

RF Test Report

Project Number: 4997926**Offer Number:** SUW-202207003065**Report Number:** 4997926EMC01**Revision Level:** 1**Client:** Vanu Inc.**Equipment Under Test:** Anywave LTE BTS**Model Number:** VA60003-0001**FCC ID:** RD6-VA60003-0001**Applicable Standards:** ANSI C63.26:2014

Part 2, Part 22(H), Part 24(E), Part 27

RSS-132 Issue 3; RSS-133 Issue 6

RSS-139, Issue 4; RSS-GEN, Issue 5

Report issued on: 13 February 2023**Test Result:** Compliant

FOR THE SCOPE OF ACCREDITATION UNDER CERTIFICATE NUMBER: 3212.01

This report must not be used by the client to claim product certification, approval, or endorsement by A2LA, NIST, or any agency of the Federal Government.

Prepared by:

A handwritten signature in blue ink that reads 'Andrew Bluhm'.

Andrew Bluhm, Jr RF/EMC Engineer

Reviewed by:

A handwritten signature in blue ink that reads 'Martin Taylor'.

Martin Taylor, Project Engineer

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1 Summary of Test Results

Reference Sections		Test Description	Test Condition	Test Result
FCC	ISED			
2.1046	RSS-GEN (6.12)	Conducted Output Power	Conducted	Compliant
24.232(d) 27.50(d)(5)	RSS-132 (5.4) RSS-133 (6.4) RSS-139 (5.5)	Peak-to-Average Ratio		Compliant
2.1049(h) 22.917(b) 24.238(b) 27.53(h)	RSS-GEN (6.7)	Occupied Bandwidth		Reported
2.1051 22.917(a) / (b) 24.238(a) / (b) 27.53(h)	RSS-132 (5.5) RSS-133 (6.5) RSS-139 (5.6)	Band Edge / Conducted Spurious Emissions		Compliant
22.913(a)	--	Effective Radiated Power	Radiated	Compliant
2.1046(a) 24.232(c) 27.50(d)(4)	RSS-132 (5.4) RSS-133 (6.4) RSS-139 (5.5)	Equivalent Isotropically Radiated Power		Compliant
2.1053 22.917(a) / (b) 24.238(a) / (b) 27.53(h)	RSS-GEN (6.13) RSS-132 (5.5) RSS-133 (6.5.1) RSS-139 (5.6)	Radiated Spurious Emissions		Compliant
2.1055 22.355 24.235 27.54	RSS-GEN (6.11) RSS-132 (5.3) RSS-133 (6.3) RSS-139 (5.4)	Frequency Stability		Compliant

1.1 Modifications Required to Compliance

None

2 General Information

2.1 Client Information

Name: Vanu Inc.
Address: 81 Hartwell Ave Suite 200
City, State, Zip, Country: Lexington, MA 02421

2.2 Test Laboratory

Name: SGS North America, Inc.
Address: 620 Old Peachtree Road NW, Suite 100
City, State, Zip, Country: Suwanee, GA 30024, USA

Accrediting Body: A2LA
Type of lab: Testing Laboratory
Certificate Number: 3212.01
Designation Number: US1126
CAB Identifier: US0186

2.3 General Information of EUT

Product Description: Anywave LTE BTS
Model Number: VA60003-0001
Serial Number: 194216006

Modes of Operation: LTE Bands 2/4/5 (Downlink Channels)

Antenna Type: N/A
Test Voltage: 120Vac 60Hz
Rated Voltage: 120Vac 50-60Hz

Sample Received Date: 25 August 2022
Dates of testing: 01 - 29 September 2022

2.4 Description of Test Modes

The EUT was tested under normal operating conditions. Commands provided were sent to operate in LTE Bands 2, 4, and 5 on low, middle, and high downlink channels at maximum power. The device was set to transmit continuously.

3 RF Output Power / Effective Radiated Power

3.1 Test Result

Test Description	Specification		Test Result
	FCC	ISED	
RF Output Power	2.1046	RSS-GEN (6.12)	Compliant
Effective Radiated Power	22.913(a)	--	Compliant
Effective Isotropic Radiated Power	2.1046(a) 24.232(c) 27.50(d)(4)	RSS-132 (5.4) RSS-133 (6.4) RSS-139 (5.5)	Compliant

3.2 Test Method

The device was sent commands to tell it which band/channel to operate on. The measurements were conducted at the low, middle, and high downlink channel.

3.3 Test Site

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 21.6 °C

Relative Humidity: 50.8 %

Atmospheric Pressure: 98.22 kPa

3.4 Test Equipment

Test End Date: 13-Sep-2022

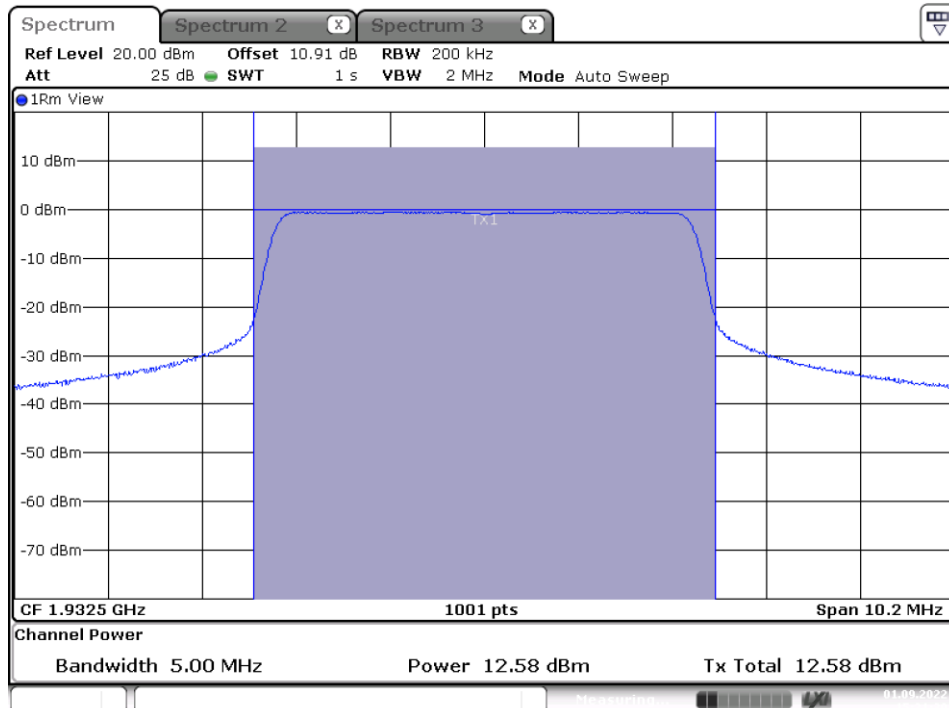
Tester: AB

Equipment	Model	Manufacturer	Asset Number	Cal Date	Cal Due Date
RF CABLE, SMA TO N	LL142	CENTRICRF	19011	16-Mar-2022	16-Mar-2023
ATTENUATOR, 10DB (TS8997)	10DB	ROHDE & SCHWARZ	B095593	12-May-2022	12-May-2023
SIGNAL ANALYZER (TS8997)	FSV30	ROHDE & SCHWARZ	B085749	4-Jan-2022	4-Jan-2024

