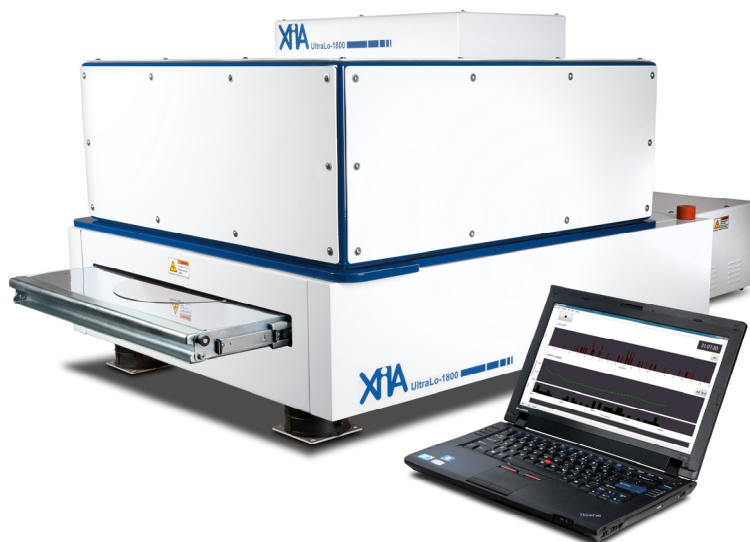


UltraLo-1800

Next Generation Alpha Particle Counter

Features & Benefits

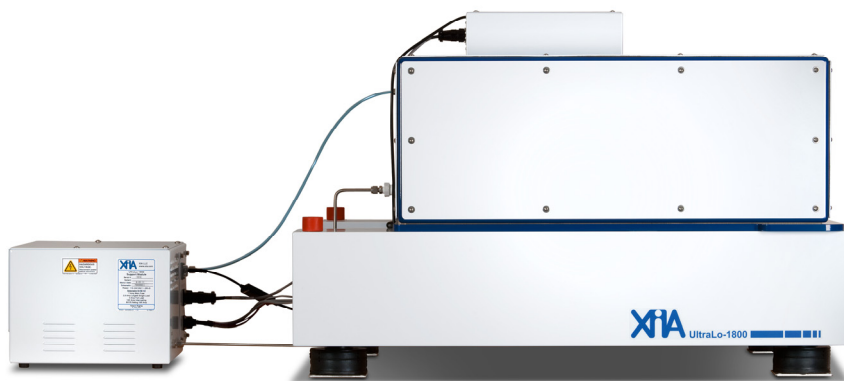
- **Electronic Background Suppression.** Dramatically reduces counting times; measure ULA samples in hours or days, not weeks or months.
- **Advanced sample analysis.** Energy information allows for the identification of isotopes on sample surfaces.
- **Complete instrument control via software.** Run management, data analysis, system health metrics, and much more.



The UltraLo-1800 is a windowless, ultra low background alpha particle counter designed to measure the alpha particle emissivity of solid materials. The system employs the patented technique of electronic background suppression, which drives achievable background rates to 0.0001 alphas/cm²/hr and below. This is a factor of 50 or more better than can be achieved by the conventional proportional counter systems that are currently available. With the UltraLo-1800, it becomes feasible to measure samples having emissivities in the 0.001 to 0.0005 alpha/cm²/hr range in fewer than 10 hours, and to measure emissivities below 0.0005 alpha/cm²/hr in fewer than 100 hours.

Performance category	Specification
Required counting time for measurement of ULA (0.001) sample ¹	(50%) 6 hrs, (25%) 24hrs, (12.5%) 90 hrs -- (measurement accuracy) time
Required counting time for measurement of LA (0.01) sample ¹	(50%) 30 min, (25%) 2.5 hrs, (12.5%) 9 hrs -- (measurement accuracy) time
Typical counter efficiency	> 90% of 2 π
Energy resolution (²³⁰ Th source)	< 9% FWHM (at 4.6 MeV)
Energy sensitivity range	1-10 MeV
Sample sizes (typical min - max)	300mm wafer (707cm ²) - 1800cm ²

1 – Sample assumed to be 300mm wafer (count times drop by factor of 2.5 when using max sample area)



Counting system includes:

- **Counting Module.** Sample handling, measurement chamber, signal processing electronics.
- **Support Box.** Power supplies, gas control, etc.
- **Laptop.** Windows 7 professional, x64.



