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Report On

Application for Grant of Equipment Authorization of the
Inseego Corp.

M1000 Wireless Hotspot Modem

FCC CFR 47 Part 2 and 27: 2018

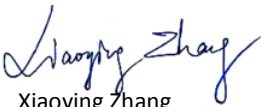
RSS-139 Issue 3: 2015

RSS-130 Issue 2: 2019

Report No. 72146272B

May 2019



REPORT ON	Radio Testing of the Inseego Corp. M1000 Wireless Hotspot Modem
TEST REPORT NUMBER	72146272B
PREPARED FOR	Inseego Corp. 9605 Scranton Road, Suite 300 San Diego, CA 92121 USA
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APPROVED BY	 Ferdinand S. Custodio Name Authorized Signatory Title: Senior EMC Test Engineer/Wireless Team Lead
DATED	May 10, 2019



Revision History

72146272B Inseego Corp. M1000 Wireless Hotspot Modem					
DATE	OLD REVISION	NEW REVISION	REASON	PAGES AFFECTED	APPROVED BY
05/10/2019	-	Initial Release			Ferdinand Custodio

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SECTION 1

REPORT SUMMARY

Radio Testing of the
Inseego Corp.
M1000 Wireless Hotspot Modem

1.1 INTRODUCTION

The information contained in this report is intended to show verification of the Inseego Corp. M1000 Wireless Hotspot Modem to the requirements of the following:

- FCC CFR 47 Part 2 and 27: 2018
- RSS-139 Issue 3: 2015
- RSS-130 Issue 2: 2019

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	Inseego Corp.
Product Marketing Name	5G MiFi 1000
Model Number(s)	M1000
FCC ID Number	PKRISGM1000
IC Number	3229A-M1000
Serial Number(s)	FF161218B00106, FF130219B00478, FF130219B00624, FF130219B00600
Number of Samples Tested	4
Test Specification/Issue/Date	• FCC CRF 47 Part 2 and 27 (October 1, 2018) • KDB412172 D01 Determining ERP and EIRP v01r01 August 07, 2015: Guidelines for determining the Effective Radiated Power (ERP) and Equivalent Isotropically Radiated Power (EIRP) of an RF transmitting system • KDB971168 D01 Power Meas License Digital Systems v03r01: April 9 2018: Measurement guidance for certification of licensed digital transmitters • RSS-139 Issue 3: July 2015 – Advanced Wireless Services (AWS) Equipment Operating in the Bands 1710-1780 MHz and 2110-2180 MHz • RSS-130 Issue 2: February 2019 – Mobile Broadband Services (MBS) Equipment Operating in the Frequency Bands 617-652 MHz, 663-698 MHz, 698-756 MHz and 777-787 MHz • RSS-Gen Issue 5 Amendment 1: March 2019 - General Requirements for Compliance of Radio Apparatus • ANSI C63.26-2015: American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services



Start of Test	March 05, 2019
Finish of Test	April 26, 2019
Name of Engineer(s)	Xiaoying Zhang
Related Document(s)	Supporting documents for EUT certification are separate exhibits.

1.2 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out in accordance with FCC CFR 47 Part 2 and 27: 2018 with cross-reference to the corresponding ISSED RSS standard is shown below.

Section	FCC Part Sections(s)	RSS Section(s)	Test Description	Result
2.1	2.1046	RSS-139 (6.5) RSS-130 (4.6.3)	Transmitter Conducted Output Power	Compliant
2.2	2.1046 27.50(h)(2)	RSS-139 (6.5)	Equivalent Isotropic Radiated Power	Compliant
2.3	2.1046 27.50 (b)(10)	RSS-130 (4.6.3)	Effective Radiated Power	Compliant
2.4	2.1049 27.53(h)(3)	RSS-Gen (6.7) RSS-139 (6.6)	Occupied Bandwidth	Compliant
2.5	27.50 (d)(5)	RSS-139 (6.5) RSS-130 (4.6.1)	Peak-Average Ratio	Compliant
2.6	2.1051 27.53(h)(1)(3)	RSS-139 (6.6) RSS-130 (4.7.1)	Band Edge	Compliant
2.7	2.1051 27.53(h)(1)(3)	RSS-139 (6.6) RSS-130 (4.7.1)	Conducted Spurious Emissions	Compliant
2.8	2.1053 27.53(h)(1)	RSS-139 (6.6) RSS-130 (4.7.1)	Field Strength of Spurious Radiation	Compliant
2.9	2.1055 27.54	RSS-139 (6.4) RSS-130 (4.5)	Frequency Stability	Compliant
-	-	RSS-Gen 7.4	Receiver Spurious Emissions	N/A*
2.10	-	RSS-GEN 8.8	Power Line Conducted Emissions	Compliant

N/A* Not Applicable. No stand-alone receiver.



1.3 PRODUCT INFORMATION

1.3.1 EUT General Description

The Equipment Under Test (EUT) was an Inseego Corp. M1000 Wireless Hotspot Modem. The EUT is a Wireless Hotspot Modem supporting 3G/4G/5G/WLAN Technologies. The EUT is also equipped with a USB Port and AC Wall Power Adaptor.

1.3.2 Technical Description

EUT Description	Wireless Hotspot Modem
Product Marketing Name	5G MiFi 1000
Model Number(s)	M1000
Rated Voltage	3.8V, 4400mAh (Rechargeable Li-Ion battery pack) Input 100-240VAC, Output 5V (External AC-DC Power Adapter)
Mode Verified	WCDMA Band 4: 1710-1755 MHz LTE Band 4: 1710-1755 MHz LTE Band 13: 777-787 MHz LTE Band 66: 1710-1780 MHz
Capability	WCDMA Band 2, 4, 5, LTE Band 2, 4, 5, 13, 66, 5G Band n261, and 802.11 a/b/g/n/ac
Primary Unit (EUT)	☐ Production ☒ Pre-Production ☐ Engineering

(Client declaration, max. antenna gain covered under this test report)

Bands	Frequency(ies)	Antenna Gains
WCDMA Band 4	1710-1755 MHz	1.9 dBi
LTE Band 4	1710-1755 MHz	1.9 dBi
LTE Band 13	777-787 MHz	0.0 dBi
LTE Band 66	1710-1780 MHz	1.9 dBi

1.3.3 Transmit Frequency Table

Technology / Band	Tx Frequency (MHz)	Emission Designator	EIRP	
			Max. Power (dBm)	Max. Power (mW)
WCDMA Band 4	1710-1755	4M15F9W	25.80	380.19

Technology / Band	Modulation	Bandwidth (MHz)	Tx Frequency (MHz)	Emission Designator	EIRP	
					Max. Power (dBm)	Max. Power (mW)
LTE Band 4	QPSK	1.4	1710-1750	1M08G7D	25.51	355.63
		3	1710-1750	2M69G7D	25.63	365.59
		5	1710-1750	4M48G7D	25.63	365.59
		10	1710-1750	8M94G7D	25.40	346.74
		15	1710-1750	13M4G7D	25.52	356.45
		20	1710-1750	17M9G7D	25.57	360.58
	16QAM	1.4	1710-1750	1M09W7D	24.67	293.09
		3	1710-1750	2M68W7D	24.83	304.09
		5	1710-1750	4M47W7D	24.76	299.23
		10	1710-1750	8M95W7D	24.68	293.76
		15	1710-1750	13M4W7D	24.73	297.17
		20	1710-1750	17M9W7D	24.78	300.61
LTE Band 66	QPSK	1.4	1710-1780	1M08G7D	25.64	291.07
		3	1710-1780	2M68G7D	25.70	295.12
		5	1710-1780	4M48G7D	25.70	295.12
		10	1710-1780	8M94G7D	25.53	357.27
		15	1710-1780	13M4G7D	25.69	370.68
		20	1710-1780	17M9G7D	25.77	377.57
	16QAM	1.4	1710-1780	1M08W7D	24.75	298.54
		3	1710-1780	2M68W7D	24.96	313.33
		5	1710-1780	4M48W7D	24.82	303.39
		10	1710-1780	8M95W7D	24.75	298.54
		15	1710-1780	13M4W7D	24.93	311.17
		20	1710-1780	17M9W7D	25.03	318.42



Technology / Band	Modulation	Bandwidth (MHz)	Tx Frequency (MHz)	Emission Designator	ERP	
					Max. Power (dBm)	Max. Power (mW)
LTE Band 13	QPSK	5	777-787	4M48G7D	21.78	150.66
		10	777-787	8M97G7D	21.71	148.25
	16QAM	5	777-787	4M48W7D	21.04	127.06
		10	777-787	8M96W7D	20.87	122.18

1.4 EUT TEST CONFIGURATION

1.4.1 Test Configuration Description

Test Configuration	Description
A	Conducted antenna port measurement. EUT Transmits at max power and is powered by the internal battery and/or USB via AC Adapter.
B	Radiated test setup / case spurious emissions. The EUT is connected to the call box in radiated way or connect to the call box with antenna port terminated by the call box.

1.4.2 EUT Exercise Software

EUT is controlled by a CMW 500 Wideband Radio Communication Tester. There is no other test software used during verification.

1.4.3 Support Equipment and I/O cables

Manufacturer	Equipment/Cable	Description
Inseego Corp.	USB Cable	Type A to Type C USB Cable. M/N: NOV7000USB
Inseego Corp.	External AC-DC Power Adapter	Model: SSW-2783, PN: 40123126.01 Input: 100-240VAC, 50/60Hz, 0.5A Output: 5VDC, max. 2A

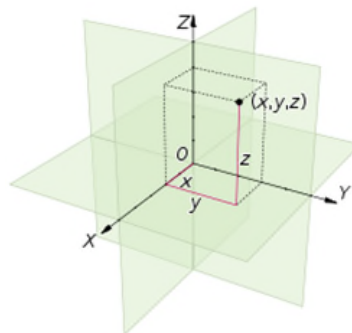
1.4.4 Worst Case Configuration

Worst-case configuration used in this test report as per output power measurements:

Technology / Band	Test Configuration
WCDMA Band 4	Connection Setup: Test Mode, Type: RMC, Test Mode: No Loop

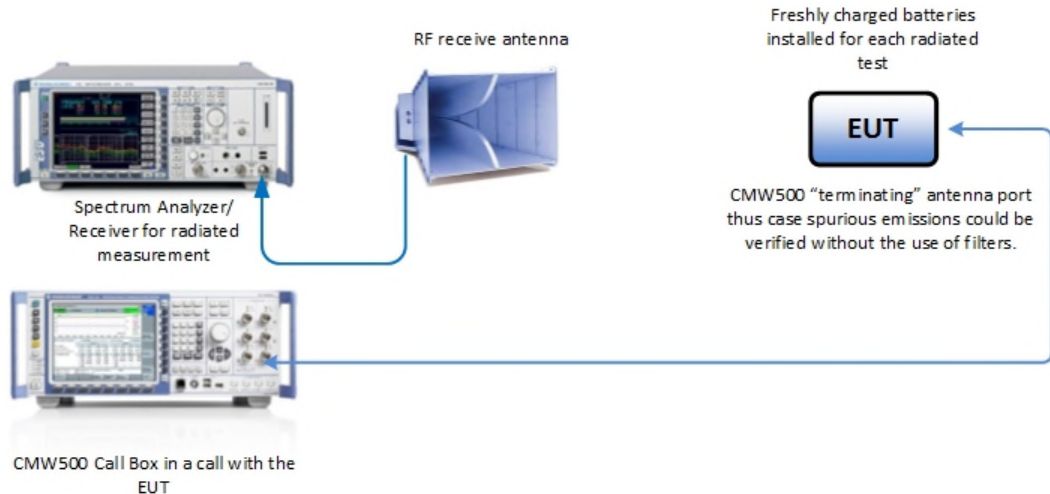
Band	Channel BW	Modulation	RB Size/Offset
LTE Band 4	3 MHz	QPSK	1/7
LTE Band 13	5 MHz	QPSK	1/12
LTE Band 66	20 MHz	QPSK	1/49

For radiated measurements X, Y, and Z orientations were verified. The verification was determined "Y" as worst case configuration.

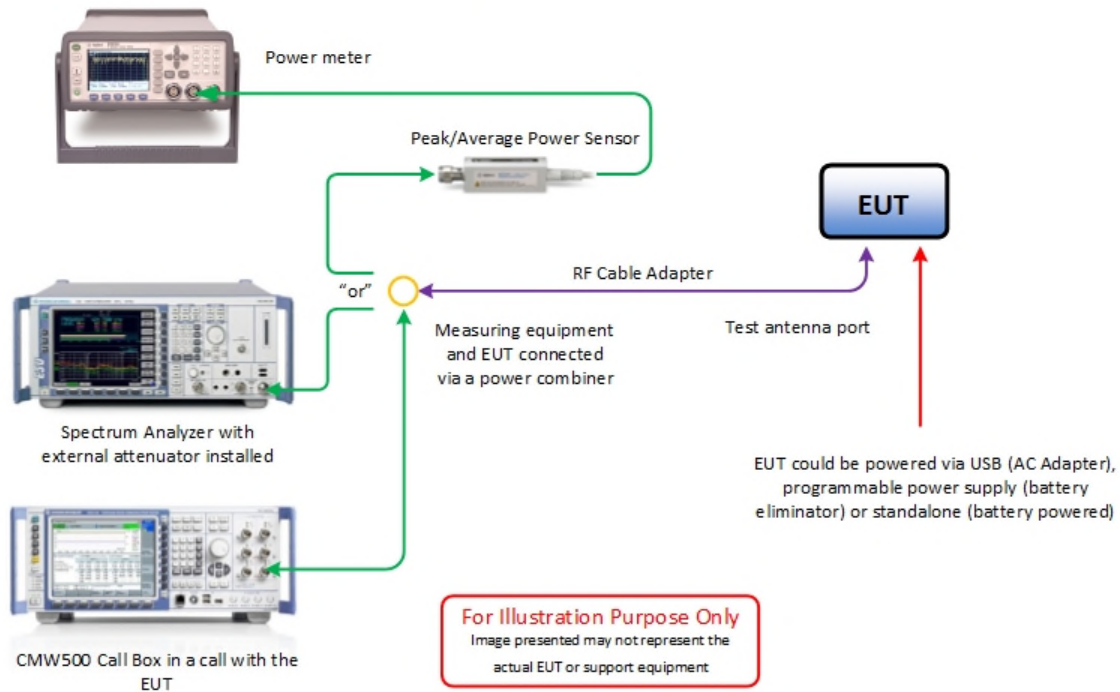


1.4.5 Simplified Test Configuration Diagram

Radiated Test Configuration



Conducted (Antenna Port) Test Configuration





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: FF161218B00106, FF130219B00478, FF130219B00624		
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 and radiated emissions the equipment under test (EUT) was configured to measure its highest possible emission level. 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 (IC) 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.



1.10 SAMPLE CALCULATIONS

1.10.1 WCDMA Emission Designator

Emission Designator = 4M15F9W
 WCDMA BW = 4.15 MHz
 F = Frequency Modulation
 9= Composite Digital Info
 W = Combination (Audio/Data)

1.10.2 LTE Emission Designator (QPSK)

Emission Designator = 4M51G7D
 G = Phase Modulation
 7= Quantized/Digital Info
 D = Data Transmission, telemetry, telecommand

1.10.3 LTE Emission Designator (16QAM)

Emission Designator = 4M50W7D
 W = Frequency Modulation
 7= Quantized/Digital Info
 D = Data Transmission, telemetry, telecommand

1.10.4 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

1.10.5 Spurious Radiated Emission – Substitution Method

Example = 84dBμV/m @ 1413 MHz (numerical sample only)

The field strength reading of 84dBμV/m @ 1413 MHz (2nd Harmonic of 706.5 MHz) is the maximized measurement when the EUT is on the turntable measured at 3 meters. The gain of the substituted antenna is 7.8dBi while the transmit cable loss is 1.0 dB (cable between signal generator and the substituted antenna). The signal generator level is adjusted until the 84dBμV/m level at the receiving end is replicated (identical test setup, i.e. same antenna, cable/s and preamp). If the adjusted signal generator level is -18dBm, then we have the following for both EIRP and ERP as required:

$$\begin{aligned}
 P_{\text{EIRP}} &= -18 \text{ dBm} + 7.8 \text{ dBi} - 1 \text{ dB} \\
 &= 11.2 \text{ dBm} \\
 P_{\text{ERP}} &= P_{\text{EIRP}} - 2.15 \text{ dB} \\
 &= 11.2 \text{ dBm} - 2.15 \text{ dB} \\
 &= 9.05 \text{ dBm}
 \end{aligned}$$



SECTION 2

TEST DETAILS

Radio Testing of the
Inseego Corp.
M1000 Wireless Hotspot Modem



2.1 TRANSMITTER CONDUCTED POWER MEASUREMENTS

2.1.1 Specification Reference

FCC 47 CFR Part 2, Clause 2.1046
RSS-139, Clause 6.5
RSS-130, Clause 4.6.3

2.1.2 Standard Applicable

The conducted power measurements were made in accordance to FCC Part 2 Clause 2.1046 and RSS-139 Clause 6.5, and RSS-130 Clause 4.6.3.

FCC 47 CFR Part 2.1046:

(a) For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in § 2.1033(c)(8). The electrical characteristics of the radio frequency load attached to the output terminals when this test is made shall be stated.

(c) For measurements conducted pursuant to paragraphs (a) and (b) of this section, all calculations and methods used by the applicant for determining carrier power or peak envelope power, as appropriate, on the basis of measured power in the radio frequency load attached to the transmitter output terminals shall be shown. Under the test conditions specified, no components of the emission spectrum shall exceed the limits specified in the applicable rule parts as necessary for meeting occupied bandwidth or emission limitations.

