



# FCC RF Test Report

APPLICANT : Nokia Shanghai Bell Co., Ltd.  
EQUIPMENT : Nokia FastMile 5G Receiver High Gain  
BRAND NAME : Nokia  
MODEL NAME : 5G16-A  
FCC ID : 2ADZR5G16A  
STANDARD : 47 CFR Part 2, 22(H), 24(E), 27(L), 27(N)  
CLASSIFICATION : PCS Licensed Transmitter (PCB)  
TEST DATE(S) : May 05, 2023 ~ Jun. 15, 2023

We, Sporton International Inc. (Kunshan), would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.26-2015 and shown compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. (Kunshan), the test report shall not be reproduced except in full.

Jason Jia

Approved by: Jason Jia



**Sporton International Inc. (Kunshan)**

No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300  
People's Republic of China



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### REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FG341901A	Rev. 01	Initial issue of report	Jun. 20, 2023



## SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.4	§2.1046	Conducted Output Power	-	Report Only	-
	§22.913(a)(5)	Effective Radiated Power (Band 5) (Band 26)	ERP < 7 Watt	PASS	-
	§27.50(c)(10)	Effective Radiated Power (Band 71)	ERP < 3 Watt		-
	§24.232(c)	Equivalent Isotropic Radiated Power (Band 2) (Band 25)	EIRP < 2Watt		-
	§27.50(d)(4)	Equivalent Isotropic Radiated Power (Band 4) (Band 66)	EIRP < 1Watt		-
3.5	§24.232(d)	Peak-to-Average Ratio	<13 dB	PASS	-
3.6	§2.1049	Occupied Bandwidth	-	Report Only	-
3.7	§2.1051 §22.917(a) §24.238(a) §27.53(g) §27.53(h)	Conducted Band Edge Measurement (Band 2) (Band 4) (Band 5) (Band 25) (Band 26) (Band 66) (Band 71)	< 43+10log <sub>10</sub> (P[Watts])	PASS	-
3.8	§2.1051 §22.917(a) §24.238(a) §27.53(g) §27.53(h)	Conducted Spurious Emission (Band 2) (Band 4) (Band 5) (Band 25) (Band 26) (Band 66) (Band 71)	< 43+10log <sub>10</sub> (P[Watts])	PASS	-
3.9	§2.1055 §22.355	Frequency Stability Temperature & Voltage	< 2.5 ppm for Part 22	PASS	-
	§2.1055 §24.235 §27.54		Within Authorized Band		
4.4	§2.1053 §22.917(a) §24.238(a) §27.53(g) §27.53(h)	Radiated Spurious Emission (Band 2) (Band 4) (Band 5) (Band 25) (Band 26) (Band 66) (Band 71)	< 43+10log <sub>10</sub> (P[Watts])	PASS	Under limit 21.19 dB at 1656.000 MHz

**Conformity Assessment Condition:**

- The test results (PASS/FAIL) with all measurement uncertainty excluded are presented against the regulation limits or in accordance with the requirements stipulated by the applicant/manufacturer who shall bear all the risks of non-compliance that may potentially occur if measurement uncertainty is taken into account.
- The measurement uncertainty please refer to each test result in the section "Measurement Uncertainty"

**Disclaimer:**

The product specifications of the EUT presented in the test report that may affect the test assessments are declared by the manufacturer who shall take full responsibility for the authenticity.



# 1 General Description

## 1.1 Applicant

Nokia Shanghai Bell Co., Ltd.

388#, Ningqiao Road, China (Shanghai) Pilot Free Trade Zone, Shanghai 201206, China

## 1.2 Manufacturer

Nokia Solutions and Networks Oy

Karakaari 7, 02610 Espoo, Finland

## 1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Nokia FastMile 5G Receiver High Gain
Brand Name	Nokia
Model Name	5G16-A
FCC ID	2ADZR5G16A
IMEI Code	Conducted: 355231280005192 Radiation: 35523128005010
HW Version	3TG02369Axxx, x:A~Z
SW Version	5GReceiver-HG-2_D230200B31T0001E0147
EUT Stage	Identical Prototype



### 1.4 Product Specification of Equipment Under Test

Standards-related Product Specification	
<b>Tx Frequency</b>	LTE Band 2 : 1850 MHz ~ 1910 MHz LTE Band 4 : 1710 MHz ~ 1755 MHz LTE Band 5 : 824 MHz ~ 849 MHz LTE Band 25 : 1850 MHz ~ 1915 MHz LTE Band 26 : 824 MHz ~ 849 MHz LTE Band 66 : 1710 MHz ~ 1755 MHz LTE Band 71: 663 MHz ~ 698 MHz
<b>Rx Frequency</b>	LTE Band 2 : 1930 MHz ~ 1990 MHz LTE Band 4 : 2110 MHz ~ 2155 MHz LTE Band 5 : 869 MHz ~ 894 MHz LTE Band 25 : 1930 MHz ~ 1995 MHz LTE Band 26 : 869 MHz ~ 894 MHz LTE Band 66 : 2110 MHz~ 2155 MHz LTE Band 71: 617 MHz ~ 652 MHz
<b>Bandwidth</b>	LTE Band 2 : 1.4MHz / 3MHz / 5MHz / 10MHz / 15MHz / 20MHz LTE Band 4 : 1.4MHz / 3MHz / 5MHz / 10MHz / 15MHz / 20MHz LTE Band 5 : 1.4MHz / 3MHz / 5MHz / 10MHz LTE Band 25 : 1.4MHz / 3MHz / 5MHz / 10MHz / 15MHz / 20MHz LTE Band 26 : 1.4MHz / 3MHz / 5MHz / 10MHz / 15MHz LTE Band 66 : 1.4MHz / 3MHz / 5MHz / 10MHz / 15MHz / 20MHz LTE Band 71 : 5MHz / 10MHz / 15MHz / 20MHz
<b>Maximum Output Power to Antenna</b>	<b>&lt;Ant. 0&gt;</b> LTE Band 2 : 17.89 dBm LTE Band 4 : 15.41 dBm LTE Band 25 : 18.41 dBm LTE Band 66 : 15.75 dBm <b>&lt;Ant. 4&gt;</b> LTE Band 5 : 22.67 dBm LTE Band 26 : 22.82 dBm LTE Band 71 : 22.91 dBm
<b>Antenna Gain</b>	<b>&lt;Ant. 0&gt;</b> LTE Band 2 : 13.67 dBi LTE Band 4 : 13.67 dBi LTE Band 25 : 13.72 dBi LTE Band 66 : 13.72 dBi <b>&lt;Ant. 4&gt;</b> LTE Band 5 : 2.39 dBi LTE Band 26 : 2.39 dBi LTE Band 71 : 1.09 dBi
<b>Type of Modulation</b>	QPSK / 16QAM / 64QAM / 256QAM

### 1.5 Modification of EUT

No modifications are made to the EUT during all test items.



### 1.6 Maximum ERP/EIRP Power and Emission Designator

LTE Band 2		QPSK		16QAM/64QAM/256QAM	
BW (MHz)	Frequency Range (MHz)	Maximum EIRP(W)	Emission Designator (99%OBW)	Maximum EIRP(W)	Emission Designator (99%OBW)
1.4	1850.7 ~ 1909.3	1.3772	1M09G7D	1.1429	1M10W7D
3	1851.5 ~ 1908.5	1.4223	2M70G7D	1.1614	2M72W7D
5	1852.5 ~ 1907.5	1.4028	4M49G7D	1.2331	4M49W7D
10	1855.0 ~ 1905.0	1.3772	9M05G7D	1.1376	9M07W7D
15	1857.5 ~ 1902.5	1.3740	13M5G7D	1.1995	13M5W7D
20	1860.0 ~ 1900.0	1.4322	18M0G7D	1.2445	17M9W7D
LTE Band 25		QPSK		16QAM/64QAM/256QAM	
BW (MHz)	Frequency Range (MHz)	Maximum EIRP(W)	Emission Designator (99%OBW)	Maximum EIRP(W)	Emission Designator (99%OBW)
1.4	1850.7 ~ 1914.3	1.4355	1M09G7D	1.1912	1M10W7D
3	1851.5 ~ 1913.5	1.4928	2M70G7D	1.2942	2M72W7D
5	1852.5 ~ 1912.5	1.4859	4M49G7D	1.3183	4M49W7D
10	1855.0 ~ 1910.0	1.4997	9M05G7D	1.2388	9M07W7D
15	1857.5 ~ 1907.5	1.5066	13M5G7D	1.2912	13M5W7D
20	1860.0 ~ 1905.0	1.6331	18M0G7D	1.3552	17M9W7D
LTE Band 4		QPSK		16QAM/64QAM/256QAM	
BW (MHz)	Frequency Range (MHz)	Maximum EIRP(W)	Emission Designator (99%OBW)	Maximum EIRP(W)	Emission Designator (99%OBW)
1.4	1710.7 ~ 1754.3	0.8017	1M09G7D	0.6653	1M10W7D
3	1711.5 ~ 1753.5	0.7870	2M71G7D	0.6730	2M73W7D
5	1712.5 ~ 1752.5	0.8035	4M48G7D	0.6668	4M49W7D
10	1715.0 ~ 1750.0	0.7980	9M05G7D	0.6714	9M07W7D
15	1717.5 ~ 1747.5	0.7816	13M5G7D	0.6761	13M5W7D
20	1720.0 ~ 1745.0	0.8091	17M9G7D	0.6792	17M9W7D
LTE Band 5		QPSK		16QAM/64QAM/256QAM	
BW (MHz)	Frequency Range (MHz)	Maximum ERP(W)	Emission Designator (99%OBW)	Maximum ERP(W)	Emission Designator (99%OBW)
1.4	824.7 ~ 848.3	0.1901	1M09G7D	0.1644	1M09W7D
3	825.5 ~ 847.5	0.1950	2M72G7D	0.1679	2M72W7D
5	826.5 ~ 846.5	0.1923	4M49G7D	0.1671	4M50W7D
10	829.0 ~ 844.0	0.1954	9M07G7D	0.1683	9M03W7D





LTE Band 26		QPSK		16QAM/64QAM/256QAM	
BW (MHz)	Frequency Range (MHz)	Maximum ERP(W)	Emission Designator (99%OBW)	Maximum ERP(W)	Emission Designator (99%OBW)
1.4	824.7 ~ 848.3	0.1945	1M09G7D	0.1698	1M09W7D
3	825.5 ~ 847.5	0.1928	2M72G7D	0.1687	2M72W7D
5	826.5 ~ 846.5	0.1972	4M49G7D	0.1726	4M50W7D
10	829.0 ~ 844.0	0.1954	9M07G7D	0.1738	9M03W7D
15	831.5 ~ 841.5	0.2023	13M5G7D	0.1770	13M5W7D
CH26790	824.0	0.2014	13M5G7D	0.1758	13M5W7D
LTE Band 66		QPSK		16QAM/64QAM/256QAM	
BW (MHz)	Frequency Range (MHz)	Maximum EIRP(W)	Emission Designator (99%OBW)	Maximum EIRP(W)	Emission Designator (99%OBW)
1.4	1710.7 ~ 1754.3	0.8570	1M09G7D	0.7112	1M10W7D
3	1711.5 ~ 1753.5	0.8395	2M70G7D	0.7244	2M72W7D
5	1712.5 ~ 1752.5	0.8531	4M49G7D	0.7031	4M49W7D
10	1715.0 ~ 1750.0	0.8453	9M03G7D	0.7112	9M03W7D
15	1717.5 ~ 1747.5	0.8375	13M4G7D	0.7015	13M5W7D
20	1720.0 ~ 1745.0	0.8851	17M9G7D	0.7244	17M9W7D
LTE Band 71		QPSK		16QAM/64QAM/256QAM	
BW (MHz)	Frequency Range (MHz)	Maximum ERP(W)	Emission Designator (99%OBW)	Maximum ERP(W)	Emission Designator (99%OBW)
5	665.5 ~ 695.5	0.1517	4M49G7D	0.1230	4M53W7D
10	668.0 ~ 693.0	0.1503	9M05G7D	0.1259	9M05W7D
15	670.5 ~ 690.5	0.1500	13M4G7D	0.1245	13M5W7D
20	673.0 ~ 688.0	0.1531	17M9G7D	0.1253	17M9W7D

**Note:**

1. LTE Band 26 overlaps the entire frequency range of LTE Band 5. Therefore, the test results provided in this report covers Band 5 and the portion of Band 26 subject to Part 22.
2. LTE Band 66 overlaps the entire frequency range of LTE Band 4. Therefore, the test results provided in this report covers Band 66 as well as Band 4.
3. LTE Band 25 overlaps the entire frequency range of LTE Band 2. Therefore, the test results provided in this report covers Band 25 as well as Band 2.
4. All modulations have been tested, only the worst test results of PSK & QAM are shown in the report.



### 1.7 Testing Location

Sporton International Inc. (Kunshan) is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.02.

<b>Test Firm</b>	Sporton International Inc. (Kunshan)		
<b>Test Site Location</b>	No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China TEL : +86-512-57900158		
<b>Test Site No.</b>	<b>Sporton Site No.</b>	<b>FCC Designation No.</b>	<b>FCC Test Firm Registration No.</b>
	03CH04-KS TH01-KS	CN1257	314309

### 1.8 Test Software

Item	Site	Manufacture	Name	Version
1.	03CH04-KS	AUDIX	E3	6.2009-8-24al

### 1.9 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ♦ 47 CFR Part 2, 22(H), 24(E), 27(L), 27(N)
- ♦ ANSI C63.26-2015
- ♦ FCC KDB 971168 D01 Power Meas License Digital Systems v03r01
- ♦ FCC KDB 412172 D01 Determining ERP and EIRP v01r01

**Remark:**

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.



## 2 Test Configuration of Equipment Under Test

### 2.1 Test Mode

Antenna port conducted and radiated test items listed below are performed according to KDB 971168 D01 Power Meas License Digital Systems v03r01 with maximum output power.

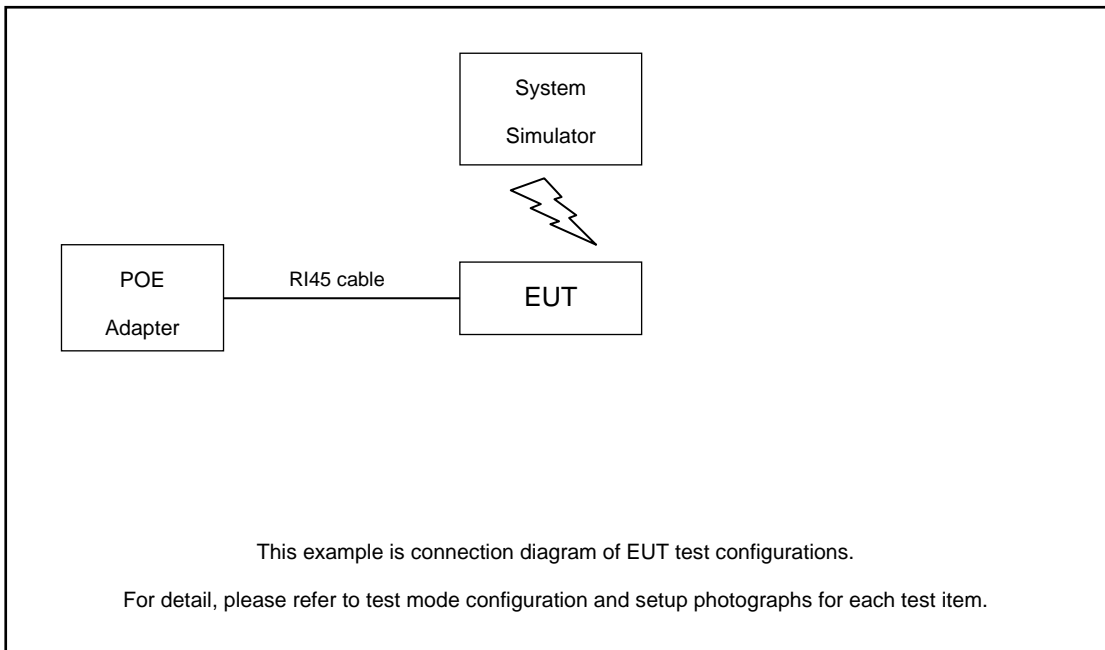
Radiated measurements are performed by rotating the EUT in three different orthogonal test planes to find the maximum emission. (Y Plane)

Test Items	Band	Bandwidth (MHz)						Modulation				RB #			Test Channel		
		1.4	3	5	10	15	20	QPSK	16 QAM	64 QAM	256 QAM	1	Half	Full	L	M	H
Max. Output Power	2	v	v	v	v	v	v	v	v	v	v	v		v	v	v	v
	4	v	v	v	v	v	v	v	v	v	v	v		v	v	v	v
	5	v	v	v	v	-	-	v	v	v	v	v		v	v	v	v
	25	v	v	v	v	v	v	v	v	v	v	v		v	v	v	v
	26	v	v	v	v	v	-	v	v	v	v	v		v	v	v	v
	66	v	v	v	v	v	v	v	v	v	v	v		v	v	v	v
	71	-	-	v	v	v	v	v	v	v	v	v		v	v	v	v
Peak-to-Average Ratio	25						v	v	v	v	v			v		v	
	26					v	-	v	v	v	v			v		v	
	66						v	v	v	v	v			v		v	
	71						v	v	v	v	v			v		v	
26dB and 99% Bandwidth	25	v	v	v	v	v	v	v	v	v	v			v		v	
	26	v	v	v	v	v	-	v	v	v	v			v		v	
	66	v	v	v	v	v	v	v	v	v	v			v		v	
	71	-	-	v	v	v	v	v	v	v	v			v		v	
Conducted Band Edge	25	v	v	v	v	v	v	v	v	v	v	v		v	v		v
	26	v	v	v	v	v	-	v	v	v	v	v		v	v		v
	66	v	v	v	v	v	v	v	v	v	v	v		v	v		v
	71	-	-	v	v	v	v	v	v	v	v	v		v	v		v
Conducted Spurious Emission	25	v	v	v	v	v	v	v				v			v	v	v
	26	v	v	v	v	v	-	v				v			v	v	v
	66	v	v	v	v	v	v	v				v			v	v	v
	71	-	-	v	v	v	v	v				v			v	v	v



Test Items	Band	Bandwidth (MHz)						Modulation			RB #			Test Channel				
		1.4	3	5	10	15	20	QPSK	16 QAM	64 QAM	256 QAM	1	Half	Full	L	M	H	
Frequency Stability	25				v			v				v				v		
	26				v		-	v				v				v		
	66				v			v				v				v		
	71				v			v				v				v		
E.R.P / E.I.R.P	25	v	v	v	v	v	v	v	v	v	v	v		v	v	v	v	
	26	v	v	v	v	v	-	v	v	v	v	v		v	v	v	v	
	66	v	v	v	v	v	v	v	v	v	v	v		v	v	v	v	
	71	-	-	v	v	v	v	v	v	v	v	v		v	v	v	v	
Radiated Spurious Emission	25	Worst Case															v	
	26	Worst Case															v	
	66	Worst Case															v	
	71	Worst Case															v	
Note	<ol style="list-style-type: none"> <li>The mark "v " means that this configuration is chosen for testing</li> <li>The mark "-" means that this bandwidth is not supported.</li> <li>The device is investigated from 30MHz to 10 times of fundamental signal for radiated spurious emission test under different RB size/offset and modulations in exploratory test. Subsequently, only the worst case emissions are reported.</li> <li>All test items are based on engineering evaluation.</li> </ol>																	

## 2.2 Connection Diagram of Test System



## 2.3 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model No.	FCC ID	Data Cable	Power Cord
1.	Power Supply	GWINSTEK	PSS-2002	N/A	N/A	Unshielded, 1.8 m
2.	LTE Base Station	Anritsu	MT8820C	N/A	N/A	Unshielded, 1.8 m

## 2.4 Measurement Results Explanation Example

### For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

The spectrum analyzer offset is derived from RF cable loss.

*Offset = RF cable loss.*

Following shows an offset computation example with cable loss 5.6 dB.

