Radio Testing of the

Nextivity Inc.
Industrial Signal Booster
Model: Cel-Fi QUATRA 4000
NU: I42-36CNU, CU: I41-WXCU
In accordance with

FCC CFR 47 Part 90 (October 2023)
RSS-140 issue 1 (April 2018)
RSS-119 Issue 12 (May 2015), A1 (2022)
RSS-131 issue 4 (December 2022)

Product Service

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Nextivity Inc.
16550 West Bernardo Drive, Bldg 5, Suite 550,
San Diego, CA 92127, USA
Date: December 2024
Document Number: 721003832A Issue 01 | Version Number: 01

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Authorized Signatory	Ferdinand S. Custodio	12/06/2024	

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

EXECUTIVE SUMMARY
Test reports and supporting documents of this product was reviewed and the EUT in general was confirmed to be in compliance with FCC CFR 47 Part 90, RSS-140 issue 1 (April 2018), RSS-119 Issue 12 (May 2015), A1 (2022) and RSS-131 issue 4 (December 2022).

A2LA Cert. No. 2955.13

ACCREDITATION
Our A2LA Accreditation does not cover opinions and interpretations and any expressed are outside the scope of our A2LA Accreditation.

TÜV SÜD America, Inc.
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REPORT ON	Radio Testing of the Nextivity Inc. Cel-Fi QUATRA 4000 Industrial Signal Booster
TEST REPORT NUMBER	721003832A
REPORT DATE	November 2024
PREPARED FOR	Nextivity Inc. 16550 West Bernardo Drive, Bldg 5, Suite 550, San Diego, CA 92127, USA
CONTACT PERSON	CK Li Sr. Principal Engineer, Regulatory (858) 485-9422 CLi@NextivityInc.com
PREPARED BY	**Name: Miguel Angel Rabago Garcia** Authorized Signatory Title: Wireless Test Engineer
APPROVED BY	**Name: Ferdinand S. Custodio** Authorized Signatory Title: Senior EMC Test Engineer / Wireless Team Lead

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Revision History

721003832A
Nextivity Inc.
Cel-Fi QUATRA 4000 Industrial Signal Booster

DATE	OLD REVISION	NEW REVISION	REASON	PAGES AFFECTED	APPROVED BY
12/06/2024	—	Initial Release			Ferdinand S. Custodio

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

SECTION 1

REPORT SUMMARY

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

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

1.1 INTRODUCTION

The information contained in this report is intended to show verification of the Nextivity Inc. Cel-Fi QUATRA 4000 to the requirements of FCC CFR 47 Part 90, RSS-140 issue 1 (April 2018), RSS-119 Issue 12 (May 2015), A1 (2022) and RSS-131 issue 4 (December 2022).

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.
Model Name	Cel-Fi QUATRA 4000
Model Number(s)	NU: I42-36CNU, CU: I41-WXCU
EUT	Industrial Signal Booster
FCC ID	NU: YETII41-36CNU, CU: YETI41-WXCU
IC ID	NU: 9298A-I4236CNU and CU: 9298A-I41WXCU
Serial Number(s)	544421000144(NU)&541421000038(CU). 544421000138(NU)&541421000007,541421000175,541421000014,541421000168,541421000106, 541421000083 (CUs)
Number of Samples Tested	2
Test Specification/Issue/Date	• FCC CFR 47 Part 90 (October 1, 2023) • RSS-140 - Equipment Operating in the Public Safety Broadband Frequency Bands 758-768 MHz and 788-798 MHz (issue 1, April 2018) • RSS-119 – Land Mobile and Fixed Equipment Operating in the Frequency Range 27.41-960 MHz (issue 12, May 2015, A1 April 2022) • RSS-131 – Zone Enhancers (issue 4, Updated December 2022) • SRSP-540 - Technical Requirements for Public Safety Broadband Systems in the Bands 758-768 MHz and 788-798 MHz (issue 1, April 2018) • SRSP-511 - Technical Requirements for Land Mobile Radio Services Operating in the Bands 768-776 MHz and 798-806 MHz (issue 2, December 2017) • RSS-Gen - General Requirements for Compliance of Radio Apparatus (Issue 5, November 2019 Amendment 1) • ANSI C63.26-2015: American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services

Start of Test	October 15, 2024
Finish of Test	October 19, 2024
Name of Engineer(s)	Miguel Rabago
Related Document(s)	• KDB971168 D01 Power Meas License Digital Systems v03r01 (Measurement Guidance for Certification of Licensed Digital Transmitters) • KDB412172 D01 Determining ERP and EIRP v01r01 (Guidelines for Determining the Effective Radiated Power (ERP) and Equivalent Isotropically Radiated Power (EIRP) of a RF Transmitting System) • KDB 935210 D05 v01r04 Measurements Guidance for Industrial and Non-Consumer Signal Booster, Repeater, And Amplifier Devices • Product Spec for RFQ_Q4000 Zorro_v1 • 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 90 is shown below:

Section	Part 2	Part 90	RSS-140	RSS-119	KDB 935210 D05/ RSS-131	Test Description	Result
2.1	2.1046	-	-	-	10.2	Transmitter Conducted Output Power	Compliant
2.2	2.1046	90.219(d)(3)(i) 90.219(e)(1)	4.3	5.4	-	Effective Radiated Power	Compliant
2.3	2.1049	90.219(e)(4)(ii)	RSS-Gen 6.7	5.5	-	Occupied Bandwidth	Compliant
2.4	-	-	4.3	-	-	Peak-Average Ratio	Compliant
2.5	-	90.543(e)(3)(5)	4.4	-	-	Band Edge	Compliant
2.6	2.1051	90.219(e)(3) 90.543(e)(2)(3)(4)(5) 90.543(c)(f)	4.4	5.8.9.2	4.7.3/10.6	Conducted Spurious Emissions	Compliant
2.7	2.1055	90.213 90.539(b)	4.2	5.9	4.8/ 9.4	Frequency Stability	Compliant
-	-	-	RSS-Gen 7.1		-	Receiver Spurious Emissions	N/A*
2.8	-	-	-	-	4.2/ -	AGC Threshold Level	Compliant
2.9	-	-	-	-	4.3/ 9.1	Out of Band Rejection	Compliant
2.10	-	90.219(e)(4)(ii)	-	-	4.4/ 9.2	Input-versus-output signal comparison	Compliant
-	-	90.219 (e)(4)(iii) 90.210 90.543(a)	-	5.8.9	4.4/ -	Emission Mask and Adjacent Channel Power	N/A**
2.11	-	90.219(e)(1)	-	-	4.5/ 10.3	Input / Output Power and Amplifier / Booster Gain	Compliant
2.12	-	90.219(e)(2)	-	-	4.6/10.4	Noise Figure	Compliant
2.13	2.1051	90.219(e)(3) 90.543(c)	4.4	5.8.9.2	4.7/ -	Out-of-band/out-of-block (Intermodulation) and Spurious Emissions	Compliant
2.14	2.1053	90.219(e)(3) 90.543(e)(1)(3)(f)	4.4	-	4.9/ -	Field Strength of Spurious Emissions	Compliant

N/A* Not required as per RSS-GEN 5.3. EUT is not a Stand-alone receiver.
N/A** The EUT is an equipment without audio low pass filter and mask C applies. The received signal is wideband LTE B14 20 MHz signal, and it does not meet the unwanted Emission Mask C limits of § 90.210 which is for narrow band. Therefore, emission mask is not applicable to the retransmitted output signals.

1.3 PRODUCT INFORMATION

1.3.1 Technical Description

Cel-FiTM “Zorro” is a WCDMA/LTE “Provider-Specific” Signal Booster to improve voice and data cellular performance in large enterprise environments. Zorro is capable to support up to Two (2) carriers (via separated donor antenna ports).
Zorro consists of two separate units: the Network Unit (NU), and the Coverage Unit (CU). The NU comprises a transmitter and receiver which communicates with the cell tower and the CU. CU comprises a transmitter and receiver which communicate with the User Equipment (e.g. Cellphone) and the NU. Figure 1 illustrates the typical application. The system operates with the need to install external antennas.
Users place the NU in an area with the strongest signal from the carrier networks. The CUs are then either placed in the center of the home or office, or in the area where the best signal quality is most needed. The NU and CU are placed at varying distances apart and are communicated via Ethernet cables. One NU can connect upto Six (6) CUs via Ethernet Cat 5 cables.
The NU transmits and receives Cellular signals ① from the base station and operates similar to a cellular handset. The CU transmits and receives signals ② with the cellular handset and operates on frequencies similar to the cellular base station. CU coverage area >10m.
91837NU includes a FCC certified Cellular modem. With the use of the modem it allows the system to access internet and for product registration, software updates, capturing and displaying details metrics of the system

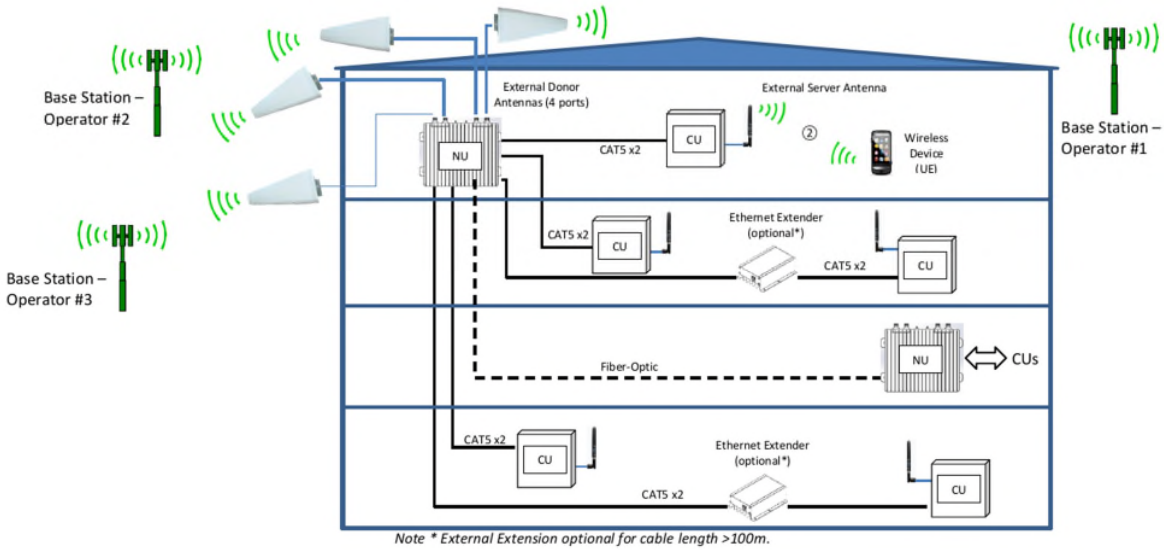
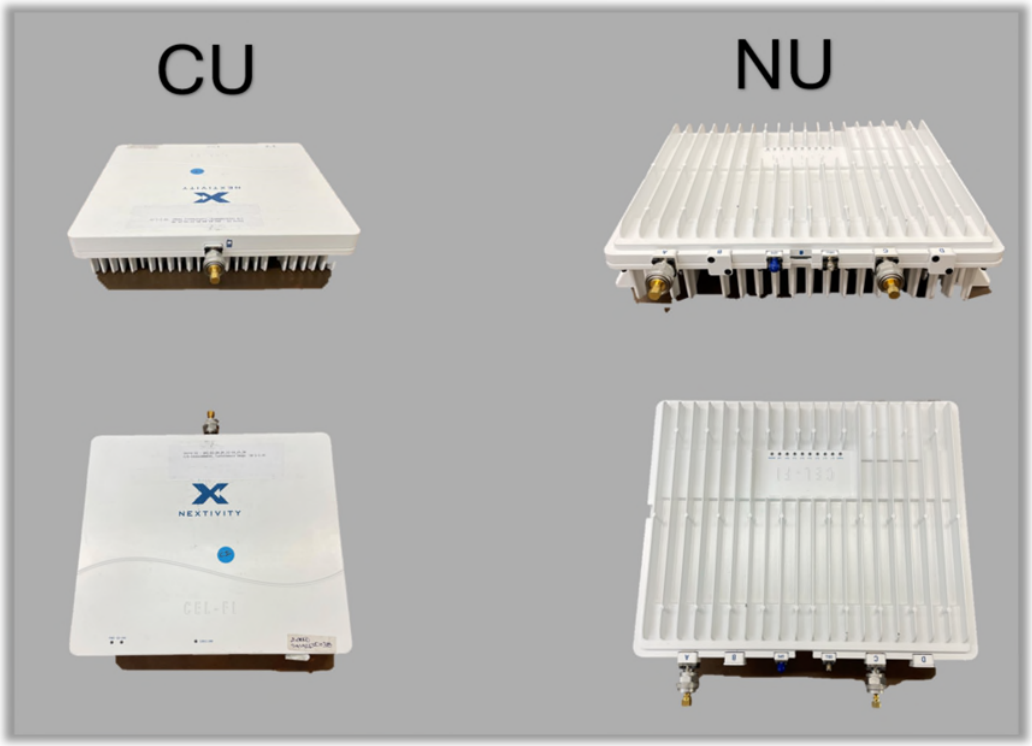


Figure 1: System Overview



Equipment under Test

1.3.2 EUT General Description

EUT Description	Industrial Signal Booster	
Trade Name	Cel-Fi™	
Model Name	Cel-Fi QUATRA 4000	
Model Number(s)	NU: I42-36CNU, CU: I41-WXCU	
Rated Voltage	NU: 120 VAC 60Hz CU: 54V DC (powered from NU via 2 Ethernet cables)	
Mode Verified	LTE Band 14	
Frequency Bands	WCDMA Band 5:	UL: 824 - 849MHz DL: 869 - 894MHz
	LTE Band 4:	UL: 1710 - 1755MHz DL: 2110 - 2155MHz
	LTE Band 12:	UL: 699 - 716MHz DL: 729 - 746MHz
	LTE Band 14:	UL: 788 - 798MHz DL: 758 - 768MHz

	LTE Band 25:	UL: 1850 - 1915MHz
		DL: 1930 - 1995MHz
	LTE Band 30:	UL: 2305 - 2315MHz
		DL: 2350 - 2360MHz

(Note: LTE Band 30 Test Data are for reference only. These band are disabled by software on the final product)

Product Specifications

Signal Bandwidth (MHz)	WCDMA Band 5		LTE Band 4, 25		LTE Band 12, 30		LTE Band 14	
	DL (dBm)	UL (dBm)	DL (dBm)	UL (dBm)	DL (dBm)	UL (dBm)	DL (dBm)	UL (dBm)
5	WCDMA: 13 LTE: 16	WCDMA: 22 LTE: 20	Max. 16	22	Max. 16	B12: 22 B30: 19	N/A	
10							13	22
15					N/A		N/A	
20	N/A				N/A		N/A	

Power Tolerance (dBm): ± 2

Capability: WCDMA (Band 5), LTE (Band 4, 12, 14 and 25)

Primary Unit (EUT):
☐ Production
☐ Pre-Production
☒ Engineering

Environment: Fixed, Indoor

Manufacturer Declared Temperature Range: 0°C to 40°C

Antenna Type: External Antenna (SMA Connectors)

Antenna Model: N/A

Antenna gain: N/A

Input and Output ports Impedance: 50 Ohms

Gain

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

Maximum Antenna System (Antenna + Cable) Gain.

Port	Max System (Antenna & Cable) Gain for Band 14
Server Port	17.5
Donnor Port	17.38

Note: *Maximum System Gain was calculated to comply with MPE for Simultaneous Transmission.

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1.3.3 Transmit Frequency Table

Mode	Signal Bandwidth (MHz)	Tx Frequency (MHz)	Emission Designator	Conducted Power	
				Max. Power Avg (dBm)	Max. Power Avg (W)
WCDMA Band 5 Downlink	5	871.4 – 891.6	3M88F9W	15.32	0.034041
	5 (3 Carriers)	871.4 – 891.6		16.99	0.050003
WCDMA Band 5 Uplink	5	826.4 – 846.6	4M05F9W	21.42	0.138676
	5 (3 Carriers)	826.4 – 846.6		21.68	0.147231
LTE Band 4 Downlink	5	2110 - 2155	4M72F9W	15.21	0.033189
	10	2110 - 2155	9M31F9W	15.84	0.038371
	15	2110 - 2155	13M6F9W	15.73	0.037411
	20	2110 - 2155	18M4F9W	15.3	0.033884
LTE Band 4 Uplink	5	1710 - 1755	4M64F9W	21.53	0.142233
	10	1710 - 1755	9M26F9W	23.37	0.21727
	15	1710 - 1755	13M6F9W	21.97	0.157398
	20	1710 - 1755	18M4F9W	21.68	0.147231
LTE Band 12 Downlink	5	729 - 746	4M73F9W	15.56	0.035975
	10	729 - 746	9M24F9W	15.51	0.035563
LTE Band 12 Uplink	5	699 - 716	4M64F9W	21.92	0.155597
	10	699 - 716	9M25F9W	21.9	0.154882
LTE Band 14 Downlink	10 MHz	758 - 768	8M86F9W	12.4	0.017378
LTE Band 14 Uplink	10 MHz	788 - 798	8M85F9W	22.13	0.163305
LTE Band 25 Downlink	5	1932.5 – 1992.5	4M63F9W	15.16	0.03281
	10	1935 – 1990	8M96F9W	15.47	0.035237
	15	1937.5 – 1987.5	13M4F9W	16.54	0.045082
	20	1940 – 1985	17M9F9W	16.86	0.048529
LTE Band 25 Uplink	5	1852.5 – 1912.5	4M47F9W	21.01	0.126183
	10	1855 – 1910	8M98F9W	23.48	0.222844
	15	1857.5 – 1907.5	13M4F9W	21.77	0.150314
	20	1860 – 1905	17M9F9W	21.64	0.145881
LTE Band 30 Downlink	5	2350 - 2360	4M43F9W	15.15	0.032734
	10	2350 - 2360	8M83F9W	14.8	0.0302
LTE Band 30 Uplink	5	2305 - 2315	4M45F9W	21.39	0.137721
	10	2305 - 2315	8M87F9W	21.51	0.141579

NOTE: CONDUCTED POWER MEASUREMENTS FOR BAND 4, 5, 12 AND 25 ARE FROM 721003832B NEXTIVITY ZORRO FCC PART 20 TEST REPORT

1.4 EUT TEST CONFIGURATION

1.4.1 Test Configuration Description

Test Configuration	Description
A	Downlink. Input signal is applied to the antenna port of Donor (NU). Output is monitored from the antenna port of Server (CU).
B	Uplink. Input signal is applied to the antenna port of Server (CU). Output is monitored from the antenna port of Donor (NU).
C	Radiated test setup. The EUT was in “Burn in Mode” which is a mode were all antennas were transmitting and receiving at the same time as worst case scenario for radiated testing.

1.4.2 EUT Exercise Software

Manufacturer Provided a Nextivity Chart Interface v2.0.0.16

1.4.3 Support Equipment and I/O cables

Manufacturer	Equipment/Cable	Description
Dell	Support Laptop	M/N: Latitude D630 PP18L S/N: 5SBJBG1
Dell	Support Laptop AC Adapter	M/N: PA-1900-02D S/N: 5SBJBG1
Nextivity	Support USB cable x 2	Custom 1.0 meter shielded USB Type A to Micro B cable
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

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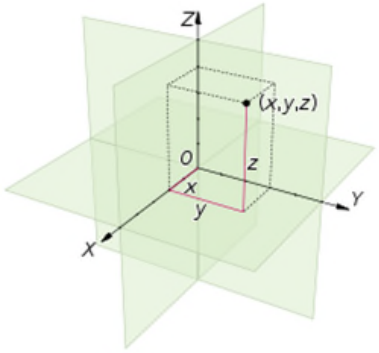
1.4.4 Worst Case Configuration

Worst-case configuration used in this test report per Transmitter Conducted Output Power (Section 2.1 of this test report). This is for single channel verification. Otherwise, all three channels (Low, Middle and High) are verified:

Mode	Bandwidth	Channel No.	Frequency
LTE Band 14 Downlink	10 MHz	Middle Channel 5330	763 MHz
LTE Band 14 Uplink	10 MHz	Middle Channel 23330	793 MHz

Final installation position is unknown at the time of verification. For radiated measurements X and Z orientations were verified since the EUT won't work on Y orientation. No major variation in emissions observed between the three (3) orientations. Verifications performed using "X" configuration.



