

Test report

379384-2TRFWL

Date of issue: October 17, 2019

Applicant: Carnegie Technologies

Product: Wireless Bridge

Model: SatBridge

Model variant: N/A


FCC ID: 2ARIP-0007

Specifications:

- ◆ FCC 47 CFR Part 25
Satellite communications

Test location

Company name	Nemko USA, Inc.
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City	Carlsbad
Province	California
Postal code	92008
Country	USA
Telephone	+1 760 444 3500
Website	www.nemko.com
Site number	FCC: US5058; IC: 2040B-3

Tested by	Martha Espinoza, Wireless Engineer
Reviewed by	Juan Manuel Gonzalez, EMC/Wireless Laboratories and Business Development Manager
Review date	October 17, 2019
Reviewer signature	

Limits of responsibility

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report. This test report has been completed in accordance with the requirements of ISO/IEC 17025. All results contain in this report are within Nemko USA's ISO/IEC 17025 accreditation.

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Table of contents

Table of contents	3
Section 1. Report summary	4
1.1 Applicant and manufacturer	4
1.2 Test specifications	4
1.3 Test methods.....	4
1.4 Statement of compliance	4
1.5 Exclusions.....	4
1.6 Test report revision history	4
Section 2. Summary of test results.....	5
2.1 FCC Part 25 test results	5
Section 3. Equipment under test (EUT) details	6
3.1 Sample information.....	6
3.2 EUT information	6
3.3 Technical information	6
3.4 Product description and theory of operation	6
3.5 EUT exercise details.....	6
3.6 EUT setup diagram	7
3.7 EUT sub assemblies	7
Section 4. Engineering considerations.....	8
4.1 Modifications incorporated in the EUT	8
4.2 Technical judgment	8
4.3 Deviations from laboratory tests procedures.....	8
Section 5. Test conditions.....	9
5.1 Atmospheric conditions	9
5.2 Power supply range.....	9
Section 6. Measurement uncertainty	10
6.1 Uncertainty of measurement	10
Section 7. Test equipment	11
7.1 Test equipment list.....	11
Section 8. Testing data	12
8.1 FCC 2.1049 Occupied bandwidth.....	12
8.2 FCC 25.204 Transmitter e.i.r.p. for mobile earth stations	15
8.3 Spurious at Antenna Terminals FCC 25.202(f)	18
8.4 Field Strength Of Radiated Spurious Emissions FCC 25.202(f) & Part 2 Subpart J §2.1053.....	24
8.5 FCC 25.202(d) Frequency tolerance, Earth stations.....	30
8.6 FCC 25.216 and RSS-170 5.4.3.2 Limits on emissions from mobile earth stations for protection of aeronautical radionavigation-satellite service.....	31
Section 9. Block diagrams of test set-ups	34
9.1 Radiated emissions set-up for frequencies below 1 GHz.....	34
9.2 Radiated emissions set-up for frequencies above 1 GHz.....	35

Section 1. Report summary

1.1 Applicant and manufacturer

Company name	Carnegie Technologies
Address	9737 Great Hillis Trails Suite 260
City	Austin
Province/State	Texas
Postal/Zip code	78759
Country	U.S.A.

Manufacturer:

Company name	Carnegie Technologies
Address	9737 Great Hills Trail, Suite 260
Austin	Austin
Province/State	TX
Postal/Zip code	78759
Country	U.S.A.
Contact Name/Phone/Email	John Nagy +1-512-627-3787 jnagy@carnegietechnologies.com

1.2 Test specifications

FCC 47 CFR Part 25	Satellite communications
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1.3 Test methods

273109 D01 Equip Auth Guide Part 25 TXReceiver v02r02 (2011)	Equipment Authorization Guidance for Part 25 Transceivers
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1.4 Statement of compliance

In the configuration tested, the EUT was found compliant.

Testing was completed against all relevant requirements of the test standard. Results obtained indicate that the product under test complies in full with the requirements tested. The test results relate only to the items tested.

See "Summary of test results" for full details.

1.5 Exclusions

None

1.6 Test report revision history

Revision #	Details of changes made to test report
379384-2TRFWL	Original report issued

Section 2. Summary of test results

2.1 FCC Part 25 test results

Part	Test description	Verdict
25.204	Power limit	Pass
2.1046	Occupied bandwidth	Pass
2.1053	Field strength of spurious radiation.	Pass
25.202(f)	Spurious emissions at the antenna terminal	Pass
25.202(f)	Field strength of spurious emissions	Pass
25.202(d)	Frequency tolerance, earth stations	Pass
25.216	Limits for emissions from mobile earth stations for protection of aeronautical radionavigation satellite service	Pass

Notes: ¹ Measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, was performed with the supply voltage varied between 85 % and 115 % of the nominal rated supply voltage. No noticeable output power variation was observed

² The Antennas are located within the enclosure of EUT and not user accessible.

Section 3. Equipment under test (EUT) details

3.1 Sample information

Receipt date	August 28, 2019
Nemko sample ID number	379384

3.2 EUT information

Product name	SatBridge
Model	AP-TH1118
Model variant	N/A
Serial number	192630030 (AP Board), 193031072 (Main Ant Board) & 192628999(HPA SN)
Software revision	Eng. Version

3.3 Technical information

Frequency band	1626.595MHz – 1660.200MHz in the 1626.5-1660.5 MHz L-Band Mobile Satellite Service
Frequency Min (MHz)	1626.595MHz
Frequency Max (MHz)	1660.200MHz
RF power Min (W)	N/A
RF power Max (W)	78.343
Measured BW (kHz) (99 %)	251.710
Type of modulation	QPSK and APSK
Emission classification (F1D, G1D, D1D)	252KG1D
Transmitter spurious, Units @ distance	f=16.305 GHz Level=79.98db μ V/m @ 3 meters
Power requirements	120VAC/60Hz
Antenna information	The EUT uses a unique antenna coupling/ non-detachable antenna to the intentional radiator. 11.3 dBi Internal Antenna

3.4 Product description and theory of operation

EUT Transmits in the L1 band only (1626.5MHz to 1660.5MHz) and it has two modulations (QPSK and APSK).

3.5 EUT exercise details

Proprietary scripts provided by the manufacturer were used to exercise the EUT. Once a script is executed the EUT will transmit at maximum power at low or high channel with chosen modulation.

3.6 EUT setup diagram



Figure 3.6-1: Setup diagram

3.7 EUT sub assemblies

Table 3.7-1: EUT sub assemblies

Description	Brand name	Model/Part number	Serial number
Access point	Carnegie technologies	N/A	N/A

Table 3.7-2: Support equipment

Description	Brand name	Model/Part number	Serial number	Rev.
Computer Laptop	DELL	Latitude 7490	8KC8QN2	-
USB – CAT 5C Adapter	-	-	-	-
CAT-5c cable	-	-	-	-

Section 4. Engineering considerations

4.1 Modifications incorporated in the EUT

The following modifications were performed by client:

Mid Channel was retested with an internal Software defined attenuation of 10dB to meet the limits of Masks:

SW Settings:

(QPSK) senddsp srtvTestTxTone PNB512_910_QPSK 10 75000

(16APSK) senddsp srtvTestTxTone PNB512_910_APSK 10 75000

4.2 Technical judgment

None

4.3 Deviations from laboratory tests procedures

No deviations were made from laboratory procedures.

Section 5. Test conditions

5.1 Atmospheric conditions

Temperature	15–30 °C
Relative humidity	20–75 %
Air pressure	860–1060 mbar

When it is impracticable to carry out tests under these conditions, a note to this effect stating the ambient temperature and relative humidity during the tests shall be recorded and stated.

5.2 Power supply range

The normal test voltage for equipment to be connected to the mains shall be the nominal mains voltage. For the purpose of the present document, the nominal voltage shall be the declared voltage, or any of the declared voltages $\pm 5\%$, for which the equipment was designed.

Voltage used during testing: AC-DC Adaptor at 120VAC/60Hz

Section 6. Measurement uncertainty

6.1 Uncertainty of measurement

Nemko USA Inc. has calculated measurement uncertainty and is documented in EMC/MUC/001 "Uncertainty in EMC measurements." Measurement uncertainty was calculated using the methods described in CISPR 16-4 Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC measurements; as well as described in UKAS LAB34: The expression of Uncertainty in EMC Testing. Measurement uncertainty calculations assume a coverage factor of K=2 with 95% certainty.

Test name	Measurement uncertainty, dB
All antenna port measurements/ including OBW	0.55
Conducted spurious emissions	1.13
Radiated spurious emissions	3.78
AC power line conducted emissions	1.38
Supply Voltages	0.05%
Time	2.09%

Section 7. Test equipment

7.1 Test equipment list

Table 7.1-1: Equipment list

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
EMC Test Receiver	Rohde & Schwarz	ESU 40	E1121	1 year	05-25-2020
Antenna, Bilog	Schaffner-Chase	CBL6111C	1480	1 year	04-18-2020
Antenna, Horn	ETS	3117-PA	E1139	1 year	03-21-2020
Spectrum Analyzer	Rohde & Schwarz	FSV40	E1120	1 year	10-24-2019
Temperature chamber	Test Equity	115A	E1162	1 year	06-18-2020
Variac	Dayton	1520	S1045	NCR	Verified with 813
Multimeter	Fluke	111	813	1 year	06-13-2020

Table 7.1-2: Radiated emissions test software details

Manufacturer of Software	Details
Rohde-Schwarz	EMC 32 V10.0

Notes: None

Section 8. Testing data

8.1 FCC 2.1049 Occupied bandwidth

8.1.1 Definitions and limits

FCC:

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission.

