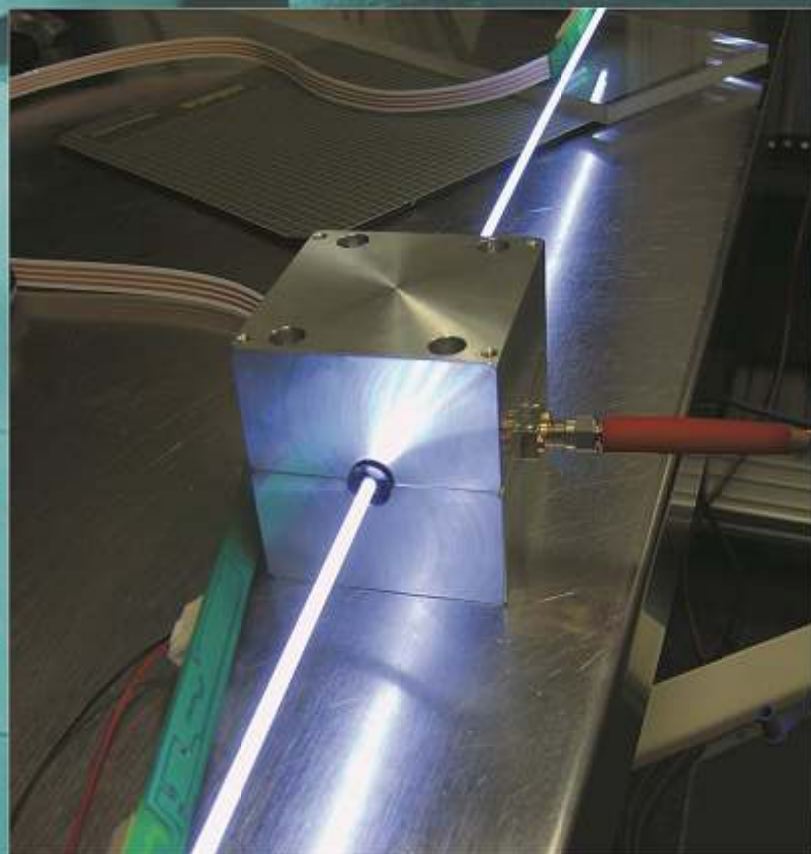




# CONSULTING SERVICE IN DISPLAY TECHNOLOGY MEASUREMENTS

Display Technology Measurement  
Modeling and Optical Simulation  
Characterization and Evaluation  
Efficiency Characterization  
Testing and Calibration  
Precision Measurement  
Environmental Testing  
Automotive Lighting  
General Lighting  
Portable Lighting  
Worldwide Cooperation



i-sft GmbH Measurement Catalog

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Innovation in display  
technology measurement

Are you seeking  
for reliable display  
technology  
measurement  
service?

## i-sft GmbH Company Overview

i-sft GmbH is a leading German - based specialist in the field of display technology consulting, measurement and testing. i-sft 's extensive, state - of - the -art testing and calibration facility - combined with an intimate understanding of display metrology - enables the company to generate credible performance data, specifications and analyses for a range of display technologies. i-sft 's knowledge is vital for providing comparisons between display manufacturers and ensuring quality control within the display market.

Just one of the company's vast range of services is performing the optical measurements contained in popular display metrology standards, including VESA FPDM 2.0, TCO '99/'03/'05, and SPWG 3.5. i-sft 's technical consultancy and advanced testing and measurement services are in demand from display developers, manufacturers and distributors around the globe.

### i-sft GmbH Competences/Experiences

Our experienced engineers and consultants will assist you in developing a display measurement system especially for your needs. We are specialized and trained for advanced expertise in the areas we develop our measurement systems. By combining both academic background and industrial experience, i-sft GmbH is an ideal partner for a wide range of projects and technical expertise for evaluating measurement methods.

Our lab is available for assisting in getting solutions to metrological tasks in the field of optical, electrical and environmental measurements.

i-sft GmbH is certified in accordance with TÜV CERT that the company has established and applies a quality management system for Physical Measurement Services and Development of Related Procedures.



### Integrating Sphere -

Integrating sphere is highly reflective enclosure with its interior coated for high diffuse reflectivity, such that the reflected light enters the sphere and reaches the detector after bouncing around the surface.

The surface should approach ideal Lambertian scatterer conditions where the light introduced to it is scattered in all directions and its intensity is proportional to the cosine of the angle of observation.