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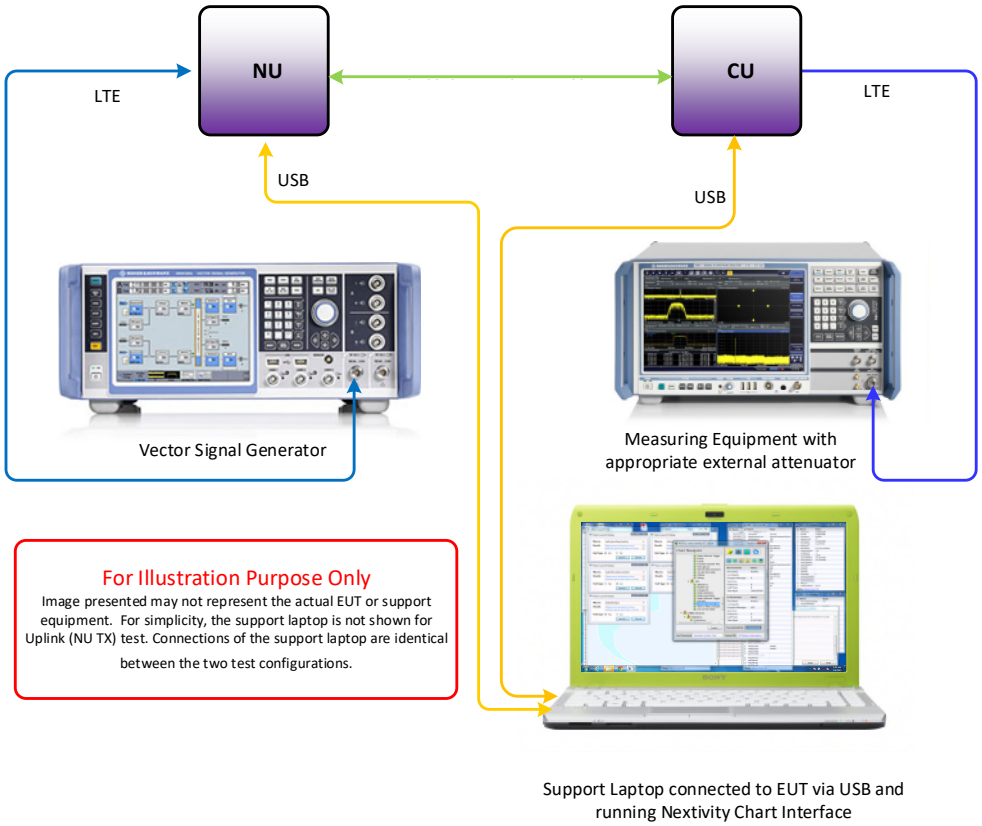
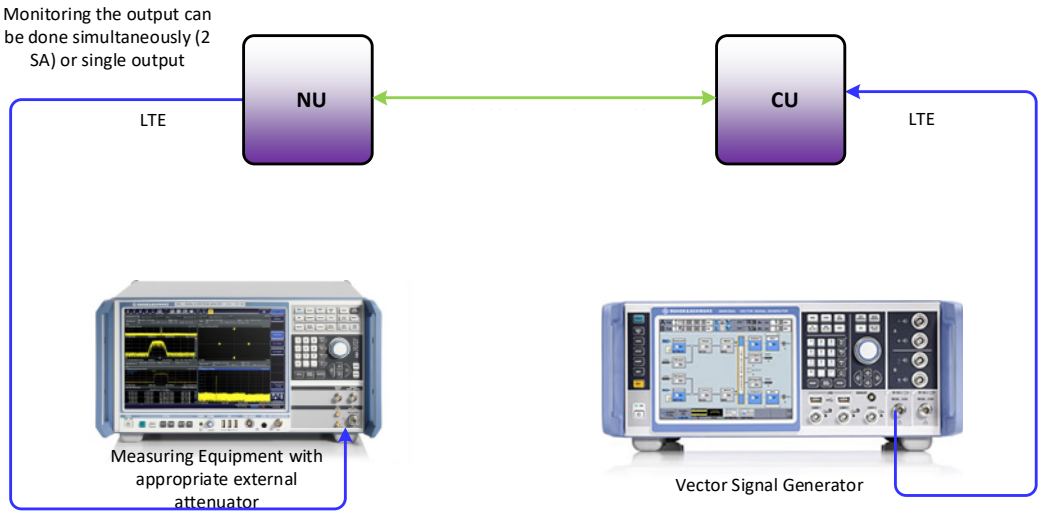
1.4.5 Simplified Test Configuration Diagram

Downlink (CU Tx) Conducted Test



Uplink (NU Tx) Conducted Test



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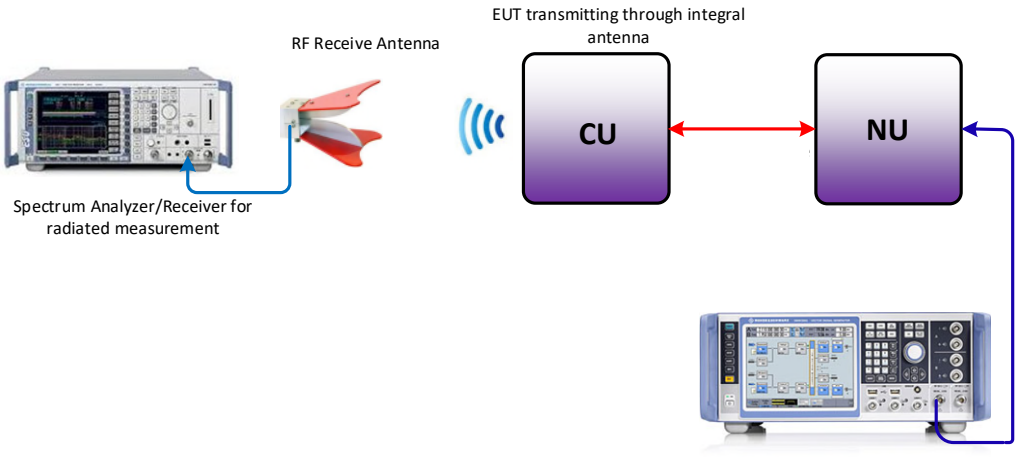
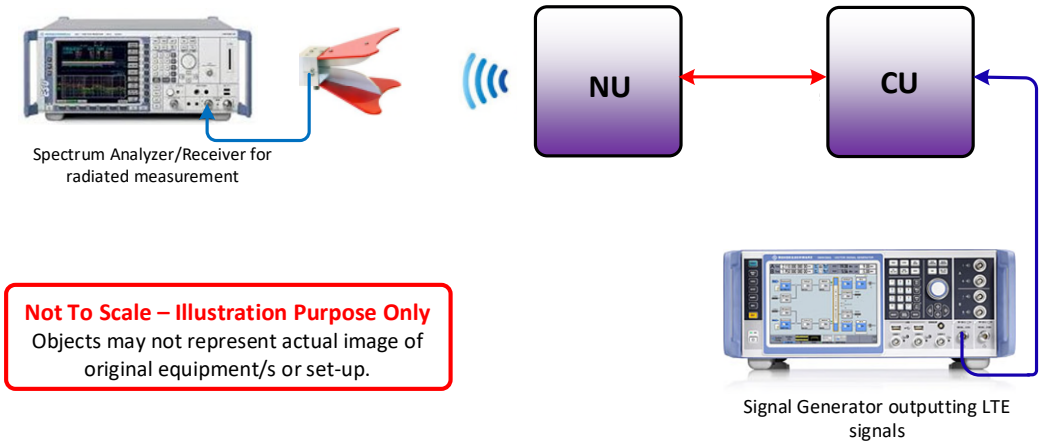
Radiated Testing (Downlink)



Radiated Testing (Uplink)



Not To Scale – Illustration Purpose Only
Objects may not represent actual image of original equipment/s or set-up.

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: 544421000144(NU)&541421000038(CU). 544421000138(NU)&541421000007,541421000175,541421000014,541421000168,541421000106, 541421000083 (CUs)	-	-

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

1.7 TEST METHODOLOGY

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

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

1.8 TEST FACILITY LOCATION

1.8.1 TÜV SÜD America Inc. (Mira Mesa)

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

1.8.2 TÜV SÜD America Inc. (Rancho Bernardo)

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

1.9 TEST FACILITY REGISTRATION

1.9.1 FCC – Designation No.: US1146

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 (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-0412 and A-0413

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

1.9.6 RRA – Identification No. US0102

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

1.9.7 OFCA – U.S. Identification No. US0102

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

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SECTION 2

TEST DETAILS

Radio Test of the
Nextivity Inc.
Cel-Fi QUATRA 4000 Industrial Signal Booster

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

2.1 TRANSMITTER CONDUCTED OUTPUT POWER

2.1.1 Specification Reference

FCC 47 CFR Part 2, Clause 2.1046
RSS-119, Clause 10.2

2.1.2 Standard Applicable

The conducted power mesurements were made in accordance to FCC Part 2 Clasue 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.

RSS-131, 10.2: The output power of the zone enhancer shall comply with the transmitter output power of the equipment with which it is to be used and chall be within ±1.0 dB of the manifacturer's rated output power listed in zone enhancer equipment specifications.

2.1.3 Equipment Under Test and Modification State

Serial No: 544421000144(NU)&541421000038(CU)./ Test Configuration A and B

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

October 15, 2024 / MR

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	26.3°C
Relative Humidity	48.6%
ATM Pressure	99.7kPa

2.1.7 Additional Observations

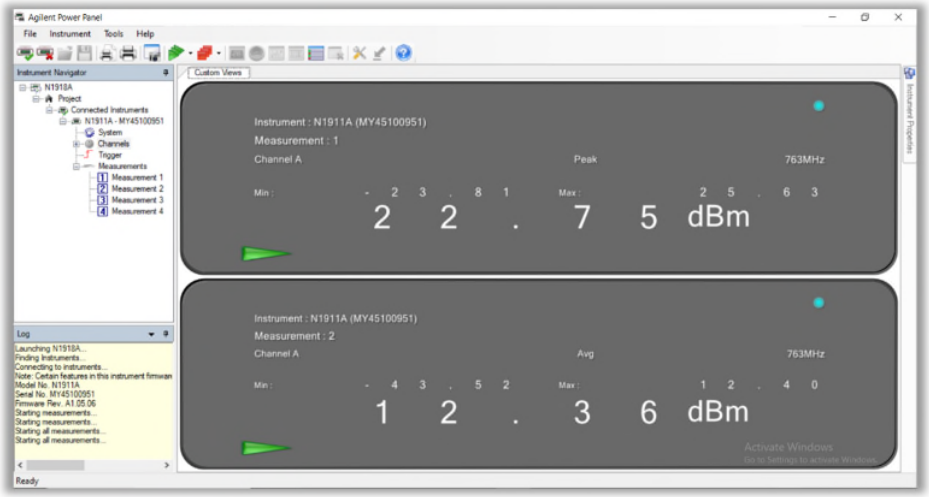
- This is a conducted test using power meter.
- The path loss was measured and entered as a level offset.
- Both Peak and Average measurements presented.
- LTE Band 14 only supports 10 MHz bandwidth..

2.1.8 Test Results

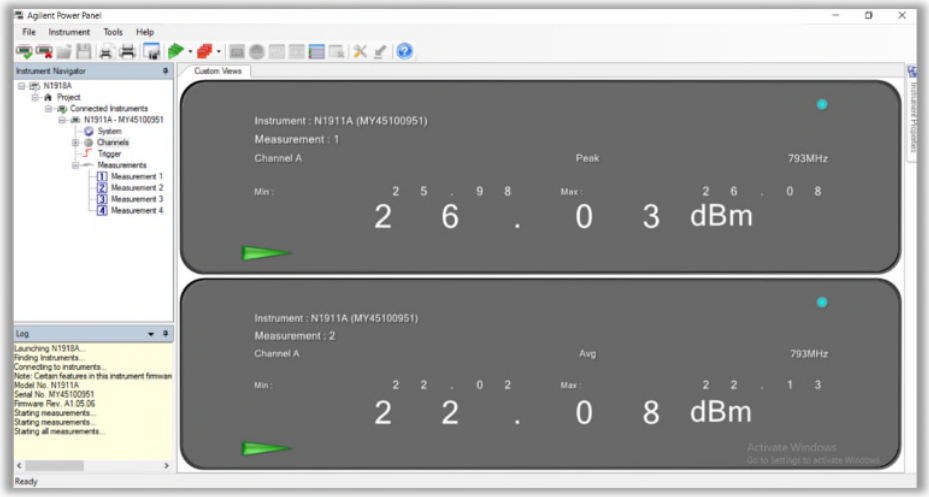
LTE Band 14 Downlink							
Bandwidth (MHz)	**Channel**	**Frequency (MHz)**	**Average Power (dBm)**	**PK Power (dBm)**	**Limit According to Manufacturer (dBm)**	**RSS-131 Avg Limit (dB)**	**Result**
10	-	-	-	-			
	5330	**763.0**	**12.40**	**25.63**	**13**	**±1 Manufacturer declared (13dBm)**	Compliant
	-	-	-	-			

LTE Band 14 Uplink							
Bandwidth (MHz)	**Channel**	**Frequency (MHz)**	**Average Power (dBm)**	**PK Power (dBm)**	**Limit According to Manufacturer (dBm)**	**RSS-131 Avg Limit (dB)**	**Result**
10	-	-	-	-			
	23330	**793.0**	**22.13**	**26.08**	**22**	**±1 Manufacturer declared (22dBm)**	Compliant
	-	-	-	-			

2.1.9 Sample Test Plot



LTE Band 14 DL 10 MHz Bandwidth Middle Channel



LTE Band 14 UL 10 MHz Bandwidth Middle Channel

2.2 EFFECTIVE RADIATED POWER

2.2.1 Specification Reference

FCC 47 CFR Part 90, Clause 90.219(d)(3)(i),

2.2.2 Standard Applicable

FCC 47 CFR Part 90, Clause 90.219:
Except as set forth in paragraph (d)(3)(ii) of this section, signal boosters must be deployed such that the radiated power of each retransmitted channel, on the forward link and on the reverse link, does not exceed 5 Watts effective radiated power (ERP)

2.2.3 Equipment Under Test and Modification State

Serial No: 544421000144(NU)&541421000038(CU)

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

October 15, 2024 / MR

2.2.5 Test Equipment Used

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

2.2.6 Environmental Conditions/ Test Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

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

2.2.7 Additional Observations

- ERP and EIRP were calculated as per Section 1.2 and 1.3 of KDB412172 D01 (Determining ERP and EIRP v01).
- Calculation formula in logarithmic terms:

$$\textbf{ERP or EIRP} = P_T + G_T - L_C$$

Where:

P_T = transmitter output power, expressed in dBm (Section 2.1 of this test report)
G_T = gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP);
$G_T(dBd) = G_T(dBi) – 2.15$ dB
L_C = signal attenuation in the connecting cable between the transmitter and antenna, in dB.

2.2.8 Sample Computation

ERP = $P_T + G_T - L_C$ - 2.15dB
= 29.87 (Peak) + 0.13 (max. gain) – 3.84 (cable loss) -2.15
= 24.01 dBm

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2.2.9 Test Results

LTE Band 14 Downlink						
Bandwidth (MHz)	**Frequency (MHz)**	**Max Power Average (dBm)**	**Max System Gain (dBi)***	**ERP (dBm)**	**ERP Limit (dBm)**	**Result**
10	-	-	-	-	-	
	763.0	**12.40**	**11.67**	**21.92**	**36.99**	Compliant
	-	-	-	-	**-**	

Note: *Maximum System Gain was used to comply with MPE when simultaneous transmission.

LTE Band 14 Uplink						
Bandwidth (MHz)	**Frequency (MHz)**	**Max Power Average (dBm)**	**Max System Gain (dBi)***	**ERP (dBm)**	**ERP Limit (dBm)**	**Result**
10	-	-	-	-	-	
	793.0	**22.13**	**12.35**	**32.33**	**36.99**	Compliant
	-	-	**-**	-	**-**	

Note: *Maximum System Gain was used to comply with MPE when simultaneous transmission.

2.3 OCCUPIED BANDWIDTH

2.3.1 Specification Reference

FCC 47 CFR Part 2, Clause 2.1049
RSS-GEN Issue 5, Clause 6.7

2.3.2 Standard Applicable

FCC Part 2.1049, RSS-GEN 6.7

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

Using the occupied bandwidth meansurement function in the spectrum analyzer, the 99% occupied bandwith was measured.

2.3.3 Equipment Under Test and Modification State

Serial No: 544421000144(NU)&541421000038(CU) / Test Configuration A and B

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

October 15, 2024 / MR

2.3.5 Test Equipment Used

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

2.3.6 Environmental Conditions/ Test Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	21.0°C
Relative Humidity	30.9%
ATM Pressure	98.6kPa

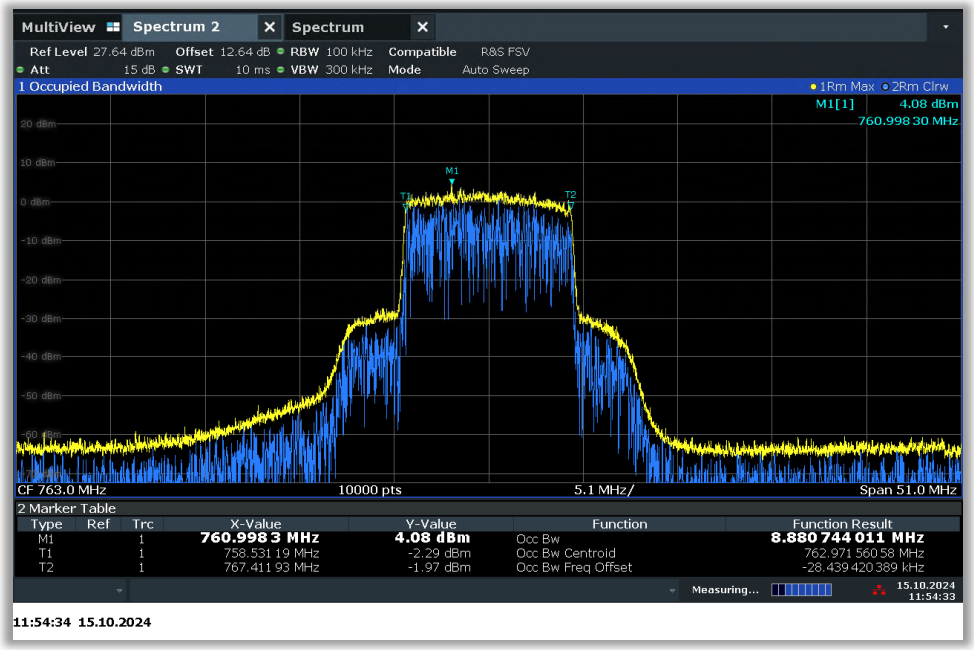
2.3.7 Additional Observations

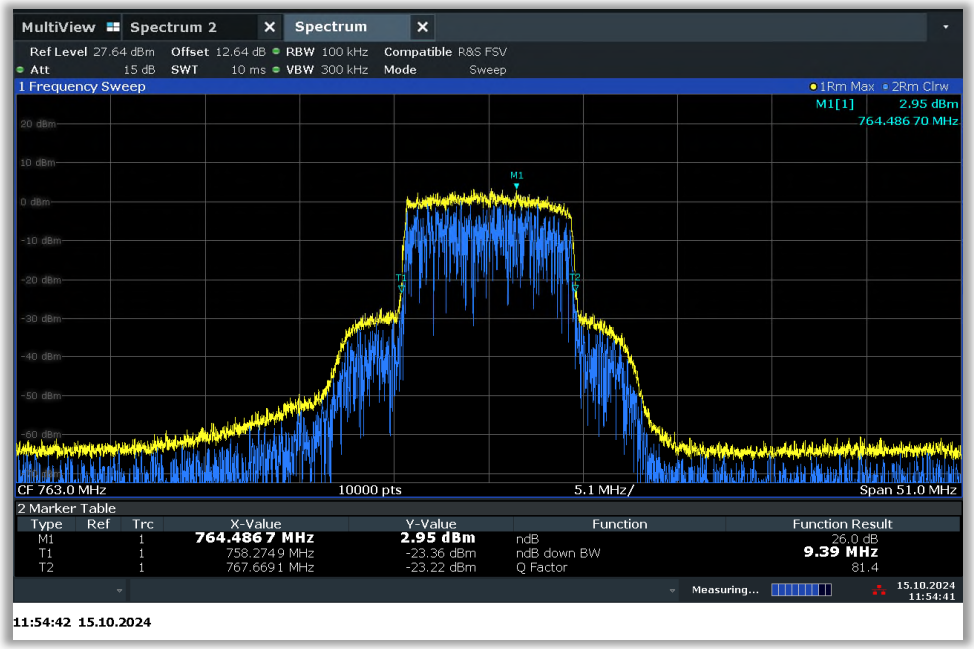
- This is a conducted test.
- Using the occupied bandwidth meansurement function in the spectrum analyzer, the 99% occupied bandwith was measured.
- The transmitter shall be operated at its maximum carrier power measured under normal test conditions.
- The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts.
- The RBW is set to 1% of the OBW while the VBW is ≥3X RBW.
- The detector is peak and the trace mode is max hold.
- LTE Band 14 only supports 10 MHz bandwidth..
- The path loss was measured and entered as a level offset.

