

# EM-3242 One-chip monolithic Rotation Angle Sensor

## Preliminary Specification

These specifications are subject to change without notice

### ◆ Characteristics

Rotation Angle Sensor Device with Hall Element Inside

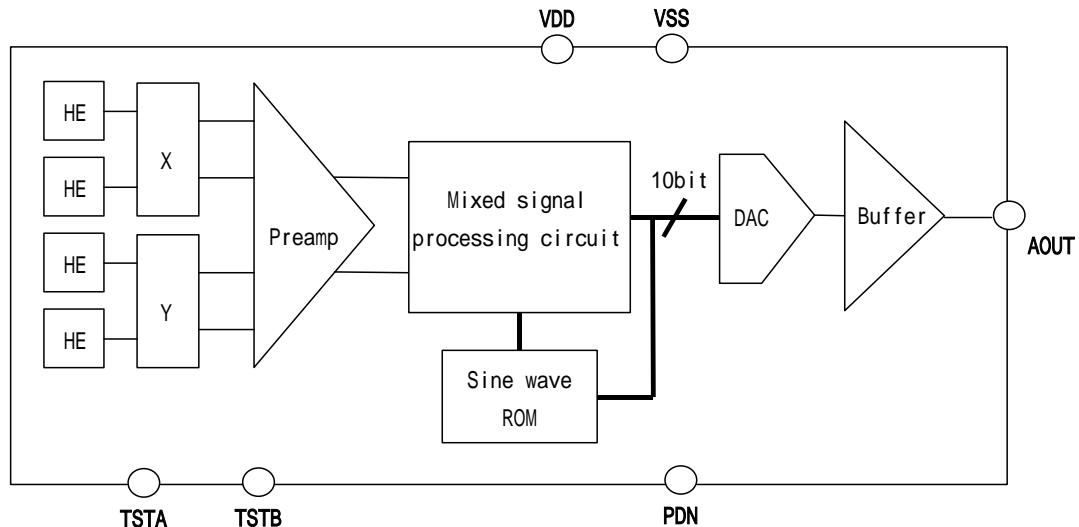
- Contact-less Angle Sensor function can be realized by small magnet and EM-3242
- Extremely small Temperature drift
- Super small package
- 3V single power supply



### ◆ Outline

EM3242 outputs analogue voltage proportionate to the angle, by the processing the Hall output which can be obtained from the plural Hall Elements formed on the silicon chip. Just by pairing the small magnet and EM3242, you can make up the contact-less angle sensor function which corresponds to 360degrees angle range. There are no particular restrictions on the magnet which fits together with EM-3242, and there is few change in the output voltage level or in the angle errors due to the temperature dependence of the magnet.

### ◆ Block Diagram



### ◆ Absolute Maximum Ratings

Symbol	Parameter	Min.	Max.	Unit	Notes
$V_{DD}$	Supply Voltage	-0.3	6.5	V	
$V_{IN}$	Input Voltage	0	$V_{DD} + 0.3$	V	PDN terminal
$T_S$	Storage Temperature Range	-55	125	°C	

### ◆ Recommended Operating Conditions

Symbol	Parameter	Min.	Typ.	Max.	Unit	Notes
$V_{DD}$	Supply Voltage	2.7	3.0	3.3	V	
$T_A$	Operating Temperature Range	-30		85	°C	

## ◆ Electrical & Magnetic Specifications

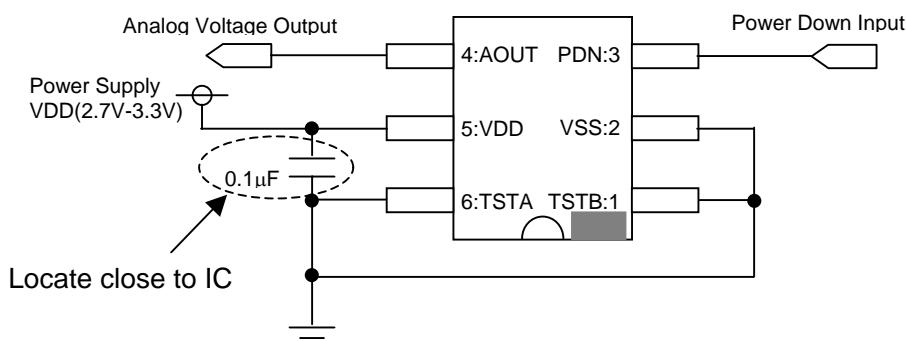
Condition is;  $T_a=25^\circ C$ ,  $V_{DD}=3V$  if particular notes are not defined.

