

# GroundCom (SME) HPA and

Tomas Gotthans, ~~Jakub Gotthans~~

29.7.2021



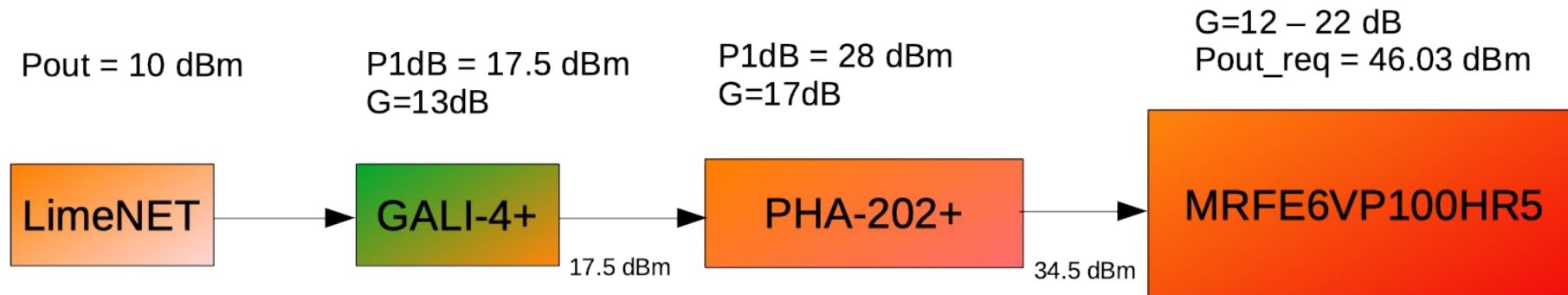
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# Groundcom HPA Requirements

