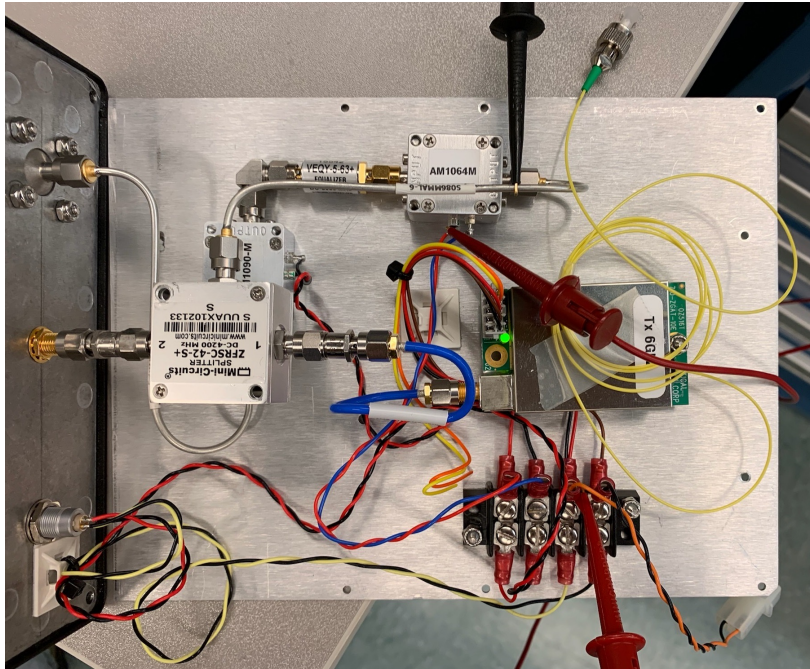
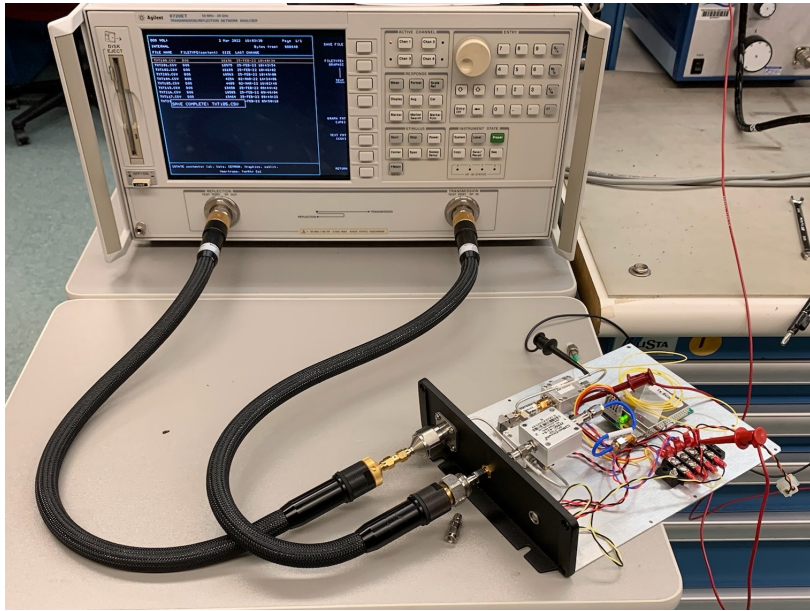


