Instruction manual and data sheet PCA-60-05-10-800-x

Photoconductive THz antenna for laser excitation wavelengths $\lambda \sim 800$ nm

PCA – Photo Conductive Antenna

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1. Spectral performance:

**Performance of recommended THz antenna combination**

Emitter: PCA-60-05-10-800-h- CTL-D25mm
Detector: bPCA-100-05-10-800-h- CTL-D25mm

Measurement in air
2. Antenna parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>minimum ratings</th>
<th>standard</th>
<th>maximum ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dark resistance</td>
<td>2 MΩ</td>
<td>3 MΩ</td>
<td>4 MΩ</td>
</tr>
<tr>
<td>Voltage</td>
<td></td>
<td>40 V</td>
<td>50 V</td>
</tr>
<tr>
<td>Optical mean power @ 50 – 100 MHz repetition rate</td>
<td>10 mW</td>
<td>15 mW</td>
<td></td>
</tr>
<tr>
<td>Pulse fluence</td>
<td></td>
<td>200 µJ/cm²</td>
<td>250 µJ/cm²</td>
</tr>
</tbody>
</table>

**Attention:** The F-number of the optical lens focusing the laser beam onto the antenna gap must be larger than a certain value to avoid too high pulse fluency. This means, that the minimum diameter of the focused beam waist must be about 120 % of the gap distance g. For a Gaussian beam the minimum focus length $f_{\text{min}}$ of the optical lens can be estimated as

$$f_{\text{min}} = \frac{0.3 \cdot \pi \cdot g \cdot D}{\lambda}$$

with

- $g$ – gap distance of the antenna
- $\lambda$ - laser wavelength
- $D$ – diameter of the laser beam hitting the focusing lens.

For $\lambda = 0.8 \, \mu\text{m}$ and $g = 5 \, \mu\text{m}$ the minimum possible F-number of the lens is $f_{\text{min}}/D = 1.9 \pi$.

Dark current voltage characteristic
3. Antenna design

antenna dimensions

PCA 40-05-10-800
PCA 40-05-10-800 (detail)
4. Order information

PCA-40-05-10-800-x  Photoconductive antenna

- length  $l = 60 \, \mu\text{m}$
- gap  $g = 5 \, \mu\text{m}$
- width  $w = 10 \, \mu\text{m}$
- laser wavelength  $\lambda = 800 \, \text{nm}$

$x$ denotes the type of mounting as follows:

- $x = 0$: unmounted chip $4 \, \text{mm} \times 4 \, \text{mm}$ with 2 bond contact pads
- $x = h$: mounted on an Al disc with $25.4 \, \text{mm} \varnothing$ and hyperhemispherical silicon substrate lens, 1m coaxial cable with BNC or SMA connector
- $x = a$: mounted on an Al disc with $25.4 \, \text{mm} \varnothing$ and aspheric focusing silicon substrate lens, 1m coaxial cable with BNC or SMA connector
- $x = c$: mounted on an Al disc with $25.4 \, \text{mm} \varnothing$ and aspheric collimating silicon substrate lens CL-12 for 12 mm THz beam diameter, 1m coaxial cable with BNC or SMA connector
- $x = h-f$: fiber coupled antenna with hyperhemispherical silicon substrate lens
- $x = l$: with aspheric focusing optical lens for free space laser excitation
- $x = p$: with preamplifier for detector antenna

For information about THz beam guiding possibilities please [click here](#).