



# Standard Electrode Coaxial Ge Detectors

## (SEGe)



Nuclear



Healthcare



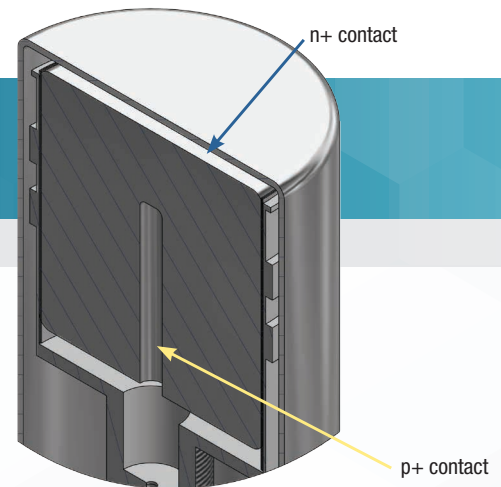
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Coaxial Ge Detector Configuration

### KEY FEATURES

- Energy range from 40 keV to >10 MeV
- High resolution – good peak shape
- Excellent timing resolution
- High energy rate capability
- Equipped with Intelligent Preamplifier
- Diode FET protection
- Warm-up/HV shutdown
- USB 2.0 Serial Interface

### DESCRIPTION

The conventional coaxial germanium detector is often referred to as Pure Ge, HPGe, Intrinsic Ge, or Hyperpure Ge. Regardless of the superlative used, the detector is basically a cylinder of germanium with an n-type contact on the outer surface, and a p-type contact on the surface of an axial well. The germanium has a net impurity level of around  $10^{10}$  atoms/cc so that with moderate reverse bias, the entire volume between the electrodes is depleted, and an electric field extends across this active region. Photon interaction within this region produces charge carriers which are swept by the electric field to their collecting electrodes, where a charge sensitive preamplifier converts this charge into a voltage pulse proportional to the energy deposited in the detector.

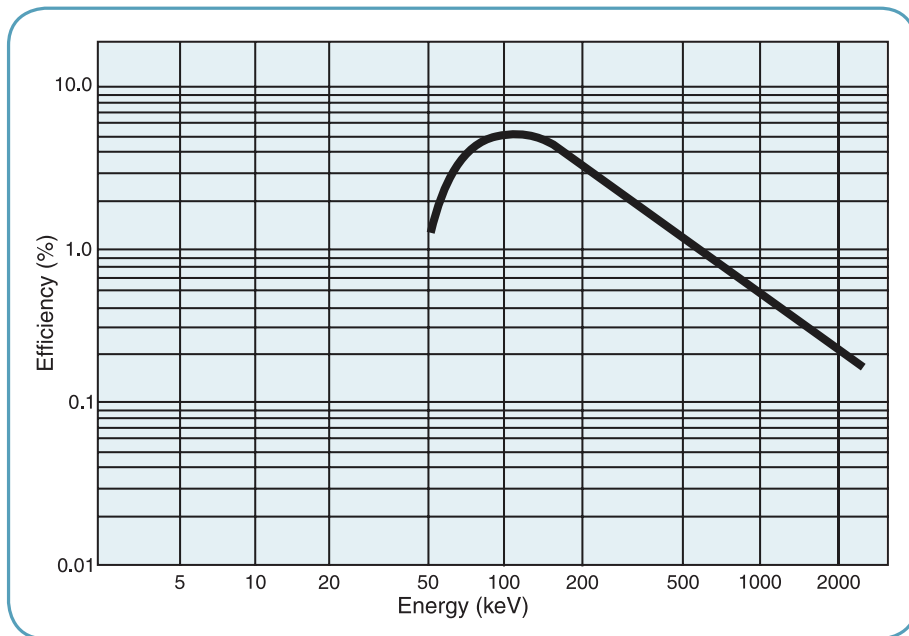
The n and p contacts, or electrodes, are typically diffused lithium and implanted boron respectively. The outer n-type diffused lithium contact is about 0.5 mm thick. The inner contact is about 0.3  $\mu\text{m}$  thick. A surface barrier may be substituted for the implanted boron with equal results.

The CANBERRA Coaxial Ge detector can be shipped and stored without cooling. However, long term stability is best preserved by keeping the detector cold. Like all germanium detectors, it must be cooled when it is used to avoid excessive thermally-generated leakage current. The non-perishable nature of this detector widens the application of Ge spectrometers to include field use of portable spectrometers.

The useful energy range of the Coaxial Ge detector is 40 keV to more than 10 MeV. The resolution and peak shapes are excellent and are available over a wide range of efficiencies. A list of available models is given in the accompanying table.

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Typical Absolute Efficiency Curve for 15% Detector  
(25 cm detector to source spacing)

## SPECIFICATIONS

### SEGe GERMANIUM DETECTOR

General Specifications and Information

#### Standard configuration includes:

- Vertical Slimline dipstick cryostat with 30 liter Dewar.
- Model iPA – Intelligent Preamplifier with 3 meter bias, high voltage inhibit, signal, and power cables.

