QUANTUM YIELD BERLIN

PRODUCT BROCHURE

THE LUQY FAMILY

LuQY Pro

PLQY, ELQY & QFLS in seconds

Compact, rapid, absolute luminescence measurements and analysis. Made easy.



Thin films

Layer stacks

Complete devices

OVERVIEW

Absolute luminescence, from film to finished device

LuQY Pro is a precisely calibrated measurement system that rapidly resolves absolute PL/EL of your sample, and instantly calculates its PLQY/ELQY and QFLS. This versatile tool is easy-to-use and is oriented to understanding your end-device, offering automated control of a dynamic range of optoelectrical measurement conditions. Define custom recipes, run them remotely, and connect reliable analysis to existing infrastructure so that the tool integrates with your unique research workflow.

Precisely calibrated

Calibrated integrating sphere and spectrometer for absolute light detection, tested before the tool is shipped

Device-oriented excitation

Whether by laser or an integrated SMU, the software matches the excitation to 1-sun equivalent carrier densities

Instant multi-faceted insights

Automatic analysis by the integrated LuQY Control software, based on established scientific methods.

At a glance

Spectral range	550–1050 nm (customisable)
Excitation	532 nm (customisable) 0.001–20 suns
Spot sizes	0.1 and 1 cm² (smaller on request)
Electrical excitation	±10 V · ±150 mA
Samples	≤ 30 × 30 × 10 mm (holder customisable)
Subcells	up to 6 contactable

Instant results

- PLQY
- QFLS/ iV_{OC}
- ELQY
- ΔV_{NR}
- Diode ideality factor
- pseudo FF and JV curves

Your sample should be the complicated part. Not the measurement.

