2.6 SPURIOUS EMISSION AT BAND EDGE

2.6.1 Specification Reference

FCC 47 CFR Part 2, Clause 2.1051
FCC 47 CFR Part 22, Clause 22.917(a)(b)
FCC 47 CFR Part 24, Clause 24.238(a)(b)
RSS-132, Clause 5.5
RSS-133, Clause 6.5

2.6.2 Standard Applicable

In the 1.0 MHz bands immediately outside and adjacent to the equipment's operating frequency block, the emission power per any 1% of the emission bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least 43 + 10 log10 p(watts).

For more than 1.0 MHz outside the operating frequency block, the emission power per any 1 MHz (for Band 2) or 100 kHz (for Band 5) shall be attenuated (in dB) below the transmitter output power P (dBW) by at least 43 + 10 log10 p(watts).

2.6.3 Equipment Under Test and Modification State

Serial No: FF161218B00106 and FF130219B00478 / Test Configuration A

2.6.4 Date of Test/Initial of test personnel who performed the test

March 04 to 06, 2019 / XYZ

2.6.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.6.6 Environmental Conditions/ Test Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	21.8 - 22.3 °C
Relative Humidity	43.2 - 50.5 %
ATM Pressure	99.0 - 99.3 kPa

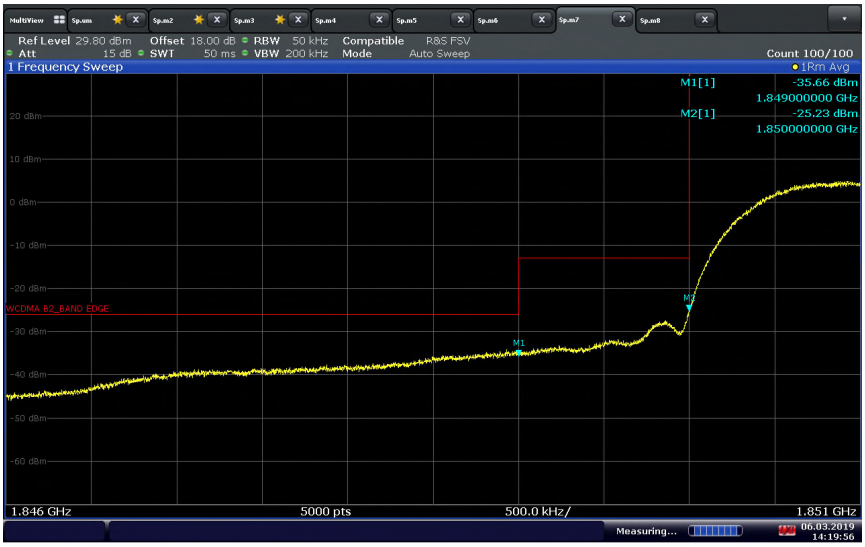
2.6.7 Additional Observations

- This is a conducted test.
- The path loss were measured and entered as a level offset.
- RBW is set to minimum 1% of EBW and VBW is set to >3 x RBW in the 1 MHz band immediately outside and adjacent to the channel edge.
- For WCDMA/LTE Band 2, RBW was set 1% of the Emission Bandwidth and for emissions more than 1.0 MHz outside the equipment's operating frequency block, andthe limit is set to:
  -13 + 10lg (RBW_{used}/1 MHz) dBm.

- For WCDMA/LTE Band 5, RBW was set 1% of the Emission Bandwidth and for emissions more than 1.0 MHz outside the equipment's operating frequency block, the limit is set to:
  -13 + 10lg (RBW_{used}/100kHz) dBm.
- Low and High channels on all channel bandwidth and modulation are verified. Only worst case configuration for all technologies presented in this test report.

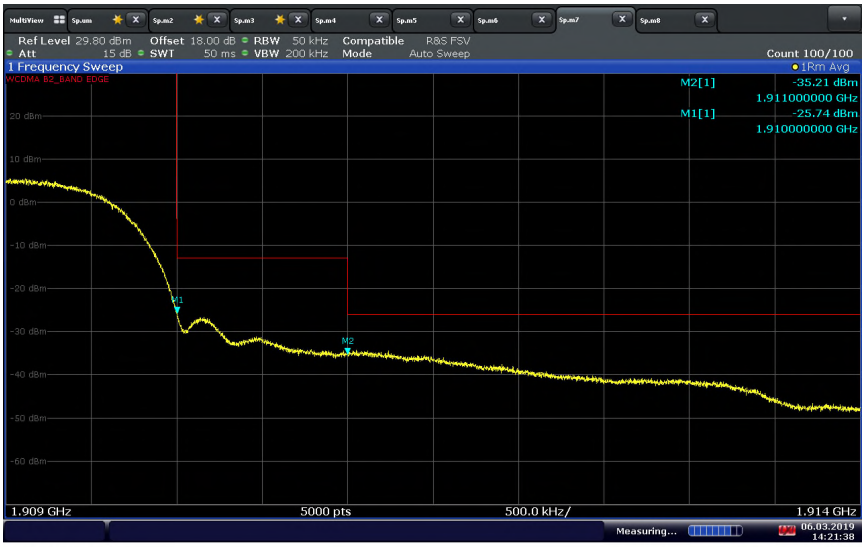
2.6.8 Test Results

WCDMA Band 2/Low Channel 1852.4 MHz / Band Edge @ 1850 MHz

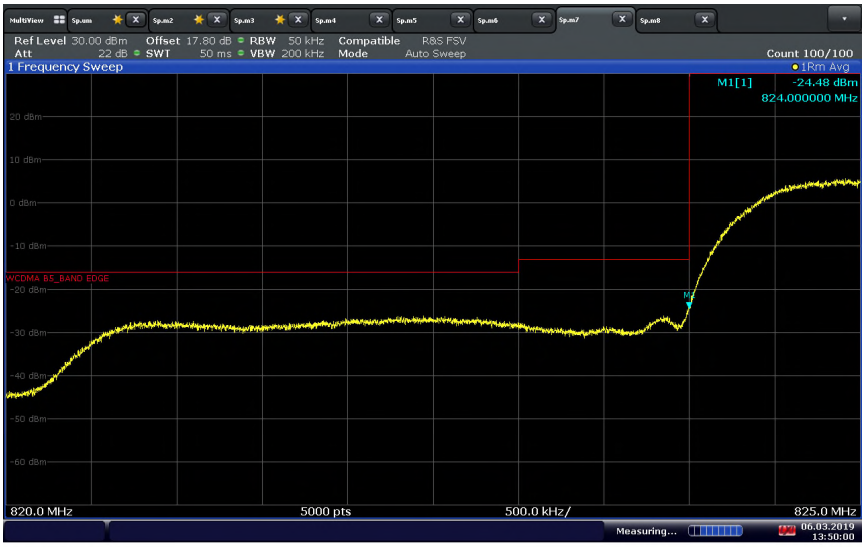


14:19:56 06.03.2019

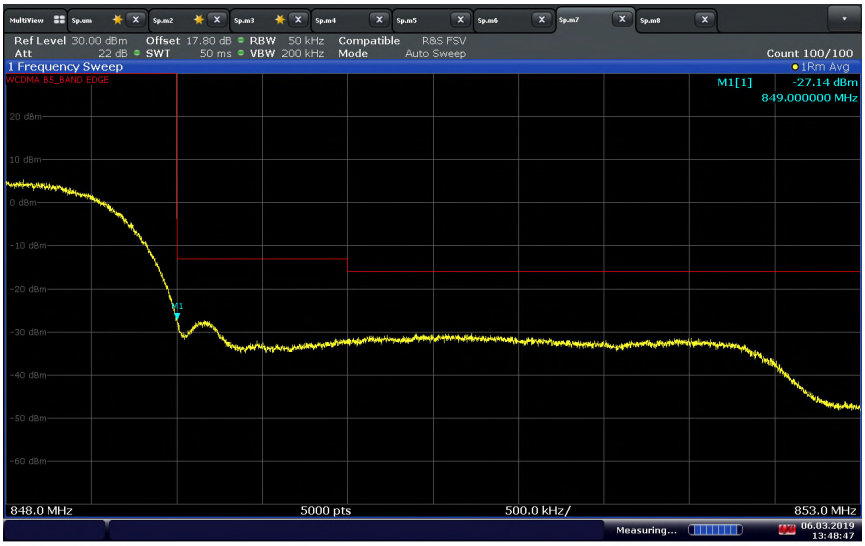
WCDMA Band 2/High Channel 1907.6 MHz / Band Edge @ 1910 MHz



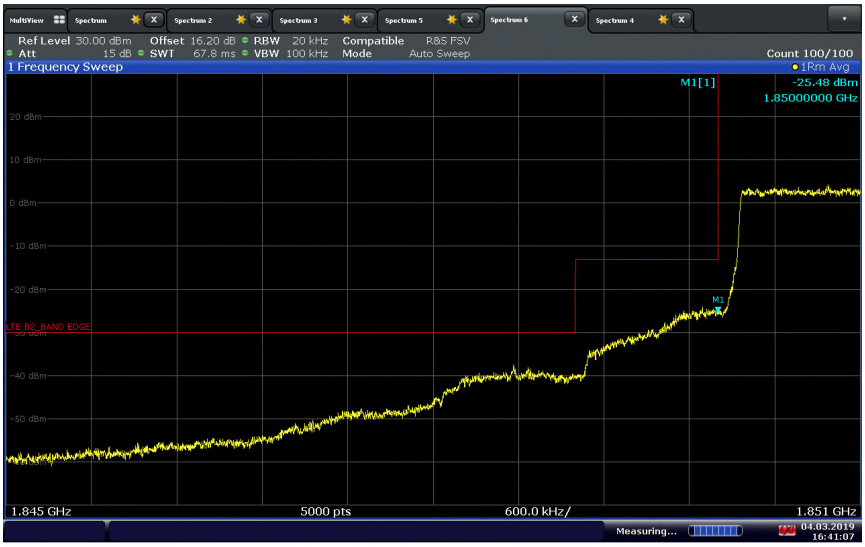
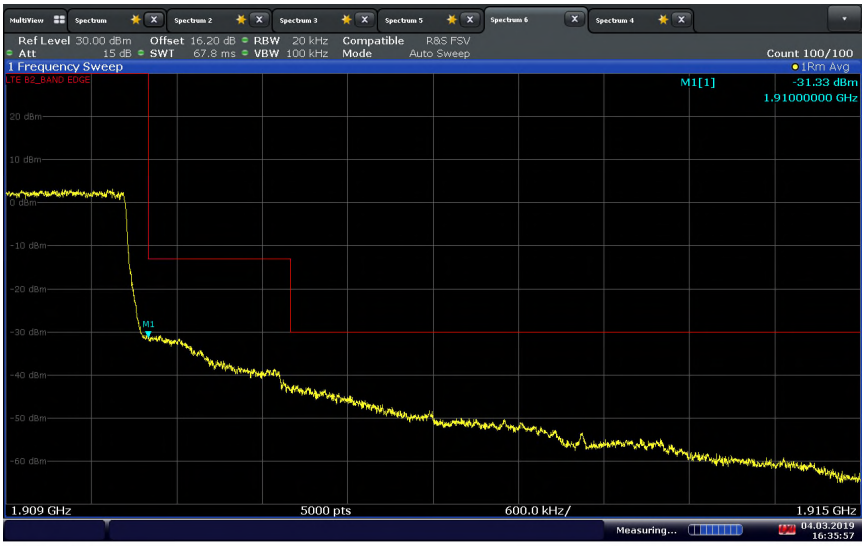
14:21:39 06.03.2019

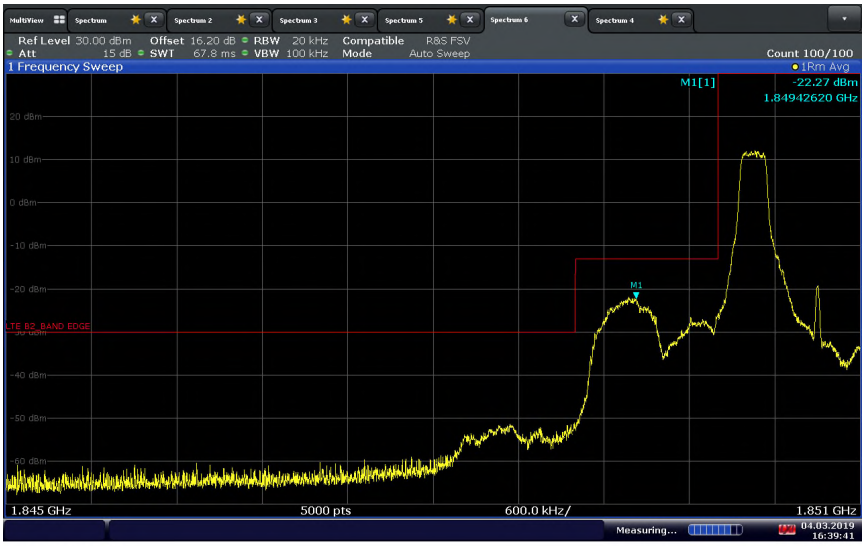
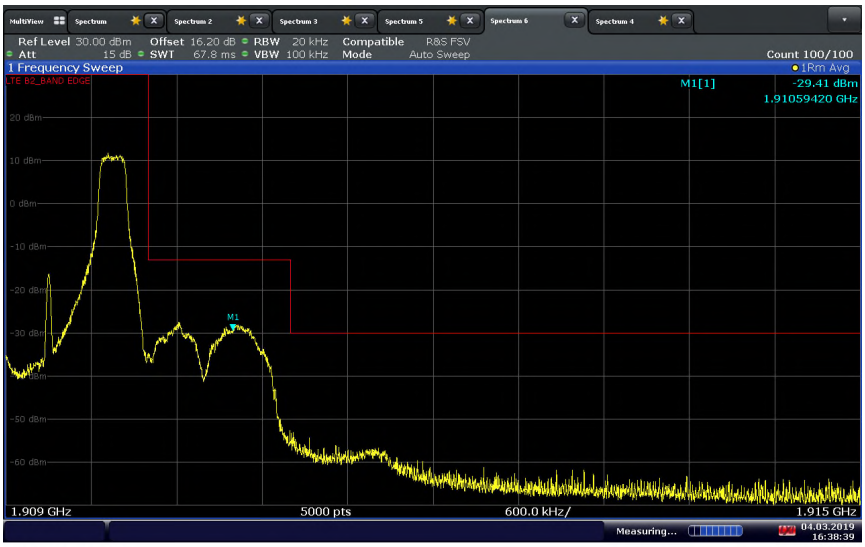
WCDMA Band 5/Low Channel 826.4 MHz / Band Edge @ 824 MHz


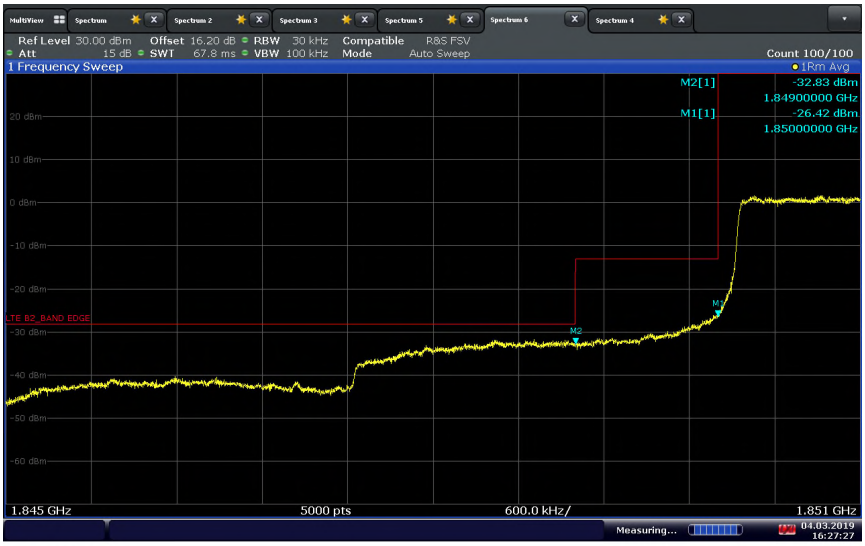
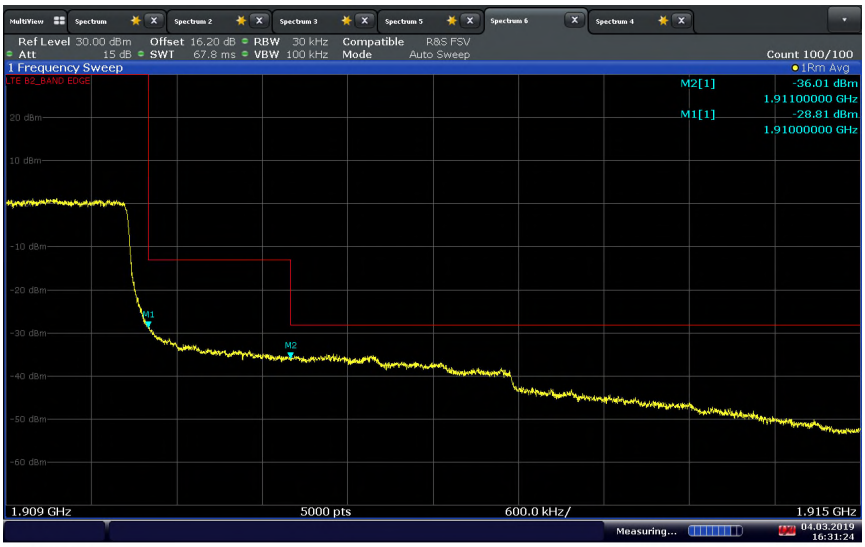
13:50:00 06.03.2019

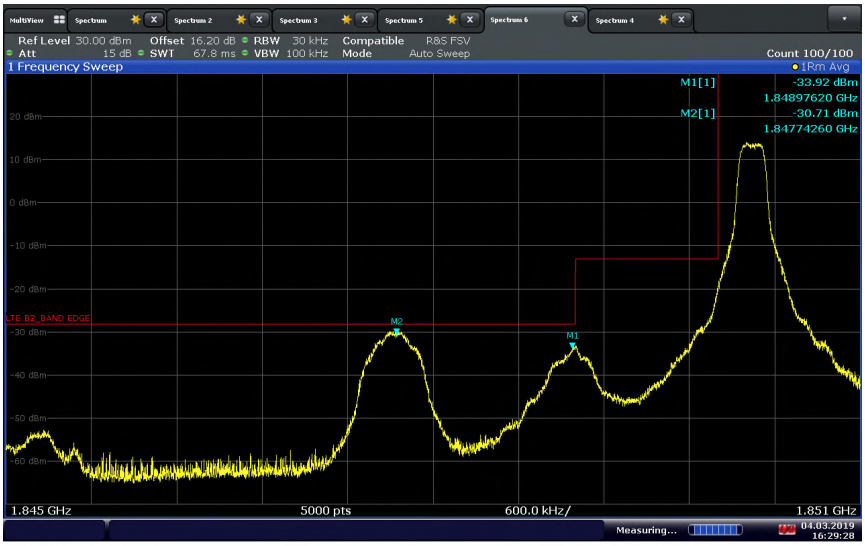
WCDMA Band 5/High Channel 846.6 MHz / Band Edge @ 849 MHz


13:48:48 06.03.2019

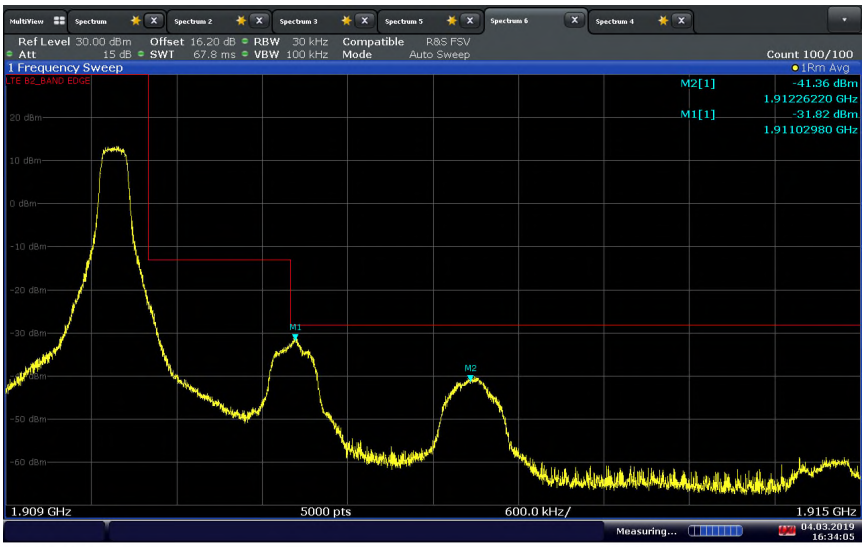
LTE Band 2 (1.4 MHz BW)/QPSK/Low Channel 1850.7 MHz/Full RB Band Edge @1850 MHz
 16:41:07 04.03.2019
LTE Band 2 (1.4 MHz BW)/QPSK/High Channel 1909.3 MHz/Full RB Band Edge @1910 MHz
 16:35:57 04.03.2019

LTE Band 2 (1.4 MHz BW)/QPSK/Low Channel 1850.7 MHz/1 RB 0 offset Band Edge @1850 MHz
 16:39:41 04.03.2019
LTE Band 2 (1.4 MHz BW)/QPSK/High Channel 1909.3 MHz/1 RB 5 offset Band Edge @1910 MHz
 16:38:40 04.03.2019

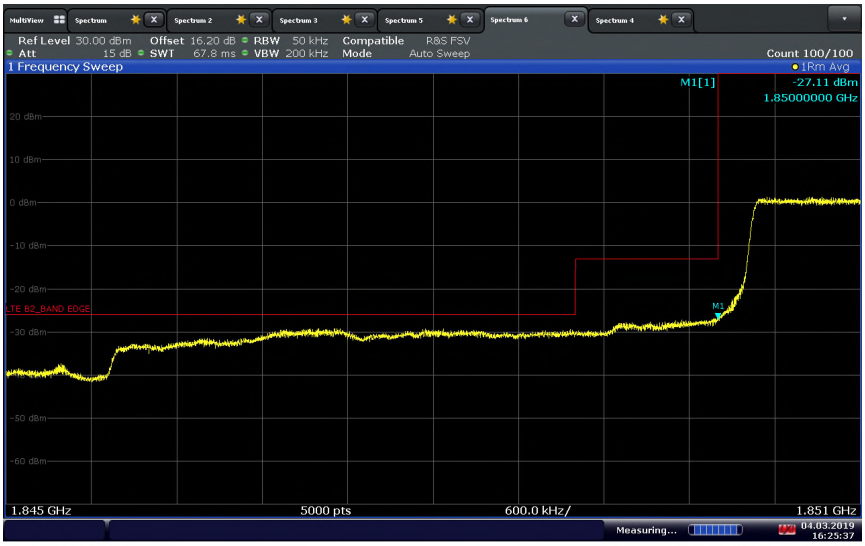
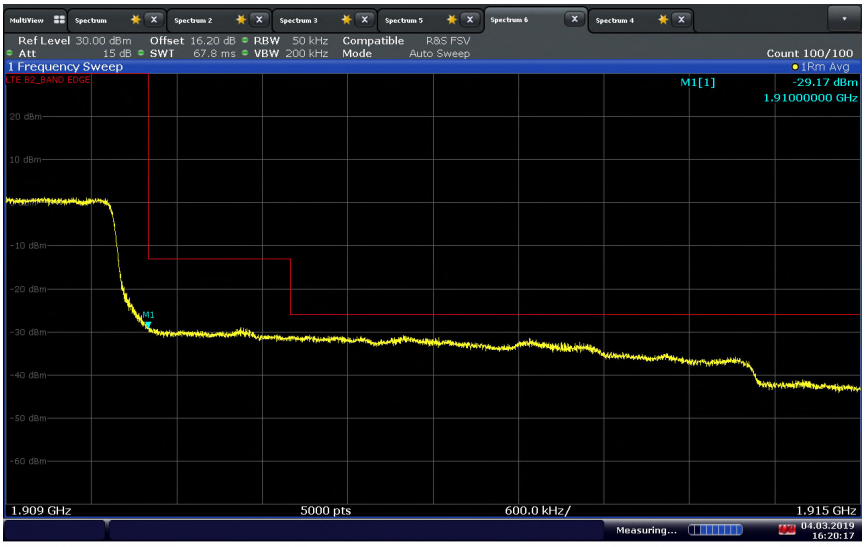
LTE Band 2 (3 MHz BW)/QPSK/Low Channel 1851.5 MHz/Full RB Band Edge @1850 MHz
 16:27:27 04.03.2019
LTE Band 2 (3 MHz BW)/QPSK/High Channel 1908.5 MHz/Full RB Band Edge @1910 MHz
 16:31:24 04.03.2019

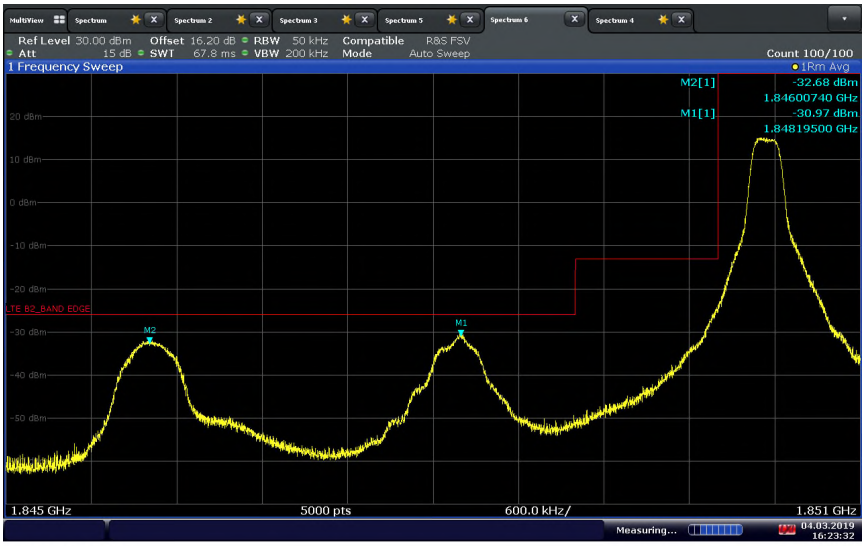
LTE Band 2 (3 MHz BW)/QPSK/Low Channel 1851.5 MHz/1 RB 0 offset Band Edge @1850 MHz


