

HX712-05-S/HX712-20-S/HX712-30-S High performance Hall effect current sensor

HX712 is a high-performance Hall effect current sensor known for its precision, excellent linearity, and temperature stability. It measures both DC and AC currents, making it suitable for industrial, consumer, and communication applications.

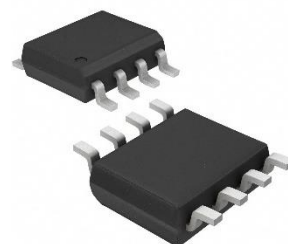
The internal structure of HX712 features a low-noise linear Hall circuit with a low impedance main current wire. The input current flows through an internal $0.9\text{m}\Omega$ wire, generating a magnetic field that induces an electrical signal in the Hall circuit. This signal is processed to produce a usable voltage output.

The sensor's low impedance wire minimizes power loss and heat dissipation while providing inherent insulation with a basic working isolation voltage of 424VRMS and an insulation withstand voltage of 3500VRMS .

Utilizing advanced BiCMOS technology, the linear Hall circuit includes high-sensitivity components such as the Hall sensor group, preamplifier, common mode suppression circuit, temperature compensation unit, oscillator, dynamic offset cancellation circuit, and amplifier output module. In the absence of current, the static output is at 50% VCC. With a 5V supply voltage, the output varies linearly between 0.2V and 4.8V with up to 0.1% linearity.

Additionally, HX712 integrates a differential common mode rejection circuit to prevent external interference from affecting chip output; its dynamic offset elimination ensures stable sensitivity against external pressure or packaging stress.

Packaged in SOP8 format and operating within -40 to $+125^\circ\text{C}$ range, HX712 complies with RoHS regulations.



SOP-8

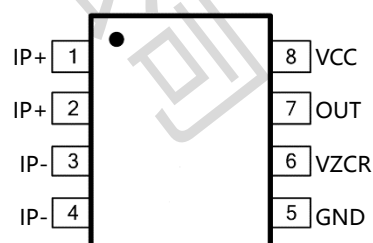
Characteristic

- Providing a zero current reference output of 0.5VCC enables more flexible application modes.
- Provide multiple range options, including 5A, 20A, 30A, with a wide range of applications.
- It offers high isolation and voltage resistance, with a safe isolation voltage of 3500VRMS between wire and signal pins.
- Low loss with a wire resistance of just $0.9\text{m}\Omega$, minimizing power loss and heat dissipation.
- High bandwidth, up to 250kHz , with a step response time of $1.2\text{ }\mu\text{s}$.
- The error at room temperature is 0.5%, and the error over the entire temperature range is $\pm 3\%$.
- It has good temperature stability and adopts Hall signal amplification circuit and temperature compensation circuit.
- Adopting a differential Hall structure, it has strong resistance to external magnetic interference.
- Has the ability to resist mechanical stress, and magnetic parameters will not shift due to external pressure.
- ESD (HBM) has an anti-static ability of 4000V .

Application

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

Chip Pin Description		
NUMBER	NAME	FUNCTION
1	IP+	Sampling current positive terminal
2	IP+	Sampling current positive terminal
3	IP-	Sampling current negative terminal
4	IP-	Sampling current negative terminal
5	GND	Ground
6	VZCR	Zero current reference signal output
7	OUT	Signal output terminal
8	VCC	Voltage at Common Collector



PRODUCT INFORMATION			
Product Name	Sensitivity (mV/A)	Encapsulation	Package
HX712-05-S	400	SOP-8	Braid tape, 2500 volumes
HX712-20-S	100	SOP-8	Braid tape, 2500 volumes
HX712-30-S	50	SOP-8	Braid tape, 2500 volumes

