

Next generation

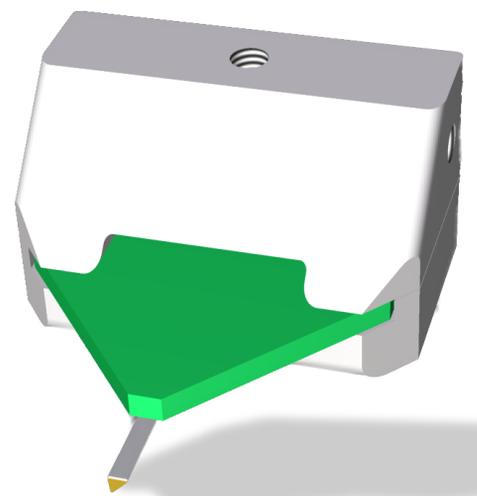
Terahertz microprobe series



Application notes

TeraSpike

LT-GaAs photoconductive field detector





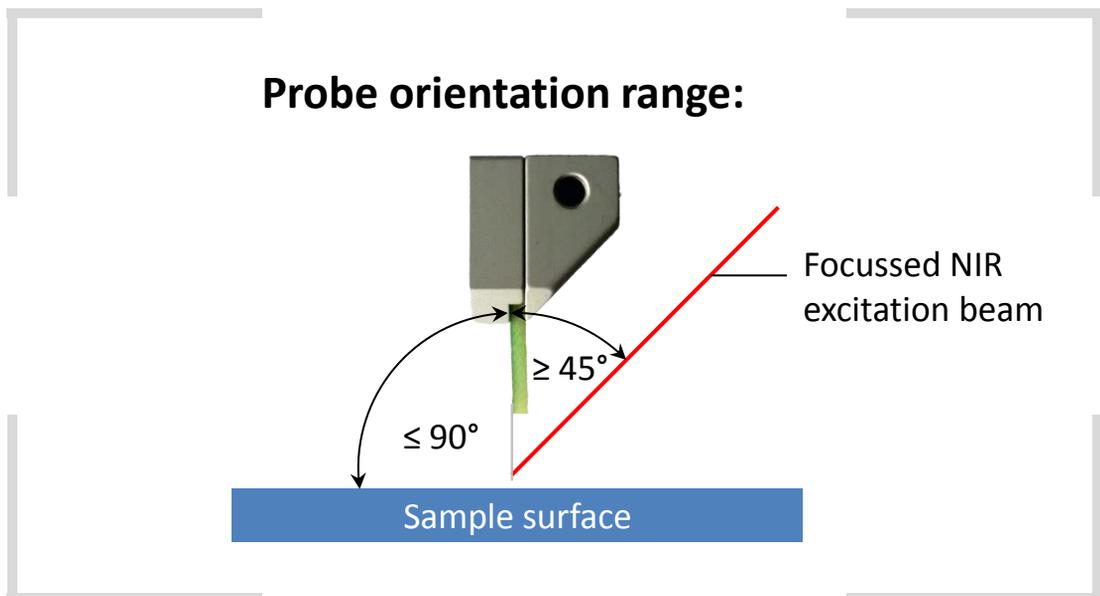
Caution!

- Do **not** touch the LT-GaAs cantilever or glass-carrier! The device may get damaged.
 - Always keep a safe distance between the probe-tip and other objects when handling the probe-tip manually!
 - Do **not** drop the probe-tip!
 - Always keep the device in a clean and dust-free environment.
 - Do **not** use air or nitrogen streams to remove particles from the probe-tip! The thin LT-GaAs cantilever structure may break.
 - Keep the optical excitation (permanent or short) below $5 \mu\text{J}/\text{cm}^2$ to avoid thermal damage!
 - For gentle use average optical excitation below $2.5 \mu\text{J}/\text{cm}^2$ (approx. 5 mW @ 80 MHz and 40 μm spot-size) is recommended.
 - Avoid bias voltages (voltage spikes) above 10 V at the probe terminal! Such voltage spikes may be generated by ungrounded sources, switching events or ESD.
 - Keep the bias voltage for optical alignment below 3 V (1 V is recommended).
 - Laser radiation is partially reflected by the probe-tip. Refer to laser safety instructions.
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Preparation

and recommended procedures:

- In order to avoid accidental mechanical damage of the microprobe, it is a good practice to install the microprobe as the last component of the fully prepared measurement set-up. It is recommended to use the dummy device TeraSpike Phantom for first installation tests. For storage please use the provided storage box.
- Although your TeraSpike microprobe is equipped with a voltage protection circuit it is still recommended to prevent electrostatic discharge while handling the microprobe i.e. by wearing a conducting wrist strap.
- Before device installation, block all laser beams in the area of operation to avoid injuries and thermal device damage. Obey the security instructions of your laser manufacturer.
- It is recommended to install a CCD microscope camera or microscope into the set-up in order to monitor the positioning and optical excitation of the microprobe.



