



2.5 OCCUPIED BANDWIDTH

2.5.1 Specification Reference

FCC 47 CFR Part 2, Clause 2.1049
FCC 47 CFR Part 22, Clause 22.917(b)
FCC 47 CFR Part 24, Clause 24.238(b)
RSS-GEN, Clause 6.7

2.5.2 Standard Applicable

The transmitted signal bandwidth shall be reported as the 99% emission 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.

26dB Bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated by at least 26 dB below the transmitter power.

2.5.3 Equipment Under Test and Modification State

Serial No: AZ280418A00044 / Test Configuration A

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

June 06, 11, 2018 / XYZ

2.5.5 Test Equipment Used

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

2.5.6 Environmental Conditions/ Test Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	24.8 – 25.7°C
Relative Humidity	46.4 – 51.3%
ATM Pressure	98.5 kPa

2.5.7 Additional Observations

- This is a conducted test. Both 26dB bandwidth and 99% bandwidth presented.
- Using the occupied bandwidth measurement function in the spectrum analyzer, the 99% occupied bandwidth was measured.
- The 26dB bandwidth was measured in accordance with ANSI C63.26 clause 5.4.3 using the ndB measurement function in the spectrum analyzer.
- The transmitter shall be operated at its maximum carrier power measured under normal test conditions.
- The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts.



- The resolution bandwidth (RBW) shall be in the range of 1% of the occupied bandwidth (OBW) and video bandwidth (VBW) shall be at least 3x RBW.
- Low, Mid and High channels for all bandwidths and modulations were verified. Test results of Mid channel were presented as representative.

2.5.8 Test Results

WCDMA				
Band	Channel	Frequency	99% OBW (MHz)	26dB BW (MHz)
Band 2	9400	1880.0	4.14	4.75
Band 5	4183	836.6	4.22	4.93

LTE Band 2					
Modulation	Bandwidth (MHz)	Channel	Frequency	99% OBW (MHz)	26dB BW (MHz)
QPSK	1.4	18900	1880.0	1.09	1.25
	3			2.69	3.02
	5			4.49	4.95
	10			8.95	9.86
	15			13.43	14.65
	20			17.84	19.19
16QAM	1.4	18900	1880.0	1.09	1.25
	3			2.69	3.00
	5			4.49	4.93
	10			8.95	9.64
	15			13.42	14.59
	20			17.89	19.19

LTE Band 5					
Modulation	Bandwidth (MHz)	Channel	Frequency	99% OBW (MHz)	26dB BW (MHz)
QPSK	1.4	20525	836.5	1.09	1.24
	3			2.69	3.0
	5			4.49	4.95
	10			8.94	9.72
16QAM	1.4	20525	836.5	1.09	1.24
	3			2.69	2.97
	5			4.47	4.93
	10			8.93	9.64

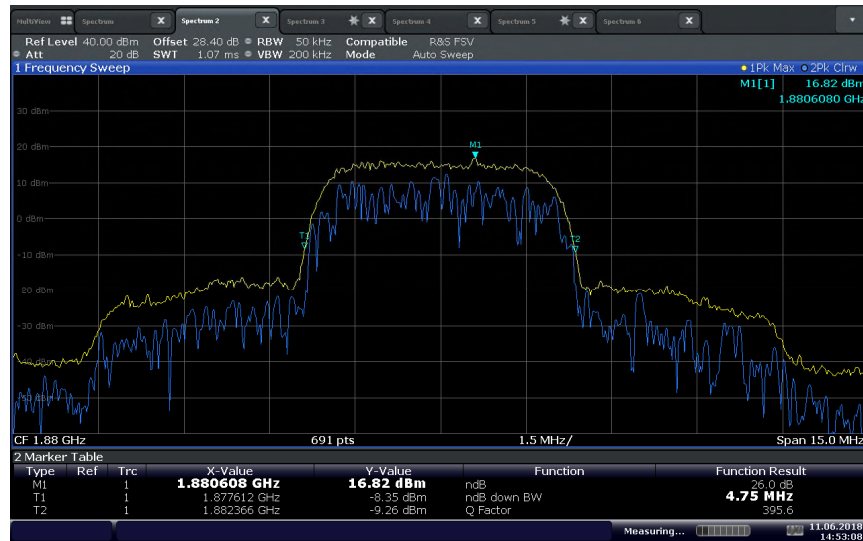
2.5.9 Example Test Plots

WCDMA Band 2 / Middle Channel 1880 MHz / 99% OBW



14:50:56 11.06.2018

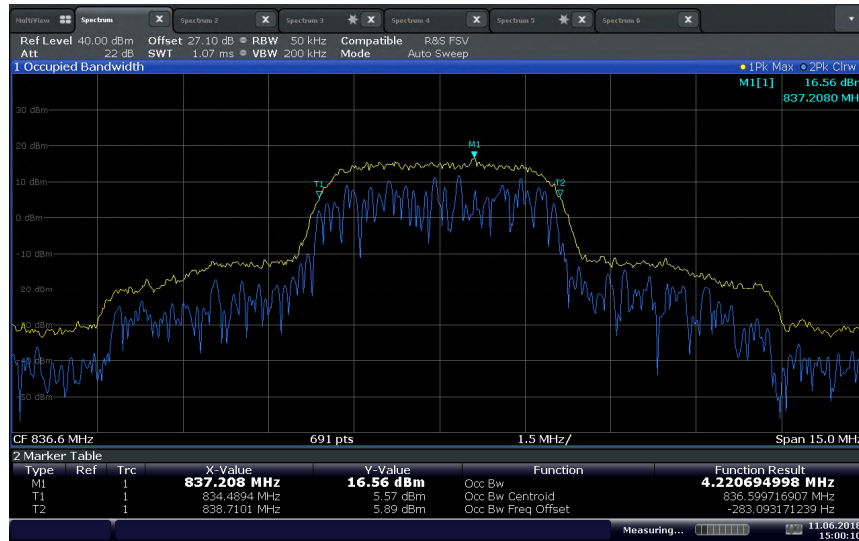
WCDMA Band 2 / Middle Channel 1880 MHz / 26dB BW



14:53:09 11.06.2018

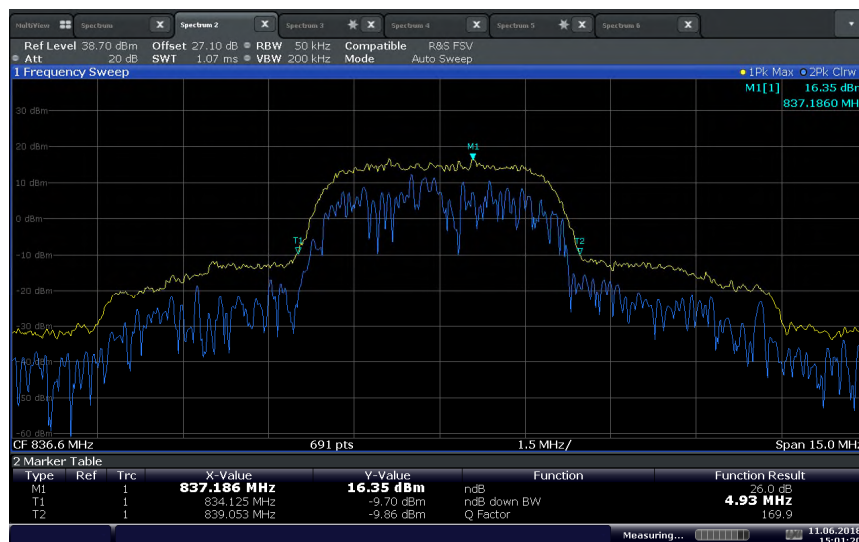


WCDMA Band 5 / Middle Channel 836.6 MHz /99% OBW



15:00:11 11.06.2018

WCDMA Band 5 / Middle Channel 836.6 MHz / 26dB OBW



15:01:21 11.06.2018



LTE Band 2 (5 MHz BW) / Middle Channel 1880 MHz / QPSK / 99% OBW



17:23:45 06.06.2018

LTE Band 2 (5 MHz BW) / Middle Channel 1880 MHz / QPSK / 26dB BW



10:28:00 07.06.2018

LTE Band 5 (5 MHz BW) / Middle Channel 836.5 MHz / QPSK / 99% OBW



f 11:24:52 07.06.2018

LTE Band 5 (5 MHz BW) / Middle Channel 836.5 MHz / QPSK / 26dB BW



11:25:42 07.06.2018



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 $43 + 10 \log_{10} P(\text{watts})$.

2.6.3 Equipment Under Test and Modification State

Serial No: AZ280418A00044 / Test Configuration A

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

July 16 and 17, 2018 / 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	24.9 - 25.1 °C
Relative Humidity	53.7 %
ATM Pressure	99.0 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 $>3 \times \text{RBW}$ in the 1 MHz band immediately outside and adjacent to the channel edge.
- 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:
 $-13 + 10 \lg (\text{RBW}_{\text{used}}/100\text{kHz}) \text{ dBm}$.
- 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, the limit is set to:
 $-13 + 10 \lg (\text{RBW}_{\text{used}}/1 \text{ MHz}) \text{ dBm}$.
- 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



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



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



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



LTE Band 2 (1.4 MHz BW)/QPSK/Low Channel 1850.7 MHz/Full RB Band Edge @1850 MHz



LTE Band 2 (1.4 MHz BW)/QPSK/High Channel 1909.3 MHz/Full RB Band Edge @1910 MHz



LTE Band 2 (1.4 MHz BW)/QPSK/Low Channel 1850.7 MHz/1 RB 0 offset Band Edge @1850 MHz



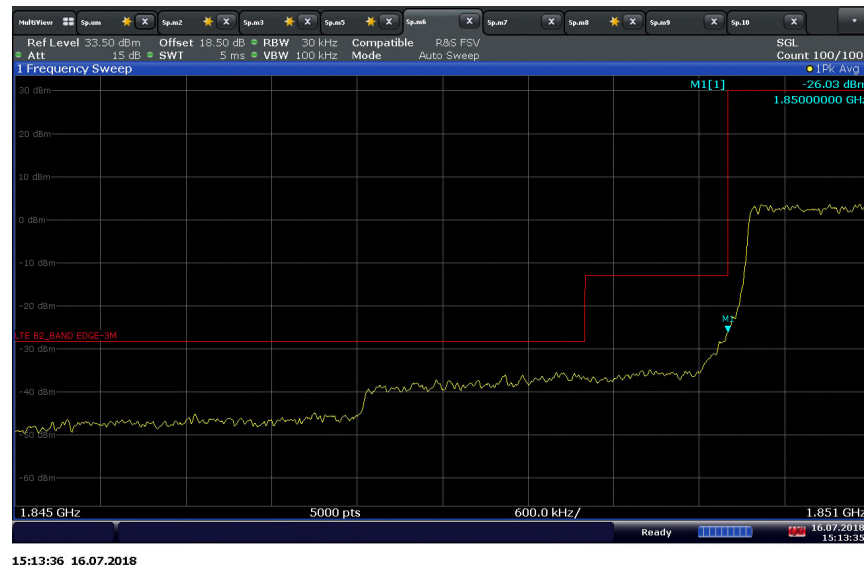
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LTE Band 2 (1.4 MHz BW)/QPSK/High Channel 1909.3 MHz/1 RB 5 offset Band Edge @1910 MHz



15:02:07 16.07.2018

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



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



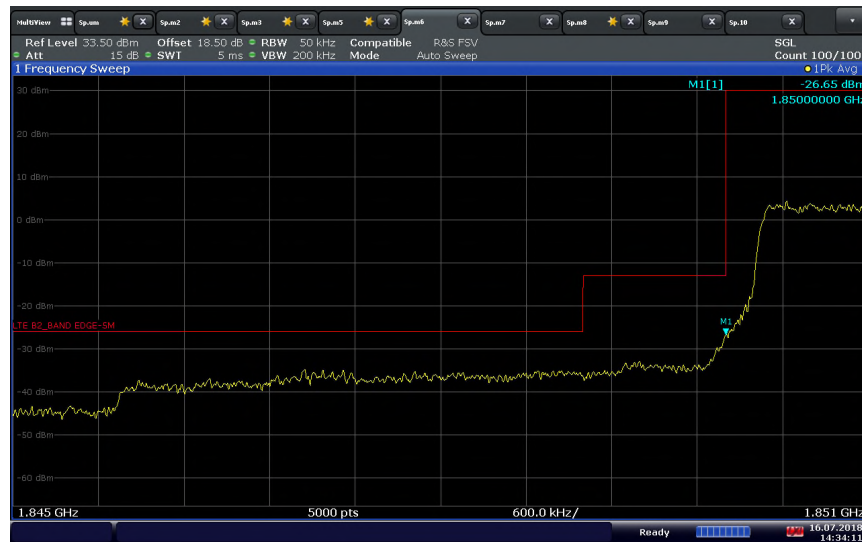
LTE Band 2 (3 MHz BW)/QPSK/Low Channel 1851.5 MHz/1 RB 0 offset Band Edge @1850 MHz



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



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



14:34:12 16.07.2018

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



14:32:14 16.07.2018

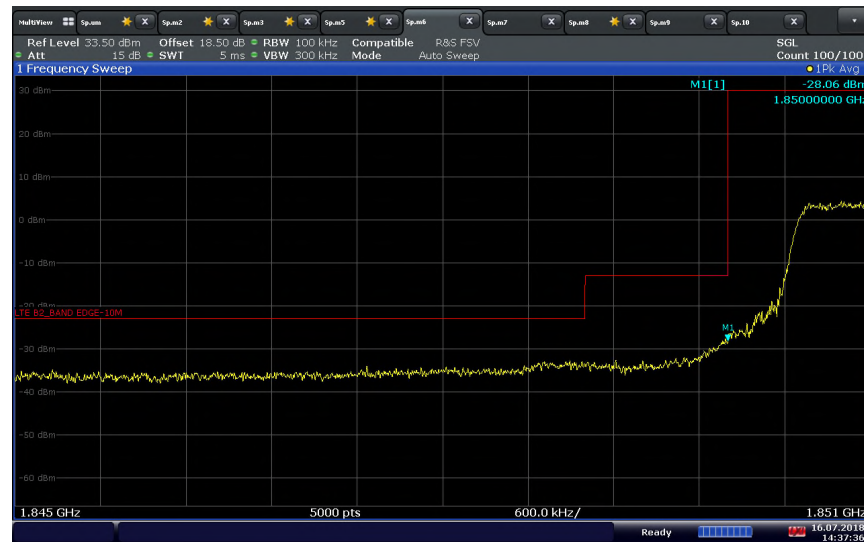
LTE Band 2 (5 MHz BW)/QPSK/Low Channel 1852.5 MHz/1 RB 0 offset Band Edge @1850 MHz



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

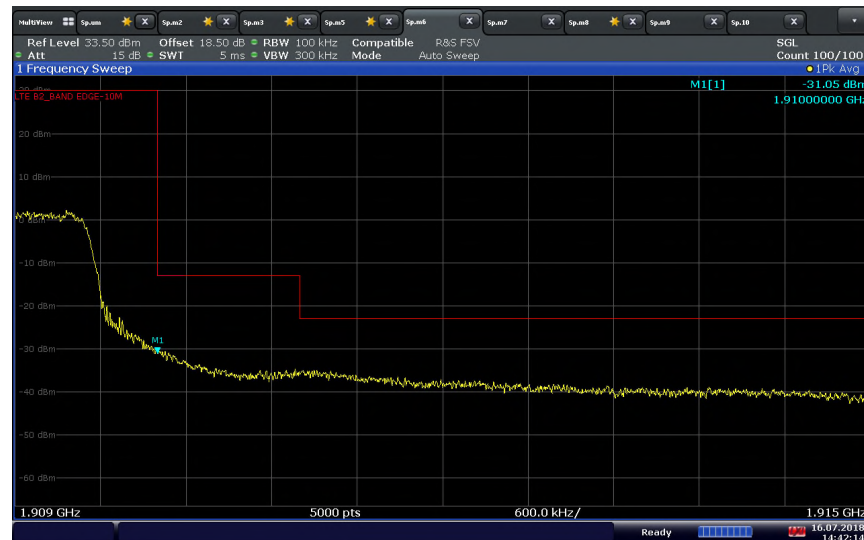


LTE Band 2 (10 MHz BW)/QPSK/Low Channel 1855 MHz/Full RB Band Edge @1850 MHz



14:37:36 16.07.2018

LTE Band 2 (10 MHz BW)/QPSK/High Channel 1905 MHz/Full RB Band Edge @1910 MHz



14:42:15 16.07.2018

LTE Band 2 (10 MHz BW)/QPSK/Low Channel 1855 MHz/1 RB 0 offset Band Edge @1850 MHz



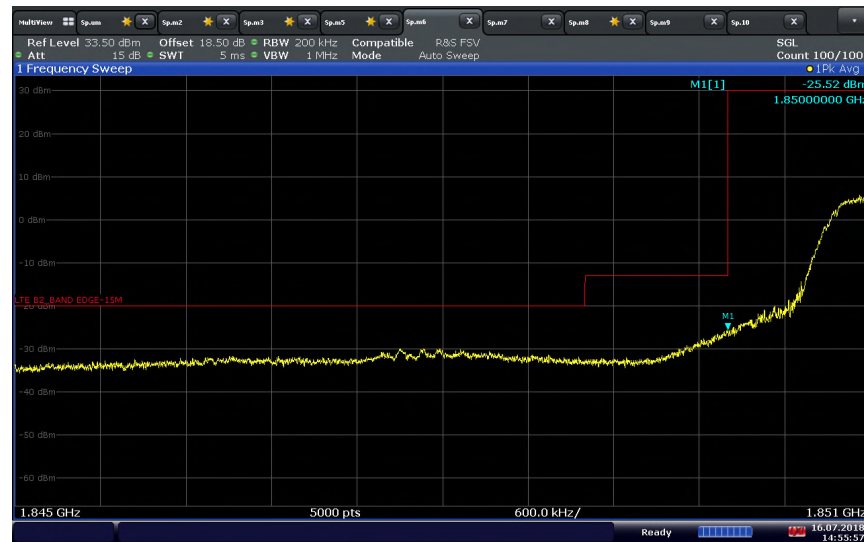
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LTE Band 2 (10 MHz BW)/QPSK/High Channel 1905 MHz/1 RB 49 offset Band Edge @1910 MHz

