CSHV SERIES

005999
Issue 6

Open Loop Current Sensors

DESCRIPTION

The CSHV Series are open loop current sensors that use Hall-effect sensing and patented Honeywell technology to bring the best combination of performance and reliability for current sensing applications.

These products are non-intrusive and electrically isolated from the monitored circuit. This ensures a simple sensing method. They are rated for a primary current measurement range of ±100 A to ±1500 A dc.

The CSHV Series is AEC-Q100 qualified to meet higher quality and reliability. For motor control applications, the current measurement is directly proportional to the motor torque. Current measurement can also be used to determine the speed at which the motor is turning. Such speed information can be calculated by understanding how the control algorithm affects the current level.

CUSTOMIZATION

The CSHV Series may be customized to best meet specific application needs. Solutions may be tailored to exact specifications for improved time to market, lower total system costs, and enhanced reliability.

Honeywell provides global technical assistance and engineering/service support.

DIFFERENTIATION

- **Accuracy:** Hall-effect sensing and stable amplification circuitry for improved accuracy over the full operating temperature range
- **Magnetic immunity:** Optimized magnetic circuit allows for excellent performance in diverse magnetic environments
- **Flexible:** Customizable to meet specific application requirements

VALUE TO CUSTOMERS

- **Accurate:** Designed to enable precise battery state measurement for improved user experience. Accurate current sensing enables precise and smooth motor control
- **Fast Response Time:** Fast response time allows fault detection and asset protection before catastrophic failure
- **Ease of use:** Magnetic immunity allows for easy integration into different magnetic environments
- **Easy system integration:** Analog voltage output may be used by battery management system

FEATURES

- Active open loop current sensing using Hall-effect technology
- High accuracy and low temperature drift
- Operating temperature of -40°C to 125°C [-40°F to 257°F]
- Analog voltage output
- CE and UKCA certification; REACH and RoHS compliant
- AEC-Q100 qualified for higher reliability

AEC-Q100

APPLICATIONS

- Current measurement for battery management systems in electrified vehicles (EV, HEV, PHEV, BEV)
- Current leakage detection and fault isolation in battery charging systems
- Current measurement in energy storage systems
- Fault detection in heavy industrial equipment

PORTFOLIO

Honeywell offers a variety of current sensors for potential use in many applications. To view the entire product portfolio, click here.

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TABLE 1. ABSOLUTE MAXIMUM RATINGS (not operating)

Characteristic	Symbol	Unit	Parameter			Condition
			Min.	Typ.	Max.	
Supply voltage max.	$V_{S\ max.}$	V	—	—	10	—
Reverse supply voltage max.	$V_{R\ max.}$	V	-0.3	—	—	—
Output voltage max.	$V_{OUT\ max.}$	V	-0.3	—	10	V_{OUT} reverse/forward voltage
Output current max.	$I_{OUT\ max.}$	mA	-10	—	10	—
Ambient storage temperature	—	°C	-40	—	125	—
Electrostatic discharge voltage	V_{ESD}	kV	—	—	8	—
RMS voltage for AC isolation test	V_{DWV}	kV	—	—	2.5	50 Hz, 1 min
Creepage distance	d_{Cp}	mm	4.9	—	—	—
Clearance	d_{Cl}	mm	4.9	—	—	—
Comparative tracking index	CTI	—	PLC3	—	—	—

TABLE 2. OPERATING CHARACTERISTICS IN NOMINAL RANGE (I_{PN})

