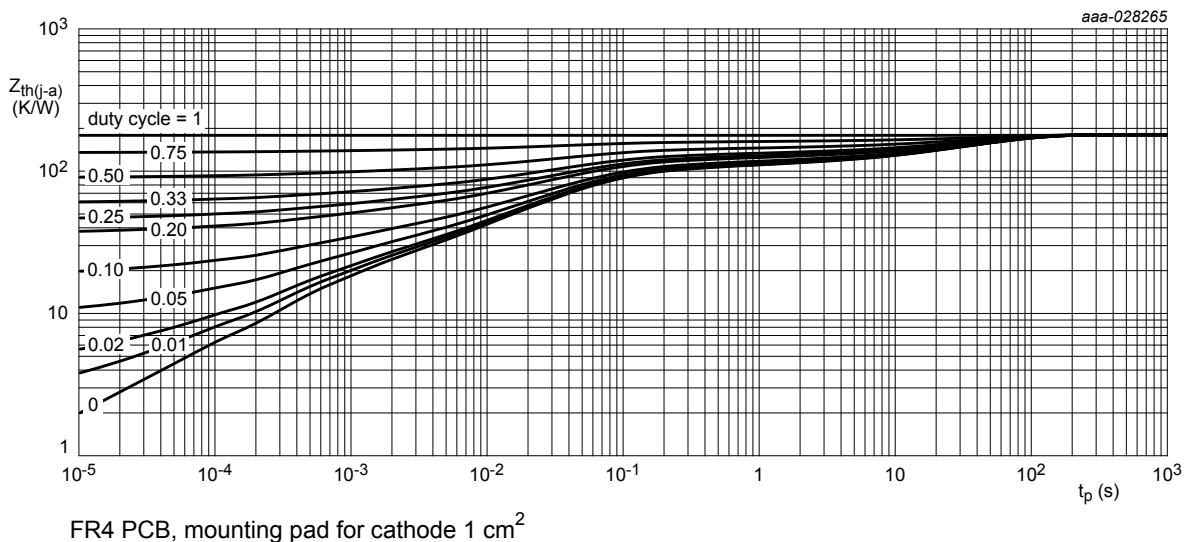
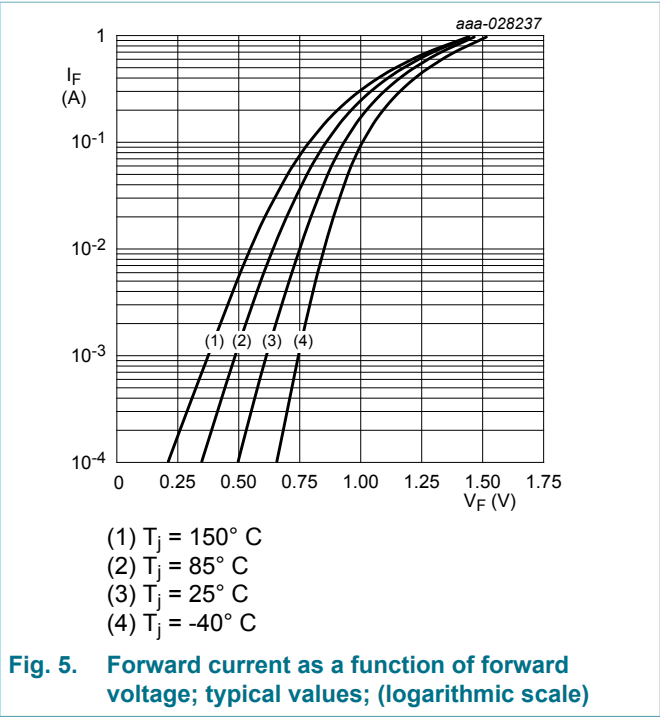
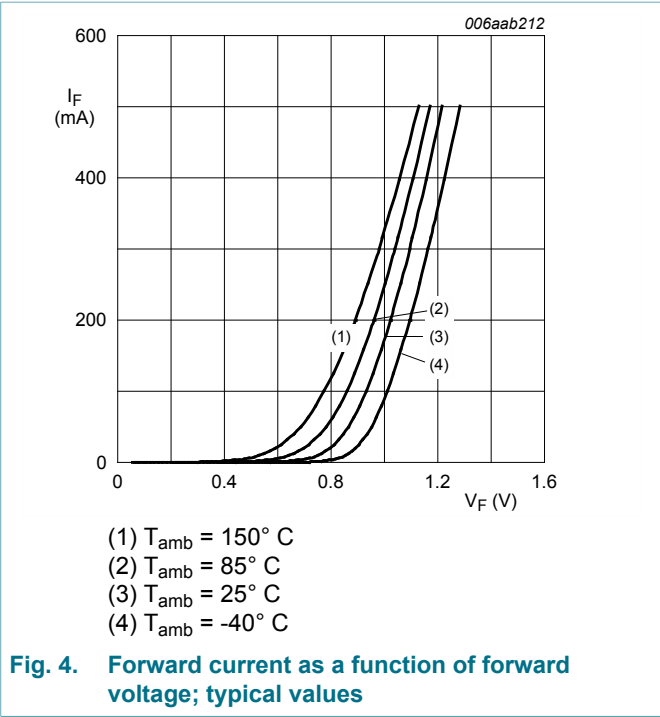


