

Annex 1: Measurement diagrams to TEST REPORT No.: 17-1-0264601T03b

According to:
FCC Regulations
Part 15.247

for

Agilion GmbH

Wireless Mesh Gateway Pulse | Phase 6032502
Communication and Real Time Location System

FCC-ID: SCF6032502

Laboratory Accreditation and Listings		
 Deutsche Akkreditierungsstelle D-PL-12047-01-01 Accredited EMC-Test Laboratory	 Industry Canada Reg. No.: 3462D-1 Reg. No.: 3462D-2 Reg. No.: 3462D-3	 Voluntary Controls for Electromagnetic Emissions Reg. No.: R-20013, C-20009, T-20006, G-20013
 	 Authorized Test Lab Lab Code: 20011130-00	 FEDERAL COMMUNICATIONS COMMISSION USA • MRA US-EU 0003
accredited according to DIN EN ISO/IEC 17025		
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Laboratory Accreditation and Listings		

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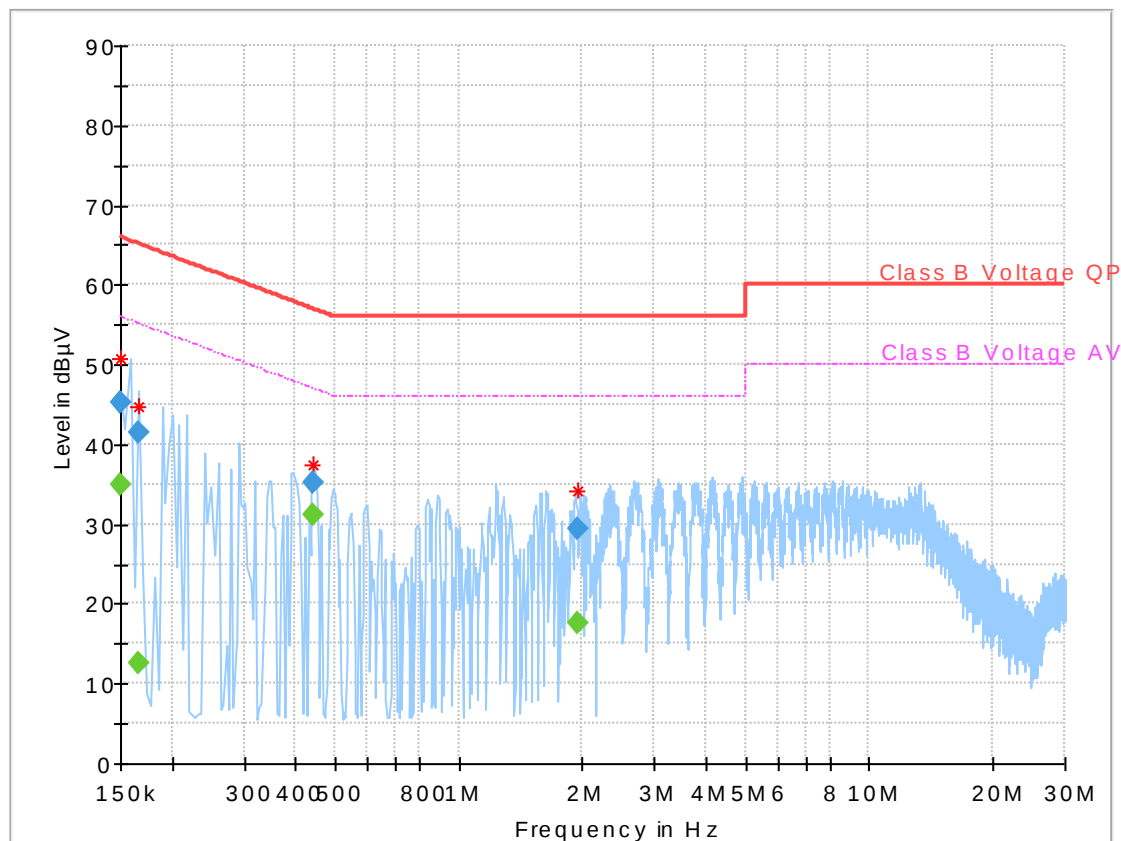
1. Conducted EMI measurements on AC-mains port according 15.207, class B

Diagram 1.01_Ch18_RFR2

Common Information

Test Description:	Conducted Voltage Measurement Class B
Test Site & Location:	Conducted Emission, CETECOM GmbH Essen
Test Software:	R&S EMC32 v9.15
Test Specification:	FCC 15.207 /RSS-Gen.
Operating Mode:	RFR2, Channel 18, Antenne 1 active, Powerlevel 15
Measured on line:	N/L1
Diagram details:	Shows the peak values as a sum of measured ports in maxhold mode
Environmental Conditions:	Humidity: 40%rH; Temperature: 22°C
Operator:	MBe

Full Spectrum



Final Result

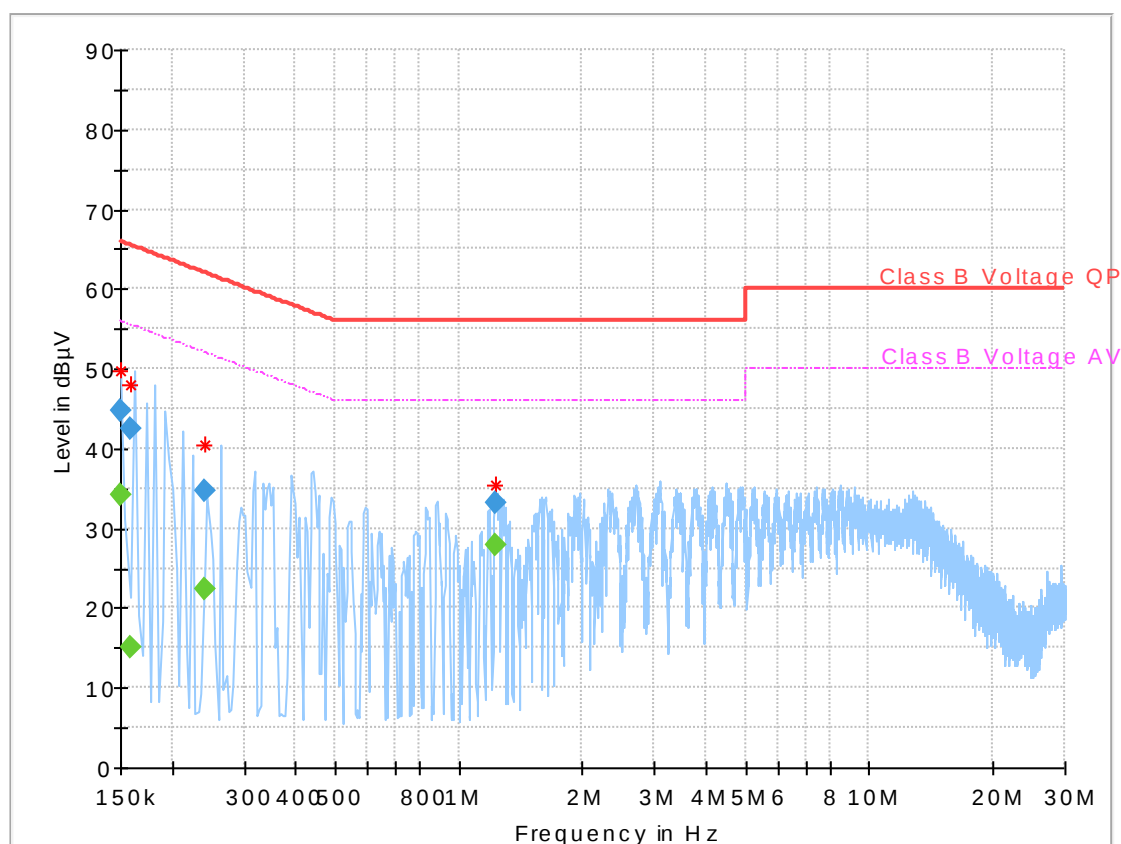
Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)
0.150000	---	35.04	56.00
0.150000	45.30	---	66.00
0.166563	---	12.66	55.13
0.166563	41.49	---	65.13
0.440469	---	31.27	47.05
0.440469	35.26	---	57.05
1.939844	---	17.66	46.00
1.939844	29.52	---	56.00

Diagram 1.02_Ch18_RFR2

Common Information

Test Description:	Conducted Voltage Measurement Class B
Test Site & Location:	Conducted Emission, CETECOM GmbH Essen
Test Software:	R&S EMC32 v9.15
Test Specification:	FCC 15.207 /RSS-Gen.
Operating Mode:	RFR2, Channel 18, Antenna 2 active, Powerlevel 15
Measured on line:	N/L1
Diagram details:	Shows the peak values as a sum of measured ports in maxhold mode
Environmental Conditions:	Humidity: 40%rH; Temperature: 22°C
Operator:	MBe

Full Spectrum



Final Result

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)
0.150000	44.74	---	66.00
0.150000	---	34.18	56.00
0.158750	42.56	---	65.53
0.158750	---	15.11	55.53
0.240781	34.81	---	62.07
0.240781	---	22.49	52.07
1.234531	33.29	---	56.00
1.234531	---	27.82	46.00

2. Radiated field strength measurements accord. §15.209&15.205

2.1. Magnetic field measurements $f < 30\text{MHz}$

2.1.1. Channel 11

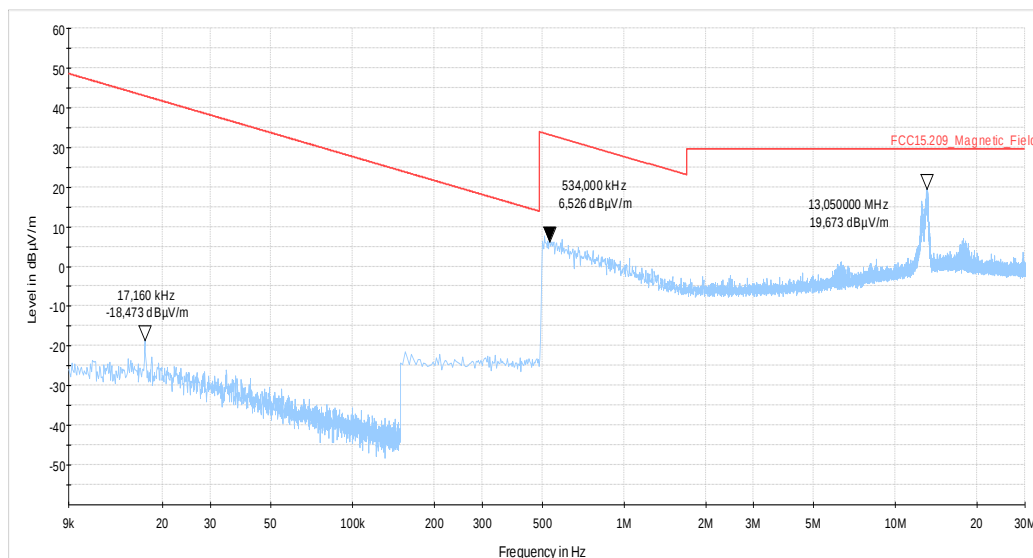


Diagram 1: Channel 11 (2.05_MgF_RFR2_Ch11_PWR15_ant0_laying)

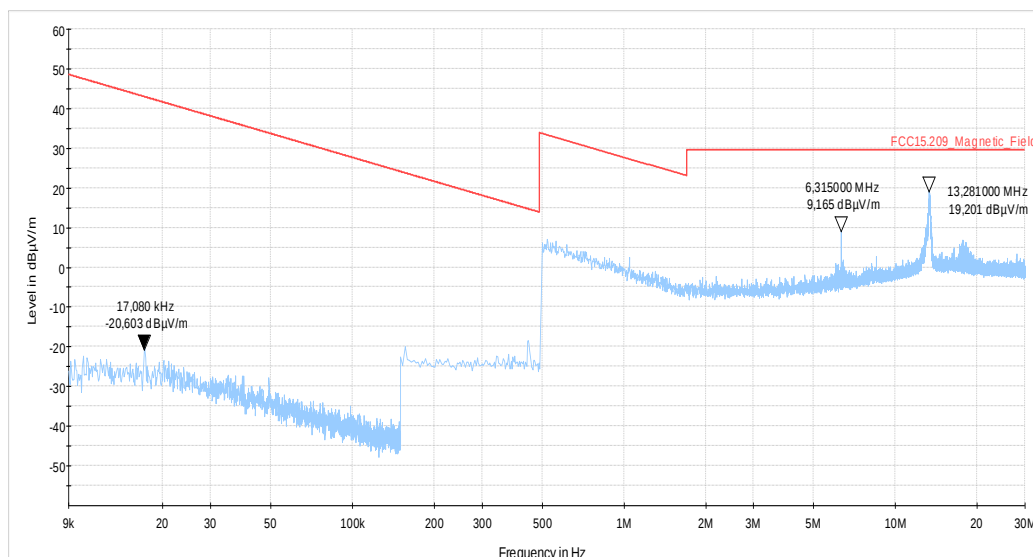


Diagram 2: Channel 11 (2.06_MgF_RFR2_Ch11_PWR15_ant0_standing)

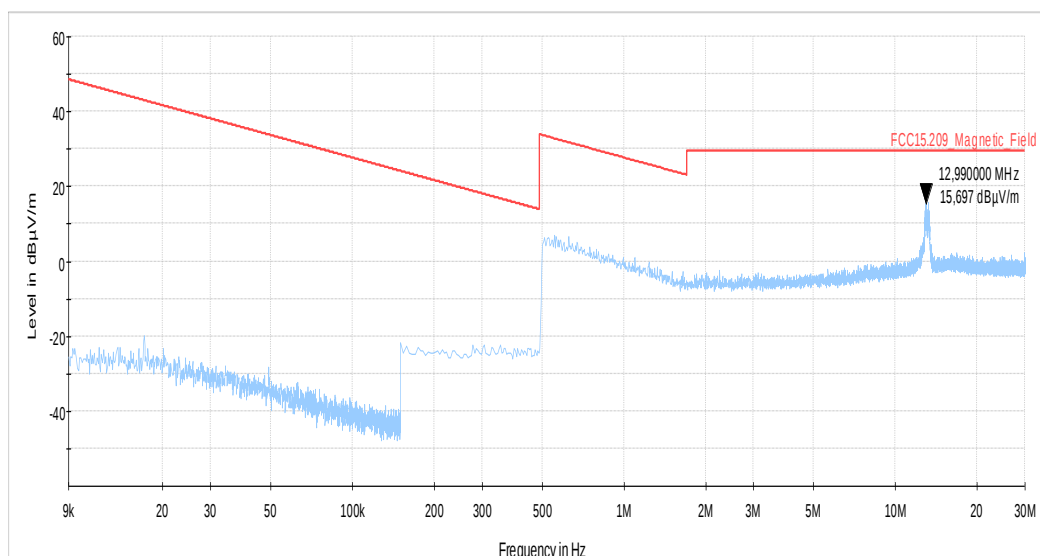


Diagram 3: Channel 11 (2.11_MgF_RFR2_Ch11_PWR15_ant1_laying_PoE120VAC)

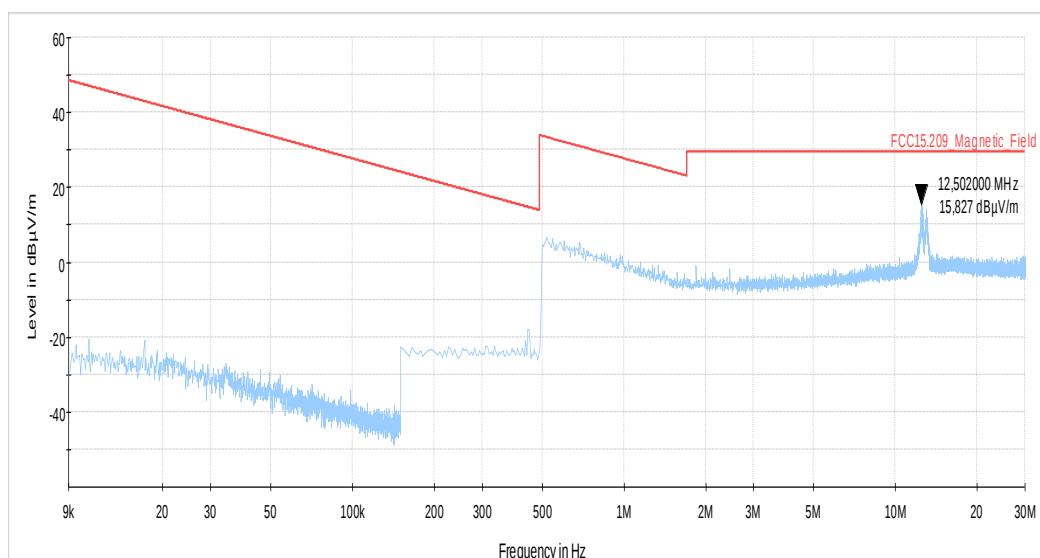


Diagram 4: Channel 11 (2.12_MgF_RFR2_Ch11_PWR15_ant1_standing_PoE120VAC)

