AS5304

Magnet Specification

Magnetic Multipole Ring, MR20-44
Pole Length 2.0 mm, 44 Poles

1 General Description

This specification defines the dimensional and magnetic properties of a multipole magnetic ring for use with the AS5304 magnetic encoder for off-axis rotary applications.

Figure 1

AS5304 with multipole ring magnet for off-axis rotary motion sensing (not to scale)

Note:

The MR20-44 magnet contains only the magnetic ring (see picture on the right), the metal carrier is shown for illustration purposes only

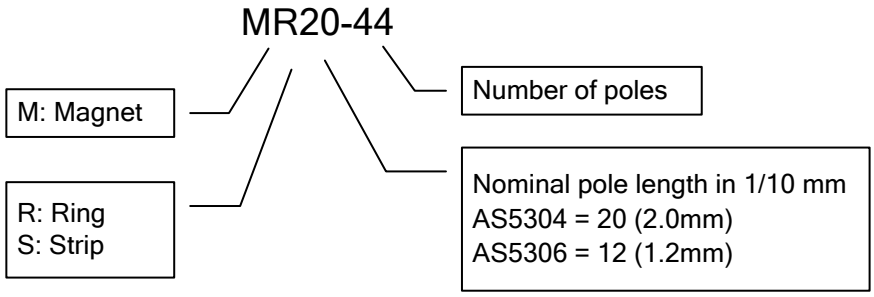
2 Multipole Ring Magnets for the AS5304

Figure 2 shows the proper placement of a multipole ring over the AS5304. 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:



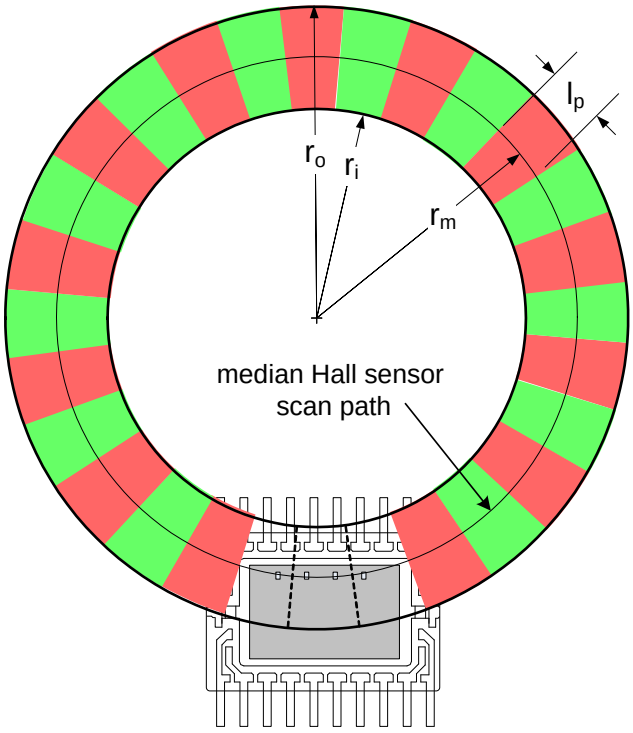
The correct measurement radius for the MR20-44 magnet ring is therefore:

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

$$rm = \frac{2.0 * 44}{2 * \pi} = 14.00mm$$

Figure 2

Proper placement of the ring magnet (not to scale)



