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Report On

Application for Grant of Equipment Authorization of the
Nextivity Inc.

QUATRA 4000 Industrial Signal Booster

FCC CFR 47 Part 20
RSS-131

Report No. 72154394D

December 2019

FCC ID: NU: YETI441234CNU
CU: YETI415ECU
IC: NU: 9298A-I441234CNU
CU: 9298A-I415ECU
Report No. 72154394D



REPORT ON	Radio Testing of the Nextivity Inc. QUATRA 4000 Industrial Signal Booster
TEST REPORT NUMBER	72154394D
PREPARED FOR	Nextivity Inc. 16550 West Bernardo Drive, Bldg 5, Suite 550, San Diego, CA 92127, USA
CONTACT PERSON	CK Li Sr. Principal Engineer, Regulatory (858) 485-9442 CLi@Nextivityinc.com
PREPARED BY	 Xiaoying Zhang Name Authorized Signatory Title: EMC/Wireless Test Engineer
APPROVED BY	 Ferdinand S. Custodio Name Authorized Signatory Title: Senior EMC Test Engineer/Wireless Team Lead
DATED	<u>December 19, 2019</u>

FCC ID: NU: YETI441234CNU
CU: YETI415ECU
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Revision History

72154394D Nextivity Inc. QUATRA 4000 Industrial Signal Booster					
DATE	OLD REVISION	NEW REVISION	REASON	PAGES AFFECTED	APPROVED BY
12/19/2018	-	Initial Release			Ferdinand Custodio

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SECTION 1

REPORT SUMMARY

Radio Testing of the
Nextivity Inc.
QUATRA 4000 Industrial Signal Booster

1.1 INTRODUCTION

The information contained in this report is intended to show verification of the Nextivity Inc. QUATRA 4000 Industrial Signal Booster to the requirements of the following:

- FCC CFR 47 Part 20
- RSS-Gen Issue 5 April 2018
- RSS-131 Issue 3 January 2017

Objective	To perform Radio Testing to determine the Equipment Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out.
Manufacturer	Nextivity Inc.
EUT	Industrial Signal Booster
Product Marketing Name	QUATRA 4000
Model Number(s)	NU: I44-1234CNU CU: I41-5ECU
FCC ID Number	NU: YETI441234CNU CU: YETI415ECU
IC Number	NU: 9298A-I441234CNU CU: 9298A-I415ECU
Serial Number(s)	370920000139 (NU) and 371929000156 (CU)
Number of Samples Tested	2
Test Specification/Issue/Date	• FCC CFR 47 Part 20 (October 1, 2018) • RSS-131 - Zone Enhancer (Issue 3, May 2017)
Start of Test	November 15, 2019
Finish of Test	December 13, 2019
Name of Engineer(s)	Xiaoying Zhang
Related Document(s)	KDB 935210 D05 Indus Booster Basic Meas v01r03 (April 15, 2019)

1.2 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out in accordance with FCC CFR 47 Part 20 with cross-reference to the corresponding ISSED RSS standards is shown below.

Section	Spec Clause			Test Description	Result
	FCC Part 20	KDB 935210 D05	RSS-131		
2.1	20.21 (c)	3.2	-	AGC Threshold Level	Compliant
2.2		3.3	5.2.1	Out-of-Band rejection	Compliant
2.3		3.4	5.2.2	Input-versus-Output Signal Comparison	Compliant
2.4		3.5	5.2.3	Mean Output Power and Amplifier/Booster Gain	Compliant
2.5		3.6	-	Out-of-band/out-of-block (Intermodulation) and Spurious Emissions	Compliant
-		3.7	-	Frequency Stability	Note
-		3.8	-	Spurious Emissions Radiated Measurement	Note

Note: Different Standard Applies; Refer to test report 72154394A Test Report for WCDMA Band 5 and LTE Band 5, 25 and 72154394B for LTE Band 4, 12, 13, 30 and 71.

1.3 PRODUCT INFORMATION

1.3.1 EUT General Description

The Equipment Under Test (EUT) was a Nextivity Inc. QUATRA 4000 Industrial Signal Booster. The EUT is a WCDMA/LTE Signal Booster to improve voice and data cellular performance in large enterprise environments. Quatra 4000 is capable to support up to four carriers (via separate donor antenna ports). Quatra 4000 consists of two separate units: the Network Unit (NU), and the Coverage Unit (CU). The NU comprises a transmitter and receiver which communicate with the cell tower and the CU. CU comprises a transmitter and receiver which communicate with the User Equipment (e.g. Cell Phone) and the NU.

Users place the NU in an area with the strongest signal from the carrier networks. The CUs are then either placed in the center of the home or office, or in the area where the best signal quality is most needed. The NU and CU are placed at varying distance apart and are communicated via Ethernet cables.

One NU can connect up to six CUs via Ethernet Cat 5 cables. The NU transmits and receives Cellular signals from the base station and operates similar to a cellular handset. The CU transmits and receives signals with the cellular handset and operates on frequencies similar to the cellular base station.

NU has four antenna ports. Each antenna port is assigned to support one operator, separated donor antennas. Up to two bands can be transmitted simultaneously at each antenna port from yellow group to another colored group (eg. Carrier B: LTE Band 71 + Band 4, Band 71 + Band 25, Band 12 + Band 4, Band 12 + Band 25).

Up to two bands on each antenna port															
Ant Port	1					2					3			4	
Operator #	A					B					C			D	
Max Support BW	30 MHz					40 MHz					30 MHz			40 MHz	
Band	LB12	LB30	W5	L25	L4	L71	L12	L4	L25	L13	L25	L4	L41	L26	L25
Band Combination	√		√			√		√		√	√		√	√	
	√			√		√			√	√		√	√		√
	√				√		√	√		-	-	-		√	√
		√	√				√		√	-	-	-	-	-	-
		√		√				√	√	-	-	-	-	-	-
		√			√	-	-	-	-	-	-	-	-	-	-

The WCDMA Band 5, LTE Band 4, 12, 13, 25, 26 869-894/824-849 MHz, 30 and 71 function of the EUT were verified in this test report.

1.3.2 Technical Description

EUT Description	Industrial Signal Booster
Trade Name	CeI-Fi™
Product Marketing Name	QUATRA 4000
Model Number(s)	NU: I44-1234CNU CU: I41-5ECU
Rated Voltage	NU: 120 VAC 60Hz CU: 54V DC (powered from NU via 2 Ethernet cables)
Mode Verified	WCDMA Band 5, LTE Band 4, 12, 13, 25, 26 (869-894/824-849MHz), 30 and 71
Frequency Bands	WCDMA Band 5: Uplink: 824 – 849 MHz Downlink: 869 – 894 MHz LTE Band 4: Uplink: 1710 - 1785 MHz Downlink: 2110 - 2155 MHz LTE Band 12: Uplink: 699 - 716 MHz Downlink: 729 - 746 MHz LTE Band 13: Uplink: 777 - 787 MHz Downlink: 746 - 756 MHz LTE Band 25: Uplink: 1850 - 1915MHz Downlink: 1930 -1995MHz LTE Band 26: Uplink: 824 – 849 MHz Downlink: 869 – 894 MHz LTE Band 30: Uplink: 2305 - 2315 MHz Downlink: 2350 - 2360 MHz LTE Band 71: Uplink: 663 - 698 MHz Downlink: 617 - 652 MHz

Product Specifications

Frequency Band	WCDMA B5 LTE B26	LTE Band 12, 13, 30	LTE Band 4, 25, 71
Booster Bandwidth (MHz)	5, 10, 15	5, 10	5, 10, 15, 20
Downlink Output Power (dBm)	Max. 13 (WCDMA) Max. 16 (LTE)	Max. 16	Max. 16
Uplink Output Power (dBm)	Max. 22	Max. 22 (Band 12, 13) Max. 19 (Band 30)	Max. 22

Capability WCDMA (Band 5), LTE (Band 4, 12, 13, 25, 26, 30, 41 and 71)

Primary Unit (EUT)

- ☐ Production
☒ Pre-Production
☐ Engineering

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Environment	Fixed, Indoor
Manufacturer Declared Temperature Range	0°C to 40°C
Antenna Type	External Antenna
Manufacturer	Refer to the Antenna information supplied by the manufacture
Antenna Model	Refer to the Antenna information supplied by the manufacture
Maximum Antenna Gain	

Radio	Uplink (Donor)	Downlink (Server)
WCDMA Band 5	6.31 dBi	0.4 dBi
LTE Band 4	5.72 dBi	2.6 dBi
LTE Band 12	6.77 dBi	0.4 dBi
LTE Band 13	6.48 dBi	0.4 dBi
LTE Band 25	5.37 dBi	2.6 dBi
LTE Band 26	6.35 dBi	0.4 dBi
LTE Band 30	4.33 dBi	2.3 dBi
LTE Band 71	6.91 dBi	0.4 dBi

1.4 EUT TEST CONFIGURATION

1.4.1 Test Configuration Description

Test Configuration	Description
A	Downlink (CU TX). Input signal is applied to antenna port of NU. Output is monitored from antenna port of CU.
B	Uplink (NU TX). Input signal is applied to antenna port of CU. Output is monitored from antenna port of NU.

1.4.2 EUT Exercise Software

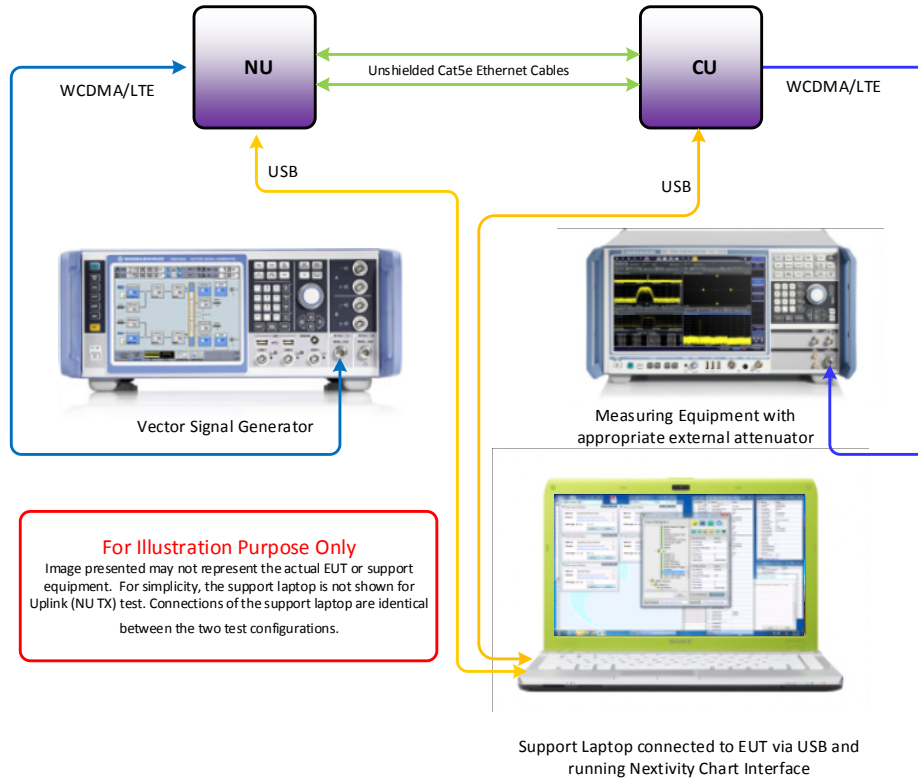
Manufacturer provided a Nextivity Chart Interface v2.0.0.16 running from a support laptop where both EUT are connected via USB.

1.4.3 Support Equipment and I/O cables

Manufacturer	Equipment/Cable	Description
Dell	Support Laptop	M/N Latitude D630 PP18L S/N 5SBJBG1
Dell	Support Laptop AC Adapter	M/N PA-1900-02D S/N 5SBJBG1
Nextivity	Support USB cable x 2	Custom 1.0 meter shielded USB Type A to Type A cable
Nextivity	Support USB cable x 2	Custom 1.0 meter shielded USB Type A to Micro B cable
Nextivity	USB / Interface Box x 2	Unshielded with "Tag-Connect" interface
Agilent	ESG Vector Signal Generator	M/N: E4438C, S/N: MY49071335
Ramsey	Support Shielded Test Enclosure	With custom USB cable

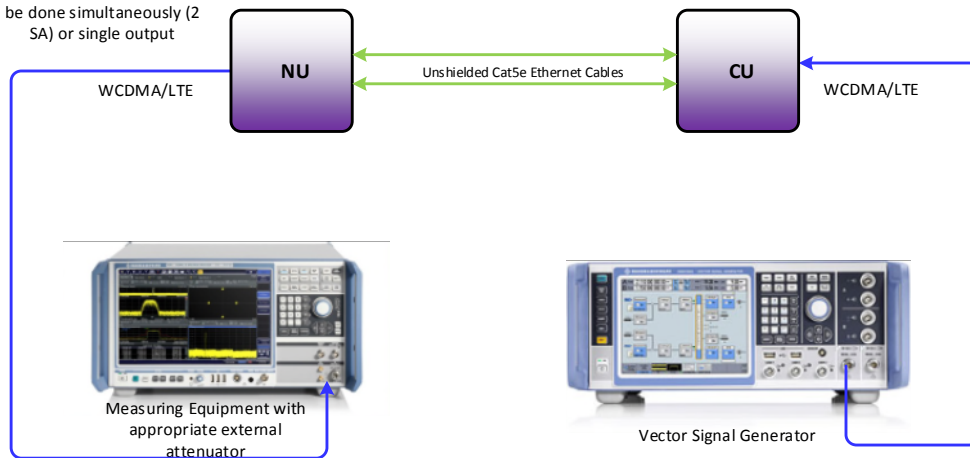
1.4.4 Simplified Test Configuration Diagram

Downlink (CU Tx) Conducted Test



Uplink (NU Tx) Conducted Test

Monitoring the output can be done simultaneously (2 SA) or single output



1.5 DEVIATIONS FROM THE STANDARD

No deviations from the applicable test standards or test plan were made during testing.

