

S4-CSA01

Lateral sensitive programmable Hall-effect current sensor IC

Description

The S4-CSA01 is a Hall-effect based current sensor employing proprietary vertical backside Hall-effect sensor technology. It is assembled in a small SOIC-8 package and can be mounted on top of a primary current bar or conductor on PCB. The IC contains a fast analog signal path with factory calibrated gain and offset temperature drift compensation.

Various parameters such as sensitivity, zero output voltage, temperature drift and signal bandwidth as well as operating modes such as ratiometric versus fixed, differential versus additive can be programmed in application.

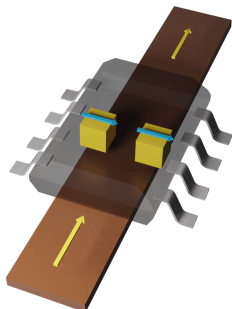
Applications

- BLDC motor control
- BMS modules, EV and HEV inverter
- AC/DC and DC/DC converters
- Smart fuse

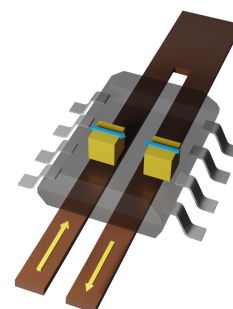
Application Example

The S4-CSA01 can be used directly on top of PCB or busbar primary current conductor and detects the lateral magnetic field generated by the primary current. The S4-CSA01 has two geometrically separated Hall-effect sensor areas, located approximately 1.6mm apart from each other. Depending on the programmed mode, the sensor signals from the two sensors are either added (Additive Mode) or subtracted (Differential Mode for stray field immunity).

Additive Mode



Differential Mode



Features

- Unique backside vertical Hall-effect sensor technology for sensing of lateral magnetic fields
- Multi point programmable sensitivity & offset temperature compensation
- Very large sensitivity programming range
- User programmable bandwidth 10kHz – 80kHz, 5μs step response (80kHz BW)
- Additive and differential operational mode for enhanced stray field suppression
- Ratiometric or fixed output range mode
- Supply under voltage and over voltage detection
- Operating temperature range: -40°C – +105°C
- Supply voltage range: 4.5V – 5.5V
- AEC-Q100 qualified



Key Specifications

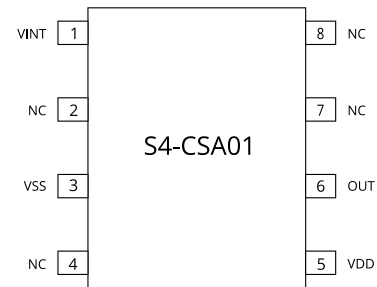
General

Supply Voltage Range	4.5 – 5.5V
Supply Current	≤15mA
Magnetic Sensitivity Range	30 – 750mV/mT
Signal Bandwidth	10 – 80kHz
Output Voltage Range (Ratio)	10% – 90%VDD
Output Voltage Range (Fixed)	0.5 – 4.5V
Power On Time	≤1ms
Operating temperature	-40°C – +105°C

Performance

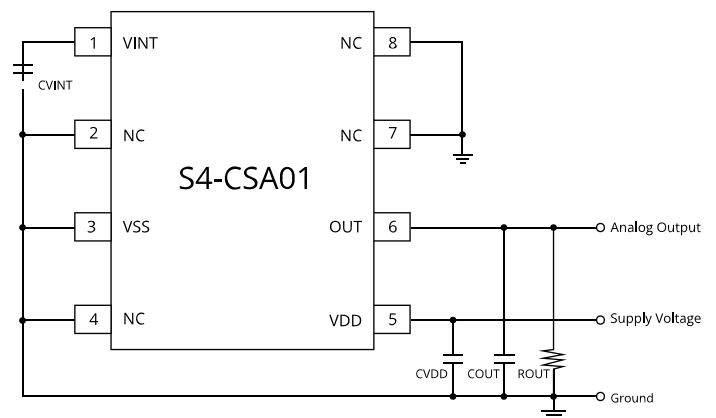
Linearity Error	+/- 1.0%
Sensitivity Initial Error	+/- 1.2%
Sensitivity Temp. Drift	+/- 2%
Offset in full temperature range	+/- 25mV
Noise (RMS)	≤10mV
Step Response	5μs
Stray Field Immunity:	X direction: - 65dB Y direction: - 50dB Z direction: - 70dB

Pin Assignment



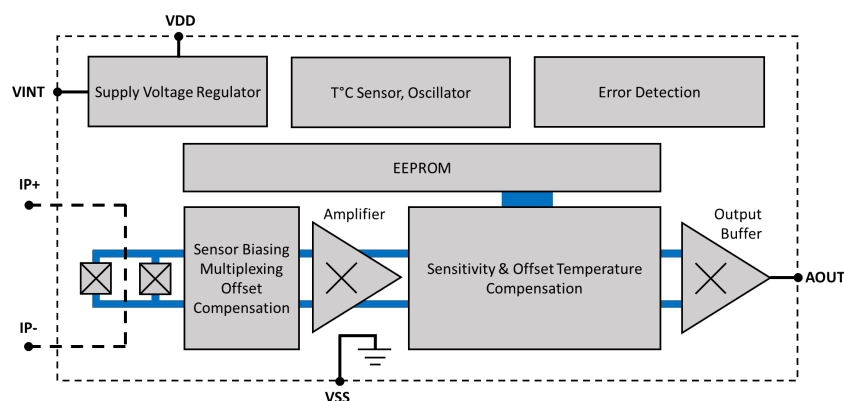
SOIC-8 Package

Recommended Application Circuit



Recommended component values:
CVDD:100nF; **COUT:**1 – 10nF; **CVINT:** 33nF;
ROUT:4.7 - 100kOhm

Block Diagram



Highlights

- Very large current measurement range: +/-3A – +/-2000A and higher
- Due to the unique backside vertical Hall-effect sensor technology no limitations for the maximum measured magnetic field and no hysteresis error present
- Due to the lateral measurement direction, no significant change of bus bar in comparing to the no SFI capable solutions needed

