

2007

Catalogue

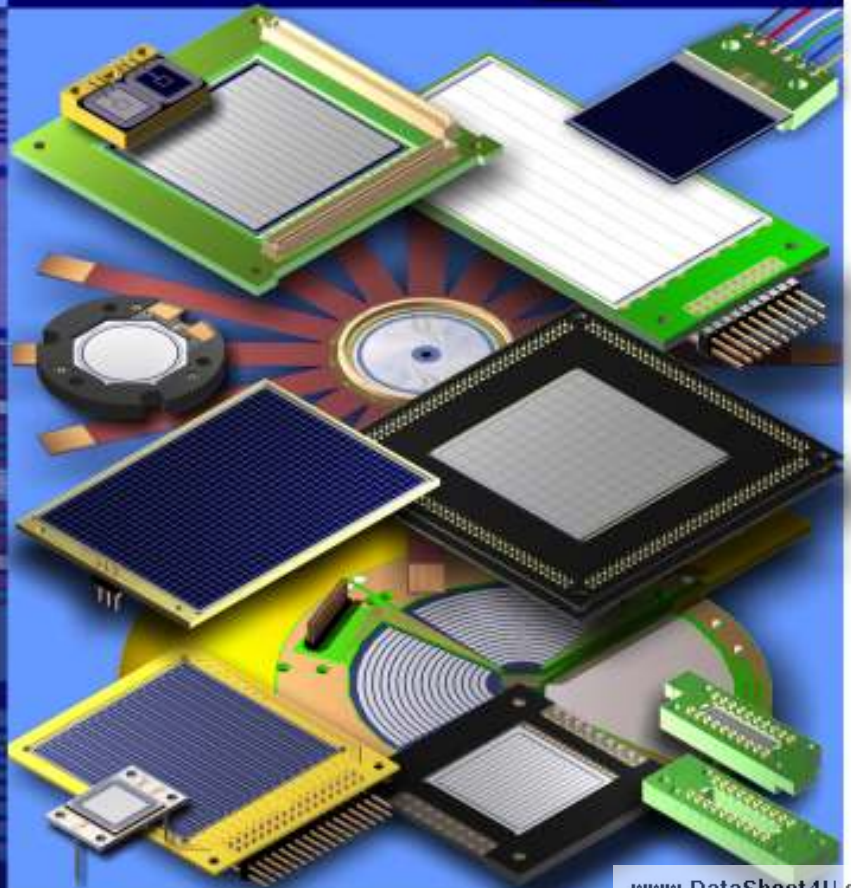


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INTRODUCTION

MICRON SEMICONDUCTOR PHYSICS 2007



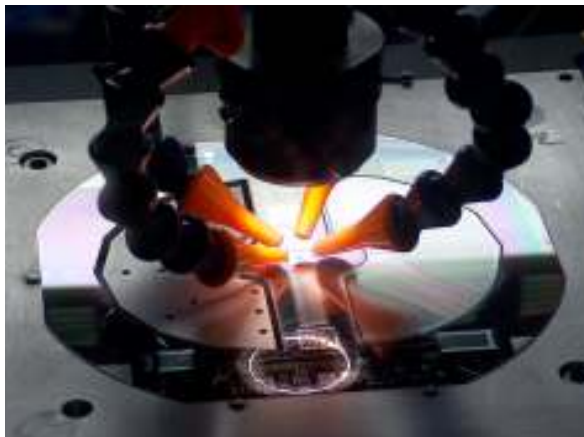
Micron Semiconductor Ltd has developed the most extensive custom range of AC and DC detectors in the world over the past 20 years. In 2006 more than 20 new detectors, including pixels, microstrips, duo and tetra-lateral devices were designed, several of which are now available in the 2007 catalogue.

Many of our most popular designs used in radioactive beam, nuclear and space physics have been developed further with a variety of implant windows, metal coverage and packaging options for minimizing dead layers and closer spacing between detector assemblies.

2006 saw Micron Semiconductor's most extensive contribution to space physics, delivering over 100 fully space qualified assemblies to worldwide institutes and space agencies. The NASA's STEREO mission, to observe 3D images of the sun, is ready to launch Micron's thinnest space qualified devices, the single sided MSA003/016-15 μm .



The development of thin silicon devices continues with projects to delivery single sided ultra thin silicon less than 10 μm and double sided large area super thin microstrip detectors less than 40 μm thick.



Micron continues to provide a full in-house processing capability for 4 and 6-inch silicon wafer technology. The standard thickness range for 4-inch wafers is 40 – 1500 μm and on 6-inch wafers it is 150 – 1000 μm , other thicknesses are available as non-standard. There are also projects studying different silicon materials including NTD, MCZ and p-type for future high energy physics experiments.

Laser cutting is in full production for computerized dicing irregular detector shapes, boring small diameter holes and achieving minimum damage to silicon devices edges.

SILICON SENSOR OPTIONS

Window Type

The range of dead layer windows available with the in-house Varian 300 XP ion implanter 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	MINIMUM ENERGY THRESHOLD	
		Electron	Proton
2	0.5 μm	4 KeV	70 KeV
7	0.1 μm	1 KeV	10 KeV
9	0.05 μm	300 eV	4 KeV

Metal Coverage

The standard metallisation scheme is 100 % sputtered aluminium of thickness 0.5 μm for good ultrasonic wire bonding connections. 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.

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 μm 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 μm 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.

The metal coverage refers to the junction side, but can also be achieved on the ohmic side upon request. 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.

Wafer Size

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

WAFER SIZE	STANDARD SILICON THICKNESSES AVAILABLE
3-inch	20, 30, 40 μm
4-inch	40, 50, 65, 80, 100, 140, 250, 300, 500, 1000, 1500 μm
6-inch	150, 200, 300, 400, 500, 675 μm

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

Single sided large area MSX25 (50 x 50 mm²) and Design W1(SS) strip detectors are produced to 20 μm using a proprietary process.

Guard Ring Design

Latest designs incorporate a multi-guard designed to support a higher bias voltage beyond full depletion and avoid premature breakdown. They are therefore better suited for sensors fabricated on the thicker silicon range beyond 500 μm which require high depletion voltage operation.

Packages

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 or on black FR4 material where light transmission through the package needs to be minimized. 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 are also available on request. Assemblies have been designed where the detector is mounted on a heat conducting substrate with the readout ASIC amplifiers connected directly to the support, see MSA127 detector assembly.

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 a specific connector part. The choice of connector is critical as it often occupies valuable space in an experiment. It is also important to ensure that the insertion force of a mating connector does not stress or damage the detector assembly.

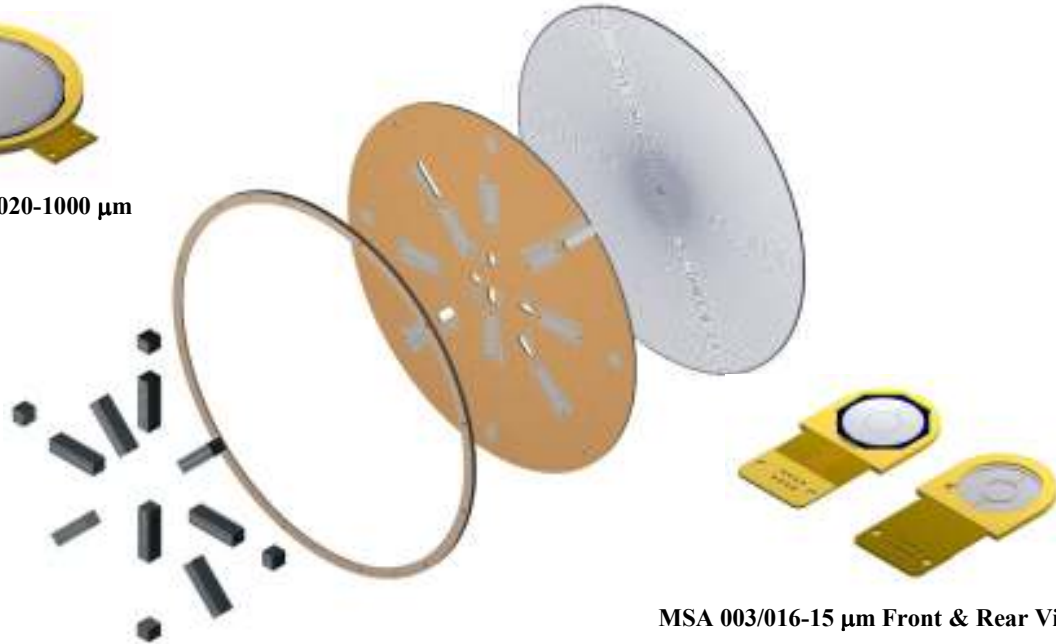
CUSTOM SILICON ANNULAR DETECTORS

SILICON DETECTOR TYPE: SINGLE SIDED DC Annular detectors

DESIGN: Totally depleted ion implanted structures.



MSA 002/020-1000 μm



MSA 003/016-15 μm Front & Rear View

MSA127 assembly supplied to TR SAXS Project at Argonne National Lab.

	DESIGN	ACTIVE AREA DIAMETER (mm)	CHIP DIMENSIONS	WINDOW TYPE	METAL COVERAGE	WAFER SIZE (inch)	GUARD RING DESIGN	PACKAGE
	MSA002/020	Element 1 Active Area Diameter = 8.0 mm Element 2 Active Area Diameter = 20.0 mm N° Annuli = 2 Annular Separation = 40 μm	24.0 mm Flat-to-Flat N° Sides = 16	2, 7, 9	M	4	MGR	Chip Only
	MSA003/016	Element 1 Active Area Diameter = 7.0 mm Element 2/3 Active Area Diameter = 16.0 mm N° Annuli = 2 Annular Separation = 50 μm	18.15 mm Flat-to-Flat N° Sides = 8	2, 7, 9	M	4	MGR	Chip Only
	MSA127	Active Area Diameter = 67.236 mm N° Annuli = 127 Annular Pitch = Variable Annular Separation = 50 μm Hole Diameter = 9.8 mm	136.472 mm Flat-to-Flat N° Sides = 24	2	M	6	MGR	Ceramic Flip Chip Mounted

* Available as optical or nuclear devices

ENVIRONMENTAL TESTING OPTIONS: Space qualified, military, industrial, research, physics projects

EXPERIEMENT: Caltech:-STEREO, Argonne National Lab:- TR SAXS

QUALITY ASSURANCE: ISO9001

CUSTOM SILICON CIRCULAR PAD DETECTORS

SILICON DETECTOR TYPE: SINGLE AREA

DESIGN: Totally depleted ion implanted structures.

SINGLE SIDED, SINGLE ELEMENT CIRCULAR MSD SERIES:

DESIGN	ACTIVE AREA DIAMETER (mm)	CHIP DIMENSIONS (mm ²)	WINDOW TYPE	METAL COVERAGE	WAFER SIZE (inch)	GUARD RING DESIGN	PACKAGE
MSD003	3.00	5.0 x 5.0	2	M	4	MGR	Chip Only
MSD004*	4.00	7.0 x 7.0	2, 7, 9	M, T, P	4	SGR	Black FR4 PCB
MSD005	5.00	7.0 x 7.0	2, 7, 9	M, T, P	4	MGR	Black FR4 PCB
MSD062	6.20	8.2 x 8.2	2, 7, 9	M, T, P	4	MGR	Chip Only
MSD007*	7.00	10.0 x 10.0	2, 7, 9	M, T, P	3 & 4	SGR & MGR	Range of Black FR4 PCBs
MSD008*	8.00	10.0 x 10.0	2, 7, 9	M, T, P	4	MGR	Black FR4 PCB
MSD009	9.00	11.0 x 11.0	2	M	4	MGR	Chip Only
MSD010	10.00	13.0 x 13.0	2, 7, 9	M, T, P	4	MGR	Chip Only
MSD011	10.00	12.0 x 12.0	2	M	6	MGR	Ceramic
MSD018*	18.00	21.0 Flat-To-Flat (8 Sides)	2, 7, 9	M, T, P	4	MGR	Black FR4 PCB
MSD020	20.00	22.0 x 22.0	2	M	4	MGR	Chip Only
MSD024	24.50	28.76 Flat-To-Flat (16 Sides)	2	M	6	MGR	Housed in a metal case
MSD030	30.00	32.00 x 32.00	2	M	4	MGR	Chip Only
MSD035	35.0	39.0 Flat-To-Flat	2, 7, 9	G	4	MGR	Range of Black FR4 PCBs
MSD040	40.00	44.0 Flat-To-Flat (16 Sides)	2	M	4	MGR	Chip Only
MSD085	85.00	90.0 Flat-To-Flat (16 Sides)	2, 7, 9	M, T, P	4	MGR	Black FR4 PCB

RADIATION HARDNESS: Survival to 10^{14} Neutrons, 10^{15} ProtonsCAPACITANCE: Subject to depletion depth e.g. 40 pF/cm for 300 μ m

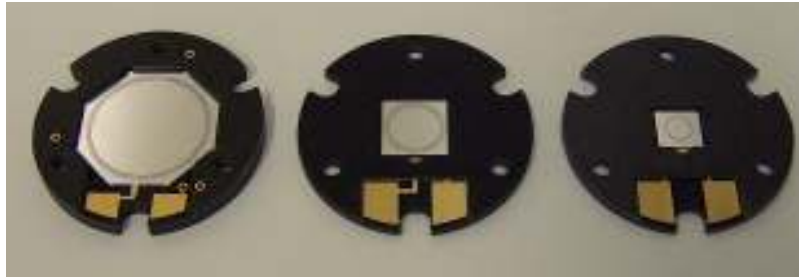
LEAKAGE CURRENT: 1 nA/cm to 8 nA/cm subject to active area and depletion depth.

WINDOW: Thin 0.1 μ m
Standard 0.5 μ m

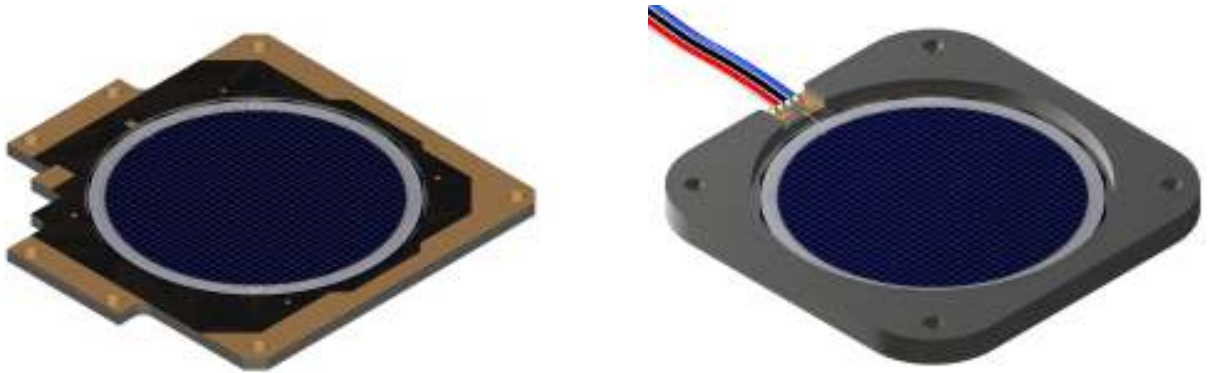
OPERATING TEMPERATURE RANGE: -65°C to +125°C

ENVIRONMENTAL TESTING OPTIONS: Space qualified, military, industrial, research, physics projects.

QUALITY ASSURANCE: ISO9001



MSD018, MSD007 AND MSD004 assemblies supplied to JAXA are mounted on PCBs with common mounting positions.



Many detector have a range of packages e.g. MDS035 used by the COMPASS and Crater Projects.



MSD024 detector supplied as an alpha monitor.



MSD085, the largest of the circular single areas.

CUSTOM SILICON PHOTODIODES

SILICON DETECTOR TYPE:	LARGE SINGLE AREA STRUCTURE
TECHNOLOGY:	3 INCH & 4 INCH SILICON
DESIGN:	Ion implanted silicon photodiodes featuring ultra low leakage currents, low noise, thin window and fast response. Available in assorted packages to meet a variety of light detection applications requiring rugged reliable structures for scientific, industrial, military and space applications. These devices can also be used as low cost nuclear particle detectors.
EXPERIMENTS WITH CsI INTERFACE:	GSL's Aladin and Indiana University's Silicon Ball.
CUSTOMER CHOICE:	Selected or Standard
ACTIVE AREA:	

TYPE	ACTIVE AREA
MSP1 - 65	2.0 x 2.0 mm ²
MSP2 - 200	5.5 x 2.75 mm ²
MSP3E - 300	10.0 x 10.0 mm ²
MSP4E - 300	20.0 x 20.0 mm ²
MSP5 - 300	5.0 x 5.0 mm ²
MSP7E - 140	7.0 x 3.0 mm ²
MSP8 - 300	20.0 x 3.0 mm ²
MSP05 - 300	24 mm Diameter

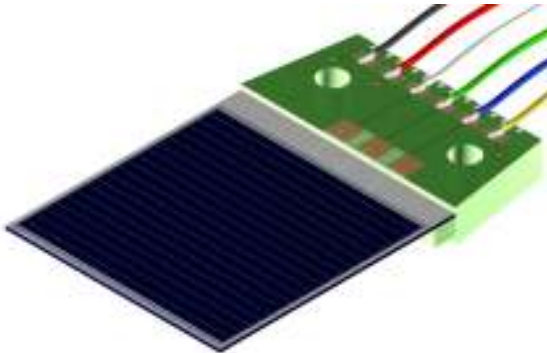
STANDARD WINDOW:	0.5 μm			
UV/BLUE WINDOW:	0.1 μm	Special Request		
THICKNESS:	65 μm	140 μm	200 μm	300 μm
FULL DEPLETION (FD):	5V	20 V	30 V	50 V
TYPICALLY CAPACITANCE (TYP):	160 pF/cm ²	75 pF/cm ²	50 pF/cm ²	35 pF/cm ²
SENSITIVITY:	300 – 1150 nm			
RESPONSIVITY: (900 nm)	0.6 A/W			
RESPONSIVITY: (550 nm)	0.3 A/W			
LEAKAGE CURRENT: (@ 20°C, FD)	Selected 0.5 nA/cm, typically 1.5 nA/cm maximum. Standard 1.5 nA/cm, typically 3 nA/cm maximum.			
NEP (900 nm):	10 A/Hz typically			
RISE TIME: (850 nm, 20 Ω, FD)	2 ns, typically 10 ns maximum			
FALL TIME: (850 nm, 20 Ω, FD)	5 ns, typically 10 ns maximum			
PACKAGING:	E Designation epoxy molded			
PACKAGE WINDOW:	Transparent epoxy, clear glass, filtered glass, sapphire or quartz			
CsI RESOLUTION:	To 5 % with selected electronics & field effect transistors.			
OPERATING TEMPERATURE:	Standard -20°C to +55°C Selected -46°C to +85°C			
RADIATION HARDNESS COEFF:	3 x 10 A cm (neutrons and protons)			
STABILITY & RELIABILITY:	All devices released are on bias at 20 V for 500 hours at 20°C.			

QUALITY ASSURANCE: ISO9001

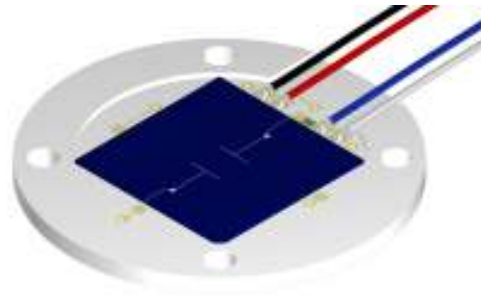
CUSTOM SILICON DUO-LATERAL POSITION SENSITIVE DETECTORS

SILICON DETECTOR TYPE: DOUBLE SIDED SINGLE AREA POSITION SENSITIVE DETECTOR

DESIGN: A double sided p-on-n silicon structure with highly uniform resistive junction and ohmic layers and equipotential channels. The readout between two anodes is orthogonal with respect to the readout between the two cathodes.



The MSPSD DL 04-300 Assembly for the FAUST Upgrade Experiment.



MSPSD DL 050 ceramic assembly

DOUBLE SIDED MSPSD DUO SERIES:

DESIGN	ACTIVE AREA DIMENSION (mm ²)	CHIP DIMENSIONS (mm ²)	GUARD RING DESIGN	WAFER SIZE (inch)	PACKAGE
MSPSD DL 010	1.0 x 1.0	3.0 x 3.0	SGR	4	Chip Only
MSPSD DL 011	1.0 x 1.0	15.356 x 15.356	SGR	4	Ceramic
MSPSD DL 030	3.0 x 3.0	5.0 x 5.0	SGR	4	Chip Only
MSPSD DL 031	3.0 x 3.0	15.356 x 15.356	SGR	4	Ceramic
MSPSD DL 050	5.0 x 5.0	7.0 x 7.0	SGR	4	Chip Only
MSPSD DL 051	5.0 x 5.0	15.356 x 15.356	SGR	4	Ceramic
MSPSD DL 03	10.0 x 10.0	12.0 x 12.0	SGR	4	Chip Only
MSPSD DL 0311	10.0 x 10.0	15.356 x 15.356	SGR	4	Ceramic
MSPSD DL 04	20.0 x 20.0	21.0 x 23.0	SGR	4	Standard FR4
MSPSD DL 63	63.0 x 63.0	66.0 x 66.0	MGR	4	Chip Only

ENVIRONMENTAL TESTING

OPTIONS: Space qualified, military, industrial, research, physics projects.

QUALITY ASSURANCE: ISO9001

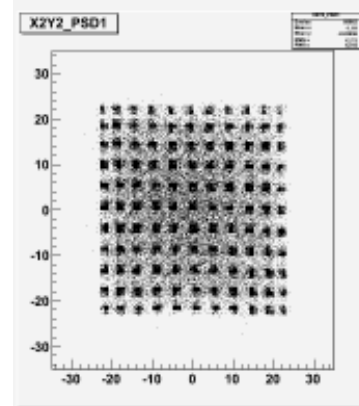
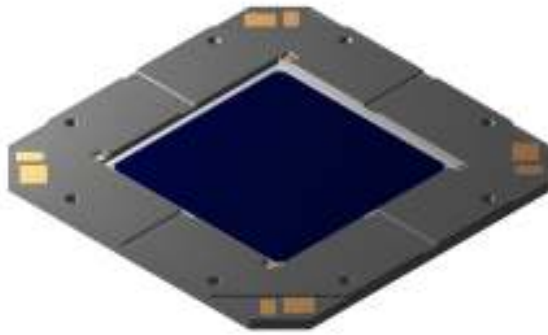
DESIGN MSPSD TETRA SERIES CUSTOM SILICON TETRA-LATERAL POSITION SENSITIVE DETECTOR SILICON

DETECTOR TYPE:

DESIGN:

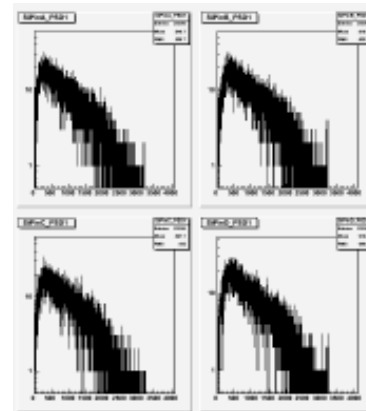
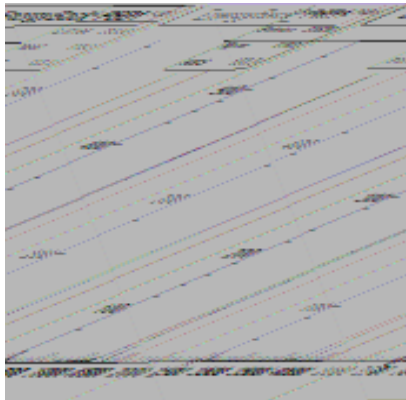
SINGLE SIDED SINGLE AREA POSITION SENSITIVE DETECTOR

A single sided p-on-n silicon structure with highly uniform resistive junction and equipotential channels. The readout is between four corner anodes and a single cathode. The designs feature an infinity plane for eliminating any pin cushion affects to achieve < 1 mm position resolution with heavy ions.



The MSPSD TL 63-200 assembly with a double recess package to protect wire bonds in a close stack configuration.

Recent test beam at the Texas A & M facility using ⁶³Cu, ¹⁶O and ⁴He have shown the MSPSD DL63-200 achieve 100 % linearity and a position resolution < 1mm.