1.6 MODIFICATION RECORD

Description of Modification	Modification Fitted By	Date Modification Fitted
Serial Number: 370920000139 (NU) and 371929000156 (CU)		
None	—	—

The table above details modifications made to the EUT during the test programme. The modifications incorporated during each test (if relevant) are recorded on the appropriate test pages.

1.7 TEST METHODOLOGY

All measurements contained in this report were conducted with ANSI C63.26 2015, American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services

For conducted (if applicable) and radiated emissions the equipment under test (EUT) was configured to measure its highest possible emission level. This level was based on the maximized cable configuration from exploratory testing per ANSI C63.26-2015. The test modes were adapted according to the Operating Instructions provided by the manufacturer/client.

1.8 TEST FACILITY LOCATION

1.8.1 TÜV SÜD America Inc. (Mira Mesa)

10040 Mesa Rim Road, San Diego, CA 92121-2912 (32.901268,-117.177681). Phone: 858 678 1400 FAX: 858 546 0364

1.8.2 TÜV SÜD America Inc. (Rancho Bernardo)

16936 Via Del Campo, San Diego, CA 92127-1708 (33.018644,-117.092409). Phone: (858) 678-1400 Fax: (858) 546-0364.

1.9 TEST FACILITY REGISTRATION

1.9.1 FCC – Designation No.: US1146

TUV SUD America Inc. (San Diego), is an accredited test facility with the site description report on file and has met all the requirements specified in §2.948 of the FCC rules. The acceptance letter from the FCC is maintained in our files and the Designation is US1146.



1.9.2 Innovation, Science and Economic Development Canada (ISED) Registration No.: 3067A-1 & 22806-1

The 10m Semi-anechoic chamber of TUV SUD America Inc. (San Diego Rancho Bernardo) has been registered by Certification and Engineering Bureau of Innovation, Science and Economic Development Canada for radio equipment testing with Registration No. 3067A-1.

The 3m Semi-anechoic chamber of TUV SUD America Inc. (San Diego Mira Mesa) has been registered by Certification and Engineering Bureau of Innovation, Science and Economic Development Canada for radio equipment testing with Registration No. 22806-1.

1.9.3 BSMI – Laboratory Code: SL2-IN-E-028R (US0102)

TUV Product Service Inc. (San Diego) is a recognized EMC testing laboratory by the BSMI under the MRA (Mutual Recognition Arrangement) with the United States. Accreditation includes CNS 13438 up to 6GHz.

1.9.4 NCC (National Communications Commission - US0102)

TUV SUD America Inc. (San Diego) is listed as a Foreign Recognized Telecommunication Equipment Testing Laboratory and is accredited to ISO/IEC 17025 (A2LA Certificate No.2955.13) which under APEC TEL MRA Phase 1 was designated as a Conformity Assessment Body competent to perform testing of equipment subject to the Technical Regulations covered under its scope of accreditation including RTTE01, PLMN01 and PLMN08 for TTE type of testing and LP002 for Low-Power RF Device type of testing.

1.9.5 VCCI – Registration No. A-0280 and A-0281

TUV SUD America Inc. (San Diego) is a VCCI registered measurement facility which includes radiated field strength measurement, radiated field strength measurement above 1GHz, mains port interference measurement and telecommunication port interference measurement.

1.9.6 RRA – Identification No. US0102

TUV SUD America Inc. (San Diego) is National Radio Research Agency (RRA) recognized laboratory under Phase I of the APEC Tel MRA.

1.9.7 OFCA – U.S. Identification No. US0102

TUV SUD America Inc. (San Diego) is recognized by Office of the Communications Authority (OFCA) under Appendix B, Phase I of the APEC Tel MRA.

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1.10 SAMPLE CALCULATIONS

1.10.1 LTE Emission Designator (QPSK)

Emission Designator = 1M30F9W
 F = Frequency Modulation
 9= Composite Digital Info
 W = Combination (Audio/Data)

1.10.2 Spurious Radiated Emission (below 1GHz)

Measuring equipment raw measurement (dbμV) @ 30 MHz			24.4
Correction Factor (dB)	Asset# 1066 (cable)	0.3	-12.6
	Asset# 1172 (cable)	0.3	
	Asset# 1016 (preamplifier)	-30.7	
	Asset# 1175(cable)	0.3	
	Asset# 1002 (antenna)	17.2	
Reported QuasiPeak Final Measurement (dbμV/m) @ 30MHz			11.8

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SECTION 2

TEST DETAILS

Radio Testing of the
Nextivity Inc.
QUATRA 4000 Industrial Signal Booster

2.1 AGC THRESHOLD LEVEL

2.1.1 Specification Reference

KDB 935210 D05, Clause 3.2

2.1.2 Standard Applicable

AGC Threshold Level is tested according to KDB 935210 D05, Clause 3.2:

The AGC threshold shall be determined by applying the procedure of 3.2 (of the current KDB), but with the signal generator configured to produce representative broadband band-limited AWGN signal.

2.1.3 Equipment Under Test and Modification State

Serial No: 370920000139 (NU) and 371929000156 (CU) / Test Configuration A and B

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

November 13, 2019 / ZXY

2.1.5 Test Equipment Used

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

2.1.6 Environmental Conditions/ Test Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	24.3°C
Relative Humidity	45.5%
ATM Pressure	99.1kPa

2.1.7 Additional Observations

- This is a conducted test.
- AWGN 4.1 MHz Signal was used as the applicable test signal type.
- When testing output power of the EUT, a power meter was used according to method 3.5.4 of this KDB, and a spectrum analyzer was used according to method 3.5.3 when testing input power of the EUT.
- The AGC threshold level was recorded when increase the input level until a 1 dB increase in the input signal power no longer causes a 1 dB increase in the output signal power.
- Both downlink and uplink are tested.

2.1.8 Test Results

AGC Threshold Level						
Mode	Bandwidth (MHz)	Channel	Frequency (MHz)	Average Power		AGC Threshold Level (dBm)
				(dBm)	(W)	
WCDMA B5 Downlink	5	4408	881.6	11.59	0.014	-84.03
WCDMA B5 Uplink	5	4183	836.6	21.71	0.148	-73.80
LTE B4 Downlink	5	2175	2132.5	11.25	0.013	-83.81
LTE B4 Uplink	5	20175	1732.5	22.75	0.188	-78.50
LTE B12 Downlink	5	5095	737.5	11.06	0.013	-82.97
LTE B12 Uplink	5	23095	707.5	23.83	0.242	-71.95
LTE B13 Downlink	5	5230	751	10.86	0.012	-84.23
LTE B13 Uplink	5	23230	782	21.35	0.136	-72.09
LTE B25 Downlink	5	8365	1962.5	11.71	0.015	-87.85
LTE B25 Uplink	5	26365	1882.5	22.40	0.174	-77.62
LTE B26 (869-894MHz) Downlink	5	8915	881.5	10.98	0.013	-88.15
LTE B26 (824-849MHz) Uplink	5	26915	836.5	23.82	0.241	-77.05
LTE B30 Downlink	5	9820	2355	10.92	0.012	-87.74
LTE B30 Uplink	5	27710	2310	19.74	0.094	-79.42
LTE B71 Downlink	5	68761	634.5	10.77	0.012	-78.84
LTE B71 Uplink	5	133297	680.5	22.95	0.197	-76.97

2.2 OUT-OF-BAND REJECTION

2.2.1 Specification Reference

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

2.2.2 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.

2.2.3 Equipment Under Test and Modification State

Serial No: 370920000139 (NU) and 371929000156 (CU) / Test Configuration A and B

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

November 14, 2019 / ZXY

2.2.5 Test Equipment Used

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

2.2.6 Environmental Conditions/ Test Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	25.0°C
Relative Humidity	45.3%
ATM Pressure	99.3kPa

2.2.7 Additional Observations

- This is a conducted test.
- The path loss was measured and entered as an offset.
- A swept CW signal whose frequency range is $\pm 250\%$ 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.

2.2.8 Test Results

WCDMA Band 5						
Mode	Bandwidth (MHz)	Channel	Frequency (MHz)	-20 dBc Point		20 dB BW (MHz)
				T1 (MHz)	T2 (MHz)	
Downlink	5	4408	881.6	879.35	883.85	4.5
Uplink	5	4183	836.6	834.33	838.84	4.51

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	2130.03	2134.96	4.93
Uplink	5	20175	1732.5	1730.03	1734.96	4.93

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	735.034	739.97	4.93
Uplink	5	23095	707.5	705.03	709.96	4.93

LTE Band 13						
Mode	Bandwidth (MHz)	Channel	Frequency (MHz)	-20 dBc Point		20 dB BW (MHz)
				T1 (MHz)	T2 (MHz)	
Downlink	5	5230	751.0	748.57	753.45	4.88
Uplink	5	23230	782.0	779.53	784.46	4.93

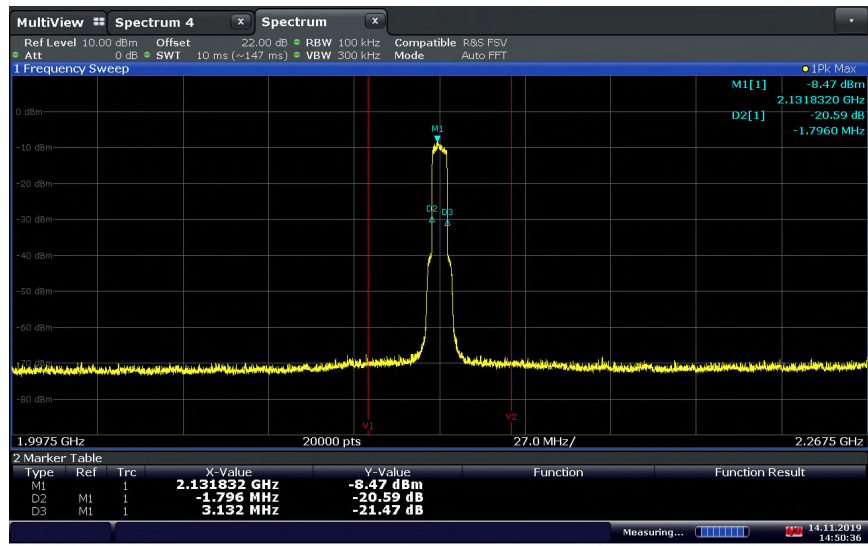
LTE Band 25						
Mode	Bandwidth (MHz)	Channel	Frequency (MHz)	-20 dBc Point		20 dB BW (MHz)
				T1 (MHz)	T2 (MHz)	
Downlink	5	8365	1962.5	1960.03	1964.96	4.93
Uplink	5	26365	1882.5	1879.98	1884.99	5.01

LTE Band 26 (869 - 894 / 824 - 849 MHz)						
Mode	Bandwidth (MHz)	Channel	Frequency (MHz)	-20 dBc Point		20 dB BW (MHz)
				T1 (MHz)	T2 (MHz)	
Downlink	5	8915	881.5	879.03	883.96	4.93
Uplink	5	26915	836.5	834.03	838.97	4.94

LTE Band 30						
Mode	Bandwidth (MHz)	Channel	Frequency (MHz)	-20 dBc Point		20 dB BW (MHz)
				T1 (MHz)	T2 (MHz)	
Downlink	5	9820	2355.0	2352.53	2357.46	4.93
Uplink	5	27710	2310.0	2307.53	2312.47	4.94