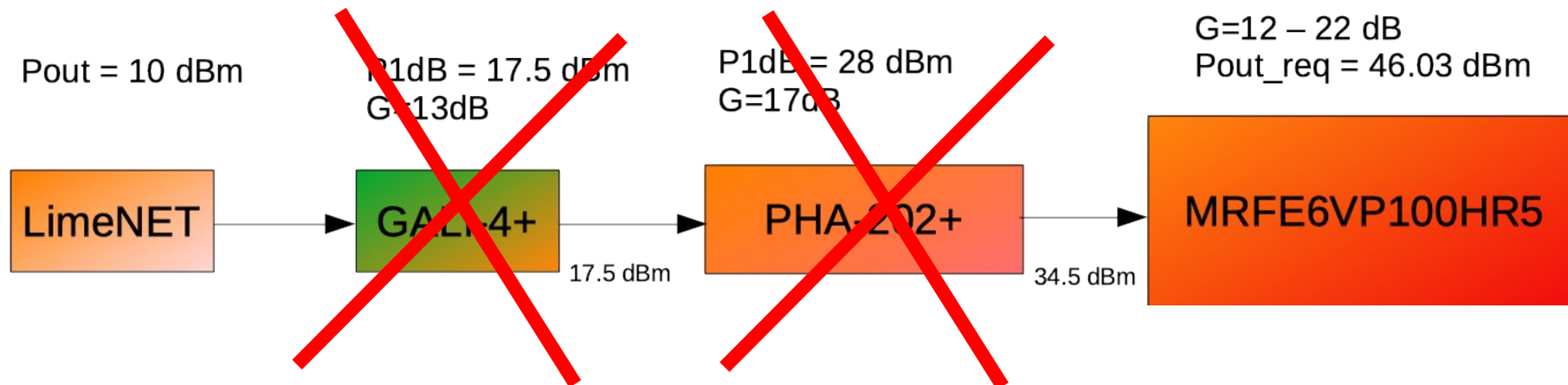
## Design HPA for VHF and UHF

Max. Tx power [W]	40W
RF bandwidth UHF	435-438 MHz
RF bandwidth VHF	144-146 MHz

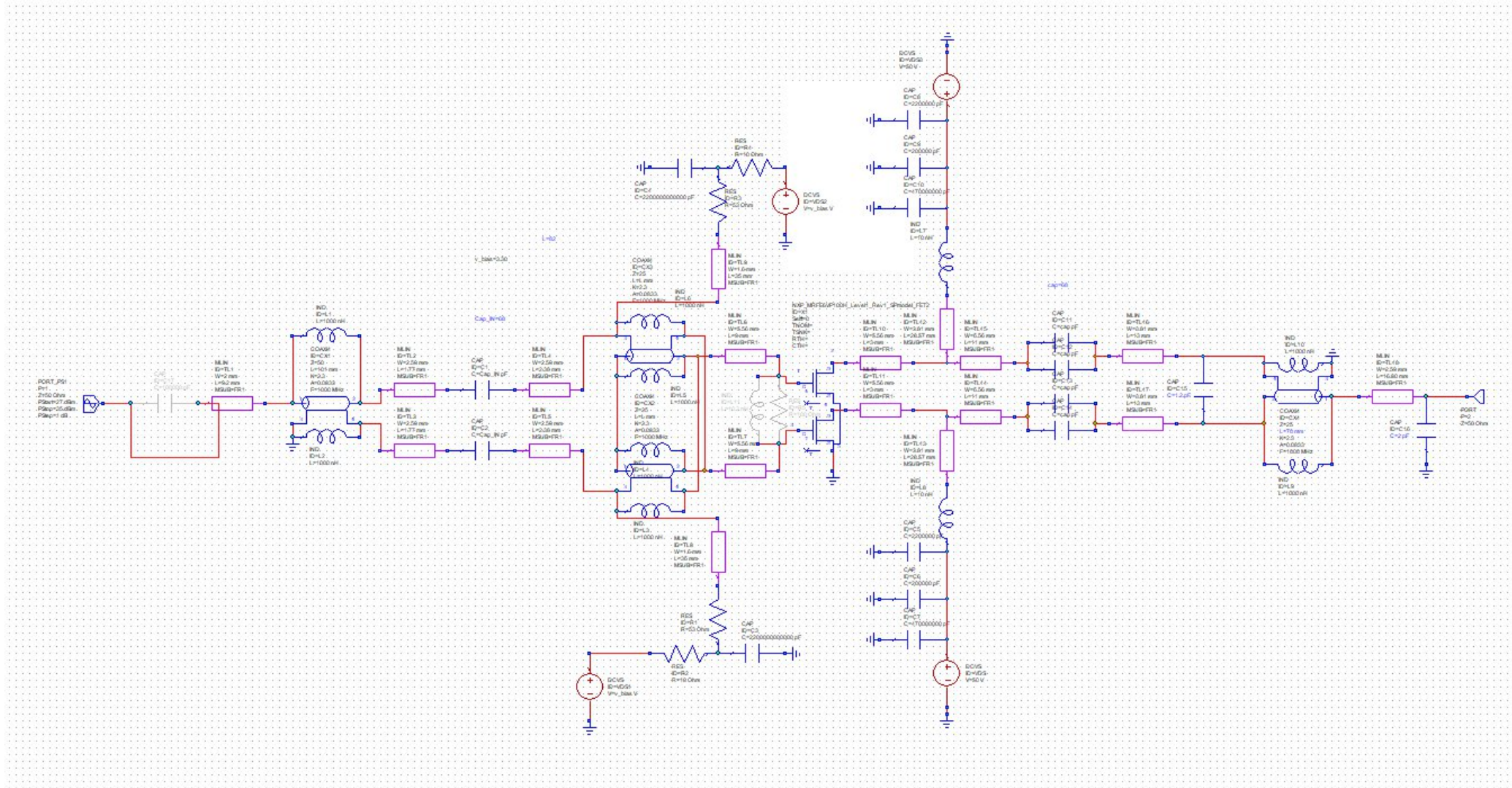


