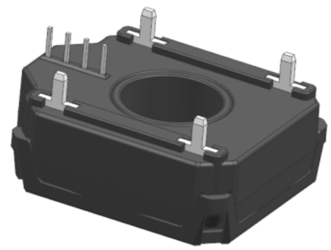
HSCW900S5-TRSP1 series current sensor provides a faster and more cost-effective solution for AC, DC, or pulse current detection, and provides effective isolation for the primary and secondary sides.

Features:

- Open Loop current sensor with Hall effect technology
- Unipolar +5V DC Power supply
- Output voltage: Fully ratio-metric(in sensitivity and offset)
- Primary current measuring range up to ±900 A
- Operating temperature range: −40 °C to +125 °C
- Excellent accuracy and good linearity
- High frequency bandwidth
- Fast response time



Applications:

- EV/HEV Motor drive application
- Inverters
- Battery Management
- DC/DC converter

Working Principle:

The open-loop current sensor utilizes Ampere's law (the magnetic field generated around a straight wire is proportional to the current in the wire) and the characteristics of Hall devices to detect the magnitude of the magnetic field intensity B generated by the primary current, thereby detecting the current in the wire. The proportional relationship between B and I within the linear range of hysteresis is:

$B(I_P) = K * I_P$ （K constant）

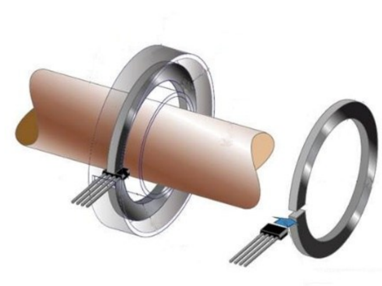
The Hall voltage is thus expressed by:

$V_H = (R_H/d) * I * K * I_P$

Except for I_P, all terms of this equation are constant.

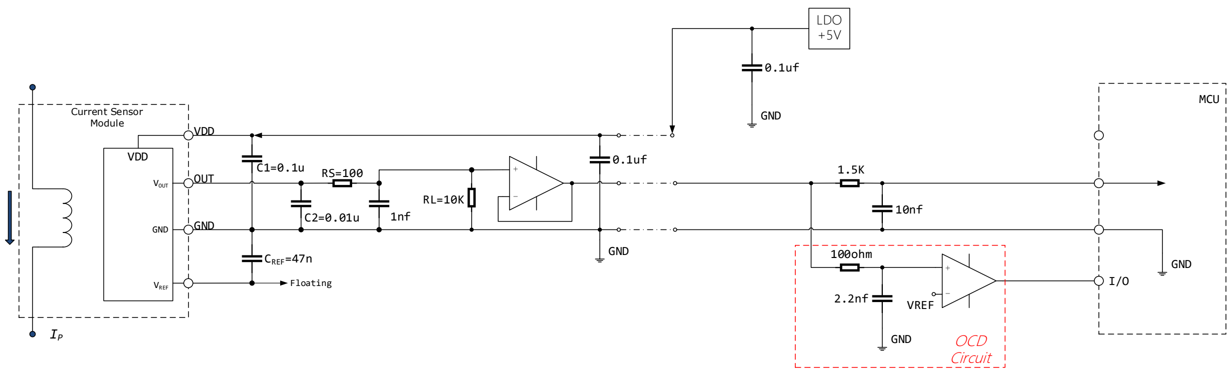
Therefore:

$V_H = K1 * I_P$（K1 constant）



A specific Hall chip calculates the primary current by amplifying V_H to obtain voltage.

Recommended Application Diagram:



Ordering:

P/N	V_{QVO}	Primary current measuring range I_P (A)	Sensitivity Sens (Typ.) (mV/A)	MPQ (PCS)	MOQ (PCS)
HSCW900S5-TFSP1	$V_{CC}/2$	±900	2.22	432	432

Naming:

HSCW 900 S5 - T R SP1
① ② ③ ④ ⑤ ⑥

① HSCW series

② Primary current measuring range I_P (A)=±900A

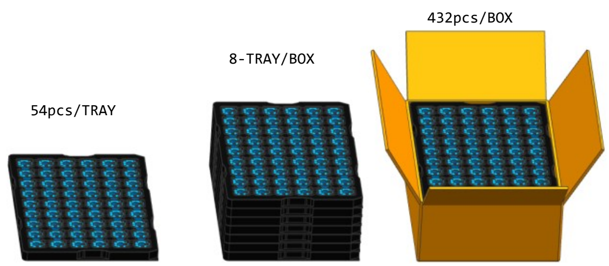
③ IC type

④ Tray packing

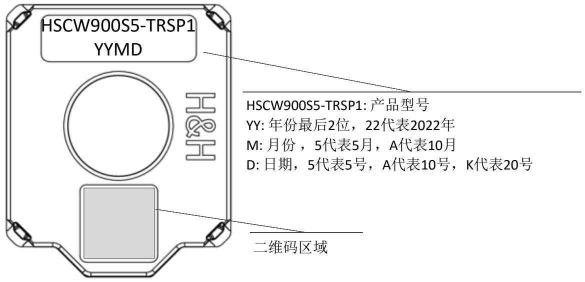
⑤ R： full ratiometric， $V_{QVO}=V_{CC}/2$

