Report On

Application for Grant of Equipment Authorization of the Nextivity Inc. Cel-Fi G41-CE Cellphone Signal Booster

In accordance with:
FCC CFR 47 Part 20
RSS-131 Issue 4

Prepared for:
Nextivity Inc.
16550 West Bernardo Drive, Bldg 5, Suite 550,
San Diego, CA 92127, USA

Issue Date: November 2023
Document Number: 72189913G | Issue: 01

RESPONSIBLE FOR	NAME	TITLE	DATE	SIGNATURE
Prepared By	Miguel Rabago	JR EMC/Wireless Engineer	11/28/2023	
Authorized Signatory	Ferdinand S. Custodio	Senior EMC Test Engineer / Wireless Team Lead	11/28/2023	

Signatures in this approval box have checked this document in line with the requirements of TÜV SÜD Product Service document control rules.

EXECUTIVE SUMMARY
Report and test data representing the EUT are verified and the EUT itself found to be in compliance with FCC CFR 47 Part 20 and RSS-131 Issue 4 for ISED

A2LA Cert. No. 2955.13

TÜV SÜD America, Inc.
10040 Mesa Rim Road
San Diego, CA 92121-2912

TÜV SÜD America, Inc.
Rancho Bernardo Facility
16936 Via Del Campo
San Diego, CA 92127

Phone: 858 678 1400
www.tuv-sud-america.com

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1 Report Summary

1.1 Report Modification Record

Alterations and additions to this report will be issued to the holders of each copy in the form of a complete document.

Issue	Description of Change	Date of Issue
1	Initial Release	11/28/2023

1.2 Introduction

The information contained in this report is intended to show verification of the Nextivity Inc. Cel-Fi G41 to the requirements of FCC CFR 47 Part 20 and RSS-131.

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. 16550 West Bernardo Drive, Bldg 5, Suite 550, San Diego, CA 92127, USA
Applicant Contact Information	CK Li Sr. Principal Engineer, Regulatory CLi@NextivityInc.com (858) 485-9442
FCC ID	YETG41-CE
ISED Certification Number:	9294A-G41CE
Model Number(s)	G41-CE
Test Specification/Issue/Date	• FCC CFR 47 Part 20 (October 1, 2022). • RSS-131 – Zone Enhancers (Issue 4, December 2022).
Start of Test	July 17 2023
Finish of Test	November 28 2023
Name of Engineer(s)	Miguel Angel Rabago Garcia [MARG] Omar Castillo [OC]

Related Document(s)

- FCC CFR 47 Part 20 (October 1, 2022)
- ANSI C63.26-2015: American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services
- KDB 935210 D05 v01r04 Measurements Guidance for Industrial and Non-Consumer Signal Booster, Repeater, And Amplifier Devices
- RSS-131 – Zone Enhancers (issue 4, Updated December 2022)
- Product Spec for RFQ_Sapporo G41-BE_US_v1.pdf
- Supporting documents for EUT certification are separate exhibits.
- 72189913E Nextivity G41-CE FCC Part 90 RSS-131 B14 Test Report

1.3 Brief Summary of Results

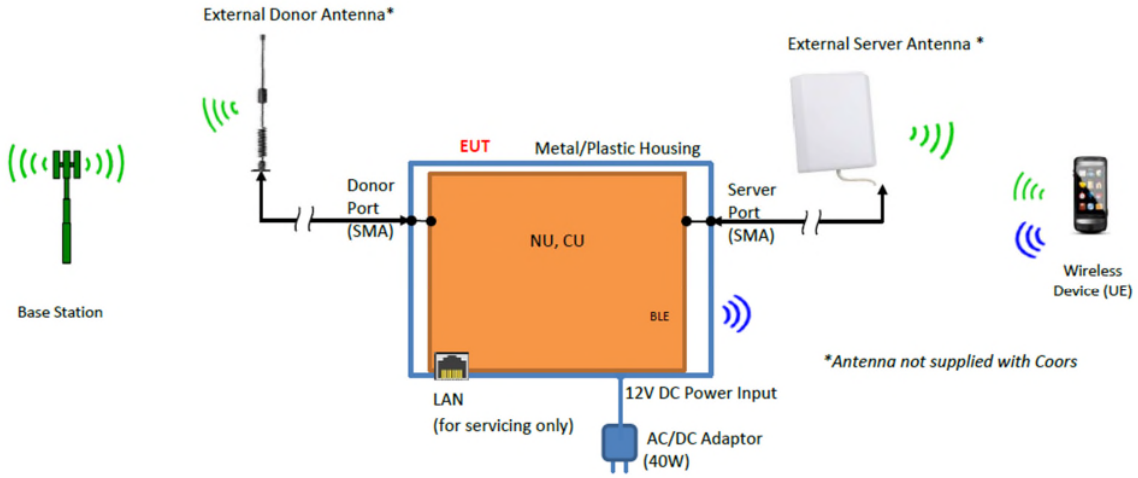
A brief summary of the tests carried out in accordance with FCC CFR 47 Part 20 with cross-reference to the corresponding requirements of KDB935210 D05 and ISED RSS-131 is shown below.
By client request only Band 25 High Channel was tested in some test cases, because it is superset of Band 2

Section	Spec Clause			Test Description	Results
	FCC Part	KDB935210 D05	RSS-131		
2.1	2.1046	-	-	Transmitter Output Power	Compliant
2.2	20.21 (C)	3.2	-	AGC Threshold Level	Compliant
2.3		3.3	Clause 9.1	Out-of-Band rejection	Compliant
2.4		3.5	Clause 9.3	Mean Output Power and Amplifier/Booster Gain	Compliant
2.5		3.4	Clause 9.2	Input-versus-Output Signal Comparison	Compliant
2.6		3.6	-	Out-of-band/out-of-block (Intermodulation) and Spurious Emissions	Compliant
2.7	2.1055	3.7	Clause 9.4	Frequency Stability	Compliant
2.8	2.1053	3.8	-	Field Strength of Spurious Emissions	Compliant

1.4 Product Information

1.4.1 Technical Description

Cel-Fi G41-CE is a single box LTE Provider Specific Signal Booster to improve voice and data cellular performance in indoor environments. Both Network Unit (NU), and the Coverage Unit (CU) are on a single PCB and installed metal/plastic housing. The NU comprises a transmitter and receiver which communicate with the cell tower. The CU comprises a transmitter and receiver which communicate with the wireless devices.
G41-CE includes Bluetooth LE and LAN connectivity. With the use of Nextivity smartphone application or the LAN, it allows user to register the product, update software, capture/display details metrics of the system.
EUT is powered by external 12VDC Power adaptor.



Sapporo Block Diagram

Cell Band Combination:

One Cell	Two Cell
4	4,2
2	4,5
5	4,25
25	2,5
	2,25

Matually Exclusive
Band 5 and 25

1.4.2 EUT Specification

EUT Description	Cellphone Signal Booster	
Trade Name	Cel-Fi™	
Model Name	Cel-Fi G41	
Model Number(s)	G41-CE	
Rated Voltage	12V DC via external AC/DC adaptor	
Mode Verified	LTE Band 2, 4, 5 and 25	
Frequency Bands	LTE Band 2:	UL: 1850 - 1910MHz DL: 1930 - 1990MHz
	LTE Band 4:	UL: 1710 - 1755MHz DL: 2110 - 2155MHz
	LTE Band 5:	UL: 824 - 849MHz DL: 869 - 894MHz
	LTE Band 25:	UL: 1850 - 1915MHz DL: 1930 - 1995MHz

Rated Power

Signal Bandwidth (MHz)	LTE Band 2, 4, 25		LTE Band 5	
	DL (dBm)	UL (dBm)	DL (dBm)	UL (dBm)
5	Max. 16	22	Max. 16	20
10				
15			N/A	
20			N/A	

Capability	LTE Band 2, 4, 5 and 25
Channel Bandwidth	LTE Band 2, 4, 25: 5MHz, 10MHz, 15MHz and 20MHz LTE Band 5: 5MHz and 10MHz
Primary Unit (EUT)	☐ Production
	☐ Pre-Production
	☒ Engineering (same as Production)

Manufacturer Declared Temperature Range	0°C to 40°C
Antenna Type	External (SMA Connectors)
Antenna Model	N/A
Antenna gain	N/A
Input and Output ports Impedance	50 Ohm

Gain

Frequency	Max System Gain
< 1 GHz	95 dB
>1 GHz	100 dB

1.4.3 Transmit Frequency Table

Mode	Signal Bandwidth (MHz)	Tx Frequency (MHz)	Emission Designator	*Conducted Power	
				Max. Power Avg (dBm)	Max. Power Avg (W)
LTE Band 2 Downlink	5	1932.5 – 1987.5	4M63F9W	9.83	0.009616123
	10	1935 – 1985	8M96F9W	12.46	0.01761976
	15	1937 – 1982.5	13M4F9W	14.46	0.027925438
	20	1940 – 1980	17M9F9W	15.87	0.0347536161
LTE Band 2 Uplink	5	1852.5 – 1907.5	4M47F9W	21.79	0.151008015
	10	1855 – 1905	8M98F9W	21.86	0.153461698
	15	1857.5 – 1902.5	13M4F9W	21.72	0.148593564
	20	1860 - 1900	17M9F9W	21.62	0.1442115352
LTE Band 4 Downlink	5	2110 - 2155	4M72F9W	9.95	0.009885531
	10	2110 - 2155	9M31F9W	12.57	0.018071741
	15	2110 - 2155	13M6F9W	14.45	0.027861212
	20	2110 - 2155	18M4F9W	15.59	0.034673685
LTE Band 4 Uplink	5	1710 - 1755	4M64F9W	22.08	0.161435856
	10	1710 - 1755	9M26F9W	22.2	0.165958691
	15	1710 - 1755	13M6F9W	22.32	0.170608239
	20	1710 - 1755	18M4F9W	22.06	0.1013911386
LTE Band 5 Downlink	5	871.4 – 891.6	4M73F9W	9.92	0.009817479
	10	871.4 – 891.6	9M24F9W	12.10	0.0112719746
LTE Band 5 Uplink	5	826.4 – 846.6	4M73F9W	19.66	0.092469817
	10	826.4 – 846.6	9M24F9W	19.57	0.09057326
LTE Band 14 Downlink	10	758 - 768	8M86F9W	12.27	0.0168655303
LTE Band 14 Uplink	10	788 - 798	8M85F9W	21.08	0.1282330583
LTE Band 25 Downlink	5	1932.5 – 1992.5	4M63F9W	9.68	0.009289664
	10	1935 – 1990	8M96F9W	12.31	0.017021585
	15	1937.5 – 1987.5	13M4F9W	13.6	0.022908677
	20	1940 – 1985	17M9F9W	13.89	0.024490632
LTE Band 25 Uplink	5	1852.5 – 1912.5	4M47F9W	20.84	0.121338885
	10	1855 – 1910	8M98F9W	20.79	0.11994993
	15	1857.5 – 1907.5	13M4F9W	20.95	0.124451461
	20	1860 – 1905	17M9F9W	21.6	0.144543977

*Note: Conducted power measurements are from Section 2.1 for Band 2, 4, 5, and 25, and from 72189913E Nextivity G41-CE FCC Part 90 RSS-131 B14 Test Report for Band 14.

1.4.4 Test Configuration

Configuration Number	Description
A	Test Mode - Downlink (CU TX). Input signal is applied to antenna port of NU. Output is monitored from antenna port of CU. (refer to 1.4.4 Figure 3)
B	Test Mode - Uplink (NU TX). Input signal is applied to antenna port of CU. Output is monitored from antenna port of NU. (refer to 1.4.4 Figure 2)
C	Normal Mode - Downlink (CU TX). Base Station Simulator is employed to send a modulated signal to antenna port of NU. Antenna port of CU is terminated with a 50Ω load. (refer to 1.4.4 Figure 1)
D	Normal Mode - Uplink (NU TX). Base Station Simulator is employed to send a modulated signal to antenna port of NU. Input signal is applied to antenna port of CU. (refer to 1.4.4 Figure 1)
E	Inter-modulation. Test setup identical to Test Configuration A and B above with the addition of another signal applied to the input of the EUT. A coupler was used in the setup to ensure that the additional signal is directed to the EUT input port. (refer to 1.4.4 Figure 5)
F	Max Downlink noise limit testing - A 50 Ohm Termination is connected to the NU antenna port and Measure the Noise Limit at the CU antenna port. (refer to 1.4.4 Figure 6)
G	Max Uplink RSSI-dependent noise limit testing - A 50 Ohm Termination is connected to the CU antenna port. A signal is connected to a step attenuator and then applied to the NU antenna port. Output is monitored from antenna port of NU. (refer to 1.4.4 Figure 7)
H	Max Downlink RSSI-dependent noise limit testing - A 50 Ohm Termination is connected to the CU antenna port. A signal is connected to a step attenuator and then applied to the NU antenna port. Output is monitored from antenna port of CU. (refer to 1.4.4 Figure 8)
I	Radiated test setup. Downlink. Input signal is applied to the antenna port of Donor (NU). The antenna port of Server (CU) is terminated with a 50Ω load or Signal Generator.
J	Radiated test setup. Uplink. Input signal is applied to the antenna port of Server (CU). The antenna port of Donor (NU) is terminated with a 50Ω load or Signal Generator.

1.4.5 EUT Exercise Software

Manufacturer Provided a Nextivity Chart Interface v2.0.0.16

1.4.6 Support Equipment and I/O cables

Manufacturer	Equipment/Cable	Description
Lenovo	Support Laptop	M/N: 20AR-S4250S, S/N: PC-03DGHKK 125/02
Lenovo	Support Laptop AC Adapter	M/N: ADLX90NLC2A S/N: 11S45N0247Z1ZS9B6926Z5
Nextivity	Support USB cable x 1	Custom 1.0 meter shielded USB Type A to Micro B cable
SIMSUKIAN	AC/DC Adapter	M/N: SK03T1-1200250V S/N: 22080308000658 IP: 100-240VAC 50/60Hz 0.6A; OP: 12VDC 2.5A 30.0W
Rohde & Schwarz	Vector Signal Generator	M/N: SMBV100A, S/N: 259021
Agilent	ESG Vectot Signal Generator	S/N: MY47271206 M/N:E4438C
Aeroflex	Signal Generator	M/N: 3005, S/N: 3005A/09L

1.4.7 Simplified Test Configuration Diagram

Figure 1 – Test configuration in EUT normal operational mode

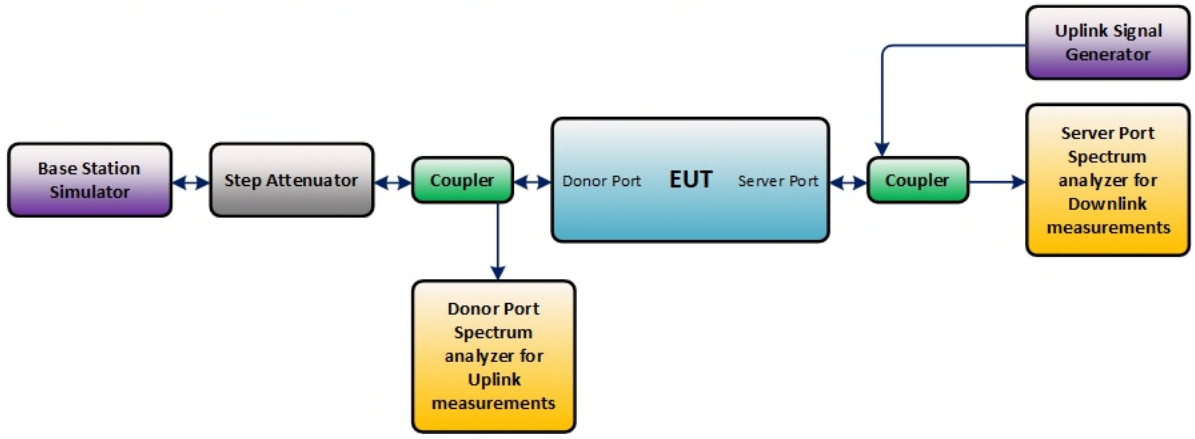


Figure 2 – Uplink test configuration in EUT test mode

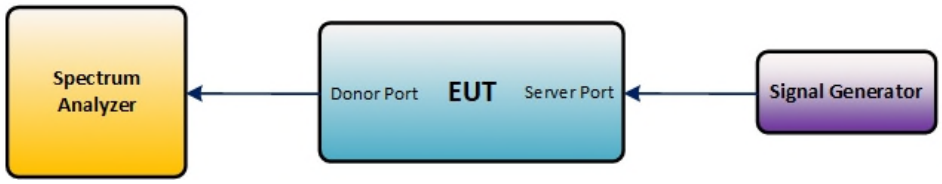


Figure 3 – Downlink test configuration in EUT test mode

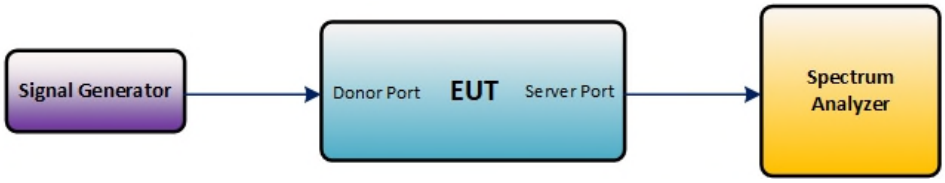


Figure 5 – Intermodulation product instrumentation test setup

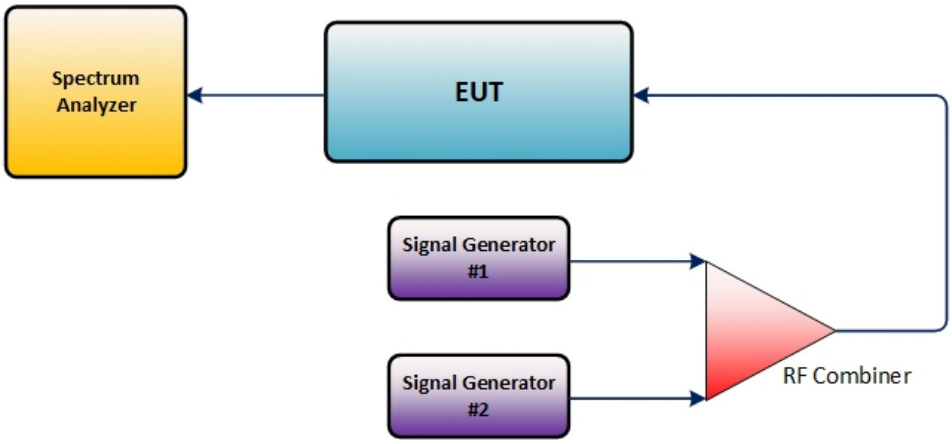


Figure 6 – Maximum downlink noise limit test configuration

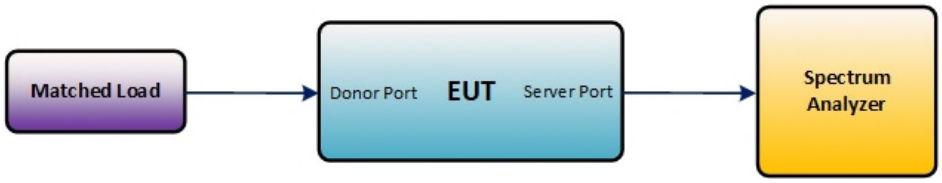


Figure 7 – Uplink RSSI-dependent noise limit test configuration

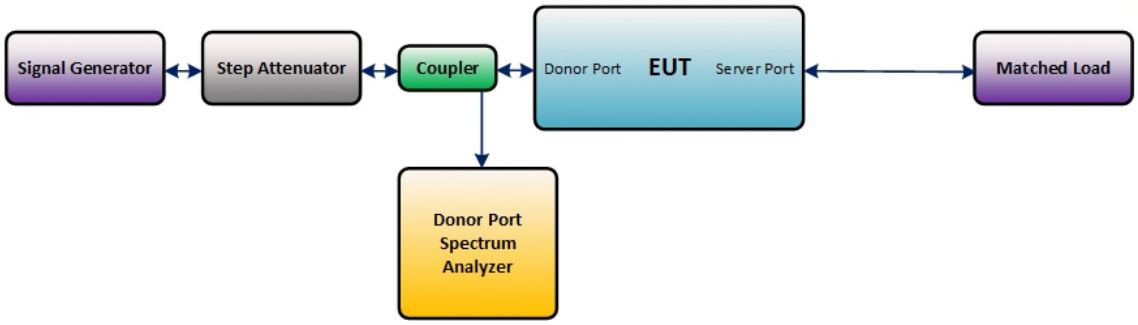
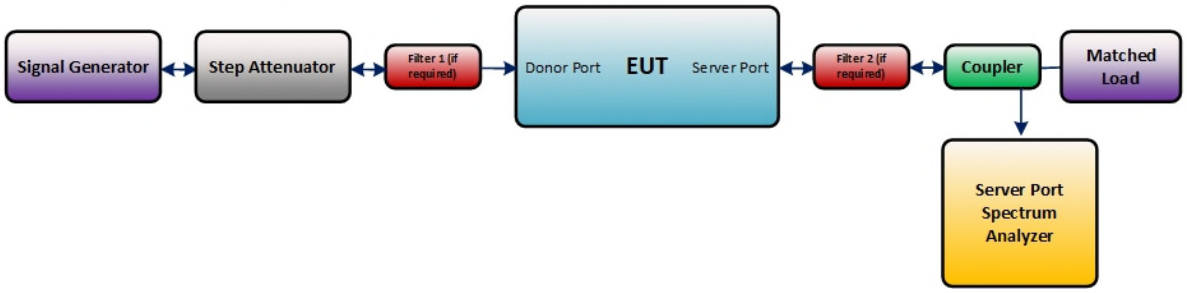


Figure 8 –Downlink RSSI-dependent noise limit test configuration



1.5 Deviations from the Standard

There were no deviations made during testing from the applicable test standard or test plan.

1.6 EUT Modification Record

The table below details modifications made to the EUT during the test program. The modifications incorporated during each test are recorded on the appropriate test pages.

Modification State	Description of Modification still fitted to EUT	Modification Fitted By	Date Modification Fitted
0	As supplied by the manufacturer	-	-

1.7 Test Methods

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 Location

TÜV SÜD America conducted the following tests at our San Diego CA, Test Laboratory's.

Office Address:

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.

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

TÜV SÜD 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 TÜV SÜD 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 TÜV SÜD 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)

TÜV Product Service Inc. (San Diego) is a recognized RADIO 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)

TÜV SÜD 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 LP0002 for Low-Power RF Device type of testing.

1.9.5 VCCI – Registration No. A-0412 and A-0413

TÜV SÜD 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

TÜV SÜD 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

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

2 Test Details

2.1 Transmitter Output Power

2.1.1 Specification Reference

FCC 47 CFR Part 2, Clause 2.1046

2.1.2 Standard Applicable

(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: 560311000026 / Test Configuration A and B

2.1.4 Date of Test/Initial of Test Personnel who Performed the Test

September 14, 2023 / MARG

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 performed at TÜV SÜD America Inc. Rancho Bernardo facility.

Ambient Temperature	27.0°C
Relative Humidity	51.5%
ATM Pressure	99.0kPa

2.1.7 Additional Observations

- This is conducted Test.
- The path loss was measured and entered as an offset level.
- Both Peak and Average measurements presented.
- Both downlink and uplink are tested.
- Only High Channel for Band 25 was tested per client request.

2.1.8 Test Resluts

Power Output (Conducted) LTE Band 2 Downlink				
Bandwidth (MHz)	Channels	Frequency (MHz)	Average Power (dBm)	Peak Power (dBm)
5	625	1932.5	9.83	20.67
	900	1960	9.31	19.89
	1175	1987.5	8.94	19.59
10	650	1935	12.37	23.5
	900	1960	12.46	23.79
	1150	1985	11.26	22.43
15	675	1937	14.05	26.35
	900	1960	14.46	26.7
	1125	1982.5	13.67	24.96
20	**700**	**1940**	**15.87**	**26.97**
	900	1960	15.41	27.52
	1100	1980	14.51	26.81

Power Output (Conducted) LTE Band 2 Uplink				
Bandwidth (MHz)	Channels	Frequency (MHz)	Average Power (dBm)	Peak Power (dBm)
5	18625	1852.5	21.79	31.69
	18925	1882.5	21.06	32.18
	1917	1907.5	21.43	32.23
10	18650	1855	21.69	31.58
	18900	1880	21.04	31.65
	19150	**1905**	**21.86**	**32.14**
15	18675	1857.5	21.72	32.51
	18900	1880	21.11	32.07
	19125	1902.5	21.06	31.95
20	18700	1860	21.61	31.96
	18900	1880	21.59	32.32
	19100	1900	21.62	32.14

Power Output (Conducted) LTE Band 4 Downlink				
Bandwidth (MHz)	Channels	Frequency (MHz)	Average Power (dBm)	Peak Power (dBm)
5	1975	2112.5	8.82	20.61
	2175	2132.5	9.14	21.11
	2375	2152.5	9.95	22.03
10	2000	2115	12.43	23.72
	2175	2132.5	12.28	23.56
	2350	2150	12.57	23.35
15	2025	2117.5	14.45	25.88
	2175	2132.5	14.45	25.85
	2325	2147.5	14.16	26.22
20	**2050**	**2120**	**15.59**	**27**
	2175	2132.5	15.4	26.23
	2300	2145	15.23	26.84

Power Output (Conducted) LTE Band 4 Uplink				
Bandwidth (MHz)	Channels	Frequency (MHz)	Average Power (dBm)	Peak Power (dBm)
5	19975	1712.5	21.32	31.18
	20175	1732.5	22.08	31.75
	20375	1752.5	21.96	32.36
10	20000	1715	22.20	31.61
	20175	1732.5	22.16	31.44
	20350	1750	22.16	32.00
15	20025	1717.5	22.15	32.31
	20175	1732.5	22.28	31.81
	20325	**1747.5**	**22.32**	**32.50**
20	20050	1720	21.99	31.74
	20175	1732.5	22.06	31.49
	20300	1745	22.09	31.93

Power Output (Conducted) LTE Band 5 Downlink				
Bandwidth (MHz)	Channels	Frequency (MHz)	Average Power (dBm)	Peak Power (dBm)
5	2425	871.5	9.03	19.44
	2525	881.5	9.64	20.52
	2625	891.5	9.92	21.39
10	**2450**	**874**	**12.10**	**23.30**
	2525	881.5	10.52	21.31
	2600	889	10.10	21.46

Power Output (Conducted) LTE Band 5 Uplink				
Bandwidth (MHz)	Channels	Frequency (MHz)	Average Power (dBm)	Peak Power (dBm)
5	20425	826.5	19.36	30.92
	20525	836.5	19.41	31.42
	20625	**846.5**	**19.66**	**31.71**
10	20450	829	19.51	30.91
	20525	836.5	19.57	31.14
	20600	844	19.34	30.75

Power Output (Conducted) LTE Band 25 Downlink				
Bandwidth (MHz)	Channels	Frequency (MHz)	Average Power (dBm)	Peak Power (dBm)
5	8665	1992.5	9.68	21.03
10	8640	1990	12.31	23.19
15	8615	1987.5	13.60	25.46
20	**8590**	**1985**	**13.89**	**26.19**

Power Output (Conducted) LTE Band 25 Downlink				
Bandwidth (MHz)	Channels	Frequency (MHz)	Average Power (dBm)	Peak Power (dBm)
5	26665	1912.5	20.84	30.96
10	26640	1910	20.79	31.79
15	26615	1907.5	20.95	32.12
20	**26590**	**1905**	**21.60**	**33.04**

2.2 AGC Threshold Level

2.2.1 Specification Reference

KDB935210 D05, Clause 3.2

2.2.2 Standard Applicable

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.

2.2.3 Equipment Under Test and Modification State

Serial No: 560311000026 / Test Configuration A and B

2.2.4 Date of Test/Initial of Test Personnel who Performed the Test

September 14, 2023 / MARG

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 performed at TÜV SÜD America Inc. Rancho Bernardo facility.

Ambient Temperature	27.0°C
Relative Humidity	51.5%
ATM Pressure	99.0kPa

2.2.7 Additional Observations

- This is conducted Test.
- LTE 20 MHz Bandwidth Singal was used for LTE Band 2, Band 4 and Band 25, and LTE 10 MHz Bandwidth Signal was used for LTE Band 5 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 KDB935210 D05, 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 increasing 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.
- Only High Channel for Band 25 was tested per client request.

2.2.8 Test Results

AGC Threshold Level						
Mode	Bandwidth (MHz)	Channel	Frequency (MHz)	Average Power		AGC Threshold Level (dBm)
				(dBm)	(W)	
LTE B2 Downlink	20	900	1960.0	15.41	0.0347	-82.5
LTE B2 Uplink	20	18900	1880.0	21.59	0.1442	-77.5
LTE B4 Downlink	20	2175	2132.5	15.4	0.0346	-82.5
LTE B4 Uplink	20	20175	1732.5	22.06	0.1606	-77.3
LTE B5 Downlink	10	2525	881.5	10.52	0.0112	-82.4
LTE B5 Uplink	10	20525	836.5	19.57	0.0905	-75.3
LTE B25 Downlink	20	8689	1995	13.89	0.0244	-82.5
LTE B25 Uplink	20	26689	1915	21.60	0.1445	-77.5

2.3 Out of Band Rejection

2.3.1 Specification Reference

KDB 935210 D05, Clause 3.3
RSS-131, Clause 9.1

2.3.2 Standard Applicable

RSS-131, Clause 9.1:
The gain-versus-frequency response and the 20 dB passband 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.

2.3.1 Equipment Under Test and Modification State

Serial No: 560311000026/ Test Configuration A and B

2.3.2 Date of Test/Initial of Test Personnel who Performed the Test.

November 28, 2023 / MARG

2.3.3 Test Equipment Used

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

2.3.4 Environmental Conditions

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility.

Ambient Temperature	26.3°C
Relative Humidity	53.3%
ATM Pressure	99.0kPa

2.3.5 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 ±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.
- Level = a sufficient level to affirm that the out-of-band rejection is > 20 dB above the noise floor and will not engage the AGC during the entire sweep.
- 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.
- Middle Channel is presented as representative configuration.
- The peak amplitude frequency f0 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.

