Deutsche Akkreditierungsstelle D-PL-21375-01-00

LENHARDT
WORLDWIDE | TESTING | CERTIFICATION

Bundesnetzagentur
BNetzA-CAB-21/21-21

Test Report

Test report no.: 24080432-41495-0
Date of issue: 2025-03-10

Test result: The test item **- passed - and complies** with below listed standards.

Applicant
AVL DiTEST GmbH

Manufacturer
AVL DiTEST GmbH

Test Item
322001

RF-Spectrum Testing according to:

FCC 47 CFR Part 15
Radio Frequency Devices – Subpart E
Unlicensed National Information Infrastructure Devices

RSS-247, Issue 3 (2023-08)
Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices

RSS-Gen, Issue 5 (2018-04)
General Requirements for Compliance of Radio Apparatus

Tested by (name, function, signature)	Karsten Geraldy Lab Manager RF	signature
Approved by (name, function, signature)	Sebastian Janoschka Head of Laboratory RF	signature

Applicant and Test item details	
Applicant	AVL DiTEST GmbH Alte Poststraße 156 8020, Graz, Austria
Manufacturer	AVL DiTEST GmbH Alte Poststraße 156 8020, Graz, Austria
Test item description	Vehicle Communication Interface VCI ONE (weLINK)
Model/Type reference	322001
Standard specific information	
FCC ID	2A9TU-322001
IC	29975-322001
HMN	N/A
PMN	VCI
HVIN	322001
FVIN	N/A
Technology	WiFi 5 GHz
Frequency	UNII bands 5150 MHz to 5850 MHz)
Antenna	Flexible Polymer Series Antenna (FXP830.24.0100B / FXP840.07.0055B)
Power supply	6.0 to 36.0 V DC
Temperature range	-30 °C to +60 °C

Disclaimer and Notes

The content of this report relates to the mentioned test sample(s) only.
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Within this test report, a ☒ point / ☐ comma is used as a decimal separator.
If otherwise, a detailed note is added adjected to its use.

Decision rule:
Decision rule based on simple acceptance without guard bands, binary statement, based on mutually agreed uncertainty tolerances with expansion factor k=2 according to ILAC-G8:09/2019

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2 GENERAL INFORMATION

2.1 Administrative details

Testing laboratory	**IBL-Lab GmbH** Heinrich-Hertz-Allee 7 66386 St. Ingbert / Germany Fon: +49 6894 38938-0 Fax: +49 6894 38938-99 URL: https://ib-lenhardt.com/ E-Mail: info@ib-lenhardt.com
Accreditation / Designation	The testing laboratory is accredited by Deutsche Akkreditierungsstelle GmbH (DAkkS) in compliance with DIN EN ISO/IEC 17025:2018. Scope of testing and registration number: • Attachment to the accreditation certificate D-PL-21375-01-00 ○ Electronics ○ Electromagnetic Compatibility ○ Radio ○ Electromagnetic Compatibility and Telecommunication (FCC requirements) ○ Telecommunication (TC) and Electromagnetic Compatibility (EMC) for Canadian Standards ○ Automotive EMC Website DAkkS: https://www.dakks.de/ The Deutsche Akkreditierungsstelle GmbH (DAkkS) is also a signatory to the ILAC Mutual Recognition Arrangement. • Designations ○ FCC Testing Laboratory Designation Number DE0024 ○ ISED ISED Company Number 27156 Testing Laboratory CAB Identifier DE0020 ○ Kraftfahrt-Bundesamt KBA-P 00120-23
Testing location	**IBL-Lab GmbH** Heinrich-Hertz-Allee 7 66386 St. Ingbert / Germany
Date of receipt of test samples	2024-09-09
Start – End of tests	2024-11-11 – 2025-03-05

2.2 Possible test case verdicts

Test sample meets the requirements	P (PASS) – the measured value is below the acceptance limit, AL = TL
Test sample does not meet the requirements	F (FAIL) – the measured value is above the acceptance limit, AL = TL
Test case does not apply to the test sample	N/A (Not applicable)
Test case not performed	N/P (Not performed)

2.3 Observations

No additional observations other than the reported observations within this test report have been made.

2.4 Opinions and interpretations

No appropriate opinions or interpretations according ISO/IEC 17025:2017 clause 7.8.7 are within this test report.

2.5 Revision history

-0 Initial Version

2.6 Further documents

List of further applicable documents belonging to the present test report:
– no additional documents –

3 ENVIRONMENTAL & TEST CONDITIONS

3.1 Environmental conditions of test laboratory

Temperature	20°C ± 5°C
Relative humidity	25-75 % r.H.
Barometric Pressure	860-1060 mbar
Power supply	230 V AC ± 5%

3.2 Normal and extreme test conditions

	minimum	nominal	maximum
Temperature	-/- °C	20 °C	-/- °C
Relative humidity	-/-	45 % r.h.	-/-
Power supply	-/- V DC	12 V DC	-/- V DC

4 TEST STANDARDS AND REFERENCES

Test standard (accredited)	Description
FCC 47 CFR Part 15	Radio Frequency Devices – Subpart E Unlicensed National Information Infrastructure Devices
RSS-247, Issue 3 (2023-08)	Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices
RSS-Gen, Issue 5 (2018-04)	General Requirements for Compliance of Radio Apparatus

Reference	Description
ANSI C63.4-2014	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
ANSI C63.10-2013	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
789033 D02 General U-NII Test Procedures New Rules v02r01	Guidelines for Compliance Testing of Unlicensed National Information Infrastructur (U-NII) Devices Part 15, Subpart E
905462 D02 UNII DFS Compliance Procedures New Rules v02	Compliance Measurement Procedures for Unlicensed-National Information Infrastructure Devices Operating in the 5250-5350 MHz and 5470-5725 MHz Bands Incorporating Dynamic Frequency Selection

5 EQUIPMENT UNDER TEST (EUT)

5.1 Product Description

Vehicle Communication Interface VCI ONE (weLINK)

*: as declared by applicant

5.2 Test Item Description

Model name*	322001
Serial number*	radiated test sample: 00122 / conducted test sample: 00114
Hardware status*	V4.2
Software status*	V2.4.3

*: as declared by applicant; please see Annex A for EUT photographs.

5.3 Technical Data of Equipment

Technology*	WiFi 5 GHz
Operational frequency band*	UNII bands 5150 MHz to 5850 MHz)
Modulation type*	802.11 a/n: BPSK, QPSK, 16QAM, 64QAM 802.11 ac: BPSK, QPSK, 16QAM, 64QAM, 256 QAM
Data rate*	802.11 a: up to 54 Mbps 802.11 n: up to 600 Mbps 802.11 ac: up to 867 Mbps
Number of channels*	25 (20 MHz bandwidth) 12 (40 MHz bandwidth) 6 (80 MHz bandwidth)
Channel bandwidth*	20/40/80 MHz
Channel spacing*	20/40/80 MHz
Antenna gain*	

Frequency (MHz)	FXP830.24.0100B Peak Gain (dBi)	FXP840.07.0055B Peak Gain [dBi]
5130	5.45	3.37
5350	6.00	2.70
5850	5.60	2.95

Number of Spatial Streams*	max. 2
DFS capability*	DFS slave
Power supply*	6.0 to 36.0 V DC
Temperature range*	-30 °C to +60 °C

*: as declared by applicant

5.4 Additional Information	
Model differences	None
Ancillaries tested with	None
Additional equipment used for testing	Notebook with test tool (terminal program with set of commands to configure necessary test modes); Companion device for DFS testing: Access Point: LINKSYS WRT3200ACM; FCC ID: Q87-WRT3200ACM

5.5 Test modes	
Mode 1, a-mode	20 MHz bandwidth, Modulation type: BPSK 6.0 Mbps*
Mode 2, ax-HE20-mode	20 MHz bandwidth, Modulation type: BPSK, 13.0 Mbps
Mode 3, ax-HE40-mode	40 MHz bandwidth, Modulation type: BPSK, 27.0 Mbps
Mode 4, ax-HE80-mode	80 MHz bandwidth, Modulation type: BPSK, 58.5 Mbps
Channel	Channels used for testing are marked in bold in 20 MHz, 40 MHz, 80 MHz channel lists (see section 5.3)
Antennas and transmit operating mode	Equipment with two antennas/transmit chains are used simultaneously but without beamforming
Worst case configuration with respect to RF output power	From conducted RF output power measurements test mode as listed above are selected for performing the RF tests. Worst case analysis according to ANSI C63.10-2013 ch. 5.6.2.2 is performed based on conducted RF output power measurements. As a result, maximum output power is achieved when antenna port 1 and antenna port 2 are used for simultaneous transmission (antenna 1 + 2) compared to single antenna port 1 or antenna port 2: Test tool provided by manufacturer allowed separate **and** simultaneous transmission using antenna port 1 and antenna port 2. Above listed test modes resp. below listed power settings are also based on module test report as listed under IC 6158A-NFB266AXIBT.

Channels with **20 MHz** channel bandwidth:

U-NII-1 & U-NII-2A (5150 MHz to 5250 MHz & 5250 MHz to 5350 MHz) channel number & center frequency								
channel	**36**	40	**44**	**48**	**52**	56	**60**	**64**
f_c / MHz	**5180**	5200	**5220**	**5240**	**5260**	5280	**5300**	**5320**

U-NII-2C (5470 MHz to 5725 MHz) channel number & center frequency												
channel	**100**	104	108	112	**116**	120	124	128	132	136	**140**	**144**
f_c / MHz	**5500**	5520	5540	5560	**5580**	5600	5620	5640	5660	5680	**5700**	**5720**

U-NII-3 (5725 MHz to 5850 MHz) channel number & center frequency					
channel	**149**	153	**157**	161	**165**
f_c / MHz	**5745**	5765	**5785**	5805	**5825**

Channels with **40 MHz** channel bandwidth:

U-NII-1 & U-NII-2A (5150 MHz to 5250 MHz & 5250 MHz to 5350 MHz) channel number & center frequency				
channel	**38**	**46**	**54**	**62**
f_c / MHz	**5190**	**5230**	**5270**	**5310**

U-NII-2C (5470 MHz to 5725 MHz) channel number & center frequency						
channel	**102**	**110**	118	126	**134**	**142**
f_c / MHz	**5510**	**5550**	5590	5630	**5670**	**5710**

U-NII-3 (5725 MHz to 5850 MHz) channel number & center frequency		
channel	**151**	**159**
f_c / MHz	**5755**	**5795**

Channels with **80 MHz** channel bandwidth:

U-NII-1 & U-NII-2A (5150 MHz to 5250 MHz & 5250 MHz to 5350 MHz) channel number & center frequency		
channel	**42**	**58**
f_c / MHz	**5210**	**5290**

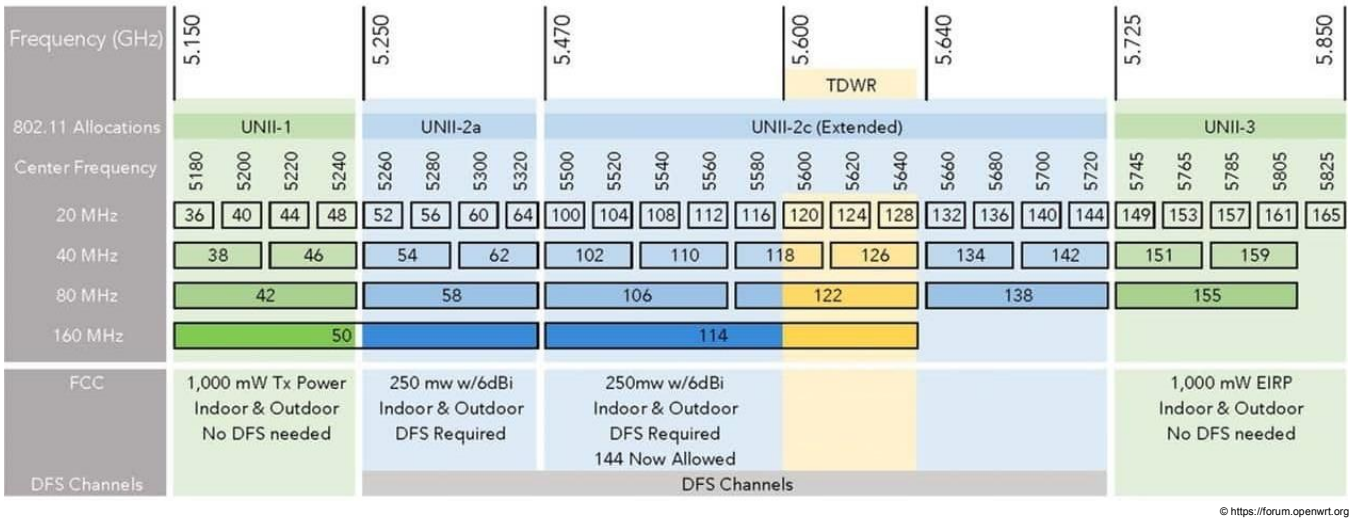
U-NII-2C (5470 MHz to 5725 MHz) channel number & center frequency			
channel	**106**	122	**138**
f_c / MHz	**5530**	5610	**5690**

U-NII-3 (5725 MHz to 5850 MHz) channel number & center frequency	
channel	**155**
f_c / MHz	**5775**

Channel Number & Power Setting			
Mode 1 EUT Channel	**Power Setting [dBm]**	**Mode 2 EUT Channel**	**Power Setting [dBm]**
36	9	36	10
44	9	44	12
48	9	48	12
52	14	52	13
60	14	60	14
64	14	64	13
100	12	100	10
116	14	116	13
140	13	140	13
144	14	144	13
149	14	149	13
157	14	157	13
165	14	165	13
Mode 3 EUT Channel	**Power Setting [dBm]**	**Mode 4 EUT Channel**	**Power Setting [dBm]**
38	8	42	9
46	13	58	11
54	13	106	9
62	10	138	14
102	9	155	13
110	13		
134	14		
142	14		
151	13		
159	13		

Above listed test modes and power settings are based on module report listed under IC 6158A-NFB266AXIBT.

WiFi 5 GHz channel plan (informative):



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6 SUMMARY OF TEST RESULTS

Test specification
FCC 47 CFR Part 15 RSS-247, Issue 3 (2023-08) / RSS-Gen, Issue 5 (2018-04)

Clause	Requirement / Test Case	Remark	Result	Verdict
§15.407(e) RSS-247, 6.2.4.1	6 dB emission bandwidth	KDB 789033, section C	77.8 MHz	**- PASS -**
§15.407(a) RSS-247, 6.2.1.2	26 dB emission bandwidth	KDB 789033, section C	91.0 MHz	**- PASS -**
RSS Gen, 6.7	Occupied bandwidth (99%)	KDB 789033, section D	78.0 MHz	**- PASS -**
§15.407(a) RSS-247, 6.2	RF output power (conducted mean power)	KDB 789033, section E	15.3 dBm	**- PASS -**
§15.407(a) RSS-247, 6.2	Antenna gain	-/-	6.0 dBi	**- PASS -**
§15.407(a) RSS-247, 6.2	Power spectral density (Mean PSD)	KDB 789033, section F	2.3 dBm/MHz	**- PASS -**
§15.407(b) RSS-247, 6.2	Band edge compliance (BEC), conducted	KDB 789033, section G	< limit	**- PASS -**
§15.407(b) RSS-247, 6.2	Band edge compliance (BEC), radiated	KDB 789033, section G	< limit	**- PASS -**
§15.407(b) RSS-247, 6.2	Conducted spurious emissions (CSE)	KDB 789033, section G	< limit	**- PASS -**
§15.407(b) / §15.209 RSS-247, 6.2 / RSS-Gen, 8.9	Radiated spurious emissions (RSE)	KDB 789033, section G	< limit	**- PASS -**
§15.407(g)	Frequency stability	KDB 789033, section A 3: demonstration of compliance is not required		**- N/A -**
§15.407(h)(1) RSS-247, 6.2	Transmit Power Control	A TPC mechanism is not required for systems with an e.i.r.p. of less than 500 mW		**- N/A -**
§15.407(h)(2) RSS-247, 6.3	Dynamic Frequency Selection (DFS) Master devices	KDB 905462		**- N/A -**
§15.407(h)(2) RSS-247, 6.3	Dynamic Frequency Selection (DFS) Client devices	KDB 905462	< limit	**- PASS -**
§15.207 RSS-Gen, 8.8	AC conducted emissions	EUT is battery powered		**- N/A -**

Comments and observations
Following pages show requirements and references of FCC Part 15.407, ANSI C63.10, KDB 789033 and KDB 905462 only. Same tests are also applicable and valid for RSS-247, with clauses given in table above.

7 TEST RESULTS

7.1 6 dB emission bandwidth

Applicability
This requirement applies to all unlicensed national information infrastructure (UNII) / licence-exempt local area network (LE-LAN) devices operating in the bands 5150-5250 MHz, 5250-5350 MHz, 5470-5725 MHz, 5725-5850 MHz and 5850-5895 MHz.

Description
The 6 dB Emission Bandwidth is defined as the frequency width of the emission that is constrained by the frequencies associated with the tow outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

Limit
§15.407(e): Within the 5.725–5.85 GHz band, the minimum 6 dB bandwidth of U–NII devices shall be at least 500 kHz.
RSS 247 section 6.2.4.1: For equipment operating in the band 5725-5850 MHz, the minimum 6 dB bandwidth shall be at least 500 kHz.

Test procedure
KDB 789033 D02, C.2.
The steps are as follows:
a) Set RBW = 100 kHz
b) Set the VBW ≥ [3 × RBW].
c) Detector = peak.
d) Trace mode = max hold.
e) Sweep = auto couple.
f) Allow the trace to stabilize.
g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.
The automatic bandwidth measurement capability of an instrument may be employed using the 6 dB bandwidth mode.

Test setup: 8.4

7.2 26 dB emission bandwidth

Applicability
This requirement applies to all unlicensed national information infrastructure (UNII) / licence-exempt local area network (LE-LAN) devices operating in the bands 5150-5250 MHz, 5250-5350 MHz, 5470-5725 MHz, 5725-5850 MHz and 5850-5895 MHz.

Description
The 26 dB Emission Bandwidth is defined as the frequency width of the emission that is constrained by the frequencies associated with the tow outermost amplitude points (upper and lower frequencies) that are attenuated by 26 dB relative to the maximum level measured in the fundamental emission.

Limit
§15.407(a):
For the 5.25–5.35 GHz and 5.47–5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz

§15.407(h):
Radar Detection Function of Dynamic Frequency Selection (DFS). U–NII devices operating with any part of its 26 dB emission bandwidth in the 5.25–5.35 GHz and 5.47–5.725 GHz bands shall employ a DFS radar detection mechanism to detect the presence of radar systems and to avoid co-channel operation with radar systems.

RSS 247 section 6.2.1.2:
Any unwanted emissions that fall into the band 5250-5350 MHz shall be attenuated below the channel power by at least 26 dB, when measured using a resolution bandwidth between 1 and 5% of the occupied bandwidth (i.e. 99% bandwidth), above 5250 MHz. The 26 dB bandwidth may fall into the 5250-5350 MHz band; however, if the occupied bandwidth also falls within the 5250-5350 MHz band, the transmission is considered as intentional and the devices shall comply with all requirements in the band 5250-5350 MHz including implementing dynamic frequency selection (DFS) and TPC, on the portion of the emission that resides in the 5250- 5350 MHz band

Test procedure
KDB 789033 D02, C.1.
The steps are as follows:
a) Set RBW = approximately 1% of the emission bandwidth.
b) Set the VBW > RBW.
c) Detector = peak.
d) Trace mode = max hold.
e) Measure the maximum width of the emission that is 26 dB down from the maximum of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

Test setup: 8.4

7.3 Occupied Bandwidth (99% OBW)

Applicability
This requirement applies to all unlicensed national information infrastructure (UNII) / licence-exempt local area network (LE-LAN) devices operating in the bands 5150-5250 MHz, 5250-5350 MHz, 5470-5725 MHz, 5725-5850 MHz and 5850-5895 MHz.

Description
The Occupied Channel Bandwidth is the bandwidth that contains 99 % of the power of the signal (RSS-Gen).

Limit
Knowledge of 99% Occupied Bandwidth is necessary for Emission designation.

Test procedure
ANSI C63.10, 6.9.3
The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission.
The following procedure shall be used for measuring 99% power bandwidth:
a) The instrument center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be between 1.5 times and 5.0 times the OBW.
b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW, and VBW shall be approximately three times the RBW, unless otherwise specified by the applicable requirement.
c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than [10 log (OBW/RBW)] below the reference level. Specific guidance is given in 4.1.5.2.
d) Step a) through step c) might require iteration to adjust within the specified range.
e) Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.
f) Use the 99% power bandwidth function of the instrument (if available) and report the measured bandwidth.
g) If the instrument does not have a 99% power bandwidth function, then the trace data points are recovered and directly summed in linear power terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5% of the total is reached; that frequency is recorded as the upper frequency. The 99% power bandwidth is the difference between these two frequencies.
h) The occupied bandwidth shall be reported by providing plot(s) of the measuring instrument display; the plot axes and the scale units per division shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

Test setup: 8.4

Test Results Mode 1				
EUT Channel	**6 dB BW [MHz]**	**26 dB BW [MHz]**	**99% OBW [MHz]**	**Limit 6 dB BW [MHz]**
36	16.40	21.80	16.80	≥ 0.5
44	16.40	21.50	16.60	≥ 0.5
48	16.40	21.50	16.60	≥ 0.5
52	16.40	21.40	16.80	≥ 0.5
60	16.40	21.40	16.70	≥ 0.5
64	16.40	21.70	16.80	≥ 0.5
100	16.40	**22.70**	13.90	≥ 0.5
116	16.40	21.00	17.20	≥ 0.5
140	16.40	22.90	16.90	≥ 0.5
144	16.40	24.20	16.90	≥ 0.5
149	16.40	20.60	16.90	≥ 0.5
157	16.40	**22.70**	17.00	≥ 0.5
165	**16.40**	20.50	**17.50**	≥ 0.5

Test Results Mode 2				
EUT Channel	**6 dB BW [MHz]**	**26 dB BW [MHz]**	**99% OBW [MHz]**	**Limit 6 dB BW [MHz]**
36	18.75	21.50	18.90	≥ 0.5
44	18.60	21.50	19.00	≥ 0.5
48	18.60	21.70	19.00	≥ 0.5
52	**18.90**	21.60	19.00	≥ 0.5
60	18.80	21.60	19.00	≥ 0.5
64	18.80	21.60	**19.10**	≥ 0.5
100	18.85	21.50	19.00	≥ 0.5
116	18.55	**22.90**	**19.10**	≥ 0.5
140	18.80	21.70	**19.10**	≥ 0.5
144	18.70	**22.90**	19.00	≥ 0.5
149	18.70	22.00	19.00	≥ 0.5
157	18.50	22.00	**19.10**	≥ 0.5
165	18.55	21.40	**19.10**	≥ 0.5

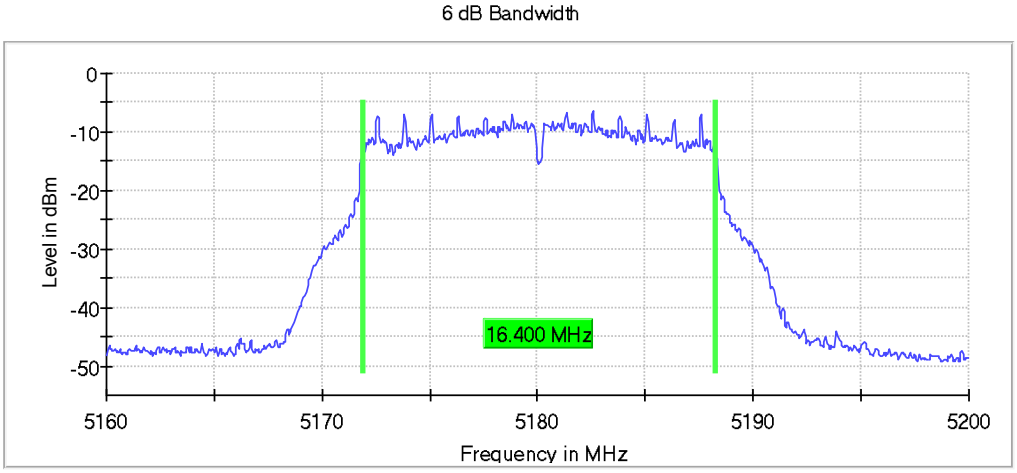
Test Results Mode 3				
EUT Channel	**6 dB BW [MHz]**	**26 dB BW [MHz]**	**99% OBW [MHz]**	**Limit 6 dB BW [MHz]**
38	37.90	**40.525**	37.75	≥ 0.5
46	37.90	40.375	37.75	≥ 0.5
54	37.90	**40.525**	38.00	≥ 0.5
62	37.85	40.075	38.00	≥ 0.5
102	37.90	**40.525**	38.00	≥ 0.5
110	37.85	39.800	38.00	≥ 0.5
134	37.75	39.800	38.00	≥ 0.5
142	**37.90**	39.800	38.00	≥ 0.5
151	37.70	39.880	38.00	≥ 0.5
159	37.60	39.800	**38.00**	≥ 0.5

Test Results Mode 4				
EUT Channel	**6 dB BW [MHz]**	**26 dB BW [MHz]**	**99% OBW [MHz]**	**Limit 6 dB BW [MHz]**
42	77.55	82.00	77.50	≥ 0.5
58	**77.80**	83.00	77.50	≥ 0.5
106	77.60	83.00	77.50	≥ 0.5
138	77.20	**91.00**	**78.00**	≥ 0.5
155	77.35	84.00	77.50	≥ 0.5

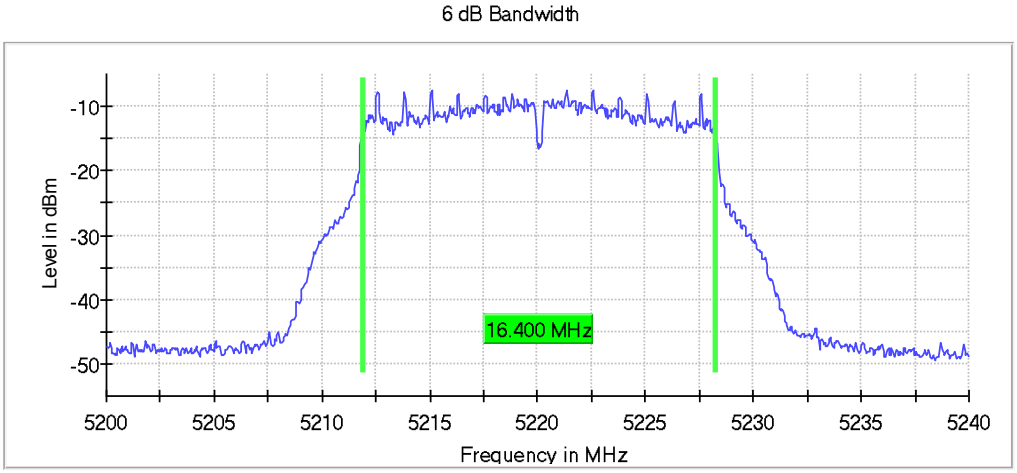
Comment:	---

Verdict	**- PASS -**	see next plots

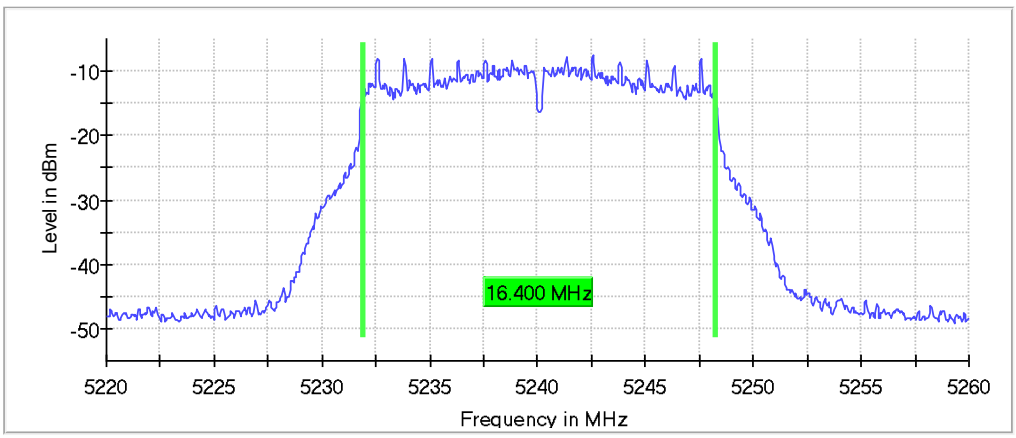
Plot 1: 6 dB emission bandwidth, Mode 1, CH36



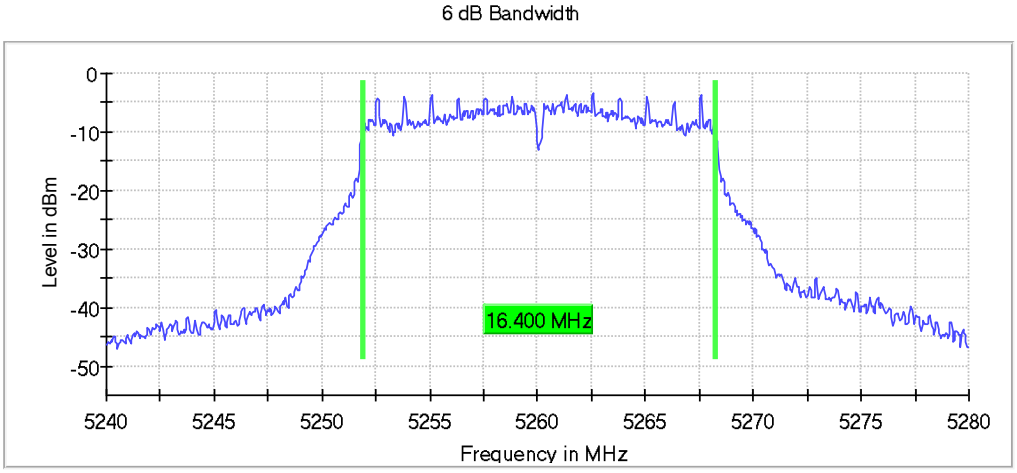
Plot 2: 6 dB emission bandwidth, Mode 1, CH44



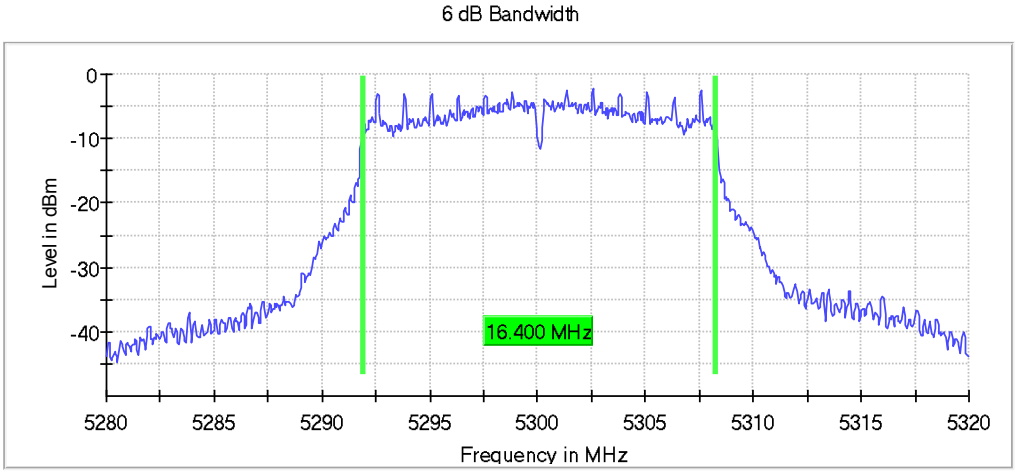
Plot 3: 6 dB emission bandwidth, Mode 1, CH48



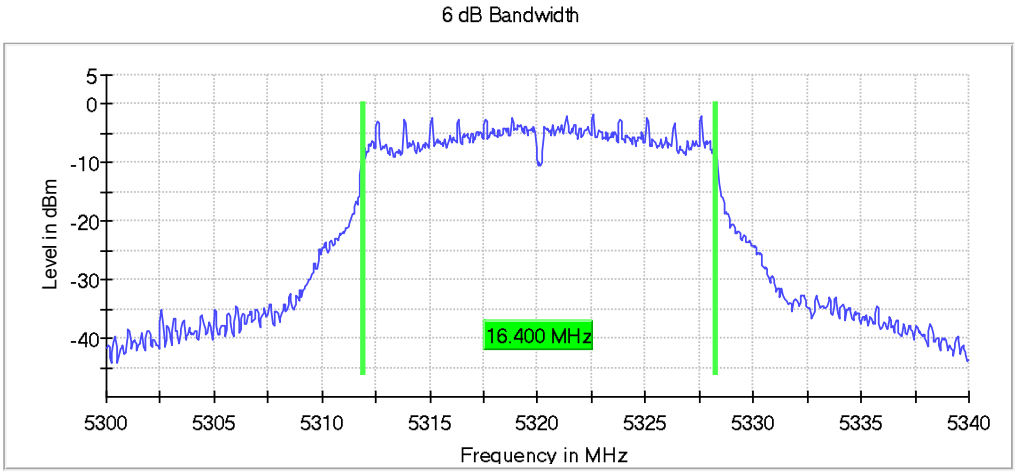
Plot 4: 6 dB emission bandwidth, Mode 1, CH52



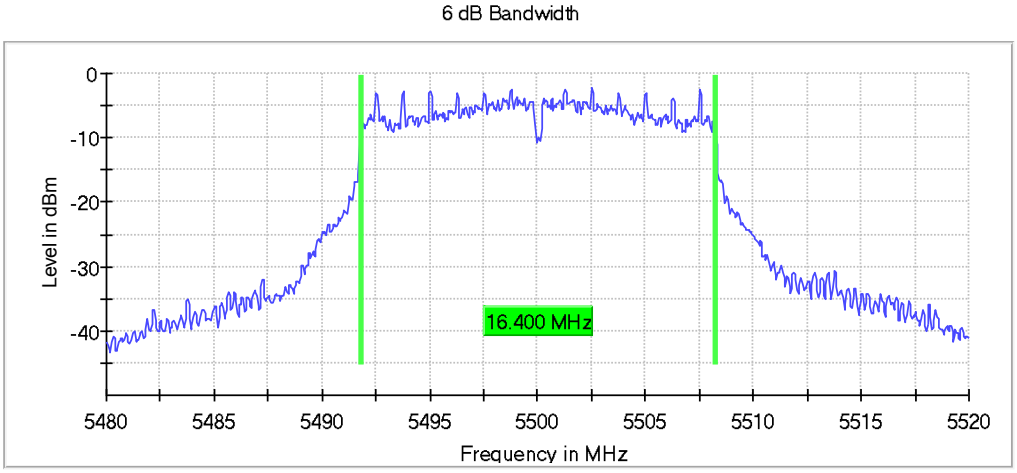
Plot 5: 6 dB emission bandwidth, Mode 1, CH60



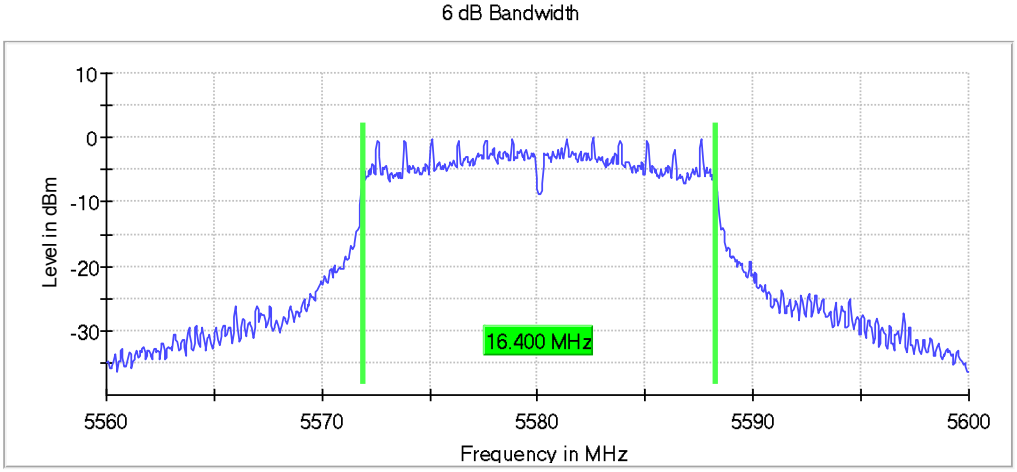
Plot 6: 6 dB emission bandwidth, Mode 1, CH64



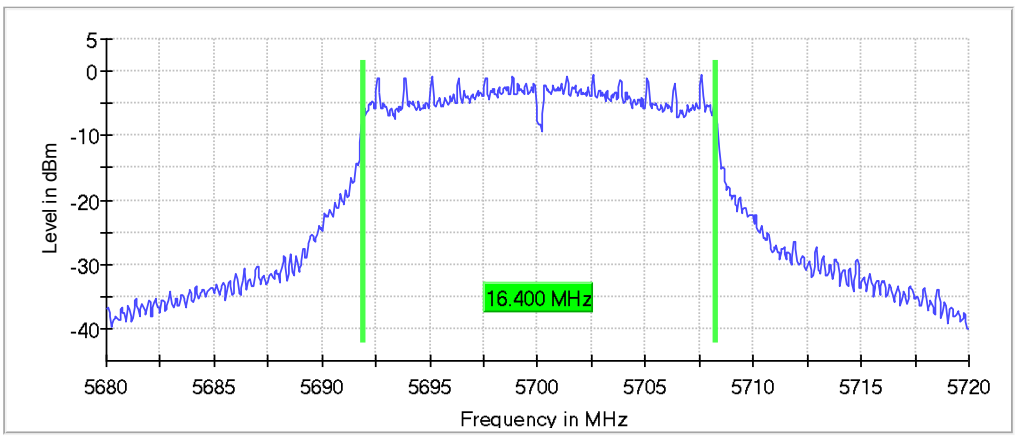
Plot 7: 6 dB emission bandwidth, Mode 1, CH100



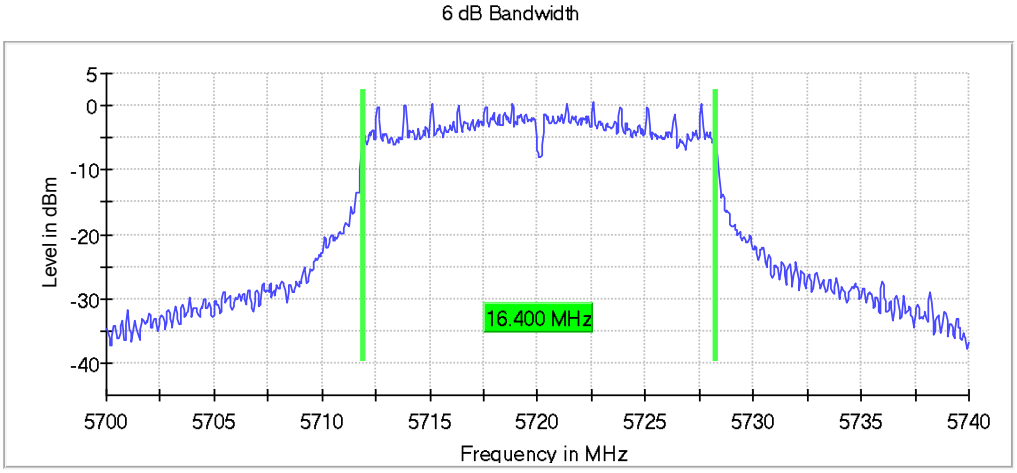
Plot 8: 6 dB emission bandwidth, Mode 1, CH116



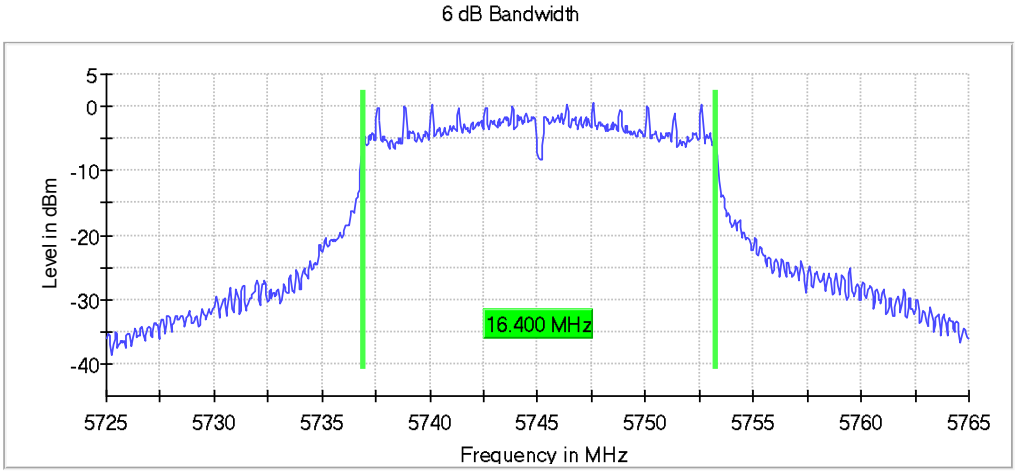
Plot 9: 6 dB emission bandwidth, Mode 1, CH140



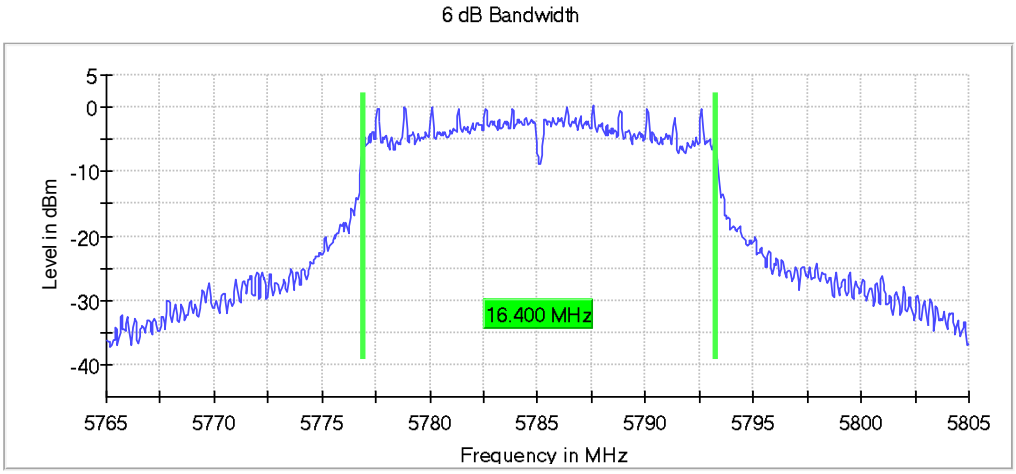
Plot 10: 6 dB emission bandwidth, Mode 1, CH144



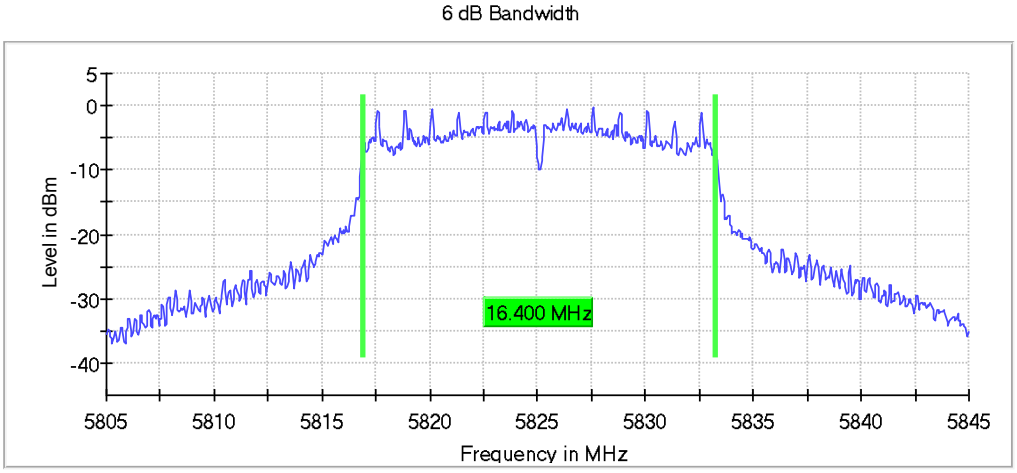
Plot 11: 6 dB emission bandwidth, Mode 1, CH149



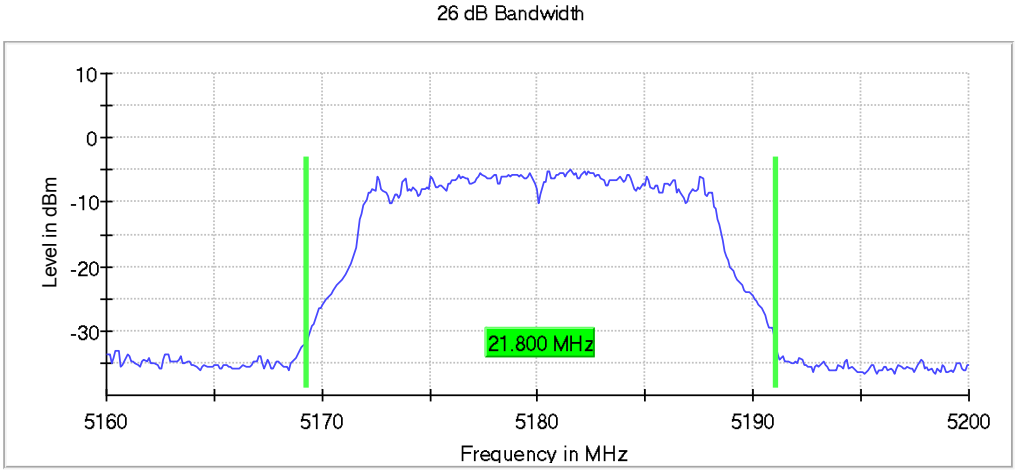
Plot 12: 6 dB emission bandwidth, Mode 1, CH157



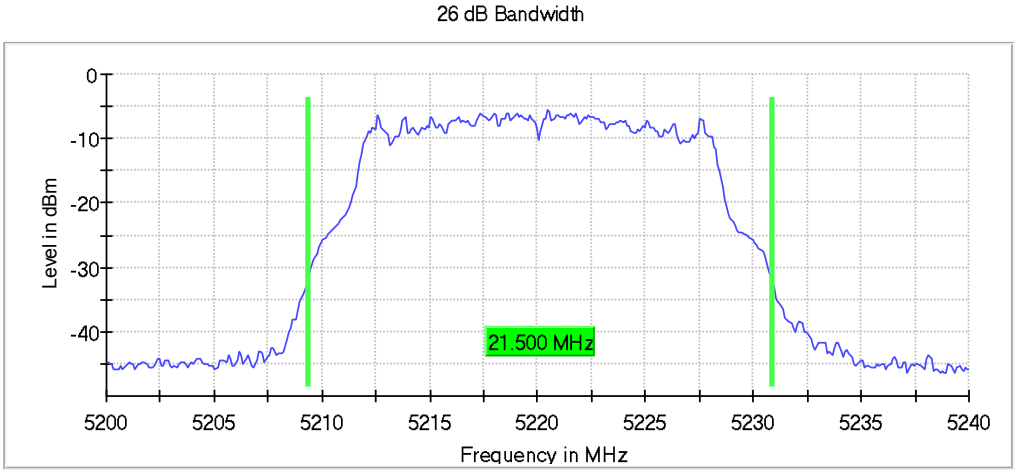
Plot 13: 6 dB emission bandwidth, Mode 1, CH165



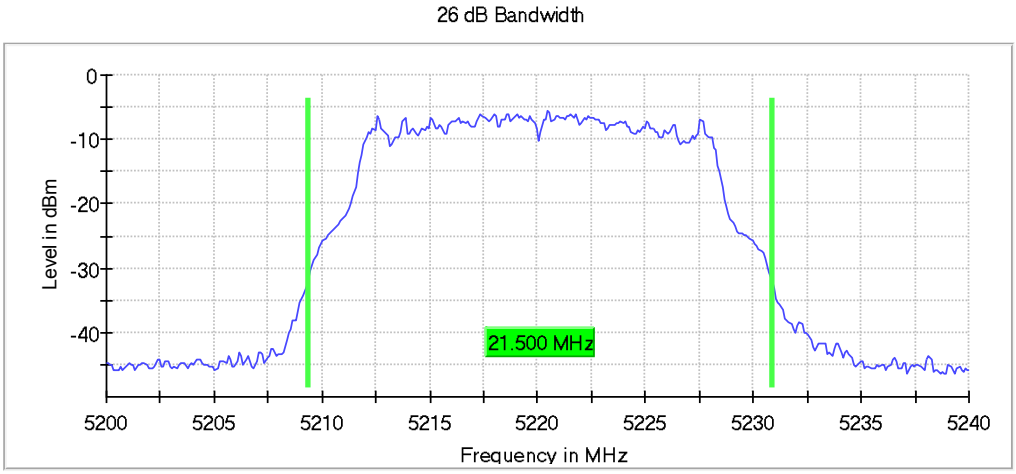
Plot 14: 26 dB emission bandwidth, Mode 1, CH36



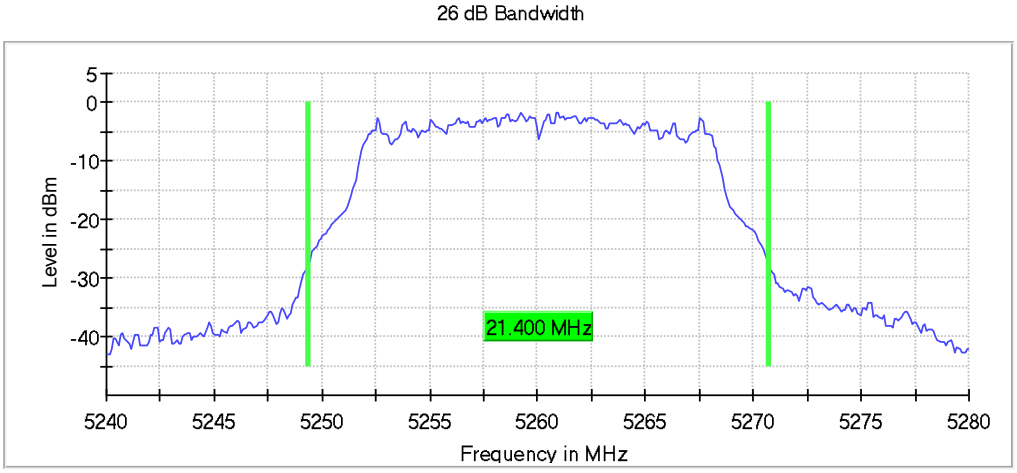
Plot 15: 26 dB emission bandwidth, Mode 1, CH44



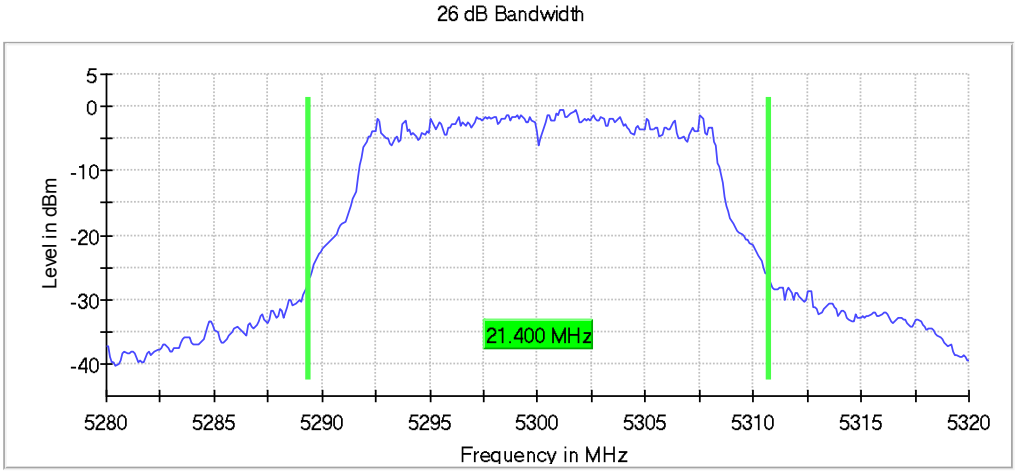
Plot 16: 26 dB emission bandwidth, Mode 1, CH48



