FCC/ISED RF Test Report

APPLICANT	:	Motorola Solutions Inc.
EQUIPMENT	:	WAVE PTX TWO-WAY RADIO
BRAND NAME	:	MOTOROLA
MODEL NAME(FCC)	:	TLK 25
MODEL NUMBER(FCC)	:	HK2197A
HVIN	:	HK2199A
PMN	:	TLK 25
MODEL NUMBER(IC)	:	HK2199A
FCC ID	:	AZ499FT7171
IC	:	109U-99FT7171
STANDARD	:	47 CFR Part 2, 22(H), 24(E), 27(L), 27(F) ISED RSS-130 Issue 2 ISED RSS-132 Issue 4 ISED RSS-133 Issue 6 ISED RSS-139 Issue 4
CLASSIFICATION	:	PCS Licensed Transmitter (PCB)
TEST DATE(S)	:	Feb. 20, 2024 ~ Feb. 23, 2024

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

ACCREDITED Cert #5145.02

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
FG341404	Rev. 01	Initial issue of report	Mar. 13, 2024
FG341404	Rev. 02	Update the information of Applicant & Manufacturer	Mar. 25, 2024
FG341404	Rev. 03	Add LTE Band 4 in the Summary of RSE on Page 4	Apr. 03, 2024
FG341404	Rev. 04	Add relevant note for RSE test data in Appendix B	Apr. 12, 2024

SUMMARY OF TEST RESULT

Report Section	FCC Rule	ISED Rule	Description	Limit	Result	Remark
3.4	§2.1046	RSS-Gen (6.12) RSS-130 (4.6) RSS-132 (5.4) RSS-133 (6.4) RSS-139 (5.5)	Conducted Output Power	-	Report Only	LTE Band 2 : 23.35 dBm LTE Band 4 : 23.37 dBm LTE Band 5 : 23.78 dBm LTE Band 13 : 24.15 dBm LTE Band 66 : 23.40 dBm
	§22.913(a)(5)	RSS-132 (5.4)	Effective Radiated Power (Band 5)	ERP < 7 Watt	PASS	-
	§27.50(b)(10)	RSS-130 (4.6)	Effective Radiated Power (Band 13)	ERP < 3 Watt		-
	§24.232(c)	RSS-133 (6.4) SRSP-510 (5.1.2)	Equivalent Isotropic Radiated Power (Band 2)	EIRP < 2Watt		-
	§27.50(d)(4)	RSS-139 (5.5)	Equivalent Isotropic Radiated Power (Band 4) (Band 66)	EIRP < 1Watt		-
3.5	§24.232(d)	RSS-130 (4.6) RSS-132 (5.4) RSS-133 (6.4) RSS-139 (5.5)	Peak-to-Average Ratio	<13 dB	PASS	-
3.6	§2.1049	RSS-GEN (6.7) RSS-130 (3.3) RSS-132 (3.4) RSS-133 (3.1) RSS-139 (3.4)	Emission Designator	-	Report Only	LTE Band 2 : 17M9G7D LTE Band 4 : 17M8G7D LTE Band 5 : 8M97G7D LTE Band 13 : 9M01W7D LTE Band 66 : 17M8G7D
3.7	§2.1051 §22.917(a) §24.238(a) §27.53(c)(2)(4) §27.53(h)	RSS-130 (4.7) RSS-132 (5.5) RSS-133 (6.5) RSS-139 (5.6)	Conducted Band Edge Measurement (Band 2) (Band 4) (Band 5) (Band 13) (Band 66)	< 43+10log10(P[Watts])	PASS	-
3.8	§2.1051 §22.917(a) §24.238(a) §27.53(c)(2) §27.53(h)	RSS-130 (4.7) RSS-132 (5.5) RSS-133 (6.5) RSS-139 (5.6)	Conducted Spurious Emission (Band 2) (Band 4) (Band 5) (Band 13) (Band 66)	< 43+10log10(P[Watts])	PASS	-
3.9	§2.1055 §22.355	RSS-GEN (6.11) RSS-133 (6.3)	Frequency Stability Temperature & Voltage	< 2.5 ppm for Part 22 Within ± 2.5 ppm for RSS-133	PASS	-
	§2.1055 §24.235 §27.54	RSS-130 (4.5) RSS-132 (5.3) RSS-139 (5.4)		Within Authorized Band		
4.4	§2.1053 §22.917(a) §24.238(a) §27.53(c)(2) §27.53(f) §27.53(h)	RSS-130 (4.7) RSS-132 (5.5) RSS-133 (6.5) RSS-139 (5.6)	Radiated Spurious Emission (Band 2) (Band 4) (Band 5) (Band 13) (Band 66)	< 43+10log$_{10}$(P[Watts])	PASS	LTE Band 2 : Under limit34.52 dB at 3705.000 MHz LTE Band 5 : Under limit 32.41 dB at 2496.000 MHz LTE Band 13 : Under limit 20.52 dB at 1560.000 MHz LTE Band 4/66 : Under limit 38.05 dB at 3420.000 MHz