2.1.3 Equipment Under Test and Modification State

Serial No: FF161218B00106, FF130219B00478 and FF130219B00624/ Test Configuration A

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

March 05, 06 and 12, 2019 / XYZ

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	21.8 - 24.0°C
Relative Humidity	43.1 - 48.8%
ATM Pressure	98.3 - 99.1 kPa



2.1.7 Additional Observations

- This is a conducted test using Power Meter.
- The path loss was measured and entered as a level offset.
- Low, Middle and High channels for all bandwidths with different RB size and RB offset and modulations were verified and reported.

2.1.8 Test Results

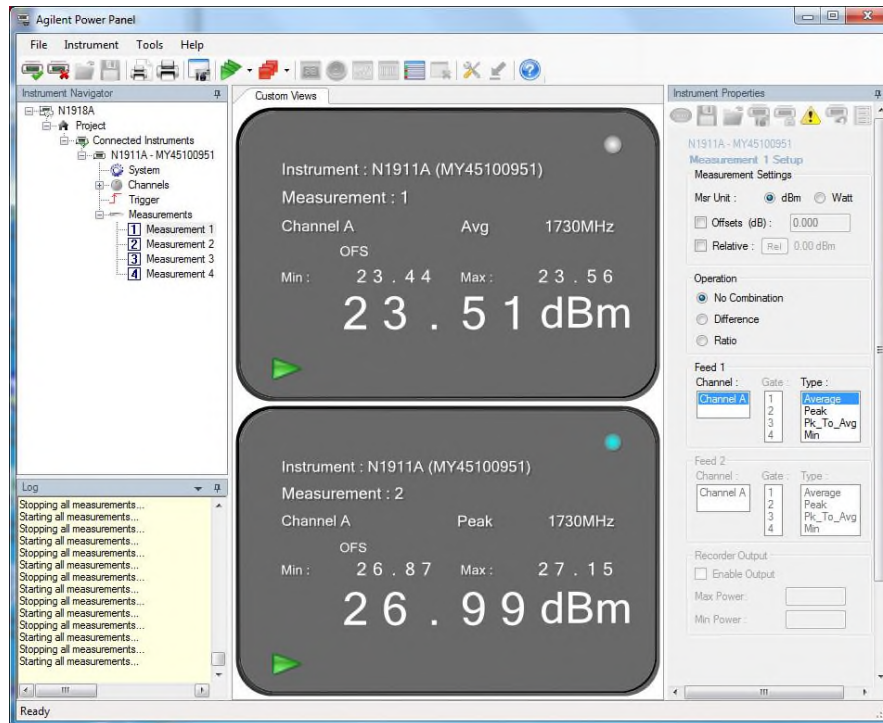
Band	Channel	Frequency (MHz)	Average Max Power (dBm)	Peak Max Power (dBm)
WCDMA Band 4	1312	1712.4	23.27	27.05
	1413	1732.6	23.51	26.99
	1513	1752.6	23.90	27.74

LTE Band 4							
Bandwidth (MHz)	Channel	Frequency (MHz)	Modulation	No. RB	RB Start	Average Power (dBm)	Peak Power (dBm)
1.4	19957	1710.7	QPSK	1	3	22.26	25.90
	20175	1732.5		1	3	23.61	27.23
	20393	1754.3		1	3	23.38	27.33
	19957	1710.7	16QAM	1	5	21.22	25.90
	20175	1732.5		1	5	22.77	27.14
	20393	1754.3		1	5	22.57	27.09
3	19965	1711.5	QPSK	1	7	22.40	25.95
	20175	1732.5		1	7	23.73	27.19
	20385	1753.5		1	7	23.48	27.19
	19965	1711.5	16QAM	1	0	21.38	25.96
	20175	1732.5		1	0	22.93	27.13
	20385	1753.5		1	0	22.63	27.03
5	19975	1712.5	QPSK	1	12	22.45	26.01
	20175	1732.5		1	12	23.73	27.14
	20375	1752.5		1	12	23.41	27.13
	19975	1712.5	16QAM	1	12	21.61	26.02
	20175	1732.5		1	12	22.86	27.15
	20375	1752.5		1	12	22.76	27.11
10	20000	1715	QPSK	1	25	22.79	26.37
	20175	1732.5		1	25	23.50	27.11
	20350	1750		1	25	23.30	26.95
	20000	1715	16QAM	1	25	21.78	26.41
	20175	1732.5		1	25	22.78	27.13
	20350	1750		1	25	22.45	26.91
15	20025	1717.5	QPSK	1	37	23.21	26.78
	20175	1732.5		1	37	23.62	27.06
	20325	1747.5		1	37	23.12	26.64
	20025	1717.5	16QAM	1	37	22.25	26.83
	20175	1732.5		1	37	22.83	27.06
	20325	1747.5		1	37	22.27	26.61
20	20050	1720	QPSK	1	49	23.67	27.20
	20175	1732.5		1	49	23.67	27.10
	20300	1745		1	49	22.28	25.85
	20050	1720	16QAM	1	0	22.73	27.24
	20175	1732.5		1	0	22.88	27.12
	20300	1745		1	0	21.32	25.87

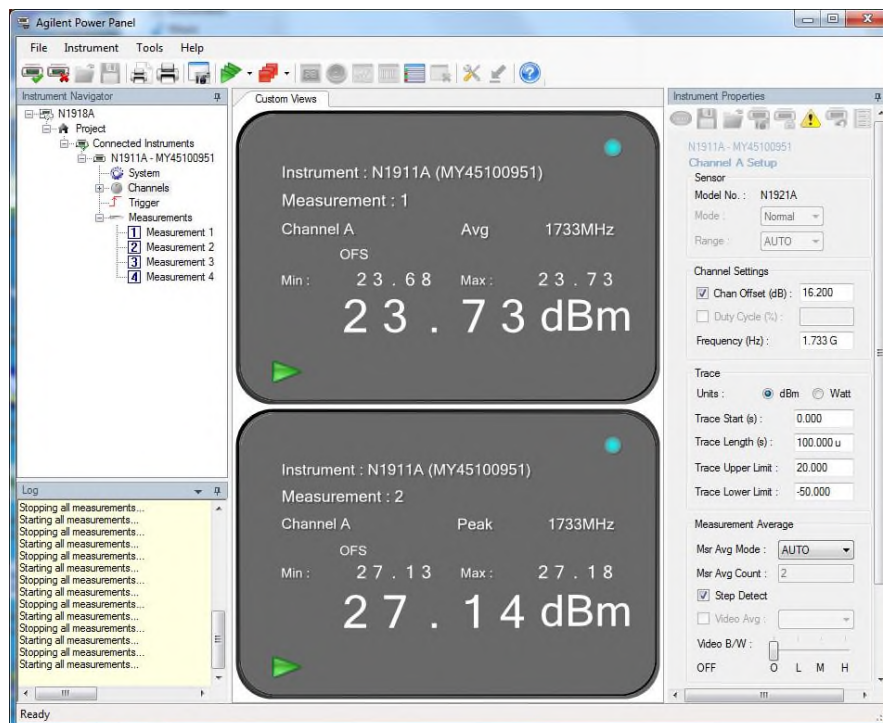
LTE Band 13							
Bandwidth (MHz)	Channel	Frequency (MHz)	Modulation	No. RB	RB Start	Average Power (dBm)	Peak Power (dBm)
5	23205	779.5	QPSK	1	12	23.48	26.95
	23230	782		1	12	23.93	27.69
	23255	784.5		1	12	23.86	27.14
	23205	779.5	16QAM	1	12	22.71	26.90
	23230	782		1	12	23.19	27.70
	23255	784.5		1	12	23.09	27.0
10	-	-	QPSK	-	-	-	-
	23230	782		1	25	23.86	27.69
	-	-		-	-	-	-
	-	-	16QAM	-	-	-	-
	23230	782		1	25	23.02	27.73
	-	-		-	-	-	-

LTE Band 66							
Bandwidth (MHz)	Channel	Frequency (MHz)	Modulation	No. RB	RB Start	Average Power (dBm)	Peak Power (dBm)
1.4	131979	1710.7	QPSK	1	3	23.74	27.52
	132322	1745		1	3	23.42	27.03
	132665	1779.3		1	3	22.82	26.30
	131979	1710.7	16QAM	1	3	22.85	27.30
	132322	1745		1	3	22.41	27.03
	132665	1779.3		1	3	21.89	26.22
3	131987	1711.5	QPSK	1	7	23.80	27.45
	132322	1745		1	7	23.62	27.14
	132657	1778.5		1	7	23.16	26.52
	131987	1711.5	16QAM	1	7	23.06	27.31
	132322	1745		1	7	22.71	27.11
	132657	1778.5		1	7	22.24	26.45
5	131997	1712.5	QPSK	1	12	23.80	27.48
	132322	1745		1	12	23.66	27.22
	132647	1777.5		1	12	22.75	26.08
	131997	1712.5	16QAM	1	12	22.92	27.33
	132322	1745		1	12	22.69	27.20
	132647	1777.5		1	12	21.95	26.06
10	132022	1715	QPSK	1	25	23.63	27.51
	132322	1745		1	25	23.13	26.77
	132622	1775		1	25	23.33	26.68
	132022	1715	16QAM	1	25	22.85	27.42
	132322	1745		1	25	22.12	26.73
	132622	1775		1	25	22.19	26.69
15	132047	1717.5	QPSK	1	37	23.79	27.49
	132322	1745		1	37	23.33	26.94
	132597	1772.5		1	37	23.25	26.83
	132047	1717.5	16QAM	1	37	23.03	27.30
	132322	1745		1	37	22.45	26.94
	132597	1772.5		1	37	22.39	26.77
20	132072	1720	QPSK	1	49	23.87	27.74
	132322	1745		1	49	23.64	27.34
	132572	1770		1	49	23.50	27.30
	132072	1720	16QAM	1	49	23.13	27.52
	132322	1745		1	49	22.80	27.35
	132572	1770		1	49	22.58	27.10

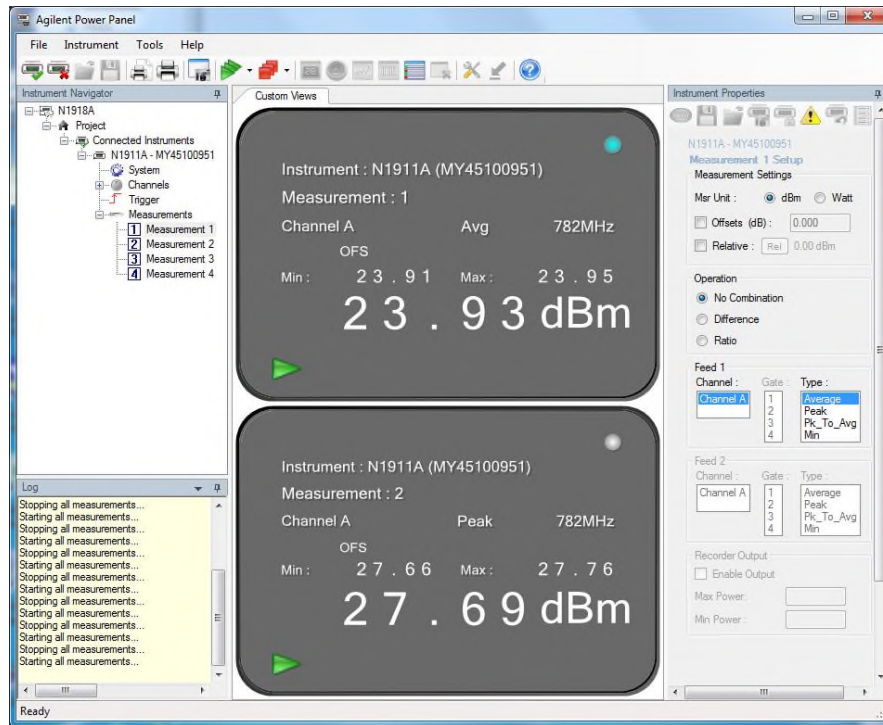
2.1.9 Sample Test Measurement Screen



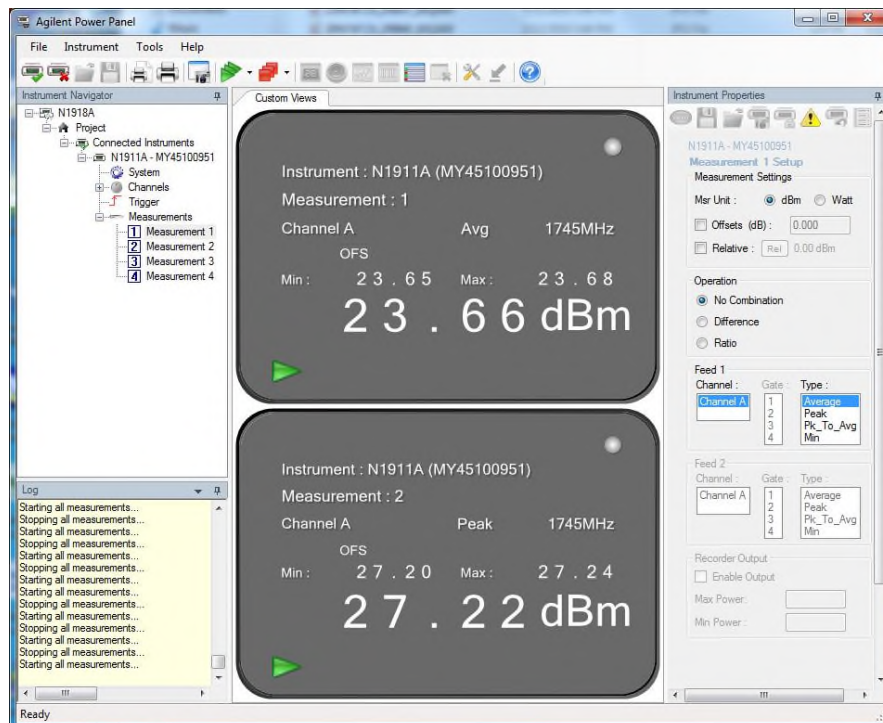
WCDMA Band 4 Middle Channel



LTE Band 4_5 MH Bandwidth Middle Channel QPSK 1 RB 12 offset



LTE Band 13_5 MH Bandwidth Middle Chanel QPSK 1 RB 12 offset



LTE Band 66_5 MH Bandwidth Middle Chanel QPSK 1 RB 12 offset



2.2 EQUIVALENT ISOTROPIC RADIATED POWER

2.2.1 Specification Reference

FCC 47 CFR Part 2, Clause 2.1046
FCC 47 CFR Part 27, Clause 27.50 (h)(2)
RSS-139, Clause 6.5

2.2.2 Standard Applicable

FCC 47 CFR Part 27.50(h)
(2) Mobile and other user stations. Mobile stations are limited to 2.0 watts EIRP. All user stations are limited to 2.0 watts transmitter output power.

RSS-139, Clause 6.5:
The equivalent isotropically radiated power (e.i.r.p.) for Mobile and portable transmitters shall not exceed one watt.

2.2.3 Equipment Under Test

Serial No: FF161218B00106, FF130219B00478 and FF130219B00624, Test Configuration (N/A, calculation only)

2.2.4 Date of Verification/Initial of test personnel who performed the calculation

March 05, 06 and 12, 2019 / XYZ

2.2.5 Additional Observations

- EIRP was calculated as per Section 1.2 and 1.3 of KDB412172 D01 (Determining ERP and EIRP v01r01).
- Calculation formula in logarithmic terms:

$$\text{EIRP} = P_T + G_T - L_c$$

Where:

P_T = transmitter conducted output power dBm (Section 2.1 of this test report)

G_T = gain of the transmitting antenna, in dBi (EIRP)

L_c = signal attenuation in the connecting cable between the transmitter and antenna, in dB (Power measurement performed directly at the primary antenna port. The loss between the LTE module and the primary antenna port is considered negligible).

- For LTE Bands, only the worst case RB size and RB offset presented.