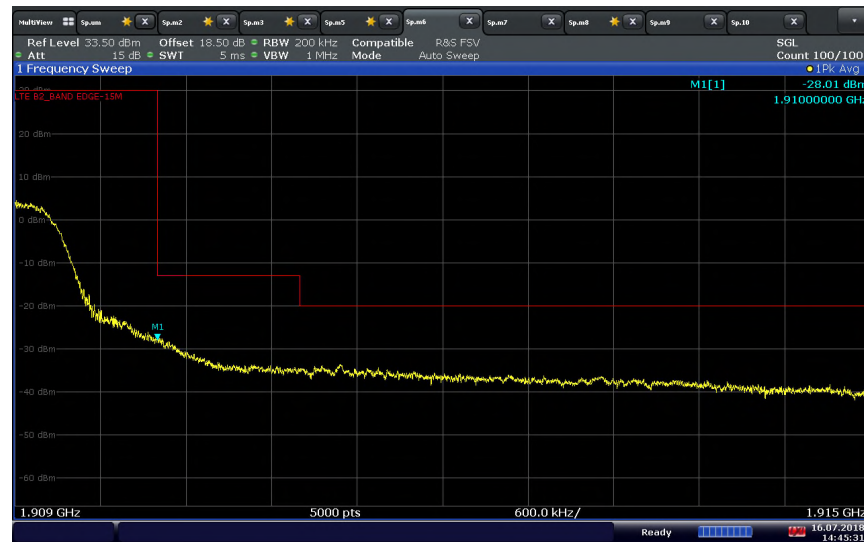


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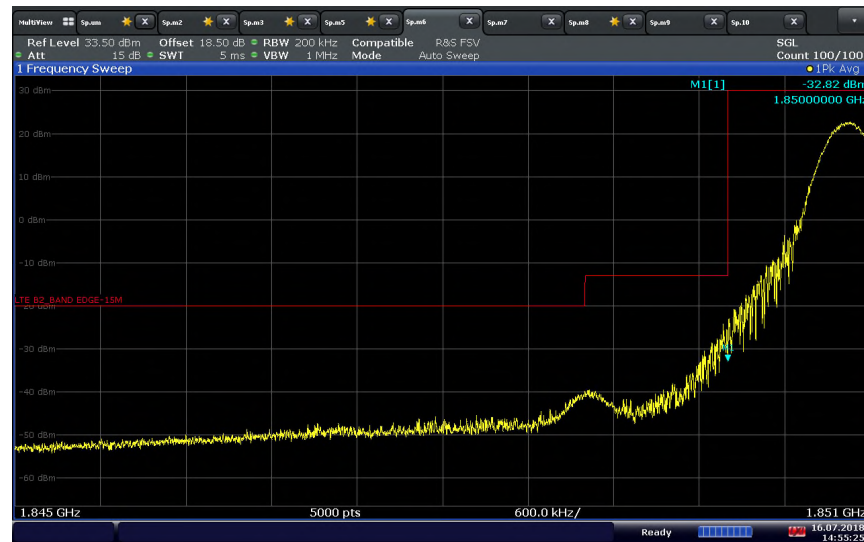
LTE Band 2 (15 MHz BW)/QPSK/Low Channel 1857.5 MHz/Full RB Band Edge @1850 MHz



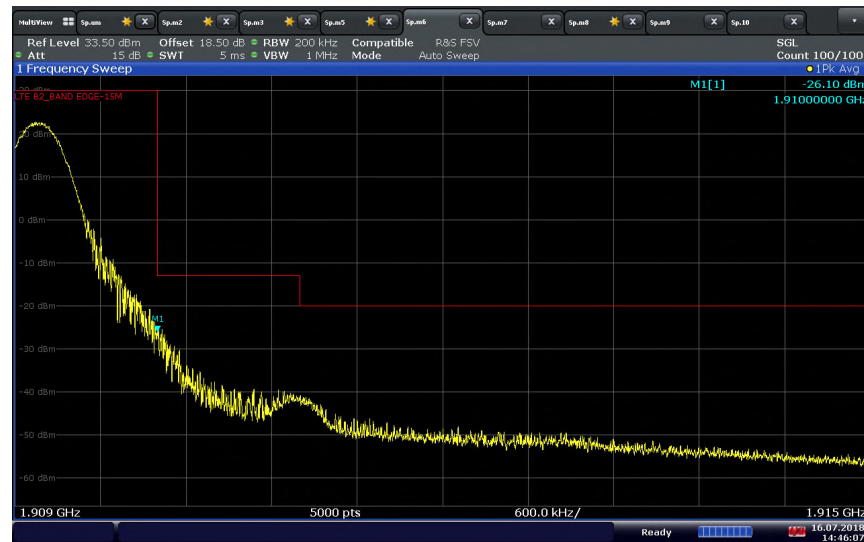
LTE Band 2 (15 MHz BW)/QPSK/High Channel 1902.5 MHz/Full RB Band Edge @1910 MHz



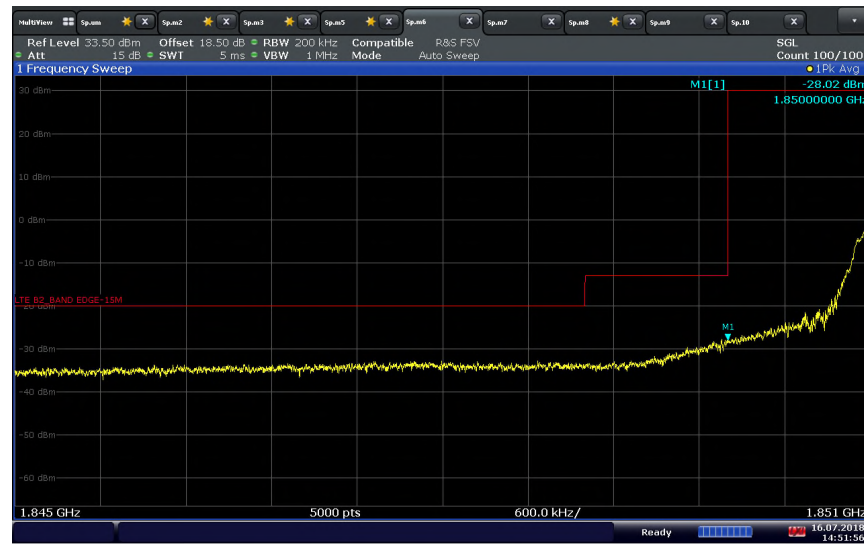
LTE Band 2 (15 MHz BW)/QPSK/Low Channel 1857.5 MHz/1 RB 0 offset Band Edge @1850 MHz



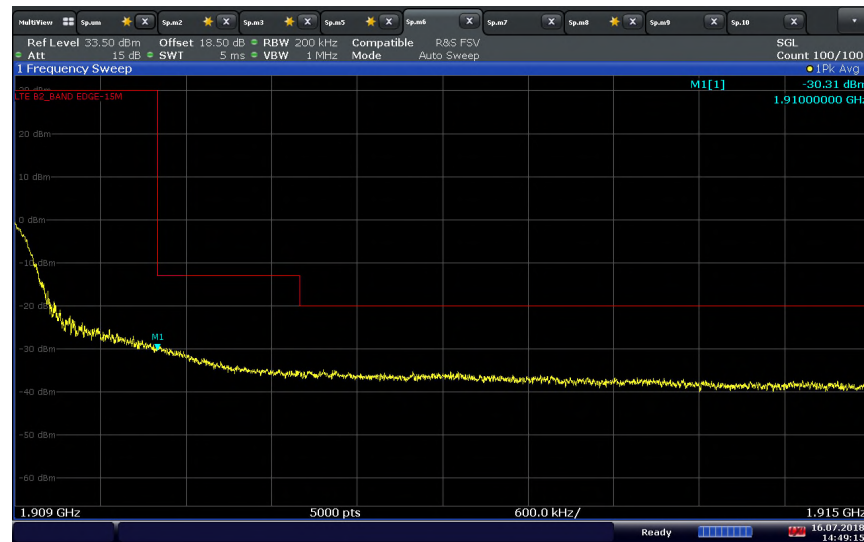
LTE Band 2 (15 MHz BW)/QPSK/High Channel 1902.5 MHz/1 RB 74 offset Band Edge @1910 MHz



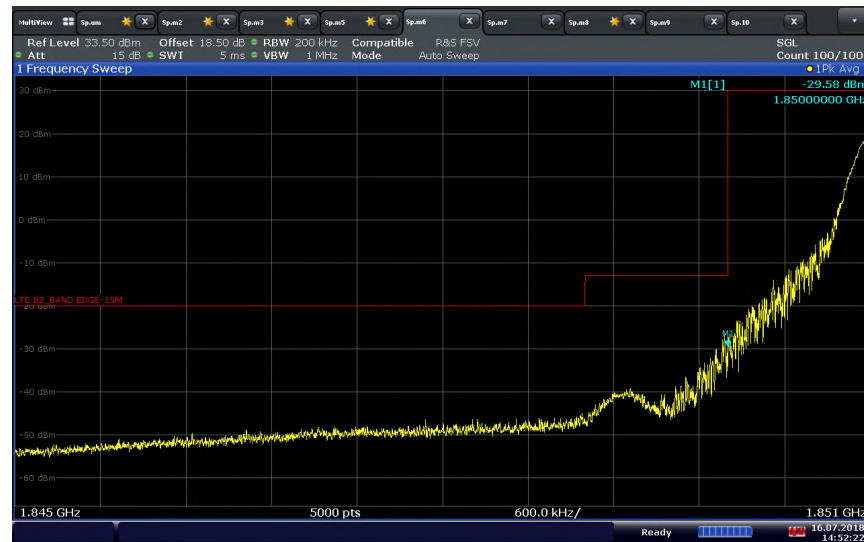
LTE Band 2 (20 MHz BW)/QPSK/Low Channel 1860 MHz/Full RB Band Edge @1850 MHz



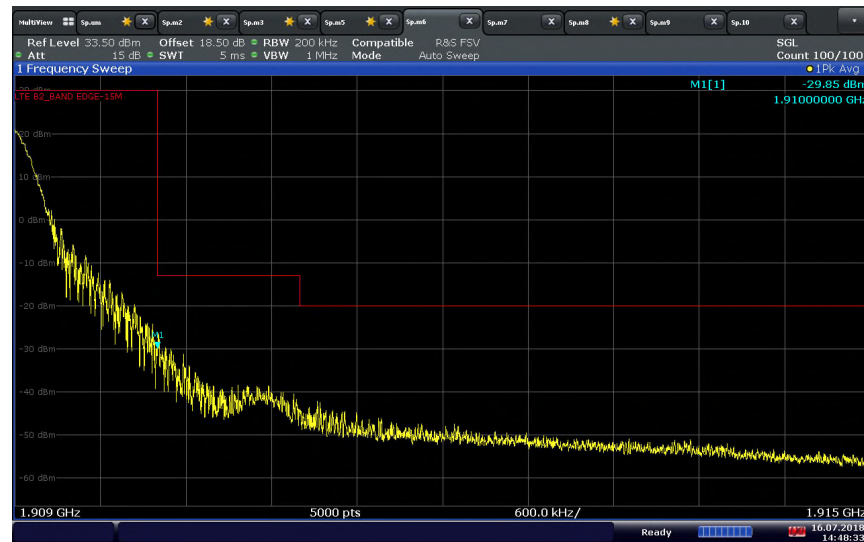
LTE Band 2 (20 MHz BW)/QPSK/High Channel 1900 MHz/Full RB Band Edge @1910 MHz



LTE Band 2 (20 MHz BW)/QPSK/Low Channel 1860 MHz/1 RB 0 offset Band Edge @1850 MHz



LTE Band 2 (20 MHz BW)/QPSK/High Channel 1900 MHz/1 RB 99 offset Band Edge @1910 MHz



LTE Band 5 (1.4 MHz BW)/QPSK/Low Channel 824.7 MHz/Full RB Band Edge @824 MHz



15:27:03 16.07.2018

LTE Band 5 (1.4 MHz BW)/QPSK/High Channel 848.3 MHz/Full RB Band Edge @849 MHz



15:29:57 16.07.2018

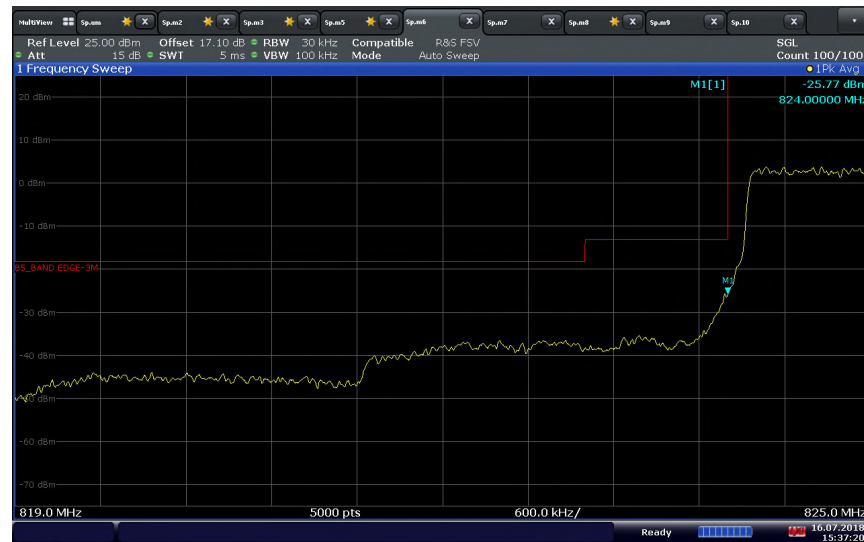
LTE Band 5 (1.4 MHz BW)/QPSK/Low Channel 824.7 MHz/1 RB 0 offset Band Edge @824 MHz



LTE Band 5 (1.4 MHz BW)/QPSK/High Channel 848.3 MHz/1 RB 5 offset Band Edge @849 MHz



LTE Band 5 (3 MHz BW)/QPSK/Low Channel 825.5 MHz/Full RB Band Edge @824 MHz



LTE Band 5 (3 MHz BW)/QPSK/High Channel 836.5 MHz/Full RB Band Edge @849 MHz



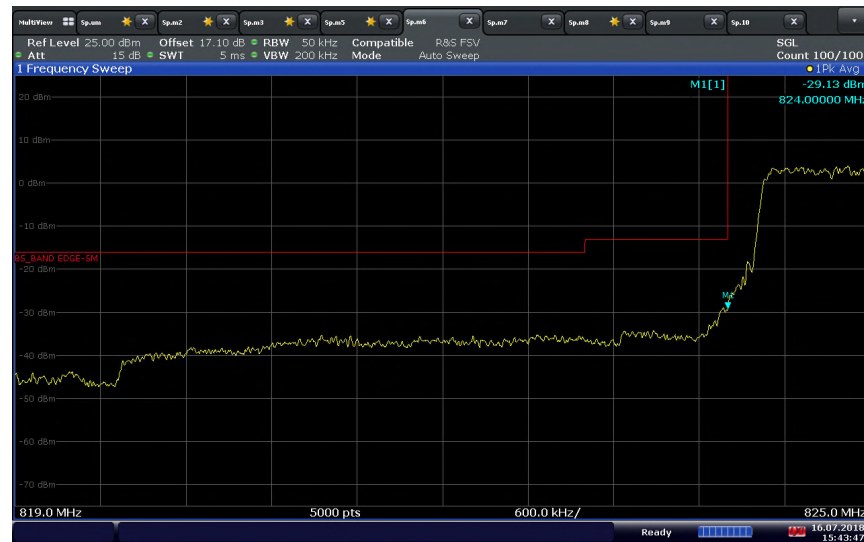
LTE Band 5 (3 MHz BW)/QPSK/Low Channel 825.5 MHz/1 RB 0 offset Band Edge @824 MHz



LTE Band 5 (3 MHz BW)/QPSK/High Channel 836.5 MHz/1 RB 14 offset Band Edge @849 MHz



LTE Band 5 (5 MHz BW)/QPSK/Low Channel 826.5 MHz/Full RB Band Edge @824MHz



15:43:48 16.07.2018

LTE Band 5 (5 MHz BW)/QPSK/High Channel 846.5 MHz/Full RB Band Edge @849 MHz



15:44:43 16.07.2018

LTE Band 5 (5 MHz BW)/QPSK/Low Channel 826.5 MHz/1 RB 0 offset Band Edge @824MHz



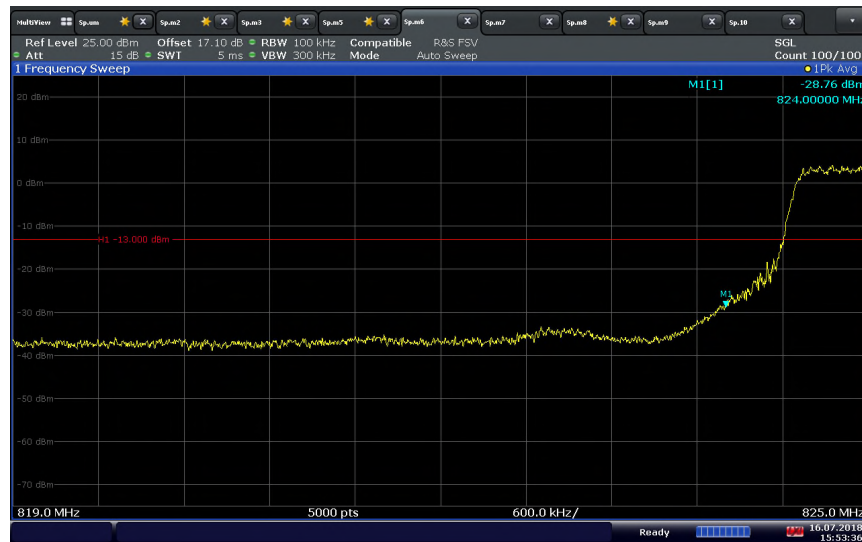
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LTE Band 5 (5 MHz BW)/QPSK/High Channel 846.5 MHz/1 RB 24 offset Band Edge @849 MHz

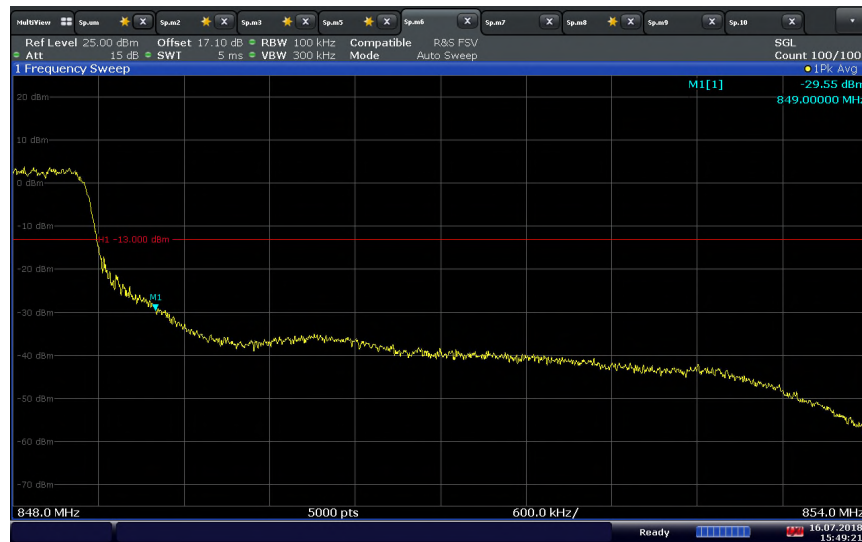


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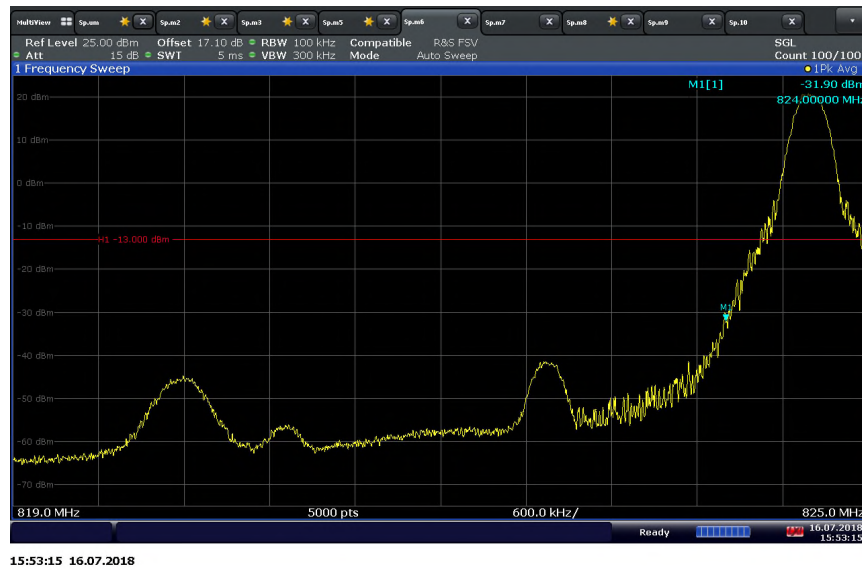
LTE Band 5 (10 MHz BW)/QPSK/Low Channel 829 MHz/Full RB Band Edge @825 MHz



LTE Band 5 (10 MHz BW)/QPSK/High Channel 844 MHz/Full RB Band Edge @849 MHz



LTE Band 5 (10 MHz BW)/QPSK/Low Channel 829 MHz/1 RB 0 offset Band Edge @825 MHz



LTE Band 5 (10 MHz BW)/QPSK/High Channel 844 MHz/1 RB 49 offset Band Edge @849 MHz



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)
FCC 47 CFR Part 24, Clause 24.238(a)
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 $43 + 10\log(P)$ dB.

