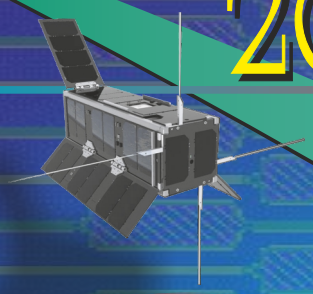
2017 Catalogue



BACKSCATTERED DETECTORS

SSSD & DSSD

RBSP

GOES-R

GO-SAT

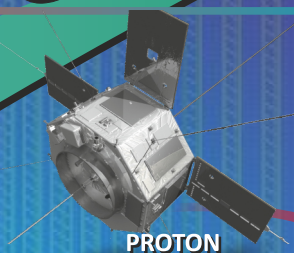
STEREO

CUBE-SAT

SOLAR ORBITER

MOON MISSION 2

SOLAR PROBE PLUS



GAMMA

X-RAY

IONS

SILICON DETECTORS

PROTON

NEUTRON

ELECTRON

SYNCHROTRON

TTT1
(DS-500)

PIXEL DETECTORS

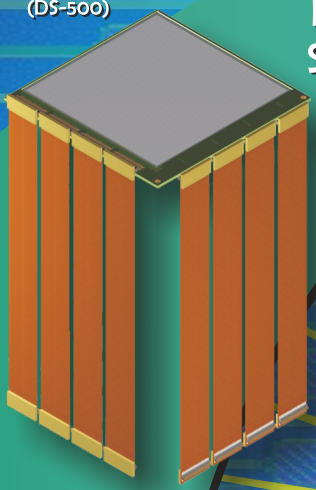
MICROSTRIP DETECTORS

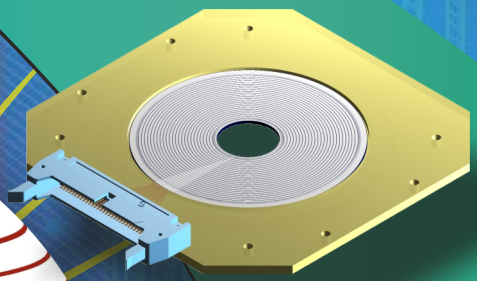
SPACE

P-TYPE SILICON

N-TYPE SILICON

S3
(DS-1000)





MICRON SEMICONDUCTOR LIMITED

PSD X SERIES

MSPX SERIES

MSX SERIES

MSD SERIES

MSA SERIES

QQQ SERIES

TTT SERIES

BB SERIES

DESIGN W

DL SERIES

TL SERIES

S SERIES

ABBA

GASPARD

MUSETT

SAMURAI

MUST 2

ISOLDE

MINOS

FAZIA

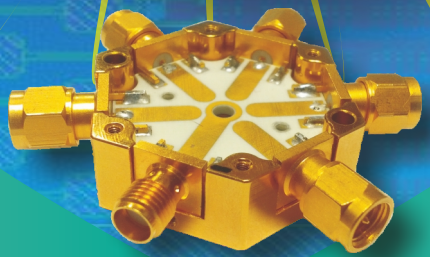
LHCb

FAUST

ATLAS

ALPHA

CLIC



DIAMOND DETECTORS

STUD & SOLDER BUMP BONDED STRUCTURES

TIMEPIX

MEDIPIX

TDCPIX

Check availability at www.micronsemiconductor.co.uk

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	500 nm	4 KeV	90 KeV
7	300 nm	2 KeV	70 KeV
9	100 nm	1K eV	20 KeV
9.5	50 nm	500 eV	10 Kev
10*	10 nm	100 eV	1 Kev
PSD	30 nm	300 eV	5 Kev

* R&D

Metal Coverage

The standard metallisation scheme is 100 % sputtered aluminium of thickness 0.5 µm for good ultra sonic 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.
E	An equipotential metal band array used on PSD devices.

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^{o} to +120^{o} required for military applications.

Wafer Size

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

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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 mm^2) 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

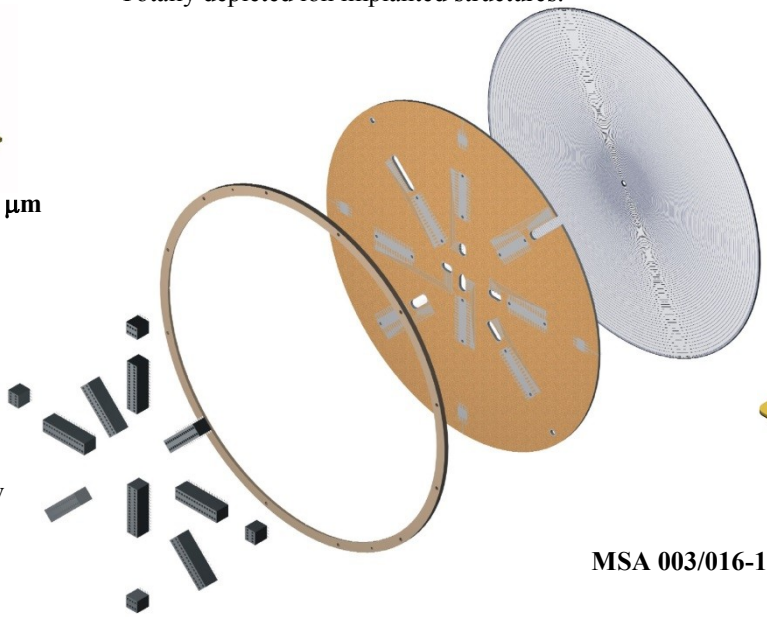
The silicon chips can be delivered as chip only or assembled in a standard or custom package. The majority of packages are made from standard FR4 material or on black FR4 material where light transmission through the package needs to be minimized. Many of the designs currently offered on FR4 material 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

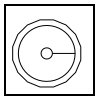
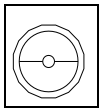
SILICON DETECTOR TYPE: SINGLE SIDED DC Annular detectors
DESIGN: Totally depleted ion implanted structures.

MSA 002/020-1000 µm



MSA127 assembly

MSA 003/016-15 µm Front & Rear View

	DESIGN	ACTIVE AREA DETAILS	CHIP DIMENSIONS	JUNCTION WINDOW	OHMIC WINDOW	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 Nº Annuli = 2 Annular Separation = 40 µm	24.0 mm Flat-to-Flat Nº Sides = 16	2M 7M 9M	2M	4	MGR	Chip Only
	MSA003/016	**Element 1** Active Area Diameter = 7.0 mm **Element 2/3** Active Area Diameter = 16.0 mm Nº Annuli = 2 Annular Separation = 50 µm	18.15 mm Flat-to-Flat Nº Sides = 8	2M 7M 9M	2M	4	MGR	Chip Only
	MSA003/016	Active Area Radi = 10.000 -15.175 mm Active Area Radi = 15.225 -19.075 mm Active Area Radi = 19.125 -22.300 mm Nº Annuli = 24 Annular Separation = 50 µm Hole Diameter = 17.0 mm	∅= 48.6 mm	2DM	2M	6	MGR	Chip Only
	MSA016	Active Area Diameter = 49.5 mm Nº Annuli = 16 Nº Elements = 90 Annular Pitch = Variable Annular Separation = 50 µm Double Metal Readout	∅= 53.3 mm	2M	2M	6	MGR	Chip Only
	MSA127	Active Area Diameter = 134.65 mm Nº Annuli = 127 Annular Pitch = Variable Annular Separation = 50 µm Hole Diameter = 9.8 mm	136.472 mm Flat-to-Flat Nº Sides = 24	2M	2M	6	MGR	Ceramic Flip Chip Mounted

QUALITY ASSURANCE: ISO9001

CUSTOM SILICON CIRCULAR PAD DETECTORS

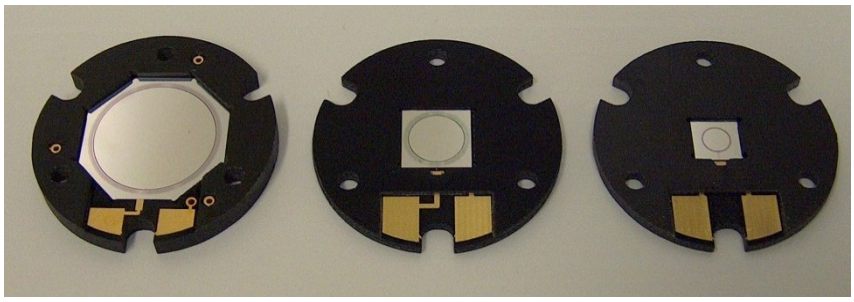
SILICON DETECTOR TYPE: SINGLE AREA
DESIGN: Totally depleted ion implanted structures.

SINGLE SIDED, SINGLE ELEMENT CIRCULAR MSD SERIES:

DESIGN	ACTIVE AREA DIAMETER (mm)	CHIP DIMENSIONS (mm^2)	JUNCTION WINDOW	OHMIC WINDOW	WAFER SIZE (inch)	GUARD RING DESIGN	PACKAGE
MSD003	3.00	5.00 x 5.00	2M	2M	4	MGR	Chip Only
MSD003810	3.810	∅ 8.690	2/7/9 M/T/P	2M	4	MGR	Chip Only
MSD004	4.00	∅ 8.00	2/7/9 M/T/P	2M	4	MGR	Black FR4 PCB
MSD004572	4.572	∅ 6.912	2/7/9 M/T/P	2M	4	MGR	Chip Only
MSD005	5.00	7.00 x 7.00	2/7/9 M/T/P	2M	4	MGR	Black FR4 PCB
MSD062	6.20	8.20 x 8.20	2/7/9 M/T/P	2M	4	MGR	Chip Only
MSD007*	7.00	10.0 x 10.0	2/7/9 M/T/P	2M	3 & 4	SGR & MGR	Range of Black FR4 PCBs
MSD007	7.00	∅ 11 .00	2M 7M 9M	2M	4	MGR	Black FR4 PCB
MSD008*	8.00	10.0 x 10.0	2/7/9 M/T/P	2M	4	MGR	Black FR4 PCB
MSD008	8.00	∅ 12.00	2M 7M, 9M	2M	4	MGR	Black FR4 PCB
MSD009	9.00	11.00 x 11.00	2M	2M	4	MGR	Chip Only
MSD010	10.00	13.00 x 13.00	2/7/9 M/T/P	2M	4	MGR	Chip Only
MSD011	10.00	12.00 x 12.00	2M	2M	6	MGR	Ceramic
MSD012	12.00	∅16.00	2/7/9 M/T/P	2M	6	MGR	Black FR4 PCB
MSD017	16.80	∅ 20.80	2M 7M 9M	2M	4	MGR	Black FR4 PCB
MSD018	18.00	21.00 Flat-To-Flat (8 Sides)	2/7/9 M/T/P	2M	4	MGR	Black FR4 PCB
MSD020	20.00	22.00 x 22.00	2M	2M	6	MGR	Chip Only
MSD020	20.00	∅ 24.00	2/7/9 T/P	2M	4	MGR	Black FR4 PCB
MSD022	21.70	∅ 25.70	2M 7M, 9M	2M	4	MGR	Black FR4 PCB
MSD023	23.00 – 31.00	∅ 27.00 – 35.00	2/7/9 T/P	2M	4	MGR	Black FR4 PCB
MSD024	24.50	28.76 Flat-To-Flat (16 Sides)	2M	2M	6	MGR	Housed in a metal case
MSD026	26.00	∅ 30.00	2M 7M, 9M	2M	4	MGR	Black FR4 PCB
MSD026	26.00	∅ 30.00	2M 7M, 9M	2M	6	MGR	Black FR4 PCB
MSD028	28.14	30.91 Flat-To-Flat (16 Sides)	2M	2M	6		Housed in a metal case
MSD030	30.00	32.00 x 32.00	2M	2M	4	MGR	Chip Only
MSD032	32.00	∅ 36.00	2M 7M, 9M	2M	4	MGR	Black FR4 PCB
MSD035	35.0	39.00 Flat-To-Flat	2G 7G 9G	2M	4	MGR	Range of Black FR4 PCBs
MSD040	40.00	44.00 Flat-To-Flat (16 Sides)	2M	2M	4	MGR	Flexi Rigid Package
MSD050	50.00	54.66 Flat-To-Flat (16 Sides)	2M	2M	6	MGR	Housed in a metal case
MSD085	85.00	90.00 Flat-To-Flat (16 Sides)	2/7/9 M/T/P	2M	4	MGR	Black FR4 PCB

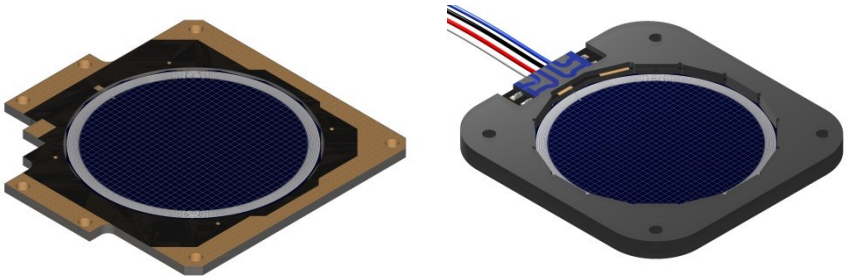
OPTIONS: Space qualified, military, industrial, research, physics projects.

QUALITY ASSURANCE: ISO9001

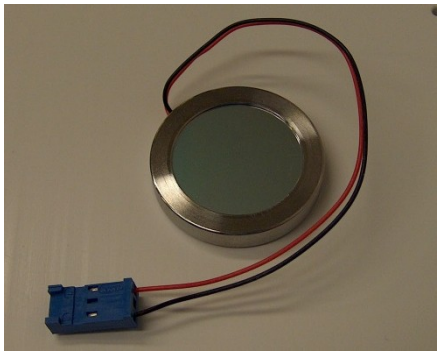


MSD018, MSD007 and MSD004 assemblies supplied to JAXA are mounted on PCBs with common mounting positions.

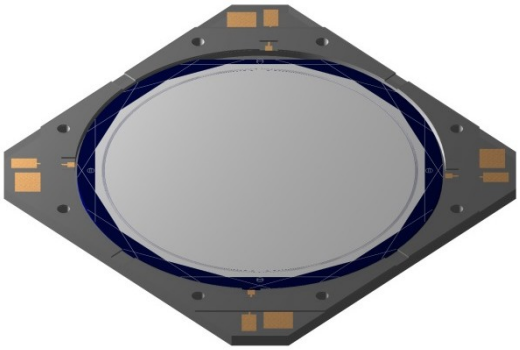
MSD004 2M/2M, MSD007 2M/2M and MSD026 2M/2M assemblies supplied with alternative packages.



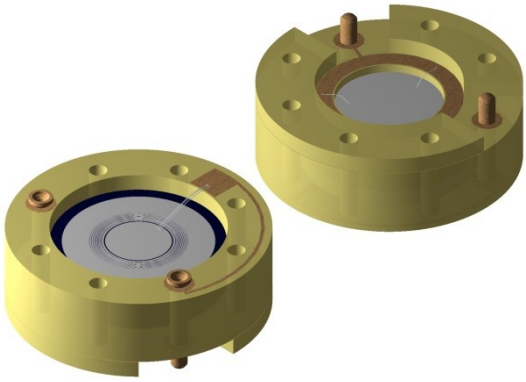
Many detector have a range of packages e.g. MSD035 9G/2M used by the COMPASS and Crater Projects.



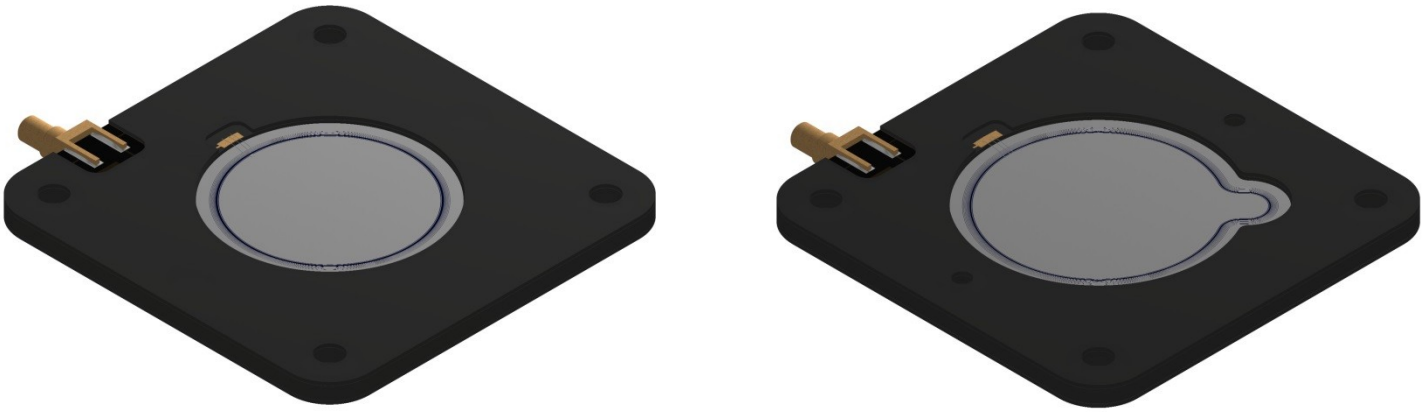
MSD024 2M/2M detector supplied as an alpha monitor.



MSD085 2M/2M, the largest of the circular single areas.



Front and rear view of the MSD003810-2500 um 2M/2M assembly.



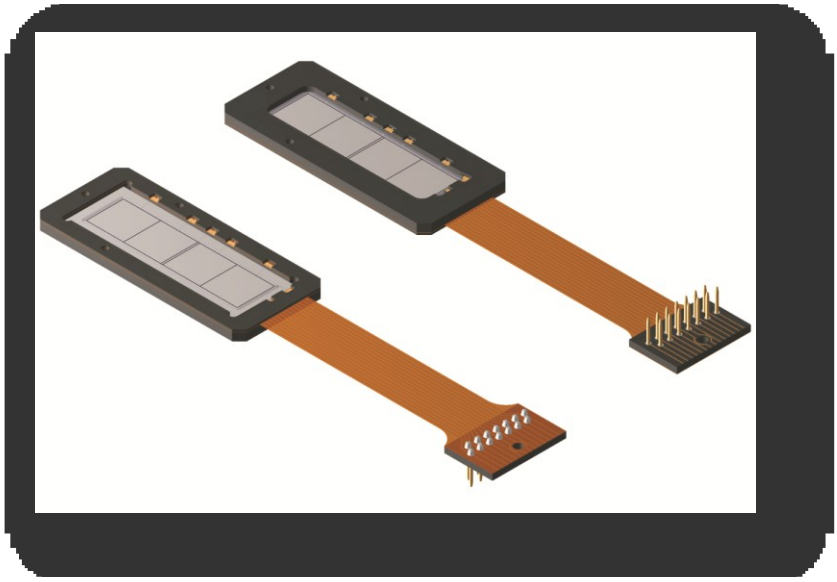
Space qualified MSD020 2M/2M and MSD023 2M/2M assemblies.

MSD040 2M/2M in a flexi-rigid package.

CUSTOM SILICON LARGE SEGMENTED DETECTORS

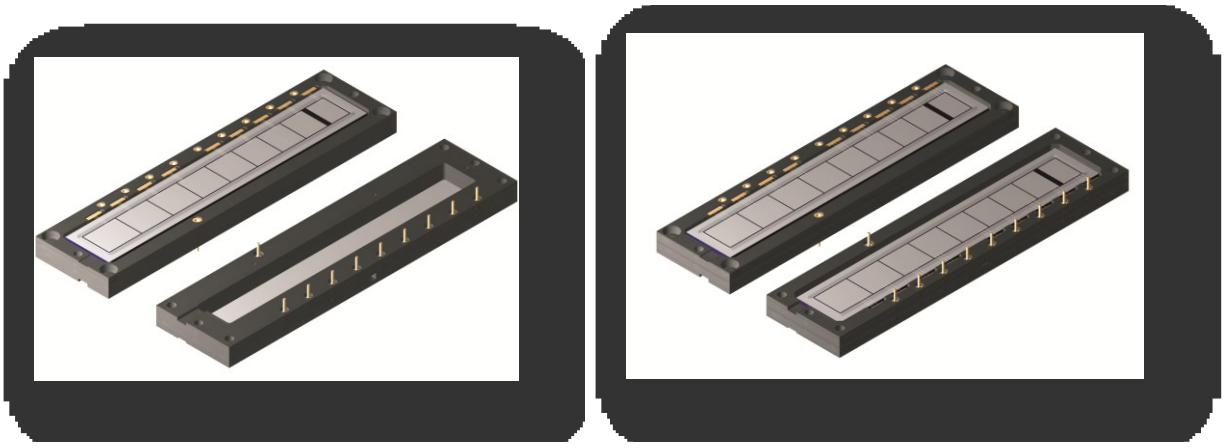
SILICON DETECTOR TYPE: DOUBLE SIDED SINGLE SEGMENTED DETECTOR
DESIGN: Totally depleted ion implanted structures.

DESIGN	MSPAD 1x5 (DS)	MSPAD 1x9 (SS)	MSPAD 1x4-1 (SS)	MSPAD 1x4-2 (SS)
TOTAL ACTIVE AREA DIMENSION (mm^2)	40.80 x 10.00	54.00 x 6.00	48.00 x 12.00	50.00 x 16.00
CHIP DIMENSIONS (mm^2)	46.80 x 16.00	15.356 x 15.356	52.00 x 16.00	54.00 x 20.00
JUNCTION SEGMENTATION	1x5	1x9	1x4	1x4
JUNCTION PITCH (um)	Varies	Varies	Varies	Varies
JUNCTION WINDOW	2M	2/7/9M	2M	2M
OHMIC SEGMENTATION	1x5	-	-	-
OHMIC PITCH (um)	Varies	-	-	-
OHMIC WINDOW	2M	2M	2M	2M
GUARD RING DESIGN	MGR	MGR	MGR	MGR
WAFER SIZE (inch)	4	4	4	4
PACKAGE	Black FR4 with kapton rigid flexi	Black FR4 with output pins	Black FR4 with embedded Junkosha Cable	Black FR4 with embedded Junkosha Cable

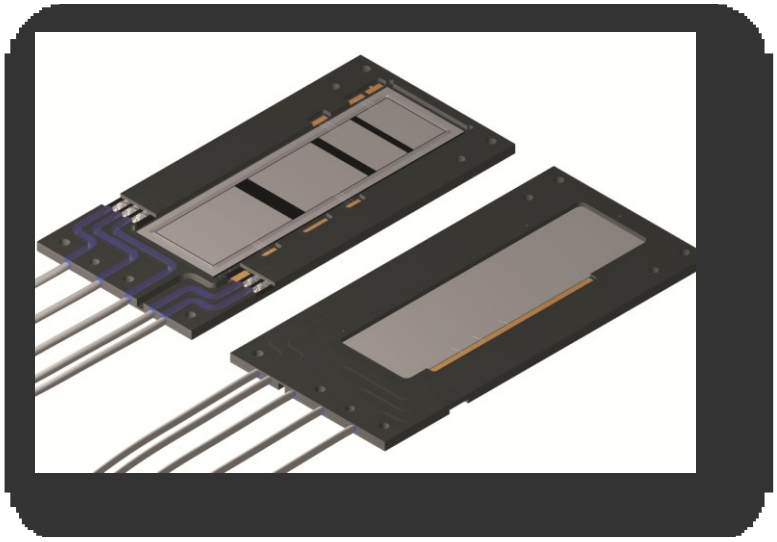


MSPAD 1x5(DS) Assembly

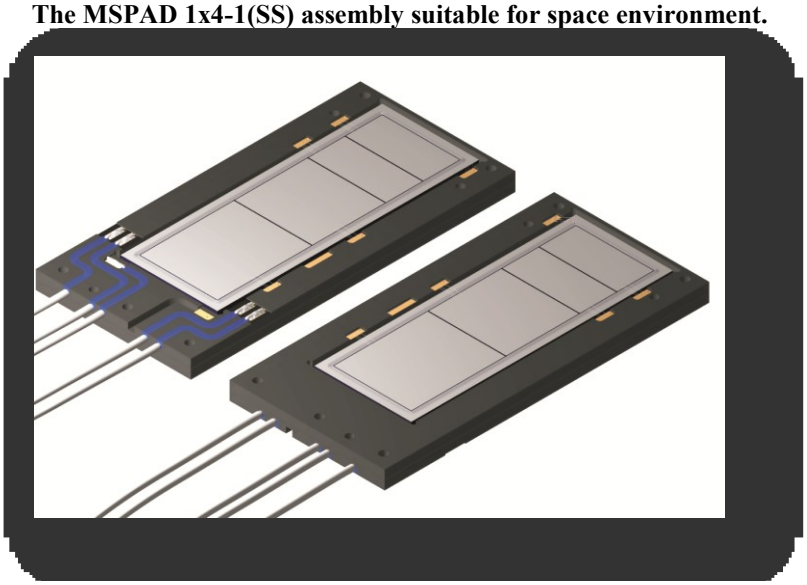
QUALITY ASSURANCE: ISO9001



The MSPAD 1x9(SS) in a single assembly configuration or two silicon devices mounted back-to-back in a single package.



The MSPAD 1x4-1(SS) assembly suitable for space environment.



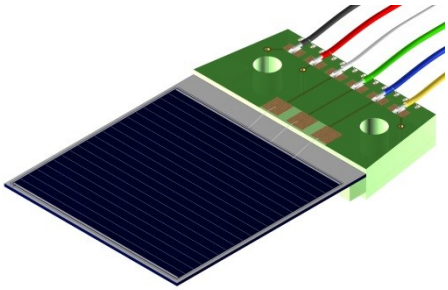
The MSPAD 1x4-2(SS) assembly.

QUALITY ASSURANCE: ISO9001

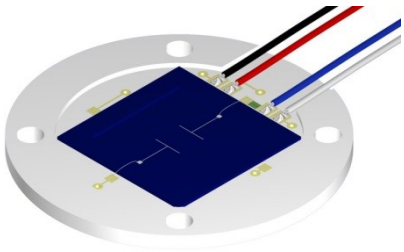
CUSTOM SILICON DUO-LATERAL POSITION SENSITIVE DETECTORS

SILICON DETECTOR TYPE: DOUBLE SIDED SINGLE AREA POSITION SENSITIVE DETECTOR

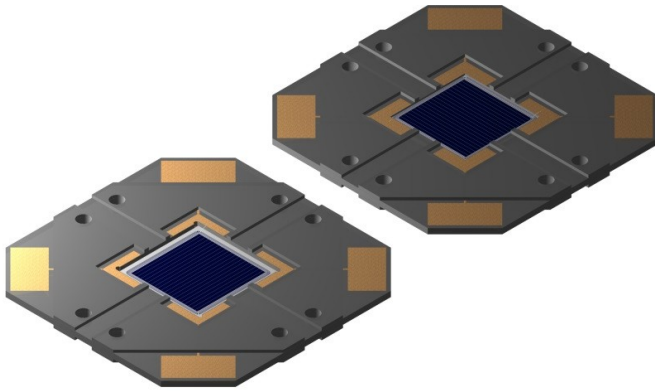
DESIGN: A double sided p-on-n silicon structure with highly uniform resistive junction and ohmic layers and equipotential channels. The readout between two anodes is orthogonal with respect to the readout between the two cathodes.



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



MSPSD DL 050 ceramic assembly



MSPSD DL041 assembly with double recess PCB to protect wire bonds in a stacked mounting configuration[1].

