Magnet Specification

# AS5306

**Magnetic Multipole Ring, MR12-72**
**Pole Length 1.2 mm, 72 Poles**

## Table of Contents



### Revision History

| Revision | Date | Owner | Description |
|---|---|---|---|
| 0.3 | 8 Sept 2014 | ekno | New design layout |

# 1 General Description

This specification defines the dimensional and magnetic properties of a multipole magnetic ring for use with the AS5306 magnetic encoder for off-axis rotary applications.

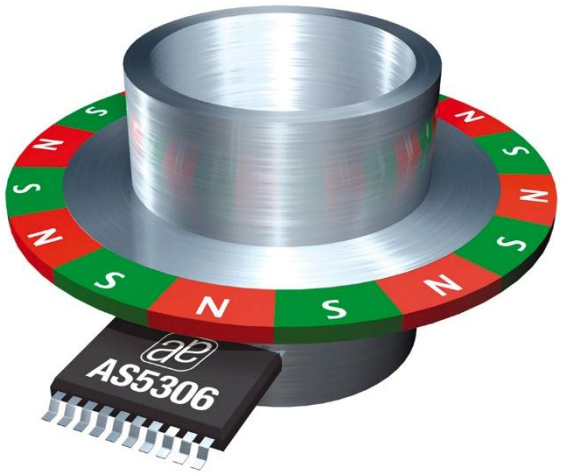



Figure 1: AS5306 with multipole ring magnet for off-axis rotary motion sensing (not to scale)

Note: The MR12-72 magnet contains only the magnetic ring, the metal carrier is shown for illustration purposes only

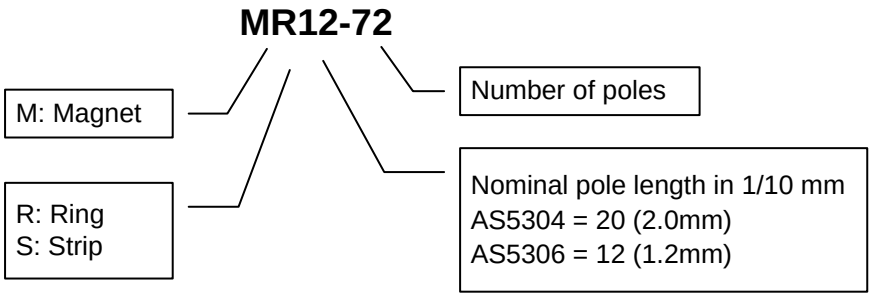
# 2 Multipole Ring Magnets for the AS5306

Figure 2 shows the proper placement of a multipole ring over the AS5306. The centerline of the magnetic ring (median Hall sensor scan path) is located over the Hall array (see Figure 3).

The magnetic ring is designed such that the pole length lp matches the required length at the scan path (typically the center) of the ring. The IC is oriented in perpendicular with respect to the rotation center.

The correct measurement radius can be calculated by the number of poles of the magnet ring and the specified pole length:

These figures can be determined by the code of the magnet:



The correct measurement radius for the MR12-72 magnet ring is therefore:

$$rm = \frac{pole\_length(mm) * number\_of\_poles}{2 * \pi}$$

$$rm = \frac{1.2 * 72}{2 * \pi} = 13.75mm$$

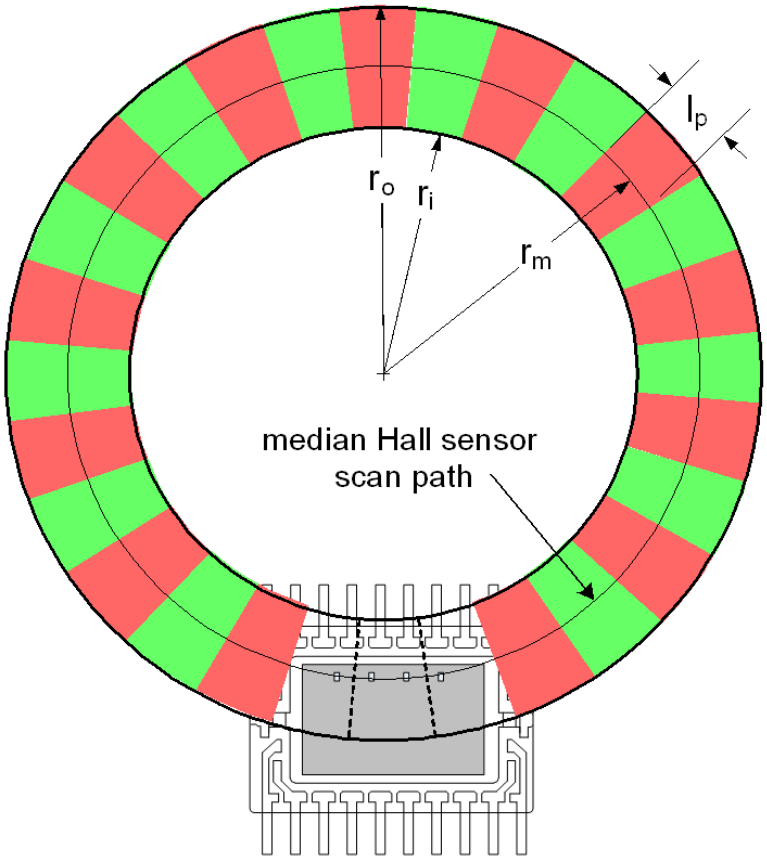



Figure 2: Proper placement of the ring magnet (not to scale)

## 3 Locating the Hall Sensor Array

The measurement radius should coincide with the Hall sensor array on the chip. The location of the Hall sensors can be seen in Figure 3. The Hall sensor array is located 1.02mm above the horizontal centerline of the TSSOP-20 package, or

3.20mm + 1.02mm = 4.22mm above the edge of pins #1….10 (top view, pin#1 at bottom left).