Installation



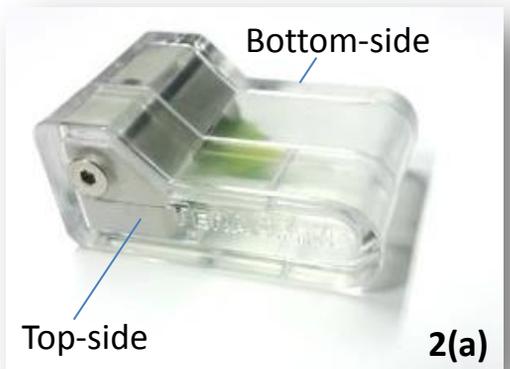
1. Installation of the mount:

Install the delivered mount at the desired position into your setup.



2. Unboxing and installation of the microprobe:

(a) The top-side of the storage box is marked with the TeraSpike writing. The bottom side is blank.



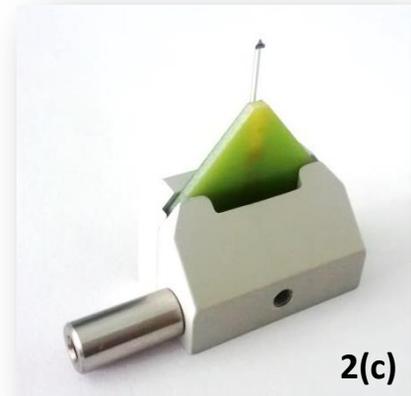
(b) First, remove the screw from the bottom side of the storage box. While keeping the box closed put the box on the bottom side. Then remove the screw from the top side of the box and remove carefully the top cover.



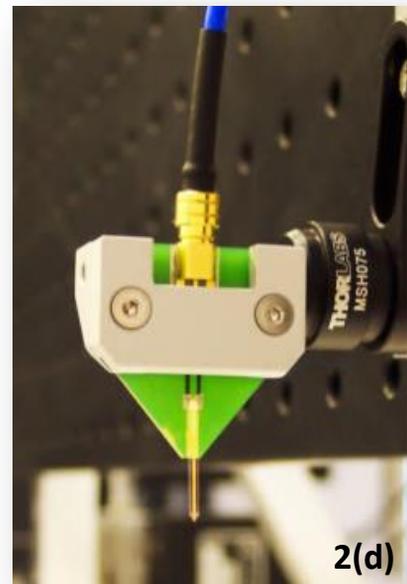
Installation

2. Unboxing and installation of the microprobe (continued):

(c) Remove the probe-tip from the box. Be careful not to touch the cantilever of the tip! Fix the post at the desired thread position of the microprobe body tightly.



(d) Connect the SMP cable to the microprobe. Install the microprobe into your set-up. Again be careful not to touch the tip apex or the glass carrier of the probe to any object.



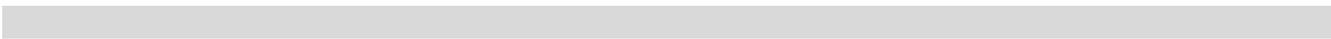
Device operation

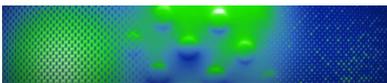
1. Connect the probe cable to a grounded stabilized sourcemeter (e.g. Keithley Sourcemeter Model 2400 or 2600) or a current amplifier with biasing option (recommended amplification range $10^6 - 10^8$ V/A).
2. Apply 1V bias voltage to the microprobe.
3. The optical excitation intensity on the microprobe should be adjusted to 2-3 $\mu\text{J}/\text{cm}^2$. Depending on your optical components the optical excitation power needs to be limited accordingly. For example, for a minimal focal spot-size of 30-40 μm adjust the average power of the optical excitation beam to 3-4 mW.
4. Unblock, align and focus the optical excitation beam to the tip of the microprobe.
5. Monitor the photo-current with 1 V bias voltage applied. Adjust the optical alignment by maximizing the photocurrent. A min. photocurrent of 100 nA should be reached under the above mentioned conditions. Avoid photocurrents higher than 1 μA by defocussing the optical excitation beam to an appropriate level or by reducing the optical power.
6. Switch of the bias voltage.
7. Connect the current amplifier to the data acquisition unit (e.g. lock-in amplifier or storage oscilloscope).
8. Start your measurements.

Maintenance



- For longer periods of disuse please store the probe in the provided box.
- If a dirt particle has been settled on the microprobe tip in a critical region please ask us for a cleaning service. Critical regions are the areas of optical excitation and the front-end electrode sections. Please do not try to use a stream of air or nitrogen. The cantilever may break if too much stream pressure is applied.





Questions? Please contact us:



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