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Making Light Work Better

Product Description

Sciencetech's Large Area Flash Solar Simulator is capable of illuminating targets of 1m × 1m up to 2m × 2m with uniform solar illumination. Our AM1.5G flash system is manufactured to achieve up to Class AAA, and our AM0 flash system is manufactured to achieve up to Class B to current IEC standards. ASTM standards testing is available upon request.

With a lamp lifetime of up to 25,000 flashes, the PSS series of Large Area Flash Solar Simulators offers a cost-effective approach for large-area device testing.

Pictured:
PSS-AM1.5G-1.5-IV20-ST-120

Large Area Flash Solar Simulator

Large Area Flash Solar Simulator

OVERVIEW

Sciencetech's flash solar simulators are designed to test large photovoltaic devices up to 2m × 2m (79" × 79") in size. The system uses a heavy-duty xenon flash lamp and AM1.5G calibrated solar filter to approximate the sun's true spectral distribution following IEC 60904-9Ed.3.0 Class A standards.

The simulator fires short flashes of light to avoid heating a photovoltaic device for measuring its performance.

Class B or C spectral match is available for AM0 models.

The system operates as a single flash/point, which, when used with a current-voltage measurement system, will produce an I-V data point.

Sciencetech flash solar simulators can be used on many types of photovoltaic devices. The optional current-voltage measurement system has an active load and wattage range that can be tailored to each type of PV material.

	Included in all PSS-series
Flash Head	•
Flash Lamp	•
Air Mass Filter	•
Enclosure	•
Sample Carriage	•
Source Measure Unit	•
Computer	•
Temperature Measurement Add-on	•

The flash solar simulator utilizes a heavy-duty/low-duty cycle xenon flashtube powered by a digitally-controlled power supply. This provides a stable and repeatable flash. The power supply can be used to fine-tune intensity, and mechanical attenuation provides the a wide operation range of intensities from 40% to 100% to accommodate different intensity requirements. To withstand heat stress in a continuous use production operation, the heavy-duty xenon flashtube has over dimensioned tungsten electrodes tested to 60,000 Joules.

The standard measurement window is 0.2 ms, but Sciencetech offers a pulse current regulator that will shape the pulse to achieve a longer, flat-topped pulse shape. This allows for a measurement window of up to 4ms with the specified temporal instability.

The system is strongly recommended to be purchased with an IV measurement system. For more information about models without an IV measurement system, please contact us.

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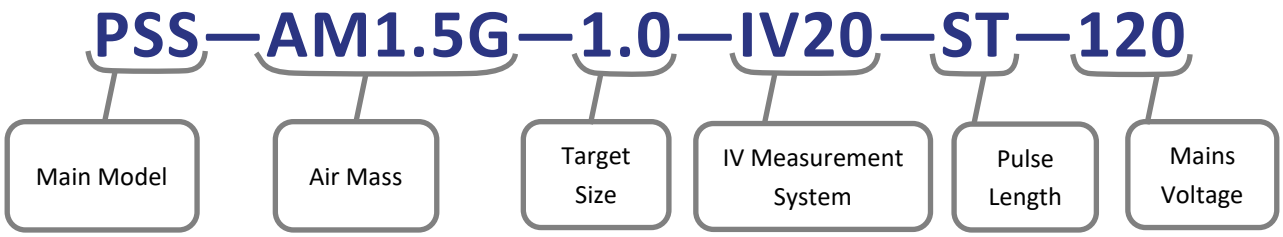
Large Area Flash Solar Simulator

CONFIGURATION

The PSS-series can be configured to suit your requirements. Choose from the options for air mass, target size, pulse length, IV measurement system, and mains voltage to build the perfect system for your application.

Model Format



Step 1

AIR MASS	Model	Air Mass Match	Spectral Range (nm)
	AM1.5G	AM1.5G	300-1200
	AM0.00	AM0	300-1400

Step 2

TARGET SIZE	Model	Uniform Square Side (m)
	1.0	0.9
	1.5	1.5
	2.0	1.9

Step 3

IV MEASUREMENT SYSTEM[1]	Model	IV System	Max. Voltage (V)	Max. Current (A)	Min. Voltage, Min. Current
	IV20	SSIVT-FT-200-20	200	20	10nV, 10fA
	IV40	SSIVT-FT-200-40	200	40	10nV, 10fA

Step 4

MEASUREMENT WINDOW	Model	Measurement Window Length (ms)
	ST	0.2
	EX	4.0

Step 5

MAINS VOLTAGE	Model	Mains Voltage
	120	120 V AC
	220	220 V AC

[1] I-V measurement systems come with an included host computer and temperature measurement add-on.

