



The Class A+AA Pico small-area LED solar simulator replicates world-class sunlight with no fragile bulbs or moving parts. The Pico can replicate the standard AM1.5G and AM0 solar spectra with the click of a button.

The Pico has excellent 2% Class A spatial non-uniformity, exceptionally low 5% spectral mismatch, and short and long-term temporal instabilities of <0.5% and <1% respectively, 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 nimble and built to last. Its working distance of 7 cm provides ample volume to mount your samples and test equipment.

Our Pico ships with a wavelength range of 350 nm - 1500nm and the Variable Control Module. The Variable Control Module allows you to tune 32 channels and use our Python API. Additionally, it includes the One-Click-Sun™ (beta) Software, which replicates sunlight based on geographic location, season, and time of day, and simulates day-night cycles. Optional modules (IV characterization & Low Res EQE characterization) and vertical stand are available for immediate purchase or at a later date.



Pico with optional vertical stand

Features and Benefits

- › Rated Class A+AA according to IEC60904-9:2020 standard
- › Spectral Mismatch <5% in all spectral bins, exceeding Class A+ standard
- › Temporal instability of <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
- › Expected 10,000-hour solar simulator lifetime



Photonic Solutions Ltd
Edinburgh
EH14 4AP
+44 131 664 8122
www.photonicsolutions.co.uk





Pico package includes:

- 350 nm - 1500 nm wavelength range
- Variable Module
 - 32 tunable channels, our Python API and One-Click Sun (beta) software

Pico Optional Add-ons



IV Characterization includes:

- IV Characterization
 - Efficiency, V_{oc} , I_{sc} , I_{max} , V_{max} , Fill Factor, Shunt and Series Resistance.



Low-res EQE includes:

- Low-res EQE Characterization
 - Wavelength-resolved measurements of your device's quantum efficiency under active conditions for 30 channels



Vertical Stand:

- 80/20 aluminum frame
 - Metric breadboard



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Specifications	KLMNO		Notes
Type of Solar Simulator	Steady-State		Continuous-wave LEDs
ASTM E927 / IEC 60904-9 / JIS C 8904-9	Exceeds Class AAA IEC Specifications		1.0 sun AM1.5G
Spectral Mis-match ¹	<5%		Exceeds Class A+
Spatial Non-uniformity ²	<2%		Exceeds Class A
Temporal Instability - LT, ST ^{3,4}	<1%, <0.5%		Exceeds Class A
Spectral Range (nm)	350 - 1500		
Working Distance	7 cm		
Tuneable Channels	32		Some LED Types may be duplicated
Calibrated Output Irradiance (1.0 suns AM1.5G) ⁵	87.9		1.0 sun AM1.5G target irradiance
General Specifications	Value	Units	Notes
Type of Solar Simulator	Steady-state	N/A	Uses continuous-wave LEDs
Mounting Configuration	Two M6-threaded holes	N/A	separation distance of 100 mm
Intensity Adjustment Range	0 - 110	%	0.1 - 1.1 suns AM1.5G in 0.1 increments
Class A Illumination Area	2.5 x 2.5	cm	
Warm-up Time	10	mins	
Safe Operating Temperature	15 - 40	°C	Range beyond may damage instrument
Calibrated Operating Temperature	18 - 32	°C	Optimal operating range
Ambient % Relative Humidity	30 - 60	%	Range beyond may damage instrument
Angle of Emission	< 30	°	Directed
Illumination Head Size	(21.5 x 22.3 x 11.6)	cm	
Weight	2.2	kg	4.4 lbs (illumination head)
Unit Lifetime	10,000	hours	Expected minimum lifespan
Warranty	2	year	Optional extension available
Required External Hardware (not included)	USB keyboard/Mouse, HDMI-capable monitor	Hz	Network connection allows access via browser by any computer on the network



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	N/A	Running Linux-based Bullseye OS
Video Out	HDMI	N/A	
I/O Connectors	4 x USB-2.0	N/A	
Software Compatibility	Browser-based	N/A	Requires USB keyboard, mouse, HDMI monitor (not included)
Network Connectivity	RJ45, WiFi	N/A	Can be disabled during order or via software
Power Connector	Female DIN 4 Pin with lock	N/A	KYCON KPJX-CM-4S equivalent

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	





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	N/A	KYCON KPJX-CM-4S equivalent
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	

[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] 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.

[3] 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.

[4] LTI measured between 22.9 °C - 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.

[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](#).



