TeraMetrix™

T-Ray® Server
Software Overview

The T-Ray® Server Software is the most versatile terahertz waveform processing software available today. Built as a modular software platform, T-Ray® Server collects, analyzes, and serves terahertz waveforms and measurement data for a broad range of customer applications.

Luna Innovations' TeraMetrix product line has provided state-of-the-art pulsed terahertz (THz) measurements for over 20 years. Always focusing on the needs of our customers, T-Ray® Server has been developed as a simple but flexible software environment. T-Ray® Server is structured in a Server – Client software architecture. It runs on a powerful single board computer (SBC) embedded in the Terahertz Control Unit (TCU). This calculation engine collects and processes the terahertz waveforms to provide a broad range of measurements. These measurements can be accessed by using one of the T-Ray® Server Client programs, or by use of XML commands over one of the Ethernet ports of the SBC. This XML communication allows customers to write their own client programs that utilize the rich data available from the T-Ray® Server.

While T-Ray® Basic will allow configuration of the inputs and outputs of the TCU hardware, and will stream THz waveforms at up to 1000 per second, the real power of T-Ray® Server is demonstrated when it is coupled with the various Client programs available.

KEY FEATURES

- Designed for the factory and the researcher

- Robust database structure to ensure continuity of performance

- Built on embedded operating system to survive power failures

- Client – Server architecture for flexible configuration

- High speed data analysis of every waveform

- Powerful script interface for flexible waveform analysis

- XML command language for integrating into higher level control systems

- 20 years of THz analysis experience

- Easy to recall analysis recipes stored in the system database

BENEFITS

- Reliable THz measurements

- Easy to use interface

- Full integration support

- Field tested software platform

- Local and remote access

- Operational security through multiple user categories

SOFTWARE OPTIONS

- **T-Ray® Basic** comprises the Dashboard and Waveform Clients, and the Status and Setup modules, providing for the fundamental operation of the TCU. The Dashboard client can be run in the T-Ray® Server shell on the TCU, but, like any of the client programs, can be installed and run on a separate computer and will provide simplified status and health information on the system to ensure proper operation. The Waveform Client displays multiple views of the THz data: the Raw time domain waveform; the Power Spectrum of a single waveform calculated by Fourier transform. It will also allow logging of multiple waveforms for further analysis. The Status module provides detailed information on the internal health of the system, while the Setup module enables configuration of the TCU interfaces: digital I/O; encoders; motion axis definitions; waveform acquisition speed; software licensing. T-Ray® Basic also allows the waveforms to be streamed to external software in multiple formats.

- **T-Ray® T-Gauge** is a suite of two Client programs (Recipes and Logging) that allow for analysis of the THz waveform. The Recipes Client is a flexible interface to define how the Server will analyze each waveform to provide the desired measurement. This configured analysis is referred to as a recipe. Each recipe is stored in the internal database, and can be recalled at any time. The recipe can identify, fit, and track peaks in the waveform (reflections of the THz pulse off of a surface or interface), analyze the time domain waveform or its frequency spectrum for features or integrated power, and provide a simple programing field to combine these input data into the output measurements. The Logging Client allows the output measurements of a recipe to be displayed as a strip chart or logged to a file for later analysis. Both Recipes and Logging can also be installed and run on a separate computer communicating with the Server over Ethernet.

- **T-Ray® Imaging** will take the output of the recipe analysis, combine it with position information derived from the TCU encoder inputs, and display the result as a 2D image. Since the recipe can generate multiple measurement variables, Imaging can generate multiple images simultaneously. These images can be stored in a number of common image formats, or the full data set including the waveforms at each pixel can be stored to allow reprocessing of the data in the future. Time and/or frequency domain gating within the recipe allows for detailed analysis of the object under test, and optimization of the imaging parameters. Imaging will also display the cross-sectional image (B-scan) of each row of the image, providing a powerful method of visualizing the internal structure of an object. Imaging can be installed and run on a separate computer so images and data sets can be stored in an external location.

- **SPG** is a software module that supports our Single Point Gauge (SPG) handheld measurement tool. SPG will only run in the T-Ray® Server shell, but it provides the software interface for the SPG touchscreen. An emulated view of the touchscreen is visible in the main window, and provides the same control interface as the handheld screen. If the SPG has been set in Sequenced mode, the TCU screen will show the sequential measurements made that can also be written to a csv file for archival purposes.

- **T-Ray® Security** is a set of software features that can be added to a deployment of the SPG. This feature set includes an expanded set of user levels, and a unique login for each user. At lower user levels (Operator, Tech, and Tech Admin), the script of the recipe is not visible or accessible. The Tech Admin is able to manage user accounts. In this mode of operation, the system database that contains the recipes for waveform analysis is encrypted. Hiding and encrypting the recipe script protects corporate IP from inadvertent disclosure.

- **LSG** is a software module that runs in the T-Ray® Server shell to support our Line Scan Gauge (LSG) handheld scanner. This module drives the screen of the LSG, and displays the live B-scan obtained. The module will sense if the recipe is written for traditional NDT, or is structured for measuring the flush and gap between adjacent panels. This second, specialized mode, will align a subsurface interface and provide the measurements of flush and gap when the handheld trigger is pulled. Additional setup screens are available in this mode to allow for configuration of this sophisticated analysis.

Industry Leading Regulatory Compliance
The T-Ray® 5000 intelligent TCU has been certified by Underwriters Laboratories has received the CE mark, is fully compliant with FDA CDRH laser safety regulations, and has been tested to meet FCC part 18 regulations.

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