Characteristic	Symbol	Unit	Parameter			Condition
			Min.	Typ.	Max.	
Primary current, nominal DC	I_{PN}	A	$-I_{PN}$	—	I_{PN}	—
Supply voltage	V_S	V	4.5	5	5.5	—
Output voltage	V_{OUT}	V	$V_{OUT} = \frac{V_S}{5}(G * I_P + V_{OS})$			$I_P = (V_{OUT} * \frac{5}{V_S} - V_{OS}) / G$
Output voltage (at I_P = 0)	V_{OS}	V	—	2.500	—	—
Electrical offset voltage	$V_{OS,\ ELECT}$	mV	—	±3	—	T_A = 25°C, V_S = 5 V
Magnetic offset voltage	$V_{OS,\ MAG}$	mV	—	±2	—	T_A = 25°C, V_S = 5 V
Current consumption	I_{SUPPLY}	mA	— —	13 —	— 16	T_A = 25°C, V_S = 5 V —
Load resistance	R_L	Ohm	10k	—	—	—
Output impedance	R_{out}	Ohm	— —	1 —	— 10	T_A = 25°C T = -40°C to 125°C
Ratiometric error	ε_r	%	—	±0.5	—	—
Sensitivity	G	mV/A	—	$2000/I_{PN}$	—	T_A = 25°C
Sensitivity error: **±100 A to ±1200 A** **±1500 A**	ε_g	%	 — —	 ±0.6 ±0.8	 — —	 T_A = 25°C, V_S = 5 V T_A = 25°C, V_S = 5 V
Linearity error	ε_L	%	-1	—	1	% of full scale output
Ambient operating temperature	—	°C	-40	—	125	—
Average temperature coefficient	$V_{OS,\ ELECT}$	mV/°C	—	±0.04	—	—
Average temperature coefficient of G	—	%/°C	—	±0.02	—	—
Step response time (10 % to 90 %)	t_r	µs	—	2	6	—
Frequency bandwidth	BW	kHz	45	—	—	-3 dB
Output RMS noise (RMS)	—	mV	—	—	2	—

[1] See Table 4 for catalog listing specifics.

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TABLE 3. MECHANICAL CHARACTERISTICS

Characteristic	Description
Housing material	PBT + GF30 %
Mounting screw	M4, 2,5 N m torque max.
Mating electrical connector	TE MPN 1473672-1
Weight	58 g ±5 g

TABLE 4. ORDER GUIDE

Catalog Listing	Measure Range (A)	Sensitivity (mV/A at V_S = 5 V)	Offset (mV at V_S = 5 V)		Accuracy (% at V_S = 5 V)	
			25°C	-40°C to 85°C	25°C	-40°C to 85°C
CSHV100A-001	±100	20	±7 mV	±25 mV	±1 %	±2 %
CSHV200A-001	±200	10	±7 mV	±15 mV	±1 %	±2 %
			25°C	-40°C to 125°C	25°C	-40°C to 125°C
CSHV300A-001	±300	6.667	±7 mV	±18 mV	±1 %	±2 %
CSHV400A-001	±400	5	±7 mV	±13 mV	±1 %	±2 %
CSHV500A-001	±500	4	±7 mV	±10 mV	±1 %	±2 %
CSHV600A-001	±600	3.333	±7 mV	±10 mV	±1 %	±2 %
CSHV700A-001	±700	2.857	±7 mV	±10 mV	±1 %	±2 %
CSHV800A-001	±800	2.5	±7 mV	±10 mV	±1 %	±2 %
CSHV900A-001	±900	2.222	±7 mV	±10 mV	±1 %	±2 %
CSHV1000A-001	±1000	2	±7 mV	±10 mV	±1 %	±2 %
CSHV1100A-001	±1100	1.818	±7 mV	±10 mV	±1 %	±2 %
CSHV1200A-001	±1200	1.667	±7 mV	±10 mV	±1 %	±2 %
CSHV1500A-001	±1500	1.333	±7 mV	±10 mV	±2 %	±3 %

