

F3-CS

Thin-Film Analyzer



What is the F3-CS?

The F3-CS is a simple, robust instrument that measures reflectance, film thickness, and refractive index (with optional software upgrades).

Small Instrument for Small Samples

The F3-CS was designed to make quick work of measuring witness and coupon samples. With its integrated measurement stage, the F3-CS measures a mere 165 mm x 95 mm x 165 mm and, since it is powered by USB,* it is easily transportable. Yet it still contains all of Filmetrics' spectral analysis power.

Fast and Easy-to-Use

Everyone from line operators to R&D personnel can measure layers such as parylene and vacuum coatings in seconds. Our proprietary AutoBaseline function drastically shortens measurement setup and automatically adjusts instrument sensitivity. With the hands-free measurement mode, samples are measured by simply setting them face-down on the stage and results are provided in real time.

Thickness and Index Measurements

The optional film thickness software upgrade includes the optical constants (n & k) for all common dielectric and semiconductor materials (including parylene C, N, and HT). The F3-CS has everything necessary to measure hundreds of types of layers, no matter if they are on transparent or opaque substrates. For advanced users, the F3-CS can be further upgraded to measure refractive index.

* Other wavelength versions require external power. UV version requires external light source.

The Filmetrics Advantage

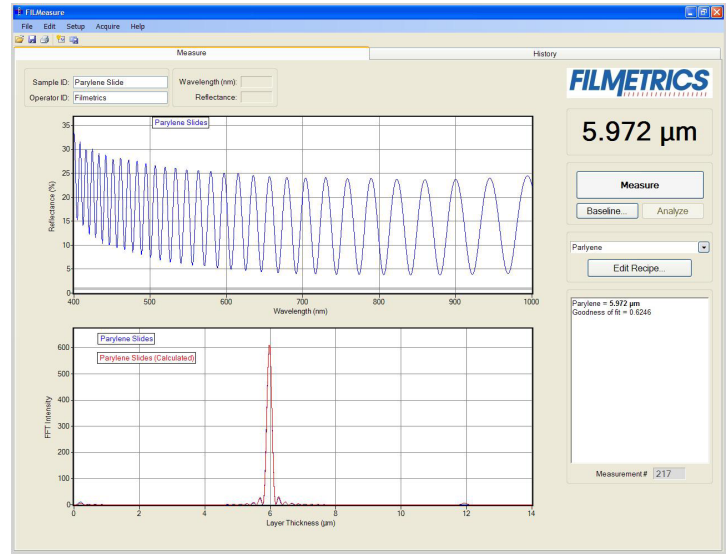
- World's leader in tabletop thin-film measurement
- 24-hour phone, e-mail, and online support
- Intuitive analysis software standard with every system

Additional Features

- Built-in online diagnostics
- Standalone software included
- Sophisticated history function for saving, reproducing, and plotting results

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The F3-CS measures parylene coatings using an easy-to-interpret interface.

General Specifications	F3-CS-UV	F3-CS	F3-CS-NIR	F3-CS-XT
Wavelength Range:	190 nm - 1100 nm	380 nm - 1050 nm	950 nm - 1700 nm	1440 nm - 1690 nm
Spot Size:	100 µm	100 µm	100 µm	100 µm
Light Source:	External, D2 + Halogen		Internal, 40k-Hour MTBF	
Measurements Specifications ¹				
Thickness Measurement Range:	1 nm - 40 µm	15 nm - 70 µm	100 nm - 250 µm	0.2 µm - 450 µm
Min. Thickness to Measure n and k ² :	50 nm	100 nm	500 nm	2 µm
Accuracy: The greater of	1 nm or 0.2%	2 nm or 0.2%	3 nm or 0.4%	5 nm or 0.4%
Precision ³ :	0.02 nm	0.02 nm	0.1 nm	1 nm
Stability ⁴ :	0.05 nm	0.05 nm	0.12 nm	1 nm

Spectrometer	
Wavelength Accuracy:	< 0.5 nm
Wavelength Reproducibility:	0.1 nm
Reflectance Accuracy for $R \leq R_{Std}^5$:	$0.01 * R_{Std}$
Reflectance Accuracy for $R > R_{Std}^5$:	$0.01 * R_{max} / R_{Std}$
Photometric Accuracy:	0.01 A
Noise:	< 0.0002 A rms
Stray Light:	< 0.25% at 500 nm

General Requirements	
Power: F3-CS-UV	100 - 240 VAC, 70 W
Power: F3-CS	USB-Supplied
Power: F3-CS-NIR / F3-CS-XT	100 - 240 VAC, 10 W
Computer Interface:	USB 2.0
Processor Speed:	1 GHz min.
Certifications:	CE EMC and safety directives

