

# ES-600

## High precision, Automotive grade current sensing module



### FEATURES

- 5KV Galvanic isolation
- Housing design IP40 compliant
- CAN2.0B interface isolated, 120Ω internal terminated
- Accuracy of current measurement  $\pm 0.1\%$
- Current measurement range  $\pm 600A$

### APPLICATIONS

- Battery current monitoring for automotive applications
- Grid energy storage
- UPS
- Charging station



### CHARACTERISTICS

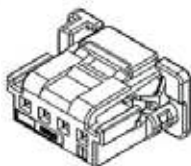
<b>Rated current measurement range</b>	$\pm 600A$
<b>Overcurrent measurement</b>	Rated current: $\pm 600A$ Peak current: $\pm 22,400A$ 1,400A for 25s 1,800A for 15s 2,000A for 10s 22,400A for 50ms
<b>Current measurement accuracy</b>	$\pm 0.1\%$
<b>Current offset error</b>	$\leq \pm 30mA$
<b>Power consumption</b>	$\leq 200mW @ 12VDC$
<b>Interface</b>	CAN2.0B isolated 120Ω terminated
<b>Grade</b>	Automotive
<b>Power consumption</b>	$\leq 200mW @ 12VDC$

<b>Power supply</b>	4.5V to 40V
<b>Current consumption</b>	18mA @12V
<b>Operating temperature range</b>	-40°C to 105°C
<b>Storage temperature range</b>	-40°C to 125°C
<b>Storage humidity</b>	95%
<b>Set-up time</b>	150 to 200 ms.
<b>Absolute temperature measurement error</b>	-1°C to 1°C
<b>Voltage isolation</b>	5KV
<b>Current offset error</b>	$\leq \pm 30mA$
<b>Noise</b>	$\leq 20mA$
<b>Current linearity</b>	0.01%
<b>Current value error</b>	-0.1 to 1% error of reading (-600A~600A) In nominal measurement range
<b>Resolution</b>	1mA
<b>Communication</b>	CAN2.0B; 500 kbit/s 120Ω termination (Option: 250Kbit/s, 500Kbit/s, 1Mbit/s)
<b>Overcurrent value error</b>	$\pm 0.5\%$ / $\pm 1\%$ typ. (-5000A ~ 5000A; -22400A ~ 22400A)
<b>Overcurrent offset error</b>	180mA
<b>Noise</b>	100mA
<b>Overcurrent linearity</b>	0.1%

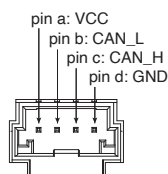
### INTERFACE



Male connector:  
Molex Part # 5600200420  
4-pin Power & CAN



Female connector:  
Molex Part # 5601230400  
4-pin Power & CAN



For more detail please see the Molex datasheets:  
[https://www.molex.com/pdm\\_docs/sd/5601230400\\_sd.pdf](https://www.molex.com/pdm_docs/sd/5601230400_sd.pdf)  
[https://www.molex.com/pdm\\_docs/sd/5600200420\\_sd.pdf](https://www.molex.com/pdm_docs/sd/5600200420_sd.pdf)

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### CAN PROTOCOL

The module uses the standard CAN2.0A/B communication protocol, and all messages use a standard frame structure. The data length of the message frame is between 1-8 bytes. The default baud of the module is 500kbps, and it can also support 1Mbps/250kbps.

Frame type	CANID	Length	byte0	byte1	byte2	byte3	byte4	byte5	byte6	byte7
Current (mA)	0x0301	6	0x00	B[3:0]: Cyclic counter individually for each channel 0-F B[4]: Overcurrent flag B[5]: Measurement error B[6]: Unit, 0/mA 1/uA	32-bit current value			—	—	—
Temperature (0.1°C)	0x0325	6	0x04	B[3:0]: Cyclic counter individually for each channel 0-F B[4]: Alarming of overtemperature on board B[5]: Alarming of overtemperature on shunt	32-bit temperature value			—	—	—

The 32-bit current/temperature data uses the big-endian format by default, that is, the high-order bit is first, the low-order bit is behind, the circle is a signed integer.

#### Example of message frame 1:

Data: 0x00 0x00 0x00 0x00 0x03 0xE8

Explanation:

0x00 Current channel flag

0x00 Unit: mA, Cyclic counter 0, no error

0x00 0x00 0x03 0xE8 0x000003E8 = 1000 = 1000Ma = 1A

#### Example of message frame 2:

Data: 0x04 0x00 0x00 0x00 0x01 0x0A

Explanation:

0x04 Temperature data flag

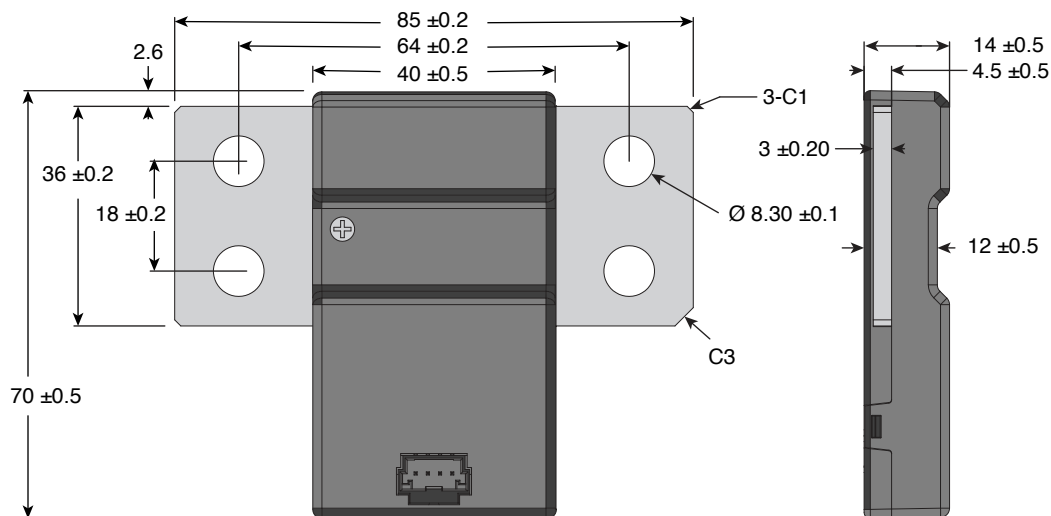
0x00 Cyclic counter 0, no alarming

0x00 0x00 0x01 0x0A 0x0000010A = 266 = 26.6°C

Note: The CANID code of module data channel, sampling interval, working mode, bit rate, etc. can be modified by the special tools provided, and the above are only the factory default values.

### DIMENSIONS

mm



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# ES-600 Series

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### MEASURING MODE

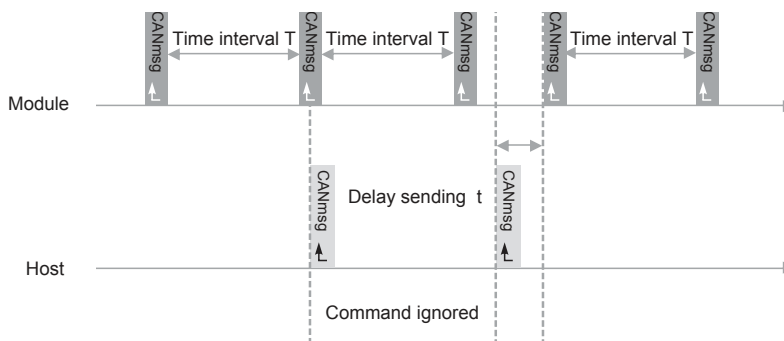
The module performs data sampling at a fixed time interval set by the system and sends data to the CAN bus. At the same time, it can also respond to the trigger command. In the interval sampling period, the measurement will be performed immediately when the trigger command is received and send the message data to the CAN bus. There is no need to wait for the next interval.

#### Time interval + command trigger mode

In some special applications, the time interval is set to be very long. If the quick measurement is required, the command needs to be triggered.

After the module receives the trigger command, if it is sampling or sending CAN message, the current trigger command will be ignored. When the command is valid, a sampling and sending process will be started immediately, and the time interval  $T$  for the next sending will be automatically calculated from the moment of this trigger.

There is a delay between the module receiving a valid trigger command and sending the CAN message, which is less than 1ms.

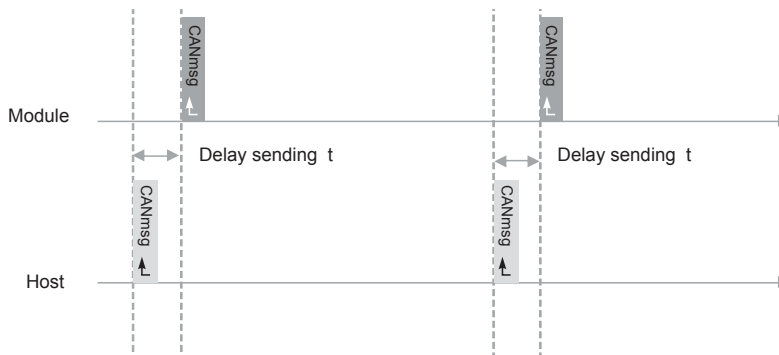


#### Command trigger mode

The module will send the measurement result to CAN bus and reset the starting point of calculated interval when the valid command is received from the host.

The module will not actively send a message, but the sampling is always ongoing at a fixed time.

There is a delay between the module receiving a valid trigger command and sending the CAN message, which is less than 1ms.



### ORDERING INFORMATION

**ES - 600**

Sensing module    Current rating  
(amps)