2.2.6 Test Results

WCDMA Band 4						
Frequency (MHz)	Max Power Average (dBm)	Antenna Gain (dBi)	EIRP			
			(dBm)	(mW)	Limit (dBm)	Margin (dB)
1712.4	23.27	1.9	25.17	328.85	33	7.83
1732.6	23.51	1.9	25.41	347.54	33	7.59
1752.6	23.90	1.9	25.80	380.19	33	7.20

LTE Band 4									
Modulation	Bandwidth (MHz)	RB Size/Offset	Channels	Frequency (MHz)	Tx Average Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dBm)
QPSK	1.4	1 / 3	19957	1710.7	22.26	1.9	24.16	33	8.84
		1 / 3	20175	1732.5	23.61	1.9	25.51	33	7.49
		1 / 3	20393	1754.3	23.38	1.9	25.28	33	7.72
	3	1 / 7	19965	1711.5	22.40	1.9	24.30	33	8.70
		1 / 7	20175	1732.5	23.73	1.9	25.63	33	7.37
		1 / 7	20385	1753.5	23.48	1.9	25.38	33	7.62
	5	1 / 12	19975	1712.5	22.45	1.9	24.35	33	8.65
		1 / 12	20175	1732.5	23.73	1.9	25.63	33	7.37
		1 / 12	20375	1752.5	23.41	1.9	25.31	33	7.69
	10	1 / 25	20000	1715.0	22.79	1.9	24.69	33	8.31
		1 / 25	20175	1732.5	23.50	1.9	25.40	33	7.60
		1 / 25	20350	1750.0	23.30	1.9	25.20	33	7.80
	15	1 / 37	20025	1717.5	23.21	1.9	25.11	33	7.89
		1 / 37	20175	1732.5	23.62	1.9	25.52	33	7.48
		1 / 37	20325	1747.5	23.12	1.9	25.02	33	7.98
	20	1 / 49	20050	1720.0	23.67	1.9	25.57	33	7.43
		1 / 49	20175	1732.5	23.67	1.9	25.57	33	7.43
		1 / 49	20300	1745.0	22.28	1.9	24.18	33	8.82

LTE Band 4									
Modulation	Bandwidth (MHz)	RB Size/Offset	Channels	Frequency (MHz)	Tx Average Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dBm)
16QAM	1.4	1 / 5	19957	1710.7	21.22	1.9	23.12	33	9.88
		1 / 5	20175	1732.5	22.77	1.9	24.67	33	8.33
		1 / 5	20393	1754.3	22.57	1.9	24.47	33	8.53
	3	1 / 0	19965	1711.5	21.38	1.9	23.28	33	9.72
		1 / 0	20175	1732.5	22.93	1.9	24.83	33	8.17
		1 / 0	20385	1753.5	22.63	1.9	24.53	33	8.47
	5	1 / 12	19975	1712.5	21.61	1.9	23.51	33	9.49
		1 / 12	20175	1732.5	22.86	1.9	24.76	33	8.24
		1 / 12	20375	1752.5	22.76	1.9	24.66	33	8.34
	10	1 / 25	20000	1715.0	21.78	1.9	23.68	33	9.32
		1 / 25	20175	1732.5	22.78	1.9	24.68	33	8.32
		1 / 25	20350	1750.0	22.45	1.9	24.35	33	8.65
	15	1 / 37	20025	1717.5	22.25	1.9	24.15	33	8.85
		1 / 37	20175	1732.5	22.83	1.9	24.73	33	8.27
		1 / 37	20325	1747.5	22.27	1.9	24.17	33	8.83
	20	1 / 0	20050	1720.0	22.73	1.9	24.63	33	8.37
		1 / 0	20175	1732.5	22.88	1.9	24.78	33	8.22
		1 / 0	20300	1745.0	21.32	1.9	23.22	33	9.78



LTE Band 66									
Modulation	Bandwidth (MHz)	RB Size/Offset	Channels	Frequency (MHz)	Tx Average Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dBm)
QPSK	1.4	1 / 3	131979	1710.7	23.74	1.9	25.64	33	7.36
		1 / 3	132322	1745	23.42	1.9	25.32	33	7.68
		1 / 3	132665	1779.3	22.82	1.9	24.72	33	8.28
	3	1 / 7	131987	1711.5	23.80	1.9	25.70	33	7.30
		1 / 7	132322	1745	23.62	1.9	25.52	33	7.48
		1 / 7	132657	1778.5	23.16	1.9	25.06	33	7.94
	5	1 / 12	131997	1712.5	23.80	1.9	25.70	33	7.30
		1 / 12	132322	1745	23.66	1.9	25.56	33	7.44
		1 / 12	132647	1777.5	22.75	1.9	24.65	33	8.35
	10	1 / 25	132022	1715	23.63	1.9	25.53	33	7.47
		1 / 25	132322	1745	23.13	1.9	25.03	33	7.97
		1 / 25	132622	1775	23.33	1.9	25.23	33	7.77
	15	1 / 37	132047	1717.5	23.79	1.9	25.69	33	7.31
		1 / 37	132322	1745	23.33	1.9	25.23	33	7.77
		1 / 37	132597	1772.5	23.25	1.9	25.15	33	7.85
	20	1 / 49	132072	1720	23.87	1.9	25.77	33	7.23
		1 / 49	132322	1745	23.64	1.9	25.54	33	7.46
		1 / 49	132572	1770	23.50	1.9	25.4	33	7.6



LTE Band 66									
Modulation	Bandwidth (MHz)	RB Size/Offset	Channels	Frequency (MHz)	Tx Average Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dBm)
16QAM	1.4	1 / 3	131979	1710.7	22.85	1.9	24.75	33	8.25
		1 / 3	132322	1745	22.41	1.9	24.31	33	8.69
		1 / 3	132665	1779.3	21.89	1.9	23.79	33	9.21
	3	1 / 7	131987	1711.5	23.06	1.9	24.96	33	8.04
		1 / 7	132322	1745	22.71	1.9	24.61	33	8.39
		1 / 7	132657	1778.5	22.24	1.9	24.14	33	8.86
	5	1 / 12	131997	1712.5	22.92	1.9	24.82	33	8.18
		1 / 12	132322	1745	22.69	1.9	24.59	33	8.41
		1 / 12	132647	1777.5	21.95	1.9	23.85	33	9.15
	10	1 / 25	132022	1715	22.85	1.9	24.75	33	8.25
		1 / 25	132322	1745	22.12	1.9	24.02	33	8.98
		1 / 25	132622	1775	22.19	1.9	24.09	33	8.91
	15	1 / 37	132047	1717.5	23.03	1.9	24.93	33	8.07
		1 / 37	132322	1745	22.45	1.9	24.35	33	8.65
		1 / 37	132597	1772.5	22.39	1.9	24.29	33	8.71
	20	1 / 49	132072	1720	23.13	1.9	25.03	33	7.97
		1 / 49	132322	1745	22.80	1.9	24.70	33	8.30
		1 / 49	132572	1770	22.58	1.9	24.48	33	8.52



2.3 EFFECTIVE RADIATED POWER

2.3.1 Specification Reference

FCC 47 CFR Part 2, Clause 2.1046
FCC 47 CFR Part 27, Clause 27.50 (b)(10)
RSS-130, Clause 4.6.3

2.3.2 Standard Applicable

FCC 47 CFR Part 27.50(b)
(10) Portable stations (hand-held devices) transmitting in the 746-757 MHz, 776-788 MHz, and 805-806 MHz bands are limited to 3 watts ERP.

RSS-130, Clause 4.6.3
The e.r.p. shall not exceed 30 watts for mobile equipment and outdoor fixed subscriber equipment. The e.r.p. shall not exceed 3 watts for portable equipment and indoor fixed subscriber equipment.

2.3.3 Equipment Under Test

Serial No: FF161218B00106, Test Configuration (N/A, calculation only)

2.3.4 Date of Verification/Initial of test personnel who performed the calculation

March 05, 2019 / XYZ

2.3.5 Additional Observations

- ERP was calculated as per Section 1.2 and 1.3 of KDB412172 D01 (Determining ERP and EIRP v01r01).
- Calculation formula in logarithmic terms:

$$\text{ERP} = P_T + G_T - L_c - 2.15\text{dB}$$

Where:

P_T = transmitter conducted output power dBm (Section 2.1 of this test report)
 G_T = gain of the transmitting antenna, in dBi (EIRP - the -2.15 in the formula is to convert EIRP to ERP);
 L_c = signal attenuation in the connecting cable between the transmitter and antenna, in dB (Power measurement performed directly at the primary antenna port. The loss between the LTE module and the primary antenna port is considered negligible).

- Only the worst-case RB size and RB offset presented.

2.3.6 Test Results

LTE Band 13									
Modulation	Bandwidth (MHz)	RB Size/Offset	Channels	Frequency (MHz)	Tx Average Power (dBm)	Antenna Gain (dBi)	ERP (dBm)	Limit (dBm)	Margin (dBm)
QPSK	5	1 / 12	23205	779.5	23.48	0	21.33	36.99	15.66
		1 / 12	23230	782	23.93	0	21.78	36.99	15.21
		1 / 12	23255	784.5	23.86	0	21.71	36.99	15.28
	10	-	-	-	-	-	-	-	-
		1 / 25	23230	782	23.86	0	21.71	36.99	15.28
		-	-	-	-	-	-	-	-
16QAM	5	1 / 12	23205	779.5	22.71	0	20.56	36.99	16.43
		1 / 12	23230	782	23.19	0	21.04	36.99	15.95
		1 / 12	23255	784.5	23.09	0	20.94	36.99	16.05
	10	-	-	-	-	-	-	-	-
		1 / 25	23230	782	23.02	0	20.87	36.99	16.12
		-	-	-	-	-	-	-	-



2.4 OCCUPIED BANDWIDTH

2.4.1 Specification Reference

FCC 47 CFR Part 2, Clause 2.1049
FCC 47 CFR Part 27, Clause 27.53 (h)(3)
RSS-139, Clause 6.6
RSS-GEN, Clause 6.7

2.4.2 Standard Applicable

The transmitted signal bandwidth shall be reported as the 99% emission bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission.

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

2.4.3 Equipment Under Test and Modification State

Serial No: FF161218B00106, FF130219B00478 and FF130219B00624/Test Configuration A

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

March 05, 06 and 13, 2019 / XYZ

2.4.5 Test Equipment Used

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

2.4.6 Environmental Conditions/ Test Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	21.8 - 22.3 °C
Relative Humidity	41.8 - 48.8 %
ATM Pressure	99.0 - 99.1kPa

2.4.7 Additional Observations

- This is a conducted test. Both 26dB bandwidth and 99% bandwidth presented.
- Using the occupied bandwidth measurement function in the spectrum analyzer, the 99% occupied bandwidth was measured.
- The 26dB bandwidth was measured in accordance with ANSI C63.26 clause 5.4.3 using the ndB measurement function in the spectrum analyzer.
- The transmitter shall be operated at its maximum carrier power measured under normal test conditions. The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts.
- The resolution bandwidth (RBW) shall be in the range of 1% of the occupied bandwidth (OBW) and video bandwidth (VBW) shall be at least 3x RBW.

- Low, Middle and High channels for all bandwidths and modulations were verified. Test results of Middle channel were presented as representative.

2.4.8 Test Results

Band	Channel	Frequency	99% OBW (MHz)	26dB BW (MHz)
WCDMA Band 4	1413	1732.6	4.15	4.70

LTE Band 4					
Modulation	Bandwidth (MHz)	Channel	Frequency (MHz)	99% OBW (MHz)	26dB BW (MHz)
QPSK	1.4	20175	1732.5	1.08	1.24
	3			2.69	2.98
	5			4.48	4.91
	10			8.94	9.69
	15			13.38	14.49
	20			17.91	19.14
16QAM	1.4	20175	1732.5	1.09	1.24
	3			2.68	2.99
	5			4.47	4.91
	10			8.95	9.60
	15			13.43	14.56
	20			17.87	19.26

LTE Band 13					
Modulation	Bandwidth (MHz)	Channel	Frequency (MHz)	99% OBW (MHz)	26dB BW (MHz)
QPSK	5	23230	782	4.48	4.93
	10			8.97	9.68
16QAM	5	23230	782	4.48	4.88
	10			8.96	9.68

LTE Band 66					
Modulation	Bandwidth (MHz)	Channel	Frequency (MHz)	99% OBW (MHz)	26dB BW (MHz)
QPSK	1.4	132322	1745.0	1.08	1.24
	3			2.68	2.96
	5			4.48	4.88
	10			8.94	9.66
	15			13.43	14.51
	20			17.89	19.17
16QAM	1.4	132322	1745.0	1.08	1.23
	3			2.68	2.99
	5			4.48	4.84
	10			8.95	9.64
	15			13.42	14.49
	20			17.93	19.20

2.4.9 Example Test Plots

WCDMA Band 4 / Middle Channel 1732.6 MHz / 99%OBW



13:05:46 06.03.2019

WCDMA Band 4 / Middle Channel 1732.6 MHz / 26dB OBW



13:05:18 06.03.2019

LTE Band 4 (5 MHz BW) / Middle Channel 1732.5 MHz / QPSK / 99%OBW



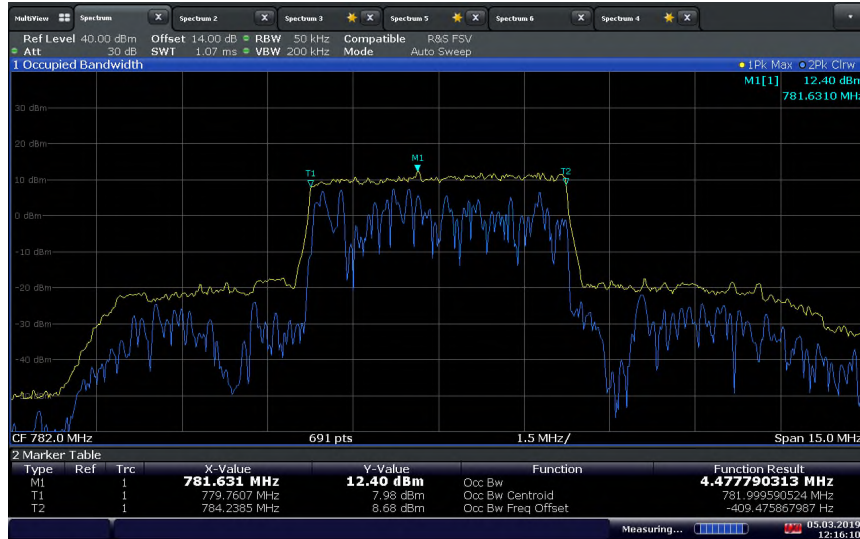
10:05:07 13.03.2019

LTE Band 4 (5 MHz BW) / Middle Channel 1732.5 MHz / QPSK / 26dB BW

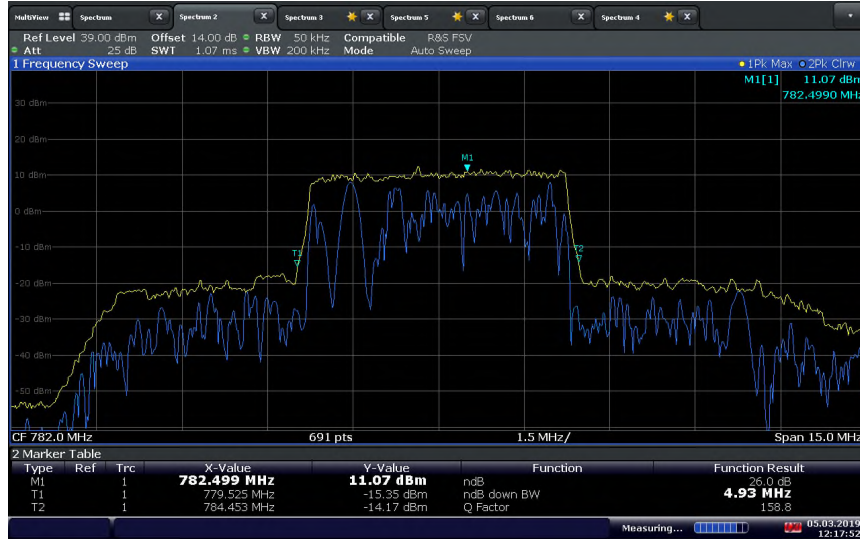


10:05:32 13.03.2019

LTE Band 13 (5 MHz BW) / Middle Channel 782 MHz / QPSK / 99%OBW



LTE Band 13 (5 MHz BW) / Middle Channel 782 MHz / QPSK / 26dB OBW



LTE Band 66 (5 MHz BW) / Middle Channel 1745.0 MHz / QPSK / 99%OBW



11:50:50 13.03.2019

LTE Band 66 (5 MHz BW) / Middle Channel 1745.0 MHz / QPSK / 26dB BW



11:50:06 13.03.2019



2.5 PEAK-AVERAGE POWER RATIO

2.5.1 Specification Reference

FCC 47 CFR Part 27, Clause 27.50 (d)(5)
RSS-139, Clause 6.5
RSS-130, Clause 4.6.1

2.5.2 Standard Applicable

FCC 47 CFR Part 27.50(d):

(5) Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (d)(6) of this section. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13dB.

RSS-130 and RSS-139:

The transmitter's peak-to-average power ratio (PAPR) shall not exceed 13 dB for more than 0.1% of the time using a signal corresponding to the highest PAPR during periods of continuous transmission.

2.5.3 Equipment Under Test and Modification State

Serial No: FF161218B00106, FF130219B00478 and FF130219B00624/Test Configuration A

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

March 05, 06 and 13, 2019 / XYZ

2.5.5 Test Equipment Used

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

2.5.6 Environmental Conditions/ Test Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	21.8 - 22.3 °C
Relative Humidity	41.8 - 48.8 %
ATM Pressure	99.0 - 99.1kPa

2.5.7 Additional Observations

- This is a conducted test.
- As per FCC KDB 971168 D01 v03r01 clause 5.7, the PAPR was measured in accordance with ANSI C63.26 clause 5.2.3.4.
- Measurement was done using the Spectrum Analyzer's Complementary Cumulative Distribution Function (CCDF) measurement profile. The built-in function is used to determine the largest deviation between the average and the peak power of the EUT in a given bandwidth (crest factor or peak-to-average ratio) A CCDF curve depicts the probability of the peak signal amplitude exceeding the average power level. Most contemporary measurement instrumentation include the capability to produce CCDF curves for an input signal provided that the instrument's resolution bandwidth can be set wide enough to accommodate the entire input signal bandwidth.
- Low, Middle and High channels for all bandwidths and modulations were verified.
- The path loss for was measured and entered as a level offset.
- There are no measured PAR levels greater than 13dB. EUT complies.