Fig. 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

10. Characteristics

Table 7. Characteristics

| Symbol    | Parameter             | Conditions                                                                                                                                      | Min | Typ | Max  | Unit          |
|-----------|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|------|---------------|
| Per diode |                       |                                                                                                                                                 |     |     |      |               |
| $V_F$     | forward voltage       | $I_F = 100\text{ mA}$ ; $t_p \leq 300\text{ }\mu\text{s}$ ; $\delta \leq 0.02$ ; $T_j = 25\text{ }^\circ\text{C}$                               | -   | -   | 1    | V             |
|           |                       | $I_F = 200\text{ mA}$ ; $t_p \leq 300\text{ }\mu\text{s}$ ; $\delta \leq 0.02$ ; $T_j = 25\text{ }^\circ\text{C}$                               | -   | -   | 1.25 | V             |
| $I_R$     | reverse current       | $V_R = 200\text{ V}$ ; pulsed; $T_j = 25\text{ }^\circ\text{C}$                                                                                 | -   | -   | 100  | nA            |
|           |                       | $V_R = 200\text{ V}$ ; pulsed; $T_j = 150\text{ }^\circ\text{C}$                                                                                | -   | -   | 100  | $\mu\text{A}$ |
| $C_d$     | diode capacitance     | $V_R = 0\text{ V}$ ; $f = 1\text{ MHz}$ ; $T_j = 25\text{ }^\circ\text{C}$                                                                      | -   | -   | 2    | pF            |
| $t_{rr}$  | reverse recovery time | $I_F = 30\text{ mA}$ ; $I_R = 30\text{ mA}$ ; $R_L = 100\text{ }\Omega$ ; $I_{R(\text{meas})} = 3\text{ mA}$ ; $T_j = 25\text{ }^\circ\text{C}$ | -   | -   | 50   | ns            |