If the option you'd like to see doesn't appear, please contact our sales department to discuss our customized options.

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SPECIFICATIONS

MODEL	PSS-AM1.5G-1	PSS-AM1.5G-1.5	PSS-AM1.5G-2	PSS-AM0-1	PSS-AM0-1.5	PSS-AM0-2
Spectral Range (nm)[1]	300 - 1200			300 - 1400		
Air Mass Filter	AM1.5G			AM0		
Uniform Illumination Area[2] (m)	0.9 × 0.9	1.5 × 1.5	1.9 × 1.9	0.9 × 0.9	1.5 × 1.5	1.9 × 1.9
Solar Simulator Classification[3]	AAA	ABA	ABA	BBA	BBA	CBA
Spectral Match Classification[3,4]	Class A			Class B		Class C
Spatial Non-Uniformity Classification[3]	Class A	Class B	Class B	Class A	Class B	Class B
Temporal Instability Classification[3]	Class A			Class A		
Working Distance (cm)[7]	7.5			7.5		
Maximum Irradiance (W/m^2)[8]	1500		1200	1100		
Maximum Irradiance (Suns)	1.5		1.2	1.1		
Mechanical Attenuation Range[9]	0.4-1.0			0.4-1.0		
Irradiance Monitor	Built-in Si reference device, calibrated for 1 Sun			Built-in Si reference device, calibrated for 1 Sun		
Temperature Monitor[10]	RTD PT100			RTD PT100		
Flash Head	Air cooled, max 2400J without pulse current regulator Air cooled, max 4800J with pulse current regulator			Air cooled, max 2400J without pulse current regulator Air cooled, max 4800J with pulse current regulator		
Lamp Type	Xenon flashtube, max 4800J			Xenon flashtube, max 4800J		
Lamp Lifetime	20,000 - 25,000 flashes (at 1 Sun)			20,000 - 25,000 flashes (at 1 Sun)		
Wavelength Control	Integrated filter, replaceable			Integrated filter, removeable		
Pulse Measurement Window[6]	0.2 ms without pulse current regulator 4.0 ms with pulse current regulator			0.2 ms without pulse current regulator 4.0 ms with pulse current regulator		
Typical Time Between Flashes (sec)	2			2		
Line Voltage Options	120V, 220V			120V, 220V		

1. The spectral range specified is the range over which the spectrum is evaluated. The source emits over a wider spectral range.
2. The uniform area is the area used for non-uniformity calibration. The solar simulator can illuminate a larger area.
3. Evaluated according to IEC 60904-9 Ed3.0.
4. Spectral match is performed using a stepping monochromator system synchronized to the flash pulse. Irradiance is measured at individual center wavelengths and is integrated across the full pulse.
5. Non-uniformity of irradiance is measured with an automated X-Y stage in accordance with the specified standard.
6. Temporal instability is classified with Sciencetech's SSIVT-FT-200-20 I-V measurement system. IV measurements start at a time of 1.8ms after pulse onset to a time of 2.0ms after pulse onset. The system is characterized with these parameters. Both measurement onset and duration are configurable.
7. The target plane is calibrated during system classification. It is nominally a tilted plane at approximately 5 degrees. A device trolley is supplied to hold devices at the required location and angle. For integration with an automated assembly / test line the device or simulator should be held at an angle.
8. Average irradiance over the measurement window is measured at the suggested pulse temporal location for IV measurements (1.8ms after pulse onset), actual peak irradiance is higher.
9. Mechanical attenuation is recommended, as it does not affect the spectral match of the solar simulator.
10. The PT100 is installed inside the cube and is used for air temperature monitoring. A 4-pin interface is provided for the RTD. A separate readout device is used to monitor temperature.

