VCS724

Anti-interference-high-precision current sensor

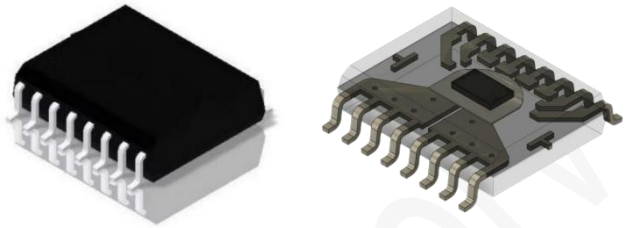
Characteristic：

- Isolation measurement, isolation withstand voltage up to 4.8kv@50HZ, 1min can measure ±10~±65A AC and DC current
- 5V power supply
- SOP-16 package
- Extremely low current lead impedance: 1mΩ
- Response time as low as 4uS
- Wide operating temperature range: -40~125°C/-55~125°C for selection High accuracy: <1% accuracy error at normal temperature

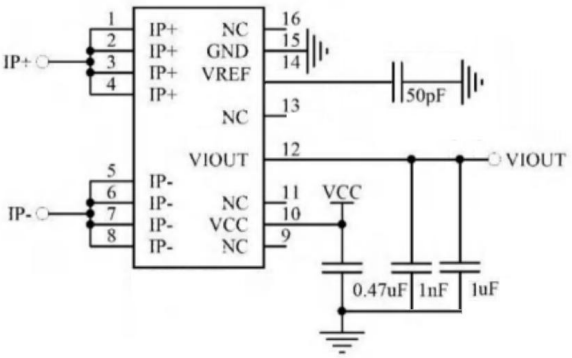
Accuracy error <3% in the whole temperature range

- Strong driving capability, load as low as 0.6kΩ
- Extremely easy-to-use peripheral circuits
- Surge current: 13kA8/20uS
- Resistant to interference from wire magnetic fields, external magnetic fields, and geomagnetic fields
- High power supply rejection ratio

Product appearance picture:



Typical application diagram:



Overview:

WKW VCS724 series of current sensor ICs are an economical and accurate solution for AC or DC current sensing in automotive, consumer and communication systems. The device consists of a precise, low-offset linear Hall sensor circuit with a copper conductive path located near the chip surface. An applied current flowing through this copper conductive path creates a magnetic field, which is sensed and converted into a proportional voltage by the integrated Hall IC. Differential sensing of current to suppress stray fields, improving accuracy in magnetically noisy environments. Due to their internal construction, the current conductors are inherently isolated from the device signal leads, which results in high isolation voltage ratings for the various offered packages.

The VCS724 device is available in a small, low-profile surface-mount SOP16 package. The leadframe is plated with 100% matte tin and is compatible with standard lead-free (Pb) printed circuit board assembly processes. It is available in a variety of compact packages. This small package is ideal for space-constrained applications. application, while also saving costs due to reduced circuit board area. It has a high degree of integration and can meet various application requirements. These current ratings vary based on ambient operating temperature.

The resistance of this conductive path is typically 1 mΩ, providing low power loss. Typical applications include motor control, load sensing and management, switch mode power supplies, and overcurrent fault protection