Variable Module

Parameter	Value	Units	Notes
Intensity Adjustment Range	0 - 110	%	0.1 to 1.1 suns AM1.5 irradiance levels
Available Spectral Presets	0.1 to 1.1 suns AM1.5G in 0.1 suns increments	N/A	AM0 and custom spectra available upon request
Automation Capability	Python API	N/A	
Stabilization Time Between Adjustments	10, 2	mins	Start up from cold, Changing spectrums once warm

IV Module

Parameter	Value	Units	Notes
Voltage Range	-13 to + 13	VDC	
Voltage Step	0.4	mV	Highest resolution at lowest gain settings
Current Range	-30 to +30	mA	
Included Hardware	Silicon reference cell + cables	N/A	22 mm x 7 mm monocrystalline silicon cell

EQE Module

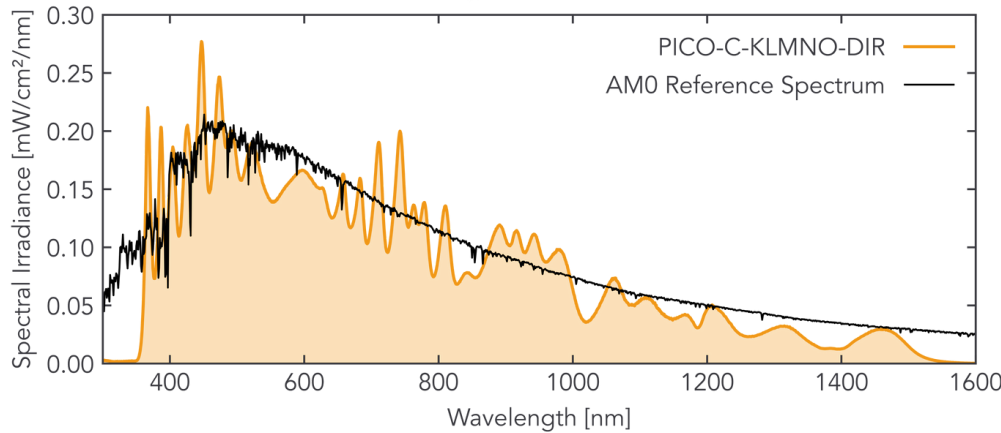
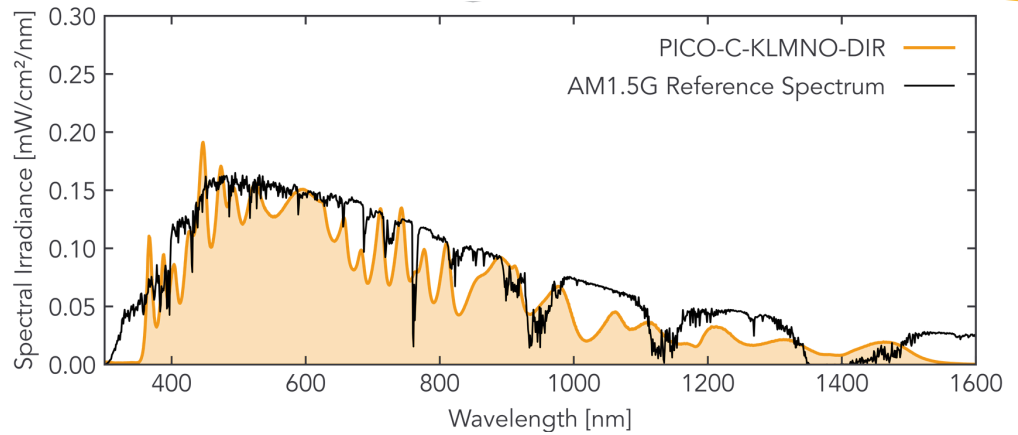
Parameter	Value	Units	Notes
Bias Voltage Range	-13 to + 13	VDC	
Current Range	-30 to +30	mA	
Gain Settings	.5, 1, 2, 4, 8	V/V	
Wavelength Resolution	100 to 200	nm	One data point provided per available LED channel, so resolution steps vary across the spectral range. White LEDs are excluded
Included Hardware	Silicon reference diode + cables	N/A	



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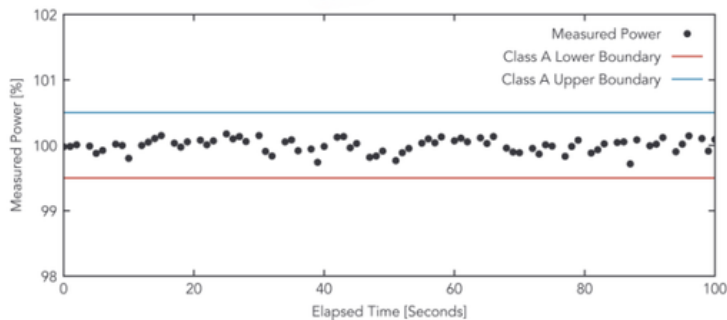


PICO - AM1.5G (KLMNO)