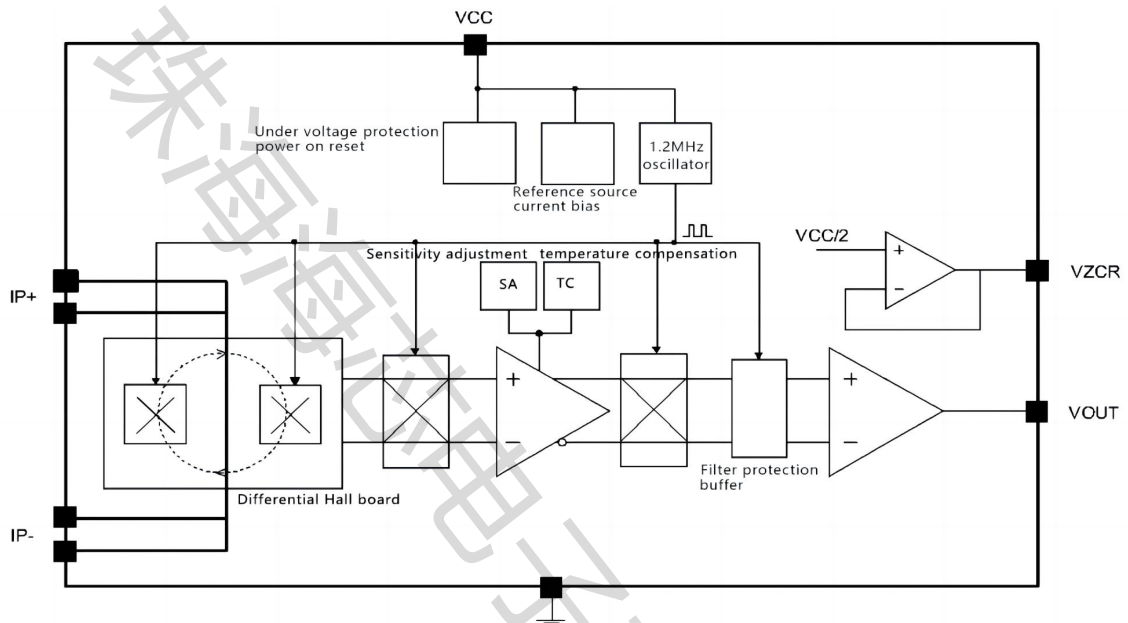
limit Parameter			
ARGUMENT	SYMBOL	NUM	UNIT
Supply voltage	VCC	7	V
Output voltage	VOUT	-0.3~VCC+0.3	V
Output source current	IOUT(SOURCE)	6	mA
Output submerged current	IOUT(SINK)	30	mA
Universal insulation voltage	VISO	3500	VRMS
Input current Peak current (3 seconds)	IPEAK	100	A
Input current Continuous current	ICON	40	A
Operating ambient temperature	TA	-40~125	°C
Maximum junction temperature	TJ	165	°C
Storage ambient temperature	TS	-55~150	°C
Magnetic field strength	B	No limit	mT
Electrostatic protection	ESD(HBM)	4000	V

Isolation Characteristic				
ARGUMENT	SYMBOL	Test Conditions/Comments	NUM	UNIT
Dielectric strength test voltage	VISO	Type test 50/60Hz,1min	3500	VRMS
	VTEST	t = 1s (100% production)	3900	VRMS
Basic insulation operating voltage	VWFSI		600	VPK
			424	VRMS
Electrical clearance		Minimum distance from input to output	3.8	mm
MRPIV	VIORM	Ac voltage (bipolar)	600	VPK
Maximum operating isolation voltage	VIOWM	Ac voltage (sine wave)	424	VRMS
		Dc voltage	600	VDC
Maximum transient isolation voltage	VIOTM	Type test, t = 60s	4949	VPK
	VTEST	t = 1s (100% production)	5515	
Maximum surge isolation voltage	VIOSM	Type test:	7000	VPK
Inrush current	ISURGE	Type test coincidence IEC 61000-4-5	7.5	kA