2.1.2. Channel 18

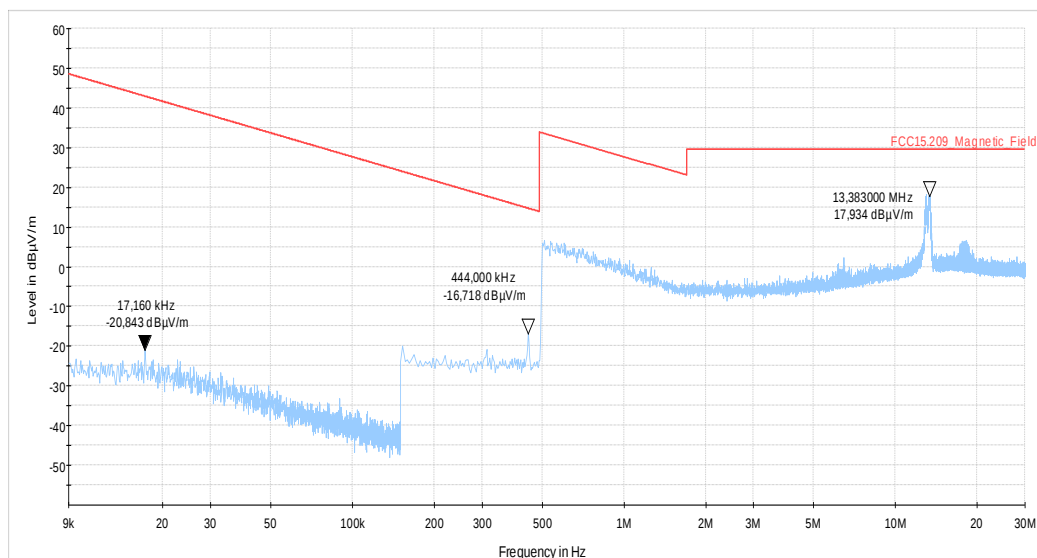


Diagram 5: Channel 18 (2.07_MgF_RFR2_Ch18_PWR15_ant1_standing)

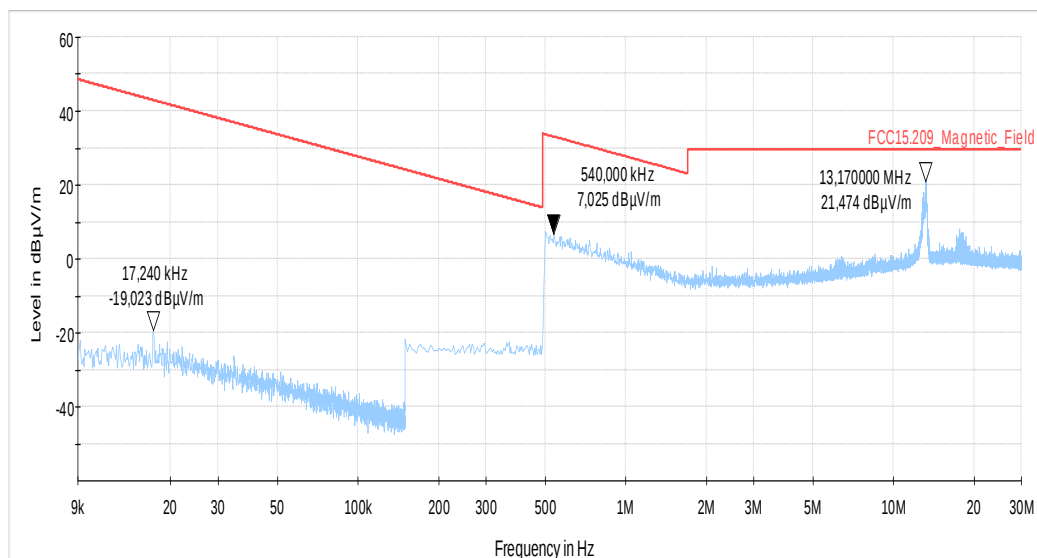


Diagram 6: Channel 18 (2.08_MgF_RFR2_Ch18_PWR15_ant1_laying)

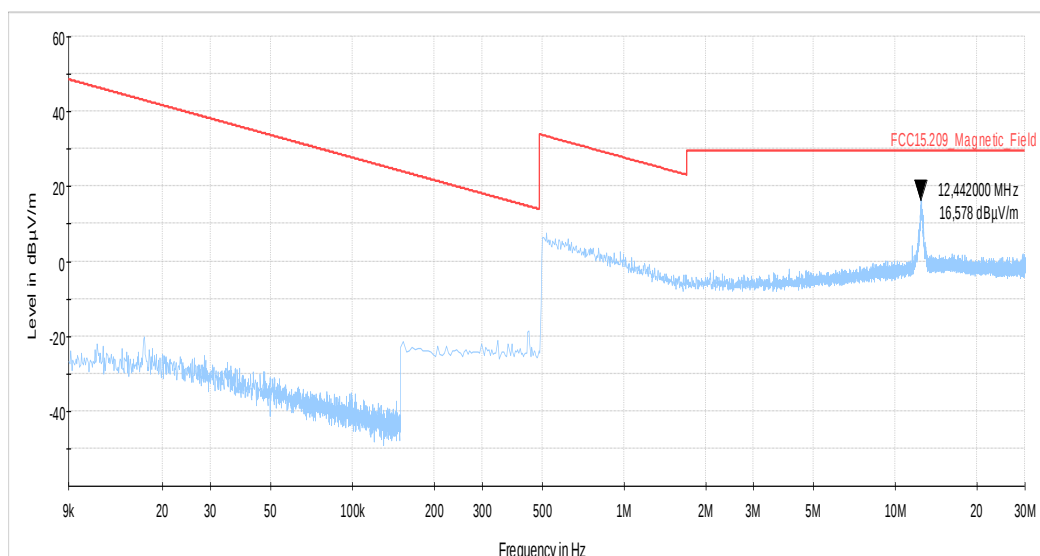


Diagram 7: Channel 18 (2.13_MgF_RFR2_Ch18_PWR15_ant0_standing_PoE120VAC)

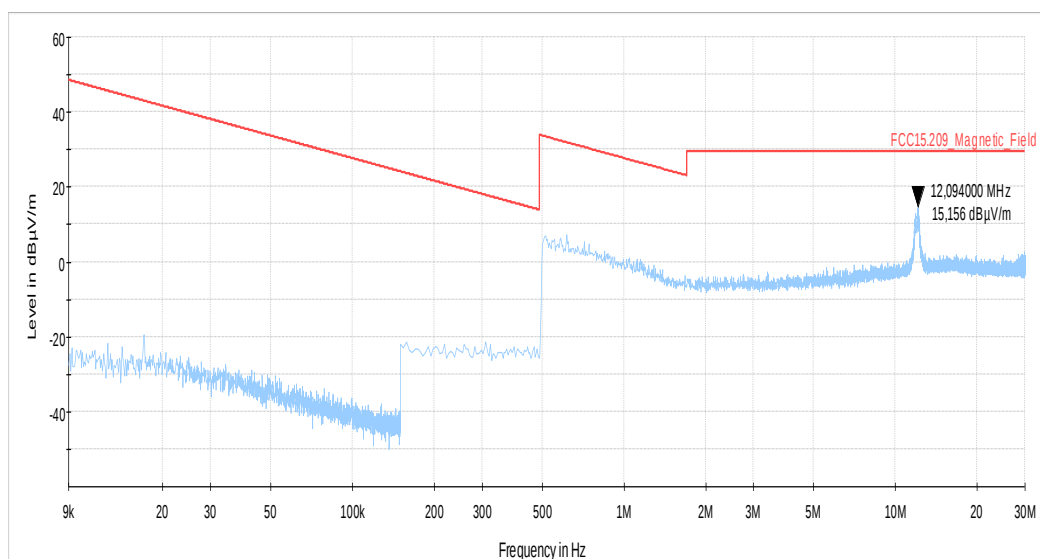


Diagram 8: Channel 18 (2.14_MgF_RFR2_Ch18_PWR15_ant0_laying_PoE120VAC)

2.1.3. Channel 26

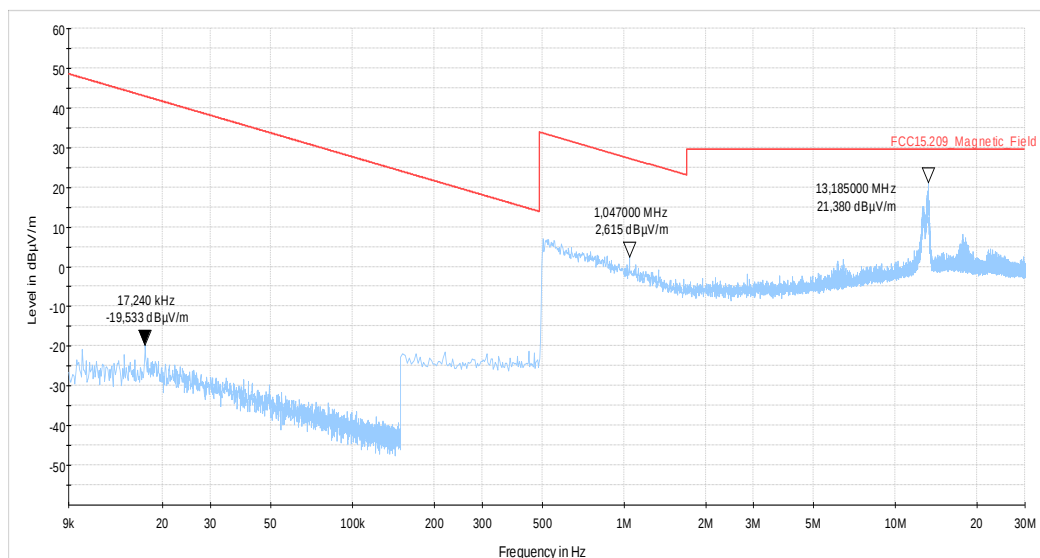


Diagram 9: Channel 26 (2.09_MgF_RFR2_Ch26_PWR15_ant1_laying_24V_DC)

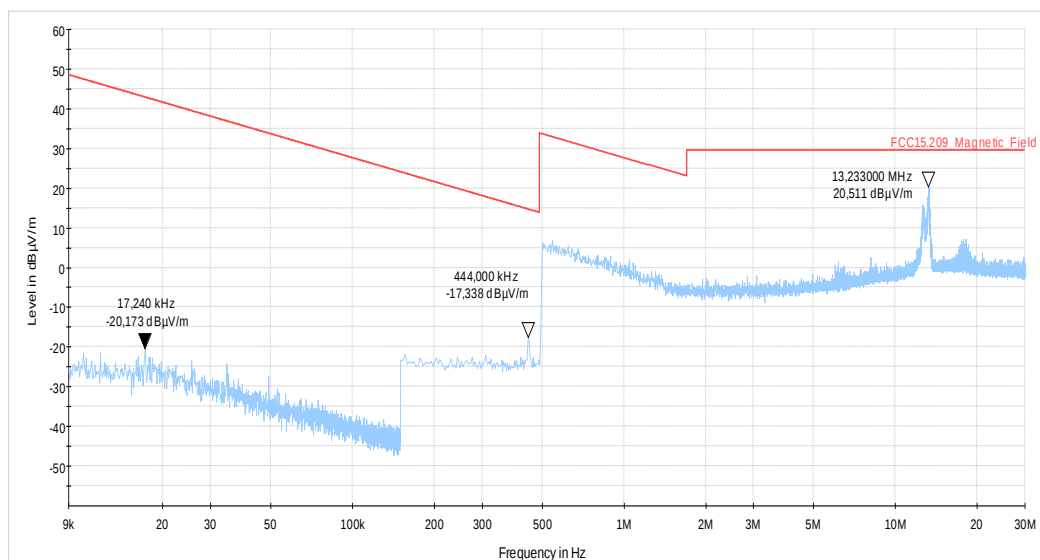


Diagram 10: Channel 26 (2.10_MgF_RFR2_Ch26_PWR15_ant1_standing_24V_DC)

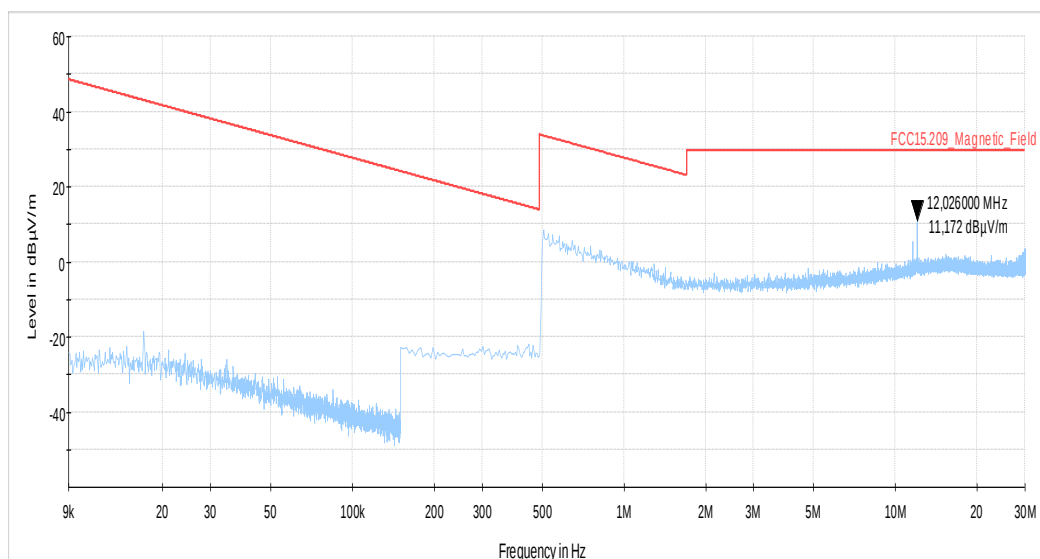


Diagram 11: Channel 26 (2.15_MgF_RFR2_Ch26_PWR15_ant0_laying_24VDC)

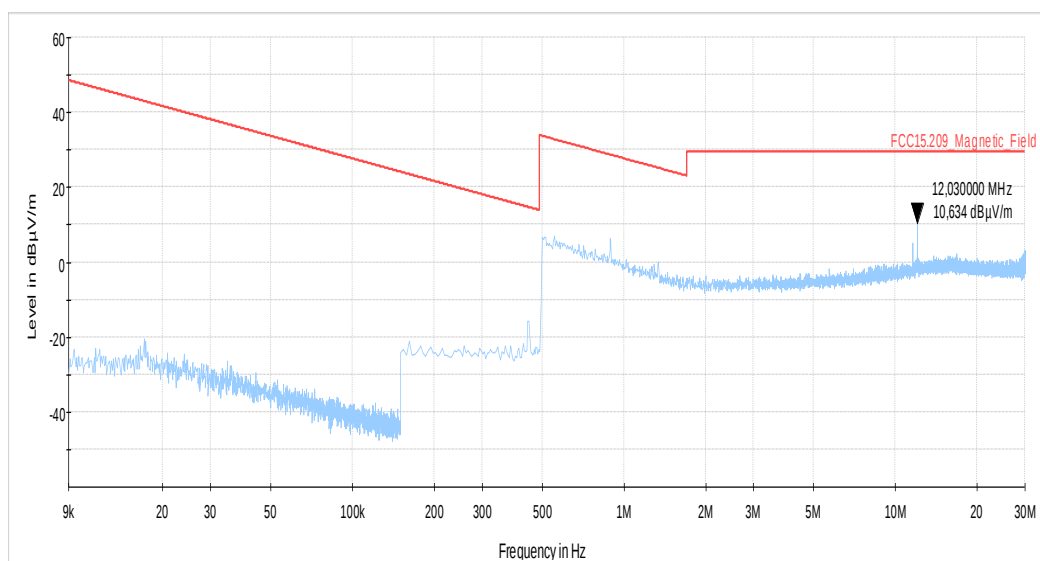


Diagram 12: Channel 26 (2.16_MgF_RFR2_Ch26_PWR15_ant0_standing_24VDC)

2.2. Field strength measurements 30MHz <f <1GHz

2.2.1. Channel 11 (antenna 1 active)

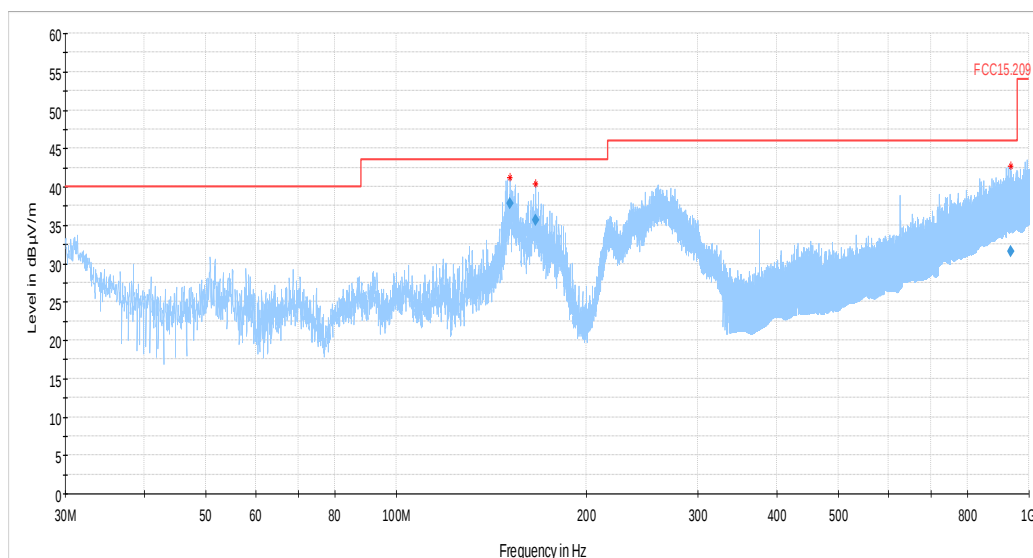


Diagram 13: Channel 11 (3.03_RFR2_Ch11_PWR15_ant1_laying_PoE120VAC)

