



- High Accuracy
- Broad Bandwidth
- Low Zero-drift

Shenzhen Hangzhi Precision Electronics Co., Ltd.

**Product Model:** BMS300  
**Measurement Range:** DC±300A  
**Accuracy:** 0.5%

## BMS300 Automotive Current Transducer

BMS300 fluxgate transducer is made of an excitation magnetic ring and a control circuit. Under normal conditions, the control circuit generates a fixed excitation current frequency to alternately place the magnetic core at the maximum saturation point. When the measured current flows, the primary current is measured by detecting the symmetry of the saturation point.

The multi-point zero-flux technology system secures the high accuracy by utilizing the technology combination of exciting magnetic flux closed-loop control, self-excited magnetic flux gate and multi-closed-loop control that realizes the closed-loop control between excitation magnetic flux and AC/DC magnetic flux generated by primary current, while the high-frequency ripple sensing channel allows the sensor to have the high performance over the full bandwidth range.

### Product photo





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## Introduction

The BMS series is suitable for battery monitoring systems that require high accuracy and low offset. It can realize the isolation measurement between the primary current (high voltage) and the secondary current (12V system).

## Key Technologies

- ◇ Excitation closed-loop control technology
- ◇ Self-excitation demagnetization technology
- ◇ Temperature control compensation technology
- ◇ Unipolar + 12V battery power supply
- ◇ Output signal: CAN (500kbps)

## Features

- ◇ Using fluxgate technology
- ◇ Unlimited over-current capability
- ◇ Panel mounting
- ◇ Optional internal digital low-pass frequency filter
- ◇ Optional CAN speed and model

## Special features

- ◇ Connector type: Tyco AMP 1473672-1
- ◇ Full galvanic isolation

## Advantage

- ◇ The error is compensated below 10mA
- ◇ High accuracy
  - 0.1% error at room temperature (nominal)
  - 0.5% error within the temperature range ( $\pm 3\sigma$ )

## Application Domain

- ◇ Hybrid and electric vehicle battery pack
- ◇ Accurate current measurement for battery management applications (SOC, SOH, SOF etc.)
- ◇ Conventional lead-acid batteries

## Electrical Performance

Parameter	Symbol	Measuring Conditions	Min	Typ	Max	Unit
Load dump over-voltage	$U_C$	400ms	—	32	—	V
Over-voltage	$U_C$	1 minute	—	24	—	V
Reverse polarity	$U_C$	1 minute	—	-16	—	V
Minimum supply voltage	$U_C$	Continuous	—	6	—	V
Maximum supply voltage	$U_C$	Continuous	—	18	—	V
Static electricity withstand voltage	$U_{ESD}$		—	4	—	KV
Creepage distance	$d_{CP}$		—	7.2	—	mm
Clearance	$d_{CI}$		—	6.95	—	mm
RMS voltage for AC insulation test	$U_d$	50Hz, 1 minute	—	2.5	—	KV
Insulation resistance	$R_{is}$	500V-ISO 16750-2	—	500	—	MΩ



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## Operating characteristics in nominal range

Parameter	Symbol	Measuring Conditions	Min	Typ	Max	Unit
<b>Electrical Data</b>						
Primary DC current	$I_{PM}$		-350		350	A
Supply voltage	$U_c$	full precision	8	13.5	16	V
Current consumption @ $I_P=0A$	$I_c$	@ $U_c=13.5V@25^{\circ}C$		40		mA
Current consumption @ $I_P=350A$	$I_c$	@ $U_c=13.5V@25^{\circ}C$		100		mA
<b>Performance Data</b>						
linearity error	$\epsilon_L$	within temperature range	-0.1		0.1	%
Offset current@ $I_P=0A$	$I_o$	Max/Min @ $3\sigma$ ; 8V to 16V; -40°C to 105°C	-10		10	mA
Overall accuracy @ $I_P=\pm 350A$	$X_G$	Max/Min @ $3\sigma$ ; 8V to 16V; -40°C to 105°C	-1750		1750	mA

