CC6903

Single chip Hall effect current sensor

10A/20A/30Aseries

Overview

CC6903 It is a high-performance single-ended output linear current sensor, which can be more effective for AC (AC) Or DC (DC) Current detection solutions are widely used in industrial, consumer and communications equipment.

CC6903 A high-precision, low-noise linear Hall circuit and a low-impedance main current wire are integrated inside. When the sampling current flows through the main current wire, the magnetic field generated by it induces a corresponding electrical signal on the Hall circuit, and the signal processing circuit outputs a voltage signal, making the product easier to use. Linear Hall circuit adopts advancedBiCMOSProcess production, including high-sensitivity Hall sensor, Hall signal pre-amplifier, high-precision Hall temperature compensation unit, oscillator, dynamic offset cancellation circuit and amplifier output module. In the absence of a magnetic field, the static output is 50%VCC.

At the power supply voltage 3.3V Under conditions,OUT allowable 0.33~2.97V Varies linearly with the magnetic field, the linearity can reach 0.4%.CC6903 The internal integrated dynamic offset cancellation circuit enables IC The sensitivity is not affected by external pressure and ICThe influence of package stress.

CC6903 provide SOP8 Package, operating temperature range-40~125°C.

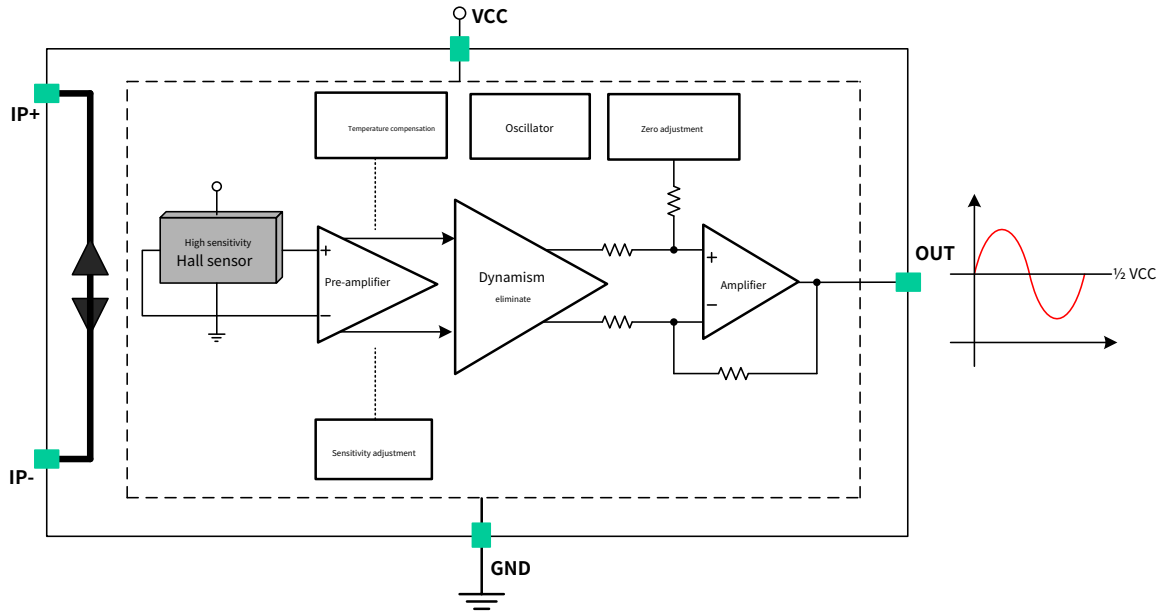
characteristic

- The static common mode output point is 50% VCC
- Wide measuring range, 10A/20A/30A
- 1MHz Chopping frequency, high bandwidth, low noise, single-ended analog
- output wire pin to signal pin 100VSafe isolation voltage and low power
- consumption
- Room temperature error 1%, Total temperature error 3%
- The temperature stability is good, the internal use of the core of the patented Hall signal amplifier circuit and temperature Degree compensation circuit
- Strong anti-interference ability
- Resistance to mechanical stress, magnetic parameters will not deviate due to external pressure
- ESD (HBM) 6000V

application

- motor control
- Load monitoring system
- Switching power supply
- Overcurrent fault protection

