VCS712

Small size - wide temperature range current sensor

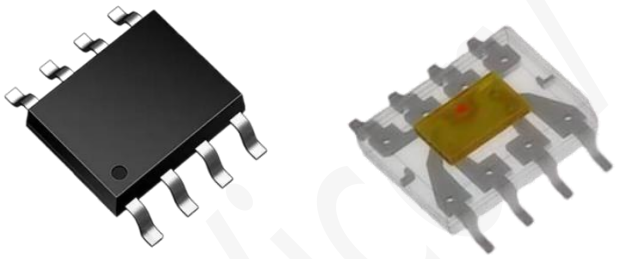
Characteristic:

- Isolation measurement, isolation withstand voltage up to 3kv@50HZ, 1min can measure 1~60A AC and DC current
- 5V/3.3V power supply selection
- SOIC8 package
- Extremely low current lead impedance: 0.8mΩ
- Support Viout – Vref differential output mode
- Zero voltage hysteresis close to 0
- Response time as low as 5uS
- Wide operating temperature range: -40~125°C/-55~125°C for selection

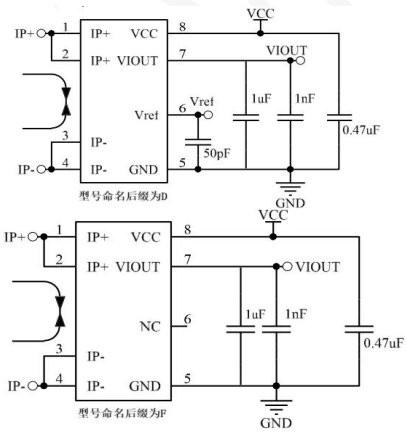
  High accuracy: <1% accuracy error at normal temperature

  Accuracy error <3% in the whole temperature range
- Strong driving capability, load as low as 2.2kΩ
- Extremely easy-to-use peripheral circuits
- Supports fully automatic wave soldering and tape and reel packaging
- Not affected by wire magnetic fields, external magnetic fields, and geomagnetic fields. High power supply rejection ratio.
- Independent research and development, no technology dependence

Product appearance picture:



Typical application diagram:



Overview:

VCS712 is a member of Wakeway's fully integrated Hall current sensor product line. The main differential output mode is convenient for downstream applications. Its ultra-wide dynamic detection capability supports customers to detect measured current ranges as low as 1A and as high as 50A. It allows users to detect load current conditions under the condition of insulation isolation, and is suitable for replacing power resistors, linear optocouplers, transformers and other passive or discrete sensor detection solutions.

The VCS712 series is an isolated current detection chip that works on the open-loop Hall sensor detection principle. By introducing the high-voltage side current wire into the package, based on the magnetic effect of the current, the equal-proportional magnetic field generated around the measured wire is sensed by the magnetic sensor of the built-in chip and converted into a processable equal-proportional voltage signal. This voltage signal After built-in high-precision ADC read amplification, combined with digital calibration technology, environmental variables such as temperature, noise, hysteresis, nonlinearity, etc. are removed, and the final output voltage value is close to the ideal transformation ratio to the measured current value, achieving isolation. current measurement.

VCS712 adopts fully automatic production and processing, which can bring customers consistency, high quality, high reliability and low cost that cannot be matched by discrete solutions. The standard package design is very suitable for customers to carry out batch automatic patch production. It is the best solution for power device current detection, power supply, load detection and other applications. We are committed to researching core chip technology to bring optimal current detection to customers. Solutions are the purpose.