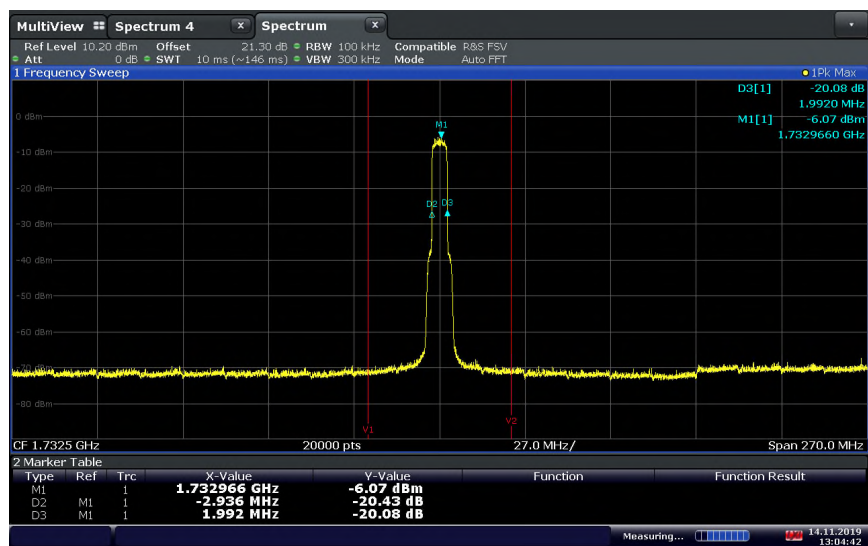
LTE Band 71						
Mode	Bandwidth (MHz)	Channel	Frequency (MHz)	-20 dBc Point		20 dB BW (MHz)
				T1 (MHz)	T2 (MHz)	
Downlink	5	68761	634.5	632.03	636.95	4.92
Uplink	5	133297	680.5	678.03	682.97	4.94

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



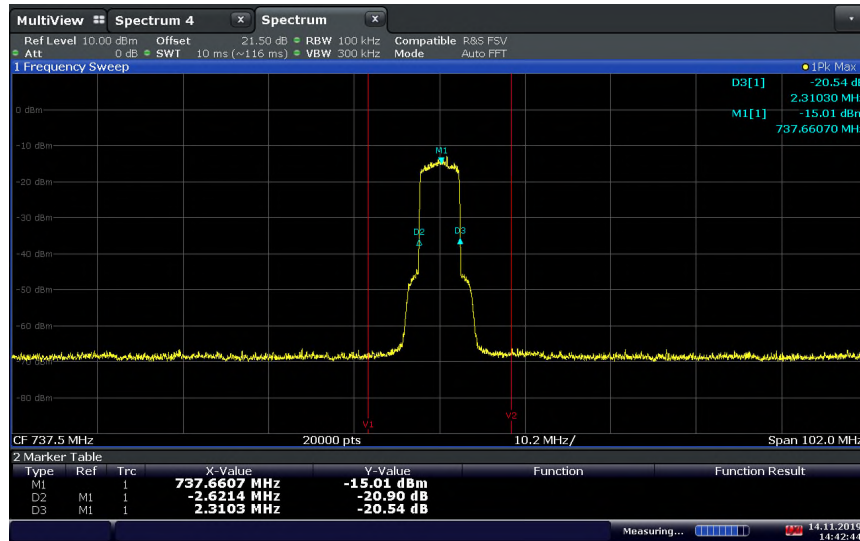
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LTE Band 4 Uplink (5 MHz BW) M Channel / Out-of-Band Rejection



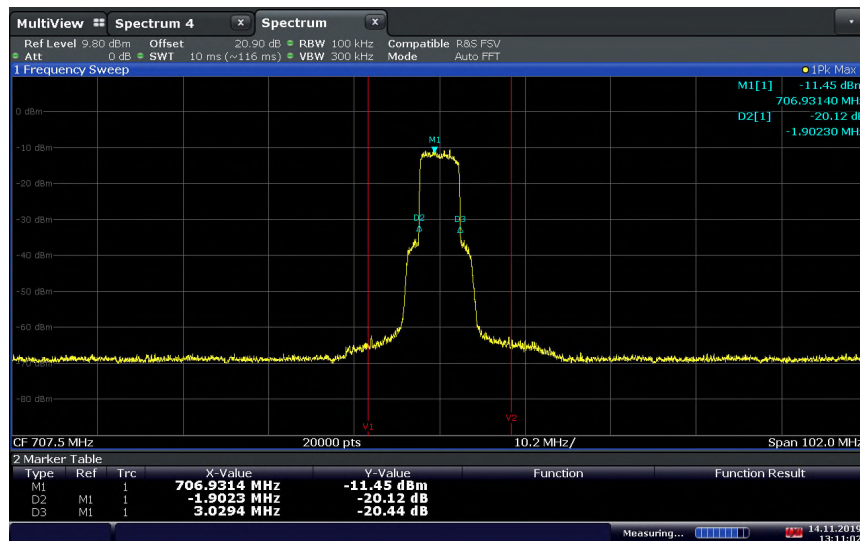
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LTE Band 12 Downlink (5 MHz BW) M Channel / Out-of-Band Rejection



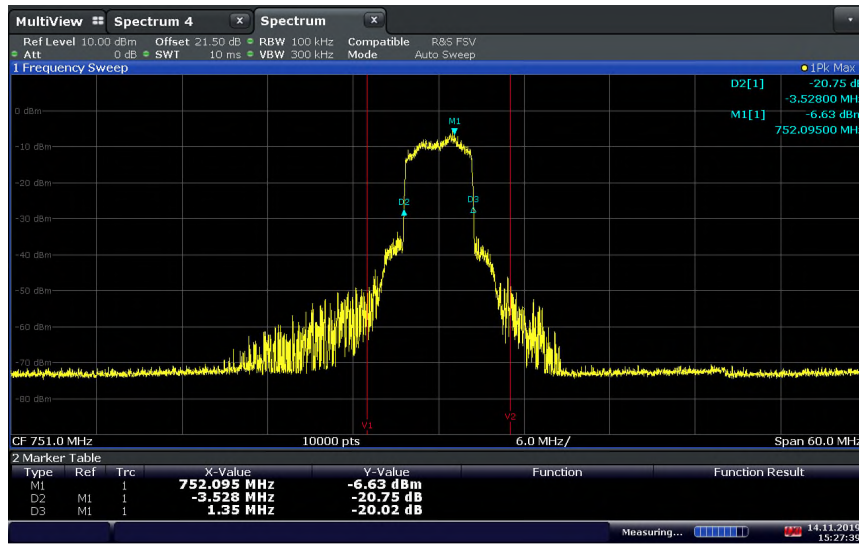
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LTE Band 12 Uplink (5 MHz BW) M Channel / Out-of-Band Rejection



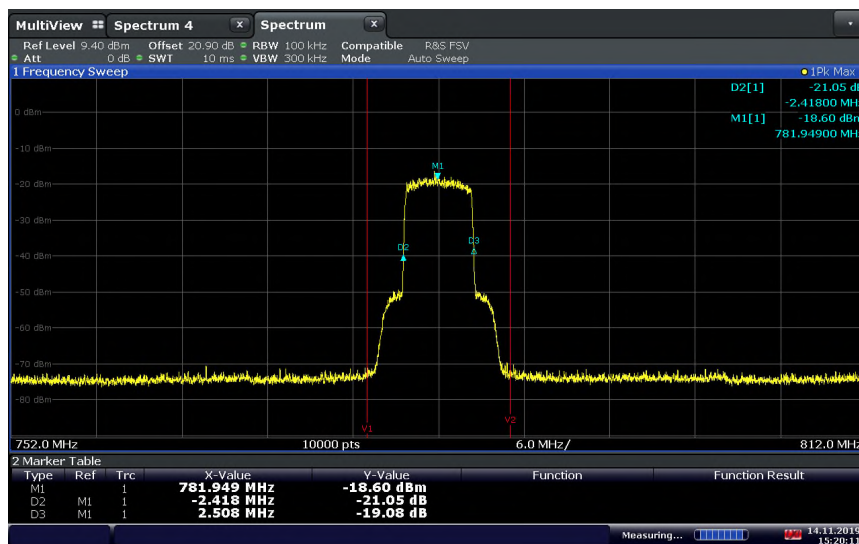
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LTE Band 13 Downlink (5 MHz BW) M Channel / Out-of-Band Rejection