Figure 1. Nomenclature

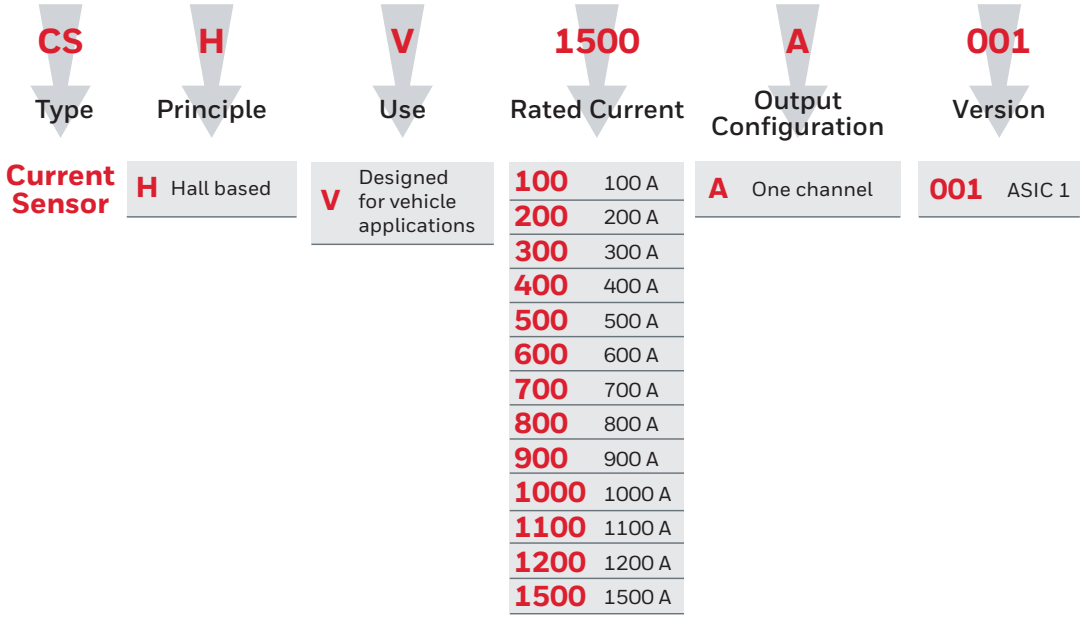

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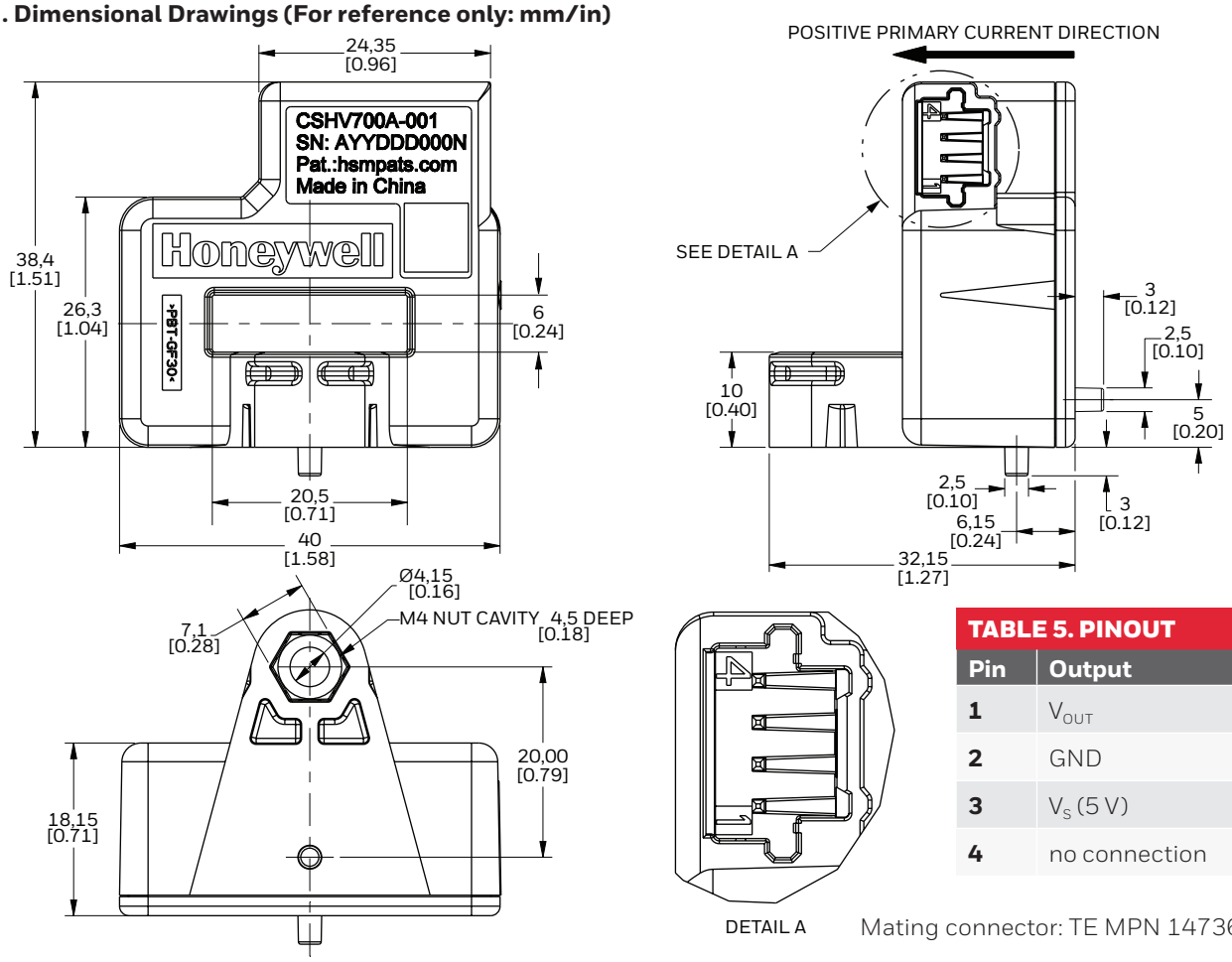
Figure 2. Dimensional Drawings (For reference only: mm/in)