8.1.2 Test summary

Test date	September 26, 2019	Temperature	22 °C
Test engineer	Martha Espinoza	Air pressure	1002 mbar
Verdict	Pass	Relative humidity	48 %

8.1.3 Observations, settings and special notes

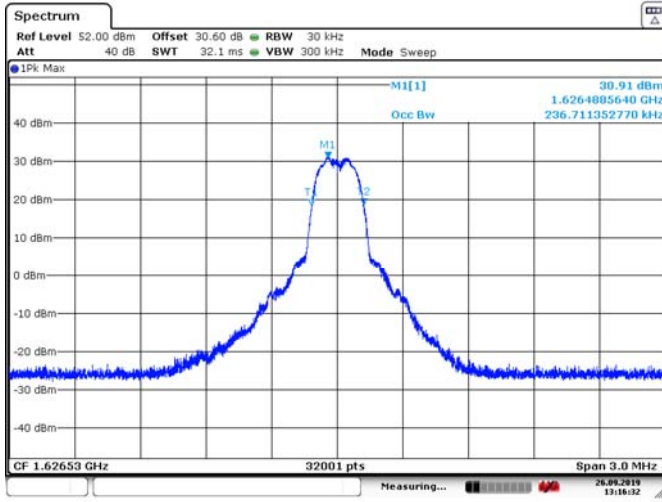
Spectrum analyser settings:

Resolution bandwidth:	≥ 1 % of span
Video bandwidth:	≥3 × RBW
Detector mode:	Peak
Trace mode:	Max Hold

8.1.4 Test data

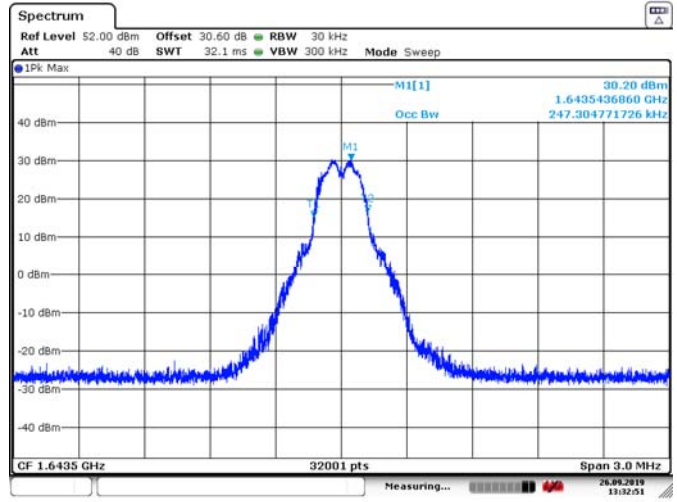
Table 8.1-1: 99 % bandwidth results

Modulation	Frequency, MHz	99 % occupied bandwidth, KHz
QPSK	1626.53	236.711
QPSK	1643.5	247.304
QPSK	1660.46875	237.273
16APSK	1626.53	238.492
16APSK	1643.5	251.710
16APSK	1660.46875	235.680



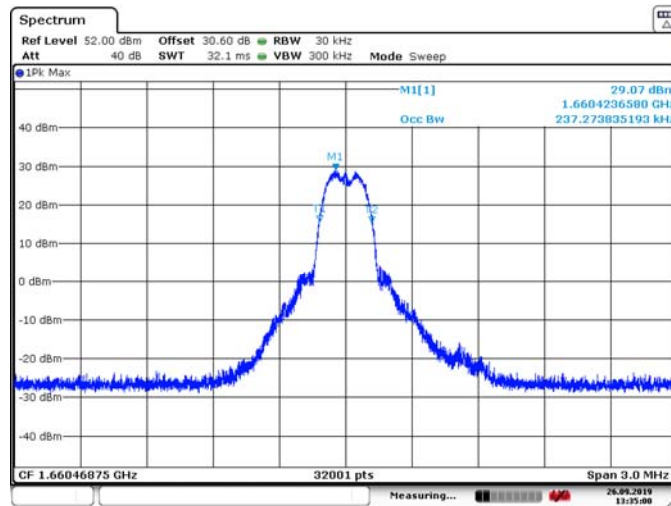
Date: 26 SEP 2019 13:16:32

Figure 8.1-1: 99 % bandwidth on low channel (QPSK)



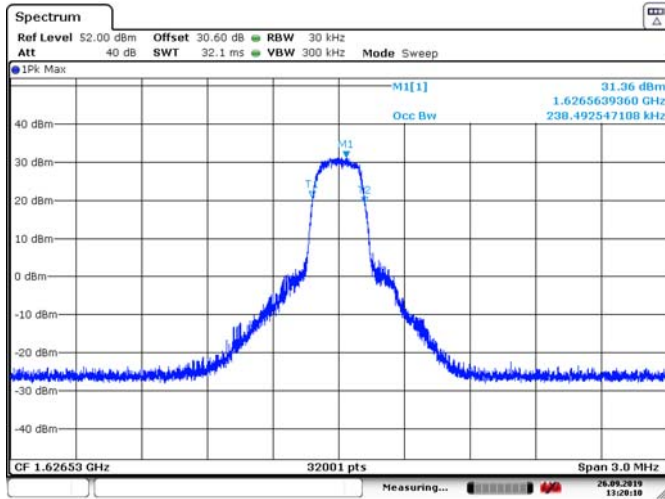
Date: 26 SEP 2019 13:32:51

Figure 8.1-2: 99 % bandwidth on mid channel(QPSK)



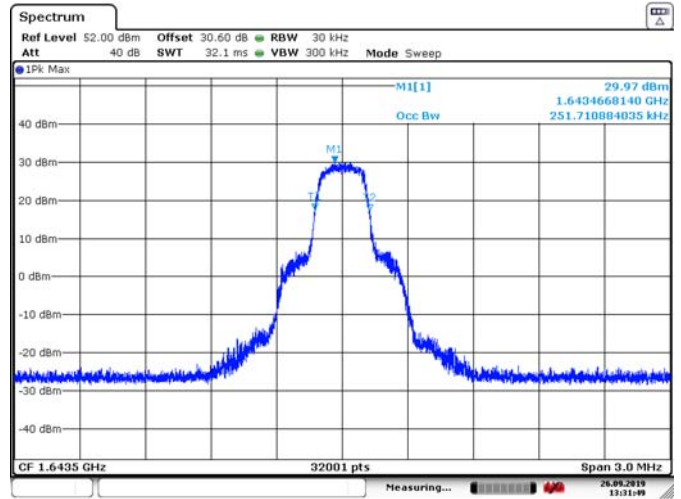
Date: 26 SEP 2019 13:35:01

Figure 8.1-3: 99 % bandwidth on high channel(QPSK)



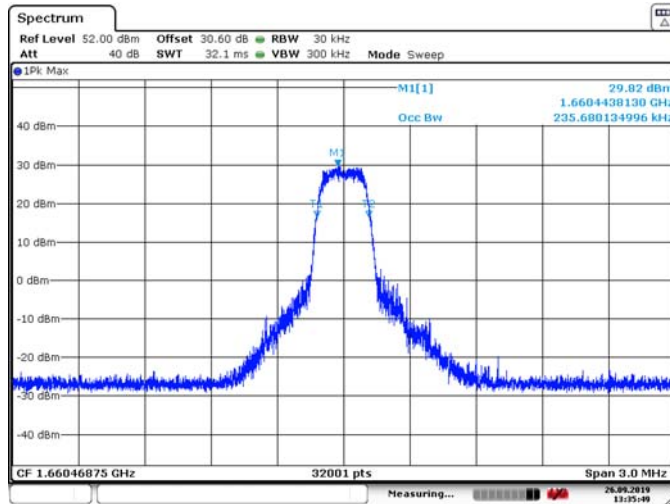
Date: 26 SEP.2019 13:20:10

Figure 8.1-4: 99 % bandwidth on low channel (16APSK)



Date: 26 SEP.2019 13:31:49

Figure 8.1-5: 99 % bandwidth on mid channel(16APSK)



Date: 26 SEP.2019 13:35:49

Figure 8.1-6: 99 % bandwidth on high channel(16APSK)

8.2 FCC 25.204 Transmitter e.i.r.p. for mobile earth stations

8.2.1 Definitions and limits

FCC:

- (a) In bands shared coequally with terrestrial radio communication services, the equivalent isotropically radiated power transmitted in any direction towards the horizon by an earth station, other than an ESV, operating in frequency bands between 1 and 15 GHz, shall not exceed the following limits except as provided for in paragraph (c) below:
 +40 dBW (70 dBm) in any 4 kHz band for $\Theta \leq 0^\circ$
 +40 + 3 Θ dBW in any 4 kHz band for $0^\circ < \Theta \leq 5^\circ$
 where Θ is the angle of elevation of the horizon viewed from the center of radiation of the antenna of the earth station and measured in degrees as positive above the horizontal plane and negative below it.
- (b) In bands shared coequally with terrestrial radiocommunication services, the equivalent isotropically radiated power transmitted in any direction towards the horizon by an earth station operating in frequency bands above 15 GHz shall not exceed the following limits except as provided for in paragraph (c) below:
 +64 dBW (94 dBm) in any 1 MHz band for $\Theta \leq 0^\circ$
 +64 + 3 Θ dBW in any 1 MHz band for $0^\circ < \Theta \leq 5^\circ$
 where Θ is as defined in paragraph (a) above.
- (c) For angles of elevation of the horizon greater than 5° there shall be no restriction as to the equivalent isotropically radiated power transmitted by an earth station towards the horizon.
- (d) Notwithstanding the e.i.r.p. and e.i.r.p. density limits specified in the station authorization, each earth station transmission shall be conducted at the lowest power level that will provide the required signal quality as indicated in the application and further amended by coordination agreements.