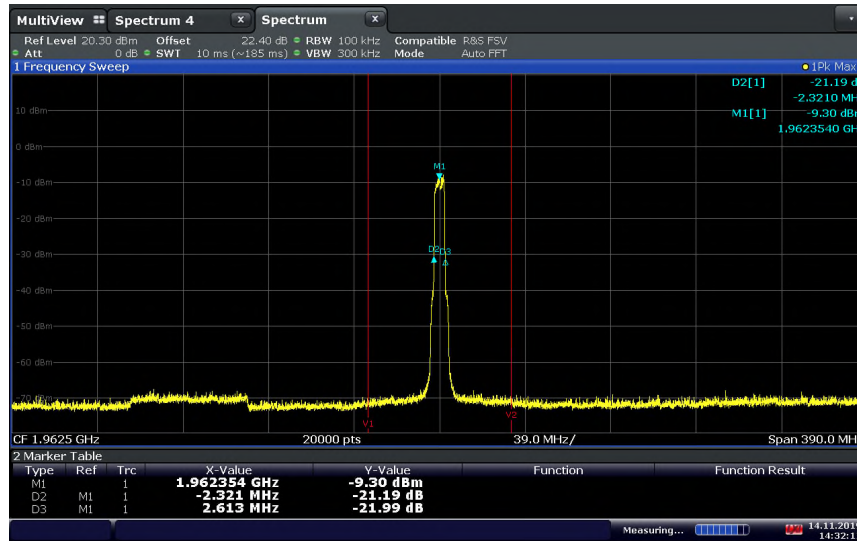
15:27:40 14.11.2019

LTE Band 13 Uplink (5 MHz BW) M Channel / Out-of-Band Rejection



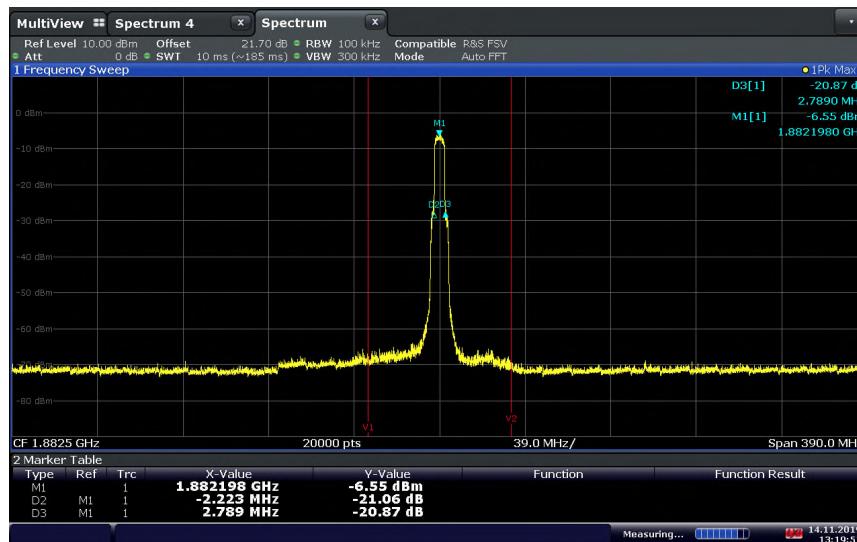
15:20:12 14.11.2019

LTE Band 25 Downlink (5 MHz BW) M Channel / Out-of-Band Rejection



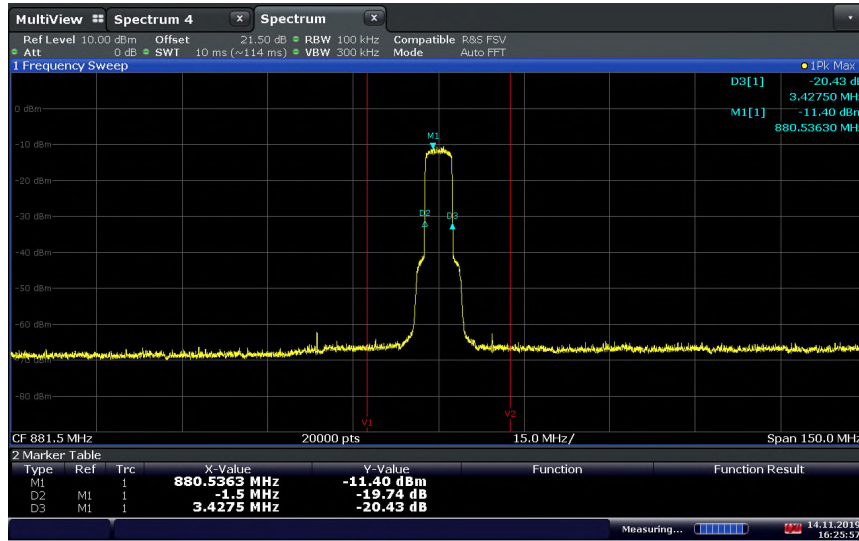
14:32:11 14.11.2019

LTE Band 25 Uplink (5 MHz BW) M Channel / Out-of-Band Rejection



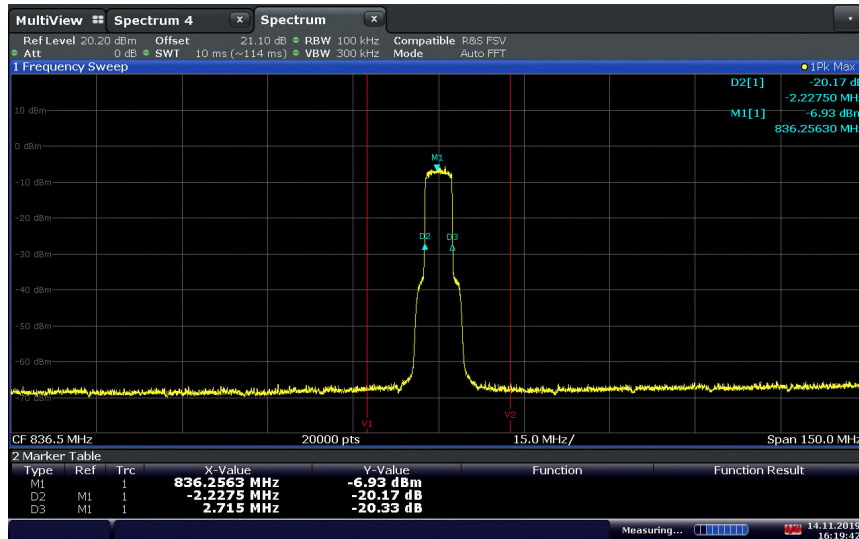
13:19:51 14.11.2019

LTE Band 26 869-894 MHz Downlink (5 MHz BW) M Channel / Out-of-Band Rejection



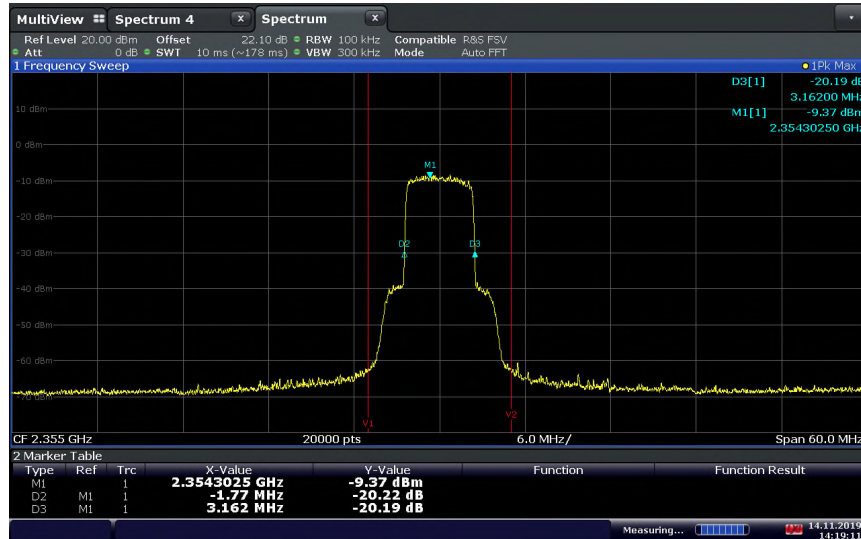
16:25:58 14.11.2019

LTE Band 26 824-849 MHz Uplink (5 MHz BW) M Channel / Out-of-Band Rejection



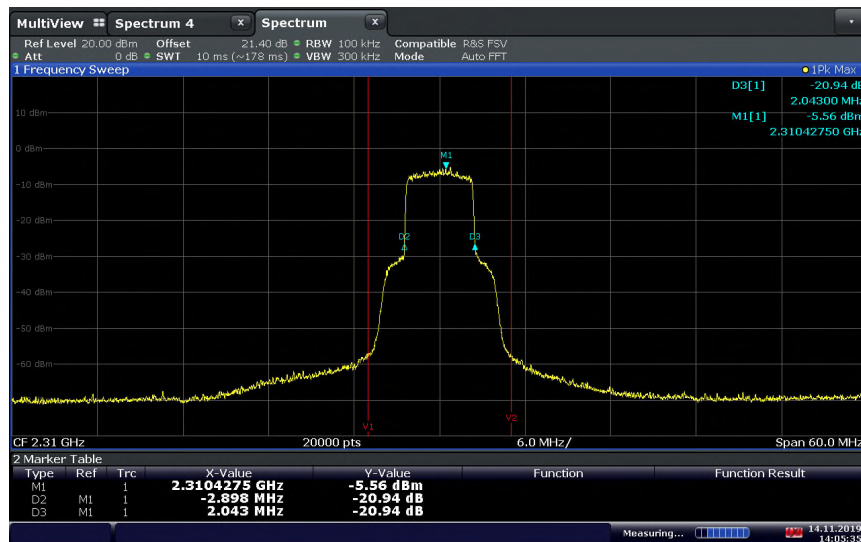
16:19:42 14.11.2019

LTE Band 30 Downlink (5 MHz BW) M Channel / Out-of-Band Rejection



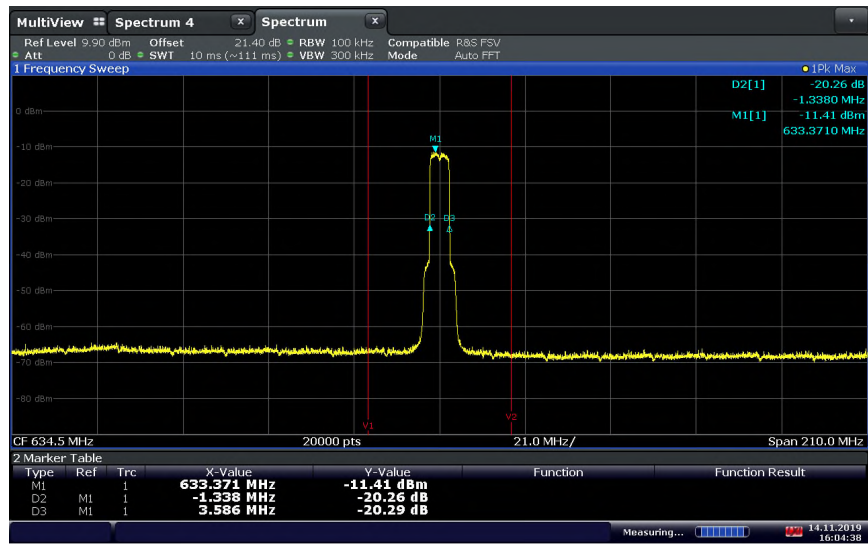
14:19:12 14.11.2019

LTE Band 30 Uplink (5 MHz BW) M Channel / Out-of-Band Rejection



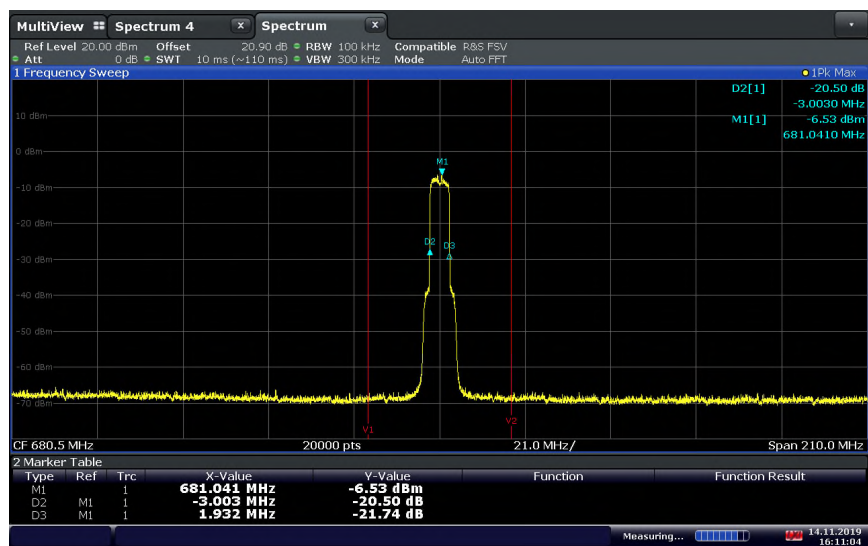
14:05:36 14.11.2019

LTE Band 71 Downlink (5 MHz BW) M Channel / Out-of-Band Rejection



16:04:38 14.11.2019

LTE Band 71 Uplink (5 MHz BW) M Channel / Out-of-Band Rejection



16:11:04 14.11.2019

2.3 INPUT-VERSUS-OUTPUT SIGNAL COMPARISON

2.3.1 Specification Reference

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

2.3.2 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.

2.3.3 Equipment Under Test and Modification State

Serial No: 370920000139 (NU) and 371929000156 (CU) / Test Configuration A and B

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

December 03 and 04, 2019 / ZXY

2.3.5 Test Equipment Used

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

2.3.6 Environmental Conditions/ Test Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	23.2 - 23.7°C
Relative Humidity	41.9 - 51.8%
ATM Pressure	98.9 - 99.3kPa

2.3.7 Additional Observations

- The path loss was measured and entered as an offset.
- The signal generator is configured to transmit LTE 5 MHz Bandwidth signal.
- 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 $> 3 \times$ 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.

2.3.8 Test Results

Compliant. There is no spectral growth of 26 dB bandwidth and it is deemed to be less than 5% of the input signal spectrum.

WCDMA Band 5 Downlink							
Signal Level	Bandwidth (MHz)	Channel	Frequency (MHz)	99% OBW (MHz)		-26 dB BW (MHz)	
				Output	Input*	Output	Input*
AGC Threshold Level	5	4408	881.6	3.87	4.17	4.34	4.63
AGC + 3 dB Level				3.87	4.17	4.36	4.63

* 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.

WCDMA Band 5 Uplink							
Signal Level	Bandwidth (MHz)	Channel	Frequency (MHz)	99% OBW (MHz)		-26 dB BW (MHz)	
				Output	Input*	Output	Input*
AGC Threshold Level	5	4183	836.6	3.87	4.17	4.35	4.63
AGC + 3 dB Level				3.88	4.17	4.35	4.63

* Since the AGC Threshold level and AGC + 3 dB level for Uplink are as low as -70 dBm, which is close to 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							
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	4.46	4.48	4.81	4.96
AGC + 3 dB Level				4.45	4.48	4.78	4.96

* 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	4.44	4.49	4.78	4.96
AGC + 3 dB Level				4.44	4.49	4.76	4.96

* Since the AGC Threshold level and AGC + 3 dB level for Uplink are as low as -70 dBm, which is close to 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	4.44	4.48	4.79	4.93
AGC + 3 dB Level				4.43	4.48	4.77	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 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	4.44	4.49	4.76	4.96
AGC + 3 dB Level				4.44	4.49	4.75	4.96

* Since the AGC Threshold level and AGC + 3 dB level for Uplink are as low as -70 dBm, which is close to 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 13 Downlink							
Signal Level	Bandwidth (MHz)	Channel	Frequency (MHz)	99% OBW (MHz)		-26 dB BW (MHz)	
				Output	Input*	Output	Input*
AGC Threshold Level	5	5230	751	4.44	4.49	4.76	4.96
AGC + 3 dB Level				4.44	4.49	4.77	4.96

* 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 13 Uplink							
Signal Level	Bandwidth (MHz)	Channel	Frequency (MHz)	99% OBW (MHz)		-26 dB BW (MHz)	
				Output	Input*	Output	Input*
AGC Threshold Level	5	23230	782	4.42	4.48	4.75	4.96
AGC + 3 dB Level				4.42	4.48	4.75	4.96

* Since the AGC Threshold level and AGC + 3 dB level for Uplink are as low as -70 dBm, which is close to 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 25 Downlink							
Signal Level	Bandwidth (MHz)	Channel	Frequency (MHz)	99% OBW (MHz)		-26 dB BW (MHz)	
				Output	Input*	Output	Input*
AGC Threshold Level	5	8365	1962.5	4.47	4.48	4.97	4.97
AGC + 3 dB Level				4.45	4.48	4.75	4.97

* 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 25 Uplink							
Signal Level	Bandwidth (MHz)	Channel	Frequency (MHz)	99% OBW (MHz)		-26 dB BW (MHz)	
				Output	Input*	Output	Input*
AGC Threshold Level	5	26365	1882.5	4.44	4.49	4.77	4.97
AGC + 3 dB Level				4.44	4.49	4.75	4.97

* Since the AGC Threshold level and AGC + 3 dB level for Uplink are as low as -70 dBm, which is close to 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 26 869-894 MHz Downlink							
Signal Level	Bandwidth (MHz)	Channel	Frequency (MHz)	99% OBW (MHz)		-26 dB BW (MHz)	
				Output	Input*	Output	Input*
AGC Threshold Level	5	8915	881.5	4.47	4.48	4.79	4.96
AGC + 3 dB Level				4.46	4.48	4.77	4.96