Best results are achieved using a 6 μs shaping time. The rise time was 150-400 ns and falling time 30us.

SINGLE SIDED MSPSD TETRA SERIES:

DESIGN	ACTIVE AREA DIMENSION (mm ²)	CHIP DIMENSIONS (mm ²)	GUARD RING DESIGN	WAFER SIZE (inch)	PACKAGE
MSPSD TL 50	5.0 x 5.0	15.356 x 15.356	SGR	4	Chip Only
MSPSD TL 07	7.0 x 7.0	10.0 x 10.0	MGR	4	Chip Only
MSPSD TL 63	63.0 x 63.0	66.0 x 66.0	MGR	4	Black FR4

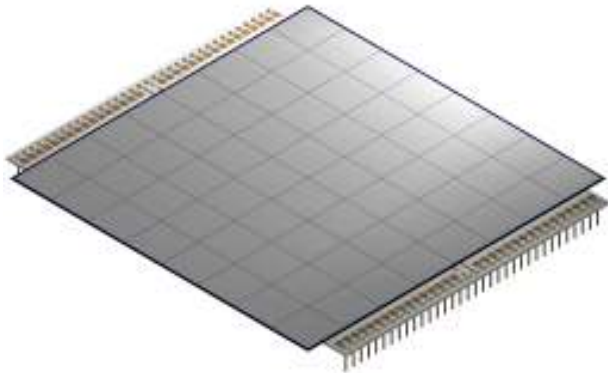
ENVIRONMENTAL TESTING OPTIONS:

Space qualified, military, industrial, research, physics projects.

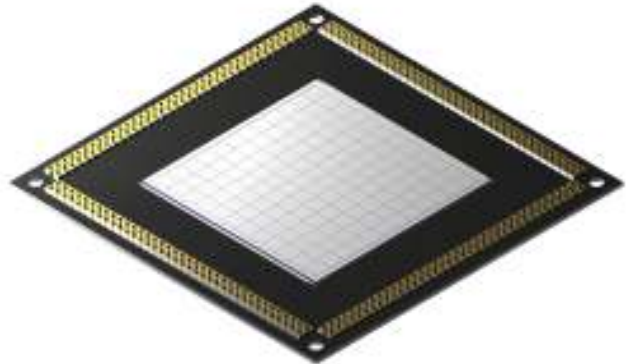
QUALITY ASSURANCE: ISO9001

CUSTOM SILICON PIXEL DETECTORS

SILICON DETECTOR TYPE: SINGLE SIDED DC PIXEL DETECTORS
 DESIGN: Totally depleted ion implanted structures with double metal system for some designs to track signals to the chip edges.



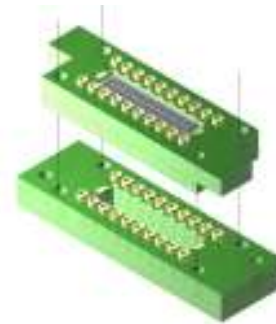
MSPX080 with double metal tracking mounted on a non-transmission ceramic.



MSPX 12x12 with double metal tracking mounted on a double stack transmission PCB.



The ultra thin silicon MSPX 042-15 um detector assembly.

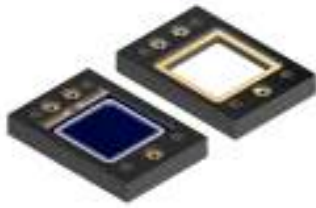


The MSPX 1 x 16 & MSPX 1x1 stack assembly.

SINGLE SIDED MSPX SERIES:

DESIGN	ACTIVE PIXEL AREA DIMENSION (μm ²)	PIXEL ARRAY	CHIP DIMENSIONS (mm ²)	WINDOW TYPE	METAL COVERAGE	WAFER SIZE (inch)	GUARD RING DESIGN	PACKAGE
MSPX 1x6 01		1 x 6		2	M	4	SGR	Polyimide
MSPX 1x6 02	1700 x 2100 1700 x 1800 1700 x 1700	1 x 6	8.00 x 15.00	2	M	4 & 6	MGR	Black FR4
MSPX 1x1*	1000 x 1000	1 x 1	4.00 x 20.50	2	M	4 & 6	MGR	Stackable Standard FR4 PCB
MSPX 1x16*	1000 x 1000	1 x 16	4.00 x 20.50	2	M	4 & 6	MGR	Stackable Standard FR4 PCB
MSPX 4 x 4	4950 x 4950	4 x 4	24.0 x 24.0	2	D	6	MGR	PCB
MSPX 12x12	4950 x 4950	12 x 12	64.0 x 64.0	2	D	6	MGR	Ceramic
MSPX 042	10000 x 10000	4 x 4	60.0 x 60.0	2	M	4	MGR	Black FR4 PCB
MSPX080	12075.0 x 12075.0	8 x 8	99.0 x 99.0	2	D	6	MGR	Ceramic

*MSPX 1x1 and MSPX 1x16 stackable package configuration



(a)

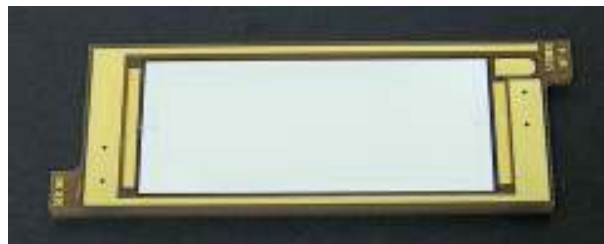


(b)



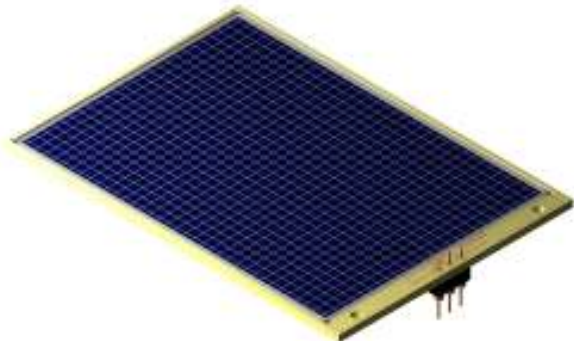
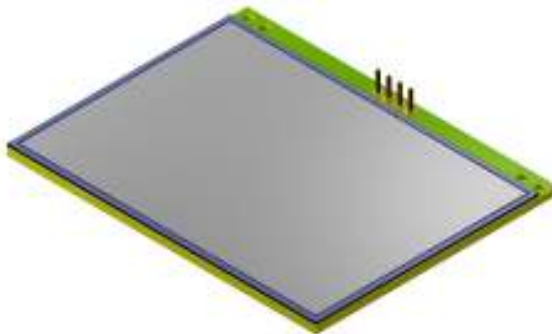
(c)

The MSX03 can be mounted in a range of packages from double recessed black FR4 (a), kapton stack with a minimum chip stack separation of 120 um (b) to ceramic transmission package for operation in ultra high vacuum environments (c).

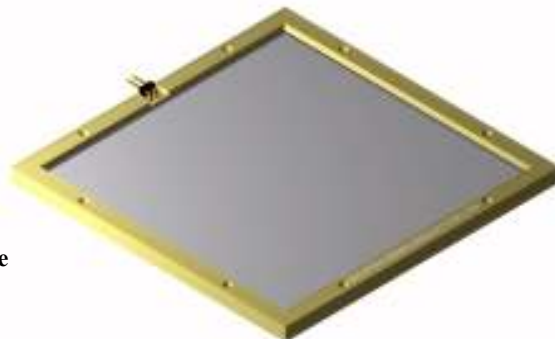


MSX 060 mounted on a double recessed FR4 transmission package.

www.DataSheet4U.com



The MSX35-500 2M and MSX35-500 2G mounted on different packages.



The MSX100 the largest active area in the MSX series.

SPECIALIST DETECTORS FOR NUCLEAR PHYSICS

SILICON DETECTOR TYPE:	TOTALLY DEPELTED SILICON MICROSTRIP DETECTOR WITH OVER VOLTAGE OPERATION.	
TECHNOLOGY:	4 INCH SILICON	
N ^o of ELEMENTS:	25	
N ^o of OUTPUTS:	25	
ELEMENT ACTIVE LENGTH:	50 mm	
TOTAL ACTIVE WIDTH:	50 mm	
ELEMENT SEPARATION:	25 μ m	
ELEMENT PITCH:	2 mm	
THICKNESS:	65 μ m, 140 μ m, 300 μ m, and 500 μ m	
RISE TIME:	20 ns maximum	
ELEMENT CAPACITANCE:	185 – 25 pF subject to thickness	
NOMINAL INTERSTRIP RESISTANCE:	100 M Ω	
ALPHA RESOLUTION	Junction 55 KeV FWHM maximum Ohmic 75 KeV FWHM maximum	
MAXIMUM NOISE PER ELEMENT (μ s T.C):	20 KeV	
METALLISATION: CONTACTS	Aluminum 3000 Å 5% metallisation on the active area element 100 % metallisation on back	
STANDARD PACKAGE:	PCB 90 x 80 mm ² Connections via soldering wires or spectra strip 801-075 Bonding wire-protected with epoxy resin to prevent user damage. Options: Total overcoat with moisture protection resin against dirty and high humidity environments.	
MINIMUM ACCEPTANCE LEVEL:	100 % elements operational when assembled based on 95% of addressed microstrip elements meeting the above specifications.	
SPECIFICATION IMPROVEMENTS:	Closer specification on the above parameters available an request	
BIASING:	Active area	Negative
	Substrate	Positive

QUALITY ASSURANCE: ISO9001

SPECIALIST DETECTORS FOR NUCLEAR PHYSICS

SILICON DETECTOR TYPE:	QUADRANT DETECTOR
DESIGN	Totally depleted ion implanted structures with multi-guard rings for over voltage operation.
PART DESIGNATION:	MSQ25-65, MSQ25-140, MSQ25-300, MSQ25-500, AND MSQ25-1000
TECHNOLOGY:	4 INCH SILICON
N ^o of ELEMENTS:	4
N ^o of OUTPUTS:	5
ELEMENT ACTIVE AREA:	2500 mm ²
TOTAL QUADRANT SECTOR AREA:	24.975 x 24.975 mm ²
QUADRANT SECTOR SEPARATION:	50 µm
CHIP DIMENSIONS:	52.02 x 52.02 mm ² 53.02 x 53.02 mm ² 57.02 x 57.02 mm ²
THICKNESS:	65 µm, 140 µm, 300 µm, 500 µm and 1000 µm
FULL DEPLETION OPERATION VOLTAGE:	10 – 250 V Subject to thickness
RISE TIME:	50 ns maximum
INTER QUADRANT RESISTANCE:	1 MΩ
RESOLUTION (Am 241):	Junction 55 KeV typical, 75 KeV maximum FWHM Ohmic 75 KeV typical, 100 KeV maximum FWHM
QUADRANT SECTOR NOISE:	15 KeV FWHM (1 µs TC)
ELEMENT (µs T.C):	20 KeV
METALLISATION:	Aluminum 3000Å
CONTACTS:	Metallisation on the active area element 100 % metallisation on back
MINIMUM ACCEPTANCE	100 % elements operational

PCB STANDARD:

Material – FR4

Thickness -1.6, 2.4 or 3.2 mm

Dimensions -70 x 70 mm²

Mountings - 4 holes Ø 5 mm at corners

Aperture - 50 x 50 mm²

Connectors -Cambion 460-1521-02-03-00

Connections - 4 to active area, 2 to ground

PCB CUSTOM:

1. Material – FR4

Thickness - 2.4 mm

Dimensions – 59.0x 59.0 mm²Aperture - 50 x 50 mm²

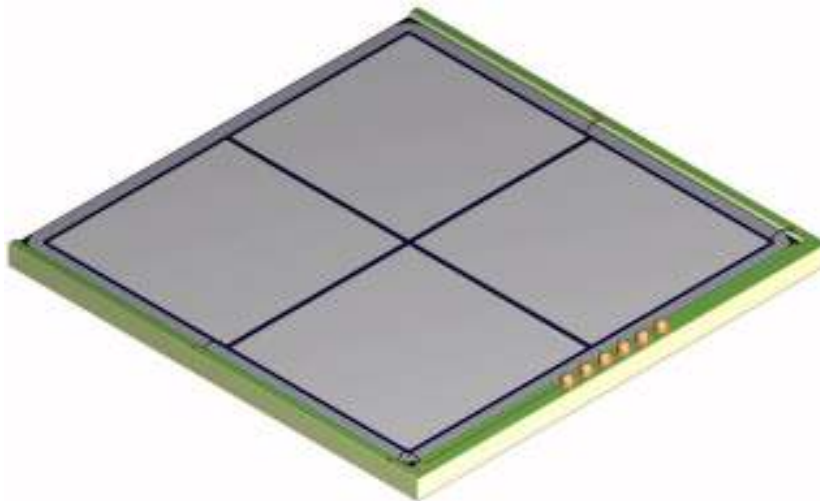
Connectors–Cambion 460-2599-04-03-00

2. Material – FR4

Thickness – 1.6, 2.4 or 3.2 mm

Dimensions – 55.4 x 55.4 mm²

Connectors–Cambion 450-3703-01-03-00

Aperture - 50 x 50 mm²

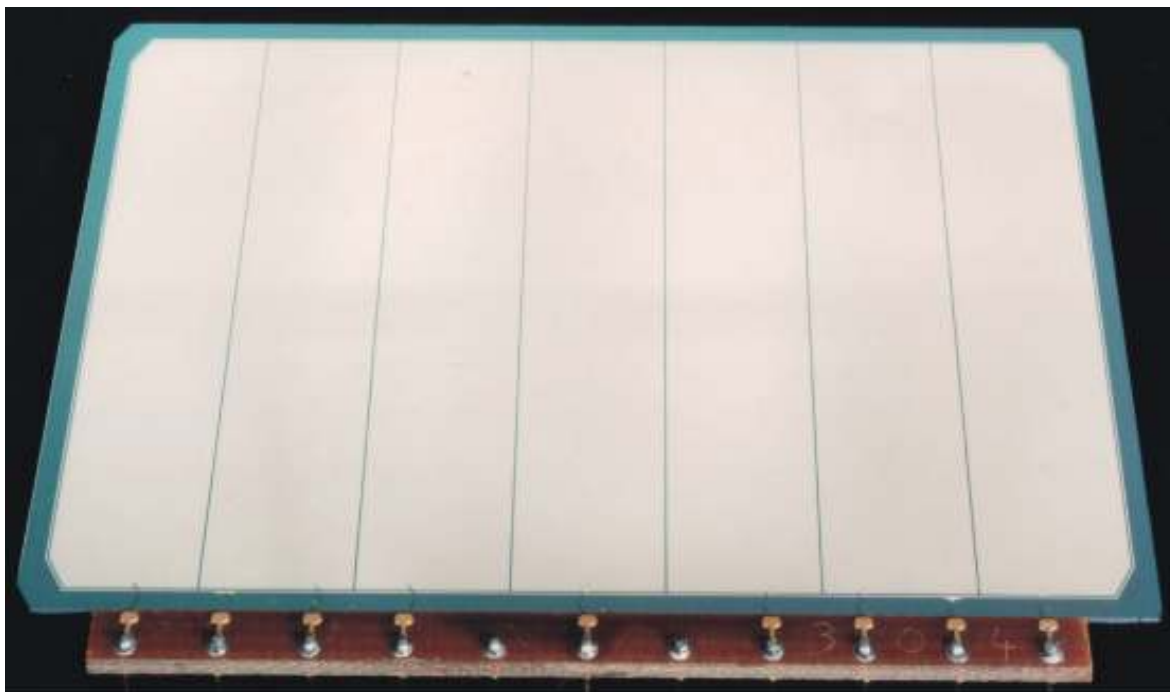
MSQ25-1000 with PCB custom package 2

EXPERIMENT: CERN ISOLDE

QUALITY ASSURANCE: ISO9001

SPECIALIST DETECTORS FOR NUCLEAR PHYSICS

SILICON DETECTOR TYPE:	MICROSTRIP DETECTOR
DESIGN TECHNOLOGY:	Totally depleted ion implanted structures with over voltage operation. 3 and 4 INCH SILICON
N ^o of ELEMENTS:	7
N ^o of OUTPUTS:	9 including substrate and guard ring.
STRIP PITCH:	8.5 mm
TOTAL ACTIVE AREA:	60.0 x 40.0 mm ²
STRIP SEPARATION:	100 μm



FULL DEPLETION (FD) OPERATING VOLTAGE:	FD to FD+30 V
LEAKAGE CURRENT (FD):	50 – 150 nA/strip
TOTAL LEAKAGE CURRENT:	1μA maximum
INTERSTRIP RESISTANCE:	10 – 100 MΩ
TOTAL ALPHA RESOLUTION:	55 KeV Typical
RADIATION HARDNESS:	1nA/cm /100 Rads (Protons)
CONNECTIONS:	Ultrasonic wire bonding
PACKAGE:	PCB edge with vertical pins
MINIMUM ACCEPTANCE:	100 % elements operational
EXPERIMENT:	CERN UA2, Brookhaven RHIC BRAHMS.

SPECIALIST DETECTORS FOR NUCLEAR PHYSICS

SILICON DETECTOR TYPE:	MICROSTRIP DETECTOR				
DESIGN:	Totally depleted ion implanted structure with over voltage operation. Includes guard-rings for high voltage operating plateau. This design is similar to Design I with 7 channels instead of 28.				
PART DESIGNATION:	DESIGNJ-140, DESIGNJ-500-GR and DESIGNJ-1000-GR				
TECHNOLOGY:	4 INCH SILICON				
N ^o of ELEMENTS:	28				
N ^o of OUTPUTS:	30				
TOTAL ACTIVE AREA:	60 x 40 mm ²				
PITCH:	2.14 mm				
SECTOR SEPARATION:	100 μm				
THICKNESS:	65 μm	140 μm	300 μm	500 μm	1000 μm
FULL DEPLETION OPERATION VOLTAGE:	30 V	30 V	30 V	80 V	200 V
LEAKAGE CURRENT (FD):	10 nA/strip typically, 100 nA/strip maximum				
INTERSTRIP RESISTANCE:	100 MΩ typical, 10 MΩ minimum				
TOTAL RESOLUTION (Am 241):	55 KeV typical, 159 KeV maximum FWHM subject to thickness/capacitance				
QUADRANT SECTOR NOISE:	15 keV FWHM (1 μs TC)				
RADIATION HARDNESS:	1 nA/cm/100 Rads (Grays) Protons				
DETECTOR ASSEMBLY PACKAGE:	One edge PCB (G10) support with three leading edge silicon sides				
CONNECTIONS:	30 vertical pins (mating sockets for PCB insets available on request)				
GUARD RING DESIGN:	Includes Guard Ring for higher voltage plateau				
ACCEPTANCE LEVEL:	100 % operational on all channels				
USER OF THIS DESIGN:	INDIANA UNIVERSITY				

SPECIALIST DETECTORS FOR NUCLEAR PHYSICS

SILICON DETECTOR TYPE: TOTALLY DEPLETED SINGLE SIDED MICROSTRIP

DESIGN: Silicon planar ion implanted passivated structure p on n silicon totally depleted single sided microstrip design exhibiting over voltage depletion capability with excellent radiation damage resistance and annealing capability for high neutron and heavy ion damage levels.

ACTIVE AREA: 20 x 20 mm²

ACTIVE LENGTH: 20 mm

ELEMENT PITCH: 2 mm

ACTIVE WIDTH: 20 mm

N^o of CHANNELS: 10

N^o of READOUTS: 100 %

THICKNESS: 200 μm, 300 μm, 450 μm and 600 μm

OPERATING VOLTAGE: 100 + 50 V

LEAKAGE CURRENT: 10 nA

RISE TIME: 10 ns /100 μm

ELEMENT CAPACITANCE: 8 – 24 pF

CONTACTING
METALLISATION: Aluminum 3000 – 8000 Å

PACKAGE: PCB with single sided readout
Dimensions – 35 x 34 mm²

SPECIALIST DETECTORS FOR NUCLEAR PHYSICS

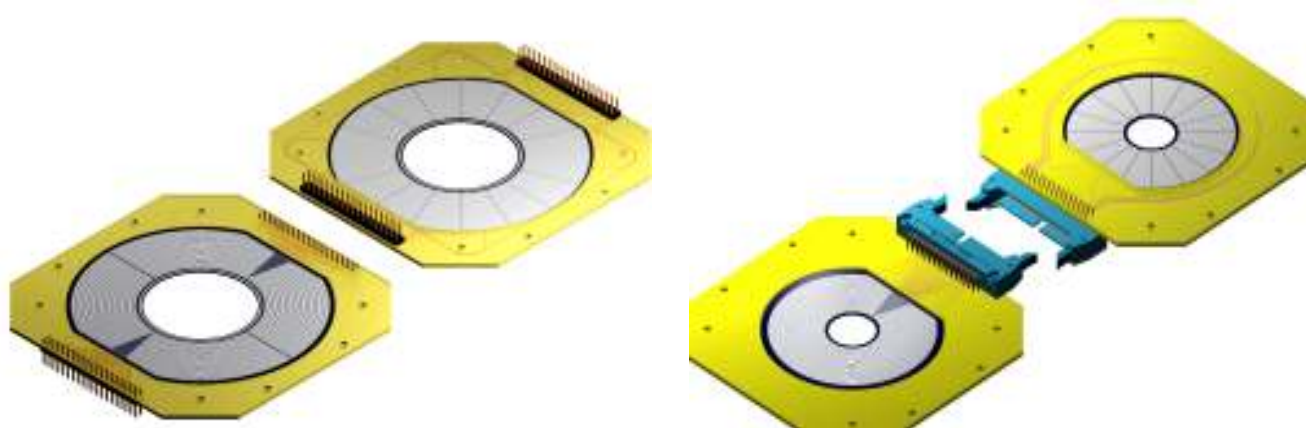
SILICON DETECTOR TYPE:	TOTALLY DEPLETED SINGLE SIDED MICROSTRIP
DESIGN:	Silicon planar ion implanted passivated structure p on n silicon totally depleted single sided microstrip design exhibiting over voltage depletion capability with excellent radiation damage resistance and annealing capability for high neutron and heavy ion damage levels subject to packaging material used in assembly.
ACTIVE AREA:	10 x 10.4 mm ²
ACTIVE LENGTH:	10 mm
ELEMENT PITCH:	20 µm
OXIDE SEPARATION:	10 µm
N ^o of CHANNELS:	520
N ^o of READOUTS:	100 %
THICKNESS:	100 µm, 140 µm, 250 µm, 300 µm, 500 µm and 1000 µm
TOTAL DARK CURRENT:	1 nA typically, 5 nA maximum
RADIATION DAMAGE	1 nA/cm /100 Rads
CONTACTING METALLISATION:	Aluminum 3000 & 8000 Å
CHIP SIZE:	14 x 14 mm
STANDARD:	Supplied as CHIP ONLY for customer assembly
CUSTOM:	Packaged devices on request to customer design fan outs.

SPECIALIST DETECTORS FOR NUCLEAR PHYSICS

SILICON DETECTOR TYPE: SINGLE AND DOUBLE SIDED RING COUNTER DESIGN

DESIGN: Silicon planar ion implanted passivated structure p on n silicon totally depleted single sided multi ring with 90° segments with optional double sided segments of 22.5° exhibiting over voltage capability with excellent radiation damage resistance and annealing capability for high neutron and heavy ion damage.

DESIGN	S1	S2
TECHNOLOGY	4	4
ACTIVE AREA	53 cm ²	35 cm ²
ACTIVE OUTER DIAMETER	96 mm	70 mm
ACTIVE INNER DIAMETER	48 mm	22 mm
ANNULAR HOLE DIAMETER	46 mm	20 mm
N ^o of FRONT SEGMENTS	4	-
N ^o of FRONT CONTACT PADS	64	48
N ^o of BACK SEGMENTS	16	16
N ^o of BACK CONTACT PADS	16	16



S1 detector and PCB as viewed from the p- and n-side.