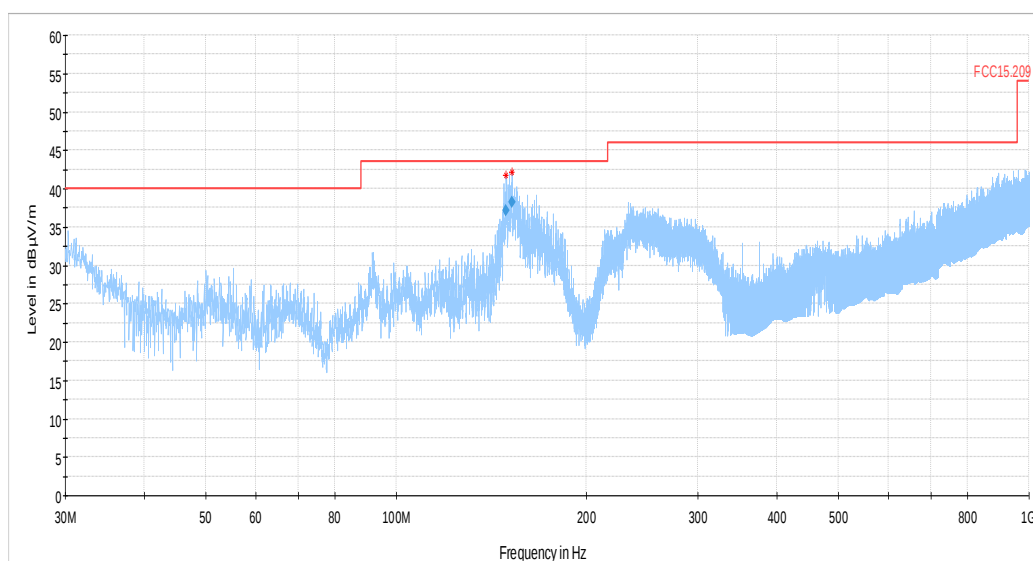


Diagram 14: Channel 11 (3.06_RFR2_Ch11_PWR15_ant1_standing_PoE120VAC)

2.2.2. Channel 18 (antenna 1 active)

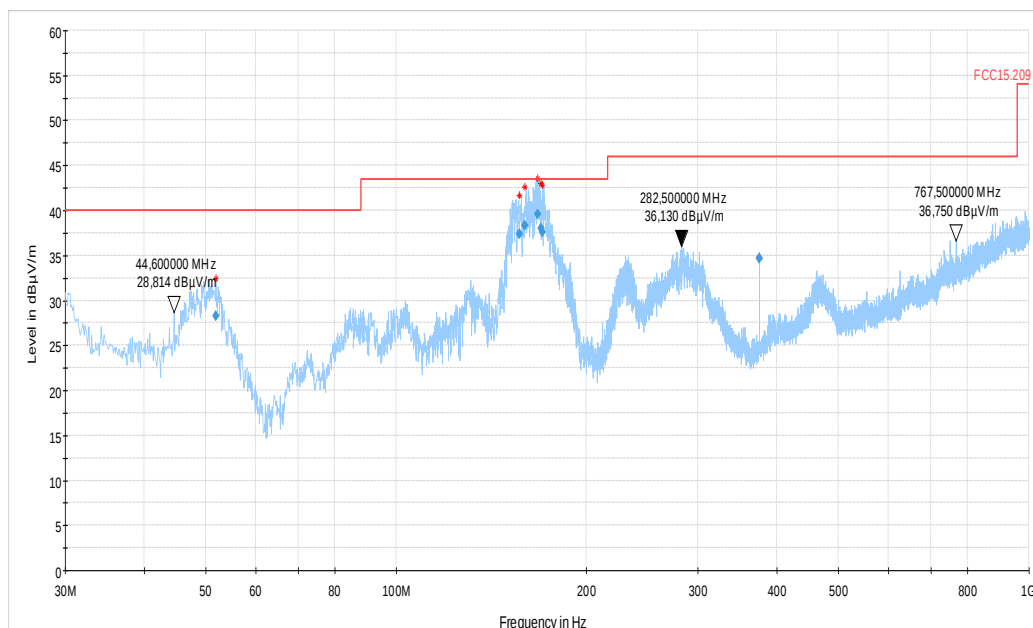


Diagram 15: Channel 18 (3.02_RFR2_Ch18_PWR15_ant1_laying)

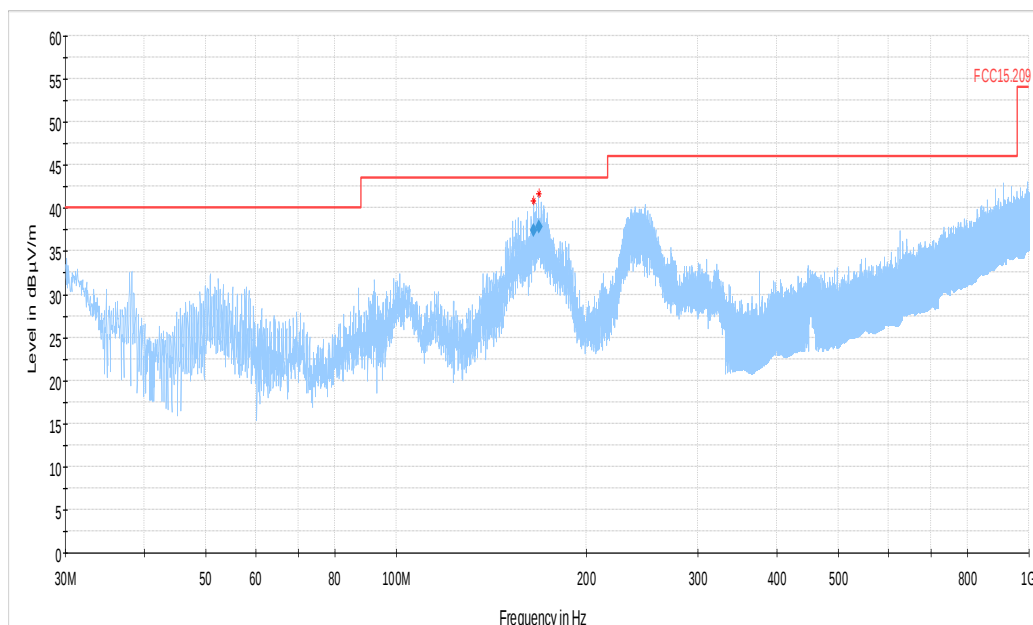


Diagram 16: Channel 18 (3.05_RFR2_Ch18_PWR15_ant1_standing_PoE)

2.2.3. Channel 26 (antenna 1 active))

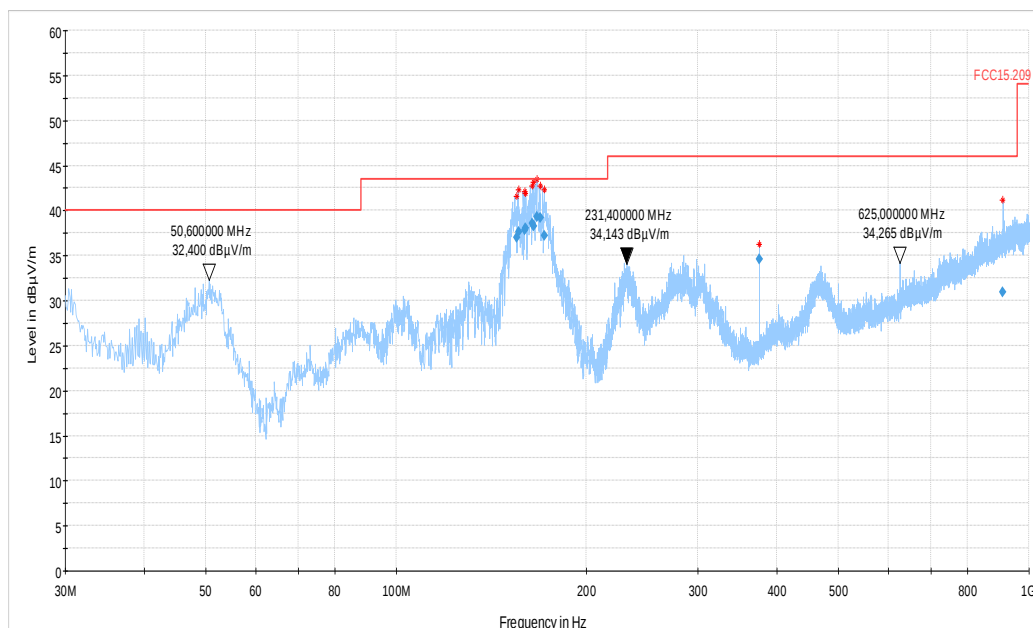


Diagram 17: Channel 26 (3.01_RFR2_Ch26_PWR15_ant1_laying)

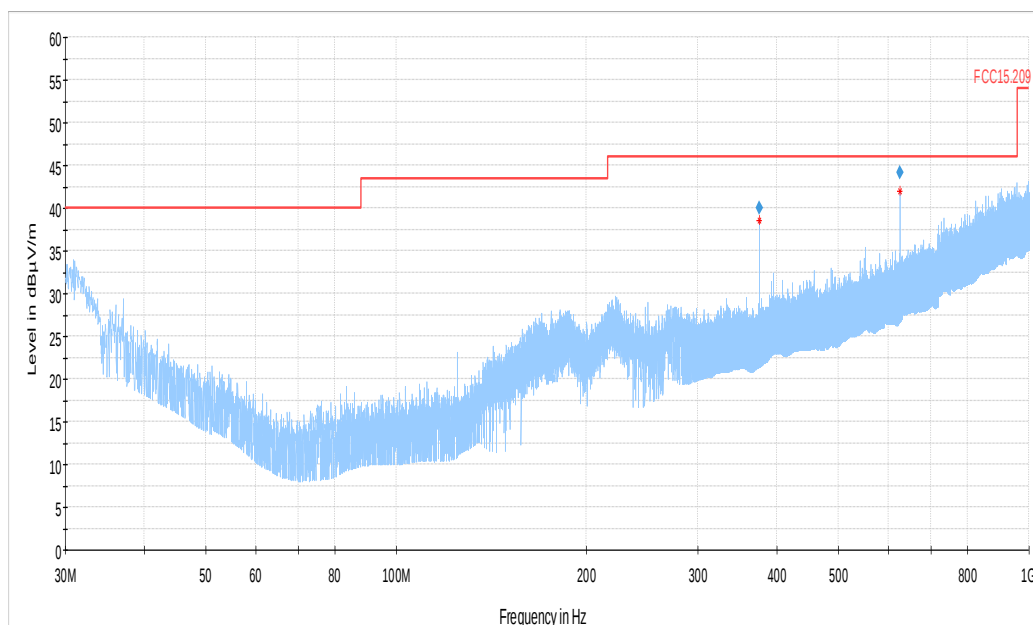


Diagram 18: Channel 26 (3.04_RFR2_Ch26_PWR15_ant1_standing_24DC)

2.2.4. Channel 11 (antenna 0 active)

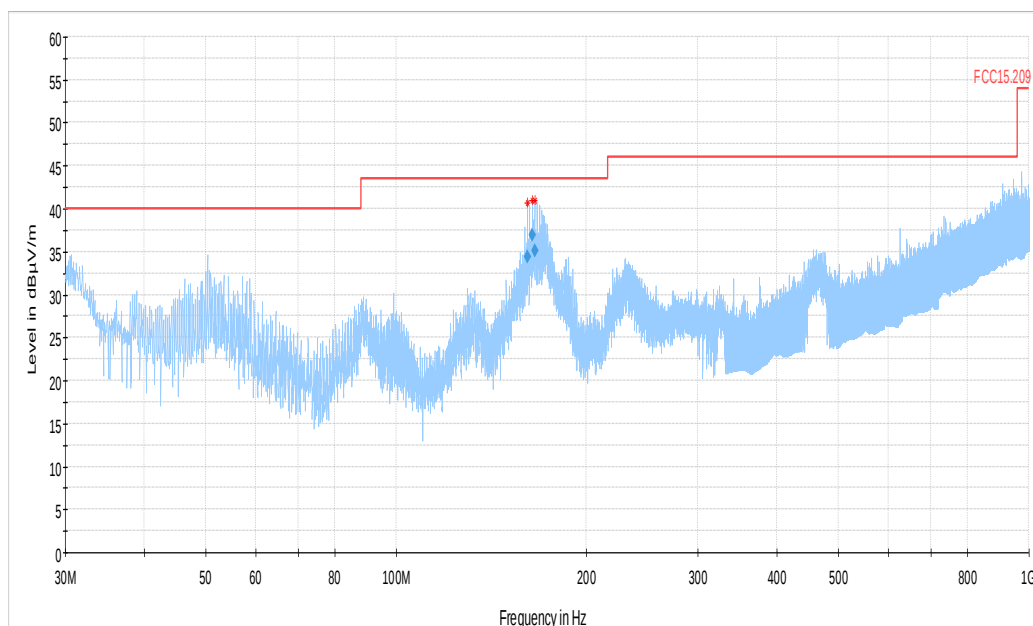


Diagram 19: (3.09_RFR2_Ch11_PWR15_ant0_laying_PoE)

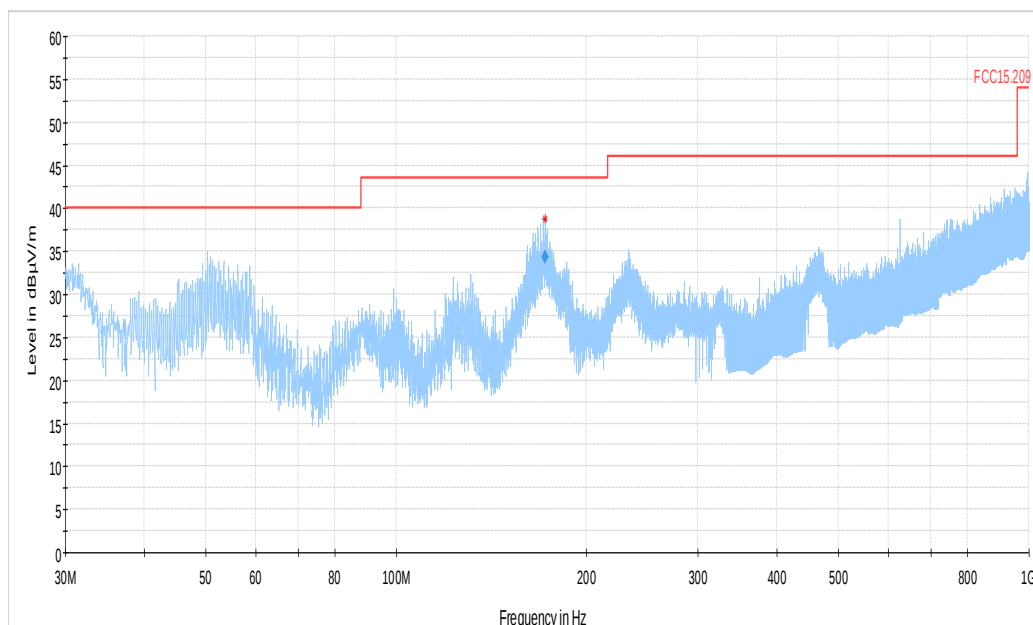


Diagram 20: (3.12_RFR2_Ch11_PWR15_ant0_standing_PoE)

2.2.5. Channel 18 (antenna 0 active)

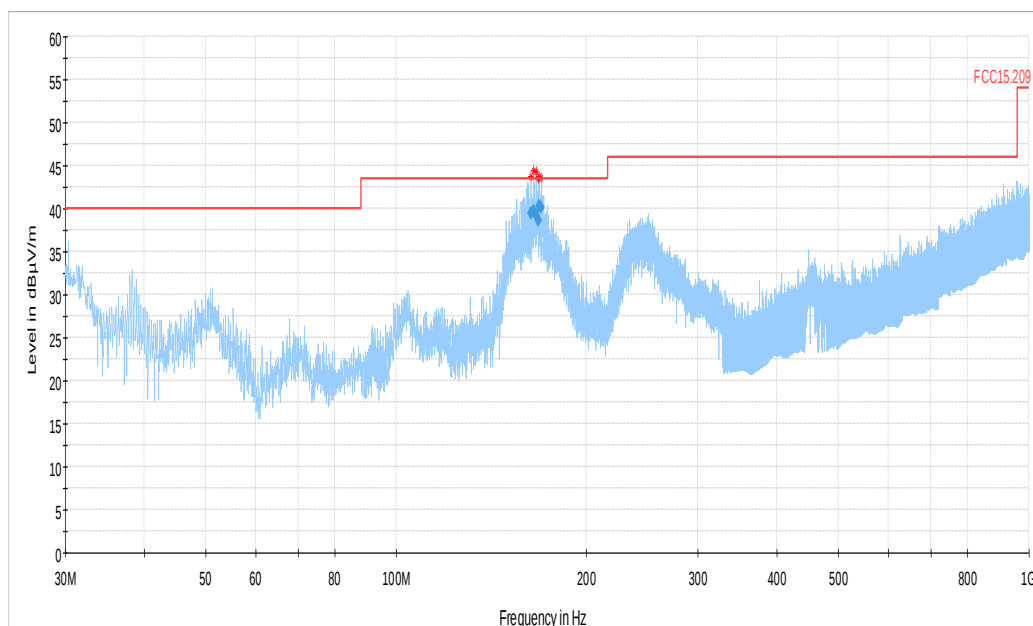


Diagram 21: Channel 18 (3.08_RFR2_Ch18_PWR15_ant0_laying_PoE)