2.3.6 Test Results

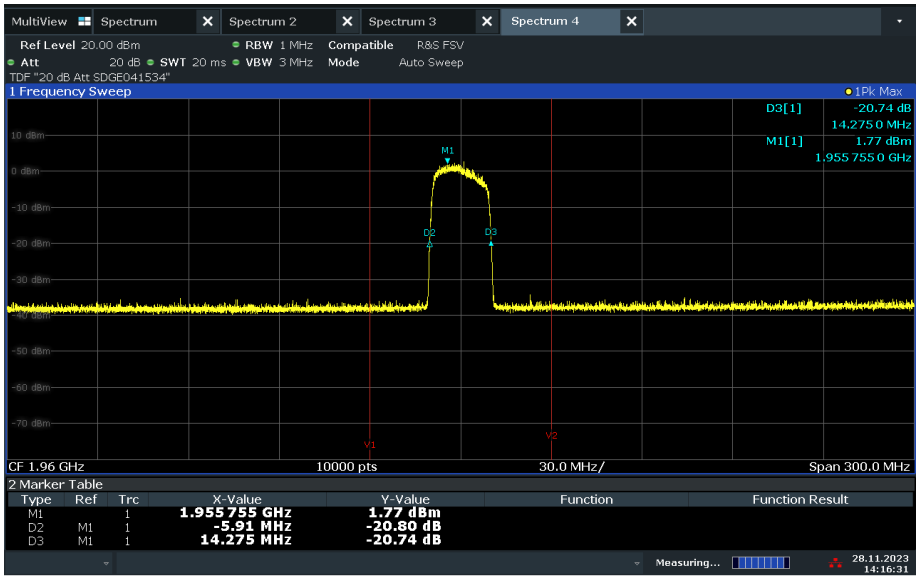
LTE Band 2						
Mode	Bandwidth (MHz)	Channel	Frequency (MHz)	-20 dBc Point		20 dB BW (MHz)
				D1 (MHz)	D2 (MHz)	
Downlink	20	900	1960.0	1949.845	1970.03	20.1
Uplink	20	18900	1880.0	1869.755	1890.185	20.4

LTE Band 4						
Mode	Bandwidth (MHz)	Channel	Frequency (MHz)	-20 dBc Point		20 dB BW (MHz)
				D1 (MHz)	D2 (MHz)	
Downlink	20	2175	2132.5	2122.315	2142.595	20.2
Uplink	20	20175	1732.5	1722.405	1742.685	20.2

LTE Band 5						
Mode	Bandwidth (MHz)	Channel	Frequency (MHz)	-20 dBc Point		20 dB BW (MHz)
				D1 (MHz)	D2 (MHz)	
Downlink	10	2525	881.5	876.675	886.315	9.6
Uplink	10	20525	836.5	831.125	841.855	10.7

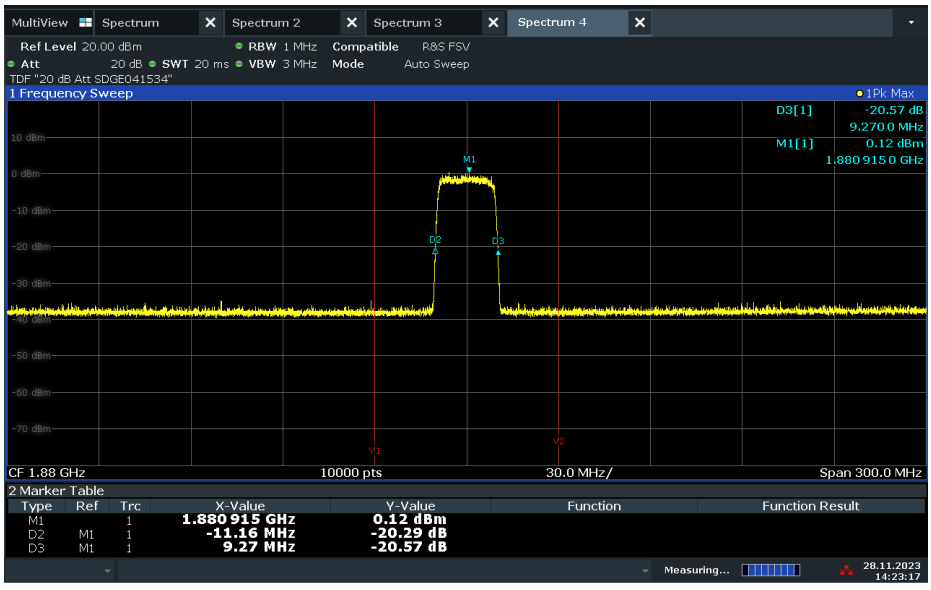
LTE Band 25						
Mode	Bandwidth (MHz)	Channel	Frequency (MHz)	-20 dBc Point		20 dB BW (MHz)
				D1 (MHz)	D2 (MHz)	
Downlink	20	8365	1962.5	1952.255	1972.595	20.3
Uplink	20	26365	1882.5	1872.345	1892.685	20.3

LTE Band 2 Downlink (20 MHz BW) Middle Ch / Out of Band Rejection



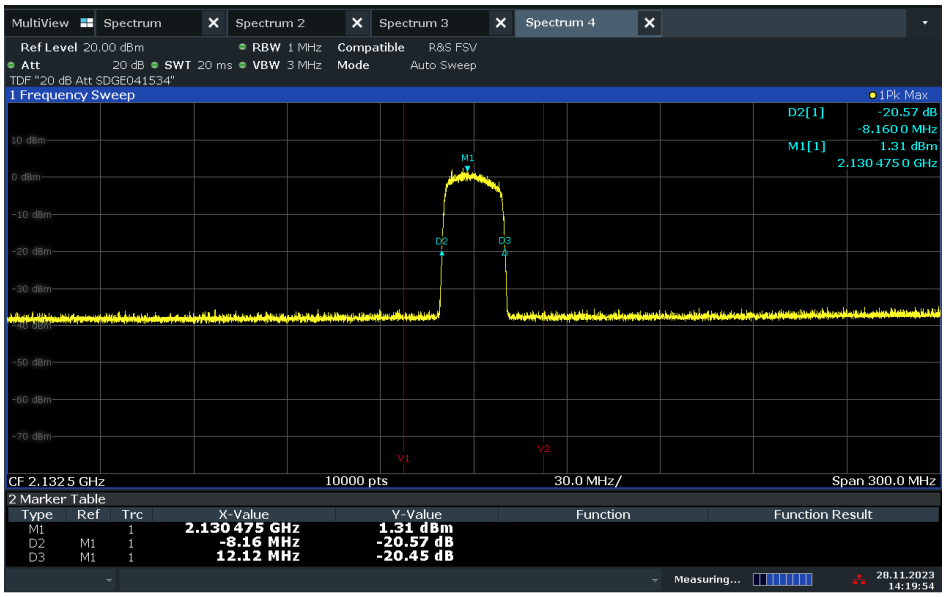
14:16:31 28.11.2023

LTE Band 2 Uplink (20 MHz BW) Middle Ch / Out of Band Rejection



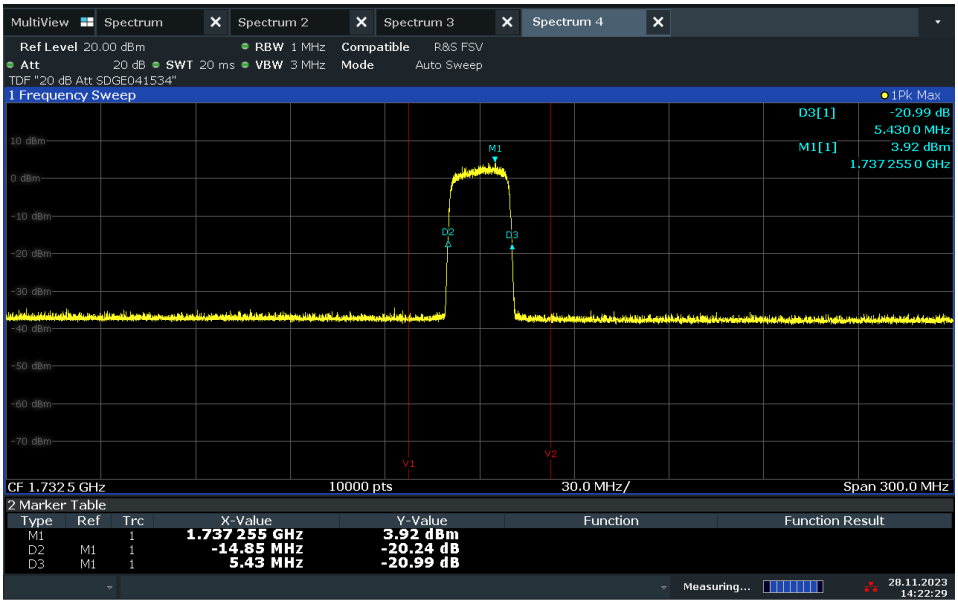
14:23:17 28.11.2023

LTE Band 4 Downlink (20 MHz BW) Middle Chl / Out of Band Rejection



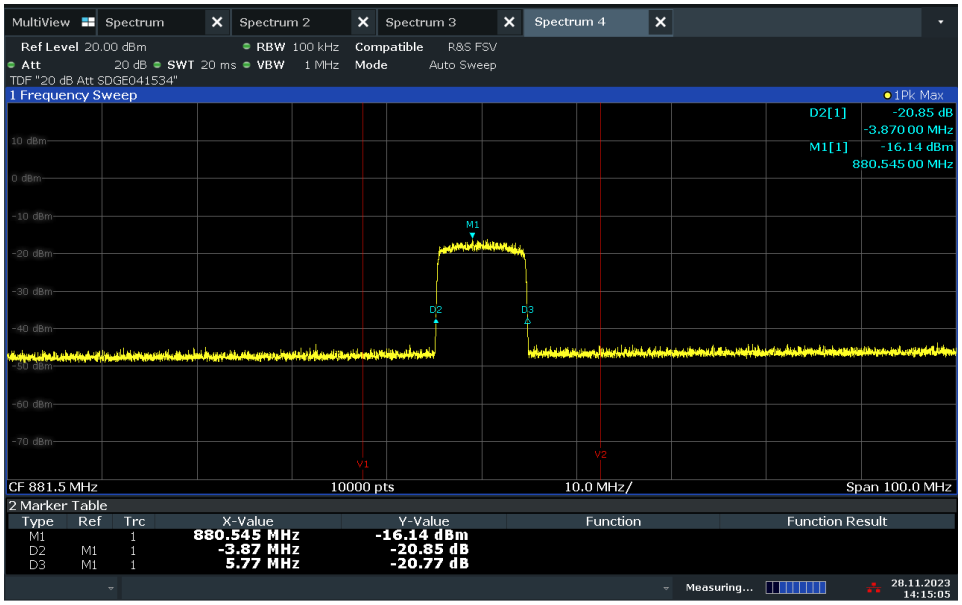
14:19:55 28.11.2023

LTE Band 4 Uplink (20 MHz BW) Middle Ch / Out of Band Rejection



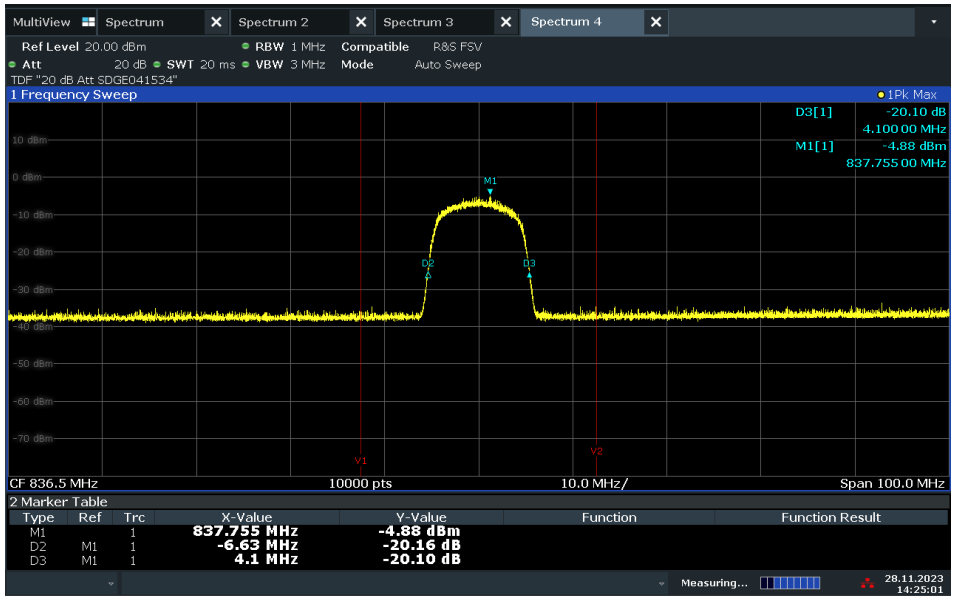
14:22:29 28.11.2023

LTE Band 5 Downlink (10 MHz BW) Middle Ch / Out of Band Rejection



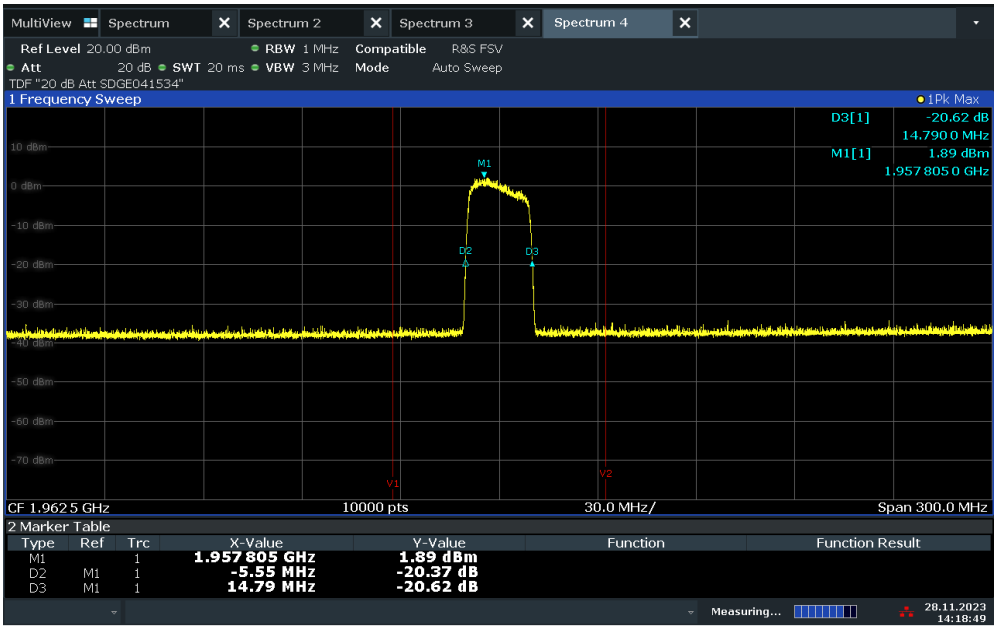
14:15:06 28.11.2023

LTE Band 5 Uplink (10 MHz BW) Middle Ch / Out of Band Rejection



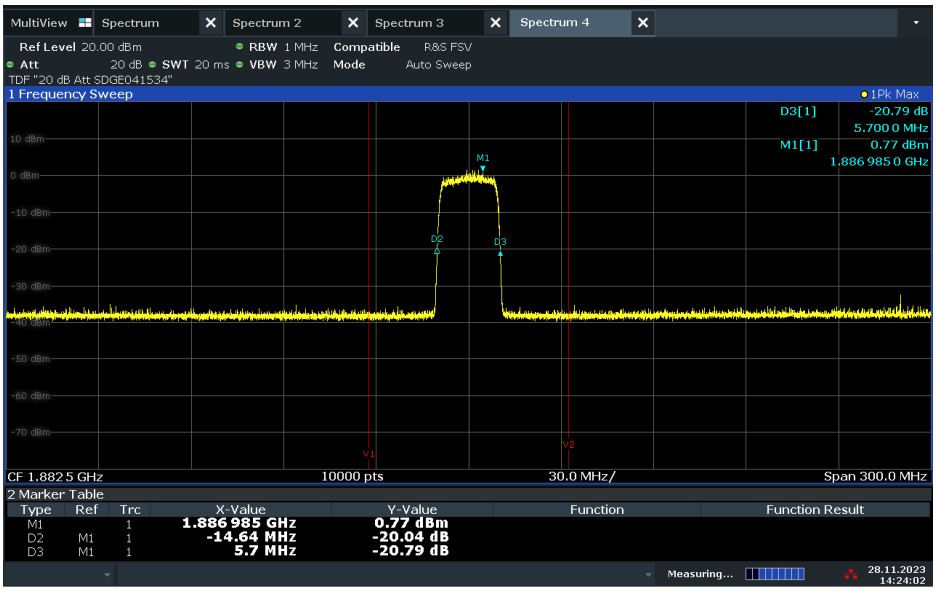
14:25:01 28.11.2023

LTE Band 25 Downlink (20 MHz BW) Middle Ch / Out of Band Rejection



14:18:49 28.11.2023

LTE Band 25 Uplink (20 MHz BW) Middle Chl / Out of Band Rejection



14:24:02 28.11.2023

2.4 Mean Output Power and Amplifier/Booster Gain

2.4.1 Specification Reference

RSS-131, Clause 9.3
KDB 935210 D05, Clause 3.5

2.4.2 Standard Applicable

RSS-131, Clause 9.3:
The zone enhancer gain shall not exceed the nominal gain (i.e the maximum gain at any frequency within the zone enhancer's passband) by more than 1.0 dB. Outside of the 20 dB passband bandwidth, the gain shall not exceed the gain at the 20 dB point.

2.4.3 Equipment Under Test and Modification State

Serial No: 560311000026 / Test Configuration A and B

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

September 14, 2023 / MARG

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 performed at TÜV SÜD America Inc. Rancho Bernardo facility.

Ambient Temperature	26.3°C
Relative Humidity	48.6%
ATM Pressure	99.7kPa

2.4.7 Additional Observations

- This is a conducted test.
- The path loss was measured and entered as an offset.
- The internal gain control of the EUT is adjusted to the maximum gain.
- The input power levels (uplink and downlink) are set to maximum input ratings, and confirm the device is not capable of operating in saturation (non-linear mode) during the test.
- All low, middle, and high channel were verified for Band 2, 4, 5 and 25.
- Only results for middle channel were presented as representative configuration.
- Both downlink and uplink are tested.
- Only High Channel for Band 25 was tested per client request.

2.4.8 Test Results

Input and Output Power and Gain								
Mode	**Bandwidth (MHz)**	**Channel**	**Frequency (MHz)**	**AGC Threshold Input (dBm)**	**Output Power (dBm)**	**Booster Gain (dB)**	***Antenna System Gain (dBi)**	**ERP**
LTE B2 Downlink	20	900	1960.0	-82.5	15.41	97.91	17.52	32.93
LTE B2 Uplink	20	18900	1880.0	-77.5	21.59	99.09	8.05	29.64
LTE B4 Downlink	20	2175	2132.5	-82.5	15.4	97.9	17.52	32.92
LTE B4 Uplink	20	20175	1732.5	-77.3	22.06	99.39	8.05	30.11
LTE B5 Downlink	10	2525	881.5	-82.4	10.52	92.92	17.52	28.04
LTE B5 Uplink	10	20525	836.5	-75.3	19.57	94.87	8.05	27.62
LTE B25 Downlink	20	8689	1962.5	-82.5	13.89	96.39	17.52	31.41
LTE B25 Uplink	20	26689	1882.5	-77.5	21.60	99.1	8.05	29.65

Input and Output Power and Gain						
Mode	**Bandwidth (MHz)**	**Channel**	**Frequency (MHz)**	**AGC Threshold + 3dB Input (dBm)**	**Output Power (dBm)**	**Booster Gain (dB)**
LTE B2 Downlink	20	900	1960.0	-79.5	15.49	94.66
LTE B2 Uplink	20	18900	1880.0	-74.5	21.12	95.62
LTE B4 Downlink	20	2175	2132.5	-79.5	15.10	94.6
LTE B4 Uplink	20	20175	1732.5	-74.3	21.8	96.1
LTE B5 Downlink	10	2525	881.5	-79.4	10.5	89.9
LTE B5 Uplink	10	20525	836.5	-72.3	19.5	91.8
LTE B25 Downlink	20	8590	1962.5	-79.5	15.02	94.52
LTE B25 Uplink	20	26590	1882.5	-74.5	21.66	96.16

FCC ID: YETG41-CE
IC: 9294A-G41CE

Limit	
Band	**System Gain (dB)**
LTE Band 2, 4 and 25	100
LTE Band 5	95

2.5 Input-vs-Output Signal Comparison

2.5.1 Specification Reference

RSS-131, Clause 9.2
KDB 935210 D05, Clause 3.4

2.5.2 Standard Applicable

RSS-131, Clause 9.2:
The spectral growth of the 26 dB bandwidth or occupied bandwidth of the output signal shall be less than 5% of the input signal spectrum.

2.5.3 Equipment Under Test and Modification State

Serial No: 560311000026/ Test Configuration A and B

2.5.4 Date of Test/Initial of Test Personnel who Performed the Test

November 28, 2023 / MARG

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 performed at TÜV SÜD America Inc. Rancho Bernardo facility.

Ambient Temperature	24.9°C
Relative Humidity	50.2%
ATM Pressure	99.4kPa

2.5.7 Additional Observations

- The path loss was measured and entered as an offset.
- The signal generator is configured to transmit LTE 20 MHz Bandwidth signal for LTE Band 2, 4, and 25 and LTE 10 MHz Bandwidth signal for LTE Band 5.
- The signal amplitude is just below the ACG threshold (determined according to section 3.2 of the current KDB), and not more than 0.5 dB below.
- Span is between 2 times to 5 times the emission bandwidth (EBW) or alternatively, the OBW.
- RBW is 1% to 5% of the anticipated OBW, VBW is > 3 x RBW.
- Set the reference level of spectrum analyzer to accommodate the maximum input amplitude level.
- Only High Channel was tested for Band 25 per client request.
- 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 f0 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.

2.5.8 Test Results

Compliant. There is no spectral growth of OBW and 26 dB bandwidth that is more than than 5% of the input signal spectrum.

LTE Band 2 Downlink							
Signal Level	Bandwidth (MHz)	Channel	Frequency (MHz)	99% OBW (MHz)		-26 dB BW (MHz)	
				Output	Input*	Output	Input*
AGC Threshold Level	20	900	1960.0	17.72	17.87	18.86	19.73
AGC + 3 dB Level				17.70	17.87	18.83	19.73

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

LTE Band 2 Uplink							
Signal Level	Bandwidth (MHz)	Channel	Frequency (MHz)	99% OBW (MHz)		-26 dB BW (MHz)	
				Output	Input*	Output	Input*
AGC Threshold Level	20	18900	1880.0	17.79	17.88	18.88	19.72
AGC + 3 dB Level				17.77	17.88	18.90	19.72

* 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 Downlink							
Signal Level	Bandwidth (MHz)	Channel	Frequency (MHz)	99% OBW (MHz)		-26 dB BW (MHz)	
				Output	Input*	Output	Input*
AGC Threshold Level	20	2175	2132.5	17.73	17.87	18.96	19.74
AGC + 3 dB Level				17.7	17.87	18.90	19.74

* 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	20	20175	1732.5	17.79	17.86	18.88	19.69
AGC + 3 dB Level				17.76	17.86	18.83	19.69

* 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 5 Downlink							
Signal Level	Bandwidth (MHz)	Channel	Frequency (MHz)	99% OBW (MHz)		-26 dB BW (MHz)	
				Output	Input*	Output	Input*
AGC Threshold Level	10	2525	881.5	9.13	8.97	9.86	9.91
AGC + 3 dB Level				9.14	8.97	9.84	9.91

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

LTE Band 5 Uplink							
Signal Level	Bandwidth (MHz)	Channel	Frequency (MHz)	99% OBW (MHz)		-26 dB BW (MHz)	
				Output	Input*	Output	Input*
AGC Threshold Level	10	20525	836.5	9.07	8.96	9.71	9.92
AGC + 3 dB Level				9.07	8.96	9.69	9.92

* 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.

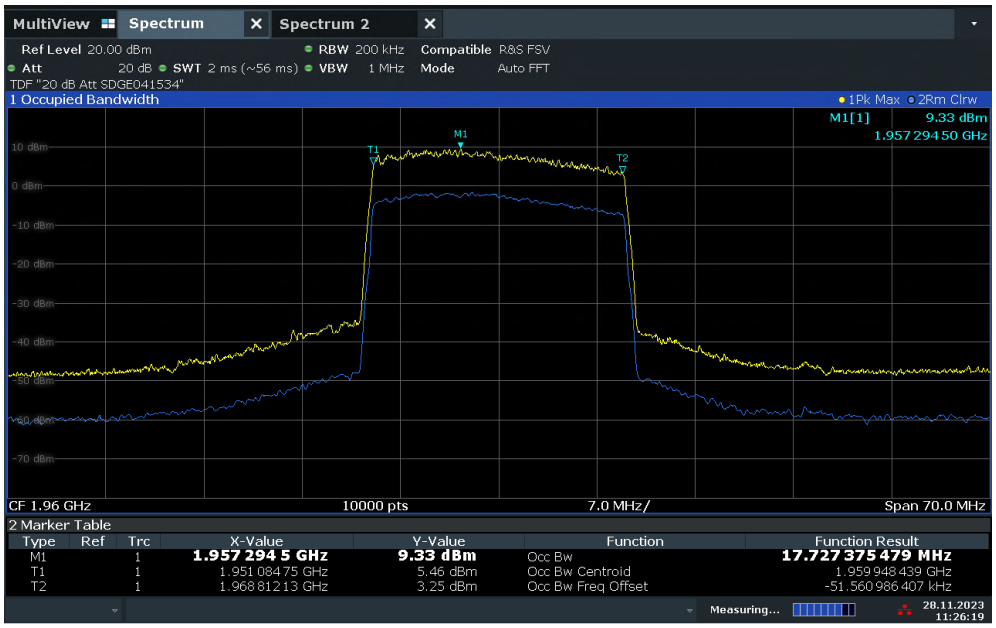
LTE Band 25 Downlink							
Signal Level	Bandwidth (MHz)	Channel	Frequency (MHz)	99% OBW (MHz)		-26 dB BW (MHz)	
				Output	Input*	Output	Input*
AGC Threshold Level	20	8590	1985	17.78	17.87	19.03	19.7
AGC + 3 dB Level				17.77	17.87	18.9	19.7

* 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	20	26590	1905	17.62	17.87	18.72	19.68
AGC + 3 dB Level				17.60	17.87	18.75	19.68

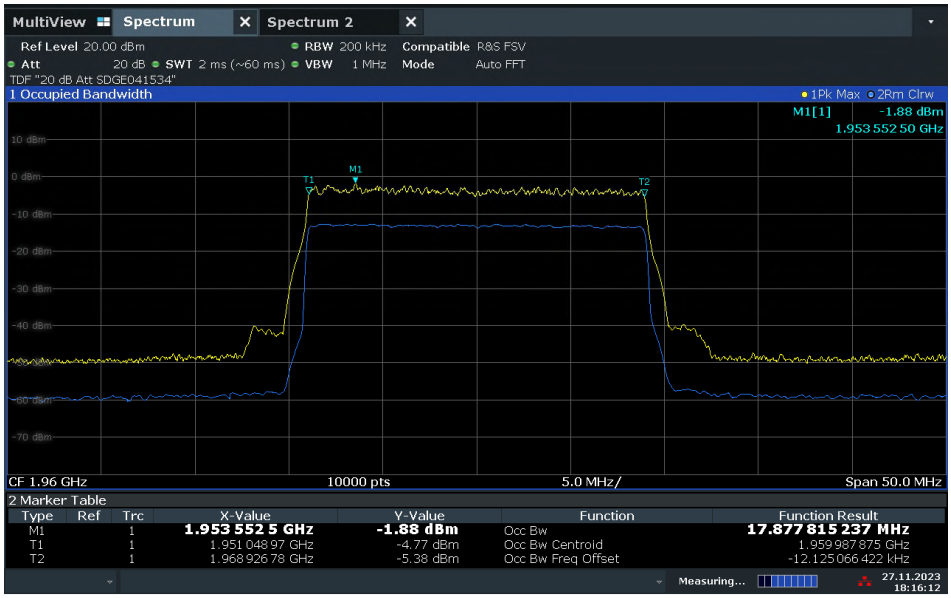
* Since the AGC Threshold level and AGC + 3 dB level for downlink are as low as -80 dBm, which is about the noise floor, the input levels are adjusted in order to get the right input 99% OBW and -26 dB BW when testing.

