**PRESENTATION**

**WHAT IS TERAHERTZ RADIATION?**

The THz portion of the electromagnetic spectrum fills the gap between the far infrared and the microwaves. More precisely, it is nestled between the high-frequency edge of the microwave band, 300 GHz (3×10^{11} Hz), and the long-wavelength edge of far-infrared light, 3000 GHz (3×10^{12} Hz or 3 THz). In wavelengths, this range corresponds to 0.1 mm (or 100 μm) infrared to 1.0 mm microwave. The THz band is set in the region where electromagnetic physics can best be described by its wave-like characteristics (microwave) and its particle-like characteristics (infrared).

![Electromagnetic Spectrum Diagram](image)

Figure 1.
The electromagnetic spectrum showing the THz gap from 100 μm to 1000 μm or 3 THz to 0.3 THz

**WHAT IS IT USED FOR?**

THz radiation is interesting because of the way it interacts with matter:

- It can penetrate things like wood, plastics, clothing, and other materials.
- It is also absorbed by water, or a material that contains water, like human skin.
- It is non-ionizing and therefore not harmful to humans like X-rays can be.

One of the first uses is the “full body scan” used at airports. It also has uses in medical applications for early detection of cancer cells.

**HOW IS IT MEASURED?**

THz sources come in many varieties, including those with CW or Pulsed outputs. They range in power from nW to mW and in energy from nJ to mJ. Like most electromagnetic sources, they must be characterized for performance and/or control.

Older THz detection methods include:

- Golay Cells
- Micro-bolometers
- Pyroelectric detector and electrical devices like photo-acoustic and Schottky diode detectors

**WHY ARE GENTEC-EO PRODUCTS BETTER?**

- **Golay Cells** used to be the detector of choice, but they are costly and often very large.
- **Pyroelectric Detectors** (like the ones used in our THZ Detectors) used to have lower performances, but recent advances placed them on the same technical level as Golay Cells, and even higher. Pyroelectric Detectors in THz measuring show several benefits to the user:
  - Broadband thermal response from 0.25 to 3000 μm
  - Can be used at room temperature with high sensitivity (measure nW of power and nJ of energy)
  - Wider power range (from nW to mW)
  - Lower cost

*a. Source: Wikipedia*
PRESENTATION
OVERVIEW OF THE DIFFERENT MODELS

We have a unique line of sensors and meters for the terahertz region. You can choose either a standalone device with on-board electronics or go with our T-Rad meter and a separate sensor. We also have small terahertz detectors that come as discrete pyroelectric units for integration.

THZ-D
- Flatest Spectral Response:
  Get the best precision across the entire THz range
- Works with our standard universal monitors:
  MAESTRO and M-LINK
- Large Apertures of 9 and 12 mm Ø

FLATEST SPECTRAL RESPONSE IN THE THz
WORKS WITH OUR STANDARD MONITORS

THZ-I-BNC
- THz Detectors with Integrated Analog (BNC) Module (no need for a monitor)
- Wide Dynamic Range from nW to μW
- BNC output:
  - Battery or AC Powered (for use with an oscilloscope)
  - Very Low Noise Level (0.4 nW for THZ2I-BL-BNC)

INTEGRATED BNC MODULE

THZ-B
- Large Choice of Apertures:
  5 mm and 9 mm Ø
- High Average Powers:
  Up to 200 mW
- Choice between Digital (T-Rad) or Analog Modules (T-Rad-Analog)
- User-Friendly Software (when used with the T-Rad module)

WORKS WITH OUR T-Rad MODULES

QS-THZ
- Hybrid Pyroelectric Detectors
- Small TO5/TO8 Packages
- Available in 2 Sizes: 5 and 9 mm Ø Apertures
- Wide Dynamic Range from nW to mW
- QS-I-TEST Test Box Available

DISCRETE PYROELECTRIC DETECTORS
SMALL TO5/TO8 PACKAGES

Available with

See page 134

See page 136

See page 138

See page 142
THZ-D
Thz Detectors for use with our universal monitors

KEY FEATURES

1. COVERS THE ENTIRE THZ SPECTRUM
   Get the best precision across the entire wavelength range and relative measurements from 30 THz to 0.1 THz.

