Millimetre Bands

Roger Ray G8CUB

Millimetre Bands

47 76 122 134 GHz

47GHz

Equipment available

- Kuhne 47GHz transverter
- Home brew. WR-28 mixer LO Pasolink X4 Multiplier
- Sub-harmonic mixer 23.5GHz LO
- Pre-amp Kuhne, Iban EB3FRN
- PA ?

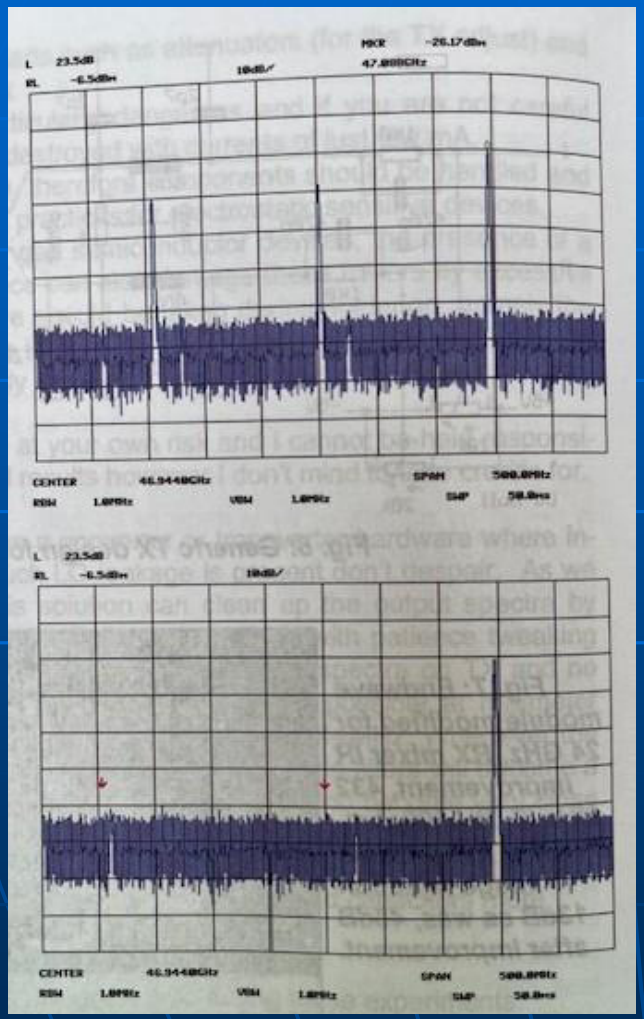
47GHz

Kuhne MKU 47 G2

47GHz

Kuhne
Transverter with
G4DBN Horns

47GHz



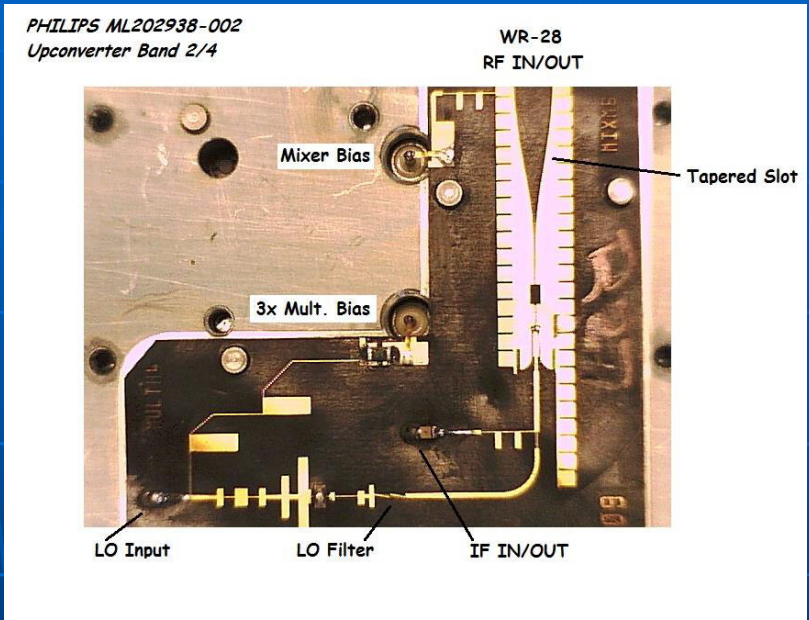
MKU47G2
From Dubus 4/2025
LO Nulling on IQ Mixer
Luis CT1DMK

Top 50mW original

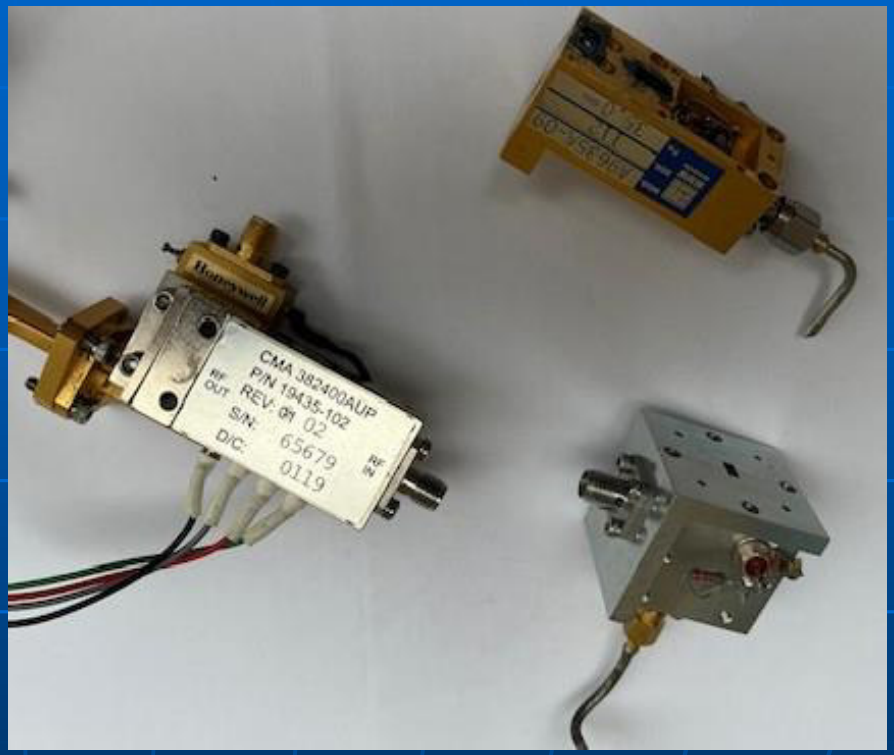
Bottom after improvement!

