2.11 OUT-OF-BAND REJECTION

2.11.1 Specification Reference

RSS-131, Clause 5.2.1
KDB 935210 D05, Clause 3.3

2.11.2 Standard Applicable

RSS-131, Clause 5.2.1:
The gain-versus-frequency response and the 20 dB bandwidth of the zone enhancer shall be reported. The zone enhancer shall reject amplification of other signals outside the passband of the zone enhancer.

Out-of-Band Rejection is tested according to KDB 935210 D05, Clause 3.3.

2.11.3 Equipment Under Test and Modification State

Serial No: NU: 976036000256 and CU: 977036000055 / Test Configuration A and B

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

October 06, 2020 / ZXY

2.11.5 Test Equipment Used

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

2.11.6 Environmental Conditions/ Test Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	23.8 °C
Relative Humidity	31.4 %
ATM Pressure	99.0 kPa

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2.11.7 Additional Observations

- This is a conducted test.
- EUT Downlink transmits on two internal antennas and uplink transmits on two external antennas simultaneously in the same frequency range, i.e. TX MIMO mode. However, there is no much differernce between two antenna ports and the measurement was performed on one antenna port as representative configuration.
- LTE 5 MHz bandwidth Signal was used as the applicable intended operating signal type.
- The path loss was measured and entered as an offset.
- A swept CW signal whose frequency range is ±250% of the manufacturer's specified pass band is configured for the testing.
- The internal gain control of the EUT is set to the maximum gain. The input signal type is set to tones.
- The CW is 3 dB below the ACG threshold (determined according to section 3.2 of the current KDB), and doesn't activate the AGC threshold throughout the test.
- Dwell time is 10 ms.
- RBW is between 1% and 5% of the manufacturer's rated pass band.
- VBW is 3 x RBW.
- Detector is peak and trace is max hold.
- The peak amplitude frequency f_0 is determined and two additional -20 dB markers are determined using the marker-delta method).
- The 20dB Bandwidth plot is recorded as the out-of-band rejection frequency response.
- Both downlink and uplink are tested.

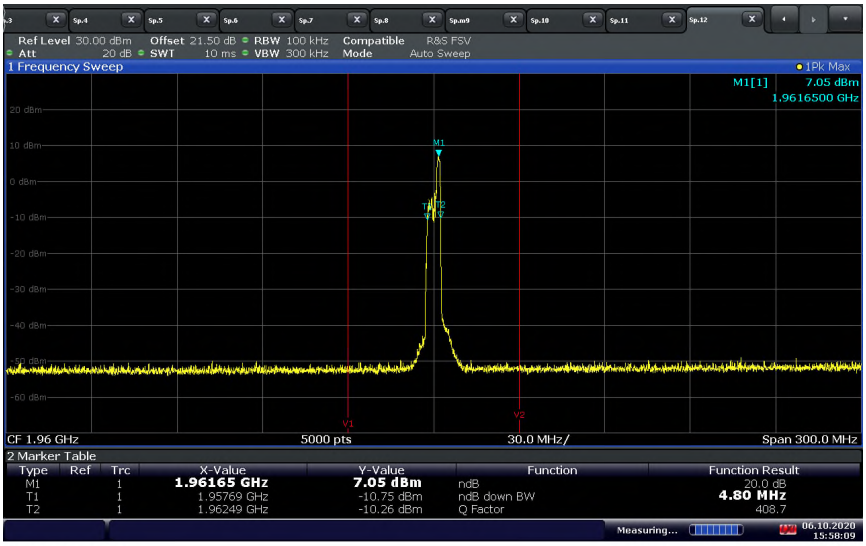
2.11.8 Test Results

LTE Band 2						
Mode	Bandwidth (MHz)	Channel	Frequency (MHz)	-20 dBc Point		20 dB BW (MHz)
				T1 (MHz)	T2 (MHz)	
Downlink	5	900	1960.0	1957.45	1963.27	5.82
Uplink	5	18900	1880.0	1876.91	1883.09	6.18

LTE Band 4						
Mode	Bandwidth (MHz)	Channel	Frequency (MHz)	-20 dBc Point		20 dB BW (MHz)
				T1 (MHz)	T2 (MHz)	
Downlink	5	2175	2132.5	2129.935	2135.281	5.35
Uplink	5	20175	1732.5	1729.719	1735.281	5.56

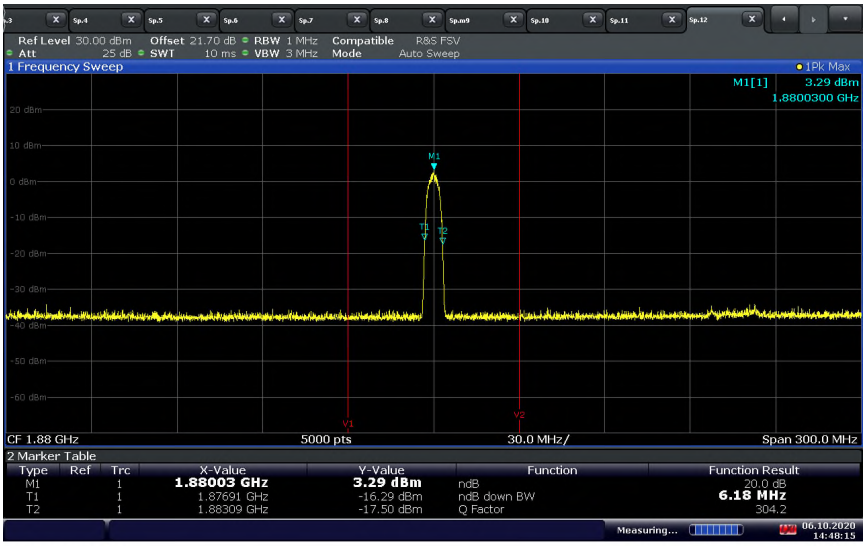
LTE Band 12						
Mode	Bandwidth (MHz)	Channel	Frequency (MHz)	-20 dBc Point		20 dB BW (MHz)
				T1 (MHz)	T2 (MHz)	
Downlink	5	5095	737.5	735.001	740.019	5.02
Uplink	5	23095	707.5	704.981	710.06	5.08

LTE Band 2 Downlink (5 MHz BW) Middle Channel / Out-of-Band Rejection



15:58:10 06.10.2020

LTE Band 2 Uplink (5 MHz BW) Middle Channel / Out-of-Band Rejection



14:48:16 06.10.2020

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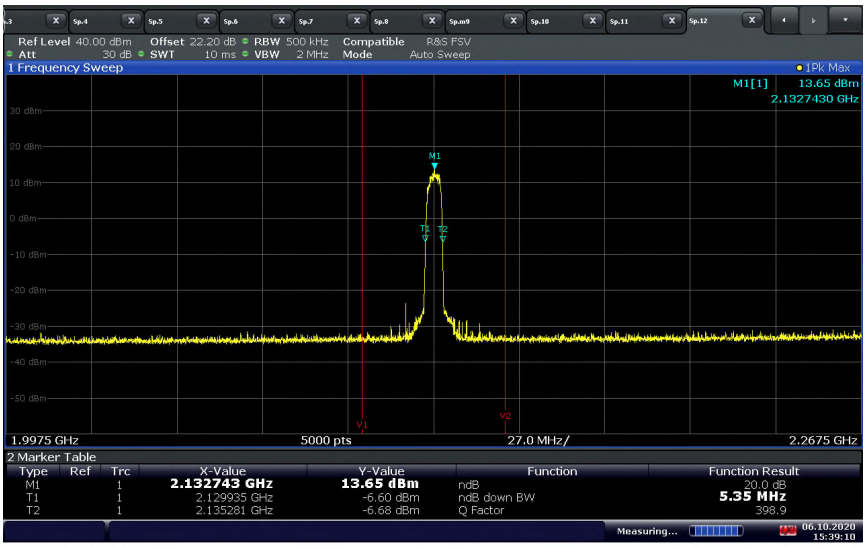
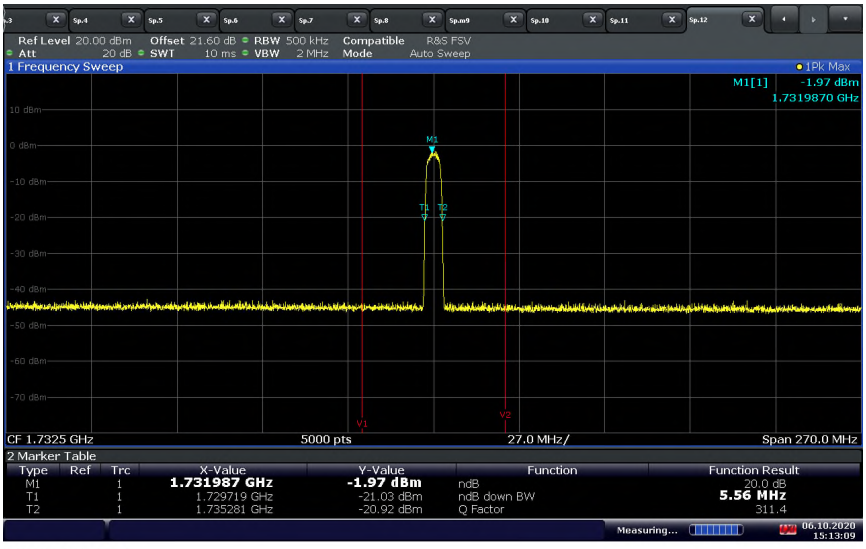
LTE Band 4 Downlink (5 MHz BW) Middle Channel / Out-of-Band Rejection



15:39:10 06.10.2020

LTE Band 4 Uplink (5 MHz BW) Middle Channel / Out-of-Band Rejection



15:13:10 06.10.2020

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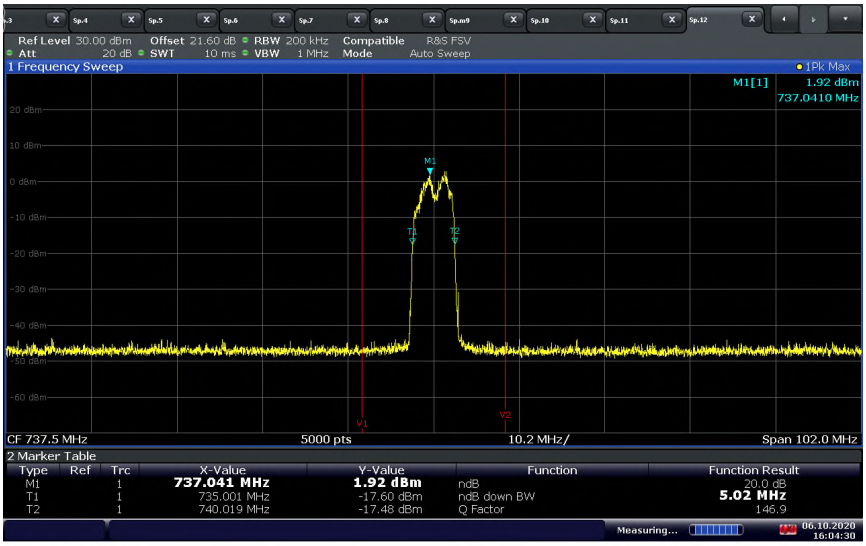
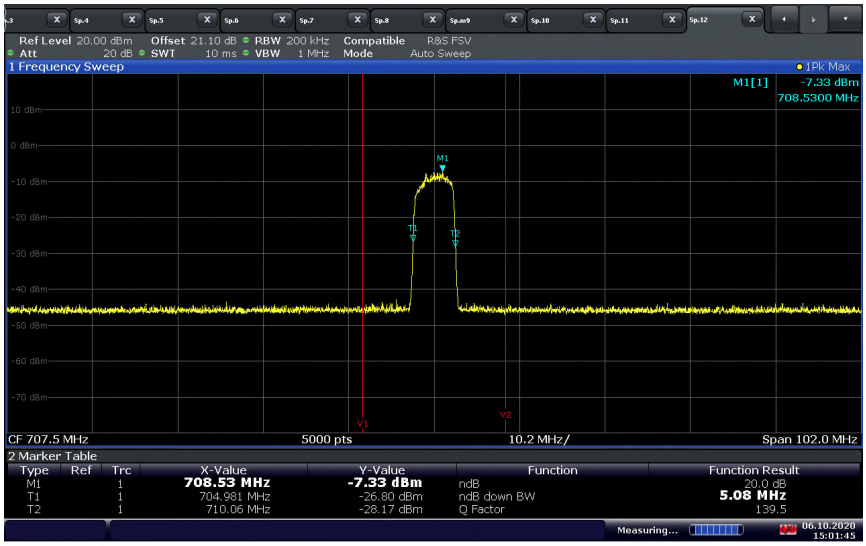
LTE Band 12 Downlink (5 MHz BW) Middle Channel / Out-of-Band Rejection



16:04:30 06.10.2020

LTE Band 12 Uplink (5 MHz BW) Middle Channel / Out-of-Band Rejection



15:01:45 06.10.2020

2.12 INPUT-VERSUS-OUTPUT SIGNAL COMPARISON

2.12.1 Specification Reference

RSS-131, Clause 5.2.2
KDB 935210 D05, Clause 3.4

2.12.2 Standard Applicable

RSS-131, Clause 5.2.2:
The spectral growth of the 26 dB bandwidth of the output signal shall be less than 5% of the input signal spectrum.

Input-versus-Output Signal Comparison is tested according to KDB 935210 D05, Clause 3.4.

2.12.3 Equipment Under Test and Modification State

Serial No: NU: 976036000256 and CU: 977036000055 / Test Configuration A and B

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

September 28 to 30, 2020 / ZXY

2.12.5 Test Equipment Used

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

2.12.6 Environmental Conditions/ Test Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	22.3 - 23.0 °C
Relative Humidity	39.1 - 57.6 %
ATM Pressure	98.7 - 98.9 kPa

2.12.7 Additional Observations

- This is a conducted test.
- EUT Downlink transmits on two internal antennas and uplink transmits on two external antennas simultaneously in the same frequency range, i.e. TX MIMO mode. However, there is no much differernce between two antenna ports and the measurement was performed on one antenna port as representative configuration.
- The path loss was measured and entered as an offset.
- The signal generator is configured to transmit LTE 5 MHz Bandwidth signal as applicable intended operating signal type.
- The signal amplitude is just below the ACG threshold (determined according to section 3.2 of the current KDB), and not more than 0.5 dB below.
- Span is between 2 times to 5 times the emission bandwidth (EBW) or alternatively, the OBW.
- RBW is 1% to 5% of the anticipated OBW, VBW is > 3 x RBW.
- Set the reference level of spectrum analyzer to accommodate the maximum input amplitude level.
- The noise floor of the spectrum analyzer is at least 36 dB below the reference level.

- Detector is positive peak and trace is max hold.
- The peak amplitude frequency f_0 is determined and the 99% occupied bandwidth was measured with the OBW function of spectrum analyzer.
- Repeat the testing with the input signal connected directly to the spectrum analyzer.
- Compare the spectral plot of the input signal to the output signal.
- Repeat the testing with input signal amplitude set to 3 dB above AGC threshold.
- Both downlink and uplink are tested.

2.12.8 Test Results

Compliant. There is no spectral growth of 26 dB bandwidth is less than 5% of the input signal spectrum.

LTE Band 2 Downlink							
Signal Level	**Bandwidth (MHz)**	**Channel**	**Frequency (MHz)**	**99% OBW (MHz)**		**-26 dB BW (MHz)**	
				Output	**Input***	**Output**	**Input***
AGC Threshold Level	5	900	1960.0	4.50	4.48	4.84	4.94
AGC + 3 dB Level				4.50	4.48	4.86	4.94

* Since the AGC Threshold level and AGC + 3 dB level for downlink are as low as -80 dBm, which is about the noise floor, the input levels are adjusted in order to get the right input 99% OBW and -26 dB BW when testing.

LTE Band 2 Uplink							
Signal Level	**Bandwidth (MHz)**	**Channel**	**Frequency (MHz)**	**99% OBW (MHz)**		**-26 dB BW (MHz)**	
				Output	**Input***	**Output**	**Input***
AGC Threshold Level	5	18900	1880.0	4.41	4.48	4.70	4.88
AGC + 3 dB Level				4.41	4.48	4.70	4.88

* Since the AGC Threshold level and AGC + 3 dB level for downlink are as low as -70 dBm, which is about the noise floor, the input levels are adjusted in order to get the right input 99% OBW and -26 dB BW when testing.