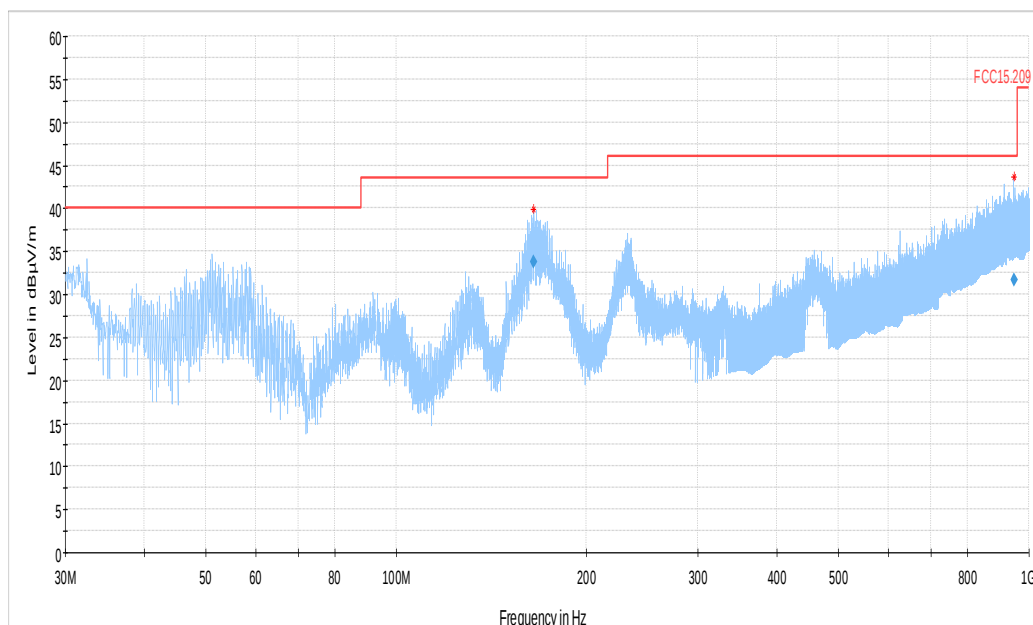


Diagram 22: (3.11_RFR2_Ch18_PWR15_ant0_standing_PoE)

2.2.6. Channel 26 (antenna 0 active))

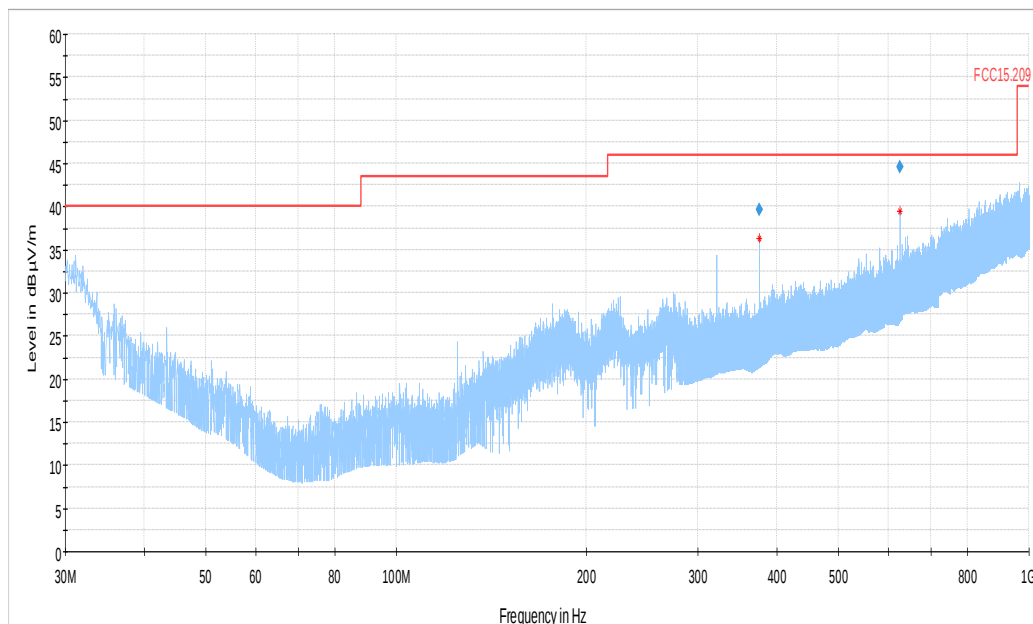


Diagram 23: (3.07_RFR2_Ch26_PWR15_ant0_laying_24DC)

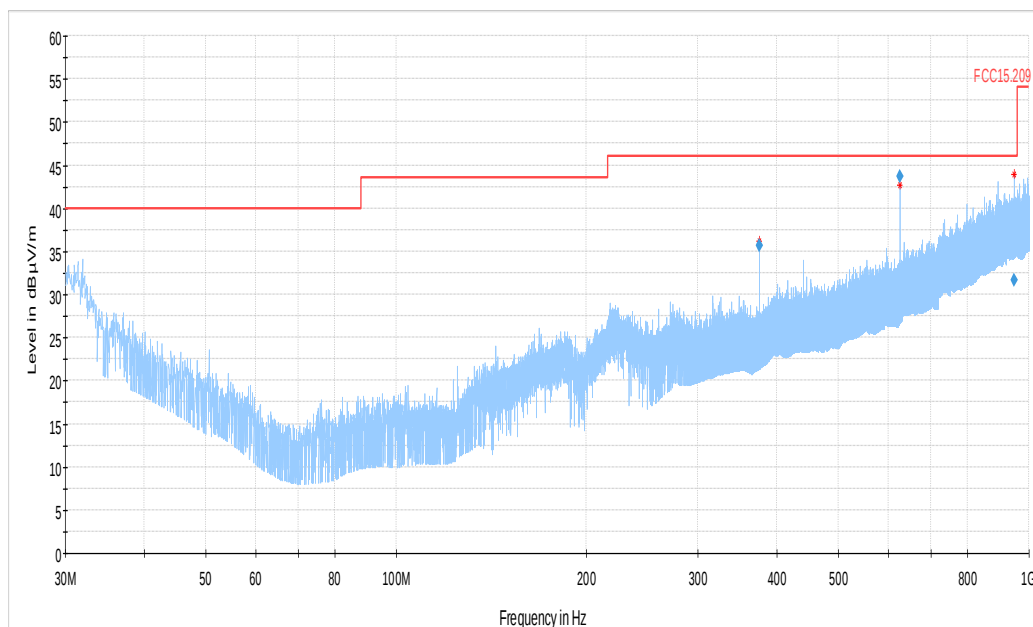


Diagram 24: (3.10_RFR2_Ch26_PWR15_ant0_standing_24DC)

2.3. Field strength measurements $f < 18\text{GHz}$

2.3.1. Channel 11

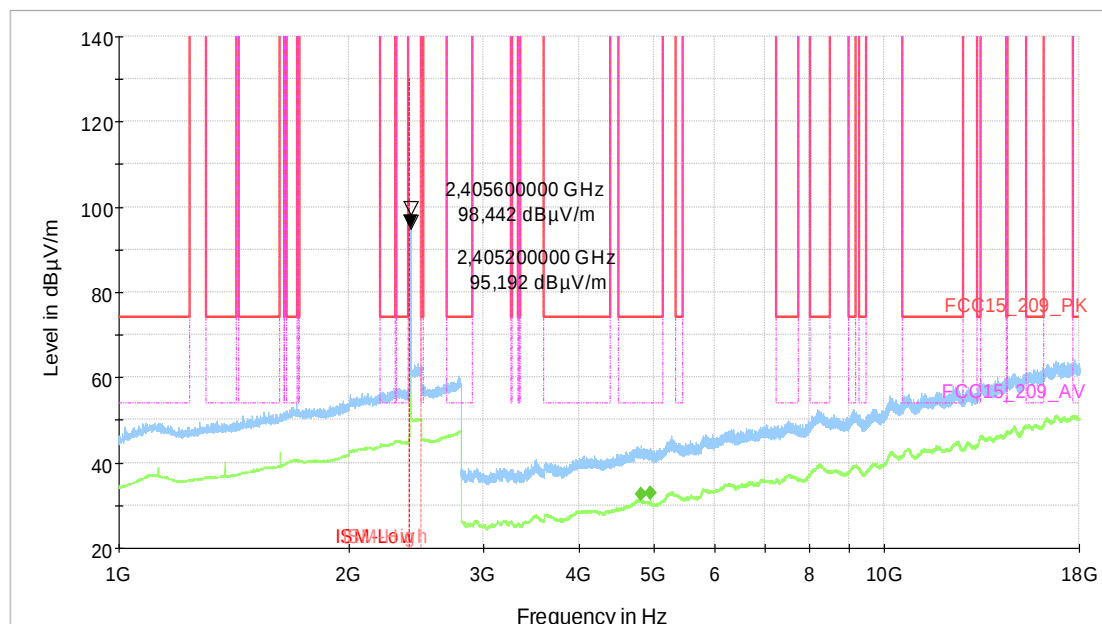


Diagram 25: Channel 11 (4.04_RFR2_Ch11_PWR_15_ant1_24V_DC)

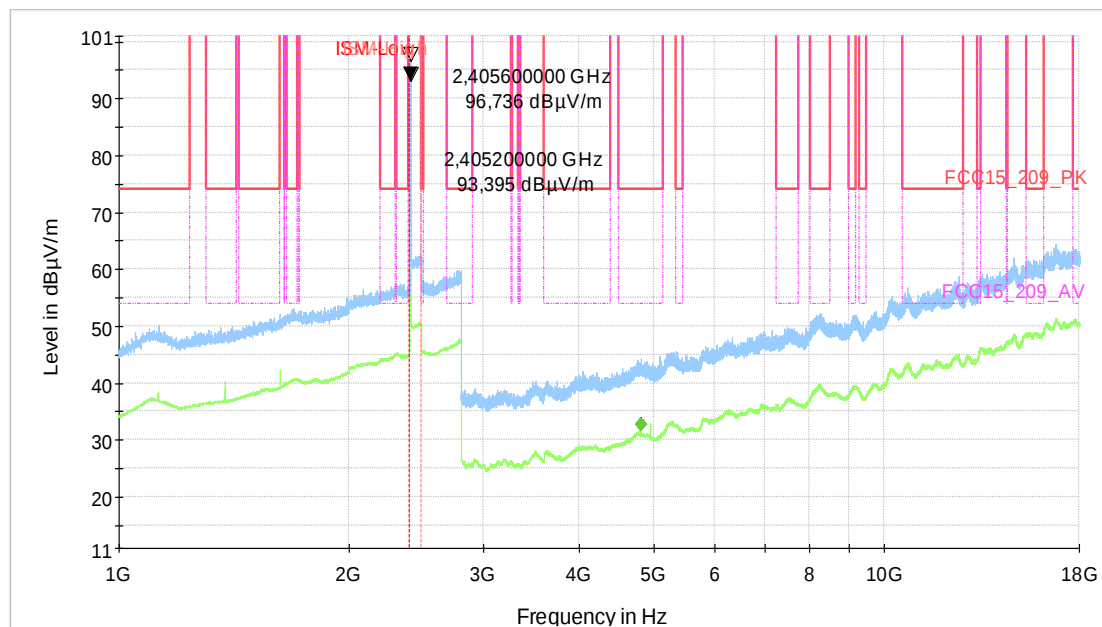


Diagram 26: Channel 11 (4.07_RFR2_Ch11_PWR_15_ant0_24V_DC)

2.3.2. Channel 18

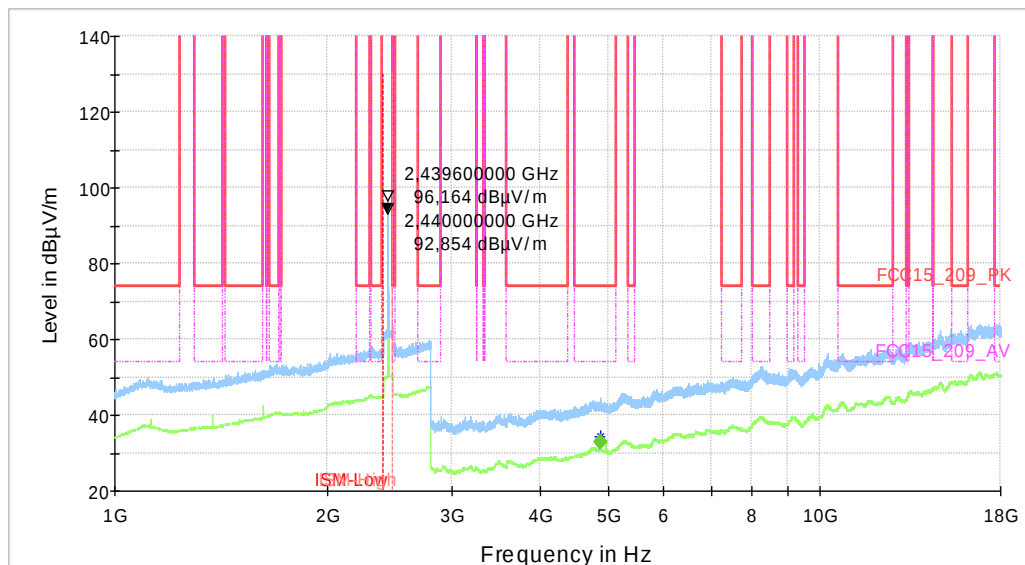


Diagram 27: Channel 18 (4.05_RFR2_Ch18_PWR_15_ant1_PoE)

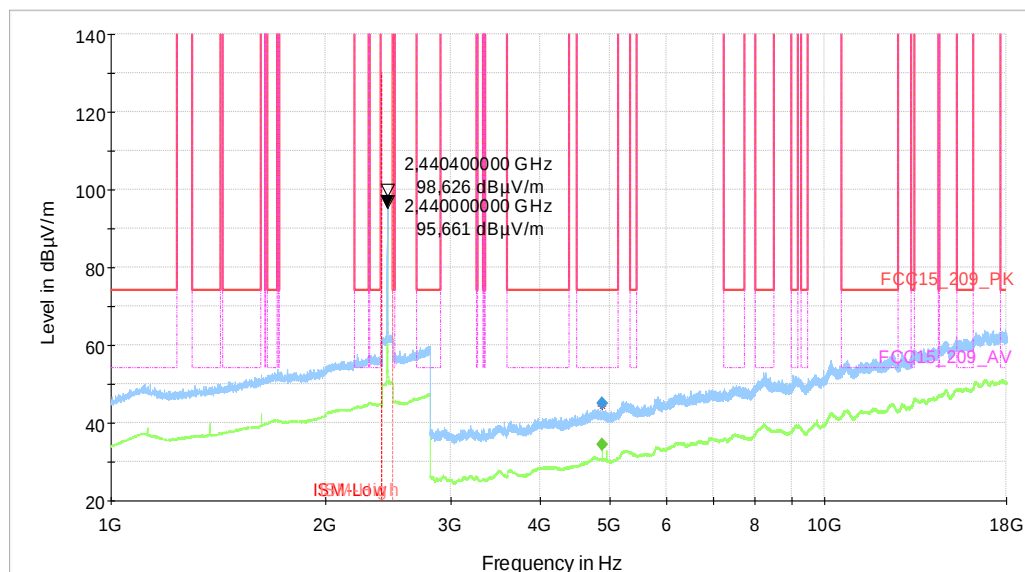


Diagram 28: Channel 18 (4.08_RFR2_Ch18_PWR_15_ant0_PoE)

2.3.3. Channel 26

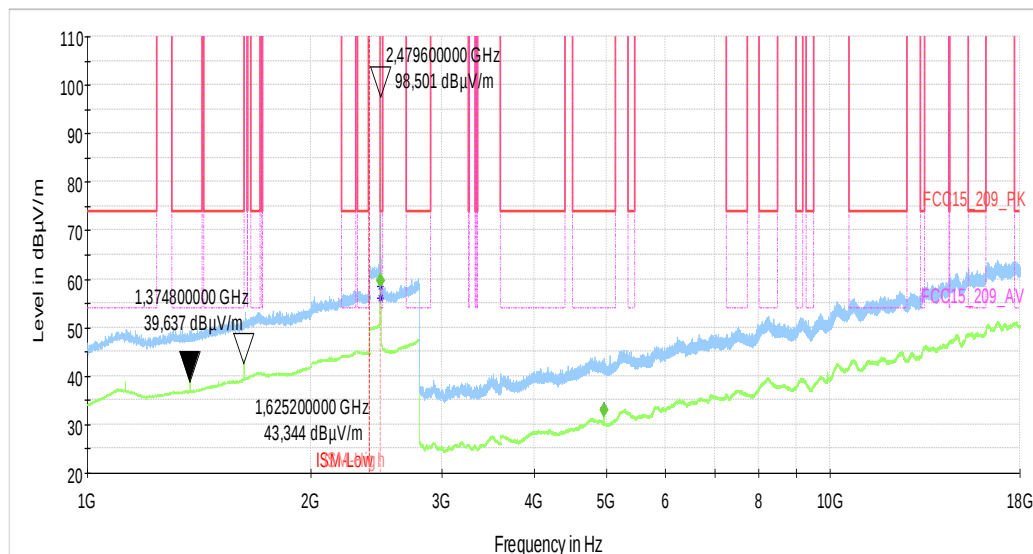


Diagram 29: Channel 26 (4.06_RFR2_Ch26_PWR_15_ant1_PoE)