3.5 Test Data - LTE Band 2

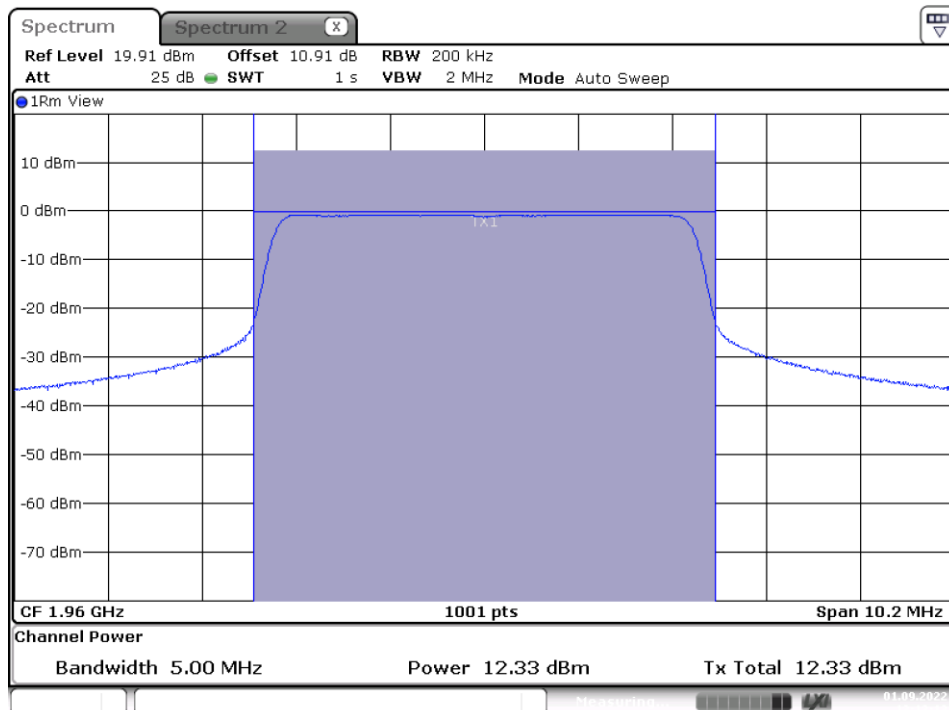
Max Power: 12.58dBm

LCH



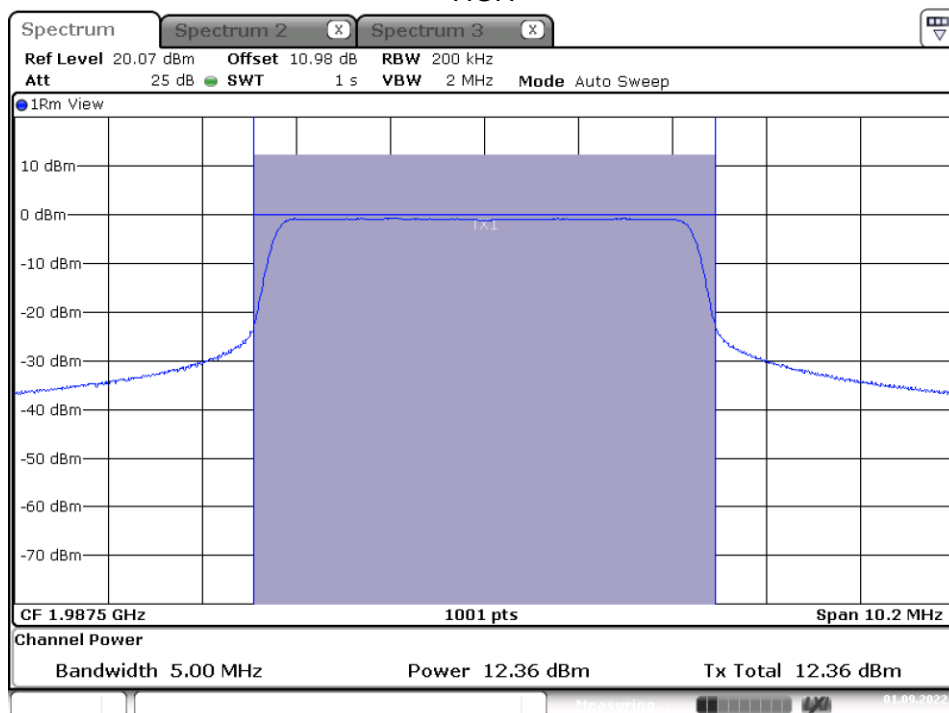
Date: 1.SEP.2022 15:21:30

MCH



Date: 1.SEP.2022 13:13:13

HCH

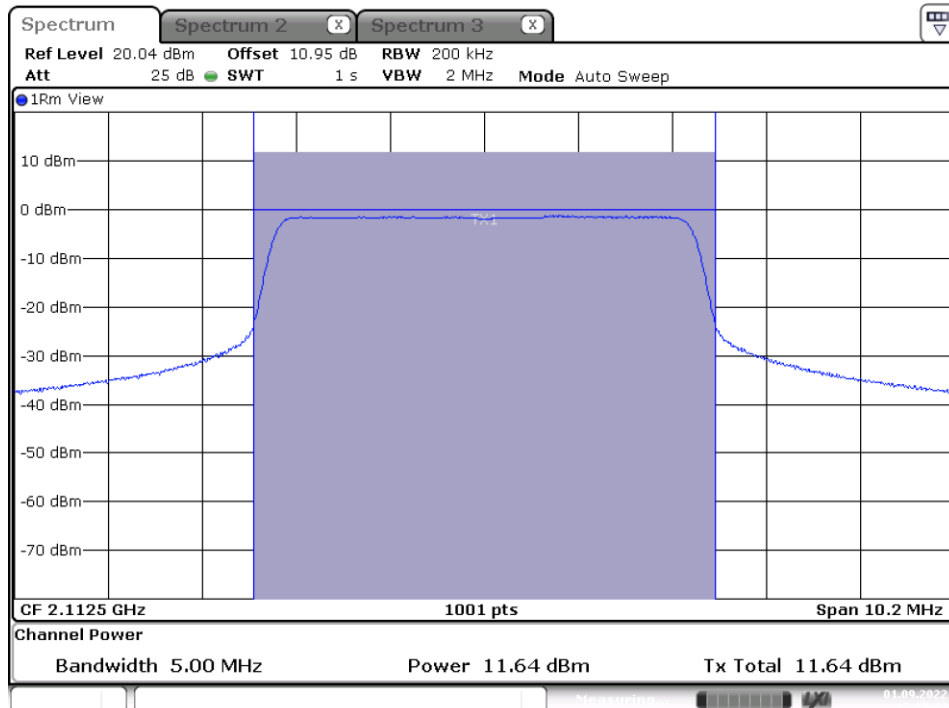


Date: 1.SEP.2022 15:26:15

3.6 Test Data - LTE Band 4

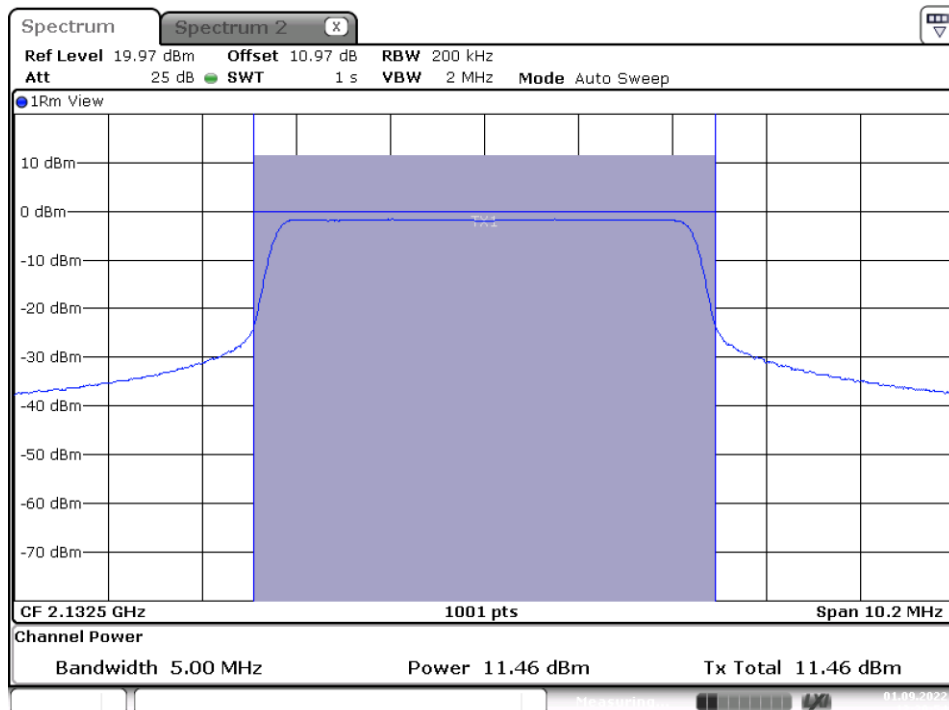
Max Power: 11.64dBm

LCH



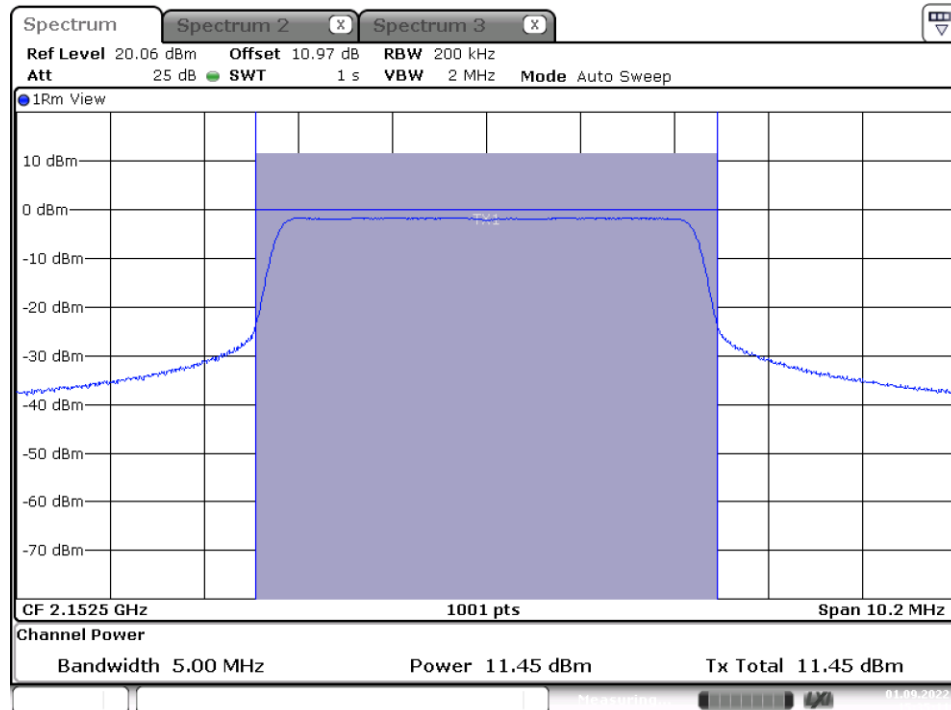
Date: 1.SEP.2022 15:27:42

MCH



Date: 1.SEP.2022 13:30:54

HCH

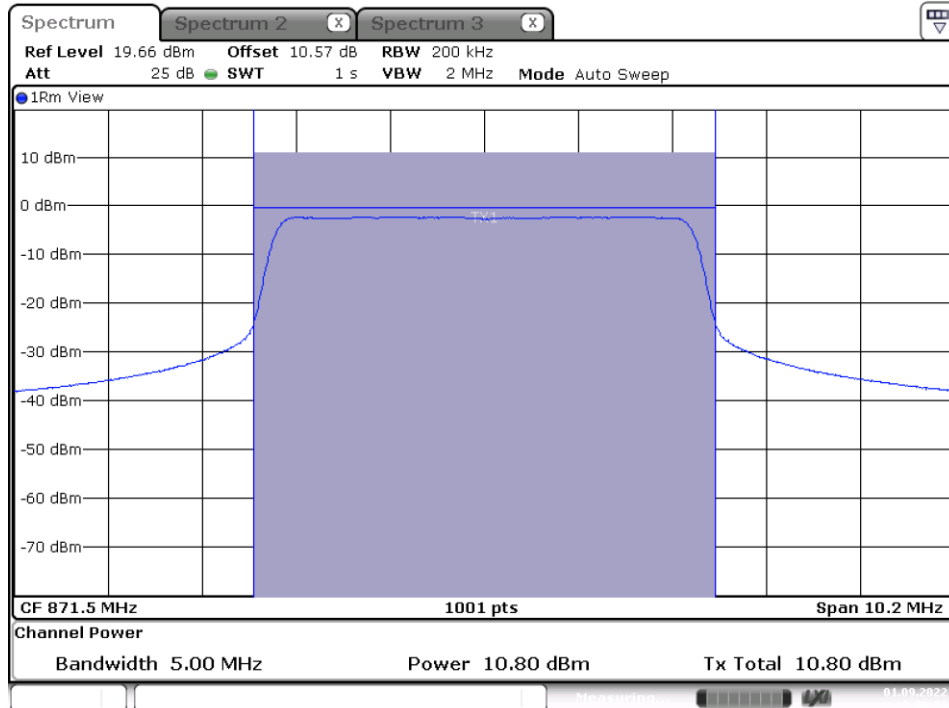


Date: 1.SEP.2022 15:35:11

3.7 Test Data - LTE Band 5

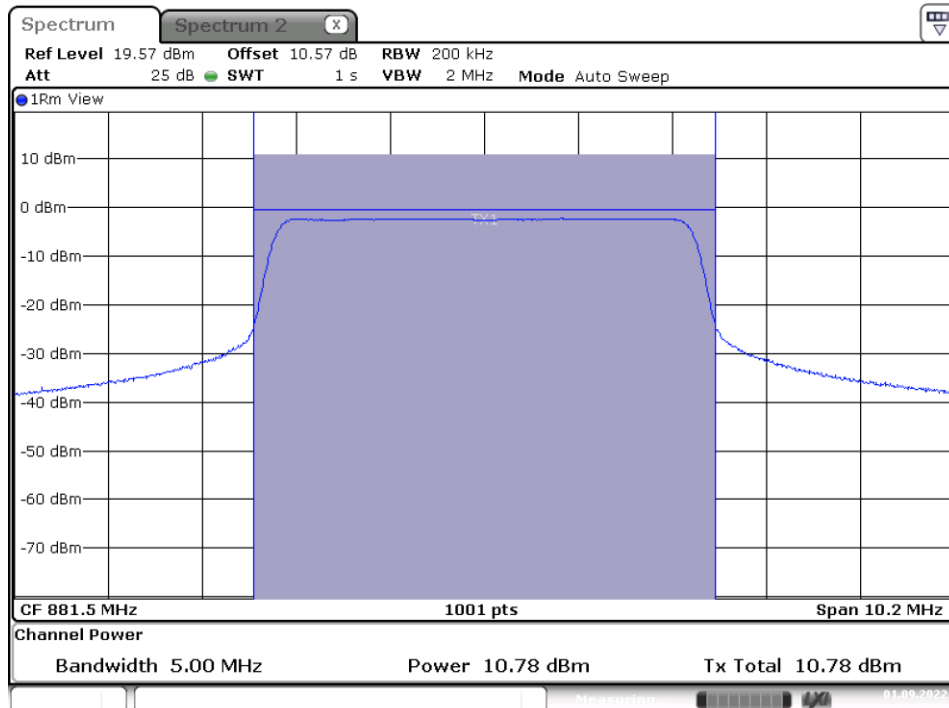
Max Power: 10.93dBm

LCH



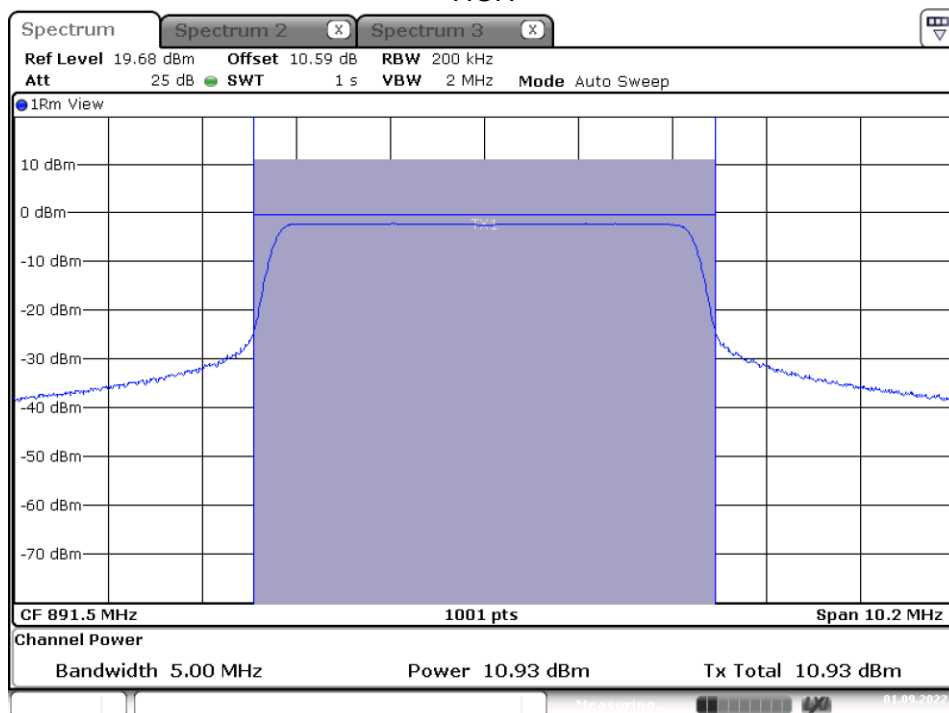
Date: 1.SEP.2022 15:56:59

MCH



Date: 1.SEP.2022 13:38:59

HCH



Date: 1.SEP.2022 16:01:06

4 Peak to Average Ratio

4.1 Test Result

Test Description	Specification		Test Result
	FCC	ISED	