47GHz

Mixers



Harmonic Philips mixer



Fundamental mixers WR-28 & WR-19

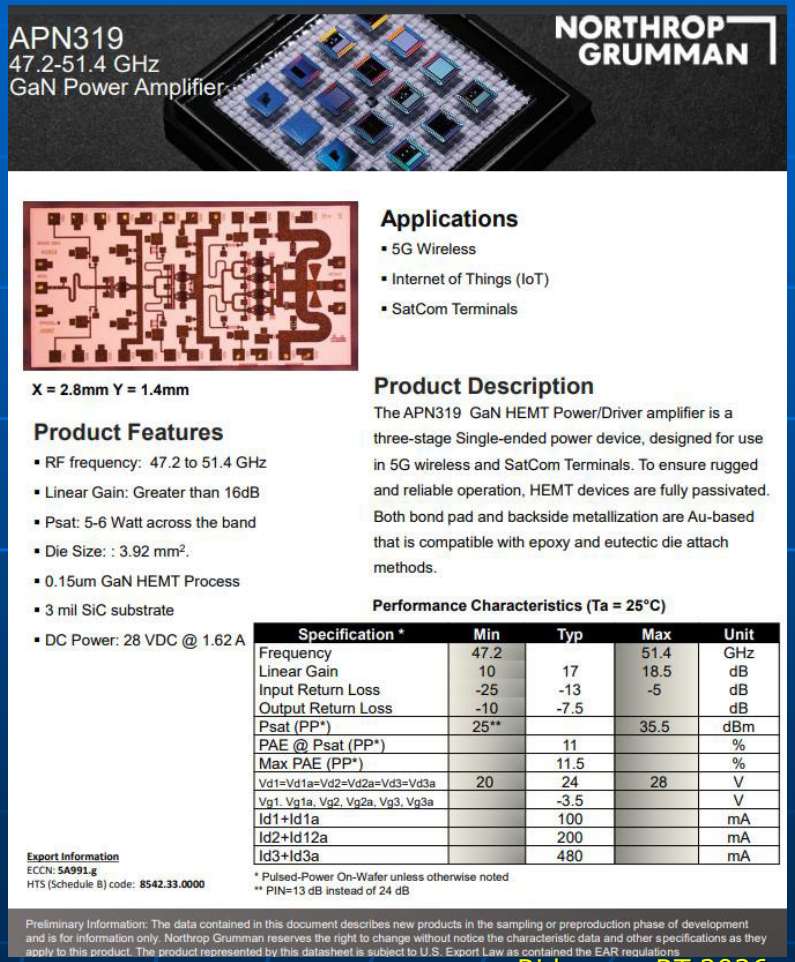
47GHz

Dual band
24/47G
Transverter

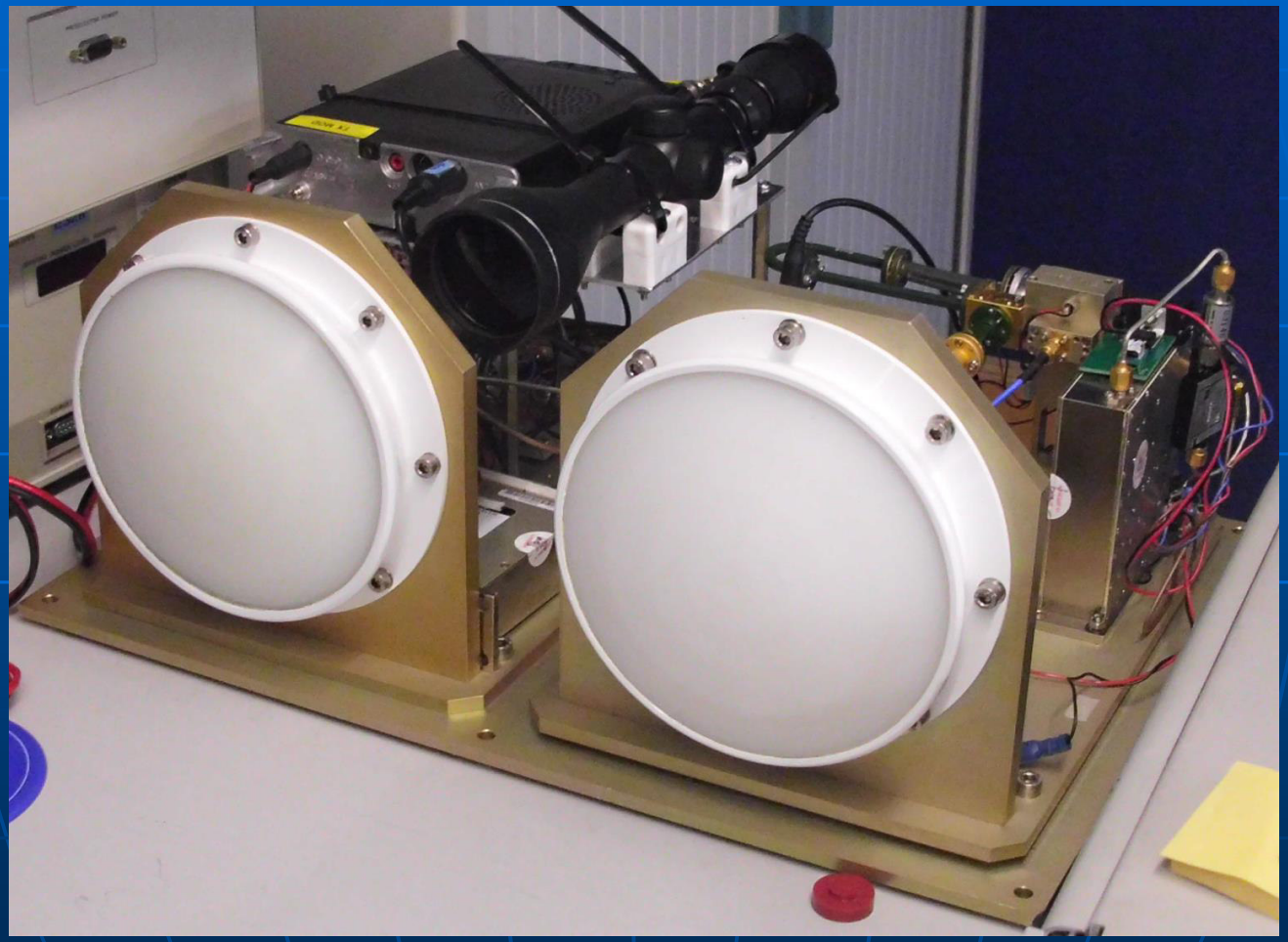
47GHz

47GHz PA

APN 319,318,352,353
5W Saturated
2-3W linear?