S2 detector and PCB as viewed from the p- and n-side

DETECTOR THICKNESS RANGE:

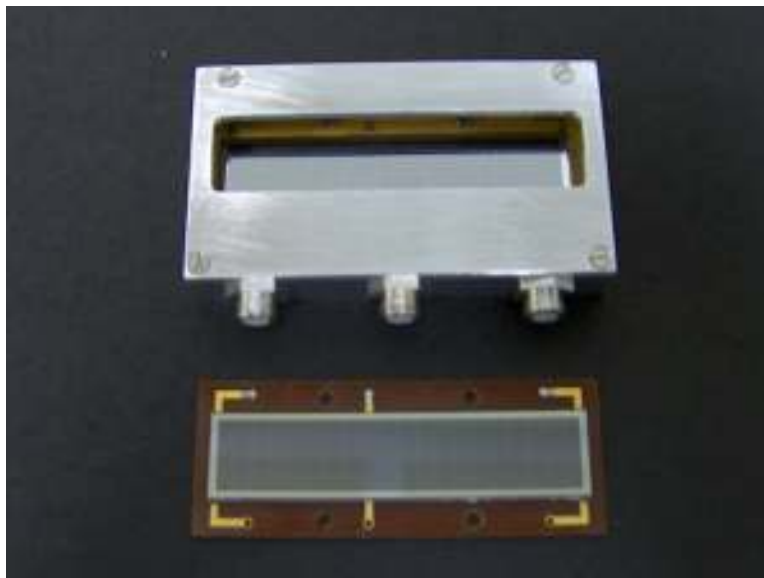
S1	65 μm, 140 μm, 300 μm and 500 μm
S2	65 μm, 140 μm, 300 μm, 500 μm and 1000 μm

PACKAGE: PCB, ceramic or PCB Kapton subject to design
 READOUT: 100 % on both sides
 CONTACTS METALLISATION: Aluminum front 1000 Å, back gold 3000 Å

QUALITY ASSURANCE: ISO9001

SPECIALIST DETECTORS FOR NUCLEAR PHYSICS

SILICON DETECTOR TYPE:	TOTALLY DEPLETED PLANAR STRUCTURE
DESIGN:	Silicon planar ion implanted structure p on n silicon totally depleted with resistive p junction layer featuring high uniformity and equipotential channel along the linear axis between the two anodes of this common cathode device.
TECHNOLOGY:	3 INCH SILICON
POSITION SENSITIVE:	1 axis
N ^o of DETECTORS:	1 or 2
ACTIVE AREA:	50 x 10 mm ²
CAPITANCE (FD):	40-20 pF/cm subject to depletion depth
INTER ANODE RESISTANCE:	4 k Ω minimum – 10 k Ω maximum
ENTRANCE/EXIT WINDOW:	0.2 μ m
THICKNESS:	35 μ m, 65 μ m, 140 μ m, 300 μ m, 500 μ m and 1000 μ m
ALPHA RESOLUTION:	0.5 %
POSITON RESOLUTION:	100 μ m - 300 μ m subject to readout electronics.
OPERATING VOLTAGE:	10 – 250 V subject to thickness chosen
PACKAGES:	Single or double detector PCB available with metal frame. Detector assembly also available in a UHV package design.
CONNECTORS:	Conhex / 3 per detector unless PCB only



Design T single PCB assembly and metal frame assembly.

NOTE: See also Design TT Series, position sensitive detectors (PSD) 18 x 10 mm².

QUALITY ASSURANCE: ISO9001

SPECIALIST DETECTORS FOR NUCLEAR PHYSICS

SILICON DETECTOR TYPE:	TOTALLY DEPLETED SINGLE SIDED MICROSTRIP
DESIGN:	Silicon planar ion implanted structure p on n silicon totally depleted with over voltage depletion capability. The design is based on equal length channels using 4 inch silicon. Operation voltage is depletion depth and silicon resistivity dependent.
TECHNOLOGY:	4 INCH SILICON
ACTIVE AREA:	77 x 57 mm ²
ELEMENT LENGTH:	57 mm
ELEMENT PITCH:	300 μm
ELEMENTWIDTH:	250 μm
ELEMENT SEPARATION:	50 μm
THICKNESS:	65 μm, 140 μm, 300 μm and 500 μm
OPERATING VOLTAGE:	10 – 100 V subject to thickness selection
ELEMENT CAPACITANCE:	10 pF
ELEMENT DARK CURRENT:	30 nA typically, 100 nA maximum
NOISE PER ELEMENT:	10 KeV
CONTACTING METALLISATION:	Aluminum 8000 Å both sides
MINIMUM ACCEPTANCE LEVEL:	98 %
PACKAGE:	PCB 130 x 130 mm ²
FAN OUT:	Flexible Kapton on two sided 160 x 160 mm
CONNECTORS:	Connei – Part N ^o 00274030105
EXPERIMENTS SUPPLIED:	FERMILAB E2687 Photon tagging detector SLAC University of Southampton

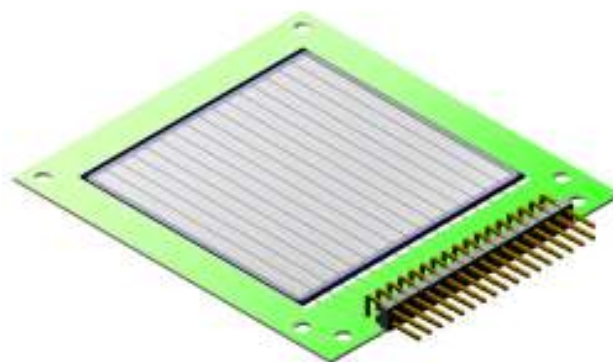
QUALITY ASSURANCE: ISO9001

SPECIALIST DETECTORS FOR NUCLEAR PHYSICS

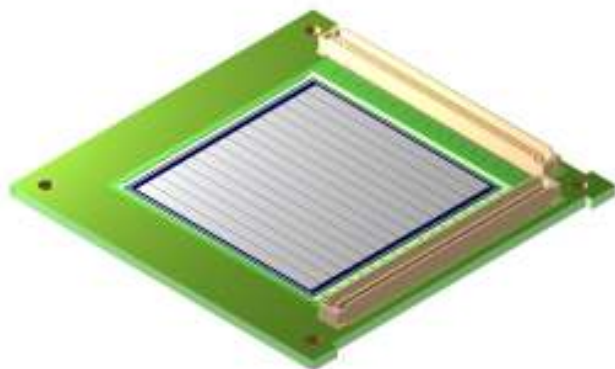
SILICON DETECTOR TYPE:	TOTALLY DEPLETED SINGLE OR DOUBLE SIDED DC MICROSTRIP.
TECHNOLOGY:	4 INCH SILICON
N ^o JUNCTION ELEMENTS:	16
N ^o OHMIC ELEMENTS:	16
ELEMENT LENGTH:	49.5 mm
ELEMENT PITCH:	3.1 mm
ELEMENT WIDTH:	3000.0 μm
ACTIVE AREA:	50.0 x 50.0 mm ²
CHIP DIMENSIONS:	52.25 x 52.25 mm ² 53.78 x 53.78 mm ²
THICKNESS:	65, 80, 140, 250, 300, 500, 1000 and 1500 μm



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



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



Design W1(DS)-300 2M on a custom FR4 transmission package.



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

WINDOW:	Junction:	Standard type 2 or shallow type 7 or 9 implants for Thin window
	Ohmic:	Standard type 2
METALLISATION:	Aluminum 3000 Å	
	Junction:	Available with 3% metal grid G or as standard M coverage.
	Ohmic:	Standard M coverage.
PACKAGE:	Range of package available, some shown above.	
ACCEPTANCE:	100 %	

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

QUALITY ASSURANCE: ISO9001

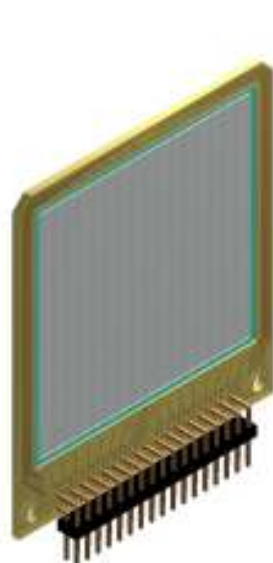
SPECIALIST DETECTORS FOR NUCLEAR PHYSICS

SILICON DETECTOR TYPE:	SINGLE DC COUPLED MICROSTRIP DETECTOR WITH MULTIGUARD RINGS FOR HIGH VOLTAGE OPERATION.						
TECHNOLOGY:	4 INCH SILICON						
PART DESIGNATION:	W2 (SS)						
ACTIVE AREA:	25 cm ² 50 x 50 mm ²						
N ^o of STRIPS:	100						
STRIP PITCH:	500 μm						
STRIP WIDTH:	450 μm						
STRIP LENGTH:	49950 μm						
THICKNESS:	40 μm	70 μm	100 μm	1	40 μm	500 μm	1000 μm
THICKNESS TOLERANCE:	± 10 μm	± 10 μm	± 10 μm		± 10 μm	± 30 μm	± 100 μm
FULL DEPLETION (FD):	10 V	10 V	15 V		20 V	70 V	200 V
OPERATING VOLTAGE:	FD to FD +30 V						
TOTAL LEAKAGE CURRENT							
TYPICAL:	300 nA	300 nA	300 nA		300 nA	400 nA	500 nA
MAXIMUM:	1 μA	1 μA	1 μA		2 μA	3 μA	
TOTAL CAPACITANCE:	5000 pF	4000 pF	3000 pF		2000 pF	600 pF	300 pF
STRIP CAPACITANCE:	50 pF	40 pF	30 pF		20 pF	8 pF	5 pF
JUNCTION FWHM							
TOTAL α RESOLUTION: Typical	175 KeV	150 KeV	120 KeV		75 KeV	65 KeV	55 KeV
Am 241 (5.486 Me) Maximum	200 KeV	175 KeV	150 KeV		100 KeV	75 KeV	75 KeV
OHMIC FWHM							
TOTAL α RESOLUTION: Typical	175 KeV	175 KeV	130 KeV		75 KeV	70 KeV	60 KeV
Am 241 (5.486 MeV) Maximum	200 KeV	200 KeV	150 KeV		100 KeV	75 KeV	75 KeV
METALLISATION:	3000 Å						
METALLISATION TOLERANCE:	± 1000 Å						
ACCEPTANCE LEVEL:	100 %, All channels operational.						
PACKAGE:	PCB Transmission mount with 102 outputs.						
EXPERIMENT:	INFN NAPOLI						

QUALITY ASSURANCE: ISO9001

SPECIALIST DETECTORS FOR NUCLEAR PHYSICS

SILICON DETECTOR TYPE: POSITION SENSITIVE DETECTOR (PSD)
 DESIGN: Silicon planar ion implanted structure p on n silicon totally depleted with resistive p junction layer featuring high uniformity and equipotential channel along the linear axis between the two anodes of this common cathode device on all microstrip channels.



X1 Assembly



X2 Assembly



X3 Assembly

DESIGN	X1	X2	X3
TECHNOLOGY	4	6	4
N ^o CHANNELS	16	4	4
POSITION SENSITIVE	1 axis on each of the 16 channels	1 axis on each of the 4 channels	1 axis on each of the 4 channels
POSITION RESOLUTION	200 μm	5650 μm	10000 μm
STRIP AREA		5.55 x 94.80 mm^2	10.0 x 75.0 mm^2
ACTIVE AREA	50 x 50 mm^2	22.2 x 94.8 mm^2	40.3 x 75.0 mm^2
CHIP DIMENSION		24.6 x 96.8 mm^2	43.3 x 78.0 mm^2
FULL DEPLETION (FD)	10 - 250 V Subject to selected thickness	20 V	10 - 250 V Subject to selected thickness
LEAKAGE CURRENT (FD)	50 - 250 nA Subject to selected thickness	30 - 50 nA	50 - 250 nA Subject to selected thickness
TOTAL CURRENT (FD)	1 - 3 μA	1 μA	1 - 3 μA
CAPACITANCE (FD)	40 - 20 pF/cm Subject to selected thickness	600 pF/strip	40 - 20 pF/cm Subject to selected thickness
INTER ANODE RESISTANCE	3 - 10 K Ω	4 - 10 K Ω	4 - 10 K Ω
ENTRANCE/EXIT WINDOW	0.2 μm		
THICKNESS	60, 140, 300, 500 & 1000 μm	300 μm	60, 140, 300, 500 & 1000 μm
ALPHA RESOLUTION	55 KeV Typical	75 KeV Typical	75 KeV Typical
PACKAGES	PCB with connectors 70.0 x 80.0 x 1.6 mm^3	PCB with connections 98.0 x 27.76 x 1.6 mm^3	PCB with connector
CONNECTORS	Leading Edge connector	Junkosha Miniature Coaxial cable	90° Unshrouded connector
MINIMUM ACCEPTANCE LEVEL	100 %	100 %	100 %

QUALITY ASSURANCE: ISO9001

SPECIALIST DETECTORS FOR NUCLEAR PHYSICS

SILICON DETECTOR TYPE:	POSITION SENSITIVE DETECTOR (PSD)
TECHNOLOGY:	3 INCH SILICON
DESIGN:	Ion implanted totally depleted sensitive resistor division detector incorporating equipotential strips for high linearity and excellent position resolution.
ACTIVE AREA:	1.44 cm ² AA1 = 12 x 12 mm ² AA2 = 13 x 13 mm ²
TOTAL LEAKAGE CURRENT:	5 µA typically, 50 µA maximum
OPERATING VOLTAGE:	FD to FD + 30 V
FULL DEPLETION (FD):	10 – 1000 V subject to thickness selected
INTER ANODE RESISTANCE:	3 KΩ minimum, 10 KΩ maximum
POSITION RESOLUTION:	200 µm
ALPHA RESOLUTION:	0.3 % typically, 1 % maximum
THICKNESS:	60 µm, 140 µm, 300 µm, 500 µm and 1000 µm
THICKNESS TOLERANCE:	± 10 µm
THICKNESS UNIFORMITY:	± 5 µm
METALLISATION:	3000 Å
METALLISATION TOLERANCE:	± 1000 Å
PACKAGES:	PCB with metal housing
CONNECTOR OPTIONS:	SMA, SMB, Conhex or Microdot
STACKING	Design compatible for stacking with E detectors.

SPECIALIST DETECTORS FOR NUCLEAR PHYSICS

SILICON DETECTOR TYPE: DOUBLE SIDED DC MICROSTRIP DETECTOR

TECHNOLOGY: 3 & 4 INCH SILICON

DESIGN: Ion implanted totally depleted double sided DC nominal structure. Detector thickness range is from 65 μm to 1500 μm subject to design selected.

EXPERIMENT	LEAR CERN	NASA	NASA	ARGONNE
DESIGN	BB1	BB2	BB4	BB5
ACTIVE	16 cm ²	5.67 cm ²	33 cm ²	10.24 cm ²
ACTIVE DIMENSIONS	40 x 40 mm ²	24 x 24 mm ²	65 mm ²	32 x 32 mm ²
N ^o CHANNELS	80 (40/side)	48 (24/side)	128 (64/side)	160 (80/side)
ELEMENT PITCH	1000 μm	1000 μm	1000 μm	400 μm
READOUT	100 %	100 %	100 %	100 %
SPACE QUALIFIED	NO	YES	YES	NO

EXPERIMENT	INDIANA	NASUDA	TIARA UPGRADE	ORRUBA
DESIGN	BB7	BB8	BB9	BB10
ACTIVE	40.90 cm ²	4.0 cm ²	26.45 cm ²	30.225 cm ²
ACTIVE DIMENSIONS	~64 x 64 mm ²	20 x 20 mm	27.9 x 94.8 mm ²	75.0 x 40.3 mm ²
N ^o CHANNELS	64 (32/side)	32 (16/side)	4 (Single Sided)	8 (Single Sided)
ELEMENT PITCH	2000 μm	1250 μm	7000 μm	4944 μm
READOUT	100 %	100 %	100 %	100 %
SPACE QUALIFIED	NO	YES	No	No

PART DESIGNATION: Add thickness after design identification e.g. BB7 - 1500

THICKNESS: 65 μm 140 μm 300 μm 500 μm 1000 μm 1500 μm

FULL DEPLETION (FD): 30 V 30 V 30 V 75 V 200 V 350 V

OPERATING PLATEAU: FD to FD + 30 V

ELEMENT CAPACITANCE: 20 pF typical

ELEMENT LEAKAGE

CURRENT: 50 nA typically, 200 nA maximum

TOTAL LEAKAGE CURRENT: 1 μA typically, 3 μA maximum

TOTAL ALPHA RESOLUTION: 55 KeV typically
(Am241)

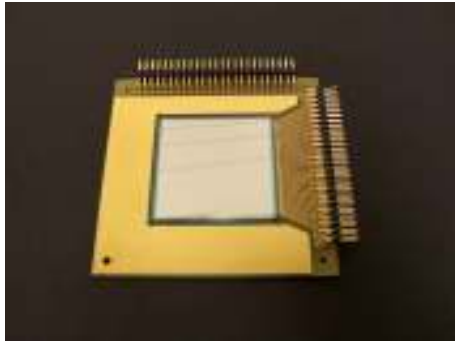
DAISY CHAINING: YES

METALLISING: 3000 Å

METALLISING TOLERANCE: ± 1000 Å

OXIDE WIDTH: Subject to detector thickness selected

OTHER DESIGNS: UHV versions with interstrip resistors
Ceramic with silicon leading edge of 500 μm



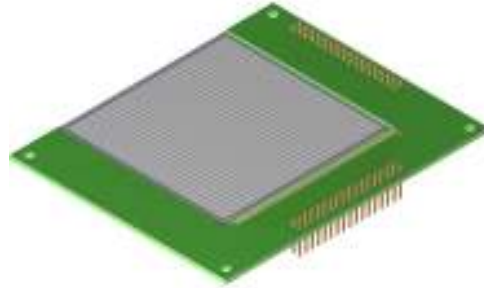
BB1(DS) Assembly.



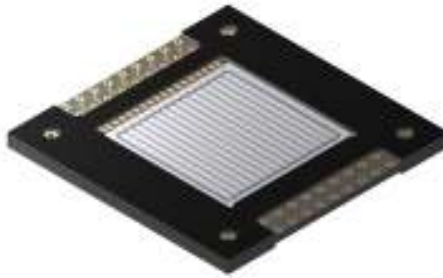
BB5(DS) Assembly.



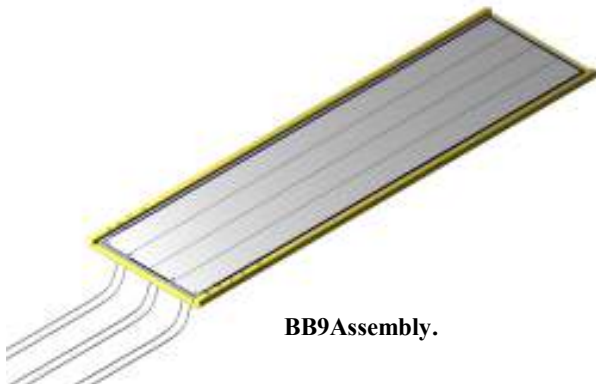
BB7(DS) Kapton Assembly.



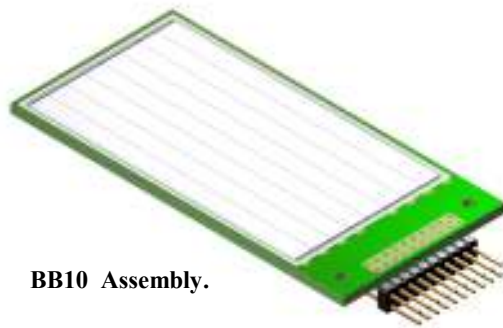
BB7(DS) PCB Assembly.



BB8(DS) Kapton Assembly.



BB9 Assembly.



BB10 Assembly.

Compatible with the X3 assembly.

SPECIALIST DETECTORS FOR NUCLEAR PHYSICS

SILICON DETECTOR TYPE:	LINEAR PAD ARRAY
TECHNOLOGY:	3 INCH SILICON
DESIGN:	Ion implanted totally depleted ultra thin window detector for detection of protons from 10 KeV. The super thin window coupled with low leakage current resolves alpha particles to 10 KeV (FWHM) and detects beta (electrons) from 1 KeV. Special guard ring techniques are used to minimize crosstalk between adjacent pixels.
ACTIVE AREA:	0.85 cm ² 28 x 3 mm ²
N ^o of ELEMENTS:	6
	PIXEL 0 6.6 x 3.0 Primary
	PIXEL 1 4.4 x 3.0 Background
	PIXEL 2 5.0 x 3.0 Primary
	PIXEL 3 0.5 x 3.0 High Rate
	PIXEL 4 3.6 x 3.0 Secondary
	PIXEL 5 6.6 x 3.0 Primary
THICKNESS:	150 µm (Other thicknesses available)
THICKNESS TOLERANCE:	± 10 µm
THICKNESS UNIFORMITY:	±2 µm
FULL DEPLETION (FD):	15 V typical, 40 V max
OPERATING VOLTAGE:	FD to 2 x FD
ELEMENT CAPACITANCE:	20 pF
ELEMENT LEAKAGE	
CURRENT 20°C:	10 nA typically, 50 nA maximum
GUARD RING:	Surrounds each element or minimum crosstalk.
ALPHA RESOLUTION FWHM:	0.2 % typically, 0.5 % maximum
METALLISING:	3000 Å on aperture and contacts only
METALLISING TOLERANCE:	± 1000 Å
PACKAGES:	Ceramic chip carrier
CONNECTOR OPTIONS:	Gold plated flying leads for PCB soldering.
DETECTOR PACKAGE	
ALIGNMENT TOLEANCE:	± 25 µm typically, ± 40 µm maximum
RADIATIONVIBRATION:	3 axis, 20 – 2 KHz, 60 sec to specification
THERMAL SHOCK:	-55 to +80°C with noise measurements
DETECTION ENDURANCE	
TEST:	168 Hours +55 °C
RADIATION HARDNESS:	Withstands 300 K Rad Si total dose over 4 years flight period.
WIRE BONDING:	Ultrasonic 50 µm aluminum wires/element
FLIGHT QUALIFICATION:	Random vibration, temperature cycling, stability test
EXPERIMENTS:	CEPPAD/IDS: Max Plank Lindau/ Aerospace Corporation

QUALITY ASSURANCE: ISO9001

SPECIALIST DETECTORS FOR NUCLEAR PHYSICS

SILICON DETECTOR TYPE: SINGLE SIDED COURSE MICROSTRIP DETECTOR
 TECHNOLOGY: 3 INCH SILICON
 DESIGN: Ion implanted totally depleted DC coupled microstrip design with strip pitch 100 – 650 μm and 16 to 64 channels. The device features ultra low dark currents and excellent radiation hardness. The standard course pitch microstrips have been used extensively in major physics experiments.

