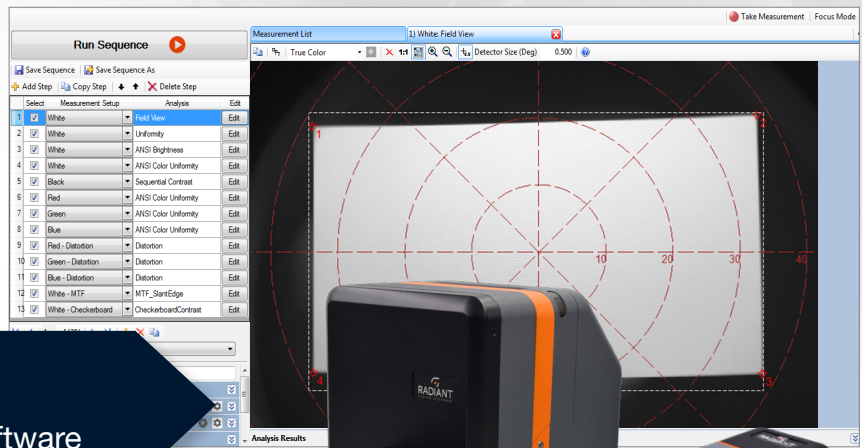# RADIANT
VISION SYSTEMS

TT-ARVR™
AR/VR Display Test Module for TrueTest™ Software

Applications

- Evaluate near-eye displays (NEDs) in AR/VR device assemblies

- Use with a Radiant ProMetric® Imaging Colorimeter or Photometer and the XRE Lens or AR/VR Lens

- Measure absolute luminance and chromaticity of projected images

- Test image clarity; characterize distortion and MTF over the field of view (FOV)

- Measure points of interest at x,y positions in angular space

Benefits

- Quickly apply pre-defined tests for AR/VR display measurement

- Accurate analysis of spatial data from images captured by wide-field-of-view optics

- Software test sequencing and API device integration to control display test images in conjunction with software analyses, enabling automated production-level testing

- Spatial x,y positions reported in degrees (°); note image position within the context of vertical and horizontal field of view

Software module with tests for evaluating display quality in augmented and virtual reality devices

Radiant Vision Systems TrueTest™ Software provides a comprehensive set of tests for image analysis within a flexible framework that enables evaluation using a single test, or multiple tests in sequence. Test sequencing and pass/fail reporting functionality make TrueTest the ideal software package for production environments. TrueTest Software can be combined with a Radiant ProMetric® Imaging Colorimeter or Photometer to create a complete testing system for light and color measurement or machine vision.

The TT-ARVR™ module for TrueTest Software provides a test suite to efficiently perform light, color, and dimensional measurements used to evaluate the quality of displays integrated into augmented (AR), virtual (VR), and mixed (MR) reality devices and headsets.

The TT-ARVR software module includes:

- **Modulation Transfer Function (MTF)**
  Evaluate image clarity based on Line Pairs, Slant Edge Contrast (ISO 12233), or Line Spread Function (LSF). Apply Through Focus MTF to find best focus across the display at each focal distance.
- **Image Distortion**
  Characterize distortion from the device or headset.
- **Field View**
  Report the horizontal, vertical, and diagonal display FOV.
- **Spatial x,y positions given in degrees (°)**
  Locate POI on software images in terms of angular FOV.

TT-ARVR™ System Requirements

- ProMetric® Imaging Photometer or Colorimeter, or ProMetric I-SC Solution
- XRE Lens or AR/VR Lens
- Windows® 10, 64 bit
- 16-32 GB RAM
- Additional system requirements vary by camera. See hardware specification sheet.

Test Library

TT-ARVR includes tests for AR/VR display quality and defect detection, including:

- ANSI Brightness
- ANSI Color Uniformity
- AutoPOI
- Checkerboard Contrast
- Chromaticity
- Compare POI
- Distortion 9 Point
- Distortion Dot Grid
- Distortion Line Grid Analysis
- Field View (Device FOV)
- Focus Uniformity
- Image Export

- MTF Line Pair
- MTF LSF (Line Spread Function)
- MTF Slant Edge
- Through Focus MTF*
- Particle Defects
- Pattern Mura
- Pixel Defects
- Points of Interest
- Sequential Contrast
- Uniformity
- Warping Analysis

For use with XRE Lens only

Captures dimensional measurements for projected image size and x,y position, reported in degrees (°). Software reports actual field of view (FOV) of the display (horizontal, vertical, diagonal) and image position within the context of angular FOV.

Examples of TT-ARVR analyses:
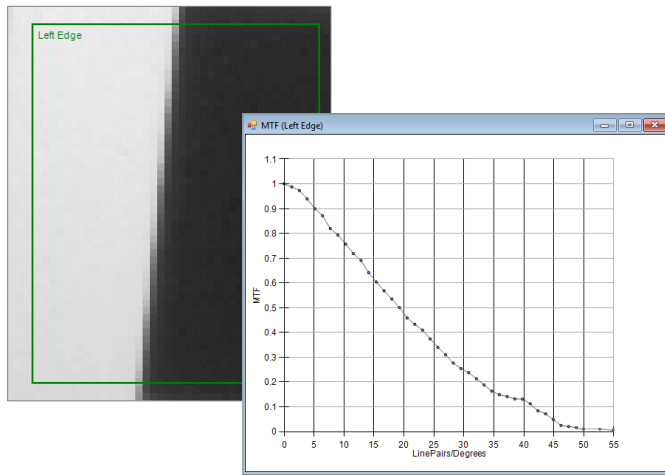
Modulation transfer function (MTF) is calculated based on ISO 12233 standard used to determine overall imaging quality.
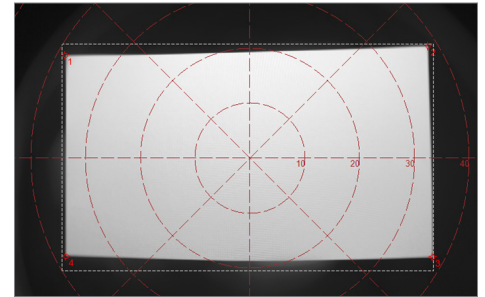

Horizontal FOV	66.504
Vertical FOV	37.488
Diagnol FOV	76.342

The Field View test calculates the angular field of view of the entire display as imaged by the system; includes horizontal, vertical, and diagonal FOV measurements.

Image distortion is characterized using a Distortion Grid test pattern to measure the spatial offset between dots of the primary image and a test pattern (above right).

CenterX	-3.7830	Degrees
CenterY	-6.0176	Degrees
ImageRotation	-0.2129	degrees
KeystoneHoriz	0.7819	%
KeystoneVert	1.6182	%
DistortionLeft	-0.2882	%
DistortionRight	2.4496	%
DistortionTop	-6.1625	%
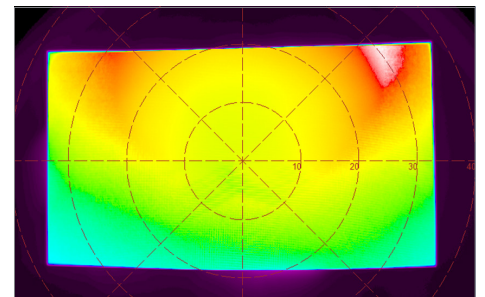
Coordinates in TT-ARVR software interface are given in degrees to report x,y positions in the context of the angular field of view.

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