

<h1>Specifications (Preliminary)</h1>

TYPE : AMI302

Spec. No. : Ver. 08

DATE : Dec. 2006

<h2>Approve</h2>

AICHI STEEL CORPORATION			

[1] Adapted Area

This specification covers standards on AMI302 that is delivered to ----- by AICHI STEEL CORPORATION.

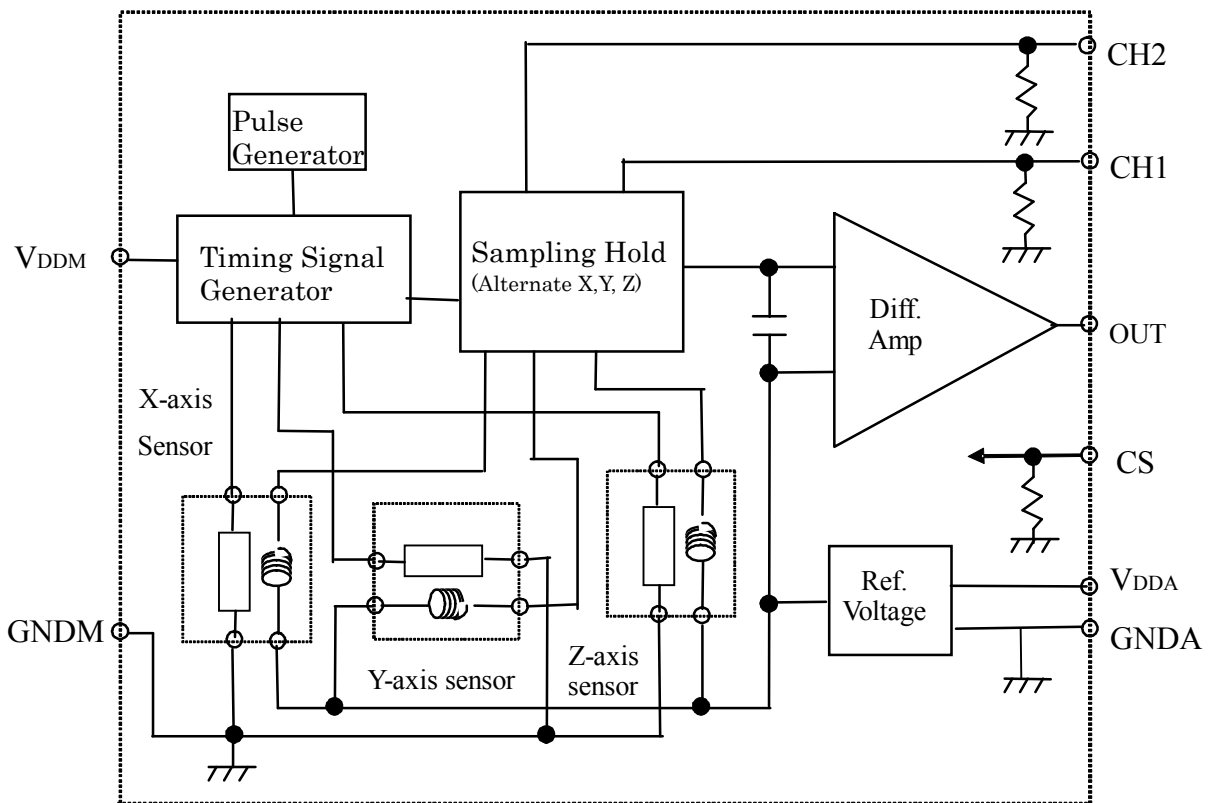
[2] General Description

The AMI302 is a small, three-axis MI sensor IC module that integrates three orthogonal positioned Magneto-Impedance sensors with their controller IC in a single small package to sense three-dimensional magnetic field strengths.

The MI sensor a well-known magnetic field sensor based on the Magneto-Impedance effect of amorphous magnetic wire.

This device outputs X-axis, Y-axis and Z-axis linear analog signals corresponding to X, Y and Z magnetic field strength.