8.2.2 Test summary

Test date	Sept 26 and 30, 2019	Temperature	22 °C
Test engineer	Martha Espinoza	Air pressure	1002 mbar
Verdict	Pass	Relative humidity	48 %

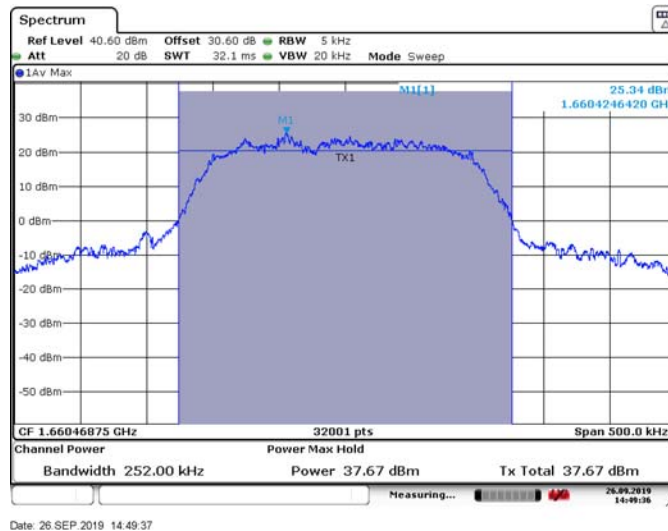
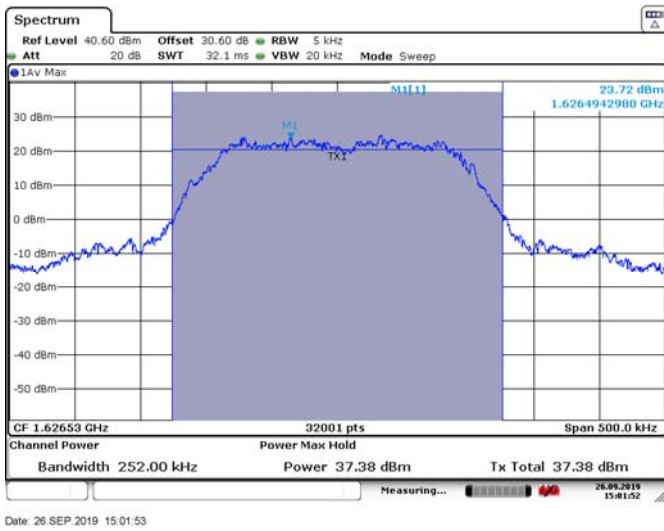
8.2.3 Observations, settings and special notes

Mid Channel was retested with internal attenuation 10:
 (QPSK) senddsp srtvTestTxTone PNB512_910_QPSK 10 75000
 (16APSK) senddsp srtvTestTxTone PNB512_910_APSK 10 75000

8.2.4 Test data

Table 8.2-1: EIRP measurement result

Modulation	Frequency, MHz	Output Power, dBm	Antenna Gain, dBi	EIRP, dBm	EIRP, dBW
QPSK	1626.53	37.38	11.3	48.68	18.68
QPSK	1643.5	34.82	10.9	45.72	15.72
QPSK	1660.46875	37.67	10.5	48.17	18.17
16APSK	1626.53	37.64	11.3	48.94	18.94
16APSK	1643.5	33.49	10.9	44.39	14.39
16APSK	1660.46875	36.76	10.5	47.26	17.26



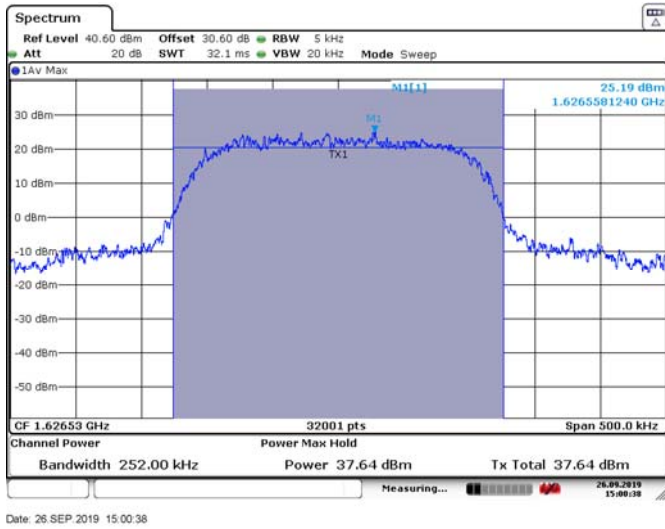


Figure 8.2-4: Power on low channel (16APSK)

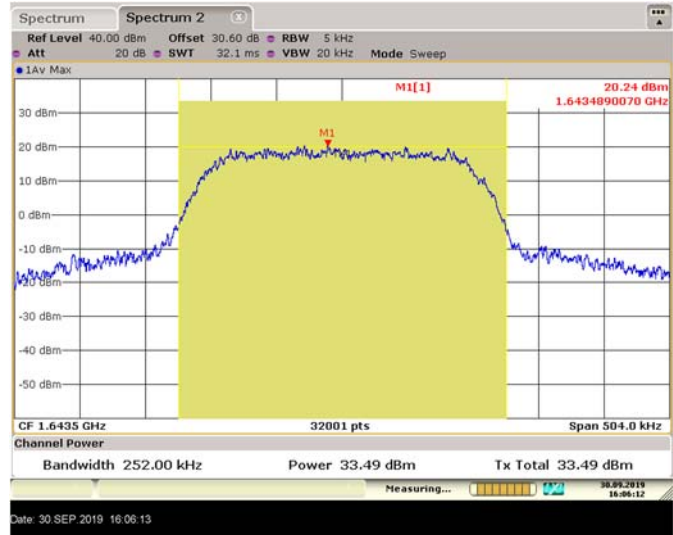


Figure 8.2-5: Power on mid channel (16APSK)

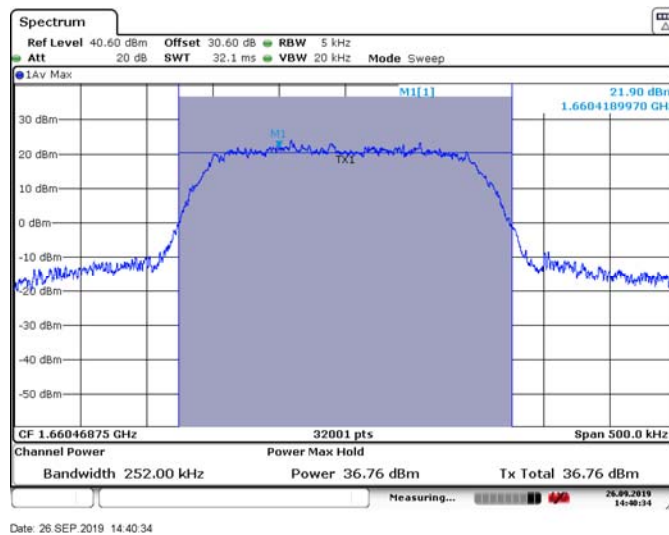


Figure 8.2-6: Power on high channel (16APSK)

8.3 Spurious at Antenna Terminals FCC 25.202(f)

8.3.1 Definitions and limits

FCC:

(f) Emission limitations. The mean power of emissions shall be attenuated below the mean output power of the transmitter in accordance with the following schedule:

(1) In any 4 kHz band, the center frequency of which is removed from the assigned frequency by more than 50 percent up to and including 100 percent of the authorized bandwidth: 25 dB;

(2) In any 4 kHz band, the center frequency of which is removed from the assigned frequency by more than 100 percent up to and including 250 percent of the authorized bandwidth: 35 dB;

(3) In any 4 kHz band, the center frequency of which is removed from the assigned frequency by more than 250 percent of the authorized bandwidth: An amount equal to 43 dB plus 10 times the logarithm (to the base 10) of the transmitter power in watts (-13 dBm fixed);

(4) In any event, when an emission outside of the authorized bandwidth causes harmful interference, the Commission may, at its discretion, require greater attenuation than specified in paragraphs (f) (1), (2) and (3) of this section.

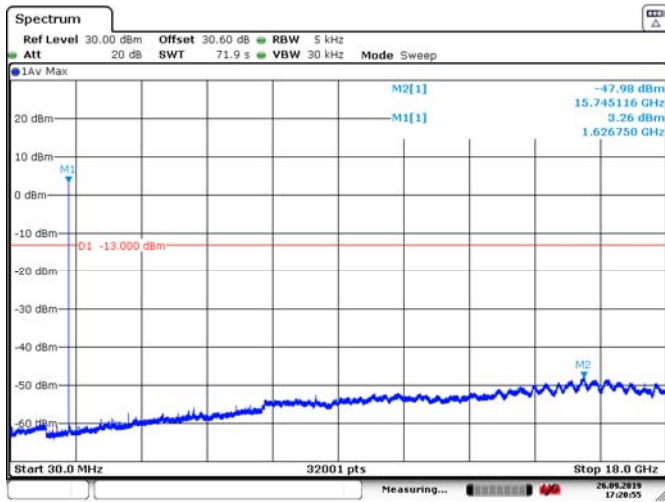
8.3.2 Test summary

Test date	September 26 to 30, 2019	Temperature	22 °C
Test engineer	Martha Espinoza	Air pressure	1002 mbar
Verdict	Pass	Relative humidity	48 %

8.3.3 Observations, settings and special notes

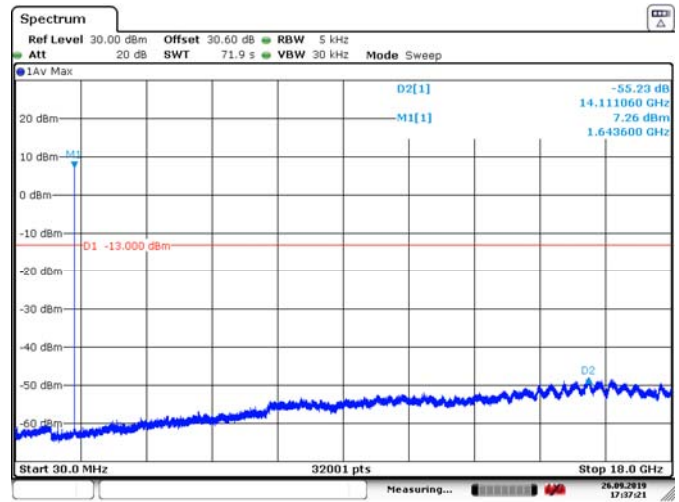
The spectrum was searched from 30 MHz to the 10th harmonic.
This is a conducted test utilizing a spectrum analyzer.
RBW is set to 5 kHz (Equipment limitation) for fundamental verification.
An offset of 30.6dB was added to compensate for the external attenuator and cable used.

