

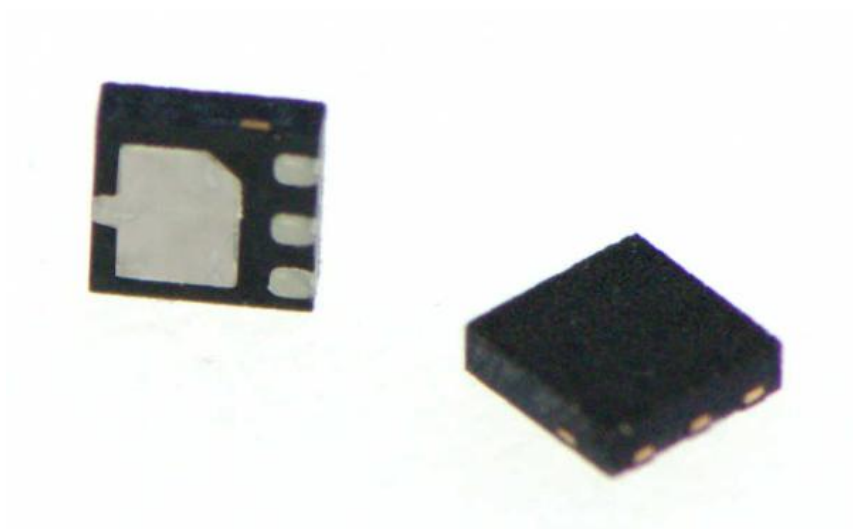
Product Data Sheet

Angle sensor chip

Product Series: BBT-A908D16E9 angle sensors

Part Number: BBT-A908D16E9

Version: Ver 1.0



CONTENTS

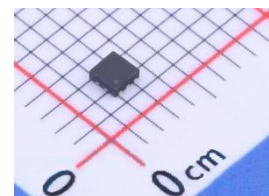
1. General Description	3
2. Key Features	3
3. Typical Application	3
4. Absolute Maximum Parameters	3
5. Magnetic Data	3
6. Electrical Characteristics	4
7. Internal circuit and Pin direction	5
8. Typical output curve	5
9. Package information	6
10. Product packaging (BBT-A908D16E9)	8
11. Reflow Profile (Reference)	9

1. General Description

BBT-A908 angle sensor is Tunneling Magneto Resistance (TMR) sensor which consists of 1 Wheatstone bridges in a package. BBT-A908 is a magnetic angle sensor to detect magnetic direction change. The Wheatstone bridge has two single ended outputs. The phase difference between the two sinusoidal outputs is 90 degrees. The sensor can detect changes in the direction of the magnetic field in 360 degrees.

2. Key Features

- Magnetic angle sensor, employing the TMR effect.
- Compatible with a wide range of supply voltages
- Superior temperature stability
- 2 half bridges (sin/cos analogue output) in a package.
- High output signal without amplifier.
- DFN packages with dimensions of DFN 1.6x1.6~4L mm.



3. Typical Application

- Rotary angle detection in mobile / OA equipment.
- Robot arm rotation angle detection.

4. Absolute Maximum Parameters

Parameter	Symbol	Limit value	unit
Supply voltage	Vcc	5.5	V
ESD (Human Body Model).	ESD(HBM)	2	kV
ESD (CDM)	ESD (CDM)	0.5	kV
External magnetic field strength	H _{ext}	130	mT
Storage temperature	T _{stg}	-40 ~ +125	°C
Operating temperature	T _{opt}	-30 ~ +125	°C
Reflow temperature	T _{reflow}	260	°C

Remark: When the operating conditions of the product exceed the limit parameters, it may cause irreparable damage to the product. Working at the limit parameters for a long time may lead to a decline in product performance and product reliability.

5. Magnetic Data

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Magnetic field	H _{ext}	20		100	mT	In-plane field only

6. Electrical Characteristics

Conditions (unless otherwise noted): $V_{cc} = 1\text{ V}$; $H_{ext} = 50\text{ mT}$; $T_{opt} = 25^\circ\text{C}$.