# A2-IF1 Test Results of 0-to-4 GHz Low-IF Subsystem

2022-08-30

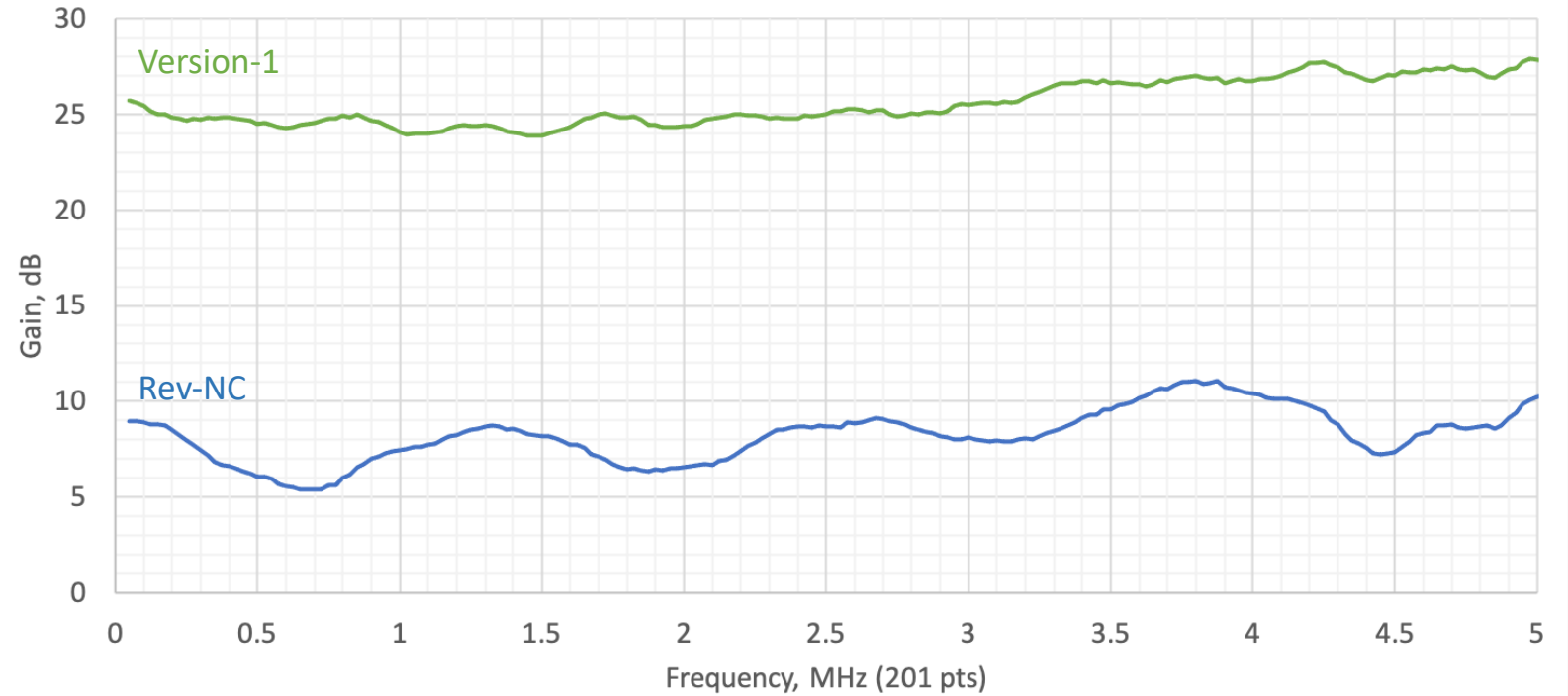
D. Kubo, R. Chilson, P. Yamaguchi



2022-03-02

### Low-IF Transmitter, Input to FPTP Output

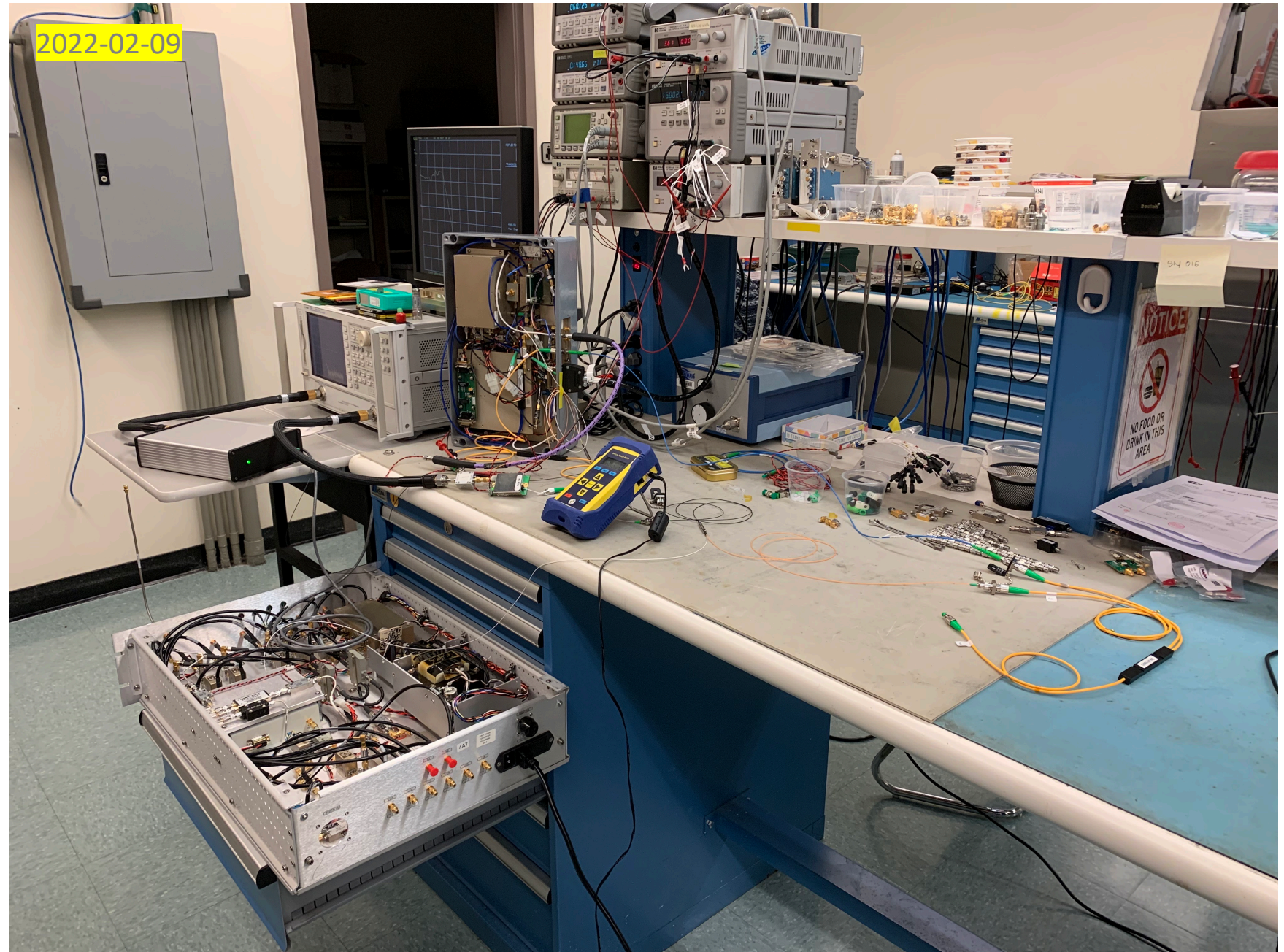
— Input to FPTP, Stock — Input to FPTP, V1



- Added 2nd amplifier to accommodate lower than expected input power (-50 dBm) from receiver. (green trace)
- Front Panel Auxiliary output represents signal into Optical Zonu transmitter
  - Plan to digitize this Aux output in the future

## VNA Tests in Lab:

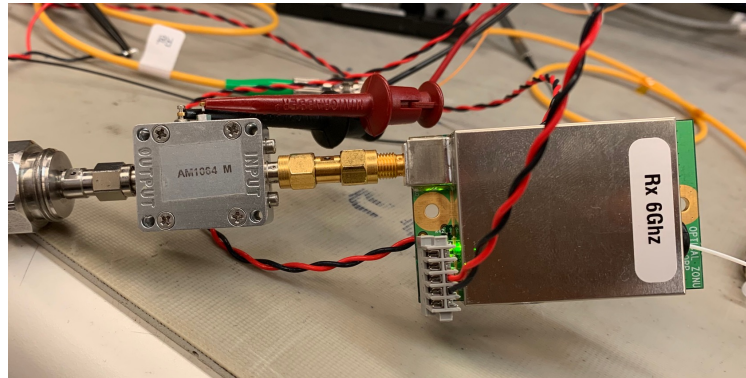
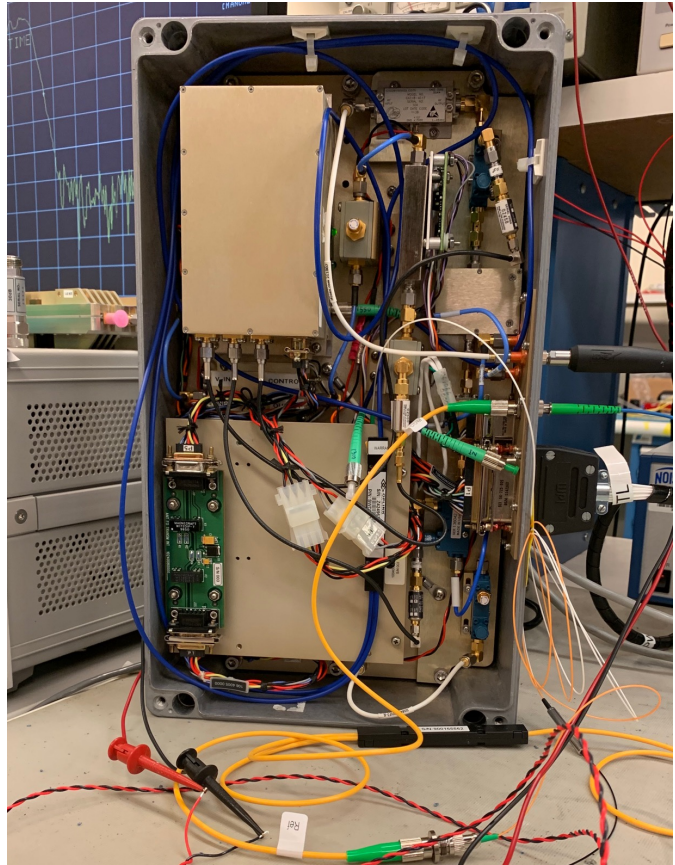
- Conducted with Transmitter rev-NC (single gain stage)
- Added CWDM filters into Ant-IF and C1DC
  - Ortel FOTx/Rx supports existing 4-16 GHz operates at 1310 nm
  - Optical Zonu FOTx/Rx supports new 0-4 GHz operates at 1290 nm
- Measured S21 for 4-16 GHz and 0-4 GHz paths
- Measured S21 cross-talk isolation between to separate channels