2.7.3 Equipment Under Test and Modification State

Serial No: AZ280418A00044 / Test Configuration A

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

June 18 and 21, 2018 / 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

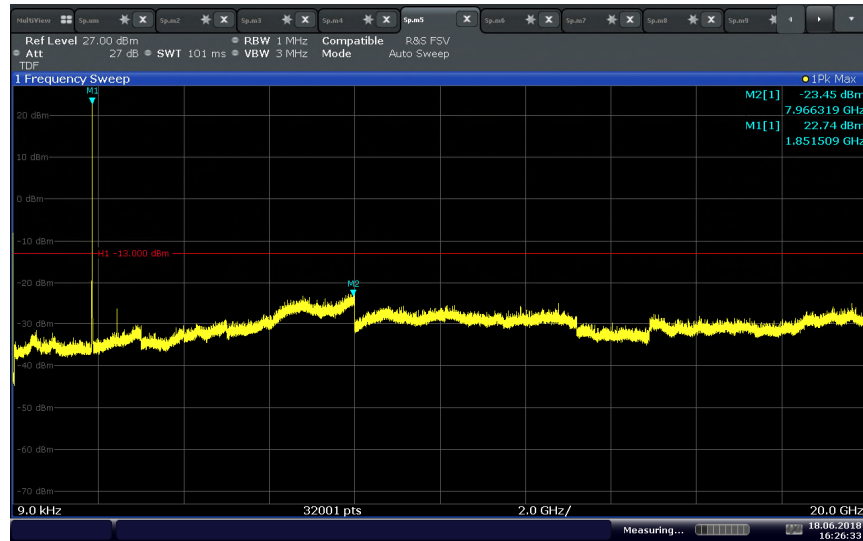
Ambient Temperature	24.0 - 24.3 °C
Relative Humidity	44.0 - 55.9%
ATM Pressure	99.0 - 99.1kPa

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.

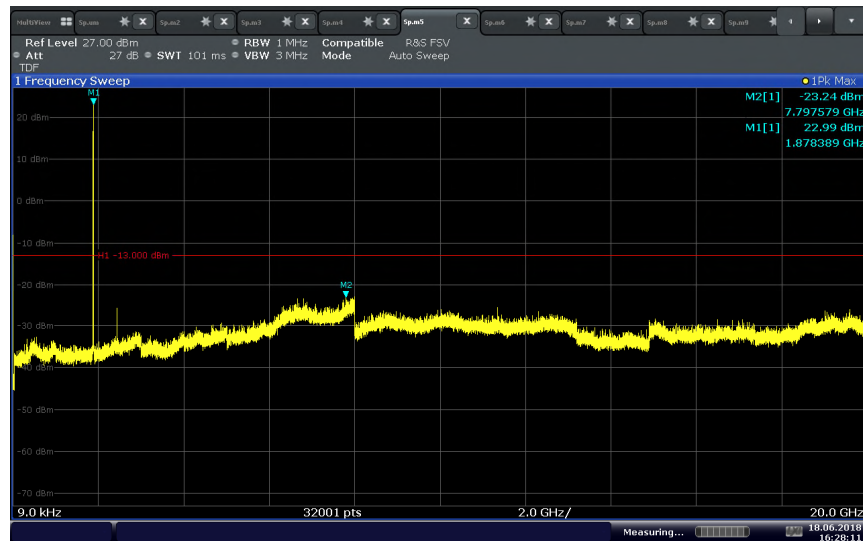
2.7.8 Test Results

WCDMA Band 2/Low Channel 1852.4 MHz



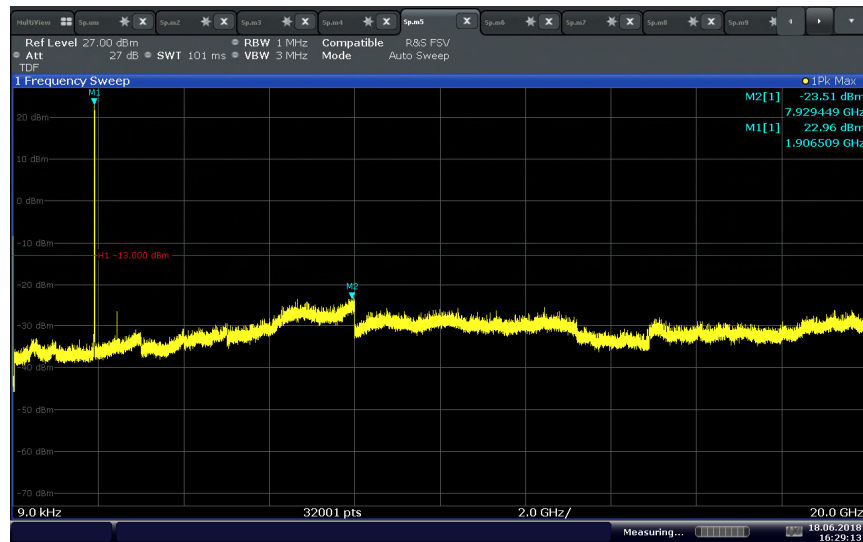
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WCDMA Band 2/Mid Channel 1880.0 MHz

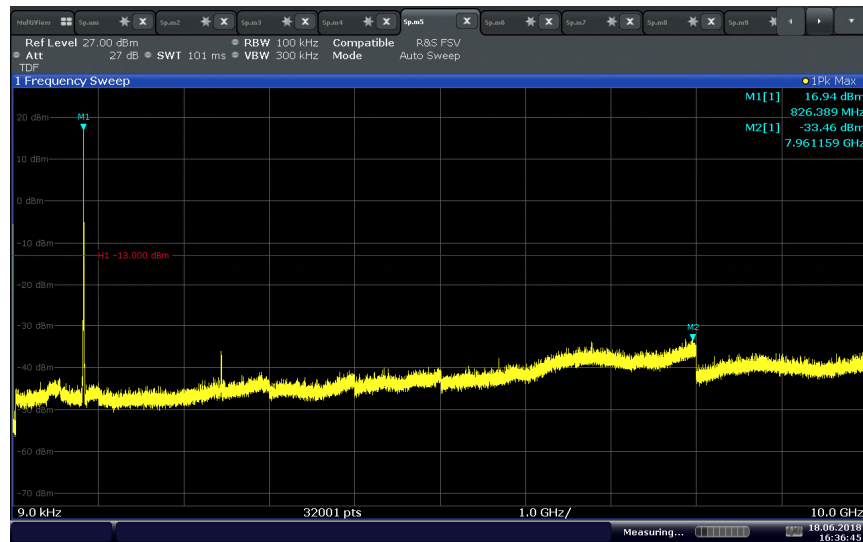


16:28:12 18.06.2018

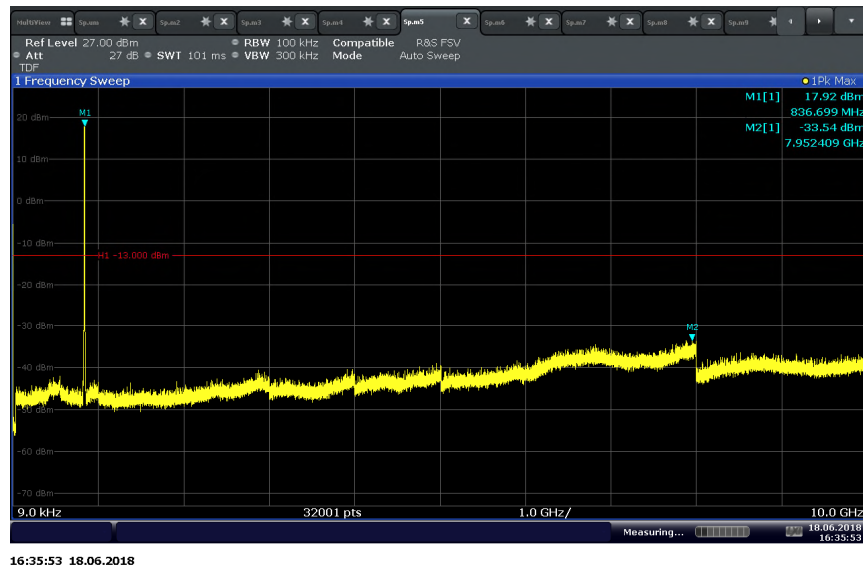
WCDMA Band 2/High Channel 1907.6 MHz



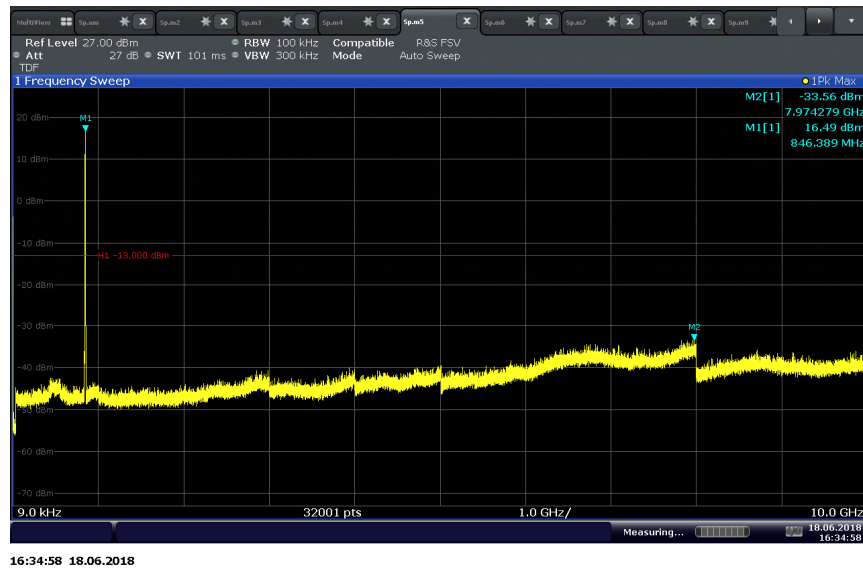
WCDMA Band 5/Low Channel 826.4 MHz



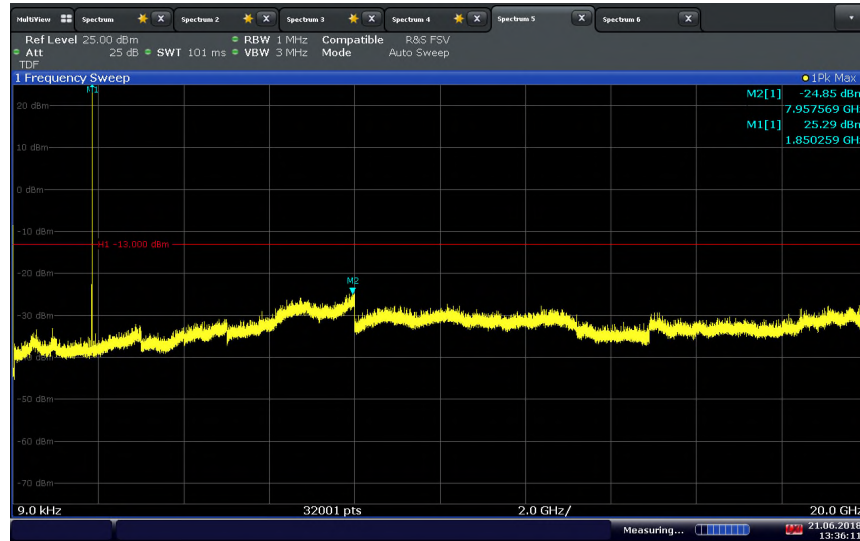
WCDMA Band 5/Mid Channel 836.6 MHz



WCDMA Band 5/High Channel 846.6 MHz

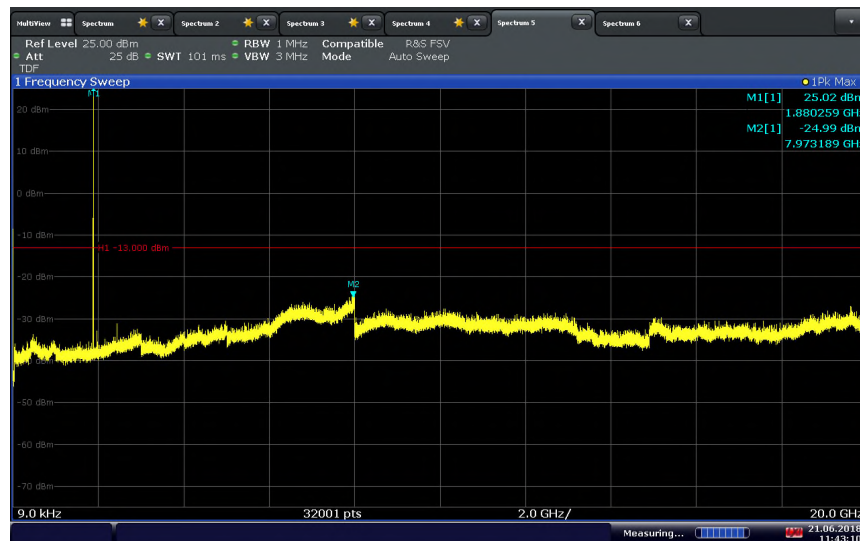


LTE Band 2 (1.4 MHz BW)/QPSK/Low Channel 1850.7 MHz



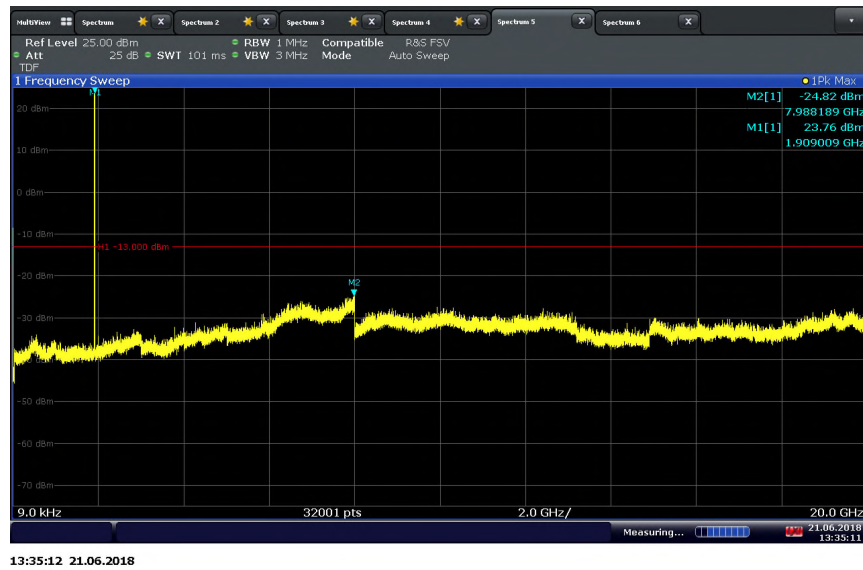
13:36:12 21.06.2018

LTE Band 2 (1.4 MHz BW)/QPSK/Mid Channel 1880.0 MHz

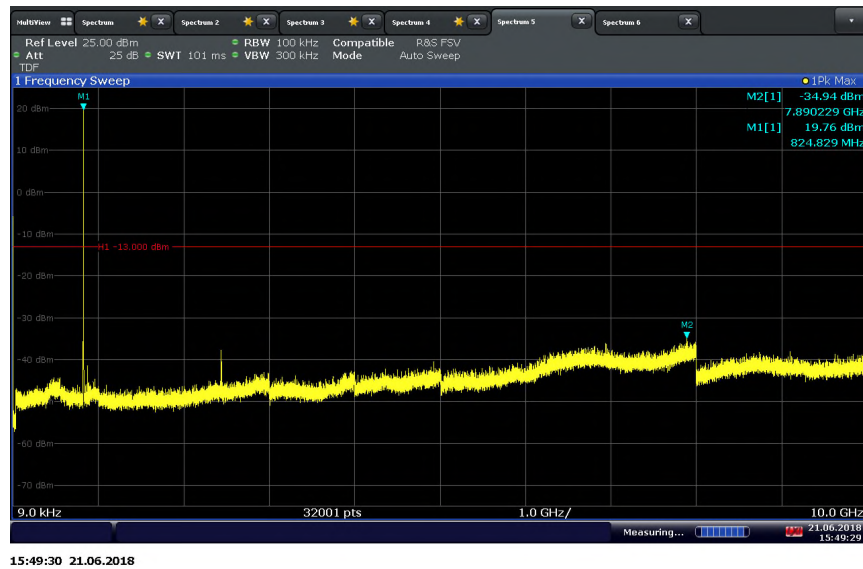


11:43:11 21.06.2018

LTE Band 2 (1.4 MHz BW)/QPSK/High Channel 1909.3 MHz

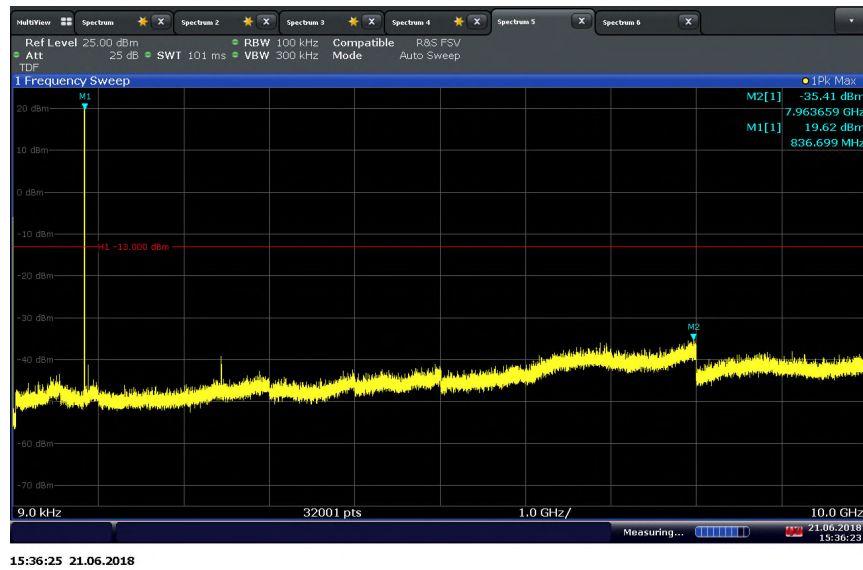


LTE Band 5 (1.4 MHz BW)/QPSK/Low Channel 824.7 MHz

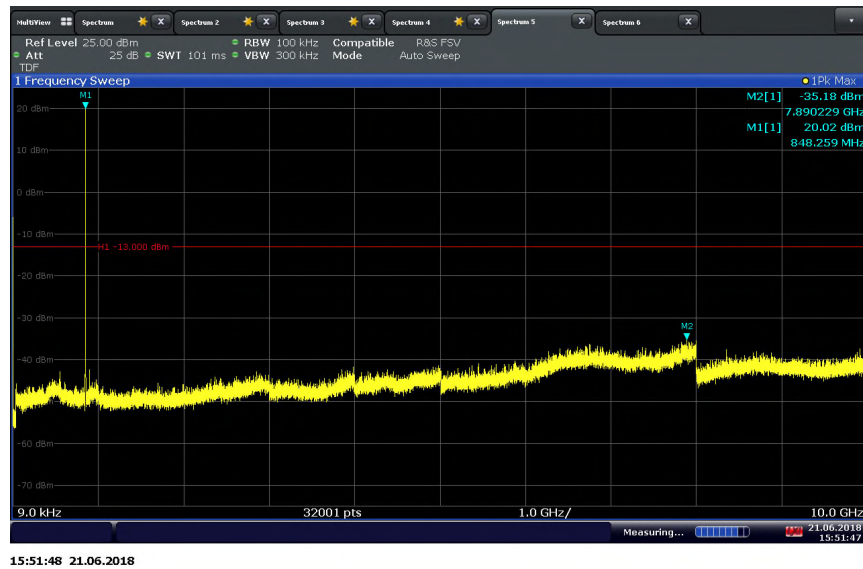




LTE Band 5 (1.4 MHz BW)/QPSK/Mid Channel 836.5 MHz



LTE Band 5 (1.4 MHz BW)/QPSK/High Channel 848.3 MHz





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: AS190818B00021 / Test Configuration B