* 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 26 824-849 MHz Uplink							
Signal Level	Bandwidth (MHz)	Channel	Frequency (MHz)	99% OBW (MHz)		-26 dB BW (MHz)	
				Output	Input*	Output	Input*
AGC Threshold Level	10	26915	836.5	4.44	4.49	4.76	4.96
AGC + 3 dB Level				4.44	4.49	4.75	4.96

* Since the AGC Threshold level and AGC + 3 dB level for Uplink are as low as -70 dBm, which is close to 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 30 Downlink							
Signal Level	Bandwidth (MHz)	Channel	Frequency (MHz)	99% OBW (MHz)		-26 dB BW (MHz)	
				Output	Input*	Output	Input*
AGC Threshold Level	5	9820	2355	4.46	4.48	4.79	4.97
AGC + 3 dB Level				4.45	4.48	4.79	4.97

* 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 30 Uplink							
Signal Level	Bandwidth (MHz)	Channel	Frequency (MHz)	99% OBW (MHz)		-26 dB BW (MHz)	
				Output	Input*	Output	Input*
AGC Threshold Level	5	27710	2310	4.44	4.49	4.75	4.94
AGC + 3 dB Level				4.44	4.49	4.76	4.94

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

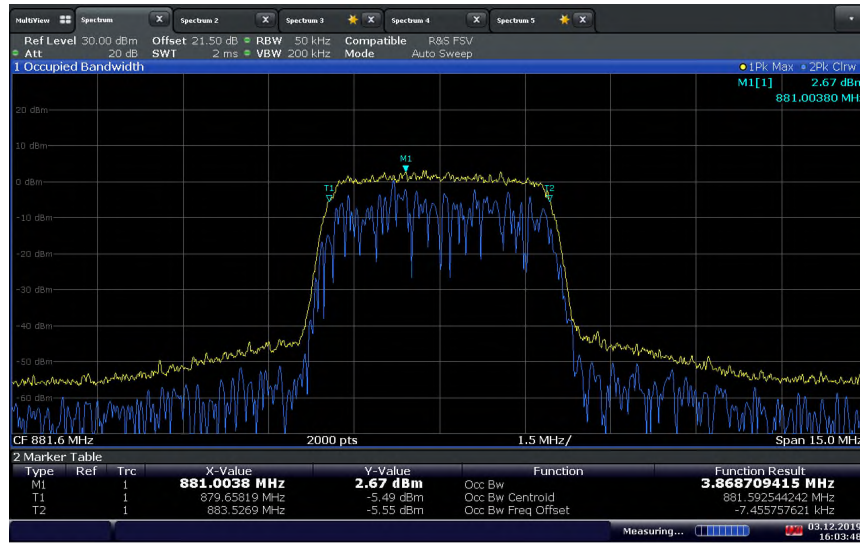
LTE Band 71 Downlink							
Signal Level	Bandwidth (MHz)	Channel	Frequency (MHz)	99% OBW (MHz)		-26 dB BW (MHz)	
				Output	Input*	Output	Input*
AGC Threshold Level	5	68761	634.5	4.46	4.48	4.79	4.96
AGC + 3 dB Level				4.45	4.48	4.79	4.96

* 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 71 Uplink							
Signal Level	Bandwidth (MHz)	Channel	Frequency (MHz)	99% OBW (MHz)		-26 dB BW (MHz)	
				Output	Input*	Output	Input*
AGC Threshold Level	5	133297	680.5	4.44	4.48	4.76	4.98
AGC + 3 dB Level				4.44	4.48	4.76	4.98

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

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



16:03:50 03.12.2019

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



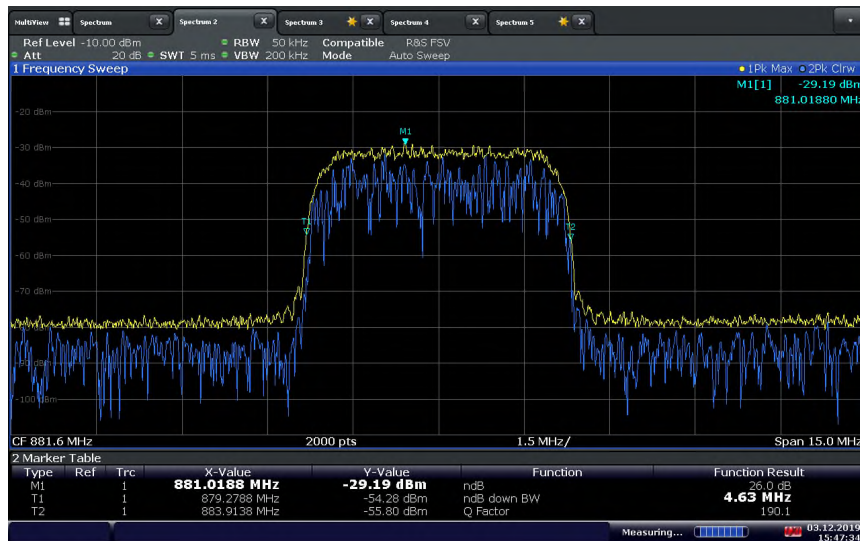
15:46:22 03.12.2019

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



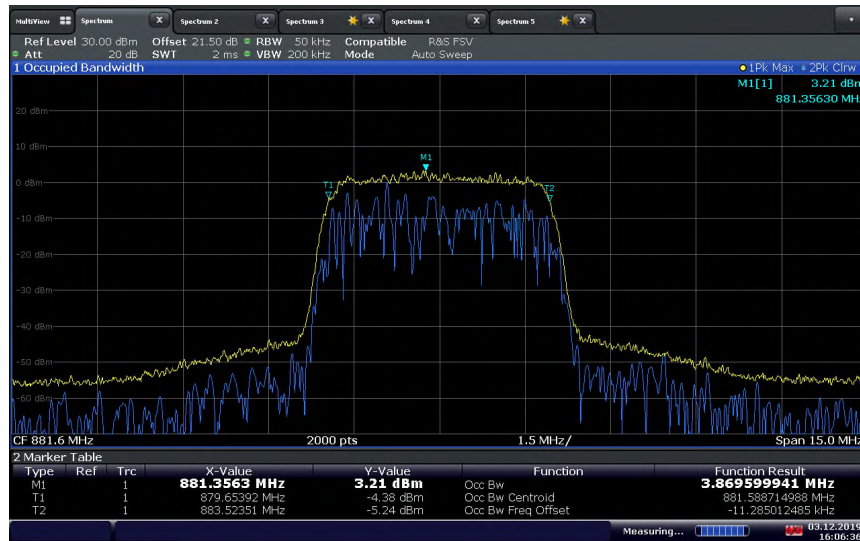
16:05:04 03.12.2019

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



15:47:35 03.12.2019

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



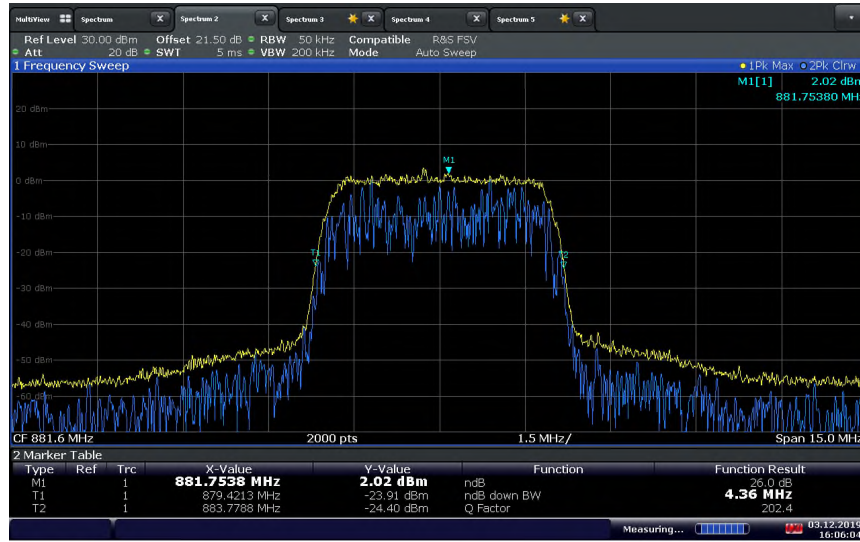
16:06:37 03.12.2019

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



15:46:22 03.12.2019

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



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



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



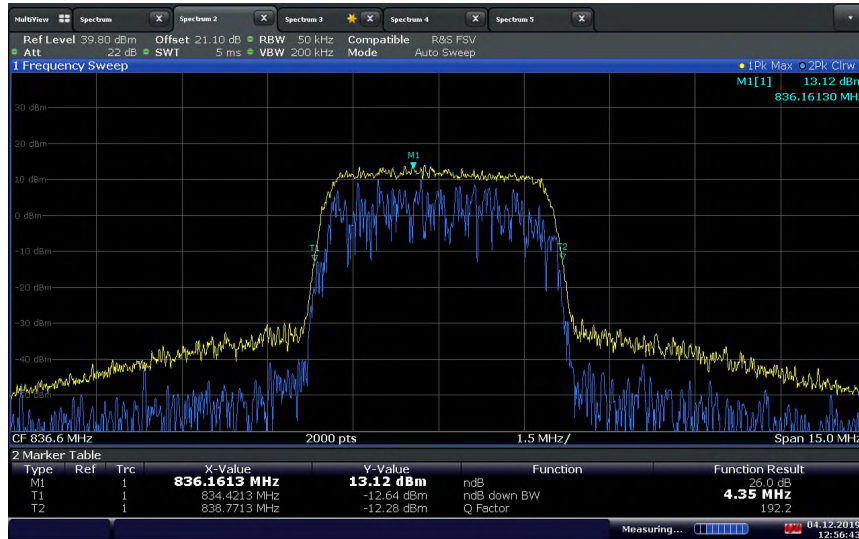
12:55:27 04.12.2019

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



15:50:45 04.12.2019

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



12:56:43 04.12.2019

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



15:49:32 03.12.2019

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



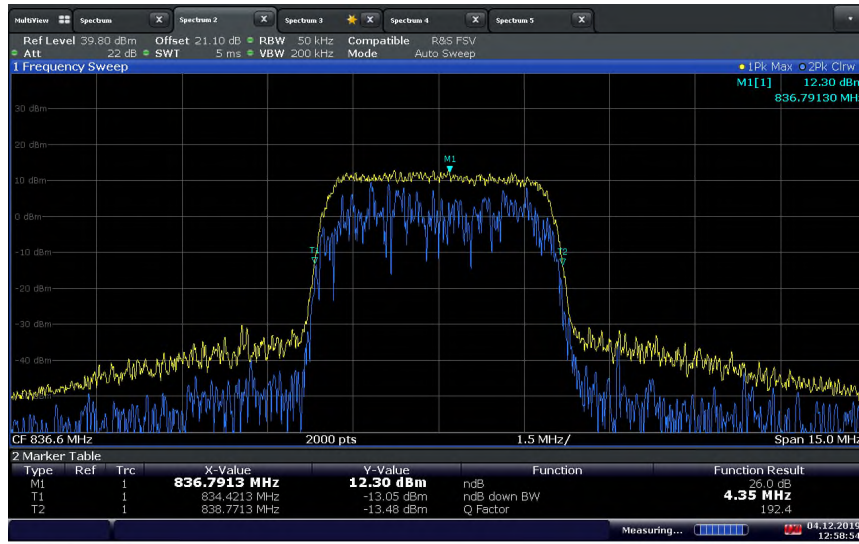
12:58:05 04.12.2019

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



15:50:45 03.12.2019

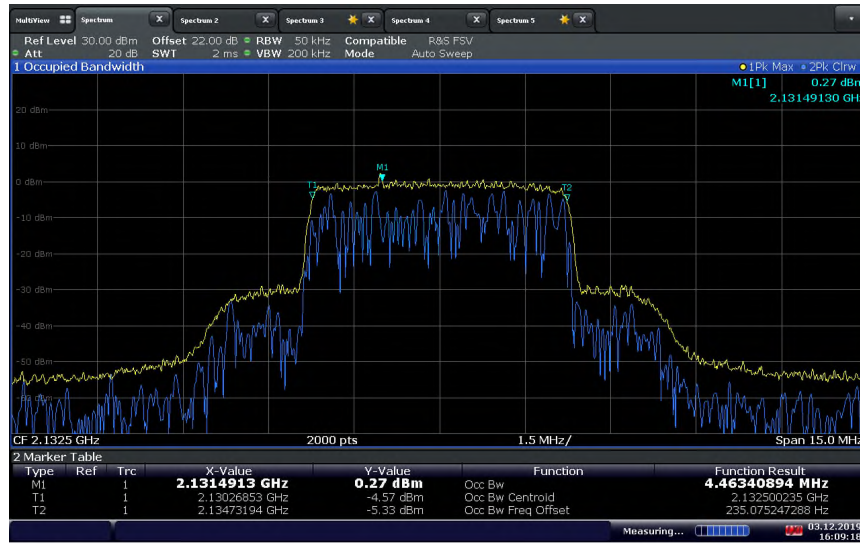
WCMDA Band 5 Uplink (5 MHz BW) Mid Channel / 26 dB BW at Output port with Input signal at AGC + 3 dB Level