See the “Cryostats, coolers & options” section for all information on available options and configurations.

The Intelligent Preamplifier (iPA) included with this style of HPGe detector has an improved, low power analog front stage providing excellent resolution and count rate performance.

An integrated digital back-end makes use of the detector sensors to continuously monitor and store all relevant parameters and status information. This data, which may be trended over time, allows the user to take preventative measures if a key parameter starts to shift and ultimately improves equipment availability and productivity.

It also enables setup and tuning of the preamplifier through digital controls rather than potentiometers.

The preamplifier status information, on board log file and digital controls are accessible through a USB 2.0 serial connection and software application which is provided with the iPA.

See the “Intelligent Preamplifier” specification sheet for more details.

# Standard Electrode Coaxial Ge Detectors (SEGe)

Model Number	Relative Efficiency (%) ≥	Full Width Half Max (FWHM) Resolution (keV)		Peak to Compton Ratio (P/C)	Peak Shape FWTM/ FWHM	Endcap diameter mm (in.)
		At 122 keV energy	At 1.3 MeV energy			
GC0518	5	0.825	1.8	32	1.90	76 (3.0)
GC1018	10	0.825	1.8	38	1.90	76 (3.0)
GC1020	10	1.0	2.0	34	2.00	76 (3.0)
GC1518	15	0.825	1.8	44	1.90	76 (3.0)
GC1520	15	1.0	2.0	40	2.00	76 (3.0)
GC2018	20	0.850	1.8	50	1.90	76 (3.0)
GC2020	20	1.10	2.0	46	2.00	76 (3.0)
GC2518	25	0.850	1.8	54	1.90	76 (3.0)
GC2520	25	1.10	2.0	50	2.00	76 (3.0)
GC3018	30	0.875	1.8	58	1.90	76 (3.0)
GC3020	30	1.20	2.0	54	2.00	76 (3.0)
GC3518	35	0.925	1.8	60	1.90	76 (3.0)
GC3520	35	1.20	2.0	56	2.00	76 (3.0)
GC4018	40	0.925	1.8	62	1.90	76 (3.0)*
GC4020	40	1.20	2.0	54	2.00	76 (3.0)*
GC4518	45	0.950	1.8	62	1.90	83 (3.25)
GC4520	45	1.20	2.0	54	2.00	83 (3.25)
GC5019	50	1.00	1.9	64	1.90	83 (3.25)*
GC5021	50	1.20	2.1	56	2.00	83 (3.25)*
GC5519	55	1.00	1.9	64	1.90	89 (3.5)
GC5521	55	1.20	2.1	56	2.00	89 (3.5)
GC6020	60	1.05	2.0	66	1.90	89 (3.5)
GC6022	60	1.25	2.2	60	2.00	89 (3.5)
GC6520	65	1.05	2.0	68	1.90	89 (3.5)
GC6522	65	1.25	2.2	62	2.00	89 (3.5)
GC7020	70	1.05	2.0	70	1.90	89 (3.5)*
GC7022	70	1.25	2.2	64	2.00	89 (3.5)*
GC8021	80	1.10	2.1	72	1.90	95 (3.75)
GC8023	80	1.30	2.3	66	2.00	95 (3.75)
GC9021	90	1.10	2.1	76	1.90	95 (3.75)
GC9023	90	1.30	2.3	70	2.00	95 (3.75)
GC10021	100	1.20	2.1	80	1.90	95 (3.75)*
GC10023	100	1.40	2.3	74	2.00	95 (3.75)*

For availability of detectors above 100% relative efficiency consult factory.

Model Number	Relative Efficiency (%) ≥	Full Width Half Max (FWHM) Resolution (keV)		Peak to Compton Ratio (P/C)	Peak Shape FWTM/ FWHM	Endcap diameter mm (in.)
		At 122 keV energy	At 1.3 MeV energy			
GC11021	110	1.20	2.1	80	1.90	102 (4.0)
GC11023	110	1.40	2.3	74	2.00	102 (4.0)
GC12021	120	1.30	2.1	80	1.90	102 (4.0)
GC12023	120	1.50	2.3	74	2.00	102 (4.0)
GC13021	130	1.30	2.1	80	1.95	108 (4.25)*
GC13023	130	1.50	2.3	74	2.00	108 (4.25)*
GC14022	140	1.30	2.2	80	1.95	108 (4.25)*
GC14024	140	1.50	2.4	74	2.00	108 (4.25)*
GC15022	150	1.30	2.2	80	1.95	108 (4.25)*
GC15024	150	1.50	2.4	74	2.00	108 (4.25)*

\* Note: Due to variations in crystal size endcap diameter may be larger. For guaranteed endcap diameter or custom specifications and hardware customization consult factory.

Above specifications are in accordance with IEEE Std 325-1996. Resolution performance is tested with Lynx® digital MCA. For resolution performance guarantee using other CANBERRA digital MCAs consult factory.

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