

9. TRANSMIT POWER CONTROL

9.1. TEST CONDITIONS

Test performed by : Arnaud FAYETTE
Date of test : December 7, 2016
Ambient temperature : 22 °C
Relative humidity : 42 %

9.2. TEST SETUP

- The Equipment Under Test is installed:

- ☒ On a table
- ☐ In an anechoic chamber

- Measurement is performed with a spectrum analyzer in:

- ☒ Conducted Method
- ☐ Radiated Method

- Test Procedure:

- ☒ KDB 789033 D02 General UNII Test Procedures New Rules v01r02 § E2 b) (Method SA-1) & F
- ☐ KDB 789033 D02 General UNII Test Procedures New Rules v01r02 § E2 c) (Method SA-2) & F
- ☒ KDB 662911 D01 Multiple Transmitter Output v02r01
- ☒ KDB 644545 D03 Guidance for IEEE 802.11ac v01



Photograph for Maximum Conducted Output Power



9.1. LIMIT

FCC Part 15.407

TPC Min (EIRP):

5250MHz-5350MHz: Shall not exceed 24dBm

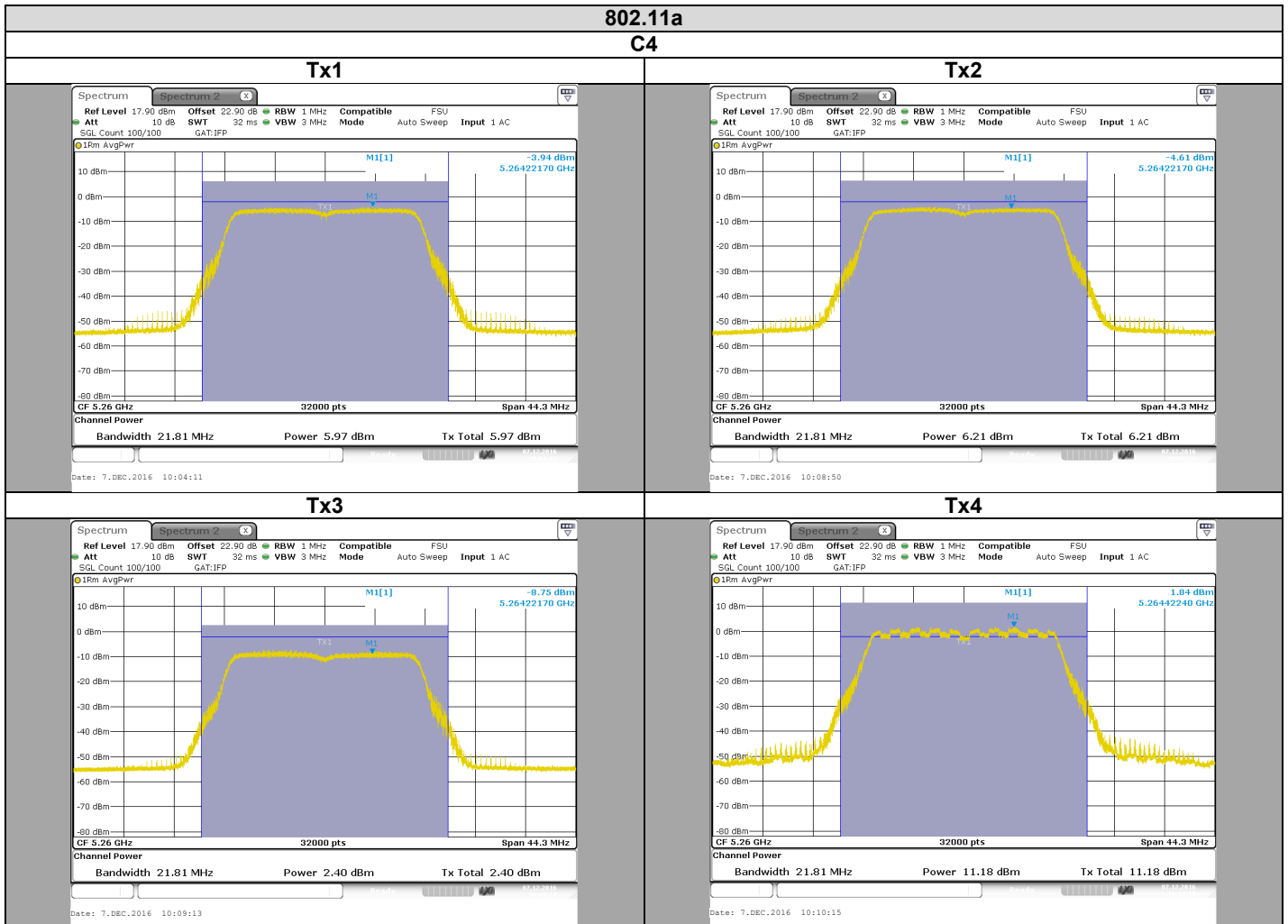
5470MHz-5725MHz: Shall not exceed 24dBm

9.2. TEST EQUIPMENT LIST

DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Cal_Date	Cal_Due
Multi-meter	KEITHLEY	2000	A1242090	2016/05	2018/05
Programmable AC/DC power supply	-; KIKUSUI	PCR500M	A7040079	Verified with calibrated multimeter	Verified with calibrated multimeter
EMI receiver	ROHDE & SCHWARZ	ESR 7	A2642023	2016/03	2017/03
RF cable & 20 dB attenuator	Télédyn	920-0202-048	A5329674	2016/10	2017/10