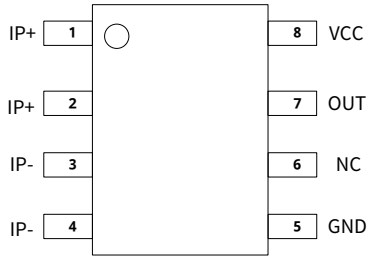
Functional block diagram



Ordering Information

product name	Sensitivity (mV/A)	Package outline	package
CC6903SO-10A	132	SOP8	reel, 2000 Piece/disk
CC6903SO-20A	66	SOP8	reel, 2000 Piece/disk
CC6903SO-30A	44	SOP8	reel, 2000 Piece/disk

Pin definition



SOP8 Encapsulation

name	Numbering	Features	name	Numbering	Features
IP+	1	Sampling current positive terminal	GND	5	Ground
IP+	2	Sampling current positive terminal	NC	6	Need to be suspended
IP-	3	Sampling current negative terminal	OUT	7	Signal output
IP-	4	Sampling current negative terminal	VCC	8	voltage

Limit parameters

parameter	symbol	Numerical value	unit
voltage	V_{CC}	7	V
The output voltage	V_{OUT}	-0.3~VCC+0.3	V
Output source current	$I_{OUT(SOURCE)}$	400	uA
Output sink current	$I_{OUT(SINK)}$	30	mA
Universal insulation voltage	V_{ISO}	100	VAC
Working temperature	T_a	-40~125	°C
Maximum junction temperature	T_J	165	°C
Storage temperature	T_S	-55~150	°C
Magnetic field strength	B	Unlimited	mT
Electrostatic protection	ESD(HBM)	6000	V
Transient inrush current at current sampling terminal	IP	1 pulse, 100 ms	100A

Note: Do not exceed the maximum rating during application to prevent damage. Long-term operation at the maximum rating may affect the reliability of the device.

Recommended working environment

parameter	symbol	Minimum	Maximum value	unit
voltage	V_{CC}	3.0	3.6	V
Ambient temperature	T_a	-40	125	°C
DC current capacity	IP	-30	30	A

Note: The actual current capacity of the chip should be determined according to the thermal resistance of the chip and the actual ambient temperature.

Working characteristics (Unless otherwise specified, V_{CC}= 3.3V @ 25 °C)

parameter	symbol	condition	Minimum	Typical value	Maximum value	unit
Electrical characteristics						
Supply voltage	V_{CC}	-	3.0	-	3.6	V
Quiescent Current	I_{CC}	OUT Hang in the air	-	5	8	mA
Output capacitive load	C_L		-	-	1	nF
Output resistance load	R_L		20	-	-	kΩ
Transmission delay time	t_D			1	1.2	us
Rise Time	tr		-	2	3.6	us
System bandwidth	BW	-3dB	-	80	-	kHz
Linearity error	Lin_{ERR}		-	0.4	1	%
Symmetry error	Sym_{ERR}		-	0.8	1.5	%
Static output point	$V_{OUT(Q)}$		1.635	1.65	1.665	V
PORtime	T_{POR}	Output from 0 To 90%	-	10	-	us
Main current terminal resistance	R_P		-	1.5	1.8	mΩ
Junction to ambient thermal resistance	θ_{JA}	Copper foil is connected to 1,2 Feet and 3,4 Feet with an area of 1500 mm^2,thickness 2 oz	-	25	-	°C/W

10A series

parameter	symbol	condition	Minimum	Typical value	Maximum value	unit
Electrical characteristics						
Current range	I_P	-	-10	-	**10**	A
Sensitivity	Sens	Full current range	**127**	**132**	**135**	mV/A
Output noise	$V_{NOISE(PP)}$		-	**20**	-	mV
Zero current output temperature coefficient	$\Delta V_{OUT(Q)}$		-	**0**.20	-	mV/°C
Sensitivity temperature coefficient	ΔSens		-	**0**.017	-	mV/A /°C
Total output error	E_{TOT}		-3.0	-	**3**.0	%