LTE Band 2 Downlink (20 MHz BW) Mid Channel / 99% OBW at Output port with Input signal at AGC Threshold Level



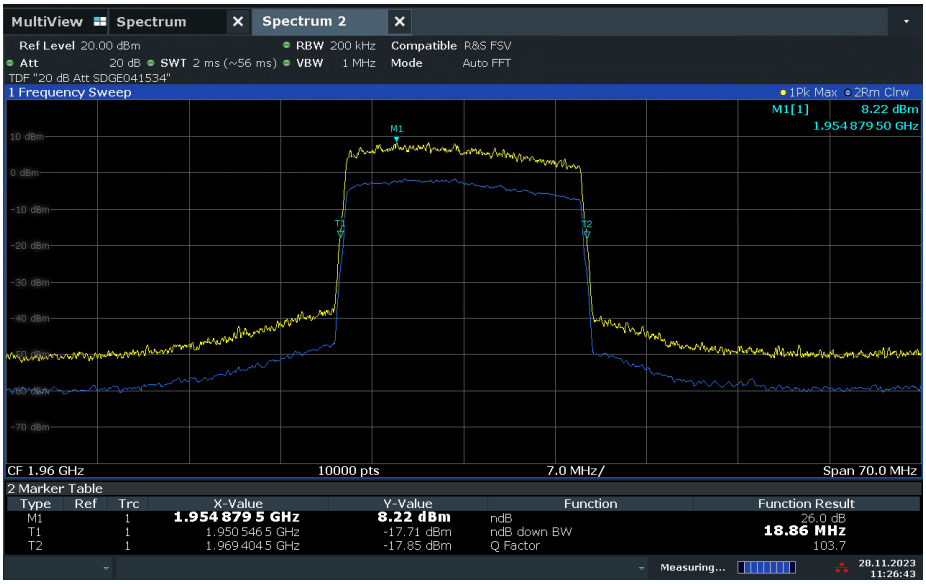
11:26:19 28.11.2023

LTE Band 2 Downlink (20 MHz BW) Mid Channel / 99% OBW at Input port (Adjusted Level)



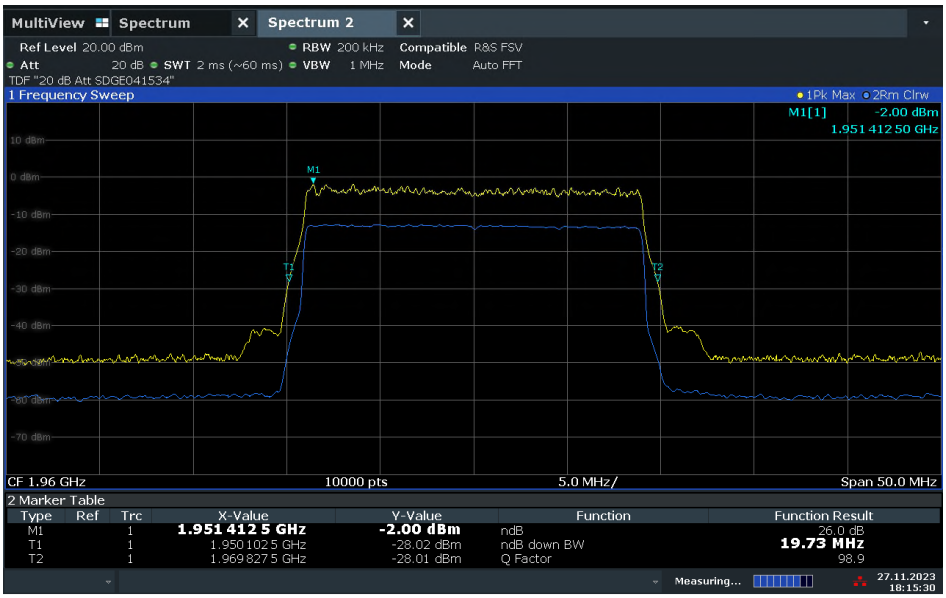
18:16:12 27.11.2023

LTE Band 2 Downlink (20 MHz BW) Mid Channel / 26 dB BW at Output port with Input signal at AGC Threshold Level



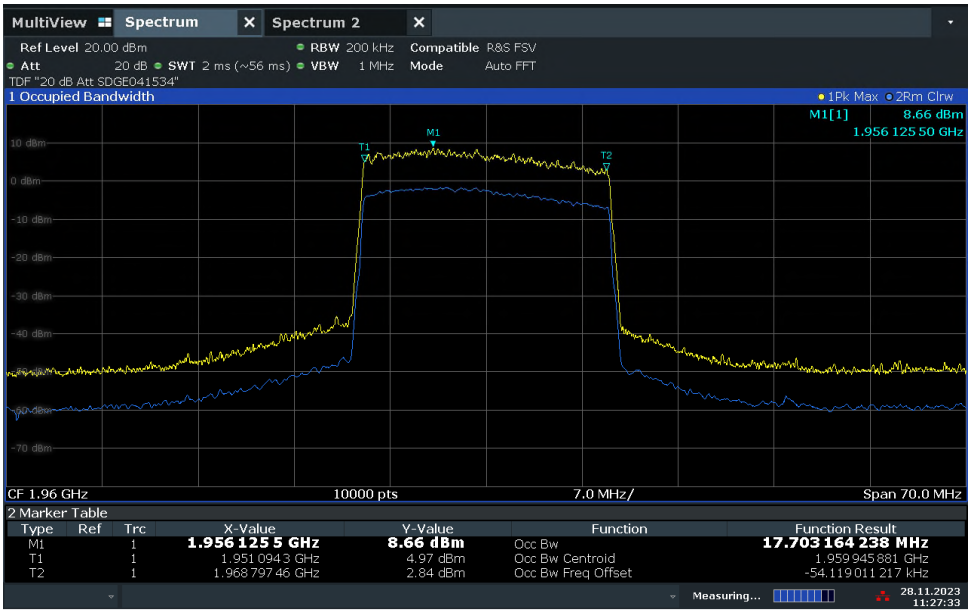
11:26:43 28.11.2023

LTE Band 2 Downlink (20 MHz BW) Mid Channel / 26 dB BW at Input port (Adjusted Level)



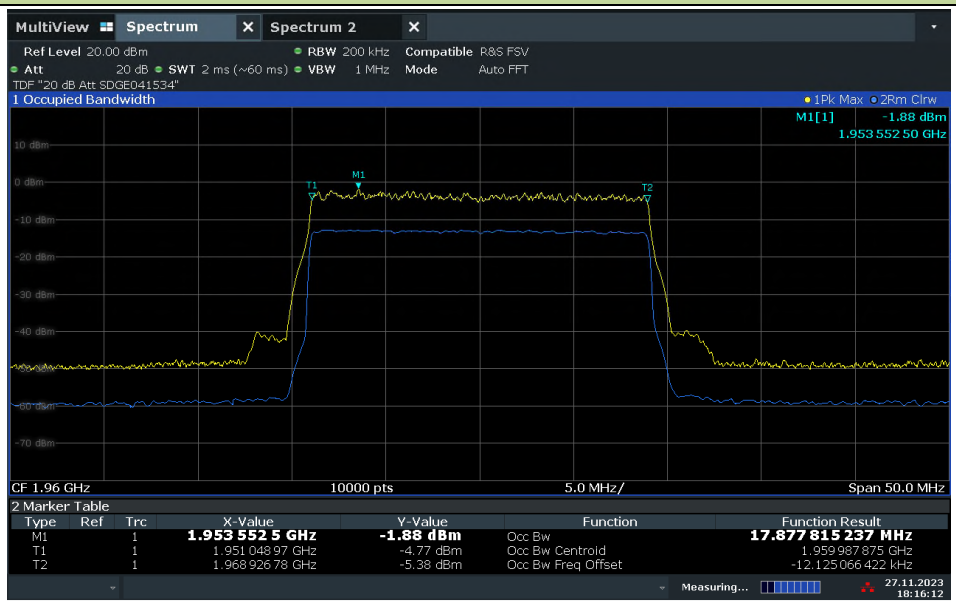
18:15:31 27.11.2023

LTE Band 2 Downlink (20 MHz BW) Mid Channel / 99% OBW at Output port with Input signal at AGC + 3 dB Level



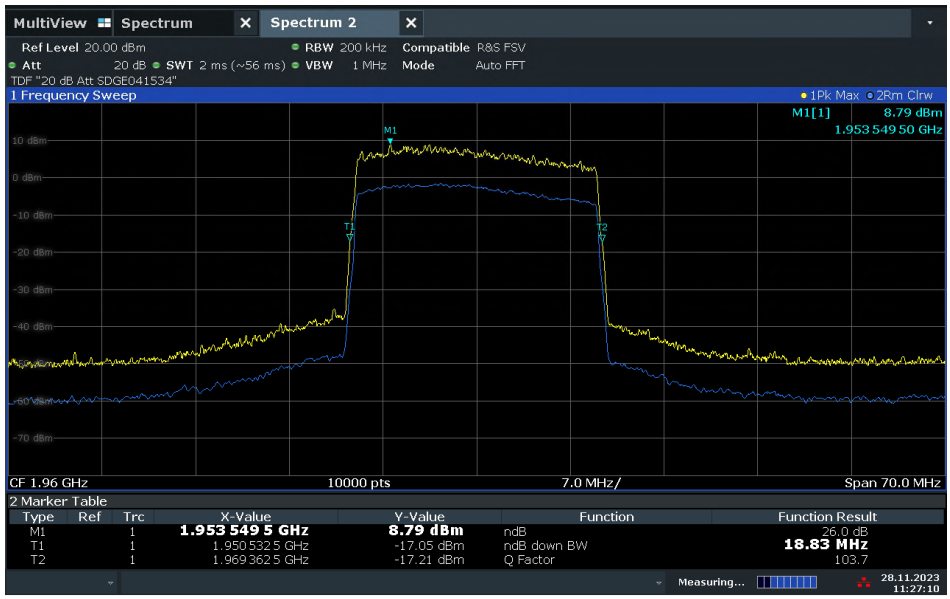
11:27:33 28.11.2023

LTE Band 2 Downlink (20 MHz BW) Mid Channel / 99% OBW at Input port (Adjusted Level)



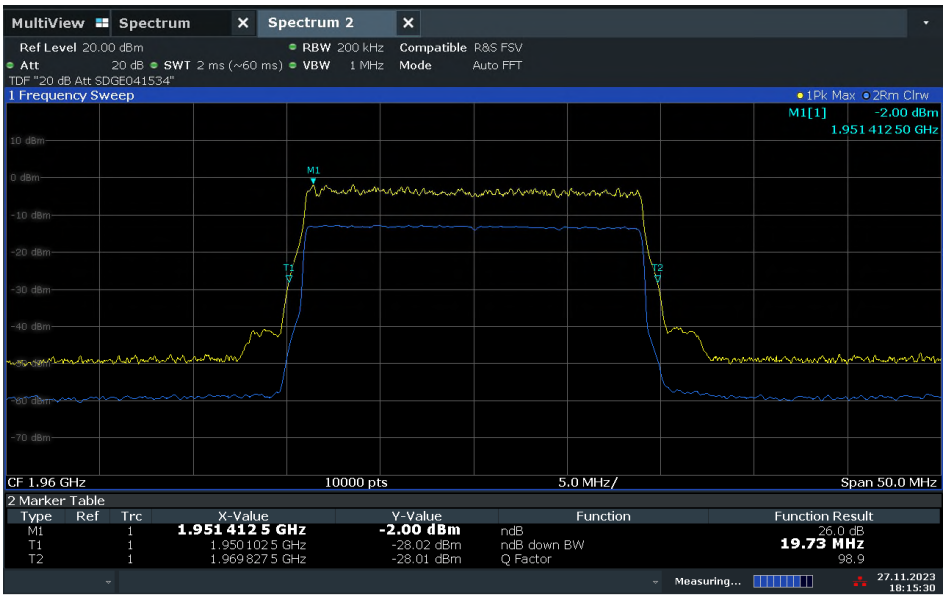
18:16:12 27.11.2023

LTE Band 2 Downlink (20 MHz BW) Mid Channel / 26 dB BW at Output port with Input signal at AGC + 3 dB Level



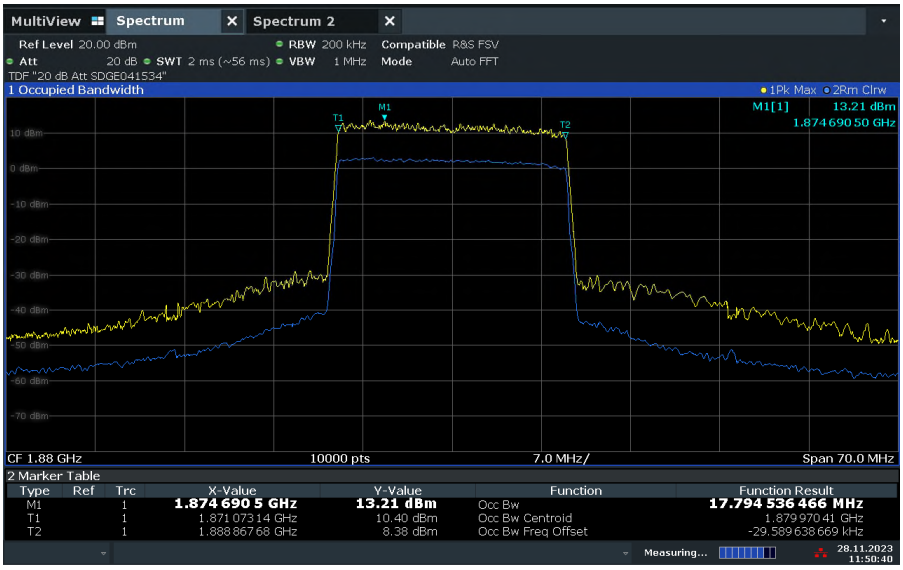
11:27:11 28.11.2023

LTE Band 2 Downlink (20 MHz BW) Mid Channel / 26 dB BW at Input port (Adjusted Level)



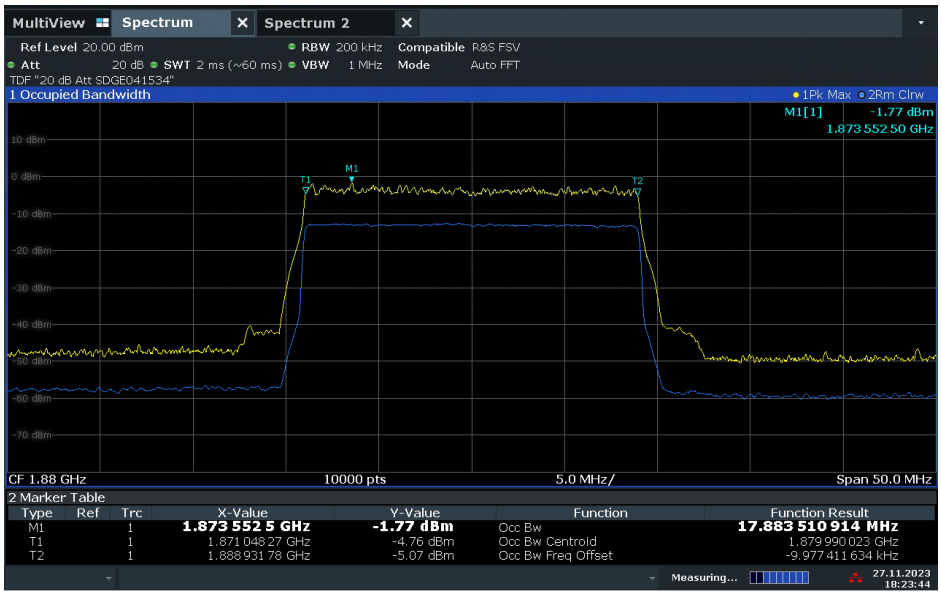
18:15:31 27.11.2023

LTE Band 2 Uplink (20 MHz BW) Mid Channel / 99% OBW at Output port with Input signal at AGC Threshold Level



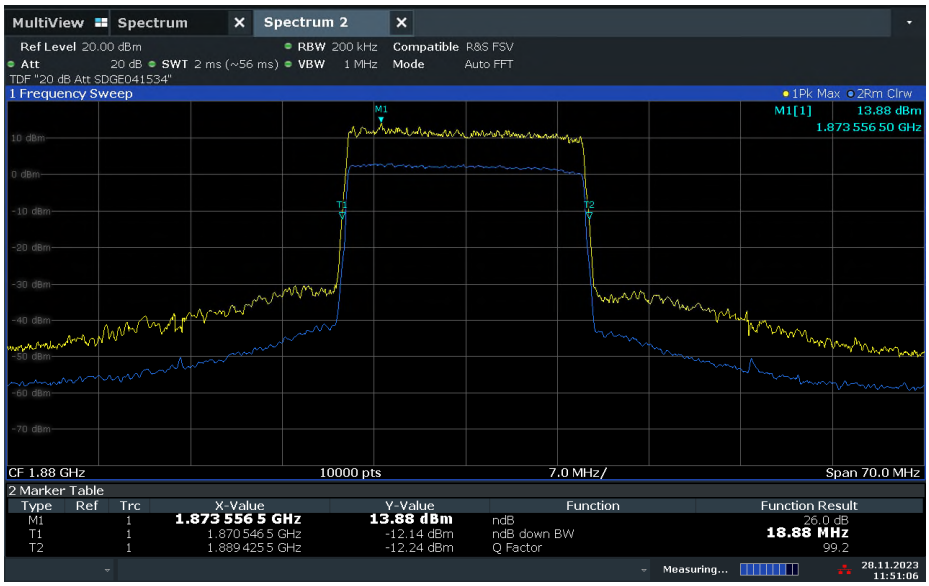
11:50:40 28.11.2023

LTE Band 2 Uplink (20 MHz BW) Mid Channel / 99% OBW at Input port (Adjusted Level)



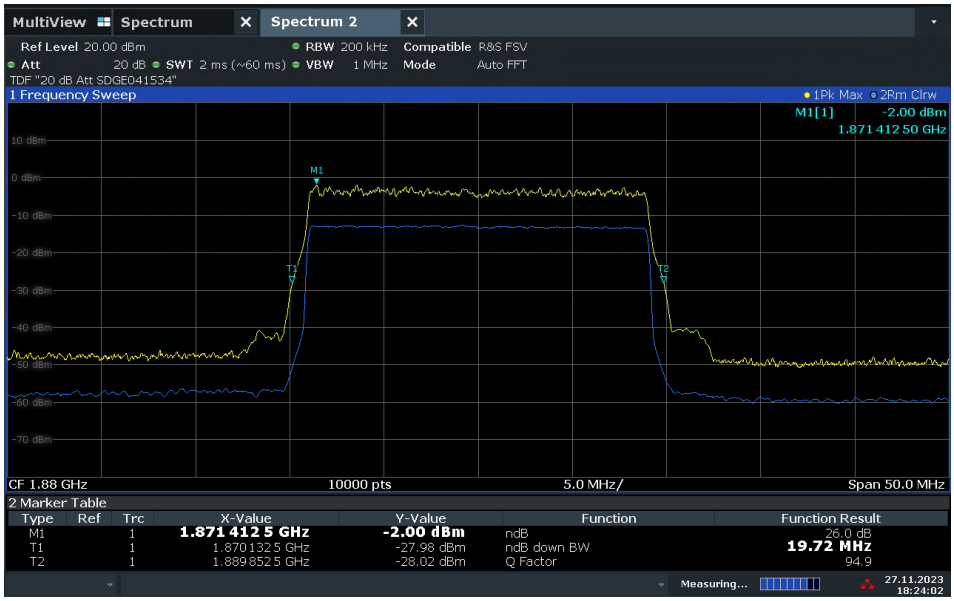
18:23:45 27.11.2023

LTE Band 2 Uplink (20 MHz BW) Mid Channel / 26 dB BW at Output port with Input signal at AGC Threshold Level



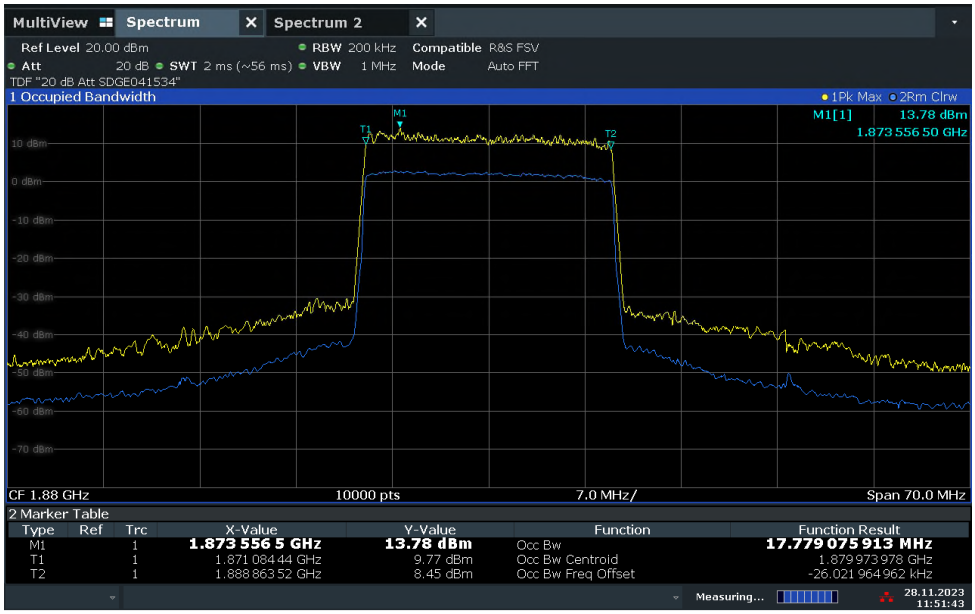
11:51:07 28.11.2023

LTE Band 2 Uplink (20 MHz BW) Mid Channel / 26 dB BW at Input port (Adjusted Level)



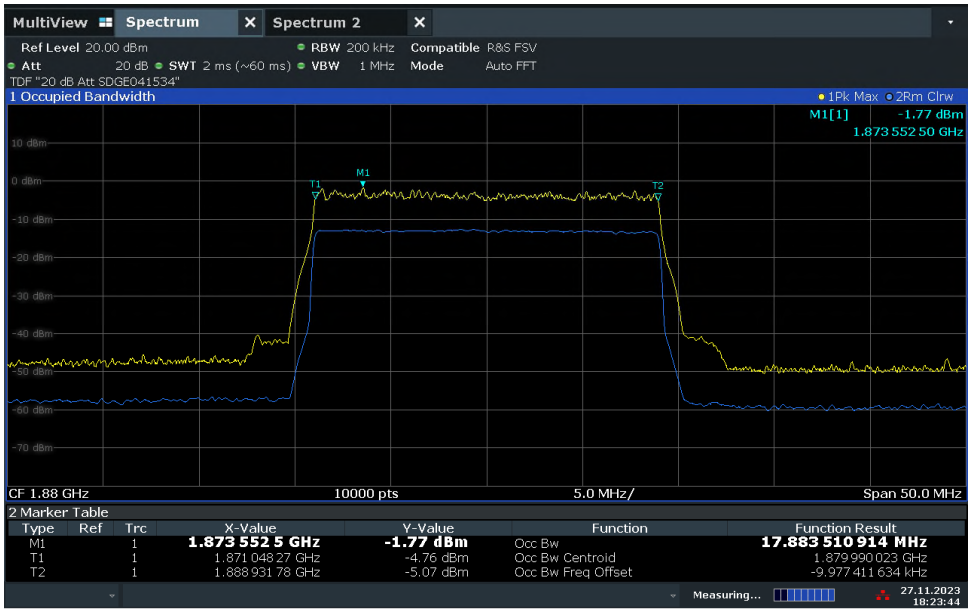
18:24:03 27.11.2023

LTE Band 2 Uplink (20 MHz BW) Mid Channel / 99% OBW at Output port with Input signal at AGC + 3 dB Level



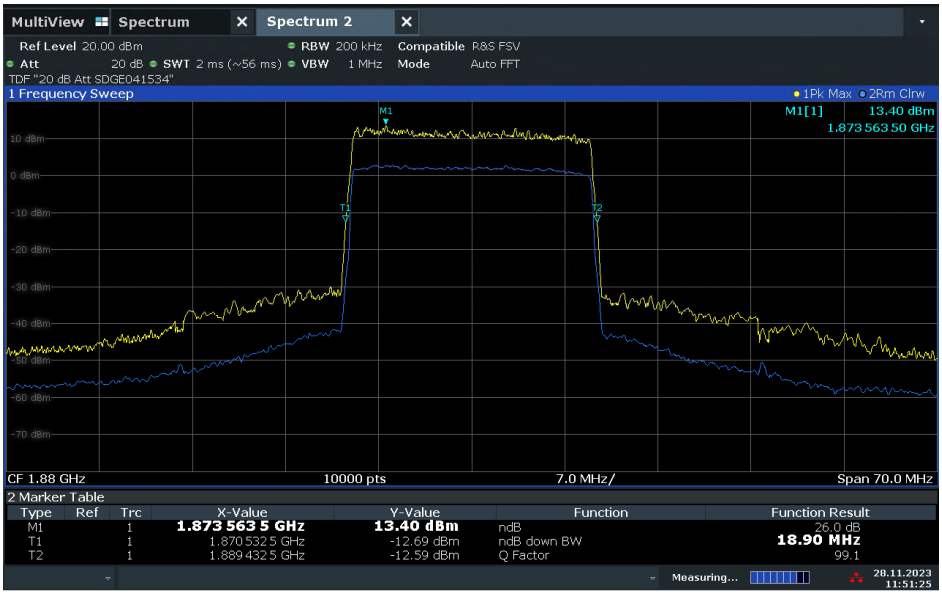
11:51:43 28.11.2023

LTE Band 2 Uplink (20 MHz BW) Mid Channel / 99% OBW at Input port (Adjusted Level)



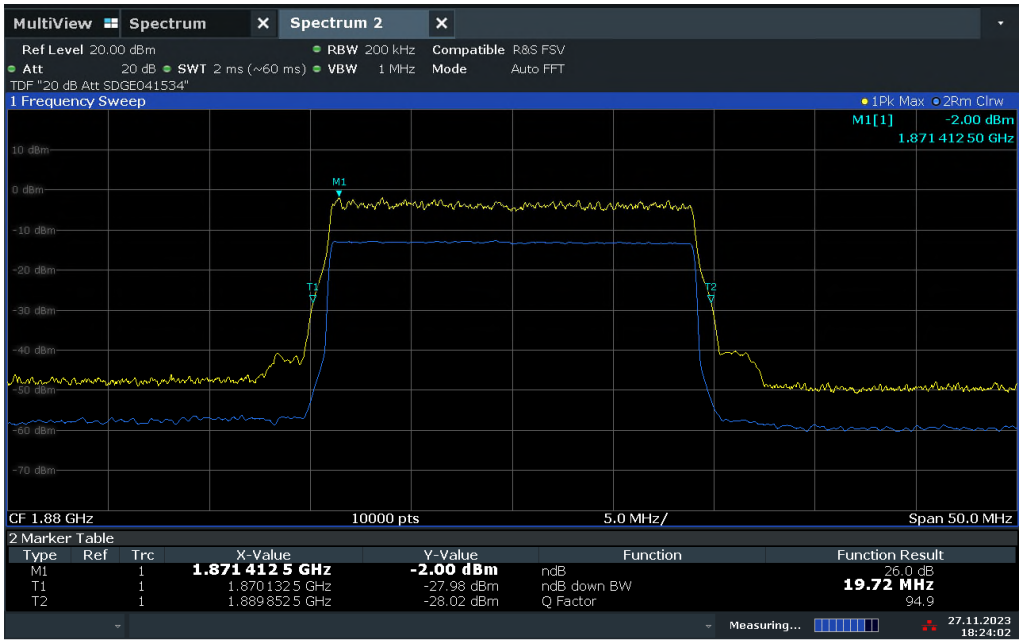
18:23:45 27.11.2023

LTE Band 2 Uplink (20 MHz BW) Mid Channel / 26 dB BW at Output port with Input signal at AGC + 3 dB Level



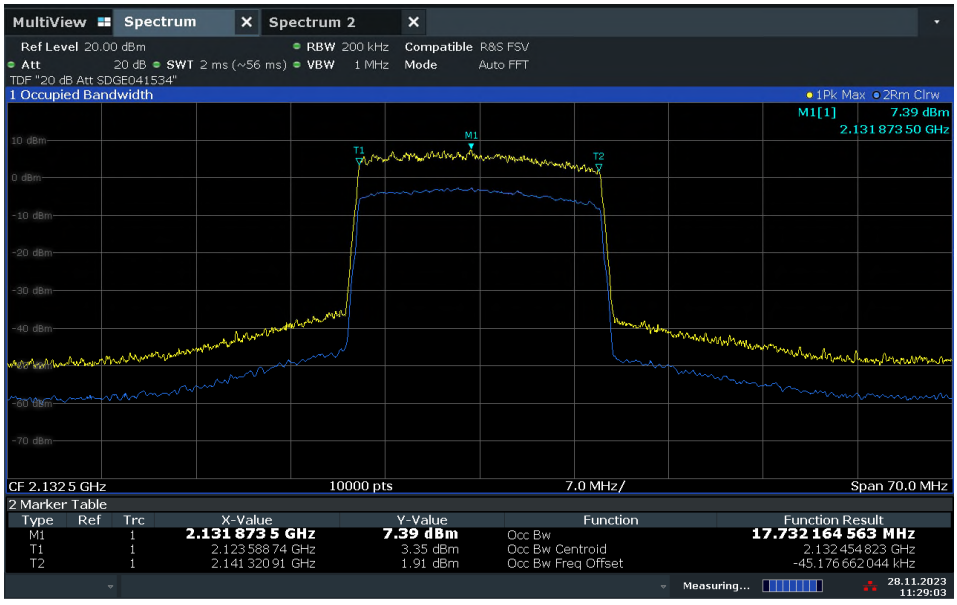
11:51:26 28.11.2023

LTE Band 2 Uplink (20 MHz BW) Mid Channel / 26 dB BW at Input port (Adjusted Level)



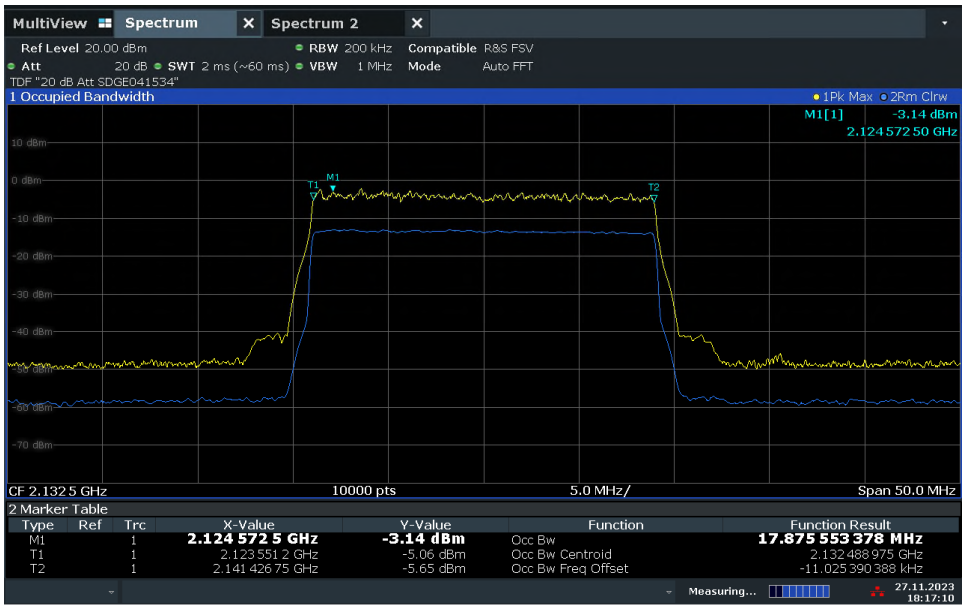
18:24:03 27.11.2023

LTE Band 4 Downlink (20 MHz BW) Mid Channel / 99% OBW at Output port with Input signal at AGC Threshold Level



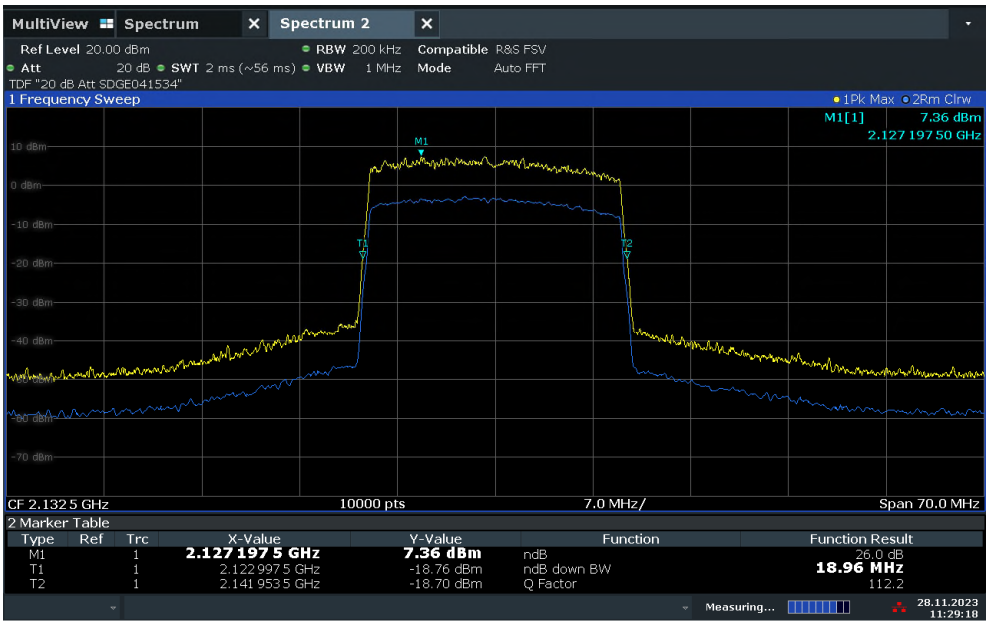
11:29:03 28.11.2023

LTE Band 4 Downlink (20 MHz BW) Mid Channel / 99% OBW at Input port (Adjusted Level)



18:17:11 27.11.2023

LTE Band 4 Downlink (20 MHz BW) Mid Channel / 26 dB BW at Output port with Input signal at AGC Threshold Level

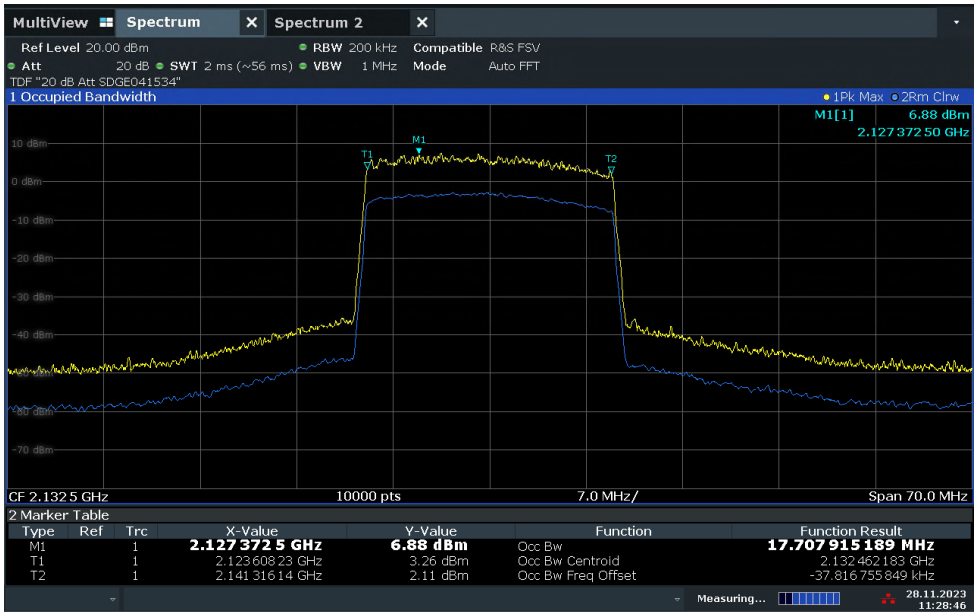


11:29:19 28.11.2023

LTE Band 4 Downlink (20 MHz BW) Mid Channel / 26 dB BW at Input port (Adjusted Level)