Peak to Average Ratio	24.232(d) 27.50(d)(5)	RSS-132 (5.4) RSS-133 (6.4) RSS-139 (5.5)	Compliant

4.2 Test Method

KDB document 971168 D01 Power Meas License Digital Systems v03r01 was used to determine peak-to-average ratio. For the LTE measurements, Clause 5.7.2 was used which defined the measurement method using the CCDF function of the spectrum analyzer. Measurements were recorded at the lowest, middle, and highest channels.

4.3 Test Site

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 21.6 °C

Relative Humidity: 50.8 %

Atmospheric Pressure: 98.22 kPa

4.4 Test Equipment

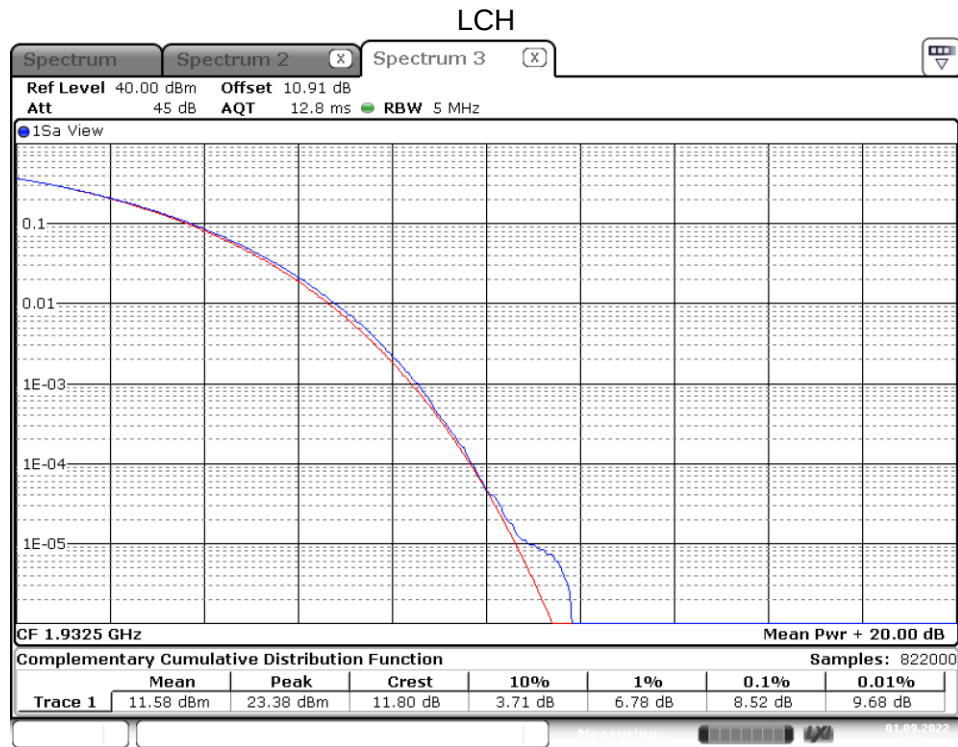
Test End Date: 13-Sep-2022

Tester: AB

Equipment	Model	Manufacturer	Asset Number	Cal Date	Cal Due Date
RF CABLE, SMA TO N	LL142	CENTRICRF	19011	16-Mar-2022	16-Mar-2023
ATTENUATOR, 10DB (TS8997)	10DB	ROHDE & SCHWARZ	B095593	12-May-2022	12-May-2023
SIGNAL ANALYZER (TS8997)	FSV30	ROHDE & SCHWARZ	B085749	4-Jan-2022	4-Jan-2024