### Final Test Data Sheet

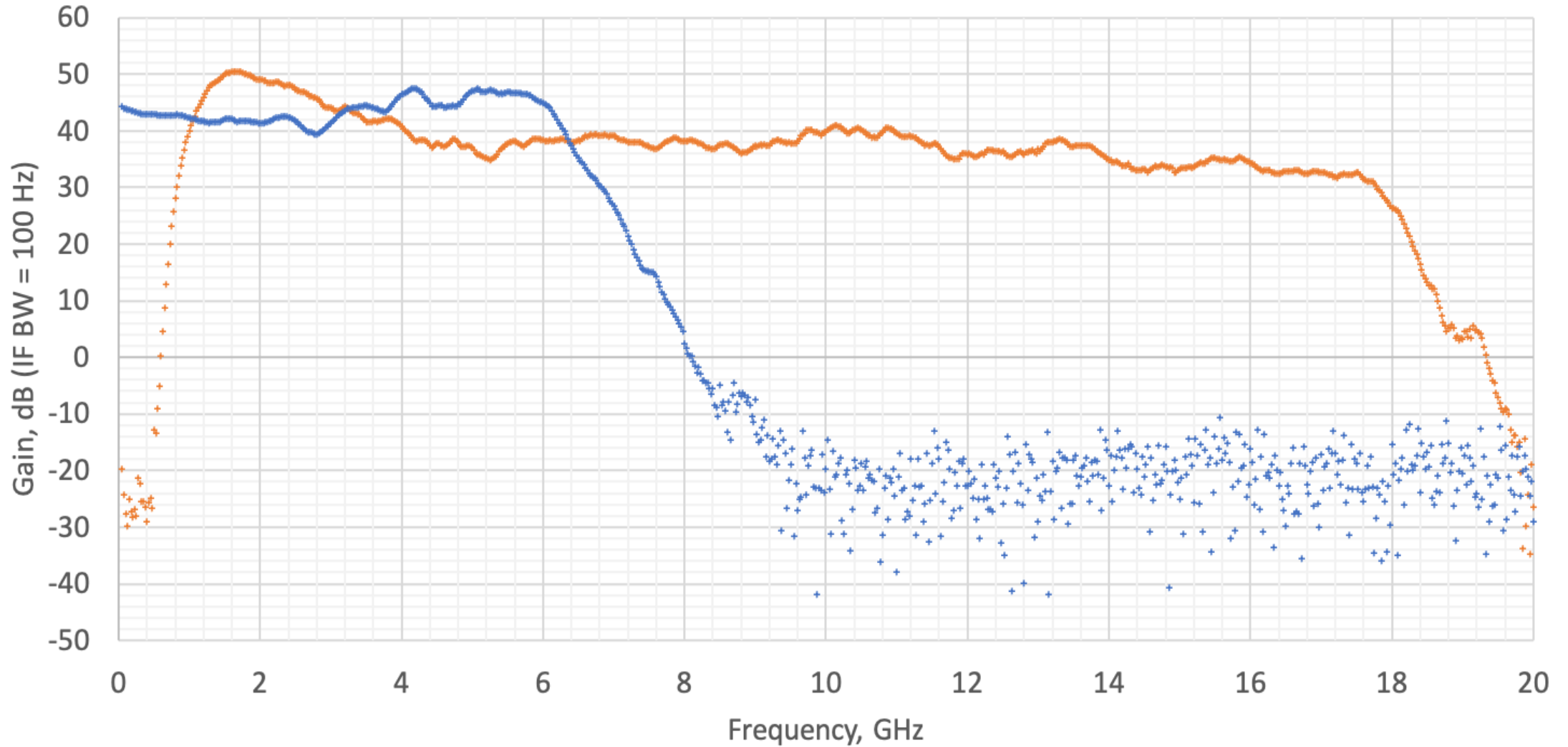
Name:	3 Port CWDM 1330 Device		Part Number:	NA
Order:	NA		Serial Number:	CWDM-1330-01
			<b>Test Results</b>	
Wavelength (nm)			1260-1620	
Channel Wavelength(nm)			1330	
Channel Spacing(nm)			20	
Pass Band(nm)			ITU±6.5	
Band Wavelength Range(nm)			1260-1620 except Channel Pass Band	
Insertion Loss Factor (dB)	Within Pass Band		0.38	
	Within Reflection Band		0.52	
Isolation (dB)	Adjacent Channel		≥30	
	Non-Adjacent Channel		≥40	
	Reflection Channel@Pass Band		≤13	
Out of Band Channel Pass Band(dB)			≤0.3	
Wavelength Dependent Loss(dB)			≤0.1	
Group Delay Dispersion(ps)			≤0.1	
Return Loss (dB)			≥50	
Reflection Loss (dB)			≥45	
Fiber Type			SMF-28e+ fiber,900um loose tube	
Connector Type			FC/APC	
Length(cm)			100±10/-0 For All Ports	
Power Handling (mW)			300	
Operating Temperature (°C)			-5~+70	
Storage Temperature (°C)			-40~+85	
Dimensions (mm)			ø5.5x38	



2022-02-10

### Low-band and High-band Responses (VNA measurement)

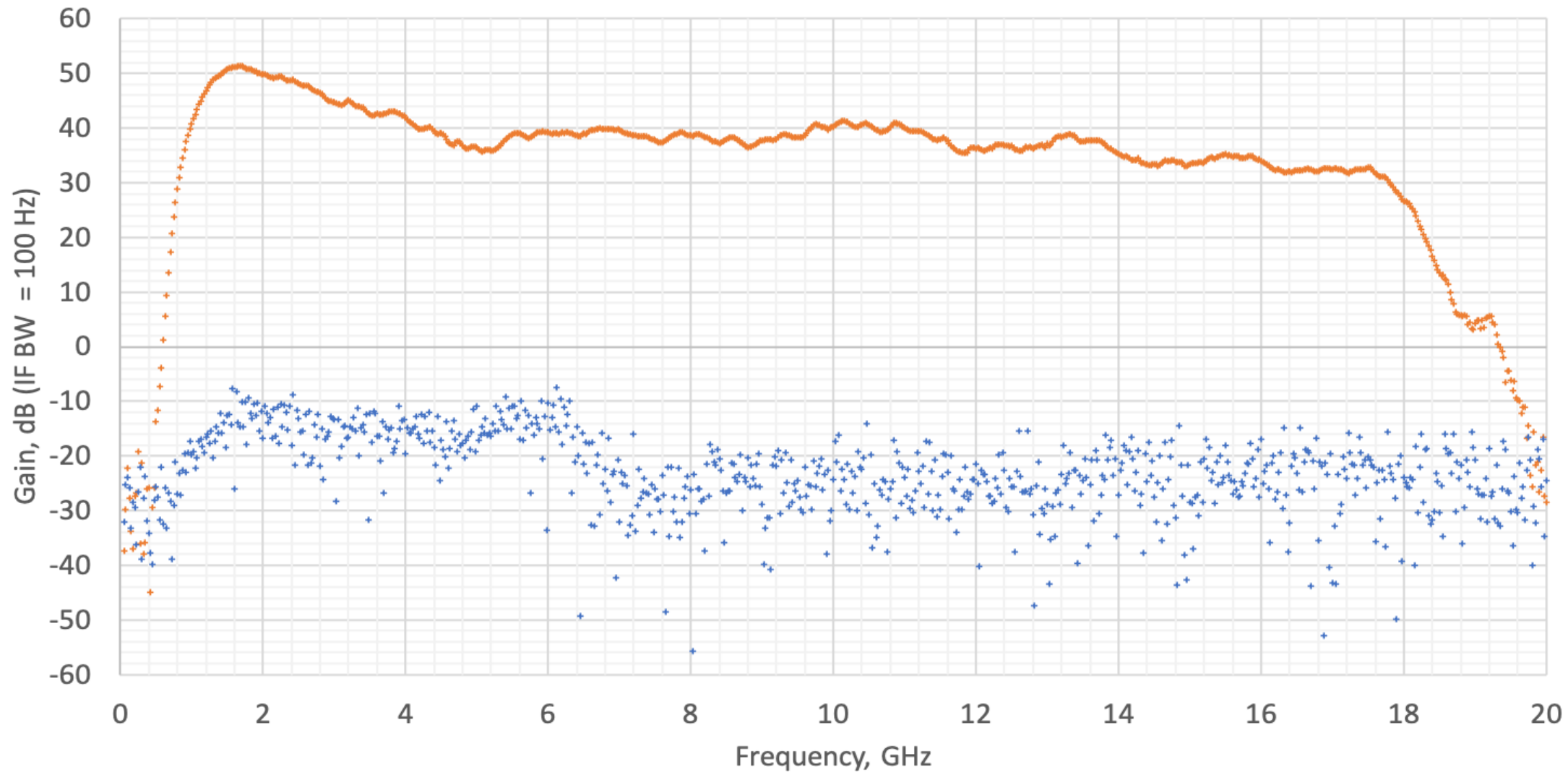
+ Ant-IF to C1DC      + Optical Transmitter Assy to OZ-516 Rx + AM1064