16:29:29 04.03.2019

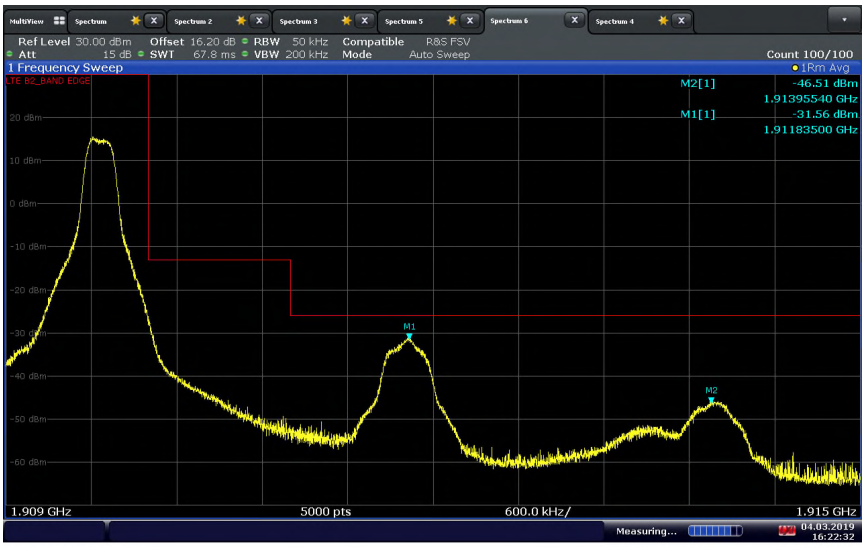
LTE Band 2 (3 MHz BW)/QPSK/High Channel 1908.5 MHz/1 RB 14 offset Band Edge @1910 MHz


16:34:05 04.03.2019

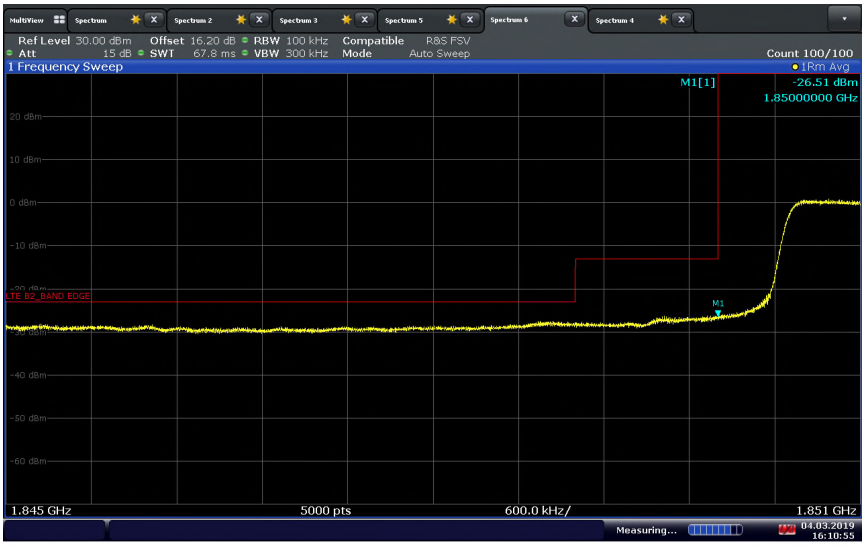
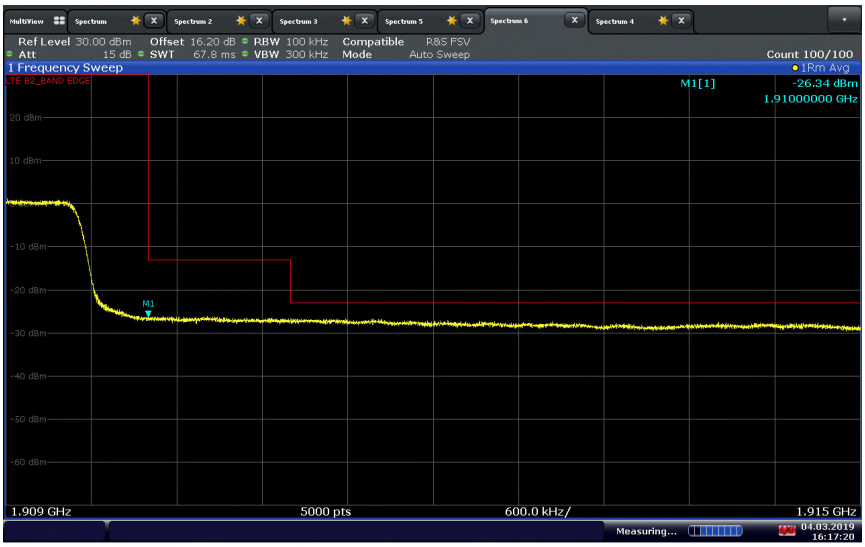
LTE Band 2 (5 MHz BW)/QPSK/Low Channel 1852.5 MHz/Full RB Band Edge @1850 MHz
 16:25:38 04.03.2019
LTE Band 2 (5 MHz BW)/QPSK/High Channel 1907.5 MHz/Full RB Band Edge @1910 MHz
 16:20:17 04.03.2019

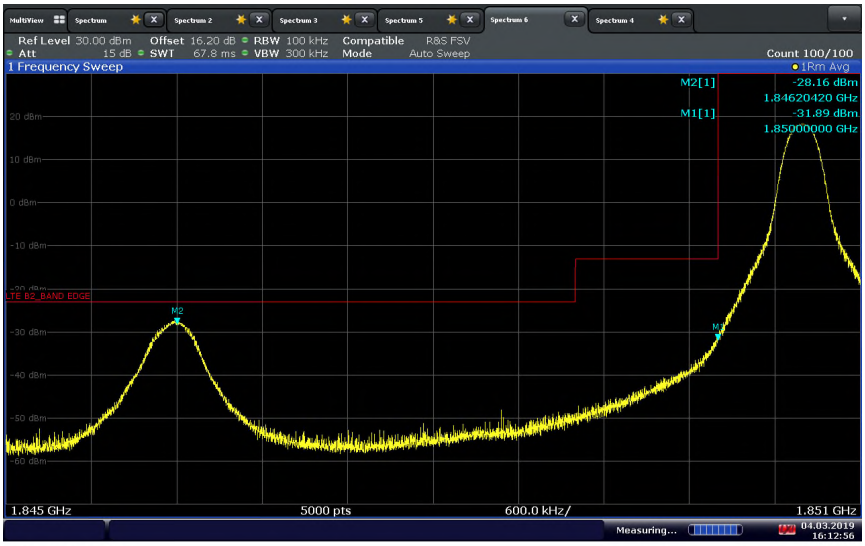
LTE Band 2 (5 MHz BW)/QPSK/Low Channel 1852.5 MHz/1 RB 0 offset Band Edge @1850 MHz


16:23:33 04.03.2019

LTE Band 2 (5 MHz BW)/QPSK/High Channel 1907.5 MHz/1 RB 24 offfset Band Edge @1910 MHz


16:22:32 04.03.2019

LTE Band 2 (10 MHz BW)/QPSK/Low Channel 1855 MHz/Full RB Band Edge @1850 MHz
 16:10:56 04.03.2019
LTE Band 2 (10 MHz BW)/QPSK/High Channel 1905 MHz/Full RB Band Edge @1910 MHz
 16:17:21 04.03.2019

LTE Band 2 (10 MHz BW)/QPSK/Low Channel 1855 MHz/1 RB 0 offset Band Edge @1850 MHz
 16:12:56 04.03.2019
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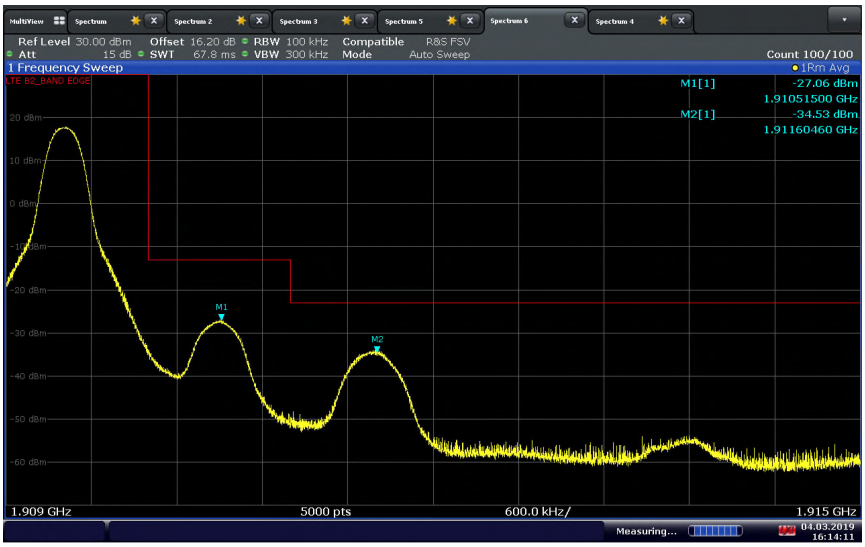
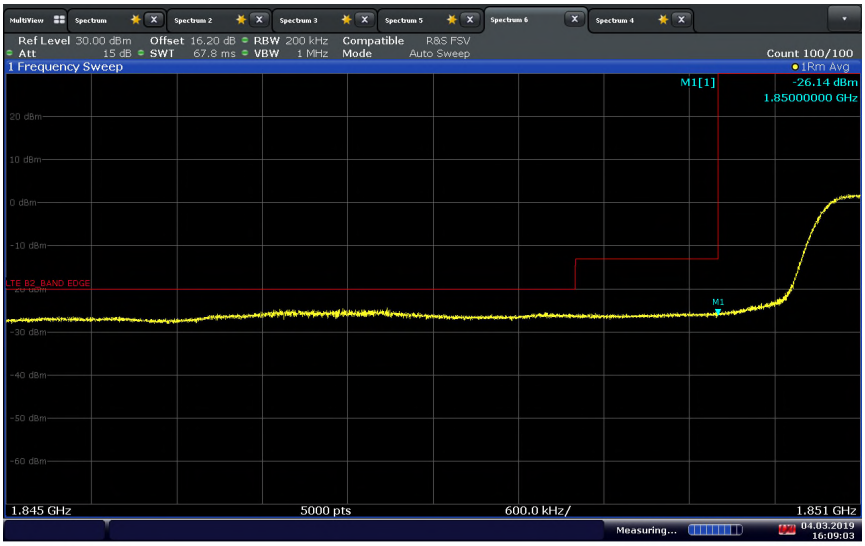
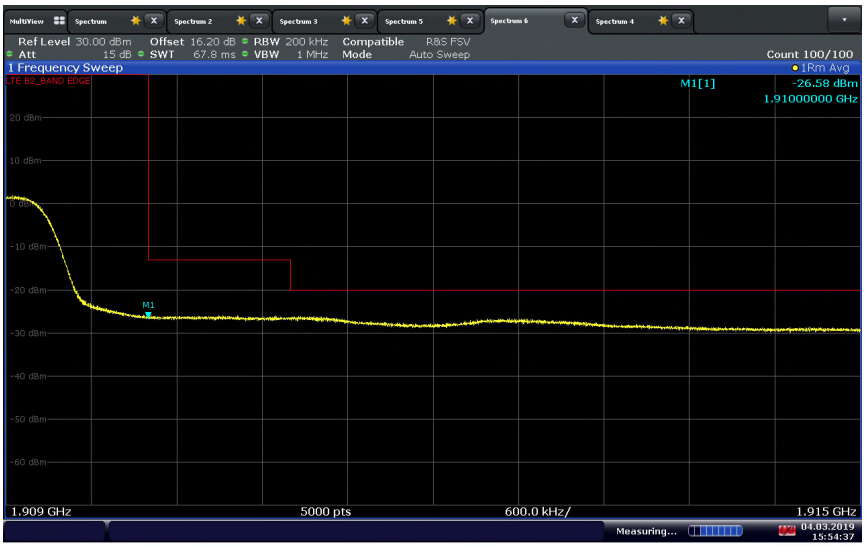
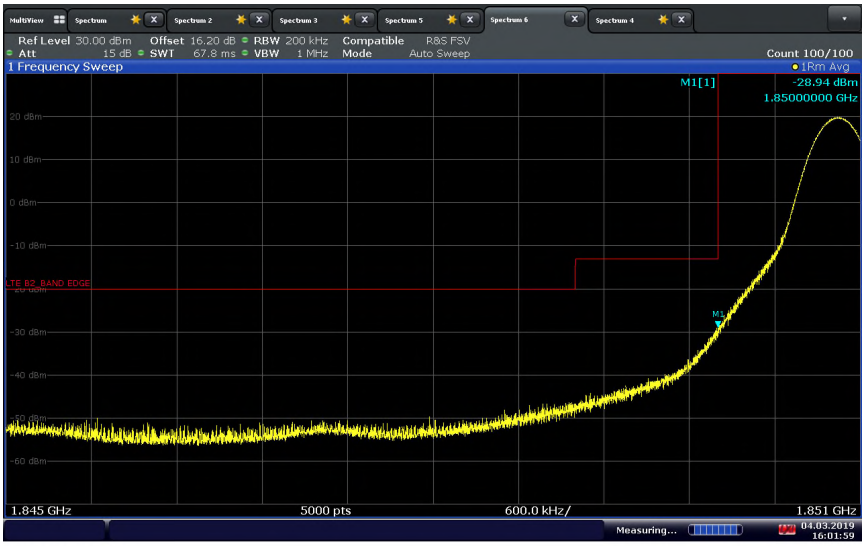
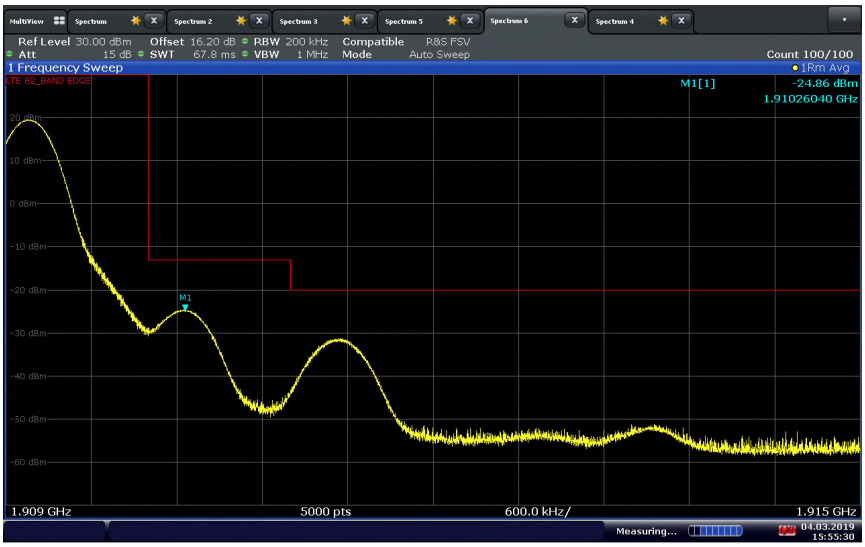
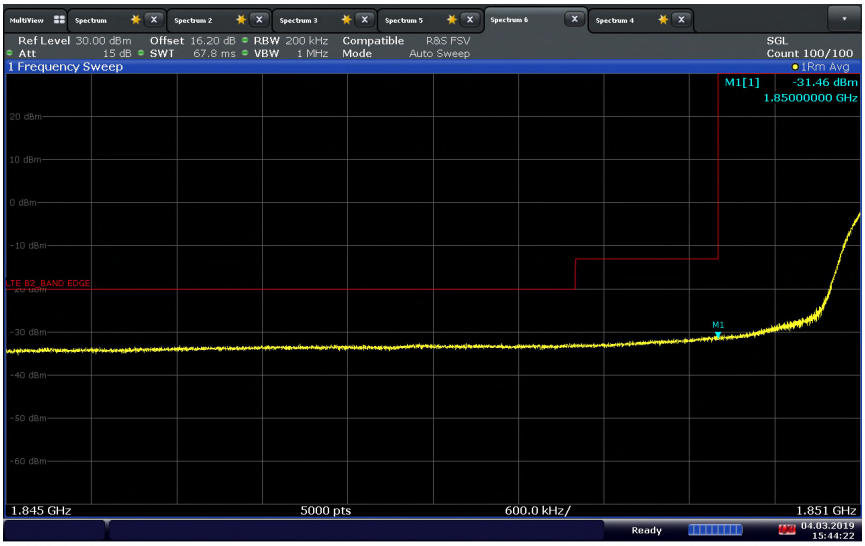
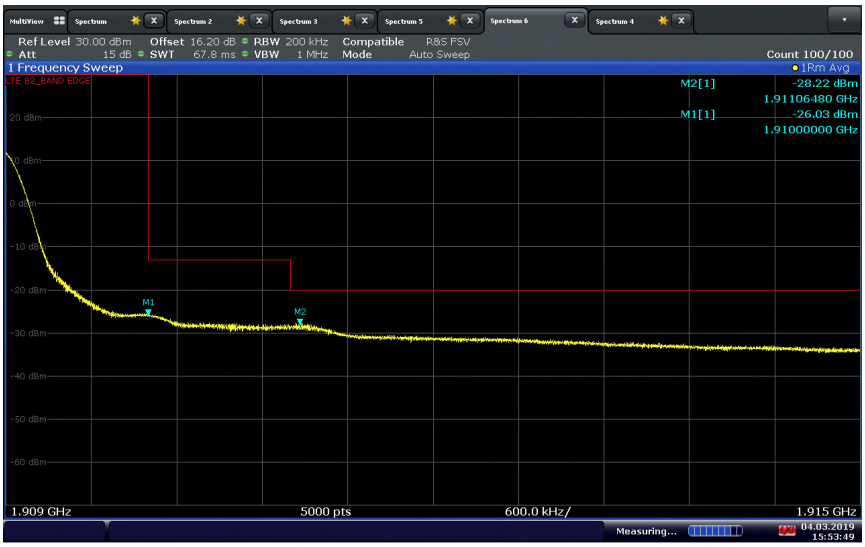
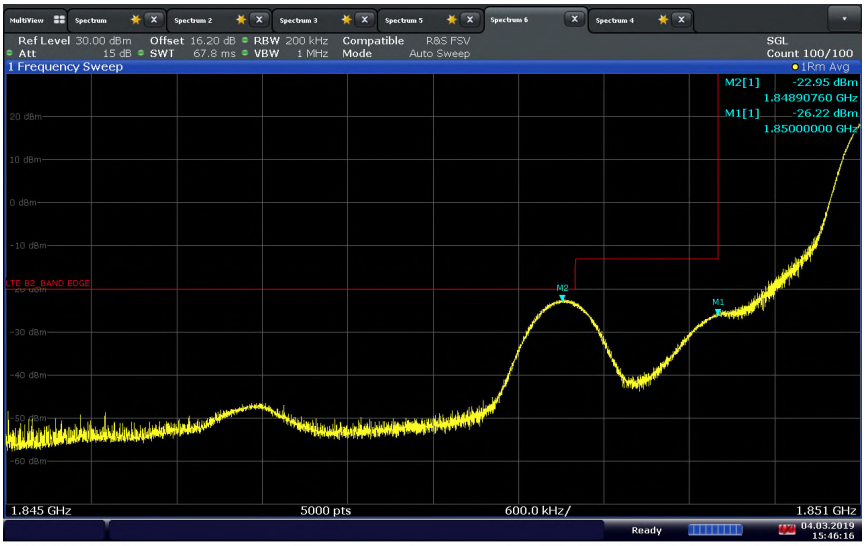
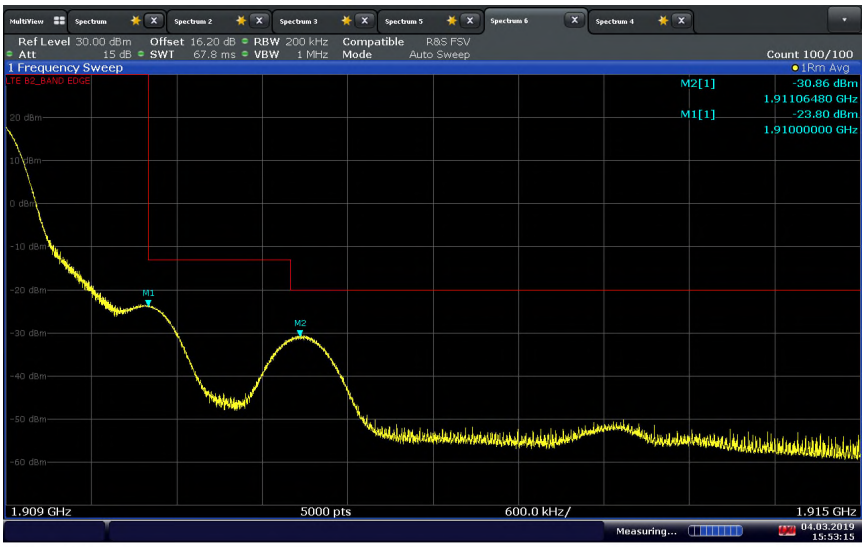
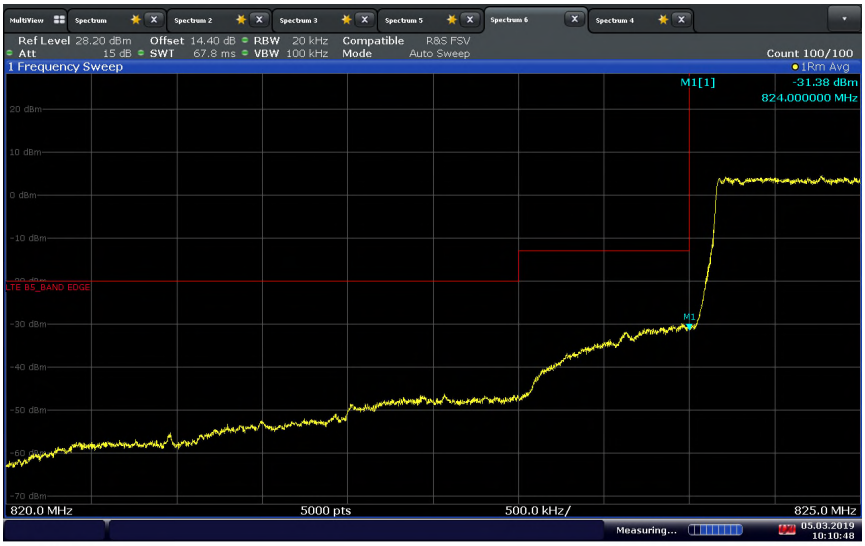
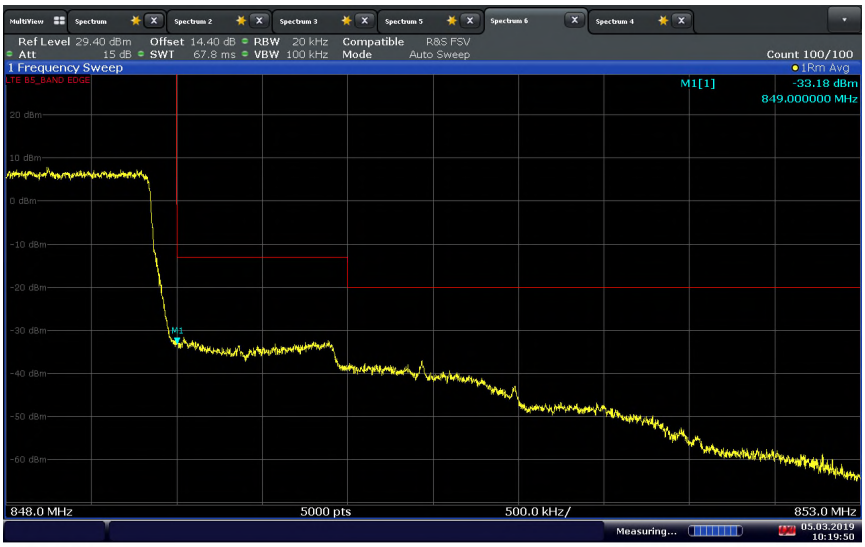
 16:14:11 04.03.2019

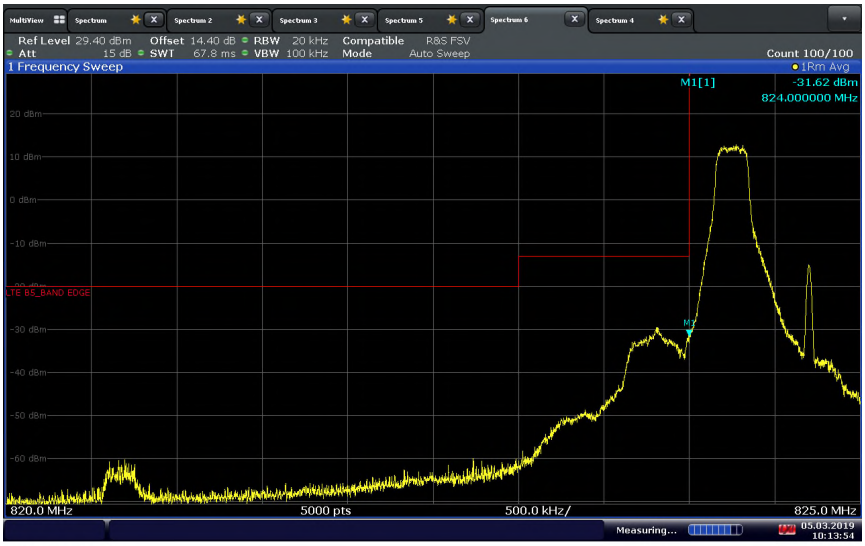
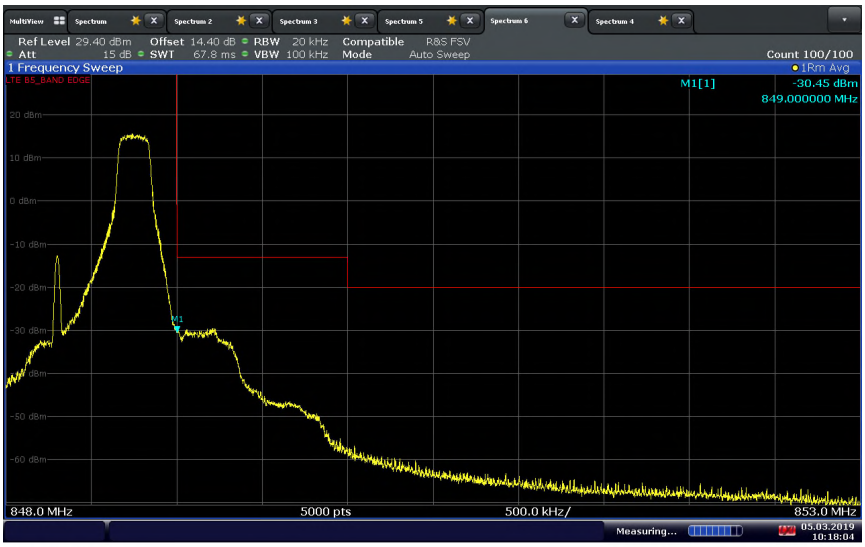
LTE Band 2 (15 MHz BW)/QPSK/Low Channel 1857.5 MHz/Full RB Band Edge @1850 MHz
 16:09:04 04.03.2019
LTE Band 2 (15 MHz BW)/QPSK/High Channel 1902.5 MHz/Full RB Band Edge @1910 MHz
 15:54:38 04.03.2019

