

SPI S4g

Current Source Module | SPI Series 19" Rack Mounted

Release November 2023_V1.7

Description

The S4g is the ideal DC source for quantum computing applications that require current biasing, specifically designed for the high demands of quantum processors.

The output range of the 4 channels can be software selected between ± 50 mA, ± 25 mA, $+50$ mA and the 18 bit DAC resolution is maintained for all the ranges. This allows the user to choose the optimal range without sacrificing resolution.

Extra care has been taken for ultra stability and extremely low noise performance together with its host rack, the SPI mainframe. Thanks to the galvanically-isolated control interface and isolated power supply, ground loops are avoided and interference (like 50 Hz) is minimized.

The S4g DC current sources are controlled by the C1b module which is connected to the host pc via USB link and configured via our Python and QCoDeS drivers.

The output can be monitored during operation, using the high-impedance voltage monitor outputs on the front panel, which route the DAC voltages through a buffer. Each current output has a status LED. This LED lights up if the signal reaches the load voltage compliance limit of ± 3.5 V.



Features

- Ultra-stable DC current source
- 4 channels per module / 18 bit resolution
- Software-selectable range: ± 50 mA, ± 25 mA, $+50$ mA
- Independent voltage output monitor for each channel
- Hosting up to 11x S4g modules in a 3 U SPI mainframe
- Up to 44 channels per 19" 3 U rack

Specifications SPI S4g - Current Source Module

Analog output channels	4
DAC resolution (vertical)	18 bit
Output range	± 50 mA, ± 25 mA, $+50$ mA
Compliance voltage	± 3.5 V
Monitor output channels	4
DNL	± 0.2 LSB
INL	± 0.5 LSB
Noise (measured @ $+50$ mA into 50Ω with ± 50 mA range)	< 2.5 nA/ $\sqrt{\text{Hz}}$ @ 10 Hz < 0.8 nA/ $\sqrt{\text{Hz}}$ @ 1 kHz
Drift (measured @ $+50$ mA into 50Ω with ± 50 mA range)	2.5 ppm/ $^{\circ}\text{C}$ of full scale

Driver/API	SCPI / Python / QCoDeS
Data connection to host pc	USB (via SPI Mainframe)
Power supply	via SPI Mainframe
Power consumption	1.625 W (no load) 2.6 W (full load)
Output connector type	SMA
Monitor Output connector type	MCX
Dimensions	35.3 x 128.7 x 182 mm ³
Weight	0.286 kg