8.3.4 Test data Spurious at Antenna Terminals



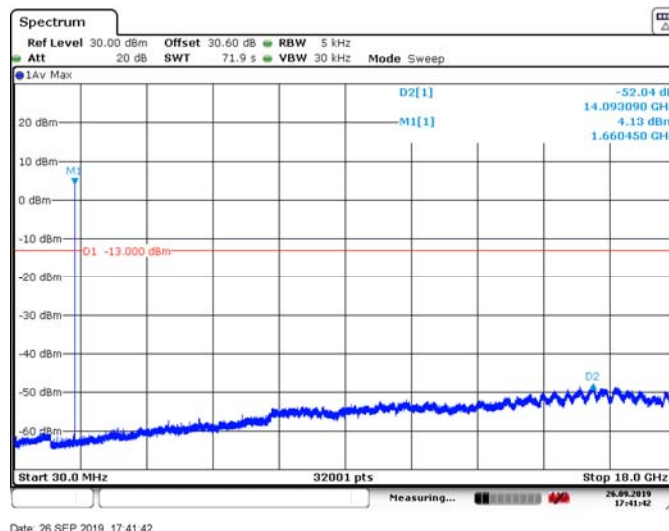
Date: 26 SEP 2019 17:20:55

Figure 8.3-1: Spurious E. at Antenna Terminals L. channel (QPSK)



Date: 26 SEP 2019 17:37:22

Figure 8.3-2: Spurious E. at Antenna Terminals M. channel (QPSK)



Date: 26 SEP 2019 17:41:42

Figure 8.3-3: Spurious E. at Antenna Terminals H. channel (QPSK)

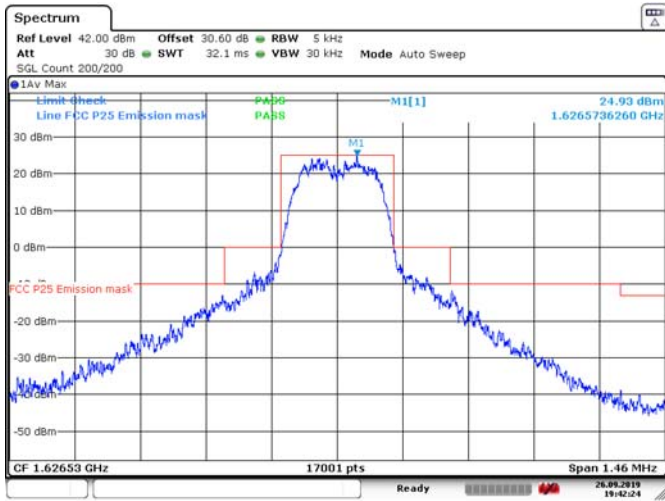


Figure 8.3-4: Emissions Mask L channel (QPSK)



Figure 8.3-5: Emissions Mask M channel (QPSK)

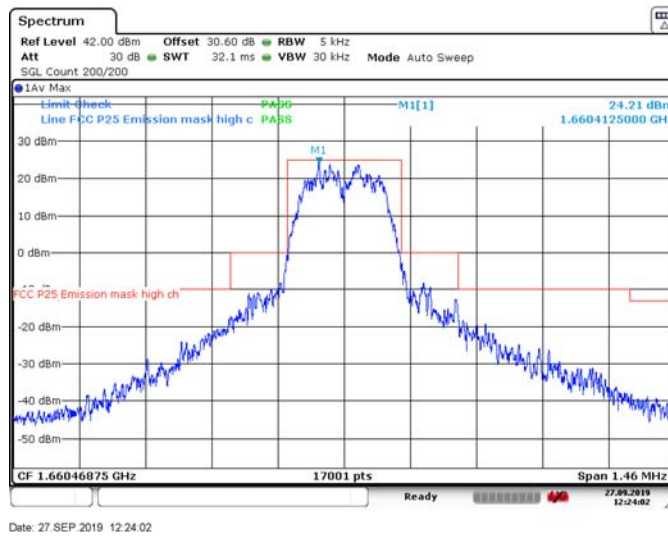


Figure 8.3-6: Emissions Mask H channel (QPSK)

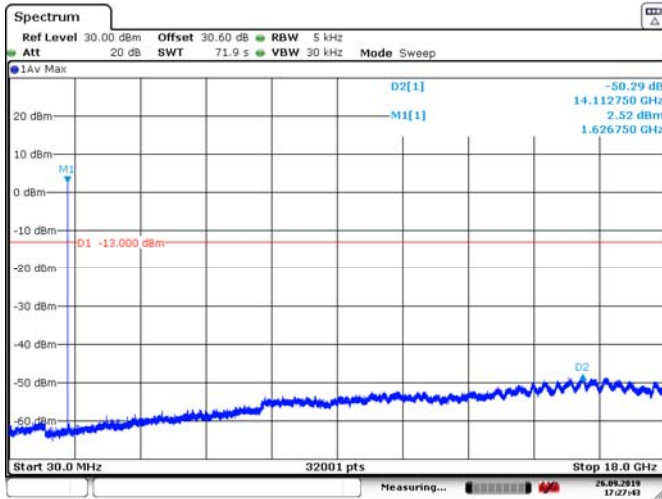


Figure 8.3-7: 2.3 Spurious E. at Antenna Terminals L. channel (APSK)

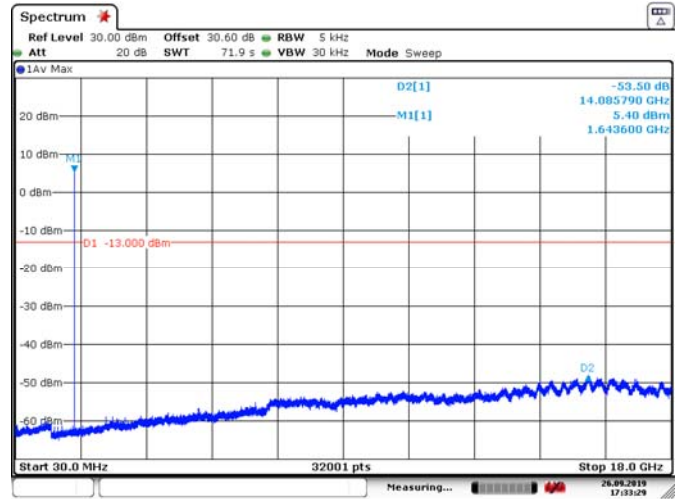


Figure 8.3-8: Spurious E. at Antenna Terminals M. channel (APSK)

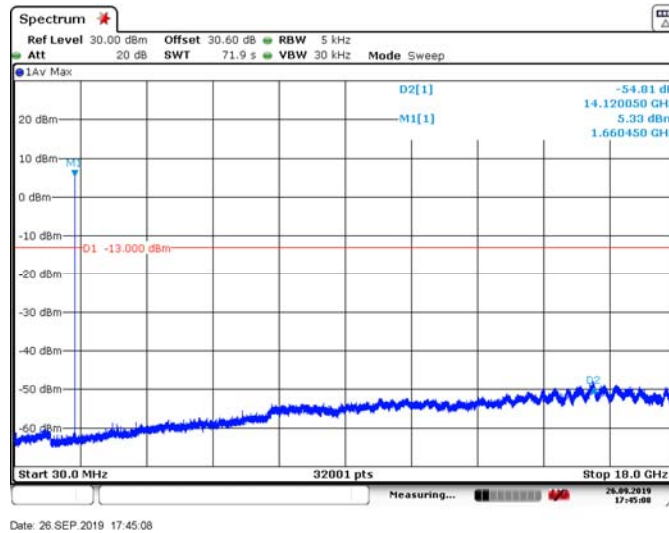


Figure 8.3-9: Spurious E. at Antenna Terminals H. channel (APSK)

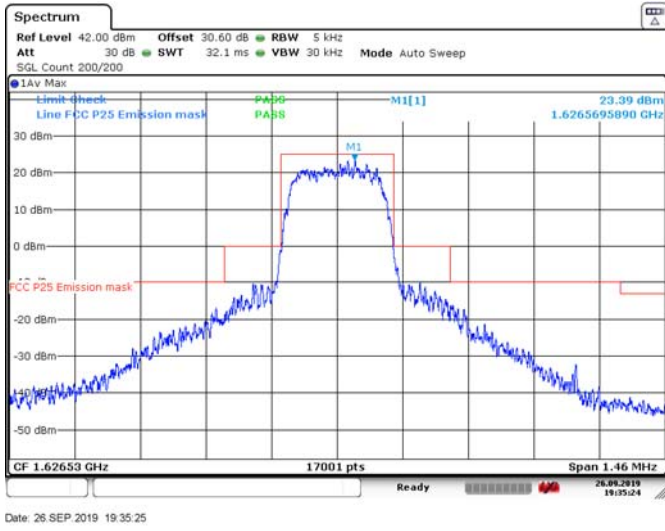


Figure 8.3-10: Emissions Mask L channel (APSK)