2. ROOM TEMPERATURE OPERATION
   Easier to use and less expensive than a Golay cell.

3. CALIBRATED AT 10.6 μm
   THZ-D detectors are calibrated at a single wavelength 10.6 um (30 THz) and at 10 Hz chopping frequency for the THZ9D. Both include typical wavelength correction data from 10.5 to 440 μm. They are used for relative measurements outside that range.

4. LARGE AREA
   Models range from 9 mm Ø for the THZ9D and 12 mm Ø for the THZ12D.

5. WIDE RANGE OF MEASUREMENTS
   Measure from 100 uW to 3 W of continuous power with the THZ12D model, the highest in our terahertz range of products, and down to 5 uW to 25 mW with the THZ9D model.

6. USE WITH A UNIVERSAL MONITOR
   No need for an exclusive monitor. These unique Thz detectors work with our standard universal monitors:
   - MAESTRO
   - M-LINK

7. SDC-500 OPTICAL CHOPPER
   The THZ9D model requires the use of an optical chopper, like our SDC-500, running at 10 Hz.

8. integra OPTIONS
   - Standard: USB Output (-INT)
   - In Option: RS-232 Output (-IDR)

AVAILABLE MODELS

THZ12D-3S-VP
(3W - Thermal Volume Absorber)

THZ9D-20mS-BL
(25mW - Pyroelectric)

ACCESSORIES

Stand with Steel Post
(Model Number: 200160)

Stand with Steel Post
(Model Number: 200428)

SDC-500 Digital Optical Chopper

Pelican Carrying Case

Extension Cables
(4, 15, 20 or 25 m)

SEE ALSO

HOW IT WORKS 14
TECHNICAL DRAWINGS 144
ABSORPTION CURVES 146
COMPATIBLE MONITORS 20
MAESTRO 20
M-LINK 32
LIST OF ALL ACCESSORIES 198
APPLICATION NOTE THZ CALIBRATION 202155
THZ-D

SPECIFICATIONS

<table>
<thead>
<tr>
<th></th>
<th>THZ9D-20mS-BL</th>
<th>THZ12D-3S-VP</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAX AVERAGE POWER</td>
<td>25 mW</td>
<td>3 W</td>
</tr>
<tr>
<td>EFFECTIVE APERTURE</td>
<td>9 mm Ø</td>
<td>12 mm Ø</td>
</tr>
<tr>
<td>COMPATIBLE MONITORS</td>
<td>MAESTRO, M-LINK &amp; APM</td>
<td>MAESTRO &amp; M-LINK</td>
</tr>
</tbody>
</table>

MEASUREMENT CAPABILITY

| Spectral Range *        |                        |               |
| Frequency               | 0.1 - 30 THz           | 0.1 - 30 THz  |
| Wavelength              | 3000 – 10 μm           | 3000 – 10 μm  |
| Maximum Average Power   |                          |               |
| with MAESTRO            | 20 mW                   | 3 W           |
| with M-LINK             | 25 mW                   | 3 W           |
| Noise Equivalent Power b| 300 nW                  | 0.5 μW        |
| Minimum Measurable Power c| N/A                    | 50 - 100 μW   |
| Thermal Drift d          | N/A                     | 12 μW/°C      |
| Rise Time (nominal) e    | <0.2 sec                | 3 sec         |
| Sensitivity (typ into 100 Hz load) f| 120 V/W              | 200 mV/W      |
| Minimum Repetition Rate g| 1000 Hz                 | 7 Hz          |
| Chopping Frequency       | 10 Hz (required)        | N/A           |
| Calibration Uncertainty h| ±5.0 % @ 10.6 μm; ±15 % @ 10.6 - 440 μm i| ±8.0 % @ 10.6 - 300 μm; ±15 % @ 300 - 440 μm |
| Repeatability           | ±0.5 %                  | ±0.5 %        |