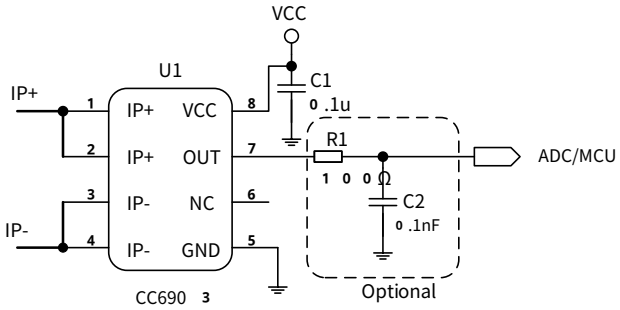
20A series

parameter	symbol	condition	Minimum	Typical value	Maximum value	unit
Electrical characteristics						
Current range	I_P	-	-20	-	**20**	A
Sensitivity	Sens	Full current range	**63**	**66**	**69**	mV/A
Output noise	$V_{NOISE(PP)}$		-	**13**	-	mV
Zero current output temperature coefficient	$\Delta V_{OUT(Q)}$		-	**0**.22	-	mV/°C
Sensitivity temperature coefficient	ΔSens		-	**0**.011	-	mV/A /°C
Total output error	E_{TOT}		-3.0	-	**3**.0	%

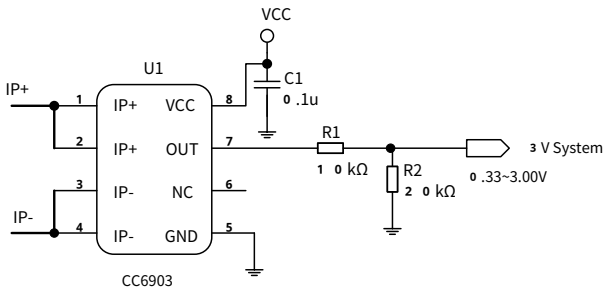
30A series

parameter	symbol	condition	Minimum	Typical value	Maximum value	unit
Electrical characteristics						
Current range	I_P	-	-30	-	**30**	A
Sensitivity	Sens	Full current range	**42**	**44**	**46**	mV/A
Output noise	$V_{NOISE(PP)}$		-	**13**	-	mV
Zero current output temperature coefficient	$\Delta V_{OUT(Q)}$		-	**0**.23	-	mV/°C
Sensitivity temperature coefficient	ΔSens		-	**0**.006	-	mV/A /°C
Total output error	E_{TOT}		-3.0	-	**3**.0	%

Typical application circuit



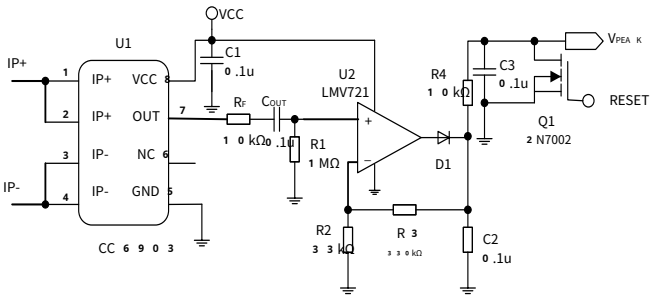
typical application



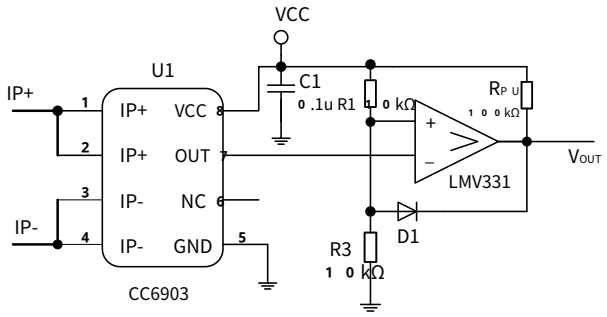
Signal attenuation circuit

Note:$I_{OUT<}$ 0.3 mA, Drive capacity according 0.25mA Calculation, sum of resistance

