



## EpiCurve® TT product family

LayTec's EpiCurve® TT family of products are optical in-situ systems featuring wafer curvature, emissivity-corrected wafer temperature and multi-wavelength reflectance. EpiCurve® TT system is a combination of LayTec's EpiCurve® and EpiTT technology.

### Features

#### Curvature

- Wafer selective in-situ curvature measurement
- Asphericity measurements to obtain information on wafer curvature along two perpendicular directions: for systems with Advanced Resolution (AR)
- Reflectance compensation detection (RCD) for enhanced dynamic range

#### Temperature

- Wafer/pocket selective true temperature (TT) measurement
- High precision calibration: factory calibration against a certified black body source and on-site calibration of the complete set-up with LayTec's calibration tool AbsoluT
- Line-scan measurements across the wafers for uniformity evaluation
- Configurations with up to two additional EpiTT heads (Twin/Triple) for temperature and reflectance measurement on additional positions (wafer rings / heating zones)

#### Reflectance

- Wafer selective reflectance measurements at three wavelengths
- Wafer selective growth rate analysis
- Recipe-controlled automated growth rate fit for multi-layer structures
- Uniformity checks (e.g., for comparison center to edge): reflectance and temperature measurements at several positions on the wafer, on different wafers and on different wafer rings (in case of Twin, Triple)
- Line-scan measurements across the wafers for uniformity evaluation

## Features

- Optimized for 24 h / 7 day operation in production environment
- Measurements on single and multiple wafers (rotating or non-rotating), supporting satellite type susceptors even with multiple wafers per satellite
- Wobble compensating optics

## Communication / Integration

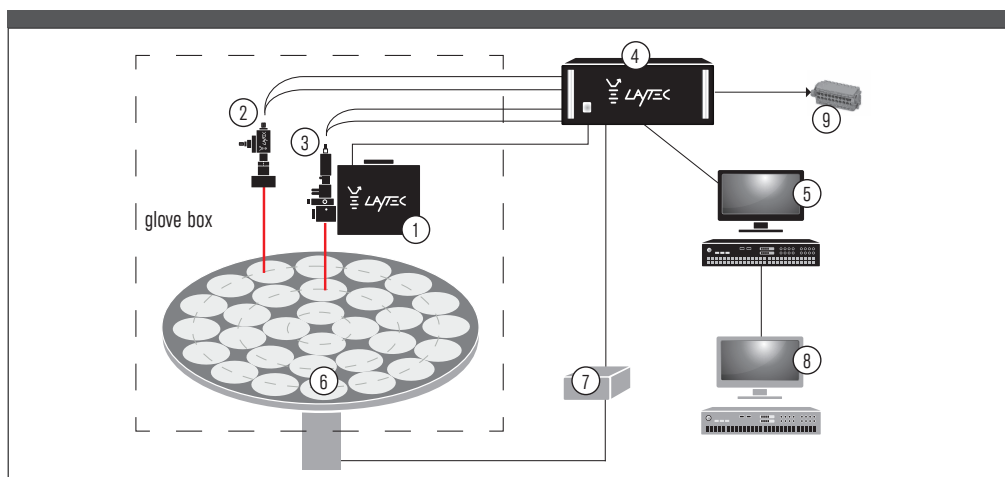
- Data exchange with growth system control computer via hardware interface and/or TCP/IP protocol based software interface. Pre-configurations is possible for different growth systems.
- Remote controllable from growth recipe
- Heartbeat/watchdog signals for SPS integration
- SECS/GEM implementation on request
- Analog output 4–20 mA

## Measurable growth parameters

Parameter	EpiCurve® TT	EpiCurve® TT AR
Curvature range*/typical accuracy ( $\text{km}^{-1}$ )	– 1950 (convex) to + 800 (concave)/ $\pm 3$	– 1950 (convex) to + 800 (concave) / $\pm 0.5$ (asphericity: $\pm 0.3$ ) <small>* In center zone depending on measurement geometry</small>
Reflectance	Noise typically better than $\pm 0.5 \%$	
Growth rate	Accuracy better than $\pm 1 \%$	
Temperature range	T=450 °C to ~ 1300 °C for large viewport systems / accuracy better than $\pm 1\text{K}$ T=500 °C to ~ 1400 °C for narrow viewport systems / accuracy better than $\pm 1\text{K}$ Other temperature ranges on request (e.g. 1500 °C for UVLED applications, 1800 °C for SiC)	
High temperature optical database includes	AlGaIn, AlGaAs, InGaIn, AlInGaP, Ge, InP, GaAs, $\text{Si}_3\text{N}_4$ , Si, SiC Other materials available on request	

## System components

### Example drawing EpiCurve®Twin TT



### Parts

- 1 – Optical head for curvature measurements EpiCurve®
- 2, 3 – EpiTT fiber optical heads for true temperature (TT) and reflectance (R) measurements
- 4 – Electronic control unit
- 5 – LayTec control computer (includes: measurement PC, TFT flat screen, mouse, keyboard)
- 6 – Deposition system (not delivered by LayTec)
- 7 – Rotation encoder (optional by LayTec on request)
- 8 – Growth control computer (not delivered by LayTec)
- 9 – Additional analog output 4–20 mA (wiring not supplied by LayTec)

## Description of the parts

EpiCurve® TT optical head for curvature, reflectance and temperature measurements

The products of our EpiCurve® TT family are equipped with 3 reflectance wavelengths as a standard. Wavelength combinations are available on request.

