

# 24GHz portable EME

OK1DFC - ZDENĚK SAMEK



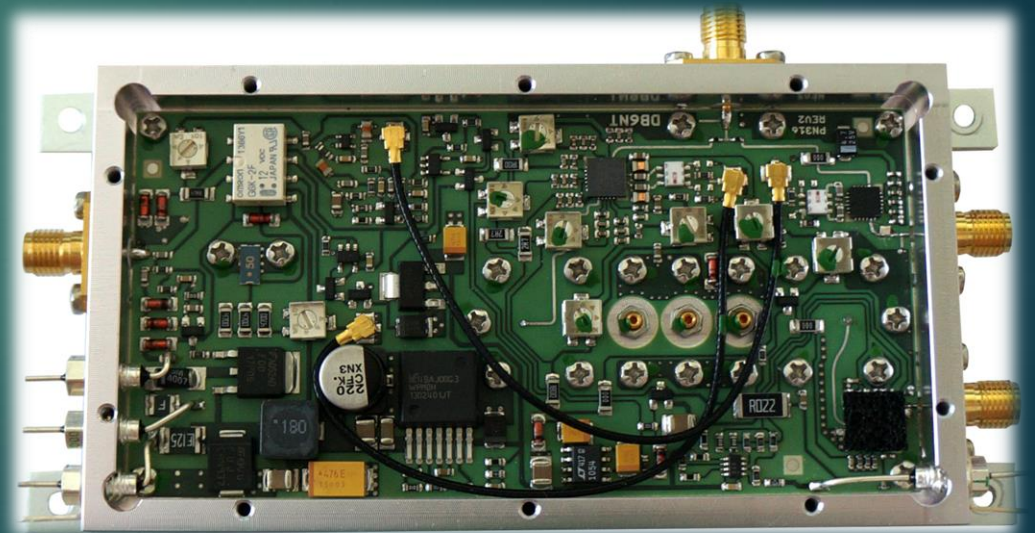
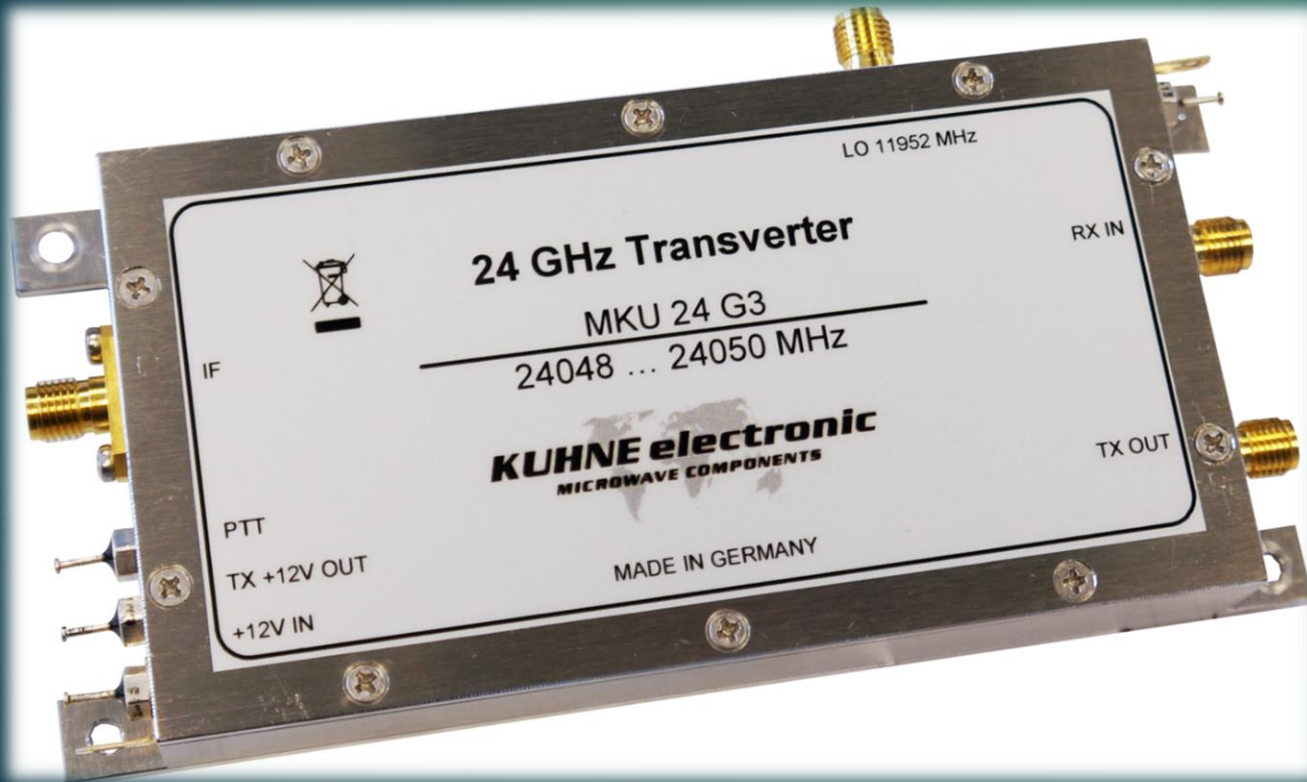
# TRV 2nd generation

- Build most important part of SSPA
- Power supply 13,8V - 6V-20A and -5V DC gate powering
- PS switching Drain voltage only if -U<sub>g</sub> is presented
- Measuring of I<sub>d</sub> build on PCB
- PTT switch on PCB build

