

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.

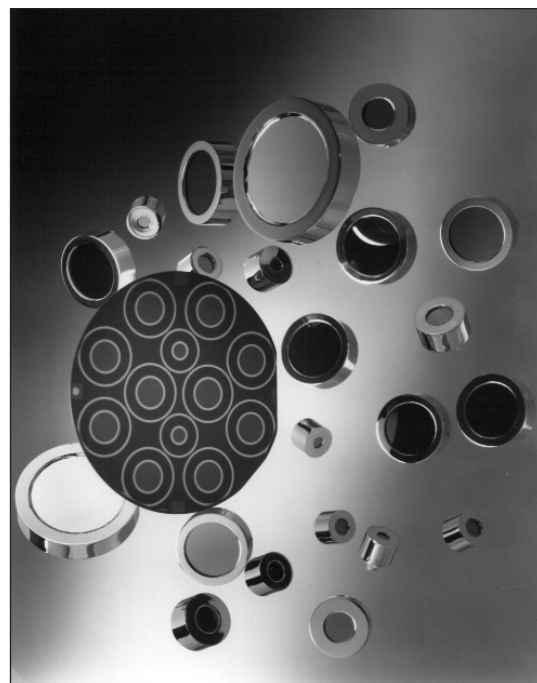
The extremely low leakage current permits specifying the energy resolution at 1- μ s amplifier shaping time constant.

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 mm² detector, have a warranted background performance of ≤ 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/cm² of active area, corresponding to 6 counts/24 hours, for a 450 mm² 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

| ULTRA Specify B, C or "Blind" T** Mount. | | | | | | | | | |
|---|--|----|-----------------------------------|--|----|-----------------------------------|--|----|-----------------------------------|
| Active Area (mm ²) | 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 ²⁴¹Am, 5.486-MeV alphas, using standard ORTEC electronics and 1-μs shaping time constants.
 ** "Blind" T Mount available up to 600-mm² ULTRAs.

| ULTRA-AS Specify B, C or "Blind" T** Mount | | |
|--|--|---------------|
| ~100 μm active depth to minimize cosmic background | | |
| Active Area (mm ²) | 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 |

* First three digits of Model No. indicate total system resolution FWHM for ²⁴¹Am, 5.486-MeV alphas, using standard ORTEC electronics and 1-μs shaping time constants.
 ** "Blind" T Mount available up to 600-mm² 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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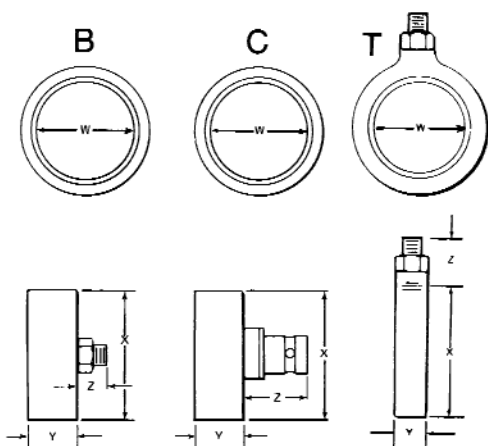
Ion-Implanted-Silicon Charged-Particle Detectors

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 mm² active area.

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

| Detector Size (mm ²) | 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 |



Specifications subject to change
051512

ORTEC[®]

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