DESIGN	EE1	EE2	EE3	EE4
EXPERIMENT	FRASCATI	ALEPH	UA2	LHC
ACTIVE AREA	12.5 cm ²	10 cm ²	5.2 cm ²	5.7 cm ²
ACTIVE DIMENSION	62.4 x 2 mm ²	50 x 20 mm ²	16 x 32 mm ²	23.9 x 23.9 mm ²
N ^o CHANNELS	96	40	16	64
ELEMENT LENGTH	20 mm	50 mm	32 mm	24mm
ELEMENT PITCH	650 μm	500 μm	100 μm	375 μm

THICKNESS: 70, 140, 300, 500 and 1000 μm
 THICKNESS TOLERANCE: $\pm 50 \mu\text{m}$
 THICKNESS UNIFORMITY: $\pm 5 \mu\text{m}$

FULL DEPLETION (FD): 30 V typical, 60 V max
 OPERATING VOLTAGE: FD to 2 x FD
 ELEMENT CAPACITANCE: 80 pF/cm 40 pF/cm 25 pF/cm
 ELEMENT LEAKAGE CURRENT: 1 nA typically, 15 nA maximum
 TOTAL LEAKAGE CURRENT: 200 nA typically, 300 nA maximum

METALLISING: 3000 Å
 METALLISING TOLERANCE: $\pm 1000 \text{ Å}$
 OXIDE EDGE WIDTH: 500 μm

RADIATION HARDNESS: Neutrons $\Delta I_R = \alpha \theta V$
 $\alpha = 3.7 \times 10^{-17} \text{ A/cm}$ typically
 $\theta = \text{Fluence}$
 $V = \text{Volume}$

CHIP ONLY PROBE TESTING: Yes
 PACKAGED: EE1 and EE2 only
 PACKAGE: PCB
 MINIMUM ACCEPTANCE LEVEL: 100 %

ADDITIONAL OPTIONS: Silox scratch proof coating

QUALITY ASSURANCE: ISO9001

SPECIALIST DETECTORS FOR NUCLEAR PHYSICS

SILICON DETECTOR TYPE:	COMBINATION DETECTOR/PHOTODIODE PIXEL ARRAY		
TECHNOLOGY:	3 INCH SILICON		
DESIGN:	Ion implanted totally depleted DC coupled structure with 5 x 5 mm ² pixels in 6 x 8 format. The device is suitable for both nuclear particle and photon detection with incident particles on the rear ohmic common cathode face and the electronics on the junction side readout at the edge by an overlay with through bonding on each pixel.		
ACTIVE AREA:	12cm ² 40 x 30 mm ²		
N ^o of CHANNELS:	48		
ELEMENT PITCH:	6 mm		
READOUT:	100 %		
THICKNESS:	300 μm	500 μm	1000 μm
THICKNESS TOLERANCE:	± 25 μm		
THICKNESS UNIFORMITY:	± 5 μm		
FULL DEPLETION (FD):	30 V	50 V	150 V
OPERATING VOLTAGE:	FD to FD + 20 V		
ELEMENT CAPACITANCE:	10 pF typically		
ELEMENT LEAKAGE CURRENT:	5 nA typically, 30 nA maximum		
TOTAL LEAKAGE CURRENT:	300 nA typically, 1 μA maximum		
METALLISATION:	8000 Å on contact only		
METALLISATION TOLERANCE:	± 1000Å		
PACKAGE:	PCB Fan out		
MINIMUM ACCEPTANCE LEVEL:	100 %		
CSI INTERFACE FOR X_RAY & GAMMA RAY DETECTION:	These detectors can interface with a CSI faceplate scintillator on the ohmic rear face of the array grooving the scintillator to match the detector pixels minimising crosstalk. This rear entry concept would also be suitable on the EHT CSI evaporated region without interfacing with the central function face. The structure with good electronics is capable of 5 % resolution with the Cs scintillator 660 KeV gammas.		
EXPERIMENT:	University of Southampton – Integral		

QUALITY ASSURANCE: ISO9001

SPECIALIST DETECTORS FOR NUCLEAR PHYSICS

SILICON DETECTOR TYPE: SINGLE SIDED TRAPEZIOD SINGLE AREA PAD DETECTOR

TECHNOLOGY: 4INCH SILICON

DESIGN: Silicon planar totally depleted ion implanted detectors p on n resistivity silicon with over voltage capability. The detectors are all designed to have a leading silicon edge cut and located within 1 mm of the active region with packages optimized for minimum dead area over total 4π spherical surface. A perfect sphere of 30 cm diameter can be built from assembling trapezoid

DESIGNATION TYPE:	III	II2	II3	II4
ACTIVE AREA:	8.4 cm ²	15 cm ²	18.2 cm ²	20.5 cm ²
HEIGHT:	46.73 mm	46.95 mm	43.44 mm	43.57 mm
BASE:	25.53 mm	37.98 mm	45.49 mm	48.64 mm
TOP:	10.45 mm	25.86 mm	38.09 mm	45.56 mm
SIDE:	47.34 mm	47.34 mm	43.59 mm	43.60 mm

DEAD LAYER:	Junction 0.6 μm maximum, Ohmic 1.5 μm maximum			
THICKNESS:	500 μm			
THICKNESS TOLERANCE:	$\pm 25 \mu\text{m}$			
THICKNESS UNIFORMITY:	$\pm 5 \mu\text{m}$			
FULL DEPLETION (FD):	50 V typically, 90 V maximum			
OPERATING VOLTAGE:	FD to FD + 30 %			
ELEMENT CAPACITANCE:	210 pF	375 pF	445 pF	512 pF
(typically)				
LEAKAGE CURRENT:	250 nA	350 nA	400 nA	500 nA
ALPHA RESOLUTION (Am 241):	1 % maximum			
RESPONSE TIME:	10 ns typically			
METALLISATION:	Junction 1750 \AA	Ohmic 3000 \AA		
METALLISATION TOLERANCE:	Junction $\pm 50 \text{\AA}$	Ohmic $\pm 1000 \text{\AA}$		
OXIDE WIDTH:	1 mm			
PACKAGE:	Transmission PCB Kapton lead to connector			
WIRE BONDING:	2 wires/detector			

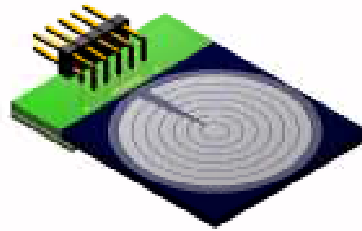
MINIMUM ACCEPTANCE LEVEL: 100 %

EXPERIMENTS: Indiana University silicon sphere of 15 cm diameter comprising of 160 detectors.
It is used at GANIL and currently at TEXAS A & M.
Legnaro Ball also use the II detectors in Italy.

QUALITY ASSURANCE: ISO9001

SPECIALIST DETECTORS FOR NUCLEAR PHYSICS

SILICON DETECTOR TYPE:	ANNULAR DETECTORS
TECHNOLOGY:	3 INCH SILICON
DESIGN:	Annular quadrants, bullseyes and dual element detectors with thin entrance window suitable for low energy electron detection from 1 KeV in electron microscopes.
APPLICATION:	Backscattered electron detectors and beam monitors.



DESIGN TYPE	LL1	LL2	LL3	LL4	LL7	LL8
ACTIVE DIAMETER	35 mm	24 mm	18 mm	10 mm	16 mm	18 mm
NUMBER OF ANNULI	1	1	1	1	4	7

CENTRAL HOLE DIAMETER: 5 – 10 mm subject to design

THICKNESS: 140 μm 220 μm 300 μm 500 μm

N^o of ELEMENTS: 2 or 4

THIN WINDOW DESIGNATION: Type 1 (Metal for contacts only, light sensitive)

STANDARD WINDOW

DESIGNATION: Type 2 (Metal coating over active area)

ELEMENT LEAKAGE

CURRENT (15 V): 1 nA typically, 30 nA maximum

BREAKDOWN VOLTAGE: 40 V minimum

(10 μA)

FORWARD VOLTAGE (10 mA): 1 V maximum

METALLISATION: 3000 \pm 1000 \AA

PACKAGE: PCB/ Ceramic with pad contact

OPTIONAL: Flying heads

OTHER ANNULAR DESIGNS: Annular quadrant microstrip with 128 channels for molecular biology applications. Center hole can be processed to 40 mm, the largest request to date.

All physics detectors are totally depleted transmission designs.

QUALITY ASSURANCE: ISO9001

SPECIALIST DETECTORS FOR NUCLEAR PHYSICS

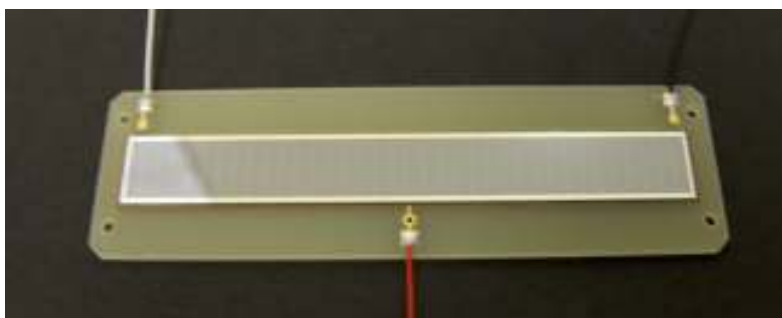
SILICON DETECTOR TYPE:	DOUBLE SIDED DC COUPLED MICROSTRIP DETECTOR		
TECHNOLOGY:	3 INCH SILICON		
DESIGN:	Ion implanted totally depleted DC coupled structure. Excellent timing resolutions have been achieved in Heavy Ion Physics experiments. Detector available centrally located and corner located in package. Compatible with Rutherford Appleton Laboratory Hybrid electronics.		
ACTIVE AREA:	2.56 cm ² 16 x 16 mm ²		
N ^o of CHANNELS:	96 (48/side)		
ELEMENT PITCH:	335 μm		
READOUT:	100 %		
THICKNESS:	60μm	140μm	300μm
		500 μm	
THICKNESS TOLERANCE:	± 15 μm		
THICKNESS UNIFORMITY:	± 5 μm		
FULL DEPLETION (FD):	30 V typical, 50 V maximum		
OPERATING VOLTAGE:	FD to 2 x FD		
ELEMENT CAPACITANCE:	1 pF typical		
ELEMENT LEAKAGE CURRENT:	3 nA typically, 30 nA maximum		
TOTAL LEAKAGE CURRENT:	100 nA typically, 300 nA maximum		
INTERSTRIP RESISTANCE JUNCTION SIDE:	10 MΩ minimum, 100 MΩ typically.		
INTERSTRIP RESISTANCE OHMIC SIDE:	100 MΩ minimum, 1 MΩ typically.		
GUARD RING:	Yes		
METALLISATION:	3000 Å		
METALLISATION TOLERANCE:	± 1000 Å		
OXIDE WIDTH:	500 μm		
RADIATION HARDNESS:	1 nA/cm ² /100 Rads		
PACKAGE:	PCB with central or corner detection		
FAN OUT:	Standard		
AMPLIFIER INTERFACE:	16 Channel Hybrid		
MINIMUM ACCEPTANCE LEVEL:	100 %		
ADDITIONAL OPTION:	Silox scratch proof coating		
EXPERIMENTS:	SERC Daresbury Charissa/University of Edinburgh		



QUALITY ASSURANCE: ISO9001

SPECIALIST DETECTORS FOR NUCLEAR PHYSICS

SILICON DETECTOR TYPE:	SINGLE SIDED POSITION SENSITIVE DETECTOR			
TECHNOLOGY:	4 INCH SILICON			
DESIGN:	Ion implanted totally depleted resistive position sensitive detector suitable for Heavy Ion Physics and spectrometer applications. The device complements DESIGN T and DESIGN A which are being used in both Heavy Ion and Nuclear Structure Physics.			
ACTIVE AREA:	18 cm ² 180 x 10 mm ²			
N ^o of CHANNELS:	2			
ELEMENT SIZE:	90 x 10 mm ²			
ELEMENT SEPARATION:	200 %			
THICKNESS:	100µm	300µm	500µm	1000µm
THICKNESS TOLERANCE:	± 25 µm			
THICKNESS UNIFORMITY:	± 5 µm			
FULL DEPLETION (FD):	20 V	30 V	50 V	150 V
OPERATING VOLTAGE:	FD to FD +50 V			
ELEMENT CAPACITANCE:	500 pF typical	200 pF typical	100 pF typical	50 pF typical
ELEMENT LEAKAGE CURRENT:	30 nA typically, 150 nA maximum			
TOTAL LEAKAGE CURRENT:	50 nA typically, 300 nA maximum			
DAISY CHAIN:	Yes			
POSITION RESOLUTION:	0.33% typically, 1 % maximum			
ALPHA RESOLUTION:	20 KeV typically, 60 KeV maximum			
NOISE RESOLUTION:	10 KeV typically, 30 KeV maximum			
INTER ANODE RESISTANCE:	5 K typically, 10 K maximum			
METALLISATION:	3000 Å			
METALLISATION TOLERANCE:	± 1000 Å			



Single Design TT-500 PCB Assembly.

PACKAGE:	PCB Transmission
HOUSING:	Metal 190 x 40 mm ² case
OUTPUTS:	Anode 1, Anode 2, Anode 3, Cathode and Case
CONNECTOR:	SMA, SMB, CONHEX and MICRODOT
EXPERIMENTS:	Magnetic spectrometer at University of North Carolina

QUALITY ASSURANCE: ISO9001

SPECIALIST DETECTORS FOR NUCLEAR PHYSICS

SILICON DETECTOR TYPE:	SINGLE SIDED DC COUPLED PAD DETECTOR	
TECHNOLOGY:	3INCH SILICON	
DESIGN:	Ion implanted totally depleted 3 element trapezoid with 1 mm total depletion depth designed for efficient 1 MeV electron position detection. Six detectors form a perfect cone when attached together.	
EXPERIMENT:	Argonne APEX	GSI Pagoda
PART DESIGNATION:	UU1	UU2
ACTIVE AREA:	4.25 cm ²	3.22 cm ²
	H = 29 mm B = 16 mm with < 87° with < 76°	H = 24 mm B = 16 mm
N ^o of CHANNELS:	3	
ELEMENT WIDTH:	4.5 mm typically	
READOUT:	100 %	
THICKNESS:	1000 μm	
THICKNESS TOLERANCE:	± 50 μm	
THICKNESS UNIFORMITY:	± 5 μm	
FULL DEPLETION (FD):	150 V typically, 200 V maximum	
OPERATING VOLTAGE:	FD to FD +50 V	
ELEMENT LEAKAGE CURRENT:	30 nA typically, 150 nA maximum	
TOTAL LEAKAGE CURRENT:	100 nA typically, 250 nA maximum	
ELECTRON RESOLUTION:	5 KeV typically, 11 KeV maximum	
B1207 (973 KeV)		
RESPONSE TIME:	10 ns typically, 20 ns maximum	
TIMING:	5 ns typically	
ALPHA RESOLUTION:	30 KeV typically, 60 KeV maximum	
Am 241 (5.486 MeV)		
GUARD RING:	Tuned for minimum leakage current on element	
METALLISATION:	3000 Å	
METALLISATION TOLERANCE:	± 1000 Å	
OXIDE EDGE WIDTH:	1 mm	
PACKAGE:	Detector chip assembly and wire bonded	
TYPE OF PACKAGE:	Ceramic	
CONNECTOR:	Vertical Pins	
OPERATING TEMPERATURE RANGE:	77 – 350 K	
MINIMUM ACCEPTANCE LEVEL:	100 % (All elements meeting specification)	

QUALITY ASSURANCE :ISO9001

SPECIALIST DETECTORS FOR NUCLEAR PHYSICS

SILICON DETECTOR TYPE:	SINGLE SIDED DC ORTHOGONAL STRIP DETECTOR	
TECHNOLOGY:	3INCH SILICON	
DESIGN:	Ion implanted totally depleted 3 multi element space qualified structures. Large 36 mm active area. Two designs with orthogonal readouts. VV1 with interstrip resistors operating on 4 outputs and VV2 with 10 outputs without resistors.	
EXPERIMENT:	NASA EPACT/WIND/CGS	NASA EPACT/LEMT
PART DESIGNATION:	VV1	VV2
ACTIVE AREA:	36 cm ²	36 cm ²
N ^o of ELEMENTS:	250	10 (5 /side)
ELEMENT WIDTH:	4.5 mm typically	
N ^o of OUTPUTS:	4	10
INTERSTRIP RESISTANCE: (Ohmic Side)	200 k	1 M
CROSSTALK:	1 % typically, 2 % maximum	
READOUT:	100 %	
THICKNESS:	140 μm	1000 μm
THICKNESS UNIFORMITY:	± 3 μm	
FULL DEPLETION (FD):	20 V typically, 40 V maximum	150 V typically, 225 V maximum
OPERATING VOLTAGE:	FD to FD +25 V	
TOTAL LEAKAGE CURRENT:	3 μA typically, 5 μA maximum	
RESPONSE TIME:	20 ns typically, 50 ns maximum	
ALPHA RESOLUTION: Am 241 (5.48 MeV)	150 KeV typically, 250 KeV maximum	
METALLISATION:	3000 Å	
METALLISATION TOLERANCE:	± 1000 Å	
OXIDE EDGE WIDTH:	1 mm	
PACKAGE:	Detector chip assembly and double wire bonded positions	
TYPE OF PACKAGE:	PCB in Test housing with SMAs	
CONTACTS:	PAD	
CONNECTOR:	Vertical Pins	
OPERATING TEMPERATURE RANGE:	-40 to +35°C	
SPACE QUALIFIED:	Random vibration/temperature cycling/stability test	
OPERATING ENVIRONMENT:	Vacuum	
MINIMUM ACCEPTANCE LEVEL:	100 % (All elements meeting specification)	

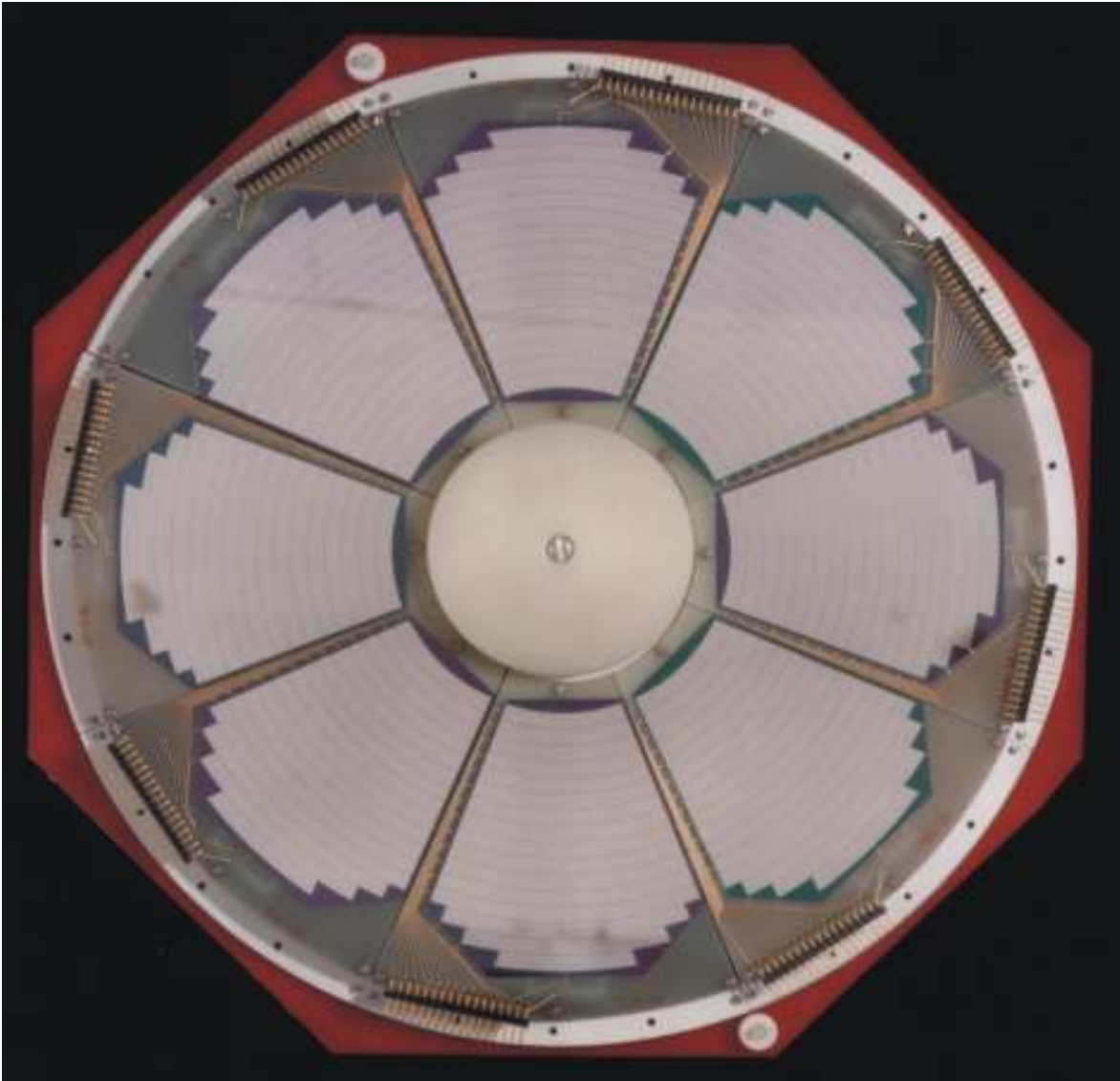
QUALITY ASSURANCE: ISO9001

SPECIALIST DETECTORS FOR NUCLEAR PHYSICS

SILICON DETECTOR TYPE:	SILICON MICROSTRIP TRAPEZOID OR WEDGE SHAPE STRUCTURE		
TECHNOLOGY:	4 INCH SILICON		
DESIGN:	Ion implanted totally depleted series of detectors of wedge shape that subtends 22.5° or 45° for construction along 360° disc annular microstrip on both radial and axial direction. Both AC and DC designs in single and double sided format are available in the series for Heavy Ion and High Energy Physics applications.		
EXPERIMENT:	IISN (Belgium)	DØ (F Disc FERMI)	DELPHI (CERN)
PART DESIGNATION:	YY1	YY2	YY3
ACTIVE INNER DIMENSIONS:	55 mm	24 mm	71 mm
ACTIVE OUTER DIMENSIONS:	130 mm	103 mm	125 mm
N° of JUNCTION ELEMENTS:	16	1024	496
N° of OHMIC ELEMENTS:	1	1024 (30°)	1
ACTIVE AREA:	29 cm ²	27 cm ²	41 cm ²
N° of SECTORS:	16	12	16
SECTOR SUBTENDS:	45°	30°	22.5°
DETECTOR EDGE SURROUND:	0.5 mm	1 mm	0.5 mm
JUNCTION PITCH:	5 mm	50 µm	1.7 mm
OHMIC PITCH:	N/A	50 µm	N/A
THICKNESS:	300 µm	300 µm	300 µm
THICKNESS TOLERANCE:	± 15 µm	± 15 µm	± 15 µm
THICKNESS UNIFORMITY:	± 5 µm	± 5 µm	± 5 µm
FULL DEPLETION (FD):	30 V typ, 50 V max	30 V typ, 50 V max	30V typ, 50 V max
OPERATING VOLTAGE:	FD to FD +30 V	FD to FD +30 V	FD to FD +30 V
BREAKDOWN VOLTAGE (10 µA):	> 2 x FD	> 2 x FD	> 2 x FD
ELEMENT CAPACITANCE:	50 pF	90 pF	100 pF
OTHER THICKNESS RANGE:	60 µm, 100 µm, 140 µm, 300 µm, 500 µm and 1000 µm		
ELEMENT LEAKAGE			
CURRENT:	20 nA typ, 100 nA max	1 nA typ, 10 nA max	10 nA typ, 50 nA max
GUARD RING:	N/A	1 µA max	1 µA max
TOTAL ALPHA RESOLUTION:	100 KeV	N/A	N/A
(FWHM)/SECTOR			
TOTAL NOISE (FWHM)/SECTOR:	75 KeV	N/A	N/A
PULSE RESPONSE TIME:	10 ns typ	10 ns typ	10 ns typ
METALLISING:	3000 Å	8000 Å	8000 Å
METALLISING TOLERANCE:	± 1000 Å	± 1000 Å	± 1000 Å
TYPE OF PACKAGE:	PCB	CHIP ONLY	CHIP ONLY
SUPPORT STRUCTURE:	Motherboard		
CONNECTOR:	IDC Header (2 x 17)	N/A	N/A
PACKAGE STRIP ACCURACY:	± 200 µm	N/A	N/A
DETECTOR STRIP ACCURACY:	± 2 µm	± 2 µm	± 2 µm
COUPLING CAPACITOR:	N/A	100 pF	100 pF
BIASING RESISTOR:	N/A	2 MΩ Polysilicon	100MΩ FOXFET
MINIMUM ACCEPTANCE LEVEL:	100 %	100 %	100 %
INTERFACE ELECTRONICS:	Rutherford 16 Ch	Fermi SVXII	CERN Amplex
WIRE BONDING (Al/Si):	25 µm	17 - 25 µm	25 µm
RADIATION HARDNESS COEF:	10 A.cm	10 A.cm	10 A.cm
READOUT PITCH:	N/A	52 µm	N/A
EXPERIMENTAL RADIATION			
LEVEL:	10 ions	1 M Rads	1 M Rads
PASSIVATION COATING:	N/A	Silox	N/A
HOLES THRU DETECTOR FOR			
SCINTILLATING FIBRES:	N/A	N/A	16
EXPERIMENTS (YY1, LEDA):	University of Edinburgh University of York INFN Catania, ITALY TRIUMF, CANADA		

QUALITY ASSURANCE: ISO9001

SILICON TRAPEZOID DC MICROSTRIP DETECTOR



TOTAL ASSEMBLY ACTIVE AREA	232.00 cm ²
TOTAL N ^o JUNCTION CHANNELS	128
TOTAL N ^o OHMIC SECTORS	8
DETECTOR THICKNESS SHOWN	300 μm
PACKAGE	PCB/Motherboard

QUALITY ASSURANCE: ISO9001

SPECIALIST DETECTORS FOR NUCLEAR PHYSICS

SILICON DETECTOR TYPE:	DOUBLE SIDED DC DETECTOR	
TECHNOLOGY:	4 INCH SILICON	
DESIGN:	DC detector featuring triple position sensitivity with dual anode with resistor division on junction side and orthogonal strips on the ohmic side with resistor division in readout banks to minimize the number of outputs.	
EXPERIMENT:	Rikko University, Japan	Jaeri, Japan
PART DESIGNATION:	AAA1	AAA2
ACTIVE AREA:	41 cm ² 64 x 64 mm ²	44 cm ² 77 x 57 mm ²
THICKNESS:	300 μm	370 μm
THICKNESS TOLERANCE:	± 15 μm	± 15 μm
THICKNESS UNIFORMITY:	± 5 μm	± 5 μm
FULL DEPLETION (FD):	50 V maximum	50 V maximum
OPERATING VOLTAGE:	30 V	40 V
ELEMENT CAPACITANCE:	130 pF	125 pF
ELEMENT LEAKAGE CURRENT:	200 nA	200 nS
GUARD RING:	Floating	Floating
TOTAL ALPHA RESOLUTION: FWHM	150 KeV max	200 keV max
INTERANODE RESISTANCE:	1 kΩ minimum	1 kΩ minimum
METALLISATION:	10000 Å	10000 Å
METALLISATION TOLERANCE:	± 1000 Å	± 1000 Å
PACKAGE:	PCB	PCB
CONNECTOR:	Vertical headers	Vertical Headers
DETECTOR PACKAGE		
ALIGNMENT:	± 100 μm	± 100 μm
N ^o of JUNCTION OUTPUTS:	12	15
N ^o of OHMIC OUTPUTS:	16	8
N ^o of STRIPS PER CHAIN:	8	16
RADIATION HARDNESS/cm ² :	10 Heavy ions, 10 light ions, 10 protons, 10 neutrons	
WIRE BONDING:	Ultrasonic 25 μm	

SPECIALIST DETECTORS FOR NUCLEAR PHYSICS

SILICON DETECTOR TYPE: DOUBLE SIDED AC DETECTOR

TECHNOLOGY: 4 INCH SILICON

DESIGN: Double sided AC coupled orthogonal R θ and RZ readout with poly silicon bias resistors.

