AN11717

KMA22x; KMA32x handling information

Rev. 2 — 9 July 2018 Application note

Document information

Info	Content
Keywords	KMA220, KMA221, KMA320, KMA321, package, handling, assembly
Abstract	This document describes the limitations to package handling and precautions for safe assembly.

Revision history

Rev	Date	Description
2.0	20180622	changed type KMA332 to KMA320
1.0	20151021	initial version

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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 KMA22x and KMA32x use the package SOT1188. It 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.

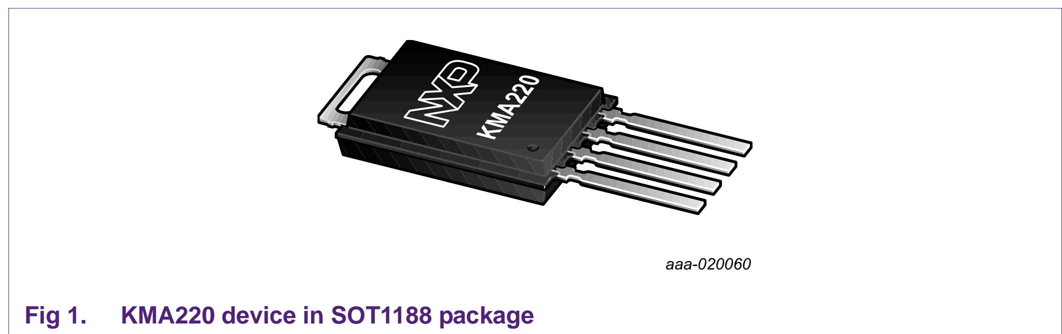

Fig 1. KMA220 device in SOT1188 package

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

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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

As all MagnetoResistive (MR) sensors, KMA22x and KMA32x 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.

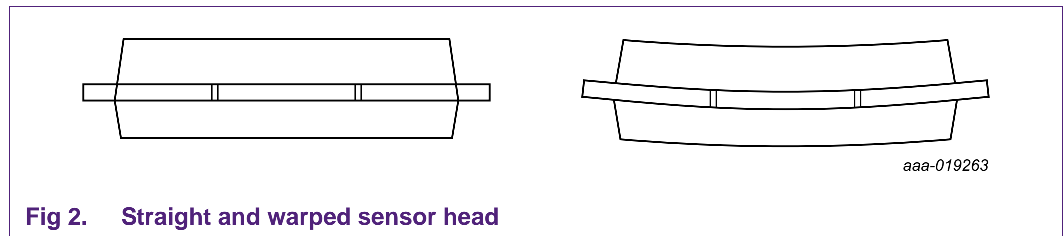

Fig 2. Straight and warped sensor head

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 Stress to sensor leads

Caused by differences in thermal expansion of sensor and environment (socket), high amount of stress can be generated. To reduce that stress, bend the sensor or external leads to prepare a flexible region. Bending recommendations see Section 5.2.

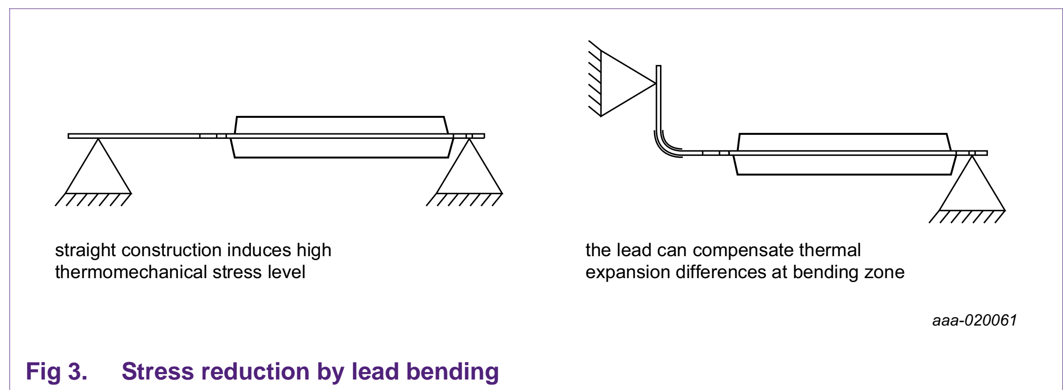

Fig 3. Stress reduction by lead bending

4. Product handling

4.1 ESD protection

Despite the KMA22x and KMA32x devices being equipped with capacitors to increase the ESD robustness, apply the usual ESD protection measures.

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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 along leads

Maximum pull force along leads is limited to 10 N per lead. Forces in other directions should be prevented as the leads tend to bend easily. Pushing of leads can cause caving-in.

