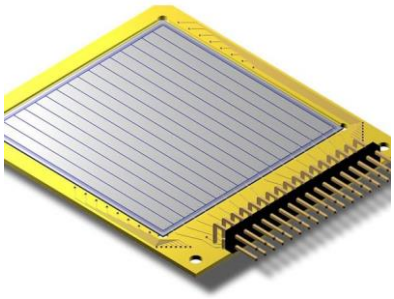
Design W1



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Detector Description

DC Strip Detector without Bias Resistors

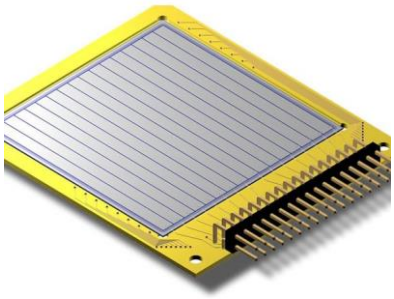
All double sided devices can be fabricated as single sided devices using either the double sided junction or ohmic side

Junction Implant Window:	Type 2 / 7 / 9 / 9.5
Junction Metal Options	M / G / P / T
Ohmic Implant Window:	Type 2
Ohmic Metal Options	M
Single or Double Sided	All double sided devices can be fabricated as single sided devices using either double sided junction or ohmic
Application	Nuclear, Research, High Energy and Ion Beam Physics
Package	PCB/PCB Kapton/Ceramic. Transmission designs and headers.
Package Comments	Various - Can typically be modified onto FR4, ceramic, polyamide and kapton. With various connector types (straight or 90 degree) to suit requirements.

Dimension Parameter	Value
Chip Dimensions - Flat to Flat (mm)	53.78 x 53.78
Chip Number of Sides	4
Active Area Width (mm)	49.50
Active Area Height (mm)	49.50
Active Area nom. (mm2)	25
Junction Pitch (µm)	3125
Ohmic Pitch (µm) *	3125
Junction Number of Strips	16
Ohmic Number of Strips *	16
Minimum Acceptance Level	100% Operational

* Applicable only to Double Sided Devices

Design W1



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Parameter	50um	65um	140um	300um	500um	1000um	1500um
Device Thickness (µm)	50	65	140	300	500	1000	1500
VFD Typical (V)	10	10	20	50	75	150	250
Total Leakage Typical at VFD (nA)	70	50	60	65	360	600	550
Total Leakage Typical at VFD +30% (nA)	85	70	130	100	465	730	630
V_B at 10 µA (V)	>50	>50	>100	>100	>150	>200	>300
V_f at 10 mA (V)	0.60	0.60	0.60	0.60	0.60	0.60	0.60
Junction Strip Capacitance Typical VFD (pF) **	4	3	2	1	1	1	1
Alpha Resolution Junction Side Typical (5.48 MeV ^{241}Am)	3%	3%	2%	2%	1%	1%	1%
Isolation (Ohmic Side)	100 K Ohm Minimum						
Isolation (Junction Side)	10 Megaohm Typical						
Acceptance Level	100% (All Channels Operational)						

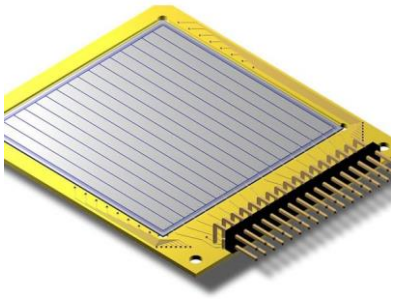
Measurements taken at 20°C on N-Type Float Zone material,
Total Alpha Resolution will be measured on both sides of the detector,
At time constants of FWHM with 241 Americium Source 5.48 MeV line.

* Applicable only to Double Sided Devices ** Excludes 1pF /cm for Cable Readout and Capacitance on packaging

Parameter	Value
Maximum Operating Voltage (V)	VFD + 30V
Operating Temperature (°C) *	-55 to + 70

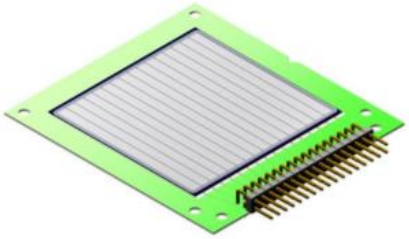
* If higher temperature of operation required, then gold contacts may need to be added (TBC).
Heating/ Cooling will half or double leakage current every 7°C for high resistivity silicon

Design W1



Packages: Various

Design W1 (DS) - 300 7G/2M on a standard FR4 transmission package *



Design W1 (DS) - 300 2M/2M on a standard ceramic transmission package

Design W1 (DS) - 300 2M/2M on a minimum material transmission package

* Compatable with the MSX25 detector assembly for a dE/E configuration.