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	1.00 x 1.00	3.00 x 3.00	SGR	4	Chip Only
MSPSD DL 011	1.00 x 1.00	15.356 x 15.356	SGR	4	Ceramic
MSPSD DL 030	3.00 x 3.00	5.0 x 5.0	SGR	4	Chip Only
MSPSD DL 031	3.00 x 3.00	15.356 x 15.356	SGR	4	Ceramic
MSPSD DL 050	5.00 x 5.00	7.0 x 7.0	SGR	4	Chip Only
MSPSD DL 051[2]	5.00 x 5.00	15.356 x 15.356	SGR	4	Ceramic
MSPSD DL 03	10.00 x 10.00	12.0 x 12.0	SGR	4	Chip Only
MSPSD DL 0311	10.00 x 10.00	15.356 x 15.356	SGR	4	Ceramic
MSPSD DL 04	20.00 x 20.00	21.0 x 23.0	SGR	4	Standard FR4
MSPSD DL 041	20.00 x 20.00	24.00x 24.00	MGR	4	Black FR4 PCB
MSPSD DL 63	63.00 x 63.00	66.0 x 66.0	MGR	4	Chip Only

ENVIRONMENTAL TESTING OPTIONS: Space qualified, military, industrial, research, physics projects . QUALITY ASSURANCE: ISO9001

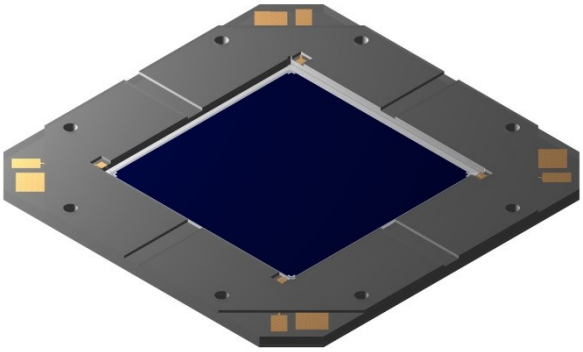
[1] This PCB is also suitable for mount the MSPSD TL20

[2] Transmissive x-ray beam position monitors with submicron position- and sub msec time resolution', Rev. Sci. Instrum. 79, 063103 (2008);

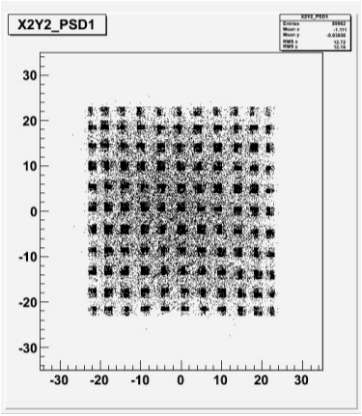
CUSTOM SILICON TETRA-LATERAL POSITION SENSITIVE DETECTOR SILICON

DETECTOR TYPE: SINGLE SIDED SINGLE AREA POSITION SENSITIVE DETECTOR

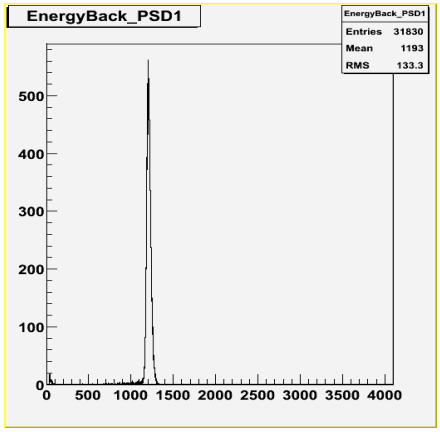
DESIGN: A single sided p-on-n silicon structure with highly uniform resistive junction and equipotential channels. The readout is between four corner anodes and a single cathode. The designs feature an infinity plane for eliminating any pin cushion affects to achieve < 1 mm position resolution with heavy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

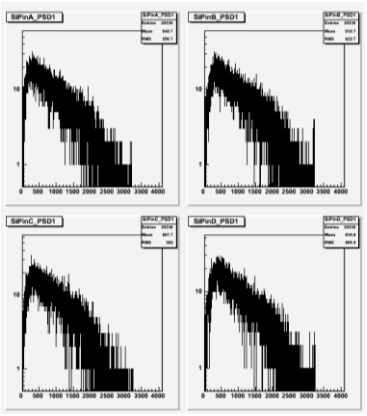


The MSPSD TL 63-200 assembly with a double recess package to protect wire bonds in a close stack configuration**.**



Recent test beam at the Texas A & M facility using ^{63}Cu, ^{16} O and ^{4}He 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 x10.0	MGR	4	Chip Only
MSPSD TL 20	20.00 x 20.00	24.00x 24.00	MGR	4	Black FR4 PCB
MSPSD TL 63	63.0 x 63.0	66.0 x 66.0	MGR	4	Black FR4 PCB

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

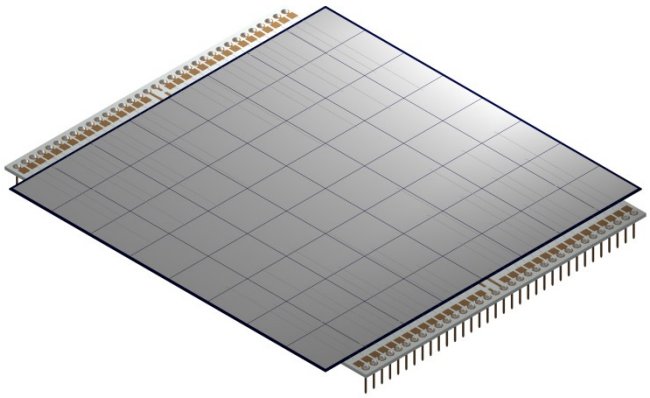
QUALITY ASSURANCE: ISO9001

[*]'Performance evaluation of position-sensitive silicon detector with four-corner readout.' NIM A, Volume 593, Issue 3, 11August 2008 Pg 399-406.

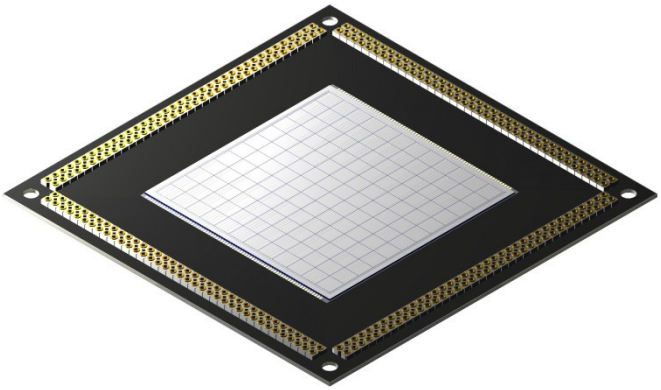
CUSTOM SILICON PIXEL DETECTORS

SILICON DETECTOR TYPE: SINGLE SIDED DC PIXEL DETECTORS

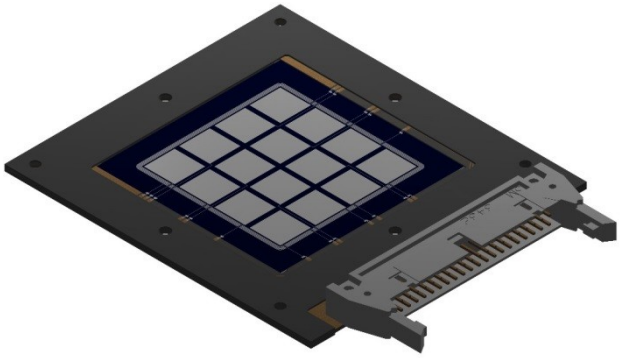
DESIGN: Totally depleted ion implanted structures with double metal system for some designs to track signals to the chip edges.



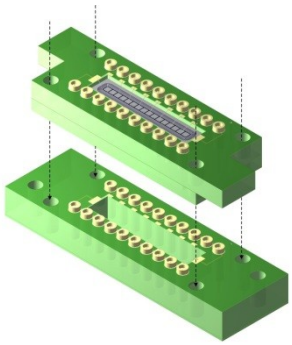
MSPX080 with double metal tracking mounted on a non-transmission ceramic.



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.

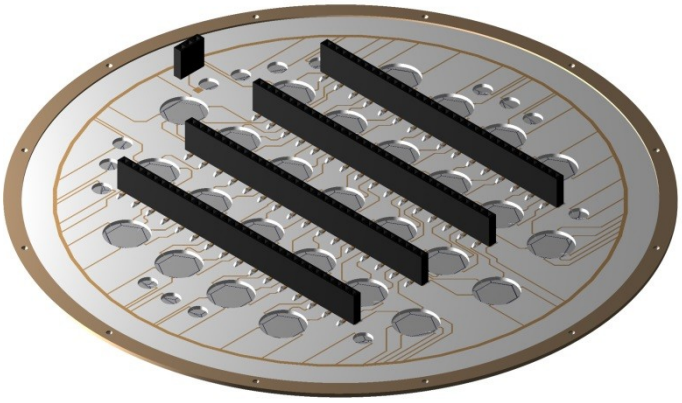
SINGLE SIDED MSPX SERIES:

DESIGN	ACTIVE PIXEL AREA DIMENSION (μm^2)	PIXEL ARRAY	CHIP DIMENSIONS (mm^2)	JUNCTION WINDOW	OHMIC WINDOW	WAFER SIZE (inch)	GUARD RING DESIGN	PACKAGE
MSPX 1x1*	1000 x 1000	1 x 1	4.00 x 20.50	2M	2M	4 & 6	MGR	Stackable Standard FR4 PCB
MSPX 1x16*	1000 x 1000	1 x 16	4.00 x 20.50	2M	2M	4 & 6	MGR	Stackable Standard FR4 PCB
MSPX 4 x 4	4950 x 4950	4 x 4	24.0 x 24.0	2D	2M	6	MGR	PCB
MSPX 12x12	4950 x 4950	12 x 12	64.0 x 64.0	2D	2M	6	MGR	Ceramic
MSPX 042	10000 x 10000	4 x 4	60.0 x 60.0	2M	2M	4	MGR	Black FR4 PCB
MSPX080	12075.0 x 12075.0	8 x 8	99.0 x 99.0	2D	2M	6	MGR	Ceramic
MSPX 128	Flat-to-Flat 8910	-	∅ 123.15	7G	2G	6	MGR	Ceramic

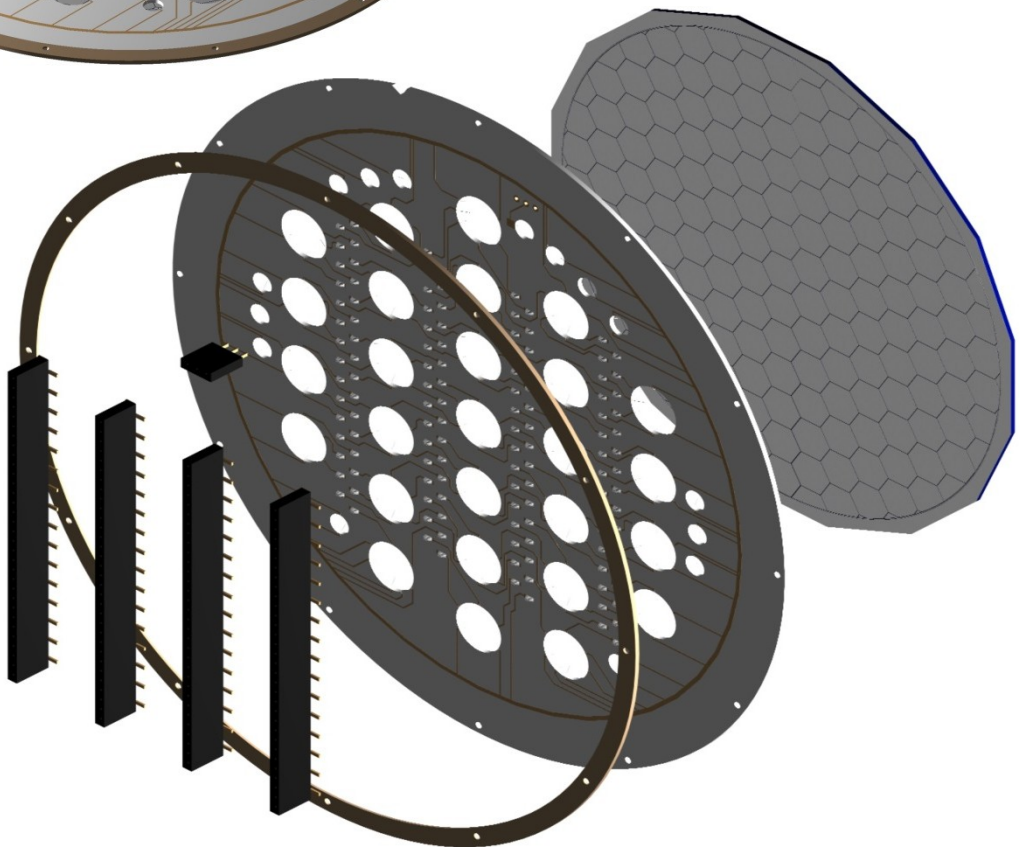
*MSPX 1x1 and MSPX 1x16 stackable package configuration

QUALITY ASSURANCE: ISO9001

CUSTOM SILICON PIXEL DETECTORS



MSPX 128 n-on-n pixel ceramic assembly



Cross sectional view of assembly components viewed from the pixilated 2M ohmic side

Wafer viewed from large area thin window 7G/2M junction side.

QUALITY ASSURANCE: ISO9001

CUSTOM SILICON PAD DETECTORS

SILICON DETECTOR TYPE: SINGLE AREA

DESIGN: Totally depleted ion implanted structures.
Micron Semiconductor's ultra low leakage currents and thin entrance window couples with fast response from total depletion with over voltage capability permits a wide range of applications for these single area detectors. For example, High Energy Physics, Fission Fragments Detection, Room Temperature X-ray Detection, Gamma Transient Detection, Heavy Ion Physics and Nuclear Structure Physics.

SINGLE SIDED MSX SERIES: Extensive range of single area detectors.

DESIGN	ACTIVE AREA DIMENSION (mm^2)	CHIP DIMENSIONS (mm^2)	JUNCTION WINDOW	OHMIC WINDOW	WAFER SIZE (inch)	GUARD RING DESIGN	PACKAGE
MSX02	5.25 x 2.75	6.05 x 3.3	2M	2M		SGR	T05
MSX03	10.0 x 10.0 17.0 x 17.0	~13 x 13 ~21.0 x 21.0	2/7/9 M/T/P	2M	4 & 6	MGR	Range of PCBs and Ceramics
MSX04	20.0 x 20.0	22.95 x 22.95	2M	2M	4	SGR	Standard FR4
MSX060	40.0 x 15.0	43.0 x 18.0	2/7/9 M/T/P	2M	4	MGR	Chip Only
MSX07	7.0 x 3.0	7.74 x 3.74	2M	2M	3	SGR	Chip Only
MSX077	7.5 x 7.5	10.50 x 10.50	2M	2M	4	MGR	Chip Only
MSX09	30.0 x 30.0	~33.0 x 33.0	2M	2M	4	SGR & MGR	Standard FR4
MSX25	50.0 x 50.0	55.0 x 55.0	2/7/9 M/G	2M	4	MGR	Range of PCBs and Ceramics.
MSX35	50.0 x 70.0	52 x 72	2M 2G	2M	4	MGR	Range of PCBs
MSX40	63.975 x 63.975	67.975 x 67.975	2M	2M	4	MGR	Range of PCBs
MSX7200	65.00 x 120.00	69.99 x 124.00	2M	2M	6	MGR	Standard FR4
MSX100-1	97.22 x 97.22	102.00 x 102.00	2M	2M	6	MGR	Standard FR4
MSX100	100.0 x 100.0	102.0 x 102.0	2M	2M	6	MGR	Standard FR4

DESIGNATION EXAMPLE: MSX003-300

RADIATION HARDNESS: Survival to 10^{14} Neutrons, 10^{15} Protons

CAPACITANCE: Subject to depletion depth e.g. 40 pF/cm for 300 µm

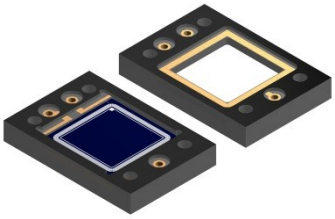
LEAKAGE CURRENT: 1 nA/cm to 8 nA/cm subject to active area and depletion depth.

WINDOW: Thin 0.1 µm Standard 0.5 µm

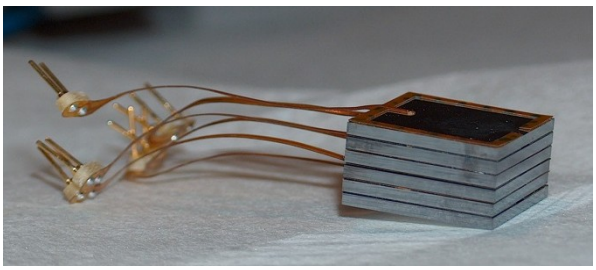
OPERATING TEMPERATURE RANGE: -65°C to +125°C

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

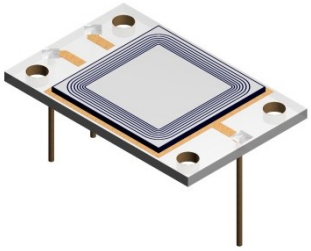
QUALITY ASSURANCE: ISO9001



(a)

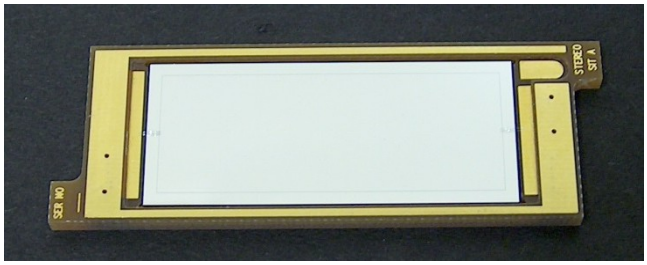


(b)

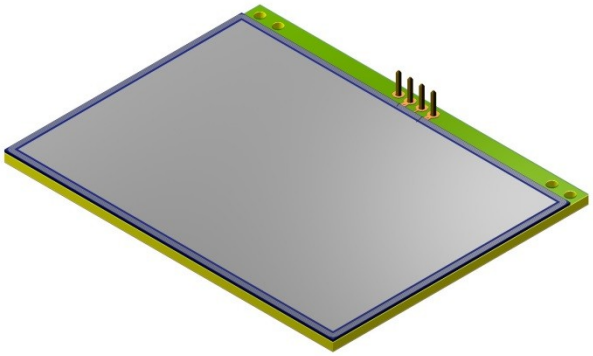


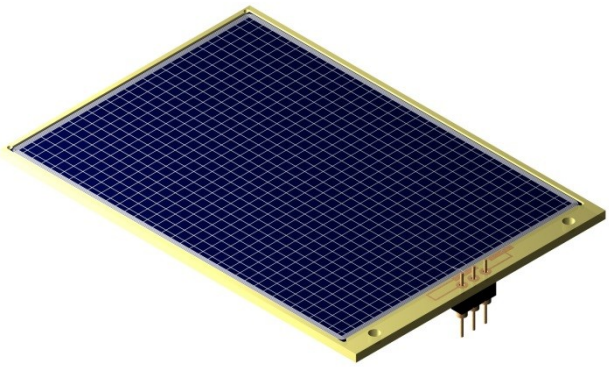
(c)

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).

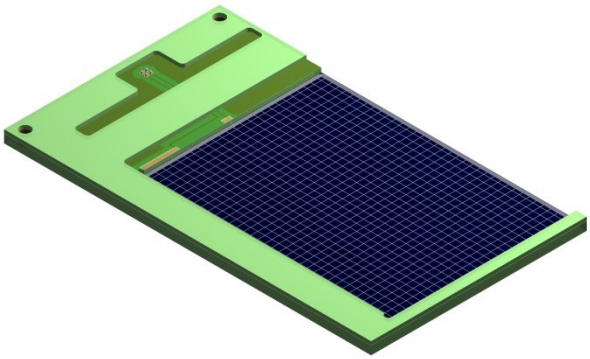


MSX 060 2M/2M mounted on a double recessed FR4 transmission package.

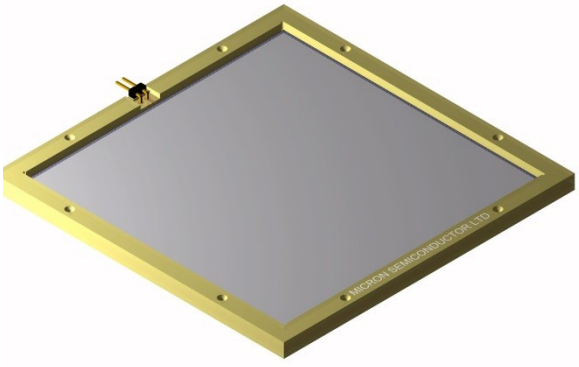




The MSX35 2M/2M and MSX35 2G/2M mounted on different packages.



The MSX35 2G/2M package compatable with the BB11 assembly.



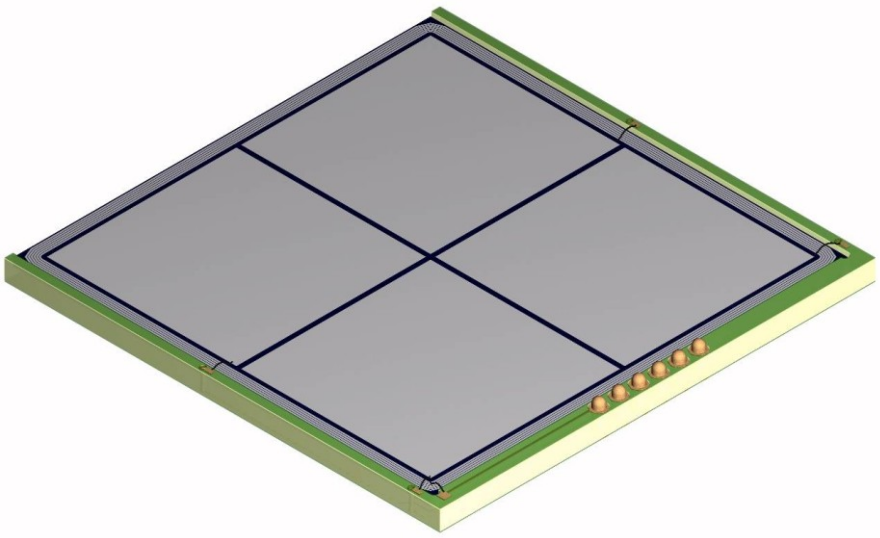
The MSX100 2M/2M the largest active area in the MSX series.

SPECIALIST DETECTORS FOR NUCLEAR PHYSICS

SILICON DETECTOR TYPE:	TOTALLY DEPELTED SILICON MICROSTRIP DETECTOR WITH OVER VOLTAGE OPERATION.
TECHNOLOGY:	4 INCH SILICON
JUNCTION WINDOW: OHMIC WINDOW:	
Nº of ELEMENTS:	25
Nº of OUTPUTS:	26
ELEMENT ACTIVE LENGTH:	50 mm
TOTAL ACTIVE WIDTH:	50 mm
ELEMENT SEPARATION:	25 µm
ELEMENT PITCH:	2 mm
THICKNESS:	65 µm, 140 µm, 300 µm, and 500 µm
RISE TIME:	20 ns maximum
ELEMENT CAPACITANCE:	185 – 25 pF subject to thickness
NOMINAL INTERSTRIP RESISTANCE:	100 MΩ
ALPHA RESOLUTION	Junction 55 KeV FWHM maximum Ohmic 75 KeV FWHM maximum
MAXIMUM NOISE PER ELEMENT (µs 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

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
JUNCTION WINDOW:	2M
OHMIC WINDOW:	2M
Nº of ELEMENTS:	4
Nº 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



MSQ25-1000 2M/2M with PCB custom package 2

PCB STANDARD:
Material – FR4
Thickness -1.6, 2.4 or 3.2 mm
Dimensions -70 x 70 mm^2
Mountings - 4 holes ⊘ 5 mm at corners
Aperture - 50 x 50 mm^2
Connectors -Cambion 460-2599-04-03-00
Connections - 4 to active area, 2 to ground

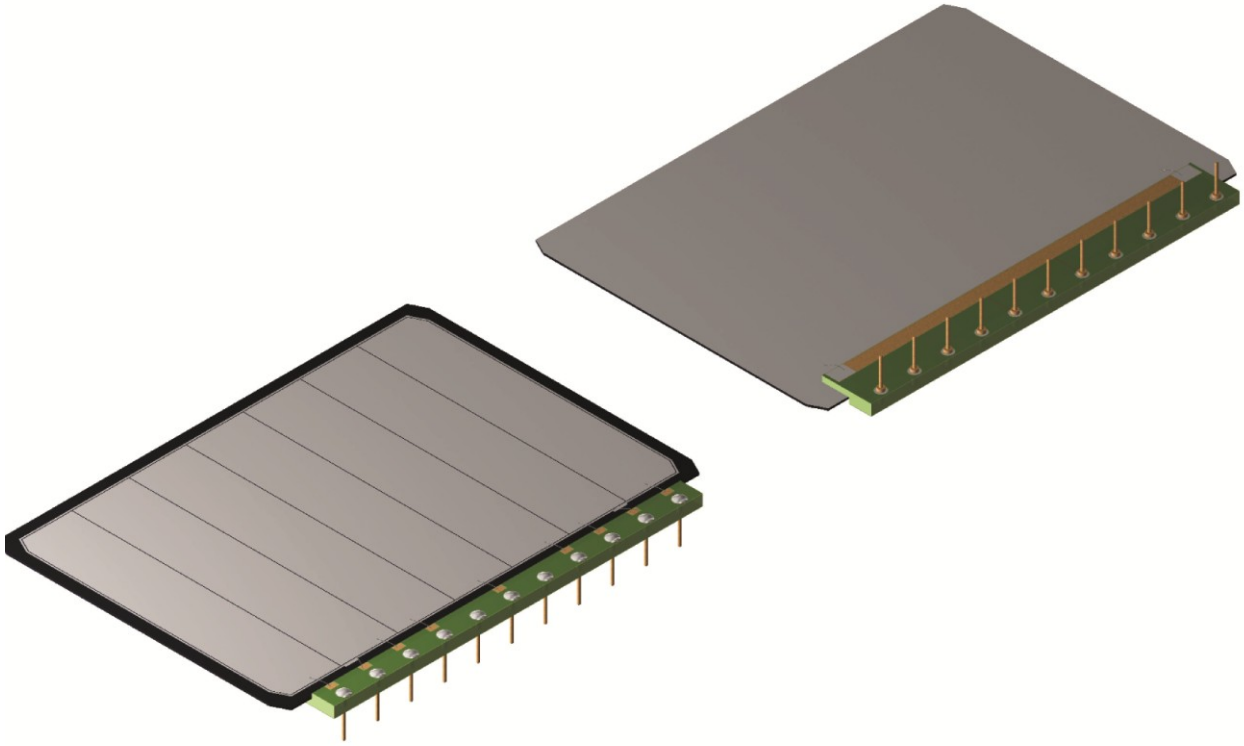
PCB CUSTOM:
1. Material – FR4
Thickness - 2.4 mm
Dimensions – 59.0x 59.0 mm^2
Aperture - 50 x 50 mm^2
Connectors–Cambion 460-2599-04-03-00

2. Material – FR4
Thickness – 1.6, 2.4 or 3.2 mm
Dimensions – 55.4 x 55.4 mm^2
Connectors–Cambion 450-3703-01-03-00
Aperture - 50 x 50 mm^2

EXPERIMENT: CERN ISOLDE

SPECIALIST DETECTORS FOR NUCLEAR PHYSICS

SILICON DETECTOR TYPE:	MICROSTRIP DETECTOR
DESIGN	Totally depleted ion implanted structures with over voltage operation.
TECHNOLOGY:	3 and 4 INCH SILICON
JUNCTION WINDOW:	2M
OHMIC WINDOW:	2M
Nº of ELEMENTS:	7
Nº 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



Design I (S/S) 2M

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.

QUALITY ASSURANCE: ISO9001

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				
JUNCTION WINDOW:	2M				
OHMIC WINDOW:	2M				
Nº of ELEMENTS:	28				
Nº 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				

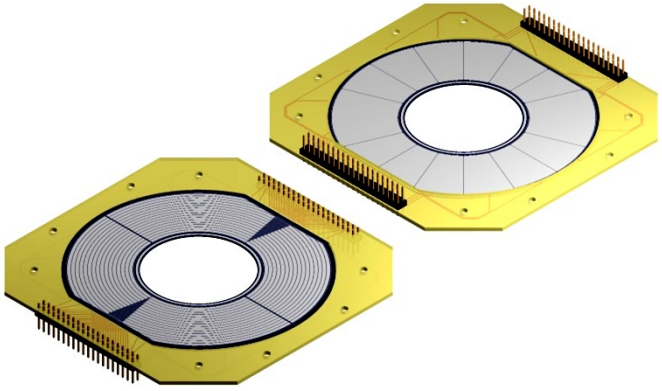
QUALITY ASSURANCE: ISO9001

SPECIALIST DETECTORS FOR NUCLEAR PHYSICS

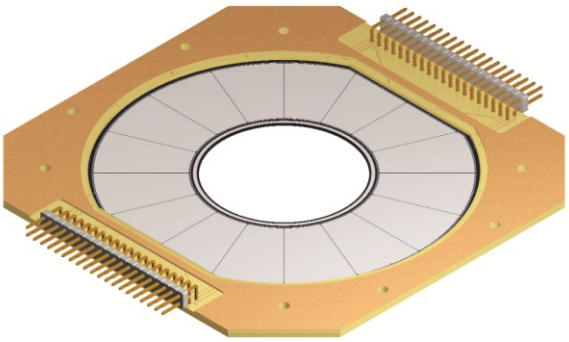
SILICON DETECTOR TYPE: SINGLE AND DOUBLE SIDED RING COUNTER DESIGN

DESIGN: Totally depleted ion implanted detector with segmented rings and optional double sided sectors. The S3 features complete rings with signal outputs tracked on the silicon detector using a narrow double metal readout system. The designs exhibiting over voltage capability with excellent radiation damage resistance and annealing capability for high neutron and heavy ion damage.