LTE Band 4 Downlink (FCC Market only)							
Signal Level	Bandwidth (MHz)	Channel	Frequency (MHz)	99% OBW (MHz)		-26 dB BW (MHz)	
				Output	Input*	Output	Input*
AGC Threshold Level	5	2175	2132.5	4.45	4.48	4.93	4.93
AGC + 3 dB Level				4.43	4.48	4.92	4.93

* Since the AGC Threshold level and AGC + 3 dB level for downlink are as low as -80 dBm, which is about the noise floor, the input levels are adjusted in order to get the right input 99% OBW and -26 dB BW when testing.

LTE Band 4 Uplink							
Signal Level	Bandwidth (MHz)	Channel	Frequency (MHz)	99% OBW (MHz)		-26 dB BW (MHz)	
				Output	Input*	Output	Input*
AGC Threshold Level	5	20175	1732.5	4.41	4.47	4.69	4.96
AGC + 3 dB Level				4.41	4.47	4.69	4.96

* Since the AGC Threshold level and AGC + 3 dB level for downlink are as low as -70 dBm, which is about the noise floor, the input levels are adjusted in order to get the right input 99% OBW and -26 dB BW when testing.

LTE Band 12 Downlink							
Signal Level	Bandwidth (MHz)	Channel	Frequency (MHz)	99% OBW (MHz)		-26 dB BW (MHz)	
				Output	Input*	Output	Input*
AGC Threshold Level	5	5095	737.5	4.40	4.47	4.75	4.91
AGC + 3 dB Level				4.40	4.47	4.74	4.91

* Since the AGC Threshold level and AGC + 3 dB level for downlink are as low as -80 dBm, which is about the noise floor, the input levels are adjusted in order to get the right input 99% OBW and -26 dB BW when testing.

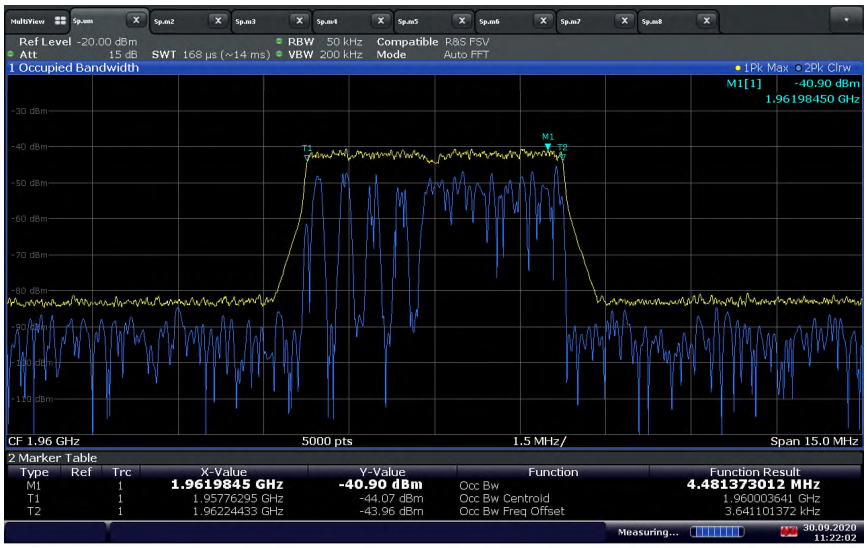
LTE Band 12 Uplink							
Signal Level	Bandwidth (MHz)	Channel	Frequency (MHz)	99% OBW (MHz)		-26 dB BW (MHz)	
				Output	Input*	Output	Input*
AGC Threshold Level	5	23095	707.5	4.40	4.48	4.72	4.94
AGC + 3 dB Level				4.40	4.48	4.70	4.94

* Since the AGC Threshold level and AGC + 3 dB level for downlink are as low as -70 dBm, which is about the noise floor, the input levels are adjusted in order to get the right input 99% OBW and -26 dB BW when testing.

LTE Band 2 Downlink (5 MHz BW) Mid Channel / 99% OBW at Output port with Input signal at AGC Threshold Level

12:40:36 29.09.2020

LTE Band 2 Downlink (5 MHz BW) Mid Channel / 99% OBW at Input port (Adjusted Level)

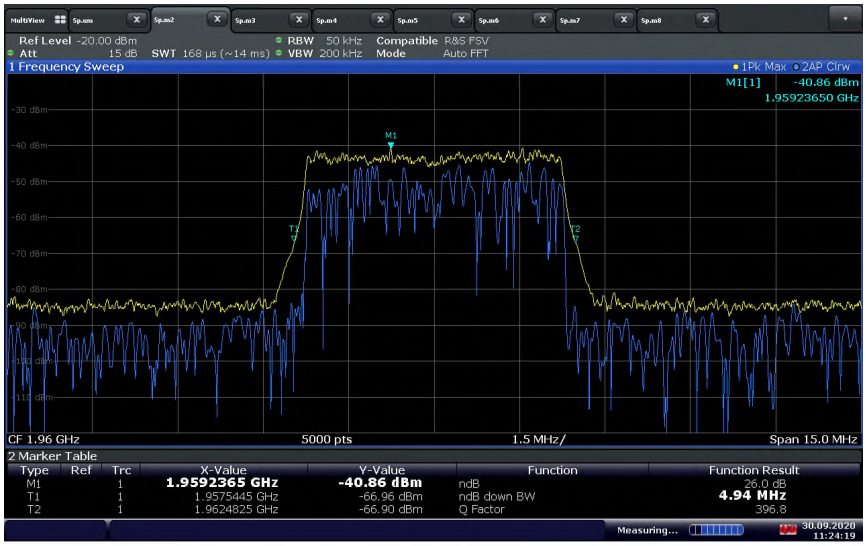


11:22:02 30.09.2020

LTE Band 2 Downlink (5 MHz BW) Mid Channel / 26 dB BW at Output port with Input signal at AGC Threshold Level

12:40:09 29.09.2020

LTE Band 2 Downlink (5 MHz BW) Mid Channel / 26 dB BW at Input port (Adjusted Level)



11:24:19 30.09.2020

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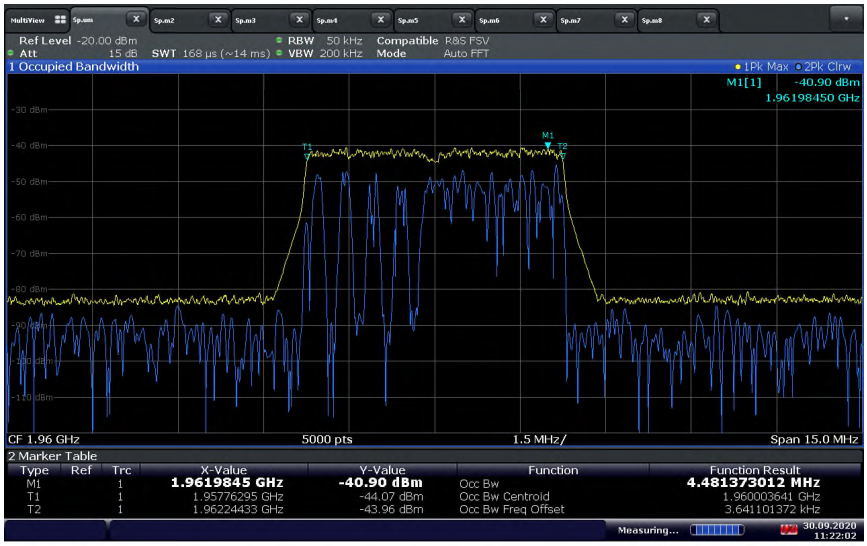
LTE Band 2 Downlink (5 MHz BW) Mid Channel / 99% OBW at Output port with Input signal at AGC + 3 dB Level

12:38:43 29.09.2020

LTE Band 2 Downlink (5 MHz BW) Mid Channel / 99% OBW at Input port (Adjusted Level)

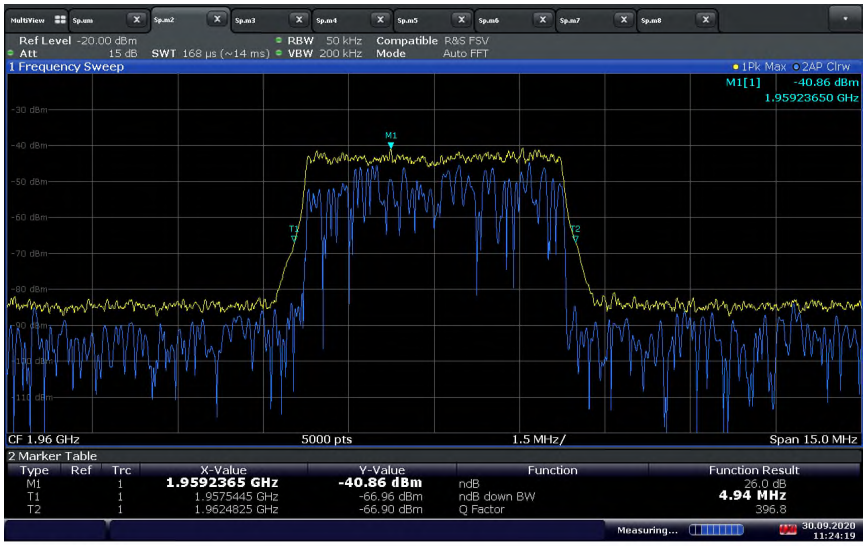


11:22:02 30.09.2020

LTE Band 2 Downlink (5 MHz BW) Mid Channel / 26 dB BW at Output port with Input signal at AGC + 3 dB Level

12:39:14 29.09.2020

LTE Band 2 Downlink (5 MHz BW) Mid Channel / 26 dB BW at Input port (Adjusted Level)



11:24:19 30.09.2020

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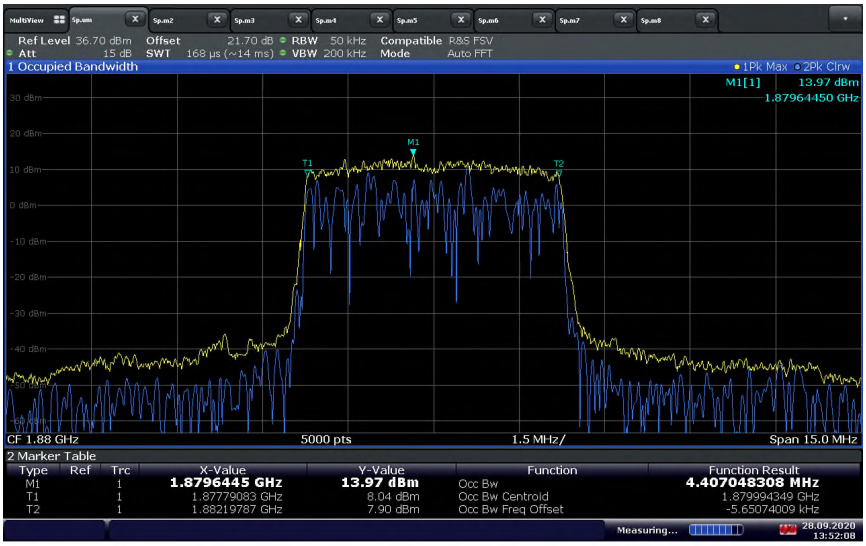
LTE Band 2 Uplink (5 MHz BW) Mid Channel / 99% OBW at Output port with Input signal at AGC Threshold Level



13:52:08 28.09.2020

LTE Band 2 Uplink (5 MHz BW) Mid Channel / 99% OBW at Input port (Adjusted Level)

11:26:40 30.09.2020

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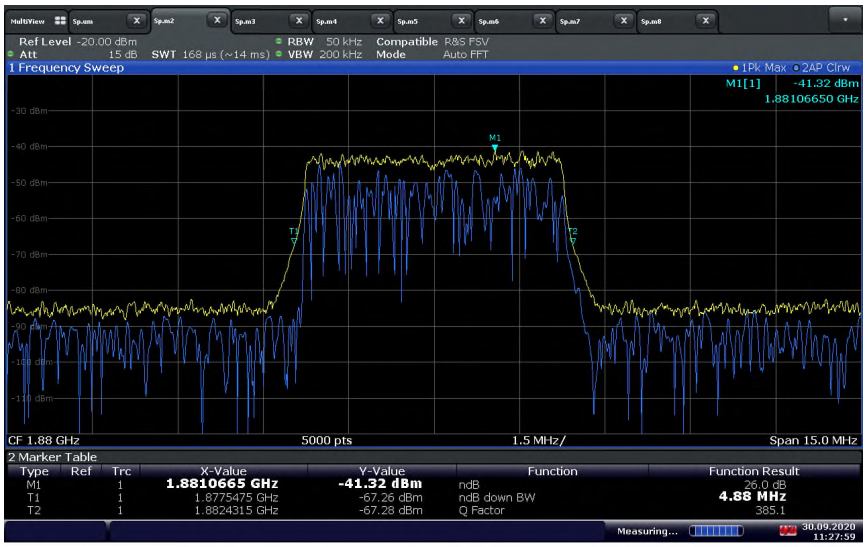
LTE Band 2 Uplink (5 MHz BW) Mid Channel / 26 dB BW at Output port with Input signal at AGC Threshold Level
 13:52:35 28.09.2020
LTE Band 2 Uplink (5 MHz BW) Mid Channel / 26 dB BW at Input port (Adjusted Level)
 11:27:59 30.09.2020

LTE Band 2 Uplink (5 MHz BW) Mid Channel / 99% OBW at Output port with Input signal at AGC + 3 dB Level
 13:54:59 28.09.2020
LTE Band 2 Uplink (5 MHz BW) Mid Channel / 99% OBW at Input port (Adjusted Level)
 11:26:40 30.09.2020

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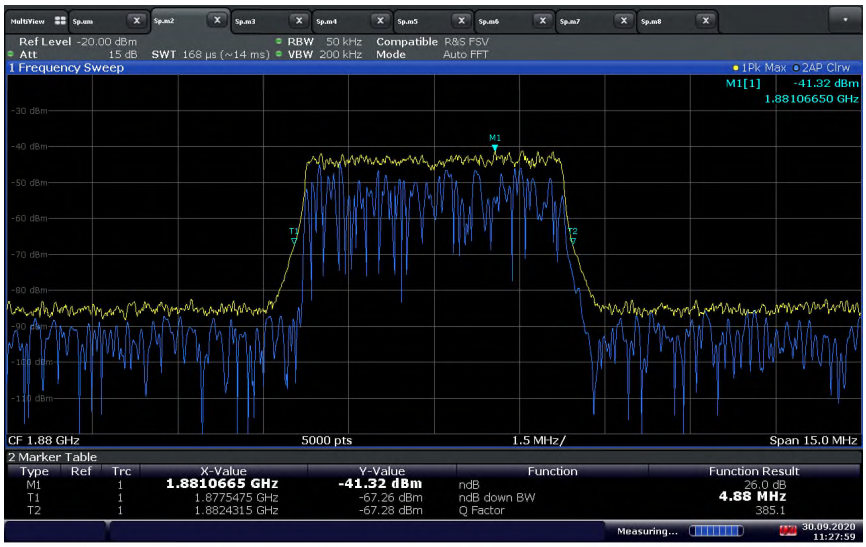
LTE Band 2 Uplink (5 MHz BW) Mid Channel / 26 dB BW at Output port with Input signal at AGC + 3 dB Level

13:55:38 28.09.2020

LTE Band 2 Uplink (5 MHz BW) Mid Channel / 26 dB BW at Input port (Adjusted Level)



11:27:59 30.09.2020

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LTE Band 4 Downlink (5 MHz BW) Mid Channel / 99% OBW at Output port with Input signal at AGC Threshold Level
 11:05:35 29.09.2020
LTE Band 4 Downlink (5 MHz BW) Mid Channel / 99% OBW at Input port (Adjusted Level)
 11:30:11 30.09.2020

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LTE Band 4 Downlink (5 MHz BW) Mid Channel / 26 dB BW at Output port with Input signal at AGC Threshold Level