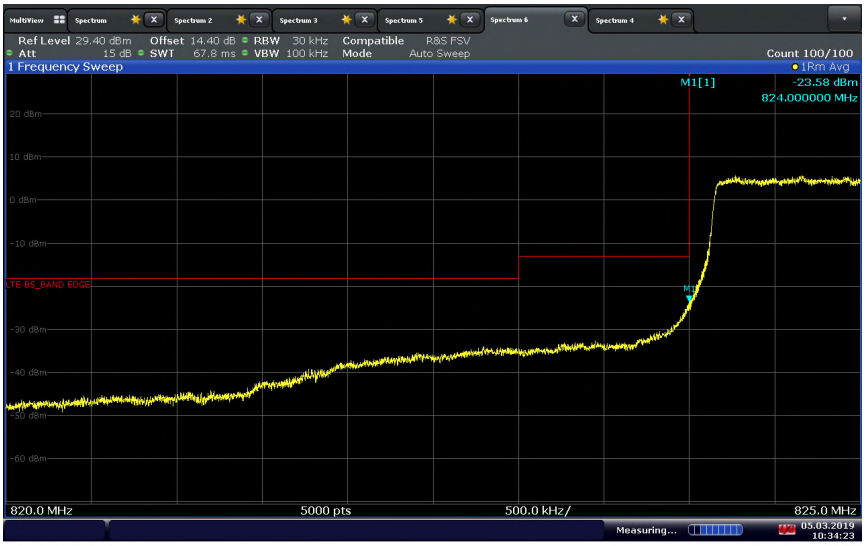
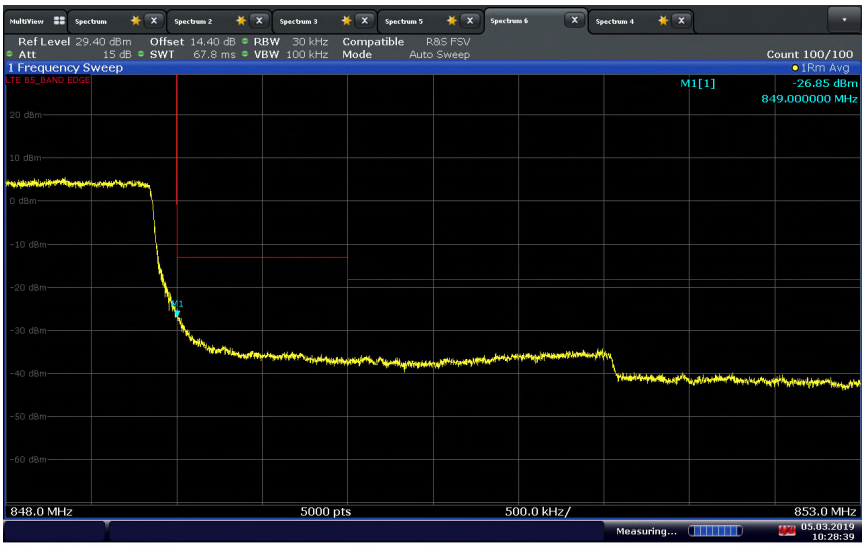
LTE Band 2 (15 MHz BW)/QPSK/Low Channel 1857.5 MHz/1 RB 0 offset Band Edge @1850 MHz
 16:02:00 04.03.2019
LTE Band 2 (15 MHz BW)/QPSK/High Channel 1902.5 MHz/1 RB 74 offset Band Edge @1910 MHz
 15:55:31 04.03.2019

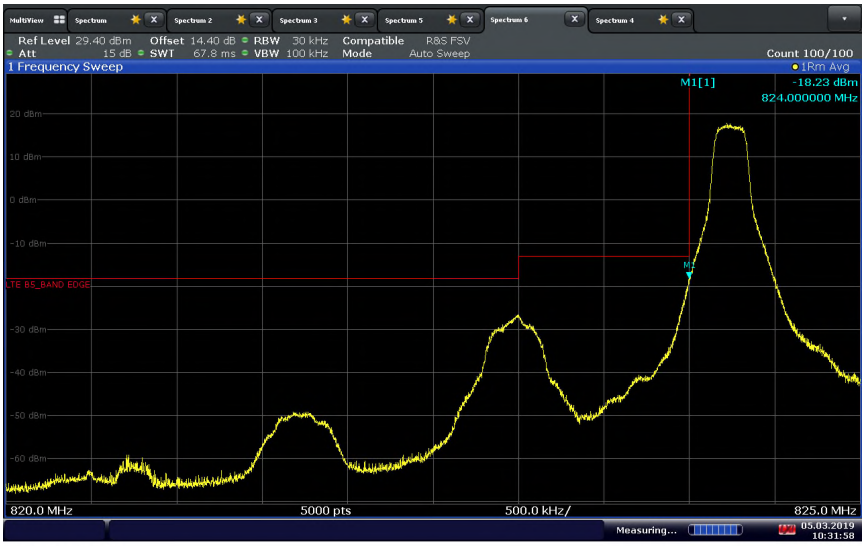
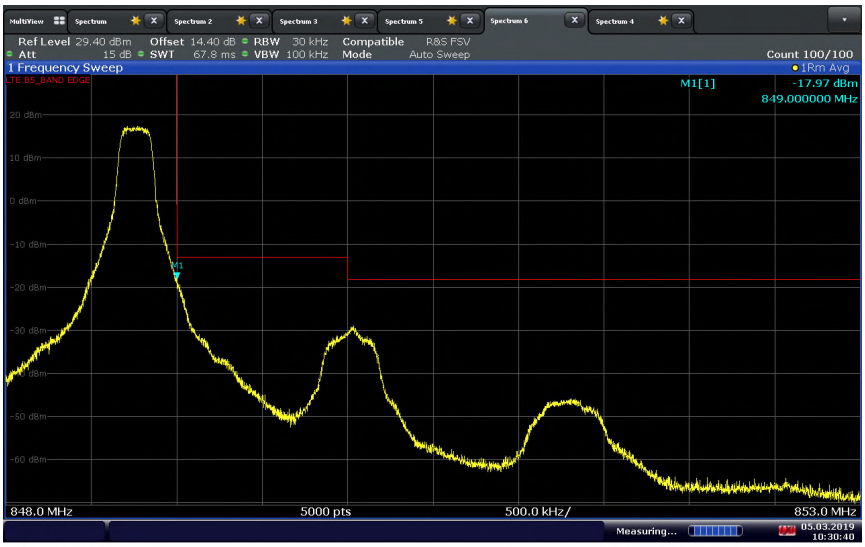
LTE Band 2 (20 MHz BW)/QPSK/Low Channel 1860 MHz/Full RB Band Edge @1850 MHz
 15:44:23 04.03.2019
LTE Band 2 (20 MHz BW)/QPSK/High Channel 1900 MHz/Full RB Band Edge @1910 MHz
 15:53:50 04.03.2019

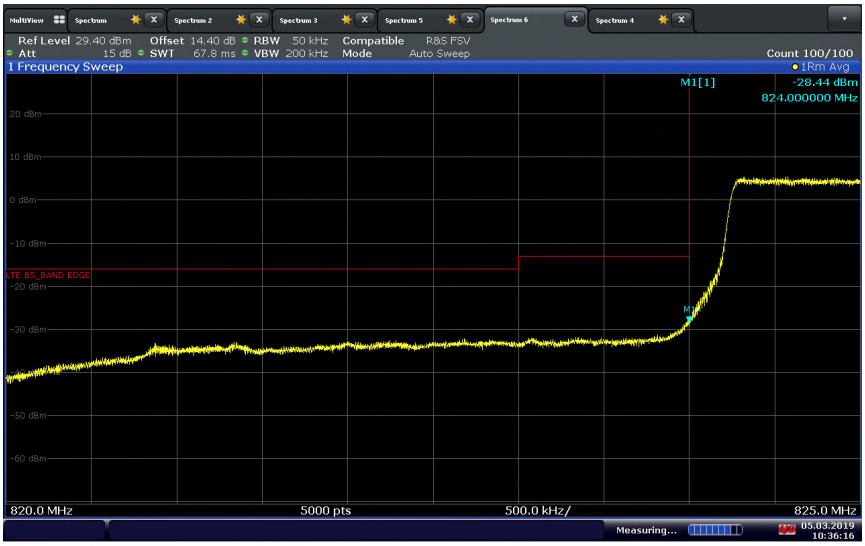
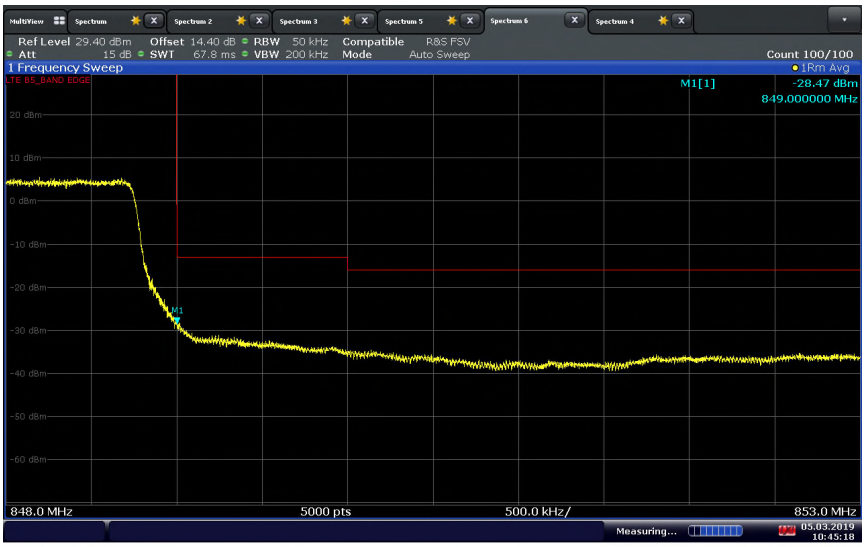
LTE Band 2 (20 MHz BW)/QPSK/Low Channel 1860 MHz/1 RB 0 offset Band Edge @1850 MHz
 15:46:17 04.03.2019
LTE Band 2 (20 MHz BW)/QPSK/High Channel 1900 MHz/1 RB 99 offset Band Edge @1910 MHz
 15:53:16 04.03.2019

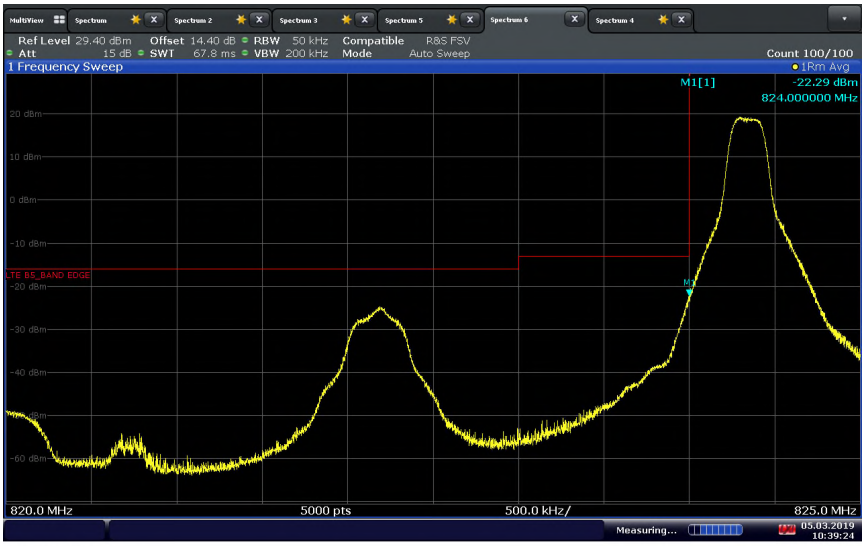
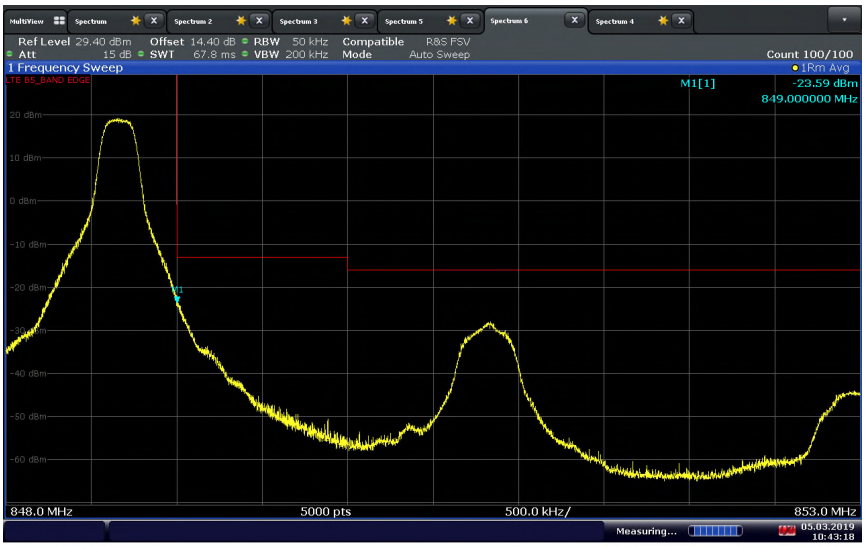
LTE Band 5 (1.4 MHz BW)/QPSK/Low Channel 824.7 MHz/Full RB Band Edge @824 MHz
 10:10:49 05.03.2019
LTE Band 5 (1.4 MHz BW)/QPSK/High Channel 848.3 MHz/Full RB Band Edge @849 MHz
 10:19:51 05.03.2019

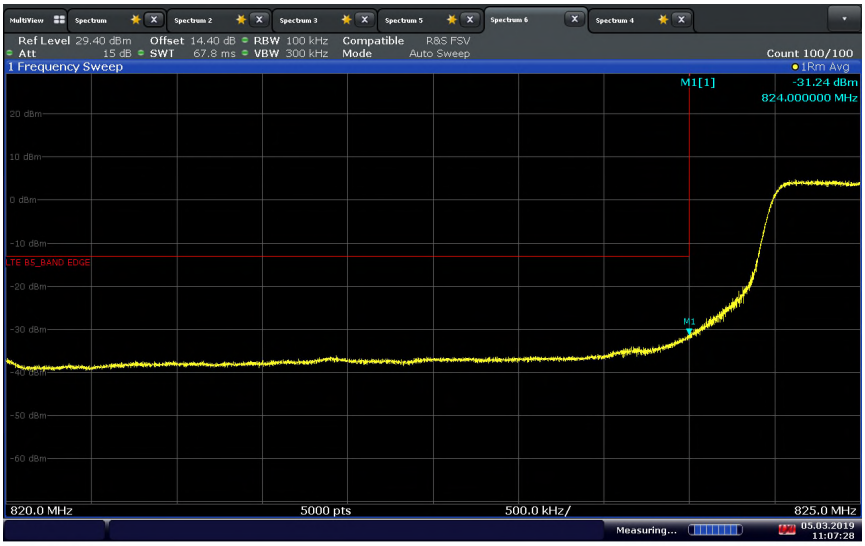
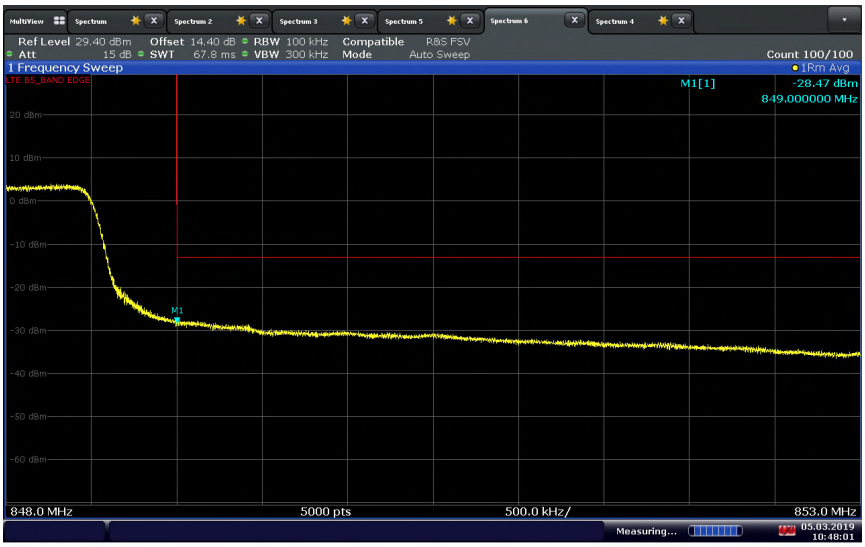
LTE Band 5 (1.4 MHz BW)/QPSK/Low Channel 824.7 MHz/1 RB 0 offset Band Edge @824 MHz
 10:13:55 05.03.2019
LTE Band 5 (1.4 MHz BW)/QPSK/High Channel 848.3 MHz/1 RB 5 offset Band Edge @849 MHz
 10:18:05 05.03.2019

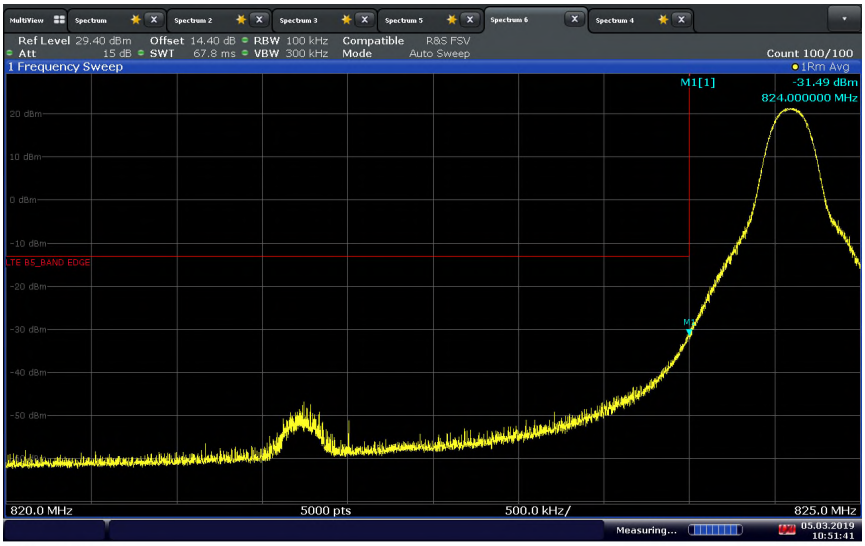
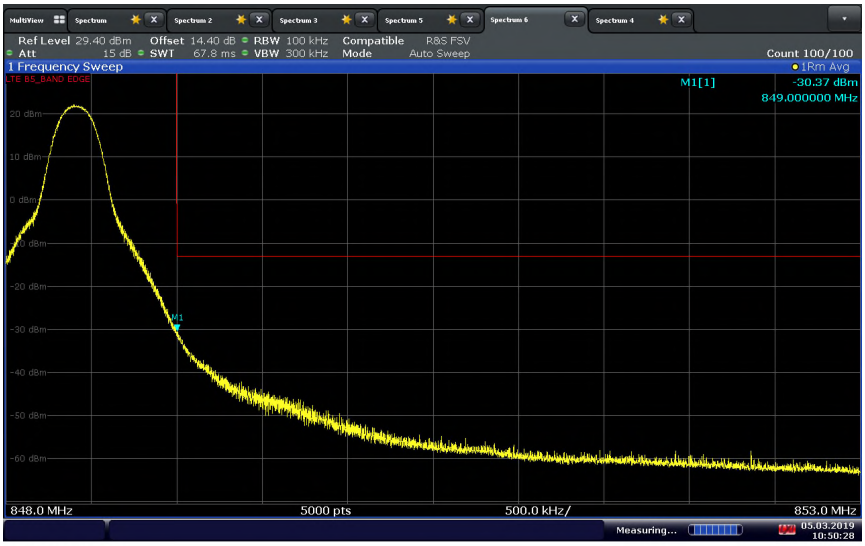
LTE Band 5 (3 MHz BW)/QPSK/Low Channel 825.5 MHz/Full RB Band Edge @824 MHz
 10:34:24 05.03.2019
LTE Band 5 (3 MHz BW)/QPSK/High Channel 836.5 MHz/Full RB Band Edge @849 MHz
 10:28:39 05.03.2019

LTE Band 5 (3 MHz BW)/QPSK/Low Channel 825.5 MHz/1 RB 0 offset Band Edge @824 MHz
 10:31:59 05.03.2019
LTE Band 5 (3 MHz BW)/QPSK/High Channel 836.5 MHz/1 RB 14 offset Band Edge @849 MHz
 10:30:41 05.03.2019

LTE Band 5 (5 MHz BW)/QPSK/Low Channel 826.5 MHz/Full RB Band Edge @824MHz
 10:36:17 05.03.2019
LTE Band 5 (5 MHz BW)/QPSK/High Channel 846.5 MHz/Full RB Band Edge @849 MHz
 10:45:19 05.03.2019

LTE Band 5 (5 MHz BW)/QPSK/Low Channel 826.5 MHz/1 RB 0 offset Band Edge @824MHz
 10:39:24 05.03.2019
LTE Band 5 (5 MHz BW)/QPSK/High Channel 846.5 MHz/1 RB 24 offset Band Edge @849 MHz
 10:43:19 05.03.2019

LTE Band 5 (10 MHz BW)/QPSK/Low Channel 829 MHz/Full RB Band Edge @825 MHz
 11:07:28 05.03.2019
LTE Band 5 (10 MHz BW)/QPSK/High Channel 844 MHz/Full RB Band Edge @849 MHz
 10:48:02 05.03.2019

LTE Band 5 (10 MHz BW)/QPSK/Low Channel 829 MHz/1 RB 0 offset Band Edge @825 MHz
 10:51:41 05.03.2019
LTE Band 5 (10 MHz BW)/QPSK/High Channel 844 MHz/1 RB 49 offset Band Edge @849 MHz
 10:50:28 05.03.2019

2.7 CONDUCTED SPURIOUS EMISSIONS

2.7.1 Specification Reference

FCC 47 CFR Part 2, Clause 2.1051
FCC 47 CFR Part 22, Clause 22.917(a)(b)
FCC 47 CFR Part 24, Clause 24.238(a)(b)
RSS-132, Clause 5.5
RSS-133, Clause 6.5

2.7.2 Standard Applicable

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10log(P) dB.

2.7.3 Equipment Under Test and Modification State

Serial No: FF161218B00106 and FF130219B00478 / Test Configuration A

2.7.4 Date of Test/Initial of test personnel who performed the test

March 04 and 06, 2019 / XYZ

2.7.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.7.6 Environmental Conditions/ Test Location

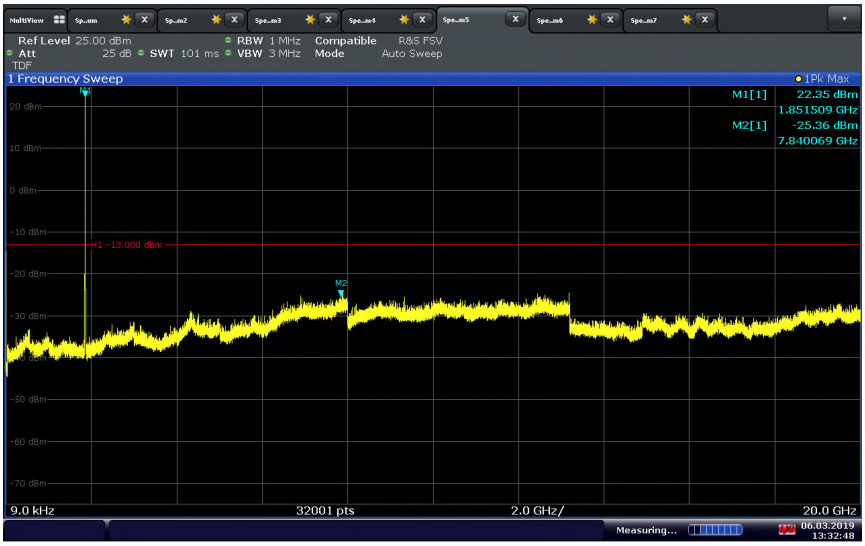
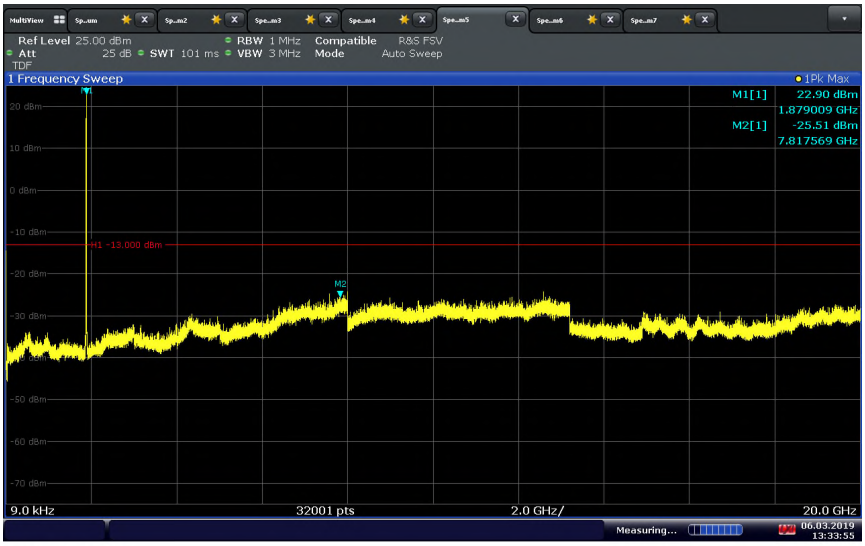
Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

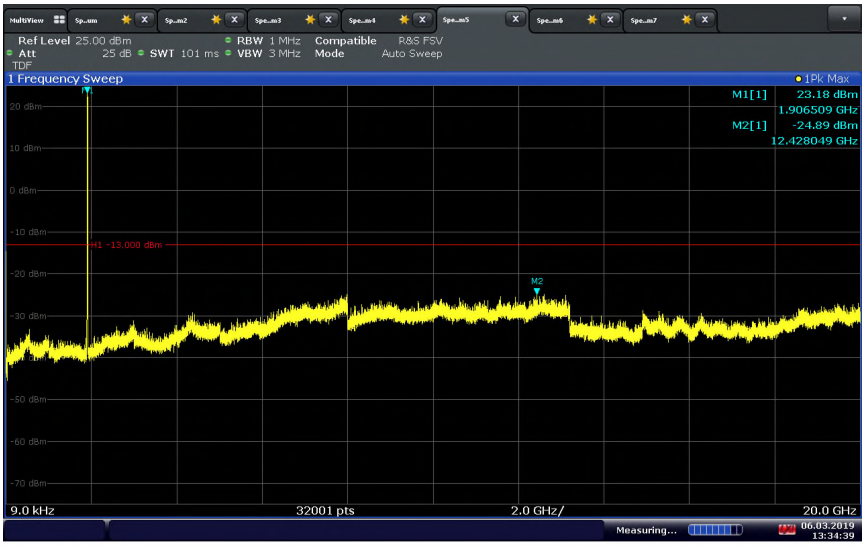
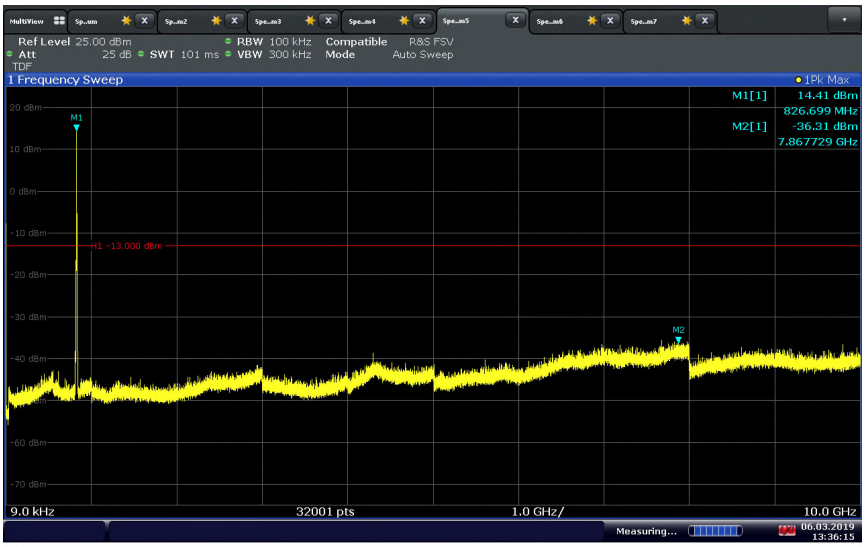
Ambient Temperature	22.1 - 22.3°C
Relative Humidity	48.8 - 50.5 %
ATM Pressure	99.1 - 99.3 kPa

