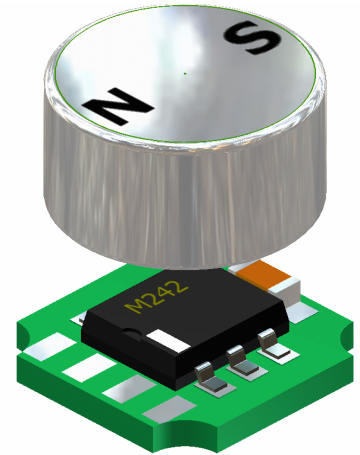


The RD102_EM3242 is a Reference Design for the Asahi EM-3242 Non-Contact Angle Position Sensing IC. The EM-3242 senses the angle of magnetic field component in the top plane of the device package. The EM-3242 provides an analog output voltage of 10% to 90% of the supply voltage for a mechanical angle range of 360° of rotation. The EM-3242 has two operating modes. One with the “In Range” detector enabled and one with the “In Range” detector disabled. The “In Range” detector includes internal circuitry which causes the output voltage to drop to 0V whenever the magnetic field level at the EM-3242 is greater than 60mT or less than 10mT. The RD102_EM3242 reference design illustrates the operating mode which has the “In-Range” detector enabled. Please note that the PDN (Power Down) function is also enabled in this mode.



EM-3242 on PCB with 0.25” diam. x 0.15” thick SmCo24 magnet, part number 55B0081. (See AN_134KIT)

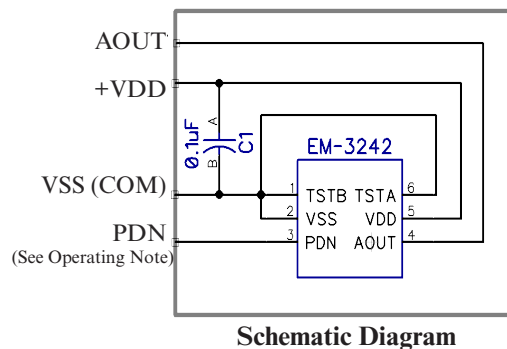
GMW offers the AN_134KIT development kit that can be used to demonstrate this RD102_EM3242 reference design. Another Reference Design, the RD101_EM3242 has the “In Range” detector and the PDN (Power Down) disabled. RD101_EM3242 is implemented in the AN_133KIT.

Features

- 360° Non-contact magnetic angle position sensing
- Analog output 10% to 90% of V_{DD}
- Non-linearity less than 3.5° at 3V
- Magnet to EM-3242 separation of 0.100” to 0.250”
- Tolerant of mechanical misalignment
- Out of Range Detection (Faults to 0V when Magnetic Field is >60mT or <10mT.
- Power Down (PDN) option reduces current draw to <10uA
- 2.7 to 5.5V operating voltage range
- Only one external component required (0.1μF)
- Less than 10mA operating current
- Ratio-metric output
- Very small 6 pin IC package (3.6mm x 4.2mm)
- Circuitry fits on a 0.25” x 0.25” PCB
- 10bit Resolution (0.36°)
- Fast update speed (40μS/update)

Reference Documents

- EM-3242 Specification Sheet - July, 2008
- 55B0082 Specification Sheet (0.25” diam. x 0.15” h SmCo24 Magnet)
- 55B0081 Specification Sheet (0.15” diam. x 0.15” h SmCo24 Magnet)
- 55C0126 Specification Sheet (0.25” sq. x 0.10” h SmCo24 Magnet)
- AN_134KIT- Engineering Development Kit
- RD101_EM3242 Reference Design for Angle sensing without “In Range” Detector



Bill of Material

- IC-1 EM-3242 IC
- C1- 0.1μF Ceramic cap-0603 SMD ±10%
- PCB FR-4, 0.8mm thick, 0.5 oz copper
- 55B0082 Cylindrical Magnet or
- 55B0081 Cylindrical Magnet or
- 55C0126 Square Magnet