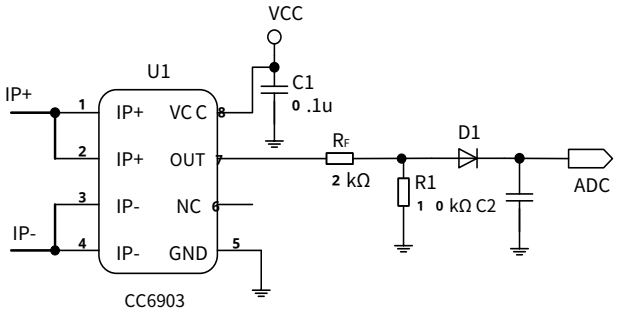
(R1+R2) Need to be greater than 20 kΩ



Current peak monitoring application



Overcurrent fault detector



Rectified output, instead of current transformer application

Output characteristics

CC6903 Static output point (IP = 0 A When) isVCC / 2 .

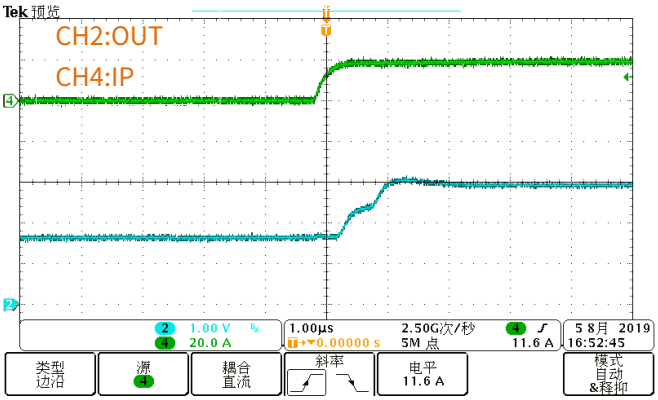
When the current increases,V_{OUT}Increase until the saturation voltage of the output op amp (V_{CC} - Rail voltage); when the current decreases,V_{OUT}Decrease until the saturation voltage of the output op amp (GND + Rail voltage). Core guaranteeVOUT in 0 .33~2.97 V In order to ensure the consistency of mass manufacturing, there is a certain margin in this range, but it is not recommended for customers to use this margin.

When the input current exceeds the range,VOUT The output of the power supply is close to the rail voltage of the power supply. When the input current does not exceed the withstand limit of the chip, the voltage will always be maintained, and the input current will return to the range After being within the range,VOUT The output will return to normal without any damage to the chip.

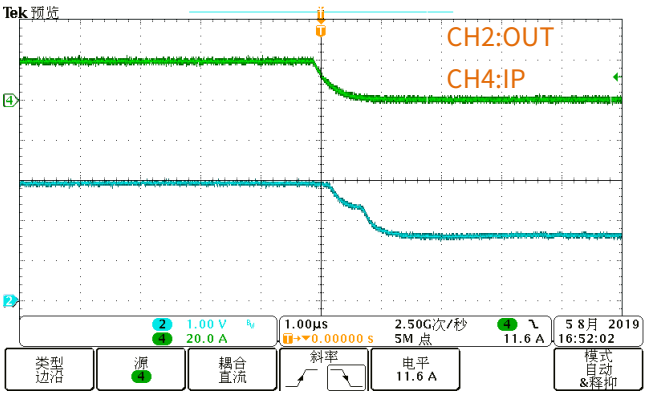
product name	Input Current	Sensitivity (mV/A)	Calculation formula (Note 1)
CC6903SO-10A	-10A ~ +10A	132	V_{OUT} = VCC / 2 + 0 .132 × I_P(A)……(V)
CC6903SO-20A	-20A ~ +20A	66	V_{OUT} = VCC / 2 + 0 .066 × I_P(A)……(V)
CC6903SO-30A	-30A ~ +30A	44	V_{OUT} = VCC / 2 + 0 .044 × I_P(A)……(V)

Note 1 : This formula is only applicable to the calculation of DC current, when AC current is applied, you should pay attention I_{PEAK} - 1 .414 × I_{RMS}, And pay attention to the positive or negative direction of the current.