Our 1m diameter sphere with average reflectivity of 97% is periodically checked and calibrated to NIST calibration standards to provide constant and accurate measurement data.

Our integrating sphere is fully automated device which generates data of:

- Luminous Flux
- Luminous Efficacy
- Spectral Radiance Flux
- Correlated Colour Temperature
- Peak and Dominant Wavelength
- Colour Rendering Index
- Purity of Light





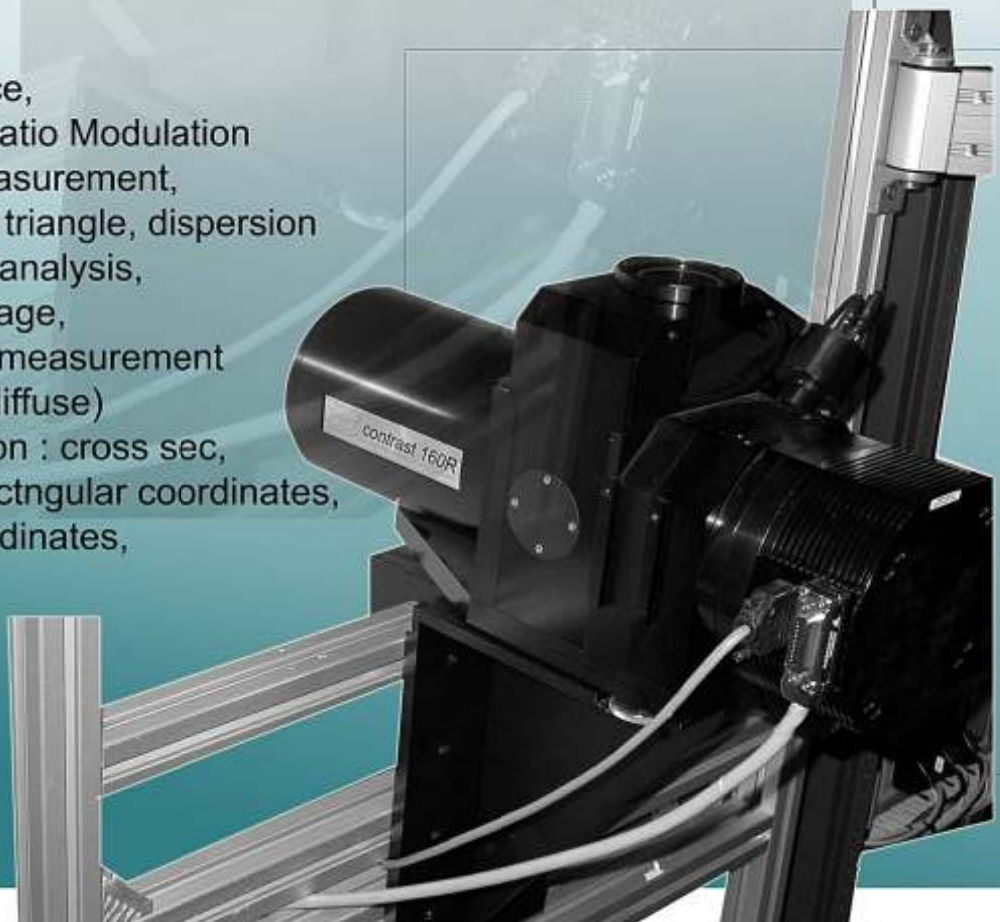
### EZcontrast 160R conoscope -

The EZcontrast 160R has been developed in order to provide instant, simple, and accurate measurements of photometric and colorimetric properties of the flat panel technology displays.

This device is the combination of traditional conoscopic brightness meter and mechanical rotation angle measurement system which provides measurement of viewing angle changes and the Fourier transform with a CCD sensors. The system contains peltier element CCD with high sensitivity in order to minimize the influence of the low noise. This device works in a range of 0.001 to 80.000 cd/m<sup>2</sup> with the measurement accuracy of <0.15 degrees and 3% brightness for incidence angle +/- 80 degrees/ azimuth : 360 degrees.

#### Measures:

- Lumianance,  
Contrast Ratio Modulation
- Colour measurement,  
CIE colour triangle, dispersion
- Grey level analysis,  
reverse image,
- Reflection measurement  
(specular,diffuse)
- Visualization : cross sec,  
azimuth rectangular coordinates,
- Polar Coordinates,
- CCT





### Luminance Colorimeter Topcon Bm-7

The Topcon Bm-7 is a fully integrated colorimeter that automatically measures the values in a single measurement by focusing on device. This system works with accuracy of +/- 2% of luminance of display values and chromaticity within +/- 0.002 for standard source.