Example :

$$\begin{aligned} \text{Offset(dB)} &= \text{RF cable loss(dB)} \\ &= 5.6 \text{ (dB)} \end{aligned}$$



## 2.5 Frequency List of Low/Middle/High Channels

LTE Band 2 Channel and Frequency List				
BW [MHz]	Channel/Frequency(MHz)	Lowest	Middle	Highest
20	Channel	18700	18900	19100
	Frequency	1860	1880	1900
15	Channel	18675	18900	19125
	Frequency	1857.5	1880	1902.5
10	Channel	18650	18900	19150
	Frequency	1855	1880	1905
5	Channel	18625	18900	19175
	Frequency	1852.5	1880	1907.5
3	Channel	18615	18900	19185
	Frequency	1851.5	1880	1908.5
1.4	Channel	18607	18900	19193
	Frequency	1850.7	1880	1909.3

LTE Band 4 Channel and Frequency List				
BW [MHz]	Channel/Frequency(MHz)	Lowest	Middle	Highest
20	Channel	20050	20175	20300
	Frequency	1720	1732.5	1745
15	Channel	20025	20175	20325
	Frequency	1717.5	1732.5	1747.5
10	Channel	20000	20175	20350
	Frequency	1715	1732.5	1750
5	Channel	19975	20175	20375
	Frequency	1712.5	1732.5	1752.5
3	Channel	19965	20175	20385
	Frequency	1711.5	1732.5	1753.5
1.4	Channel	19957	20175	20393
	Frequency	1710.7	1732.5	1754.3



LTE Band 5 Channel and Frequency List				
BW [MHz]	Channel/Frequency(MHz)	Lowest	Middle	Highest
10	Channel	20450	20525	20600
	Frequency	829	836.5	844
5	Channel	20425	20525	20625
	Frequency	826.5	836.5	846.5
3	Channel	20415	20525	20635
	Frequency	825.5	836.5	847.5
1.4	Channel	20407	20525	20643
	Frequency	824.7	836.5	848.3

LTE Band 25 Channel and Frequency List				
BW [MHz]	Channel/Frequency(MHz)	Lowest	Middle	Highest
20	Channel	26140	26340	26590
	Frequency	1860	1880	1905
15	Channel	26115	26340	26615
	Frequency	1857.5	1880	1907.5
10	Channel	26090	26340	26640
	Frequency	1855	1880	1910
5	Channel	26065	26340	26665
	Frequency	1852.5	1880	1912.5
3	Channel	26055	26340	26675
	Frequency	1851.5	1880	1913.5
1.4	Channel	26047	26340	26683
	Frequency	1850.7	1880	1914.3

LTE Band 26 Channel and Frequency List				
BW [MHz]	Channel/Frequency(MHz)	Lowest	Middle	Highest
15	Channel	26865	26915	26965
	Frequency	831.5	836.5	841.5
10	Channel	26840	26915	26990
	Frequency	829	836.5	844
5	Channel	26815	26915	27015
	Frequency	826.5	836.5	846.5
3	Channel	26805	26915	27025
	Frequency	825.5	836.5	847.5
1.4	Channel	26797	26915	27033
	Frequency	824.7	836.5	848.3



LTE Band 66 Channel and Frequency List				
BW [MHz]	Channel/Frequency(MHz)	Lowest	Middle	Highest
20	Channel	132072	132197	132322
	Frequency	1720	1732.5	1745
15	Channel	132047	132197	132347
	Frequency	1717.5	1732.5	1747.5
10	Channel	132022	132197	132372
	Frequency	1715	1732.5	1750
5	Channel	131997	132197	132397
	Frequency	1712.5	1732.5	1752.5
3	Channel	131987	132197	132407
	Frequency	1711.5	1732.5	1753.5
1.4	Channel	131979	132197	132415
	Frequency	1710.7	1732.5	1754.3

LTE Band 71 Channel and Frequency List				
BW [MHz]	Channel/Frequency(MHz)	Lowest	Middle	Highest
20	Channel	133222	133322	133372
	Frequency	673.0	680.5	688.0
15	Channel	133197	133297	133397
	Frequency	670.5	680.5	690.5
10	Channel	133172	133272	133422
	Frequency	668.0	678.0	693.0
5	Channel	133147	133247	133447
	Frequency	665.5	675.5	695.5



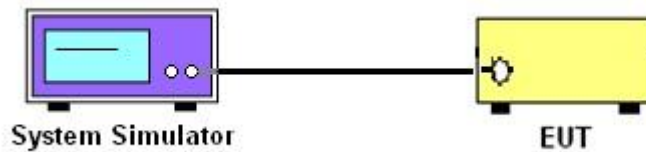
### 3 Conducted Test Items

#### 3.1 Measuring Instruments

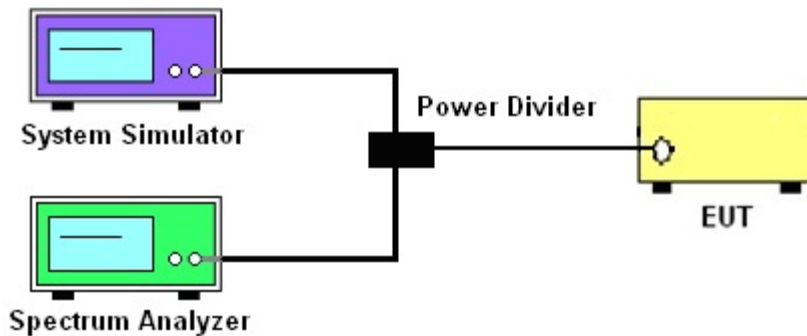
See list of measuring instruments of this test report.

#### 3.2 Test Setup

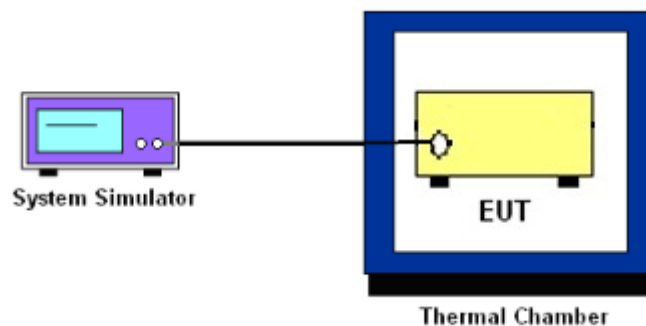
##### 3.2.1 Conducted Output Power



##### 3.2.2 Peak-to-Average Ratio, Occupied Bandwidth, Conducted Band-Edge and Conducted Spurious Emission



##### 3.2.3 Frequency Stability



### 3.3 Test Result of Conducted Test

Please refer to Appendix A.



### 3.4 Conducted Output Power and ERP/EIRP

#### 3.4.1 Description of the Conducted Output Power Measurement and ERP/EIRP Measurement

A system simulator was used to establish communication with the EUT. Its parameters were set to force the EUT transmitting at maximum output power. The measured power in the radio frequency on the transmitter output terminals shall be reported.

The ERP of mobile transmitters must not exceed 7 Watts for LTE Band 5 and Band 26.

The ERP of mobile transmitters must not exceed 3 Watts for LTE and Band 71.

The EIRP of mobile transmitters must not exceed 2 Watts for LTE Band 2 and Band 25.

The EIRP of mobile transmitters must not exceed 1 Watts for LTE Band 4 and Band 66.

According to KDB 412172 D01 Power Approach,

$EIRP = P_T + G_T - L_C$ ,  $ERP = EIRP - 2.15$ , where

$P_T$  = transmitter output power in dBm

$G_T$  = gain of the transmitting antenna in dBi

$L_C$  = signal attenuation in the connecting cable between the transmitter and antenna in dB

#### 3.4.2 Test Procedures

1. The testing follows ANSI C63.26 Section 5.2
2. The transmitter output port was connected to the system simulator.
3. Set EUT at maximum power through the system simulator.
4. Select lowest, middle, and highest channels for each band and different modulation.
5. Measure and record the power level from the system simulator.



## **3.5 Peak-to-Average Ratio**

### **3.5.1 Description of the PAR Measurement**

Power Complementary Cumulative Distribution Function (CCDF) curves provide a means for characterizing the power peaks of a digitally modulated signal on a statistical basis. 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. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

### **3.5.2 Test Procedures**

1. The testing follows ANSI C63.26 Section 5.2.3.4 (CCDF).
2. The EUT was connected to spectrum and system simulator via a power divider.
3. Set the CCDF (Complementary Cumulative Distribution Function) option in spectrum analyzer.
4. The highest RF powers were measured and recorded the maximum PAPR level associated with a probability of 0.1 %.
5. Record the deviation as Peak to Average Ratio.



### 3.6 Occupied Bandwidth

#### 3.6.1 Description of Occupied Bandwidth Measurement

The occupied bandwidth is the width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5% of the total mean transmitted power.

The 26 dB emission bandwidth is defined as the frequency range between two points, one above and one below the carrier frequency, at which the spectral density of the emission is attenuated 26 dB below the maximum in-band spectral density of the modulated signal. Spectral density (power per unit bandwidth) is to be measured with a detector of resolution bandwidth equal to approximately 1.0% of the emission bandwidth.

#### 3.6.2 Test Procedures

1. The testing follows ANSI C63.26 Section 5.4
2. The EUT was connected to spectrum analyzer and system simulator via a power divider.
3. The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the spectrum analyzer shall be between two and five times the anticipated OBW.
4. The nominal resolution bandwidth (RBW) shall be in the range of 1 to 5 % of the anticipated OBW, and the VBW shall be at least 3 times the RBW.
5. Set the detection mode to peak, and the trace mode to max hold.
6. Determine the reference value: Set the EUT to transmit a modulated signal. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace.  
(this is the reference value)
7. Determine the “-26 dB down amplitude” as equal to (Reference Value – X).
8. Place two markers, one at the lowest and the other at the highest frequency of the envelope of the spectral display such that each marker is at or slightly below the “-X dB down amplitude” determined in step 6. If a marker is below this “-X dB down amplitude” value it shall be placed as close as possible to this value. The OBW is the positive frequency difference between the two markers.
9. Use the 99 % power bandwidth function of the spectrum analyzer and report the measured bandwidth.



### 3.7 Conducted Band Edge

#### 3.7.1 Description of Conducted Band Edge Measurement

22.917(a)

For operations in the 824 – 849 MHz band, the FCC limit is  $43 + 10\log_{10}(P[\text{Watts}])$  dB below the transmitter power  $P(\text{Watts})$  in a 100kHz bandwidth. However, in the 1MHz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

24.238 (a)

For operations in the 1850-1910 and 1930-1990 MHz band, the FCC limit is  $43 + 10\log_{10}(P[\text{Watts}])$  dB below the transmitter power  $P(\text{Watts})$  in a 1MHz bandwidth. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

27.53 (g)

For operations in the 600MHz band and 698 -746 MHz band, the FCC limit is  $43 + 10\log_{10}(P[\text{Watts}])$  dB below the transmitter power  $P(\text{Watts})$  in a 100 kHz bandwidth. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

27.53 (h)

For operations in the 1710 – 1755 MHz band, the FCC limit is  $43 + 10\log_{10}(P[\text{Watts}])$  dB below the transmitter power  $P(\text{Watts})$  in a 1 MHz bandwidth. However, in the 1MHz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.



### 3.7.2 Test Procedures

1. The testing follows ANSI C63.26 section 5.7
2. The EUT was connected to spectrum analyzer and system simulator via a power divider.
3. The band edges of low and high channels for the highest RF powers were measured.
4. Set RBW  $\geq$  1% EBW in the 1MHz band immediately outside and adjacent to the band edge.
5. Beyond the 1 MHz band from the band edge, RBW=1MHz was used.
6. Set spectrum analyzer with RMS detector.
7. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
8. Checked that all the results comply with the emission limit line.

Example:

The limit line is derived from  $43 + 10\log(P)$ dB below the transmitter power P(Watts)

$$= P(W) - [43 + 10\log(P)] \text{ (dB)}$$

$$= [30 + 10\log(P)] \text{ (dBm)} - [43 + 10\log(P)] \text{ (dB)} = -13\text{dBm}.$$

9. When using the integration method, the starting frequency of the integration shall be centered at one-half of the RBW away from the band edge.



### 3.8 Conducted Spurious Emission

#### 3.8.1 Description of Conducted Spurious Emission Measurement

The power of any emission outside of the authorized operating frequency ranges must be lower than the transmitter power (P) by a factor of at least  $43 + 10 \log (P)$  dB.

It is measured by means of a calibrated spectrum analyzer and scanned from 30 MHz up to a frequency including its 10<sup>th</sup> harmonic.

#### 3.8.2 Test Procedures

1. The testing follows ANSI C63.26 section 5.7
2. The EUT was connected to spectrum analyzer and system simulator via a power divider.
3. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
4. The middle channel for the highest RF power within the transmitting frequency was measured.
5. The conducted spurious emission for the whole frequency range was taken.
6. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz.
7. Set spectrum analyzer with RMS detector.
8. Taking the record of maximum spurious emission.
9. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
10. The limit line is derived from  $43 + 10\log(P)$ dB below the transmitter power P(Watts)  
=  $P(W) - [43 + 10\log(P)]$  (dB)  
=  $[30 + 10\log(P)]$  (dBm) -  $[43 + 10\log(P)]$  (dB)  
= -13dBm.



## 3.9 Frequency Stability

### 3.9.1 Description of Frequency Stability Measurement

The frequency stability shall be measured by variation of ambient temperature and variation of primary supply voltage to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the transmitter shall be maintained within  $\pm 0.00025\%$  ( $\pm 2.5\text{ppm}$ ) of the center frequency.

### 3.9.2 Test Procedures for Temperature Variation

1. The testing follows ANSI C63.26 section 5.6.4
2. The EUT was set up in the thermal chamber and connected with the system simulator.
3. With power OFF, the temperature was decreased to  $-30^{\circ}\text{C}$  and the EUT was stabilized before testing. Power was applied and the maximum change in frequency was recorded within one minute.
4. With power OFF, the temperature was raised in  $10^{\circ}\text{C}$  step up to  $50^{\circ}\text{C}$ . The EUT was stabilized at each step for at least half an hour. Power was applied and the maximum frequency change was recorded within one minute.

### 3.9.3 Test Procedures for Voltage Variation

1. The testing follows ANSI C63.26 section 5.6.5
2. The EUT was placed in a temperature chamber at  $20\pm 5^{\circ}\text{C}$  and connected with the system simulator.
3. The power supply voltage to the EUT was varied from 85% to 115% of the nominal value for other than hand carried battery equipment.
4. For hand carried, battery powered equipment, reduce the primary ac or dc supply voltage to the battery operating end point, which shall be specified by the manufacturer.
5. The variation in frequency was measured for the worst case.



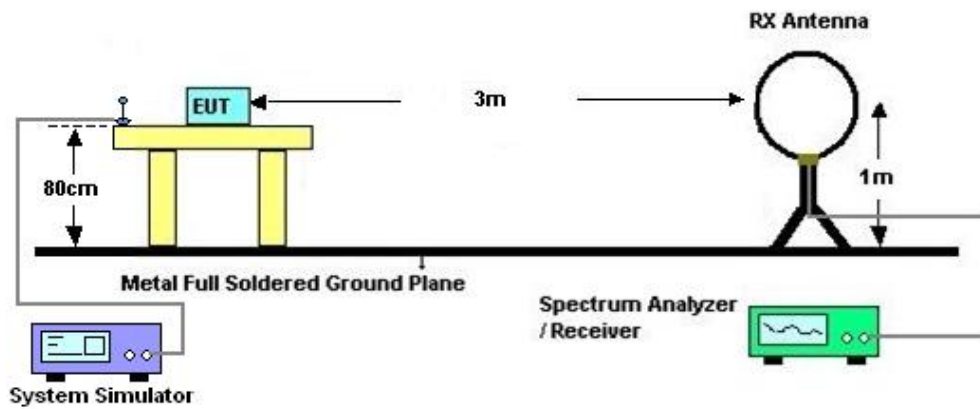
## 4 Radiated Test Items

### 4.1 Measuring Instruments

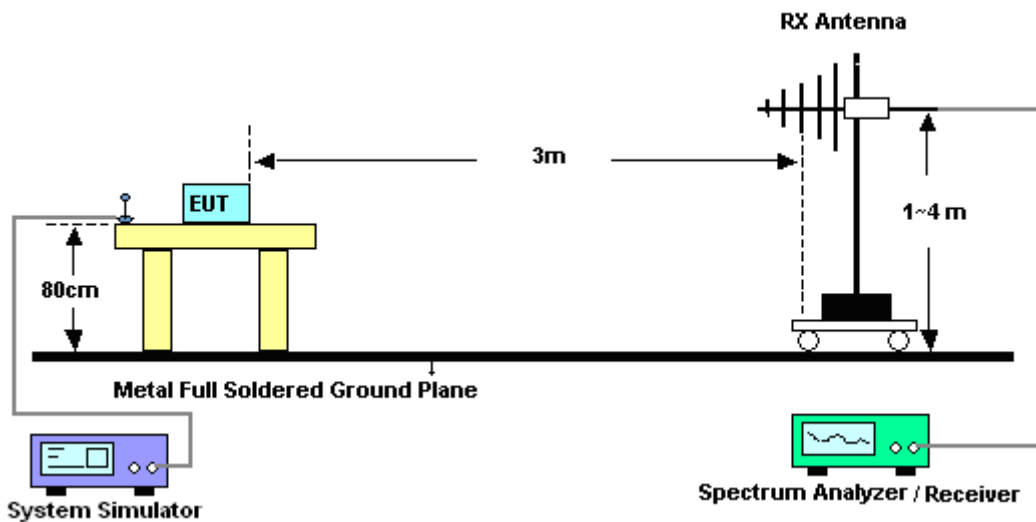
See list of measuring instruments of this test report.

### 4.2 Test Setup

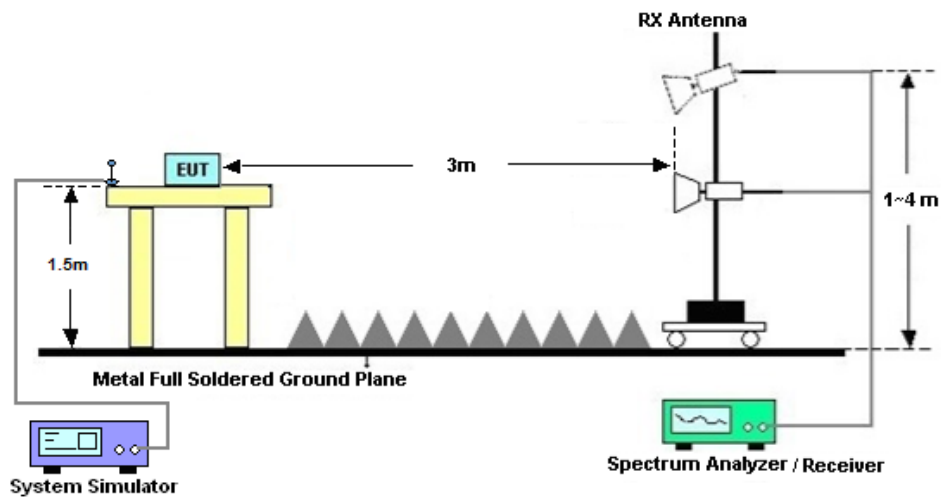
#### 4.2.1 For radiated test below 30MHz



#### 4.2.2 For radiated test from 30MHz to 1GHz



#### 4.2.3 For radiated test above 1GHz



#### 4.3 Test Result of Radiated Test

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.

Please refer to Appendix B.



## 4.4 Radiated Spurious Emission

### 4.4.1 Description of Radiated Spurious Emission

The radiated spurious emission was measured by substitution method according to ANSI C63.26. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least  $43 + 10 \log(P)$  dB.