9.3. RESULTS

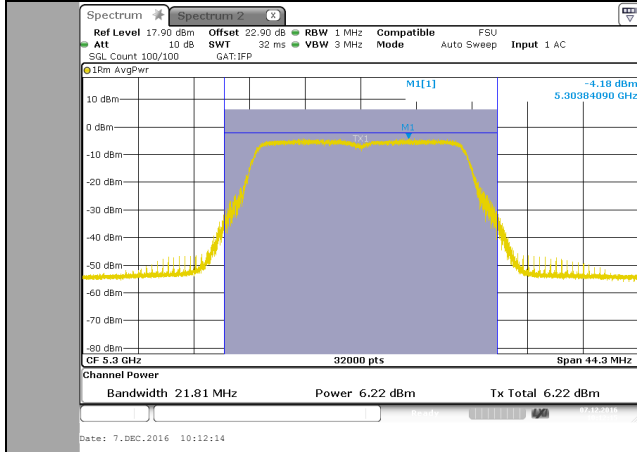
9.3.1. Without Beamforming



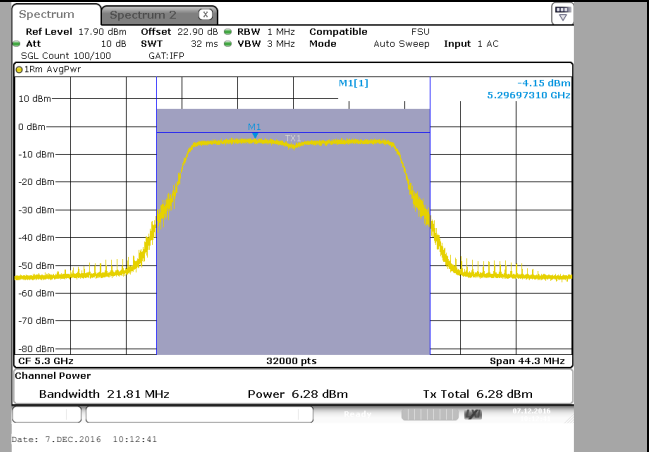
802.11a

C5

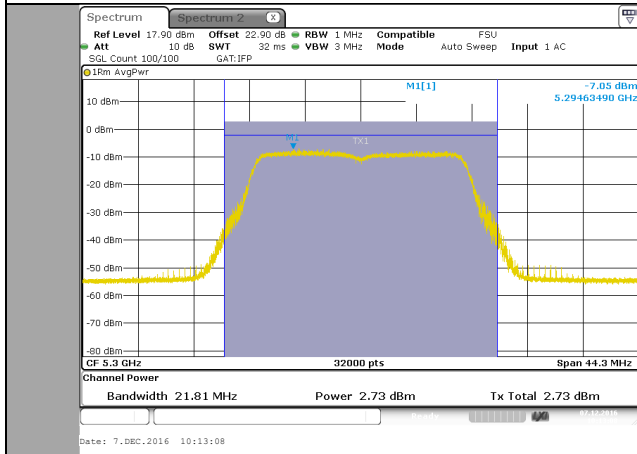
Tx1



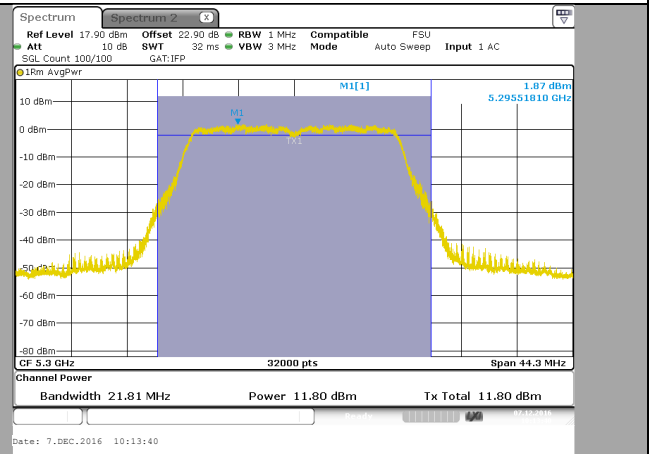
Tx2



Tx3



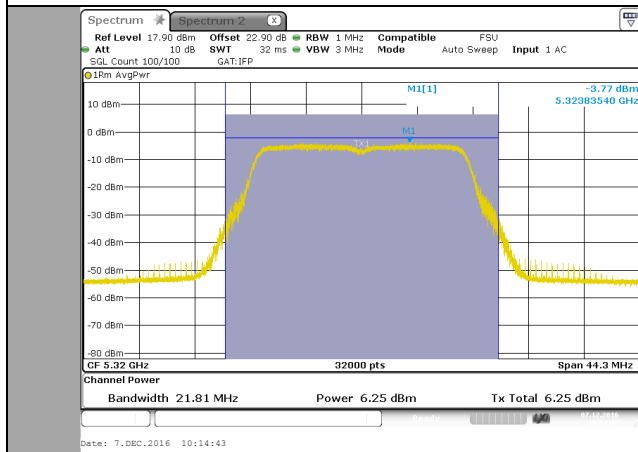
Tx4



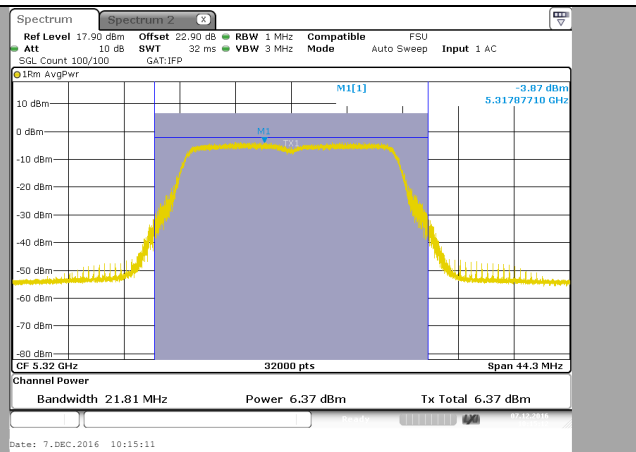
802.11a

C6

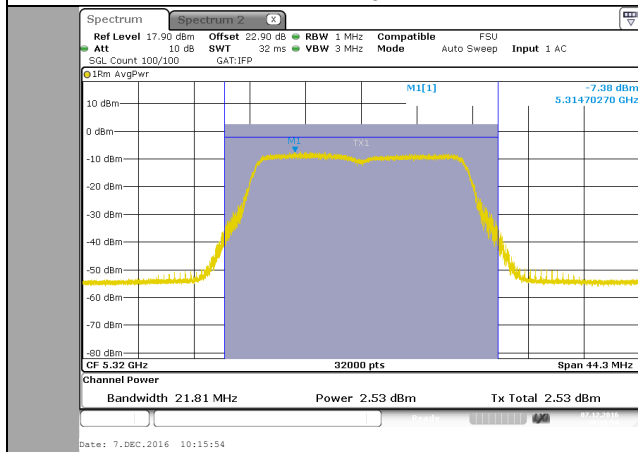
Tx1



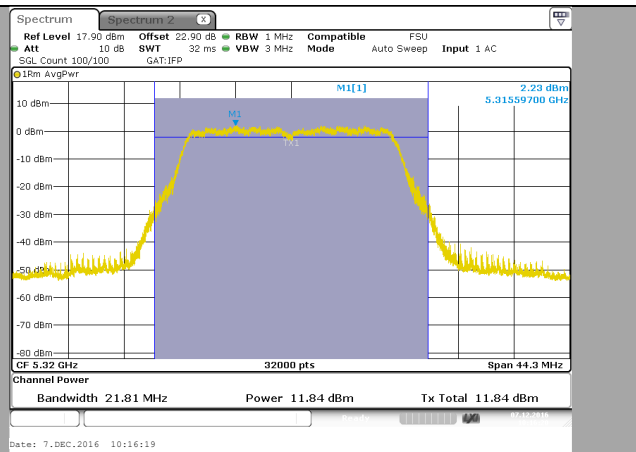
Tx2



Tx3



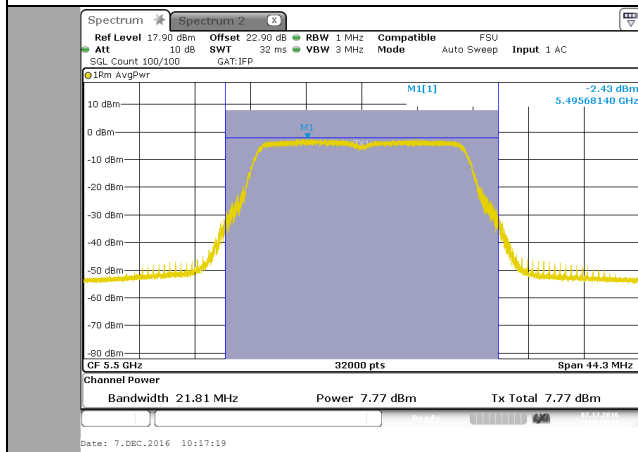
Tx4



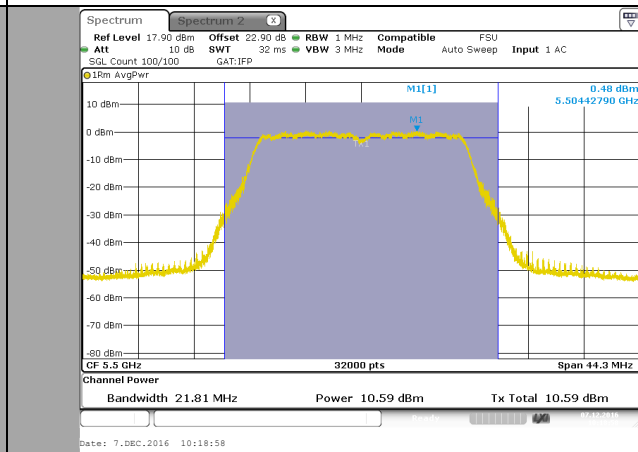
802.11a

C7

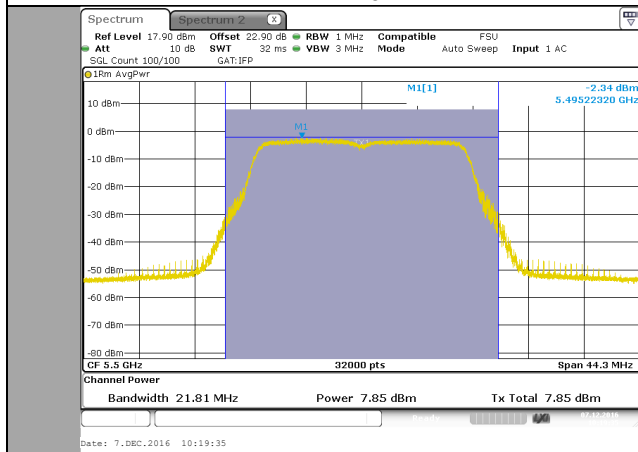
Tx1



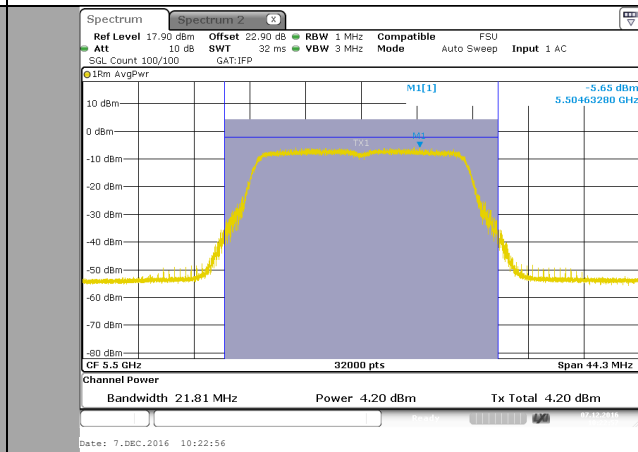
Tx2



Tx3



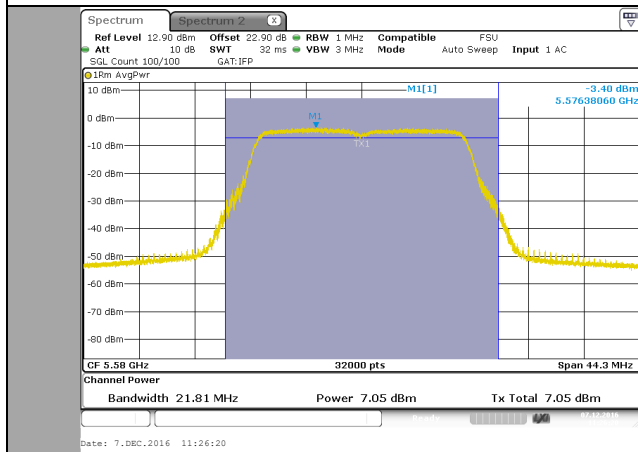
Tx4



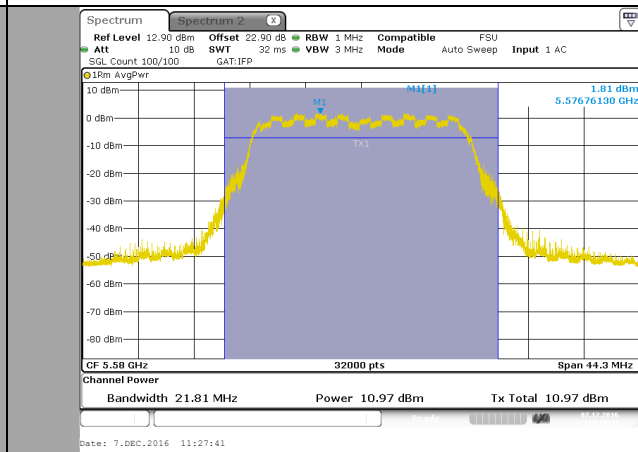
802.11a

C8

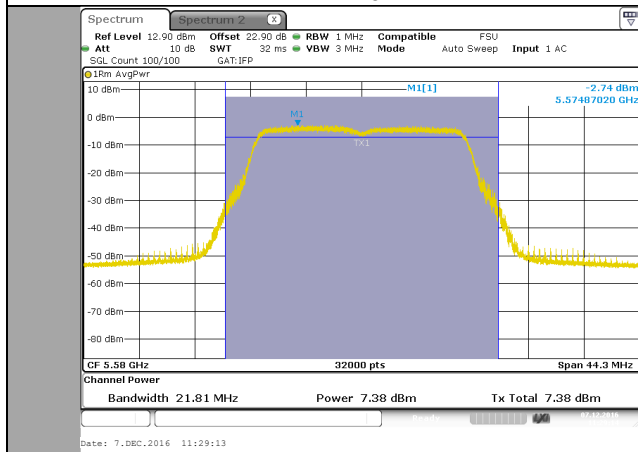
Tx1



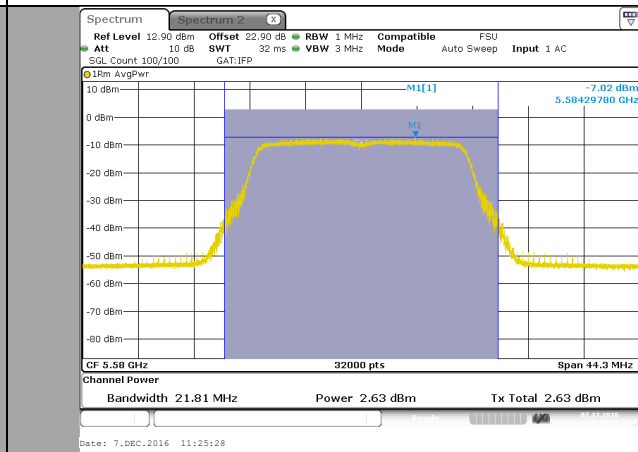
Tx2



Tx3



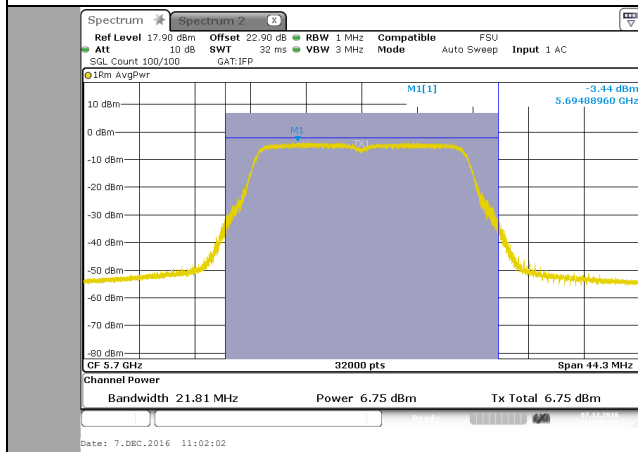
Tx4



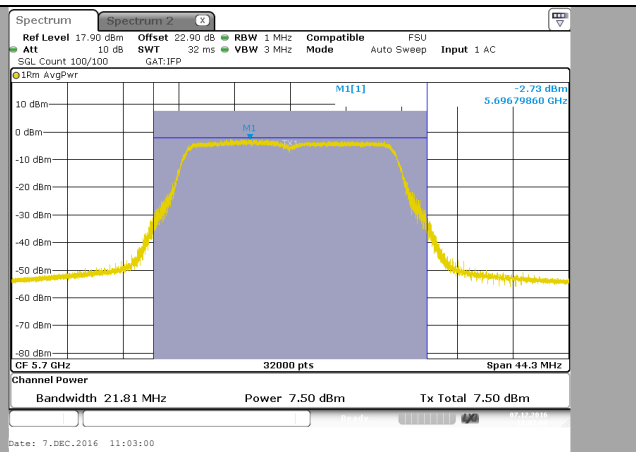
802.11a

C9

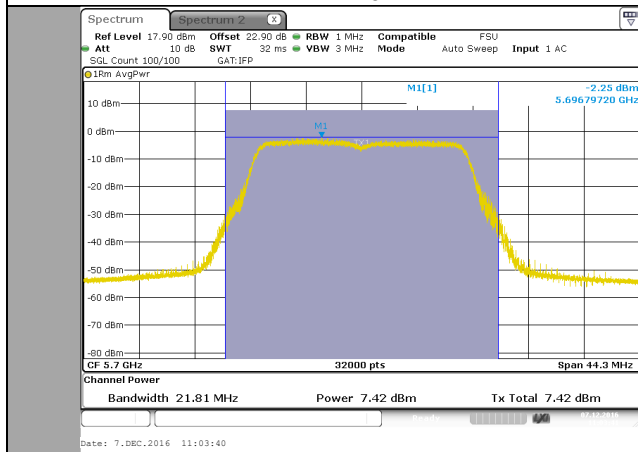
Tx1



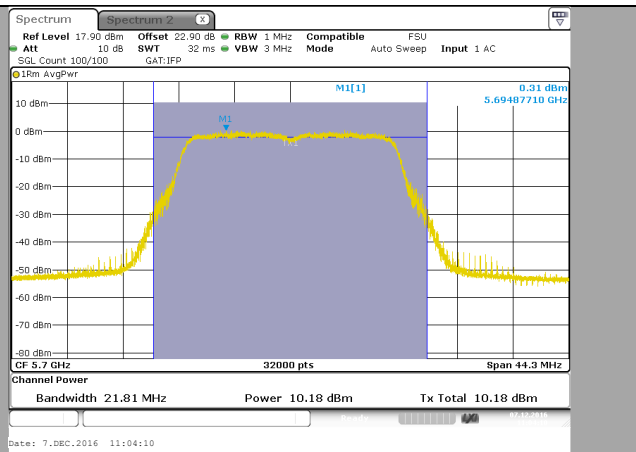
Tx2



Tx3



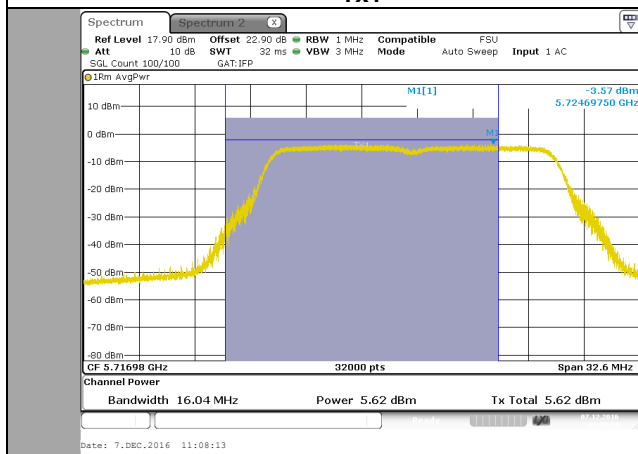
Tx4



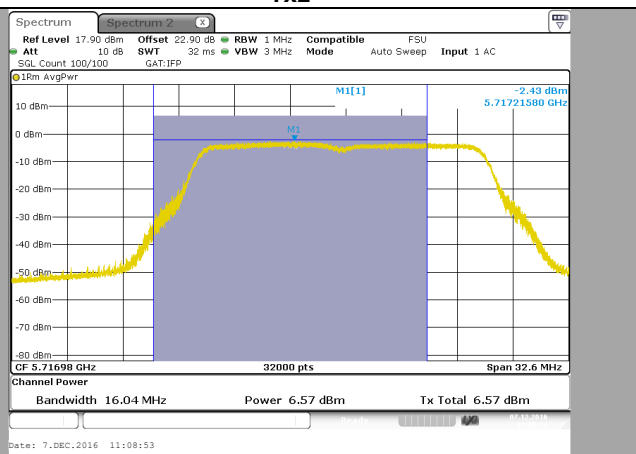
802.11a

C10 Straddle 5470MHz-5725MHz

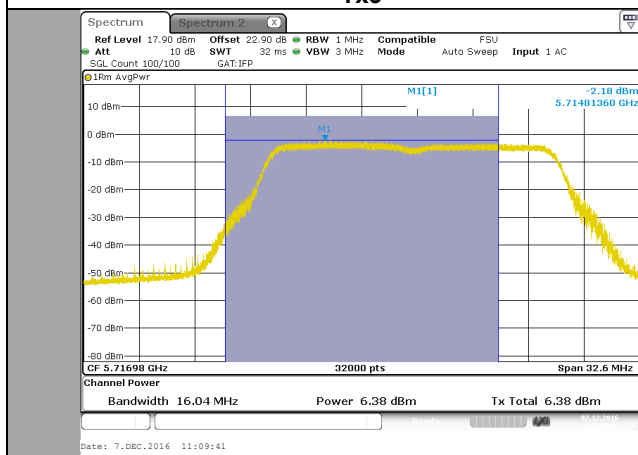
Tx1



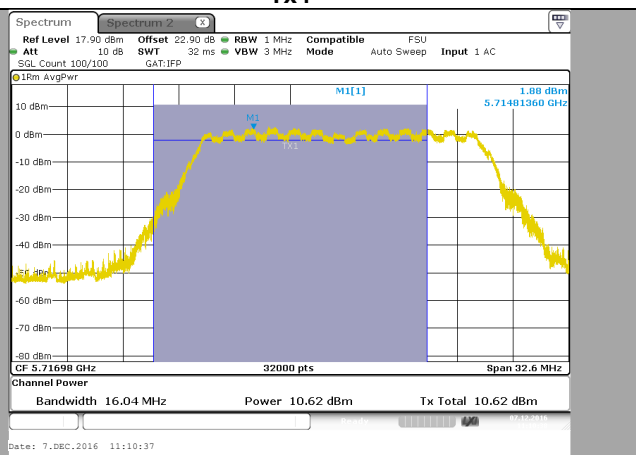
Tx2

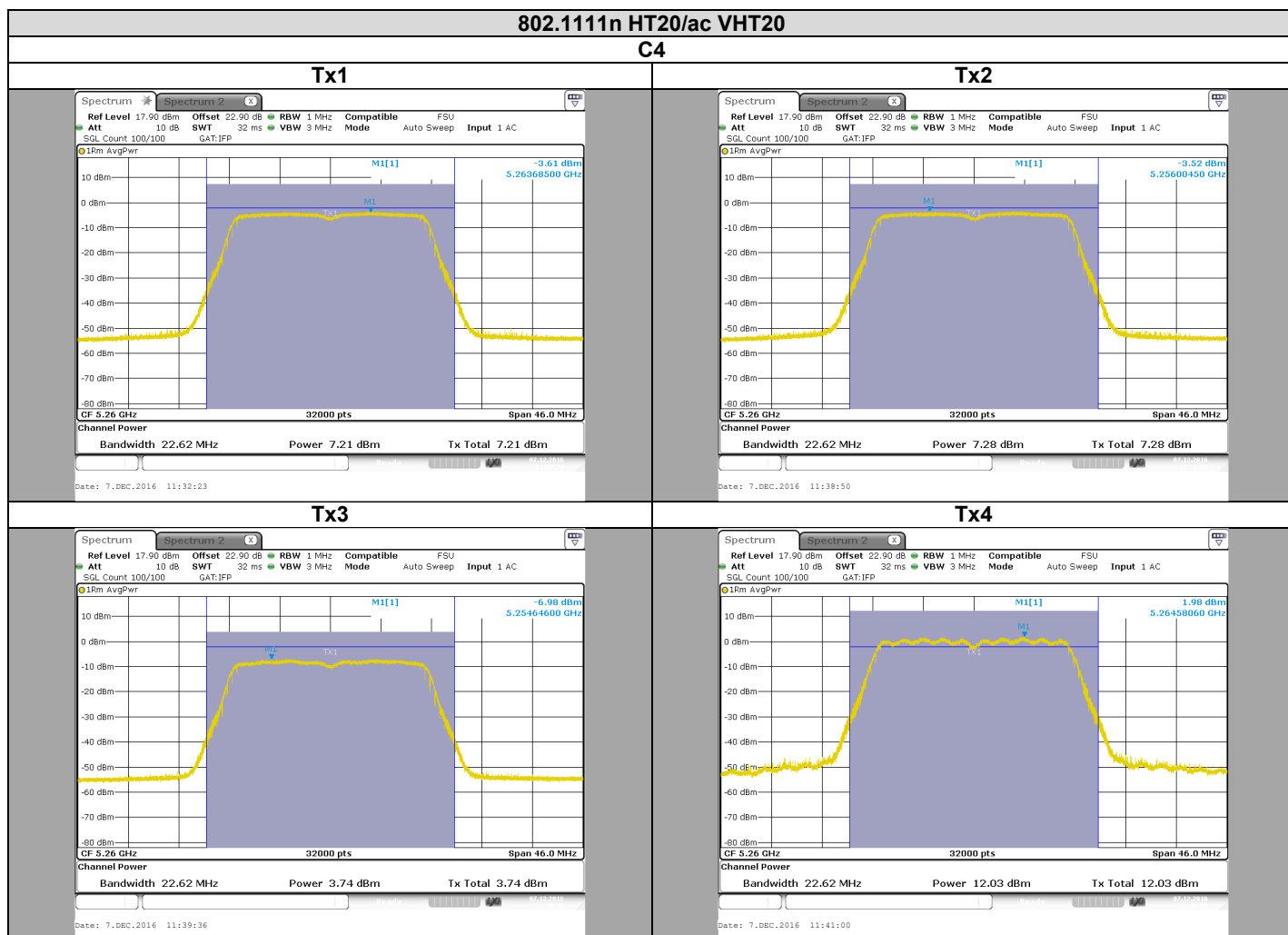


Tx3



Tx4

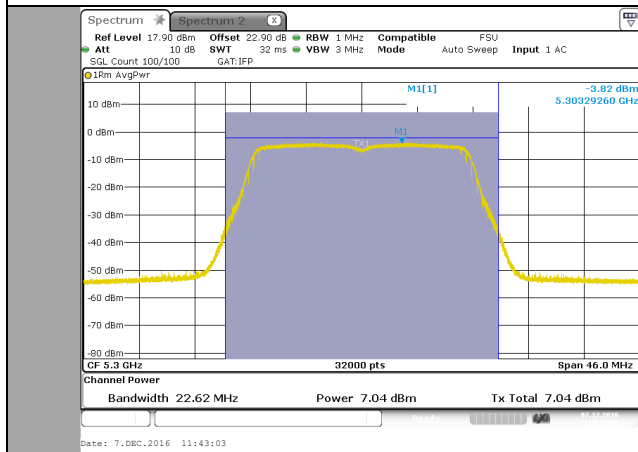




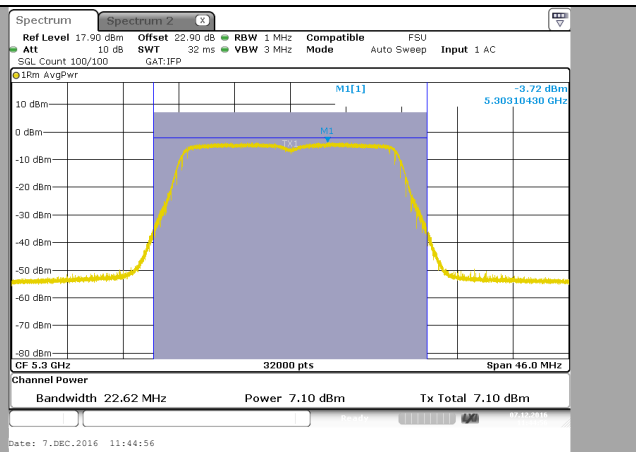
802.1111n HT20/ac VHT20

