



BAS21QA

High-voltage switching diode

9 April 2018

Product data sheet

1. General description

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

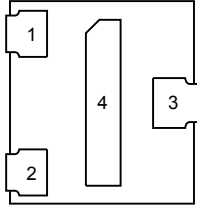
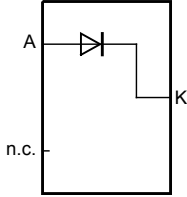
Table 1. Quick reference data

| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|-----------|---------------------------------|---|-----|-----|-----|------|------|
| I_F | forward current | $T_j = 25$ °C | [1] | - | - | 330 | mA |
| V_R | reverse voltage | | | - | - | 200 | V |
| V_{RRM} | repetitive peak reverse voltage | | | - | - | 250 | V |
| V_F | forward voltage | $I_F = 200$ mA; $t_p \leq 300$ μ 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; $R_L = 100$ Ω ; $I_{R(meas)} = 3$ 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 | A | anode |  <p>Transparent top view DFN1010D-3 (SOT1215)</p> |  <p>aaa-021941</p> |
| 2 | n.c. | not connected | | |
| 3 | K | cathode | | |
| 4 | K | cathode | | |

6. Ordering information

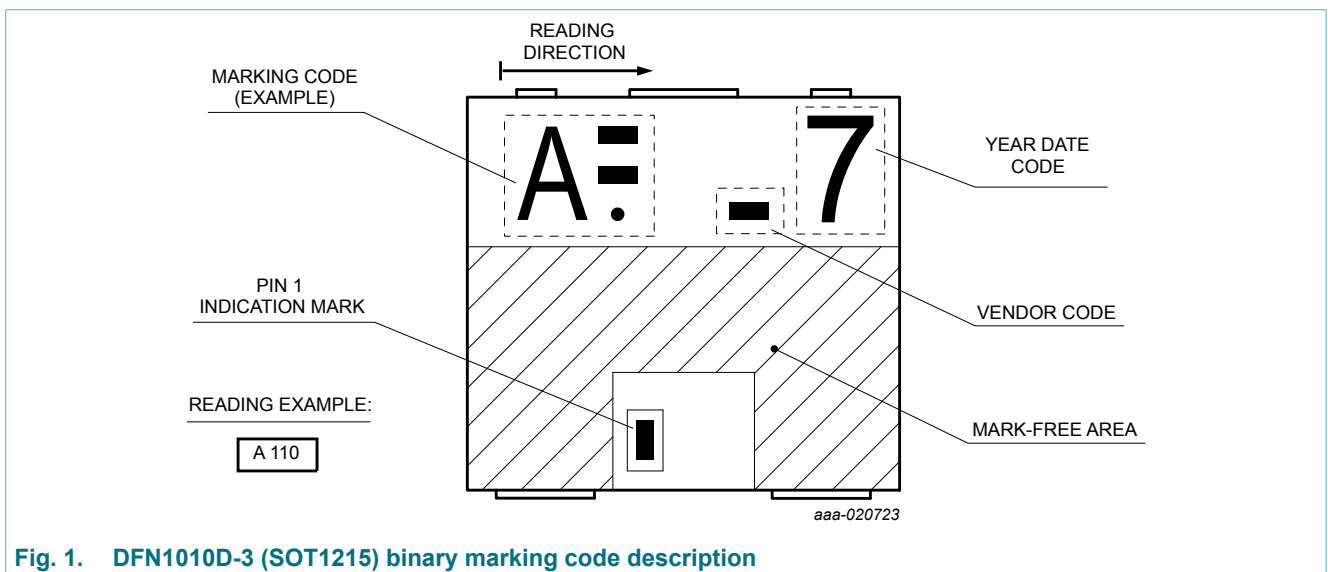
Table 3. Ordering information

| Type number | Package | | |
|-------------|------------|--|---------|
| | Name | Description | Version |
| BAS21QA | 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 |
|-------------|--------------|
| BAS21QA | X 001 |