## General Characteristics

Parameter	Symbol	Measuring Conditions	Min	Typ	Max	Unit
Ambient operating temperature	$T_A$	Guaranteed accuracy $\pm 3\sigma$ temperature range	-40	—	+85	°C
Mass	M	—		67		g



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## CAN Output Specification

CAN Interface characteristics:

- ◇ CAN protocol 2.0B Version
- ◇ Bit order: big endian (Motorola)
- ◇ CAN oscillator tolerance: 0.27%
- ◇ No sleep mode capacity
- ◇ 120Ω termination resistor to be added externally, internal CAN impedance = 4.8kΩ

Message Description	CAN ID	Name	Data Length (Nb byte)	Type of frame	Message launch type	Message launch type	Signal Description	Start bit	End bit
Return Current I <sub>P</sub> (mA)	View selection table	BMS300_I <sub>P</sub>	8	Standard	Cyclic message every 10 ±1ms	I <sub>P</sub> Value: 80000000H=0mA 7FFFFFFFH=1mA 80000001H=1mA	IP_Value	24	32
						Error Info 0=Normal, 1=Failed	Error_Indication	32	1
						CSM-FAIL	Error_Info	33	7
						sensor information	SW_Revision	56	24

CAN frame content									
	BIT7	BIT 6	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1	BIT 0	
BYTE 0	IP_VALUE								
	MSB 7	6	5	4	3	2	1	0	
BYTE 1	IP_VALUE								
	15	14	13	12	11	10	9	8	
BYTE 2	IP_VALUE								
	23	22	21	20	19	18	17	16	
BYTE 3	IP_VALUE								
	31	30	29	28	27	26	25	LSB 24	
BYTE 4	ERROR_INFO							ERROR_INDICATION	
	MSB 39	38	37	36	35	34	LSB 33	32	
BYTE 5	SENSOR_INFO								
	MSB 47	46	45	44	43	42	41	40	
BYTE 6	SENSOR_INFO								
	55	54	53	52	51	50	49	48	
BYTE 7	SENSOR_INFO								
	63	62	61	60	59	58	57	LSB 56	



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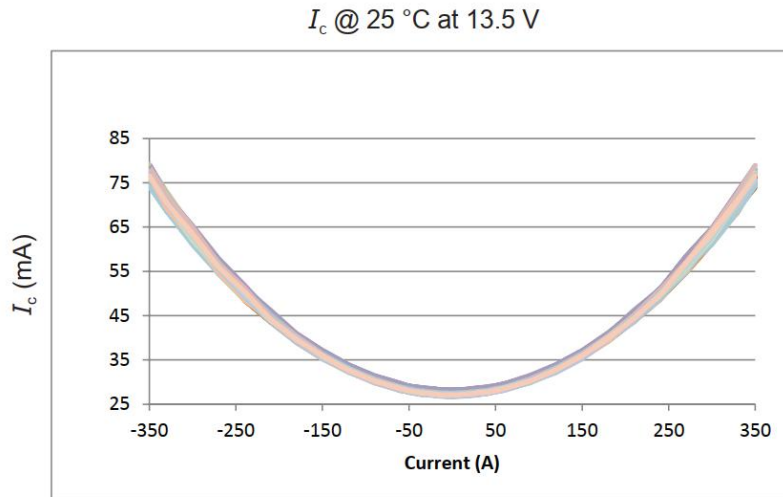
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## Error Management (DTC)

Failure Mode	I <sub>P</sub> Value	Error Indicatoin	Error Information
FLASH CRC error	FFFF FFFF	1	0x41
Excitation frequency is too high (<2.5kHz) for more than 10 milliseconds	FFFF FFFF	1	0x42
Fluxgate does not oscillate for more than 20 milliseconds	FFFF FFFF	1	0x43
Safe mode	FFFF FFFF	1	0x44
Invalid data for more than 100 milliseconds	FFFF FFFF	1	0x46
Supply voltage out of range	FFFF FFFF	1	0x47

