

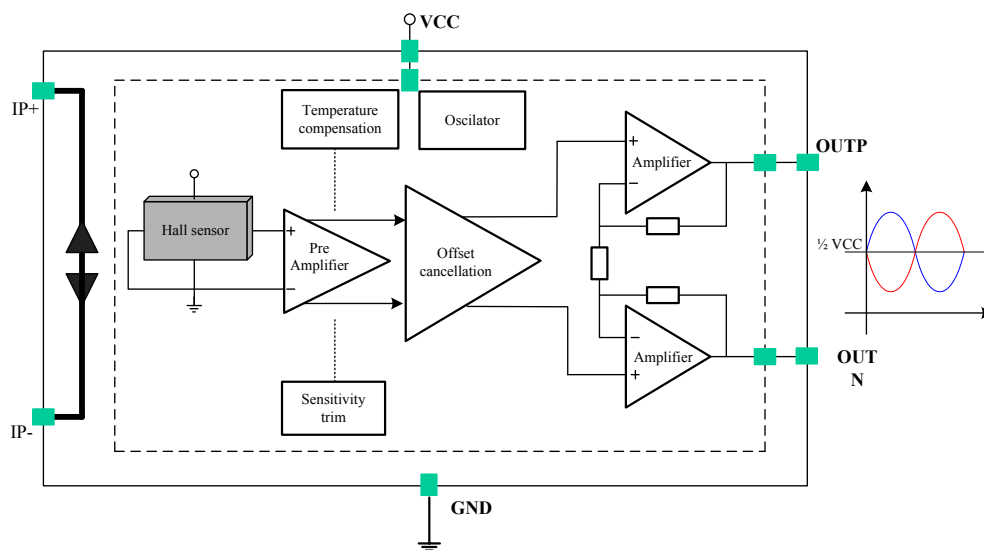
**Features:**

1. Static common mode output point: 50%  $V_{CC}$
2. Wide measuring range: 5A
3. 1MHz chopping frequency, high bandwidth, low noise, fully differential analog output
4. Output signal strength does not vary with the offset of the static common mode output point
5. Low power consumption
6. Output error at normal temperature: 1%, output error at full temperature range: 3%
7. High temperature stability
8. Strong anti-interference ability
9. Insensitive to physical stress
10. ESD (HBM): 6000V

**Applications:**

1. Electric motor control
2. Load Inspecting System
3. Switching power system
4. Overcurrent protection

**Functional Diagram**



**General Description**

SCD500S is a high performance, fully differential output linear current sensor. It can provide more effective solutions for AC or DC current detection and be widely used in industry, consumer and communication equipment.

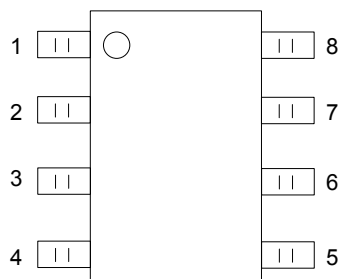
SCD500S incorporates a highly accurate, low-noise linear Hall circuit and a low-Z primary current conductor. The sampling current flows through the main current wire, and the magnetic field produced by it induces the corresponding electrical signals on the Hall circuit, and then outputs differential signals through the signal processing circuit. This technology eliminates the common mode noise introduced by the single ended output sensor because the common mode output point varies with temperature, so the signal output range and the noise-signal ratio can be greatly enhanced. The linear Hall circuit is manufactured by advanced BiCMOS technology, it contains the following modules: high sensitivity Hall sensor, signal preamplifier, high precision temperature compensation unit, oscillator, offset cancellation unit and amplifier. In the absence of a magnetic field,

the static output is 50%  $V_{CC}$ . Under the power supply voltage 5V, the  $OUT_{P(N)}$  can vary linearly between 0.2~4.8V accord to the magnetic field, the linear output range ( $OUT_P-OUT_N$ ) of the signal can be between -4.6~4.6V, signal output strength has greatly improved compared with the traditional single ended output, at the same time, the anti-interference performance of products has also been greatly improved. The internal integrated dynamic offset cancellation circuit makes the IC insensitive from external stresses and the effect of IC package stresses. The chip packaging standard is SOP8, operating temperature range is between -20~125°C.