2.5.8 Test Results

Band	Channels	Frequency (MHz)	PAR (dB)	Limit for PAR (dB)
WCDMA Band 4	1312	1712.4	3.85	13
	1413	1732.6	3.57	13
	1513	1752.6	3.87	13

LTE Band 13					
Modulation	Bandwidth (MHz)	Channels	Frequency (MHz)	PAR (dB)	Limit for PAR (dB)
QPSK	5	23205	779.5	5.48	13
		23230	782	5.54	13
		23255	784.5	5.70	13
	10	-	-	-	13
		23230	782	5.81	13
		-	-	-	13
16QAM	5	23205	779.5	6.32	13
		23230	782	6.71	13
		23255	784.5	6.83	13
	10	-	-	-	13
		23230	782	6.70	13
		-	-	-	13

LTE Band 4					
Modulation	Bandwidth (MHz)	Channels	Frequency (MHz)	PAR (dB)	Limit for PAR (dB)
QPSK	1.4	19957	1710.7	4.41	13
		20175	1732.5	1.60	13
		20393	1754.3	2.32	13
	3	19965	1711.5	4.38	13
		20175	1732.5	1.53	13
		20385	1753.5	2.25	13
	5	19975	1712.5	4.47	13
		20175	1732.5	1.40	13
		20375	1752.5	2.77	13
	10	20000	1715	3.83	13
		20175	1732.5	2.24	13
		20350	1750	2.47	13
	15	20025	1717.5	3.60	13
		20175	1732.5	2.60	13
		20325	1747.5	3.11	13
	20	20050	1720	3.13	13
		20175	1732.5	3.31	13
		20300	1745	3.86	13
16QAM	1.4	19957	1710.7	5.39	13
		20175	1732.5	2.26	13
		20393	1754.3	3.19	13
	3	19965	1711.5	5.20	13
		20175	1732.5	2.25	13
		20385	1753.5	3.08	13
	5	19975	1712.5	5.39	13
		20175	1732.5	2.0	13
		20375	1752.5	3.68	13
	10	20000	1715	4.74	13
		20175	1732.5	2.79	13
		20350	1750	3.34	13
	15	20025	1717.5	4.42	13
		20175	1732.5	3.48	13
		20325	1747.5	4.07	13
	20	20050	1720	4.05	13
		20175	1732.5	3.99	13
		20300	1745	4.56	13

LTE Band 66					
Modulation	Bandwidth (MHz)	Channels	Frequency (MHz)	PAR (dB)	Limit for PAR (dB)
QPSK	1.4	131979	1710.7	4.48	13
		132322	1745	5.24	13
		132665	1779.3	4.41	13
	3	131987	1711.5	4.58	13
		132322	1745	5.15	13
		132657	1778.5	4.37	13
	5	131997	1712.5	4.96	13
		132322	1745	5.18	13
		132647	1777.5	4.50	13
	10	132022	1715	5.71	13
		132322	1745	5.73	13
		132622	1775	4.85	13
	15	132047	1717.5	5.77	13
		132322	1745	5.84	13
		132597	1772.5	5.58	13
	20	132072	1720	5.93	13
		132322	1745	6.20	13
		132572	1770	6.04	13
16QAM	1.4	131979	1710.7	5.21	13
		132322	1745	6.23	13
		132665	1779.3	5.42	13
	3	131987	1711.5	5.54	13
		132322	1745	6.06	13
		132657	1778.5	5.34	13
	5	131997	1712.5	5.81	13
		132322	1745	6.16	13
		132647	1777.5	5.39	13
	10	132022	1715	6.69	13
		132322	1745	6.61	13
		132622	1775	5.83	13
	15	132047	1717.5	6.66	13
		132322	1745	6.67	13
		132597	1772.5	6.65	13
	20	132072	1720	6.70	13
		132322	1745	6.96	13
		132572	1770	7.19	13

2.5.9 Example Test Plots

WCDMA Band 4 / Middle Channel 1732.6 MHz



LTE Band 4 / Middle Channel 1732.5 MHz



LTE Band 13 (5 MHz BW) / Middle Channel 782 MHz / QPSK



LTE Band 66 (5 MHz BW) / Middle Channel 1745 MHz / QPSK





2.6 SPURIOUS EMISSION AT BAND EDGE

2.6.1 Specification Reference

FCC 47 CFR Part 2, Clause 2.1051
FCC 47 CFR Part 27, Clause 27.53(h)(1)(3)
FCC 47 CFR Part 27, Clause 27.53(c)(2)
RSS-139, Clause 6.6
RSS-130, Clause 4.7.1

2.6.2 Standard Applicable

FCC 47 CFR Part 27.53

(h) AWS emission limits – (1) General protection levels. Except as otherwise specified below, for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 MHz bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10}(P)$ dB.

(c) For operations in the 746-758 MHz band and the 776-788 MHz band, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:

(2) On any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log_{10}(P)$ dB.

RSS-139, Clause 6.6:

(i) In the first 1.0 MHz bands immediately outside and adjacent to the equipment's smallest operating frequency block, which can contain the equipment's occupied bandwidth, the emission power per any 1% of the emission bandwidth shall be attenuated below the transmitter output power P (dBW), by at least $43 + 10 \log_{10} p$ (watts) dB.

RSS-130:

4.7.1 The unwanted emissions in any 100 kHz bandwidth on any frequency outside the low frequency edge and the high frequency edge of each frequency block range(s), shall be attenuated below the transmitter power, P (dBW), by at least $43 + 10 \log_{10} p$ (watts), dB. However, in the 100 kHz band immediately outside of the equipment's frequency block range, a resolution bandwidth of 30 kHz may be employed.



2.6.3 Equipment Under Test and Modification State

Serial No: FF161218B00106, FF130219B00478 and FF130219B00624/Test Configuration A

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

March 05, 06 and 15, 2019 / XYZ

2.6.5 Test Equipment Used

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

2.6.6 Environmental Conditions/ Test Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

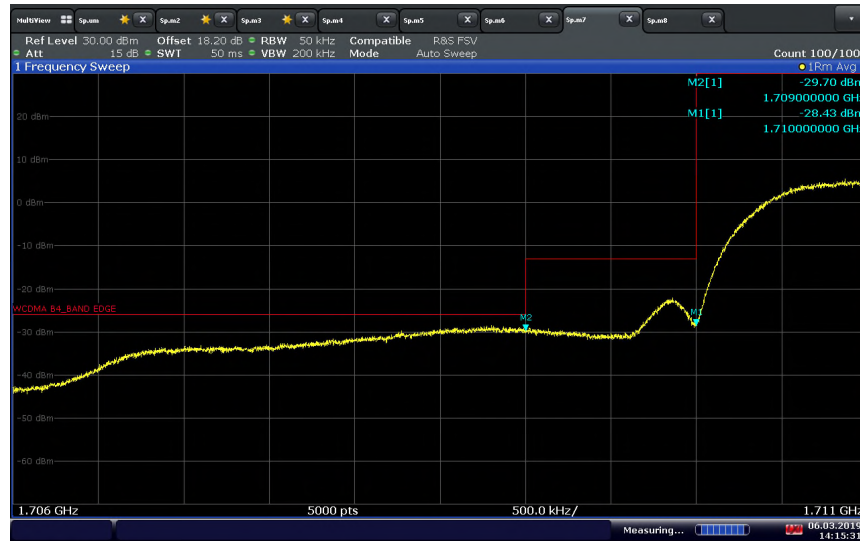
Ambient Temperature	21.8 – 22.3°C
Relative Humidity	43.2 – 48.8 %
ATM Pressure	99.0 – 99.1kPa

2.6.7 Additional Observations

- This is a conducted test.
- The path loss were measured and entered as a level offset.
- For band 4 and 66, RBW is set to minimum 1% of EBW and VBW is set to $>3 \times \text{RBW}$, and for emissions more than 1.0 MHz outside the equipment's operating frequency block, the limit is set to:
 $-13 + 10\lg(\text{RBW}_{\text{used}}/1 \text{ MHz}) \text{ dBm}$.
- For LTE Band 13, RBW was set 30 kHz, and for emissions more than 100 kHz outside the equipment's operating frequency block, and the limit is set to:
 $-13 + 10\lg(\text{RBW}_{\text{used}}/100 \text{ kHz}) \text{ dBm}$.
- Only worst case configuration for all technologies presented in this test report.

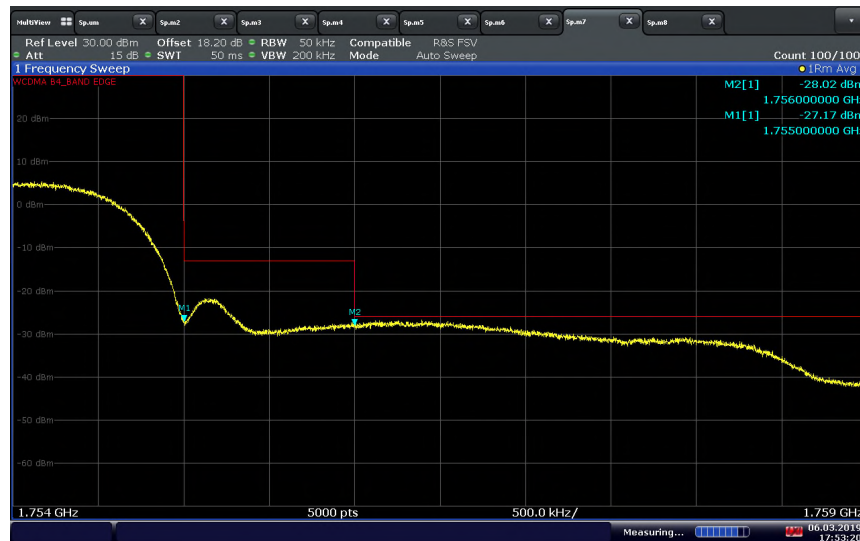
2.6.8 Test Results

WCDMA Band 4 / Low Channel 1712.4 MHz / Band Edge @1710 MHz



14:15:31 06.03.2019

WCDMA Band 4 / High Channel 1752.6 MHz / Band Edge @1755 MHz



17:53:20 06.03.2019

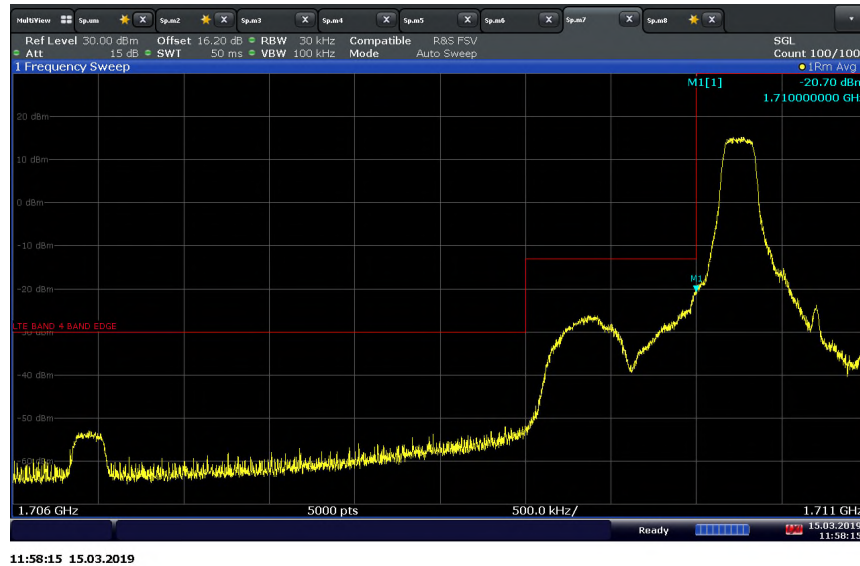
LTE Band 4 (1.4 MHz BW)/QPSK/Low Channel 1710.7 MHz/Full RB Band Edge @1710 MHz



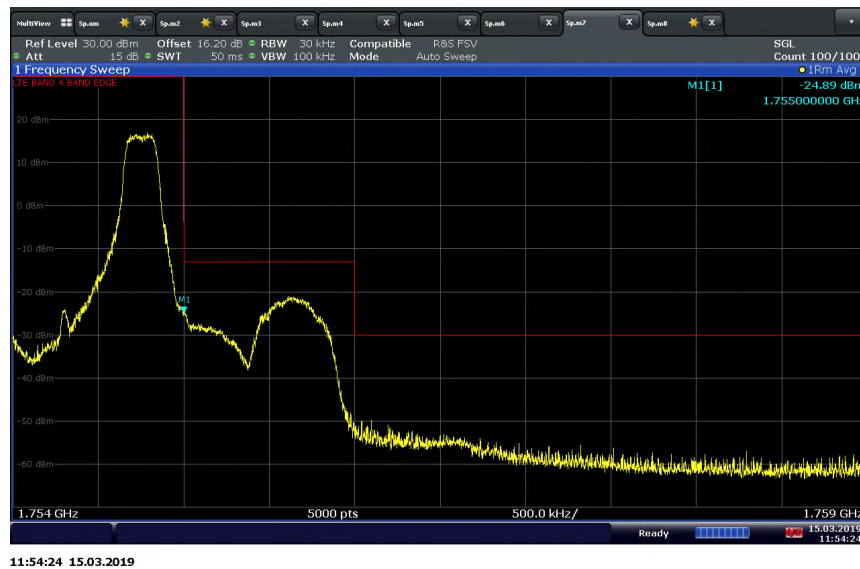
LTE Band 4 (1.4 MHz BW)/QPSK/High Channel 1754.3 MHz/Full RB Band Edge @1755 MHz



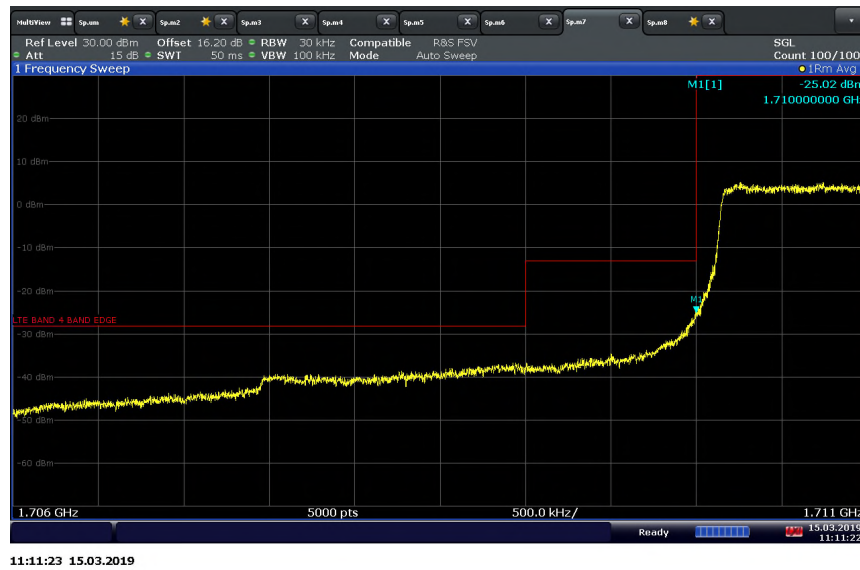
LTE Band 4 (1.4 MHz BW)/QPSK/Low Channel 1710.7 MHz/1 RB 0 offset Band Edge @1710 MHz



LTE Band 4 (1.4 MHz BW)/QPSK/High Channel 1754.3 MHz/1 RB 5 offset Band Edge @1755 MHz



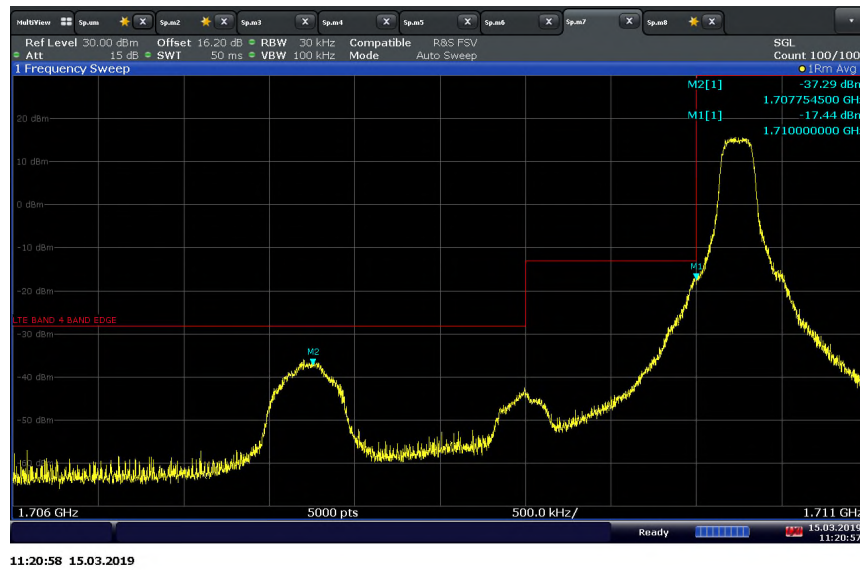
LTE Band 4 (3 MHz BW)/QPSK/Low Channel 1711.5 MHz/Full RB Band Edge @1710 MHz



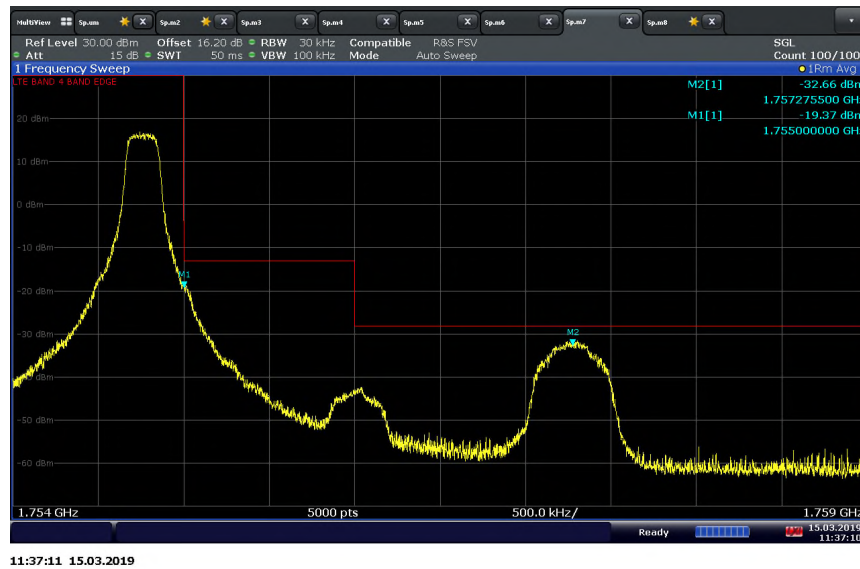
LTE Band 4 (3 MHz BW)/QPSK/High Channel 1753.5 MHz /Full RB Band Edge @1755 MHz