Design	AA Ø		CHIP Ø		Junction Window	Junction Elements	Junction Pitch (mm)	Ohmic Window	Ohmic Elements	Wafer	Guard Ring Design	Package
	Inner (mm)	Outer (mm)	Inner (mm)	Outer (mm)								
S1	48.00	96.00	46.00	100.00	2M	64 Incomplete Rings	1.505	2M	16 Sectors	4	MGR	Standard FR4 and Standard FR4 with cooling plate
S2	22.00	70.00	20.00	76.00	2M	48 Incomplete Rings	0.491	2M	16 Sectors	4	MGR	Standard FR4
S2_1500	26.01	70.00	20.00	76.00	2M	45 Incomplete Rings	0.491	2M	16 Sectors	6	MGR	Standard FR4
S3	22.00	70.00	20.00	76.00	2DM	24 Complete Rings	0.886	2M	32 Sectors	4	MGR	Standard FR4
S4	10.00	130.1	15.00	124.98	2/7/9 P	128 Sectors	-	2M	256 Complete Rings	6	MGR	Standard FR4 with SM resistors
S5	22.96	70.09	20.00	76.00	2/7/9 P	24 Incomplete Rings	Varies	2/7/9 P	16 Sectors	4	MGR	Standard FR4
S7	25.918	70.09	20.00	76.00	2DM	45 Complete Rings	0.493	2M	16 Sectors	4	MGR	Standard FR4

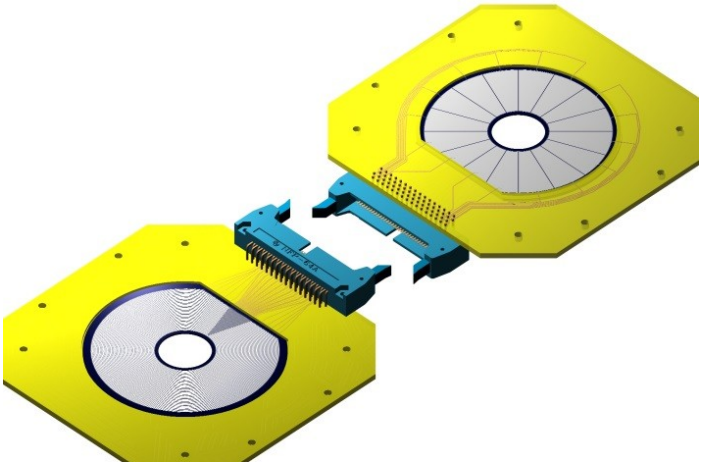


S1 detector and PCB as viewed from the p- and n-side.

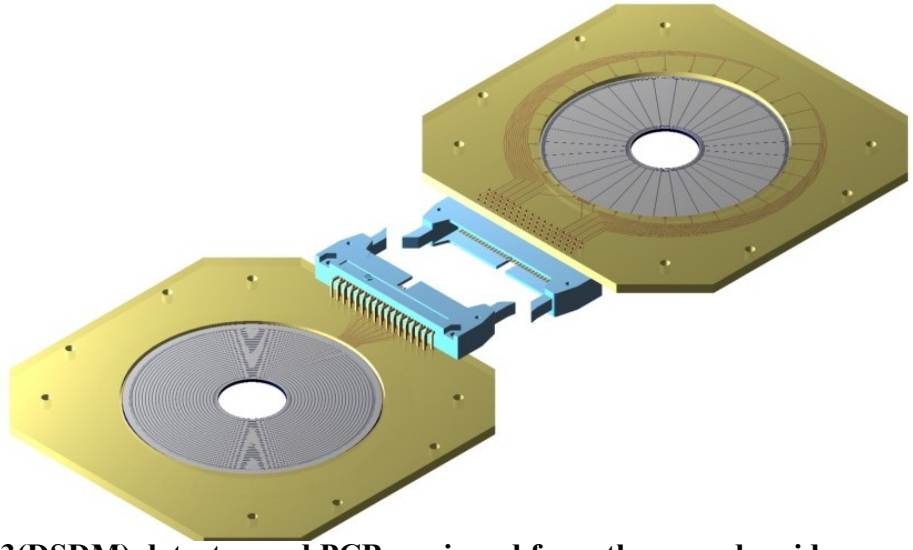


S1 detector mounted in a package with a copper cooling plate.

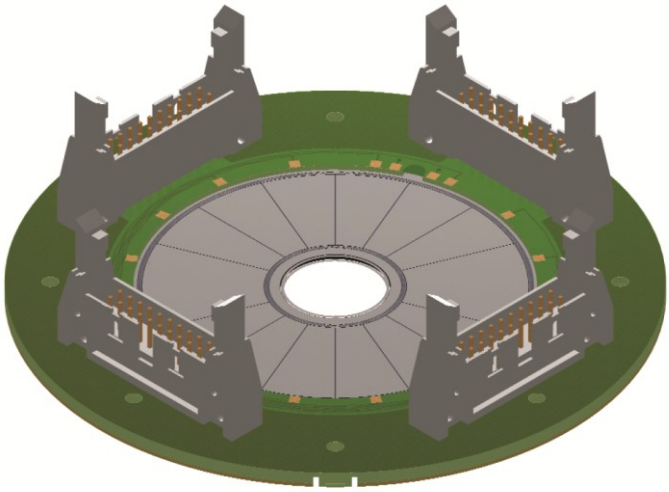
QUALITY ASSURANCE: ISO9001



S2(DS) detector and PCB as viewed from the p- and n-side.



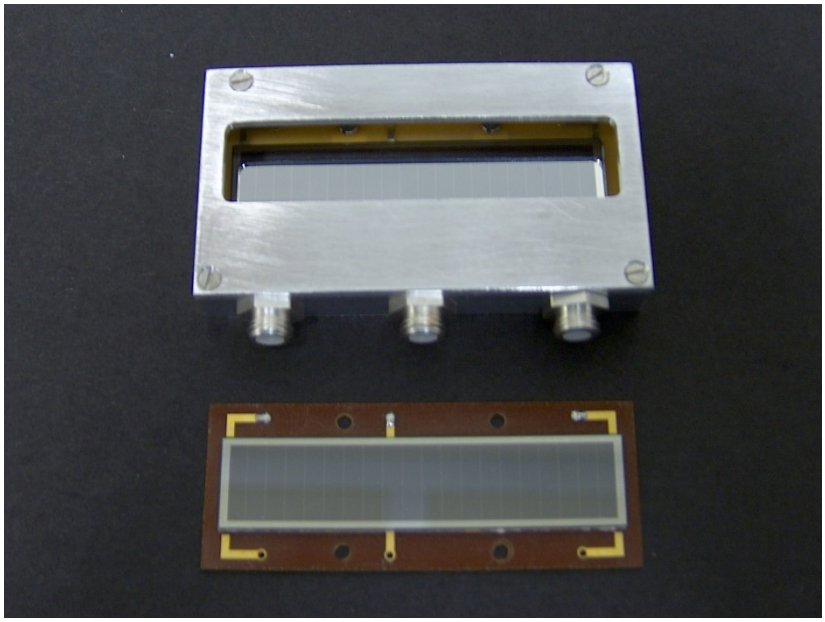
S3(DSDM) detector and PCB as viewed from the p- and n-side.



S7 detector assembly.

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:	4 INCH SILICON
JUNCTION WINDOW:	PSD
OHMIC WINDOW:	2M
POSITION SENSITIVE:	1 axis
Nº 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 kΩ minimum – 10 kΩ maximum
ENTRANCE/EXIT WINDOW:	0.2 µm
THICKNESS:	35 µm, 65 µm, 140 µm, 300 µm, 500 µm and 1000 µm
ALPHA RESOLUTION:	0.5 %
POSITON RESOLUTION:	100 µm - 300 µm 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



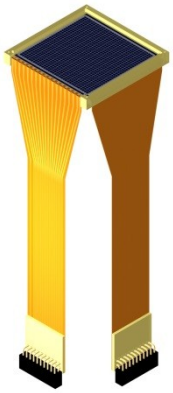
Design T PSD/2M single PCB assembly and metal frame assembly.

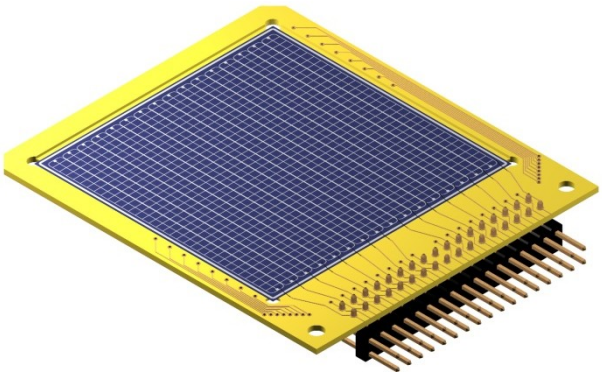
NOTE: See also Design TT Series, position sensitive detectors (PSD) 18 x 10 mm^2.

QUALITY ASSURANCE: ISO9001

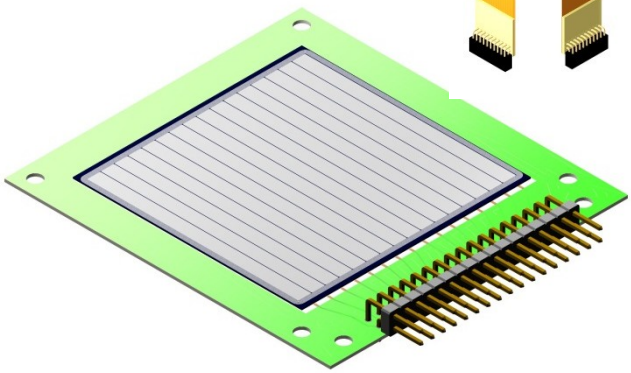
SPECIALIST DETECTORS FOR NUCLEAR PHYSICS

SILICON DETECTOR TYPE:	TOTALLY DEPLETED SINGLE OR DOUBLE SIDED DC MICROSTRIP.
TECHNOLOGY:	4 INCH SILICON
Nº JUNCTION ELEMENTS:	16
Nº 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:	Variable to fit package.

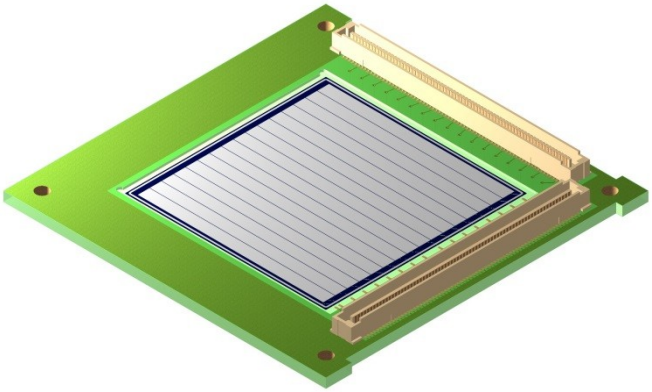




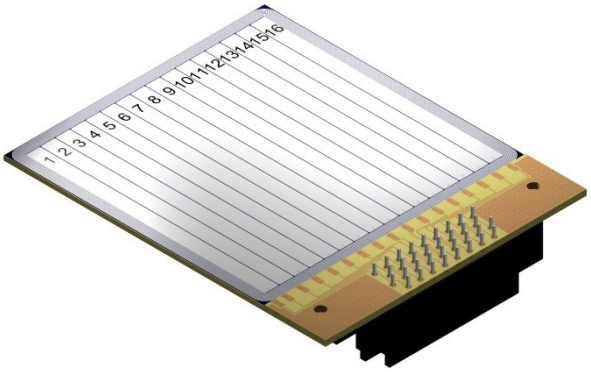
Design W1(DS)-300 7G/2M on a standard FR4 transmission package*.



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



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



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

JUNCTION WINDOW:	2/7/9 M/T/P
OHMIC WINDOW:	2M
PACKAGE:	Range of package available, some shown above.
ACCEPTANCE:	100 %

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

QUALITY ASSURANCE: ISO9001

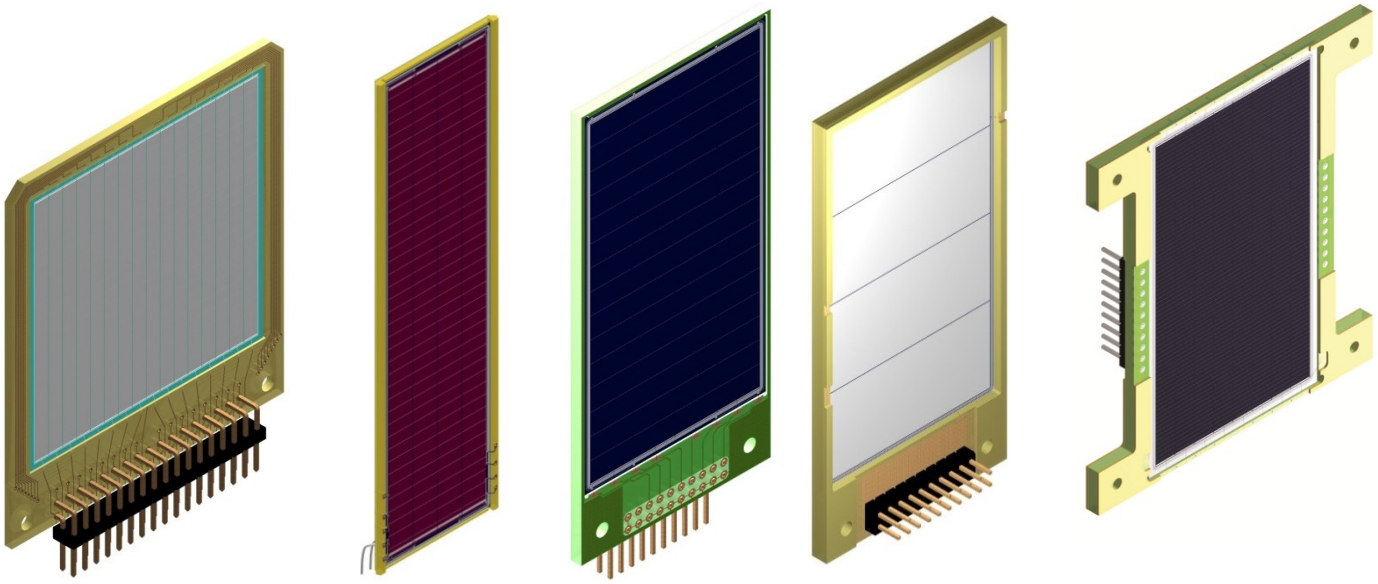
SPECIALIST DETECTORS FOR NUCLEAR PHYSICS

SILICON DETECTOR TYPE:	SINGLE DC COUPLED MICROSTRIP DETECTOR WITH MULTIGUARD RINGS FOR HIGH VOLTAGE OPERATION.					
TECHNOLOGY:	4 INCH SILICON					
PART DESIGNATION:	W2 (SS)					
JUNCTION WINDOW:	2M					
OHMIC WINDOW:	2M					
ACTICE AREA:	25 cm^2 50 x 50 mm^2					
Nº of STRIPS:	100					
STRIP PITCH:	500 µm					
STRIP WIDTH:	450 µm					
STRIP LENGTH:	49950 µm					
THICKNESS:	40 µm	70 µm	100µm 1	40µm	500 µm	1000 µm
THICKNESS TOLERANCE:	± 10 µm	± 10 µm	± 10 µm	± 10 µm	± 30 µm	±100µm
FULL DEPLETION (FD):	10 V	10 V	15 V	20V	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	5pF
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					

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** **Super X3 with standard pads on rear.** **X4 Assembly**

DESIGN	**X1(SS)**	**X2(SS)**	**X3(SS) / Super X3(DS)**	**X4(SS)**
TECHOLOGY	4	6	4	4
JUNCTION WINDOW	PSD E	PSD E	PSD E	PSD E
OHMIC WINDOW	2M	2M	2M	2M
Nº CHANNELS	16	4	4/ 8	8
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	1 axis on each of the 8 channels
POSITION RESOLUTION	200 µm	5650 µm	10000 µm	5100 µm
STRIP AREA		5.55 x 94.80 mm^2	10.0 x 75.0 mm^2	5.10 x 75.00 mm^2
ACTIVE AREA	50 x 50 mm^2	22.2 x 94.8 mm^2	40.3 x 75.0 mm^2	41.5 x 75.00 mm^2
CHIP DIMENSION	52.1 x 52.1 mm^2	24.6 x 96.8 mm^2	43.3 x 78.0 mm^2	45.6 x 79.00 mm^2
FULL DEPLETION (FD)	10 - 250 V Subject to thickness	10 - 250 V Subject to thickness	10 - 250 V Subject to thickness	10 - 250 V Subject to thickness
LEAKAGE CURRENT (FD)	50 – 250 nA Subject to thickness	50 – 250 nA Subject to thickness	50 – 250 nA Subject to thickness	50 – 250 nA Subject to thickness
TOTAL CURRENT (FD)	1 – 3 µA	1–3 µA	1 – 3 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	40 – 20 pF/cm Subject to selected thickness
INTER ANODE RESISTANCE	3 – 10 KΩ	4 – 10 KΩ	4 – 10 KΩ	4 – 10 KΩ
ENTRANCE WINDOW	0.2 µm	0.2 µm	0.2 µm	0.2 µm
PACKAGES	PCB with connectors	PCB with connections	PCB with connector	PCB with connector
CONNECTORS	Unshrouded connector	Junkosha Miniature Coaxial cable	Unshrouded connector	Unshrouded connector
MINIMUM ACCEPTANCE LEVEL	100 %	100 %	100 %	100 %

QUALITY ASSURANCE: ISO9001

SPECIALIST DETECTORS FOR NUCLEAR PHYSICS

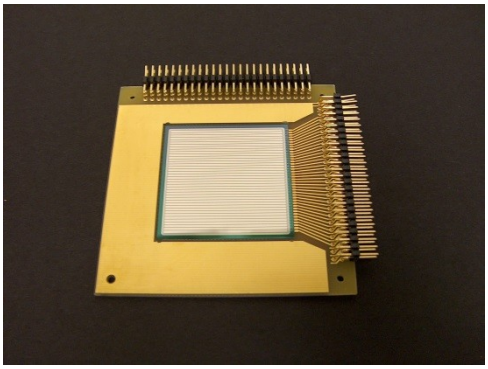
SILICON DETECTOR TYPE: SINGLE & DOUBLE SIDED DC MICROSTRIP DETECTOR

TECHNOLOGY: 4 & 6 INCH SILICON

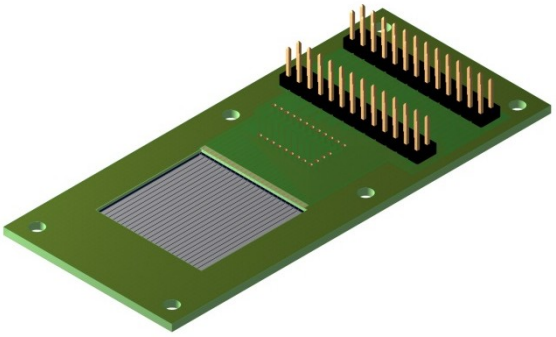
DESIGN: Ion implanted totally depleted single and double sided DC nominal structure. Detector thickness range is from 65 µm to 1500 µm subject to design selected.

DESIGN	EXPERIMENT	WAFER TECHNOLOGY	JUNCTION WINDOW	OHMIC WINDOW	ACTIVE AREA mm^2	Nº CHANNELS	ELEMENT PITCH	READOUT	SPACE QUALIFIED
BB1	LEAR CERN	4-inch	2M	2M	40 x 40	80 (40/side)	1000 µm	100 %	NO
BB2	NASA	4-inch	2M	2M	24 x 24	48 (24/side)	1000 µm	100 %	YES
BB4	NASA	4-inch	2M	2M		128 (64/side)	1000 µm	100 %	YES
BB5	ARGONNE	4-inch	2M	2M	32 x 32	160 (80/side)	400 µm	100 %	NO
BB7	INDIANA	4-inch	2M	2M	~64 x 64	64 (32/side)	2000 µm	100 %	NO
BB8	NASUDA	4-inch	2/7/9 M/P/T	2/7/9 M/P/T	20 x 20	32 (16/side)	1250 µm	100 %	YES
BB9	TIARA UPGRADE	6-inch	2M	2M	27.9 x 94.8	4 (Single Sided)	7000 µm	100 %	NO
BB10	ORRUBA	4-inch	2M	2M	75.0 x 40.3	8 (Single Sided	4944 µm	100 %	NO
BB11	TIGRESS	4-inch	2G 7G 9G	2G 7G 9G	71.9 x 47.9	24 Junction Side 48 Ohmic Side	3000 µm 1000 µm	100 %	NO
BB12		4-inch	2M	2M	62.35 x 62.35	320 (160/side)	390 µm	100%	NO
BB13	ANKE	4-inch	2M	2M	62.03 x 62.03	256 (128/side)	485 µm	100 %	NO
BB14	ALPHA	6-inch	2M	2M	50.06 x 111.95	256 Junction 128 Ohmic	227 µm 875 µm	100 % with resistors	NO
BB15	SuperORRUBA	4-inch	2M	2M	75.0 x 40.3	64 Junction 4 Ohmic	1172.5 µm 10087.5 µm	100%	NO
BB16		4-inch	2M	2M	46.3 x 70.4 Trapezoid Left & Right	4 Junction	11600 µm	100%	NO
BB17	Search for new super heavy nuclei at JINR	6-inch	2/7/9 P	2M	47.97 x 127.97	48 Junction 128 Ohmic	1000 µm 1000 µm	100%	NO
BB18	AIDA	6-inch	2M	2M	71.63 x 71.63	128 Junction 128 Ohmic	560 µm 560 µm	100% with resistors	NO
BB19	Day-one Experiment at HESR	4-inch	2/7/9 P	2M	76.77 x 50.00	64 Junction (Single Sided)	1200 µm	100 %	No

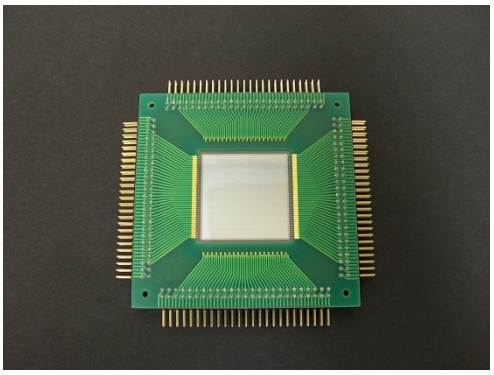
QUALITY ASSURANCE: ISO9001



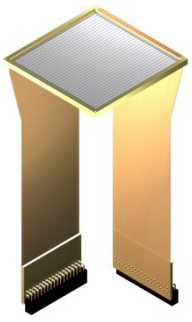
BB1(DS) 2M/2M Assembly.



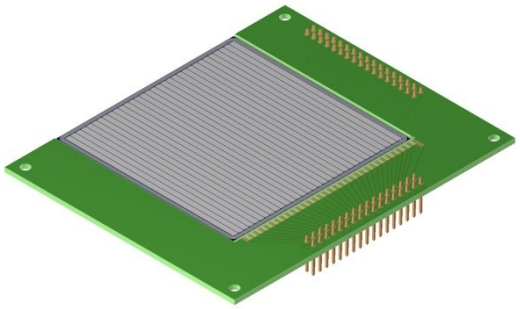
BB2(DS) 2M/2M Assembly.



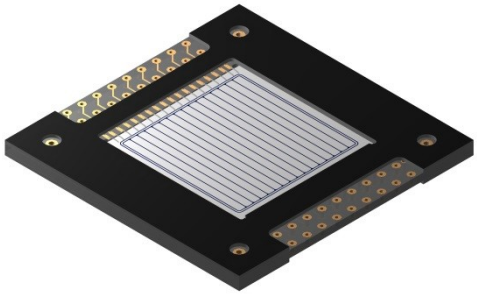
BB5(DS) 2M/2M Assembly.



BB7(DS) 2M/2M Kapton Assembly.

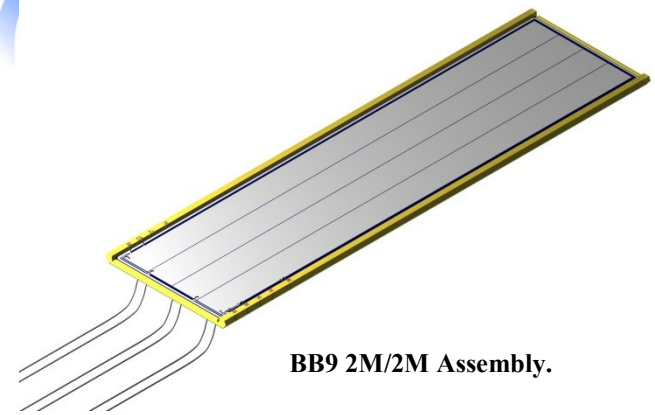


BB7(DS) 2M/2M PCB Assembly.

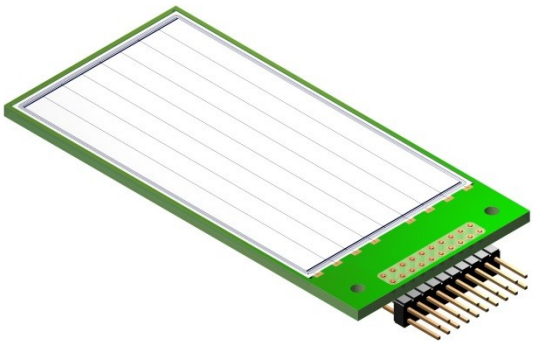


BB8(DS) 9T/9T Assembly.

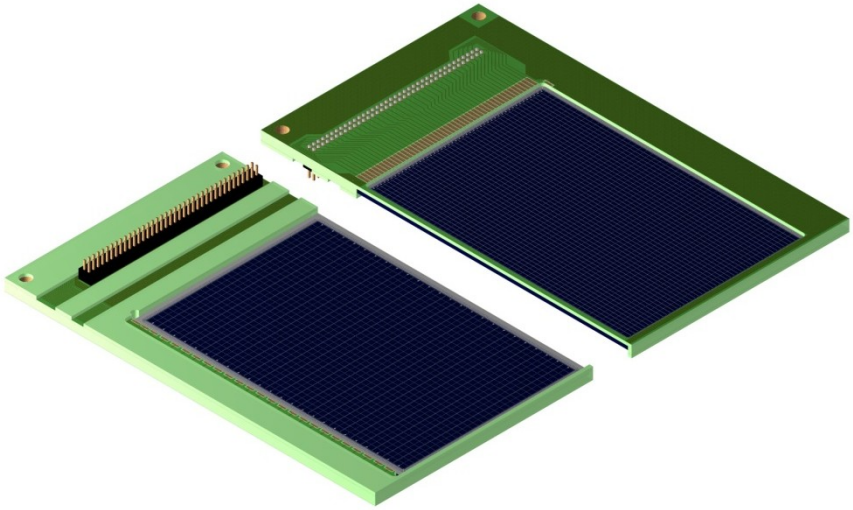
QUALITY ASSURANCE: ISO9001



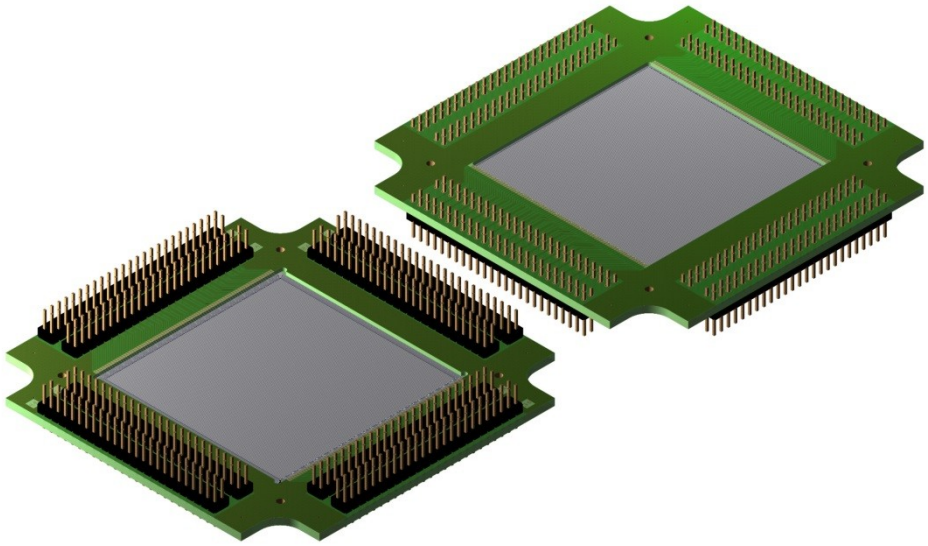
BB9 2M/2M Assembly.