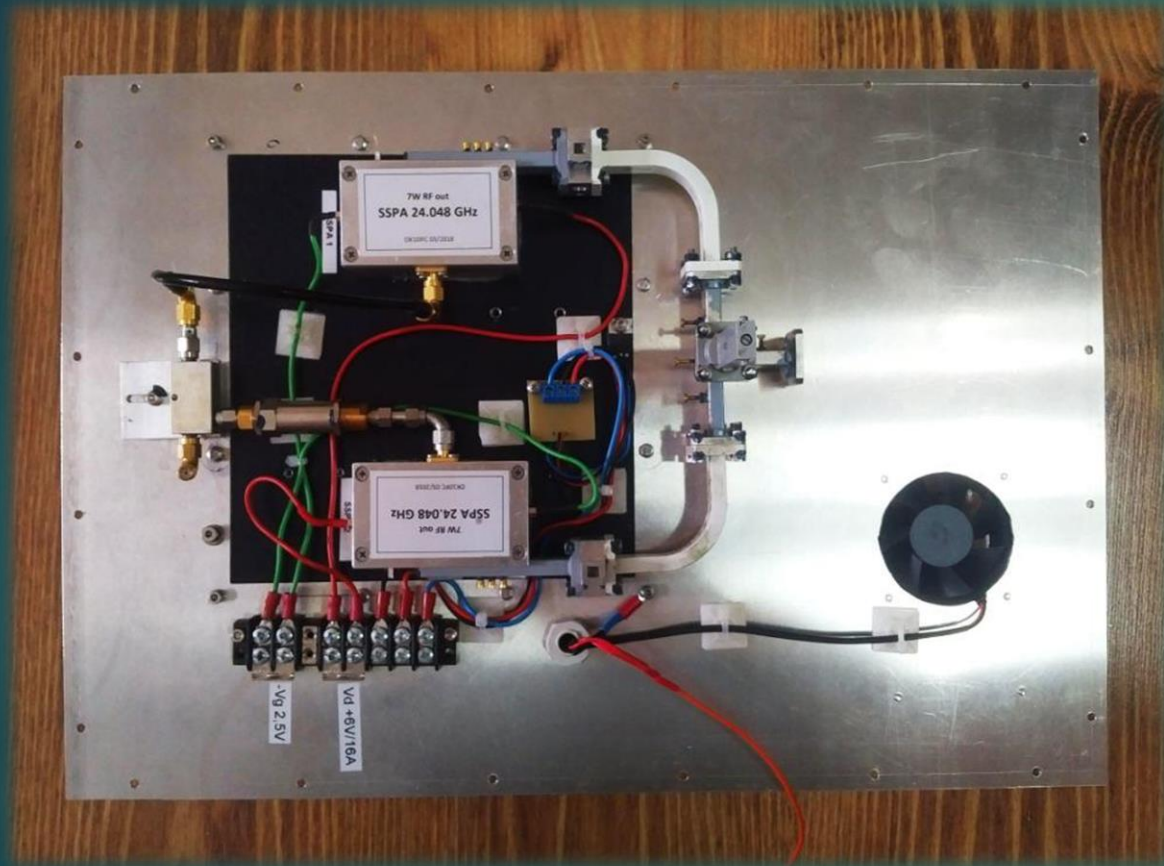


# TRV 2nd generation - DB6NT

- Used in TRV 3rd generation too
- TRV DB6NT
- 2,6 W RF out TX
- 4 dB N/F RX

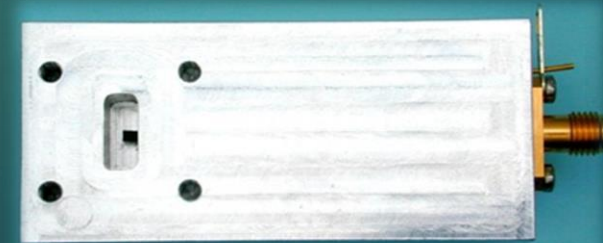


# TRV 2nd generation – SSPA + KLNA

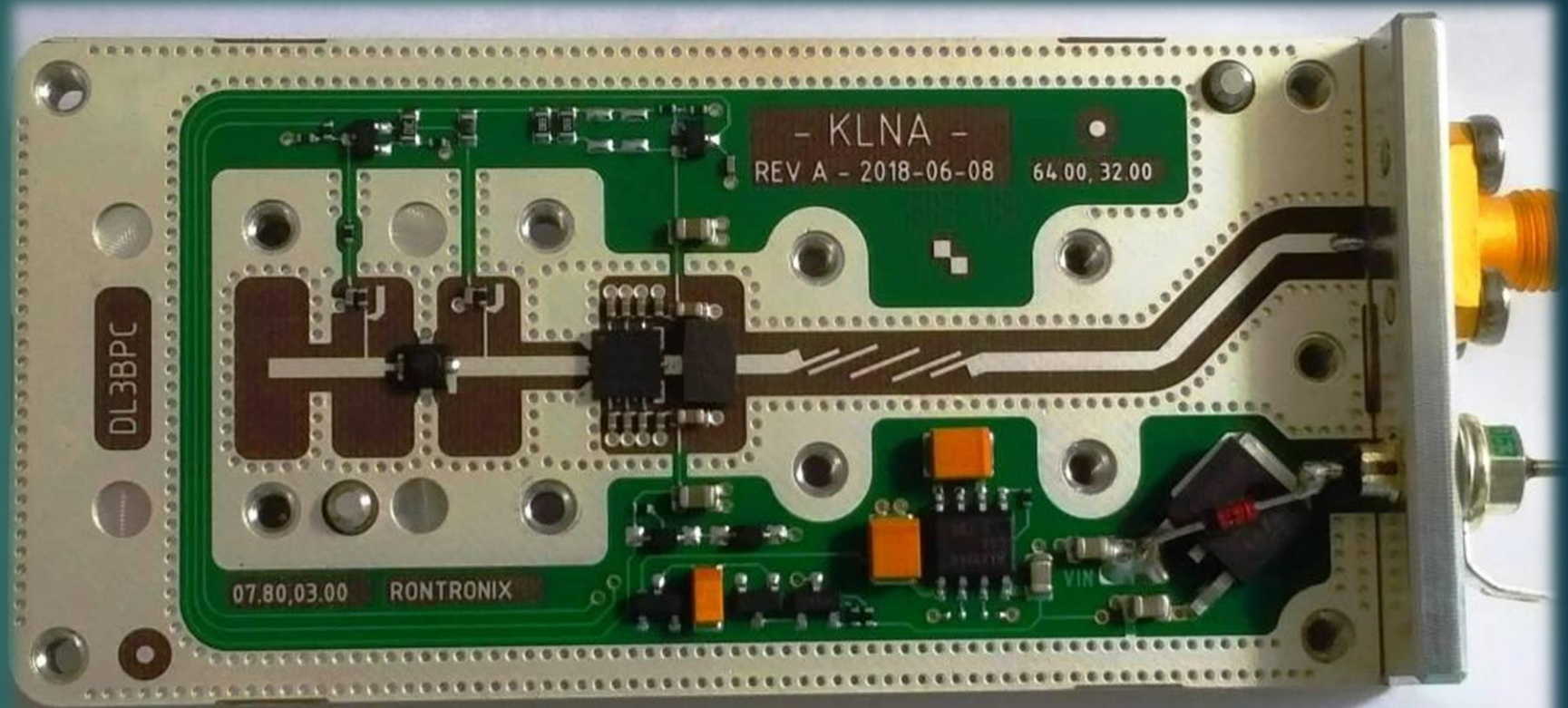


- SSPA 2xTGA4915CP – 10W

- WR42 VLNA - 1,6dB N/F
- Gain 25dB

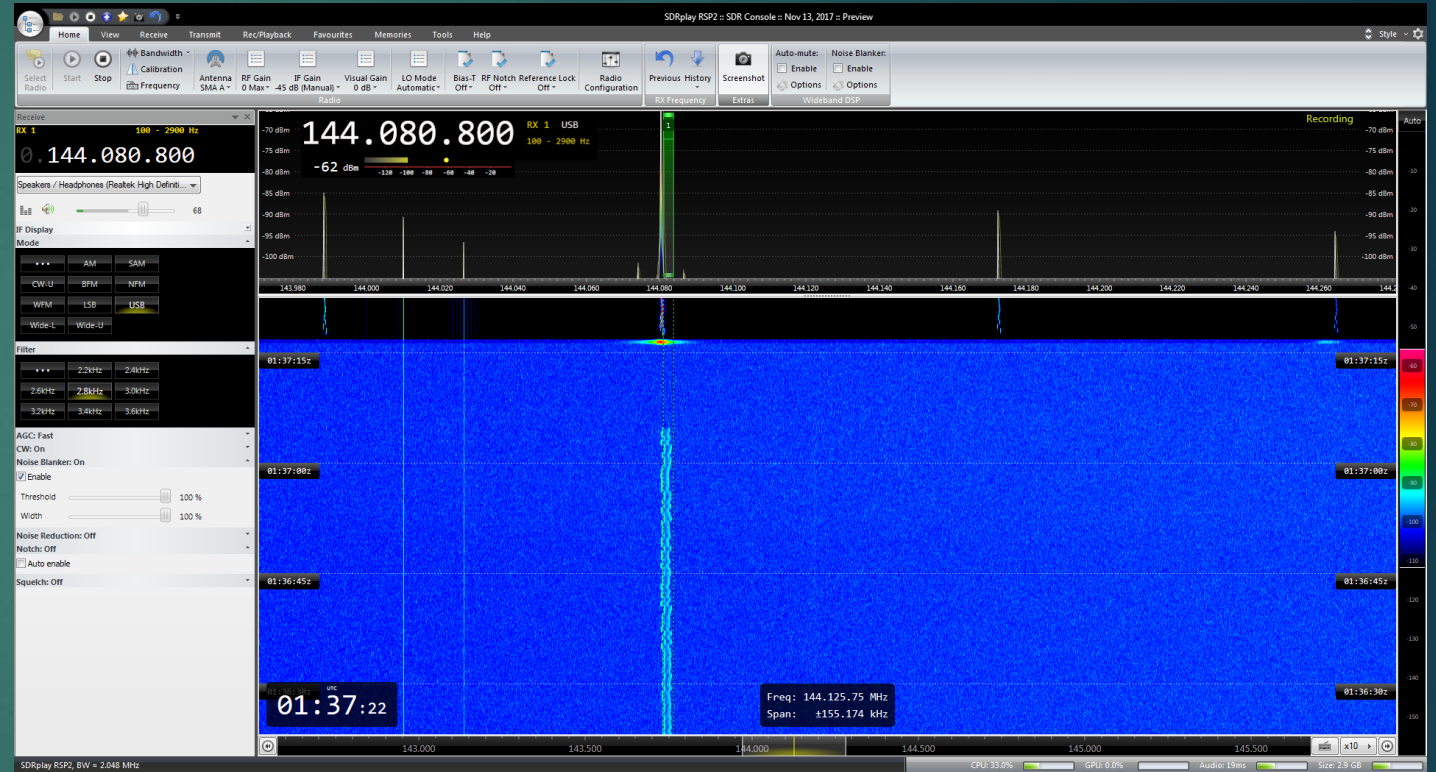
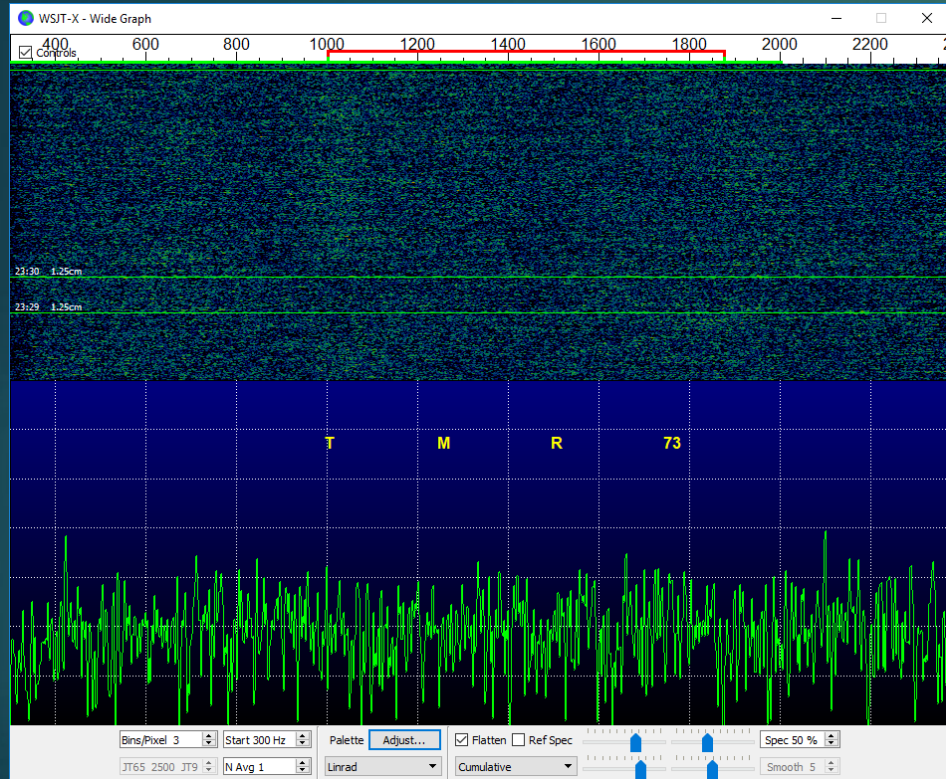