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

October 19 and 22, 2018 / 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	24.3 °C
Relative Humidity	28.3 - 50.7 %
ATM Pressure	98.8 - 99.1 kPa

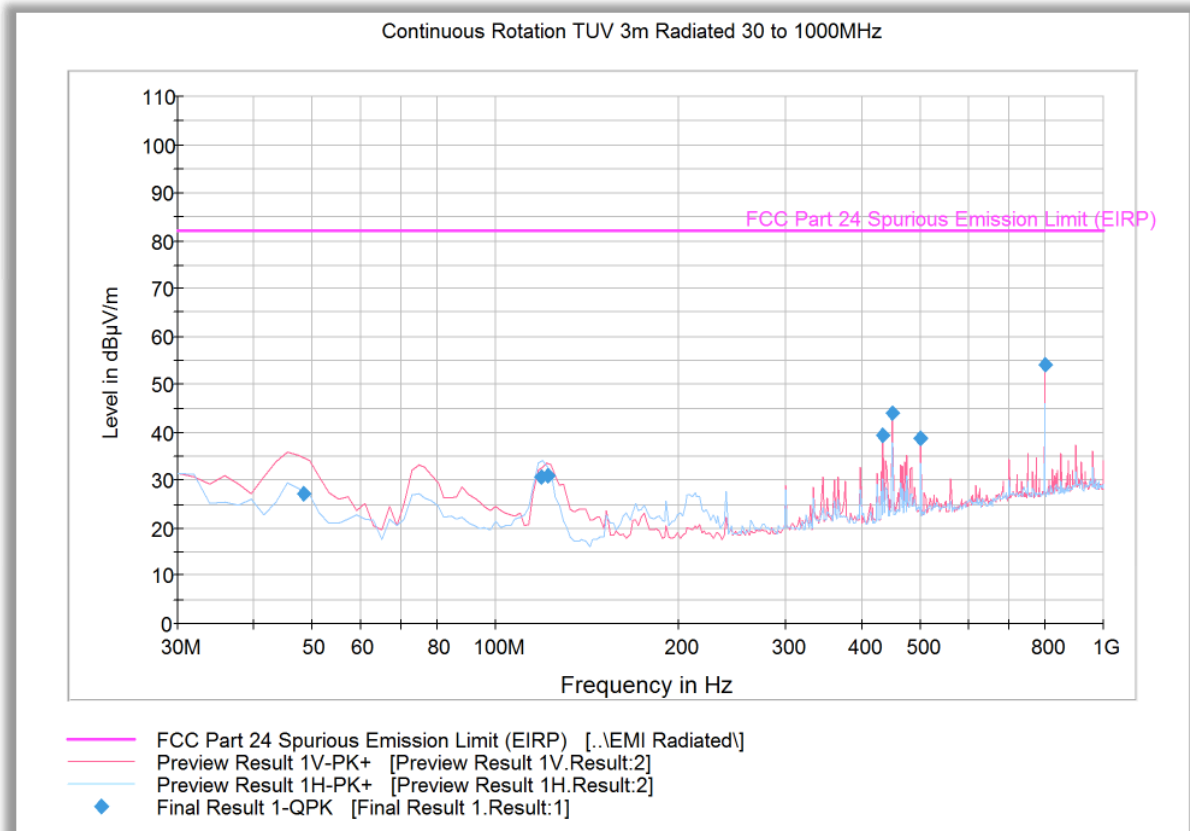
2.8.7 Additional Observations

- 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 by a call box 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 V8.52 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.

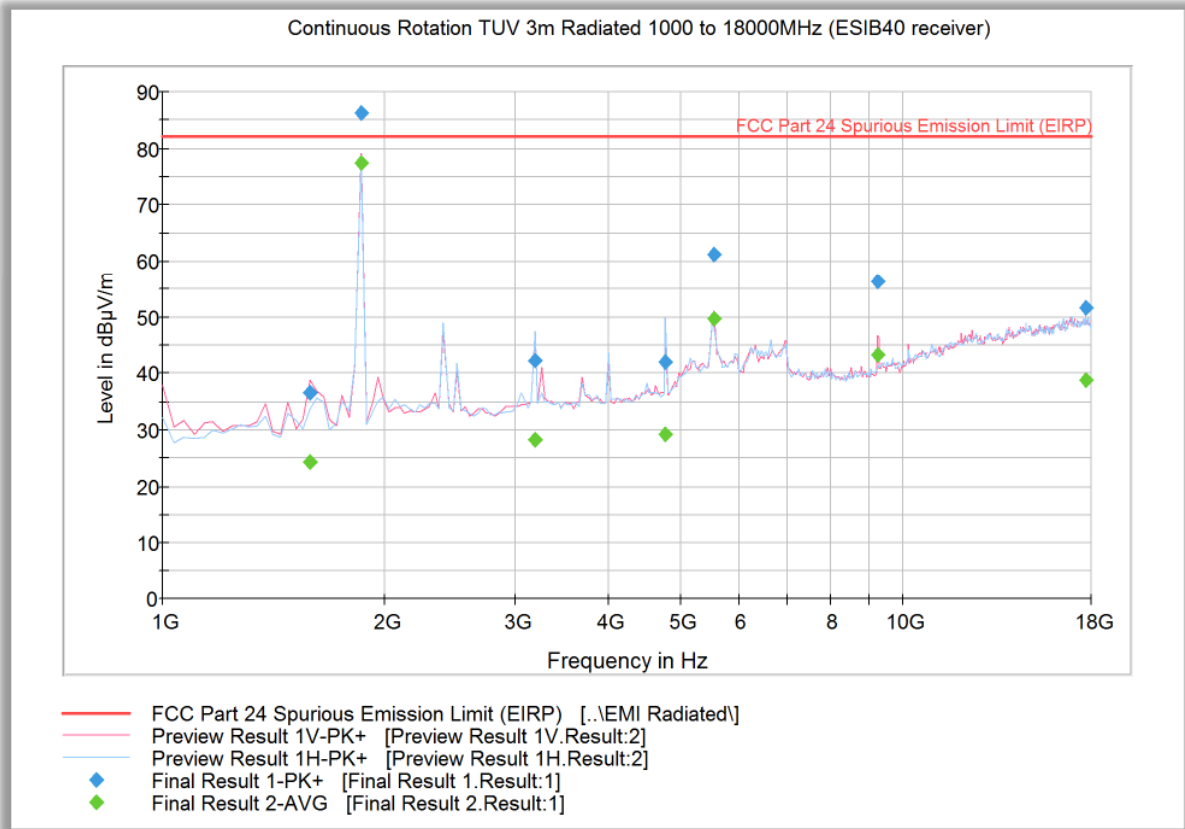
2.8.9 Radiated Emission Test Results Below 1GHz_Worst Case Configuration_WCDMA Band 2 Mid Channel



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)
48.431102	27.2	1000.0	120.000	150.0	V	58.0	-14.6	55.0	82.2
118.898838	30.7	1000.0	120.000	231.0	H	16.0	-14.7	51.5	82.2
121.866613	31.0	1000.0	120.000	100.0	V	141.0	-14.6	51.2	82.2
433.368657	39.3	1000.0	120.000	100.0	V	13.0	-3.9	43.0	82.2
449.999760	44.0	1000.0	120.000	171.0	V	122.0	-3.1	38.2	82.2
500.020842	38.9	1000.0	120.000	155.0	V	130.0	-2.0	43.4	82.2
800.003447	54.2	1000.0	120.000	100.0	V	175.0	3.6	28.1	82.2

2.8.10 Radiated Emission Test Results Above 1GHz_ Worst Case Configuration_WCDMA Band 2 Low Channel



Peak Data

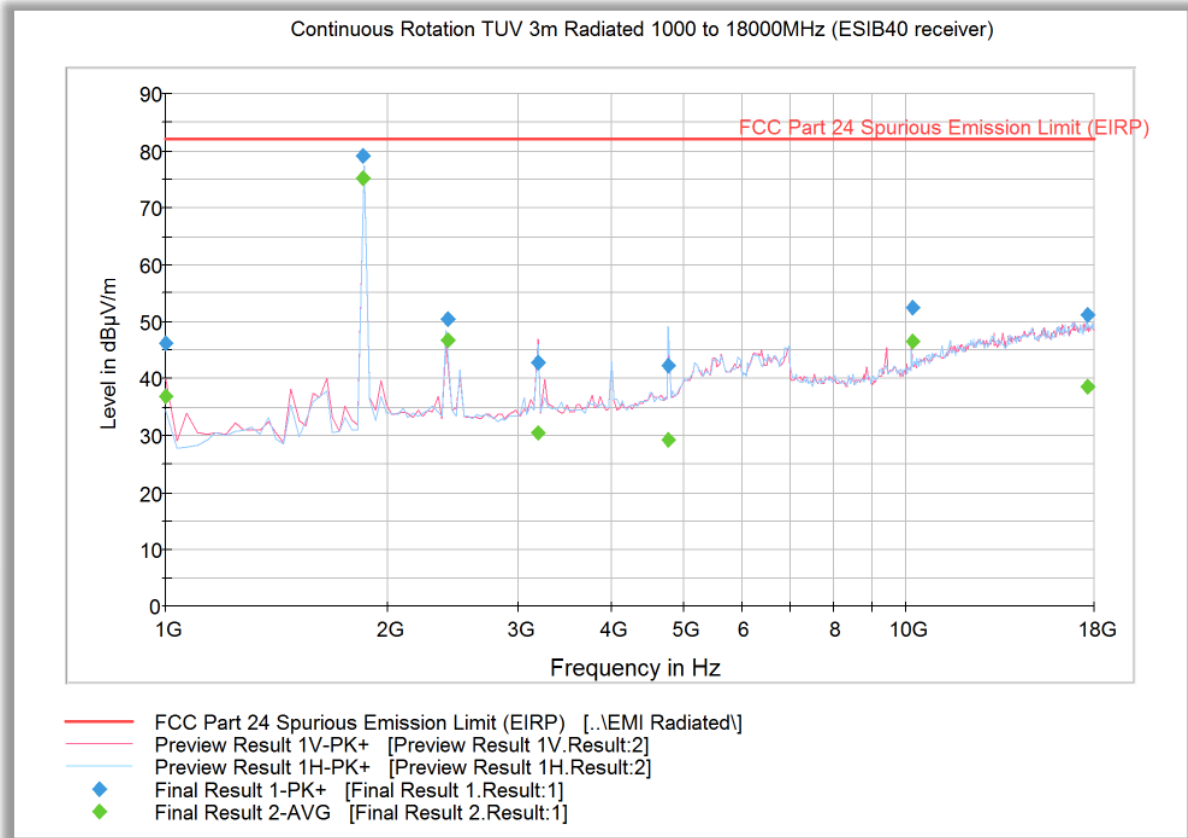
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1583.358317	36.7	1000.0	1000.000	231.4	V	3.0	-5.8	45.6	82.2
1853.503407	86.2	1000.0	1000.000	315.2	V	182.0	-2.9	Fundamental Carrier*	
3188.560721	42.2	1000.0	1000.000	103.7	H	3.0	0.9	40	82.2
4774.963126	42.0	1000.0	1000.000	201.5	H	59.0	3.5	40.2	82.2
5554.930261	61.2	1000.0	1000.000	242.4	V	54.0	4.9	21	82.2
9258.288978	56.3	1000.0	1000.000	293.2	V	254.0	8.4	25.9	82.2
17657.918637	51.7	1000.0	1000.000	102.7	H	4.0	17.7	30.5	82.2

Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1583.358317	24.2	1000.0	1000.000	231.4	V	3.0	-5.8	58	82.2
1853.503407	77.5	1000.0	1000.000	315.2	V	182.0	-2.9	Fundamental Carrier*	
3188.560721	28.3	1000.0	1000.000	103.7	H	3.0	0.9	53.9	82.2
4774.963126	29.3	1000.0	1000.000	201.5	H	59.0	3.5	52.9	82.2
5554.930261	49.7	1000.0	1000.000	242.4	V	54.0	4.9	32.5	82.2
9258.288978	43.3	1000.0	1000.000	293.2	V	254.0	8.4	38.9	82.2
17657.918637	38.9	1000.0	1000.000	102.7	H	4.0	17.7	43.3	82.2

* 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_ Worst Case Configuration_WCDMA Band 2 Middle Channel



Peak Data

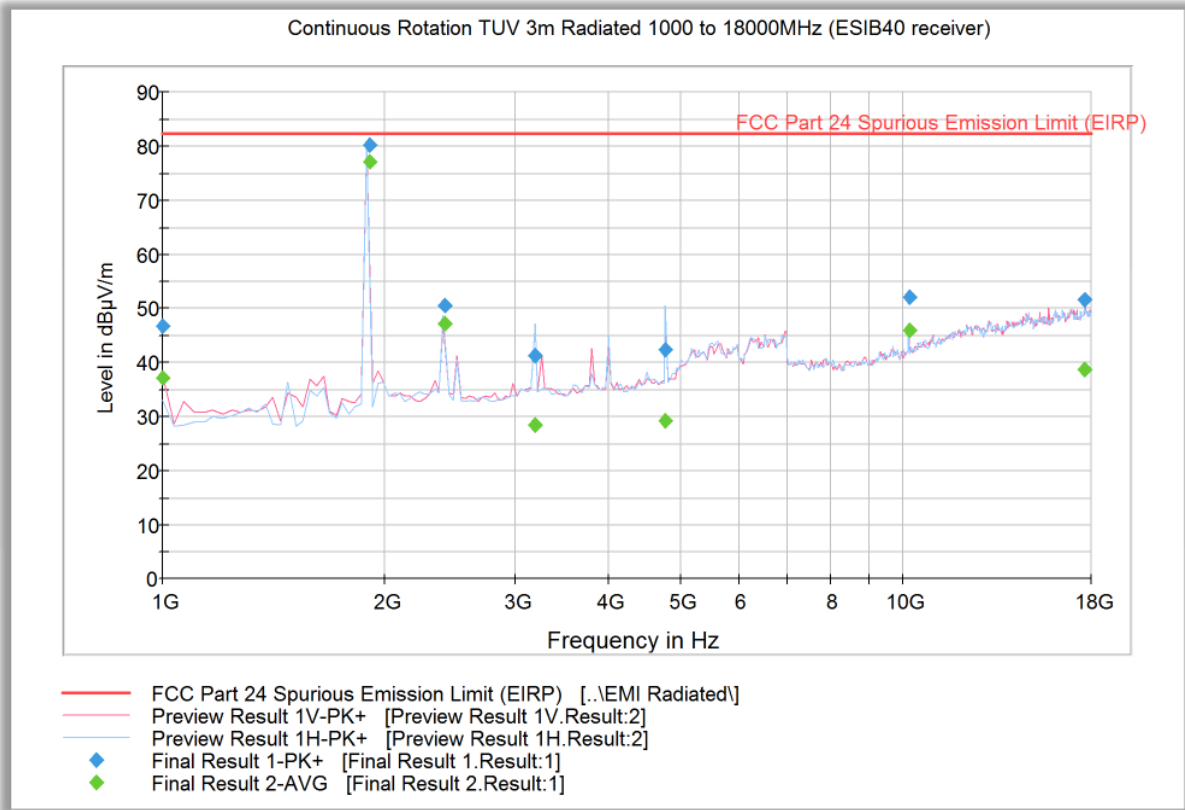
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1000.000000	46.1	1000.0	1000.000	192.5	V	162.0	-7.0	36.1	82.2
1875.103407	79.1	1000.0	1000.000	282.2	H	313.0	-2.8	Fundamental Carrier*	
2399.793587	50.5	1000.0	1000.000	103.7	H	202.0	-1.2	31.7	82.2
3187.360721	42.7	1000.0	1000.000	125.7	V	221.0	0.9	39.5	82.2
4786.963126	42.3	1000.0	1000.000	231.4	H	79.0	3.5	39.9	82.2
10200.196794	52.4	1000.0	1000.000	175.6	V	132.0	9.9	29.8	82.2
17585.782365	51.2	1000.0	1000.000	250.5	H	322.0	17.6	31	82.2

Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1000.000000	36.9	1000.0	1000.000	192.5	V	162.0	-7.0	45.3	82.2
1875.103407	75.2	1000.0	1000.000	282.2	H	313.0	-2.8	Fundamental Carrier*	
2399.793587	46.8	1000.0	1000.000	103.7	H	202.0	-1.2	35.4	82.2
3187.360721	30.6	1000.0	1000.000	125.7	V	221.0	0.9	51.6	82.2
4786.963126	29.3	1000.0	1000.000	231.4	H	79.0	3.5	52.9	82.2
10200.196794	46.5	1000.0	1000.000	175.6	V	132.0	9.9	35.7	82.2
17585.782365	38.6	1000.0	1000.000	250.5	H	322.0	17.6	43.6	82.2

* 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_ Worst Case Configuration_WCDMA Band 2 High Channel



Peak Data

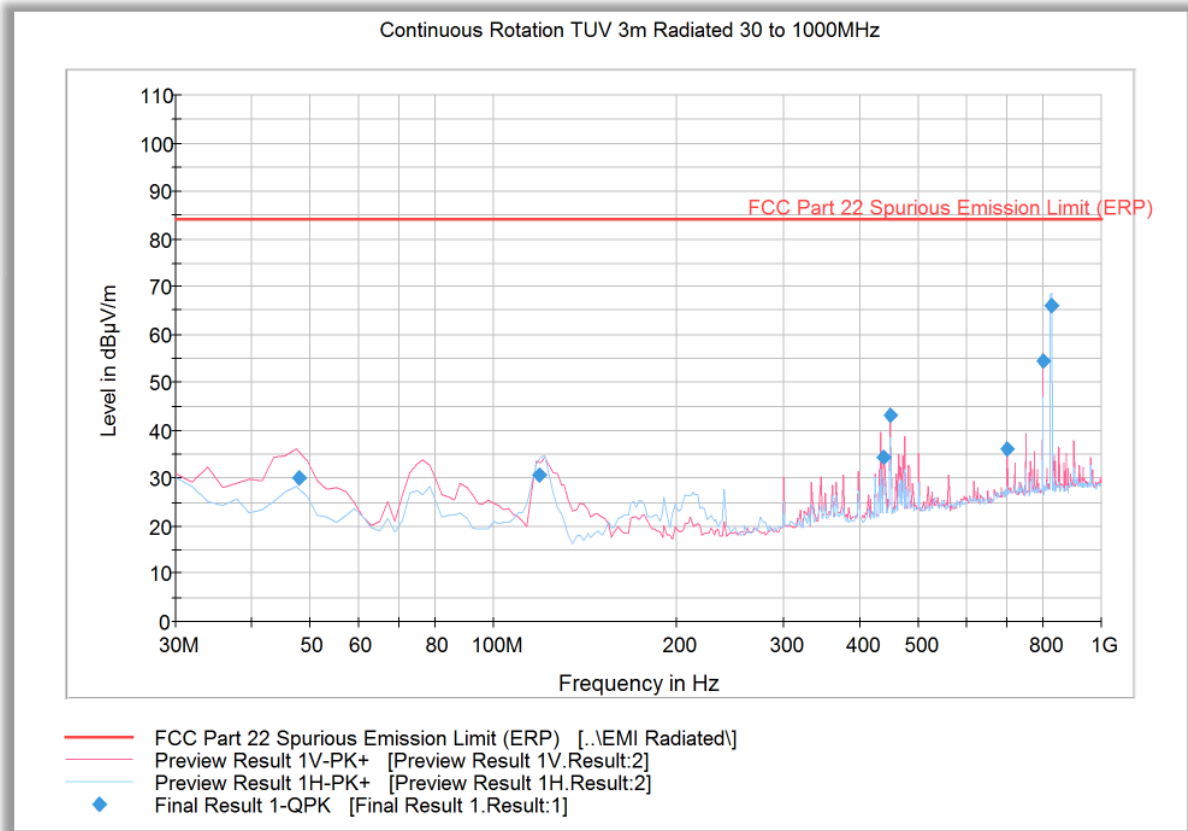
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1000.000000	46.8	1000.0	1000.000	241.3	V	162.0	-7.0	35.4	82.2
1900.171543	80.2	1000.0	1000.000	141.7	V	203.0	-2.7	Fundamental Carrier*	
2400.193587	50.5	1000.0	1000.000	103.7	H	200.0	-1.2	31.7	82.2
3178.960721	41.4	1000.0	1000.000	152.2	H	30.0	0.9	40.8	82.2
4774.163126	42.2	1000.0	1000.000	166.6	H	99.0	3.5	40	82.2
10200.196794	52.1	1000.0	1000.000	193.5	V	107.0	9.9	30.1	82.2
17596.982365	51.4	1000.0	1000.000	252.3	H	31.0	17.6	30.8	82.2

Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1000.000000	37.1	1000.0	1000.000	241.3	V	162.0	-7.0	45.1	82.2
1900.171543	77.2	1000.0	1000.000	141.7	V	203.0	-2.7	Fundamental Carrier*	
2400.193587	47.3	1000.0	1000.000	103.7	H	200.0	-1.2	34.9	82.2
3178.960721	28.4	1000.0	1000.000	152.2	H	30.0	0.9	53.8	82.2
4774.163126	29.3	1000.0	1000.000	166.6	H	99.0	3.5	52.9	82.2
10200.196794	46.0	1000.0	1000.000	193.5	V	107.0	9.9	36.2	82.2
17596.982365	38.7	1000.0	1000.000	252.3	H	31.0	17.6	43.5	82.2

* 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 Low Channel

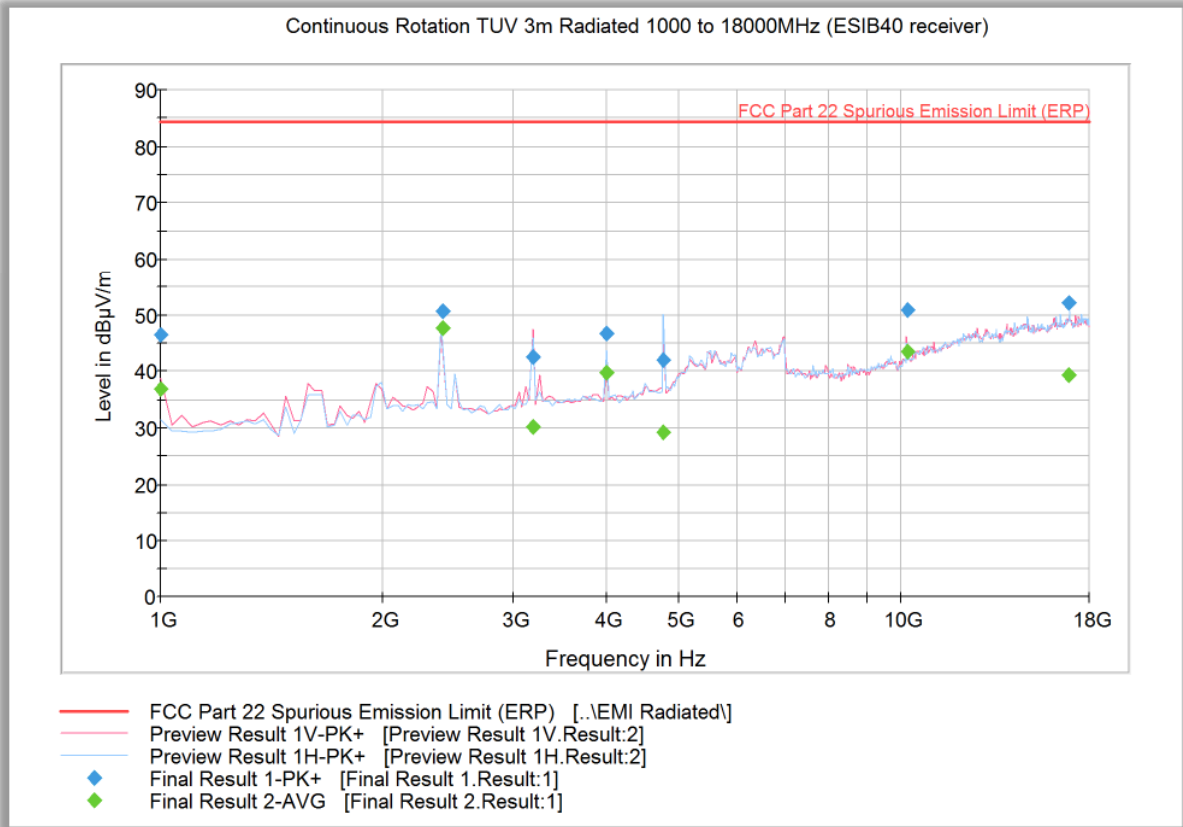


Quasi Peak Data

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
48.014990	30.2	1000.0	120.000	100.0	V	15.0	-14.5	54.2	84.4
118.842725	30.7	1000.0	120.000	301.0	H	209.0	-14.7	53.7	84.4
437.496433	34.4	1000.0	120.000	226.0	V	131.0	-3.8	50.0	84.4
449.999760	43.0	1000.0	120.000	171.0	V	135.0	-3.1	41.4	84.4
700.001283	36.1	1000.0	120.000	115.0	V	91.0	2.6	48.3	84.4
800.003447	54.6	1000.0	120.000	100.0	V	175.0	3.6	29.8	84.4
826.977876	66.1	1000.0	120.000	100.0	H	200.0	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



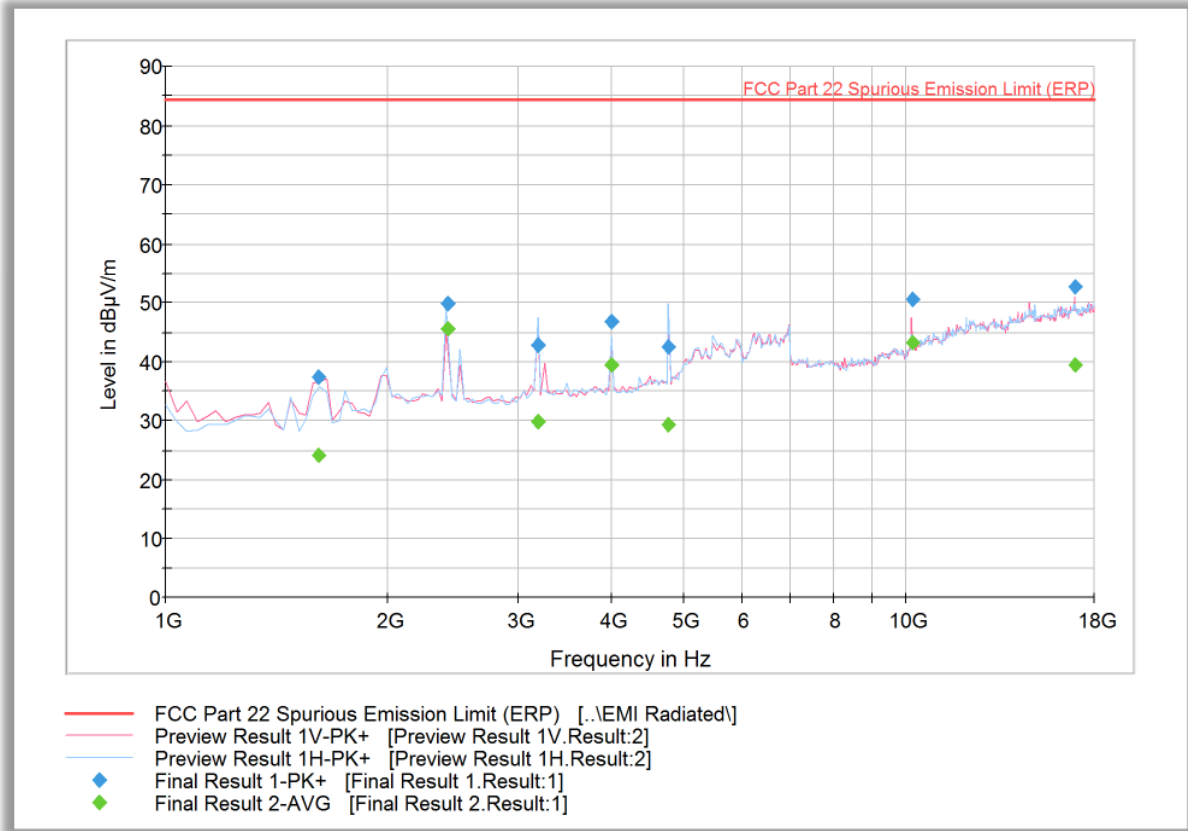
Peak Data

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1000.000000	46.4	1000.0	1000.000	203.5	V	182.0	-7.0	38.0	84.4
2400.193587	50.7	1000.0	1000.000	103.7	H	200.0	-1.2	33.7	84.4
3187.760721	42.6	1000.0	1000.000	183.5	V	0.0	0.9	41.8	84.4
3999.795992	46.8	1000.0	1000.000	193.5	H	109.0	2.4	37.6	84.4
4770.963126	42.1	1000.0	1000.000	250.5	H	83.0	3.5	42.3	84.4
10199.796794	50.9	1000.0	1000.000	174.6	V	133.0	9.9	33.5	84.4
16896.019639	52.1	1000.0	1000.000	212.4	H	4.0	17.9	32.3	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)
1000.000000	37.0	1000.0	1000.000	203.5	V	182.0	-7.0	47.4	84.4
2400.193587	47.8	1000.0	1000.000	103.7	H	200.0	-1.2	36.6	84.4
3187.760721	30.2	1000.0	1000.000	183.5	V	0.0	0.9	54.2	84.4
3999.795992	39.9	1000.0	1000.000	193.5	H	109.0	2.4	44.5	84.4
4770.963126	29.3	1000.0	1000.000	250.5	H	83.0	3.5	55.1	84.4
10199.796794	43.6	1000.0	1000.000	174.6	V	133.0	9.9	40.8	84.4
16896.019639	39.4	1000.0	1000.000	212.4	H	4.0	17.9	45.0	84.4

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



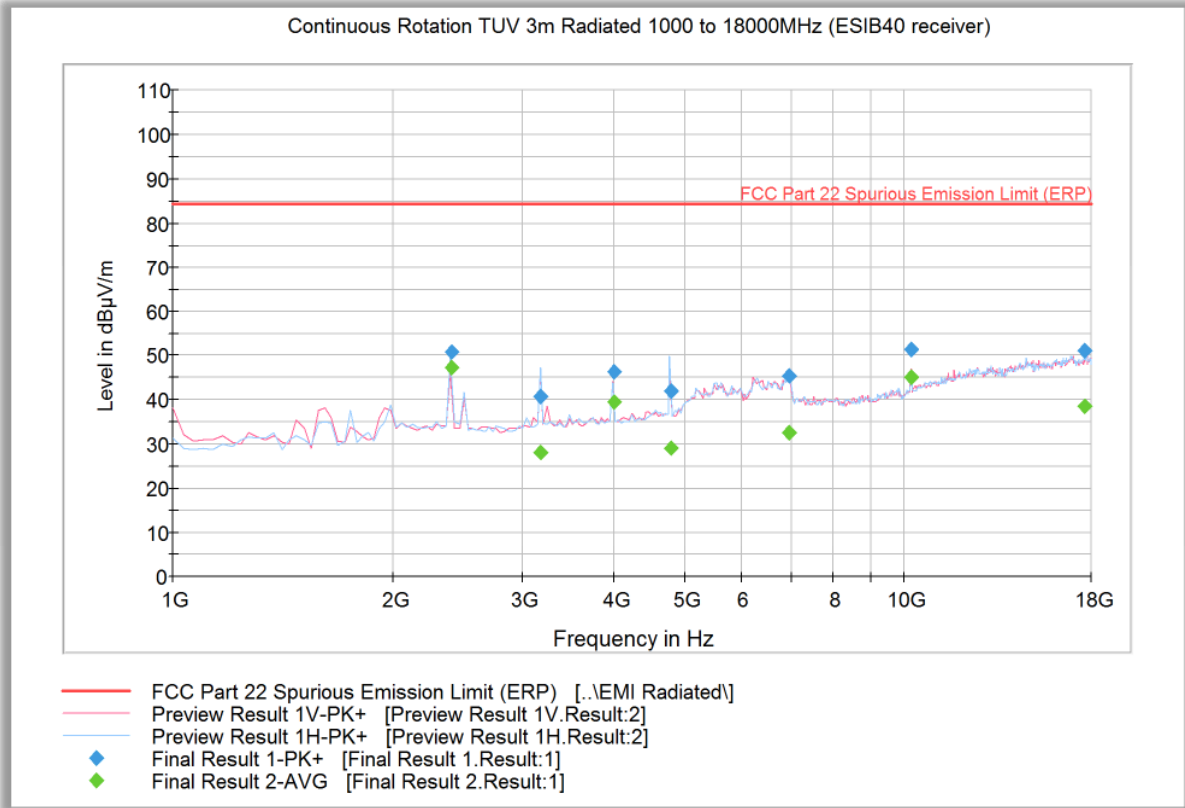
Peak Data

Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1610.226453	37.3	1000.0	1000.000	174.6	V	312.0	-5.7	47.1	84.4
2400.193587	49.8	1000.0	1000.000	103.7	H	221.0	-1.2	34.6	84.4
3187.360721	42.8	1000.0	1000.000	124.7	H	-20.0	0.9	41.6	84.4
4000.195992	46.8	1000.0	1000.000	303.2	H	32.0	2.4	37.6	84.4
4784.563126	42.5	1000.0	1000.000	250.5	H	79.0	3.5	41.9	84.4
10199.796794	50.5	1000.0	1000.000	175.6	V	133.0	9.9	33.9	84.4
16918.019639	52.6	1000.0	1000.000	352.7	V	43.0	17.9	31.8	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)
1610.226453	24.3	1000.0	1000.000	174.6	V	312.0	-5.7	60.1	84.4
2400.193587	45.5	1000.0	1000.000	103.7	H	221.0	-1.2	38.9	84.4
3187.360721	29.9	1000.0	1000.000	124.7	H	-20.0	0.9	54.5	84.4
4000.195992	39.6	1000.0	1000.000	303.2	H	32.0	2.4	44.8	84.4
4784.563126	29.3	1000.0	1000.000	250.5	H	79.0	3.5	55.1	84.4
10199.796794	43.3	1000.0	1000.000	175.6	V	133.0	9.9	41.1	84.4
16918.019639	39.4	1000.0	1000.000	352.7	V	43.0	17.9	45.0	84.4

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



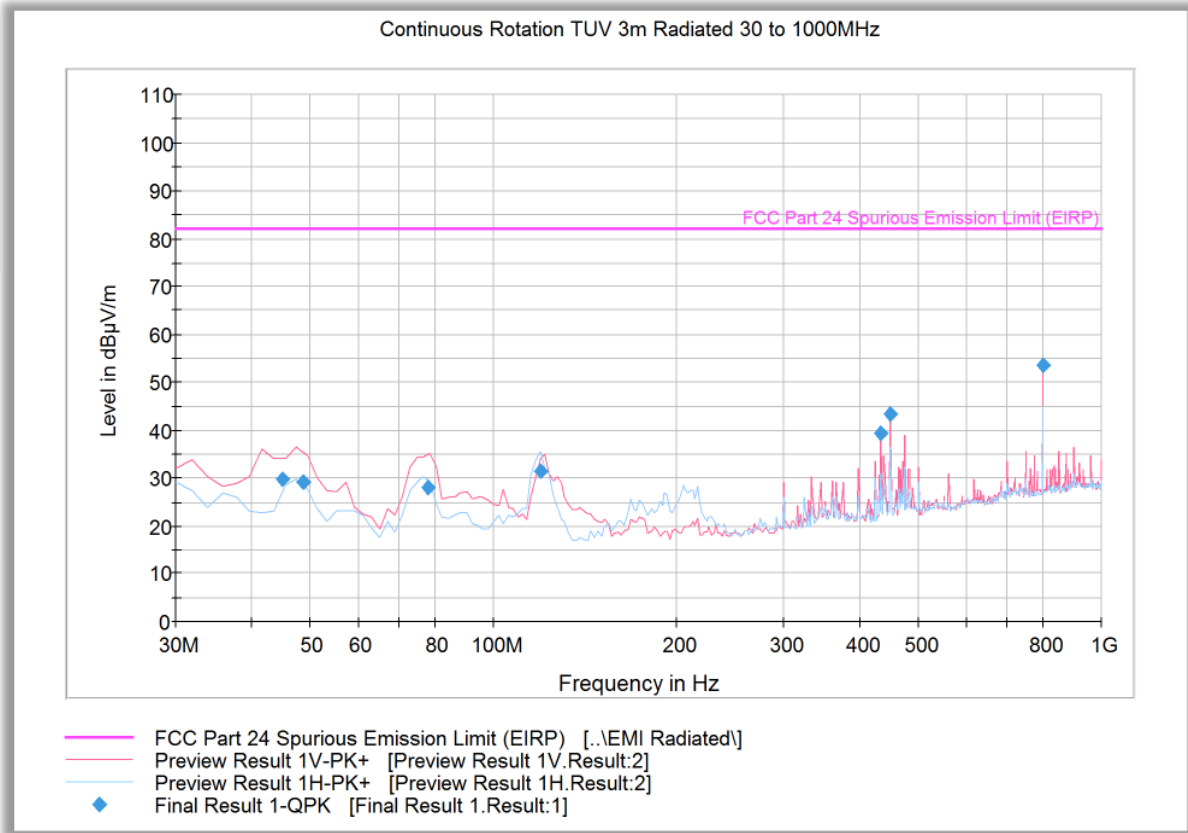
Peak Data

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
2400.193587	50.9	1000.0	1000.000	102.7	H	201.0	-1.2	33.5	84.4
3175.360721	40.8	1000.0	1000.000	151.2	H	2.0	0.9	43.6	84.4
3999.795992	46.5	1000.0	1000.000	314.2	H	332.0	2.4	37.9	84.4
4786.163126	42.1	1000.0	1000.000	242.4	H	264.0	3.5	42.3	84.4
6958.923848	45.5	1000.0	1000.000	202.5	V	241.0	6.3	38.9	84.4
10199.796794	51.3	1000.0	1000.000	202.5	V	132.0	9.9	33.1	84.4
17596.182365	51.2	1000.0	1000.000	152.2	V	11.0	17.6	33.2	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)
2400.193587	47.4	1000.0	1000.000	102.7	H	201.0	-1.2	37.0	84.4
3175.360721	28.3	1000.0	1000.000	151.2	H	2.0	0.9	56.1	84.4
3999.795992	39.5	1000.0	1000.000	314.2	H	332.0	2.4	44.9	84.4
4786.163126	29.3	1000.0	1000.000	242.4	H	264.0	3.5	55.1	84.4
6958.923848	32.5	1000.0	1000.000	202.5	V	241.0	6.3	51.9	84.4
10199.796794	45.3	1000.0	1000.000	202.5	V	132.0	9.9	39.1	84.4
17596.182365	38.5	1000.0	1000.000	152.2	V	11.0	17.6	45.9	84.4