The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

### 4.4.2 Test Procedures

1. The testing follows ANSI C63.26 Section 5.5
2. The EUT was placed on a turntable with 0.8 meter height for frequency below 1GHz and 1.5 meter height for frequency above 1GHz respectively above ground.
3. The EUT was set 3 meters from the receiving antenna mounted on the antenna tower.
4. The table was rotated 360 degrees to determine the position of the highest spurious emission.
5. The height of the receiving antenna is varied between 1m to 4m to search the maximum spurious emission for both horizontal and vertical polarizations.
6. During the measurement, the system simulator parameters were set to force the EUT transmitting at maximum output power.
7. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking the record of maximum spurious emission.
8. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
9. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
10.  $EIRP \text{ (dBm)} = S.G. \text{ Power} - Tx \text{ Cable Loss} + Tx \text{ Antenna Gain}$
11.  $ERP \text{ (dBm)} = EIRP - 2.15$
12. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

The limit line is derived from  $43 + 10\log(P)$ dB below the transmitter power P(Watts)  
 $= P(W) - [43 + 10\log(P)] \text{ (dB)}$   
 $= [30 + 10\log(P)] \text{ (dBm)} - [43 + 10\log(P)] \text{ (dB)}$   
 $= -13\text{dBm}.$



## 5 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV40	101040	10Hz~40GHz	Oct. 12, 2022	May 05, 2023~Jun. 15, 2023	Oct. 11, 2023	Conducted (TH01-KS)
Power divider	STI	STI08-0055	-	0.5~40GHz	NCR	May 05, 2023~Jun. 15, 2023	NCR	Conducted (TH01-KS)
Temperature & humidity chamber	Hongzhan	LP-150U	H2014011440	-40~+150°C 20%~95%RH	Jul. 15, 2022	May 05, 2023~Jun. 15, 2023	Jul. 14, 2023	Conducted (TH01-KS)
EXA Spectrum Analyzer	Keysight	N9010B	MY57471079	10Hz~44G,MAX 30dB	Oct. 12, 2022	May 06, 2023	Oct. 11, 2023	Radiation (03CH04-KS)
Loop Antenna	R&S	HFH2-Z2	100321	9kHz~30MHz	Oct. 16, 2022	May 06, 2023	Oct. 15, 2023	Radiation (03CH04-KS)
Bilog Antenna	TeseQ	CBL6111D	49922	30MHz-1GHz	May 24, 2022	May 06, 2023	May 23, 2023	Radiation (03CH04-KS)
Horn Antenna	Schwarzbeck	BBHA9120D	1284	1GHz~18GHz	Oct. 16, 2022	May 06, 2023	Oct. 15, 2023	Radiation (03CH04-KS)
SHF-EHF Horn	Com-power	AH-840	101070	18GHz~40GHz	Jan. 08, 2023	May 06, 2023	Jan. 07, 2024	Radiation (03CH04-KS)
Amplifier	SONOMA	310N	187289	9KHz-1GHz	May 24, 2022	May 06, 2023	May 23, 2023	Radiation (03CH04-KS)
Amplifier	MITEQ	EM18G40G GA	060728	18~40GHz	Jan. 05, 2023	May 06, 2023	Jan. 04, 2024	Radiation (03CH04-KS)
high gain Amplifier	EM	EM01G18G A	060840	1Ghz-18Ghz	Oct. 12, 2022	May 06, 2023	Oct. 11, 2023	Radiation (03CH04-KS)
Amplifier	Agilent	8449B	3008A02370	1Ghz-18Ghz	Oct. 12, 2022	May 06, 2023	Oct. 11, 2023	Radiation (03CH04-KS)
AC Power Source	Chroma	61601	F104090004	N/A	NCR	May 06, 2023	NCR	Radiation (03CH04-KS)
Turn Table	ChamPro	EM 1000-T	060762-T	0~360 degree	NCR	May 06, 2023	NCR	Radiation (03CH04-KS)
Antenna Mast	ChamPro	EM 1000-A	060762-A	1 m~4 m	NCR	May 06, 2023	NCR	Radiation (03CH04-KS)

NCR: No Calibration Required



## 6 Measurement Uncertainty

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI 63.26-2015. All the measurement uncertainty value were shown with a coverage K=2 to indicate 95% level of confidence. The measurement data show herein meets or exceeds the CISPR measurement uncertainty values specified in CISPR 16-4-2 and can be compared directly to specified limit to determine compliance.

### Uncertainty of Conducted Measurement

Test Item	Uncertainty
Conducted Power	±0.46 dB
Conducted Emissions	±0.48 dB
Occupied Channel Bandwidth	±0.1 %

### Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	3.82dB
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### Uncertainty of Radiated Emission Measurement (1 GHz ~ 18 GHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	3.56dB
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### Uncertainty of Radiated Emission Measurement (18 GHz ~ 40 GHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	3.54dB
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### Appendix A. Test Results of Conducted Test

Test Engineer :	Simle Wang	Temperature :	22~23°C
		Relative Humidity :	40~42%

### A1. Conducted Output Power(Average power) and ERP/EIRP

#### LTE Band 2:

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	EIRP(W)		
							L	M	H
Channel				18700	18900	19100	EIRP(W)		
Frequency (MHz)				1860	1880	1900	L	M	H
20	QPSK	1	0	17.55	17.89	17.61	1.3243	1.4322	1.3428
20	QPSK	1	99	17.36	17.34	17.28	1.2677	1.2618	1.2445
20	QPSK	100	0	16.37	16.43	16.30	1.0093	1.0233	0.9931
20	16QAM	1	0	17.14	17.28	17.18	1.2050	1.2445	1.2162
20	64QAM	1	0	15.71	15.65	15.48	0.8670	0.8551	0.8222
20	256QAM	1	0	12.68	12.72	12.81	0.4315	0.4355	0.4446
Channel				18675	18900	19125	EIRP(W)		
Frequency (MHz)				1857.5	1880	1902.5	L	M	H
15	QPSK	1	0	17.71	17.69	17.67	1.3740	1.3677	1.3614
15	16QAM	1	0	16.80	16.84	17.12	1.1143	1.1246	1.1995
Channel				18650	18900	19150	EIRP(W)		
Frequency (MHz)				1855	1880	1905	L	M	H
10	QPSK	1	0	17.67	17.72	17.66	1.3614	1.3772	1.3583
10	16QAM	1	0	16.39	16.89	16.75	1.0139	1.1376	1.1015
Channel				18625	18900	19175	EIRP(W)		
Frequency (MHz)				1852.5	1880	1907.5	L	M	H
5	QPSK	1	0	17.76	17.80	17.74	1.3900	1.4028	1.3836
5	16QAM	1	0	16.86	16.91	17.24	1.1298	1.1429	1.2331
Channel				18615	18900	19185	EIRP(W)		
Frequency (MHz)				1851.5	1880	1908.5	L	M	H
3	QPSK	1	0	17.86	17.73	17.70	1.4223	1.3804	1.3709
3	16QAM	1	0	16.98	16.92	16.94	1.1614	1.1455	1.1508
Channel				18607	18900	19193	EIRP(W)		
Frequency (MHz)				1850.7	1880	1909.3	L	M	H
1.4	QPSK	1	0	17.65	17.72	17.64	1.3552	1.3772	1.3521
1.4	16QAM	1	0	16.86	16.88	16.91	1.1298	1.1350	1.1429



LTE Band 4:

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	EIRP(W)		
Channel				20050	20175	20300	EIRP(W)		
Frequency (MHz)				1720	1732.5	1745	L	M	H
20	QPSK	1	0	15.09	15.03	15.41	0.7516	0.7413	0.8091
20	QPSK	1	99	15.02	15.34	15.41	0.7396	0.7962	0.8091
20	QPSK	100	0	14.27	14.02	14.45	0.6223	0.5875	0.6486
20	16QAM	1	0	14.33	14.65	14.29	0.6310	0.6792	0.6252
20	64QAM	1	0	13.31	13.36	13.32	0.4989	0.5047	0.5000
20	256QAM	1	0	10.05	10.12	10.23	0.2355	0.2393	0.2455
Channel				20025	20175	20325	EIRP(W)		
Frequency (MHz)				1717.5	1732.5	1747.5	L	M	H
15	QPSK	1	0	15.13	15.04	15.26	0.7586	0.7430	0.7816
15	16QAM	1	0	14.32	14.37	14.63	0.6295	0.6368	0.6761
Channel				20000	20175	20350	EIRP(W)		
Frequency (MHz)				1715	1732.5	1750	L	M	H
10	QPSK	1	0	15.07	15.18	15.35	0.7482	0.7674	0.7980
10	16QAM	1	0	14.22	14.31	14.60	0.6152	0.6281	0.6714
Channel				19975	20175	20375	EIRP(W)		
Frequency (MHz)				1712.5	1732.5	1752.5	L	M	H
5	QPSK	1	0	15.02	15.13	15.38	0.7396	0.7586	0.8035
5	16QAM	1	0	14.20	14.26	14.57	0.6124	0.6209	0.6668
Channel				19965	20175	20385	EIRP(W)		
Frequency (MHz)				1711.5	1732.5	1753.5	L	M	H
3	QPSK	1	0	15.15	15.08	15.29	0.7621	0.7499	0.7870
3	16QAM	1	0	14.61	14.37	14.46	0.6730	0.6368	0.6501
Channel				19950	20175	20393	EIRP(W)		
Frequency (MHz)				1710	1732.5	1754.3	L	M	H
1.4	QPSK	1	0	15.10	15.22	15.37	0.7534	0.7745	0.8017
1.4	16QAM	1	0	14.41	14.45	14.56	0.6427	0.6486	0.6653



LTE Band 5:

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	ERP(W)		
Channel				20450	20525	20600	ERP(W)		
Frequency (MHz)				829	836.5	844	L	M	H
10	QPSK	1	0	22.58	22.49	22.67	0.1914	0.1875	0.1954
10	QPSK	1	49	22.34	22.38	22.41	0.1811	0.1828	0.1841
10	QPSK	50	0	21.86	21.92	21.90	0.1622	0.1644	0.1637
10	16QAM	1	0	21.98	22.02	21.95	0.1667	0.1683	0.1656
10	64QAM	1	0	21.24	21.20	21.25	0.1406	0.1393	0.1409
10	256QAM	1	0	18.05	18.10	18.08	0.0675	0.0682	0.0679
Channel				20425	20525	20625	ERP(W)		
Frequency (MHz)				826.5	836.5	846.5	L	M	H
5	QPSK	1	0	22.60	22.50	22.51	0.1923	0.1879	0.1884
5	16QAM	1	0	21.95	21.99	21.86	0.1656	0.1671	0.1622
Channel				20415	20525	20635	ERP(W)		
Frequency (MHz)				825.5	836.5	847.5	L	M	H
3	QPSK	1	0	22.66	22.58	22.54	0.1950	0.1914	0.1897
3	16QAM	1	0	21.93	21.90	22.01	0.1648	0.1637	0.1679
Channel				20407	20525	20643	ERP(W)		
Frequency (MHz)				824.7	836.5	848.3	L	M	H
1.4	QPSK	1	0	22.53	22.49	22.55	0.1892	0.1875	0.1901
1.4	16QAM	1	0	21.90	21.87	21.92	0.1637	0.1626	0.1644





LTE Band 25:

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	EIRP(W)		
Channel				26140	26340	26590	EIRP(W)		
Frequency (MHz)				1860	1880	1905	L	M	H
20	QPSK	1	0	18.02	18.41	17.93	1.4928	1.6331	1.4622
20	QPSK	1	99	17.85	17.94	17.83	1.4355	1.4655	1.4289
20	QPSK	100	0	16.99	17.05	16.92	1.1776	1.1940	1.1588
20	16QAM	1	0	17.26	17.60	17.11	1.2531	1.3552	1.2106
20	64QAM	1	0	16.16	16.11	16.03	0.9727	0.9616	0.9441
20	256QAM	1	0	13.12	13.02	13.22	0.4831	0.4721	0.4943
Channel				26115	26340	26615	EIRP(W)		
Frequency (MHz)				1857.5	1880	1907.5	L	M	H
15	QPSK	1	0	18.06	18.04	18.02	1.5066	1.4997	1.4928
15	16QAM	1	0	17.15	17.19	17.39	1.2218	1.2331	1.2912
Channel				26090	26340	26640	EIRP(W)		
Frequency (MHz)				1855	1880	1910	L	M	H
10	QPSK	1	0	17.99	18.04	17.98	1.4825	1.4997	1.4791
10	16QAM	1	0	16.71	17.21	17.07	1.1041	1.2388	1.1995
Channel				26065	26340	26665	EIRP(W)		
Frequency (MHz)				1852.5	1880	1912.5	L	M	H
5	QPSK	1	0	17.96	18.00	17.94	1.4723	1.4859	1.4655
5	16QAM	1	0	17.06	17.11	17.48	1.1967	1.2106	1.3183
Channel				26055	26340	26675	EIRP(W)		
Frequency (MHz)				1851.5	1880	1913.5	L	M	H
3	QPSK	1	0	18.02	17.89	17.86	1.4928	1.4488	1.4388
3	16QAM	1	0	17.40	17.38	17.34	1.2942	1.2882	1.2764
Channel				26047	26340	26683	EIRP(W)		
Frequency (MHz)				1850.7	1880	1914.3	L	M	H
1.4	QPSK	1	0	17.78	17.85	17.77	1.4125	1.4355	1.4093
1.4	16QAM	1	0	16.99	17.01	17.04	1.1776	1.1830	1.1912



LTE Band 26:

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	ERP(W)			
Channel				26790	26865	26915	26965				
Frequency (MHz)				824	831.5	836.5	841.5	Straddle Ch	L	M	H
15	QPSK	1	0	22.80	22.76	22.82	22.66	0.2014	0.1995	0.2023	0.1950
15	QPSK	1	74	22.41	22.37	22.43	22.49	0.1841	0.1824	0.1849	0.1875
15	QPSK	75	0	22.08	21.94	22.01	21.88	0.1706	0.1652	0.1679	0.1629
15	16QAM	1	0	22.21	22.11	22.24	22.10	0.1758	0.1718	0.1770	0.1714
15	64QAM	1	0	21.42	21.36	21.32	21.31	0.1466	0.1445	0.1432	0.1429
15	256QAM	1	0	18.16	18.15	18.02	18.01	0.0692	0.0690	0.0670	0.0668
Channel					26840	26915	26990	ERP(W)			
Frequency (MHz)					829	836.5	844		L	M	H
10	QPSK	1	0		22.67	22.61	22.54		0.1954	0.1928	0.1897
10	16QAM	1	0		22.02	22.16	22.06		0.1683	0.1738	0.1698
Channel					26815	26915	27015	ERP(W)			
Frequency (MHz)					826.5	836.5	846.5		L	M	H
5	QPSK	1	0		22.71	22.65	22.55		0.1972	0.1945	0.1901
5	16QAM	1	0		22.11	22.13	22.02		0.1718	0.1726	0.1683
Channel					26815	26915	27025	ERP(W)			
Frequency (MHz)					825.5	836.5	847.5		L	M	H
3	QPSK	1	0		22.61	22.46	22.52		0.1928	0.1862	0.1888
3	16QAM	1	0		21.95	22.03	21.89		0.1656	0.1687	0.1633
Channel					26797	26915	27033	ERP(W)			
Frequency (MHz)					824.7	836.5	848.3		L	M	H
1.4	QPSK	1	0		22.65	22.50	22.56		0.1945	0.1879	0.1905
1.4	16QAM	1	0		21.96	22.06	22.00		0.1660	0.1698	0.1675



LTE Band 66:

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	EIRP(W)		
Channel				132072	132197	132322	EIRP(W)		
Frequency (MHz)				1720	1732.5	1745	L	M	H
20	QPSK	1	0	15.43	15.37	15.75	0.8222	0.8110	0.8851
20	QPSK	1	99	15.36	15.68	15.62	0.8091	0.8710	0.8590
20	QPSK	100	0	14.61	14.36	14.79	0.6808	0.6427	0.7096
20	16QAM	1	0	14.67	14.88	14.63	0.6902	0.7244	0.6839
20	64QAM	1	0	13.65	13.70	13.66	0.5458	0.5521	0.5470
20	256QAM	1	0	10.39	10.46	10.57	0.2576	0.2618	0.2685
Channel				132047	132197	132347	EIRP(W)		
Frequency (MHz)				1717.5	1732.5	1747.5	L	M	H
15	QPSK	1	0	15.38	15.29	15.51	0.8128	0.7962	0.8375
15	16QAM	1	0	14.57	14.62	14.74	0.6745	0.6823	0.7015
Channel				132022	132197	132372	EIRP(W)		
Frequency (MHz)				1715	1732.5	1750	L	M	H
10	QPSK	1	0	15.27	15.38	15.55	0.7925	0.8128	0.8453
10	16QAM	1	0	14.42	14.51	14.80	0.6516	0.6653	0.7112
Channel				131997	132197	132397	EIRP(W)		
Frequency (MHz)				1712.5	1732.5	1752.5	L	M	H
5	QPSK	1	0	15.20	15.31	15.59	0.7798	0.7998	0.8531
5	16QAM	1	0	14.38	14.44	14.75	0.6457	0.6546	0.7031
Channel				131987	132197	132407	EIRP(W)		
Frequency (MHz)				1711.5	1732.5	1753.5	L	M	H
3	QPSK	1	0	15.38	15.31	15.52	0.8128	0.7998	0.8395
3	16QAM	1	0	14.88	14.60	14.69	0.7244	0.6792	0.6934
Channel				131979	132197	132415	EIRP(W)		
Frequency (MHz)				1710.7	1732.5	1754.3	L	M	H
1.4	QPSK	1	0	15.34	15.46	15.61	0.8054	0.8279	0.8570
1.4	16QAM	1	0	14.65	14.69	14.80	0.6871	0.6934	0.7112



LTE Band 71:

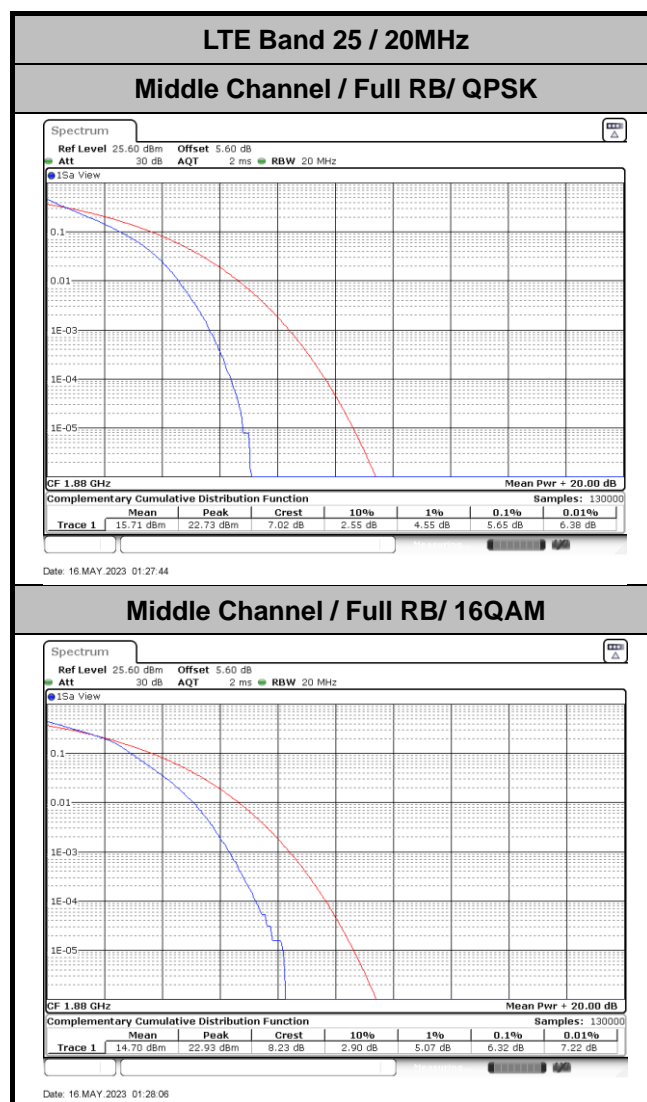
BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	ERP(W)		
Channel				133222	133322	133372			
Frequency (MHz)				673	683	688	L	M	H
20	QPSK	1	0	22.88	22.86	22.80	0.1521	0.1514	0.1493
20	QPSK	1	99	22.75	22.91	22.87	0.1476	0.1531	0.1517
20	QPSK	100	0	21.97	21.92	21.81	0.1233	0.1219	0.1189
20	16QAM	1	0	22.02	22.03	22.04	0.1247	0.1250	0.1253
20	64QAM	1	0	21.05	21.24	21.20	0.0998	0.1042	0.1033
20	256QAM	1	0	19.87	20.02	20.01	0.0760	0.0787	0.0785
Channel				133197	133297	133397	EIRP(W)		
Frequency (MHz)				670.5	680.5	690.5	L	M	H
15	QPSK	1	0	22.76	22.82	22.75	0.1479	0.1500	0.1476
15	16QAM	1	0	21.92	21.97	22.01	0.1219	0.1233	0.1245
Channel				133172	133272	133422	EIRP(W)		
Frequency (MHz)				668	678	693	L	M	H
10	QPSK	1	0	22.75	22.81	22.83	0.1476	0.1496	0.1503
10	16QAM	1	0	22.06	22.02	21.98	0.1259	0.1247	0.1236
Channel				133147	133247	133447	EIRP(W)		
Frequency (MHz)				665.5	675.5	695.5	L	M	H
5	QPSK	1	0	22.77	22.85	22.87	0.1483	0.1510	0.1517
5	16QAM	1	0	21.89	21.95	21.96	0.1211	0.1227	0.1230