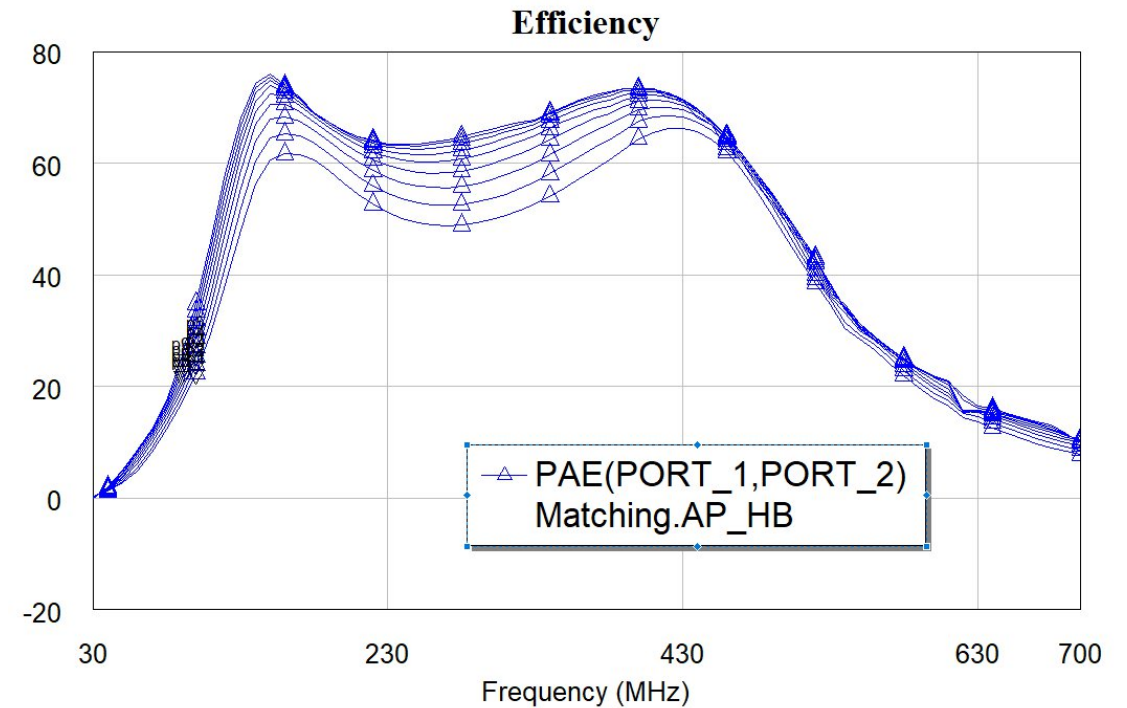
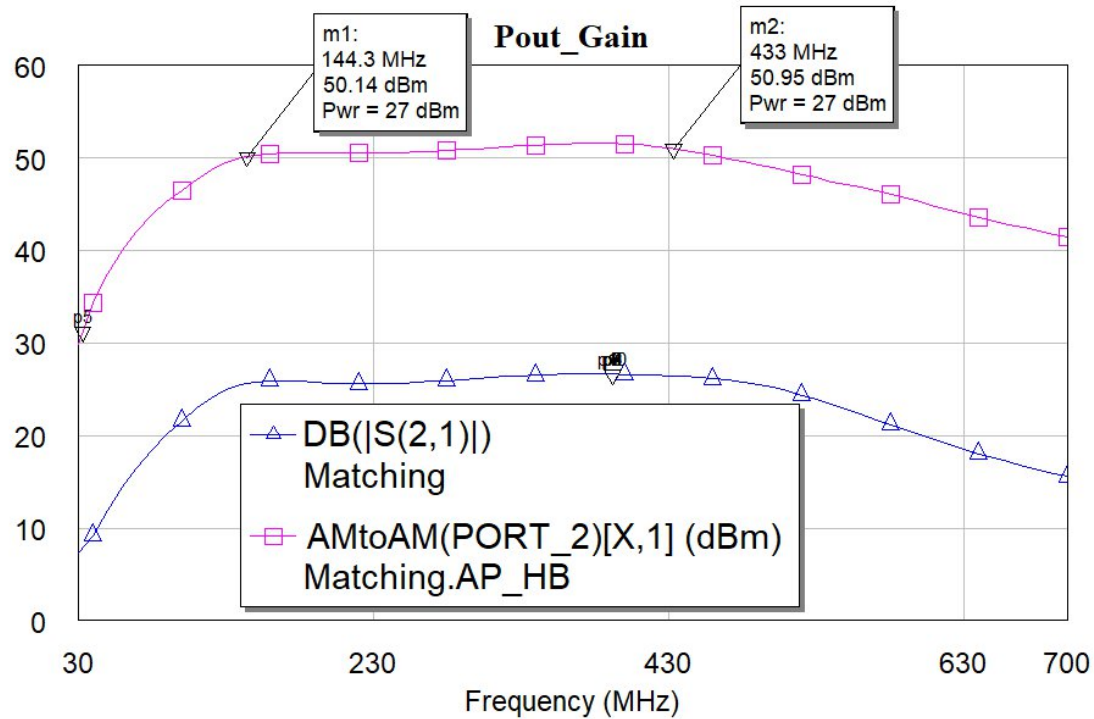
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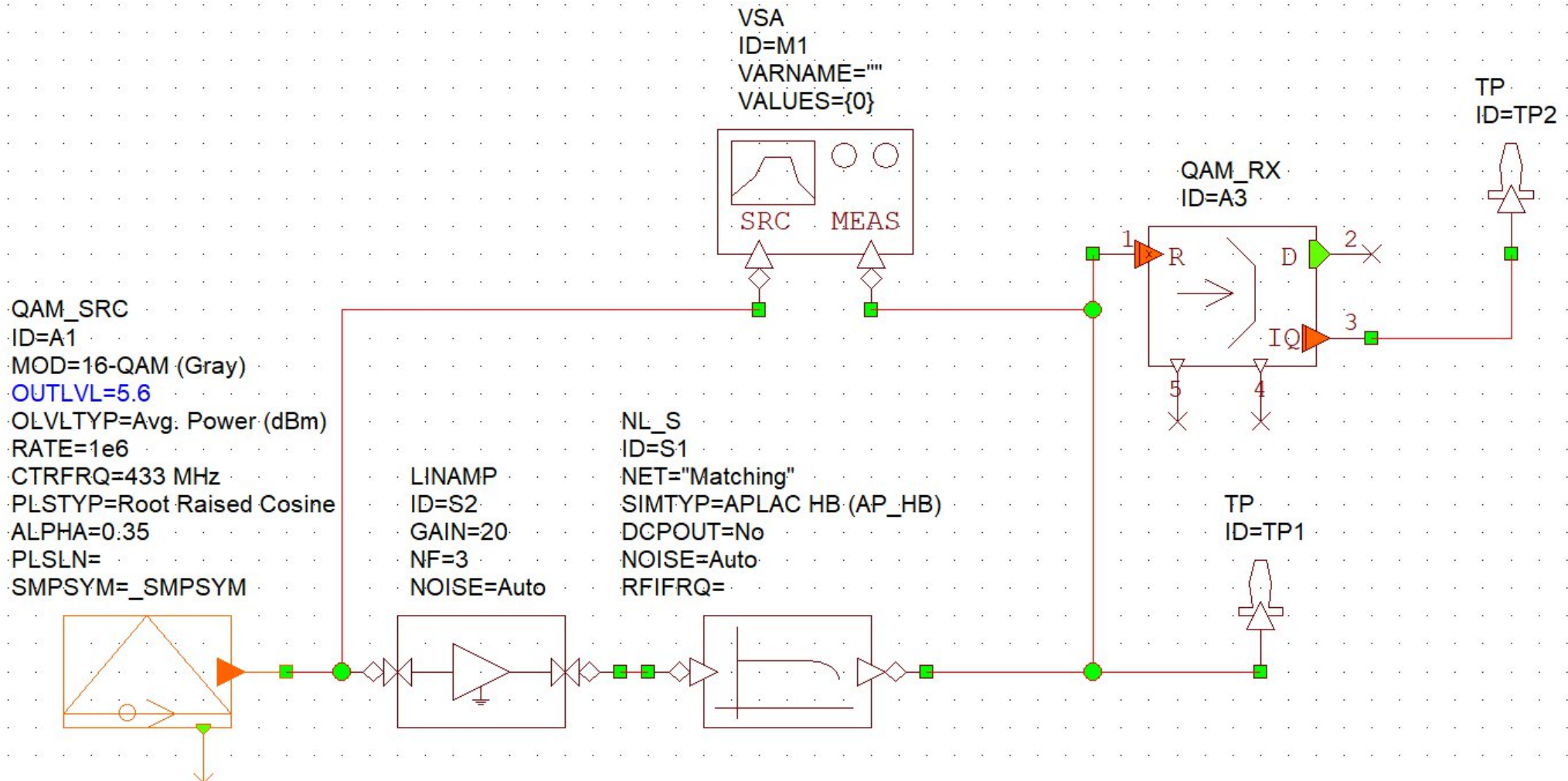