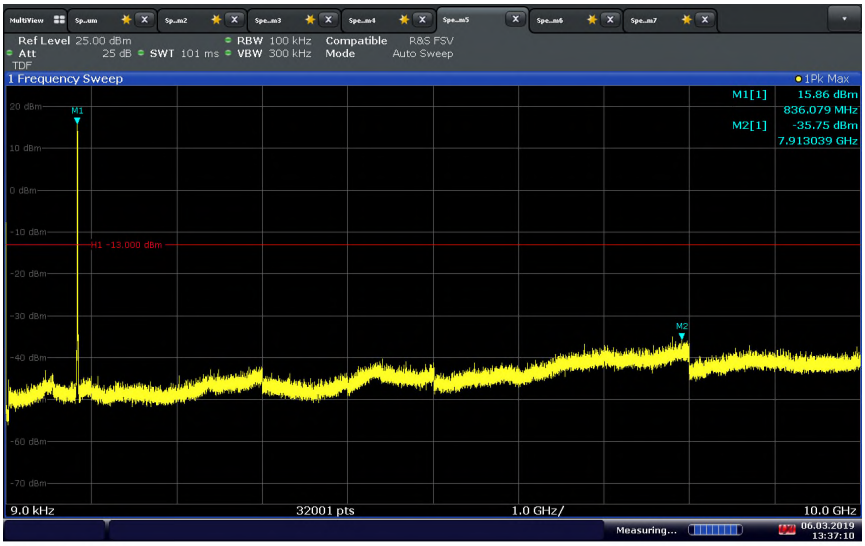
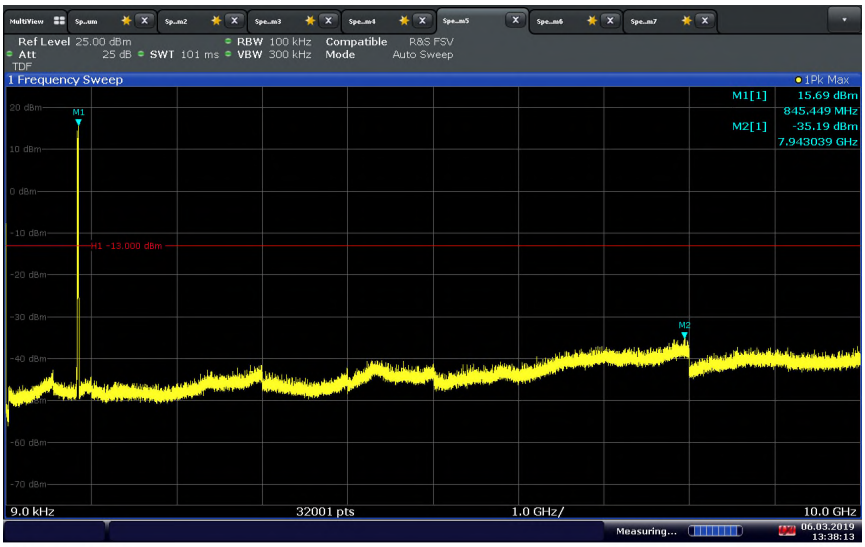
2.7.7 Additional Observations

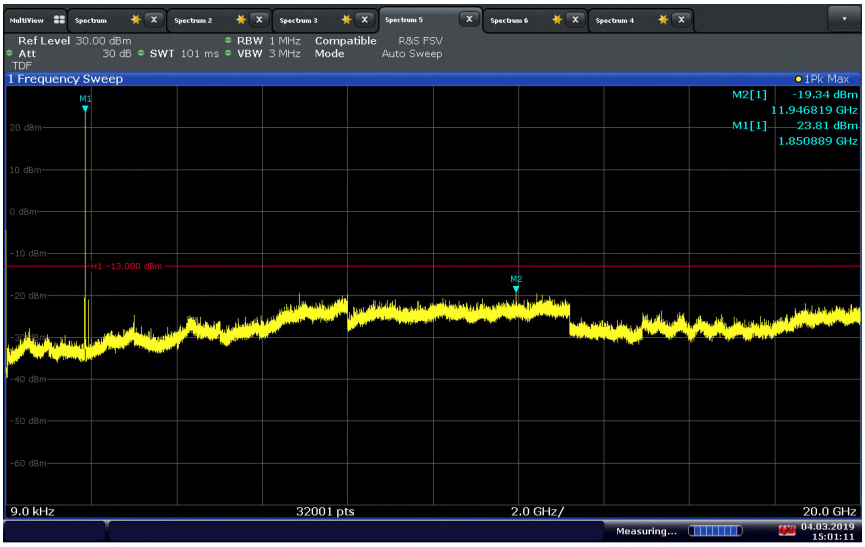
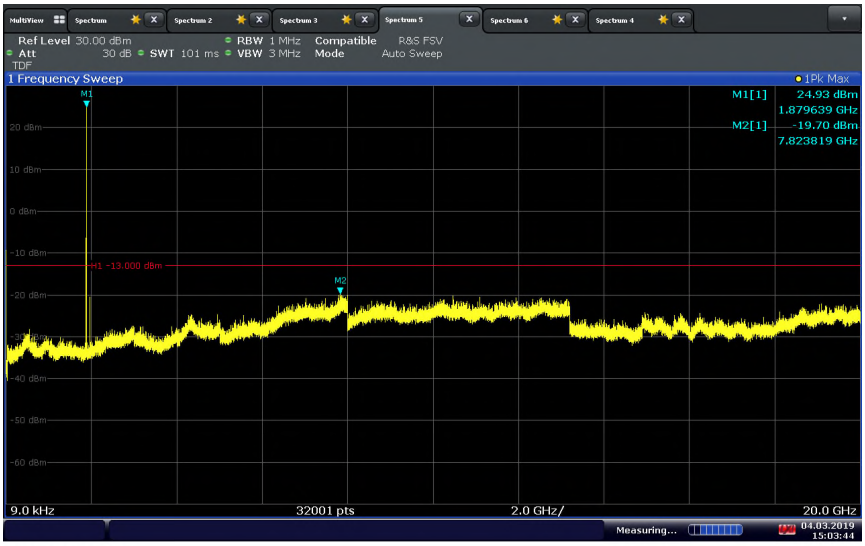
- This is a conducted test.
- The spectrum was searched from 9 kHz to the 10th harmonic.
- The path loss was measured and entered as a transducer factor (TDF).
- For WCDMA/LTE Band 5, RBW was set to 100kHz.
- For WCDMA/LTE Band 2, RBW was set to 1 MHz.
- Low, Middle and High channels on all channel bandwidth and modulation are verified. Only worst case configuration for all technologies presented in this test report.

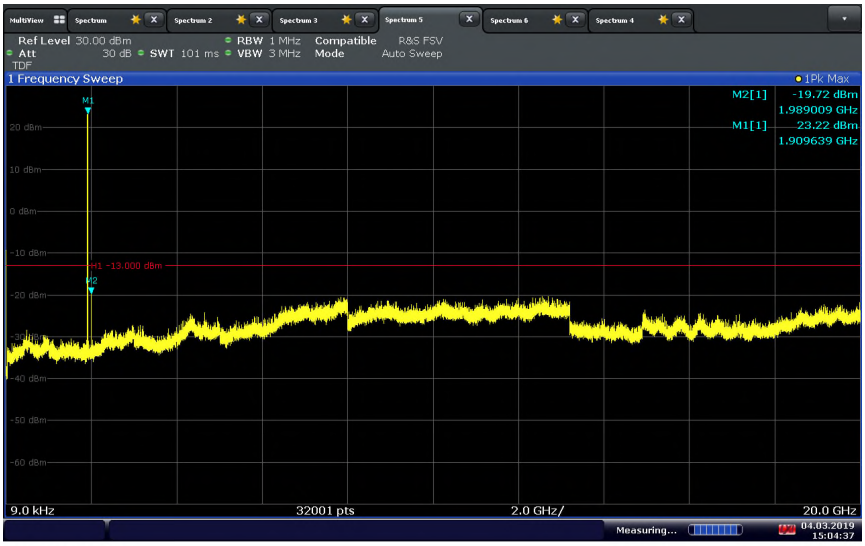
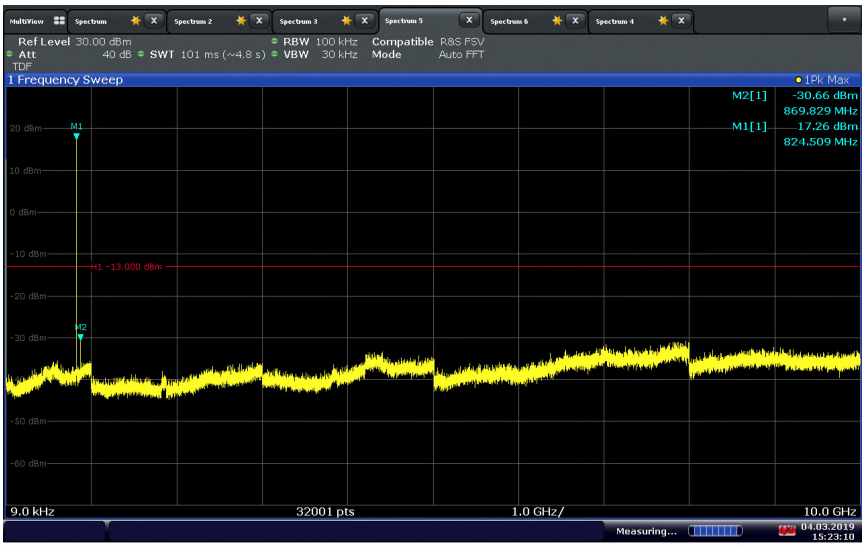
2.7.8 Test Results

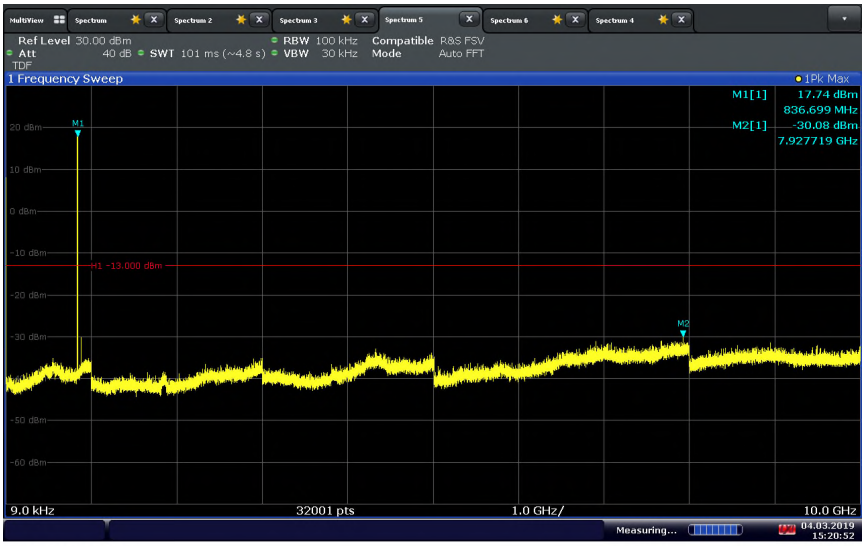
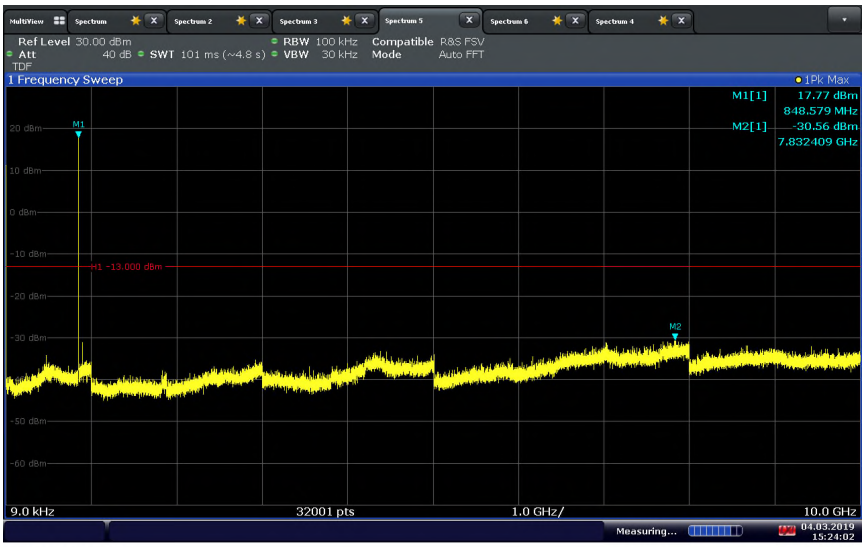
WCDMA Band 2/Low Channel 1852.4 MHz
 13:32:48 06.03.2019
WCDMA Band 2/Mid Channel 1880.0 MHz
 13:33:55 06.03.2019

WCDMA Band 2/High Channel 1907.6 MHz
 13:34:39 06.03.2019
WCDMA Band 5/Low Channel 826.4 MHz
 13:36:15 06.03.2019

WCDMA Band 5/Mid Channel 836.6 MHz
 13:37:11 06.03.2019
WCDMA Band 5/High Channel 846.6 MHz
 13:38:14 06.03.2019

LTE Band 2 (1.4 MHz BW)/QPSK/Low Channel 1850.7 MHz
 15:01:11 04.03.2019
LTE Band 2 (1.4 MHz BW)/QPSK/Mid Channel 1880.0 MHz
 15:03:44 04.03.2019

LTE Band 2 (1.4 MHz BW)/QPSK/High Channel 1909.3 MHz
 15:04:38 04.03.2019
LTE Band 5 (1.4 MHz BW)/QPSK/Low Channel 824.7 MHz
 15:23:11 04.03.2019

LTE Band 5 (1.4 MHz BW)/QPSK/Mid Channel 836.5 MHz
 15:20:53 04.03.2019
LTE Band 5 (1.4 MHz BW)/QPSK/High Channel 848.3 MHz
 15:24:03 04.03.2019

2.8 FIELD STRENGTH OF SPURIOUS RADIATION

2.8.1 Specification Reference

FCC 47 CFR Part 2, Clause 2.1053
FCC 47 CFR Part 22, Clause 22.917(a)
FCC 47 CFR Part 24, Clause 24.238(a)
RSS-132, Clause 5.5
RSS-133, Clause 6.5

2.8.2 Standard Applicable

Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

2.8.3 Equipment Under Test and Modification State

Serial No: FF161218B00106 and FF130219B00478/ Test Configuration B

2.8.4 Date of Test/Initial of test personnel who performed the test

March 08 and 17, 2019 / XYZ

2.8.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.8.6 Environmental Conditions/ Test Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	21.8 - 23.2 °C
Relative Humidity	29.0 - 42.6 %
ATM Pressure	99.1 - 99.2 kPa

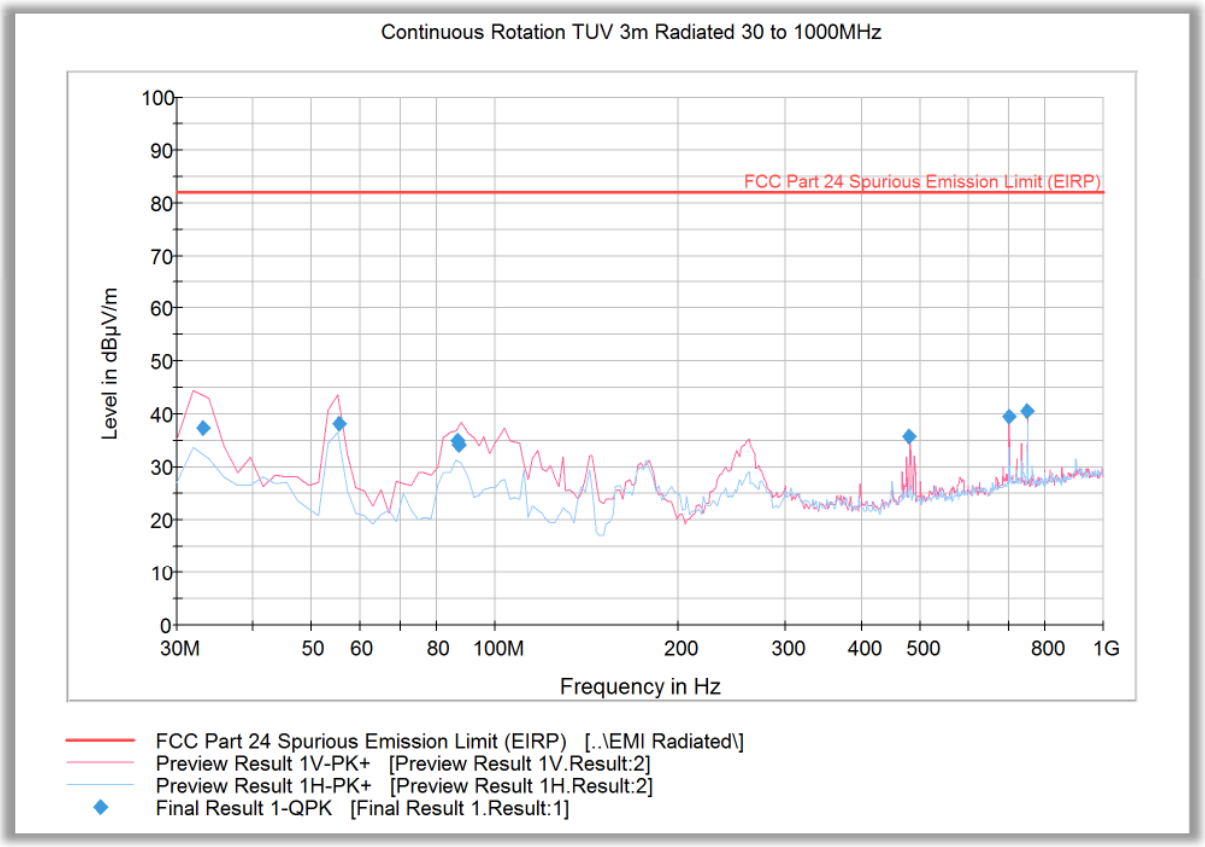
2.8.7 Additional Observations

- This is a radiated test using substitution method as per Unwanted Emissions: Radiated Spurious method of measurement of ANSI/TIA/EIA-603-C 2004, August 17, 2004.
- Emissions within 6dB of the limit will be proven by substitution method.
- This is cabinet spurious emissions testing. Main antenna port was terminated during the test. Fundamental frequency measurement will be ignored for this test.
- Only the worst case configuration presented in this test report.
- Only noise floor measurements observed above 18GHz.
- Measurement was done using EMC32 automated software. Reported level is the actual level with all the correction factors factored in. Correction Factor column is for informational purposes only.

2.8.8 Test Results

Compliant. See attached plots.

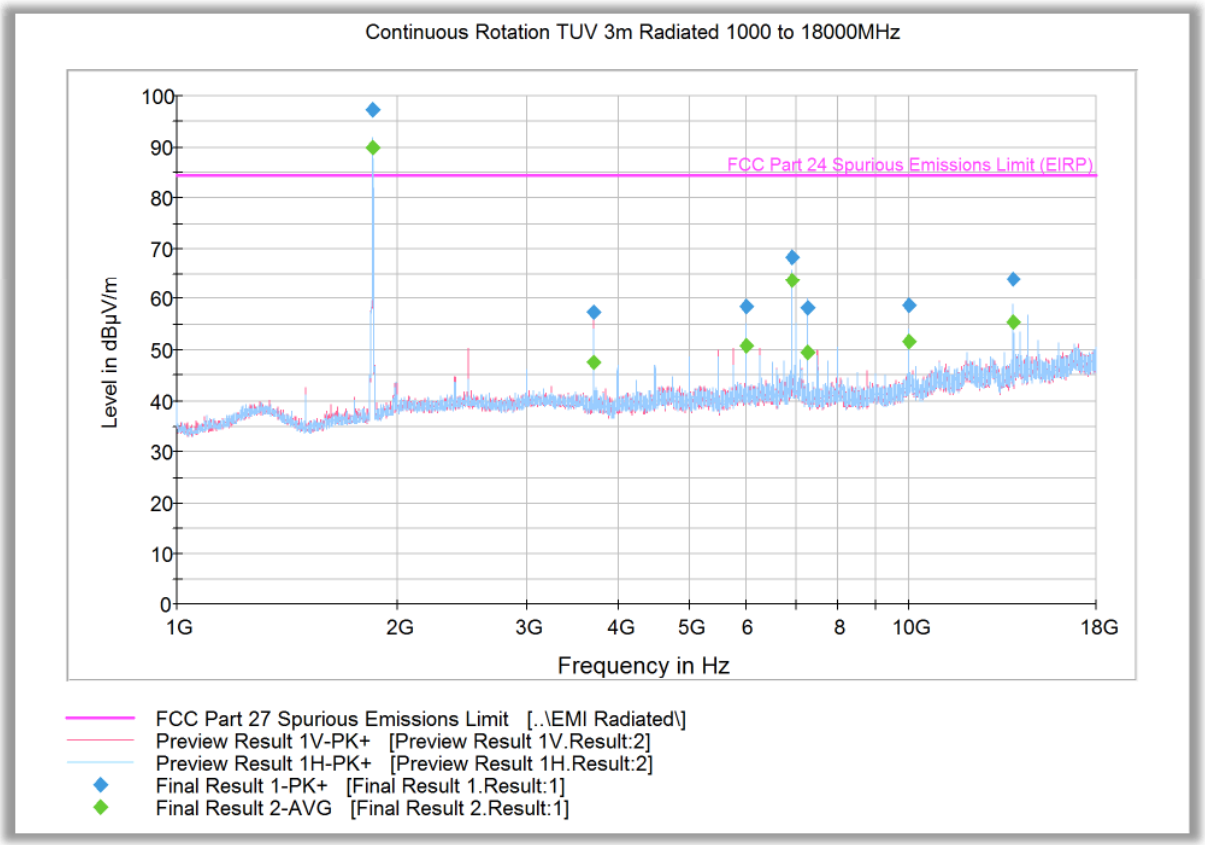
2.8.9 Radiated Emission Test Results Below 1GHz_Worst Case Configuration_WCDMA Band 2 High Channel



Quasi Peak Data

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
33.200000	37.4	1000.0	120.000	100.0	V	182.0	-9.2	47.0	84.4
55.430541	38.2	1000.0	120.000	100.0	V	65.0	-15.8	46.2	84.4
86.588858	35.0	1000.0	120.000	100.0	V	182.0	-15.5	49.4	84.4
87.236633	34.3	1000.0	120.000	100.0	V	174.0	-15.4	50.1	84.4
480.021964	35.7	1000.0	120.000	100.0	V	122.0	-1.6	48.7	84.4
700.001283	39.5	1000.0	120.000	150.0	V	15.0	2.6	44.9	84.4
749.982365	40.5	1000.0	120.000	134.0	V	16.0	2.9	43.9	84.4

2.8.10 Radiated Emission Test Results Above 1GHz_WCDMA Band 2 Low Channel



Peak Data

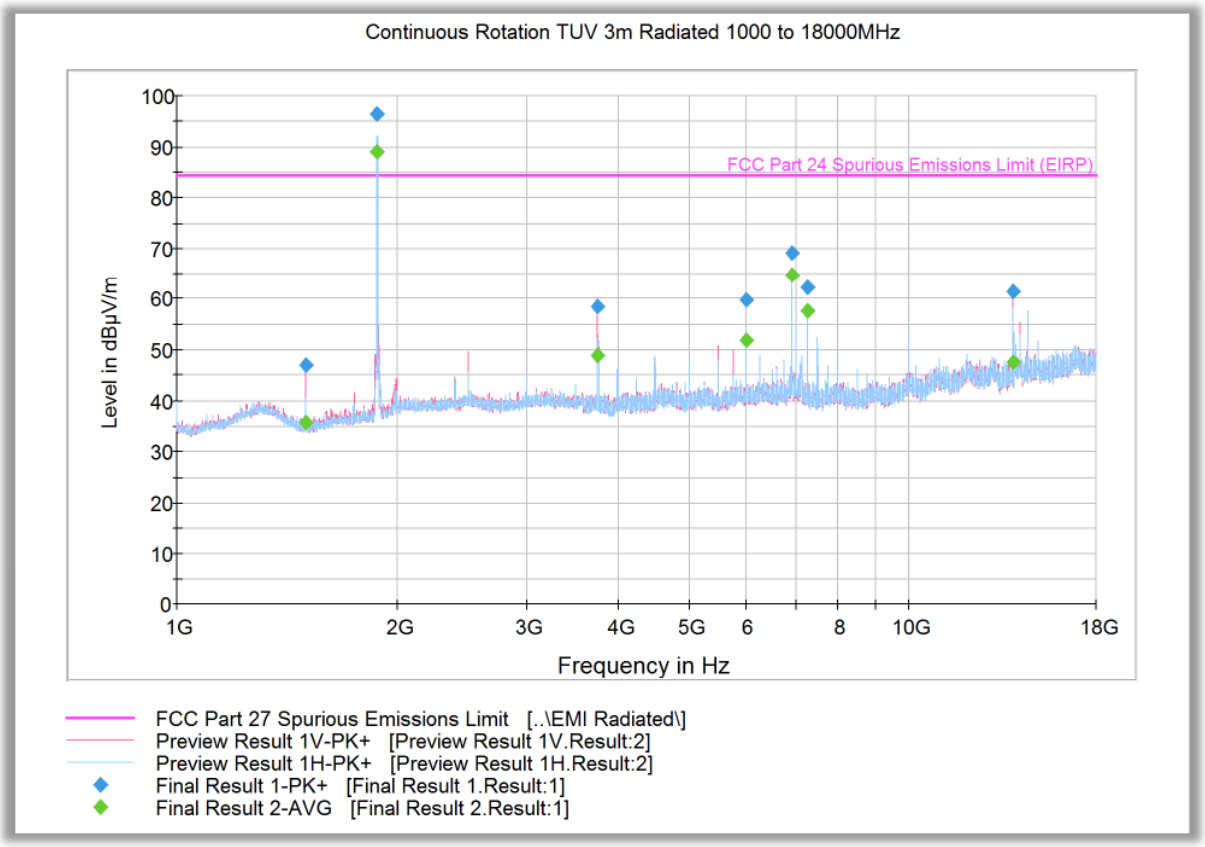
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1851.333333	97.2	1000.0	1000.000	103.7	H	180.0	-2.9	Fundamental Carrier*	
3702.633333	57.3	1000.0	1000.000	99.7	V	295.0	2.0	27.1	84.4
5999.900000	58.4	1000.0	1000.000	200.5	H	345.0	5.7	26.0	84.4
6918.266667	68.3	1000.0	1000.000	306.2	H	112.0	6.7	16.1	84.4
7253.000000	58.2	1000.0	1000.000	103.7	H	59.0	7.0	26.2	84.4
10000.166667	58.7	1000.0	1000.000	265.3	H	41.0	9.6	25.7	84.4
13836.100000	63.9	1000.0	1000.000	151.6	H	48.0	14.1	20.5	84.4

Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1851.333333	89.9	1000.0	1000.000	103.7	H	180.0	-2.9	Fundamental Carrier*	
3702.633333	47.6	1000.0	1000.000	99.7	V	295.0	2.0	36.8	84.4
5999.900000	50.8	1000.0	1000.000	200.5	H	345.0	5.7	33.6	84.4
6918.266667	63.8	1000.0	1000.000	306.2	H	112.0	6.7	20.6	84.4
7253.000000	49.6	1000.0	1000.000	103.7	H	59.0	7.0	34.8	84.4
10000.166667	51.8	1000.0	1000.000	265.3	H	41.0	9.6	32.6	84.4
13836.100000	55.4	1000.0	1000.000	151.6	H	48.0	14.1	29.0	84.4

***** This is the fundamental frequency not part of spurious emission evaluation. Data provided for information purpose only.