C5

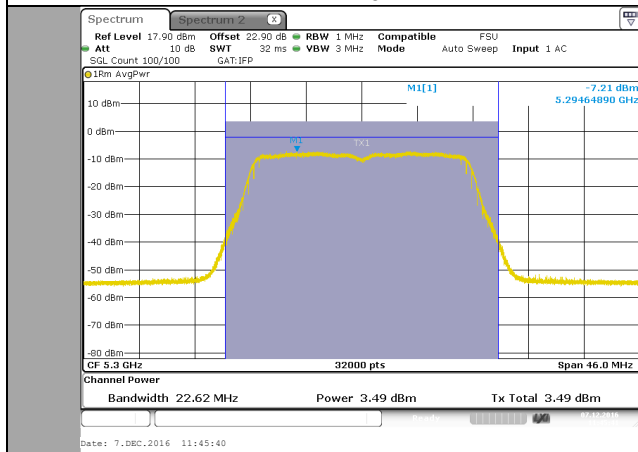
Tx1



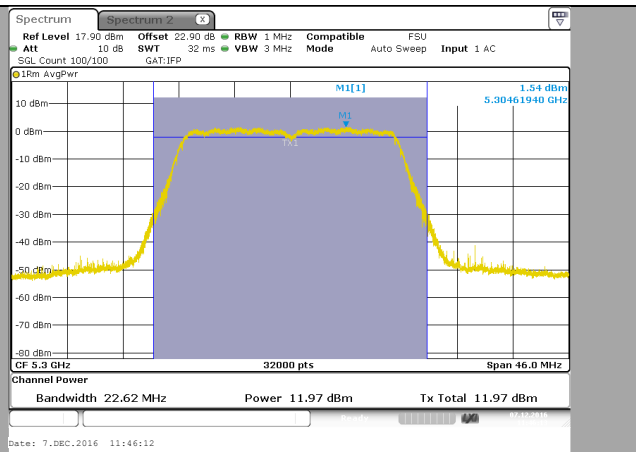
Tx2



Tx3



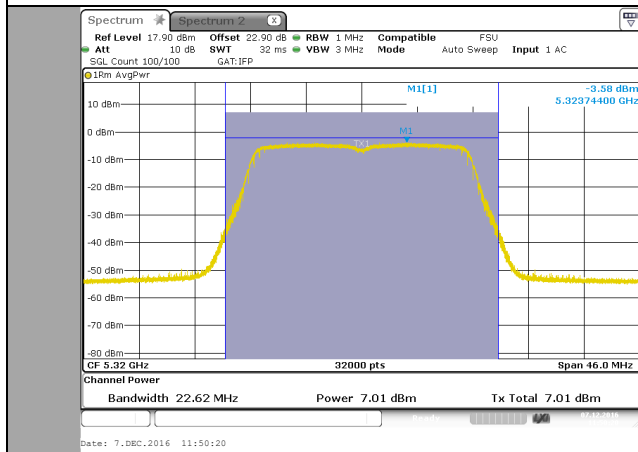
Tx4



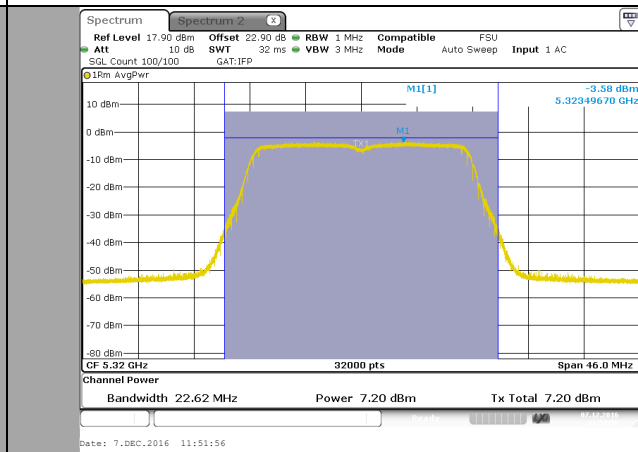
802.1111n HT20/ac VHT20

C6

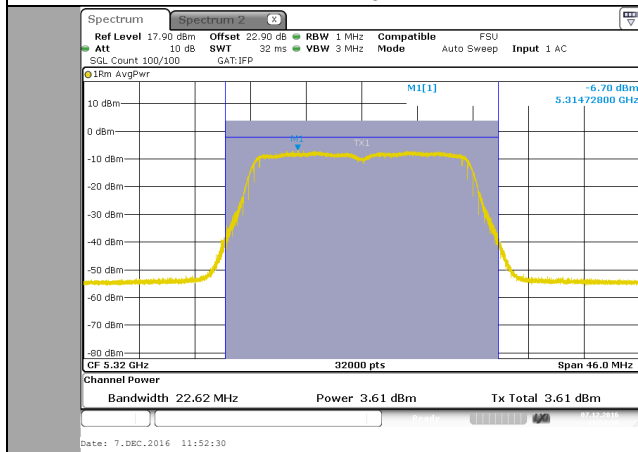
Tx1



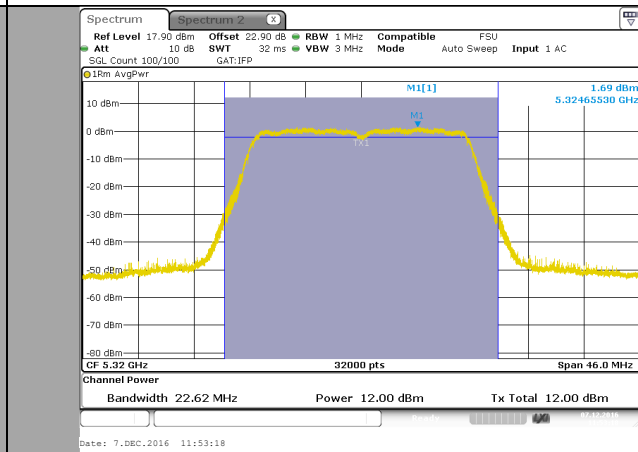
Tx2



Tx3



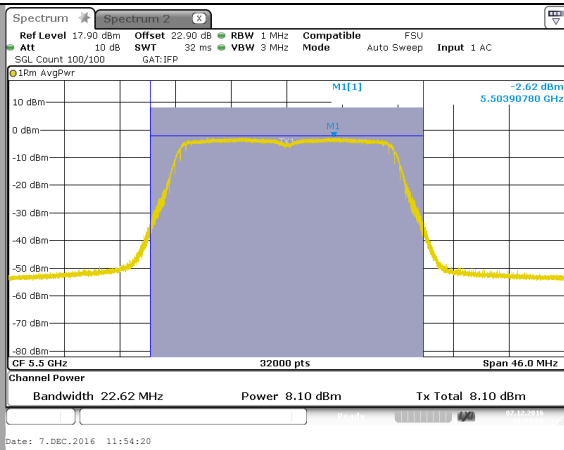
Tx4



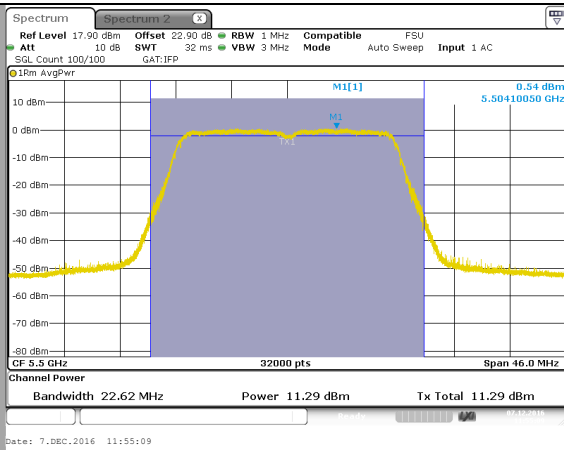
802.1111n HT20/ac VHT20

C7

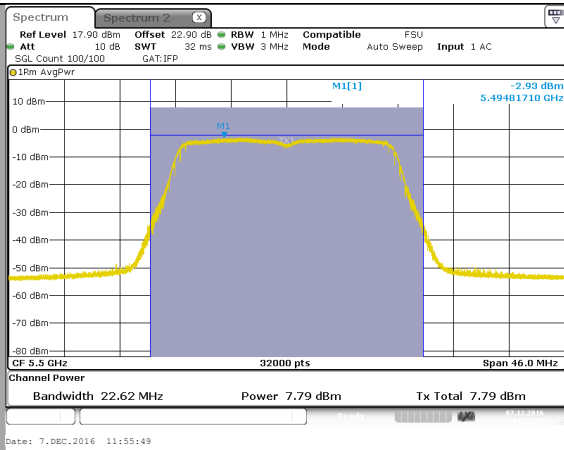
Tx1



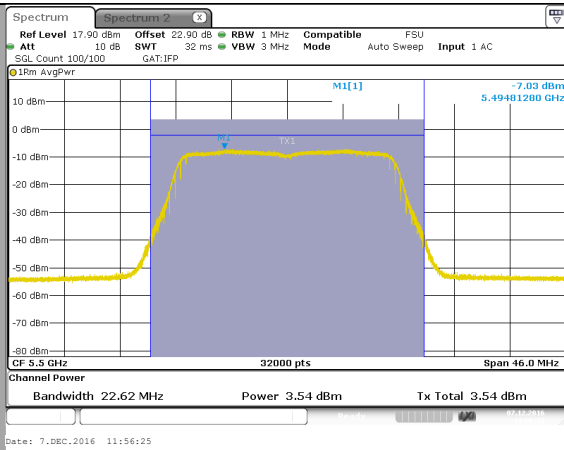
Tx2



Tx3



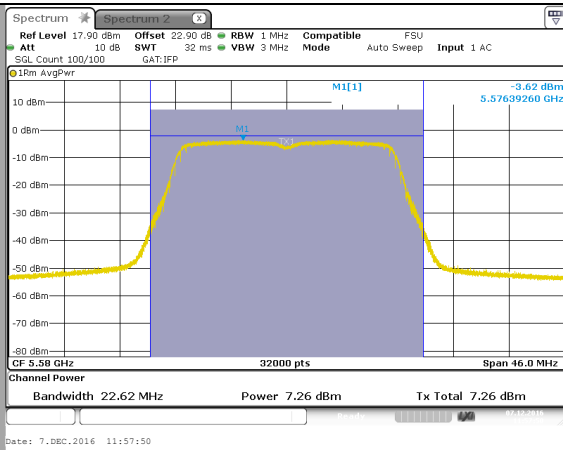
Tx4



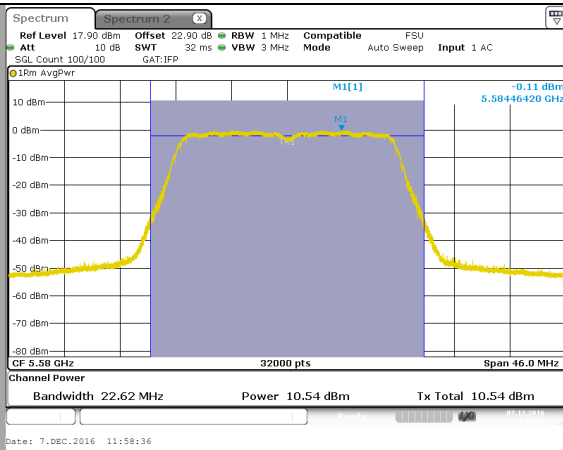
802.1111n HT20/ac VHT20

C8

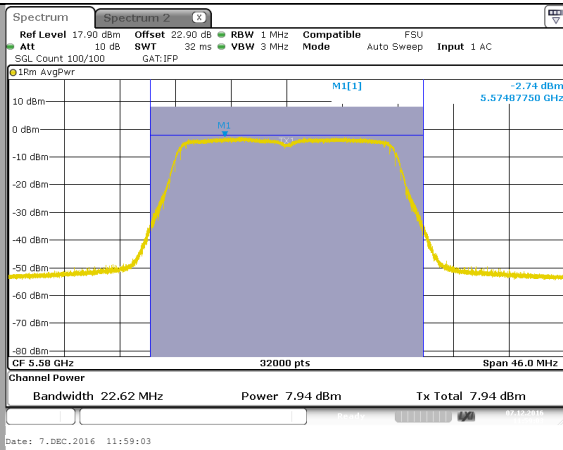
Tx1



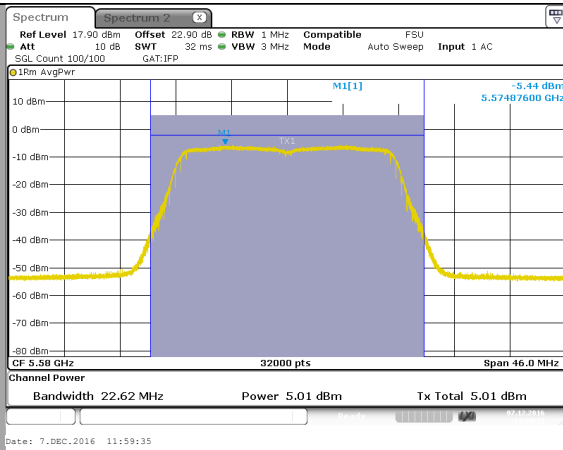
Tx2



Tx3



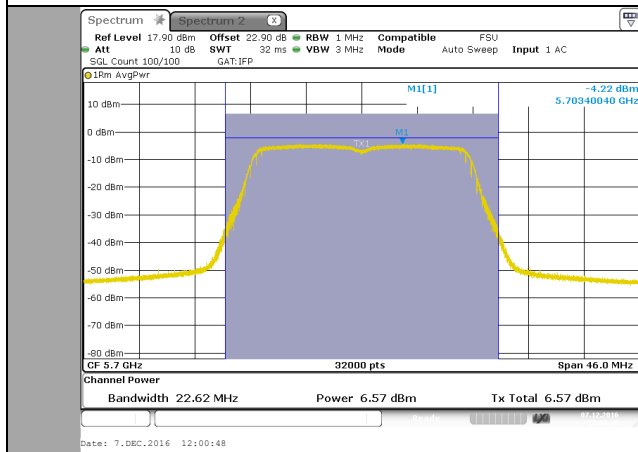
Tx4



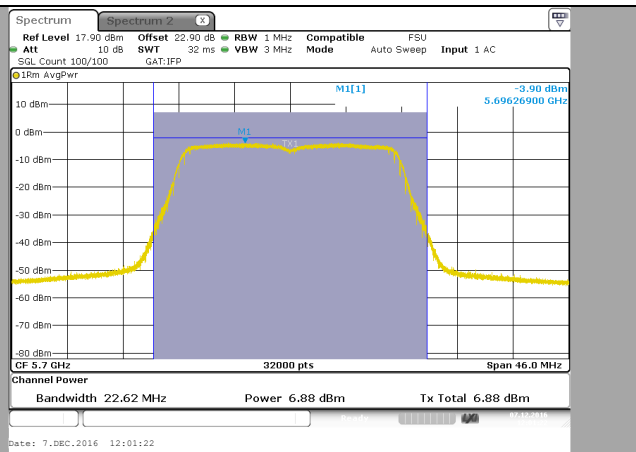
802.1111n HT20/ac VHT20

C9

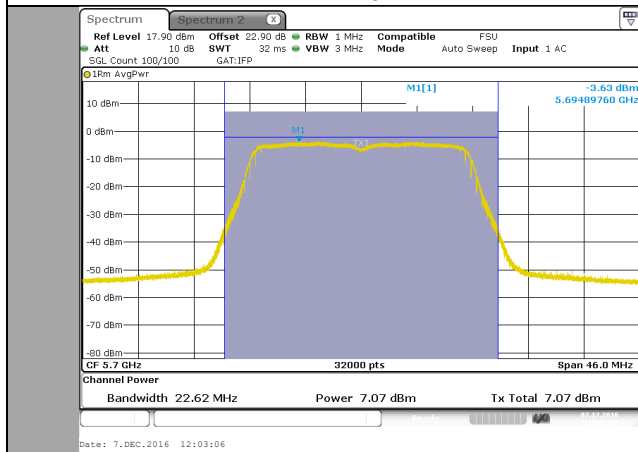
Tx1



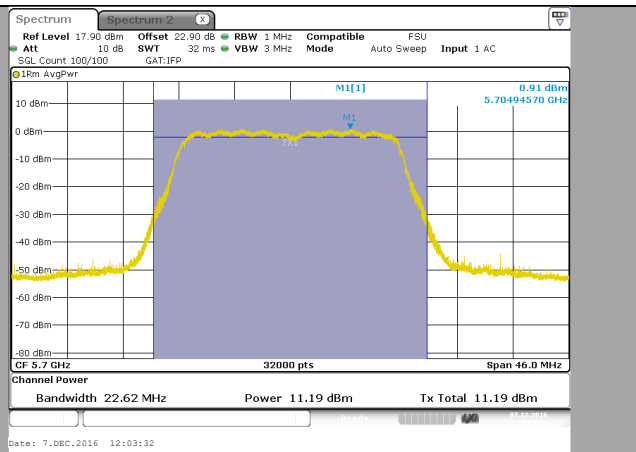
Tx2



Tx3

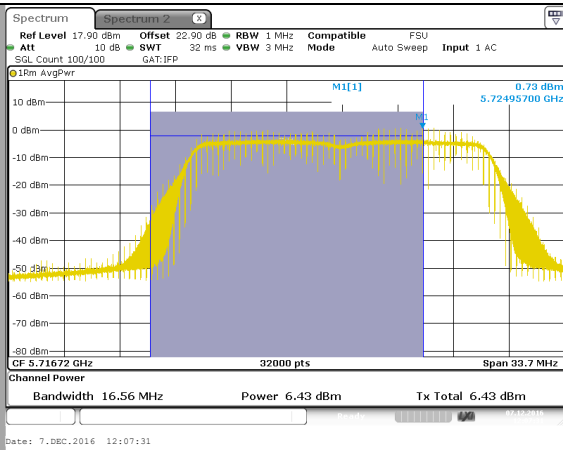


Tx4

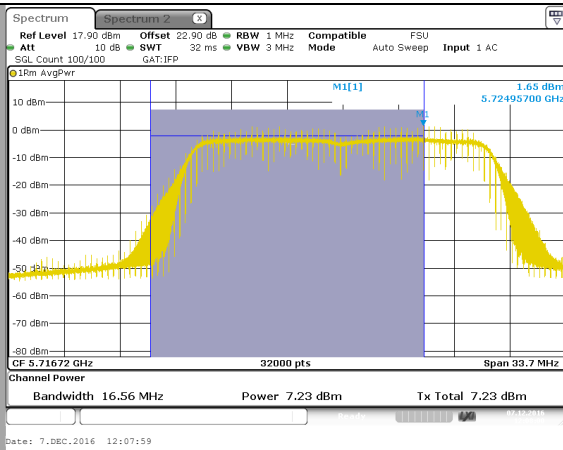


**802.1111n HT20/ac VHT20
C10 Straddle 5470MHz-5725MHz**

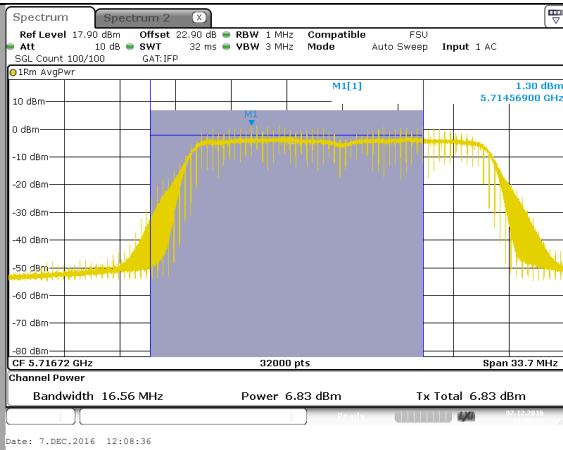
Tx1



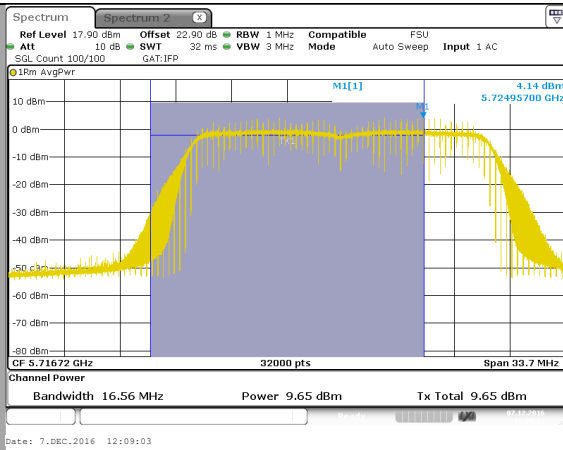
Tx2

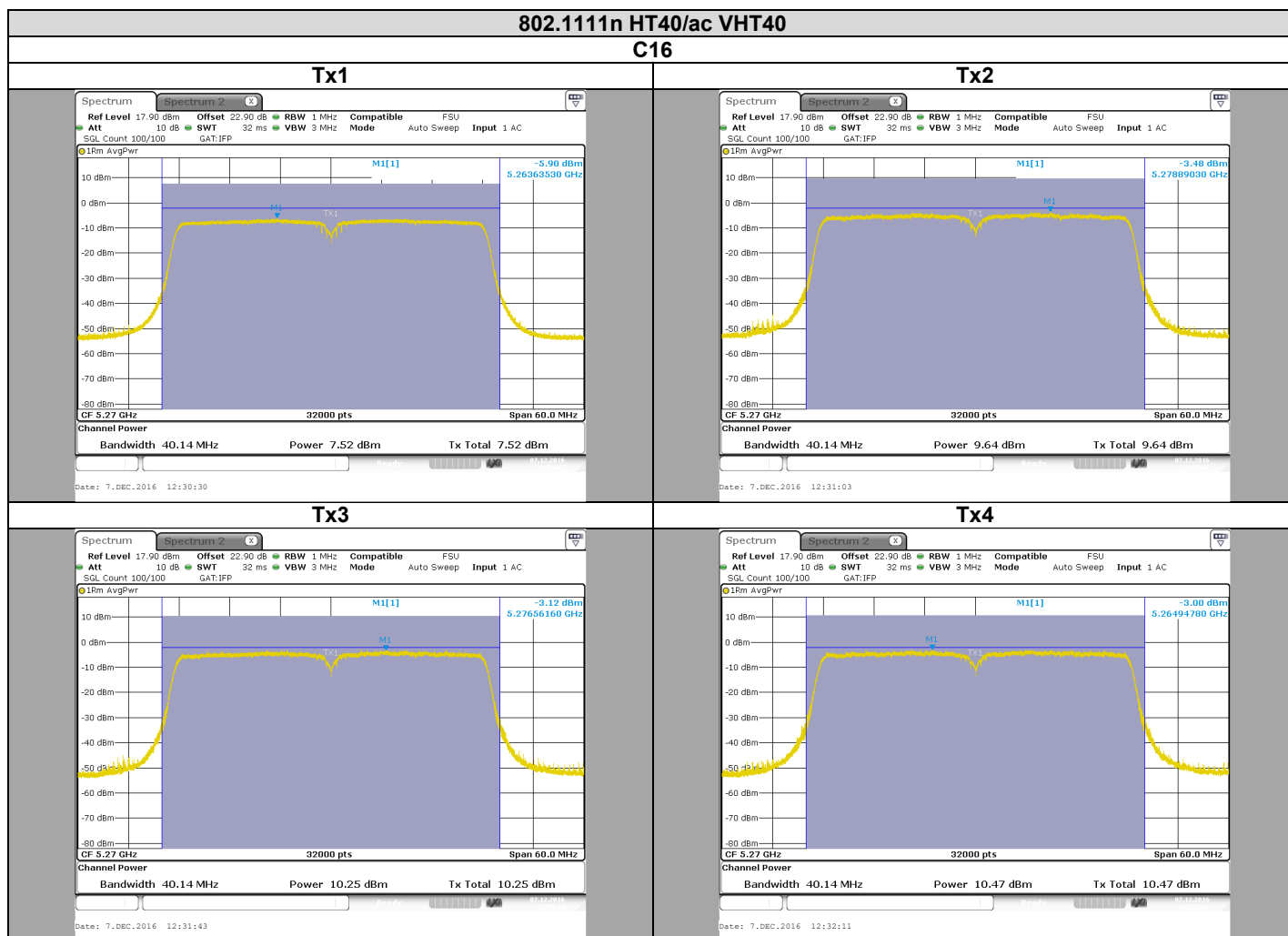


Tx3



Tx4

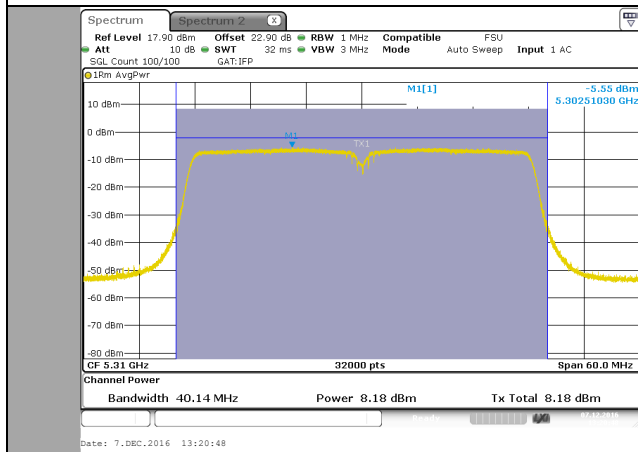




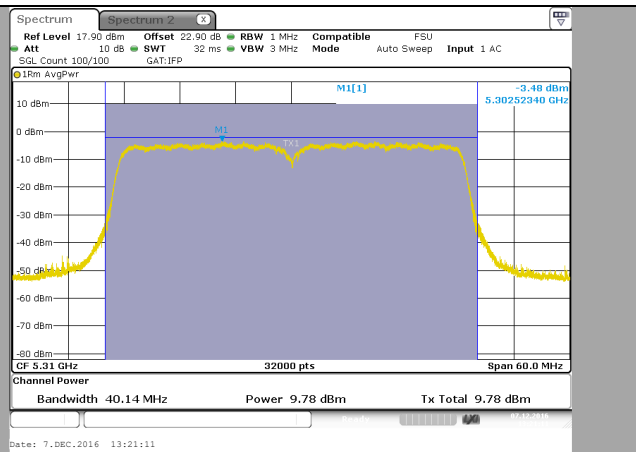
802.1111n HT40/ac VHT40

C17

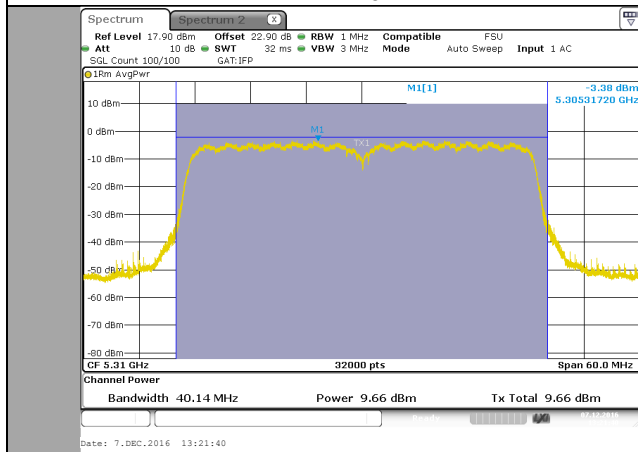
Tx1



