

TOCS LED CHARACTERIZATION SYSTEMS

For Simultaneous Thermal, Optical and Electrical characterization of LEDs

TOCS-20 20-INCH DIAMETER LED CHARACTERIZATION SYSTEM



FLEXIBLE DESIGN

Labsphere TOCS LED Thermal, Optical, Electrical Characterization Systems allow users to quickly, accurately, and simultaneously measure the optical and thermal characteristics of various LEDs and arrays.

LED manufacturers, integrators and users are paying more attention to the thermal and electrical characteristics of LEDs because thermal variances at the junction can affect an LED's performance in terms of color, output, life expectancy, luminous efficacy and linearity performance.

Labsphere TOCS systems are available in sphere sizes ranging from 20 inches to 76 inches, each designed for both 2π and 4π measurement geometries¹. The base systems consist of a lamp measurement integrating sphere, a high resolution CCD array spectrometer, electrical/thermal plate and temperature controller, auxiliary lamp and a precision variable current power supply. Our powerful TOCS-SS software is provided with each system. A Keithley 2400 series SourceMeter®, required to operate the system, is purchased independently, then integrated into the base system. This gives customers flexibility in choosing an appropriate model or to supply a currently owned SourceMeter® for integrating into the system.

CALIBRATION SOURCE OPTIONS

For user flexibility three calibration sources are available. At least one of these calibration sources is required to operate the system. (Designation XX denotes sphere size when ordering).

Model :TOCS-XX-ICS- Internal Calibration Source for 2π measurement geometry. Typically used in a production environment where fast calibrations are needed.

Model: TOCS-XX-ECS – External Calibration Source for 2π , LM-79 compliant measurement geometry.

Model TOCS-XX-4 π Center Mount Calibration Source for 4π measurements. This internal calibration source includes necessary baffle, lamp post, and mounting hardware for LM-78 and LM-79 measurement geometry.

¹. 4π measurement is not under thermal control

FEATURES:

- Complete Thermal, Optical & Electrical Analysis
- Automated Data Acquisition & Analysis
- TEC Temperature Control and Monitoring
- Measure optical properties as a function of temperature and operating current
- Available in 20, 40, 65 and 76 inch sphere diameters
- Conforms to IESNA LM-79 & LM-80 measurement geometries
- Ambient Air Temperature Control Available

MEASURE

- Electrical : I, V, Electrical Watts
- Optical: Flux, Color, Luminous Efficiency
- Thermal: Case temperature control vs electrical and optical parameters

APPLICATION AREAS:

- Packaged LEDs
- Modules & Arrays
- Backlight Displays
- Solid State Lighting



THEMAL PLATE WITH MOUNTING ADAPTER

POWERFUL, ACCURATE TOCS SOFTWARE

TOCS-SS STANDARD SOFTWARE

The TOCS-SS software, provided with the TOCS System, provides a powerful, yet easy-to-use menu driven operating environment. It allows users to control the LED temperature and operating current at specified ranges. This control enables the software to measure and characterize the device under test (DUT) over a wide range of temperatures.

System software automates procedures for measuring the spectral characteristics and controlling current and temperature. Software simultaneously collects electrical, optical and thermal data which is graphed and viewed on screen, or can be exported to Excel® format for further analysis.

MEASUREMENT FUNCTIONS

- ILV @ constant T: step & control I, stabilize T, measure L & V
- VLI @ constant T: step & control V, stabilize T, measure L & I
- TLV @ constant I: step & control T, stabilize T, measure L & V
- TLI @ constant V: step & control T, stabilize T, measure L & I
- ILV/T: perform ILV@constant T, step T and repeat at each T
- VLI/T: perform VLI @ constant T, step T and repeat at each T