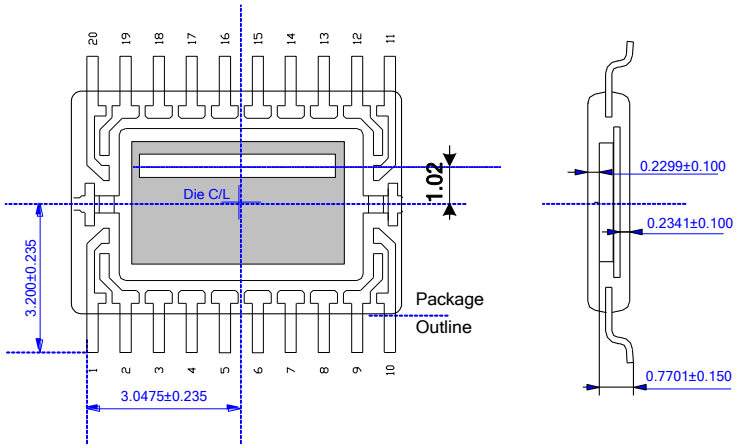



Figure 3: Location of Hall sensors in the TSSOP-20 package

## 4 Dimensional Specification

Magnet Order # AS5000-MR12-72 on ams web shop

| Parameter | Symbol | Min | Typ | Max | Unit | Note |
|---|---|---|---|---|---|---|
| Magnet material | | | | | | Plastic bonded Strontium Ferrite SrFe. |
| Pole length | $l_p$ | | 1.2 | | mm | Suited for AS5306 |
| Number of poles | | | 72 | | | |
| Inner ring radius | $r_i$ | 11.975 | 12 | 12.025 | mm | |
| Resolution | Res | 5760 | | | steps/rev | With AS5306 @ 160x interpolation |
| | | 12.49 | | | bit | |
| | | 1440 | | | ppr | |
| Measurement radius | $r_m$ | | 13.75 | | mm | Pole length* number of poles / 2π |
| Outer ring radius | $r_o$ | 15.975 | 16 | 16.025 | mm | |
| Strip thickness | d | 1.5 | 1.5 | 1.6 | mm | |
| Magnetic amplitude | $A_{mag}$ | | Tbd | | mT | Measured at IC surface |
| Amplitude variation | | | | Tbd | mT | |
| Magnetic offset | $Off_{mag}$ | | Tbd | | mT | |
| Temperature range | $T_{amb}$ | | Tbd | | °C | |
| Magnetic temperature drift | $T_{dmag}$ | | Tbd | | %/K | |

## 5 Marking

The ring has two marks at the backside:

One mark shows the number of poles (72) the other mark shows a single digit letter, which is of no relevance.

## 6 Mounting the Magnet Ring

As mentioned in chapter 5, the magnet ring has two markings, which represent the backside of the ring. The front side should be facing the AS5306 IC with a gap of <lp/2 = <0.6mm.

The magnet ring may be mounted directly on magnetic or non-magnetic surfaces. When magnetic surfaces are used, the ring may be mounted on top of the surface, but not immersed in a cavity, as this may weaken the magnetic field of the magnet. When mounting the magnet on a non-magnetic surface, either method is acceptable.

Depending on the carrier material, there are several adhesives available to glue the ring to the surface. For general ruggedness and vibration demands, the use of two-component-adhesive (binder + hardener) has proven to be successful in most cases.

For more rigid demands, magnet suppliers offer customized solutions where the magnet material is directly overmolded on the carrier, e.g. a shaft, bushing, plate, etc..

Please contact your magnet supplier for more information. A list of recommended suppliers is available for download on the ams website.

## 7 Magnet Supplier Information

**Bomatec AG**

Hofstrasse 1

CH-8181 Höri

Tel. +41 44 872 10 00

http://www.bomatec.ch

# Copyright



# Disclaimer

Devices sold by ams AG are covered by the warranty and patent indemnification provisions appearing in its Term of Sale. ams AG makes no warranty, express, statutory, implied, or by description regarding the information set forth herein or regarding the freedom of the described devices from patent infringement. ams AG reserves the right to change specifications and prices at any time and without notice. Therefore, prior to designing this product into a system, it is necessary to check with ams AG for current information.

This product is intended for use in normal commercial applications. Applications requiring extended temperature range, unusual environmental requirements, or high reliability applications, such as military, medical life-support or lifesustaining equipment are specifically not recommended without additional processing by ams AG for each application. For shipments of less than 100 parts the manufacturing flow might show deviations from the standard production flow, such as test flow or test location.

The information furnished here by ams AG is believed to be correct and accurate. However, ams AG shall not be liable to recipient or any third party for any damages, including but not limited to personal injury, property damage, loss of profits, loss of use, interruption of business or indirect, special, incidental or consequential damages, of any kind, in connection with or arising out of the furnishing, performance or use of the technical data herein. No obligation or liability to recipient or any third party shall arise or flow out of ams AG rendering of technical or other services.

# Contact Information

**Headquarters**

ams AG
Tobelbader Strasse 30
8141 Unterpremstaetten
Austria
T. +43 (0) 3136 500 0
For Sales Offices, Distributors and Representatives, please visit:
**http://www.ams.com/contact**