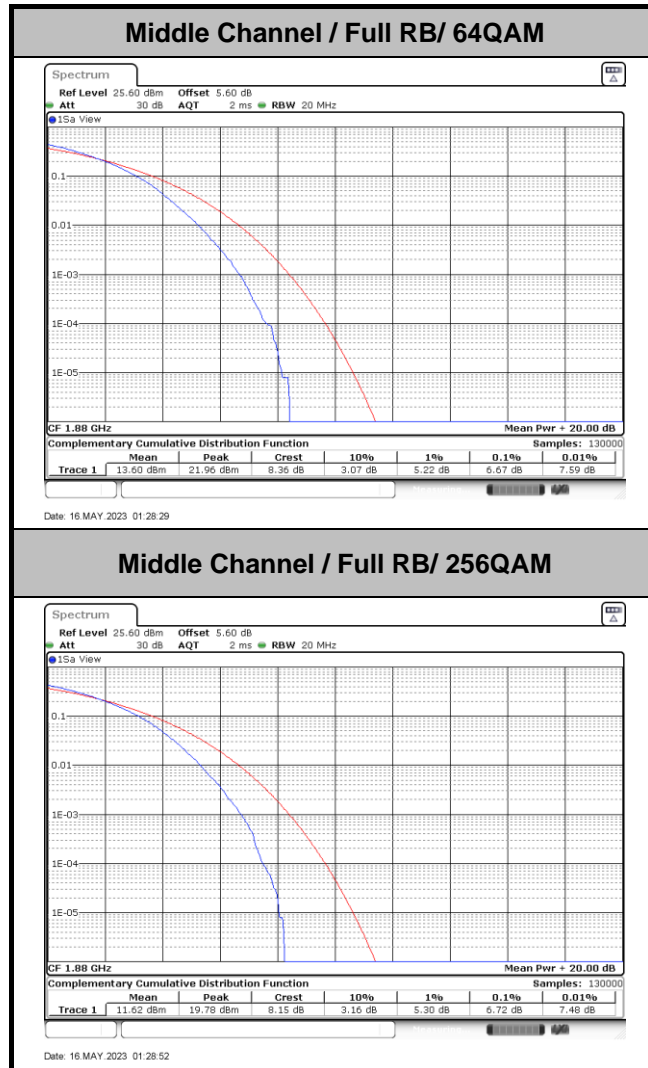


## A2. LTE Band 25

### A2.1 Peak-to-Average Ratio

Mode	LTE Band 25 / 20MHz				
Mod.	QPSK	16QAM	64QAM	256QAM	Limit: 13dB
RB Size	Full RB	Full RB	Full RB	Full RB	Result
Middle CH	5.65	6.32	6.67	6.72	PASS







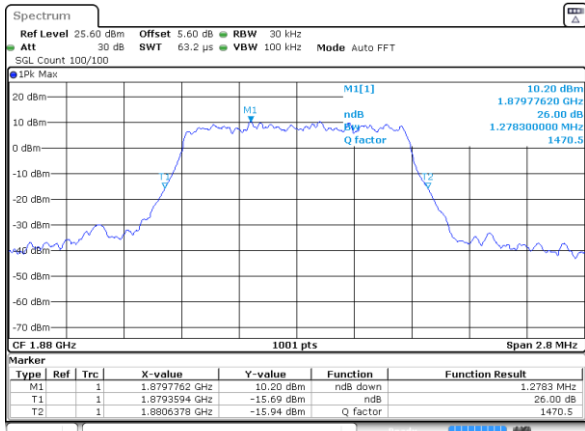
### A2.2 26dB Bandwidth

Mode	LTE Band 25 : 26dB BW(MHz)	
<b>BW</b>	<b>1.4MHz</b>	
<b>Mod.</b>	<b>QPSK</b>	<b>16QAM</b>
<b>Middle CH</b>	1.27	1.31
<b>Mod.</b>	<b>64QAM</b>	<b>256QAM</b>
<b>Middle CH</b>	1.26	1.28
<b>BW</b>	<b>3MHz</b>	
<b>Mod.</b>	<b>QPSK</b>	<b>16QAM</b>
<b>Middle CH</b>	2.97	2.94
<b>Mod.</b>	<b>64QAM</b>	<b>256QAM</b>
<b>Middle CH</b>	2.95	2.97
<b>BW</b>	<b>5MHz</b>	
<b>Mod.</b>	<b>QPSK</b>	<b>16QAM</b>
<b>Middle CH</b>	4.84	4.90
<b>Mod.</b>	<b>64QAM</b>	<b>256QAM</b>
<b>Middle CH</b>	4.98	4.86
<b>BW</b>	<b>10MHz</b>	
<b>Mod.</b>	<b>QPSK</b>	<b>16QAM</b>
<b>Middle CH</b>	9.75	9.85
<b>Mod.</b>	<b>64QAM</b>	<b>256QAM</b>
<b>Middle CH</b>	10.05	9.75
<b>BW</b>	<b>15MHz</b>	
<b>Mod.</b>	<b>QPSK</b>	<b>16QAM</b>
<b>Middle CH</b>	14.50	14.47
<b>Mod.</b>	<b>64QAM</b>	<b>256QAM</b>
<b>Middle CH</b>	14.35	14.41
<b>BW</b>	<b>20MHz</b>	
<b>Mod.</b>	<b>QPSK</b>	<b>16QAM</b>
<b>Middle CH</b>	19.06	18.90
<b>Mod.</b>	<b>64QAM</b>	<b>256QAM</b>
<b>Middle CH</b>	19.10	19.06