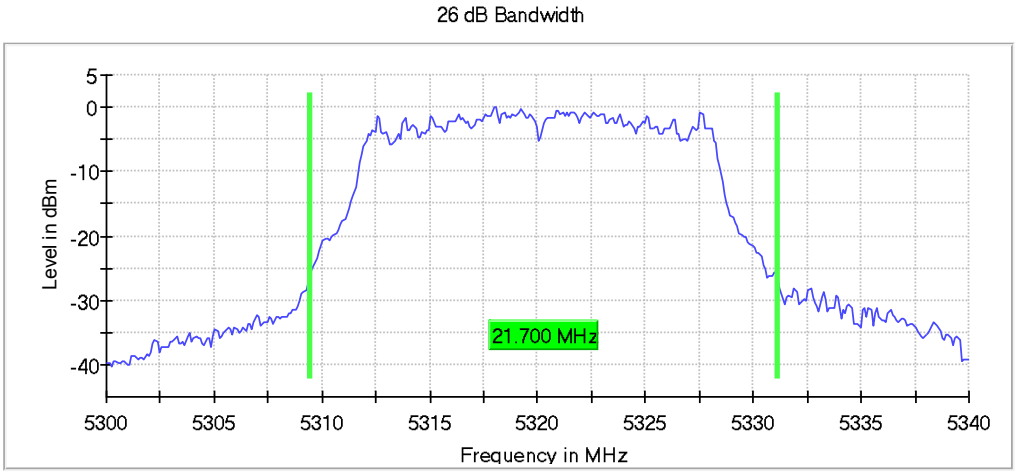
Plot 17: 26 dB emission bandwidth, Mode 1, CH52



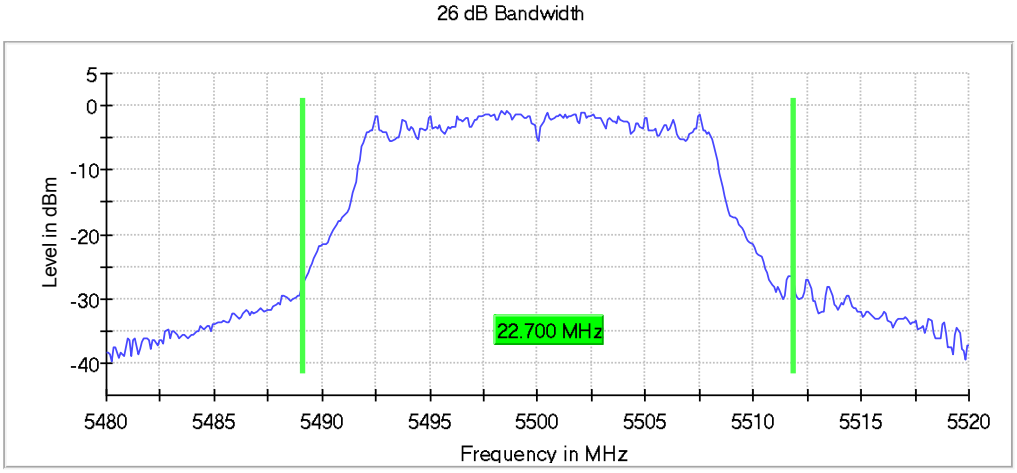
Plot 18: 26 dB emission bandwidth, Mode 1, CH60



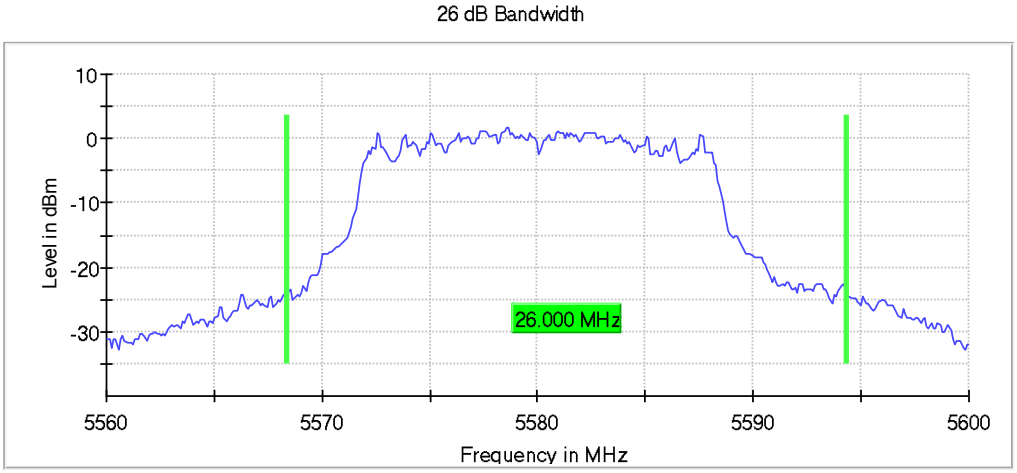
Plot 19: 26 dB emission bandwidth, Mode 1, CH64



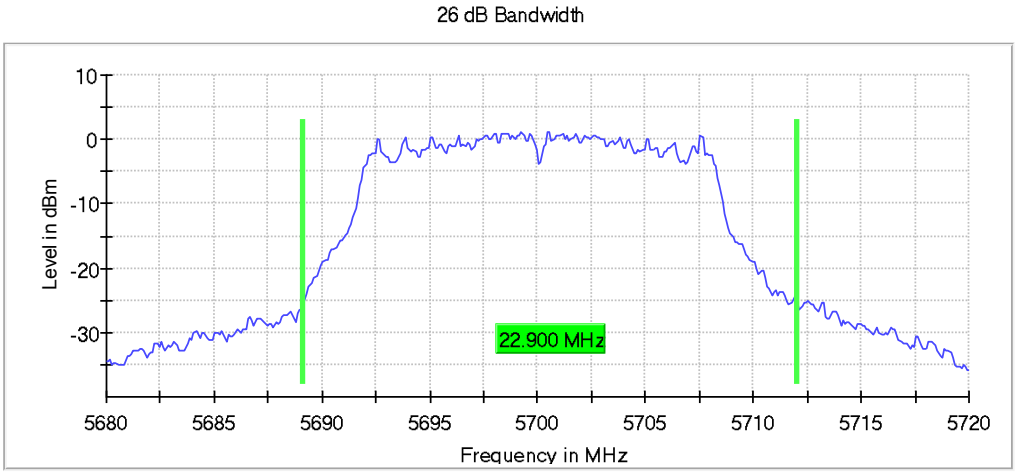
Plot 20: 26 dB emission bandwidth, Mode 1, CH100



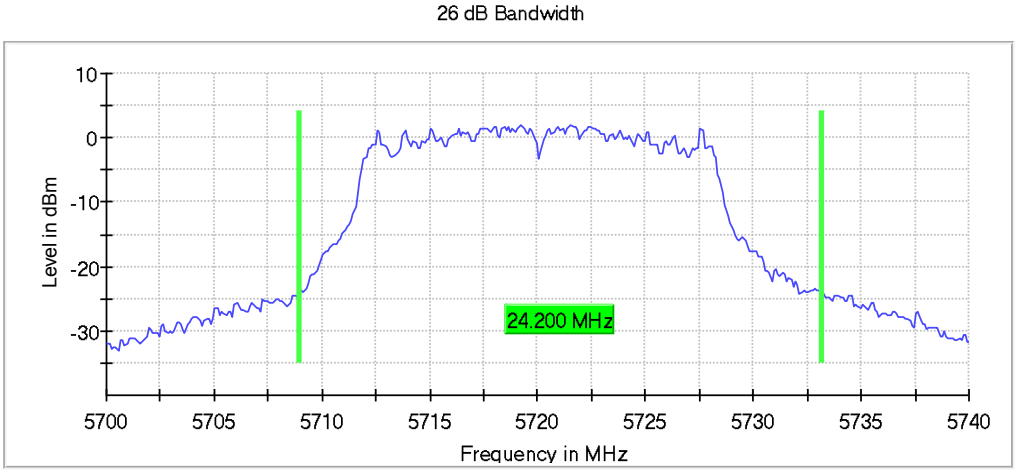
Plot 21: 26 dB emission bandwidth, Mode 1, CH116



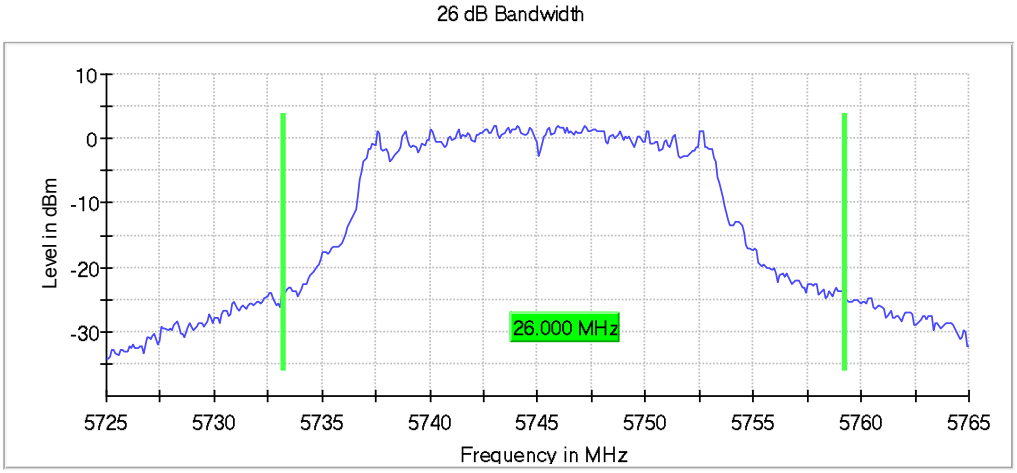
Plot 22: 26 dB emission bandwidth, Mode 1, CH140



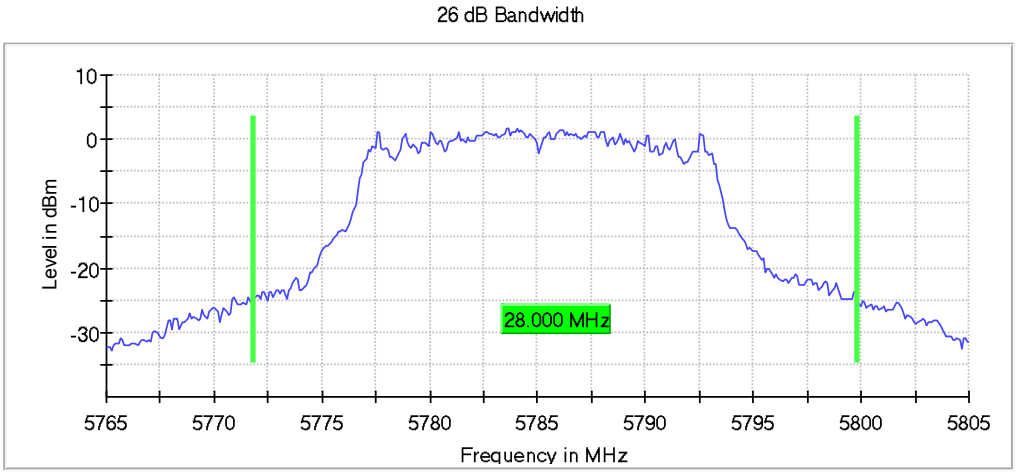
Plot 23: 26 dB emission bandwidth, Mode 1, CH144



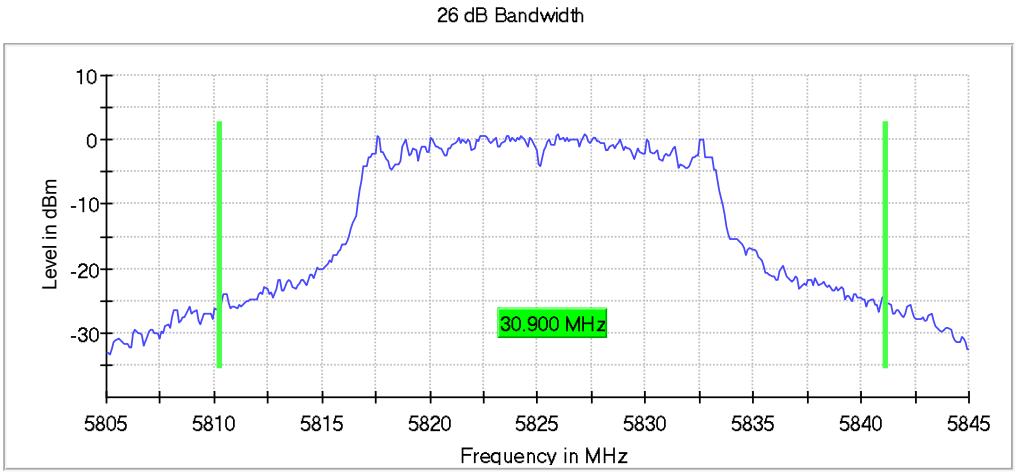
Plot 24: 26 dB emission bandwidth, Mode 1, CH149



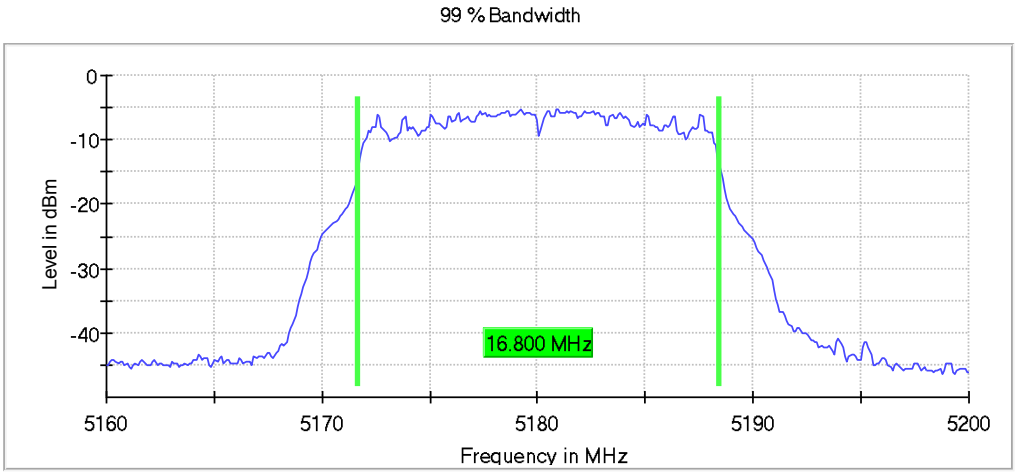
Plot 25: 26 dB emission bandwidth, Mode 1, CH157



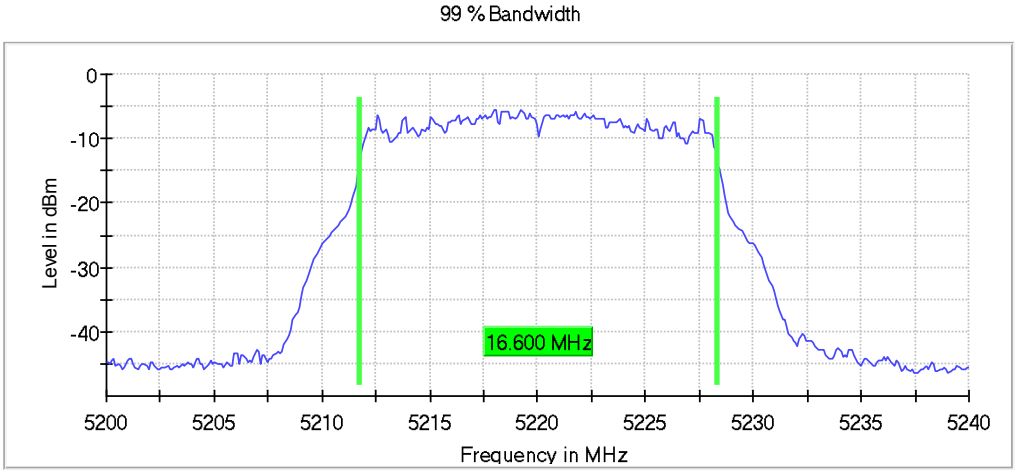
Plot 26: 26 dB emission bandwidth, Mode 1, CH165



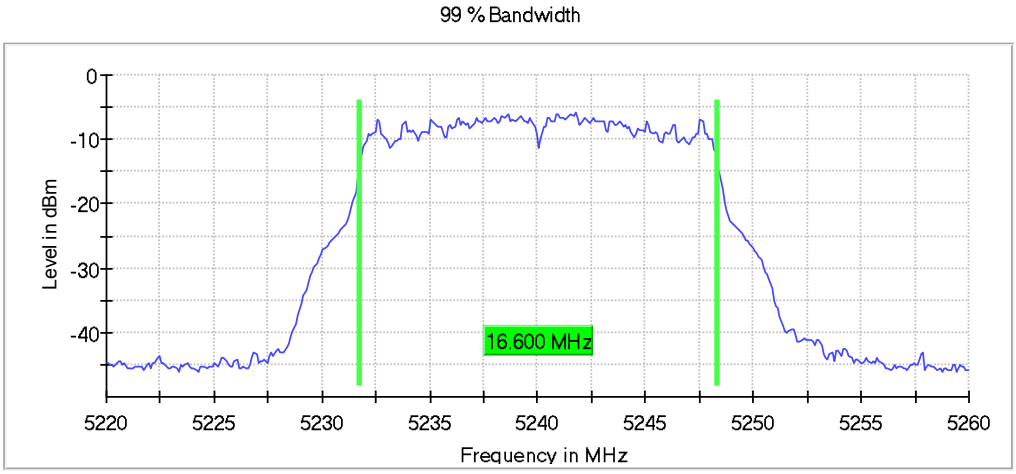
Plot 27: 99% occupied bandwidth, Mode 1, CH36



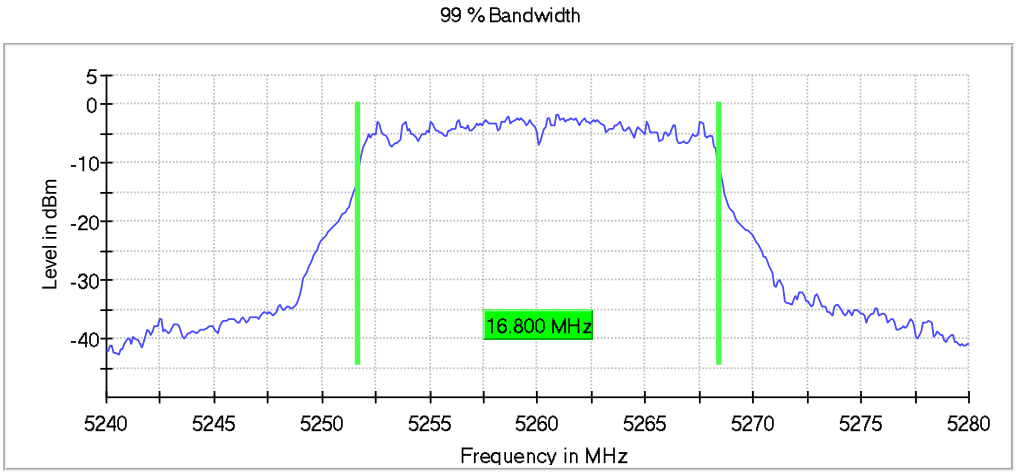
Plot 28: 99% occupied bandwidth, Mode 1, CH44



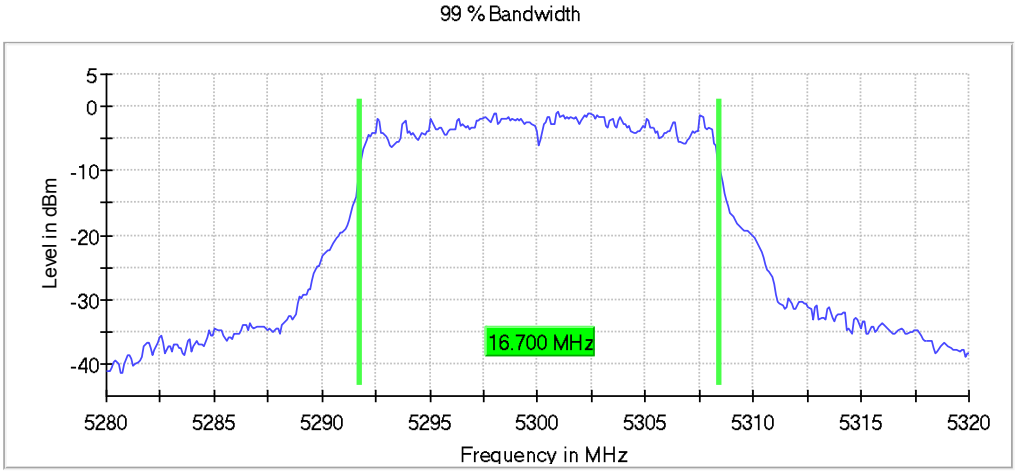
Plot 29: 99% occupied bandwidth, Mode 1, CH48



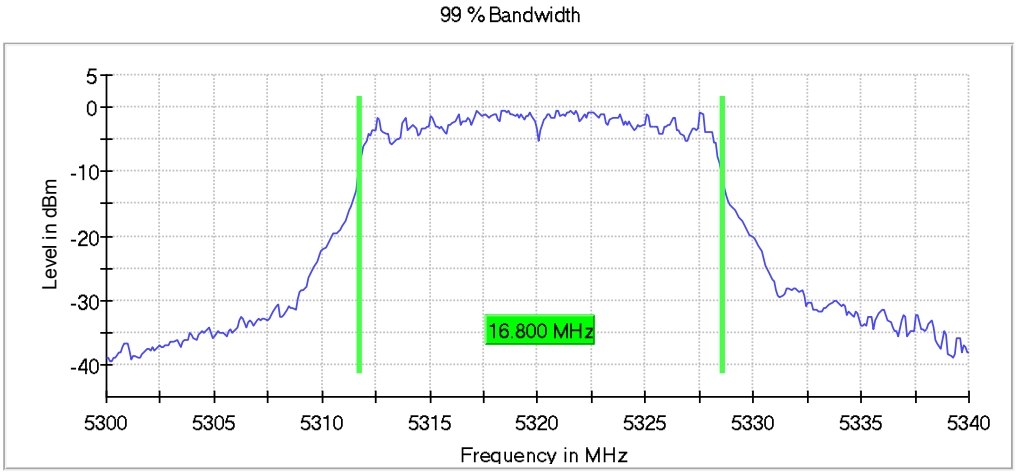
Plot 30: 99% occupied bandwidth, Mode 1, CH52



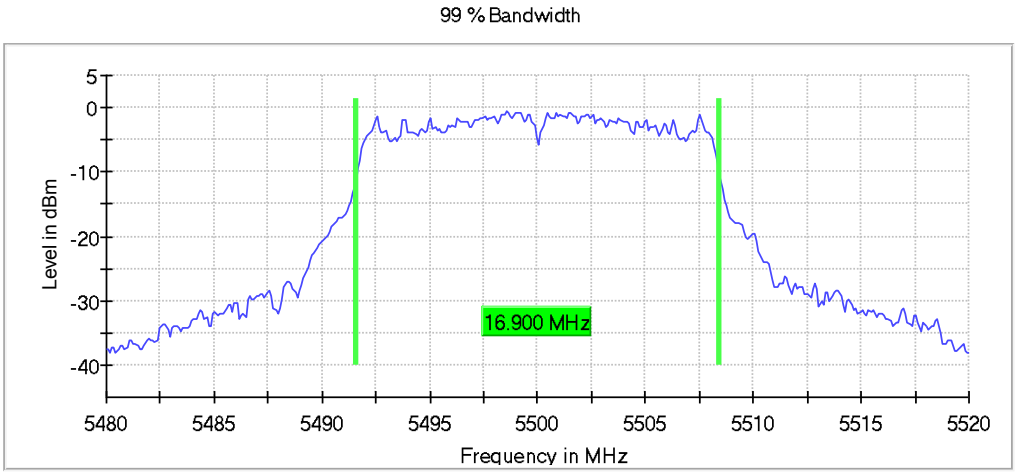
Plot 31: 99% occupied bandwidth, Mode 1, CH60



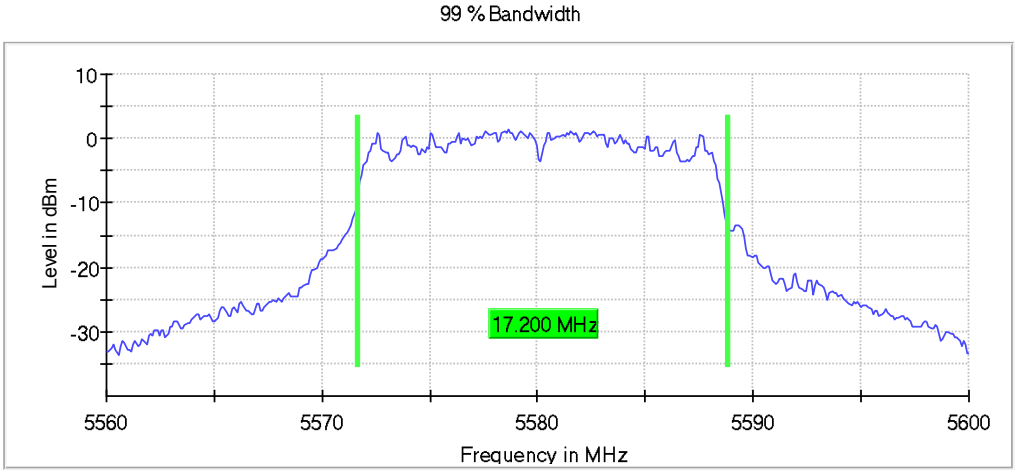
Plot 32: 99% occupied bandwidth, Mode 1, CH64



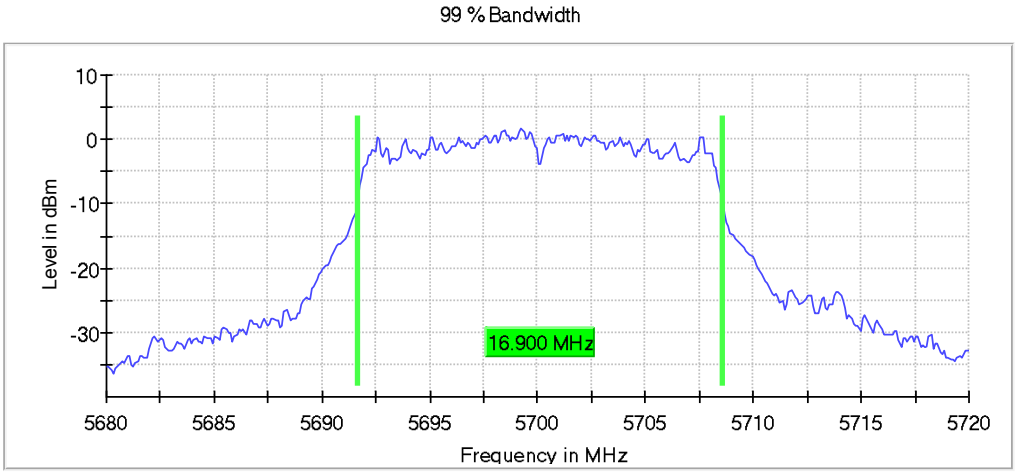
Plot 33: 99% occupied bandwidth, Mode 1, CH100



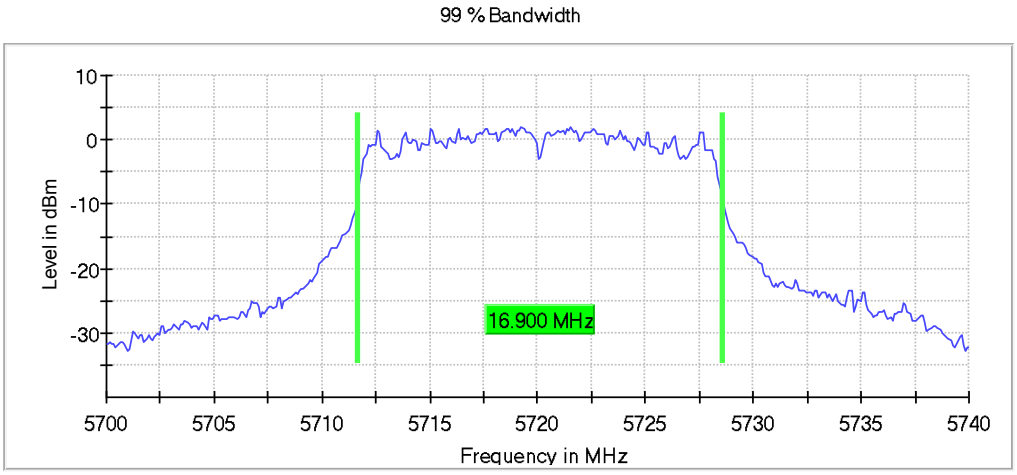
Plot 34: 99% occupied bandwidth, Mode 1, CH116



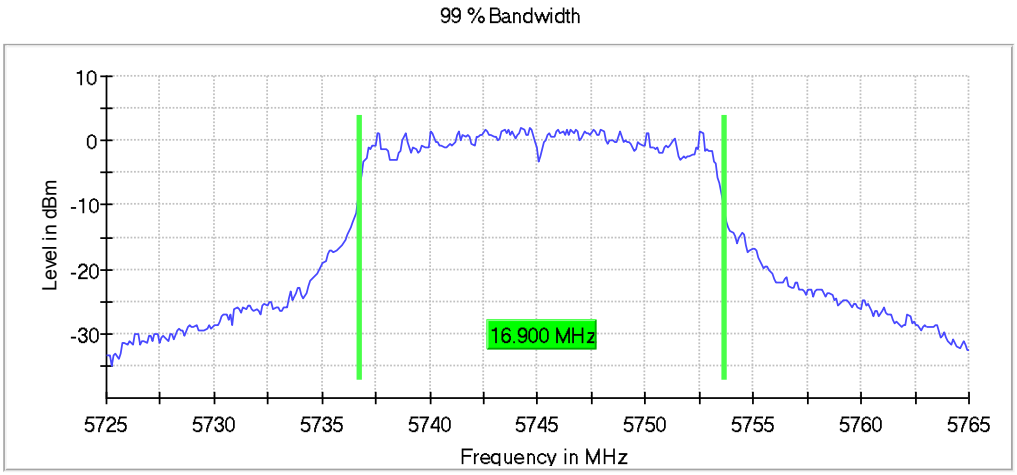
Plot 35: 99% occupied bandwidth, Mode 1, CH140



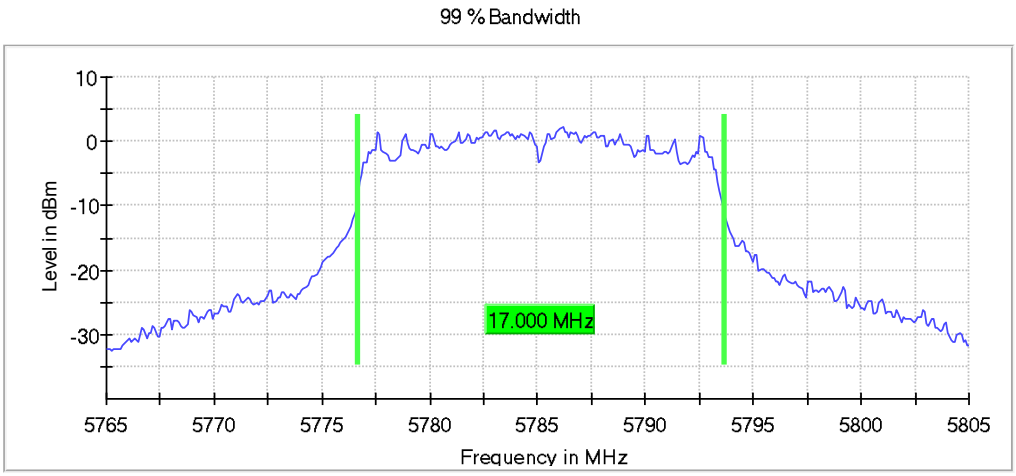
Plot 36: 99% occupied bandwidth, Mode 1, CH144



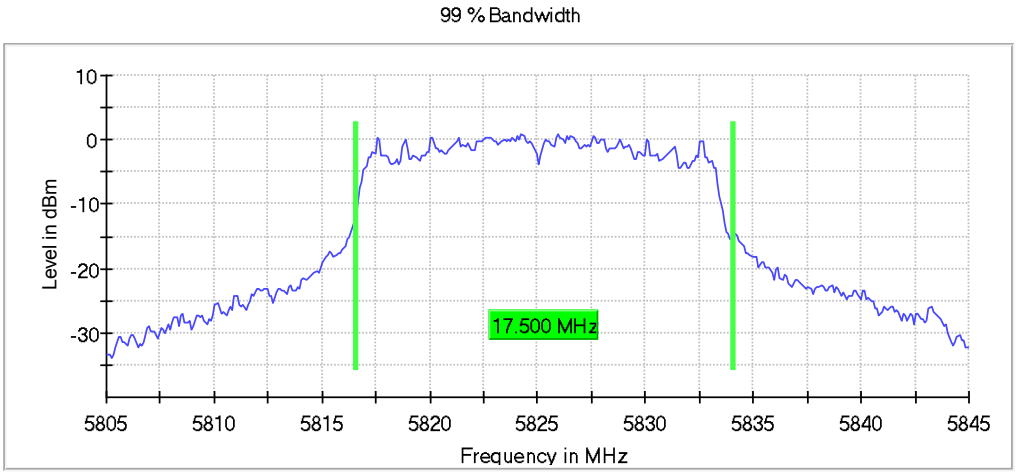
Plot 37: 99% occupied bandwidth, Mode 1, CH149



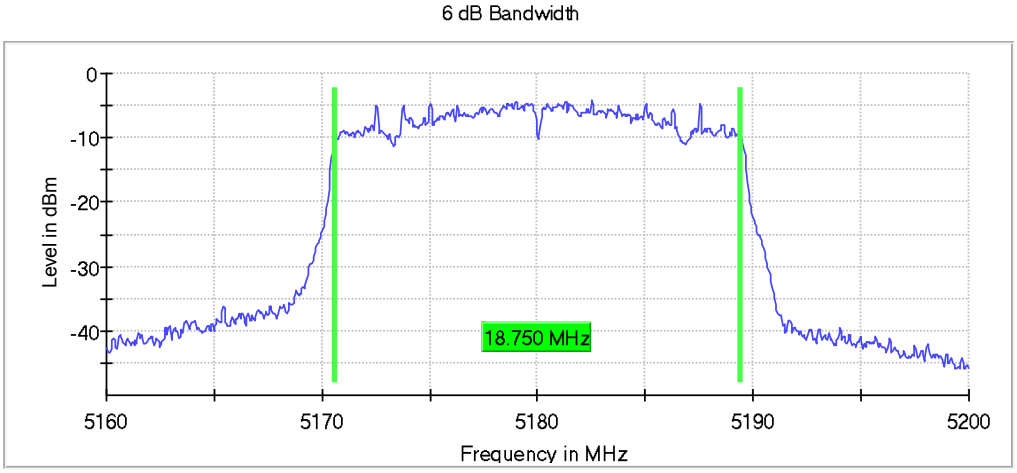
Plot 38: 99% occupied bandwidth, Mode 1, CH157



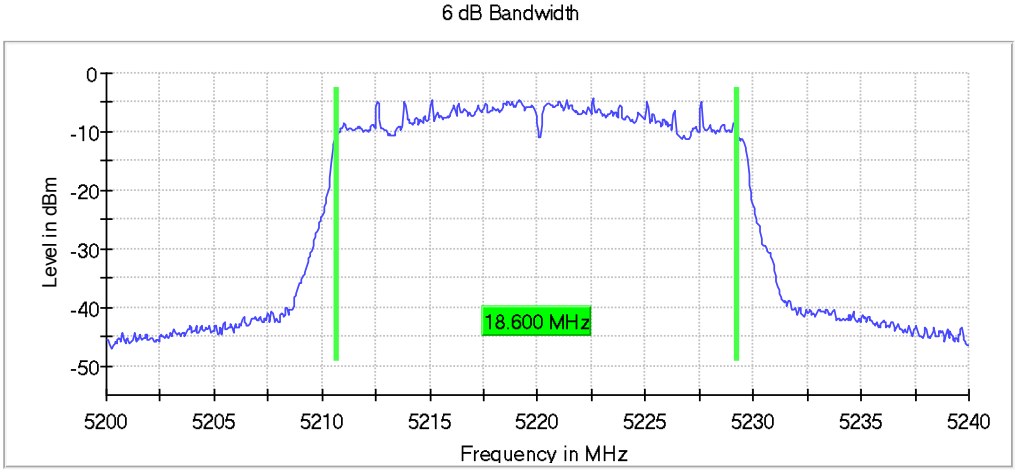
Plot 39: 99% occupied bandwidth, Mode 1, CH165



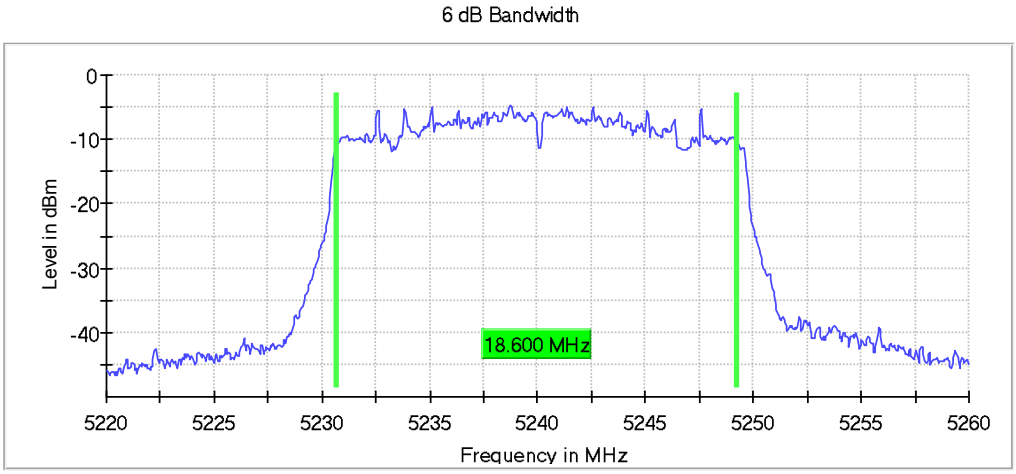
Plot 40: 6 dB emission bandwidth, Mode 2, CH36



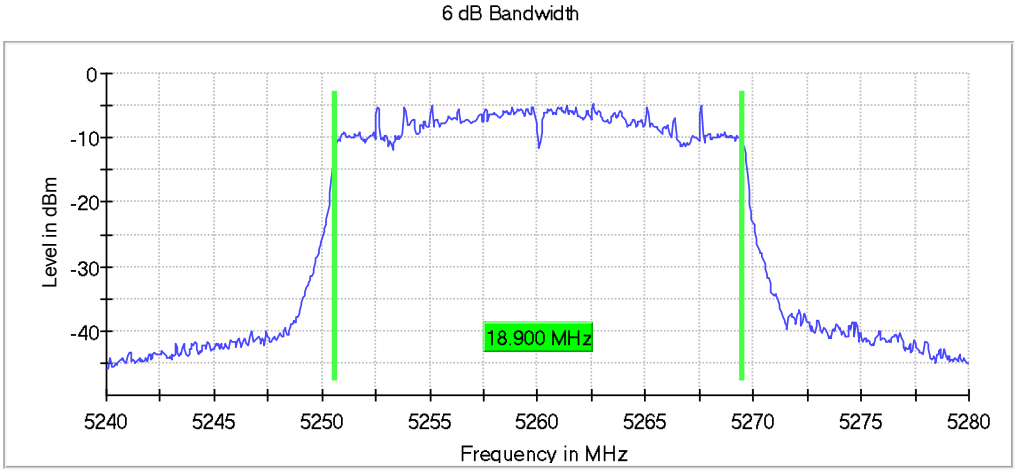
Plot 41: 6 dB emission bandwidth, Mode 2, CH44



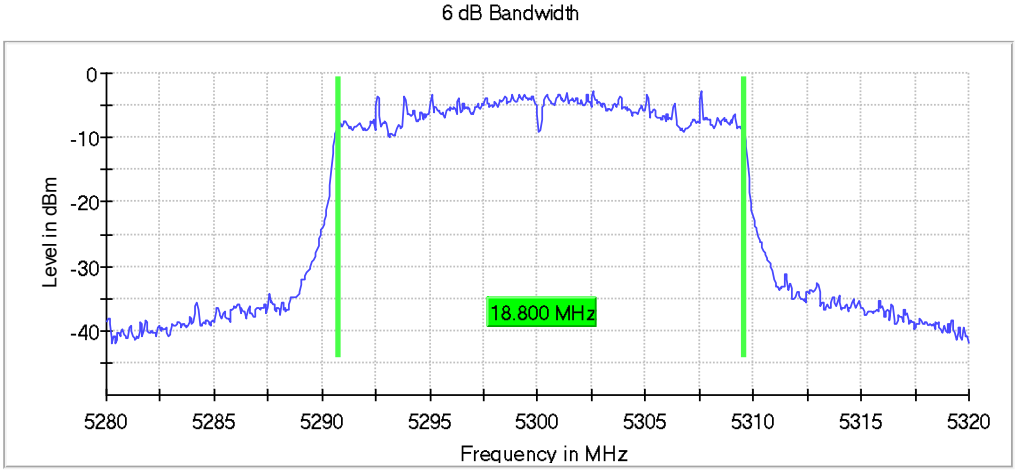
Plot 42: 6 dB emission bandwidth, Mode 2, CH48



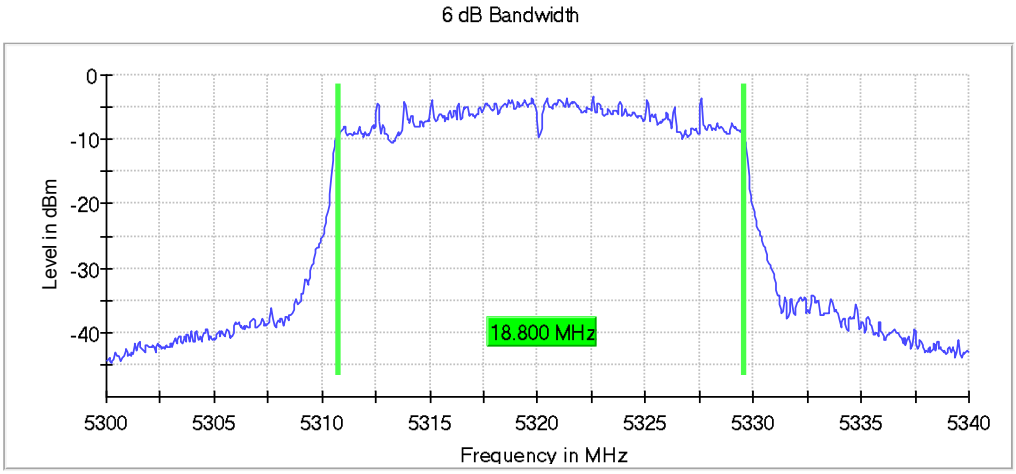
Plot 43: 6 dB emission bandwidth, Mode 2, CH52



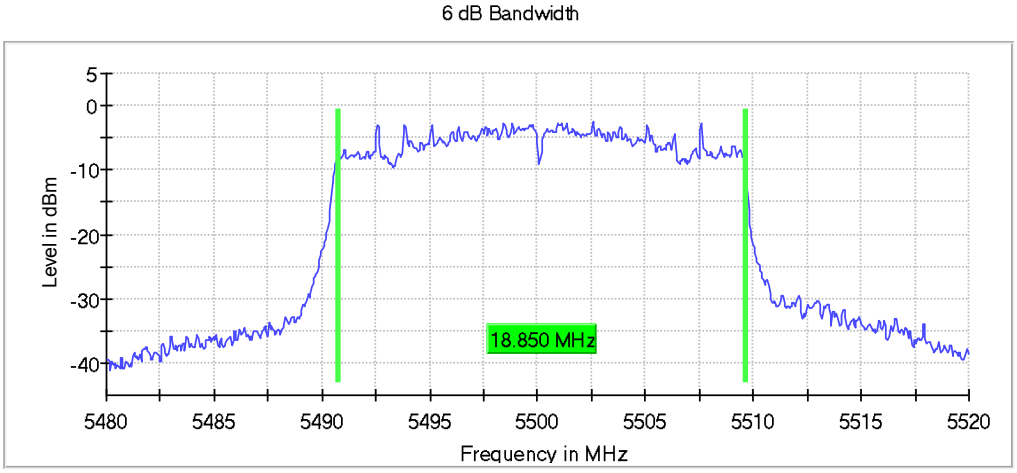
Plot 44: 6 dB emission bandwidth, Mode 2, CH60



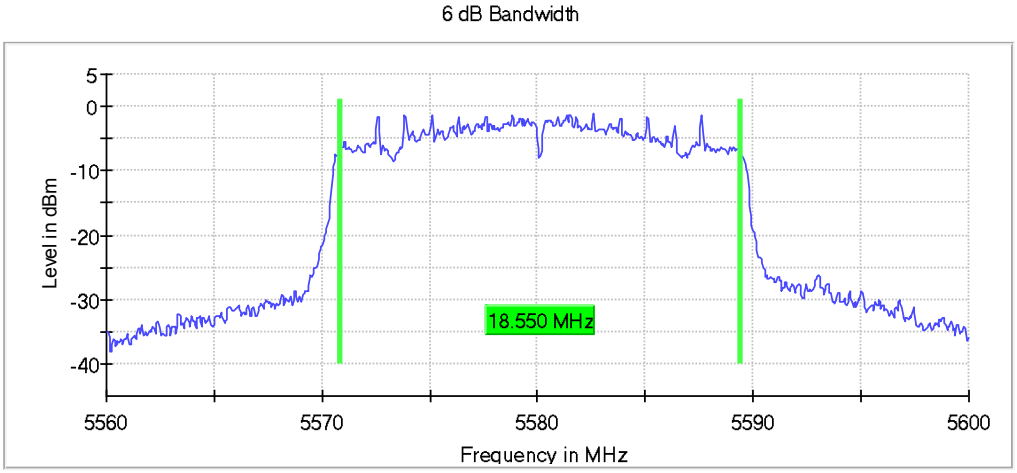
Plot 45: 6 dB emission bandwidth, Mode 2, CH64



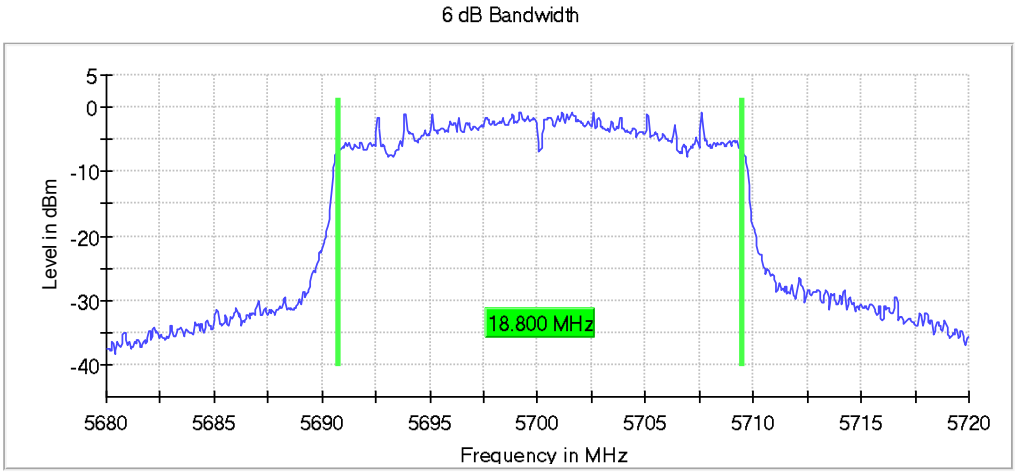
Plot 46: 6 dB emission bandwidth, Mode 2, CH100



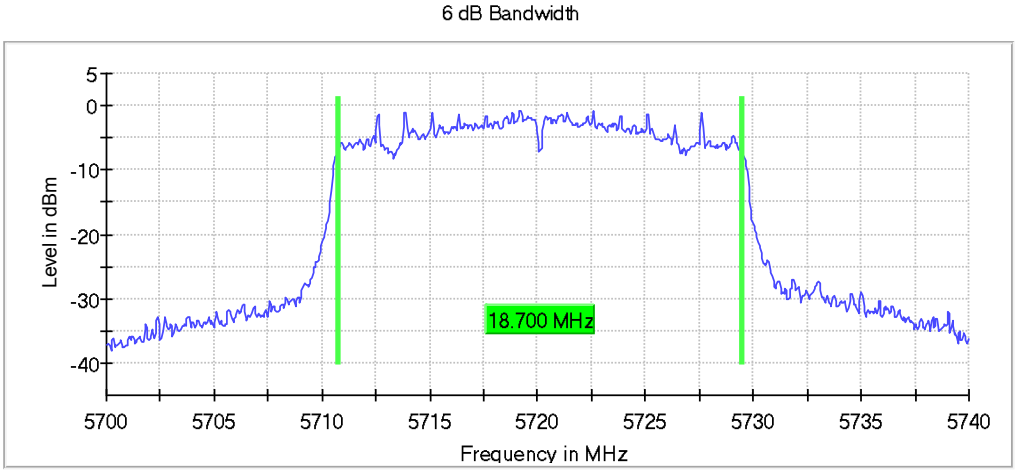
Plot 47: 6 dB emission bandwidth, Mode 2, CH116



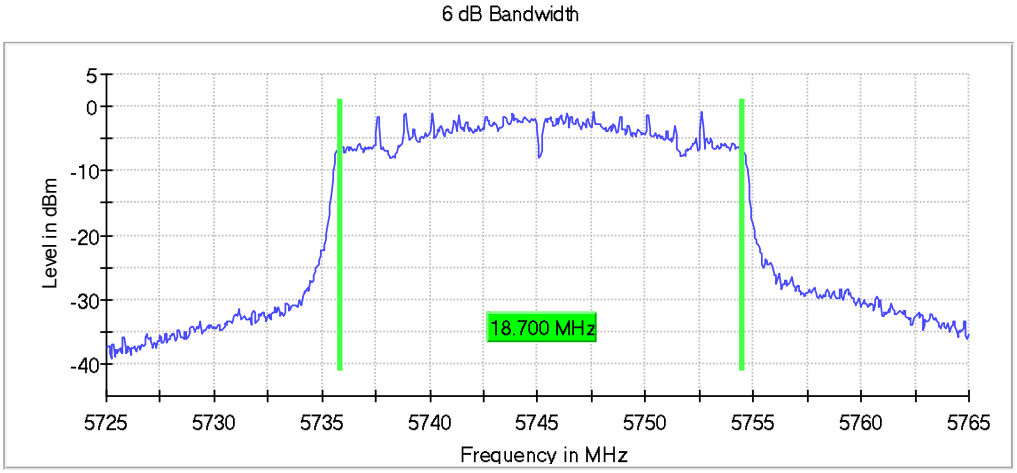
Plot 48: 6 dB emission bandwidth, Mode 2, CH140



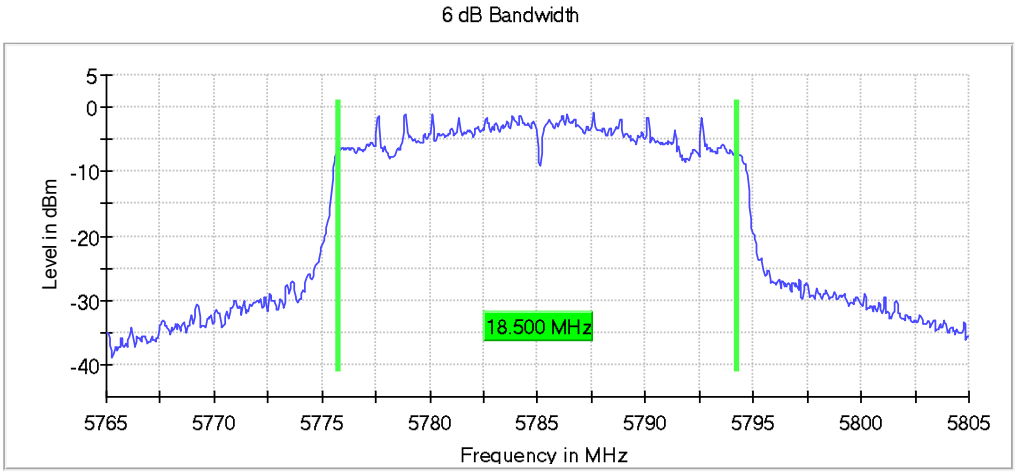
Plot 49: 6 dB emission bandwidth, Mode 2, CH144