2.3.8 Test Results and Sample Test Plot

LTE Band 14 Downlink				
Bandwidth (MHz)	**Channel**	**Frequency (MHz)**	**99% OBW (MHz)**	**-26dB BW (MHz)**
10	-	-	-	-
	5330	763.0	8.88	9.39
	-	-	-	-

LTE Band 14 Uplink				
Bandwidth (MHz)	**Channel**	**Frequency (MHz)**	**99% OBW (MHz)**	**-26dB BW (MHz)**
10	-	-	-	-
	23330	793.0	8.92	9.43
	-	-	-	-

LTE Band 14 Downlink (10 MHz BW) / Middle Channel 763 MHz / 99%OBW


LTE Band 14 Downlink (10 MHz BW) / Middle Channel 763 MHz / 26dB BW


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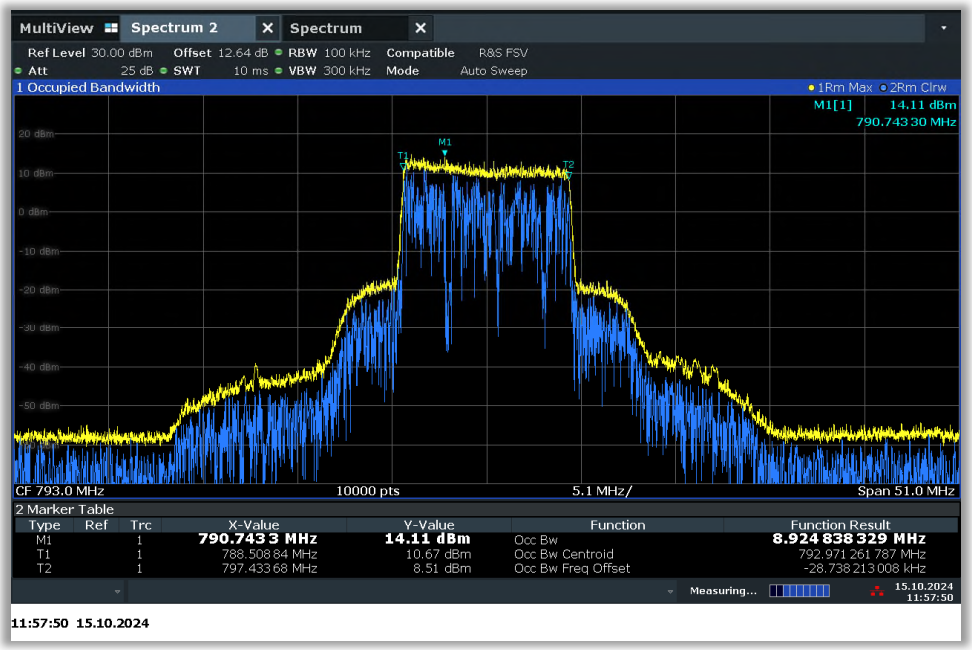
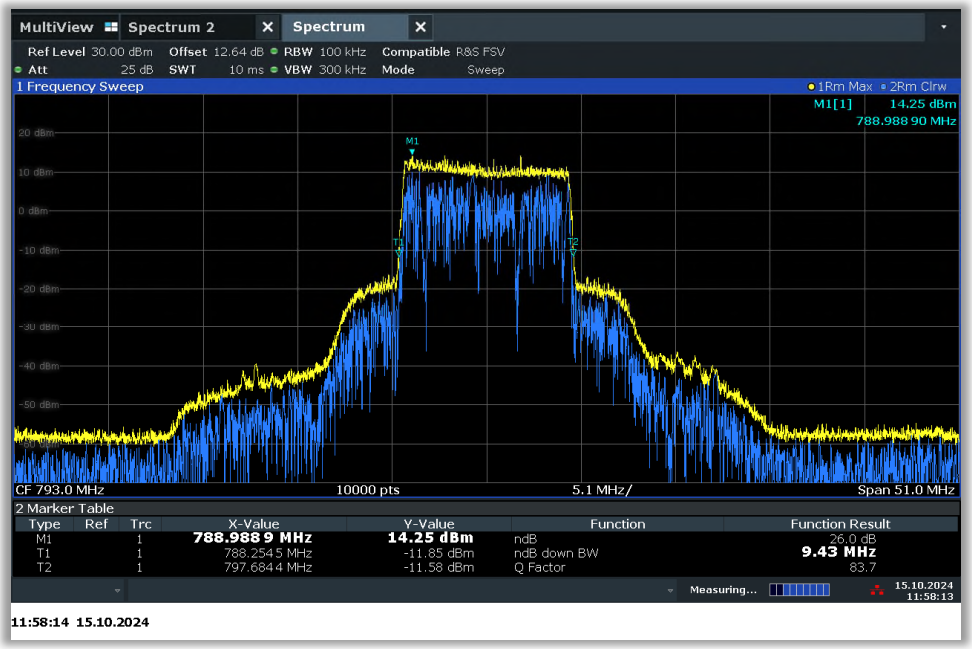
LTE Band 14 Uplink (10 MHz BW) / Middle Channel 793 MHz / 99%OBW



LTE Band 14 Uplink (10 MHz BW) / Middle Channel 793 MHz / 26dB BW



2.4 PEAK-AVERAGE RATIO

2.4.1 Specification Reference

RSS-140 Issue 1, Clause 4.3

2.4.2 Standard Applicable

RSS-140 clause 4.3

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

2.4.3 Equipment Under Test and Modification State

Serial No: 544421000144(NU)&541421000038(CU) / Test Configuration A and B

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

October 15, 2024 / MR

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	20.9°C
Relative Humidity	23.2%
ATM Pressure	98.6kPa

2.4.7 Additional Observations

- This is a conducted test.
- 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.
- RBW was set to maximum the SA can support.
- There are no measured PAR levels greater than 13dB.
- The path loss was measured and entered as a level offset.

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2.4.8 Test Results

LTE Band 14 Downlink					
Bandwidth (MHz)	**Channels**	**Frequency (MHz)**	**PAR (dB)**	**Limit (dB)**	**Results**
10 MHz	-	-	-		
	5330	763.0	10.75	13	Compliant
	-	-	-		

LTE Band 14 Uplink					
Bandwidth (MHz)	**Channels**	**Frequency (MHz)**	**PAR (dB)**	**Limit (dB)**	**Results**
10 MHz	-	-	-		
	23330	793.0	11.14	13	Compliant
	-	-	-		

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2.4.9 Sample Test Plot

LTE Band 14 Downlink (10 MHz BW) / Middle Channel 763 MHz

LTE Band 14 Uplink (10 MHz BW) / Middle Channel 793 MHz

2.5 BAND EDGE

2.5.1 Specification Reference

FCC 47 CFR Part 2, Clause 2.1051
FCC 47 CFR Part 90.543 (e)(3)(5)
RSS-140, Clause 4.4
KDB971168 Clause 6.1

2.5.2 Standard Applicable

FCC 47 CFR Part 90, Clause 90.543:
(e) For operations in the 758–768 MHz and the 788–798 MHz bands, 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:
(3) On any frequency between 775–788 MHz, above 805 MHz, and below 758 MHz, by at least 43 + 10 log (P) dB.
(5) Compliance with the provisions of paragraph (e)(3) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of 30 kHz may be employed.

RSS-140:
4.4 Transmitter unwanted emissions limits
The power of any unwanted emission outside the bands 758-768 MHz and 788-798 MHz shall be attenuated below the transmitter output power P in dBW as follows, where p is the transmitter output power in watts:
a. For any frequency between 769-775 MHz and 799-806 MHz:
i 76 + 10 log (p), dB in a 6.25 kHz band for fixed and base station equipment
ii 65 + 10 log (p), dB in a 6.25 kHz band for mobile and portable/hand-held equipment

b For any frequency between 775-788 MHz, above 806 MHz, and below 758 MHz: 43 + 10 log (p), dB in a bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency bands 758-768 MHz and 788-798 MHz, a resolution bandwidth of 30 kHz may be employed.

2.5.3 Equipment Under Test and Modification State

Serial No: 544421000144(NU)&541421000038(CU) / Test Configuration A and B

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

October 15, 2024 / MR

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	20.9°C
Relative Humidity	25.2%
ATM Pressure	99.7kPa

2.5.7 Additional Observations

- This is a conducted test. Test guidance is per Section 6.1 of KDB971168 (D01 Power Meas License Digital Systems v03r01).
- The path loss was measured and entered as a level offset.
- For LTE Band 14, RBW was set to 30 kHz and the limit for emissions 100 kHz outside of the low frequency edge and the high frequency edge of each frequency block range(s) was set to:

  Limit = -13dBm + 10lg(30/100) = -18.23 dBm

2.5.8 Test Result

Compliant – There is not a significant emission outside the licensee's frequency band of operation.

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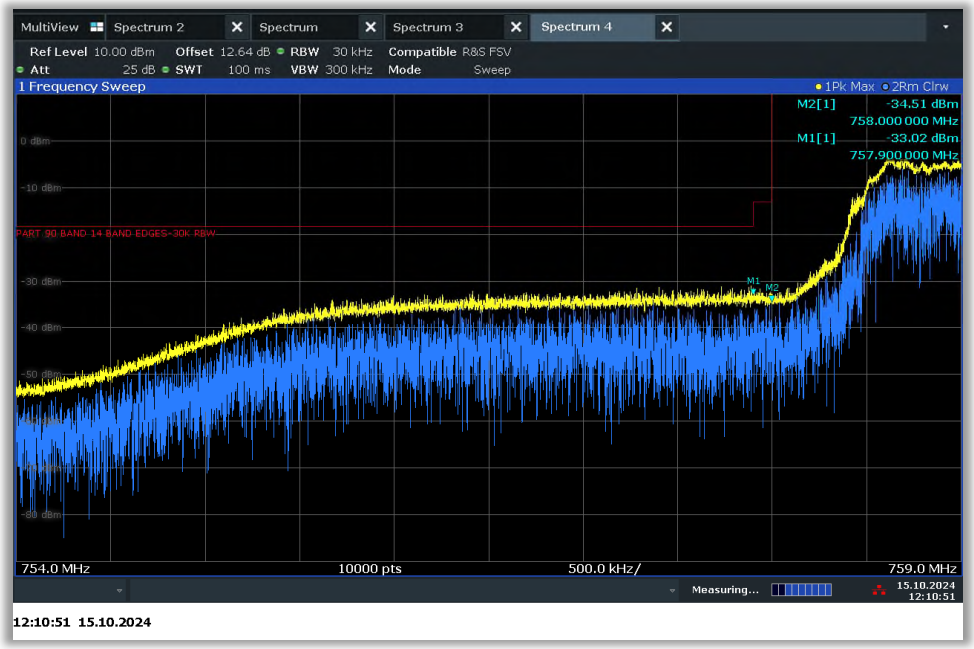
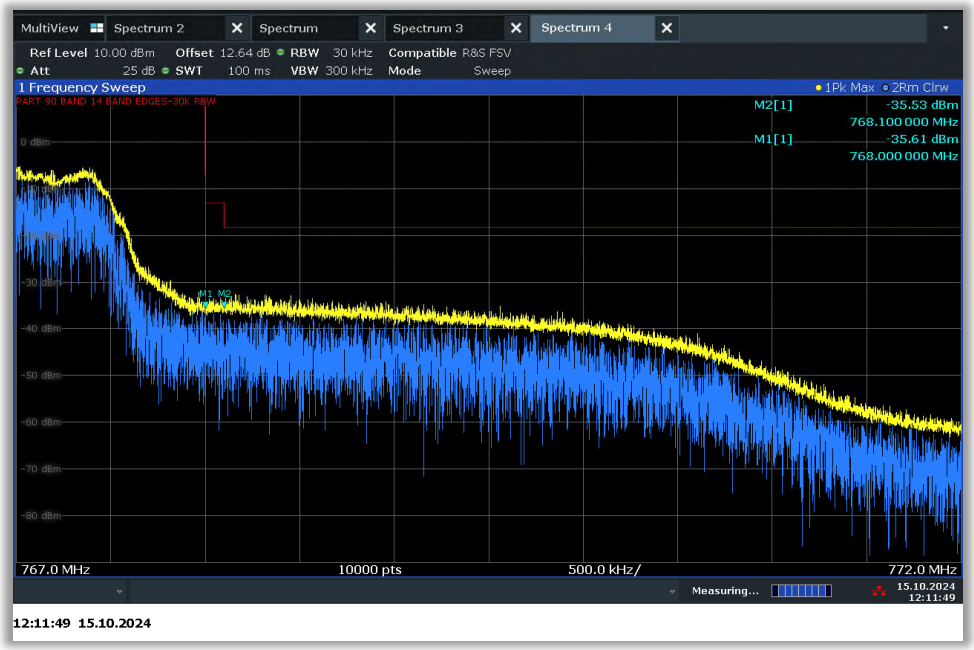
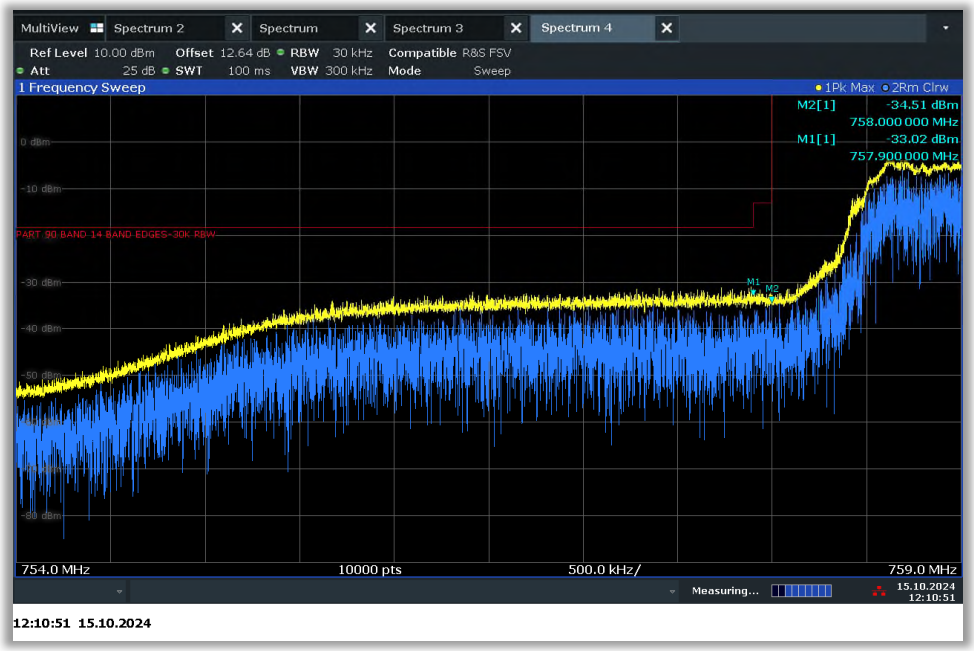
2.5.9 Sample Test Plots

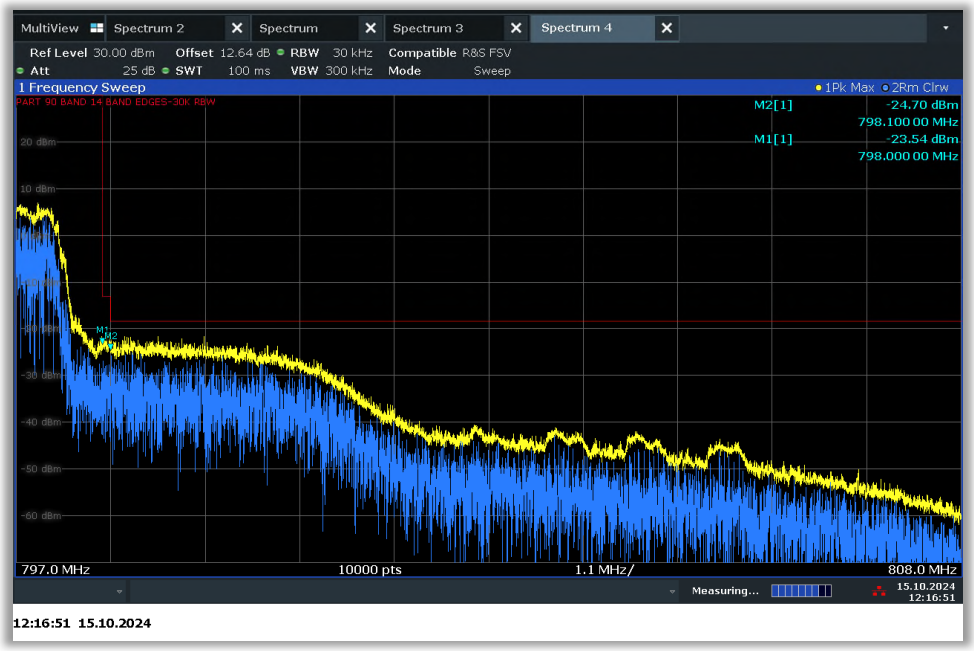
LTE Band 14 Downlink 10MHz Bandwidth Middle Channel Low Band Edge



LTE Band 14 Downlink 10MHz Bandwidth Middle Channel High Band Edge



LTE Band 14 Uplink 10MHz Bandwidth Middle Channel Low Band Edge


LTE Band 14 Uplink 10MHz Bandwidth Middle Channel High Band Edge


2.6 CONDUCTED SPURIOUS EMISSIONS

2.6.1 Specification Reference

FCC 47 CFR Part 2, Clause 2.1051
FCC 47 CFR Part 90, Clause 90.219(e)(3)
FCC 47 CFR Part 90, Clause 90.543(e)(2)(3)(4)(5)(f)
RSS-140, Clause 4.4
RSS-131, Clause 10.6
KDB935210 D05, Clause 4.73

2.6.2 Standard Applicable

FCC 47 CFR Part 90, Clause 90.219(e)(3)
Spurious emissions from a signal booster must not exceed −13 dBm within any 100 kHz measurement bandwidth.

FCC 47 CFR Part 90, Clause 90.543:
(e) For operations in the 758–768 MHz and the 788–798 MHz bands, 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 all frequencies between 769–775 MHz and 799–805 MHz, by a factor not less than 65 + 10 log (P) dB in a 6.25 kHz band segment, for mobile and portable stations.

(3) On any frequency between 775–788 MHz, above 805 MHz, and below 758 MHz, by at least 43 + 10 log (P) dB.

(4) Compliance with the provisions of paragraphs (e)(1) and (2) of this section is based on the use of measurement instrumentation such that the reading taken with any resolution bandwidth setting should be adjusted to indicate spectral energy in a 6.25 kHz segment.

(5) Compliance with the provisions of paragraph (e)(3) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of 30 kHz may be employed.

(f) For operations in the 758–775 MHz and 788–805 MHz bands, all emissions including harmonics in the band 1559–1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

RSS-140, Clause 4.4:
4.4 Transmitter unwanted emissions limits
The power of any unwanted emission outside the bands 758-768 MHz and 788-798 MHz shall be attenuated below the transmitter output power P in dBW as follows, where p is the transmitter output power in watts:
a. For any frequency between 769-775 MHz and 799-806 MHz:
    i 76 + 10 log (p), dB in a 6.25 kHz band for fixed and base station equipment
    ii 65 + 10 log (p), dB in a 6.25 kHz band for mobile and portable/hand-held equipment

b For any frequency between 775-788 MHz, above 806 MHz, and below 758 MHz: 43 + 10 log (p), dB in a bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and

adjacent to the frequency bands 758-768 MHz and 788-798 MHz, a resolution bandwidth of 30 kHz may be employed.

In addition, the equivalent isotropically radiated power (e.i.r.p.) of all emissions, including harmonics in the band 1559-1610 MHz, shall not exceed −70 dBW/MHz for wideband emissions, and −80 dBW/kHz for discrete emissions of less than 700 Hz bandwidth.

RSS-131, Clause 10.6:
Zone enhancers shall meet the following requirements;

1. Minor departures from the exact reference frequencies of the input signals atre permitted provided the retransmitted signals meet the frequency stability limit specified in RSS-119 for the equipment with which the zone enhancer is to be used.
2. The rentrasnmitted signals shall meet the unwanted emissions limits in RSS-119 that applies to the equipment with which the zone enhancer is to be used,

2.6.3 Equipment Under Test and Modification State

Serial No: 544421000144(NU)&541421000038(CU) / Test Configuration A and B

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

October 15 and 17, 2024 / MR

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	23.5 - 24.9°C
Relative Humidity	49.4 - 50.2%
ATM Pressure	99.4 - 99.7kPa

2.6.7 Additional Observations

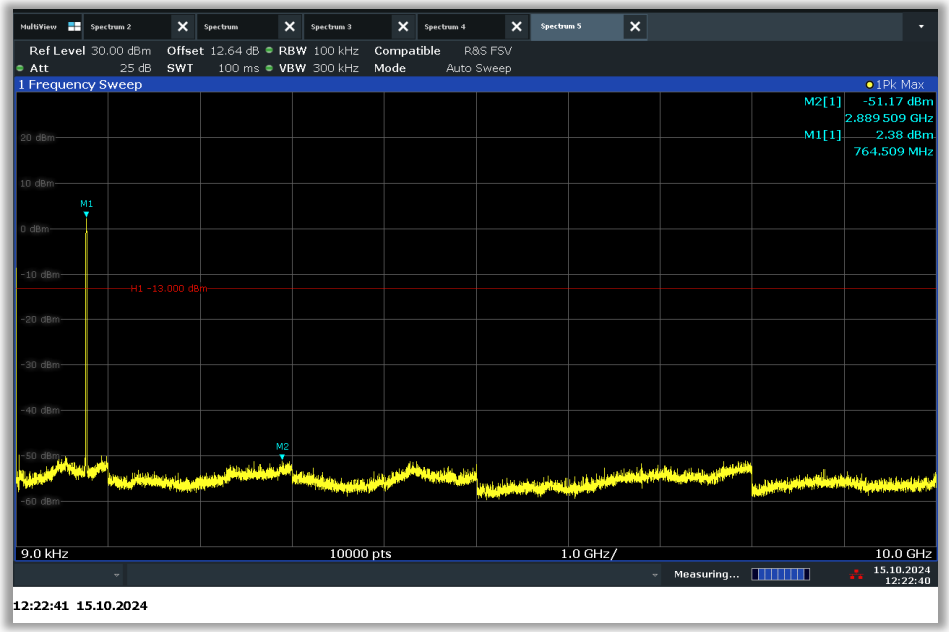
- This is a conducted test. Test guidance is per Section 4.7.3 of KDB935210 (Measurements Guidance for Industrial and Non-Consumer Signal Booster, Repeater, And Amplifier Devices D05 v01r04).
- The path loss was measured and entered as a level offset.
- Detector is peak and trace is set to max hold as the worst case setting.
- The spectrum was searched from 9 kHz to up to the 10th harmonic
- All low, middle and high channels for all supporting bandwidths were verified and only middle channel presented in this test report as representative configuration.

