122 / 134GHz Going Further?

122/134Ghz record, "and the way forward to increase distance"

Roger Ray G8CUB

Millimetre Bands 122 134GHz

67km Contact

Equipment Used

Comparison to VK System

Weather requirements

Path profile

Tx Power

Antenna Gain

122G Frequency

67km attempt

GW8CUB/P The Blorenge toward Birdlip

67km attempt





Received signals



134 received by G8GTZ/P

122 received by G8CUB/P

Opera received



122/134GHz



122/134GHz



Tuneable Doubler

122/134GHz Receive



24GHz IF, 98/110GHz LO

122/134GHz

ADF5355 - 100MHz Ref



Dual band Tx



Dual band Tx



Equipment available VK 122 transverter VK 122 / 134 transverter Home brew transverter. X4 followed by doubler Sub-harmonic mixer Tripler TX Multiplier / Doubler TX

VK 122GHz System Home brew X3 from multiplier X2 sub-harmonic mixer Fundamental mixer wr-10? Separate TX 5mW+ New VK 122 / 134 System

VK Revolutionised Operation!
Best receive option
Combine with High Power TX?
Allows much experimentation with antennas
New VK 122 / 134 boards see later

Dubus designs Boards (source was Kuhne) Housing / diodes DL2AM X4 Broadern modules 'sub-harmonic' mixer Fundamental mixer TX CW / FM / Opera

VK System, Next Game Changer?
Longer paths than 122
Alignment for 122
Separate TX 5mW possible?

New VK 122/134GHz

- Operation on both 122G and 134G bands
- Cleaner L.O. (Better Phase noise)
- Smaller L.O. Tuning steps due to use of upgraded PLL chip ADF
- Frequency disciplining using either 1pps or 10MHz input
- User serial re-programming of all channel frequencies
- Built in auto switching I/Q quadrature combiner for improved RX performance
- Same PCB mechanical footprint as older 122G only boards
- High quality 100MHz oven reference oscillator on board

122/134G VK





Output Power Measurement



Optimised on 134 – 162uW

Atmospheric Loss dB/km





Operating Frequencies 122GHz 122,400 (122,256) 122GHz 122,999.6 (122,855.2)?

■ 134GHz 134,400 (134,256)

Path Profile



Path Losses

Calculated path loss:

122GHz free-space loss 171dB + 50dB atmospheric loss = 221dB 134GHz free-space loss 172dB + 36dB atmospheric loss = 208dB

Weather Da	ta from Met offic	ce:
14.00 April	26	
	Birdlip	Blorenge
Visibility	E	VG
Temperatur	e 7C	6C
Humidity	55%	59%
Pressure	1004	1005
Dew Point	-1.4C	-1.4C

Getting More Power



122G Gunn Oscillator



122 GHz Test Sources

• 1.6 mm hole in standard blank UG flange





WB-SG2 Sig Gen 7.65GHz

Antenna Gain



Size	Gain	Beamwidth
0.6m	56dB	0.22 deg
0.3m	50dB	0.45 deg
0.15m	44dB	0.90 deg

0.3m Cassegrain antenna

Waveguide as HPF ■ Fco (GHZ) = 150/а Where a = longest dimension in mm• Fco (GHZ) = 176/d Where d = diameter in mm2.7mm round cut-off 65 GHz 1.7mm round cut-off 104 GHz 1.0mm round cut-off 176 GHz

When is the best time to operate on Millimetre Bands?

- On all millimetre wave bands where water vapour adds to the path loss, the best time is when the dew point is low.
- This normally means that the temperature is coldest. Preferably cold and dry. VK3UM & SRTM Path Profile, software can be used to predict atmosphere absorption. G8AGN's weather box is very useful in the field