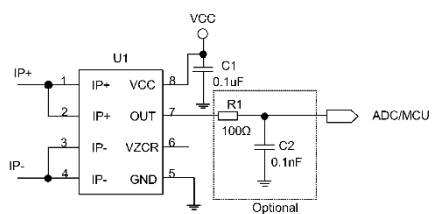
Work Environment				
	SYMBOL	MIN	MAX	UNIT
Input voltage	VIN+,VIN-	-600	600	VPK
Input current (DC/AC RMS)	IP	-50	50	A
Supply voltage	VCC	4.5	5.5	V
Ambient temperature	TA	-40	125	°C

Operating characteristics Unless other wise specified, VCC=5V @						
Parameter	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Electrical Characteristic						
Supply Voltage	VCC		4.5	5	5.5	V
static current	ICC	OUT hanging		20	25	mA
internal reference	VZCR		2.470	2.500	2.530	V
Static output voltage	VOUTQ	IP=0	2.490	2.500	2.510	V
Output capacitor load	CL				1	nF
Output resistance load	RL		1.5			kΩ
Main current terminal resistance	RP	IP=2A		0.9	1.2	mΩ
Transmission delay time	tD			1	2	μs
rise time	tr			1	2.2	μs
Reference output sink current	IZCR(SINK)			-	3000	μA
Linearity Error	LinERR			0.1	0.5	%
Symmetry error	SymERR			0.5	1.5	%
POR time	TPOR	Output from 0 to 90%		10		μs
CMRR	CMRR		38			dB
System bandwidth	BW	-3dB	250			kHz
Reference output source current	IZCR(SOURCE)				400	μA
05 series						
Current range	IP		-5		5	A
sensitivity	Sens	Full current range	388	400	412	mV/A
Zero current differential output error	VOE		-45		45	mV
output noise	VN(RMS)			45		mV
Zero current output temperature coefficient	ΔVOUT(Q)			0.34		mV/°C
Sensitivity temperature coefficient	ΔSENS			0.096		mV/A /°C
Total output error	ETOT		-3.0		3.0	%
20 series						
Current range	IP		-20		20	A
sensitivity	Sens	Full current range	97	100	103	mV/A
Zero current differential output error	VOE		-25		25	mV
output noise	VN(RMS)			11		mV
Zero current output temperature coefficient	ΔVOUT(Q)			0.34		mV/°C
Sensitivity temperature coefficient	ΔSENS			0.024		mV/A /°C
Total output error	ETOT		-3.0		3.0	%
30 series						
Current range	IP		-30		30	A
sensitivity	Sens	Full current range	65	67	69	mV/A
Zero current differential output error	VOE		-15		15	mV
output noise	VN(RMS)			8		mV
Zero current output temperature coefficient	ΔVOUT(Q)			0.28		mV/°C
Sensitivity temperature coefficient	ΔSENS			0.016		mV/A /°C
Total output error	ETOT		-3.0		3.0	%

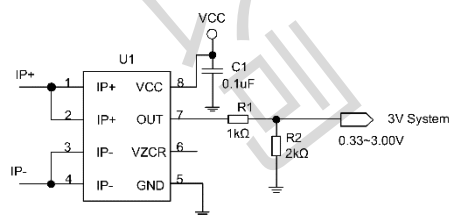
Functional Block Diagram



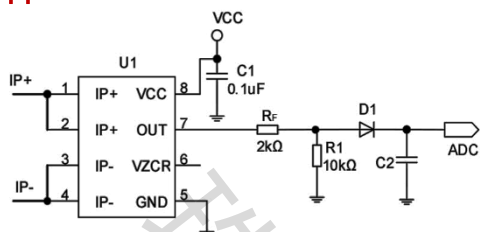
Typical applications



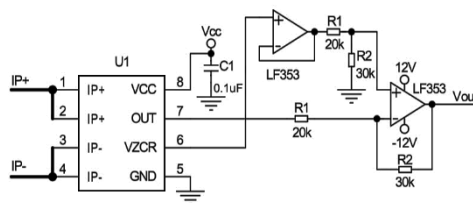
Signal attenuation circuit



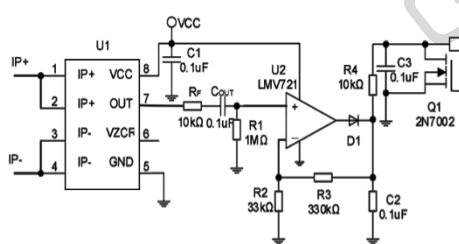
Rectified output, replacing the application of current transformers