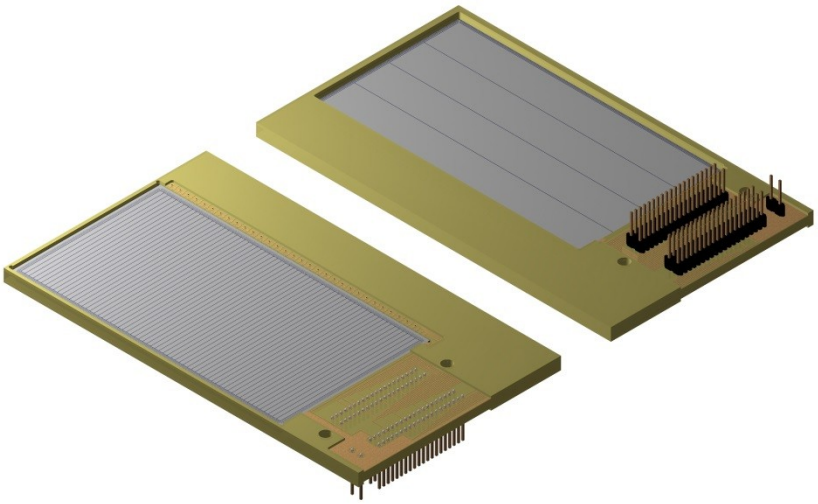
BB10 2M/2M Assembly.
Compatible with the X3 assembly.



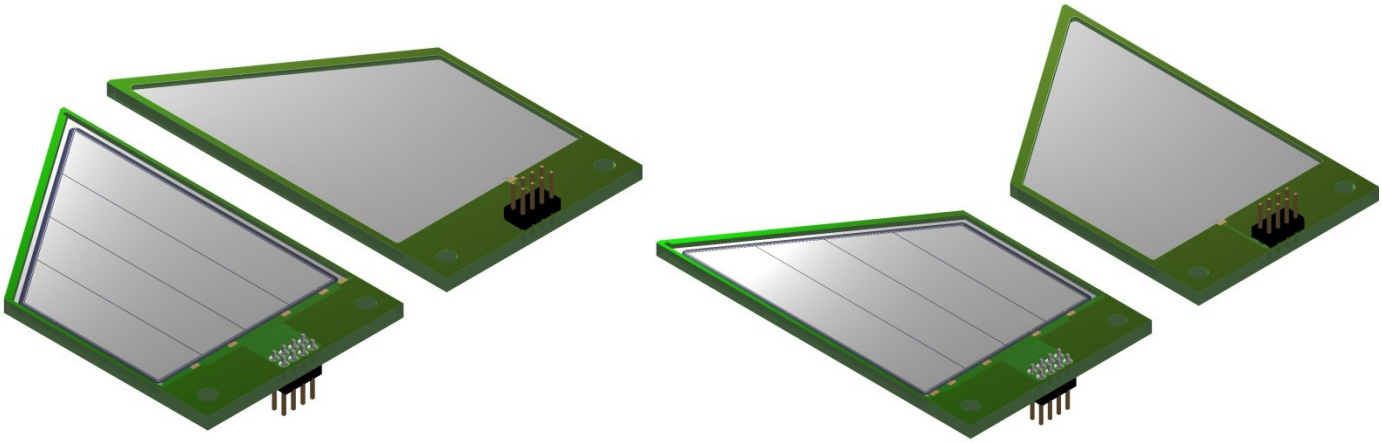
BB11(DS) 7G/7G Assembly front and Rear View.



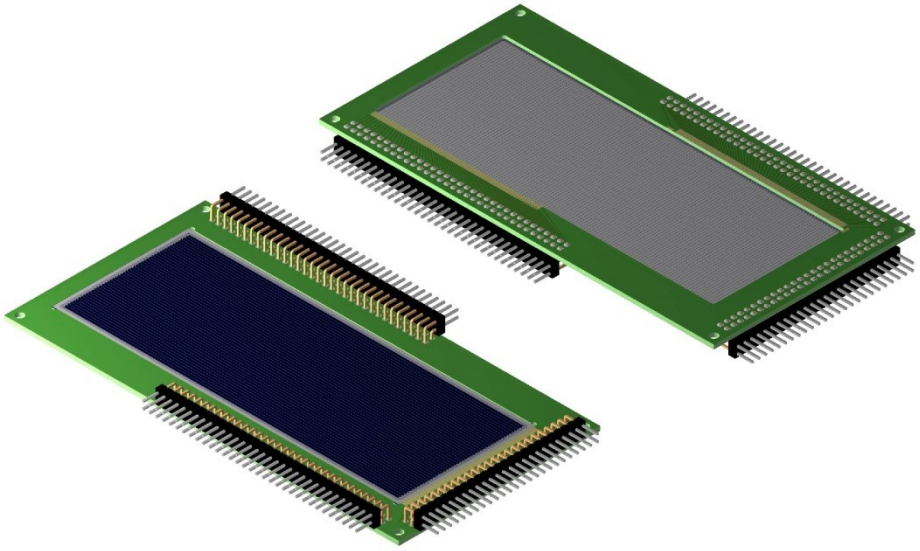
BB12(DS) 2M/2M Assembly front and Rear View.



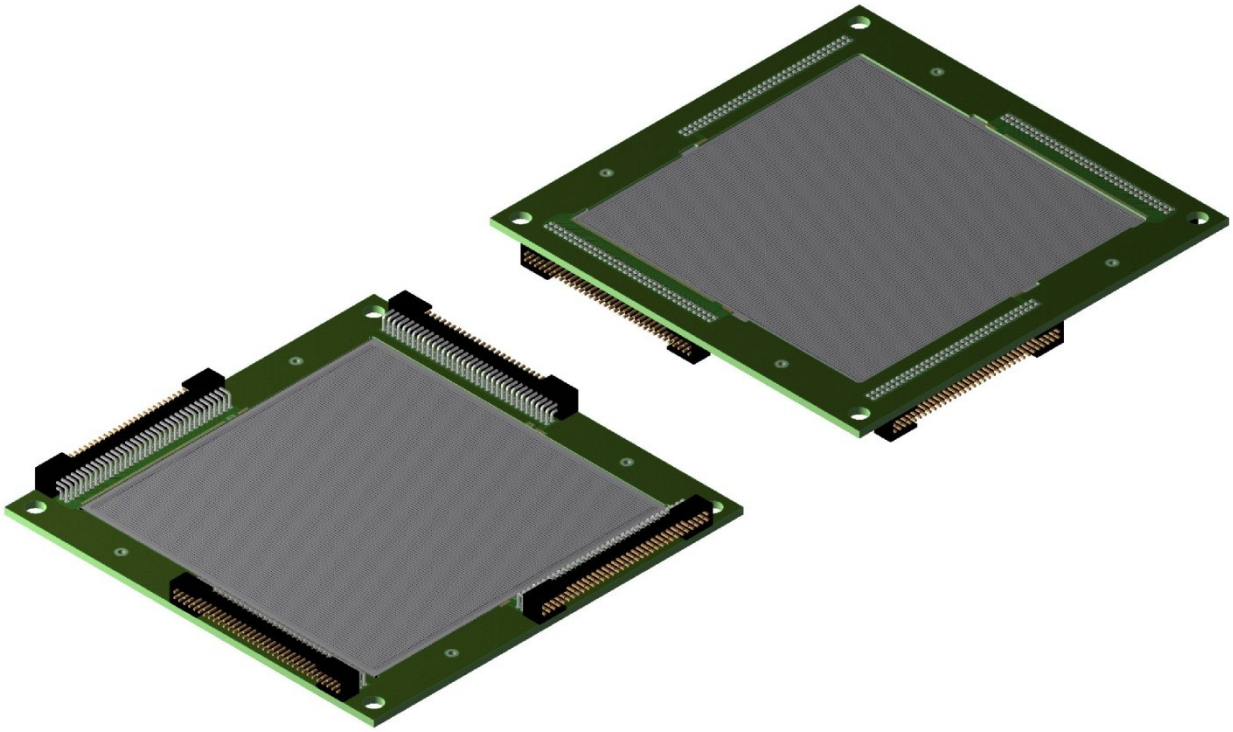
BB15(SS) 2M/2M Assembly.



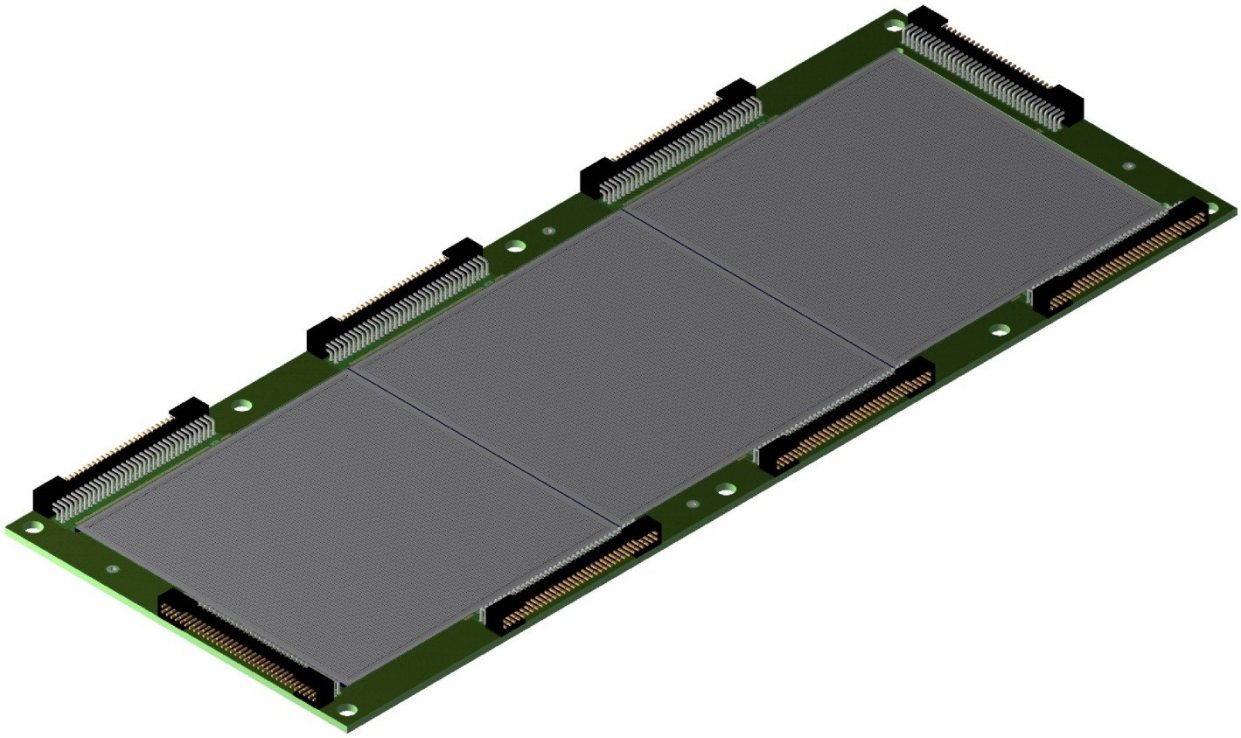
BB16(SS) 2M/2M Left and Right Assembly.



BB17(DS)2/7/9 P/2M Assembly



BB18(DS) 2M/2M Single Assembly.

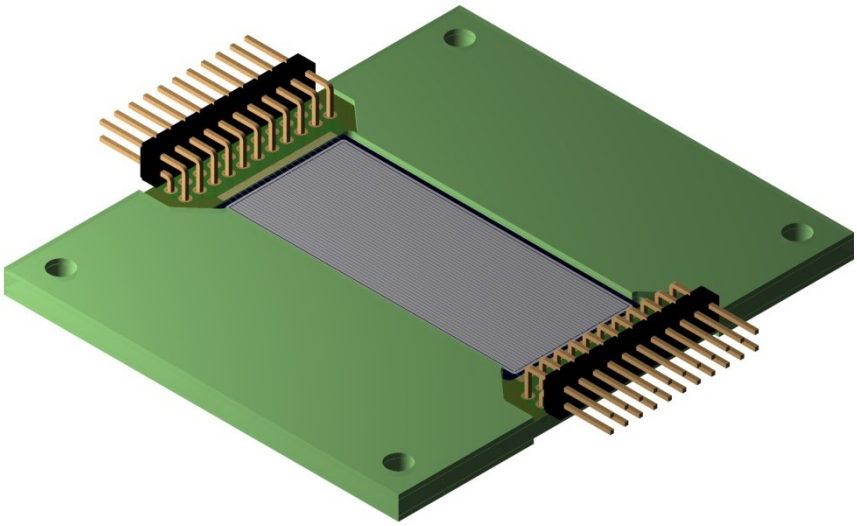


BB18(DS) 2M/2M Triple daisy Chain Assembly.

SPECIALIST DETECTORS FOR NUCLEAR PHYSICS

SILICON DETECTOR TYPE: SINGLE SIDED COURSE MICROSTRIP DETECTOR
TECHNOLOGY: 3 & 4 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
JUNCTION WINDOW	2M	2M	2M	2M
OHMIC WINDOW	2M	2M	2M	2M
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
Nº CHANNELS	96	40	16	64
ELEMENT LENGTH	20 mm	50 mm	32 mm	24mm
ELEMENT PITCH	650µm	500µm	100µm	375µm



EE2(SS) 2M/2M Assembly.

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

RADIATION HARDNESS: Neutrons $\Delta I_R = \alpha\ \theta\ V$
$\alpha = 3.7 \times 10^{-17}$ A/cm typically
θ = Fluence
V = Volume
CHIP ONLY PROBE TESTING: Yes
PACKAGED: EE1 and EE2 only
PACKAGE: PCB
MINIMUM ACCEPTANCE LEVEL: 100 %

QUALITY ASSURANCE: ISO9001

SPECIALIST DETECTORS FOR NUCLEAR PHYSICS

SILICON DETECTOR TYPE: ANNULAR DETECTORS

TECHNOLOGY: 3, 4 & 6 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.

DESIGNS:

Design	Hole Diameter ∅/µm	Inner Active Area Diameter ∅/µm	Outer Active Area Diameter ∅/µm	Chip Shape	Chip Dimension Flat-to-Flat /µm	JUNCTION WINDOW	OHMIC WINDOW	Number of Element
LL1	14000	15995	33800	12 Sided	34800	2M 7M 9M	2M	4 Quadrants
LL2	5600	6858	24130	8 Sided	25350	2M 7M 9M	`	4 Quadrants
LL3	4900	6750	18050	8Sided	18600	2/7/9 M/G/P/T	2M	4 Quadrants
LL4	5400	6400	10000	8 Sided	10750	2/7/9 M/G	2M	4 Quadrants
LL7	N/A	7900	16000	8 Sided	19000	2M	2M	4 Annualars
LL8	N/A	4000	28000	Square	31600	2M	2M	7 Annualars
LL10	N/A	600	20000	8 Sided	21000	2G 7G 9G	2M	15 Elements
LL11	N/A-	600	19900	8 Sided	21000	2G	2M	5 Annualars
LL12	N/A	2900	20000	8 Sided	21000	2G 7G 9G	2M	14 Elements
LL13	4900	5850	FLAT = 18000	8 Sided	19000	2/7/9 G/P	2M	4 Quadrants
LL14	3300	4220	FLAT = 10080	8 Sided	10600	2G 7G 9G	2M	4 Quadrants
LL16	1050	2000	FLAT = 12000	Square	14000	2G 7G 9G	2M	4 Quadrants
LL20	5600	6600	FLAT = 14068	12 Sided	15068	2G 7G 9G	2M	4 Quadrants
LL21	5600	6600	FLAT = 14068	12 Sided	15068	2G 7G 9G	2M	1
LL22	5600	6600	FLAT = 14138	12 Sided	18288	2G 7G 9G	2M	4 Quadrants
LL23	5600	6600	FLAT = 14138	8 Sided Special	15068	2G 7G 9G	2M	3 Elements

ELEMENT LEAKAGE
CURRENT (15 V): 1 nA typically, 30 nA maximum
BREAKDOWN VOLTAGE(10 µA)40 V minimum
FORWARD VOLTAGE (10 mA): 1 V maximum

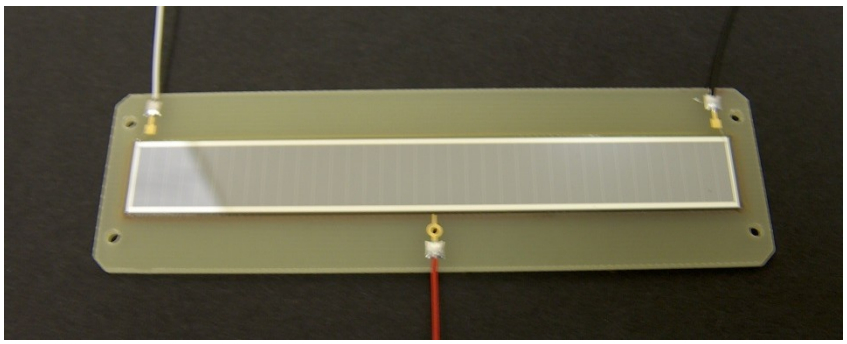
PACKAGE: PCB and ceramic with pad contact, connectors or kaptons.
OPTIONAL: Flying leads.

All physics detectors are totally depleted transmission designs.

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 AA which are being used in both Heavy Ion and Nuclear Structure Physics.			
JUNCTION WINDOW:	PSD			
OHMIC WINDOW:	2M			
ACTICE AREA:	18 cm^2 180 x 10 mm^2			
Nº 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			



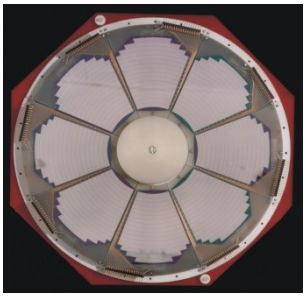
Single Design TT-500 PSD/2M PCB Assembly.

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

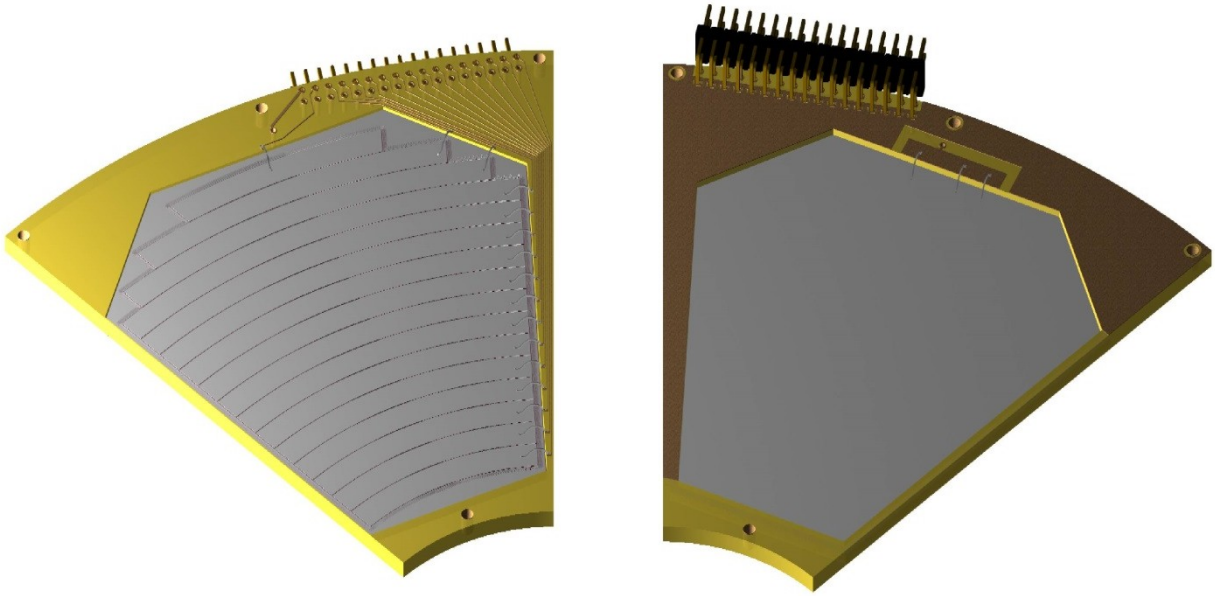
QUALITY ASSURANCE: ISO9001

SPECIALIST DETECTORS FOR NUCLEAR PHYSICS

SILICON DETECTOR TYPE:	SILICON MICROSTRIP TRAPEZOID OR WEDGE SHAPE STRUCTURE
TECHNOLOGY:	4 INCH SILICON
DESIGN:	Ion implanted totally depleted single sided DC wedge detector that subtends 45° for construction along 360° disc annular microstrip.



PART DESIGNATION:	**YY1**
JUNCTION WINDOW:	2/7/9 M/T/P
OHMIC WINDOW:	2M
ACTIVE INNER DIMENSIONS:	55 mm
ACTIVE OUTER DIMENSIONS:	130 mm
Nº of JUNCTION ELEMENTS:	16
Nº of OHMIC ELEMENTS:	1
ACTIVE AREA:	29 cm^2
Nº of SECTORS:	16
SECTOR SUBTENDS:	45°
JUNCTION PITCH:	5 mm
OHIMC PITCH:	N/A
OPERATING VOLTAGE:	FD to FD +30 V
BREAKDOWN VOLTAGE (10 µA):	> 2 x FD
TOTAL ALPHA RESOLUTION: (FWHM)/SECTOR	100 KeV
TOTAL NOISE (FWHM)/SECTOR:	75 KeV
PULSE RESPONSE TIME:	10 ns typ
TYPE OF PACKAGE:	PCB
SUPPORT STRUCTURE:	Motherboard
CONNECTOR:	IDC Header (2 x 17)
MIMIMUM ACCEPTANCE LEVEL:	100 %



YY1(SS) 9T/2M Assembly Front and Rear Views.

EXPERIMENTS (YY1, LEDA):	University of Edinburgh
	University of York
	INFN Catania, ITALY
	TRIUMF, CANADA

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.	
EXPERIEMNT:	Rikko University, Japan	Jaeri, Japan
PART DESIGNATION:	**AAA1**	**AAA2**
ACTICE AREA:	41 cm^2	44 cm^2
	64 x 64 mm^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
Nº of JUNCTION OUTPUTS:	12	15
Nº of OHMIC OUTPUTS:	16	8
Nº 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	

QUALITY ASSURANCE: ISO9001

SPECIALIST DETECTORS FOR NUCLEAR PHYSICS

SILICON DETECTOR TYPE:	DOUBLE SIDED AC DETECTOR
TECHNOLOGY:	4 INCH SILICON
DESIGN:	Double sided AC coupled orthogonal Rθ and RZ readout with poly silicon bias resistors.
EXPERIEMNT:	BABAR
JUNCTION WINDOW:	2M
OHMIC WINDOW:	2M

PART DESIGNATION:	**BBBI**	**II**	**III**	**IV**	**V**	**VI**
ACTIVE DIMENSIONS Rθ (mm):	41	49	71	53	53	53
ACTIVE DIMENSIONS RZ (mm):	42	45	44	68	54	68
STRIP PITCH Rθ (μm):	50	55	55	50	50	50 – 41
STRIP PITCH RZ (μm):	50	50	50	105	100	100
Nº of STRIP Rθ	799	874	1275	1023	1023	1023
Nº of STRIP RZ	821	881	859	631	525	667

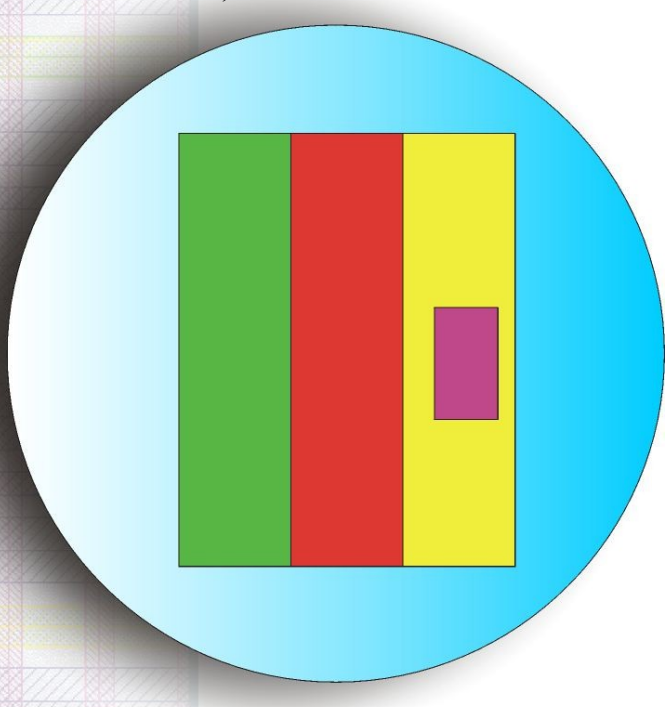
THICKNESS:	300 μm
THICKNESS TOLERANCE:	± 15 μm
THICKNESS UNIFORMITY:	± 5 μm
FULL DEPLETION (FD):	20 V
OPERATING VOLTAGE:	FD to 3 x FD
COUPLING CAPACITANCE:	200 pF
BIAS RESISTOR:	5 MΩ
ELEMENT LEAKAGE CURRENT:	1 nA
TOTAL CURRENT:	3 μA maximum
GUARD RING:	10 nA
PACKAGE:	Chip only
RADIATION HARDNESS:	1 MRad