DAMAGE THRESHOLDS

| Maximum Average Power Density i| 50 mW/cm² | 30 W/cm² |
| Maximum Energy Density         | <0.1 J/cm²| <1 J/cm² |

PHYSICAL CHARACTERISTICS

| Effective Aperture          | 9 mm Ø        | 12 mm Ø      |
| Absorber (High Damage Threshold) | BL (Black Absorber) | VP (Volume Absorber) |
| Dimensions                 | 38.10 x 26.2 mm | 73H x 73W x 28D mm |
|                           |               | (80D mm with tube)  |
| Weight (head only)         | 91 g          | 320 g        |

ORDERING INFORMATION

| Product Name                | THZ9D-20mS-BL-D0 | THZ12D-3S-VP-D0 |
| Add Extension for INTEGRA (USB) | -INT             | -INT           |
| Product Number (without stand) | 202256            | 202229         |
| Add Extension for INTEGRA (RS-232) | -IDR             | -IDR          |
| Product Number (without stand) | Call              | 203029         |

Specifications are subject to change without notice.

a. From 10 to 440 μm, spectrometer measurement with multiple laser references validation. From 440 to 600 μm, spectrometer measurement only. From 600 to 3000 μm, relative measurement only. This spectral range is subject to change.
b. Nominal value, actual value depends on electrical noise in the measurement system.
c. Actual value depends on ambient conditions and the measurement system.
d. Minimum repetition rate for stable average power measurements.
e. Maximum output voltage = sensitivity x maximum power.
f. Including linearity with power.
g. At 1064 nm, 1 W CW.
THZ-I-BNC

THz Detectors with Integrated Analog Module

KEY FEATURES

1. COVERS THE ENTIRE THZ SPECTRUM
   Get the best precision across the entire wavelength range and relative measurements from 30 THz to 0.1 THz.

2. ROOM TEMPERATURE OPERATION
   Easier to use and less expensive than a Golay cell.

3. MEASURE POWER FROM nW TO µW
   With state of the art pyroelectric sensors, measure down to 8 nW with 0.4 nW NEP

4. INTEGRATED ANALOG MODULE
   Plug the device directly into your oscilloscope or Lock-In amplifier

5. BATTERY OR EXTERNAL POWER
   Includes 9V Battery and an external power supply

6. CALIBRATED AT 0.63 μm
   All THz detectors are calibrated at a single wavelength (0.63 μm) and include typical wavelength correction data from 0.25 to 440 μm. They are used for relative measurements outside that range.

7. SDC-500 OPTICAL CHOPPER
   The THZ-I-BNC models require the use of an optical chopper, like our SDC-500, running at 5 Hz.

AVAILABLE MODELS

THZ5I-BL-BNC
(5 mm-Organic Black)

ACCESSORIES

SEE ALSO

TECHNICAL DRAWINGS 144
ABSORPTION CURVES 146
LIST OF ALL ACCESSORIES 198

APPLICATION NOTES

THZ MEASUREMENT: PYROELECTRIC VS GOLAY CELL 201924
THZ CALIBRATION 202155
SDC-500 DIGITAL OPTICAL CHOPPER 202154
THZ-I-BNC SETUP 202177
## THZ-I-BNC

### SPECIFICATIONS

<table>
<thead>
<tr>
<th>THZ5I-BL-BNC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MAX AVERAGE POWER</strong></td>
</tr>
<tr>
<td><strong>EFFECTIVE APERTURE</strong></td>
</tr>
<tr>
<td><strong>INTEGRATED MODULE</strong></td>
</tr>
</tbody>
</table>