8. Limiting values

Table 5. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134)

| Symbol | Parameter | Conditions | | Min | Max | Unit |
|------------------|-------------------------------------|---|-----|-----|-----|------|
| V_{RRM} | repetitive peak reverse voltage | $T_j = 25\text{ °C}$ | | - | 250 | V |
| V_R | reverse voltage | | | - | 200 | V |
| I_F | forward current | | [1] | - | 330 | mA |
| I_{FSM} | non-repetitive peak forward current | $t_p = 1\text{ }\mu\text{s}; T_{j(\text{init})} = 25\text{ °C}; \text{square wave}$ | | - | 9 | A |
| | | $t_p = 100\text{ }\mu\text{s}; T_{j(\text{init})} = 25\text{ °C}; \text{square wave}$ | | - | 3 | A |
| | | $t_p = 10\text{ ms}; T_{j(\text{init})} = 25\text{ °C}; \text{square wave}$ | | - | 1.7 | A |
| I_{FRM} | repetitive peak forward current | $t_p \leq 1\text{ ms}; \delta \leq 0.25$ | | - | 900 | mA |
| P_{tot} | total power dissipation | $T_{\text{amb}} \leq 25\text{ °C}$ | [1] | - | 350 | mW |
| | | | [2] | - | 610 | 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 Printed-Circuit Board (PCB), single-sided copper, tin-plated mounting pad for cathode 1cm².

9. Thermal characteristics

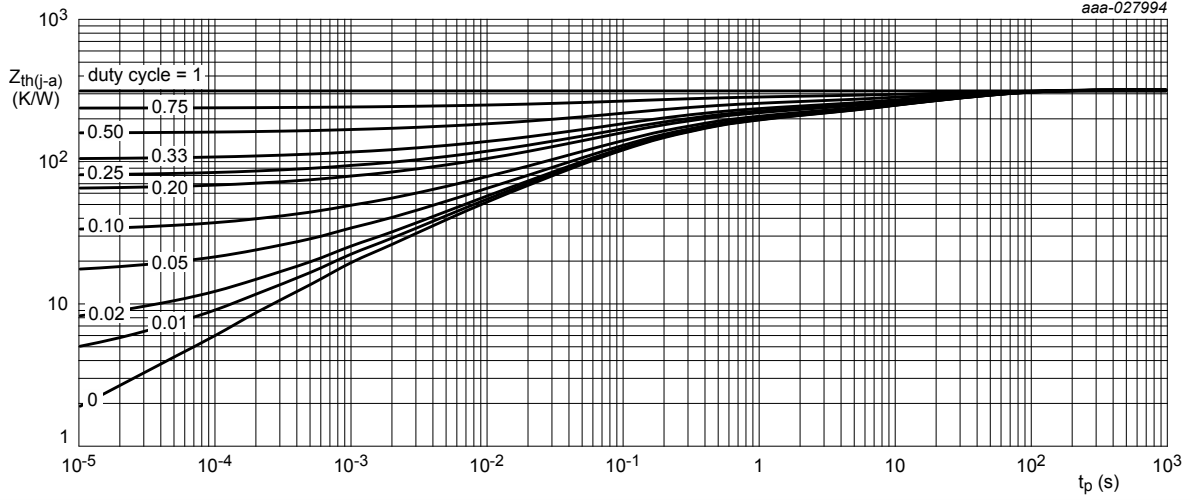
Table 6. Thermal characteristics

| 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.