EXPERIEMNT: BABAR

PART DESIGNATION:	BBBI	II	III	IV	V	VI
ACTIVE DIMENSIONS R θ (mm):	41	49	71	53	53	53
ACTIVE DIMENSIONS RZ (mm):	42	45	44	68	54	68
STRIP PITCH R θ (μ m):	50	55	55	50	50	50 – 41
STRIP PITCH RZ (μ m):	50	50	50	105	100	100
N ^o of STRIP R θ	799	874	1275	1023	1023	1023
N ^o of STRIP RZ	821	881	859	631	525	667

THICKNESS: 300 μ m

THICKNESS TOLERANCE: \pm 15 μ m

THICKNESS UNIFORMITY: \pm 5 μ m

FULL DEPLETION (FD): 20 V

OPERATING VOLTAGE: FD to 3 x FD

COUPLING CAPACITANCE: 200 pF

BIAS RESISTOR: 5 M Ω

ELEMENT LEAKAGE

CURRENT: 1 nA

TOTAL CURRENT: 3 μ A maximum

GUARD RING: 10 nA

METALLISATION: 0.8 μ m

METALLISATION TOLERANCE: \pm 0.1 μ m

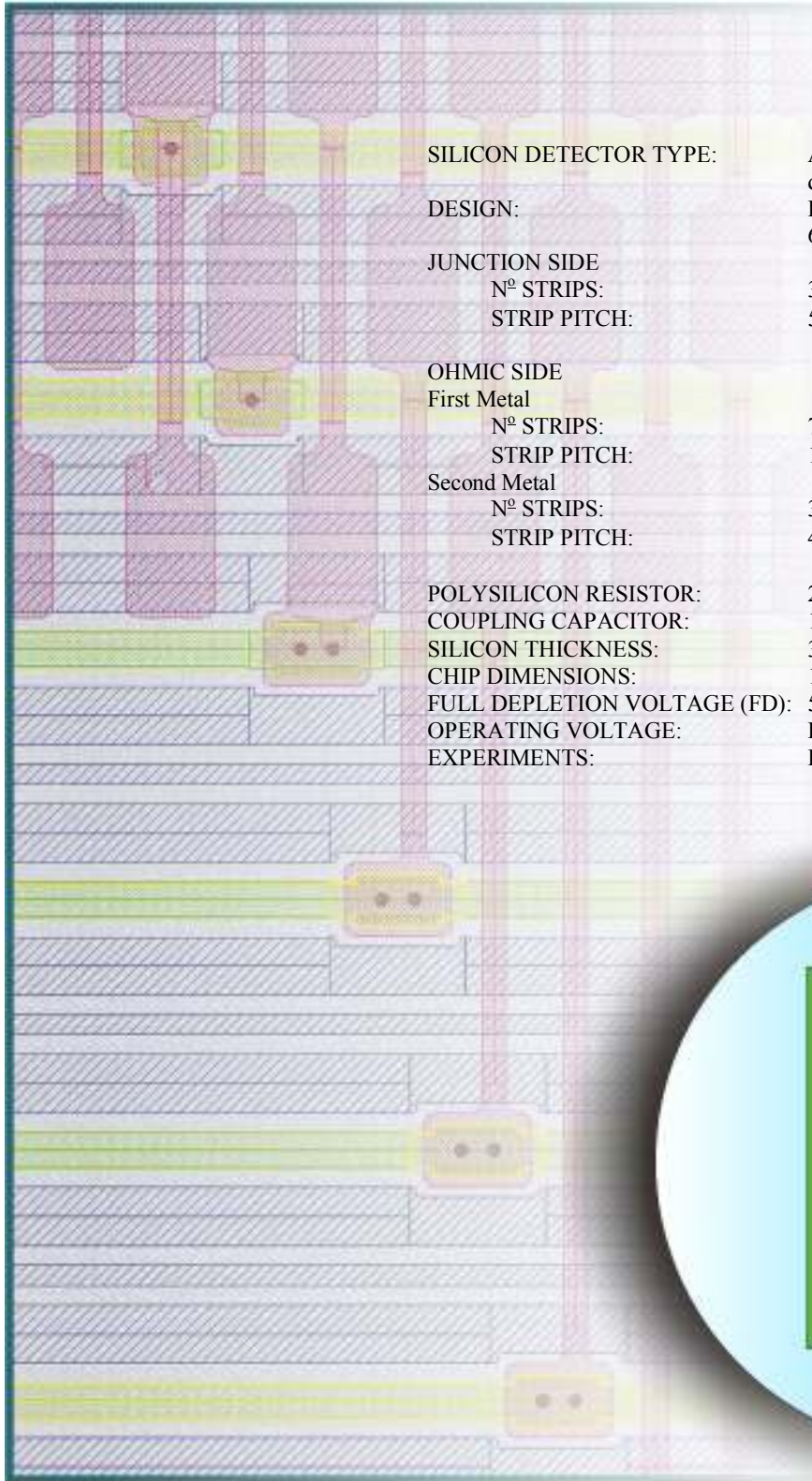
PACKAGE: Chip only

RADIATION HARDNESS: 1 MRad

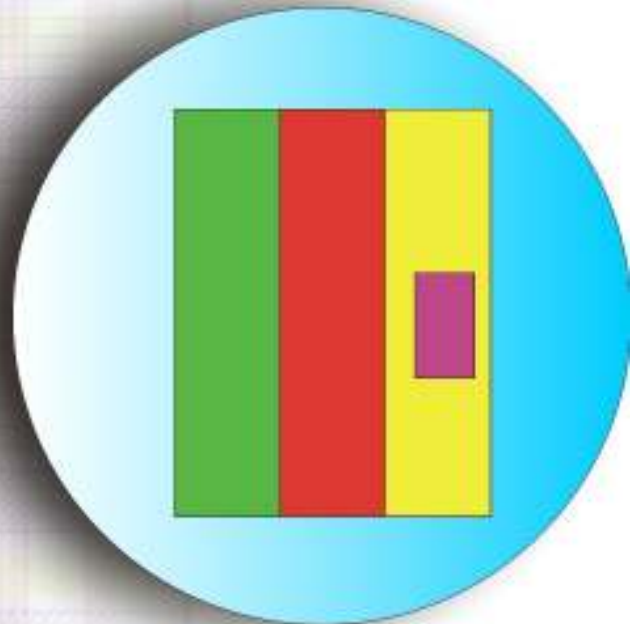
GRADES:	GRADE A+	Experimental 99 % minimum/side
	GRADE A	Experimental 97 % minimum/side
	GRADE B+	Study 90 % minimum/side
	GRADE B	Trial 80 % minimum/side
	GRADE C	Mechanical – Non operational

QUALITY ASSURANCE: ISO9001

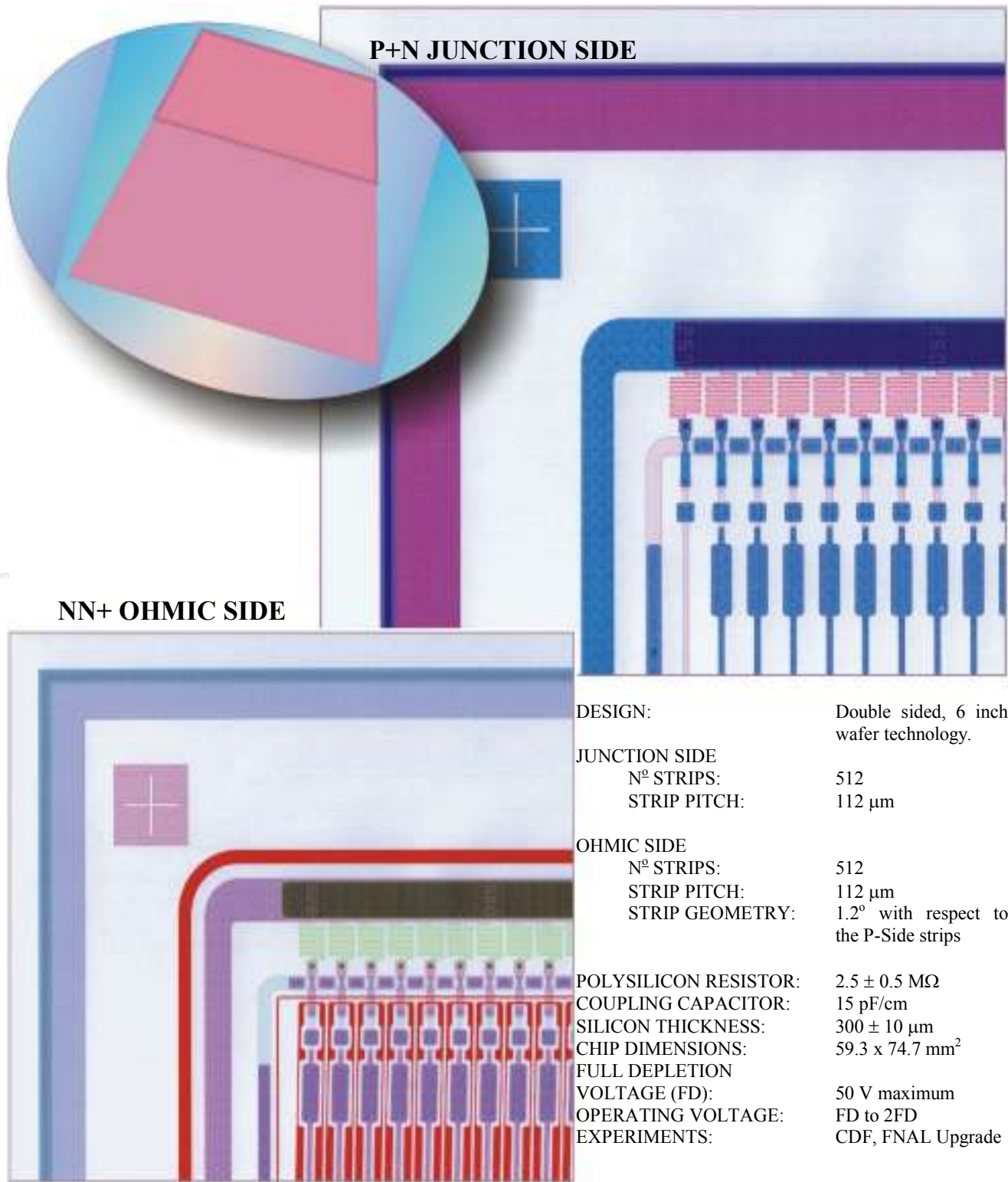
AC COUPLED ION IMPLANTED TOTALLY DEPLETED DOUBLE SIDED DOUBLE METAL MICROSTRIP DETECTOR



SILICON DETECTOR TYPE:	AC coupled ion implanted totally depleted silicon microstrip detector.
DESIGN:	Double sided, two metal layers on NN+ 6 inch wafer technology.
JUNCTION SIDE	
N° STRIPS:	384
STRIP PITCH:	50 μm
OHMIC SIDE	
First Metal	
N° STRIPS:	768
STRIP PITCH:	153.5 μm
Second Metal	
N° STRIPS:	384
STRIP PITCH:	49.5 μm
POLYSILICON RESISTOR:	2.5 \pm 0.5 M Ω
COUPLING CAPACITOR:	100 pF
SILICON THICKNESS:	300 \pm 10 μm
CHIP DIMENSIONS:	120.125 x 21.2 mm ²
FULL DEPLETION VOLTAGE (FD):	50 V maximum
OPERATING VOLTAGE:	FD to 2FD
EXPERIMENTS:	D \emptyset , FNAL

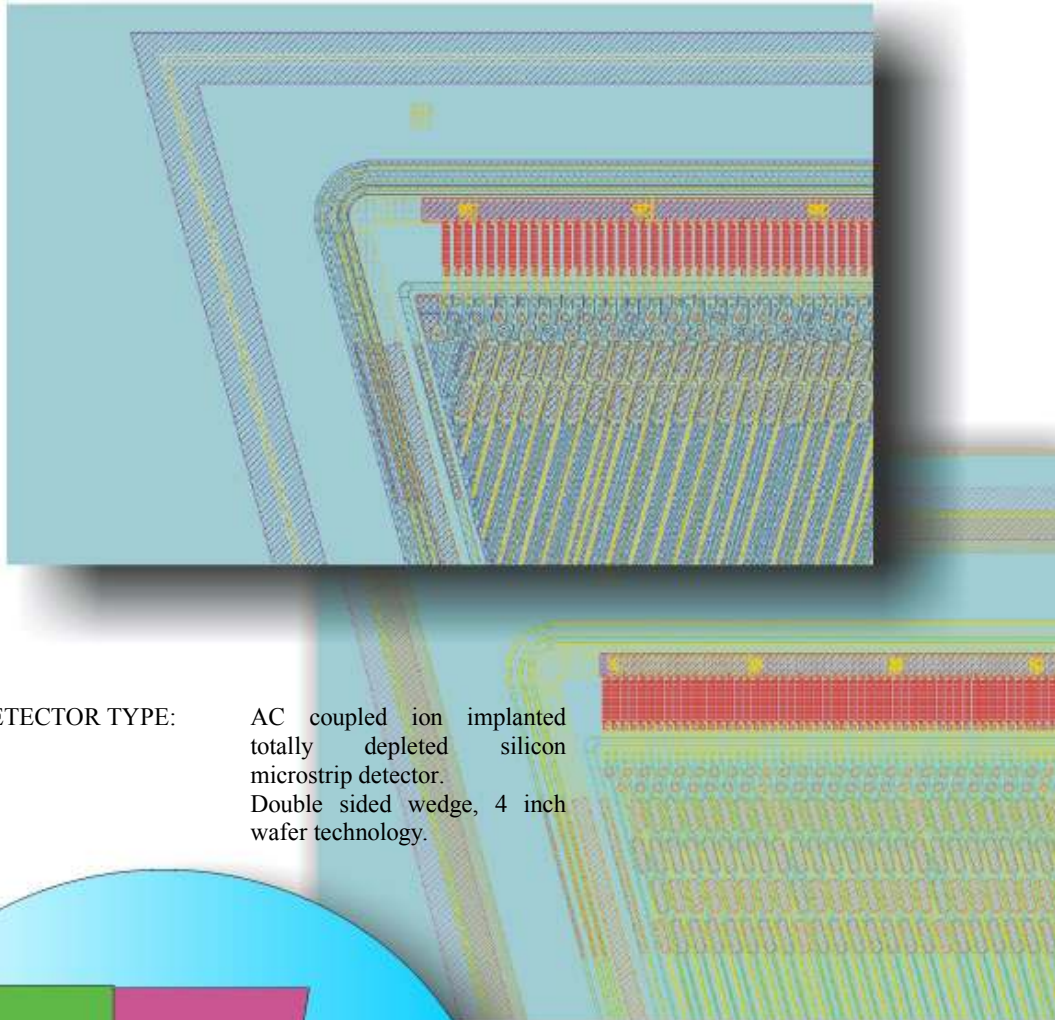


AC COUPLED ION IMPLANTED TOTALLY DEPLETED DOUBLE SIDED MICROSTRIP DETECTOR



DESIGN:	Double sided, 6 inch wafer technology.
JUNCTION SIDE	
N° STRIPS:	512
STRIP PITCH:	112 μm
OHMIC SIDE	
N° STRIPS:	512
STRIP PITCH:	112 μm
STRIP GEOMETRY:	1.2° with respect to the P-Side strips
POLYSILICON RESISTOR:	2.5 \pm 0.5 M Ω
COUPLING CAPACITOR:	15 pF/cm
SILICON THICKNESS:	300 \pm 10 μm
CHIP DIMENSIONS:	59.3 x 74.7 mm ²
FULL DEPLETION VOLTAGE (FD):	50 V maximum
OPERATING VOLTAGE:	FD to 2FD
EXPERIMENTS:	CDF, FNAL Upgrade

AC COUPLED ION IMPLANTED TOTALLY DEPLETED DOUBLE SIDED WEDGE MICROSTRIP DETECTOR



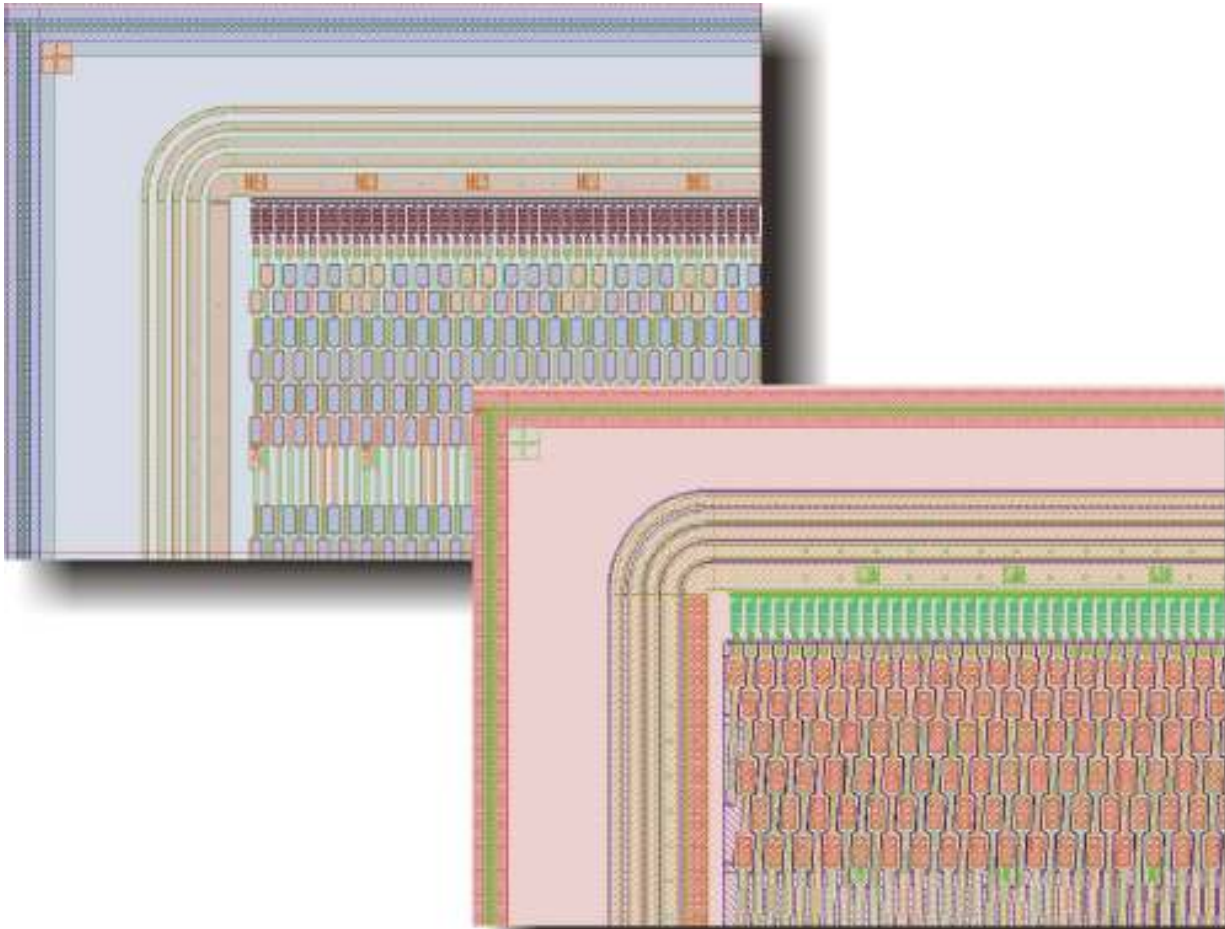
SILICON DETECTOR TYPE: AC coupled ion implanted totally depleted silicon microstrip detector.
 DESIGN: Double sided wedge, 4 inch wafer technology.



JUNCTION SIDE	
N° STRIPS:	1024
STRIP PITCH:	50 μm
OHMIC SIDE	
N° STRIPS:	768
STRIP PITCH:	62.5 μm
POLYSILICON RESISTOR:	2.5 ± 0.5 MΩ
COUPLING CAPACITOR:	100 pF
SILICON THICKNESS:	300 ± 10 μm
CHIP DIMENSIONS	
HEIGHT:	79.21 mm
BASE:	59.21 mm
TOP:	16.73 mm
FULL DEPLETION	
VOLTAGE (FD):	50 V maximum
OPERATING VOLTAGE:	FD to 2FD
EXPERIMENTS:	DØ, FNAL Upgrade

DESIGN CCG

AC COUPLED ION IMPLANTED TOTALLY DEPLETED DOUBLE SIDED WEDGE MICROSTRIP DETECTOR

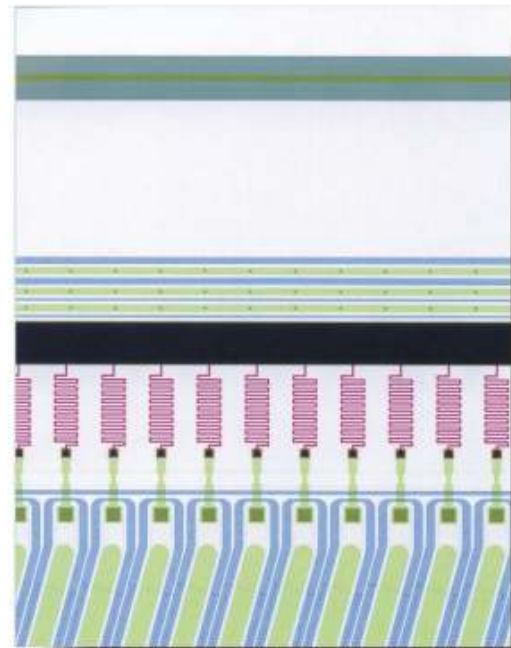
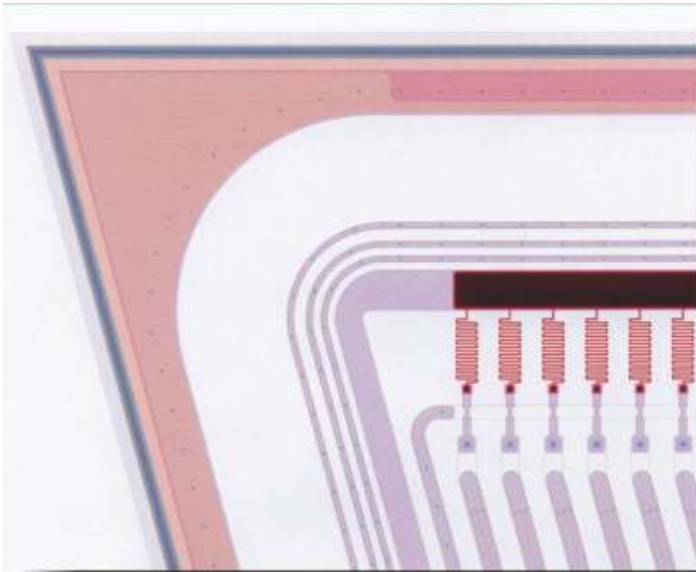


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SILICON DETECTOR TYPE:	AC coupled ion implanted totally depleted silicon microstrip detector.
DESIGN:	Double sided wedge, 4 inch wafer technology.
JUNCTION SIDE	
N° STRIPS:	640
STRIP PITCH:	50 μm
OHMIC SIDE	
N° STRIPS:	512
STRIP PITCH:	62.5 μm
STRIP GEOMETRY:	2° with respect to P-Side strips
POLYSILICON RESISTOR:	2.5 \pm 0.5 M Ω
COUPLING CAPACITOR:	100 pF
SILICON THICKNESS:	300 \pm 10 μm
CHIP DIMENSIONS:	60.0 x 34.0 mm ²
FULL DEPLETION VOLTAGE (FD):	50 V maximum
OPERATING VOLTAGE:	FD to 2FD
EXPERIMENTS:	DØ, FNAL Upgrade

AC COUPLED ION IMPLANTED TOTALLY DEPLETED DOUBLE SIDED WEDGE MICROSTRIP DETECTOR



SILICON DETECTOR TYPE: AC coupled ion implanted totally depleted silicon microstrip detector.