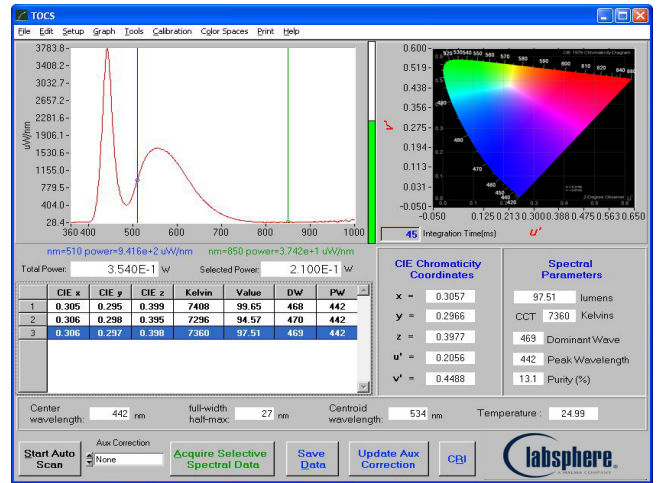
Key: L = Lumens
 V = Voltage
 I = Current
 T = Temperature

SOFTWARE FEATURES

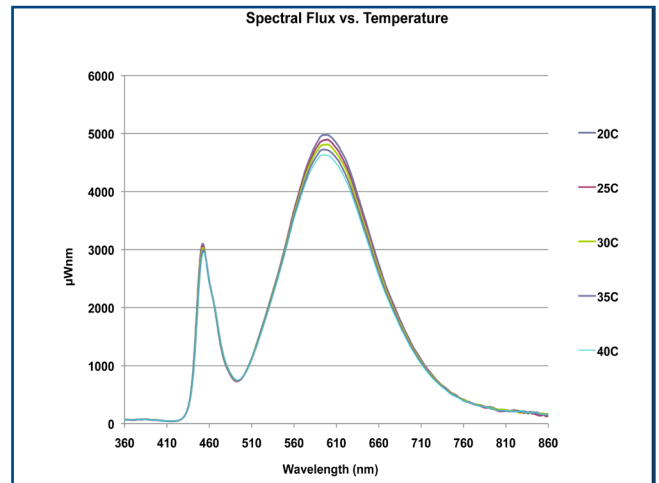
- Binning for flux and color
- Convenient menu driven operation
- Measured data displays in Real-Time
- Displays current and voltage settings on screen
- Easily enter LED and SSL information for test identification
- Displays LED, lamp standard and auxiliary lamp parameters
- Automatically generates data and test reports
- Allows for easy export to database programs for further QC Analysis

SOFTWARE OPERATING ENVIRONMENT

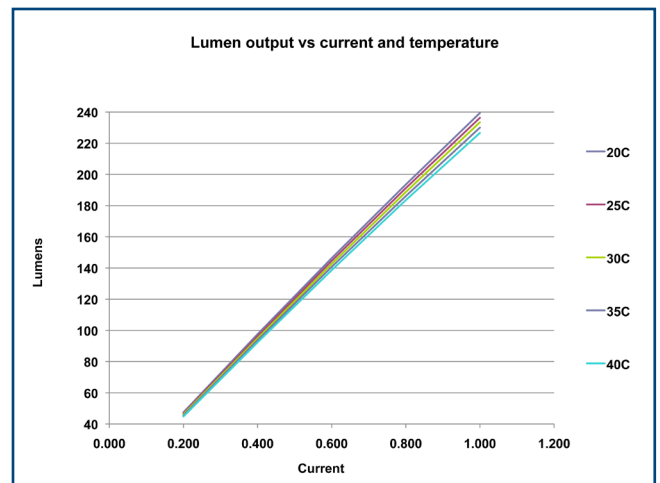
- Windows XP, 7, or VISTA - 32 or 64 bit operating systems