This system is periodically checked and calibrated to NIST standard to provide accurate and reliable measurement data for variety of apertures (2, 1, 0.2, and 0.1 degrees)



#### Measuring functions:

- Luminance ( $\text{cd/m}^2$ )
- x,y chromaticity coordinates
- u,v chromaticity coordinates
- CCT and duv
- CIE 1976  $L^*a^*b$
- CIE 1976  $L^*u^*v$
- Contrast Ratio Modulation



### MURATest

MURATest 2-D luminance and colour meter ensure a large optical modulation transfer function with low distortion and low aberration. The system provides 2D uniform analysis of luminance and colour of display within 1 point measurement. This device feature excellent spatial resolution and dynamic resolution.

The optics provides a precise image of the display with minimal compensation for optical defects. The system uses the Fourier transform of the point spread function for the modulation transform function.

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- Contrast Ratio Modulation





## Temperature and humidity chambers

It is one of the most common scientific approaches to determine the stresses applied to a product. Temperature and humidity change is the process in which an application is exposed to multiple series of changing extremes.

For that purpose, Espec platinum series chambers are used. The equipment is originally calibrated by manufacturer and periodically controlled to provide accurate simulation conditions. You can select from variety of sizes and additional options to meet your specific testing requirements.

### Chambers setup:

- 1000x1000x800 mm
- 600x850x250 mm
- 300x300x250 mm
- -70°C to 170°C
- 0 - 98% RH
- Dew point measurement
- One-time and cyclic





### NF Plasma Discharge Characteristics Tester

A 6 kV/rk V 20 mA plasma discharge characteristic tester is integrated device to drive and simulate lamp conditions. The system includes a power supply, a voltmeter for measuring the output voltage, another voltmeter for measuring the voltage between terminals, and an ammeter for measuring the current that flows through plasma discharge lamp.

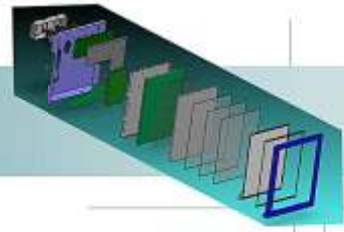
The system contains main unit and the tester bench for lamps attachment.

#### NF Tester Specification:

- 25kHz to 130kHz :accuracy +/-1%
- Output voltage: 6kVrms
- Output current: 20 mArms
- Output voltage distortion factor 5%
- Constant voltage mode
- Constant current mode
- Discharge start voltage







## 3D CAD Modeling and Light Simulation

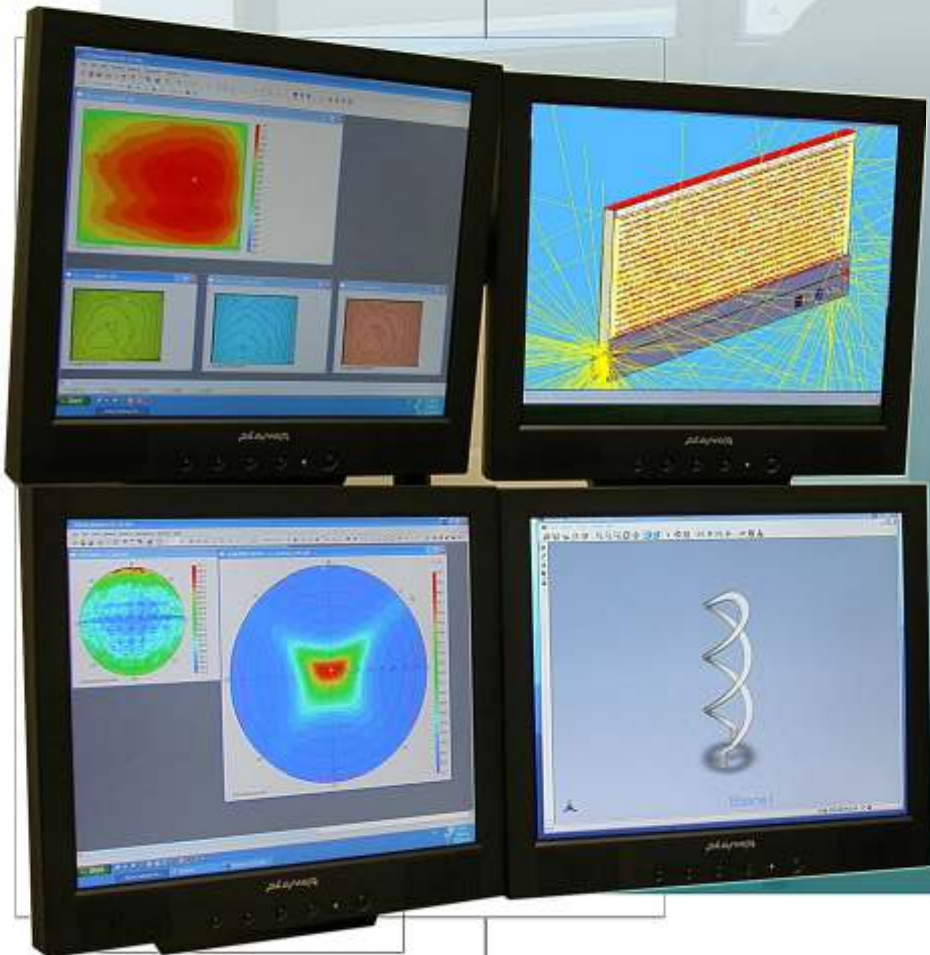
### 3D CAD Modeling and Light Simulation