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

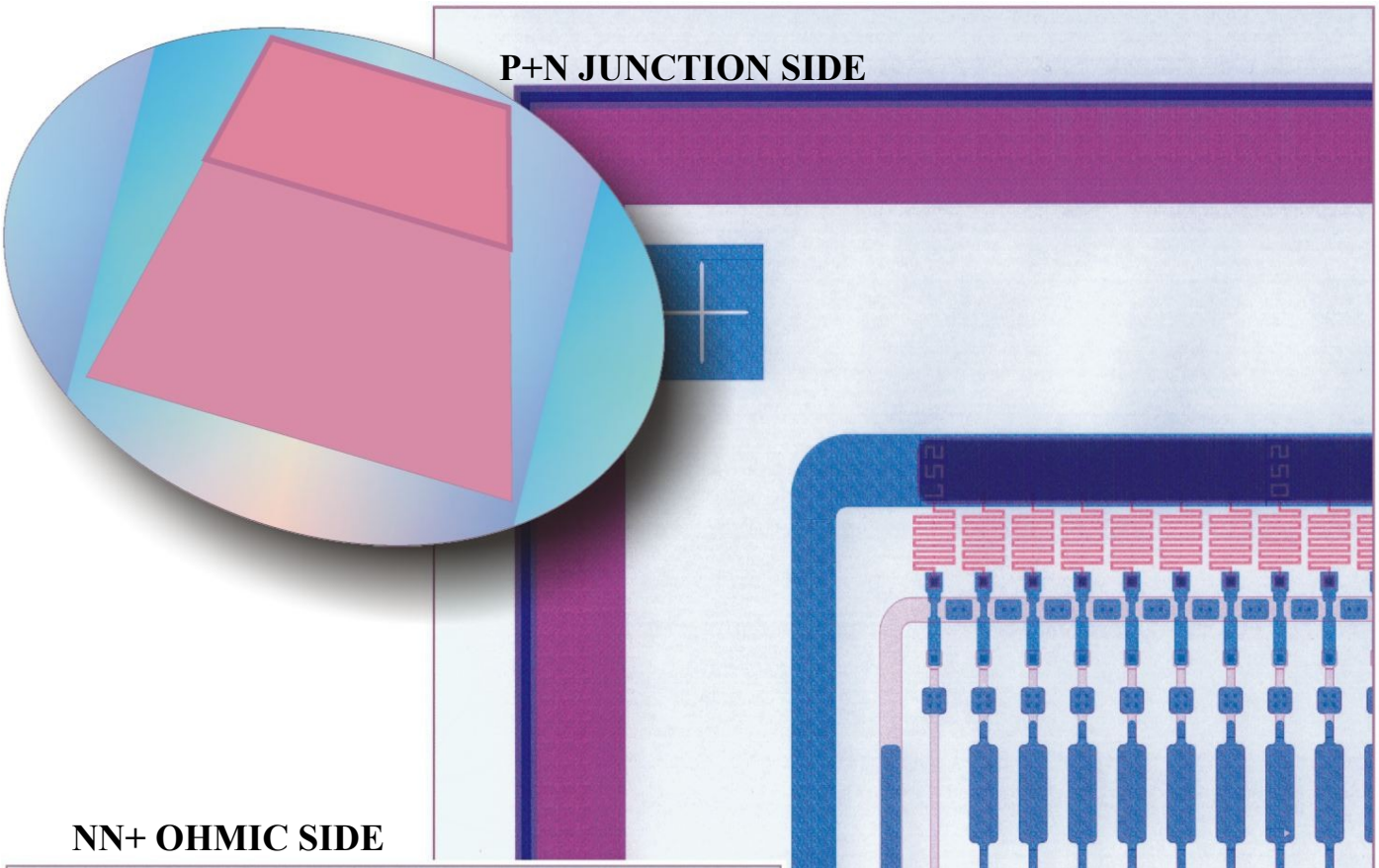
QUALITY ASSURANCE: ISO9001

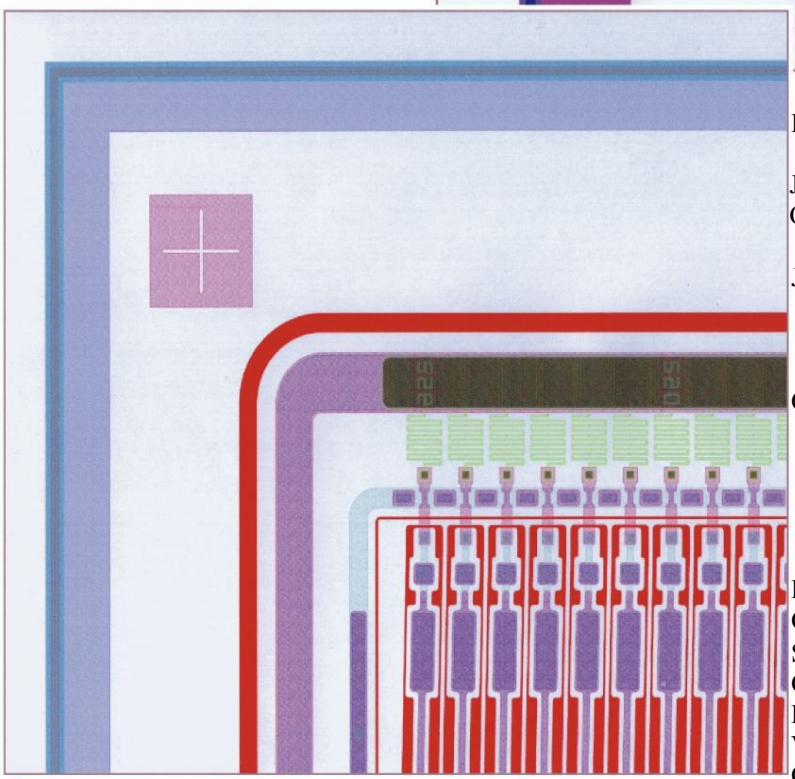
AC COUPLED ION IMPLANTED TOTALLY DEPLETED DOUBLE SIDED DOUBLE METAL MICROSTRIP DETECTOR

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 WINDOW:	2M
OHMIC WINDOW:	2M
JUNCTION SIDE	
Nº STRIPS:	384
STRIP PITCH:	50 µm
OHMIC SIDE	
First Metal	
Nº STRIPS:	768
STRIP PITCH:	153.5 µm
Second Metal	
Nº STRIPS:	384
STRIP PITCH:	49.5 µm
POLYSILICON RESISTOR:	2.5 ± 0.5 MΩ
COUPLING CAPACITOR:	100 pF
SILICON THICKNESS:	300 ± 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∅, FNAL



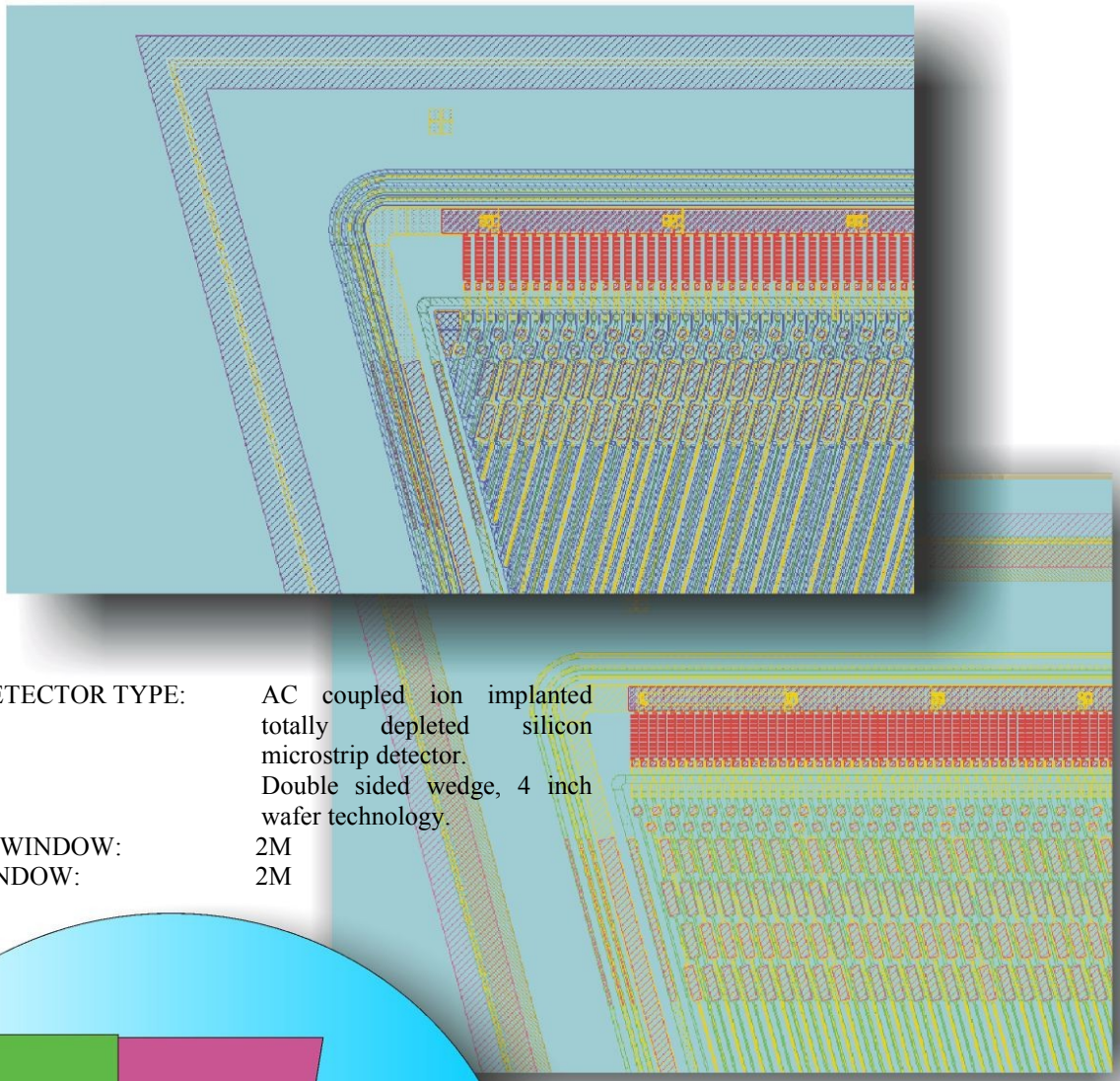
AC COUPLED ION IMPLANTED TOTALLY DEPLETED DOUBLE SIDED MICROSTRIP DETECTOR



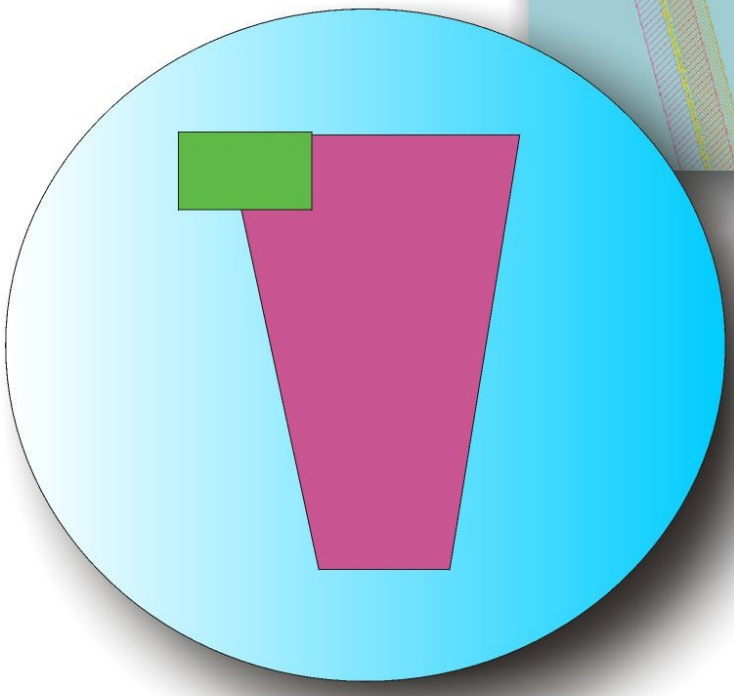


DESIGN:	Double sided, 6 inch wafer technology.
JUNCTION WINDOW:	2M
OHMIC WINDOW:	2M
JUNCTION SIDE	
Nº STRIPS:	512
STRIP PITCH:	112 µm
OHMIC SIDE	
Nº STRIPS:	512
STRIP PITCH:	112 µm
STRIP GEOMETRY:	1.2^{o} with respect to the P-Side strips
POLYSILICON RESISTOR:	2.5 ± 0.5 MΩ
COUPLING CAPACITOR:	15 pF/cm
SILICON THICKNESS:	300 ± 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



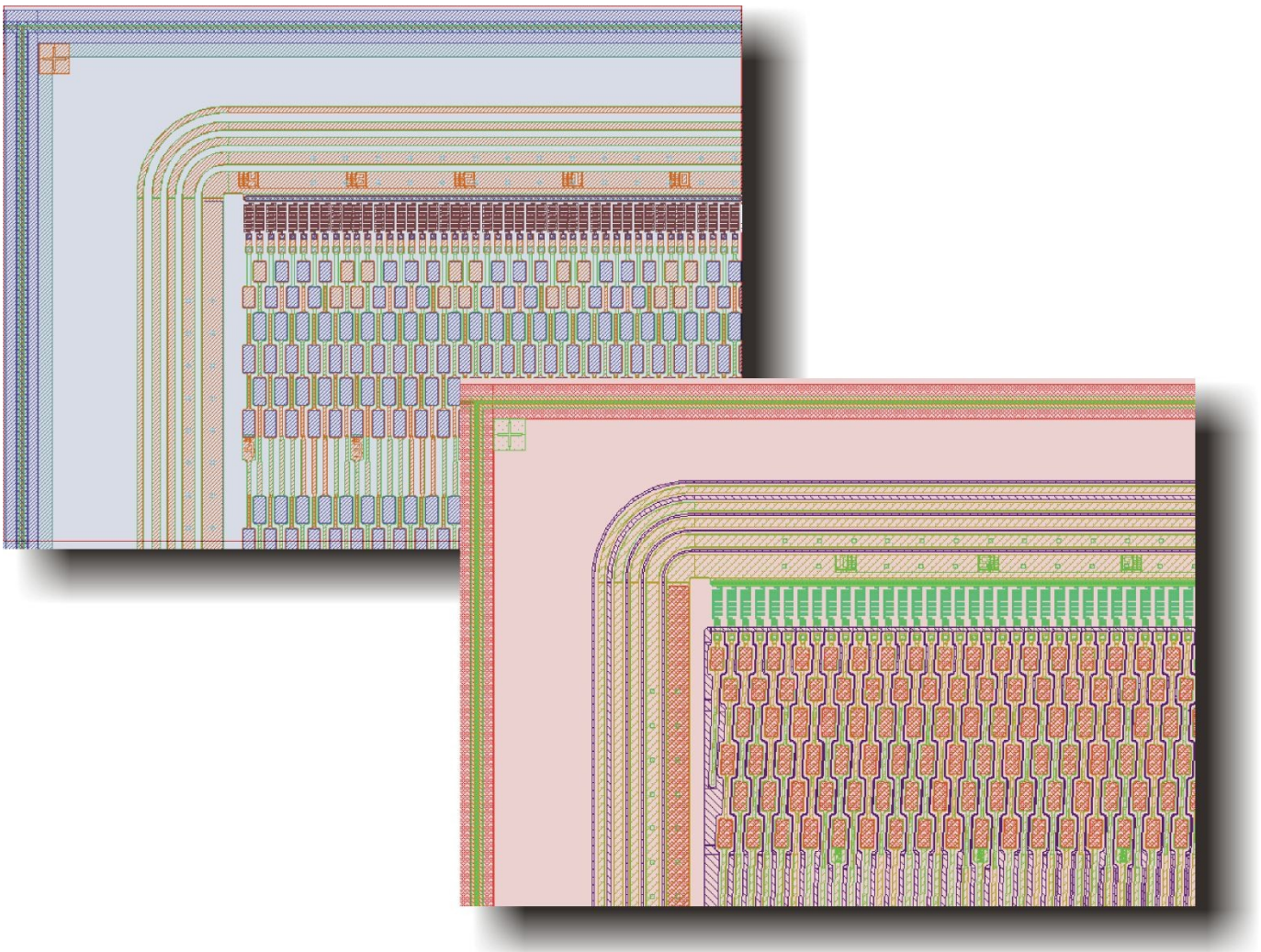
SILICON DETECTOR TYPE:	AC coupled ion implanted totally depleted silicon microstrip detector.
DESIGN:	Double sided wedge, 4 inch wafer technology.
JUNCTION WINDOW:	2M
OHMIC WINDOW:	2M

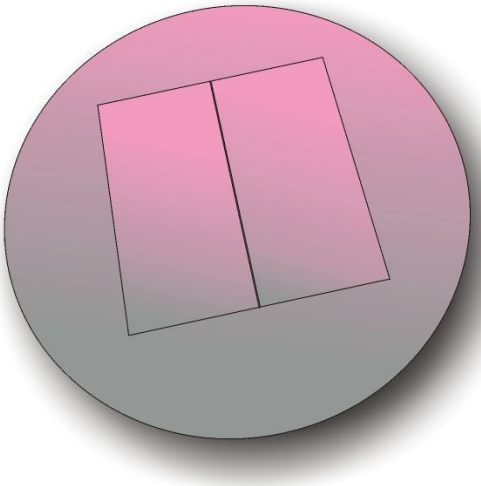


JUNCTION SIDE	
Nº STRIPS:	1024
STRIP PITCH:	50 μm
OHMIC SIDE	
Nº STRIPS:	768
STRIP PITCH:	62.5 μm
POLYSILICON RESISTOR:	2.5 ± 0.5 MΩ
COUPLING CAPACITOR:	100 pF
SILICON THICKNESS:	300 ± 10 μm
CHIP DIMENSIONS	
HEIGHT:	79.21 mm
BASE:	59.21 mm
TOP:	16.73 mm
FULL DEPLETION VOLTAGE (FD):	50 V maximum
OPERATING VOLTAGE:	FD to 2FD
EXPERIMENTS:	D∅, FNAL Upgrade

QUALITY ASSURANCE: ISO9001

AC COUPLED ION IMPLANTED TOTALLY DEPLETED DOUBLE SIDED WEDGE MICROSTRIP DETECTOR

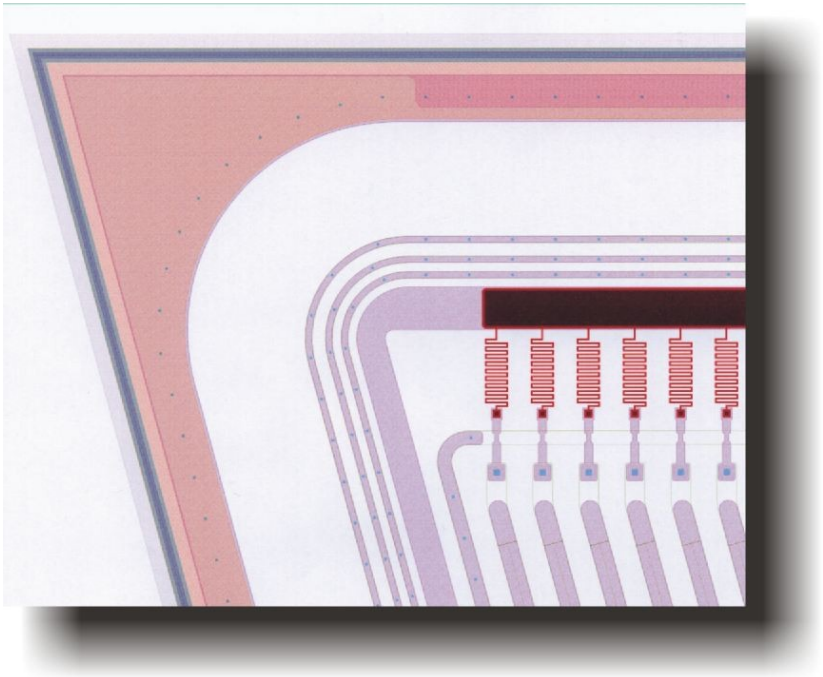


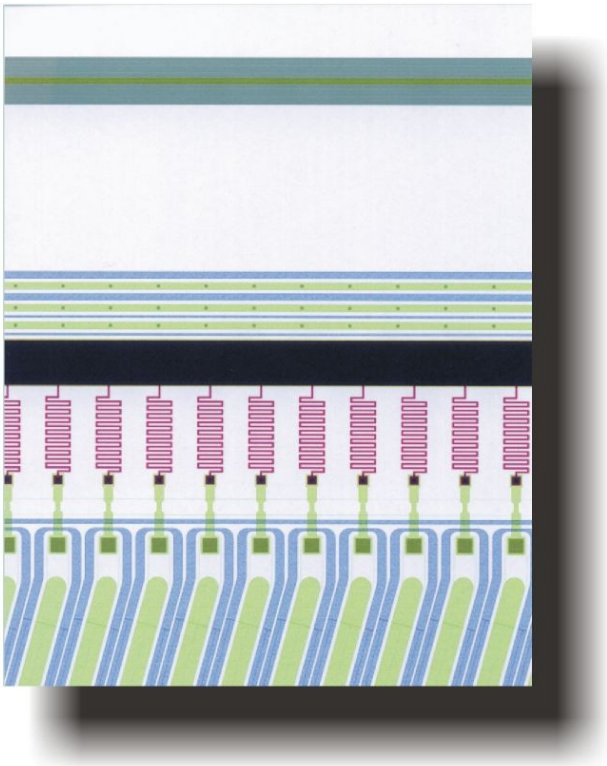


SILICON DETECTOR TYPE:	AC coupled ion implanted totally depleted silicon microstrip detector.
DESIGN:	Double sided wedge, 4 inch wafer technology.
JUNCTION WINDOW:	2M
OHMIC WINDOW:	2M
JUNCTION SIDE	
Nº STRIPS:	640
STRIP PITCH:	50 µm
OHMIC SIDE	
Nº STRIPS:	512
STRIP PITCH:	62.5 µm
STRIP GEOMETRY:	2^{o} with respect to P-Side strips
POLYSILICON RESISTOR:	2.5 ± 0.5 MΩ
COUPLING CAPACITOR:	100 pF
SILICON THICKNESS:	300 ± 10 µm
CHIP DIMENSIONS:	60.0 x 34.0 mm^2
FULL DEPLETION VOLTAGE (FD):	50 V maximum
OPERATING VOLTAGE:	FD to 2FD
EXPERIMENTS:	D⊘, FNAL Upgrade

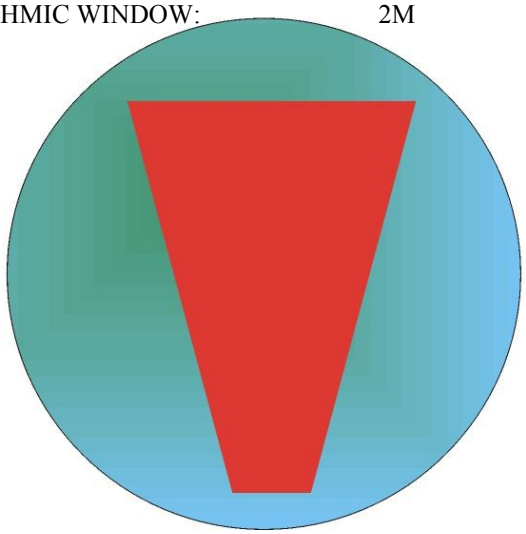
QUALITY ASSURANCE: ISO9001

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 WINDOW:	2M
OHMIC WINDOW:	2M



JUNCTION SIDE	
Nº STRIPS:	516
STRIP PITCH:	160 µm
OHMIC SIDE	
Nº 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 x 10^{14} protons/cm^2 or equivalent neutrons.

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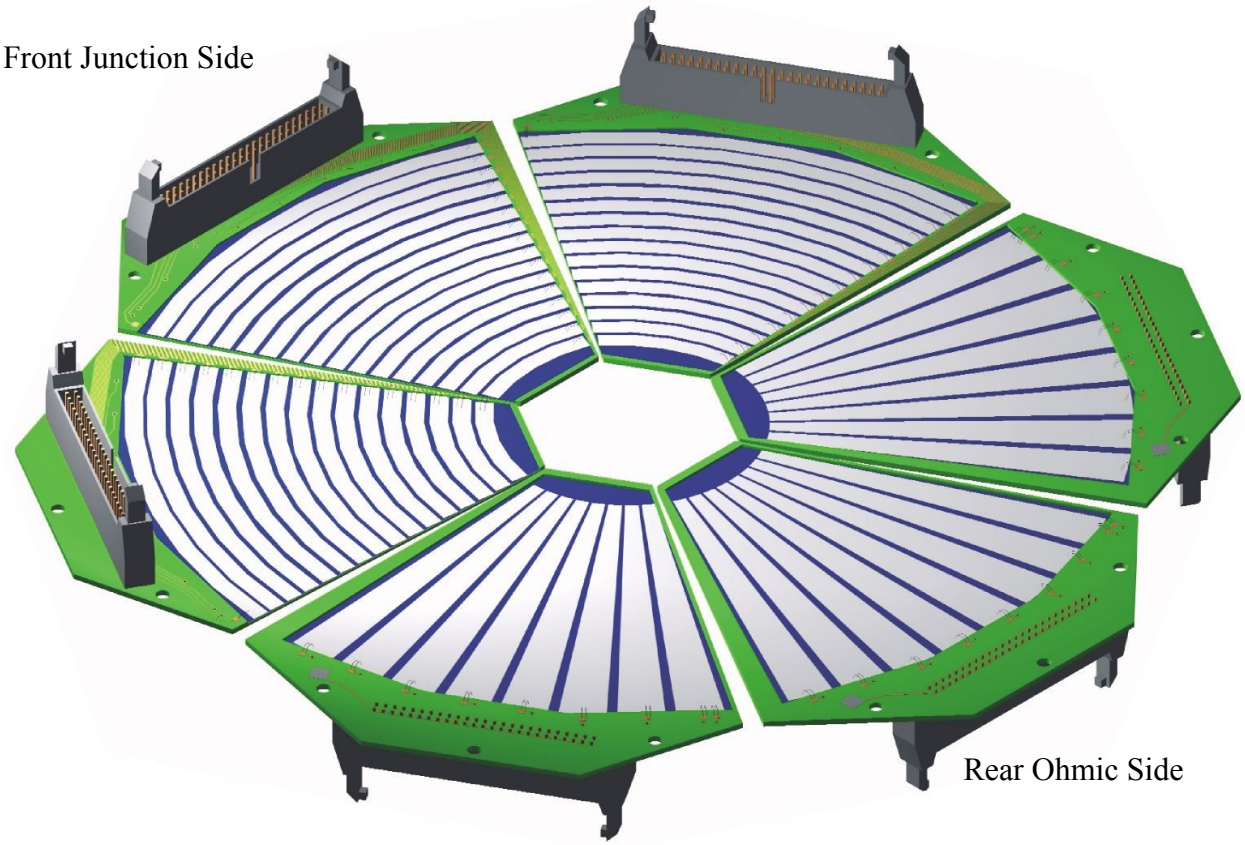
Phi Detector R Detector

PHI DETECTOR	PHI DETECTOR	R DETETCTOR
WAFER TECHNOLOGY	6 Inch	6 Inch
THICKNESS*	200 & 300 µm	200 & 300 µm
SILICON	Standard or oxygenated p-n or n-on-n	Standard or oxygenated p-n or n-on-n
JUNCTION IMPLANT	2G (Not 3%)	2M
OHMIC IMPLANT	2G (Not 3%	2M
INNER ACTIVE DIAMETER	8 mm	8 mm
INNER ACTIVE DIAMETER	40 mm	40 mm
Nº STRIPS/SIDE	2048	2048
STRIP PITCH	24 – 55 µm	13 – 92 µm
STRIP WIDTH	16 – 28 µm	12 – 63 µm
POLYSILICON RESISTORS	1 MΩ	1 MΩ
COUPLING CAPACITANCE	80 pF	50 - 200 pF
FULL DEPLETION (FD) VOLTAGE	50 V max	50 V max
OPERATING VOLTAGE	200 V	200 V

EXPERIMENT: LHCb CERN

DOUBLE SIDED 60º WEDGE DETECTOR FOR RADIOACTIVE BEAM PHYSICS

Front Junction Side



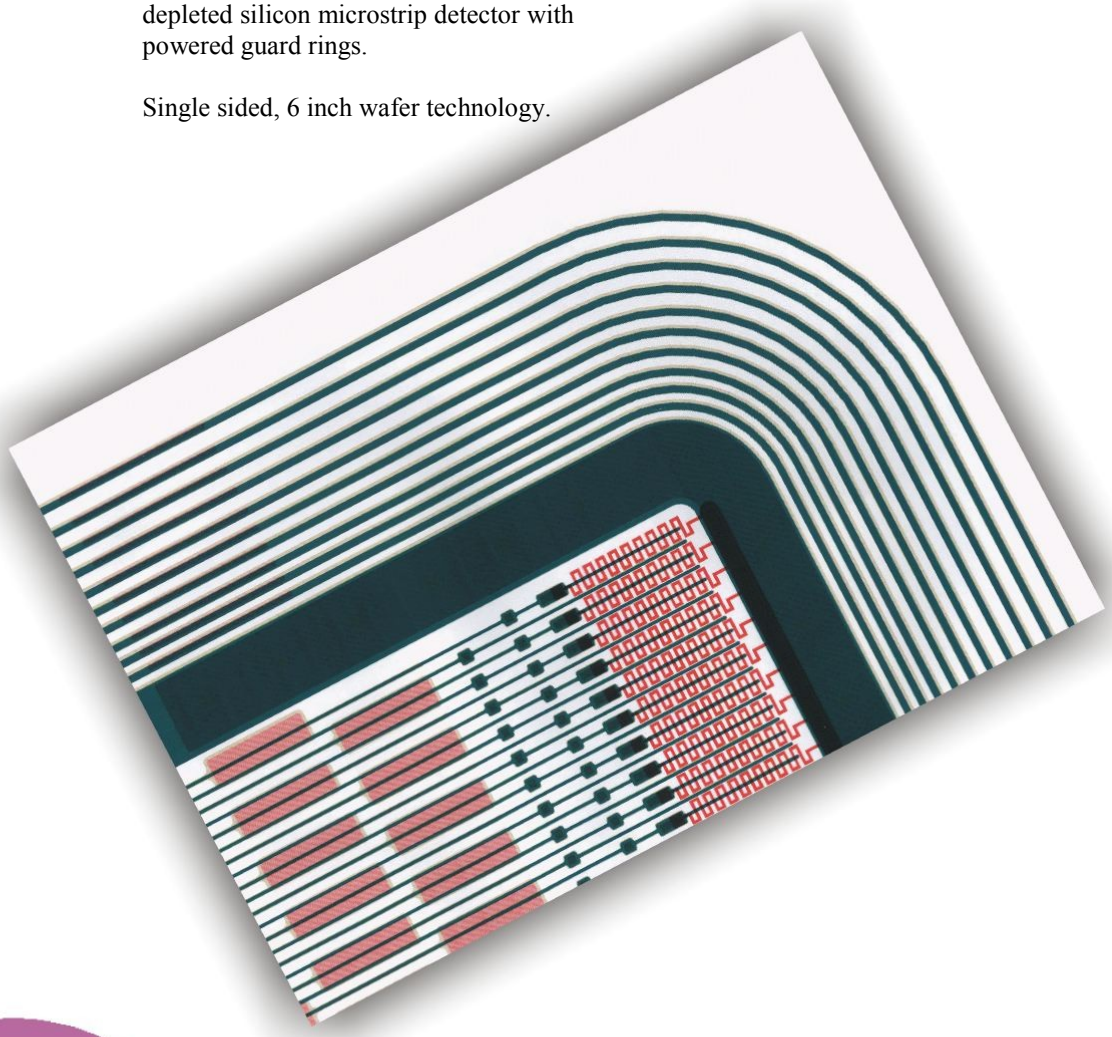
Rear Ohmic Side

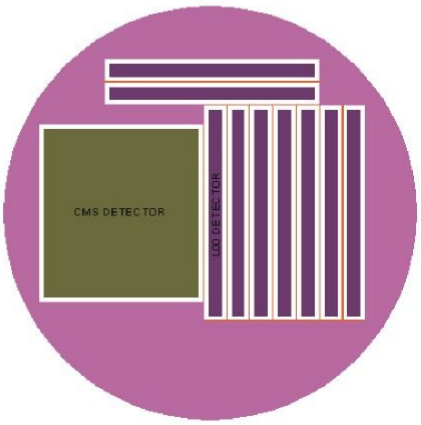
SILICON DETECTOR TYPE:	DOUBLE SIDED DC STRIP DETECTOR
TECNOLOGY:	6 INCH SILICON
EXPERIMENTS:	HYBALL and TIARA
JUNCTION WINDOW:	2M
OHMIC WINDOW:	2M
ACTIVE AREA:	54000 mm^2
INNER RADIUS:	32.6 mm
OUTER RADIUS:	135.1 mm
Nº ANNULAR JUNCTION STRIPS:	16
STRIP PITCH:	6.4 mm
Nº RADIAL OHMIC STRIPS:	8
SECTOR ANGLE:	6.8º
DETECTOR THICKNESS [ΔE]:	150 µm
DETECTOR THICKNESS [E]:	400 µm
DEPLETION VOLTAGE [E]:	100 V max
PACKAGE:	PCB Transmission with tracking. Readout from one end of strips via 3M, 50 way connector with side latches, part Nº 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} protrons/cm^2. 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.





