

S4-CSA02

Lateral sensitive programmable Hall-effect current sensor IC

Description

S4-CSA02 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.

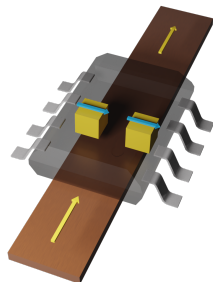
Applications

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

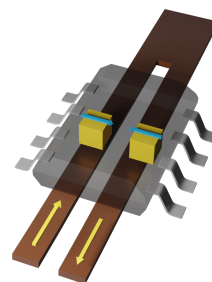
Application Example

S4-CSA02 can be used directly on top of PCB or busbar primary current conductor and detects the lateral magnetic field generated by the primary current. S4-CSA02 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
- Additive and differential operational mode for enhanced stray field suppression
- User programmable bandwidth 16kHz – 250kHz, 3 μ s step response time
- Multi point programmable sensitivity & offset temperature compensation
- Very large sensitivity programming range
- Ratiometric or fixed output range mode
- Supply under voltage and over voltage detection
- Supply voltage range: 4.5V – 5.5V
- Operating temperature range: -40°C – +150°C
- AEC-Q100 Grade 0 automotive qualified



Key Specifications

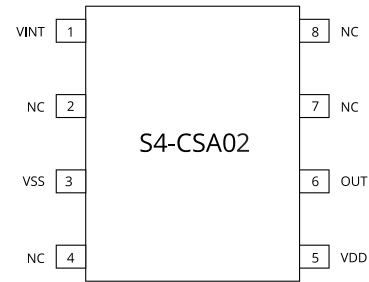
General

Supply Voltage Range	4.5 – 5.5V
Supply Current	≤15mA
Magnetic Sensitivity Range	5 – 844mV/mT
Signal Bandwidth	16 – 250kHz
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

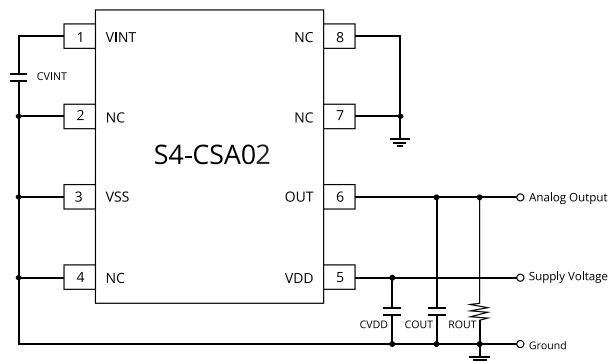
Linearity Error	+/- 0.5%
Sensitivity Temperature Drift	+/- 1.0%
Offset Error Over Full Temperature Range	+/- 5mV
Noise (RMS)	≤10mV
Step Response Time (typ.)	3μs
Stray Field Immunity:	X direction: - 65dB Y direction: - 50dB Z direction: - 70dB

Pin Assignment



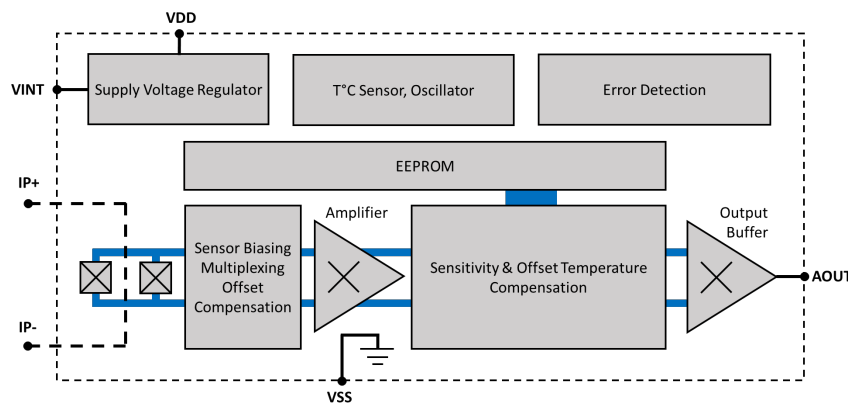
SOIC-8 Package

Recommended Application Circuit



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

Block Diagram



Highlights

- Unlimited current measurement range
- Due to the unique backside vertical Hall-effect sensor technology no limitations for the maximum measured magnetic field and no hysteresis error
- Due to the lateral measurement direction, no significant change in busbar needed in comparison to solutions without SFI