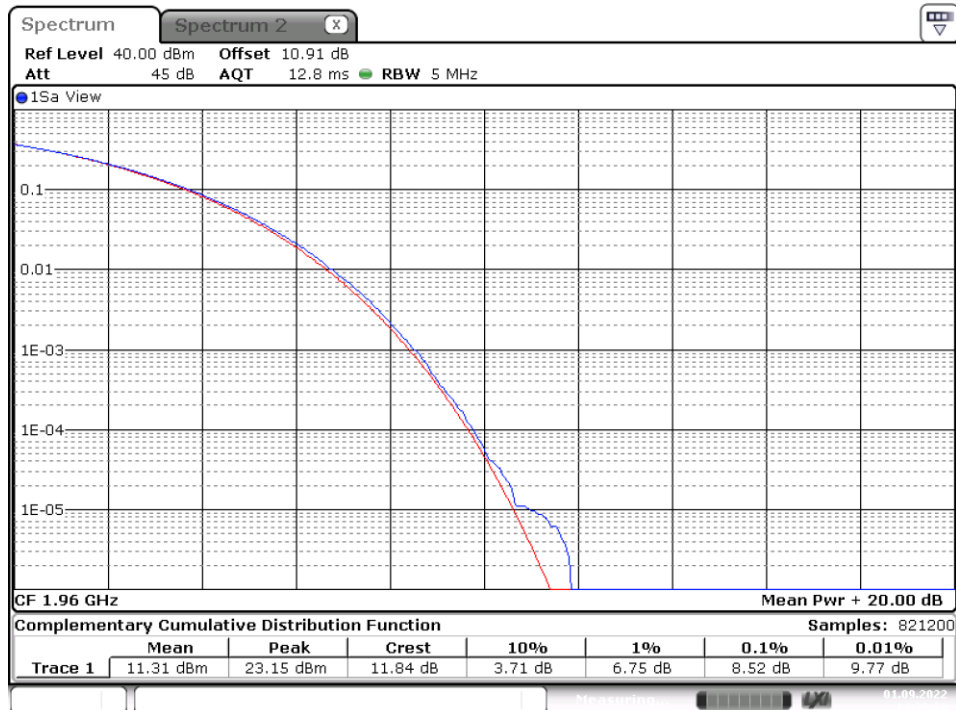
4.5 Test Data – LTE Band 2

Test Result (dB)			Limit (dB)	Verdict
LCH	MCH	HCH		
8.52	8.52	8.52	13	PASS



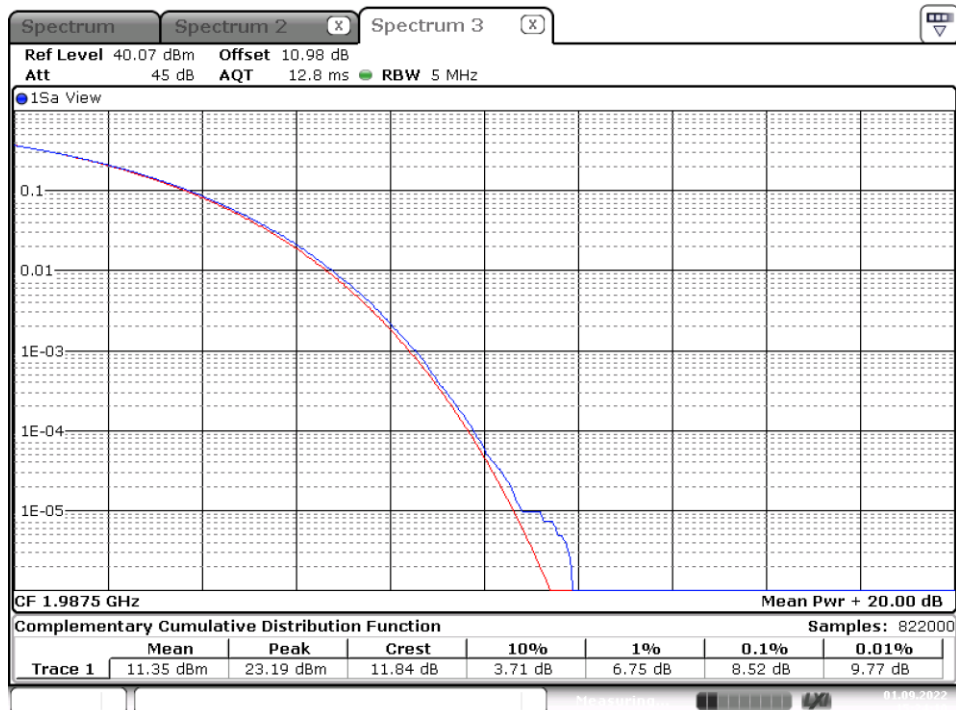
Date: 1.SEP.2022 15:22:44

MCH



Date: 1.SEP.2022 14:39:28

HCH

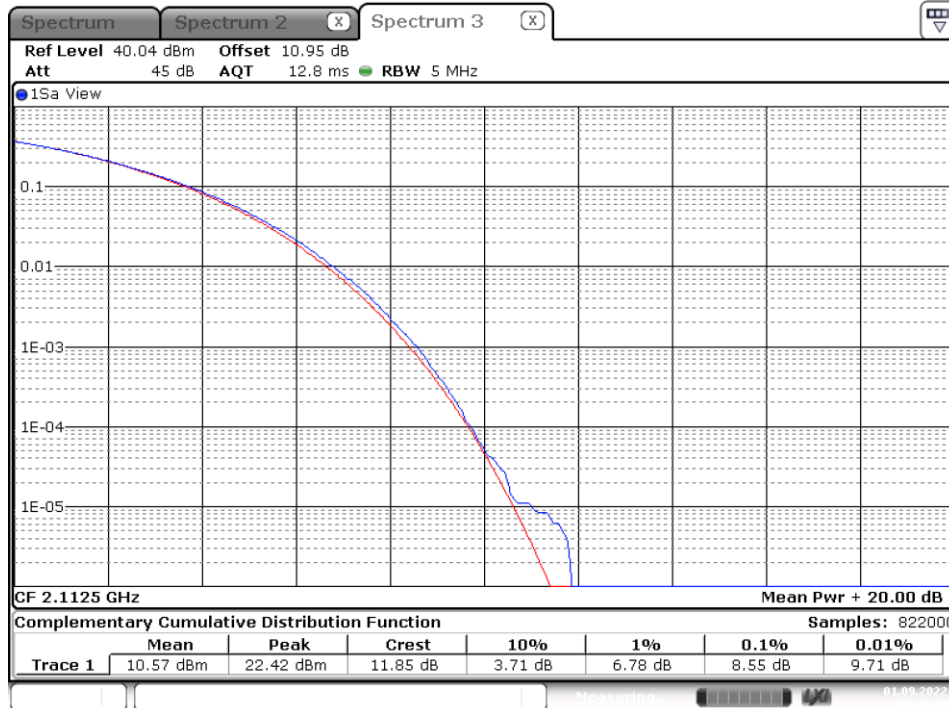


Date: 1.SEP.2022 15:24:10

4.6 Test Data – LTE Band 4

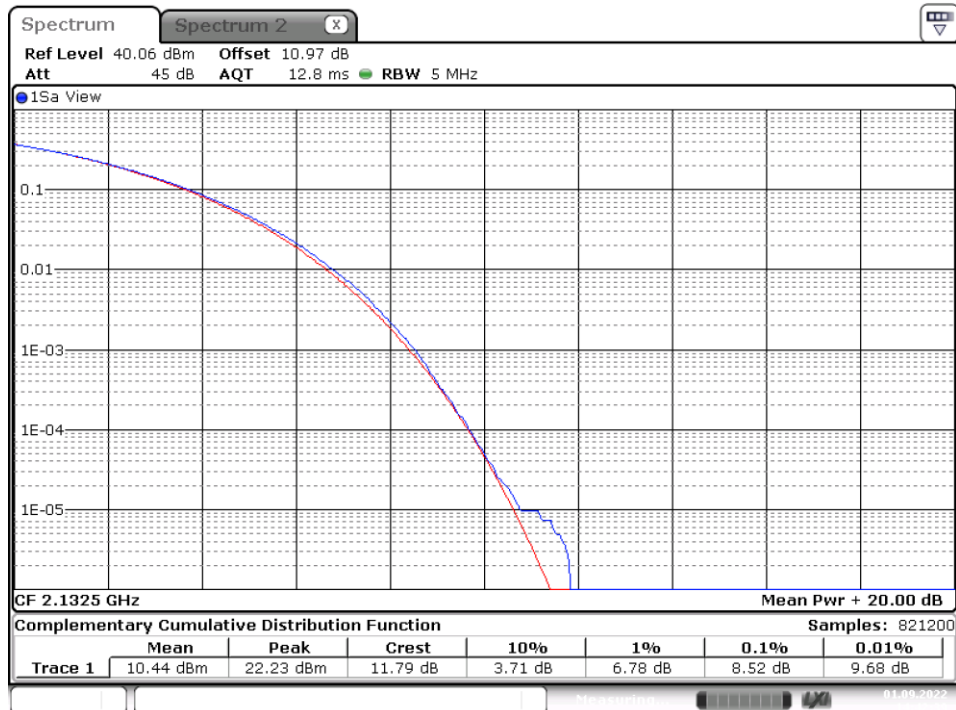
Test Result (dB)			Limit (dB)	Verdict
LCH	MCH	HCH		
8.55	8.52	8.52	13	PASS

LCH



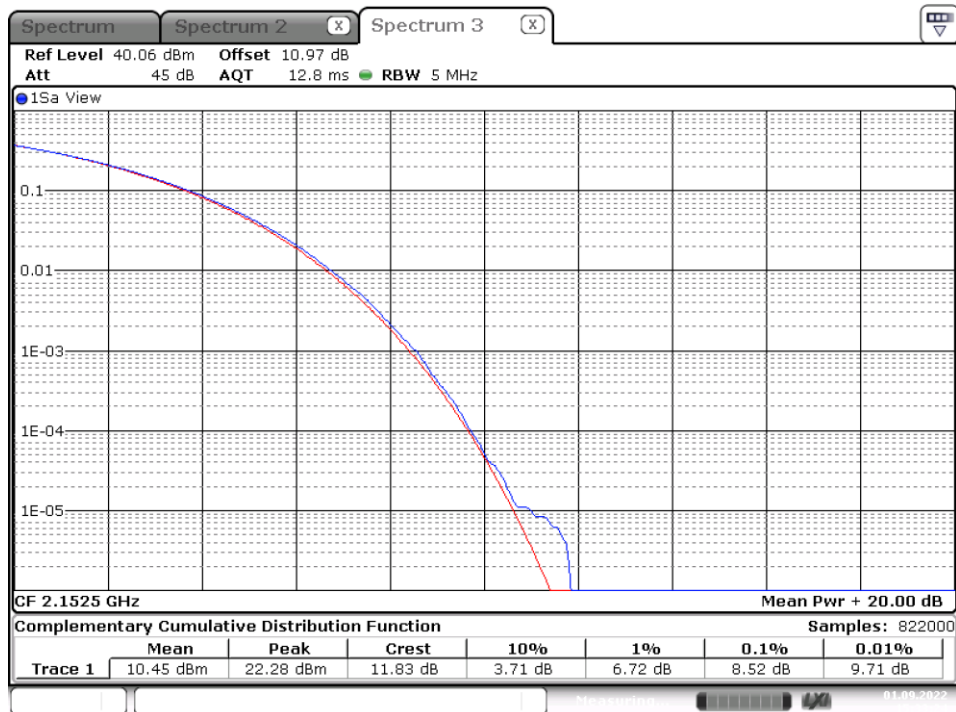
Date: 1.SEP.2022 15:32:07

MCH



Date: 1.SEP.2022 14:42:40

HCH

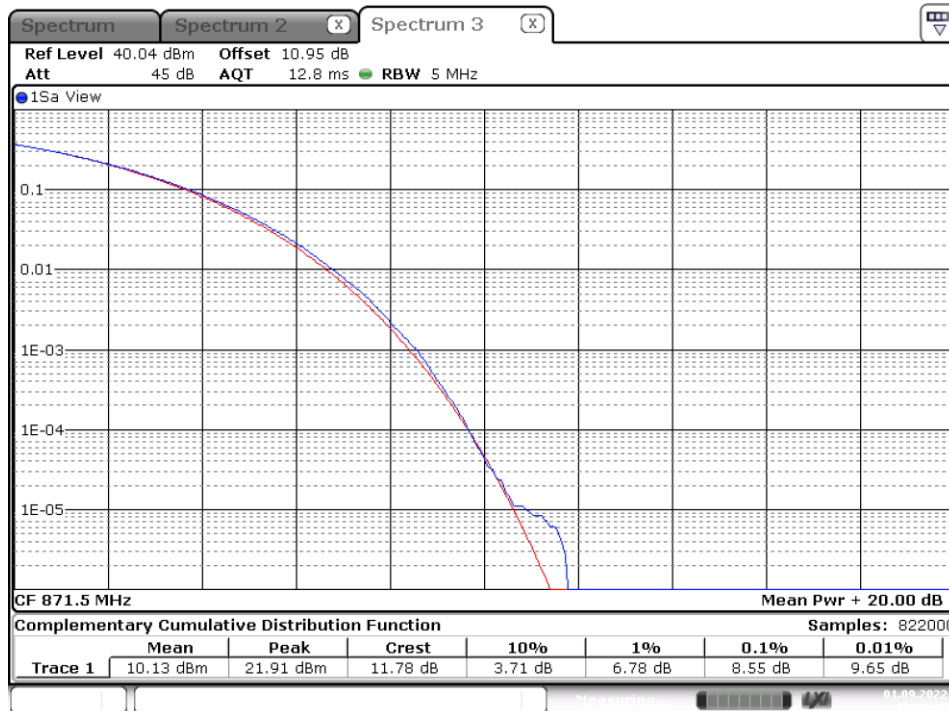


Date: 1.SEP.2022 15:33:25

4.7 Test Data – LTE Band 5

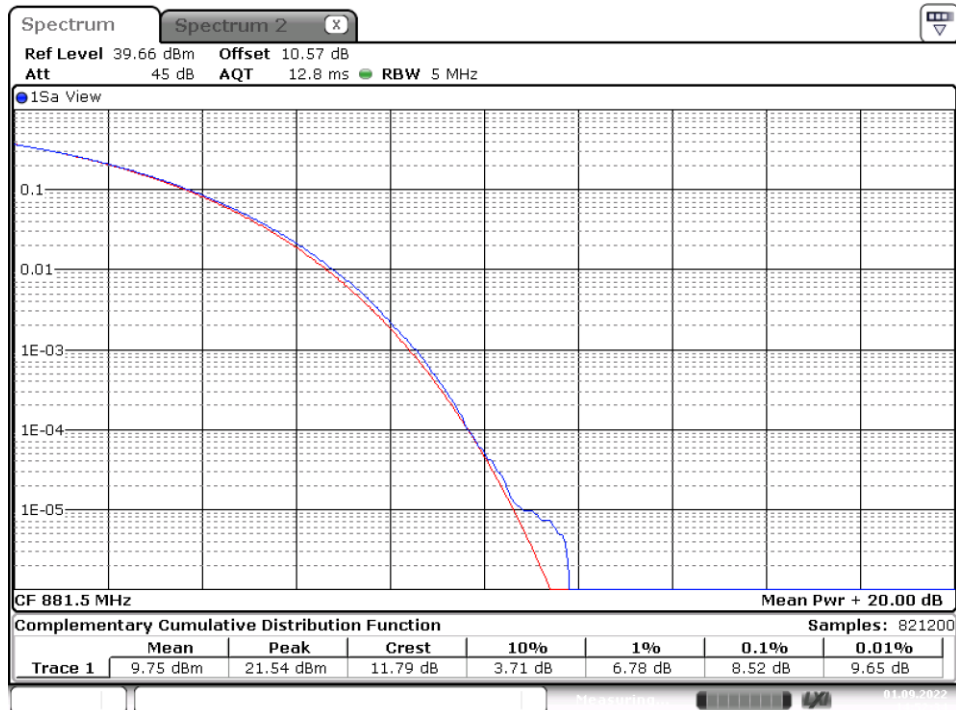
Test Result (dB)			Limit (dB)	Verdict
LCH	MCH	HCH		
8.55	8.52	8.46	13	PASS