>45W dissipation!
28V supply

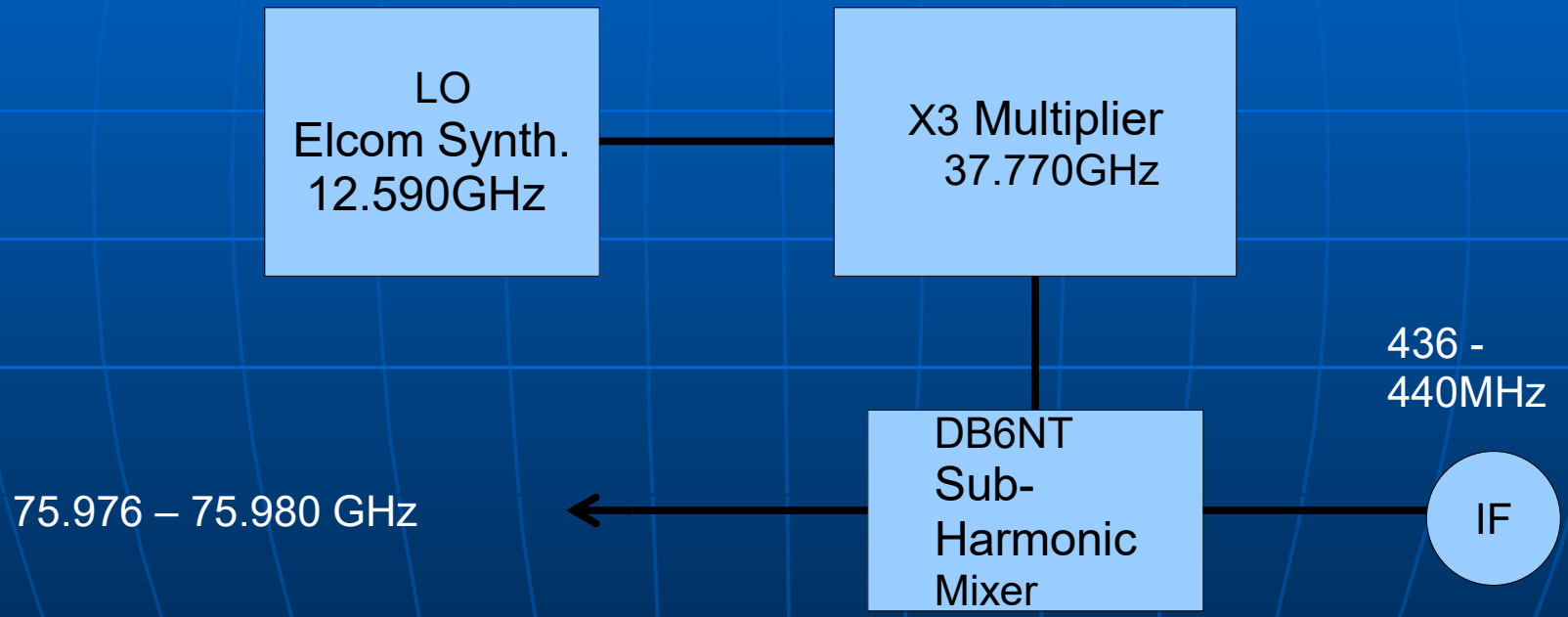


76GHz



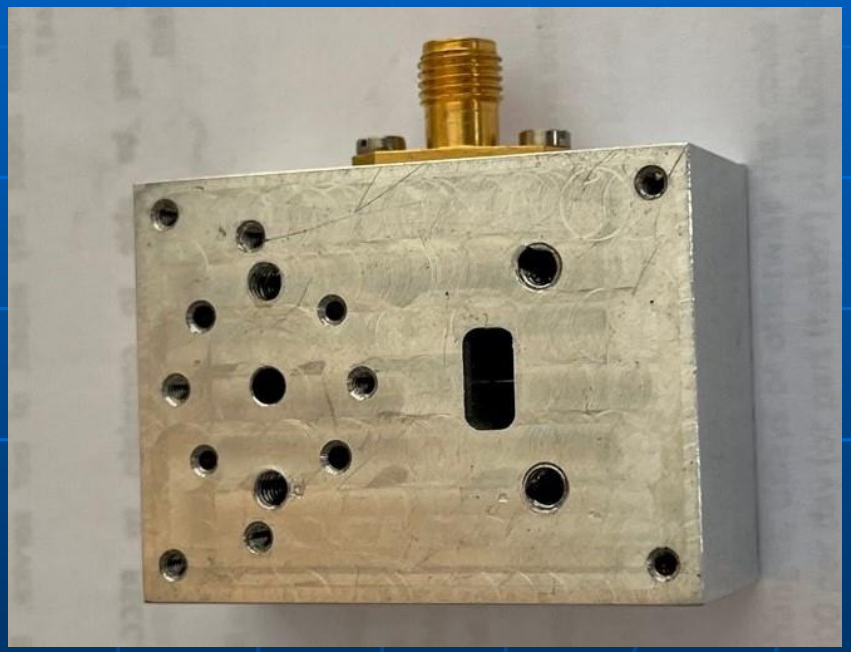
76GHz

- **76GHz Transverter**



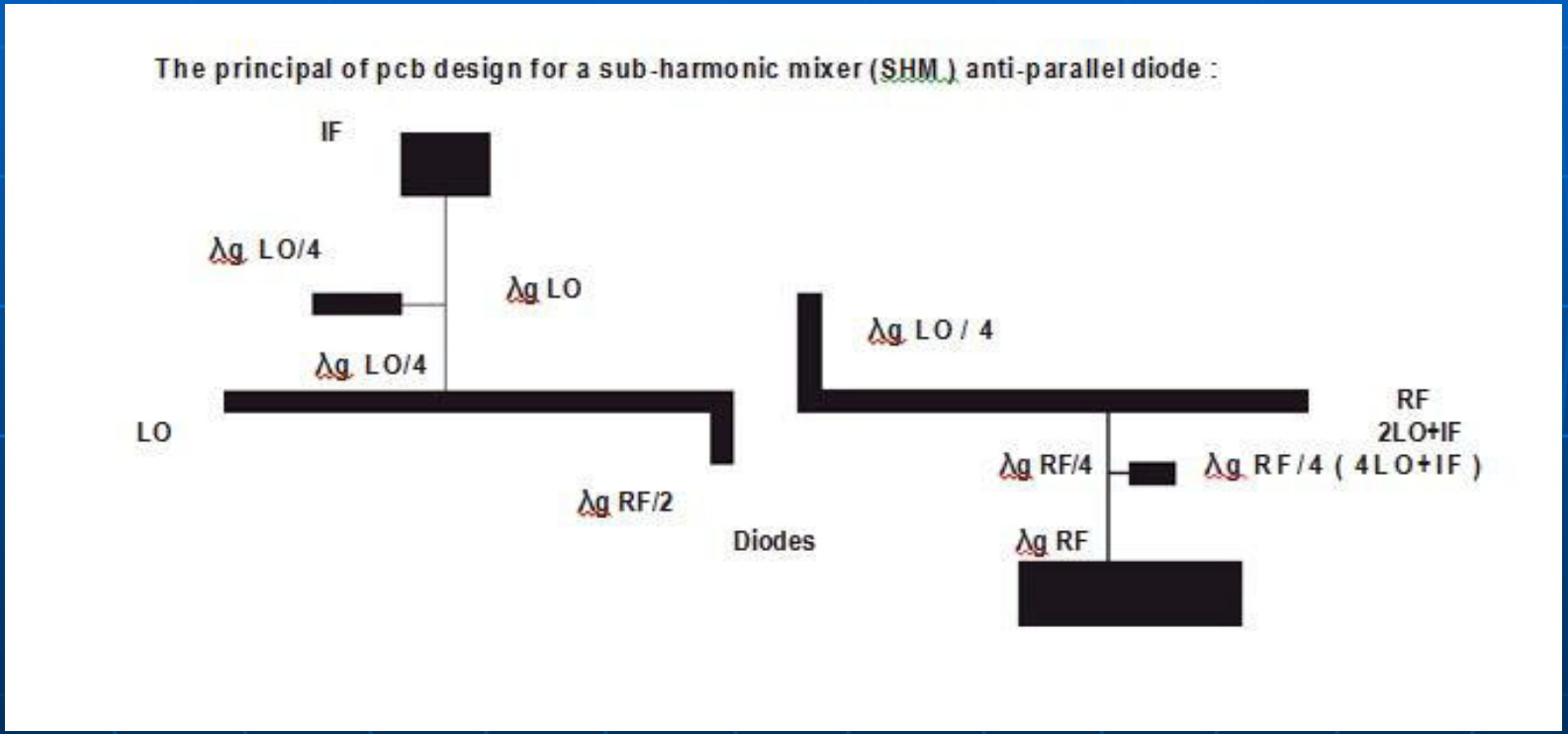
76GHz


+12V GND +9V
CTR-960459 REV -
19435-101 80719
CMA 382400AUP