# HPA AWR Design



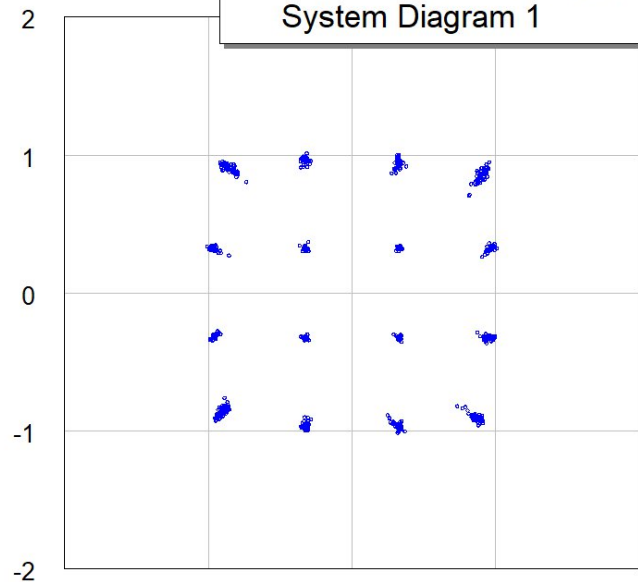


# HPA AWR Design



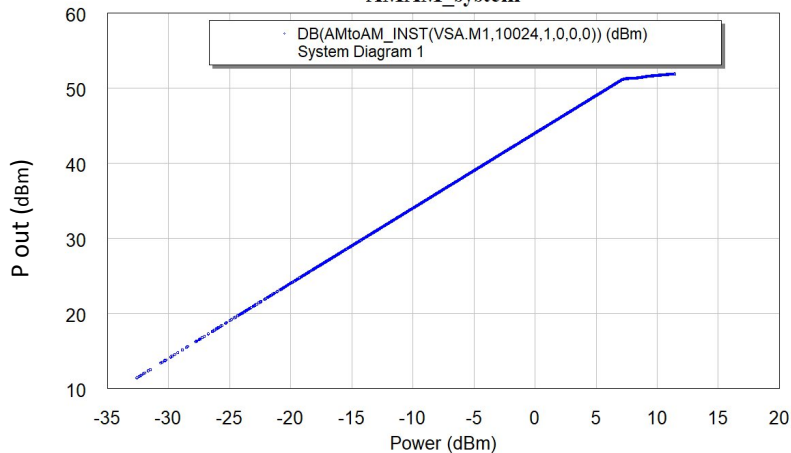
# HPA AWR Design

IQ(TP.TP2,1000,0,1,0,0,0)  
System Diagram 1

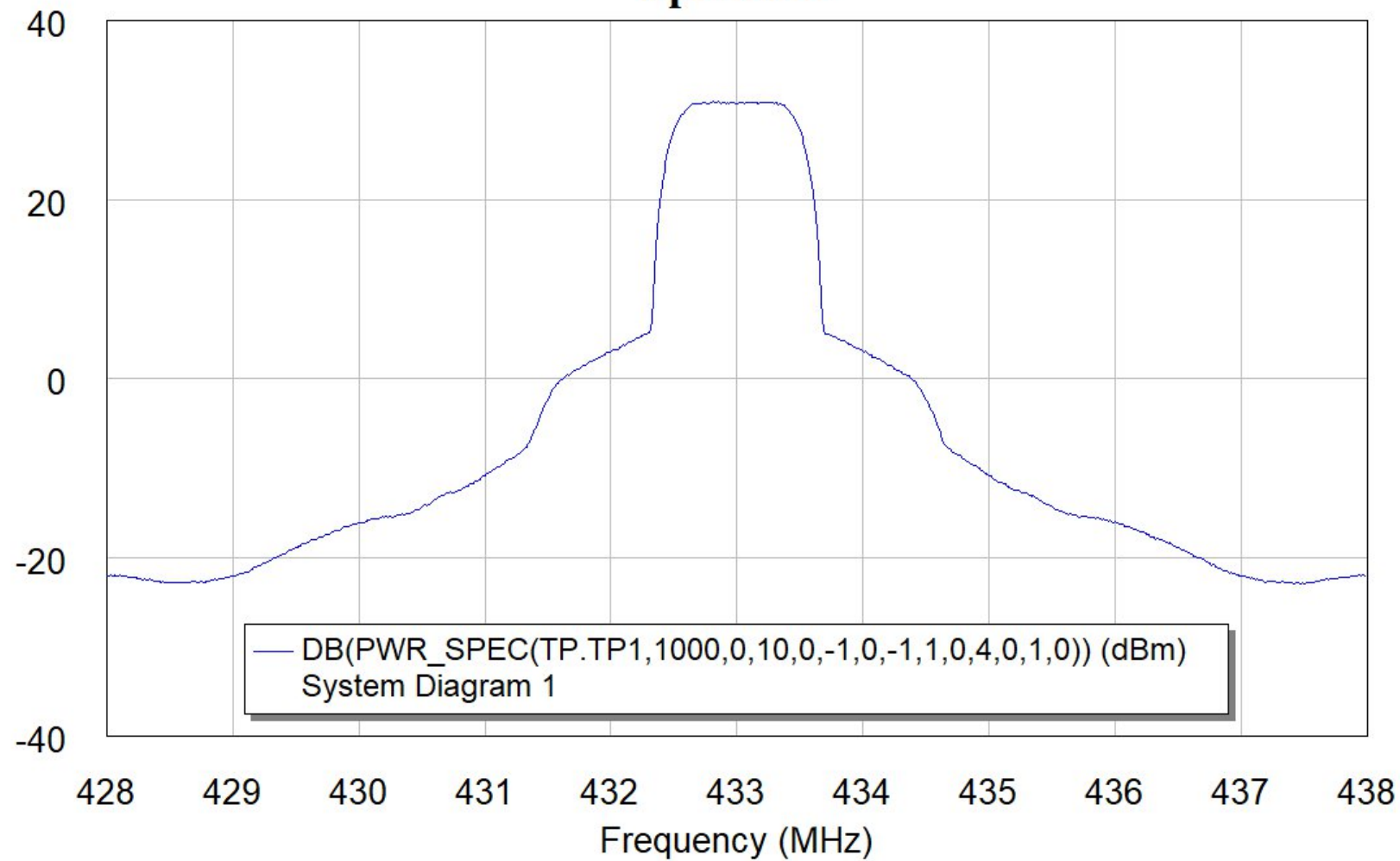


AMAM\_system

DB(AMtoAM\_INST(VSA.M1,10024,1,0,0,0)) (dBm)  
System Diagram 1

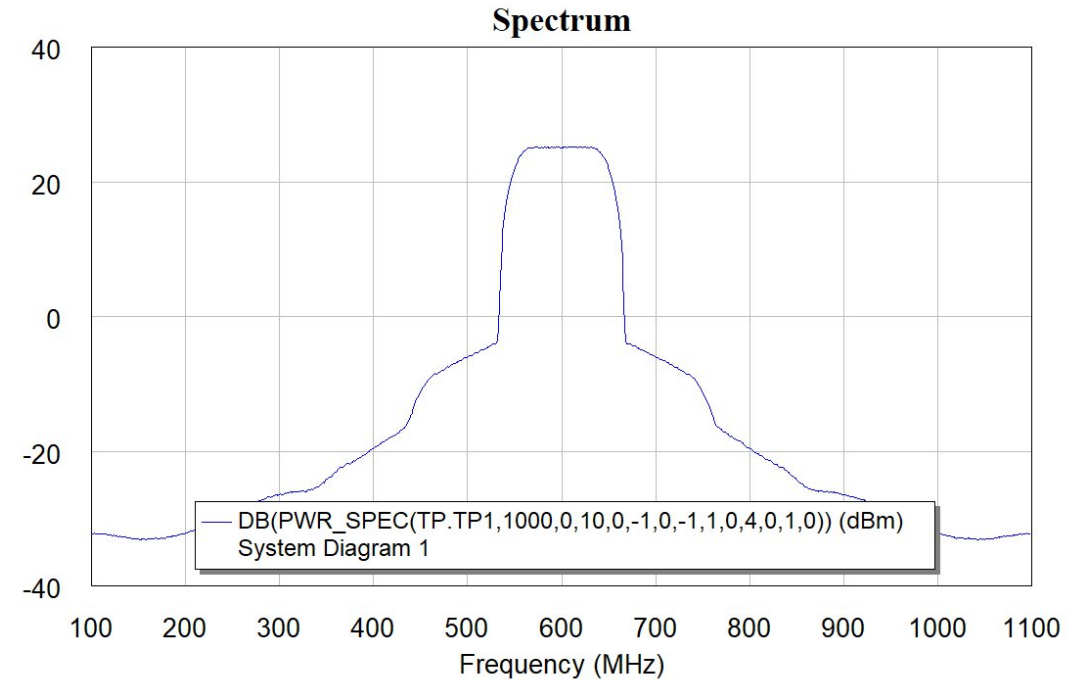
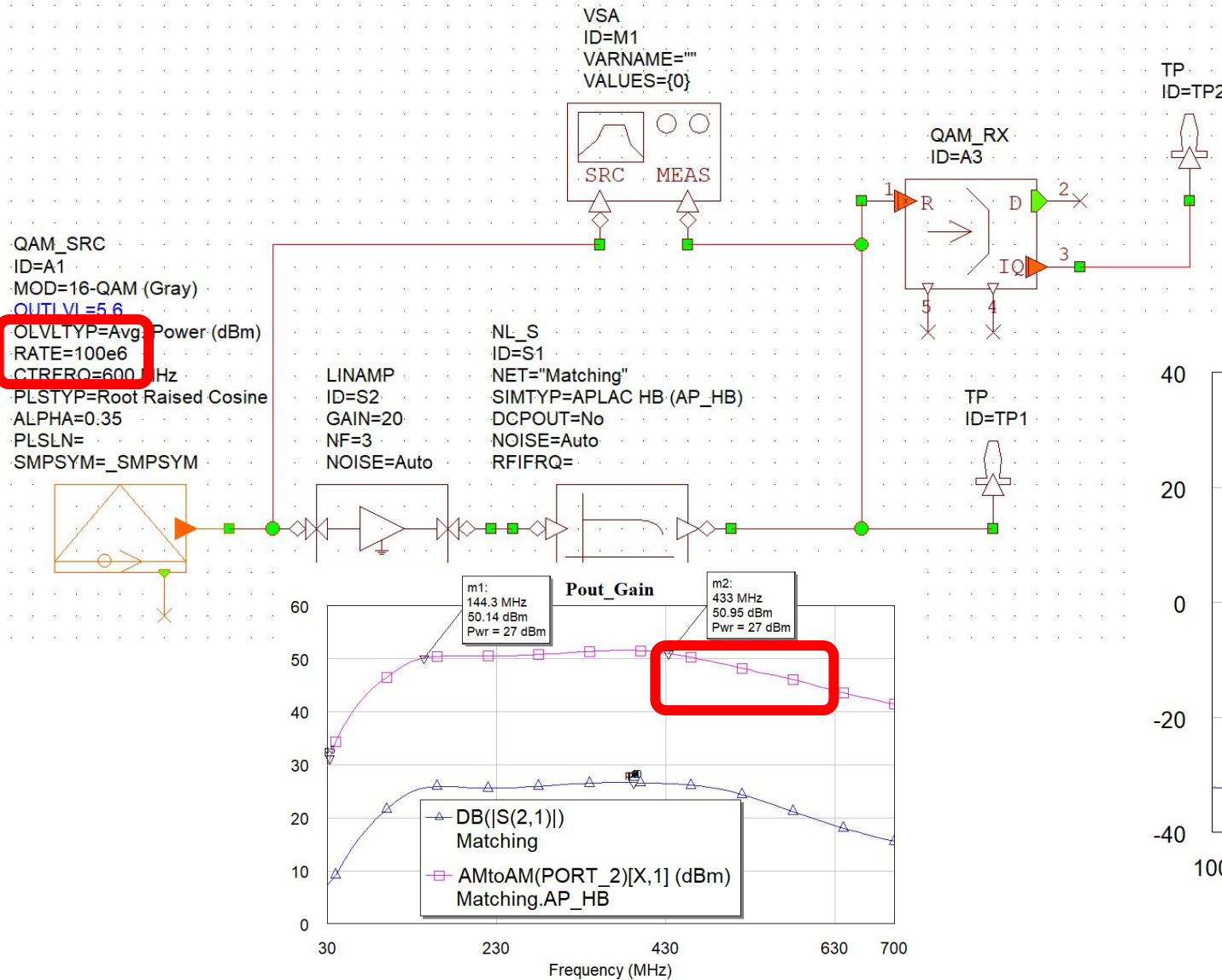