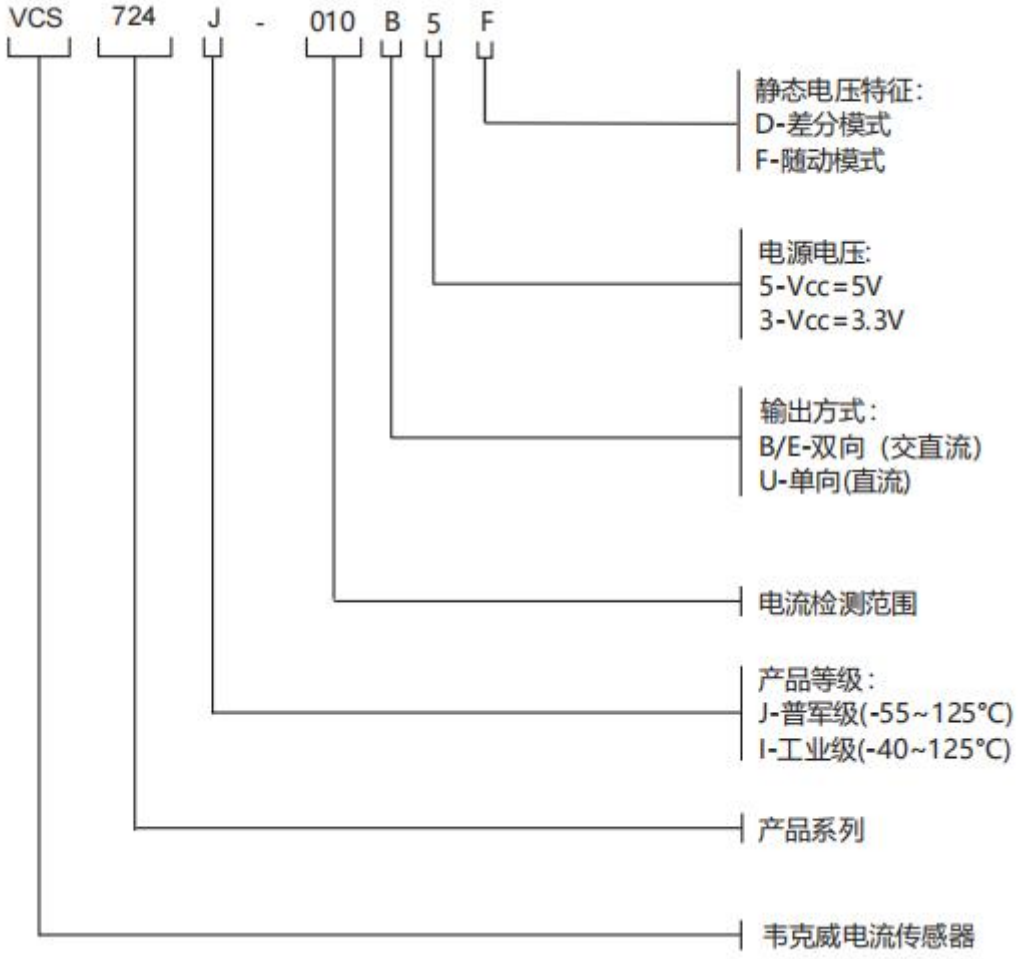
SJ20790-2000 认证

Selection table:

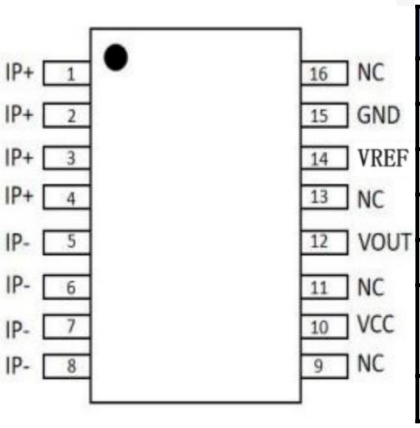
Model	Temp Range(°C)	Detect current(A)	Sensitivity (mV/A)	Zero output(V)	Rated output(V)	Special Code	Voltage Reference (V)
VCS724I-20E5D	(-40~125℃)	±20	100	E(2.5)	2	D	2.5
VCS724I-25E5D		±25	80				
VCS724I-30E5D		±30	66				
VCS724I-40E5D		±40	50				
VCS724I-50E5D		±50	40				
VCS724I-65E5D		±65	30.75				
VCS724I-20U5F		20	200	U(0.1Vcc)	4	F	NC
VCS724I-25U5F		25	160				
VCS724I-30U5F		30	132				
VCS724I-40U5F		40	100				
VCS724I-50U5F		50	80				
VCS724I-65U5F		65	60.5				
VCS724I-20E3D		±20	66	E(1.65)	1.32	D	1.65
VCS724I-30E3D		±30	44				
VCS724I-40E3D		±40	33				
VCS724I-50E3D		±50	26.4				
VCS724I-65E3D		±65	20.3				
VCS724I-20U3F		20	132	U(0.1Vcc)	2.64	F	NC
VCS724I-30U3F		30	88				
VCS724I-40U3F		40	66				
VCS724I-50U3F		50	52.8				
VCS724I-65U3F		65	40.6				
Remark: -55~125℃ (VCS724J) products are available. For more ordering models, please contact Wakeway technical staff.							