DESIGN: Double sided wedge, 6 inch wafer technology



JUNCTION SIDE	
N° STRIPS:	516
STRIP PITCH:	160 μm
OHMIC SIDE	
N° STRIPS:	516
STRIP PITCH:	160 μm
POLYSILICON RESISTOR:	2.0 ± 0.5 MΩ
COUPLING CAPACITOR:	16 pF/cm
SILICON THICKNESS:	300 ± 10 μm
CHIP DIMENSIONS	
HEIGHT:	115.9 mm
BASE:	23.2 mm
HEIGHT:	85.4 mm
FULL DEPLETION VOLTAGE (FD):	50 V maximum
OPERATING VOLTAGE:	FD to 2FD
EXPERIMENTS:	HERMES, DESY

R AND PHI DETECTOR FOR PARTICLE PHYSICS

SILICON DETECTOR TYPE: Double sided, AC coupled metal semicircular microstrip detector with multi guard rings.

DESIGN: This p-strips on n design includes a double metal layer for readout of the inner strips. The wafer layout includes 2 R-detectors and a single phi detector that can sustain operation in a high radiation environment up to 6×10^{14} protons/cm² or equivalent neutrons.



Phi Detector



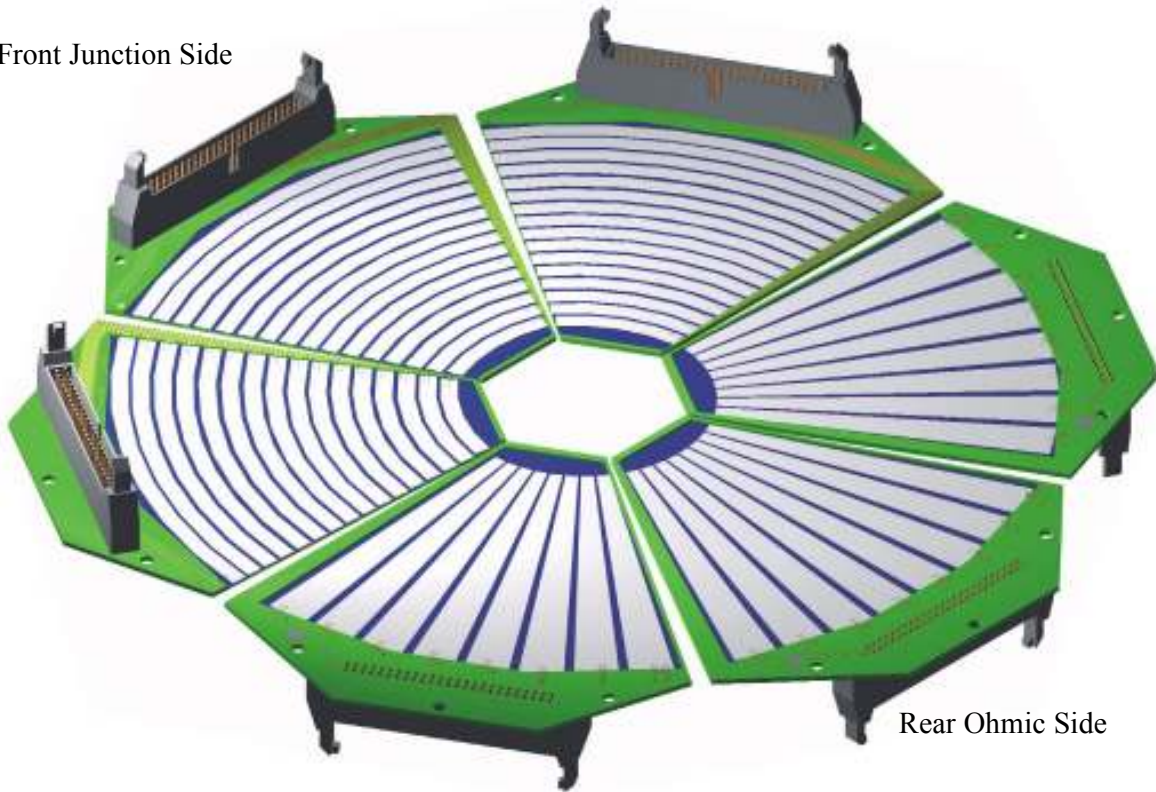
R Detector

PHI DETECTOR		R DETECTOR	
WAFER TECHNOLOGY	6 Inch	WAFER TECHNOLOGY	6 Inch
THICKNESS*	200 & 300 μm	THICKNESS	200 & 300 μm
SILICON	Standard or oxygenated	SILICON	Standard or oxygenated
INNER ACTIVE DIAMETER	8 mm	INNER ACTIVE DIAMETER	8 mm
INNER ACTIVE DIAMETER	40 mm	INNER ACTIVE DIAMETER	40 mm
N ^o STRIPS/SIDE	2048	N ^o STRIPS/SIDE	2048
STRIP PITCH	24 – 55 μm	STRIP PITCH	13 – 92 μm
STRIP WIDTH	16 – 28 μm	STRIP WIDTH	12 – 63 μm
POLYSILICON RESISTORS	1 M Ω	POLYSILICON RESISTORS	1 M Ω
COUPLING CAPACITANCE	80 pF	COUPLING CAPACITANCE	50 - 200 pF
FULL DEPLETION (FD) VOLTAGE	50 V max	FULL DEPLETION (FD) VOLTAGE	50 V max
OPERATING VOLTAGE	200 V	OPERATING VOLTAGE	200 V

EXPERIMENT: LHCb CERN

DOUBLE SIDED 60° WEDGE DETECTOR FOR RADIOACTIVE BEAM PHYSICS

Front Junction Side



Rear Ohmic Side

www.DataSheet4U.com

SILICON DETECTOR TYPE:
 TECNOLOGY:
 EXPERIMENTS:
 ACTIVE AREA:
 INNER RADIUS:
 OUTER RADIUS:
 N° ANNULAR JUNCTION STRIPS:
 STRIP PITCH:
 N° RADIAL OHMIC STRIPS:
 SECTOR ANGLE:
 DETECTOR THICKNESS [ΔE]:
 DETECTOR THICKNESS [E]:
 DEPLETION VOLTAGE [E]:

DOUBLE SIDED DC STRIP DETECTOR
 6 INCH SILICON
 HYBALL and TIARA
 54000 mm²
 32.6 mm
 135.1 mm
 16
 6.4 mm
 8
 6.8°
 150 μm
 400 μm
 100 V max

PACKAGE:

PCB Transmission with tracking.
 Readout from one end of strips via 3M, 50 way connector with
 side latches, part N° 3433-6602.

EXPERIMENTS:

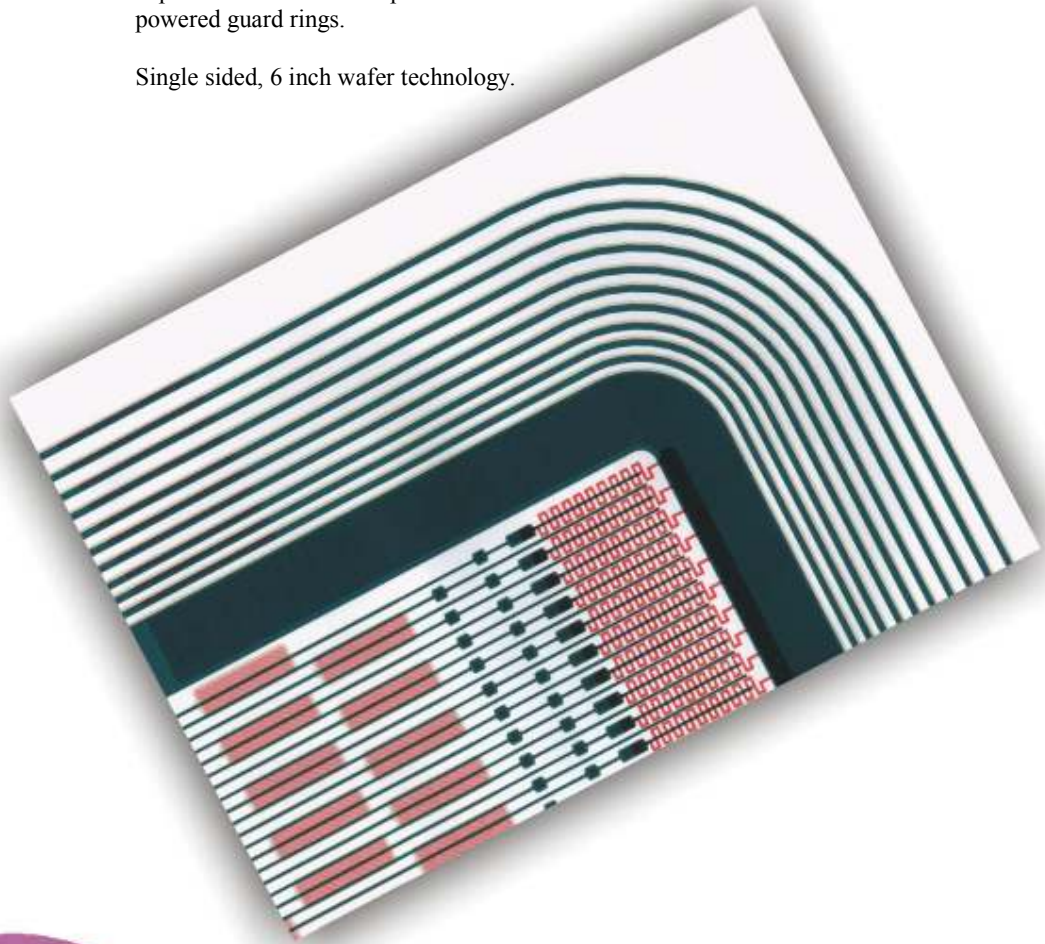
HYBALL, ORNL USA
 TIARA, UNIVERSITY OF SURREY UK

SPECIALIST DETECTORS FOR PARTICLE PHYSICS

A high voltage detector employed by CDF 00 at FNAL 3 TeV tevetron. The detector resides close to the collider beam being exposed to 10^{14} protons/cm². This detector is available as standard or oxygenated version. The pre-irradiation operating voltage capability of this device is 1000 V.

SILICON DETECTOR TYPE: AC coupled ion implanted totally depleted silicon microstrip detector with powered guard rings.

DESIGN: Single sided, 6 inch wafer technology.



JUNCTION SIDE

N° STRIPS:

256

STRIP PITCH:

25 μ m

SILICON THICKNESS:

150, 300, 400 μ m

ACTIVE AREA DIMENSIONS:

78.4 x 8.43 mm²

FULL DEPLETION VOLTAGE (FD):

60 V maximum

OPERATING VOLTAGE:

600 V Typical, 1000 V max

MINIMUM ACCEPTANCE LEVEL:

100 %

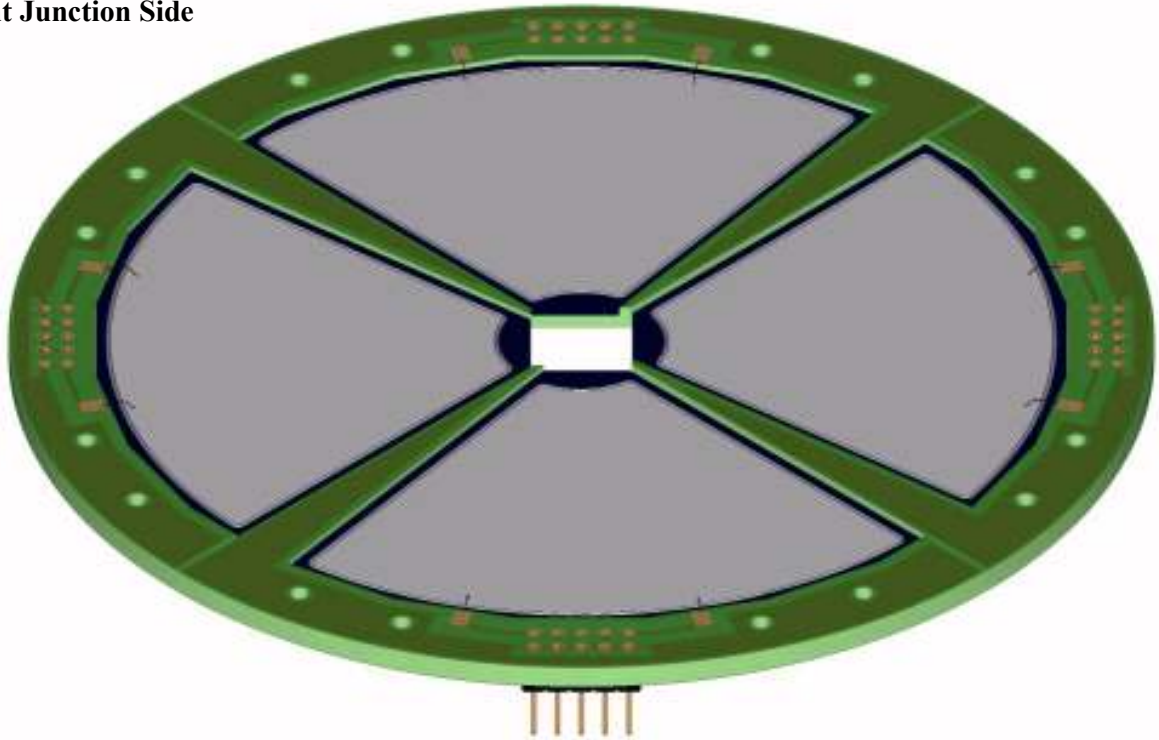
EXPERIMENT:

CDF, FNAL

90° SINGLE AREA PAD DETECTOR

This detector is to be used in conjunction with the r/φ detector QQQ2 on a common motherboard.

Front Junction Side



SILICON DETECTOR TYPE:
 TECHNOLOGY:
 DETECTOR THICKNESS:

SINGLE AREA 90° PAD DETECTOR
 3 INCH SILICON
 40 μm

ACTIVE AREA:
 ANGLE:
 INNER RADIUS:
 OUTER RADIUS:

1731.0 mm²
 82°
 9.0 mm
 50.0 mm

FULL DEPLETION (FD):
 OPERATING VOLTAGE:
 TOTAL LEAKAGE CURRENT:
 TOTAL RESOLUTION (Am 241):

PACKAGE:

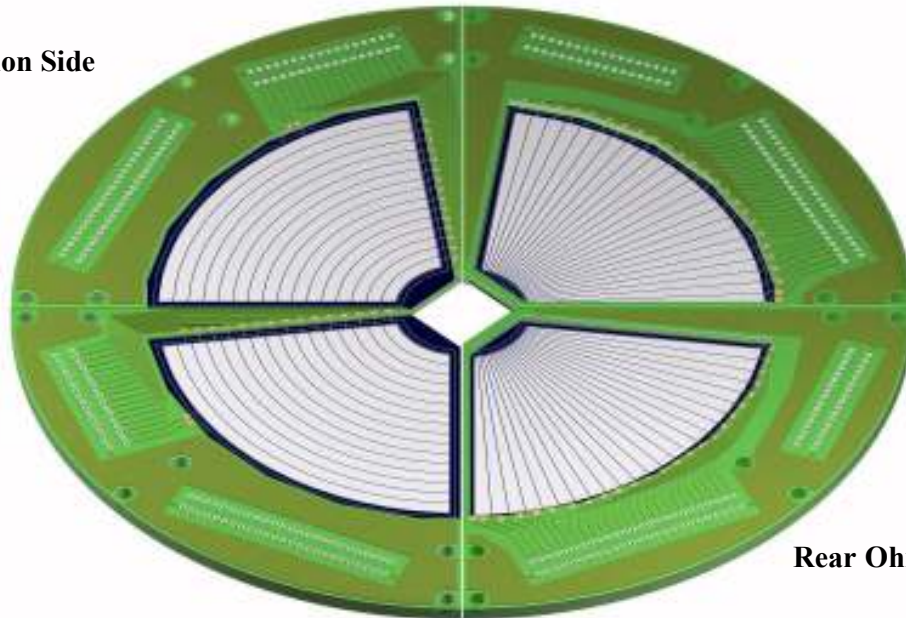
90° recessed double sided transmission PCB with rear ground plane.
 Material: FR4
 Dimensions
 Depth = 2.0 mm
 Outer Radius = 61.0 mm
 Inner Dimension = 7.4 mm
 Mounting: 4 positions with a Ø2.2 mm

CONNECTION:
 EXPERIMENT:

2 x 5 row unshrouded vertical or 90° pin header
 IISN

SINGLE OR DOUBLE SIDED 90° CD DETECTOR

Front Junction Side



Rear Ohmic Side

SILICON DETECTOR TYPE:	DOUBLE SIDED DC STRIP DETECTOR	
TECNOLOGY:	4 INCH SILICON	
JUNCTION WINDOW:		
STANDARD:	0.5 μm	
THIN:	0.1 μm	
	Detectors are available as optical or nuclear devices.	
ACTIVE AREA:	1139.0 mm^2	
INNER RADIUS:	9.0 mm	
OUTER RADIUS:	41.0 mm	
N° ANNULAR JUNCTION STRIPS:	16	
STRIP PITCH:	2.0 mm	
STRIP SEPARATION:	0.1 mm	
N° RADIAL OHMIC STRIPS:	24	
SECTOR ANGLE:	3.4°	
FULL DEPLETION (FD):		
OPERATING VOLTAGE:		
TOTAL LEAKAGE CURRENT:		
TOTAL RESOLUTION (Am 241):		
PACKAGE:	90° recessed single sided transmission PCB. Material: FR4 Dimensions Depth = 2.4 mm Outer Radius = 61.0 mm Inner Dimension = 7.4 mm Mounting: 6 positions with a $\varnothing 2.2\text{mm}$	90° recessed double sided transmission PCB. Material: FR4 Dimensions Depth = 2.4 mm Outer Radius = 61.0 mm Inner Dimension = 7.4 mm Mounting: 6 positions with a $\varnothing 2.2\text{mm}$
CONNECTION:	Samtec Connector FTSH-117-01-L-D-EJ	50 way connector with latches 3M 81050-660301

EXPERIMENTS: IISN, REX ISOLDE at CERN, UNIVERSITY OF YORK
TRIUMPH CANADA, DINEX SPAIN

QUALITY ASSURANCE: ISO9001

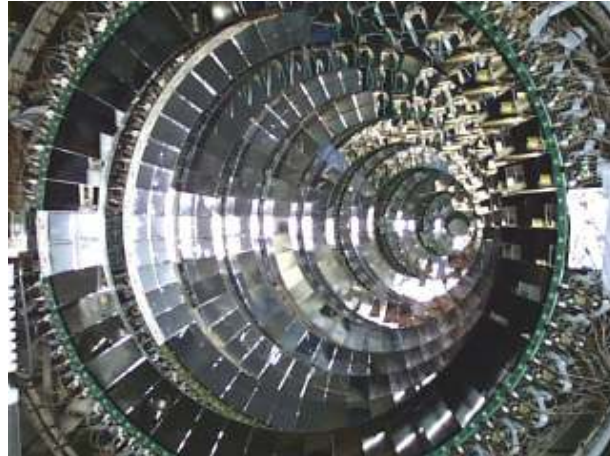
SINGLE SIDED WEDGE DETECTORS FOR RADIOACTIVE BEAM PHYSICS

SILICON DETECTOR TYPE: Single sided segmented trapezoid

TECNOLOGY: 6 INCH SILICON



Chimera 5-300 Assembly



Chimera experiments with all 9 rings mounted.

RING	ELEMENTS	CHIP			ACTIVE AREA			WINDOW TYPE	METAL COVERAGE	WAFER SIZE	GUARD RING DESIGN	PACKAGE
		Length um	Width 1 um	Width 2 um	Length um	Width 1 um	Width 2 um					
1	2	106600	63200	23700	99100	62250	22850	2, 7 & 9	M & TT	6	SGR	Standard FR4
2	2	111650	63100	35600	10415	62100	34700	2, 7 & 9	M & TT	6	SGR	Standard FR4
3	2	111400	59600	39150	10390	58600	38250	2, 7 & 9	M & TT	6	SGR	Standard FR4
4	2	115600	56500	39600	10810	55500	38650	2, 7 & 9	M & TT	6	SGR	Standard FR4
5	2	100850	62950	48450	93350	61950	47550	2, 7 & 9	M & TT	6	SGR	Standard FR4
6	2	89400	56850	46400	81900	55850	45450	2, 7 & 9	M & TT	6	SGR	Standard FR4
7	2	103300	61800	49800	95800	60800	48850	2, 7 & 9	M & TT	6	SGR	Standard FR4
8	2	89350	62950	52950	81850	61950	52000	2, 7 & 9	M & TT	6	SGR	Standard FR4
9	2	112650	64800	52450	10515	63800	51550	2, 7 & 9	M & TT	6	SGR	Standard FR4
10	4	51350	54650	27700	49300	52030	26150	2	M	4	SGR	Chip Only
11	4	66100	71300	38300	64100	68730	36740	2	M	4	SGR	Chip Only

SILICON THICKNESS: 150, 300, 400 μm

CONNECTOR:

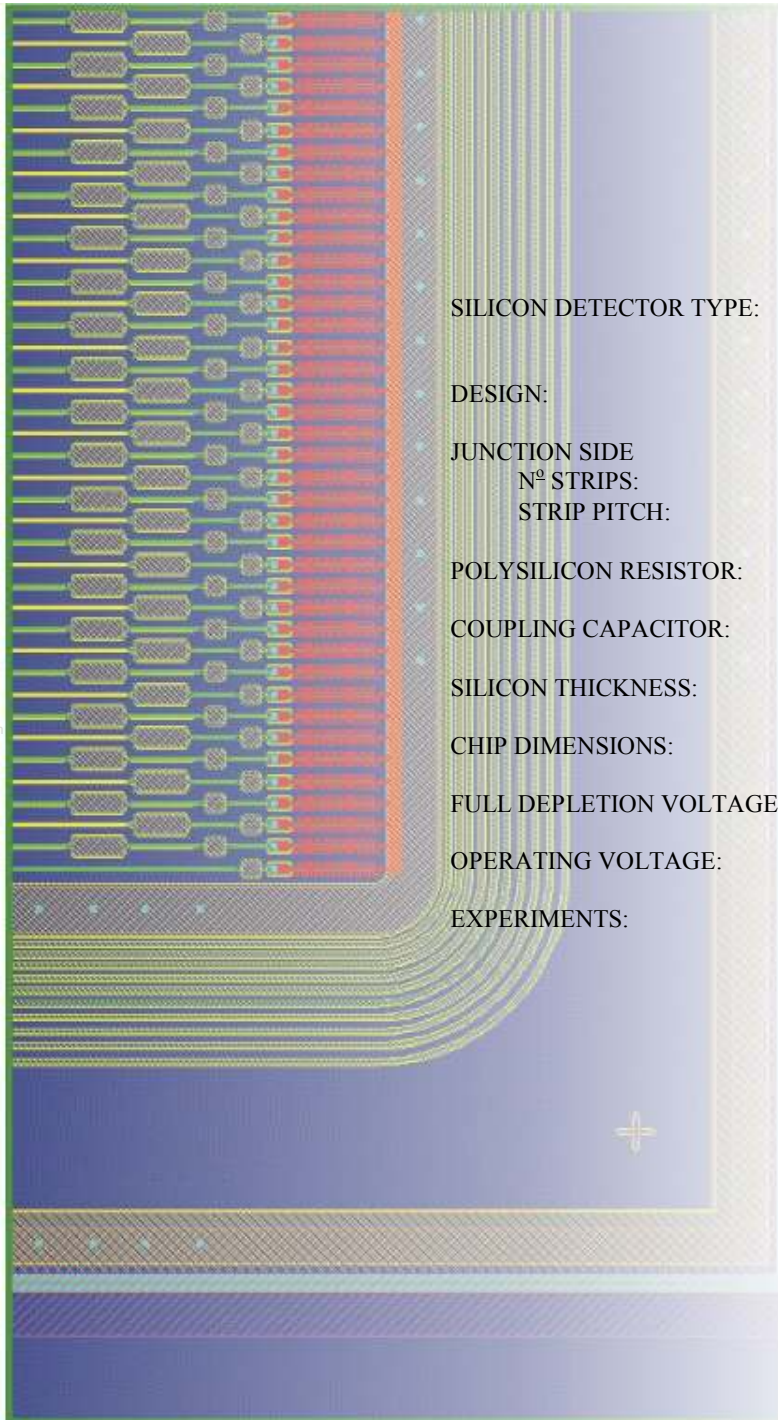
PACKAGE:

Standard FR4 PCB with silicon support on one edge to minimize material radiation lengths.