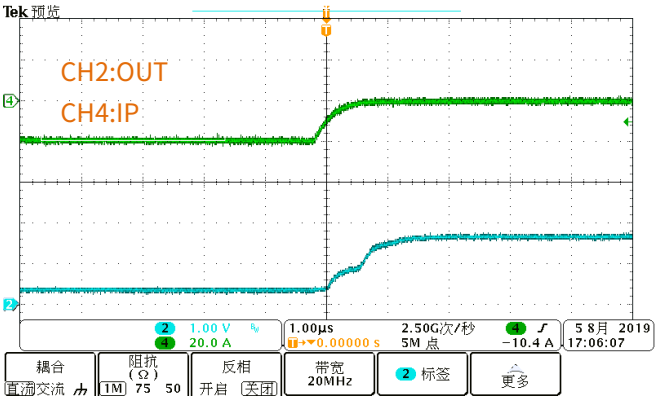
Curve & Wave (Unless otherwise specified, V_{CC}= 3.3V @ 25 °C)



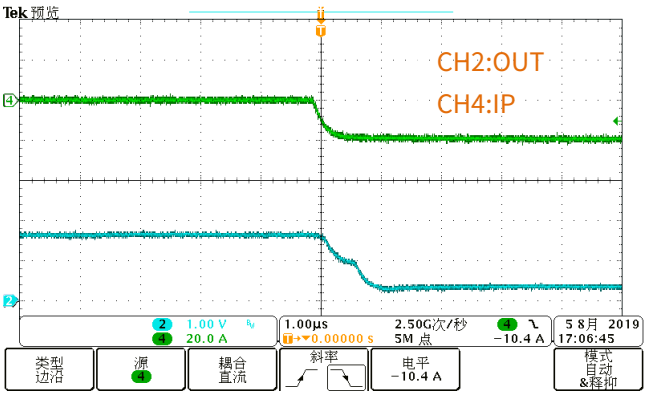
V_{OUT} vs. IP(Forward current rising edge response) (20 A)



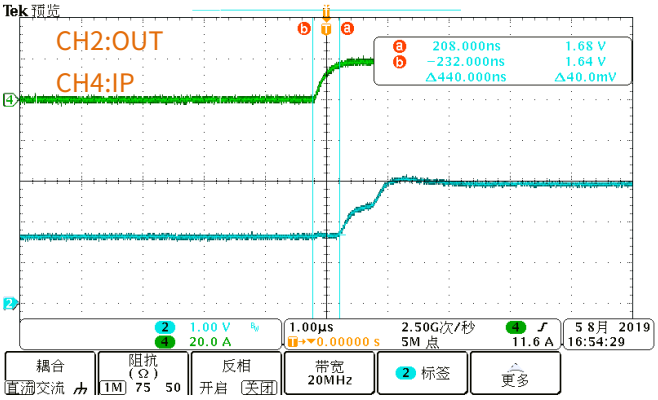
V_{OUT} vs. IP(Forward current falling edge response) (20 A)



V_{OUT} vs. IP(Response to rising edge of negative current) (20 A)

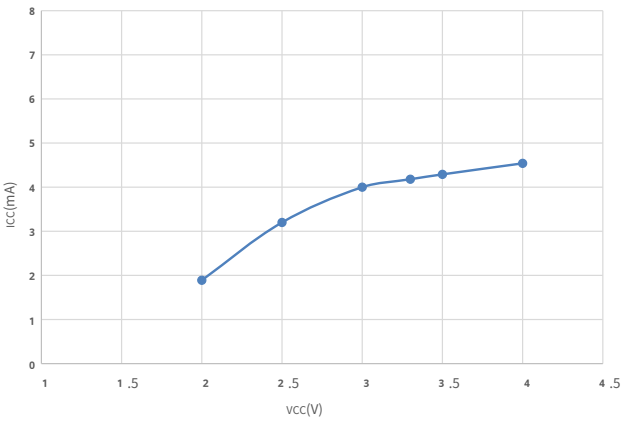


V_{OUT} vs. IP(Response to the falling edge of negative current) (20 A)