2.6.8 Test Result

Compliant – There is not a Spurious Emission detected above the limits lines

2.6.9 Sample Test Plots

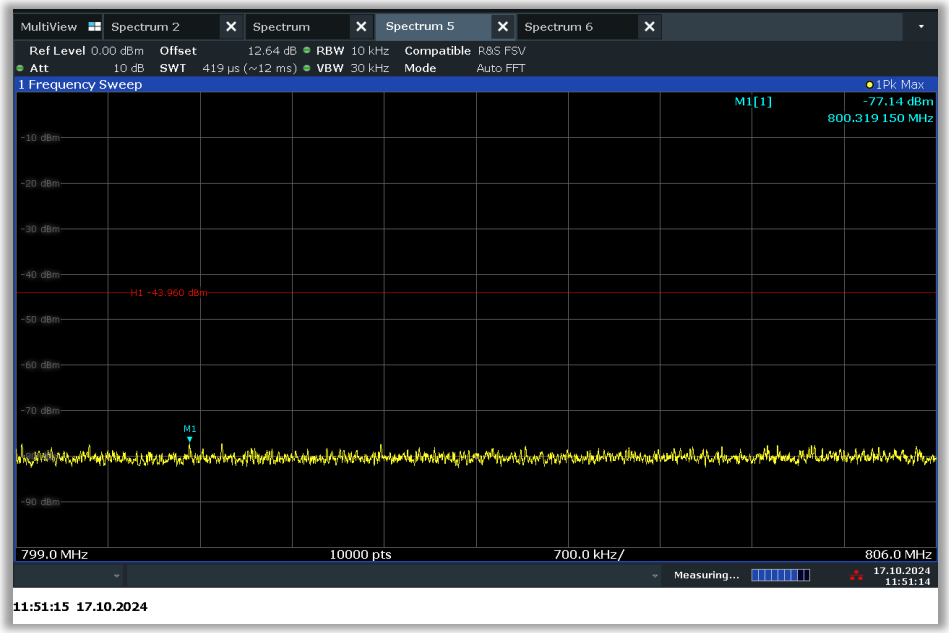
LTE Band 14 Downlink 10MHz Bandwidth Middle Channel Conducted Spurious Emissions



LTE Band 14 Downlink 10MHz Bandwidth Middle Channel Conducted Spurious Emissions 769 – 775 MHz

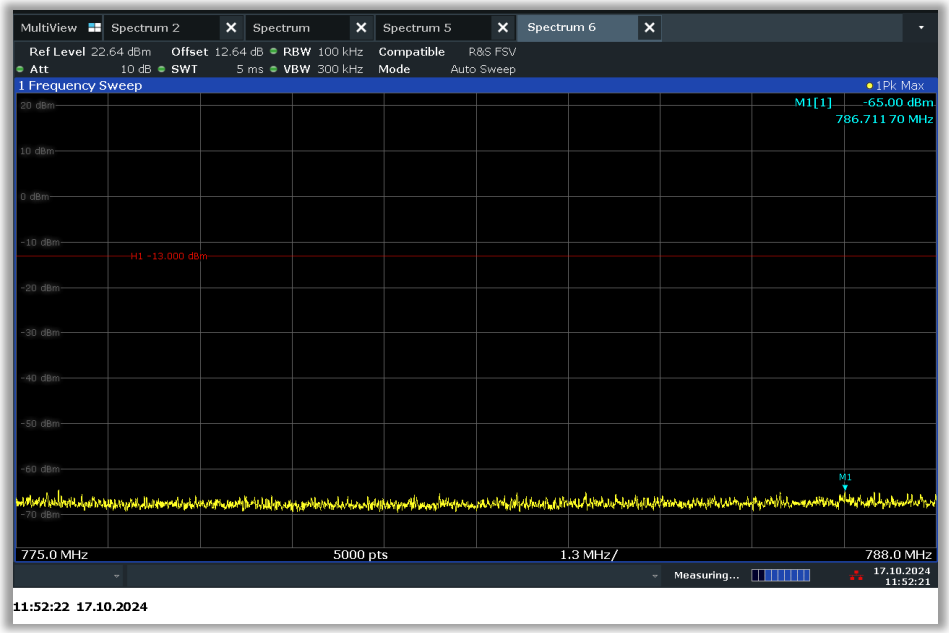
Limit = -46 + 10lg (10/6.25) = -43.96 dBm

LTE Band 14 Downlink 10MHz Bandwidth Middle Channel Conducted Spurious Emissions 799 – 806 MHz



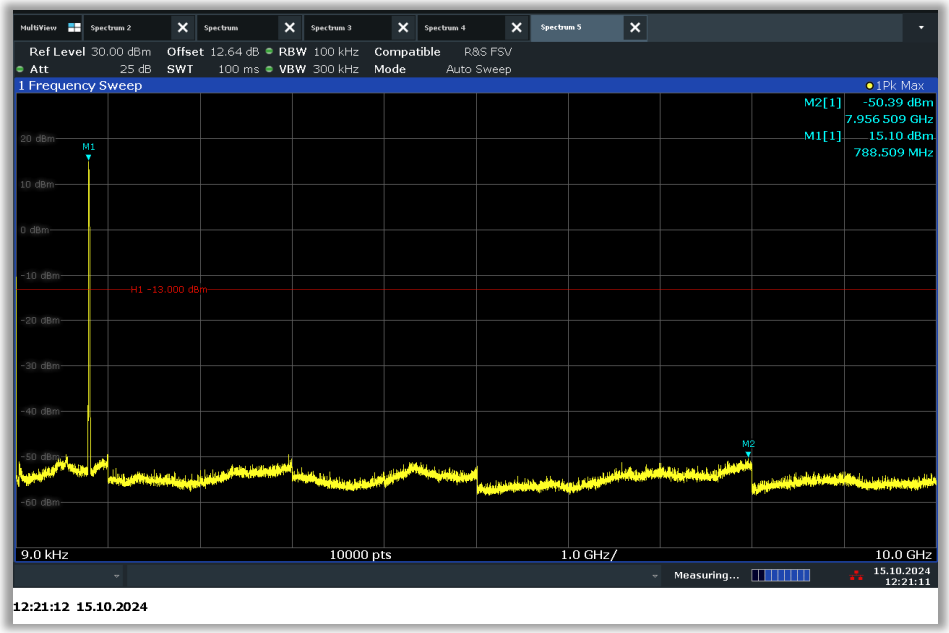
Limit = -46 + 10lg (10/6.25) = -43.96 dBm

LTE Band 14 Downlink 10MHz Bandwidth Middle Channel Conducted Spurious Emissions 775 – 788 MHz



LTE Band 14 Downlink 10MHz Bandwidth Middle Channel Conducted Spurious Emissions 1559 – 1610 MHz (EIRP)

LTE Band 14 Uplink 10MHz Bandwidth Middle Channel Conducted Spurious Emissions



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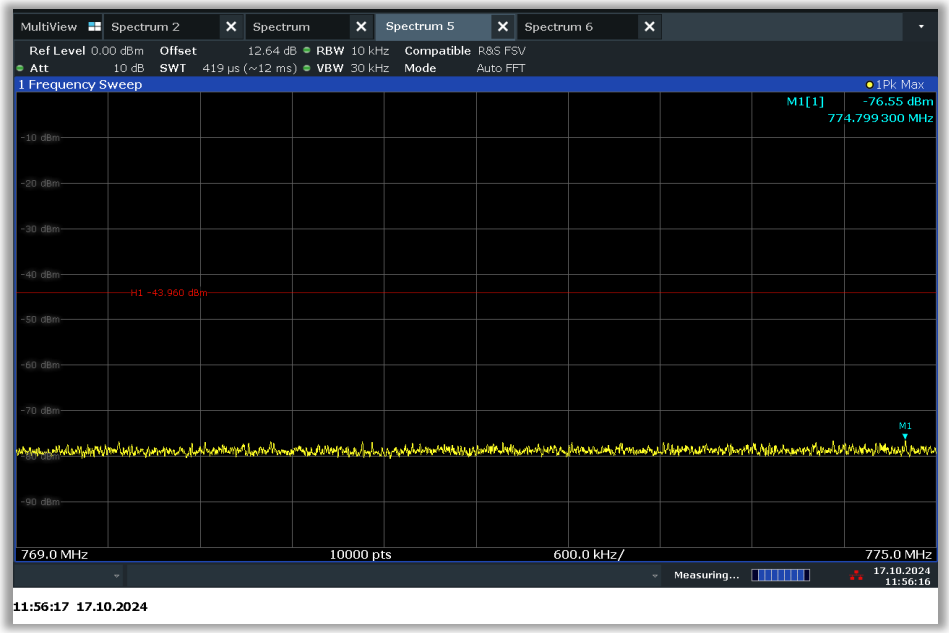
LTE Band 14 Uplink 10MHz Bandwidth Middle Channel Conducted Spurious Emissions 769 – 775 MHz



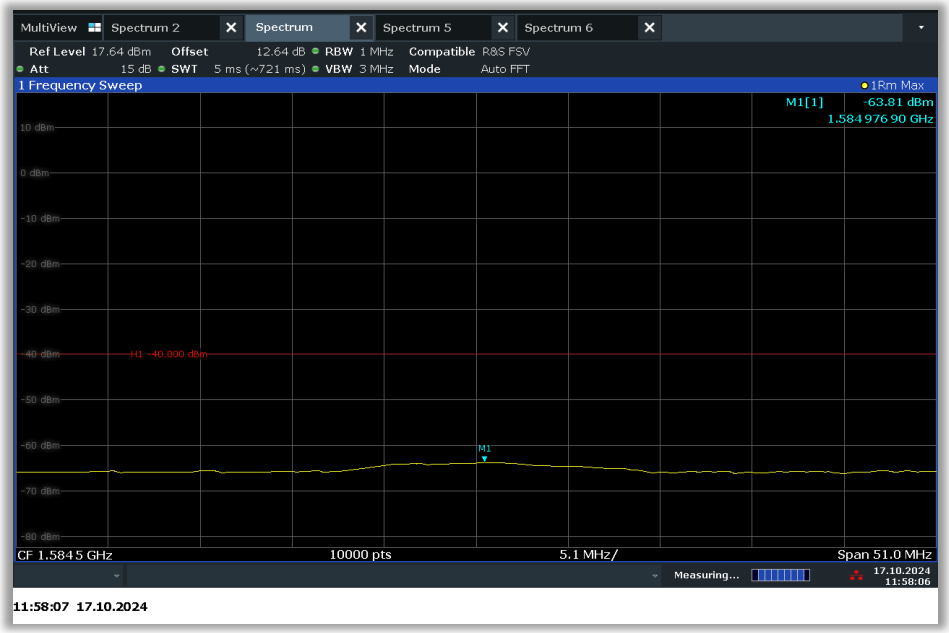
Limit = -46 + 10lg (10/6.25) = -43.96 dBm

LTE Band 14 Uplink 10MHz Bandwidth Middle Channel Conducted Spurious Emissions 799 – 806 MHz

Limit = -46 + 10lg (10/6.25) = -43.96 dBm

LTE Band 14 Uplink 10MHz Bandwidth Middle Channel Conducted Spurious Emissions 775 – 788 MHz

LTE Band 14 Uplink 10MHz Bandwidth Middle Channel Conducted Spurious Emissions 1559 – 1610 MHz (EIRP)



2.7 FREQUENCY STABILITY

2.7.1 Specification Reference

FCC 47 CFR Part 2, Clause 2.1055
FCC 47 CFR Part 90, Clause 90.539(b)
RSS-140, Clause 4.2
KDB935210 D05, Clause 4.8.
RSS-131, Clause 9.4
RSS-119, Clause 5.9

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.

FCC 47 CFR Part 90, Clause 90.539(b):
Transmitters designed to operate in 769–775 MHz and 799–805 MHz frequency bands must meet the frequency stability requirements in this section.
(b) The frequency stability of base transmitters operating in the narrowband segment must be 100 parts per billion or better.

FCC 47 CFR Part 90, Clause 90.213:
(a) Unless noted elsewhere, transmitters used in the services governed by this part must have a minimum frequency stability as specified in the following table:

MINIMUM FREQUENCY STABILITY

[Parts per million (ppm)]

Frequency range (MHz)	Fixed and base stations	Mobile stations	
		Over 2 watts output power	2 watts or less output power
Below 25	[1 2 3] 100	100	200
25–50	20	20	50
72–76	5	.....	50
150–174	[5 11] 5	[6] 5	[4 6] 50
216–220	1.0	.....	1.0
220–222 [12]	0.1	1.5	1.5
421–512	[7 11 14] 2.5	[8] 5	[8] 5
806–809	[14] 1.0	1.5	1.5
809–824	[14] 1.5	2.5	2.5
851–854	1.0	1.5	1.5
854–869	1.5	2.5	2.5
896–901	[14] 0.1	1.5	1.5
902–928	2.5	2.5	2.5
902–928 [13]	2.5	2.5	2.5
929–930	1.5	.....	.....
935–940	0.1	1.5	1.5
1427–1435	[9] 300	300	300
Above 2450 [10]	.....	.....	.....

RSS-140, Clause 4.2:
The frequency stability shall be sufficient to ensure that the occupied bandwidth stays within the operating frequency block when tested to the tmperature and supply voltage variations specified in RSS-Gen.

RSS-119, Clause 5.9:
The frequency error of frequency difference shall not exceed the limits specified in Table 18

Table 18 – Transient Frequency Behaviour

Channel Bandwidth (kHz)	Time Intervals (Notes 1, 2)	Maximum Frequency Difference (kHz)	Transient Duration Limit (ms)	
			138-174 MHz	406.1-512 MHz
25	t_1	±25	5	10
	t_2	±12.5	20	25
	t_3	±25	5	10
12.5	t_1	±12.5	5	10
	t_2	±6.25	20	25
	t_3	±12.5	5	10
6.25	t_1	±6.25	5	10
	t_2	±3.125	20	25
	t_3	±6.25	5	10

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: 544421000144(NU)&541421000038(CU) / Test Configuration A and B

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

October 16, 2024 / MR

2.7.5 Test Equipment Used

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

2.7.6 Environmental Conditions/ Test Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	25.3°C
Relative Humidity	50.3%
ATM Pressure	99.0kPa

2.7.7 Additional Observations

- This is a conducted test.
- The EUT was operated at 120.0VAC nominal voltage and was placed in the temperature chamber for the series of evaluations performed.
- For LTE band 14, test performed in 10 MHz Bandwidth Middle channel as the representative configuration. Input Type "Tones" was selected and the EUT was injected a CW signal from a Signal Generator and maximum frequency error was monitored using the spectrum analyser.
- The Temperature was reduced to -30°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 increased by 10°C steps and allowed to settle before taking the next set of measurements. The EUT was tested over the temperature -30°C to +50°C.
- Voltage variation was also performed at 85% and 115% of the nominal voltage.
- The path loss was measured and entered as a level offset.

2.7.8 Test Results Summary

LTE B14 Downlink – 10 MHz BW Middle Channel				
Voltage (VDC)	**Temperature (°C)**	**Frequency Error (Hz)**	**Frequency Error (ppm)**	**Limit (ppm)**
120	-30	0	0	1.5
	-20	0	0	1.5
	-10	0	0	1.5
	0	0	0	1.5
	+10	0	0	1.5
	+20	0	0	1.5
	+30	0	0	1.5
	+40	0	0	1.5
	+50	0	0	1.5
102	+20	0	0	1.5
138		0	0	1.5

LTE B14 Downlink Frequency Range					
Channel	**Temperature (°C)**	**Voltage (VAC)**	**F_L (MHz)**	**F_H (MHz)**	**Limit (MHz)**
Low Channel	-30	120	758.5897	-	>758
	+20	102	758.5659	-	
		120	758.5472	-	
		138	758.5588	-	
	+50	120	758.5599	-	
High Channel	-30	120	-	767.3942	<768
	+20	102	-	767.3974	
		120	-	767.4331	
		138	-	767.3943	
	+50	120	-	767.3935	

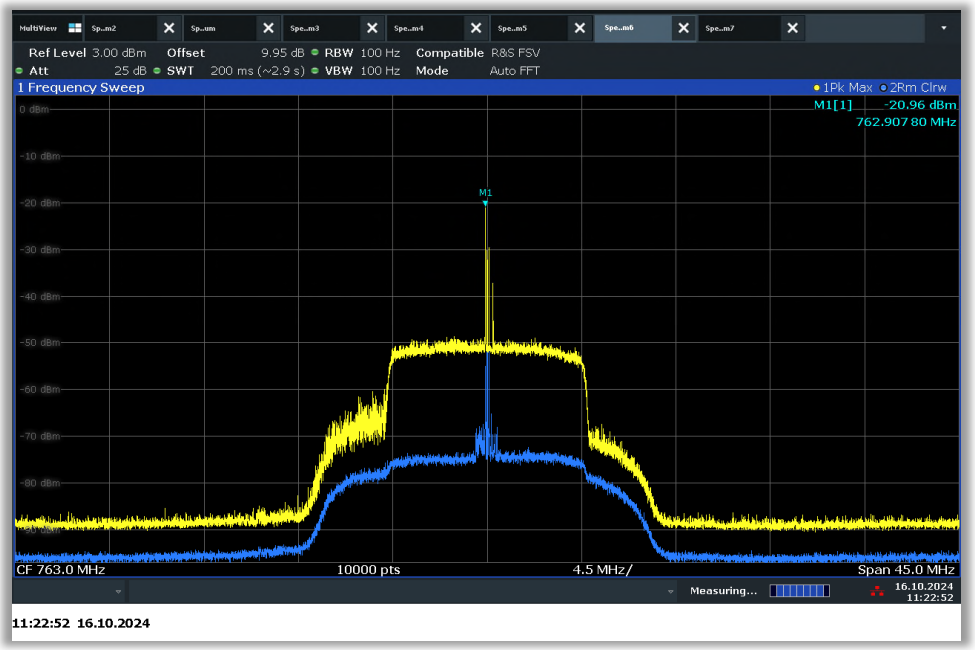
Compliant - The frequency stability of the EUT is sufficient to keep it within the authorized frequency ranges at any temperature interval and voltage variations across the measured range.

LTE B14 Uplink – 10 MHz BW Middle Channel				
Voltage (VDC)	**Temperature (°C)**	**Frequency Error (Hz)**	**Frequency Error (ppm)**	**Limit (ppm)**
120	-30	0	0	1.5
	-20	0	0	1.5
	-10	0	0	1.5
	0	0	0	1.5
	+10	0	0	1.5
	+20	0	0	1.5
	+30	0	0	1.5
	+40	0	0	1.5
	+50	0	0	1.5
102	+20	0	0	1.5
138		0	0	1.5

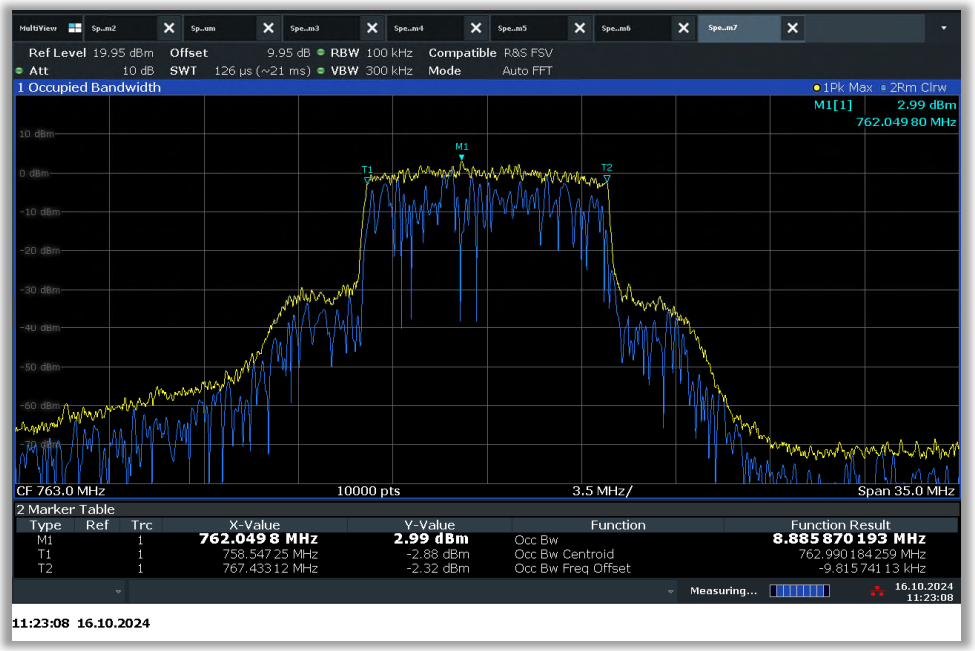
LTE B14 Uplink Frequency Range					
Channel	**Temperature (°C)**	**Voltage (VAC)**	**F_L (MHz)**	**F_H (MHz)**	**Limit (MHz)**
Low Channel	-30	120	788.5312		>788
	+20	102	788.5377		
		120	788.5351		
		138	788.5144		
	+50	120	788.4920		
High Channel	-30	120		797.4218	<798
	+20	102		797.4180	
		120		797.4089	
		138		797.4134	
	+50	120		797.4498	

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

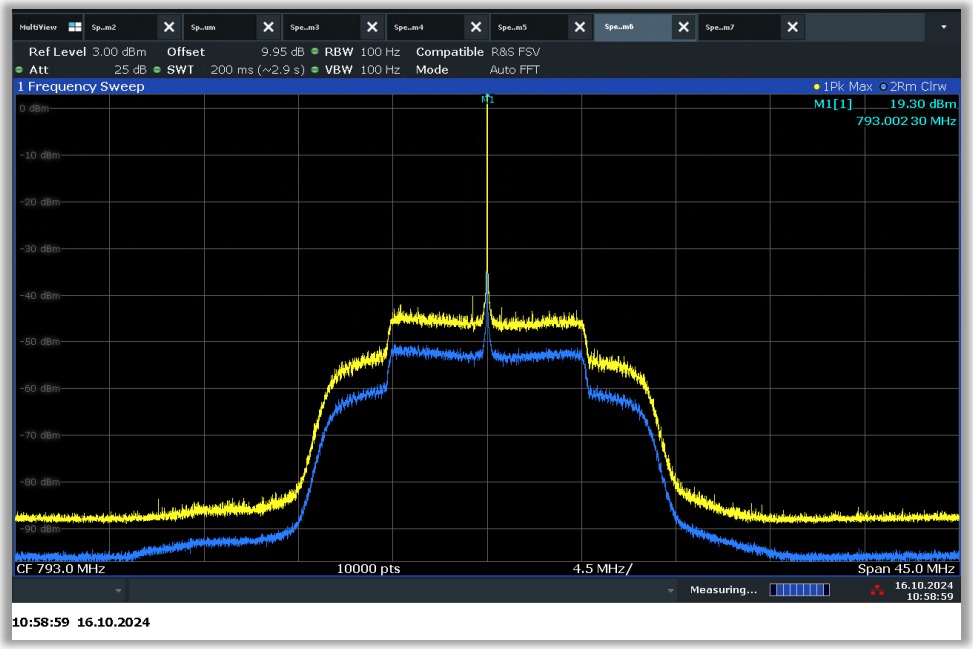
2.7.9 Sample Test Plots



LTE Band 14 Downlink Middle Channel 120VAC @ 20°C



LTE B14 Downlink Middle Channel Low Edge and High Edge @ 20°C Nominal Voltage



LTE Band 14 Uplink Middle Channel 120VAC @ 20°C

LTE B14 Uplink Middle Channel Low Edge and High Edge @ 20°C Nominal Voltage

2.8 AGC THRESHOLD LEVEL

2.8.1 Specification Reference

KDB 935210 D05, Clause 4.2

2.8.2 Standard Applicable

AGC Threshold Level is tested according to KDB 935210 D05, Clause 4.2:

The AGC threshold shall be determined by applying the procedure of 3.2 (of the current KDB), but with the signal generator configured to produce a test signal defined in Table 1, a CW input signal or a digitally modulated signal, consistent with the discussion about signal type in 4.1.