SHOEBOX-SIZE FORM FACTOR

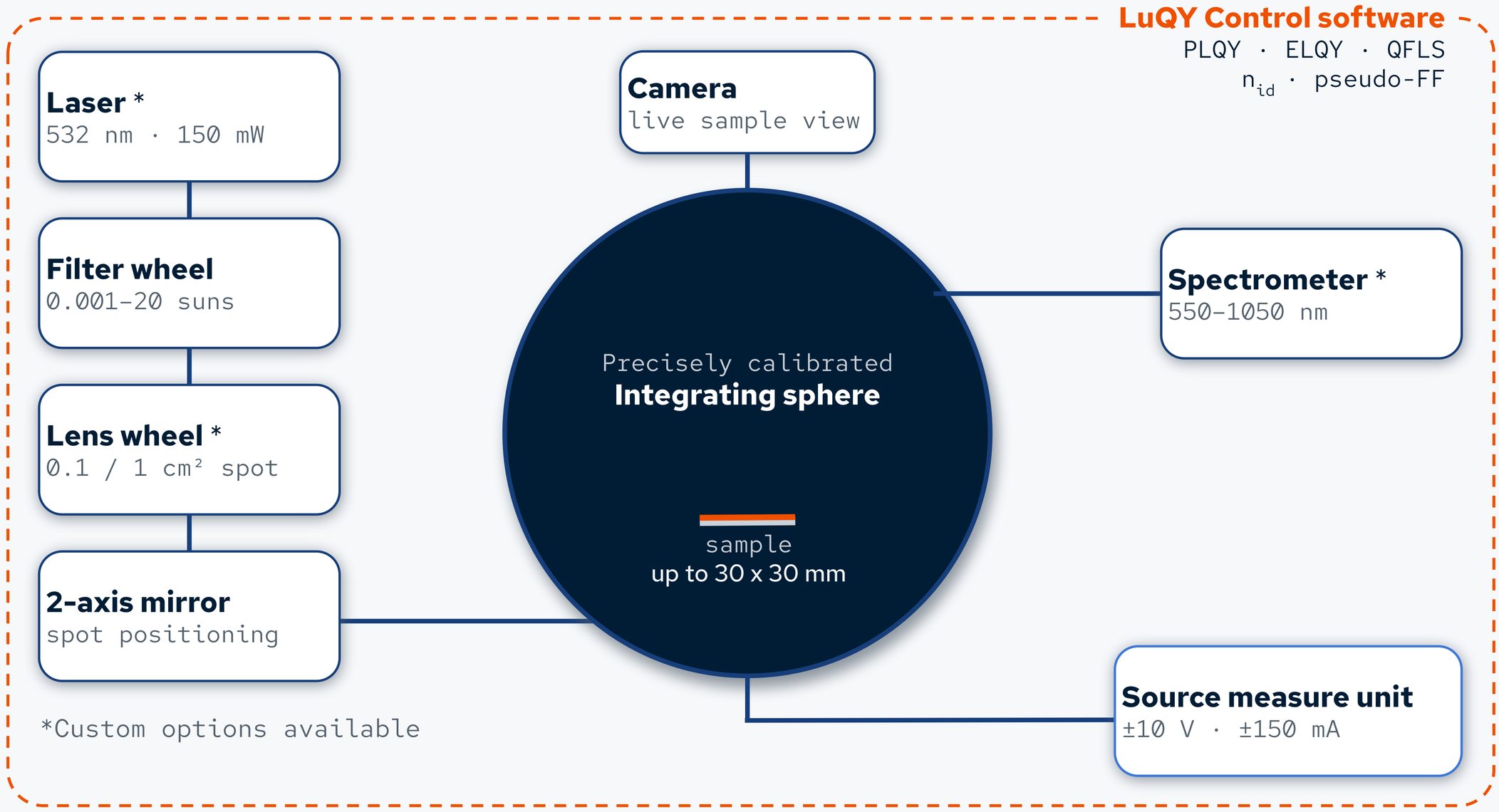
Integrated design

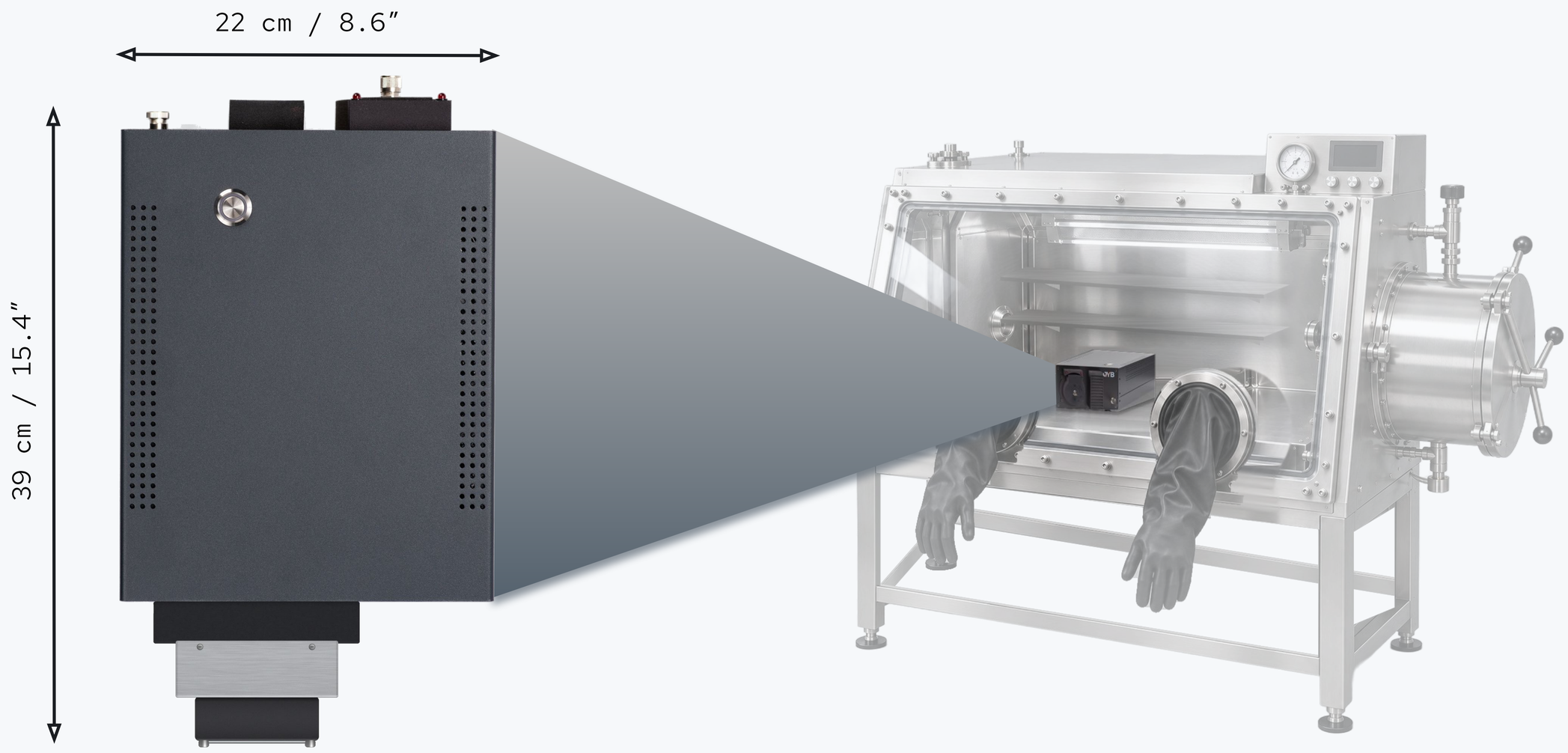
Calibrated hardware

Glovebox compatible

All-in-one hardware. Compact footprint.

A Peltier-cooled laser with motorized optics for 4 orders of excitation intensity, and variable spot size. An SMU for integrated electrical biasing. An integrating sphere that collects every photon the sample emits, calibrated to a spectrometer which records absolute luminescence from the UV till the NIR. All seamlessly integrated to an in-built software.





SOFTWARE
| LUQY CONTROL

Versatile software control.

Just plug & play.

The inbuilt LuQY Control software offers uncomplicated yet powerful measurement control, and shows everything live – the spectra, the sample and