

Scintillation Detectors integrated with Silicon Photomultiplier (SiPM)



As more scintillation detectors are shifting to silicon photomultipliers (SiPMs) from photomultiplier tubes (PMTs) due to the inherent advantages of compactness, ruggedness, low voltage and magnetic field insensitivity, Luxium Solutions has developed unique integrated solutions to truly leverage the value of SiPMs.

FLEXIBLE DESIGN:

Luxium Solutions SiPM based sensors have been designed for maximum flexibility with multiple options to meet your needs. Products range from upgraded versions of basic detectors with PMTs and integrated analog electronics to fully integrated, plug and play detectors with MCAs and a digital readout. Options include:

- **Functionality** ranging from basic counters to analog and digital spectroscopy
- **Modular construction** to add capability to meet connectivity and environmental requirements
- **Wide range of performance levels** (power, resolution, etc.)
- **Scalable** for range of sensor sizes and applications

FULLY OPTIMIZED TOTAL SENSOR SOLUTION:

Using our expertise with detector processing and packaging and optical analysis, Luxium Solutions has developed cost effective solutions to provide excellent performance, including optimization of:

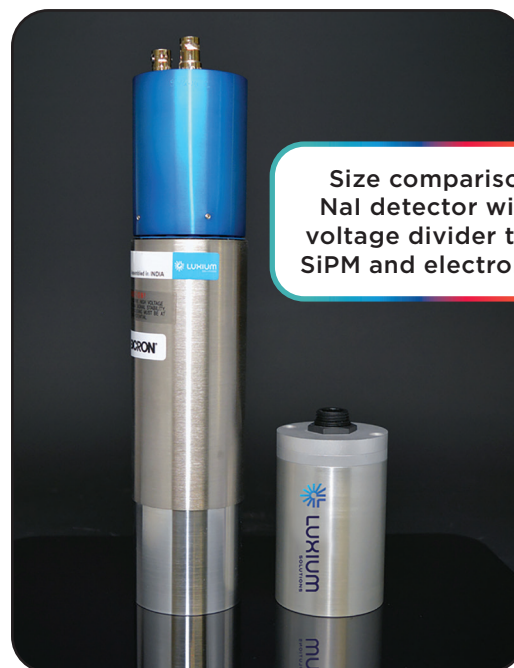
- **Number and location of SiPMs** for required performance
- **Detector packaging** to match SiPM configuration
- **Gain compensation** over a wide temperature range
- **TTL Output** with factory selectable threshold levels for counting applications

RUGGEDNESS:

Luxium Solutions, an acknowledged leader in building long lasting, rugged radiation detectors, has leveraged our expertise to develop industry-leading SiPM integrated solutions. Features include:

- **Designed for and evaluated under ANSI N42.34, 2021**
- **Option for water tight package and connectors**
- **Long lasting hermetic sealing technology**

**LUXIUM SOLUTIONS HAS THE SiPM
INTEGRATED SOLUTION TO MEET YOUR
NEEDS, RANGING FROM STANDARD
CONFIGURATIONS TO HIGHLY
CUSTOMIZED APPLICATIONS**

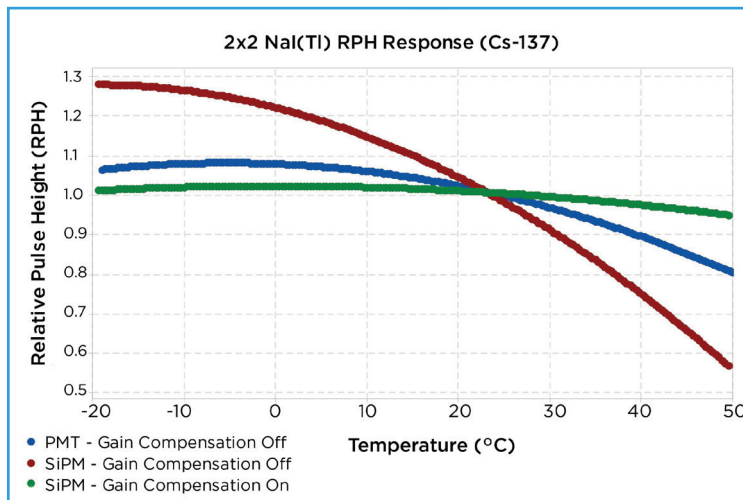


Size comparison of 2"x2"
NaI detector with PMT and
voltage divider to equivalent
SiPM and electronics package