# TRV 3rd generation – new KLNA



- WR42 KLNA - 1,1dB N/F
- Gain 30dB

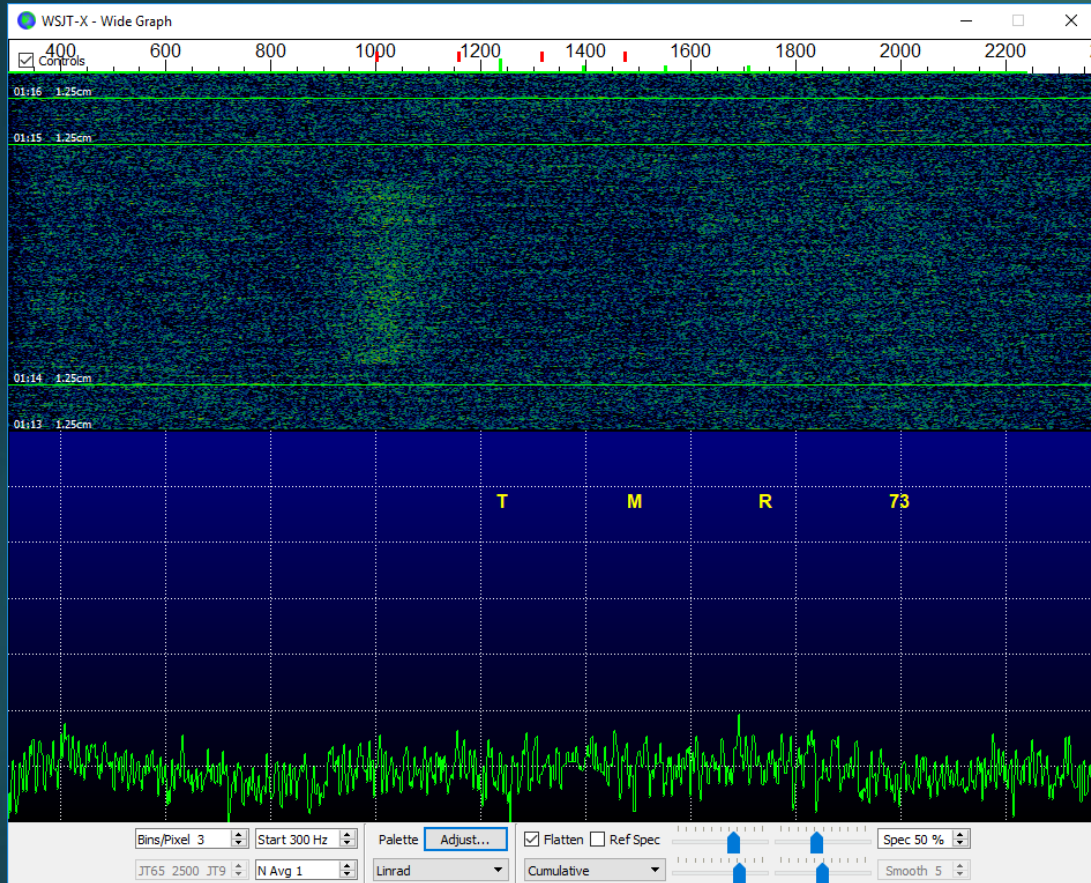
# 24GHz first test and QSOs



1000 Hz tuning tone OK1KIR – rain  
Resulting to NO EME but nice R/S 😊

- R/S signal of OK1KIR during first test when WX does not cooperate well

# 24GHz 2nd test and QSOs



WSJT-X v1.8.0-rc2 by K1JT

File Configurations View Mode Decode Save Tools Help

Single-Period Decodes

UTC	dB	DT	Freq	Message
2347	-23	2.6	738	*
2348	-25	-0.4	805	:
2349	-25	5.2	796	*
2352	-25	1.7	921	:
2354	-25	2.9	959	*
2356	-26	1.8	1088	:
2358	-26	5.3	935	:
0000	-26	5.4	903	:
0000	-25	5.4	903	:
0002	-25	-0.8	680	*
0004	-25	0.6	910	*
0006	-17	2.7	1045	* OK1DFC OK1KIR JN79 0
0008	-16	2.6	1026	* OK1DFC OK1KIR JN79 0
0010	-16	2.8	1030	* OK1DFC OK1KIR JN79 0
0012	-16	2.8	1037	* OK1DFC OK1KIR JN79 0
0014	-17	2.6	1008	* OK1DFC OK1KIR JN79 0
0016	-14	2.7	1029	* OK1DFC OK1KIR JN79 0
0018	-15	2.7	1052	* OK1DFC OK1KIR JN79 0
0020	-17	2.7	1045	* OK1DFC OK1KIR JN79 5
0022	-15	2.7	1049	* OK1DFC OK1KIR JN79 0
0024	-15	2.7	1059	* OK1DFC OK1KIR JN79 0
0026	-15	2.6	1043	* OK1DFC OK1KIR JN79 0
0028	-25	5.1	1018	:
0030	-25	4.5	758	:

Average Decodes

UTC	dB	DT	Freq	Message
2357	Tx	1000	@ 1000 Hz	
2357	Tx	1000	@ OK1KIR OK1DFC -19	
2359	Tx	1000	@ OK1KIR OK1DFC -19	
0001	Tx	1000	@ OK1KIR OK1DFC -19	
0003	Tx	1000	@ OK1KIR OK1DFC -19	
0005	Tx	1000	@ 1000 Hz	
0007	Tx	1000	@ 1000 Hz	
0008	-16	2.6	1026	* OK1DFC OK1KIR JN79 0
0009	Tx	1000	@ 1000 Hz	
0010	-16	2.8	1030	* OK1DFC OK1KIR JN79 0
0011	Tx	1000	@ 1000 Hz	
0011	Tx	1000	@ OK1KIR OK1DFC -16	
0012	-16	2.8	1037	* OK1DFC OK1KIR JN79 0
0013	Tx	1000	@ OK1KIR OK1DFC -16	
0015	Tx	1000	@ OK1KIR OK1DFC -16	
0016	-14	2.7	1029	* OK1DFC OK1KIR JN79 0
0017	Tx	1000	@ OK1KIR OK1DFC -16	
0019	Tx	1000	@ 1000 Hz	
0021	Tx	1000	@ 1000 Hz	
0023	Tx	1000	@ 1000 Hz	
0025	Tx	1000	@ 1000 Hz	
0027	Tx	1000	@ 1000 Hz	
0029	Tx	1000	@ 1000 Hz	
0031	Tx	1000	@ 1000 Hz	

Log QSO Stop Monitor Erase Decode Enable Tx Halt Tx Tune Menus

1.25cm S 24 048,099 998 Tx even/1st

DX Call DX Grid Tx 1000 Hz Tx ← Rx

OK1KIR JN79dw Rx 1000 Hz Rx ← Tx

Az: 270 18 km F Tol 1000 Lock Tx=Rx

Lookup Add Report -16 Submode D

2018 zář 03 00:34:44

Generate Std Msgs Next Now Pwr

OK1KIR OK1DFC JN79 Tx 1

OK1KIR OK1DFC -16 Tx 2

OK1KIR OK1DFC R-16 Tx 3

@1500 (RRR) Tx 4

@1750 (73) Tx 5

@1000 (TUNE) Tx 6

Receiving QRA64 D Last Tx: 1000 Hz 44/60 WD:20m

1000 Hz tuning tone OK1KIR – easy copy and decoding 😊, but no QSO 😞

# 24GHz first QSOs 😊

WSJT-X v1.9.1 by K1JT

File Configurations View Mode Decode Save Tools Help

Single-Period Decodes					Average Decodes				
UTC	dB	DT	Freq	Message	UTC	dB	DT	Freq	Message
1044	-17	2.6	1001	\$* OK1DFC OK1KIR JN79	1045	Tx	1000	\$	OK1KIR OK1DFC -17
1046	-17	2.6	940	\$# OK1DFC OK1KIR R-19	1047	Tx	1000	\$	OK1KIR OK1DFC RRR
1048	-17	2.5	948	\$* OK1DFC OK1KIR RRR	1049	Tx	1000	\$	OK1KIR OK1DFC RRR
1050	-17	2.7	937	\$* OK1DFC OK1KIR RRR	1049	Tx	1000	\$	OK1KIR OK1DFC 73
1052	-18	2.7	962	\$* OK1DFC OK1KIR 73	1051	Tx	1000	\$	OK1KIR OK1DFC 73
1053	-26	3.2	1130	\$*	1053	Tx	1000	\$	OK1KIR OK1DFC 73

Log QSO Stop Monitor Erase Clear Avg Decode Enable Tx Halt Tx Tune Menus

1.25cm S 24 048,134 655 Tx even/1st Tx 1000 Hz Tx ← Rx

DX Call DX Grid OK1KIR JN79dw Rx 1001 Hz Rx ← Tx

Az: 270 18 km F Tol 1000 Hold Tx Freq Report -17 Submode F Sync -1

2018 zář 05 10:54:13 Sh Auto Seq Tx6

Generate Std Msgs Next Now Pwr

G3WDG OK1DFC JN79	<input type="radio"/>	Tx 1
G3WDG OK1DFC -19	<input type="radio"/>	Tx 2
G3WDG OK1DFC R-19	<input type="radio"/>	Tx 3
G3WDG OK1DFC RRR	<input type="radio"/>	Tx 4
G3WDG OK1DFC 73	<input checked="" type="radio"/>	Tx 5
CQ OK1DFC JN79	<input type="radio"/>	Tx 6

Receiving JT4F Last Tx: OK1KIR OK1DFC 73 13/60 WD:20m

WSJT-X v1.9.1 by K1JT

File Configurations View Mode Decode Save Tools Help

Single-Period Decodes					Average Decodes				
UTC	dB	DT	Freq	Message	UTC	dB	DT	Freq	Message
1204	-19	2.7	1023	:* OK1DFC G3WDG IO92	1203	Tx	1000	@	1000 Hz
1206	-20	2.7	1029	:* OK1DFC G3WDG R-19	1205	Tx	1000	@	G3WDG OK1DFC -19
1208	-25	2.7	1035	:* OK1DFC G3WDG 73	1206	-20	2.7	1029	:* OK1DFC G3WDG R-19
1210	-20	2.8	1034	:* SO PSED WRKG	1207	Tx	1000	@	G3WDG OK1DFC -19
1212	-23	2.7	1024	:*	1207	Tx	1000	@	G3WDG OK1DFC RRR
1214	-26	0.2	941	:	1209	Tx	1000	@	G3WDG OK1DFC 73
					1211	Tx	1000	@	G3WDG OK1DFC 73
					1212	-23	2.7	1024	:*
					1213	Tx	1000	@	G3WDG OK1DFC 73

Log QSO Stop Monitor Erase Decode Enable Tx Halt Tx Tune Menus

1.25cm S 24 048,131 891 Tx even/1st Tx 1000 Hz Tx ← Rx

DX Call DX Grid Rx 1023 Hz Rx ← Tx

F Tol 1000 Hold Tx Freq Report -19 Submode D Sync -1

2018 zář 05 12:15:05 Sh Auto Seq Tx6

Generate Std Msgs Next Now Pwr

G3WDG OK1DFC JN79	<input type="radio"/>	Tx 1
G3WDG OK1DFC -19	<input type="radio"/>	Tx 2
G3WDG OK1DFC R-19	<input type="radio"/>	Tx 3
G3WDG OK1DFC RRR	<input type="radio"/>	Tx 4
G3WDG OK1DFC 73	<input checked="" type="radio"/>	Tx 5
CQ OK1DFC JN79	<input type="radio"/>	Tx 6

Receiving QRA64 D Last Tx: G3WDG OK1DFC 73 5/60 WD:20m

- OK1KIR -17/-19dB 4mdish – 20W
- G3WDG -20/-19dB 3m dish – 10W



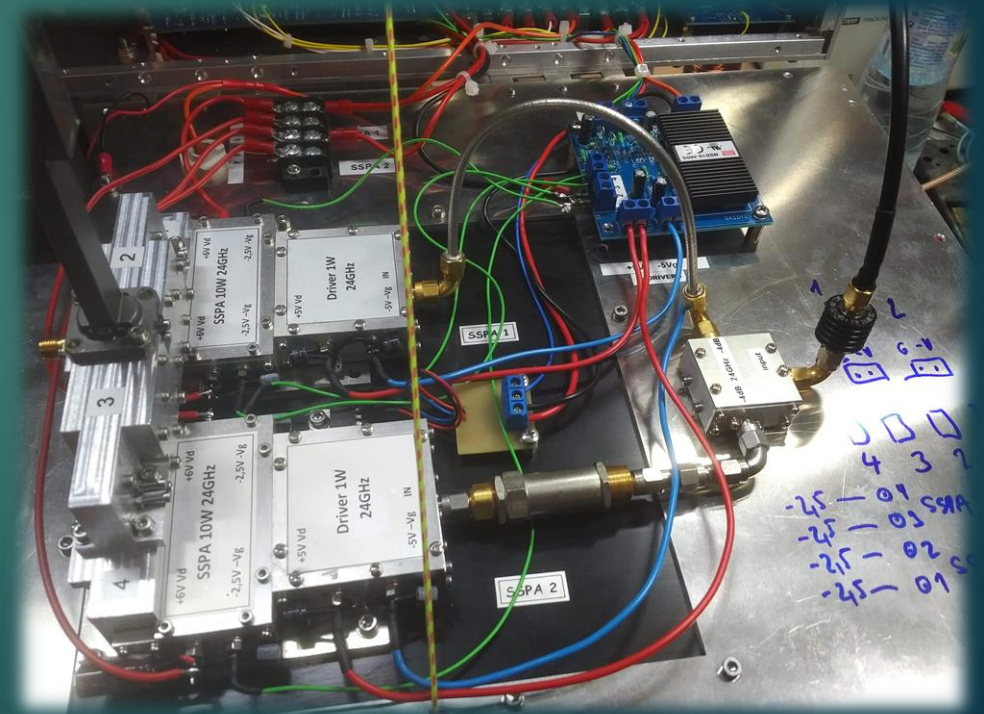
# 24GHz traffic and QSOs in 4U1ITU

- Easy copy and decoding everybody who was calling
- Worked: **OK1KIR, G3WDG, OZ1LPR, LX1DB** – **CW !!!**
- Heard and decoded:
- **JA1WQF, PA0BAT, OK1CA, W5LUA, DL7YC,**

