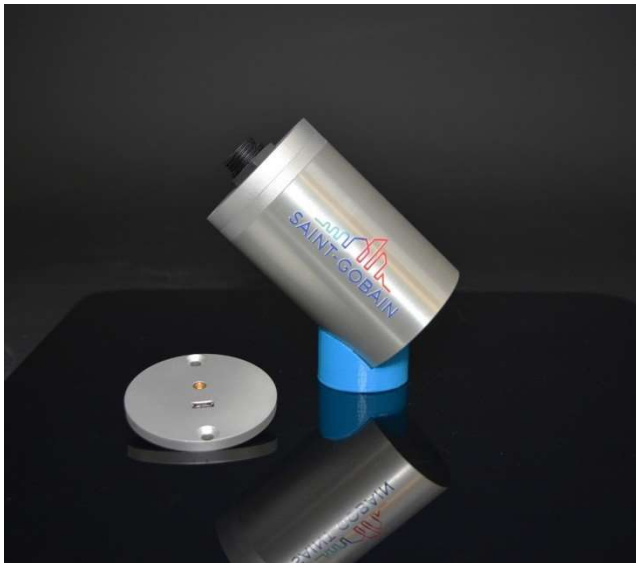
SAINT-GOBAIN

Saint-Gobain Crystals

User guide for SiPM based radiation sensors



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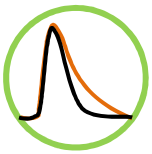
1.0.0 Overview

The following document will give an overview of Saint-Gobain Crystals radiation sensors based on SiPM technology. It will guide the user on choosing the appropriate solution to match their needs as well as provide information on basic operation of the device. Each of the following are different preamplifier configuration options available. Please note, only a single output type is available per detector.

Counter – The sensor provides a TTL pulse in response to ionizing particles. This configuration is ideal when the only data of interest is the number of counts the detector is seeing. This can be used in applications such as dosimetry, personnel and environmental monitoring and protection, medical imaging, radiometric assay, and basic nuclear security.

Analog Spectroscopic – The sensor provides a positive going charge sensitive tail-pulse with a 50 µsec decay that is similar to a traditional PMT pre-amplifier output. Ideal plug and play replacement for most radiation sensors currently in use. This option is a great choice for applications such as isotope identification and analysis and physics research.

Advanced Analog Spectroscopic – The sensor provides a positive going pulse and it utilizes a Current to Voltage converter topology. This solution is utilized in faster, more advanced applications where an existing MCA or Digitizer require the fastest pulse for pulse shape discrimination analysis or advanced specialty applications. Pulse shape discrimination (PSD) is required when using dual detection capability crystals such as CLLB and NaIL in order to distinguish between gammas and neutrons. This is a top of the line choice for the fastest electronics on the market today, and works well in applications such as military security, cosmic radiology detection and analysis, pulse shape discrimination where the detection of both gammas and neutrons are required, or heavily active areas that need accurate counts as well as spectroscopy.



2.0.0 Electrical Characteristics

2.1.0 Power

The electronics are designed to operate within the maximum power specifications. As such, upon initially applying power, the integrated power supply will gradually ramp up the SiPM voltage to the pre-set value in order to minimize current surge.

Power is supplied to the sensors through the V_{BUS} pin (+5VDC).

Family	Product	Max Power @ 5V	
Analog	Counter	60 mW	12 mA
	Analog Spectroscopic		
	Advanced Analog Spectroscopic		

