Instruction manual and data sheet PCA-40-05-10-1550-x

Photoconductive THz antenna for laser excitation wavelengths $\lambda \sim 1550$ nm

PCA – Photo Conductive Antenna

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1. Spectral performance

![Graph showing spectral performance](image)

- Emitter: JAM 765 PCA 40-05-10-h-CTL
- Detector: JAM 765 bPCA 180-05-10-h-CTL
- Detector: JAM 765 bPCA 100-05-10-h-CTL

10 mW on both antennas
Emitter voltage 3 V

\[ \lambda = 1550 \text{ nm}, \tau = 100 \text{ fs} \]
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>2.0 kΩ</td>
<td>3.5 kΩ</td>
<td>5 kΩ</td>
</tr>
<tr>
<td>Voltage</td>
<td>3 V</td>
<td>3 V</td>
<td></td>
</tr>
<tr>
<td>Optical mean power @ 50 – 100 MHz repetition rate</td>
<td>8 mW</td>
<td>10 mW</td>
<td></td>
</tr>
<tr>
<td>Pulse fluence</td>
<td>200 µJ/cm²</td>
<td>250 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 \( \lambda = 1.5 \, \mu\text{m} \) and \( g = 5 \, \mu\text{m} \) the minimum possible F-number of the lens is \( f_{\text{min}}/D = \pi \).

*Current-voltage characteristics*
3. Antenna design

antenna dimensions in mm

PCA 40-05-10-1550

bPCA 40-05-10-1550 (detail)
4. Order information

PCA-40-05-10-1550-\(x\)  
Photoconductive antenna  
length  \(l = 40 \text{ µm}\)  
gap  \(g = 5 \text{ µm}\)  
width  \(w = 10 \text{ µm}\)  
laser wavelength  \(\lambda = 1550 \text{ nm}\)

\(x\) 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 CSL-20 for 20 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