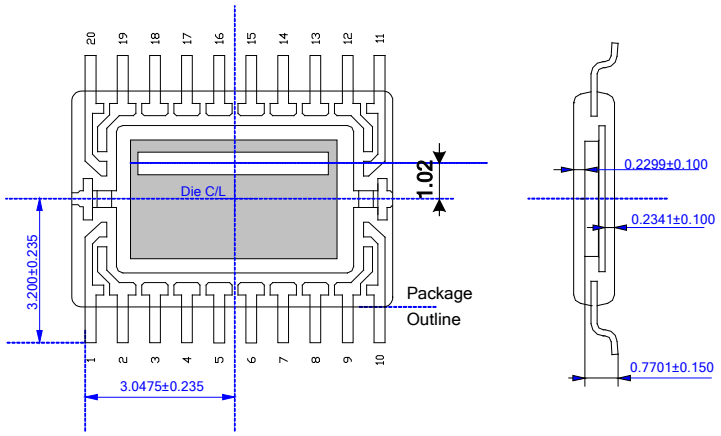
3 Locating the Hall Sensor Array

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



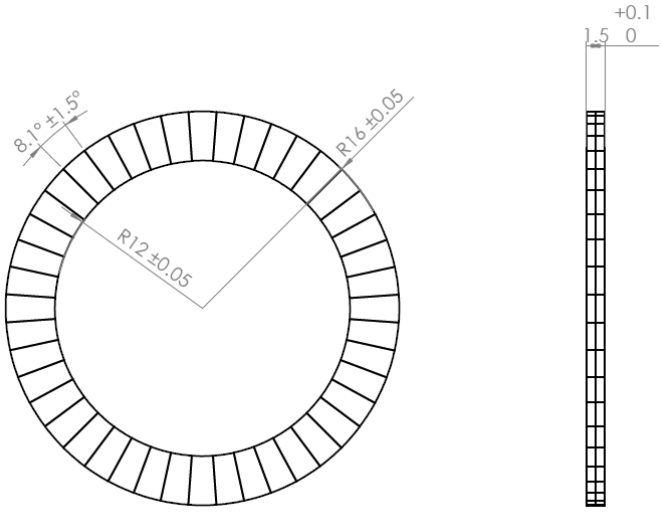
4 Dimensional Specification

Magnet Order # AS5000-MR20-44 on ams web shop www.ams.com/ICdirect

Parameter	Symbol	Min	Typ	Max	Unit	Note
Magnet material						Plastic bonded Strontium Ferrite SrFe. Supplier-internal material grade = BMNP-1612.
Remanence	Br	280		300	mT	
Pole length	l_p		2.0		mm	Suited for AS5304
Number of poles			44			
Inner ring radius	r_i	11.975	12	12.025	mm	
Resolution	Res		3520		steps/rev	With AS5304 @ 160x interpolation
			11.78		bit	
			880		ppr	
Measurement radius	r_m		14.00		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}	52	76	89	mT	Measured at magnet surface
Amplitude variation				25	mT	
Temperature range	T_{amb}		Tbd		°C	
Magnetic temperature drift	T_{dmag}		Tbd		%/K	

5 Mechanical Drawing



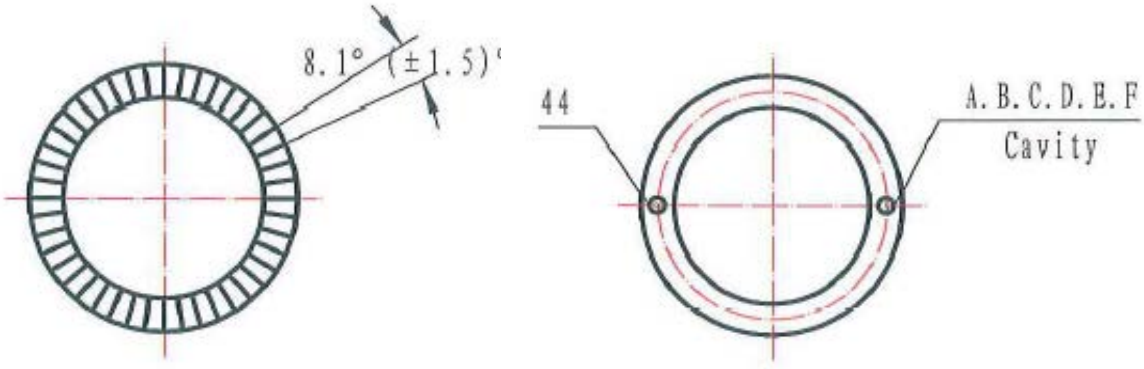
6 Marking

The magnet ring has two marks at the backside:

One mark shows the number of poles (44) the other mark shows a single digit letter (A…F), which is of no relevance.

Figure 4

Markings at the backside of the magnet



7 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 AS5304 IC with a gap of <lp/2 = <1.0mm.

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.

8 Magnet Supplier Information

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