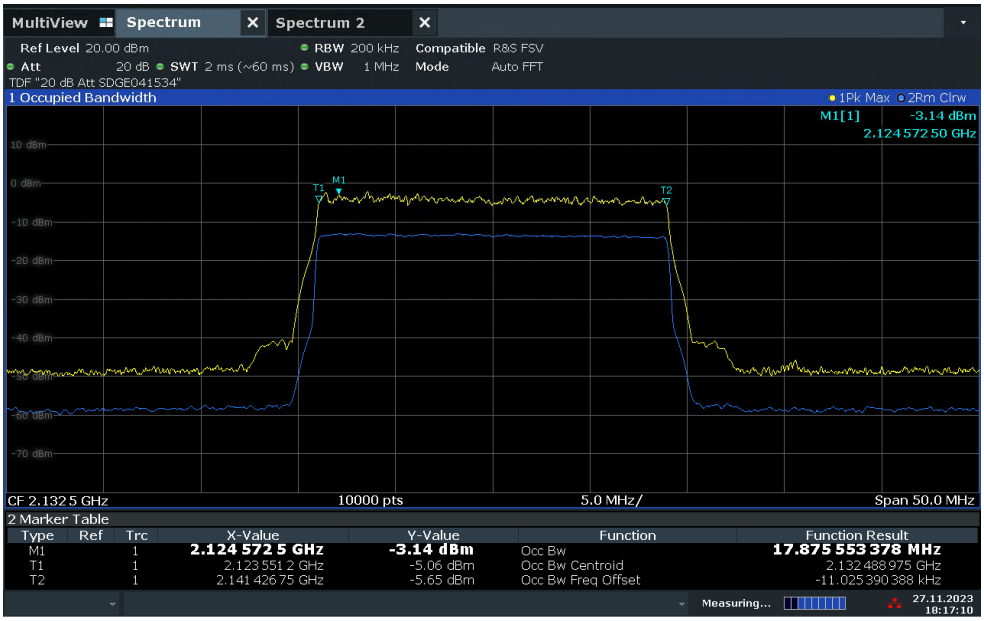
18:16:54 27.11.2023

LTE Band 4 Downlink (20 MHz BW) Mid Channel / 99% OBW at Output port with Input signal at AGC + 3 dB Level



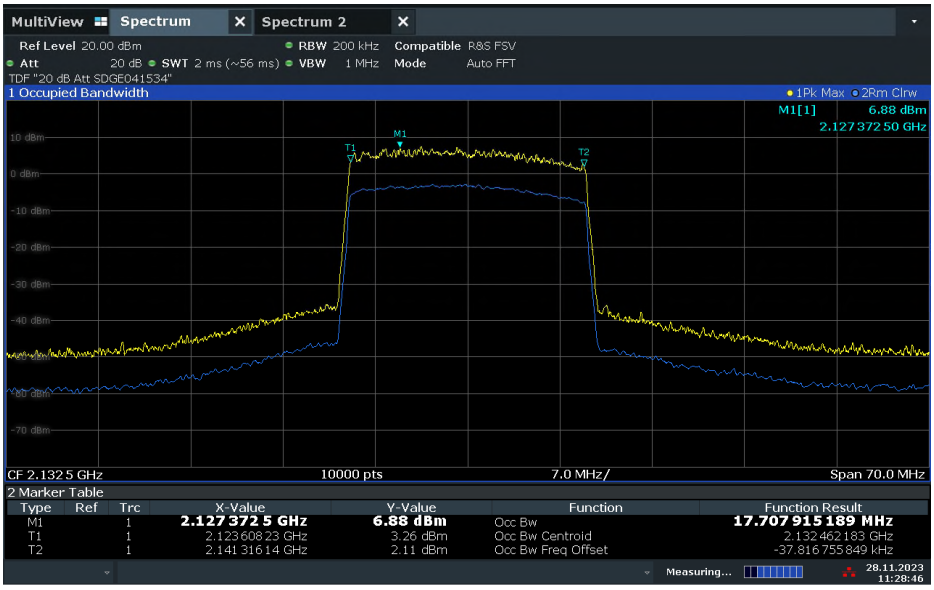
11:28:47 28.11.2023

LTE Band 4 Downlink (20 MHz BW) Mid Channel / 99% OBW at Input port (Adjusted Level)



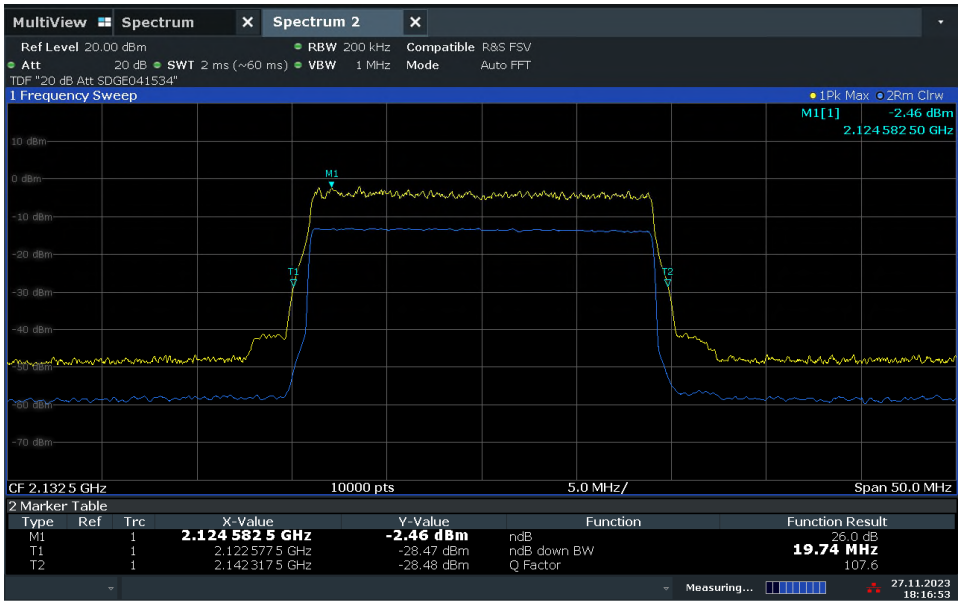
18:17:11 27.11.2023

LTE Band 4 Downlink (20 MHz BW) Mid Channel / 99% OBW at Output port with Input signal at AGC + 3 dB Level



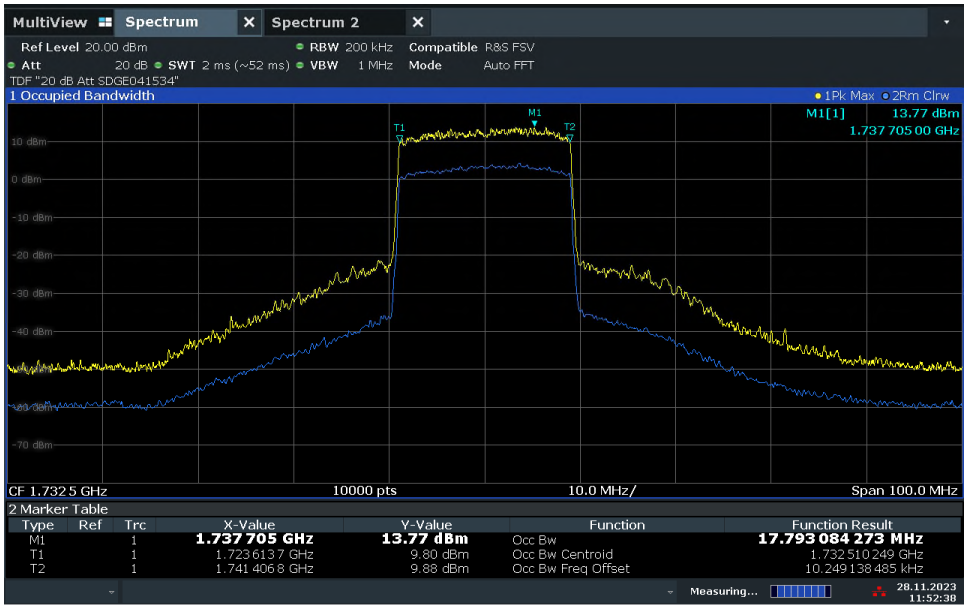
11:28:47 28.11.2023

LTE Band 4 Downlink (20 MHz BW) Mid Channel / 26 dB BW at Input port (Adjusted Level)



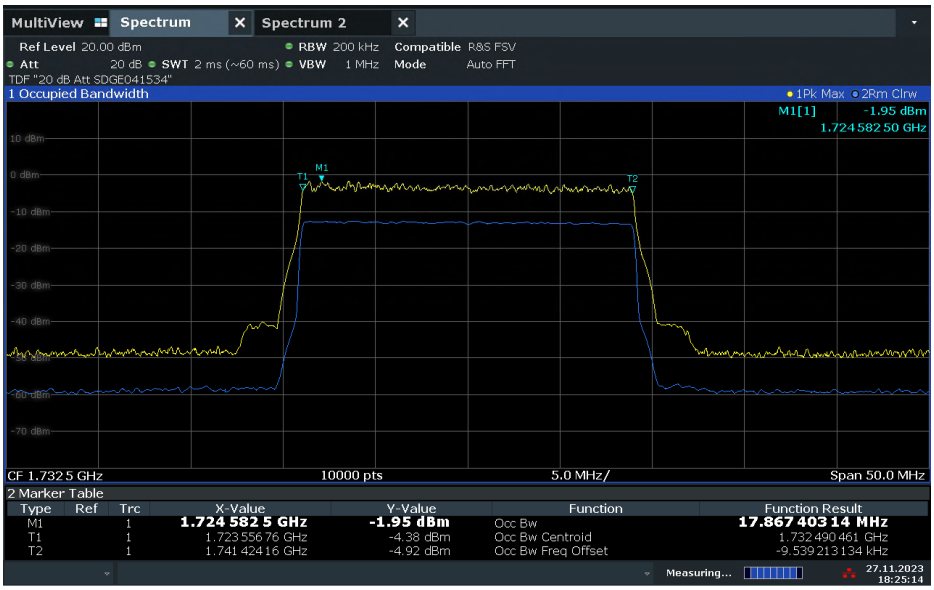
18:16:54 27.11.2023

LTE Band 4 Uplink (20 MHz BW) Mid Channel / 99% OBW at Output port with Input signal at AGC Threshold Level



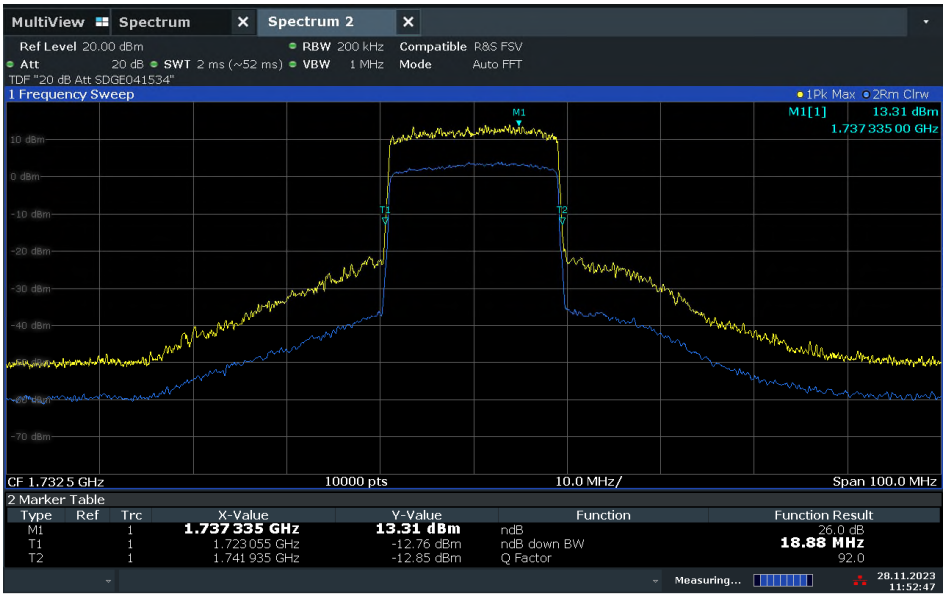
11:52:39 28.11.2023

LTE Band 4 Uplink (20 MHz BW) Mid Channel / 99% OBW at Input port (Adjusted Level)



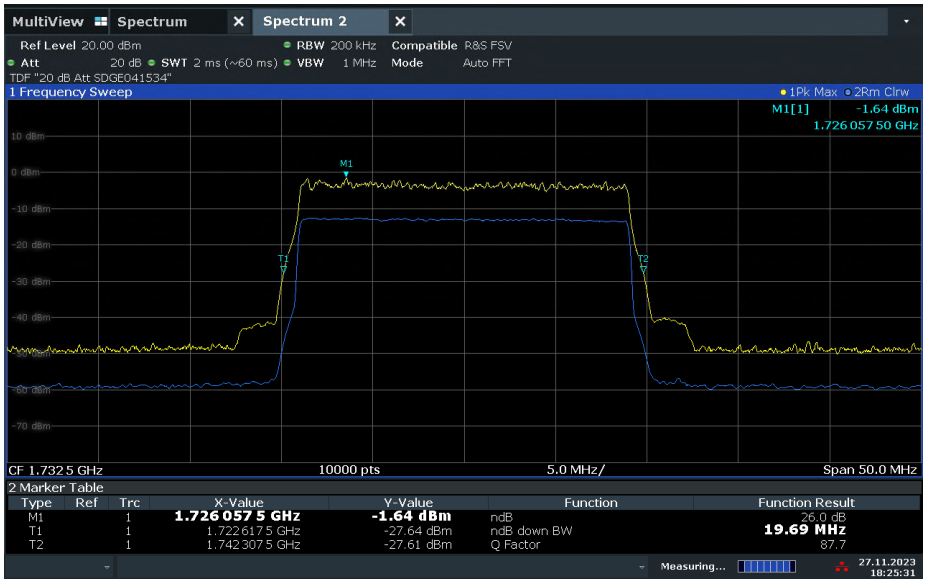
18:25:14 27.11.2023

LTE Band 4 Uplink (20 MHz BW) Mid Channel / 26 dB BW at Output port with Input signal at AGC Threshold Level



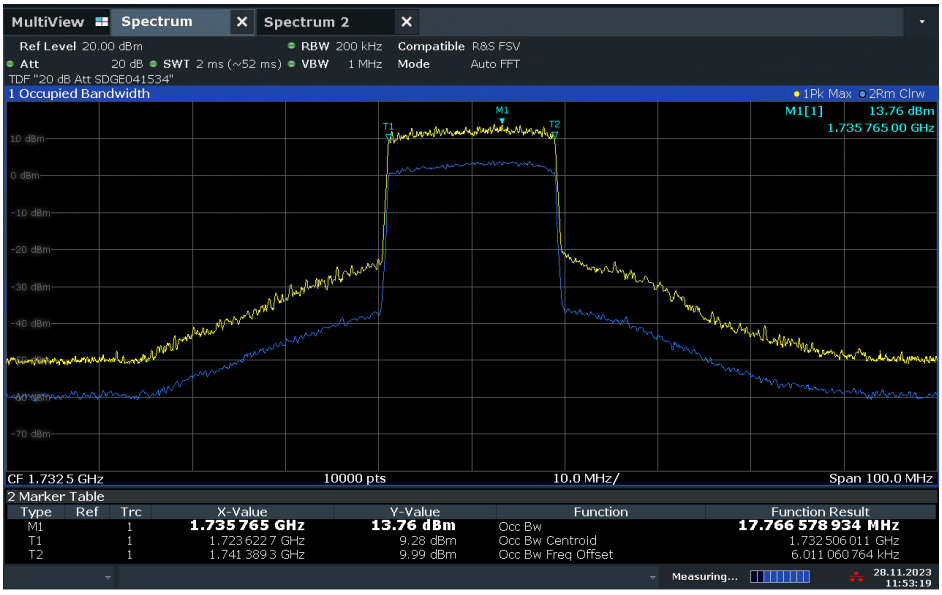
11:52:47 28.11.2023

LTE Band 4 Uplink (20 MHz BW) Mid Channel / 26 dB BW at Input port (Adjusted Level)



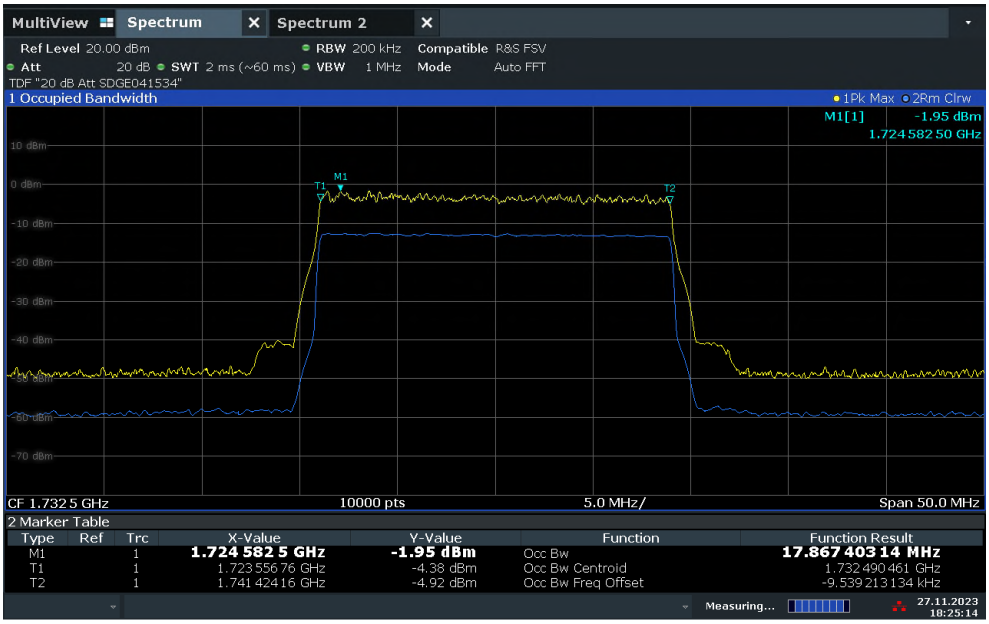
18:25:32 27.11.2023

LTE Band 4 Uplink (20 MHz BW) Mid Channel / 99% OBW at Output port with Input signal at AGC + 3 dB Level



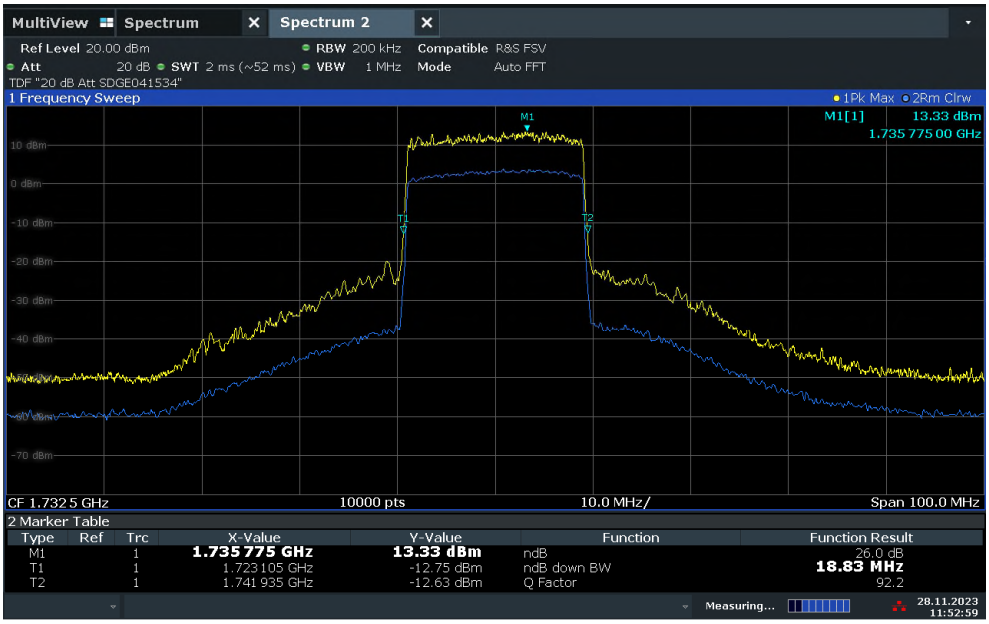
11:53:19 28.11.2023

LTE Band 4 Uplink (20 MHz BW) Mid Channel / 99% OBW at Input port (Adjusted Level)



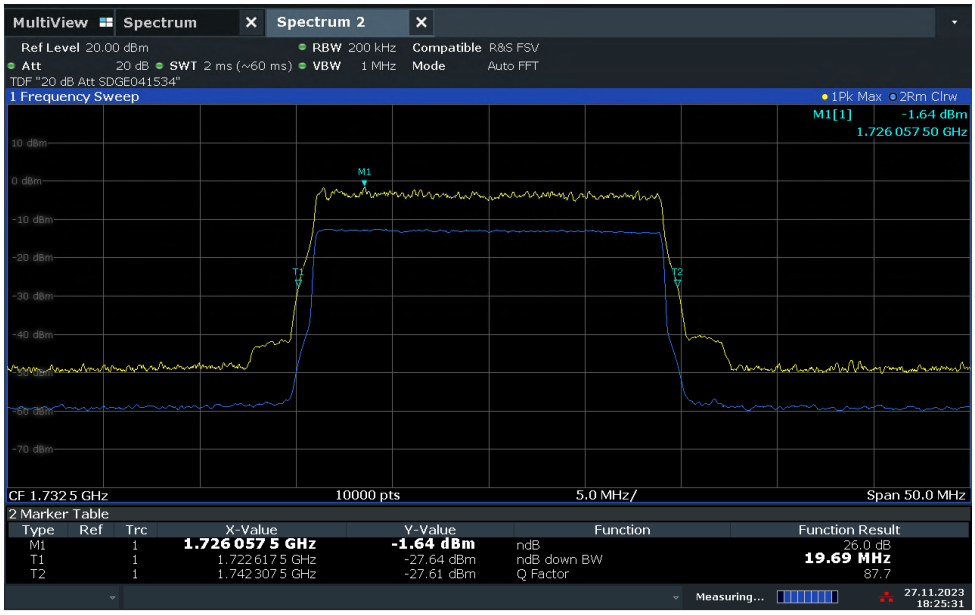
18:25:14 27.11.2023

LTE Band 4 Uplink (20 MHz BW) Mid Channel / 26 dB BW at Output port with Input signal at AGC + 3 dB Level



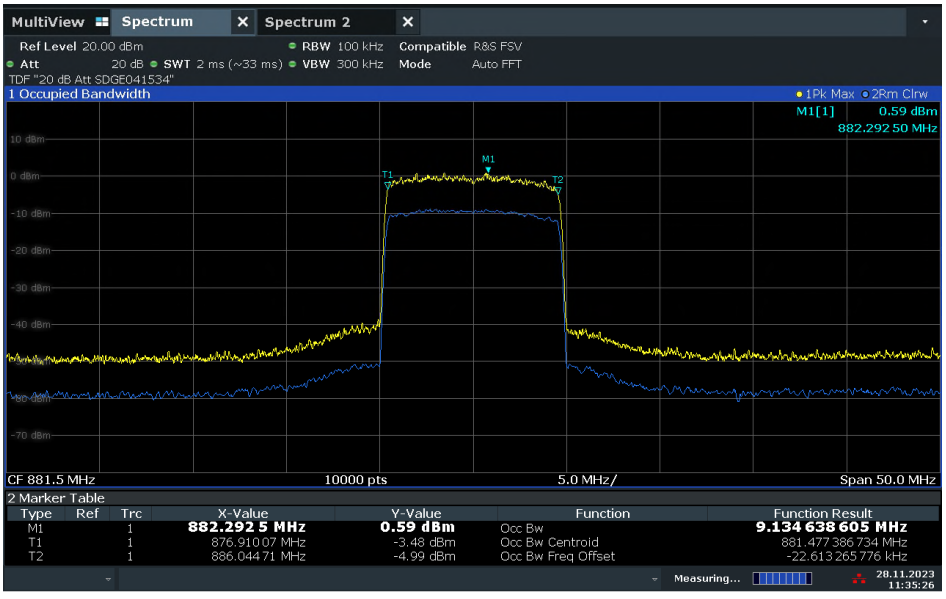
11:52:59 28.11.2023

LTE Band 4 Uplink (20 MHz BW) Mid Channel / 26 dB BW at Input port (Adjusted Level)



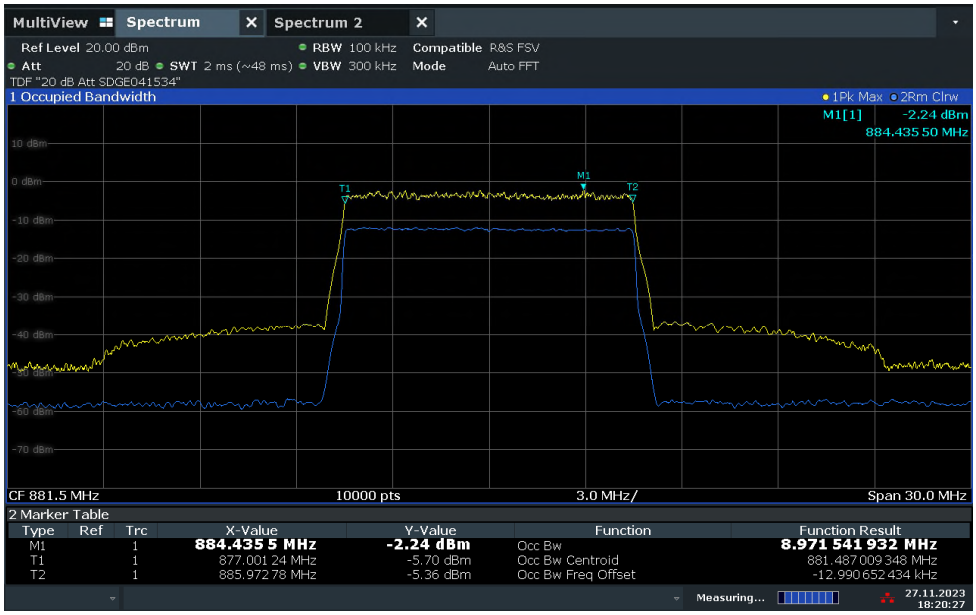
18:25:32 27.11.2023

LTE Band 5 Downlink (10 MHz BW) Mid Channel / 99% OBW at Output port with Input signal at AGC Threshold Level



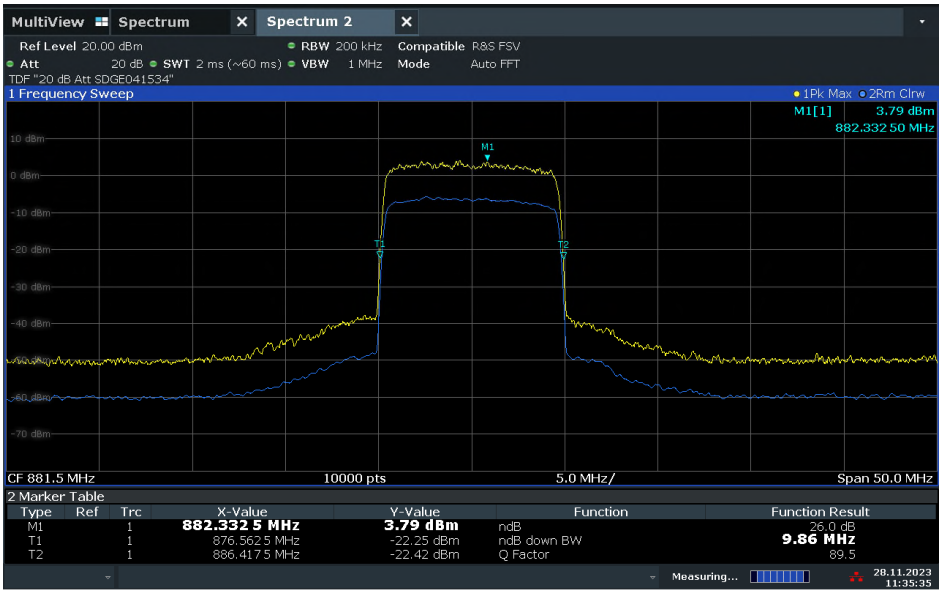
11:35:27 28.11.2023

LTE Band 5 Downlink (10 MHz BW) Mid Channel / 99% OBW at Input port (Adjusted Level)



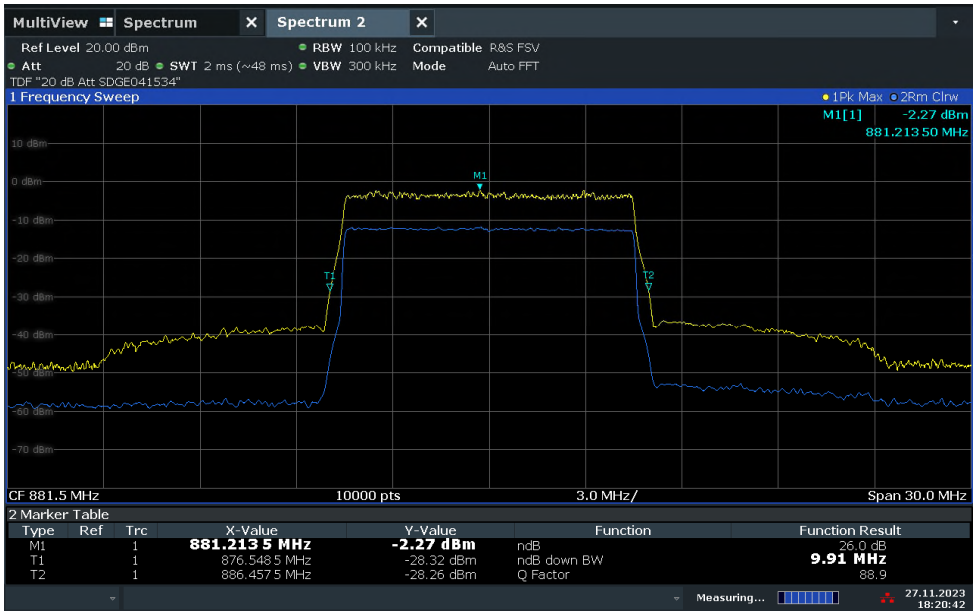
18:20:28 27.11.2023

LTE Band 5 Downlink (10 MHz BW) Mid Channel / 26 dB BW at Output port with Input signal at AGC Threshold Level



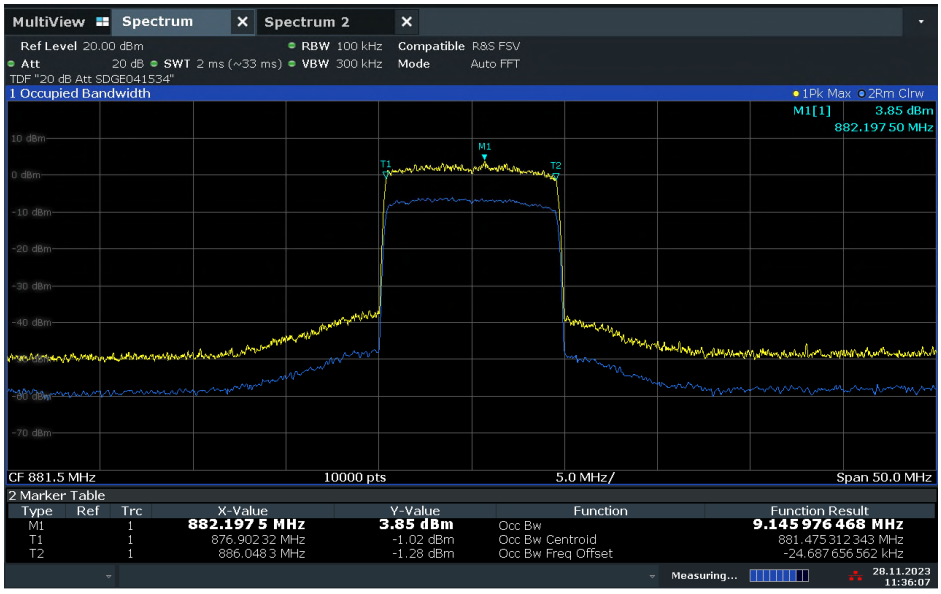
11:35:36 28.11.2023

LTE Band 5 Downlink (10 MHz BW) Mid Channel / 26 dB BW at Input port (Adjusted Level)