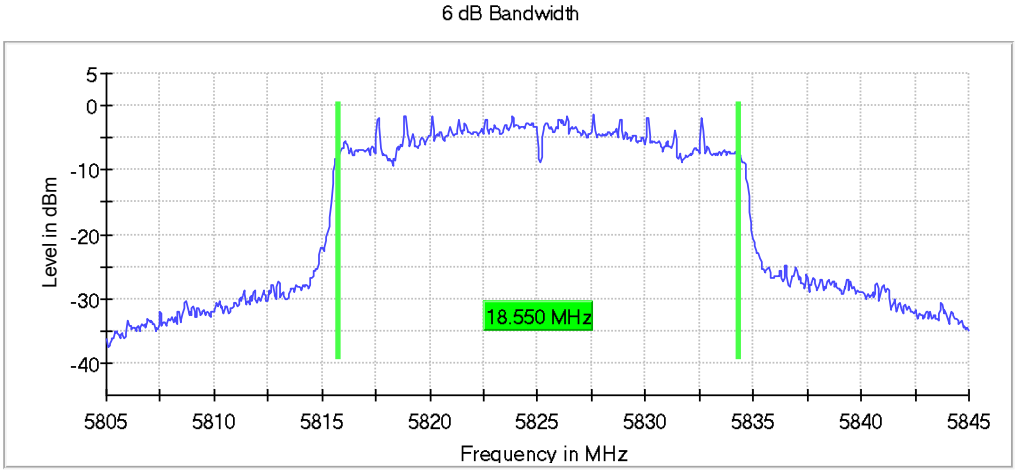
Plot 50: 6 dB emission bandwidth, Mode 2, CH149



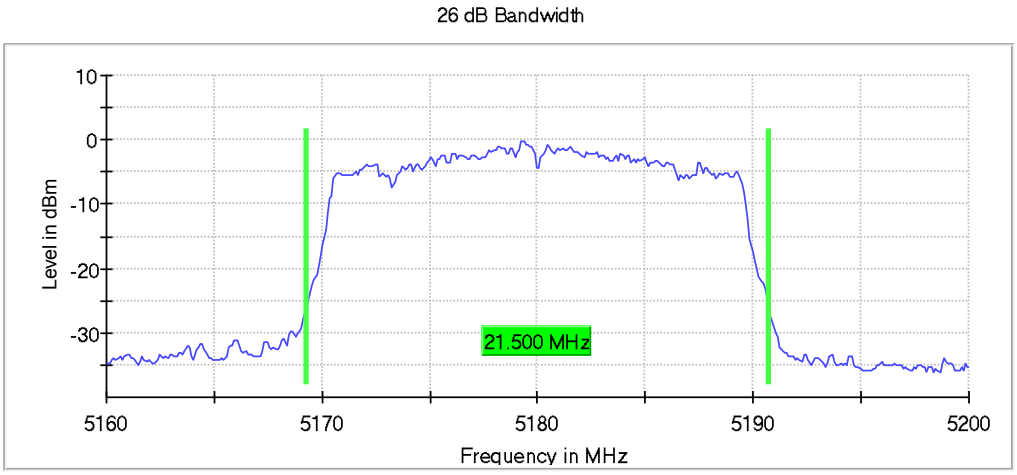
Plot 51: 6 dB emission bandwidth, Mode 2, CH157



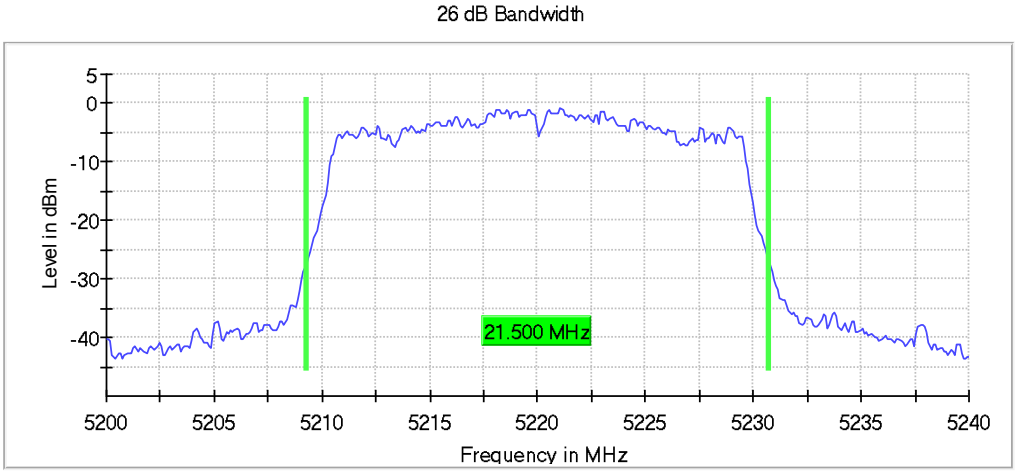
Plot 52: 6 dB emission bandwidth, Mode 2, CH165



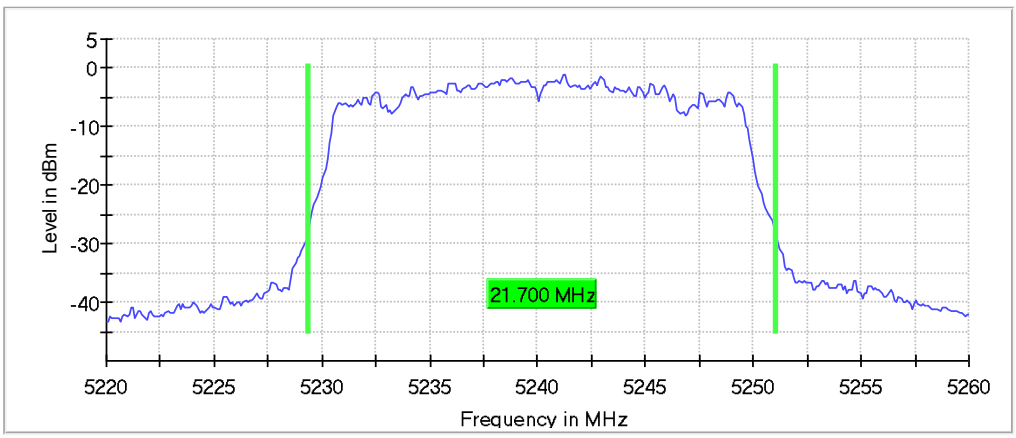
Plot 53: 26 dB emission bandwidth, Mode 2, CH36



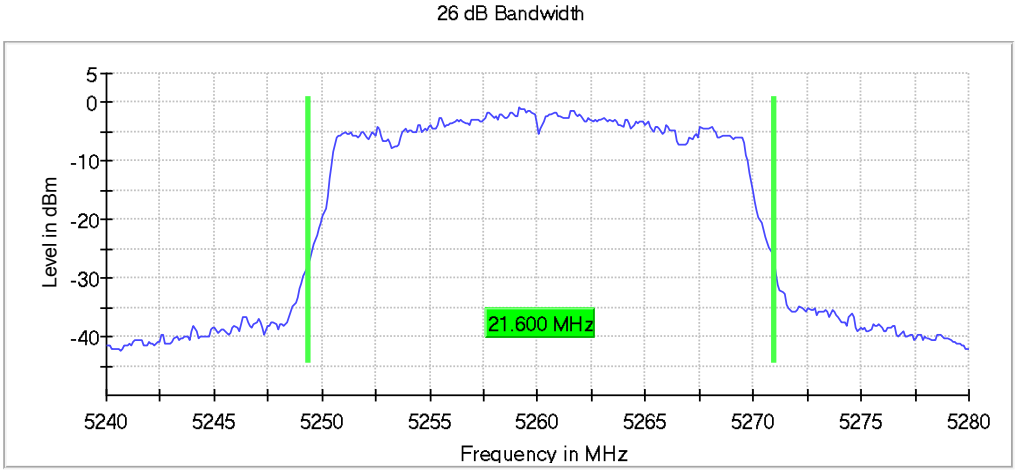
Plot 54: 26 dB emission bandwidth, Mode 2, CH44



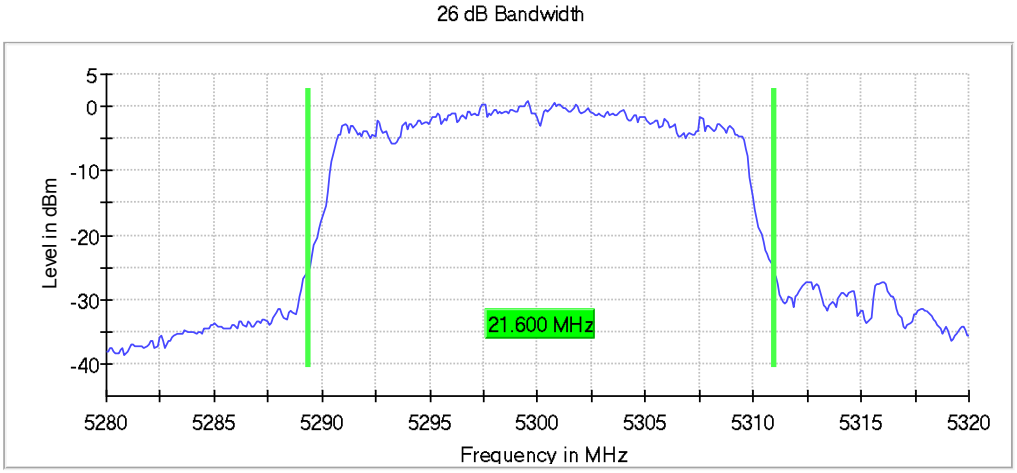
Plot 55: 26 dB emission bandwidth, Mode 2, CH48



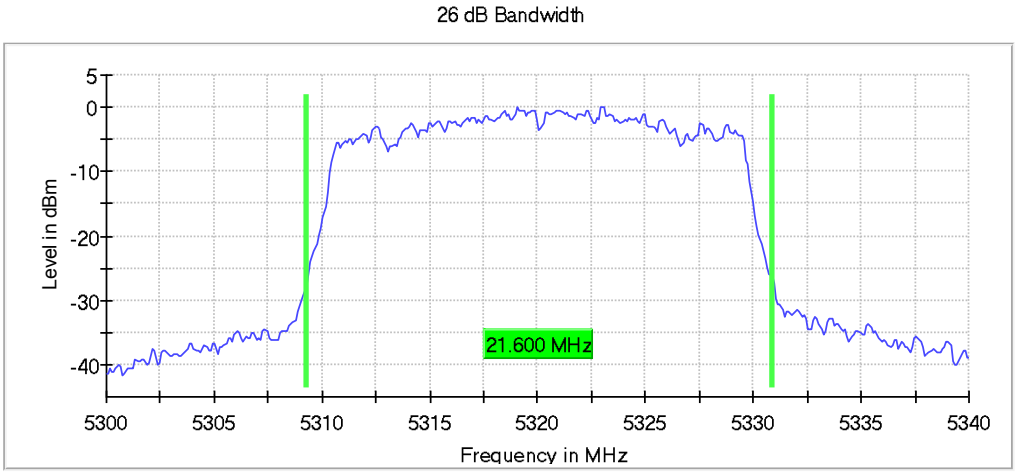
Plot 56: 26 dB emission bandwidth, Mode 2, CH52



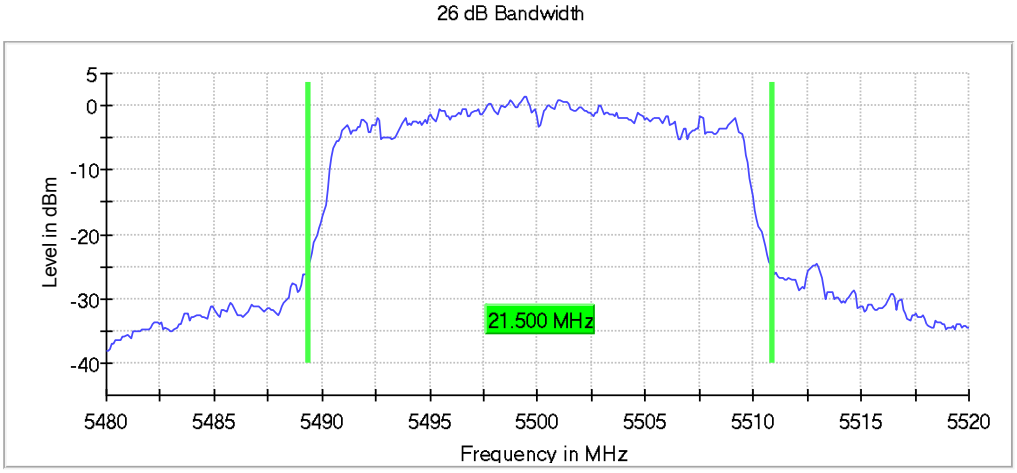
Plot 57: 26 dB emission bandwidth, Mode 2, CH60



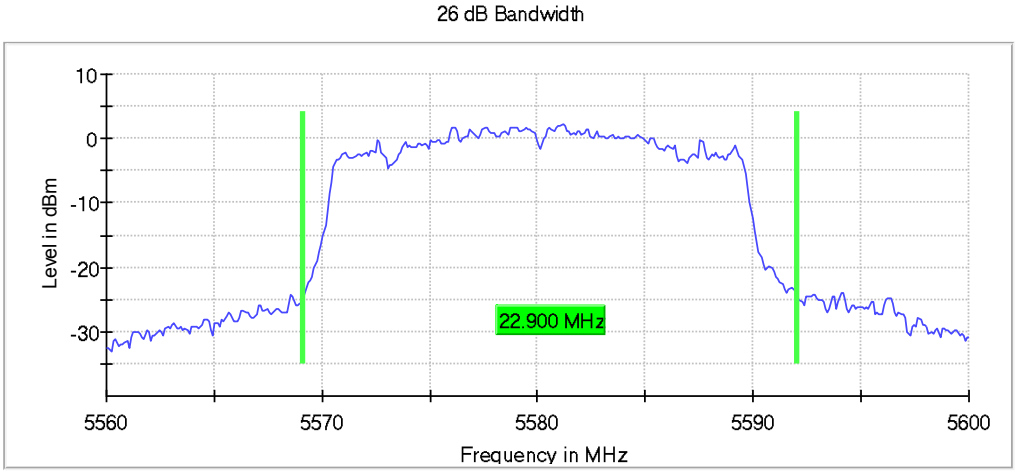
Plot 58: 26 dB emission bandwidth, Mode 2, CH64



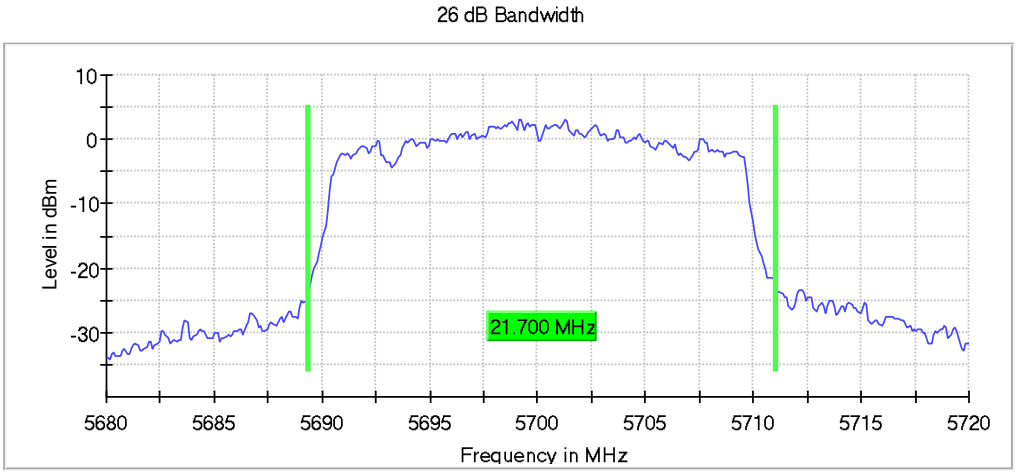
Plot 59: 26 dB emission bandwidth, Mode 2, CH100



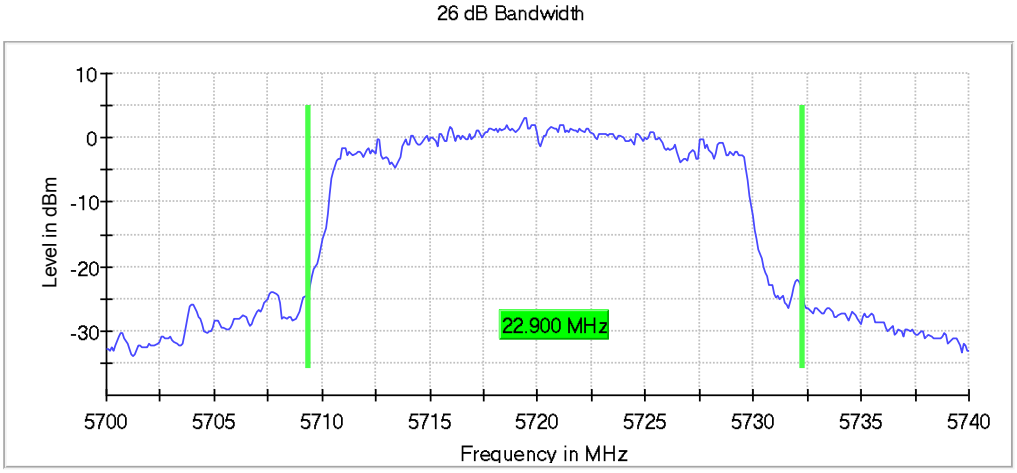
Plot 60: 26 dB emission bandwidth, Mode 2, CH116



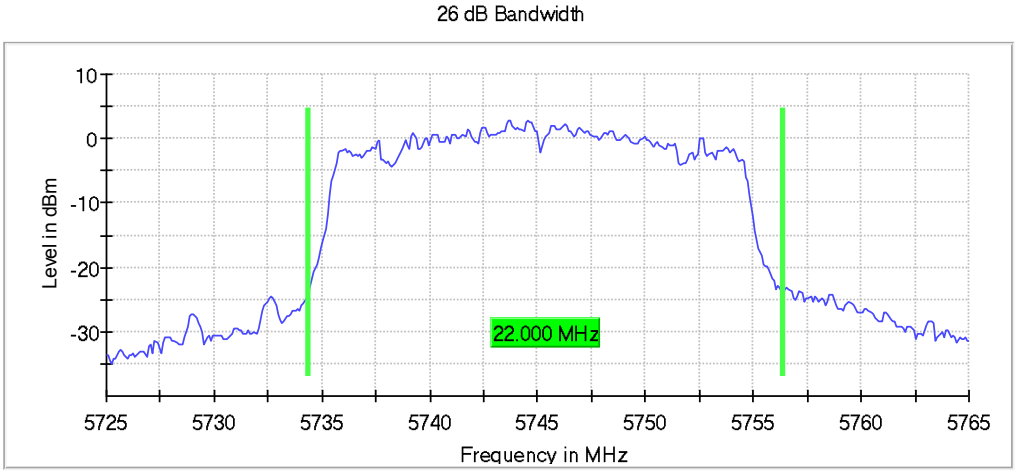
Plot 61: 26 dB emission bandwidth, Mode 2, CH140



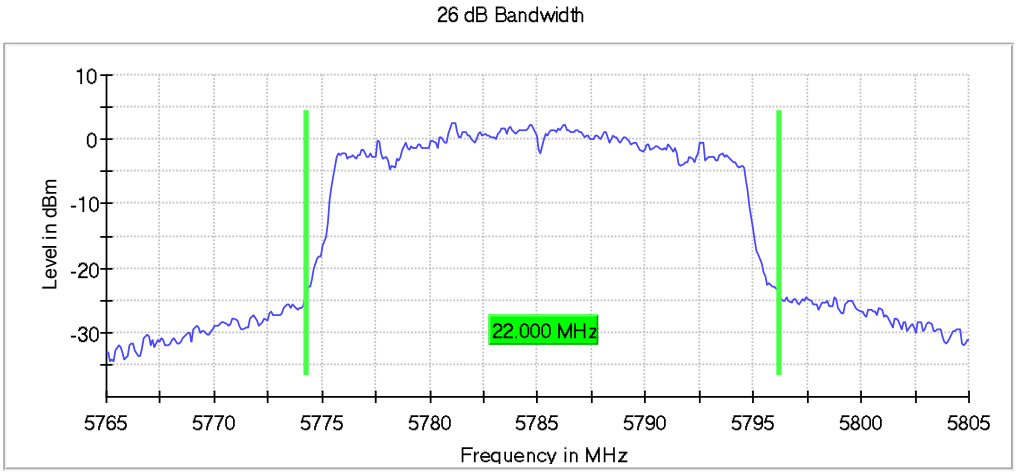
Plot 62: 26 dB emission bandwidth, Mode 2, CH144



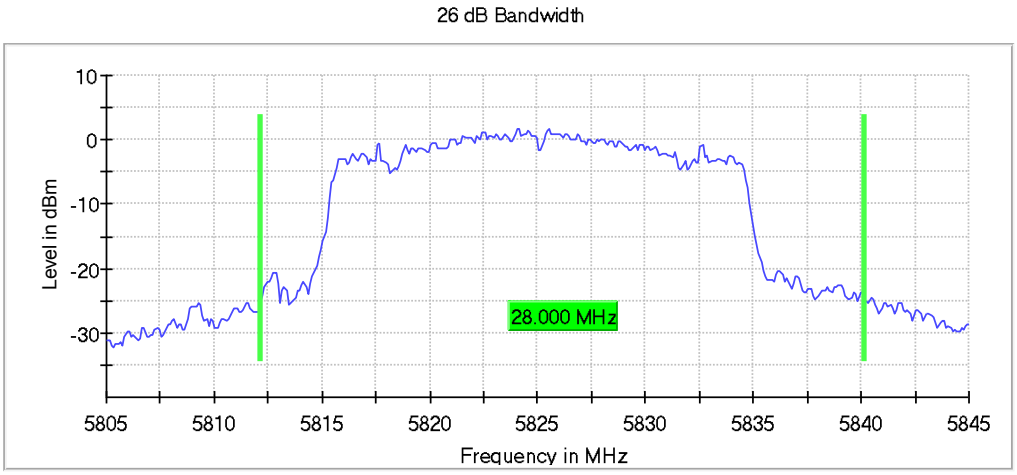
Plot 63: 26 dB emission bandwidth, Mode 2, CH149



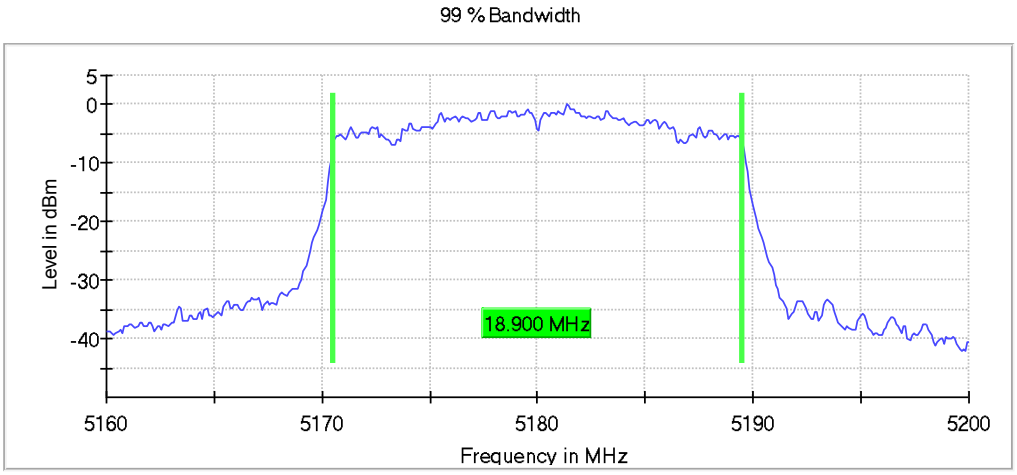
Plot 64: 26 dB emission bandwidth, Mode 2, CH157



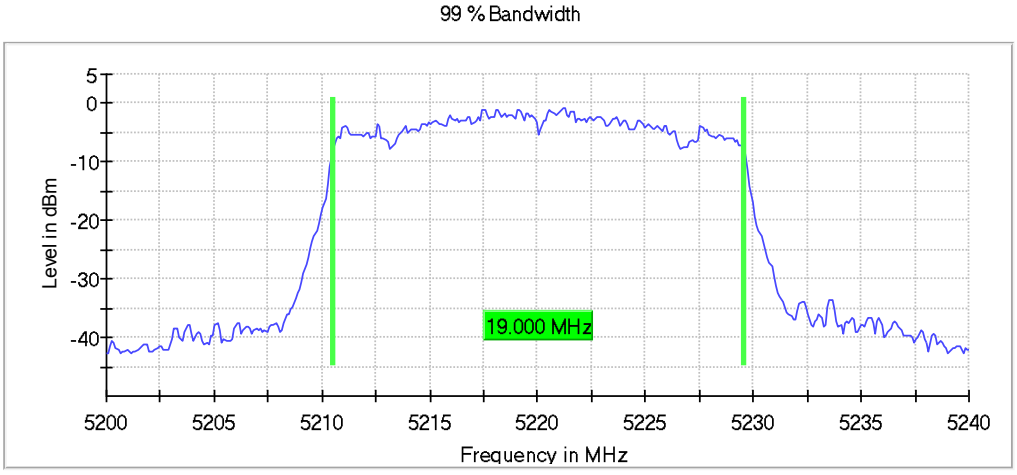
Plot 65: 26 dB emission bandwidth, Mode 2, CH165



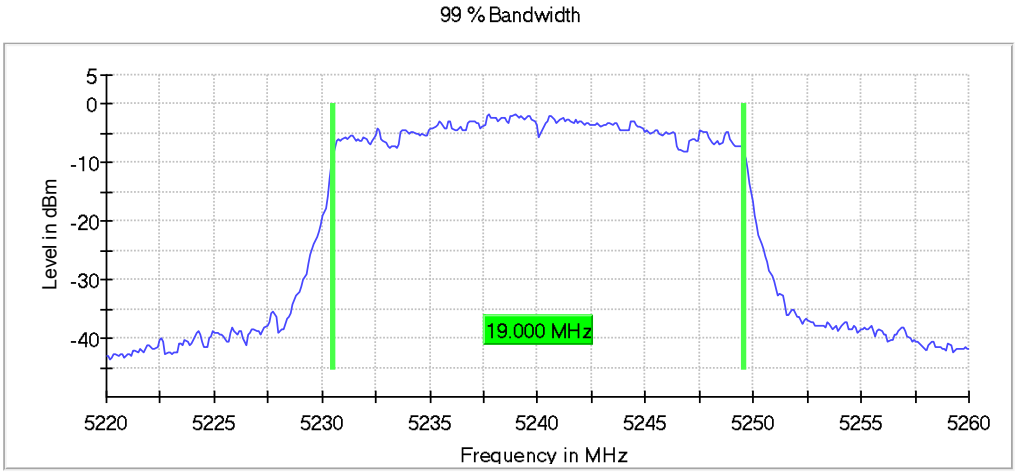
Plot 66: 99% occupied bandwidth, Mode 2, CH36



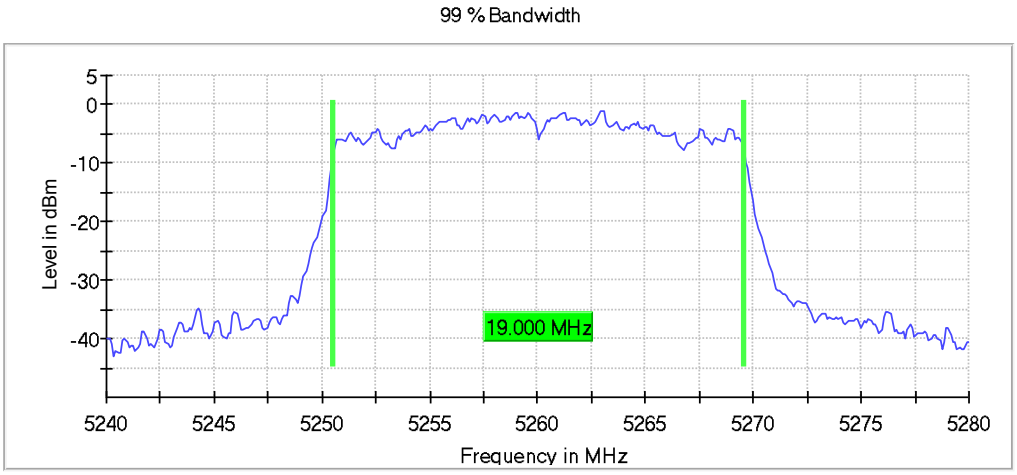
Plot 67: 99% occupied bandwidth, Mode 2, CH44



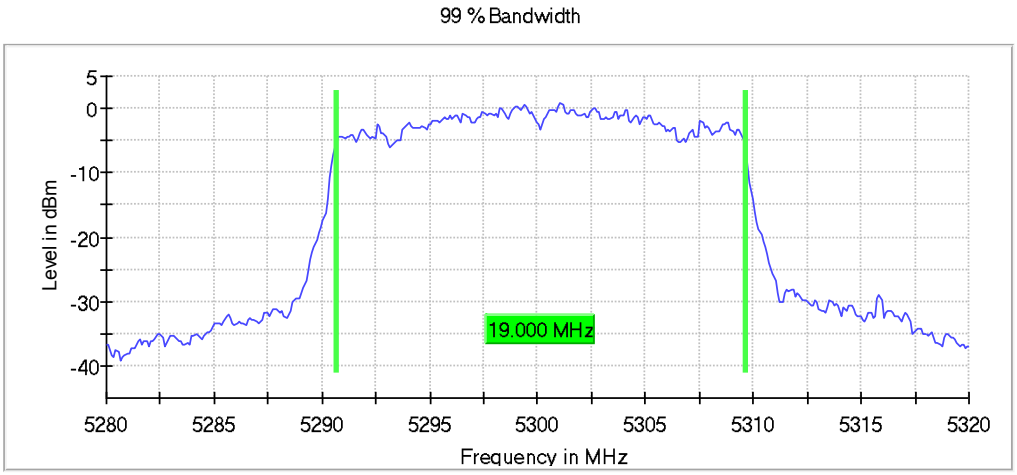
Plot 68: 99% occupied bandwidth, Mode 2, CH48



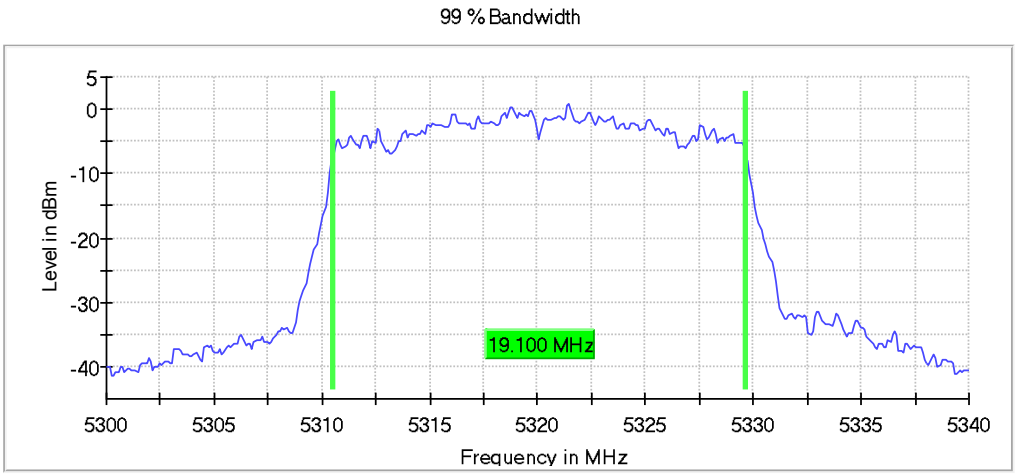
Plot 69: 99% occupied bandwidth, Mode 2, CH52



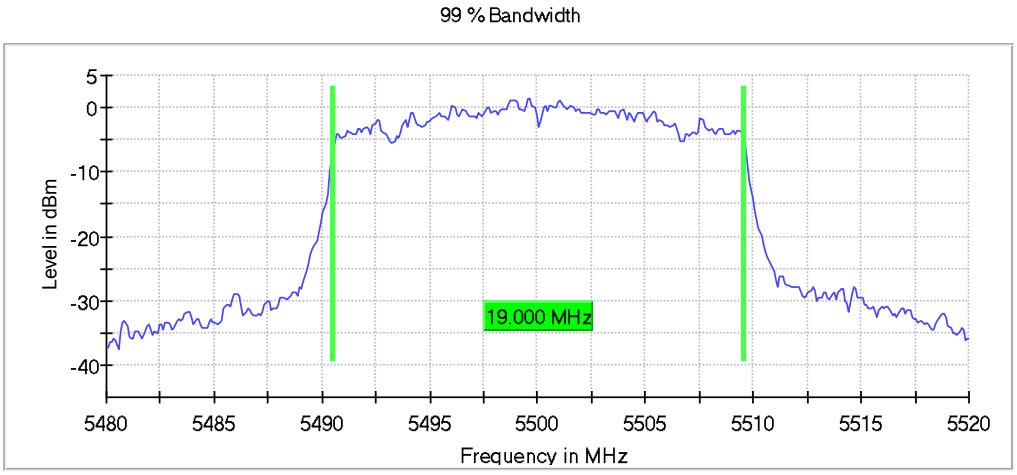
Plot 70: 99% occupied bandwidth, Mode 2, CH60



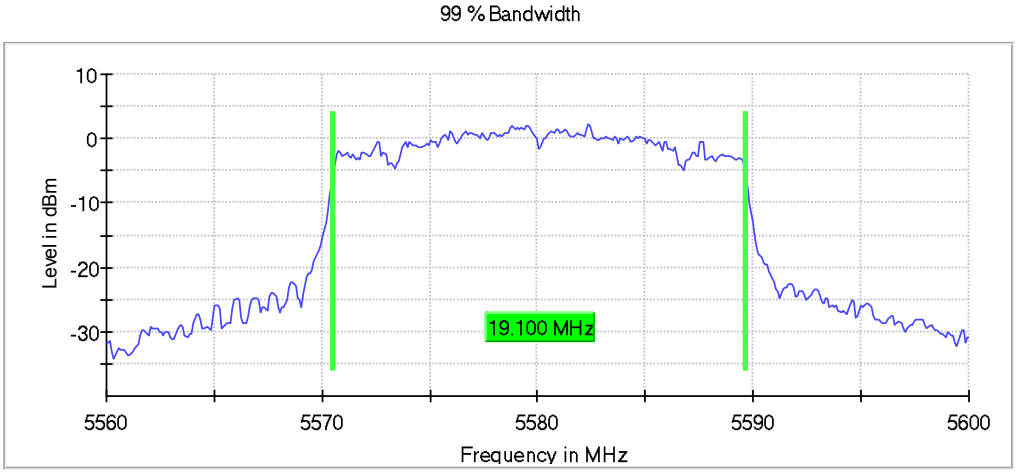
Plot 71: 99% occupied bandwidth, Mode 2, CH64



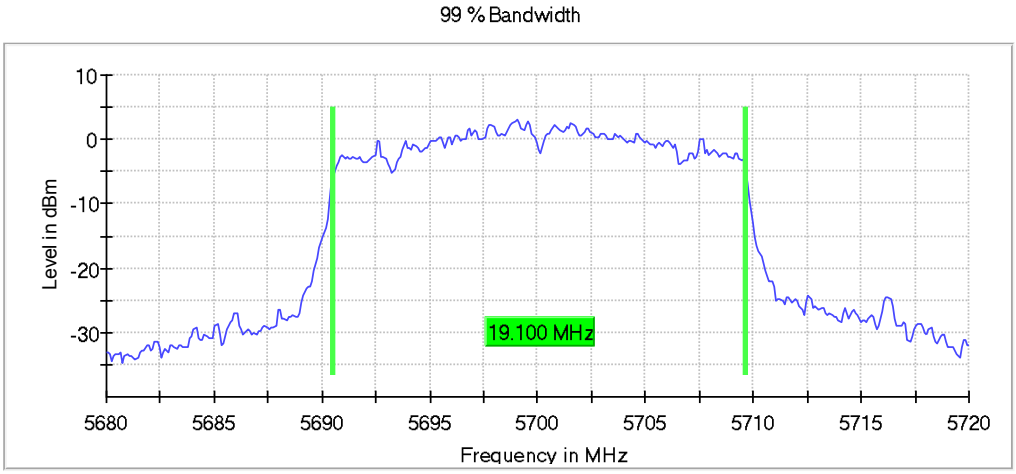
Plot 72: 99% occupied bandwidth, Mode 2, CH100



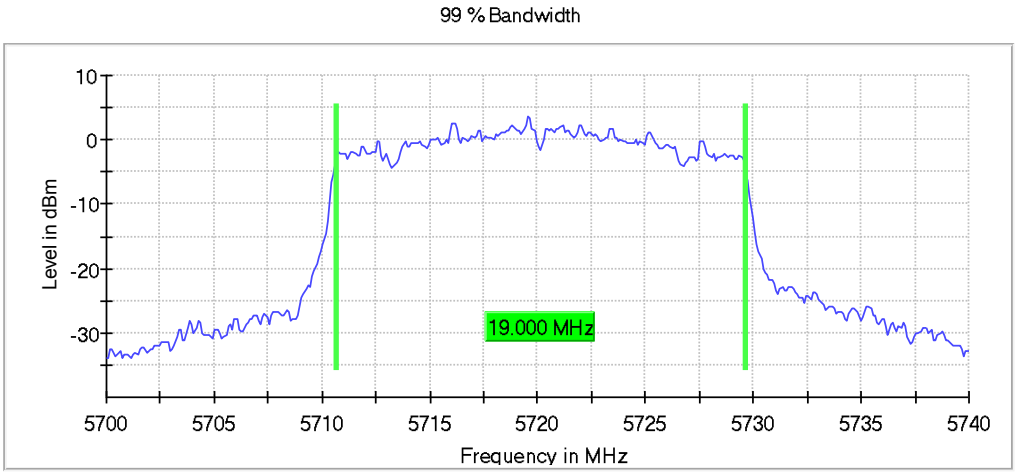
Plot 73: 99% occupied bandwidth, Mode 2, CH116



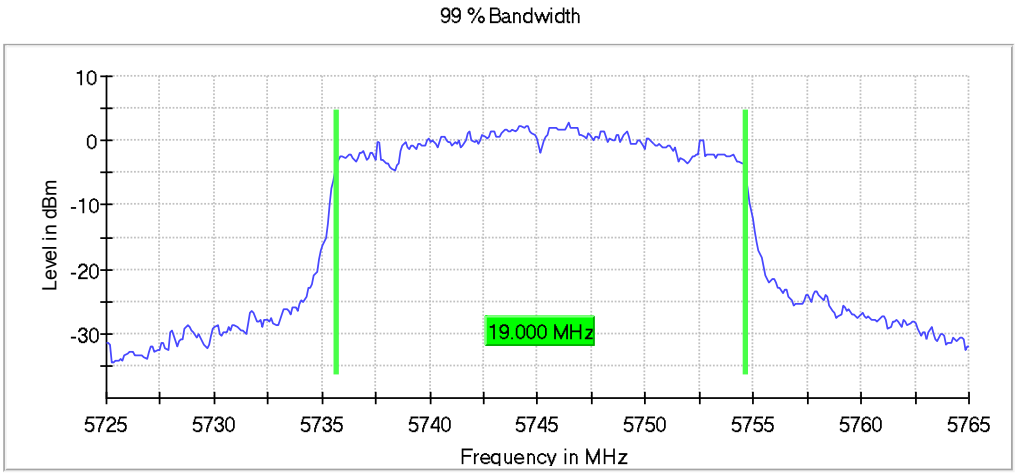
Plot 74: 99% occupied bandwidth, Mode 2, CH140



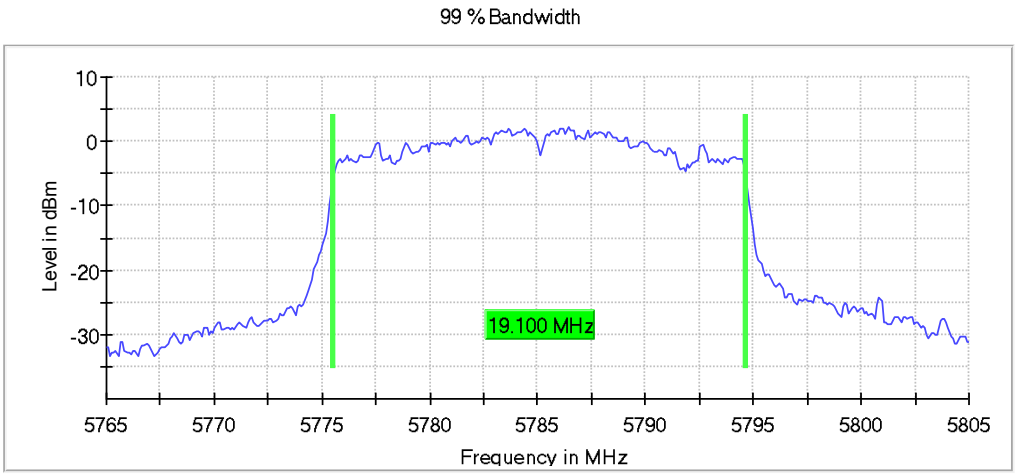
Plot 75: 99% occupied bandwidth, Mode 2, CH144



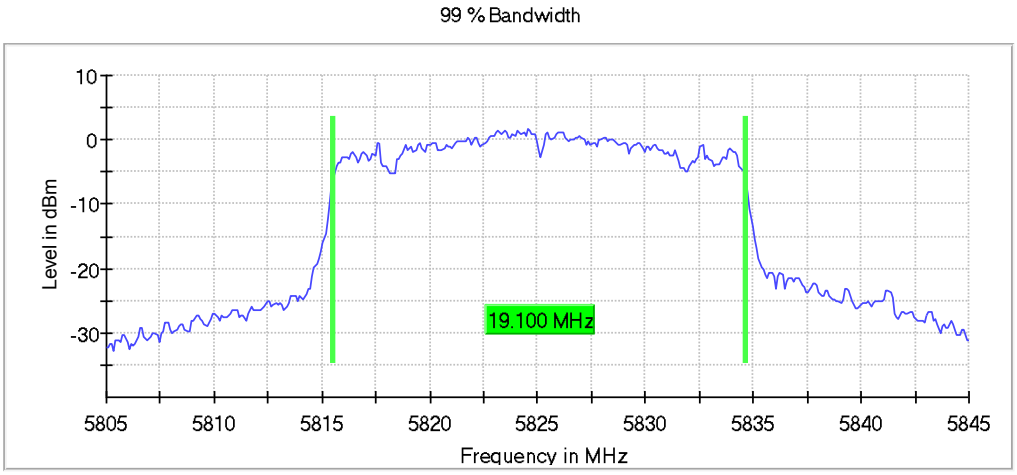
Plot 76: 99% occupied bandwidth, Mode 2, CH149



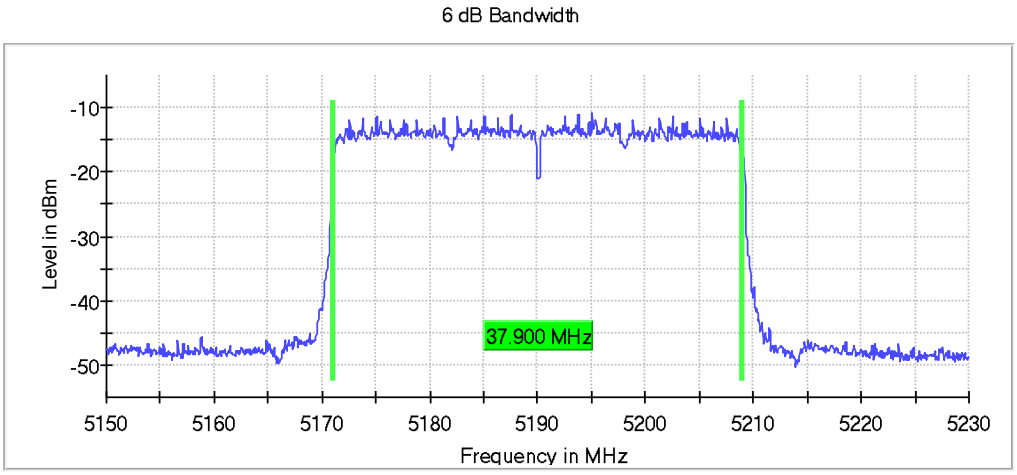
Plot 77: 99% occupied bandwidth, Mode 2, CH157



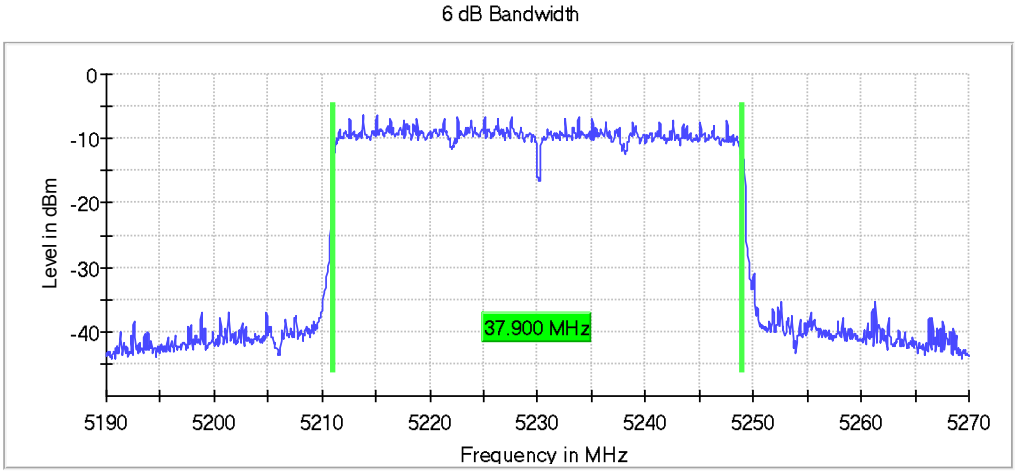
Plot 78: 99% occupied bandwidth, Mode 2, CH165



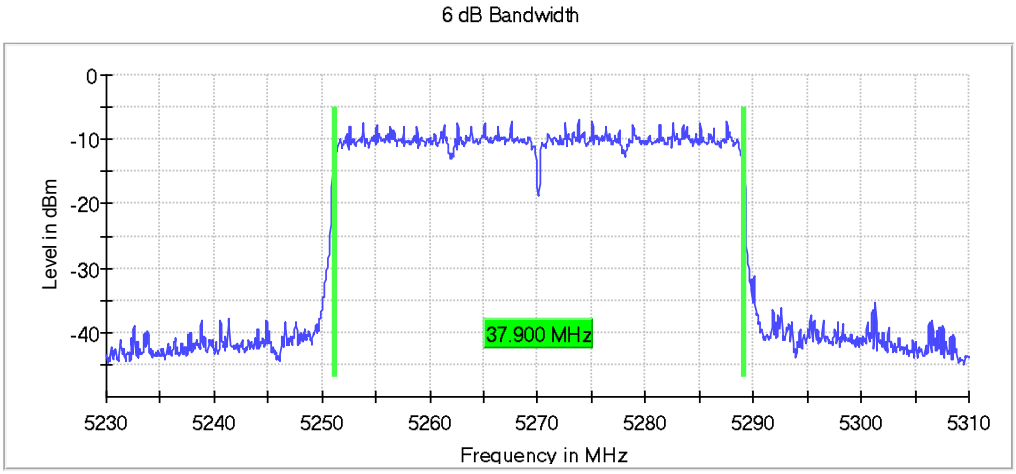
Plot 79: 6 dB emission bandwidth, Mode 3, CH38



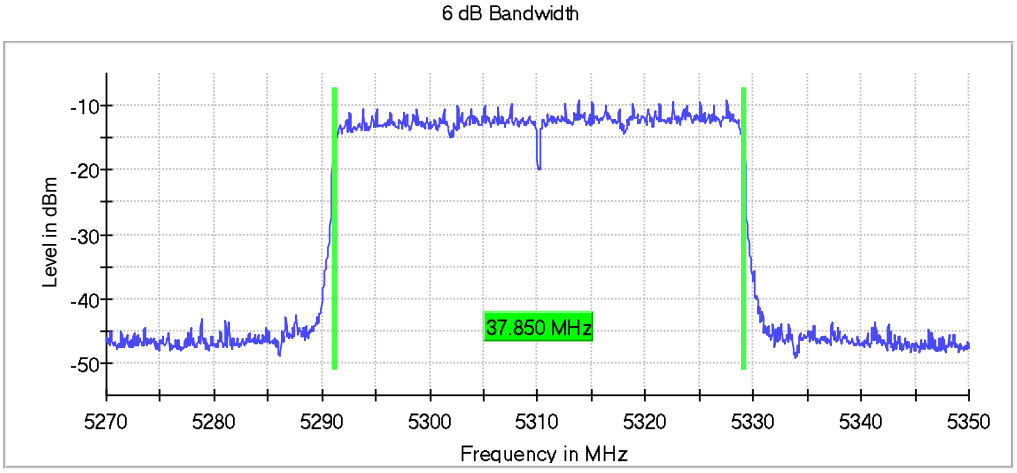
Plot 80: 6 dB emission bandwidth, Mode 3, CH46



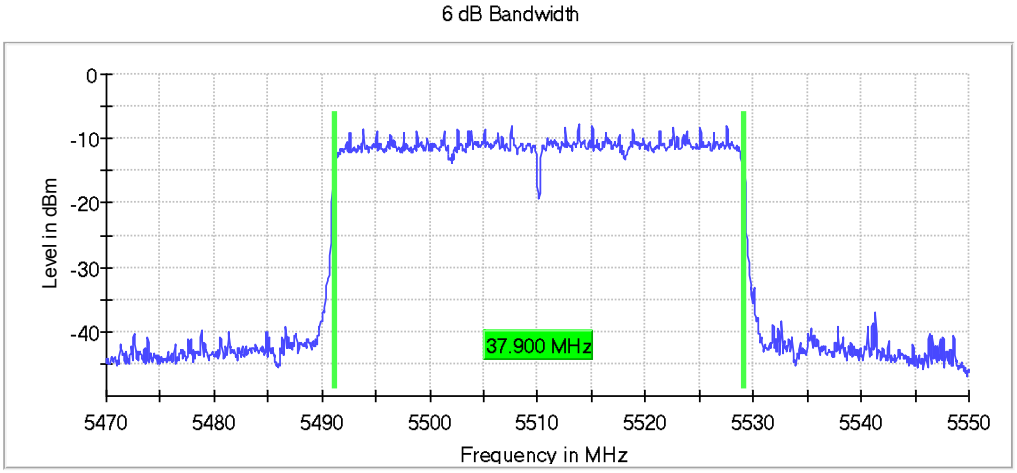
Plot 81: 6 dB emission bandwidth, Mode 3, CH54



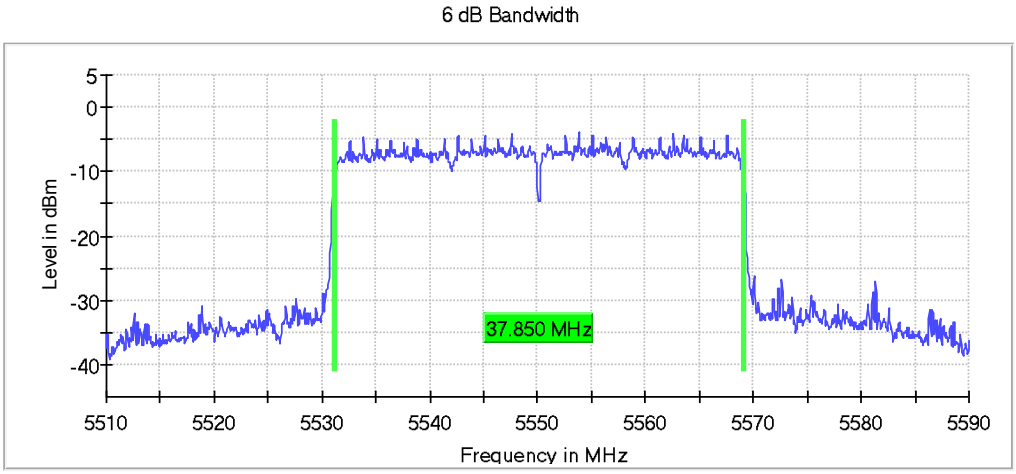
Plot 82: 6 dB emission bandwidth, Mode 3, CH62



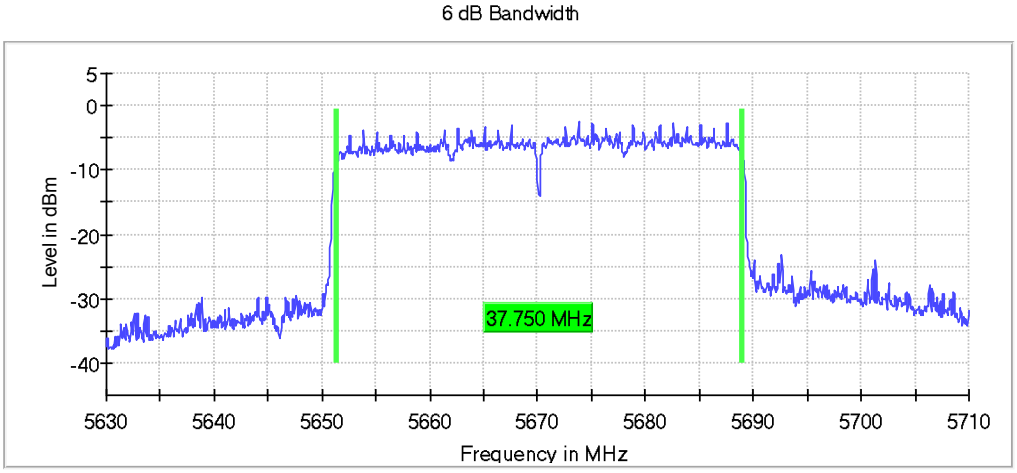
Plot 83: 6 dB emission bandwidth, Mode 3, CH102



