AN11705

KMA210, KMA215, and KMA310 handling information

Rev. 2 — 7 March 2018 Application note

Document information

Info	Content
Keywords	KMA210, KMA215, KMA310, package, handling, assembly
Abstract	This document describes the limitations to package handling and precautions for safe assembly.

Revision history

Rev	Date	Description
2	20180307	added product type KMA310
1	20151014	initial version

Contact information

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1. Introduction

1.1 General

NXP Semiconductors is not the owner of customer processes and cannot test them under all conditions. Therefore, the information below is a general guideline for product handling and package assembly.

It does not replace the process development and release by the customer.

1.2 Package information

The products KMA210, KMA215, and KMA310 use the package SOT1288. The pin width of KMA210 and KMA215 is 0.37 mm (nominal) to allow through hole printed-circuit board (PCB) mounting. The pin width of KMA310 is optimized with 0.62 mm (nominal) for direct connection to external lead frame without PCB. The SOT1288 is fit for soldering and welding. The leads can be bent according to customer requirements. The products require gentle handling as especially the leads can bend unintentionally due to their small cross section and length.

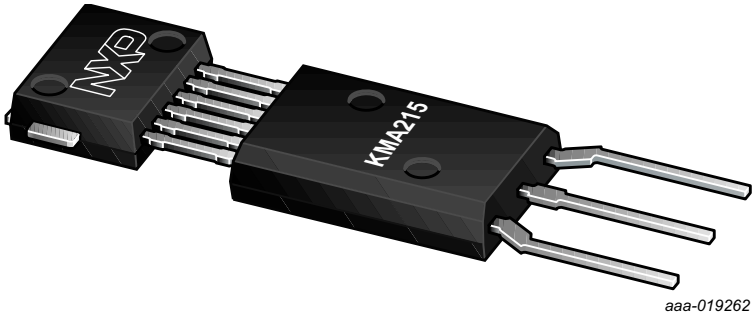


Fig 1. KMA215 device in SOT1288 package

2. Storage

2.1 Store conditions

Secure and clean store areas must be provided to isolate and protect the products.

Conditions in the store areas shall be such that the quality of the products does not deteriorate due to, among others, harmful gasses or electrical fields.

Storage conditions:

- Temperature
  - Min. +8 °C
  - Max. +45 °C
- Humidity
  - Min. 25 %
  - Max. 75 %
  - No condensation is allowed under any condition
- Light intensity
  - No direct sunlight

2.2 Shelf life

The shelf life for packed products is 4 years after the date code.

3. Precautions

3.1 Stress to sensor head

All magnetoresistive (MR) sensors react on severe mechanical stress. It can compromise the accuracy of the device. Prevent bending (warping) of the sensor head as that applies enormous stress to the sensor chip.

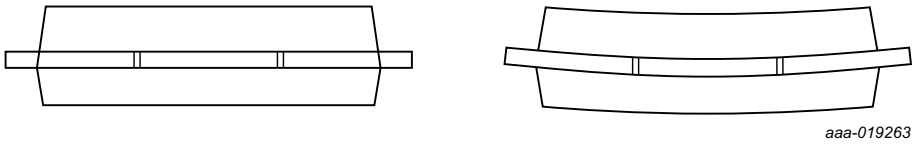


Fig 2. Straight and warped sensor head

Often the sensor is attached to a substrate (e.g. a throttle body cover). The sensor should be decoupled as much as possible from the substrate, e.g. by using a soft silicone glue to fix the sensor.

3.2 Internal leads

The internal leads connect the MR sensor in sensor head with application-specific integrated circuit (ASIC) at the ASIC body.

Potential contamination during product life at that area can cause leakage currents from lead to lead. In that case, the sensor signal would be modified, causing an angular error. With that the internal leads have to be protected from environmental impacts. It is done by covering it with a conformal coating as used to protect PCBs or soft glue in case the product is glued to a support.

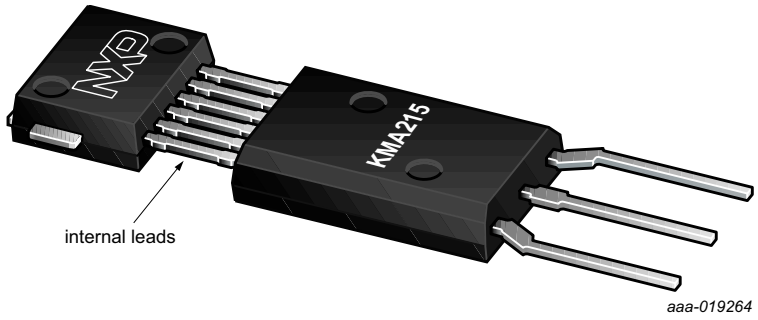


Fig 3. Internal leads

4. Product handling

4.1 ESD protection

Despite the devices being equipped with capacitors to increase the electrostatic discharge (ESD) robustness, apply the usual ESD protection measures.

4.2 Forces on body

Forces on the plastic body during general handling should not exceed 10 N. Apply forces via flat surfaces, parallel to the sensor surface. Avoid stress concentrations at smaller areas.