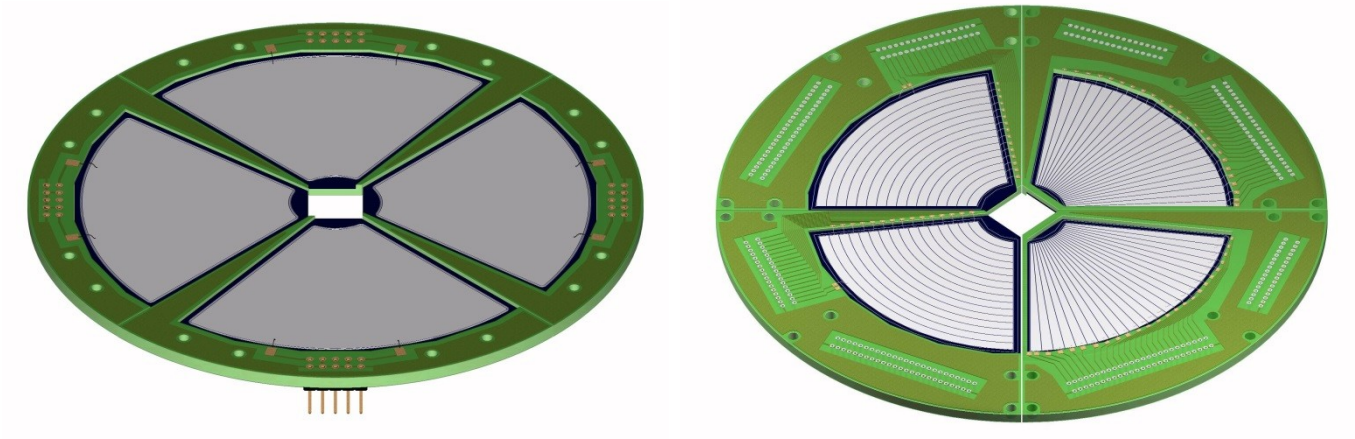
JUNCTION WINDOW:	2M
OHMIC WINDOW:	2M
JUNCTION SIDE	
Nº STRIPS:	256
STRIP PITCH:	25 µm
SILICON THICKNESS:	150, 300, 400 µm
ACTIVE AREA DIMENSIONS:	78.4 x 8.43 mm^2
FULL DEPLETION VOLTAGE (FD):	60 V maximum
OPERATING VOLTAGE:	600 V Typical, 1000 V max
MINIMUM ACCEPTANCE LEVEL:	100 %
EXPERIMENT:	CDF, FNAL

QUALITY ASSURANCE: ISO9001

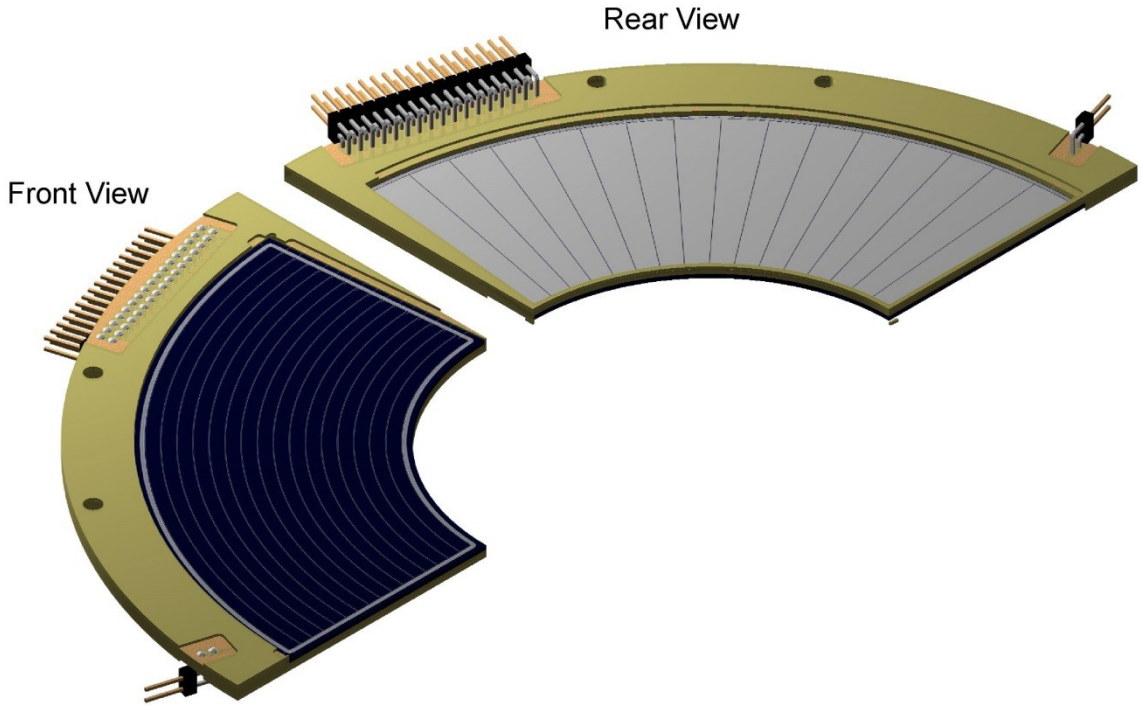
DC ANNULAR PAD and SEGMENTED DETECTORS

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

Design	Inner Active Area Radius mm	Outer Active Area Radius mm	Nº Elements	JUNCTION WINDOW	OHMIC WINDOW	Number of Units
QQQ1	9.00	50.00	1	2M	2M	4 Quadrants
QQQ2	9.00	41.00	Junction = 16 Ohmic = 24	2/7/9 M/P	`2M	4 Quadrants
QQQ3	50.1	99.1	Junction = 16 Ohmic = 16	2/7/9 M/T/P	2M	4 Quadrants
QQQ5	25.25	81.95	Junction = 32 Ohmic = 4	2/7/9 P	2M	4 Quadrants



QQQ1 and QQQ2 assemblies which can be used delta E/E configuration with common mounting holes.

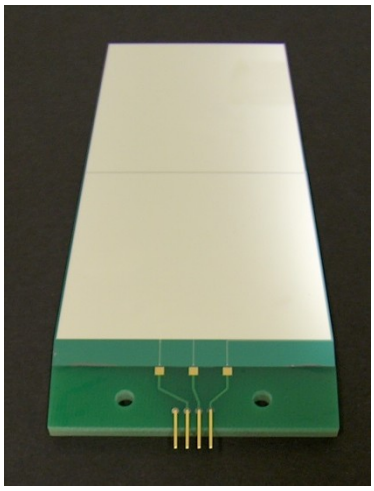


QQQ3 Assembly.

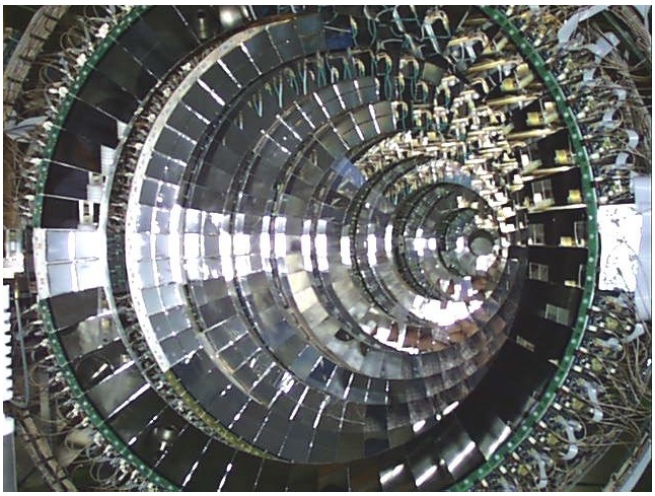
SINGLE SIDED WEDGE DETECTORS FOR RADIOACTIVE BEAM PHYSICS

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			JUNCTION WINDOW	OHMIC WINDOW	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/T	2M	6	SGR	Standard FR4
2	2	111650	63100	35600	10415	62100	34700	2/7/9 M/T	2M	6	SGR	Standard FR4
3	2	111400	59600	39150	10390	58600	38250	2/7/9 M/T	2M	6	SGR	Standard FR4
4	2	115600	56500	39600	10810	55500	38650	2/7/9 M/T	2M	6	SGR	Standard FR4
5	2	100850	62950	48450	93350	61950	47550	2/7/9 M/T	2M	6	SGR	Standard FR4
6	2	89400	56850	46400	81900	55850	45450	2/7/9 M/T	2M	6	SGR	Standard FR4
7	2	103300	61800	49800	95800	60800	48850	2/7/9 M/T	2M	6	SGR	Standard FR4
8	2	89350	62950	52950	81850	61950	52000	2/7/9 M/T	2M	6	SGR	Standard FR4
9	2	112650	64800	52450	10515	63800	51550	2/7/9 M/T	2M	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

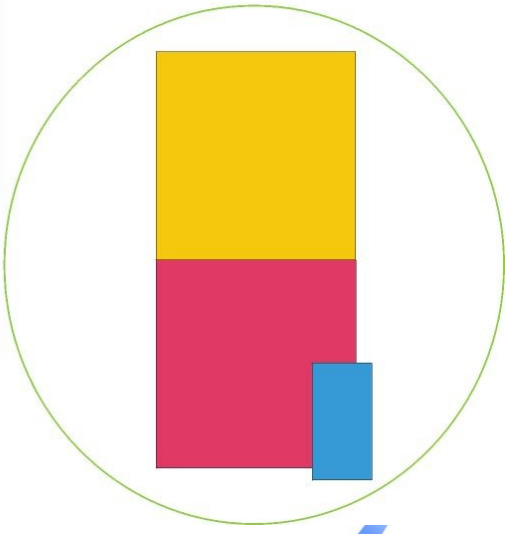
CONNECTOR:

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 F OR 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 WINDOW:	2M
OHMIC WINDOW:	2M
JUNCTION SIDE	
Nº STRIPS:	1024 + 2
STRIP PITCH:	61 μm
POLYSILICON RESISTOR:	4.5 ± 0.5 MΩ
COUPLING CAPACITOR:	100 pF
SILICON THICKNESS:	300 ± 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 & DC COUPLED ION IMPLANTED TOTALLY DEPLETED DOUBLE SIDED 90° MICRONSTRIP DETECTOR WITH GUARD RINGS

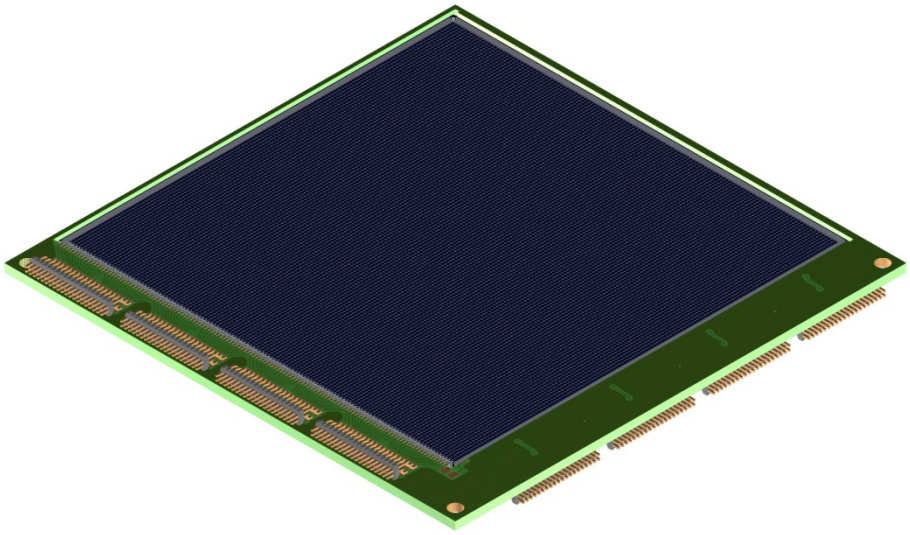
SILICON DETECTOR TYPE: AC and DC coupled ion implanted totally depleted silicon microstrip detector.

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

DETECTOR DESIGN	TTT1(DS)	TTT 2(DS)	TTT 3(DS)	TTT 4(DS)	TTT5(DS)	TTT6(DS)	TTT8(DS)	TTT9(DS)
WAFER TECHNOLOGY	6	6	6	6	6	6	6	6
DESIGN TYPE	AC	DC	DC	DC	DC	DC	AC	AC
ACTIVE AREA (mm^2)	97.30 x 97.30	97.22 x 97.22	97.22 x 97.22	97.22 x 97.22	97.22 x 97.22	93.20 x 93.20	97.96 x 97.96	92.91 x 95.43
JUNCTION WINDOW	2G	2M	2/7/9 M/G/P/T	2/7/9 M/P/T	2/7/9 G	2M	2M	2M
OHMIC WINDOW	2G	2M	2M	2M	2M	2M	2M	2M
NUMBER OF JUNCTION STRIPS	128	128	128	128	128	64	1024	1024
JUNCTION STRIP PITCH (um)	758	760	760	760	760	1470	95.7	90.80
JUNCTION STRIP WIDTH (um)	702	700	700	730	730	590	65.7	36.0
JUNCTION STRIP LENGTH (um)	96968	97220	97220	97280	97280	93200	97956.8	95.43
JUNCTION RESISTOR VALUE (MΩ)	10 – 80	-	-	-	-	-	2	2
JUNCTION COUPLING CAPACITOR (pF)	~ 1000	-	-	-	-	-		
NUMBER OF OHMIC STRIPS	128	128	128	128	128	64	-	-
OHMIC STRIP PITCH (um)	758	760	760	760	760	1470	-	-
OHMIC STRIP WIDTH (um)	702	700	700	700	700	590	-	-
OHMIC STRIP LENGTH (um)	96968	97220	97220	97220	97220	93200	-	-
OHMIC RESISTOR VALUE (MΩ)	10 – 80	-	-	-	-	-	-	-
OHMIC COUPLING CAPACITOR (pF)	~1000	-	-	-	-	-	-	-
GUARD RING DESIGN	SGR	MGR	MGR	MGR	MGR	MGR	MGR	-
CHIP DIMENSIONS (mm^2)	97.30 x 97.30	100.42 x 100.42	100.42 x 100.42	100.42 x 100.42	100.42 x 100.42	99.20 x 99.20	100.00 x 100.00	95.15 x 97.75
EXPERIMENT	TIGRE BLAST	MUST II	MUSETT					-

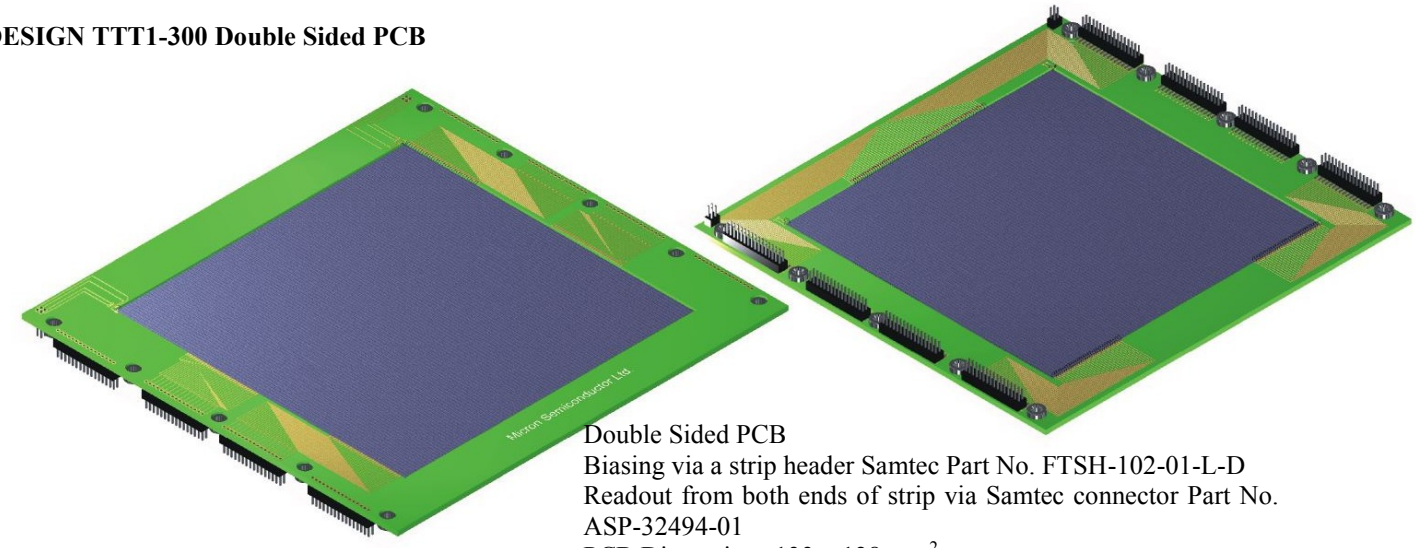
PACKAGES

DESIGN TTT Series Standard Assembly



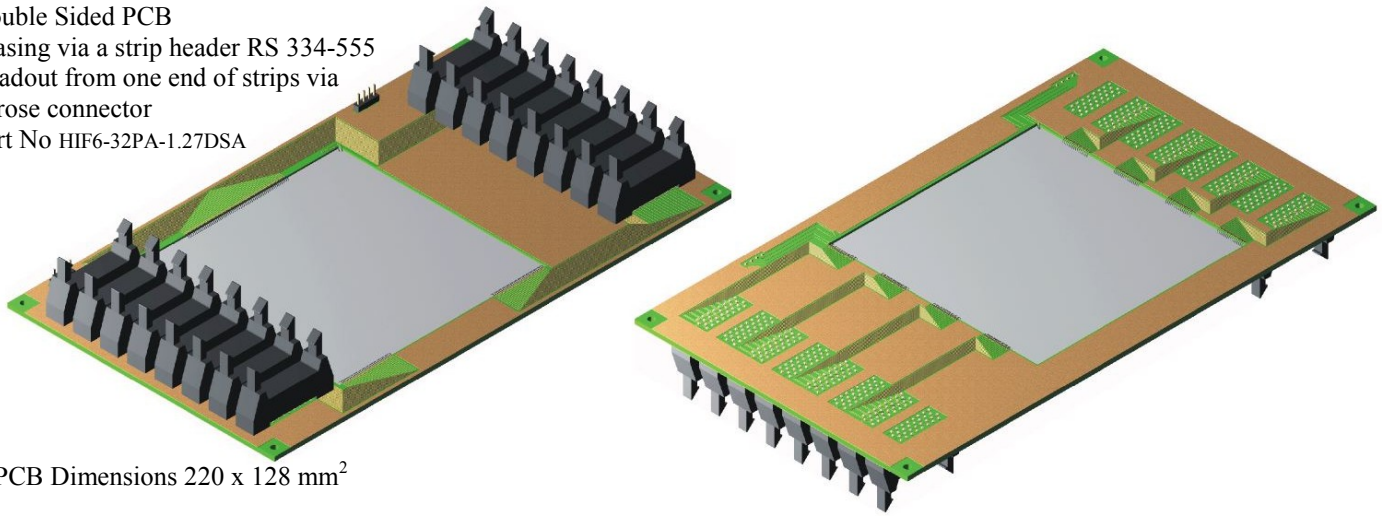
Double Sided PCB
Readout from one end of strip via Samtec connector Part No. FTMH-120-03-L-DH
A range of mating kapton available upon request
PCB Dimensions 114 x 114 mm^2

DESIGN TTT1-300 Double Sided 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 mm^2

DESIGN TTT1-300 Double Sided PCB
Double Sided PCB
Biasing via a strip header RS 334-555
Readout from one end of strips via
Hirose connector
Part No HIF6-32PA-1.27DSA



PCB Dimensions 220 x 128 mm^2

PIXELATED DETECTOR WITH MULTI-GUARD RINGS

SILICON DETECTOR TYPE: DC coupled ion implanted totally depleted silicon pixelated detector.

TECHNOLOGY: 4 inch wafer technology.

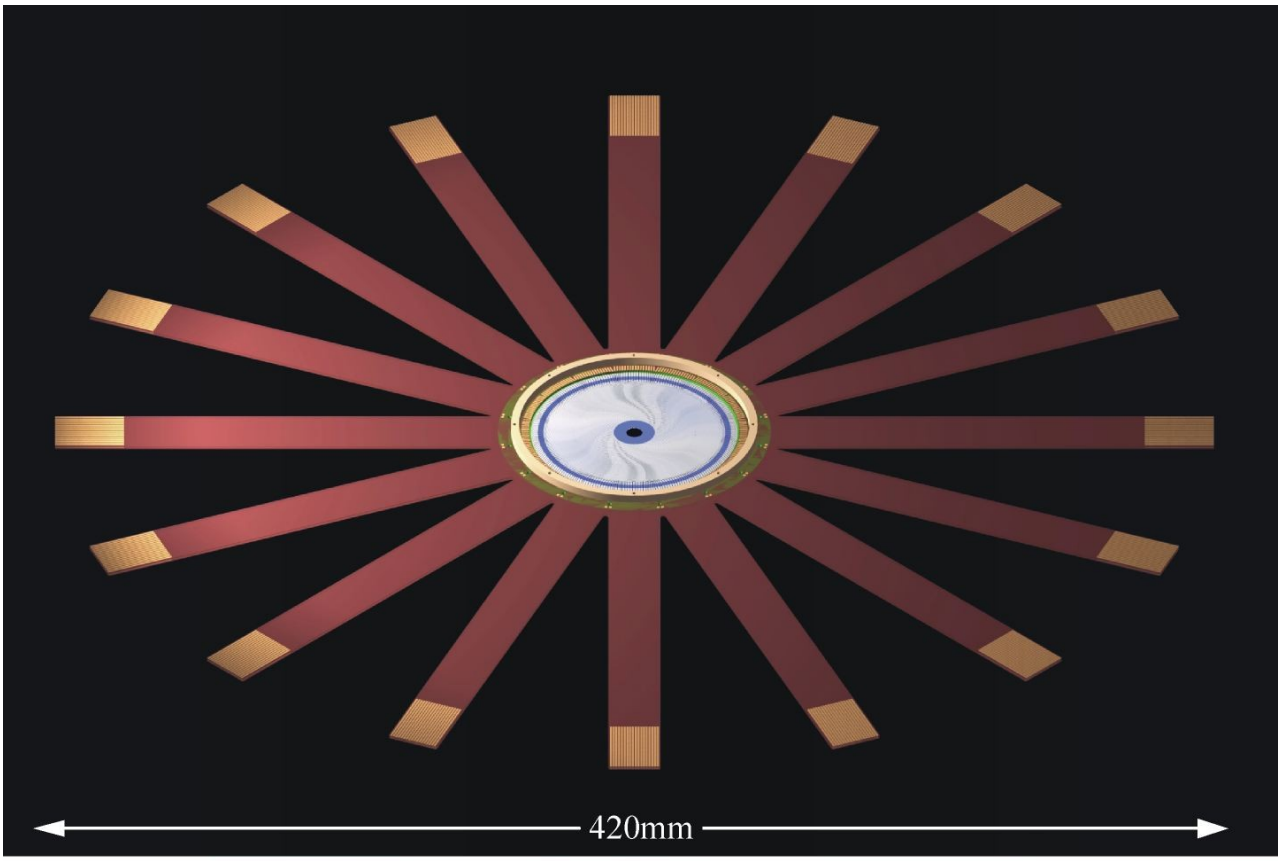
DESIGN: Single sided pixelated device with a multi-guard ring design for high radiation environment operation.

