

ELECTRICAL INSTRUMENTATION CALIBRATION REPORT

This document states that the instrument described below meets or exceeds all manufacturer specifications. The calibration results published in this certificate were obtained using equipment capable of producing results that are traceable through NIST to the International System of Units (SI). ILT is Accredited to ISO/IEC 17025:2017. Calibration conforms to ANSI/NCSL Z540.1-1994 and ANSI/NCSL Z540.3-2006. subclause 5.3

Date:	17 - O	ct-22	Certificate #	ate #: 2210171405E SO#:		SE SO#:	#: 177778		
Temp:	23	Degrees C	Humidity:	45	%	Procedure:	TP-0113:08NO	OV2	011
Rendered To: Quantum Design GmBH									
Instrume	ntMod	el-S/N:	IL1700 #2338						
Calibrati	on/Ren	air Remark	s: None						
Canbran	Oil Rep	an Kemark	s. None						
Parts (If	Neede	d): None							
-									
				_					
As Found Tolerance In Ou	: ˈ	As Found Readings	As Found Permissible Error	Ар	plied Current	Adjusted Readings	Permissible Adjustment Error	As L Tole In	eft rance Out
V	7	1.000E-3	+/- 0.5%		1.000E-3	1.000E-3	+/- 0.2%		
V	7	1.001E-4	+/-0.5%		1.000E-4	1.001E-4	+/- 0.2%	V	
V		1.000E-5	+/-0.7%		1.000E-5	1.000E-5	+/- 0.2%	V	
V		9.99E-7	+/-1.0%		1.000E-6	9.99E-7	+/- 0.2%	V	
V		9.98E-8	+/-1.0%	1.000E-7		9.98E-8	+/- 0.5%	V	
V		1.001E-8	+/-1.0%	1.000E-8		1.001E-8	+/- 0.5%	V	
V		1.002E-9	+/-1.0%		1.000E-9	1.002E-9	+/- 0.5%	V	
V	3	9.97E-11	+/-1.5%		1.000E-10	9.97E-11	+/- 1.0%	V	
Tolerance	after rep	pair and/or cali	bration: 🗸 In		Out	ly.		-	
Measurement Uncertainty: 1mA=±0.065%, 100uA=±0.062%, 10uA=±0.062%, 1uA=±0.065%, 100nA=±0.073%, 10nA=±0.079%, 1nA=±0.084%, 100pA=0.26%. Confidence Level of Uncertainty is 95% (K=2).									
		-	ile applies, unless sta			, , ,			
The above Instrument was compared to the Keithley Current Calibrator/Source Model 263 S/N 0730631 calibrated									

Calibrated By:

Electrical Calibration Tech. Chris Kucy

This certificate applies only to the item identified and shall not be reproduced other than in full, without the specific written approval by International Light Technologies, Inc.

