

AUTOMOTIVE CURRENT TRANSDUCER – FLUXGATE TECHNOLOGY CAB500-C



Introduction

The CAB family is best suited for battery monitoring application where high accuracy and very low offset are required.

It offers galvanic isolation between the primary circuit (high voltage) and the secondary circuit (12V system).

Automotive applications

- High voltage Battery Pack Monitoring
- Hybrid Vehicles
- PHEV and EV Vehicles.

Features

- Transducer using Fluxgate technology
- Unlimited over-current capability
- Panel mounting
- Unipolar +12V battery power supply
- Output signal: High speed CAN (500kpbs)
- Optional internal digital low-pass frequency filter
- Connector type: Tyco AMP 1473672-1

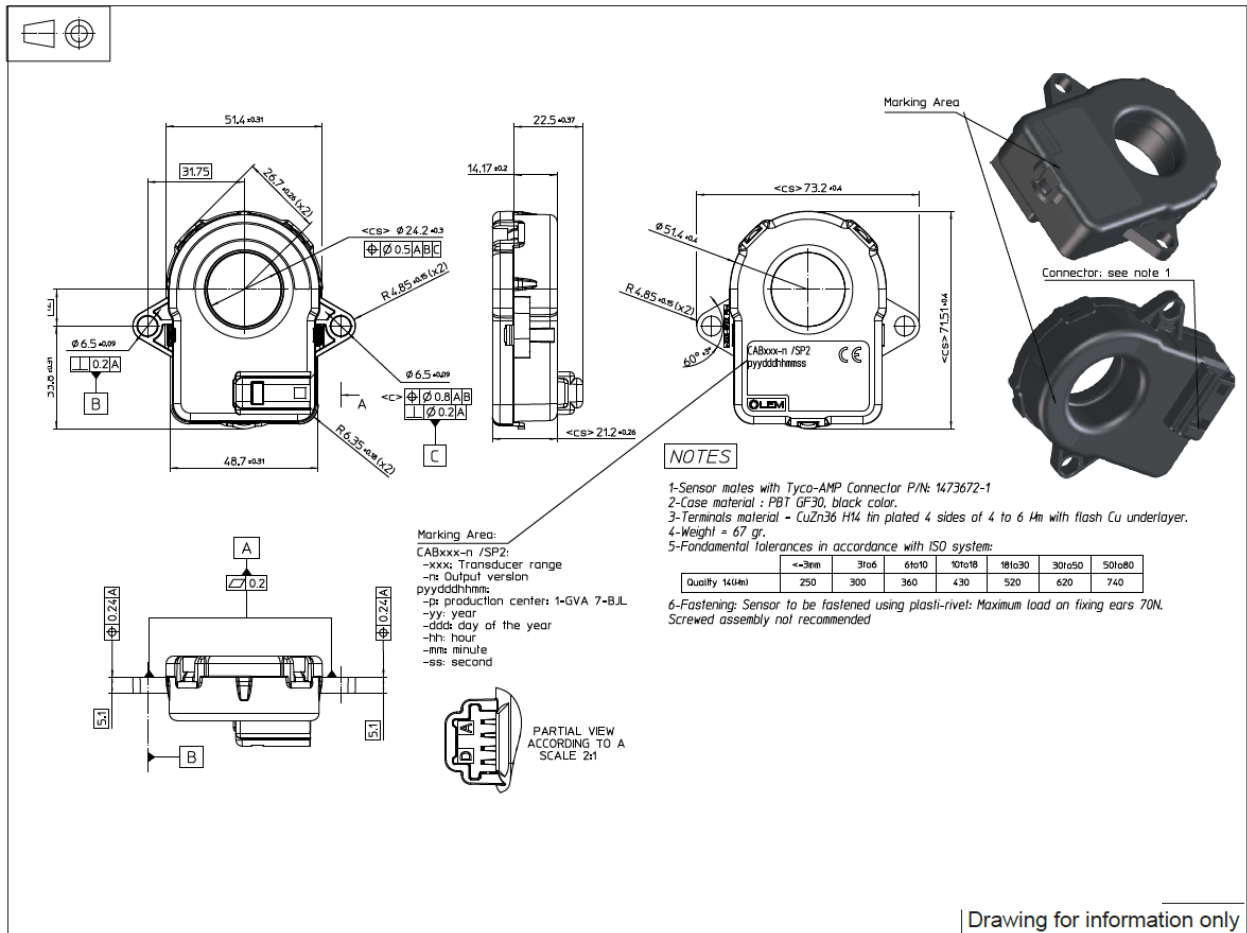
Principle of CAB Family

Special feature(s)

Advantages

- Offset below 10mA
- High overall accuracy
 - 0.1% error at room temperature
 - 0.5% error over temperature range
- Contact-less measurement (magnetic).