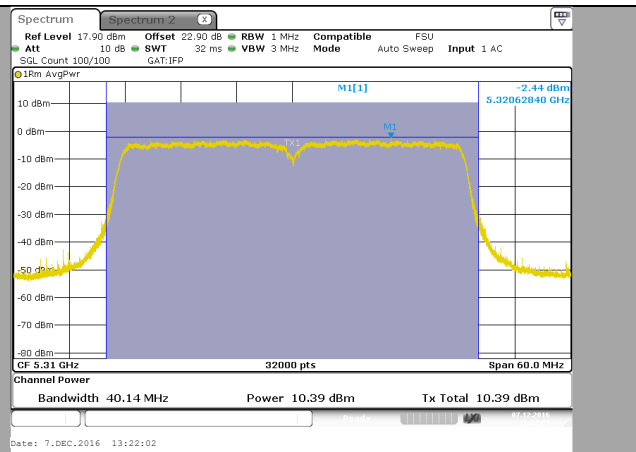
Tx2



Tx3



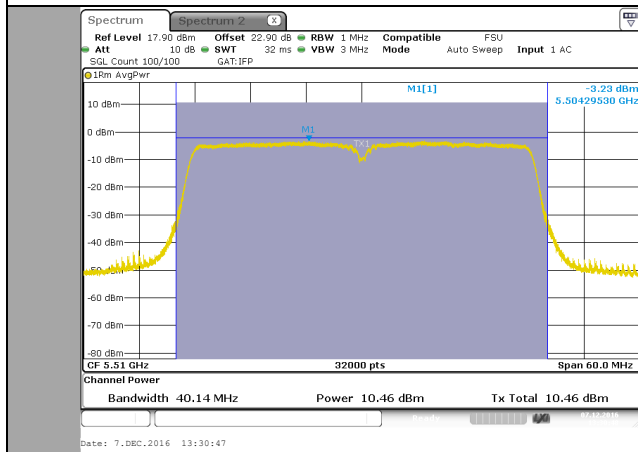
Tx4



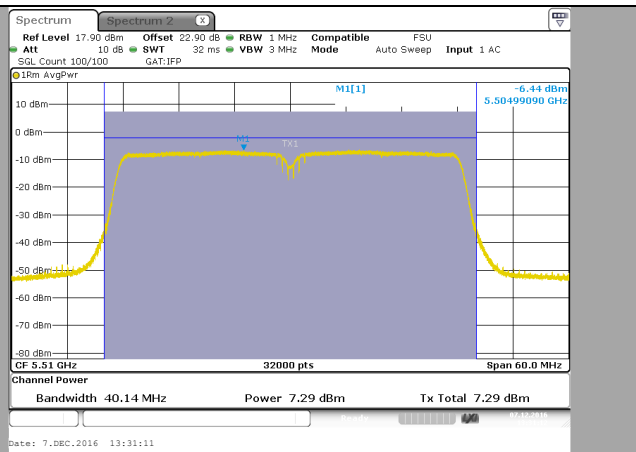
802.1111n HT40/ac VHT40

C18

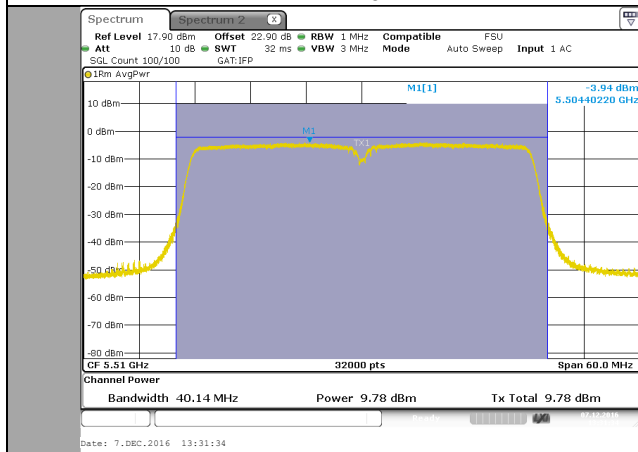
Tx1



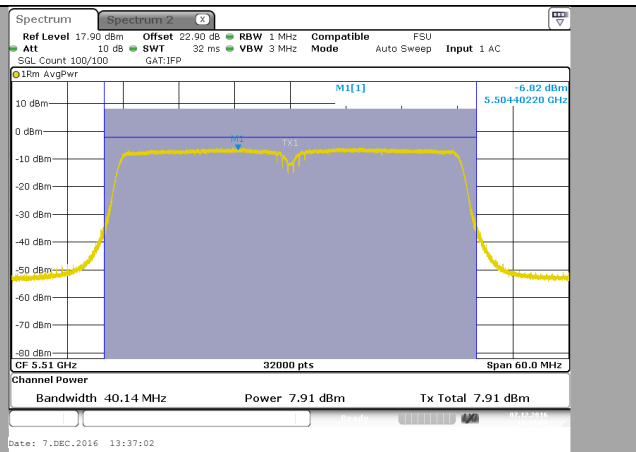
Tx2



Tx3



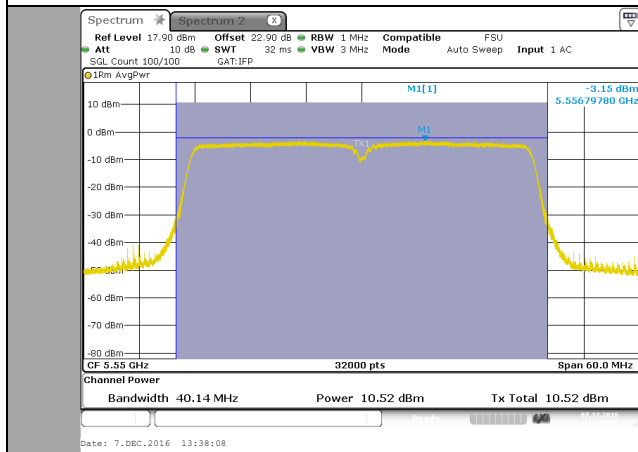
Tx4



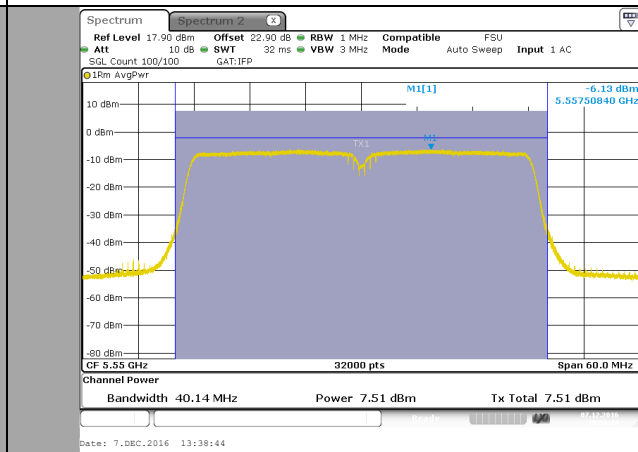
802.1111n HT40/ac VHT40

C19

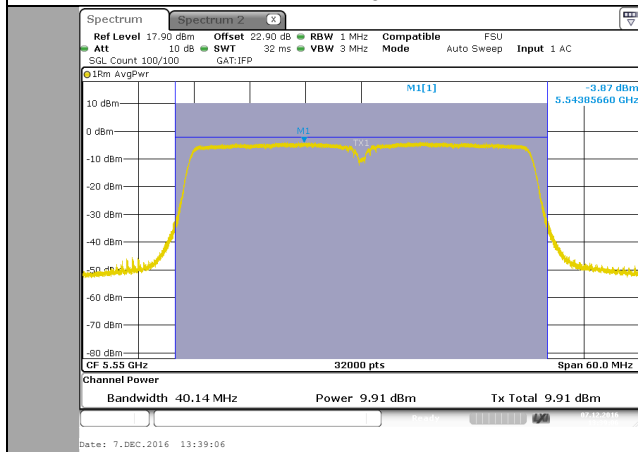
Tx1



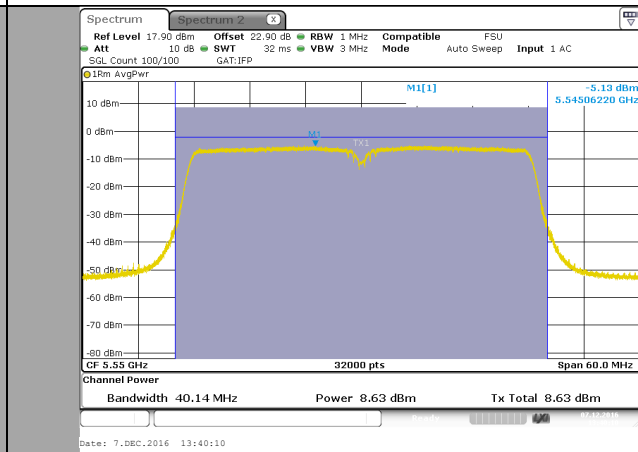
Tx2



Tx3



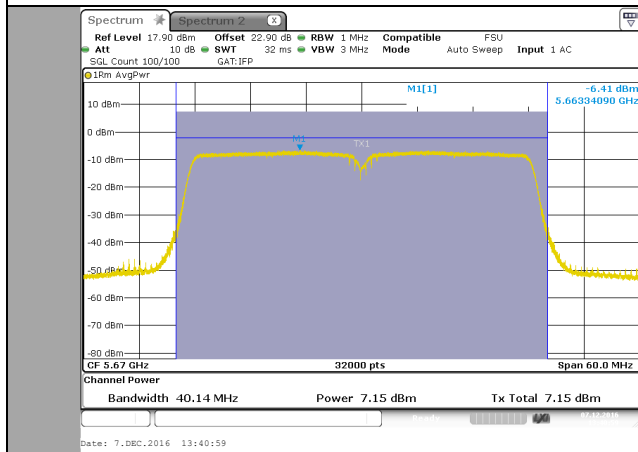
Tx4



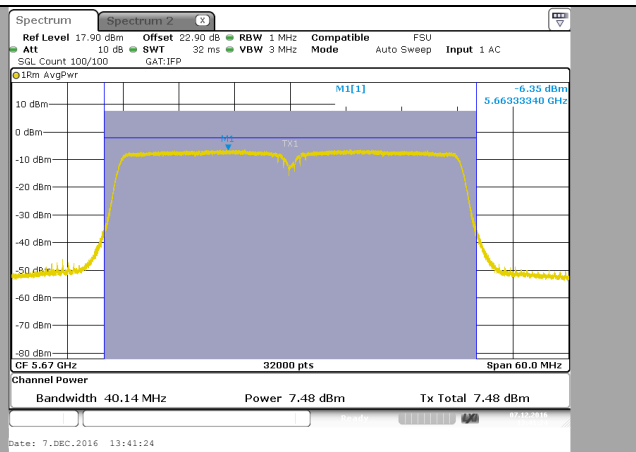
802.1111n HT40/ac VHT40

C20

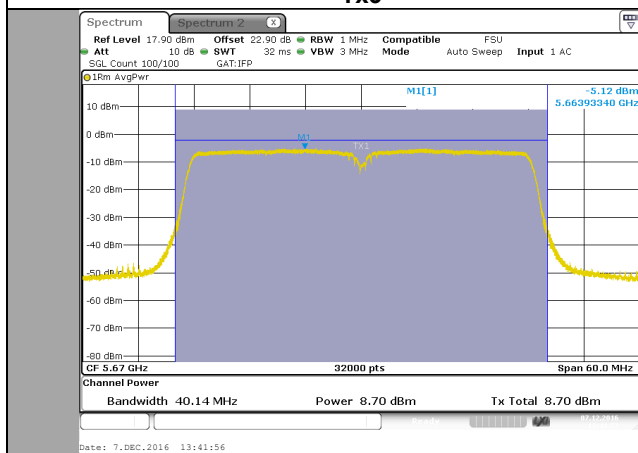
Tx1



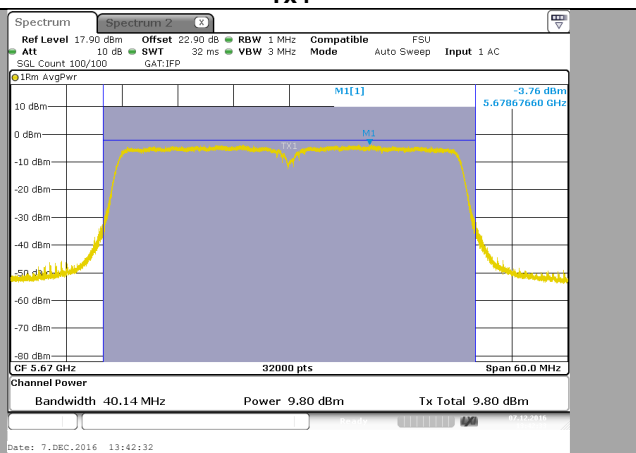
Tx2

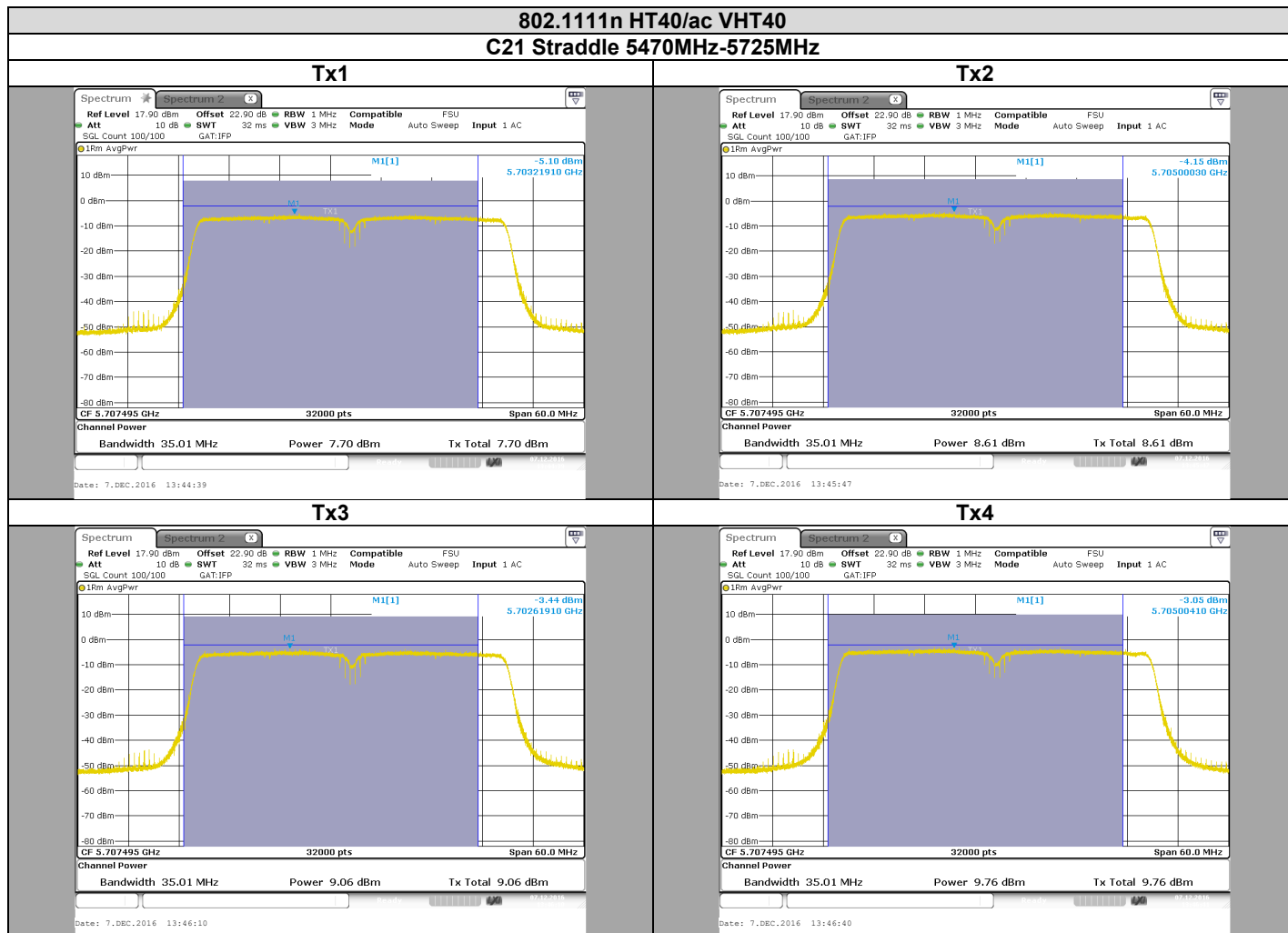


Tx3



Tx4

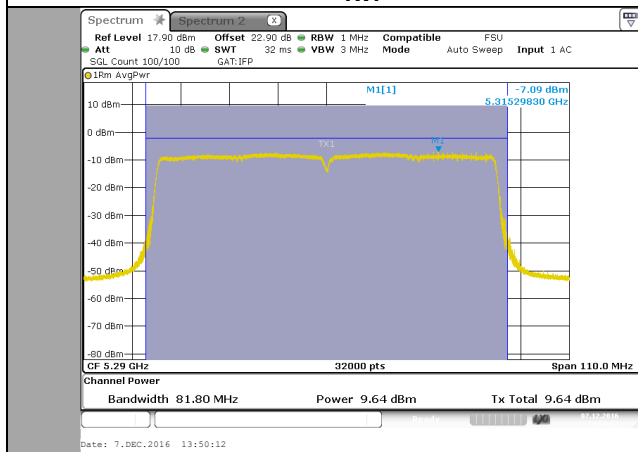




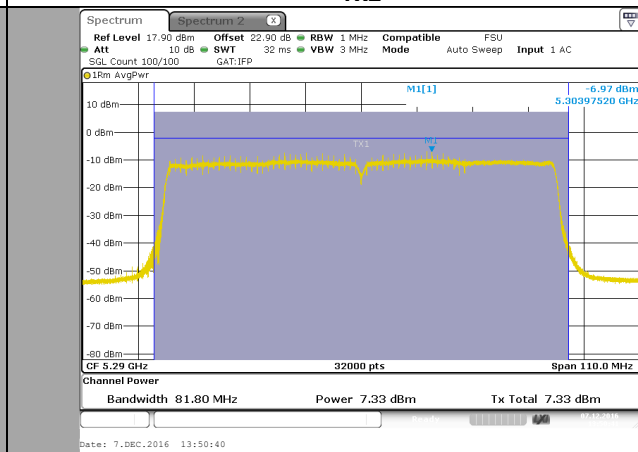
802.11ac VHT80

C25

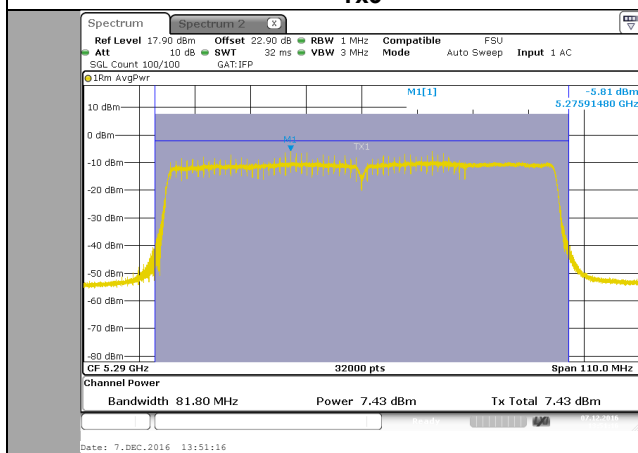
Tx1



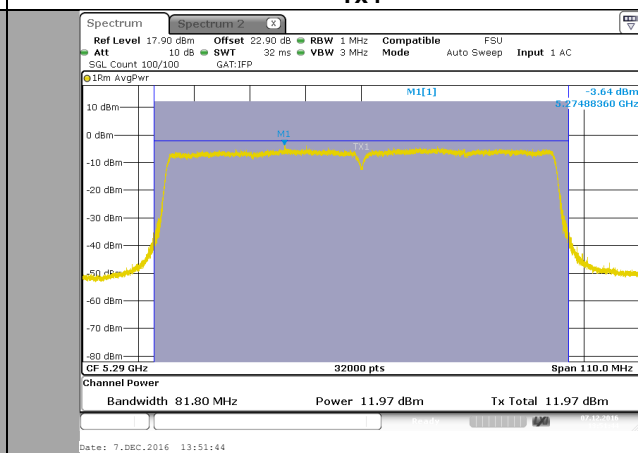
Tx2



Tx3



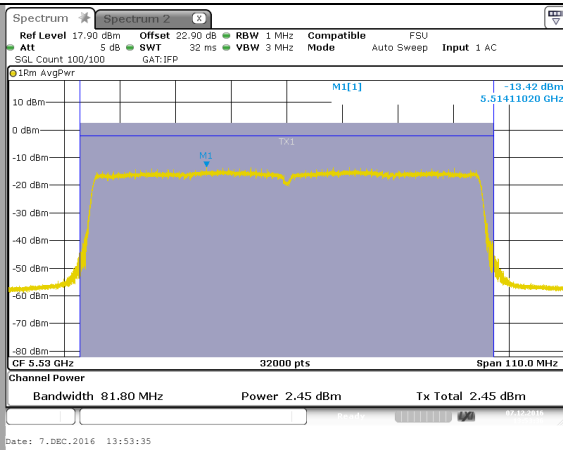
Tx4



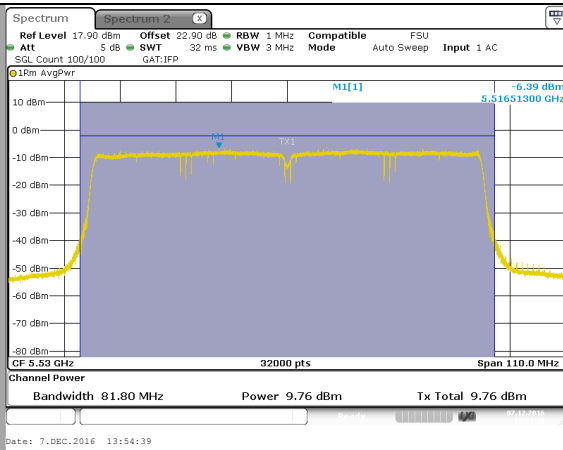
802.11ac VHT80

C26

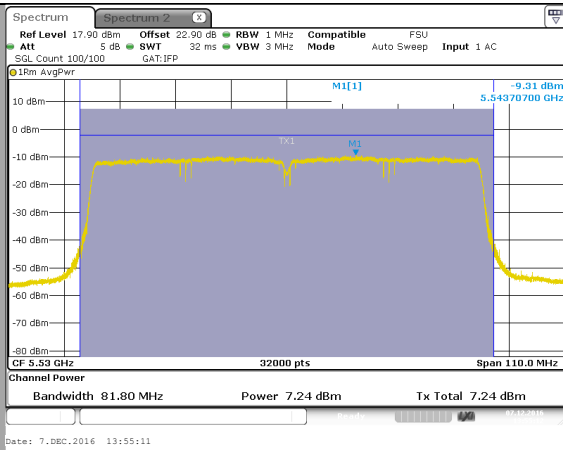
Tx1



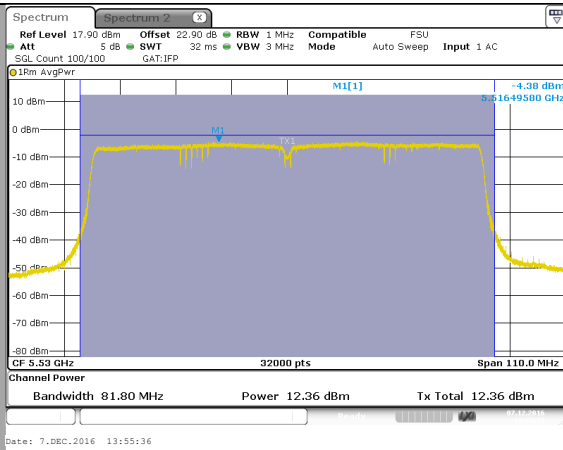
Tx2



Tx3



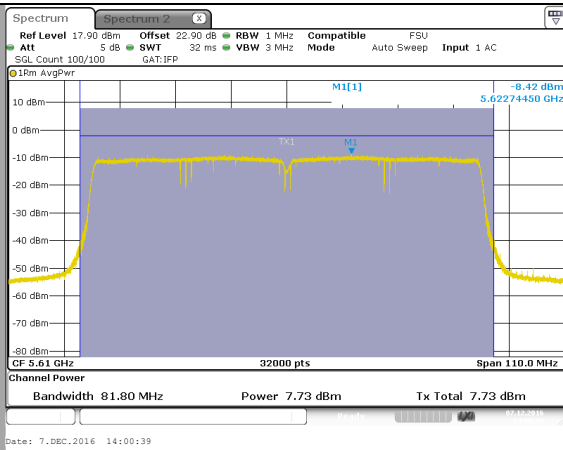
Tx4



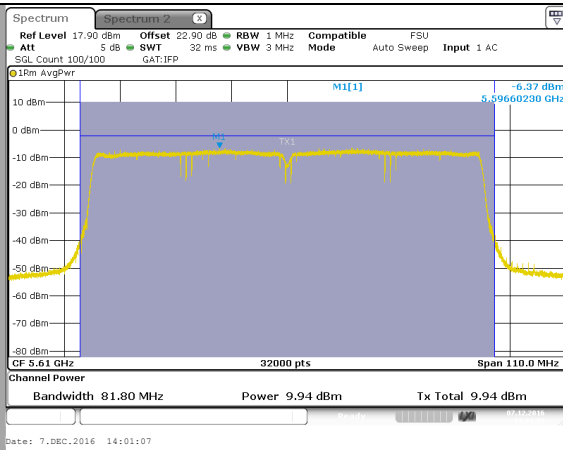
802.11ac VHT80

C27

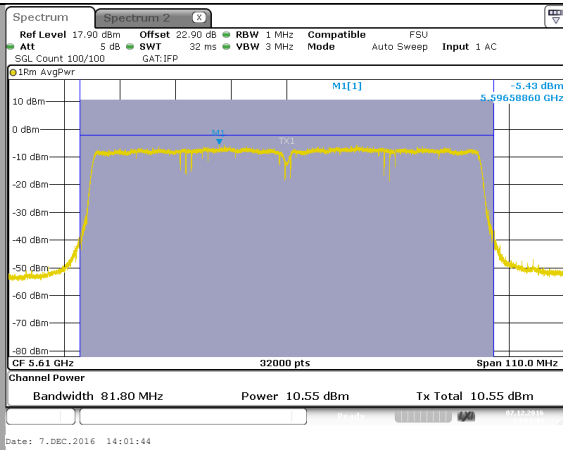
Tx1



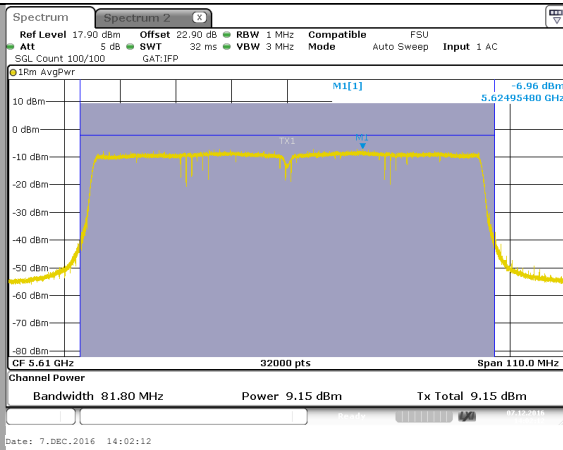
Tx2



Tx3



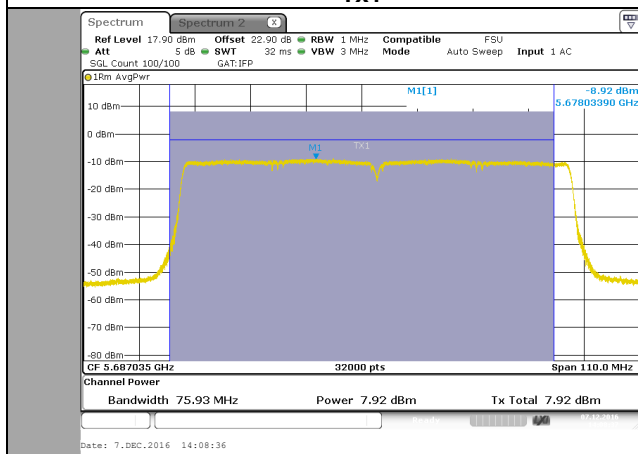
Tx4