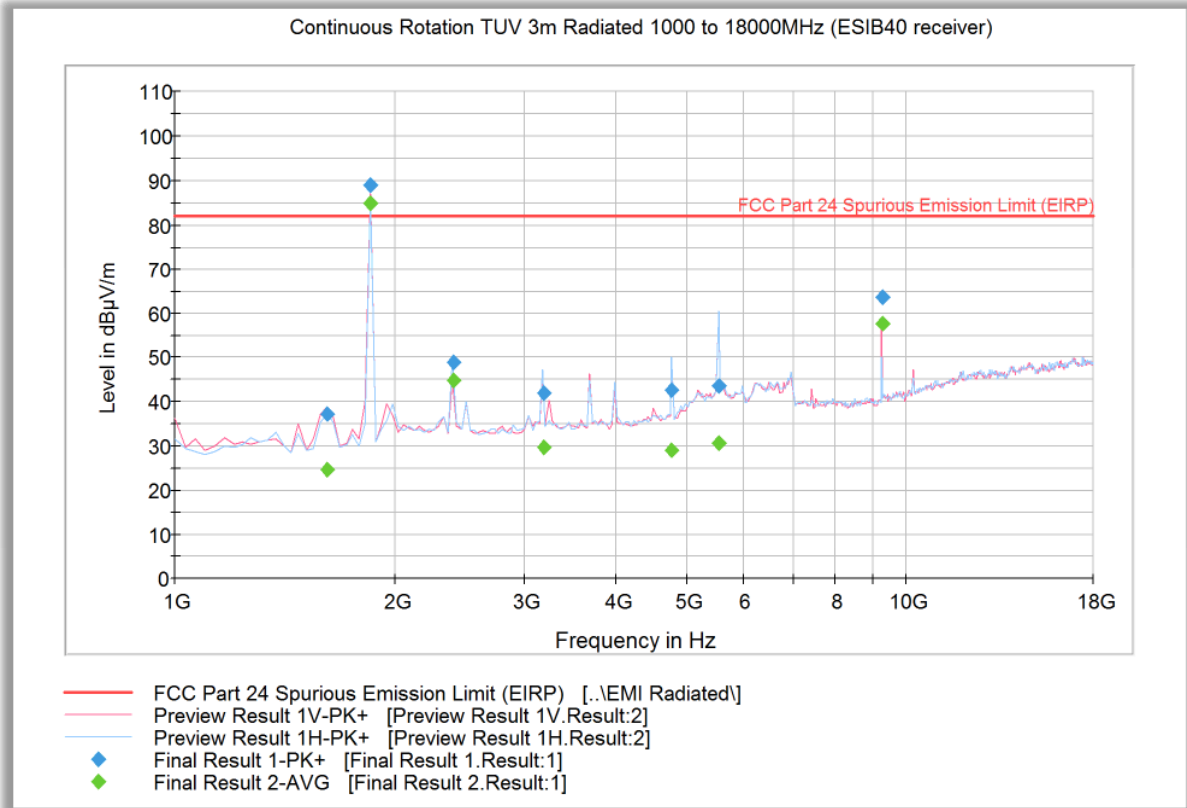
2.8.17 Radiated Emission Test Results Below 1GHz_Worst Case Configuration_LTE Band 2_10 MHz Bandwidth_High Channel_1 RB 0 offset_QPSK



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)
45.023327	29.8	1000.0	120.000	100.0	V	205.0	-13.4	52.4	82.2
48.614990	29.2	1000.0	120.000	105.0	V	15.0	-14.7	53.0	82.2
78.277194	28.1	1000.0	120.000	159.0	V	196.0	-17.1	54.1	82.2
119.258838	31.7	1000.0	120.000	246.0	H	14.0	-14.7	50.6	82.2
433.328657	39.4	1000.0	120.000	100.0	V	31.0	-3.9	42.9	82.2
449.999760	43.4	1000.0	120.000	171.0	V	125.0	-3.1	38.9	82.2
800.003447	53.5	1000.0	120.000	100.0	V	169.0	3.6	28.8	82.2

2.8.18 Radiated Emission Test Results Above 1GHz_Worst Case Configuration_LTE Band 2_10 MHz Bandwidth_Low Channel_1 RB 0 offset_QPSK



Peak Data

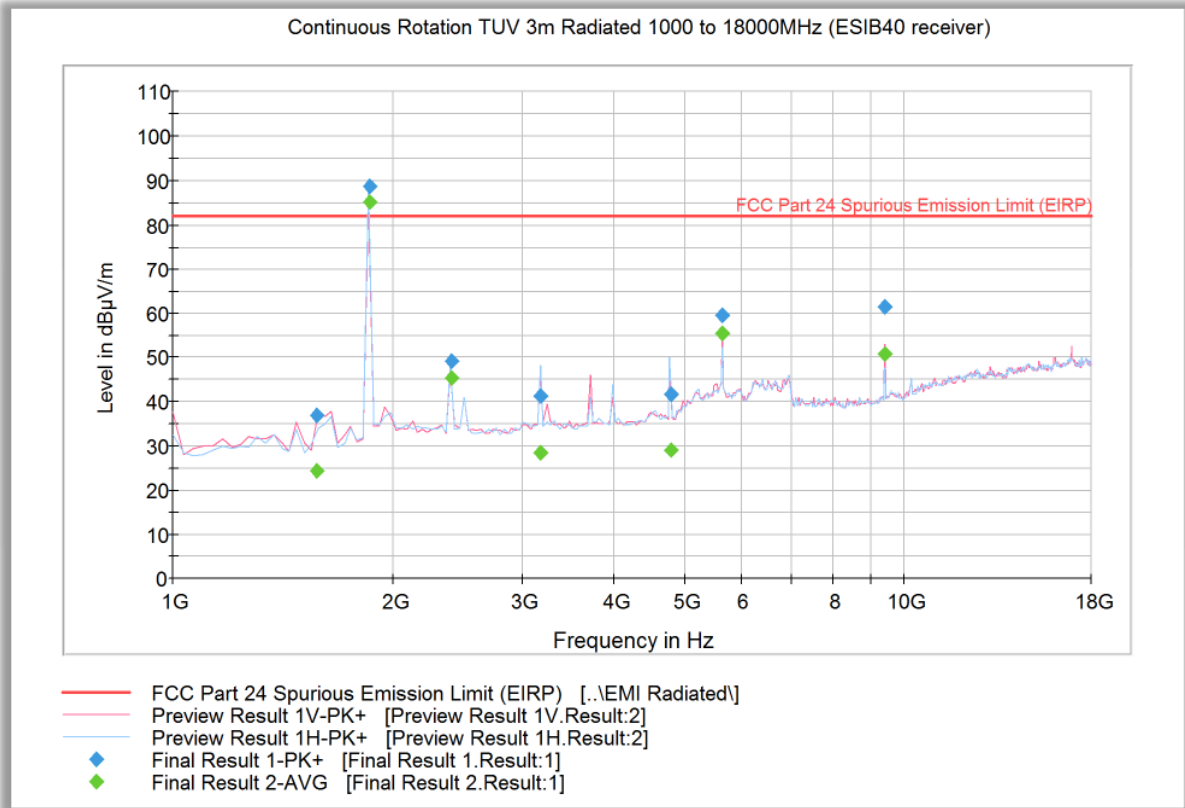
Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1615.426453	37.3	1000.0	1000.000	175.6	V	23.0	-5.6	44.9	82.2
1850.703407	88.9	1000.0	1000.000	327.2	V	184.0	-2.9	Fundamental Carrier*	
2400.193587	49.0	1000.0	1000.000	103.7	H	222.0	-1.2	33.2	82.2
3187.760721	42.1	1000.0	1000.000	116.7	H	12.0	0.9	40.1	82.2
4782.163126	42.6	1000.0	1000.000	151.6	H	258.0	3.5	39.6	82.2
5526.462124	43.5	1000.0	1000.000	314.2	H	112.0	4.8	38.7	82.2
9253.088978	63.6	1000.0	1000.000	250.5	V	251.0	8.4	18.6	82.2

Average Data

Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1615.426453	24.7	1000.0	1000.000	175.6	V	23.0	-5.6	57.5	82.2
1850.703407	84.9	1000.0	1000.000	327.2	V	184.0	-2.9	Fundamental Carrier*	
2400.193587	44.9	1000.0	1000.000	103.7	H	222.0	-1.2	37.3	82.2
3187.760721	29.8	1000.0	1000.000	116.7	H	12.0	0.9	52.4	82.2
4782.163126	29.2	1000.0	1000.000	151.6	H	258.0	3.5	53	82.2
5526.462124	30.6	1000.0	1000.000	314.2	H	112.0	4.8	51.6	82.2
9253.088978	57.6	1000.0	1000.000	250.5	V	251.0	8.4	24.6	82.2

* This is the fundamental frequency 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_10 MHz Bandwidth_Middle Channel_1 RB 0 offset_QPSK



Peak Data

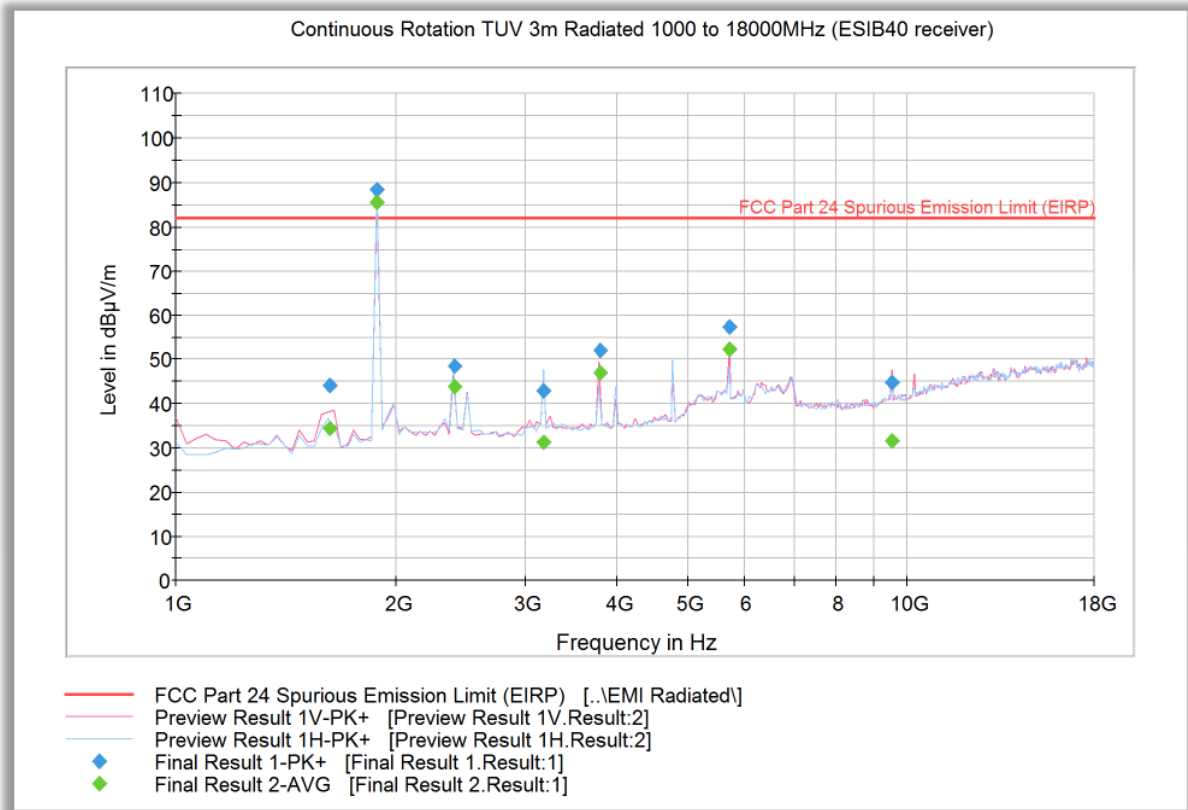
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1577.358317	37.0	1000.0	1000.000	193.5	V	-3.0	-5.8	45.2	82.2
1855.903407	88.8	1000.0	1000.000	327.2	H	305.0	-2.9	Fundamental Carrier*	
2400.193587	49.3	1000.0	1000.000	103.7	V	343.0	-1.2	32.9	82.2
3183.360721	41.4	1000.0	1000.000	116.7	H	32.0	0.9	40.8	82.2
4787.363126	41.7	1000.0	1000.000	242.4	H	99.0	3.5	40.5	82.2
5626.666533	59.5	1000.0	1000.000	250.5	V	20.0	5.0	22.7	82.2
9378.161523	61.5	1000.0	1000.000	220.4	V	84.0	8.5	20.7	82.2

Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1577.358317	24.6	1000.0	1000.000	193.5	V	-3.0	-5.8	57.6	82.2
1855.903407	85.1	1000.0	1000.000	327.2	H	305.0	-2.9	Fundamental Carrier*	
2400.193587	45.4	1000.0	1000.000	103.7	V	343.0	-1.2	36.8	82.2
3183.360721	28.4	1000.0	1000.000	116.7	H	32.0	0.9	53.8	82.2
4787.363126	29.3	1000.0	1000.000	242.4	H	99.0	3.5	52.9	82.2
5626.666533	55.4	1000.0	1000.000	250.5	V	20.0	5.0	26.8	82.2
9378.161523	50.9	1000.0	1000.000	220.4	V	84.0	8.5	31.3	82.2

* This is the fundamental frequency 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_10 MHz Bandwidth_High Channel_1 RB 0 offset_QPSK



Peak Data

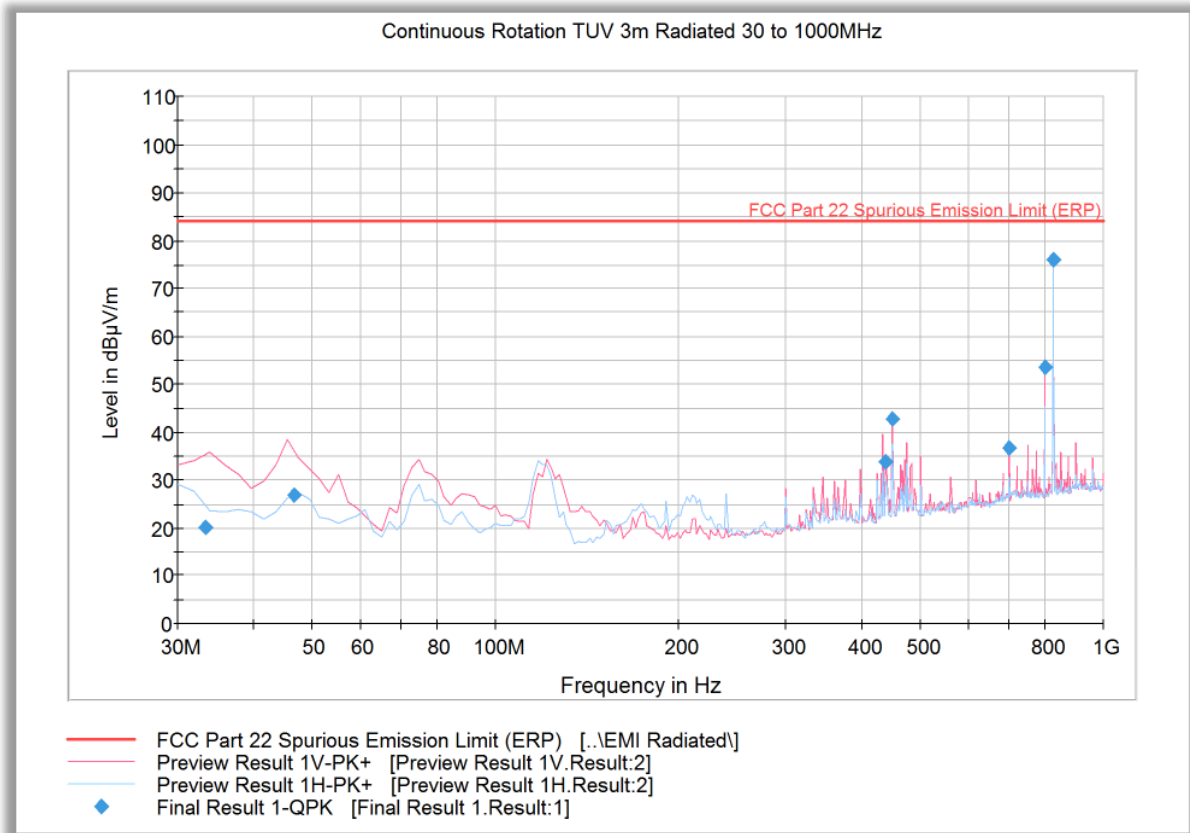
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1625.026453	44.1	1000.0	1000.000	184.5	V	321.0	-5.6	38.1	82.2
1884.771543	88.2	1000.0	1000.000	316.2	H	311.0	-2.7	Fundamental Carrier*	
2400.193587	48.7	1000.0	1000.000	99.7	V	348.0	-1.2	33.5	82.2
3187.360721	42.8	1000.0	1000.000	200.5	V	-2.0	0.9	39.4	82.2
3800.987174	52.0	1000.0	1000.000	304.2	V	24.0	2.1	30.2	82.2
5701.602806	57.5	1000.0	1000.000	338.1	V	23.0	4.8	24.7	82.2
9513.634068	45.0	1000.0	1000.000	200.5	V	326.0	8.6	37.2	82.2

Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1625.026453	34.4	1000.0	1000.000	184.5	V	321.0	-5.6	47.8	82.2
1884.771543	85.4	1000.0	1000.000	316.2	H	311.0	-2.7	Fundamental Carrier*	
2400.193587	43.7	1000.0	1000.000	99.7	V	348.0	-1.2	38.5	82.2
3187.360721	31.3	1000.0	1000.000	200.5	V	-2.0	0.9	50.9	82.2
3800.987174	46.9	1000.0	1000.000	304.2	V	24.0	2.1	35.3	82.2
5701.602806	52.2	1000.0	1000.000	338.1	V	23.0	4.8	30	82.2
9513.634068	31.7	1000.0	1000.000	200.5	V	326.0	8.6	50.5	82.2

* This is the fundamental frequency 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

