



## Spectrum

### Spectral Analysis and High-Speed Analog Input Module



# Maximize Your High-Speed Dynamic Applications

Designed for analog  
measurements

## Overview

The Spectrum Spectral Analysis and High-Speed Input Module—available in three-channel or nine-channel variants—offers high-speed synchronous sampling for analog inputs, with

dedicated analog input hardware that includes amplifiers, filters, and analog-to-digital converters (ADC).

## Benefits and Features

- › Synchronization across multiple modules
- › Simultaneous measurement across all channels
- › Sustained high-speed measurements up to 10 kHz
- › Ideal for three-axis accelerometers and strain gages
- › Connection to data logger via EPI and CPI
- › Streamlined creation of basic programs

## Detailed Description

The Spectrum 103 (three channels) and 109 (nine channels) share the same design, offering a variety of selectable input ranges on each channel.

### Synchronization

Synchronization is achieved when all channels are sampled in coordination, based on a shared clock or timing signal.

Each channel is digitized using a 32-bit ADC and offer channel-to-channel sampling synchronization within approximately  $\pm 10$  ns.

When using the EPI bus to synchronize across multiple modules, module-to-module synchronization is achieved within approximately  $\pm 100$  ns.

### Simultaneous

To achieve simultaneous measurements, where each channel is sampled at exactly the same time, each channel has its own dedicated ADC and processor. All channels begin their measurements at the same time and record over the same time interval—ensuring true time alignment across the board. Special hardware and processing is used to eliminate signal propagation delays and clock drift between modules.

### Sample Rate

The Spectrum is capable of sustained high-speed measurements—up to 10,000 Hz per channel continuously. This is faster than any of our other products and allows for detailed insight into fast-changing signals.

When programming, select an anti-aliasing filter for sample rates up to 10 kHz and bandwidths up to 5 kHz.

### Three-Axis

Each Spectrum channel offers selectable input ranges:  $\pm 200$  mV,  $\pm 1$  V,  $\pm 5$  V, and  $\pm 10$  V. The Spectrum 103 and 109, providing three or nine input channels respectively, make them ideal for three-axis accelerometers and strain gages.

### Connection via EPI and CPI

Spectrum modules connect to data loggers via EPI or CPI networks using standard Ethernet cables (CAT5e, CAT6, or higher). EPI networks are ideal for Spectrum applications. For

smaller channel count setups, a single Spectrum is connected to a traditional CPI-enabled data logger, such as the CR6.

### Basic Programming

Short Cut software streamlines basic program creation for reading multiple Spectrum modules. It generates a wiring diagram and a CRBasic program for your data logger. For advanced processing or data management, you can further customize the CRBasic program.

## Specifications

Operating Temperature Range	-40° to +70°C
Storage Temperature	-55° to +85°C
IP Rating	IP20
Humidity	0 to 99% (non-condensing)
Number of Channels	<ul style="list-style-type: none"> <li>» Three differential (Spectrum 103)</li> <li>» Nine differential (Spectrum 109)</li> </ul>
Input Range	$\pm 10000$ mV, $\pm 5000$ mV, $\pm 1000$ mV, and $\pm 200$ mV
Common-Mode Input Voltage	$\pm 15$ Vdc
Absolute Maximum Input Voltage	$\pm 16$ Vdc
A/D Converters	32-bit SAR ADCs
Measurement Accuracy @ 20°C	$\pm(0.04\%$ of reading $\pm 130$ $\mu$ V) Note: The accuracy specification

	does not include sensor error or measurement noise.
Input Resistance	80 M $\Omega$
Input Time Constant	230 ns
Input Offset Current	5 nA typical, maximum @ 50°C
Processor	Digital signal processor 32-bit with floating point units
Processor Speed	400 MHz
Memory	128 MB SRAM
Power Requirements	10 to 30 Vdc voltage
Dimensions	21.6 x 13.7 x 7.6 cm (8.5 x 5.4 x 3.0 in.); additional clearance required for cables and wires
Weight	1.6 kg (3.53 lb)

For comprehensive details, visit: [www.campbellsci.cc/spectrum](http://www.campbellsci.cc/spectrum) 