2.8.11 Radiated Emission Test Results Above 1GHz_WCDMA Band 2 Middle Channel



Peak Data

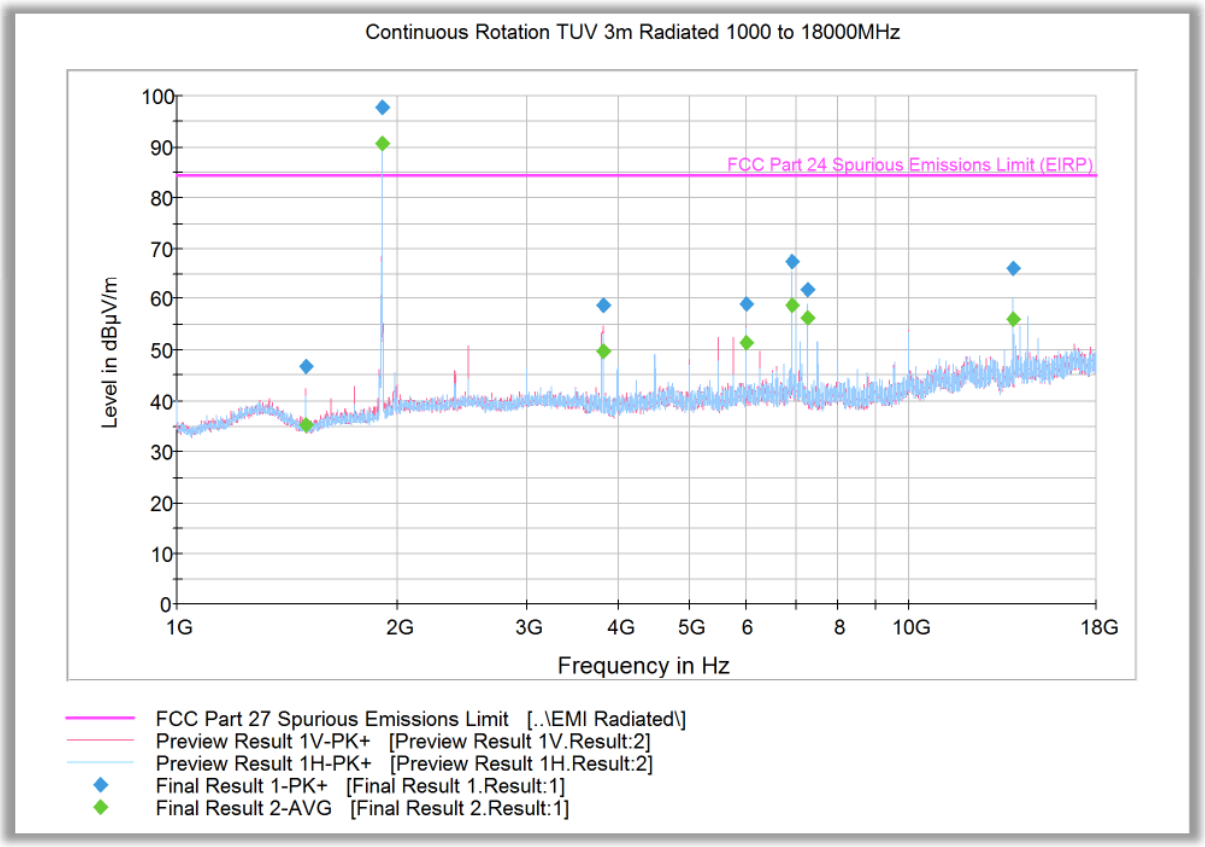
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1500.000000	46.9	1000.0	1000.000	102.7	V	49.0	-6.1	37.5	84.4
1879.100000	96.4	1000.0	1000.000	103.7	H	181.0	-2.7	Fundamental Carrier*	
3762.133333	58.4	1000.0	1000.000	103.7	V	144.0	2.0	26.0	84.4
5999.900000	59.9	1000.0	1000.000	194.5	H	206.0	5.7	24.5	84.4
6918.500000	69.1	1000.0	1000.000	301.2	H	113.0	6.7	15.3	84.4
7252.633333	62.3	1000.0	1000.000	130.7	H	61.0	7.0	22.1	84.4
13834.966667	61.5	1000.0	1000.000	182.6	V	261.0	14.1	22.9	84.4

Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1500.000000	35.7	1000.0	1000.000	102.7	V	49.0	-6.1		
1879.100000	89.2	1000.0	1000.000	103.7	H	181.0	-2.7	Fundamental Carrier*	
3762.133333	48.9	1000.0	1000.000	103.7	V	144.0	2.0	35.5	84.4
5999.900000	52.0	1000.0	1000.000	194.5	H	206.0	5.7	32.4	84.4
6918.500000	64.8	1000.0	1000.000	301.2	H	113.0	6.7	19.6	84.4
7252.633333	57.6	1000.0	1000.000	130.7	H	61.0	7.0	26.8	84.4
13834.966667	47.4	1000.0	1000.000	182.6	V	261.0	14.1	37.0	84.4

***** This is the fundamental frequency not part of spurious emission evaluation. Data provided for information purpose only.

2.8.12 Radiated Emission Test Results Above 1GHz_WCDMA Band 2 High Channel



Peak Data

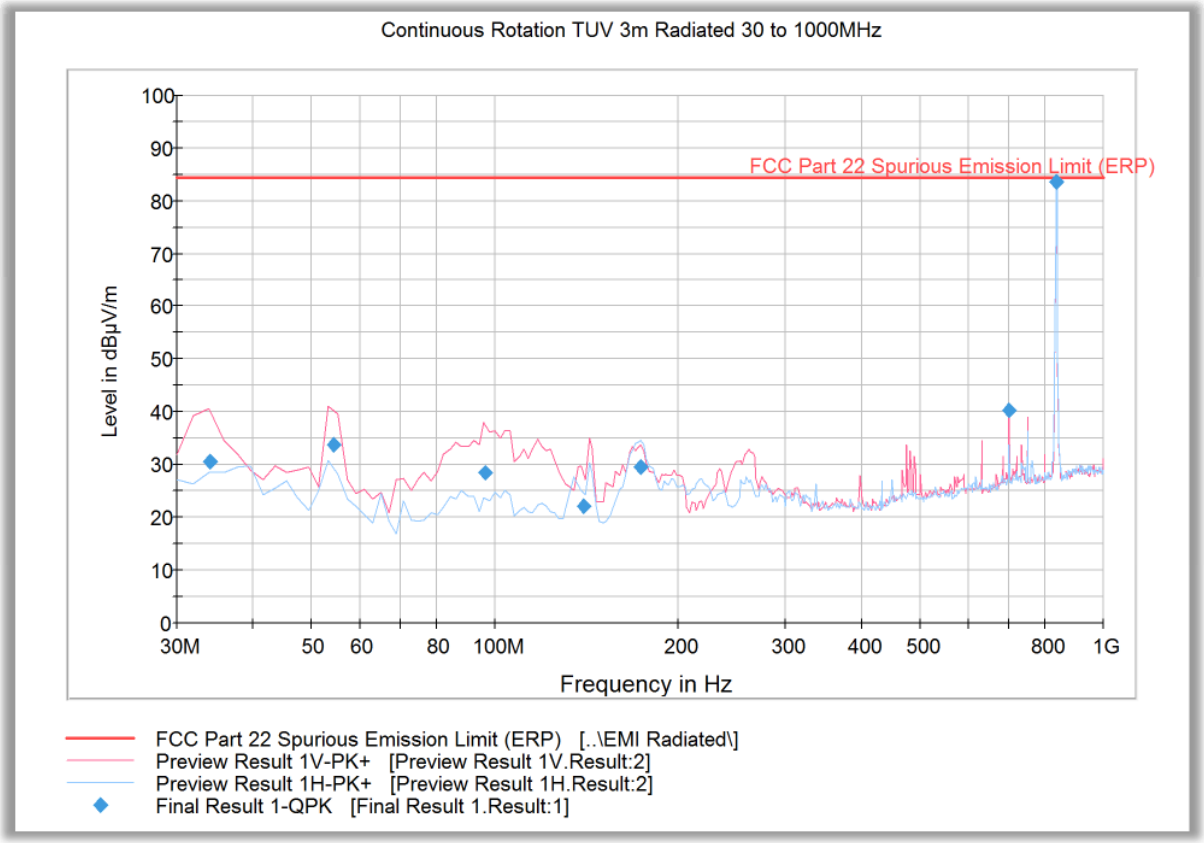
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1500.000000	46.7	1000.0	1000.000	103.7	V	48.0	-6.1	37.7	84.4
1908.566667	97.7	1000.0	1000.000	151.6	H	206.0	-2.5	Fundamental Carrier*	
3817.266667	58.9	1000.0	1000.000	103.7	V	146.0	2.3	25.5	84.4
5999.900000	58.9	1000.0	1000.000	200.5	V	168.0	5.7	25.5	84.4
6919.033333	67.6	1000.0	1000.000	307.2	H	112.0	6.7	16.8	84.4
7252.966667	61.8	1000.0	1000.000	270.3	V	98.0	7.0	22.6	84.4
13835.766667	66.1	1000.0	1000.000	200.5	H	193.0	14.1	18.3	84.4

Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1500.000000	35.2	1000.0	1000.000	103.7	V	48.0	-6.1	49.2	84.4
1908.566667	90.7	1000.0	1000.000	151.6	H	206.0	-2.5	Fundamental Carrier*	
3817.266667	49.8	1000.0	1000.000	103.7	V	146.0	2.3	34.6	84.4
5999.900000	51.4	1000.0	1000.000	200.5	V	168.0	5.7	33.0	84.4
6919.033333	58.7	1000.0	1000.000	307.2	H	112.0	6.7	25.7	84.4
7252.966667	56.3	1000.0	1000.000	270.3	V	98.0	7.0	28.1	84.4
13835.766667	56.0	1000.0	1000.000	200.5	H	193.0	14.1	28.4	84.4

* This is the fundamental frequency not part of spurious emission evaluation. Data provided for information purpose only.

2.8.13 Radiated Emission Test Results Below 1GHz_ Worst Case Configuration_WCDMA Band 5 Middle Channel

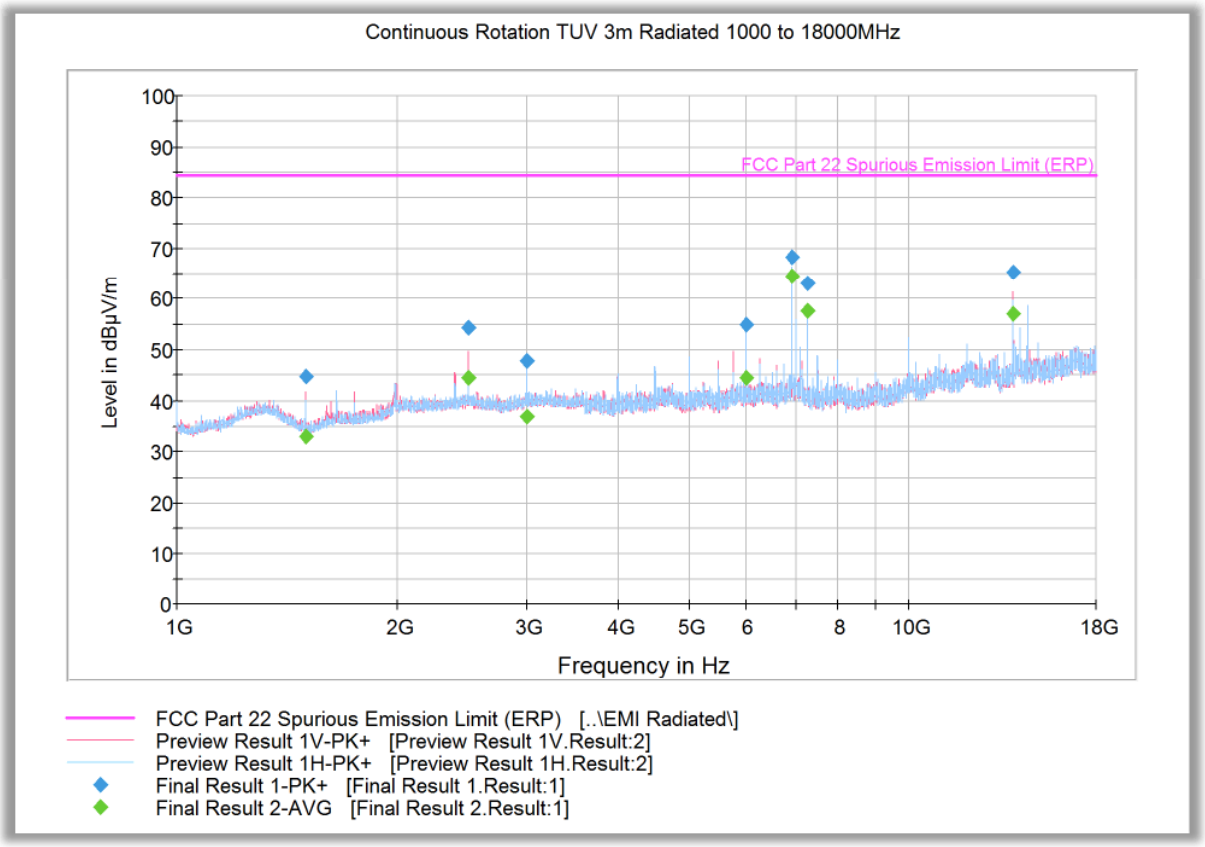


Quasi Peak Data

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
33.967776	30.6	1000.0	120.000	120.0	V	279.0	-9.5	53.7	84.4
54.326653	33.6	1000.0	120.000	121.0	V	94.0	-15.7	50.8	84.4
96.292184	28.5	1000.0	120.000	100.0	V	231.0	-13.5	55.9	84.4
139.825491	22.2	1000.0	120.000	106.0	V	199.0	-14.0	62.2	84.4
173.607695	29.3	1000.0	120.000	100.0	H	155.0	-11.6	55.0	84.4
700.001283	40.4	1000.0	120.000	155.0	V	11.0	2.6	44.0	84.4
836.593427	83.6	1000.0	120.000	100.0	H	338.0	4.3	Fundamental Carrier*	

***** This is the fundamental frequency not part of spurious emission evaluation. Data provided for information purpose only.

2.8.14 Radiated Emission Test Results Above 1GHz_Worst Case Configuration_WCDMA Band 5 Low Channel



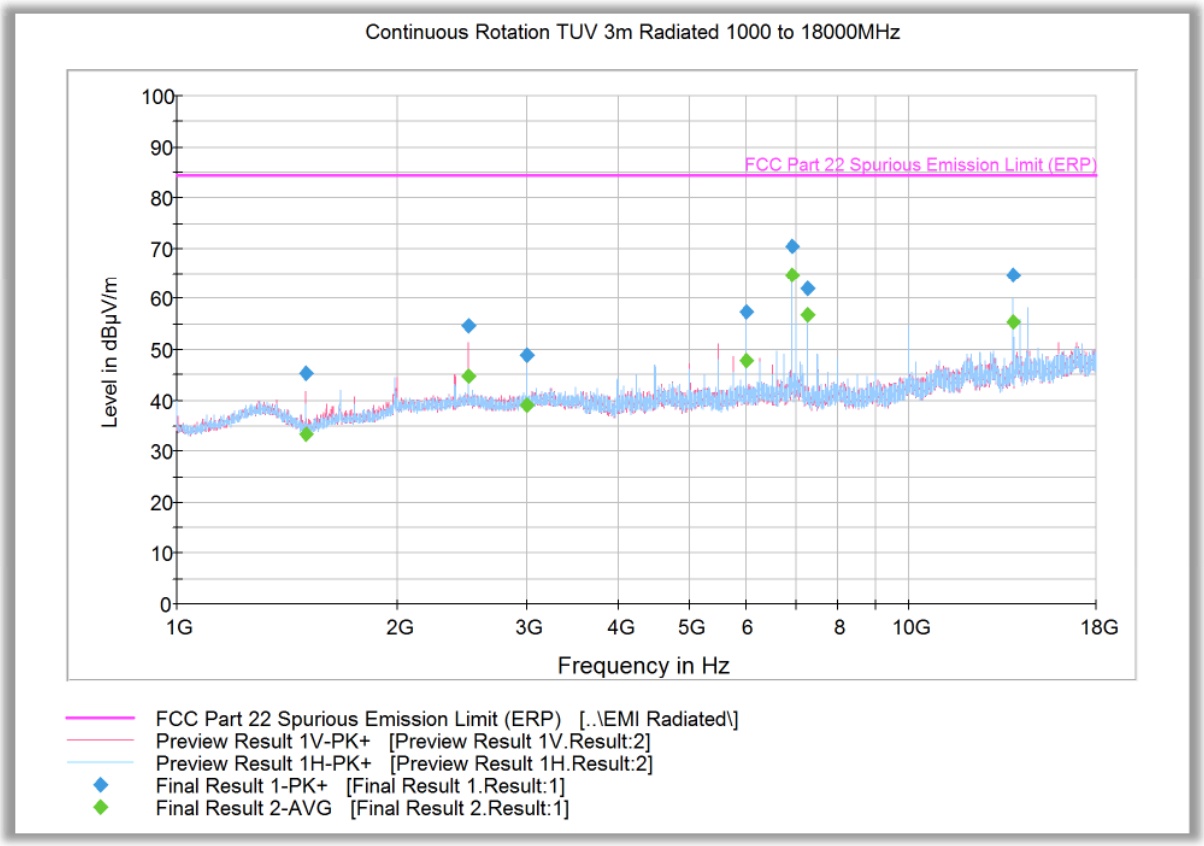
Peak Data

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1500.000000	44.7	1000.0	1000.000	104.7	V	4.0	-6.1	39.6	84.4
2499.766667	54.2	1000.0	1000.000	103.7	V	159.0	-0.3	30.1	84.4
2999.966667	47.8	1000.0	1000.000	102.7	H	-7.0	0.9	36.6	84.4
5999.900000	54.9	1000.0	1000.000	151.6	V	162.0	5.7	29.5	84.4
6918.100000	68.4	1000.0	1000.000	307.2	H	112.0	6.7	16.0	84.4
7253.000000	63.0	1000.0	1000.000	200.5	H	32.0	7.0	21.3	84.4
13835.933333	65.4	1000.0	1000.000	301.2	V	107.0	14.1	18.9	84.4

Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1500.000000	33.2	1000.0	1000.000	104.7	V	4.0	-6.1	51.2	84.4
2499.766667	44.5	1000.0	1000.000	103.7	V	159.0	-0.3	39.9	84.4
2999.966667	36.9	1000.0	1000.000	102.7	H	-7.0	0.9	47.5	84.4
5999.900000	44.5	1000.0	1000.000	151.6	V	162.0	5.7	39.9	84.4
6918.100000	64.4	1000.0	1000.000	307.2	H	112.0	6.7	20.0	84.4
7253.000000	57.7	1000.0	1000.000	200.5	H	32.0	7.0	26.7	84.4
13835.933333	57.1	1000.0	1000.000	301.2	V	107.0	14.1	27.3	84.4

2.8.15 Radiated Emission Test Results Above 1GHz_Worst Case Configuration_WCDMA Band 5 Middle Channel



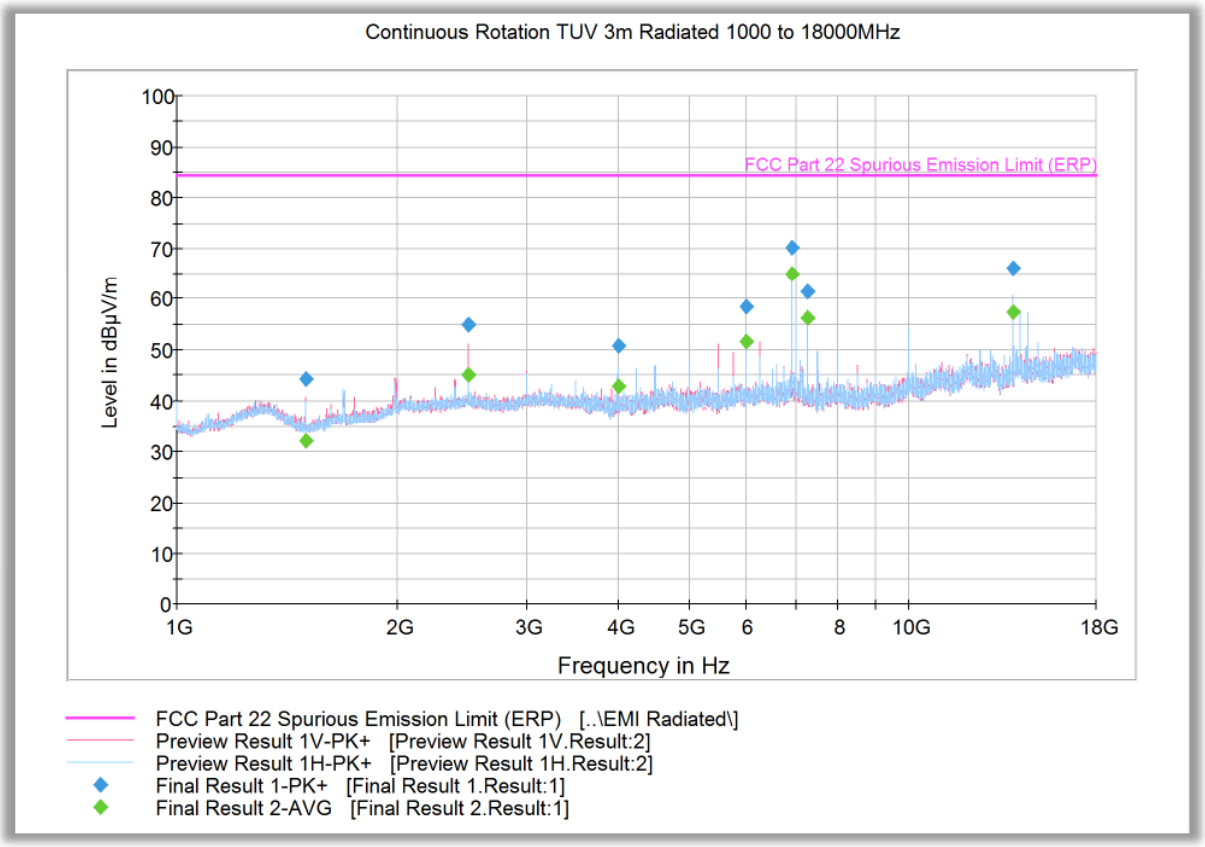
Peak Data

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1500.000000	45.2	1000.0	1000.000	120.7	V	358.0	-6.1	39.2	84.4
2500.166667	54.5	1000.0	1000.000	103.7	V	153.0	-0.3	29.8	84.4
2999.966667	49.0	1000.0	1000.000	165.6	H	25.0	0.9	35.4	84.4
5999.900000	57.5	1000.0	1000.000	128.7	H	320.0	5.7	26.9	84.4
6918.133333	70.4	1000.0	1000.000	174.6	H	48.0	6.7	14.0	84.4
7252.966667	62.0	1000.0	1000.000	103.7	H	65.0	7.0	22.3	84.4
13836.166667	64.7	1000.0	1000.000	209.4	H	49.0	14.1	19.7	84.4

Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1500.000000	33.5	1000.0	1000.000	120.7	V	358.0	-6.1	50.9	84.4
2500.166667	44.8	1000.0	1000.000	103.7	V	153.0	-0.3	39.6	84.4
2999.966667	39.1	1000.0	1000.000	165.6	H	25.0	0.9	45.2	84.4
5999.900000	47.7	1000.0	1000.000	128.7	H	320.0	5.7	36.7	84.4
6918.133333	64.8	1000.0	1000.000	174.6	H	48.0	6.7	19.6	84.4
7252.966667	57.0	1000.0	1000.000	103.7	H	65.0	7.0	27.4	84.4
13836.166667	55.4	1000.0	1000.000	209.4	H	49.0	14.1	29.0	84.4