**CONCLUSION ????? – NEED MORE POWER !!!!**

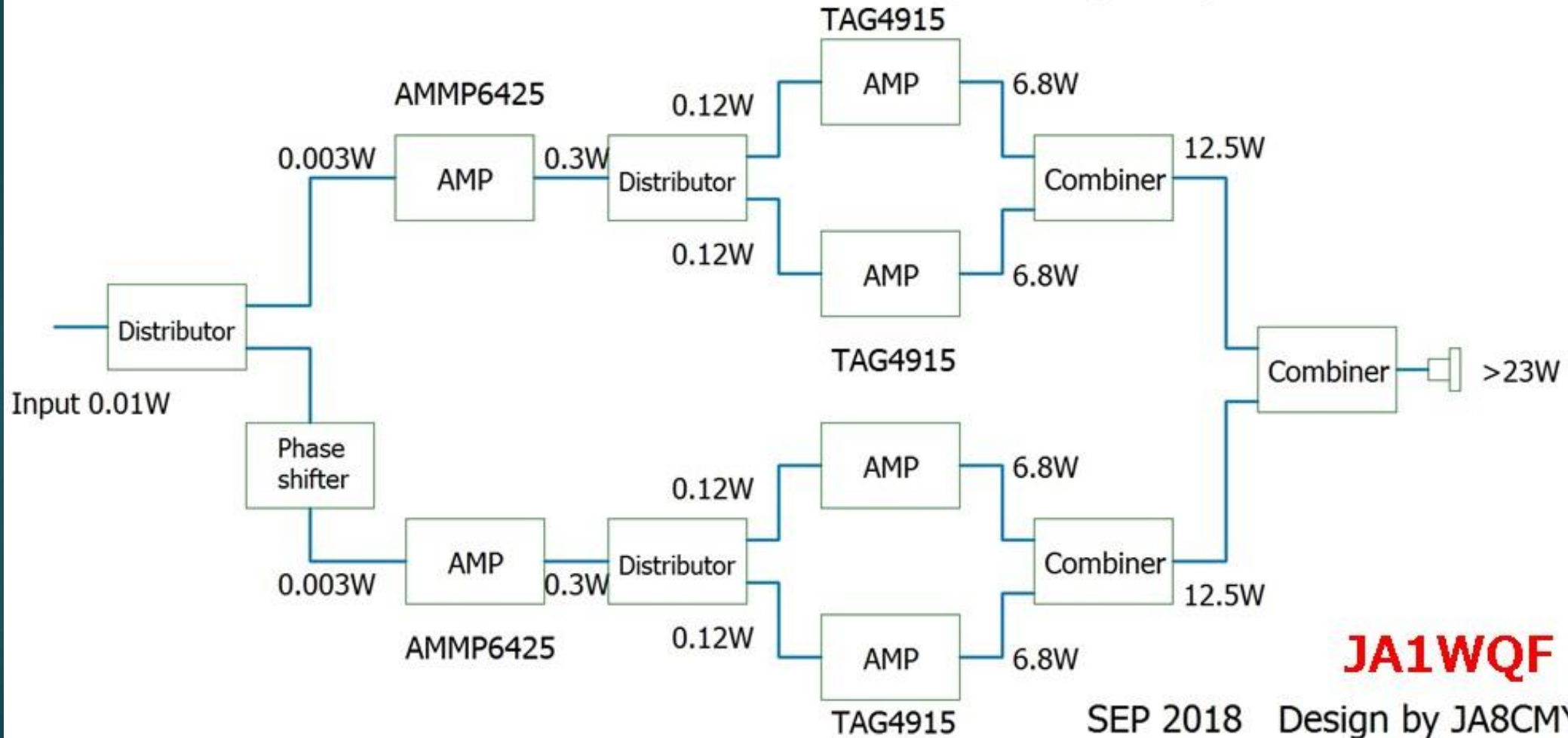
# 24GHz new SSPA build

- Minimum 20W
- 2xDB6NT – not available anymore
- JA1WQF – 4xTGA4915CP – Mitsuo open to help
- Need to build new power supply giving 6,8V / 30A DC
- New DC/DC down convertor 28V/13,8V – 500W
- Measuring of current
- Protection
- RF measuring
- Heatsink – Cooling



# 24GHz new SSPA

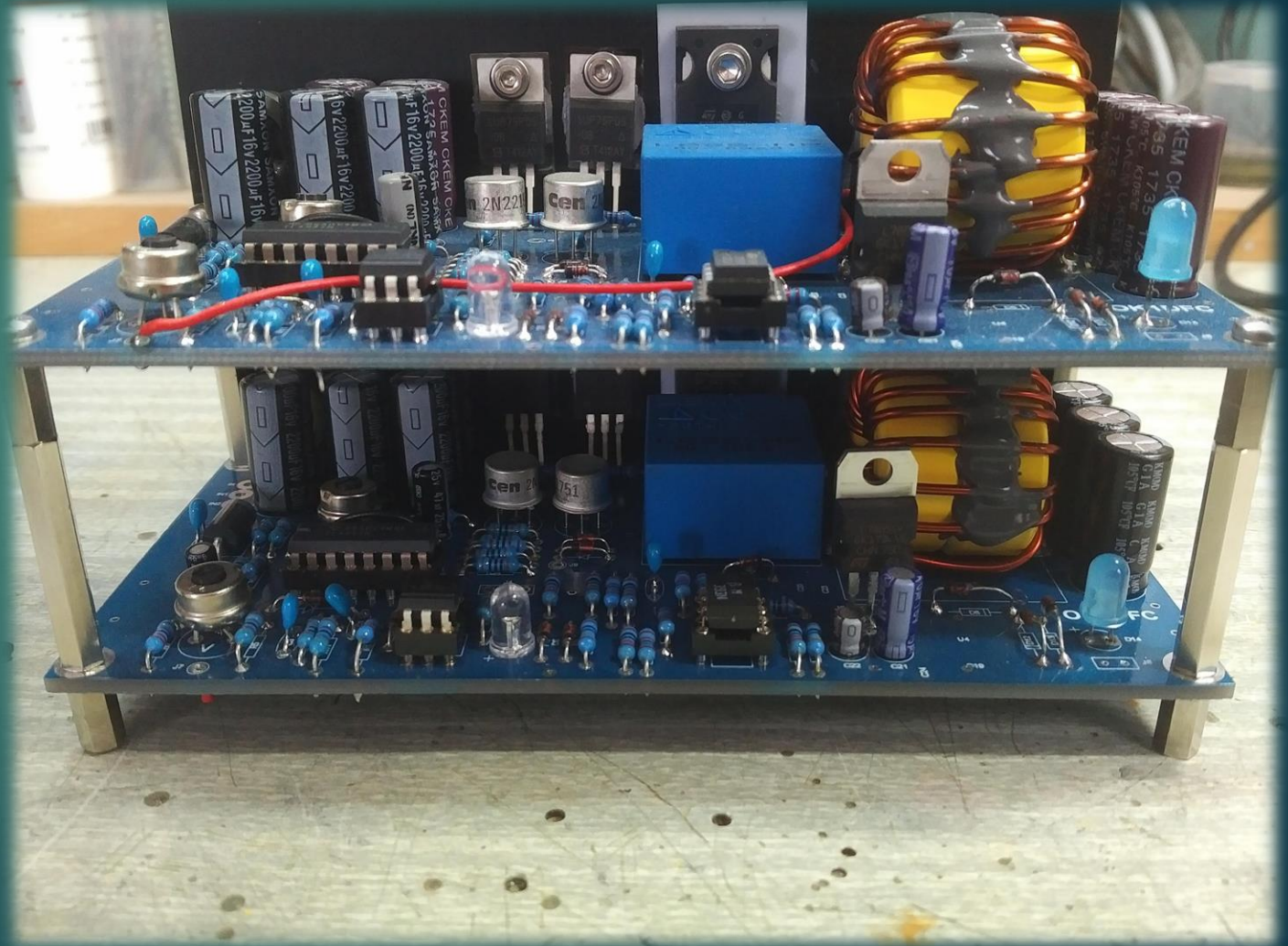
## 24GHz Peltier element cooling 23W(25W)SSPA