11:06:03 29.09.2020

LTE Band 4 Downlink (5 MHz BW) Mid Channel / 26 dB BW at Input port (Adjusted Level)

11:31:54 30.09.2020

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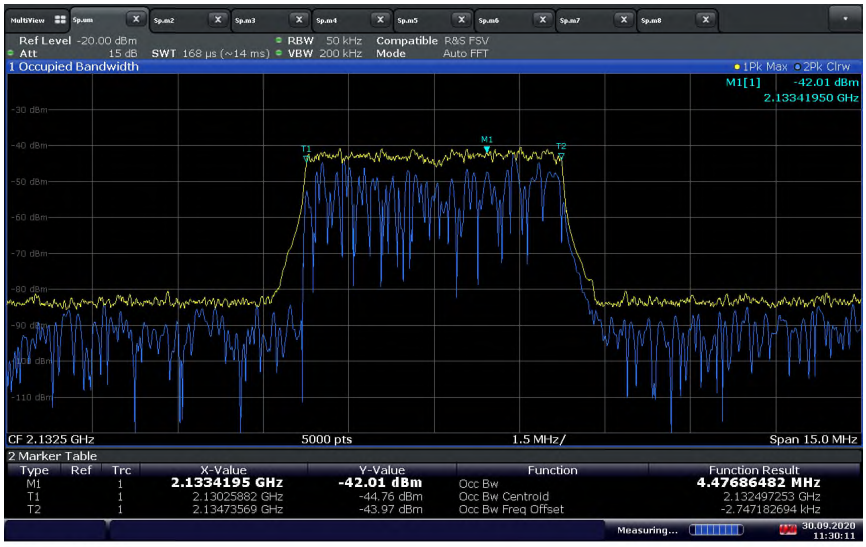
LTE Band 4 Downlink (5 MHz BW) Mid Channel / 99% OBW at Output port with Input signal at AGC + 3 dB Level

11:07:16 29.09.2020

LTE Band 4 Downlink (5 MHz BW) Mid Channel / 99% OBW at Input port (Adjusted Level)



11:30:11 30.09.2020

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LTE Band 4 Downlink (5 MHz BW) Mid Channel / 26 dB BW at Output port with Input signal at AGC + 3 dB Level

11:08:27 29.09.2020

LTE Band 4 Downlink (5 MHz BW) Mid Channel / 26 dB BW at Input port (Adjusted Level)

11:31:54 30.09.2020

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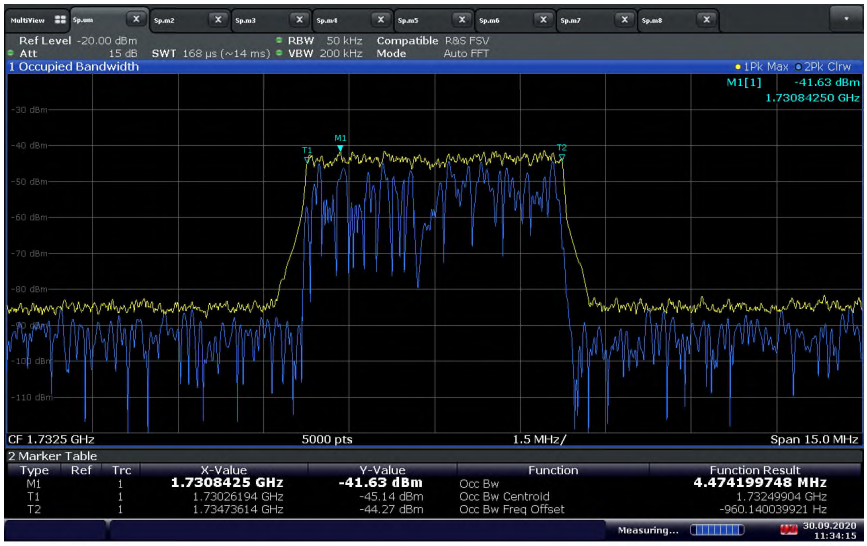
LTE Band 4 Uplink (5 MHz BW) Mid Channel / 99% OBW at Output port with Input signal at AGC Threshold Level
 08:55:27 29.09.2020
LTE Band 4 Uplink (5 MHz BW) Mid Channel / 99% OBW at Input port (Adjusted Level)
 11:34:16 30.09.2020

LTE Band 4 Uplink (5 MHz BW) Mid Channel / 26 dB BW at Output port with Input signal at AGC Threshold Level
 08:56:17 29.09.2020
LTE Band 4 Uplink (5 MHz BW) Mid Channel / 26 dB BW at Input port (Adjusted Level)
 11:36:03 30.09.2020

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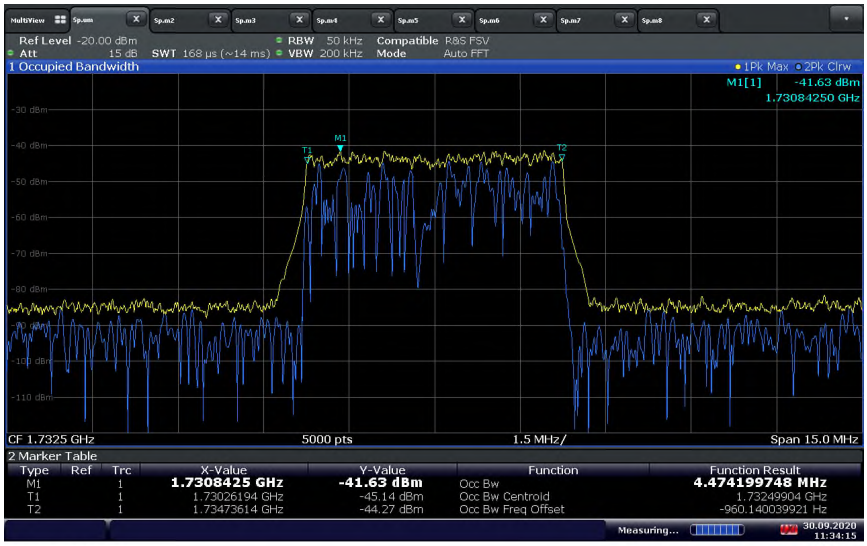
LTE Band 4 Uplink (5 MHz BW) Mid Channel / 99% OBW at Output port with Input signal at AGC + 3 dB Level
 08:57:56 29.09.2020
LTE Band 4 Uplink (5 MHz BW) Mid Channel / 99% OBW at Input port (Adjusted Level)
 11:34:16 30.09.2020

LTE Band 4 Uplink (5 MHz BW) Mid Channel / 26 dB BW at Output port with Input signal at AGC + 3 dB Level

08:58:34 29.09.2020

LTE Band 4 Uplink (5 MHz BW) Mid Channel / 26 dB BW at Input port (Adjusted Level)

11:36:03 30.09.2020

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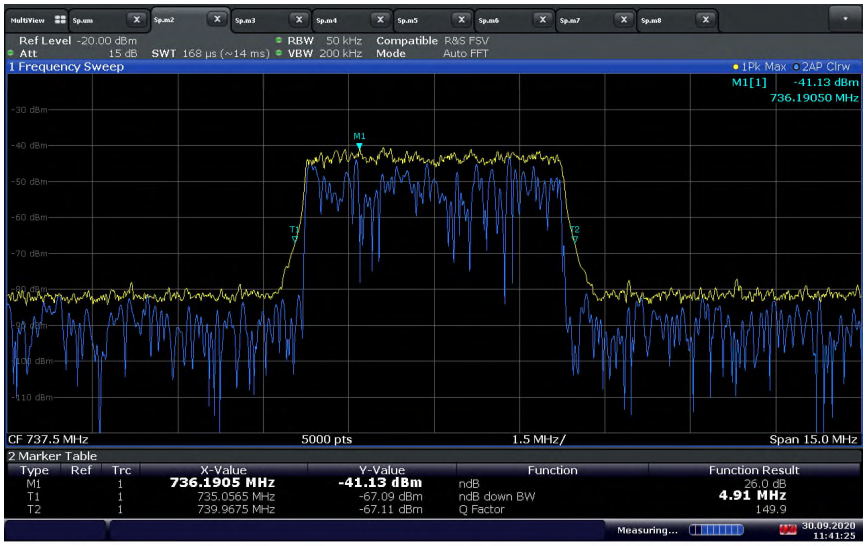
LTE Band 12 Downlink (5 MHz BW) Mid Channel / 99% OBW at Output port with Input signal at AGC Threshold Level
 10:47:20 29.09.2020
LTE Band 12 Downlink (5 MHz BW) Mid Channel / 99% OBW at Input port (Adjusted Level)
 11:39:50 30.09.2020

LTE Band 12 Downlink (5 MHz BW) Mid Channel / 26 dB BW at Output port with Input signal at AGC Threshold Level

11:06:03 29.09.2020

LTE Band 12 Downlink (5 MHz BW) Mid Channel / 26 dB BW at Input port (Adjusted Level)



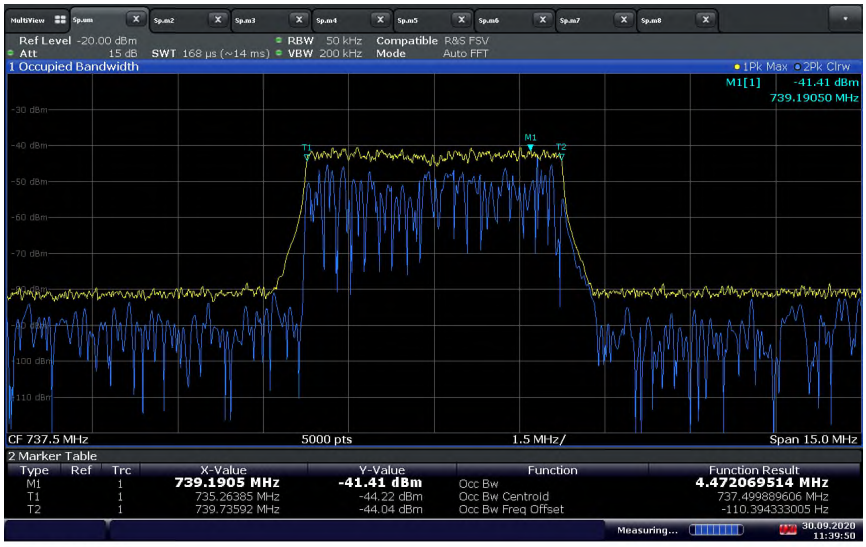
11:41:26 30.09.2020

TÜV SÜD AMERICA INC 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone: 858 678 1400 FAX: 858 546 0364

LTE Band 12 Downlink (5 MHz BW) Mid Channel / 99% OBW at Output port with Input signal at AGC + 3 dB Level

11:07:16 29.09.2020

LTE Band 12 Downlink (5 MHz BW) Mid Channel / 99% OBW at Input port (Adjusted Level)



11:39:50 30.09.2020

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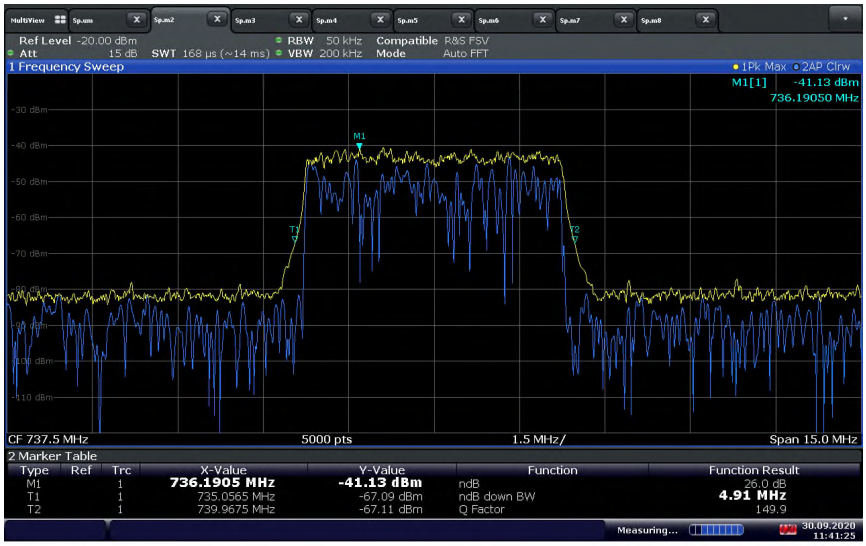
LTE Band 12 Downlink (5 MHz BW) Mid Channel / 26 dB BW at Output port with Input signal at AGC + 3 dB Level

11:08:27 29.09.2020

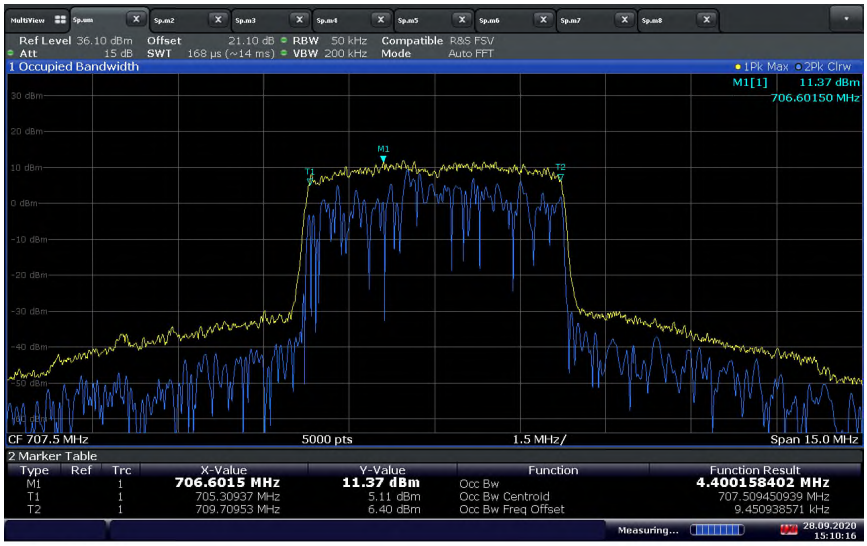
LTE Band 12 Downlink (5 MHz BW) Mid Channel / 26 dB BW at Input port (Adjusted Level)



11:41:26 30.09.2020

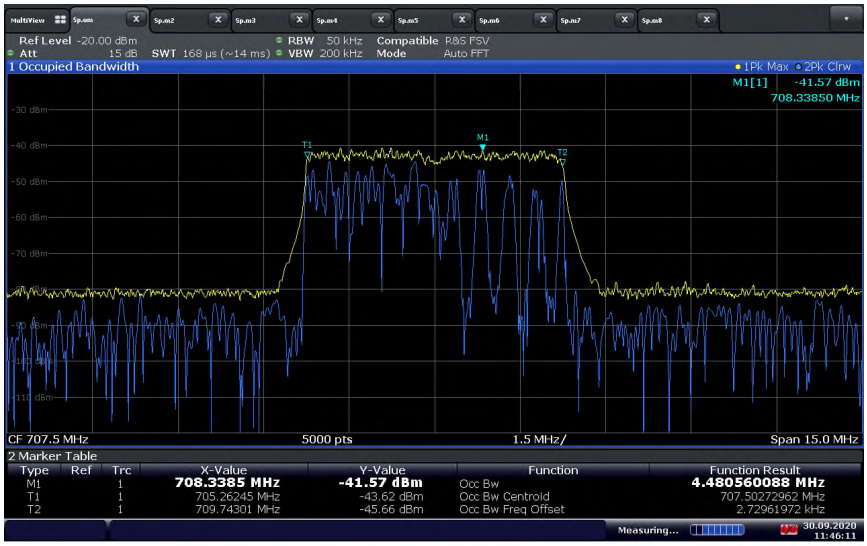
TÜV SÜD AMERICA INC 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone: 858 678 1400 FAX: 858 546 0364

LTE Band 12 Uplink (5 MHz BW) Mid Channel / 99% OBW at Output port with Input signal at AGC Threshold Level



15:10:17 28.09.2020

LTE Band 12 Uplink (5 MHz BW) Mid Channel / 99% OBW at Input port (Adjusted Level)