⑥ SP1： no extended case

Packing information:



Marking information:



Mechanical characteristics:

- Housing Materials PA66+GF30
- Magnetic core FeSi wound core
- Electrical terminal coating 100% tin plated
- Weight 27.4g ±5 %

Absolute ratings (not operating)

Characteristic	Symbol	Rating	Unit	Condition
Maximum supply voltage	V_{CC}	8	V	Programming mode
		6.5		Working mode
Maximum Current consumption	I_{CC}	18	mA	
Output Voltage	V_{OUT}	0.15 to V_{CC}-0.15	V	
Output Current	I_{OUT}	±40	mA	
Ambient working temperature	T_A	-40 to 125	℃	
Ambient storage temperature	T_S	-40 to 125	℃	
Electrostatic discharge voltage	V_{ESD}	8	KV	ISO10605 Air and Contact
RMS voltage for AC insulation test	V_{ISO}	2.5	KV	50Hz, 1 min, ISO 16750.2-2006/IEC 60664.1-2007
Isolation resistance	R_{ISO}	>500M	ohm	500V DC ISO 16750.2-2006/IEC 60664.1-2007
Creepage distance	d_{CP}	11.71	mm	mm
Clearance	d_{CI}	5.746	mm	mm
Comparative traking index	CTI	550V		

Operating characteristics

All characteristics noted under conditions −900 A ≤ I_P ≤ 900 A, 4.75 V ≤ V_{CC} ≤ 5.25 V, −40 °C ≤ T_A ≤ 125 °C, unless other- wise noted.

Parameter	Symbol	Condition	Min	Typ.	Max	Unit
Supply Voltage	V_{CC}		4.75	5	5.25	V
Current consumption	I_{CC}	R_L ≥ 10KΩ		13	18	mA
Power-on Delay	T_{PO}	T_A=25°C		80		μs
Ratiometricity error	E_r		-0.3		0.3	%
Offset voltage	V_{QVO}	T_A = 25°C		2.5±0.010		V
Output voltage range	V_{OUT}	T_A = 25°C, I_P=I_{PMAX}	0.5		4.5	
Load resistance	R_L	V_{OUT} to V_{CC} or GND	10			KΩ
Response Time	$t_{RESPONSE}$	T_A=25°C, C_L=1nF, I_P step=50% of I_{P+}, 90% input to 90% Output		4		μs
Bandwidth	BW	Small signal −3dB, C_L=1nF, T_A=25°C	40			KHz
Output internal resistance	R_{OUT}	T_A = 25°C	–	8	–	Ω

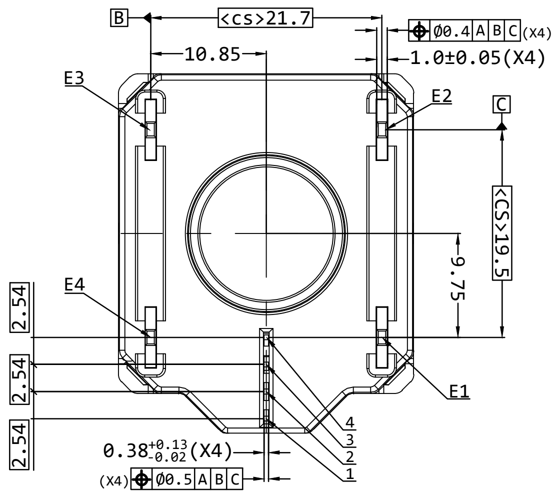
代理商：锦锋科技 http://www.szkingfrom.com/

Performance Data

All characteristics noted under conditions −900 A ≤ I_P ≤ 900 A, 4.75 V ≤ V_{CC} ≤ 5.25 V, −40 °C ≤ T_A ≤ 125 °C, unless other- wise noted.