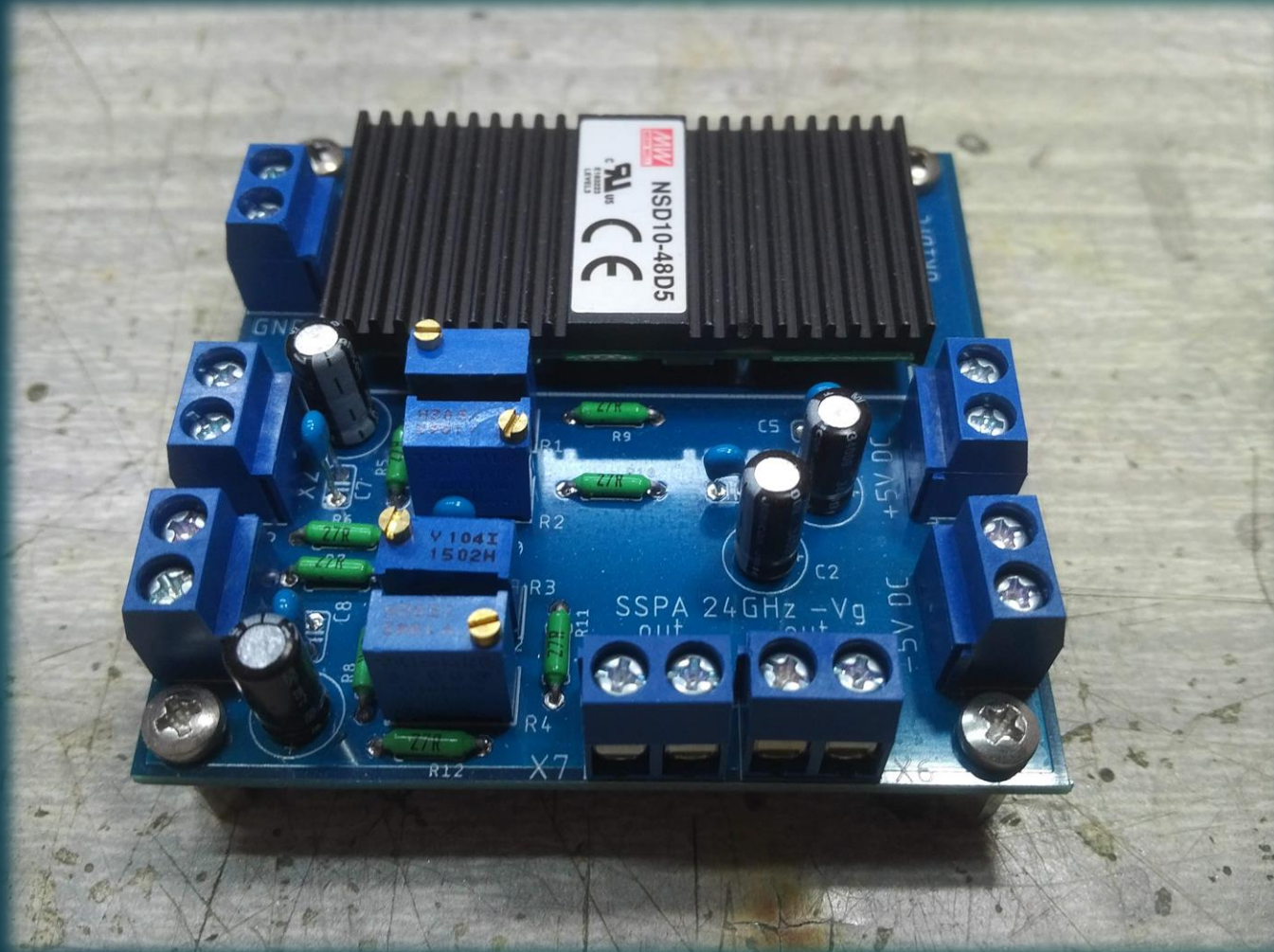
# 24GHz new power supply



- 2 PS used for 10W before
- 2x 6,8V / 15A and -5V for -Vg

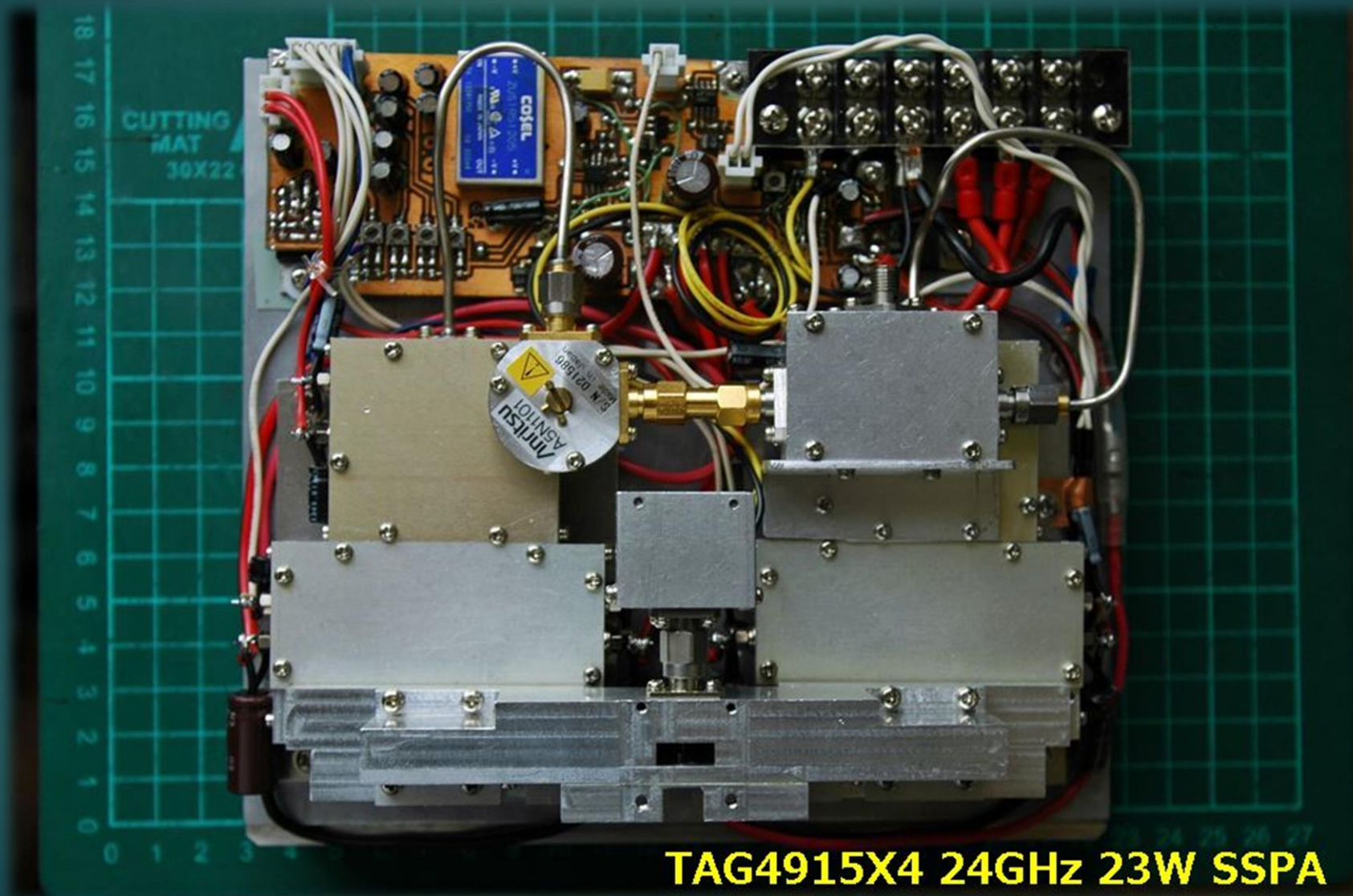


# 24GHz new power supply



- DC/DC 28V to +5V and -5V /1A for driver
- Trim for 4xTGA4915CP  $-V_g$  -0,7V – idle current TGA setup
- **Idle current of 1 TGA is 4A !!!!**