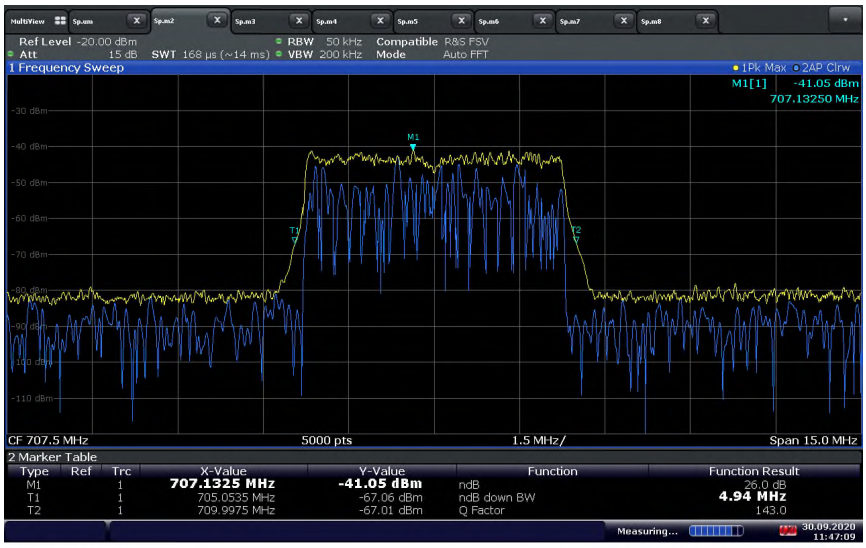


11:46:11 30.09.2020

LTE Band 12 Uplink (5 MHz BW) Mid Channel / 26 dB BW at Output port with Input signal at AGC Threshold Level

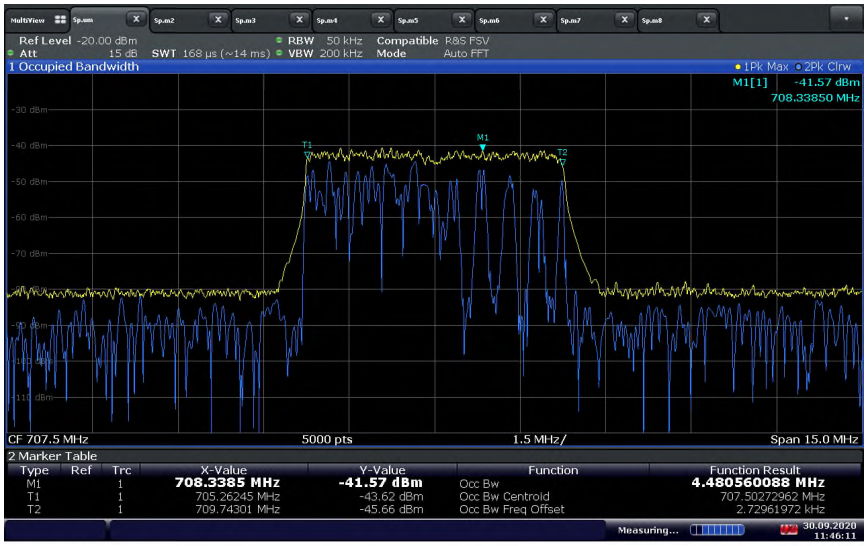
15:10:58 28.09.2020

LTE Band 12 Uplink (5 MHz BW) Mid Channel / 26 dB BW at Input port (Adjusted Level)



11:47:09 30.09.2020

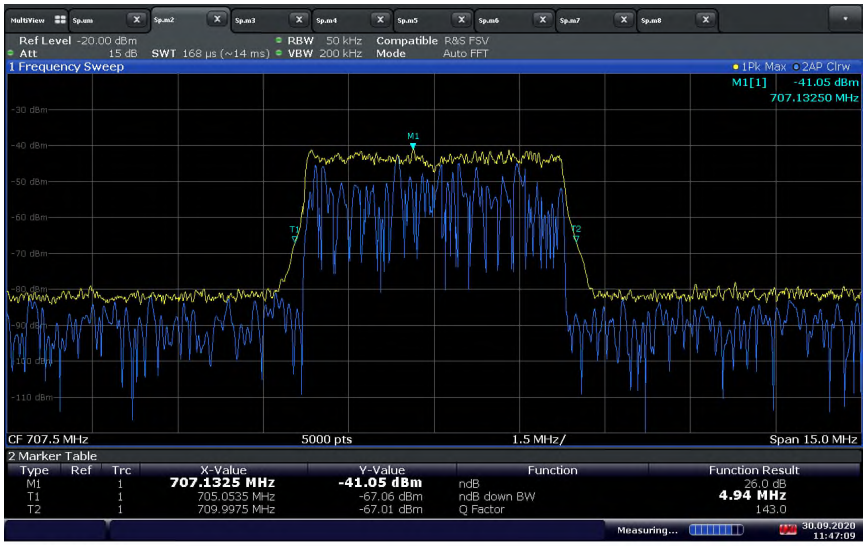
TÜV SÜD AMERICA INC 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone: 858 678 1400 FAX: 858 546 0364

LTE Band 12 Uplink (5 MHz BW) Mid Channel / 99% OBW at Output port with Input signal at AGC + 3 dB Level
 15:14:11 28.09.2020
LTE Band 12 Uplink (5 MHz BW) Mid Channel / 99% OBW at Input port (Adjusted Level)
 11:46:11 30.09.2020

LTE Band 12 Uplink (5 MHz BW) Mid Channel / 26 dB BW at Output port with Input signal at AGC + 3 dB Level

15:15:01 28.09.2020

LTE Band 12 Uplink (5 MHz BW) Mid Channel / 26 dB BW at Input port (Adjusted Level)



11:47:09 30.09.2020

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2.13 MEAN OUTPUT POWER AND AMPLIFIER/BOOSTER GAIN

2.13.1 Specification Reference

RSS-131, Clause 5.2.3
KDB 935210 D05, Clause 3.5

2.13.2 Standard Applicable

RSS-131, Clause 5.2.3:
The zone enhancer gain shall not exceed the nominal gain by more than 1.0 dB.

2.13.3 Equipment Under Test and Modification State

Serial No: NU: 976036000256 and CU: 977036000055 / Test Configuration A and B

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

September 27, 28, and October 12, 2020 / ZXY

2.13.5 Test Equipment Used

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

2.13.6 Environmental Conditions/ Test Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	21.8 – 23.2 °C
Relative Humidity	48.7 - 51.6 %
ATM Pressure	98.7 kPa

2.13.7 Additional Observations

- This is a conducted test.
- EUT Downlink transmits on two internal antennas and uplink transmits on two external antennas simultaneously in the same frequency range, i.e. TX MIMO mode. However, there is no much differernce between two antenna ports and the measurement was performed on one antenna port as representative configuration.
- The path loss was measured and entered as an offset.
- The internal gain control of the EUT is adjusted to the maximum gain (100 dB).
- The input power levels (uplink and downlink) are set to maximum input ratings, and confirm the device is not capable of operating in saturation (non-linear mode) during the test.
- The signal generator is configured to LTE 5 MHz bandwidth as the typical signal.
- A power meter or was used to measure the output power and a spectrum analyzer was used to measure the input power according to KDB 935210 D05 clause 3.5.3.
- Both downlink and uplink are tested.

2.13.8 Test Results

Compliant. The booster gain does not exceed the nominal gain by more than 1.0 dB.

Input and Output Power and Gain						
Mode	**Bandwidth (MHz)**	**Channel**	**Frequency (MHz)**	**AGC Threshold Input (dBm)**	**Output Power (dBm)**	**Booster Gain (dB)**
LTE B2 Downlink	5	900	1960.0	-85.75	10.33	96.08
LTE B2 Uplink	5	18900	1880.0	-75.90	21.60	97.50
LTE B4 Downlink	5	2175	2132.5	-85.25	10.30	95.55
LTE B4 Uplink	5	20175	1732.5	-76.34	23.35	99.69
LTE B12 Downlink	5	5095	737.5	-88.27	10.31	98.58
LTE B12 Uplink	5	23095	707.5	-79.14	20.79	99.93

Input and Output Power and Gain						
Mode	**Bandwidth (MHz)**	**Channel**	**Frequency (MHz)**	**AGC Threshold + 3dB Input (dBm)**	**Output Power (dBm)**	**Booster Gain (dB)**
LTE B2 Downlink	5	900	1960.0	-84.51	10.57	95.08
LTE B2 Uplink	5	18900	1880.0	-73.04	21.94	94.98
LTE B4 Downlink	5	2175	2132.5	-84.15	10.32	94.47
LTE B4 Uplink	5	20175	1732.5	-73.52	23.66	97.18
LTE B12 Downlink	5	5095	737.5	-86.76	10.43	97.19
LTE B12 Uplink	5	23095	707.5	-76.35	20.90	97.25

Limit	
Band	**System Gain (dB)**
LTE Band 2, 4, 12	100

2.14 OUT-OF-BAND/OUT-OF-BLOCK (INTERMODULATION) AND SPURIOUS EMISSIONS

2.14.1 Specification Reference

KDB 935210 D05, Clause 3.6

2.14.2 Standard Applicable

Limit refer to related FCC Rule Sections for each bands.

Out-of-Band/Out-of-Block and spurious emissions is tested according to KDB 935210 D05 Clause 3.6.

2.14.3 Equipment Under Test and Modification State

Serial No: NU: 976036000256 and CU: 977036000055 / Test Configuration A and B

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

October 01, 2020 / ZXY

2.14.5 Test Equipment Used

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

2.14.6 Environmental Conditions/ Test Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

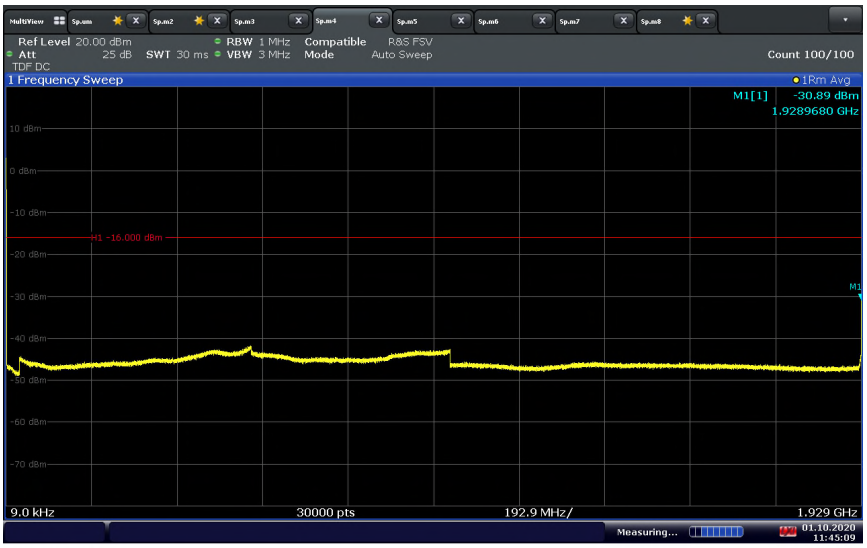
Ambient Temperature	23.0°C
Relative Humidity	40.6%
ATM Pressure	98.8kPa

2.14.7 Additional Observations

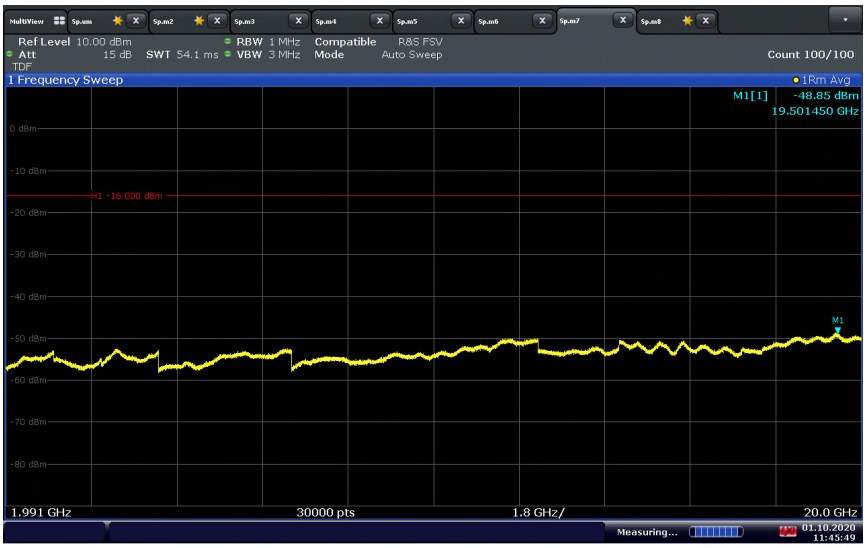
- This is a conducted test.
- The transducer factor (TDF) used is from the external attenuators and cables used.
- EUT Downlink transmits on two internal antennas and uplink transmits on two external antennas simultaneously in the same frequency range, i.e. TX MIMO mode. However, there is no much differernce between two antenna ports and the measurement was performed on one antenna port as representative configuration. The limit was adjusted with a correction of -3 dB [10Log(2)] by using Measure and Add 10Log(N) dB technique according to FCC KDB 662911 D01 Multiple Transmitter Output accounting for simultaneous transmission from two internal or external antenna ports.
- The signal generator is configured for LTE signal and 5 MHz Bandwidth was tested as representative configuration.
- RBW is 1 MHz or 100 kHz according to related FCC Rule Sections for each bands, VBW is > 3 x RBW.
- The spectrum analyzer was set to RMS detector and trace average is 100 traces.
- Both Downlink and Uplink are tested.
- Intermodulation-product spurious emission measurements are not required for single-channel boosters that can't accommodate two simultaneous signals within the pass band.

2.14.8 Test Results

LTE Band 2 Downlink (5 MHz BW) Low Channel / Spurious Emissions



11:45:09 01.10.2020



11:45:50 01.10.2020

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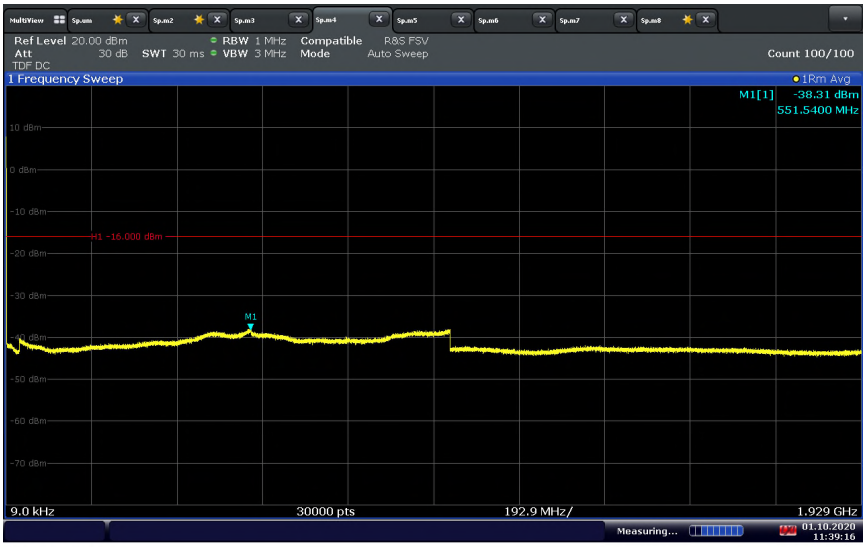
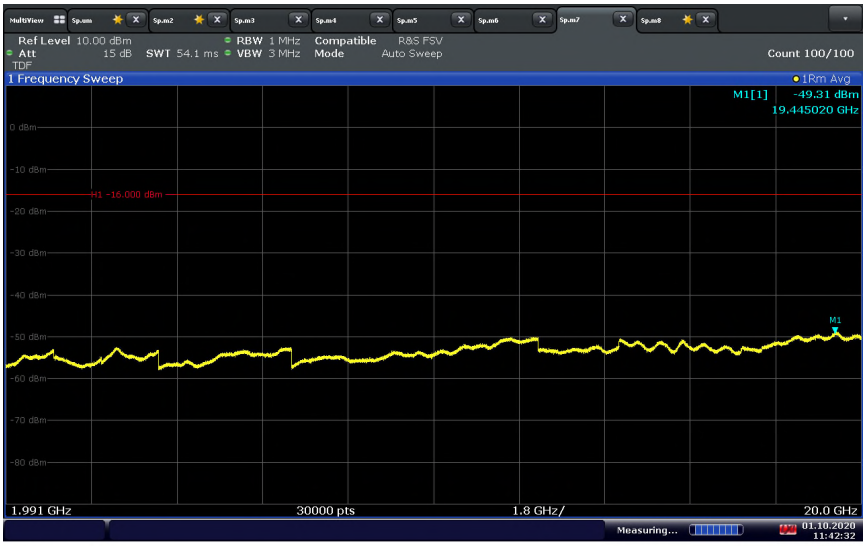
LTE Band 2 Downlink (5 MHz BW) Mid Channel / Spurious Emissions