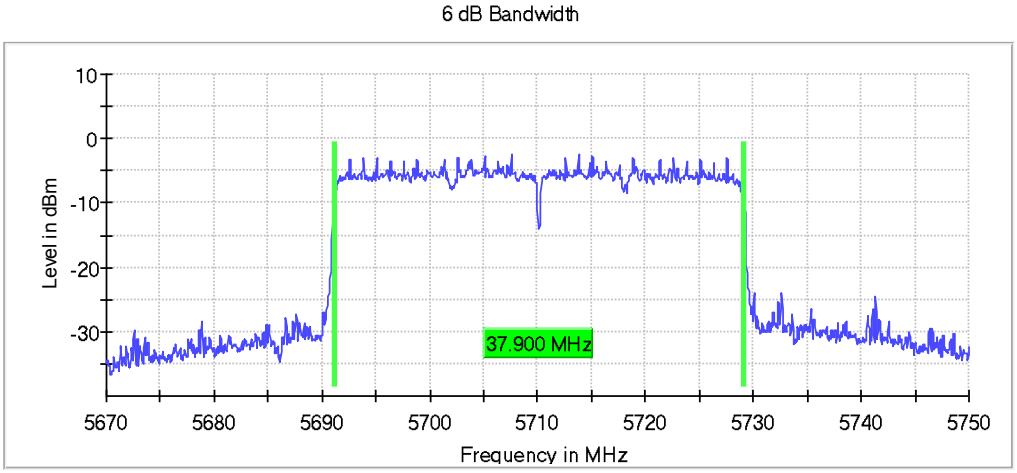
Plot 84: 6 dB emission bandwidth, Mode 3, CH110



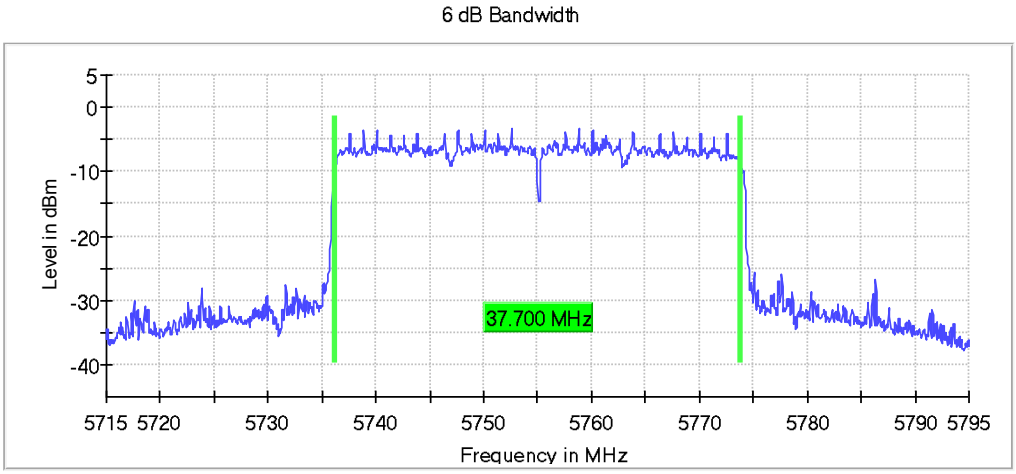
Plot 85: 6 dB emission bandwidth, Mode 3, CH134



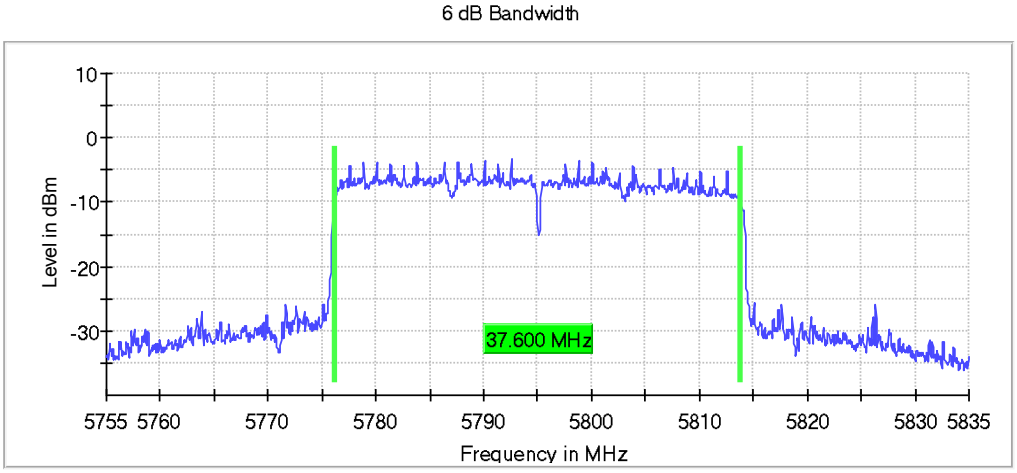
Plot 86: 6 dB emission bandwidth, Mode 3, CH142



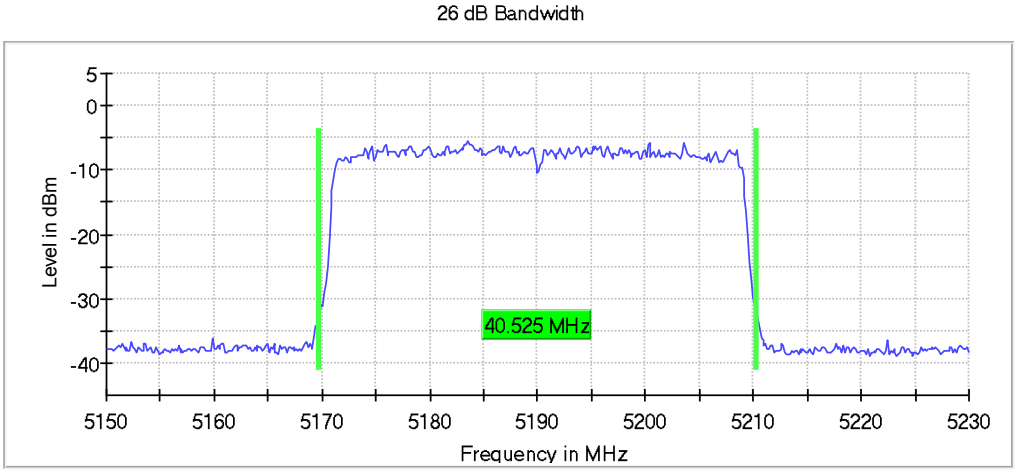
Plot 87: 6 dB emission bandwidth, Mode 3, CH151



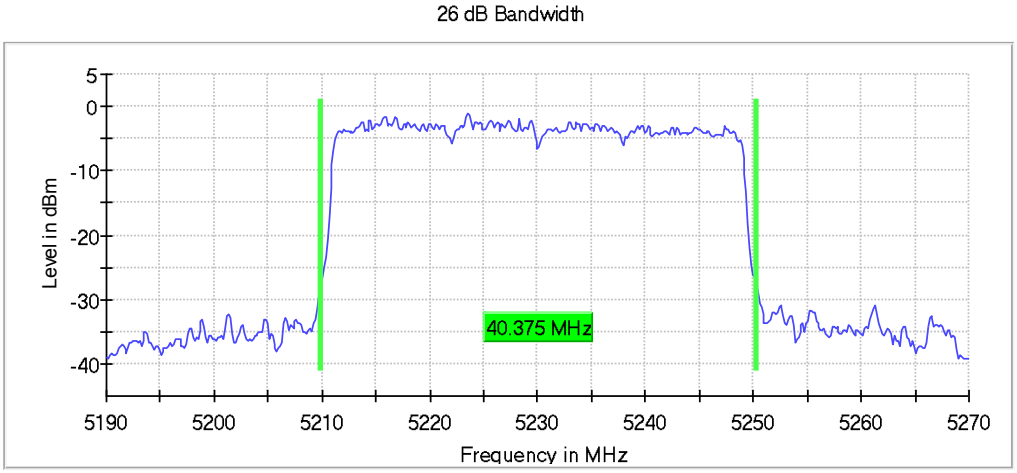
Plot 88: 6 dB emission bandwidth, Mode 3, CH159



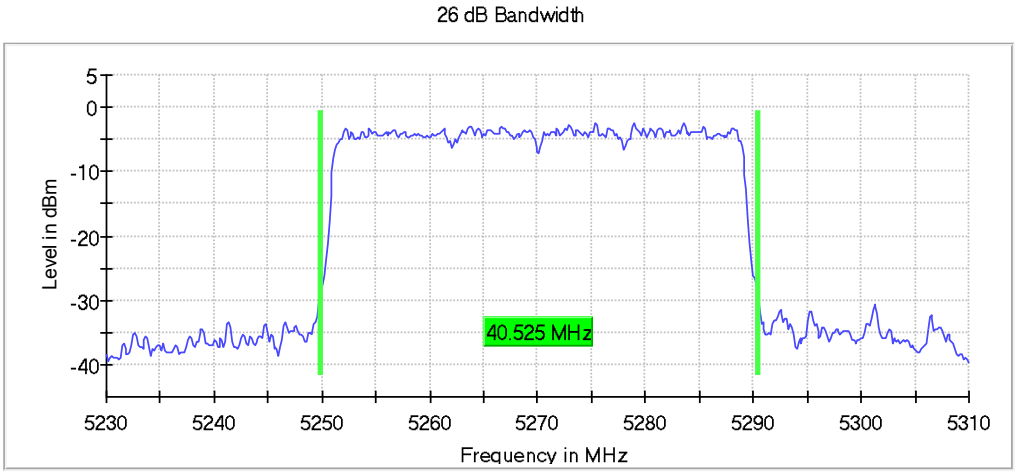
Plot 89: 26 dB emission bandwidth, Mode 3, CH38



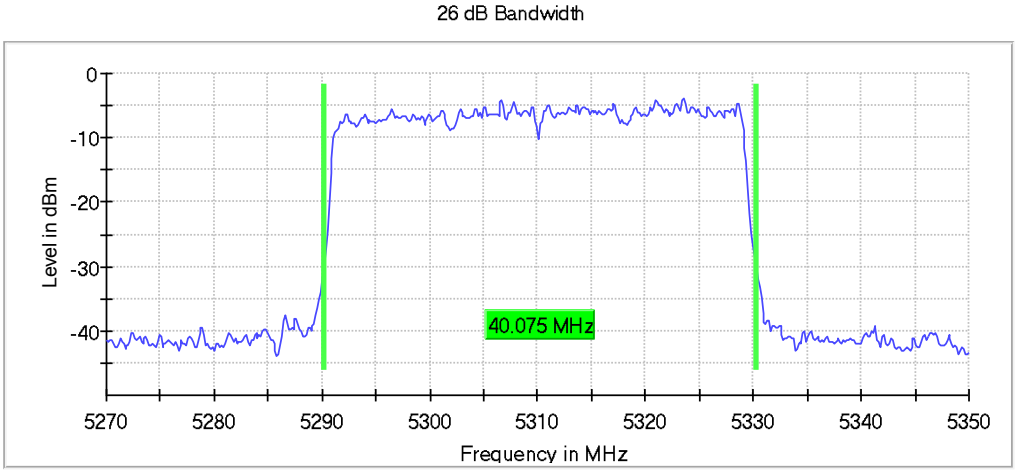
Plot 90: 26 dB emission bandwidth, Mode 3, CH46



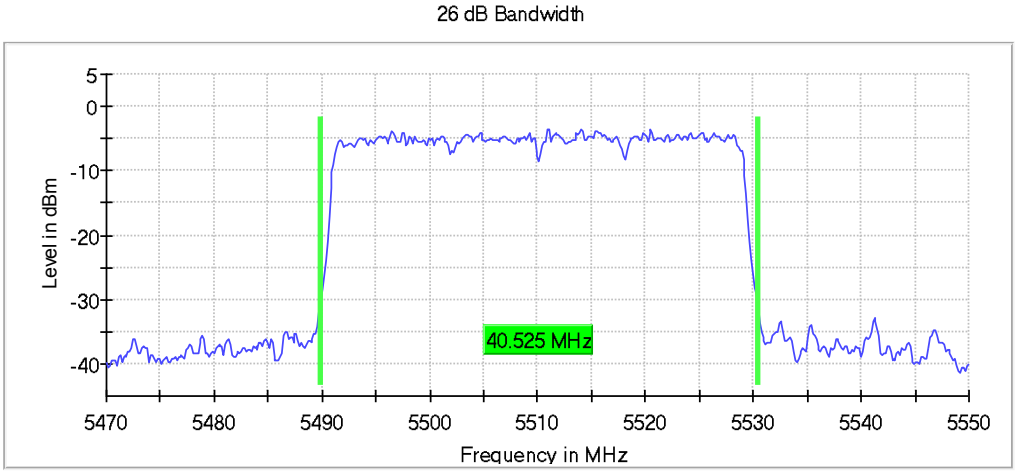
Plot 91: 26 dB emission bandwidth, Mode 3, CH54



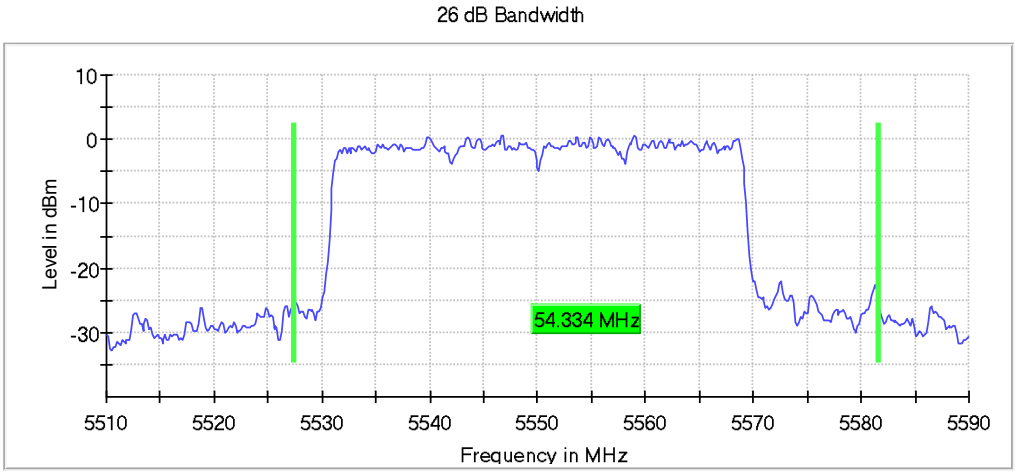
Plot 92: 26 dB emission bandwidth, Mode 3, CH62



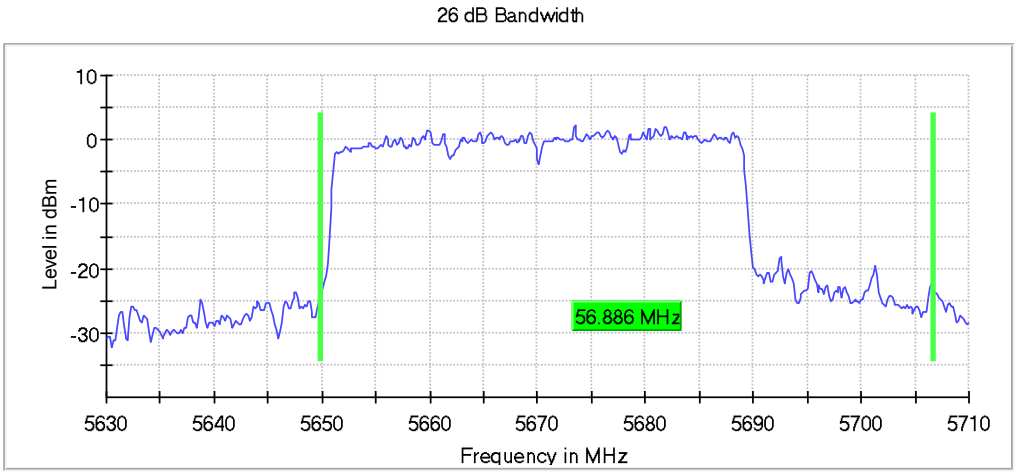
Plot 93: 26 dB emission bandwidth, Mode 3, CH102



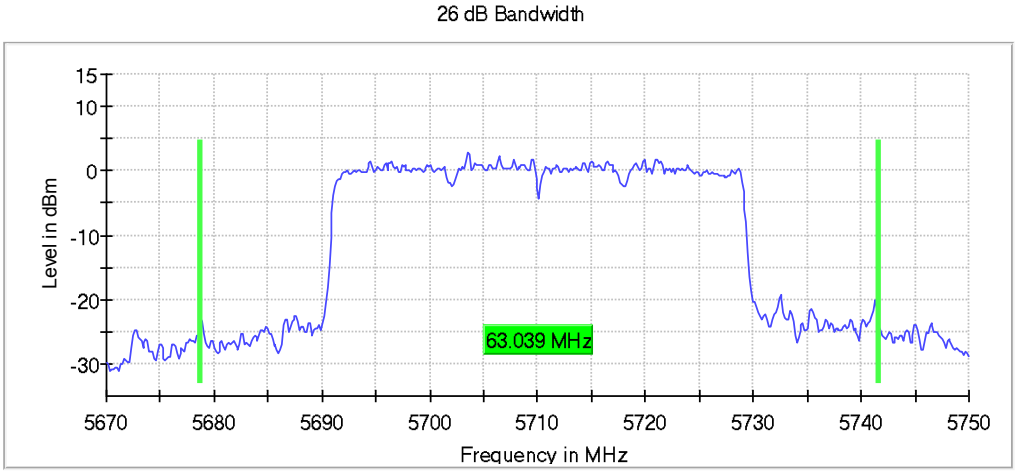
Plot 94: 26 dB emission bandwidth, Mode 3, CH110



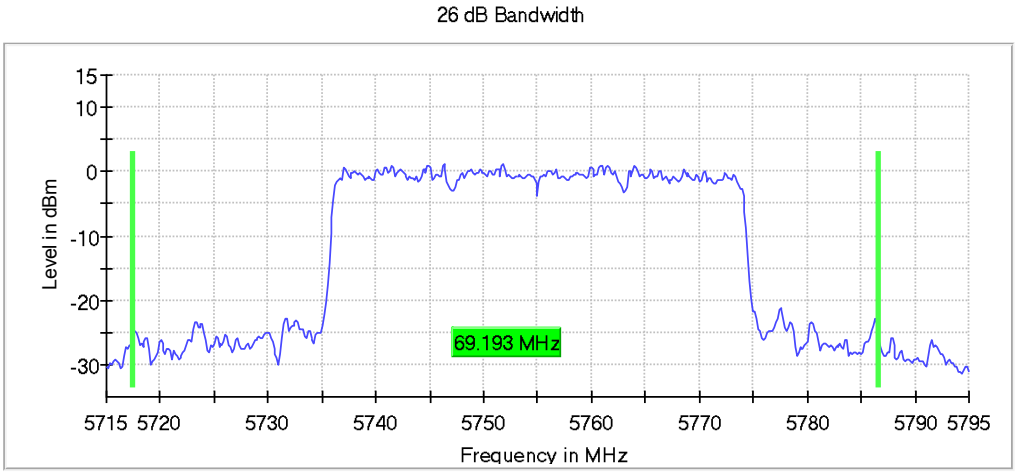
Plot 95: 26 dB emission bandwidth, Mode 3, CH134



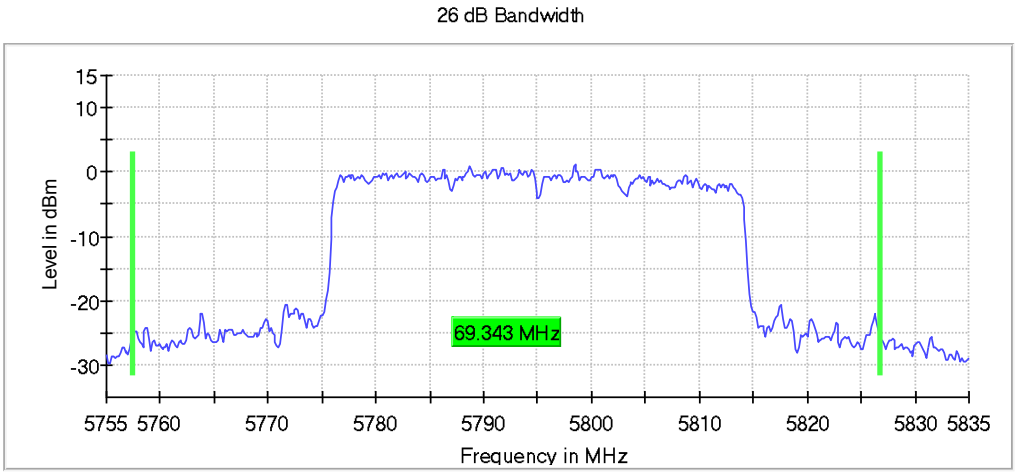
Plot 96: 26 dB emission bandwidth, Mode 3, CH142



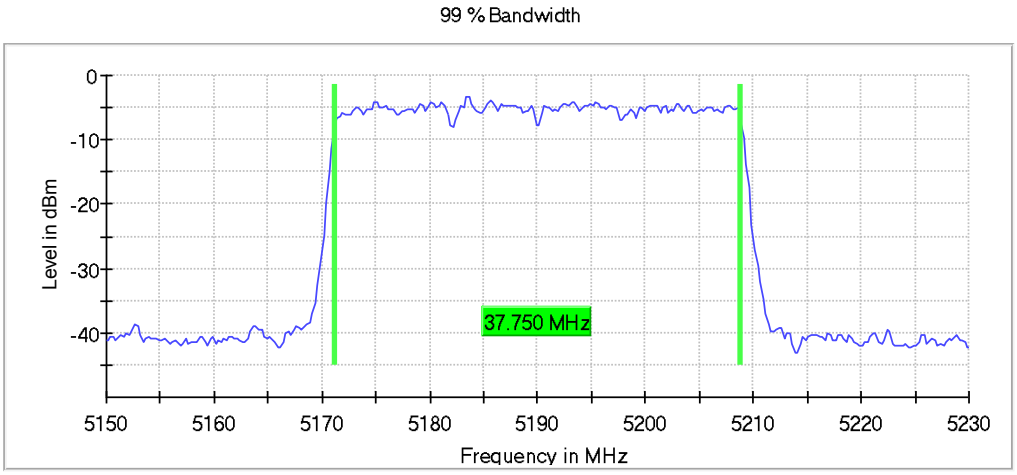
Plot 97: 26 dB emission bandwidth, Mode 3, CH151



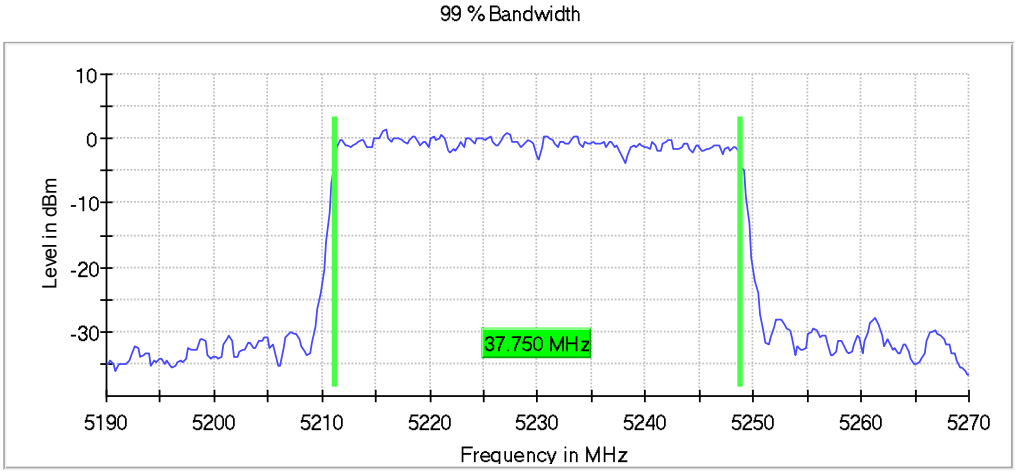
Plot 98: 26 dB emission bandwidth, Mode 3, CH159



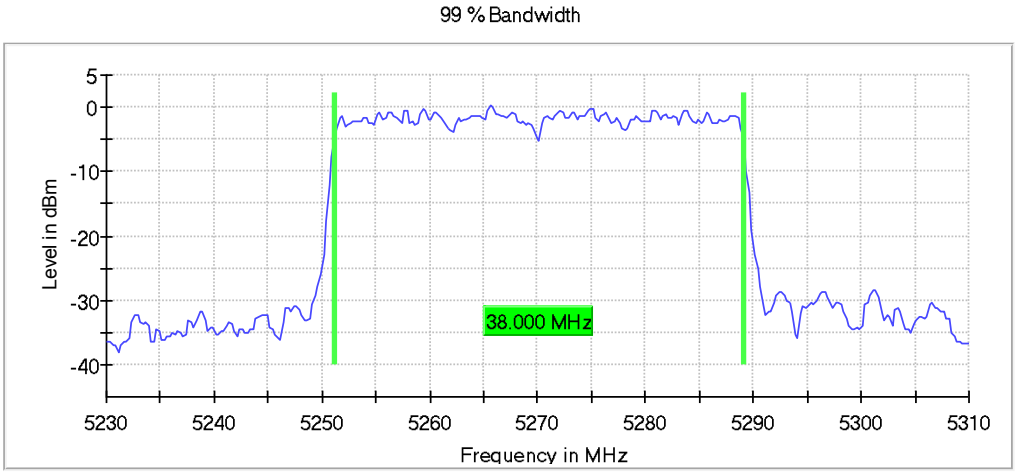
Plot 99: 99% occupied bandwidth, Mode 3, CH38



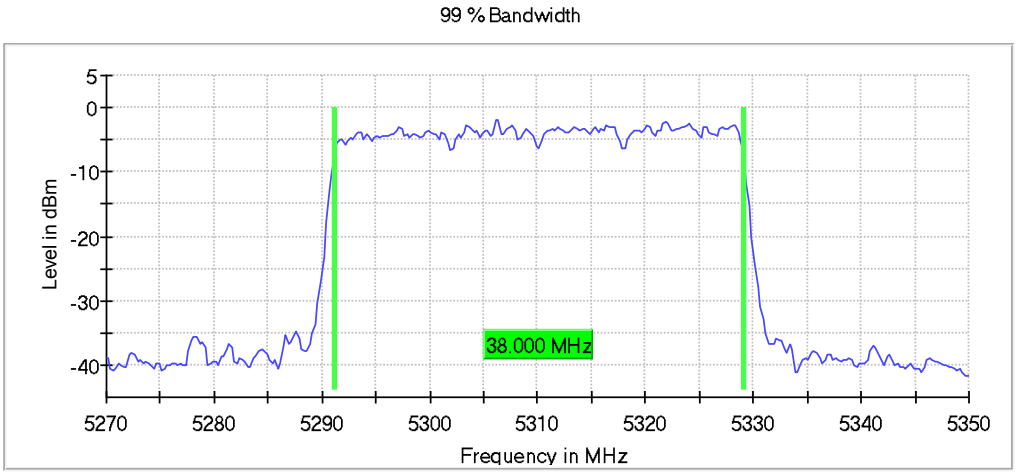
Plot 100: 99% occupied bandwidth, Mode 3, CH46



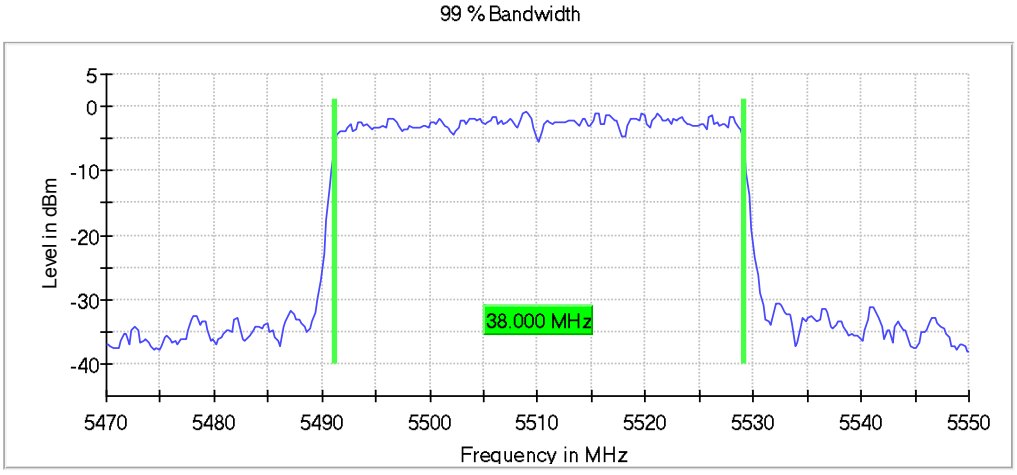
Plot 101: 99% occupied bandwidth, Mode 3, CH54



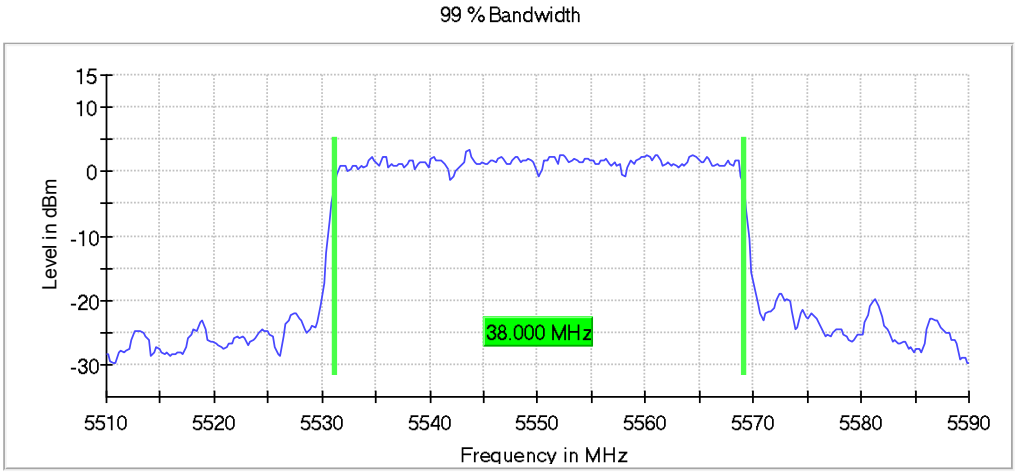
Plot 102: 99% occupied bandwidth, Mode 3, CH62



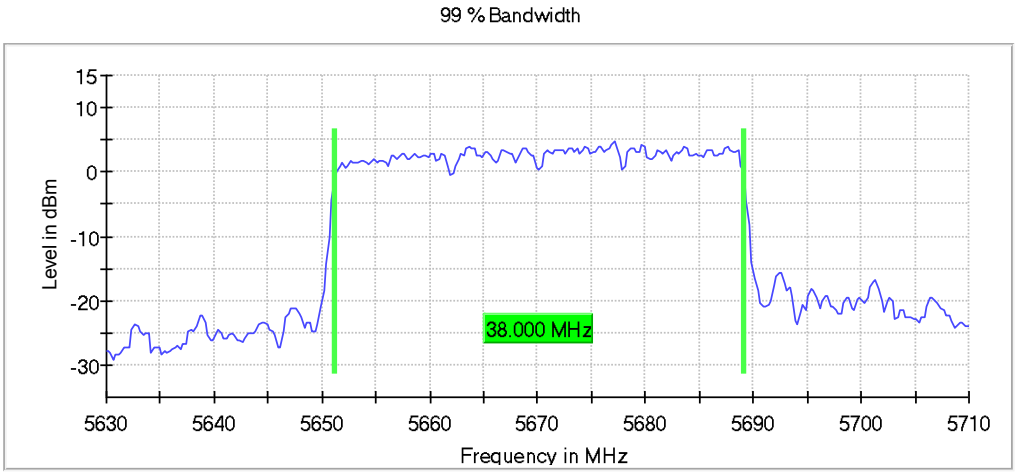
Plot 103: 99% occupied bandwidth, Mode 3, CH102



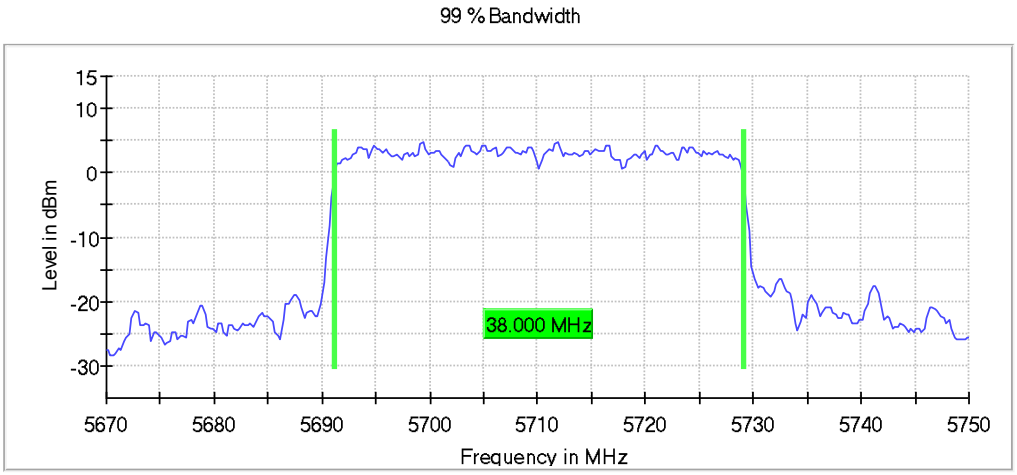
Plot 104: 99% occupied bandwidth, Mode 3, CH110



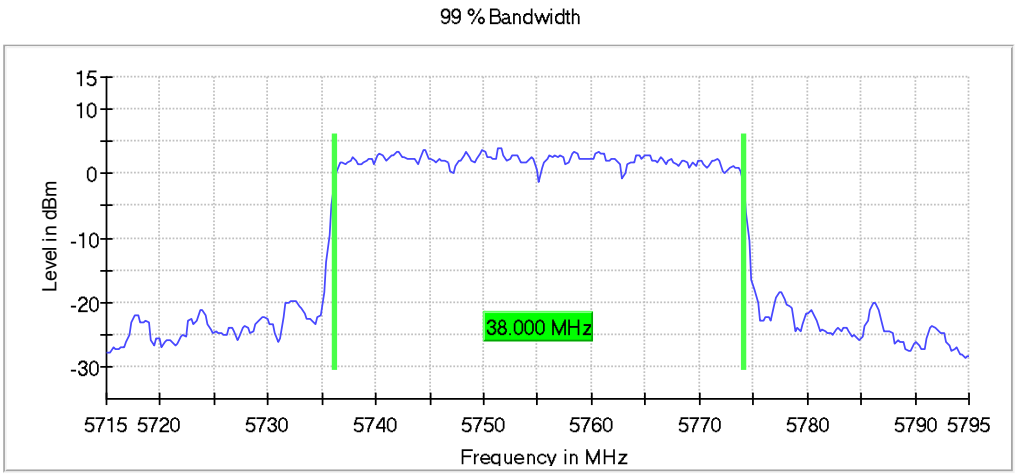
Plot 105: 99% occupied bandwidth, Mode 3, CH134



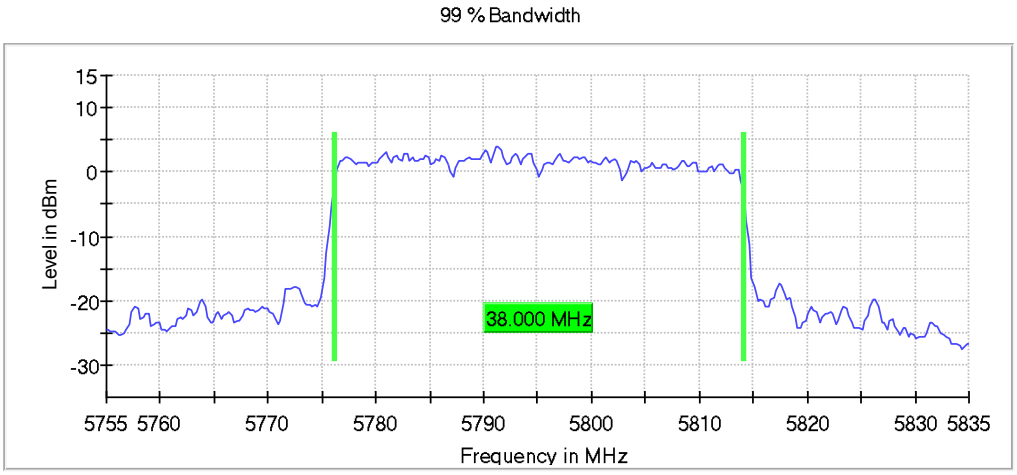
Plot 106: 99% occupied bandwidth, Mode 3, CH142



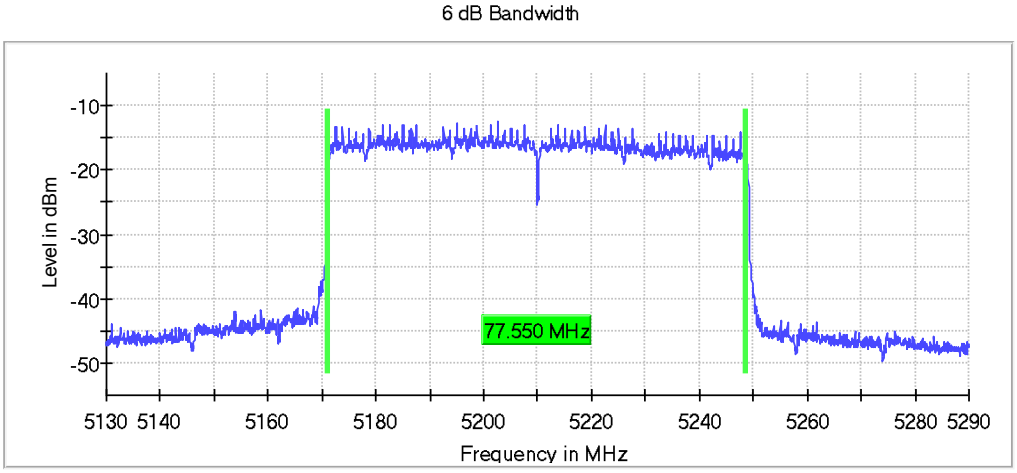
Plot 107: 99% occupied bandwidth, Mode 3, CH151



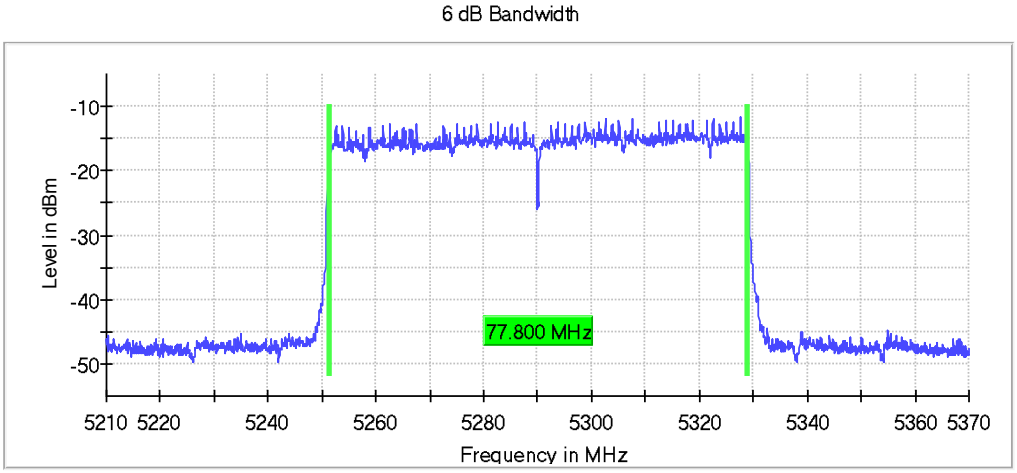
Plot 108: 99% occupied bandwidth, Mode 3, CH159



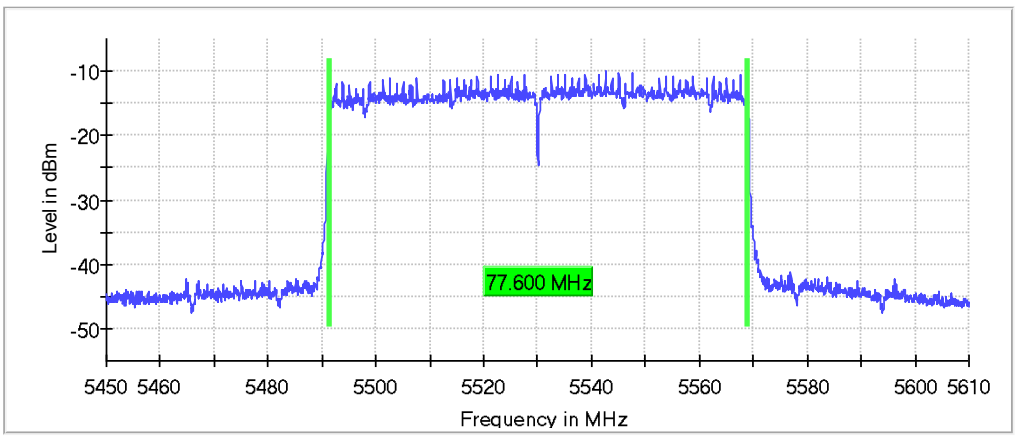
Plot 109: 6 dB emission bandwidth, Mode 4, CH42



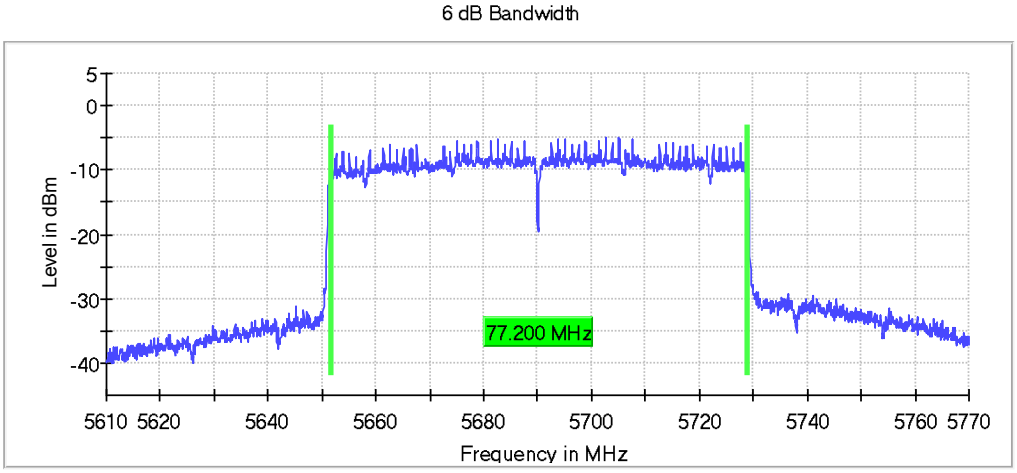
Plot 110: 6 dB emission bandwidth, Mode 4, CH58



Plot 111: 6 dB emission bandwidth, Mode 4, CH106

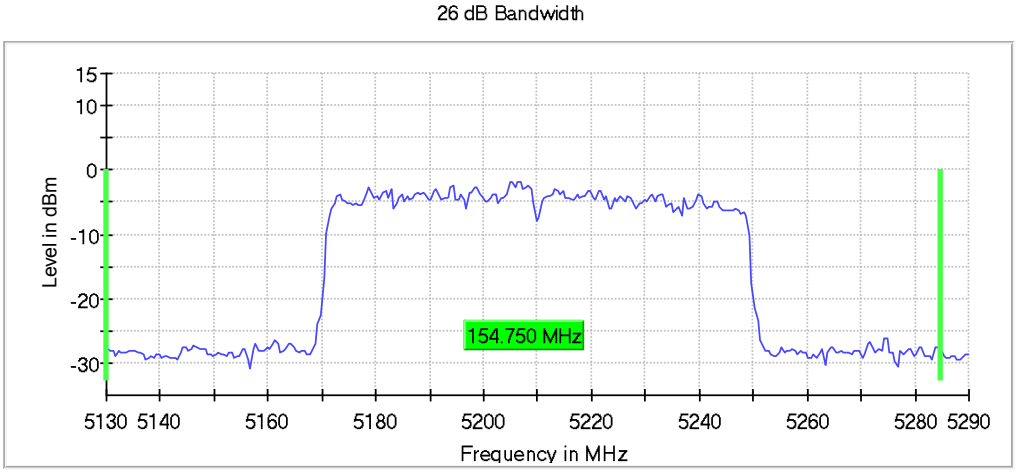


Plot 112: 6 dB emission bandwidth, Mode 4, CH138

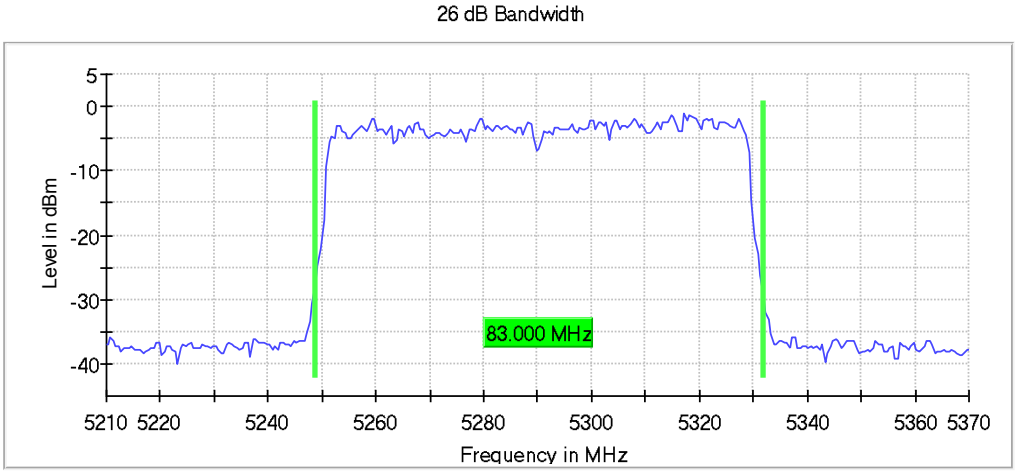


Plot 113: 6 dB emission bandwidth, Mode 4, CH155

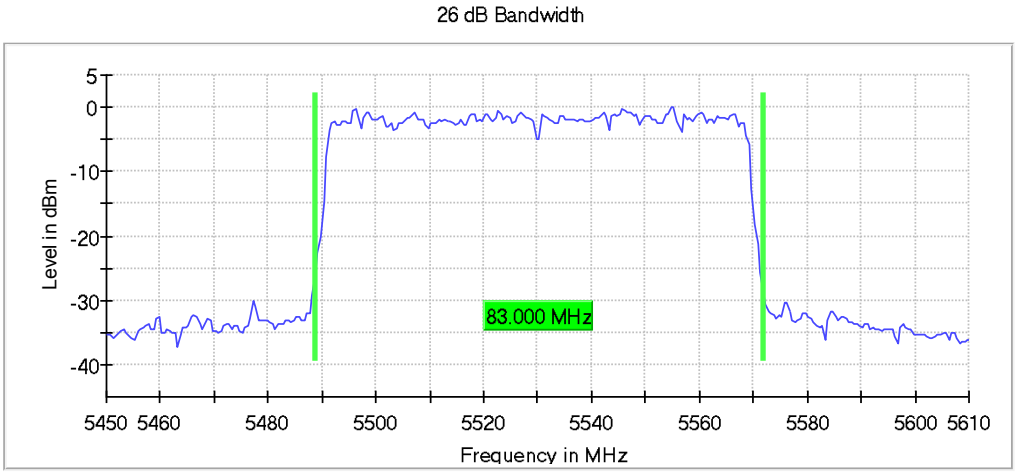
Plot 114: 26 dB emission bandwidth, Mode 4, CH42



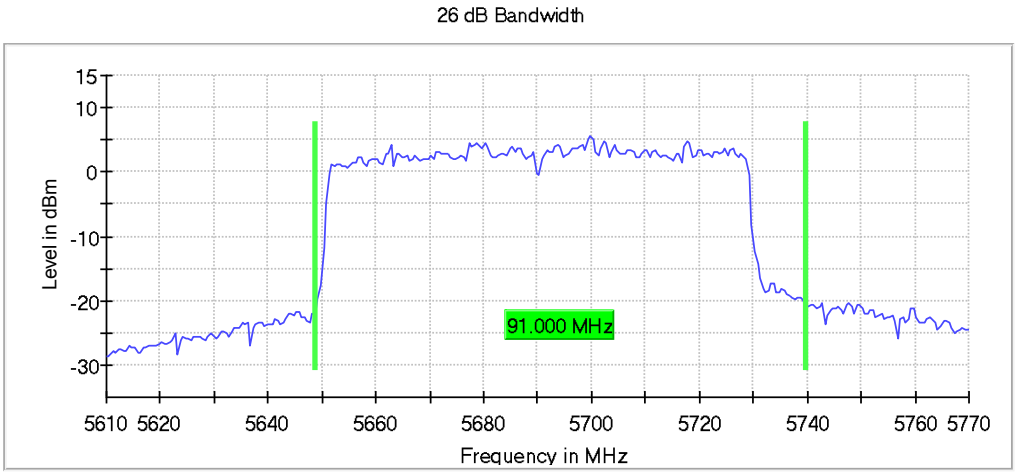
Plot 115: 26 dB emission bandwidth, Mode 4, CH58



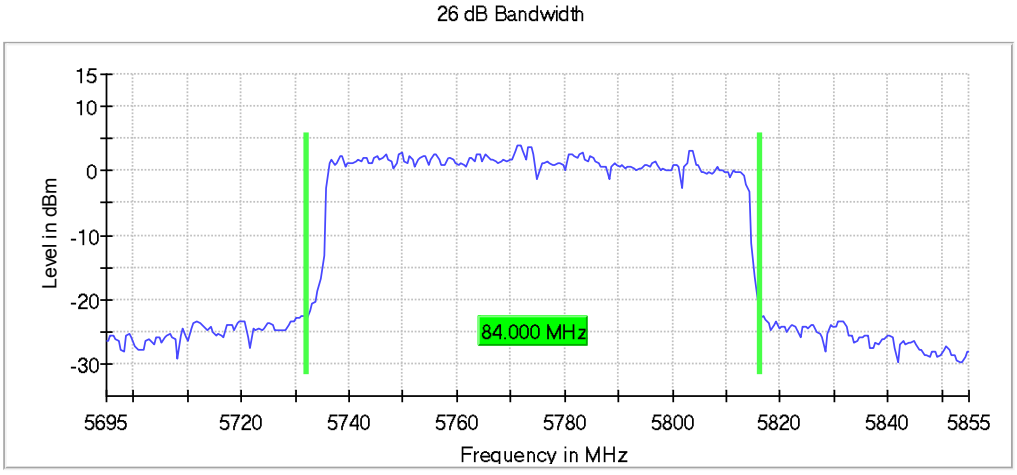
Plot 116: 26 dB emission bandwidth, Mode 4, CH106



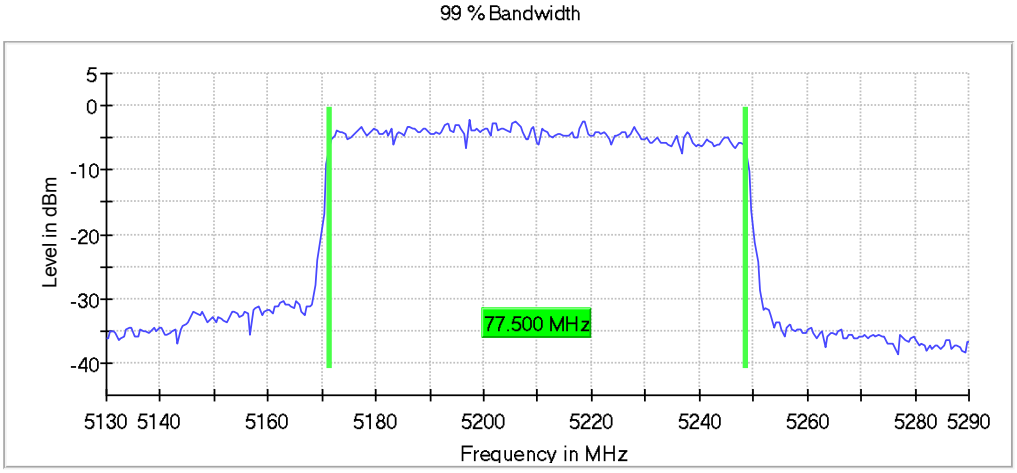
Plot 117: 26 dB emission bandwidth, Mode 4, CH138



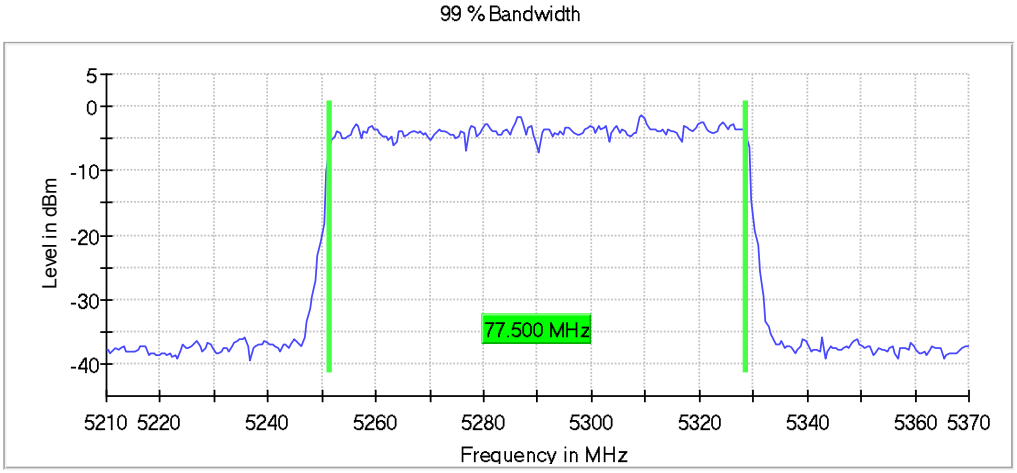
Plot 118: 26 dB emission bandwidth, Mode 4, CH155



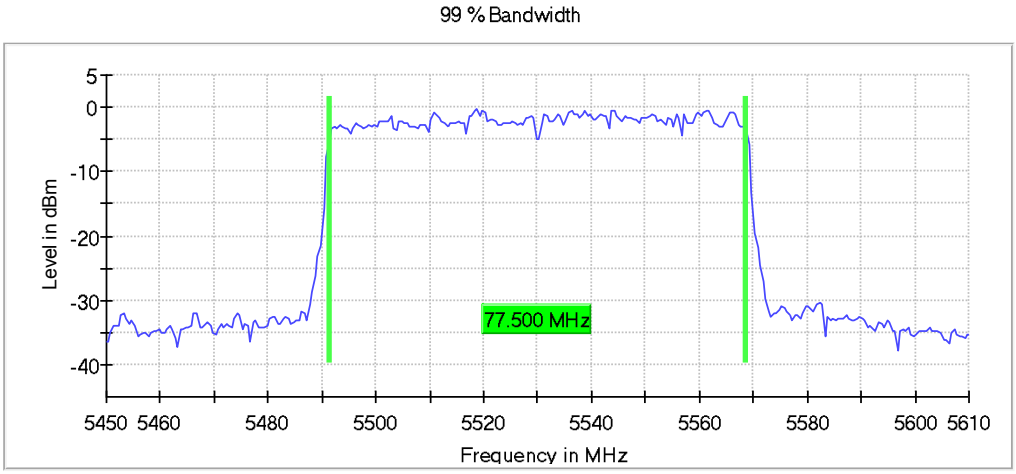
Plot 119: 99% occupied bandwidth, Mode 4, CH42



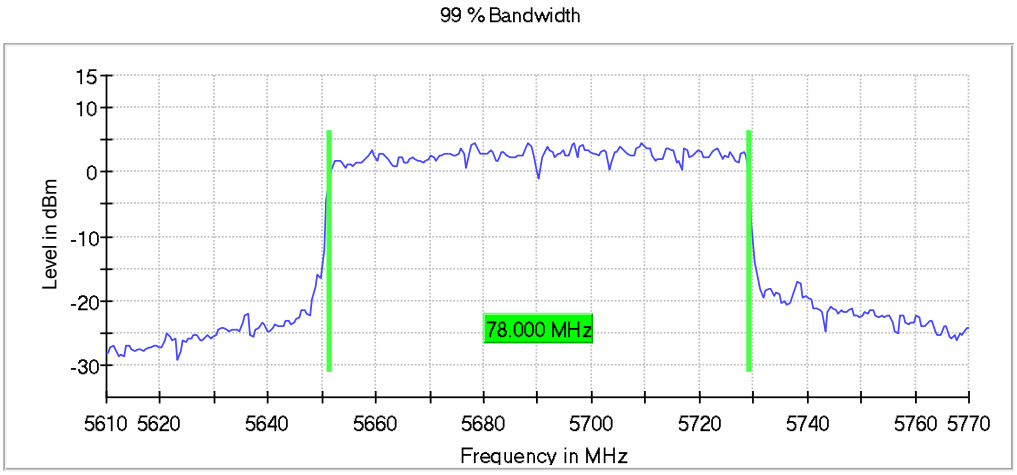
Plot 120: 99% occupied bandwidth, Mode 4, CH58



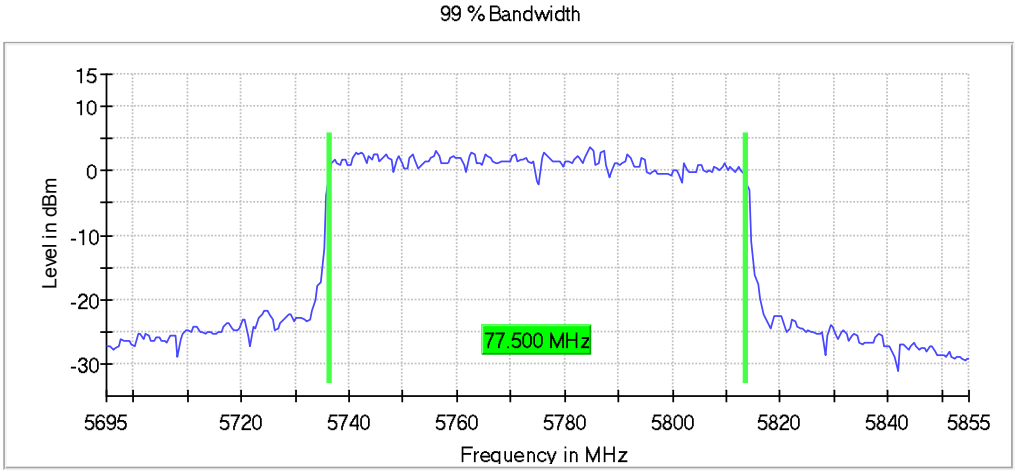
Plot 121: 99% occupied bandwidth, Mode 4, CH106



Plot 122: 99% occupied bandwidth, Mode 4, CH138



Plot 123: 99% occupied bandwidth, Mode 4, CH155



7.4 RF Output Power (Conducted Mean Power)

Applicability
This requirement applies to all unlicensed national information infrastructure (UNII) / licence-exempt local area network (LE-LAN) devices operating in the bands 5150-5250 MHz, 5250-5350 MHz, 5470-5725 MHz, 5725-5850 MHz and 5850-5895 MHz.