# 24GHz new SSPA JA1WQF

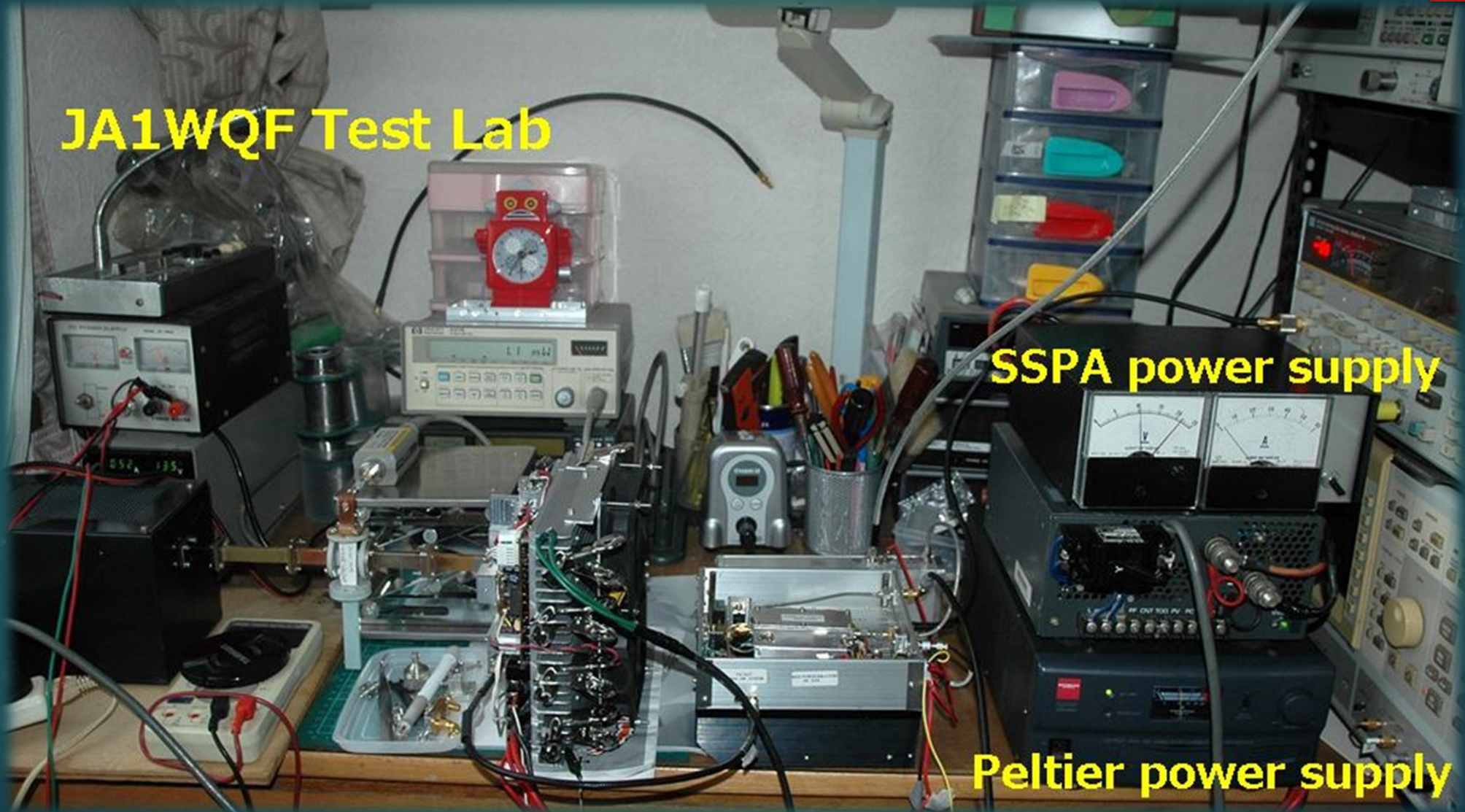


# 24GHz new SSPA JA1WQF

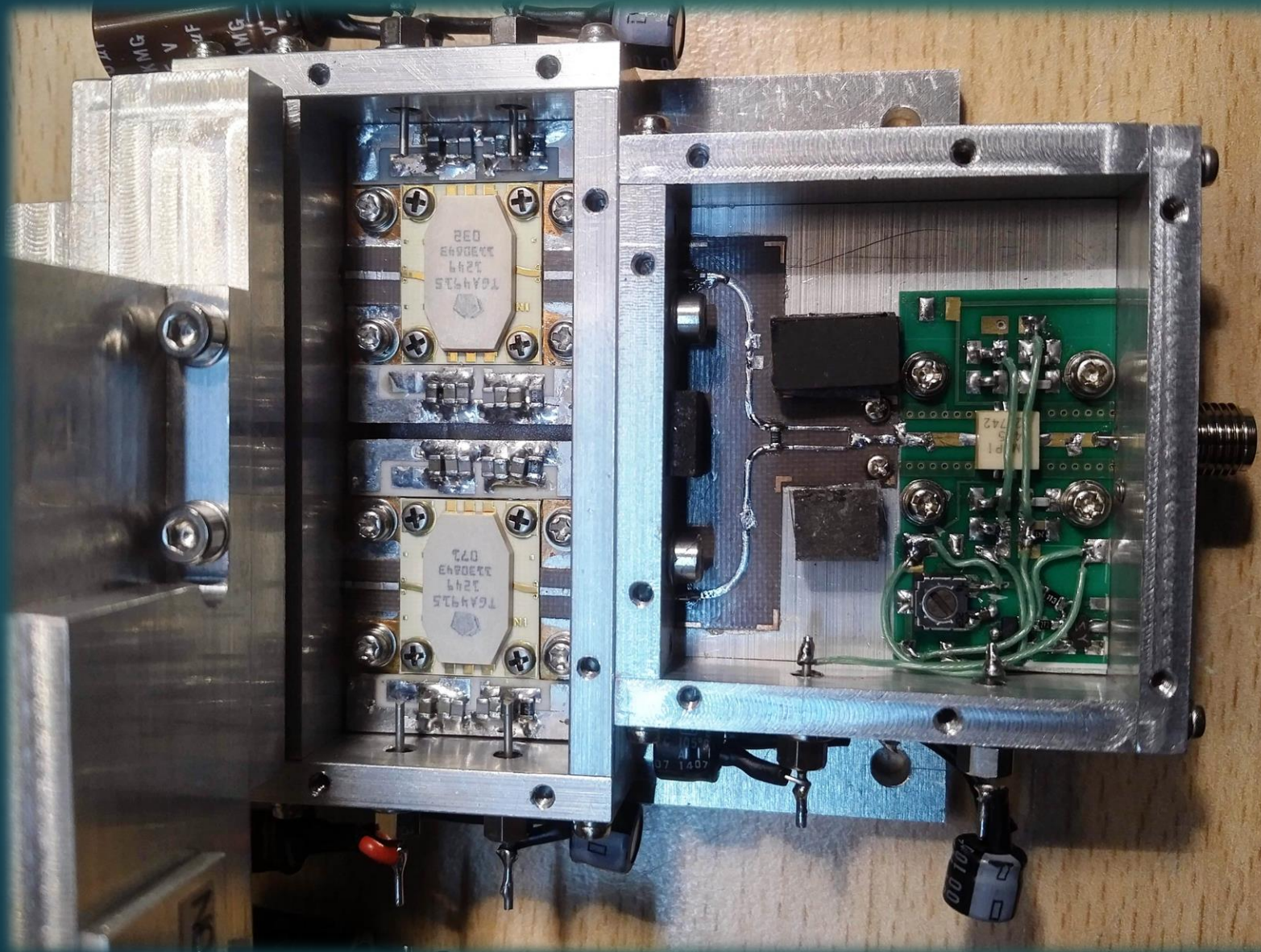
**JA1WQF Test Lab**

**SSPA power supply**

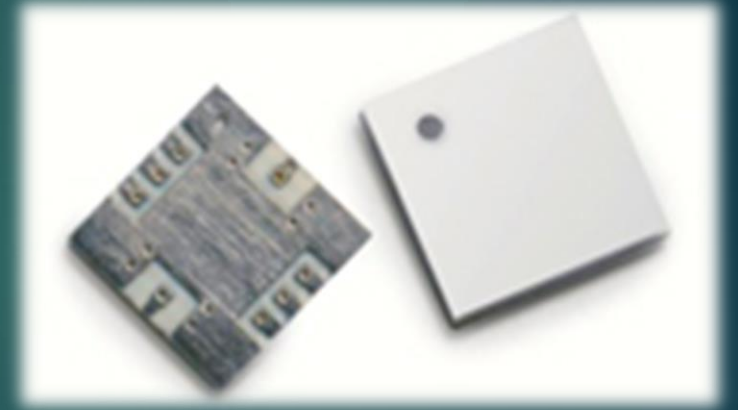
**Peltier power supply**



# 24GHz new SSPA



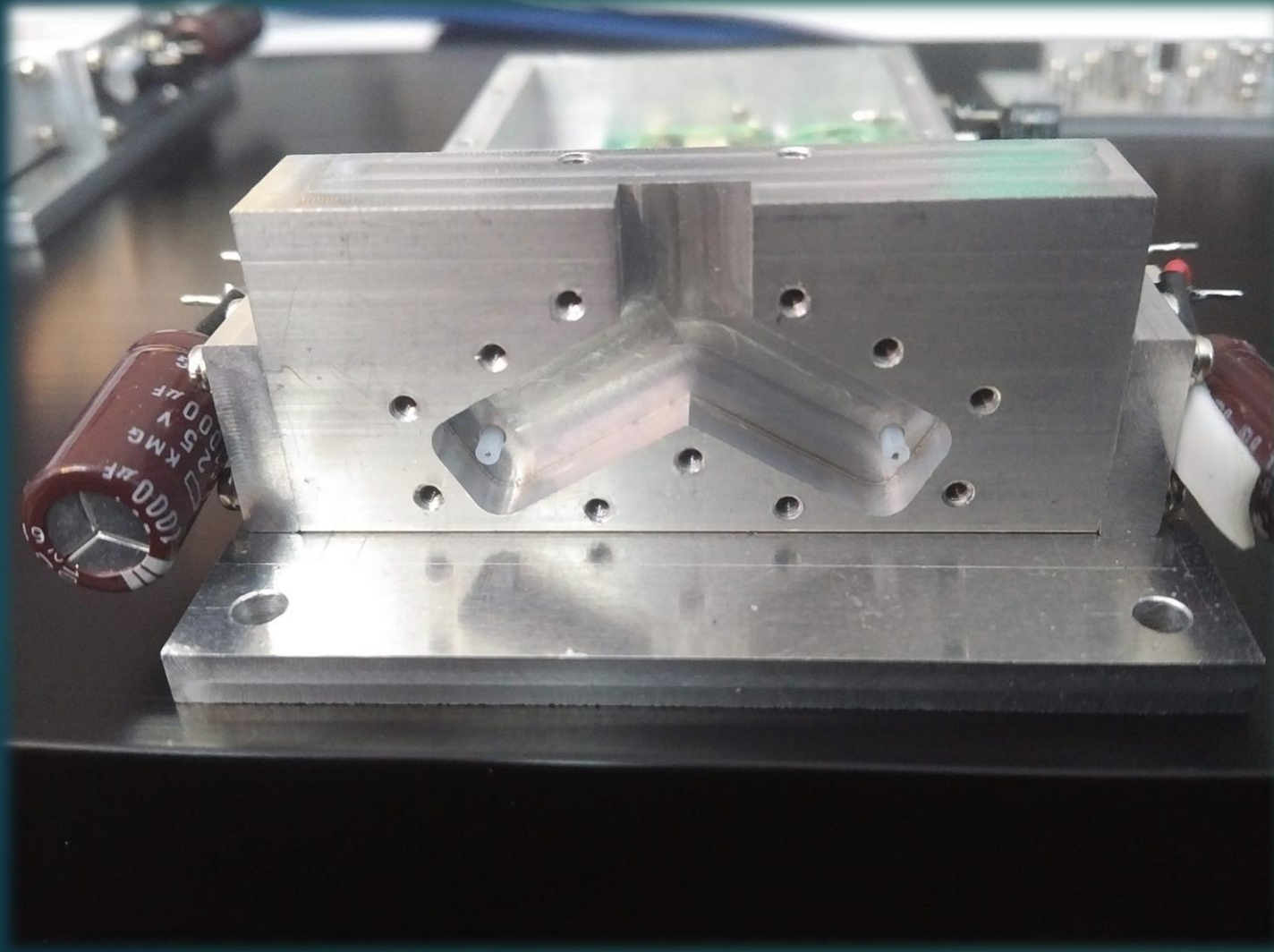
- MMIC Driver 1W AMMP6425
- Wilkinson divider 2x4dB
- 2xTGA4915CP
- Waveguide combiner
- 11,5W RF output