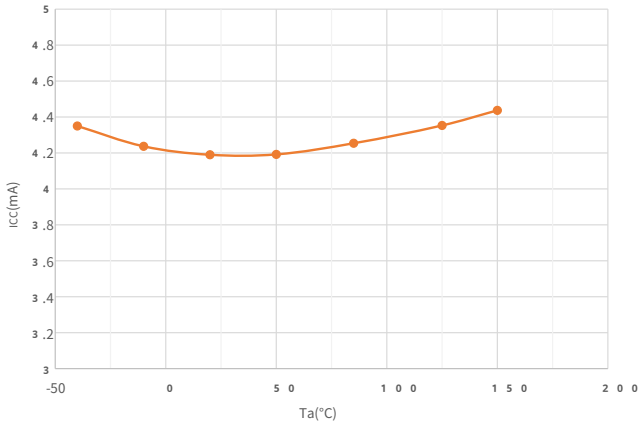


t_DResponse time(20 A)

Quiescent Current

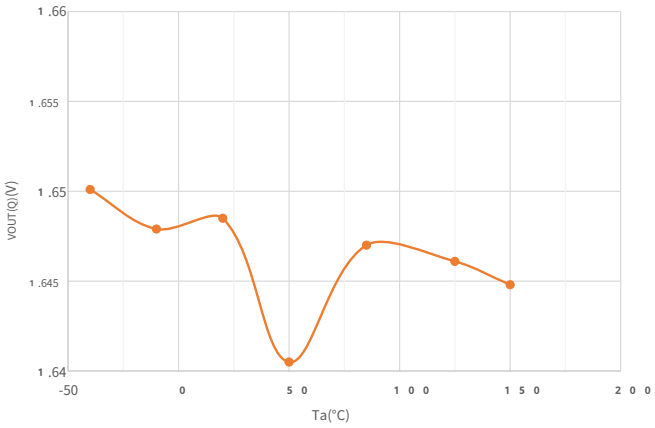


Quiescent Current vs. V_{CC}

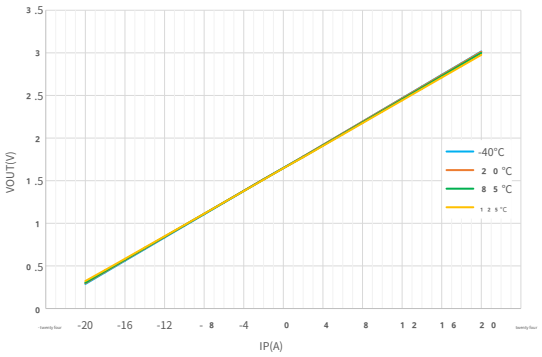


Quiescent Current vs. Ta

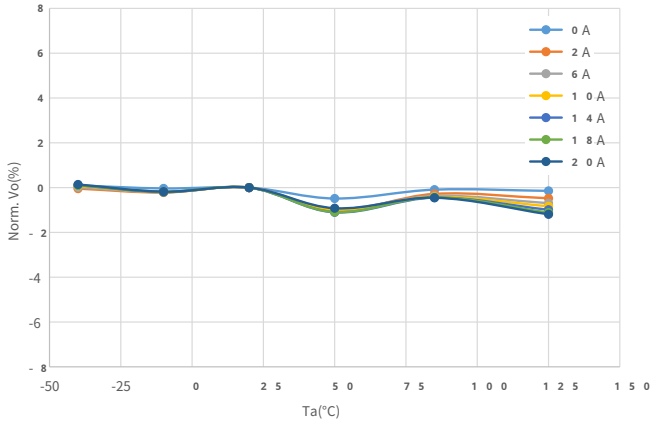
20Aseries



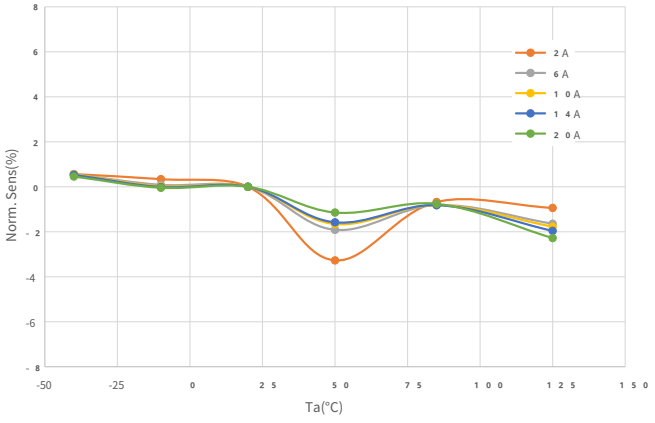
$V_{OUT(Q)}$ vs. Ta (20A)