### Ordering Information

Part No.	Sens (mV/A)	$T_A$	Package	Packing
SCD500SESGT	400	-40°C to 85°C	SOP8	3000 pieces per reel
SCD500SKSGT	400	-40°C to 125°C	SOP8	3000 pieces per reel

### Pin Definitions and Descriptions



SOP8 Package

Name	No	Function	Name	No	Function
IP+	1	Current positive terminal	GND	5	Device ground connection
IP+	2	Current positive terminal	OUT <sub>N</sub>	6	Output negative terminal
IP-	3	Current negative terminal	OUT <sub>P</sub>	7	Output positive terminal
IP-	4	Current negative terminal	V <sub>CC</sub>	8	Supply Voltage

### Absolute Maximum Ratings

Parameter	Symbol	Value	Units
Supply Voltage	$V_{CC}$	7	V
Output Voltage	$V_{OUT}$	-0.3~ $V_{CC}+0.3$	V
Output Current Source	$I_{OUT(SOURCE)}$	400	uA
Output Current Sink	$I_{OUT(SINK)}$	30	mA
Operating Ambient Temperature	$T_A$	-40~125	°C
Junction Temperature	$T_J$	165	°C
Storage Temperature	$T_S$	-55~150	°C
Magnetic field intensity	B	Unlimited	mT
Electrostatic protection	ESD(HBM)	6000	V

Exceeding the absolute maximum ratings may cause permanent damage. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

### Recommended operating environment

Parameter	Symbol	Min	Max	Units
Supply Voltage	V <sub>CC</sub>	4.5	5.5	V
Operating Ambient Temperature	T <sub>A</sub>	-20	85	°C
Current Range	I <sub>P</sub>	-5	5	A

### General Electrical Specifications (unless otherwise specified, V<sub>CC</sub>=5V @ 25°C)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Supply Voltage	V <sub>CC</sub>	-	4.5	-	5.5	V
Supply Current	I <sub>CC</sub>	OUT Suspended	-	5	8	mA
Output Capacitance Load	C <sub>L</sub>	OUT <sub>P/N</sub> to GND	-	-	1	nF
Output Resistive Load	R <sub>L</sub>	OUT <sub>P/N</sub> to GND	20	-	-	kΩ
Primary Conductor Resistance	R <sub>P</sub>		-	1.5	1.8	mΩ
V <sub>IOUT</sub> Signal Propagation Time	t <sub>D</sub>			1	1.2	uS
V <sub>IOUT</sub> Signal Rise Time	t <sub>r</sub>		-	2	3.6	uS
Bandwidth	BW	-3dB	-	200	-	kHz
Linearity Error	Lin <sub>ERR</sub>		-	0.4	1	%
Symmetry Error	Sym <sub>ERR</sub>		-	0.8	1.5	%
Quiescent Output Point	V <sub>OUTP/N(Q)</sub>		2.48	2.5	2.52	%
POR Time	T <sub>POR</sub>	Output From 0 to 90%	-	10	-	uS

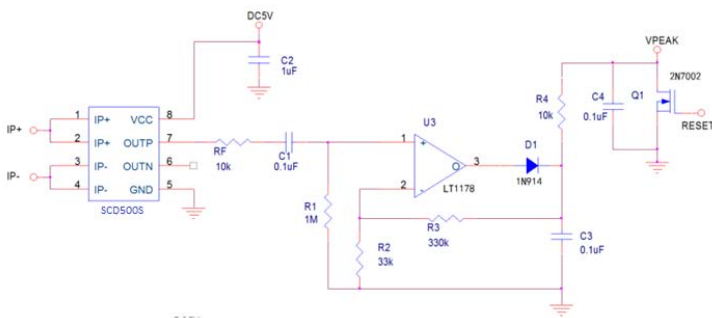
### Common Operating Characteristics

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Current Range	I <sub>P</sub>		-5		5	A
Sensitivity	SENS		390	400	410	mV/A
Output Noise	V <sub>N(P-P)</sub>		-	50	-	mV
Zero Current Output Temperature Coefficient	Δ <sub>IOUT(Q)</sub>		-	0.26	-	mV/°C
Sensitivity Temperature Coefficient	Δ <sub>SENS</sub>		-	0.054	-	mV/A/°C
Total Output Error	E <sub>TOT</sub>		-3	-	3	%

