



The Class AAA Pico LED small-area solar simulator provides world-class sunlight replication with no fragile bulbs or moving parts. The Pico can replicate the standard AM1.5G solar spectrum with the click of a button. The Pico has excellent 2% Class A spatial non-uniformity, exceptionally low 5% spectral mismatch, and a short-term temporal instability of 0.1%, all in a 2.5 cm x 2.5 cm square illumination area. Minimal warm-up time and long LED lifetimes mean the Pico is both nimble and built to last. Its working distance of 7 cm provides you with ample volume to mount your samples and test equipment, while its small footprint allows it to be comfortably integrated into existing test setups.

The Fixed Pico ships with the AM1.5G spectrum, while the optional Variable Spectrum Module provides the ability to customize spectra through the individual adjustment of 32 LED channels. The Variable Spectrum Module also includes the One-Click-Sun™ (beta) Software which replicates sunlight based on geographic location, season, and time of day, and can simulate day-night cycles.

Additional modules provide the ability to measure photovoltaic IV characteristics and obtain low-resolution EQE measurements, removing the need to integrate separate measurement systems and instrumentation.

Features and Benefits



- Rated Class AAA according to IEC60904-9:2020, ASTM E927-19, JIS 8904-9:2017 standards
- Spectral Mismatch <5% in all spectral bins, exceeding Class A standard
- Temporal instability of <0.1%, exceeding Class A standard
- Class A spatial non-uniformity in 2.5 cm x 2.5 cm square area
- Fast turn on time, minimal warmup time
- Guaranteed 10,000-hour solar simulator lifetime (with LED lifetime ranging from 10,000 – 100,000 hours)

Optional Modules

- **Variable Module:** Enables variable output from 0% to 110% and individual control of up to 32 LED channels. Includes One-Click-Sun™ (beta) Software and Python API
- **IV Module:** Power conversion efficiency measurement and report generation for solar cell characterization
- **Low-Resolution EQE Module:** Provides wavelength-resolved measurements of your device's quantum efficiency under active conditions
- **Support Stand:** Strong aluminium structure that mounts your Pico with vertical alignment



Pico Solar Simulator

Parameter	Value	Units	Notes
Type of Solar Simulator	Steady-State	N/A	Uses Continuous-Wave light emitting diodes (LEDs)
Mounting Configuration	Two 1/4"-20-threaded holes separated by 4" (imperial model)	N/A	OR two M6-threaded holes separated by 100 mm (metric model). Arbitrary orientation possible.
Spectral Preset	AM1.5G	N/A	
Spectral Mismatch ¹	≤ 5	%	Exceeds Class A
Short-term Temporal Instability (STI) ²	≤ 0.1	%	Exceeds Class A
Long-term Temporal Instability (LTI) ³	≤ 2	%	Exceeds Class A
Spatial Non-Uniformity ⁴	≤ 2	%	Class A in 2.5 cm x 2.5 cm square area centered in beam ⁴
Warm-up Time	10	minutes	
Calibrated Operating Temperature	18 - 32	°C	Range over which calibrated behaviour is expected
Safe Operating Temperature	15 - 40	°C	Range beyond which the instrument may be damaged or lose calibration
Ambient % Relative Humidity	30 - 60	%	Humidity range beyond which the instrument may be damaged or lose calibration
Standard Compliance	Class AAA to IEC60904-9:2020 Class AAA to ASTM E927-19 Class AAA to JIS C 8904-9:2017	N/A	1.0 sun AM1.5G
Unit Lifetime	10,000	hours	LED lifetime ranges from 10,000 - 100,000 hours
Warranty	2	years	Optional extension available

Parameter	Product Model				Units	Notes	
	Product Name	DIR-BASE	DIR-BASE-UV	DIR-BASE-NIR			DIR-BASE-UV-NIR
	Product SKU	PICO-LMN-DIR	PICO-KLMN-DIR	PICO-LMNO-DIR			PICO-KLMNO-DIR
Calibrated Irradiance ⁵	75.9 ± 3.8	79.1 ± 4.0	84.7 ± 4.2	87.9 ± 4.4	mW/cm ²	1.0 sun AM1.5G target irradiance	
Spectral Range	400 - 1100	350 - 1100	400 - 1500	350 - 1500	nm		
Working Distance	7	7	7	7	cm		
Angle of Emission	≤ 30	≤ 30	≤ 30	≤ 30	°	Measured from surface normal	
Wavelength Channels	26	28	30	32	N/A	Adjustable channels only available with Variable Module. Some LED types may be duplicated	
Illumination Head Size	21.5 x 22.3 x 11.6	21.5 x 22.3 x 11.6	21.5 x 22.3 x 11.6	21.5 x 22.3 x 11.6	cm		

¹ Spectral Mismatch measured at 1.0 sun AM1.5G using calibrated spectroradiometer centered in illumination field, according to ASTM E927-19 spectral bins.