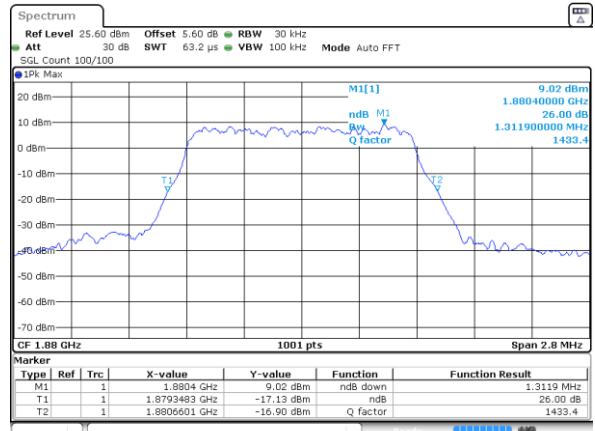
LTE Band 25

Middle Channel / 1.4MHz / QPSK



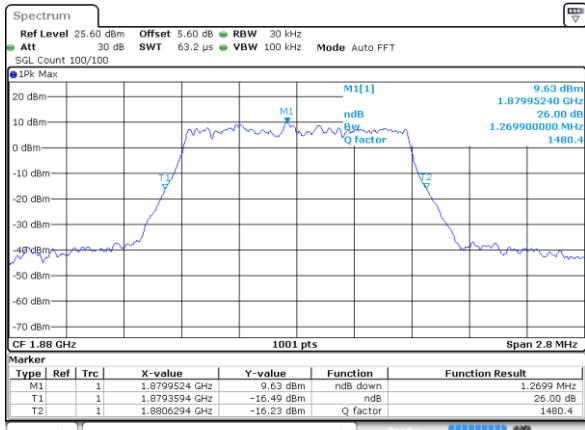
Date: 16 MAY 2023 01:45:43

Middle Channel / 1.4MHz / 16QAM



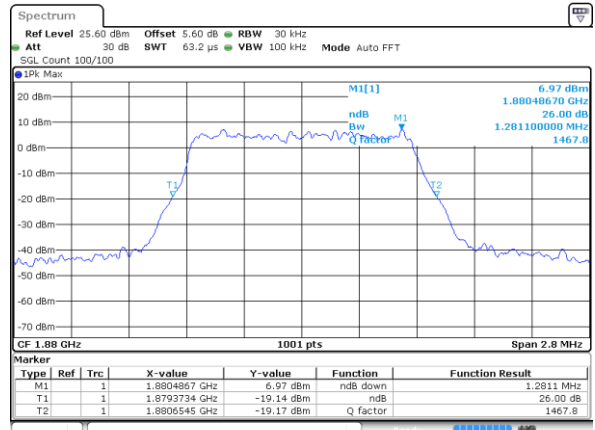
Date: 16 MAY 2023 01:46:04

Middle Channel / 1.4MHz / 64QAM



Date: 17 MAY 2023 06:24:36

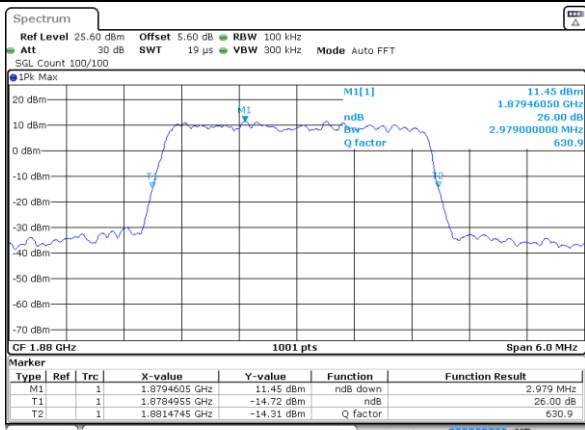
Middle Channel / 1.4MHz / 256QAM



Date: 17 MAY 2023 06:25:28

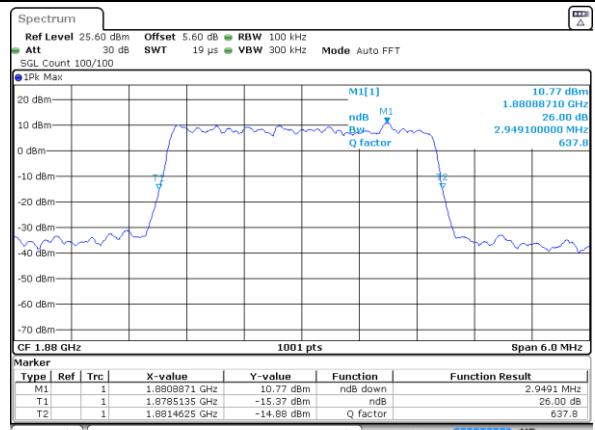
LTE Band 25

Middle Channel / 3MHz / QPSK



Date: 16 MAY 2023 01:47:31

Middle Channel / 3MHz / 16QAM

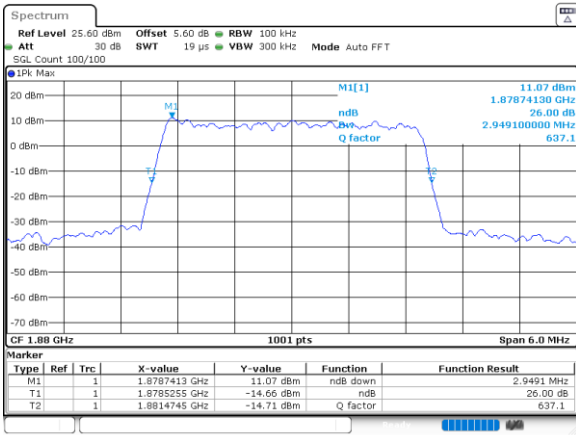


Date: 16 MAY 2023 01:47:09



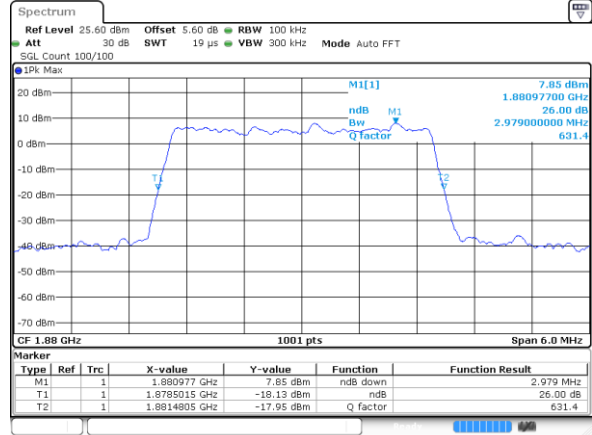


Middle Channel / 3MHz / 64QAM



Date: 24.MAY.2023 15:35:07

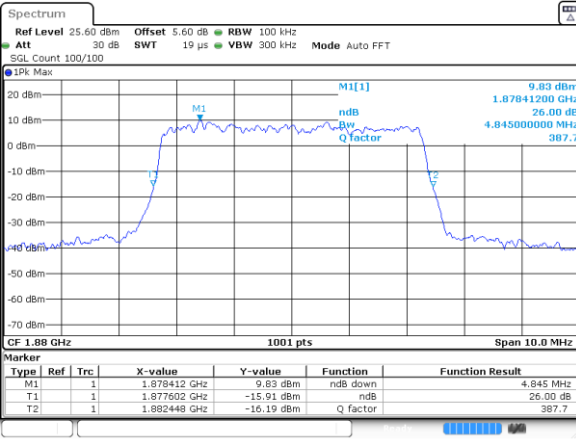
Middle Channel / 3MHz / 256QAM



Date: 17.MAY.2023 06:28:57

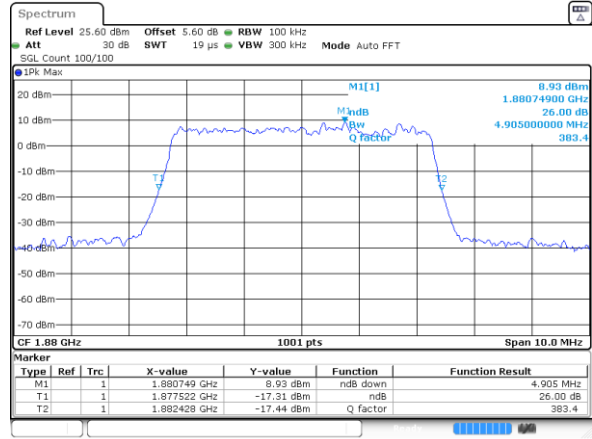
LTE Band 25

Middle Channel / 5MHz / QPSK



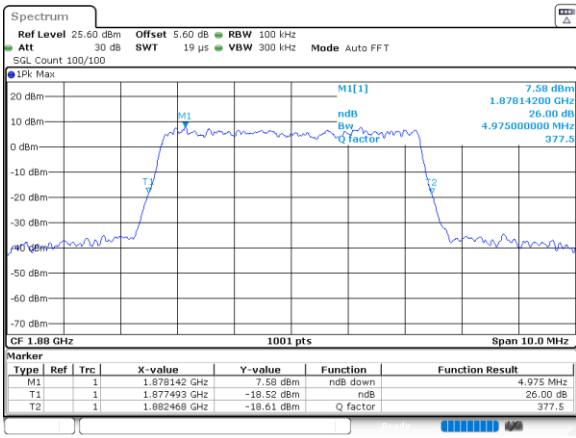
Date: 16.MAY.2023 01:47:52

Middle Channel / 5MHz / 16QAM



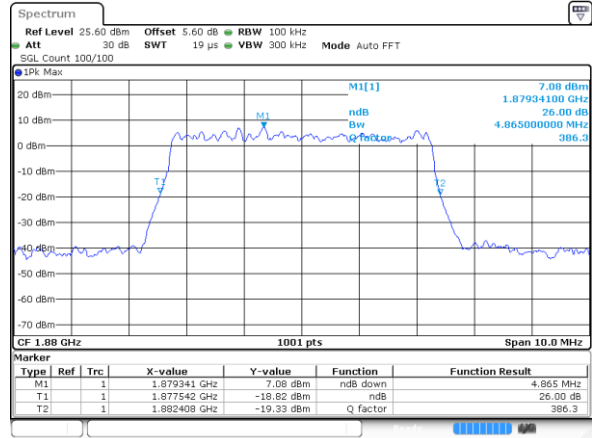
Date: 16.MAY.2023 01:48:14

Middle Channel / 5MHz / 64QAM



Date: 24.MAY.2023 15:34:42

Middle Channel / 5MHz / 256QAM

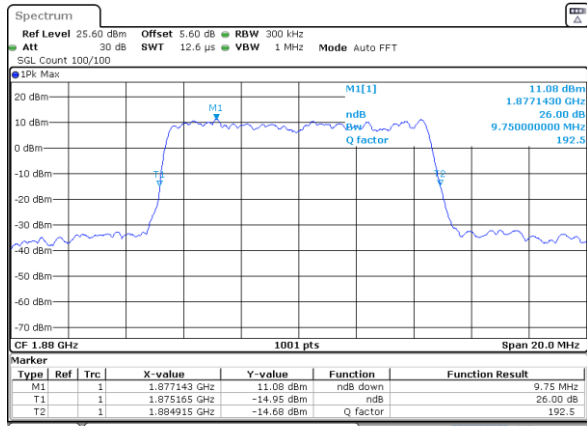


Date: 17.MAY.2023 06:31:39

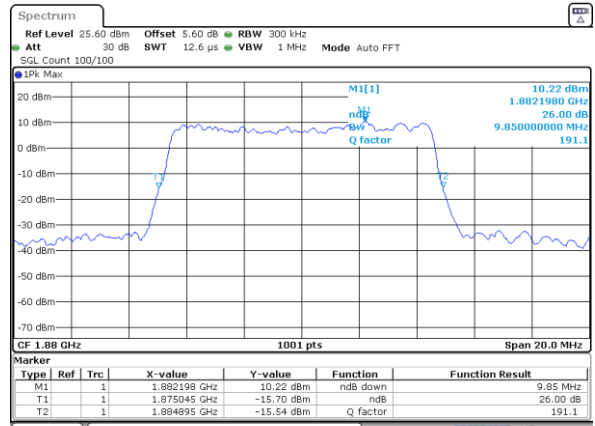


LTE Band 25

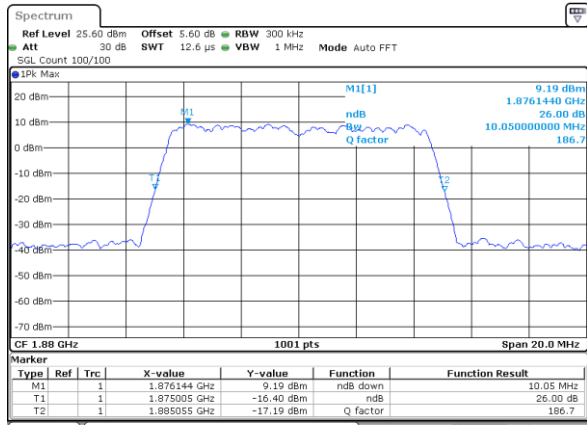
Middle Channel / 10MHz / QPSK



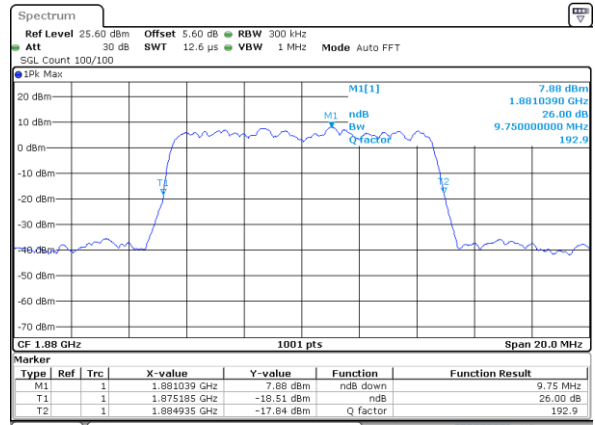
Middle Channel / 10MHz / 16QAM



Middle Channel / 10MHz / 64QAM

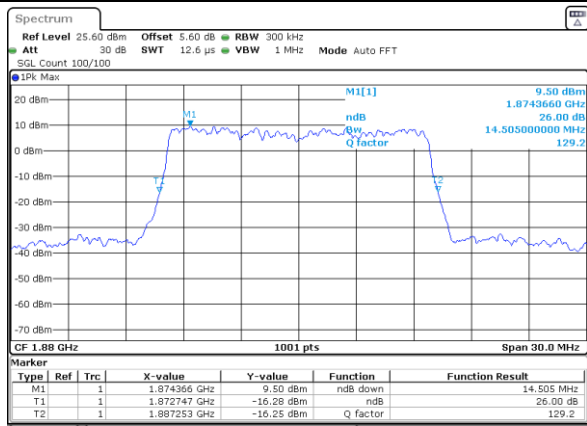


Middle Channel / 10MHz / 256QAM

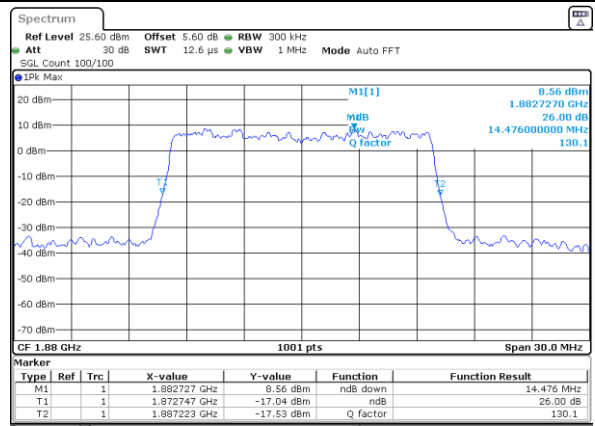


LTE Band 25

Middle Channel / 15MHz / QPSK

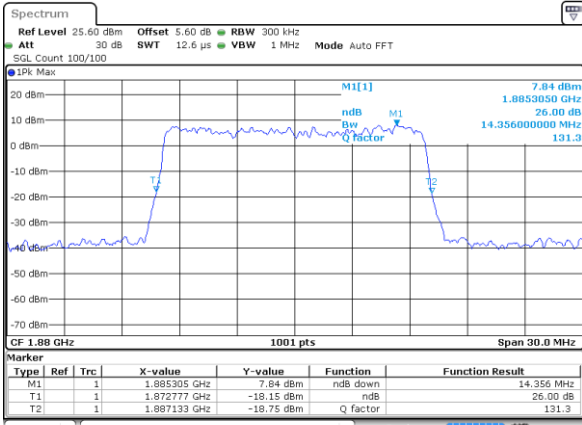


Middle Channel / 15MHz / 16QAM



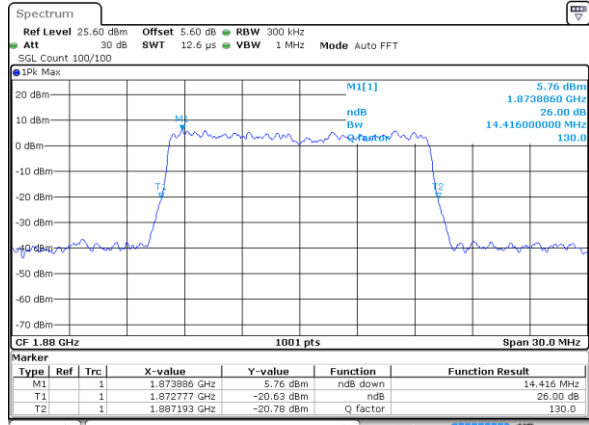


Middle Channel / 15MHz / 64QAM



Date: 17 MAY 2023 06:39:29

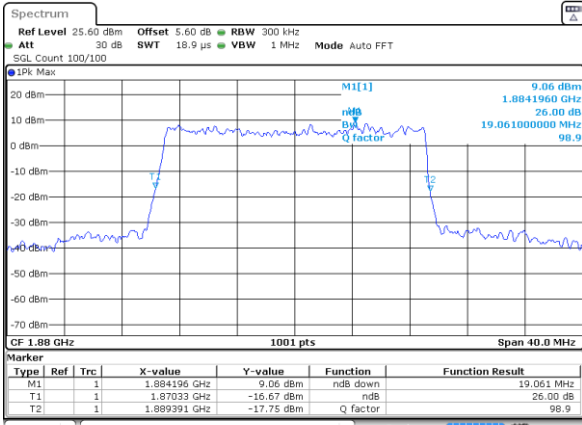
Middle Channel / 15MHz / 256QAM



Date: 17 MAY 2023 06:40:33

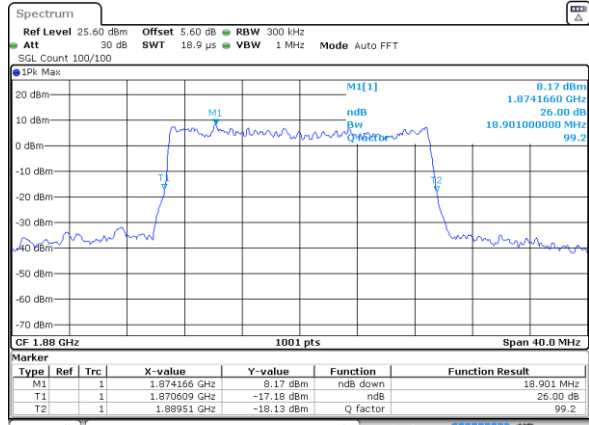
LTE Band 25

Middle Channel / 20MHz / QPSK



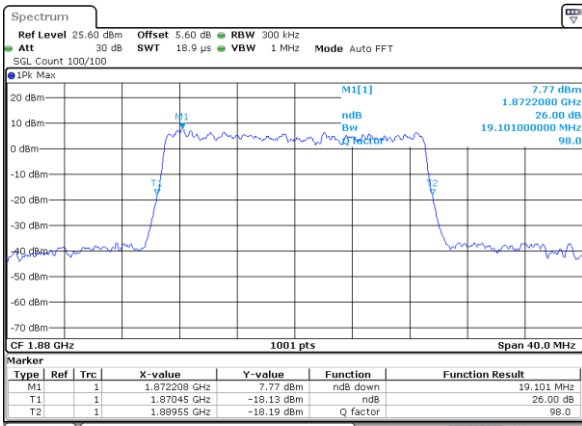
Date: 16 MAY 2023 01:53:15

Middle Channel / 20MHz / 16QAM



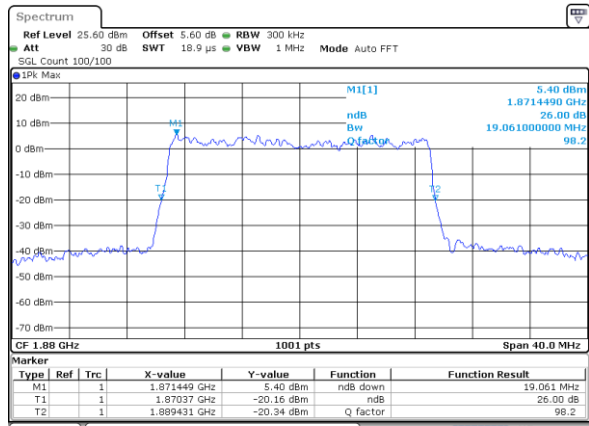
Date: 16 MAY 2023 01:52:53

Middle Channel / 20MHz / 64QAM



Date: 17 MAY 2023 06:42:48

Middle Channel / 20MHz / 256QAM



Date: 17 MAY 2023 06:43:34



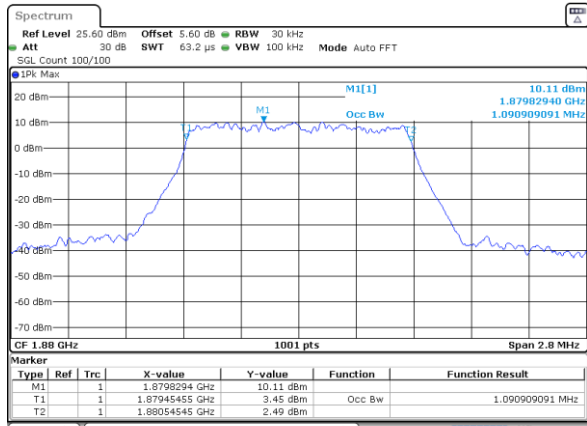
### A2.3 Occupied Bandwidth

Mode	LTE Band 25 : 99%OBW(MHz)	
<b>BW</b>	<b>1.4MHz</b>	
<b>Mod.</b>	<b>QPSK</b>	<b>16QAM</b>
Middle CH	1.09	1.10
<b>Mod.</b>	<b>64QAM</b>	<b>256QAM</b>
Middle CH	1.08	1.09
<b>BW</b>	<b>3MHz</b>	
<b>Mod.</b>	<b>QPSK</b>	<b>16QAM</b>
Middle CH	2.70	2.72
<b>Mod.</b>	<b>64QAM</b>	<b>256QAM</b>
Middle CH	2.72	2.72
<b>BW</b>	<b>5MHz</b>	
<b>Mod.</b>	<b>QPSK</b>	<b>16QAM</b>
Middle CH	4.49	4.47
<b>Mod.</b>	<b>64QAM</b>	<b>256QAM</b>
Middle CH	4.48	4.49
<b>BW</b>	<b>10MHz</b>	
<b>Mod.</b>	<b>QPSK</b>	<b>16QAM</b>
Middle CH	9.05	9.01
<b>Mod.</b>	<b>64QAM</b>	<b>256QAM</b>
Middle CH	9.07	9.05
<b>BW</b>	<b>15MHz</b>	
<b>Mod.</b>	<b>QPSK</b>	<b>16QAM</b>
Middle CH	13.46	13.46
<b>Mod.</b>	<b>64QAM</b>	<b>256QAM</b>
Middle CH	13.40	13.43
<b>BW</b>	<b>20MHz</b>	
<b>Mod.</b>	<b>QPSK</b>	<b>16QAM</b>
Middle CH	17.98	17.90
<b>Mod.</b>	<b>64QAM</b>	<b>256QAM</b>
Middle CH	17.94	17.94