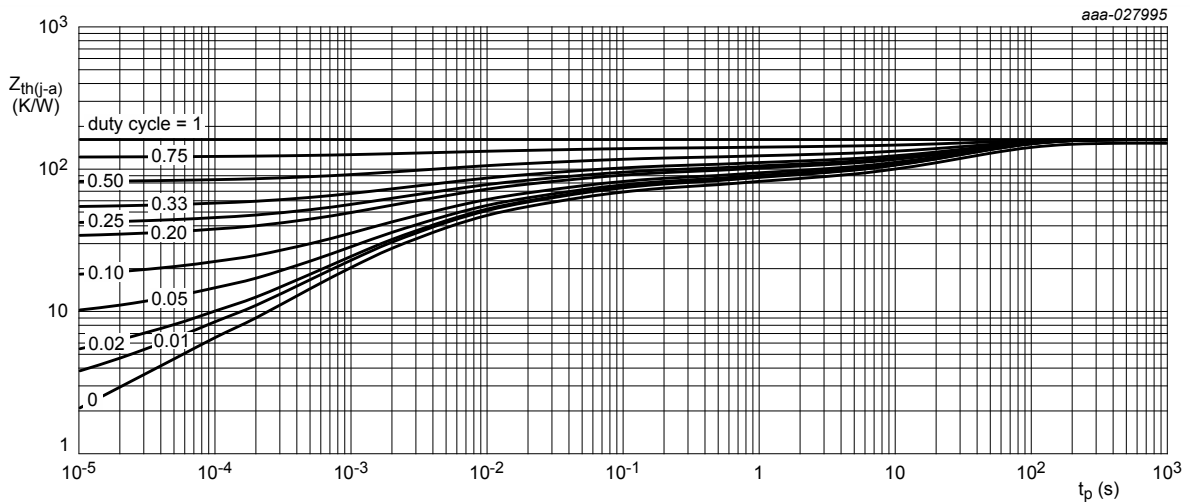
[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated mounting pad for cathode 1cm².

[3] Soldering point of cathode tab.



FR4 PCB, standard footprint

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



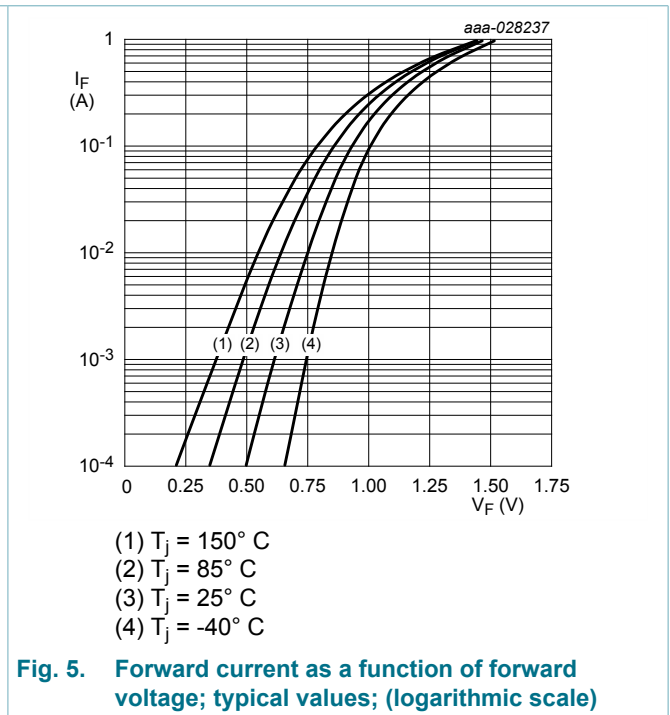
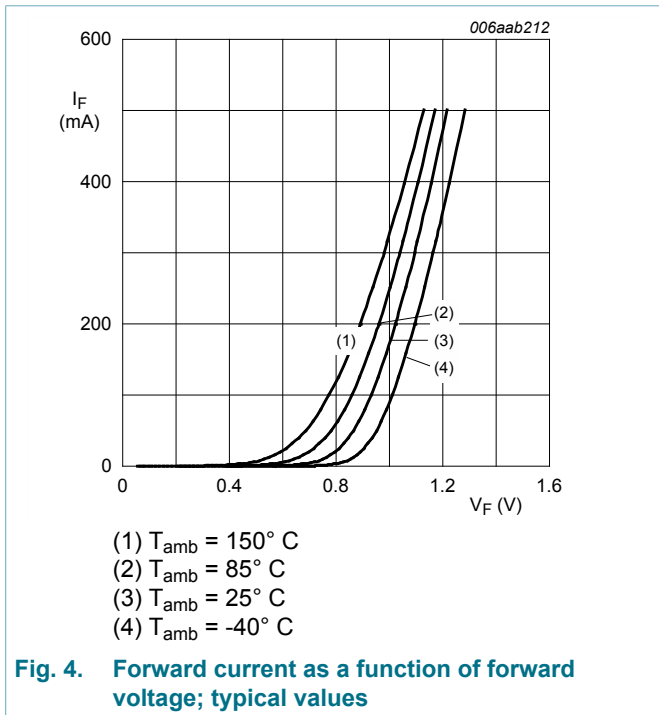
FR4 PCB, mounting pad for cathode 1 cm²