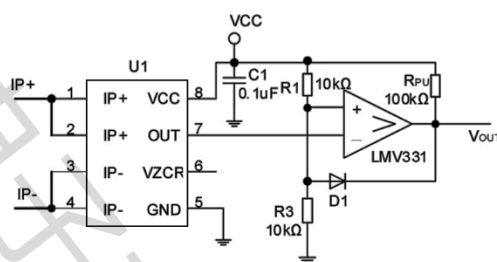
Zero Point Migration Application



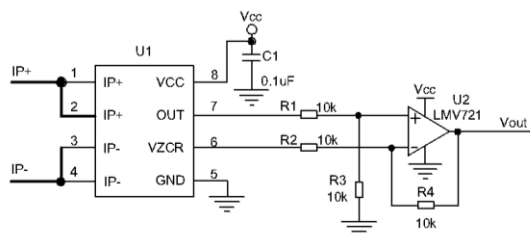
Application of Peak Current Monitoring



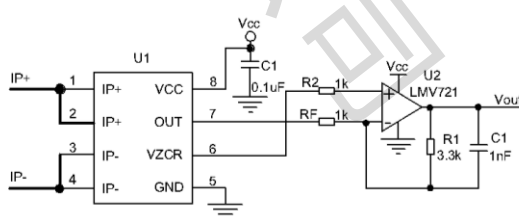
Overcurrent fault detector



Application of Zero Point Migration for Unidirectional Current and Single Power Supply

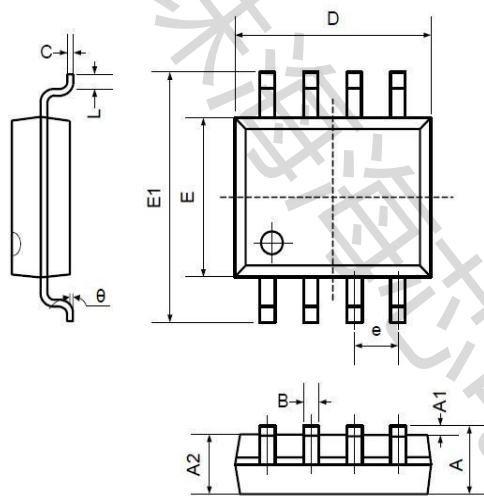


Gain amplification application

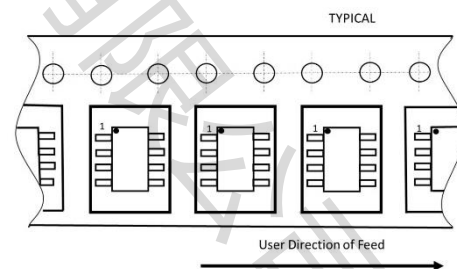
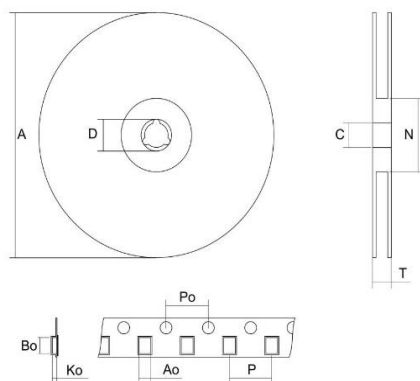


Packaging and packaging

SOP8 (Package Outline Dimensions)



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
B	0.330	0.510	0.013	0.020
C	0.190	0.250	0.007	0.010
D	4.780	5.000	0.188	0.197
E	3.800	4.000	0.150	0.157
E1	5.800	6.300	0.228	0.248
e	1.270TYP		0.050TYP	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°



Packaging Method	Number
Braid	2500PCS/disk