11:39:16 01.10.2020



11:42:33 01.10.2020

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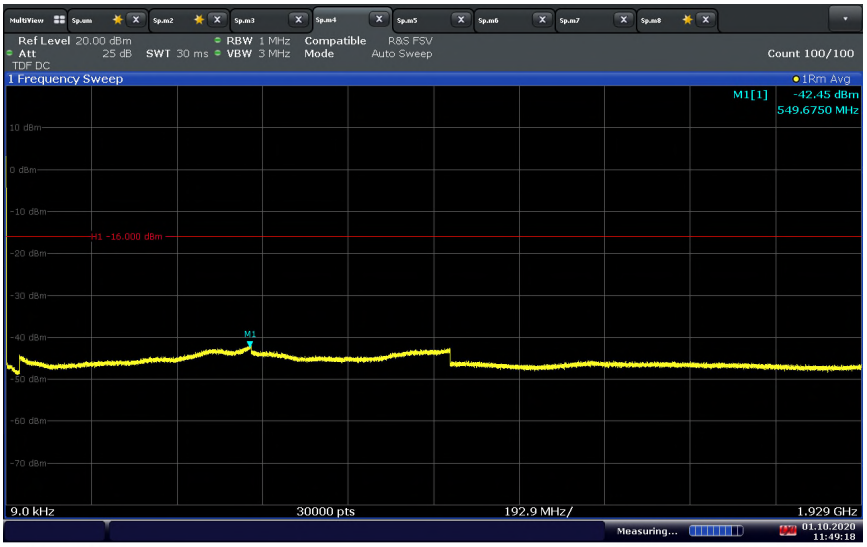
LTE Band 2 Downlink (5 MHz BW) High Channel / Spurious Emissions



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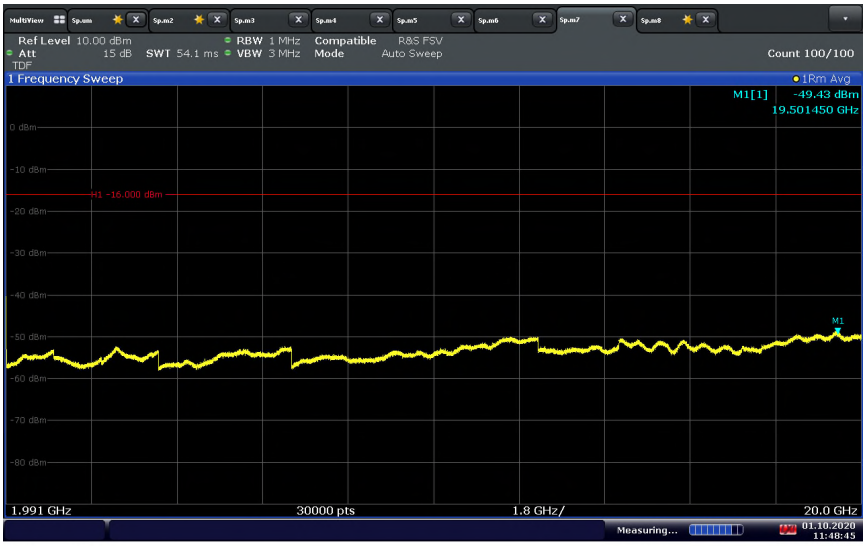
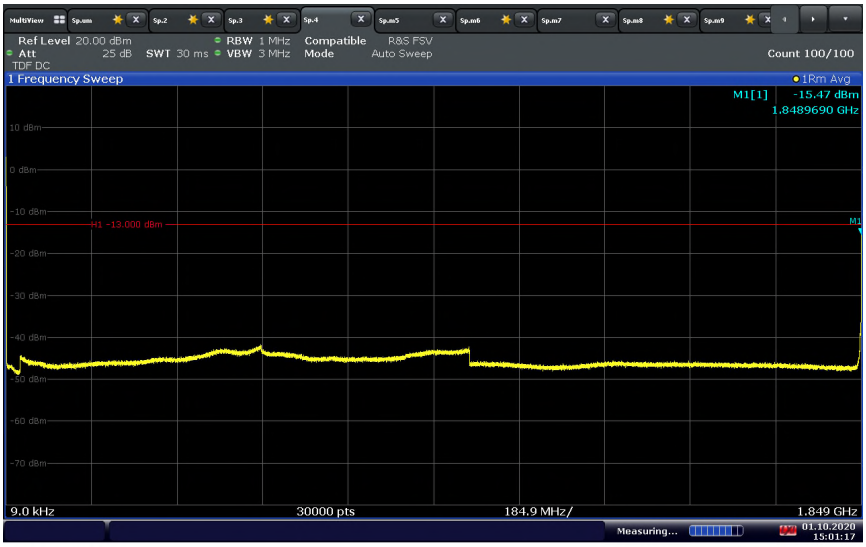
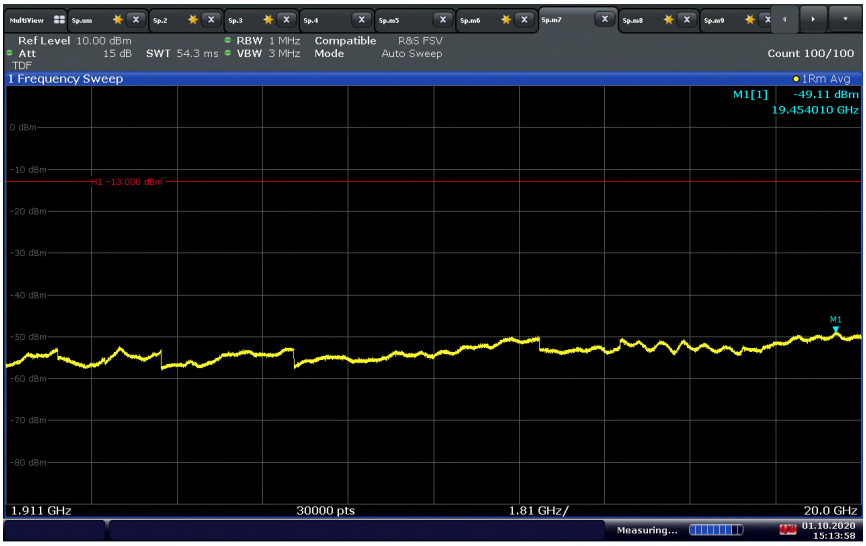


11:48:46 01.10.2020

LTE Band 2 Uplink (5 MHz BW) Low Channel / Spurious Emissions



15:01:18 01.10.2020



15:13:58 01.10.2020

The limit should be adjusted with a correction of -3 dB [10Log(2)] accounting for MIMO transmission on both external antennas
Limit = -13 - 3 = -16 dBm

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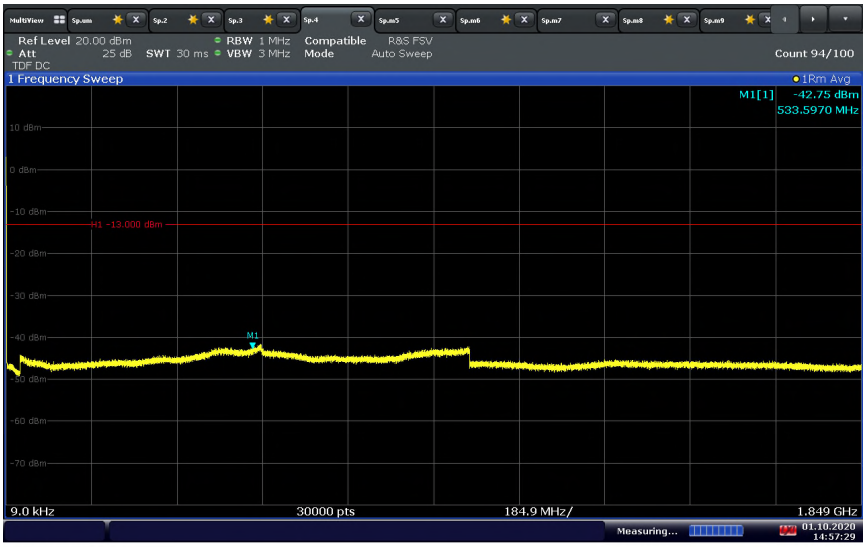
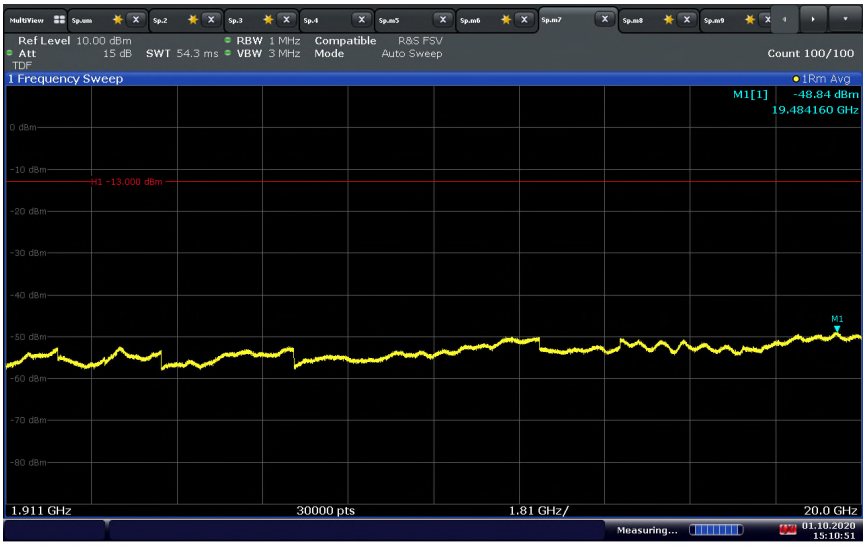
LTE Band 2 Uplink (5 MHz BW) Mid Channel / Spurious Emissions



14:57:30 01.10.2020



15:10:52 01.10.2020

The limit should be adjusted with a correction of -3 dB [10Log(2)] accounting for MIMO transmission on both external antennas
Limit = -13 - 3 = -16 dBm

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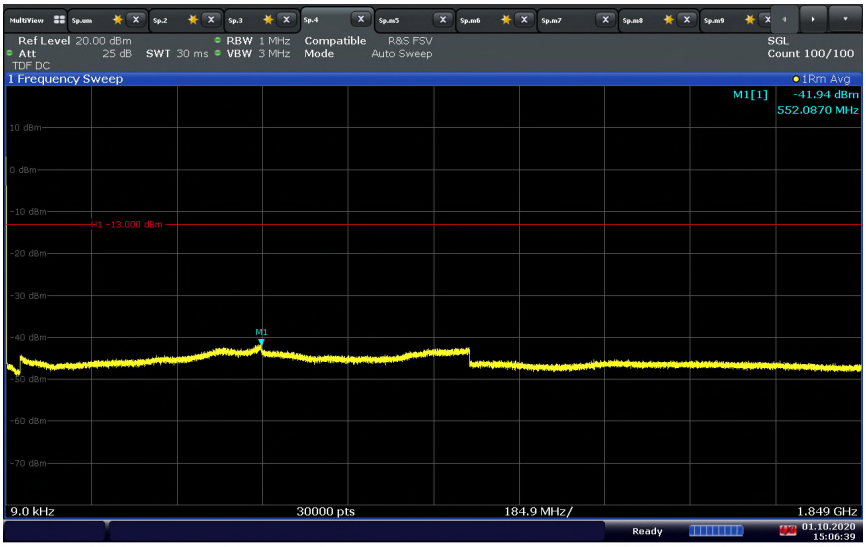
LTE Band 2 Uplink (5 MHz BW) High Channel / Spurious Emissions



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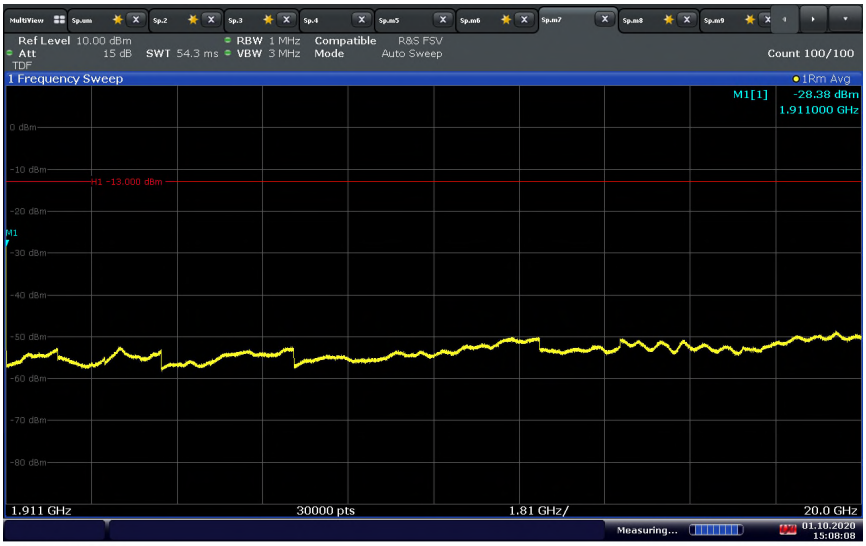
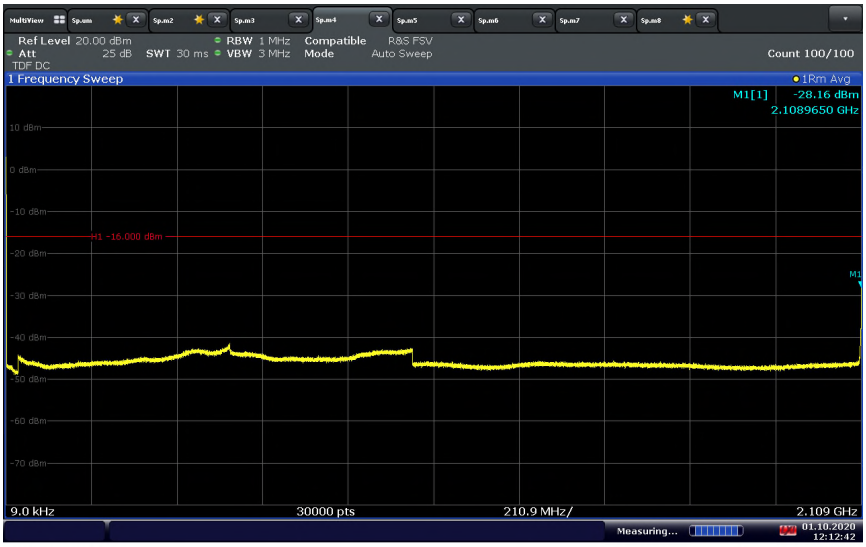