[3] Block Diagram



[4] Terminal Description

Name	Pin No.	I/O	Description	Reference
VDDA	11	Power	Sensor specific power input (+2.60 V to +3.60 V)	Please mount a bypass capacitor between VDDA and GNDA, VDDM and GNDM
VDDM	7	Power	Sensor power current monitor terminal	
GNDA	12	Power	Sensor specific ground	
GNDM	6	Power	Sensor power current monitor terminal	
OUT	1	Output	Linear DC output proportional to magnetic fields	
CS	10	Input	Chip standby	
CH2	9	Input	X axis / Y axis / Z axis output switching	
CH1	8	Input		
NC	2,3,4,5	-	Non-Connection	

[5] Absolute Maximum Ratings

Parameter	Symbol	Ratings	Unit
Supply Voltage	VDD	-0.3 to +6.5	V
Storage Temperature	TSTG	-40 to +125	°C
Input Voltage	VIN	-0.3V to VDD+0.3	V

[6] Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit
Supply Voltage	VDD	2.60	3.00	3.60	V
Operation Temperature	TOPR	-20	—	+85	°C

[7] Electrical Characteristics

(Operating Conditions : Ta= +25 °C 、VDD= +3.00V 、10 μ F ceramic capacitor between VDD and GND)

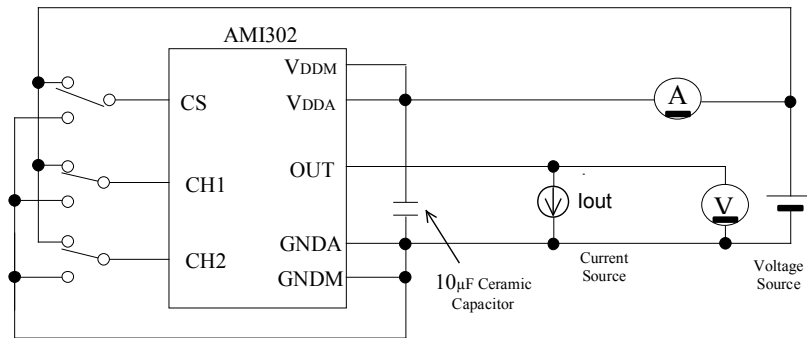
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Output Voltage	VO1	IO1 = +10μA, +1.0mT	2.7	—	—	V
	VO2	IO2 = -10μA, -1.0mT	—	—	0.03	V
Operating current	I _{DD1}	CS= "H"	—	2.3	3.0	mA
	I _{DD2}	CS= open , CH1 = open, CH2 = open	—	—	1	μA
High Level Voltage Input	VH	For CH1, CH2 and CS	80% VDD	—	—	V
Low Level Voltage Input	VL	For CH1, CH2 and CS	—	—	20% VDD	V
Input Resistance	RIN	CH to GND , CS to GND	—	2	—	Mohm

[8] Magnetic Characteristics

(Operating Conditions : Ta= +25 °C 、VDD= +3.00V 、10 μ F ceramic capacitor between VDD and GND)

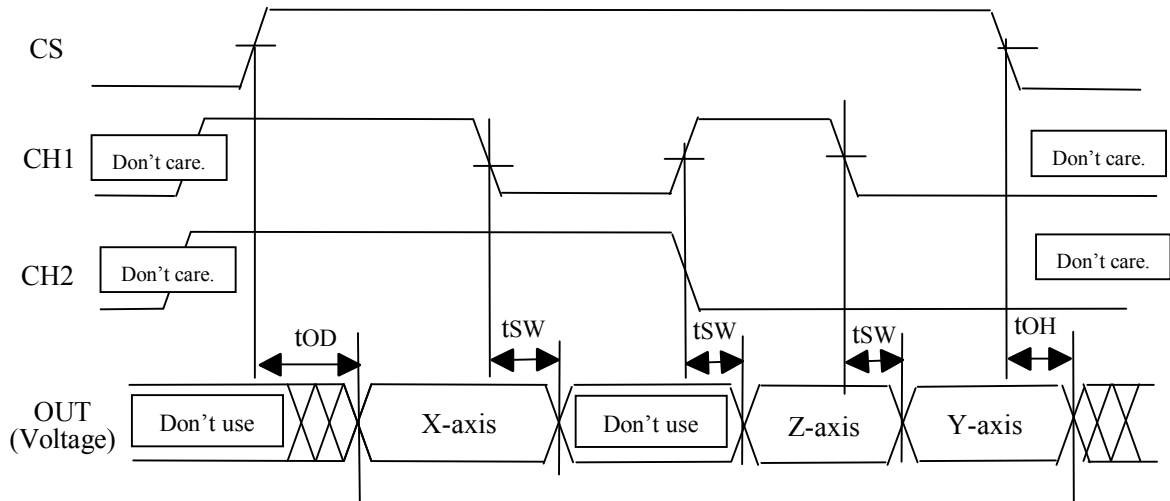
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Dynamic Range	Rm	CS = "H"	±0.2	—	—	mT
Linearity	Lin	CS = "H", within ±0.2mT	—	1.6	—	%FS
Output Offset Voltage at Zero Gauss	Vofs	CS = "H"	800	1500	1900	mV
Sensitivity	deltaV	CS = "H"	1.6	2.4	3.8	mV /μT
Frequency Range of Magnetic field	Fr	CS = "H"	—	—	1	kHz