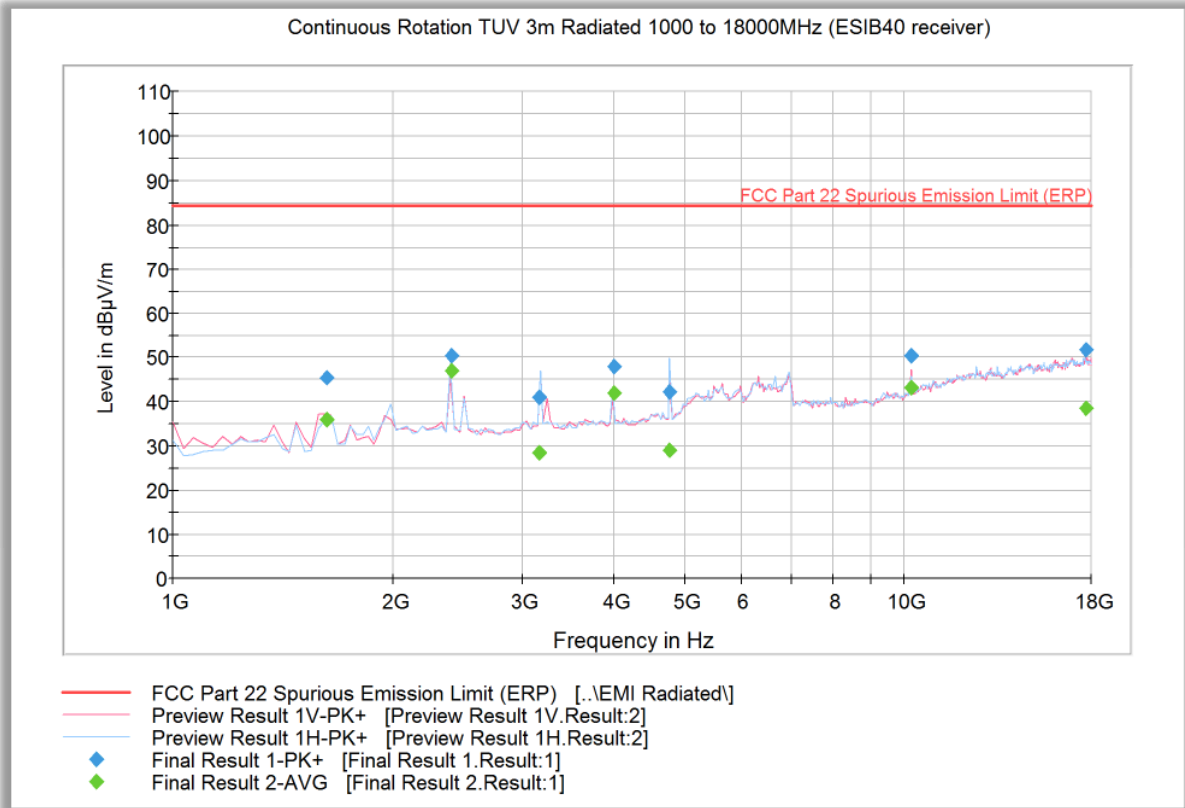


Quasi Peak Data

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
33.247776	20.4	1000.0	120.000	100.0	V	198.0	-9.2	64.0	84.4
46.751102	26.9	1000.0	120.000	159.0	V	76.0	-14.0	57.5	84.4
437.496433	33.9	1000.0	120.000	188.0	V	130.0	-3.8	50.5	84.4
449.999760	42.8	1000.0	120.000	171.0	V	129.0	-3.1	41.6	84.4
700.001283	36.8	1000.0	120.000	109.0	V	95.0	2.6	47.6	84.4
800.003447	53.5	1000.0	120.000	100.0	V	179.0	3.6	30.9	84.4
826.753988	76.1	1000.0	120.000	100.0	H	198.0	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



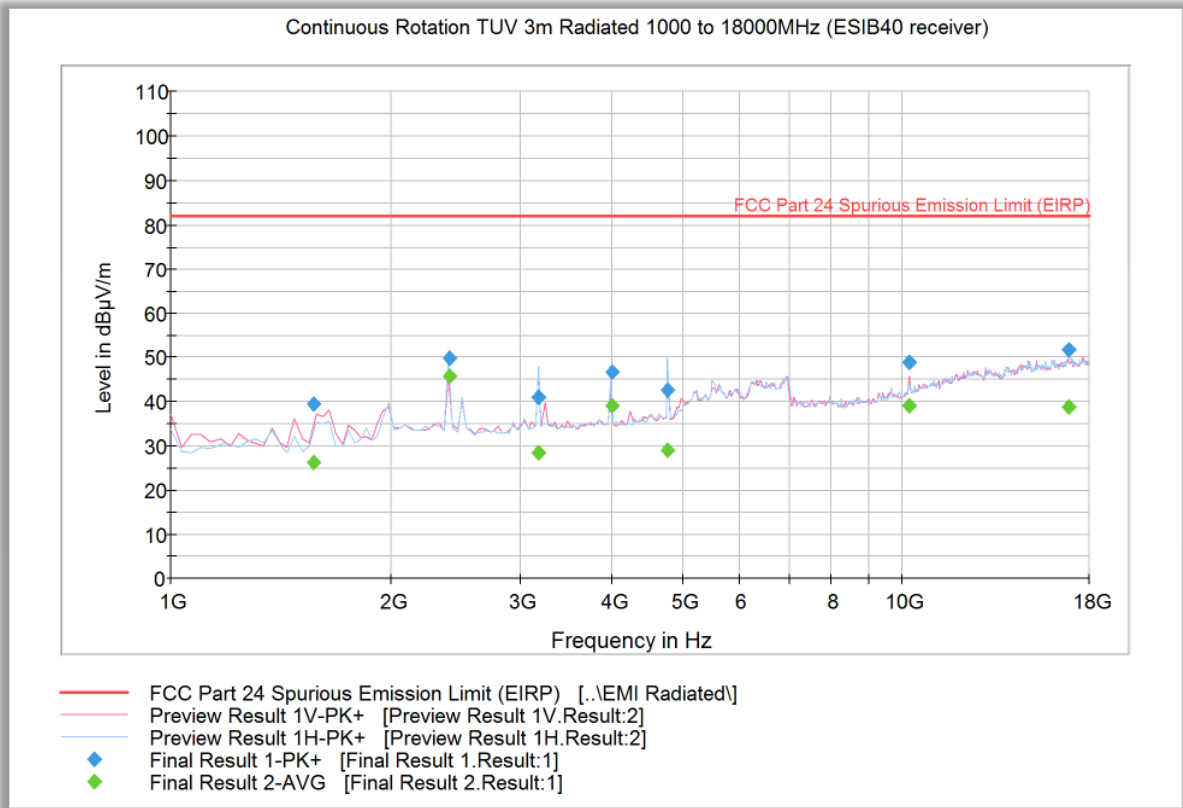
Peak Data

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1625.026453	45.4	1000.0	1000.000	250.5	V	22.0	-5.6	39.0	84.4
2400.193587	50.5	1000.0	1000.000	103.7	H	201.0	-1.2	33.9	84.4
3170.560721	41.1	1000.0	1000.000	132.7	H	-2.0	0.9	43.3	84.4
4000.195992	48.1	1000.0	1000.000	151.6	H	64.0	2.4	36.3	84.4
4775.763126	42.2	1000.0	1000.000	203.5	H	64.0	3.5	42.2	84.4
10200.196794	50.4	1000.0	1000.000	175.6	V	133.0	9.9	34.0	84.4
17692.786774	51.6	1000.0	1000.000	315.1	V	278.0	17.7	32.8	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)
1625.026453	36.1	1000.0	1000.000	250.5	V	22.0	-5.6	48.3	84.4
2400.193587	46.9	1000.0	1000.000	103.7	H	201.0	-1.2	37.5	84.4
3170.560721	28.4	1000.0	1000.000	132.7	H	-2.0	0.9	56.0	84.4
4000.195992	42.0	1000.0	1000.000	151.6	H	64.0	2.4	42.4	84.4
4775.763126	29.3	1000.0	1000.000	203.5	H	64.0	3.5	55.1	84.4
10200.196794	43.2	1000.0	1000.000	175.6	V	133.0	9.9	41.2	84.4
17692.786774	38.6	1000.0	1000.000	315.1	V	278.0	17.7	45.8	84.4

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



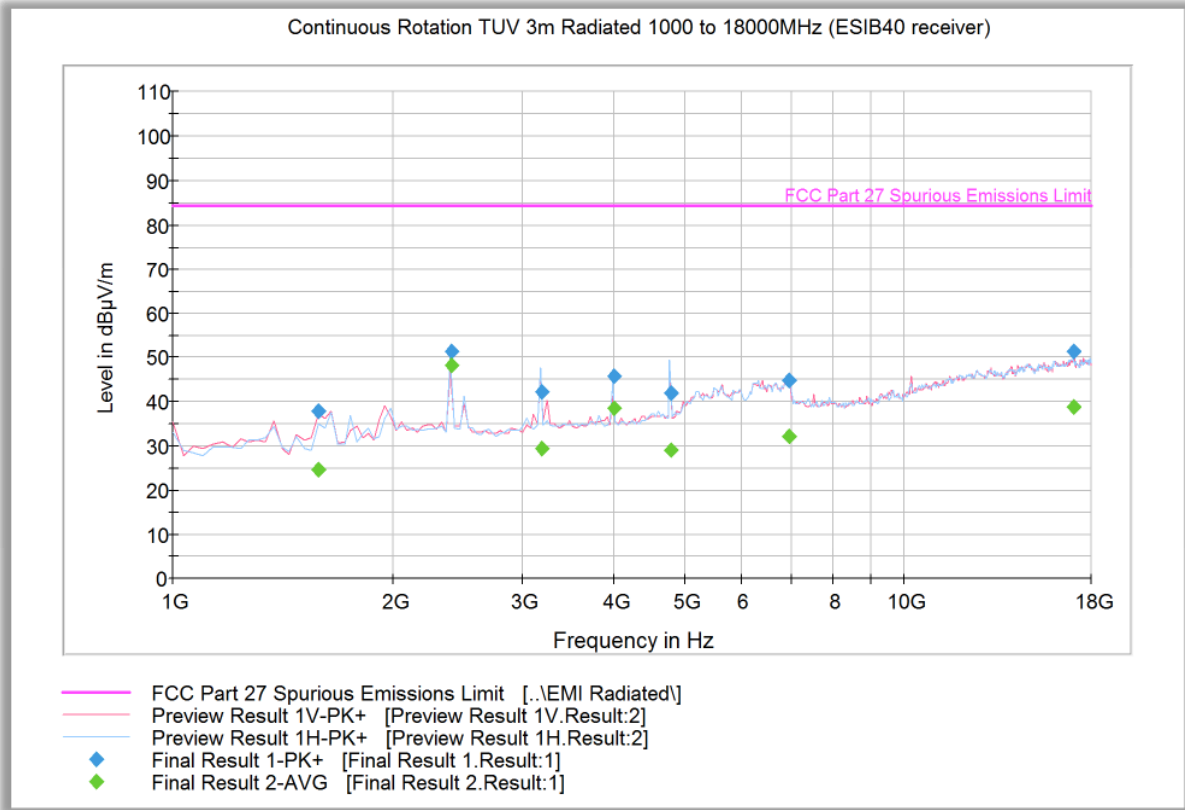
Peak Data

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1570.558317	39.3	1000.0	1000.000	252.3	V	199.0	-5.9	45.1	84.4
2400.193587	49.8	1000.0	1000.000	103.7	H	221.0	-1.2	34.6	84.4
3180.560721	41.0	1000.0	1000.000	116.7	H	43.0	0.9	43.4	84.4
4000.195992	46.8	1000.0	1000.000	315.2	V	25.0	2.4	37.6	84.4
4776.563126	42.6	1000.0	1000.000	193.5	H	278.0	3.5	41.8	84.4
10199.796794	48.9	1000.0	1000.000	233.4	V	232.0	9.9	35.5	84.4
16845.883367	51.6	1000.0	1000.000	102.7	H	67.0	17.9	32.8	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)
1570.558317	26.4	1000.0	1000.000	252.3	V	199.0	-5.9	58.0	84.4
2400.193587	45.7	1000.0	1000.000	103.7	H	221.0	-1.2	38.7	84.4
3180.560721	28.4	1000.0	1000.000	116.7	H	43.0	0.9	56.0	84.4
4000.195992	39.0	1000.0	1000.000	315.2	V	25.0	2.4	45.4	84.4
4776.563126	29.2	1000.0	1000.000	193.5	H	278.0	3.5	55.2	84.4
10199.796794	39.2	1000.0	1000.000	233.4	V	232.0	9.9	45.2	84.4
16845.883367	39.0	1000.0	1000.000	102.7	H	67.0	17.9	45.4	84.4

2.8.24 Radiated Emission Test Results Above 1GHz_Worst Case Configuration_LTE Band 5_5 MHz Bandwidth High 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)
1584.558317	37.8	1000.0	1000.000	184.5	V	-2.0	-5.8	46.6	84.4
2400.193587	51.3	1000.0	1000.000	103.7	H	197.0	-1.2	33.1	84.4
3187.760721	42.2	1000.0	1000.000	222.4	H	40.0	0.9	42.2	84.4
4000.195992	45.6	1000.0	1000.000	303.2	H	331.0	2.4	38.8	84.4
4784.163126	41.9	1000.0	1000.000	222.4	H	99.0	3.5	42.5	84.4
6955.723848	45.0	1000.0	1000.000	138.7	H	311.0	6.3	39.4	84.4
16997.824048	51.4	1000.0	1000.000	103.7	V	239.0	17.7	33.0	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)
1584.558317	24.6	1000.0	1000.000	184.5	V	-2.0	-5.8	59.8	84.4
2400.193587	48.4	1000.0	1000.000	103.7	H	197.0	-1.2	36.0	84.4
3187.760721	29.5	1000.0	1000.000	222.4	H	40.0	0.9	54.9	84.4
4000.195992	38.5	1000.0	1000.000	303.2	H	331.0	2.4	45.9	84.4
4784.163126	29.3	1000.0	1000.000	222.4	H	99.0	3.5	55.1	84.4
6955.723848	32.4	1000.0	1000.000	138.7	H	311.0	6.3	52.0	84.4
16997.824048	39.0	1000.0	1000.000	103.7	V	239.0	17.7	45.4	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, Clause 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: AZ280418A00044 / Test Configuration A

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

July 11, 2018 / 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 25.7 °C
 Relative Humidity 54.1 %
 ATM Pressure 98.7 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 4.3VDC 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)*
3.7	-30	16.47	0.0088	± 0.1
	-20	16.76	0.0089	± 0.1
	-10	16.92	0.009	± 0.1
	0	16.24	0.0086	± 0.1
	+10	15.94	0.0085	± 0.1
	+20	17.02	0.009	± 0.1
	+30	18.3	0.0097	± 0.1
	+40	16.58	0.0088	± 0.1
	+50	17.02	0.009	± 0.1
3.3	20	17.72	0.009	± 0.1
4.3		16.54	0.008	± 0.1

* Limit for WCDM Band 2 is according to 3GPP TS 25 101 V11.14.0

The frequency stability of the EUT is sufficient to keep it within the authorised frequency ranges at any temperature interval and voltage variations across the measured range.

WCDMA Band 5 – QPSK 5 MHz BW-Middle Channel 836.5 MHz				
Voltage (VDC)	Temperature (°C)	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
3.7	-30	-2.99	-0.0036	± 2.5
	-20	-3.81	-0.0046	± 2.5
	-10	-3.62	-0.0043	± 2.5
	0	-3.73	-0.0045	± 2.5
	+10	-2.82	-0.0034	± 2.5
	+20	-3.58	-0.0043	± 2.5
	+30	-3.75	-0.0045	± 2.5
	+40	-4.1	-0.0049	± 2.5
	+50	-2.8	-0.0034	± 2.5
3.3	20	-3.6	-0.0043	± 2.5
4.3		-3.07	-0.0037	± 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)*
3.7	-30	24.06	0.0128	± 0.1
	-20	21.62	0.0115	± 0.1
	-10	22.72	0.0121	± 0.1
	0	22.07	0.0117	± 0.1
	+10	22.16	0.0118	± 0.1
	+20	21.09	0.0112	± 0.1
	+30	19.34	0.0103	± 0.1
	+40	19.37	0.0103	± 0.1
	+50	18.08	0.0096	± 0.1
3.3	20	17.34	0.0092	± 0.1
4.3		17.48	0.0093	± 0.1

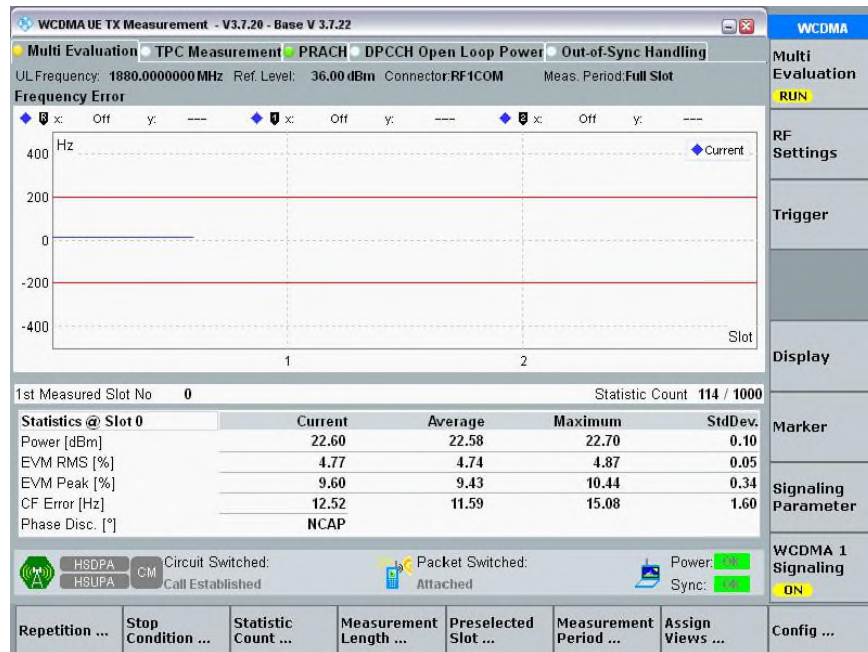
* Limit for LTE Band 2 is according to 3GPP TS 36 101 V11.25.0

The frequency stability of the EUT is sufficient to keep it within the authorised frequency ranges at any temperature interval and voltage variations across the measured range.

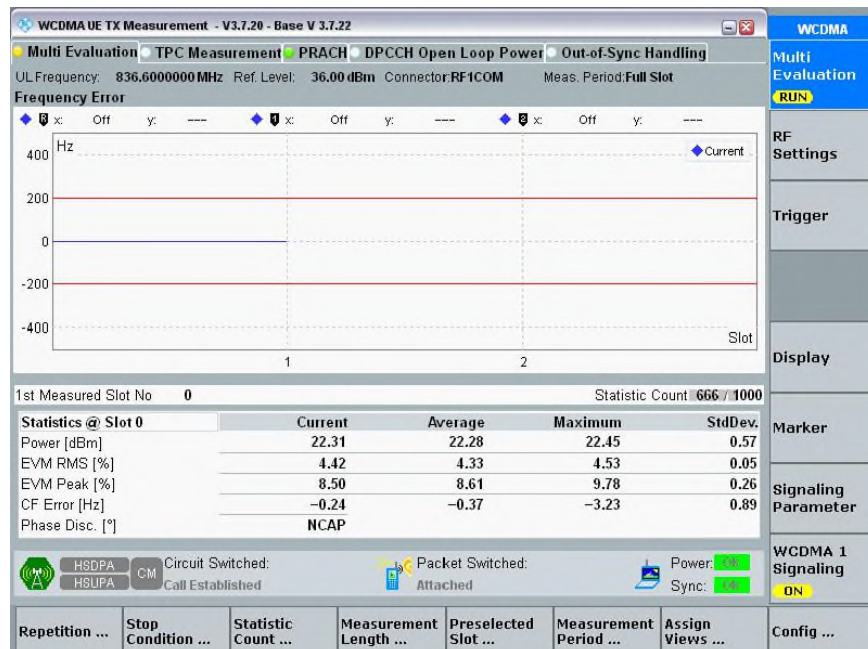


LTE Band 5 – QPSK 5 MHz BW-Middle Channel 836.5 MHz				
Voltage (VDC)	Temperature (°C)	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
3.7	-30	-10.83	-0.013	± 2.5
	-20	-8.33	-0.01	± 2.5
	-10	-9.11	-0.0109	± 2.5
	0	-8.78	-0.0105	± 2.5
	+10	-9.44	-0.0113	± 2.5
	+20	-11.59	-0.0139	± 2.5
	+30	-10.46	-0.0125	± 2.5
	+40	-10.5	-0.0126	± 2.5
	+50	-9.83	-0.0118	± 2.5
3.3	20	8.98	-0.0107	± 2.5
4.3		-7.7	-0.0092	± 2.5

2.9.9 Sample Test plot



WCDMA Band 2_Middle Channel @20°C



WCDMA Band 5_Middle Channel @20°C

CMW 500 V 3.7.22 - LTE Measurement - V3.7.30 - TX Measurement

Multi Evaluation

PRACH

SRS

FDD Freq: 1880.0 MHz Ref. Level: 40.70 dBm BW: 5.0 MHz CP: Normal Meas Subfr/Slot: 0 / All

TX Measurement

Detected Allocation

NoRB:25OffsetRB:0

	Current	Average	Extreme	StdDev	
EVM RMS [%] I/h	3.87 4.03	3.76 3.91	3.92 4.07	0.12 0.13	
EVM Peak [%] I/h	29.98 30.03	26.94 30.17	31.04 31.83	3.35 0.48	
EVM DMRS [%] I/h	2.47 2.38	2.43 2.59	2.64 2.92	0.09 0.16	
MErr RMS [%] I/h	3.34 3.50	3.27 3.41	3.37 3.52	0.09 0.09	
MErr Peak [%] I/h	-29.72 -29.78	26.77 29.77	-30.82 -31.05	3.32 0.48	
MErr DMRS [%] I/h	2.01 1.94	1.97 2.06	2.11 2.26	0.06 0.09	
PhErr RMS [°] I/h	1.13 1.17	1.08 1.11	1.17 1.20	0.05 0.05	
PhErr Peak [°] I/h	-6.10 7.72	7.05 7.70	-8.68 -9.78	0.61 0.45	
PhErr DMRS [°] I/h	0.82 0.78	0.80 0.89	0.99 1.14	0.04 0.09	
IQ Offset [dBc]	-50.55	-51.45	-48.87	0.86	
IQ Gain Imbalance [dB]	-0.10	-0.11	-0.13	0.01	
IQ Quadrature Error [°]	-0.38	-0.38	-0.44	0.02	
Freq Error [Hz]	9.96	7.70	21.09	3.26	
Timing Error [Ts]	1.58	1.81	6.33	0.17	
OBW [MHz]	4.43	4.43	4.44	0.01	
	Current	Average	Min	Max	StdDev
TX Power [dBm]	21.57	21.57	21.47	21.62	0.01
Peak Power [dBm]	26.38	26.33	26.79	26.74	0.12

Statistic Count

Out of Tolerance

Detected Modulation

Detected Channel Type

View Filter Throughput

20 / 20

0.00 %

QPSK

PUSCH

100.0 %

PS: Connection Established

RRC State Connected

LTE Signaling

Run

Repetition ...