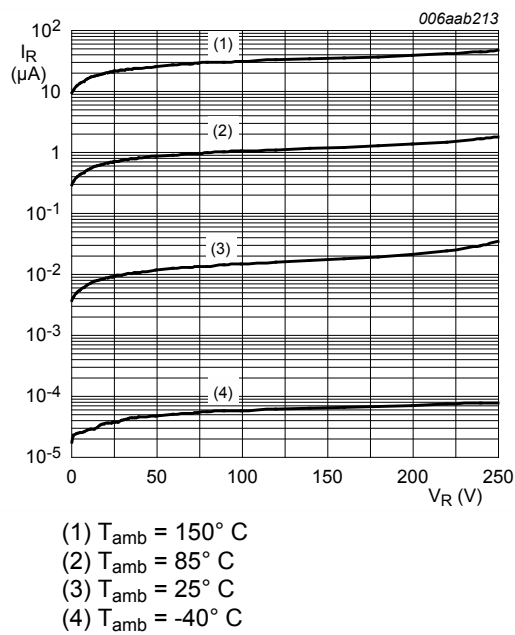


Fig. 6. Reverse current as a function of reverse voltage; typical values

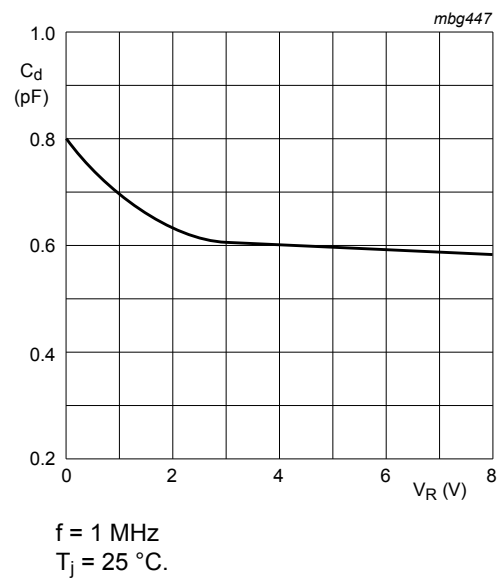
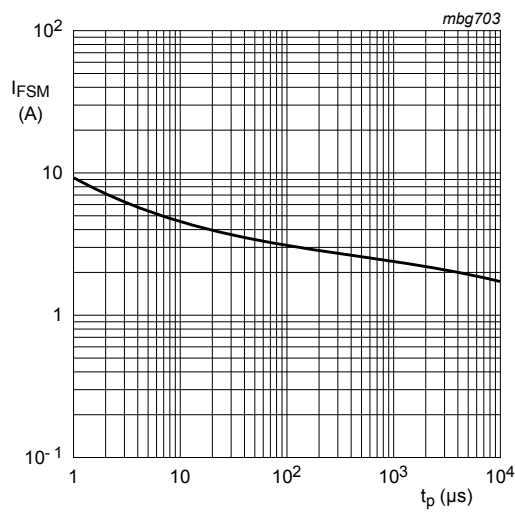


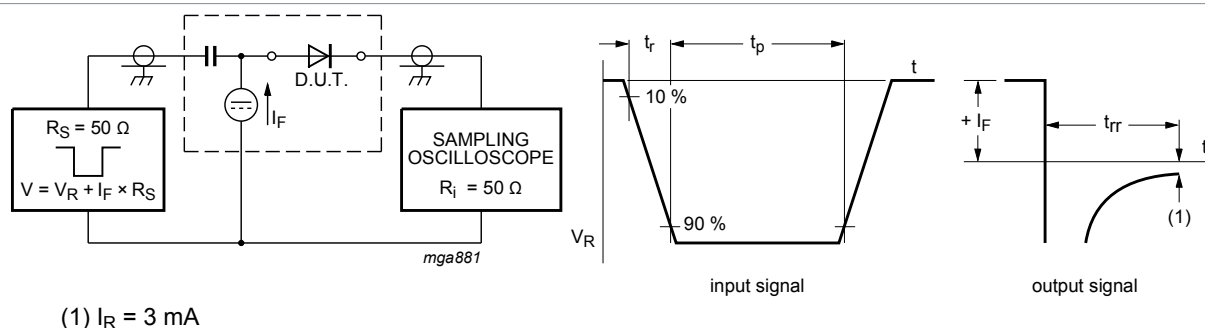
Fig. 7. Diode capacitance as a function of reverse voltage; typical values.