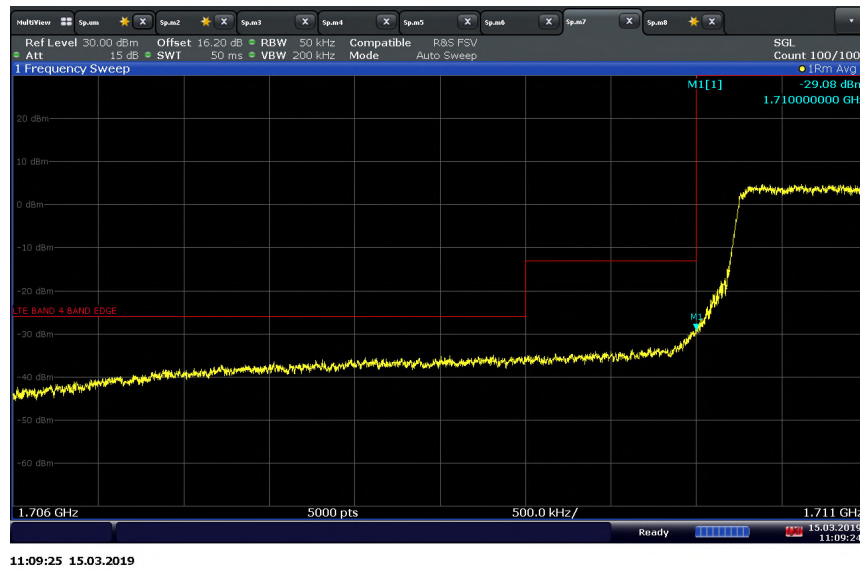
LTE Band 4 (3 MHz BW)/QPSK/Low Channel 1711.5 MHz/1 RB 0 offset Band Edge @1710 MHz



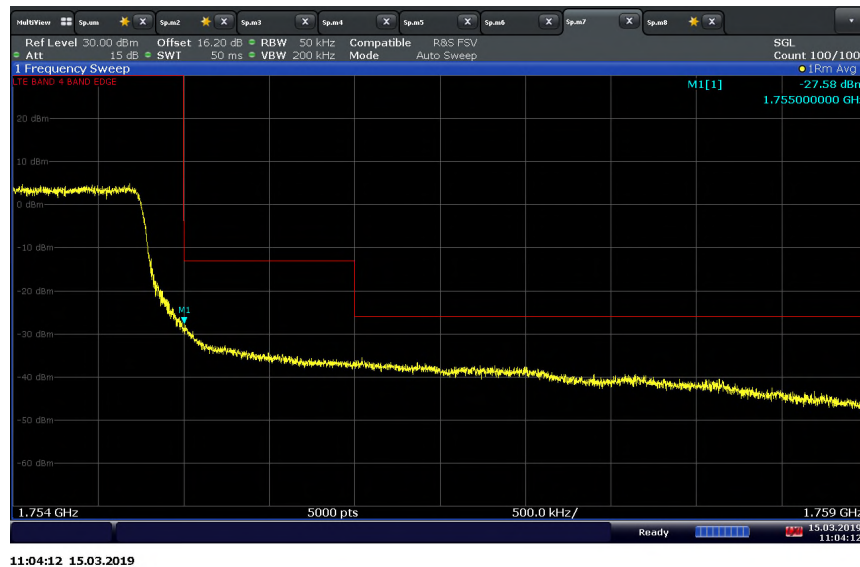
LTE Band 4 (3 MHz BW)/QPSK/High Channel 1753.5 MHz/1 RB 14 offset Band Edge @1755 MHz



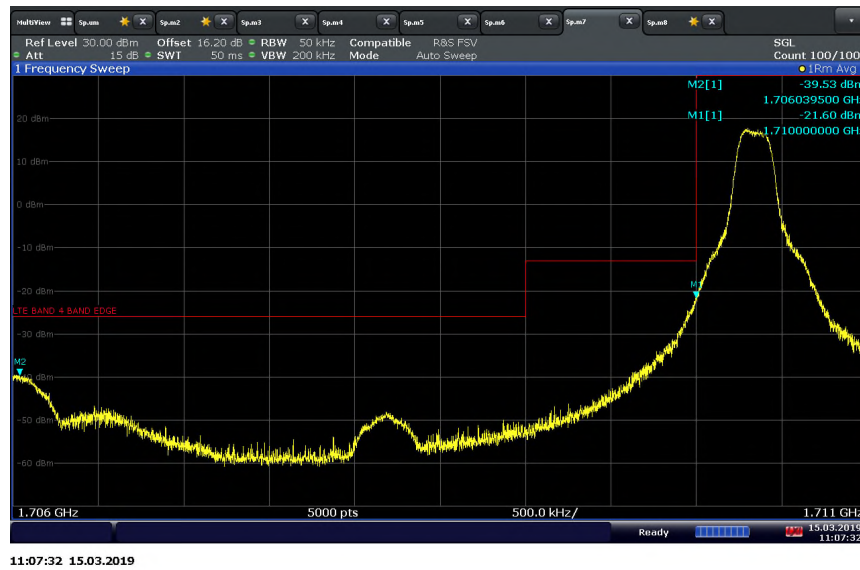
LTE Band 4 (5 MHz BW)/QPSK/Low Channel 1712.5 MHz/Full RB Band Edge @1710 MHz



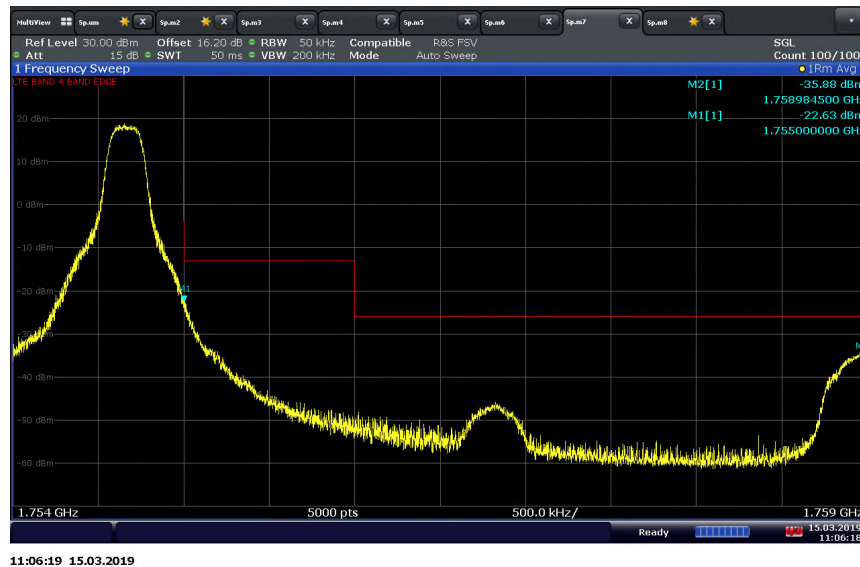
LTE Band 4 (5 MHz BW)/QPSK/High Channel 1752.5 MHz/Full RB Band Edge @1755 MHz



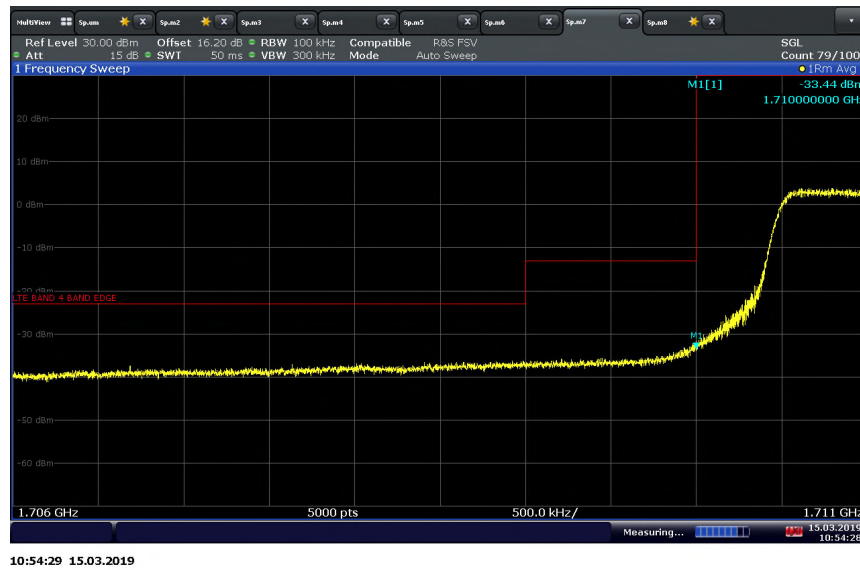
LTE Band 4 (5 MHz BW)/QPSK/Low Channel 1712.5 MHz/1 RB 0 offset Band Edge @1710 MHz



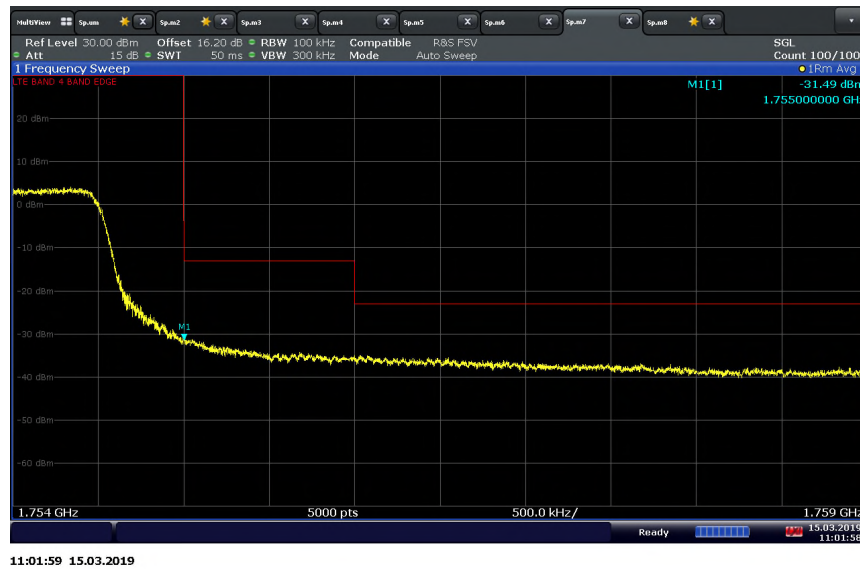
LTE Band 4 (5 MHz BW)/QPSK/High Channel 1752.5 MHz/1 RB 24 offset Band Edge @1755 MHz



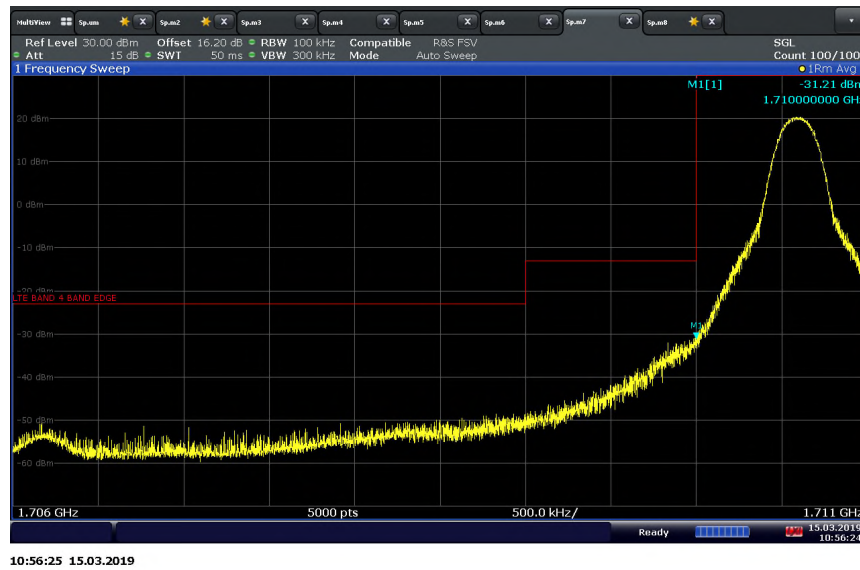
LTE Band 4 (10 MHz BW)/QPSK/Low Channel 1715 MHz/Full RB Band Edge @1710 MHz



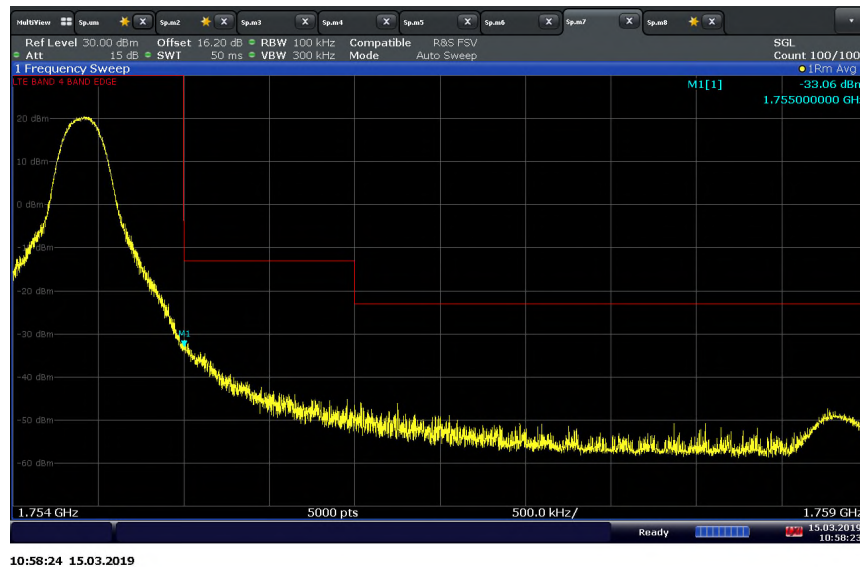
LTE Band 4 (10 MHz BW)/QPSK/High Channel 1750 MHz/Full RB Band Edge @1755 MHz



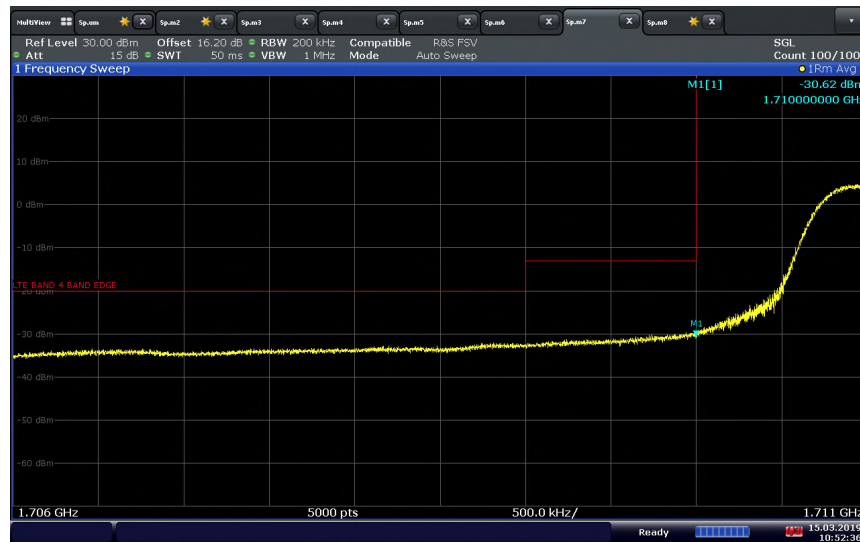
LTE Band 4 (10 MHz BW)/QPSK/Low Channel 1715 MHz/1 RB 0 offset Band Edge @1710 MHz



LTE Band 4 (10 MHz BW)/QPSK/High Channel 1750 MHz/1 RB 49 offset Band Edge @1755 MHz

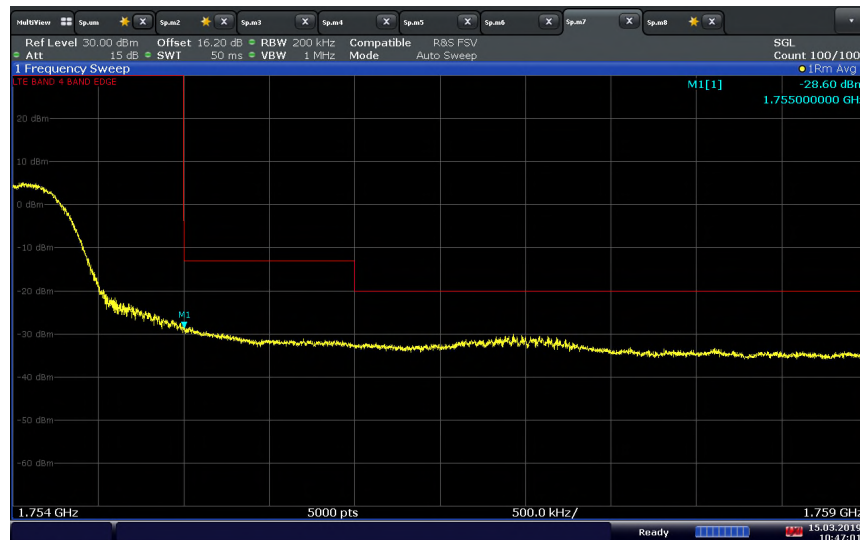


LTE Band 4 (15 MHz BW)/QPSK/Low Channel 1717.5 MHz/Full RB Band Edge @1710 MHz



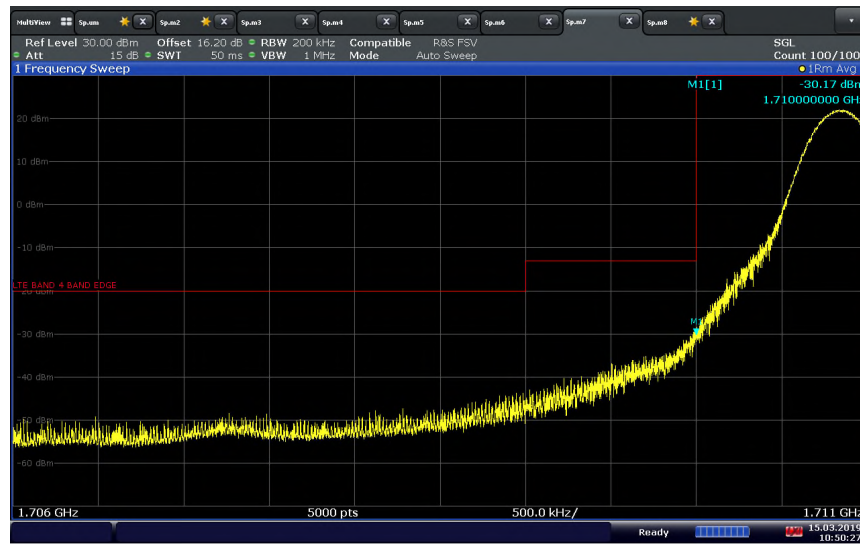
10:52:37 15.03.2019

LTE Band 4 (15 MHz BW)/QPSK/High Channel 1747.5 MHz/Full RB Band Edge @1755 MHz



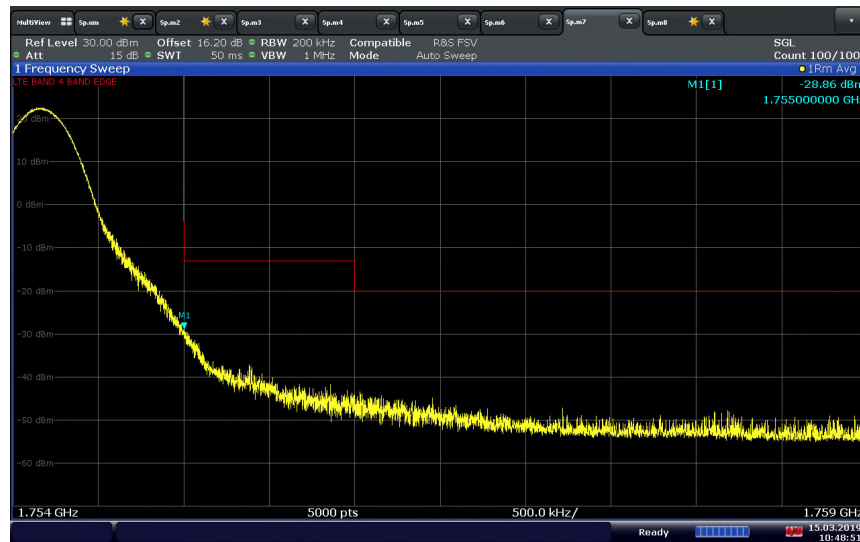
10:47:01 15.03.2019

LTE Band 4 (15 MHz BW)/QPSK/Low Channel 1717.5 MHz/1 RB 0 offset Band Edge @1710 MHz