## Accuracy curve





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## BMS300 Test table

Test	Test standard	Procedure
<b>Environmental Test</b>		
Low temperature operating endurance	ISO16750-4	120hours, -40°C, power on
High temperature operating endurance	ISO16750-4	120hours, 85°C, power on.
Powered thermal cycle endurance	ISO16750-4	540cycles (936hours) , -40°C (20 min) , +85°C (20 min) , slope 4°C/min
Thermal shock	ISO 16750-4	-40°C (20 min soak) /85°C (20 min soak) , 1000 cycles, with connectors => 667 h (28 days)
Thermal humidity cycle	ISO 16750-4	240 hours, -10°C/+65°C, humidity 93% , Not powered on
High temperature and humidity endurance	JESD 22-A101	85°C, humidity 85%, 1000 hours
Vibration	ISO 16750-3	Test IV, -40°C/+85C, 8 hours (Figure 1), rotation speed and acceleration 27.1 m/s <sup>2</sup> , 20 h/axis, 3 axes+, power on and monitor output
Mechanical shock	ISO16750-3	500m/s <sup>2</sup> , 10 times in each direction (60 in total), half-sine pulse
Handling drop	ISO16750-3	There are 2 landing points in each direction, 3 axes, a total of 6 landing points, 1 meter away from the concrete floor
Dust (and other solid intrusion)	ISO20653	IP category: 4
Water intrusion	DIN 40050-9	IP category: 2
Mixed flowing gas	IEC60068-2-60	Method 4 in Table 1. H <sub>2</sub> S, NO <sub>2</sub> , Cl <sub>2</sub> , SO <sub>2</sub> , 25±1°C, RH 75±3%, 21 days
Salt fog	ISO16750-4	Concentration 50 g/L. Cycle: salt spray for 4 hours, 60°C < 30% RH, dry for 2 hours, wet at 50°C 95% RH for 2 hours, 110 cycles



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Test	Test standard	Procedure
<b>EMC Test</b>		
Conducted radiation-voltage method	CISPR25	9kHz to 108MHz, level 3
Conducted Radiation-Current Method	CISPR25	20kHz to 108MHz,level 3
Emitting radiation (ALSE)	CISPR25	0.1 MHz to 5 GHz,level 3
Current Injection Crane Interference (BCI)	ISO11452-4	Test Level II and Test Level IV
Transient disturbances along the power supply	ISO7637-2	The basis is ISO7637-2
Anti-radiation field - dark acoustic chamber (ALSE)	ISO 11452-2	Test frequency: 80 MHz-3.2 GHz, test level: 100 V/m 200 V/m
Transient disturbance along I/O	ISO7637-3	Fast Level a: cc - 150v 10 minutes; Fixed b: CCC +100 V 10 minutes, Slow pulse positive: ICC +20 V 20 min; Slow pulse negative: icc - 20v 20 minutes
Anti-static test	ISO10605	Not powered, pin: ±4kv, case: ±8kv, air: ±15 kV and ±30 kV
Electrostatic discharge operation test	ISO10605	Power on, indirect contact discharge: +4 kV ±8 kV ±15 kV ±25 kV, air: ±8 kV ±20 kV
<b>Electrical Test</b>		
DC supply voltage	ISO 16750-2	Follow Code B
Overvoltage	ISO 16750-2	18V, 1 hour, @65°C; 24V, 1 minute, @25°C
Alternating voltage superposition	ISO 16750-2	Severity Level 2: Upp= 4 V; Severity Level 4: Upp= 2 V
Supply voltage rises and falls slowly	ISO 16750-2	Umin= 8 V, 0.5 V/min, running time 10 minutes
Power supply Momentary drop in power	ISO 16750-2	Room temperature, Usmin is 4.5 V
Power supply voltage drop reset	ISO 16750-2	Usmin = 8 V
Reverse voltage	ISO 16750-2	Case 2
Open circuit	ISO 16750-2	Single line/multi-line open circuit
Short circuit protection	ISO 16750-2	Test signal circuit, short circuit voltage Usmax=16V and GND, duration 60 seconds