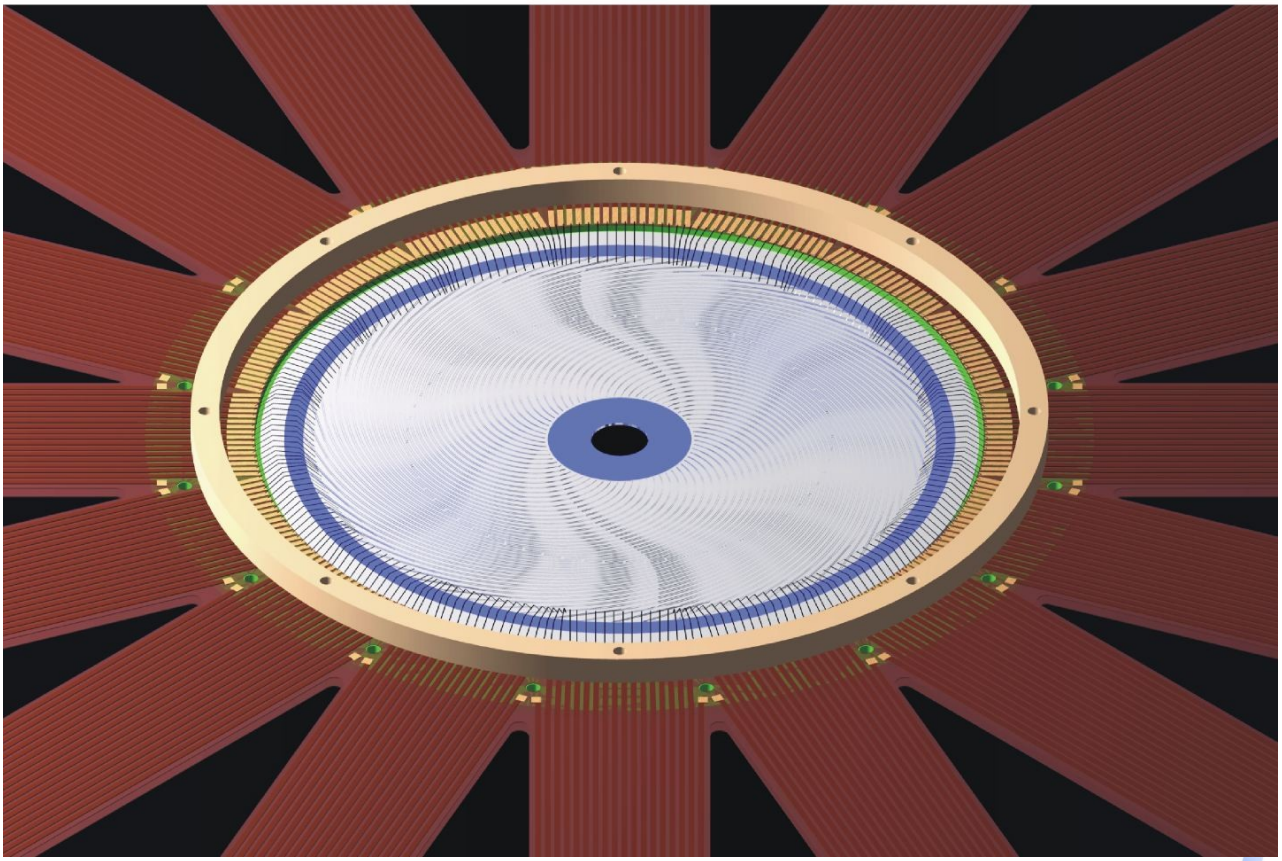
DESIGN	WAFER TECHNOLOGY	SS/DS	JUNCTION WINDOW	OHMIC WINDOW	TOTAL ACTIVE AREA mm^2	Nº ELEMENTS	ELEMENT AREA mm^2	**READOUT**
XXX2	4-inch	DS	2M	2M	R_{INNER} = 3.00 mm R_{OUTER} = 35.00	128 per side	3820.18	100 %
XXX3	4-inch	SS	2M & 7/9 P	2M	40 x 40	4	1.27 x 1.27 5.65 x 6.35	100 %
XXX4	4-inch	SS	2M	2M	57.5 x 26.5	2	28.725 x 28.725	100 %

MINIMUM ACCEPTANCE LEVEL: 100 %

QUALITY ASSURANCE: ISO9001

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.

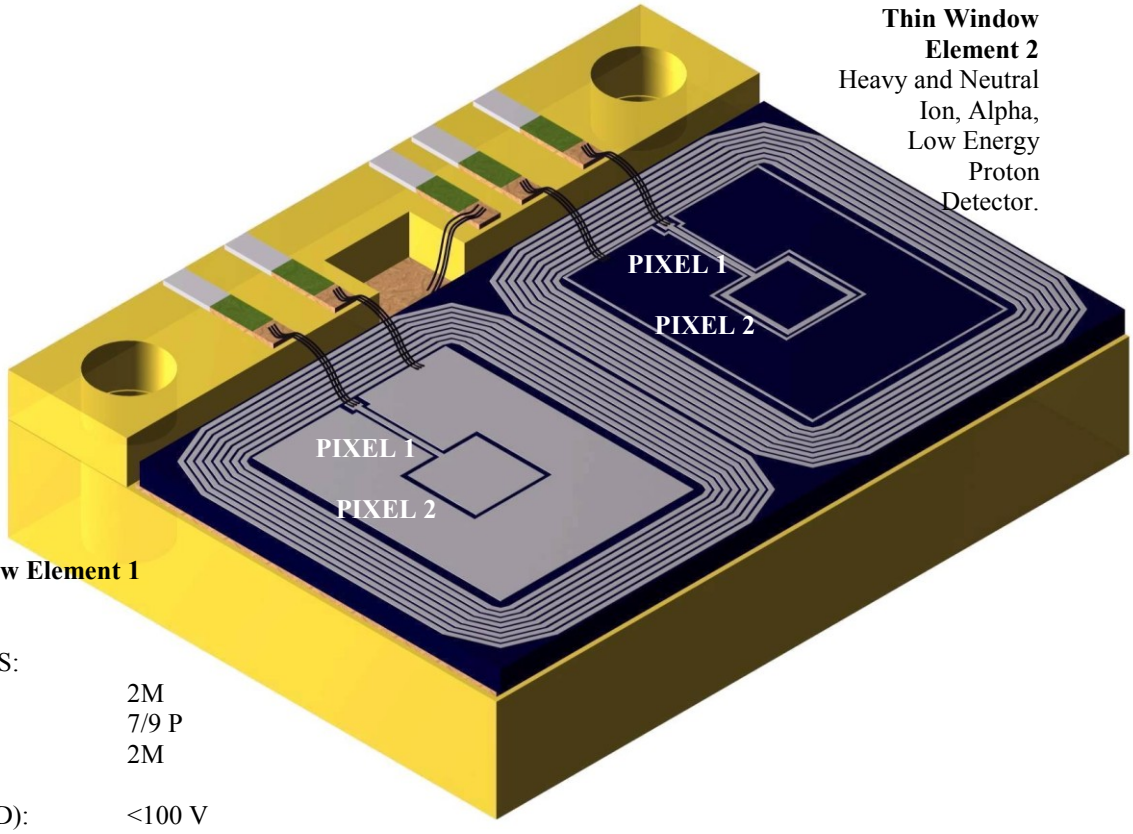
TECHNOLOGY: 4 inch wafer technology.

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 mm^2
PIXEL 2: 5.65 x 6.35 mm^2

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



Standard Window Element 1
Electron Detector

JUNCTION WINDOWS:
ELEMENT 1: 2M
ELEMENT 2: 7/9 P
OHMIC WINDOW: 2M

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 mm^3
Mounting holes, ∅ 1.6 mm, are separated by 12.0 mm
CONNECTION: Solder pads

MINIMUM ACCEPTANCE LEVEL: 100 %
EXPERIMENTS: MERCURY MESSENGER
QUALITY ASSURANCE: ISO9001

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.

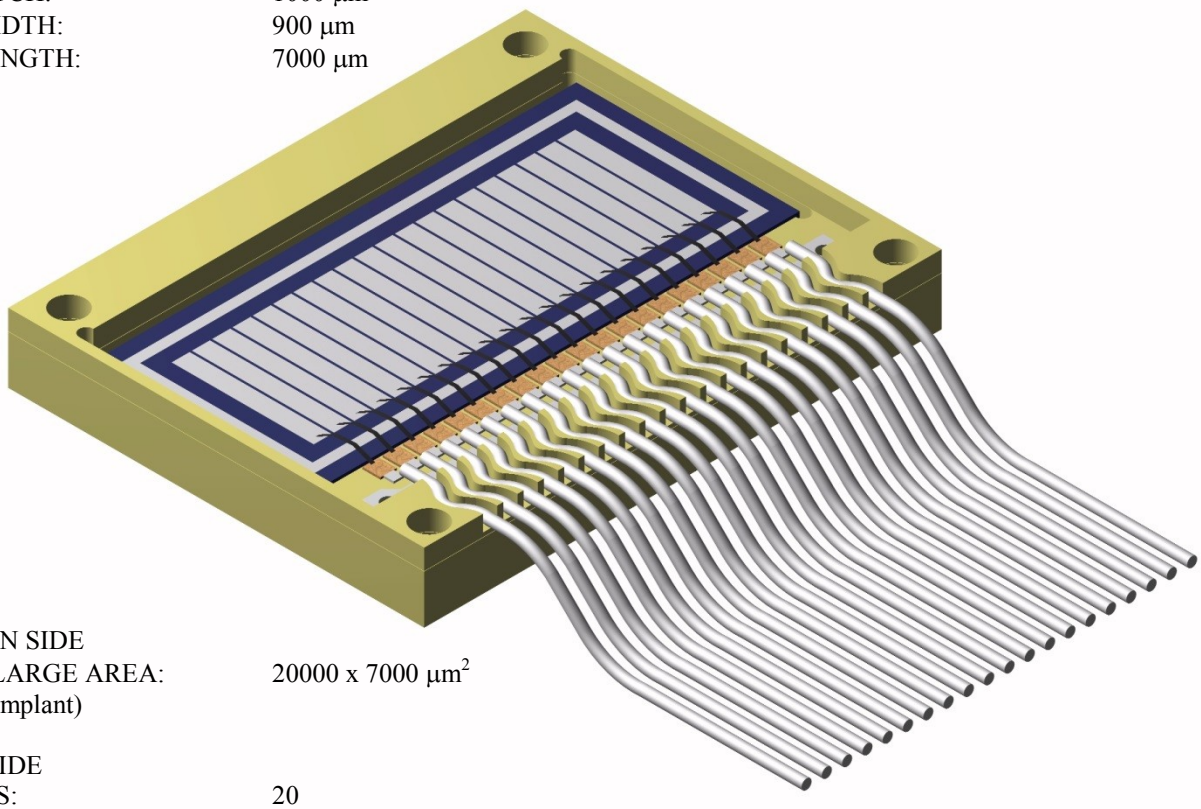
TECHNOLOGY: 3 inch wafer technology for n-n design
4 inch wafer technology for p-n design

JUNCTION WINDOW: 2M
OHMIC WINDOW: 2M

P-N DEVICE:

JUNCTION SIDE

Nº STRIPS:	20
STRIP PITCH:	1000 µm
STRIP WIDTH:	900 µm
STRIP LENGTH:	7000 µm



N-N DEVICE:

JUNCTION SIDE

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

OHMIC SIDE

Nº 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 mm^3
Mounting holes, ∅ 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)

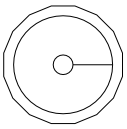
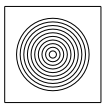
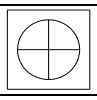
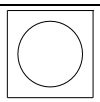
NOVEL DETECTORS

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.

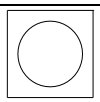
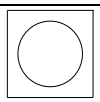
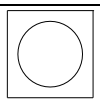
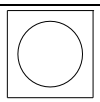
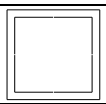
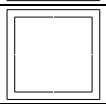
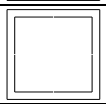
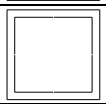
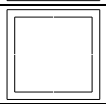
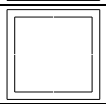
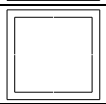
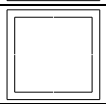
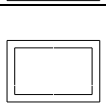
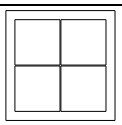
SILICON DETECTOR TYPE: DC DIODES

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	JUNCTION WINDOW	OHMIC WINDOW	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 Nº Annuli = 2 Annular Separation = 100 µm	9.0 x 9.0 mm^2	2M	2M	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 Nº Annuli = 3 Annular Separation = 100 µm	14.0 x 14.0 mm^2	2M	2M	MGR	6	Chip Only
	MSA004/009	Total Active Area Diameter = 9.8 mm Nº Annuli = 4 Annular Pitch = 1250 µm Annular Separation = 100 µm	13.0 x 13.0 mm^2	2M	1M	MGR	4	Chip Only
	MSA005/009	Active Area Diameter = 9.8 mm Nº Annuli = 5 Annular Pitch = 1000 µm Annular Separation = 100 µm	13.0 x 13.0 mm^2	2M	2M	MGR	4	Chip Only
	MSA010/009	Active Area Diameter = 9.8 mm Nº Annuli = 10 Annular Pitch = 500 µm Annular Separation = 100 µm	13.0 x 13.0 mm^2	2M	2M	MGR	4	Chip Only
	MSCQ009	Active Area Diameter = 9.8 mm Quadrant Separation = 50 µm	13.0 x 13.0 mm^2	2M	2M	MGR	4	Chip Only
	MSD0013	Active Area Diameter = 1.3 mm	3.3 x 3.3	2/7/9 M	2M	MGR	4	Chip Only
	MSD004	Active Area Diameter = 4.0 mm	7.0 x 7.0 mm^2	2/7/9 M/P/T	2M	SGR	4	PCB
	MSD005	Active Area Diameter = 5.0 mm	10.0 x 10.0 mm^2	2M	2M	MGR	4	PCB
	MSD0051	Active Area Diameter = 5.0 mm	7.0 x 7.0 mm^2	2/7/9 M	2M	MGR	6	PCB

NOVEL DETECTORS

	MSD0056	Active Area Diameter = 5.0 mm	8.7 x 8.7 mm^2	2/7/9 M	2M	MGR	6	PCB
	MSD057	Active Area Diameter = 5.692 mm	15.4 x 15.4 mm^2	2M	2M	MGR	4	PCB
	MSD009	Active Area Diameter = 9.8 mm	13.0 x 13.0 mm^2	2M	2M	MGR	4	PCB
	MSD010	Active Area Diameter = 10.0 mm	13.0 x 13.0 mm^2	2M	2M	MGR	4	PCB
	MSX00	Active Area = 4.25 x 1.75	6.25 x 3.75	2M	2M	MGR	4	Chip Only
	MSX004	Active Area = 2.0 x 2.0	4.0 x 4.0	2M	2M	Single & MGR	6	Chip Only
	MSX014	Active Area = 7.0 x 2.0	9.0 x 4.0	2M	2M	MGR	6	Chip Only
	MSX7*	Active Area = 2.646 x 2.646	4.646 x 4.646	2/7/9 M	2M	MGR	4 & 6	Chip Only
	MSX029	Active Area = 1.7 x 1.7	3.7 x 3.7	2/7/9 M	2M	MGR	4	Chip Only
	MSX031*	Active Area = 3.162 x 3.162	6.162 x 6.162	2/7/9 M	2M	MGR	4	Chip Only
	MSX4x4*	Active Area = 4.0 x 4.0	6.0 x 6.0	2/7/9 M	2M	MGR	4	Chip Only
	MSX05	Active Area = 5.0 x 5.0	7.0 x 7.0	2M	2M	MGR	6	Chip Only
	MSX072	Active Area = 9.0 x 8.0	11.0 x 10.0	2M	2M	MGR	6	Chip Only
	MSPX040	Active Area Pixel = 1400 x 1400 μm^2 Pixel Array = 4 x 4	9.10 x 9.10	2M	2M	MGR	4	Chip Only
	MSPX041	Active Area Pixel = 900 x 900 μm^2 Pixel Array = 4 x 4	9.10 x 9.	2M	2M	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	2M	2M	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	2M	2M	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	2M	2M	MGR	4	Chip Only

Alphabet Summary

Single Alphabet Index

Design	Wafer Diameter inch	Active Dimensions mm	Type	Element Length mm	Pitch µm	Nº 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	DSM	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
DSM Double Sided Microstrip

SSAR Single Sided Annular
DSAR Double Sided Annular

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	400µm	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	25µm	1048	300	60-1500	QUARTZ	CERN OMEGA
EE1-EE4	3	Microstrips	SSM/DC	20-50	100um-650µm	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	60µm	256/384/512/768	300	100-500	CHIP	FERMI CDF SVXII
HH	4	10.25 x 15.38 x 50.41	SSM/DC	50	40µm/60µm	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	335µm	96	60	60-1500	PCB	ARGONNE/ ORNL
QQ	3	10 x 5.2	SSM/DC	10	10µm	520	150	300	CHIP	CERN OMEGA
RR	3	7 x 14	LINEAR ARRAY	4.84	2.39mm	3	1000	60-1500	PCB	LANL/ CLUSTER

SSM Single Sided Microstrip
DSM Double Sided Microstrip
SSAR Single Sided Annular
DSAR Double Sided Annular
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
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	500µm	250	140	140-1500	PCB	NASA EPACT/ WIND
W2	3	Orthogonal 36	SSM/DC	VARIABLE	500µm	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	50µm	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

SSM Single Sided Microstrip
DSM Double Sided Microstrip
SSAR Single Sided Annular
DSAR Double Sided Annular
Q Quadrant
P Pixel
PSD Position Sensitive Detector
SSDMM Single Sided Double Metal Microstrip
LA Linear Array

Triple Alphabet Index

Design	Wafer Diameter Inch	Nº. Devices per Wafer	Dimensions (mm)	Device Type	Details	Pitch		Nº 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	
BBBI BBBII BBBIII BBBIV BBBV BBBVI	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	D∅
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	D∅
GGG	4	1	60 x 34	DSM/AC	Square 2° Stereo AC Double Sided Microstrip	50	62.5	640	512	2°	300	Chip Only	D∅
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

SSM Single Sided Microstrip
DSM Double Sided Microstrip

SSAR Single Sided Annular
DSAR Double Sided Annular

Q Quadrant
P Pixel

PSD Position Sensitive Detector
SSDMM Single Sided Double Metal Microstrip

LA Linear Array

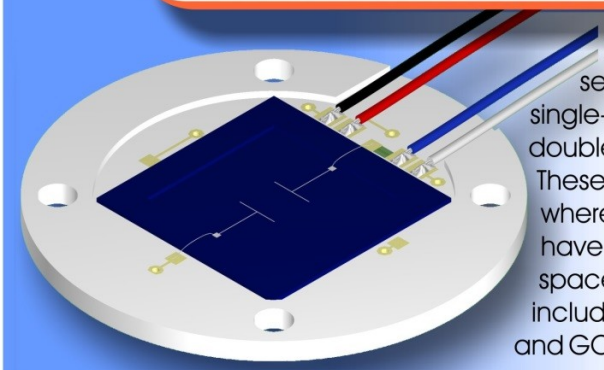
Triple Alphabet Index

Design	Wafer Diameter Inch	Nº. Devices per Wafer	Dimensions (mm)	Device Type	Details	Pitch		Nº 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	Archemides 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

SSM Single Sided Microstrip
DSM Double Sided Microstrip
SSAR Single Sided Annular
DSAR Double Sided Annular
Q Quadrant
P Pixel
PSD Position Sensitive Detector
SSDMM Single Sided Double Metal Microstrip
LA Linear Array

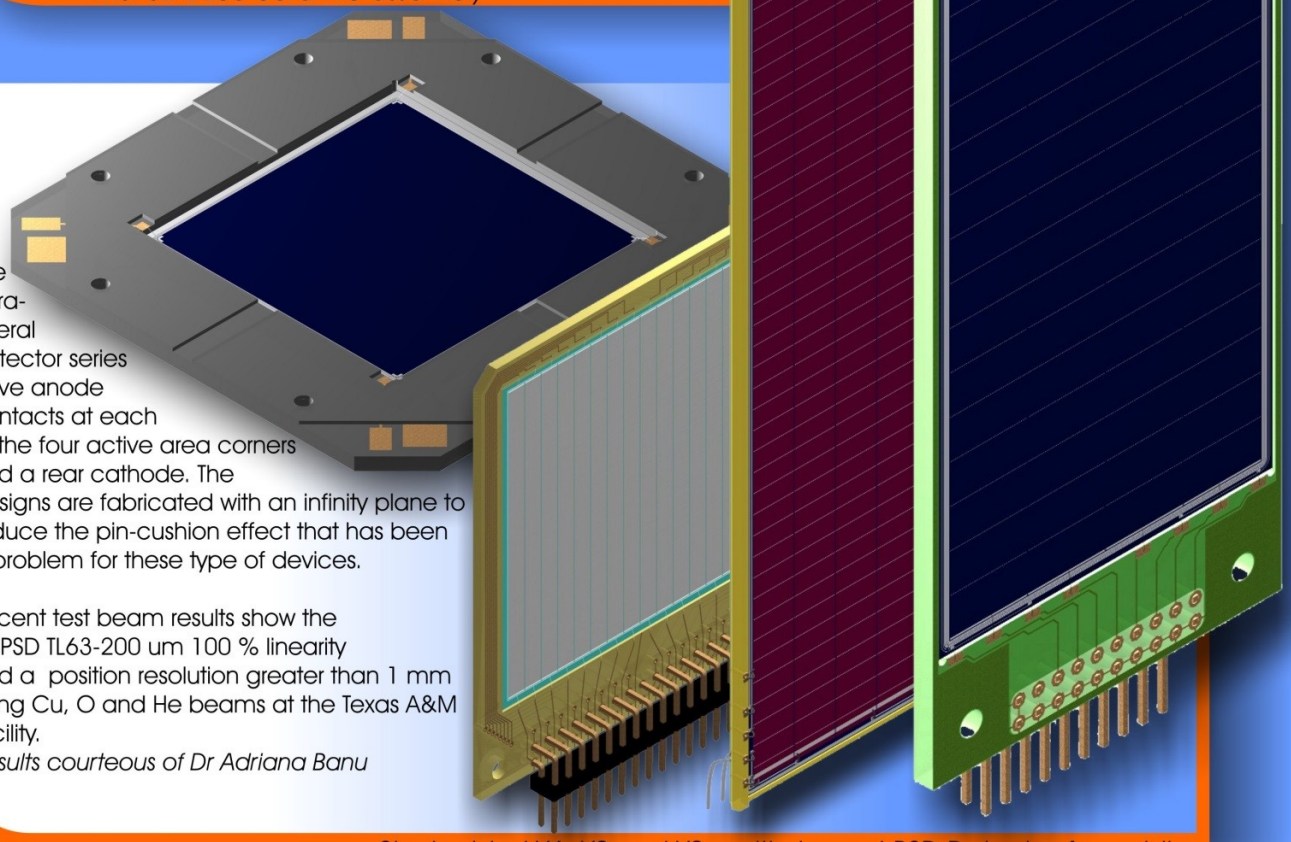
Position Sensitive Detectors

Single & Multi Element Linear, Duo-Lateral and Tetra-Lateral Devices



Micron Semiconductor's range of position sensitive detectors (PSDs) has extended from single-lateral devices with multi elements to duo-lateral double sided and single sided tetra-lateral assemblies. These position sensitive resistive division structures are ideal where minimum readout channels are required. Sensors have been supplied to the radioactive beam and space communities for programs including TIARA, ORRUBA, FAUST and GO-SAT.

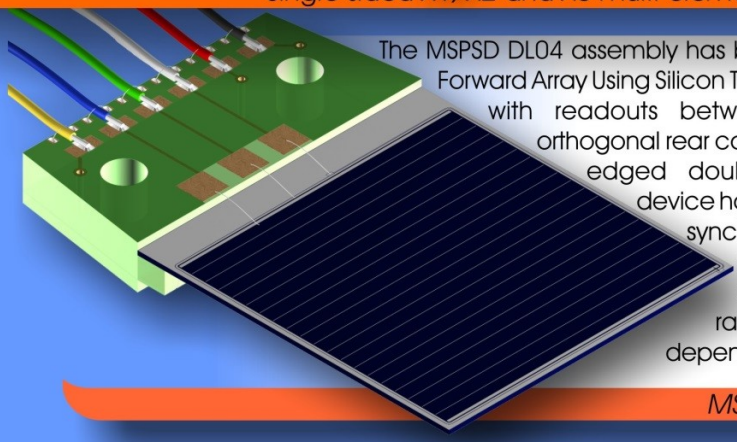
MSPSD DL05 ceramic assembly



The tetra-lateral detector series have anode contacts at each of the four active area corners and a rear cathode. The designs are fabricated with an infinity plane to reduce the pin-cushion effect that has been a problem for these type of devices.

Recent test beam results show the MSPSD TL63-200 um 100 % linearity and a position resolution greater than 1 mm using Cu, O and He beams at the Texas A&M facility.
Results courteous of Dr Adriana Banu

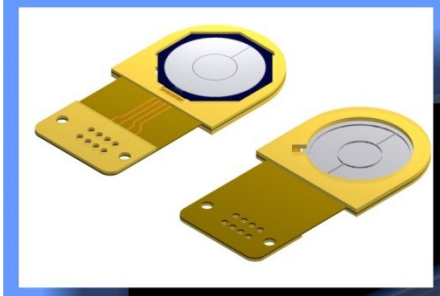
Single sided X1, X2 and X3 multi element PSD Detector Assemblies

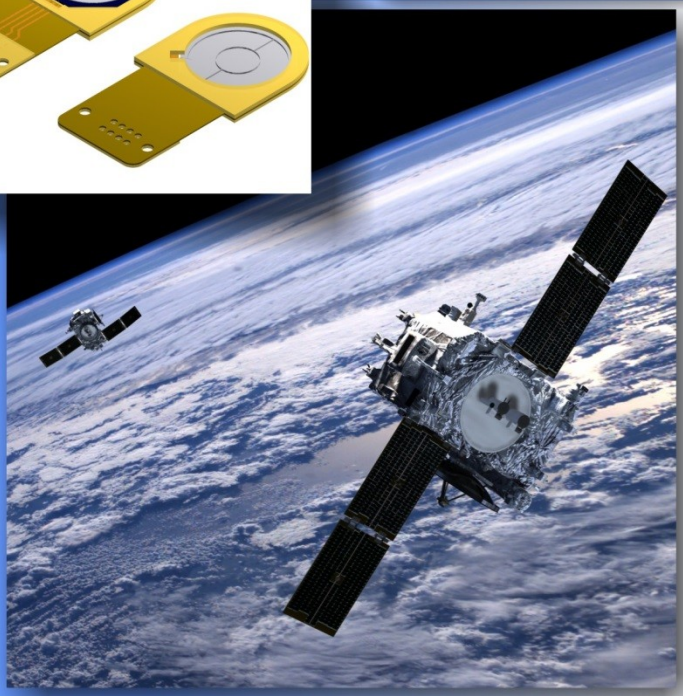


The MSPSD DL04 assembly has been supplied to FAUST, the Forward Array Using Silicon Technology. The silicon detector, with readouts between the front anodes and orthogonal rear cathodes, is supported on a single edged double recessed package. The device has also been developed for X-ray synchrotron beam diagnostics with a position resolution objective of 1 um.The PSD silicon thickness range is from 10 um to 1000 um depending on the application.

MSPSD DL05 ceramic assembly

Space Physics Missions Galore!





RECENT AWARDS

Japanese Space Agency JAXA

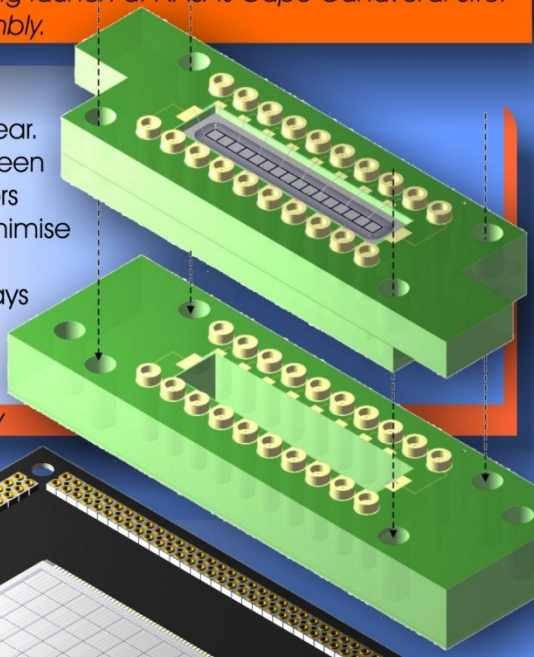
GO-SAT
TEDA
JESON
SMART SAT

NASA & ESA Space Missions

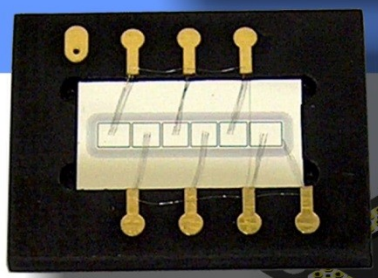
IES Cluster Upgrade
MMS
EPT
HiLET
CRATER
HIP
MAGPIE
STEREO
RBSP
GOESR

The STEREO LET and HET telescopes currently awaiting launch at NASA's Cape Canaveral Site. Insert showing the MSA 003/026-15um silicon assembly.

