GS-1290 NED Near-Eye Display Measurement System

Gamma Scientific offers the world's first spectro-radiometric, image quality and autocollimating alignment analysis instrument for characterizing the Virtual Image and Qualified Viewing Space of near-eye displays. The GS-1290 NED (patent pending) delivers high spatial resolution display quality measurements for virtual & augmented reality and Head Up Displays.

The system is ideally suited for manufacturers of near-eye displays for entertainment, medical, avionics & industrial applications, conforming to standards being developed by the IDCM committee of SID and the IEC.

High Spatial Resolution, Color & Contrast Measurement

Unmatched Accuracy and Performance

- Lightweight & Compact Design for wide angle range and spatial positioning with Robotic Arms
- Integrated 12 MP CMOS Camera
- Proprietary SLR Viewing System With Integrated LED Measurement Spot Projector
- Built-in Autocollimator for Accurate Alignment
- Variable Field of View with Motorized Selection of a Range of Measurement Spot Apertures

Measurement Parameters			
✔	Luminance Uniformity	✔	Spectral Transmittance
✔	Color Uniformity	✔	Response Time
✔	Contrast	✔	Flicker
✔	Field of View	✔	Image Contrast / MTF
✔	Image Virtual Distance	✔	Left / Right Parallax Error

Since 1961, Gamma Scientific has delivered state-of-the-art measurement solutions for manufacturers and users of light sources, sensors and displays. Products include spectroradiometers, calibration light sources, goniophotometers, integrating spheres, thin film measurement systems, and LED testers / sorters. In addition to our exceptional technical and functional capabilities, Gamma Scientific is ISO/IEC 17025 accredited by NVLAP (NVLAP lab code 200823-0).

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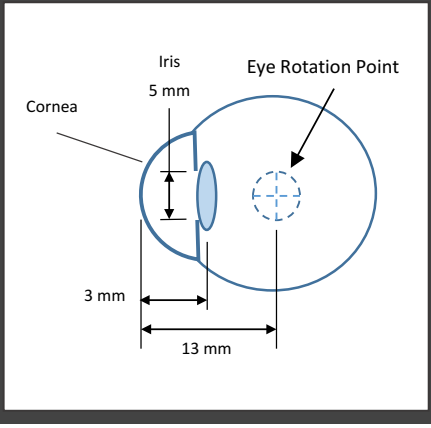
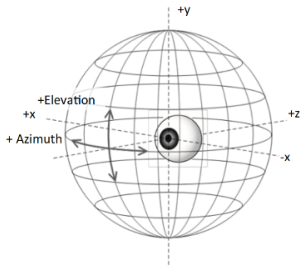
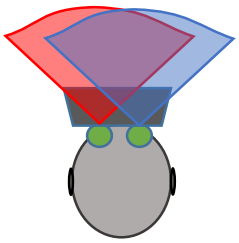


Most display spectroradiometers have entrance pupils ranging from 20 to 40 mm. Proper characterization of near-eye displays requires an entrance pupil 5 mm or smaller diameter, matching that of the human iris. While this reduced entrance pupil greatly improves measurement accuracy, the light measurement system must have sufficient sensitivity and dynamic range to provide adequate signal to noise for both the small and large viewing areas associated with such displays.





An important additional measurement consideration is the vantage point from which the display virtual image is viewed. Typically the center of the spherical coordinate system, and the Eye Rotation Point is an integral part of the mechanical positioning and control system.

These collective criteria are being used by the IDCM committee of the Society for Information Display to establish regulations for specification and safety of such systems.

Luminance, color and uniformity measurements are essential performance metrics in the Augmented/Virtual Reality and Head Up Display visual field of view. Recent work has been done that defines a minimum essential set of measurement instrument optics system characteristics to assure repeatable and reproducible photometric and colorimeteric measurement results.

Key Application Areas

Ensuring repeatable and reproducible photometric and colorimetric measurement results

Virtual Reality

Augmented Reality

Helmet Mounted Displays

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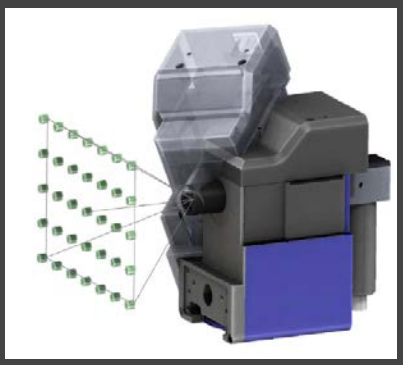
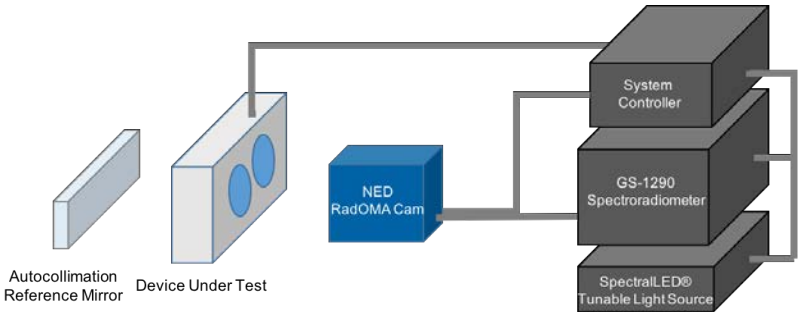
The Radiometric Optical Multichannel Analyzer (RadOMA) camera/telescope integral optical head maps display uniformity at vantage point field of view, including luminance, CCT, CIE x,y, peak and dominant wavelength. An integrated programmable pattern generator displays any 2D / 3D test pattern and outputs in standard VDU formats such as Display Port and HDMI. With automatic scaling to any display resolution, the system supports from synchronous updates for motion artifact analysis.