LCH

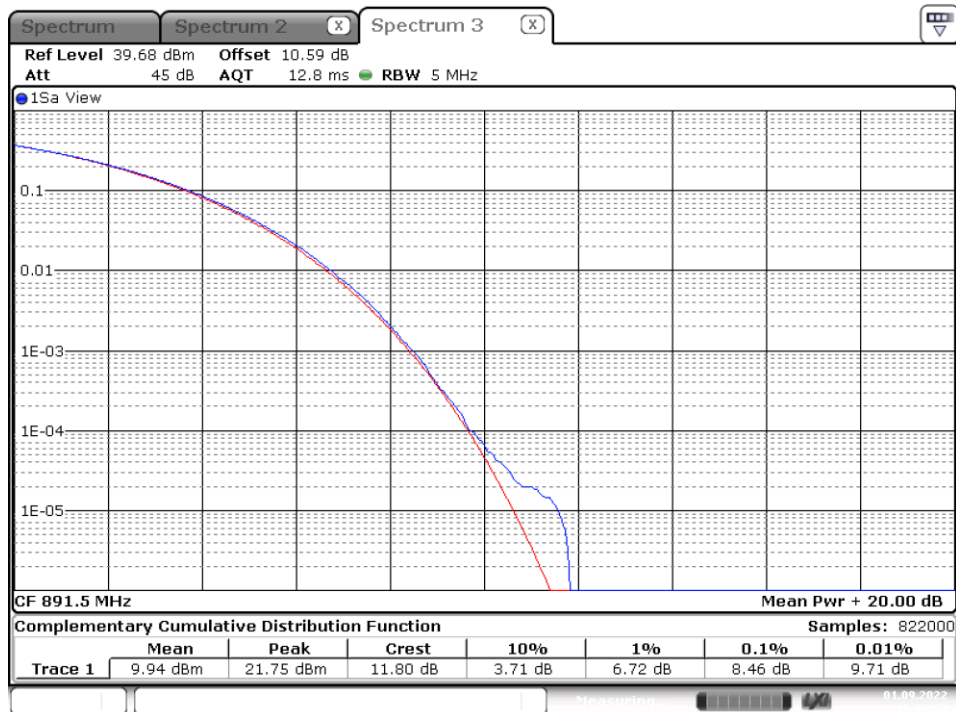


Date: 1.SEP.2022 15:58:25

MCH



HCH



5 Occupied Bandwidth

5.1 Test Result

Test Description	Specification		Test Result
	FCC	ISED	
Occupied Bandwidth	2.1049(h) 22.917(b) 24.238(b) 27.53(h)	RSS-GEN (6.7)	Reported

5.2 Test Method

The 99% measurement function of the spectrum analyzer was used for occupied bandwidth. The measurement was conducted at the lowest, middle, and highest channel of each band.

5.3 Test Site

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 21.6 °C

Relative Humidity: 50.8 %

Atmospheric Pressure: 98.22 kPa

5.4 Test Equipment

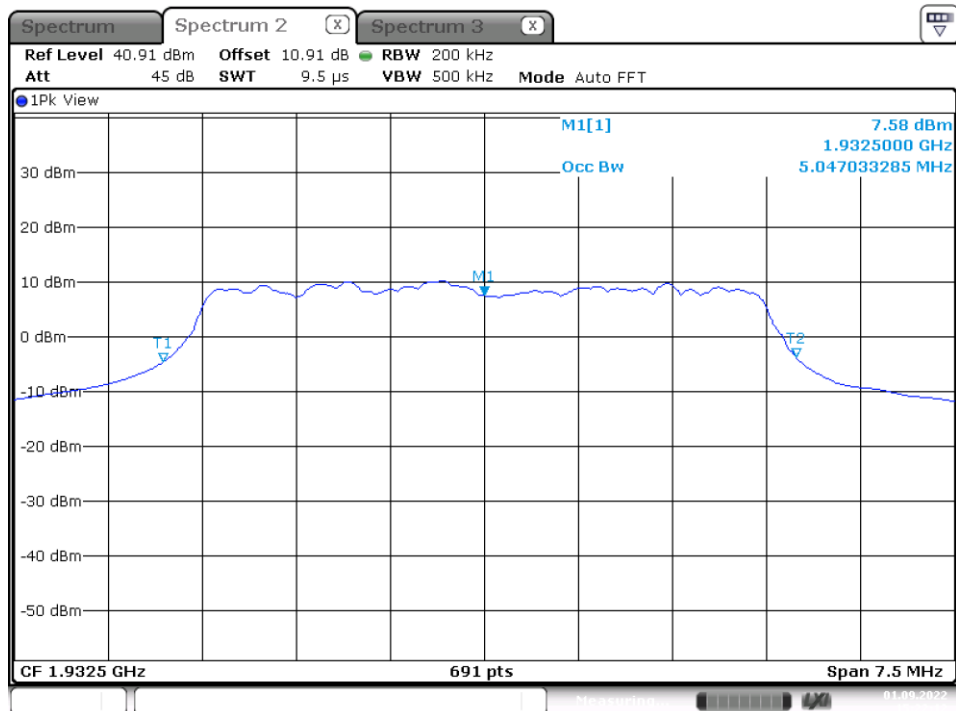
Test End Date: 13-Sep-2022

Tester: AB

Equipment	Model	Manufacturer	Asset Number	Cal Date	Cal Due Date
RF CABLE, SMA TO N	LL142	CENTRICRF	19011	16-Mar-2022	16-Mar-2023
ATTENUATOR, 10DB (TS8997)	10DB	ROHDE & SCHWARZ	B095593	12-May-2022	12-May-2023
SIGNAL ANALYZER (TS8997)	FSV30	ROHDE & SCHWARZ	B085749	4-Jan-2022	4-Jan-2024