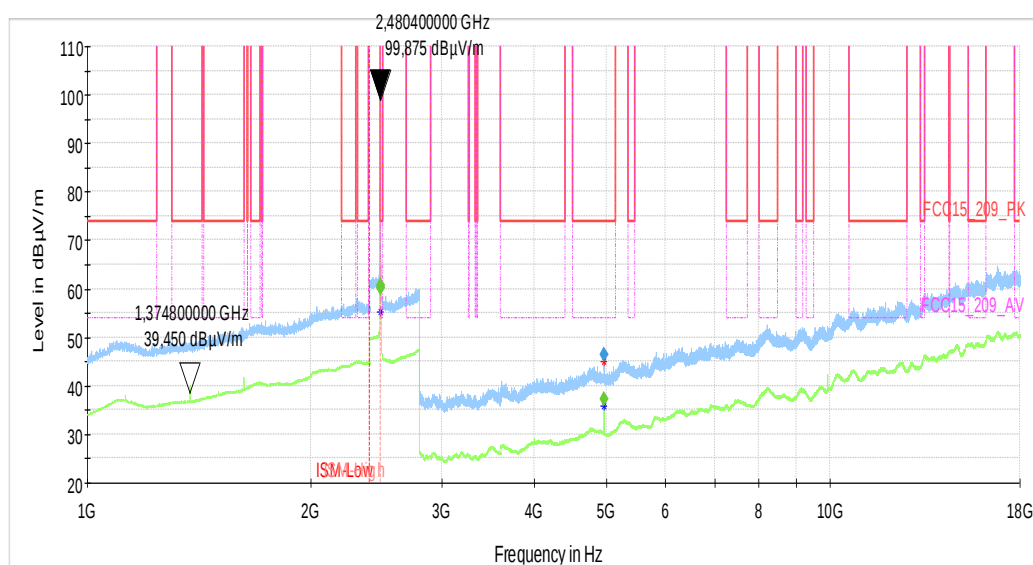


Diagram 30: Channel 26 (4.09_RFR2_Ch26_PWR_15_ant0_PoE)

2.4. Field strength measurements above 18GHz

2.4.1. Channel 11

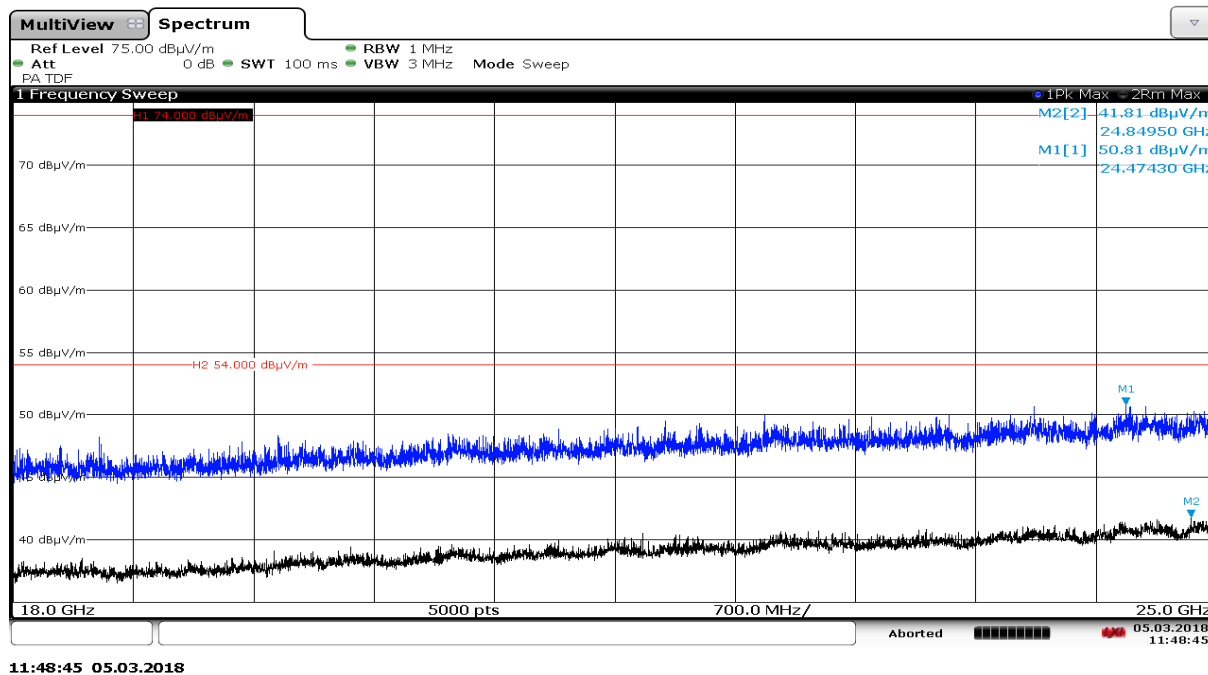


Diagram 31: 4.13_RFR2_Ch11_PWR_15_ant1_24V_DC

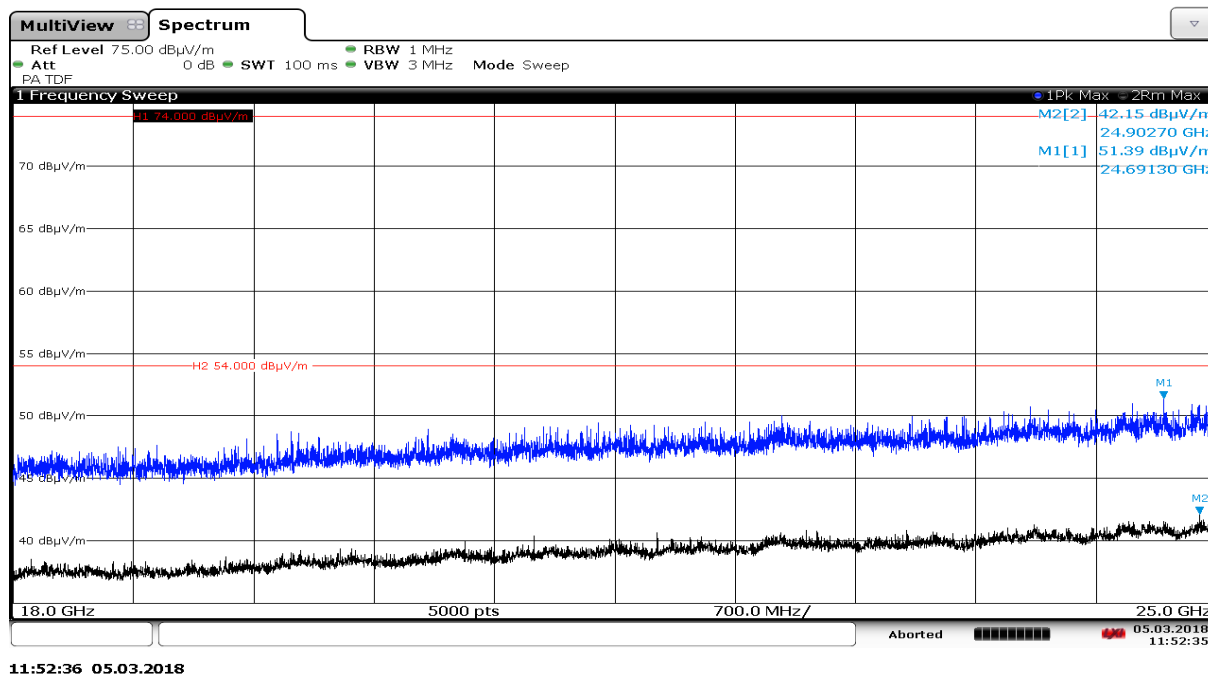
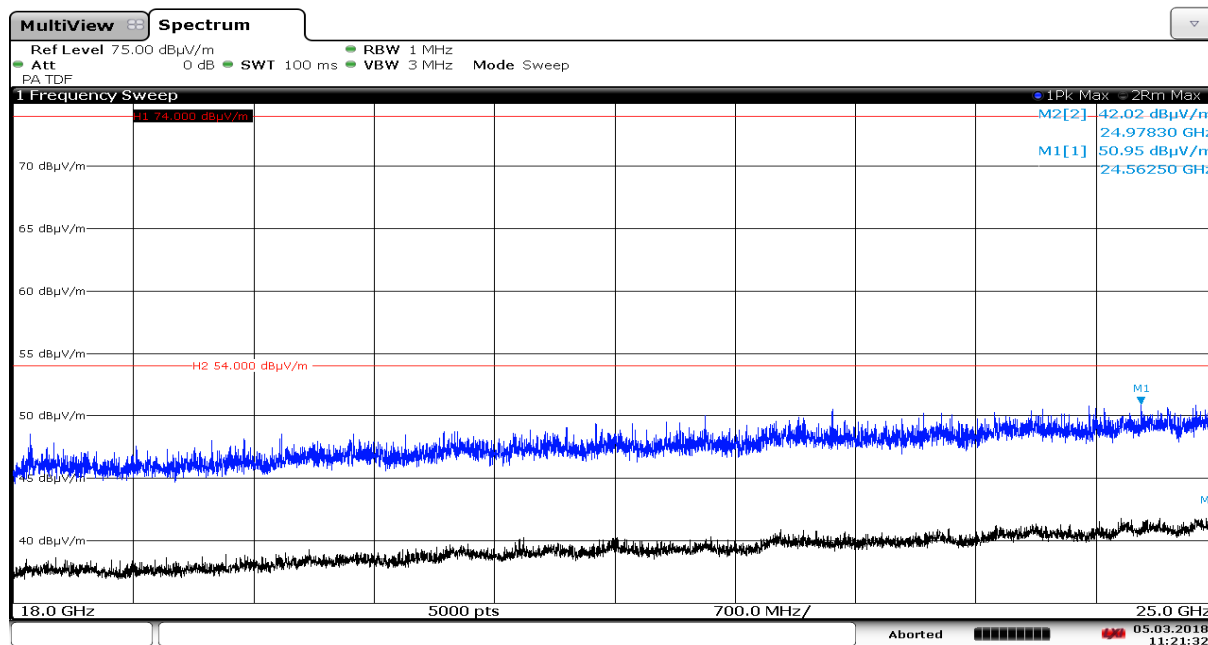


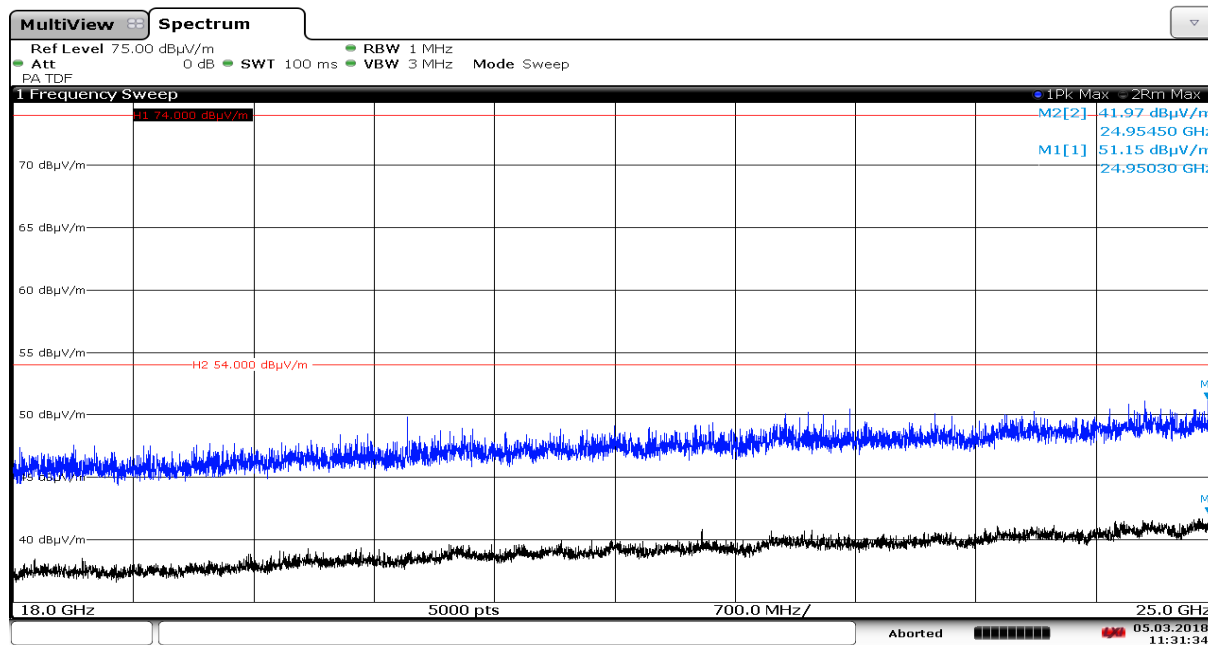
Diagram 32: 4.16_RFR2_Ch11_PWR_15_ant0_24V_DC

2.4.2. Channel 18



11:21:32 05.03.2018

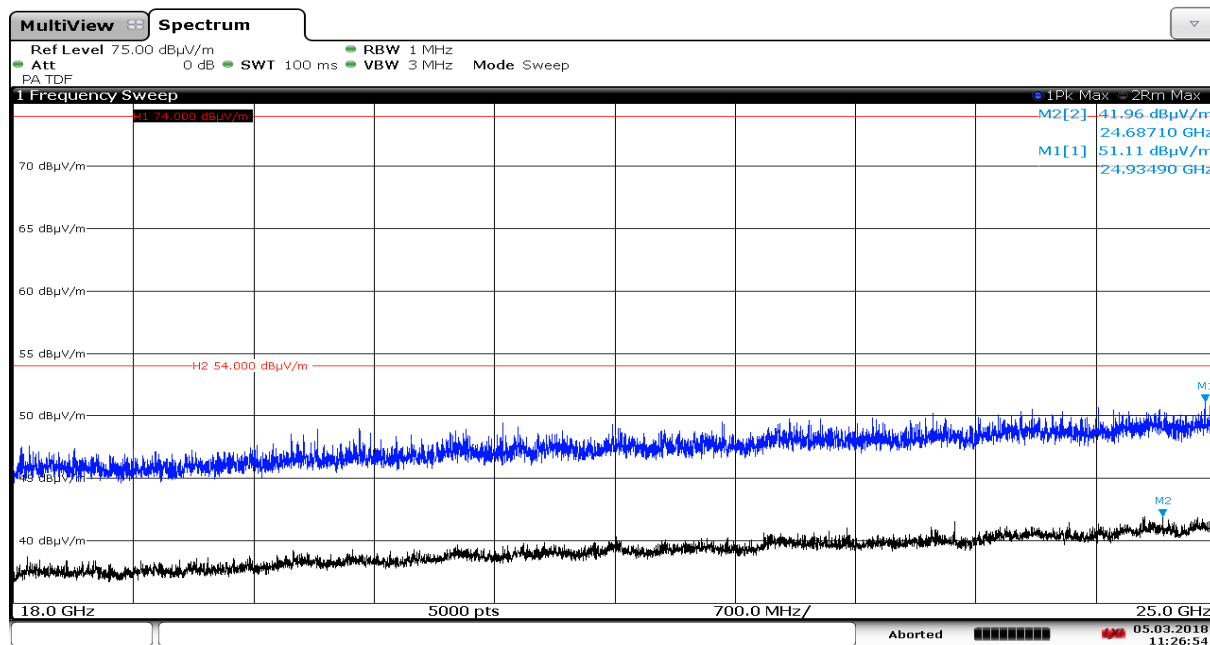
Diagram 33: 4.14_RFR2_Ch18_PWR_15_ant1_PoE



11:31:35 05.03.2018

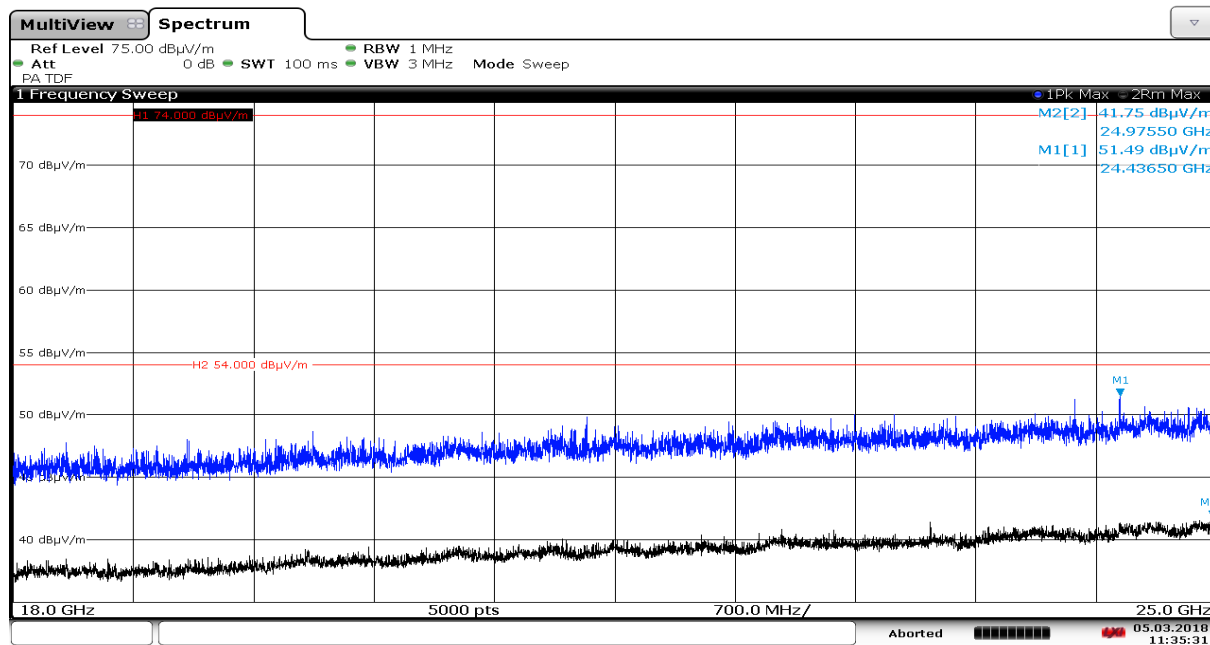
Diagram 34: 4.17_RFR2_Ch18_PWR_15_ant0_PoE