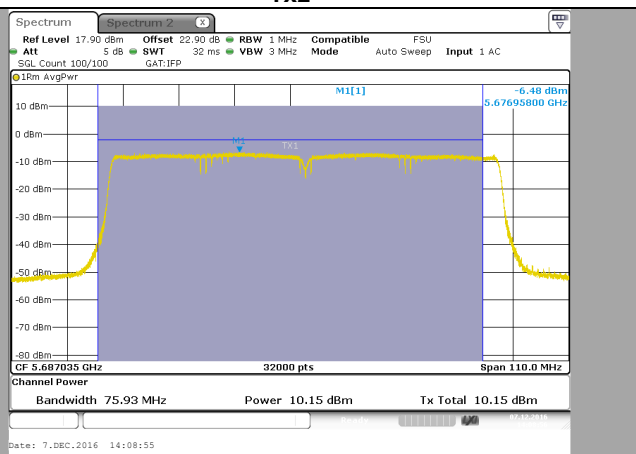
802.11ac VHT80

C28 Straddle 5470MHz-5725MHz

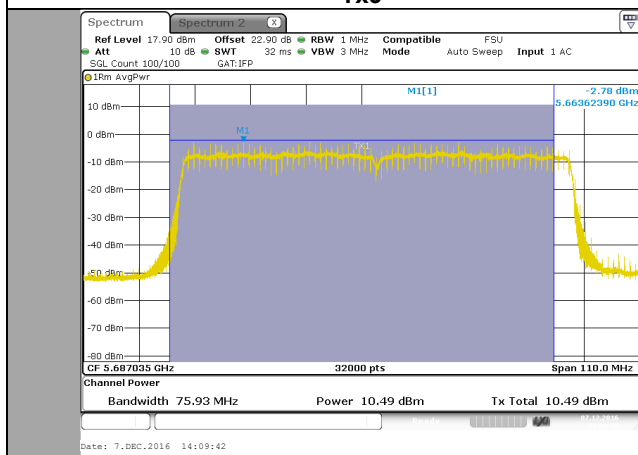
Tx1



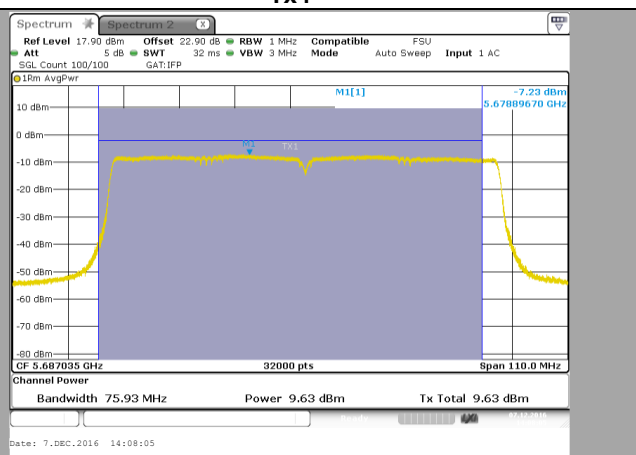
Tx2



Tx3



Tx4



802.11a

Channel	Tx1 (dBm)	Tx2 (dBm)	Tx3 (dBm)	Tx4 (dBm)	TxAll (dBm)	AG (dBi)	TPC Min (dBm)	TPC Min Limit (dBm)
C4	5,97	6,21	2,4	11,18	13,6	8	21,6	24
C5	6,22	6,28	2,73	11,8	14,1	8	22,1	24
C6	6,25	6,37	2,53	11,84	14,1	8	22,1	24
C7	7,77	10,59	7,85	4,2	14,2	8	22,2	24
C8	7,05	10,97	7,38	2,63	14,0	8	22,0	24
C9	6,75	7,5	7,42	10,18	14,2	8	22,2	24
C10 Straddle 5470MHz-5725MHz	5,62	6,57	6,38	10,62	13,8	8	21,8	24

802.11n HT20/ac VHT20

Channel	Tx1 (dBm)	Tx2 (dBm)	Tx3 (dBm)	Tx4 (dBm)	TxAll (dBm)	AG (dBi)	TPC Min (dBm)	TPC Min Limit (dBm)
C4	7,21	7,28	3,74	12,03	14,6	8	22,6	24
C5	7,04	7,1	3,49	11,97	14,5	8	22,5	24
C6	7,01	7,2	3,61	12	14,5	8	22,5	24
C7	8,1	11,29	7,79	3,54	14,5	8	22,5	24
C8	7,26	10,54	7,94	5,01	14,2	8	22,2	24
C9	6,57	6,88	7,07	11,19	14,4	8	22,4	24
C10 Straddle 5470MHz-5725MHz	6,43	7,23	6,83	9,65	13,8	8	21,8	24

802.11n HT40/ac VHT40

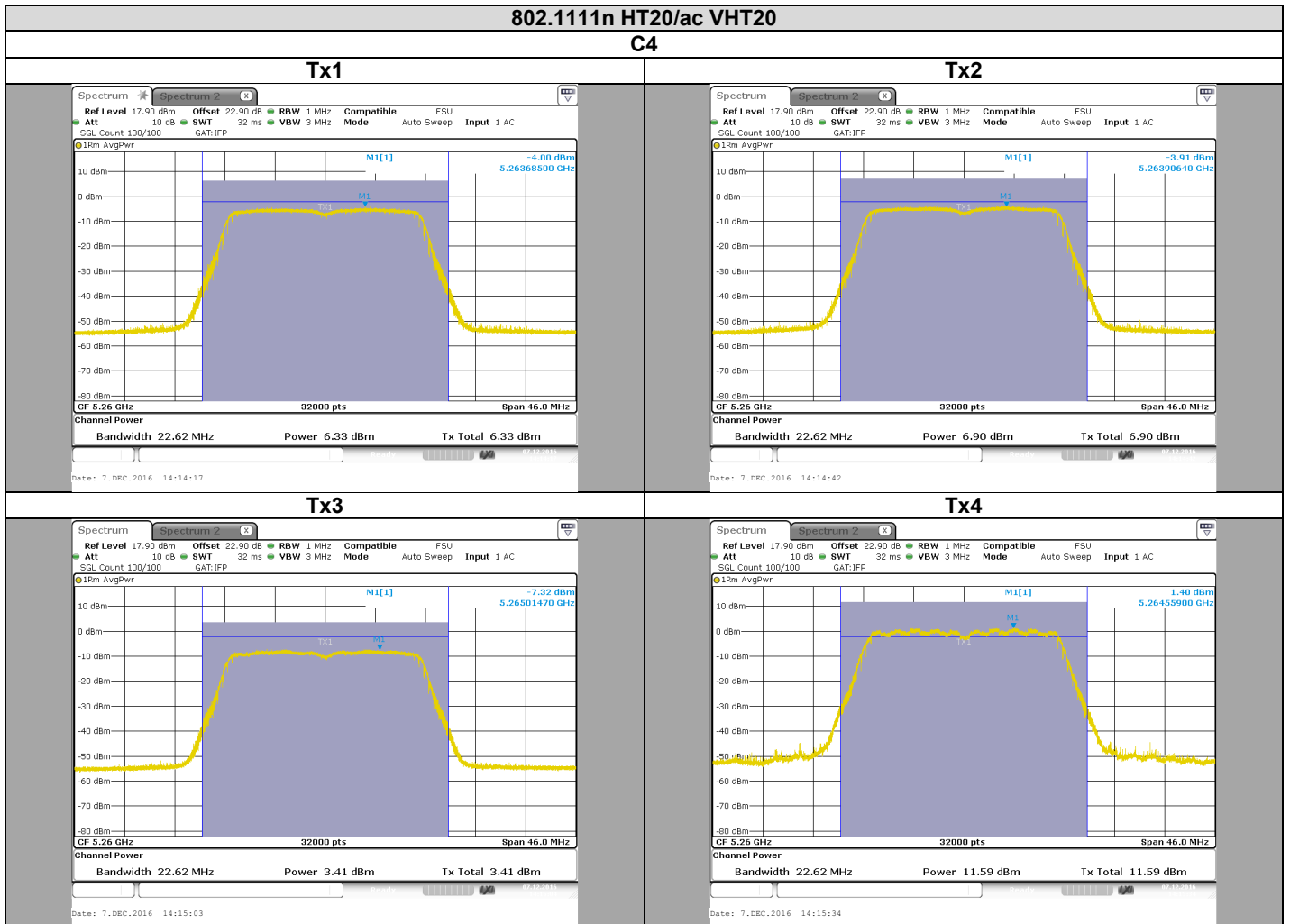
Channel	Tx1 (dBm)	Tx2 (dBm)	Tx3 (dBm)	Tx4 (dBm)	TxAll (dBm)	AG (dBi)	TPC Min (dBm)	TPC Min Limit (dBm)
C16	7,52	9,64	10,25	10,47	15,6	8	23,6	24
C17	8,18	9,78	9,66	10,39	15,6	8	23,6	24
C18	10,46	7,29	9,78	7,91	15,1	8	23,1	24
C19	10,52	7,51	9,91	8,63	15,3	8	23,3	24
C20	7,15	7,48	8,7	9,8	14,4	8	22,4	24
C21 Straddle 5470MHz-5725MHz	7,7	8,61	9,06	9,76	14,9	8	22,9	24