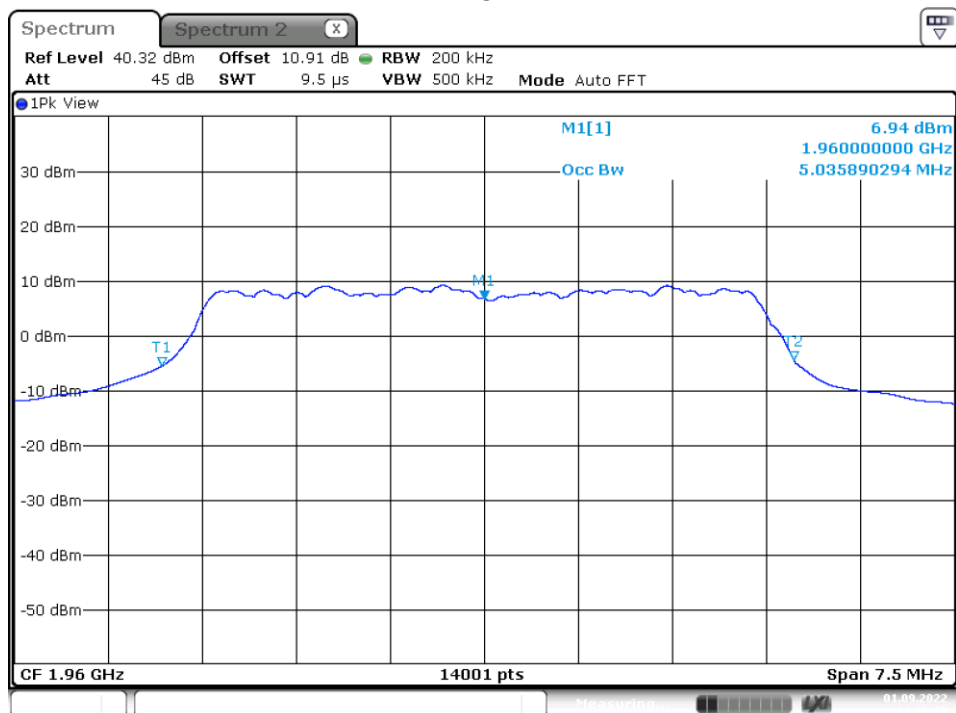
5.5 Test Data – LTE Band 2

LCH



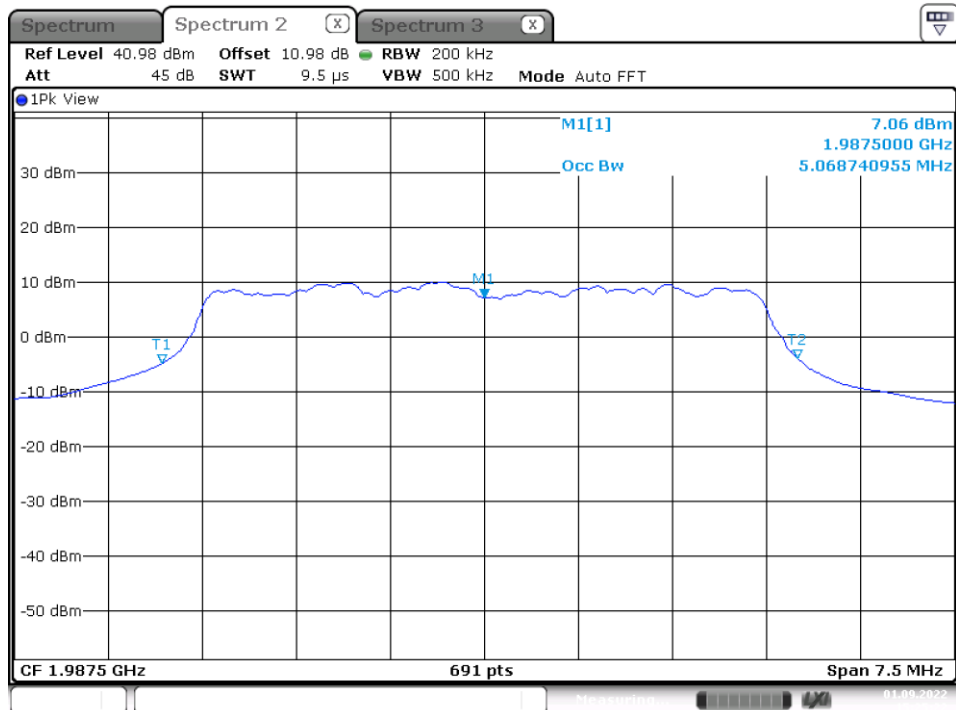
Date: 1.SEP.2022 15:22:12

MCH



Date: 1.SEP.2022 14:19:20

HCH



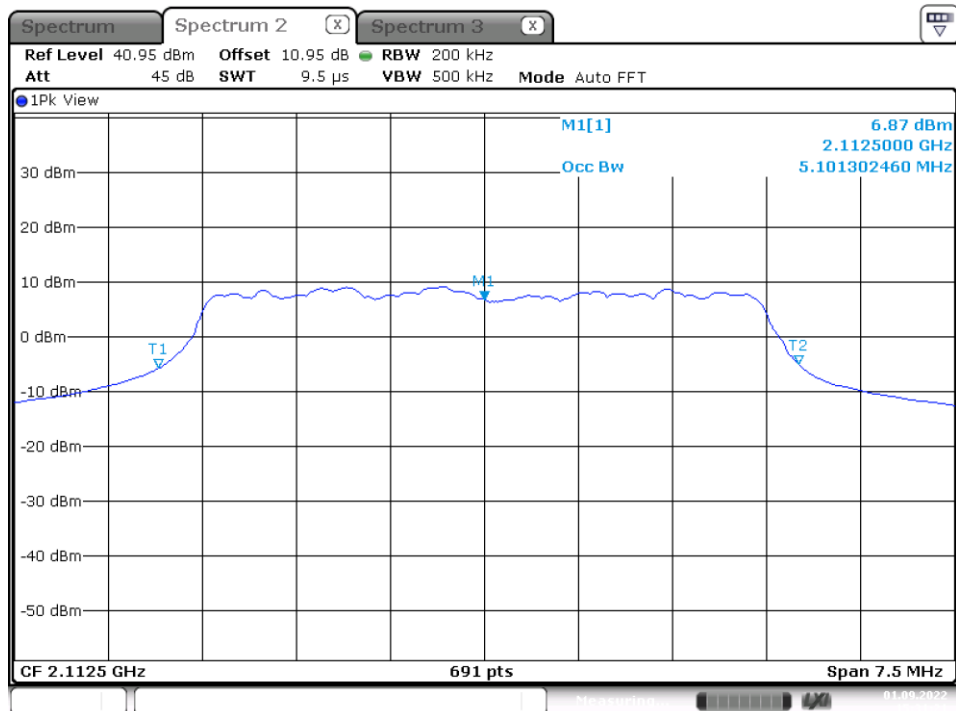
Date: 1.SEP.2022 15:25:22

Tabular Data

Occupied Bandwidth (MHz)		
LCH	MCH	HCH
5.047	5.036	5.069

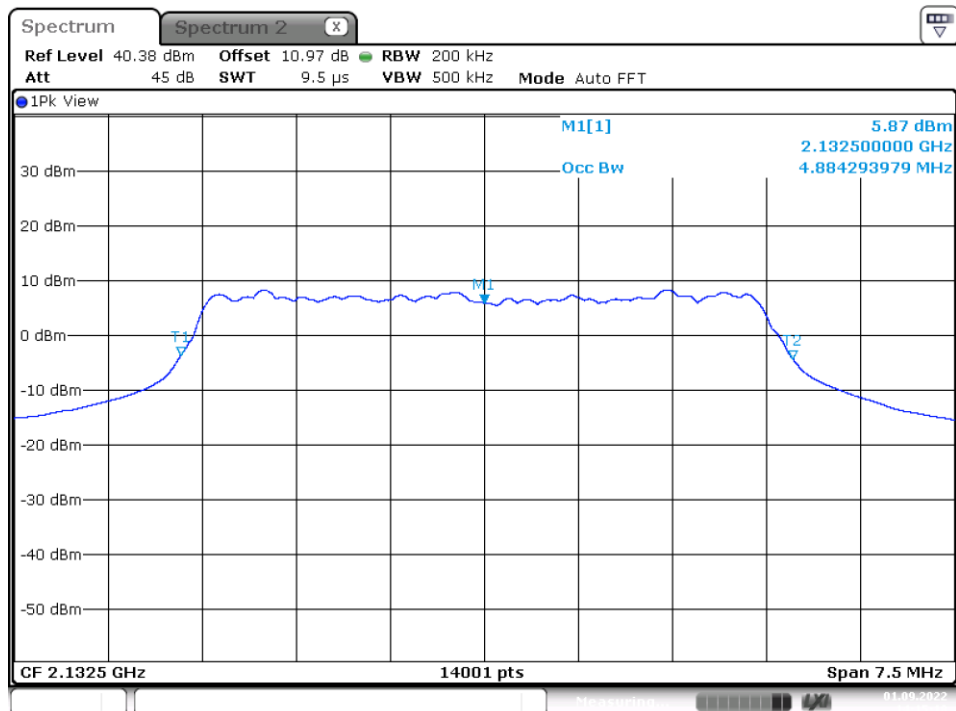
5.6 Test Data – LTE Band 4

LCH



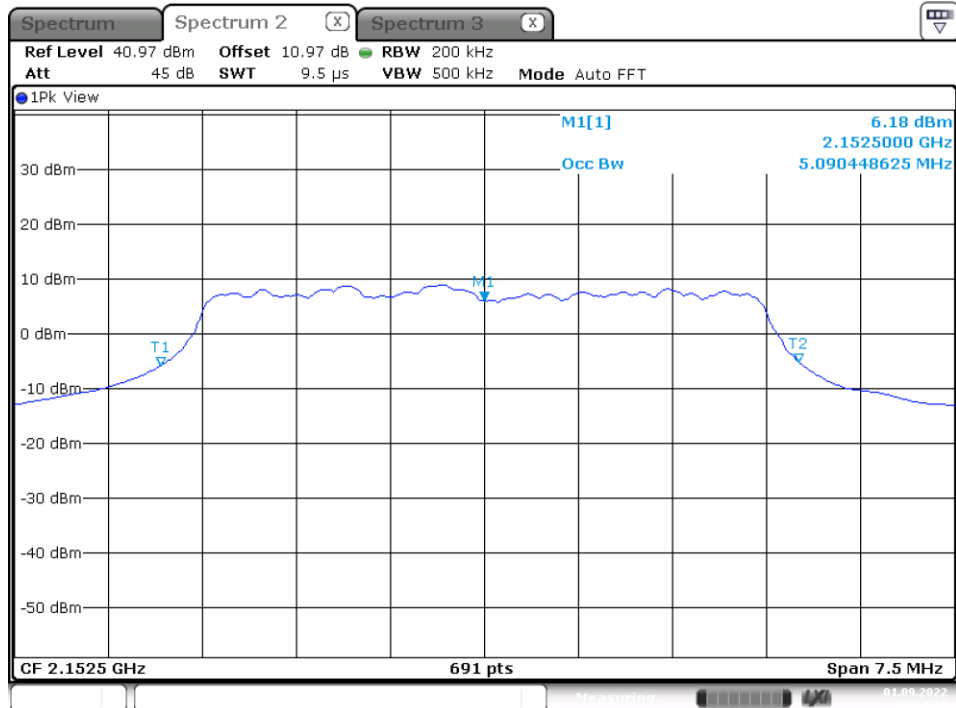
Date: 1.SEP.2022 15:31:22

MCH



Date: 1.SEP.2022 14:15:19

HCH



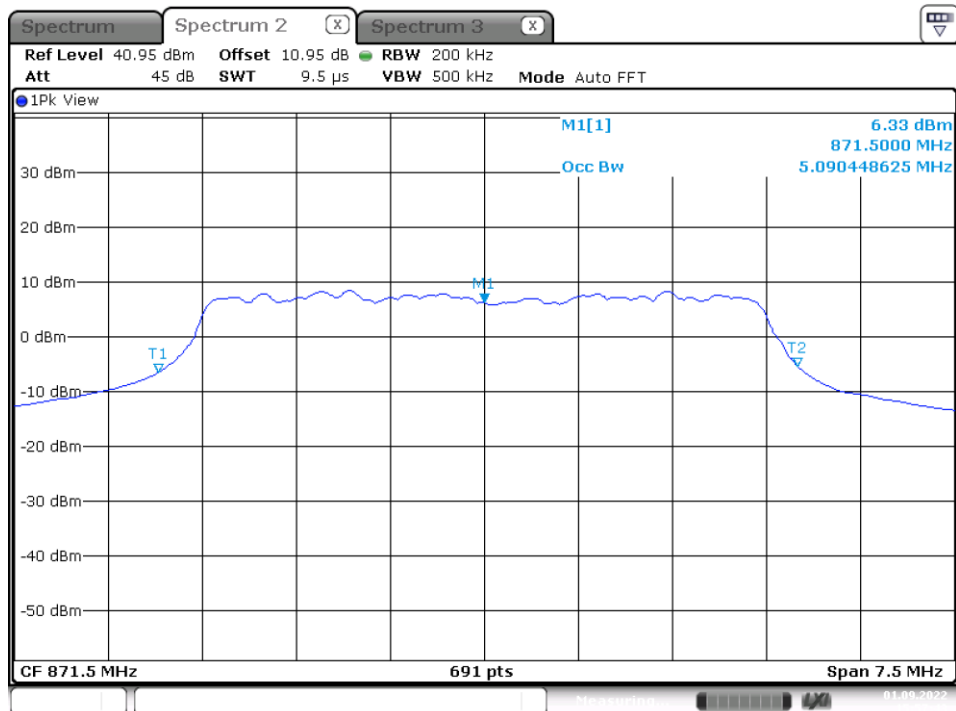
Date: 1.SEP.2022 15:34:20

Tabular Data

Occupied Bandwidth (MHz)		
LCH	MCH	HCH
5.101	4.884	5.090

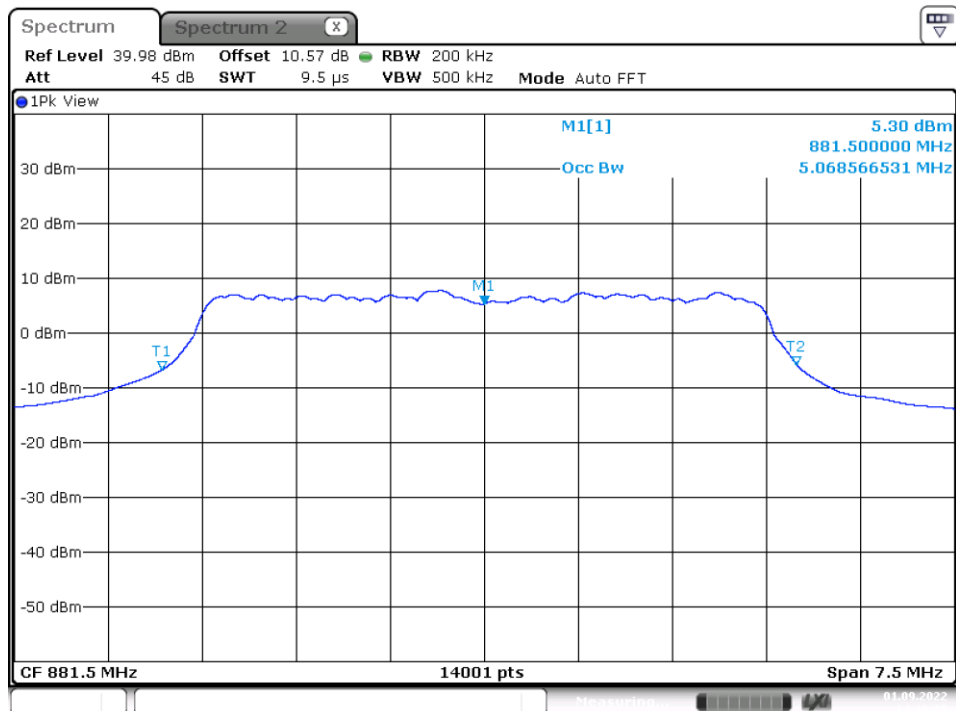
5.7 Test Data – LTE Band 5

LCH



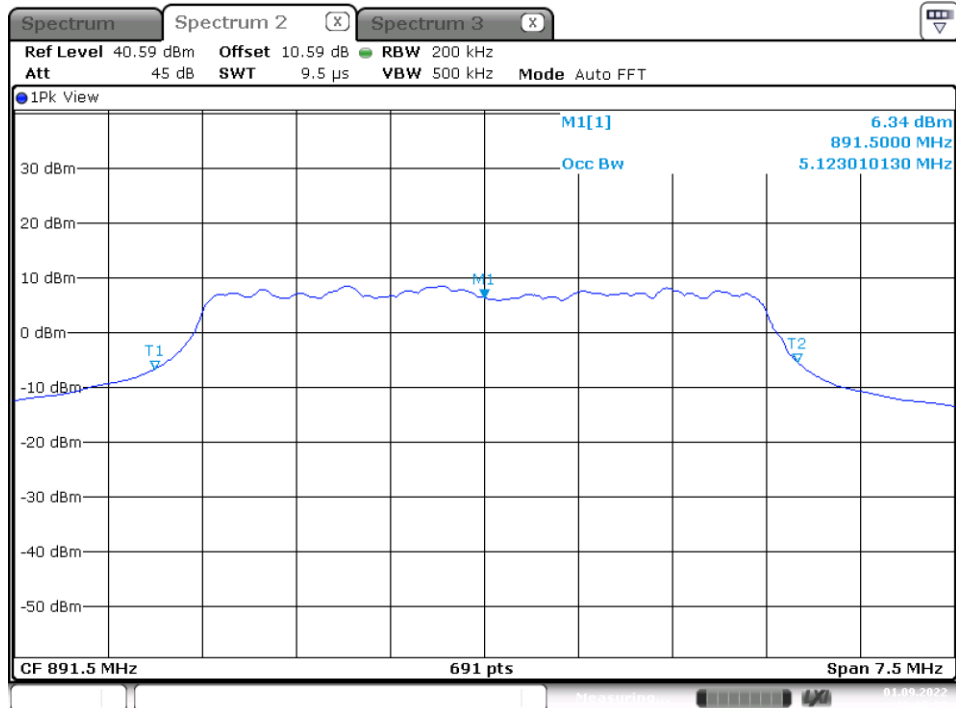
Date: 1.SEP.2022 15:57:43

MCH



Date: 1.SEP.2022 14:10:25

HCH



Date: 1.SEP.2022 16:00:28

Tabular Data

Occupied Bandwidth (MHz)		
LCH	MCH	HCH
5.090	5.069	5.123

6 Band Edge and Conducted Spurious Emissions

6.1 Test Result