Description
The RF Output Power is defined as the conducted mean output power.

Limit
§15.407 (a)

- For client devices in the 5.15–5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW
- For the 5.25–5.35 GHz and 5.47–5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz.
- For the band 5.725–5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W

RSS 247 section 6.2:

- Frequency band 5150-5250 MHz:
  - For other devices (other than OEM devices installed in vehicles), the maximum e.i.r.p. shall not exceed 200 mW or 10 + 10 $\log_{10}$B, dBm, whichever power is less.
- Frequency band 5250-5350 MHz:
  - The maximum conducted output power shall not exceed 250 mW or 11 + 10 log10B, dBm, whichever is less.
  - The maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 log10B, dBm, whichever is less. B is the 99% emission bandwidth in megahertz. Note that devices with a maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.
- Frequency band 5470-5600 and 5650-5725 MHz:
  - The maximum conducted output power shall not exceed 250 mW or 11 + 10 log10B, dBm, whichever is less.
- Frequency band 5725-5850 MHz:
  - The maximum conducted output power shall not exceed 1 W.

B is the 99% emission bandwidth in megahertz.

Test procedure
KDB 789033 D02, E. / ANSI C63.10, 12.3.3.2 Method PM-G
Method PM-G is measurement using a gated RF average power meter.
Measurements may be performed using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Because the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.

Test setup: 8.4
EUT's antenna ports 0 and 1 are connected to 2 of 8 available input ports of TS8997 open switch and control platform OSP-B157W8 (see test setup 8.4). Input ports are connected to a synchronized multichannel high-resolution power meter where maximum (average) conducted output power for each EUT antenna port is measured. Total power is summarized by TS8997 system controller using measurement software EMC32/WMS32.

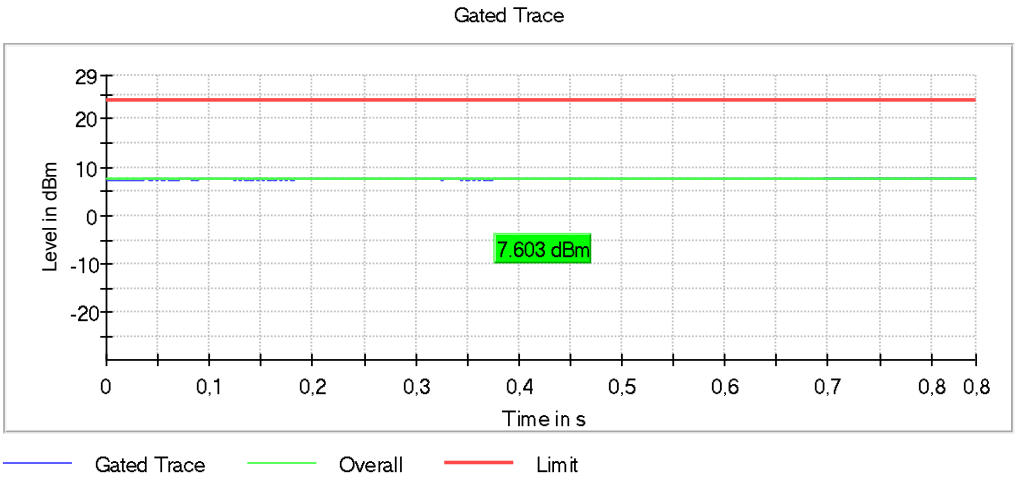
Test Results Mode 1 & Mode 2				
RF Output Power (Conducted Mean Power, gated RMS)				
Mode 1 EUT Channel	**RF Output Power [dBm]**	**Mode 2 EUT Channel**	**RF Output Power [dBm]**	**Limit [dBm]**
36	7.6	36	10.4	24.0
44	7.9	44	10.8	24.0
48	8.4	48	11.2	24.0
52	12.7	52	11.6	24.0
60	13.1	60	12.7	24.0
64	13.3	64	11.6	24.0
100	12.6	100	12.3	24.0
116	14.4	116	13.5	24.0
140	14.3	140	14.2	24.0
144	**15.3**	144	**14.3**	24.0
149	15.0	149	14.0	30.0
157	14.8	157	13.9	30.0
165	14.3	165	13.4	30.0

Test Results Mode 3 & Mode 4				
RF Output Power (Conducted Mean Power, gated RMS)				
Mode 3 EUT Channel	**RF Output Power [dBm]**	**Mode 4 EUT Channel**	**RF Output Power [dBm]**	**Limit [dBm]**
38	5.8	42	7.2	24.0
46	11.6	58	8.8	24.0
54	11.2	-/-	-/-	24.0
62	8.3	-/-	-/-	24.0
102	9.4	106	9.7	24.0
110	13.2	138	**15.0**	24.0
134	15.0	-/-	-/-	24.0
142	**15.2**	-/-	-/-	24.0
151	14.1	155	13.7	30.0
159	13.8	-/-	-/-	30.0

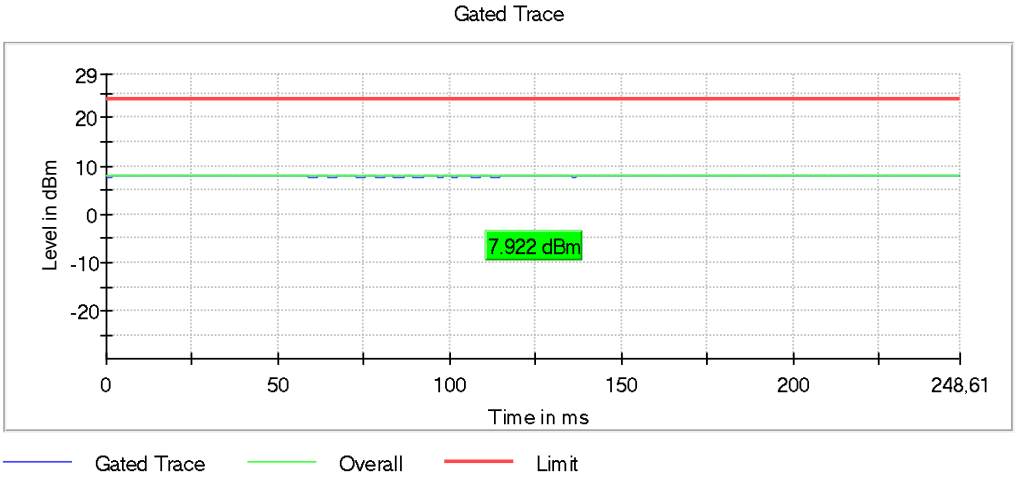
Comment:	---

Verdict	**- PASS -**	see next plots

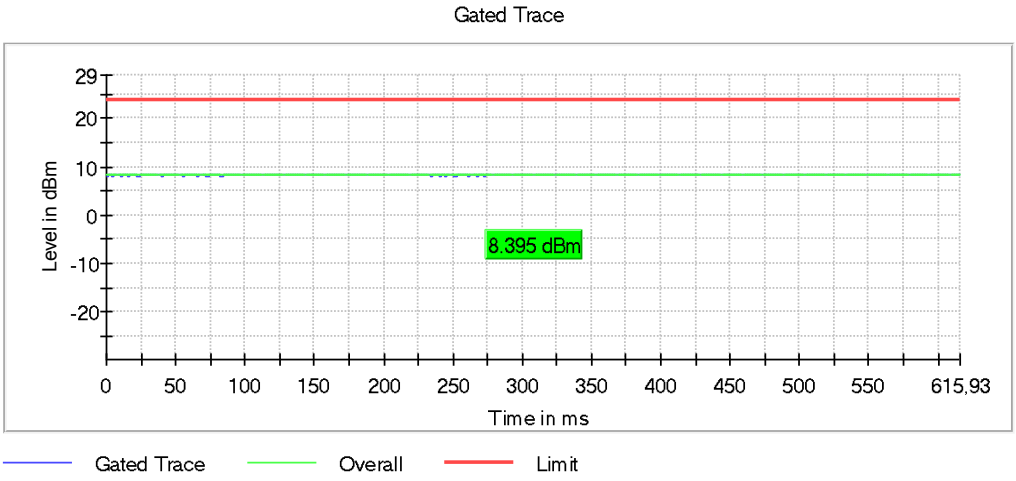
Plot 124: RF output power, Mode 1, CH36



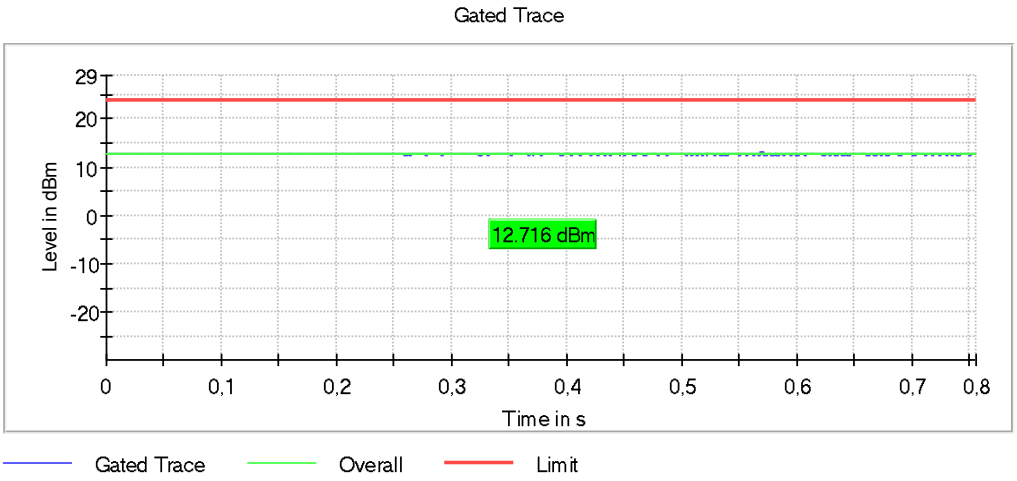
Plot 125: RF output power, Mode 1, CH44



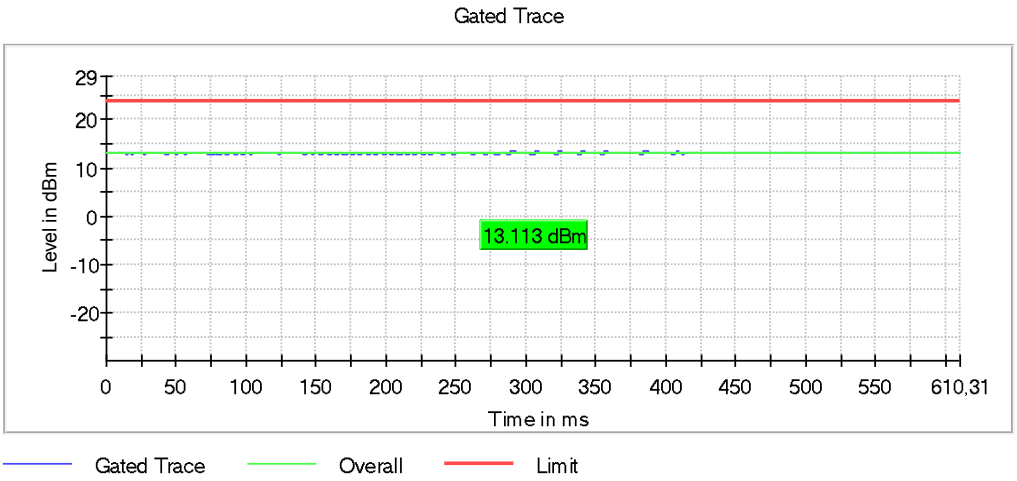
Plot 126: RF output power, Mode 1, CH48



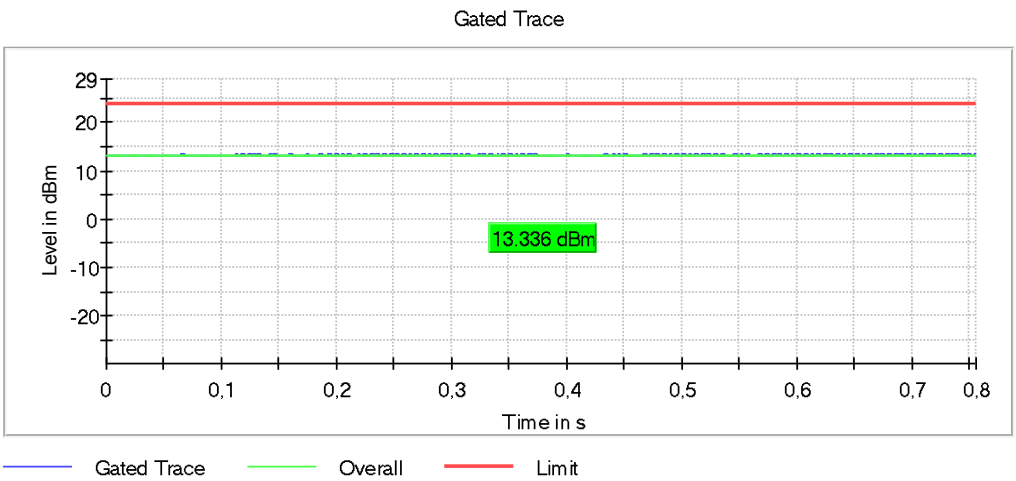
Plot 127: RF output power, Mode 1, CH52



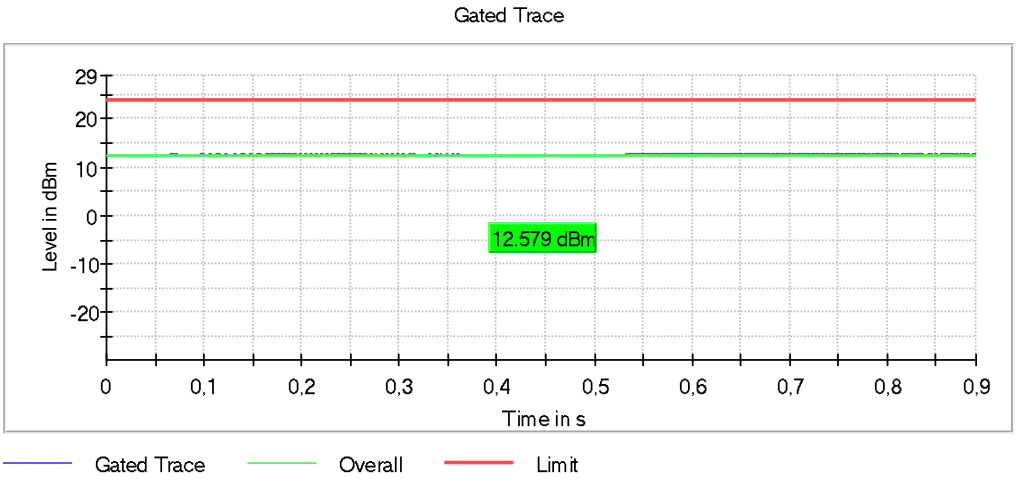
Plot 128: RF output power, Mode 1, CH60



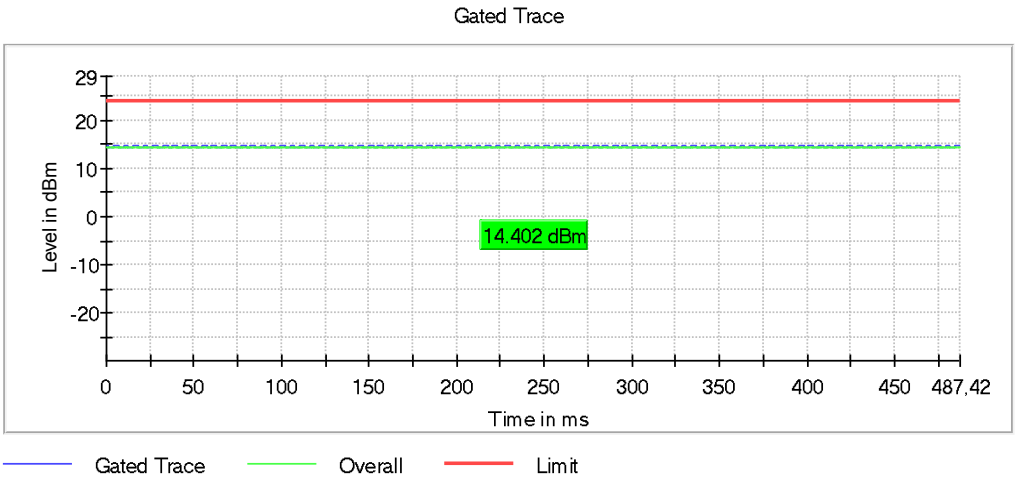
Plot 129: RF output power, Mode 1, CH64



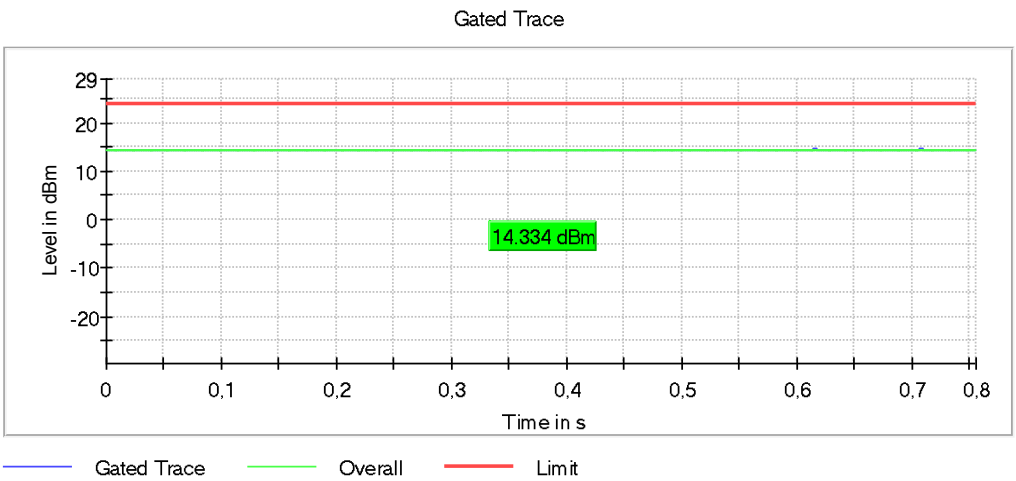
Plot 130: RF output power, Mode 1, CH100



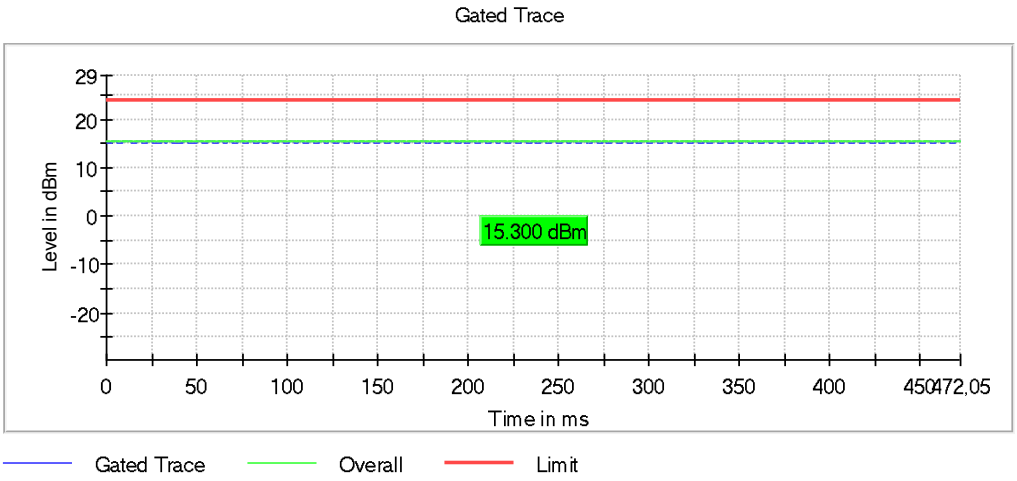
Plot 131: RF output power, Mode 1, CH116



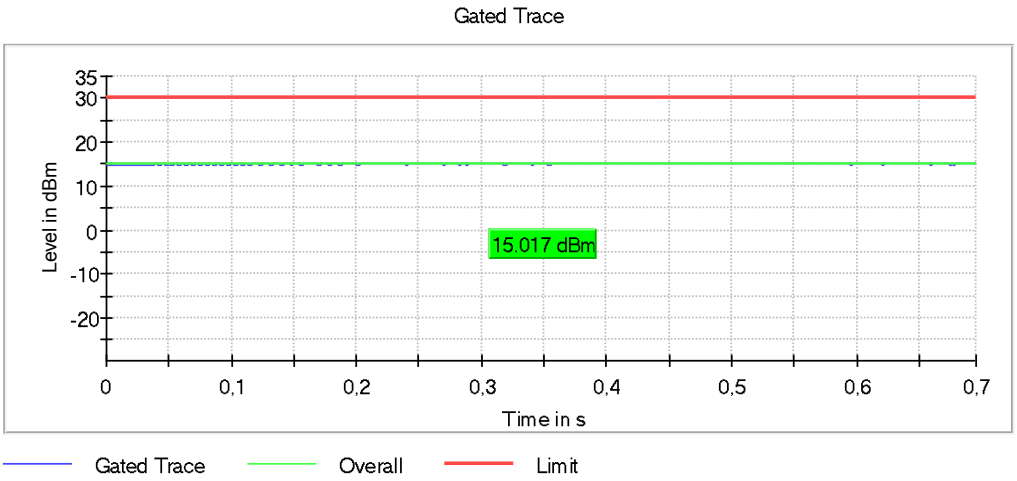
Plot 132: RF output power, Mode 1, CH140



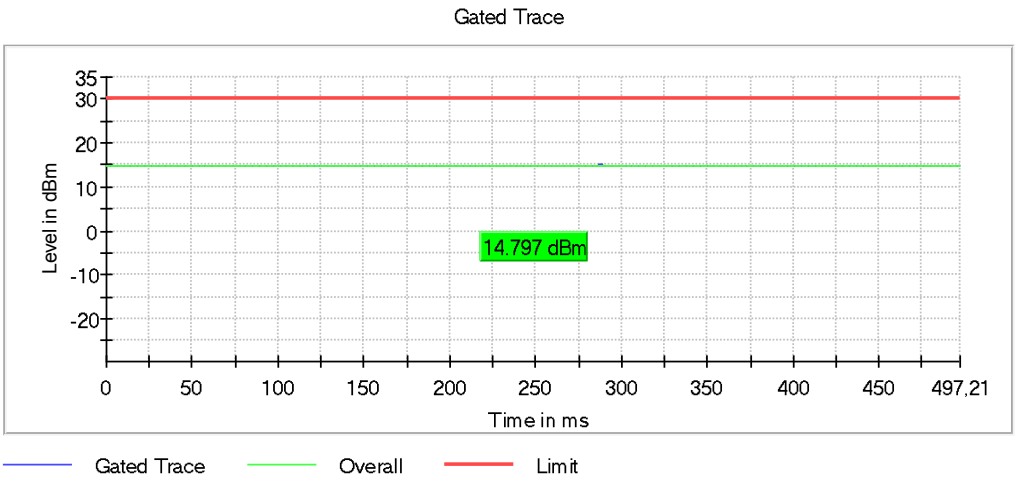
Plot 133: RF output power, Mode 1, CH144



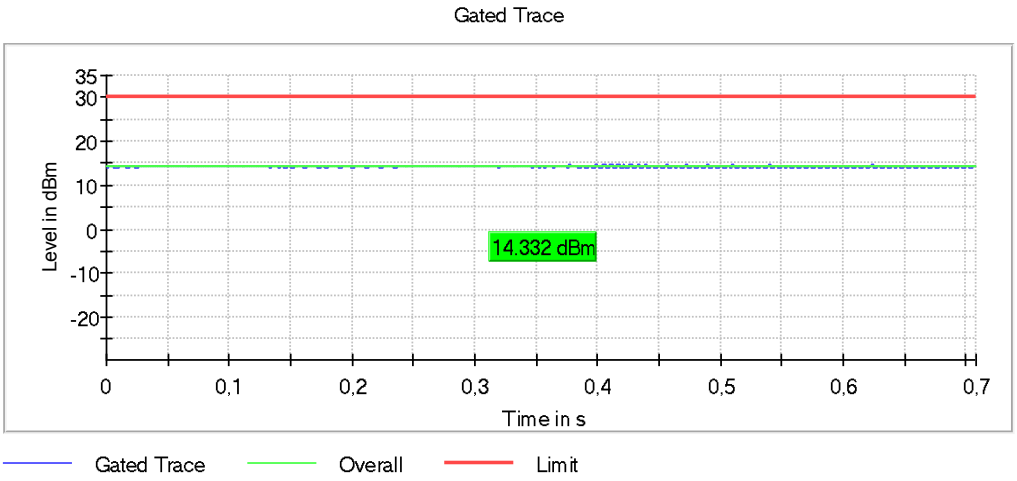
Plot 134: RF output power, Mode 1, CH149



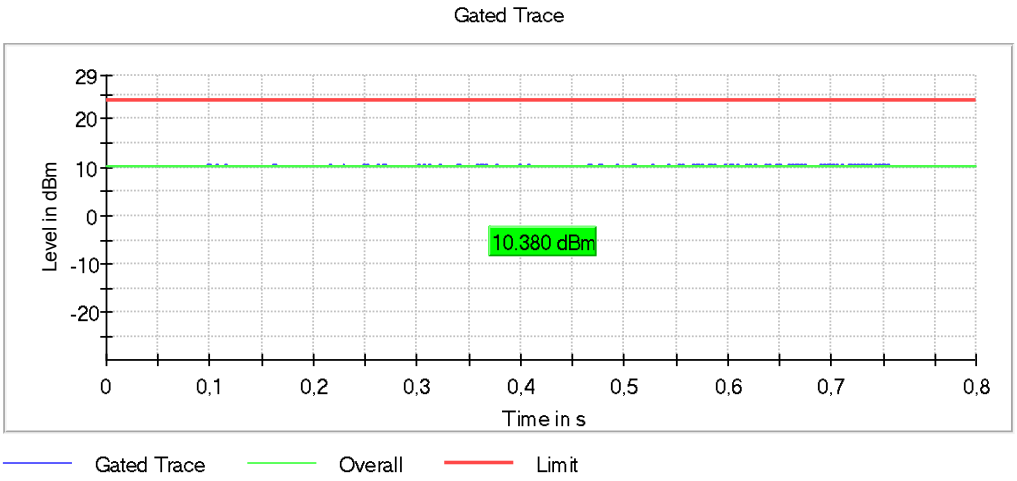
Plot 135: RF output power, Mode 1, CH157



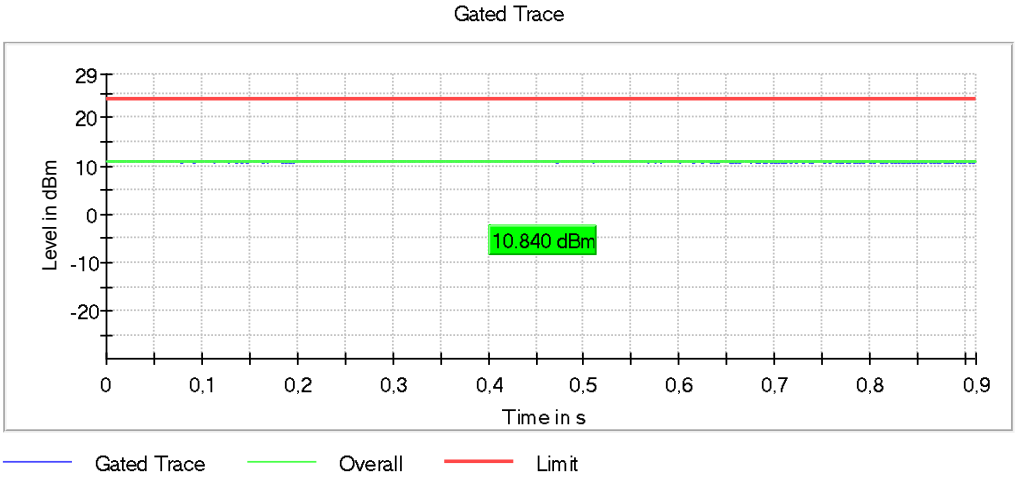
Plot 136: RF output power, Mode 1, CH165



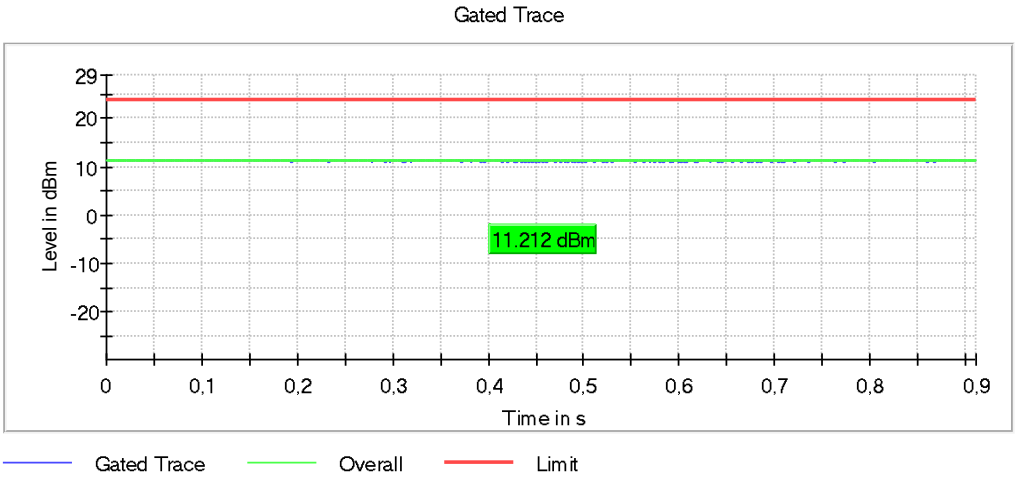
Plot 137: RF output power, Mode 2, CH36



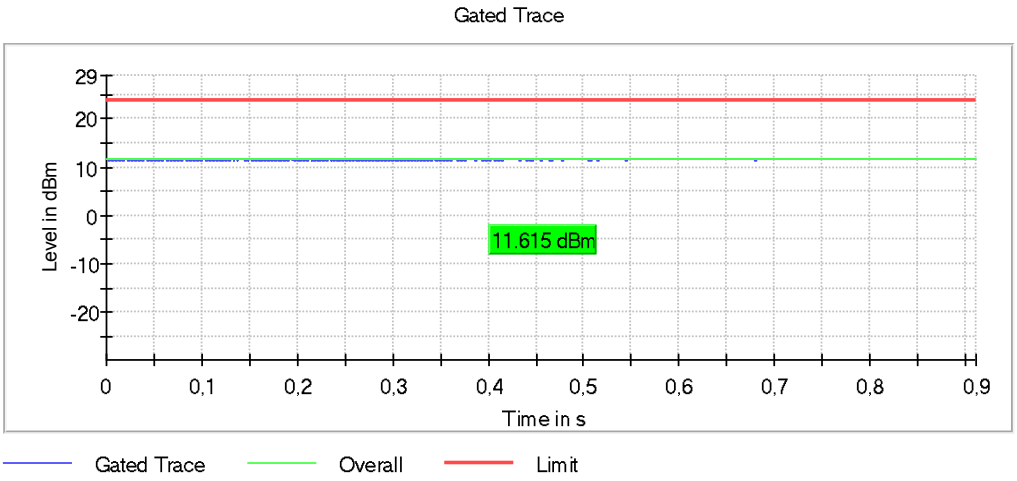
Plot 138: RF output power, Mode 2, CH44



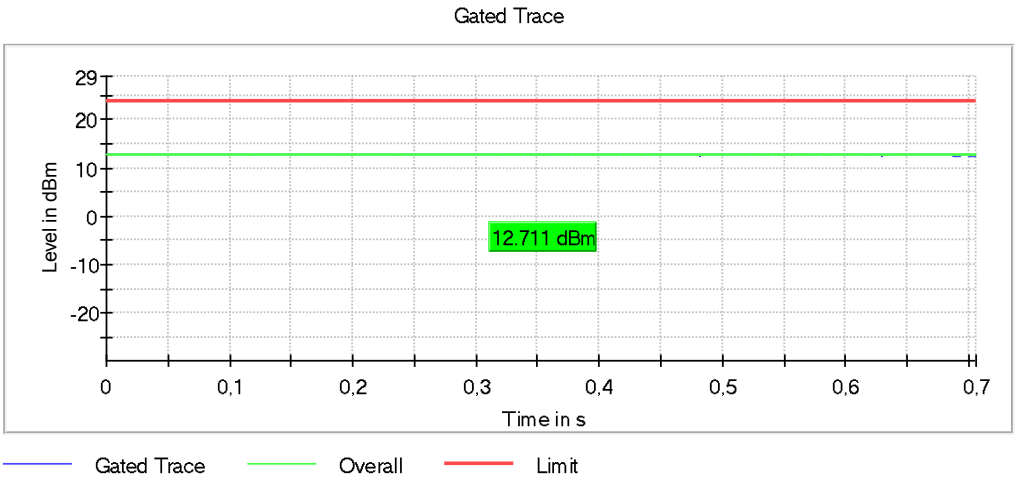
Plot 139: RF output power, Mode 2, CH48



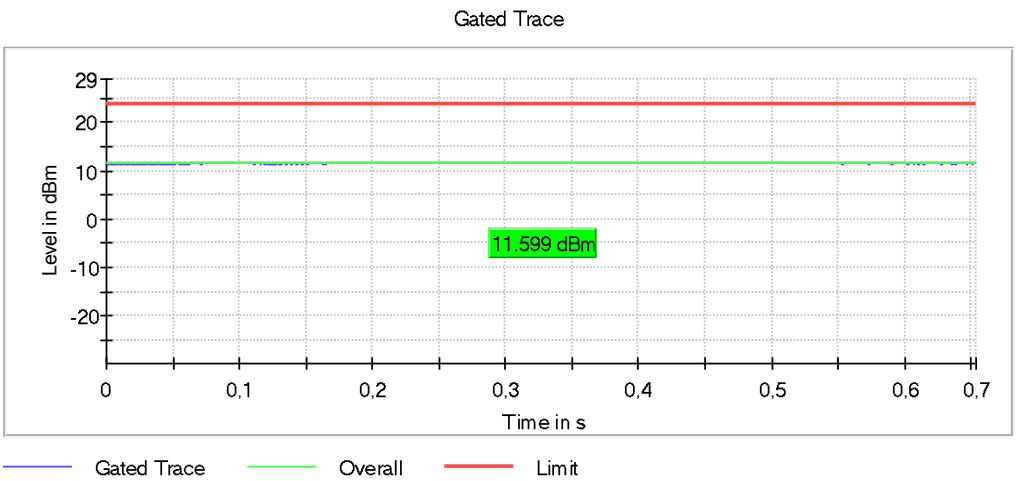
Plot 140: RF output power, Mode 2, CH52



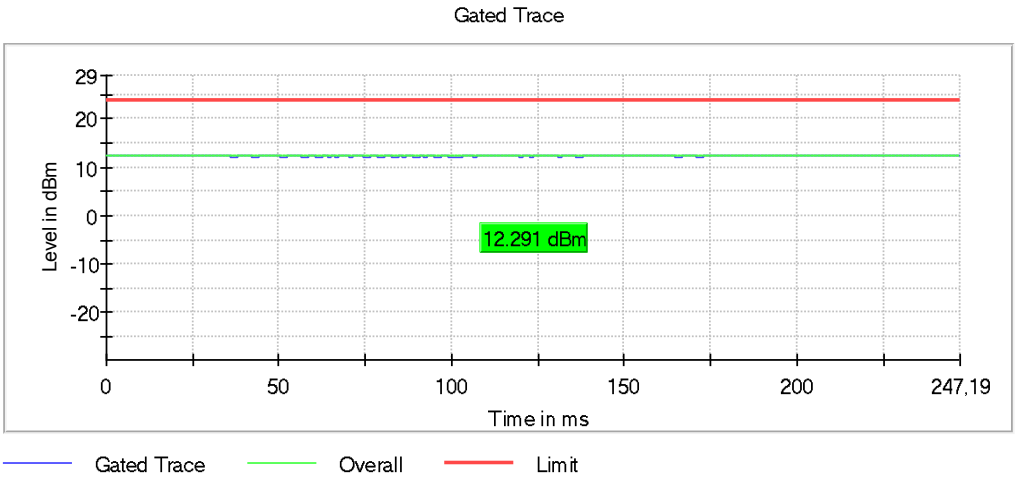
Plot 141: RF output power, Mode 2, CH60



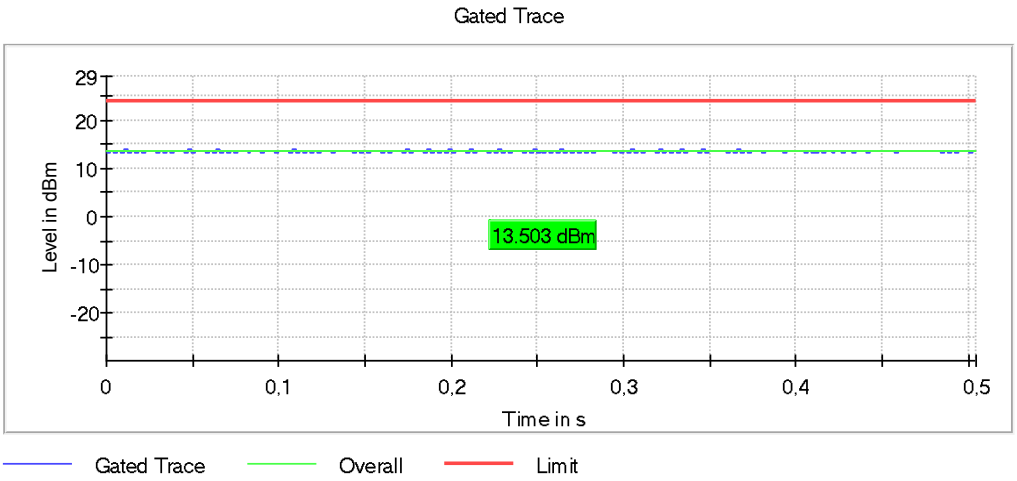
Plot 142: RF output power, Mode 2, CH64



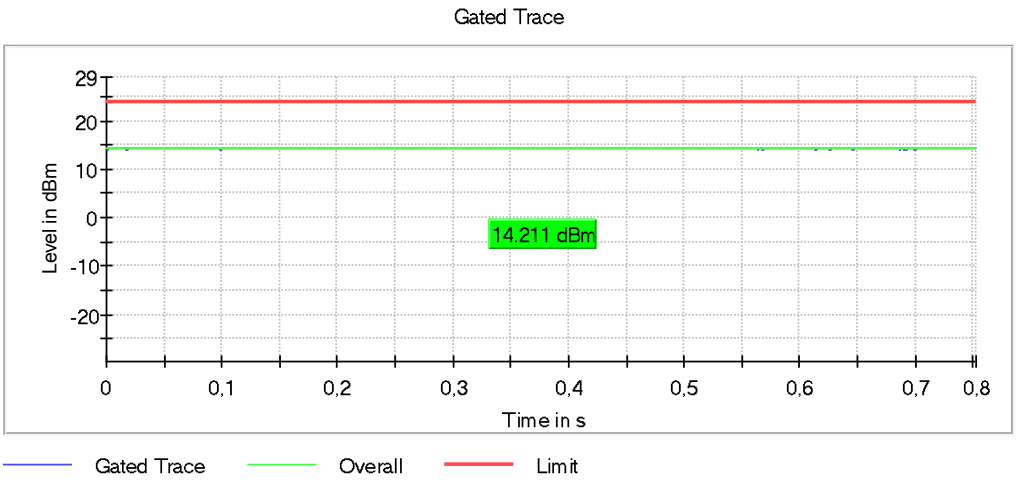
Plot 143: RF output power, Mode 2, CH100



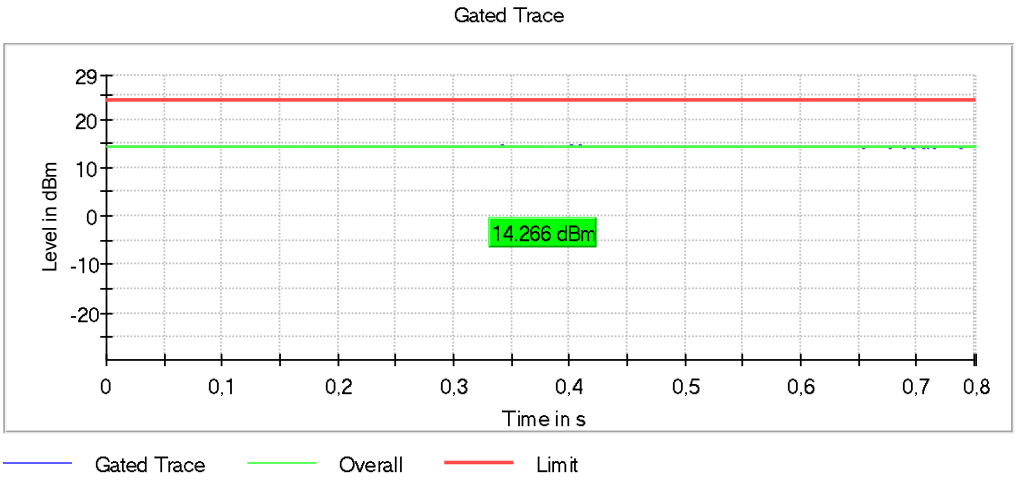
Plot 144: RF output power, Mode 2, CH116



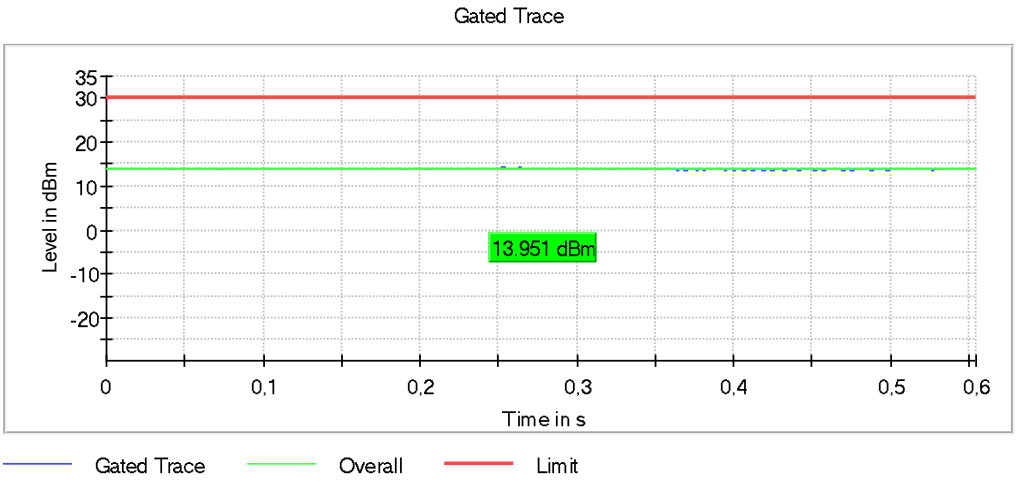
Plot 145: RF output power, Mode 2, CH140



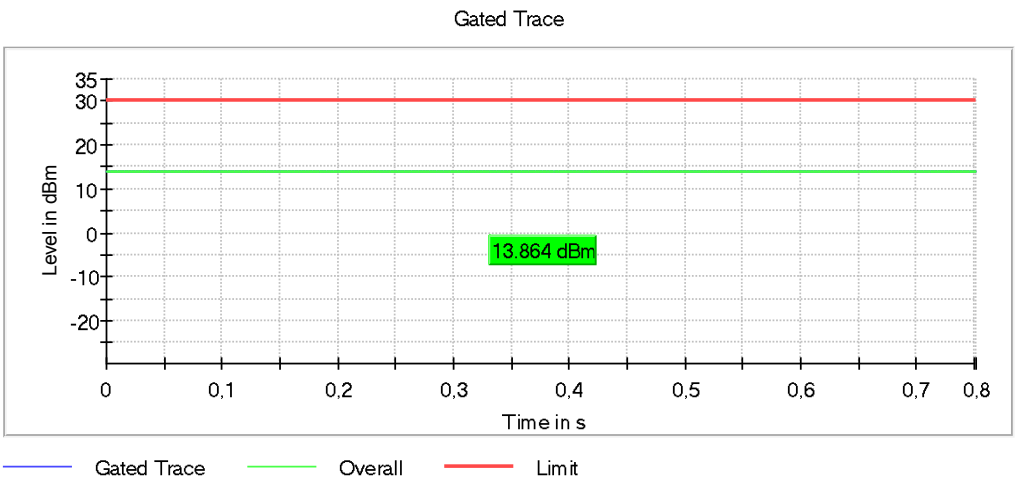
Plot 146: RF output power, Mode 2, CH144



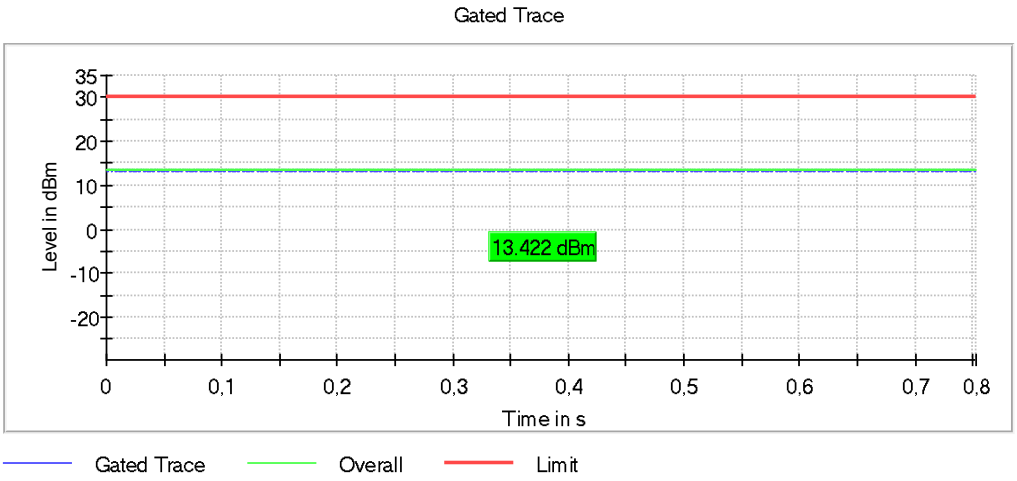
Plot 147: RF output power, Mode 2, CH149