² STI measured at 25 °C for 100 seconds at 1 Hz, at 1.0 sun AM1.5G using 22 mm x 7 mm monocrystalline silicon cell in single-device configuration, physically masked to a 6 mm x 6 mm square area, centered in illumination field. STI calculated using Equation (1) from ASTM E927-19 Section 7.1.7.

³ LTI measured between 22.9 - 28.6 °C for 3000 hours at 1 sample/day at 1.0 sun AM1.5G using same silicon cell as in STI measurement, centered in illumination field. LTI calculated using Equation (1) from ASTM E927-19 Section 7.1.7. Measurement fluctuations are primarily correlated with room temperature fluctuations.

⁴ Spatial Non-uniformity measured at 1.0 sun AM1.5G using 22 mm x 7 mm monocrystalline silicon cell in single-device configuration, physically masked to a 6 mm x 6 mm square area. Detector is moved in 25 square-grid measurements across the illumination plane. Non-uniformity calculated using Equation (2) from ASTM E927-19 Section 7.2.9.

⁵ These values are equivalent to the often-quoted 100 mW/cm² standard value for 1-sun solar simulators. For more information, see our [article explaining calibrated spectral irradiance](#).



Head Weight	2.2	2.2	2.2	2.2	kg	
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Pico Control Box

Parameter	Value	Units	Notes
Size	25.4 x 35.6 x 12.7	cm	
Weight	2.8	kg	6.2 lbs
Materials	Powder-coated aluminium	N/A	
Embedded Computer	Raspberry Pi running Linux-based Raspbian OS	N/A	
Video Out	HDMI	N/A	
I/O Connectors	4 x USB-2.0	N/A	
Software Compatibility	Browser-based	N/A	For initial setup, USB keyboard, USB mouse and HDMI-capable monitor are required (not included)
Network Connectivity	RJ45, WiFi	N/A	Can be disabled during order fulfilment or via software after installation
Power Connector	Female DIN 4 Pin with lock (KYCON KPJX-CM-4S equivalent)	N/A	

Pico Power Supply

Parameter	Value	Units	Notes
Input voltage (AC)	85 – 264	V	AC
Input current	2 – 4	A	Varies with input voltage
Inrush current (max.)	95 – 120	A	Cold start, varies with input voltage
AC Phase	1	N/A	
AC Frequency	47 – 63	Hz	
Input AC Plug Set	Matched to buyer's national standard	N/A	
Input AC Receptacle	IEC320-C14	N/A	
Output Power	220	W	
Output Voltage	24	V	
Output DC Receptacle	Male DIN 4 Pin with lock (KYCON KPPX – 4P equivalent)	N/A	
Ambient operating temperature	-30 to +70	°C	
Case Flammability	UL94-V0	N/A	
Size	21.0 x 8.5 x 4.6	cm	
Weight	1.1	kg	