the calculated PLQY & QFLS/iV_{OC}. Run complete & automated measurement recipes, control it remotely and configure database integration of the results for swift & hands-free characterization.

1 | Live view - spectrum & sample

3 | Instant PLQY/ELQY and QFLS



2 | Easy control on device-oriented settings

4 | Acquisition in seconds

Automate sweeps and analysis

- Sweeps of laser intensity, SMU biasing and laser position
- One-click pseudo-JV curves and ideality factors in minutes

Remote control

- APIs for remote access of measurement software
- Design & save automated sequences for your workflows

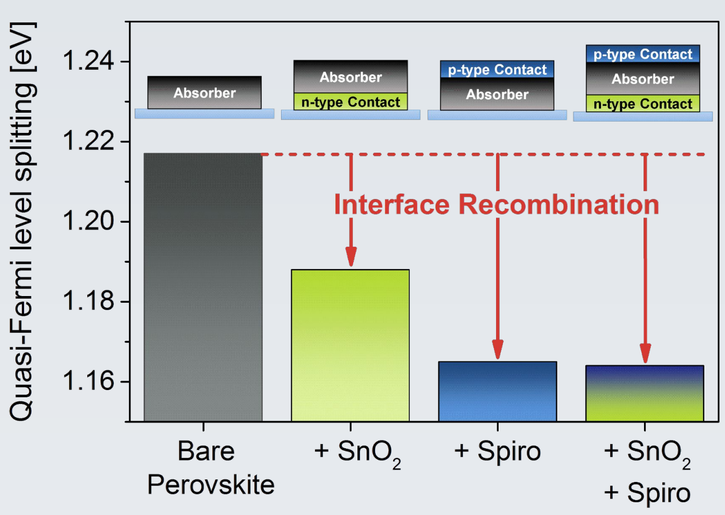
Ready-to-use open data

- Automatic .txt result files
- Database integration: MySQL, PostgreSQL, SQL Server, SQLite
- QYB Lab and NOMAD Oasis