Dimensions CAB500-C series (in mm)

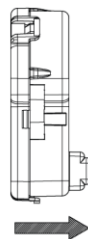


Mounting recommendation

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

Connection

Pin Out	
A	CAN-L
B	CAN-H
C	GND
D	U_c



I_p (positive primary current direction)

CAB500-C

Absolute maximum ratings (not operating)

Parameter	Symbol	Unit	Specification	Conditions
Load-dump over-voltage	U_c	V	32	400ms
Over-voltage	U_c	V	24	1minute
Reverse polarity	U_c	V	-50	1minute
Minimum power supply	U_c	V	6	continuous, not measuring
Maximum power supply	U_c	V	18	continuous, not measuring
Creepage distance	d_{cp}	mm	TDB	
Clearance	d_{cl}	mm	TDB	
Rms voltage for AC insulation test	U_d	kV	2.5	50Hz, 1min
Insulation resistance	R_{is}	M Ω	500	
IP Level			IP41	

Characteristics in nominal range

Parameter	Symbol	Unit	Specification			Conditions
			Min	Typical	Max	
Electrical Data						
Supply voltage ¹⁾	U_c	V	8	13.5	16	
Current consumption @ $I_p = 0A$	I_c	mA	TBD	25	TBD	
Current consumption @ $I_p = 500A$	I_c	mA	TBD	TBD	TBD	
Ambient operating temperature	T_A	°C	-40		85	Temperature range with accuracy guaranteed +/-3 sigma
Performance Data						
Primary nominal DC or current rms	I_{PN}	A	-500		500	
Overall accuracy @ $I_p = 0 A$	X_g	mA	-10		10	over operating temperature range (1)
Overall accuracy @ $I_p = 350 A$	X_g	mA	-350		350	At room temperature (1)
Overall accuracy @ $I_p = 500 A$	X_g	mA	-1750		1750	over operating temperature range (1)
			-500		500	At room temperature (1)
			-2500		2500	over operating temperature range (1)
Linearity error	el	%		0.1		At room temperature
Gain drift		ppm/°C		70		
Output noise		mA		TBD		
Frequency bandwidth ²⁾	BW	Hz		TBD		
Power up time		ms		150		
Setting time after over load		ms		TBD		

(1) Performances are considered with average value over 10 CAN frames (100ms).

CAB500-C

CAN output specification

- CAN protocol 2.0B
- Bit order: big endian (Motorola)
- CAN oscillator tolerance: 0.27% (to be confirmed by test)
- No sleep capability
- 120 ohm termination resistor to be added externally