Test Description	Specification		Test Result
	FCC	ISED	
Conducted spurious emissions and Band Edge	2.1051 22.917(a) / (b) 24.238(a) / (b) 27.53(h)	RSS-132 (5.5) RSS-133 (6.5) RSS-139 (5.6)	Compliant

6.2 Test Method

KDB document 971168 D01 Power Meas License Digital Systems v03r01, Clause 6 was used to measure spurious emissions at the antenna terminals.

Lowest, middle, and highest channels were evaluated for each band.

6.3 Test Site

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 21.6 °C

Relative Humidity: 50.8 %

Atmospheric Pressure: 98.22 kPa

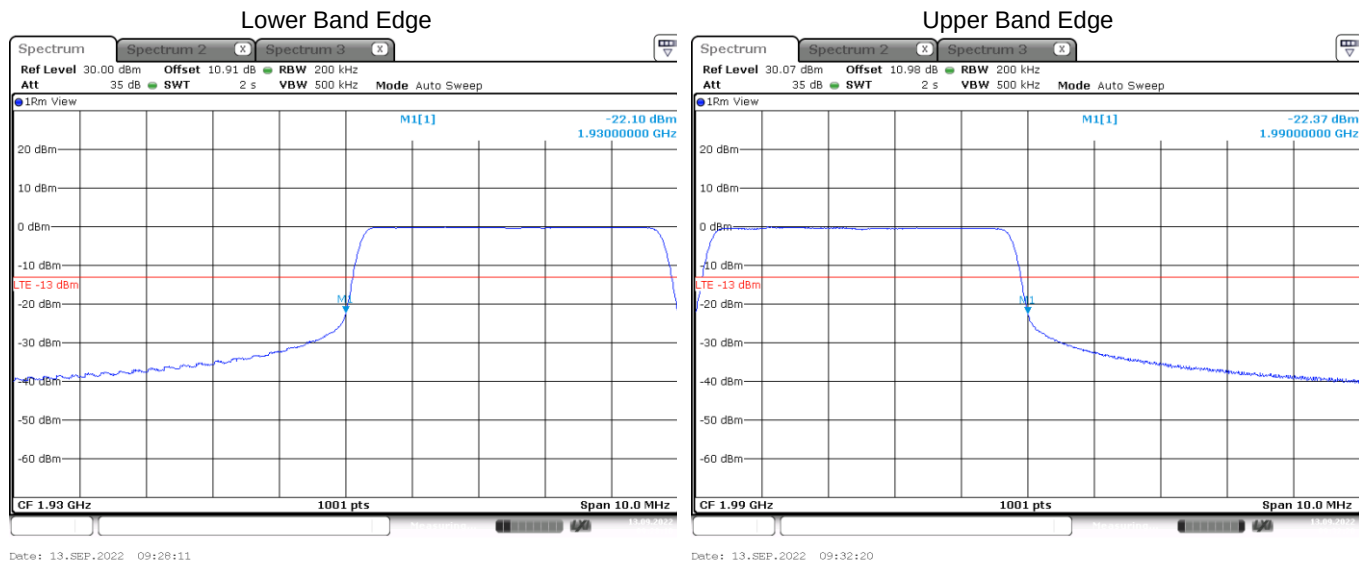
6.4 Test Equipment

Test End Date: 13-Sep-2022

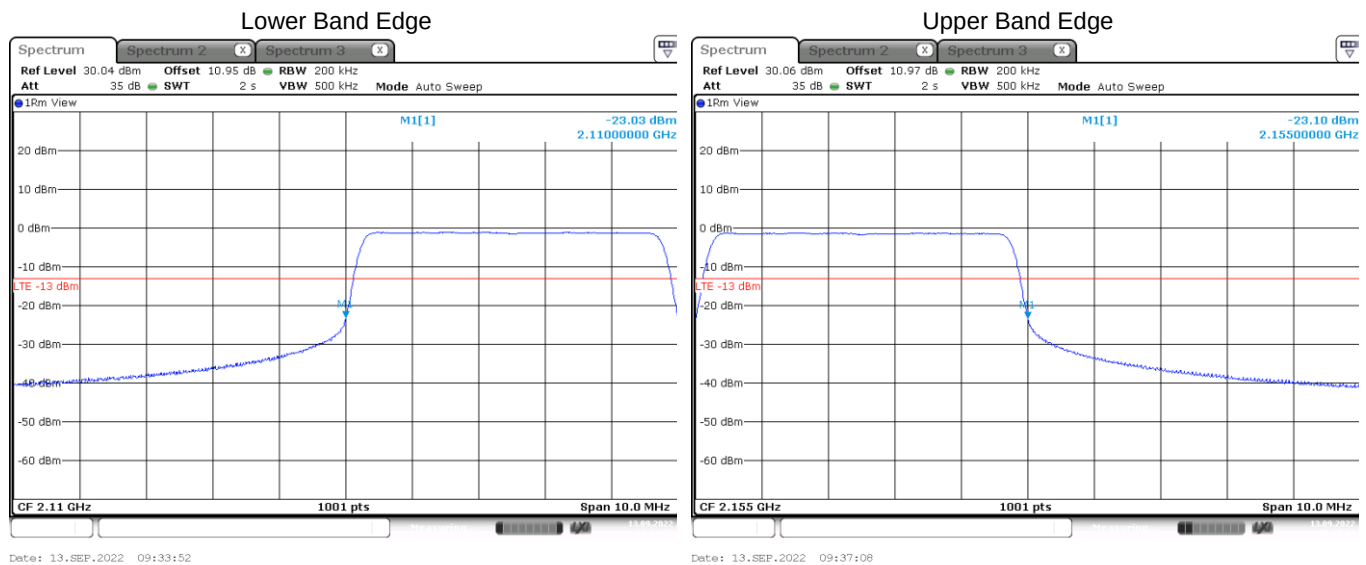
Tester: AB

Equipment	Model	Manufacturer	Asset Number	Cal Date	Cal Due Date
RF CABLE, SMA TO N	LL142	CENTRICRF	19011	16-Mar-2022	16-Mar-2023
ATTENUATOR, 10DB (TS8997)	10DB	ROHDE & SCHWARZ	B095593	12-May-2022	12-May-2023
SIGNAL ANALYZER (TS8997)	FSV30	ROHDE & SCHWARZ	B085749	4-Jan-2022	4-Jan-2024