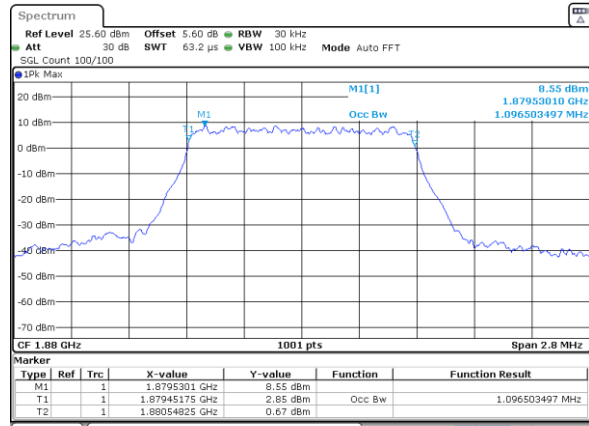
LTE Band 25

Middle Channel / 1.4MHz / QPSK



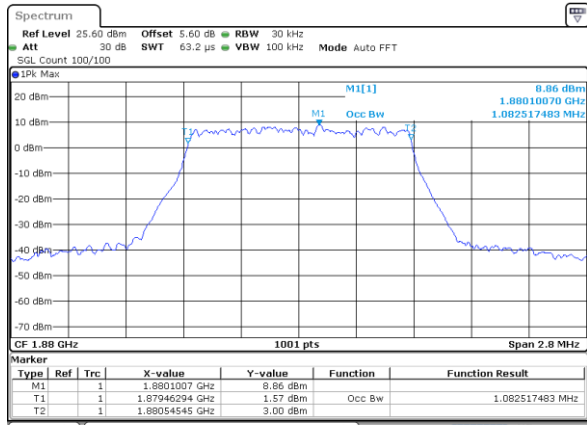
Date: 16 MAY 2023 01:45:00

Middle Channel / 1.4MHz / 16QAM



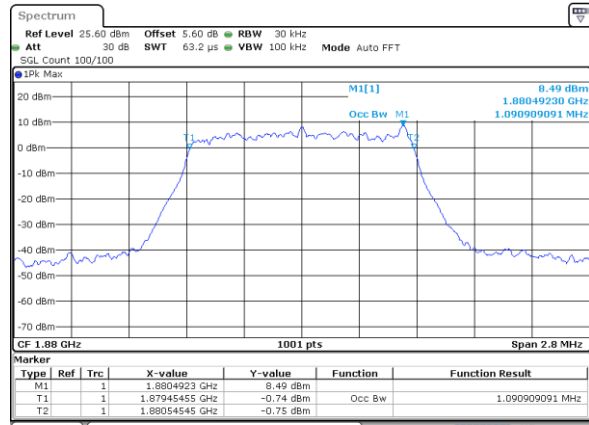
Date: 16 MAY 2023 01:45:22

Middle Channel / 1.4MHz / 64QAM



Date: 17 MAY 2023 06:24:15

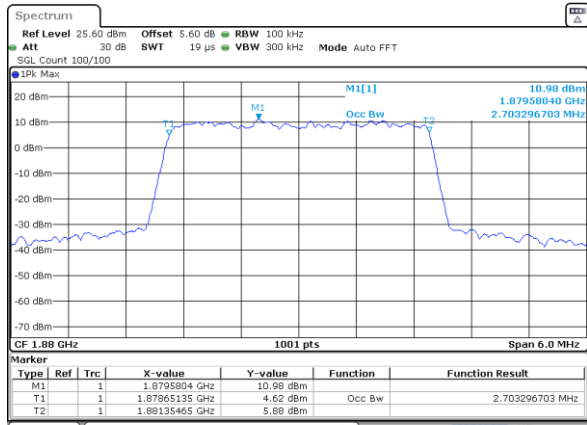
Middle Channel / 1.4MHz / 256QAM



Date: 17 MAY 2023 06:25:01

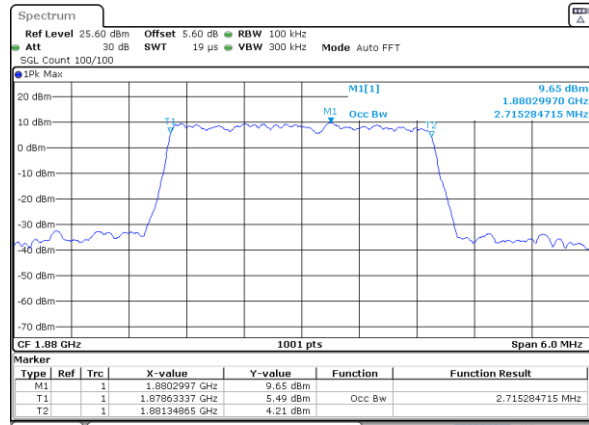
LTE Band 25

Middle Channel / 3MHz / QPSK



Date: 16 MAY 2023 01:46:26

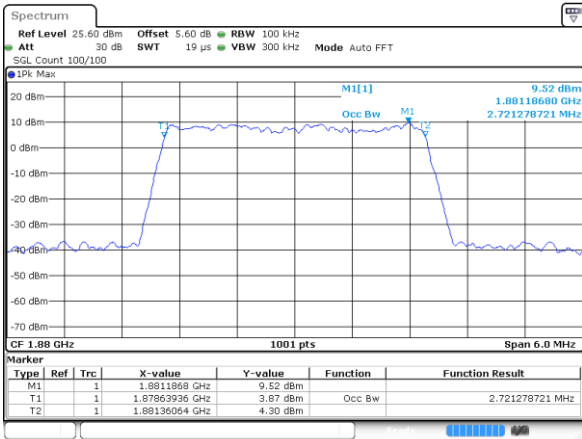
Middle Channel / 3MHz / 16QAM



Date: 16 MAY 2023 01:46:48

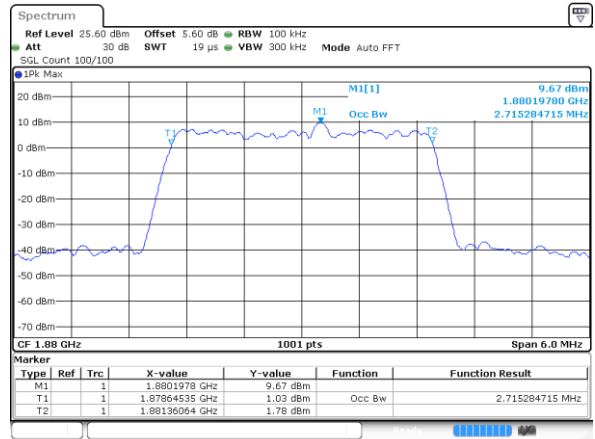


Middle Channel / 3MHz / 64QAM



Date: 17 MAY 2023 06:29:42

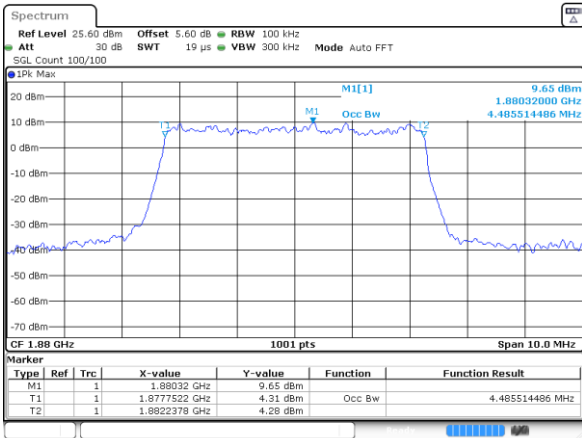
Middle Channel / 3MHz / 256QAM



Date: 17 MAY 2023 06:28:34

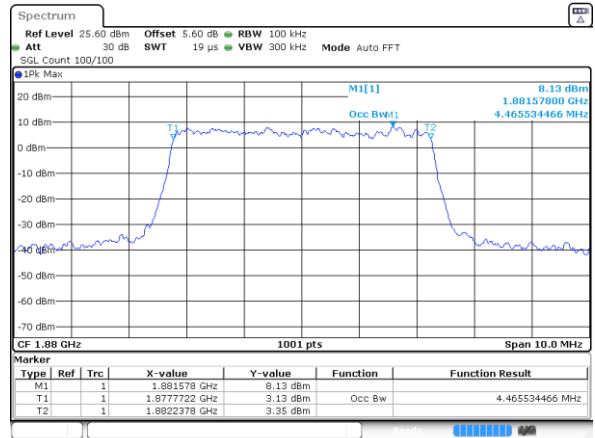
LTE Band 25

Middle Channel / 5MHz / QPSK



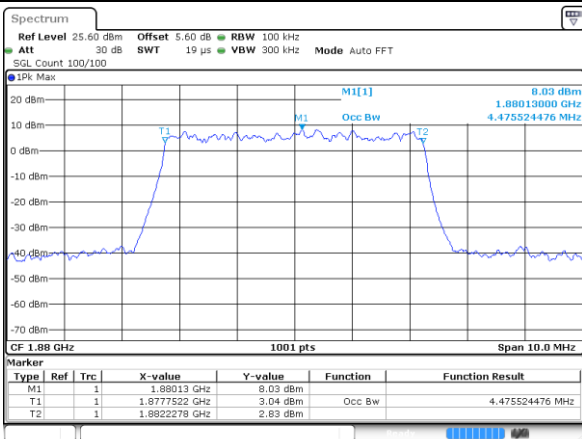
Date: 16 MAY 2023 01:48:57

Middle Channel / 5MHz / 16QAM



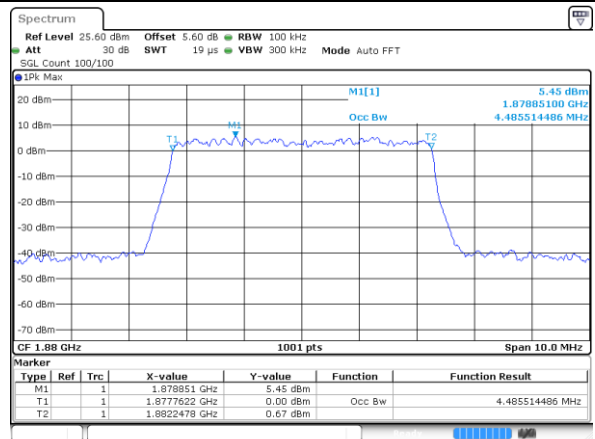
Date: 16 MAY 2023 01:48:35

Middle Channel / 5MHz / 64QAM



Date: 17 MAY 2023 06:30:43

Middle Channel / 5MHz / 256QAM

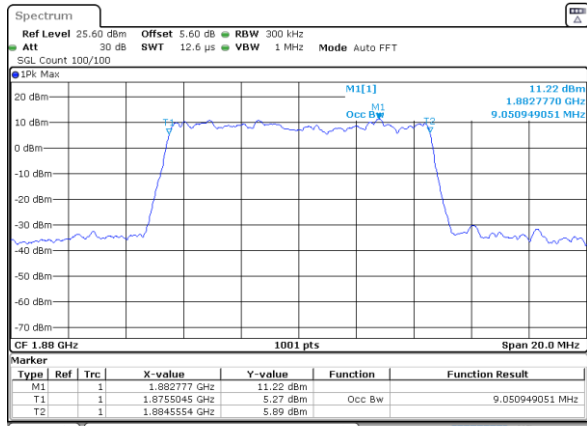


Date: 17 MAY 2023 06:32:58



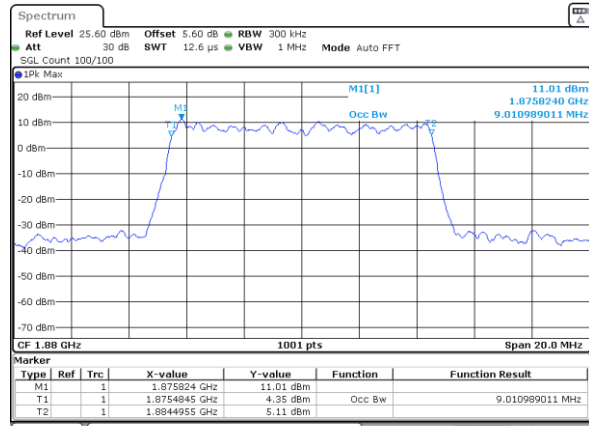
LTE Band 25

Middle Channel / 10MHz / QPSK



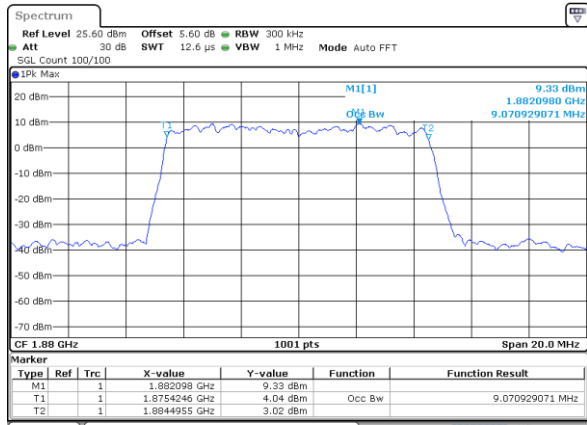
Date: 16 MAY 2023 01:49:19

Middle Channel / 10MHz / 16QAM



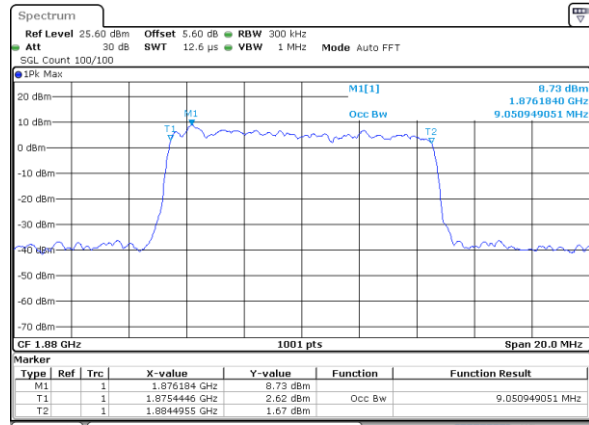
Date: 16 MAY 2023 01:49:40

Middle Channel / 10MHz / 64QAM



Date: 17 MAY 2023 06:36:52

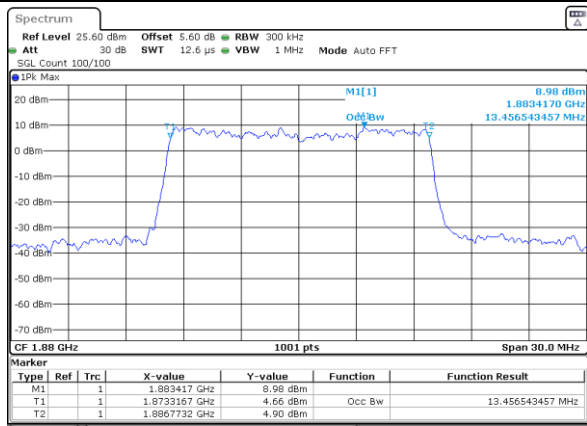
Middle Channel / 10MHz / 256QAM



Date: 17 MAY 2023 06:37:15

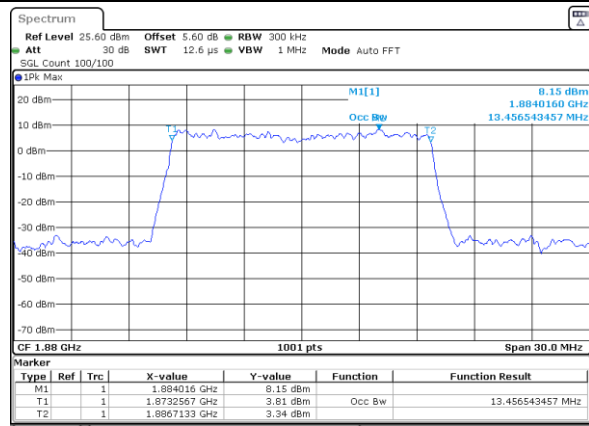
LTE Band 25

Middle Channel / 15MHz / QPSK



Date: 16 MAY 2023 01:51:49

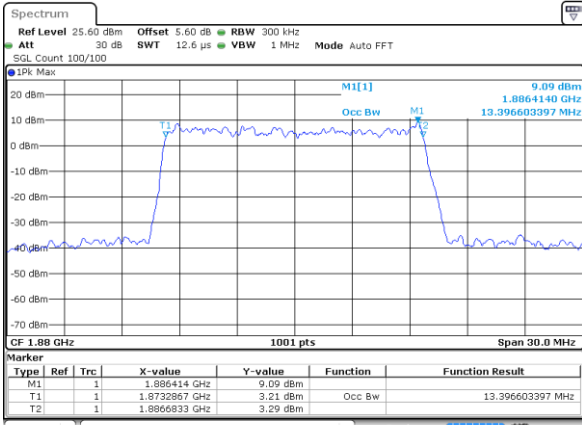
Middle Channel / 15MHz / 16QAM



Date: 16 MAY 2023 01:51:27

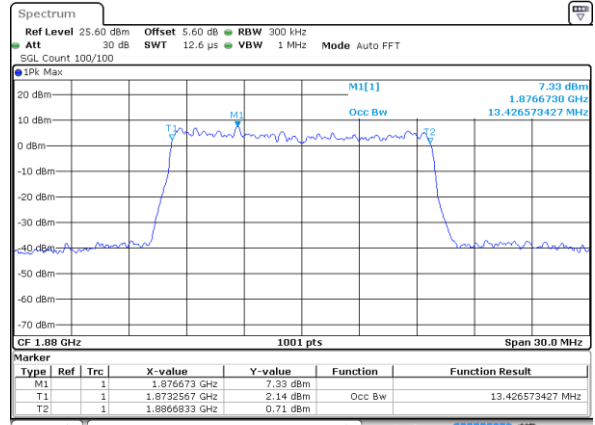


Middle Channel / 15MHz / 64QAM



Date: 17 MAY 2023 06:39:10

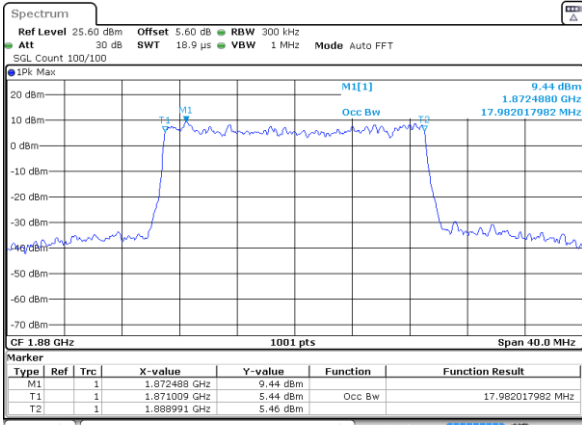
Middle Channel / 15MHz / 256QAM



Date: 17 MAY 2023 06:39:53

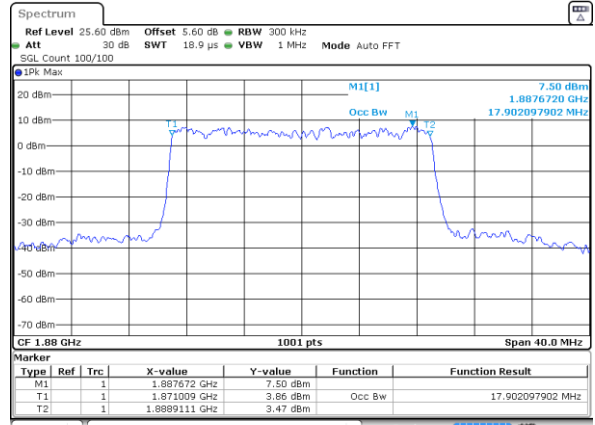
LTE Band 25

Middle Channel / 20MHz / QPSK



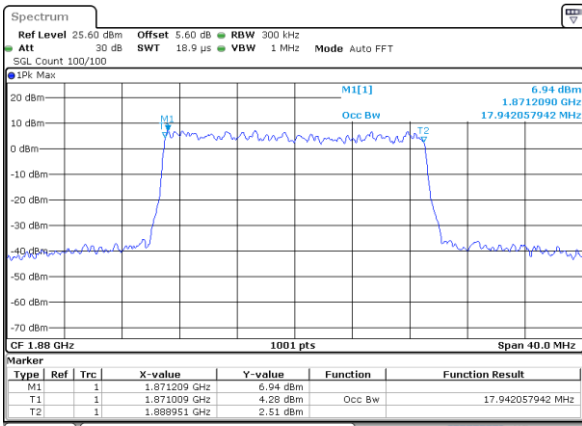
Date: 16 MAY 2023 01:52:11