Instruments That Advance The Art

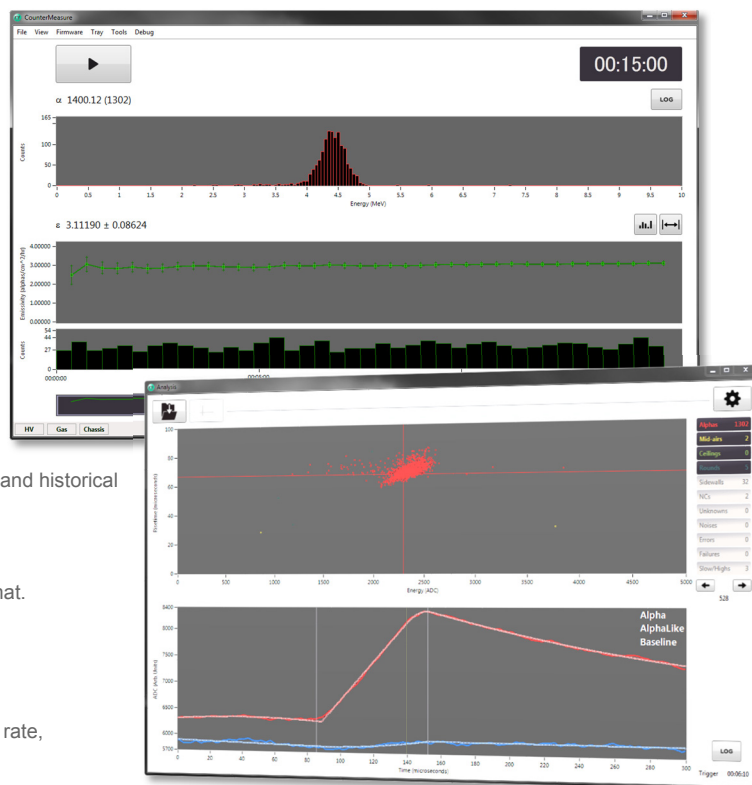
Interface Software

CounterMeasure – the interface to the UltraLo-1800 system – is a powerful data collection, analysis, and instrument control application.

The software capabilities include the display of energy spectra, time stamped events, system health metrics, measurement error evolution, and much more. Sophisticated yet intuitive, this tool provides users with unique insights into their alpha particle emission measurements.

Highlighted Features:

- **Robust Data Management:** Easily access and review both current and historical measurement data.
- **Data Export:** Generate and save datasets in convenient ASCII format.
- **Report Generation:** Measurement results saved to PDF reports.
- **System Health Information:** Monitor system noise levels, gas flow rate, operating bias and more.



Requirements	Specification
Minimum sample size (typical)	300mm wafer (707cm ²)
Maximum sample size	1800cm ²
Maximum sample weight	20 lbs (9 kg)
Maximum sample thickness	0.25 in (6.3 mm)
Counting Gas	Argon
Gas pressure	21psi (150kPa) ±5%
Line Voltage	100-240 (VAC) 50/60 Hz
Power Consumption (Instrument)	50 W (100 W maximum)
Power Consumption (Laptop)	30 W
System dimensions (L x W x H)	65 in x 35 in x 27 in (165 cm x 89 cm x 69 cm)
Weight	360 lb (163 kg)

To Dig Deeper

- [1] M. S. Gordon, D. F. Heidel, K. P. Rodbell, B. Dwyer-McNally and W. K. Warburton, "An Evaluation of an Ultralow Background Alpha-Particle Detector," *IEEE Transactions on Nuclear Science*, vol. 56, no. 6, 2009.
- [2] W. K. Warburton, B. Dwyer-McNally, M. Momayezi and J. E. Wahl, "Ultra-low background alpha particle counter using pulse shape analysis," in *IEEE Nuclear Science Symposium Conference Record*, Rome, Italy, 2004.
- [3] W. K. Warburton and B. Dwyer-McNally, "Electronic Background Rejection in a New Ultra-Low Background Alpha Particle Counter," *Nuclear Instruments and Methods in Physics Research Section B*, vol. 263, no. 1, pp. 221-224, 2007.
- [4] R. Wong, S.-J. Wen, P. Su and B. Dwyer-McNally, "Alpha emission of fully processed silicon wafers," in *International Integrated Reliability Workshop*, South Lake Tahoe, 2010.
- [5] W. K. Warburton, J. E. Wahl and M. Momayezi, "Ultra-low background gas-filled alpha counter". United States of America Patent 6732059, 4 May 2004.