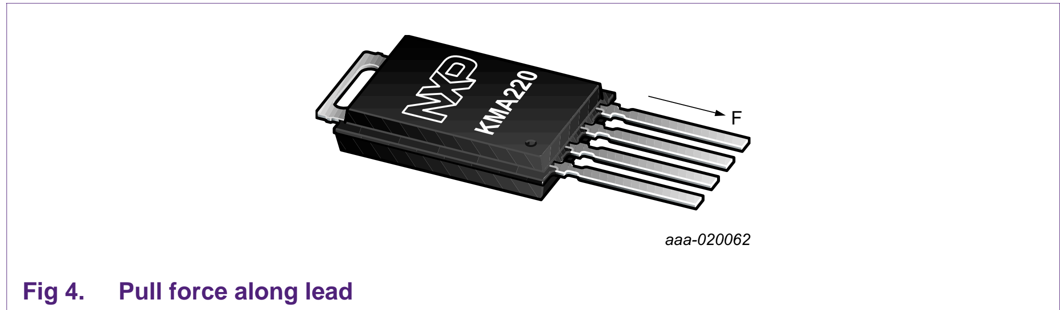

Fig 4. Pull force along lead

4.4 Forces at fin

Maximum pull force is limited to 15 N. Forces perpendicular to the fin should be prevented as the fin tends to bend easily.

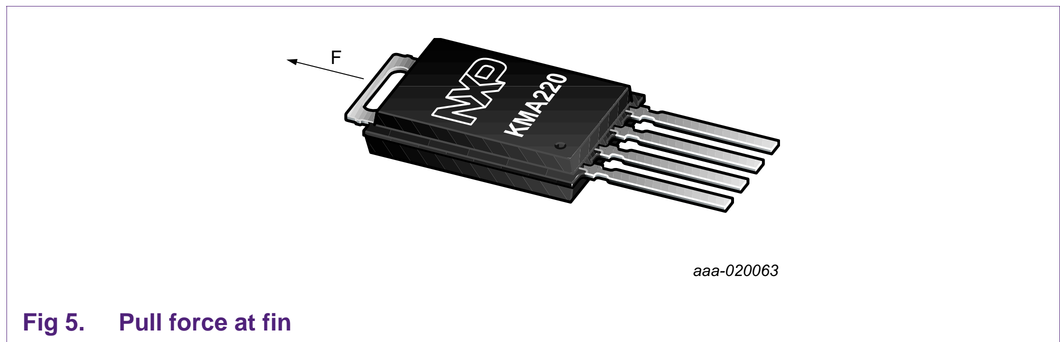

Fig 5. Pull force at fin

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4.5 Product picking out of tape

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

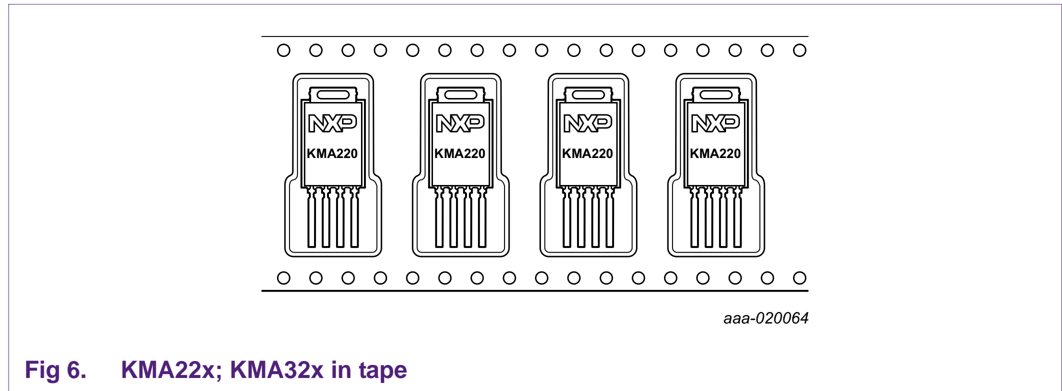

Fig 6. KMA22x; KMA32x in tape

5. Product assembly

5.1 Product alignment

5.1.1 Package features for alignment

Blue areas are preferred for alignment in socket.

Red areas should not be used for alignment due to uncontrolled package outline caused by gate remains or potential mold compound flash.

Other areas can be used for alignment.