[9] Test Circuit



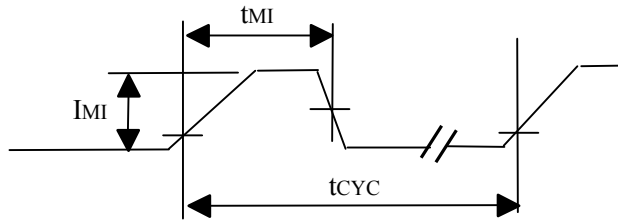
[10] Timing Chart

10-1. OUT pin control



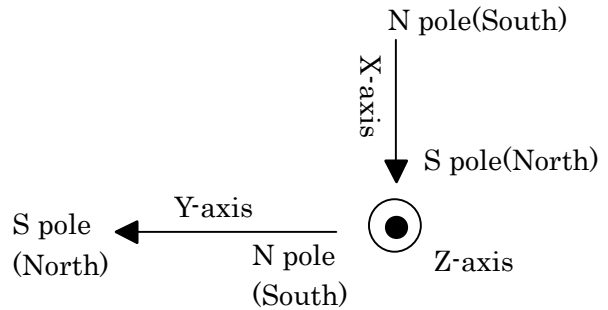
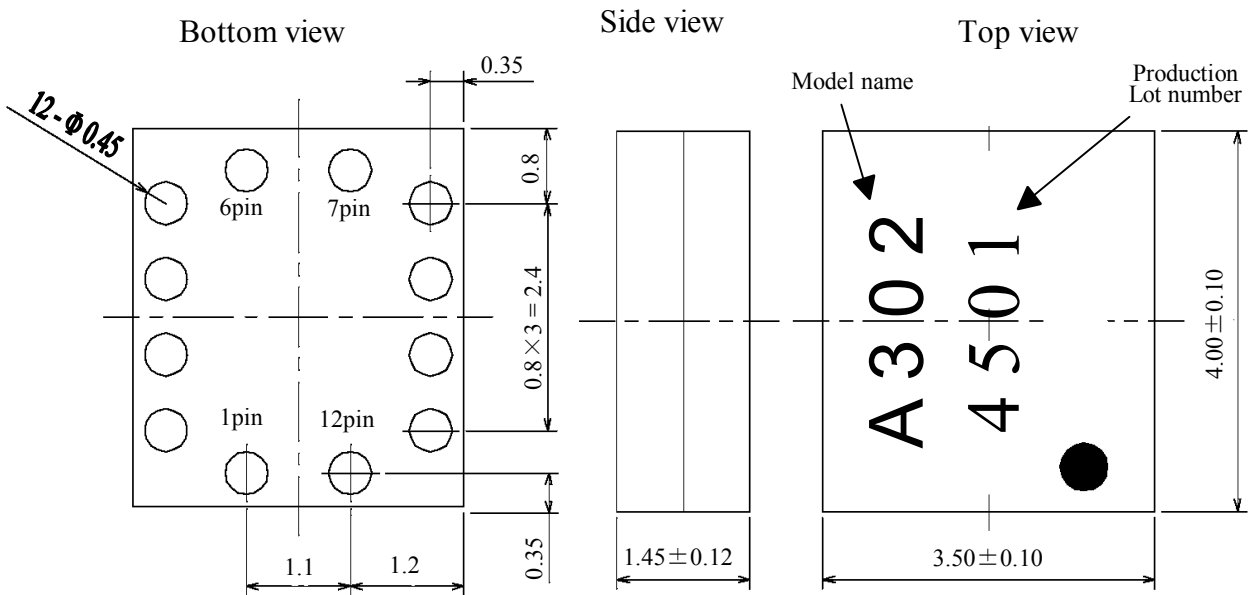
Parameter	Symbol	Min.	Max.	Unit
CSW to active output delay	tOD	—	1.0	ms
CH to OUT switch delay	tSW	—	1.0	ms
Output hold time	tOH	—	0	ns

10-2. Through Current of MI sensor



Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Sensor Current Time	t _{MI}		—	40	—	ns
Sensor Current	I _{MI}	VDD= +3.00 V	—	200	—	mA
Sensor Current cycle	t _{CYC}		—	5000	—	ns

[11] Dimensions and Marking Layout (Unit:mm)



(The arrows indicate the direction of magnetic field yielding positive output voltage)