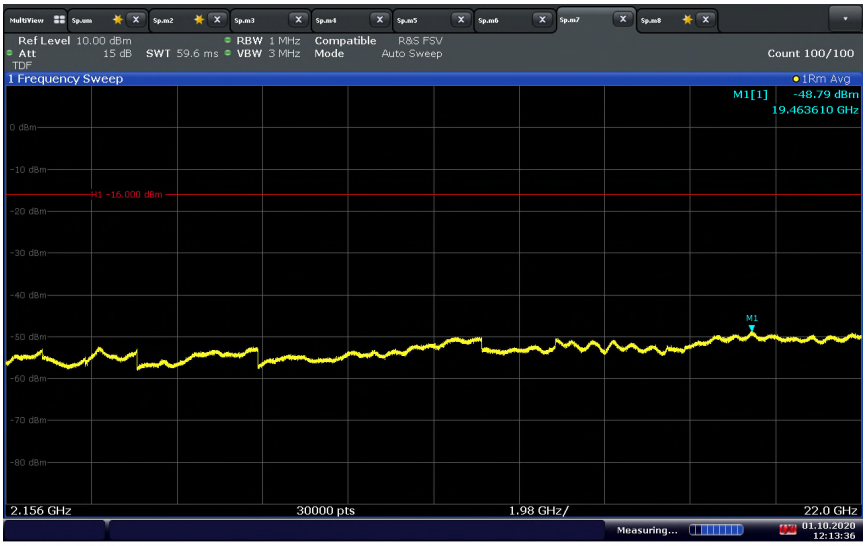
15:08:08 01.10.2020

The limit should be adjusted with a correction of -3 dB [10Log(2)]
accounting for MIMO transmission on both external antennas
Limit = -13 - 3 = -16 dBm

LTE Band 4 Downlink (5 MHz BW) Low Channel / Spurious Emissions



12:12:43 01.10.2020



12:13:37 01.10.2020

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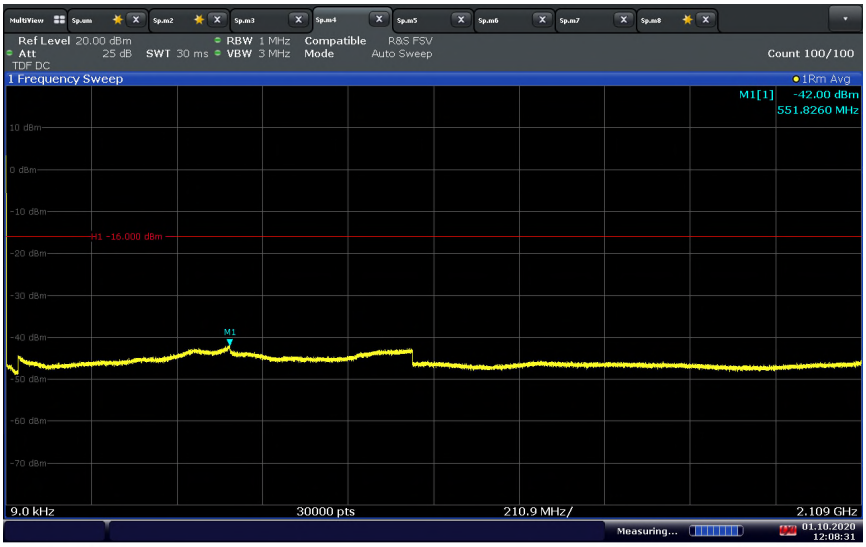
LTE Band 4 Downlink (5 MHz BW) Mid Channel / Spurious Emissions



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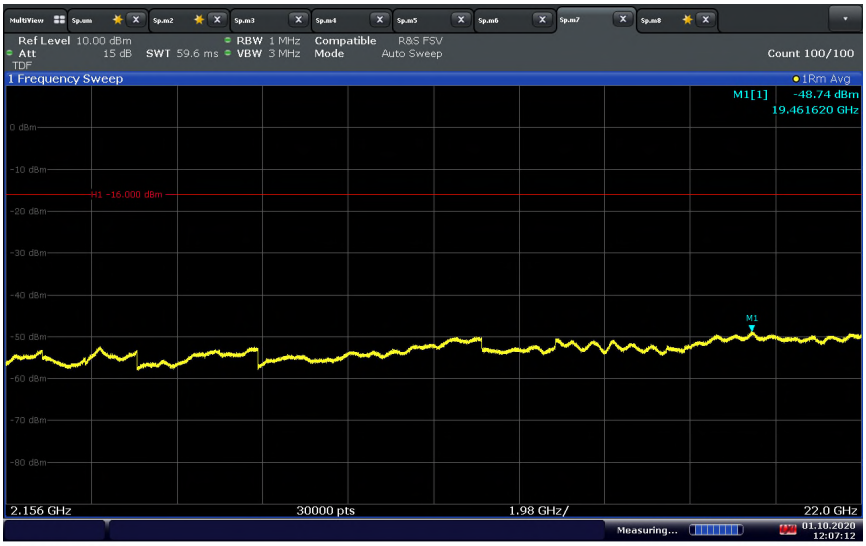

12:07:13 01.10.2020

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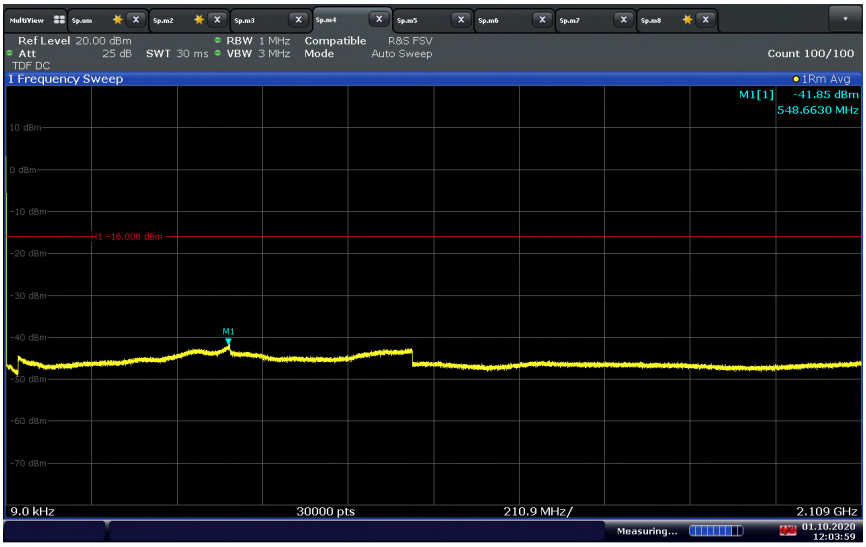
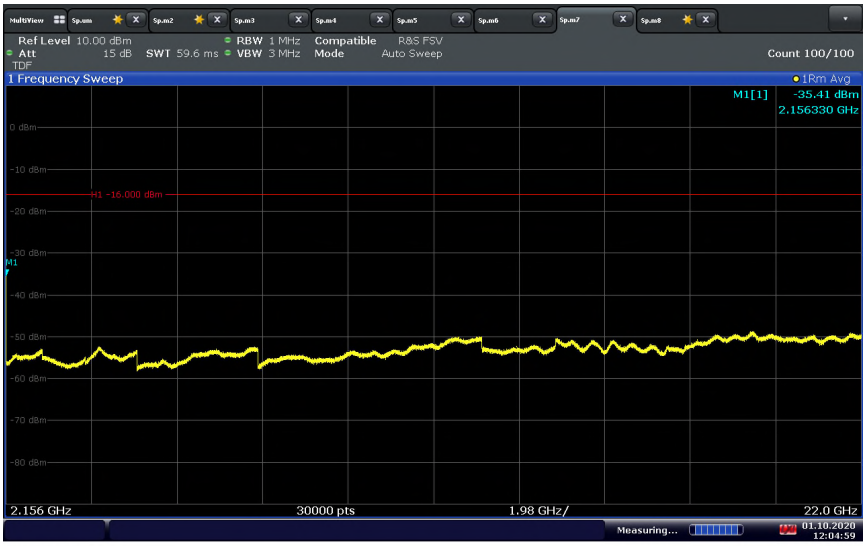
LTE Band 4 Downlink (5 MHz BW) High Channel / Spurious Emissions

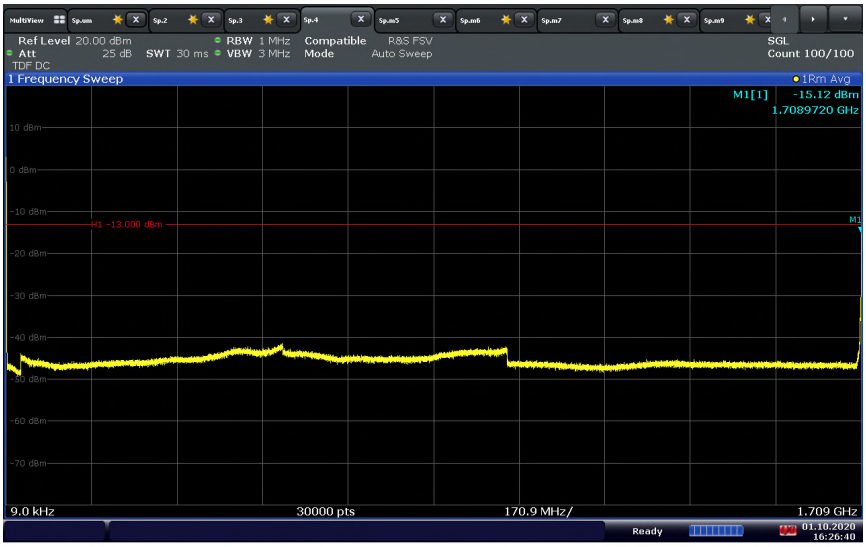


12:03:59 01.10.2020

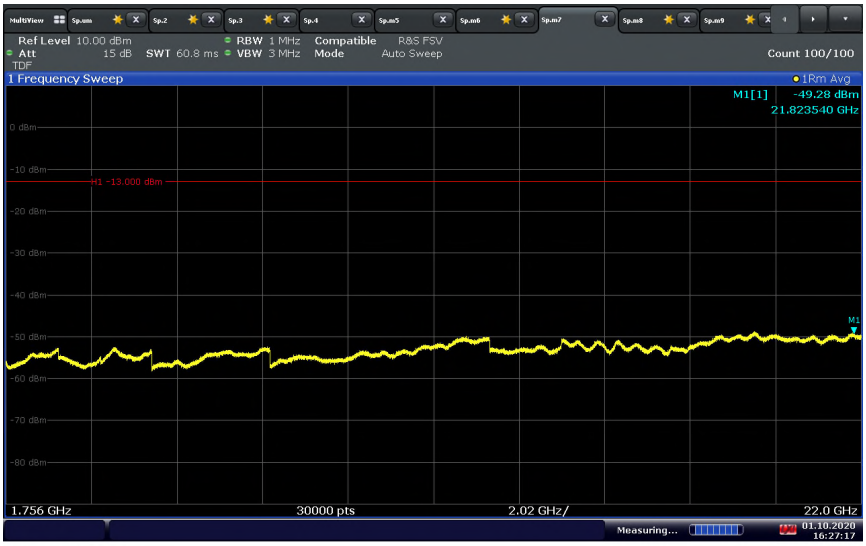


12:04:59 01.10.2020

LTE Band 4 Uplink (5 MHz BW) Low Channel / Spurious Emissions



16:26:41 01.10.2020



16:27:18 01.10.2020

The limit should be adjusted with a correction of -3 dB [10Log(2)]
accounting for MIMO transmission on both external antennas
Limit = -13 - 3 = -16 dBm

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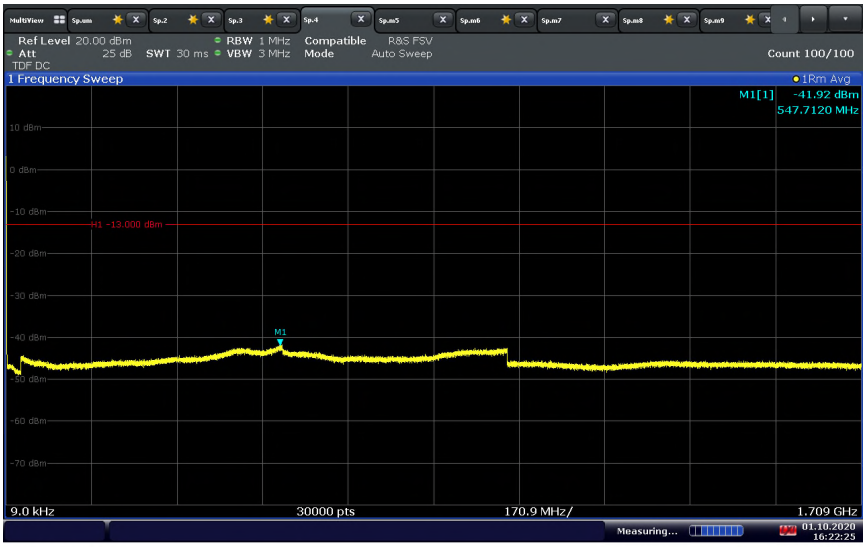
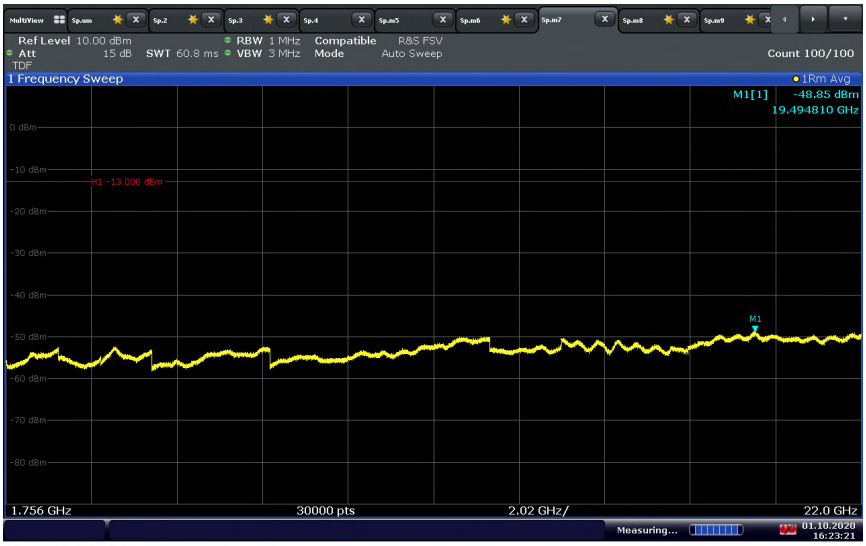
LTE Band 4 Uplink (5 MHz BW) Mid Channel / Spurious Emissions



16:22:26 01.10.2020



16:23:22 01.10.2020

The limit should be adjusted with a correction of -3 dB [10Log(2)] accounting for MIMO transmission on both external antennas
Limit = -13 - 3 = -16 dBm

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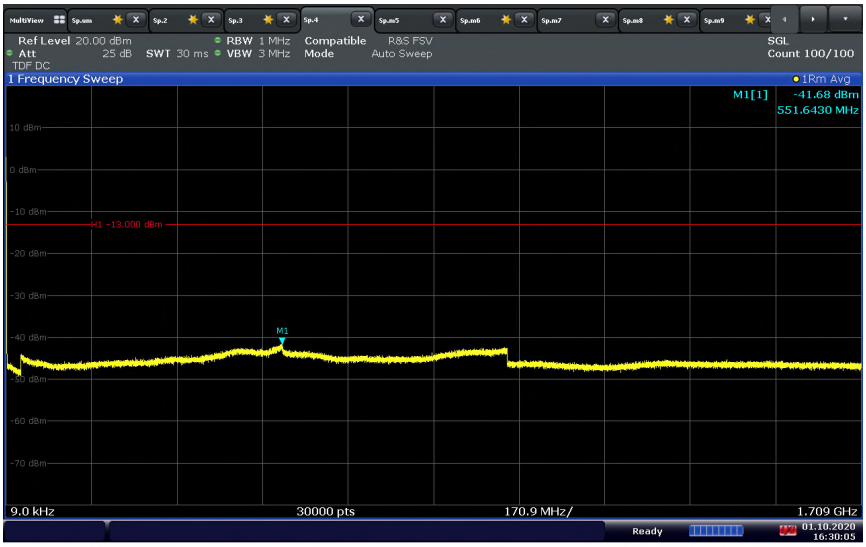
LTE Band 4 Uplink (5 MHz BW) High Channel / Spurious Emissions