2.4.3. Channel 26



11:26:55 05.03.2018

Diagram 35: 4.15_RFR2_Ch26_PWR_15_ant1_PoE



11:35:31 05.03.2018

Diagram 36: 4.18_RFR2_Ch26_PWR_15_ant0_PoE

3. Band-edge measurements

3.1. Channel 11 (left band edge)

3.1.1. Conducted 20dBc

Result

DUT Frequency (MHz)	Result
2405.000000	PASS

Inband Peak

Frequency (MHz)	Level (dBm)
2405.108235	6.1

Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2399.950000	-32.9	19.1	-13.9	PASS
2399.900000	-34.3	20.4	-13.9	PASS
2399.850000	-34.8	21.0	-13.9	PASS
2399.800000	-34.9	21.0	-13.9	PASS
2399.750000	-35.0	21.1	-13.9	PASS
2399.700000	-35.0	21.1	-13.9	PASS
2399.650000	-35.5	21.6	-13.9	PASS
2399.600000	-35.7	21.8	-13.9	PASS
2399.550000	-35.8	21.9	-13.9	PASS
2399.500000	-35.9	22.0	-13.9	PASS
2399.450000	-36.0	22.2	-13.9	PASS
2399.400000	-36.1	22.2	-13.9	PASS
2399.350000	-36.2	22.3	-13.9	PASS
2399.300000	-36.3	22.4	-13.9	PASS
2399.250000	-36.3	22.5	-13.9	PASS

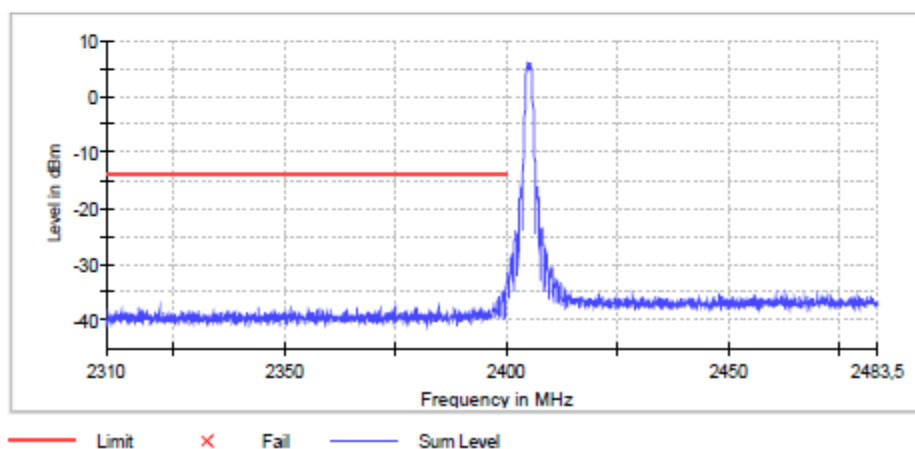


Diagram 37: Channel 26 – Band –Edge low (Ch11=2405MHz)

3.1.2. Radiated

20dBc criterium -> pass (limit is red-line)

3.2. Channel 26 (right band edge)

3.2.1. Conducted 20dBc

Result

DUT Frequency (MHz)	Result
2480.000000	PASS

Inband Peak

Frequency (MHz)	Level (dBm)
2480.552941	5.0

Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2483.923077	-31.4	16.4	-15.0	PASS
2483.870192	-31.4	16.5	-15.0	PASS
2483.817308	-31.7	16.8	-15.0	PASS
2484.134615	-32.1	17.1	-15.0	PASS
2483.975962	-32.1	17.1	-15.0	PASS
2483.764423	-32.2	17.2	-15.0	PASS
2484.081731	-32.2	17.3	-15.0	PASS
2484.028846	-32.4	17.5	-15.0	PASS
2483.711538	-32.8	17.8	-15.0	PASS
2484.187500	-33.5	18.5	-15.0	PASS
2484.240385	-33.8	18.9	-15.0	PASS
2483.658654	-35.1	20.1	-15.0	PASS
2484.293269	-35.1	20.1	-15.0	PASS
2484.927885	-35.2	20.3	-15.0	PASS
2484.980769	-35.5	20.5	-15.0	PASS

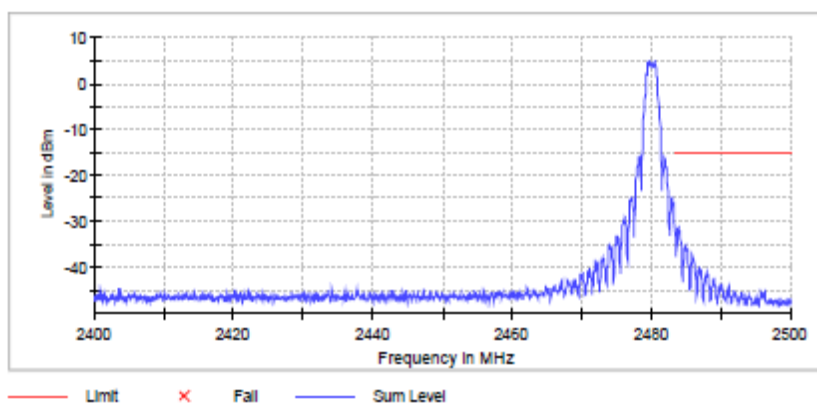


Diagram 38: Channel 26 – Band –Edge high (Ch26=2480MHz)

3.2.2. Radiated accord. §15.209 & 15.205

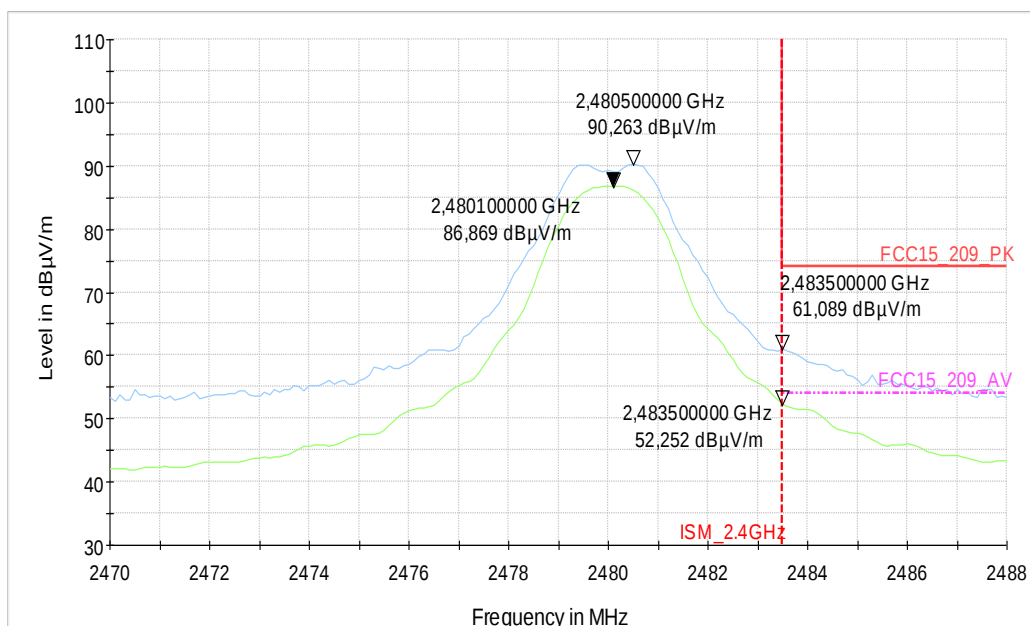


Diagram 39: Antenna 1 (test performed with power level = 27)

➔ pass

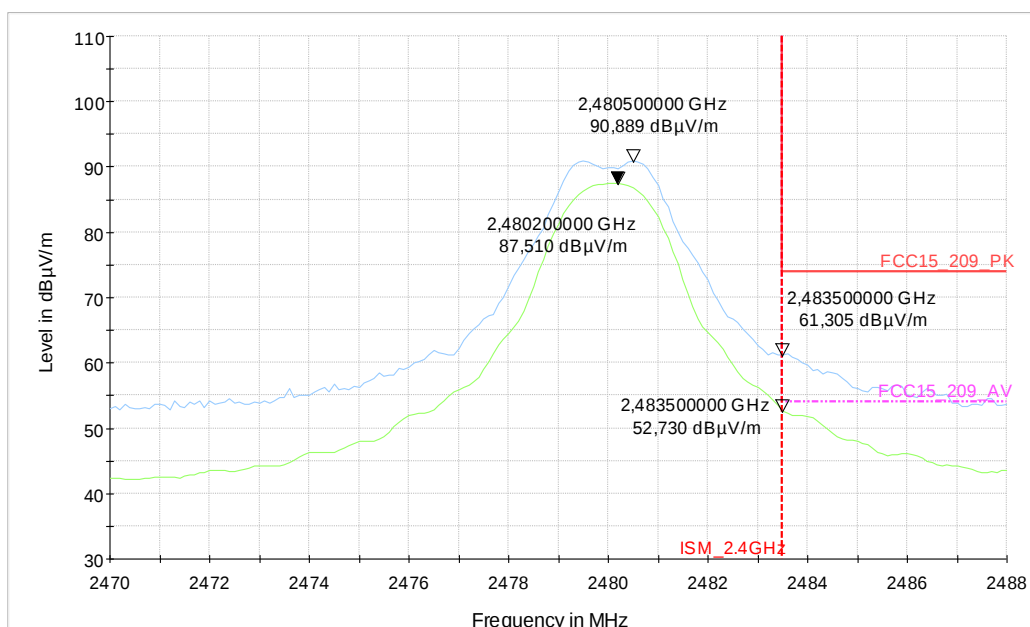
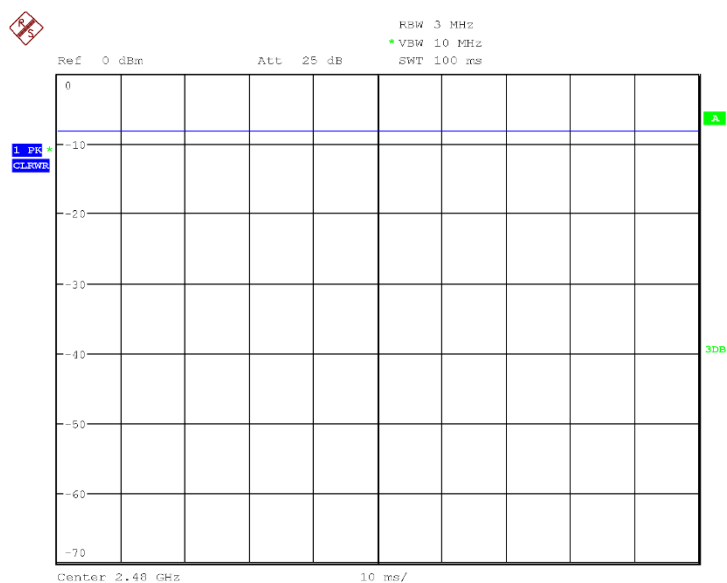


Diagram 40: Antenna 2 (test performed with power level = 27)

➔ pass

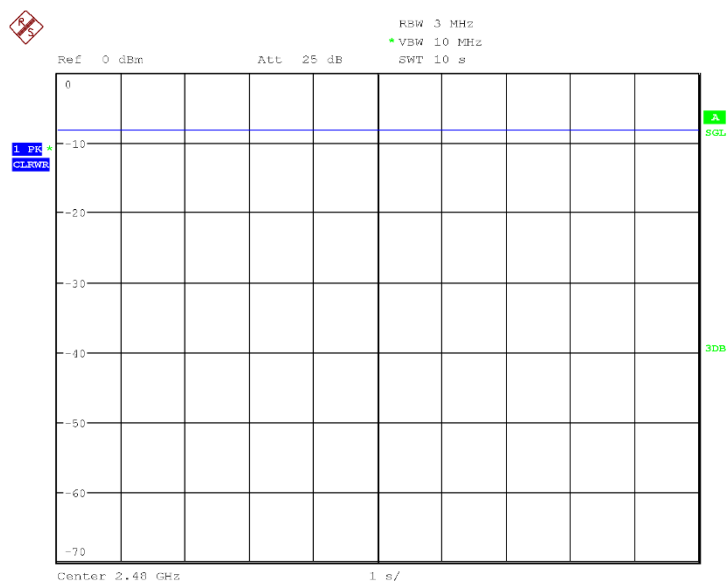
4. Conducted RF-measurements on antenna port

4.1. Duty-Cycle of EUT



Date: 27.FEB.2018 10:40:30

Diagram 41: check of duty-cycle on channel 26 (100ms period)



Date: 27.FEB.2018 10:42:05

Diagram 42: check of duty-cycle on channel 26 (long 10s period)

4.2. Conducted RF-power (Peak)

4.2.1. Channel 11 (Port0)

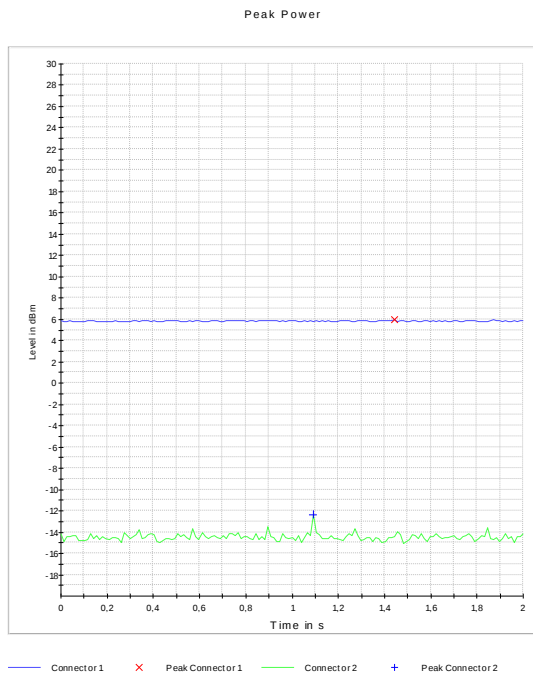


Diagram 43: Channel 11 (Peak Power=6dBm)

4.2.2. Channel 11 (Port1)

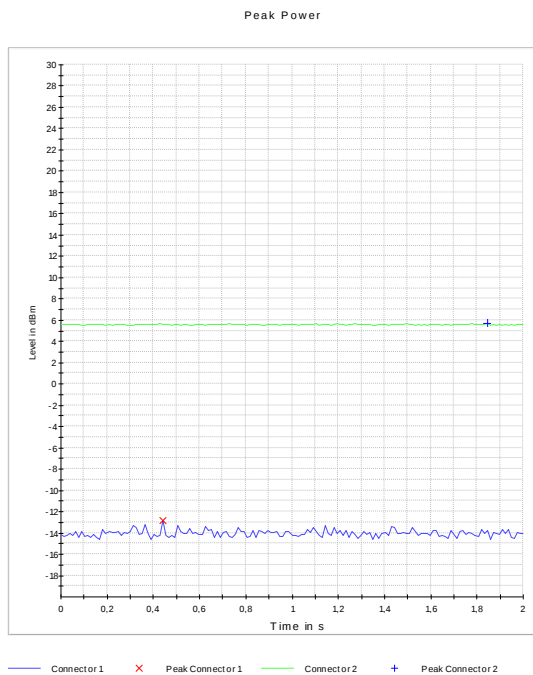


Diagram 44: Channel 11 ((Peak Power=5.8 dBm)

4.2.3. Channel 12 (Port0)

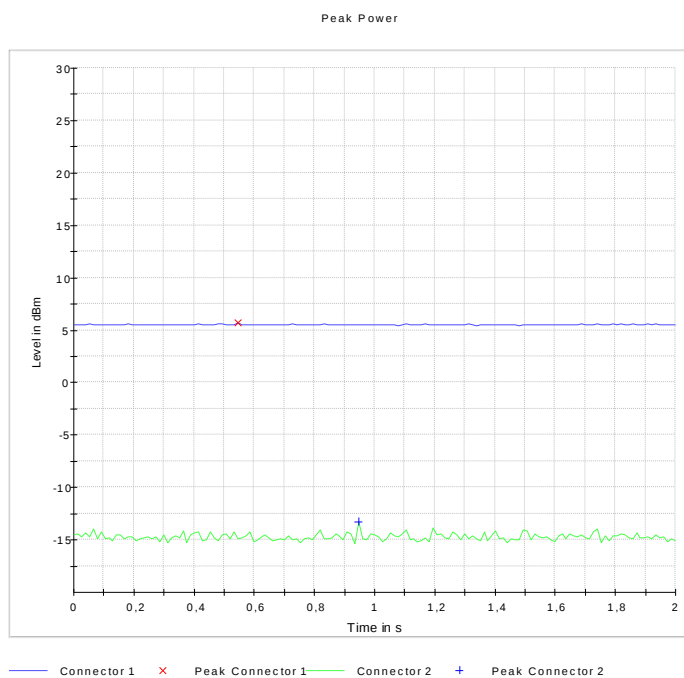


Diagram 45: Channel 12 (5.8dBm)