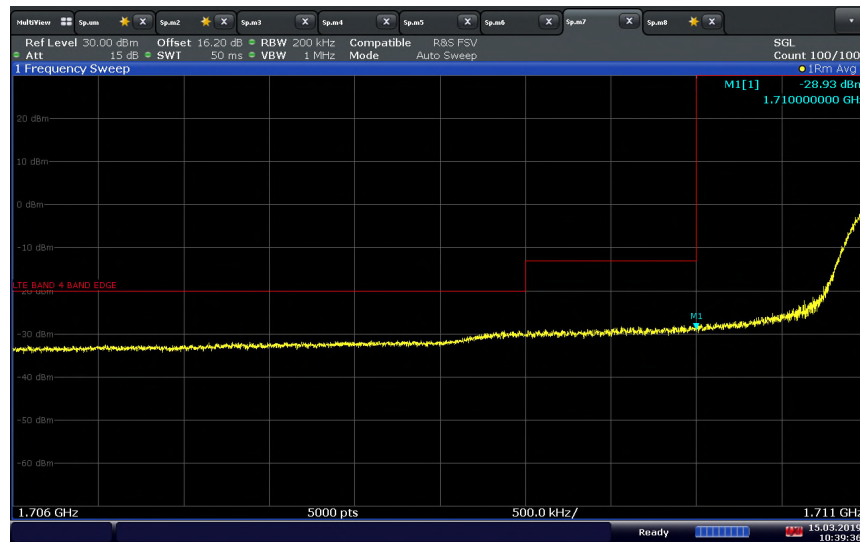
10:50:27 15.03.2019

LTE Band 4 (15 MHz BW)/QPSK/High Channel 1747.5 MHz/1 RB 74 offset Band Edge @1755 MHz



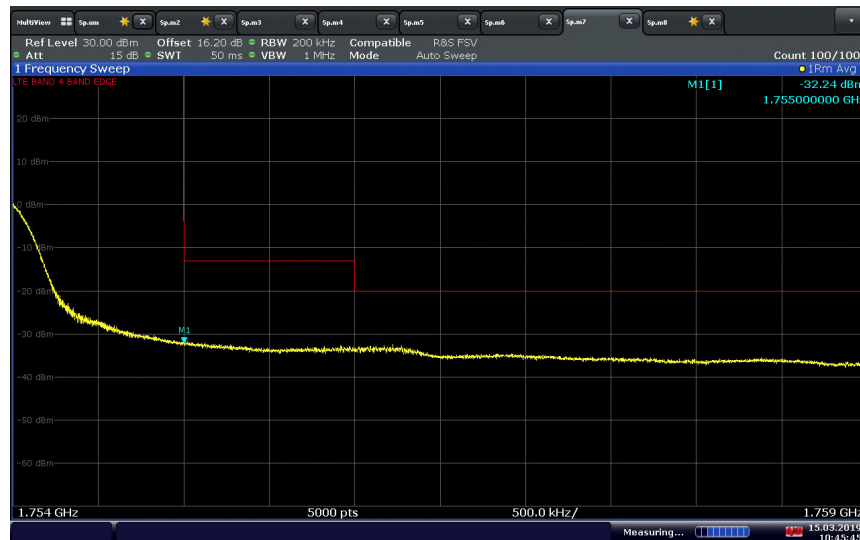
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LTE Band 4 (20 MHz BW)/QPSK/Low Channel 1720 MHz/Full RB Band Edge @1710 MHz



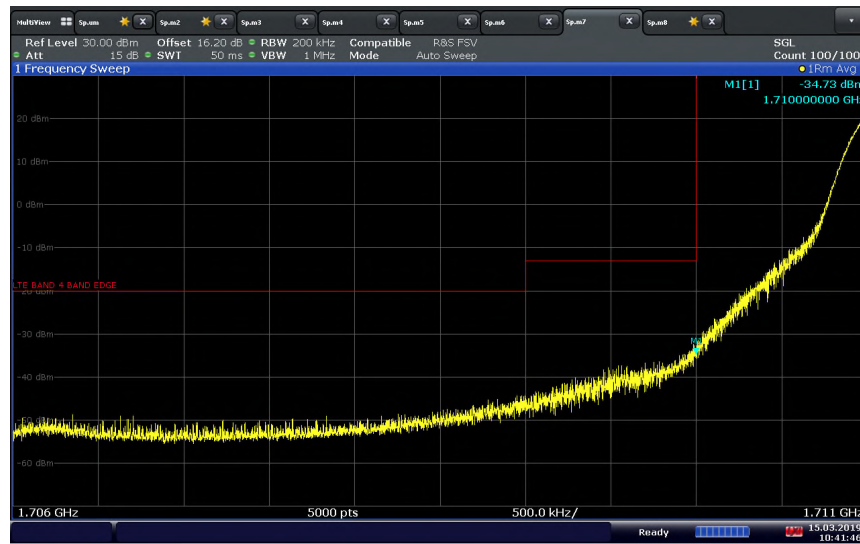
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LTE Band 4 (20 MHz BW)/QPSK/High Channel 1745 MHz/Full RB Band Edge @1755 MHz



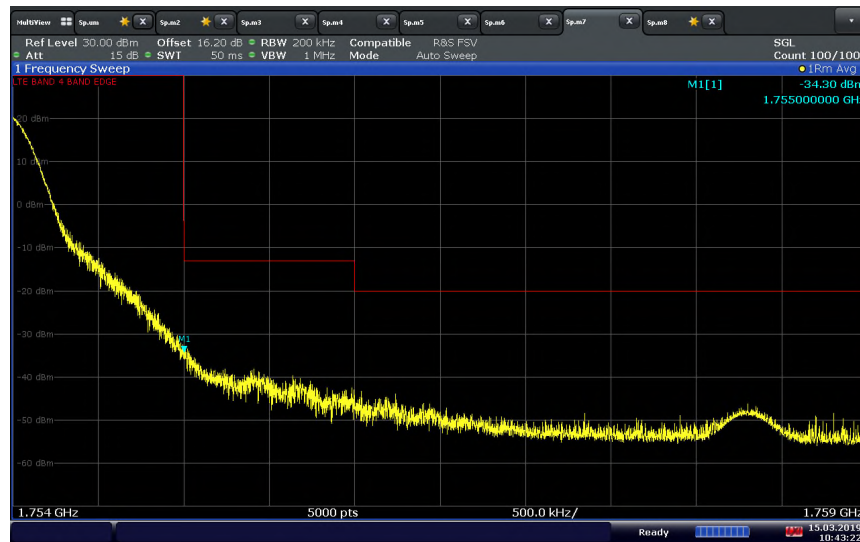
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LTE Band 4 (20 MHz BW)/QPSK/Low Channel 1720 MHz/1 RB 0 offset Band Edge @1710 MHz



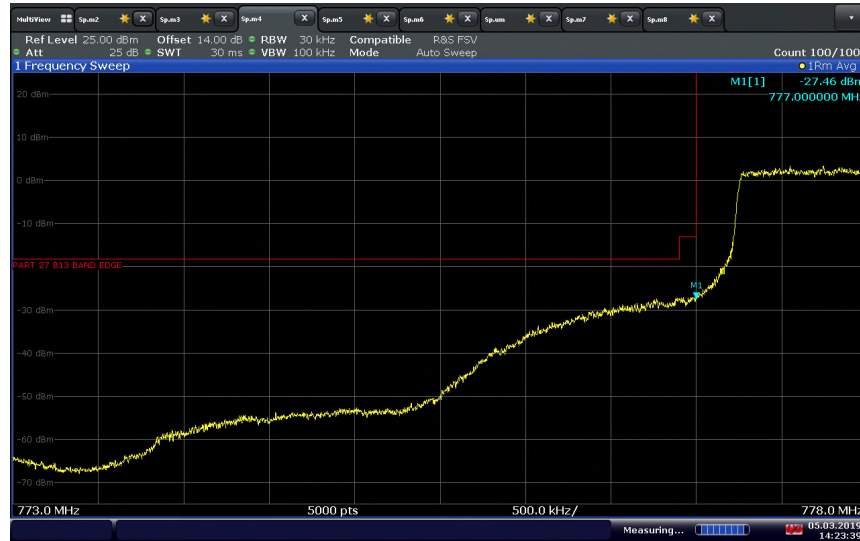
10:41:47 15.03.2019

LTE Band 4 (20 MHz BW)/QPSK/High Channel 1745 MHz/1 RB 99 offset Band Edge @1755 MHz



10:43:23 15.03.2019

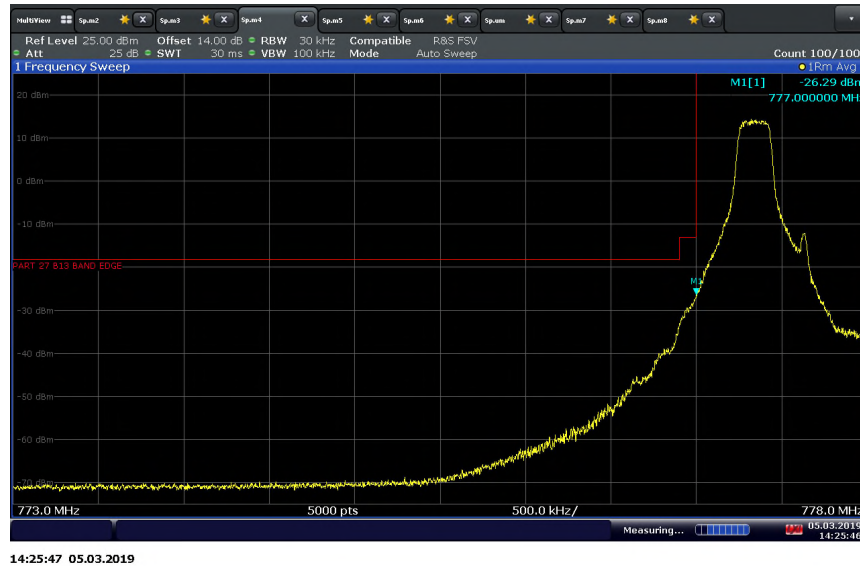
LTE Band 13 (5 MHz BW)/QPSK/Low Channel 779.5 MHz/Full RB Band Edge @777 MHz



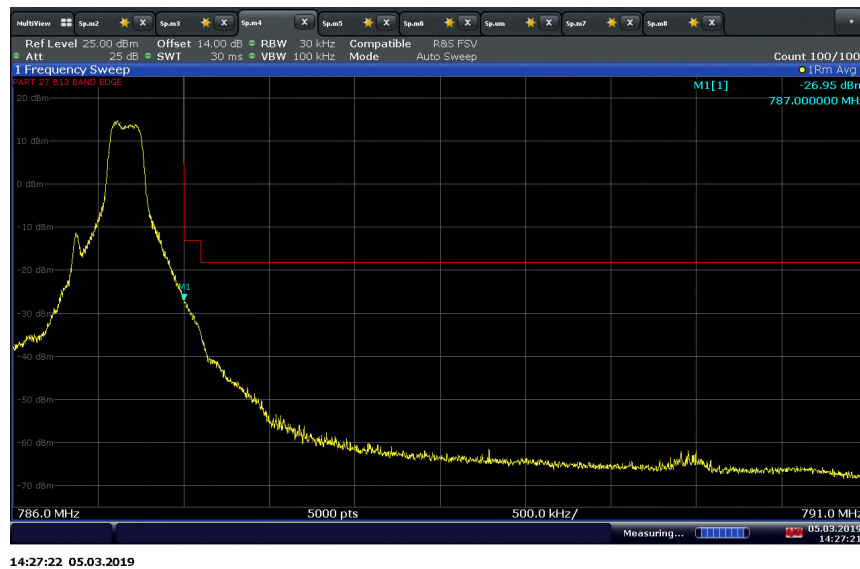
LTE Band 13 (5 MHz BW)/QPSK/High Channel 784.5 MHz/Full RB Band Edge @787 MHz



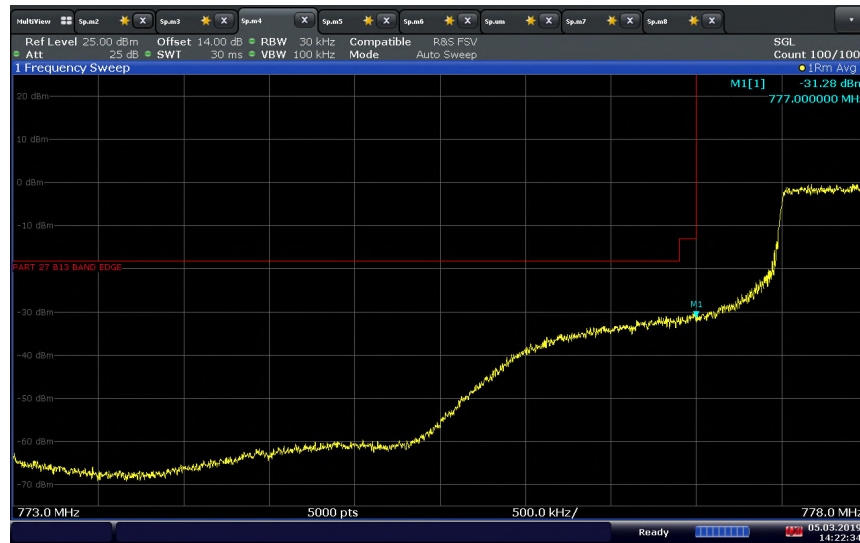
LTE Band 13 (5 MHz BW)/QPSK/Low Channel 779.5 MHz/1 RB 0 offset Band Edge @777 MHz



LTE Band 13 (5 MHz BW)/QPSK/High Channel 784.5 MHz/1 RB 24 offset Band Edge @787 MHz

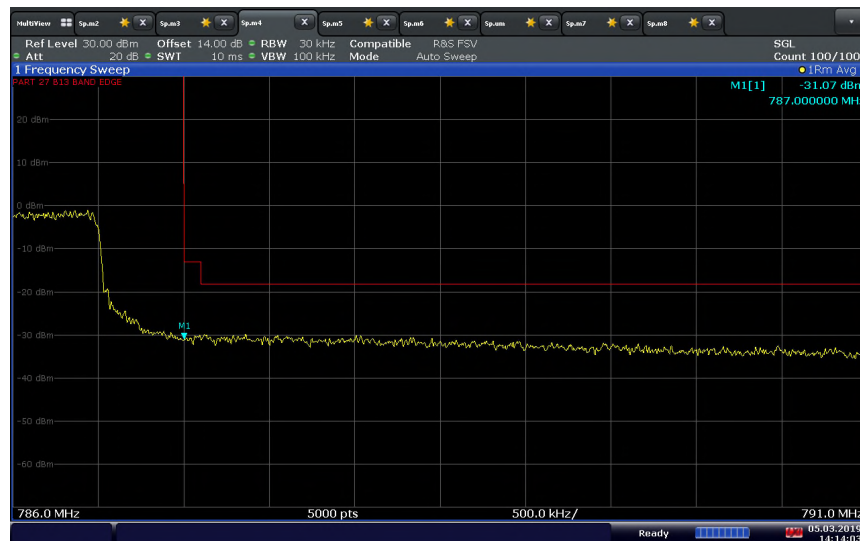


LTE Band 13 (10 MHz BW)/QPSK/Middle Channel 782 MHz/Full RB Low Band Edge @777 MHz