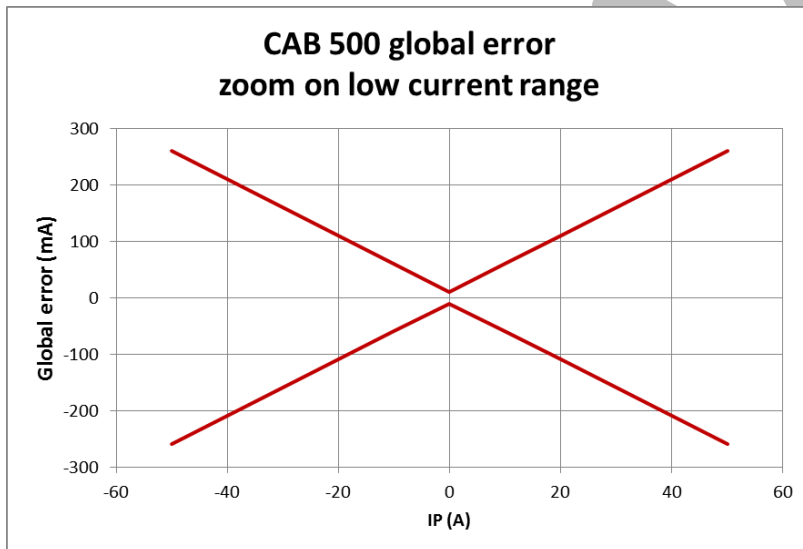
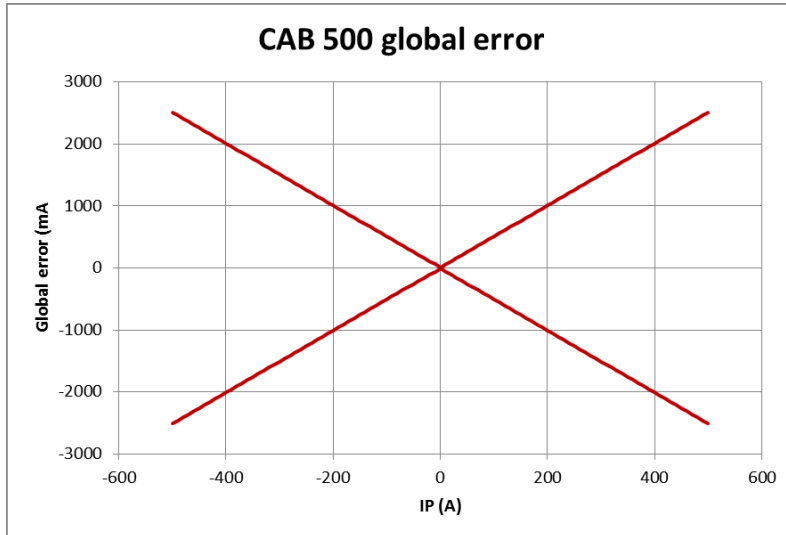
Message Description	CAN ID	Name	Data Length (Nb bytes)	Type of frame	Message launch type	Signal Description	Signal Name	Start Bit	End Bit
Return Current I_p (mA)	See version table below	CAB300_ I_p	8	Standard	Cyclic trancedived message 10ms cycle	I_p Value: 80000000H=0mA, 7FFFFFFFH=-1mA, 80000001H=1mA	IP_VALUE	0	31
						b0: Error Information (0=Normal, 1: failure)	ERROR_INDICATION	32	32
						b7 to b1: RxQuality (0 to 100%)	ERROR_INFORMATION	33	39
						Vacant bits (fixed to 0)	VACANT_DATA_3BYTES	40	63

Diagnostic Trouble Code (DTC)

FAILURE MODE	I_p VALUE	ERROR INDICATION	ERROR INFORMATION
Error on dataflash CRC	FFFF FFFF	1	0x41
Fluxgate running at high frequency (< 2.5 kHz) for more than 10 ms	FFFF FFFF	1	0x42
Fluxgate not oscillating for more than 20 ms	FFFF FFFF	1	0x43
CAB entered in fail safe mode	FFFF FFFF	1	0x44
Signal not available for more than 100 ms	FFFF FFFF	1	0x46
Supply voltage out of range	FFFF FFFF	1	0x47