Parameter	Symbol	Conditions	Min	Typ	Max	Unit	Remarks
Operating voltage	V_{cc}		—	1	5.5	V	
Bridge resistance	R_s		2	—	10	kOhm	V_{cc} -Gnd
Output voltage peak to peak amplitude	V_{pp1} / V_{pp2}		250	320	390	mV/V	1)
Mid Point Voltage	Offset1 /Offset2		450	500	550	mV/V	2)
Difference between the mid voltages of two outputs	offset		-15	—	15	mV/V	3)
Resistance Temp.Coefficient	TC_R	$T_L=25^\circ\text{C}$ $T_H=65^\circ\text{C}$	—	-0.05	—	%/K	4)
Amplitude Temp.Coefficient	$TC_{V_{pp1}}$ / $TC_{V_{pp2}}$	$T_L=25^\circ\text{C}$ $T_H=65^\circ\text{C}$	—	-0.09	—	%/K	5)

Remark:

1) The output difference between maximum voltage and minimum voltage (Such as fig1: V_{pp1} or V_{pp2}).

2) The average value of the maximum voltage and the minimum voltage (Such as fig1: $\frac{V_{max}+V_{min}}{2}$).

3) Offset=Offset1-Offset2

$$4) TC_R = \frac{[R_{s_{65^\circ\text{C}}} - R_{s_{25^\circ\text{C}}}]}{R_{s_{25^\circ\text{C}}} * [65 - 25]}$$

$$5) TC_{V_{pp1}} = \frac{[V_{pp1_{65^\circ\text{C}}} - V_{pp1_{25^\circ\text{C}}}]}{V_{pp1_{25^\circ\text{C}}} * [65 - 25]}, TC_{V_{pp2}} = \frac{[V_{pp2_{65^\circ\text{C}}} - V_{pp2_{25^\circ\text{C}}}]}{V_{pp2_{25^\circ\text{C}}} * [65 - 25]}$$

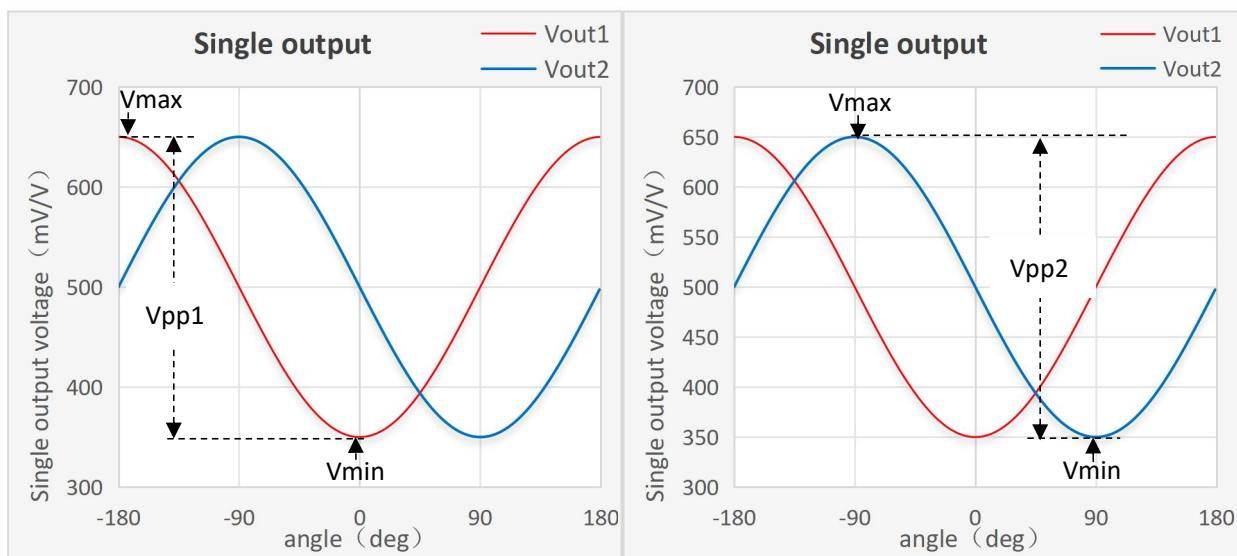


Fig. 1 explanation of amplitude and offset definition. The scale in the figure has been exaggerated to make the signals easier to see.