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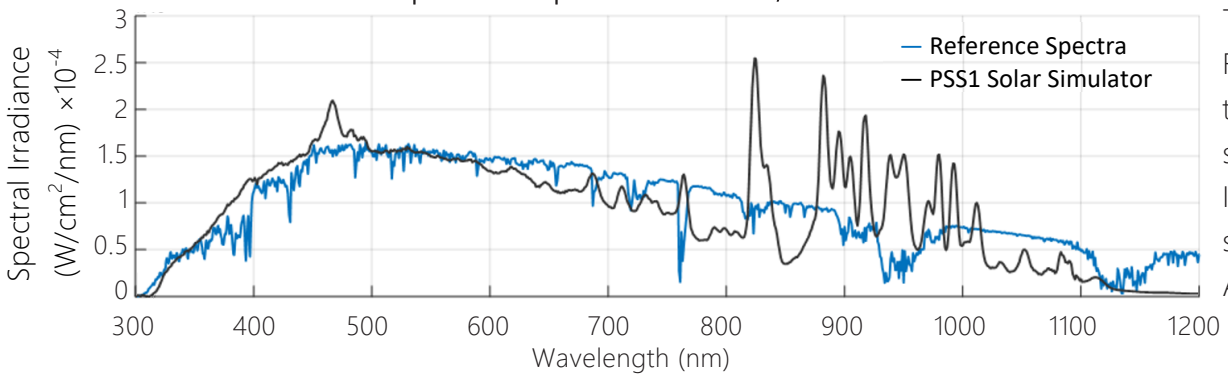
Large Area Flash Solar Simulator

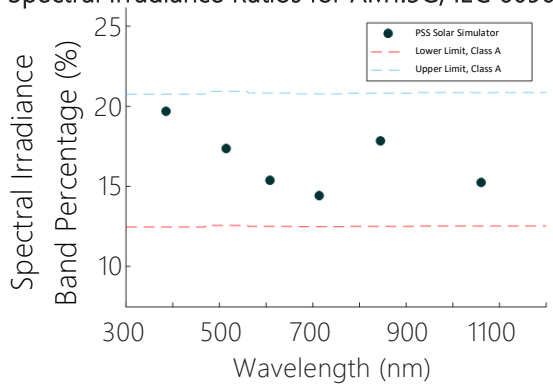
SPECTRAL MATCH

Solar Simulator Spectral Comparison for AM1.5G, IEC 60904-9 Ed.3.0



The Large Area Flash Solar Simulator offers a Class A spectral match to IEC 60904-9 Ed.3.0 standards using an AM1.5G filter.

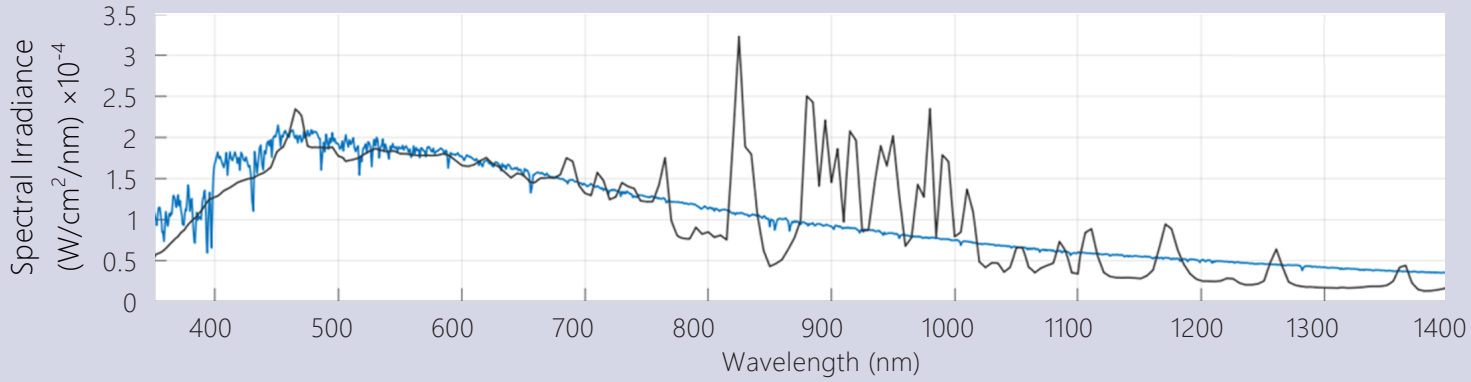
Spectral Irradiance Ratios for AM1.5G, IEC 60904-9 Ed.3.0



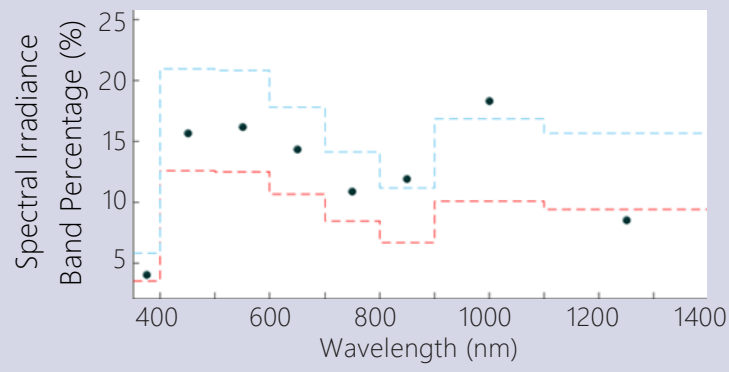
Wavelength (nm)	Percentage	Class
300-470	19.70	A
470-561	17.39	A+
561-657	15.37	A+
657-772	14.43	A
772-919	17.86	A+
919-1200	15.24	A+