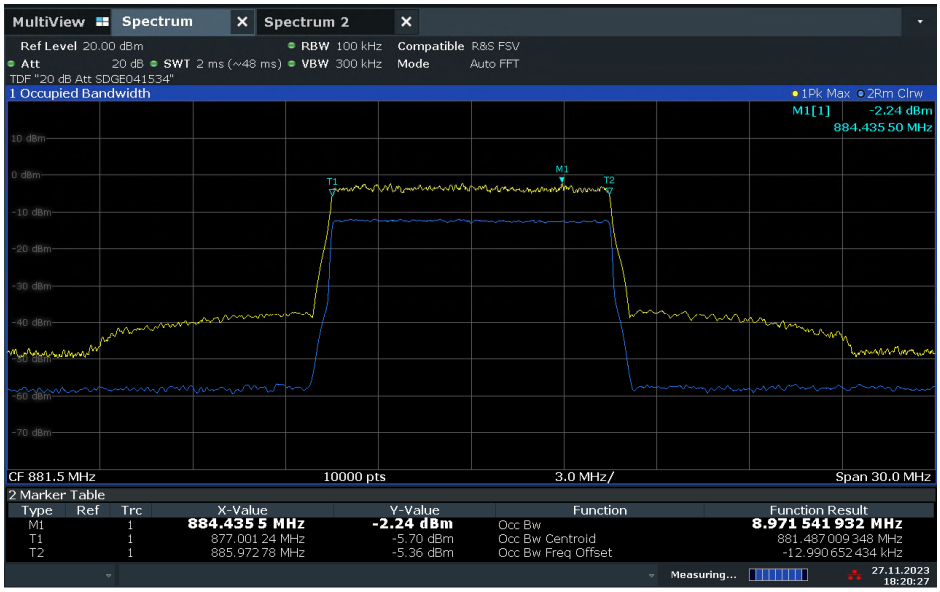
18:20:43 27.11.2023

LTE Band 5 Downlink (10 MHz BW) Mid Channel / 99% OBW at Output port with Input signal at AGC + 3 dB Level



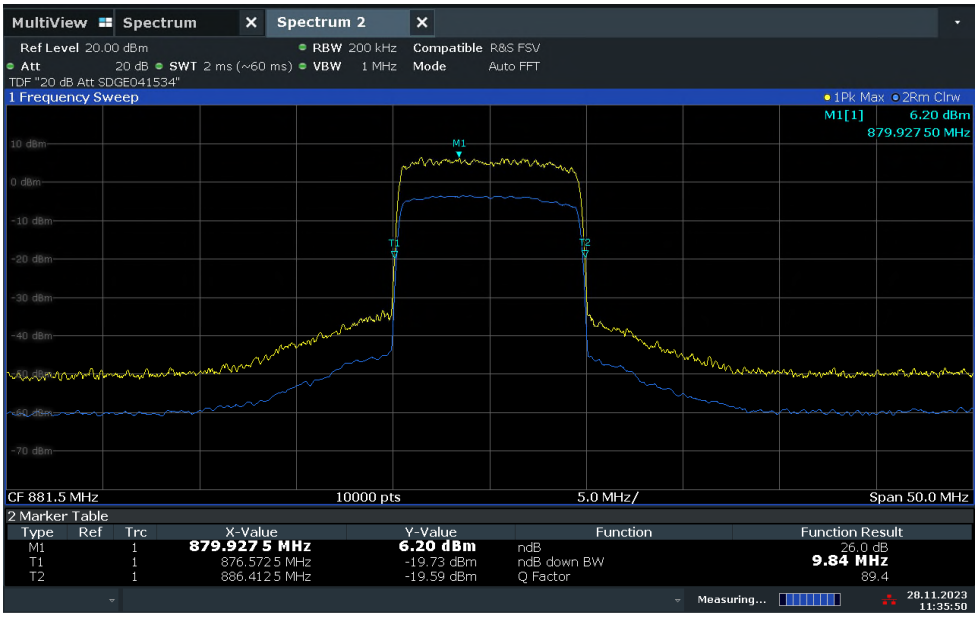
11:36:07 28.11.2023

LTE Band 5 Downlink (10 MHz BW) Mid Channel / 99% OBW at Input port (Adjusted Level)



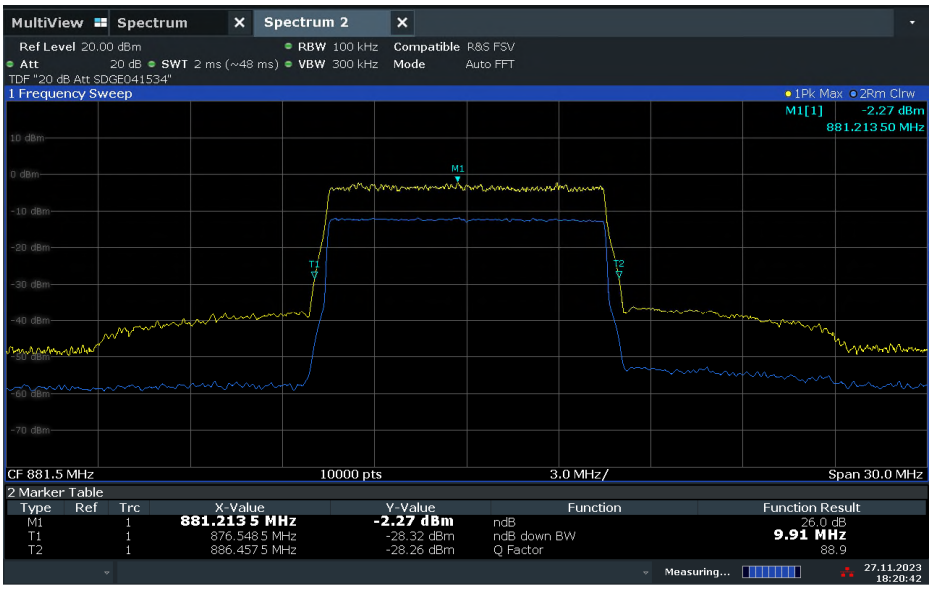
18:20:28 27.11.2023

LTE Band 5 Downlink (10 MHz BW) Mid Channel / 26 dB BW at Output port with Input signal at AGC + 3 dB Level



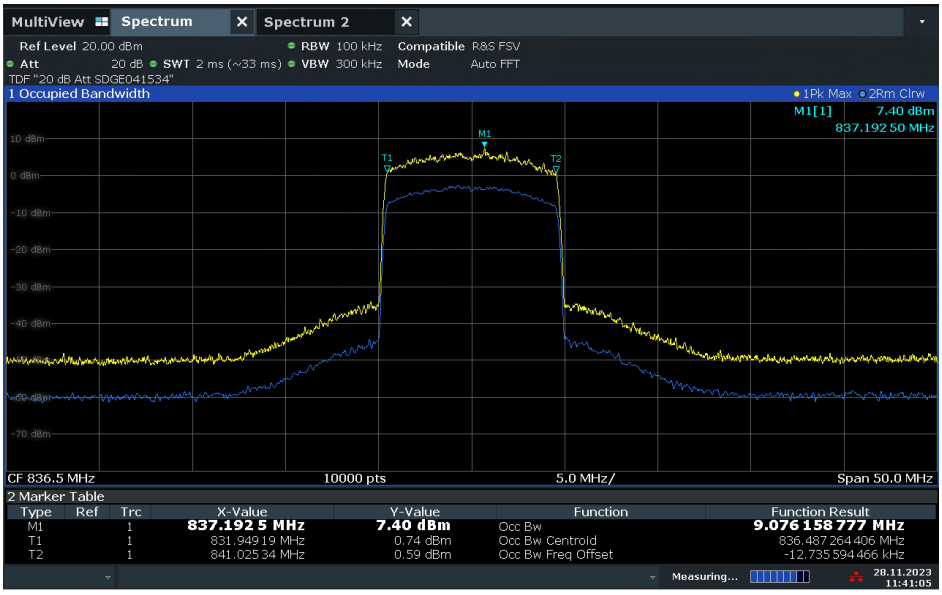
11:35:50 28.11.2023

LTE Band 5 Downlink (10 MHz BW) Mid Channel / 26 dB BW at Input port (Adjusted Level)



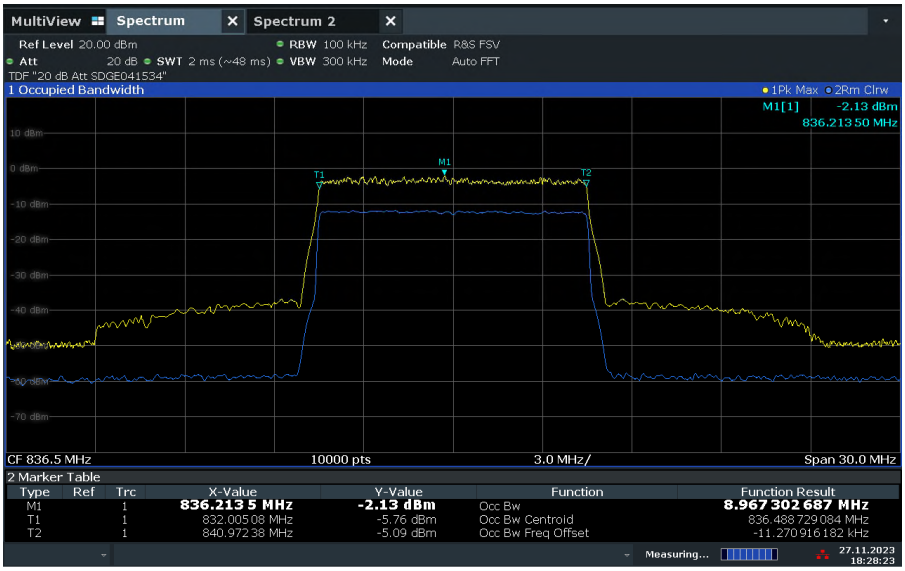
18:20:43 27.11.2023

LTE Band 5 Uplink (10 MHz BW) Mid Channel / 99% OBW at Output port with Input signal at AGC Threshold Level



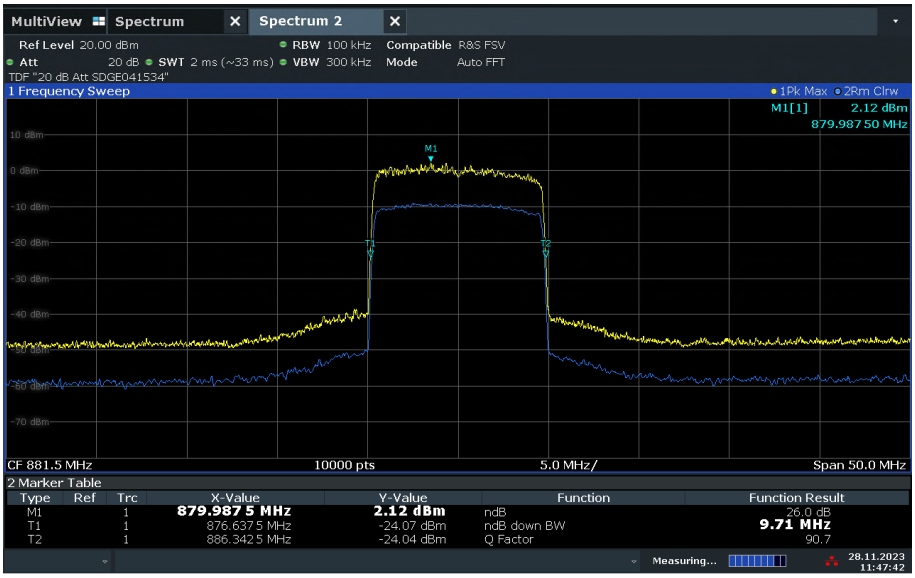
11:41:05 28.11.2023

LTE Band 5 Uplink (10 MHz BW) Mid Channel / 99% OBW at Input port (Adjusted Level)



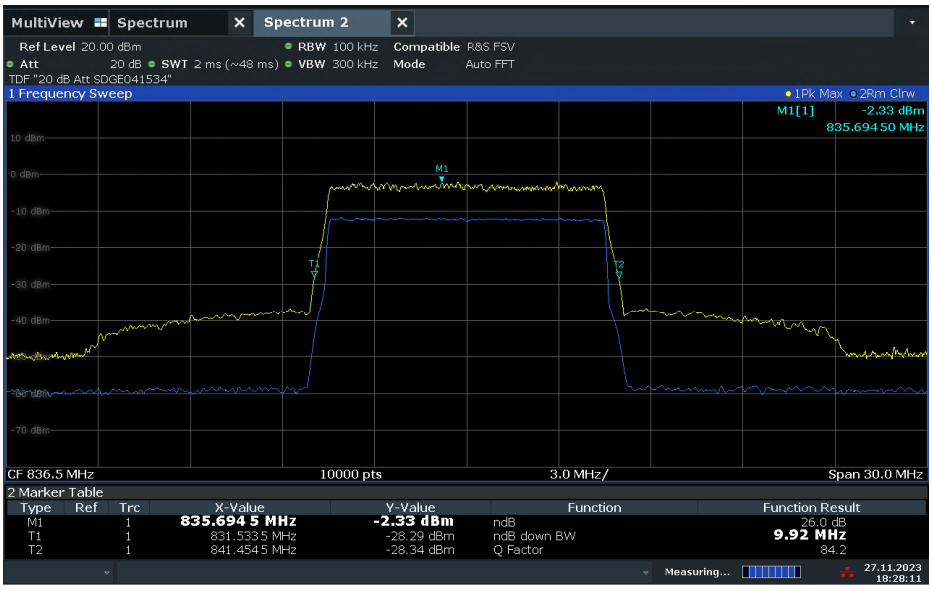
18:28:24 27.11.2023

LTE Band 5 Uplink (10 MHz BW) Mid Channel / 26 dB BW at Output port with Input signal at AGC Threshold Level



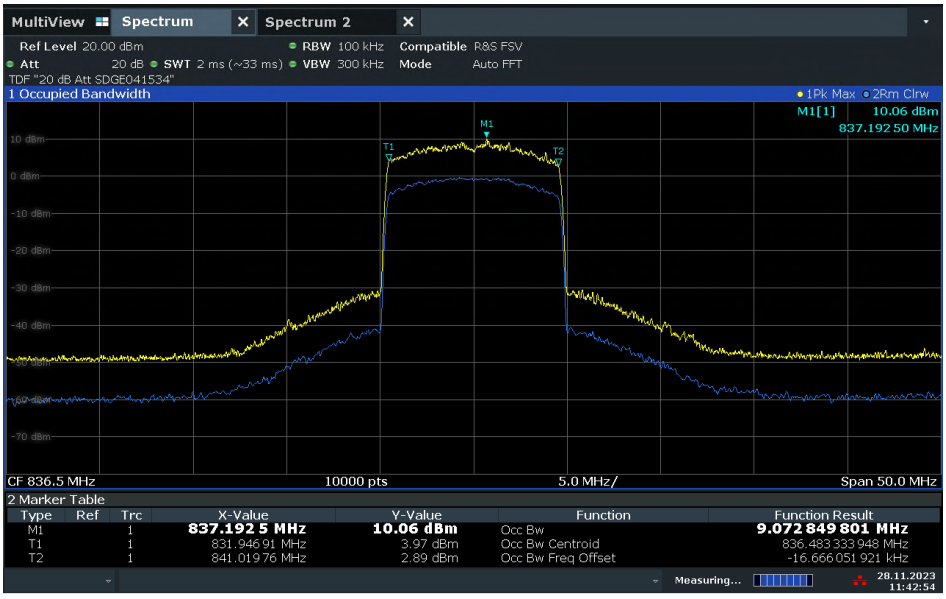
11:47:43 28.11.2023

LTE Band 5 Uplink (10 MHz BW) Mid Channel / 26 dB BW at Input port (Adjusted Level)



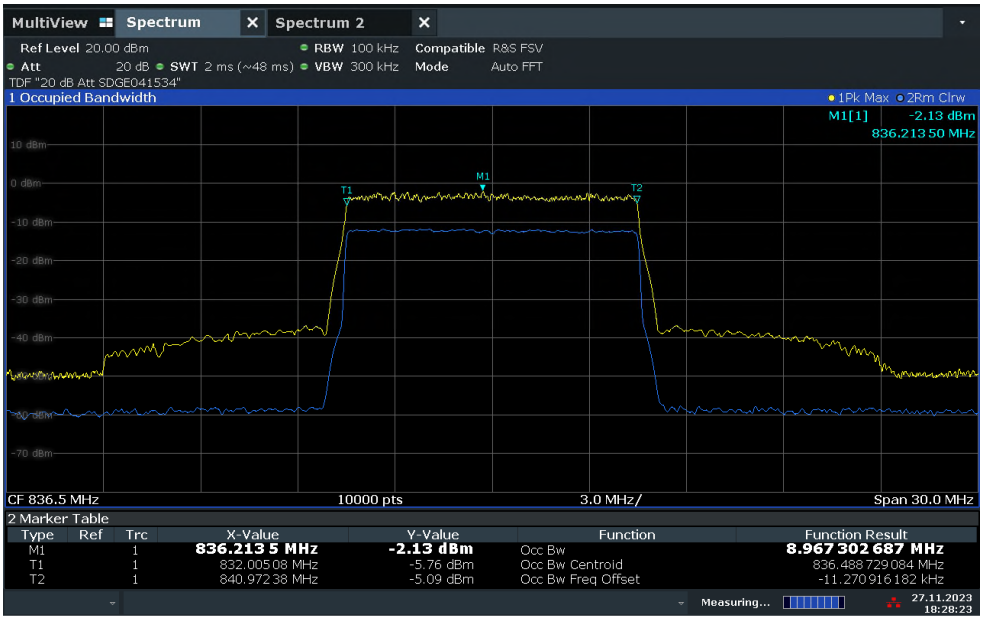
18:28:12 27.11.2023

LTE Band 5 Uplink (10 MHz BW) Mid Channel / 99% OBW at Output port with Input signal at AGC + 3 dB Level



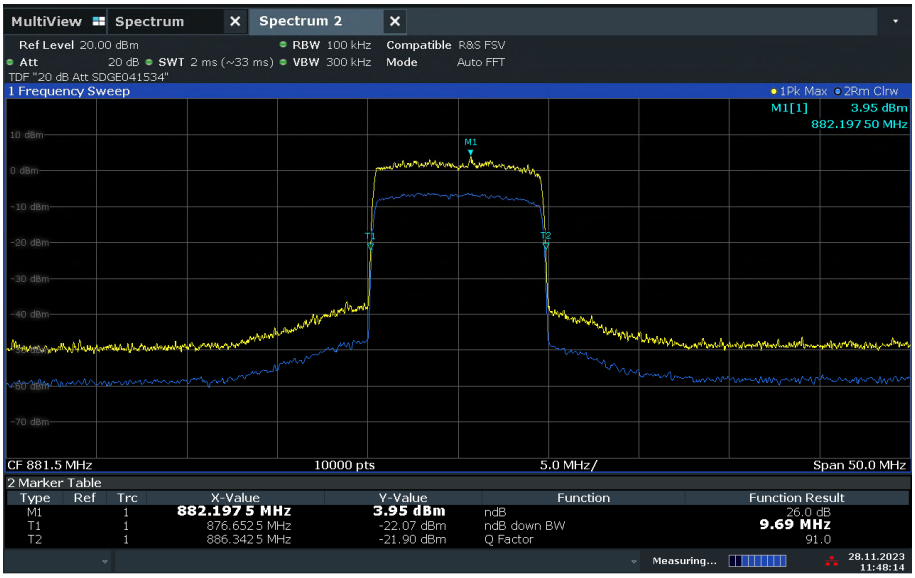
11:42:54 28.11.2023

LTE Band 5 Uplink (10 MHz BW) Mid Channel / 99% OBW at Input port (Adjusted Level)



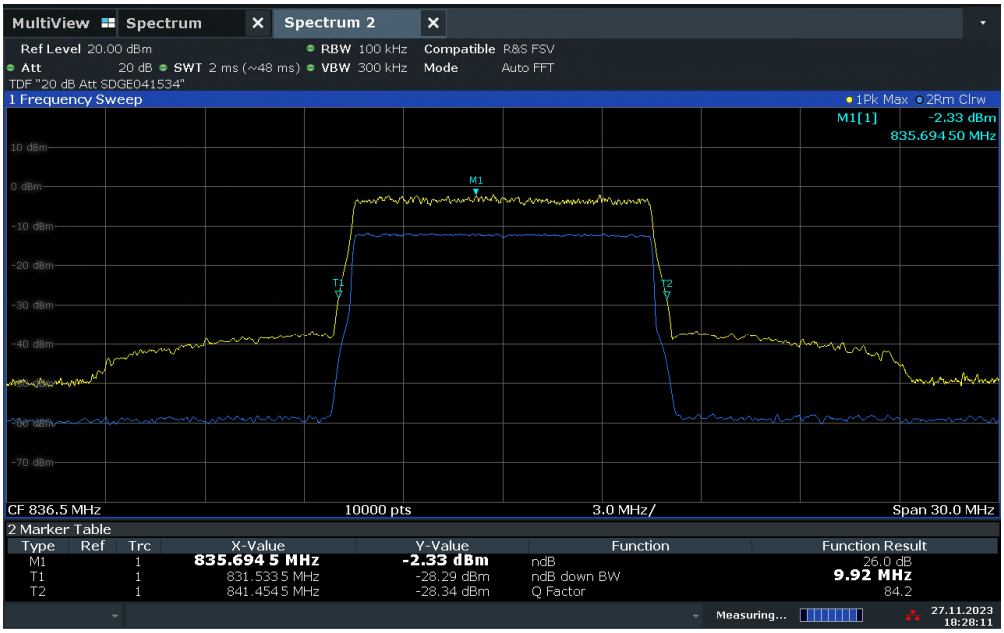
18:28:24 27.11.2023

LTE Band 5 Uplink (10 MHz BW) Mid Channel / 26 dB BW at Output port with Input signal at AGC + 3 dB Level



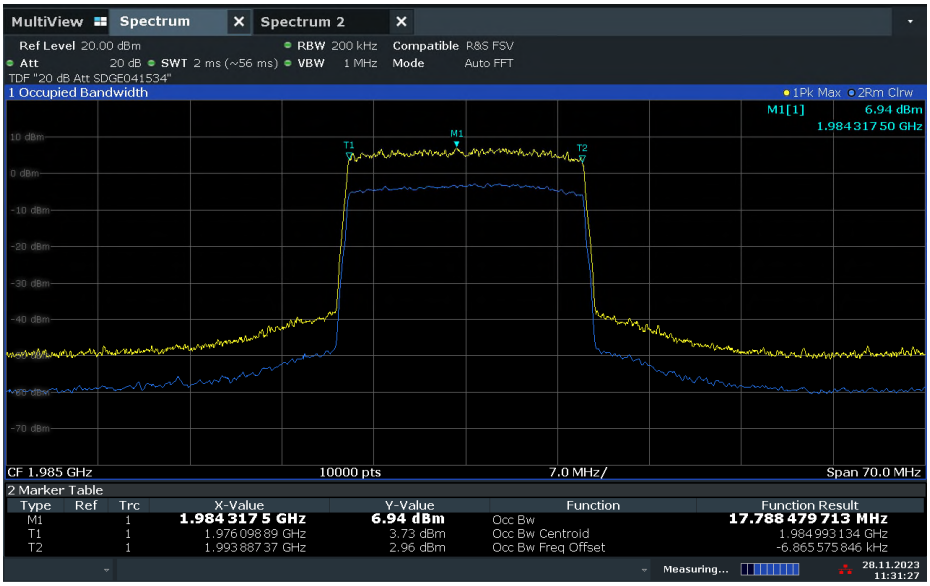
11:48:14 28.11.2023

LTE Band 5 Uplink (10 MHz BW) Mid Channel / 26 dB BW at Input port (Adjusted Level)



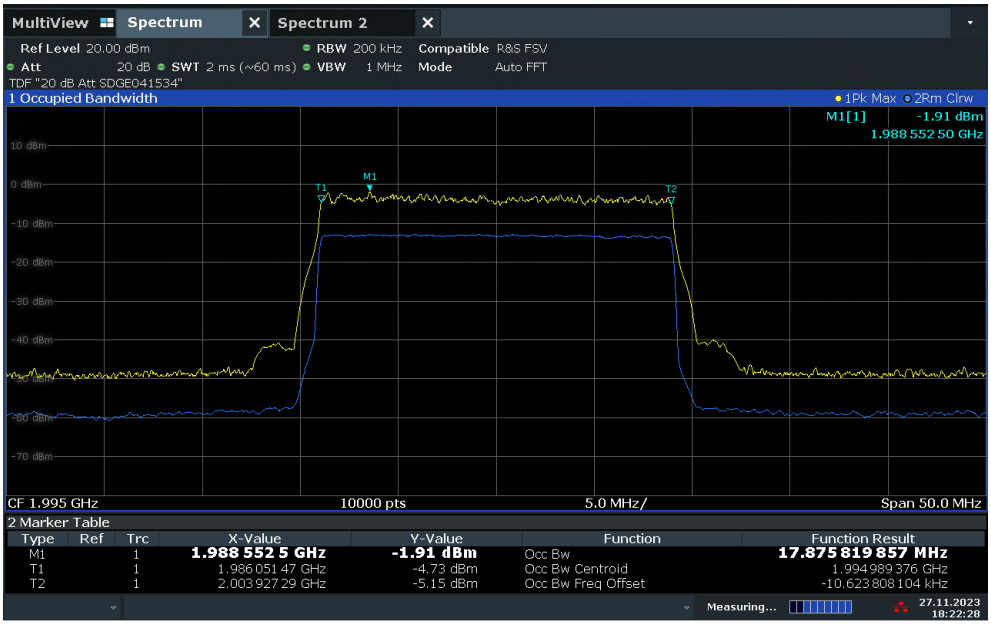
18:28:12 27.11.2023

LTE Band 25 Downlink (20 MHz BW) High Channel / 99% OBW at Output port with Input signal at AGC Threshold Level



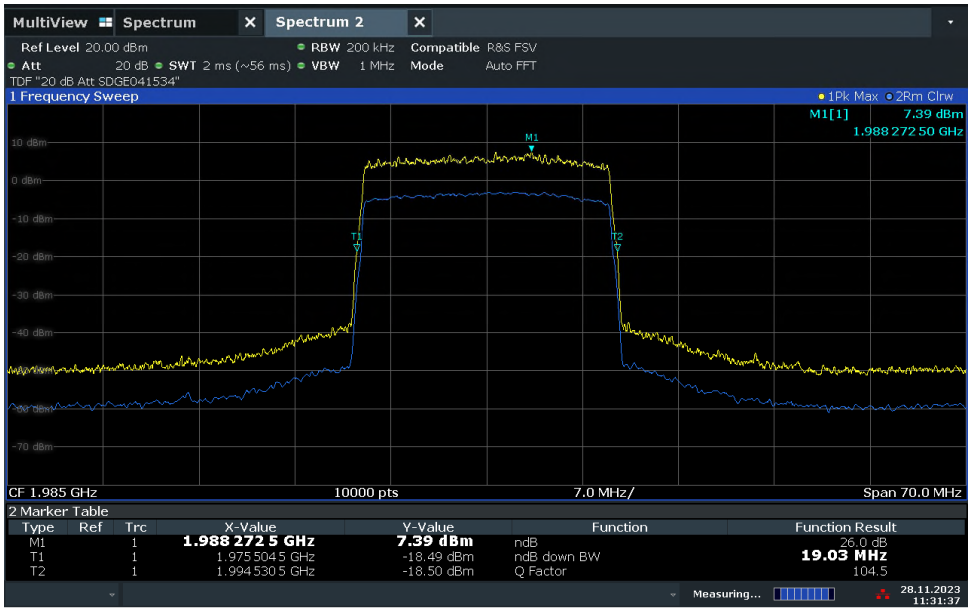
11:31:27 28.11.2023

LTE Band 25 Downlink (20 MHz BW) High Channel / 99% OBW at Input port (Adjusted Level)



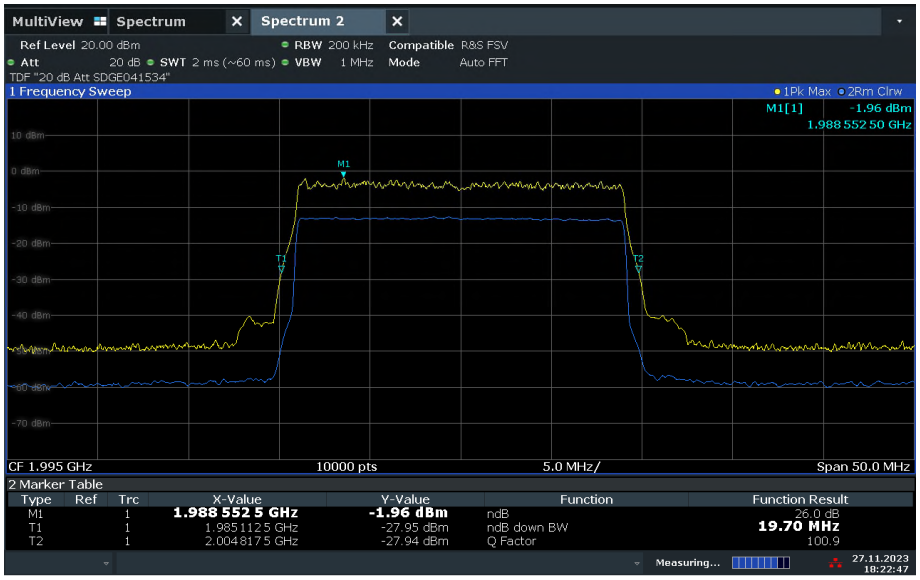
18:22:29 27.11.2023

LTE Band 25 Downlink (20 MHz BW) High Channel / 26 dB BW at Output port with Input signal at AGC Threshold Level



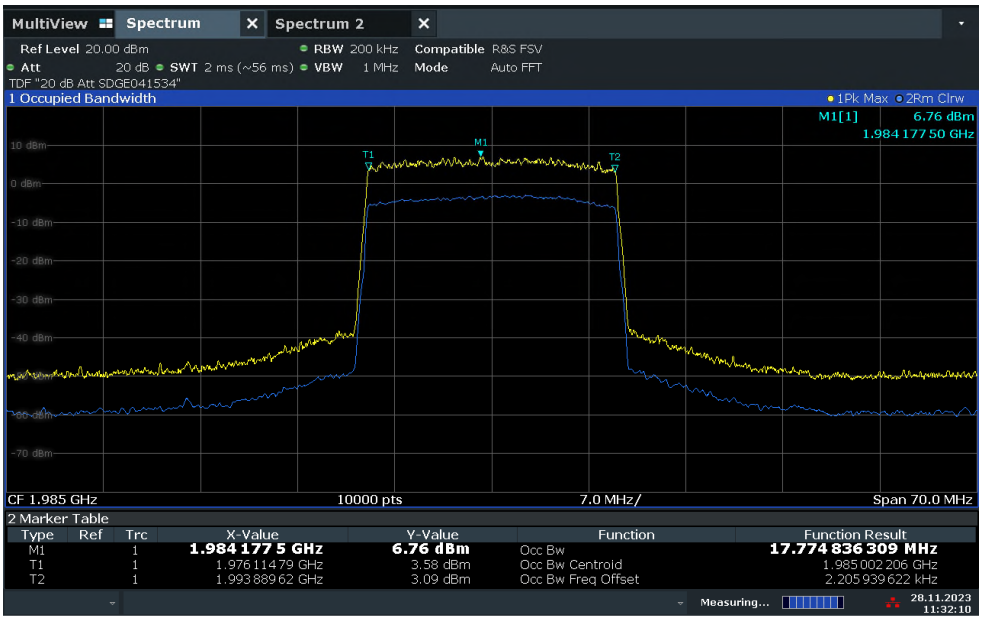
11:31:38 28.11.2023

LTE Band 25 Downlink (20 MHz BW) High Channel / 26 dB BW at Input port (Adjusted Level)