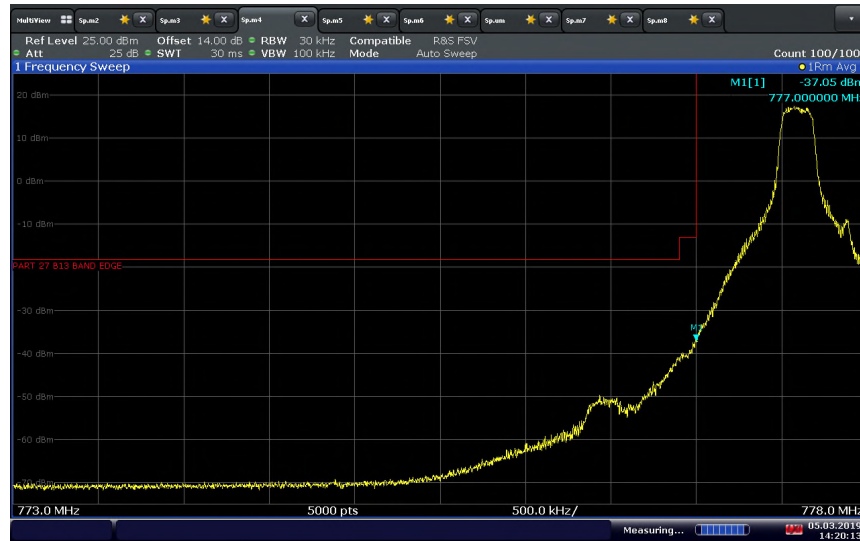
14:22:34 05.03.2019

LTE Band 13 (10 MHz BW)/QPSK/Middle Channel 782 MHz/Full RB High Band Edge @787 MHz



14:14:04 05.03.2019

LTE Band 13 (10 MHz BW)/QPSK/Middle Channel 782 MHz/1 RB 0 offset Low Band Edge @777 MHz



LTE Band 13 (10 MHz BW)/QPSK/Middle Channel 782 MHz/1 RB 49 offset Low Band Edge @787 MHz



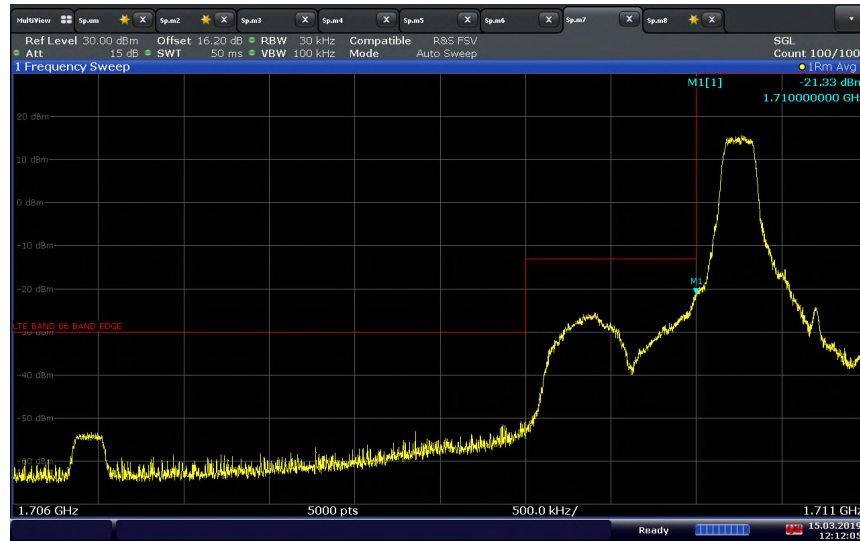
LTE Band 66 (1.4 MHz BW)/QPSK/Low Channel 1710.7 MHz/Full RB Band Edge @1710 MHz



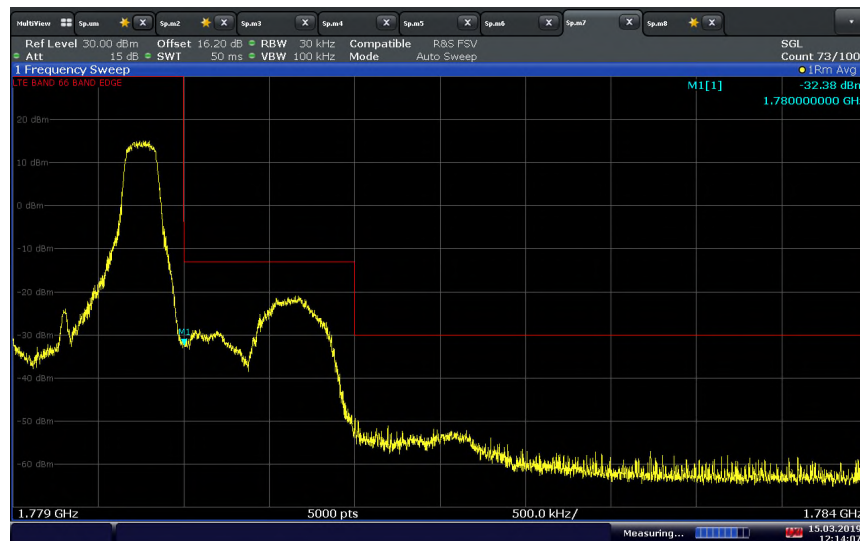
LTE Band 66 (1.4 MHz BW)/QPSK/High Channel 1779.3 MHz/Full RB Band Edge @1780 MHz



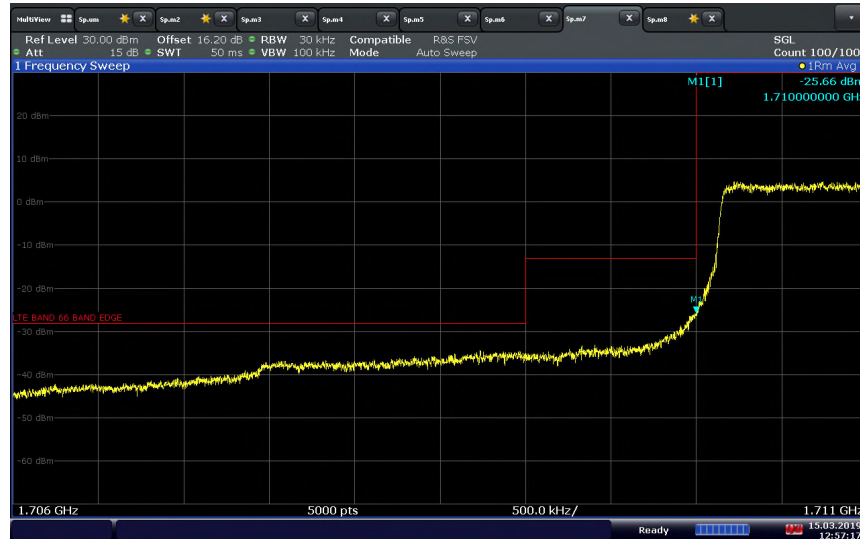
LTE Band 66 (1.4 MHz BW)/QPSK/Low Channel 1710.7 MHz/1 RB 0 offset Band Edge @1710 MHz



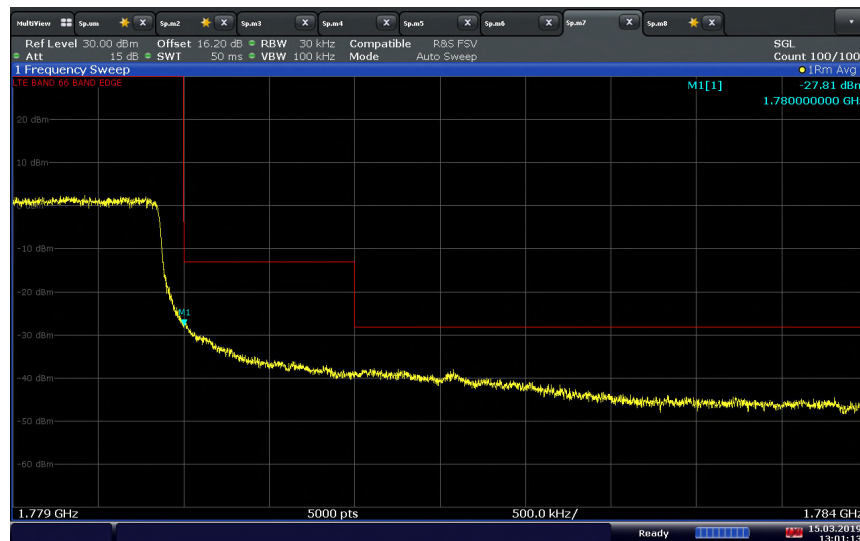
LTE Band 66 (1.4 MHz BW)/QPSK/High Channel 1779.3 MHz/1 RB 5 offset Band Edge @1780 MHz



LTE Band 66 (3 MHz BW)/QPSK/Low Channel 1711.5 MHz/Full RB Band Edge @1710 MHz



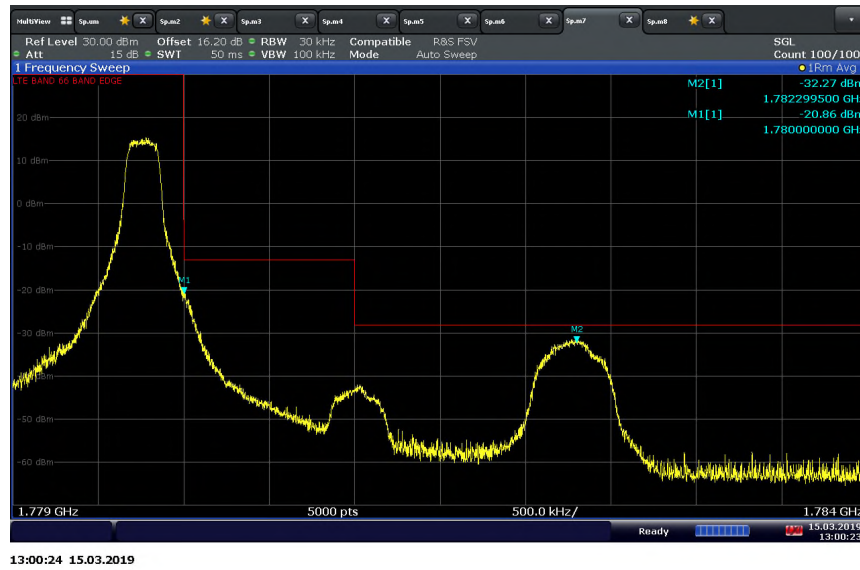
LTE Band 66 (3 MHz BW)/QPSK/High Channel 1778.5 MHz /Full RB Band Edge @1780 MHz



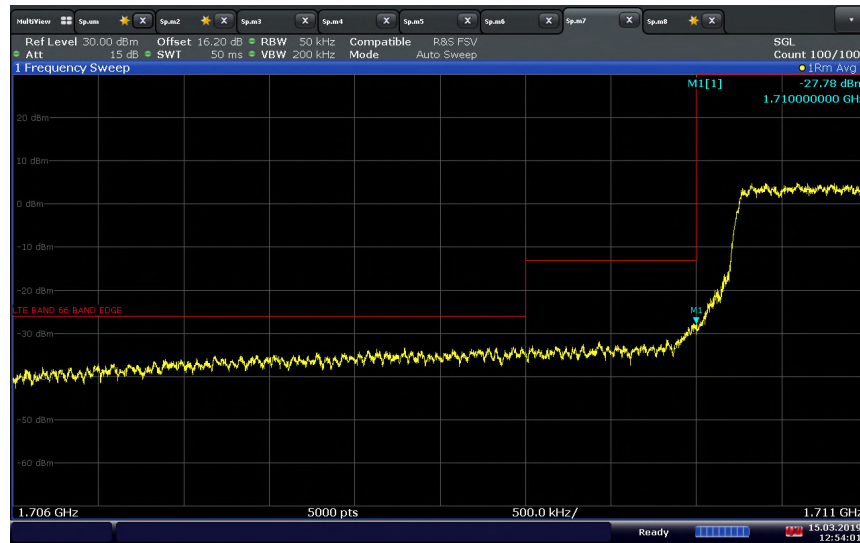
LTE Band 66 (3 MHz BW)/QPSK/Low Channel 1711.5 MHz/1 RB 0 offset Band Edge @1710 MHz



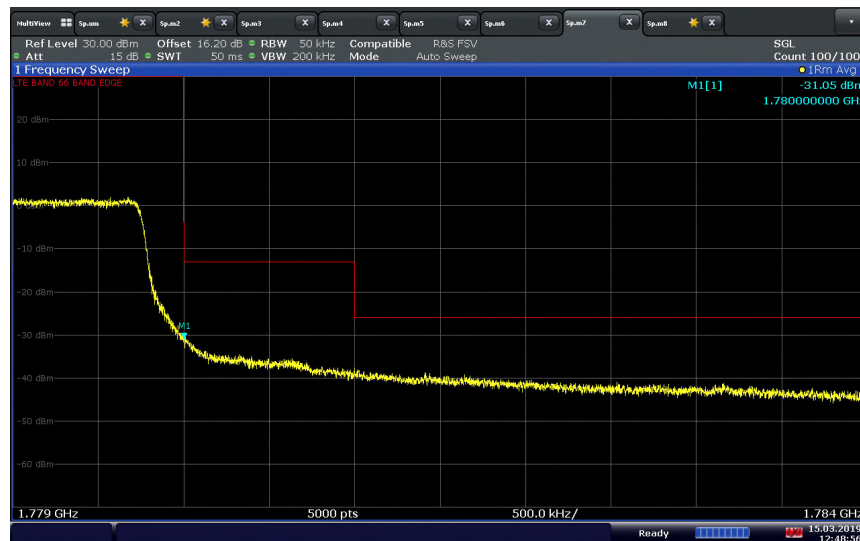
LTE Band 66 (3 MHz BW)/QPSK/High Channel 1778.5 MHz/1 RB 14 offset Band Edge @1780 MHz



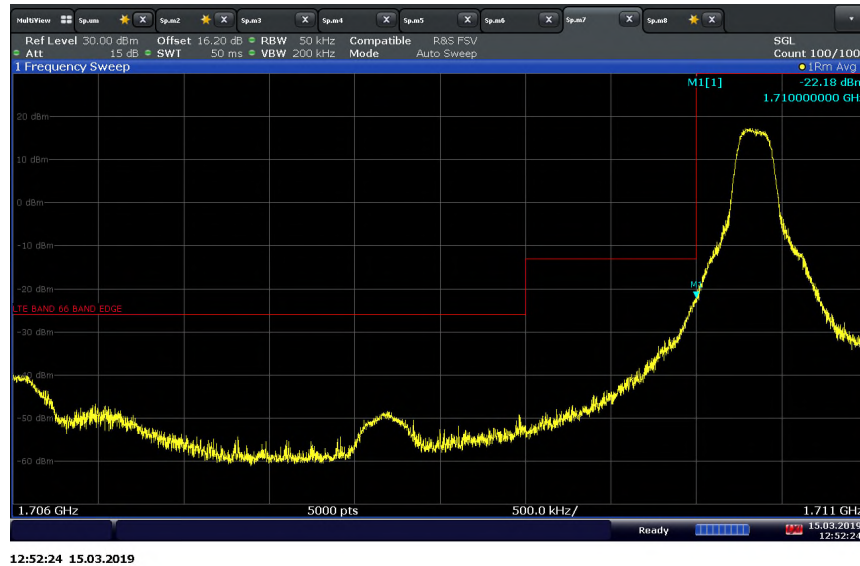
LTE Band 66 (5 MHz BW)/QPSK/Low Channel 1712.5 MHz/Full RB Band Edge @1710 MHz



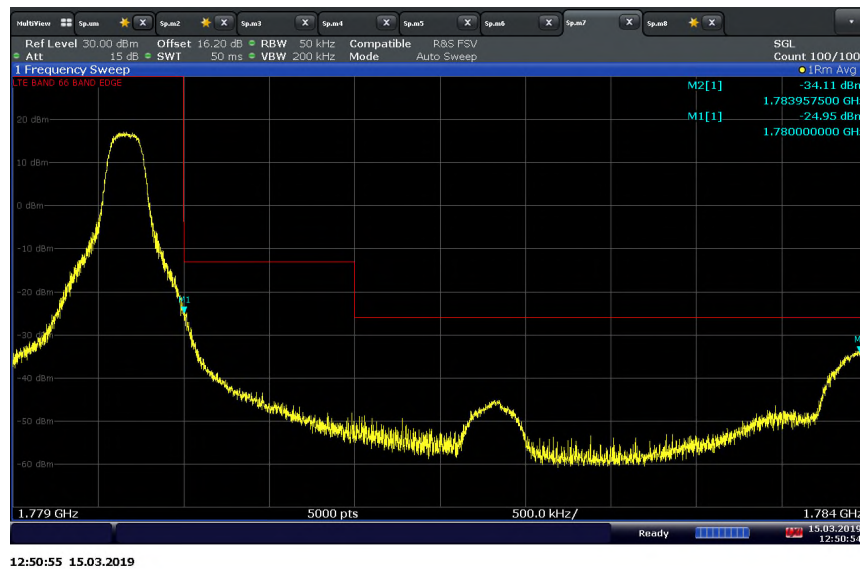
LTE Band 66 (5 MHz BW)/QPSK/High Channel 1777.5 MHz/Full RB Band Edge @1780 MHz



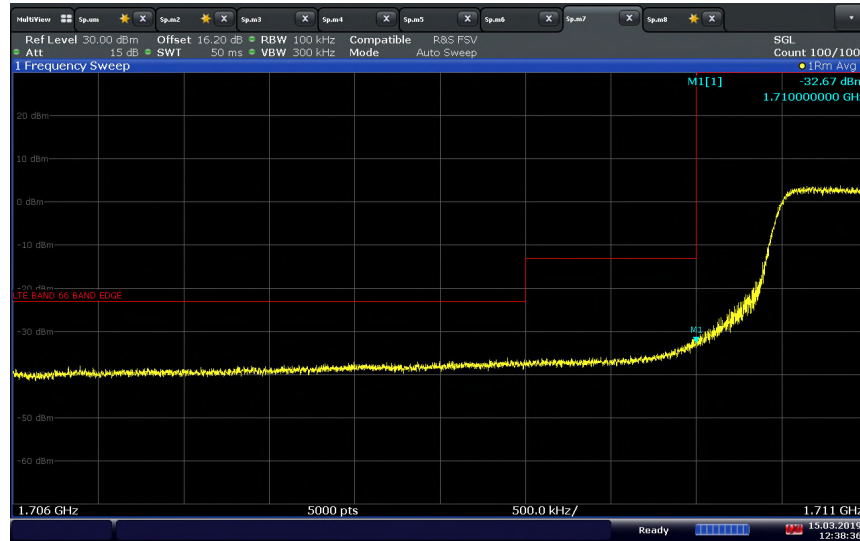
LTE Band 66 (5 MHz BW)/QPSK/Low Channel 1712.5 MHz/1 RB 0 offset Band Edge @1710 MHz



