mini-Z™

Terahertz Time Domain Spectrometer

ZOMEGA THz

see the possibilities(TM)

Features

- Compact terahertz transceiver head
- Real-time spectroscopy
- Fast scanning rate: up to 20Hz
- Broadband sensitivity up to 4.0 THz
- Transmission & Reflection modes
- I/O ports for external device control
- Robust vibration tolerant operation
- Integrated design
- Turnkey operation
- Open architecture
- USB 2.0 & Bluetooth connectivity
- Remote operation via network
- Integrated or fiber-coupled laser options

PRODUCT SPECIFICATIONS	
Spectral Range	0.1 - 4.0 THz
Freq. Resolution	< 50 GHz (after FFT)
Dynamic Range	> 70 dB (peak)
Operational Geometry	Transmission & Reflection
Standoff Distance	1 - 40 cm
THz Emitter	Photoconductive Antenna
THz Detector	ZnTe Electro-Optical Crystal
Software	Labview Supported Software
Interface	USB 2.0 & Bluetooth
Size (L x W x H)	10.5” x 6.25” x 2.75”
Weight (lbs)	< 4.8 lbs

Performance

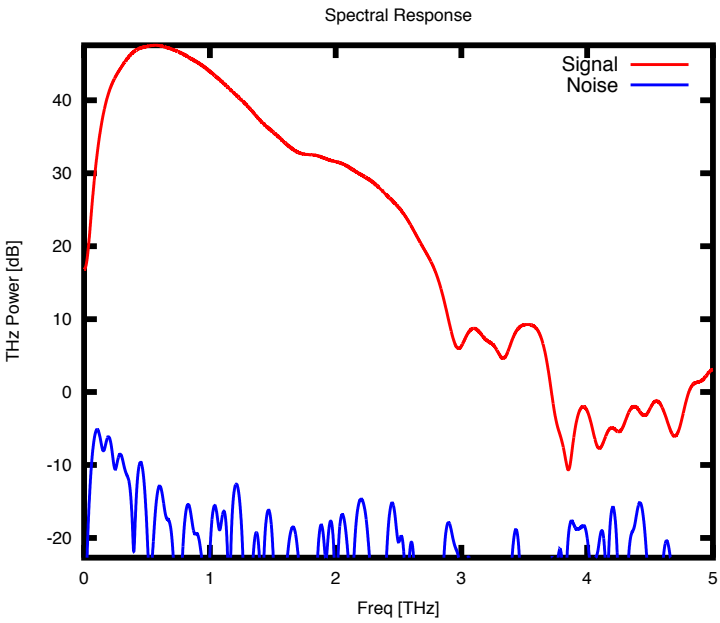
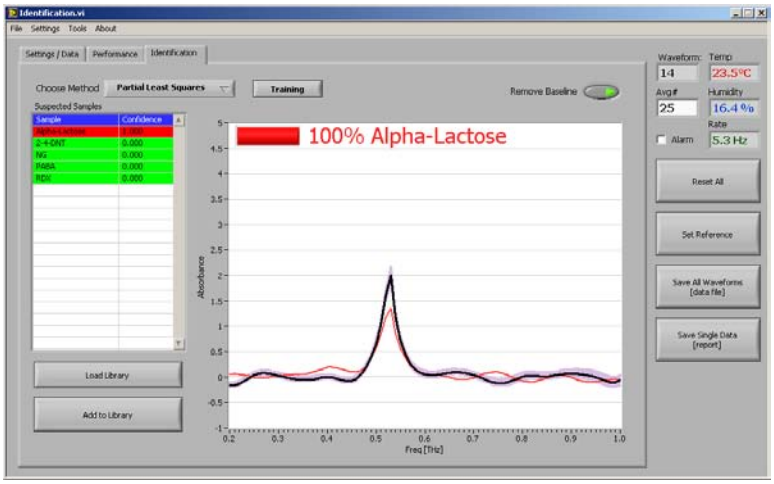


Figure 1: Dipole antenna (PCA-LTGAAS-L50) measured with EO detection with <110> ZnTe (1mm thick), Pump laser: 780nm, 90 fs, 20mW, 50 MHz. Acquisition time: 25s (4 Hz, 100 waveform average)

mini-Z Applications: Real-time Chemical Identification



Capabilities

- **Stand-off reflection measurement**
- **Real-time spectroscopy**
- **Penetrates cloth and other non-dielectrics**
- **Specific chemical signatures for identification**
- **Integrated scattering baseline correction**
- **Multiple assessment algorithms**
- **User expandable signature library**

OVERVIEW

THz radiation in the range of 0.1-10 THz induces low-frequency crystalline lattice vibrations, hydrogen-bond stretching, and other normal vibrational modes of molecules in many chemical and biological materials including explosives, drugs and other biomolecules. The transmitted or reflected THz spectra of these materials contain THz fingerprints (see Fig. 3 below) which provide rich information unavailable in other electromagnetic spectra. In addition, many typical covering materials such as paper, plastic and fabric are transparent at THz frequencies, allowing non-destructive, non-contact inspection of packaged goods.