P/N 19435-102
RF OUT
REV: 02
RF IN
S/N: 64798
D/C: 0102



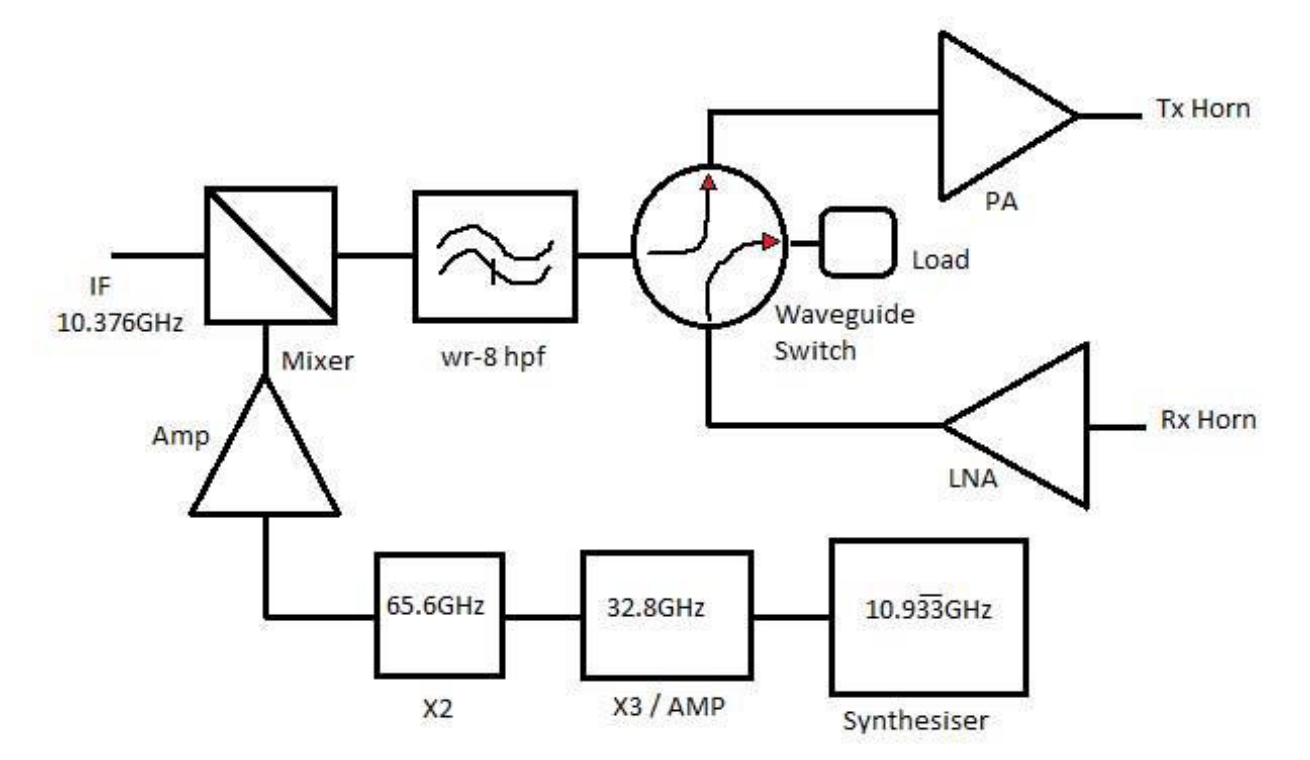
76GHz

Sub-harmonic Mixer Diode MA4E1318 Anti-parallel diode

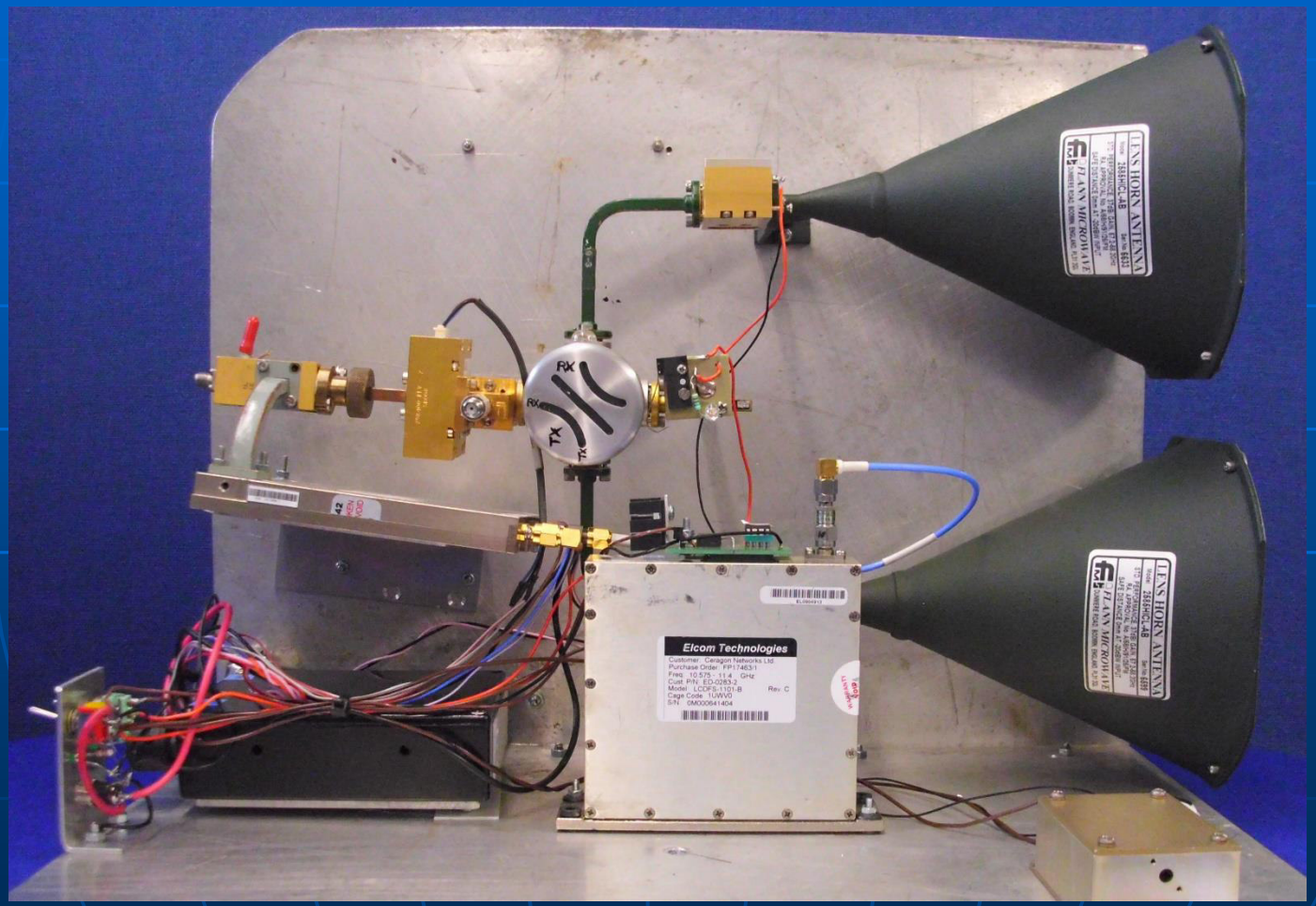


Drive 38GHz +13 to +21dBm 76GHz hole 2.7mm dia.