SJ20790-2000 认证

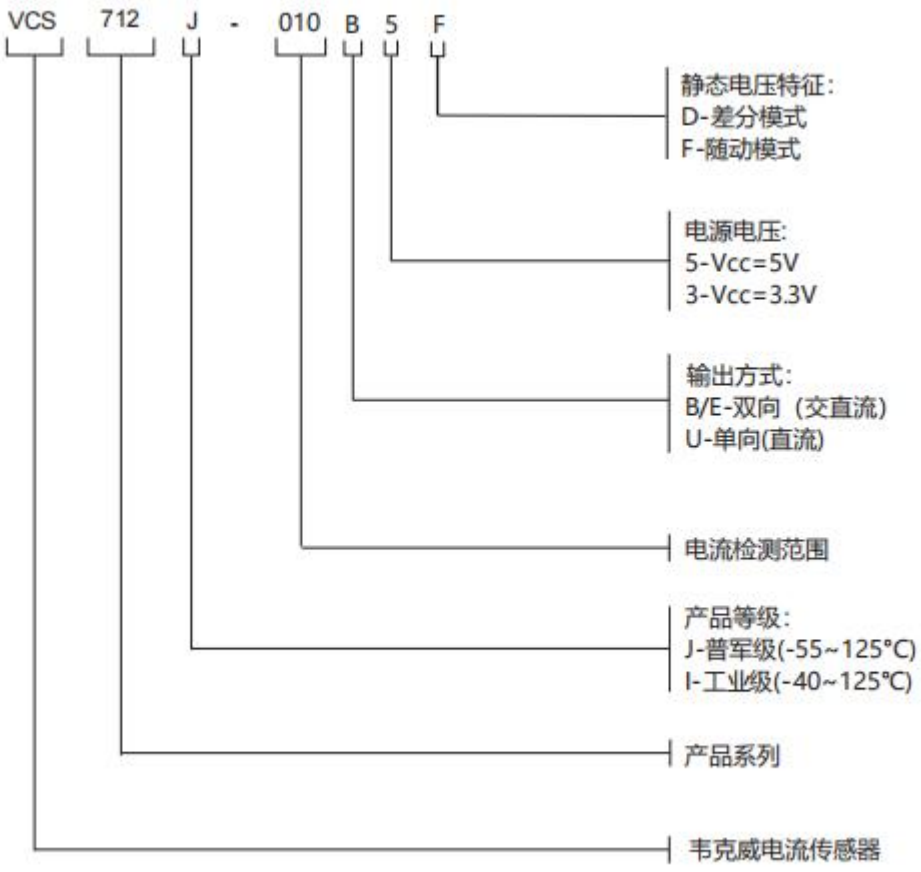
Selection table:

Model	Temp Range(°C)	Detect current(A)	Sensitivity (mV/A)	Zero output(V)	Rated output(V)	Special Code	Voltage Reference (V)
VCS712I-010B5F	(-40~125℃)	±10	200	B(0.5Vcc)	2	F	NC
VCS712I-020B5F		±20	100				
VCS712I-025B5F		±25	80				
VCS712I-030B5F		±30	66				
VCS712I-040B5F		±40	50				
VCS712I-050B5F		±50	40				
VCS712I-010U5F		10	400	U(0.1Vcc)	4		
VCS712I-020U5F		20	200				
VCS712I-030U5F		30	133				
VCS712I-040U5F		40	100				
VCS712I-050U5F		50	80				
VCS712I-010E5D		±10	200	E(2.5)	2	D	2.5
VCS712I-020E5D		±20	100				
VCS712I-025E5D		±25	80				
VCS712I-030E5D		±30	66				
VCS712I-040E5D		±40	50				
VCS712I-050E5D		±50	40				
VCS712I-010B3F		±10	132	B(0.5Vcc)	1.32	F	NC
VCS712I-020B3F		±20	66				
VCS712I-030B3F		±30	44				
VCS712I-040B3F		±40	33				
VCS712I-050B3F		±50	26.4				
VCS712I-010U3F		10	264	U(0.1Vcc)	2.64		
VCS712I-020U3F		20	132				
VCS712I-030U3F		30	88				
VCS712I-040U3F		40	66				
VCS712I-050U3F		50	52.8				

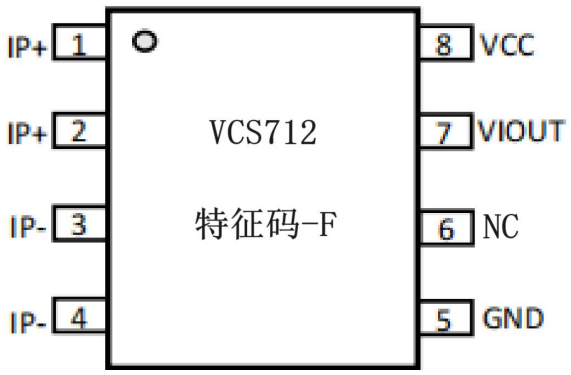
Remarks: -55~125 (VCS712J) products are available. For more ordering models, please contact Wakeway' s technical staff.