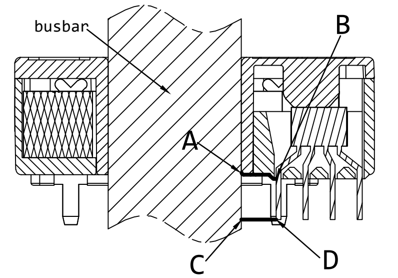
Parameter	Symbol	Condition	Min	Typ.	Max	Unit
Ratiometricity error	E_r	@V_{CC}=4.75~5.25V	-0.3		0.3	%
Sensitivity error	E_{Sens}	@T_A=25°C;V_{CC}=5V	-1		1	%
Electrical offset voltage	V_{OE}	I_P=0A， T_A=25°C	-3	±2	3	mV
Magnetic offset voltage	V_{OM}	I_P=0A, T_A=25°C, after excursion of I_{PM}		±2		mV
Offset voltage	V_{OFFSET}	T_A=25°C		±8		mV
Linearity Error	Lin_{ERR}	% Of full rang	-1	0.5	1	%
Offset voltage over temperature		@-40~125℃	-15		15	mV
Sensitivity error over temperature		@-40~125℃	-50		50	mV

Total Error:



Terminals	Definitions
1	VREF
2	VOUT
3	GND
4	VCC
E1-E4	Ground(*)

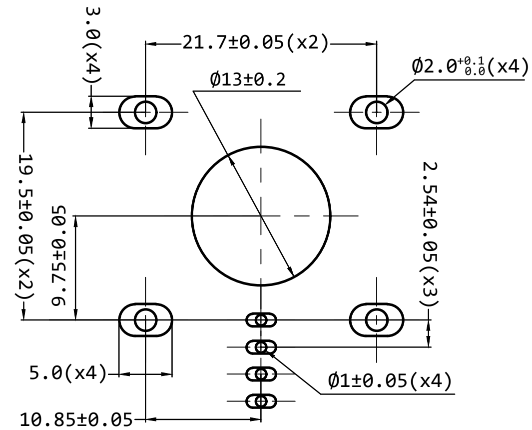
(*) Only 1 of these 4 pins could be connected

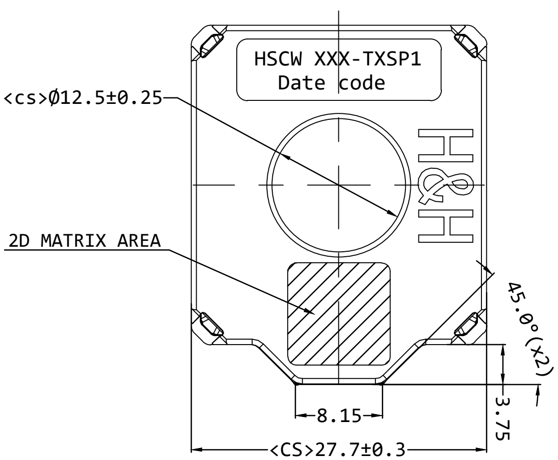


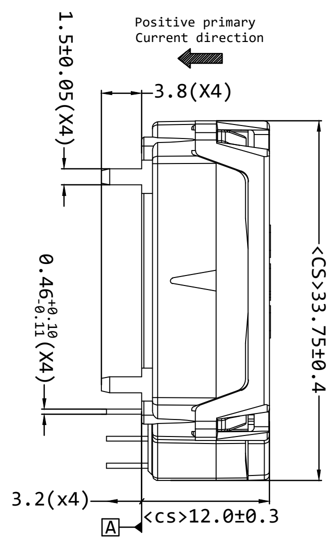
Creepage distance A to B 3.57mm
Electrical appliance clearance C to D 3.26mm

PCB DRILLING(scale1:1)

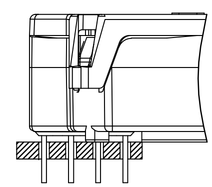
Advisable dimensions
Viewed from component side







Clearance view



Drawing for information only

Performance Parameters Definitions:

- Offset Voltage @ I_P = 0 A

The offset voltage is the output voltage when the primary current is zero. The ideal value of $V_{QVO} = V_{CC}/2$

So, the difference of $V_{QVO} - V_{CC}/2$ is called the total offset voltage error. This offset error can be attributed to the electrical offset (due to the resolution of the ASIC quiescent voltage trimming), the magnetic offset, the thermal drift and the thermal hysteresis.

- Sens(Sensitivity):

The current sensor's sensitivity Sens is the slope of the straight line $V_{OUT} = V_{CC}/5 \times (2.5 + 2 \times I_P/I_{P\_MAX})$

- Offset with Temperature:

The error of the offset in the operating temperature is the variation of the offset in the temperature considered with the initial offset at 25 °C. The offset voltage variation V_{OETC} is a maximum variation the offset voltage in the temperature range: V_{OETC} = V_{OETC} max − V_{OETC} min

- Sensitivity with temperature:

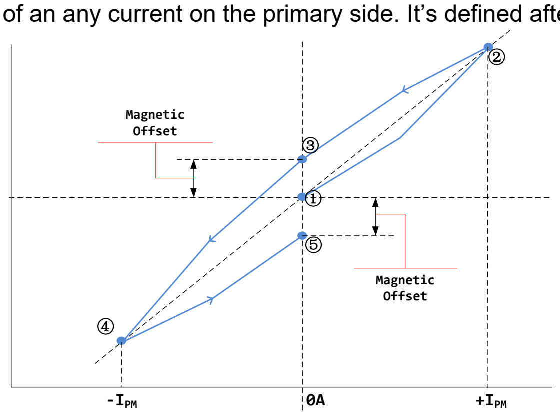
The error of the sensitivity in the operating temperature is the relative variation of sensitivity with the temperature considered with the initial offset at 25 °C.