With the mini-Z real-time spectroscopic capability, inspection applications like the sorting system shown in Fig. 2. A video of the mini-Z sorting pellets based on absorption feature identification is available on our web site.

Figure 2: Real-time sorting using absorption spectrum acceptance criteria.

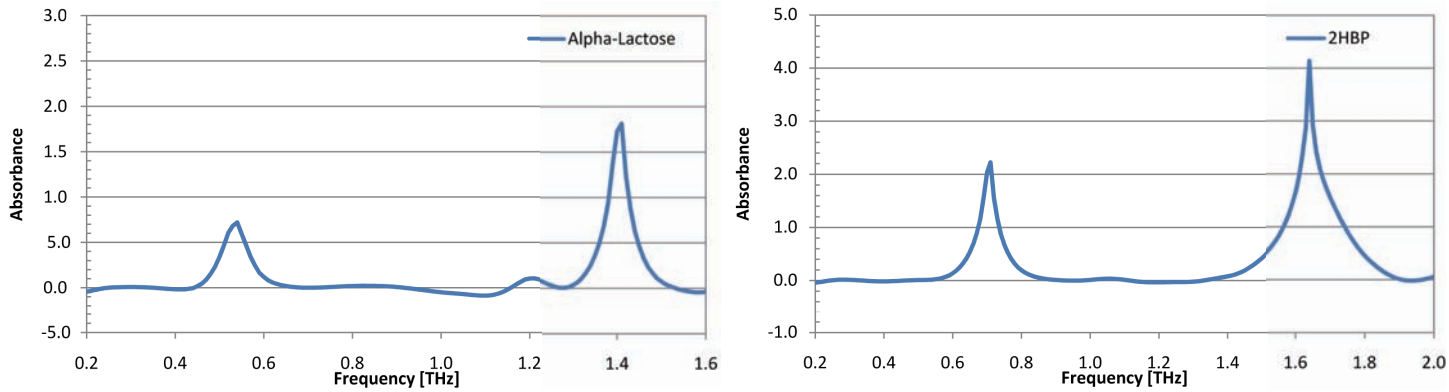


Figure 3: Sample absorption spectra of alpha-lactose and 2HBP respectively, measured using the mini-Z in transmission mode.

mini-Z Applications: Spectroscopic Imaging & Inspection

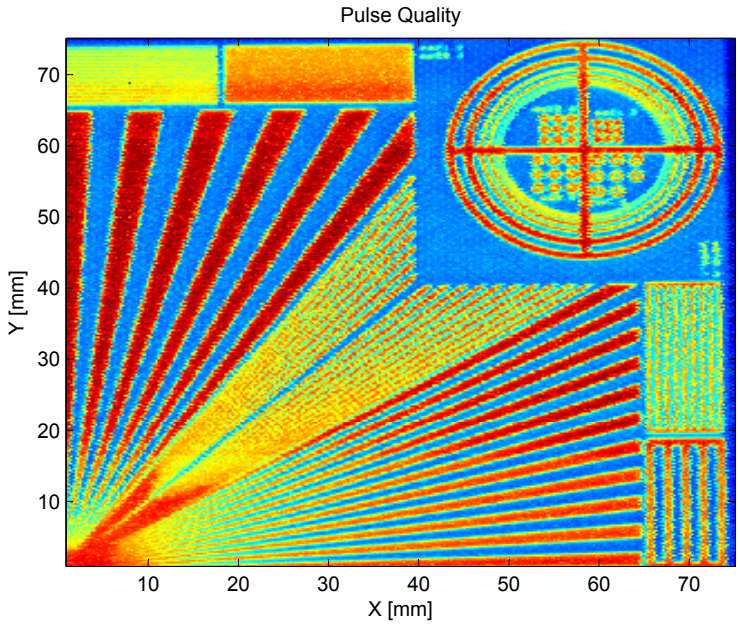


Figure 4: Resolution testing target printed on a 1mm thick printed circuit board

Capabilities

- **Broadband THz imaging**
- **Time domain contains structure & spectroscopic information**
- **Imaging resolution < 300µm**
- **Separates chemical signatures in images based on spectroscopic library**
- **Multiple image analysis modes:**
  - **Amplitude**
  - **Pulse quality**
  - **Peak position**
  - **Spectroscopic identification**

OVERVIEW

Terahertz Time Domain measurements contain an unparalleled richness of information about the target, revealing both structural and spectroscopic information. The mini-Z provides a state-of-the-art THz TDS imaging system, with the ability to form high-resolution images with better than 300µm resolution, as shown in Fig. 4 above. The software comes with built-in analysis support for Amplitude, Pulse quality, Peak position and spectroscopic identification measurements, as show in Fig. 5 below. Raw data can also be exported into other scientific analysis packages for further reduction, and the mini-Z comes with all the source code needed to integrate this capability into your own processes **without expensive licensing fees**!