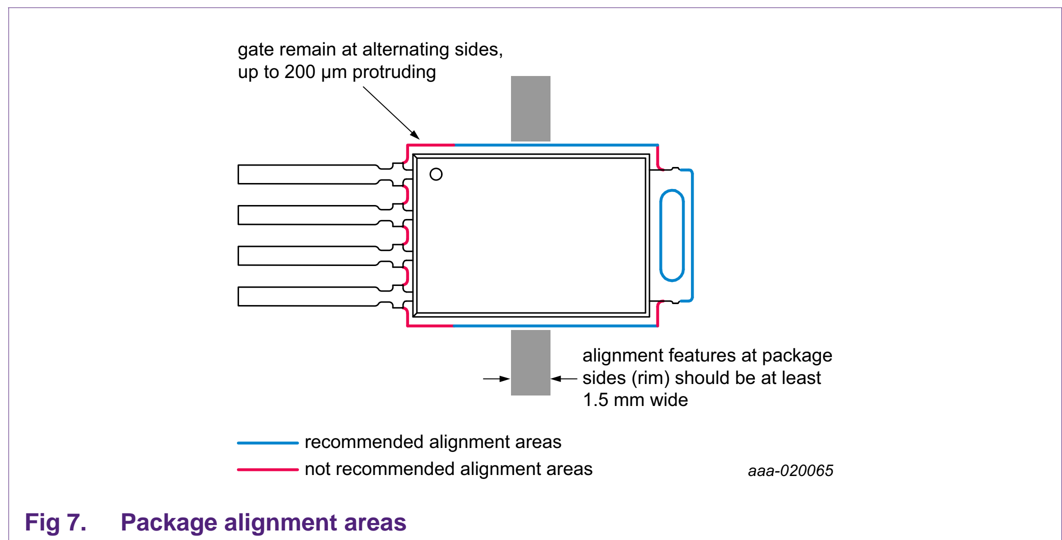

Fig 7. Package alignment areas

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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 fin is part of the lead frame, it is the preferred alignment feature.
- The RP has a tolerance of ±0.1 mm regarding the fin.
- 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.

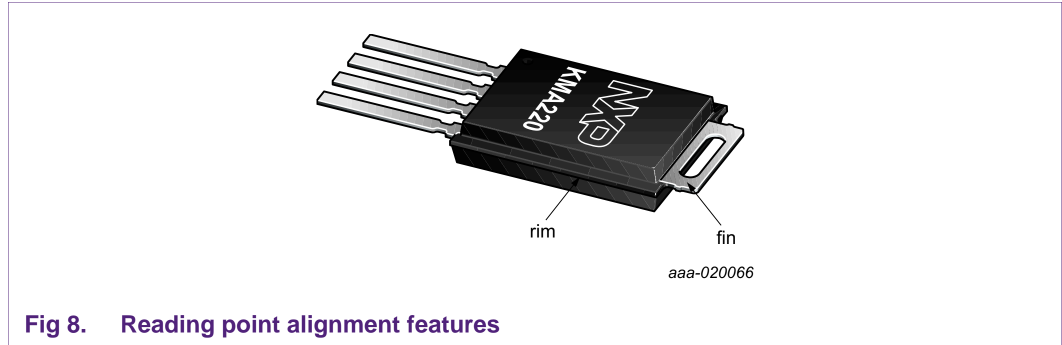

Fig 8. Reading point alignment features

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 rim. It is also possible to align at the leads itself.

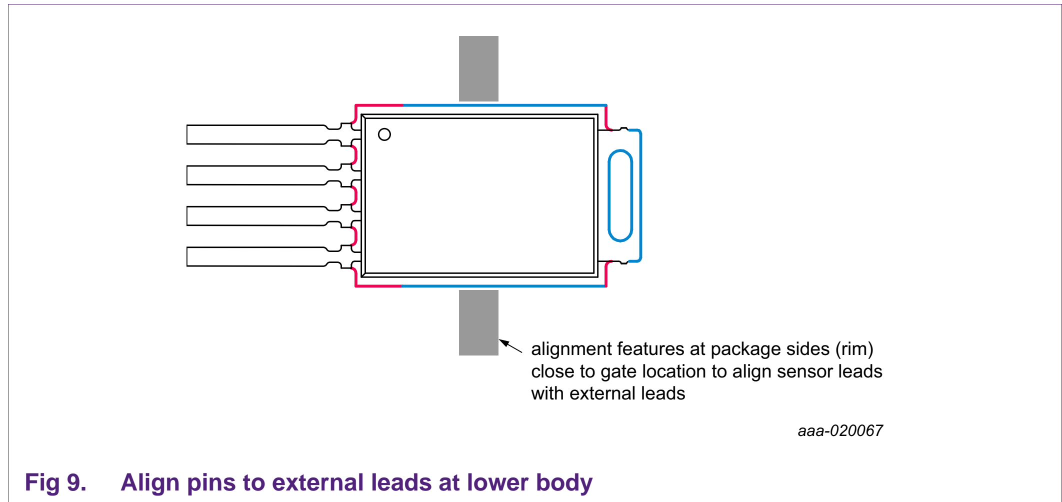

Fig 9. Align pins to external leads at lower body

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5.2 Lead bending

To adapt the packages to customer requirements, the leads can be bent as shown in Figure 10 and Figure 11.