2.8.16 Radiated Emission Test Results Above 1GHz_Worst Case Configuration_WCDMA Band 5 High Channel



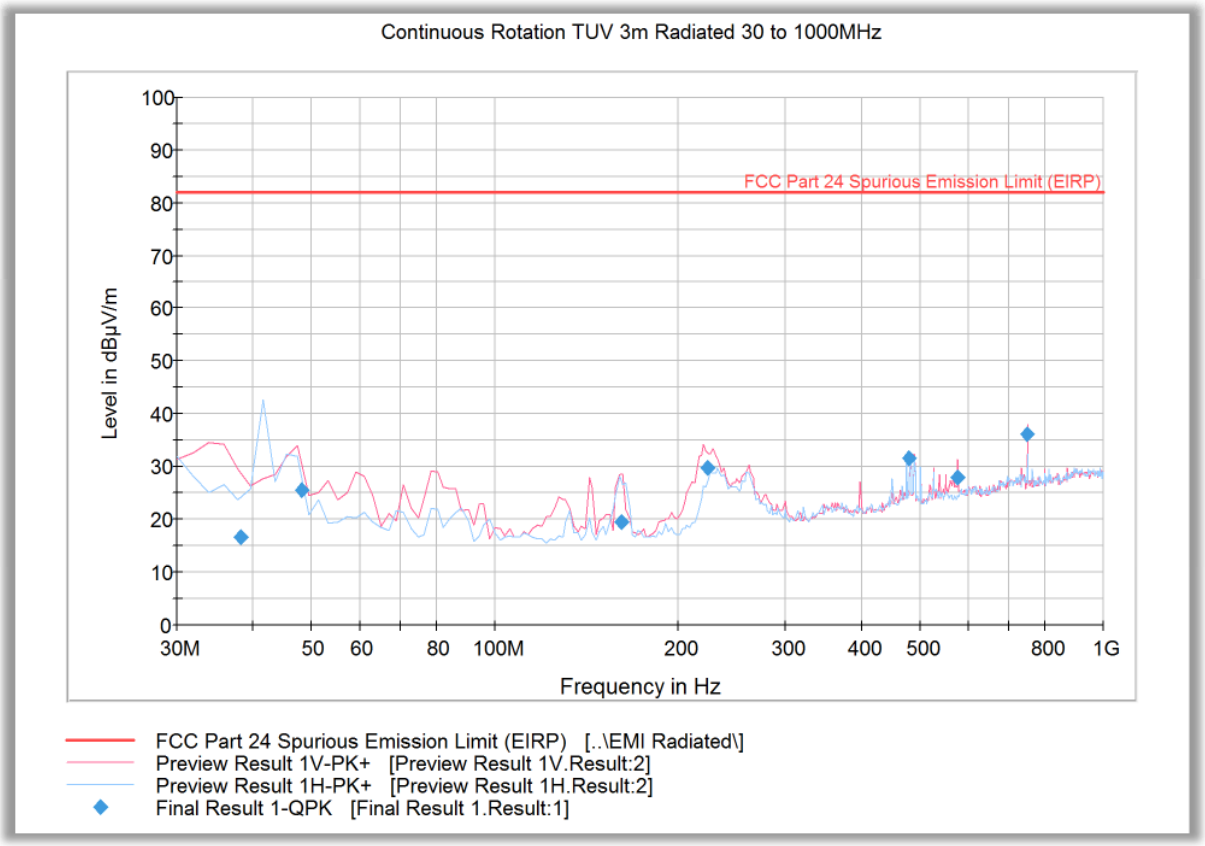
Peak Data

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1500.000000	44.2	1000.0	1000.000	99.7	V	260.0	-6.1	40.2	84.4
2500.166667	54.8	1000.0	1000.000	103.7	V	159.0	-0.3	29.6	84.4
4000.133333	50.8	1000.0	1000.000	103.7	H	75.0	2.5	33.6	84.4
5999.900000	58.4	1000.0	1000.000	99.7	H	81.0	5.7	26.0	84.4
6918.066667	70.1	1000.0	1000.000	169.6	H	48.0	6.7	14.3	84.4
7252.433333	61.4	1000.0	1000.000	302.2	H	30.0	7.0	23.0	84.4
13835.133333	66.1	1000.0	1000.000	301.2	V	107.0	14.1	18.3	84.4

Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1500.000000	32.2	1000.0	1000.000	99.7	V	260.0	-6.1	52.2	84.4
2500.166667	45.0	1000.0	1000.000	103.7	V	159.0	-0.3	39.4	84.4
4000.133333	42.8	1000.0	1000.000	103.7	H	75.0	2.5	41.6	84.4
5999.900000	51.6	1000.0	1000.000	99.7	H	81.0	5.7	32.8	84.4
6918.066667	65.1	1000.0	1000.000	169.6	H	48.0	6.7	19.3	84.4
7252.433333	56.2	1000.0	1000.000	302.2	H	30.0	7.0	28.2	84.4
13835.133333	57.3	1000.0	1000.000	301.2	V	107.0	14.1	27.1	84.4

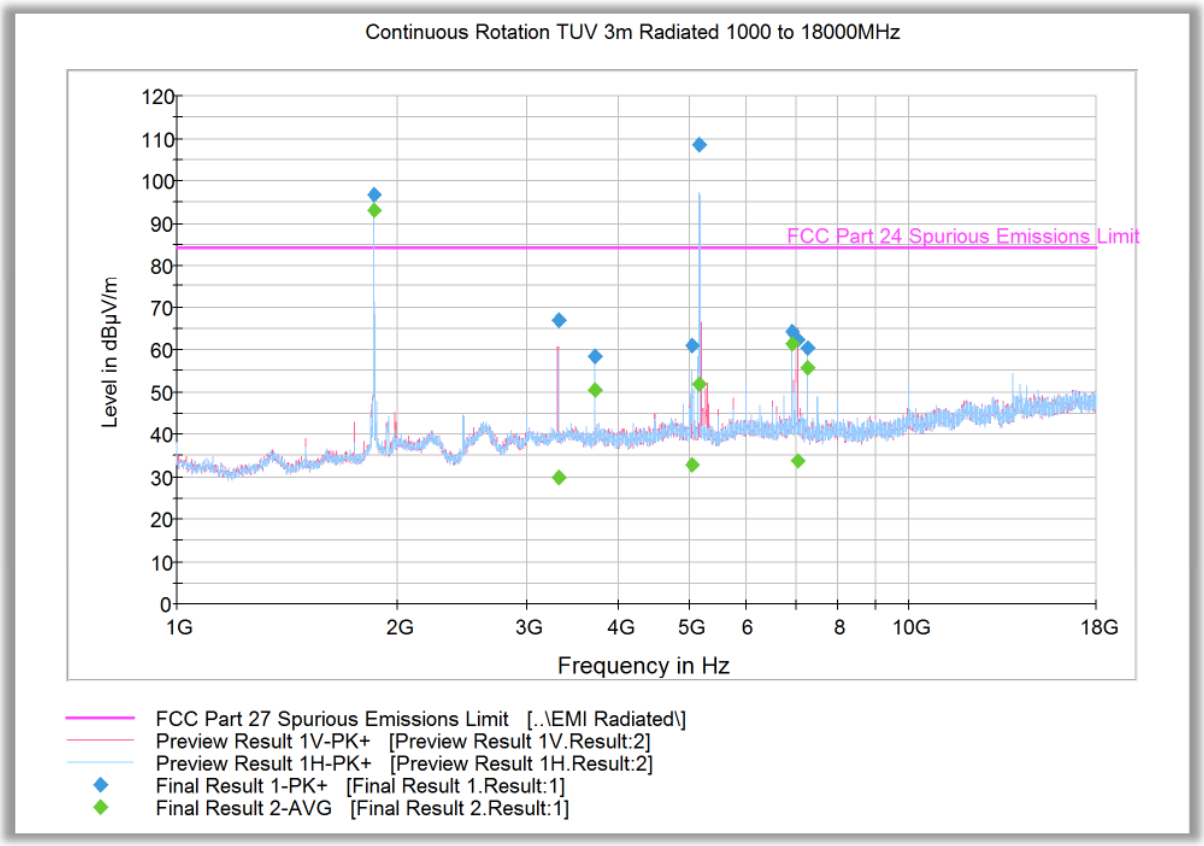
2.8.17 Radiated Emission Test Results Below 1GHz_Worst Case Configuration_LTE Band 2_20 MHz Bandwidth_Middle Channel_1 RB 49 offset_QPSK



Quasi Peak Data

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
38.263327	16.6	1000.0	120.000	355.0	H	60.0	-11.3	67.8	84.4
48.254990	25.5	1000.0	120.000	110.0	V	277.0	-14.5	58.9	84.4
161.280481	19.6	1000.0	120.000	105.0	V	3.0	-11.8	64.8	84.4
223.621002	29.6	1000.0	120.000	100.0	V	107.0	-9.4	54.8	84.4
480.021964	31.5	1000.0	120.000	110.0	H	230.0	-1.6	52.9	84.4
574.992465	27.8	1000.0	120.000	133.0	V	23.0	-0.6	56.6	84.4
749.982365	36.1	1000.0	120.000	116.0	V	333.0	2.9	48.3	84.4

2.8.18 Radiated Emission Test Results Above 1GHz_Worst Case Configuration_LTE Band 2_20 MHz Bandwidth_Low Channel_1 RB 49 offset_QPSK



Peak Data

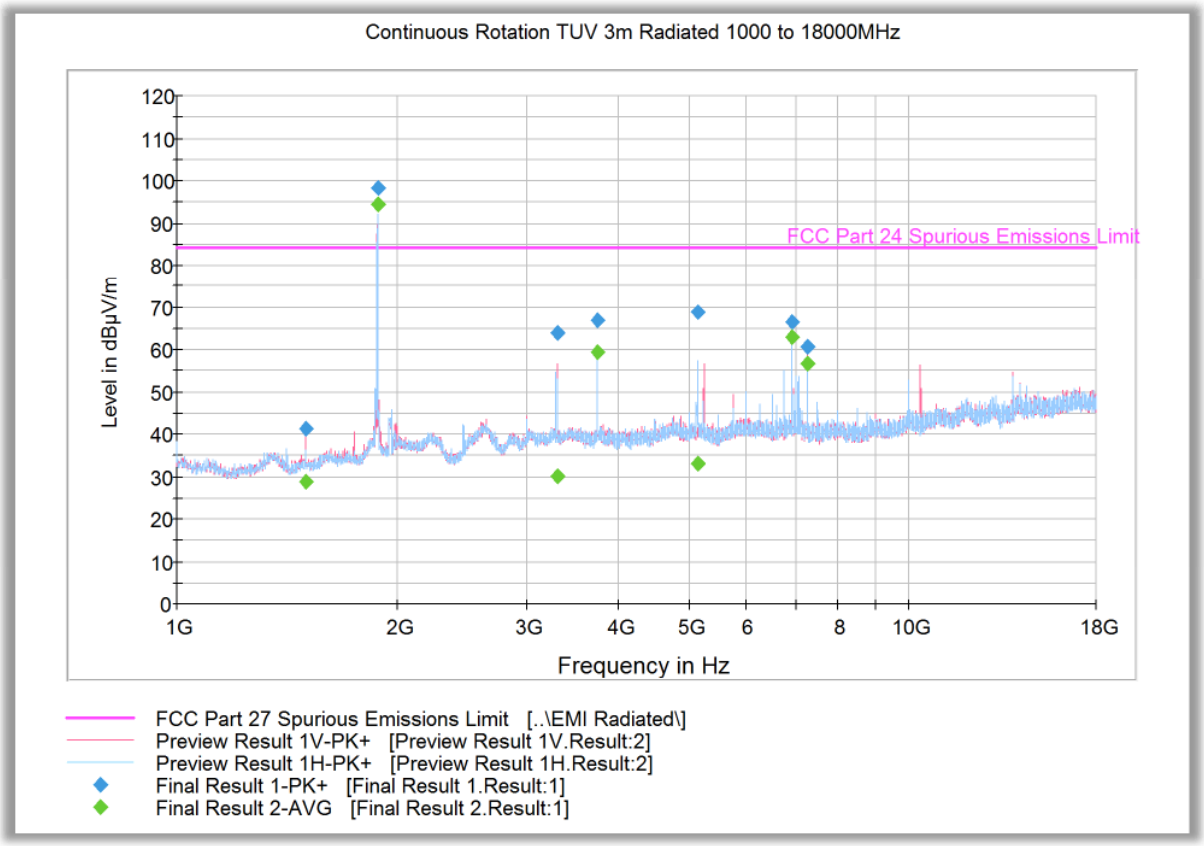
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1860.033333	96.7	1000.0	1000.000	301.2	H	105.0	-2.8	Fundamental Carrier*	
3315.966667	66.8	1000.0	1000.000	199.5	V	65.0	1.0	17.6	84.4
3720.200000	58.5	1000.0	1000.000	297.2	H	208.0	2.0	25.9	84.4
5051.900000	61.1	1000.0	1000.000	152.2	H	353.0	3.9	23.3	84.4
5173.933333	108.6	1000.0	1000.000	112.7	H	82.0	4.2	WIFI 5.2GHz Signal	
6916.400000	64.4	1000.0	1000.000	102.7	H	54.0	6.7	20.0	84.4
7033.533333	62.4	1000.0	1000.000	132.7	V	-8.0	6.9	22.0	84.4
7247.700000	60.2	1000.0	1000.000	103.7	H	59.0	7.0	24.2	84.4

Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1860.033333	93.0	1000.0	1000.000	301.2	H	105.0	-2.8	Fundamental Carrier*	
3315.966667	30.0	1000.0	1000.000	199.5	V	65.0	1.0	54.4	84.4
3720.200000	50.6	1000.0	1000.000	297.2	H	208.0	2.0	33.8	84.4
5051.900000	32.7	1000.0	1000.000	152.2	H	353.0	3.9	51.7	84.4
5173.933333	51.6	1000.0	1000.000	112.7	H	82.0	4.2	WIFI 5.2GHz Signal	
6916.400000	61.4	1000.0	1000.000	102.7	H	54.0	6.7	23.0	84.4
7033.533333	33.9	1000.0	1000.000	132.7	V	-8.0	6.9	50.5	84.4
7247.700000	55.8	1000.0	1000.000	103.7	H	59.0	7.0	28.6	84.4

***** The fundamental frequency and WIFI 5.2 GHz signals are not part of spurious emission evaluation. Data provided for information purpose only.

2.8.19 Radiated Emission Test Results Above 1GHz_Worst Case Configuration_LTE Band 2_20 MHz Bandwidth_Middle Channel_1 RB 49 offset_QPSK



Peak Data

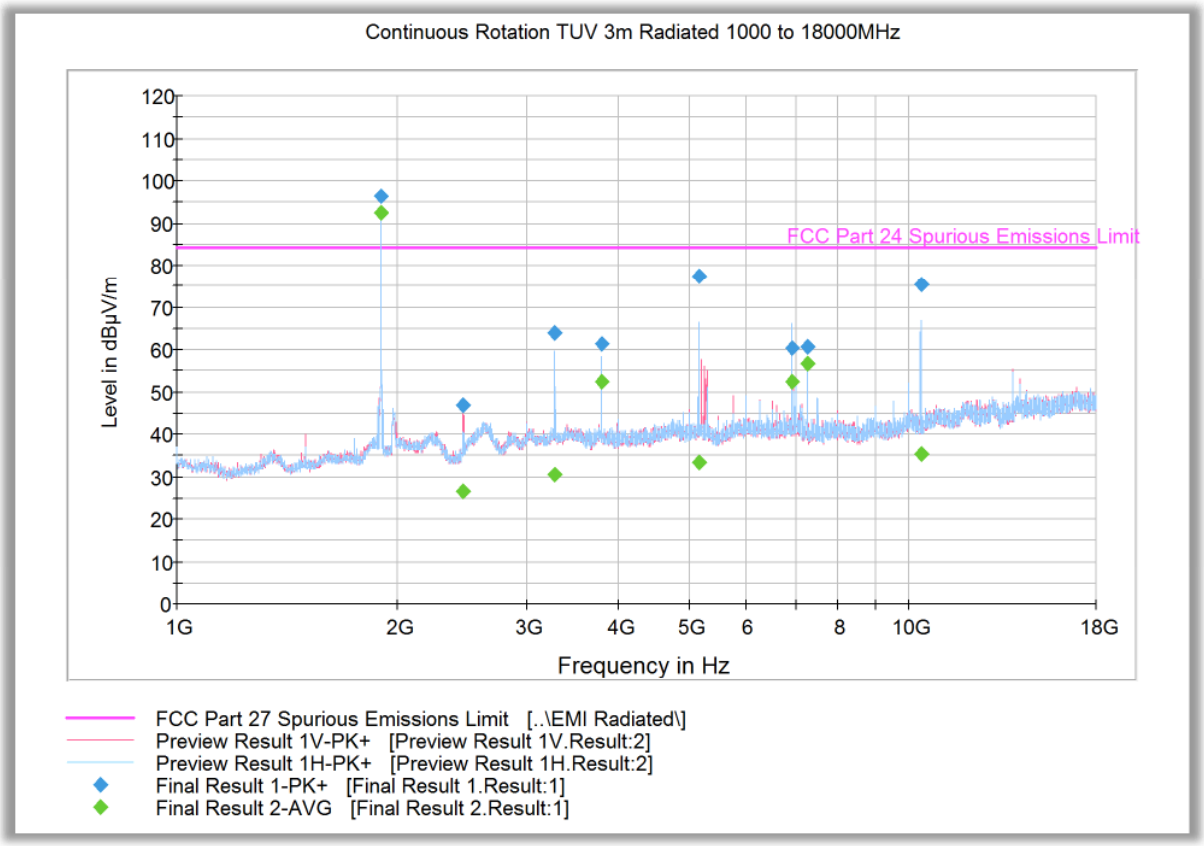
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1500.000000	41.5	1000.0	1000.000	128.7	V	-7.0	-6.1	42.9	84.4
1880.233333	98.3	1000.0	1000.000	291.2	H	214.0	-2.7	Fundamental Carrier*	
3301.366667	64.1	1000.0	1000.000	296.2	V	82.0	1.0	20.3	84.4
3760.066667	66.9	1000.0	1000.000	131.7	V	271.0	2.0	17.5	84.4
5149.333333	68.8	1000.0	1000.000	134.7	H	152.0	4.1	15.6	84.4
6916.200000	66.5	1000.0	1000.000	111.7	H	198.0	6.7	17.9	84.4
7247.466667	60.5	1000.0	1000.000	103.7	V	109.0	7.0	23.9	84.4

Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1500.000000	28.7	1000.0	1000.000	128.7	V	-7.0	-6.1	55.7	84.4
1880.233333	94.3	1000.0	1000.000	291.2	H	214.0	-2.7	Fundamental Carrier*	
3301.366667	30.0	1000.0	1000.000	296.2	V	82.0	1.0	54.4	84.4
3760.066667	59.3	1000.0	1000.000	131.7	V	271.0	2.0	25.1	84.4
5149.333333	33.1	1000.0	1000.000	134.7	H	152.0	4.1	51.3	84.4
6916.200000	63.1	1000.0	1000.000	111.7	H	198.0	6.7	21.3	84.4
7247.466667	56.7	1000.0	1000.000	103.7	V	109.0	7.0	27.7	84.4

***** The fundamental frequency and WIFI 5.2 GHz signals are not part of spurious emission evaluation. Data provided for information purpose only.

2.8.20 Radiated Emission Test Results Above 1GHz_Worst Case Configuration_LTE Band 2_20 MHz Bandwidth_High Channel_1 RB 49 offset_QPSK



Peak Data

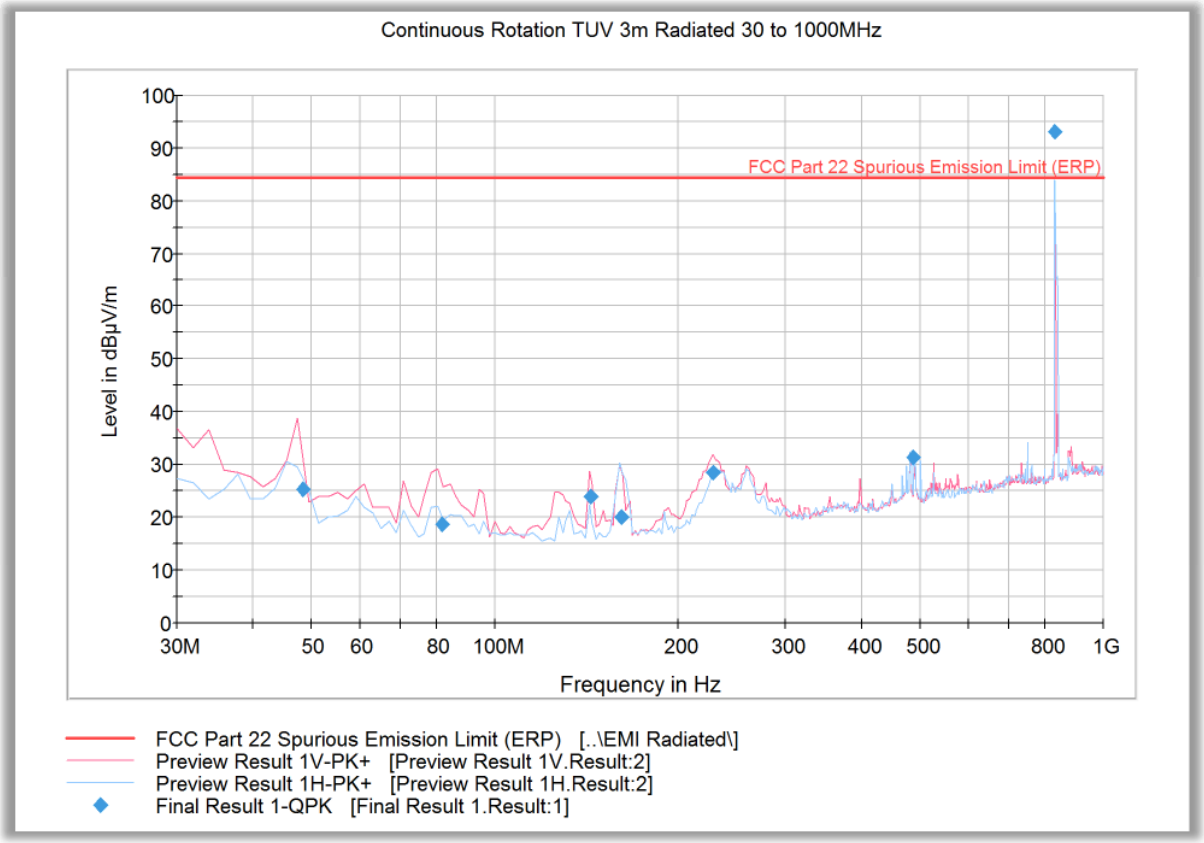
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1900.066667	96.4	1000.0	1000.000	128.7	H	263.0	-2.5	Fundamental Carrier*	
2461.800000	46.8	1000.0	1000.000	103.7	V	58.0	-0.6	37.6	84.4
3283.466667	63.9	1000.0	1000.000	200.5	H	59.0	1.0	20.5	84.4
3800.100000	61.2	1000.0	1000.000	130.7	H	28.0	2.2	23.2	84.4
5160.833333	77.2	1000.0	1000.000	152.2	H	283.0	4.2	7.2	84.4
6916.766667	60.2	1000.0	1000.000	103.7	H	204.0	6.7	24.2	84.4
7246.766667	60.6	1000.0	1000.000	99.7	V	145.0	7.0	23.8	84.4
10363.466667	75.4	1000.0	1000.000	165.6	H	308.0	10.4	9.0	84.4

Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1900.066667	92.4	1000.0	1000.000	128.7	H	263.0	-2.5	Fundamental Carrier*	
2461.800000	26.5	1000.0	1000.000	103.7	V	58.0	-0.6	57.9	84.4
3283.466667	30.5	1000.0	1000.000	200.5	H	59.0	1.0	53.9	84.4
3800.100000	52.5	1000.0	1000.000	130.7	H	28.0	2.2	31.9	84.4
5160.833333	33.3	1000.0	1000.000	152.2	H	283.0	4.2	51.1	84.4
6916.766667	52.4	1000.0	1000.000	103.7	H	204.0	6.7	32.0	84.4
7246.766667	56.6	1000.0	1000.000	99.7	V	145.0	7.0	27.8	84.4
10363.466667	35.3	1000.0	1000.000	165.6	H	308.0	10.4	49.1	84.4

***** The fundamental frequency signal is not part of spurious emission evaluation. Data provided for information purpose only.

2.8.21 Radiated Emission Test Results Below 1GHz_Worst Case Configuration_LTE Band 5_5 MHz Bandwidth Low Channel_1 RB 13 offset_QPSK

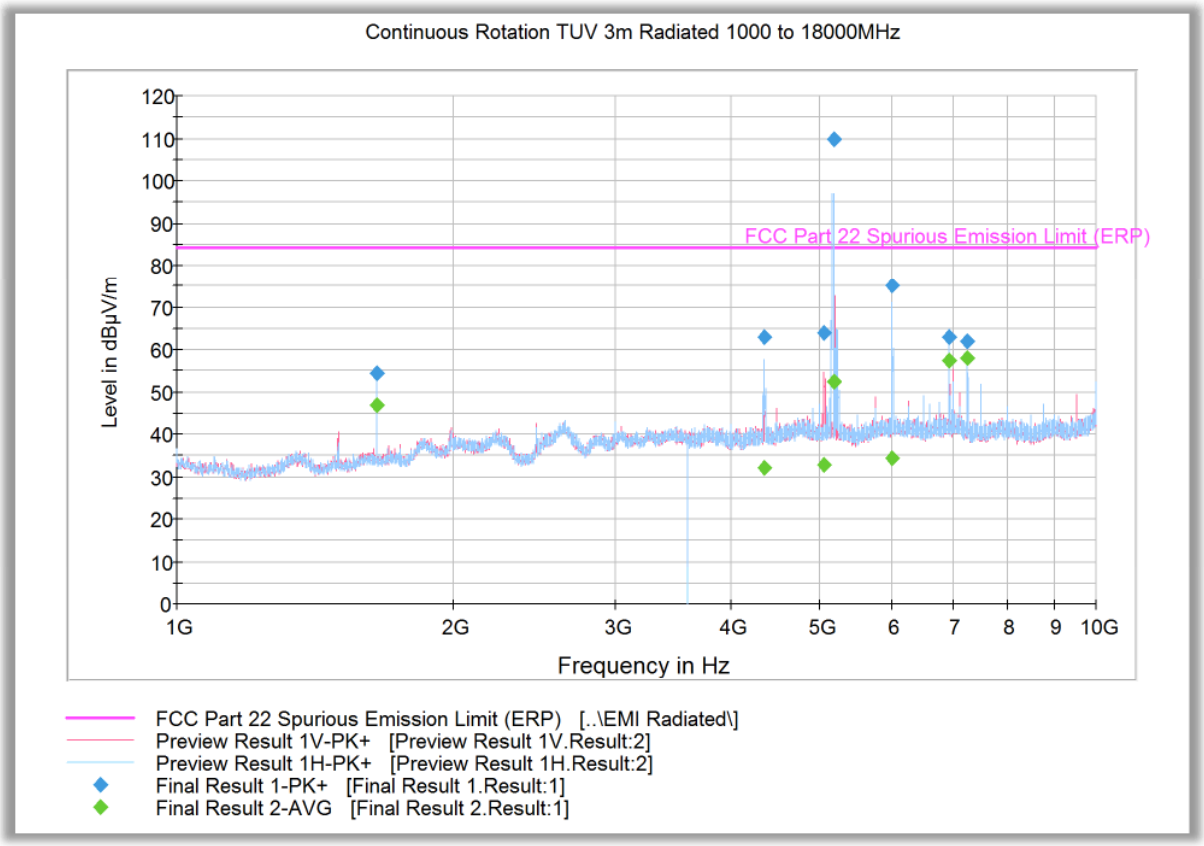


Quasi Peak Data

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
48.374990	25.3	1000.0	120.000	134.0	V	161.0	-14.6	59.1	84.4
81.781082	18.6	1000.0	120.000	202.0	V	106.0	-16.6	65.8	84.4
143.505491	24.1	1000.0	120.000	100.0	V	336.0	-13.9	60.3	84.4
161.280481	20.1	1000.0	120.000	100.0	V	351.0	-11.8	64.3	84.4
228.796553	28.3	1000.0	120.000	100.0	V	164.0	-9.3	56.0	84.4
487.517515	31.4	1000.0	120.000	197.0	H	190.0	-1.7	53.0	84.4
832.145651	93.2	1000.0	120.000	203.0	H	203.0	4.3	Fundamental Carrier*	

***** This is the fundamental frequency not part of spurious emission evaluation. Data provided for information purpose only.