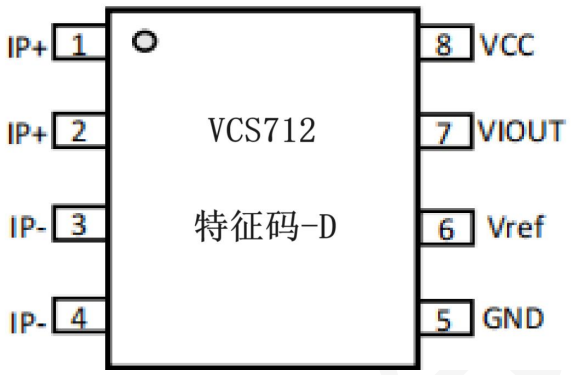
E	When there is no current in the IP, VIOUT@0A=VREF=2.5V, which is suitable for bidirectional current detection. The zero point and sensitivity do not change with the VCC ratio.
B	When there is no current in the IP, VIOUT@0A=0.5VCC, which is suitable for bidirectional current detection. The zero point and sensitivity change with the VCC ratio.
U	When there is no current in the IP, VIOUT@0A=0.1VCC, which is suitable for unidirectional current detection. The zero point and sensitivity change with the VCC ratio.
D	Differential mode, the 6th pin of the chip is the VREF pin, which is suitable for typical circuit and differential circuit design. The differential circuit can effectively reduce environmental and temperature interference.
F	Follow-up mode, the 6th pin of the chip is NC pin, no special definition, suitable for typical circuit design
Remark 1: When selecting feature code F, the default 0A output is B/U. When selecting feature code D, the default 0A output is E. Remark 2: The sensitivity is equal to the rated output/rated current.	

Naming rules:



Pin definition:





Pin number	Pin name	Describe
1/2	IP+	Primary current input positive terminal, supports only connecting 1 or 2
3/4	IP-	The negative terminal of the primary current output supports only connecting 3 or 4
5	GND	Weak current GND isolated from primary current lines
6	NC	Undefined, left empty
	VREF	Reference terminal, supports input and output, VIOUT=Vref (when IP=0A), can be used for differential circuit design
7	VIOUT	The output voltage is equal to the primary current, and IP+VIOUT in the same direction=IP*sensitivity+VIOUT (0A)
8	VCC	Chip supply voltage

Limit parameters:

Characteristic	Symbol	Max	Unit	Remark
Voltage	Vcc	6	V	
Output voltage	VIOUT	6	V	
Max junction temperature	TJ (max)	165	℃	
1 minute isolation withstand voltage test (50Hz)	VISO	3000	VRMS	
Under ambient temperature conditions,Continuously load the maximum IP value	IPmax	40	A	It is directly related to the heat dissipation capacity of PCB. This data relies on WKW demo test board
Under ambient temperature conditions,Transient Overload IP Line End Capability	IPover	80	A	It is directly related to the heat dissipation capacity of PCBdemo. This data relies on Yu Weikewei's test board 1pulse100ms, 1% duty cycle

Electrical performance parameters:

Characteristic	Symbol	Min	Typical value	Max	Unit	Remark/Condition
Supply voltage	Vcc	4.5	5	5.5	V	
Supply current	ICC		20		mA	
Primary current impedance	RP		0.8		mΩ	
Reference voltage	VREF		2.5		V	Special CodeD
Zero output	Voq		2.5		V	E,See selection table for details
			0.5vcc		V	B,See selection table for details
			0.1vcc		V	U,See selection table for details
Rated output (Viout– Vref)	VFS		2		V	The suffix isB5F/E5F
			4		V	The suffix isU5F,See selection table for details
			1.32		V	The suffix isB3F,See selection table for details
Sensitivity	Sens		VFS/IPR		mV/A	See selection table for details
Rated current	IPR	1		60	A	See selection table for details
Zero drift	YD	-3	±1	3	%	
Thermal zero drift	δ T	-1	±0.5	1	%	
Ripple	Voq_pp			100	mV	
Response time	tresponse			10	uS	
Bandwidth	f		100		kHz	
Linearity	ELIN		±1		%	
Accuracy	ACC		±1		%	25℃
Full temperature range accuracy	ACC	-3		3	%	See selection table for full temperature range

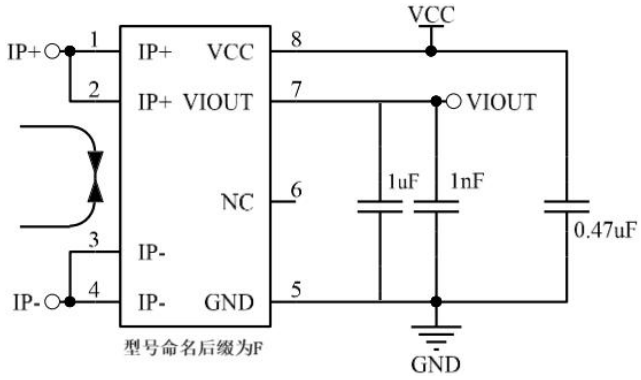
Application circuit:

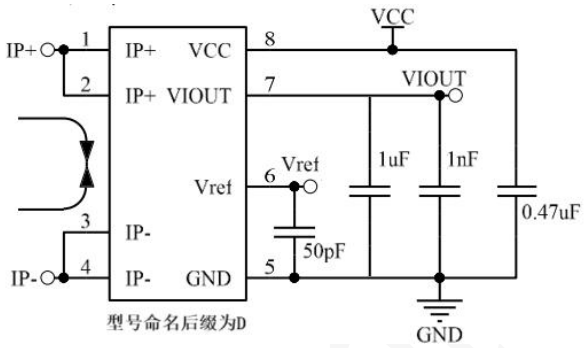
Introduction: The design of Typical application circuit is simple and convenient, and is generally used in environments with small temperature changes and external electromagnetic interferenc e; differential application circuits have good anti-interference properties and are suitable for envi ronments with large temperature changes and external electromagnetic interference;

Notice:

1、The output capacitance at the VIOUT terminal can be adjusted according to frequency and ripple requirements (the larger the capacitance, the lower the ripple and frequency)
2、When designing, it is necessary to consider whether the sensor Output voltage is within the ADC acquisition range.ÿ

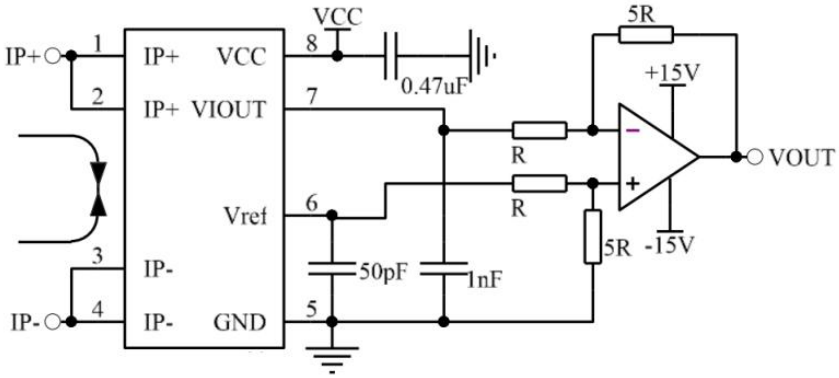
- Typical application circuit



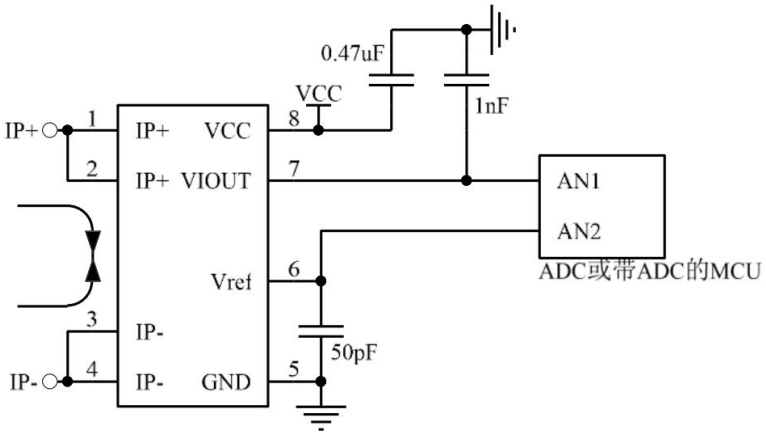


- Differential application circuit

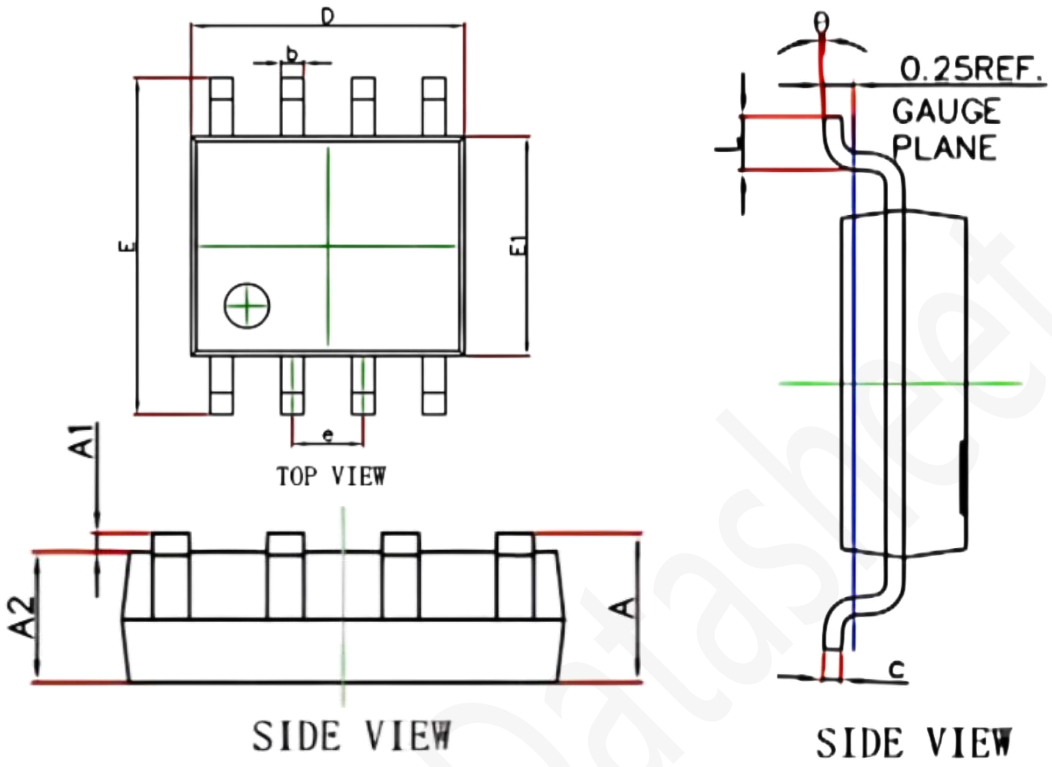
① Hardware differential acquisition circuit