Operating Note

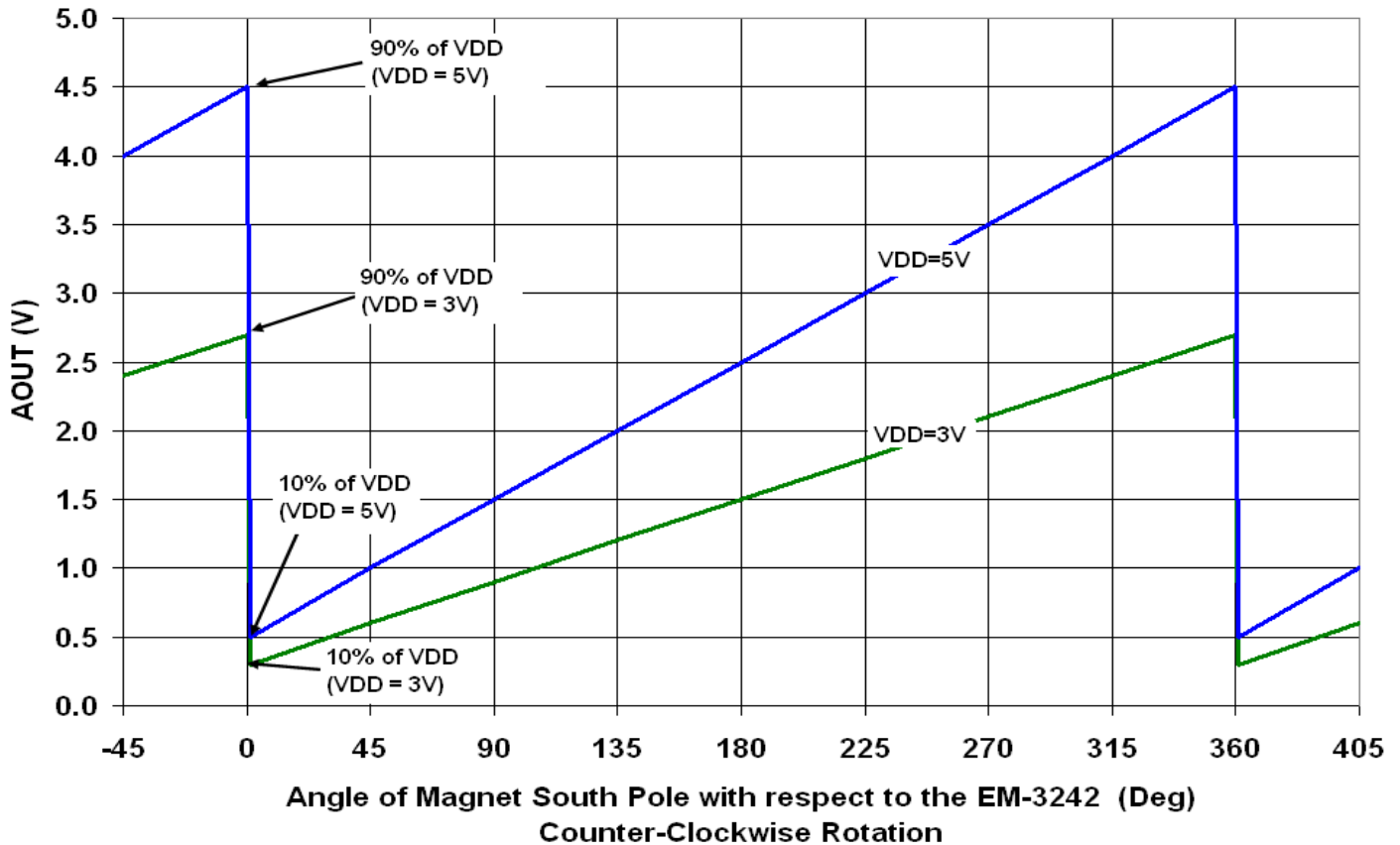
Power Down (PDN) is enabled when PDN is tied to VSS (COM). Tie PDN to +VDD to activate the sensor for normal operation.