[12] Reliability

No.	Test Item	Test Method [Based on EIAJ ED-4701]	*1. Prepara tion	Duration	Judgement
1	High temperature storage	Ta= +125°C	----	1000 hours	Satisfies [7] Electrical Characteristics and [8] Magnetic Characteristics after testing
2	Low temperature storage	Ta= - 40°C	----	1000 hours	
3	Temperature humidity storage	Ta= +85°C , RH= 85%	1) + 2)	1000 hours	
4	High temperature bias	Ta= +85°C , VDD= +3.6V	----	1000 hours	
5	Temperature humidity bias	Ta= +85°C , RH= 85% , VDD= +3.6V	1) + 2)	1000 hours	
6	Temperature cycle (air)	- 40°C ↔ +125°C (30min – 5min – 30min)	1) + 2)	100 cycles	
7	Thermal shock (liquid)	- 40°C ↔ +125°C (5min – 10sec – 5min)	1) + 2)	100 cycles	
8	USPCT	Ta= +125°C, RH= 85%, 2 x 10 ⁵ Pa	1) + 2)	100 hours	
9	Solder heat resistance	Infrared reflow (See below : high temp reflow peak less than 260°C)	1)	2 times	
10	ESD sensitivity 1	C= 200pF ,R= 0 ohm , ± 150V (Min.)	----	5 times	
	ESD sensitivity 2	C= 100pF ,R= 1.5k ohm , ± 1kV (Min.)	----	3 times	
11	Latch up	C= 200pF ,R= 0 ohm , ± 150V (Min.)	----	1 time	
12	Solderability	Ta= +235°C	----	3 seconds	Covered with solder more than 95% of the dipped portion of the terminal.

*1. Preparation (based on EIAJ ED4701-2 B101A)

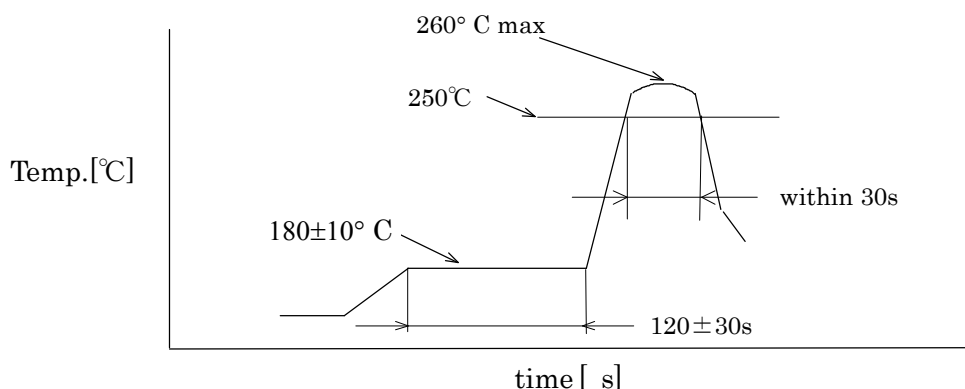
The following preparations, related to moisture during storage and heat stress during mounting, were carried out prior to the abovementioned test items as noted in the preparation column.

1) Saturation humidification treatment

(Ta= +85°C, RH= 30%, t= 168 hours → Ta= +30°C , RH= 70% ,t= 168 hours)

2) IR Reflow (twice)

IR Reflow heat conditions



[13] Notes

- 1) This device uses a C-MOS IC. Please take precautions to prevent damage due to electrostatic discharge.
- 2) We recommend placing a capacitor (capacity more than 10 μ F) between VDD and GND to keep stable operation.
- 3) The writing pattern to VDD and GND should be as wide as possible so as to reduce the high frequency impedance.
- 4) Storage (Moisture Proof Packaging)
 - ① Please do not leave the device in the following environments:
 - * High temperature and high humidity
 - * Places with direct sun light
 - * Places with extreme temperature changes
 - * Dusty places
 - * In corrosive gas
 - ② Recommended storage temperature and humidity:
 - * +5 $^{\circ}$ C \sim +30 $^{\circ}$ C, below 70%RH, please use device within one year.
- 5) Usage after Opening the Moisture Proofed Packaging
 - ① After opening the moisture proof packaging, please store device in a temperature range of +5 $^{\circ}$ C \sim +30 $^{\circ}$ C and humidity conditions below 70%RH. Apply device within 7 days.
However, we recommend keeping the device in a moisture proof storage (+5 $^{\circ}$ C \sim +30 $^{\circ}$ C, below 30%RH).
 - ② In case 7 days have exceeded after opening, please keep in a moisture proof storage (+5 $^{\circ}$ C \sim +30 $^{\circ}$ C, below 30%RH). Apply device within 14 days.
 - ③ However, we recommend using the device directly after the first opening.