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



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



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

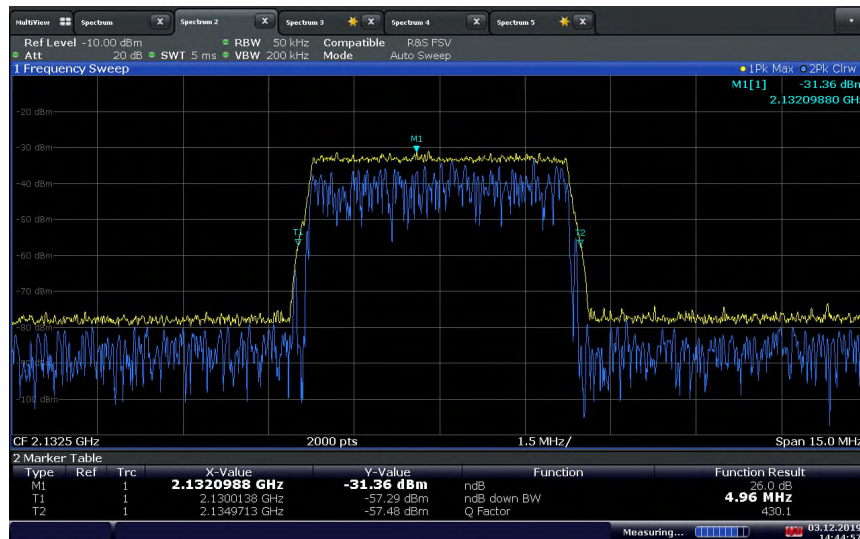


LTE Band 4 Downlink (5 MHz BW) Mid Channel / 26 dB BW at Output port with Input signal at AGC Threshold Level



16:10:07 03.12.2019

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



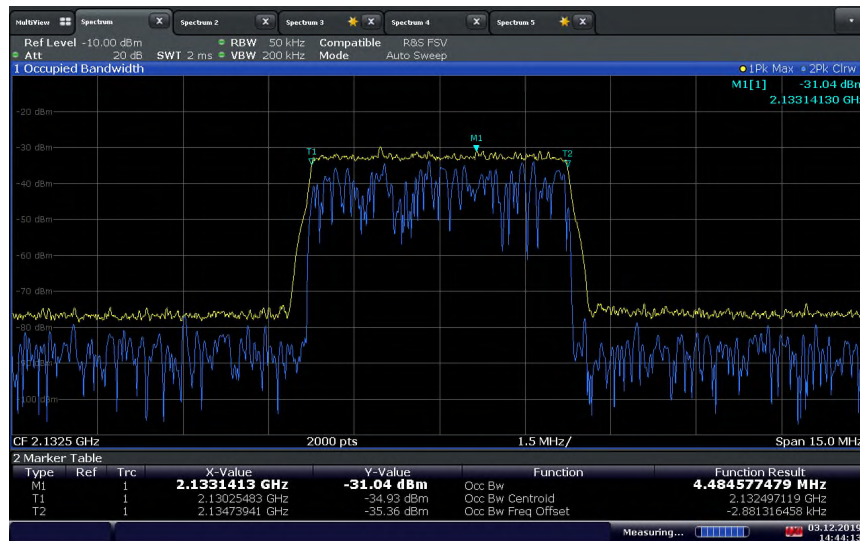
14:44:58 03.12.2019

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



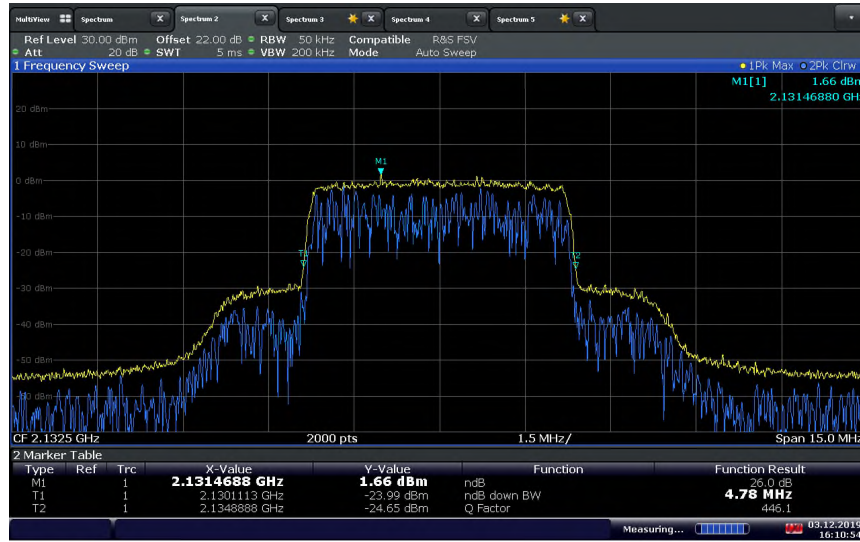
16:11:44 03.12.2019

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



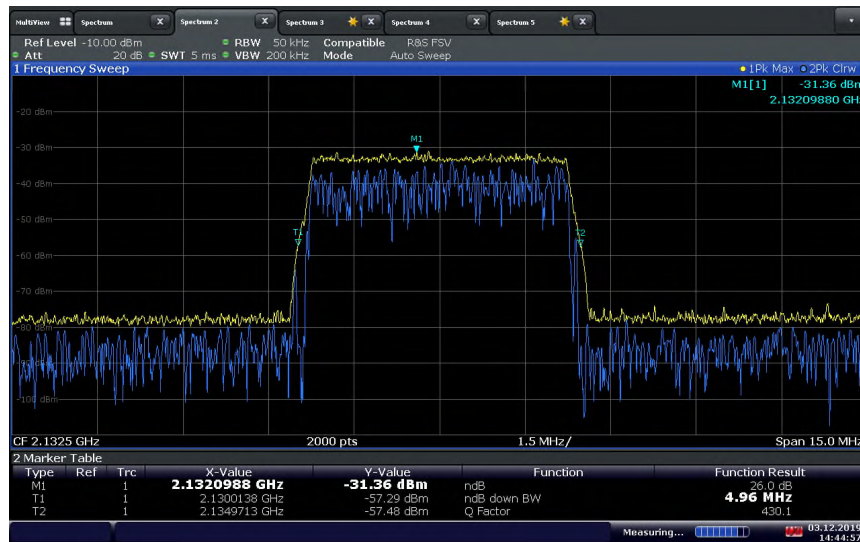
14:44:14 03.12.2019

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



16:10:55 03.12.2019

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



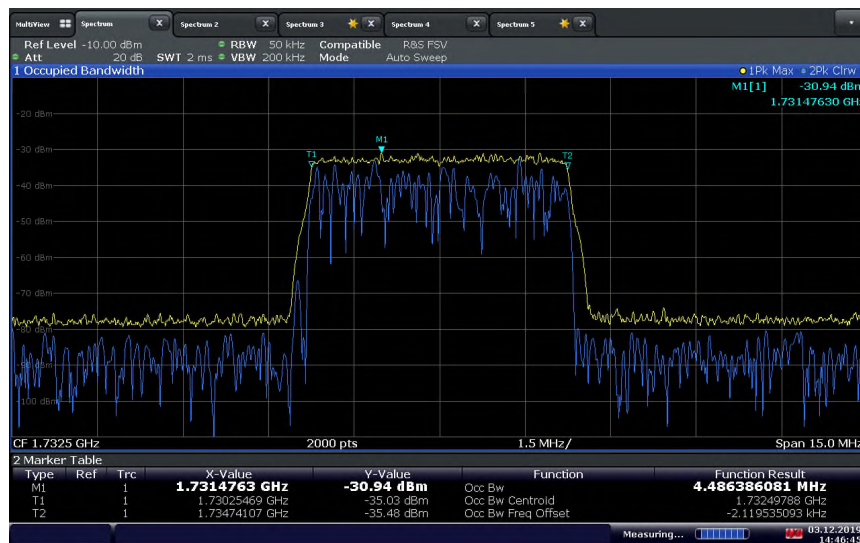
14:44:58 03.12.2019

LTE Band 4 Uplink (5 MHz BW) Mid Channel / 99% OBW at Output port with Input signal at AGC Threshold Level



12:44:35 04.12.2019

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



14:46:45 03.12.2019

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



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

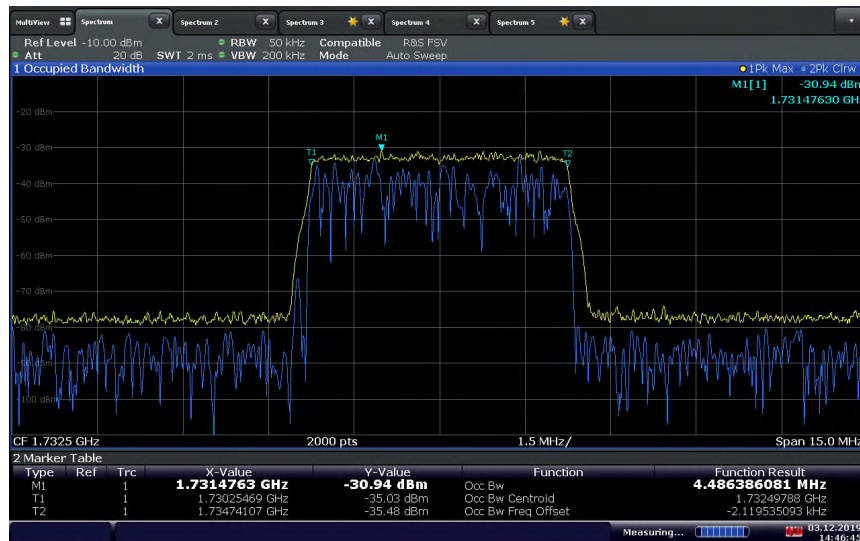


LTE Band 4 Uplink (5 MHz BW) Mid Channel / 99% OBW at Output port with Input signal at AGC + 3 dB Level