Depending on your application, the curvature measurement is performed by a red or a blue laser.

### Light sources

Light source	Curvature		Reflectance
	Semiconductor laser		High brightness LED module
Standard wavelengths and bandwidth (nm)	405 (blue)	670 (red)	405 ± 1, 633 ± 1.5, 950 ± 5, others on request
Life-time according to manufacturer (h)	>10 000	>20 000	>20 000

### Measurements frequency

Parameter	Susceptor rotation (rpm)	Number of data points per second (Hz)
Curvature		18...35
Reflectance	3... ~ 20	100
	20... ~ 100	2000

The number of measurements within one susceptor revolution (max. sampling rate per round) and the time between the measurements (data repetition rate) depend on susceptor / carrier rotation.

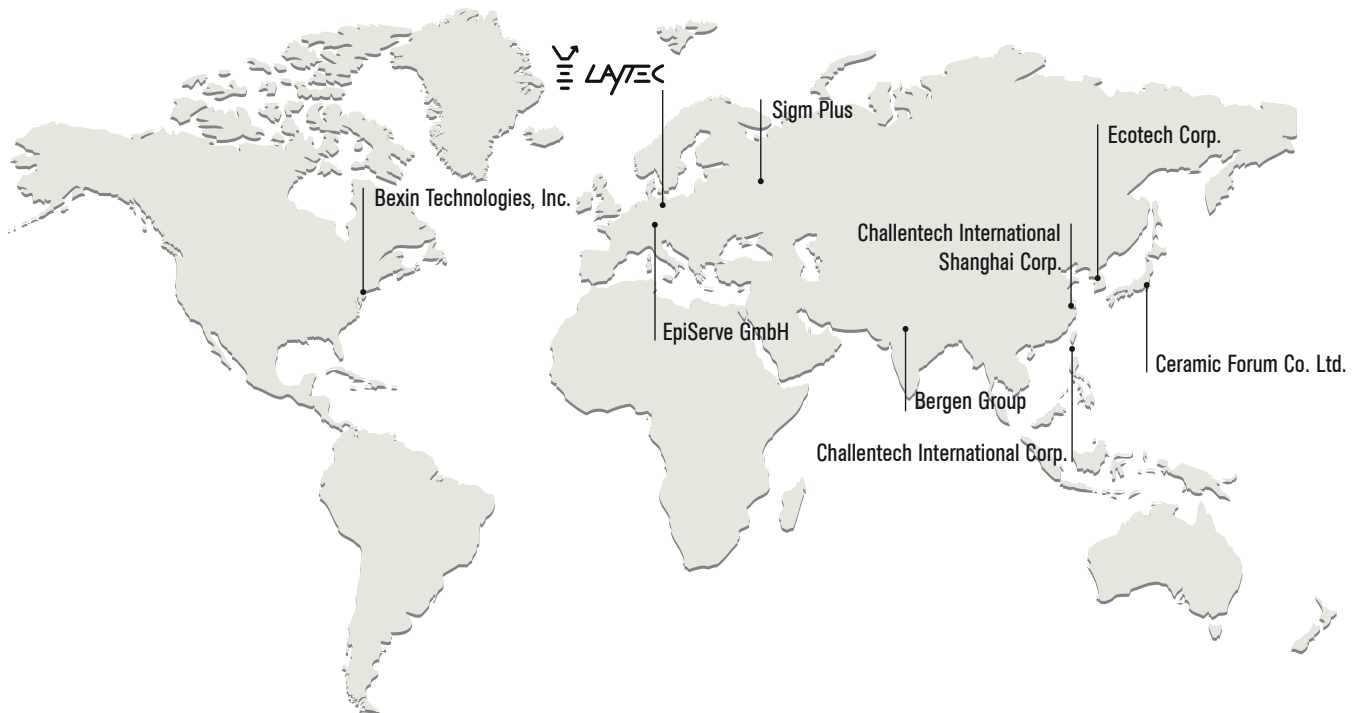
### Examples for different rotation frequencies

Typical susceptor / Carrier rotation (rpm)	Rotation frequency example (rpm)	Repetition rate (sec)	Spatial resolution: max. number of measurements per revolution	
			Curvature (Based on 18 Hz)	Reflectance
0 and 3...~25	10	6	100	600
	20	3	50	300
20...~120	60	4	18	2 000
	120	2	9	1 000

### Electronic control unit and PC

The electronic control unit and measurement PC are standard 19" boxes that can be easily mounted into existing 19" racks.

## Global Network



We are the leading manufacturer of integrated optical metrology systems for all thin-film processes. LayTec systems can be customized for every specific process. For your specific application please contact LayTec directly or your local LayTec representative:

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\* provide technical service as well

Specifications are subject to further technical development and may differ from those given in the data sheet. In certain cases, performance may be limited by reactor type and/or growth conditions. Please consult our technical sales team to see how LayTec metrology can best serve your specific application.

For further information please contact:

**LayTec AG**  
Seesener Str. 10-13  
10709 Berlin, Germany

Tel.: +49 (0)30 89 00 55-0  
Fax: +49 (0)30 89 00 55-180  
Email: [info@laytec.de](mailto:info@laytec.de)  
Web: [laytec.de](http://laytec.de)



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