4.3 Forces on leads

Maximum pull force along leads is limited to 5 N. Forces in other directions should be prevented as the leads tend to bend easily. Pushing of leads can cause bulging.

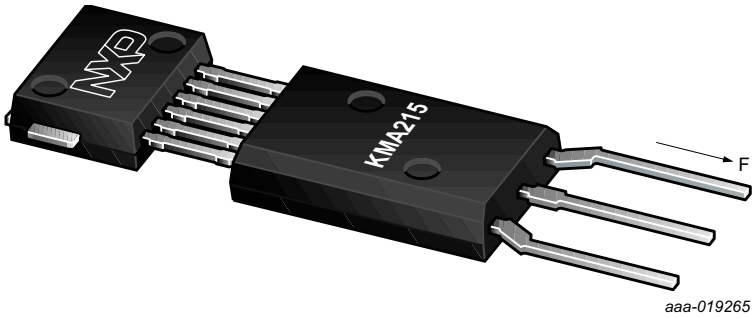


Fig 4. Pull force along lead

4.4 Product picking out of tape

Products should be picked at ASIC body by either a flat or cavity type sucker.

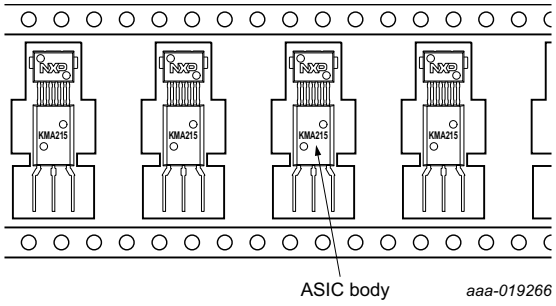


Fig 5. KMA215 in tape

5. Product assembly

5.1 Product alignment

5.1.1 Package features for alignment

Blue areas are preferred for alignment in socket.

Do not use the red areas for alignment due to uncontrolled package outline caused by gate remains or potential mold compound flash.

Other areas can be used for alignment.

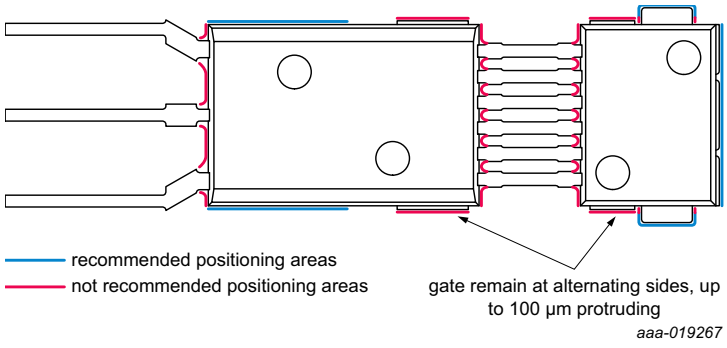


Fig 6. Package alignment areas

5.1.2 Reading point alignment

Best reference for the reading point (RP) is the lead frame (LF) as the die is attached to the LF.

- As the ears are part of the lead frame, they are the preferred alignment feature.
- The RP has a tolerance of ±0.1 mm regarding the ears.
- The lead frame formed the rim (mold compound flowed to the lead frame edge, forming the rim). Therefore, it has the same tolerance of ±0.1 mm.

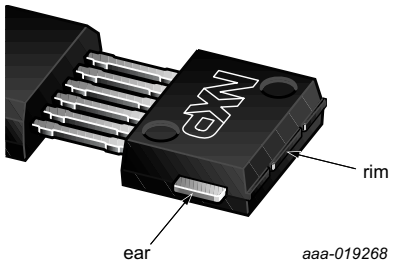


Fig 7. Reading point alignment features

5.1.3 Pin alignment

Just aligning the package at the sensor head may not be sufficient to ensure proper positioning of the pins to their external counterparts.

Align the product at the lower ASIC body.