2022-02-10

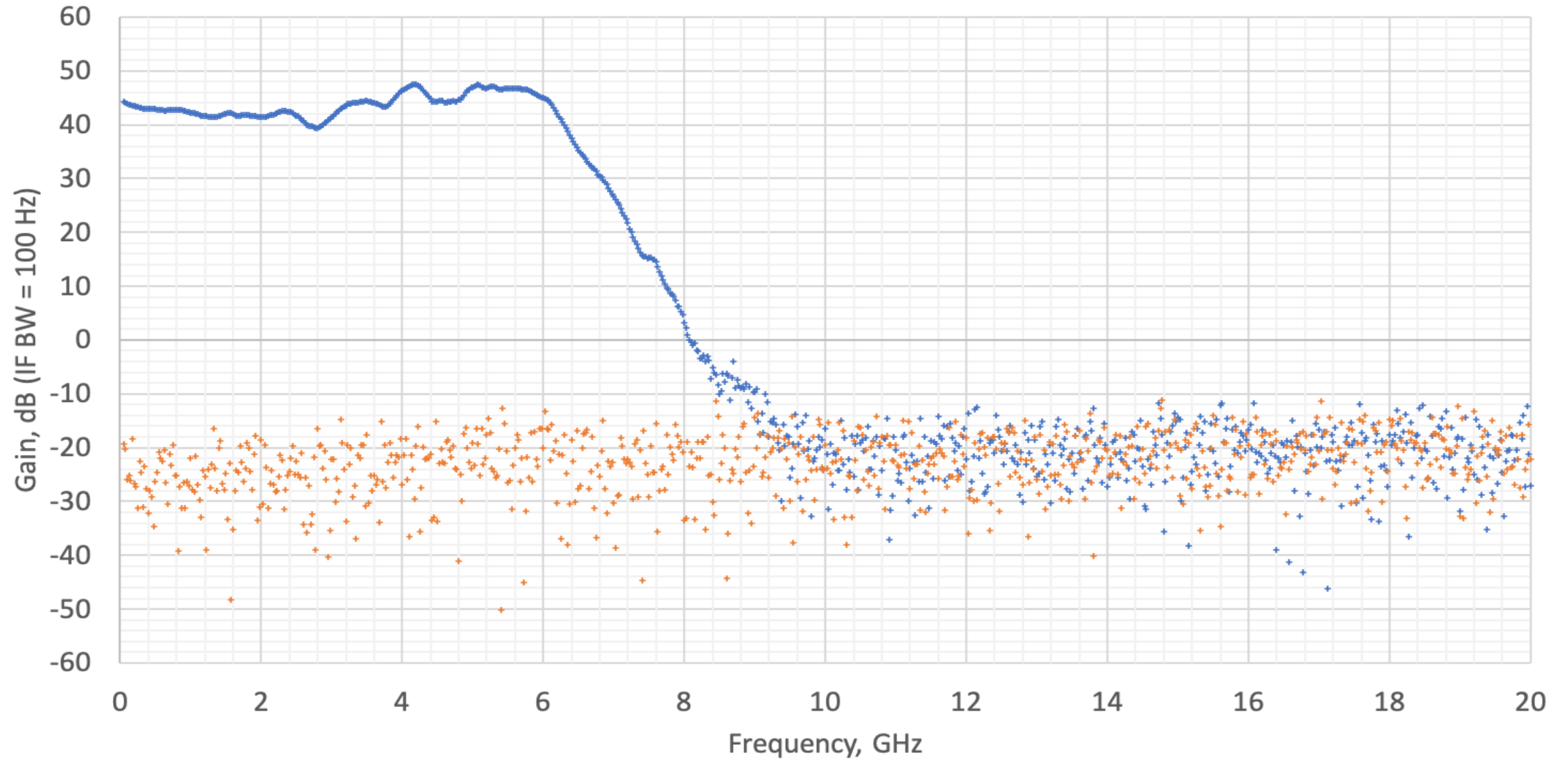
### Low-band to High-band Leakage (VNA Measurement)