A typical GS-1290 NED system consists of a System Controller, a high-accuracy Spectroradiometer with exceptional low-light measurement capability, a high resolution SpectraLED® tunable light source system and a state-of-the-art RadOMA autocollimator Camera.

The various elements of the system are fully integrated and configured by Gamma Scientific to ensure out-of-the-box, plug and play operation.

The Gamma Scientific compact camera system is mounted to a precision 6-axis industrial robot that controls the x, y, and z position, the position of the vantage point, as well as the pointing direction relative to the exit pupil of the near-eye display. The system can be configured into three different modes of data acquisition:

- Spectroradiometric measurement of display content or display optical spectral transmittance
- View and define measurement area
- Image capture

The compact size of the NED camera allows positioning of the telescope entrance pupil at the display reference eye point between the earpieces of the device under test. Field of view data is acquired at different eye relief distances for measurement and analysis. Manually actuated positioning systems are also available.

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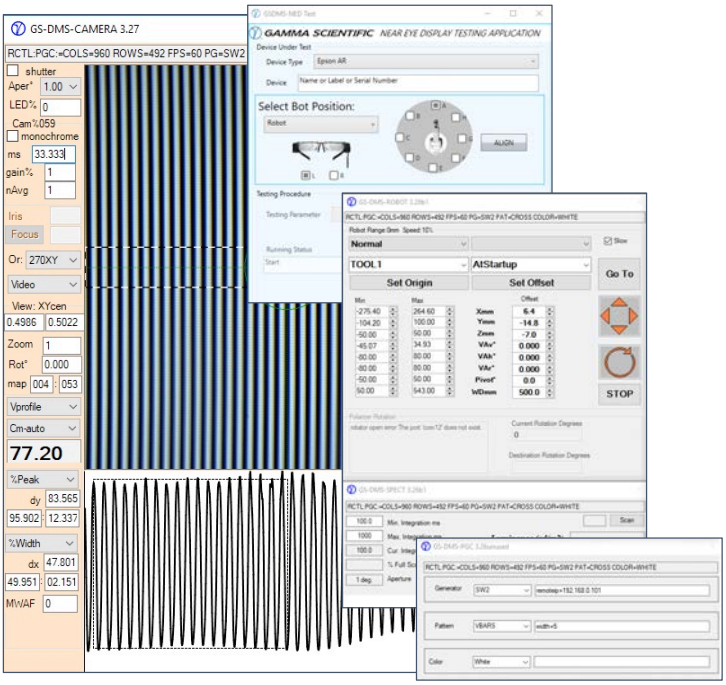


MTF and Position Screen Shots

A fully integrated and developed set of software supplies all the tools necessary to align, and characterize luminance, color, luminance & color uniformity, field of view, contrast and resolution contrast, in a programmable an automated process.

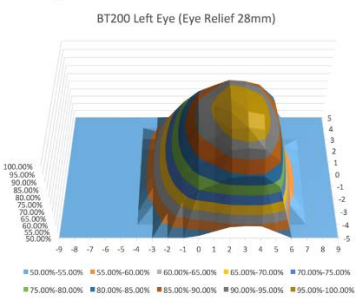
This is accomplished using a structure of modular software that allows the flexibility to combine pattern generation, goniometric positioning, automatic data collection and custom test generation and selection.

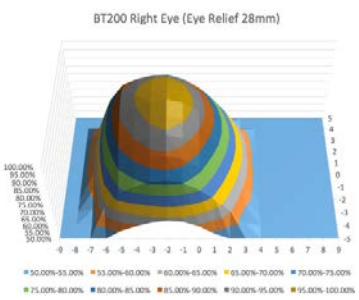
Custom test suites can be programmed to run multiple types of tests rapidly and consecutively.

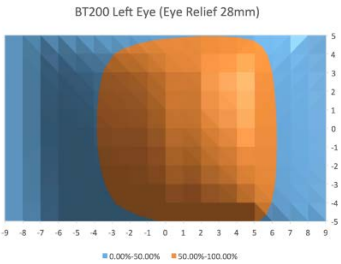
Leveraging more than 30 years of expertise in field-deployed HUD measurement systems for US military aircraft including the F-16, F-18, B1B, C-17 and F-35 Gamma Scientific has unmatched depth of expertise in display measurement.

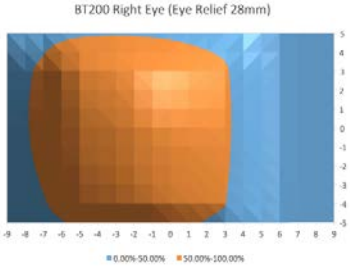
Critical Enabling Design Features

- Compact size to allow positioning of entrance pupil at the design eye point
- Small 1 to 5 mm entrance pupil diameter for accurate luminance and color measurement and eye motion box mapping
- High sensitivity / high dynamic range spectrometer with signal to noise for small and large areas
- Exceptional color measurement spectral purity
- Ability to point in different directions to different areas in the Virtual Image field of view
- Precision angular alignment to the device under test
- Precision mechanical positioning to the design eye point









Revision 12.17

Specifications are subject to change without notice.

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