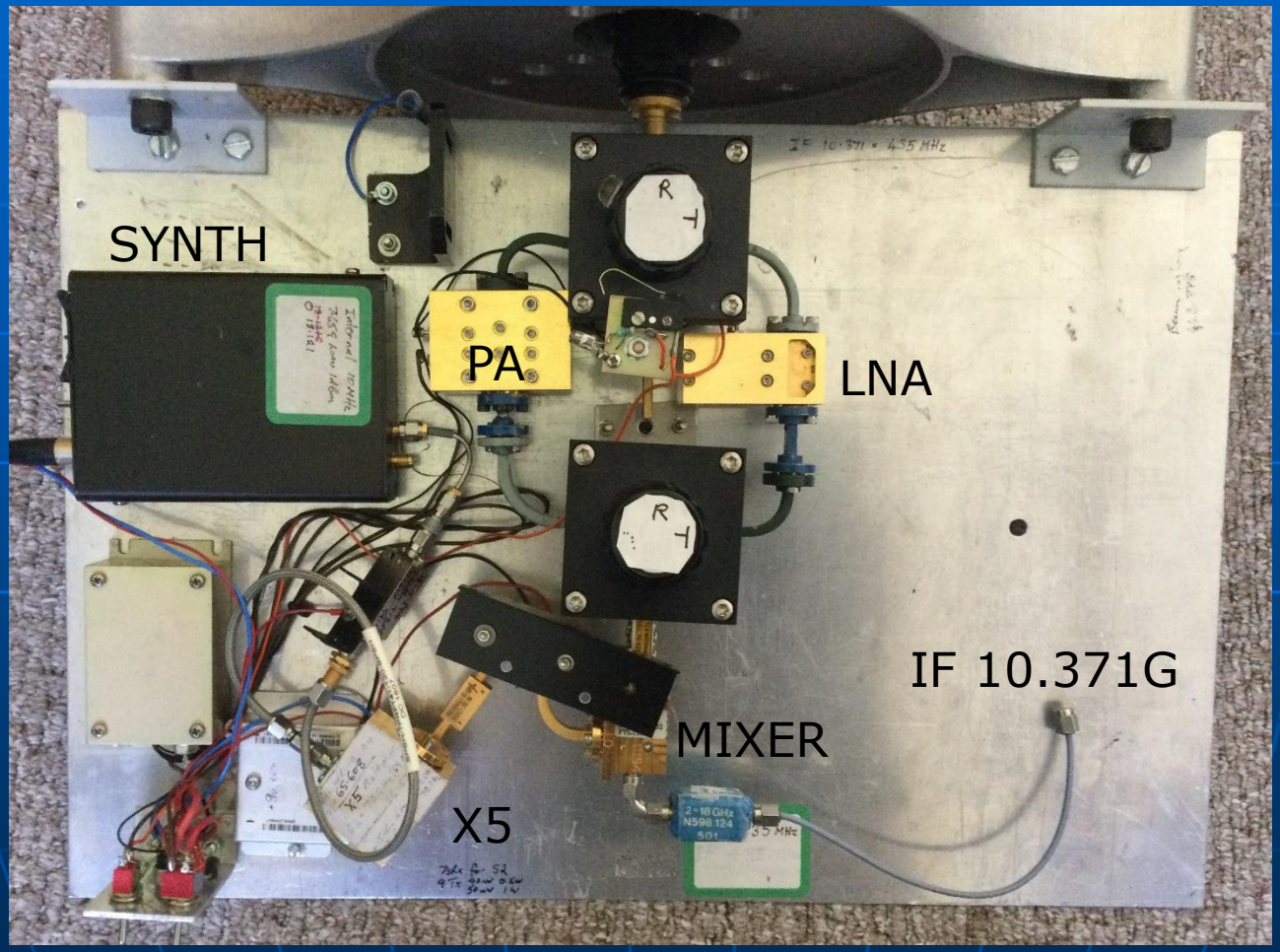
76GHz


Tx Horn
PA
Load
IF
10.376GHz
Waveguide
Switch
Mixer
wr-8 hpf
Amp
Rx Horn
LNA
65.6GHz
32.8GHz
10.933GHz
X2
X3 / AMP
Synthesiser