Optional Modules

Pico Variable Module			
Parameter	Value	Units	Notes
Type of Solar Simulator	Spectrally-adjustable, steady-state	N/A	Uses Continuous-Wave light emitting diodes (LEDs)
Intensity Adjustment Range	0 - 110	%	0.1 to 1.1 suns AM1.5G irradiance levels along with full off
Available Spectral Presets	0.1 to 1.1 suns AM1.5G in 0.1 sun increments	N/A	AM0 and custom spectra available upon request
Automation Capability	Through included Python API	N/A	
Stabilization Time Between Adjustments	10	minutes	For changing from 1.0 to 0.1 suns. Stabilization time for other situations will depend on magnitude of step change.
Required External Hardware (not included)	USB Keyboard, USB Mouse, HDMI-capable monitor	N/A	Connecting a Pico to a network allows access via browser by any computer on the network
IV Module			
Parameter	Value	Units	Notes
Voltage Range	-13 to +13	VDC	
Voltage Step	0.4	mV	Highest resolution at lowest gain setting
Current Range	-30 to +30	mA	
Included Hardware	Silicon reference solar cell + cables	N/A	22 mm x 7 mm monocrystalline silicon cell
Required External Hardware (not included)	USB Keyboard, USB Mouse, HDMI-capable monitor	N/A	Connecting a Pico to a network allows access via browser by any computer on the network
Low-Resolution EQE Module			
Parameter	Value	Units	Notes
Bias Voltage Range	-13 to +13	VDC	
Current Range	-30 to +30	mA	
Gain Settings	0.5, 1, 2, 4, 8	V/V	
Wavelength Resolution	10 to 200	nm	One data point provided per available LED channel, so resolution steps vary across the spectral range. White LEDs are excluded.
Included Hardware	Silicon reference photodiode + cables	N/A	
Required External Hardware (not included)	USB Keyboard, USB Mouse, HDMI-capable monitor	N/A	Connecting a Pico to a network allows access via browser by any computer on the network
Required External Hardware (not included)	USB Keyboard, USB Mouse, HDMI-capable monitor	N/A	Connecting a Pico to a network allows access via browser by any computer on the network
Support Stand			
Parameter	Value	Units	Notes

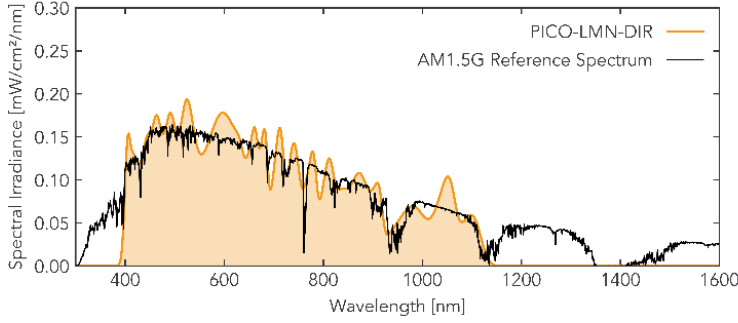


Size	44.5 x 44.5 x 49.0	cm	
Weight	22.5	kg	
Materials	Powder-coated aluminium, brushed aluminium	N/A	