Revision Date: 4 FEB 2009

North American Distributor:

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AOUT vs. Position of South Pole of Magnet



360° to 0° Transition

When the Angle of rotation approaches the 360° position, the output will approach 90% of the supply voltage and then abruptly change to 10% of V_{DD} and then start increasing again as the angle increases. This transition can be as wide as 0.5°. If the position of the magnet is held steady at a point within the 0.5° range, there is a possibility that the output will randomly switch between the 90% level and the 10% level. Both levels represent the same angle of 0°. If the output is filtered with a low pass filter, the average voltage output could be approximately 50% of V_{DD} , thus creating an error in the reading. This can be avoided by not using a low pass filter. If a microprocessor is used to sample the output, it can simply register a 10% V_{DD} reading and a 90% V_{DD} reading as the same angle (0°).

Non-Linearity Specifications

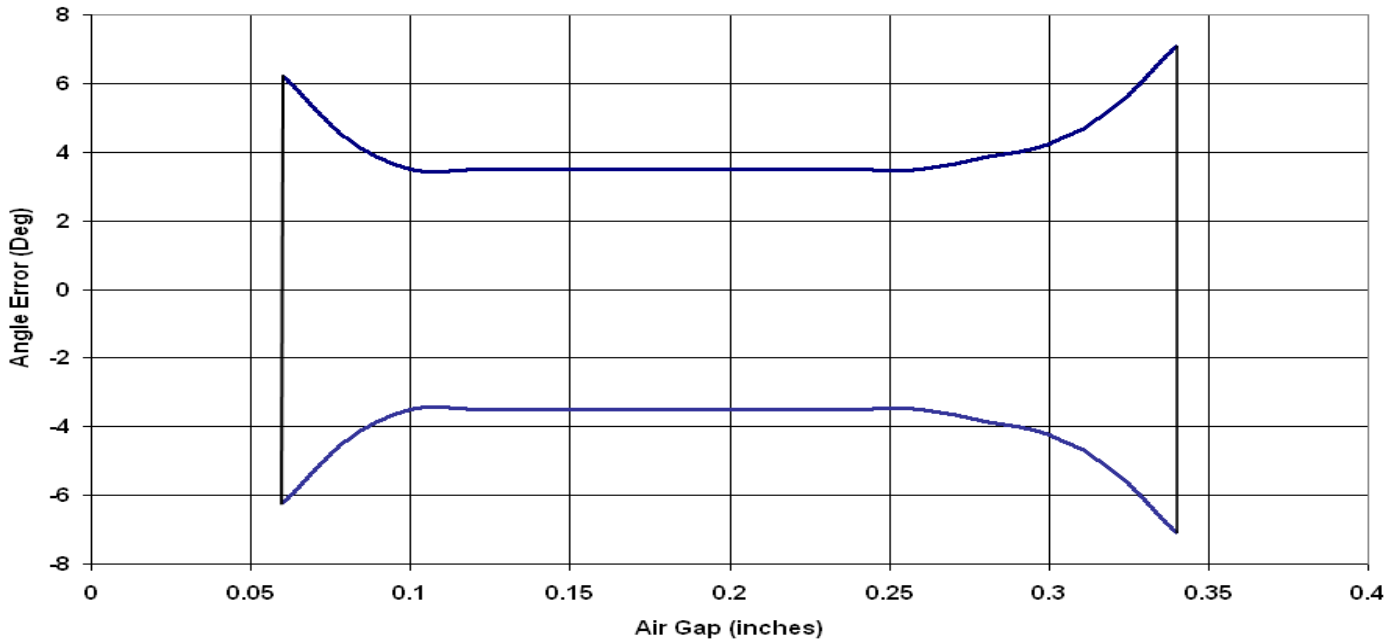
The EM-3242 is specified to operate within $\pm 3.5^\circ$ of non-linearity when the supply is 3V and $\pm 6^\circ$ when the supply voltage is 5V over the magnetic field range of 20mT to 50mT. With the "In Range" detector enabled, as in this case, the sensor will continue operate normally until the magnetic field strength at the sensor either exceeds 60mT or drops below 10mT. When these limits are exceeded, the output of the EM-3242 will drop to 0.2V or less. The following graphs show the relationship between the non-linearity range and the air gap between the magnet and sensor for the 55B0082 magnet.