6.5 Test Data - Band Edge – LTE Band 2

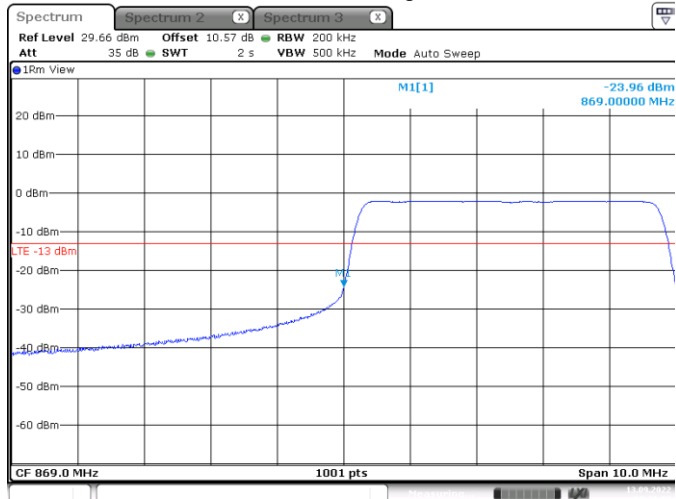


6.6 Test Data - Band Edge – LTE Band 4

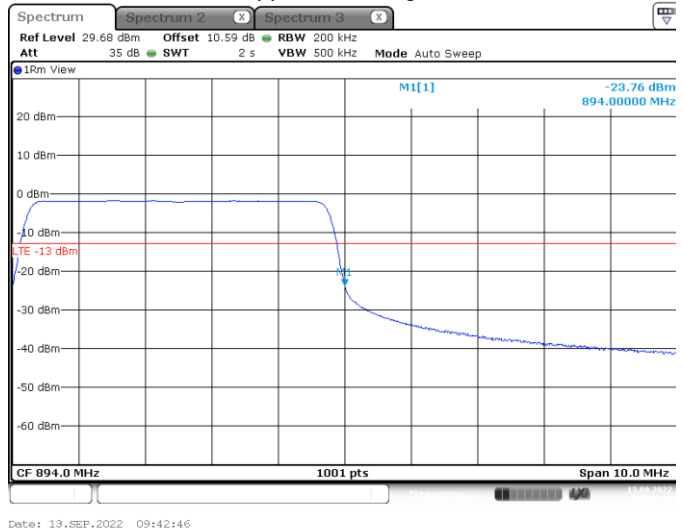


6.7 Test Data - Band Edge – LTE Band 5

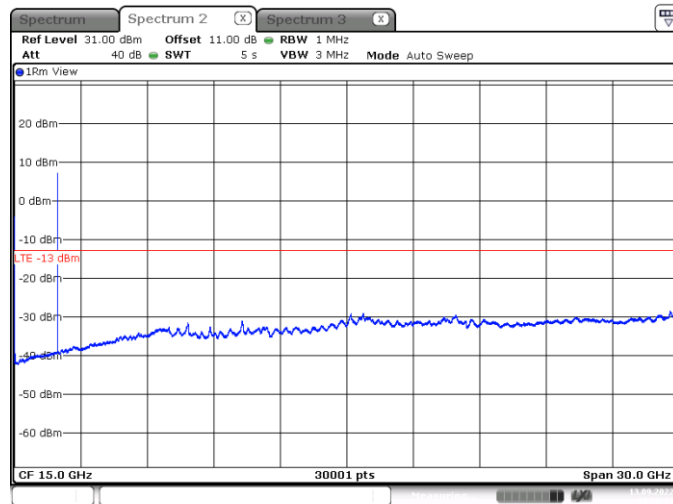
Lower Band Edge



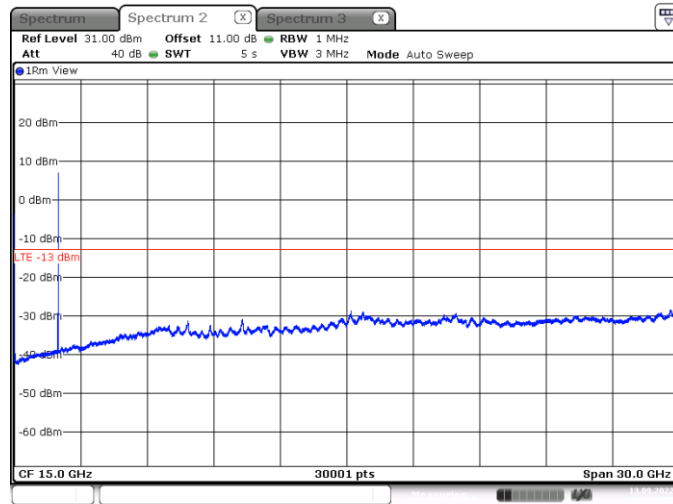
Upper Band Edge



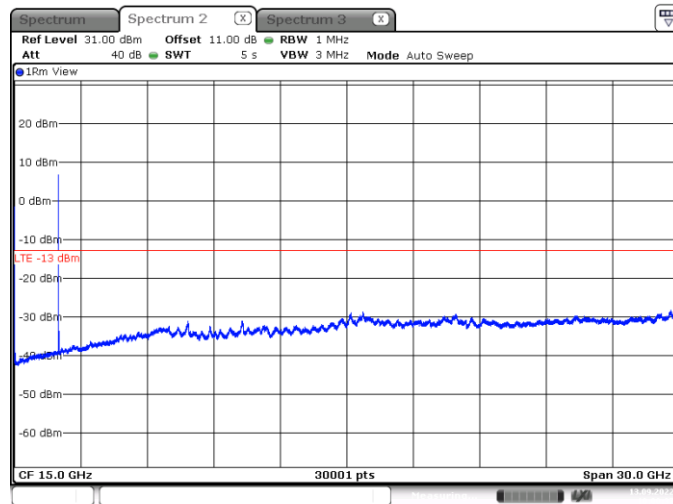
6.8 Test Data – Spurious Emission - LTE Band 2



Date: 13.SEP.2022 09:56:22

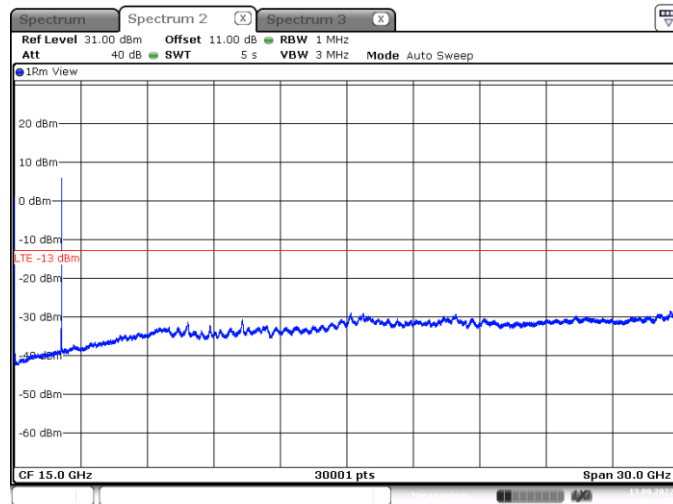


Date: 13.SEP.2022 09:59:08

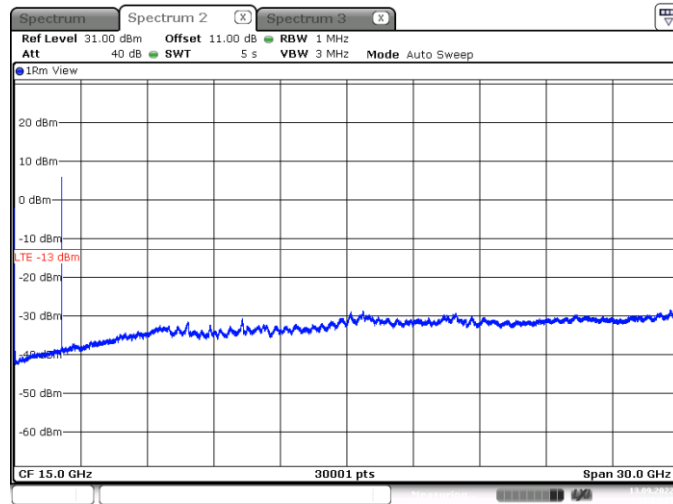


Date: 13.SEP.2022 10:00:37

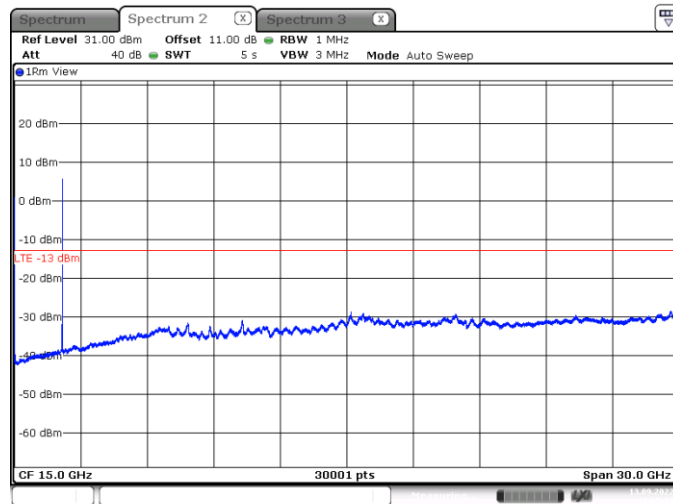
6.9 Test Data – Spurious Emission - LTE Band 4



Date: 13.SEP.2022 10:01:50

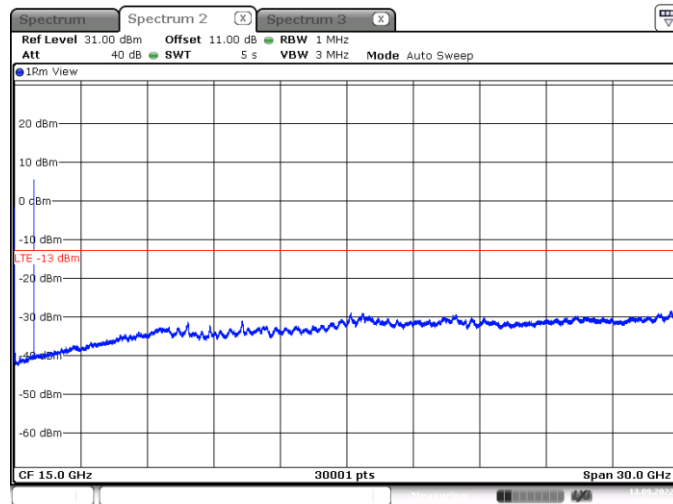


Date: 13.SEP.2022 10:04:15

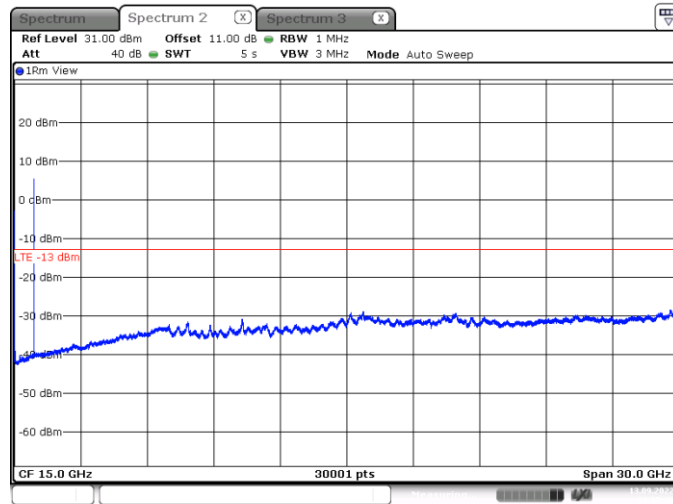


Date: 13.SEP.2022 10:05:28

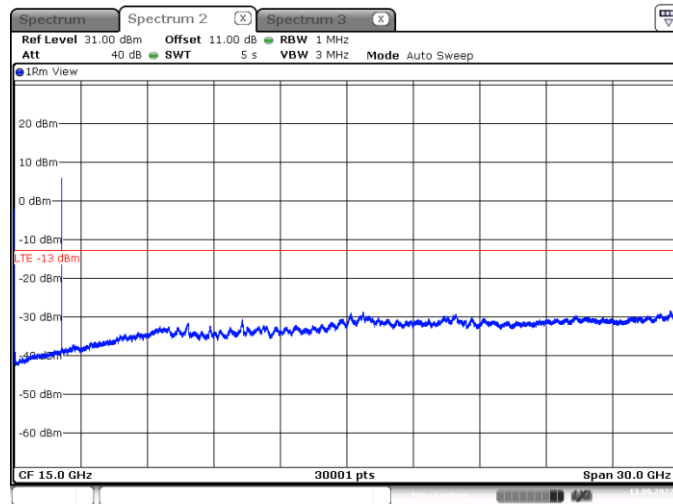
6.10 Test Data – Spurious Emission - LTE Band 5



Date: 13.SEP.2022 10:06:33



Date: 13.SEP.2022 10:07:48



Date: 13.SEP.2022 10:04:15