### MEASUREMENT CAPABILITY

<table>
<thead>
<tr>
<th>Spectral Range *</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
</tr>
<tr>
<td>Wavelength</td>
</tr>
<tr>
<td>Max Measurable Power</td>
</tr>
<tr>
<td>Noise Equivalent Power b</td>
</tr>
<tr>
<td>Rise Time (0-100%)</td>
</tr>
<tr>
<td>Sensitivity (Typical) b</td>
</tr>
<tr>
<td>Chopping Frequency</td>
</tr>
<tr>
<td>Calibration Uncertainty</td>
</tr>
</tbody>
</table>

### DAMAGE THRESHOLDS

| Maximum Average Power Density (1064 nm) | 50 mW/cm² |

### PHYSICAL CHARACTERISTICS

| Effective Aperture | 5 mm Ø |
| Sensor | Pyroelectric |
| Absorber | BL |
| Analog Output | 0-10 V |
| Dimensions | 81.3Ø X 99.3D mm |
| Weight | 500 g |

### ORDERING INFORMATION

| Product Name | THZ5I-BL-BNC-D0 |
| Product Number (without stand) | 202288 |

Specifications are subject to change without notice. // Compatible stand: P/N 200428

---

* a. Projected Spectral Range.
  From 10 to 440 μm, spectrometer measurement.
  From 440 to 3000 μm, relative measurement only.
  This spectral range is subject to change.

b. At 632 nm and a chopping frequency of 5Hz.
THZ-B
THZ-B Detectors and T-Rad Modules

KEY FEATURES

1. COVERS THE ENTIRE THZ SPECTRUM
Get the best precision across the entire wavelength range and relative measurements from 30 THz to 0.1 THz.

2. ROOM TEMPERATURE OPERATION
Easier to use and less expensive than a Golay cell.

3. MEASURE POWER FROM nW TO mW
With state of the art pyroelectric sensors, measure down to 100 nW with 5 nW NEP.

4. USE WITH T-RAD THZ MODULE OR T-RAD-ANALOG POWER MODULE
Each head can be connected to an oscilloscope using the analog power module (T-Rad-Analog) or directly to a PC with the digital power module (T-Rad).

5. SEVERAL SENSOR SIZES AVAILABLE
Choice of 5 mm and 9 mm diameter.

6. CALIBRATED AT 0.63 μm
All THz detectors are calibrated at a single wavelength (0.63 μm) and include a typical wavelength correction data from 0.25 to 440 μm. They are used for relative measurements outside that range.

7. SDC-500 OPTICAL CHOPPER
All THZ-B detectors require the use of an optical chopper, like our SDC-500, to sync the signal at either 5 Hz (DA models) or 25 Hz (DZ models).

8. ADVANCED SOFTWARE WITH MANY FEATURES (WITH T-RAD MODULE)
Strip Chart, Histogram, Full Statistics, Tuning Needle with min/max indicators and Data Logging.

AVAILABLE MODELS

THZ5B-BL (5 mm-Organic Black)
THZ9B-BL (9 mm-Organic Black)

ACCESSORIES

Stand with Delrin Post (Model Number: 200428)
Removable IR Windows (Various types available)
SDC-500 Digital Optical Chopper
T-Rad-Analog Analog Power Supply
Winston Cone
Pelican Carrying Case

SEE ALSO

TECHNICAL DRAWINGS 144
ABSORPTION CURVES 146
LIST OF ALL ACCESSORIES 198

APPLICATION NOTES

THZ MEASUREMENT: PYROELECTRIC VS GOLAY CELL 201924
THZ CALIBRATION 202155
THZ-WC-13: WINSTON CONE ACCESSORY 202172
SDC-500 DIGITAL OPTICAL CHOPPER 202154
THZ SETUP 202177