Mating connector: TE MPN 1473672-1

TABLE 5. PINOUT

Pin	Output
1	V_{OUT}
2	GND
3	V_S (5 V)
4	no connection

Figure 3. Part Marking Details

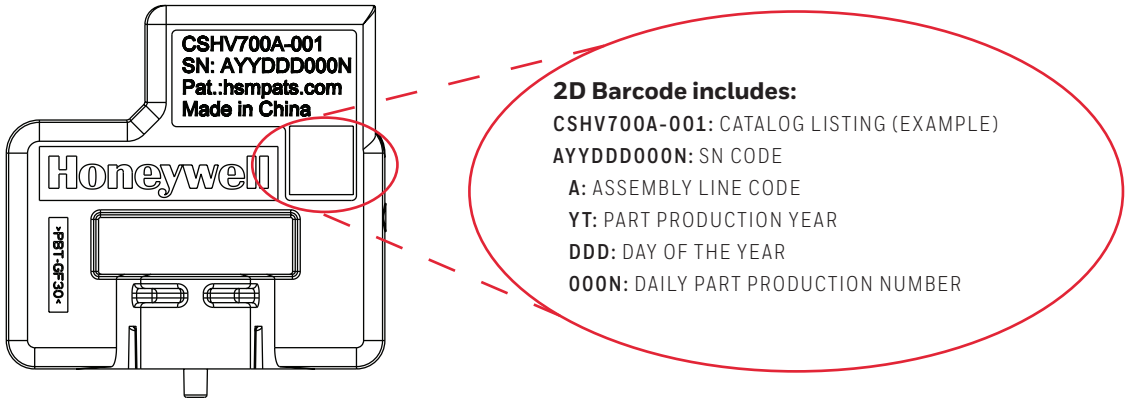
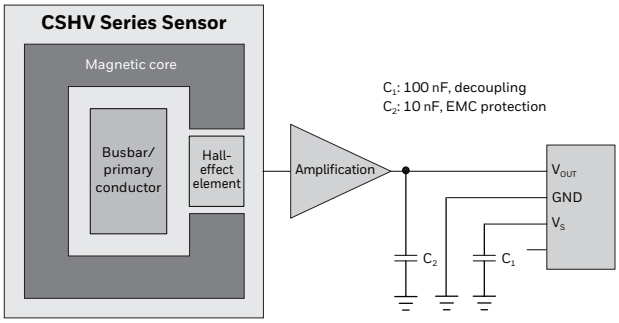


Figure 4. Electrical Diagram



NOTICE

SENSOR ACCESSIBILITY

- Ensure that the current sensor is installed in a suitable electrical enclosure which is only accessible with the use of special tools.

