

# ULTRA and ULTRA AS

## Ion-Implanted-Silicon Charged-Particle Detectors

### ULTRA

- **The standard for charged-particle detector spectroscopy.**
- **Ultra-thin entrance contact for optimum energy resolution.**
- **High geometric efficiency due to close detector-to-can spacing.**
- **Rugged and reliable.**
- **Gold-plated cans for contacts that last a lifetime.**
- **Advanced surface passivation for total device stability.**
- **ORTEC quality and reliability.**
- **Bakeable up to 200°C (requires special order).**

### ULTRA-AS

- **Low-background version for alpha spectroscopy.**

ULTRA ion-implanted-silicon detectors for alpha and beta spectroscopy are the most advanced charged-particle detectors ever produced. They possess the reliability that has made ORTEC the sole supplier to NASA of silicon detectors for space applications.

Both the entrance and the back contact are ion implanted. The entrance contact is an extremely thin (~500 Å) boron implantation. The distance between the silicon surface and the top of the mounting can is <1 mm providing maximum geometric efficiency. The front contact can be easily cleaned with a solvent-moistened cotton swab.

ULTRA detectors have gold-plated mounting cans. The superior electrical conductivity of gold, which can never oxidize, makes it the choice versus stainless steel or aluminum. An advanced surface passivation that covers the critical silicon dioxide layer guarantees absolute device stability.

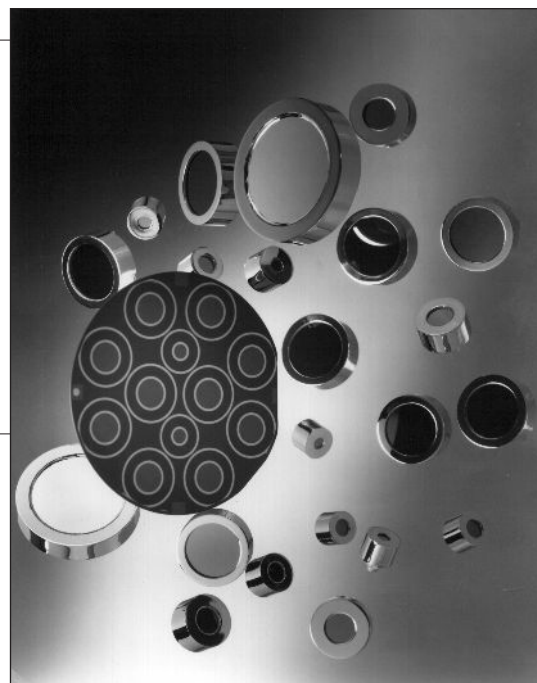
The extremely low leakage current permits specifying the energy resolution at 1- $\mu$ s amplifier shaping time constant.

Low-background ULTRA-AS detectors are made with special low-background materials and have an optimized depletion thickness to minimize background counts from cosmic rays. All ORTEC Alpha Spectrometers (Alpha Aria, Alpha Duo, Alpha Ensemble, 576A, and SOLOIST) are equipped with either ULTRA-AS detectors or R-Series, Ruggedized Surface Barrier Detectors. All these spectrometers, when equipped with a 450 mm<sup>2</sup> detector, have a warranted background performance of  $\leq 24$  counts per day, over the 3- to 8-MeV energy range.

The dimensions of the ULTRA and ULTRA-AS detector mounting cans being identical to those of the corresponding size A or R Series detectors ensure that ULTRA detectors will fit perfectly in any application where A or R Series detectors are being used now.

\*Extensive care regarding detector and chamber cleanliness can result in background count levels as low as 0.05 counts/hr/cm<sup>2</sup> of active area, corresponding to 6 counts/24 hours, for a 450 mm<sup>2</sup> active area.

\*\*ULTRA Series detectors require positive bias voltage. R Series detectors require negative polarity bias.



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## Ion-Implanted-Silicon Charged-Particle Detectors