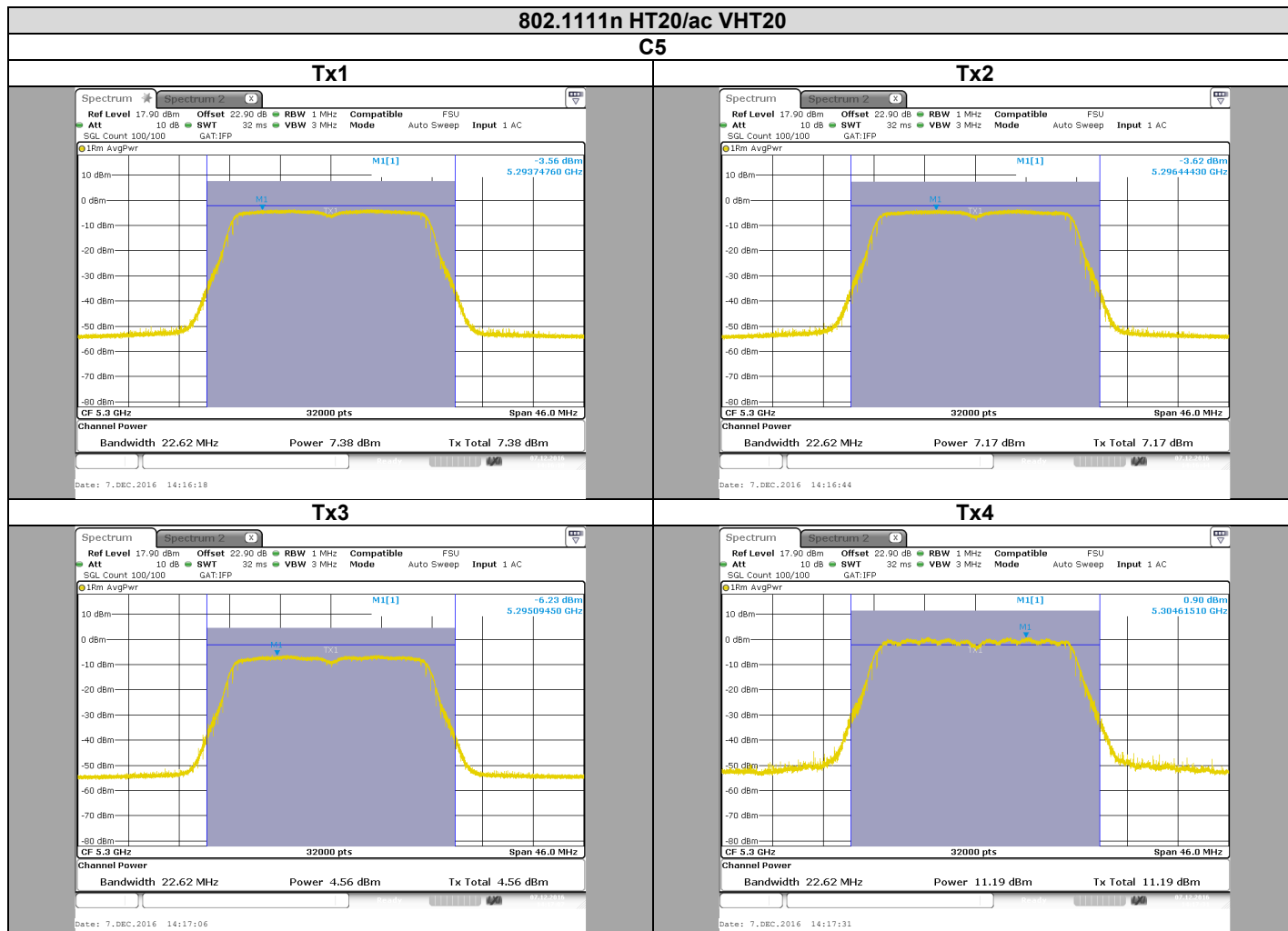


802.11ac VHT80

Channel	Tx1 (dBm)	Tx2 (dBm)	Tx3 (dBm)	Tx4 (dBm)	TxAll (dBm)	AG (dBi)	TPC Min (dBm)	TPC Min Limit (dBm)
C25	9,64	7,33	7,43	11,97	15,5	8	23,5	24
C26	2,45	9,76	7,24	12,36	15,3	8	23,3	24
C27	7,73	9,94	10,55	9,15	15,5	8	23,5	24
C28 Straddle 5470MHz-5725MHz	7,92	10,15	10,49	9,63	15,7	8	23,7	24