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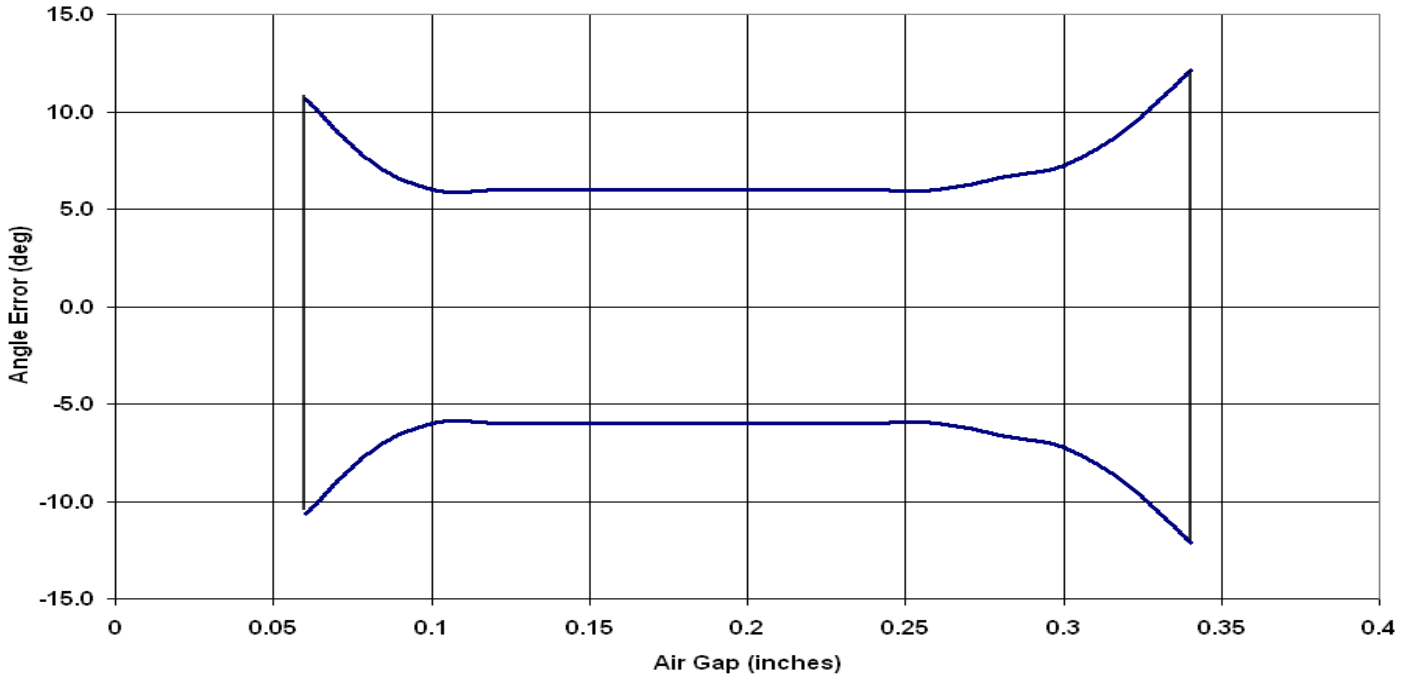
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Limited Range Operating Mode
Angle Error vs Air Gap for the 55B0082 Magnet
VDD = 3.0V



Limited Range Operating Mode
Angle Error vs Air Gap for the 55B0082 Magnet
VDD = 5.0V



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