Middle Channel / 20MHz / 16QAM



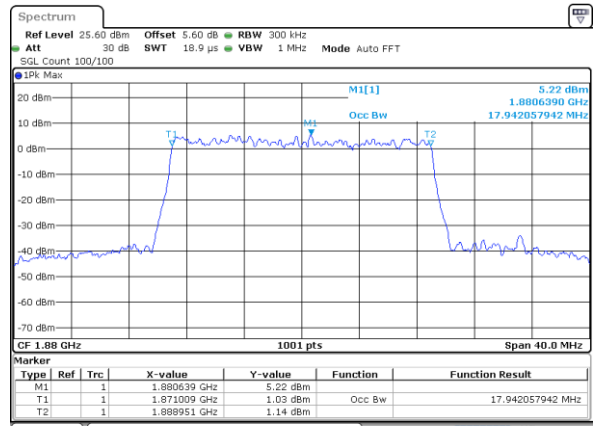
Date: 16 MAY 2023 01:52:32

Middle Channel / 20MHz / 64QAM



Date: 17 MAY 2023 06:43:09

Middle Channel / 20MHz / 256QAM

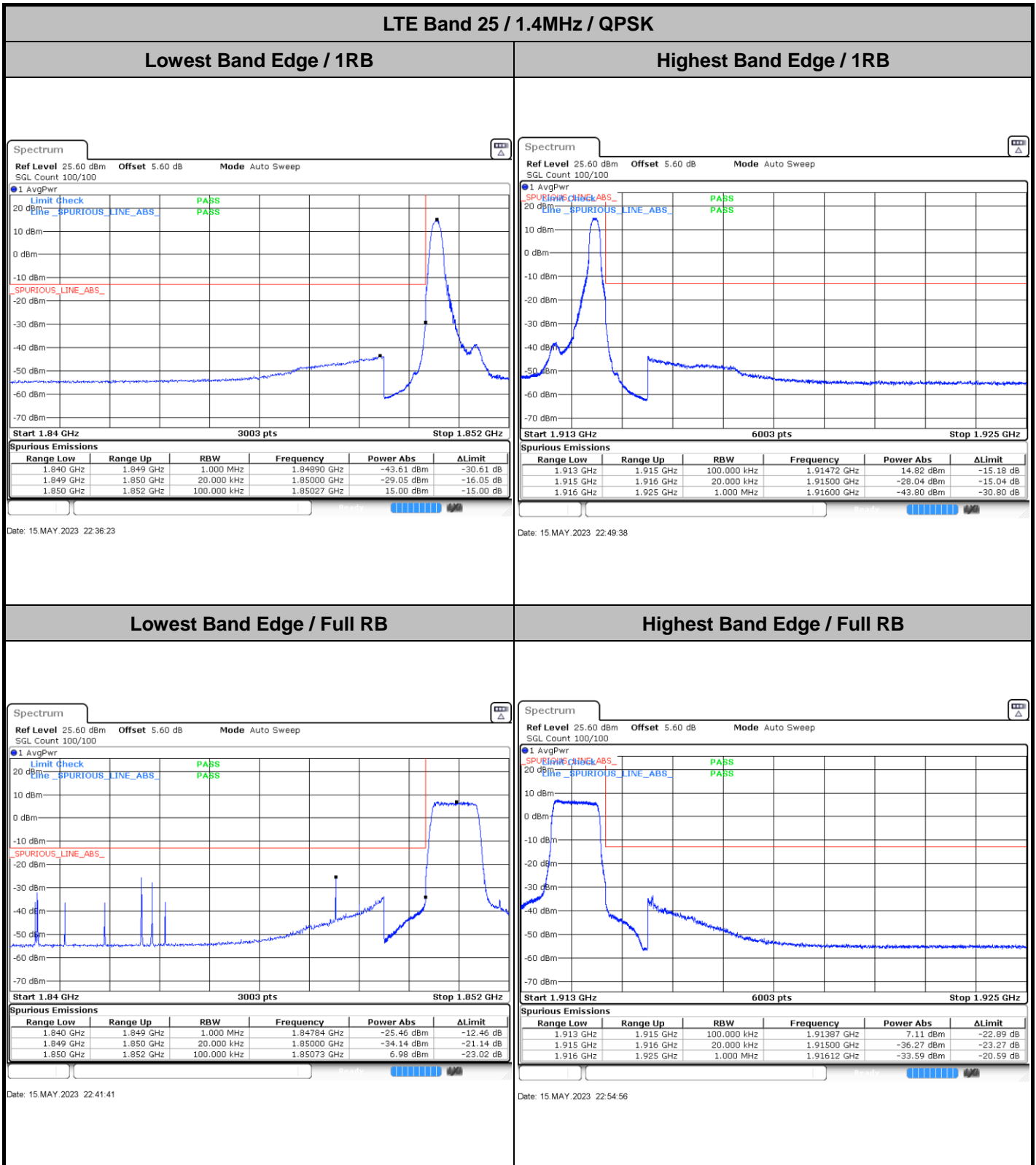


Date: 17 MAY 2023 06:44:13





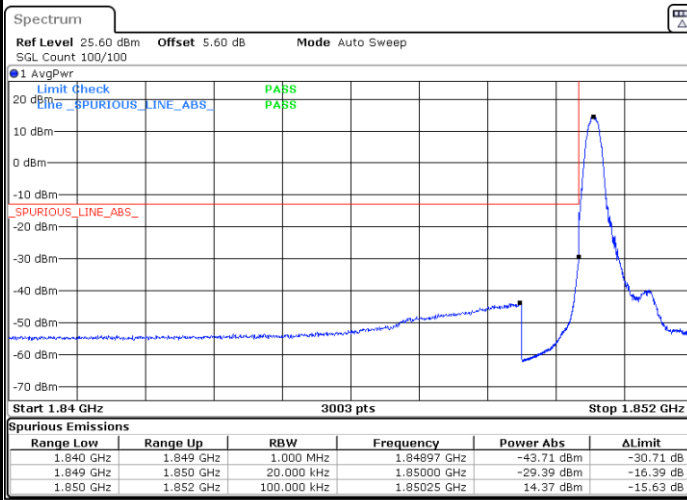
# A2.4 Conducted Band Edge





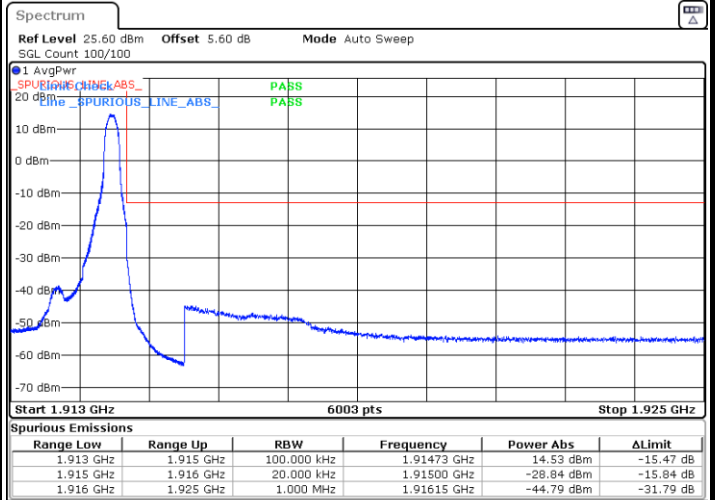
LTE Band 25 / 1.4MHz / 16QAM

Lowest Band Edge / 1 RB



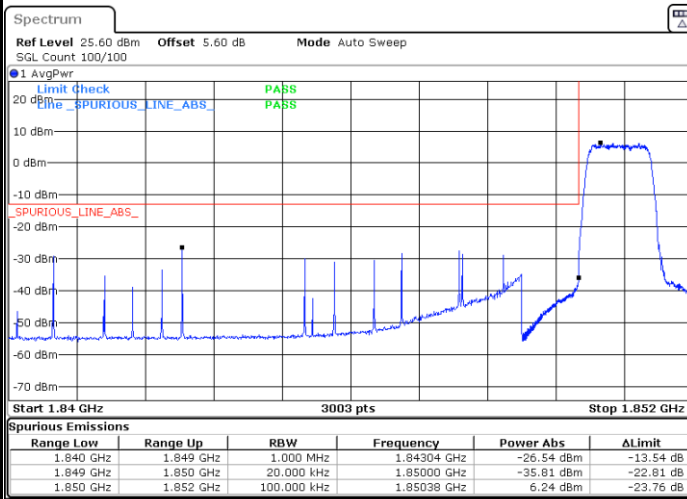
Date: 15.MAY.2023 22:37:43

Highest Band Edge / 1 RB



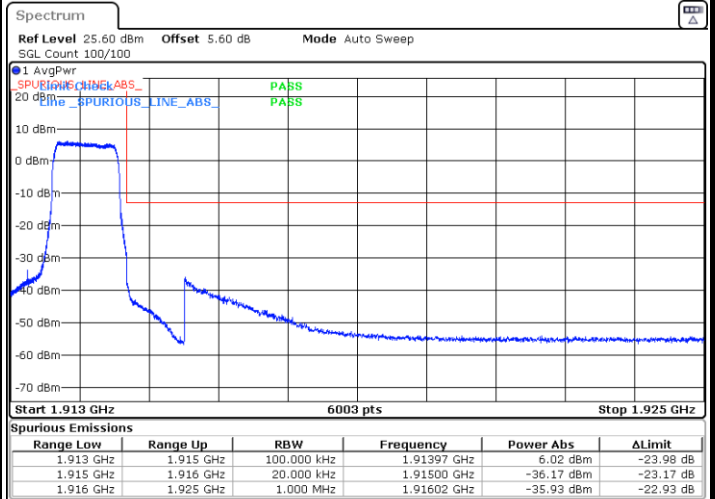
Date: 15.MAY.2023 22:50:58

Lowest Band Edge / Full RB



Date: 15.MAY.2023 22:43:00

Highest Band Edge / Full RB

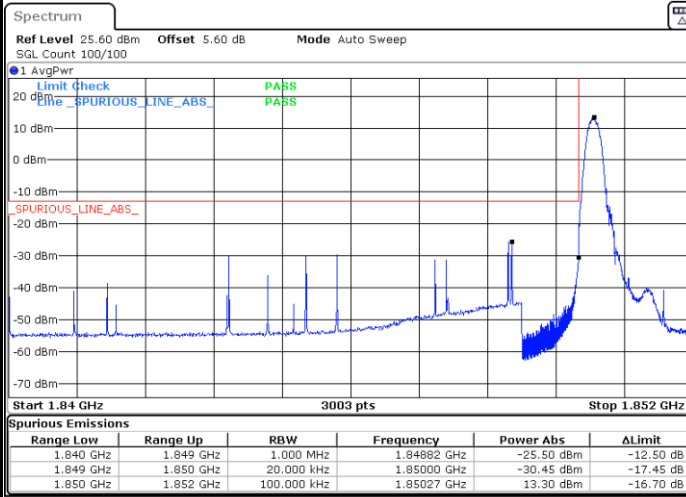


Date: 15.MAY.2023 22:56:16



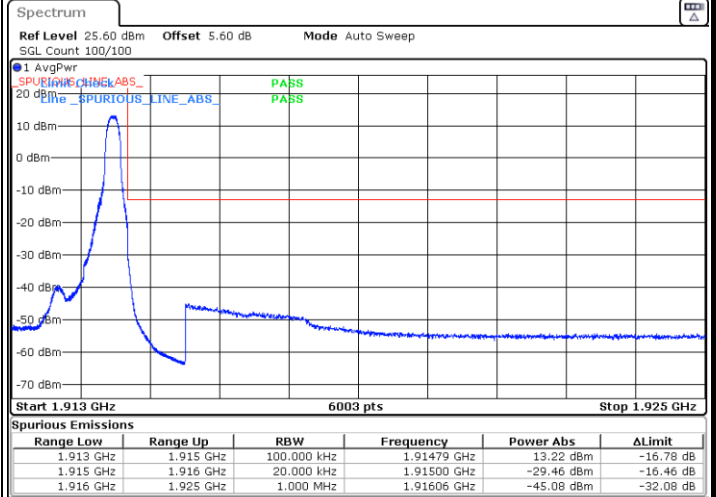
LTE Band 25 / 1.4MHz / 64QAM

Lowest Band Edge / 1 RB



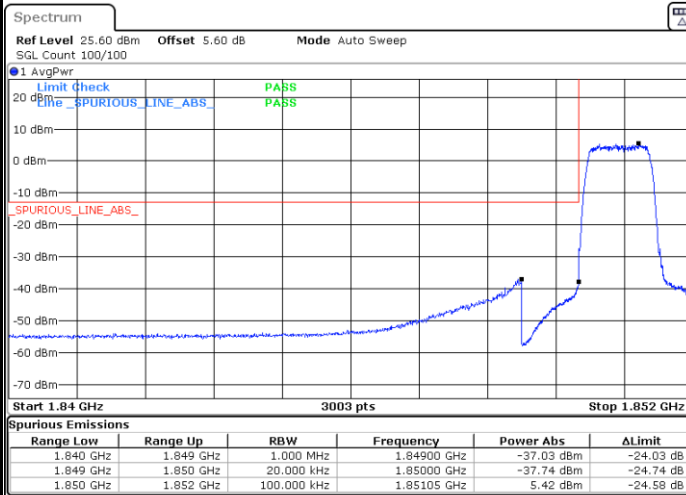
Date: 15.MAY.2023 22:39:02

Highest Band Edge / 1 RB



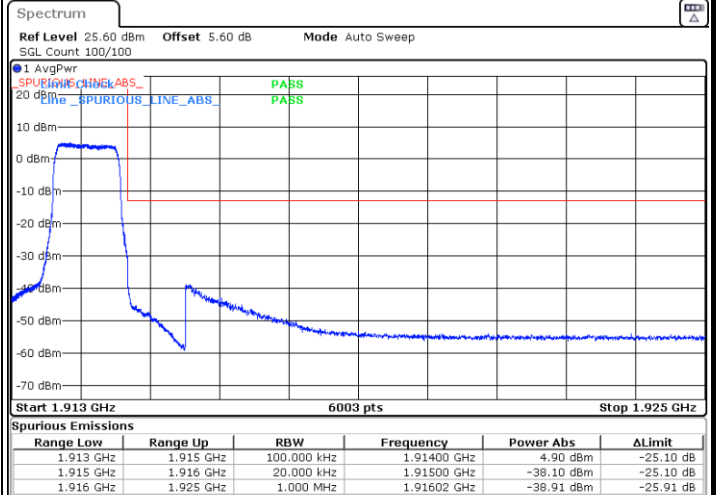
Date: 15.MAY.2023 22:52:17

Lowest Band Edge / Full RB



Date: 15.MAY.2023 22:44:20

Highest Band Edge / Full RB

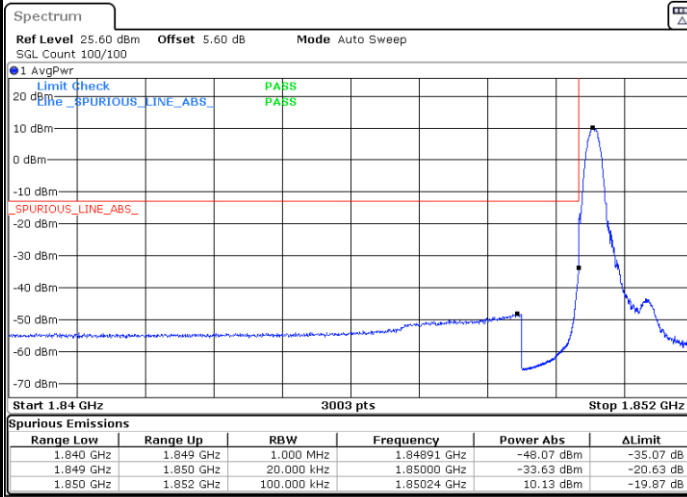


Date: 15.MAY.2023 22:57:35



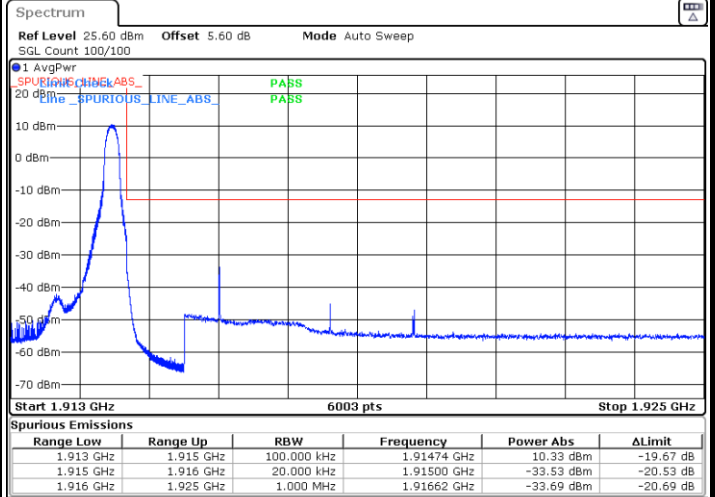
LTE Band 25 / 1.4MHz / 256QAM

Lowest Band Edge / 1 RB



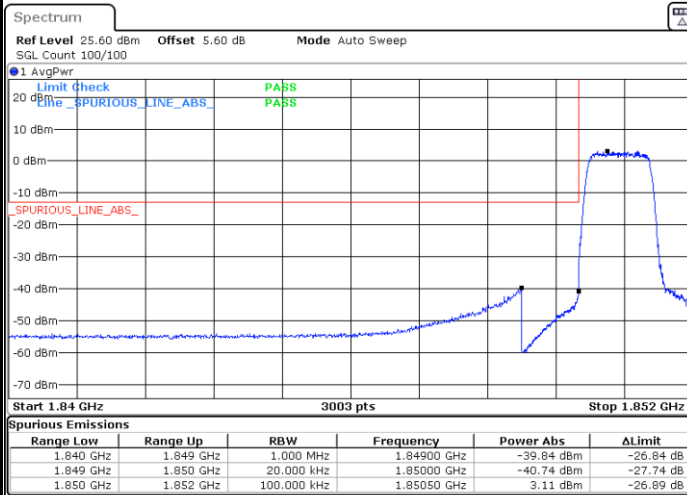
Date: 15.MAY.2023 22:40:21

Highest Band Edge / 1 RB



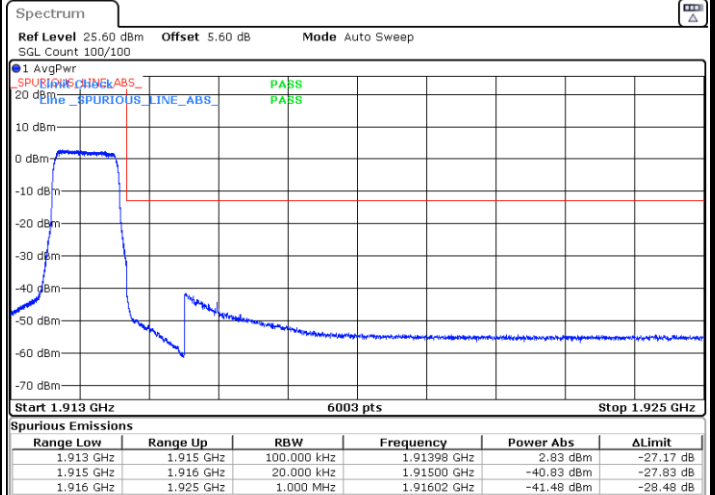
Date: 15.MAY.2023 22:53:37

Lowest Band Edge / Full RB



Date: 15.MAY.2023 22:45:39

Highest Band Edge / Full RB

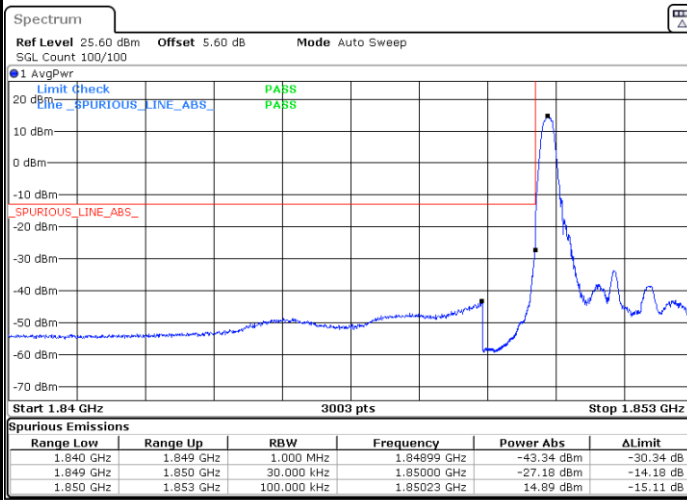


Date: 15.MAY.2023 22:58:55



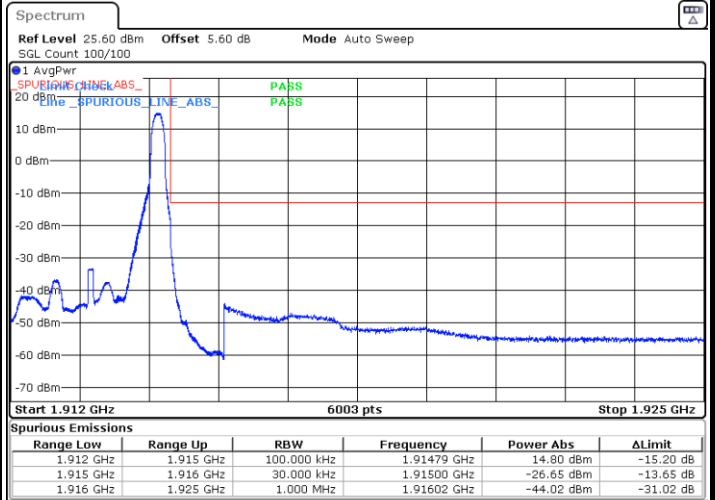
LTE Band 25 / 3MHz / QPSK

Lowest Band Edge / 1RB



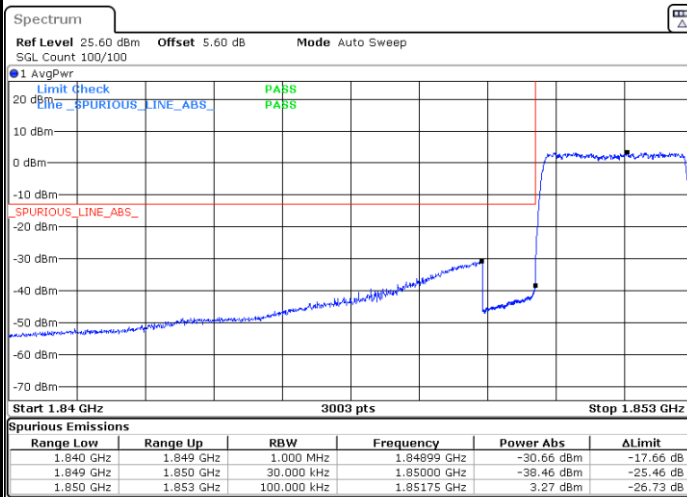
Date: 15.MAY.2023 23:13:04

Highest Band Edge / 1 RB



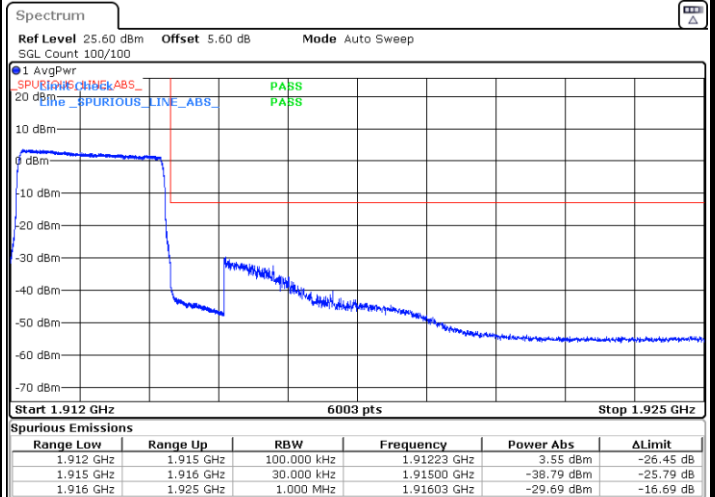
Date: 15.MAY.2023 23:21:02

Lowest Band Edge / Full RB



Date: 15.MAY.2023 23:06:26

Highest Band Edge / Full RB

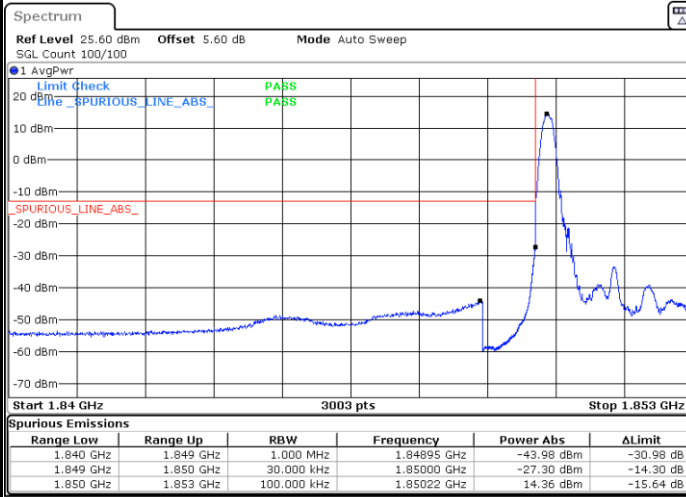


Date: 15.MAY.2023 23:26:20



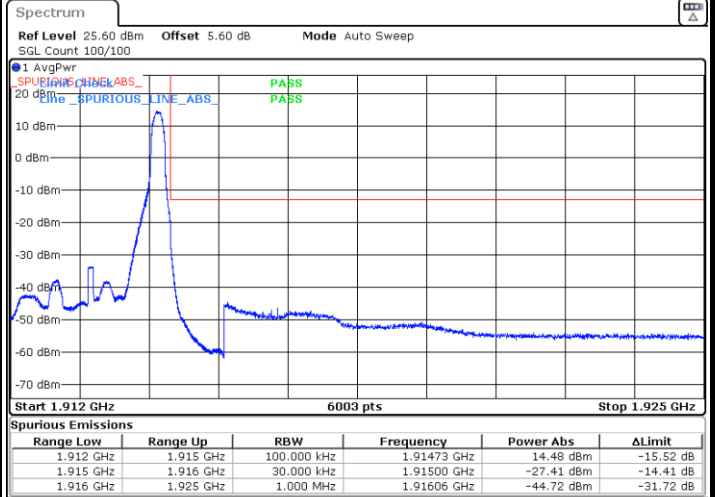
LTE Band 25 / 3MHz / 16QAM

Lowest Band Edge / 1 RB



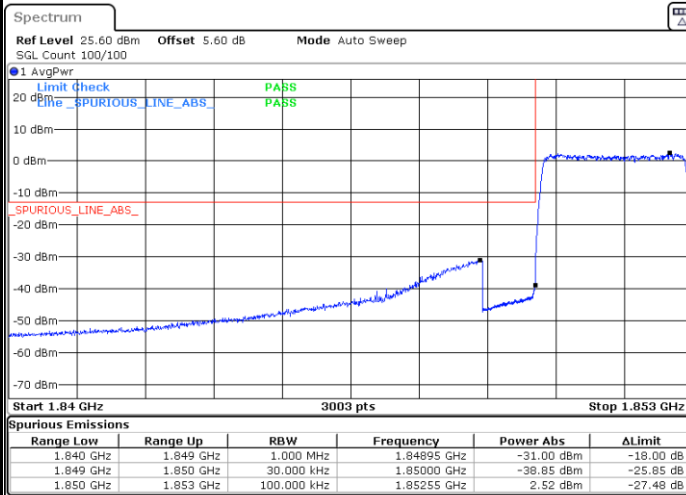
Date: 15.MAY.2023 23:14:23

Highest Band Edge / 1 RB



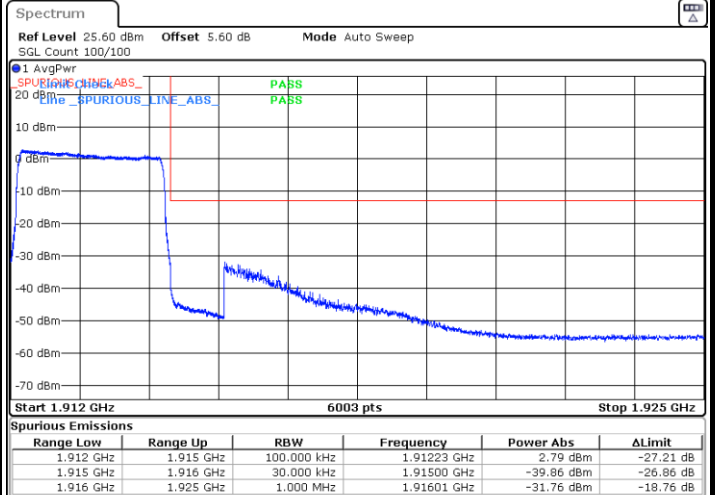