- Electrical Offset Voltage:

The error caused by the noise of the amplification factor of the HALL component and the internal operational amplifier itself is called the electrical offset voltage

- Magnetic Offset:

The magnetic offset is the consequence of an any current on the primary side. It's defined after a stated excursion of primary current.

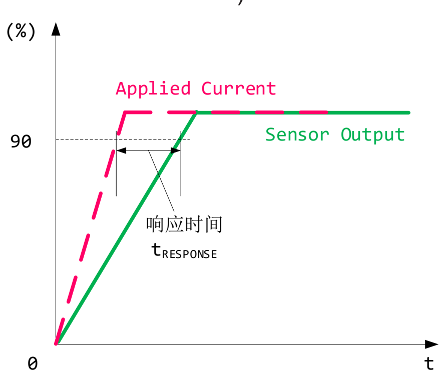


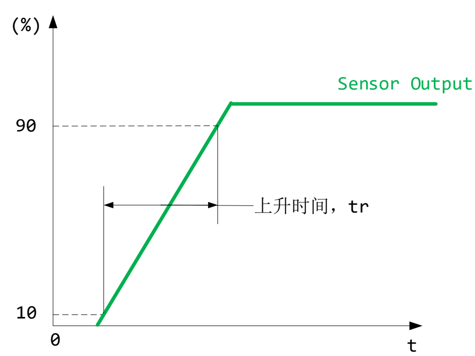
- Response Time:

The time interval between a) when the applied current reaches 90% of its final value, and b) when the sensor reaches 90% of its output corresponding to the applied current

- Rise time:

The time interval between a) when the sensor reaches 10% of its final value, and b) when it reaches 90% of its final value





- QVO Ratiometricity error：

When the supply voltage V_{CC} changes from 5V to 4.75<VCC1<5.25V, the deviation between the QVO output of the sensor and the theoretical value. The formula is defined as follows：

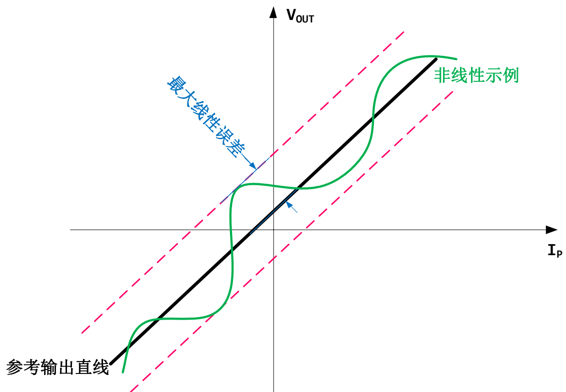
$$E_r = (1 - \frac{\frac{V_{QVO(V_{CC1})}}{V_{QVO(5V)}}}{V_{CC1}/5}) \times 100\%$$

- Linearity Error：

Non linearity is an indicator that measures the linearity of a sensor IC within the full current measurement range, the end base line is used as the reference working line：

$$\mathrm{Lin_{ERR}} = \frac{\Delta \mathrm{L_{max}}}{\mathrm{Y_{FS}}} \times 100\%$$

Lin_{ERR} – End base linearity error of sensors
ΔLMAX – The absolute value of the arithmetic mean of the output signal values measured multiple times in the forward and reverse strokes at the same calibration point, compared to the maximum difference between the corresponding point on the reference line



线性误差曲线

Notes：

1. Incorrect connection may damage the sensor. After connecting the sensor to a 5V power supply, the measured current passes through the direction of the sensor arrow, and the corresponding voltage value can be measured at the output.
2. Full ratiometry： When the supply voltage increases or decreases by a certain percentage, V_{QVO}, Sens are also increased or decreased by the same percentage. V_{OUT} follows: $\boldsymbol{V_{OUT}} = \frac{V_{CC}}{2} + 2 \times I_P/I_{P_{MAX}}$
3. Storage conditions: Storage temperature ≤ 30 ℃, storage humidity 30-60%
4. Shelf life: All products are vacuum packed. If the packaging is in good condition, the storage period of tinned parts is 6 months from the date of manufacture. After unpacking or if the vacuum packaging leaks, please use the prodcuts within 3 months. If the above time is exceeded and the storage conditions cannot be guaranteed, it is recommended to perform a solderability test before use.