### Ordering Information

<b>ULTRA Specify B, C or "Blind" T** Mount.</b>									
Active Area (mm <sup>2</sup> )	Guaranteed Maximum Resolution* (keV FWHM)		Minimum Depletion Depth 100 μm	Guaranteed Maximum Resolution* (keV FWHM)		Minimum Depletion Depth 300 μm	Guaranteed Maximum Resolution* (keV FWHM)		Minimum Depletion Depth 500 μm
	α	β	Model No.	α	β	Model No.	α	β	Model No.
25	12	6	U-012-025-100	11	5	U-011-025-300	11	5	U-011-025-500
	14	8	U-014-025-100	13	7	U-013-025-300	12	6	U-012-025-500
50	12	6	U-012-050-100	11	5	U-011-050-300	11	5	U-011-050-500
	14	8	U-014-050-100	13	7	U-013-050-300	13	7	U-013-050-500
100	13	7	U-013-100-100	12	6	U-012-100-300	12	6	U-012-100-500
	15	9	U-015-100-100	14	8	U-014-100-300	14	8	U-014-100-500
150	14	9	U-014-150-100	13	8	U-013-150-300	12	7	U-012-150-500
	16	10	U-016-150-100	15	9	U-015-150-300	14	9	U-014-150-500
300	16	11	U-016-300-100	15	10	U-015-300-300	14	9	U-014-300-500
	19	14	U-019-300-100	18	13	U-018-300-300	17	12	U-017-300-500
450	17	12	U-017-450-100	16	11	U-016-450-300	15	10	U-015-450-500
	21	16	U-021-450-100	20	15	U-020-450-300	19	14	U-019-450-500
600	22	17	U-022-600-100	21	16	U-021-600-300	20	15	U-020-600-500
	24	19	U-024-600-100	23	18	U-023-600-300	22	17	U-022-600-500
900	27	22	U-027-600-100	25	20	U-025-900-300	23	18	U-023-900-500
	33	28	U-033-900-100	30	25	U-030-900-300	28	23	U-028-900-500
1200	35	30	U-035-1200-100	30	25	U-030-1200-300	28	23	U-028-1200-500
	42	37	U-042-1200-100	37	32	U-037-1200-300	35	30	U-035-1200-500
2000	50	45	U-050-2000-100	40	35	U-040-2000-300	35	30	U-035-2000-500
	58	53	U-058-2000-100	48	43	U-048-2000-300	43	38	U-043-2000-500
3000	60	55	U-060-3000-100	55	50	U-055-3000-300	50	45	U-050-3000-500
	70	65	U-070-3000-100	65	60	U-065-3000-300	60	55	U-060-3000-500

\* First three digits of Model No. indicate total system resolution FWHM for <sup>241</sup>Am, 5.486-MeV alphas, using standard ORTEC electronics and 1-μs shaping time constants.  
 \*\* "Blind" T Mount available up to 600-mm<sup>2</sup> ULTRAs.

<b>ULTRA-AS Specify B, C or "Blind" T** Mount</b>		
~100 μm active depth to minimize cosmic background		
Active Area (mm <sup>2</sup> )	Alpha Resolution* (keV FWHM @5.486 MeV)	Model No.
300	19	U-019-300-AS
450	20	U-020-450-AS
490	20	U-020-490-AS
600	24	U-024-600-AS
900	29	U-029-900-AS
1200	37	U-037-1200-AS
2000	53	U-053-2000-AS
3000	64	U-064-3000-AS

\* First three digits of Model No. indicate total system resolution FWHM for <sup>241</sup>Am, 5.486-MeV alphas, using standard ORTEC electronics and 1-μs shaping time constants.  
 \*\* "Blind" T Mount available up to 600-mm<sup>2</sup> ULTRAs.

#### To Order:

Add the appropriate letter **prefix** for the mounting desired.  
 Example: **BU**-016-300-100 or **TU**-016-300-100.\*\*

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### Mounting Arrangements

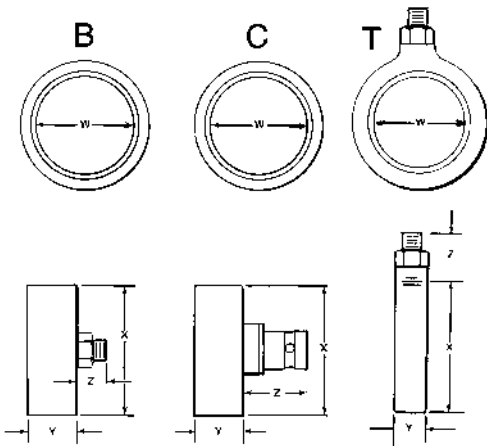
**B** Microdot connector on the rear of the can.

**C** BNC connector on the rear of the can.

**T** Microdot on the side of the can. Only one side of the can has an opening. Available up to 600 mm<sup>2</sup> active area.

V, W, X, Y, and Z dimensions are given in millimeters.

Detector Size (mm <sup>2</sup> )	W (Nominal)	Type B Rear Microdot			Type C Rear BNC			Type "BLIND" T Side Microdot Mount		
		X	Y	Z	X	Y	Z	X	Y	Z
025	5.6	16.7	12.3	7.1	16.7	12.3	15.9	19.4	7.9	9.9
050	8.0	16.7	12.3	7.1	16.7	12.3	15.9	19.4	7.9	9.9
100	11.3	23.6	12.3	7.1	23.6	12.3	15.9	26.1	7.9	9.9
150	13.8	23.6	12.3	7.1	23.6	12.3	15.9	26.1	7.9	9.9
300	19.5	28.6	12.3	7.1	28.6	12.3	15.9	31.6	7.9	9.9
450	23.9	32.0	12.3	7.1	32.0	12.3	15.9	34.8	7.9	9.9
490	25.0	33.4	12.3	7.1	33.4	12.3	15.9			
600	27.6	36.1	12.3	7.1	36.1	12.3	15.9	38.4	7.9	9.9
900	33.9	45.2	12.3	7.1	45.2	12.3	15.9			
1200	40.0	48.8	12.3	7.1	48.8	12.3	15.9			
2000	51.0	65.5	12.3	7.1	65.5	12.3	15.9			
3000	62.0	76.2	12.3	7.1	76.2	12.3	15.9			
Tol.	±0.5	±0.3	±0.3	±0.3	±0.3	±0.3	±0.3	±0.3	±0.3	±0.3



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