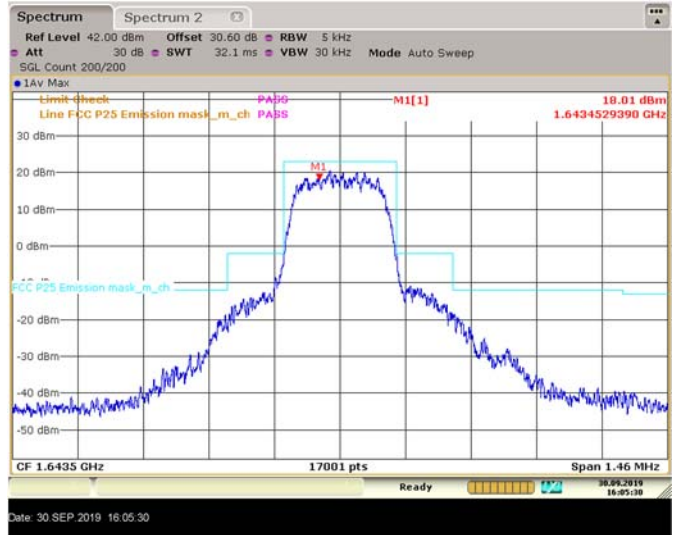


Figure 8.3-11: Emissions Mask M channel (APSK)

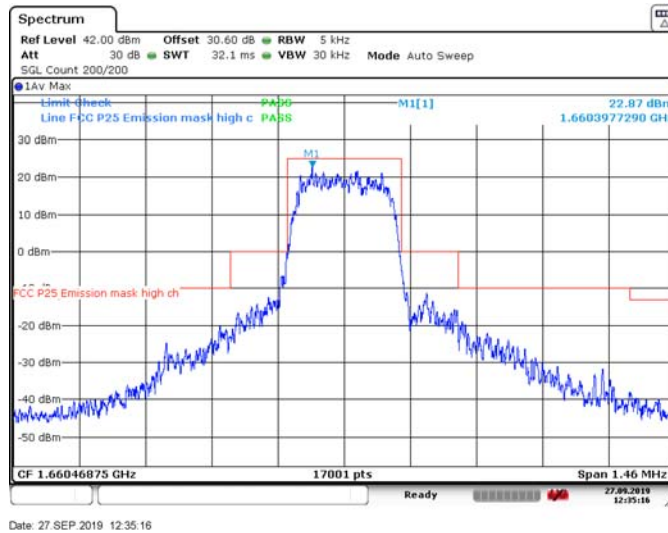


Figure 8.3-12: Emissions Mask H channel (APSK)

8.4 Field Strength Of Radiated Spurious Emissions FCC 25.202(f) & Part 2 Subpart J §2.1053

8.4.1 Definitions and limits

FCC:

(f) Emission limitations. The mean power of emissions shall be attenuated below the mean output power of the transmitter in accordance with the following schedule:

(1) In any 4 kHz band, the center frequency of which is removed from the assigned frequency by more than 50 percent up to and including 100 percent of the authorized bandwidth: 25 dB;

(2) In any 4 kHz band, the center frequency of which is removed from the assigned frequency by more than 100 percent up to and including 250 percent of the authorized bandwidth: 35 dB;

(3) In any 4 kHz band, the center frequency of which is removed from the assigned frequency by more than 250 percent of the authorized bandwidth: An amount equal to 43 dB plus 10 times the logarithm (to the base 10) of the transmitter power in watts (-13 dBm fixed);

(4) In any event, when an emission outside of the authorized bandwidth causes harmful interference, the Commission may, at its discretion, require greater attenuation than specified in paragraphs (f) (1), (2) and (3) of this section.

§2.1053 Measurements required: Field strength of spurious radiation.

(a) Measurements shall be made to detect spurious emissions that may be radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal conditions of installation and operation. Curves or equivalent data shall be supplied showing the magnitude of each harmonic and other spurious emission.

8.4.2 Test summary

Test date	September 26 and 30, 2019	Temperature	22 °C
Test engineer	Martha Espinoza	Air pressure	1002 mbar
Verdict	Pass	Relative humidity	48 %

8.4.3 Observations, settings and special notes

The spectrum was searched from 30 MHz to the 10th harmonic.
This is a radiated test and the EUT antenna port is connected to a 50ohms load for this test.
Procedure is per §15.209 (120kHzRBW below 1GHz and 1MHzRBW above 1GHz). If all emissions during testing complies with these RBW settings re-evaluation using 4kHz RBW won't be required.
Limit for this test is 82.23dBµV/m @ 3 meters (-13dBm) E.I.R.P.

8.4.4 Test data

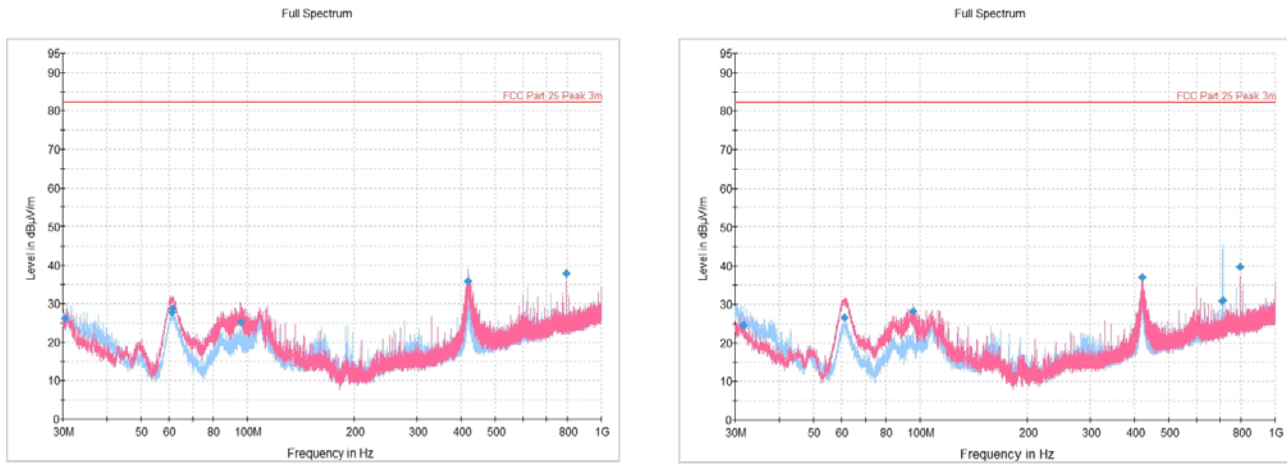


Figure 8.4-1: Radiated field strength measurement, Low channel and high channel, Below 1 GHz

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
30.480000	26.18	82.23	56.05	1000.0	120.000	102.0	H	-7.0	20.5
61.096333	27.87	82.23	54.36	1000.0	120.000	128.0	V	122.0	6.8
61.549000	28.75	82.23	53.48	1000.0	120.000	102.0	V	335.0	6.8
96.099667	25.17	82.23	57.06	1000.0	120.000	109.0	V	190.0	11.5
419.142000	35.90	82.23	46.33	1000.0	120.000	130.0	V	289.0	19.9
798.013667	37.87	82.23	44.36	1000.0	120.000	98.0	H	217.0	25.8

Table 8.4-1: Radiated field strength measurement results for low channel

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
31.693000	24.70	82.23	57.53	1000.0	120.000	102.0	H	5.0	19.8
61.137000	26.56	82.23	55.67	1000.0	120.000	102.0	V	306.0	6.8
95.522667	28.25	82.23	53.98	1000.0	120.000	104.0	V	-11.0	11.4
420.630333	37.13	82.23	45.10	1000.0	120.000	115.0	V	288.0	20.0
709.980000	30.96	82.23	51.27	1000.0	120.000	150.0	H	262.0	24.8
713.415333	31.06	82.23	51.17	1000.0	120.000	119.0	H	298.0	24.9
797.973667	39.70	82.23	42.53	1000.0	120.000	98.0	H	205.0	25.8