Stop Condition ...

Statistic Count ...

Channel Bandwidth ...

Measurement Subframes ...

Assign Views

Config ...

LTE Band 2_5 MHz Bandwidth_Middle Channel @20°C

CMW 500 V 3.7.22 - LTE Measurement - V3.7.30 - TX Measurement

Multi Evaluation

PRACH

SRS

FDD Freq.: 836.5 MHz Ref. Level: 40.30 dBm BW: 5.0 MHz CP: Normal Meas Subfr/Slot: 0 / All

TX Measurement

Detected Allocation

NoRB:

25

OffsetRB:

0

	Current		Average		Extreme		StdDev	
EVM RMS [%] I/h	3.27	3.41	3.39	3.55	3.54	3.70	0.12	0.13
EVM Peak [%] I/h	22.54	28.81	26.19	29.90	30.86	30.89	3.84	0.46
EVM DMRS [%] I/h	2.00	2.43	2.08	2.26	2.24	2.53	0.10	0.19
MErr RMS [%] I/h	2.88	3.03	3.00	3.15	3.12	3.28	0.11	0.11
MErr Peak [%] I/h	-22.34	-28.31	26.04	29.58	-30.73	-30.76	3.89	0.58
MErr DMRS [%] I/h	1.67	1.93	1.71	1.82	1.83	1.98	0.06	0.10
PhErr RMS [°] I/h	0.90	0.92	0.92	0.95	0.97	1.01	0.03	0.04
PhErr Peak [°] I/h	-6.89	-7.71	6.46	7.20	-8.11	-8.92	0.72	0.57
PhErr DMRS [°] I/h	0.63	0.85	0.67	0.76	0.76	0.91	0.05	0.10
IQ Offset [dBc]	-51.43		-51.25		-49.15		0.58	
IQ Gain Imbalance [dB]	-0.09		-0.08		-0.10		0.01	
IQ Quadrature Error [°]	-0.01		-0.02		-0.08		0.02	
Freq Error [Hz]	-10.93		-4.82		-11.59		2.32	
Timing Error [Ts]	4.38		4.43		5.14		0.15	
OBW [MHz]	4.43		4.43		4.44		0.01	
		Current		Average	Min	Max		StdDev
TX Power [dBm]	21.62		21.61		21.54	21.66	0.00	
Peak Power [dBm]	26.78		26.74		26.53	26.87	0.09	

Statistic Count

Out of Tolerance

Detected Modulation

Detected Channel Type

View Filter Throughput

20 / 20

0.00 %

QPSK

PUSCH

100.0 %

PS: Connection Established

RRC State Connected

LTE Signaling

Run

Repetition ...

Stop Condition ...

Statistic Count ...

Channel Bandwidth ...

Measurement Subframes ...

Assign Views

Config ...

LTE Band 5_5 MHz Bandwidth_Middle Channel @20°C



2.10 RECEIVER SPURIOUS EMISSIONS

2.10.1 Specification Reference

RSS-132, Clause 5.6
RSS-133, Clause 6.6
RSS-GEN, Clause 7.4

2.10.2 Standard Applicable

Receiver spurious emissions shall comply with the limits specified in RSS-Gen:

RSS-Gen, Clause 7.4

If the receiver has a detachable antenna of known impedance, an antenna-conducted spurious emissions measurement is permitted as an alternative to radiated measurement. However, the radiated method of section 7.3 is preferred.

The antenna-conducted test shall be performed with the antenna disconnected and with the receiver antenna port connected to a measuring instrument having equal input impedance to that specified for the antenna. The RF cable connecting the receiver under test to the measuring instrument shall also have the same impedance to that specified for the receiver's antenna.

The spurious emissions from the receiver at any discrete frequency, measured at the antenna port by the antenna-conducted method, shall not exceed 2 nW (-57dBm) in the frequency range 30-1000 MHz and 5 nW (-53dBm) above 1 GHz.

2.10.3 Equipment Under Test and Modification State

Serial No: AZ280418A00044 / Test Configuration C

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

July 26, 2018 / 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

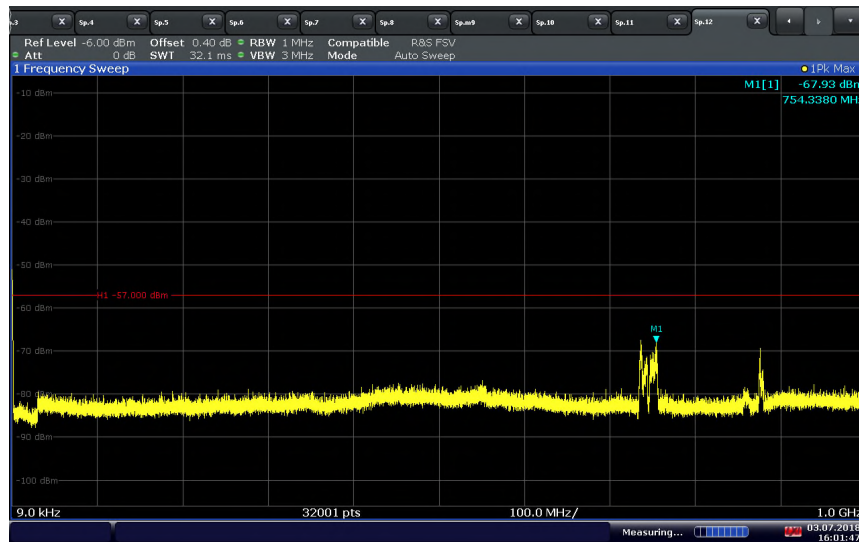
Ambient Temperature	25.9 °C
Relative Humidity	56.1 %
ATM Pressure	99.7 kPa

2.10.7 Additional Observations

- This is a conducted test per Clause 7.4 of RSS-Gen.
- Test performed on RX only antenna port of the EUT.

2.10.8 Test Results

Receiver Spurious below 1 GHz



16:01:48 03.07.2018

Receiver Spurious Above 1 GHz



12:24:30 07.08.2018



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	12/14/17	12/14/18
-	Wideband Radio Communication Tester	CMW 500	158164	Rhode & Schwarz	04/04/18	04/04/19
8825	20dB Attenuator	46-20-34	BK5773	Weinschel Corp.	Verified by 7608 and 7582	
-	10dB Attenuator	VAT-10W2+2W	N/A	MCL	Verified by 7608 and 7582	
Radiated Test Setup						
7582	Signal/Spectrum Analyzer	FSW26	101614	Rhode & Schwarz	12/14/17	12/14/18
7608	Vector Signal Generator	SMBV100A	259021	Rhode & Schwarz	09/19/17	09/19/19
1002	Bilog Antenna	3142C	00058717	EMCO	11/20/17	11/20/18
7575	Double-ridged waveguide horn antenna	3117	00155511	EMCO	06/16/18	06/16/20
1193	Pre-amplifier	PAM-0202	185	A.H. Systems, Inc.	04/11/18	04/11/19
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
8628	Pre-amplifier	QLI-01182835-JO	8986002	Quinstar	02/06/18	02/06/19
-	UXM Wireless Test Set	E7515A	MY56180375	Keysight	For Signalling only	
-	Wideband Radio Communication Tester	CMW 500	158164	Rhode & Schwarz	For Signalling only	
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
11312	Mini Environmental Quality Meter	850027	CF099-56010-340	Sper Scientific	02/26/18	02/26/19
	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														
<table> <tr> <td colspan="3">Combined standard uncertainty</td><td>Normal</td><td>2.85</td><td>dB</td><td></td></tr> <tr> <td colspan="3">Expanded uncertainty</td><td>Normal, k=2</td><td>5.70</td><td>dB</td><td></td></tr> </table>							Combined standard uncertainty			Normal	2.85	dB		Expanded uncertainty			Normal, k=2	5.70	dB	
Combined standard uncertainty			Normal	2.85	dB															
Expanded uncertainty			Normal, k=2	5.70	dB															

3.2.4 Conducted Measurements

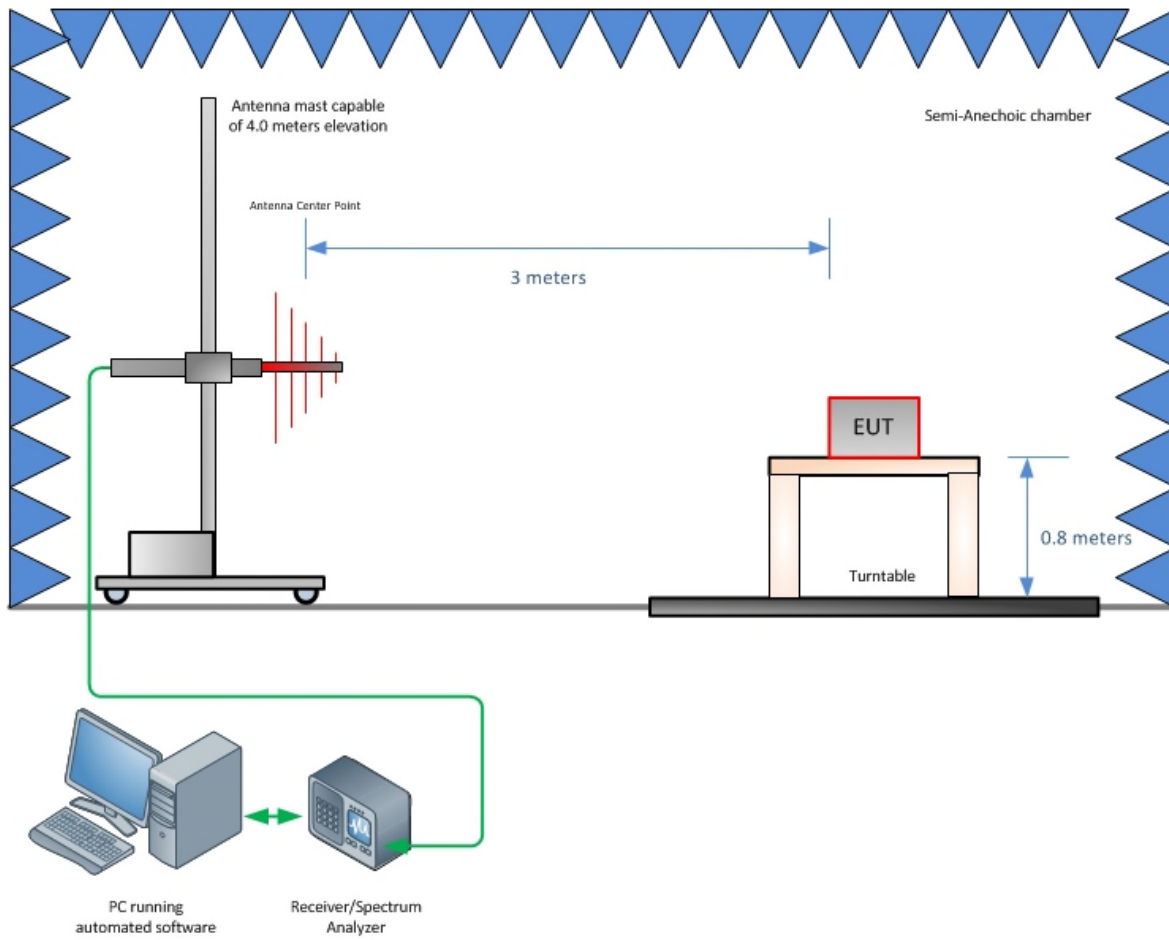
	Input Quantity (Contribution) X_i	Value	Prob. Dist.	Divisor	$u_i(x)$	$u_i(x)^2$														
1	Receiver reading	0.10 dB	Normal, k=1	1.000	0.10	0.01														
2	LISN-receiver attenuation	0.10 dB	Normal, k=2	2.000	0.05	0.00														
3	LISN voltage division factor	0.30 dB	Normal, k=2	2.000	0.15	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																			
<table> <tr> <td colspan="3">Combined standard uncertainty</td><td>Normal</td><td>1.66</td><td>dB</td><td></td></tr> <tr> <td colspan="3">Expanded uncertainty</td><td>Normal, k=2</td><td>3.31</td><td>dB</td><td></td></tr> </table>							Combined standard uncertainty			Normal	1.66	dB		Expanded uncertainty			Normal, k=2	3.31	dB	
Combined standard uncertainty			Normal	1.66	dB															
Expanded uncertainty			Normal, k=2	3.31	dB															



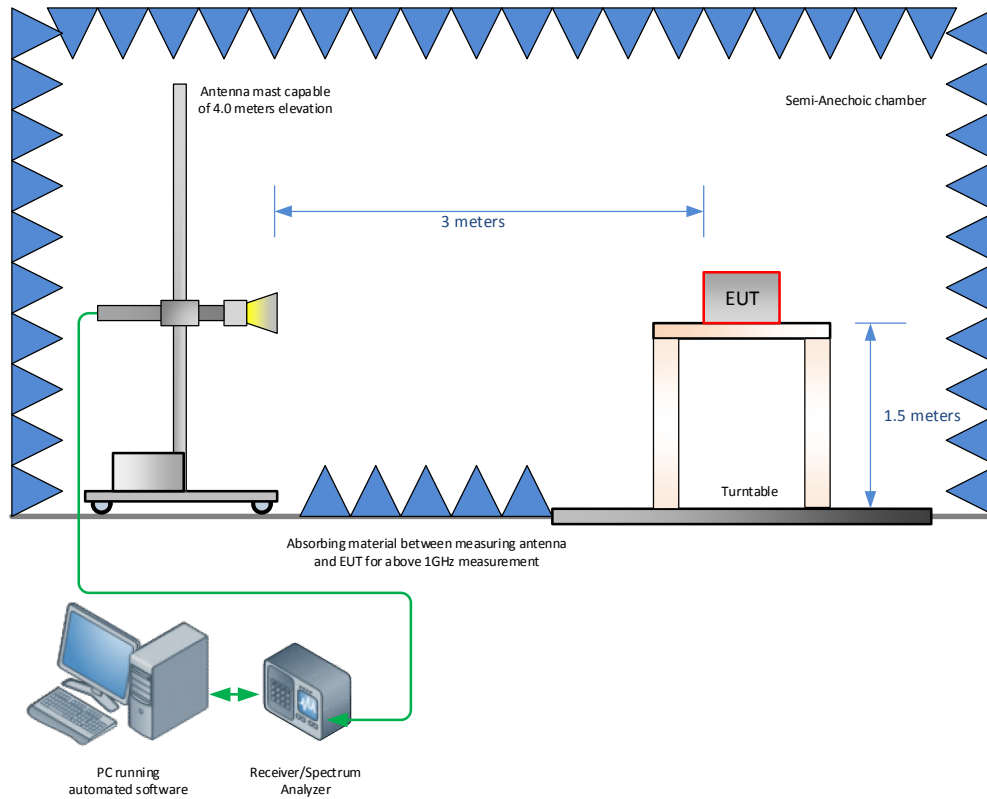
SECTION 4

DIAGRAM OF TEST SETUP

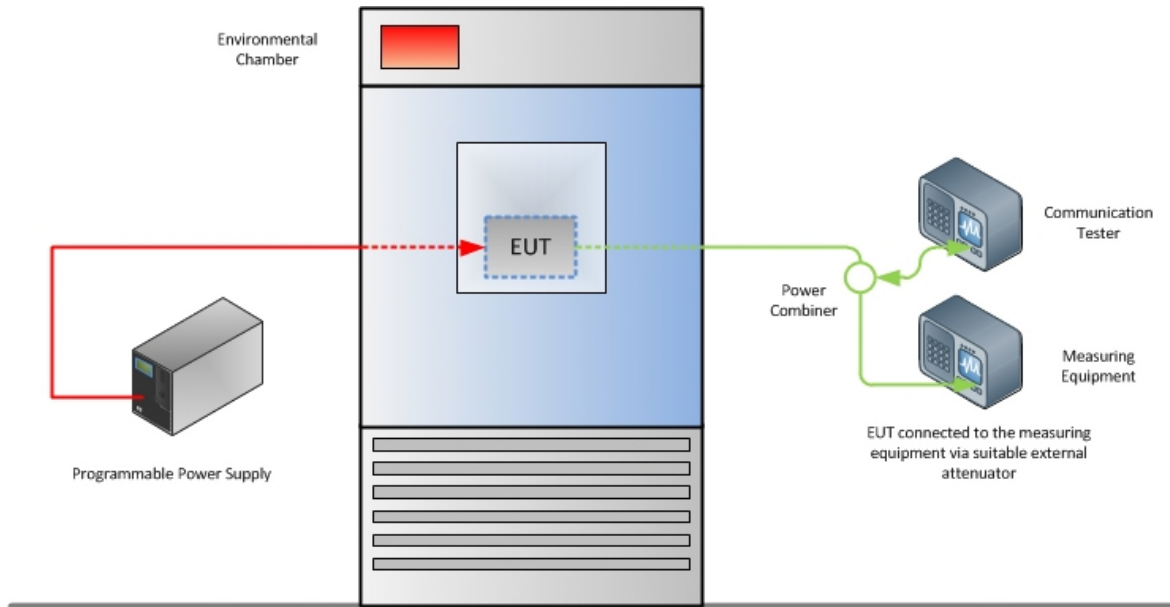
4.1 TEST SETUP DIAGRAM



Radiated Emission Test Setup (Below 1GHz)



Radiated Emission Test Setup (Above 1GHz)



Frequency Stability Test Configuration



SECTION 5

ACCREDITATION, DISCLAIMERS AND COPYRIGHT



5.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT

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