9.3.2. With Beamforming

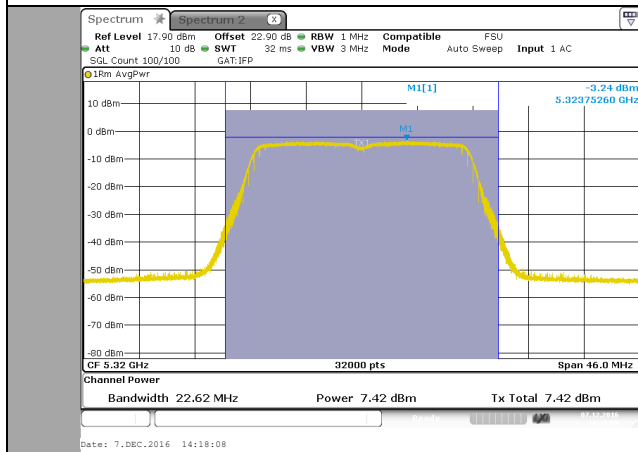




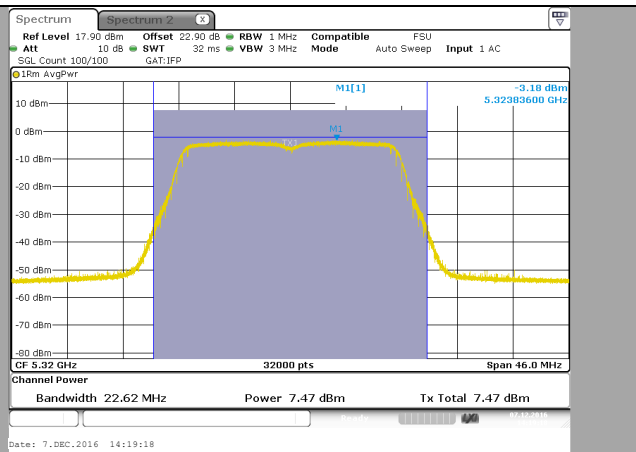
802.1111n HT20/ac VHT20

C6

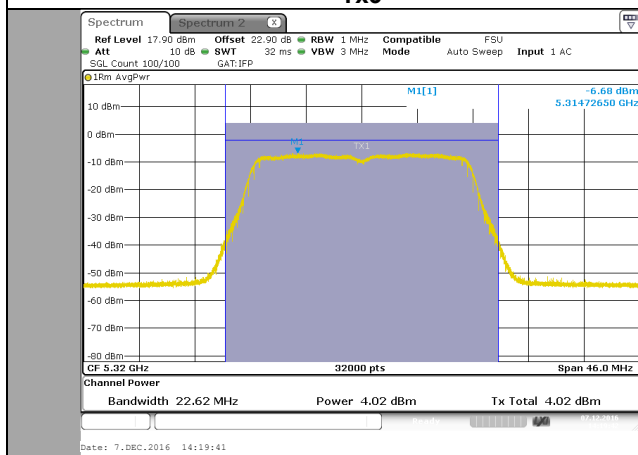
Tx1



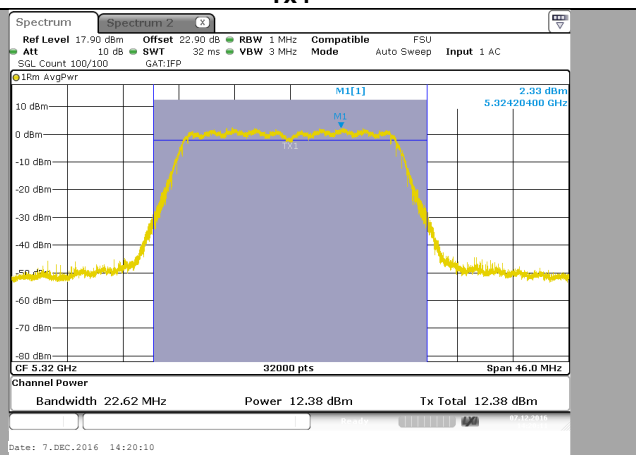
Tx2



Tx3



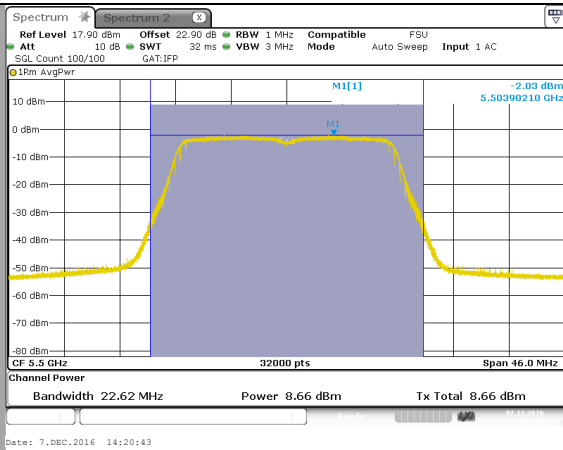
Tx4



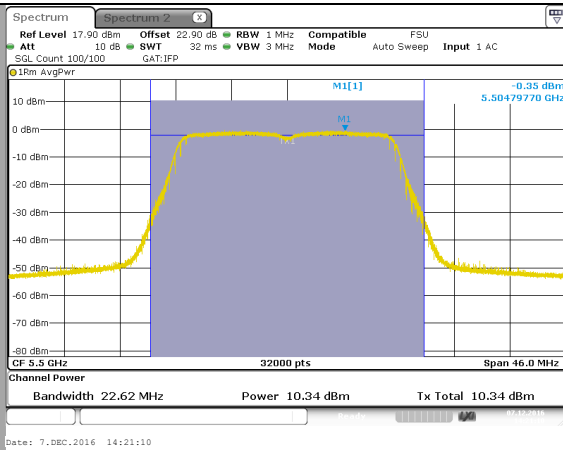
802.1111n HT20/ac VHT20

C7

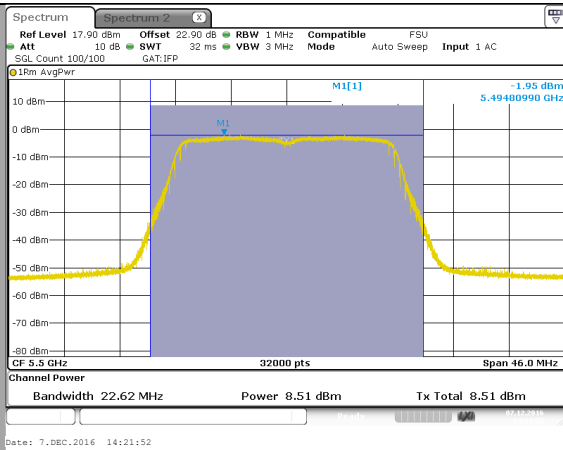
Tx1



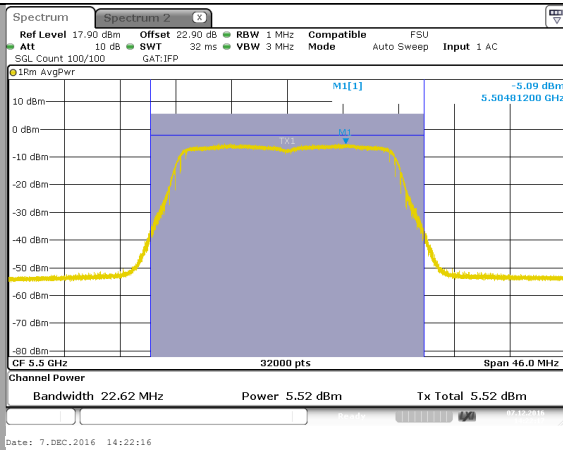
Tx2



Tx3



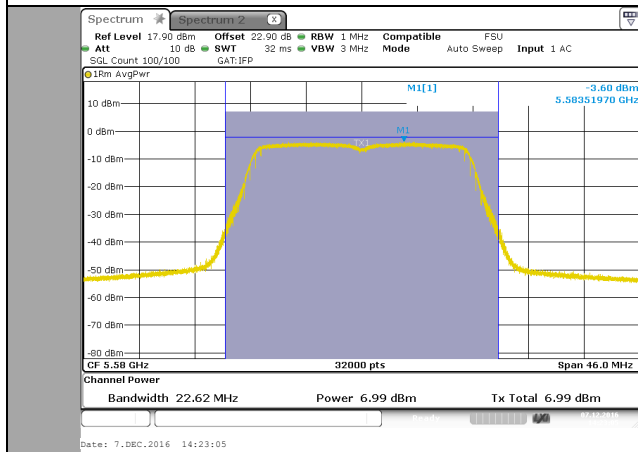
Tx4



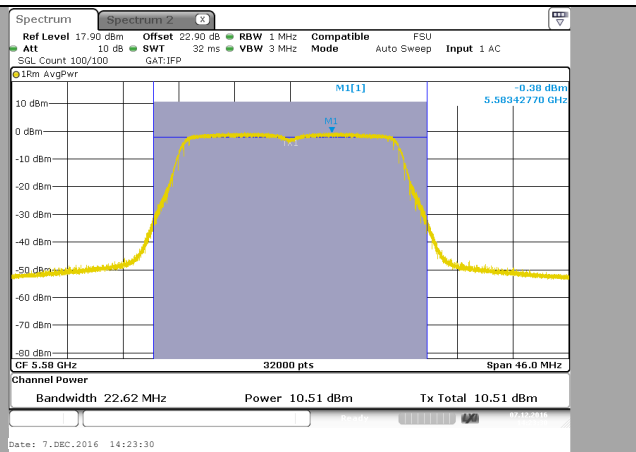
802.1111n HT20/ac VHT20

C8

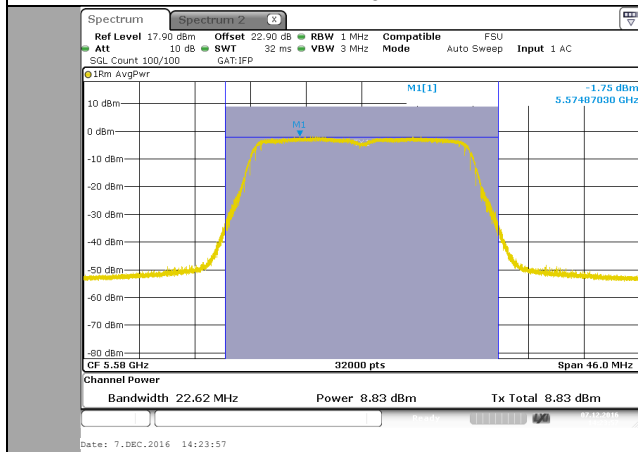
Tx1



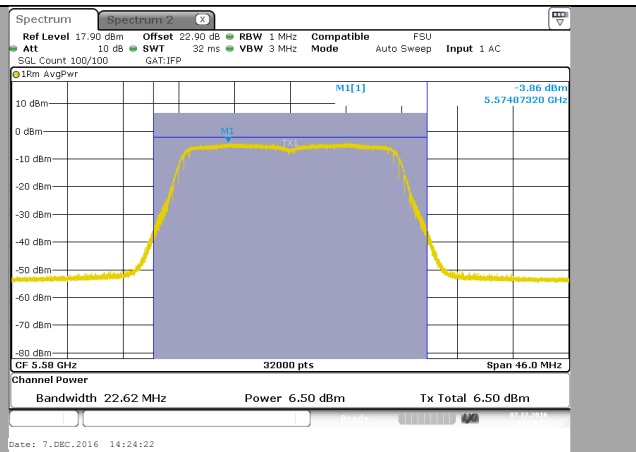
Tx2



Tx3



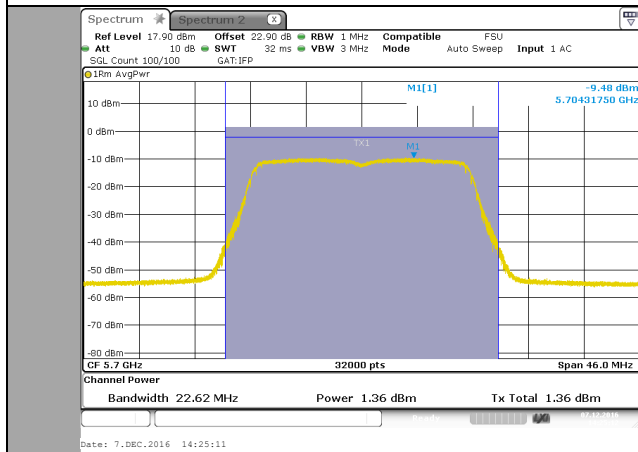
Tx4



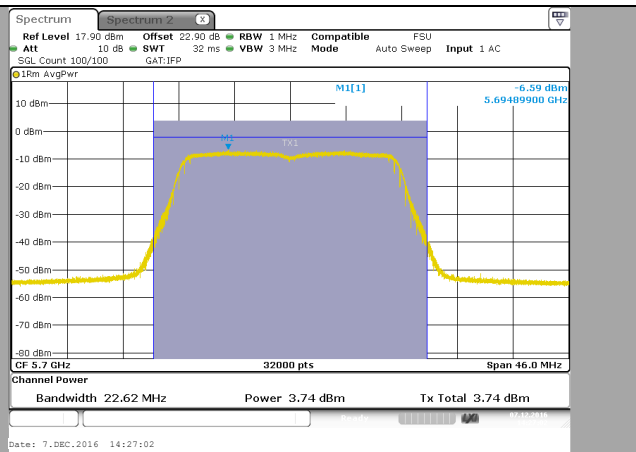
802.1111n HT20/ac VHT20

C9

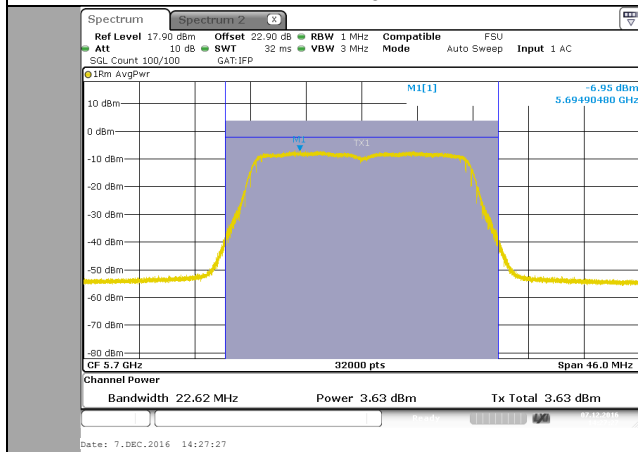
Tx1



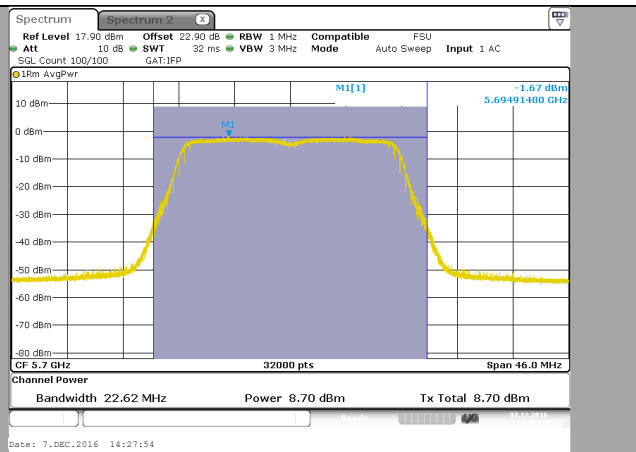
Tx2



Tx3

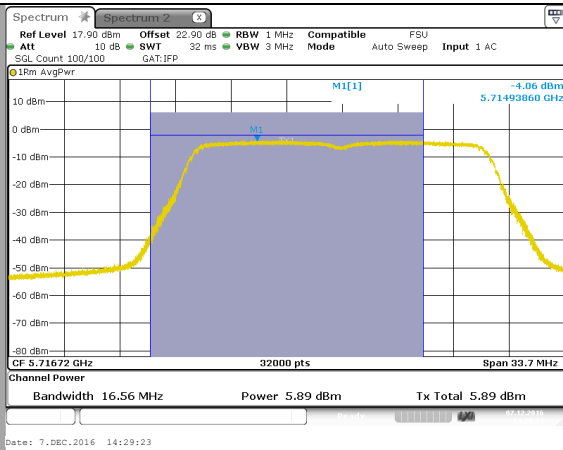


Tx4

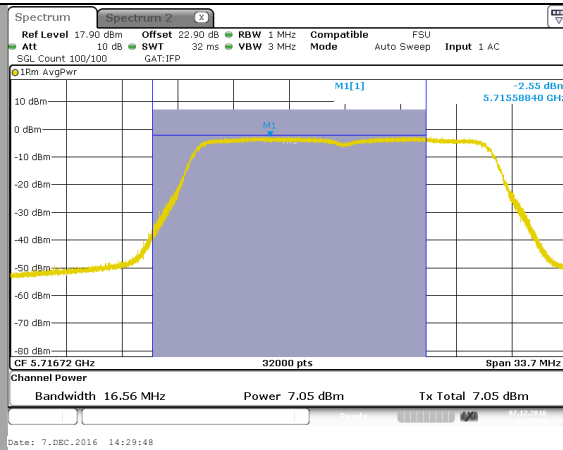


**802.1111n HT20/ac VHT20
C10 Straddle 5470MHz-5725MHz**

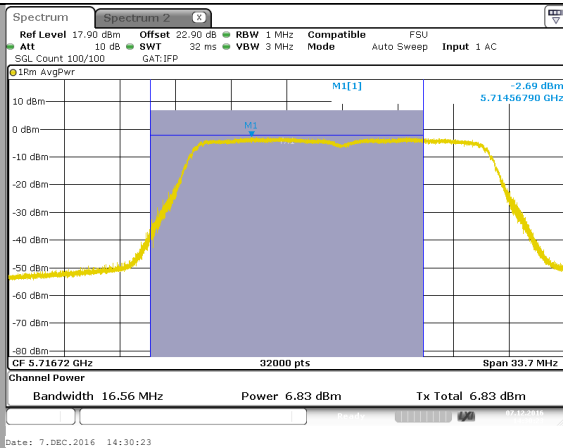
Tx1



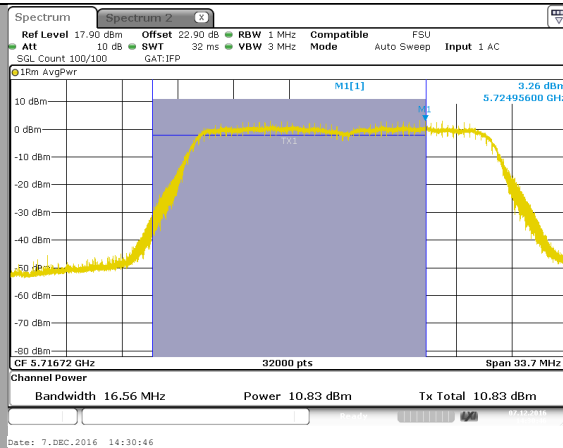
Tx2



Tx3



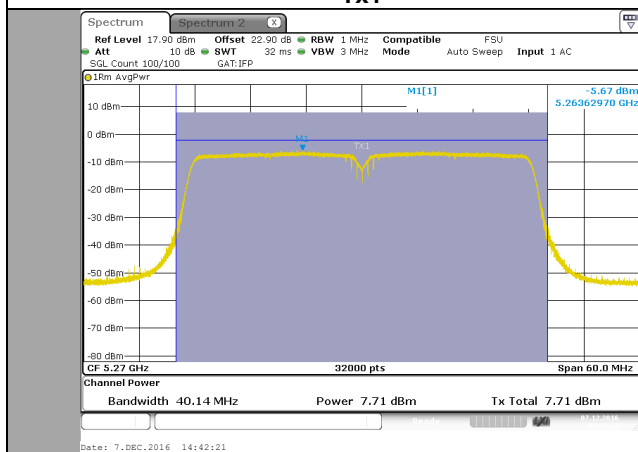
Tx4



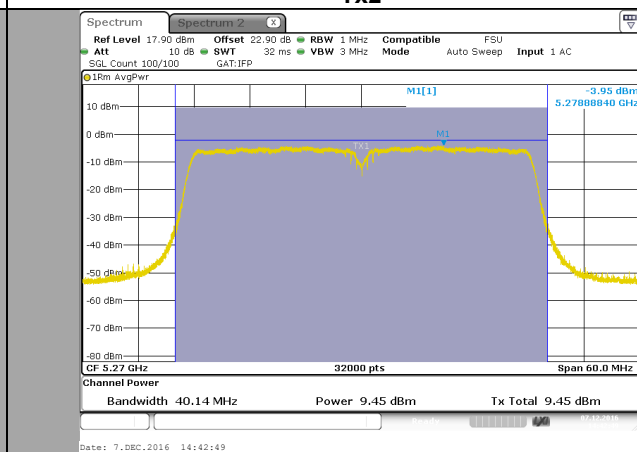
802.1111n HT40/ac VHT40

C16

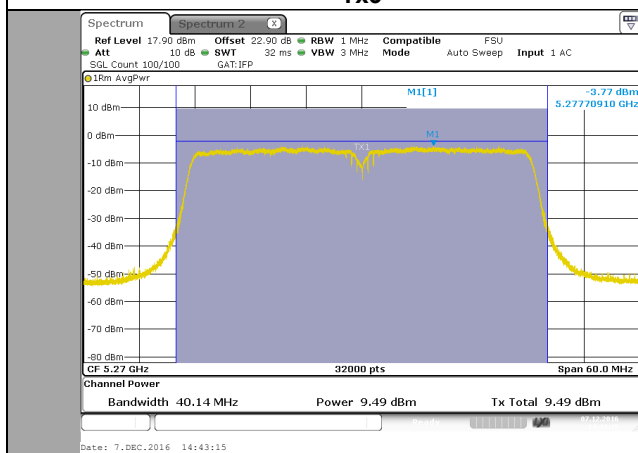
Tx1



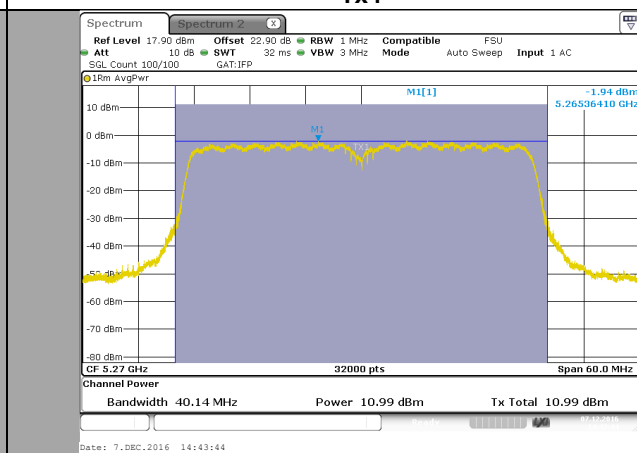
Tx2



Tx3



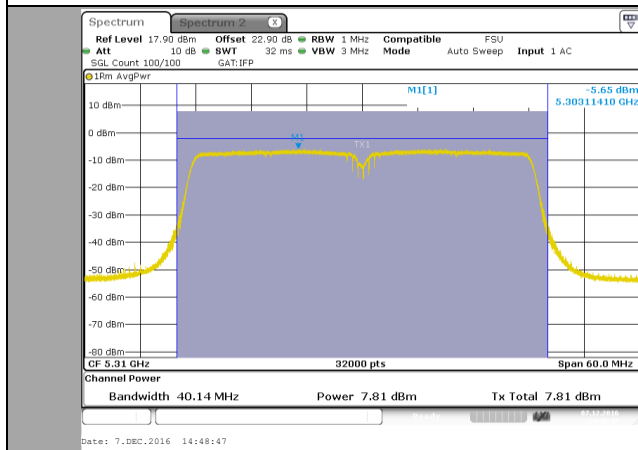
Tx4



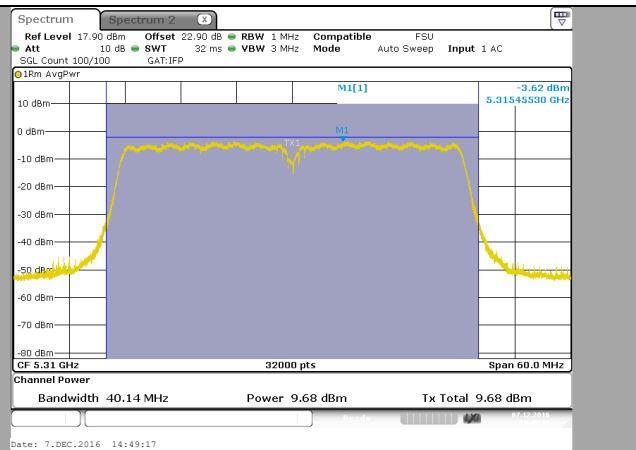
802.1111n HT40/ac VHT40

C17

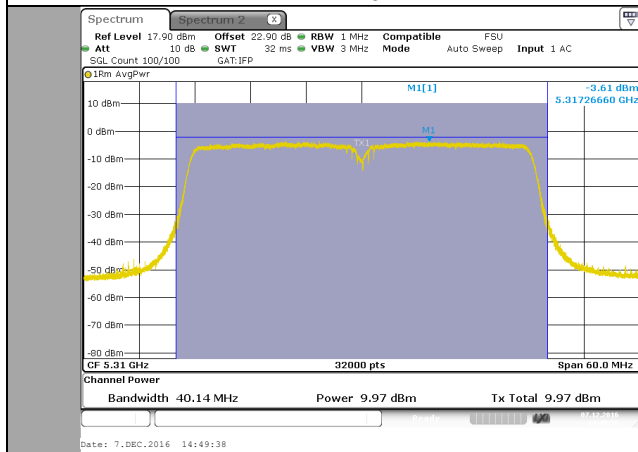
Tx1



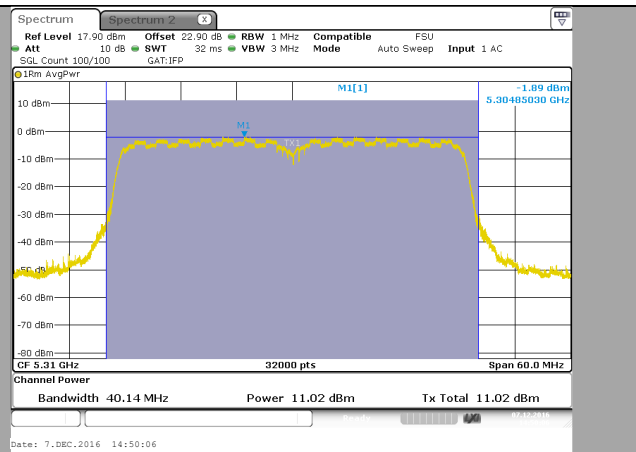
Tx2



Tx3



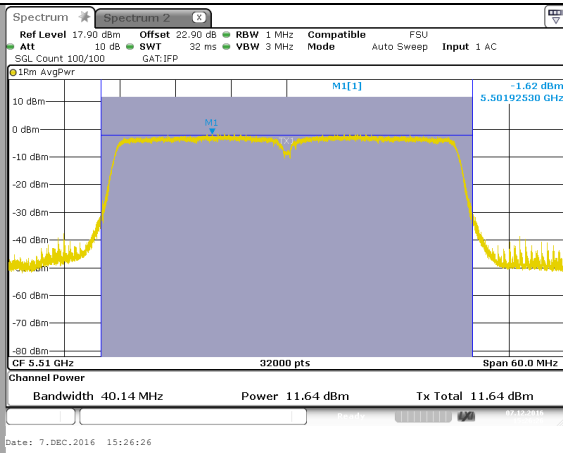
Tx4



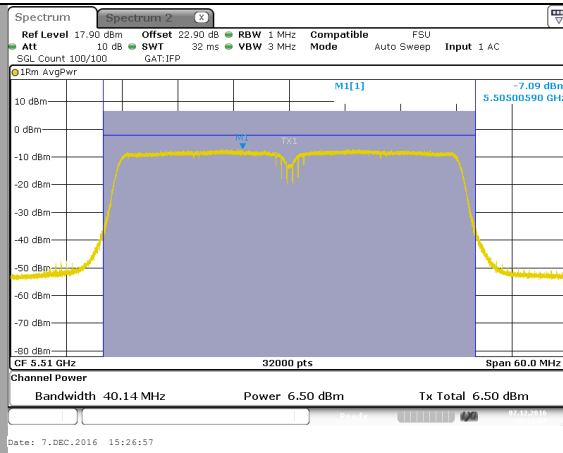
802.1111n HT40/ac VHT40

C18

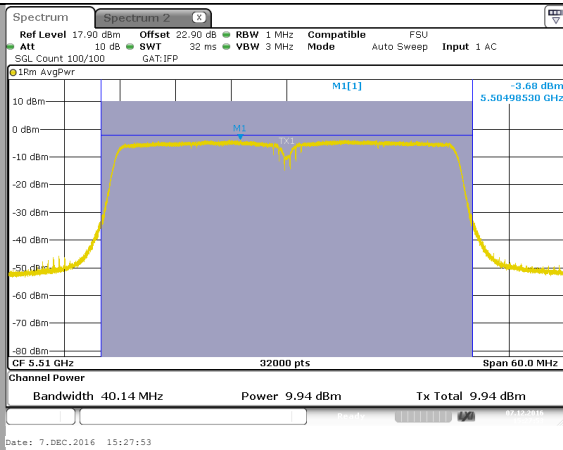
Tx1



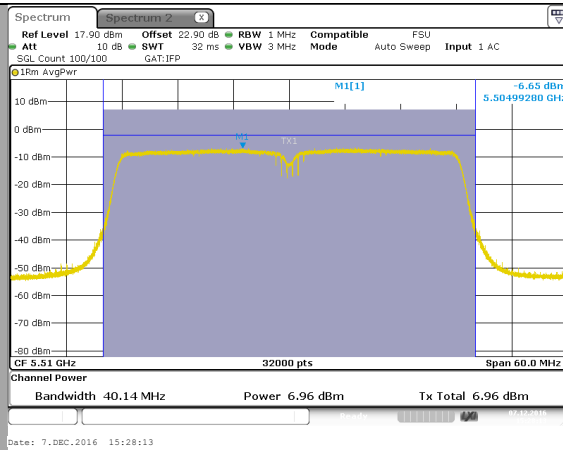
Tx2



Tx3



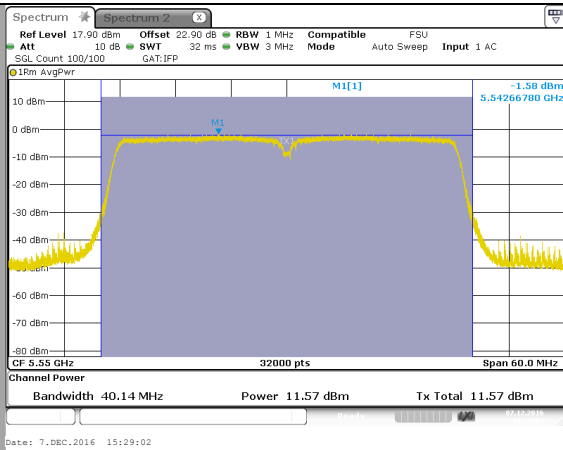
Tx4



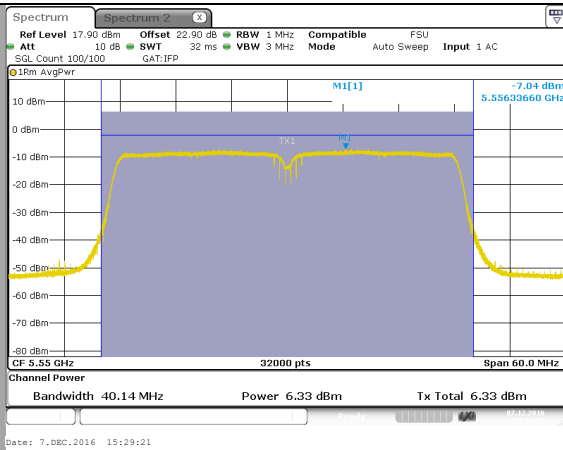
802.1111n HT40/ac VHT40

C19

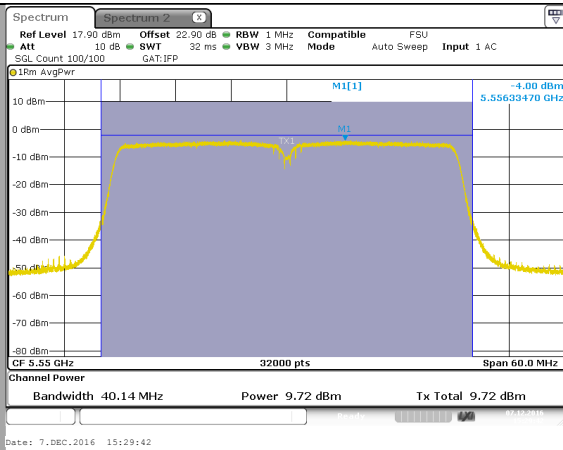
Tx1



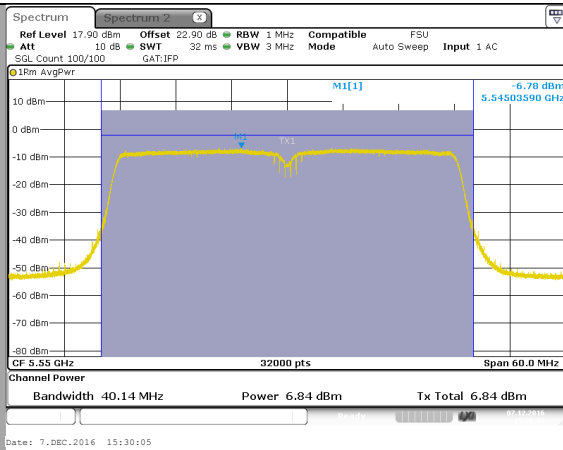
Tx2



Tx3



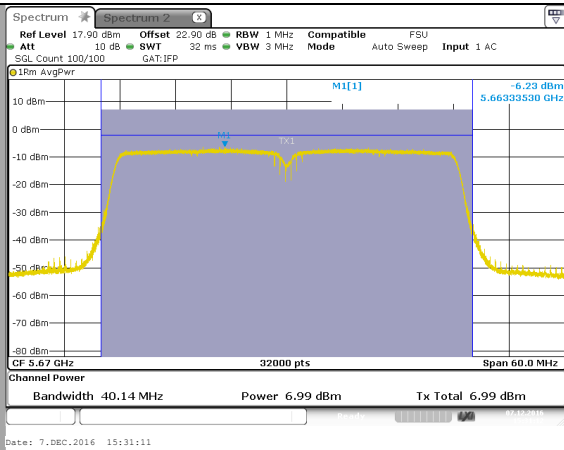
Tx4



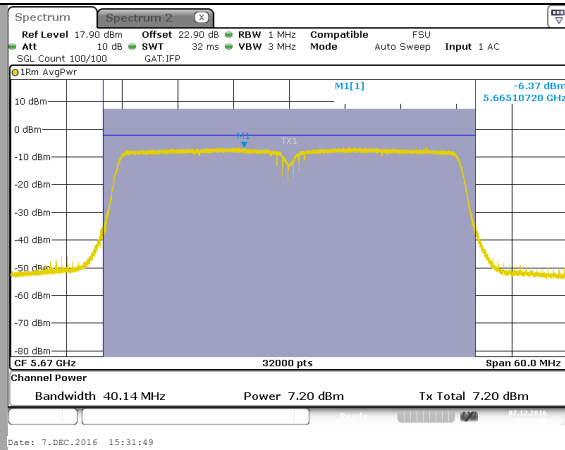
802.1111n HT40/ac VHT40

C20

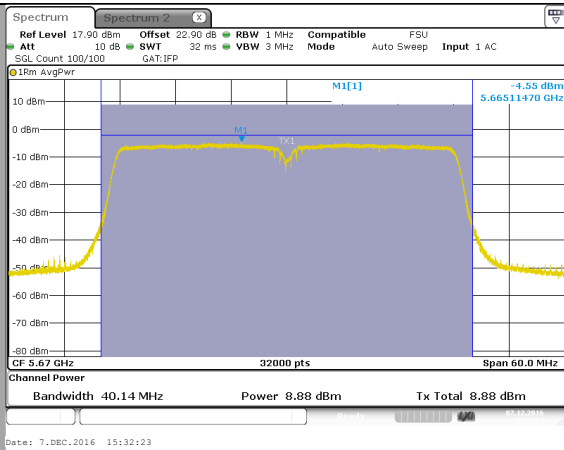
Tx1