4.2.4. Channel 12 (Port1)

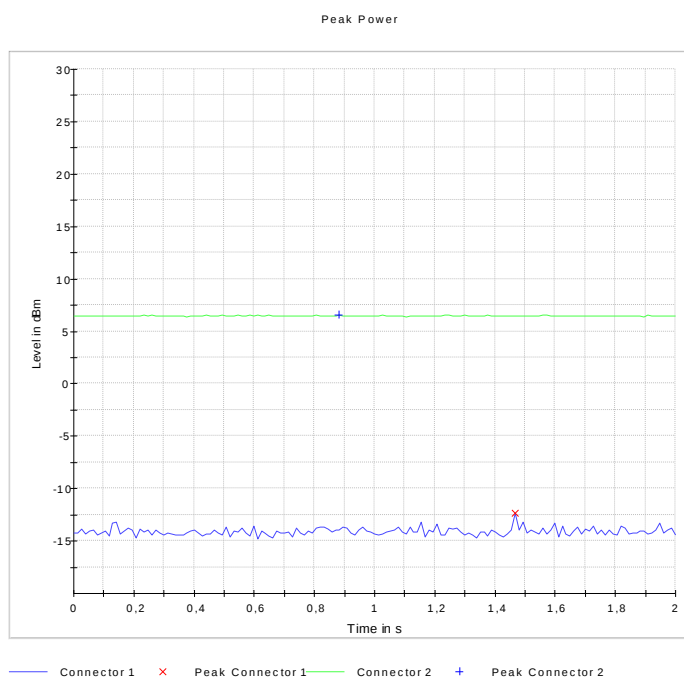


Diagram 46: Channel 12 (6.6 dBm)

4.2.5. Channel 18 (Port0)

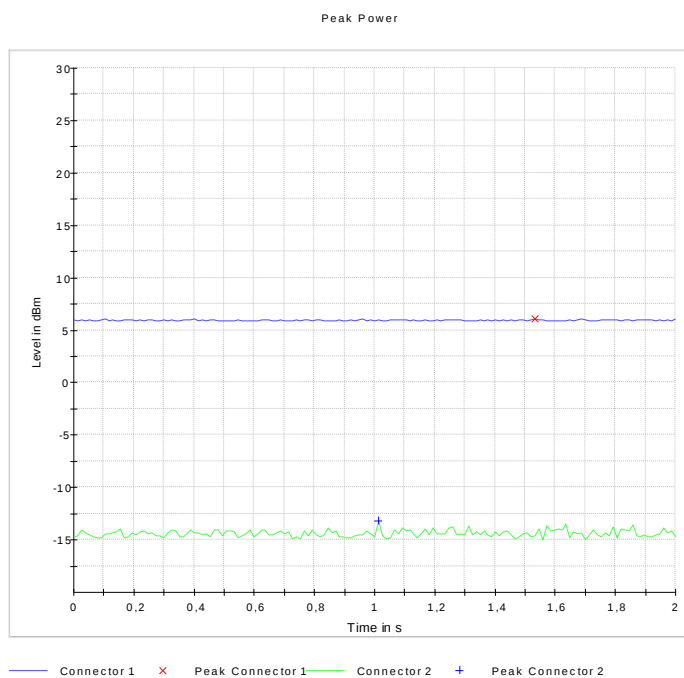


Diagram 47: Channel 18 (6.1dBm)

4.2.6. Channel 18 (Port1)

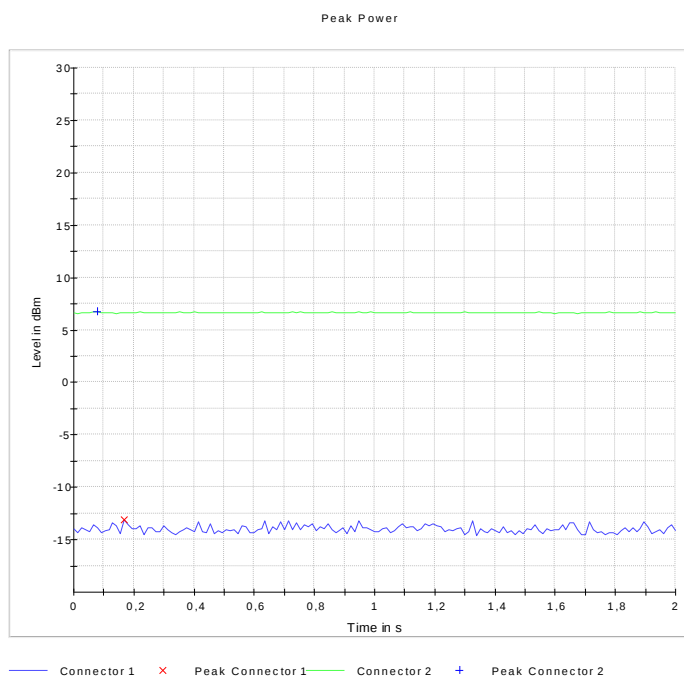


Diagram 48: Channel 18 (6.8dBm)

)

4.2.7. Channel 26 (Port0)

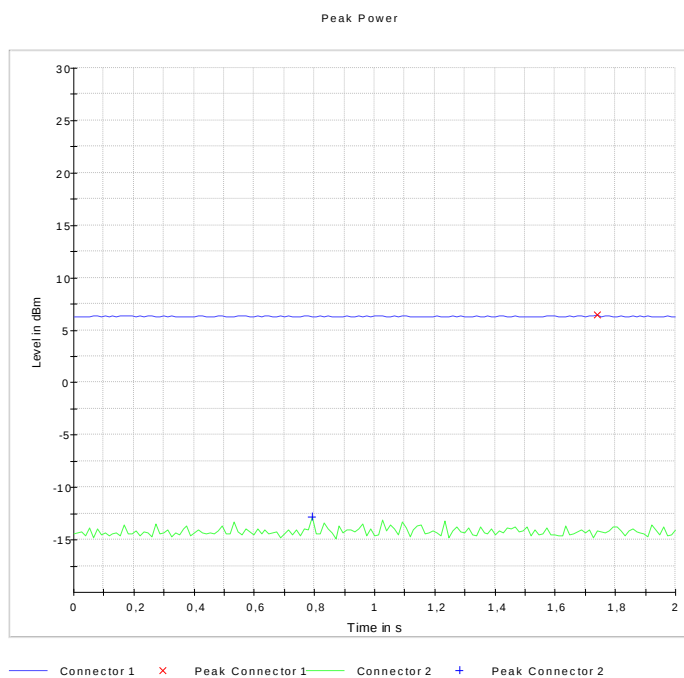


Diagram 49: Channel 26 (peak power = 6.5dBm)

4.2.8. Channel 26 (Port1)

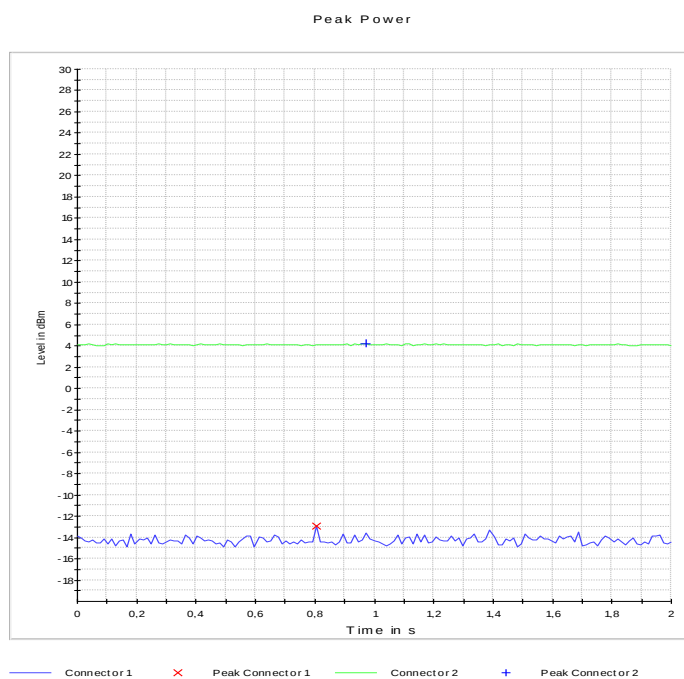


Diagram 50: Channel 26 (Peak power=4.3dBm)

4.3. 6-dB Bandwidth

4.3.1. 6-dB Bandwidth Ch11 –fehlt

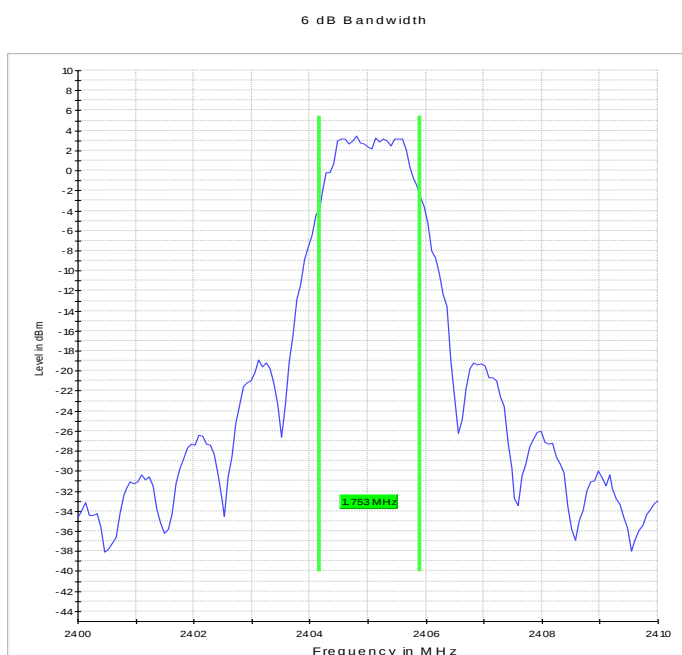


Diagram 51: Channel 11

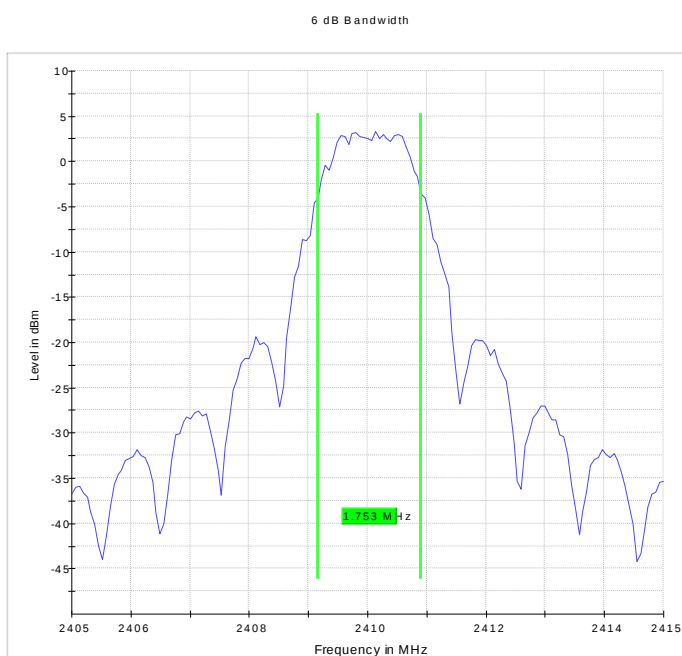


Diagram 52: Channel 12

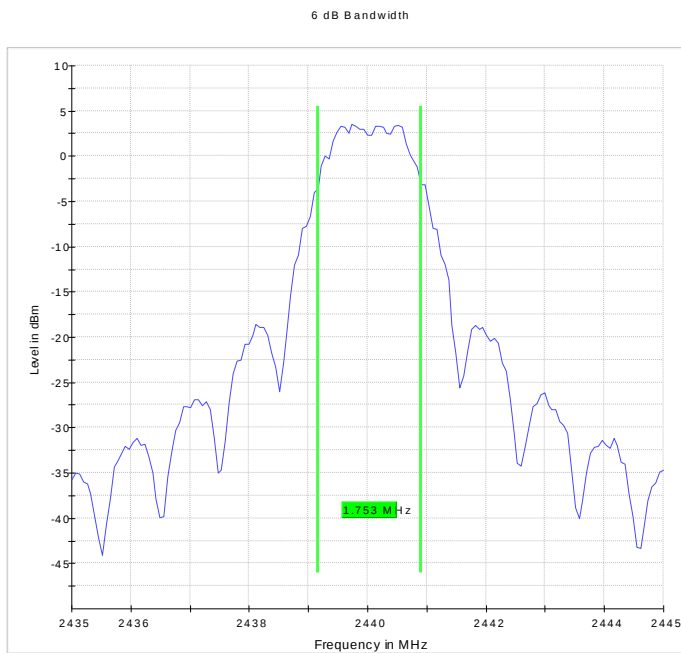


Diagram 53: Channel 18

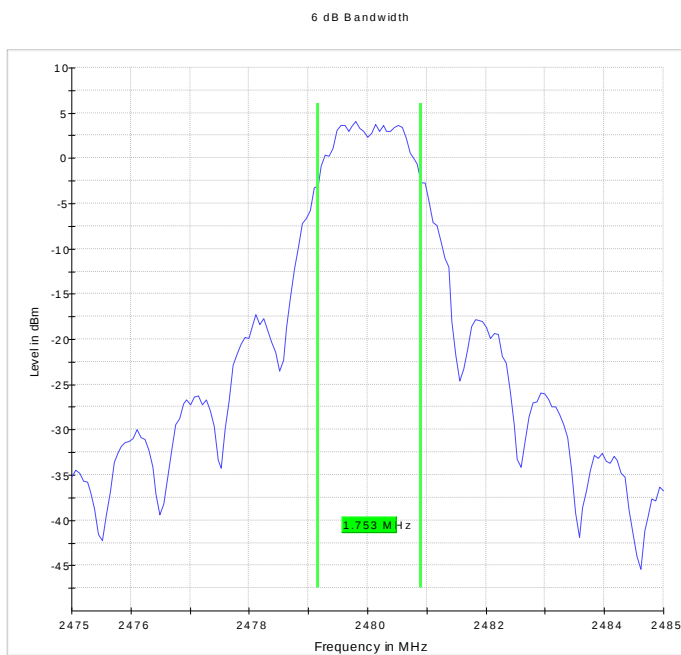
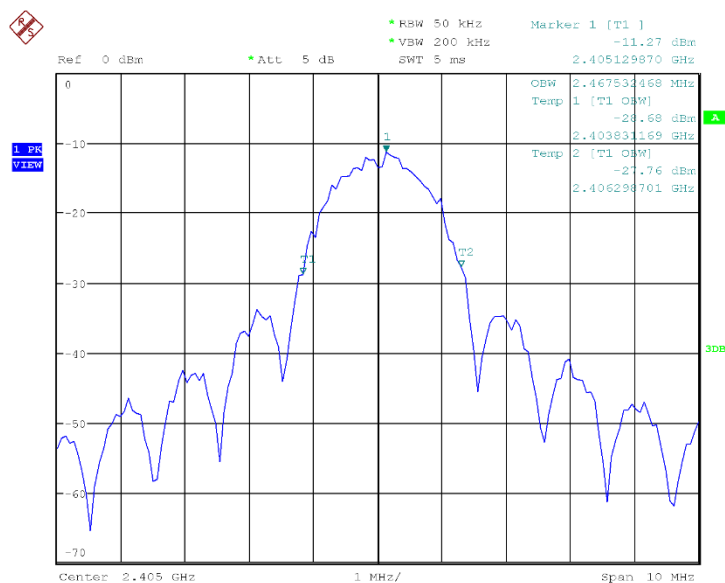