Date: 15.MAY.2023 23:22:21

Lowest Band Edge / Full RB



Date: 15.MAY.2023 23:07:46

Highest Band Edge / Full RB

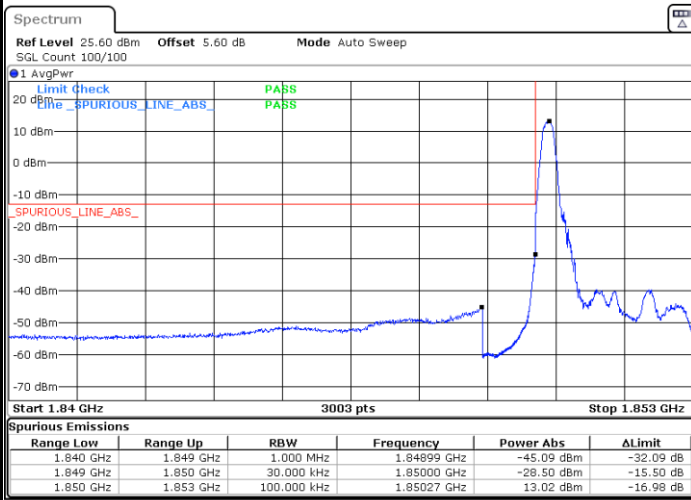


Date: 15.MAY.2023 23:27:39



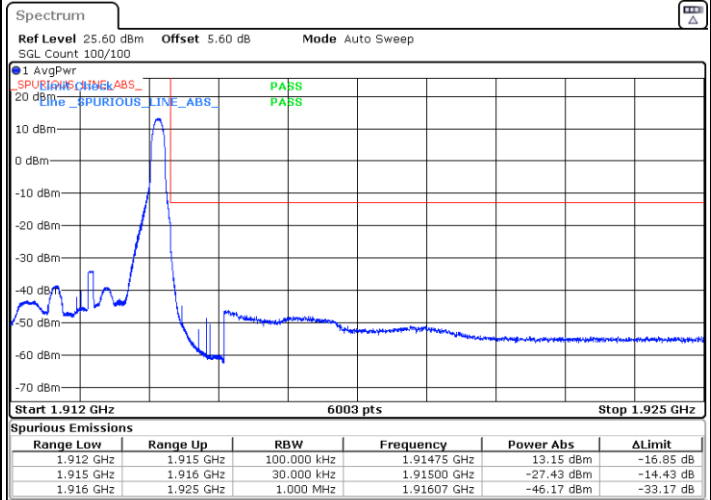
LTE Band 25 / 3MHz / 64QAM

Lowest Band Edge / 1 RB



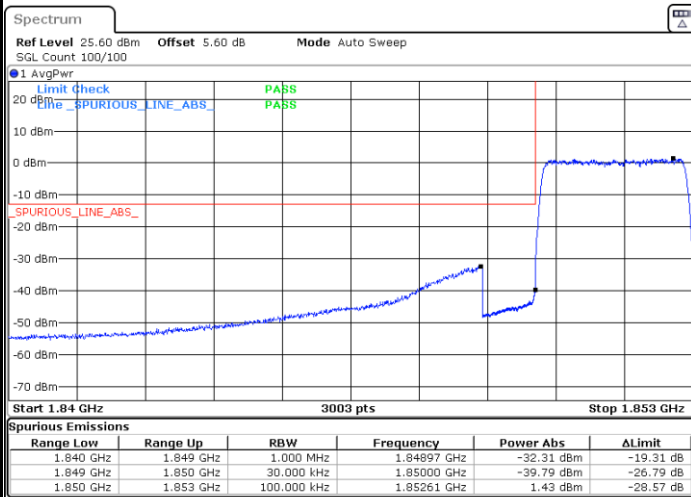
Date: 15.MAY.2023 23:15:43

Highest Band Edge / 1 RB



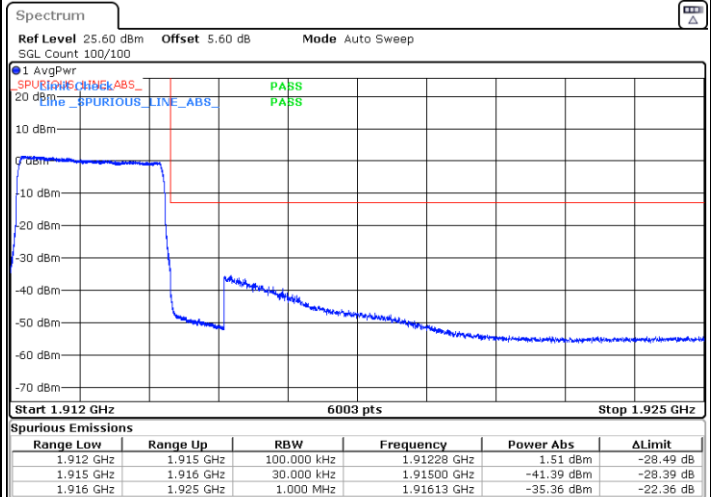
Date: 15.MAY.2023 23:23:40

Lowest Band Edge / Full RB



Date: 15.MAY.2023 23:09:05

Highest Band Edge / Full RB



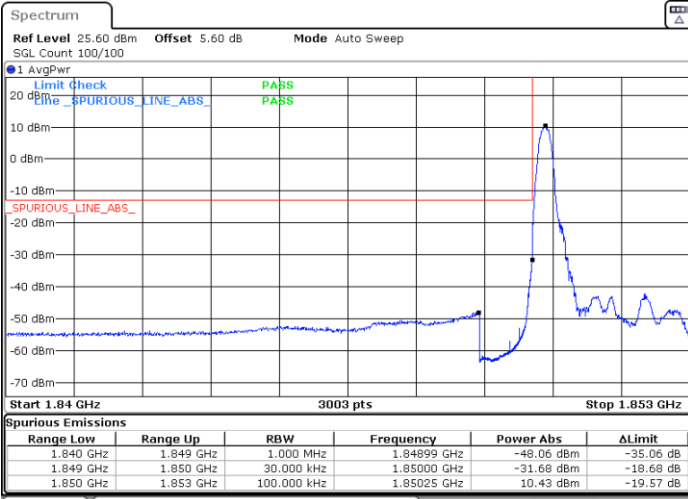
Date: 15.MAY.2023 23:28:59



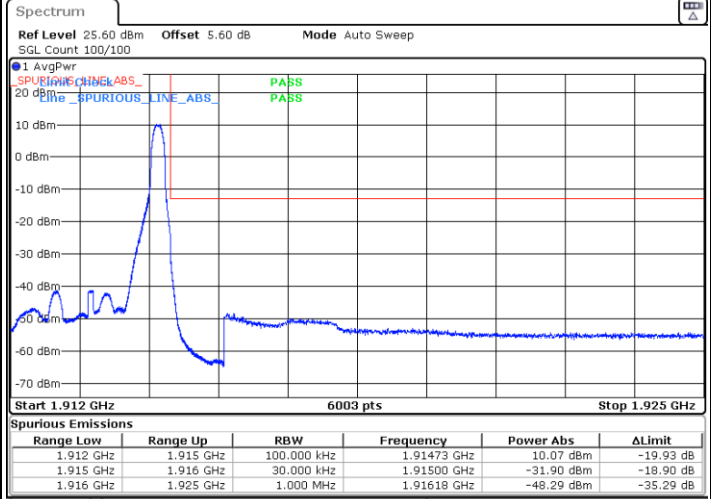
LTE Band 25 / 3MHz / 256QAM

Lowest Band Edge / 1 RB

Highest Band Edge / 1 RB



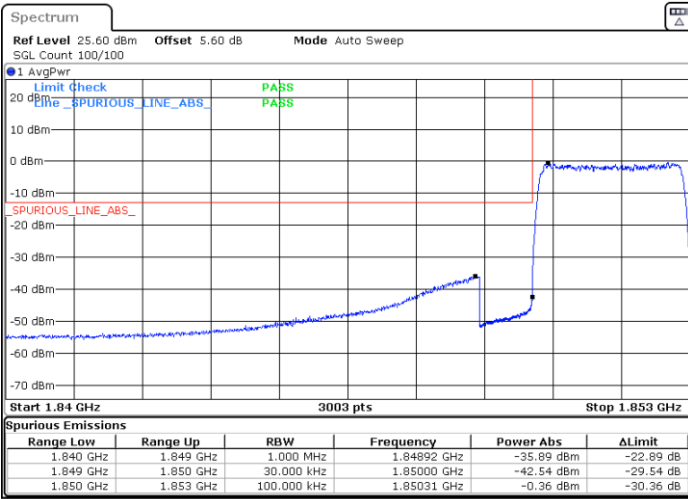
Date: 15.MAY.2023 23:17:02



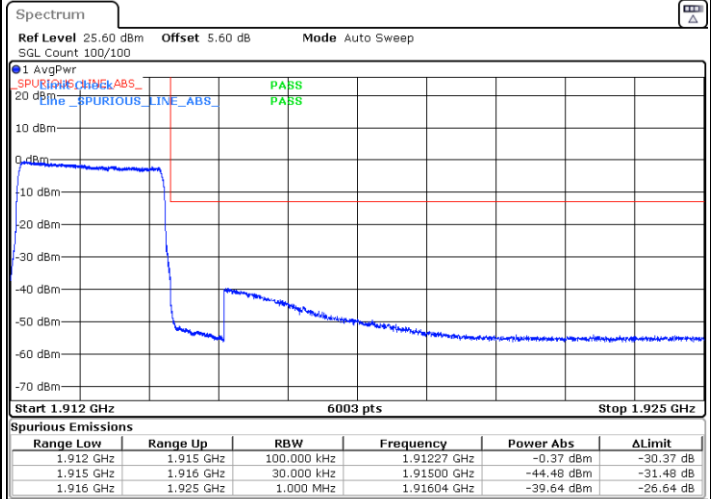
Date: 15.MAY.2023 23:25:00

Lowest Band Edge / Full RB

Highest Band Edge / Full RB



Date: 15.MAY.2023 23:10:24



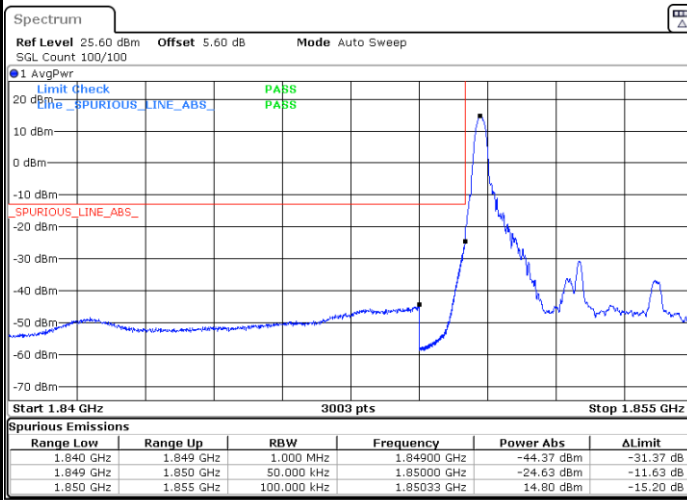
Date: 15.MAY.2023 23:30:18





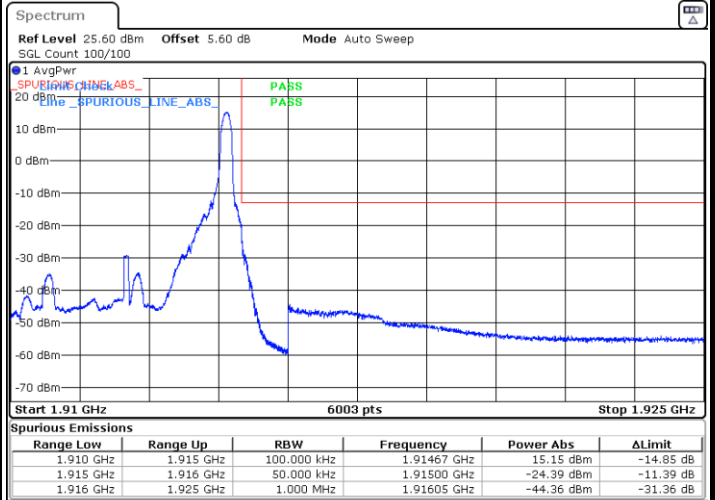
LTE Band 25 / 5MHz / QPSK

Lowest Band Edge / 1 RB



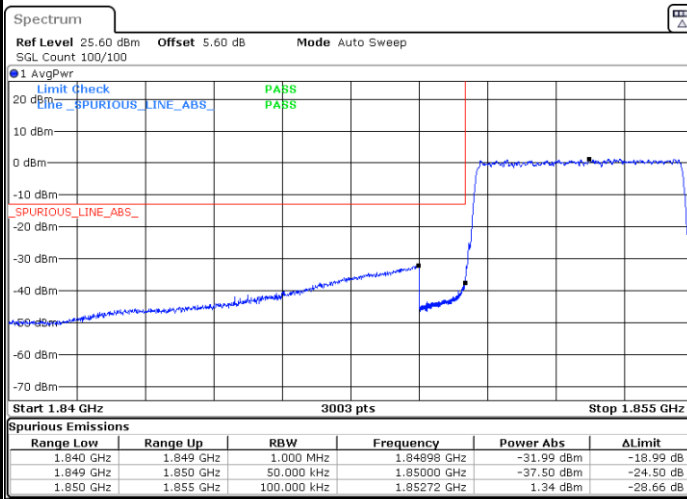
Date: 15.MAY.2023 23:39:02

Highest Band Edge / 1 RB



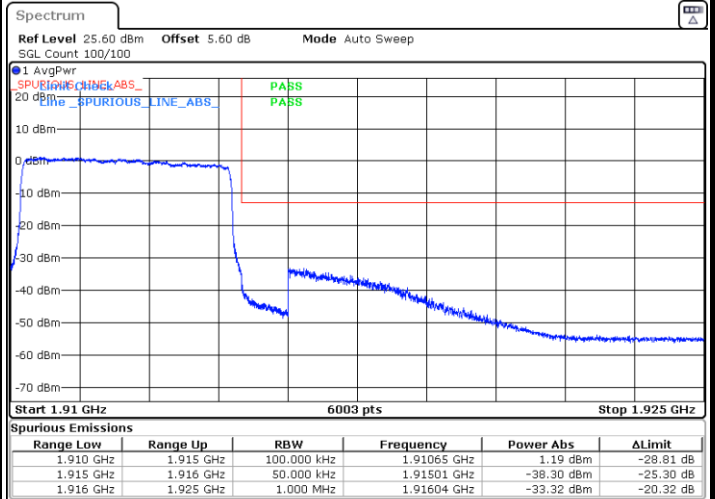
Date: 15.MAY.2023 23:52:19

Lowest Band Edge / Full RB



Date: 15.MAY.2023 23:32:25

Highest Band Edge / Full RB

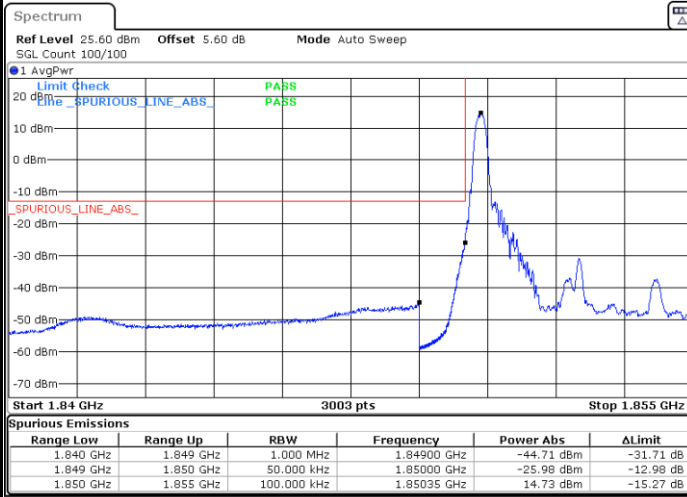


Date: 15.MAY.2023 23:47:01



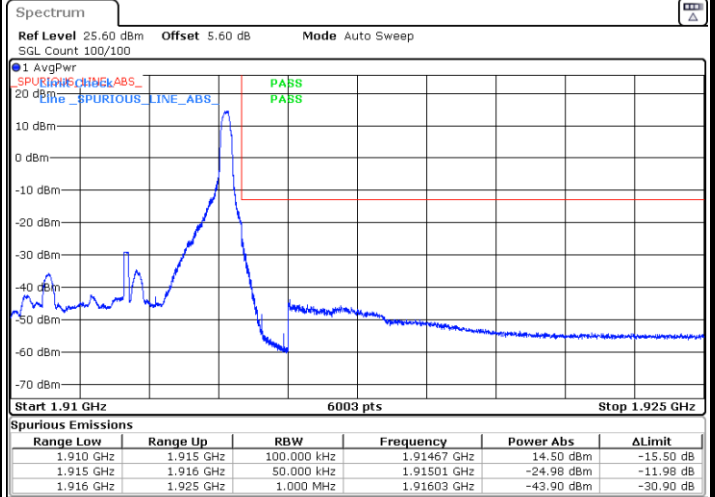
LTE Band 25 / 5MHz / 16QAM

Lowest Band Edge / 1RB



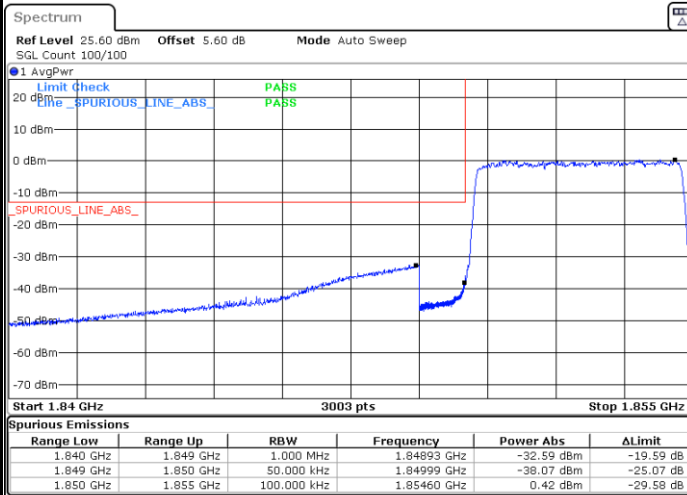
Date: 15.MAY.2023 23:40:22

Highest Band Edge / 1 RB



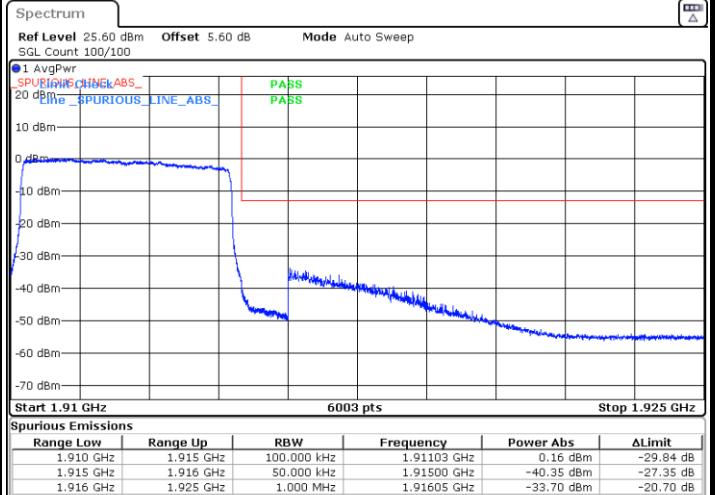
Date: 15.MAY.2023 23:53:38

Lowest Band Edge / Full RB



Date: 15.MAY.2023 23:33:44

Highest Band Edge / Full RB

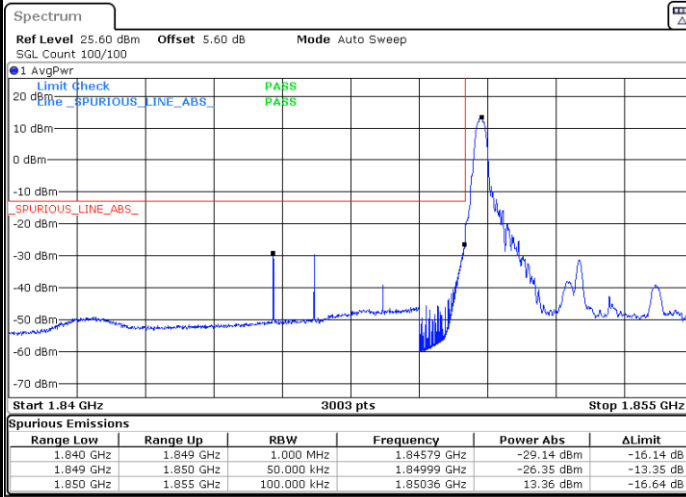


Date: 15.MAY.2023 23:48:20



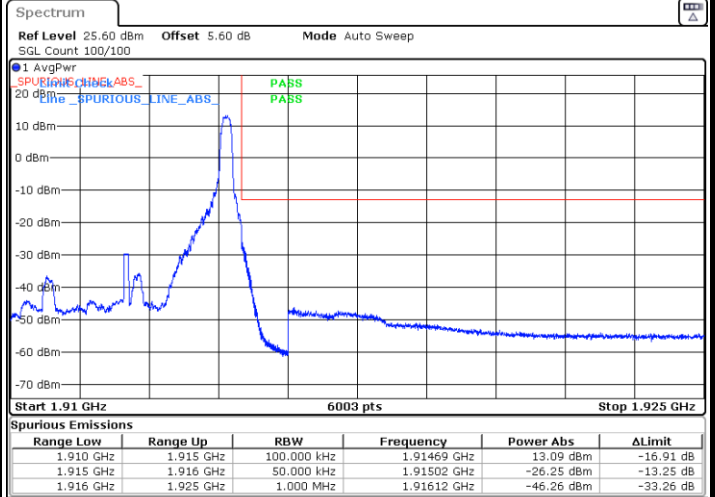
LTE Band 25 / 5MHz / 64QAM

Lowest Band Edge / 1RB



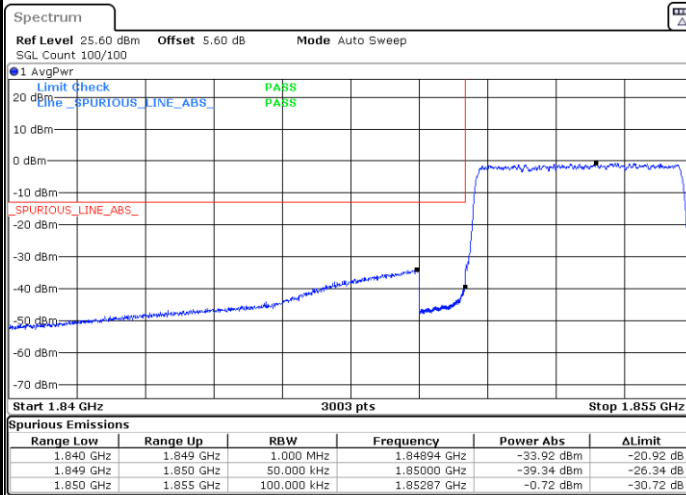
Date: 15.MAY.2023 23:41:41

Highest Band Edge / 1 RB



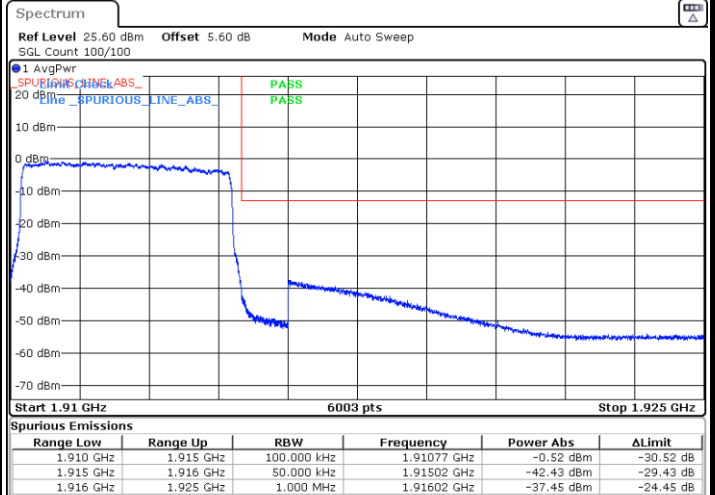
Date: 15.MAY.2023 23:54:58

Lowest Band Edge / Full RB



Date: 15.MAY.2023 23:35:04

Highest Band Edge / Full RB



Date: 15.MAY.2023 23:49:40