i-sft GmbH offers its capabilities of project design and light simulation. We proud ourself to propose innovative skills in photometric and lighting design together with opto- mechanical solutions. Our service is also focused on system optimization, calculating all optical performances and reducing the size and drawbacks of your system.

The light simulation package includes illumination analysis, multiply virtual lighting prototypes, simulating and analyzing photometric properties and optimizing your photometric results.

Just some of the company's range of capabilities :

- Irradiance, Illuminance
- Cartesian Intensity
- The real colour on each point
- Intensity distribution
- Polar Intensity
- Optimizing results
- Spectrum on each point of irradiance map





## Flat panel displays characterization

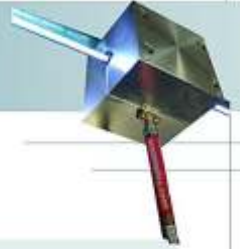
i-sft GmbH takes pride in providing superior measurement service in display technology. Our measurement procedures apply to many popular standards such as VESA FPDM 2.0 or TCO '99/'03/'05.

Typical display technology measurements:

- Luminance and colour- level, uniformity
- Contrast ratio
- Gray scale and gamma
- Colour gamut
- Luminous Flux
- Checkerbord Luminance and Contrast
- Uniformity of colours, contrast ratio, luminance
- Viewing angle performance
- Reflectance with diffuse illumination
- Specular reflectance
- Power consumption & supply
- Efficiencies
- Mechanical and Physical Characteristics
- Emissions
- Response time measurement
- Box patter measurements
- Shadowing
- Reflection- angular dependence
- Environmental considerations: Photometric and Radiometric characterization vs. Temperature & Humidity measured coherently in time
- Correlated Colour Temperature variation
- RGB Settings
- Colour grayscale linearity
- CIE 1931, 1976 representation
- RGB colour dispersion
- Colour angular dependence
- Visualization : cross-sections, azimuth rectangular coordinates, incidence polar coordinates
- CCT angular dependence



To find out more please visit our website or contact us directly



### Light sources characterization

i-sft GmbH provides comprehensive light sources measurements which are precisely designed to your specific needs. Three main case studies of i-sft GmbH are Automotive Lighting, General Lighting, and Portable Lighting measurement solutions.

The new requirements concerning the illumination of modern spaces and light distribution in terms photometry brings urgency to constantly improving our measurement capabilities. Please refer to some of the most common measurements formulated by types :