Devices intended for used in 700 MHz Public Safety Broadband spectrum shall be tested using representative band-limited AWGN signal (99% OBW of 4.1 MHz) or the applicable signal type (e.g., LTE)

2.8.3 Equipment Under Test and Modification State

Serial No: 544421000144(NU)&541421000038(CU) / Test Configuration A and B

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

October 15, 2024 / MR

2.8.5 Test Equipment Used

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

2.8.6 Environmental Conditions/ Test Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	24.9°C
Relative Humidity	50.2%
ATM Pressure	99.3kPa

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2.8.7 Additional Observations

- This is a conducted test.
- For LTE Band 14 LTE, 10 MHz bandwidth Signal was used as the applicable test signal type, a power meter was used according to method 4.5.4 of this KDB, and a spectrum analyser was used according to method 4.5.3 with setting as below when testing input power of the EUT:
    a) RBW = 100 kHz, VBW ≥ 3 x RBW
    b) Peak Detector, Trace mode to Max Hold
    c) Span is at least 1 MHz
- 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.

2.8.8 Test Results

LTE Band 14						
Mode	Bandwidth (MHz)	Channel	Frequency (MHz)	Average Power		AGC Threshold Level (dBm)
				(dBm)	(W)	
Downlink	10	5330	763.0	12.40	0.0173780083	-81.2
Uplink	10	23330	793.0	22.13	0.1633051948	-71.6

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2.9 OUT-OF-BAND REJECTION

2.9.1 Specification Reference

KDB 935210 D05, Clause 4.3
RSS-131, Clause 9.1

2.9.2 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 4.3.

2.9.3 Equipment Under Test and Modification State

Serial No: 544421000144(NU)&541421000038(CU) / Test Configuration A and B

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

October 16, 2024 / MR

2.9.5 Test Equipment Used

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

2.9.6 Environmental Conditions/ Test Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	25.3°C
Relative Humidity	44.9%
ATM Pressure	99.3kPa

2.9.7 Additional Observations

- This is a conducted test.
- The path loss was measured and entered as a 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 (CW).
- The CW is 3 dB below the ACG threshold (determined according to section 3.2 and 4.2 of the current KDB), and doesn't activate the AGC threshold throughout the test.
- Dwell time is 10 ms in the Signal Generator
- Frequency Step is 50 kHz.
- RBW is between 1% and 5% of the manufacturer's rated pass band.
- VBW is 3 x RBW.
- Detector is peak and trace is max hold.
- The peak amplitude frequency f_0 is determined and two additional -20 dB markers are determined using the marker-delta method).
- The 20dB Bandwidth plot is recorded as the out-of-band rejection frequency response.
- Both downlink and uplink are tested.

2.9.8 Test Results

LTE Band 14						
Mode	Bandwidth (MHz)	Channel	Frequency (MHz)	-20 dBc Point		20 dB BW (MHz)
				T1 (MHz)	T2 (MHz)	
Downlink	10	5330	763.0	758.134	767.854	9.72
Uplink	10	23330	793.0	788.11	797.866	9.76

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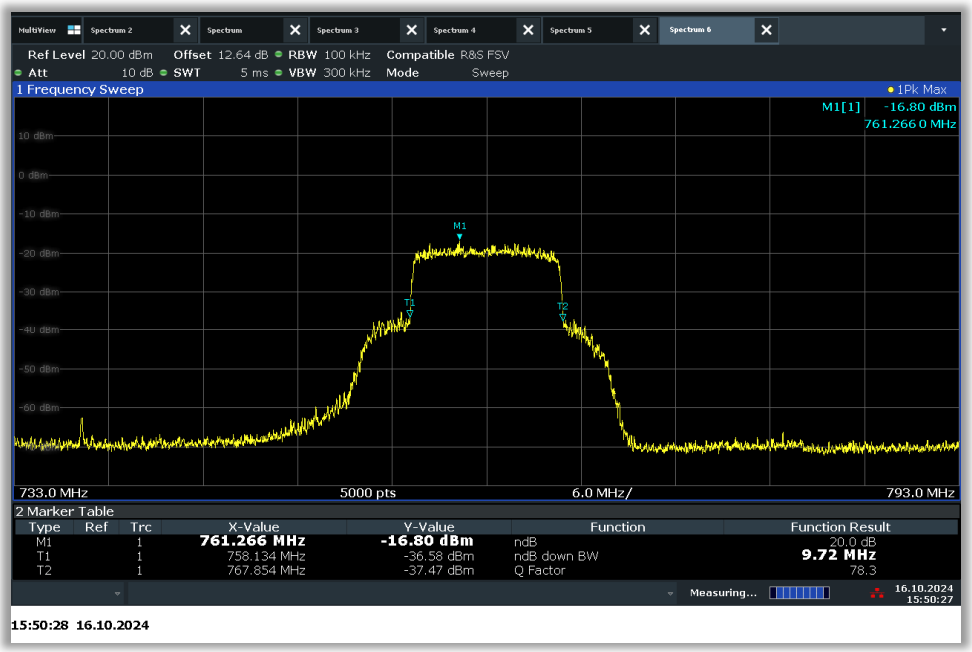
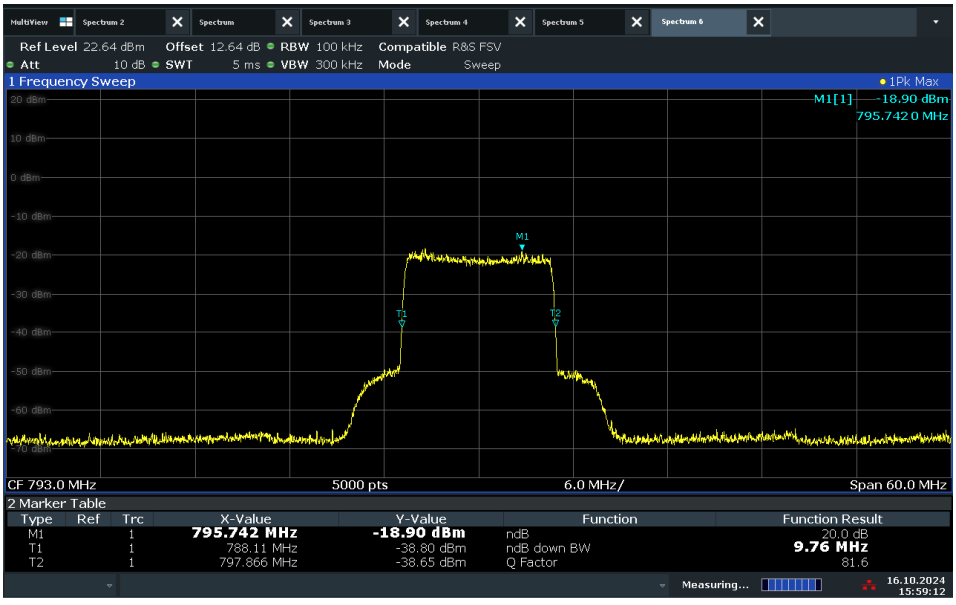
2.9.9 Sample Test Plots

LTE Band 14 Downlink (10 MHz BW) Middle Chl / Out-of-Band Rejection



LTE Band 14 Uplink (10 MHz BW) M Channel / Out-of-Band Rejection



2.10 INPUT-VERSUS-OUTPUT SIGNAL COMPARISON

2.10.1 Specification Reference

FCC 47 CFR Part 90, Clause 90.219 (e)(4)(ii)
RSS-131, Clause 9.2
KDB 935210 D05, Clause 4.4

2.10.2 Standard Applicable

FCC 47 CFR Part 90, Clause 90.219 (e)(4):
(ii) There is no change in the occupied bandwidth of the retransmitted signals.

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.

Input-versus-Output Signal Comparison is tested according to KDB 935210 D05, Clause 4.4.

2.10.3 Equipment Under Test and Modification State

Serial No: 544421000144(NU)&541421000038(CU) / Test Configuration A and B

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

October 15 and 16, 2024 / MR

2.10.5 Test Equipment Used

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

2.10.6 Environmental Conditions/ Test Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	21.0°C	24.9°C
Relative Humidity	30.9%	50.2%
ATM Pressure	98.6kPa	99.4kPa

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2.10.7 Additional Observations

- The path loss was measured and entered as an offset
- For LTE Band 14, the signal generator is configured to transmit LTE 10 MHz Bandwidth signal.
- The signal amplitude is just below the ACG threshold (determined according to section 3.2 and 4.2 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 analyser to accommodate the maximum input amplitude level.
- Detector is positive peak and trace is max hold.
- The peak amplitude frequency f_0 is determined and the 99% occupied bandwidth was measured with the OBW function of spectrum analyser.
- Repeat the testing with the input signal connected directly to the spectrum analyser.
- 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.

2.10.8 Test Results

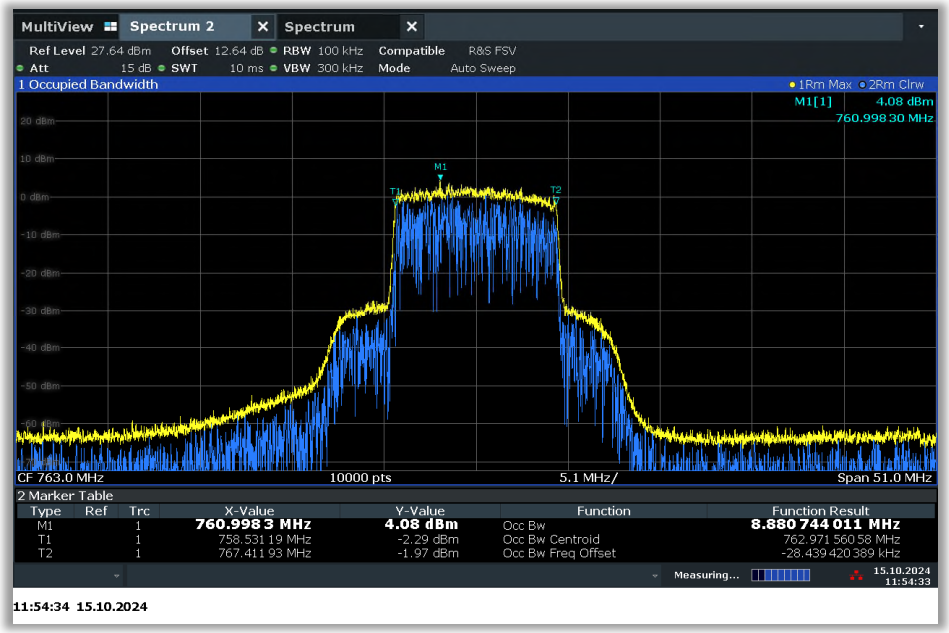
Compliant. There is no spectral growth of OBW and 26 dB bandwidth that is more than than 5% of the input signal spectrum.

LTE Band 14 Downlink							
Signal Level	Bandwidth (MHz)	Channel	Frequency (MHz)	99% OBW (MHz)		-26 dB BW (MHz)	
				Output	Input*	Output	Input*
AGC Threshold Level	10	5330	763.0	8.88	8.95	9.39	9.79
AGC + 3 dB Level				8.84	8.97	9.40	9.55

* Since the AGC Threshold level and AGC + 3 dB level for downlink are as low as -81.2 dBm, which is about the noise floor, the input levels are adjusted to get the right input 99% OBW and -26 dB BW when testing.

LTE Band 14 Uplink							
Signal Level	Bandwidth (MHz)	Channel	Frequency (MHz)	99% OBW (MHz)		-26 dB BW (MHz)	
				Output	Input*	Output	Input*
AGC Threshold Level	10	23330	793.0	8.92	8.96	9.43	9.69
AGC + 3 dB Level				8.91	8.96	9.36	9.86

* Since the AGC Threshold level and AGC + 3 dB level for Uplink are as low as -71.6 dBm, which is close to the noise floor, the input levels are adjusted to get the right input 99% OBW and -26 dB BW when testing.

LTE Band 14 Downlink (10 MHz BW) Mid Channel / 99% OBW at Output port with Input signal at AGC Threshold Level


LTE Band 14 Downlink (10 MHz BW) Mid Channel / 99% OBW at Input port (Adjusted Level)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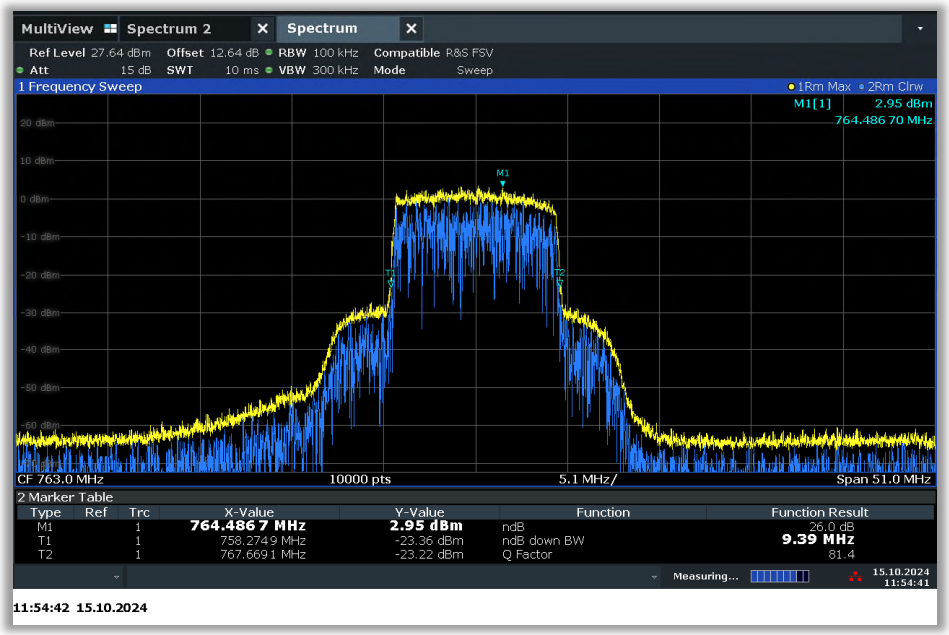
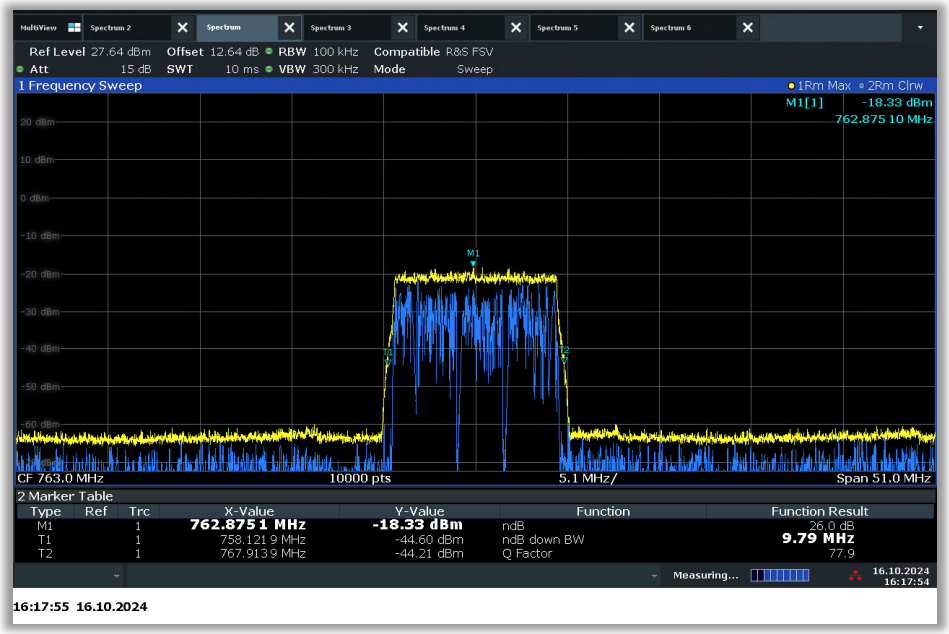
LTE Band 14 Downlink (10 MHz BW) Mid Channel / 26 dB BW at Output port with Input signal at AGC Threshold Level


LTE Band 14 Downlink (10 MHz BW) Mid Channel / 26 dB BW at Input port (Adjusted Level)


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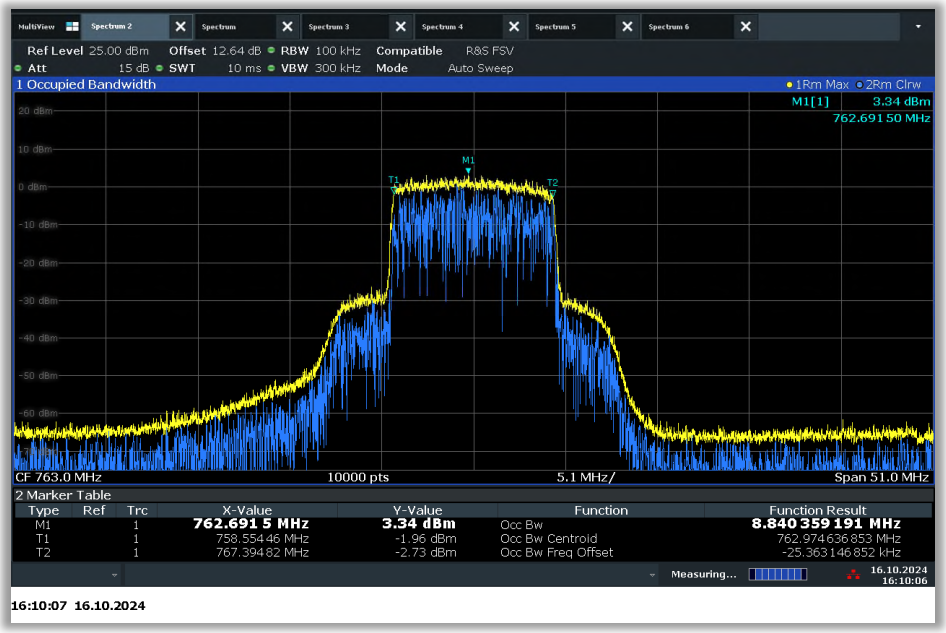
LTE Band 14 Downlink (10 MHz BW) Mid Channel / 99% OBW at Output port with Input signal at AGC + 3 dB Level