E	IP When there is no current, VIOUT@0A=VREF, suitable for bidirectional current detection, 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 chip has a VREF reference 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 chip has no VREF reference pin, suitable for typical circuit design
Remark1: When selecting Special CodeF, the default 0A output is B/U. When selecting Special CodeD, the default 0A output is E Remark2: Sensitivity size is equal to Rated output/Rated current	

Naming rules:



Pin definition:



Pin numbe	Pin name	Describe
1/2/3/4	IP+	Primary current input positive terminal
5/6/7/8	IP-	Primary current output negative terminal
9/11/13/16	NC	Undefined, left empty
10	VCC	Chip Supply voltage
12	VIOUT	Output voltage equal to the primary current, and IP+VIOUT=IP*Sensitivity in the same direction
14	NC	Undefined, left empty
	VREF	Reference terminal, supports input and output, VIOUT=Vref (when IP=0A), can be used for
15	GND	Weak current GND isolated from primary current lines

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	4800	VRMS	
Under ambient temperature conditions, Continuously load the maximum IP value	IPmax	65	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	125	A	It is directly related to the heat dissipation capacity of the PCB demo. This data is based on Wakeway'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	
		3.0	3.3	3.6	V	
Supply current	ICC		10		mA	
Primary current impedance	RP		1		mΩ	
Reference voltage	VREF		2.5		V	Special CodeD，5V
			1.65		V	Special CodeD，3.3V
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/E5D
			4		V	The suffix isU5F,See selection table for details
			1.32		V	The suffix isE3D,See selection table for details
			2.64		V	The suffix isU3F,See selection table for details
Sensitivity	Sens		VFS/IPR		mV/A	See selection table for details
Rated current	IPR	1		65	A	See selection table for details
Zero drift	YD	-3	±1	3	%	
Thermal zero drift	δ T	-1	±0.5	1	%	
Ripple	Voq_pp		20		mV	
Response time	tresponse			10	uS	
Bandwidth	f			250	kHz	
Linearity	ELIN		±1		%	
Accuracy	ACC		±1		%	25℃
Full temperature range accuracy	ACC	-3		3	%	See selection table for full temperature range

Application circuit:

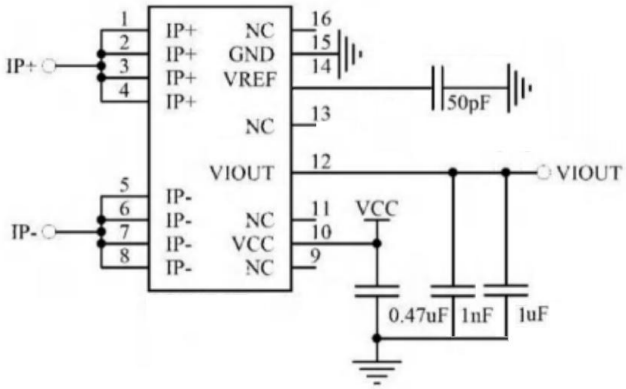
Introduction: The design of Typical application circuit is simple and convenient, and is generally used in environments with small temperature changes and external electromagnetic interferenc e; differential application circuits have good anti-interference properties and are suitable for envi ronments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

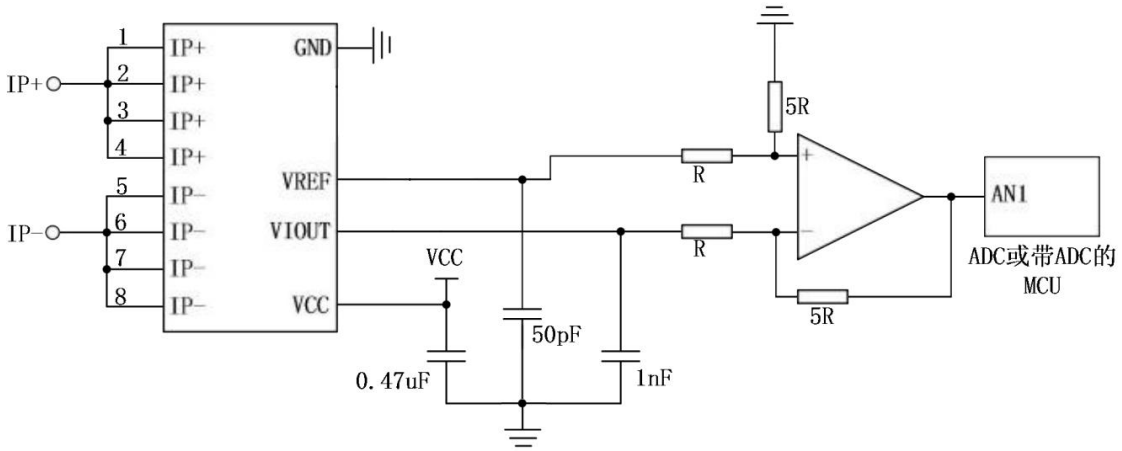
② When designing, it is necessary to consider whether the sensor Output voltage is within th e ADC acquisition range.