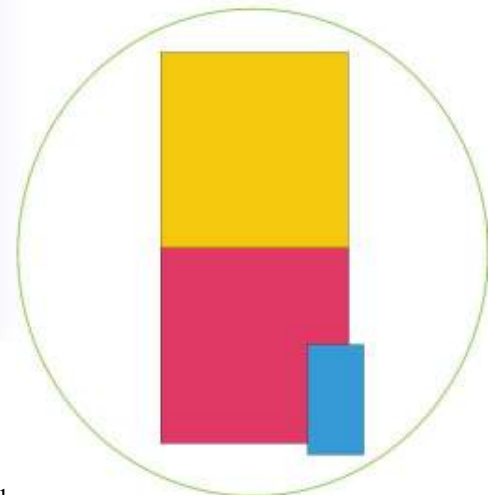
EXPERIMENTS:

CHIMERA and INDRA

AC COUPLED ION IMPLANTED TOTALLY DEPLETED SINGLE SIDED MICRONSTRIP DETECTOR WITH MULTI-GUARDRING DESIGN FOR HIGH RADIATION ENVIRONMENT



SILICON DETECTOR TYPE:	AC coupled ion implanted totally depleted silicon microstrip detector.
DESIGN:	Single sided, multi-guard ring design for high radiation environment, 6 inch wafer technology.
JUNCTION SIDE N° STRIPS:	1024 + 2
STRIP PITCH:	61 μm
POLYSILICON RESISTOR:	4.5 \pm 0.5 M Ω
COUPLING CAPACITOR:	100 pF
SILICON THICKNESS:	300 \pm 10 μm
CHIP DIMENSIONS:	62.6 x 60.3 mm ²
FULL DEPLETION VOLTAGE (FD):	50 V maximum
OPERATING VOLTAGE:	FD to 2FD
EXPERIMENTS:	CMS, CERN

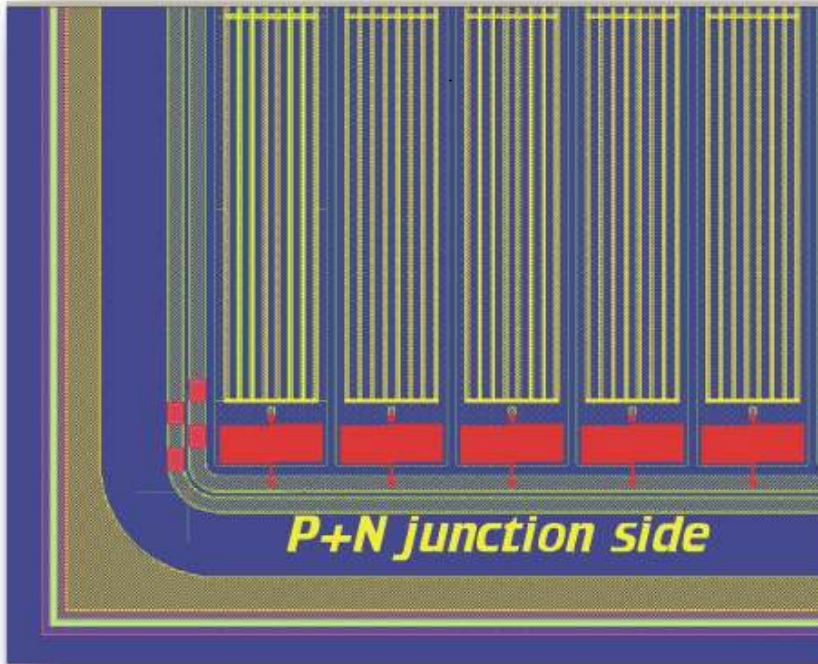


QUALITY ASSURANCE: ISO9001

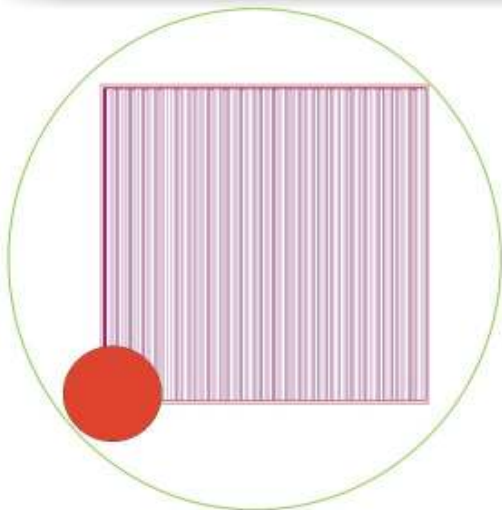
**AC COUPLED ION IMPLANTED TOTALLY DEPLETED DOUBLE SIDED 90°
MICRONSTRIP DETECTOR WITH MULTI-GUARD RING**

SILICON DETECTOR TYPE: AC coupled ion implanted totally depleted silicon microstrip detector.

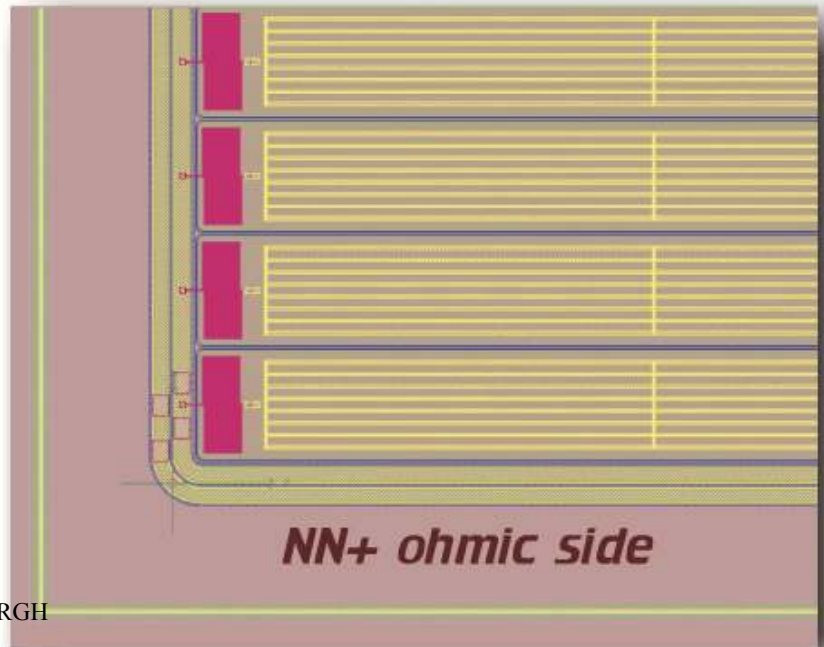
DESIGN: Double sided, multi-guard ring design for high radiation environment, 6 inch wafer technology.



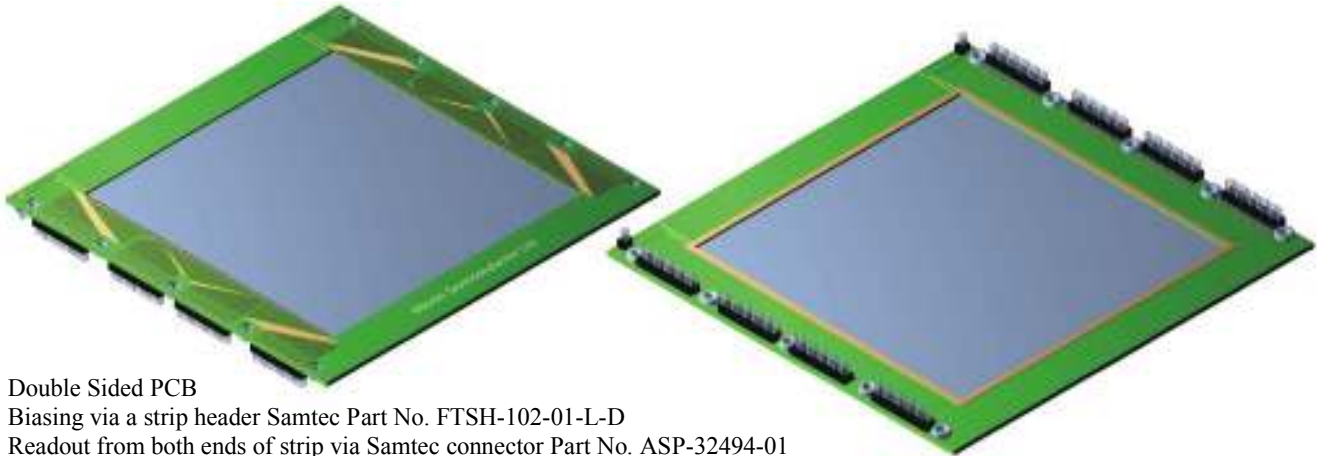
JUNCTION SIDE	
N° STRIPS:	128
STRIP PITCH:	758 μm
OHMIC SIDE	
N° STRIPS:	128
STRIP PITCH:	758 μm
POLYSILICON RESISTOR:	10 – 80 MΩ
COUPLING CAPACITOR:	1000 pF
SILICON THICKNESS:	300 ± 10 μm
ACTIVE AREA DIMENSIONS:	97.3 x 97.3 mm ²
CHIP DIMENSIONS:	99.0 x 99.0 mm ²
FULL DEPLETION VOLTAGE (FD):	50 V maximum
OPERATING VOLTAGE:	FD to 2FD
QUALITY:	100 %
ACCEPTANCE LEVEL:	100 %



EXPERIMENTS: TIGRE, NASA
 DESY, HERMES
 BLAST, MIT
 GE6, UNIV of EDINBURGH



PACKAGES

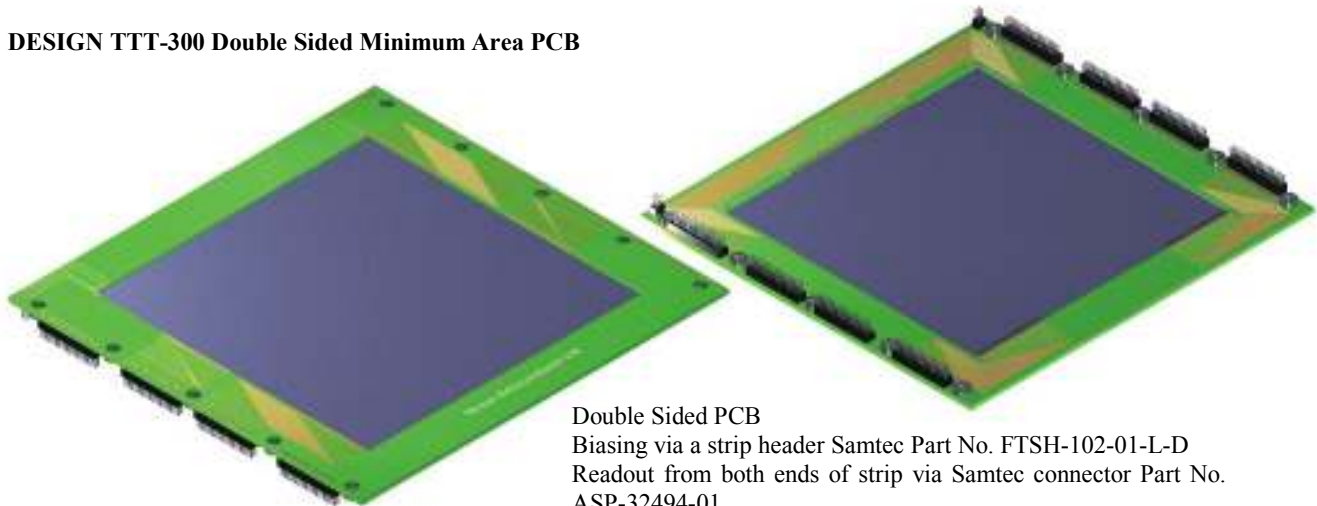
DESIGN TTT-300 Single Sided Minimum Area PCB

Double Sided PCB

Biasing via a strip header Samtec Part No. FTSH-102-01-L-D

Readout from both ends of strip via Samtec connector Part No. ASP-32494-01

PCB Dimensions 133 x 128 mm²

DESIGN TTT-300 Double Sided Minimum Area PCB

Double Sided PCB

Biasing via a strip header Samtec Part No. FTSH-102-01-L-D

Readout from both ends of strip via Samtec connector Part No.

ASP-32494-01

PCB Dimensions 133 x 128 mm²

DESIGN TTT-300 Double Sided Standard PCB

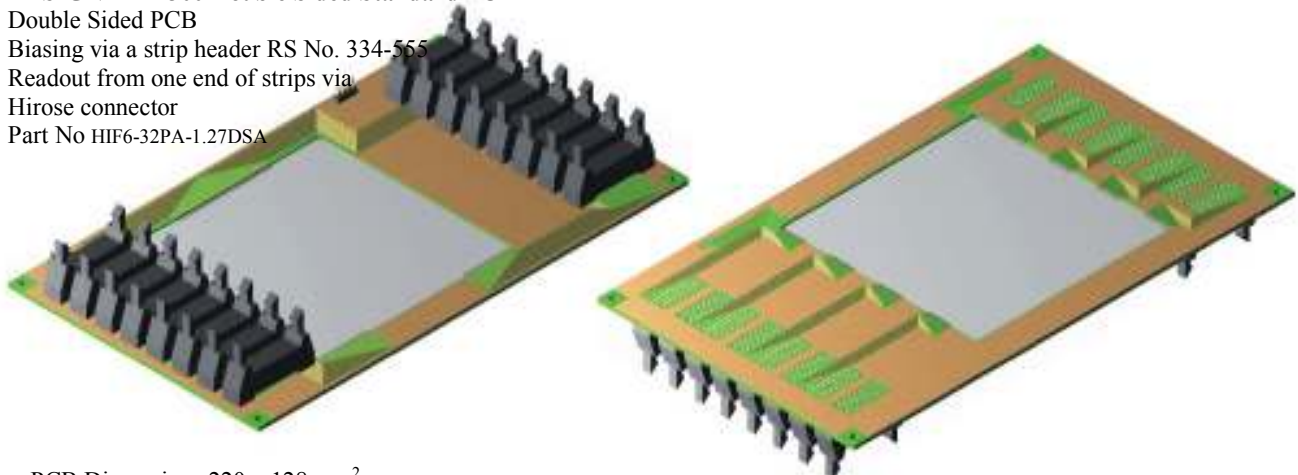
Double Sided PCB

Biasing via a strip header RS No. 334-555

Readout from one end of strips via

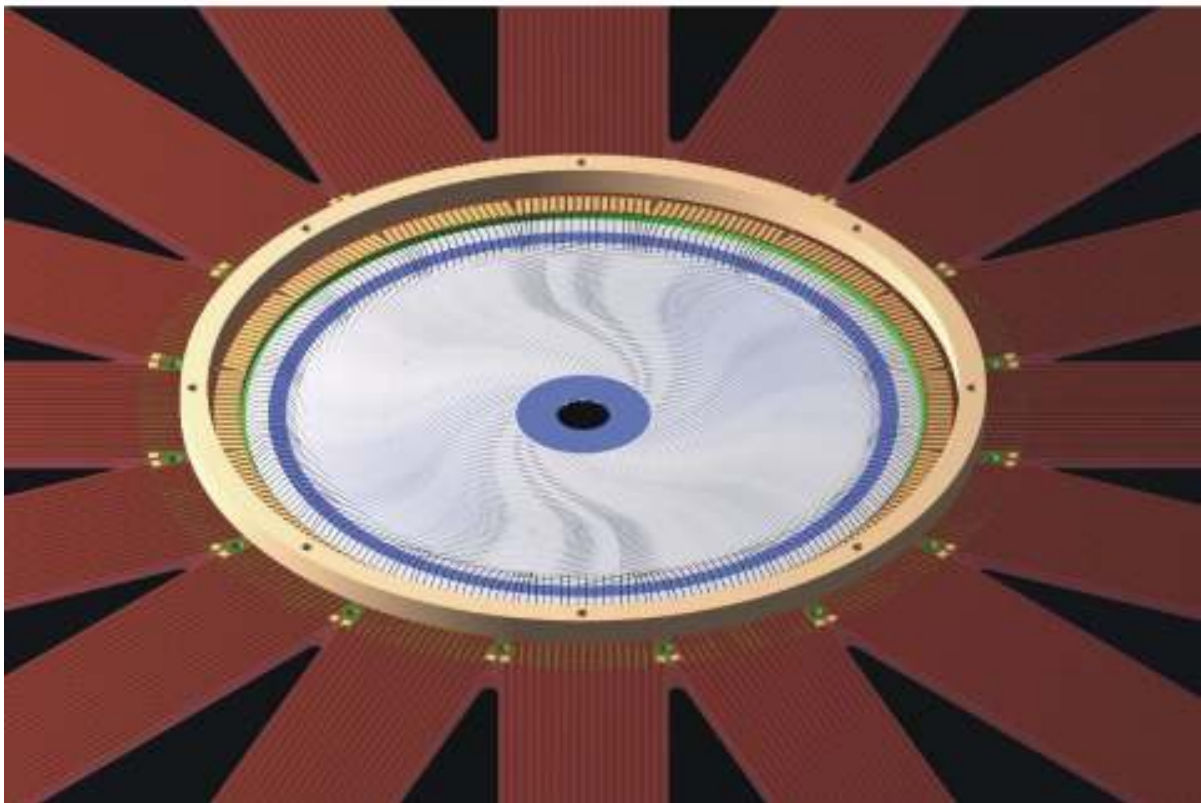
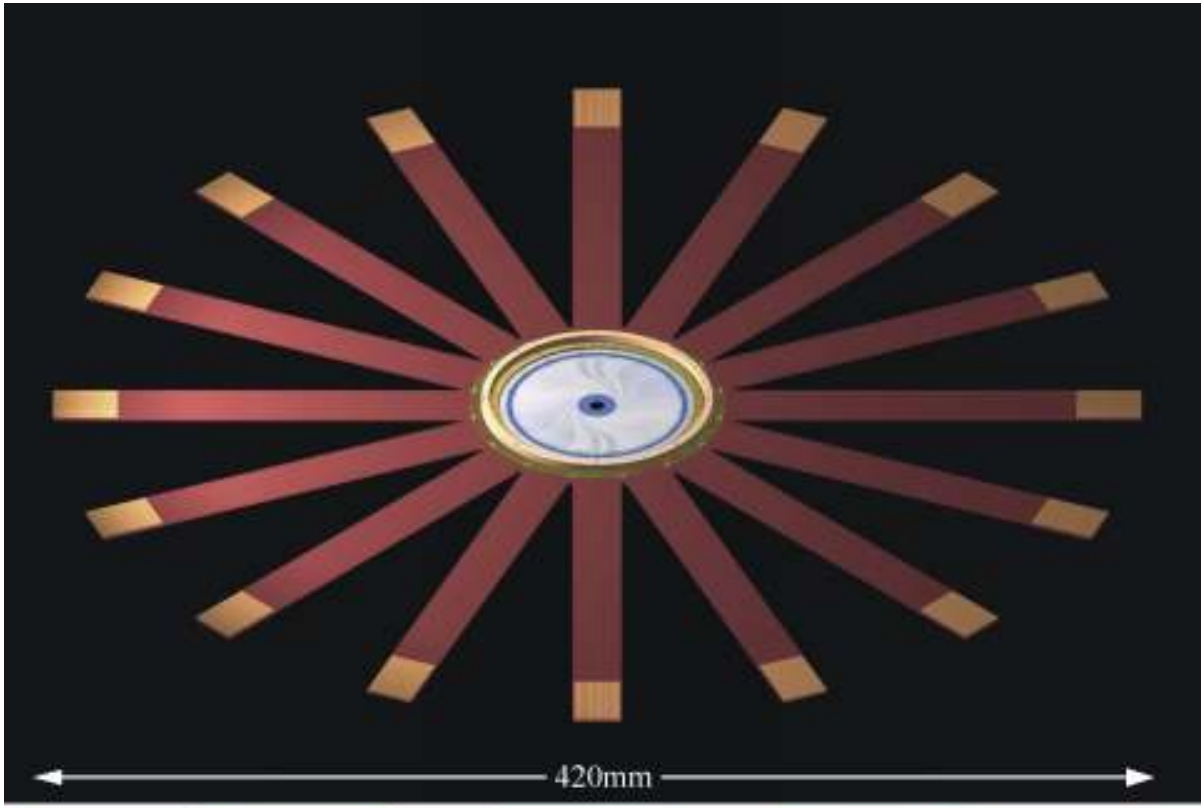
Hirose connector

Part No HIF6-32PA-1.27DSA



PCB Dimensions 220 x 128 mm²

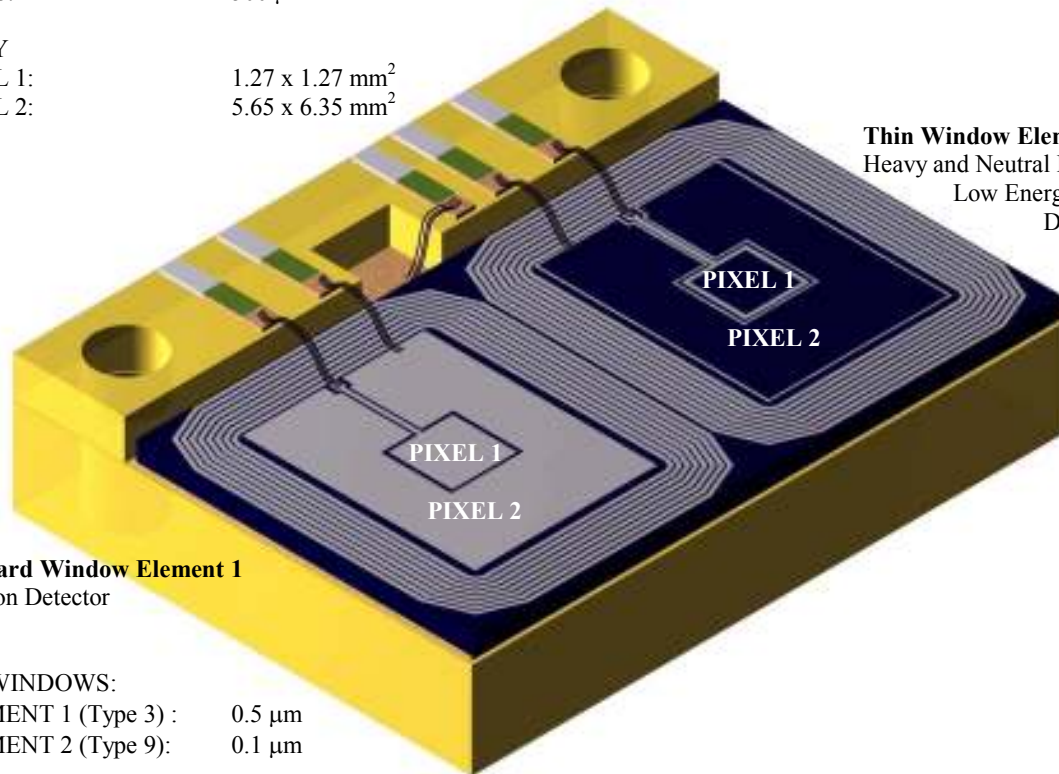
DETECTOR AND KAPTON ASSEMBLY



ΔE/DX AND E/DX PIXELATED DETECTOR WITH MULTI-GUARD RINGS

SILICON DETECTOR TYPE: DC coupled ion implanted totally depleted silicon pixelated detector.
 TECHNOLOGY: 4 inch wafer technology.
 DESIGN: Single sided pixelated device with a multi-guard ring design for high radiation environment operation.
 THICKNESS: 500 μm

GEOMETRY
 PIXEL 1: 1.27 x 1.27 mm²
 PIXEL 2: 5.65 x 6.35 mm²



Standard Window Element 1
 Electron Detector

Thin Window Element 2
 Heavy and Neutral Ion, Alpha,
 Low Energy Proton
 Detector.