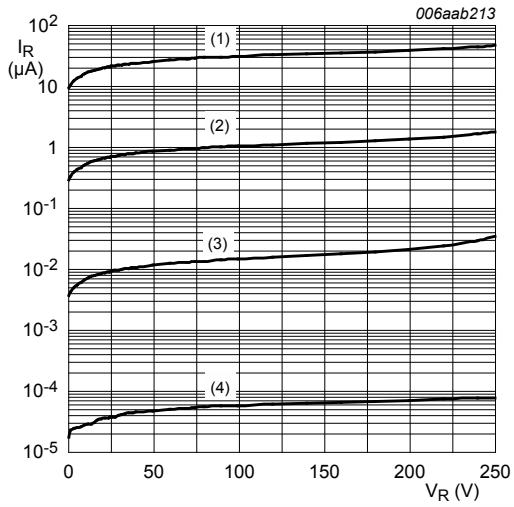
Fig. 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

10. Characteristics

Table 7. Characteristics

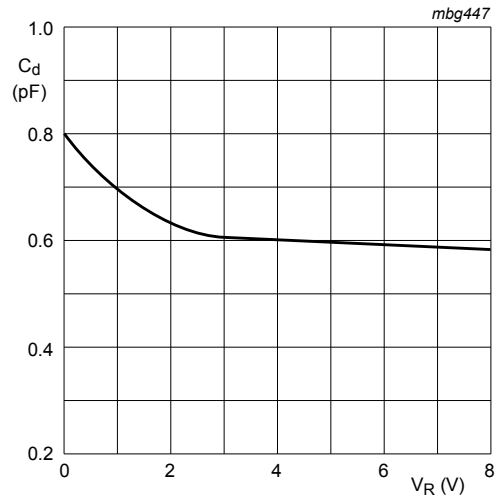
| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|----------|-----------------------|---|-----|-----|------|---------------|
| V_F | forward voltage | $I_F = 100 \text{ mA}; t_p \leq 300 \text{ }\mu\text{s}; \delta \leq 0.02;$ $T_j = 25 \text{ }^\circ\text{C}$ | - | - | 1 | V |
| | | $I_F = 200 \text{ mA}; t_p \leq 300 \text{ }\mu\text{s}; \delta \leq 0.02;$ $T_j = 25 \text{ }^\circ\text{C}$ | - | - | 1.25 | V |
| I_R | reverse current | $V_R = 200 \text{ V}; \text{pulsed}; T_j = 25 \text{ }^\circ\text{C}$ | - | - | 100 | nA |
| | | $V_R = 200 \text{ V}; \text{pulsed}; T_j = 150 \text{ }^\circ\text{C}$ | - | - | 100 | μA |
| 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 |