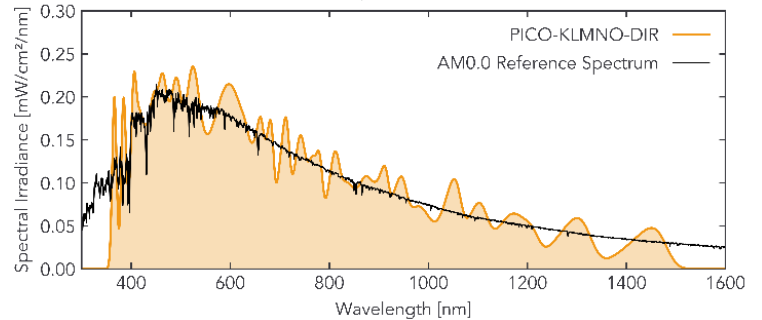
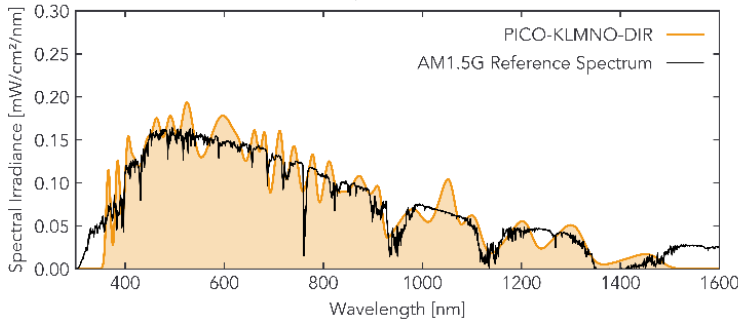
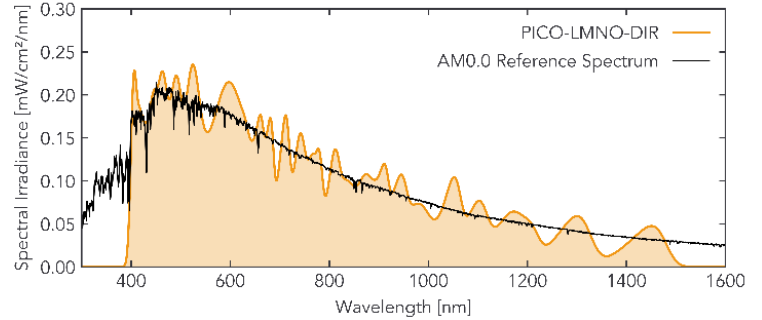
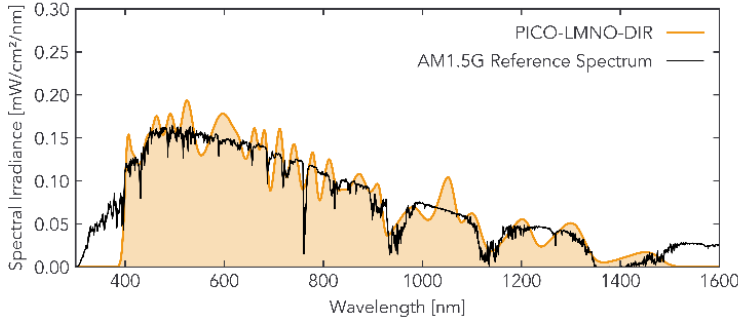
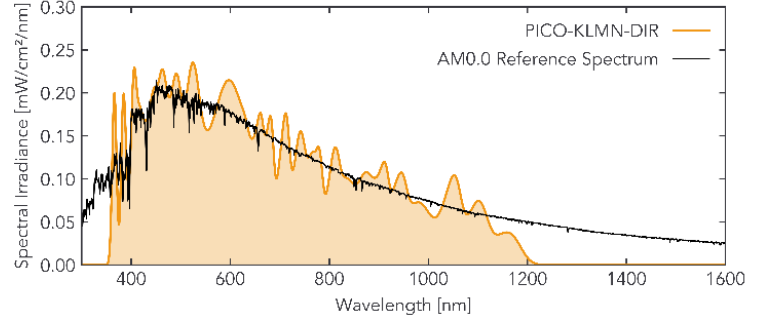
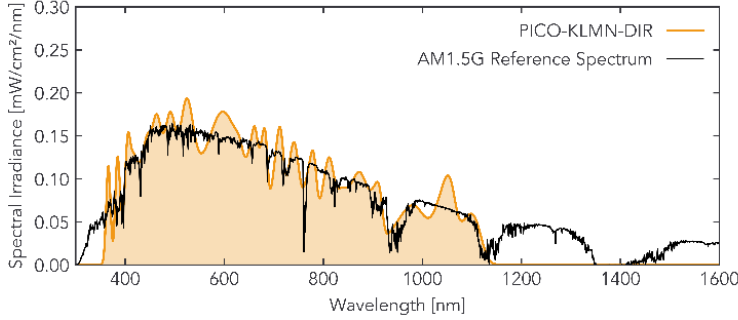
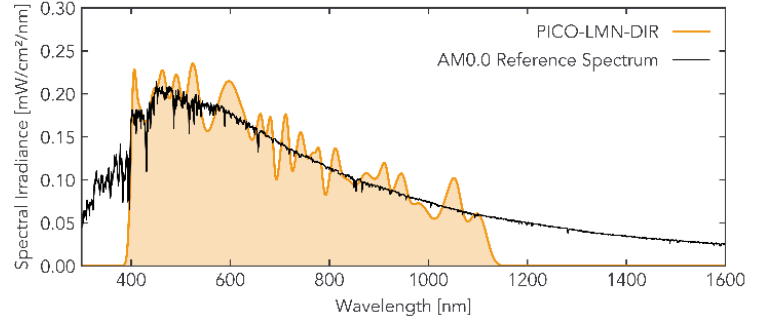


