

Lanthanum Bromide Integrated Detector Design

The integrated Lanthanum Bromide (LaBr₃:Ce) detector design consists of a crystal coupled directly to a specially selected photomultiplier tube (PMT). This is the best design for applications requiring premium performance.

Standard Configurations -

Because of the *high light output* and *fast decay time* of the LaBr materials, PMT selection and integration as well as the use of specific electronics are key to optimizing performance.

Standard integrated designs are available with up to a 3" diameter by 3" long. Larger designs can be produced upon request. Associated electronics have been developed to offer you a choice of designs optimized for spectroscopic performance.

Table 1 summarizes standard configurations including PMT diameter and typical performance. Tables 2 and 3 give the electronics options to be used for each design. To continue to serve your needs, new designs have been developed:

- » Elongated designs including crystal 1" diameter by 4" long are well adapted when position information is required by the application
- » X-ray detectors with thin crystals 2.5mm thick to serve high count rate applications

Table 1. Standard Configurations with Typical Energy Resolution Values -

Configuration	Scintillator Size	PMT diameter	⁵⁷ Co (122keV) End on	¹³⁷ Cs (662keV) End on
LaB₃(Ce)				
25 S 25/ 1.5 /B380	1" Øx 1" thick	1.5"	≤6.5%	≤3.5%
38S38/ 2/ B380	1.5" Ø x 1.5" thick	2"	≤6.0%	≤3.0%
51S51/ 2 / B380	2" Ø x 2" thick	2"	≤6.0%	≤3.5%
76S76/ 3 / B380	3" Ø x 3" thick	3"	≤6.0%	≤3.5%
76S76/ 3.5" /B380	3" Ø x 3" thick	3.5"	≤6.0%	≤3.0%

Other sizes of crystals and PMTs can be quoted upon request.

Lanthanum Bromide

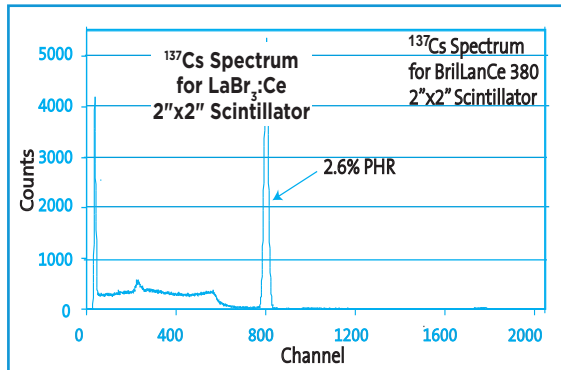
Integrated Detector Design

The results shown in Figures 1 through 3, and in Table 1 were obtained in our laboratories at room temperature with standard modular electronics.

The Lanthanum Bromide integrated designs are compatible with laboratory operation, which is normal pressure and humidity and temperatures ranging from +4°C to +43°C.

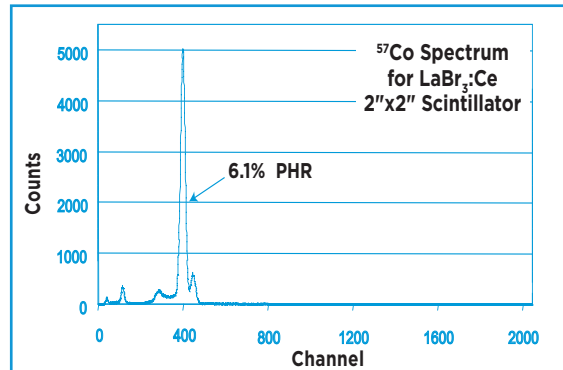
LaBr₃(Ce) Performance

Figure 1.



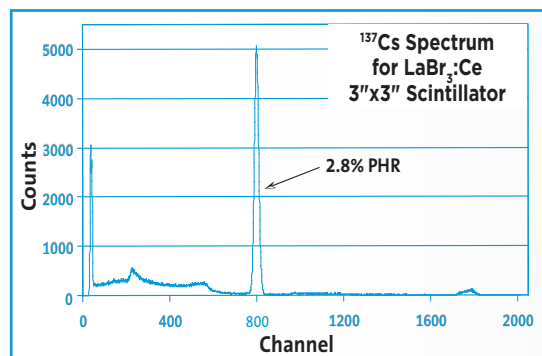
¹³⁷Cs Spectrum for a 2"x2" LaBr₃:Ce crystal.
FWHM is for the 662keV peak.

Figure 2.



⁵⁷Co Spectrum for a 2"x2" LaBr₃:Ce crystal.
FWHM is for the 122keV peak.

Figure 3.



¹³⁷Cs Spectrum for a 3"x3" LaBr₃:Ce crystal.
FWHM is for the 662keV peak.



Saint-Gobain Brilliance Model 51S51 B380 detectors
with 2"x2" crystal integrally mounted to a Photomultiplier Tube.

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Plug-on Electronics -

Plug-on voltage divider and voltage divider/preamplifier modules have been developed to match the special characteristics of the Lanthanum Bromide materials.

Common characteristics of these electronics are:

- Standard sockets:

12-pin - FE1012

14-pin - FE1014

- High voltage connector:

SHV - refer to Table 2; or

BNC/HT (MHV) - refer to Table 3

- BNC for the signal connector

- Power connector:

9-pin socket (P/N Amphenol 17DE09S)¹

2-pin socket (P/N Radiall BR2 R605.550.000)²

- Power supply: +/-12V

Other connectors and design options can be proposed upon request.

Table 2. Plug-on Electronics' Part Numbers - SHV and 9-pin Power Connector

US Standard

PMT details		Voltage Divider AS20	Voltage Divider / Preamplifier		Adaptor
Diameter	Description		AS2712 Positive Output,	AS2612 Negative Output	
1.5"	12-pin, 10 stage*	6-4-6243	6-4-6228	6-4-6224	9-3-5555
2", 3", 3.5"	14-pin, 8 stage**	6-4-6242	6-4-6227	6-4-6223	9-3-6029

Table 3. Plug-on Electronics' Part Numbers - BNC/HT (MHV) and 2-pin Power Connector

Europe Standard

PMT details		Voltage Divider AS20	Voltage Divider / Preamplifier		Adaptor
Size	Description		AS2712 Positive Output,	AS2612 Negative Output	
1.5"	12-pin, 10 stage*	6-4-5663	6-4-5673	6-4-5671	9-3-5555
2", 3", 3.5"	14-pin, 8 stage**	6-4-5662	6-4-5672	6-4-5670	9-3-6029

¹ Mating plug (Amphenol P/N 17DE09P)

² Mating plug (Radiall P/N BR2 R605.005.000 for a 5.5mm ϕ wire or BR2 R605.004.000 for a 4.5mm ϕ wire)

* 12 pin to 14 pin conversion adaptors are available for some PMTs.

** An adaptor is available to allow use of the 14-pin 8-stage PMT with a 14-pin 10-stage PMT voltage divider.



Saint-Gobain Crystals

www.crystals.saint-gobain.com

Patents: US7,067,815B2;US7,067,816B2;US7,250,609B2;US7,233,006B2,

EP1257612B1*,EP1516078B1,EP1255796B1*,ZL01805267.3,ZL03813659.7,UA75591C2,UA75066C2

*These original patents were granted to Stichting Voor de Technische Wetenschappen. Inventors are P. Dorenbos, C. W. E. van Eijk, H.U. Gudel, K.W. Kraemer, E. V. D. van Loef.

Technology is licensed to Saint-Gobain Cristaux & Detecteurs.

Manufacturer reserves the right to alter specifications.

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