Based on square wave currents.  
 $T_{j(\text{init})} = 25^\circ\text{C}$

Fig. 8. Non-repetitive peak forward current as a function of pulse duration; maximum values

## 11. Test information

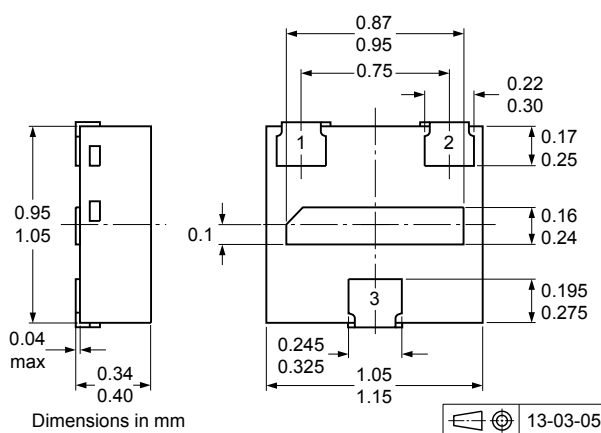


**Fig. 9. Reverse recovery time test circuit and waveforms**

## 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

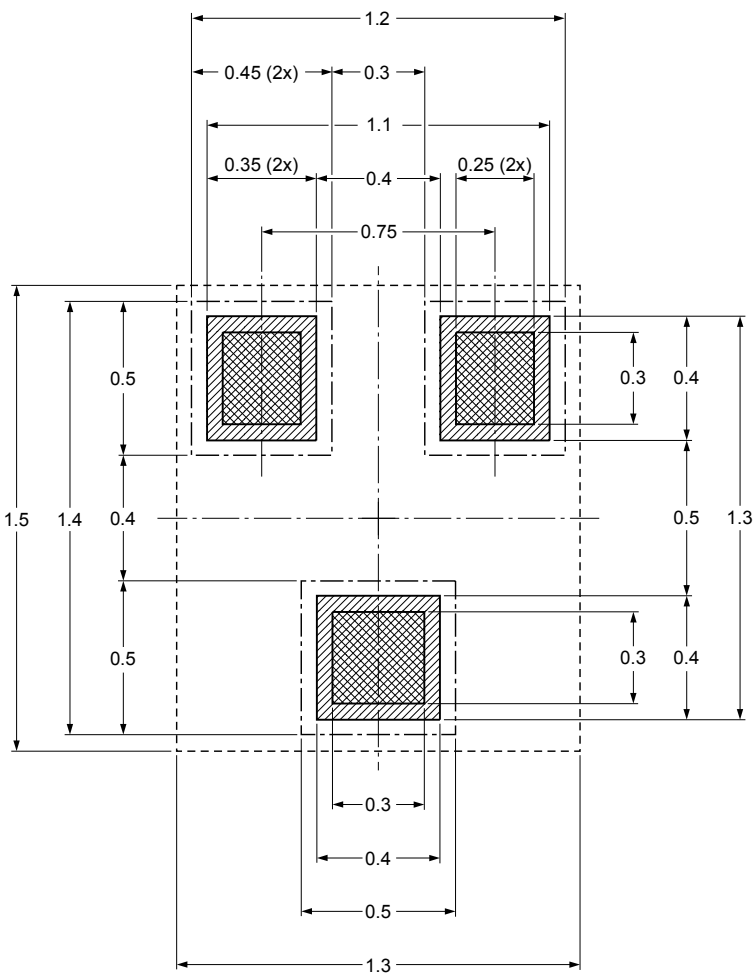


**Fig. 10. Package outline DFN1010D-3 (SOT1215)**

13. Soldering

Footprint information for reflow soldering of DFN1010D-3 package

SOT1215



- solder land
- solder land plus solder paste
- occupied area
- solder resist

Dimensions in mm

Issue date ~~12-11-23~~  
13-03-06

sot1215\_fr

Fig. 11. Reflow soldering footprint for DFN1010D-3 (SOT1215)



14. Revision history

Table 8. Revision history

| Data sheet ID | Release date | Data sheet status  | Change notice | Supersedes |
|---------------|--------------|--------------------|---------------|------------|
| BAV23QA v.1   | 20180409     | 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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Date of release: 9 April 2018

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