The Large Area Flash Solar Simulator offers a Class A spectral match to ASTM E927 standards using an AM0 filter (no spectral standard for AM0 is available under IEC 60904-9 Ed.3.0).

Solar Simulator Spectral Comparison for AM0 (E490), ASTM E927-19



Spectral Irradiance Ratios for AM0 (E490), ASTM E927-19



Wavelength (nm)	Percentage	Class
350-400	4.95	A
400-500	15.70	A
500-600	16.19	A
600-700	14.35	A
700-800	10.90	A
800-900	11.95	B
900-1100	18.31	B
1100-1400	8.54	B

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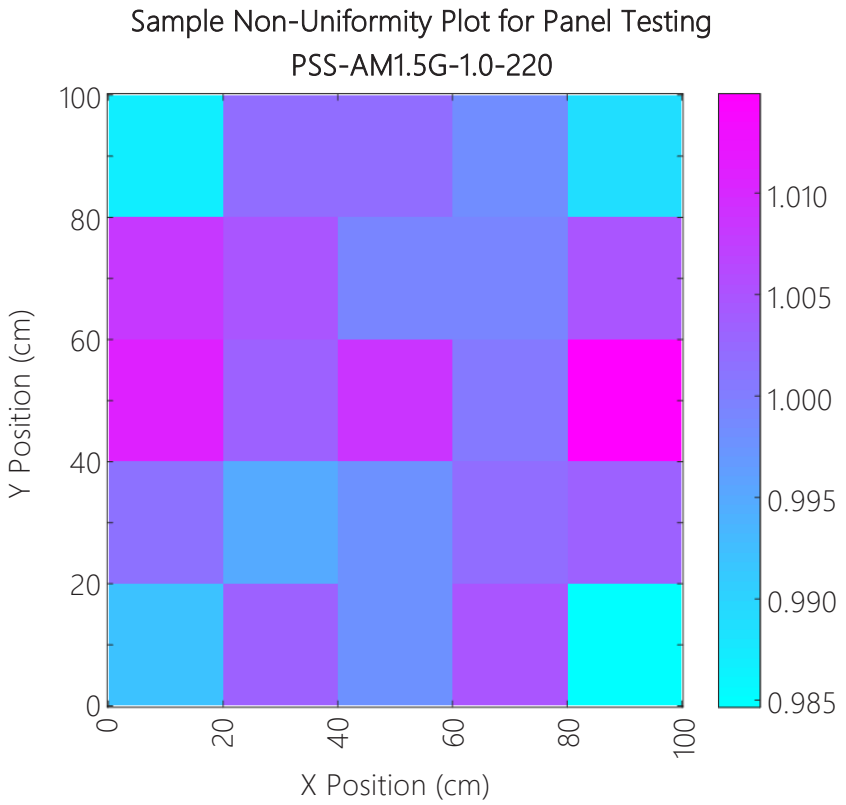
CLASSIFICATION

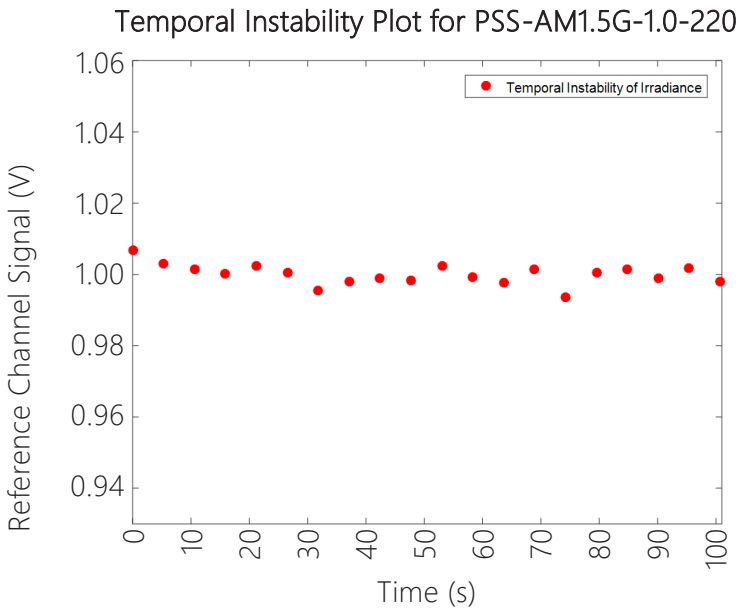
Spatial Non-Uniformity[1]

Spatial non-uniformity for panel testing requires 25 equally-spaced points of measurement, within certain detector size requirements.