Form F-094B Rev J







OPTICAL CALIBRATION CERTIFICATE

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Rendered-to: QUANTUM DESIGN GMBH	
Detector: SED033 #4776	Input Optic: W #5599
Filter:F #16702	Misc.: N/A #
Calibrated With: IL1700 #2338	+5V Bias Off
(PIR) PEAK IRRADIANCE RESPONSE SENSITIVITY FACTO	OR AS CALIBRATED ON: 18-Oct-2022
1.246E-2 (A)(cm2)(W-1) assuming monochromatic (A)(cm2)(mW-1) assuming monochromatic	
1.05% *Change In Sensitivity From Previous Cali	ibration Dated: 29-Oct-2018
Tolerance As Found: ✓ In Out	Tolerance As Left: ✓ In Out
Unit will read directly in watts per square centimeter or milliWat above.	is per square centimeter when used with the sensitivity factor
REFERENCE PLANE: Groove ONE formed by filter or diffuse	r elements and next element, counted from front surface of assembly.
	ove. Difference includes intrinsic detector change. NIST recertification
PRIMARY STANDARD: U.S. National Institute of Standards at I219 - December 3, 2015 - NIST Test No. 685/287304-15/2 CD204 - December 2, 2015 - NIST Test No. 685/287304-15/1	alibration Due: December 3, 2025
INTERNATIONAL LIGHT TECHNOLOGIES PRIMARY TRA	ANSFER STANDARDS:
IL #01 IL #02 SED033 #3275	
	ncertainty of: +/- 0.31% Confidence Level of Uncertainty is 95% (k=2)
LIGHT SOURCE: _1T 1000W QTH	LAMP OUTPUT: _3.20E-5 W/cm2
INSTRUMENTATION; SED033 #6400	PROCEDURE: OP-0029
TEMPERATURE: 22.8 degrees C	HUMIDITY:30%
CALIBRATED BY: 9 - Hoy	
Calibration Technician: Jon Hoyt	
THIS CERTIFICATE APPLIES ONLY TO THE ITEMS IDENTIFIED AND SH WITHOUT THE SPECIFIC WRITTEN APPROVAL BY INTERNATIONAL LI	ALL NOT BE REPRODUCED EXCEPT IN FULL,
Calibration Date: 10/18/2022 Certificate No: 210183225	Sales Order #: 177778
	Calibration Accretiation# 66765

Form F-074 (Rev L)



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Rendered-to: QUANTUM DESIGN GMBH					
Detector: SED033 #4776	Input Optic:_	R #415			
Filter:F #16702	Misc.:	N/A#			
Calibrated With: IL1700 #2338		+5V Bias	Off		
(PRR) PEAK RADIANCE RESPONSE SENSITIVITY FACTOR	R AS CALIBI	RATED O	N: 18-Oct-2022		
9.12E-4 (A)(cm2)(sr)(W-1) assuming monochr	omatic radia	nce at 600	Onm		
2.82% *Change In Sensitivity From Previous Cal	ibration Dated	l: 29-Oct-2	2018		
Tolerance As Found: ✓ In Out	Tolerance	As Left:	✓ In	Out	
Unit will read directly in watts per square centimeter per steradia	n when used v	vith the ser	nsitivity factor ab	oove	
				•	
REFERENCE PLANE: Average F.O.V. +/-0.75 Degrees					
* ILT's Simple Accept Decision Rule Applies, Unless Stated Abupdates, lab experimental error or modifications to the hardware		ce includes	s intrinsic detecto	or change, NIST re	certification
PRIMARY STANDARD: U.S. National Institute of Standards at I219 - December 3, 2015 - NIST Test No. 685/287304-15/2 C D204 - December 2, 2015 - NIST Test No. 685/287304-15/1	alibration Due	e: Decembe	er 3, 2025		
INTERNATIONAL LIGHT TECHNOLOGIES PRIMARY TRA	ANSFER STA	NDARDS	:		
IL #01 IL #02 SED033 #3275					
ILT Transfer Uncertainty to Customer =+/- 3%plus NIST U	ncertainty of:	+/- 0.31%	Confidence Le	evel of Uncertaint	y is 95% (k=2)
LIGHT SOURCE: <u>1T 1000W QTH/Reflectance Tablet</u>	_ LAMP OU	TPUT:	9.89E-6 W/cm2/s	sr	
INSTRUMENTATION: SED033 #6400	PROCEDU	JRE: <u>O</u> I	P-0041		
TEMPERATURE: 22.8 degrees C	HUMIDIT	Y:	30%		_
CALIBRATED BY: 9 - Hoy					
Calibration Technician: Jon Hoyt					
THIS CERTIFICATE APPLIES ONLY TO THE ITEMS IDENTIFIED AND SH WITHOUT THE SPECIFIC WRITTEN APPROVAL BY INTERNATIONAL LI				L,	13
Calibration Date: 10/18/2022	Sales	Order#: _	177778_	ilac MRA	PJLA Calibration Accreditation# 66765