7. Internal circuit and Pin direction

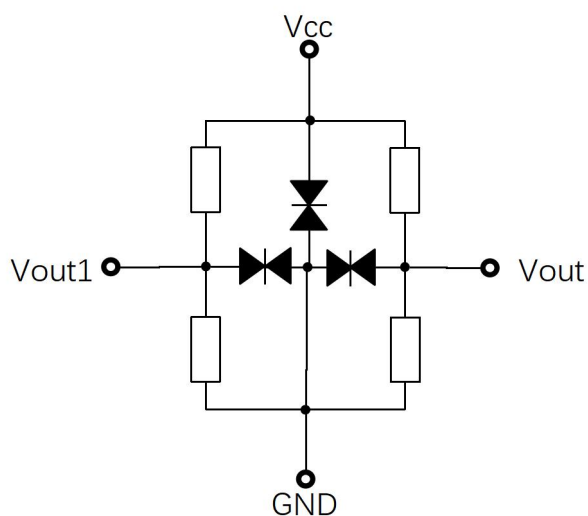


Fig. 2 Schematic diagram of the circuit of the sensor.

8. Typical output curve

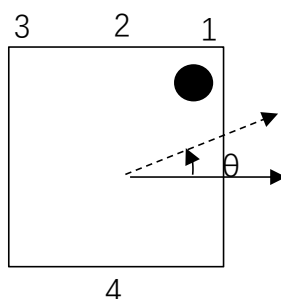


Fig. 3 Angle and magnetic field detection direction

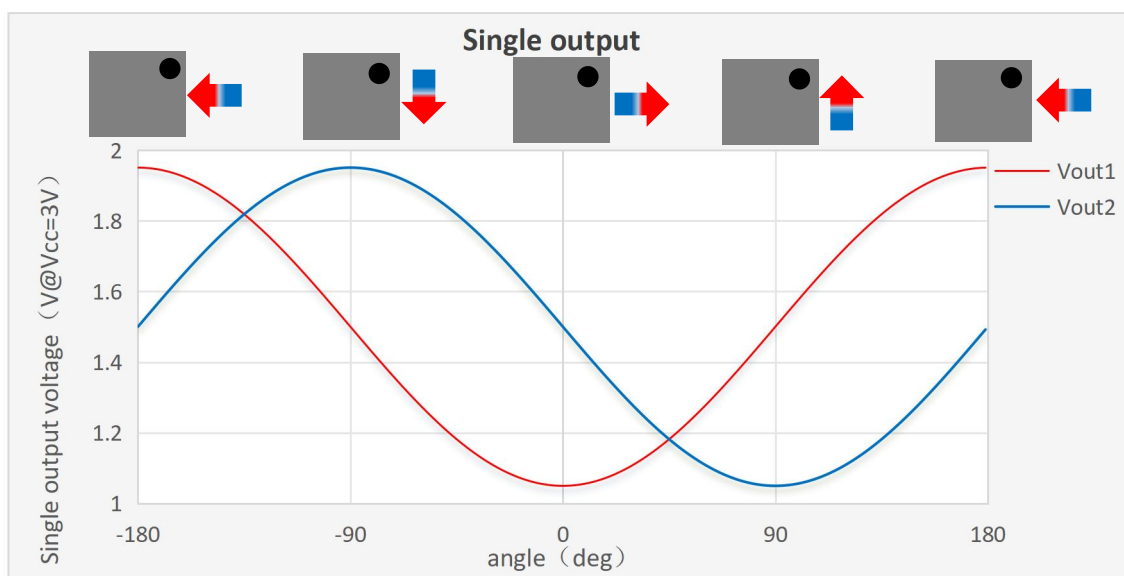
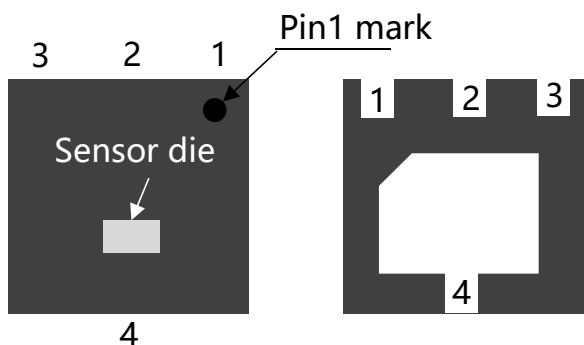


Fig. 4 Output signals of Vout1 and Vout2.

