

Quantum Efficiency (IPCE) and Spectral Response Metrology Tools



Abet Technologies Model QE-1100 Quantum Efficiency measurement tool, 350-1100 nm range

Adaptable

Abet Technologies Quantum Efficiency tools ship in many flavors to match the customer's metrology needs. Here we use Model QE-1100 to showcase standard components most useful for single junction devices and Model QE-1800 with most useful components selected for triple junction cells.

Complete

Standard models and custom configured systems are self-contained and ship with all the necessary hardware and software included: a PHOTOR instrument control and QE data analysis software package, a monochromator, light sources for monochromator and bias light, a bias voltage supply (+/- 10V), a chopper wheel and a dual channel lock-in amplifier, an I/V converter to separate AC from DC signals and amplify them, all necessary reference and monitor cells, temperature monitoring electronics, and as ordered cell mounting and contacting hardware, temperature control, XY translation stages for QE mapping, Internal Quantum Efficiency option.

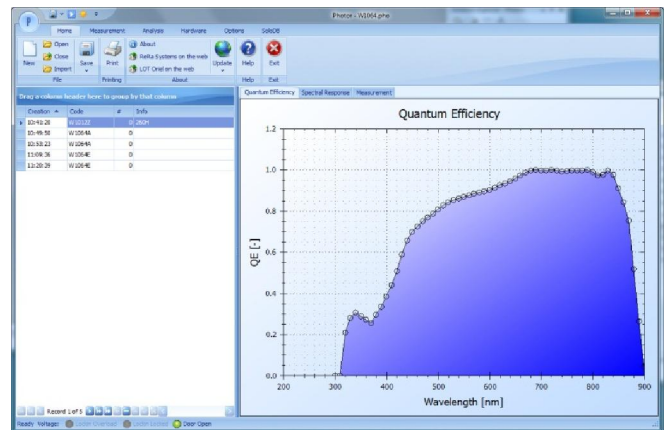
Optimized Design

A dual channel lock-in amplifier allows monitor cell use in every scan to assure data accuracy. The included DC mode electronics allow QE metrology on organic cells if needed. Computer controlled multi-color bias lights allow flexible multi-junction cells biasing. System design flexibility allows testing of a wide variety of cell types. A partial listing includes: poly silicon, c-Si, mc-Si, nc-Si, III-V compound cells; thin film: CdTe, CIS, CIGS, SI; 3rd generation: organic polymer, dye.

- Complete turnkey solution for spectral characterization
- Modular setup for maximum flexibility
- Single and multi-junction devices
- EQE (IPCE) and IQE capabilities
- Spectral range 280-1800 nm
- Dual channel lock-in amplifier
- Variable bias light (white or multi-color)

PHOTOR Software

A complete control of all system functions in all the models of Abet Technologies' QE-1100 and QE-1800 systems capabilities is contained in the PHOTOR software package. This software also offers standards compliant data analysis for QE, IPCE, IQE, Spectral Response, single and multi-junction, Mismatch Factor, short circuit current for different ASTM standard spectra. PHOTOR has been developed using the latest Microsoft.NET technology resulting in a Microsoft Office 2010 look and feel and making the user learning curve very short. The algorithms used in PHOTOR meet all the current IEC standards for Spectral Response measurements. Relative measurements can be easily scaled to calibrated currents for different spectral irradiances. All such calculations are done using the ASTM G173 Reference Solar Spectral Tables.



Ordering Information

QE-1100 System includes

AB2100	QE Base System
AB2131-1	Halogen Light Source
AB150	150 mm Monochromator
AB3056	Kelvin Probe Set

QE-1800 System includes

AB2100	QE Base System
AB2131-1	Halogen Light Source
AB2131-2	Xenon light source
AB2180	Dual Lamp system preparation
AB300	300 mm Monochromator 280-1800 nm
AB3056	Kelvin Probe Set with magnetic bases
AB2152-2	Ge reference cell