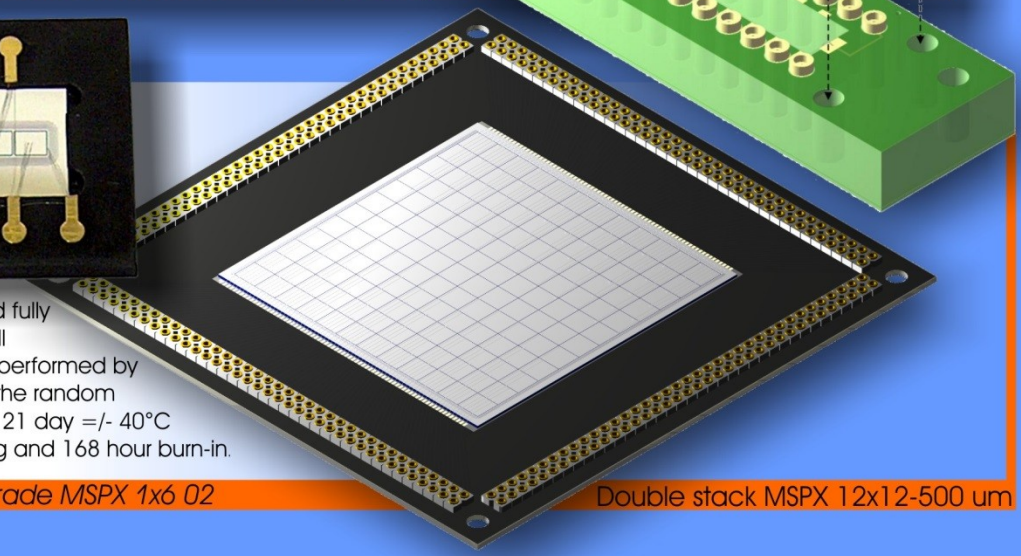
Our involvement with space missions has grown to a significant activity in the last year. The largest range of new detectors has been supplied to space physics. Many detectors are supplied on black FR4 supports to minimise light transmission through packages. Designs include single and multi pixel arrays on stackable packages to single area diodes.



MSPX 1 x 16 & MSPX 1 x 1 stack assembly



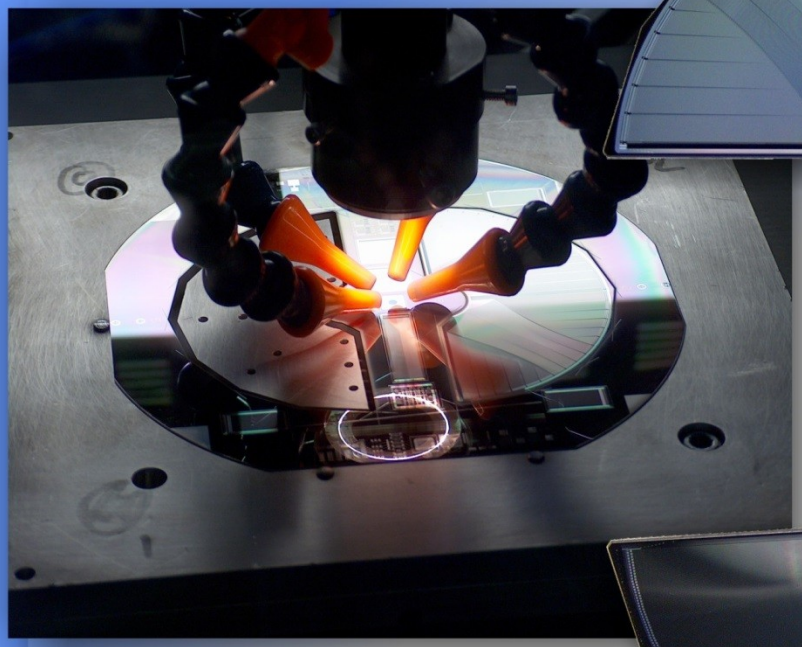
All assemblies supplied fully space qualified with all environmental testing performed by Micron staff including the random vibration testing, NASA 21 day =/- 40°C temperature cycling and 168 hour burn-in.

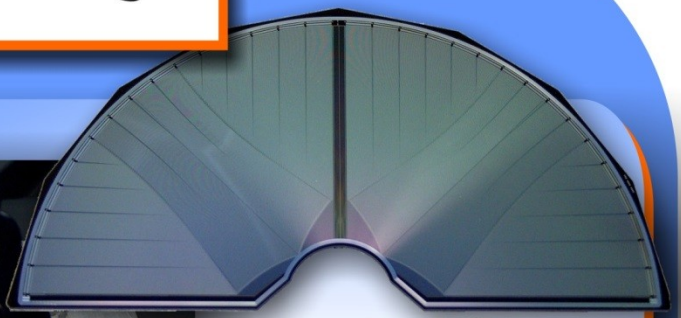


IES CLUSTER Upgrade MSPX 1x6 02

Double stack MSPX 12x12-500 um

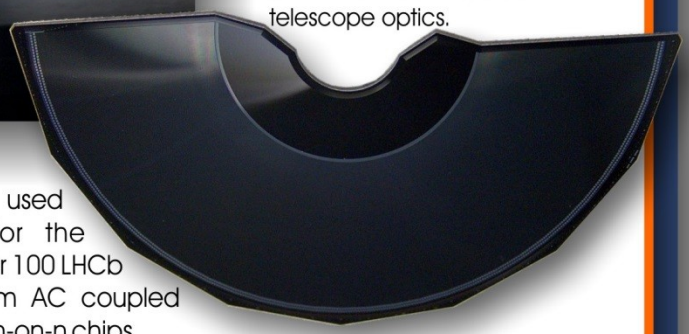
New Technologies





Laser Profiling

The in-house laser profiling facility is utilised on many production projects. The programmable feature enables the cutting of any geometry silicon, giving the physicists the opportunity to design devices of any shape, while the Ø30um is ideal for boring small holes. Holes of Ø10um are also feasible with telescope optics.

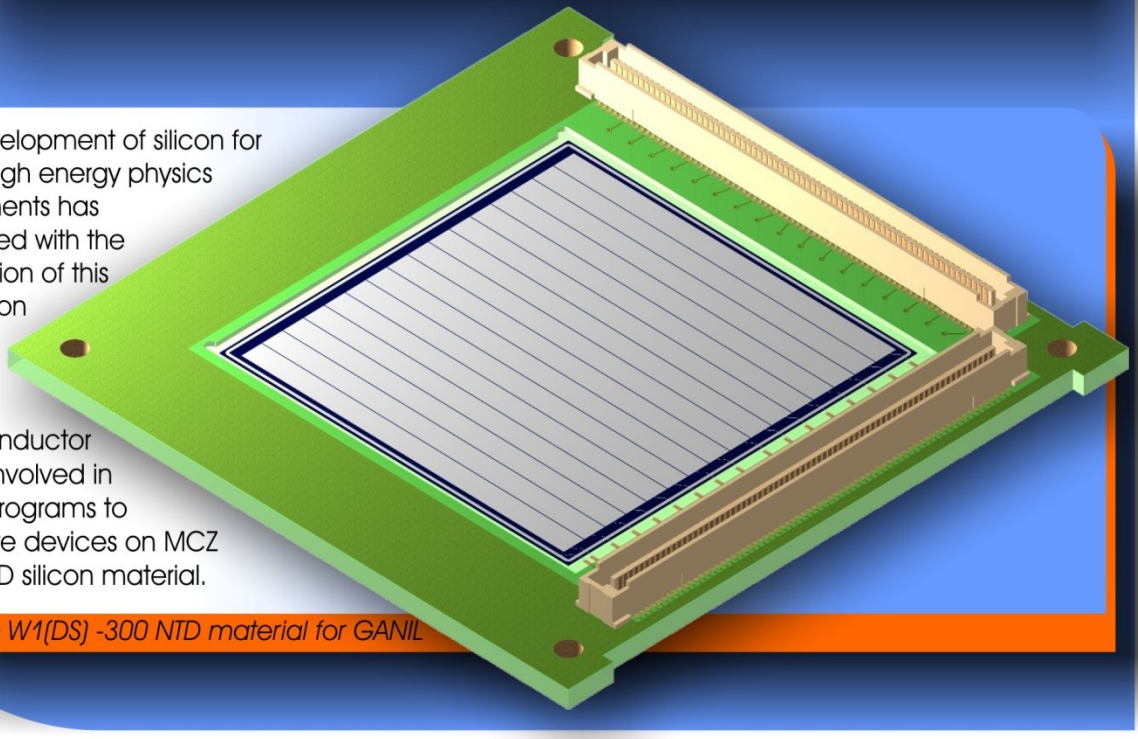


The frequency tripled 355nm Nd/YAG pulsed laser creates minimum silicon damage enabling studies to fabricate the ultimate goal of an edgeless detector.

The laser was used extensively for the delivery of over 100 LHCb R & Phi-300um AC coupled double metal n-on-n chips.

LHCb R and Phi-300 um chips fabricated on p-type silicon.

The development of silicon for future high energy physics experiments has continued with the fabrication of this device on p-type silicon. Micron Semiconductor is also involved in R & D programs to fabricate devices on MCZ and NTD silicon material.



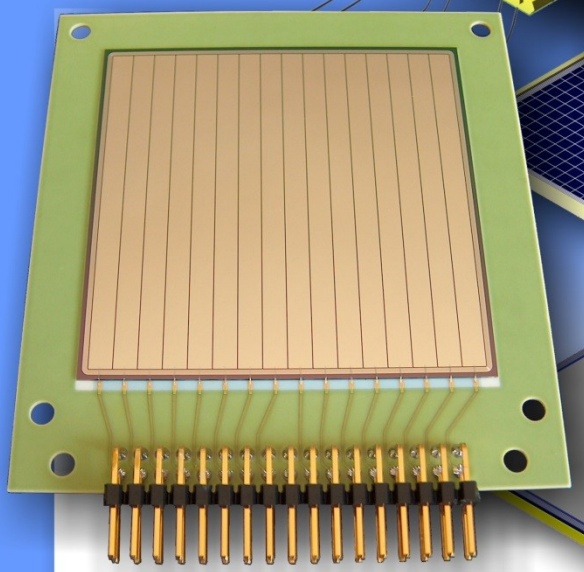
Design W1(DS) -300 NTD material for GANIL

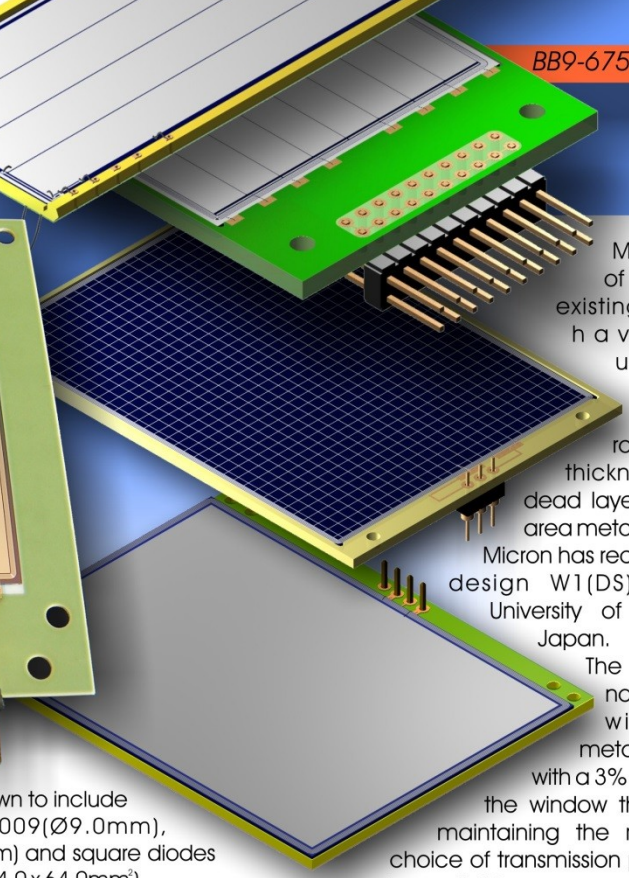
New Designs

Both the TIARA and ORRUBA experiments have been upgraded with single sided strip detectors to compliment the X2 and X3 PSD assemblies already supplied by Micron.

BB10-65 um for ORRUBA

BB9-675 um for TIARA





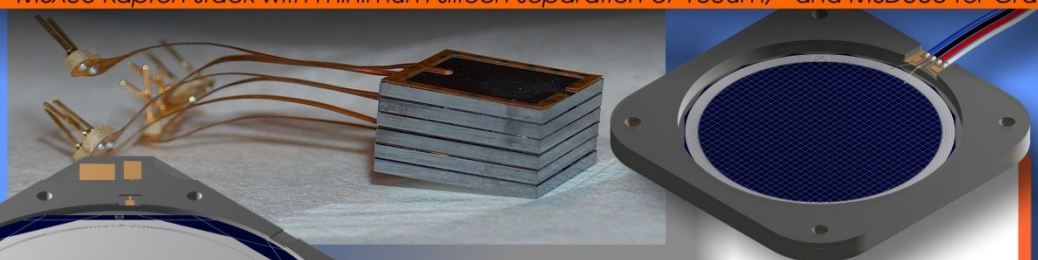
Many of Micron's existing designs have been updated to offer a greater range of silicon thickness, implant dead layers and active area metal coverage.

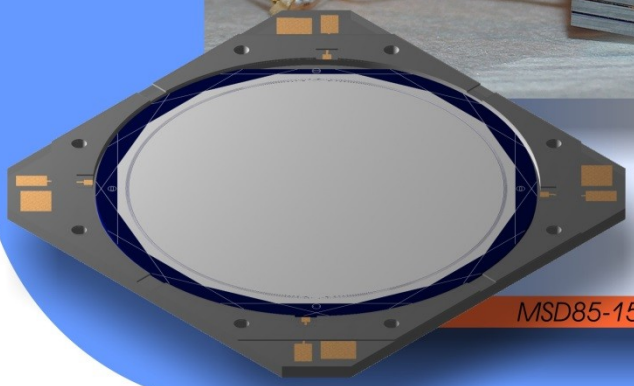
Micron has recently supplied design W1(DS)-65 um to University of Huelva and Japan.

The MSX35 can now be offered with a total metal coverage or with a 3% grid to reduce the window thickness while maintaining the rise time . A choice of transmission packages are also available.

The range of single area diodes has grown to include circular MSD062(Ø6.2mm), MSD009(Ø9.0mm), MSD020(Ø20.0mm), & MSD85(Ø85.0mm) and square diodes MSX075 (7.5 x 7.5mm^2) & MSX40 (64.0 x 64.0mm^2).

BELOW - MSX03 Kapton stack with minimum silicon separation of 150um, and MSD035 for Crater





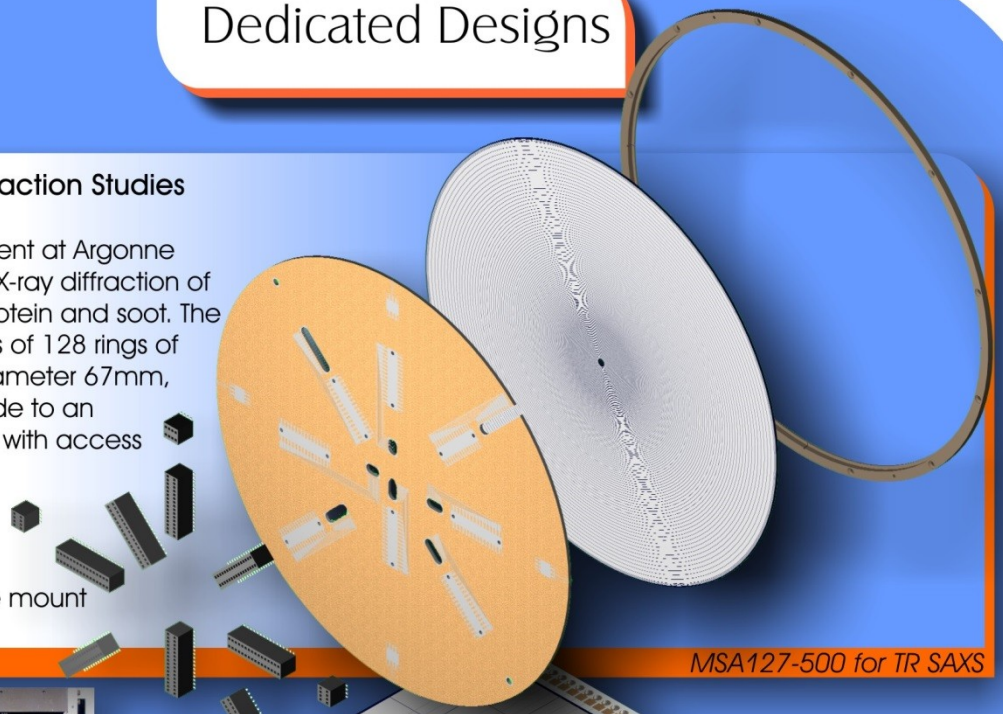
Micron is continually offering new packages for existing detector designs to suit different experimental configurations. Many FR4 PCBs can be manufactured on ceramics for operation in ultra high vacuum environment .

MSD85-1500um space qualified assembly

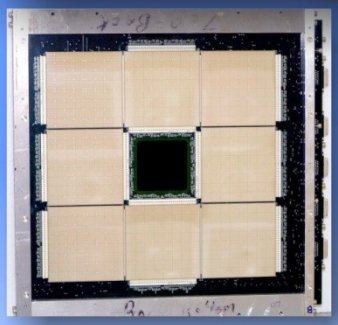
Dedicated Designs

Syncrotron Diffraction Studies

The TR SAXS experiment at Argonne intends to study the X-ray diffraction of materials such as protein and soot. The MSA127-500 consists of 128 rings of maximum active diameter 67mm, mounted junction side to an aluminium substrate with access windows for wire bonding. Readout electronics are connected to the substrate via surface mount connectors.



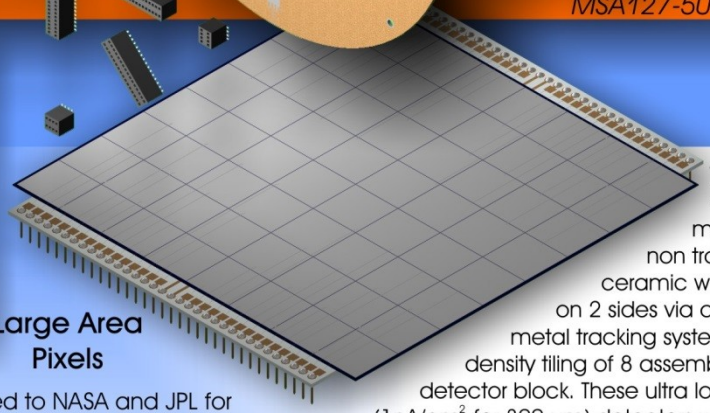
MSA127-500 for TR SAXS



Large Area Pixels

The MSPX080 has been supplied to NASA and JPL for manned simulations to Mars. The 8x8 pixel array covers an active area of 99x99mm^2.

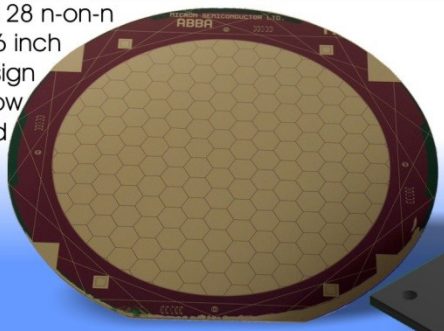
MSPX080 in 8 assembly block



This device is mounted on a non transmission ceramic with readout on 2 sides via a double metal tracking system for high density tiling of 8 assemblies on a 3x3 detector block. These ultra low current (1nA/cm^2 for 300 um) detectors will be excellent for large area coverage with minimum dead space between devices.

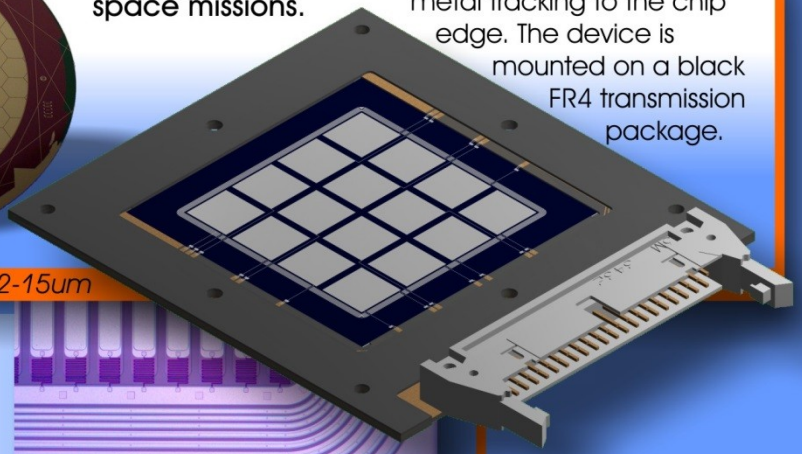
MSPX080 in sigle form

Abba, a 128 n-on-n pixilated 6 inch wafer design with shallow implanted junction window.



Ultra thin Pixel arrays for future space missions.

The MSPX042-15um has a 4x4 pixel array with single metal tracking to the chip edge. The device is mounted on a black FR4 transmission package.



MSPX042-15um

The Alpha experiment is a cold antihydrogen trap at Cern. The silicon detector is a double sided DC coupled device with polysilicon resistors. The junction side consists of 128 strips with a pitch of 227um and orthogonal ohmic strip pitch of 875um.

CVD Diamond Detectors

Diamond Properties

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

Low Z, tissue equivalent

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

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

Very **high resistivity** (10^{13} – 10^{16} Ω.cm)

Natural UV sensitivity

Detector Properties

Solid state ionisation chamber

Low capacitance (typically pF level)

High energy resolution
(1% level at 5.48 MeV)

Technical Specifications

High purity CVD diamond

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

Dimensions:
- SC CVD: 2 x 2 mm to 4.5 x 4.5 mm
- PC CVD: 2 x 2 mm to 20 x 20 mm

Thickness
- 100 µm and 500 µm standard
- other thicknesses available on request

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

Applications

High energy physics (beam positioning, beam monitoring)

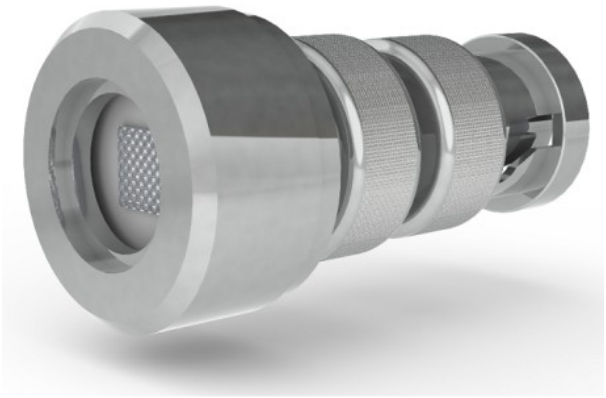
Civil nuclear (medical, oil & gas)

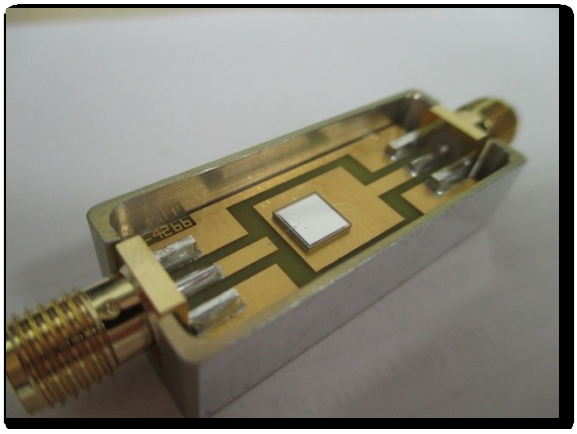
Medical therapy, dosimetry

Synchrotrons and cyclotrons

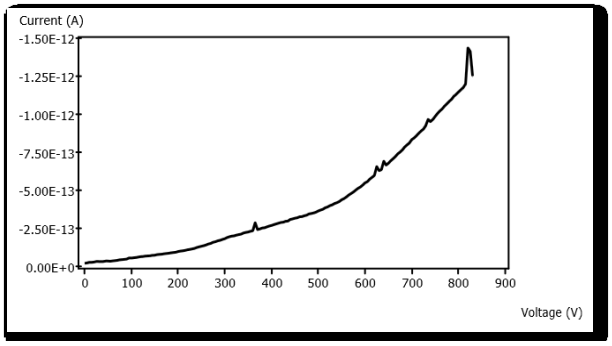
Deep UV (<225 nm)

Neutron detection (fast and thermal)

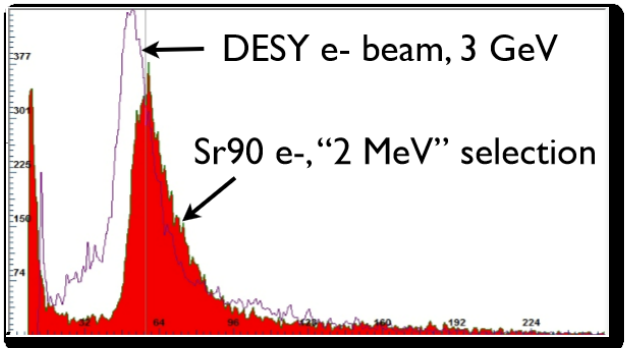




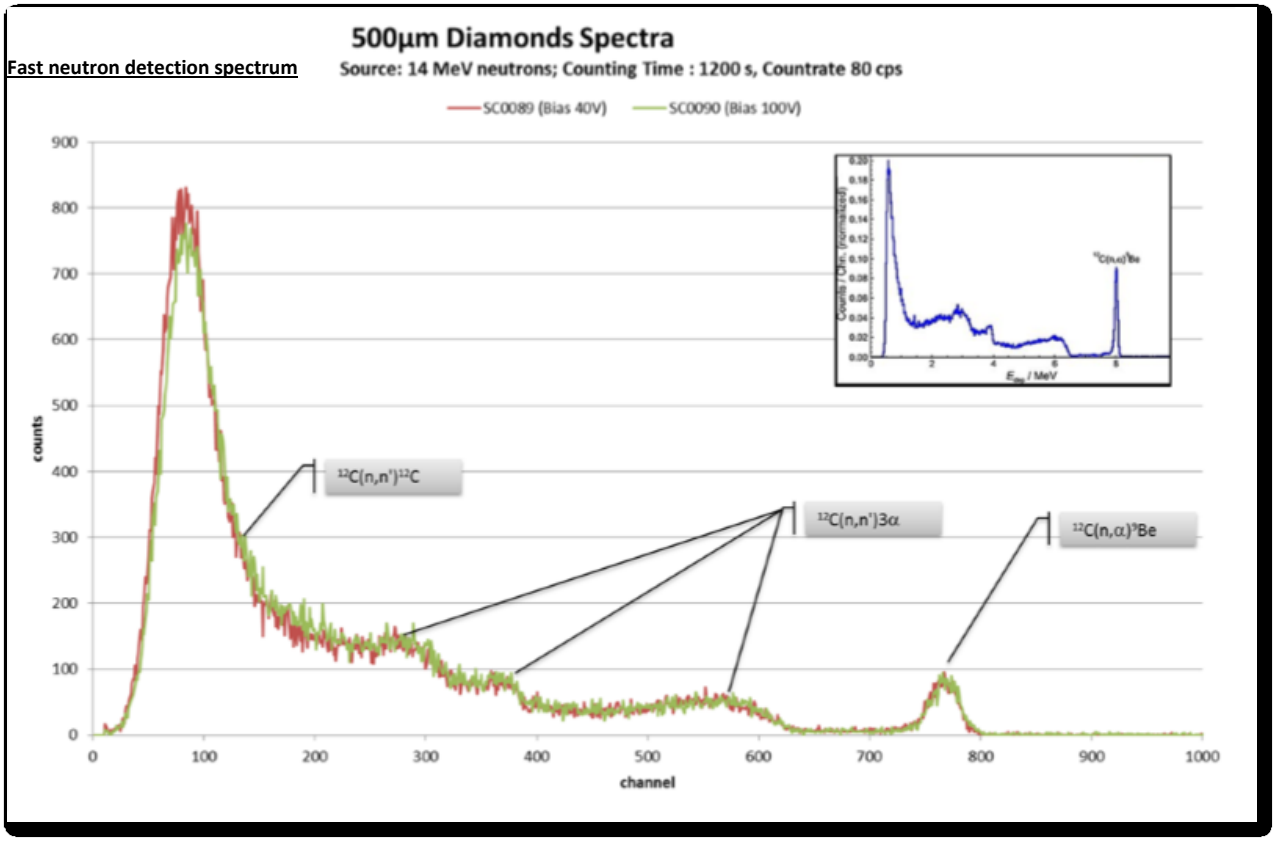
I-V curve of a SC CVD detector



Response to 2 MeV and 3 GeV electrons



Fast neutron detection spectrum



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