- Typical application circuit

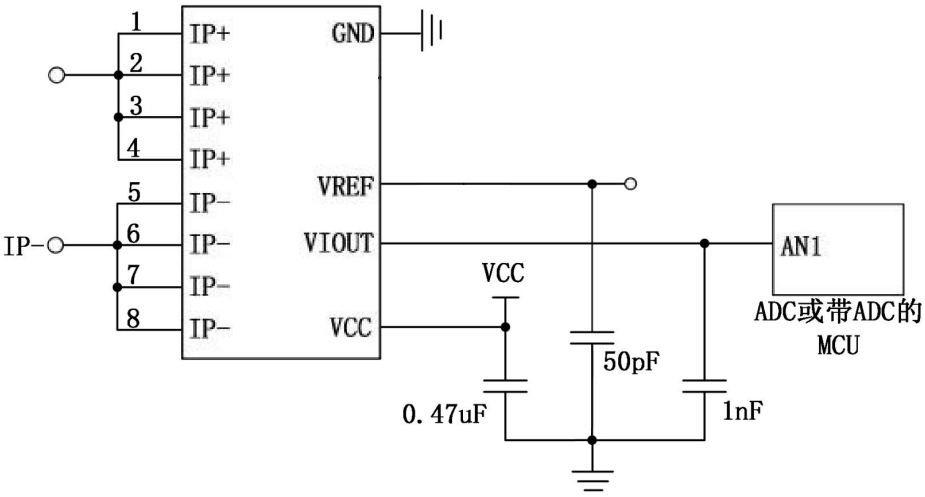


- Differential application circuit

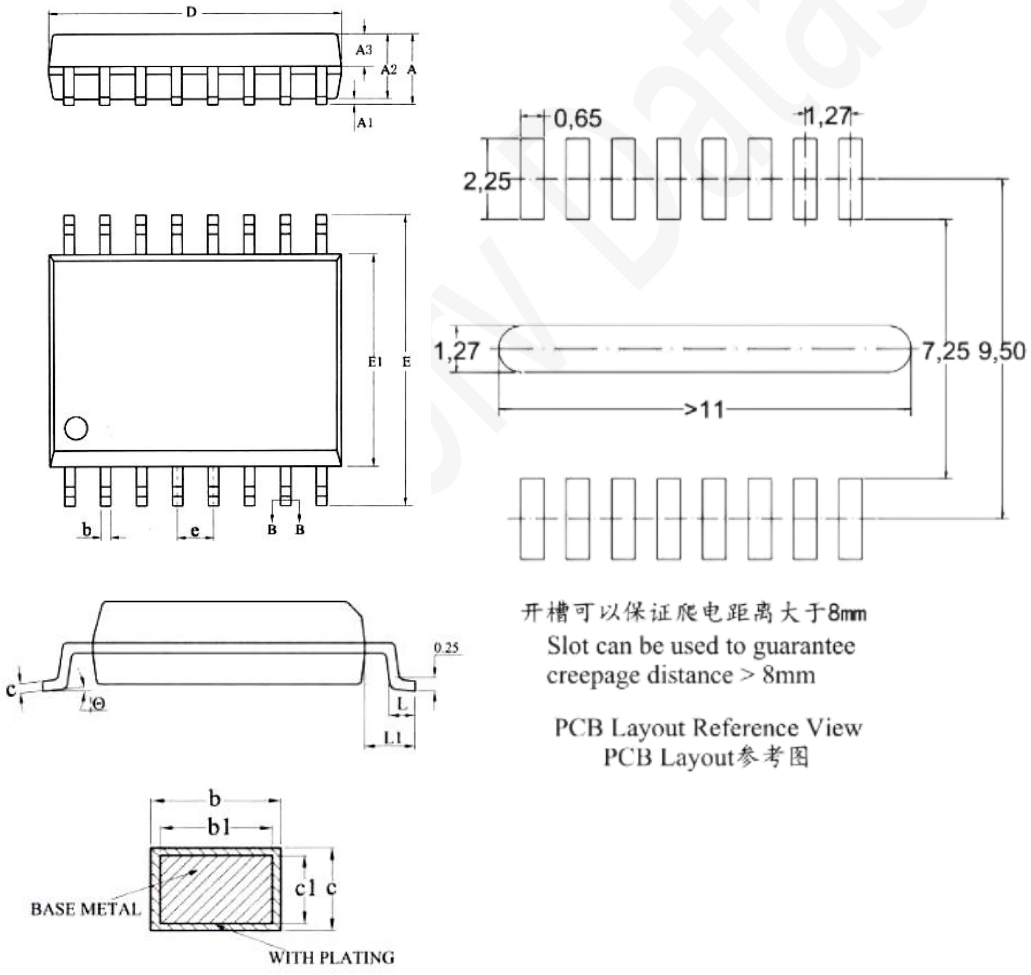
① Hardware differential acquisition circuit:VOUT=(VIOUT-VREF)*(5R/R)



