Instruction manual and data sheet bPCA-3000-05-10-800-x

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

PCA – Photo Conductive Antenna

Table of contents:

1. Spectral performance .................................................................................................................. 2
2. Antenna parameters ................................................................................................................... 3
3. Antenna design .......................................................................................................................... 4
4. Order information ..................................................................................................................... 5
1. Spectral Performance

Emitter: bPCA 180-05-10-800-h
Detector: bPCA 3000-05-10-800-h
P = 10 mW
V_{Emitter} = 10V, f = 10kHz

\( \lambda = 780 \text{ nm}, \tau = 100 \text{ fs}, t_{\text{int}} = 0.5 \text{ s} \)
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>500 kΩ</td>
<td>1 MΩ</td>
<td>2 MΩ</td>
</tr>
<tr>
<td>Voltage</td>
<td>10 V</td>
<td>15 V</td>
<td></td>
</tr>
<tr>
<td>Optical mean power @ 50 – 100 MHz repetition rate</td>
<td>10 mW</td>
<td>20 mW</td>
<td></td>
</tr>
<tr>
<td>Pulse fluence</td>
<td>250 µJ/cm²</td>
<td>500 µJ/cm²</td>
<td></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 \( \lambda = 0.8 \) µm and \( g = 5 \) µm the minimum possible F-number of the lens is \( f_{\text{min}}/D = 1.9 \pi \).
3. Antenna design

antenna dimensions in µm

bPCA 3000-05-10-1060

bPCA 3000-05-10-1060 (detail)
4. Order information

bPCA-180-05-10-800-x  Photoconductive antenna
length  \( l = 180 \ \mu m \)
gap     \( g = 5 \ \mu m \)
width   \( w = 10 \ \mu m \)
laser wavelength \( \lambda = 800 \ \text{nm} \)

\( x \) denotes the type of mounting as follows:

\( x = 0 \) unmounted chip 4 mm x 4 mm with 2 bond contact pads
\( x = h \) mounted on an Al disc with 25.4 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 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 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