Temporal Instability[1]

	Value	Units
Total IV Scan Time	100	s
Time Between Data Points	5.3	s
Total Measurement Points	20	
Maximum Irradiance	1.008	Suns
Minimum Irradiance	0.9944	Suns
Short Term Instability, STI[2]	0.44[4]	%
Short Term Instability Classification	A+	IEC 60904-9 Ed.3.0
Long Term Instability, LTI [3]	0.67[4]	%
Long Term Instability Classification	A	IEC 60904-9 Ed.3.0



1. Measured in accordance to IEC 60904-9 Ed3.0.
2. According to method 5.4.1.2.a) Simultaneous measurement of irradiance, current and voltage, 300 —1200 nm. Automatic declaration of class A.
3. According to method 5.3.1.3.a) LTI value is related to time for acquiring I-V characteristic.
4. STI and LTI values are taken as the worst value from 5 repeat measurements of temporal instability.

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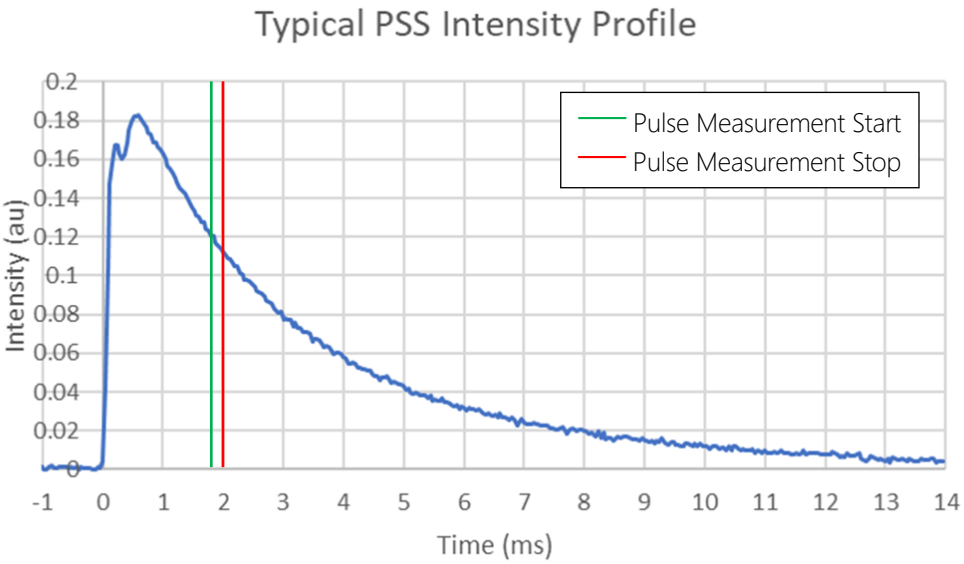
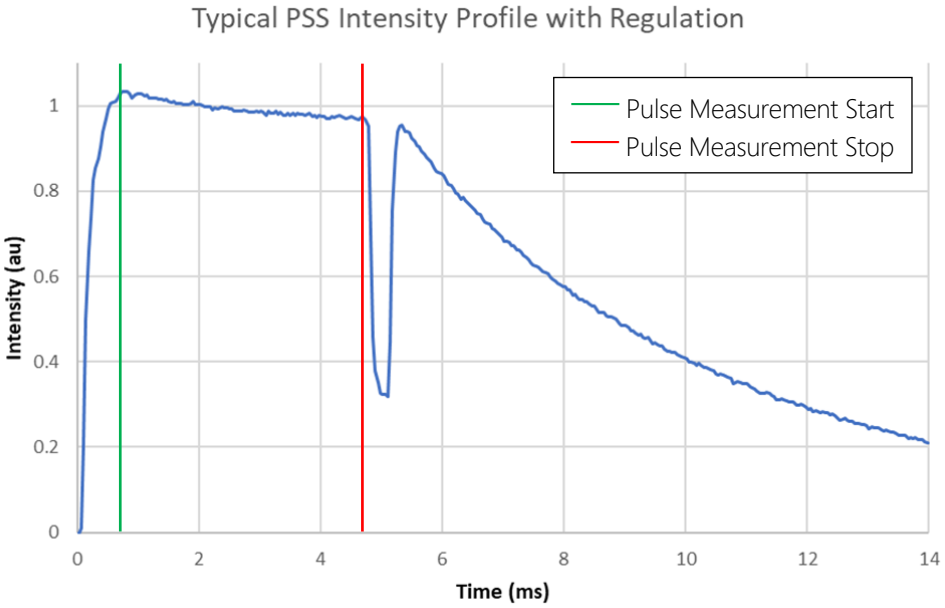
PULSE LENGTH