Symbol	Parameter	Min.	Typ.	Max.	Unit	Notes
$B_{RANGE}$	Detectable Magnetic Field Range	20	30	40	mT	
$A_{RANGE}$	Detectable angle range	0		360	Deg.	
$A_{PREC}$	Angle error	-6.0		6.0	Deg.	
$A_{RES}$	Angle resolution		0.36		Deg.	*2
$A_{TD}$	Angle temperature drift		$\pm 1$		Deg.	$@-30 \sim 85^\circ C$ *1
INL	INL of output voltage			TBD		*2
$T_{OUT}$	Angle output cycle		40		$\mu s$	A/D Conversion Cycle
$T_d$	Signal delay time		140	180	$\mu s$	*2
$V_{out(min.)}$	Minimum Output Voltage	$0.095V_{DD}$	$0.1V_{DD}$	$0.105V_{DD}$	V	$@0^\circ$ deg.
$V_{out(max.)}$	Maximum Output Voltage	$0.895V_{DD}$	$0.9V_{DD}$	$0.905V_{DD}$	V	$@359.64^\circ$ deg.
$I_{SUP}$	Consumption Current		8	12	mA	While driving Sensor
$I_{PD}$				1	$\mu A$	While Power Down
$T_{PD}$	Start up time		680	850	$\mu s$	PDN:L H
$I_{OUT}$	Output Current	-0.3		0.3	mA	
$C_L$	Load Capability			200	pF	*2

\*1) Based on Ambient Temperature = 25

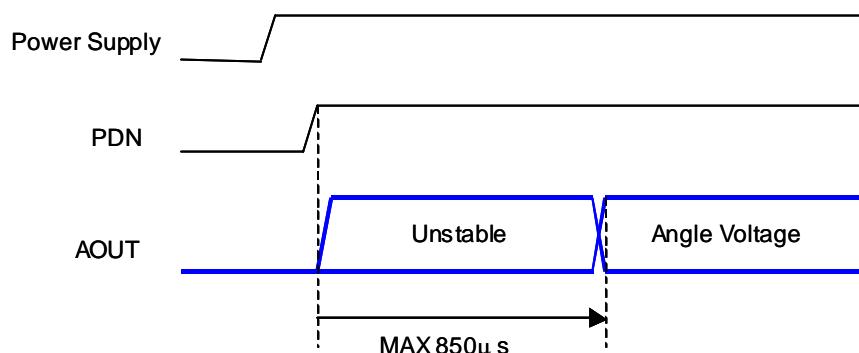
\*2) This is a design assurance parameter. And this parameter will not be inspected in mass production.

## ◆ Application Circuit (Example)



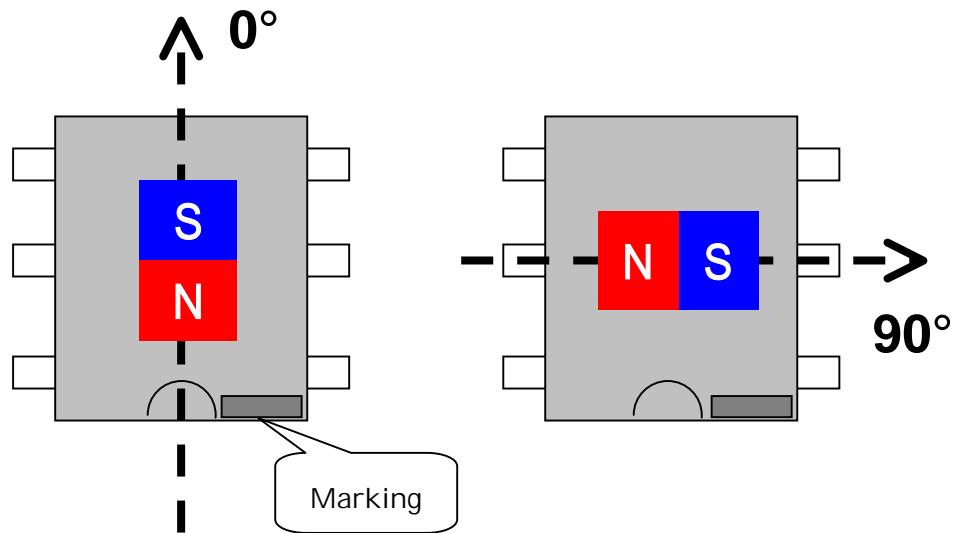
\*Bypass capacitor must be inserted between VDD and VSS.