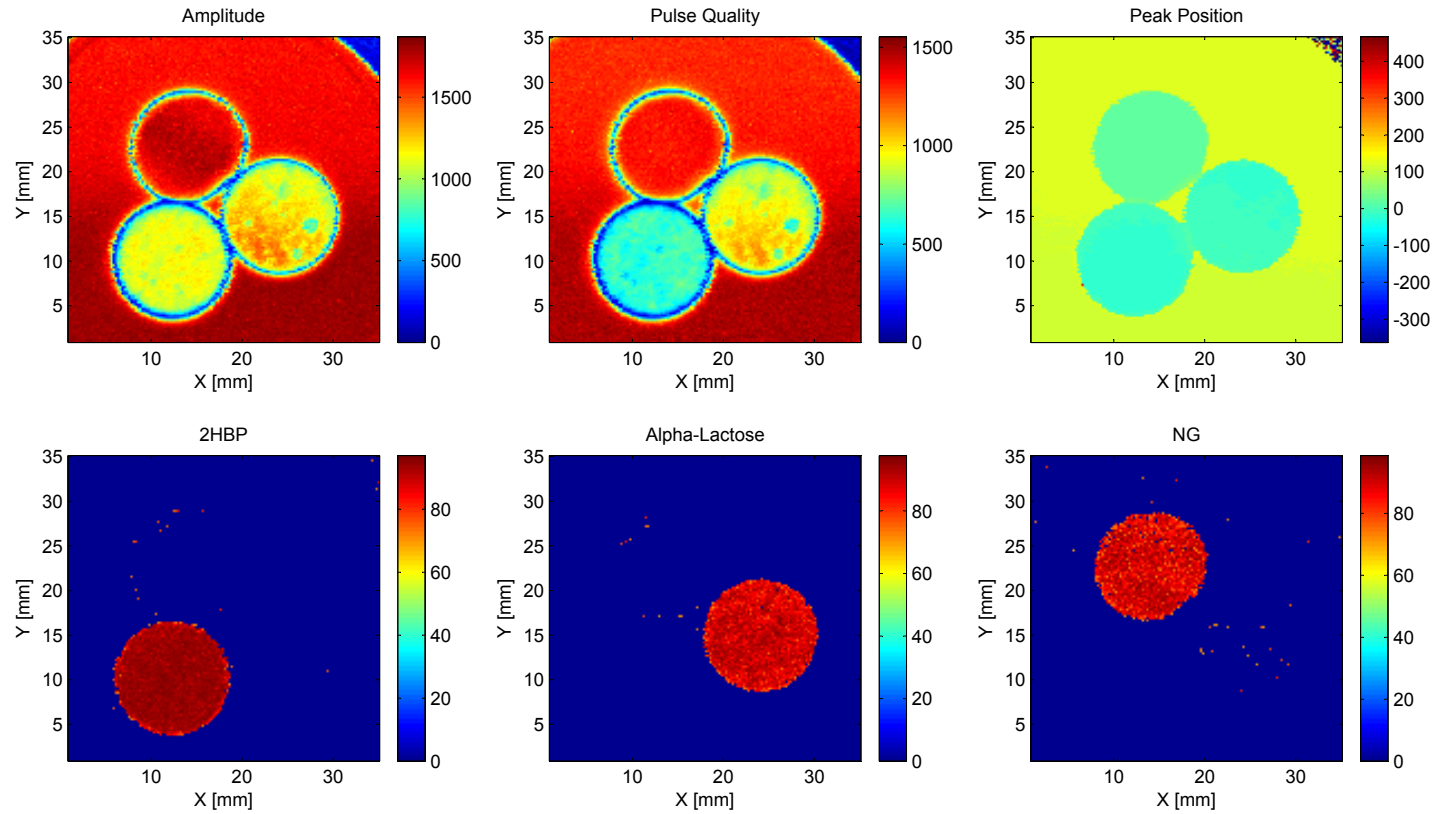


Figure 5: THz TDS image of three pellets containing 2HBP, alpha-lactose and nitroguanidine respectively.