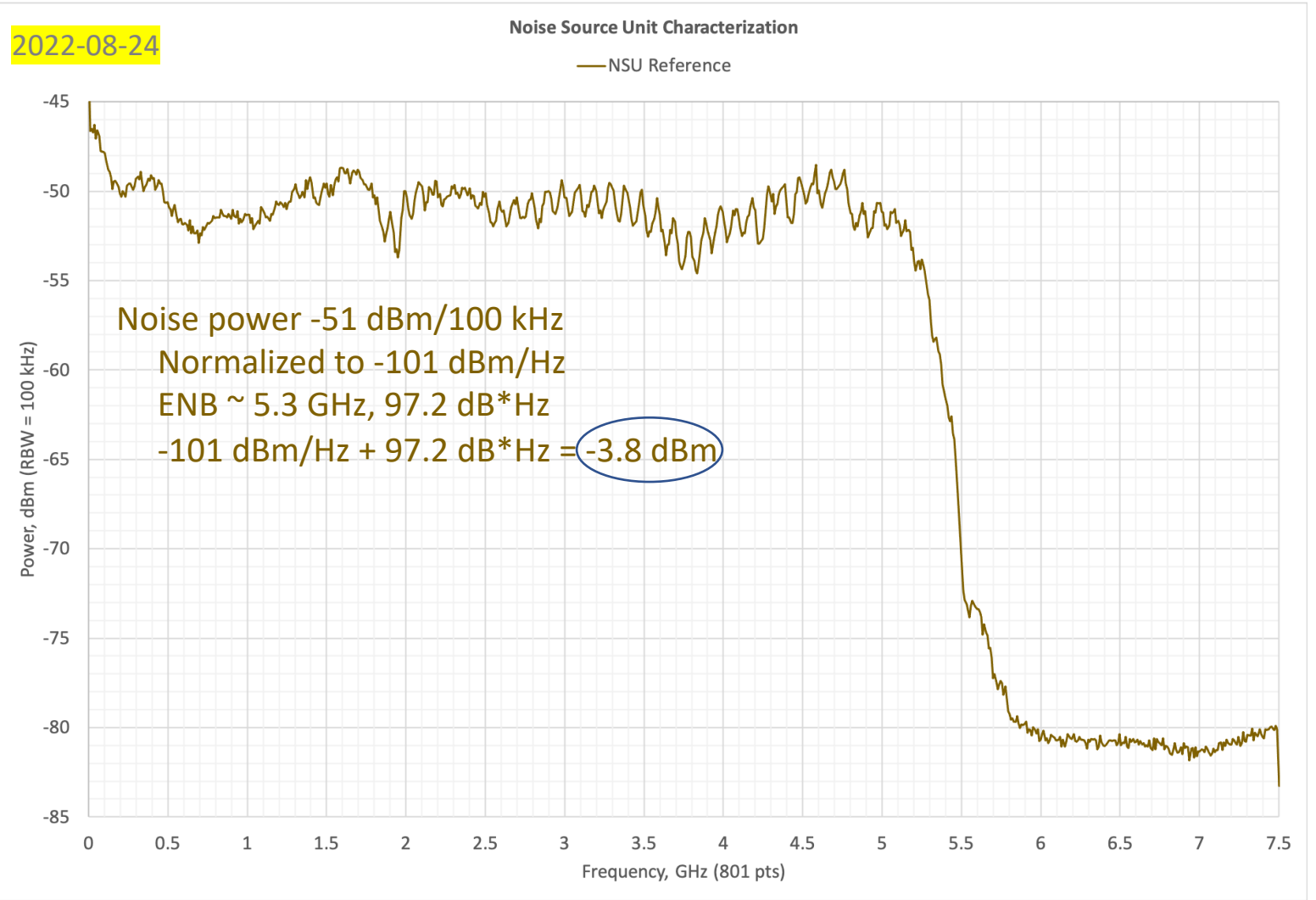
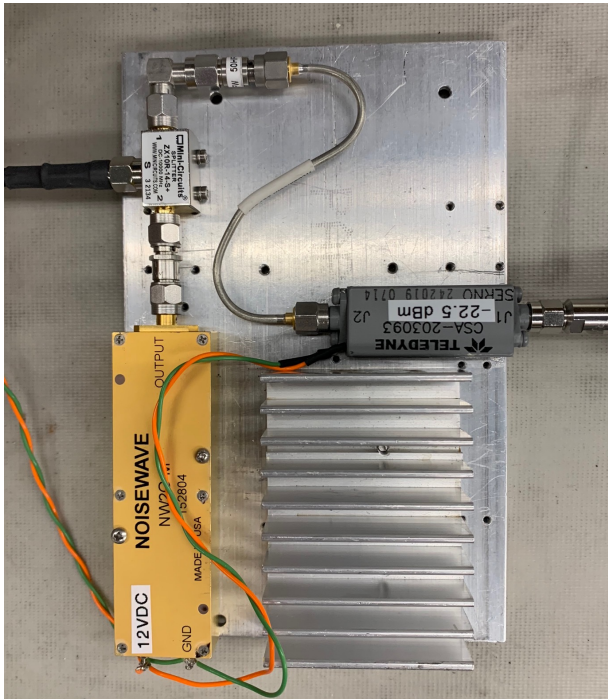
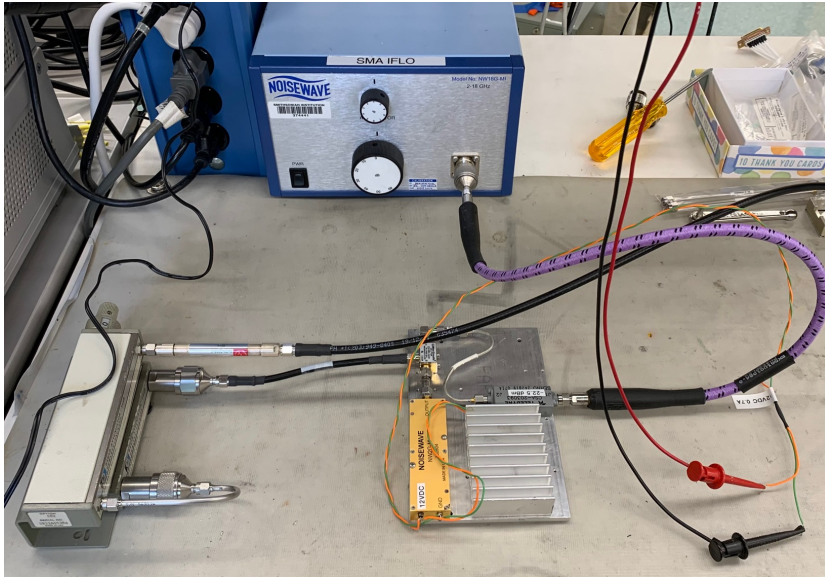
• In High-band, Out High-band    • In Low-band, Out High-band



### VNA High-band to Low-band Leakage (VNA Measurement)

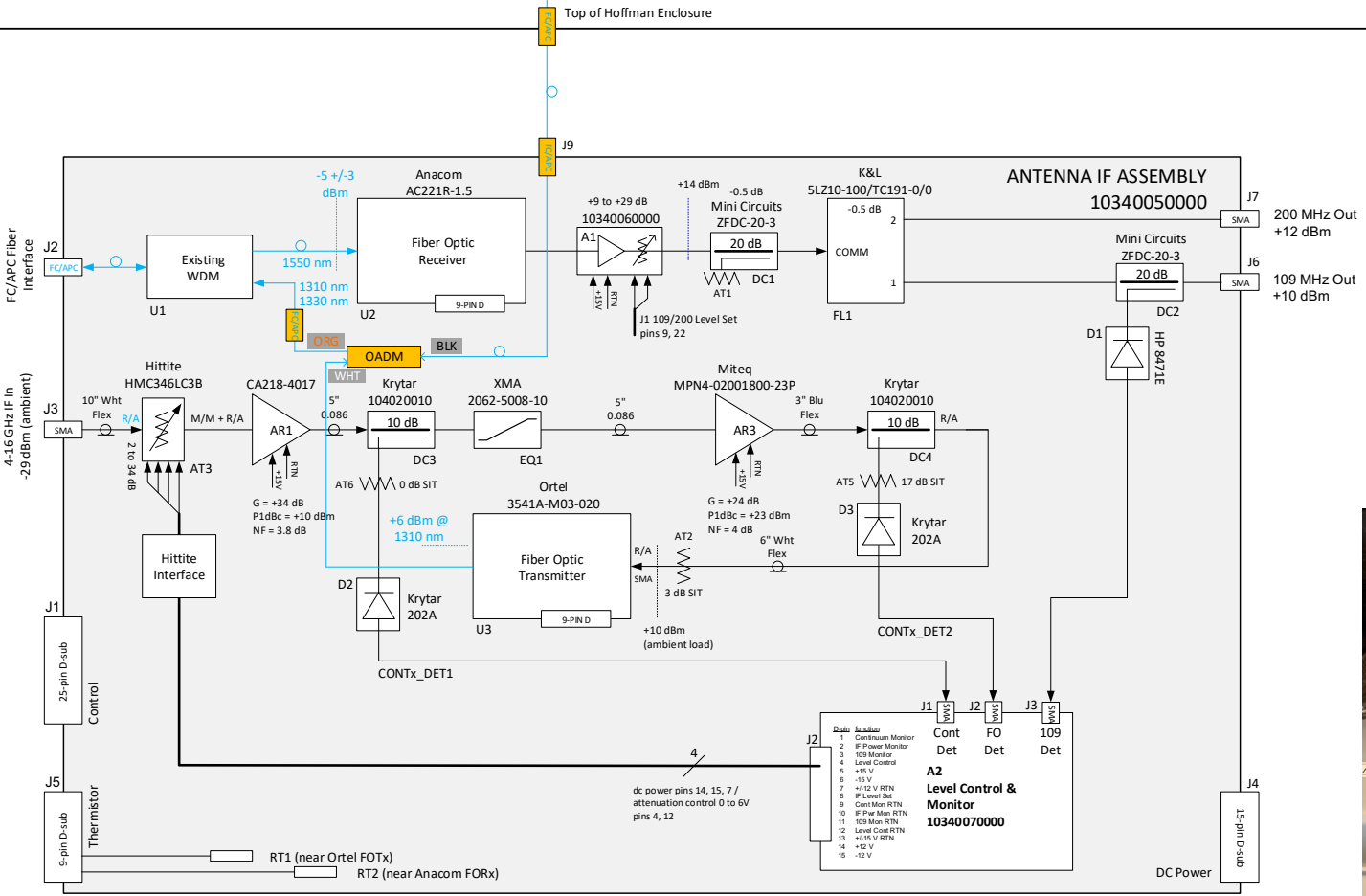
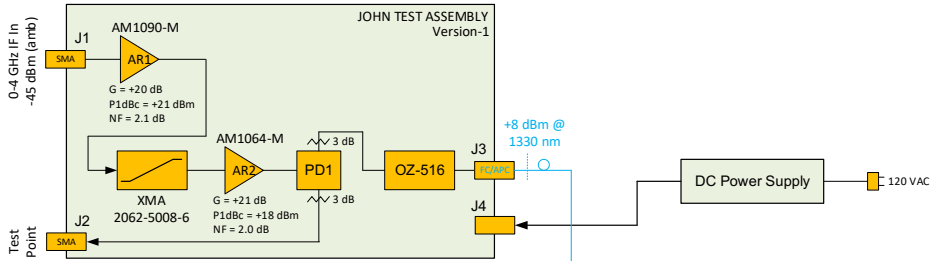
+ In Low-band, Out Low-band    + In High-band, Out Low-band