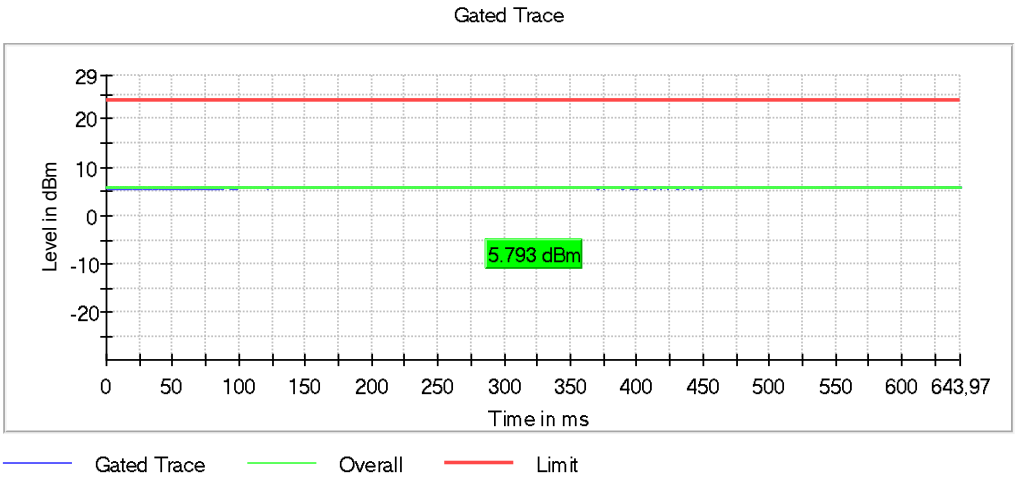
Plot 148: RF output power, Mode 2, CH157



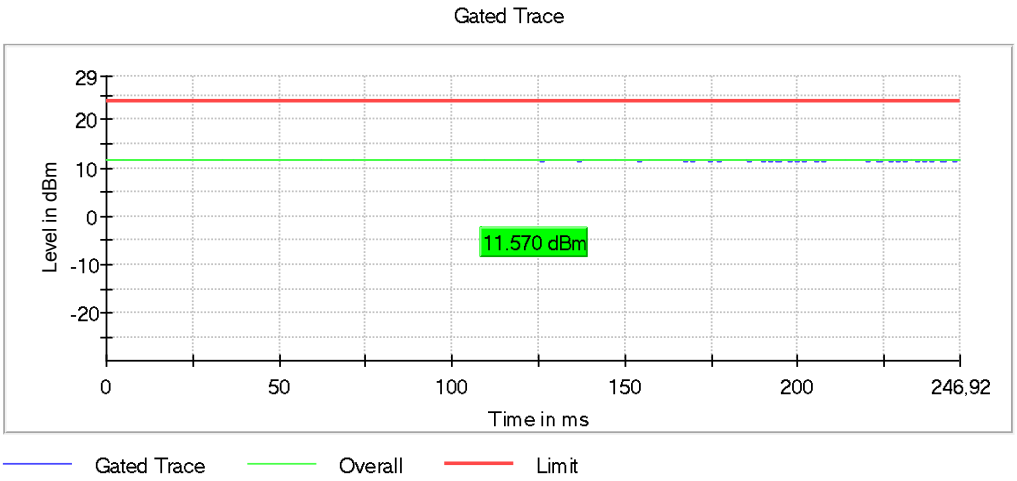
Plot 149: RF output power, Mode 2, CH165



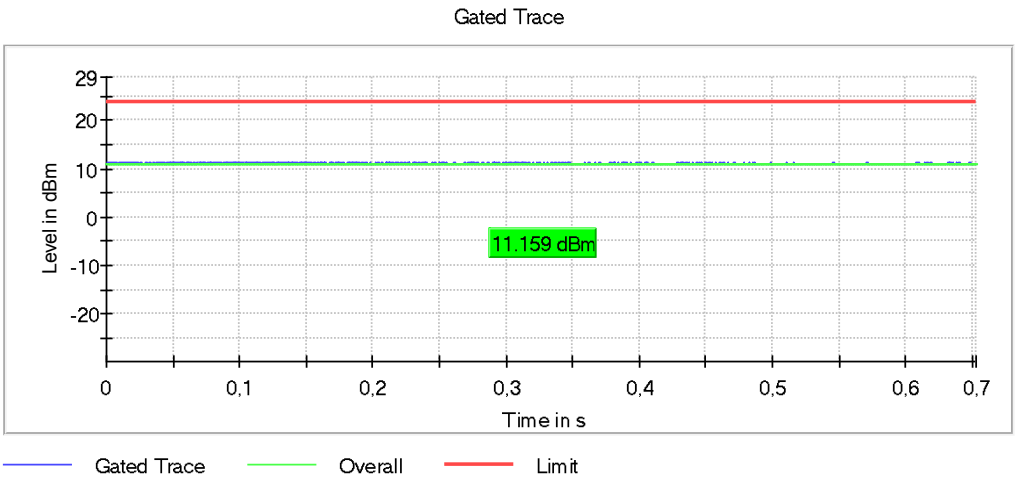
Plot 150: RF output power, Mode 3, CH38



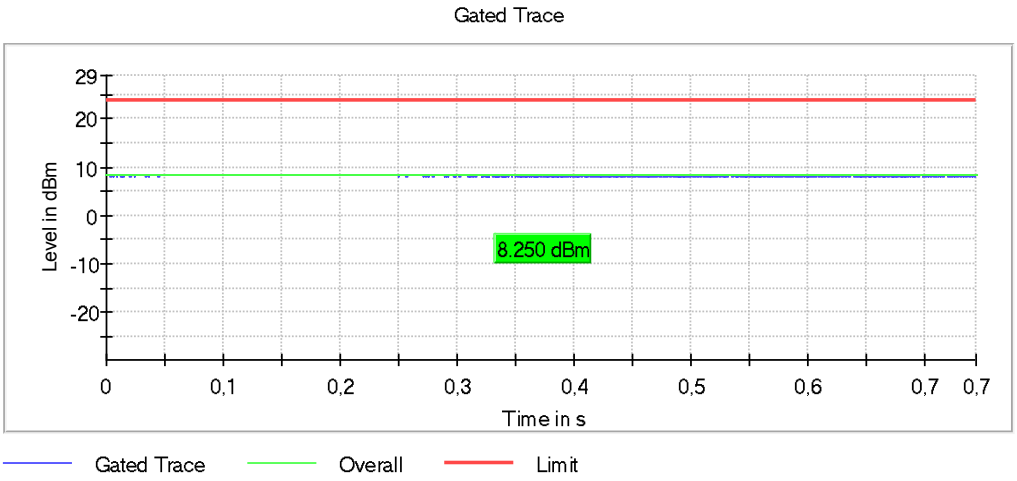
Plot 151: RF output power, Mode 3, CH46



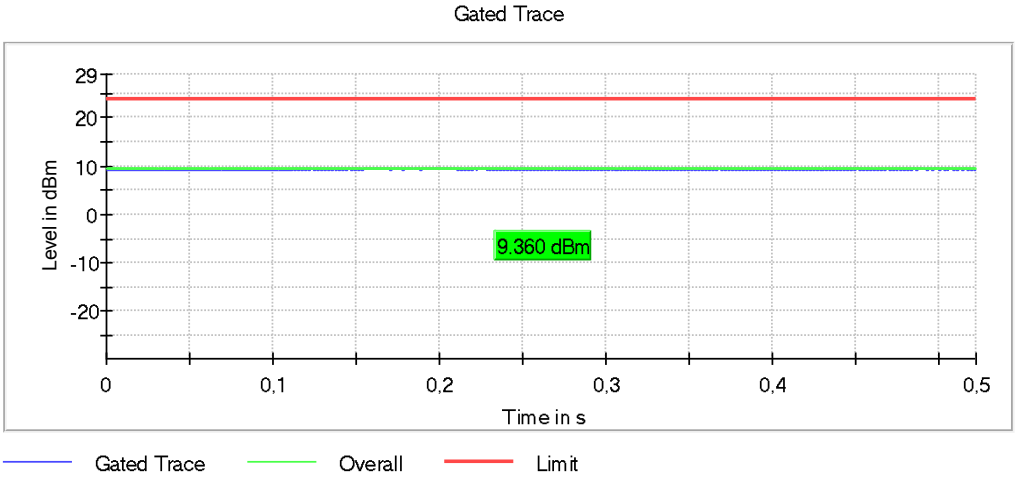
Plot 152: RF output power, Mode 3, CH54



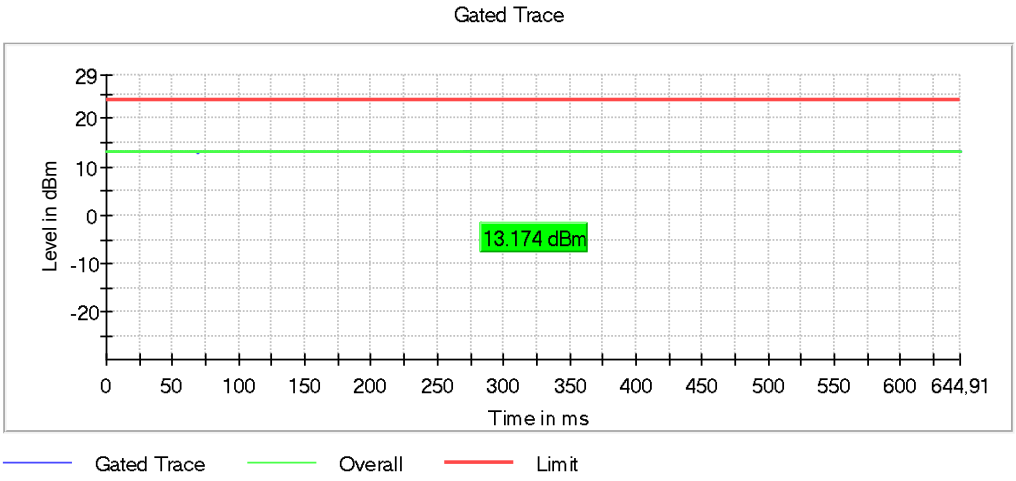
Plot 153: RF output power, Mode 3, CH62



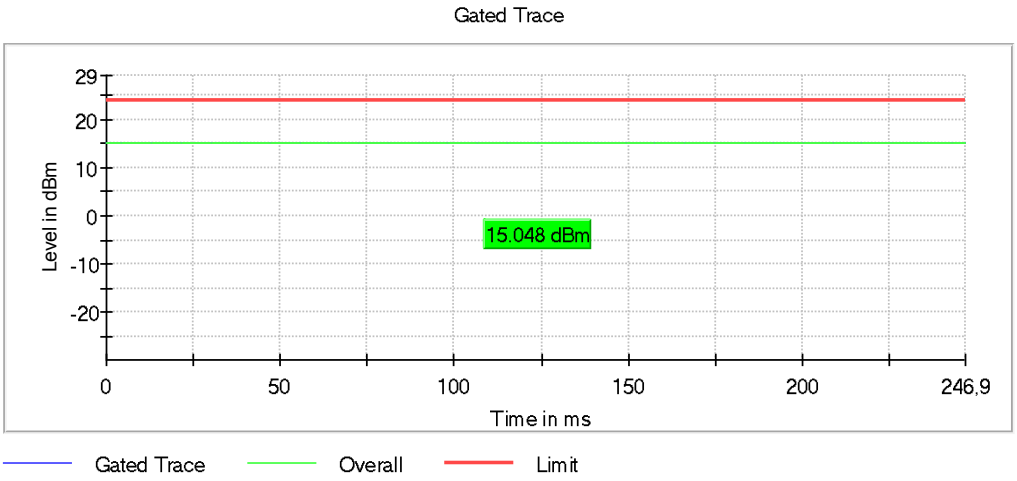
Plot 154: RF output power, Mode 3, CH102



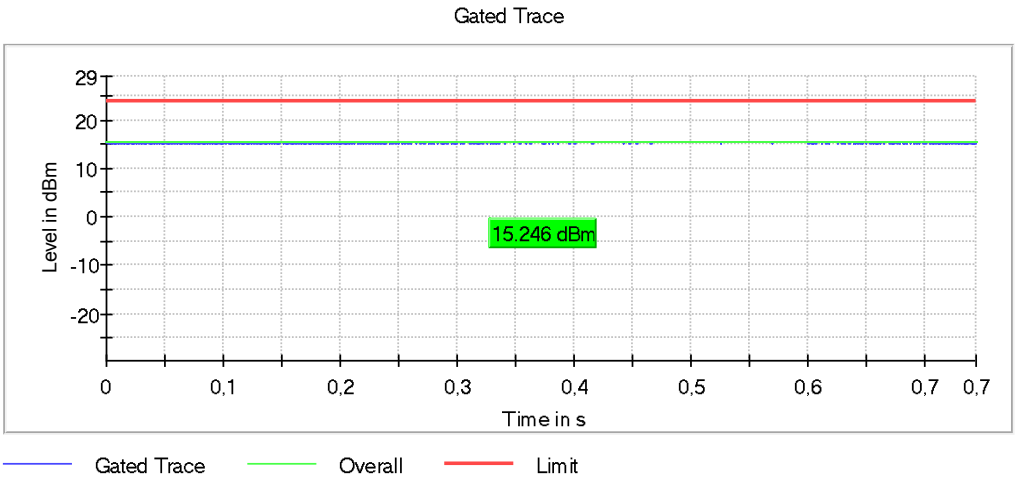
Plot 155: RF output power, Mode 3, CH110



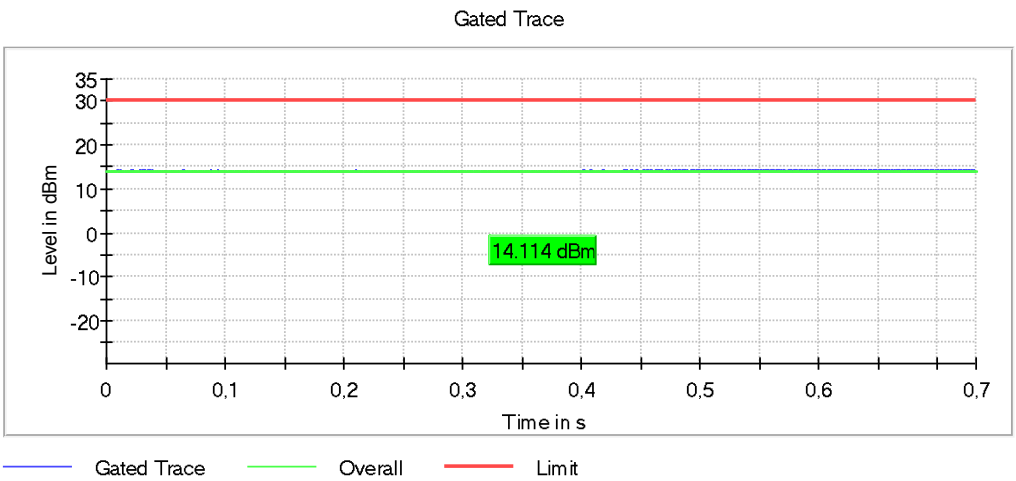
Plot 156: RF output power, Mode 3, CH134



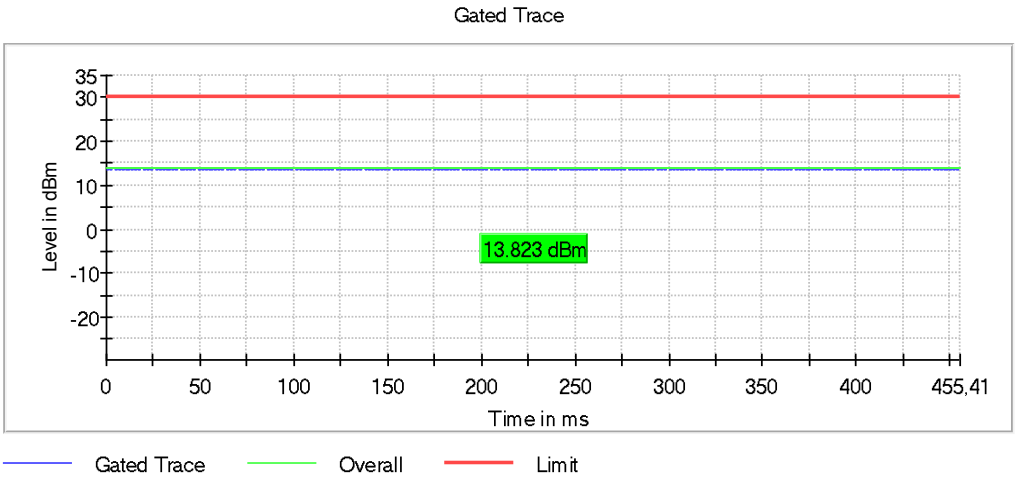
Plot 157: RF output power, Mode 3, CH142



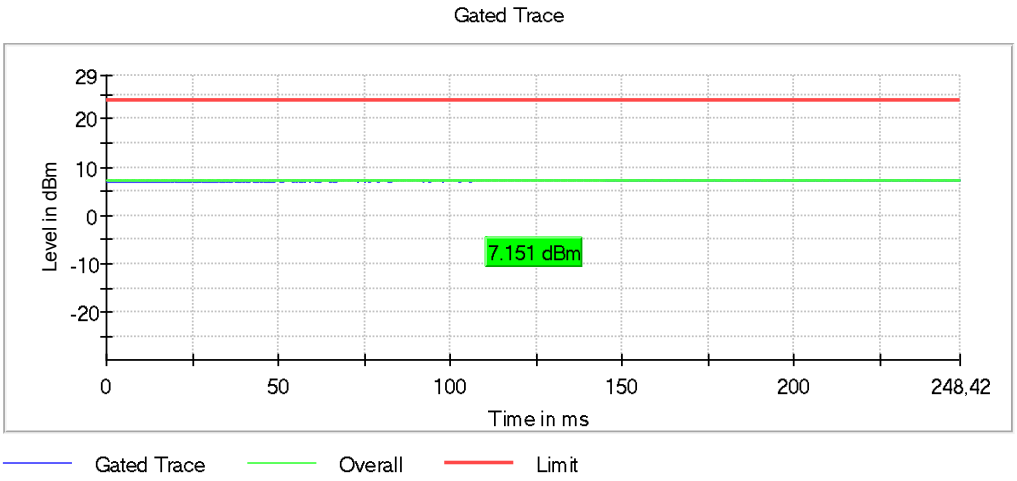
Plot 158: RF output power, Mode 3, CH151



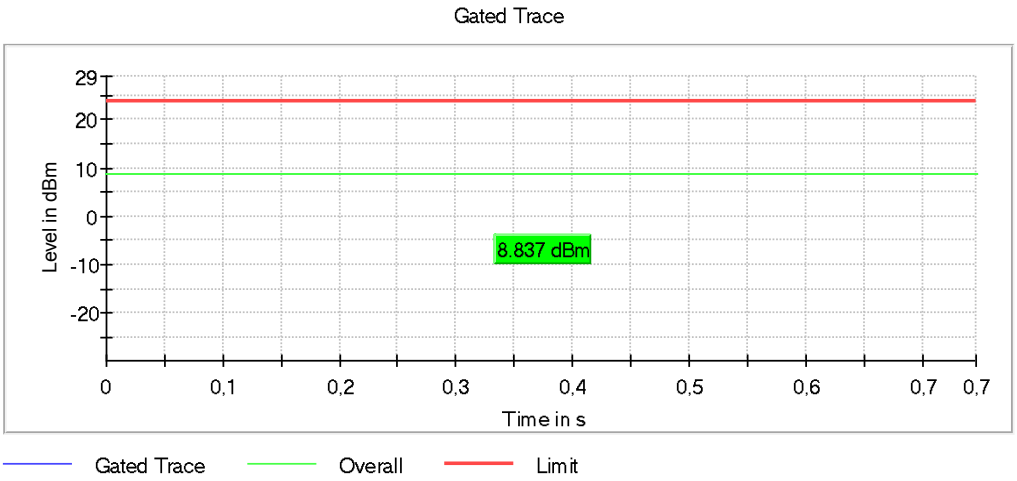
Plot 159: RF output power, Mode 3, CH159



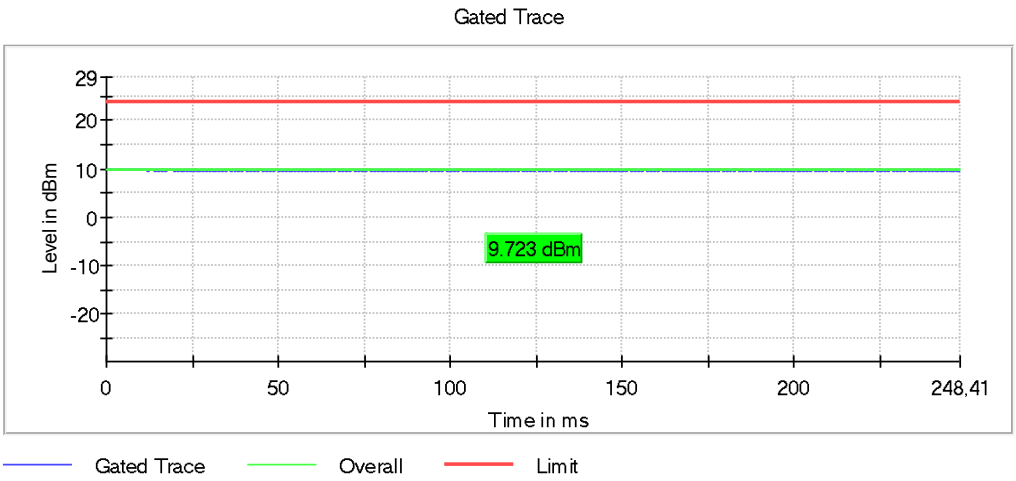
Plot 160: RF output power, Mode 4, CH42



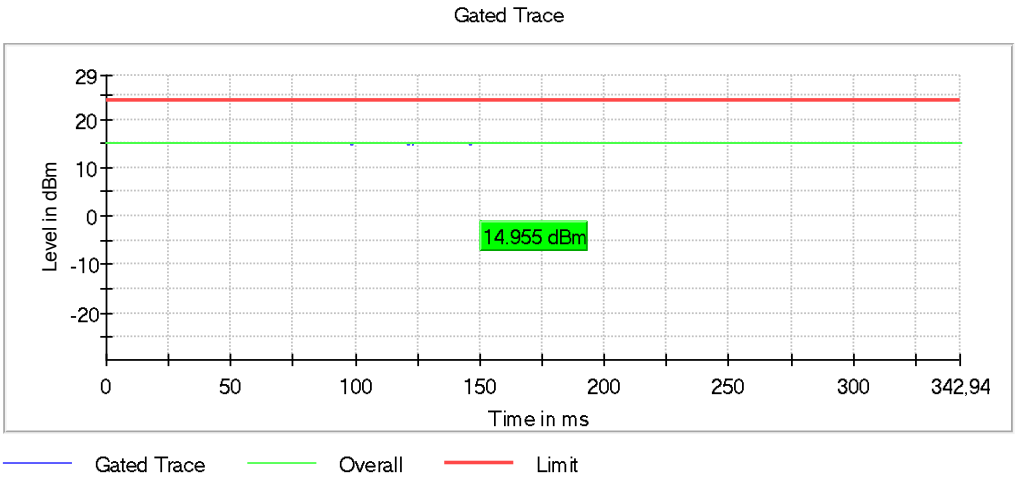
Plot 161: RF output power, Mode 4, CH58



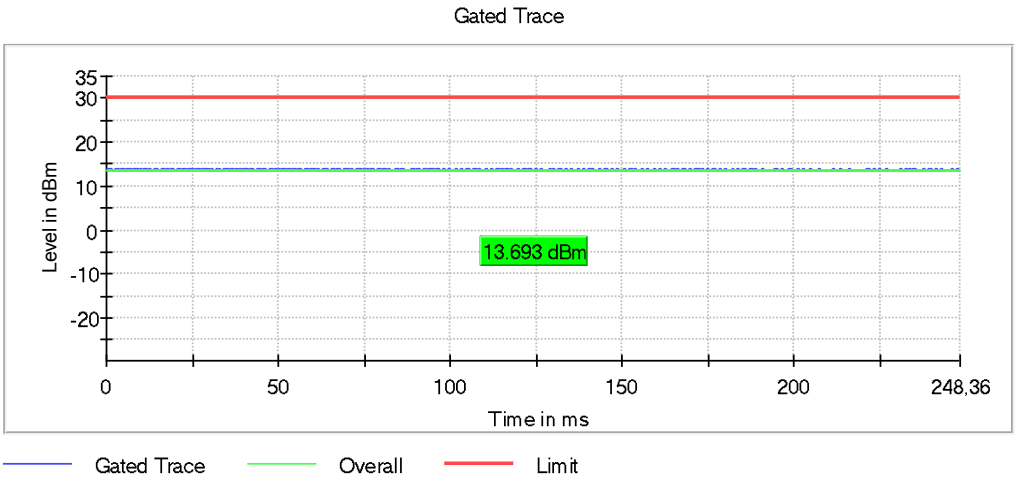
Plot 162: RF output power, Mode 4, CH106



Plot 163: RF output power, Mode 4, CH138



Plot 164: RF output power, Mode 4, CH155



7.5 Antenna Gain

Applicability
This requirement applies to all unlicensed national information infrastructure (UNII) / licence-exempt local area network (LE-LAN) devices operating in the bands 5150-5250 MHz, 5250-5350 MHz, 5470-5725 MHz, 5725-5850 MHz and 5850-5895 MHz.

Description
The antenna gain is defined as the difference between radiated power (peak or mean EIRP) subtracted by the conducted power of the module, given in dBi.

Limit
§15.407 (a), RSS-247 section 6.2:
If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi

Antenna type	low channel [dBi]	mid channel [dBi]	high channel [dBi]	Limit [dBi]
FXP830.24.0100B	5.45	6.00	5.60	6
FXP840.07.0055B	3.37	2.70	2.95	6
				6

Note: for antenna details see section 5.3.

Comment:	Antenna gain as declared by applicant.

Verdict	**- PASS -**	---

7.6 Power Spectral Density (Mean PSD)

Applicability

This requirement applies to all unlicensed national information infrastructure (UNII) / licence-exempt local area network (LE-LAN) devices operating in the bands 5150-5250 MHz, 5250-5350 MHz, 5470-5725 MHz, 5725-5850 MHz and 5850-5895 MHz.

Description

The Power Spectral Density (PSD) is defined as the conducted mean power spectral density during any time of continuous transmission.

Limits

§15.407 (a)

- For client devices in the 5.15–5.25 GHz band, the maximum power spectral density shall not exceed 11 dBm in any 1 MHz band
- For the 5.25–5.35 GHz and 5.47–5.725 GHz bands, the maximum power spectral density shall not exceed 11 dBm in any 1 MHz band.
- For the band 5.725–5.85 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500 kHz band

RSS 247 section 6.2:

- Frequency band 5470-5600 and 5650-5725 MHz:
  - The power spectral density shall not exceed 11 dBm in any 1.0 MHz band.
- Frequency band 5725-5850 MHz:
  - The power spectral density shall not exceed 30 dBm in any 500 kHz band.

Test procedure

KDB 789033 D02, F / ANSI C63.10, 12.4.2.2 Method SA-1

Method SA-1 uses trace averaging with the EUT transmitting at full power throughout each sweep. The procedure for this method is as follows:

a) Set span to encompass the entire 99% OBW of the signal.

b) Set RBW = 1 MHz.

c) Set VBW ≥ 3 MHz.

d) Number of points in sweep ≥ [2 × span / RBW]. (This gives bin-to-bin spacing ≤ RBW / 2, so that narrowband signals are not lost between frequency bins.)

e) Sweep time = auto.

f) Detector = Power averaging (rms), if available. Otherwise, use sample detector mode.

g) If transmit duty cycle < 98%, use a video trigger with the trigger level set to enable triggering only on full power pulses. The transmitter shall operate at maximum power control level for the entire duration of every sweep. If the EUT transmits continuously (i.e., with no OFF intervals) or at duty cycle ≥ 98%, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to “free run.”

h) Trace average at least 100 traces in power averaging (rms) mode.

i) Compute power by integrating the spectrum across the 99% OBW of the signal using the instrument’s band-power measurement function, with band limits set equal to the OBW bandedges.

If the instrument does not have a band-power function, then sum the spectrum levels (in power units) at 1 MHz intervals extending across the 99% OBW of the spectrum.

Test setup: 8.4

EUT’s antenna ports 1 and 2 are connected to 2 of 8 available input ports of TS8997 open switch and control platform OSP-B157W8 (see test setup 8.4). Input ports are connected to a spectrum analyzer where power spectral density of maximum (average) conducted output power for each EUT antenna port is measured. Total power spectral density is summarized by TS8997 system controller using measurement software EMC32/WMS32.

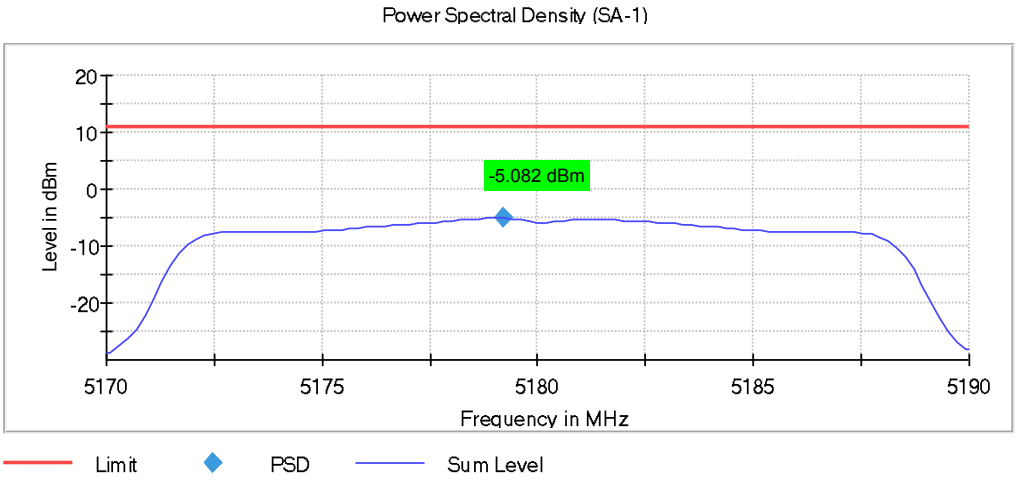
Test Results Mode 1 & Mode 2				
Power Spectral Density (Mean PSD)				
Mode 1 EUT Channel	**Mode 1 [dBm]**	**Mode 2 EUT Channel**	**Mode 2 [dBm]**	**Limit [dBm]**
36	-5.1	36	-0.9	11.0
44	-4.8	44	-1.9	11.0
48	-5.2	48	-1.0	11.0
52	-1.5	52	-0.2	11.0
60	1.3	60	0.3	11.0
64	-3.6	64	-5.2	11.0
100	-0.8	100	**0.5**	11.0
116	0.4	116	-1.0	11.0
140	1.5	140	-2.8	11.0
144	**2.3**	144	-3.0	11.0
149	-4.2	149	-1.4	30.0
157	-0.5	157	-5.8	30.0
165	-4.8	165	-3.7	30.0

Test Results Mode 3 & Mode 4				
Power Spectral Density (Mean PSD)				
Mode 3 EUT Channel	**Mode 3 [dBm]**	**Mode 4 EUT Channel**	**Mode 4 [dBm]**	**Limit [dBm]**
38	-10.3	42	-13.1	11.0
46	-9.7	58	-11.1	11.0
54	-10.2	-/-	-/-	11.0
62	-9.9	-/-	-/-	11.0
102	-7.0	106	-10.0	11.0
110	-4.6	138	**-6.5**	11.0
134	-3.7	-/-	-/-	11.0
142	**-2.0**	-/-	-/-	11.0
151	-8.6	155	-10.9	30.0
159	-5.8	-/-	-/-	30.0