Table 8.4-2: Radiated field strength measurement results for high channel

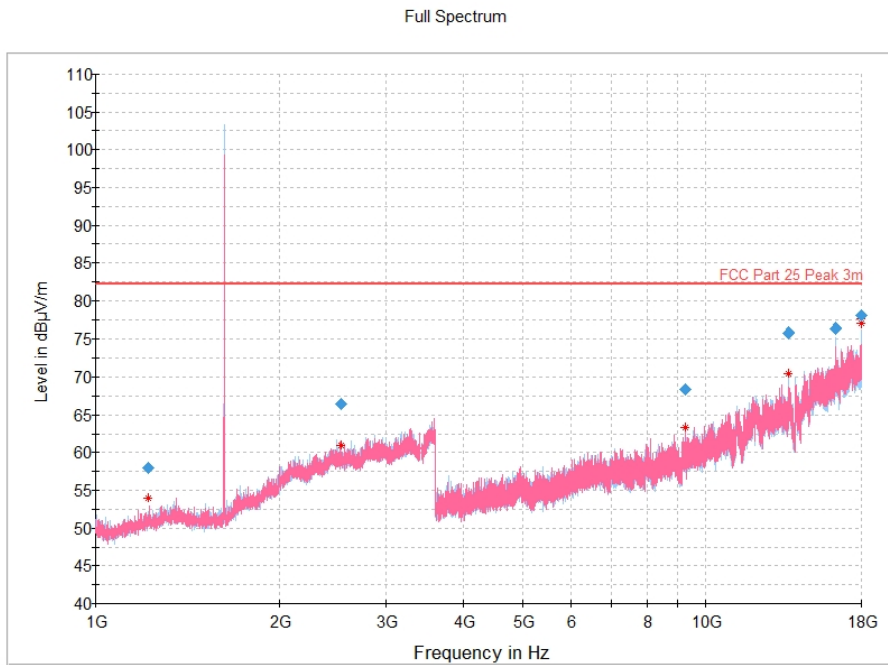


Figure 8.4-2: Radiated field strength measurement, Low channel Above 1 GHz

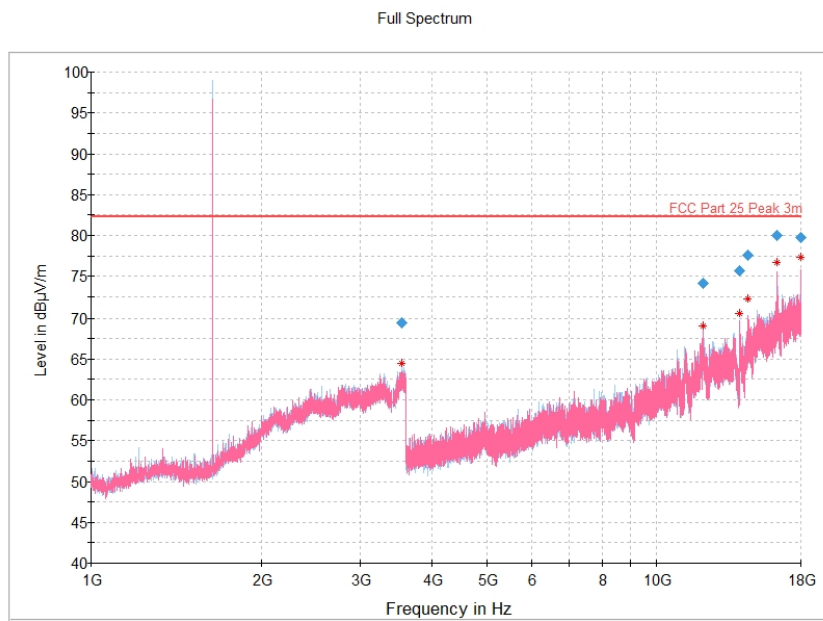


Figure 8.4-3: Radiated field strength measurement, mid channel Above 1 GHz

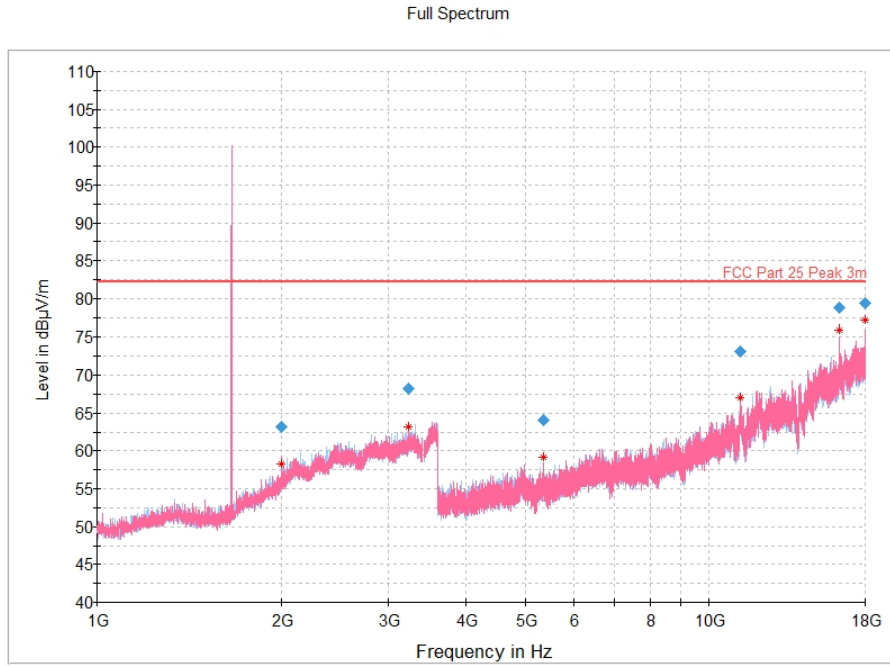


Figure 8.4-4: Radiated field strength measurement, high channel Above 1 GHz



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1221.133333	57.97	82.23	24.26	5000.0	1000.000	282.0	H	91.0	32.5
2527.666667	66.52	82.23	15.71	5000.0	1000.000	132.0	H	207.0	38.5
9250.800000	68.40	82.23	13.83	5000.0	1000.000	112.0	V	350.0	48.1
13678.100000	75.80	82.23	6.43	5000.0	1000.000	121.0	H	289.0	53.7
16304.133333	76.45	82.23	5.78	5000.0	1000.000	218.0	H	0.0	58.6
17993.633333	78.12	82.23	4.11	5000.0	1000.000	232.0	H	231.0	59.7

Table 8.4-3: Radiated field strength measurement results for low channel

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
3536.166667	69.47	82.23	12.76	5000.0	1000.000	104.0	H	268.0	39.9
14531.333333	77.63	82.23	4.60	5000.0	1000.000	200.0	V	10.0	55.0
12062.633333	74.11	82.23	8.12	5000.0	1000.000	130.0	V	10.0	52.5
14009.533333	75.71	82.23	6.52	5000.0	1000.000	161.0	V	174.0	53.9
17997.166667	79.75	82.23	2.48	5000.0	1000.000	201.0	V	-11.0	59.7
16304.666667	79.98	82.23	2.25	5000.0	1000.000	143.0	V	333.0	58.6

Table 8.4-4: Radiated field strength measurement results for mid channel

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2007.300000	63.21	82.23	19.02	5000.0	1000.000	186.0	V	8.0	36.3
3233.666667	68.18	82.23	14.05	5000.0	1000.000	169.0	V	219.0	39.6
5348.033333	64.05	82.23	18.18	5000.0	1000.000	151.0	V	162.0	43.3
11249.100000	73.21	82.23	9.02	5000.0	1000.000	127.0	V	239.0	51.4
16304.866667	78.85	82.23	3.38	5000.0	1000.000	178.0	V	131.0	58.6
17996.366667	79.40	82.23	2.83	5000.0	1000.000	231.0	V	122.0	59.7

Table 8.4-5: Radiated field strength measurement results for high channel

8.5 FCC 25.202(d) Frequency tolerance, Earth stations

8.5.1 Definitions and limits

FCC:

The carrier frequency of each earth station transmitter authorized in these services shall be maintained within 0.001 percent (± 10 ppm) of the reference frequency.

§2.1055 Frequency stability

(a) The frequency stability shall be measured with variation of ambient temperature as follows:

(1) From -30°C to $+50^{\circ}\text{C}$ for all equipment except that specified in paragraphs (a)(2) and (3) of this section

(b) Frequency measurements shall be made at the extremes of the specified temperature range and at intervals of not more than 10°C through the range.

(d) The frequency stability shall be measured with variation of primary supply voltage as follows:

(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.

8.5.2 Test summary

Test date:	September 27, 2019	Temperature:	21 °C
Test engineer:	Martha Espinoza	Air pressure:	1001 mbar
Verdict:	Pass	Relative humidity:	48 %

8.5.3 Observations, settings and special notes

Offset was calculated as follows: $\frac{F_{\text{Measured}} - F_{\text{reference}}}{F_{\text{reference}}} \times 10^6$

8.5.4 Test data

Table 8.5-1: Frequency tolerance

Test conditions	Frequency, Hz	Offset, ppm	Limit, \pm ppm	Margin, ppm
+50 °C, Nominal	1,643,499,305	-0.03	10	9.97
+40 °C, Nominal	1,643,499,350	0	10	10
+30 °C, Nominal	1,643,499,350	0	10	10
+20 °C, +15 %	1,643,499,305	-0.03	10	9.97
+20 °C, Nominal	1,643,499,350		Reference	
+20 °C, -15 %	1,643,499,247	-0.06	10	9.94
+10 °C, Nominal	1,643,499,276	-0.04	10	9.96
0 °C, Nominal	1,643,499,276	-0.04	10	9.96
-10 °C, Nominal	1,643,499,305	-0.03	10	9.97
-20 °C, Nominal	1,643,499,305	-0.03	10	9.97
-30 °C, Nominal	1,643,499,276	-0.04	10	9.96

Note: Offset was calculated as per the following formula: $\frac{F_{\text{Measured}} - F_{\text{reference}}}{F_{\text{reference}}} \times 1 \cdot 10^6$

8.6 FCC 25.216 Limits on emissions from mobile earth stations for protection of aeronautical radionavigation-satellite service

8.6.1 Definitions and limits

FCC:

(c) The e.i.r.p. density of emissions from mobile earth stations with assigned uplink frequencies between 1610 MHz and 1660.5 MHz shall not exceed -70 dBW/MHz (-40 dBm/MHz), averaged over any 2 millisecond active transmission interval, in the band 1559–1605 MHz. The e.i.r.p. of discrete emissions of less than 700 Hz bandwidth from such stations shall not exceed -80 dBW (-50 dBm), averaged over any 2 millisecond active transmission interval, in the 1559–1605 MHz band.

(f) Mobile earth stations with assigned uplink frequencies in the 1610–1660.5 MHz band shall suppress the power density of emissions in the 1605–1610 MHz band to an extent determined by linear interpolation from -70 dBW/MHz (-40 dBm/MHz) at 1605 MHz to -10 dBW/MHz (20 dBm/MHz) at 1610 MHz.