V_{OUT} vs. IP (20A)



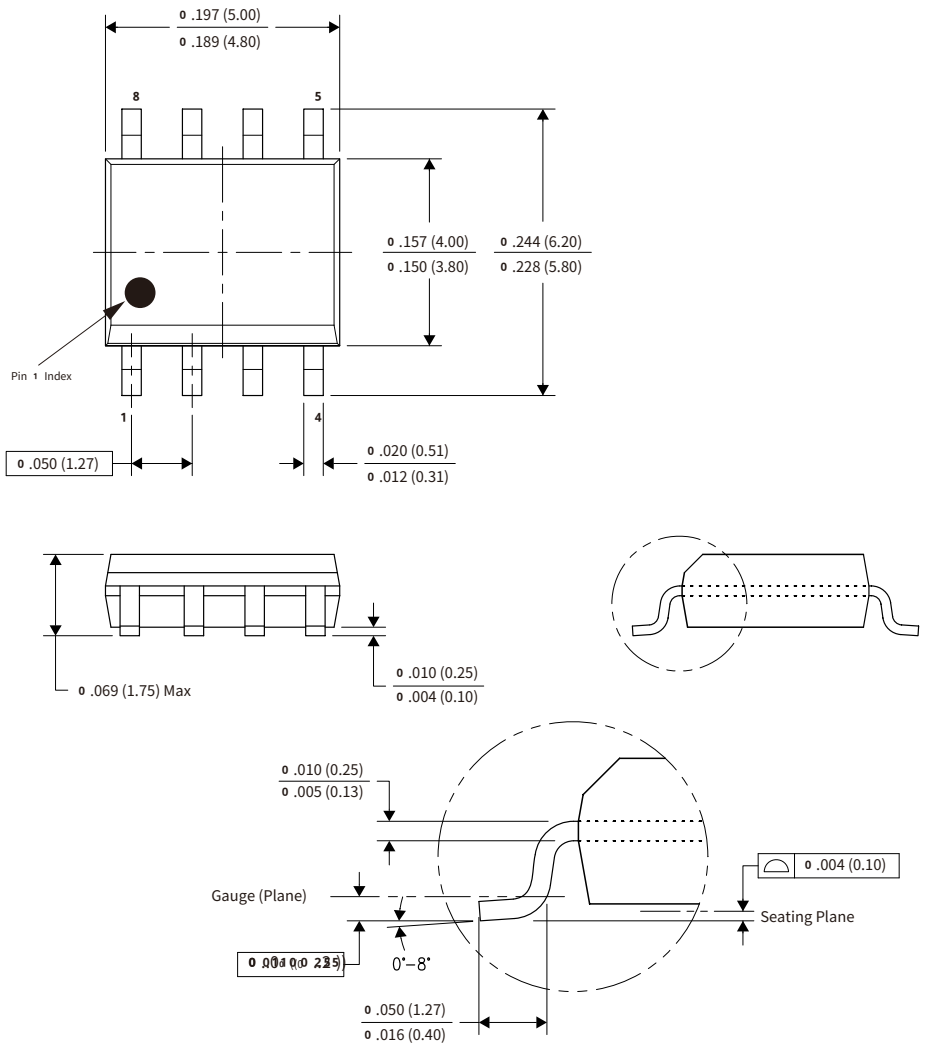
V_{OUT} error vs. Ta (20A)



Sens error vs. Ta (20A)

Dimensions

SOP8 Encapsulation



note:

1. The dimensions are in inches (millimeters).

Marking:

first row: CC6903SOproduct name

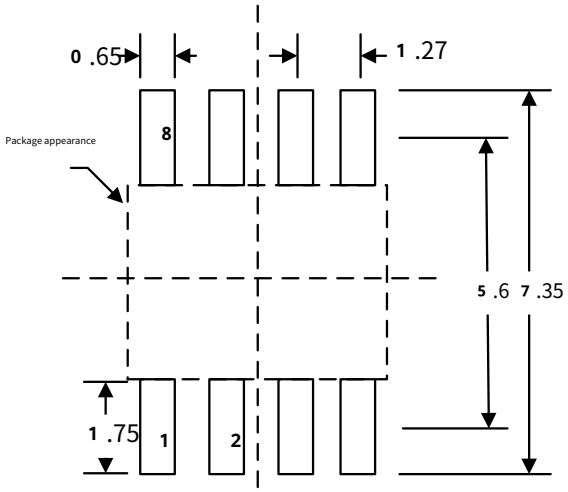
second line:ELC-XXA

- XX：Detection current range

The third row: XXYYWW

- XX – Code
- YY – Last two digits of the year
- WW – Number of weeks

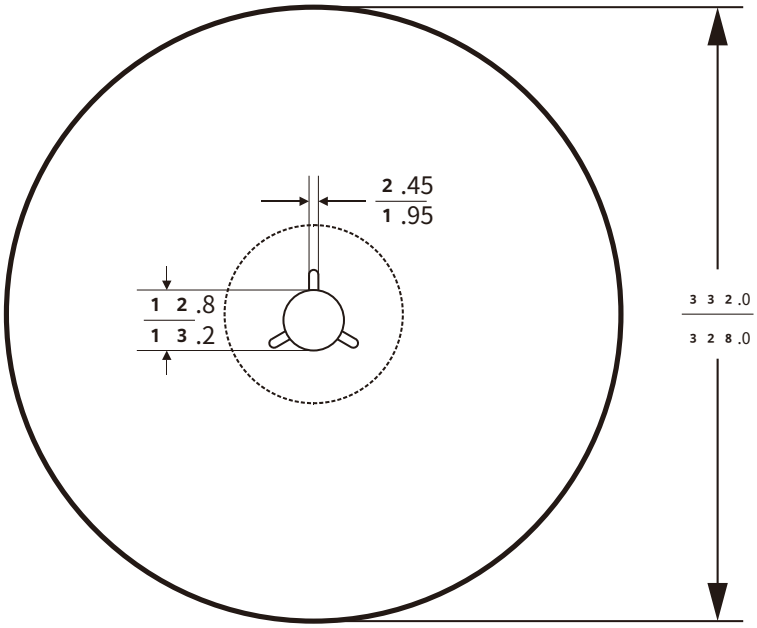
Package reference



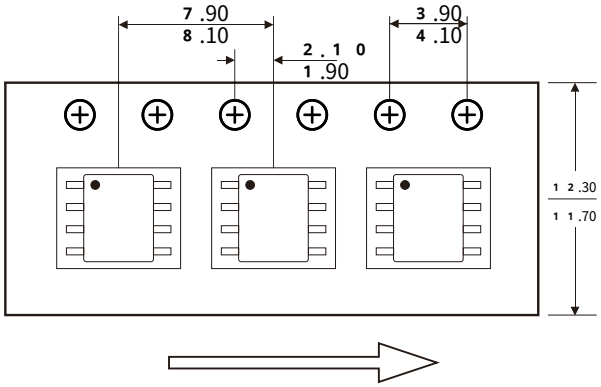
Reference one

note:layout Layout requirements: below the chip, it is not recommended to wire,ProhibitTake the high current line

Packaging & Taping



Reel size information



User Direction of Feed

Note: the front and back of each tape is empty 50 ±2 grid

About Xinjin

Chengdu Xinjin Electronics Co., Ltd. (CrossChip Microsystems Inc.)was founded in 2013 In 1998, it was a national high-tech enterprise engaged in the design and sales of integrated circuits. The company has strong technical strength and has more than forty patents of various types, which are mainly used in Hall sensor signal processing. It has the following product lines:

- ✓ High-precision linear Hall sensor
- ✓ Various Hall switches
- ✓ Single-phase motor driver
- ✓ Single chip current sensor
- ✓ AMRMagnetoresistive sensor

contact us

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