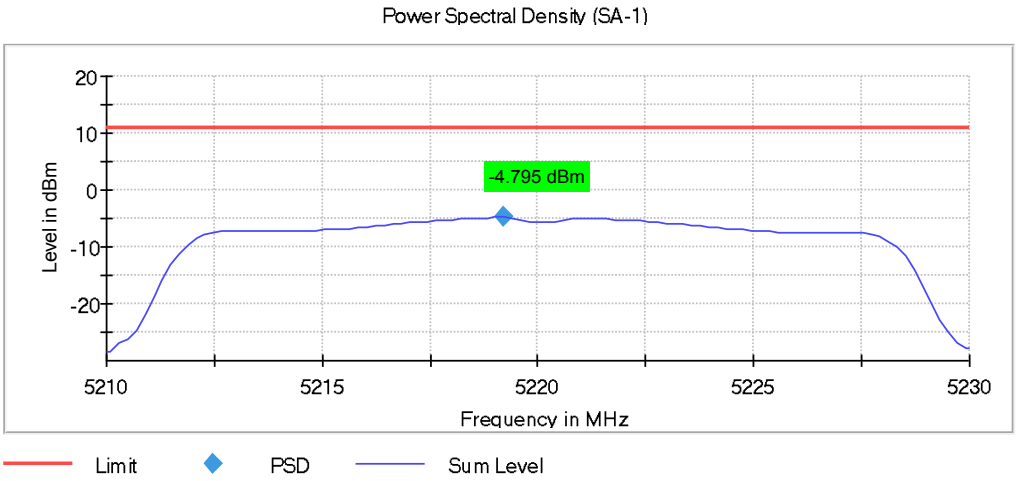
Comment:	---

Verdict	**- PASS -**	see next plots

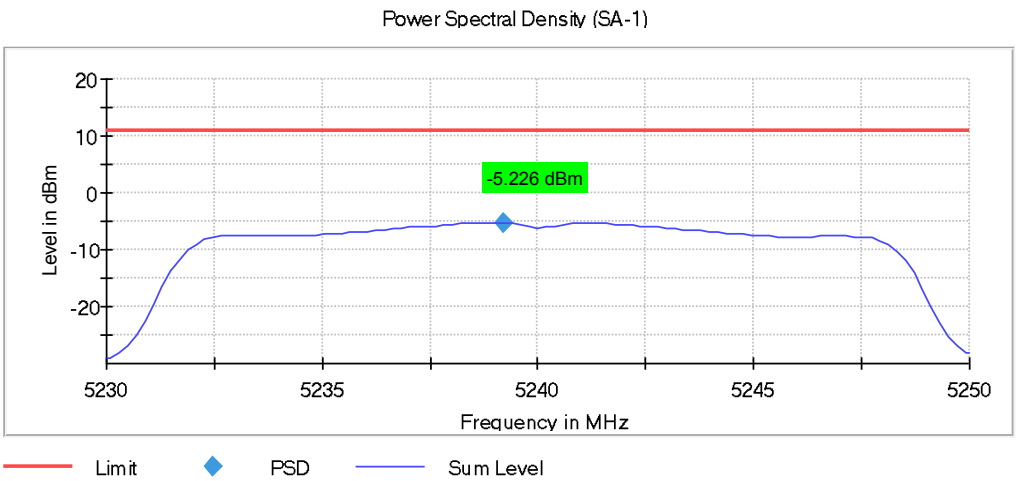
Plot 165: Average PSD, Mode 1, CH36



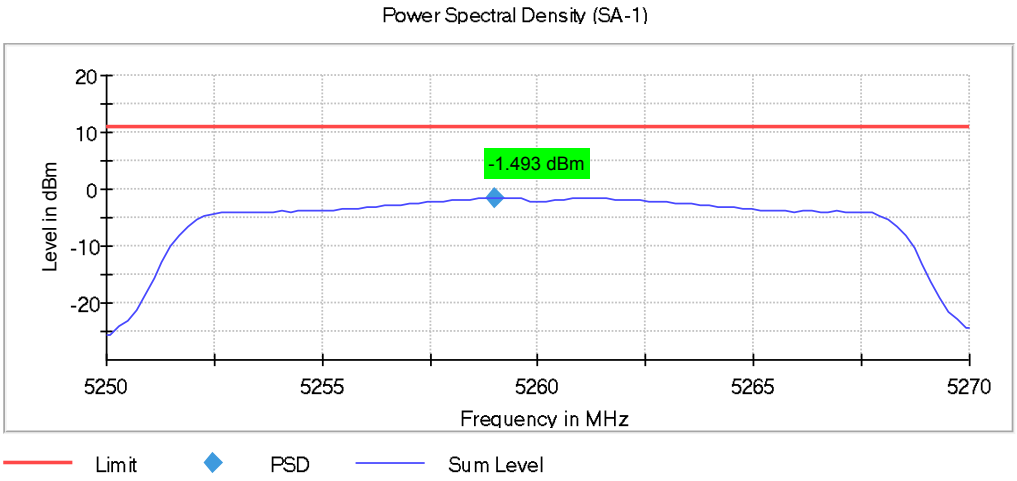
Plot 166: Average PSD, Mode 1, CH44



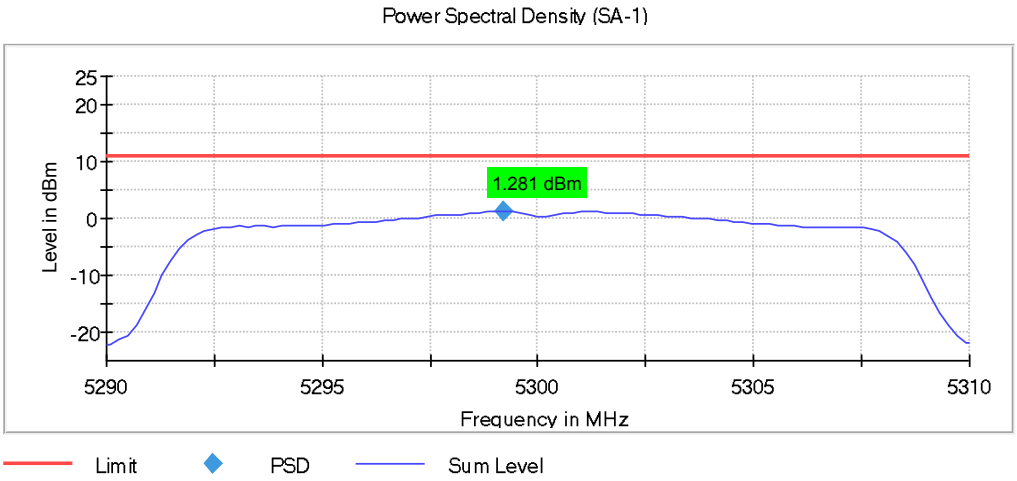
Plot 167: Average PSD, Mode 1, CH48



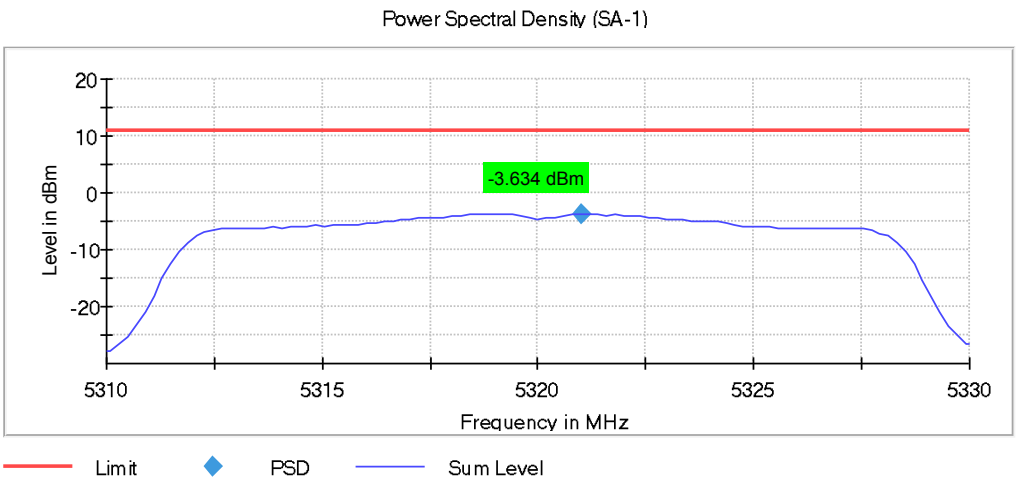
Plot 168: Average PSD, Mode 1, CH52



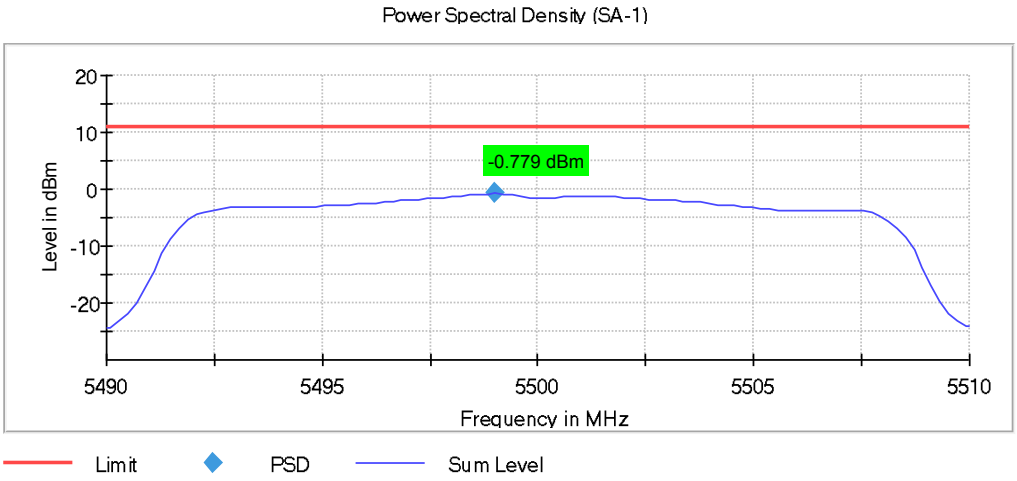
Plot 169: Average PSD, Mode 1, CH60



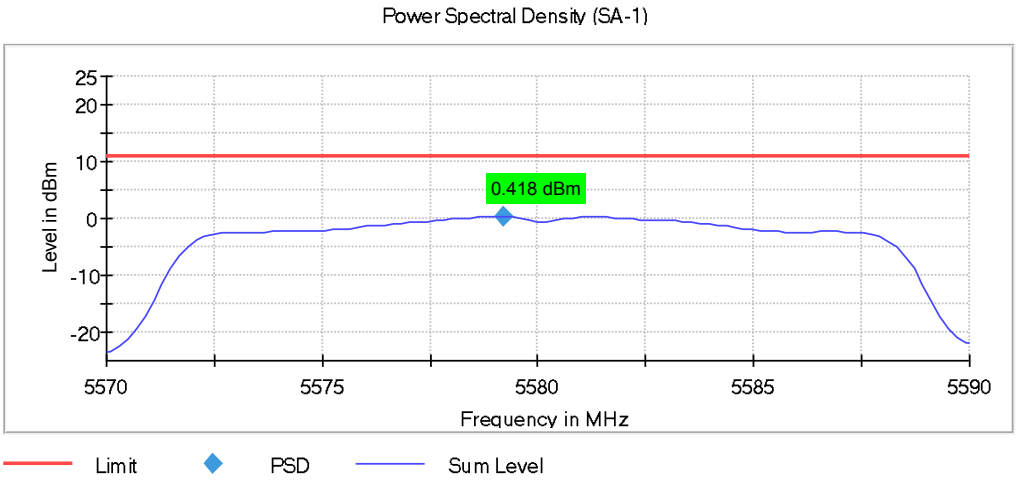
Plot 170: Average PSD, Mode 1, CH64



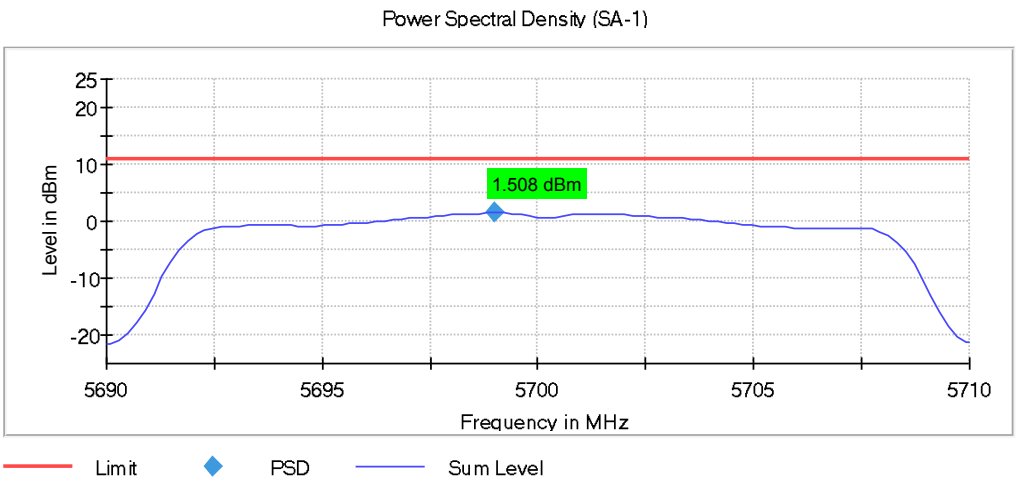
Plot 171: Average PSD, Mode 1, CH100



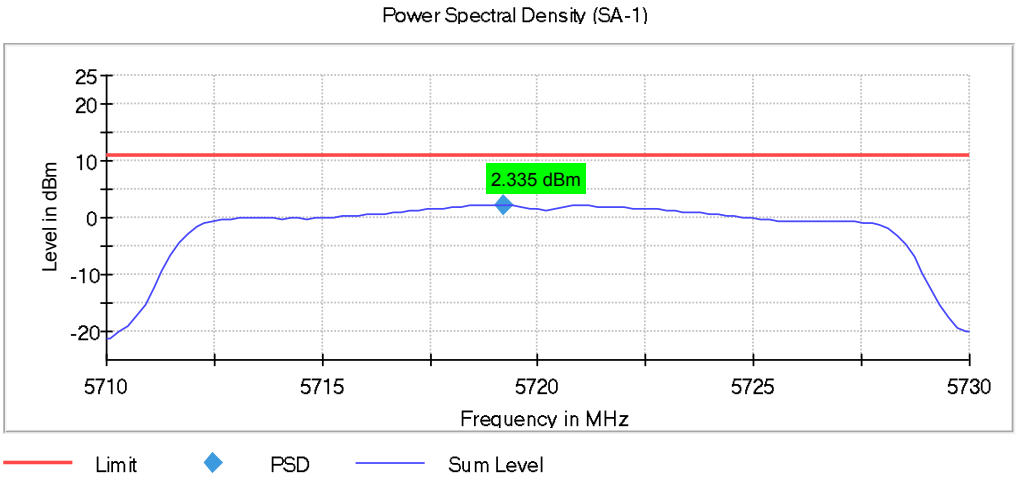
Plot 172: Average PSD, Mode 1, CH116



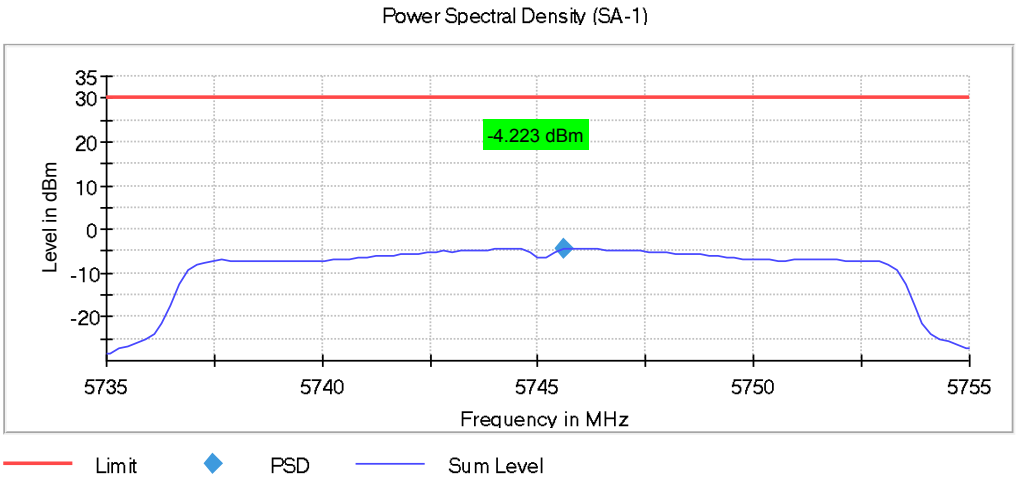
Plot 173: Average PSD, Mode 1, CH140



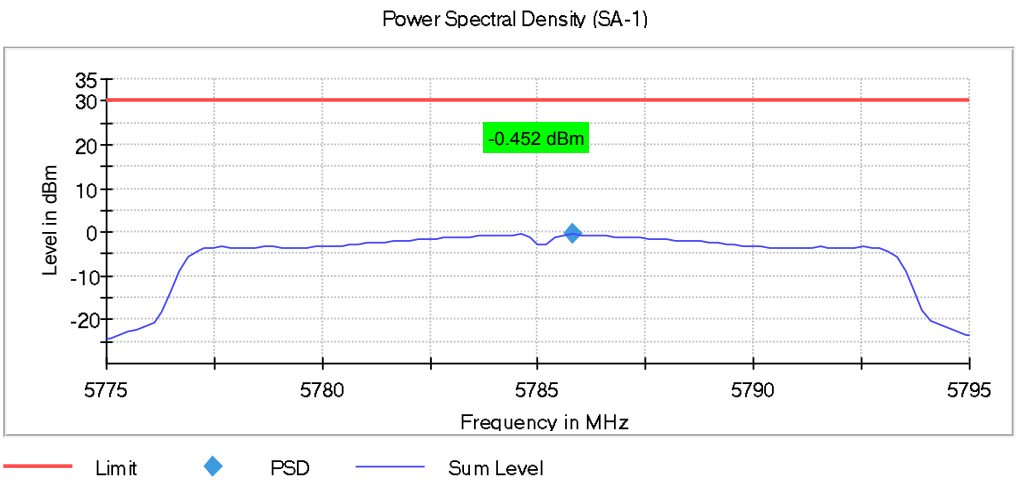
Plot 174: Average PSD, Mode 1, CH144



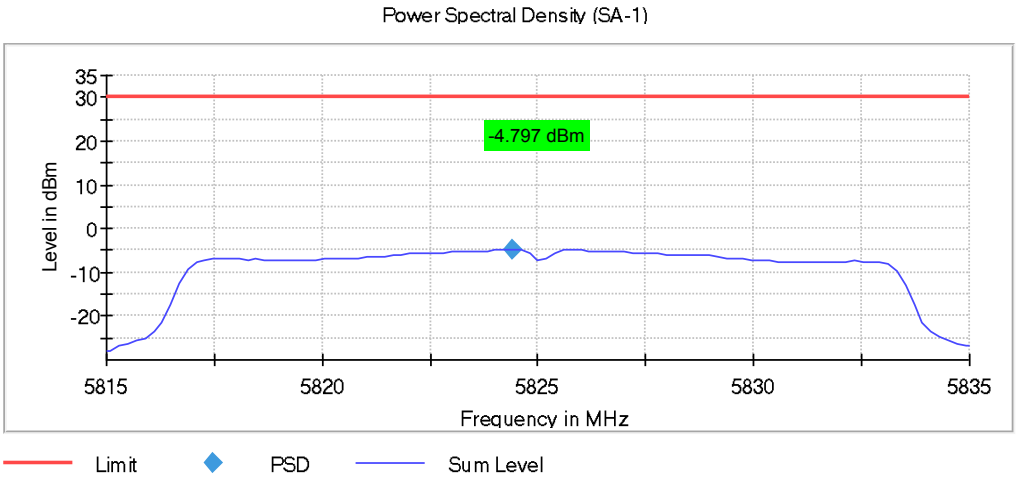
Plot 175: Average PSD, Mode 1, CH149



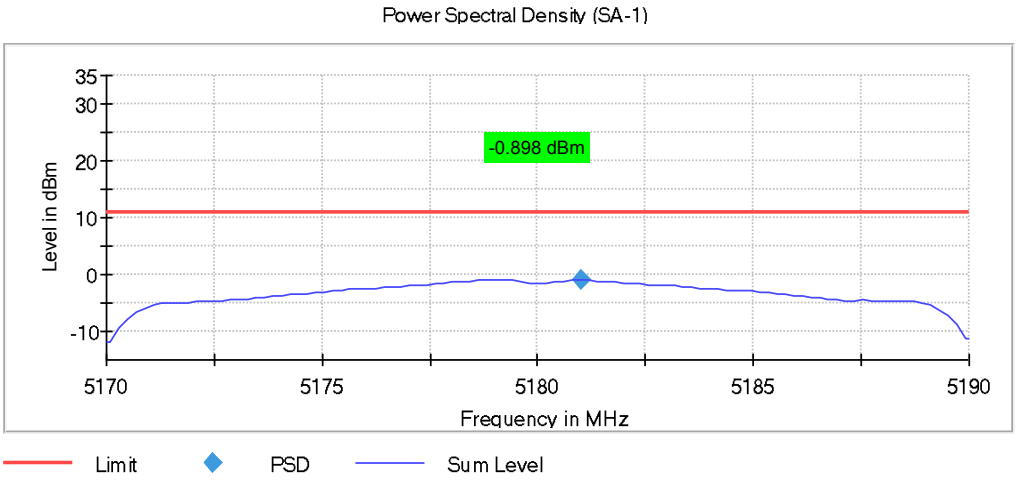
Plot 176: Average PSD, Mode 1, CH157



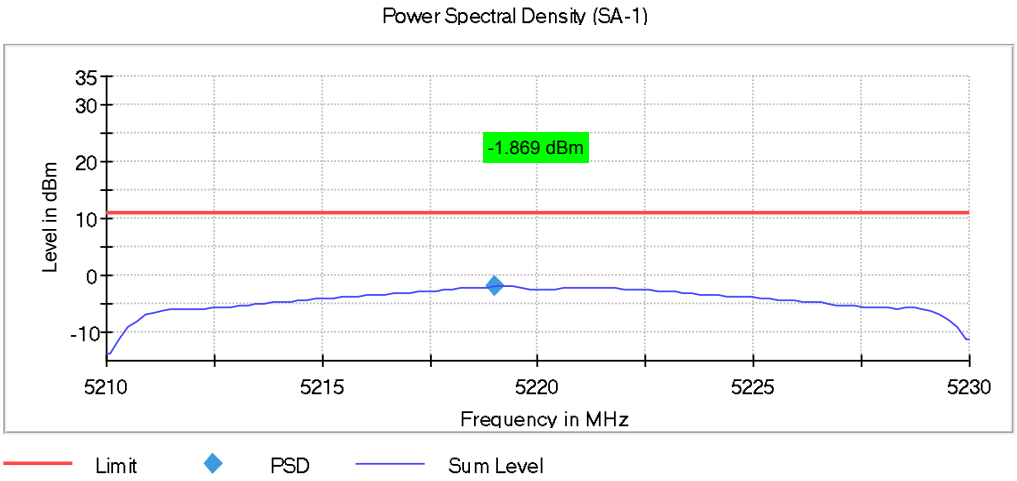
Plot 177: Average PSD, Mode 1, CH165



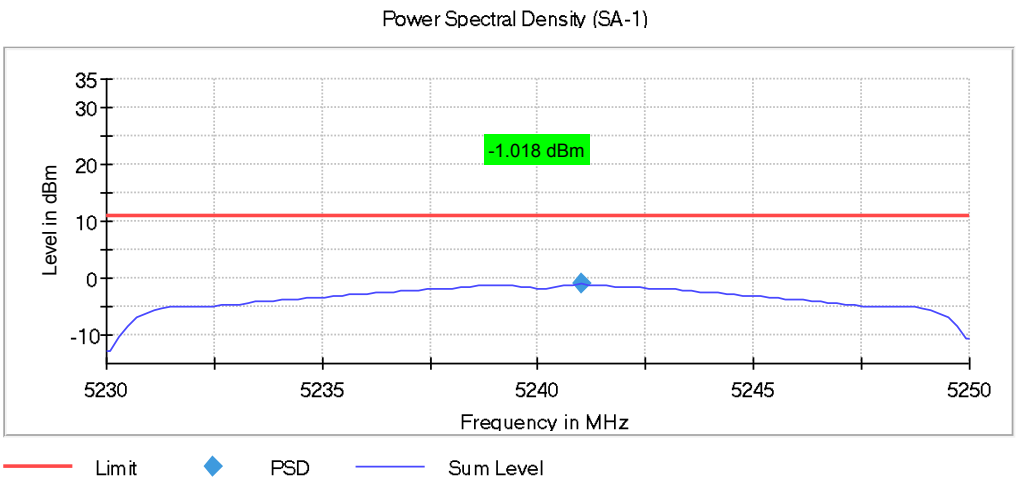
Plot 178: Average PSD, Mode 2, CH36



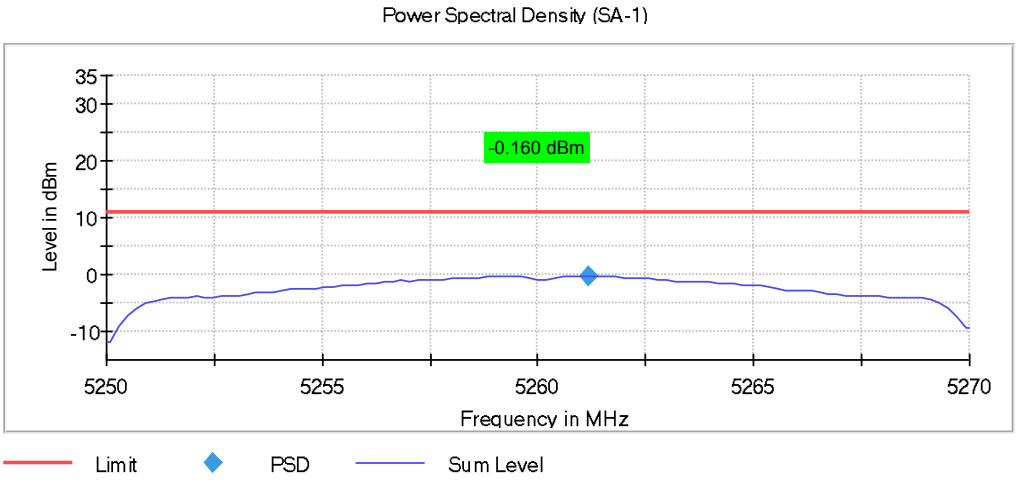
Plot 179: Average PSD, Mode 2, CH44



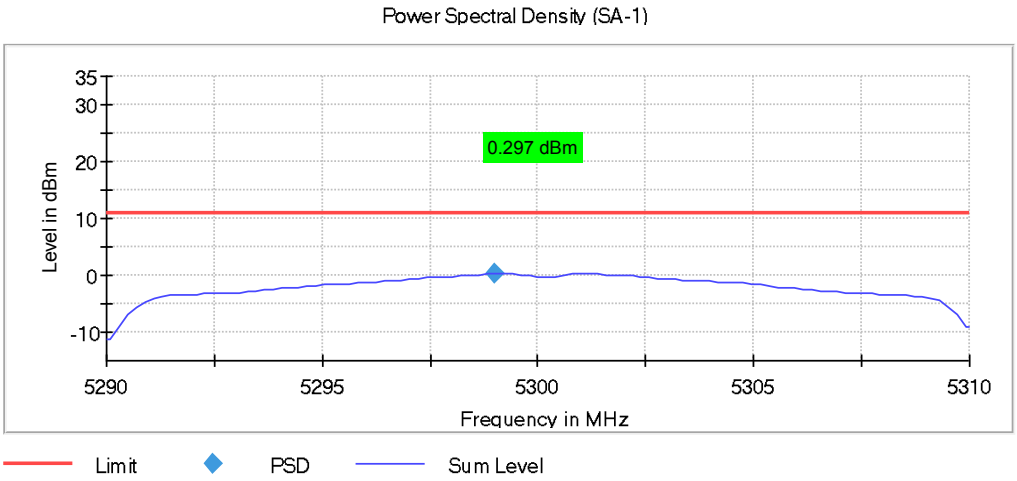
Plot 180: Average PSD, Mode 2, CH48



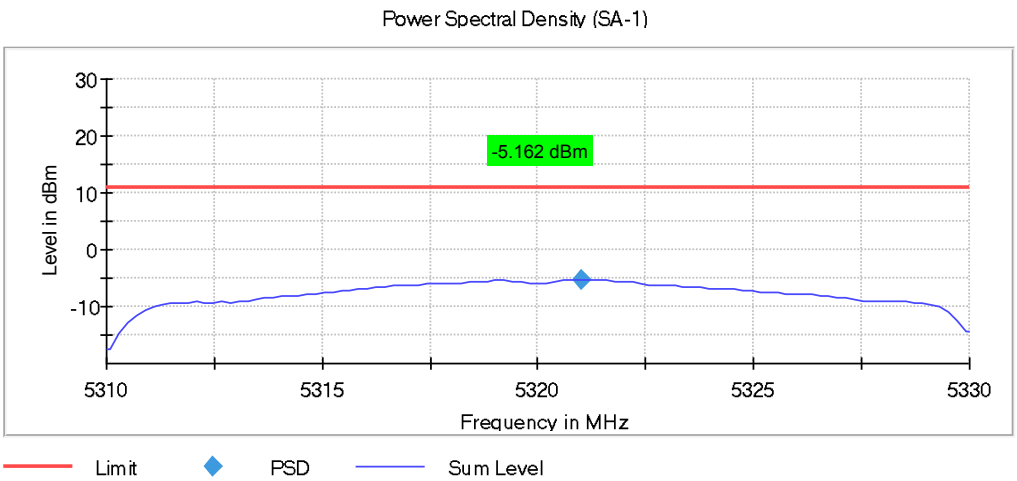
Plot 181: Average PSD, Mode 2, CH52



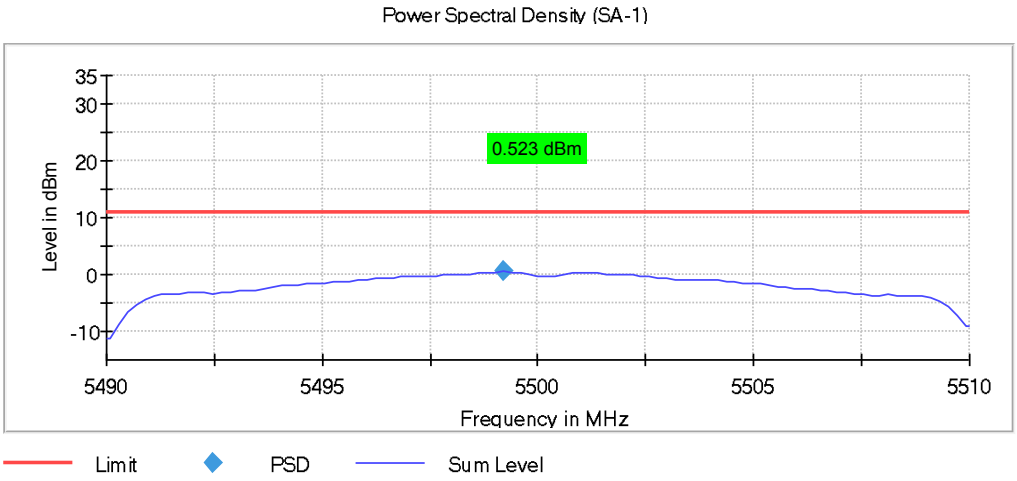
Plot 182: Average PSD, Mode 2, CH60



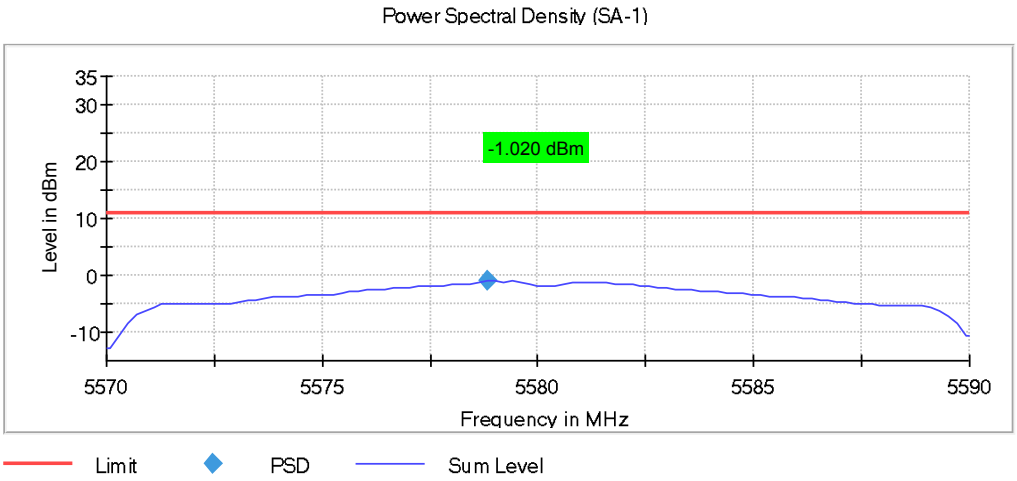
Plot 183: Average PSD, Mode 2, CH64



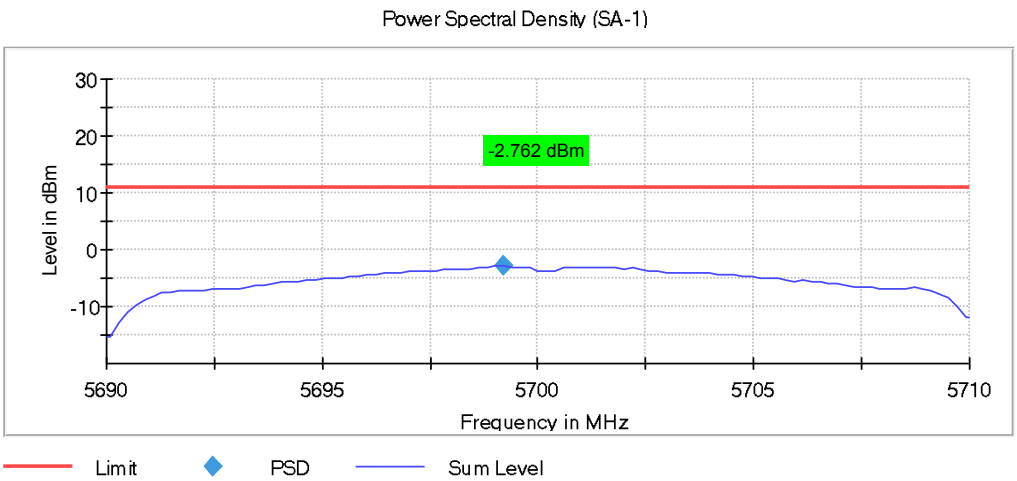
Plot 184: Average PSD, Mode 2, CH100



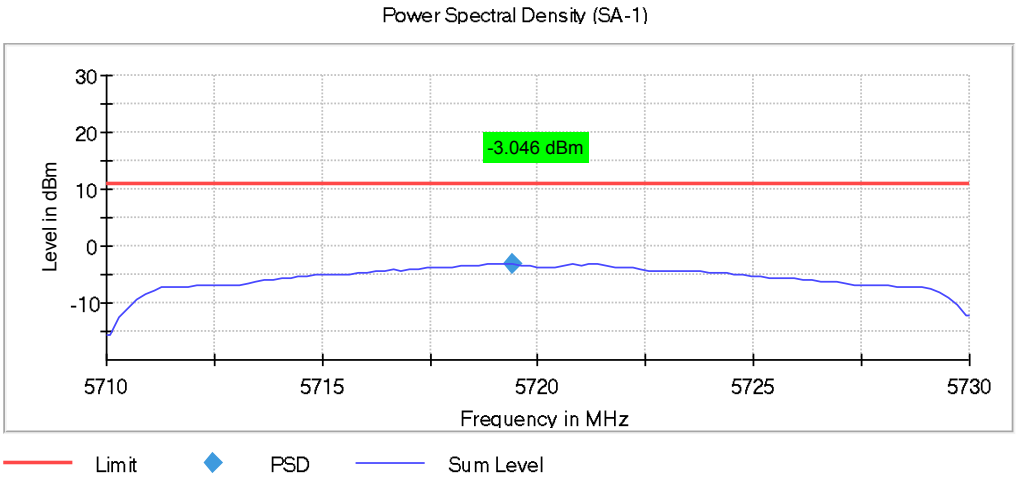
Plot 185: Average PSD, Mode 2, CH116



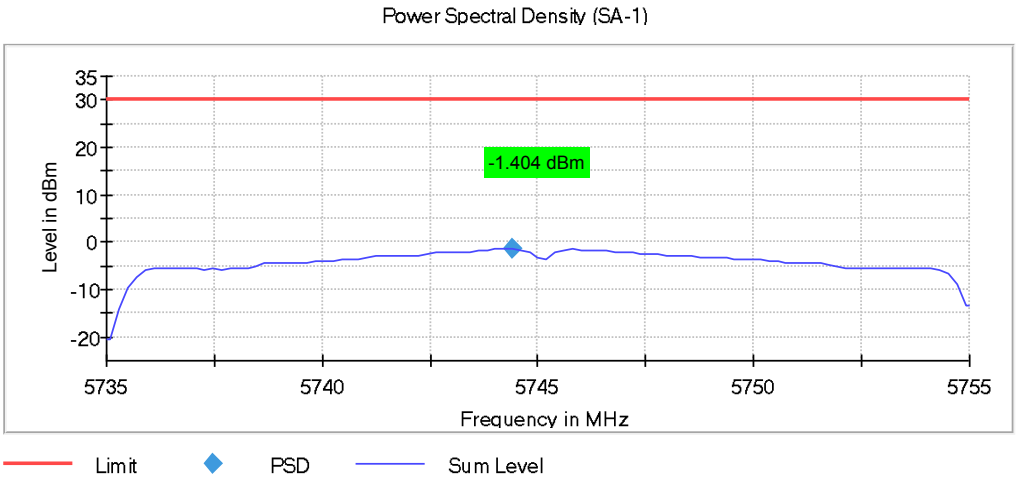
Plot 186: Average PSD, Mode 2, CH140



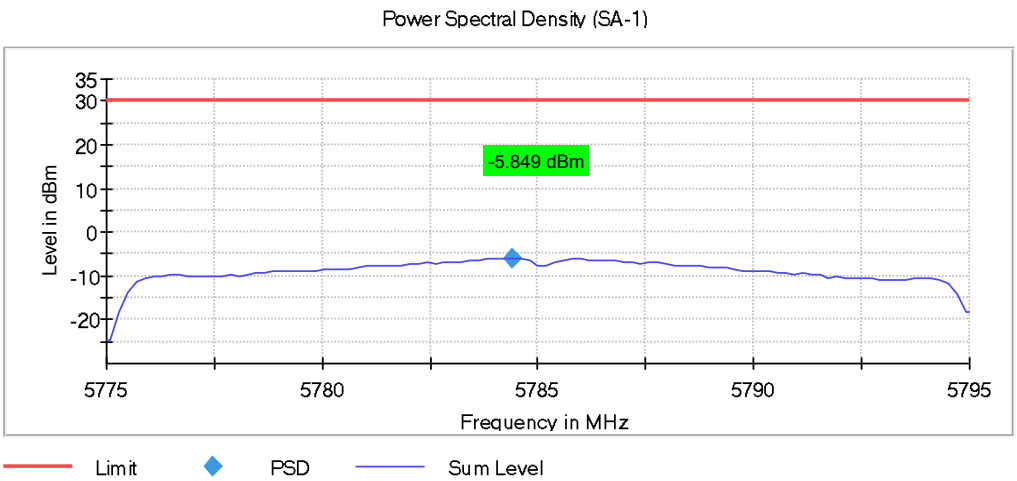
Plot 187: Average PSD, Mode 2, CH144



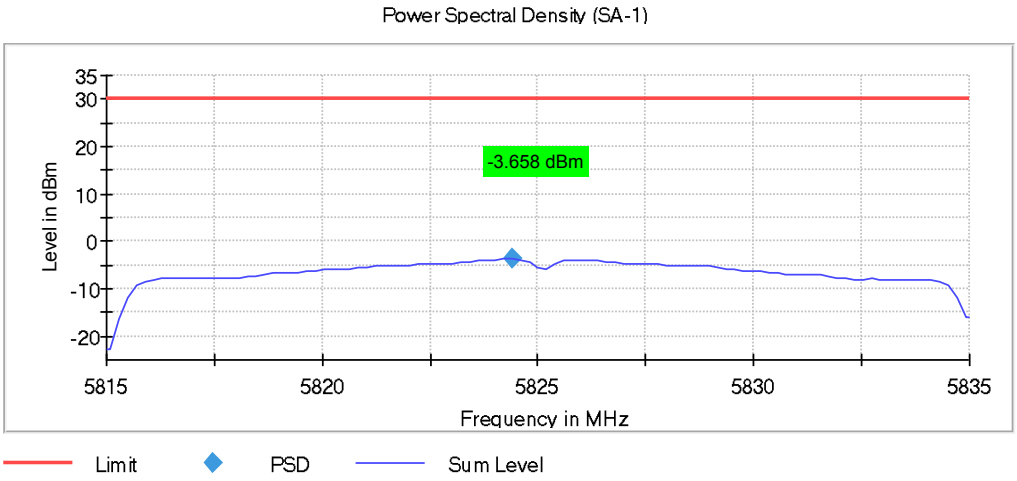
Plot 188: Average PSD, Mode 2, CH149



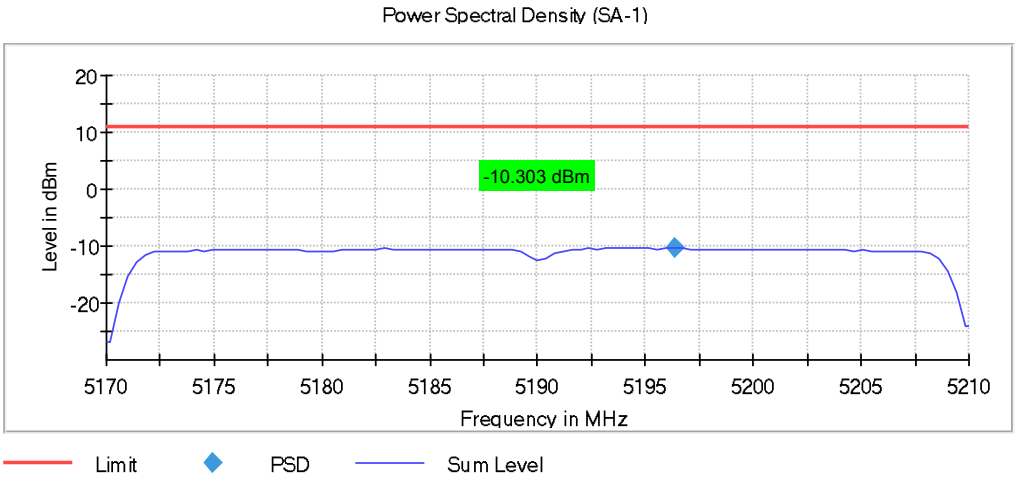
Plot 189: Average PSD, Mode 2, CH157



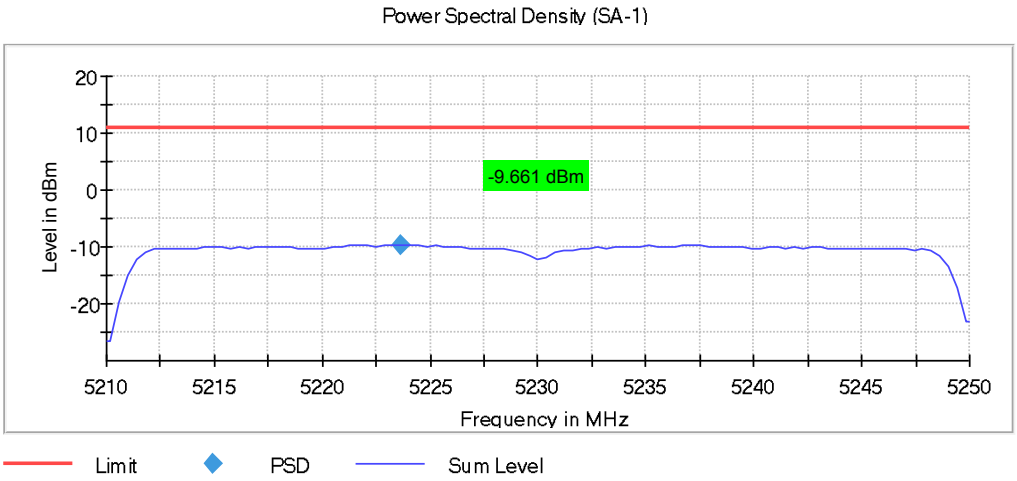
Plot 190: Average PSD, Mode 2, CH165



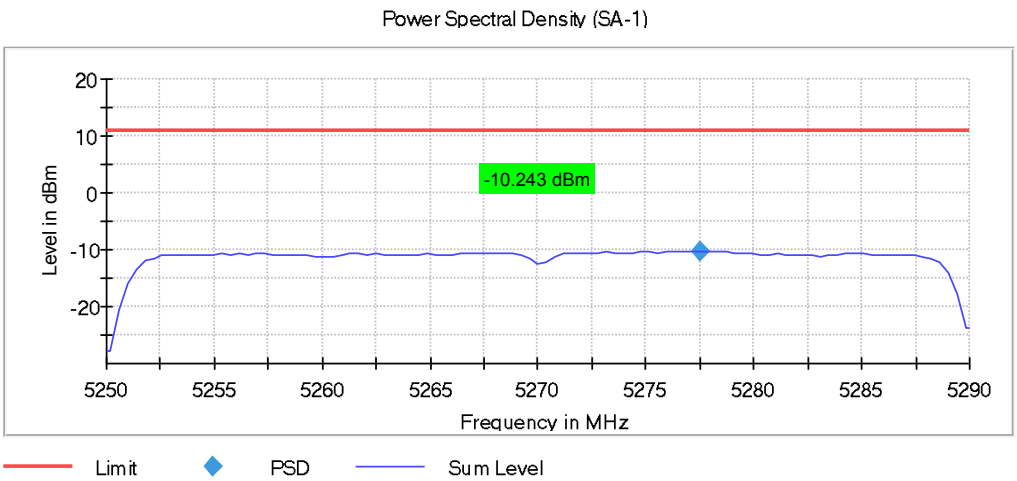
Plot 191: Average PSD, Mode 3, CH38



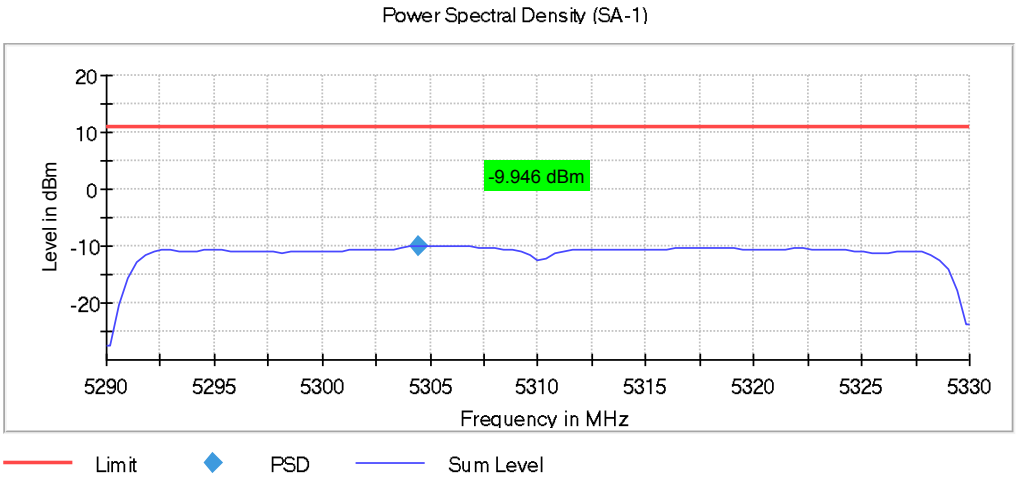
Plot 192: Average PSD, Mode 3, CH46



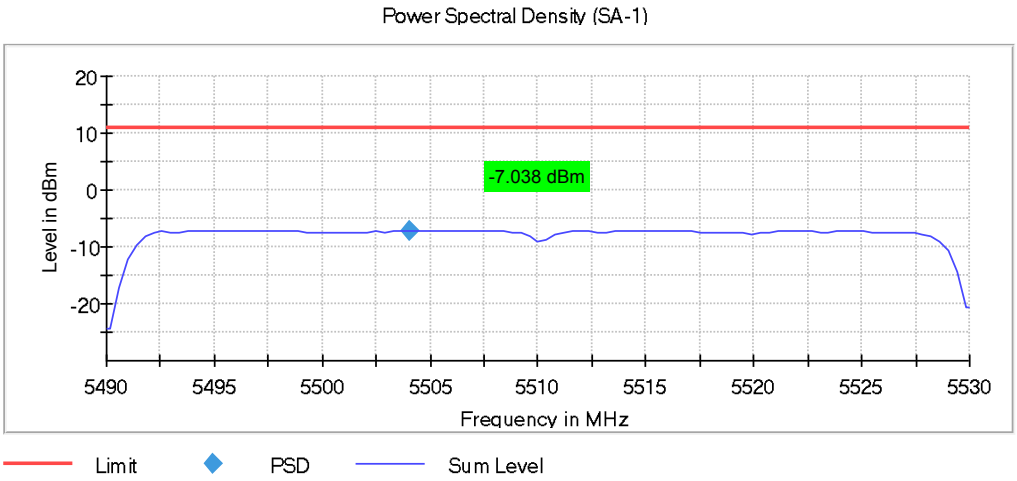
Plot 193: Average PSD, Mode 3, CH54



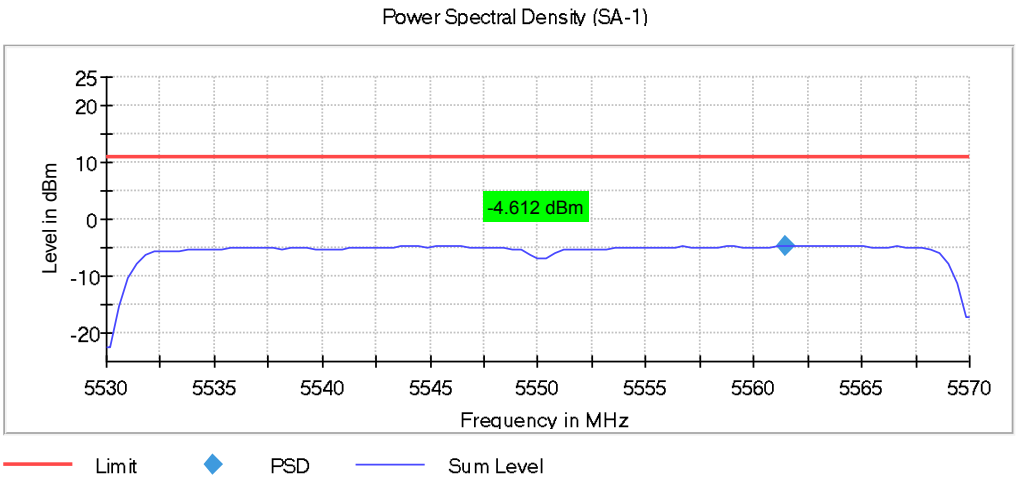
Plot 194: Average PSD, Mode 3, CH62



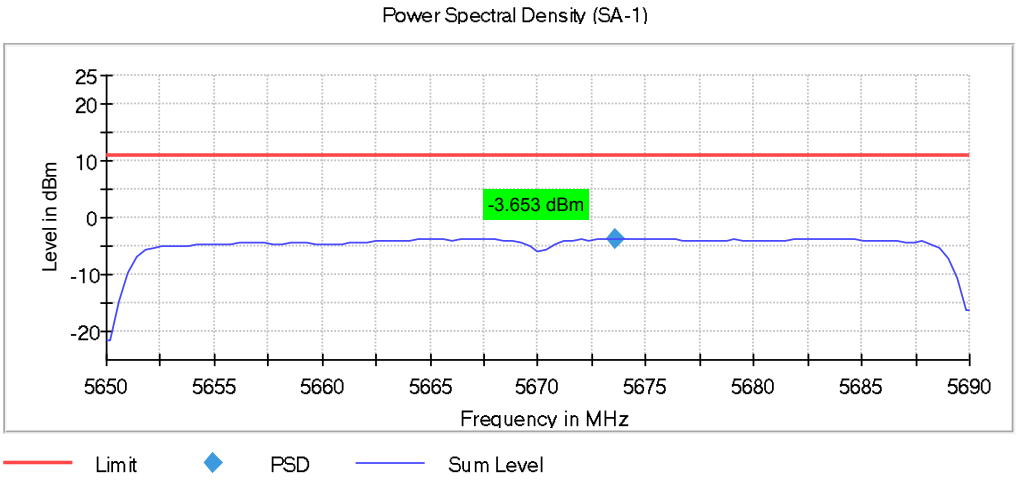
Plot 195: Average PSD, Mode 3, CH102



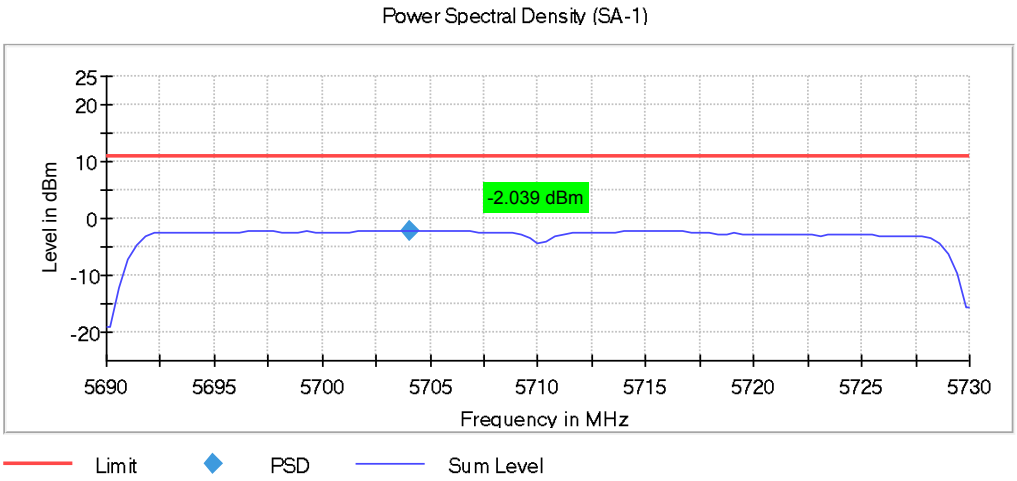
Plot 196: Average PSD, Mode 3, CH110



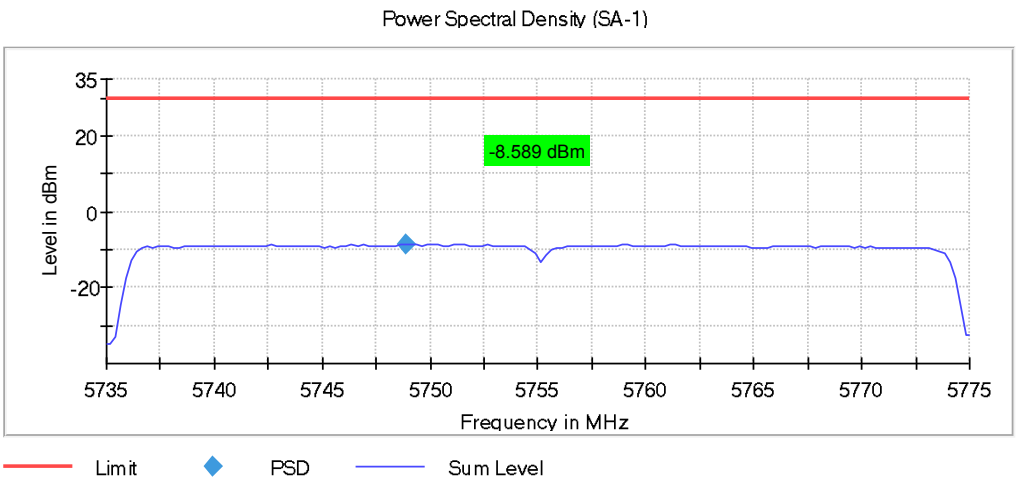
Plot 197: Average PSD, Mode 3, CH134



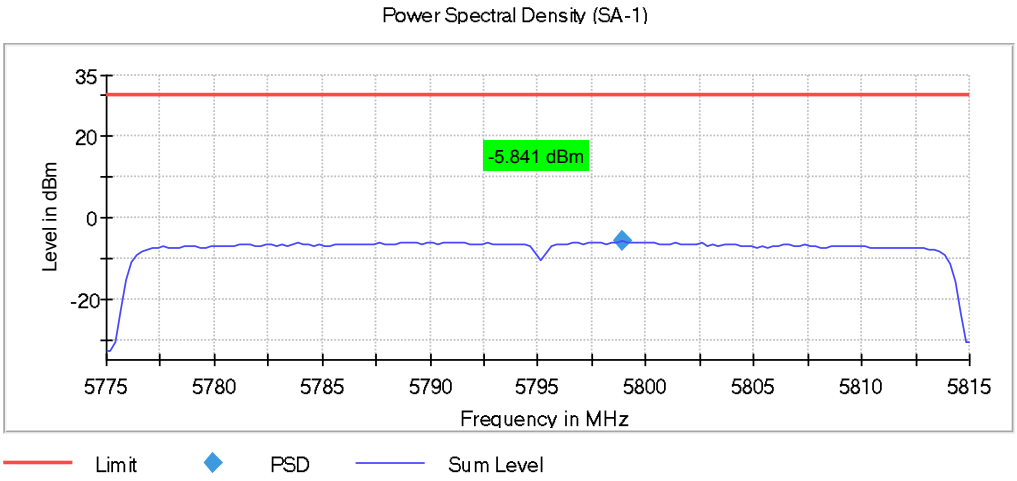
Plot 198: Average PSD, Mode 3, CH142



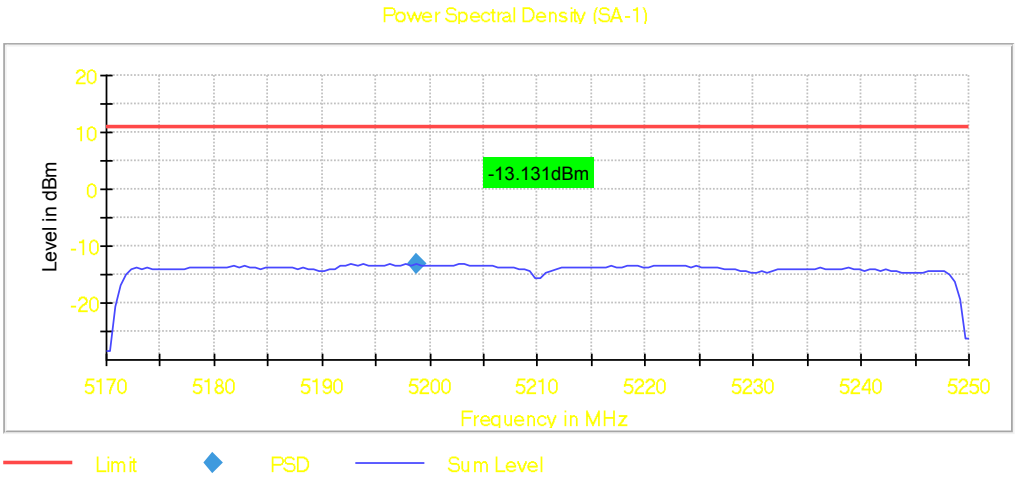
Plot 199: Average PSD, Mode 3, CH151



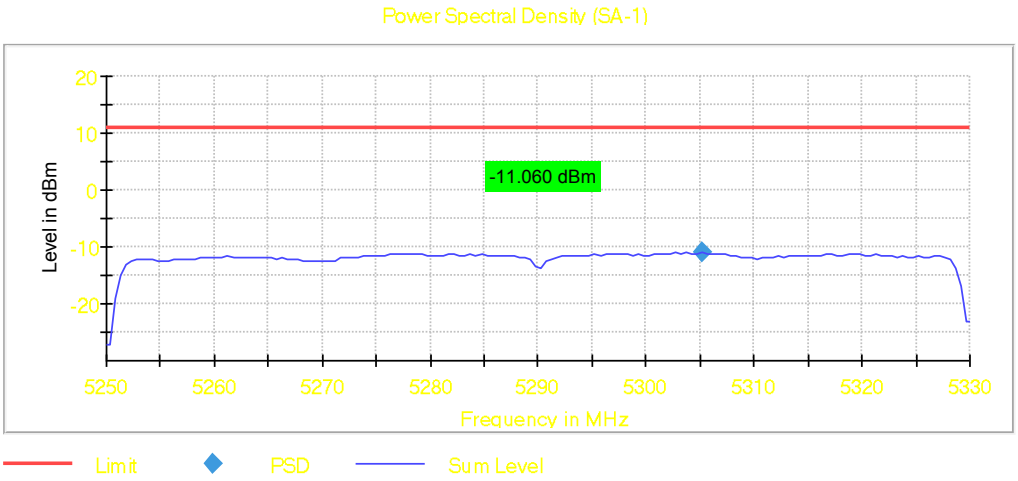
Plot 200: Average PSD, Mode 3, CH159



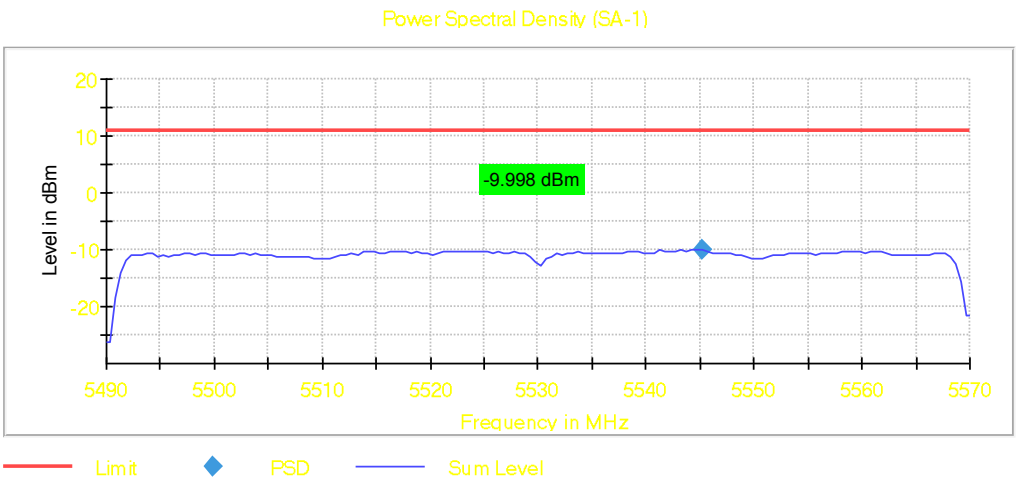
Plot 201: Average PSD, Mode 4, CH42



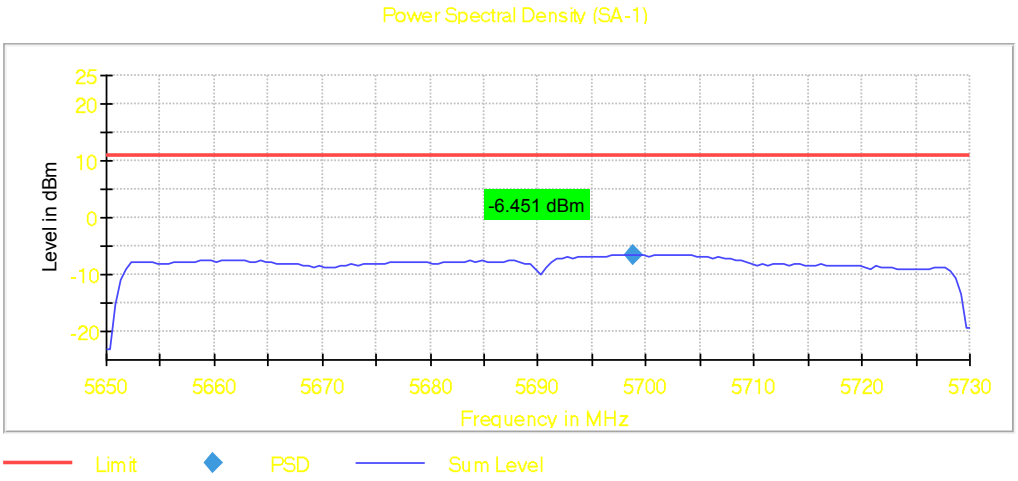
Plot 202: Average PSD, Mode 4, CH58



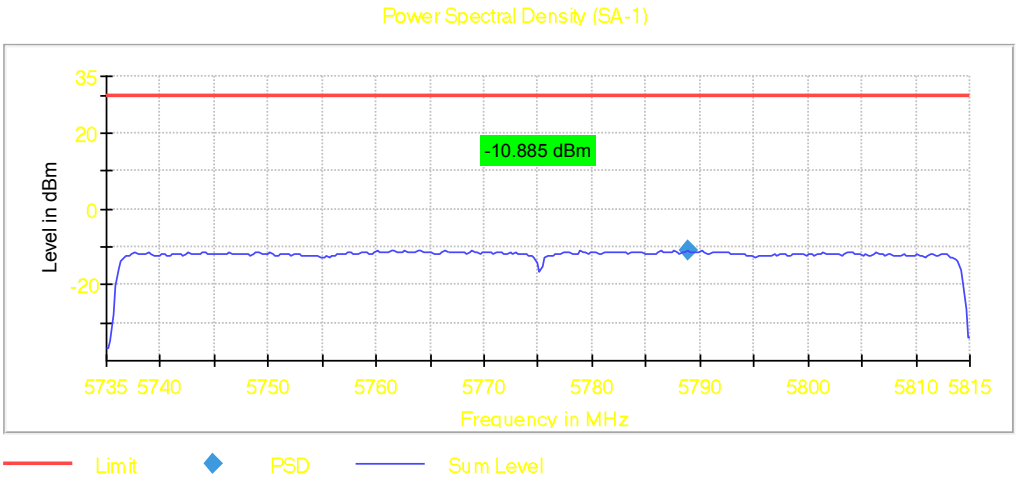
Plot 203: Average PSD, Mode 4, CH106



Plot 204: Average PSD, Mode 4, CH138



Plot 205: Average PSD, Mode 4, CH155



7.7 Band Edge Compliance (BEC), conducted

Applicability

This requirement applies to all unlicensed national information infrastructure (UNII) / licence-exempt local area network (LE-LAN) devices operating in the bands 5150-5250 MHz, 5250-5350 MHz, 5470-5725 MHz, 5725-5850 MHz and 5850-5895 MHz.

Description

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Unwanted band-edge emissions may be measured using either of the special band-edge measurement techniques (the marker-delta or integration methods). Note that the marker-delta method is primarily a radiated measurement technique that requires the 99% occupied bandwidth edge to be within 2 MHz of the authorized band edge, whereas the integration method can be used in either a radiated or conducted measurement without any special requirement with regards to the displacement of the unwanted emission(s) relative to the authorized bandwidth.

Limits

§15.407(b)

The maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

(1) For transmitters operating in the 5.15–5.25 GHz band: All emissions out- side of the 5.15–5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

(2) For transmitters operating in the 5.25–5.35 GHz band: All emissions out- side of the 5.15–5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

(3) For transmitters operating in the 5.47–5.725 GHz band: All emissions out- side of the 5.47–5.725 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

(4) For transmitters operating in the 5.725–5.85 GHz band:

(i) All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

Test procedure

Test according to FCC title 47 part 15 §15.407(b), KDB 789033 D02 General U-NII Test Procedures New Rules v02r01 II.G.3.d ii and ANSI C63.10-2013.

Channel filter is used for doing integration in the measurement device.