Form F-074 (Rev L)



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Rendered-to: QUANTUM DESIGN GMBH	
Detector: SED240 #5676	nput Optic: W #7743
Filter: <u>UVB-1 #23781</u>	Misc.: N/A #
Calibrated With: IL1700 #2338	+5V Bias <u>On</u>
	120
(PIR) PEAK IRRADIANCE RESPONSE SENSITIVITY FACTOR	R AS CALIBRATED ON: 18-Oct-2022
1.36E-5 (A)(cm2)(W-1) assuming monochromate (A)(cm2)(mW-1) assuming monochromatic	
<u>-4.23%</u> *Change In Sensitivity From Previous Calib	ration Dated: 29-Oct-2018
Tolerance As Found: 🗹 In 🗀 Out	Tolerance As Left: ✓ In Out
<u>Unit will read directly in watts per square centimeter or milliWatts above.</u>	per square centimeter when used with the sensitivity factor
REFERENCE PLANE: Groove ONE formed by filter or diffuser of	elements and next element, counted from front surface of assembly.
* ILT's Simple Accept Decision Rule Applies, Unless Stated Aboundates, lab experimental error or modifications to the hardware a	ve. Difference includes intrinsic detector change, NIST recertification adjustments.
PRIMARY STANDARD: U.S. National Institute of Standards and I219 - December 3, 2015 - NIST Test No. 685/287304-15/2 Cal D204 - December 2, 2015 - NIST Test No. 685/287304-15/1 C	ibration Due: December 3, 2025
INTERNATIONAL LIGHT TECHNOLOGIES PRIMARY TRAI	NSFER STANDARDS:
U522 U1023 N/A	
LT Transfer Uncertainty to Customer = +/- 5.5% plus NIST Unc	pertainty of: <u>+/- 1.25%</u> Confidence Level of Uncertainty is 95% (k=2)
LIGHT SOURCE: 19s Hg-Xe	LAMP OUTPUT: 1.250E-3 W/cm2
INSTRUMENTATION: #1029/SCS280/W	PROCEDURE: OP-0007
TEMPERATURE: 22.8 degrees C	HUMIDITY: 30%
CALIBRATED BY: 9 - Noyt	
Calibration Technician: Jon Hoyt	
THIS CERTIFICATE APPLIES ONLY TO THE ITEMS IDENTIFIED AND SHA WITHOUT THE SPECIFIC WRITTEN APPROVAL BY INTERNATIONAL LIG	
Calibration Date: <u>10/18/2022</u> Certificate No: <u>210183227</u>	Sales Order #: 177778
	Accreditation# 66765

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Rendered-to: QUANTUM DESIGN GMBH			
Detector: SED240 #5676	Input Optic:_	W #7743	
Filter: <u>ACT5 #23008</u>	Misc.:	N/A#	
Calibrated With: IL1700 #2338		+5V Bias On	
		6	
(PIR) PEAK IRRADIANCE RESPONSE SENSITIVITY	FACTOR AS CALIE	BRATED ON: 18-Oct-2022	2.
3.94E-4 (A)(cm2)(eff W-1) assuming m	onochromatic irradi	ance at 270nm	
<u>-4.14%</u> *Change In Sensitivity From Previous	ous Calibration Dated	: 29-Oct-2018	
Tolerance As Found: ✓ In ☐ Out	Tolerance	As Left: In	☐ Out
Unit will read directly in effective watts per square centin	neter when used with t	he sensitivity factor above.	
REFERENCE PLANE: Groove ONE formed by filter or	diffuser elements and	next element, counted from	n front surface of assembly.
* ILT's Simple Accept Decision Rule Applies, Unless St updates, lab experimental error or modifications to the h		e includes intrinsic detector	r change, NIST recertification
PRIMARY STANDARD: U.S. National Institute of Stan I219 - December 3, 2015 - NIST Test No. 685/287304 D204 - December 2, 2015 - NIST Test No. 685/287304	-15/2 Calibration Due	: December 3, 2025	
INTERNATIONAL LIGHT TECHNOLOGIES PRIMA	RY TRANSFER STA	NDARDS:	
U1023 U522 N/A			
LT Transfer Uncertainty to Customer = $\pm \frac{1}{4.5\%}$ plus ?	NIST Uncertainty of:	<u>+/- 1.77%</u> Confidence Le	vel of Uncertainty is 95% (k=2)
LIGHT SOURCE: SpectroPro1500/1000W Xe	LAMP OU'	TPUT: 1.072E-6 W/cm2	
INSTRUMENTATION: SED240 #3355	PROCEDU	RE: <u>OP-0018</u>	
TEMPERATURE: 22.8 degrees C	HUMIDIT	Y:30%	
CALIBRATED BY: 9 - Hoya			
Calibration Technician: Jon Hoyt			ží
THIS CERTIFICATE APPLIES ONLY TO THE ITEMS IDENTIFIED WITHOUT THE SPECIFIC WRITTEN APPROVAL BY INTERNAT			
Calibration Date: 10/18/2022 Certificate No: 21018	3228 Sales	Order #: <u>177778</u>	Hac-MRA PJLA Calibration
			Accreditation#