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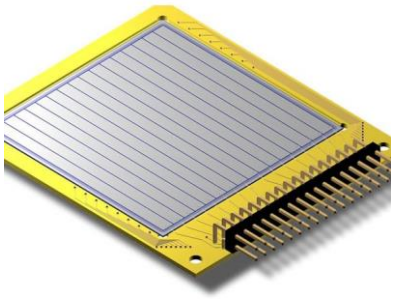
Design W1



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PRODUCT CHOICE INFORMATION

Silicon Type

N-Type

The majority of devices are fabricated on n-type float zone material with a crystal orientation of <100>. This material has a high resistivity typically in the range 3 – 10 KΩ cm.

P-Type

P-type silicon processing can be offered on all designs where segmentation isolation is possible.

NTD

Neutron transmutation doped n-type silicon is offered for applications where low resistivity variation across the wafer is required. This material has a much higher depletion voltage than regular high resistivity n-type material.

Silicon Wafer Size and Thickness

The wafer size corresponds to the standard* silicon thicknesses that the device can be processed on.

Wafer Size	Standard Silicon Thickness (µm)
4-inch	20, 30, 40, 50, 65, 80, 100, 140, 250, 300, 500, 1000, 1500
6-inch	150, 200, 300, 400, 500, 675, 1000, 1500

*Other non standard and R&D silicon thicknesses are available on request.

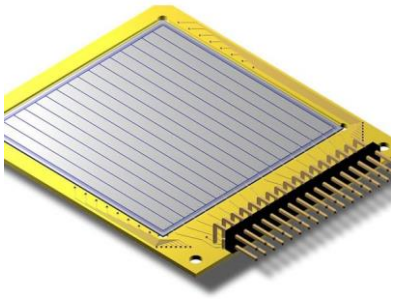
Junction and Ohmic Window Type

Implant Type

The range of dead layer windows available with the in-house implanters are listed below. Window types refer to the junction of a device, but can also be achieved on the ohmic side upon request.

Window Type	Dead Layer (µm)	Minimum Energy Threshold Electron (KeV)	Minimum Energy Threshold Protons (KeV)
2	0.50	4	90
7	0.30	2	70
9	0.10	1	10
9.5	0.05	0.5	1

Design W1



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Metallisation Coverage Type

The coverage of the metal over the active area can be suited to the sensors application and to compliment the dead layer of the implant. The metal coverage refers to both the junction side and ohmic sides.

Metal Coverage	Description
M	A continuous metal coverage of standard thickness over the whole active area regions
G	Grid coverage, typically 3 %, of standard thickness metallisation over the whole active area and contact pads for wire bonding.
P	A periphery metal band, typically 30 mm wide, around the edge of the active areas and contact pads for wire bonding. The majority of the active area metal coverage free.
T	A standard periphery coverage, as described above, for good electrical contact, and a thin metal coverage typically 0.1 -0.3 mm over the majority of the active area.
D	A double metal process used to track readout signal in a direction different to the active area elements.
E	An equipotential metal band array used on PSD devices.

Metallisation Type

The standard metallisation scheme is 100 % sputtered aluminium of thickness 0.3 µm for good ultra sonic wire bonding connections.

For space applications a thicker metal deposition can be offered.

The evaporated metal system Ti/Ni/Au is also available on request. Gold ohmic contacts are used for high operating temperature detectors +55° to +120° required for military applications.

SENSOR PACKAGE

The silicon chips can be delivered as chip only or assembled in a standard or custom package.

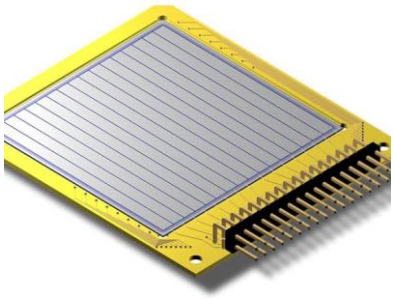
The majority of packages are made from standard FR4 material. Black FR4 material can be offered where light transmission through the package needs to be minimised.
Many of the designs currently offered on FR4 material can be modified and transferred onto ceramic 96% alumina or aluminium nitride for operation in ultra high vacuum environments. Other package materials such as polyamide and kapton for high density readouts with limited space have been utilised for many applications.

The connector type (straight or 90 degree) and orientation (exiting the junction or ohmic side) can also be changed to suit the experimental arrangement. Where a common pitch is used it may also be possible to request an alternative connector on an existing package.

SPACE QUALIFICATION

Space qualification of detectors can be supplied on request

Design W1



RADIATION

3 x 10^{15} protons 10 Megarad Proton damage 1nA /cm^2 /100 RAD increase in leakage current.

At 10MR leakage current increases but self-annealing reduces current at room temperature and above.

Detector will invert to P-Type at 3 x 10^{14} protons/cm^2 (10 Megarad)

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