AB2100 QE Base System includes

System enclosure, desk-top computer, dual channel lock-in amplifier, reflective optics, bias voltage supply (+/- 10V), magnetic base mount, Si reference cell (280-1100 nm), optical feedback ready, bias light halogen lamp source with power supply, DC measurement mode for organic cells, PHOTOR software

Light Sources

AB2131-1	Halogen Light Source, 100W, power supply and focusing optics included
AB2131-2	Xenon Light Source, 150 W, power supply and focusing optics included
AB2142	Computer controlled multi-color bias light with selectable LEDs (standard selections 455 nm and 810 nm)
AB2180	Dual Lamp system preparation consists of an automatic flip mirror, control electronics, PHOTOR software extension for flip mirror control

Monochromators

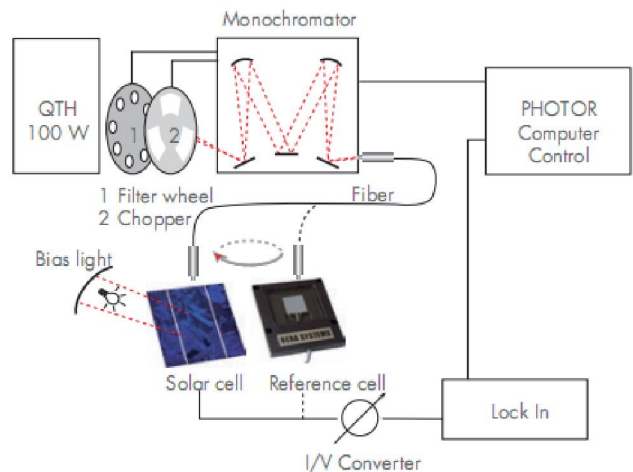
AB150	150 mm Monochromator, single grating, 350-1100 nm, electronic filter wheel with order sorting filters included, 5 nm bandwidth
AB300	300 mm Monochromator, triple grating, 280-1800 nm, electronic filter wheel with order sorting filters included, 5 nm bandwidth

Reference Cells

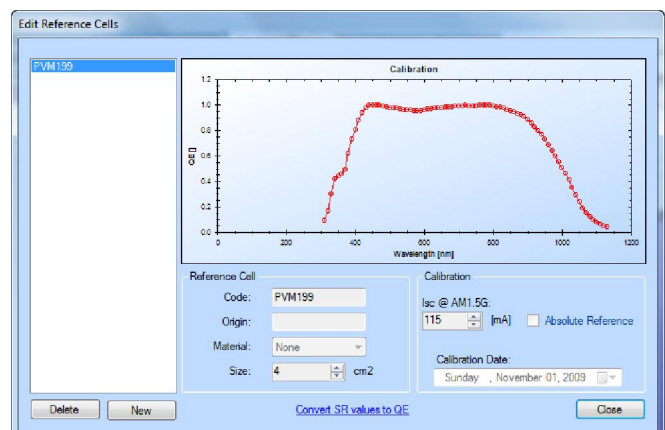
AB2152-1	Si reference cell, 280-1100 nm NIST traceable calibration
AB2152-2	Ge reference cell, 700-1800 nm NIST traceable calibration

Accessories and Options

AB2160	IQE option with BaSO ₄ coated integrating sphere
AB150-UV	280-350 nm range option for AB150 monochromator
AB150-IR	1100-1800 nm range option for AB150 monochromator, not combinable with the UV option
AB2170	motorized XY table, 160x160 range min
AB2112	Temperature control ready vacuum stage, 160x160 mm
15275	Vacuum pump, 40 lpm, 650 mmHg, 115 V
15275	Vacuum pump, 40 lpm, 650 mmHg, 230 V
15281	Temperature Stabilizing Recirculator, 25°C
15285	Heating/Cooling Recirculator, dew point to 120°C
AB3056	Kelvin Probe Set includes two magnetic base micromanipulators with Kelvin probes



Schematic representation of the key components of a QE system



PHOTOR screen with reference cell data

Abet Technologies regularly continues to upgrade our products and therefore all specifications are subject to change without notice. Please contact factory for the current specifications.