TABLE 6. EMC TEST SPECIFICATIONS

Test	Standard	Procedure
CISPR 25 Conducted RF Emissions - Voltage	CISPR25	According to CISPR 25:2008 Commission Form of Testing
CISPR 25 Conducted RF Emissions - Current	CISPR25	According to CISPR 25:2008 Commission Form of Testing
CISPR 25 Radiated Emissions	CISPR25	According to CISPR 25:2008 Commission Form of Testing
Bulk Current Injection (BCI) Test	ISO 11452-4	According to ISO 11452-4
RF Radiated Immunity - ALSE	IEC 61000-4-3	According to ISO IEC 61000-4-3
Electrostatic Discharge	ISO 10605	Unpowered direct contact discharge: ±8 kV Unpowered air discharge: ±15 kV Powered-up direct contact discharge: ±4 kV Powered-up air discharge: ±8 kV
Fast Transients Burst Immunity Test	IEC 61000-4-4	2 kV Power port, 1 kV signal port
Magnetic Field Emission Test	IEC 61000-4-8	20 kHz to 200 kHz
Conducted/Coupled Immunity	ISO 11452-4	According to ISO 11452-4, test CCC and ICC

TABLE 7. ELECTRICAL TEST SPECIFICATIONS

Test	Standard	Procedure
Single line Open Circuit Tests	ISO16750-2-4.9	Connect sensor to 5V power supply and power on the sensor. Disconnect Us, GND, Us & GND for twice. Each open circuit time :60 ±1 second & 10 ± 1 second
Short Circuit Protection	ISO 16750-2-4.10	Connect sensor to power supply and power on the sensor by 5 V. Apply short circuit between Vout & GND, Vout & Us. Each hold for 60 seconds
Insulation Resistance Test	ISO 16750-2-4.12	500 Vdc ±10 Vdc for 60 s; Resistance criteria: ≥100 MOhm
dc & ac Voltage Insulation Test		Test voltage: 2500 Vdc & 2500 Vac. Frequency: dc & 50~60 Hz. Test duration: 60 seconds

TABLE 8. ENVIRONMENTAL TEST SPECIFICATIONS

Test	Standard	Procedure
High Temperature Operating Test	ISO16750-4	48 hour, 85°C. Performance test before and after test from -40°C to 85°C
Low Temperature Operating Test	ISO16750-4	120 hour, -40°C. Performance test before and after test from -40°C to 85°C
Thermal Cycle Test	ISO16750-4	30 cycles,one cycle contains -40°C (90 minute soak) & 85°C (120 minute soak). Transition time = 270 minutes. Performance test before and after test from -40°C to 85°C
Vibration	SAE J2380	10 Hz to 200 Hz, 10.95 hour/axis, 3 axis. Performance test before and after test from -40°C to 85°C
Mechanical Shock	ISO16750-3	500 m/s, 20 each direction (60 total), half sine pulse. Performance test before and after test from -40 °C to 85 °C
Handling Drop	ISO 16750-3	1st fall of each DUT at a different dimensional axis, 2nd fall with the given DUT at the same dimensional axis but on the opposite side of the housing, from 1 m on concrete floor. Performance test before and after test from -40°C to 85°C
High Temperature Durability Test	ISO16750-4	3000 hour, 85°C. Performance test before and after test from -40°C to 85°C

WARRANTY/REMEDY

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship during the applicable warranty period. Honeywell's standard product warranty applies unless agreed to otherwise by Honeywell in writing; please refer to your order acknowledgment or consult your local sales office for specific warranty details. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace, at its option, without charge those items that Honeywell, in its sole discretion, finds defective. **The foregoing is buyer's sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose. In no event shall Honeywell be liable for consequential, special, or indirect damages.**

While Honeywell may provide application assistance personally, through our literature and the Honeywell web site, it is buyer's sole responsibility to determine the suitability of the product in the application.

Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this writing. However, Honeywell assumes no responsibility for its use.

⚠ WARNING
PERSONAL INJURY

DO NOT USE these products as safety or emergency stop devices or in any other application where failure of the product could result in personal injury.

Failure to comply with these instructions could result in death or serious injury.

⚠ WARNING
MISUSE OF DOCUMENTATION

- The information presented in this product sheet is for reference only. Do not use this document as a product installation guide.
- Complete installation, operation, and maintenance information is provided in the instructions supplied with each product.

Failure to comply with these instructions could result in death or serious injury.

For more information
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