8.6.2 Test summary

Test date	September 27, 2019	Temperature	21 °C
Test engineer	Martha Espinoza	Air pressure	1001 mbar
Verdict	Pass	Relative humidity	48 %

8.6.3 Observations, settings and special notes

This is a conducted test utilizing a spectrum analyzer. RBW is set to 1MHz.
 An offset of 30.6dB was added to compensate for the external attenuator and cable used.
 The spectrum was investigated between 1605MHz and 1610MHz.
 There are no emissions observed at the frequency range investigated.

8.6.4 Test data

Section 8

Test name

Specification

Testing data

FCC 25.216 Limits on emissions from mobile earth stations for protection of aeronautical radionavigation-satellite service

FCC Part 25

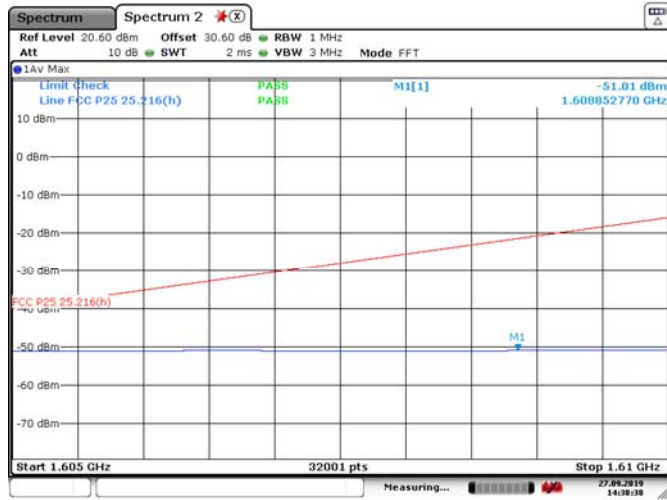


Figure 8.6-1: L channel (QPSK)

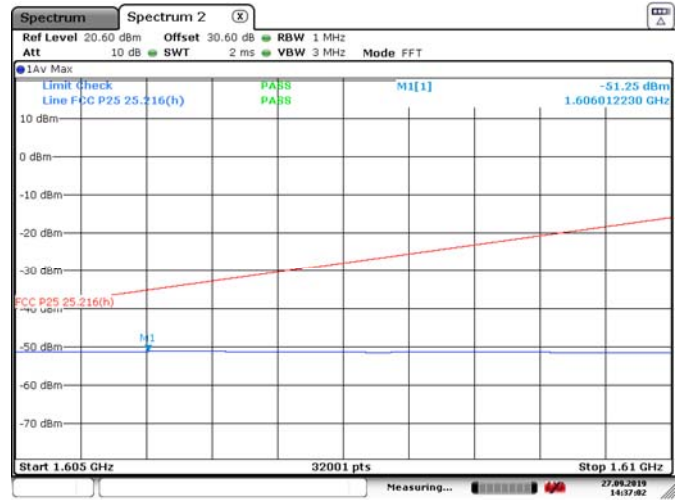


Figure 8.6-2: M channel (QPSK)

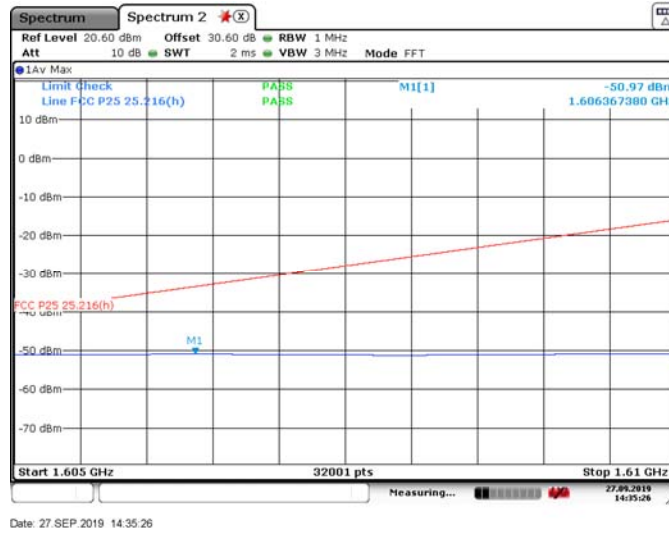
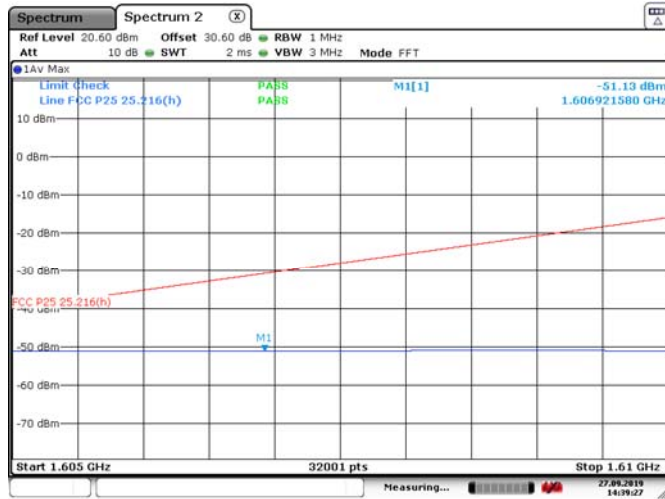
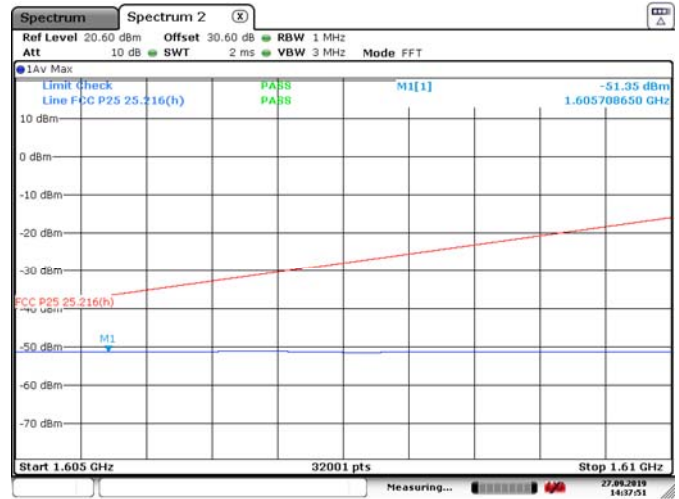


Figure 8.6-3: H channel (QPSK)



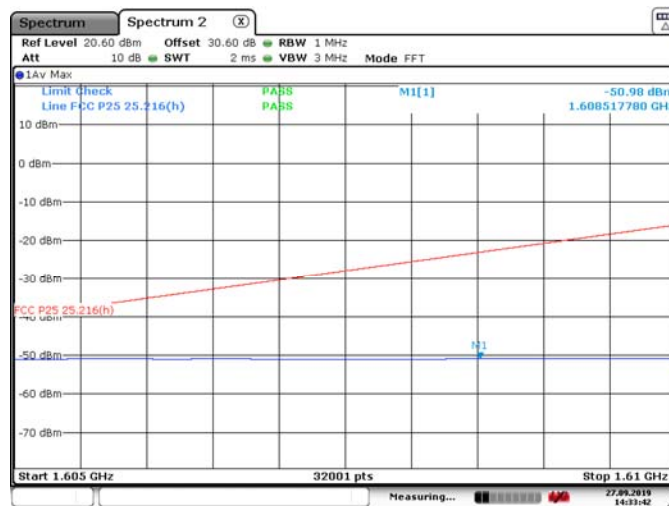
Date: 27 SEP 2019 14:39:28

Figure 8.6-4: L channel (APSK)



Date: 27 SEP 2019 14:37:51

Figure 8.6-5: M channel (APSK)