LTE Band 14 Downlink (10 MHz BW) Mid Channel / 99% OBW at Input port (Adjusted Level)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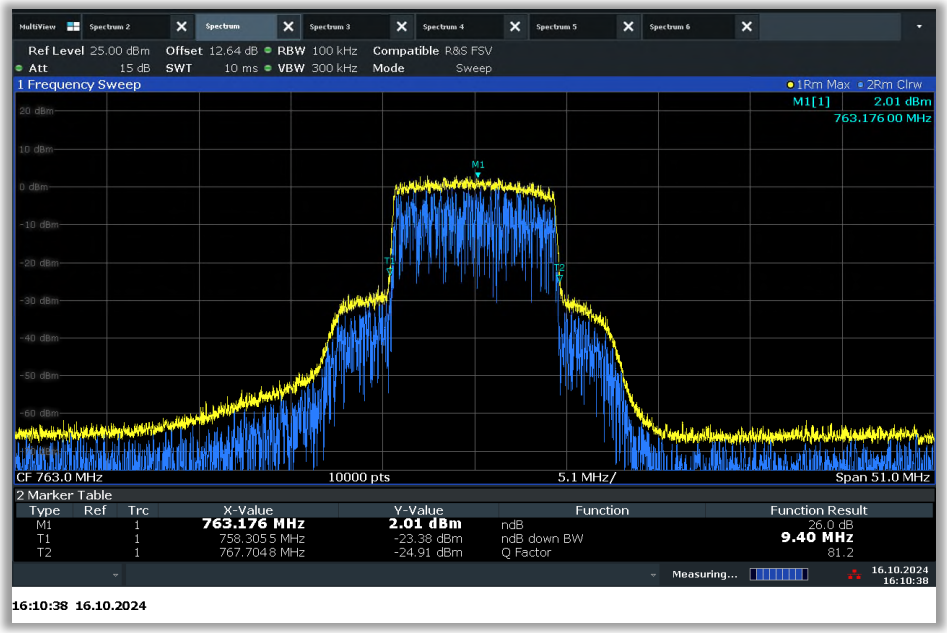
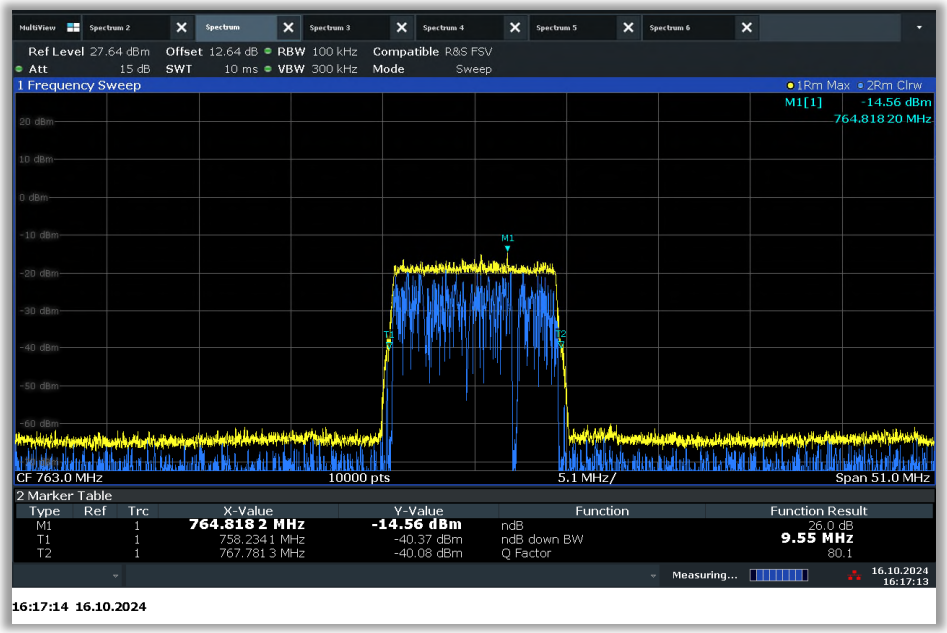
LTE Band 14 Downlink (10 MHz BW) Mid Channel / 26 dB BW at Output port with Input signal at AGC + 3 dB Level


LTE Band 14 Downlink (10 MHz BW) Mid Channel / 26 dB BW at Input port (Adjusted Level)


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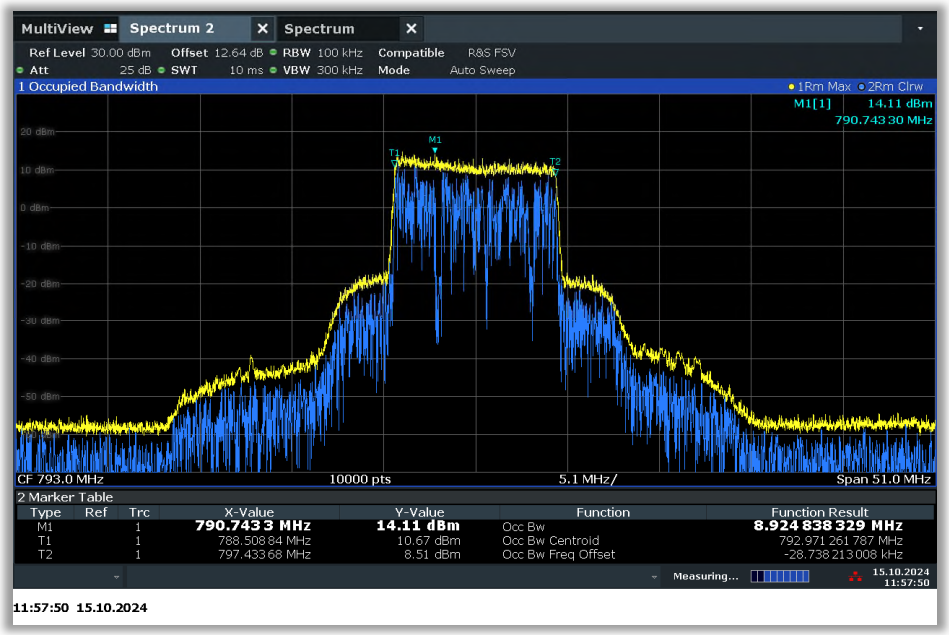
LTE Band 14 Uplink (10 MHz BW) Mid Channel / 99% OBW at Output port with Input signal at AGC Threshold Level

LTE Band 14 Uplink (10 MHz BW) Mid Channel / 99% OBW at Input port (Adjusted Level)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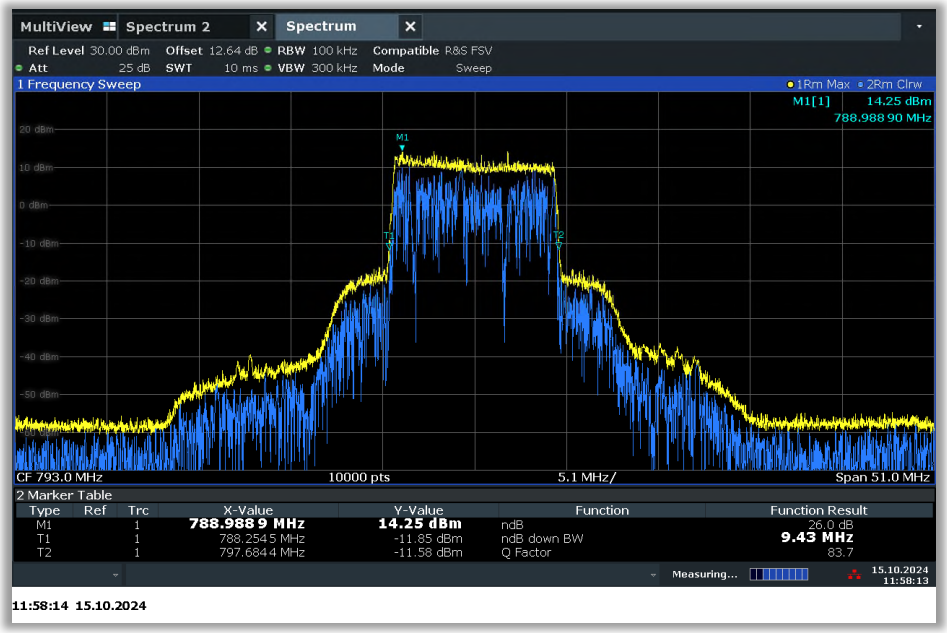
LTE Band 14 Uplink (10 MHz BW) Mid Channel / 26 dB BW at Output port with Input signal at AGC Threshold Level

LTE Band 14 Uplink (10 MHz BW) Mid Channel / 26 dB BW at Input port (Adjusted Level)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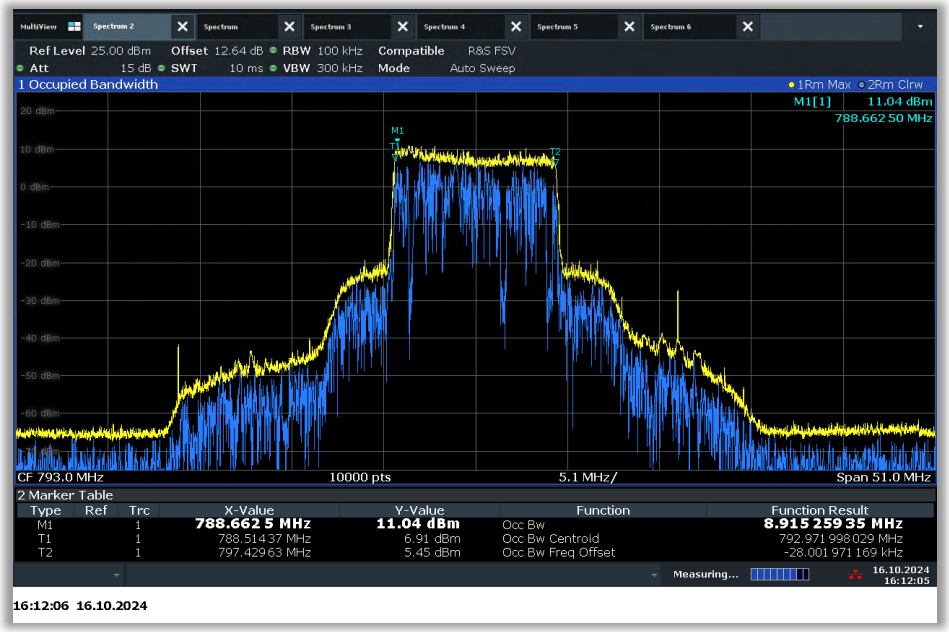
LTE Band 14 Uplink (10 MHz BW) Mid Channel / 99% OBW at Output port with Input signal at AGC + 3 dB Level

LTE Band 14 Uplink (10 MHz BW) Mid Channel / 99% OBW at Input port (Adjusted Level)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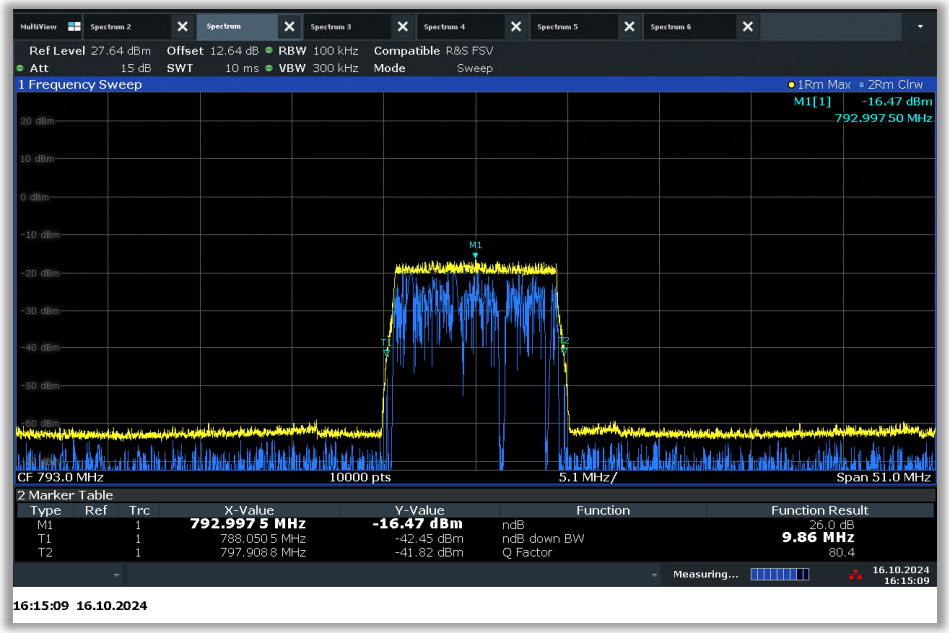
LTE Band 14 Uplink (10 MHz BW) Mid Channel / 26 dB BW at Output port with Input signal at AGC + 3 dB Level


LTE Band 14 Uplink (10 MHz BW) Mid Channel / 26 dB BW at Input port (Adjusted Level)


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2.11 INPUT AND OUTPUT POWER AND AMPLIFIER/BOOSTER GAIN

2.11.1 Specification Reference

FCC 47 CFR Part 90, Clause 90.219(e)(1)
RSS-131, Clause 9.3
KDB 935210 D05, Clause 4.5

2.11.2 Standard Applicable

FCC 47 CFR Part 90, Clause 90.219(e):
(1) The output power capability of a signal booster must be designed for deployments providing a radiated power not exceeding 5 Watts ERP for each retransmitted channel.

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.

2.11.3 Equipment Under Test and Modification State

Serial No: 544421000144(NU)&541421000038(CU) / Test Configuration A and B

2.11.4 Date of Test/Initial of test Personnel Who Performed The Test

October 15, 2024 / MR

2.11.5 Test Equipment Used

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

2.11.6 Environmental Conditions/ Test Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	24.9°C
Relative Humidity	50.2%
ATM Pressure	99.3kPa

2.11.7 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.
- For LTE B14, the signal generator was configured for LTE 10 MHz signal as the intended operating signal type.
- A power meter was used to measure the power according to KDB 935210 D05 clause 4.5.3.
- Both downlink and uplink are tested.

2.11.8 Test Results

Compliant. The booster gain does not exceed the nominal gain (95 dB for LTE B14) by more than 1.0 dB.

LTE Band 14 Input and Output Power and Gain						
Mode	**Bandwidth (MHz)**	**Channel**	**Frequency (MHz)**	**AGC Threshold Input (dBm)**	**Output Power (dBm)**	**Booster Gain (dB)**
Downlink	10	5330	763.0	-81.2	12.40	93.6
Uplink	10	23330	793.0	-71.6	22.13	93.73

LTE Band 14 Input and Output Power and Gain						
Mode	**Bandwidth (MHz)**	**Channel**	**Frequency (MHz)**	**AGC Threshold + 3dB Input (dBm)**	**Output Power (dBm)**	**Booster Gain (dB)**
Downlink	10	5330	763.0	-78.2	12.41	90.61
Uplink	10	23330	793.0	-68.6	22.00	90.6

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2.12 NOISE FIGURE

2.12.1 Specification Reference

FCC 47 CFR Part 90, Clause 90.219 (e)(2)
KDB 935210 D05, Clause 4.6
RSS-131, Clause 10.4

2.12.2 Standard Applicable

FCC Part 90.219 (e)(2):
The noise figure of a signal booster must not exceed 9 dB in either direction.

RSS-131, Clause 10.4:
Zone enhancers working with equipment certified under RSS-119 shall comply with the following noise limits:

The noise figure of a zone enhancer shall not exceed 9 dB in either direction.

2.12.3 Equipment Under Test and Modification State

Serial No: 544421000144(NU)&541421000038(CU) / Test Configuration A and B

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

October 17, 2024 / MR

2.12.5 Test Equipment Used

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

2.12.6 Environmental Conditions/ Test Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	23.0°C
Relative Humidity	44.8%
ATM Pressure	99.1kPa

2.12.7 Additional Observations

- The path loss was measured and entered as an offset.
- For LTE Band 14, 10 MHz Bandwidth LTE was tested as representative configuration. The Downlink and Uplink Gains are measured with a LTE signal injected to the device under test.
- The input of the EUT is terminated when measuring the noise output.
- The spectrum analyser was set to 100 trace average in RMS mode.
- RBW is 1 MHz, VBW is > 3 x RBW.
- Channel power was recorded.
- The noise figure was calculated using the following formula:

  Noise Figure (NF) = N – Gain + 174 dB – $10\lg_{10}$(B)

  - N = Noise Power Output in dBm/MHz
  - Gain = Gain of the device under test
  - B = Resolution Bandwidth of spectrum analyzer in Hz
  - 174 = Thermal noise for 1 Hz RBW at room temperature

- Both Downlink and Uplink are tested.

2.12.8 Test Results

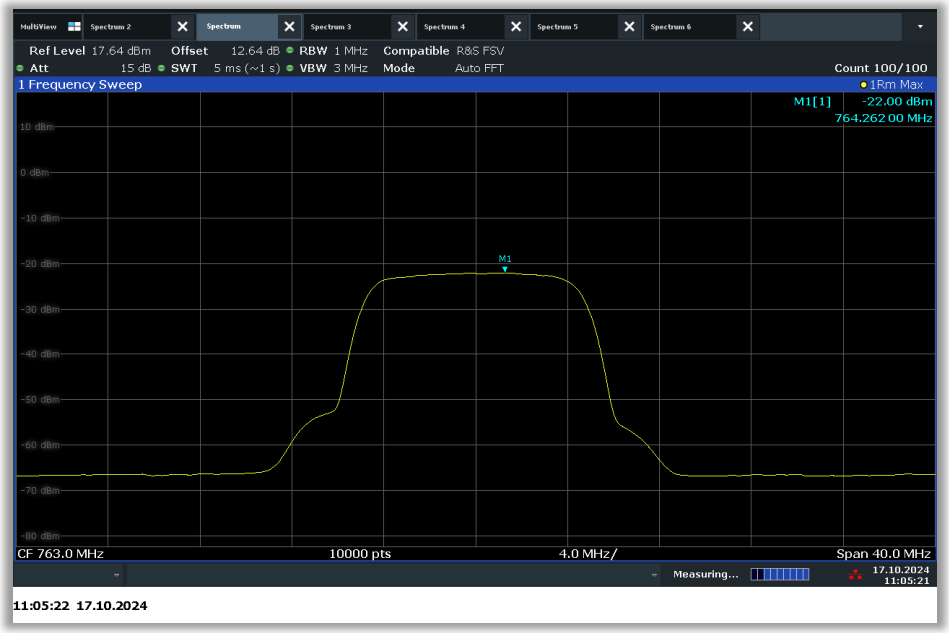
LTE Band 14 Booster Gain					
Mode	**Bandwidth (MHz)**	**Frequency (MHz)**	**Input Power (dBm)**	**Output Power (dBm/MHz)**	**Gain (dB)**
Downlink	10	763.0	-81.2	12.40	93.6
Uplink	10	793.0	-71.6	22.13	93.73

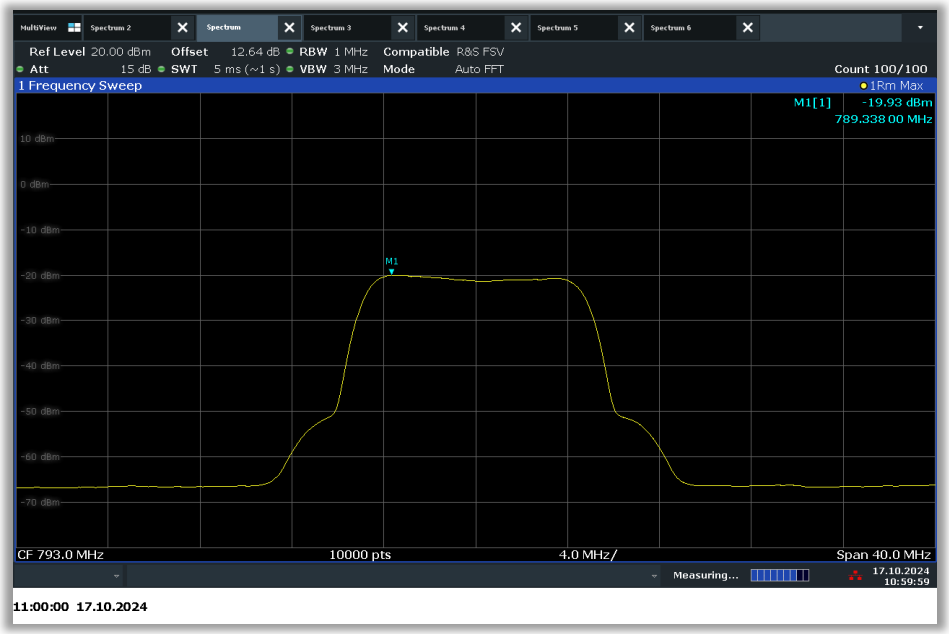
LTE Band 14 Noise Figure							
Mode	**Bandwidth (MHz)**	**Frequency (MHz)**	**RBW (MHz)**	**Noise Output (dBm/MHz)**	**Booster Gain (dB)**	**Noise Figure (dB)**	**Limit (dB)**
Downlink	10	763.0	1	-22.0	93.6	-1.6	9
Uplink	10	793.0	1	-19.93	93.73	4.09	9

.

Downlink Noise Figure = N – Gain + 174 dB – $10\lg_{10}$(B)
= -22.0 – 93.6 + 174 dB – $10\lg_{10}$(B)
= -1.6 dB

Uplink Noise Figure = N – Gain + 174 dB – $10\lg_{10}$(B)
= -19.93 – 93.73 + 174 dB – $10\lg_{10}$(B)
= 4.09 dB

LTE Band 14 Downlink (10 MHz BW) Middle Channel / Noise Output


LTE Band 14 Uplink (10 MHz BW) Middle Channel / Noise Output


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

2.13.1 Specification Reference

FCC 47 CFR Part 2, Clause 2.1051
FCC 47 CFR Part 90, Clause 90.219(e)(3)
FCC 47 CFR Part 90, Clause 90.543(c)
RSS-140, Clause 4.4
RSS-119, Clause 5.8.9.2
KDB 935210 D05, Clause 4.7
RSS-131, Clause 10.3.

2.13.2 Standard Applicable

FCC 47 CFR Part 90.219(e):
(3) Spurious emission from a signal booster must not exceed -13 dBm within any 100kHz measureemnt bandwith.

FCC 47 CFR Part 90.543:
(c) Out-of-band emission limit. On any frequency outside of the frequency ranges covered by the ACP tables in this section, the power of any emission must be reduced below the mean output power (P) by at least 43 + 10 log (p) dB in a 100 kHz bandwidth for frequencies less than 1 GHz, and in a 1 MHz bandwidth for frequencies greater than 1 GHz.

RSS-140, Clause 4.4 Transmitter unwanted emissions limits:
The power of any unwanted emission outside the bands 758-768 MHz and 788-798 MHz shall be attenuated below the transmitter output power P in dBW as follows, where p is the transmitter output power in watts:
a. For any frequency between 769-775 MHz and 799-806 MHz:
i 76 + 10 log (p), dB in a 6.25 kHz band for fixed and base station equipment
ii 65 + 10 log (p), dB in a 6.25 kHz band for mobile and portable/hand-held equipment

b For any frequency between 775-788 MHz, above 806 MHz, and below 758 MHz: 43 + 10 log (p), dB in a bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency bands 758-768 MHz and 788-798 MHz, a resolution bandwidth of 30 kHz may be employed.