2.8.22 Radiated Emission Test Results Above 1GHz_Worst Case Configuration_LTE Band 5_5 MHz Bandwidth Low Channel_1 RB 13 offset_QPSK



Peak Data

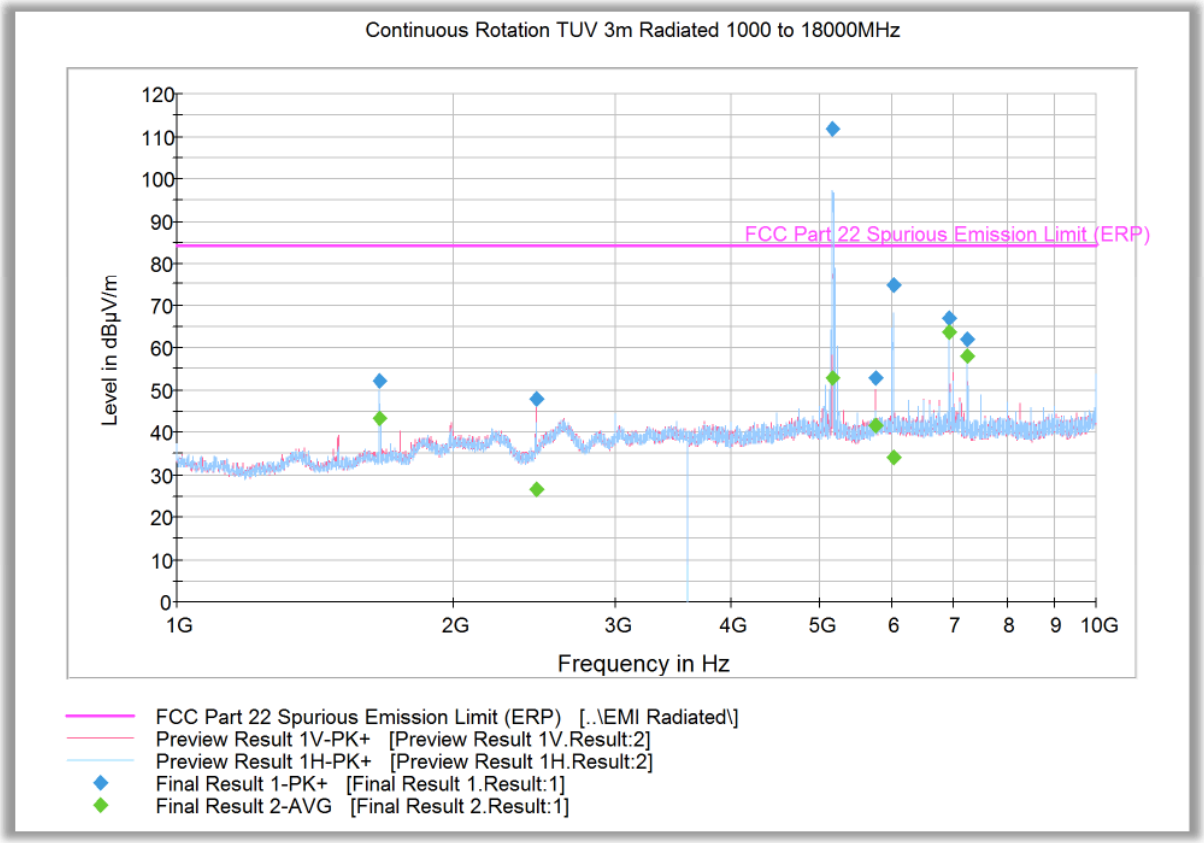
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1649.000000	54.4	1000.0	1000.000	195.5	H	166.0	-5.2	30.0	84.4
4358.000000	63.1	1000.0	1000.000	152.2	H	75.0	3.2	21.3	84.4
5060.700000	64.0	1000.0	1000.000	169.6	V	92.0	4.0	20.3	84.4
5174.300000	109.7	1000.0	1000.000	252.3	H	6.0	4.2	WIFI 5.2 GHz Signal	
6003.700000	75.1	1000.0	1000.000	102.7	H	-8.0	5.7	9.3	84.4
6916.800000	62.8	1000.0	1000.000	103.7	H	53.0	6.7	21.6	84.4
7247.200000	61.9	1000.0	1000.000	103.7	V	110.0	7.0	22.5	84.4

Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1649.000000	46.9	1000.0	1000.000	195.5	H	166.0	-5.2	37.5	84.4
4358.000000	32.1	1000.0	1000.000	152.2	H	75.0	3.2	52.3	84.4
5060.700000	32.7	1000.0	1000.000	169.6	V	92.0	4.0	51.7	84.4
5174.300000	52.4	1000.0	1000.000	252.3	H	6.0	4.2	WIFI 5.2 GHz Signal	
6003.700000	34.3	1000.0	1000.000	102.7	H	-8.0	5.7	50.1	84.4
6916.800000	57.4	1000.0	1000.000	103.7	H	53.0	6.7	27.0	84.4
7247.200000	58.2	1000.0	1000.000	103.7	V	110.0	7.0	26.2	84.4

***** The WIFI 5.2 GHz frequency signal is not part of spurious emission evaluation. Data provided for information purpose only.

2.8.23 Radiated Emission Test Results Above 1GHz_Worst Case Configuration_LTE Band 5_10 MHz Bandwidth Middle Channel_1 RB 0 offset_QPSK



Peak Data

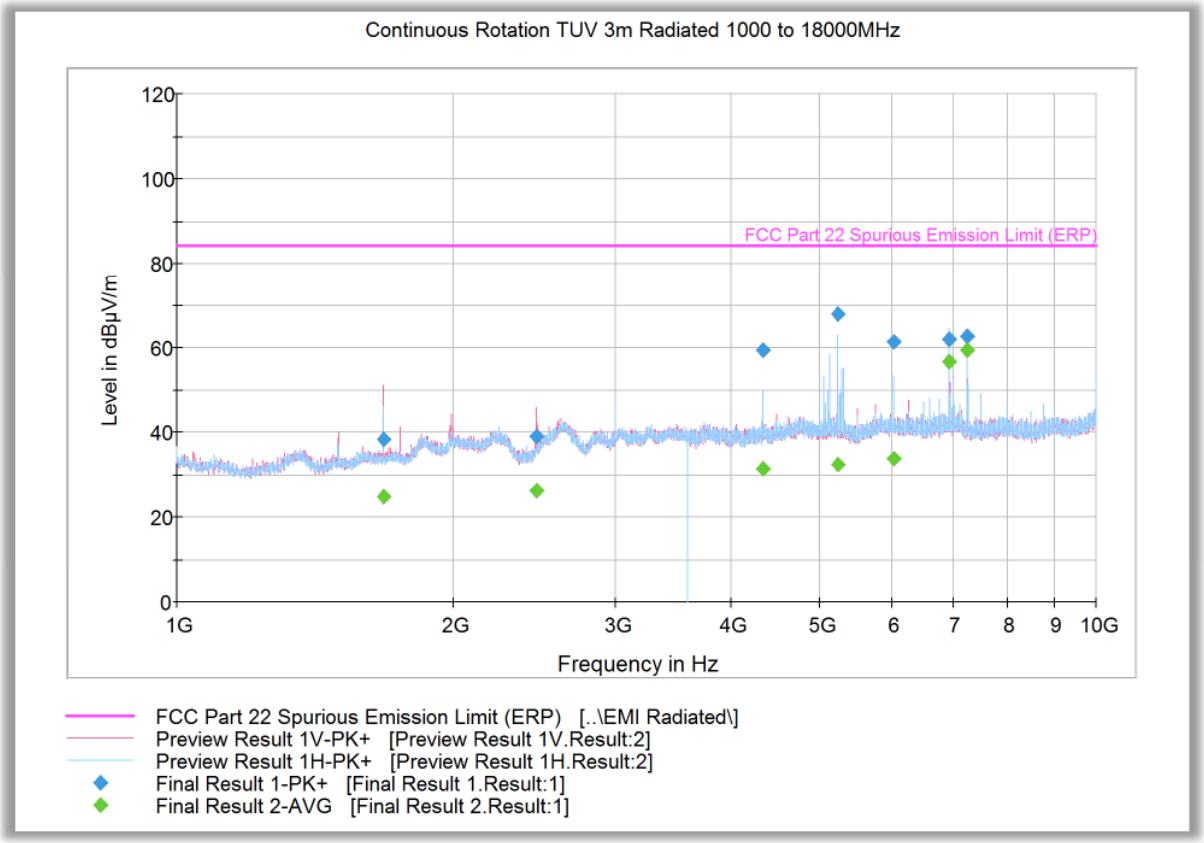
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1664.400000	52.0	1000.0	1000.000	190.5	H	169.0	-5.2	32.4	84.4
2461.000000	47.8	1000.0	1000.000	112.7	V	54.0	-0.6	36.6	84.4
5172.900000	111.8	1000.0	1000.000	141.7	H	151.0	4.2	-27.4	84.4
5750.100000	52.7	1000.0	1000.000	124.7	V	192.0	5.3	31.7	84.4
6014.400000	74.6	1000.0	1000.000	151.6	H	18.0	5.8	9.8	84.4
6916.100000	66.8	1000.0	1000.000	112.7	H	155.0	6.7	17.5	84.4
7247.200000	62.1	1000.0	1000.000	103.7	H	331.0	7.0	22.3	84.4

Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1664.400000	43.4	1000.0	1000.000	190.5	H	169.0	-5.2	41.0	84.4
2461.000000	26.6	1000.0	1000.000	112.7	V	54.0	-0.6	57.8	84.4
5172.900000	52.9	1000.0	1000.000	141.7	H	151.0	4.2	31.4	84.4
5750.100000	41.5	1000.0	1000.000	124.7	V	192.0	5.3	42.9	84.4
6014.400000	34.3	1000.0	1000.000	151.6	H	18.0	5.8	50.1	84.4
6916.100000	63.8	1000.0	1000.000	112.7	H	155.0	6.7	20.6	84.4
7247.200000	58.1	1000.0	1000.000	103.7	H	331.0	7.0	26.3	84.4

***** The WIFI 5.2 GHz frequency signal is not part of spurious emission evaluation. Data provided for information purpose only.

2.8.24 Radiated Emission Test Results Above 1GHz_Worst Case Configuration_LTE Band 5_10 MHz Bandwidth High Channel_1 RB 0 offset_QPSK



Peak Data

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1679.400000	38.3	1000.0	1000.000	147.7	V	295.0	-5.1	46.1	84.4
2463.000000	39.0	1000.0	1000.000	252.3	V	323.0	-0.6	45.4	84.4
4337.100000	59.3	1000.0	1000.000	111.7	H	86.0	3.0	25.1	84.4
5229.900000	68.0	1000.0	1000.000	151.6	H	135.0	4.4	16.3	84.4
6016.500000	61.4	1000.0	1000.000	102.7	H	95.0	5.8	23.0	84.4
6916.400000	62.1	1000.0	1000.000	103.7	H	207.0	6.7	22.3	84.4
7247.200000	62.6	1000.0	1000.000	104.7	V	112.0	7.0	21.8	84.4

Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1679.400000	24.8	1000.0	1000.000	147.7	V	295.0	-5.1	59.6	84.4
2463.000000	26.1	1000.0	1000.000	252.3	V	323.0	-0.6	58.3	84.4
4337.100000	31.6	1000.0	1000.000	111.7	H	86.0	3.0	52.8	84.4
5229.900000	32.3	1000.0	1000.000	151.6	H	135.0	4.4	52.1	84.4
6016.500000	33.7	1000.0	1000.000	102.7	H	95.0	5.8	50.7	84.4
6916.400000	56.8	1000.0	1000.000	103.7	H	207.0	6.7	27.6	84.4
7247.200000	59.3	1000.0	1000.000	104.7	V	112.0	7.0	25.1	84.4

2.9 FREQUENCY STABILITY

2.9.1 Specification Reference

FCC 47 CFR Part 2, Clause 2.1055
FCC 47 CFR Part 22, Clause 22.355
FCC 47 CFR Part 24, Clause 24.235
RSS-132, Clause 5.3
RSS-133, Clause 6.3

2.9.2 Standard Applicable

FCC Part 22, Clause 22.355:
Except as otherwise provided in this part, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances given in Table C–1 of this section.

Table C–1—Frequency Tolerance for Transmitters in the Public Mobile Services

Frequency range (MHz)	Mobile ≤3 watts (ppm)
821 to 896	2.5

FCC Part 24, Clause 24.235:
The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

RSS-132, Clause 5.3:
The carrier frequency shall not depart from the reference frequency in excess of ±2.5 ppm for mobile stations.

RSS-133, Clasue 6.3:
The carrier frequency shall not depart from the reference frequency, in excess of ±2.5 ppm for mobile stations.

2.9.3 Equipment Under Test and Modification State

Serial No: FF161218B00106, FF130219B00600 and FF130219B00478 / Test Configuration A

2.9.4 Date of Test/Initial of test personnel who performed the test

March 17 and 18, April 24, 2019 / XYZ

2.9.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.9.6 Environmental Conditions/ Test Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	22.4 – 25.9 °C
Relative Humidity	29.0 – 49.8 %
ATM Pressure	99.0 - 99.1 kPa

2.9.7 Additional Observations

- This is a conducted test. The EUT was operated at 3.7VDC nominal voltage and was placed in the temperature chamber for this evaluation. The EUT was controlled by a CMW500 and utilizing a spectrum analyzer for measurement.
- Test performed in 5 MHz Bandwidth Middle channel as the representative configuration.
- Measurement was done using the CMW 500 measurement function.
- The EUT was tested over the temperature -30°C to +50°C in 10°C steps and allowed to sit for 1 hour to allow the equipment and chamber temperature to stabilize. The measurements were then performed.
- Voltage variation was also performed at voltage 3.3VDC and higher 4.2VDC of the nominal voltage at 20°C.

2.9.8 Test Results

WCDMA Band 2 – QPSK 5 MHz BW-Middle Channel 1880 MHz				
Voltage (VDC)	**Temperature (°C)**	**Frequency Error (Hz)**	**Frequency Error (ppm)**	**Limit (ppm)***
3.8	-30	17.40	0.0093	± 2.5
	-20	16.20	0.0086	± 2.5
	-10	15.99	0.0085	± 2.5
	0	14.47	0.0077	± 2.5
	+10	14.93	0.0079	± 2.5
	+20	14.21	0.0076	± 2.5
	+30	14.31	0.0076	± 2.5
	+40	15.0	0.0080	± 2.5
	+50	16.02	0.0085	± 2.5
3.3	20	-14.21	0.0076	± 2.5
4.2		13.65	0.0073	± 2.5

WCDMA Band 5 – QPSK 5 MHz BW-Middle Channel 836.6 MHz				
Voltage (VDC)	**Temperature (°C)**	**Frequency Error (Hz)**	**Frequency Error (ppm)**	**Limit (ppm)**
3.8	-30	-6.20	-0.0074	± 2.5
	-20	-4.68	-0.0056	± 2.5
	-10	-5.91	-0.0071	± 2.5
	0	-5.26	-0.0063	± 2.5
	+10	6.14	0.0073	± 2.5
	+20	-6.03	-0.0072	± 2.5
	+30	-5.89	-0.0070	± 2.5
	+40	-6.08	-0.0073	± 2.5
	+50	-5.84	-0.0070	± 2.5
3.3	20	-7.40	-0.0089	± 2.5
4.2		6.58	0.0079	± 2.5

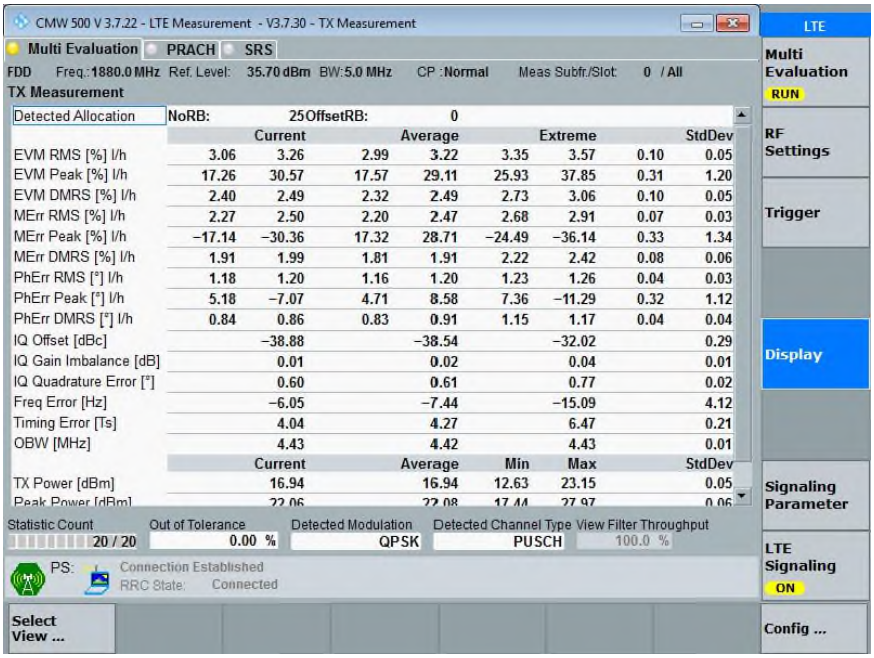
LTE Band 2 – QPSK 5 MHz BW-Middle Channel 1880 MHz				
Voltage (VDC)	**Temperature (°C)**	**Frequency Error (Hz)**	**Frequency Error (ppm)**	**Limit (ppm)**
3.8	-30	12.70	0.0068	± 2.5
	-20	14.32	0.0076	± 2.5
	-10	-12.83	-0.0068	± 2.5
	0	11.90	0.0063	± 2.5
	+10	-14.59	-0.0078	± 2.5
	+20	-15.09	-0.0080	± 2.5
	+30	-12.69	-0.0068	± 2.5
	+40	-13.56	-0.0072	± 2.5
	+50	-12.90	-0.0069	± 2.5
3.3	20	12.12	0.0064	± 2.5
4.2		-12.87	-0.0069	± 2.5

LTE Band 5 – QPSK 5 MHz BW-Middle Channel 836.5 MHz				
Voltage (VDC)	**Temperature (°C)**	**Frequency Error (Hz)**	**Frequency Error (ppm)**	**Limit (ppm)**
3.8	-30	8.71	0.0104	± 2.5
	-20	9.29	0.0111	± 2.5
	-10	-8.36	-0.010	± 2.5
	0	9.10	0.0109	± 2.5
	+10	8.31	0.0099	± 2.5
	+20	-8.23	-0.0098	± 2.5
	+30	7.90	0.0094	± 2.5
	+40	-7.94	-0.0095	± 2.5
	+50	8.91	0.0107	± 2.5
3.3	20	-8.12	-0.097	± 2.5
4.2		7.28	0.0087	± 2.5

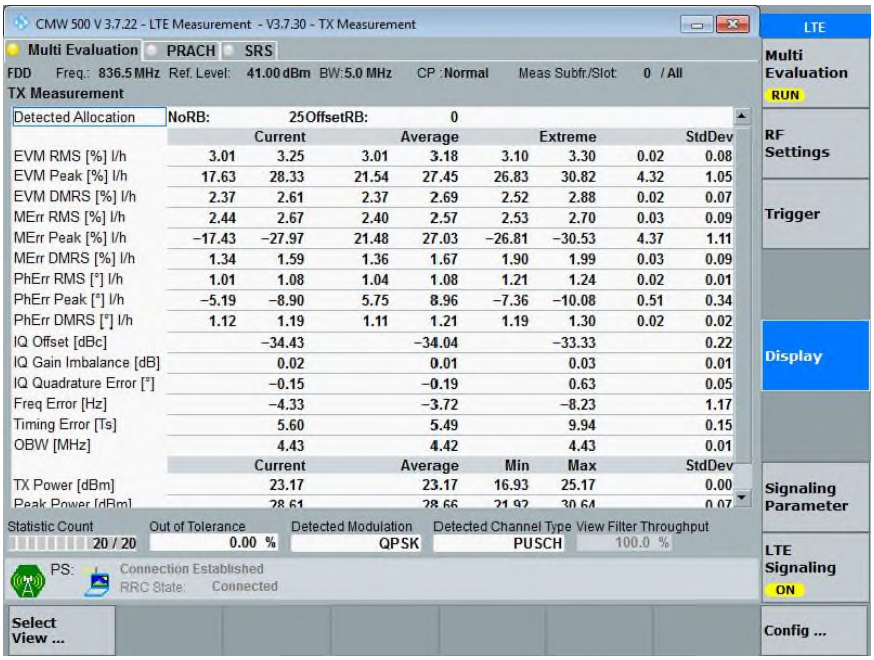
2.9.9 Sample Test plot

WCDMA Band 2_Middle Channel @20°C

WCDMA Band 5_Middle Channel @20°C



LTE Band 2_5 MHz Bandwidth_Middle Channel @20°C



LTE Band 5_5 MHz Bandwidth_Middle Channel @20°C

2.10 CONDUCTED EMISSIONS

2.10.1 Specification Reference

FCC CFR 47 Part 15, Clause 15.207(a)
RSS-Gen, Section 8.8

2.10.2 Standard Applicable

An intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 µH/50 ohms line impedance stabilization network (LISN).

Frequency of emission (MHz)	Conducted limit (dBµV)	
	Quasi-peak	Average
0.15–0.5	66 to 56*	56 to 46*
0.5–5	56	46
5–30	60	50

**Decreases with the logarithm of the frequency.*

2.10.3 Equipment Under Test and Modification State

Serial No: FF161218B00106 / Test Configuration B

2.10.4 Date of Test/Initial of test personnel who performed the test

April 26, 2019/XYZ

2.10.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.10.6 Environmental Conditions/ Test Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	23.1 °C
Relative Humidity	53.6 %
ATM Pressure	99.1 kPa

2.10.7 Additional Observations

Measurement was done using EMC32 automated software. Reported level is the actual level with all the correction factors factored in. Correction Factor column is for informational purposes only. See Section 2.10.8 for sample computation.

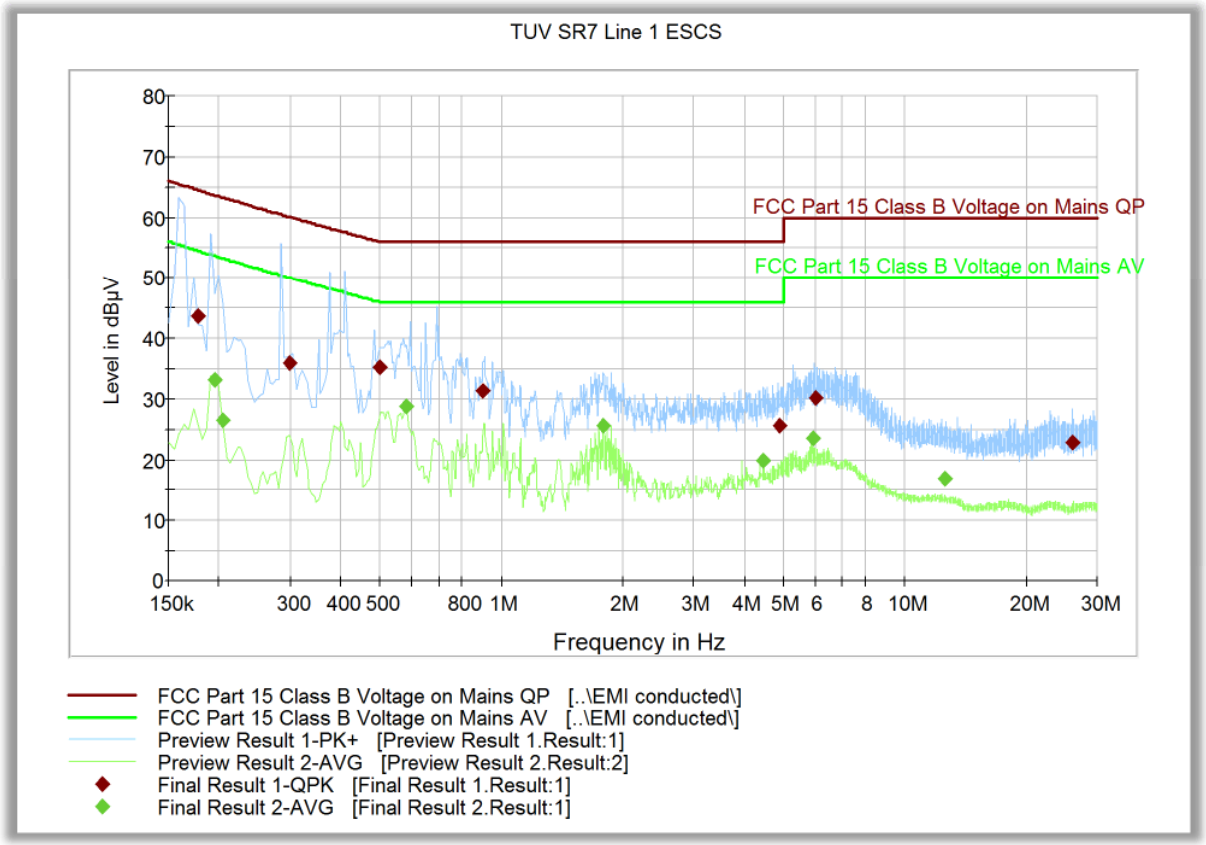
2.10.8 Sample Computation (Conducted Emission – Quasi Peak)

Measuring equipment raw measurement (dbµV) @ 150kHz			5.5
Correction Factor (dB)	Asset# 8607 (20 dB attenuator)	19.9	20.7
	Asset# 1177 (cable)	0.15	
	Asset# 1176 (cable)	0.35	
	Asset# 7568 (LISN)	0.30	
Reported QuasiPeak Final Measurement (dbµV) @ 150kHz			**26.2**

2.10.9 Test Results

Compliant. See attached plots and tables.