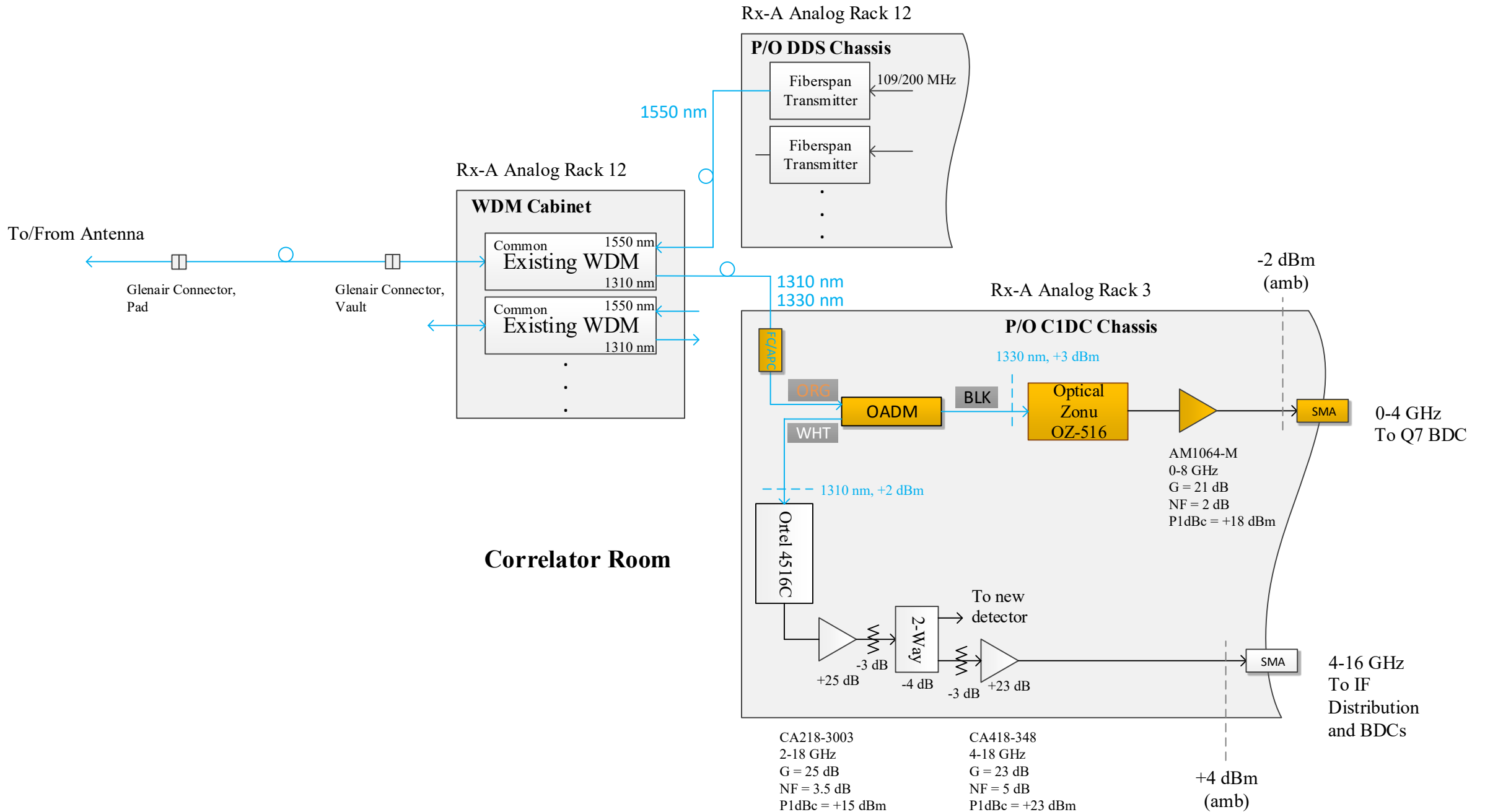


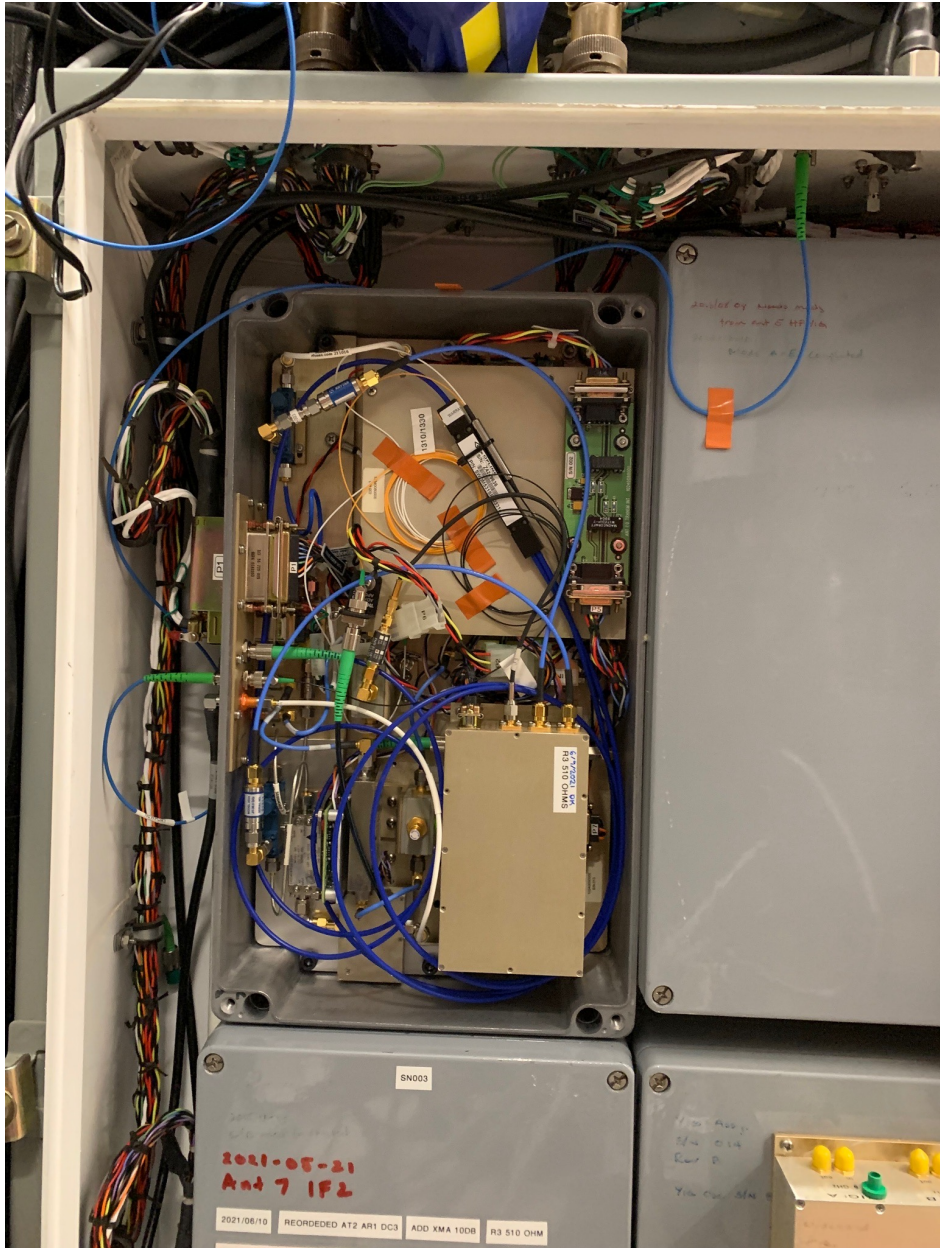
Step atten = 0 dB, measure -2.6 dBm with power meter