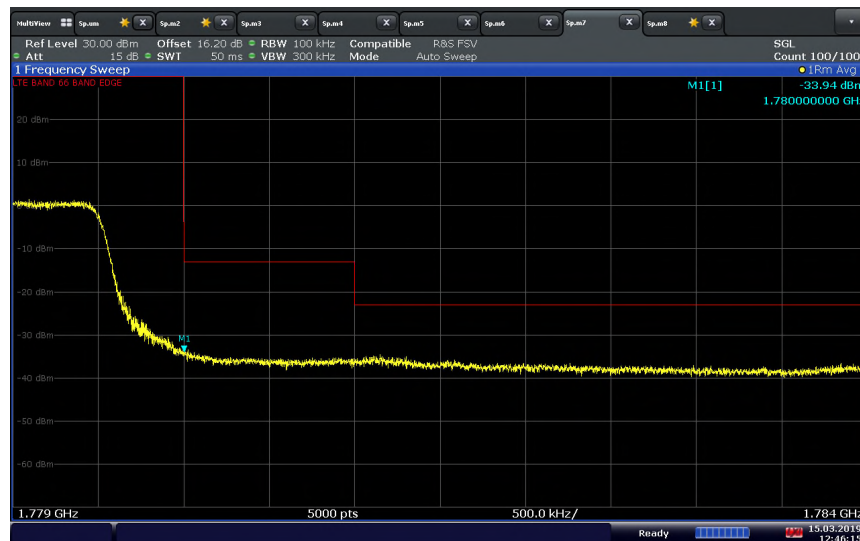
LTE Band 66 (5 MHz BW)/QPSK/High Channel 1777.5 MHz/1 RB 24 offset Band Edge @1780 MHz



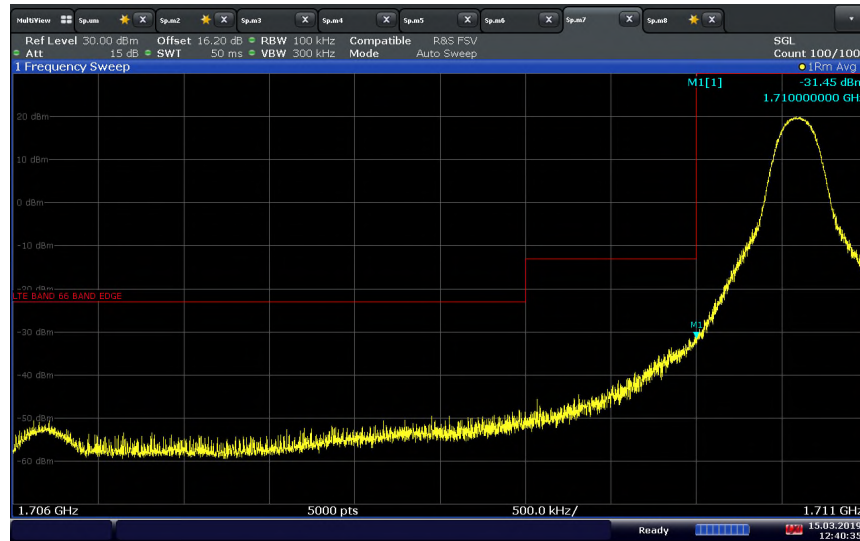
LTE Band 66 (10 MHz BW)/QPSK/Low Channel 1715 MHz/Full RB Band Edge @1710 MHz



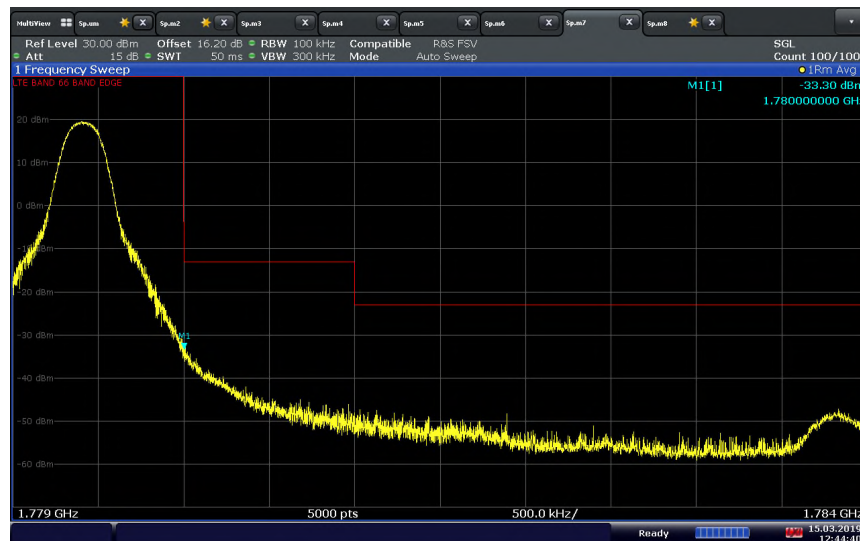
LTE Band 66 (10 MHz BW)/QPSK/High Channel 1775 MHz/Full RB Band Edge @1780 MHz



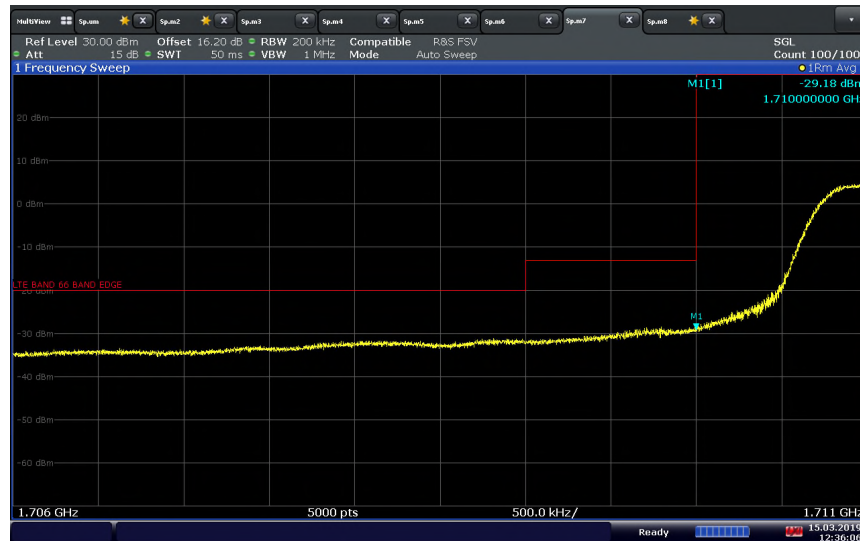
LTE Band 66 (10 MHz BW)/QPSK/Low Channel 1715 MHz/1 RB 0 offset Band Edge @1710 MHz



LTE Band 66 (10 MHz BW)/QPSK/High Channel 1775 MHz/1 RB 49 offset Band Edge @1780 MHz

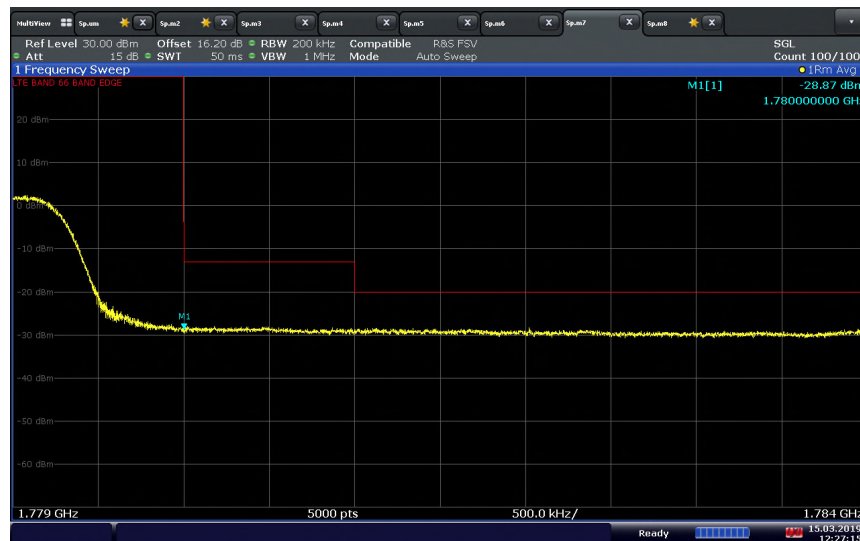


LTE Band 66 (15 MHz BW)/QPSK/Low Channel 1717.5 MHz/Full RB Band Edge @1710 MHz



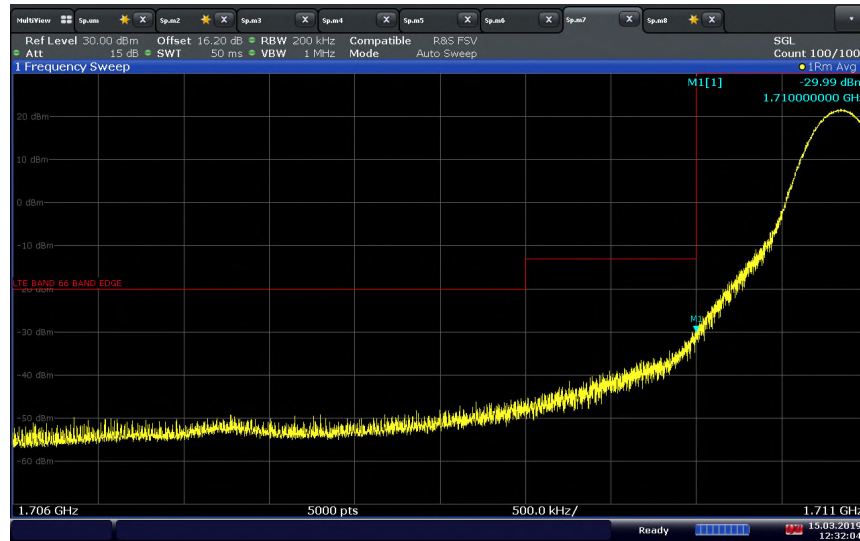
12:36:07 15.03.2019

LTE Band 66 (15 MHz BW)/QPSK/High Channel 1772.5 MHz/Full RB Band Edge @1780 MHz

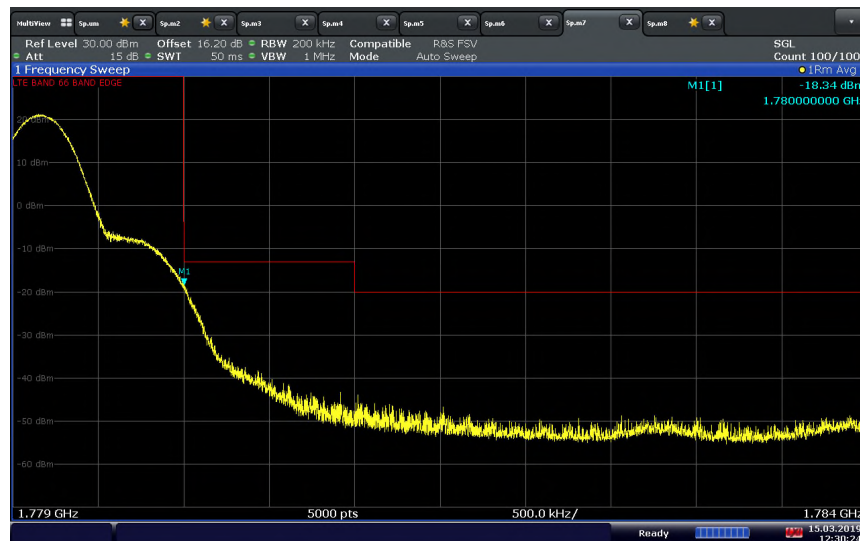


12:27:15 15.03.2019

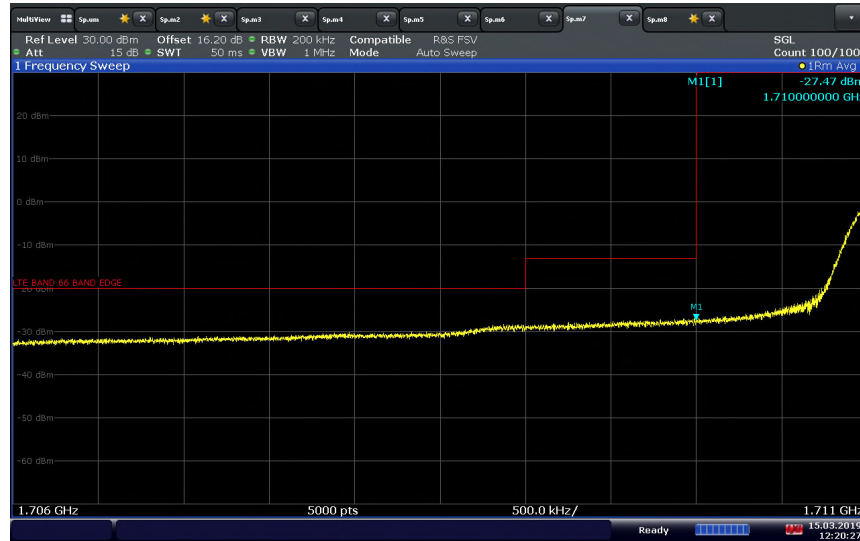
LTE Band 66 (15 MHz BW)/QPSK/Low Channel 1717.5 MHz/1 RB 0 offset Band Edge @1710 MHz



LTE Band 66 (15 MHz BW)/QPSK/High Channel 1772.5 MHz/1 RB 74 offset Band Edge @1780 MHz

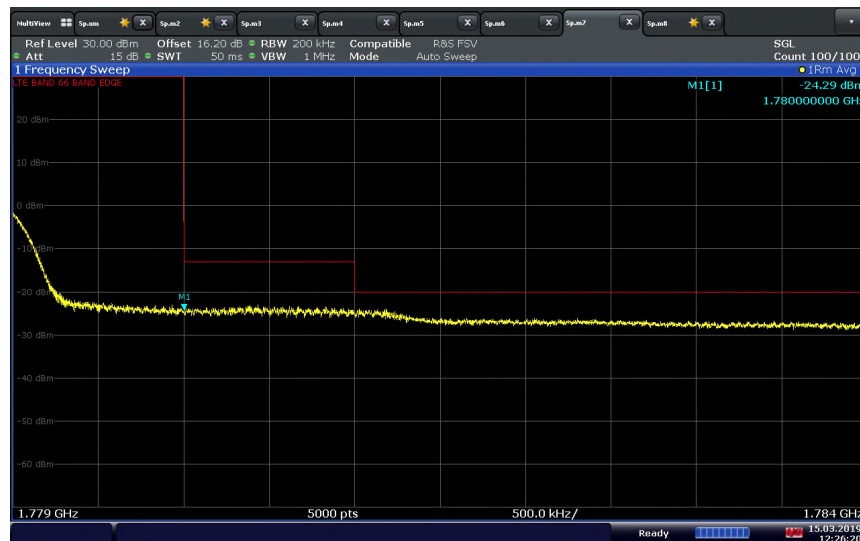


LTE Band 66 (20 MHz BW)/QPSK/Low Channel 1720 MHz/Full RB Band Edge @1710 MHz



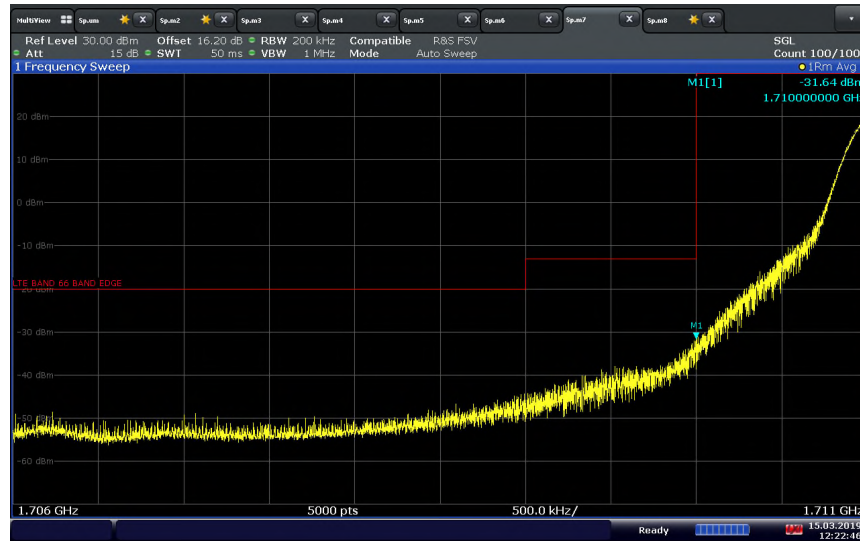
12:20:28 15.03.2019

LTE Band 66 (20 MHz BW)/QPSK/High Channel 1770 MHz/Full RB Band Edge @1780 MHz



12:26:20 15.03.2019

LTE Band 66 (20 MHz BW)/QPSK/Low Channel 1720 MHz/1 RB 0 offset Band Edge @1710 MHz



LTE Band 66 (20 MHz BW)/QPSK/High Channel 1770 MHz/1 RB 99 offset Band Edge @1780 MHz