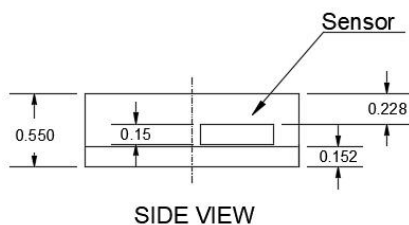
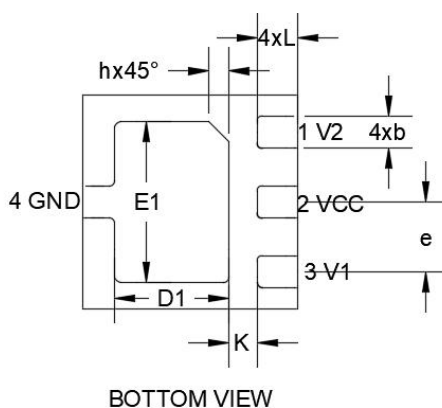
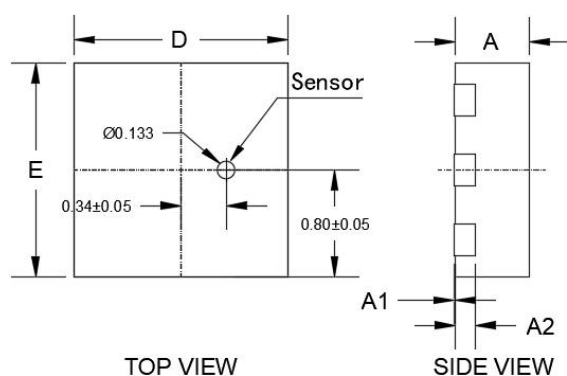
9. Package information

9.1. Pin configuration & Pin description



Symbol	Function
Vout1	Analog sinusoidal output, 90 degrees of phase different from Vout1
Vcc	Supply voltage
Vout2	Analog sinusoidal output
Gnd	Ground

9.2. Package Dimension & Sensing Area



COMMON DIMENSIONS (UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	0.500	-	0.600
A1	0.000	-	0.050
A2	0.152REF		
b	0.190	-	0.290
D	1.500	-	1.700
E	1.500	-	1.700
D1	0.750	-	0.950
E1	1.100	-	1.300
e	-	0.520BSC	-
h	0.100	-	0.200
L	0.250	-	0.350
k	0.160	-	0.260

Fig.5 Outline package diagram of BBT-A908D16E9 series sensor (unit: mm)

10. Product packaging

Item	Spec	Remark
Reel	7 inch	Fig.10
Carrier width	8 mm	Fig.10
Leader empty length	400 mm	REF: EIA-481
Trailer empty length	160 mm	REF: EIA-481
Quantity of reel	4000 pcs/ 7" Reel	Full of tape reel
MSL Level	L3	J-STD-020E