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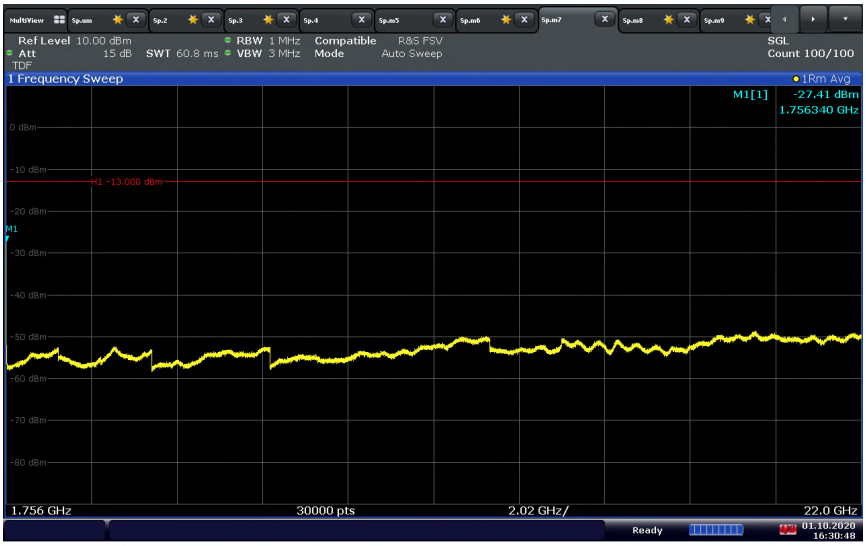

16:30:48 01.10.2020

The limit should be adjusted with a correction of -3 dB [10Log(2)] accounting for MIMO transmission on both external antennas
Limit = -13 - 3 = -16 dBm

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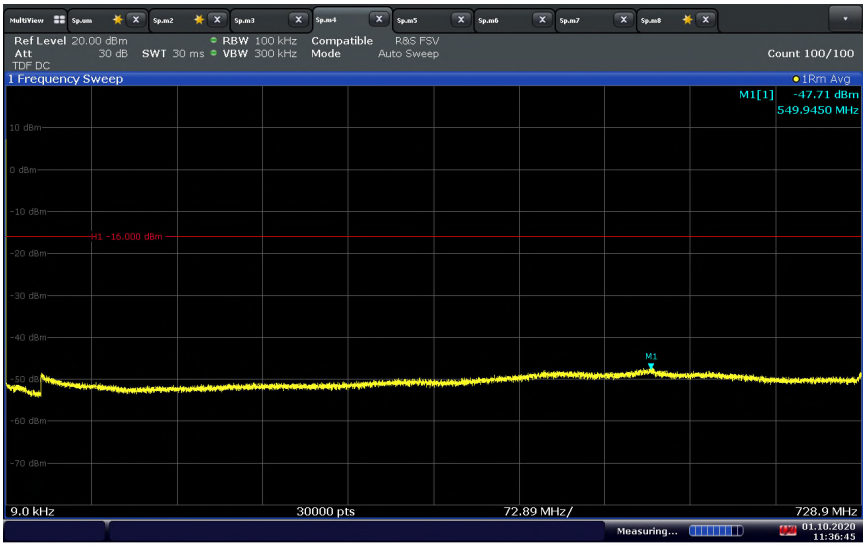
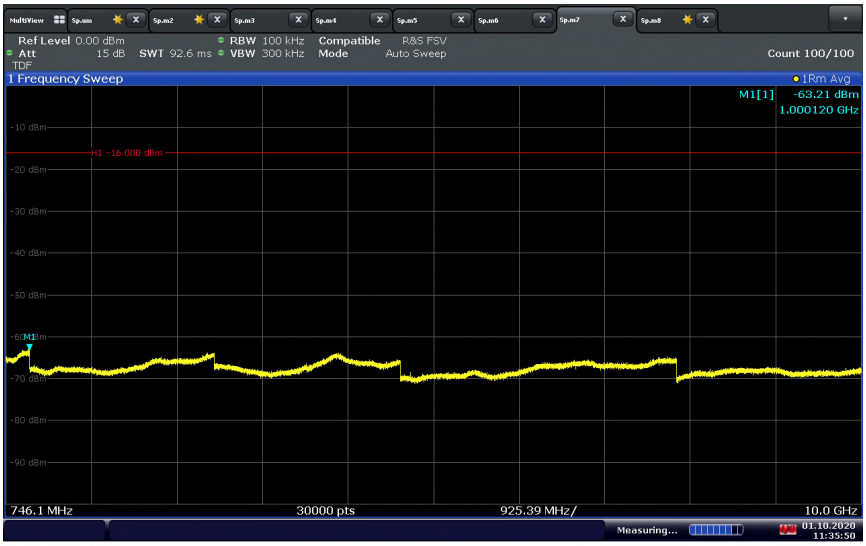
LTE Band 12 Downlink (5 MHz BW) Low Channel / Spurious Emissions

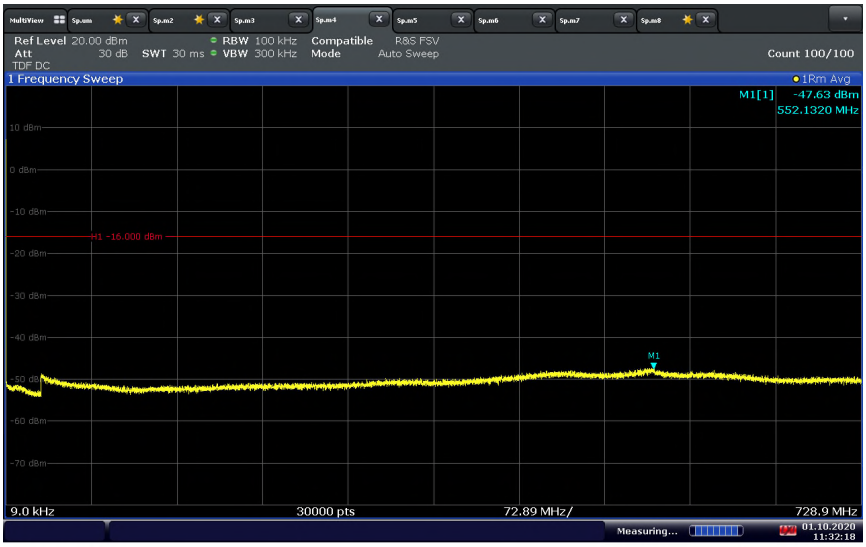


11:36:45 01.10.2020

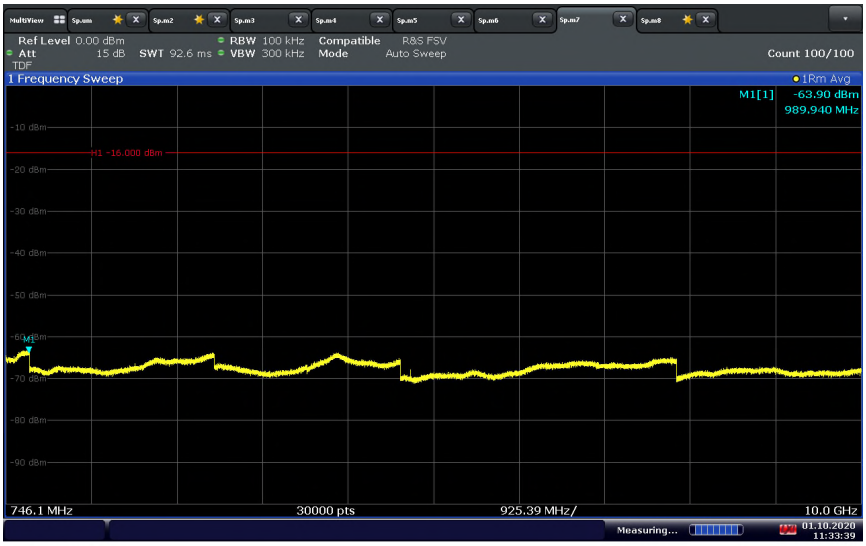


11:35:50 01.10.2020

LTE Band 12 Downlink (5 MHz BW) Mid Channel / Spurious Emissions



11:32:19 01.10.2020



11:33:40 01.10.2020

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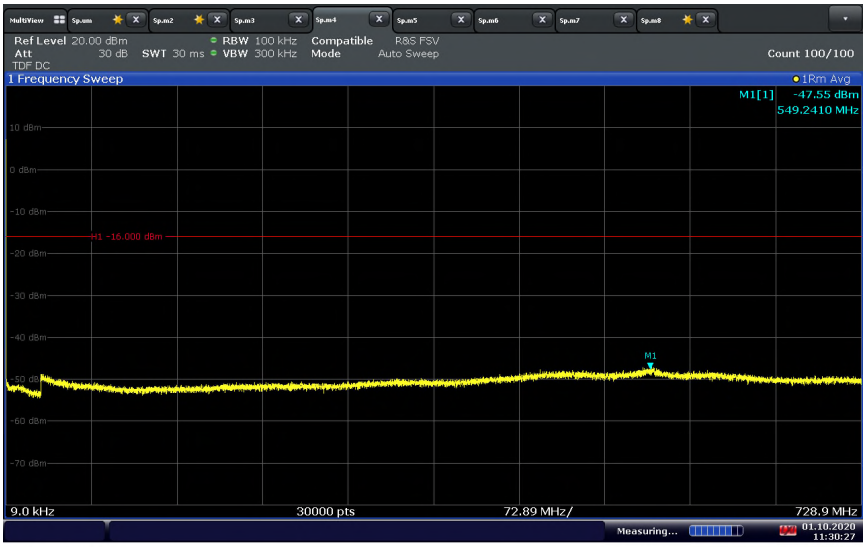
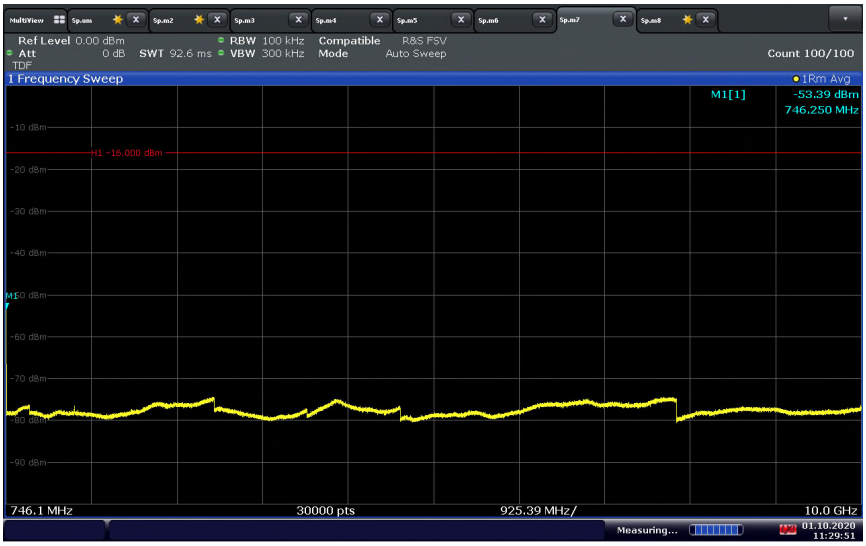
LTE Band 12 Downlink (5 MHz BW) High Channel / Spurious Emissions



11:30:28 01.10.2020



11:29:51 01.10.2020

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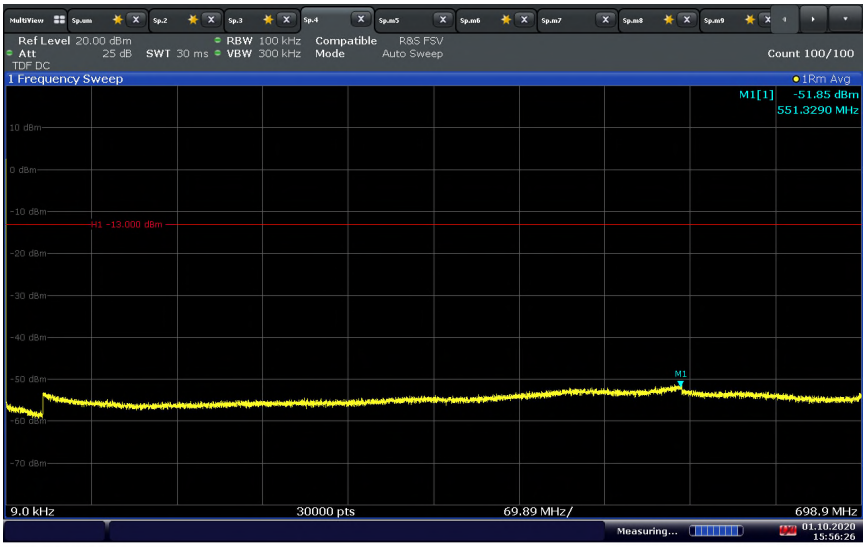
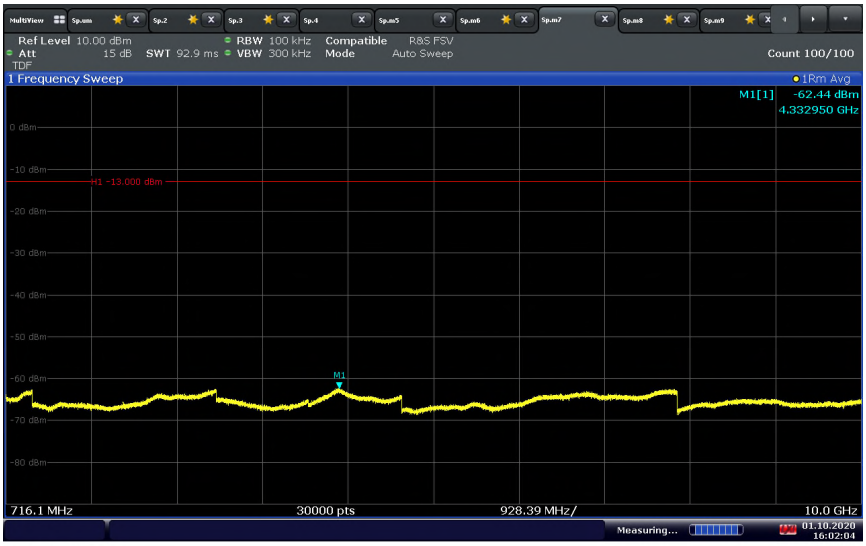
LTE Band 12 Uplink (5 MHz BW) Low Channel / Spurious Emissions



15:56:27 01.10.2020

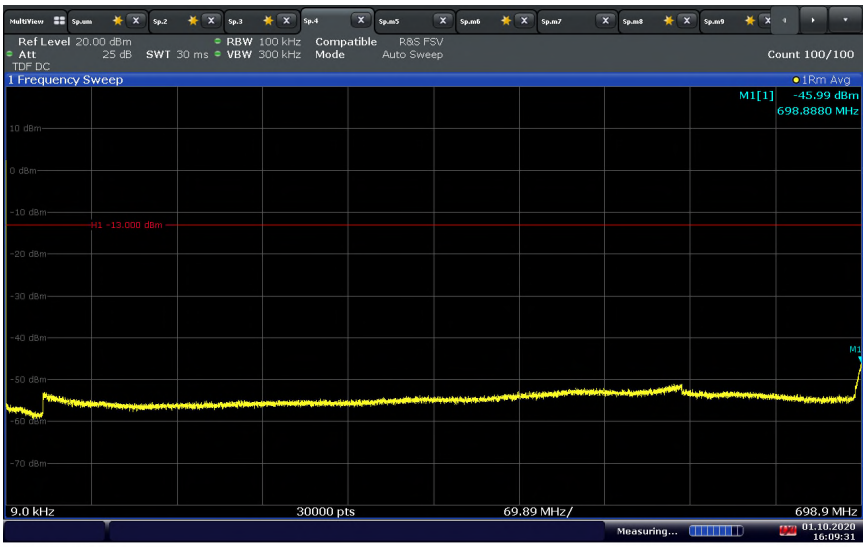


16:02:05 01.10.2020

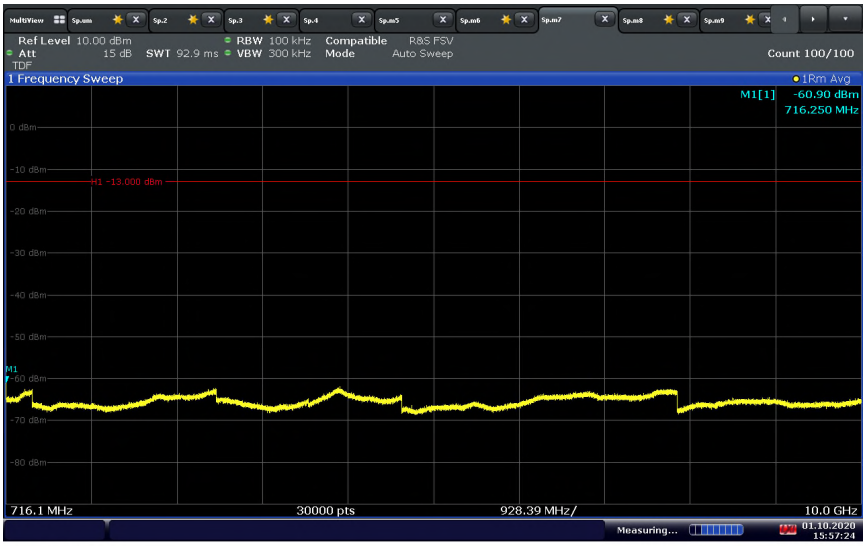
The limit should be adjusted with a correction of -3 dB [10Log(2)]
accounting for MIMO transmission on both external antennas
Limit = -13 - 3 = -16 dBm

