

2018



# Diamond Catalogue



# CVD Diamond Detectors

## Diamond Properties

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**Wide band gap:** operates at room temperature or at high temperatures with a negligible dark current (pA level)

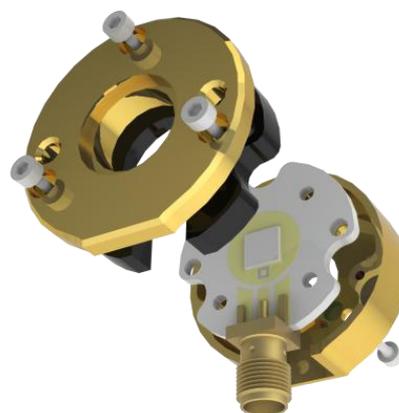
**Low Z**, tissue equivalent

High electron and hole mobility, ensuring a **fast signal** collection and a fast rise time

**Radiation hard** and inert allows for use in hostile, highly radiative or high temperature, environments

Very **high resistivity** ( $10^{13} - 10^{16} \Omega \cdot \text{cm}$ )

**Natural UV** sensitivity



## Technical Specifications

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**High purity** CVD diamond

Available in **polycrystalline** (PC) and **monocrystalline** (SC) forms, suitable for different applications

### Dimensions

- SC CVD: 2 x 2 mm to 4.5 x 4.5 mm
- PC CVD: 2 x 2 mm to 10 x 10 mm
- other dimensions available on request

### Thickness

- 50 to 500  $\mu\text{m}$  standard
- other thicknesses available on request

Various **metals and contact geometries** are available on request, their optimisation depend on the application.

## Detector Properties

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Solid state ionisation chamber

Low capacitance (typically pF level)

Low dark current (typically pA level)

High energy resolution (measured at 5.48 MeV)

Solar blind

## Applications

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High energy physics (beam positioning, beam monitoring)

Civil nuclear (medical, oil & gas)

Medical therapy, dosimetry

Synchrotrons and cyclotrons

Deep UV (<225 nm)

Neutron detection (fast and thermal)

## CVD Diamond Type and Sizes

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CVD Diamond come in various **sizes, thickness and quality**. The table below lists the standard dimensions and thickness available for each quality of CVD Diamond.

**Electronic grade (EL)** is the highest quality. The concentration in nitrogen and boron impurities is the lowest achievable by the industry, allowing spectroscopic applications.

**Standard grade (STD)** contains more nitrogen (at the ppm level), but can be used in specific applications. Only single crystal CVD diamond is available in this quality.

<b>CVD Dimensions (mm)</b>	<b>SC EL</b>	<b>SC Std</b>	<b>PC EL</b>
<b>2 x 2</b>	100 → 500 μm	100 → 500 μm	
<b>3 x 3</b>	100 → 500 μm	100 → 500 μm	
<b>4.5 x 4.5</b>	100 → 500 μm	100 → 500 μm	
<b>5 x 5</b>			100 → 500 μm
<b>6 x 6</b>		100 μm → 1.2 mm	
<b>7 x 7</b>		100 μm → 1.2 mm	
<b>8 x 8</b>		100 μm → 1.2 mm	
<b>10 x 10</b>			100 → 500 μm

*Valid at the time of writing. Please enquire to check availability.*

## CVD Diamond Sensor Design

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The table below lists the most standard designs used on CVD Diamond. They are very flexible and can be adapted to suit different needs. The contacts these design are made of include a variety of metals and non-metals such as: aluminium, titanium, nickel, gold, silver...

<b>Sensor Design</b>	<b>Shape</b>
Single Window	square <b>or</b> circular
Quadrant	square <b>or</b> circular
Strips	orthogonal on each side for a X-Y sensor <b>or</b> interdigitated for a surface sensor
Pixels	squares, various sizes available
Position Sensitive	2 strips on each side over a thin conductive layer for a X-Y sensor with position resolution
Thick – Thin	electrode thinner than bonding pad

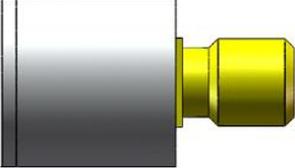
## Sensor Packaging

The diamond detectors can be supplied as chip only or assembled on standard or custom-made packages. The majority of packages are made from ceramic 96% alumina for operation in ultra-high vacuum environments or FR4 material. They are made with gold-free contacts and can be supplied as transmission packages with a custom-diameter through-hole.

Examples of casing are shown below, for which the standard is aluminium, bare or gold-plated. The preferred connecting option is the small SMA connector for use in limited spaces. Other connectors such as TNC or BNC coaxial or triaxial connectors are available on request.

In addition to all these, various FR4 or ceramic board shapes and sizes are available, as well as the entire range of Micron Semiconductor packages.

The following table introduces a few of our most common board and case designs. We are always designing and fabricating new solutions, capable of housing one or several CVD sensor of any size.

<p><b>MSL-DD-01</b></p> 	<p><b>MSL-DD-02</b></p> 	<p><b>MSL-DD-04</b></p> 
<p><b>MSL-DD-05</b></p> 	<p><b>MSL-DD-07</b></p> 	<p><b>MSL-DD-08</b></p> 



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