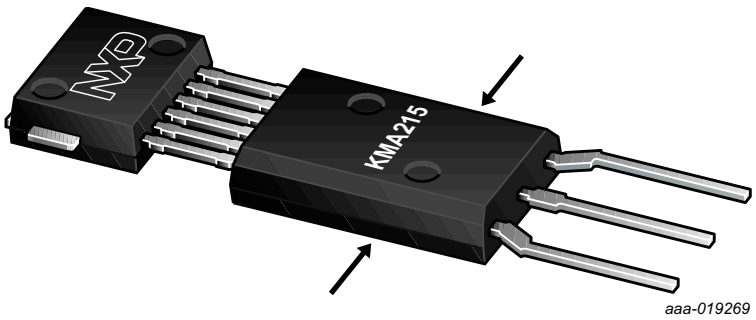


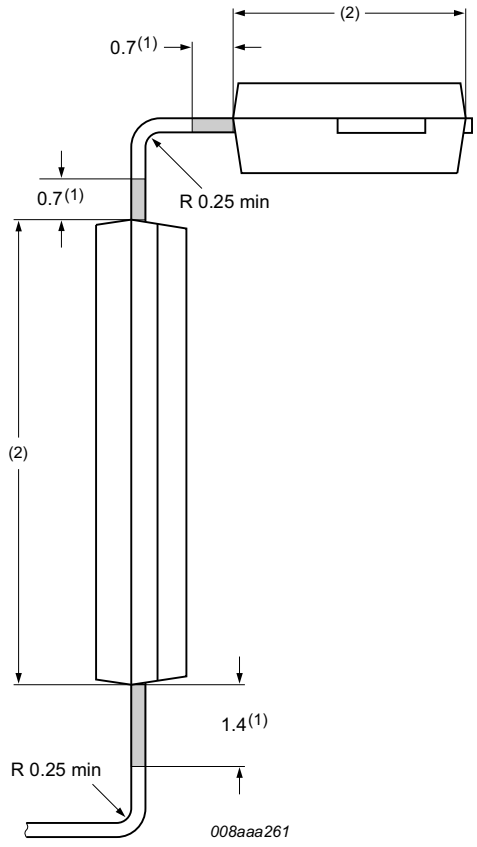
Fig 8. Align pins to external leads at lower ASIC body

5.2 Lead bending

To adapt the packages to customer requirements, the leads can be bent as shown in Figure 9. Both internal and external leads (pins) can be bent.

It is not recommended to bend the dambar region (see Figure note 1 of Figure 9) as the lead geometry in those areas can compromise the bending result. Instead, bending is recommended at the straight parts of the leads.

To prevent lead pull forces at the entrance to the plastic body, use proper clamping at the leads in between the bending position and the plastic body.



Dimensions in mm

(1) No bending allowed.

(2) Plastic body and interface plastic body - leads: application of bending forces not allowed.

Fig 9. Lead bending sketch

5.2.1 Lead bend control

After intentional or unintentional lead bending or twisting, verify that the products are not mechanically damaged.

Smooth bending without buckling in bending zone, inner radius > 250 μm.

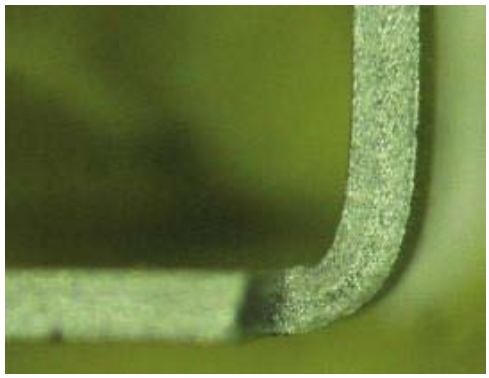


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Fig 10. Smooth bending

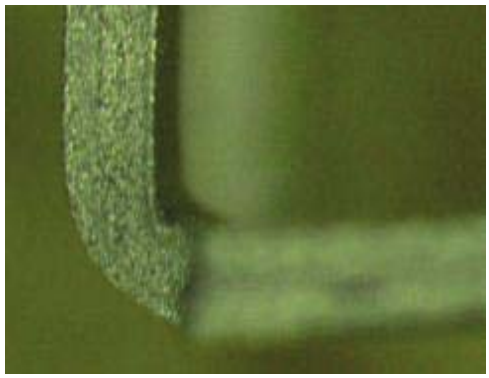

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Fig 11. Kink in bending zone, reject

No exposed Cu (Sn layer cracked, Cu core material exposed) allowed.

Leads just in front of package entrance not bent, no gaps at lead entrance all around leads.

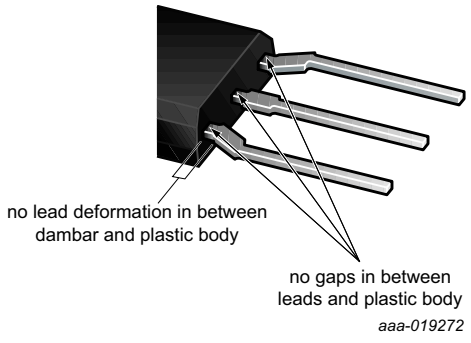

Fig 12. Lead entrance to body check

5.3 Soldering

The solderability qualification is according to AEC-Q100 Rev-G (Rev-H for KMA310). Recommended soldering process for leaded devices is wave soldering. The maximum soldering temperature is 260 °C for maximum 5 s.

Alternatively, the device can be reflow soldered.

5.4 Welding

During electro-welding, a heat wave travels along the leads causing high stress to the sensor product. To limit the stress, control the heat by verifying that the Sn reflow zone does stop in front of plastic body (at body entrance).

Alternatively, laser-welding is possible.

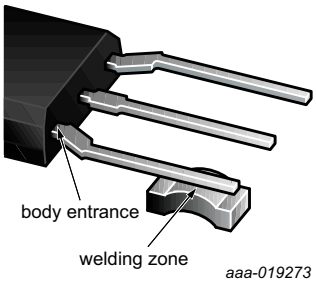

Fig 13. Welding information

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7. Figures

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