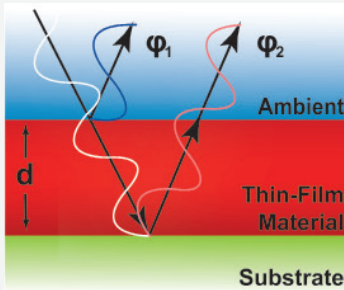
Operating System	
PC:	Windows XP (SP2) - Latest Windows (64-bit)
Mac:	OS X Lion - Latest Mac OS running Parallels

¹ With optional software upgrades, material dependent.
² Index measurements require UPG-Thickness-to-n&k.
³ 1σ of 100 measurements of 500 nm SiO₂-on-Si. Average of 1σ over 20 successive days.
⁴ 2σ of daily average of 100 measurements of 500 nm SiO₂-on-Si over 20 successive days.
⁵ R_{Std} is reflectance of the reflectance standard. R_{max} is the maximum measured reflectance over the wavelength range.

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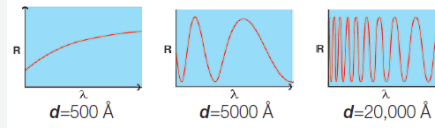
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How Does It Work?



When light encounters an interface between two materials, it is partially reflected. The wave-like nature of light causes reflections from multiple interfaces to interfere with each other, resulting in oscillations in the wavelength spectrum of the reflected light.

Determination of thickness (d)



From the frequency of these oscillations, we determine the distance between the different interfaces and thus, the thickness of the materials (with more oscillations meaning greater thickness). Other material characteristics are also measured, such as refractive index and roughness.

FILMeasure Software - The Building Blocks of Thin-Film Analysis

FILMeasure is the analysis software that comes with every Filmetrics single-spot measurement instrument. It follows a modular approach so you can customize to fit your measurement needs. Here are the modules you need for the different measurement applications:

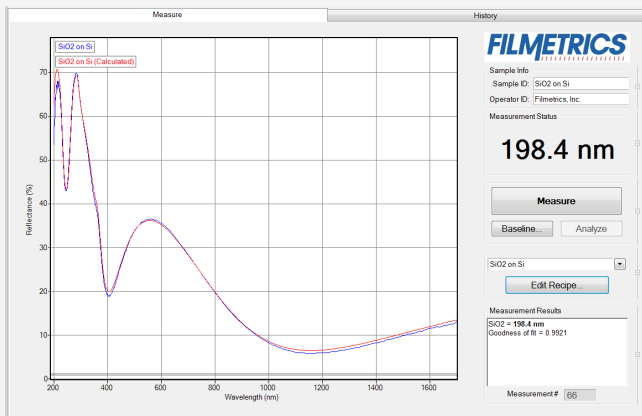
Reflectance Measurements:
Base FILMeasure software
(standard)

Thickness Measurements:
UPG-RT-to-Thickness
(optional)

Refractive Index Measurements:
UPG-Thickness-to-n&k
(optional)

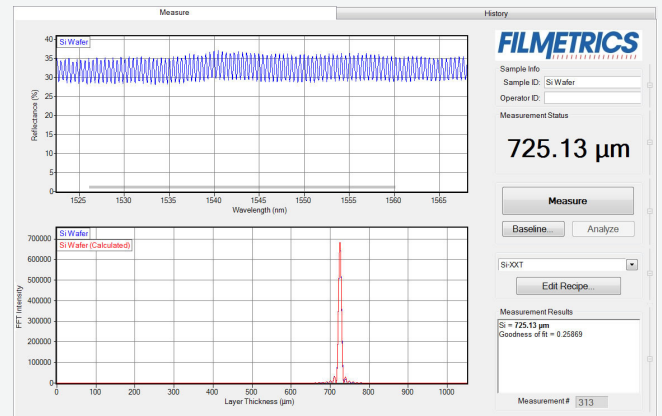
FILMeasure offers two analysis modes: Spectrum-Matching and FFT. In Spectrum-Matching mode, you can analyze thickness as well as refractive index, whereas FFT mode is only for thickness but is often more robust for thicker films. Depending on the actual materials of your samples, layer stacks of up to dozens of individual layers can be analyzed.

Spectrum-Matching Analysis



With Spectrum Matching, you can analyze thickness from 1 nm to 450 μm and do so in a split second. It also enables you to measure the refractive index of your samples (UPG-Thickness-to-n&k needed).

FFT (Fast Fourier Transform) Analysis



If your sample layers are 10 μm or greater, the FFT analysis makes quick work of your thickness measurements. Real quick. Like 1kHz quick.

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