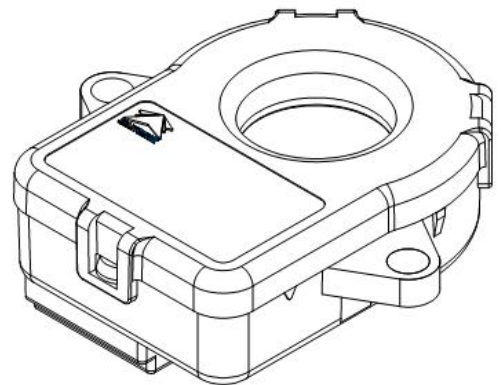
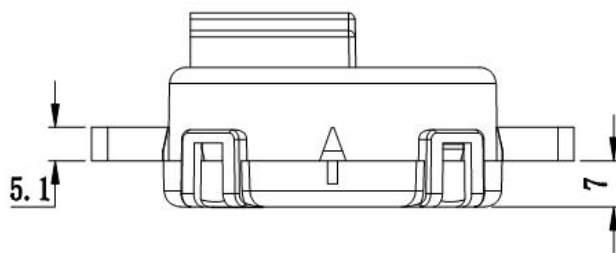
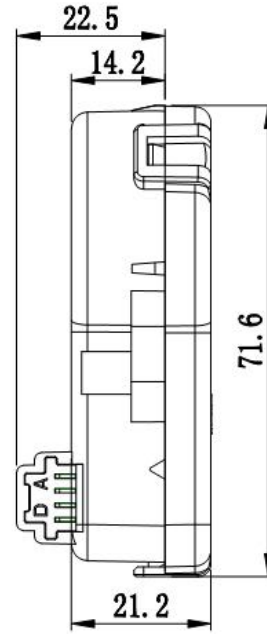
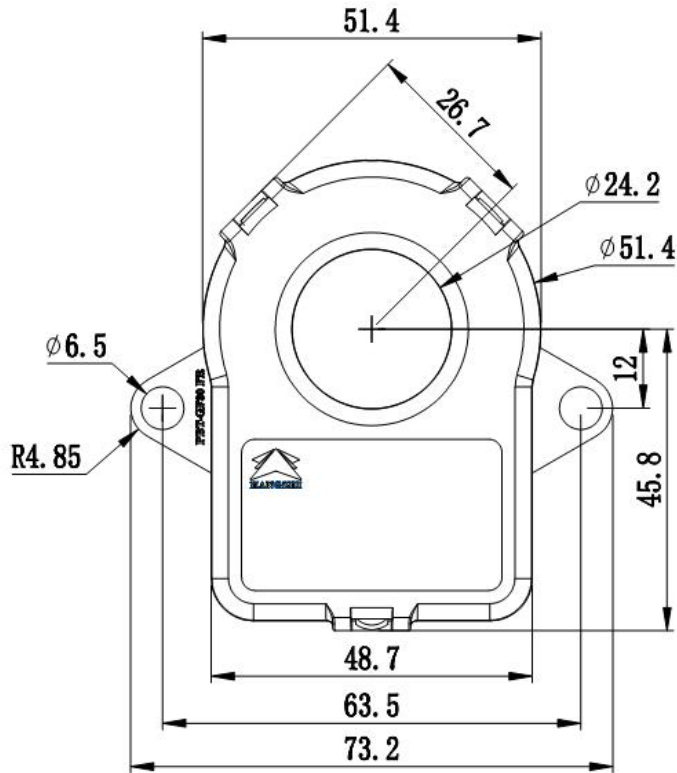
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## Dimensions

Unit: mm







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## Mechanical characteristics

Plastic case: PBT GF 30  
Magnetic core: Nanocrystalline  
Electrical terminal coating: Tin plated

## Installation recommendations

Connector type: Tyco-AMP P/N: 1 473672-1

## Connection

No.	Pin	Definition	Interface
1	A	CAN-L	
2	B	CAN-H	
3	C	GND	
4	D	Uc	