IMPLANT WINDOWS:
 ELEMENT 1 (Type 3) : 0.5 μm
 ELEMENT 2 (Type 9): 0.1 μm

FULL DEPLETION (FD): <100 V
 OPERATING VOLTAGE: FD to FD + 30 V
 ELEMENT 1 LEAKAGE CURRENT: 25 nA
 ELEMENT 2 LEAKAGE CURRENT: 25 nA
 TOTAL LEAKAGE CURRENT: 50 nA
 ALPHA RESOLUTION ELEMENT 2: 12 KeV FWHM

METALLISING:
 ELEMENT 1: 10,000 Å over active area
 ELEMENT 2: 3000 Å around periphery of active area

PACKAGE: The chip is recessed in a non-transmission FR4 PCB
 Dimensions = 14.9 x 11.5 x 4.4 mm³
 Mounting holes, Ø 1.6 mm, are separated by 12.0 mm
 CONNECTION: Solder pads

MINIMUM ACCEPTANCE LEVEL: 100 %
 EXPERIMENTS: MERCURY MESSENGER

SINGLE SIDED DC MICROSTRIP DETECTOR

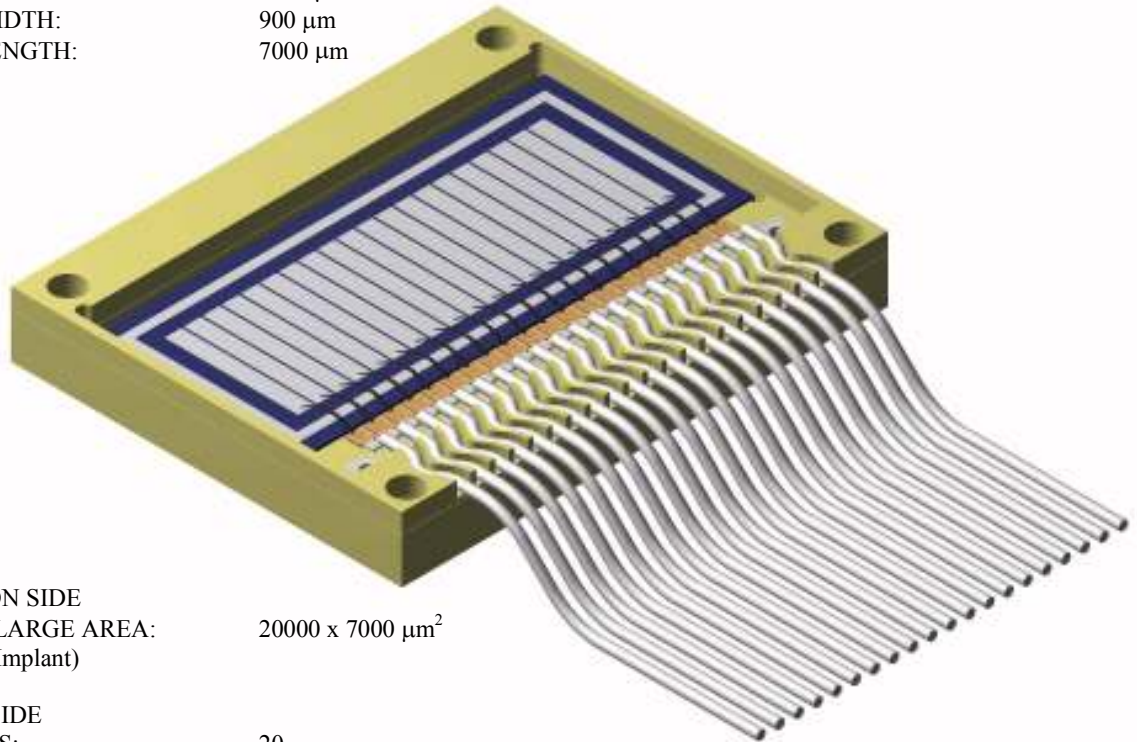
SILICON DETECTOR TYPE: DC coupled ion implanted totally depleted silicon microstrip detector which can be tailored for single sided p-n devices or n-n double sided devices. The device has a multi-guard ring design for high radiation environment operation.

TECHNOLOGY: 3 inch wafer technology for n-n design
4 inch wafer technology for p-n design

THICKNESS: 65 -1000 μm

P-N DEVICE:

JUNCTION SIDE	
N ^o STRIPS:	20
STRIP PITCH:	1000 μm
STRIP WIDTH:	900 μm
STRIP LENGTH:	7000 μm



N-N DEVICE:

JUNCTION SIDE	
SINGLE LARGE AREA:	20000 x 7000 μm^2
(Shallow Implant)	

OHMIC SIDE	
N ^o STRIPS:	20
STRIP PITCH:	1000 μm
STRIP WIDTH:	900 μm
STRIP LENGTH:	7000 μm

CHIP DIMENSIONS: 20000 x 7000 μm^2

PACKAGE: The chip is recessed in a transmission FR4 PCB
Dimensions = 18.5 x 25.5 x 1.0 mm³
Mounting holes, \varnothing 1.6 mm

CONNECTION: Junkosha Miniature Coaxial cable

MINIMUM ACCEPTANCE 100 %

(This detector is also available as a standard single sided p-n 32 channel chip only detector)

NOVEL DETECTORS

The devices listed below can be ordered in small quantities on a variety of thicknesses currently stocked. Not all thickness listed below are always available.

SILICON DETECTOR TYPE:

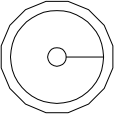









DC DIODES

DESIGN:









Totally depleted ion implanted structures with guard ring to enable high voltage operating plateau.

TECHNOLOGY:

3, 4 and 6 inch silicon.

DESIGN	DETECTOR NAME	GEOMETRY DIMENSION	CHIP DIMENSION	WINDOW TYPE	METAL COVERAGE	GUARD RING DESIGN	WAFER SIZE inch	PACKAGE
	MSA002/009	Element 1 Active Area Diameter = 0.2 mm Element 2 Active Area Diameter = 7.0 mm N° Annuli = 2 Annular Separation = 100 µm	9.0 x 9.0 mm ²	2	M	MGR	6	Chip Only
	MSA003/014	Element 1 Active Area Diameter = 0.1 mm Element 2 Active Area Diameter = 7.0 mm Element 3 Active Area Diameter = 12.0 mm N° Annuli = 3 Annular Separation = 100 µm	14.0 x 14.0 mm ²	2	M	MGR	6	Chip Only
	MSA004/009	Total Active Area Diameter = 9.8 mm N° Annuli = 4 Annular Pitch = 1250 µm Annular Separation = 100 µm	13.0 x 13.0 mm ²	2	M	MGR	4	Chip Only
	MSA005/009	Active Area Diameter = 9.8 mm N° Annuli = 5 Annular Pitch = 1000 µm Annular Separation = 100 µm	13.0 x 13.0 mm ²	2	M	MGR	4	Chip Only
	MSA010/009	Active Area Diameter = 9.8 mm N° Annuli = 10 Annular Pitch = 500 µm Annular Separation = 100 µm	13.0 x 13.0 mm ²	2	M	MGR	4	Chip Only
	MSCQ009	Active Area Diameter = 9.8 mm Quadrant Separation = 50 µm	13.0 x 13.0 mm ²	2	M	MGR	4	Chip Only
	MSD0013	Active Area Diameter = 1.3 mm	3.3 x 3.3	2, 7 & 9	M	MGR	4	Chip Only
	MSD004	Active Area Diameter = 4.0 mm	7.0 x 7.0 mm ²	2, 7, 9	M, P & TT	SGR	4	PCB
	MSD005	Active Area Diameter = 5.0 mm	10.0 x 10.0 mm ²	2	M	MGR	4	PCB
	MSD0051	Active Area Diameter = 5.0 mm	7.0 x 7.0 mm ²	2, 7, 9	M	MGR	6	PCB

NOVEL DETECTORS

	MSD0056	Active Area Diameter = 5.0 mm	8.7 x 8.7 mm ²	2, 7, 9	M	MGR	6	PCB
	MSD057	Active Area Diameter = 5.692 mm	15.4 x 15.4 mm ²	2	M	MGR	4	PCB
	MSD009	Active Area Diameter = 9.8 mm	13.0 x 13.0 mm ²	2	M	MGR	4	PCB
	MSD010	Active Area Diameter = 10.0 mm	13.0 x 13.0 mm ²	2	M	MGR	4	PCB
	MSX00	Active Area = 4.25 x 1.75	6.25 x 3.75	2	M	MGR	4	Chip Only
	MSX004	Active Area = 2.0 x 2.0	4.0 x 4.0	2	M	Single & MGR	6	Chip Only
	MSX014	Active Area = 7.0 x 2.0	9.0 x 4.0	2	M	MGR	6	Chip Only
	MSX7*	Active Area = 2.646 x 2.646	4.646 x 4.646	2, 7, 9	M	MGR	4 & 6	Chip Only
	MSX029	Active Area = 1.7 x 1.7	3.7 x 3.7	2, 7, 9	M	MGR	4	Chip Only
	MSX031*	Active Area = 3.162 x 3.162	6.162 x 6.162	2, 7, 9	M	MGR	4	Chip Only
	MSX4x4*	Active Area = 4.0 x 4.0	6.0 x 6.0	2, 7, 9	M	MGR	4	Chip Only
	MSX05	Active Area = 5.0 x 5.0	7.0 x 7.0	2	M	MGR	6	Chip Only
	MSX072	Active Area = 9.0 x 8.0	11.0 x 10.0	2	M	MGR	6	Chip Only
	MSPX040	Active Area Pixel = 1400 x 1400 μm ² Pixel Array = 4 x 4	9.10 x 9.10	2	M	MGR	4	Chip Only
	MSPX041	Active Area Pixel = 900 x 900 μm ² Pixel Array = 4 x 4	9.10 x 9.	2	M	MGR	4	Chip Only
	MSPX 100 x 64	Active Area Pixel = 89.0 x 39.0 μm ² Pixel Array = 100 x 64	14.5 x 15.0	2	M	MGR	4	Chip Only
	MSPX 128 x 96	Active Area Pixel = 89.0 x 39.0 μm ² Pixel Array = 128 x 96	17.5 x 22.15	2	M	MGR	6	Chip Only
	MSQ05	Active Quadrant = 5.0 x 5.0 mm ² Dimensions Quadrant Separation = 100 μm	12.1 x 12.1 mm ²	2	M	MGR	4	Chip Only

Alphabet Summary

Single Alphabet Index

Design	Wafer Diameter inch	Active Dimensions mm	Type	Element Length mm	Pitch μm	N ^o Channels	Standard Thickness μm	Thickness Range μm	Package	Experiment
A*	1	35 x 24	SSM	15	20	1200	300	50 - 1000	CHIP ONLY	CERN - DELPHI
B	3	50 x 50	SSM	50	50	1000	300	50 - 1000	PCB FAN OUT	CERN - NA14 /E789
C*	3	50 x 50	SSM	50	50	1000	300	50 - 1000	PCB FAN OUT	FERMI E653
D*	3	32 x 59	SSM	62	25	1200	300	50 - 1000	CHIP ONLY	CERN - DELPHI
E*	3	50 x 50	SSM	50	50	1000	300	50 - 1000	PCB FAN OUT	FERMI E653
F	3	50 x 50	SSM	50	2000	25	300	50 - 1000	PCB	EDINBURGH
G	3	50 x 50	Q	25	N/A	4	300	50 - 1000	PCB	GSi
H*	3	60	PAD	N/A	N/A	12	300	50 - 1000	CHIP ONLY	OKLAHOMA
I	3	60 x 40	SSM	40	8500	7	300	50 - 1000	PCB EDGE	CERN - UA2
J	3	60 x 40	SSM	40	210	28	300	50 - 1000	PCB EDGE	CERN - UA2
K	3	50 x 50	SSM	50	50/100	688	300	50 - 1000	PCB/KAPTON	FERMI E687/E771
L	3	50 x 50	SSM	50	25/50	688	300	50 - 1000	PCB/KAPTON	FERMI E687/E771
M	4	90 x 35	SSM	90	25	700	300	100 - 500	PCB FAN OUT	FERMI E653
N	4	90 x 35	SSM	90	50	700	300	100 - 500	PCB FAN OUT	FERMI E653
O*	3	60 x 32	DSM	60	25	512	300	50 - 1000	CHIP ONLY	CERN - DELPHI
P	3	20 x 20	SSM	20	2000	10	300	50 - 1000	PCB	EDINBURGH
Q	3	10 x 10.4	SSM	10	20	520	300	50 - 1000	CHIP ONLY	CERN - OMEGA
R	3	60	SSAR	N/A	N/A	384	300	50 - 1000	MOTHERBOARD/ CERAMIC	CERN - OMEGA
S	4	96	DSAR	N/A	N/A	80	300	100 - 500	PCB	HEIDELBERG
T	3	50 x 10	PSD	50	10000	1	300	50 - 1000	PCB/METAL HOUSING	SERC OXFORD
U	4	75 x 57	SSM	75	50	512	300	100 - 500	CHIP ONLY	FERMI CDF
V	4	77 x 57	SSM	57	300	256	300	100 - 500	PCB/KAPTON	FERMI E687
W1	3	50 x 50	DSM	50	300	32	300	50 - 1000	PCB	ONL/ WASHINGTON
W2	4	50 x 50	SSM/	50	500	100	300	70 - 1000	PCB	NAPOLI
X	3	50 x 50	SSM PDS	50	3120	16	300	140 - 1000	PCB	SERC/EDINBURGH
Y	4	90 15	SSM	90	30	512	300	100 - 500	CHIP ONLY	SLAC MKII
Z*	3	50 x 50	SSMQ	25	500	192	300	50 - 1000	PCB	LLNL NOVA

*Indicates obsolete Designs

SSM Single Sided Microstrip
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SSAR Single Sided Annular
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Q Quadrant
P Pixel

PSD Position Sensitive Detector
SSDMM Single Sided Double Metal Microstrip

LA Linear Array

Double Alphabet Index

Design	Wafer Diameter inch	Active Dimensions mm	Type	Element Length mm	Pitch	No Channels	Standard Thickness μm	Thickness Range μm	Package	Experiment
AA	3	12 x 12	PSD	12	N/A	1	140	60-1500	PCB	CHARISSA
BB1	3	40 x 40	DSM/DC	40	1mm	80	300	60-1500	PCB	ARGONNE/ORNL
BB2	3	24 x 24	DSM/DC	40	1mm	48	300	60-1500	PCB	NASA (MARS)
BB4	3	70 Diameter	DSM/DC	VARIABLE	1mm	128	300	60-1500	PCB	NASA ACE
BB5	4	32 x 32	DSM/DC	32	400 μm	160	60	60-1500	PCB	ARGONNE
CC	3	28 x 30	PAD	25	VARIABLE	6	150	50-1500	CERAMIC	CEPPAD
DD	3	25 x 25	SSM/DC	25	25 μm	1048	300	60-1500	QUARTZ	CERN OMEGA
EE1-EE4	3	Microstrips	SSM/DC	20-50	100 μm -650 μm	16/26/40/64	300	140-500	PCB	CERN ALEPH/ UA2/ LHC
FF	3	40 x 30	PAD	5	6mm	48	300	300-1500	PCB	ESA INTERAL
GG	4	85	DSM/AC	85	60 μm	256/384/512/768	300	100-500	CHIP	FERMI CDF SVXII
HH	4	10.25 x 15.38 x 50.41	SSM/DC	50	40 μm /60 μm	256	300	100-500	CHIP	SSC SDC
II	4	Wedge	PAD	45	N/A	1	500	100-500	PCB/KAPTON	INDIANA SPERE
KK	3	47 at variable	SSM/DC	47	1mm	47/44	300	N/A	KEVLAR	DELPHI SAT
LL1-LL4	3	10-35 Diameter	Q	CIRCULAR	N/A	4	250	65-300	PCB/CERAMIC	ELECTRON DETECTORS
MM	3	180 x 15	SSP	10	10mm	18	300	100-500	PCB	CRRES
NN	3	50 x 50	SSM/DC	50	1mm	50	300	140-500	PCB	CERN DELPHI
PP	3	16 x 16	DSM/DC	16	335 μm	96	60	60-1500	PCB	ARGONNE/ ORNL
QQ	3	10 x 5.2	SSM/DC	10	10 μm	520	150	300	CHIP	CERN OMEGA
RR	3	7 x 14	LINEAR ARRAY	4.84	2.39mm	3	1000	60-1500	PCB	LANL/ CLUSTER

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Double Alphabet Index

Design	Wafer Diameter inch	Active Dimensions mm	Type	Element Length mm	Pitch	No Channels	Standard Thickness μm	Thickness Range μm	Package	Experiment
TT	4	18 x 10	PSD	180		2	300	100-1000	PCB	DUKE
UU	3	29 x 24 x 16	PAD	29 OR 24	4.5mm	3	1000	60-1500	CERAMIC	ARGONNE
UU2	3	29 x 24 x 16	PAD	29 OR 24	4.5mm	3	1000	60-1500	CERAMIC	GSI TRAPEZOID
W1	3	68 Diameter	SSM/DC	VARIABLE	500 μm	250	140	140-1500	PCB	NASA EPACT/ WIND
W2	3	Orthogonal 36	SSM/DC	VARIABLE	500 μm	10	1000	140-1500	PCB	NASA EPACT/ LEMT
WW	4	80 x 36	PSD	36	26.7mm	3	500	100-500	PCB/HOUSING	GSI MULTIELEMENT
XX	3	Wedge	SSM/DC	VARIABLE	VARIABLE	96	300	140-500	CHIP	CERN L3
YY1	4	Wedge	SSM/DC	VARIABLE	5mm JUNCTION	16	300	60-1500	PCB	IISN/ LEDA
YY2	4	Wedge	DSM/AC	VARIABLE	50 μm	2048	300	60-1500	CHIP	DZERO F DISK
YY3	4	Wedge	SSM/DC	VARIABLE	1.7mm JUNCTION	31	300	60-1500	CHIP	CERN DELPHI
ZZ1,ZZ2	3	13 x 13 and 20 x 20	PADS	13-20	STACKS	2 or 3	500	65-1500	PCB	SPACE TELESCOPES

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LA Linear Array

Triple Alphabet Index

Design	Wafer Diameter Inch	N ^o . Devices per Wafer	Dimensions (mm)	Device Type	Details	Pitch		N ^o Channels		Orientation	Thickness µm	Packaging	Experiment
						Junction	Ohmic	Junction	Ohmic				
AAA1 AAA2	4	2	64 x 64 77 x 57	DSM PSD	EXOTIC DC Double Sided PSD Microstrip			12 15	16 8	90°	65 - 1000	PCB Readout	
BBB1 BBB2 BBB3 BBB4 BBB5 BBB6	4	4	41 x 42 49 x 45 71 x 44 67 x 52 54x52	DSM/DC	Rectangular DC Double sided Microstrip	50 55 55 50 50 50-41	50 50 50 105 100 100	799 874 1275 1023 1023 1023	821 881 859 631 525 667	90°	300	Chip Only	BABAR
CCC	6	2	74.3 x 40.3, 70.4 x 60.17	DSM/AC	Rectangular AC Double Sided Microstrip					1.2°	300	Chip Only	CDF SVX
DDD5	6	1	120 x 21	DSM/AC	Rectangular AC Double Sided Double Metal	50	153.5 49.5	384	768 384	90°	300	Chip Only	DØ
EEE	6	1	74.7 x 59.3	DSM/AC	Rectangular AC Double Sided Stereo Microstrip	112	112	512	512	1.2°	300	PCB Coaxial Readout	CDF ISL
FFF	4	1	59 x 79 x 17	DSM/AC	F Wedge Trapezoid AC Double Sided Microstrip	50	62.5	1024	768	30°	300	Chip Only	DØ
GGG	4	1	60 x 34	DSM/AC	Square 2° Stereo AC Double Sided Microstrip	50	62.5	640	512	2°	300	Chip Only	DØ
HHH	6	1	85 x 115 x 23	DSM/AC	Trapezoid AC Double Sided Microstrip	516	516	160	160	30°	300	Chip Only	DESY HERMES
III	3	2	50 x 50	SSM/DC DSM/DC	IND/ MSU/ WA E/E DC Single/Double Sided Microstrip					90°	65/ 500/ 1000	PCB Kapton Readout	
JJJ	4	2	50 x 26 x 66	SSM	Wedge Single Sided Radial Strips Pad Detectors					0°	300	Chip Only	DESY H1
KKK	3	3	53 x 53, 74.5 x 53		Rectangular AC Coupled Long/ Short/ Wedge					0°	300	Chip Only	PHENEX
LLL-PHI LLL-R	6	2	Inner Radius 10, Outer Radius 50	SSDMM/ AC	R & Phi Semi-Circle Shaped AC Single Sided	24-55 13-92		2048 2048		-	200/ 300	Chip Only	LHC-b
MMM	6	2	Inner Radius 32.6, Outer Radius 135.1	DSM/AC	57° Wedge Double Sided DC Radial And Axial Strips	6.4	6.8°	16	8	-	150/ 400	PCB Readout	HYBALL
OOO	6	1	78.4 x 8.43	SSM/DC	Rectangular AC Single Sided Microstrip	25		256		0°	300	Chip Only	CDF 00
PPP	4	4	40 x 40, 30 x 35	PAD	Pentagon Single/ Multi Element Pads					-	140/ 1000	PCB Coaxial Readout	Euroball
QQQ1 QQQ2	3	2	40 x 40, 30 x 35	DSM/DC	DC Double Sided 90° Pad DC Double Sided 90Radial/ Axial Strip And					-	35/ 65/ 500/ 1500	PCB Readout	REX-ISOLDE
RRR	6	4	65 x 62	PAD	CHIMERA Trapezoid Single Sided Dual Pad Detector					-	35/ 65/ 500/ 1500	PCB Readout	CHIMERA

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Triple Alphabet Index

Design	Wafer Diameter Inch	N ^o . Devices per Wafer	Dimensions (mm)	Device Type	Details	Pitch		N ^o Channels		Orientation	Thickness μm	Packaging	Experiment
						Junction	Ohmic	Junction	Ohmic				
SSS	6	2	64 x 60	SSM/AC	Rectangular Al Single Sided Microstrip With Multiguard	61		1024+2		0°	300	Chip Only	CMS
TTT	6	1	99 x 99	DSM/AC	Rectangular AC Double Sided Microstrip For Space	758	758	128	128	90°	300	Chip Only	TIGRE
UUU1 UUU2	6	1	106.8 x 64 89.5 x 89.5	SSM/AC	Rectangular AC Single Sided Microstrip For Space	194 228	320 384			0°	300/ 400	Chip Only	GLAST
VVV	3	2	Diameter 15 and 7	Q	Single Sided 5 Sector Quadrant Bullseye Pad Detectors					-	15/ 35/ 300/ 500	PCB Tube	LEAR
WWW	3	2	40.4 x 5, 40.4 x 4.5	SSM/DC	Rectangular Single Sided DC 128 Channel Microstrip					0°	1000	PCB	GRAAL
XXX	3	1	50 x 25	P	Thin 750Å Window Pixel Array For Space Research					-	399	PCB Kapton Readout	IMAGE
XXX2	4	1	Inner Radius 3, Outer 35	SSS/DC	Archimedes Swirl Detector					-	65/140/300/500	PCB Kapton Readout	COSY
XXX3	4	1	14.7 x 8.5	SSP	Pixelated Standard and Thin Window Detector					-	300/400	PCB	MERCURY MESSENGER
YYY	3	2	28.2 x 3	LA	Thin 750Å Window Linear Array For Space Research					-	140/ 1500	DIL Package	CAPPAD
ZZZ	4	6	7 x 24	SSM/DC	Rectangular Single Sided Microstrip For Space Research	1000		20		0°	300/ 400	PCB	IMEX

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