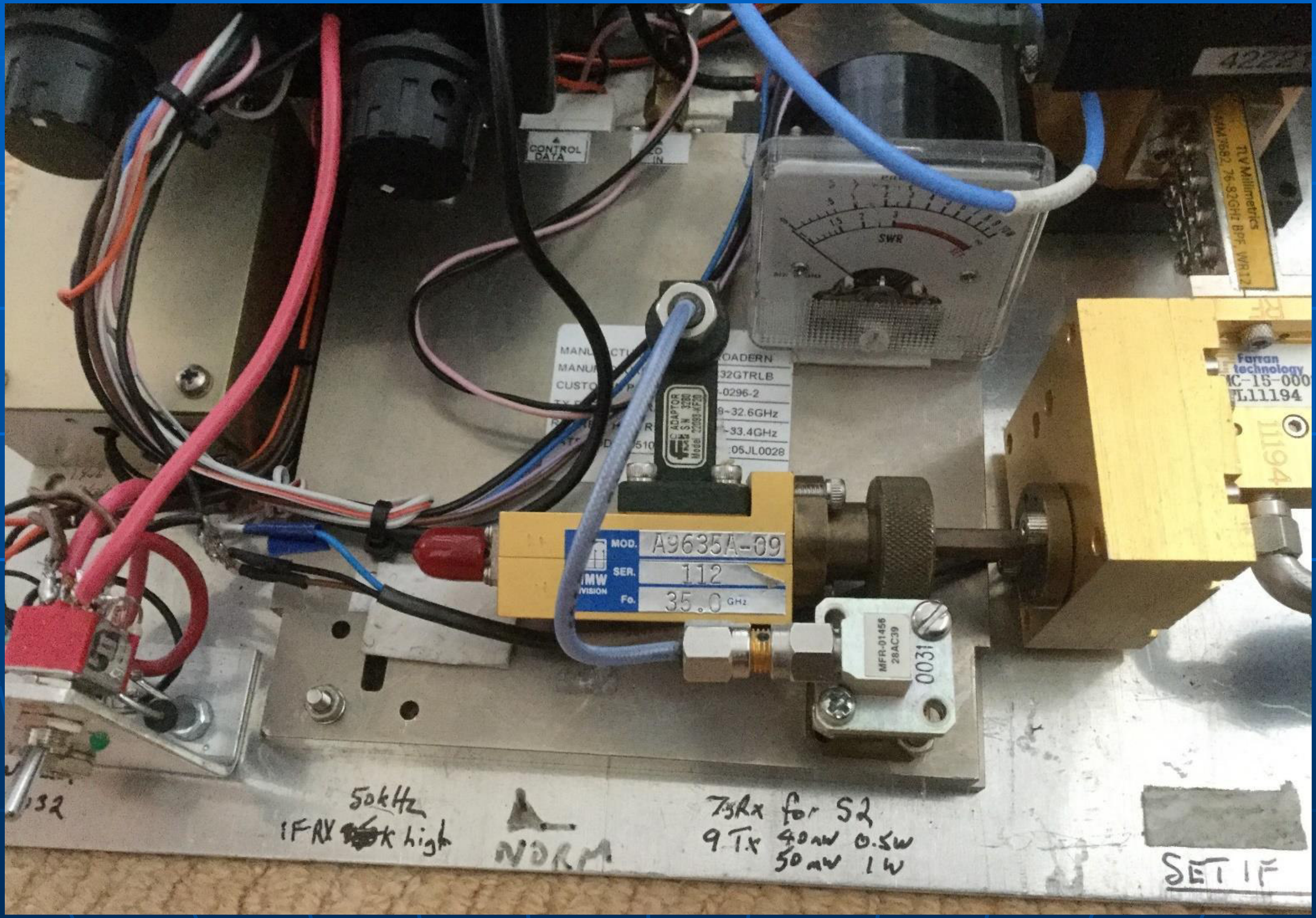
76GHz



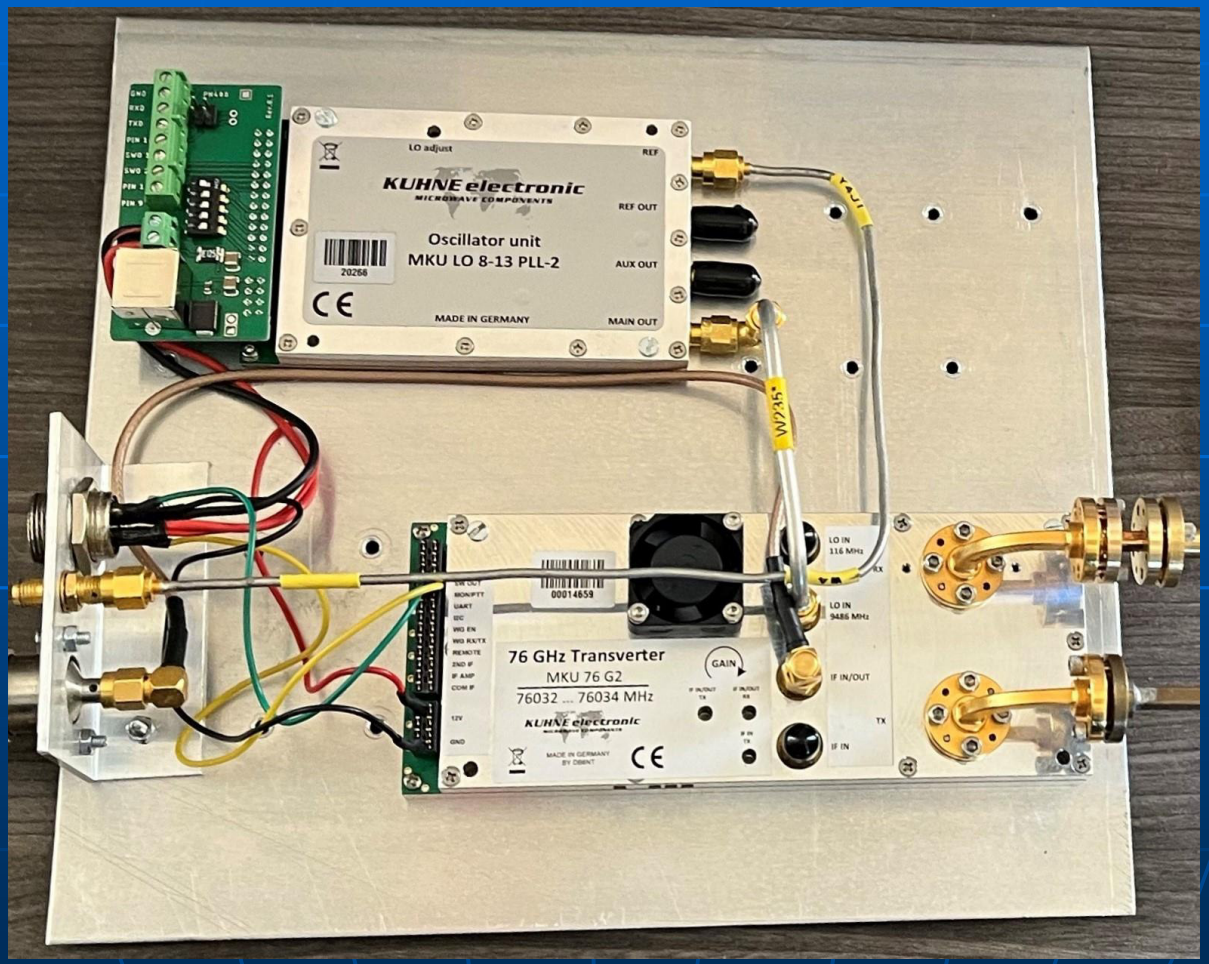
76GHz



76GHz

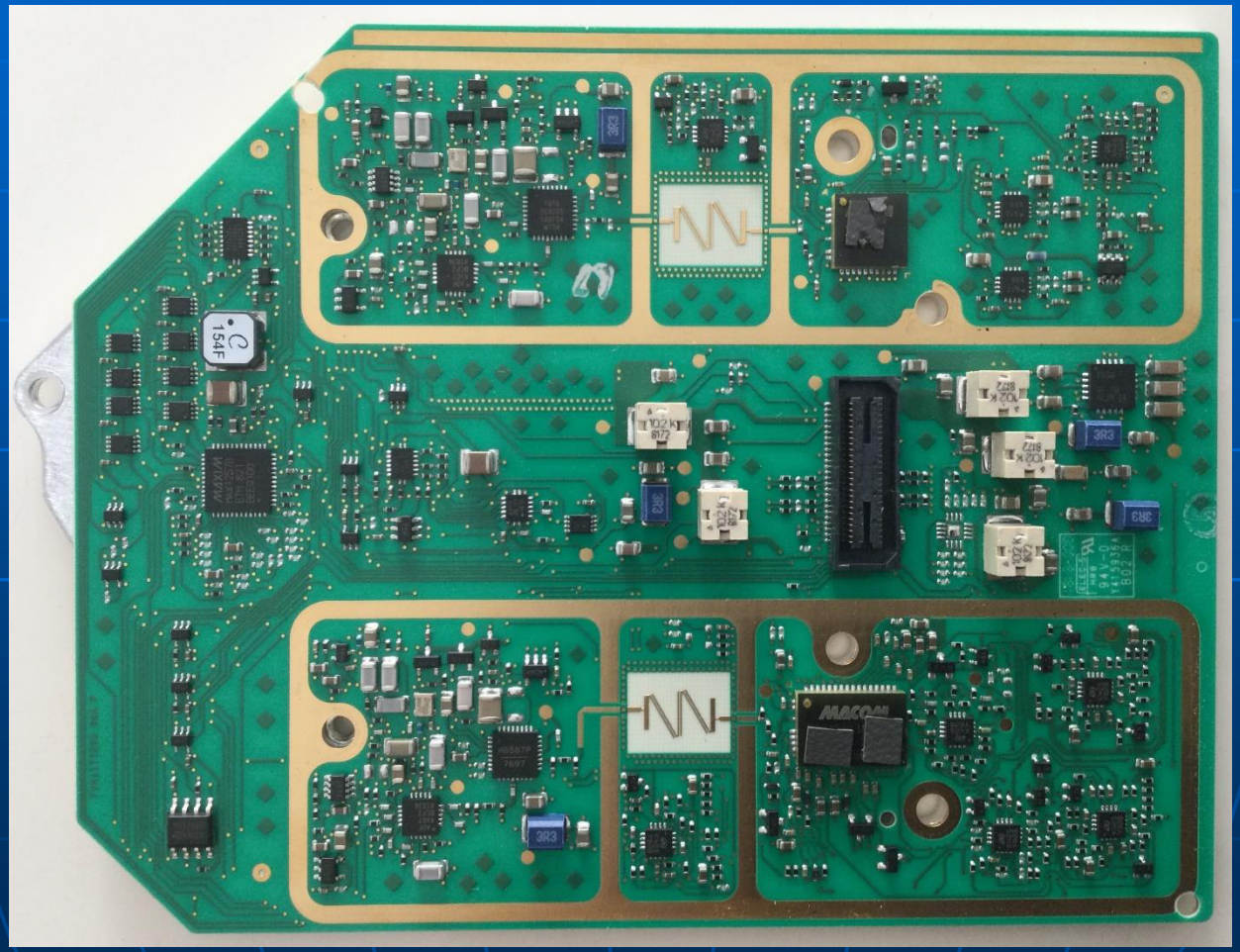


76GHz


LO adjust
REF
KUHNE electronic
MICROWAVE COMPONENTS
REF OUT
Oscillator unit
MKU LO 8-13 PLL-2
AUX OUT
MADE IN GERMANY
MAIN OUT
76 GHz Transverter
MKU 76 G2
76032 .... 76034 MHz
KUHNE electronic
GAIN
LO IN
116 MHz
LO IN
9486 MHz
IF IN/OUT
IF IN