Watch the Demo video available on our website at www.gentec-eo.com
**THZ-B**

### SPECIFICATIONS

<table>
<thead>
<tr>
<th></th>
<th>THZ5B-BL</th>
<th>THZ9B-BL</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MAX AVERAGE POWER</strong></td>
<td>20 mW</td>
<td>20 mW</td>
</tr>
<tr>
<td><strong>EFFECTIVE APERTURE</strong></td>
<td>5 mm Ø</td>
<td>9 mm Ø</td>
</tr>
<tr>
<td><strong>COMPATIBLE MODULES</strong></td>
<td>T-Rad and T-Rad-Analog</td>
<td>T-Rad and T-Rad-Analog</td>
</tr>
</tbody>
</table>

### MEASUREMENT CAPABILITY

<table>
<thead>
<tr>
<th></th>
<th>With T-Rad</th>
<th>With T-Rad-Analog</th>
<th>With T-Rad</th>
<th>With T-Rad-Analog</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spectral Range *</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequency</td>
<td>0.1 - 30 THz</td>
<td></td>
<td>0.1 - 30 THz</td>
<td></td>
</tr>
<tr>
<td>Wavelength</td>
<td>3000 - 10 μm</td>
<td></td>
<td>3000 - 10 μm</td>
<td></td>
</tr>
<tr>
<td>Max Measurable Power</td>
<td>20 mW</td>
<td>43 μW</td>
<td>20 mW</td>
<td>150 μW</td>
</tr>
<tr>
<td>Noise Equivalent Power (NEP)</td>
<td>5 nW</td>
<td>1.0 x 10⁻⁹ W/(Hz)⁵</td>
<td>50 nW</td>
<td>3.0 x 10⁻⁹ W/(Hz)⁵</td>
</tr>
<tr>
<td>Rise Time (90%)</td>
<td>≤ 0.2 s</td>
<td></td>
<td>≤ 0.2 s</td>
<td></td>
</tr>
<tr>
<td>Sensitivity (Typical)</td>
<td>N/A</td>
<td>70 kV/W</td>
<td>N/A</td>
<td>20 kV/W</td>
</tr>
<tr>
<td>Chopping Frequency b</td>
<td>25 Hz</td>
<td>5 Hz</td>
<td>25 Hz</td>
<td>5 Hz</td>
</tr>
</tbody>
</table>

### DAMAGE THRESHOLDS

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Max Average Power Density (@ 1064 nm)</td>
<td>10 mW/cm²</td>
<td></td>
<td>10 mW/cm²</td>
<td></td>
</tr>
</tbody>
</table>

### PHYSICAL CHARACTERISTICS

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Effective Aperture</td>
<td>5 mm Ø</td>
<td></td>
<td>9 mm Ø</td>
<td></td>
</tr>
<tr>
<td>Sensor</td>
<td>Pyroelectric</td>
<td></td>
<td>Pyroelectric</td>
<td></td>
</tr>
<tr>
<td>Absorber</td>
<td>BL</td>
<td></td>
<td>BL</td>
<td></td>
</tr>
<tr>
<td>Dimensions</td>
<td>66.00 x 46.5D mm</td>
<td></td>
<td>66.00 x 46.5D mm</td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>227 g</td>
<td></td>
<td>227 g</td>
<td></td>
</tr>
</tbody>
</table>

### COMPATIBLE METER

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>PC-Based</td>
<td>T-Rad: See detailed specifications on next page</td>
<td></td>
<td>T-Rad-Analog: See detailed specifications on next page</td>
<td></td>
</tr>
<tr>
<td>Analog Power Supply</td>
<td>T-Rad-Analog</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### ORDERING INFORMATION

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Product Name</td>
<td>THZ5B-BL-DA-D0</td>
<td></td>
<td>THZ5B-BL-DA-D0</td>
<td></td>
</tr>
<tr>
<td>Product Number (with stand)</td>
<td>202293</td>
<td>202292</td>
<td>202295</td>
<td>202294</td>
</tr>
</tbody>
</table>

Specifications are subject to change without notice. // Compatible stand: P/N 200428

---

*a. Projected Spectral Range.*  
From 10 to 440 μm, spectrometer measurement.  
From 440 to 3000 μm, relative measurement only.  
This spectral range is subject to change.  