Extend the Pulse Using the Pulse Current Regulator





The PSS series has an available pulse current regulator that shapes the pulse in the pulse measurement window to achieve a flatter pulse profile over a longer period. It adjusts the resistance over the course of the pulse to allow the current to remain constant over a period of 4.0 ms.

In the standard measurement window PSS, the measurement window used is 0.2 ms, taken after a 1.8 ms delay from the start of the pulse. This location is chosen to optimize temporal stability.

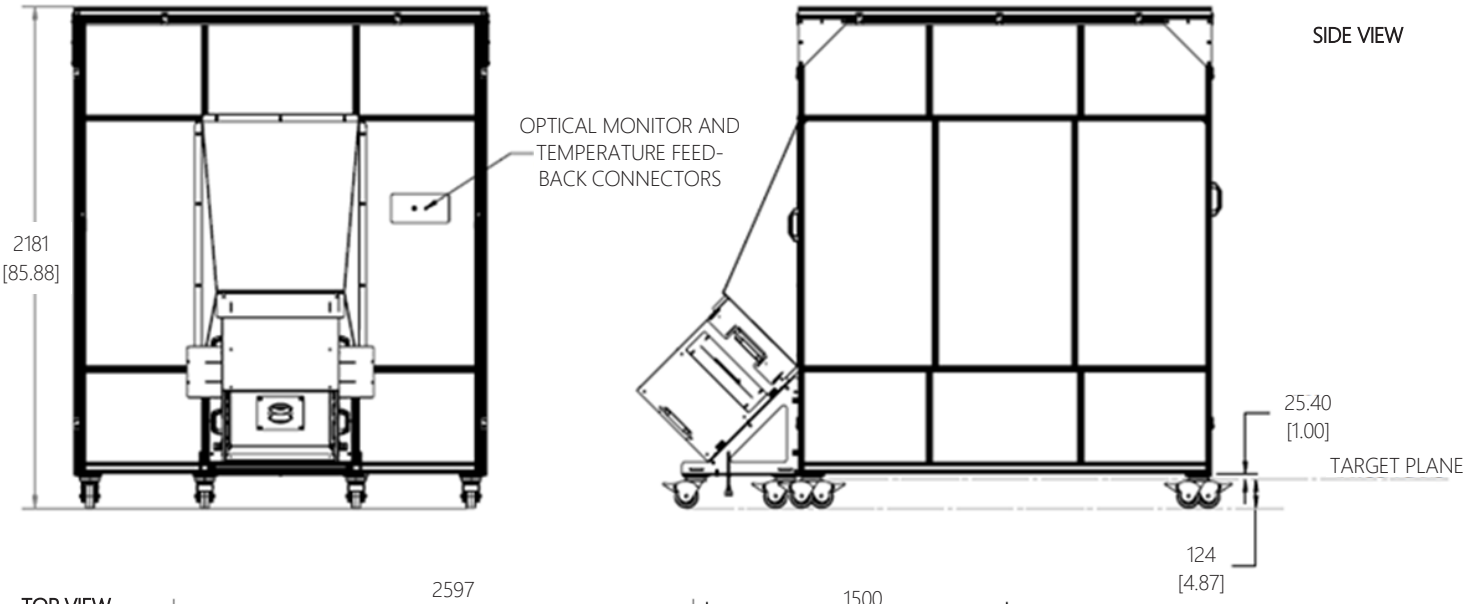
When using the pulse current regulator to extend the measurement window, the pulse remains flat for 4.0 ms after an initial 0.7 ms delay.