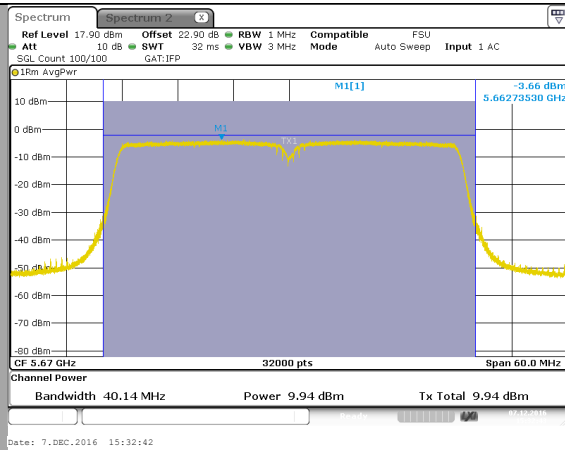
Tx2

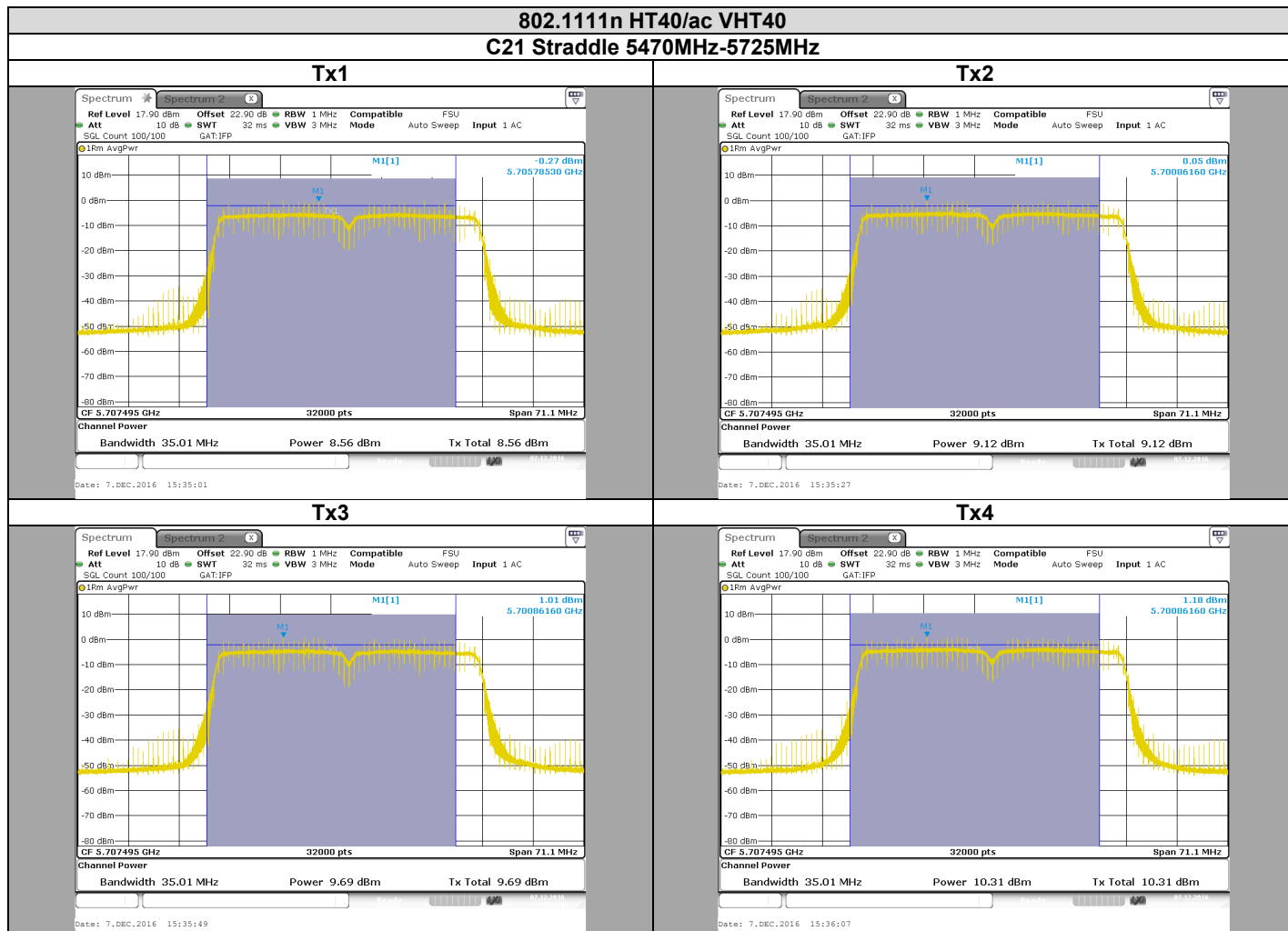


Tx3



Tx4





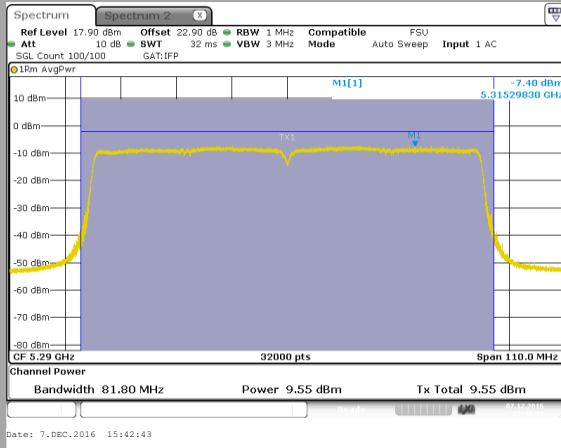


L C I E

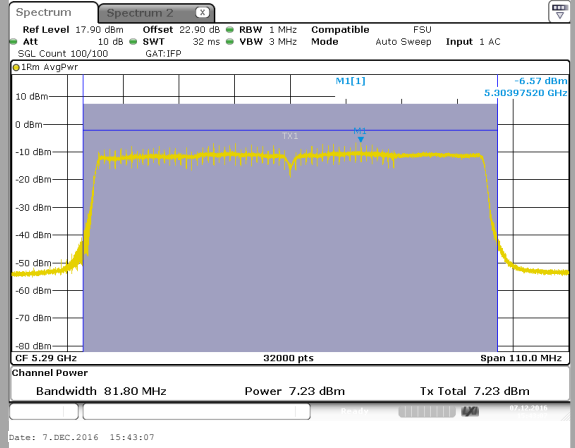
802.11ac VHT80

C25

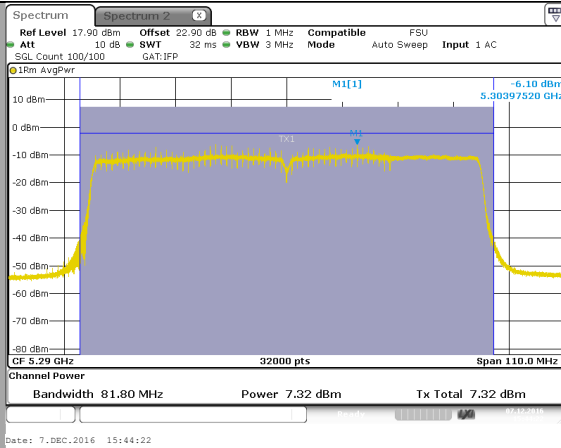
Tx1



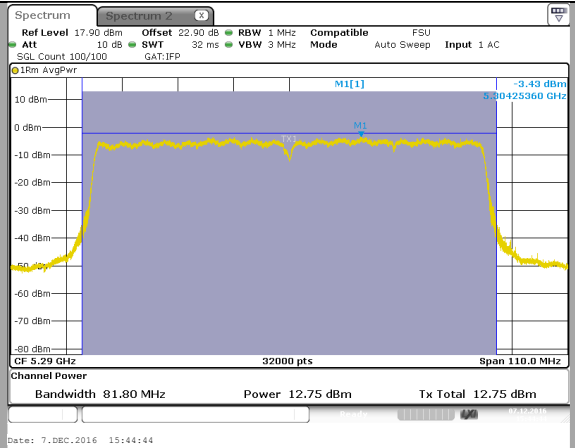
Tx2

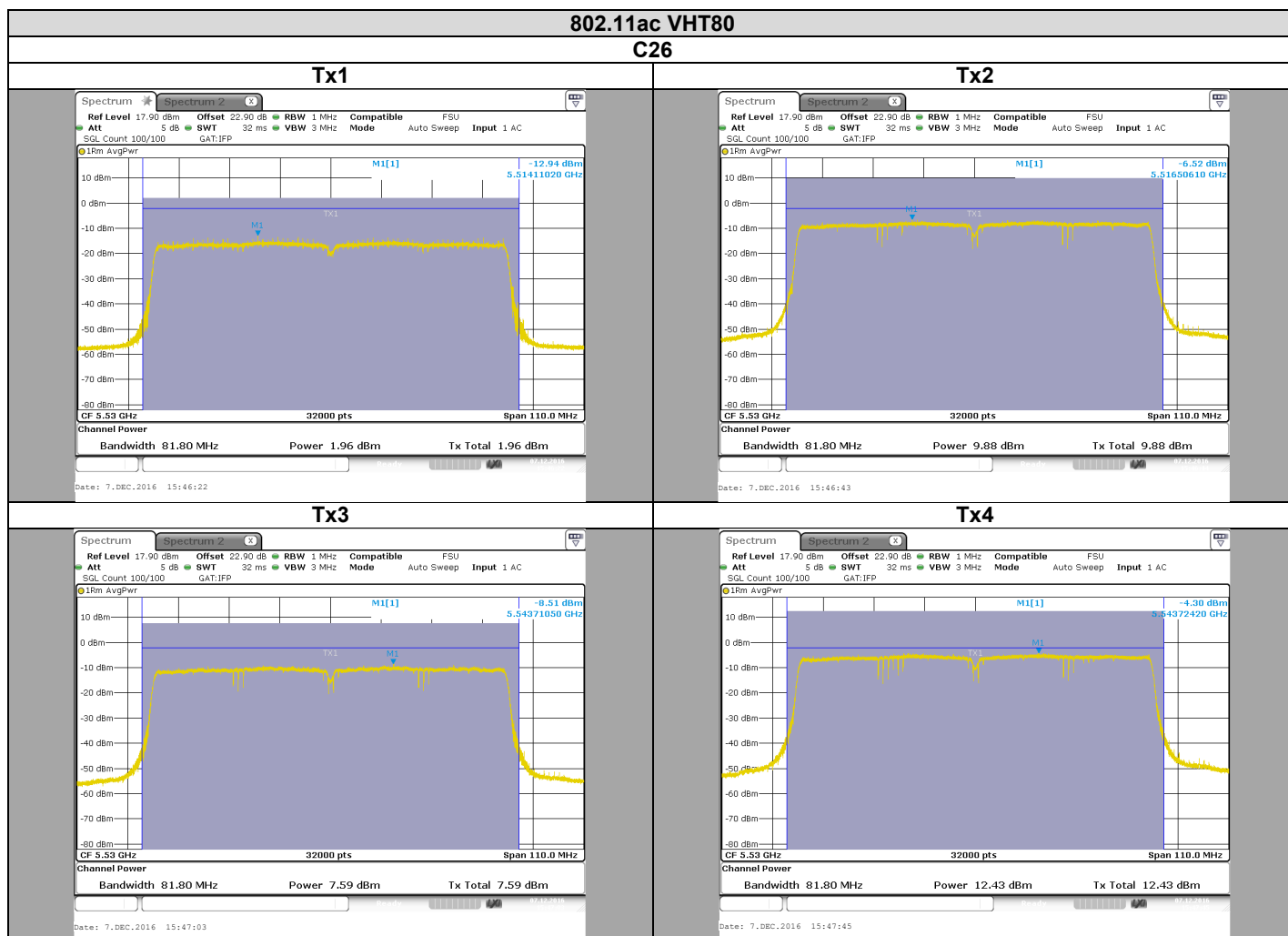


Tx3



Tx4

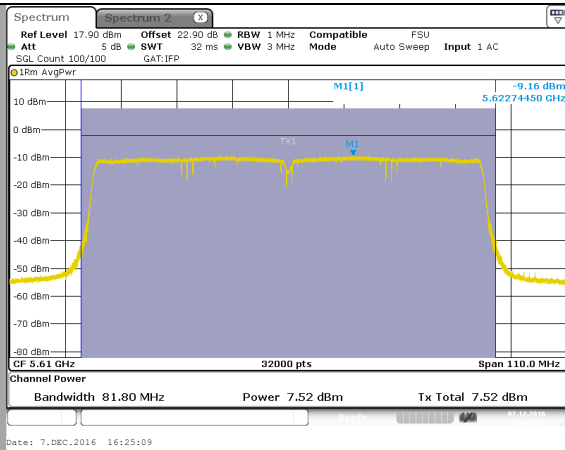




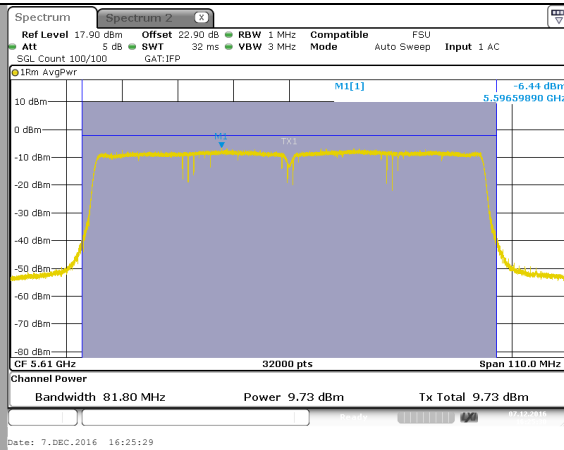
802.11ac VHT80

C27

Tx1



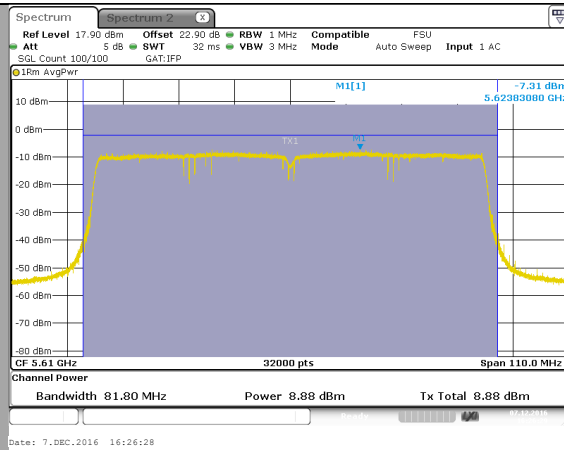
Tx2



Tx3



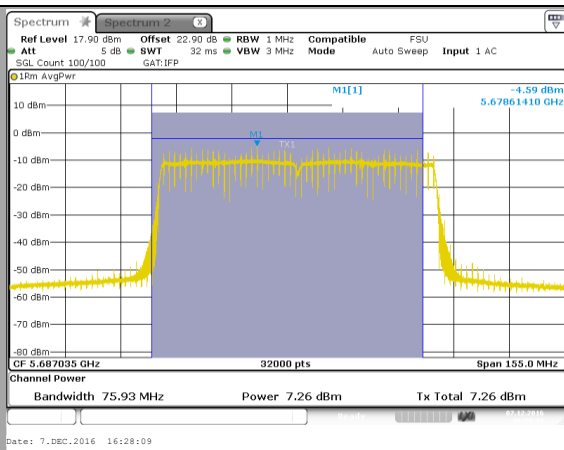
Tx4



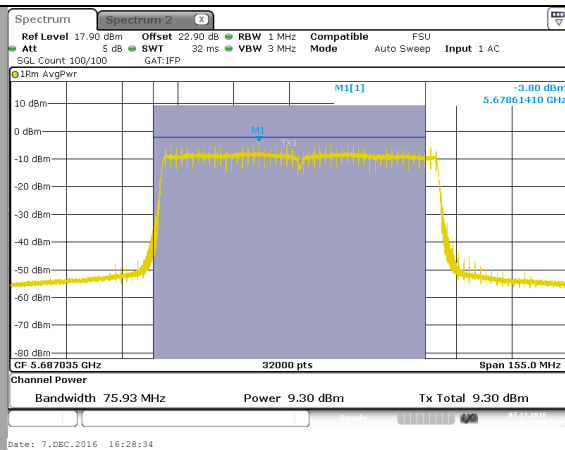
802.11ac VHT80

C28 Straddle 5470MHz-5725MHz

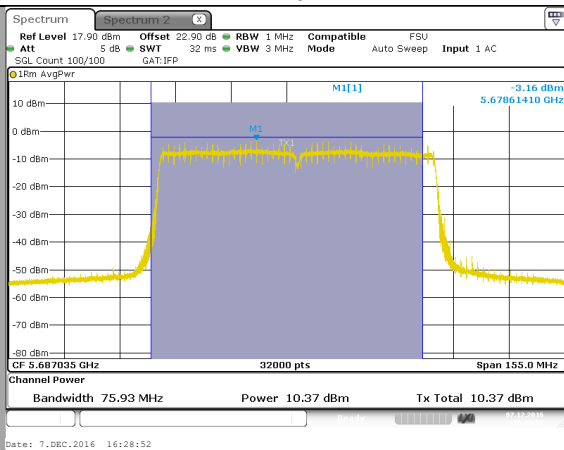
Tx1



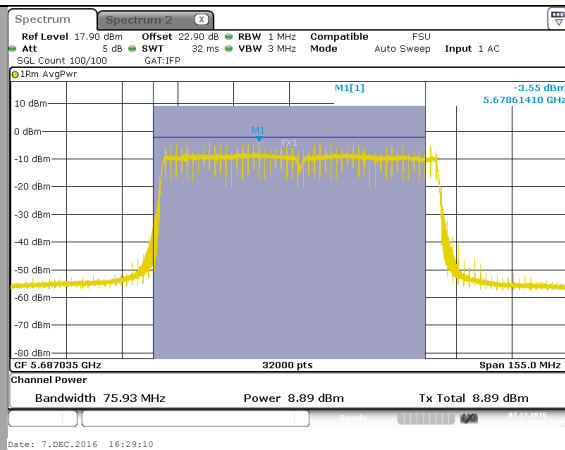
Tx2



Tx3



Tx4



802.11n HT20/ac VHT20

Channel	Tx1 (dBm)	Tx2 (dBm)	Tx3 (dBm)	Tx4 (dBm)	TxAll (dBm)	AG (dBi)	TPC Min (dBm)	TPC Min Limit (dBm)
C4	6,33	6,9	3,41	11,59	14,1	8,0	22,1	24
C5	7,38	7,17	4,56	11,19	14,3	8,0	22,3	24
C6	7,42	7,47	4,02	12,38	14,9	8,0	22,9	24
C7	8,66	10,34	8,51	5,52	14,6	8,0	22,6	24
C8	6,99	10,51	8,83	6,5	14,5	8,0	22,5	24
C9	1,36	3,74	3,63	8,7	11,3	8,0	19,3	24
C10 Straddle 5470MHz-5725MHz	5,89	7,05	6,83	10,83	14,1	8,0	22,1	24

802.11n HT40/ac VHT40

Channel	Tx1 (dBm)	Tx2 (dBm)	Tx3 (dBm)	Tx4 (dBm)	TxAll (dBm)	AG (dBi)	TPC Min (dBm)	TPC Min Limit (dBm)
C16	7,71	9,45	9,49	10,99	15,6	8,0	23,6	24
C17	7,81	9,68	9,97	11,02	15,8	8,0	23,8	24
C18	11,64	6,5	9,94	6,96	15,3	8,0	23,3	24
C19	11,57	6,33	9,72	6,84	15,2	8,0	23,2	24
C20	6,99	7,2	8,88	9,94	14,4	8,0	22,4	24
C21 Straddle 5470MHz-5725MHz	8,56	9,12	9,69	10,31	15,5	8,0	23,5	24

802.11ac VHT80

Channel	Tx1 (dBm)	Tx2 (dBm)	Tx3 (dBm)	Tx4 (dBm)	TxAll (dBm)	AG (dBi)	TPC Min (dBm)	TPC Min Limit (dBm)
C25	9,55	7,23	7,32	12,75	15,9	8,0	23,9	24
C26	1,96	9,88	7,59	12,43	15,4	8,0	23,4	24
C27	7,52	9,73	10,82	8,88	15,4	8,0	23,4	24
C28 Straddle 5470MHz-5725MHz	7,26	9,3	10,37	8,89	15,1	8,0	23,1	24



9.4. CONCLUSION

Transmit Power Control measurement performed on the sample of the product **SAGEMCOM TheBox (253697282)**, SN: **616400107098** in configuration and description presented in this test report, show levels **compliant** to the **47 CFR PART 15.407** limits.