## Spectrum



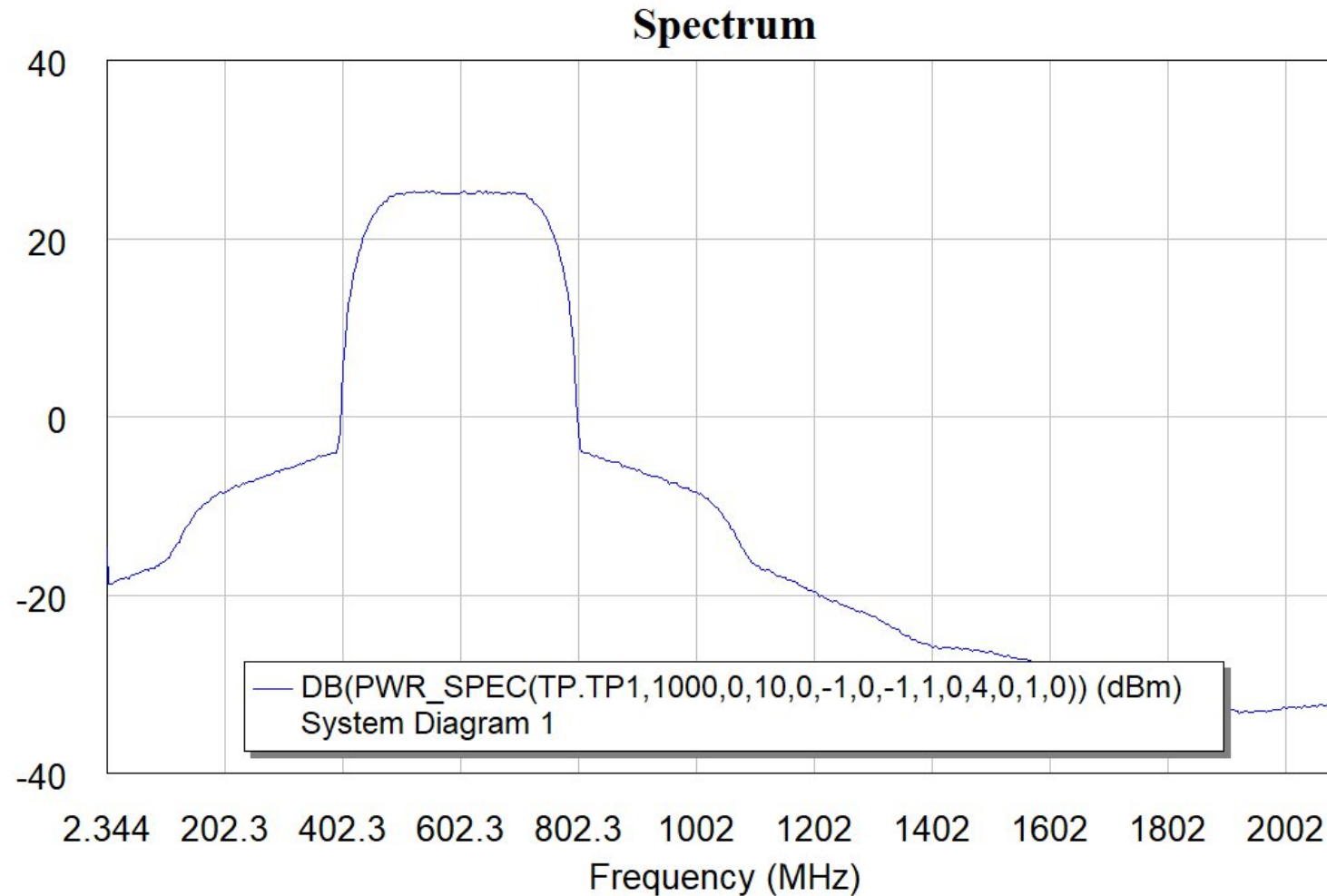
DB(PWR\_SPEC(TP.TP1,1000,0,10,0,-1,0,-1,1,0,4,0,1,0)) (dBm)  
System Diagram 1