Test setup: 8.4 with conducted sample (see section 5.2)

Test results, Mode 1			
BEC	**low channel [dBm]**	**high channel [dBm]**	**Limit [dBm]**
U-NII-1 & U-NII-2A	≤ -40.0	≤ -28.7	≤ -27
U-NII-2C & U-NII-3	≤ -29.6	≤ -44.0	≤ -27

Test results, Mode 2			
BEC	**low channel [dBm]**	**high channel [dBm]**	**Limit [dBm]**
U-NII-1 & U-NII-2A	≤ -41.0	≤ -33.0	≤ -27
U-NII-2C & U-NII-3	≤ -31.1	≤ -43.0	≤ -27

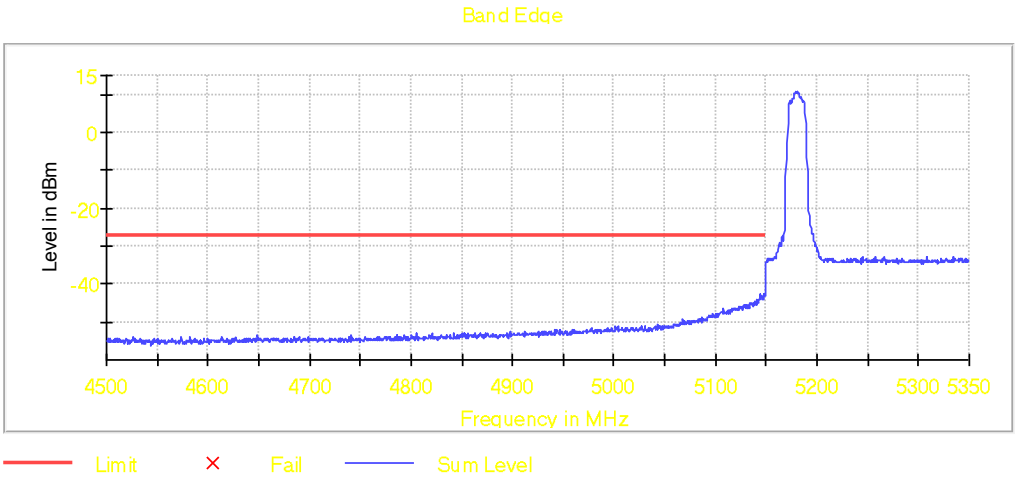
Test results, Mode 3			
BEC	**low channel [dBm]**	**high channel [dBm]**	**Limit [dBm]**
U-NII-1 & U-NII-2A	≤ -38.0	≤ -33.6	≤ -27
U-NII-2C & U-NII-3	≤ -28.3	≤ -43.0	≤ -27

Test results, Mode 4			
BEC	**low channel [dBm]**	**high channel [dBm]**	**Limit [dBm]**
U-NII-1 & U-NII-2A	≤ 31.7	≤ -30.0	≤ -27
U-NII-2C & U-NII-3	≤ -27.8	≤ -32.8	≤ -27

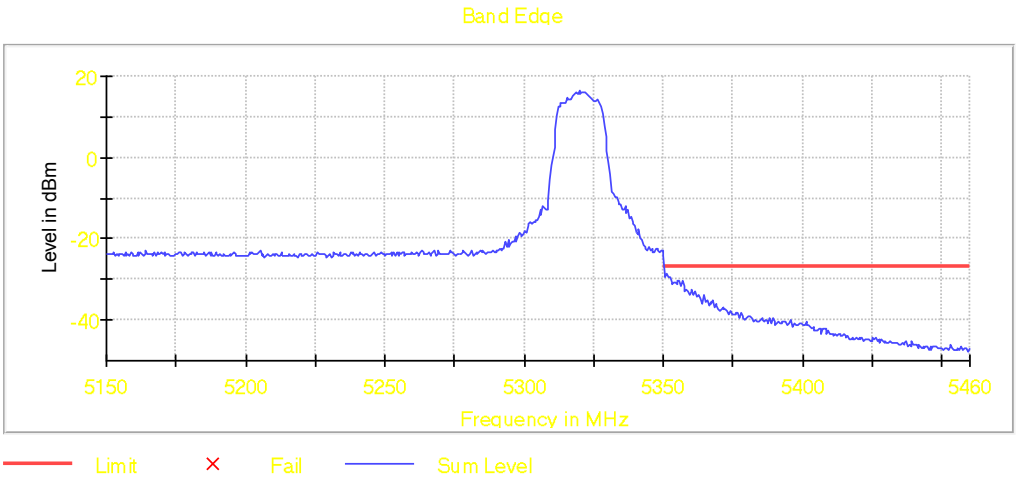
Comment:	---

Verdict	**- PASS -**	see next plots

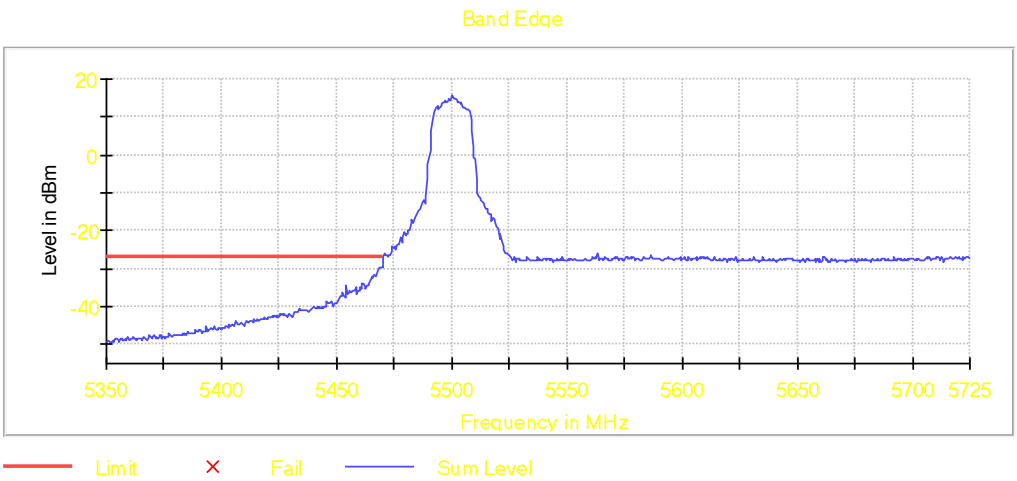
Plot 206: BEC low, Mode 1, CH36



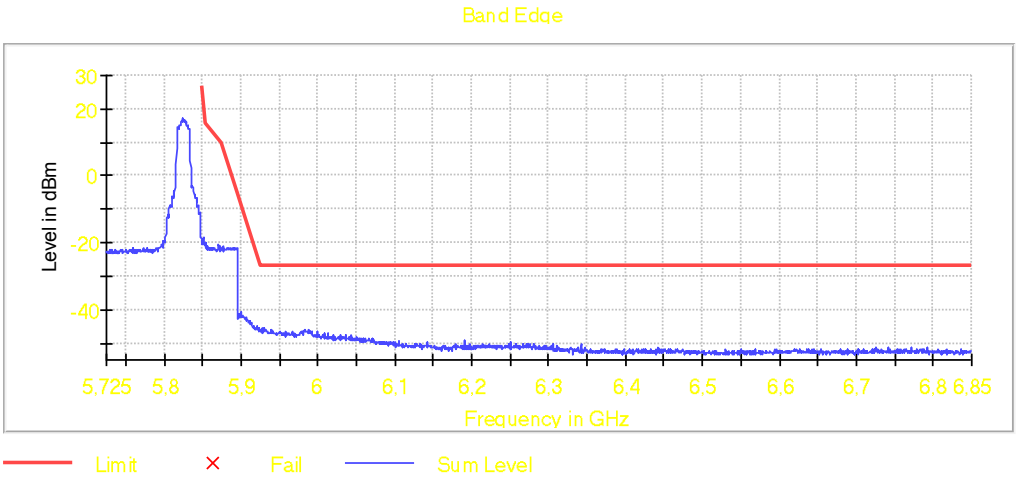
Plot 207: BEC high, Mode 1, CH64



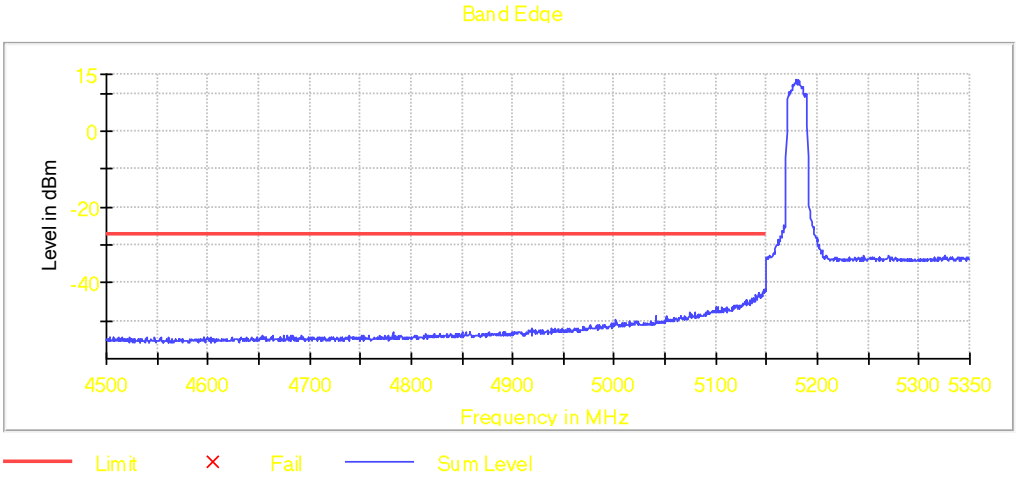
Plot 208: BEC low, Mode 1, CH100



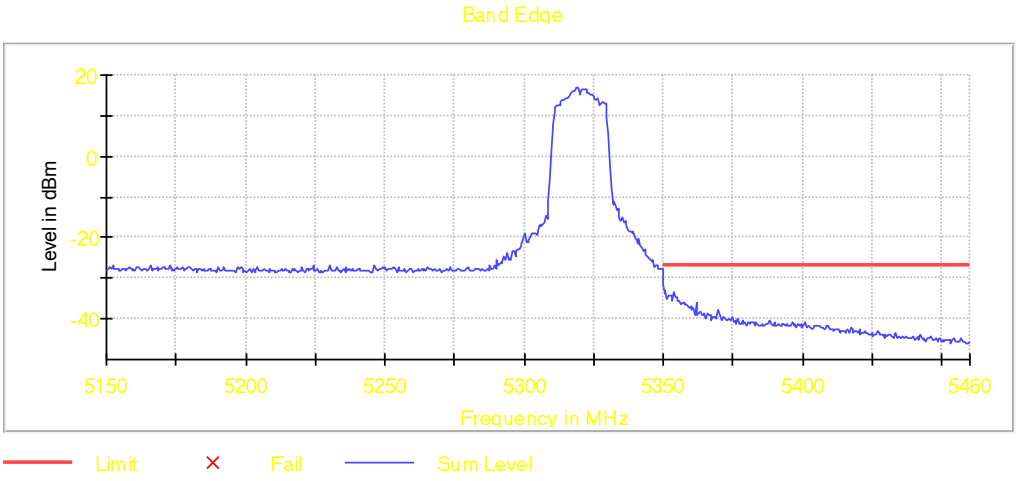
Plot 209: BEC high, Mode 1, CH165



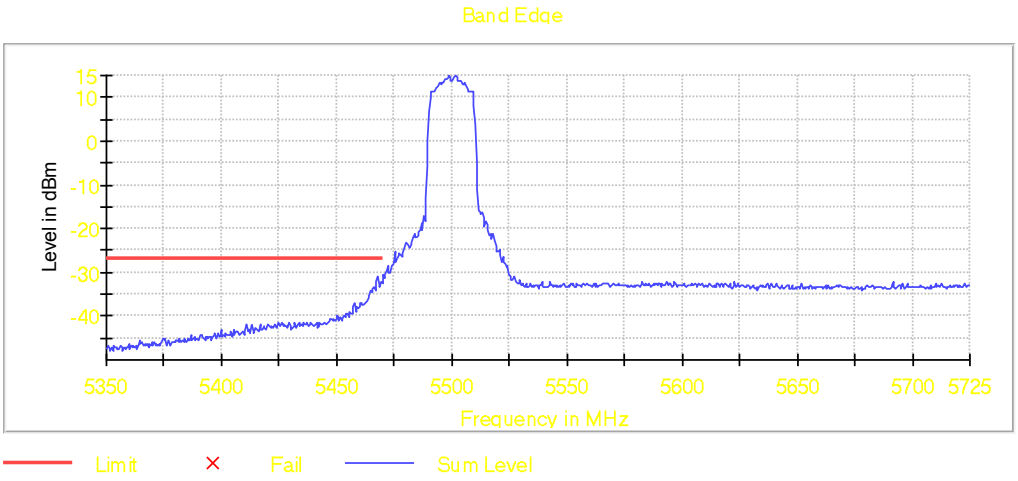
Plot 210: BEC low, Mode 2, CH36



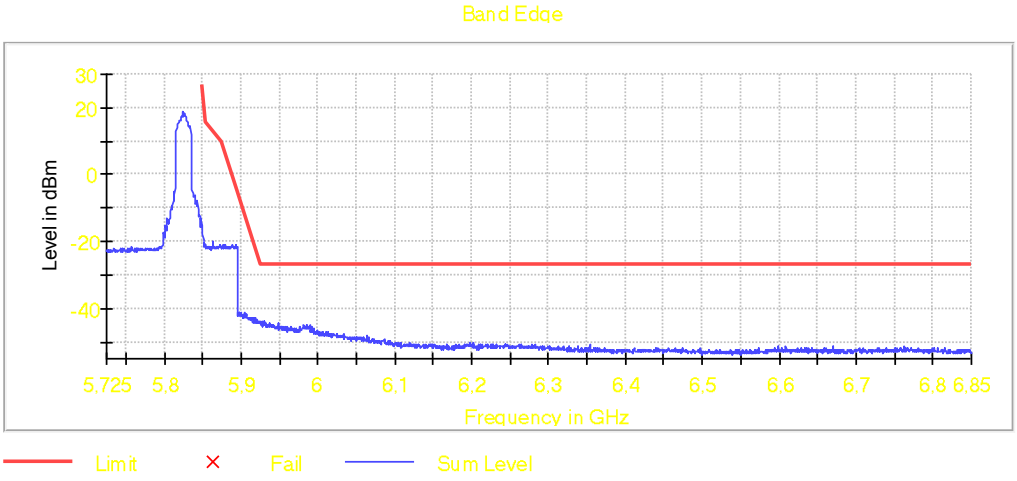
Plot 211: BEC high, Mode 2, CH64



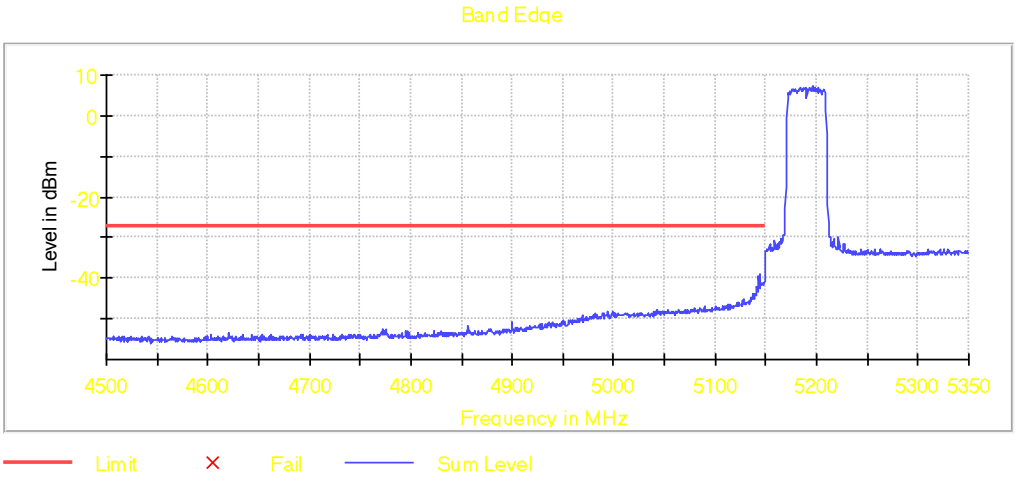
Plot 212: BEC low, Mode 2, CH100



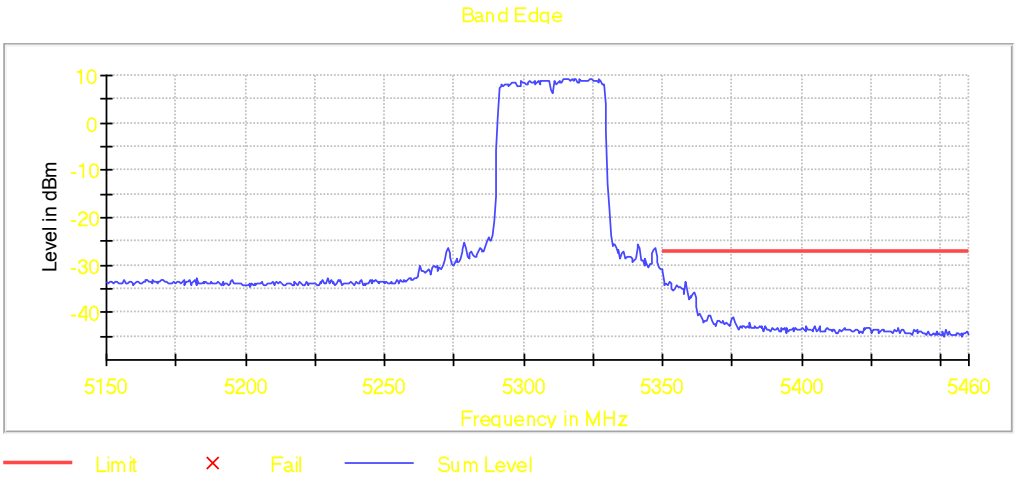
Plot 213: BEC high, Mode 2, CH165



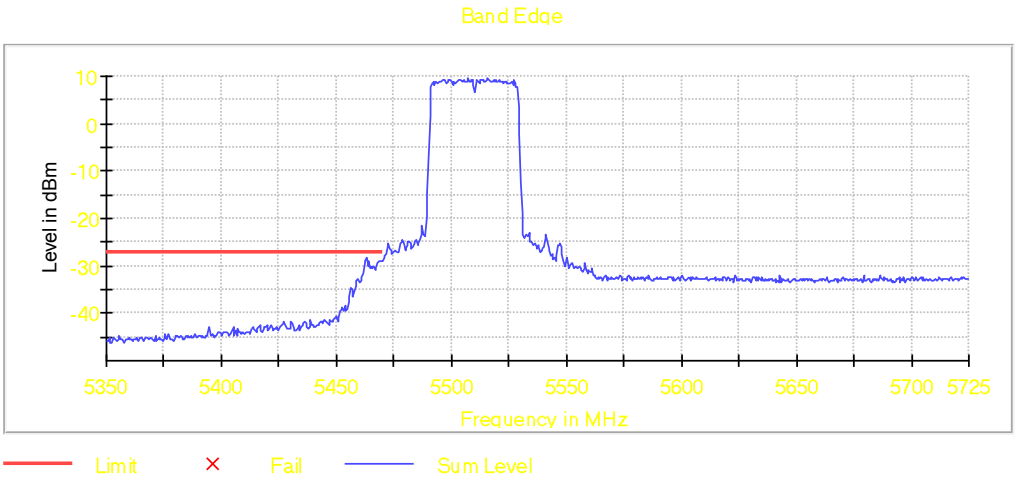
Plot 214: BEC low, Mode 3, CH38



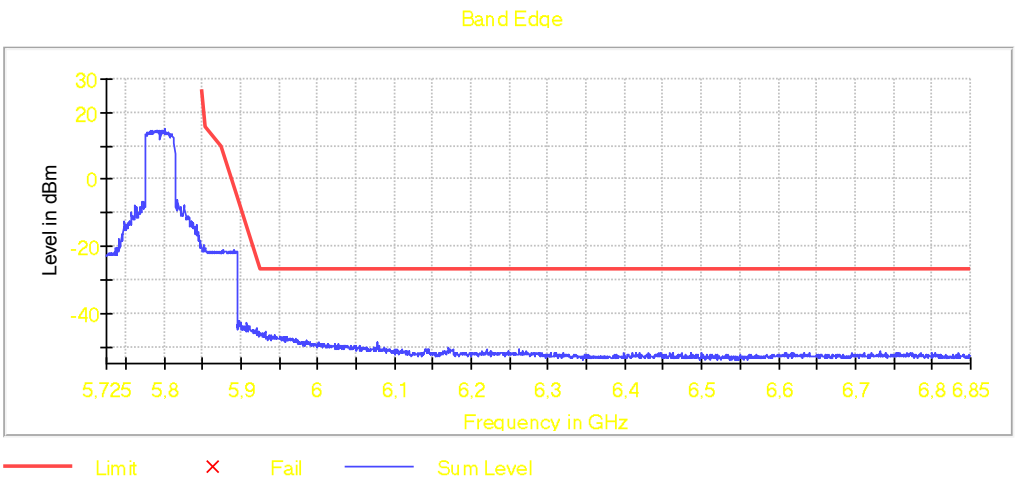
Plot 215: BEC high, Mode 3, CH62



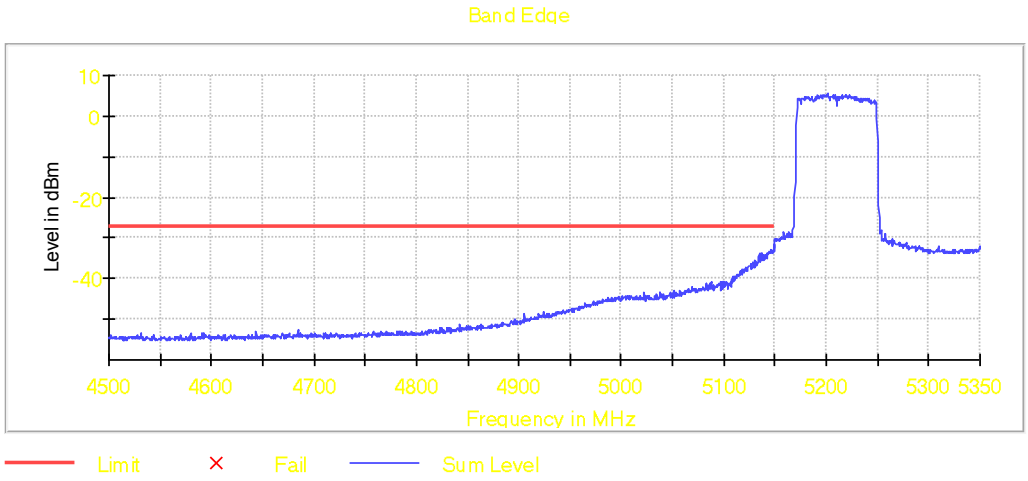
Plot 216: BEC low, Mode 3, CH102



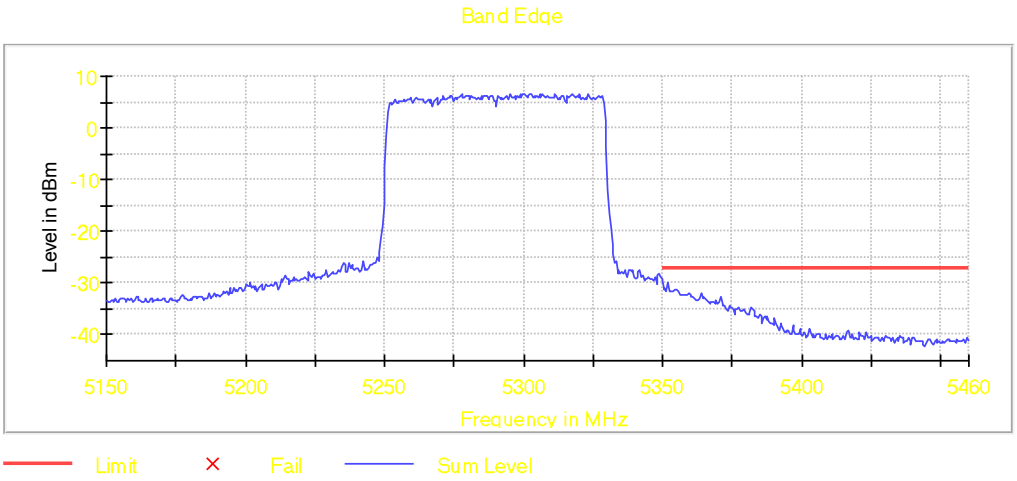
Plot 217: BEC high, Mode 3, CH159



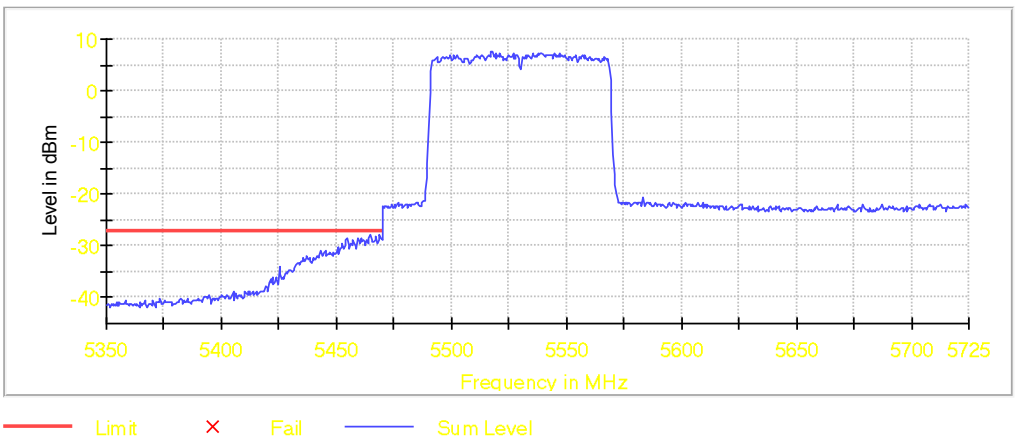
Plot 218: BEC low, Mode 4, CH42



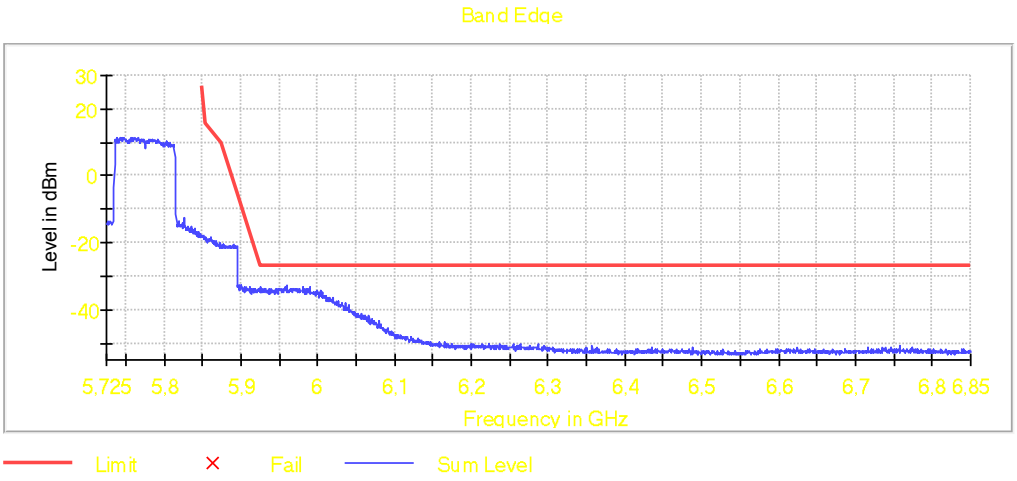
Plot 219: BEC high, Mode 4, CH58



Plot 220: BEC low, Mode 4, CH106



Plot 221: BEC high, Mode 4, CH155



7.8 Band Edge Compliance (BEC), radiated

Applicability
This requirement applies to all unlicensed national information infrastructure (UNII) / licence-exempt local area network (LE-LAN) devices operating in the bands 5150-5250 MHz, 5250-5350 MHz, 5470-5725 MHz, 5725-5850 MHz and 5850-5895 MHz.

Description
KDB 789033 D02 General U-NII Test Procedures New Rules v02r01 II.G.3.d ii
Unwanted band-edge emissions may be measured using either of the special band-edge measurement techniques (the marker-delta or integration methods). Note that the marker-delta method is primarily a radiated measurement technique that requires the 99% occupied bandwidth edge to be within 2 MHz of the authorized band edge, whereas the integration method can be used in either a radiated or conducted measurement without any special requirement with regards to the displacement of the unwanted emission(s) relative to the authorized bandwidth.

Limits
§15.407(b)
RSS-247, 6.2
The maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:
(1) For transmitters operating in the 5.15–5.25 GHz band: All emissions out- side of the 5.15–5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
(2) For transmitters operating in the 5.25–5.35 GHz band: All emissions out- side of the 5.15–5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
(3) For transmitters operating in the 5.47–5.725 GHz band: All emissions out- side of the 5.47–5.725 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
(4) For transmitters operating in the 5.725–5.85 GHz band:
(i) All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

Test procedure
The marker-delta method as described in ANSI C63.10, 6.10.6 or the integration methode as described in ANSI C63.10, 12.7.4.4.3 can be used to perform measurements of the unwanted emissions level at the band edges.

Test setup: 8.2 with radiated sample (see section 5.2)

Test results, Mode 1			
BEC	**low channel [dBµV/m]**	**high channel [dBµV/m]**	**Limit AVG/Peak [dBµV/m]**
U-NII-1 & U-NII-2A	41.4	49.4	≤ -54 / 74
U-NII-2C & U-NII-3	44.7	49.6	≤ -54 / 74

Test results, Mode 2			
BEC	**low channel [dBµV/m]**	**high channel [dBµV/m]**	**Limit AVG/Peak [dBµV/m]**
U-NII-1 & U-NII-2A	44.8	47.8	≤ -54 / 74
U-NII-2C & U-NII-3	44.8	49.8	≤ -54 / 74

Test results, Mode 3			
BEC	**low channel [dBµV/m]**	**high channel [dBµV/m]**	**Limit AVG/Peak [dBµV/m]**
U-NII-1 & U-NII-2A	39.9	44.8	≤ -54 / 74
U-NII-2C & U-NII-3	48.9	44.8	≤ -54 / 74

Test results, Mode 4			
BEC	**low channel [dBµV/m]**	**high channel [dBµV/m]**	**Limit AVG/Peak [dBµV/m]**
U-NII-1 & U-NII-2A	44.8	47.7	≤ -54 / 74
U-NII-2C & U-NII-3	51.2	44.8	≤ -54 / 74

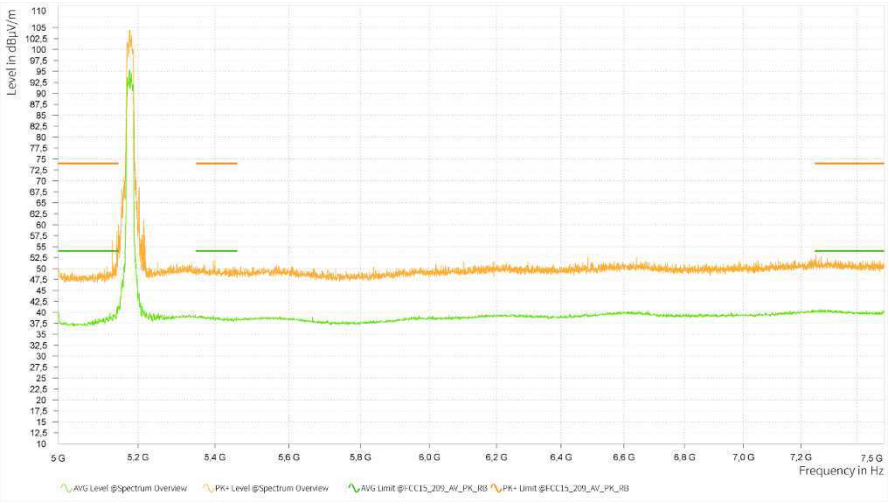
Comment:	Above tables show field strength values and field strength limits as per §15.209 resp. RSS-Gen. Measurements are performed as field strength measurements with a limit of 54 dBµV/m (AVG) and 74 dBµV (Peak) as per §15.209 resp. RSS-Gen. A field strength limit of 54 dBµV/m at 3 m corresponds to an EIRP of -41.3 dBm and is therefore more stringent than the required -27 dBm of §15.407(b) resp. RSS-247, 6.2.

Verdict	**- PASS -**	see next plots

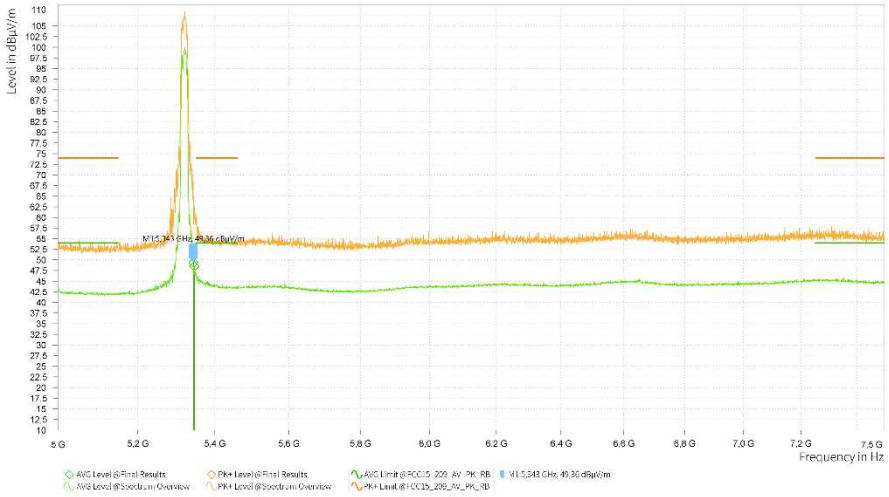
* description of traces for radiated Bend Edge Compliance (BEC) measurements:

positive Peak (Max Hold) trace
average Peak (Max Hold) trace

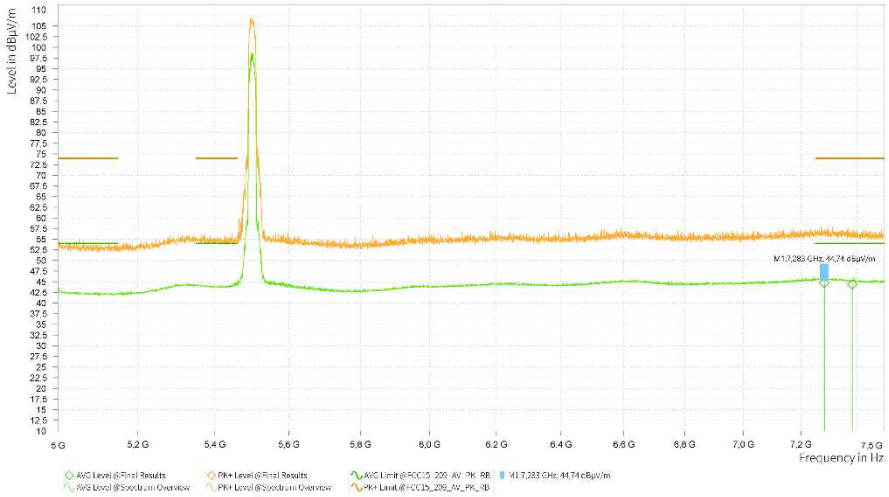
Plot 222: BEC low, Mode 1, CH36



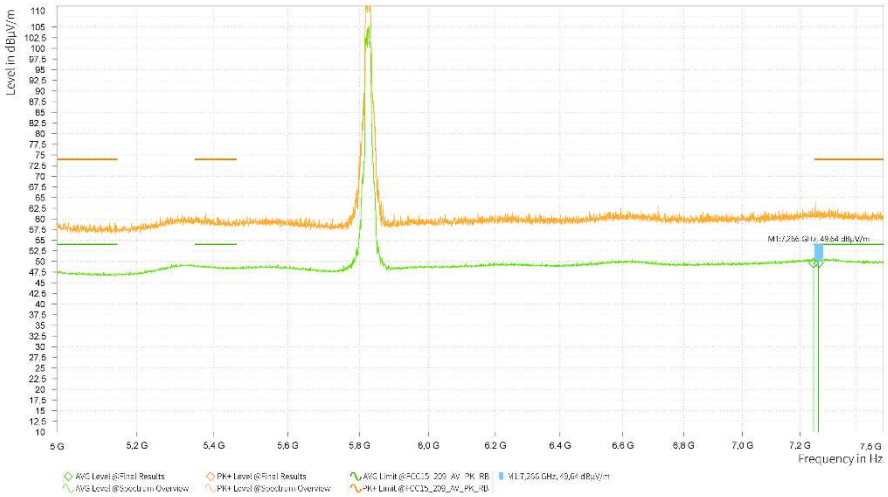
Plot 223: BEC high, Mode 1, CH64



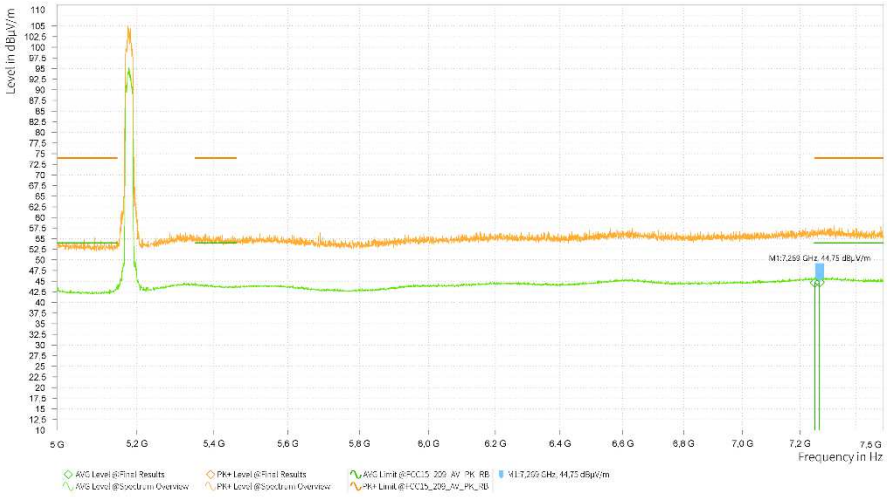
Plot 224: BEC low, Mode 1, CH100



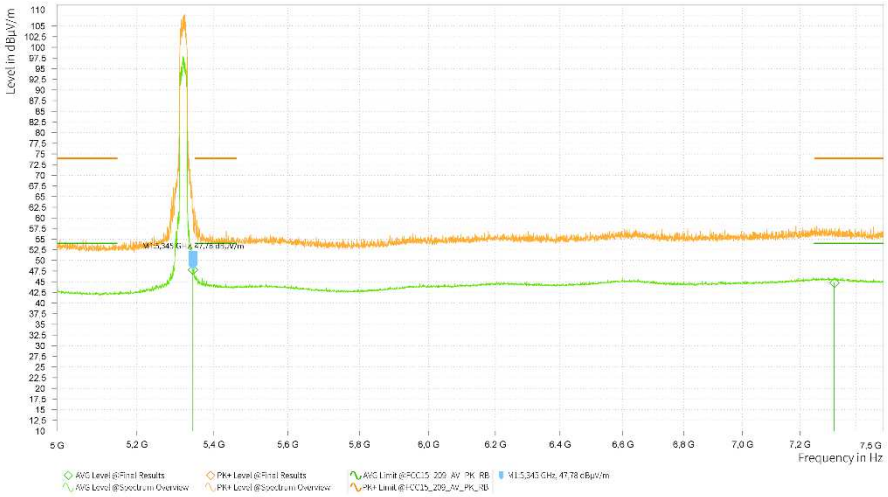
Plot 225: BEC high, Mode 1, CH165



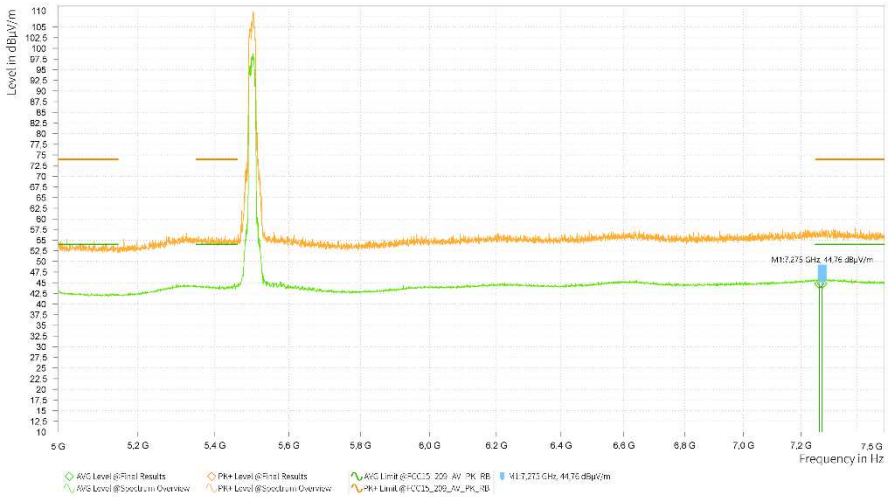
Plot 226: BEC low, Mode 2, CH36



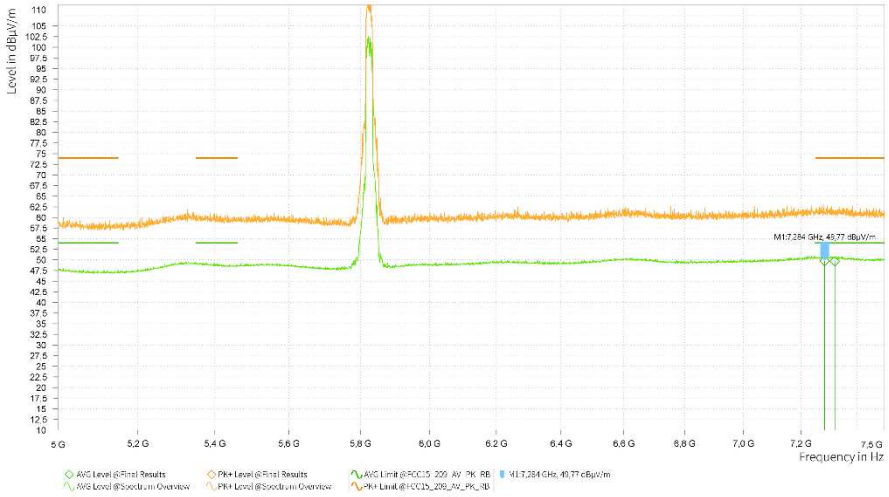
Plot 227: BEC high, Mode 2, CH64



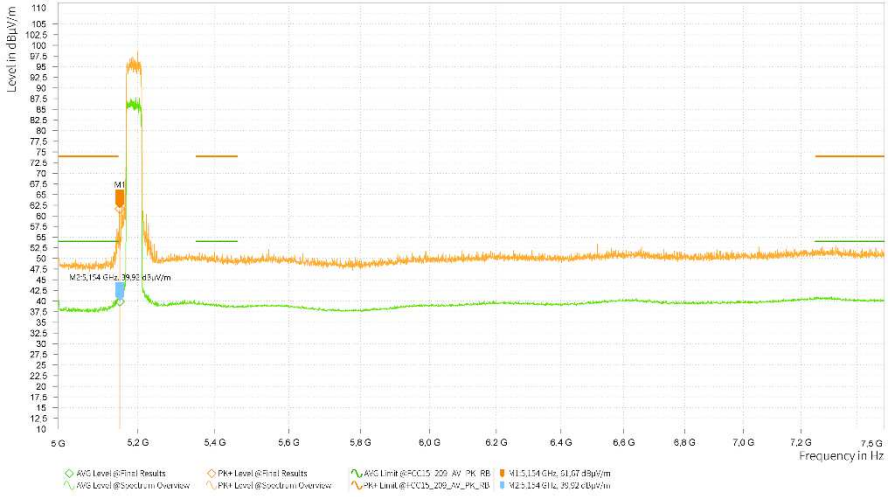
Plot 228: BEC low, Mode 2, CH100



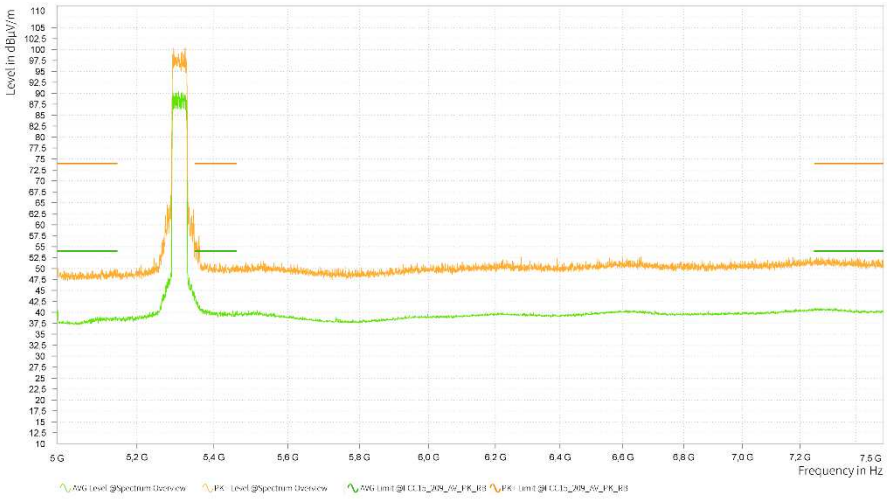
Plot 229: BEC high, Mode 2, CH165



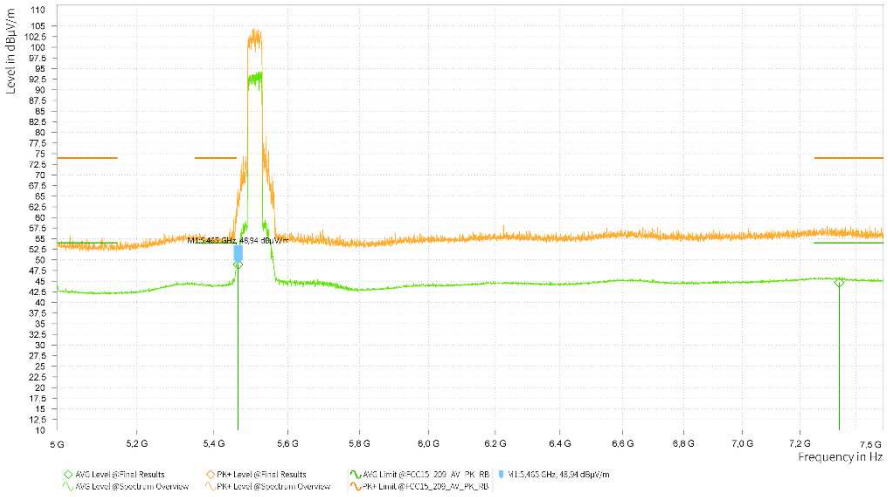
Plot 230: BEC low, Mode 3, CH38



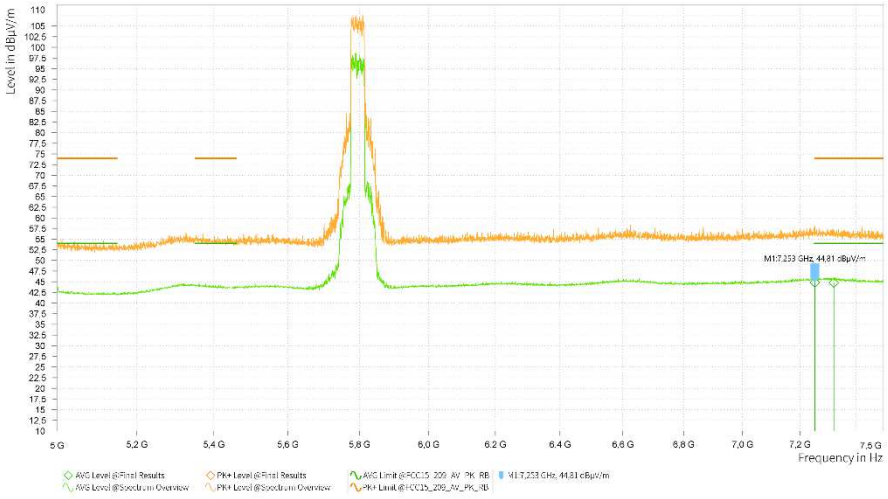
Plot 231: BEC high, Mode 3, CH62



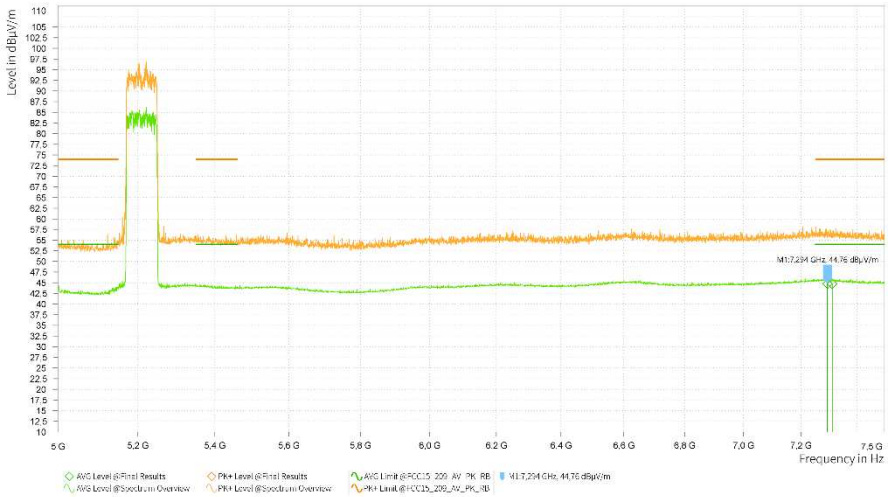
Plot 232: BEC low, Mode 3, CH102



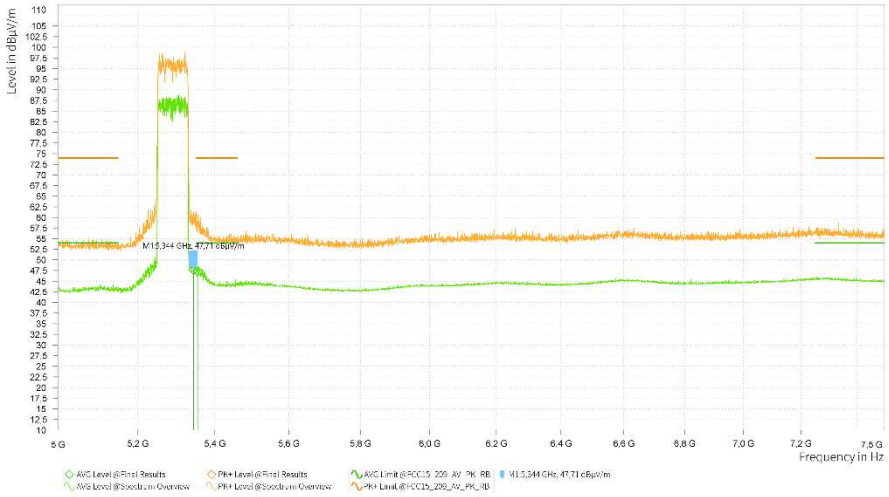
Plot 233: BEC high, Mode 3, CH159



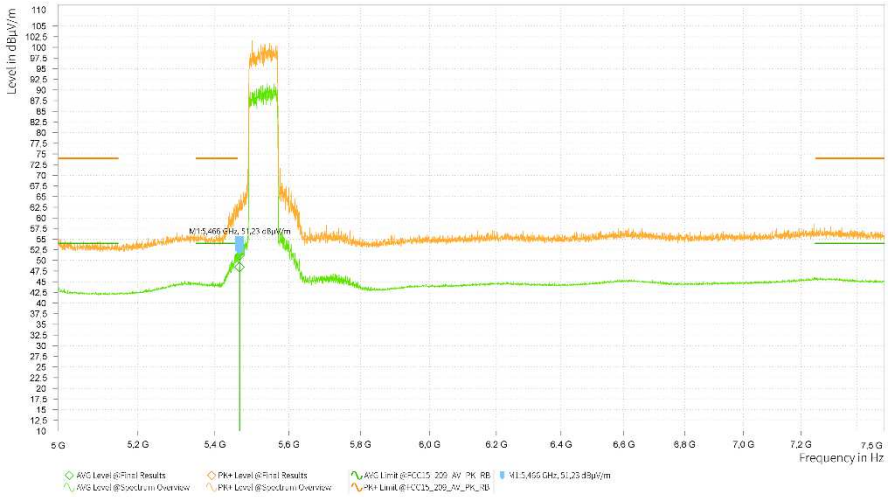
Plot 234: BEC low, Mode 4, CH42



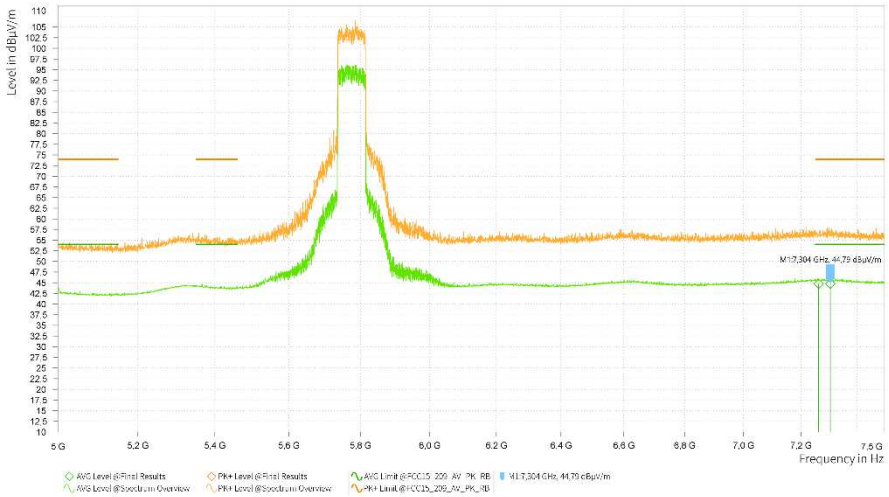
Plot 235: BEC high, Mode 4, CH58



Plot 236: BEC low, Mode 4, CH106



Plot 237: BEC high, Mode 4, CH155



7.9 Conducted Spurious Emissions (CSE)

Applicability
This requirement applies to all unlicensed national information infrastructure (UNII) / licence-exempt local area network (LE-LAN) devices operating in the bands 5150-5250 MHz, 5250-5350 MHz, 5470-5725 MHz, 5725-5850 MHz and 5850-5895 MHz.

Description
Spurious emission / unwanted emissions are emission on a frequency or frequencies which are outside the authorized band and the level of which may be reduced without affecting the corresponding transmission of information. Spurious emissions include harmonic emissions, parasitic emissions, intermodulation products and frequency conversion products.

Limits
§15.407(b)
RSS-247, 6.2
All emissions out- side of the operational frequency band shall not exceed an e.i.r.p. of-27 dBm/MHz.
Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209.

Test procedure
Test according to FCC title 47 part 15 §15.407(b), KDB 789033 D02 General U-NII Test Procedures New Rules v02r01 II.G.4&5 and ANSI C63.10-2013

Test setup: 8.4 with conducted sample (see section 5.2)

Test results: Mode 1					
Channel	**Frequency [MHz]**	**Peak/RMS Detector**	**Level [dBm]**	**Limit [dBm]**	**Verdict**
36	see next plots	MaxPeak	see next plots*	see next plots	- passed -
44	see next plots	MaxPeak	see next plots*	see next plots	- passed -
48	see next plots	MaxPeak	see next plots*	see next plots	- passed -
52	see next plots	MaxPeak	see next plots*	see next plots	- passed -
60	see next plots	MaxPeak	see next plots*	see next plots	- passed -
64	see next plots	MaxPeak	see next plots*	see next plots	- passed -
100	see next plots	MaxPeak	see next plots*	see next plots	- passed -
116	see next plots	MaxPeak	see next plots*	see next plots	- passed -
140	see next plots	MaxPeak	see next plots*	see next plots	- passed -
144	see next plots	MaxPeak	see next plots*	see next plots	- passed -
149	see next plots	MaxPeak	see next plots*	see next plots	- passed -
157	see next plots	MaxPeak	see next plots*	see next plots	- passed -
165	see next plots	MaxPeak	see next plots*	see next plots	- passed -

* all detected peaks are more thean 6 dB below the limit

Test results: Mode 2					
Channel	**Frequency [MHz]**	**Peak/RMS Detector**	**Level [dBm]**	**Limit [dBm]**	**Verdict**
36	see next plots	MaxPeak	see next plots*	see next plots	- passed -
44	see next plots	MaxPeak	see next plots*	see next plots	- passed -
48	see next plots	MaxPeak	see next plots*	see next plots	- passed -
52	see next plots	MaxPeak	see next plots*	see next plots	- passed -
60	see next plots	MaxPeak	see next plots*	see next plots	- passed -
64	see next plots	MaxPeak	see next plots*	see next plots	- passed -
100	see next plots	MaxPeak	see next plots*	see next plots	- passed -
116	see next plots	MaxPeak	see next plots*	see next plots	- passed -
140	see next plots	MaxPeak	see next plots*	see next plots	- passed -
144	see next plots	MaxPeak	see next plots*	see next plots	- passed -
149	see next plots	MaxPeak	see next plots*	see next plots	- passed -
157	see next plots	MaxPeak	see next plots*	see next plots	- passed -
165	see next plots	MaxPeak	see next plots*	see next plots	- passed -

* all detected peaks are more thean 6 dB below the limit