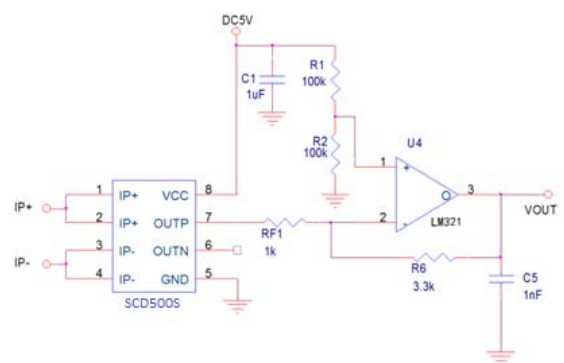
## Typical Application Circuit



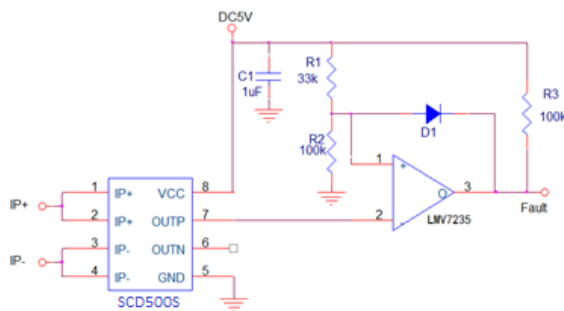
### Typical Dual Ended Output Applications



### Single Ended Output Application



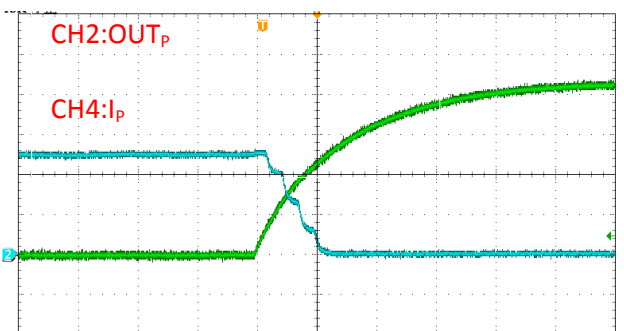
### Peak Current Monitoring Applications