It is not recommended to bend the dambar (and fin) region (see Figure note 1 of Figure 11) 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.

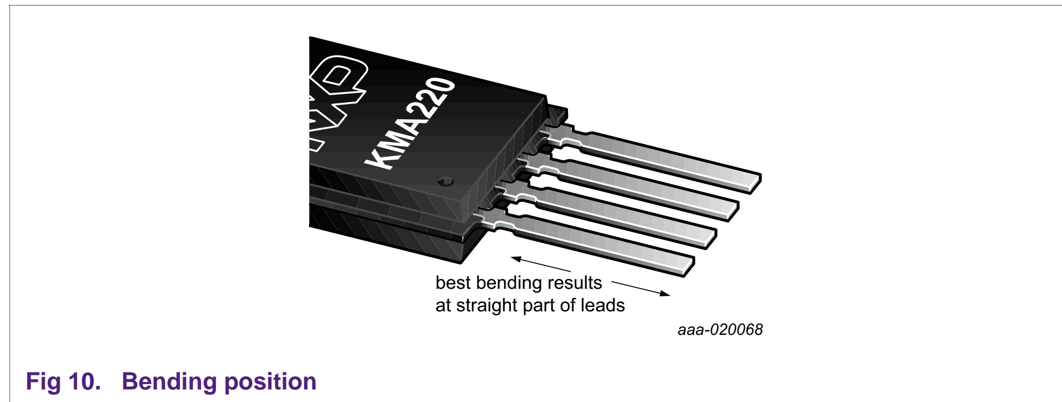
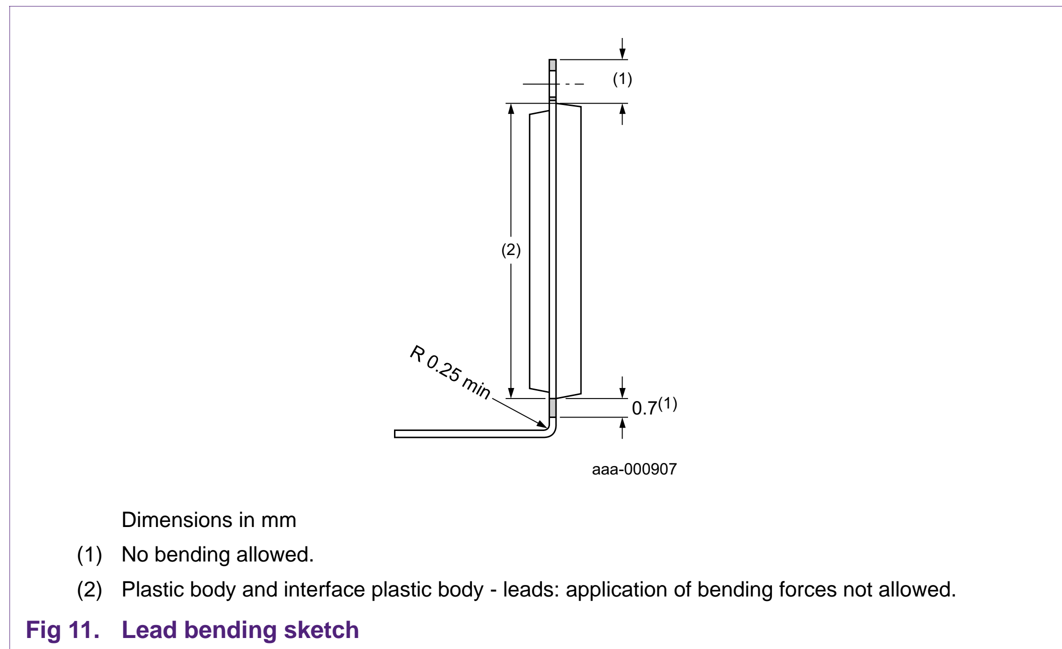


Fig 10. Bending position



Dimensions in mm

(1) No bending allowed.

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

Fig 11. Lead bending sketch

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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.