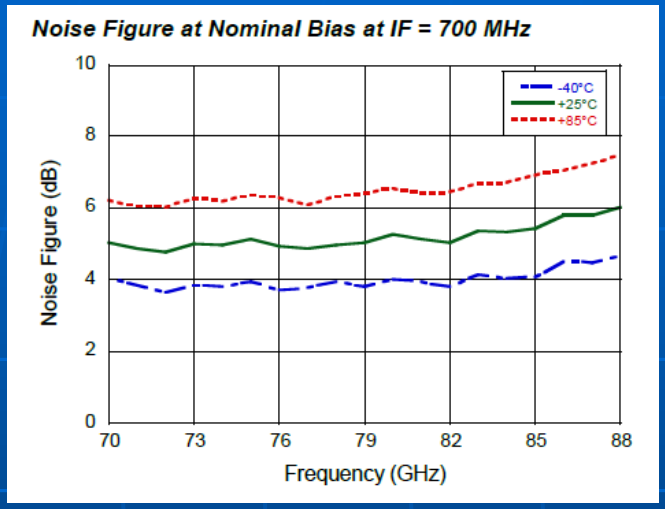
76GHz

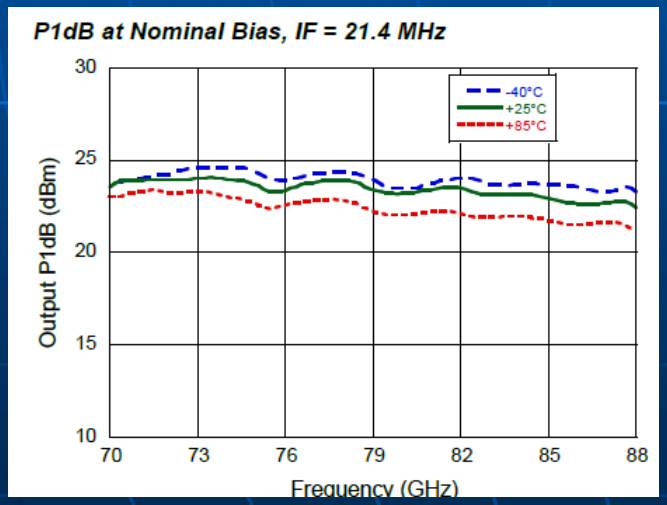
Macom Mini-Link



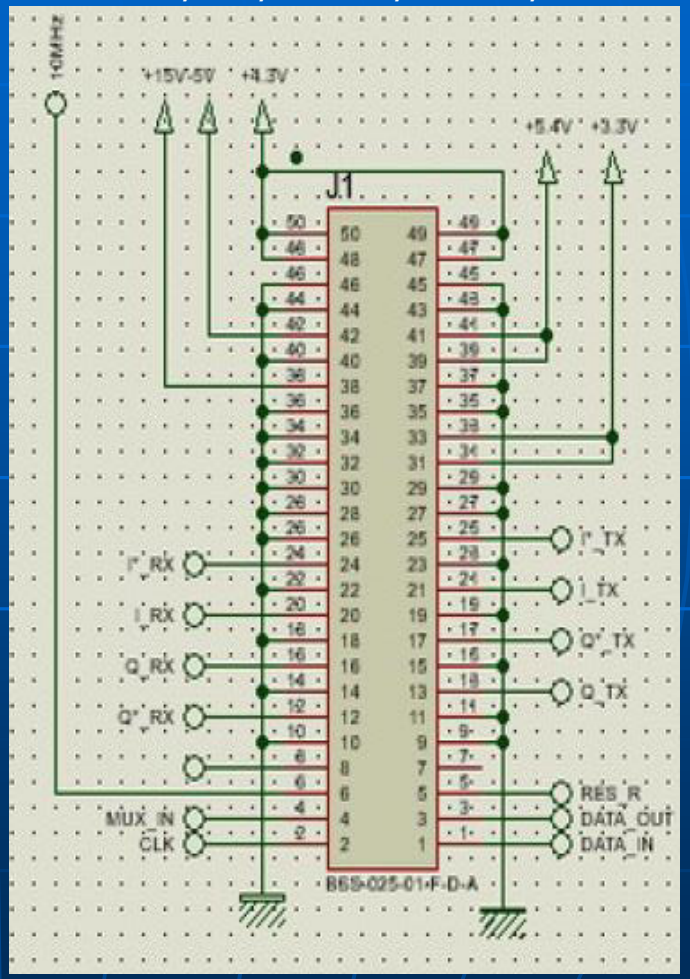
76GHz

Macom Mini-Link



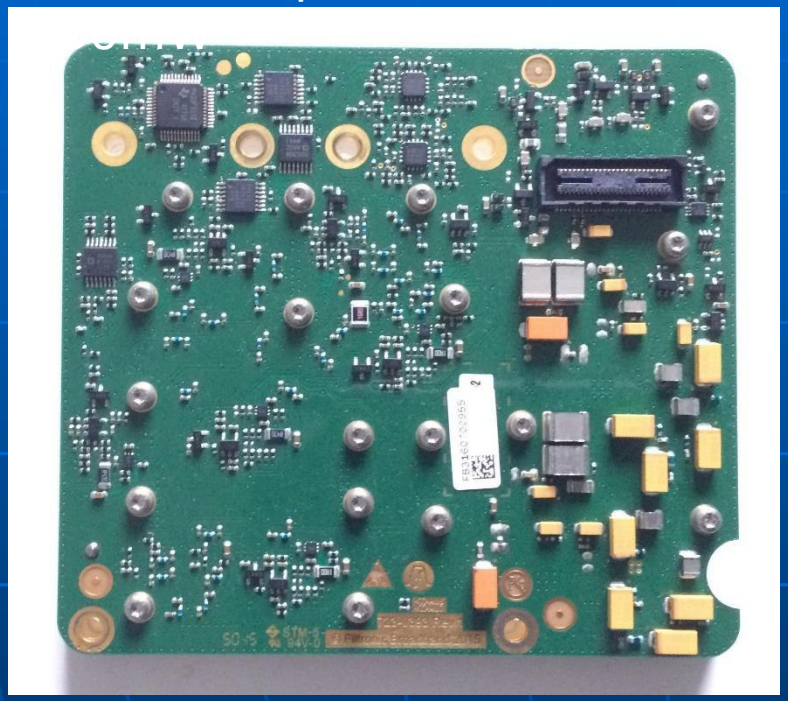


+15, -5, +4.3, +5.4, +3.3



76GHz

Filtronic Orpheus e-band



TA406/407
High or Low Band
150mW sat 7dB NF

76GHz

Orpheus
TA406 & TA407 E Band Transceivers

Filtronic

Features

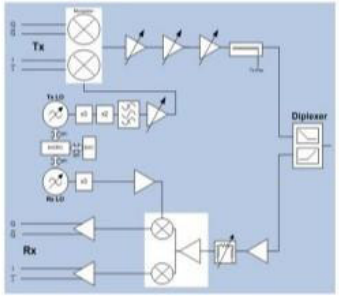
- **Fully integrated 71/81 to 76/86 GHz modules**
- **High Tx output power**
- **2GHz baseband bandwidth**
- **Low phase noise –112dBc/Hz at 1MHz**
- **Supports 256QAM modulation**
- **Integrated Diplexer**
- **Single T/R port for antenna interface**
- **Single connector modem interface**
- **100% tested- ODU ready**
- **Small Form Factor**
- **Highly linear Rx**

Description

Orpheus E-Band transceiver modules provide a turn-key solution for carrier grade mobile backhaul applications. Each module contains all the transmit and receive functions necessary for the RF section of an E Band link and provides a simple connection to a high data rate full duplex modem. The integrated diplexer connects directly to an antenna of choice via a standard WR12 interface. Internal, low phase noise VCOs are settable via an SPI interface in 31.25MHz steps to support ECC/ITU channel arrangements

- Proven system performance — 10 Gbps demonstrated with spectral efficient 256QAM modulation.
- Field proven technology — tens of thousands of Filtronic millimetre wave transceivers deployed worldwide.

Orpheus modules are designed for easy incorporation into ODUs for rapid time to market with minimal customer engineering resource.



Orpheus transceiver block diagram

Filtronic
NETPark, Thomas Wright Way, Sedgefield, Co Durham,TS21 3FD
Tel. +44 (0) 1740 625163
email: sales@filtronic.com

Orpheus
TA406 & TA407 E Band Transceivers

Filtronic

Outline Specification

Over Baseplate operating temperature –33 to +75C
All RF parameters referenced to antenna port (inclusive of diplexer loss)

Parameter	Note	Min	Typ	Max	Units
Tx Frequency	TA 406 TA 407	71 81		76 86	GHz
Baseband Bandwidth				2.0	GHz
Tx Baseband input power		-17		-7.5	dBm
Tx Power control range		20			dB
P_{sat}			22		dBm
Tx ALC accuracy		-2		2	dB
Output IP3 @ 16dBm		23	29		dBm
I/Q Gain imbalance	Tx and Rx	-3		+3	dB
I/Q Phase imbalance	Tx and Rx	-10		+10	degrees
I/Q impedance - differential	Tx and Rx		100		Ohms
Tx LO Cancellation			-30	-5	dBc
Tx Sideband suppression			-40	-20	dBc
Rx Frequency	TA 406 TA 407	81 71		86 76	GHz
Rx Noise Figure	High gain mode		7	10	dB
Rx Gain High mode		22	25	28	dB
Rx Gain Low mode		14.5	17.5	20.5	dB
Rx Gain accuracy reported over SPI		-1.5		+1.5	dB
RF input power				-23	dBm
Input IP3	Low Gain mode	-10	-7		dBm
Phase Noise	100kHz 1MHz			-89 -112	dBc/Hz
LO frequency step	Tx and Rx	31.25			MHz

Power Supplies

Voltage (V)	Max Current (mA)	Tolerance (±)	Abs' max voltage (V)
5.1	2850	2%	5.5
3.3	150	2%	3.6
2.8	800	2%	3.0
18	25	2%	20
-5	50	2%	-5.5