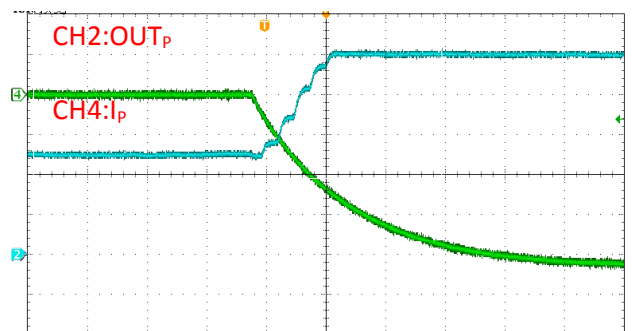
### Overcurrent Fault Detector

### High Sensitivity Applications

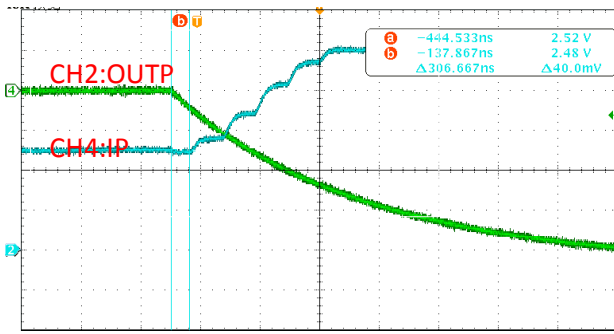
## Curve & Wave



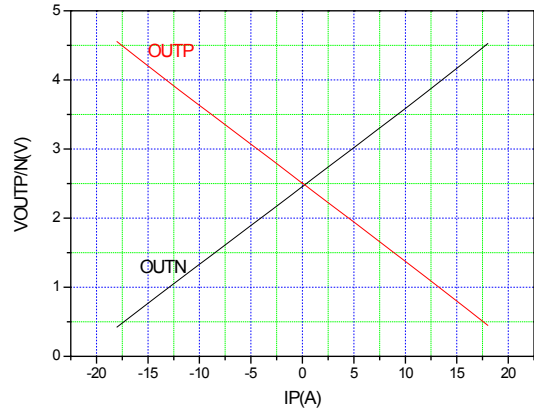
$V_o$  vs.  $I_P$ (Positive current response)



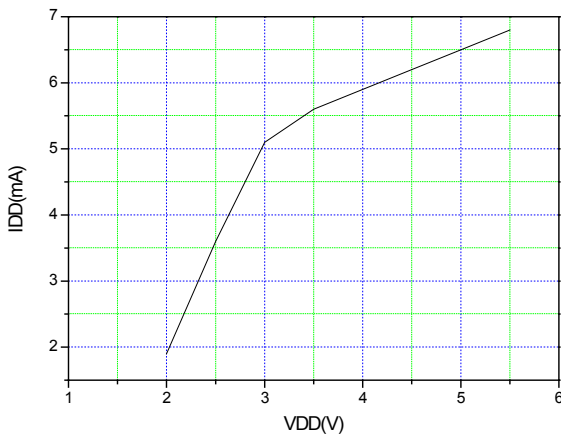
$V_o$  vs.  $I_P$ (Negative current response)



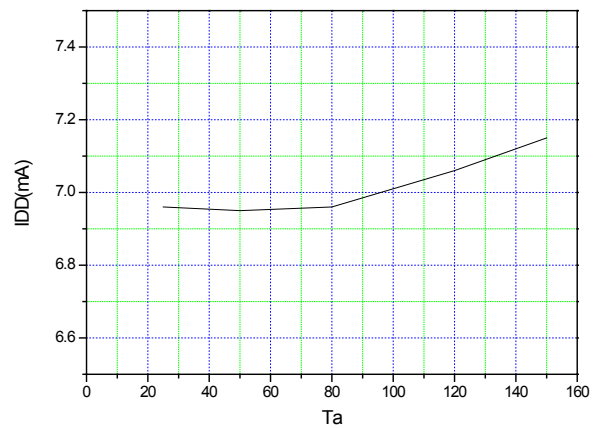
$t_D$



IP vs.  $V_O$  (20A)

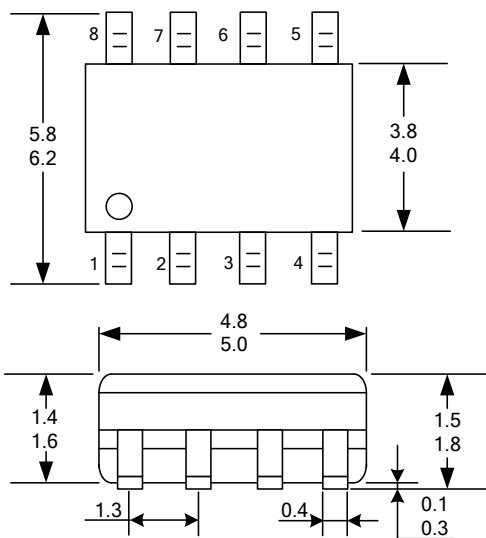


Quiescent current vs.  $V_{DD}$

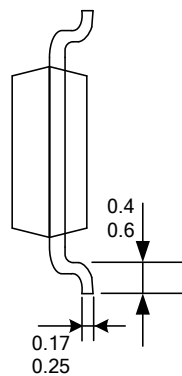


Quiescent current vs.  $T_a$

### Package Information



SOP8



**Notes:**

- 1). Controlling dimension : mm ;