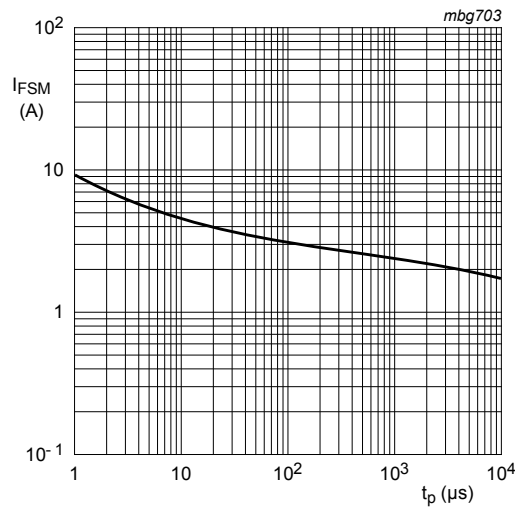
- (1) $T_{\text{amb}} = 150^\circ\text{C}$
- (2) $T_{\text{amb}} = 85^\circ\text{C}$
- (3) $T_{\text{amb}} = 25^\circ\text{C}$
- (4) $T_{\text{amb}} = -40^\circ\text{C}$

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



$f = 1\text{ MHz}$
 $T_j = 25^\circ\text{C}$.

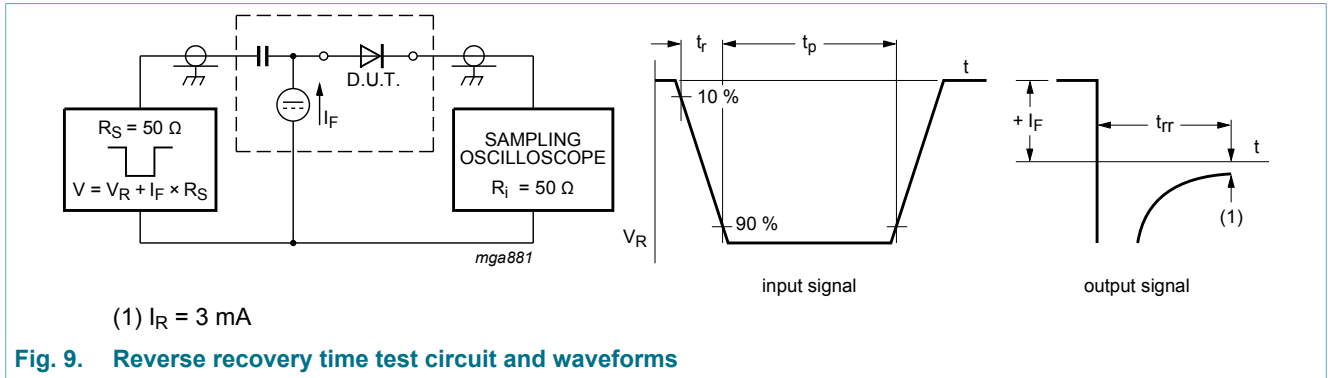
Fig. 7. Diode capacitance as a function of reverse voltage; typical values.