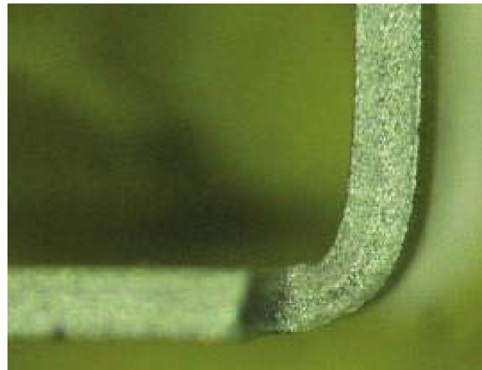

Fig 12. Smooth bending

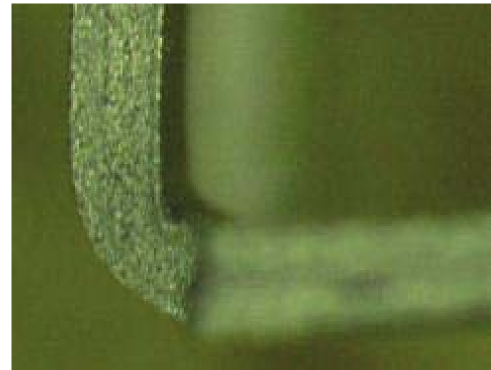

Fig 13. Kink in bending zone, reject

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.

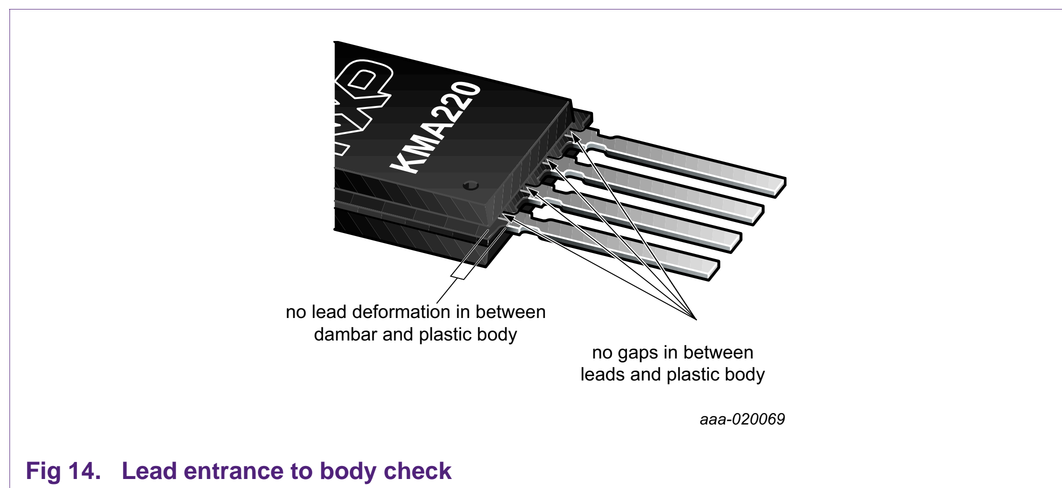

Fig 14. Lead entrance to body check

5.3 Soldering

The solderability qualification is according to AEC-Q100 Rev-G. 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.

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5.4 Welding

During electrowelding, 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).

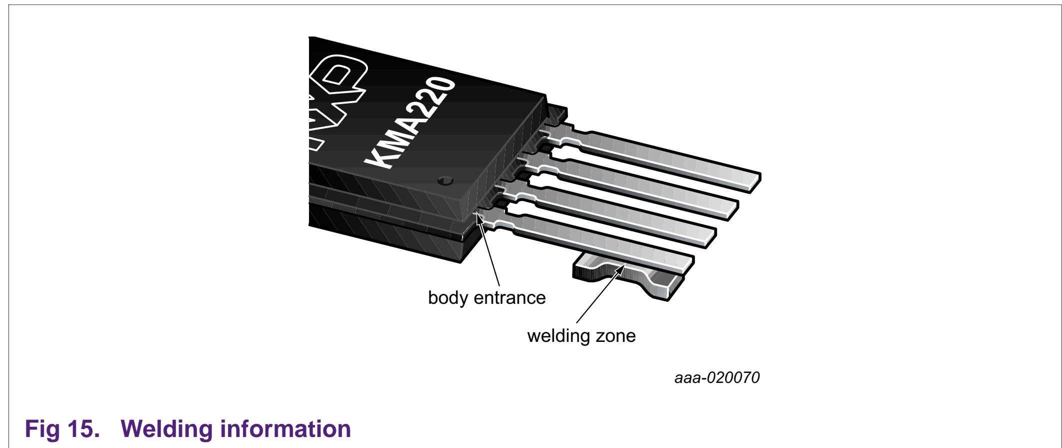

Fig 15. Welding information

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