# HPA AWR Design Problem



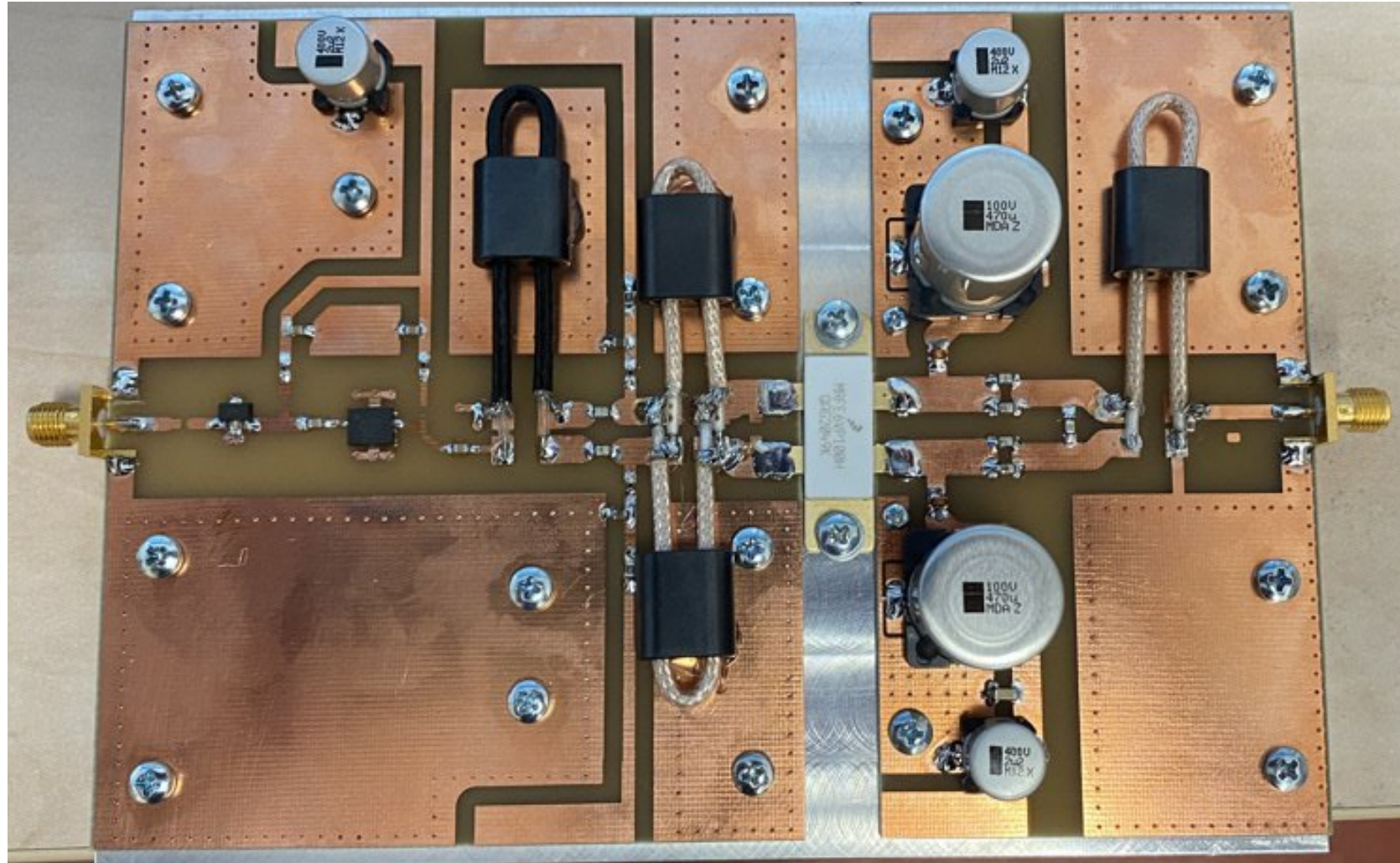


# HPA AWR Design Problem



# HPA Measurements

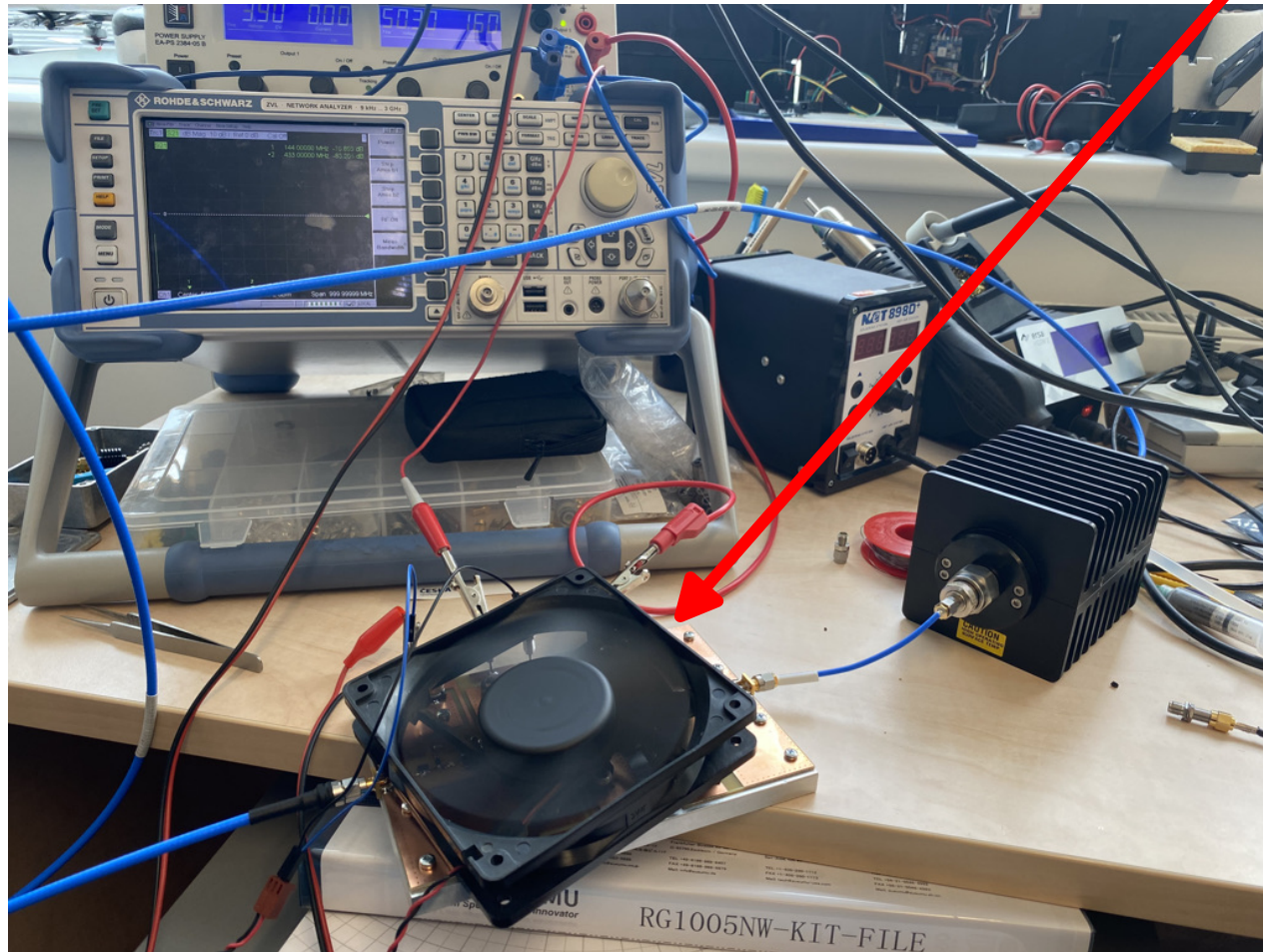
IN →



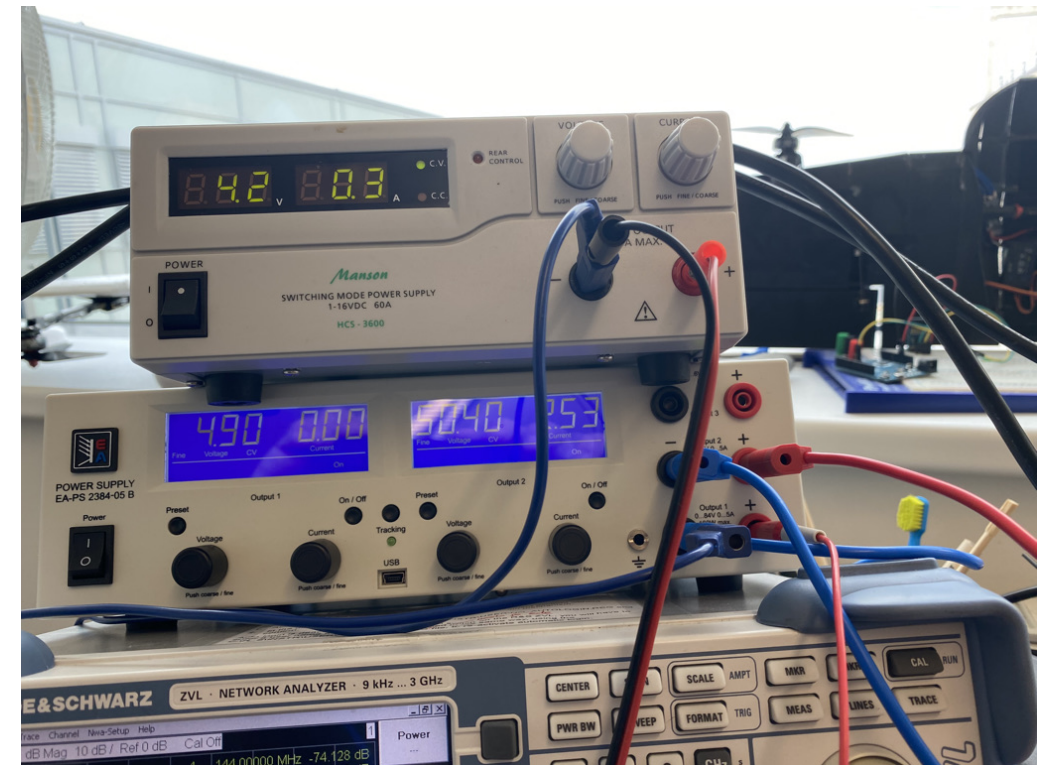
→ OUT

# HPA Measurements

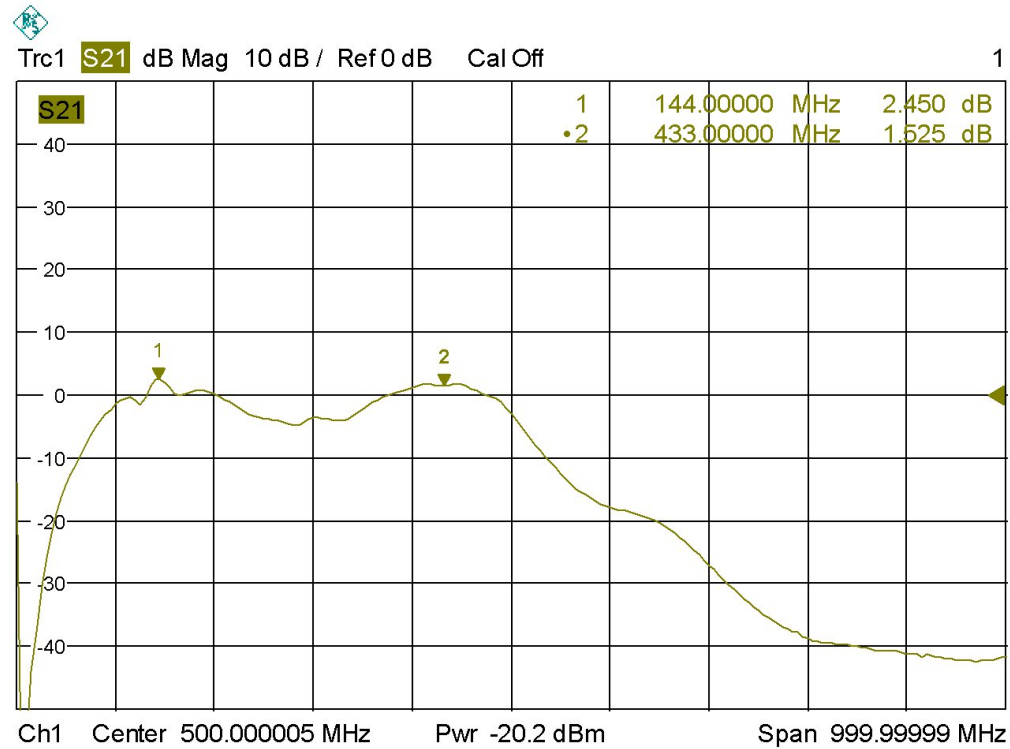
Active cooling



V<sub>bias</sub> and VSS + currents



# HPA Measurements

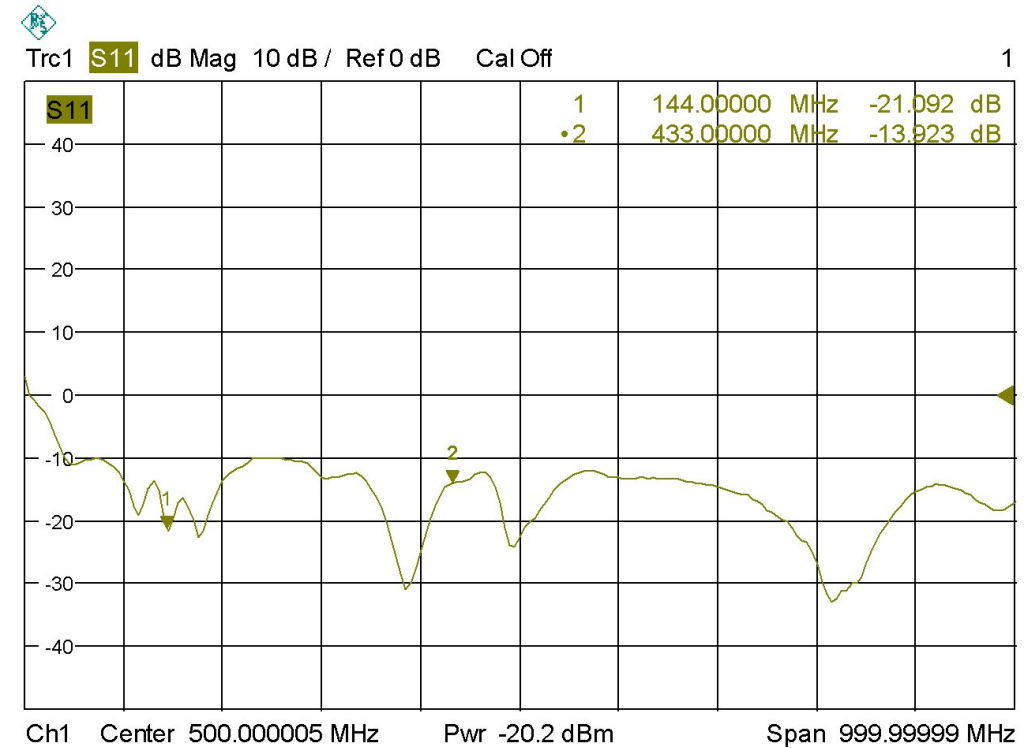


Date: 19.MAY.2008 08:46:21

ATT: 40.6dB

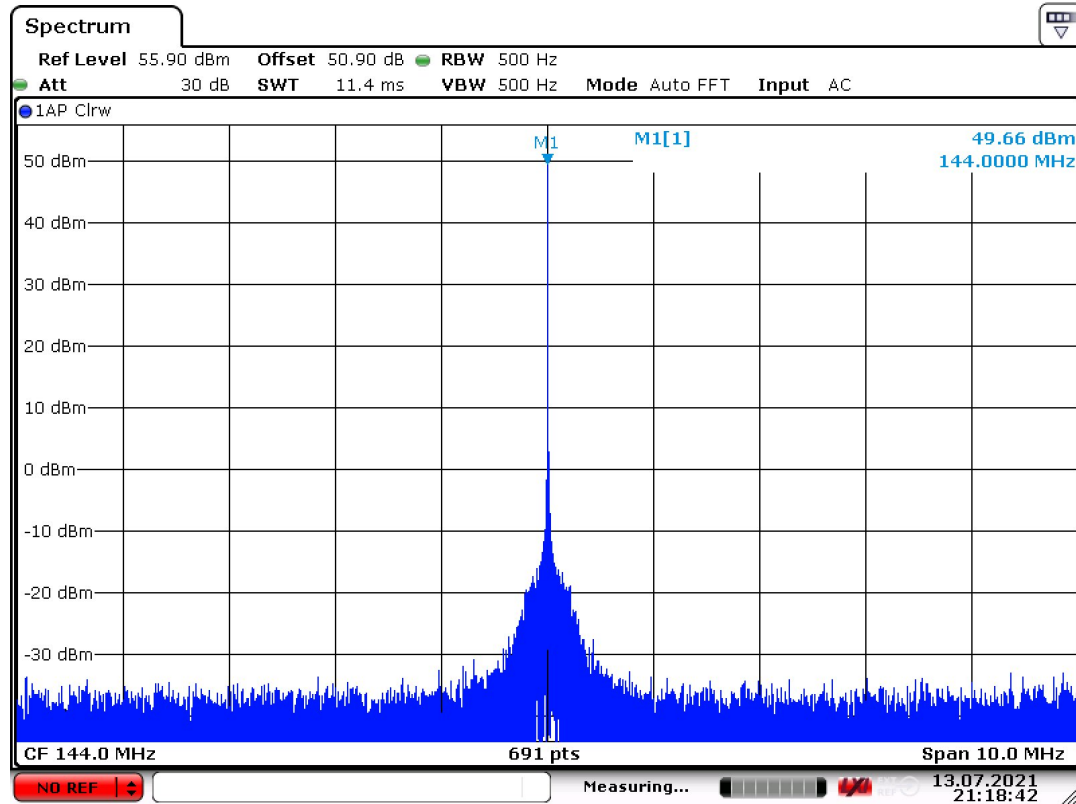
Gain@144MHz: 43.050 dB

Gain@433MHz: 42.125 dB



Date: 19.MAY.2008 08:47:02

# HPA Measurements

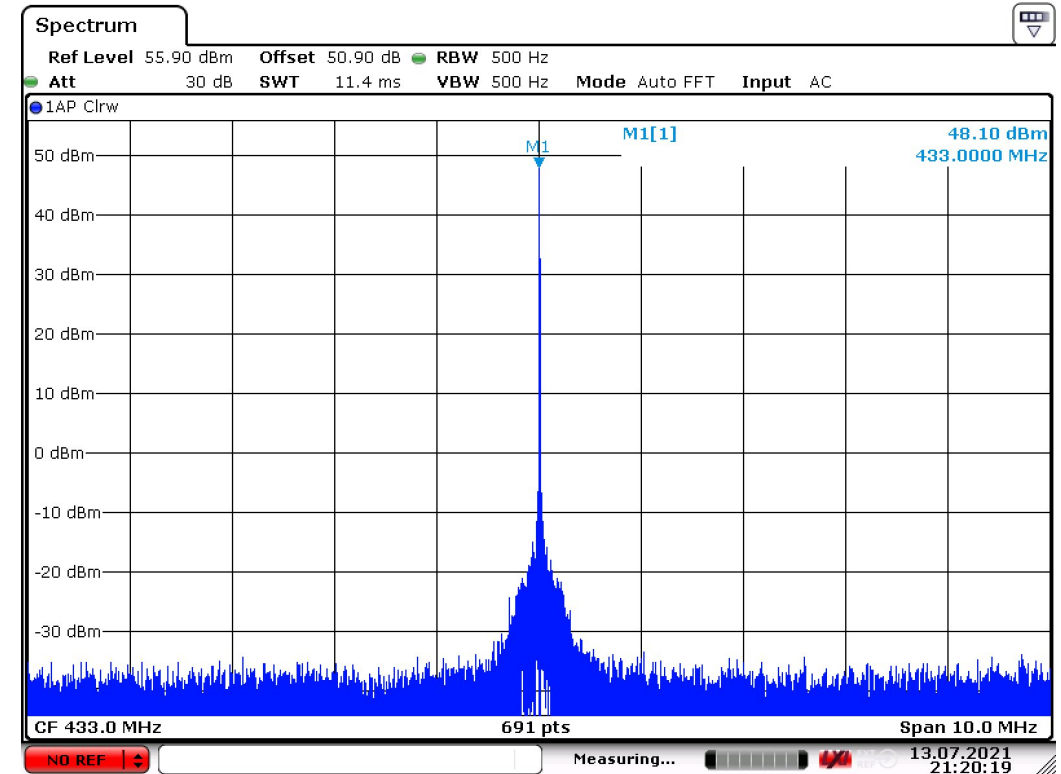


Date: 13.JUL.2021 21:18:42

ATT: 40.6dB

Pout\_max@144MHz: 49.66 dBm (92.46 W!)

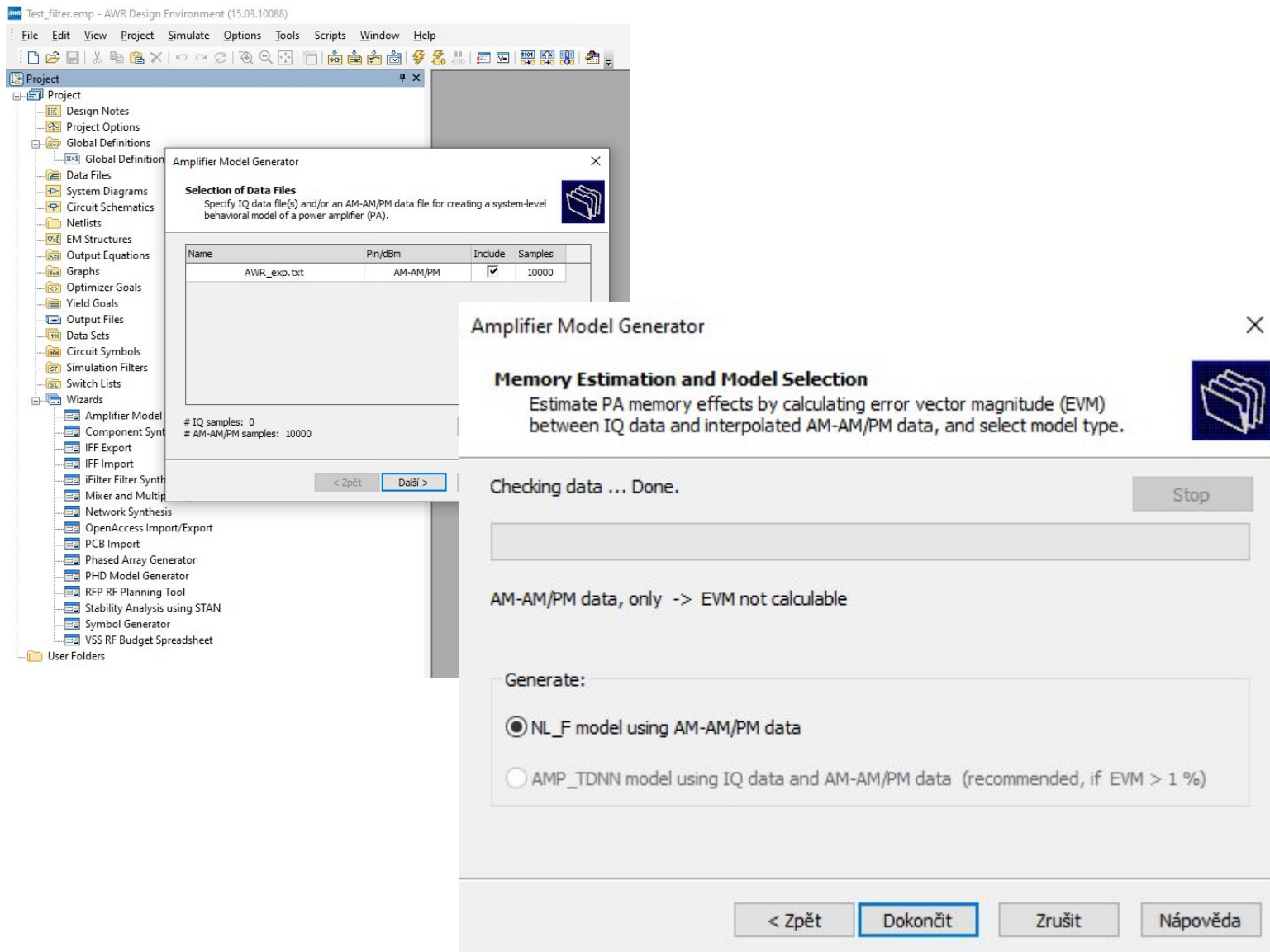
Pout\_max @433MHz: 48.10 dB (64.56 W!)



Date: 13.JUL.2021 21:20:19