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

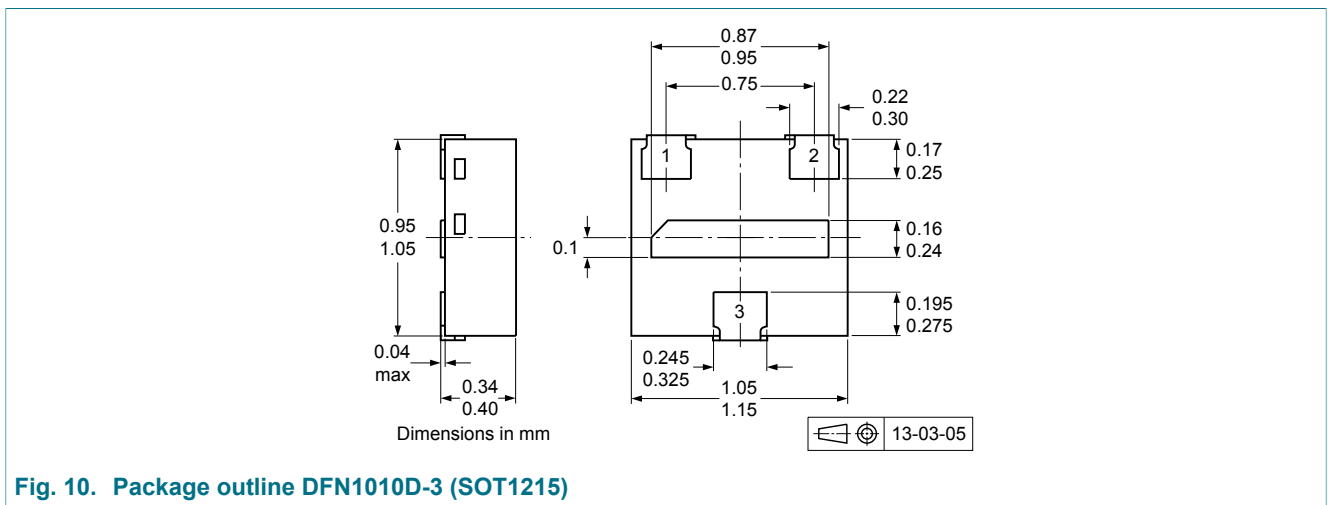
11. Test information



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.

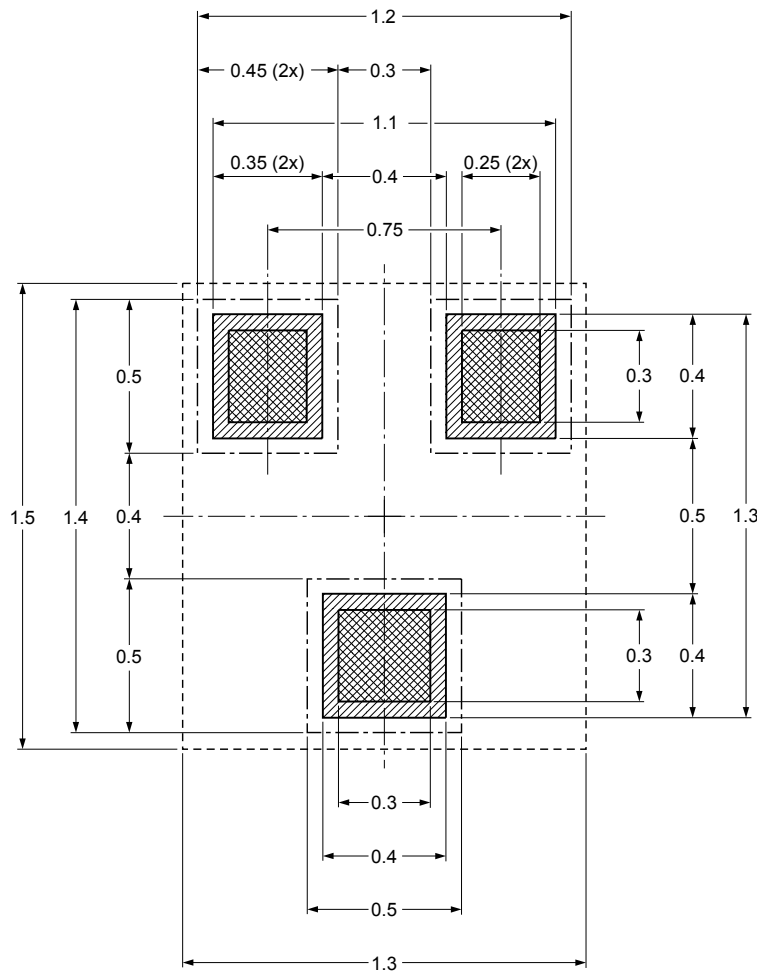
12. Package outline



13. Soldering

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 |
|---------------|--------------|--------------------|---------------|------------|
| BAS21QA 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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