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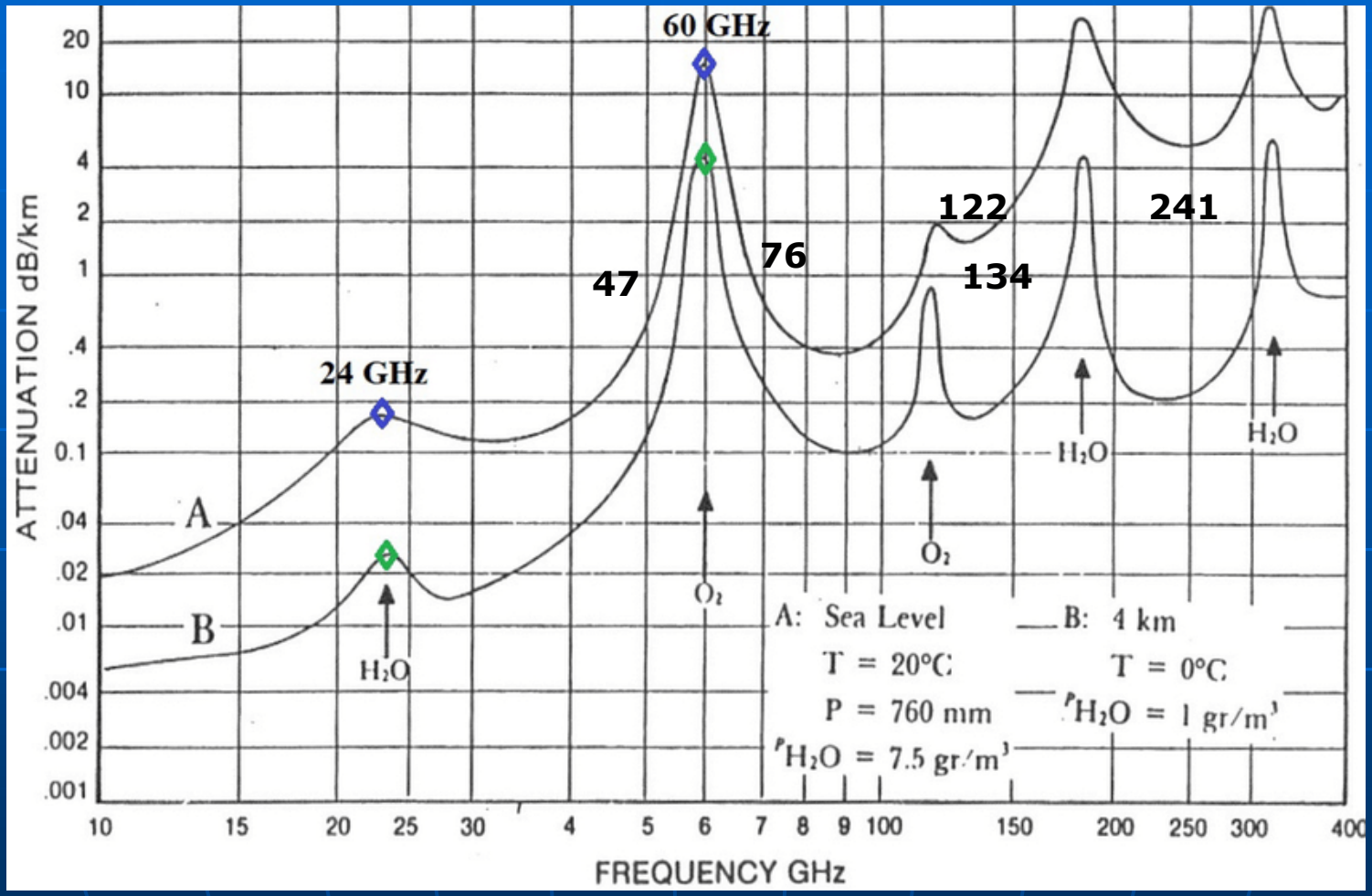
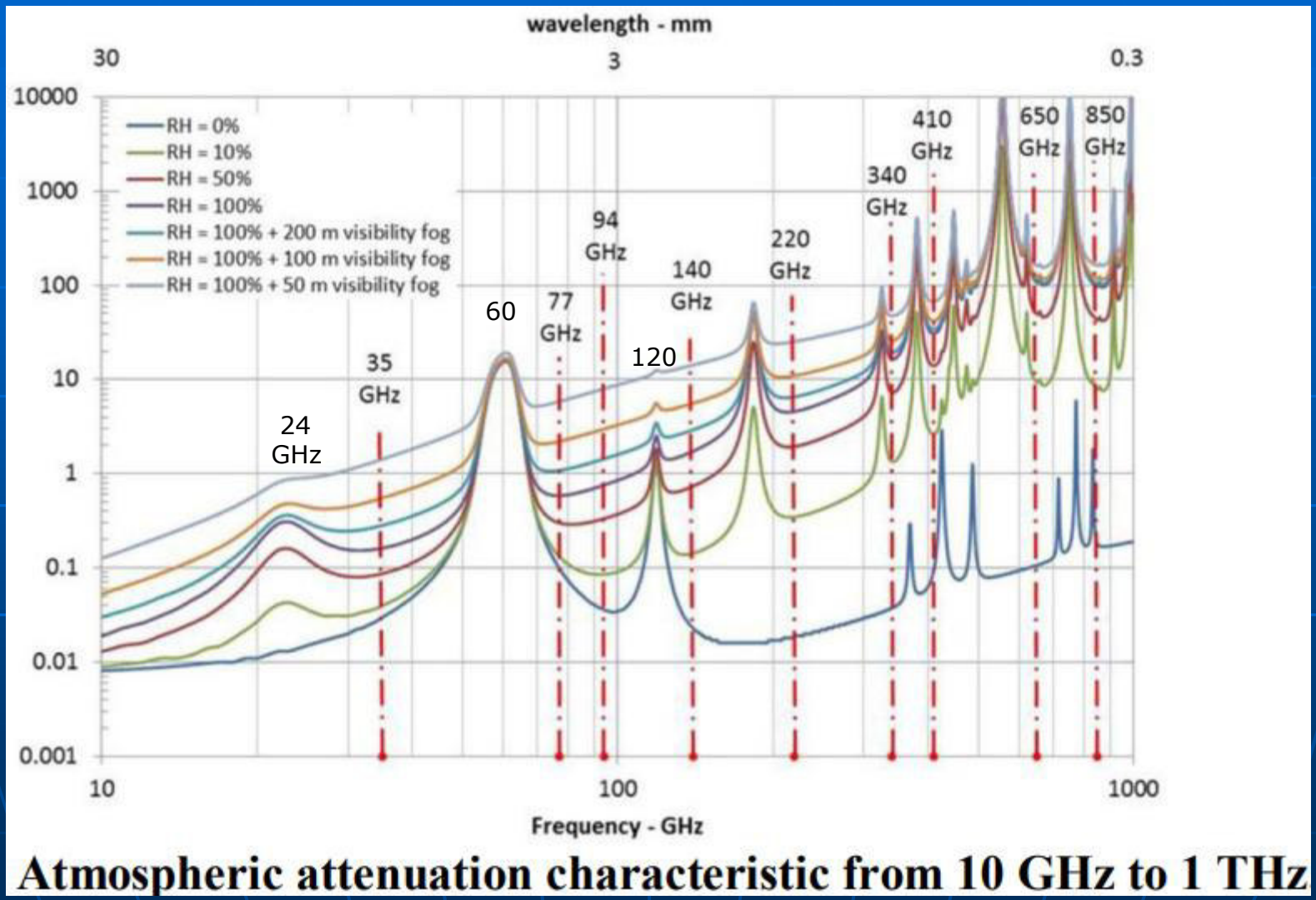
Information herein subject to change without notice or obligation

Operating Frequencies

- 47GHz 47,088.200
- 76GHz 75,976.200 (76,032.200)
- 122GHz 122,400 (122.256)
- 134GHz 134,400


60 GHz
24 GHz
47
76
122
134
241
A
B
O_2
O_2
H_2O
H_2O
H_2O
A: Sea Level
T = 20°C
P = 760 mm
ρH_2O = 7.5 gr/m³
B: 4 km
T = 0°C
ρH_2O = 1 gr/m³
ATTENUATION dB/km
20
10
4
2
1
.4
.2
0.1
.04
.02
.01
.004
.002
.001
10
15
20
25
30
4
5
6
7
8
9
100
150
200
250
300
400
FREQUENCY GHz

Atmospheric Loss dB/km



Atmospheric attenuation characteristic from 10 GHz to 1 THz