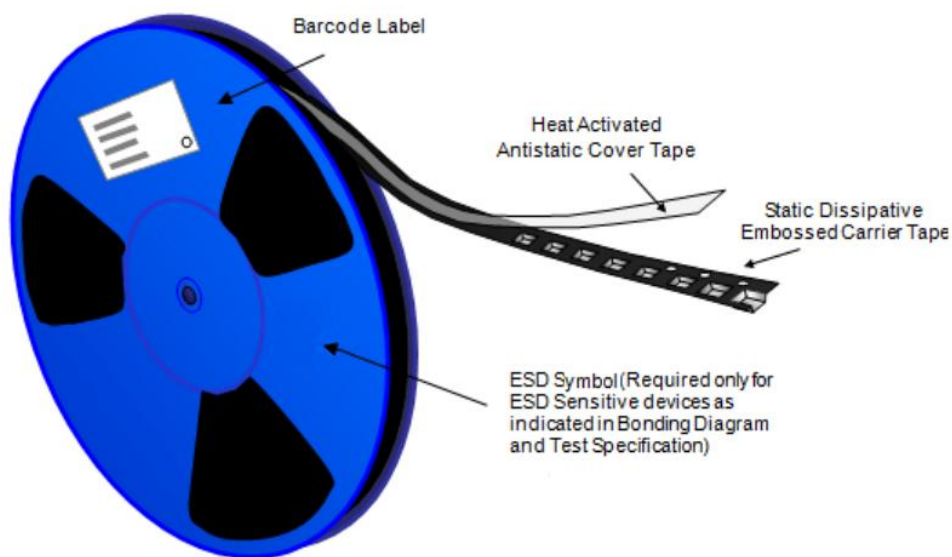


Fig.6 Tape diagram

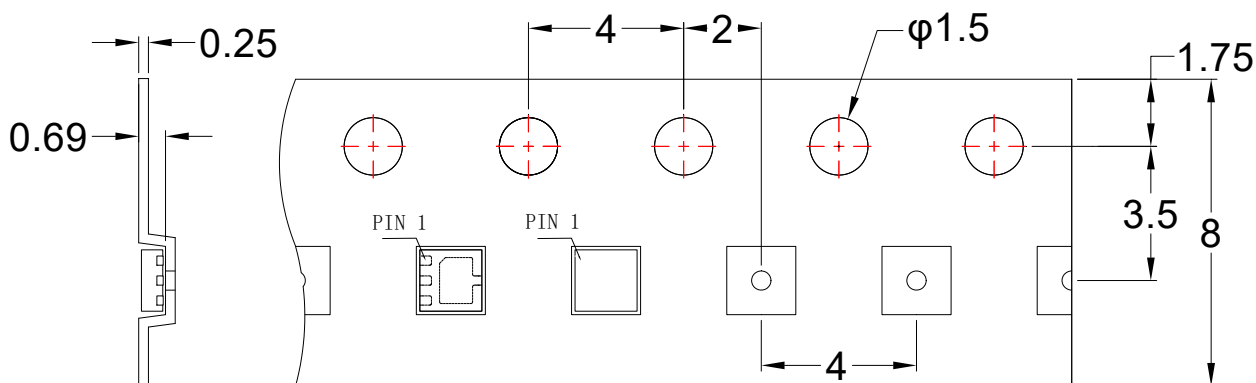
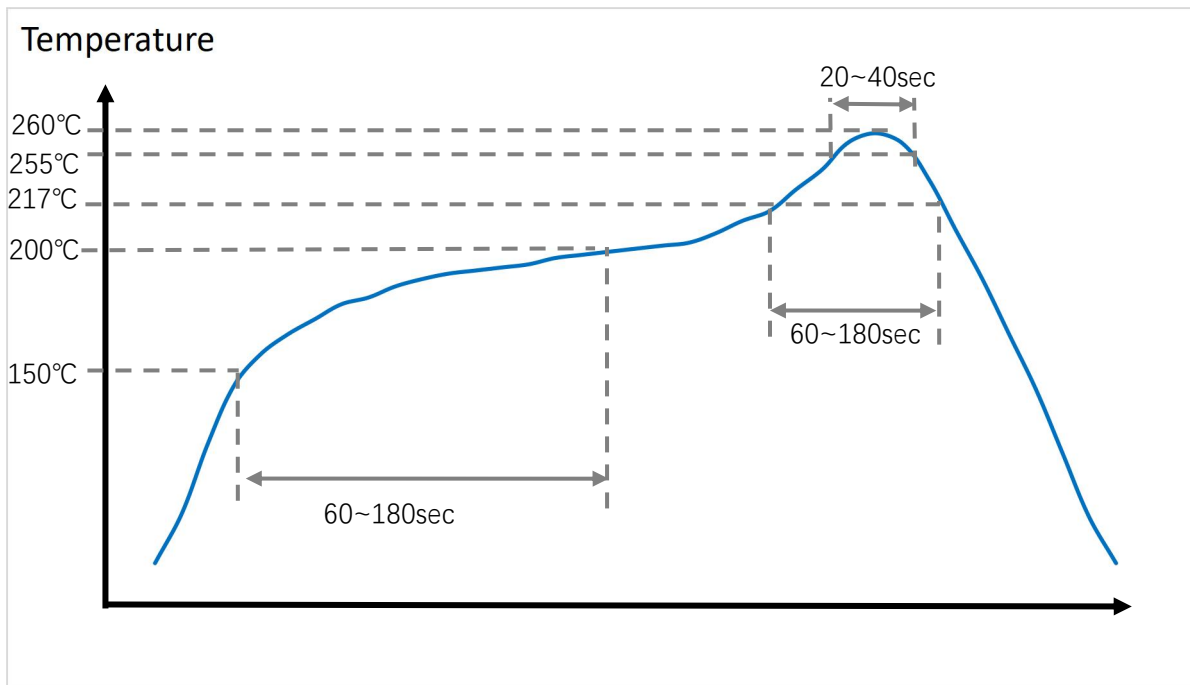


Fig.7 Carrier diagram

11. Reflow Profile (Reference)

Peak Temperature should not exceed 260 degC.

Below Profile is reference only. Please confirm productivity in assembly process.



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