② Software differential acquisition circuit



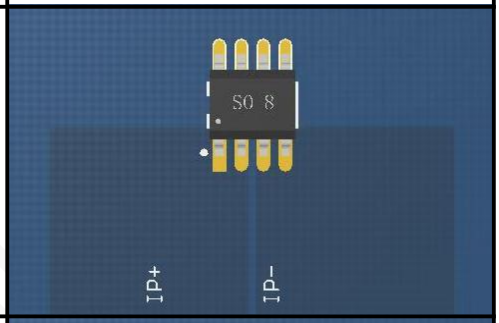
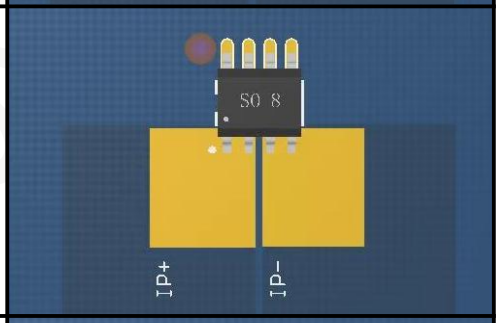
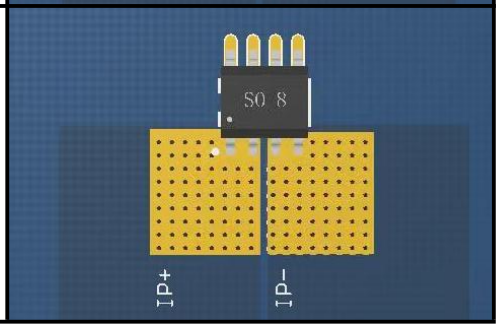
Package information:



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
D	4.700	5.100	0.185	0.201
E1	3.800	4.000	0.150	0.157
E	5.800	6.200	0.228	0.244
b	0.330	0.510	0.013	0.020
C	0.170	0.250	0.007	0.010
e	1.270(BSC)		0.050（BSC）	
L	0.400	1.270	0.016	0.050
θ	0	8	0	8

Wiring reference:

The VCS712 model current sensor is packaged in SOIP-8 and has the characteristics of small size and large measurement range, so its PCB wiring design is particularly important. The following suggestions are

Continuous current	Cabling recommendations	Arrangement
＜10A	●Standard SOIP-8 package wiring can be used, and the pin end should Full solder coverage; ●If window wiring design is adopted, temperature drift can be reduced;	
⩾10A	●Adopt the wiring in the figure below, and adopt the window design on the IP end surface; ●The surface of the window is covered with solder, and the pin end should be fully covered with solder;	
⩾30A	●Adopt the wiring in the figure below, and adopt the through-hole heat dissipation design with windows on the surface of the IP end; ●The window surface is covered with solder H>0.5mm, and the pin end should be fully covered with solder; ●Copper foil thickness is recommended to be ⩾ 4 ounces or use a multi-layer over-current design	

Note: If the temperature of the current sensor rises above 165°C for more than 1 minute, the current sensor package may be cracked or damaged due to internal heat shrinkage reaction. 165℃ temperature standard reference packaging material properties

Document modification record:

Filename	Version	Content	Modified by	Date
VCS712Product Specification	1.0	Document archiving	Yin	2024.1.17