



Diamond Gamma Voltaic: DGV-4

Our Gammavoltaic harvests ambient activity in hazardous environments to produce a modest current. A vertical stack of three individual gammavoltaic cells. Each cell is based on a commercially-bought, electronic grade, single crystal substrate.

Value's given are approximate.



Two individually-mounted DGV cells

Use Applications:

- Monitoring Radioactive Waste Storage
- Space applications
- Defence & Security

Features:

- Fit and forget – zero maintenance
- Ultra-long-life (100+ years)
- CBRN resistant and resilient

	Prototype value
Dimensions (mm)	4.5 x 4.5 x 1.5
Weight (mg)	106
Maximum V_{OC} (V)	2.1

The cell generates a micro-power current by converting the energy of the photons hitting its surface. The following tables show parameters defined by tests using synchrotron x-rays and major nuclear waste isotopes, respectively. The former was undertaken with a single-celled device, the latter with the current prototype.

	Dose Rate† (Gy/h)	V_{OC} (V)	I_{SC} (nA)	P_{MAX} (nW)	Max. Power density (nW/cm ²)	Max. Power density (nW/cm ³)
54 keV	34	0.8	888	296	1462	29235
100 keV	64	0.8	5943	1931	9536	190716
148 keV	98	0.8	10369	3170	15654	313086

As calculated using Monte Carlo High-Energy Physics simulation software, GEANT4.

Irradiation of the DGV with laboratory broad-band x-rays, from a conventional source, has proved sufficient to power a low-energy Bluetooth sensor unit. To do this, the device generated approximate 300 nW for 10 hours, after which a Bluetooth transmission containing a temperature reading was transmitted to a receiver.

	Dose Rate* (Gy/h)	V_{OC} (V)	I_{SC} (nA)	P_{MAX} (nW)	Max. Areal Power density (nW/cm ²)	Max. Volumetric Power density (nW/cm ³)
Co-60 (1170 and 1340 MeV)	17	1.6	0.7	0.4	2	40
	100	1.9	8.2	5.4	27	533
	2900	1.9	143	84	415	8296
Cs-137 (662 keV)	15	1.9	1.4	0.8	4	79
	95	2.0	9.6	7	35	691
	3200	2.0	143	96	474	9481

As measured with a calibrated diamond dosimeter