MAIN DATA SCREEN FOR TOCS STANDARD SOFTWARE



SPECTRAL FLUX VS TEMPERATURE



LUMEN OUTPUT VS CURRENT AND TEMPERATURE

ORDERING INFORMATION AND SPECIFICATIONS

SPHERE SPECIFICATIONS

Model Number:	TOCS-20	TOCS-40	TOCS-65	TOCS-76
Part Number:	AS-02827-000	AS-02841-000	AS-02842-000	AS-02843-000
Sphere Diameter:	20-inch (50 cm)	40-inch (1.02 m)	65-inch (1.65 m)	76-inch (1.93 m)
Sphere Interior Coating Reflectance:	98%	98%	98%	98%
Radiometric (Max):	400 Watts	1800 Watts	4000 Watts	5000 Watts
TPhotometric Range: (Illuminant A)	0.5 - 18,000 lm	2.0 lm - 72,500 lm	6.0 lm - 2000,000 lm	0.08 lm - 260,000 lm
Red LED Range:	0.06 lm - 4,600 lm	1.60 lm - 35,000 lm	6.0 lm - 135,000 lm	8.20 lm - 184,500 lm
Green LED Range:	0.12 lm - 5,700 lm	6.0 lm - 135,000 lm	16.0 lm - 356,500 lm	21.7 lm - 487,500 lm
Blue LED Range:	0.04 - 1,900 lm	2.3 lm - 51,000 lm	4.15 lm - 93,000 lm	5.67 lm - 127,500 lm
Thermal Port Size: (inches)	6 inch	8 inch	12 inch	16 inch
Cal Configuration 1 (TOCS-XX-ICS)	Internal 2π	Internal 2π	Internal 2π	Internal 2π
Cal Configuration 2: (TOCS-XX-ECS)	External 2π	External 2π	External 2π	External 2π
Cal Configuration 3: (TOCS-XX-4π)	Internal 4π	Internal 4π	Internal 4π	Internal 4π
DUT Temperature Range:	15° - 85°C	15° - 85°C	15° - 85°C	15° - 85°C
TE Mounting Plate:	External (2π)	External (2π)	External (2π)	External (2π)
Auxiliary Lamp (included):	35 Watt	50 Watt	100 Watt	100 Watt
Interface:	USB 2.0	USB 2.0	USB 2.0	USB 2.0
Ambient Air Temperature Control:	Available	Available	Available	Available
Sphere Dimensions: WxHxD	28.5x23.7x29.4inches	48.9x42.3x68.5 inches	112.6x78.4x84.1 inches	116.9x88.2x91.4 inches
System Weight:	117 lbs (53.07kg)	265 lbs (120.2kg)	678 lbs (307.6kg)	878 lbs (398.3kg)

SPECTROMETER SPECIFICATIONS

Spectral Range:	360 to 1000 nm
Dynamic Range Resolution:	16 bit
Optical Input:	SMA Fiber Connector
Wavelength Accuracy:	±0.15 nm
Wavelength Repeatability:	±0.1 nm
Stray Light:	<10 ⁻³
Chromaticity Accuracy:	(x,y) ±0.002
CCT Reproducibility:	< ± 5 K
Integration Time Range:	1.1ms - 4000ms

THERMAL SPECIFICATIONS

Thermal Control Repeatability:	± 0.5° C
Thermal Set-Point Resolution:	0.1° C

OPERATING ENVIRONMENT

Ambient Temperature:	20 - 35° C
Relative Humidity:	10 - 80%, non-condensing
Ambient Atmosphere:	Non-corrosive, good ventilation

TO MEET YOUR EXACT NEEDS ...

WE OFFER CUSTOM DESIGNED APERTURES FOR 2π MEASUREMENT GEOMETRY OF SSL LAMPS AND LUMINAIRES.

ALSO ASK OUR SALES ENGINEERS ABOUT RETROFITTING AN EXISTING LABSPHERE OR SPHEREOPTICS SPECTRAL LAMP MEASUREMENT SYSTEM.

THERMAL PLATFORM OPERATING RANGE

The table below shows the thermal operating ranges for standard systems at Ambient temperature 25°C. Higher power limits can be achieved with modifications to the standard system.

DUT power	Low heatsink continuous	High heatsink continuous	High heatsink momentary (10 minutes)	High heatsink momentary (1 minute)
(W)	Temperature °C	Temperature °C	Temperature °C	Temperature °C
0.0	10*	85**	100***	120+
3.5	10	85	100	120
8.7	10	85	100	120
18.4	10	85	100	120
23.6	10	85	100	120
28.9	15	85	100	120
34.4	20	85	100	120
40.0	25	85	100	120
45.9	32	85	100	120
51.9	40	85	100	120

* Temperatures below 10°C can only be achieved in low humidity environments due to possibility of condensation.