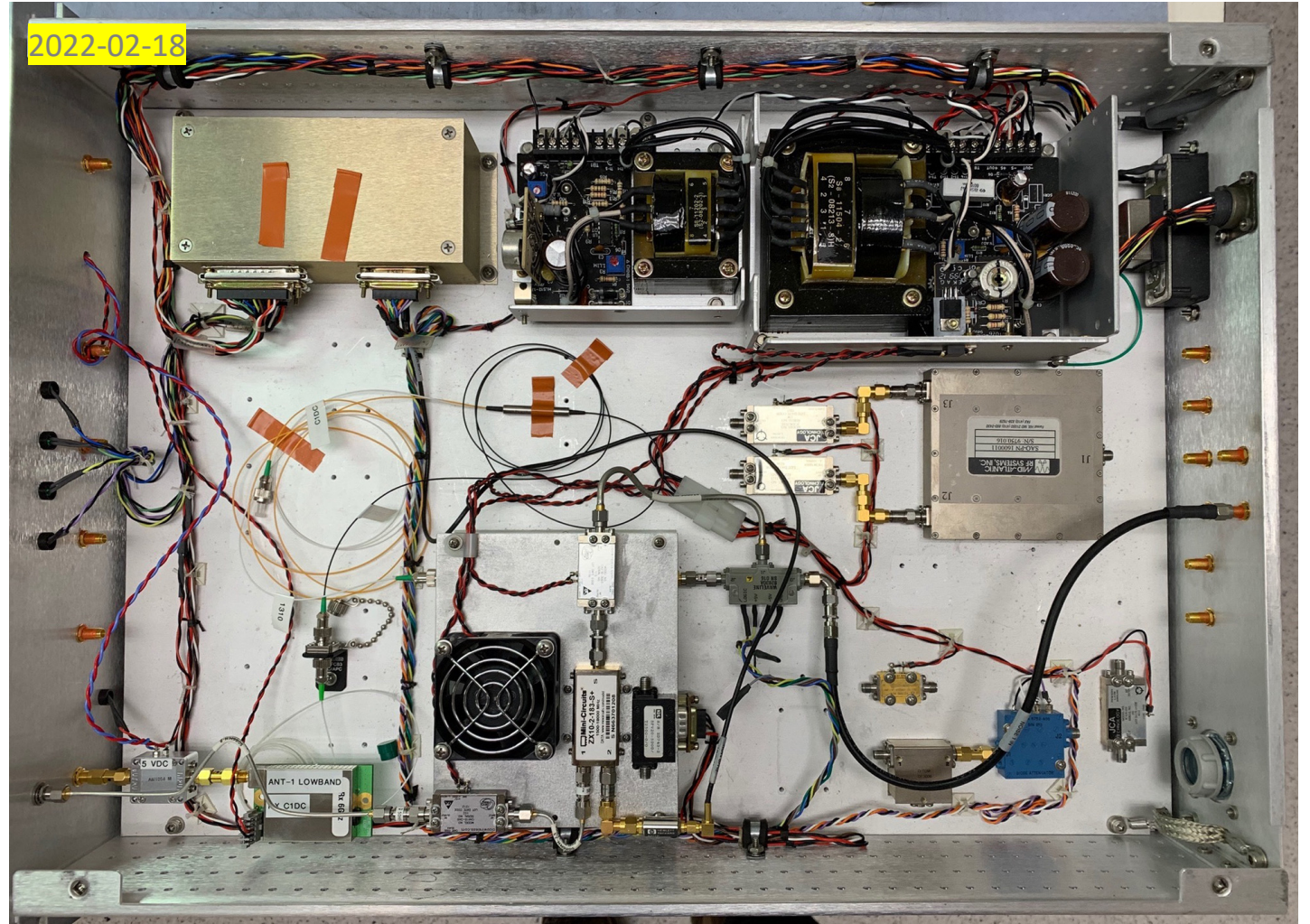
2022-08-30  
D. Kubo/J. Test  
Fname = Ant-IF Low-band