In addition, the equivalent isotropically radiated power (e.i.r.p.) of all emissions, including harmonics in the band 1559-1610 MHz, shall not exceed −70 dBW/MHz for wideband emissions, and −80 dBW/kHz for discrete emissions of less than 700 Hz bandwidth.
For LTE Band 41, out-of-Band/Out-of-Block and spurious emissions is tested according to KDB 935210 D05, Clause 3.6.

RSS-119, Clause 5.8.9.2 Out-of-Band Emission Limit:
On any frequency outside of the ranges specified in the ACP tables 13 to 16, the power of any emission shall be attenuated below the mean output power P (dBW) by at least 43 + 10 log10(p), measured in a 100 kHz bandwidth for frequencies less than or equal to 1 GHz, and in a 1 MHz bandwidth for frequencies greater than 1 GHz.

In addition, for operations in the bands 768-776 MHz and 798-806 MHz, all emissions (including harmonics in the band 1559-1610 MHz), shall not exceed:
-70 dBW/MHz equivalent isotropically radiated power (e.i.r.p.) for wideband emissions, and
-80 dBW/kHz e.i.r.p. for discrete emissions of less than 700 Hz bandwidth

RSS-131, Clause 10.3:
The effective radiated power (ERP) of the intermodulation products shall not exceed -30 dBm in a 10 KHz measurement bandwidth.

2.13.3 Equipment Under Test and Modification State

Serial No: 544421000144(NU)&541421000038(CU) / Test Configuration A and B

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

October 16 / MR

2.13.5 Test Equipment Used

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

2.13.6 Environmental Conditions/ Test Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	25.9°C
Relative Humidity	51.6%
ATM Pressure	98.9kPa

2.13.7 Additional Observations

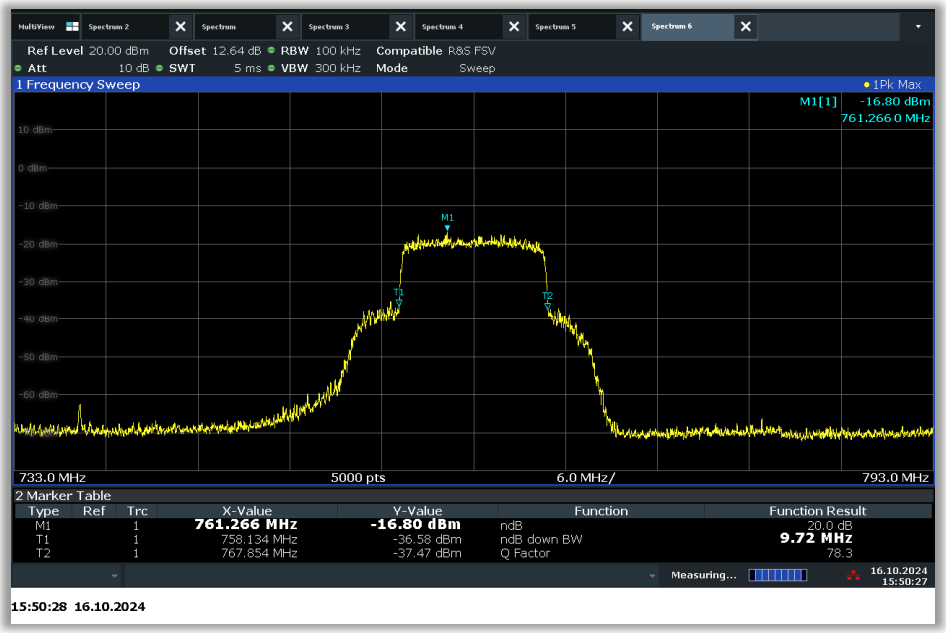
- The path loss was measured and entered as an offset.
- 10 MHz Bandwidth was tested as representative configuration for LTE Band 14
- For spurious emissions, the spectrum analyser was set to peak detector and trace is max hold.
- RBW is 100 kHz, VBW is > 3 x RBW.
- Intermodulation-product spurious emission measurements are not required for LTE Band 14 since it only support single-channel boosters and can't accommodate two simultaneous signals within the pass band.
- Both Downlink and Uplink are tested.

2.13.8 Test Results

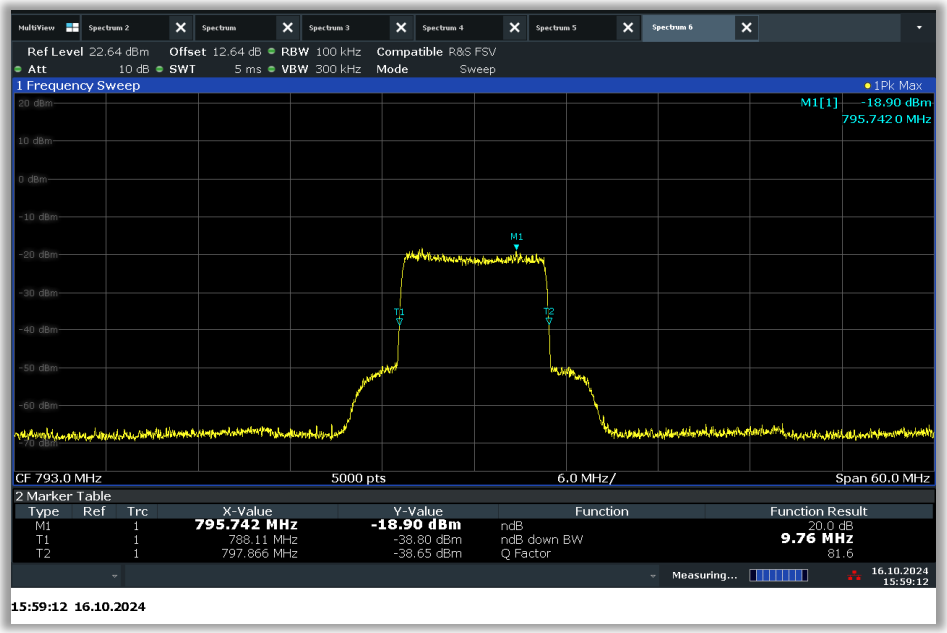
Compliant. Intermodulation product spurious emission measurements are not required for LTE Band 14 since it only supports single-channel boosters and can't accommodate two simultaneous signals within the pass band

2.13.9 Sample Test Plots

LTE Band 14 Downlink (10 MHz BW) Middle Channel / Spurious Emissions



LTE Band 14 Uplink (10 MHz BW) Middle Channel / Spurious Emissions



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2.14 FIELD STRENGTH OF SPURIOUS EMISSIONS

2.14.1 Specification Reference

FCC 47 CFR Part 2, Clause 2.1053
FCC 47 CFR Part 90, Clause 90.219(e)(3)
FCC 47 CFR Part 90, Clause 90.543(e)(1)(3)(f)
KDB 935210 D05, Clause 4.9

2.14.2 Standard Applicable

FCC 47 CFR Part 90, Clause 90.219(e)(3)

(e) Device Specifications. In addition to the general rules for equipment certification in § 90.203(a)(2) and part 2, subpart J of this chapter, a signal booster must also meet the rules in this paragraph.

(3) Spurious emissions from a signal booster must not exceed −13 dBm within any 100 kHz measurement bandwidth.

FCC 47 CFR Part 90, Clause 90.543(e)(1)(3)(f)

(e) For operations in the 758–768 MHz and the 788–798 MHz bands, 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:

(1) On all frequencies between 769–775 MHz and 799–805 MHz, by a factor not less than 76 + 10 log (P) dB in a 6.25 kHz band segment, for base and fixed stations.

(3) On any frequency between 775–788 MHz, above 805 MHz, and below 758 MHz, by at least 43 + 10 log (P) dB.

(f) For operations in the 758–775 MHz and 788–805 MHz bands, all emissions including harmonics in the band 1559–1610 MHz shall be limited to −70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and −80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

2.14.3 Equipment Under Test and Modification State.

Serial No: 544421000144(NU)&541421000038(CU) / Test Configuration C

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

October 19, 2024 / MR

2.14.5 Test Equipment Used.

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

2.14.6 Environmental Conditions

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	25.9°C
Relative Humidity	51.6%
ATM Pressure	98.9kPa

2.14.7 Additional Observations

- This is a radiated test. The spectrum was searched covering 30MHz up to the 10th harmonic of the highest frequency radio from each configuration.
- EUT was tested on Burnin Mode which consists in all antennas transmitting at the same time as worst case scenario.
- Measurement was done using EMC 32 automated software for radiated method. Reported level is the actual level with all the correction factors factored in. the Correction Factor column is for informational purposes only.
- Fundamental from Bluetooth and LTE radios are ignored.
- No significant emissions were observed above 18G

2.14.8 Limit Conversion Example.

-13dBm erp to Field strength at 3m

Using equation: E (dBµV/m) = ERP (dBm) - 20log(D) + 104.8 + 2.15; where D is the measurement distance (in the far field region) in m.

-13dBm ERP = 84.4 dBµV/m at 3m distance.

2.14.9 Sample Computation (Radiated Emission 30 MHz to 1 GHz).

Measuring equipment raw measurement (dbµV) @ 30 MHz			24.4
Correction Factor (dB/m)	Asset# 1026 (cable)	0.8	-7.0
	Asset# 1057 (cable)	0.2	
	Asset# 1016 (preamplifier)	-30.8	
	Asset# 8850 (cable)	0.2	
	Asset# 1033 (antenna)	17.2	
	Asset# 8771 (6-dB attenuator)	5.4	
Reported QuasiPeak Final Measurement (dbµV/m) @ 30MHz			**17.4**

2.14.10 Sample Computation (Radiated Emissions above 1 GHz).

Measuring equipment raw measurement (dbµV) @ 2629 MHz			37.59
Correction Factor (dB/m)	Asset# 1016 (preamplifier)	-31.9	3
	Asset# 1175(cable)	2.5	
	Asset# 7631 (antenna)	32.4	
Reported Peak Final Measurement (dbµV/m) @ 30MHz			**40.59**

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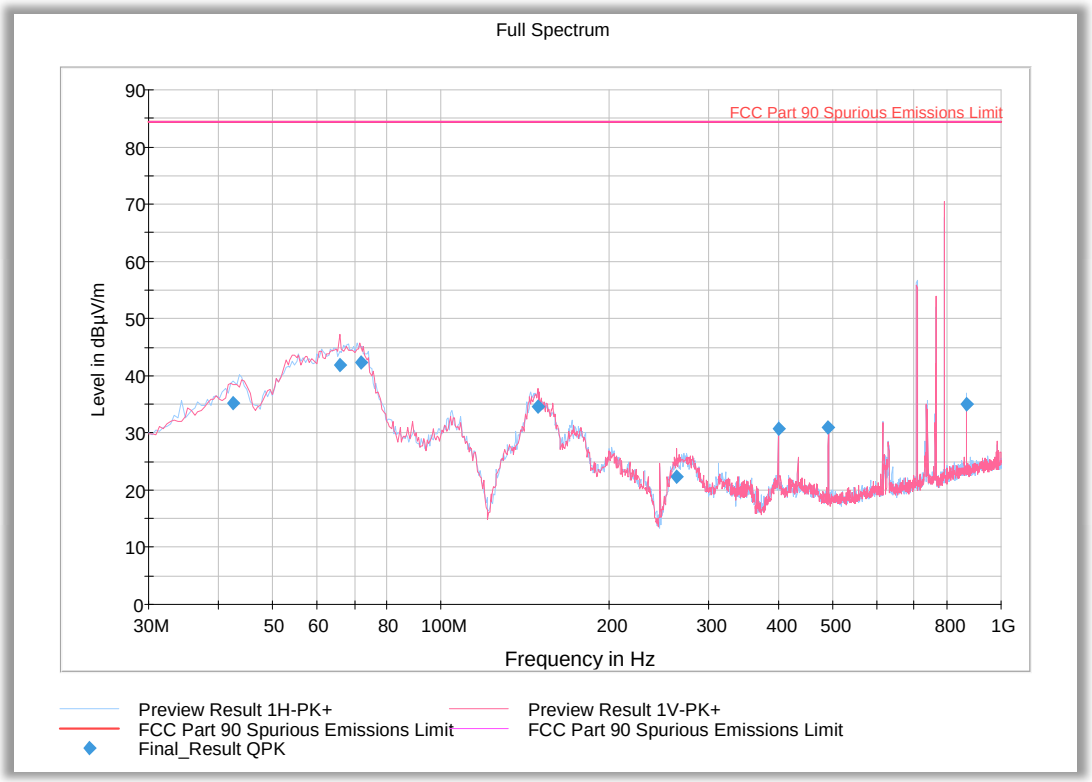
2.14.11 FCC Part 90 Test Results 30 MHz to 1 GHz (NU).



Quasi Peak Data

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
42.490000	35.29	84.40	49.11	1000.0	120.000	116.0	H	198.0	-11.0
66.130000	41.83	84.40	42.57	1000.0	120.000	112.0	V	216.0	-14.4
71.790000	42.27	84.40	42.13	1000.0	120.000	150.0	V	238.0	-15.3
148.905000	34.53	84.40	49.87	1000.0	120.000	104.0	V	153.0	-13.9
263.125000	22.27	84.40	62.13	1000.0	120.000	185.0	V	41.0	-8.6
400.015000	30.80	84.40	53.60	1000.0	120.000	113.0	H	347.0	-5.3
491.520000	30.84	84.40	53.56	1000.0	120.000	104.0	V	106.0	-3.4
867.070000	35.04	84.40	49.36	1000.0	120.000	103.0	H	274.0	3.8

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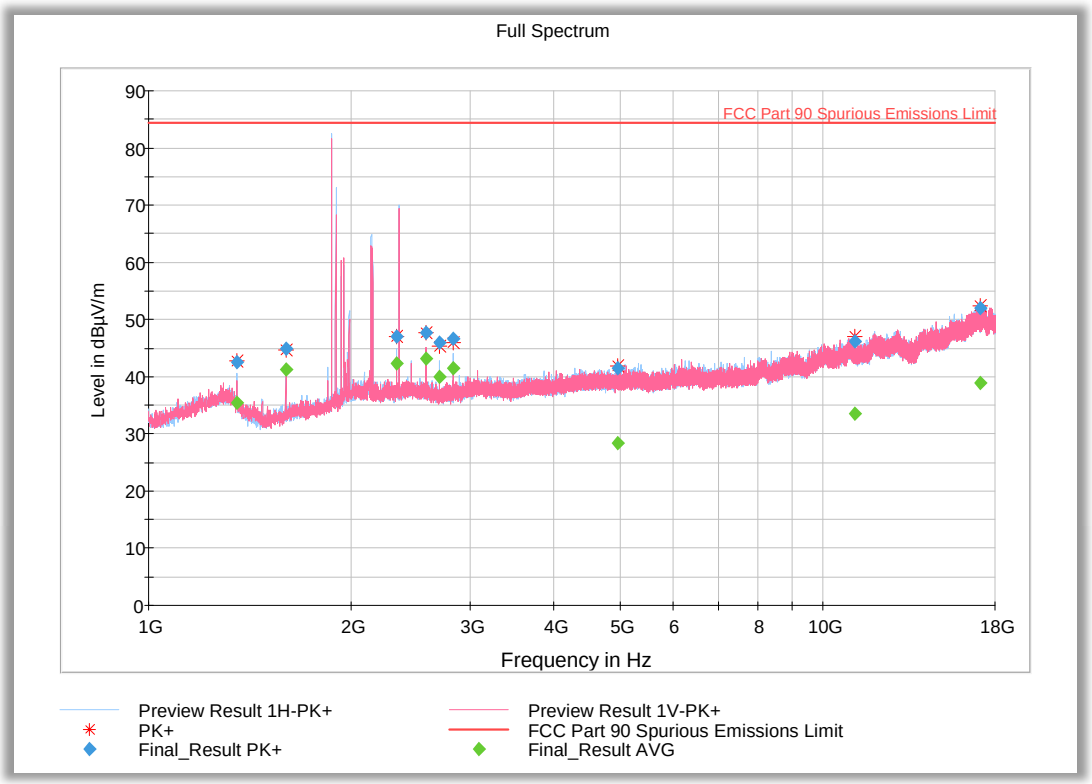
2.14.12 FCC Part 90 Test Results 1GHz to 18GHz (NU).



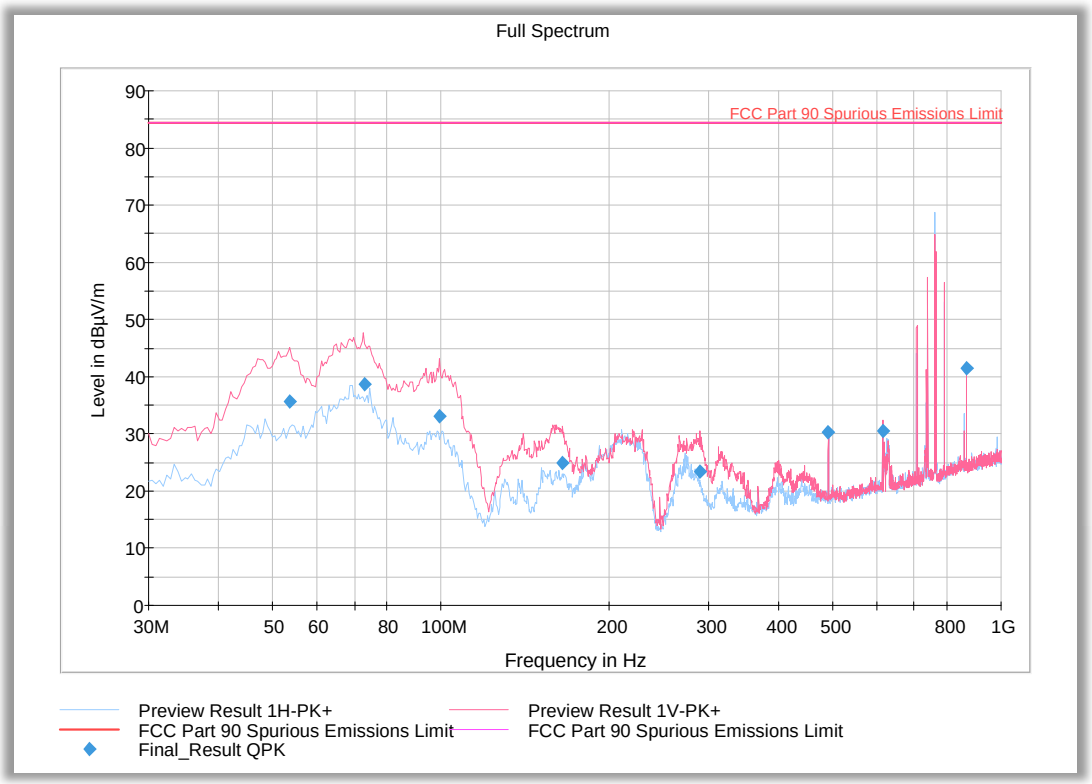
Peak Data

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1351.733333	42.48	84.40	41.92	1000.0	1000.000	378.0	H	86.0	-5.4
1597.266667	44.82	84.40	39.58	1000.0	1000.000	191.0	H	33.0	-6.3
2334.900000	46.99	84.40	37.41	1000.0	1000.000	136.0	H	118.0	-1.3
2580.433333	47.72	84.40	36.68	1000.0	1000.000	201.0	V	160.0	-0.3
2703.233333	45.99	84.40	38.41	1000.0	1000.000	102.0	H	109.0	-0.3
2826.366667	46.60	84.40	37.80	1000.0	1000.000	227.0	H	63.0	-0.1
4974.600000	41.49	84.40	42.91	1000.0	1000.000	407.0	V	273.0	4.5
11159.766667	46.20	84.40	38.20	1000.0	1000.000	390.0	V	88.0	14.7

Average Data

Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1351.733333	35.38	84.40	49.02	1000.0	1000.000	378.0	H	86.0	-5.4
1597.266667	41.25	84.40	43.15	1000.0	1000.000	191.0	H	33.0	-6.3
2334.900000	42.35	84.40	42.05	1000.0	1000.000	136.0	H	118.0	-1.3
2580.433333	43.21	84.40	41.19	1000.0	1000.000	201.0	V	160.0	-0.3
2703.233333	39.90	84.40	44.5	1000.0	1000.000	102.0	H	109.0	-0.3
2826.366667	41.54	84.40	42.86	1000.0	1000.000	227.0	H	63.0	-0.1
4974.600000	28.35	84.40	56.05	1000.0	1000.000	407.0	V	273.0	4.5
11159.766667	33.61	84.40	50.79	1000.0	1000.000	390.0	V	88.0	14.7

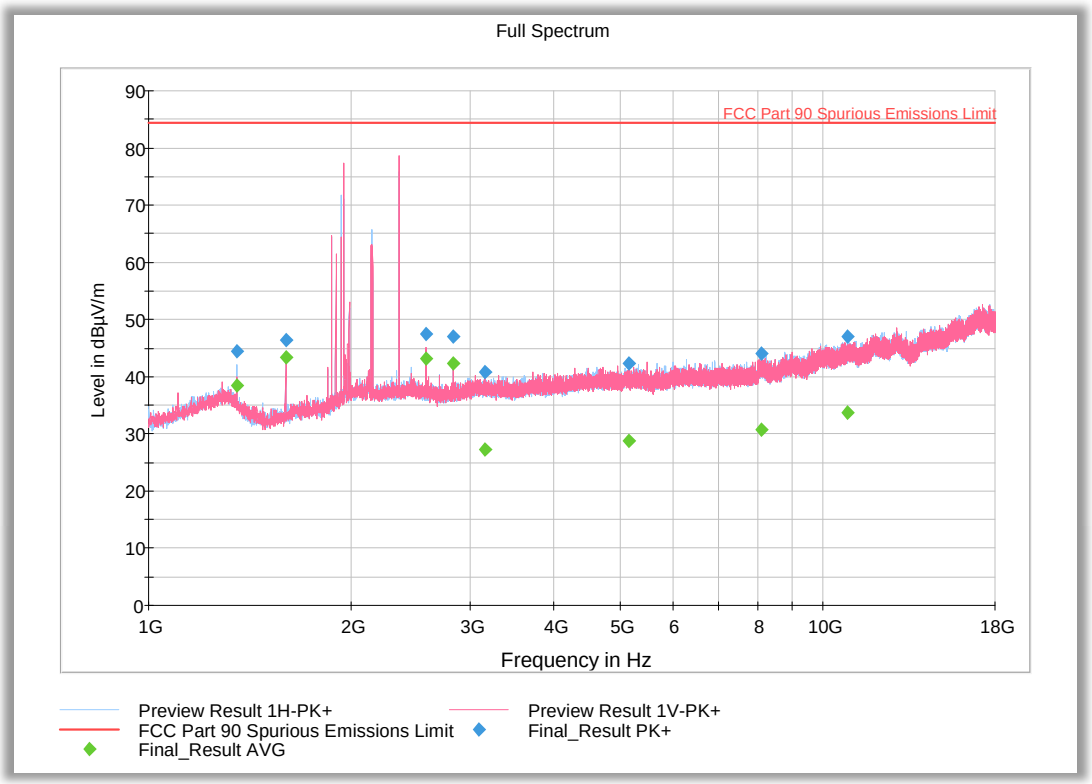
2.14.13 FCC Part 90 Test Results 30 MHz to 1 GHz (CU).