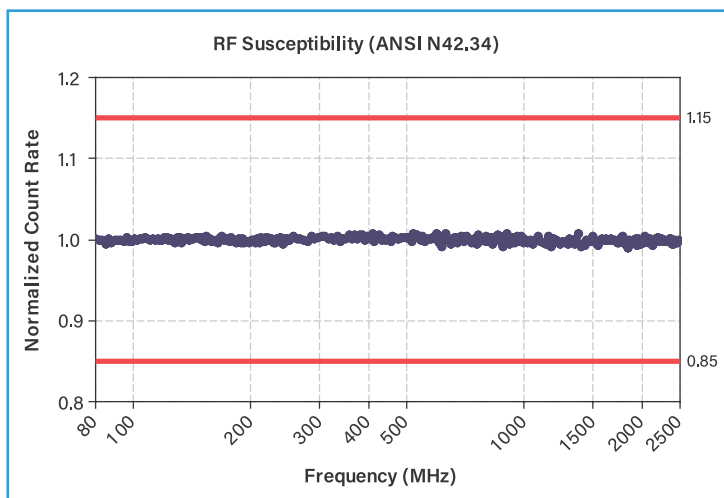
Scintillation Detectors Integrated with SiPM

Luxium Solutions SiPM based technology has been successfully evaluated under the following ANSI N42.34, 2021 conditions:

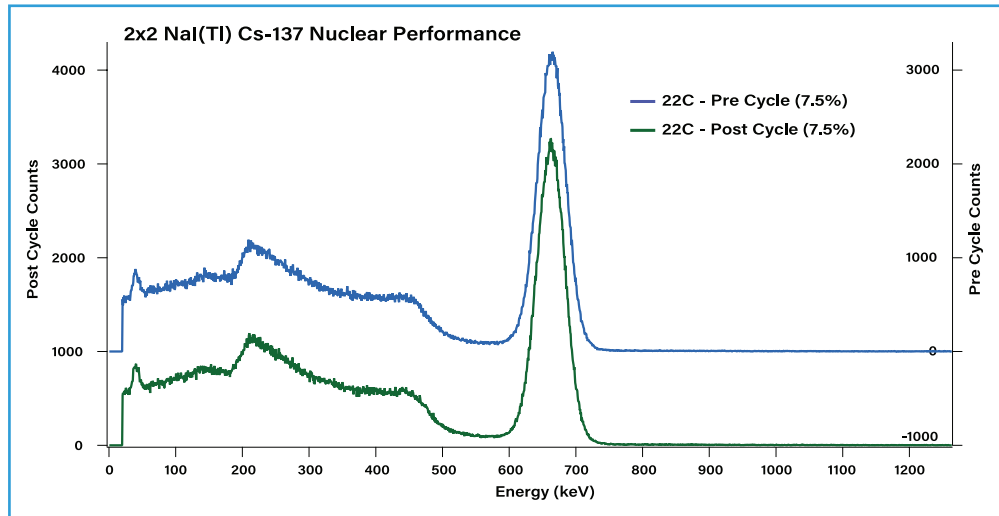
Temperature (-20°C to 50°C)	Section 7.1 and 7.2
Humidity (to 93% relative)	Section 7.3
Moisture & Dust Ingress	Section 7.4
Marine Environment (Salt Fog)	Section 7.5
Radiated Immunity (10V/m @ 80MHz to 1GHz, 3V/m @ 1GHz - 2.5GHz)	Section 8.1
Radiated Emissions	Section 8.2
Magnetic Field Immunity (100A/m @ 60Hz)	Section 8.3
Electrostatic Discharge	Section 8.4



Gain compensation technique addresses the SiPM temperature dependence and closely matches the PMT curve. This allows for a plug and play compatibility with existing control schemes. Gain compensation parameters can also be adjusted to address specific customer needs.



Performance of SiPMs and low noise electronics is unaffected when exposed to a RF field of 10V/m from 80MHz to 2500MHz.



Cs-137* nuclear performance before and after ANSI N42.34 thermal cycling (-20°C to 50°C @ 8C/hr).

*Tested with a Cs-137 encapsulated metal source.

Standard Offering

Detector Ratings		Comments
Operating Voltage	5V	USB Power
Current Draw	20mA	
Max Count Rate	130kHz / 225kHz	Charge Sens / I-V
Decay Time	50 μs / 700ns	Charge Sens / I-V
Rise Time	110ns	
Bandwidth	20db	
Output	$\approx 0.7\text{mV} / \text{keV}$	
Proportionality	≈ 3.8	NaI(Tl), 2.6MeV/662keV
Drift	<1%	Short term and long term
Gain Compensation	< $\pm 10\%$	-20°C to $+50^{\circ}\text{C}$
Noise Edge	<8keV	@ 20°C
Signal Noise	<1mV _{pp}	
Output Impedance	50 Ω	
Gain	2.5mV/pC	
Dynamic Range	9keV – 6MeV	



www.luxiumsolutions.com

Manufacturer reserves the right to alter specifications.

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(10-23)