TÜV SÜD AMERICA INC 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone: 858 678 1400 FAX: 858 546 0364

LTE Band 12 Uplink (5 MHz BW) Mid Channel / Spurious Emissions



16:09:31 01.10.2020



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The limit should be adjusted with a correction of -3 dB [10Log(2)] accounting for MIMO transmission on both external antennas
Limit = -13 - 3 = -16 dBm

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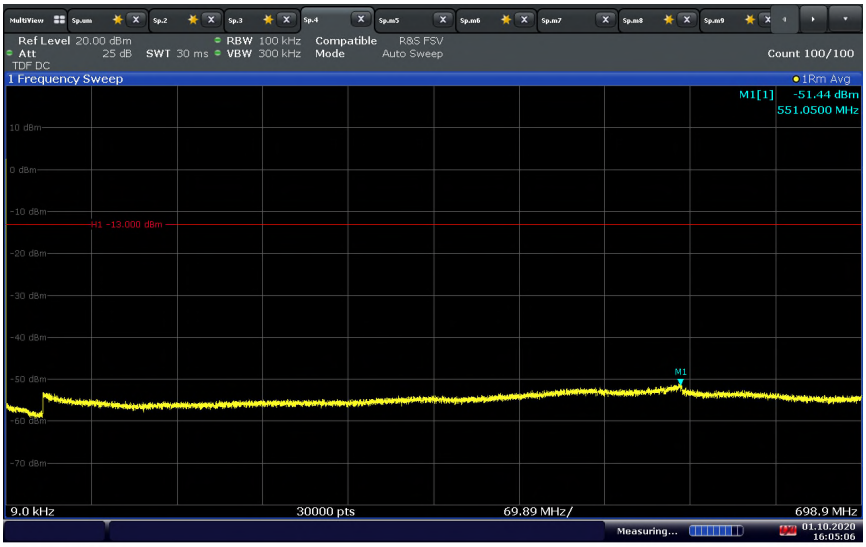
LTE Band 12 Uplink (5 MHz BW) High Channel / Spurious Emissions



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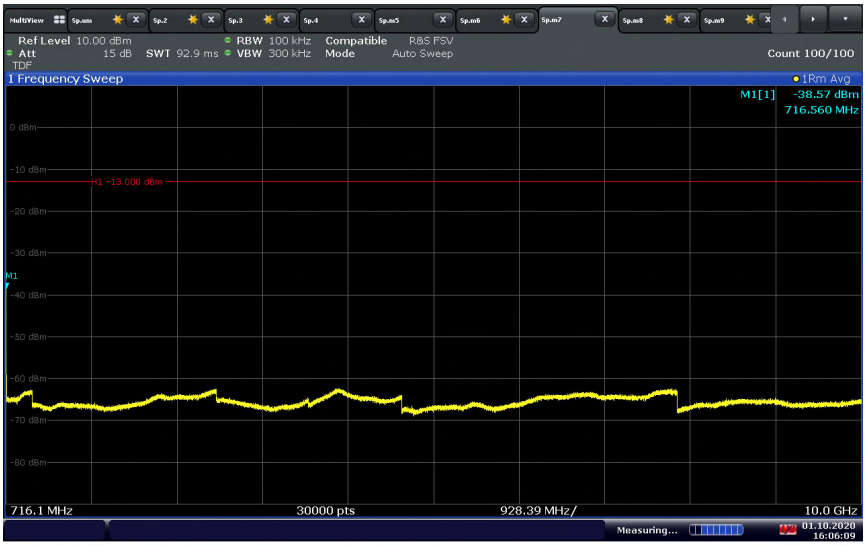

16:06:09 01.10.2020

The limit should be adjusted with a correction of -3 dB [10Log(2)]
accounting for MIMO transmission on both external antennas
Limit = -13 - 3 = -16 dBm

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SECTION 4

TEST EQUIPMENT USED

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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	08/18/20	08/18/21
50MHz-18GHz Wideband Power Sensor	N1921A	MY51100054	Agilent	50MHz-18GHz Wideband Power Sensor	09/10/20	09/10/21
7608	Vector Signal Generator	SMBV100A	259021	Rhode & Schwarz	10/10/19	10/10/21
7582	Signal/Spectrum Analyzer	FSW26	101614	Rhode & Schwarz	01/22/20	01/22/21
8825	20dB Attenuator	46-20-34	BK5773	Weinschel Corp.	Verified by 7608 and 7582	
Radiated Test Setup						
1033	Bilog Antenna	3142C	00044556	EMCO	09/05/19	09/05/21
7575	Double-ridged waveguide horn antenna	3117	00155511	EMCO	06/22/20	06/22/22
8628	Pre-amplifier	QLJ 01182835-JO	8986002	QuinStar Technologies Inc.	02/26/20	02/26/21
1016	Pre-amplifier	PAM-0202	187	A.H. Systems, Inc.	02/26/20	02/26/21
1040	EMI Test Receiver	ESIB40	100292	Rhode & Schwarz	10/11/19	10/11/20*
7620	EMI Test Receiver	ESU	100399	Rhode & Schwarz	10/18/19	10/18/20
7608	Vector Signal Generator	SMBV100A	259021	Rhode & Schwarz	10/10/19	10/10/21
7582	Signal/Spectrum Analyzer	FSW26	101614	Rhode & Schwarz	01/22/20	01/22/21
1153	High-frequency cable	SucoFlex 100 SX	N/A	Suhner	Verified by 7608 and 7620	
8543	High-frequency cable	Micropore 19057793	N/A	United Microwave Products	Verified by 7608 and 7620	
8807	2110- 2170 MHz Notch Filter	BRM50723	006	Micro-Tronics	Verified by 7608 and 7620	
8806	1.8GHz to 2.0GHz Notch Filter	BRM50707	005	Micro-Tronics	Verified by 7608 and 7620	
8813	900 MHz High Pass	777	N/A	SAC	Verified by 7608 and 7620	
Miscellaneous						
6737	Multimeter Digital	87V	36740294	Fluke	08/11/20	08/11/21
7579	Temperature Chamber	115	151617	TestQuity	Verified by 11312	
11312	Mini Environmental Quality Meter	850027	CF099-56010-340	Sper Scientific	05/22/20	05/22/21
	Test Software	EMC32	V8.53	Rhode & Schwarz	N/A	

* The equipment was still within calibration when testing.

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	Received 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 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**

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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**		

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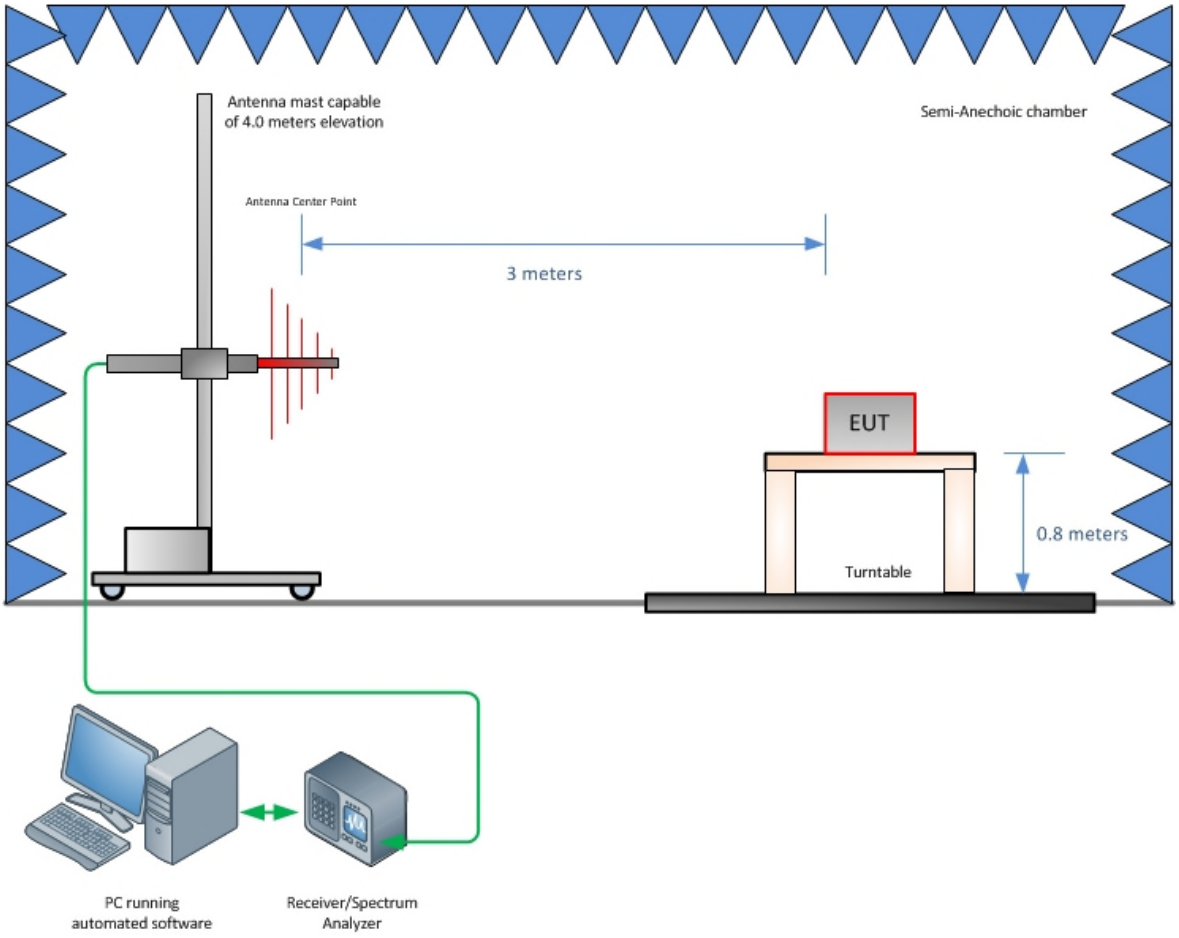
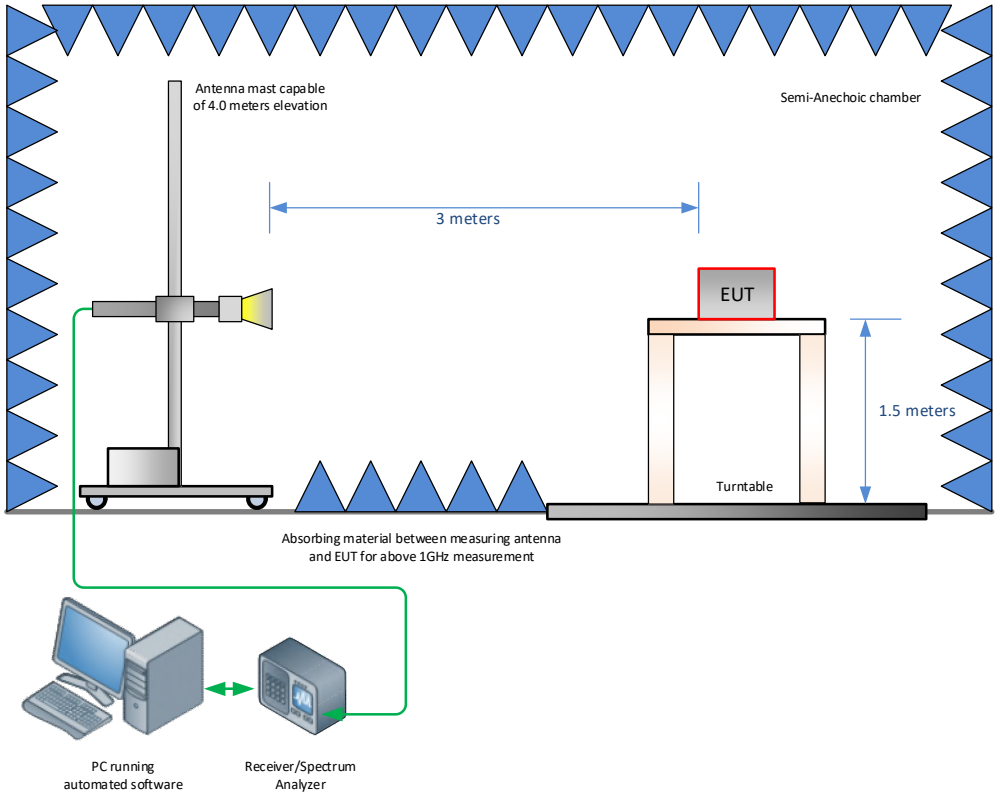
SECTION 5

DIAGRAM OF TEST SETUP

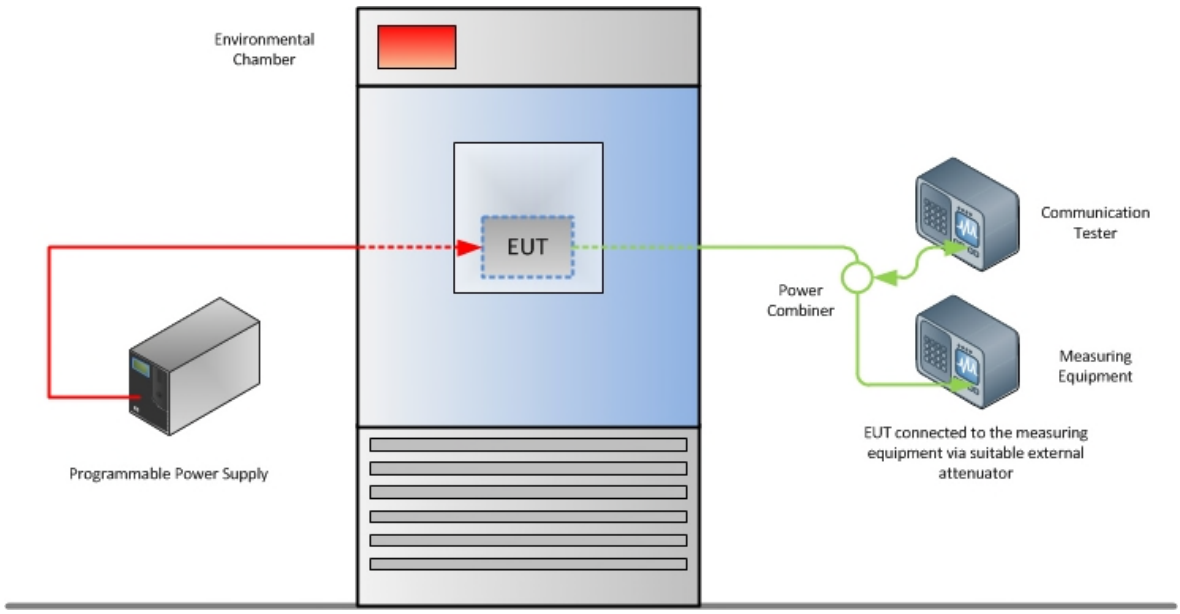
4.1 TEST SETUP DIAGRAM



Radiated Emission Test Setup (Below 1GHz)



Radiated Emission Test Setup (Above 1GHz)



Frequency Stability Test Comfiguration

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SECTION 6

ACCREDITATION, DISCLAIMERS AND COPYRIGHT

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