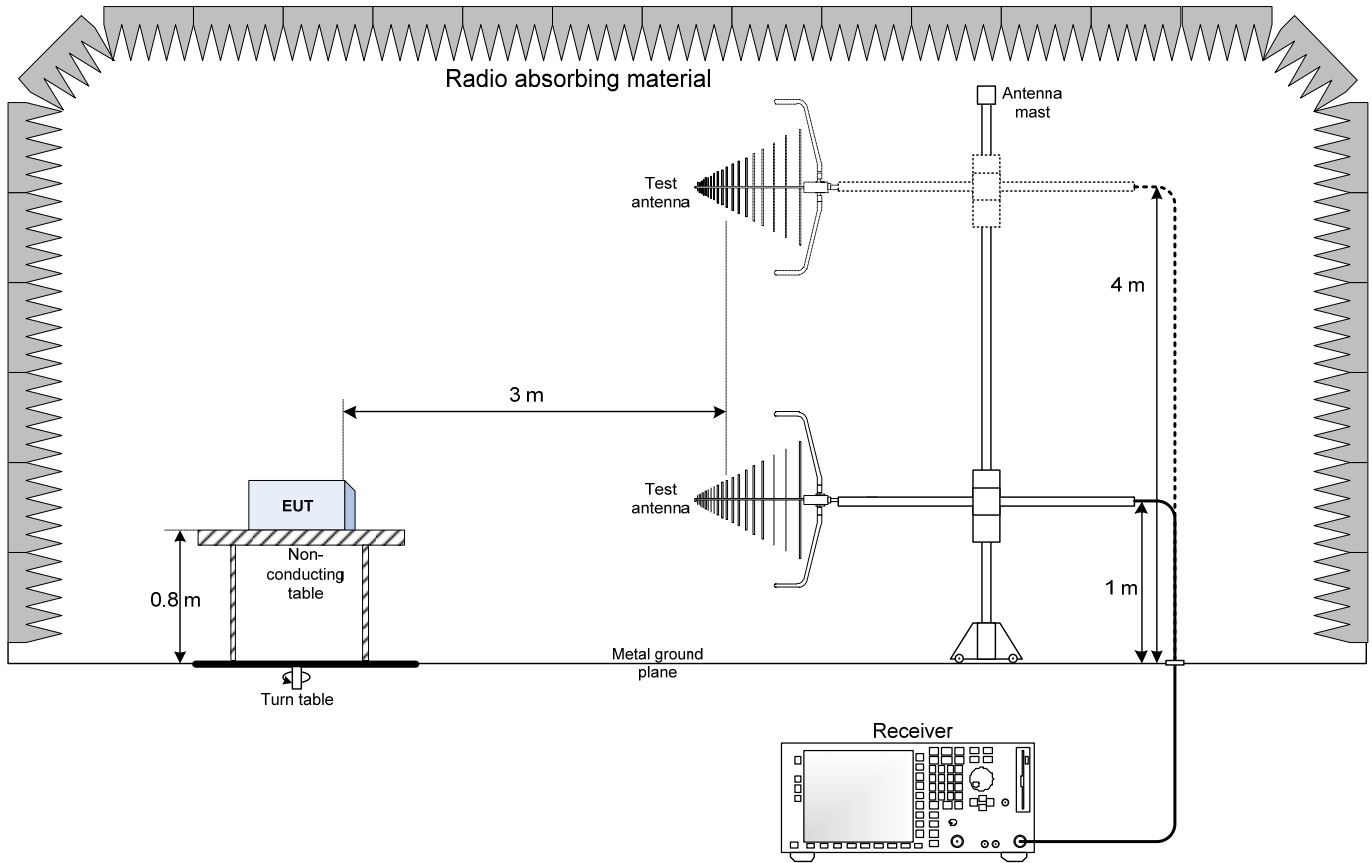


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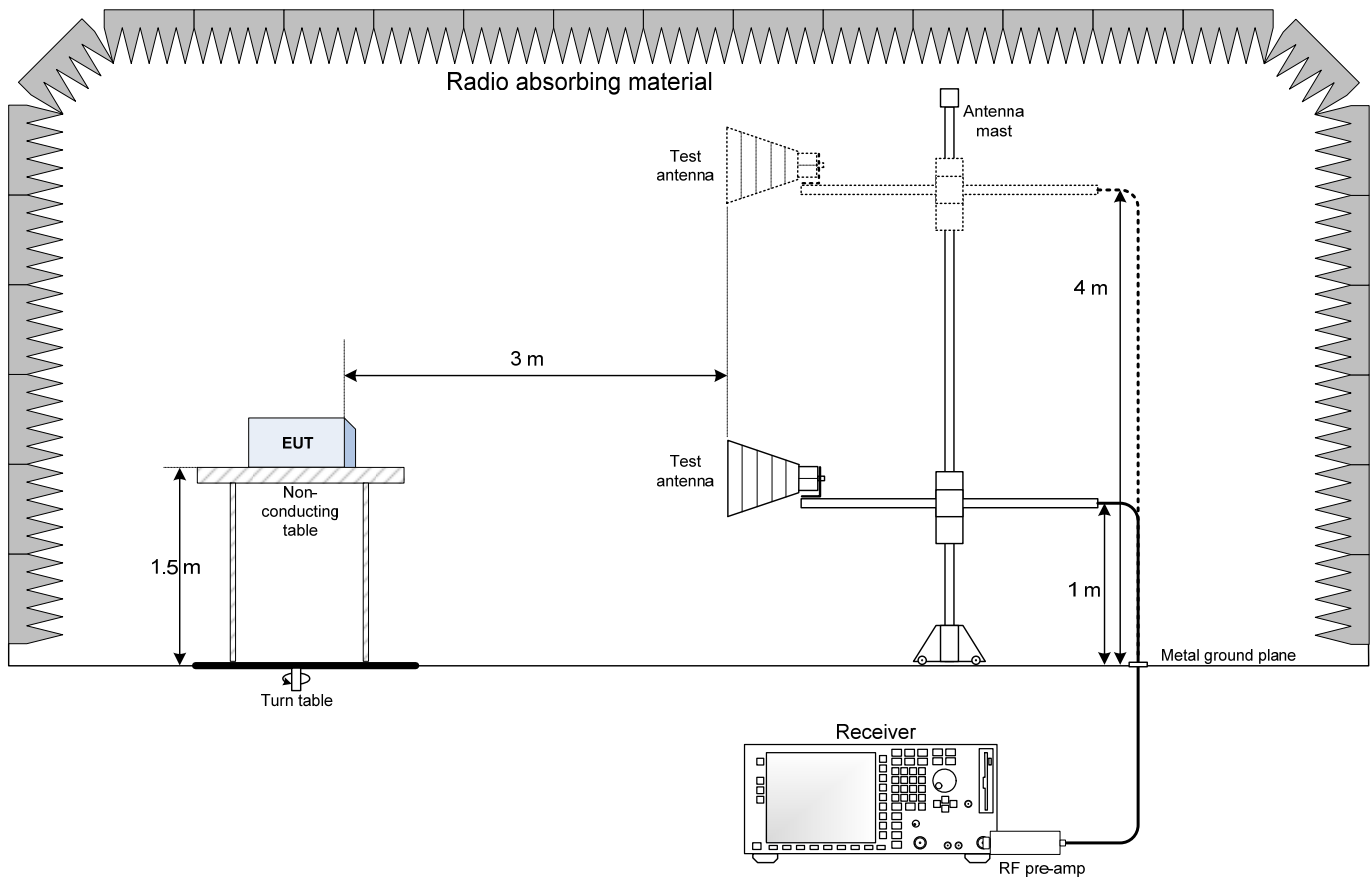
Figure 8.6-6: H channel (APSK)

Section 9. Block diagrams of test set-ups

9.1 Radiated emissions set-up for frequencies below 1 GHz

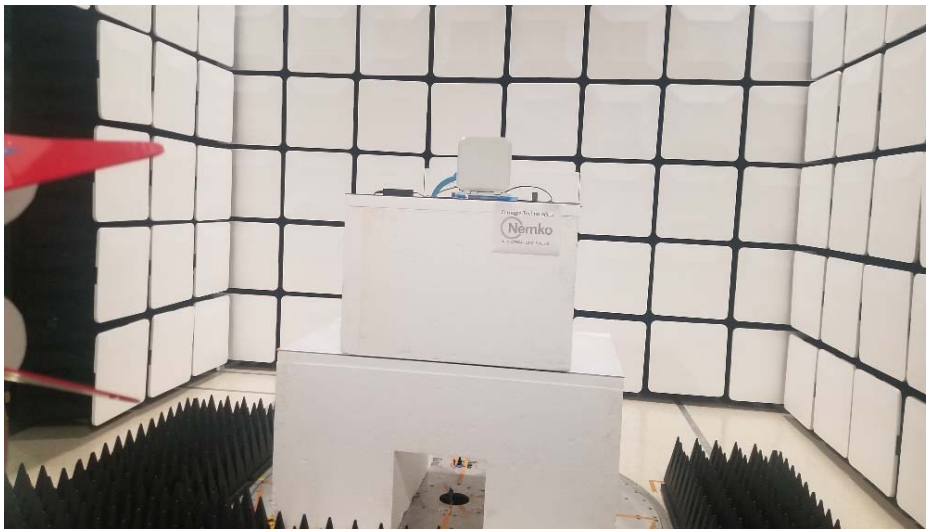


9.2 Radiated emissions set-up for frequencies above 1 GHz



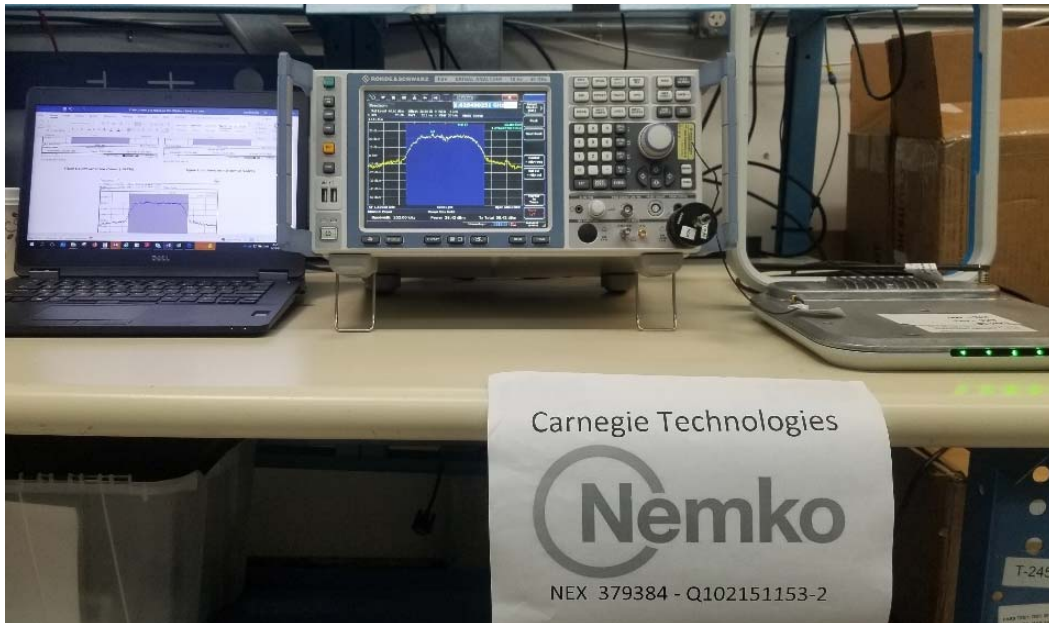
Section 10. Test Set Up Pictures

10.1 Radiated emissions set-up





10.2 Conducted port set-up



10.3 Frequency Stability Set-Up