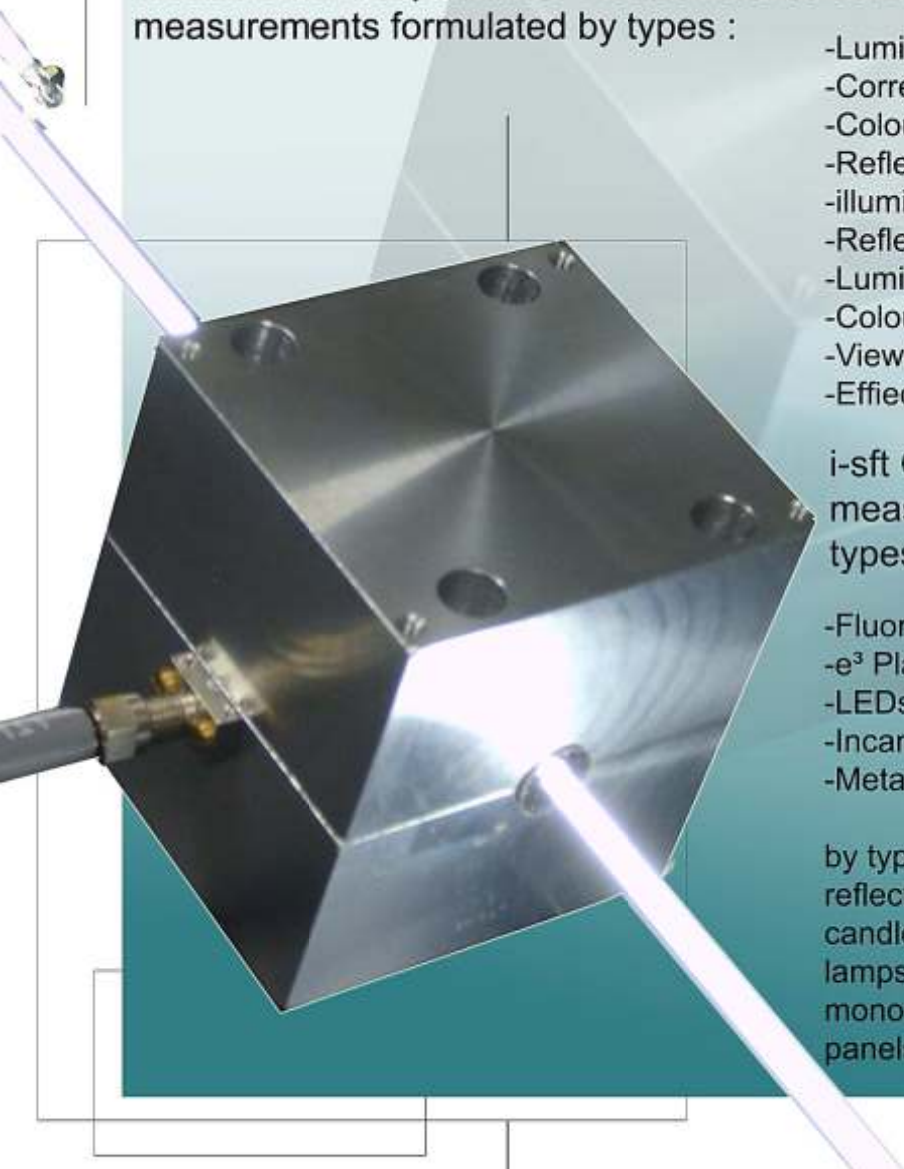
- Luminous flux
- Correlated Colour Temperature
- Colour Rendering Index
- Reflection colour diffuse and specular
- illumination
- Reflection luminance
- Luminance level
- Colour uniformity
- Viewing angle performance
- Efficiency characteristics

i-sft GmbH offers light measurement service for following types of light sources:

- Fluorescent lamps: CCFL, compact lamps,
- e<sup>3</sup> Plasma lamps,
- LEDs,
- Incandescent lamps,
- Metal halide lamps,

by type:

reflector lamps, striplights, round lamps, candle lamps, GLS lamps, dichroic, capsule lamps, Hi-spot lamps, CCFL, LED single monochromatic, tri-colour, LED modules and panels, entertainment lamps.





### Calibration Facility of Total Luminous Flux

Total luminous flux becomes one of the most important characteristics of light sources. It is a measure of the amount of light emitted from a source without regard for the direction in which it is emitted. Because this term brings a lot of difficulties it is necessary to standardize the procedure to certify data accuracy in measurement laboratories.

i-sft GmbH has developed measurement procedure to calibrate the total luminous flux and spectrum of various lamps or light sources. The total uncertainty of the calibration ranges from 1 to 2% for incandescent lamps.

#### Calibration facility specification:

- Integrating sphere: 1m diameter
- Average reflectivity: 97%
- Detector: wavelength:300-1050nm
- Wavelength resolution : 0.2 nm



## Introduction to UPE - useful power efficiency

We are proud to announce that i-sft GmbH developed a novel method of display performance characterization. The usefulness of flat panel displays is characterized by UPE factor: useful - power - efficiency.

The proposed method describes the behaviour of FPD technology in respect to optical response and power efficiency when the active area of the screen is considered.

To find out more, please visit our website:

[www.i-sft.com](http://www.i-sft.com)





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