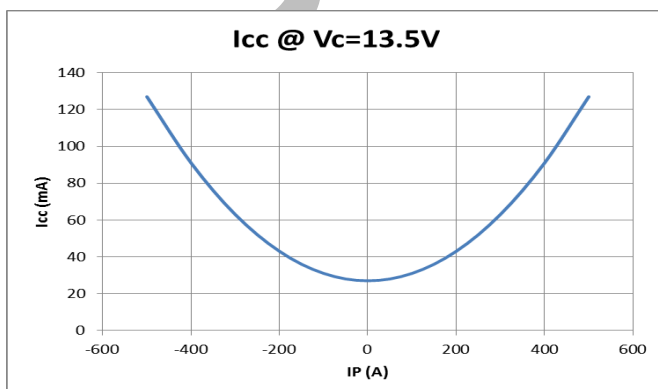
CAB500-C

Accuracy curves



Accuracy given on temperature range

Current consumption



Applicable standards

Test	Test standard	Procedure
Environmental test		
Shipping/Storage Temperature Exposure	ISO16750-4	164hrs, -40°C / + 85°C, power off, slope 0.6°C/min
Low Temperature Operating Endurance		120hrs, -40°C, power on
High Temperature Operating Endurance		85°C, 4752hrs, power on characterization before and after test only at 25°C and Vc nom
Powered Thermal Cycle Endurance	ISO16750-4	540 cycles/100min: -40°C (20min), +85°C (20min), slope 4°C/min : 900hrs characterization before and after test only at 25°C and Vc nom
Thermal Shock		-40°C (20 min soak) / 85°C (20 min soak) , 1000 cycles, with connectors => 667h (28 days)
Thermal Humidity Cycle	IEC 60068-2-38	240hrs, -10°C /+65°C , 93% humidity characterization before and after test only at 25°C and Vc nom
High Temperature and Humidity Endurance	IEC60068-2-67	85°C, 85% humidity, 1000hrs characterization before and after test only at 25°C and Vc nom Performance after test : offset<20mA, Global error < 3000mA
Vibration		Class 1 5 Hz to 1000 Hz (table 6-10), 20h / axis, 3 axis+ -40°C /+85°C during 8 hours and 25°C during 12h. (Fig.6-2) Characterization before and after test only at 25°C and Vcnom
Mechanical Shock	ISO16750-3	500m/s ² , 10 each direction (60 total) Half sine pulse Characterization before and after test only at 25°C and Vcnom
Package Drop		With final packaging 1m, 1 bottom, 4 bottom edge, 4 bottom corner => total 9 drops. 1 meter on concrete floor.
Handling Drop	ISO16750-3	1 fall in one direction for each sensor, from 1 meter on concrete floor. characterization before and after test only at 25°C and Vc nom
Dust (and other solid intrusion)	ISO20653	IP category: 4
Water Intrusion	ISO20653	IP category: 1
Dew formation test	IEC60068-2030	
Mixed Flowing Gas	IEC60068-2-60	
Salt Fog	ISO16750-4	96h @ 35°C 5% of salt water solution characterization before and after test only at 25°C and Vc nom
Chemical exposure - outside cabin compartment	ISO16750-5	24h / fluid; see PV test report for list of fluids

Test	Test standard	Procedure
EMC test		
CISPR 25 Conducted RF Emissions-Voltage on Supply Lines	CISPR25	Narrow band : 0.15 to 108 (MHz) Wide band : 0.15 to 200 (MHz)
CISPR 25 Conducted RF Emissions-Current on all Lines in Harness	CISPR25	Narrow band : 0.15 to 108 (MHz) Wide band : 0.15 to 200 (MHz)
CISPR 25 Radiated Emissions	CISPR25	30 to 1000 (MHz)
Bulk Current Injection (BCI) Test	ISO 11452-4	According to ISO 11452-4
ALSE with a Ground Plane	ISO 11452-2	According to ISO 11452-2
Transient Disturbances Conducted along Supply Lines	ISO 7637-2	According to ISO 7637-2
Transient Disturbances Conducted along I/O or Sensor Lines	ISO 7637-3	According to ISO 7637-3
Handling Test	ISO10605	Test method: IEC 61000-4-2 (2008) pins: +/-4kV case: +/-8kV
Operating Test	IEC 61000-4-2	Test method: IEC 61000-4-2 (2008) Indirect contact discharge: +/-8kV Air discharge: +/-20kV
Impulse Noise Test		+/-2kV noise simulator, on each lines
Fast Transient Noise Test		+/-2kV fast transient simulator, on each lines

SPEC

Test	Test standard	Procedure
Electrical test		
Supply Voltage Range		8V to 16V; from -40°C to 105°C
Supply Voltage Ripple	SAE J1113-2	According to SAE J1113-2
Supply Voltage Drop Out		Supply voltage drop from 11V to 0V and return to 11V. Drop duration increase from 10us to 1ms (sensor fonctionnal) and from 1ms to 2s (sensor not damaged)
Supply Voltage Dips		Supply voltage dips from 11V to dip voltage and return to 11V. Dip voltage are 5.5V, 5V, 4.5V, 4V, 3.5V and 3V. Dips duration for each levels are 100us-1ms (sensor fonctionnal) and 1ms-500ms (sensor not damaged)
Slow decreases and increase	ISO 16750-2 (2004)	According to ISO 16750-2 (2004)
Defective Regulation (Full-Fielded Alternator)		24V, 1 minute
Jump Start		18V, 60 minutes, @65°C
Load Dump		32V, 400ms; 5 pulses
Reverse Supply Voltage	ISO16750-2	-16V, 1 minute
Immunity to Short Circuits in the Supply Voltage Input and Load Output Lines		
Immunity to Short Circuits in I/O Signal Lines		

SPECIFICATION