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CALIBRATION

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Rendered-to: QUANTUM DESIGN GMBH					
Detector: SED033 #7059	Input Optic:_	W7 #00	119		
Filter:UVA #23821	Misc.:	N/A #			
Calibrated With: IL1700 #2338		+5V Bias	Off	,	
		**			
(PIR) PEAK IRRADIANCE RESPONSE SENSITIVITY FACTOR	OR AS CALIE	RATED (ON: 18-Oct-2022	2	
6.35E-3 (A)(cm2)(W-1) assuming monochrom 6.350E-06 (A)(cm2)(mW-1) assuming monochromati			m		
-1.55% *Change In Sensitivity From Previous Cal	ibration Dated	29-Oct-2	2018		
Tolerance As Found: ✓ In Out	Tolerance		✓ In	Out	
Unit will read directly in watts per square centimeter or milliWat above.	ts per square c	entimeter	when used with t	he sensitivity factor	
* ILT's Simple Accept Decision Rule Applies, Unless Stated Abupdates, lab experimental error or modifications to the hardward PRIMARY STANDARD: U.S. National Institute of Standards at I219 - December 3, 2015 - NIST Test No. 685/287304-15/2 CD204 - December 2, 2015 - NIST Test No. 685/287304-15/1 INTERNATIONAL LIGHT TECHNOLOGIES PRIMARY TRA	e adjustments. nd Technology Calibration Due Calibration Du	Detector December December	Response er 3, 2025 ber 2, 2025	r change, NIST recertific	cation
		NDAKDS	•		
SED400 #139 SED400 #1490 IL #0		NAME OF DESCRIPTION			
LT Transfer Uncertainty to Customer = <u>+/- 4.5%</u> plus NIST U	ncertainty of:	+/- 1.16%	Confidence Le	evel of Uncertainty is 95°	% (k=2)
LIGHT SOURCE: 19s Hg-Xe	LAMP OU	TPUT:	2.68E-3 W/cm2		
INSTRUMENTATION: SED033 #4544/UVA/W	PROCEDU	RE: <u>OI</u>	P-0007		
TEMPERATURE: 22.8 degrees C	HUMIDITY	/ :	30%	-	
CALIBRATED BY: 9 - Noyt					
Calibration Technician: Jon Hoyt				. 20	
THIS CERTIFICATE APPLIES ONLY TO THE ITEMS IDENTIFIED AND SH WITHOUT THE SPECIFIC WRITTEN APPROVAL BY INTERNATIONAL LI				L. ANDERSON	2
Calibration Date: 10/18/2022 Certificate No: 210183226		Order #: _		PJ Calibrateredit	

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