*b. SDC-500 Digital Optical Chopper sold separately.*
THZ-B

T-Rad

The T-Rad is a microprocessor-based digital radiometer that includes a 12-bit ADC and unique DSP Lock-In Software. It is powered by a USB connection, which also acts as a Virtual COM port. When a THZ-B Terahertz Pyroelectric detector is plugged into the T-Rad module, the module reads the content of the head’s EEPROM, which identifies the detector and provides calibration and wavelength correction data. The LabView Software supplied with the device makes it very easy to set up the radiometer, measure a THz or broadband source and record data. The software is compatible with Windows XP, VISTA and 7.

SPECIFICATIONS & FEATURES

<table>
<thead>
<tr>
<th></th>
<th>T-RAD</th>
<th>T-RAD-ANALOG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compatible Detector Heads</td>
<td>THZ-B-DZ</td>
<td>THZ-B-DA</td>
</tr>
<tr>
<td>Full Scale Ranges</td>
<td>200 nW - 200 mW*</td>
<td>N/A</td>
</tr>
<tr>
<td>Power On Light</td>
<td>Green</td>
<td>Green</td>
</tr>
<tr>
<td>Analog Output</td>
<td>0 to 3.6V, BNC</td>
<td>± 4.88 V, BNC</td>
</tr>
<tr>
<td>PC connection</td>
<td>USB 2.0</td>
<td>None</td>
</tr>
<tr>
<td>Trigger Input (TTL)</td>
<td>BNC connector</td>
<td>None</td>
</tr>
<tr>
<td>Power Supply</td>
<td>USB 2.0</td>
<td>External, 100/240 VAC 50-60 Hz, and 9V battery (both included)</td>
</tr>
<tr>
<td>Product Number</td>
<td>201849</td>
<td>202306</td>
</tr>
</tbody>
</table>

* Actual ranges vary based on the THZ-B detector selected

INSTRUMENT CONTROL AND STRIP CHART

Instrument controls and the radiant power measurement are always visible, making it easy to change the radiometer settings, no matter which display tab is selected. Instrument controls include: Range, Filter Tau, Batch Size, Data Collection Mode, Reset Options, and a Null button for background cancellation. In addition, there are more set up and operation status indicators including: detector Rv, Wavelength, Frequency (actual), Locked and Frequency in Range lights. The Strip Chart displays the Radiant Power measurement in Watts, either continuously or by the batch. Select full scale, auto scale or use our manual scaling option.

INSTRUMENT CONTROL AND TUNING NEEDLE

The “TUNE” tab selects the very useful “Tuning Needle” display. This is a simulated analog meter whose speed is determined by the “filter tau” setting. It is expected to be used during the set-up of a radiometer with a source. The “tau” value is usually set to a small value when aligning the probe to the source (i.e. when peaking the reading). There is a button control to select “full scale”, “min-max” or “reset”. In the “min-max” mode, the indicators are “blue” for the minimum power and “red” for the maximum power.
INSTRUMENT CONTROL AND STATISTICS

In the “Statistics” tab there are 4 large windows that contain the statistics for the selected batch, including: Minimum, Maximum, Standard Deviation and Mean, expressed in Engineering Notation. Standard Deviation can be displayed in Watts or as a % that is user-selectable. There is also a window that shows the bandwidth of the Digital Band Pass Filter based on the user selected “Filter Tau” (0.100 to 100 seconds). A lower time constant is helpful when setting up, and a longer one when making measurements, especially on the lower ranges of the instrument.

THZ-B-DA DETECTOR AND OSCILLOSCOPE

Here is a basic analog set up that would be useful if the optical power of the source was about 5 µW or greater. The output of the THZ5B-DA detector would be approximately 600 mV @ 5 Hz chopping frequency, giving plenty of signal for an oscilloscope. Simply read the voltage output and divide by the Rv factor (V/W) of the detector to measure the intensity of the source in Watts. Also consider applying a wavelength correction factor under certain circumstances.