Antenna-IF with CWDM filter installed

8/30/22



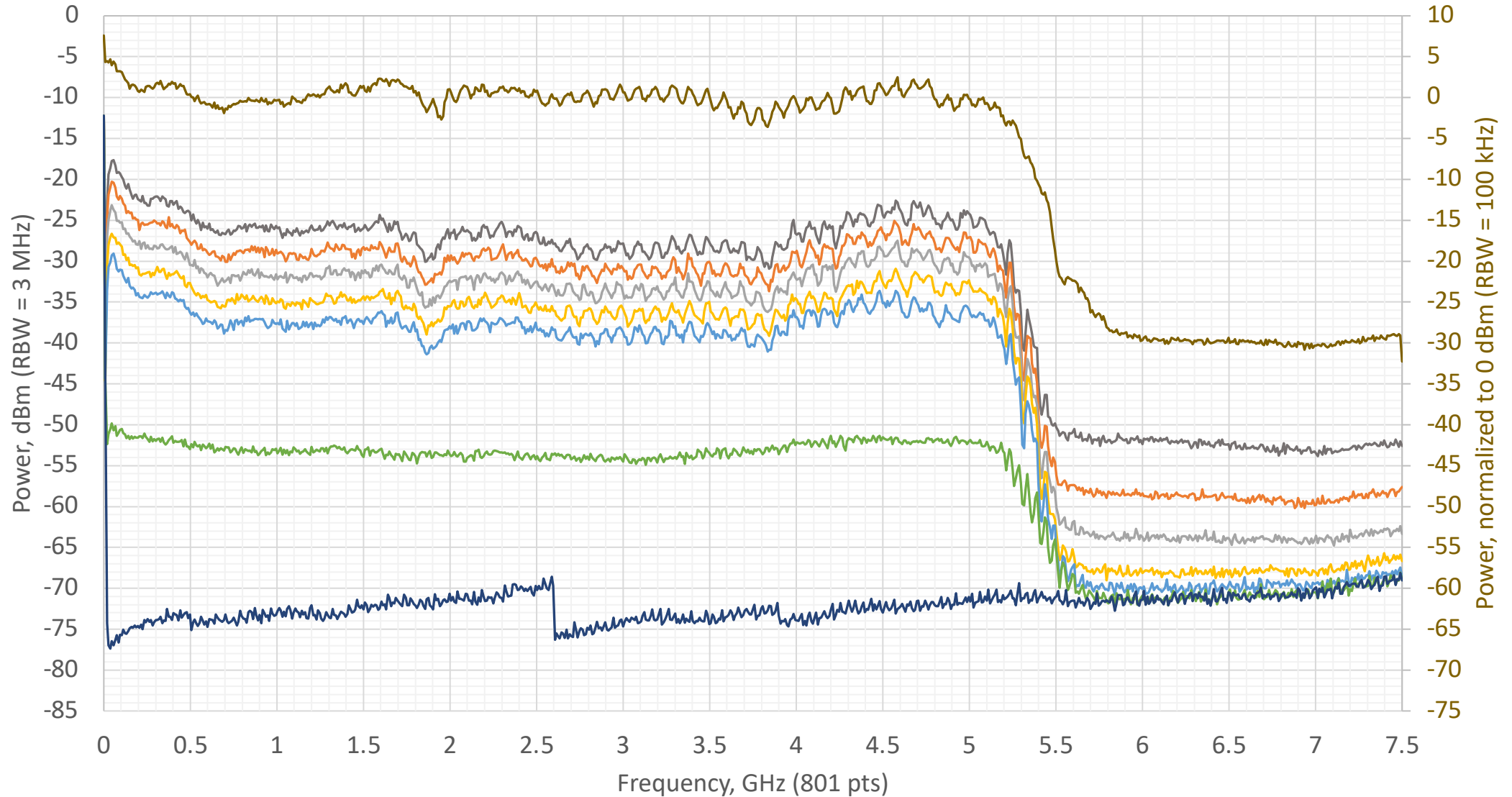
C1DC with Optical Zonu receiver + AM1064-M amp

Low-IF Design

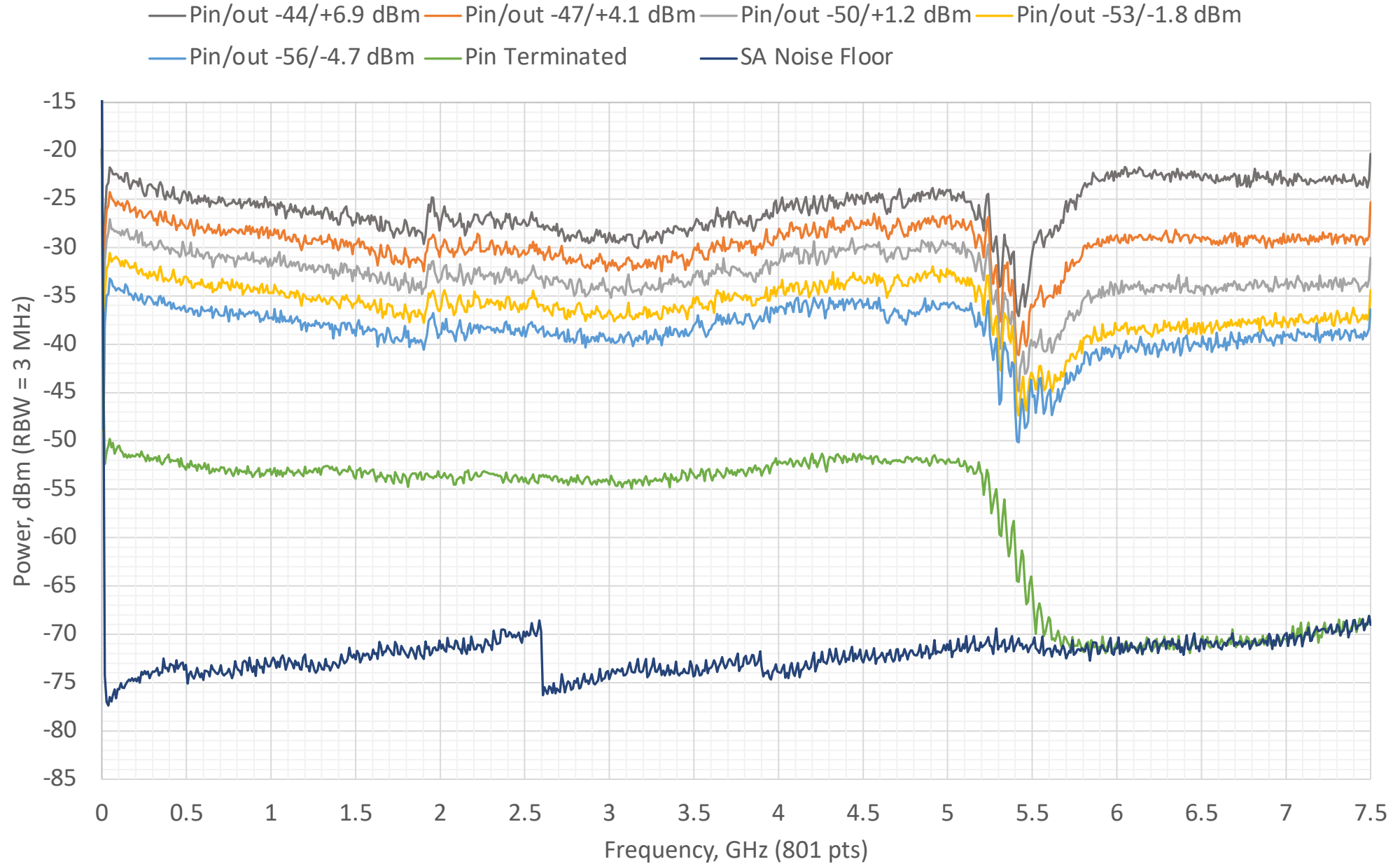
Slide 11 of 14

# 2022-08-24 A2-IF1 Low IF Characterization

— Pin/out -44/+6.9 dBm    2.8 dB    Pin/out -47/+4.1 dBm    2.9 dB    Pin/out -50/+1.2 dBm    3.0 dB    Pin/out -53/-1.8 dBm    2.9 dB    Delta  
— Pin/out -56/-4.7 dBm    Pin Terminated    SA Noise Floor    NSU Reference



### 2022-08-24 A2-IF1 Low IF Characterization



## SUMMARY & RECOMMENDATIONS

- Addition of 2<sup>nd</sup> amplifier in transmitter assembly now accommodates low level input down to -53 dBm (0-5 GHz) and still maintain > 15 dB SNR

Input Level	0.1 GHz	1 GHz	2 GHz	3 GHz	4 GHz
-44 dBm	31 dB	27 dB	27 dB	26 dB	25 dB
-47 dBm	29 dB	24 dB	23 dB	23 dB	22 dB
-50 dBm	26 dB	21 dB	21 dB	21 dB	20 dB
-53 dBm	23 dB	18 dB	19 dB	18 dB	17 dB
-56 dBm	20 dB	15 dB	16 dB	15 dB	15 dB

- See about 0.2 dB of compression at -44 dBm input
- Change order of AM amplifiers in JT Transmitter assembly to AM1064 first and AM1090 second to take advantage of higher P1dBc and lower NF numbers
- Mini-Circuits resistive power divider is not well matched and is causing passband ripple, fix with better layout and larger matching pads (OK to lower gain by another 3 dB)
- Fix Noise Source Unit (NSU) ripple or purchase a 0 to 5 GHz unit