In CZ possible to buy by  
Mouser 990 CZK

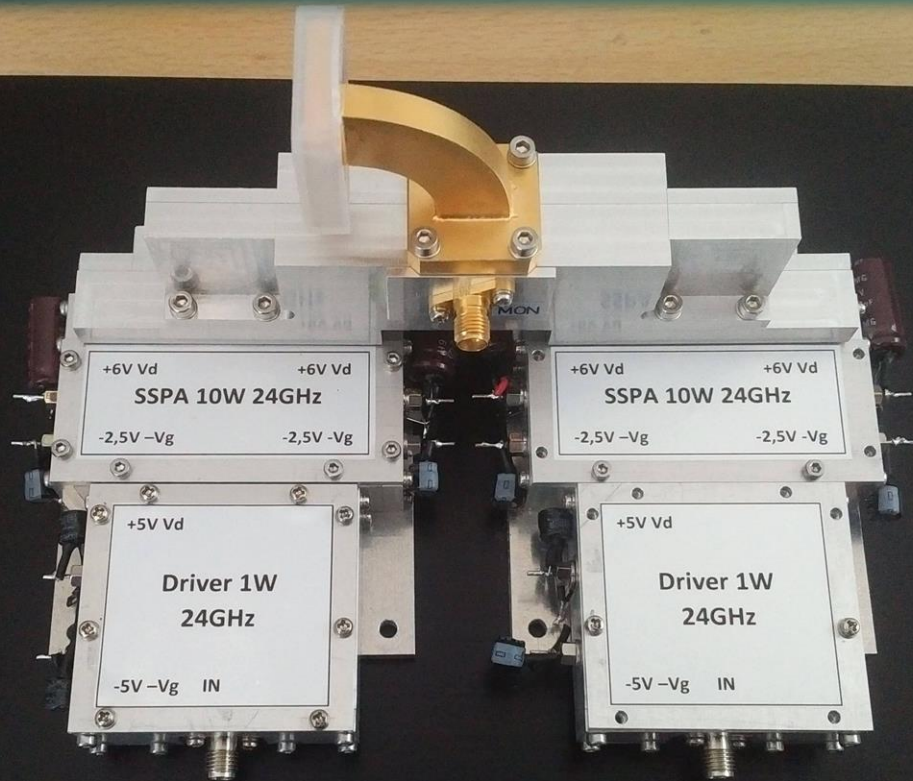


# 24GHz new SSPA



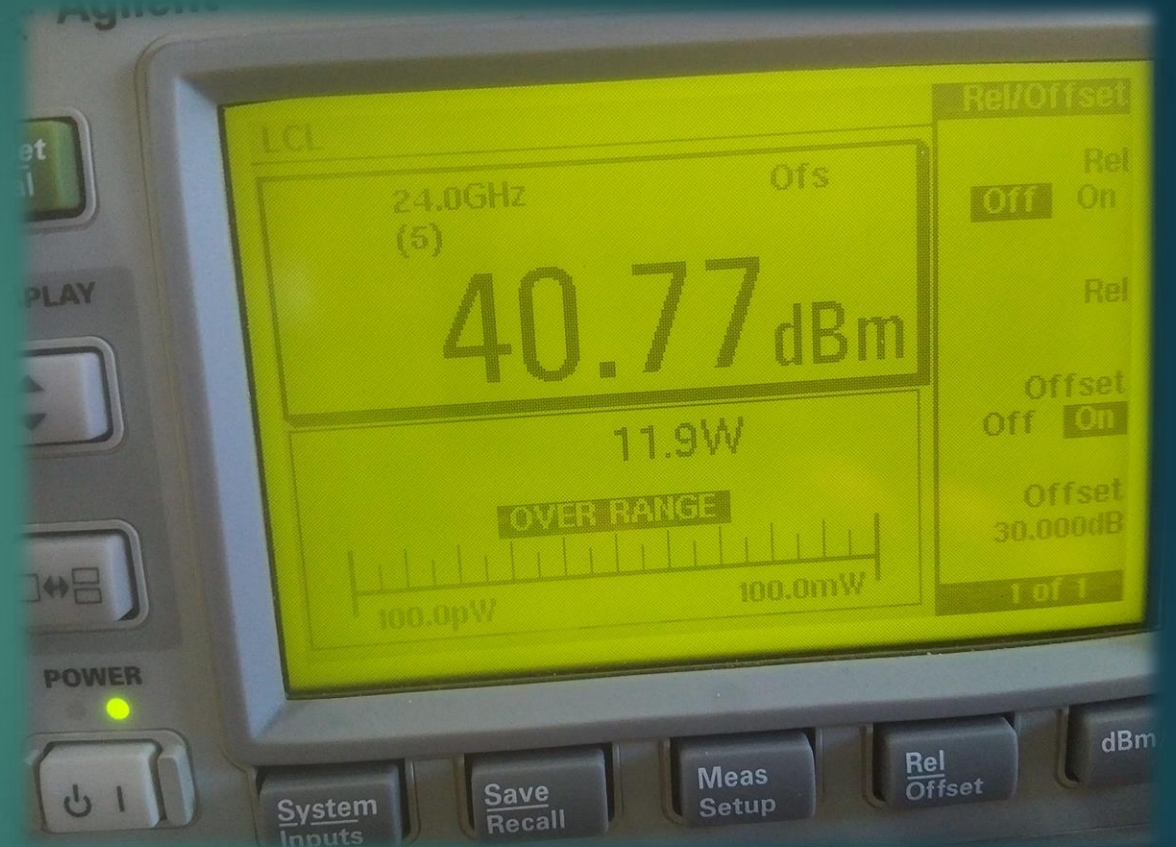
- Waveguide WR 28 combiner  
SSPA 2xTGA4915CP
- 11,5W RF output

# 24GHz new SSPA



- Waveguide combiner
- 2x2 TGA4915CP – 22W RF out

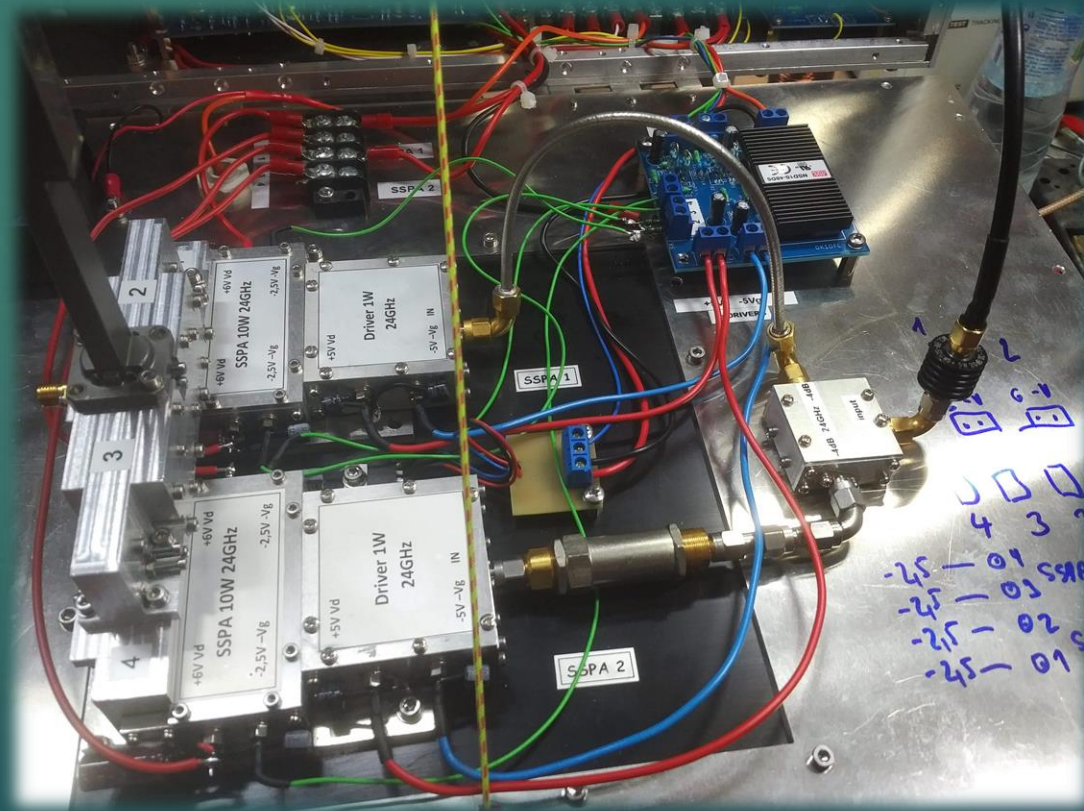
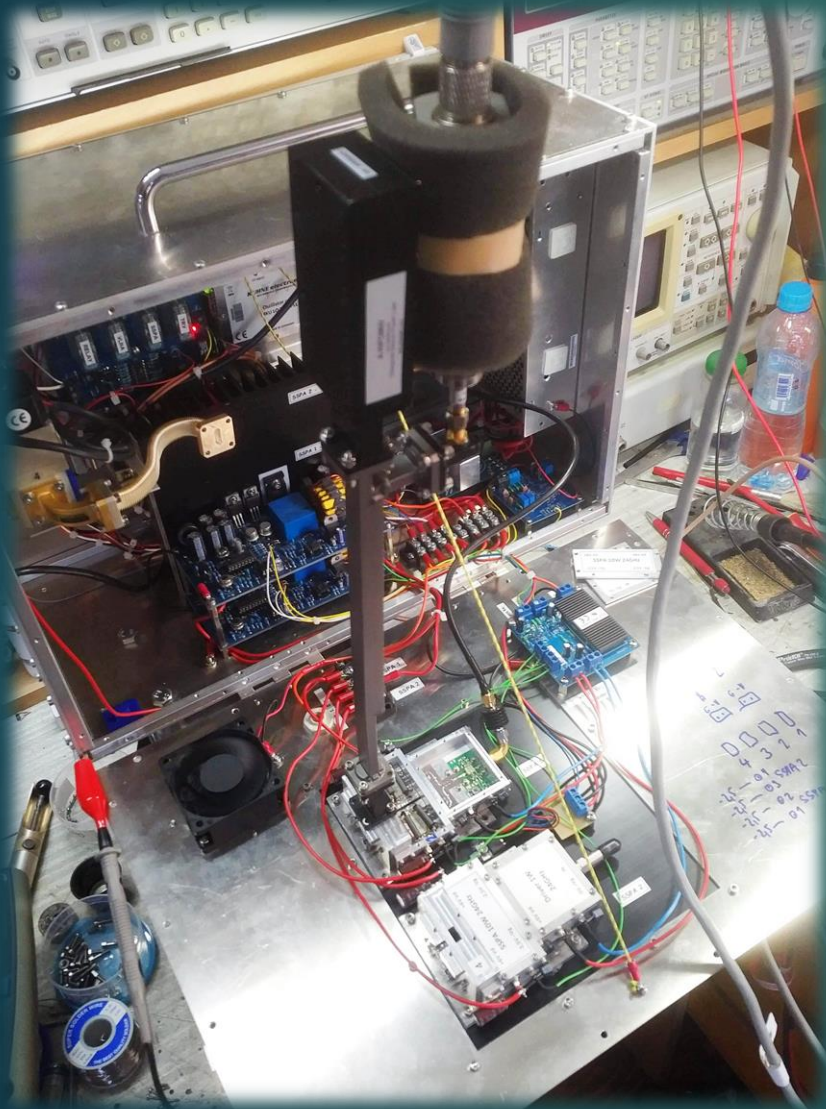
# 24GHz new SSPA