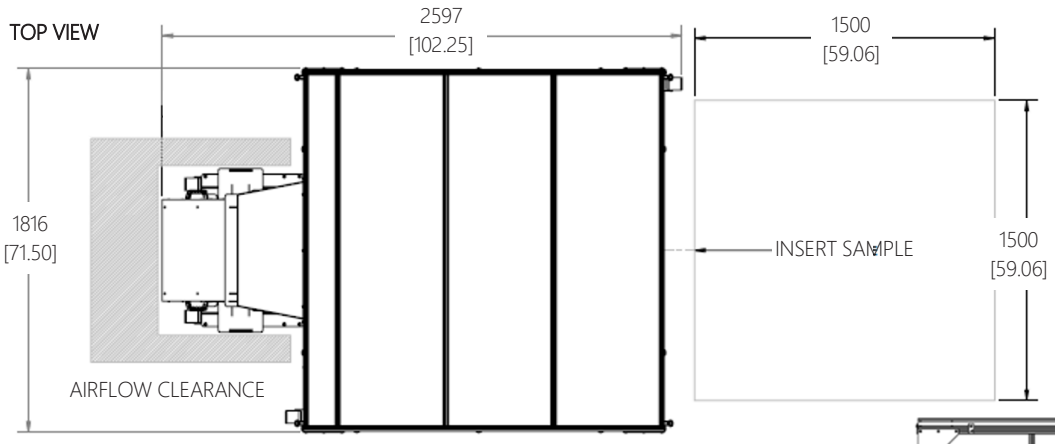
1. Note

Large Area Flash Solar Simulator

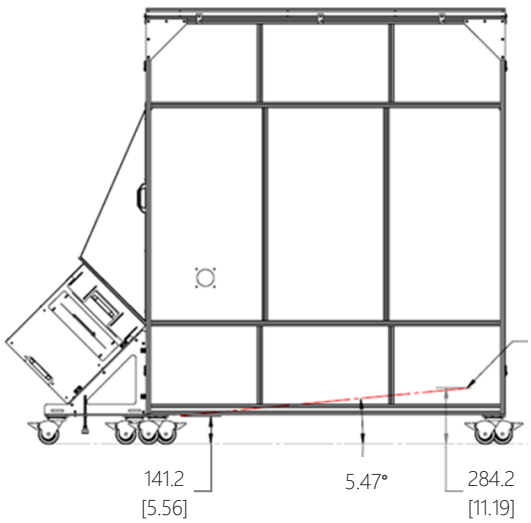
DIMENSIONS

PSS-AM1.5G-1/1.5, PSS-AM0-1/1.5 Dimensions in mm [inches]





All PSS Model Target Plane Measurements in mm [inches]

