TECHNICAL NOTE

HOW TO SET UP AND USE OUR THZ-B-DA AND THZ-I-BNC ANALOG RADIOMETER PROBES

Our line of THz Analog Radiometers was designed for use with both an Oscilloscope and Lock-In Amplifier (LIA). They are basically composed of a Pyroelectric Detector, with an organic black coating (BL), mated to a low noise current mode amplifier. The voltage output is maximized at a 5 Hz chopping frequency. The R_v of these probes, is very high and can be in the range of 20 kV/W to 400 kV/W.

As these THz Probes are very sensitive "thermal" detectors, great care must be taken when setting them up in your lab. You will want to avoid placing them close to sources of heat (IR radiation) like large power supplies or human bodies.

In addition, Pyroelectric detectors also exhibit "piezoelectric" properties and will respond to acoustic waves and/or mechanical vibration, so beware of air conditioning vents and mechanical pumps.

OK, now we're ready to walk through a typical optical set up.

APPLIES TO MODELS:

- THZ1.5B-BL-DA
- THZ5B-BL-DA
- THZ9B-BL-DA
- THZ2I-BL-BNC
- THZ5I-BL-BNC

NOTE:

Our THZ-I-BNC probes include batteries and an AC voltage supply.

Our THZ-B-DA probes require use of our external battery and AC supply T-Rad-Analog.

TECHNICAL NOTE

STEP-BY-STEP INSTRUCTIONS:

1. Mount the probe in your optical set up.
Using our Delrin post, mount the detector and align it to the optical axis of your THz source.

2. Connect analog output to Scope or LIA.
For THZ-I-BNC probes, the BNC analog output is located on the side of the housing. For THZ-B probes, the BNC analog output is located on the T-Rad-Analog power module.

3. Power up the probe.
There is a rocker on/off switch on the body of the THZ-I-BNC probe and the power module of the THZ-B probe. A green power light should illuminate.

4. AC power option.
Both models of THz probes work off batteries or an AC wall wart. Simply chose which option you prefer.

5. Need for an optical chopper.
Our detectors require use of an optical chopper running at 5 Hz. The Voltage Responsivity is measured at that chopping frequency.

6. Using an Oscilloscope.
Set the scope to "DC coupled", the voltage scale to 1 V/Div, and the time base to 100 msec/Div. When the probes are first powered up, the voltage output may be a large negative number, like -10 V (see fig.1). As the probe comes to thermal equilibrium (~5 minutes), the voltage output will move to a final value of ~+200 mV and stabilize (see fig. 2).

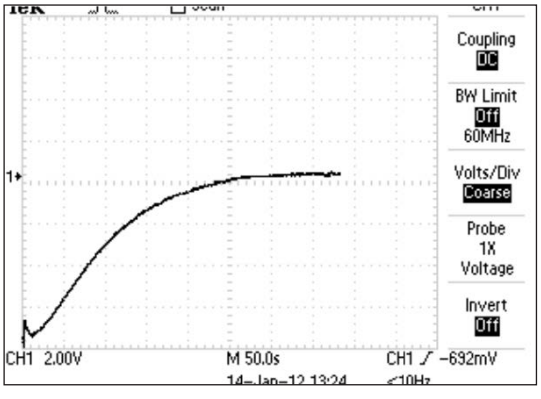


Figure 1: Power ON

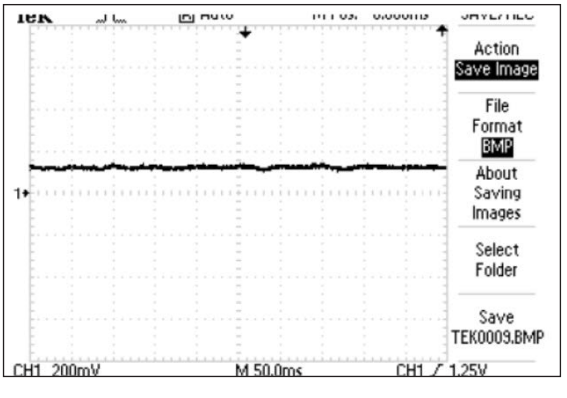


Figure 2: Beam blocked

TECHNICAL NOTE

7. Expose the probe to your source.

Now you can unblock your source and measure its power. Adjust the scope's voltage sensitivity until you get a good saw tooth voltage output (see fig. 3).

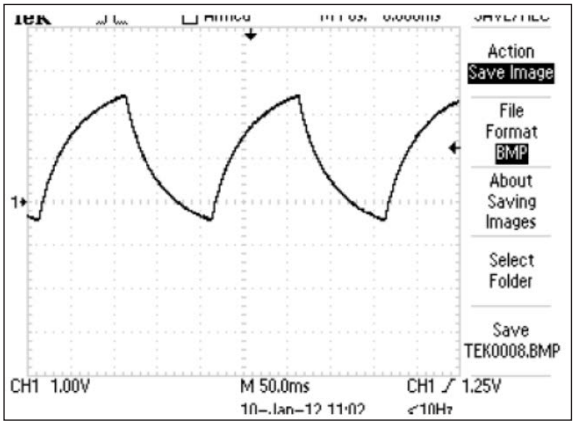


Figure 3: Measuring Power

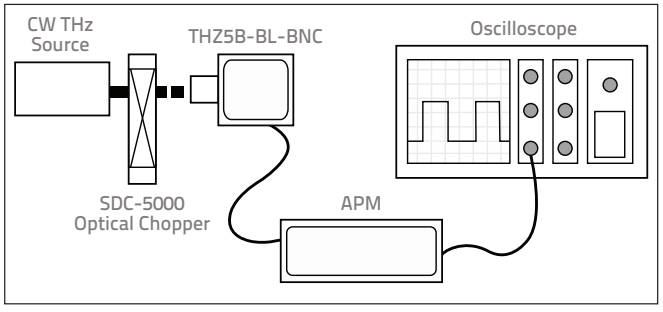
8. Now measure the voltage output.

Always measure the peak voltage and subtract the base voltage (this takes care of thermal drift) and then divide by the R_v (V/W) of the THz probe to determine Power in Watts.

9. Collect all of the radiant output.

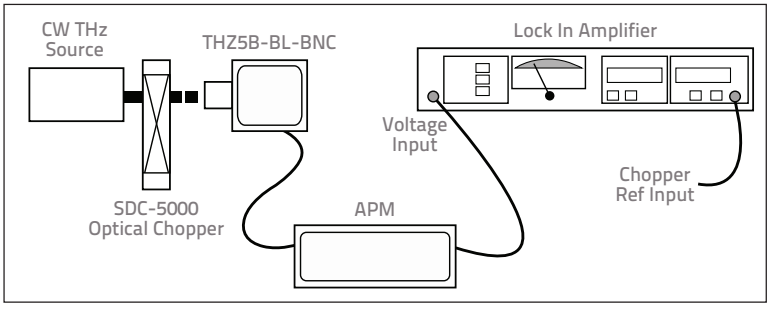
Make sure you are not overfilling the detector and losing some of the THz power.

OSCILLOSCOPE SETUP



Here is a look at a THZ5B set up with an Oscilloscope for optical power measurements. For lower power levels, the "sync" output of the chopper could be used to trigger the scope.

LOCK-IN AMPLIFIER SETUP



Here is a look at a THZ5B set up with LIA for optical power measurements. In this case you will need to use the chopper's "sync" output as the reference. Using the LIA will allow you to measure at the lowest level.

For more information about these products, check out the website at gentec-eo.com or give us a call.

Don Dooley
General Manager, Gentec-EO USA
ddooley@gentec-eo.com
(503) 697-1870