** Maintain Maximum 85° C for continuous operation

*** Temperatures to 100° C can be achieved for short term operation, not to exceed 10 minutes. Temperatures to 120° can be achieved for short term operation not to exceed 1 minute.

ORDERING INFORMATION AND SPECIFICATIONS

CALIBRATION SOURCE OPTIONS

Model Number:	TOCS-XX-ICS	TOCS-XX-ECS	TOCS-XX-4 π
Part Number:	AS-02827-002	AS-02827-003	AS-02808-100
Measurement Geometry:	2 π Internal	2 π External	4 π Internal

SPHERE INTERIOR SHOWING LAMP INSTALLED IN PORT



TOCS-XX-ICS

The TOCS-xx-ICS is an internally mounted calibration lamp that can be used when fast measurements, such as production line testing are required. The kit includes a calibrated internally mounted lamp and necessary mounting hardware. Calibration data, traceable to national laboratory standards, is provided.

TOCS-XX-ECS

The TOCS-xx-ECS is an externally mounted forward flux calibration lamp standard which conforms with LM-79 for 2 π recommended methods. The kit includes a calibrated lamp, adapter and necessary cables. Calibration data, traceable to national laboratory standards, is provided.



TOCS-XX-4 π

The TOCS-xx-4 π is offered for 4 π measurement geometry. The TOCS-XX-4 π is a center mounted calibration source and stage. The kit includes a calibrated lamp standard, lamp mounting post (base up or base down mounting), necessary baffle, mounting hardware and necessary cables, for quick and easy installation. Calibration data, traceable to national laboratory standards, is provided.



KEITHLEY 2400 SERIES SOURCEMETER® OPTIONS



We are pleased to offer the Keithley 2400 Series SourceMeters for optimum operation of the TOCS LED Characterization Systems. Our sales engineers can assist you in choosing the right model for your application. ²

The Keithley SourceMeter is a required component for operating the TOCS systems. For user convenience, the instrument can be supplied by the user and sent to Labsphere for integration into the electronics rack, or it may be purchased directly from Labsphere. Please discuss your options with a Labsphere Sales Engineer.

Model Number:	2400	2420	2425	2440
Part Number:	TOCS-2400	TOCS-2420	TOCS-2425	TOCS-2440
Description:	General Purpose	3A	High Power	5A
Power Output:	21 V, 1.05A 210V, 105mA	21V, 3.15A 63V,10.5A	21V, 3.15A 105V, 1.05A	10.5V, 5.25A 42V, 1.05A
Voltage Range:	$\pm 1 \mu\text{V}$ to $\pm 210\text{V}$	$\pm 1 \mu\text{V}$ to $\pm 63\text{V}$	$\pm 1 \mu\text{V}$ to $\pm 105\text{V}$	$\pm 1 \mu\text{V}$ to $\pm 42\text{V}$
Current Range:	$\pm 10 \text{ pA}$ to $\pm 1.05\text{A}$	$\pm 100 \text{ pA}$ to $\pm 3.15\text{A}$	$\pm 100 \text{ pA}$ to $\pm 3.15\text{A}$	$\pm 10 \text{ pA}$ to $\pm 5.25\text{A}$
Transient Response Time:	30 μs	30 μs	30 μs	30 μs
Soak Time Resolution:	1 ms	1 ms	1 ms	1 ms
Soak Time Range:	0 ms to 30 sec	0 ms to 30 sec	0 ms to 30 sec	0 ms to 30 sec
L-I-V Resolution:	1 mA	1 mA	1 mA	1 mA
L-I-V Range:	0-2000 mA	0-2000 mA	0-2000 mA	0-2000 mA

² Please reference current published Keithley 2400 SourceMeter specifications on the Keithley website before ordering. www.keithley.com