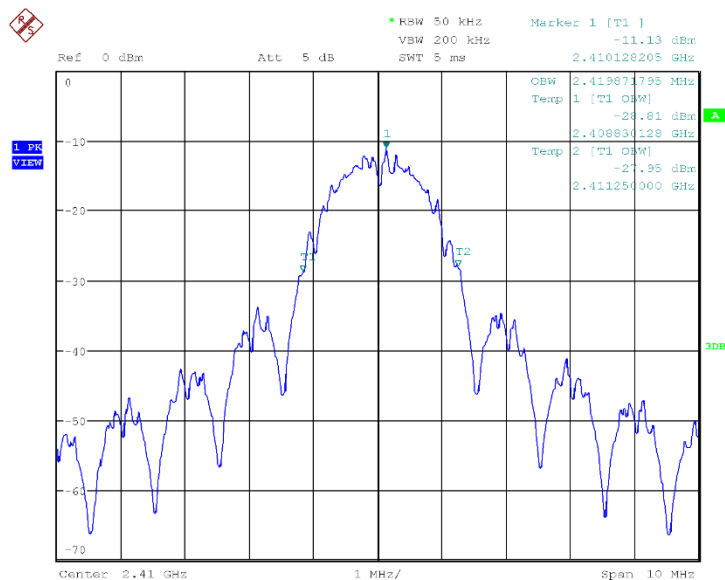
Diagram 54: Channel 26

4.4. 99% Occupied Bandwidth



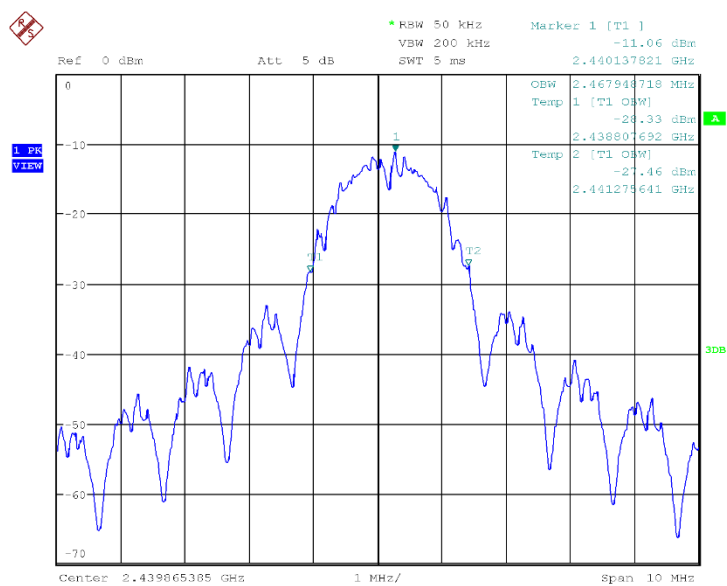
Date: 27.FEB.2018 10:18:00

Diagram 55: OBW 99% - channel 11 , Port 1



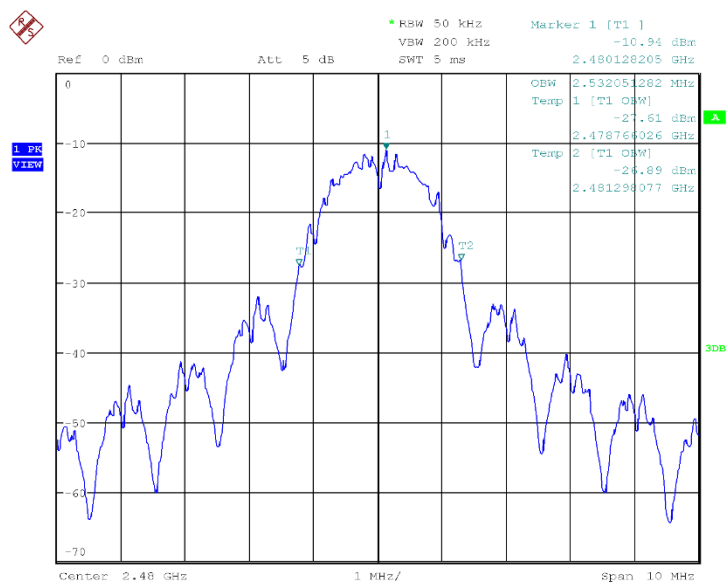
Date: 18.JAN.2018 12:04:53

Diagram 56: OBW 99% - channel 12 , Port 1



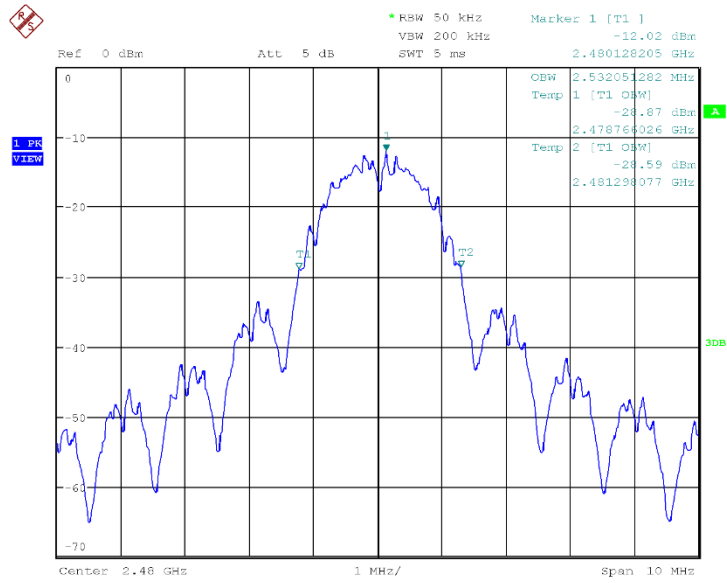
Date: 18.JAN.2018 11:53:14

Diagram 57: OBW 99% - channel 18, Port 1



Date: 18.JAN.2018 12:12:12

Diagram 58: OBW 99% - channel 26, Port1



Date: 18.JAN.2018 12:26:32

Diagram 59: OBW 99% - Channel 26, Port 2

4.5. Power Spectral Density

4.5.1. Channel 11 (Port0+1)

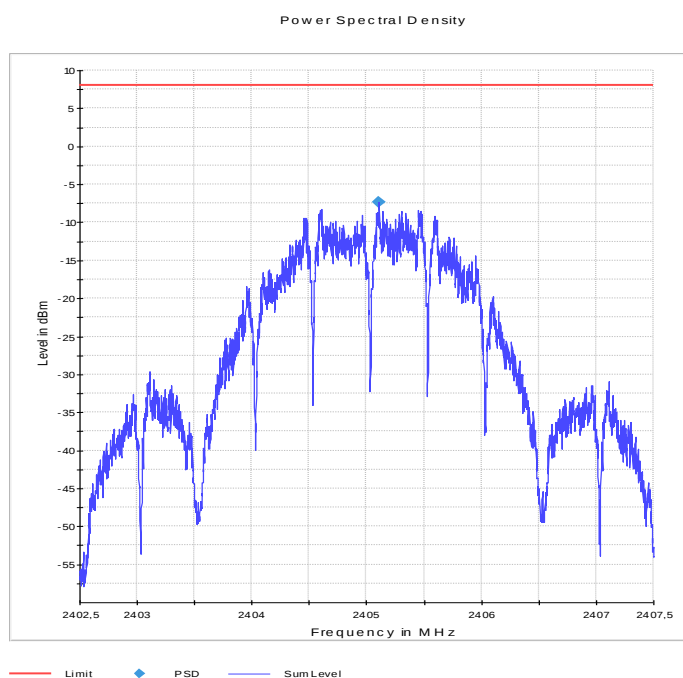


Diagram 60: Power Spectrum density (channel 11)

4.5.2. Channel 12 (Port0+1)

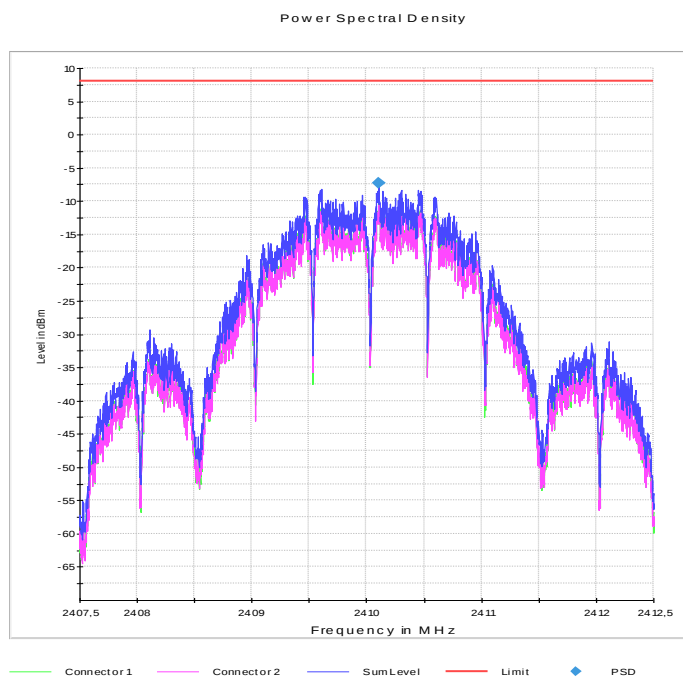


Diagram 61: Power Spectrum density (channel 12)

4.5.3. Channel 18 (Port0+1)

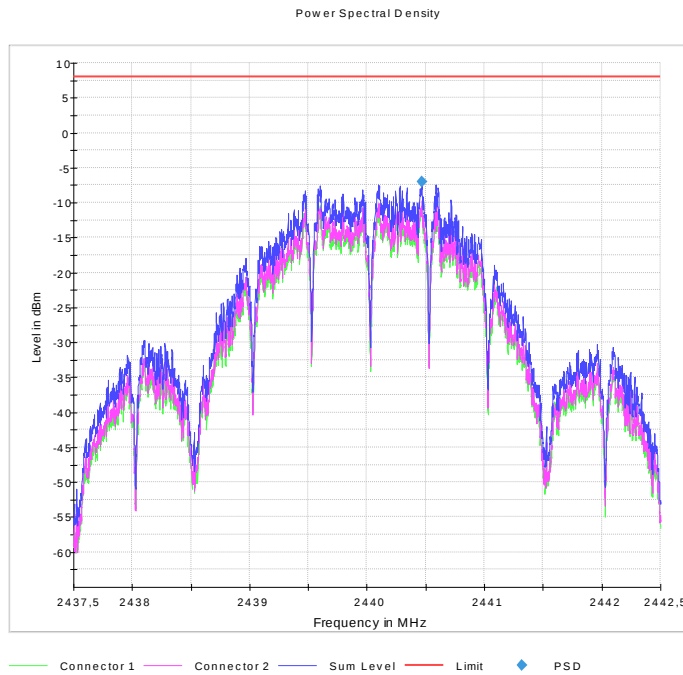


Diagram 62: Power Spectrum density (channel 18)

4.5.4. Channel 26 (Port0+1)

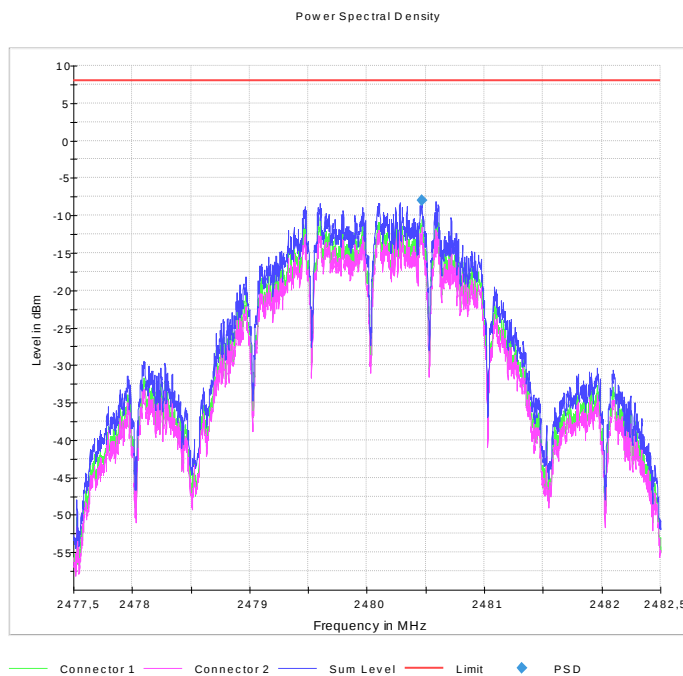


Diagram 63: Power Spectrum density (channel 26)

4.6. 20dBc Emissions (conducted)

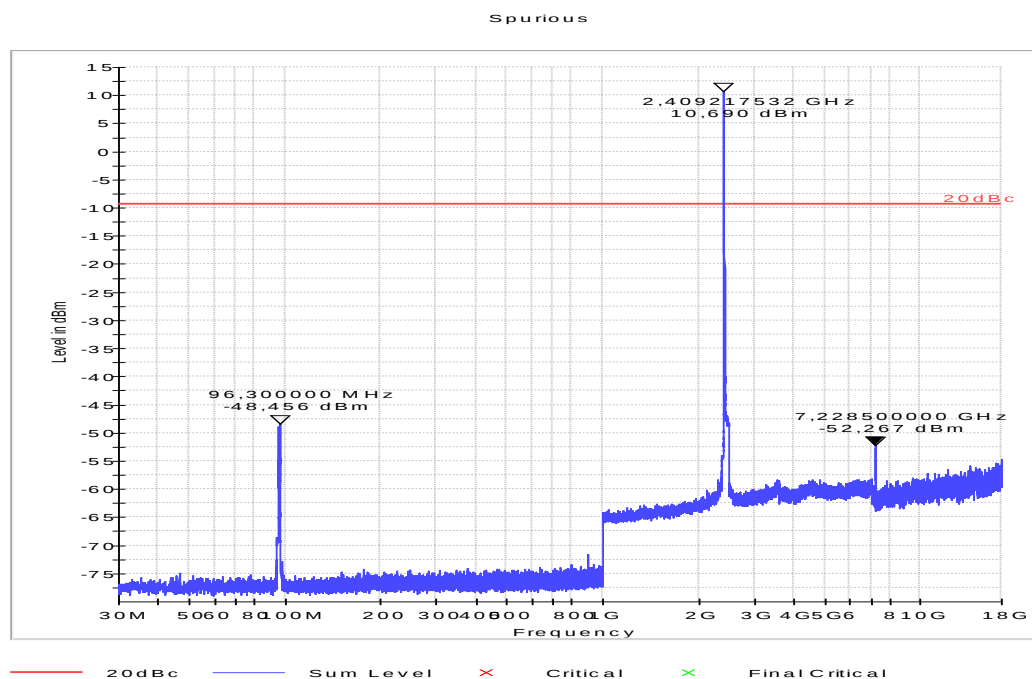


Diagram 64: 20dBc emissions on channel 12

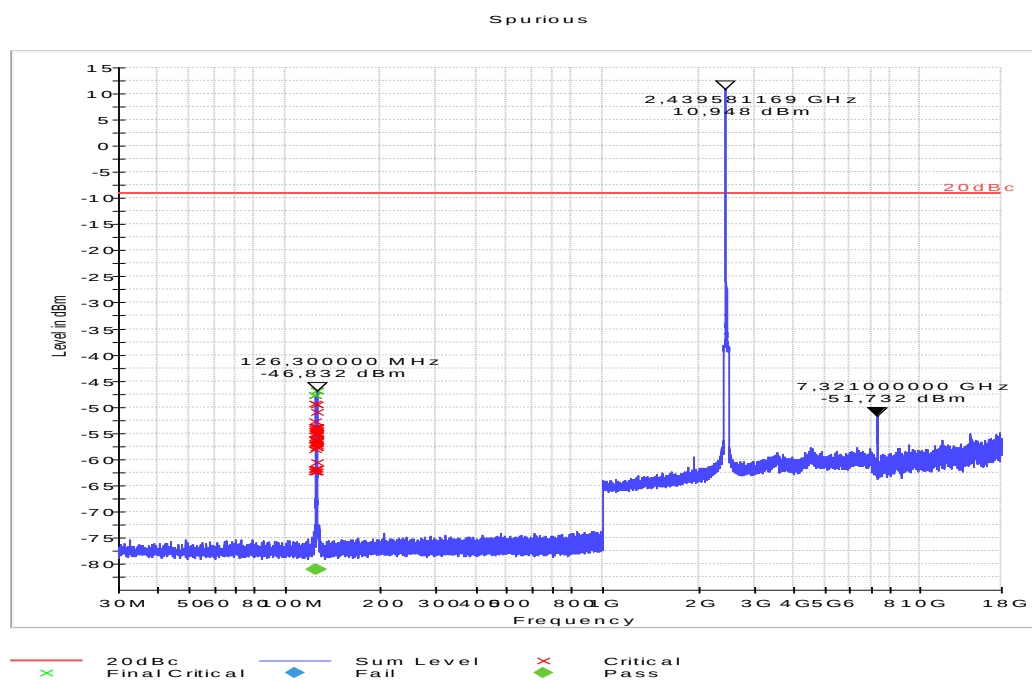


Diagram 65: 20dBc emissions on channel 18

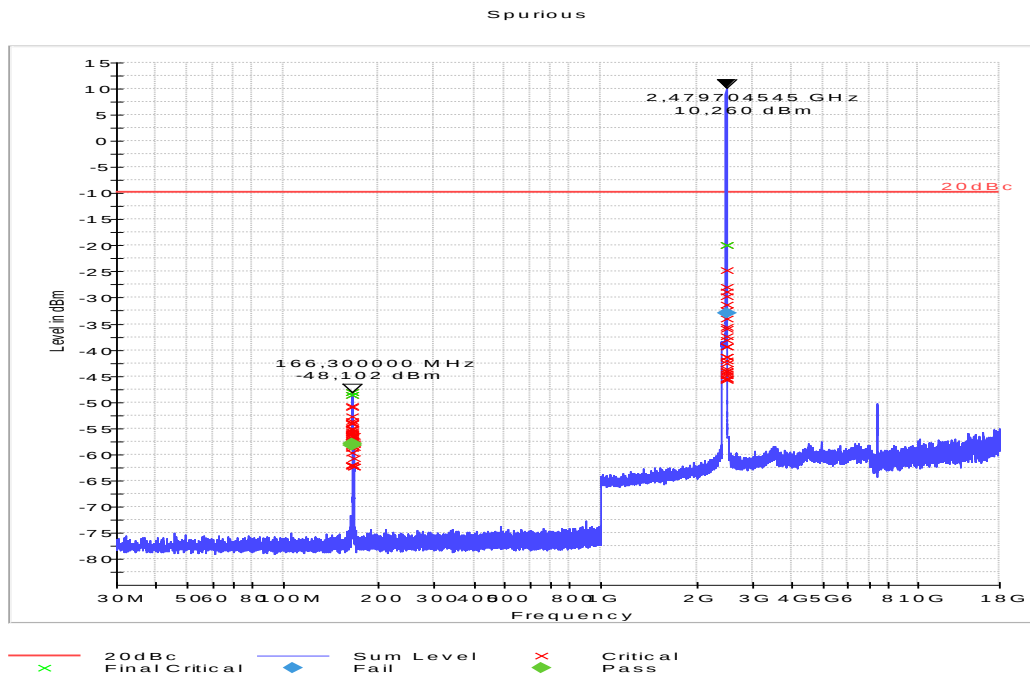


Diagram 66: 20dBc emissions on channel 26