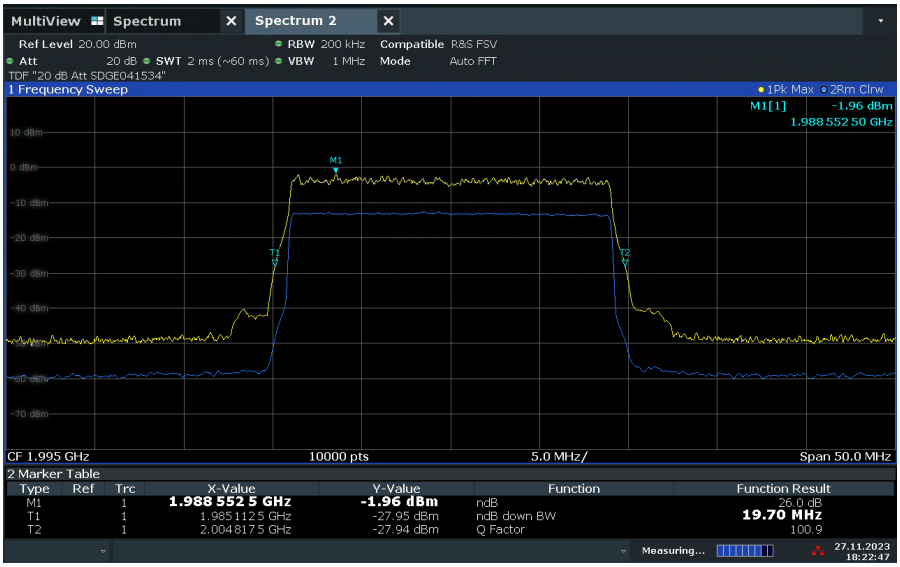
18:22:48 27.11.2023

LTE Band 25 Downlink (20 MHz BW) High Channel / 99% OBW at Output port with Input signal at AGC + 3 dB Level



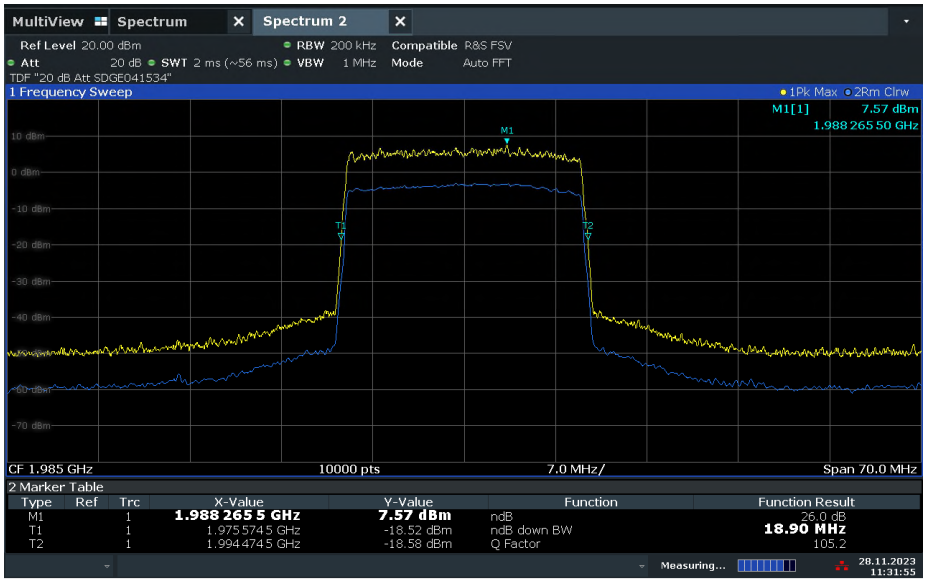
11:32:11 28.11.2023

LTE Band 25 Downlink (20 MHz BW) High Channel / 99% OBW at Input port (Adjusted Level)



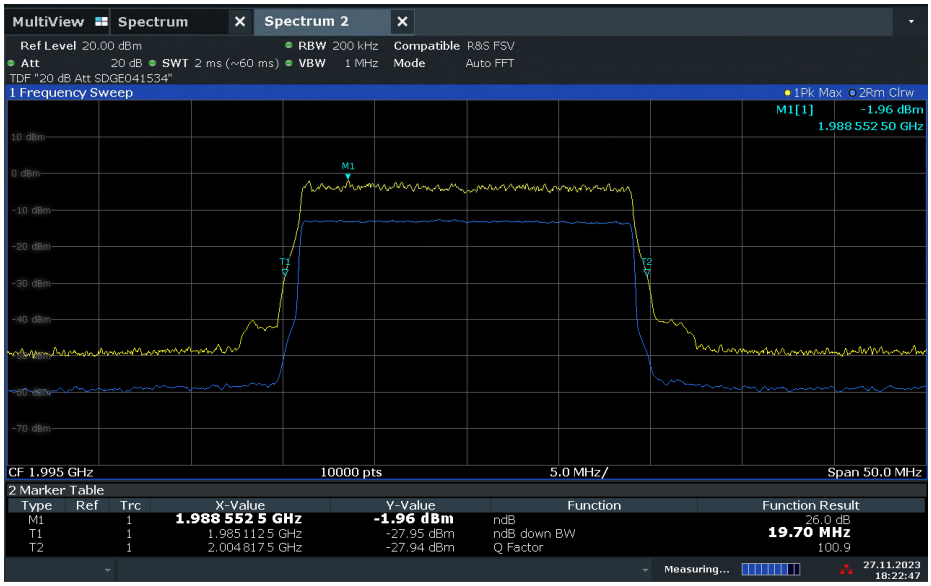
18:22:48 27.11.2023

LTE Band 25 Downlink (20 MHz BW) High Channel / 26 dB BW at Output port with Input signal at AGC + 3 dB Level



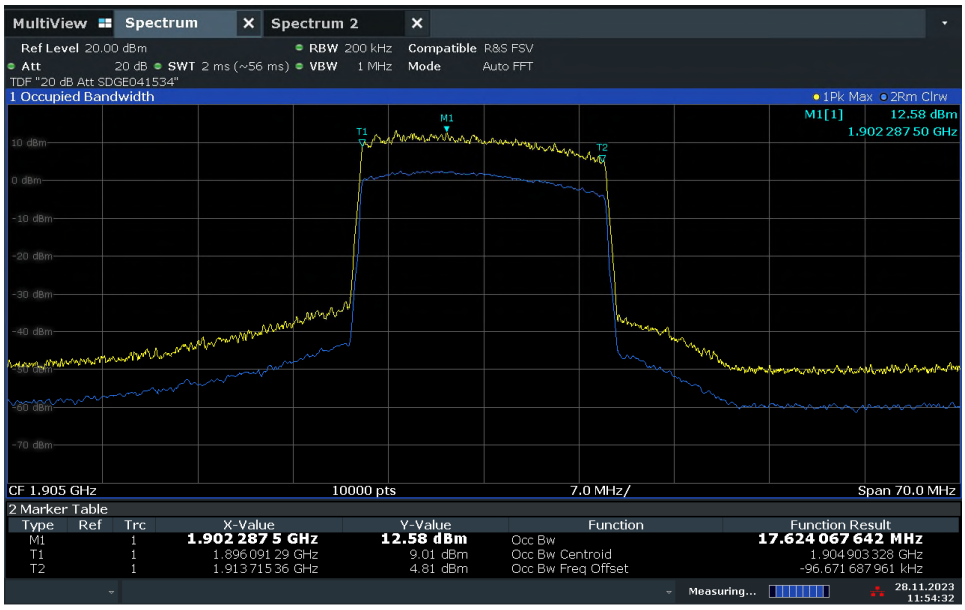
11:31:55 28.11.2023

LTE Band 25 Downlink (20 MHz BW) High Channel / 26 dB BW at Input port (Adjusted Level)



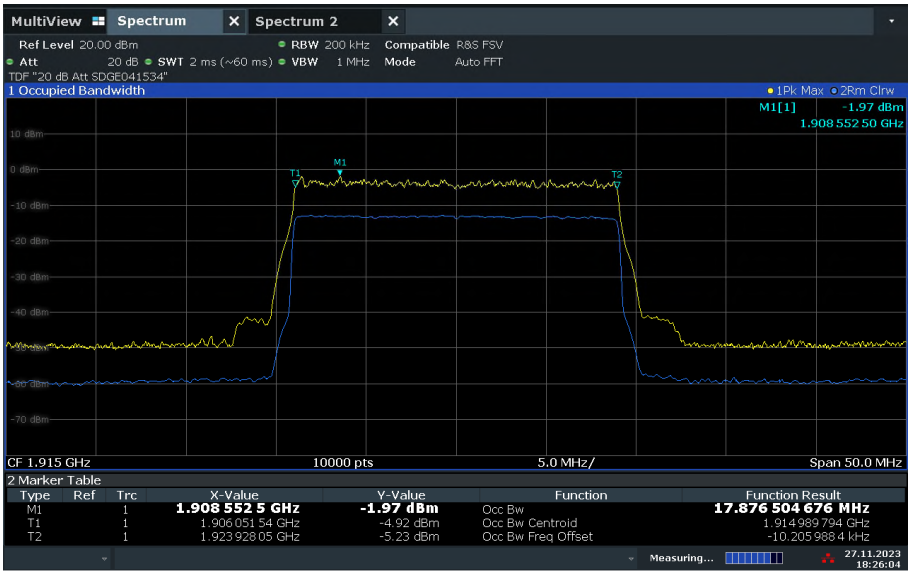
18:22:48 27.11.2023

LTE Band 25 Uplink (20 MHz BW) High Channel / 99% OBW at Output port with Input signal at AGC Threshold Level



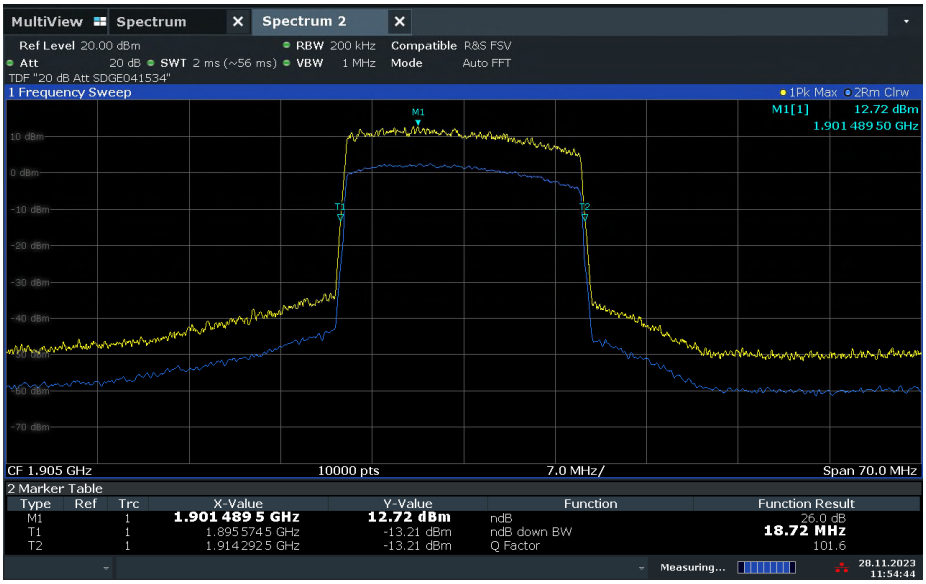
11:54:32 28.11.2023

LTE Band 25 Uplink (20 MHz BW) High Channel / 99% OBW at Input port (Adjusted Level)



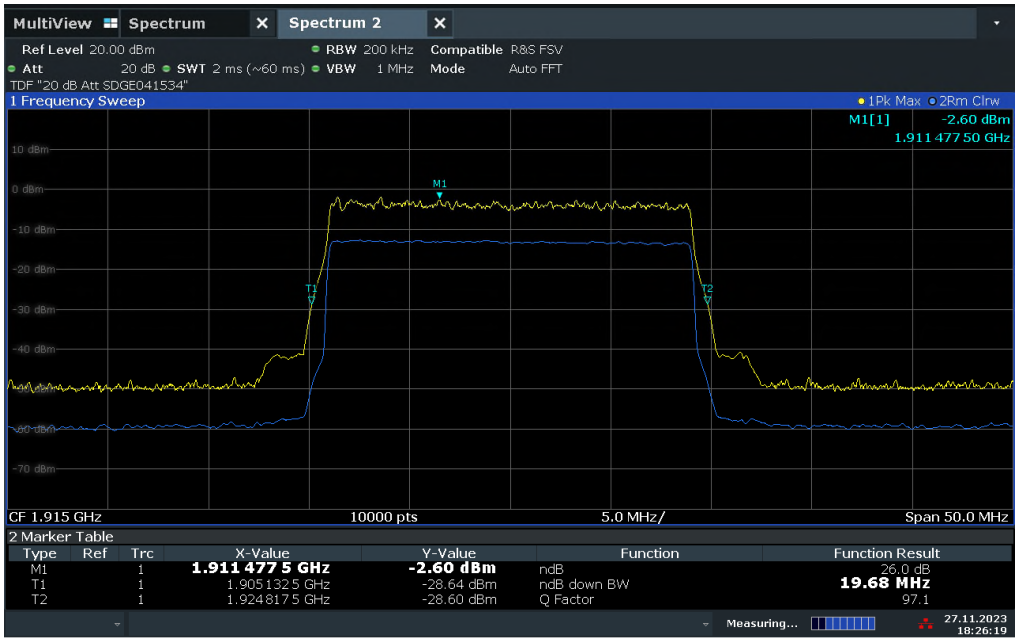
18:26:05 27.11.2023

LTE Band 25 Downlink (20 MHz BW) High Channel / 26 dB BW at Output port with Input signal at AGC Threshold Level



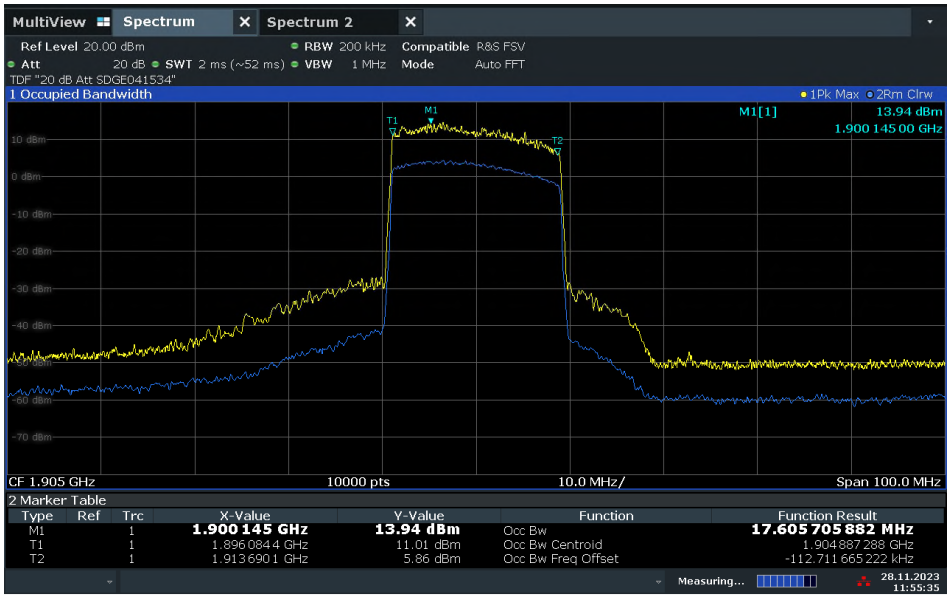
11:54:44 28.11.2023

LTE Band 25 Uplink (20 MHz BW) High Channel / 26 dB BW at Input port (Adjusted Level)



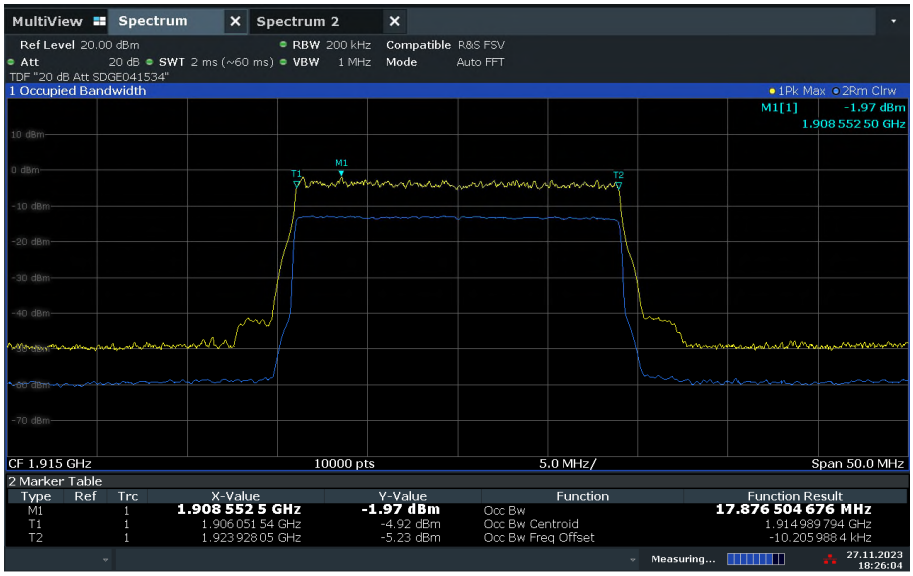
18:26:20 27.11.2023

LTE Band 25 Uplink (20 MHz BW) High Channel / 99% OBW at Output port with Input signal at AGC + 3 dB Level



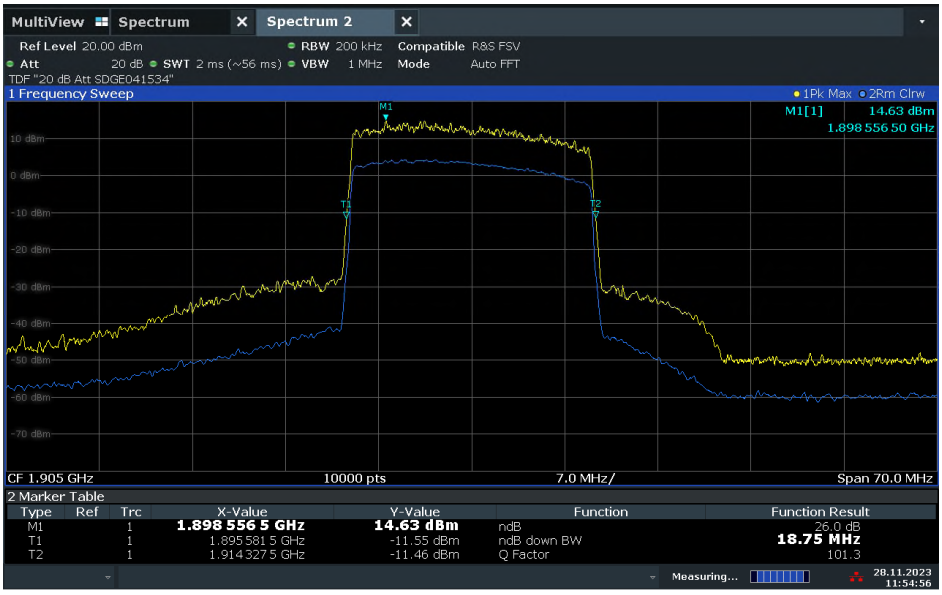
11:55:35 28.11.2023

LTE Band 25 Uplink (20 MHz BW) High Channel / 99% OBW at Input port (Adjusted Level)



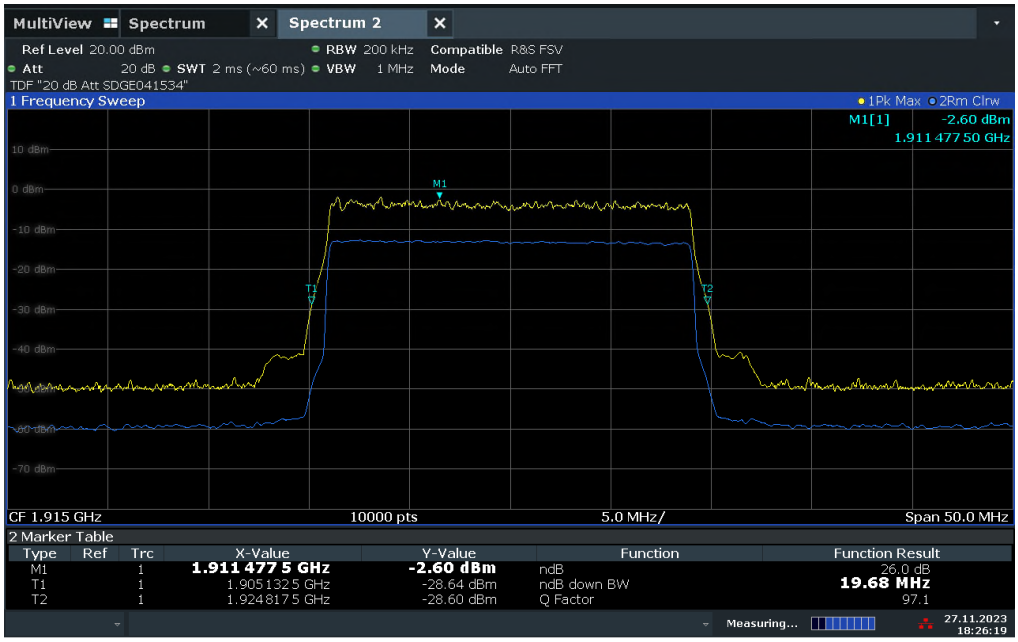
18:26:05 27.11.2023

LTE Band 25 Uplink (20 MHz BW) High Channel / 26 dB BW at Output port with Input signal at AGC + 3 dB Level



11:54:57 28.11.2023

LTE Band 25 Uplink (20 MHz BW) High Channel / 26 dB BW at Input port (Adjusted Level)



18:26:20 27.11.2023

2.6 Out-of-Band/Block (Intermodulation) and Spurious Emissions

2.6.1 Specification Reference

KDB 935210 D05, Clause 3.6

2.6.2 Standard Applicable

Limit refer to related FCC Rule Sections for each bands (FCC 22.917, FCC Part 24.238, FCC Part 27.53).

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

2.6.3 Equipment Under Test and Modification State

Serial No: 560311000026 / Configuration A and B

2.6.4 Date of Test/Initial of Test Personnel who Performed the Test

July 17, and 18 and October 9, 2023 / MARG

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 performed at TÜV SÜD America Inc. Rancho Bernardo facility.

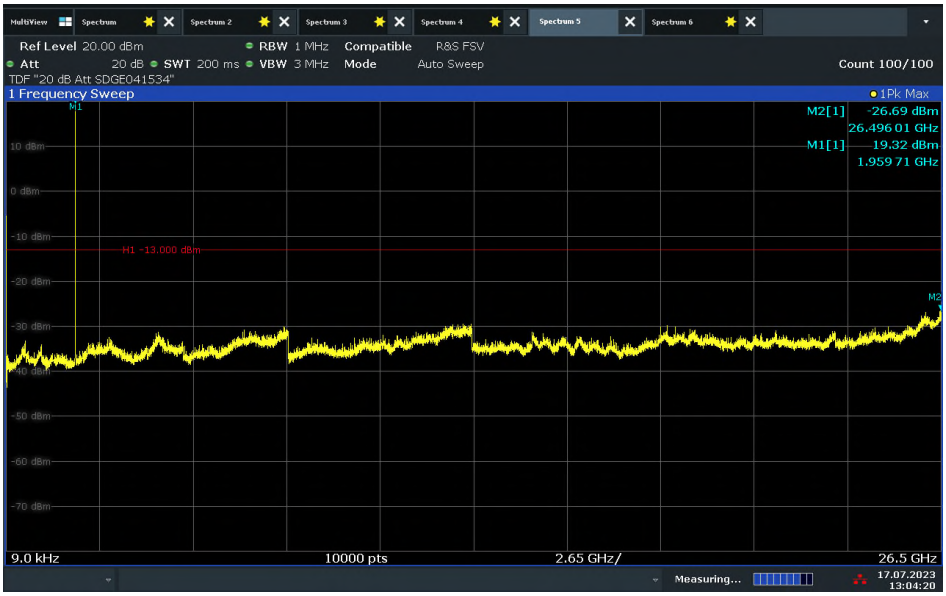
Ambient Temperature	22.7 – 26.7 °C
Relative Humidity	50.7 – 56.5%
ATM Pressure	101.1 - 98.8kPa

2.6.7 Additional Observations

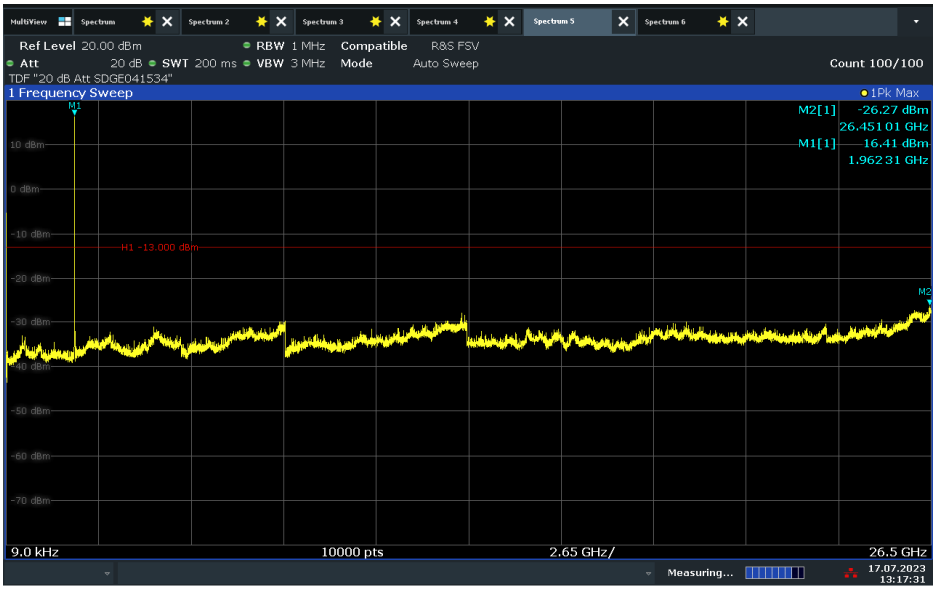
- The path loss or the transducer factor (TDF) from the external attenuators and cables was measured and entered as an offset.
- For spurious emissions, the spectrum analyser was set to peak detector and trace is max hold.
- RBW is 100 kHz, VBW is > 3 x RBW.
- All low, middle, and high channels for all bandwidths were verified and only middle channel presented in this test report as representative configuration.
- Intermodulation-product spurious emission measurements are not required for single-channel boosters that can not accommodate two simultaneous signals within the pass band.
- Plots with 20 dB attenuation (to prevent overloading the front end of the SA) were also verified with lesser attenuation to validate conformance with noise floor requirements.
- Both Downlink and Uplink are tested.
- Limit refer to related FCC Rule Sections for each bands (FCC 22.917, FCC Part 24.238, FCC Part 27.53).