Efficiency approx. 60 %

# HPA AWR Evaluation



Test\_filter.emp - AWR Design Environment (15.03.10088)

File Edit View Project Simulate Options Tools Scripts Window Help

Project

Amplifier Model Generator

Selection of Data Files

Specify IQ data file(s) and/or an AM-AM/PM data file for creating a system-level behavioral model of a power amplifier (PA).

Name	Pin/dBm	Include	Samples
AWR_exp.txt	AM-AM/PM	<input checked="" type="checkbox"/>	10000

Amplifier Model Generator

Memory Estimation and Model Selection

Estimate PA memory effects by calculating error vector magnitude (EVM) between IQ data and interpolated AM-AM/PM data, and select model type.

Checking data ... Done. Stop

AM-AM/PM data, only -> EVM not calculable

Generate:

NL\_F model using AM-AM/PM data

AMP\_TDNN model using IQ data and AM-AM/PM data (recommended, if EVM > 1 %)

< Zpět Dokončit Zrušit Nápověda

! IQ data: I\_in, Q\_in, I\_out, Q\_out  
 ! # power levels: 2  
 ! # samples per power level: 5000  
 ! # all samples: 10000  
 ! PIN\_start: -5 dBm  
 ! PIN\_stop: 0 dBm  
 ! PIN\_step: 5 dB

TSTEP = 2.5e-9  
 CTRFRQ = 1.0e9  
 SMPSYM = 8  
 Z0 = 50

PIN = -5 dBm

(I <sub>1</sub> )	(Q <sub>1</sub> )	(I <sub>2</sub> )	(Q <sub>2</sub> )	
-0.071310	0.061610	-0.559396	-1.062530	
-0.091102	0.079394	-0.699122	-1.334756	
...	...	...	...	

PIN = 0 dBm

(I <sub>1</sub> )	(Q <sub>1</sub> )	(I <sub>2</sub> )	(Q <sub>2</sub> )	
-0.126809	0.109559	-0.994599	-1.880855	
-0.162004	0.141184	-1.188688	-2.248207	
...	...	...	...	

# Thank you

gotthans@feec.vutbr.cz



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