2.10.10 M1000 120VAC 60Hz (Line 1)



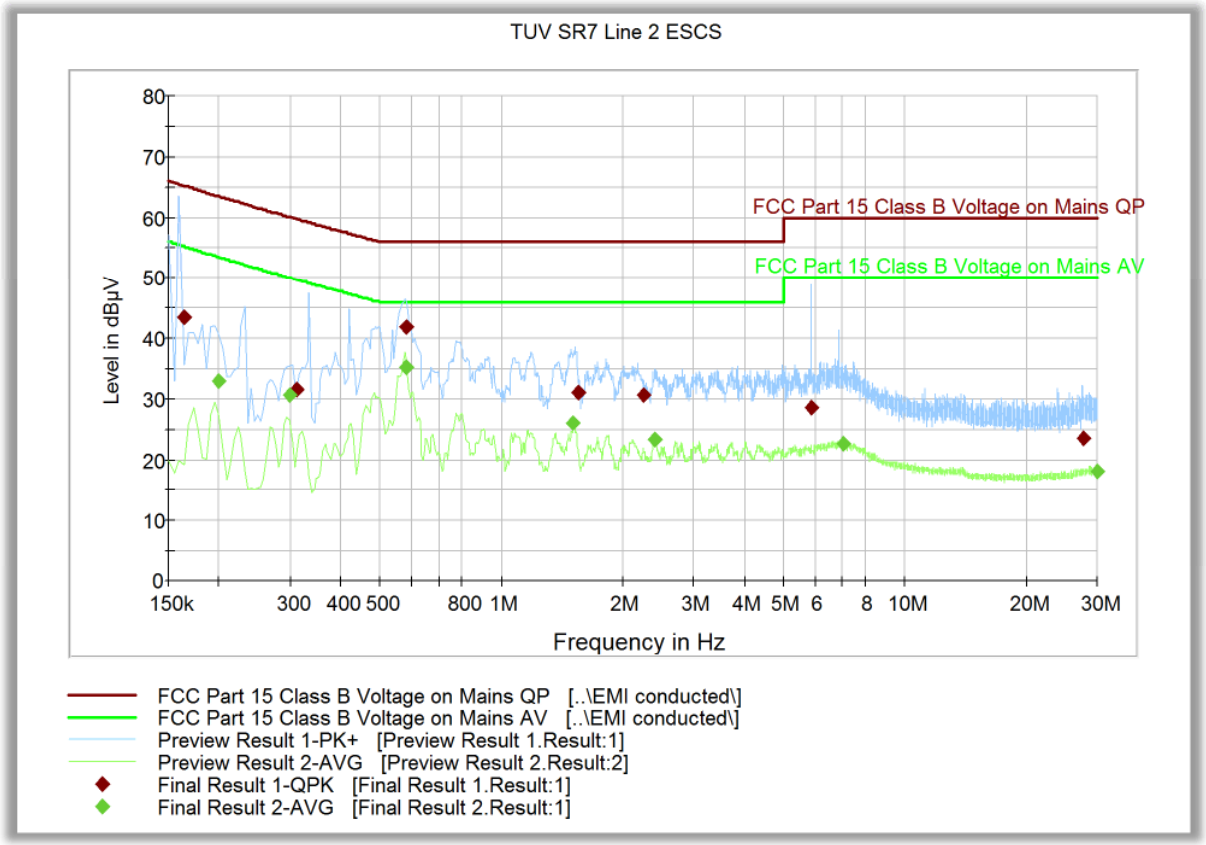
Quasi Peak

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV)
0.177000	43.6	1000.0	9.000	Off	L1	20.2	20.9	64.5
0.298500	35.8	1000.0	9.000	Off	L1	20.2	24.3	60.1
0.501000	35.2	1000.0	9.000	Off	L1	20.1	20.8	56.0
0.901500	31.4	1000.0	9.000	Off	L1	20.2	24.6	56.0
4.902000	25.5	1000.0	9.000	Off	L1	20.5	30.5	56.0
5.991000	30.1	1000.0	9.000	Off	L1	20.4	29.9	60.0
25.953000	23.0	1000.0	9.000	Off	N	20.7	37.0	60.0

Average

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - Ave (dB)	Limit - Ave (dBµV)
0.195000	33.1	1000.0	9.000	Off	L1	20.2	20.5	53.7
0.204000	26.4	1000.0	9.000	Off	L1	20.2	26.8	53.3
0.582000	28.8	1000.0	9.000	Off	L1	20.2	17.2	46.0
1.783500	25.5	1000.0	9.000	Off	L1	20.1	20.5	46.0
4.465500	19.8	1000.0	9.000	Off	L1	20.4	26.2	46.0
5.914500	23.5	1000.0	9.000	Off	L1	20.4	26.5	50.0
12.529500	16.9	1000.0	9.000	Off	N	20.7	33.1	60.0

2.10.11 M1000 120VAC 60Hz (Line 2)



Quasi Peak

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV)
0.163500	43.4	1000.0	9.000	Off	N	20.1	21.9	65.2
0.312000	31.6	1000.0	9.000	Off	N	20.1	28.1	59.7
0.582000	41.8	1000.0	9.000	Off	N	20.1	14.2	56.0
1.554000	31.2	1000.0	9.000	Off	N	20.1	24.8	56.0
2.251500	30.6	1000.0	9.000	Off	N	20.4	25.4	56.0
5.887500	28.6	1000.0	9.000	Off	N	20.4	31.4	60.0
27.672000	23.6	1000.0	9.000	Off	N	20.7	36.4	60.0

Average

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - Ave (dB)	Limit - Ave (dBµV)
0.163500	43.4	1000.0	9.000	Off	N	20.1	21.9	65.2
0.312000	31.6	1000.0	9.000	Off	N	20.1	28.1	59.7
0.582000	41.8	1000.0	9.000	Off	N	20.1	14.2	56.0
1.554000	31.2	1000.0	9.000	Off	N	20.1	24.8	56.0
2.251500	30.6	1000.0	9.000	Off	N	20.4	25.4	56.0
5.887500	28.6	1000.0	9.000	Off	N	20.4	31.4	60.0
27.672000	23.6	1000.0	9.000	Off	N	20.7	36.4	60.0

SECTION 3

TEST EQUIPMENT USED

3.1 TEST EQUIPMENT USED

List of absolute measuring and other principal items of test equipment.

ID Number (SDGE/SDRB)	Test Equipment	Type	Serial Number	Manufacturer	Cal Date	Cal Due Date
Antenna Conducted Port Setup						
7662	P-Series Power Meter	N1911A	MY45100951	Agilent	06/15/18	06/15/19
7661	50MHz-18GHz Wideband Power Sensor	N1921A	MY45241383	Agilent	06/15/18	06/15/19
7608	Vector Signal Generator	SMBV100A	259021	Rhode & Schwarz	09/19/17	09/19/19
7582	Signal/Spectrum Analyzer	FSW26	101614	Rhode & Schwarz	01/07/19	01/07/20
-	Wideband Radio Communication Tester	CMW 500	158164	Rhode & Schwarz	11/16/18	11/16/19
-	10dB Attenuator	VAT-10W2+2W	N/A	MCL	Verified by 7608 and 7582	
AC Conducted Emissions Test Setup						
1024	EMI Test Receiver	ESCS 30	847793/001	Rhode & Schwarz	09/19/18	09/19/19
7567	LISN	FCC-LISN-50-25-2	120304	Fischer Custom Comm.	12/14/17	12/14/19
8822	20dB Attenuator	34-20-34	N/A	MCE / Weinschel	Verified by 7608 and 7582	
8824	20dB Attenuator	34-20-34	N/A	MCE / Weinschel	Verified by 7608 and 7582	
7582	Signal/Spectrum Analyzer	FSW26	101614	Rhode & Schwarz	01/07/19	01/07/20
7608	Vector Signal Generator	SMBV100A	259021	Rhode & Schwarz	09/19/17	09/19/19
-	Wideband Radio Communication Tester	CMW 500	158164	Rhode & Schwarz	11/16/18	11/16/19
Radiated Test Setup						
7582	Signal/Spectrum Analyzer	FSW26	101614	Rhode & Schwarz	01/07/19	01/07/20
7608	Vector Signal Generator	SMBV100A	259021	Rhode & Schwarz	09/19/17	09/19/19
1002	Bilog Antenna	3142C	00058717	ETS-Lindgren	11/20/17	11/20/19
7575	Double-ridged waveguide horn antenna	3117	00155511	EMCO	06/16/18	06/16/20
1016	Pre-amplifier	PAM-0202	187	A.H. Systems, Inc.	03/08/19	03/08/20
8921	High-frequency cable	SucoFlex 100 SX	N/A	Suhner	Verified by 7608 and 7582	
8923	High-frequency cable	Micropore 19057793	N/A	United Microwave Products	Verified by 7608 and 7582	
1040	EMI Test Receiver	ESIB40	100292	Rhode & Schwarz	10/15/18	10/15/19
1049	EMI Test Receiver	ESU	100133	Rhode & Schwarz	07/13/18	07/13/19
8628	Pre-amplifier	QLI-01182835-JO	8986002	Quinstar	03/07/19	03/07/20
-	Wideband Radio Communication Tester	CMW 500	158164	Rhode & Schwarz	11/16/18	11/16/19

Miscellaneous						
6708	Multimeter	34401A	US36086974	Hewlett Packard	07/18/18	07/18/19
7579	Temperature Chamber	115	151617	TestQuity	08/24/18	08/24/19
7554	Barometer/Temperature /Humidity Transmitter	iBTHX-W	0400706	Omega	05/25/18	05/25/19
	Test Software	EMC32	V8.53	Rhode & Schwarz	N/A	

3.2 MEASUREMENT UNCERTAINTY

For a 95% confidence level, the measurement uncertainties for defined systems are:

3.2.1 Conducted Antenna Port Measurement

	Input Quantity (Contribution) X_i	Value	Prob. Dist.	Divisor	$u_i(x)$	$u_i(x)^2$
1	Receiver reading	0.10 dB	Normal, k=1	1.000	0.10	0.01
2	Cable attenuation	1.00 dB	Normal, k=2	2.000	0.50	0.25
3	Receiver sinewave accuracy	0.08 dB	Normal, k=2	2.000	0.04	0.00
4	Receiver pulse amplitude	0.00 dB	Rectangular	1.732	0.00	0.00
5	Receiver pulse repetition rate	0.00 dB	Rectangular	1.732	0.00	0.00
6	Noise floor proximity	0.00 dB	Rectangular	1.732	0.00	0.00
7	Frequency interpolation	0.10 dB	Rectangular	1.732	0.06	0.00
8	Mismatch	0.07 dB	U-shaped	1.414	0.05	0.00
	Combined standard uncertainty		Normal	0.52	dB	
	Expanded uncertainty		Normal, k=2	**1.03**	**dB**	

3.2.2 Radiated Emission Measurements (Below 1GHz)

	Input Quantity (Contribution) X_i	Value	Prob. Dist.	Divisor	$u_i(x)$	$u_i(x)^2$
1	Receiver reading	0.10 dB	Normal, k=1	1.000	0.10	0.01
2	Attenuation: antenna-receiver	0.20 dB	Normal, k=2	2.000	0.10	0.01
3	Antenna factor AF	0.75 dB	Normal, k=2	2.000	0.38	0.14
4	Receiver sinewave accuracy	0.45 dB	Normal, k=2	2.000	0.23	0.05
5	Receiver pulse amplitude	1.50 dB	Rectangular	1.732	0.87	0.75
6	Receiver pulse repetition rate	1.50 dB	Rectangular	1.732	0.87	0.75
7	Noise floor proximity	0.50 dB	Rectangular	1.732	0.29	0.08
8	Mismatch: antenna-receiver	0.95 dB	U-shaped	1.414	0.67	0.45
9	AF frequency interpolation	0.30 dB	Rectangular	1.732	0.17	0.03
10	AF height deviations	0.10 dB	Rectangular	1.732	0.06	0.00
11	Directivity difference at 3 m	3.12 dB	Rectangular	1.732	1.80	3.24
12	Phase center location at 3 m	1.00 dB	Rectangular	1.732	0.58	0.33
13	Cross-polarisation	0.90 dB	Rectangular	1.732	0.52	0.27
14	Balance	0.00 dB	Rectangular	1.732	0.00	0.00
15	Site imperfections	3.76 dB	Triangular	2.449	1.54	2.36
16	Separation distance at 3 m	0.30 dB	Rectangular	1.732	0.17	0.03
17	Effect of setup table material	0.77 dB	Rectangular	1.732	0.44	0.20
18	Table height at 3 m	0.10 dB	Normal, k=2	2.000	0.05	0.00
19	Near-field effects	0.00 dB	Triangular	2.449	0.00	0.00
20	Effect of ambient noise on OATS	0.00 dB				0.00
	Combined standard uncertainty		Normal	2.95	dB	
	Expanded uncertainty		Normal, k=2	**5.90**	**dB**	

3.2.3 Radiated Emission Measurements (Above 1GHz)

	Input Quantity (Contribution) X_i	Value	Prob. Dist.	Divisor	$u_i(x)$	$u_i(x)^2$
1	Receiver reading	0.10 dB	Normal, k=1	1.000	0.10	0.01
2	Attenuation: antenna-receiver	0.20 dB	Normal, k=2	2.000	0.10	0.01
3	Antenna factor AF	0.75 dB	Normal, k=2	2.000	0.38	0.14
4	Receiver sinewave accuracy	0.45 dB	Normal, k=2	2.000	0.23	0.05
5	Receiver pulse amplitude	1.50 dB	Rectangular	1.732	0.87	0.75
6	Receiver pulse repetition rate	1.50 dB	Rectangular	1.732	0.87	0.75
7	Noise floor proximity	0.50 dB	Rectangular	1.732	0.29	0.08
8	Mismatch: antenna-receiver	0.95 dB	U-shaped	1.414	0.67	0.45
9	AF frequency interpolation	0.30 dB	Rectangular	1.732	0.17	0.03
10	AF height deviations	0.10 dB	Rectangular	1.732	0.06	0.00
11	Directivity difference at 3 m	3.12 dB	Rectangular	1.732	1.80	3.24
12	Phase center location at 3 m	1.00 dB	Rectangular	1.732	0.58	0.33
13	Cross-polarisation	0.90 dB	Rectangular	1.732	0.52	0.27
14	Balance	0.00 dB	Rectangular	1.732	0.00	0.00
15	Site imperfections	3.25 dB	Triangular	2.449	1.33	1.76
16	Separation distance at 3 m	0.30 dB	Rectangular	1.732	0.17	0.03
17	Effect of setup table material	0.77 dB	Rectangular	1.732	0.44	0.20
18	Table height at 3 m	0.10 dB	Normal, k=2	2.000	0.05	0.00
19	Near-field effects	0.00 dB	Triangular	2.449	0.00	0.00
20	Effect of ambient noise on OATS	0.00 dB				0.00
	Combined standard uncertainty		Normal	2.85 dB		
	Expanded uncertainty		Normal, k=2	**5.70 dB**		

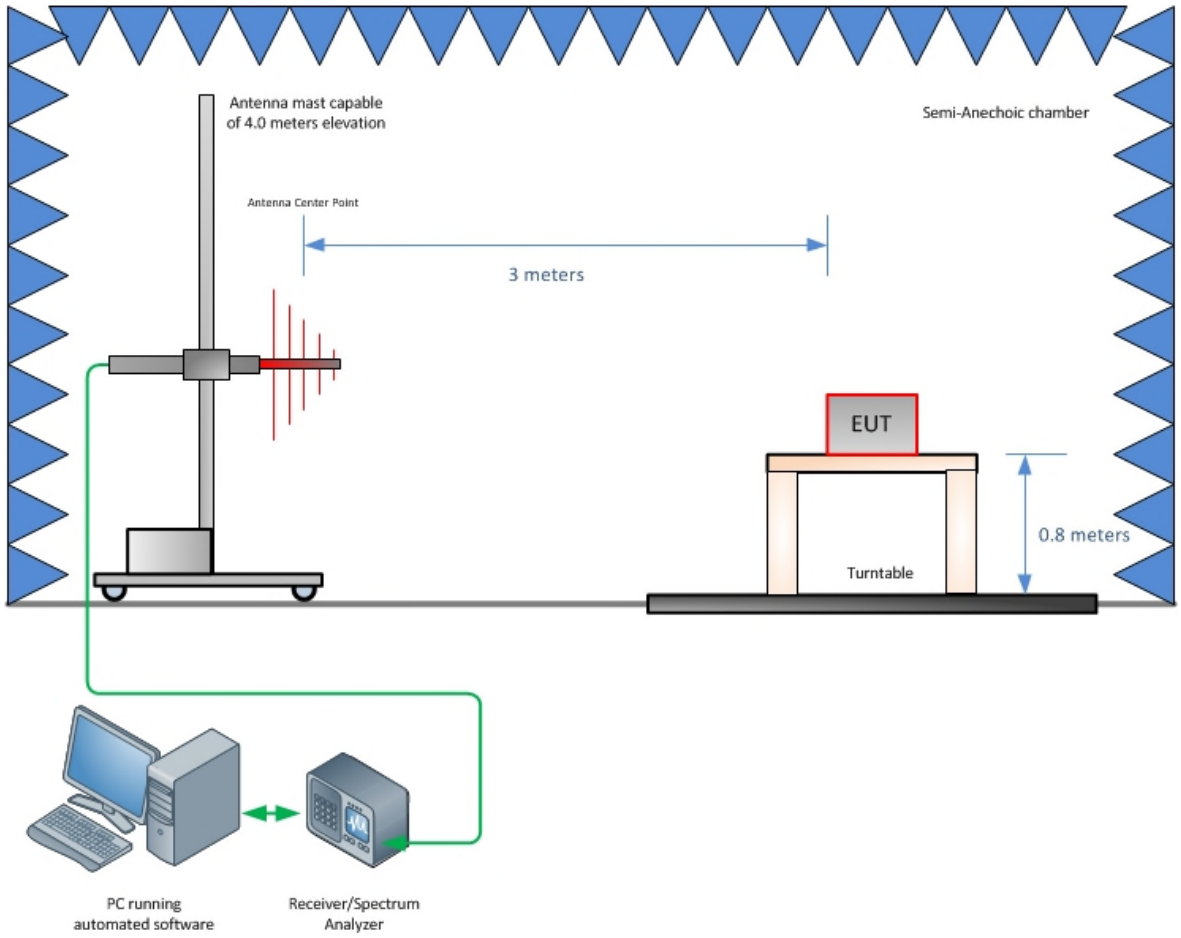
3.2.4 Conducted Measurements

	Input Quantity (Contribution) X_i	Value	Prob. Dist.	Divisor	$u_i(x)$	$u_i(x)^2$
1	Receiver reading	0.10 dB	Normal, k=1	1.000	0.10	0.01
2	LISN-receiver attenuation	0.10 dB	Normal, k=2	2.000	0.05	0.00
3	LISN voltage division factor	0.30 dB	Normal, k=2	2.000	0.15	0.02
4	Receiver sinewave accuracy	0.36 dB	Normal, k=2	2.000	0.18	0.03
5	Receiver pulse amplitude	1.50 dB	Rectangular	1.732	0.87	0.75
6	Receiver pulse repetition rate	1.50 dB	Rectangular	1.732	0.87	0.75
7	Noise floor proximity	0.00 dB	Rectangular	1.732	0.00	0.00
8	AMN VDF frequency interpolation	0.10 dB	Rectangular	1.732	0.06	0.00
9	Mismatch	0.07 dB	U-shaped	1.414	0.05	0.00
10	LISN impedance	2.65 dB	Triangular	2.449	1.08	1.17
11	Effect of mains disturbance	0.00 dB			0.00	0.00
12	Effect of the environment					
	Combined standard uncertainty		Normal	1.66 dB		
	Expanded uncertainty		**Normal, k=2**	**3.31 dB**		

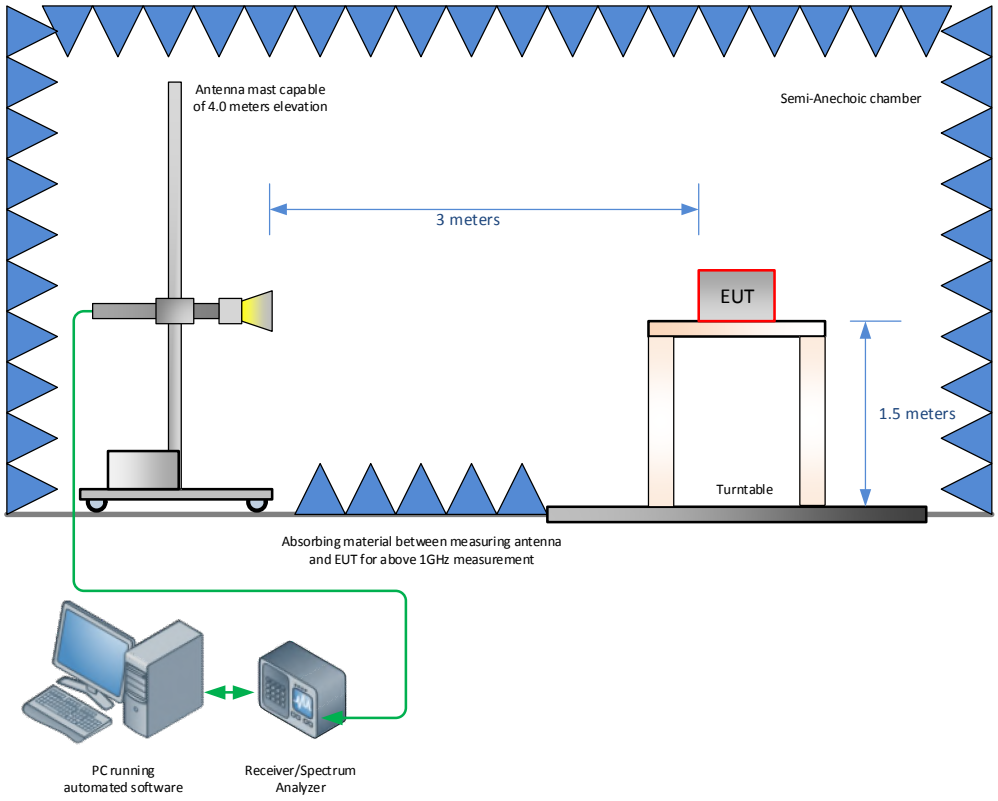
SECTION 4

DIAGRAM OF TEST SETUP

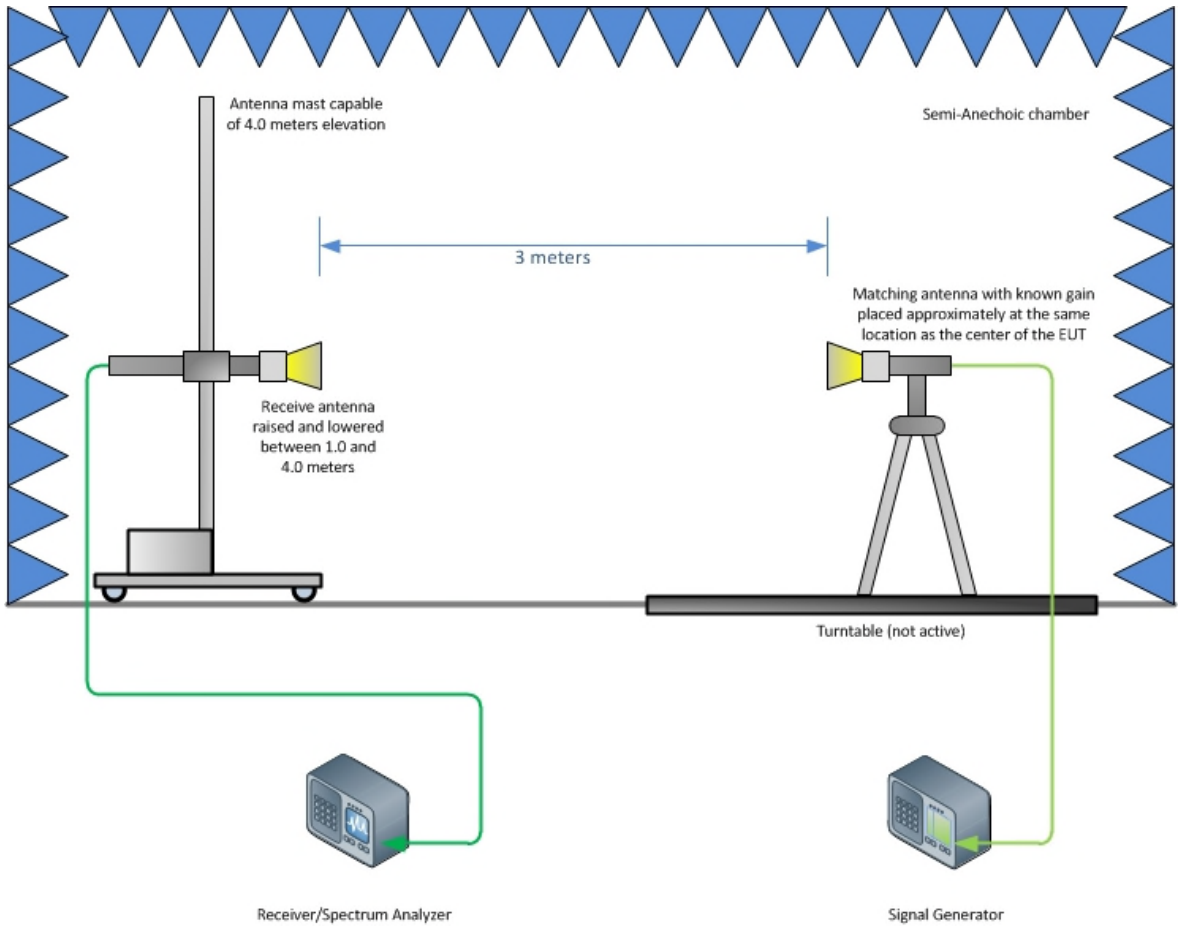
4.1 TEST SETUP DIAGRAM



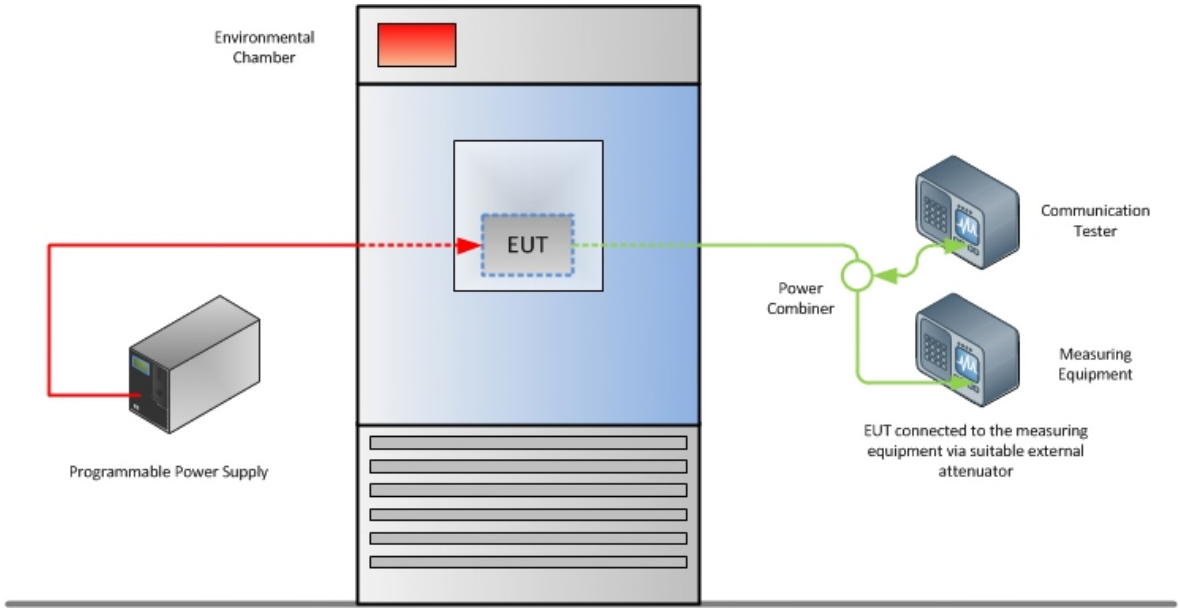
Radiated Emission Test Setup (Below 1GHz)



Radiated Emission Test Setup (Above 1GHz)



Substitution Test Method (Above 1GHz)



Frequency Stability Test Comfiguration

SECTION 5

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