Quasi Peak Data

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
53.565000	35.57	84.40	48.83	1000.0	120.000	117.0	V	152.0	-11.0
72.880000	38.66	84.40	45.74	1000.0	120.000	108.0	V	240.0	-15.3
99.315000	33.08	84.40	51.32	1000.0	120.000	111.0	V	14.0	-9.8
164.470000	24.98	84.40	59.42	1000.0	120.000	100.0	V	173.0	-13.2
289.800000	23.46	84.40	60.94	1000.0	120.000	101.0	V	315.0	-8.2
491.520000	30.23	84.40	54.17	1000.0	120.000	103.0	V	7.0	-3.4
614.385000	30.49	84.40	53.91	1000.0	120.000	100.0	V	206.0	-1.1
867.070000	41.38	84.40	43.02	1000.0	120.000	103.0	V	262.0	3.8

2.14.14 FCC Part 90 Test Results 1 GHz to 18 GHz (CU).



Peak Data

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1351.733333	44.41	84.40	39.99	1000.0	1000.000	205.0	H	-11.0	-5.4
1597.266667	46.33	84.40	38.07	1000.0	1000.000	278.0	V	56.0	-6.3
2580.433333	47.51	84.40	36.89	1000.0	1000.000	189.0	V	62.0	-0.3
2826.200000	47.06	84.40	37.34	1000.0	1000.000	194.0	H	18.0	-0.1
3154.633333	40.74	84.40	43.66	1000.0	1000.000	229.0	H	56.0	0.9
5162.733333	42.40	84.40	42.00	1000.0	1000.000	150.0	V	2.0	5.1
8104.466667	43.96	84.40	40.44	1000.0	1000.000	291.0	H	50.0	8.9
10869.533333	46.95	84.40	37.45	1000.0	1000.000	399.0	H	-9.0	14.1

Average Data (§15.209 Limits)

Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1351.733333	38.53	84.40	45.87	1000.0	1000.000	205.0	H	-11.0	-5.4
1597.266667	43.29	84.40	41.11	1000.0	1000.000	278.0	V	56.0	-6.3
2580.433333	43.27	84.40	41.13	1000.0	1000.000	189.0	V	62.0	-0.3
2826.200000	42.26	84.40	42.14	1000.0	1000.000	194.0	H	18.0	-0.1
3154.633333	27.28	84.40	57.12	1000.0	1000.000	229.0	H	56.0	0.9
5162.733333	28.77	84.40	55.63	1000.0	1000.000	150.0	V	2.0	5.1
8104.466667	30.72	84.40	53.68	1000.0	1000.000	291.0	H	50.0	8.9
10869.533333	33.65	84.40	50.75	1000.0	1000.000	399.0	H	-9.0	14.1

SECTION 3

TEST DETAILS

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3.1 TEST EQUIPMENT USED

List of absolute measuring and other principal items of test equipment.

3.1.1 Conducted Emissions Test Equipment

ID Number (SDGE/SDRB)	Test Equipment	Type	Serial Number	Manufacturer	Cal Date
Antenna Conducted Port Setup					
7608	Vector Signal Generator	SMBV100A	259021	Rhode & Schwarz	10/03/2025
7582	Signal/Spectrum Analyzer	FSW26	101614	Rohde & Schwarz	12/21/2023
-	Power Splitter	ZN2PD2-50-S+	SUU27701207	Mini Circuits	Verified with (7608) and (7582)
7610	DFS Radar Simulator and Analyzer*	Aeroflex 3005	30050A/09L	Aeroflex	NCR (for signaling purposes only)
-	20dB Attenuator	5W DC-18GHz 20dB (ATX3518-20)	N/A	MCL	Verified by 7608 and 7582
7662	Power Meter	N1911A	MY451000951	Agilent	04/04/2024
7605	Wideband Power Meter	N1921A	MY51100054	Agilent	04/14/2024
8848	Step Attenuator	RSP	834500/009	Rhode & Schwarz	Verified by 7608 and 7582
-	Directional Coupler	4226-20	N/A	Narda	Verified by 7608 and 7582
Radiated Spurious Emissions					
1033	BiConiLog Antenna	3142C	00044556	ETS Lindgren	10/16/25
68302	EMI Test Receiver	ESW44	103418	Rohde & Schwarz	07/02/25
51235	RF Pre-Amp (9kHz to 1GHz)	310	412802	Sonoma	08/14/25
68301	EMI Test Receiver	ESW44	103417	Rohde & Schwarz	07/05/25
30181	1-18GHz DRG Horn	3117	155511	ETS-Lindgren	08/20/26
8628	Pre-Amplifier	QLJ-01182835-JO	8986002	Quinstar	02/19/25
9001	Horn antenna (18-26.5GHz)	HO42S	101	Custom Microwave	10/26/25
40815	18GHz to 40GHz Low Noise Amplifier	SLKKa-30-6	19D18	Spacek Labs	10/22/25
Miscellaneous					
43003	True RMS Multimeter	85 III	96880143	Fluke	01/09/2025
7579	Temperature Chamber	115	151617	TestQuity	01/24/25
6672	D.C. Power Supply	E3611A	KR73012637	Hewlett Packard	NCR
68516	Barometric Pressure/Humidity/Temperature Sensor	SD700	A.107085	Extech Instruments	08/24/25
-	Test Software	EMC32	V11.50.0	Rhode & Schwarz	NCR

SECTION 4

MEASUREMENT UNCERTAINTY

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

4.1 MEASUREMENT UNCERTAINTY

For a 95% confidence level, the measurement uncertainties for defined systems are:

4.1.1 CONDUCTED ANTENNA PORT MEASUREMENT

	Input Quantity (Contribution) X_i	Value		Prob. Dist.	Divisor	$u_i(x)$	$u_i(x)^2$
1	Receiver reading	0.10	dB	Normal, k=1	1.000	0.10	0.01
2	Cable attenuation	1.00	dB	Normal, k=2	2.000	0.50	0.25
3	Received sinewave accuracy	0.07	dB	Normal, k=2	2.000	0.04	0.00
4	Receiver pulse amplitude	0.00	dB	Rectangular	1.732	0.00	0.00
5	Receiver pulse repetition rate	0.00	dB	Rectangular	1.732	0.00	0.00
6	Noise floor proximity	0.00	dB	Rectangular	1.732	0.00	0.00
7	Frequency interpolation	0.10	dB	Rectangular	1.732	0.06	0.00
8	Mismatch	0.07	dB	U-shaped	1.414	0.05	0.00
	Combined standard uncertainty			Normal		0.52	dB
	Expanded uncertainty			Normal, k=2		**1.03**	**dB**

4.1.2 Radiated Measurements (30MHz to 1 GHz).

Input Quantity (Contribution) Xi	Value		Prob. Dist.	Divisor	ui(x)	ui(x)2
Receiver reading	0.10	dB	Normal, k=1	1.000	0.10	0.01
Attenuation: antenna-receiver	0.20	dB	Normal, k=2	2.000	0.10	0.01
Antenna factor AF	0.75	dB	Normal, k=2	2.000	0.38	0.14
Receiver sinewave accuracy	1.10	dB	Normal, k=2	2.000	0.55	0.30
Receiver pulse amplitude	1.50	dB	Rectangular	1.732	0.87	0.75
Receiver pulse repetition rate	1.50	dB	Rectangular	1.732	0.87	0.75
Noise floor proximity	0.50	dB	Rectangular	1.732	0.29	0.08
Mismatch: antenna-receiver	0.95	dB	U-shaped	1.414	0.67	0.45
AF frequency interpolation	0.30	dB	Rectangular	1.732	0.17	0.03
AF height deviations	0.10	dB	Rectangular	1.732	0.06	0.00
Directivity difference at 3 m	3.12	dB	Rectangular	1.732	1.80	3.24
Phase center location at 3 m	1.00	dB	Rectangular	1.732	0.58	0.33
Cross-polarisation	0.90	dB	Rectangular	1.732	0.52	0.27
Balance	0.00	dB	Rectangular	1.732	0.00	0.00
Site imperfections	3.64	dB	Triangular	2.449	1.49	2.21
Separation distance at 3 m	0.30	dB	Rectangular	1.732	0.17	0.03
Effect of setup table material	0.40	dB	Rectangular	1.732	0.23	0.05
Table height at 3 m	0.10	dB	Normal, k=2	2.000	0.05	0.00
Near-field effects	0.00	dB	Triangular	2.449	0.00	0.00
Effect of ambient noise on OATS	0.00	dB				0.00
Combined standard uncertainty			Normal	2.95	dB	
Expanded uncertainty			Normal, k=2	5.89	dB	

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4.1.3 Radiated Emissions Measurements (Above 1GHz).

Input Quantity (Contribution) X_i	Value		Prob. Dist.	Divisor	$u_i(x)$	$u_i(x)^2$
Receiver reading	0.10	dB	Normal, k=1	1.000	0.10	0.01
Attenuation: antenna-receiver	0.30	dB	Normal, k=2	2.000	0.15	0.02
Preamplifier Gain	0.20	dB	Normal, k=2	2.000	0.10	0.01
Antenna factor AF	0.37	dB	Normal, k=2	2.000	0.19	0.03
Sinewave accuracy	0.57	dB	Normal, k=2	2.000	0.29	0.08
Instability of preamp gain	1.21	dB	Rectangular	1.732	0.70	0.49
Noise floor proximity	0.70	dB	Rectangular	1.732	0.40	0.16
Mismatch: antenna-preamplifier	1.41	dB	U-shaped	1.414	1.00	0.99
Mismatch: preamplifier-receiver	1.30	dB	U-shaped	1.414	0.92	0.85
AF frequency interpolation	0.30	dB	Rectangular	1.732	0.17	0.03
Directivity difference at 3 m	1.50	dB	Rectangular	1.732	0.87	0.75
Phase center location at 3 m	0.30	dB	Rectangular	1.732	0.17	0.03
Cross-polarisation	0.90	dB	Rectangular	1.732	0.52	0.27
Site imperfections VSWR (Method 2)	4.16	dB	Triangular	2.449	1.70	2.89
Effect of setup table material	1.15	dB	Rectangular	1.732	0.66	0.44
Separation distance at 3 m	0.30	dB	Rectangular	1.732	0.17	0.03
Table height at 3 m	0.00	dB	Normal, k=1	2.000	0.00	0.00
Combined standard uncertainty			Normal	2.66	dB	
Expanded uncertainty			Normal, k=2	5.32	dB	

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SECTION 5

DIAGRAM OF TEST SETUP

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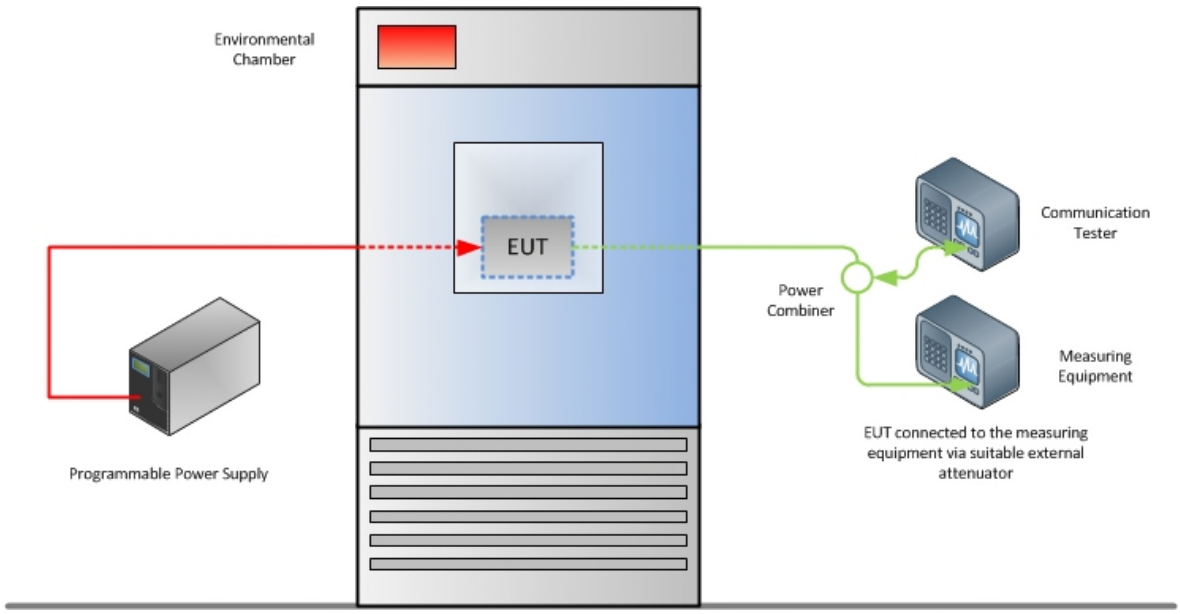
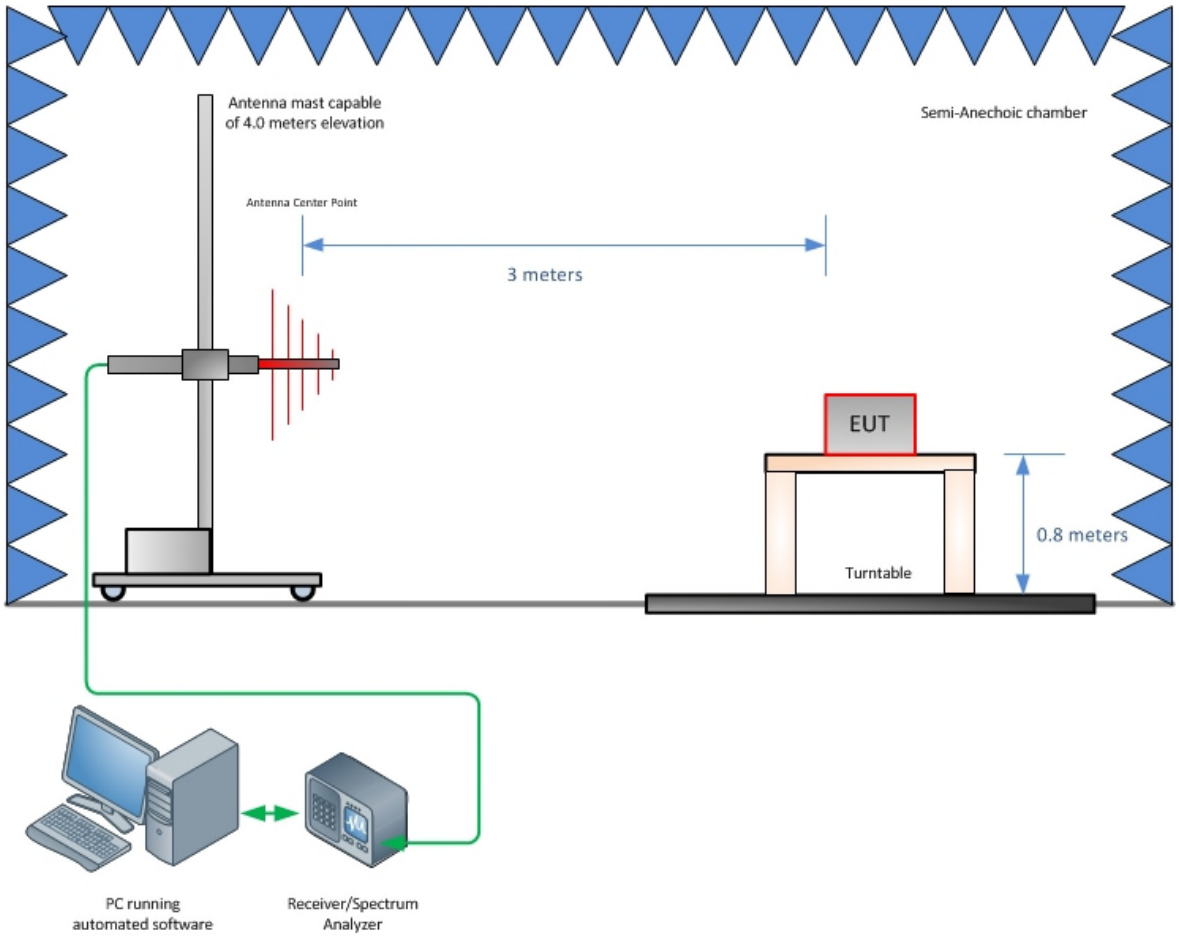
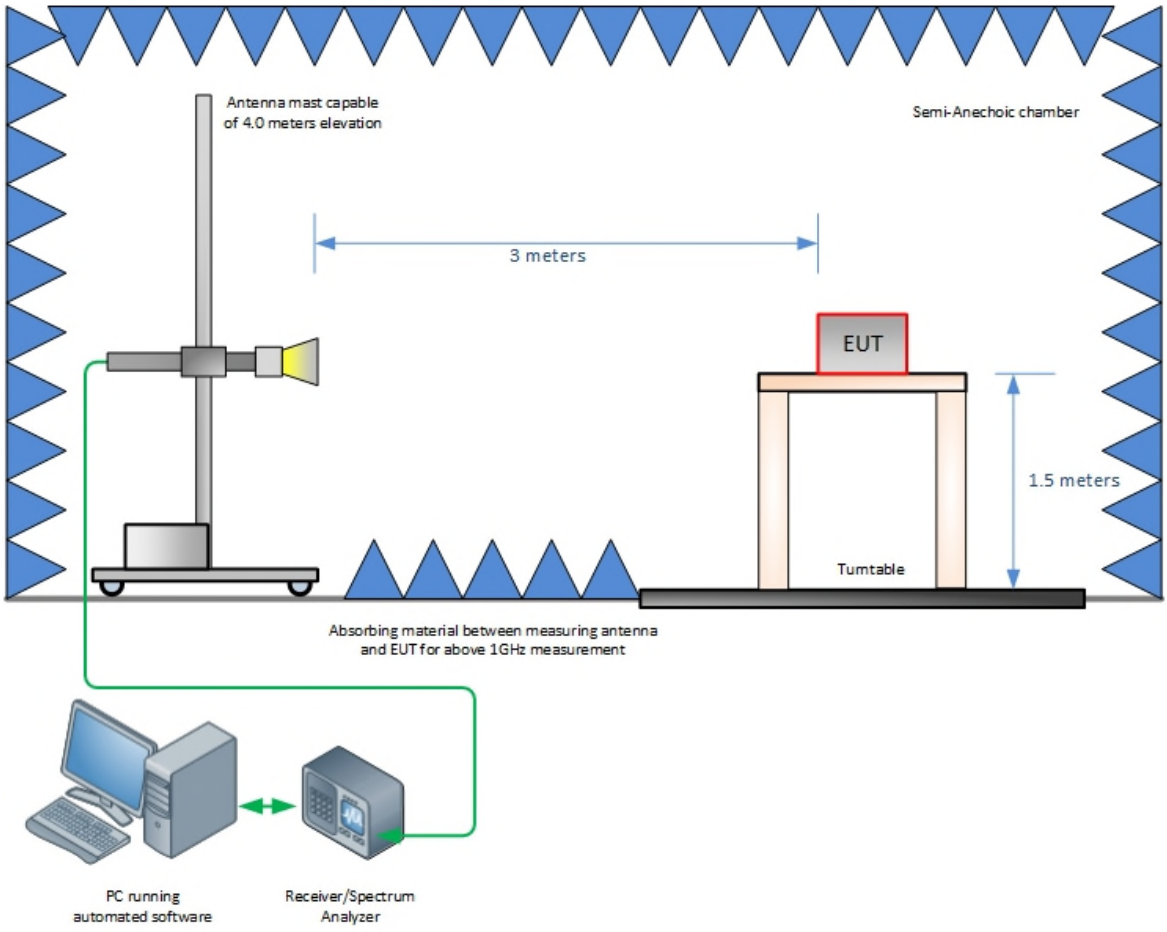
5.1 TEST SETUP DIAGRAM



Frequency Stability Test Configuration



Radiated Emission Test Setup (Below 1GHz)



Radiated Emission Test Setup (Above 1GHz)

SECTION 6

ACCREDITATION, DISCLAIMERS AND COPYRIGHT

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