Table 1

2.2.0 Connector Pinouts

Connector: Samtec FTSH-106-01-F-DV

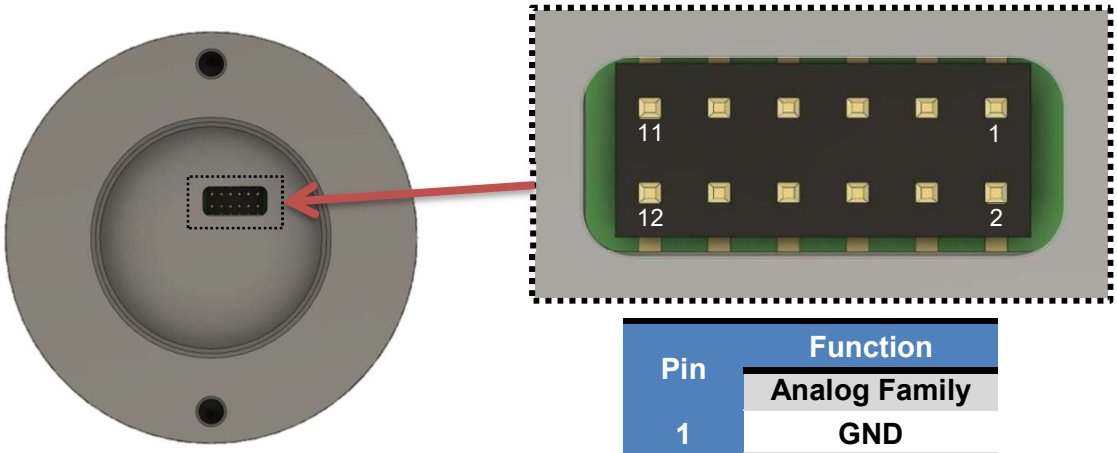


Figure 1

Pin	Function
	Analog Family
1	GND
2	GND
3	Do Not Connect
4	Do Not Connect
5	Do Not Connect
6	Do Not Connect
7	V_{BUS} (+5V)
8	Do Not Connect
9	Analog Out
10	GND
11	GND
12	GND

3.0.0 Adapter Caps/Boards

In most cases, especially for OEM applications, the sensors can be operated directly by applying power and reading out the information through the connector as shown in Figure 1. This method ensures the lowest power consumption as well as the most compact size.

However, in certain applications, the sensor requires an adapter board to simplify the communication and data collection. Depending on the model, there are several adapter caps available to allow for quick startup of data collection. The table below details some of the available adapter caps and boards. The Basic Adapter provides a Micro USB connector to provide the required +5VDC to the unit, and a coaxial MCX connector for the output signal. We provide a coaxial cable with MCX on one end and a BNC on the other with every Basic Adapter cap purchased.

For the IP65 version, a two-meter long mating cable is provided.

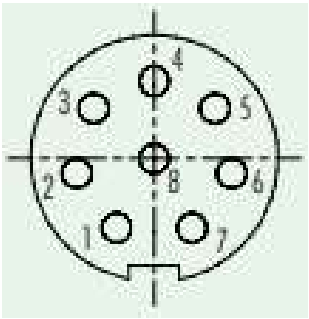
Family	Features	Connectors
Analog	Basic Adapter	Micro USB, MCX
	IP65 Rated	M12

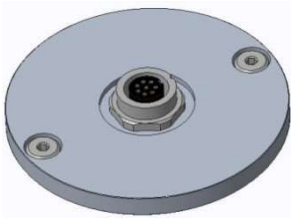
Basic Adapter

In order to use the adapter caps, install them with the provided screws onto the sensor. These allow for quick startup and testing – no software is required to begin seeing pulses.

IP65 Connector pinout and cable wire code

Pin	Wire Color	Function
1	White	Not Connected
2	Brown	Not Connected
3	Green	**TTL Out**
4	Yellow	**Ground**
5	Grey	**Ground**
6	Pink	**+5V Input**
7	Blue	**Analog Signal Output**
8	Red	**Ground**





IP-65 Adapter

4.0.0 Data Collection

Saint Gobain offers a myriad of detector options that can be optimized to your desired application. We can help you choose your scintillator type, shape, and size; the proper SiPM configuration; the correct and properly tuned preamplifier; and, if necessary, the proper output adapter. We are also happy to help train our customers, if necessary, in order to get the best use of these top-of-the-line detectors.

All sensors ship from the factory tested and calibrated with a preset operating voltage. This ensures that the units are ready to operate once received. The pulsed output from the detector can be seen on an oscilloscope.

For more advanced applications, such as spectroscopy or dual detection, external electronics are required. These can be a Multi-Channel Analyzer, a Digitizer, or other advanced electronics. Please contact Saint Gobain for our recommended detector to best match your desired application and setup.

5.0.0 Revision Updates

Revision	Date	Changes
-	June 2018	Initial release
A	December 2018	Fixed typos on the TOC
B	February 2020	Described pinout of output adapters
C	August 2020	Specified Connector: Samtec FTSH-106-01-F-DV
D	August 2020	Reworded several sections
E	January 2022	Re-specified pinout on page 4