THZ-B-DA DETECTOR AND LOCK-IN AMPLIFIER

This is another analog set-up option that we recommend if you have to measure very low power levels (i.e. less than 5 µW) where the signal may be buried in the broadband noise. The voltage output of the analog THZ-B-DA detector, powered by our T-Rad-Analog, is routed to the Lock-In Amplifier input, and the Sync Output of our SDC-500 Chopper is connected to the reference input. The Lock-In Amplifier will lock on the chopping frequency and you can dial in a long integrating time and measure a very low RMS voltage. The voltage divided by our Voltage Responsivity (V/W) equals the power of the source.

THZ-B-DZ DETECTOR AND T-Rad MODULE

Although analog solutions are available, for simplicity, convenience and sensitivity, we recommend you choose our THZ-B-DZ detectors and the T-Rad Digital Radiometer. Our unique DSP Lock-In Amplifier software provides a function much like the Analog Lock-In, but is so much easier to use. It also addresses thermal drift of the sensor and allows you to display the power measurement and complete statistics directly in digital and graphic formats. Set the range, null the background, set the filter tau (bandwidth) and make the measurement. It’s that easy!
**QS-THZ**

Hybrid THz Detectors

**KEY FEATURES**

1. **RELATIVE MEASUREMENTS FROM 0.1 TO 30 THz**
   Broadband, room temperature operation, easier to use and less expensive than a Golay cell

2. **EASY TO INTEGRATE FORMAT**
   TO5 and TO8 packages make the QS-THZ detectors small and easy to integrate in an existing system

3. **SEVERAL SENSOR SIZES AVAILABLE**
   Choice of 5 and 9 mm Ø

4. **CALIBRATED AT 0.63 μm**
   All THz detectors are calibrated at a single wavelength (0.63 μm) and include a typical wavelength correction data from 0.25 to 440 μm. They are used for relative measurements outside that range.

5. **TEST BOX AVAILABLE**
   Can be used with our QS-I-TEST test box which provides mounting and power supply

6. **PERMANENT IR WINDOW OPTIONS**
   Every model can be fitted with a permanent IR window to narrow the wavelength range:
   - S5/8: Sapphire (0.3 – 4.5 and 100 - 1000 μm)
   - Q5/8: Quartz (0.25 – 3.0 and 50 - 1000 μm)
   - Si5/8: Silicon (1.2 – 8.0 and 50 - 1000 μm)

**AVAILABLE MODELS**

- **QS5-THZ-BL** 5 mm Ø, Pyroelectric Sensor with Organic Black Coating in TO5 Packaging
- **QS9-THZ-BL** 9 mm Ø, Pyroelectric Sensor with Organic Black Coating in TO8 Packaging

**ACCESSORIES**

- QS-I-TEST Evaluation Test Box
- Permanent IR Windows (Various types available)
- SDC-500 Digital Optical Chopper
- Pelican Carrying Case

**SEE ALSO**

- TECHNICAL DRAWINGS 144
- LIST OF ALL ACCESSORIES 198

**APPLICATION NOTES**

- THZ MEASUREMENT: PYROELECTRIC VS GOLAY CELL 201924
- QS-I-TEST SPECIFICATIONS 202187
- HOW TO HANDLE PYROS 202181
- PIN-OUTS 202931
- SDC-500 DIGITAL OPTICAL CHOPPER 202154

* Pictures for indicative purposes only
QS-THZ

SPECIFICATIONS

<table>
<thead>
<tr>
<th></th>
<th>QS5-THZ-BL</th>
<th>QS9-THZ-BL</th>
</tr>
</thead>
<tbody>
<tr>
<td>VOLTAGE RESPONSIVITY</td>
<td>70 kV/W</td>
<td>30 kV/W</td>
</tr>
<tr>
<td>EFFECTIVE APERTURE</td>
<td>5 mm Ø</td>
<td>9 mm Ø</td>
</tr>
<tr>
<td>PACKAGE</td>
<td>TO5</td>
<td>TO8</td>
</tr>
</tbody>
</table>