## ◆ Output Timing

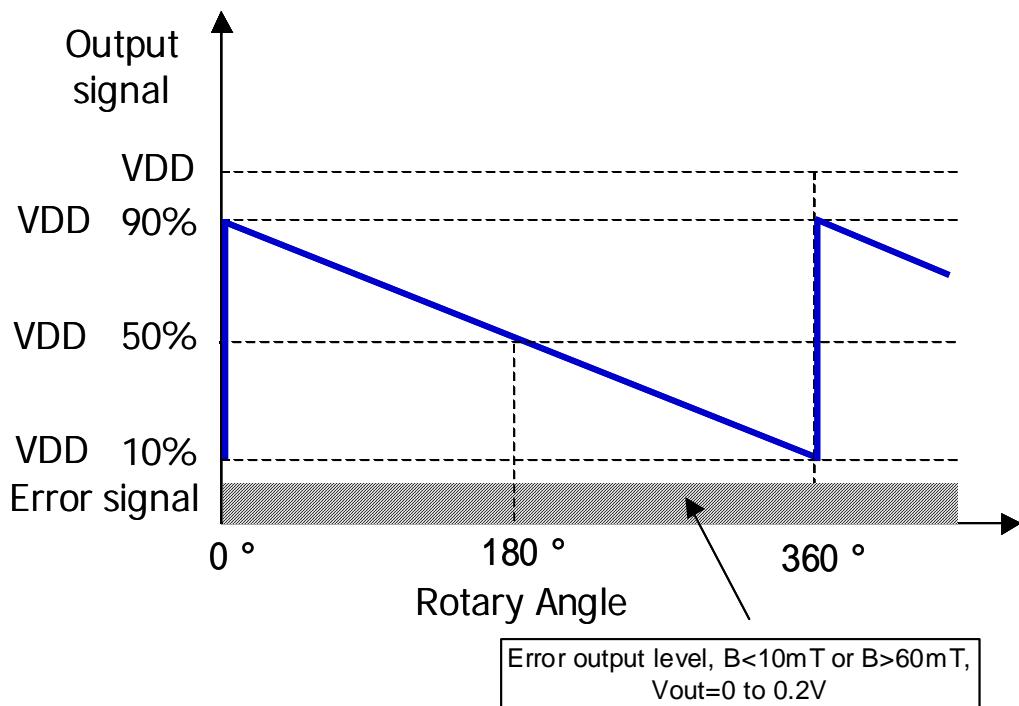


- 1) Please be noted that there is a certain period that the angle output voltage is unstable when EM3242 goes to the operation from power down (PDN) mode, as shown above.
- 2) "Power Up Voltage" should be applied to PDN pin after applying "Power Supply Voltage" to VDD pin.

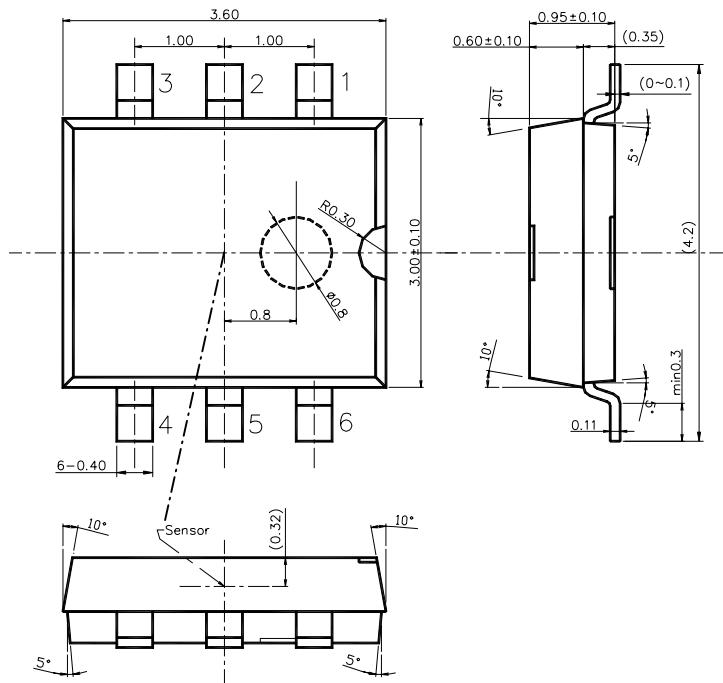
## Magnet Direction and Output Voltage



Marking side defines the N polar as  $0^\circ$ , the Output Voltage (AOUT) decreases as the magnet rotates clockwise.



## Package and Terminals



Material of the terminals; Cu

Material of the plating; Sn

\*This product is a Pb-Free Product.

Terminal Number	Terminal Name	Explanation
1	TSTB	This is an IC-Test terminal. Normally, this terminal should be connected with Ground.
2	VSS	This is a Ground Terminal.
3	PDN	This is a Power Down terminal. EM3242 goes to Active when PDN=H, and goes to PDN mode when PDN=L.
4	AOUT	This is a Sensor Output Terminal.
5	VDD	This is a Power Supply terminal. 0.1 $\mu$ F of ceramic capacitor should be connected between this terminal and GND terminal.
6	TESTA	This is an IC-Test terminal. Normally, this terminal should be connected with Ground.

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