APPLICATIONS

From loss analysis & process control to efficiency potentials

QUANTITATIVE | COMPARABLE | PREDICTIVE



Recombination analysis

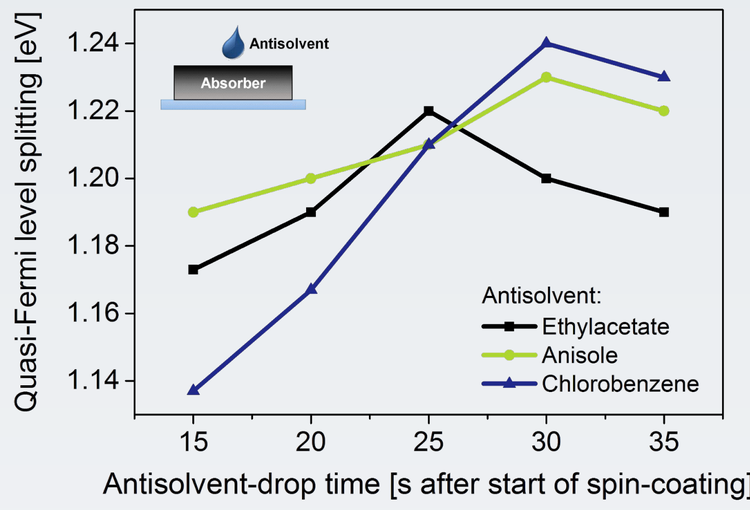
Resolve bulk vs. interface losses

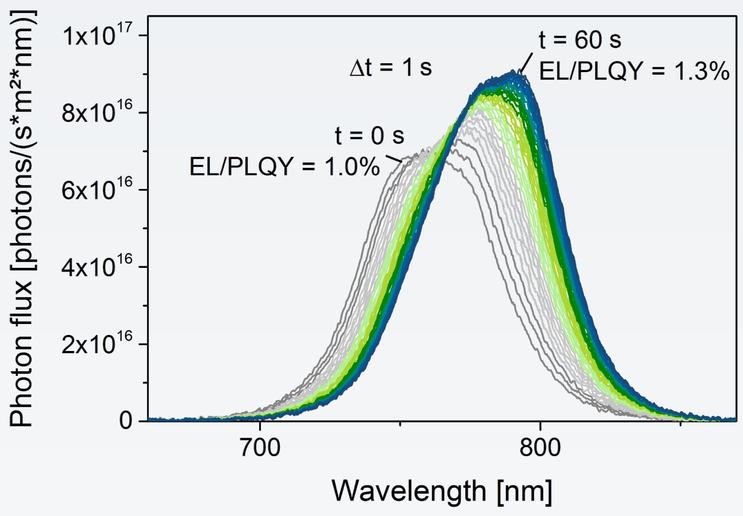
Quantify layer-by-layer changes in PLQY/QFLS under 1-sun excitation to isolate bulk and interfacial recombination losses in films, layer stacks, solar cells and LEDs.

Process control

Quality assessment

Rapid checks after each fabrication step, or accelerated screening of process parameters in, e.g. antisolvent studies.





Fast acquisition

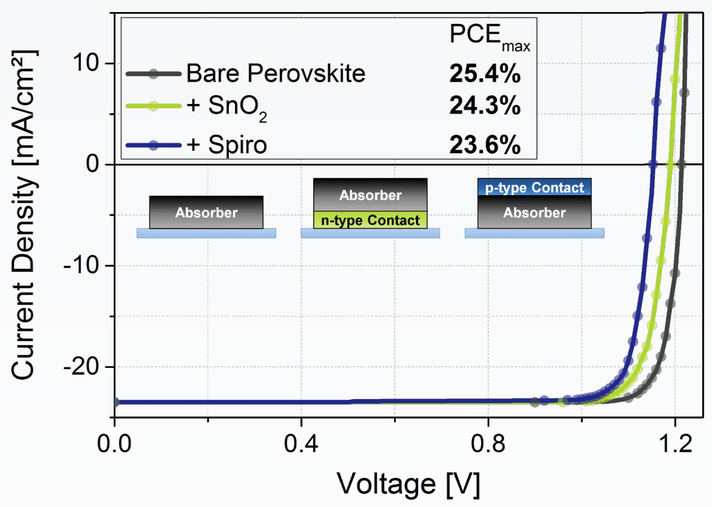
Stability and tracking

Track shifts in spectrally resolved emission, intensity, ELQY/PLQY and QFLS from 10 ms to several hours.