MEASUREMENT CAPABILITY

| Spectral Range *       | 0.1 - 30 THz               | 0.1 - 30 THz               |
| Frequency              | 0.1 - 30 THz               |                            |
| Wavelength             | 3000 - 10 μm               | 3000 - 10 μm               |
| Max Power Density      | 50 mW/cm²                  | 50 mW/cm²                  |
| Noise Equivalent Power | 1.0 x 10^4 W/(Hz)²         | 3.0 x 10^4 W/(Hz)²         |
| Detectivity *          | 4.1 x 10^6 cm/(Hz)²/W      | 2.7 x 10^6 cm/(Hz)²/W      |
| Voltage Responsivity b| 70 kV/W                    | 30 kV/W                    |

PHYSICAL CHARACTERISTICS

| Effective Aperture     | 5 mm Ø                     | 9 mm Ø                     |
| Package                | TO5                        | TO8                        |
| Sensor                 | Pyroelectric               | Pyroelectric               |
| Absorber               | BL                         | BL                         |
| Dimensions (Excluding Pins) | 9.1 x 6.4D mm        | 15.2 x 6.4D mm             |
| Weight                 | 45 g                       | 45 g                       |

ORDERING INFORMATION

| Product Name           | QS5-THZ-BL                  | QS9-THZ-BL                  |
|                       | Product Number              | Product Number              |
|                       | 202289                      | 201690                      |

Specifications are subject to change without notice.

a. Projected Spectral Range.
   From 10 to 440 μm, spectrometer measurement.
   From 440 to 3000 μm, relative measurement only.
   This spectral range is subject to change.

b. 630 nm, 5 Hz

QS-I-TEST EVALUATION TEST BOX

<table>
<thead>
<tr>
<th></th>
<th>QS-I-TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Batteries</td>
<td>+9V/-9V</td>
</tr>
<tr>
<td>R, Resistors</td>
<td>10^9 - 10^10 Ω</td>
</tr>
<tr>
<td>C, Compensating</td>
<td>YES</td>
</tr>
<tr>
<td>Package</td>
<td>101.6H x 127W x 58.4D</td>
</tr>
<tr>
<td>Optical Mount</td>
<td>1/4-20 Threaded</td>
</tr>
<tr>
<td>Front Bezel</td>
<td>SM1 (1.035-40)</td>
</tr>
<tr>
<td>Product Number</td>
<td>201693</td>
</tr>
</tbody>
</table>

* For details, contact your Gentec-EO representative.
TECHNICAL DRAWINGS

**THZ12D-3S-VP**

- FRONT Dimensions:
  - Ø 12
  - 73

- SIDE Dimensions:
  - 20
  - 31
  - 72

**THZ9D-20mS-BL**

- FRONT Dimensions:
  - Ø 38.1

- SIDE Dimensions:
  - 79
  - 27.4

- MECHANICAL APERTURE: Ø 11.5
- OPTICAL APERTURE: Ø 9

**THZ-I-BNC**

- FRONT Dimensions:
  - Ø 81.3
  - 1.035-40 INTERNAL THREAD
  - M6 MOUNTING HOLE
  - 1/4-20 MOUNTING HOLE

- SIDE Dimensions:
  - 99.3
  - 10.2
  - 49.3
  - 15.2

*All dimensions in mm*
TECHNICAL DRAWINGS

THZ-B

QS-THZ (TO5-BASED)

QS-THZ (TO8-BASED)
THZ DETECTORS

ABSORPTION CURVES

THZ12D-3S-VP

Absorption vs. Wavelength (µm)

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

0 100 200 300 400 500 600
ABSORPTION CURVES

THZ-BL

Absorption vs Wavelength (µm)