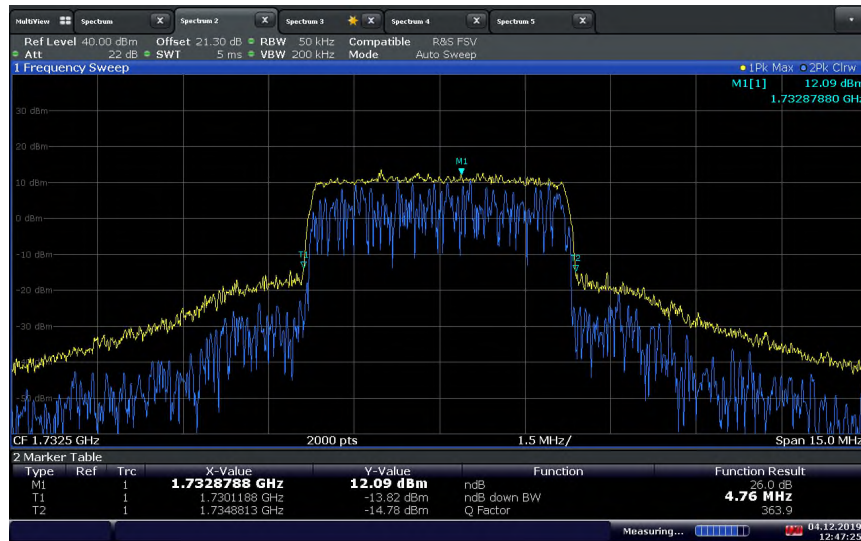
12:46:32 04.12.2019

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



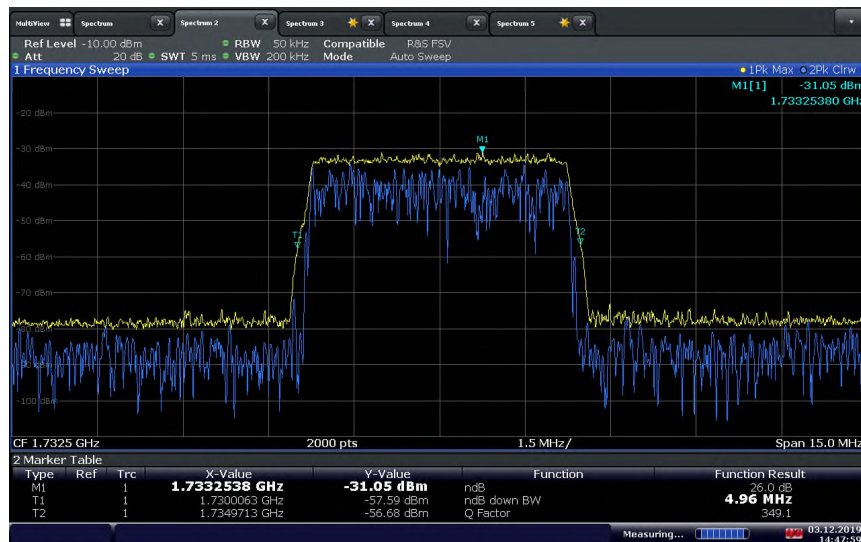
14:46:45 03.12.2019

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



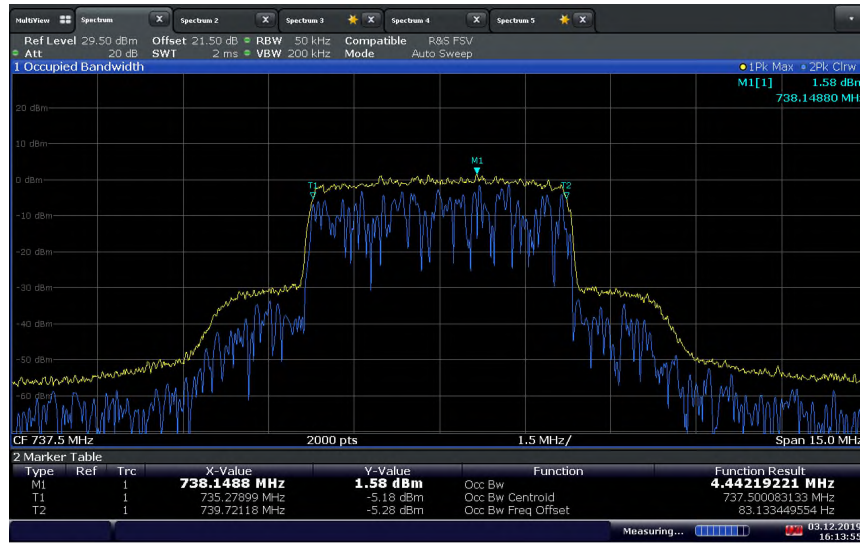
12:47:26 04.12.2019

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



14:47:59 03.12.2019

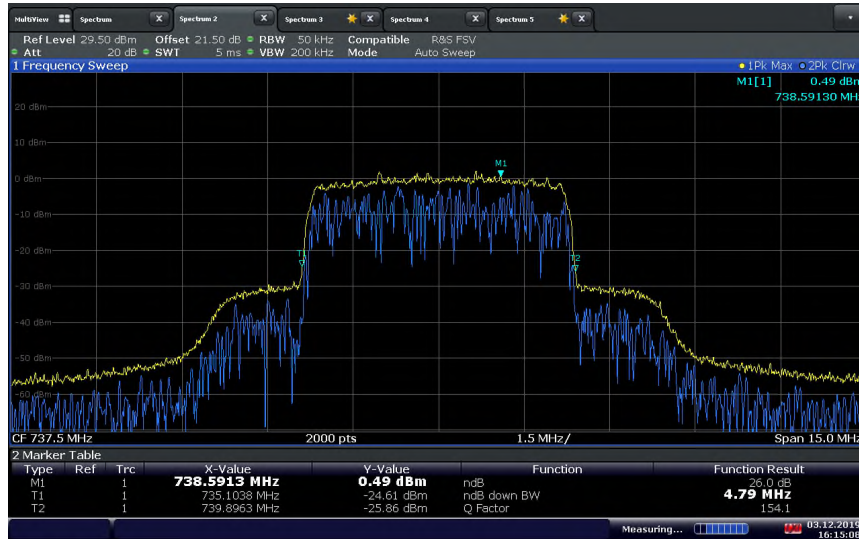
LTE Band 12 Downlink (5 MHz BW) Mid Channel / 99% OBW at Output port with Input signal at AGC Threshold Level



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



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



16:15:09 03.12.2019

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



14:49:26 03.12.2019

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



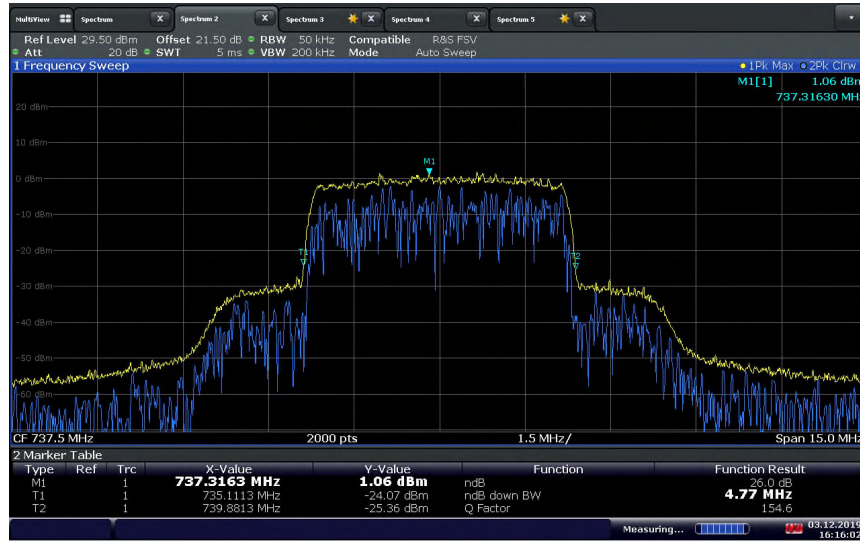
16:16:23 03.12.2019

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



14:50:36 03.12.2019

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



16:16:02 03.12.2019

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



14:49:26 03.12.2019

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



12:37:59 04.12.2019

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

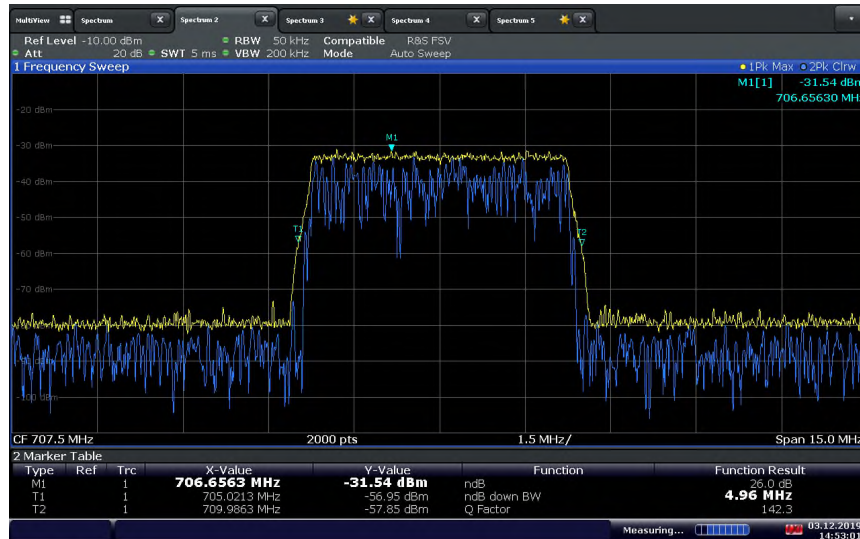


14:54:02 03.12.2019

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



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

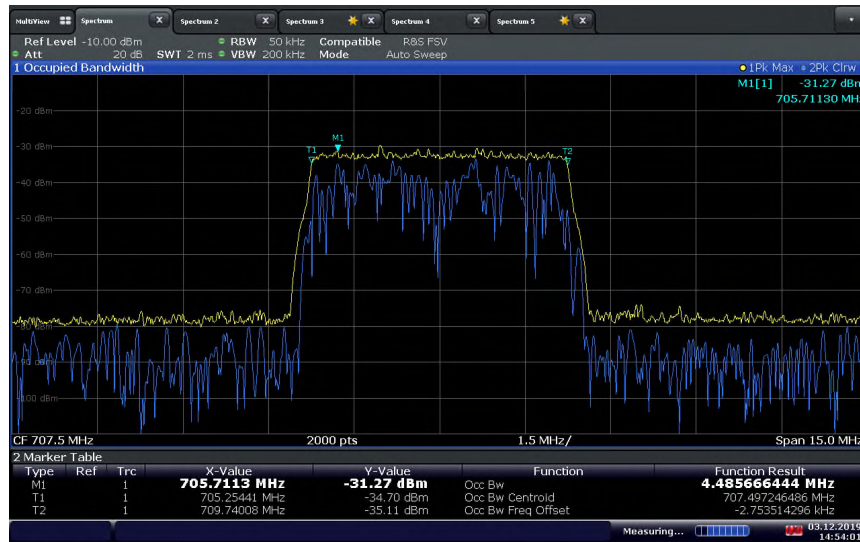


LTE Band 12 Uplink (5 MHz BW) Mid Channel / 99% OBW at Output port with Input signal at AGC + 3 dB Level



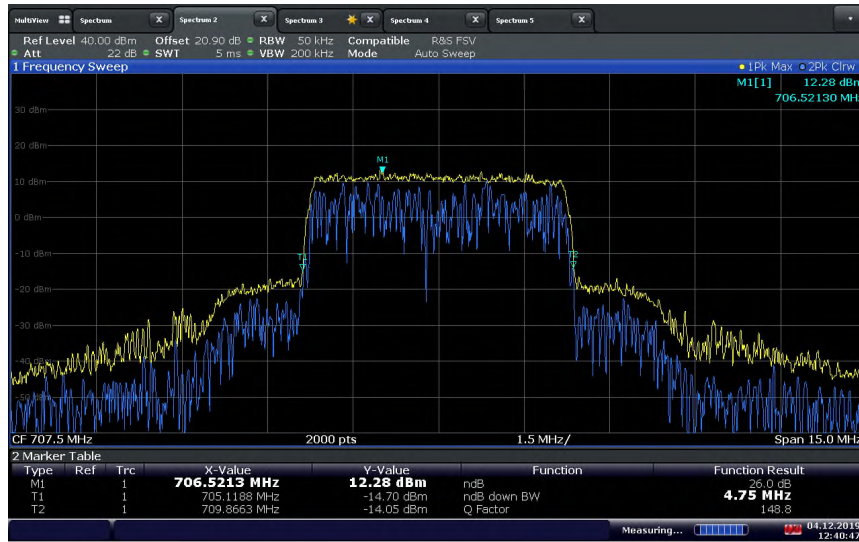
12:40:11 04.12.2019

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



14:54:02 03.12.2019

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



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



LTE Band 13 Downlink (5 MHz BW) Mid Channel / 99% OBW at Output port with Input signal at AGC Threshold Level



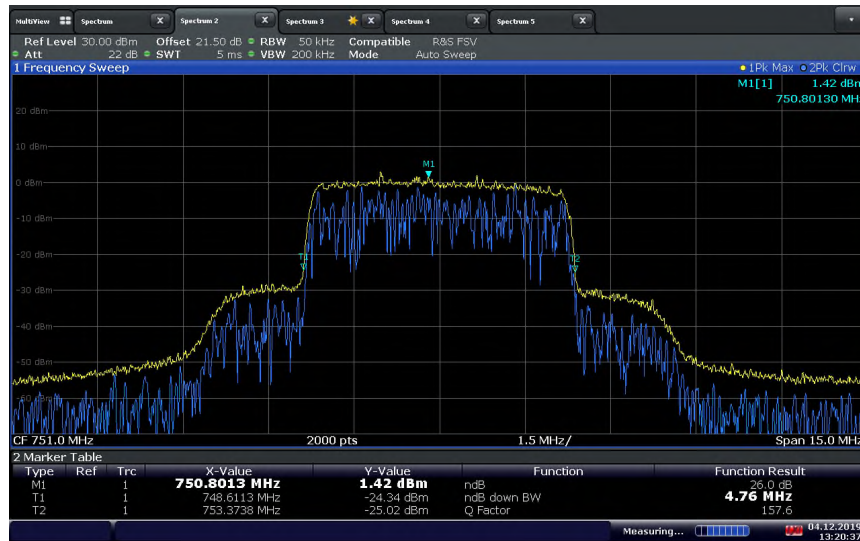
13:19:51 04.12.2019

LTE Band 13 Downlink (5 MHz BW) Mid Channel / 99% OBW at Input port (Adjusted Level)



14:55:48 03.12.2019

LTE Band 13 Downlink (5 MHz BW) Mid Channel / 26 dB BW at Output port with Input signal at AGC Threshold Level



13:20:37 04.12.2019

LTE Band 13 Downlink (5 MHz BW) Mid Channel / 26 dB BW at Input port (Adjusted Level)



14:58:10 03.12.2019

LTE Band 13 Downlink (5 MHz BW) Mid Channel / 99% OBW at Output port with Input signal at AGC + 3 dB Level



