

94 GHz Continuous Wave **Cloud Doppler Radar RPG-FMCW-94-(DP)**

RPG-FMCW-94

Applications

RPG has developed the continuous wave cloud Doppler radar RPG-FMCW-94 operating at 94 GHz. Compared to widely used pulsed radars operating at lower frequencies, the RPG FMCW-94 has two major advantages: a much lower power consumption and high mobility due to the compact design.

- High resolution vertical profiles of dBz
- LWC (Liquid Water Content) profiles
- 2D cloud profiles through elevation scanning
- Velocity profiles from Doppler spectra
- Dual Polarization (DP, optional): discrimination between cloud droplets, rain, and snow





Key Features

First Light

- Frequency: 94 GHz (λ =3.19 mm) ± 500MHz
- IF range: 0.4 GHz to 0.7 GHz
- Continuous power: 500 mW
- Antenna type: Bi-static Cassegrain with 500 mm aperture
- Antanna gain: 52.3 dB
- Beam width: 0.45° FWHM
- Dynamic range: -50 dBz to +20 dBz
- Ranging: 50 m to 12 km
- Sampling rate: 4 s
- Doppler resolution: ± 15 cm/s
- Doppler range: ± 10 m/s
- Chirp variations: 7
- Passive channels (optional):







89/170 GHz for integral LWP detection

Scanning capability: elevation and azimuth

| | | | | | | $\mathbf{M}(t)$ | | | dBZ |
|-----------------------|----------------------|------------------------------|----------------------|----------------------|-----------------------|----------------------|----------------------|----------|---------------------|
| Time: Date: | 23:40:00 14.10.14 | 00:00:00 15.10.14 | 00:20:00 15.10.14 | 00:40:00 15.10.14 | 01:00:00 15.10.14 | 01:20:00 15.10.14 | 01:40:00 15.10.14 | | Color Sc Upper L |
| Chirp Program: CHIRP2 | | Start: 18:59:58 / 14.10.2014 | | Stop: 16:13:52 / 1 | 5.10.2014 Samp | les: 15761 | Altitude Grid: | 30 m 🔻 | 5 dBZe |
| Cust | tomer: RPG | D:\RP | G-HATPRO-LAI | 101\DATA-FMCW-R | adar\FirstLight 14-10 | 0-14.dat | | Zoom Out | Lower Li -45 dBZ |

First Light



• Principle: time lag Δf between continuously emitted and received frequency chirps gives a spectrum of

Design

- The bi-static design with shielded and accurately levelled optics (antenna decoupling <-100dB)
- The generated HF signal is split up into an emitting and a receiving branch
- The receiver branch is attenuated and mixed with the signal from the receiver antenna
- The mixer down-converts the signal to the IF range
- IF signal is then filtered, amplified and digitized





beat frequency Δf

- Beat frequency spectrum contains ranging information with a resolution of $\Delta r = c/2\Delta f$
- Doppler shift f_D provides velocity profiles

RPG Radiometer Physics GmbH Birkenmaarstraße 10 53340 Meckenheim, Germany

phone: +49 2225 99981-0 www.radiometer-physics.de radiometer@radiometer-physics.de