2.6.8 Test Results

LTE Band 2 5MHz Bandwidth Downlink Middle Channel Conducted Spurious Emissions

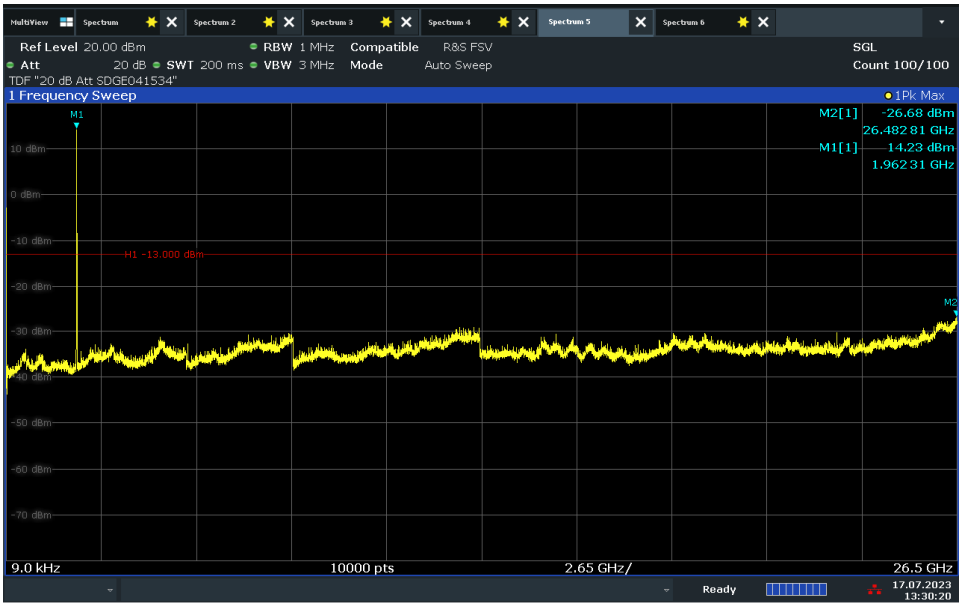


LTE Band 2 10MHz Bandwidth Downlink Middle Channel Conducted Spurious Emissions



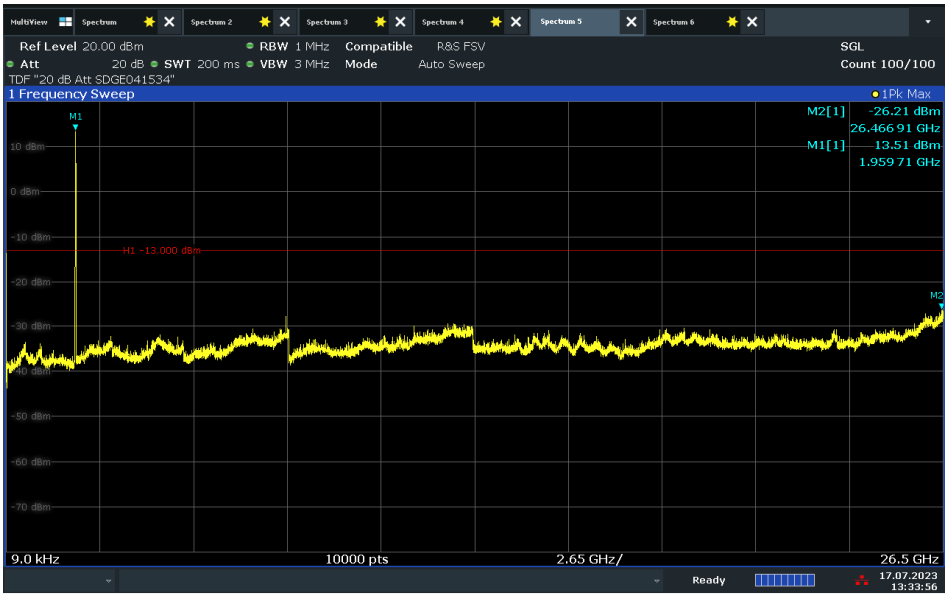
13:17:31 17.07.2023

LTE Band 2 15MHz Bandwidth Downlink Middle Channel Conducted Spurious Emissions



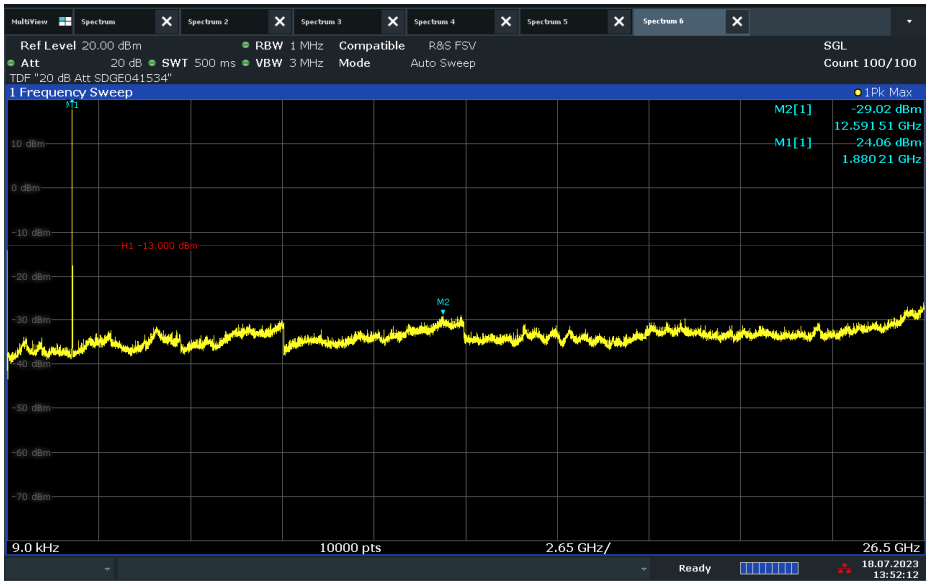
13:30:20 17.07.2023

LTE Band 2 20MHz Bandwidth Downlink Middle Channel Conducted Spurious Emissions



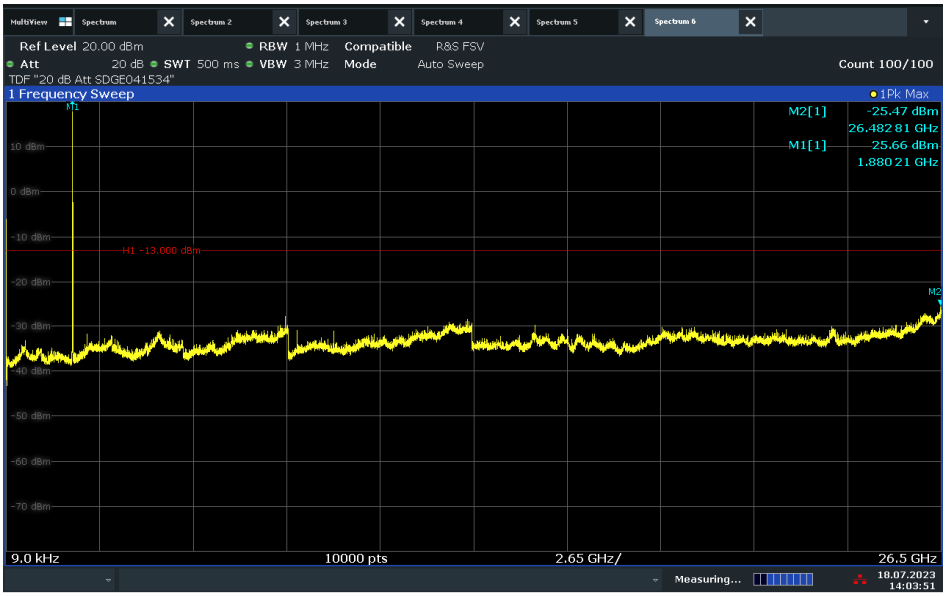
13:33:57 17.07.2023

LTE Band 2 5MHz Bandwidth Uplink Middle Channel Conducted Spurious Emissions



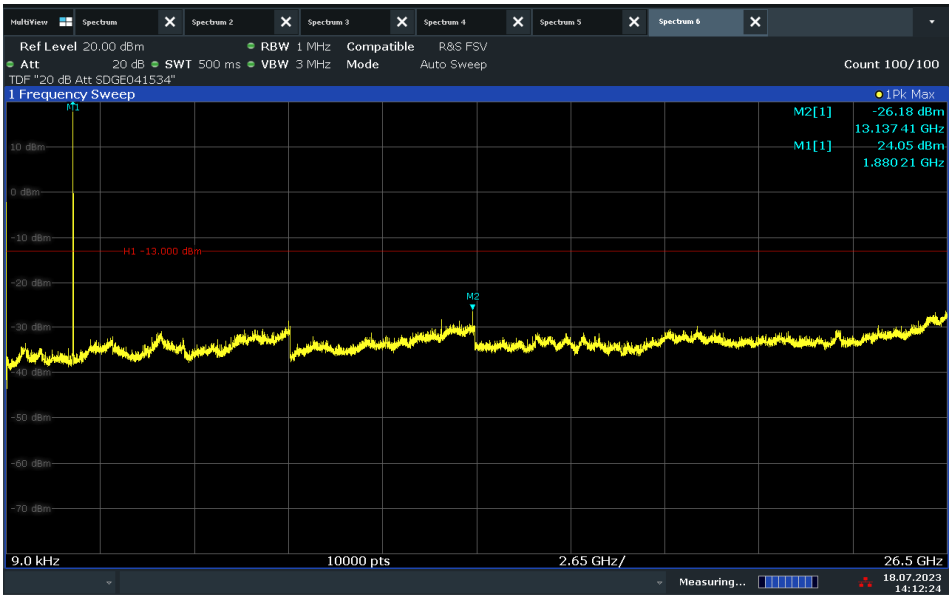
13:52:12 18.07.2023

LTE Band 2 10MHz Bandwidth Uplink Middle Channel Conducted Spurious Emissions



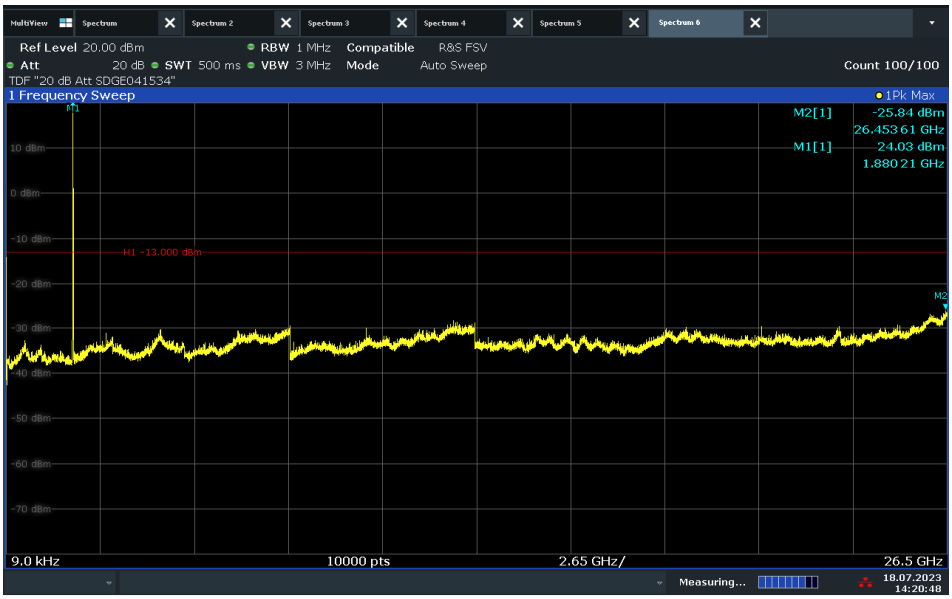
14:03:52 18.07.2023

LTE Band 2 15MHz Bandwidth Uplink Middle Channel Conducted Spurious Emissions



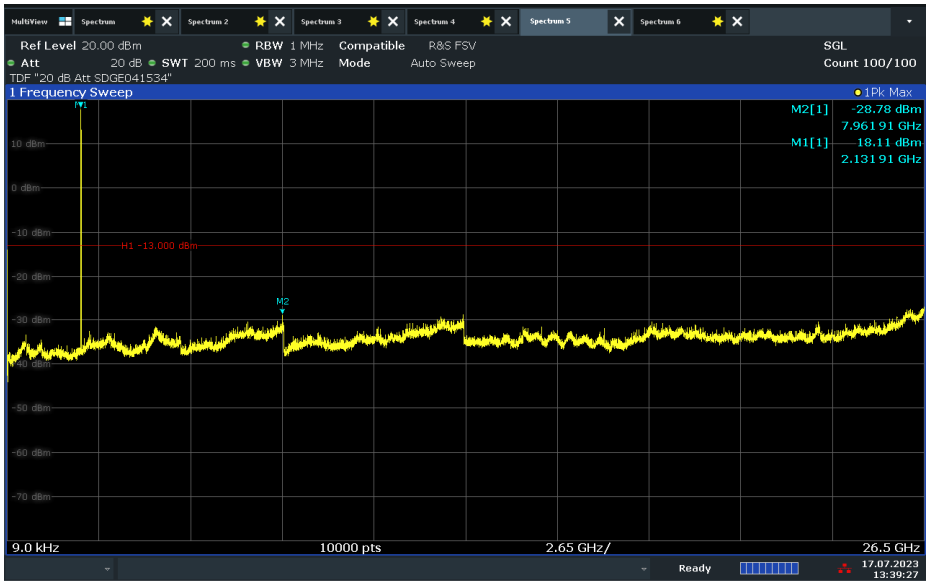
14:12:25 18.07.2023

LTE Band 2 20MHz Bandwidth Uplink Middle Channel Conducted Spurious Emissions



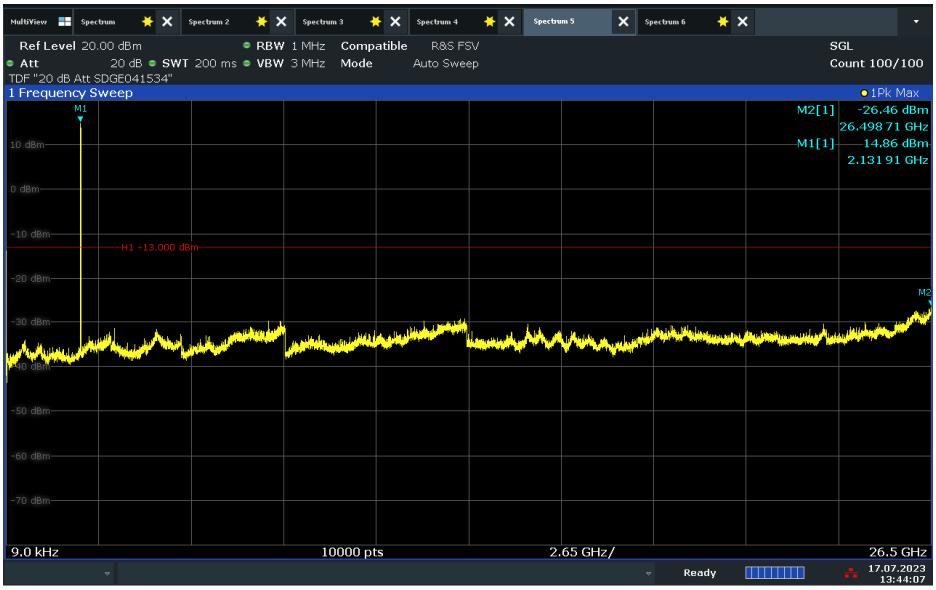
14:20:49 18.07.2023

LTE Band 4 5MHz Bandwidth Downlink Middle Channel Conducted Spurious Emissions



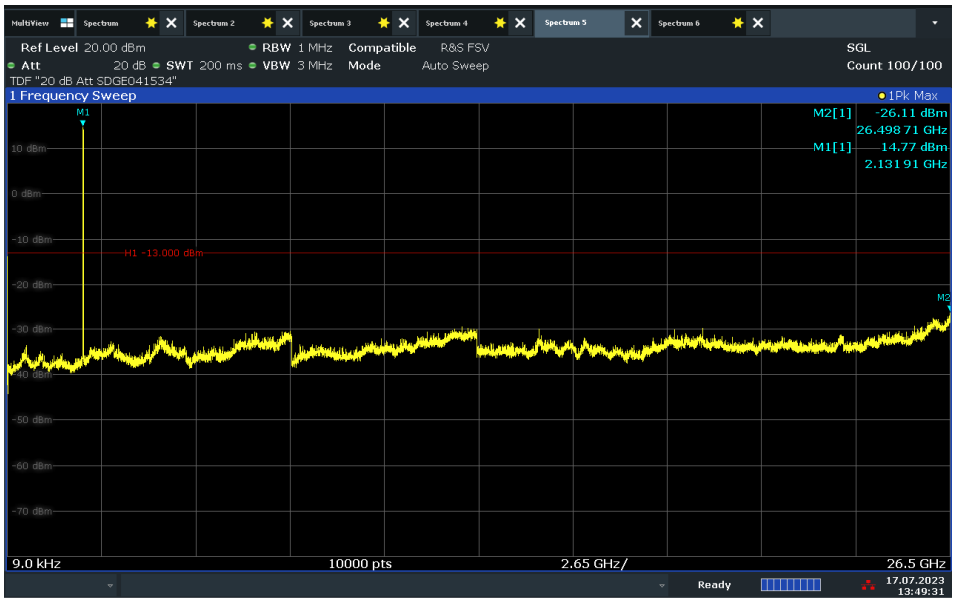
13:39:28 17.07.2023

LTE Band 4 10MHz Bandwidth Downlink Middle Channel Conducted Spurious Emissions



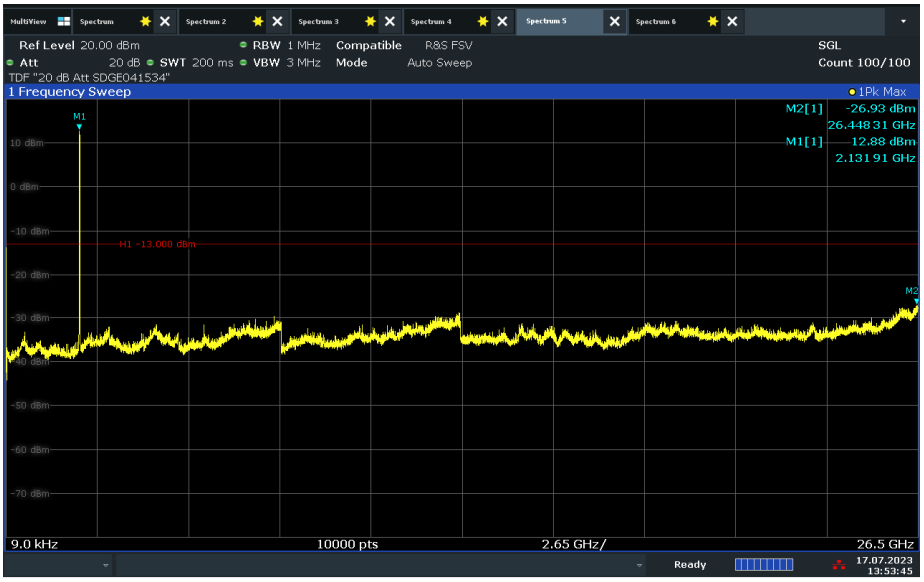
13:44:08 17.07.2023

LTE Band 4 15MHz Bandwidth Downlink Middle Channel Conducted Spurious Emissions



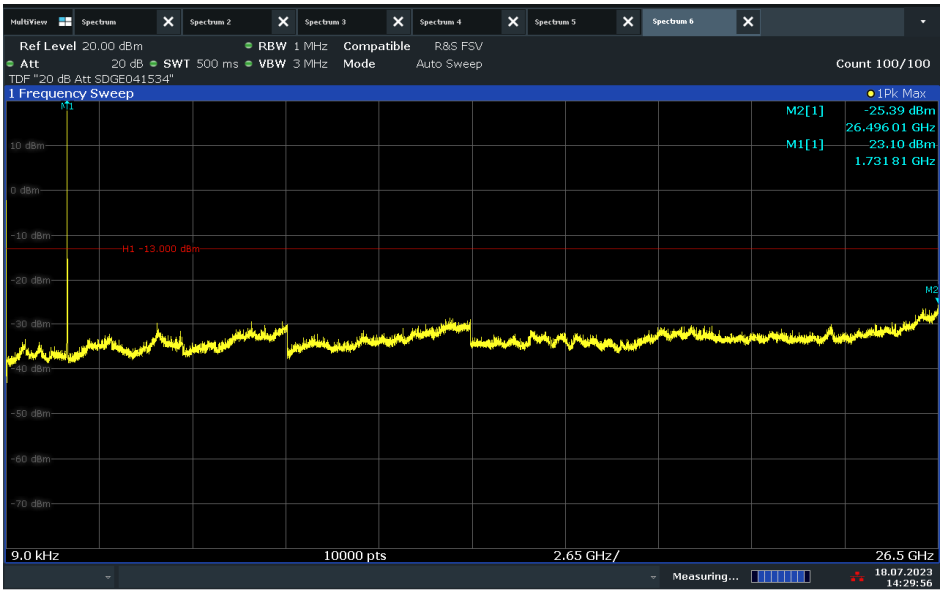
13:49:31 17.07.2023

LTE Band 4 20MHz Bandwidth Downlink Middle Channel Conducted Spurious Emissions



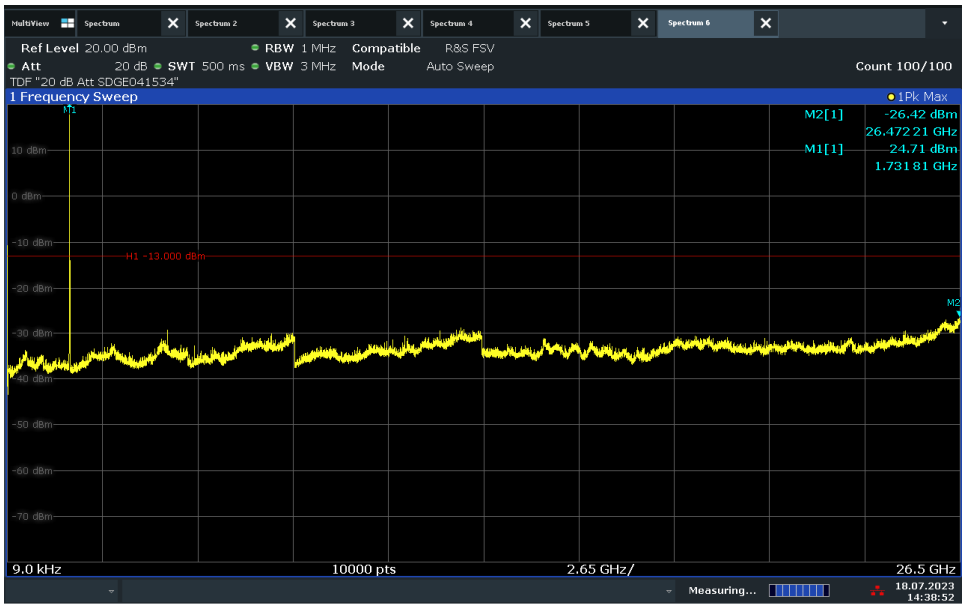
13:53:46 17.07.2023

LTE Band 4 5MHz Bandwidth Uplink Middle Channel Conducted Spurious Emissions



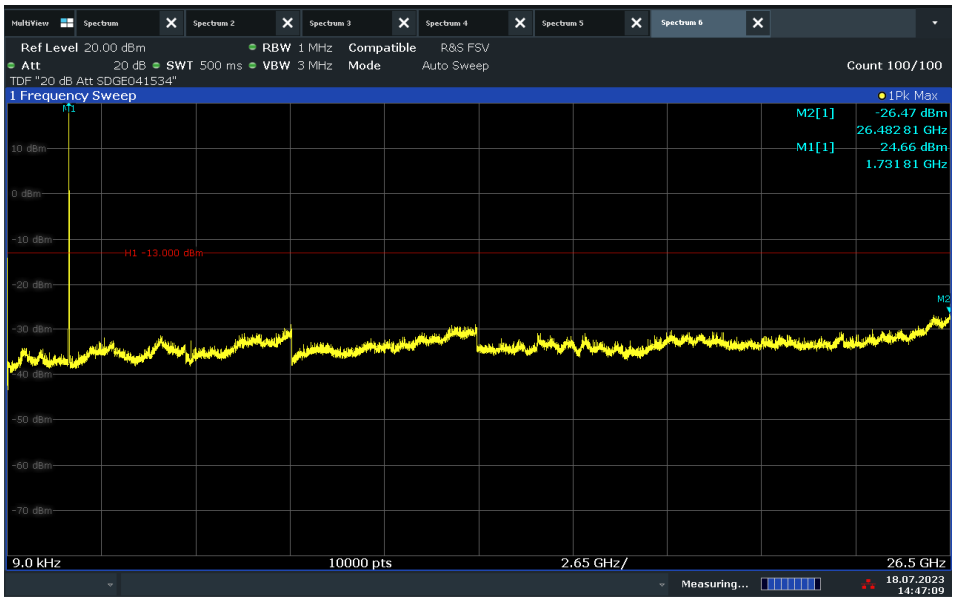
14:29:56 18.07.2023

LTE Band 4 10MHz Bandwidth Uplink Middle Channel Conducted Spurious Emissions



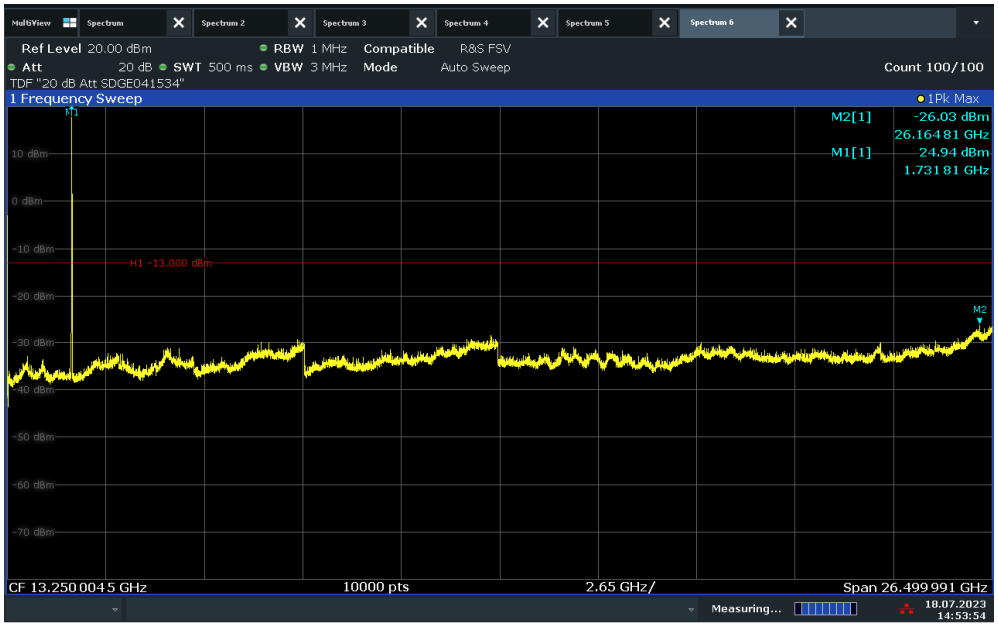
14:38:53 18.07.2023

LTE Band 4 15MHz Bandwidth Uplink Middle Channel Conducted Spurious Emissions



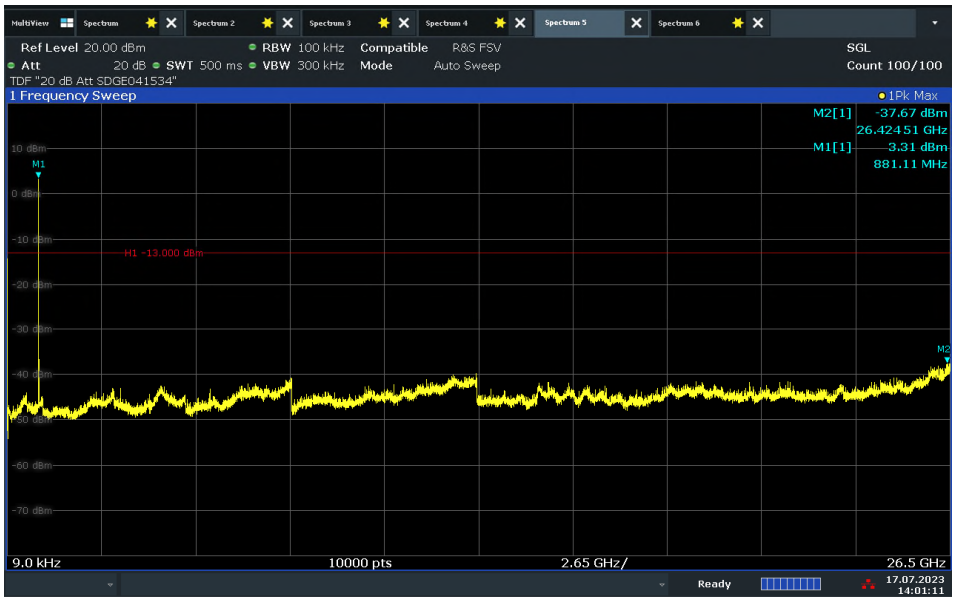
14:47:09 18.07.2023

LTE Band 4 20MHz Bandwidth Uplink Middle Channel Conducted Spurious Emissions



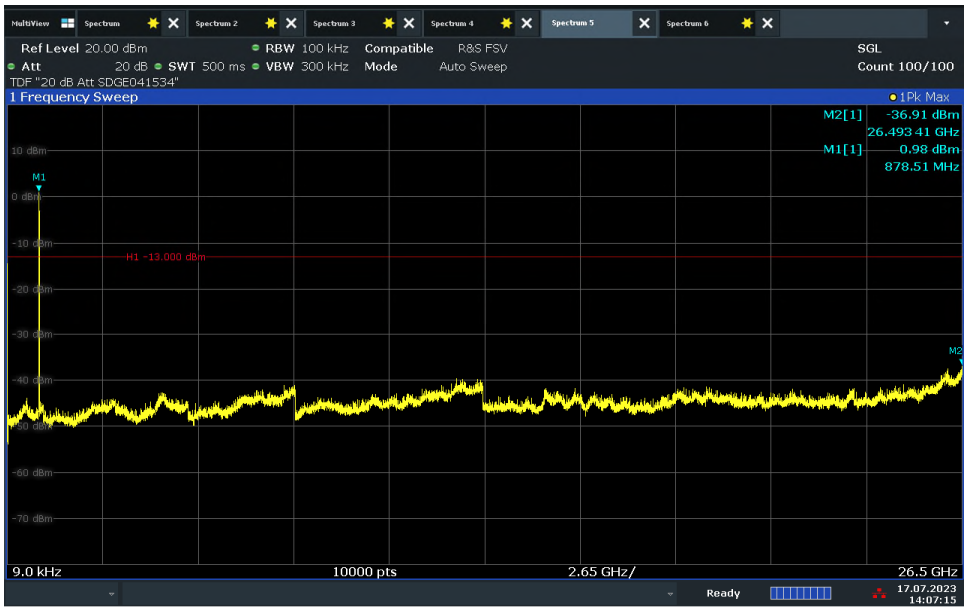
14:53:54 18.07.2023

LTE Band 5 5MHz Bandwidth Downlink Middle Channel Conducted Spurious Emissions



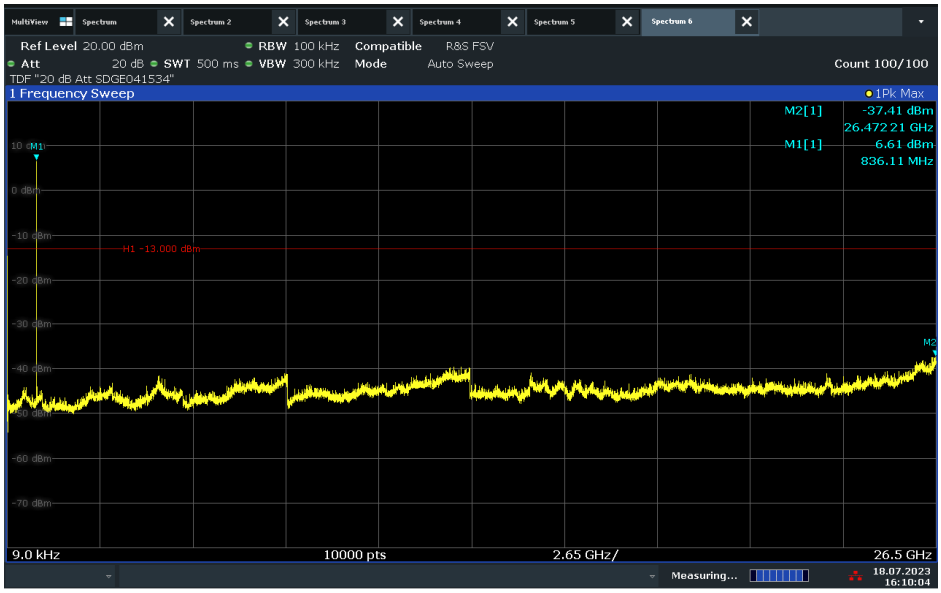
14:01:12 17.07.2023

LTE Band 5 10MHz Bandwidth Downlink Middle Channel Conducted Spurious Emissions



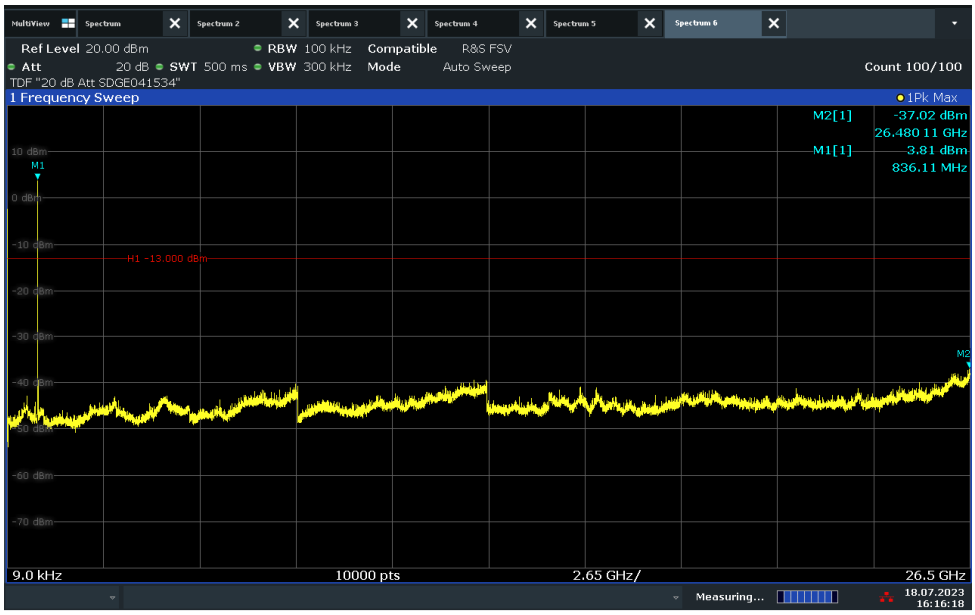
14:07:15 17.07.2023

LTE Band 5 5MHz Bandwidth Uplink Middle Channel Conducted Spurious Emissions



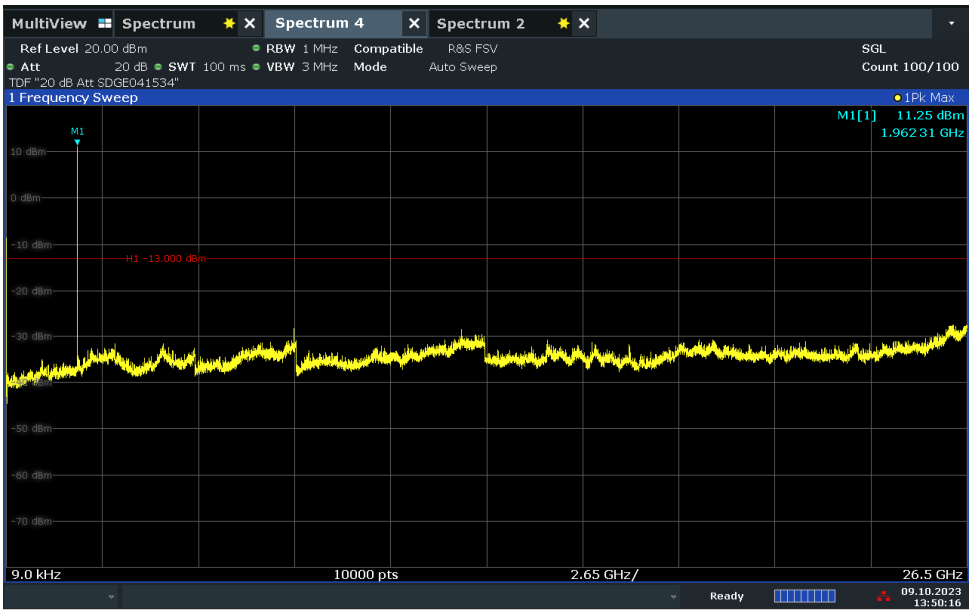
16:10:04 18.07.2023

LTE Band 5 10MHz Bandwidth Uplink Middle Channel Conducted Spurious Emissions



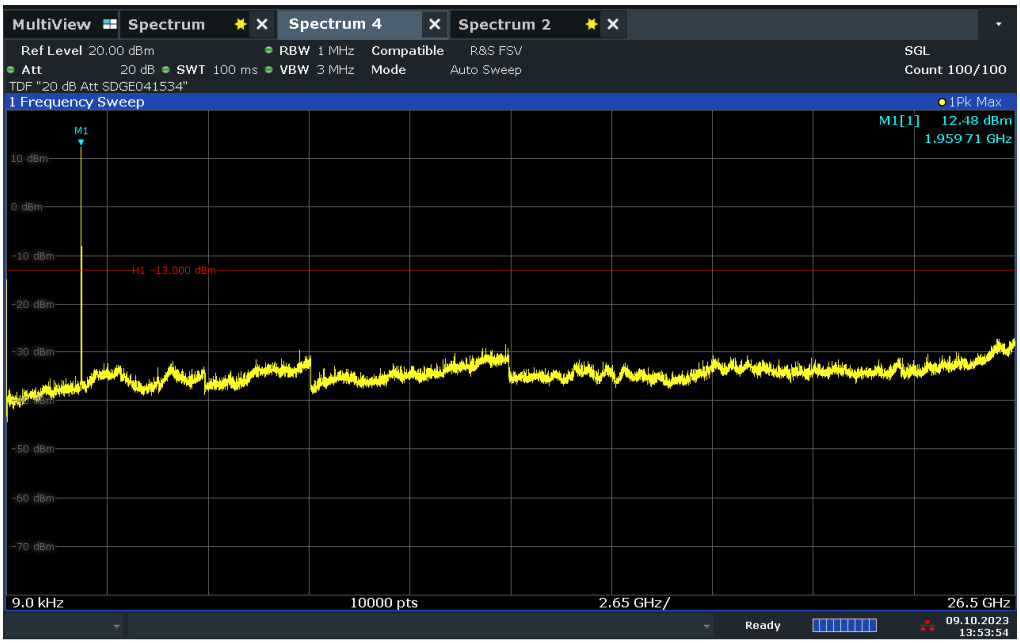
16:16:19 18.07.2023

LTE Band 25 5MHz Bandwidth Downlink Middle Channel Conducted Spurious Emissions



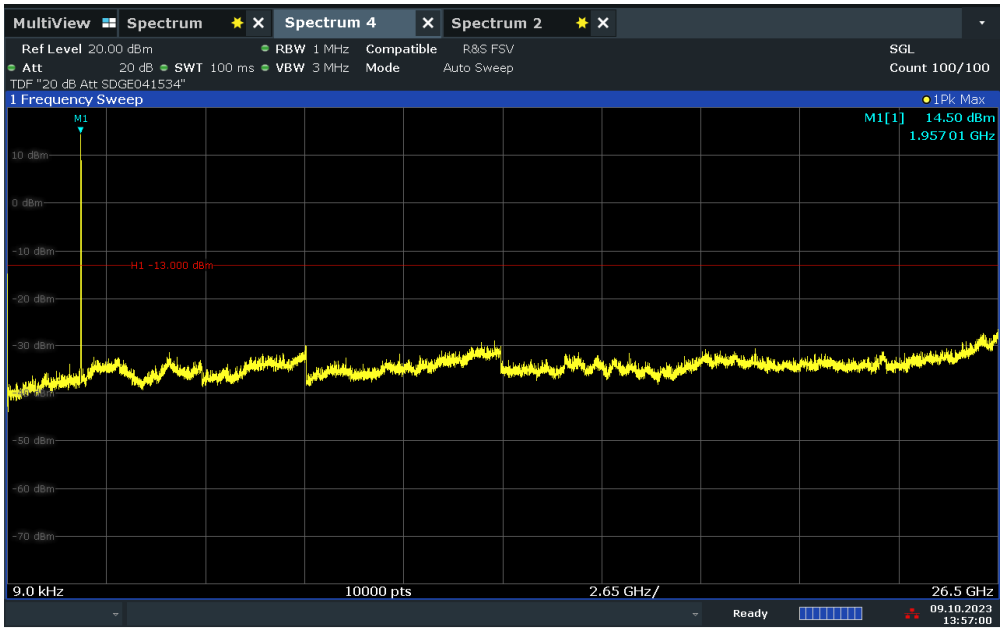
13:50:17 09.10.2023

LTE Band 25 10MHz Bandwidth Downlink Middle Channel Conducted Spurious Emissions



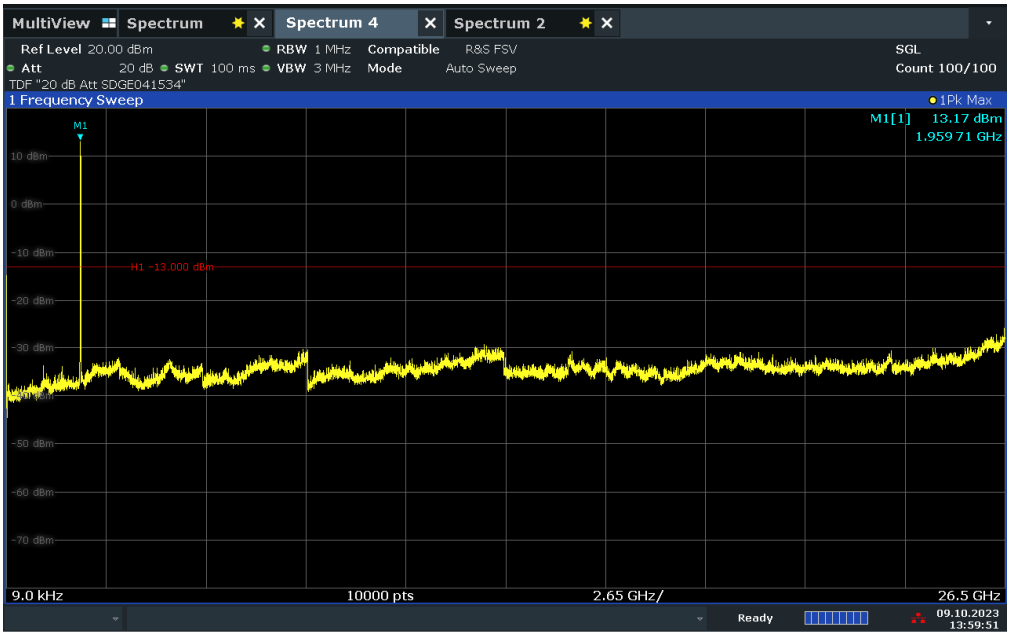
13:53:55 09.10.2023

LTE Band 25 15MHz Bandwidth Downlink Middle Channel Conducted Spurious Emissions



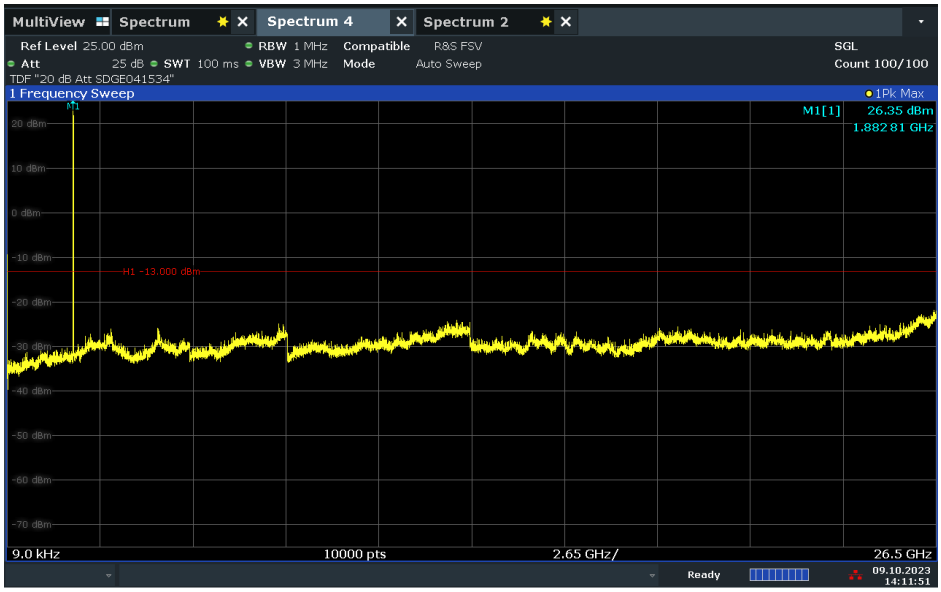
13:57:00 09.10.2023

LTE Band 25 20MHz Bandwidth Downlink Middle Channel Conducted Spurious Emissions



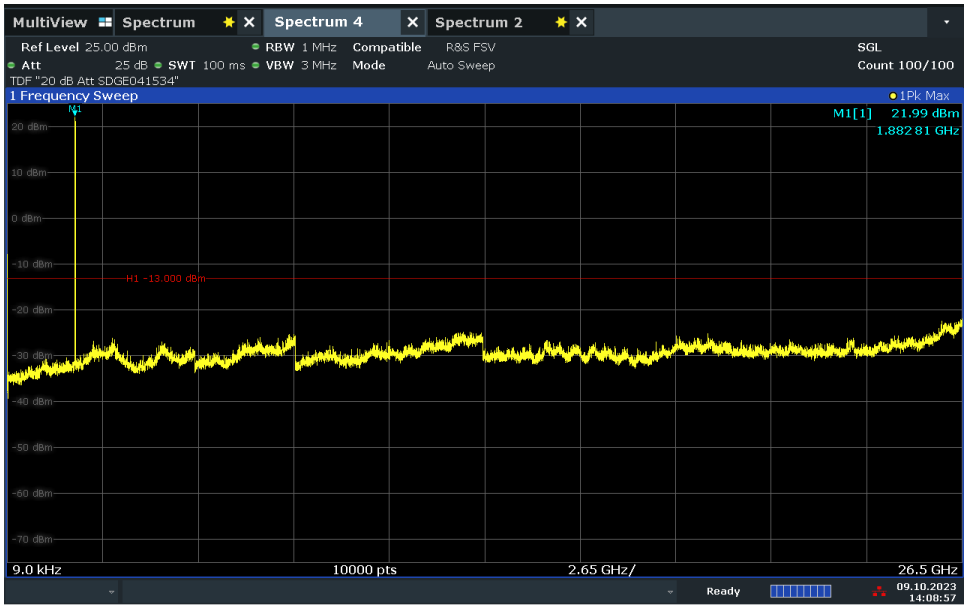
13:59:51 09.10.2023

LTE Band 25 5MHz Bandwidth Uplink Middle Channel Conducted Spurious Emissions



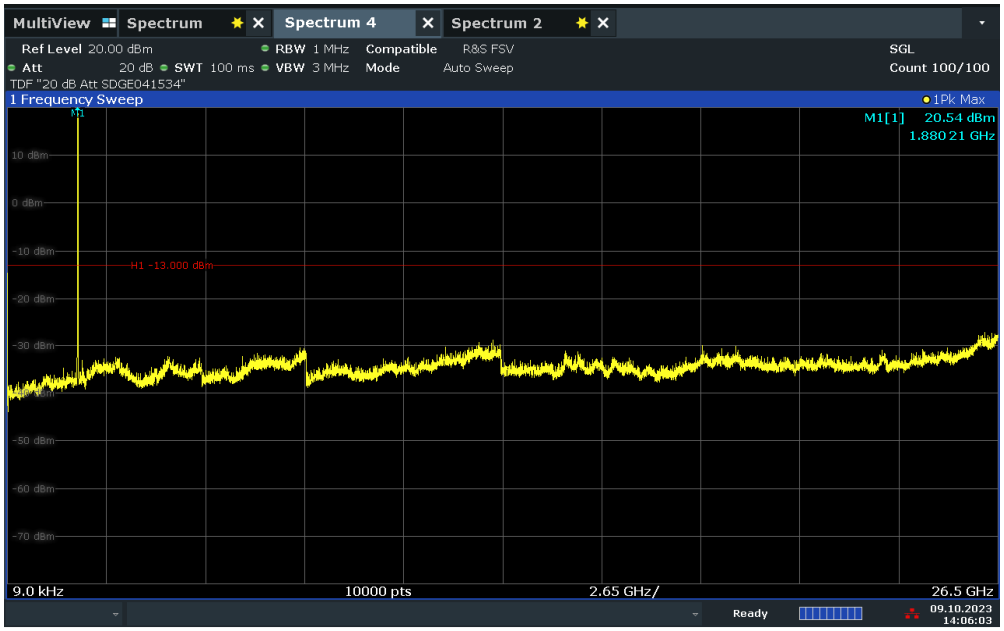
14:11:52 09.10.2023

LTE Band 25 10MHz Bandwidth Uplink Middle Channel Conducted Spurious Emissions



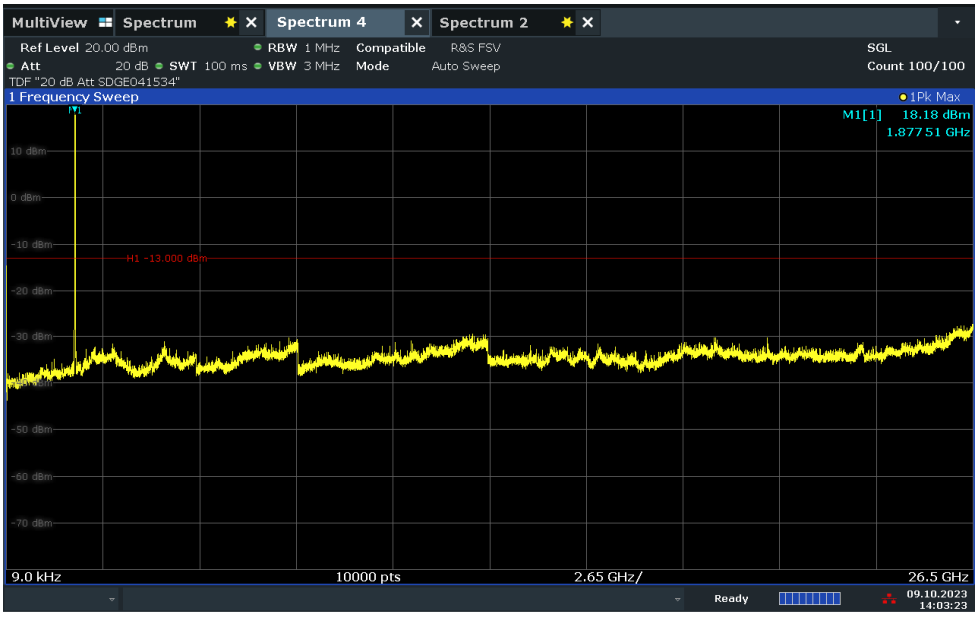
14:08:58 09.10.2023

LTE Band 25 15MHz Bandwidth Uplink Middle Channel Conducted Spurious Emissions



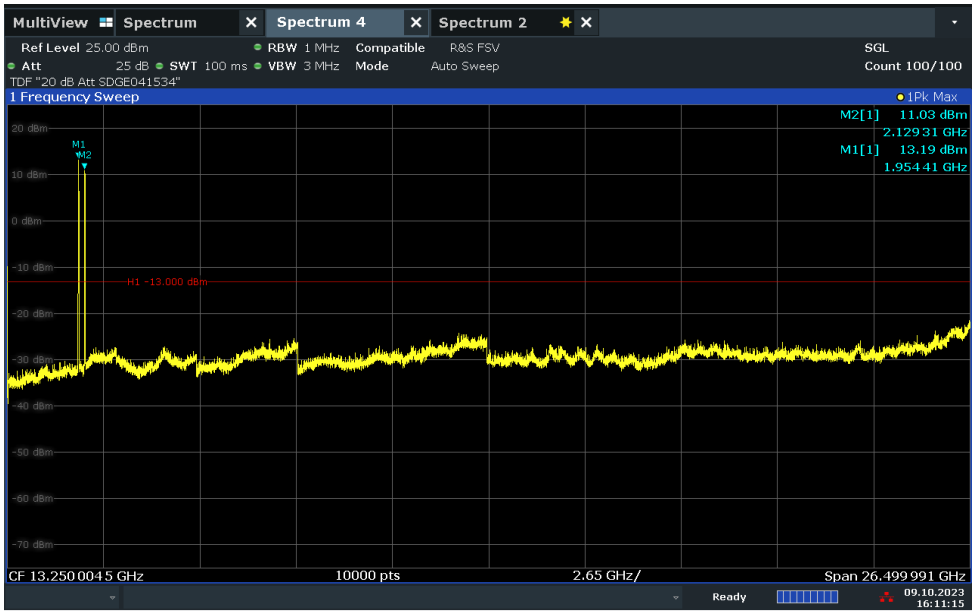
14:06:04 09.10.2023

LTE Band 25 20MHz Bandwidth Uplink Middle Channel Conducted Spurious Emissions



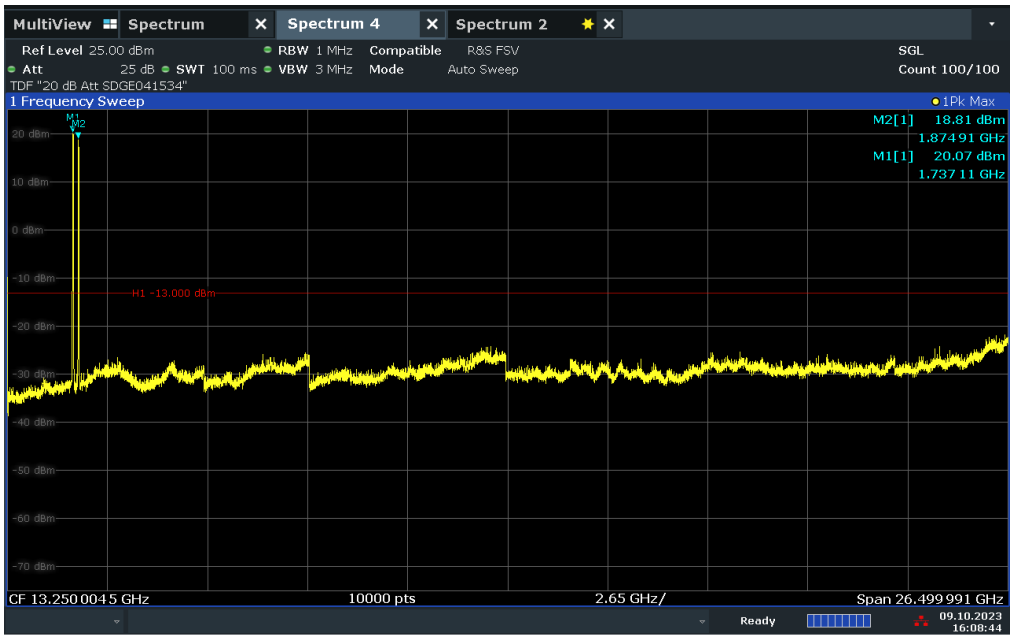
14:03:24 09.10.2023

2 Bands per antenna port Conducted Spurious Emissions
Downlink: Band 2 20MHz BW Middle Ch & Band 4 20MHz BW Middle Ch



16:11:15 09.10.2023

2 Bands per antenna port Conducted Spurious Emissions
Uplink: Band 2 20MHz BW Middle Ch & Band 4 20MHz BW Middle Ch



16:08:45 09.10.2023

2.7 Frequency Stability

2.7.1 Specification Reference

FCC 47 CFR Part 2, Clause 2.1055
RSS-131, Clause 9.4
KDB935210 D05, Clause 3.7.

2.7.2 Standard Applicable

FCC 47 CFR Part 2, Clause 2.1055
(a) The frequency stability shall be measured with variation of ambient temperature as follows:
(1) From -30° to + 50° centigrade for all equipment except that specified in paragraphs (a) (2) and (3) of this section.

RSS-131, Clause 9.4:
Industrial zone enhancers shall comply with the frequency stability given in the RSS that applies to the equipment with which the zone enhancer is to be used. In cases where the frequency stability limit is not given in the applicable RSS, the equipment shall comply with a frequency stability of ± 1.5 ppm.