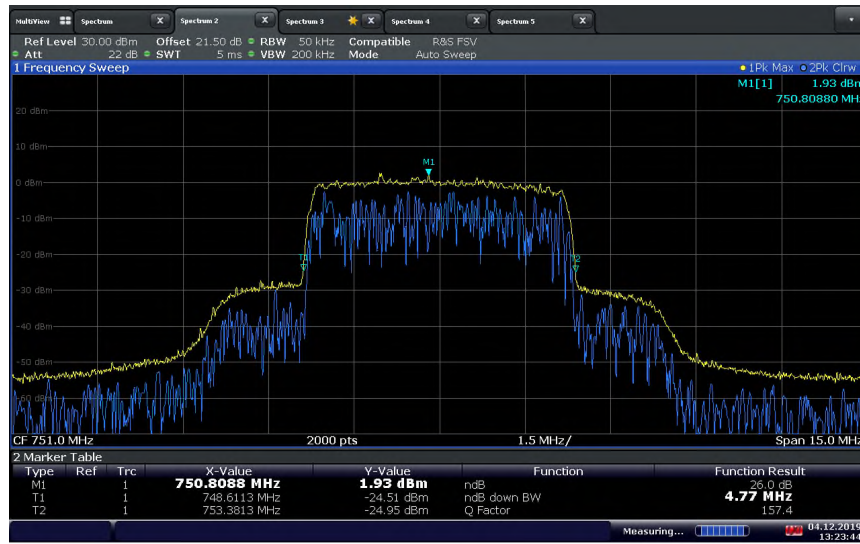
13:21:39 04.12.2019

LTE Band 13 Downlink (5 MHz BW) Mid Channel / 99% OBW at Input port (Adjusted Level)



14:55:48 03.12.2019

LTE Band 13 Downlink (5 MHz BW) Mid Channel / 26 dB BW at Output port with Input signal at AGC + 3 dB Level



13:23:45 04.12.2019

LTE Band 13 Downlink (5 MHz BW) Mid Channel / 26 dB BW at Input port (Adjusted Level)



14:58:10 03.12.2019

LTE Band 13 Uplink (5 MHz BW) Mid Channel / 99% OBW at Output port with Input signal at AGC Threshold Level



13:05:42 04.12.2019

LTE Band 13 Uplink (5 MHz BW) Mid Channel / 99% OBW at Input port (Adjusted Level)



15:01:12 03.12.2019

LTE Band 13 Uplink (5 MHz BW) Mid Channel / 26 dB BW at Output port with Input signal at AGC Threshold Level



LTE Band 13 Uplink (5 MHz BW) Mid Channel / 26 dB BW at Input port (Adjusted Level)

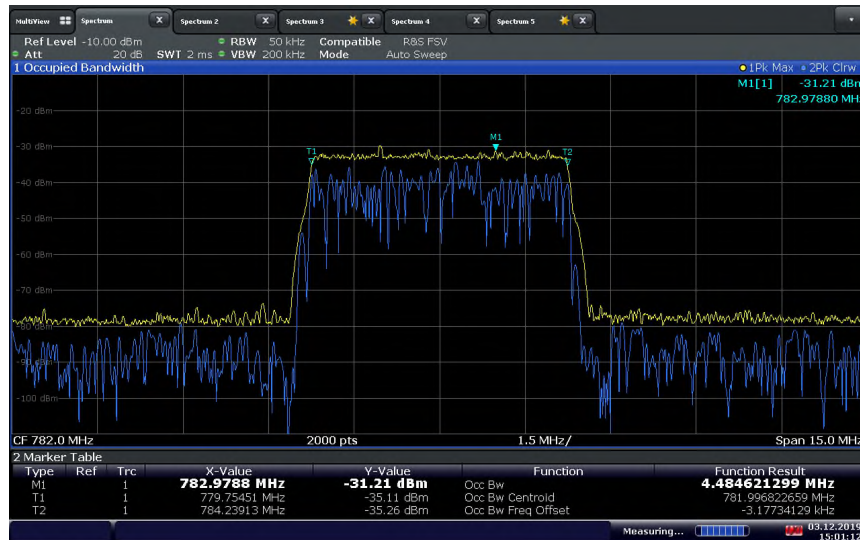


LTE Band 13 Uplink (5 MHz BW) Mid Channel / 99% OBW at Output port with Input signal at AGC + 3 dB Level



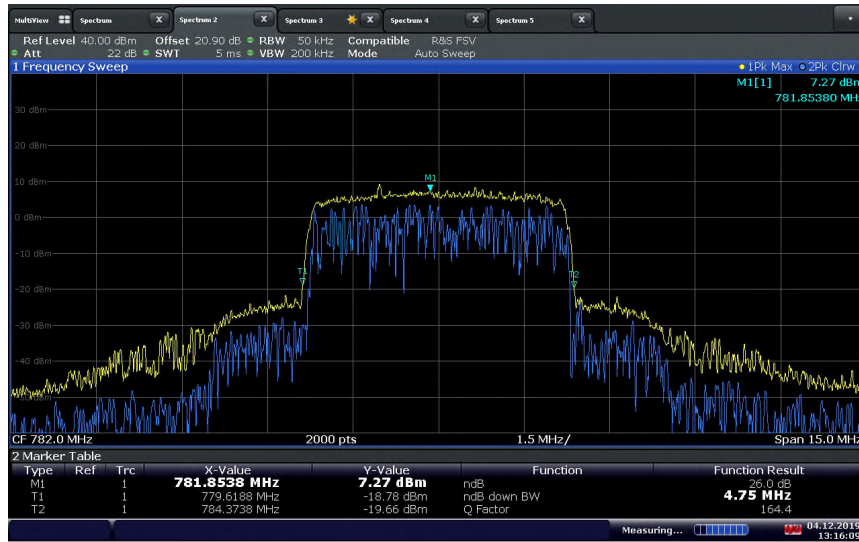
13:16:46 04.12.2019

LTE Band 13 Uplink (5 MHz BW) Mid Channel / 99% OBW at Input port (Adjusted Level)



15:01:12 04.12.2019

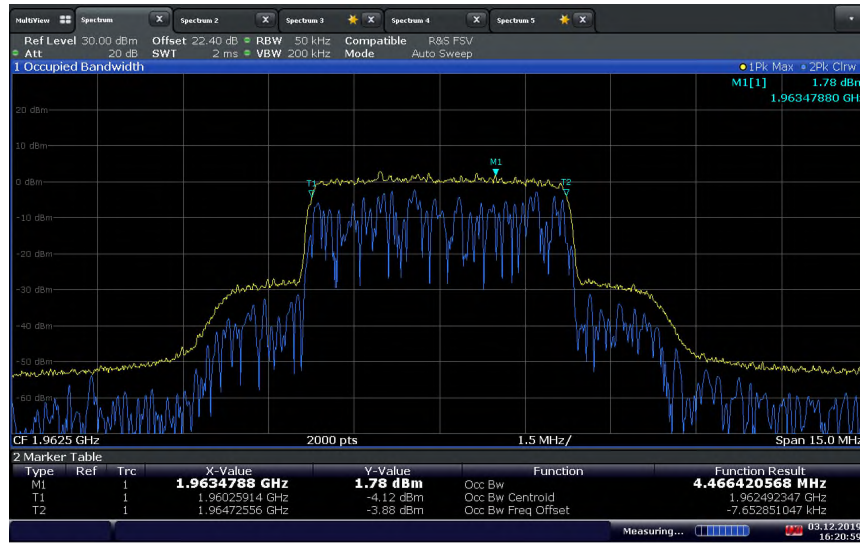
LTE Band 13 Uplink (5 MHz BW) Mid Channel / 26 dB BW at Output port with Input signal at AGC + 3 dB Level



LTE Band 13 Uplink (5 MHz BW) Mid Channel / 26 dB BW at Input port (Adjusted Level)



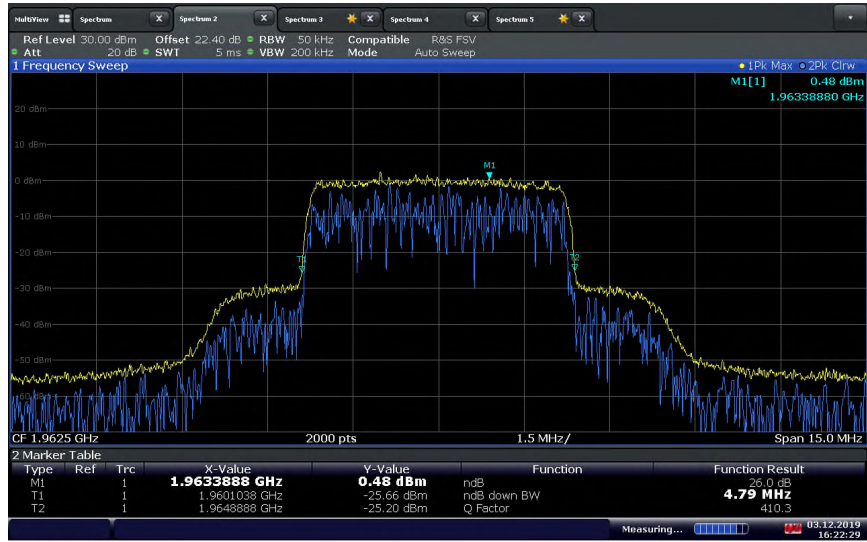
LTE Band 25 Downlink (5 MHz BW) Mid Channel / 99% OBW at Output port with Input signal at AGC Threshold Level



LTE Band 25 Downlink (5 MHz BW) Mid Channel / 99% OBW at Input port (Adjusted Level)



LTE Band 25 Downlink (5 MHz BW) Mid Channel / 26 dB BW at Output port with Input signal at AGC Threshold Level



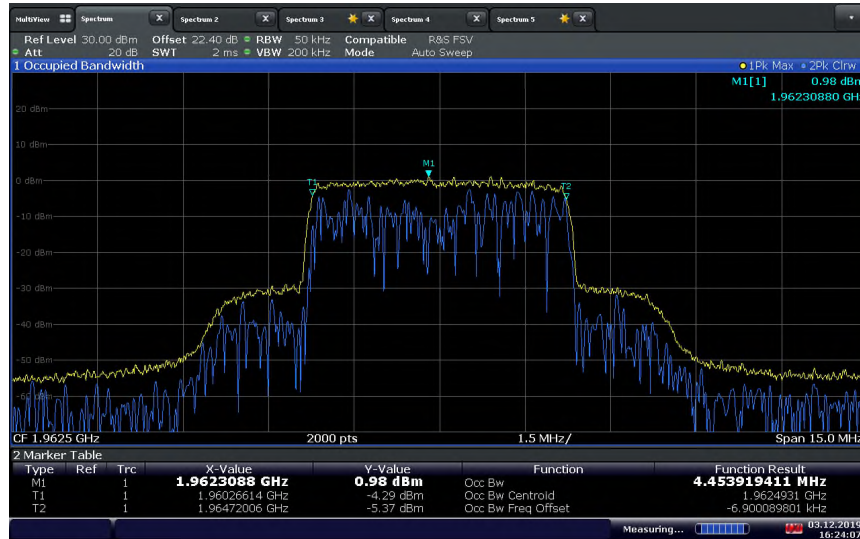
16:22:30 03.12.2019

LTE Band 25 Downlink (5 MHz BW) Mid Channel / 26 dB BW at Input port (Adjusted Level)



15:04:19 03.12.2019

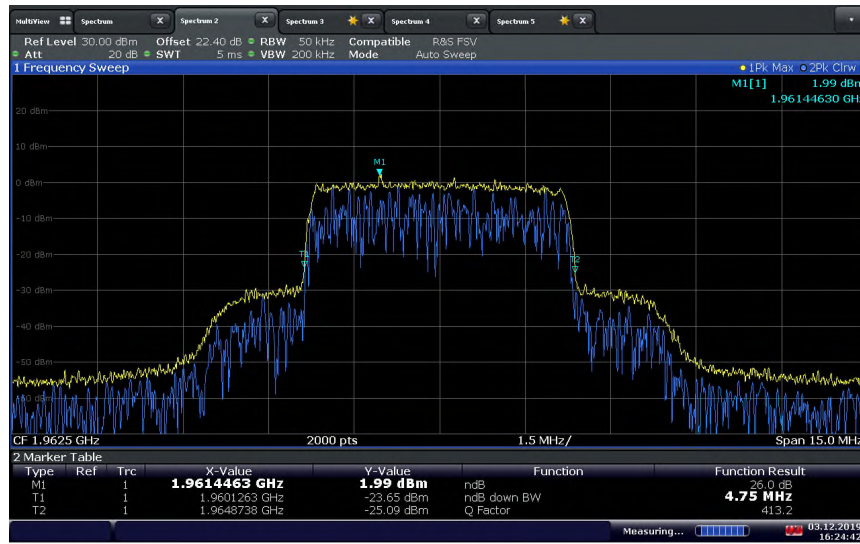
LTE Band 25 Downlink (5 MHz BW) Mid Channel / 99% OBW at Output port with Input signal at AGC + 3 dB Level



LTE Band 25 Downlink (5 MHz BW) Mid Channel / 99% OBW at Input port (Adjusted Level)



LTE Band 25 Downlink (5 MHz BW) Mid Channel / 26 dB BW at Output port with Input signal at AGC + 3 dB Level



16:24:42 03.12.2019

LTE Band 25 Downlink (5 MHz BW) Mid Channel / 26 dB BW at Input port (Adjusted Level)



15:04:19 03.12.2019