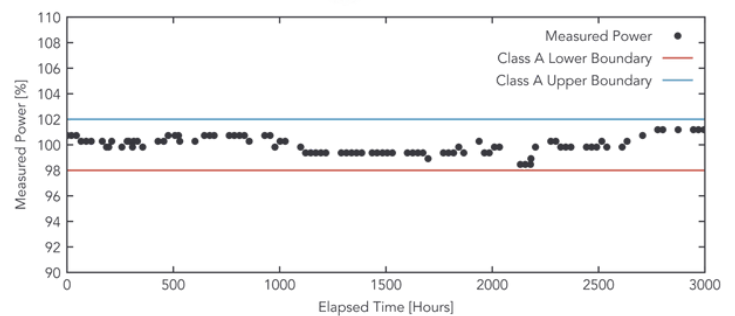
PICO - AM0 (KLMNO)

Short-Term Temporal Instability (STI)



STI measured at 25°C for 100 seconds at ~1Hz, 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.

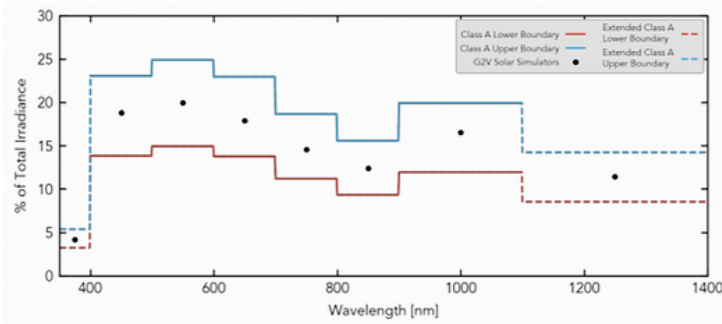
Long-Term Temporal Instability (LTI)



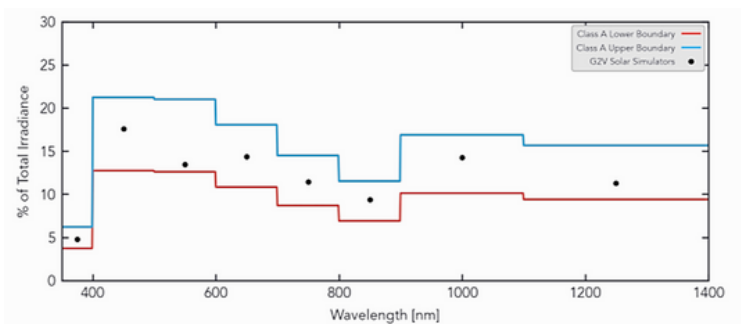
LTI Measured between 22.9°C - 28.6°C for 3000 hours at ~1 sample/day at 1.0 AM1.5G using 22 mm x 7 mm monocrystalline silicon cell in single-device configuration, physically masked to a 6 mm x 6 mm square area, centred in illumination field. LTI calculated using Equation (2) from IEC 60904-9:2020 Section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



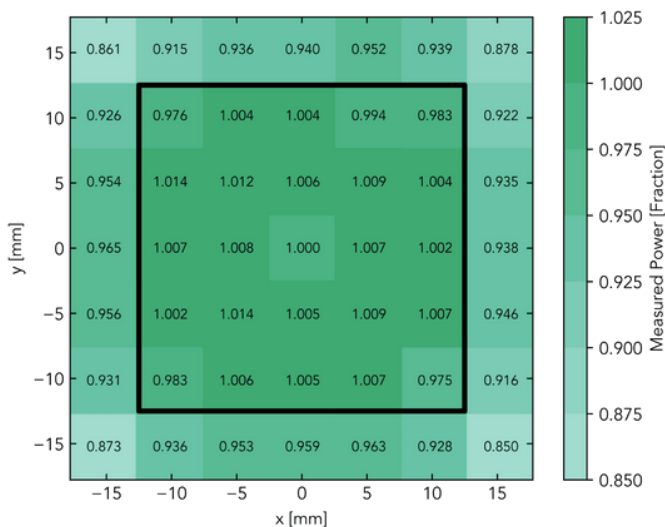
AM1.5G Spectral Mismatch



AM0 Spectral Mismatch



AM1.5G Spectral 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 moving in a 25 square-grid measurement 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%).

Note about Multijunction Validation

For the case of multijunction cells/devices/arrays, G2V is currently unable to validate the Pico for out-of-the-box performance and calibrated output for use with multijunction-based solar devices due to the lack of standardization among formulations and designs of multijunction devices. Different junction designs will sample different portions of the solar spectrum and have their own spectral responsivities, potentially resulting in spatial non-uniformity and spectral mismatch characterization outside of the Class A standards for those junctions and spectral responsivities.

Thus, G2V recommends that customers working with multijunction cells perform their own validations on-site in order to ensure their G2V product is performing to the customers' desired standards for specific junctions.

If you are willing to submit a sample of your device that you want to be tested before purchasing a Pico, G2V can calibrate a unit for that device for an extra fee.