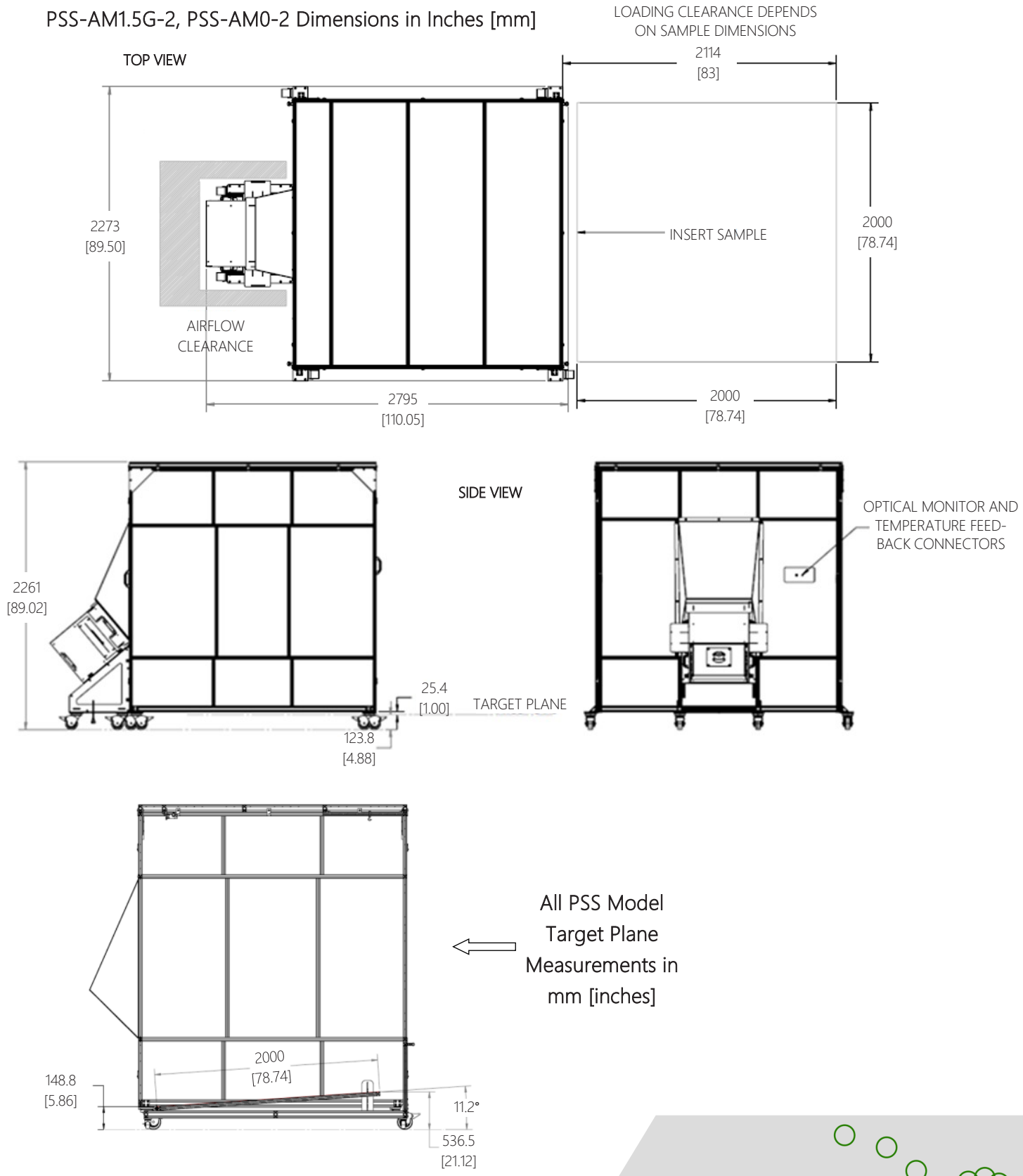


Model	PSS-AM1.5G and PSS-AM0		
	-1	-1.5	-2
Dimensions, Simulator (m, W×L×H)	2.6 × 1.85 × 2.2		2.8 × 2.3 × 2.3
Weight, Simulator (kg)	105		140
Dimensions, Equipment Rack (m, W×L×H)	0.5 × 0.5 × 0.9		0.5 × 0.5 × 0.9
Weight, Equipment Rack (kg)	32		32
Target Plane (mm, from ground)[1]	125		125

Large Area Flash Solar Simulator

DIMENSIONS

PSS-AM1.5G-2, PSS-AM0-2 Dimensions in Inches [mm]



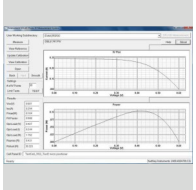
All PSS Model Target Plane Measurements in mm [inches]

Large Area Flash Solar Simulator

ACCESSORIES

Custom Interface Cables

The standard interface for the IV system is a series of banana cables. Interface cables for your device under test can be readily made on request.



IV-TEMP-F [175-9111]

Temperature Measurement Add-on

Each PSS-series large area solar simulator comes with an RTD (resistance temperature detector) mounted inside the housing to sample air temperature. However, this add-on is required to allow readout of the RTD.

SOL-REF-Q-I-F [125-9061]

Solar Reference Cell, Flash Interface

For periodic recalibration of the flash system, a calibrated reference device with known I_{SC} at 1 sun should be used. This NIST-traceable reference cell comes with an interface to allow it to be easily used with large area flash systems.

Large Area Flash Solar Simulator

ORDERING INFORMATION

MAIN PRODUCTS		
Model	SKU	Description
PSS Large Area Flash Solar Simulator	191-9101	Main PSS flash solar simulator model. Select configuration.
IV-TEMP-F	175-9111	Temperature Measurement Add-on for read-out of the RTD included with the PSS.
SOL-REF-Q-I-F	125-9061	Reference cell with flash interface. Calibrated by Sciencetech.
REPLACEMENT PARTS		
Model	SKU	Description
Replacement Filter, AM0 for Flash	160-8094	Replacement air mass filter set for the PSS-AM0 series. Both 6" × 6" and 3" × 3" filters are required for a Large Area Flash Solar Simulator to achieve an AM0 spectral match.
Replacement Filter, AM1.5G for Flash	160-8095	Replacement air mass filter set for the PSS-AM1.5G series.
ENG-HV1-124Q	652-0079	Replacement flash lamp.
DUT Carriage	191-9102	A test carriage with angled target plane, required to achieve good non-uniformity. If operating over a production line, the simulator should be installed tilted. Tilt is adjustable from 0-8°.