② Single-ended acquisition circuit



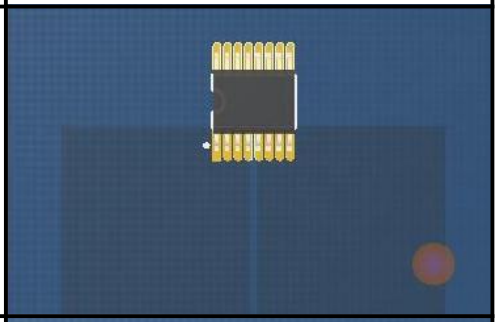
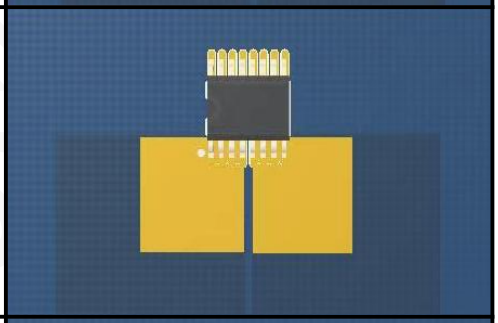
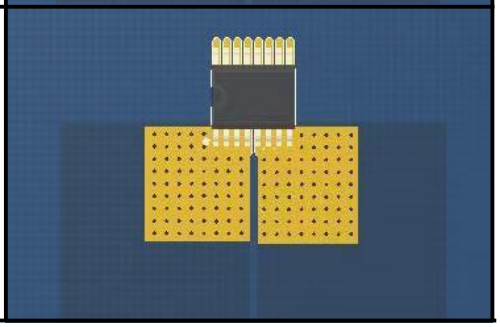
Package information:



Sy	毫米		
	MIN	NOM	MAX
A	/	/	2.65
A1	0.10	/	0.30
A2	2.25	2.30	2.35
A3	0.97	1.02	1.07
b	0.35	/	0.44
b1	0.34	0.37	0.39
C	0.25	/	0.31
c1	0.24	0.25	0.26
D	10.10	10.30	10.50
E	10.26	10.41	10.60
E1	7.30	7.50	7.70
e	1.27BSC		
L	0.55	/	0.85
L1	1.40BSC		
θ	0	/	8'

Wiring reference:

The VCS724 model current sensor is packaged in SOP-16. It is small in size and has large overcurrent. The PCB wiring design has the following recommendations.

Continuous current	Cabling recommendations	Arrangement
< 30A	●Standard SOIP-16 package wiring can be used, and the pin ends should be fully covered with solder; ●If window wiring design is adopted, temperature drift can be reduced;	
⩾30A	●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;	
⩾50A	●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. The 165°C temperature standard refers to the packaging material properties (please consult technical personnel for details on the overcurrent capability of special PCB boards).

Document modification record:

Filename	Version	Content	Modified by	Date
VCS724 Product Specification	1.0	Document archiving	Yin	2024.1.26