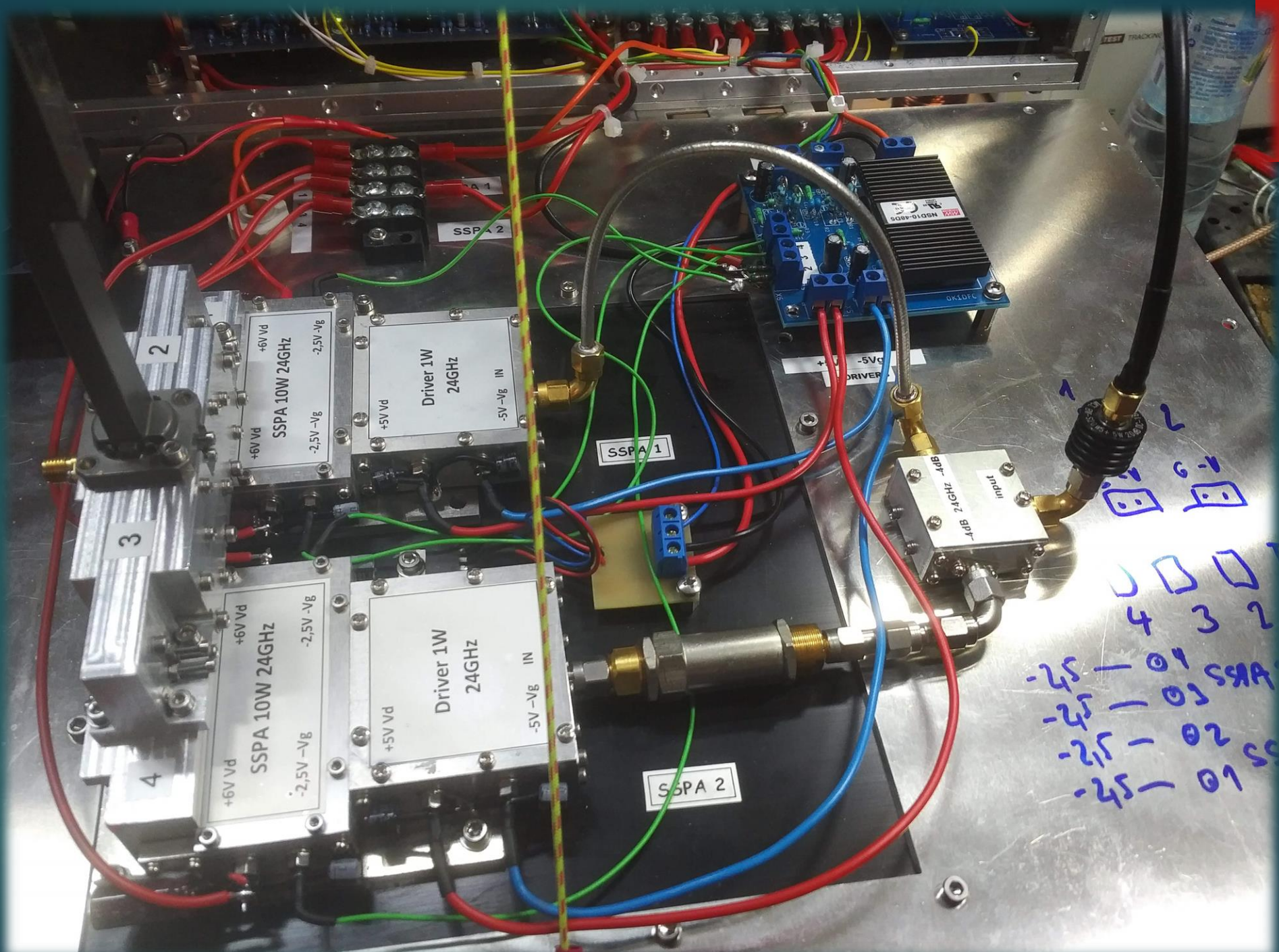


- SSPA 1 and SSPA 2 RF output

# 24GHz new SSPA final setup

- Input divider – RF in +11,8dBm
- Phase shifter in SSPA2 way
- Module SSPA1 and SSPA2 with combiners
- Main combiner and WR42 output





SSPA 2

2

+6V Vd  
SSPA 10W 24GHz  
-2,5V -Vg

+5V Vd  
Driver 1W  
24GHz  
-5V -Vg IN

SSPA 1

3

+6V Vd  
SSPA 10W 24GHz  
-2,5V -Vg

+5V Vd  
Driver 1W  
24GHz  
-5V -Vg IN

SSPA 2

-5Vg  
DRIVER

24GHz  
input

Handwritten notes in blue ink on the metal surface:

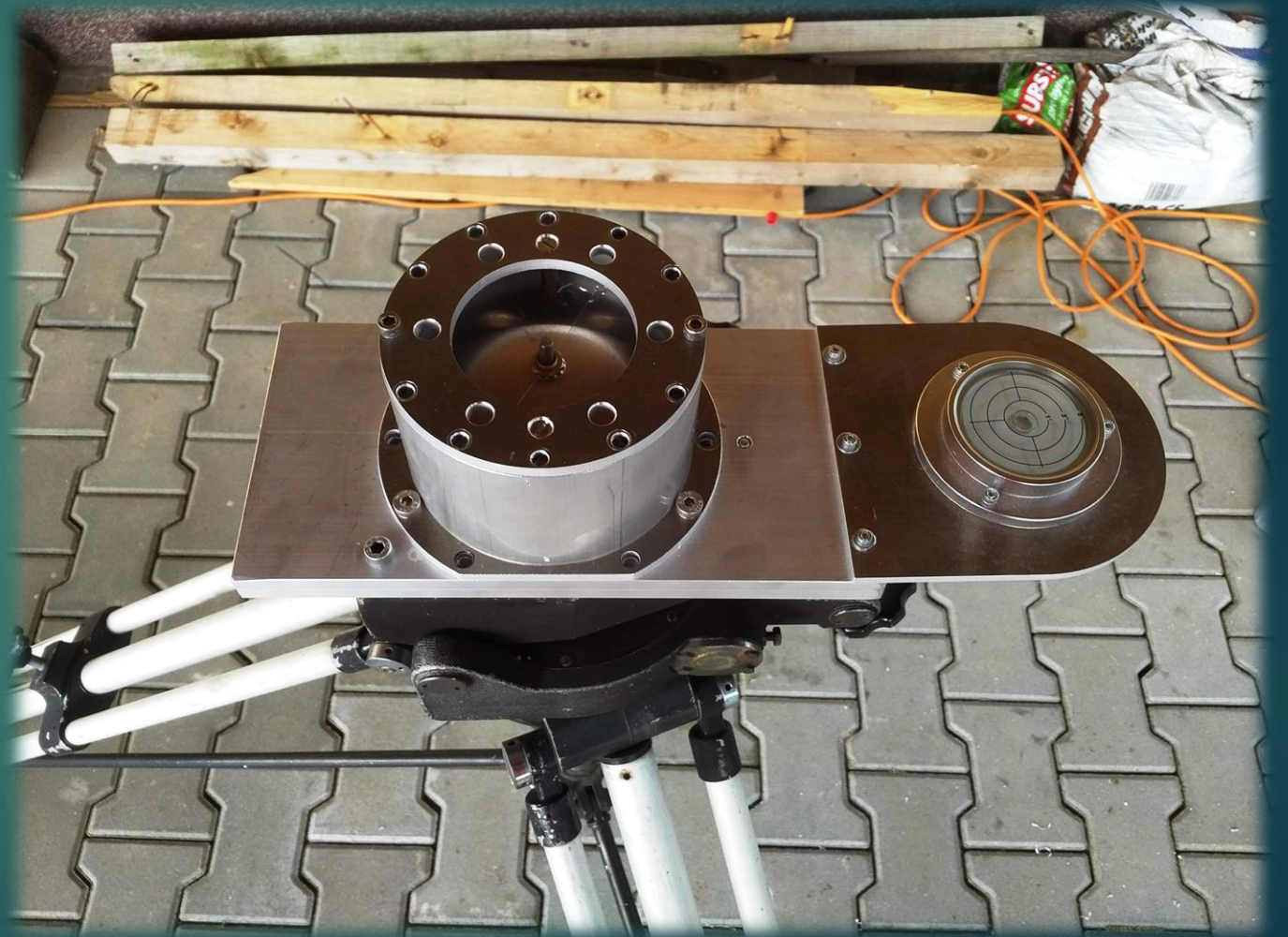
4 3 2  
SSPA  
1 01  
1 02  
1 01

# 24GHz new SSPA final setup

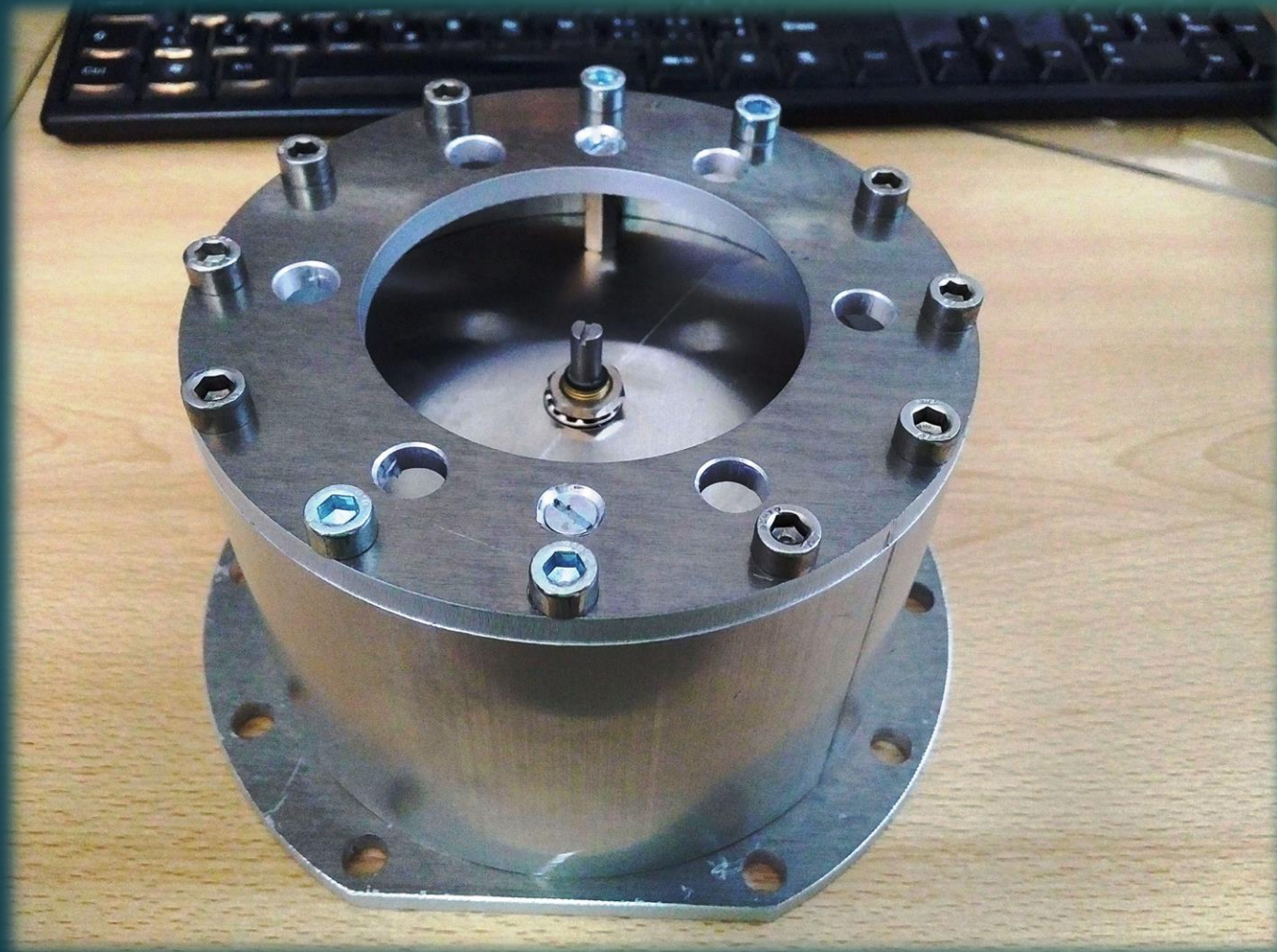


- Result after fine tuning of all screws in combiners
- Input divider – RF in +11,8dBm
- Output +43,51dBm
- Gain 31,7dB

# OK1DFC MW portable



# OK1DFC MW portable







Thank you for attention !!!

Questions ?????