Spectra by Product Model

AM1.5G

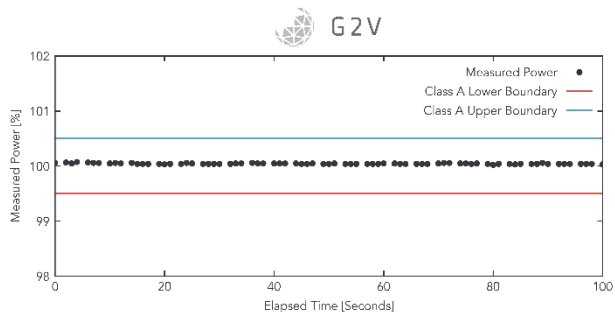


AM0



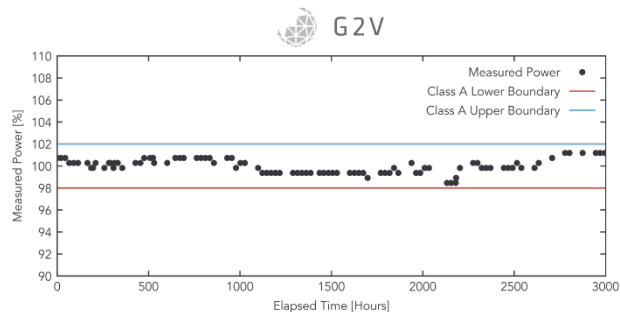


Short-Term Temporal Instability (STI)



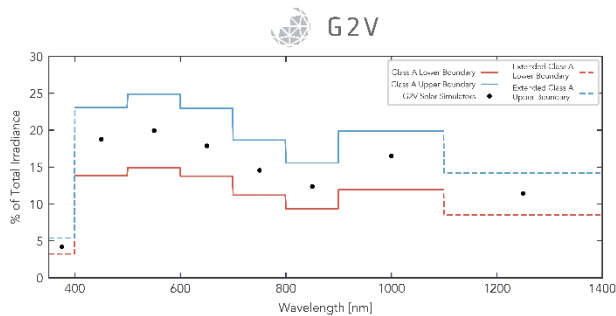
STI measured at 25 °C for 100 seconds at ~1 Hz, at 1.0 sun AM1.5G using 22 mm x 7 mm monocrystalline silicon cell in single-device configuration, physically masked to a 6 mm x 6 mm square area, centered in illumination field. STI calculated using Equation (2) from IEC 60904-9:2020 Section 3.10.

Long-Term Temporal Instability (LTI)

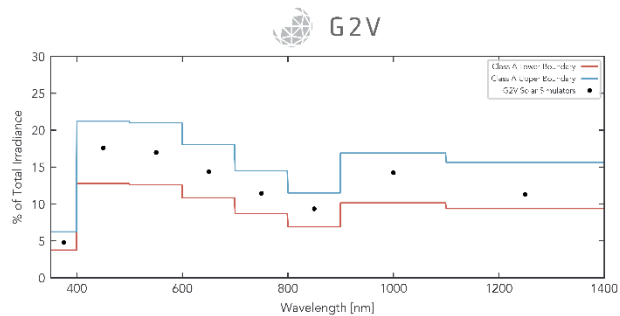


LTI measured between 22.9 - 28.6 °C for 3000 hours at ~1 sample/day at 1.0 sun AM1.5G using 22 mm x 7 mm monocrystalline silicon cell in single-device configuration, physically masked to a 6 mm x 6 mm square area, centered in illumination field. LTI calculated using Equation (2) from IEC 60904-9:2020 Section 3.10. Measurement fluctuations are primarily correlated with room temperature fluctuations.

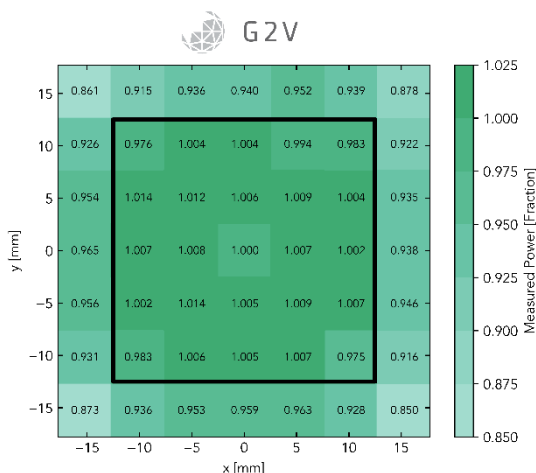
AM1.5G Spectral Mismatch



AM0 Spectral Mismatch



Spatial Non-Uniformity



Typical spatial non-uniformity measured at 1.0 sun AM1.5G using 22 mm x 7 mm monocrystalline silicon cell in single-device configuration, physically masked to a 6 mm x 6 mm square area. Detector is moved in 25 square-grid measurements across the illumination plane. Non-uniformity calculated using Equation (2) from ASTM E927-19 Section 7.2.9. Black box indicates area of Class A spatial non-uniformity (<2%).