For zone enhancers with no input signal processing capability such as modulation, or if the zone enhancer does not incorporate an internal oscillator circuit component, the frequency stability measurement in this section is not required.

2.7.3 Equipment Under Test and Modification State

Serial No: 560311000026 / Test Configuration A and B

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

August 14, 15, 16, 17,18 and October 12, 2023 / MARG

2.7.5 Test Equipment Used

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

2.7.6 Environmental Conditions

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility.

Ambient Temperature	22.4 °C	22.5 °C
Relative Humidity	42.7 %	44.2 %
ATM Pressure	100.7 kPa	100.8 kPa

2.7.7 Additional Observations

- This is a conducted test.
- The EUT was operated at 120 VAC nominal voltage and was placed in the temperature chamber for the series of temperature variation evaluations performed starting at ambient (20°C) temperature. Voltage variation is performed at 85% and 115% of the nominal voltage at 20 °C only.

- The Temperature is then set to 50°C and allowed to sit for 1 hour to allow the equipment and chamber temperature to stabilize. The measurements on both downlink and uplink were then performed. The temperature was then decreased by 10°C steps and allowed to settle before taking the next set of measurements.
- EUT was injected a CW signal from a Signal Generator and maximum frequency error was monitored using the spectrum analyser.
- 5MHz bandwidth Middle Channel was tested as the representative configuration.

2.7.8 Test Results Summary

LTE B2 Downlink			
Voltage (VAC)	***Temperature (°C)***	***Frequency Deviation (ppm)***	***Limit (ppm)***
120	-30	-0.01	1.0
	-20	-0.01	1.0
	-10	-0.01	1.0
	0	-0.01	1.0
	+10	-0.01	1.0
	+20	-0.01	1.0
	+30	-0.01	1.0
	+40	-0.01	1.0
	+50	-0.01	1.0

LTE Band 2 Downlink			
Temperature (°C)	***Voltage (VAC)***	***Frequency Deviation (ppm)***	***Limit (ppm)***
20	102	-0.01	1.0
	138	-0.01	1.0

LTE B2 Uplink			
Voltage (VAC)	***Temperature (°C)***	***Frequency Deviation (ppm)***	***Limit (ppm)***

120	-30	-0.01	1.0
	-20	-0.01	1.0
	-10	-0.01	1.0
	0	-0.01	1.0
	+10	-0.01	1.0
	+20	-0.01	1.0
	+30	-0.01	1.0
	+40	-0.01	1.0
	+50	-0.01	1.0

LTE Band 2 Uplink			
Temperature (°C)	***Voltage (VAC)***	***Frequency Deviation (ppm)***	***Limit (ppm)***
20	102	-0.01	1.0
	138	-0.01	1.0
LTE Band 5 Downlink			
Voltage (VAC)	***Temperature (°C)***	***Frequency Deviation (ppm)***	***Limit (ppm)***
120	-30	-0.01	1.5
	-20	-0.01	1.5
	-10	-0.01	1.5
	0	-0.01	1.5
	+10	-0.01	1.5
	+20	-0.01	1.5
	+30	-0.01	1.5
	+40	-0.01	1.5
	+50	-0.01	1.5
LTE Band 5 Downlink			
Temperature (°C)	***Voltage (VAC)***	***Frequency Deviation (ppm)***	***Limit (ppm)***
20	102	-0.01	1.5
	138	-0.01	1.5

LTE Band 5 Uplink			
Voltage (VAC)	***Temperature (°C)***	***Frequency Deviation (ppm)***	***Limit (ppm)***

120	-30	-0.01	1.5
	-20	-0.01	1.5
	-10	-0.01	1.5
	0	-0.01	1.5
	+10	-0.01	1.5
	+20	-0.01	1.5
	+30	-0.01	1.5
	+40	-0.01	1.5
	+50	-0.01	1.5

LTE Band 5 Uplink			
Temperature (°C)	***Voltage (VAC)***	***Frequency Deviation (ppm)***	***Limit (ppm)***
20	102	-0.01	1.5
	138	-0.01	1.5

LTE Band 25 Downlink			
Voltage (VAC)	***Temperature (°C)***	***Frequency Deviation (ppm)***	***Limit (ppm)***
120	-30	-0.01	1.0
	-20	-0.01	1.0
	-10	-0.01	1.0
	0	-0.01	1.0
	+10	-0.01	1.0
	+20	-0.01	1.0
	+30	-0.01	1.0
	+40	-0.01	1.0
	+50	-0.01	1.0

LTE Band 25 Downlink			
Temperature (°C)	***Voltage (VAC)***	***Frequency Deviation (ppm)***	***Limit (ppm)***
20	102	-0.01	1.0
	138	-0.01	1.0

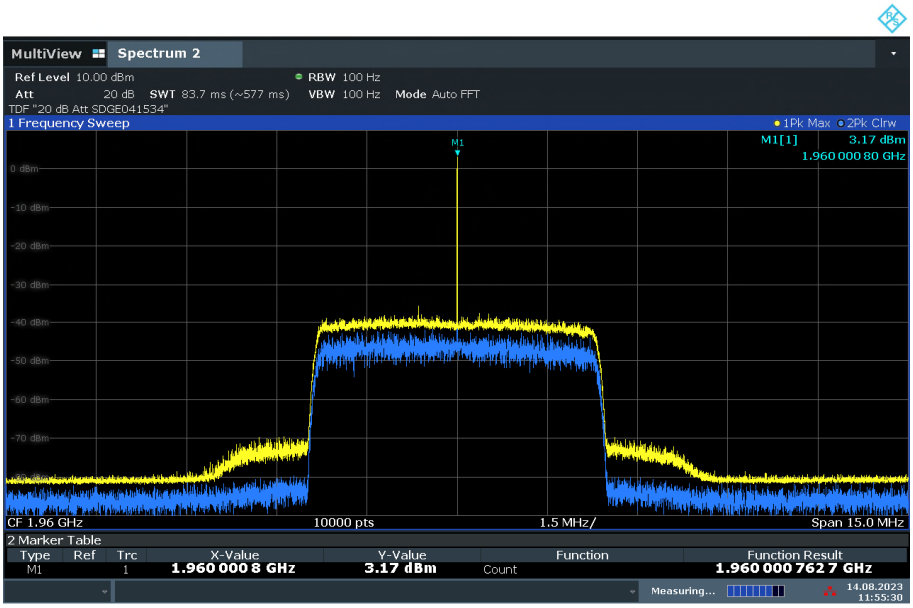
LTE Band 25 Uplink			
Voltage (VAC)	***Temperature (°C)***	***Frequency Deviation (ppm)***	***Limit (ppm)***

120	-30	-0.01	1.0
	-20	-0.01	1.0
	-10	-0.01	1.0
	0	-0.01	1.0
	+10	-0.01	1.0
	+20	-0.01	1.0
	+30	-0.01	1.0
	+40	-0.01	1.0
	+50	-0.01	1.0

LTE Band 25 Uplink			
Temperature (°C)	***Voltage (VAC)***	***Frequency Deviation (ppm)***	***Limit (ppm)***
20	102	-0.01	1.0
	138	-0.01	1.0
LTE B4 Downlink – 5 MHz BW Middle Channel 2132.5 MHz			
Voltage (VAC)	***Temperature (°C)***	***Frequency Deviation (ppm)***	***Limit (ppm)***
120	-30	-0.01	-
	-20	-0.01	-
	-10	-0.01	-
	0	-0.01	-
	+10	-0.01	-
	+20	-0.01	-
	+30	-0.01	-
	+40	-0.01	-
	+50	-0.01	-
102	+20	-0.01	-
138		-0.01	-

LTE B4 Uplink – 5 MHz BW Middle Channel 1732.5 MHz			
Voltage (VAC)	***Temperature (°C)***	***Frequency Deviation (ppm)***	***Limit (ppm)***
120	-30	-0.01	-
	-20	-0.01	-
	-10	-0.01	-
	0	-0.01	-
	+10	-0.01	-
	+20	-0.01	-
	+30	-0.01	-
	+40	-0.01	-
	+50	-0.01	-
102	+20	-0.01	-
138		-0.01	-

2.7.9 Sample Test Plots



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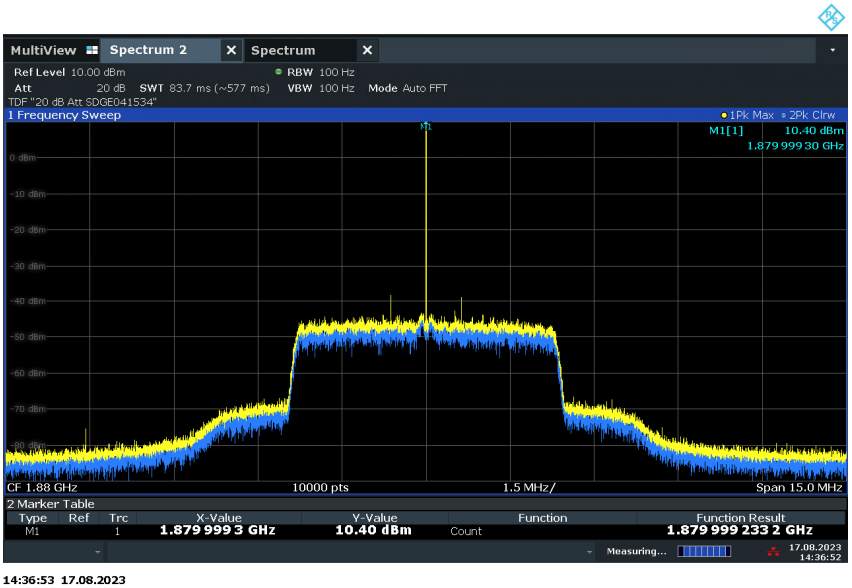
LTE B2 Downlink Middle Channel 120VAC @ 20°C



14:36:53 17.08.2023

LTE B2 Uplink Middle Channel 120VAC @ -30°C