Predictive capacity

Evaluating efficiency potentials

Ideality factors and pseudo-JV curves from intensity- or voltage-dependent EL/PLQY and iV_{OC} reveal the efficiency cap due to each additional layer in the stack.



IN RESEARCH

Scientific publications and achievements

50+

peer-reviewed publications with QYB's measurement systems

Full list here

LuQY measurement systems are validated as valuable methodology in peer-reviewed publications and are widely used in the photovoltaics community, in academic research and industrial development alike.

Published in

Nature · Nature Energy · Nature Photonics · Nature Communications · Science · Science Advances · Joule · Advanced Materials · Advanced Energy Materials · Energy & Environmental Science · ACS Energy Letters · Solar RRL

Quantify stack recombination

Resolve time-dependent effects

Quality assessment

Efficiency potentials & losses

WORLD RECORD RESEARCH USING LUQY PRO

34.6% LONGI

World record perovskite/silicon tandem solar cell, reported May 2024

Jia *et al.* Nature 644, 912-919 (2025)

| LuQY Pro - QFLS prediction and process control

26.5%

World record 2D/3D heterostructure perovskite solar cell

Zhang *et al.* Advanced Materials 37, 30 (2025)

| LuQY Pro - QFLS calculation for varied passivation layers

TRUST & VERFIFICATION

Reliable results, built on verified performance

Factory calibrated

Integrating sphere and spectrometer are calibrated together as one unit, against a NIST-traceable reference source.

Verified before delivery

Every system is individually tested and commissioned by QYB before it ships.

Research-based methods

Analysis built on established methods from peer-reviewed literature, many co-authored by the QYB team.

Compliant by design

EU conformity · EMC · electrical safety · laser safety. Class 3 laser product in secured operation.

TECHNICAL SPECIFICATIONS *

LuQY measurement unit

Spectral detection range	550 – 1050 nm (customisable)
Min. resolvable luminescence quantum yield	10^{-6} (0.0001%)
Spectrometer integration time	1 ms – 35 min
Signal-to-noise ratio	600 : 1
Sampling interval	1 nm
Photoexcitation wavelength	532 nm (customisable)
Photoexcitation intensity	~0.001–20 suns
Spot sizes (switchable in software)	configurable between 0.1 cm^2 / 1 cm^2
Max. sample size (L × W × H)	30 × 30 × 10 mm **
SMU maximum ratings	±10 V, ±150 mA
Voltage sensing precision	50 µV
Maximum contactable subcells	6, via integrated relay

General

Connectors	1× 24 V DC power plug, 1× USB 3.0
Unit dimension (L × W × H)	~390 × 220 × 130 mm
Unit weight	6.1 kg

Laser safety

Internal laser source	Class 3B
Safety system	Interlocked sample chamber

Calibration

Excitation calibration	Against certified reference solar cells
Spectral calibration	Against NIST-traceable reference source
Recommended re-calibration period	1 year

*Specifications subject to change.

**Larger sample holder and custom configurations on request.

LuQY Pro

THIS BROCHURE

Absolute PL and EL. Instant PLQY, ELQY and QFLS / iV_{OC} on samples up to 30 × 30 mm.



NEXT STEP

Discuss your application

Send us your samples and questions.
We'll help you find the right configuration and can arrange a demo measurement.

ABOUT QYB

Quantum Yield Berlin was founded in 2021 as a spin-off of Helmholtz-Zentrum Berlin. Our team brings together optical spectroscopy, semiconductor research, electronics and automation to build compact instruments that make rapid, absolute measurements and analysis simple and accessible.

THE LUQY FAMILY

Explore our product portfolio

Solutions from lab to fab

One measurement principle

Every LuQY system is built around calibrated, rapid, easy-to-use, and absolute luminescence measurement.

Integrated by design

Each product is an integrated system that combines, in one tool, calibrated hardware and instant analysis based on established scientific methods.

A system for every stage of R&D

- Compact benchtop systems
- Absolute luminescence imaging & mapping
- Automated, high-throughput platforms
- In-line characterization, and more....

Applications

Photovoltaics, LEDs, materials research, automated laboratories and beyond.

QUANTUM YIELD BERLIN

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