Conformity Assessment Condition:

1. 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.
2. 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

Motorola Solutions Inc.

Plot 2A, Medan Bayan Lepas, Mukim 12 S.W.D, 11900 Bayan Lepas, Penang, Malaysia.

1.2 Manufacturer

Motorola Solutions Malaysia SDN BHD

Plot 2A, Medan Bayan Lepas, Mukim 12 S.W.D, 11900 Bayan Lepas, Penang, Malaysia.

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	WAVE PTX TWO-WAY RADIO
Brand Name	MOTOROLA
Model Name(FCC)	TLK 25
Model Number(FCC)	HK2197A
HVIN	HK2199A
PMN	TLK 25
Model Number(IC)	HK2199A
FCC ID	AZ499FT7171
IC	109U-99FT7171
IMEI Code	Conducted: 354667800018580 Radiation: 354667800018309
HW Version	P2A
SW Version/ FVIN	VANGOGH_BASE_ENG_D01.01.01_AP_D01.02.06_LNA
EUT Stage	Identical Prototype

1.4 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx Frequency	LTE Band 2 : 1850 MHz ~ 1910 MHz LTE Band 4 : 1710 MHz ~ 1755 MHz LTE Band 5 : 824 MHz ~ 849 MHz LTE Band 13 : 777 MHz ~ 787 MHz LTE Band 66 : 1710 MHz ~ 1780 MHz
Rx Frequency	LTE Band 2 : 1930 MHz ~ 1990 MHz LTE Band 4 : 2110 MHz ~ 2155 MHz LTE Band 5 : 869 MHz ~ 894 MHz LTE Band 13 : 746 MHz ~ 756 MHz LTE Band 66 : 2110 MHz~ 2180 MHz
Bandwidth	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 13 : 5MHz / 10MHz LTE Band 66 : 1.4MHz / 3MHz / 5MHz / 10MHz / 15MHz / 20MHz
Maximum Output Power to Antenna	LTE Band 2 : 23.35 dBm LTE Band 4 : 23.37 dBm LTE Band 5 : 23.78 dBm LTE Band 13 : 24.15 dBm LTE Band 66 : 23.40 dBm
Antenna Gain	LTE Band 2 : -1.0 dBi LTE Band 4 : -0.2 dBi LTE Band 5 : -2.9 dBi LTE Band 13 : -6.8 dBi LTE Band 66 : -0.2 dBi
Type of Modulation	QPSK / 16QAM

1.5 Modification of EUT

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

1.6 Specification of Accessory

Accessories Information				
AC Adapter	**Brand Name**	MOTOROLA	**Model Name**	PS000150A31
Battery	**Brand Name**	MOTOROLA	**Model Name**	PMNN4602A
Earphone 1	**Brand Name**	MOTOROLA	**Model Name**	PMLN8536A
Earphone 2	**Brand Name**	MOTOROLA	**Model Name**	PMLN8536B
USB Cable	**Brand Name**	MOTOROLA	**Model Name**	PMKN4294A

Note: Earphone 1 and Earphone 2 are only different in model name.

1.7 Maximum ERP/EIRP and Emission Designator

LTE Band 2		QPSK		16QAM	
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	0.1710	1M10G7D	0.1318	1M10W7D
3	1851.5 ~ 1908.5	0.1671	2M70G7D	0.1312	2M72W7D
5	1852.5 ~ 1907.5	0.1710	4M49G7D	0.1306	4M50W7D
10	1855.0 ~ 1905.0	0.1687	9M03G7D	0.1306	8M95W7D
15	1857.5 ~ 1902.5	0.1694	13M4G7D	0.1279	13M5W7D
20	1860.0 ~ 1900.0	0.1718	17M9G7D	0.1318	17M8W7D
LTE Band 4		QPSK		16QAM	
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	0.1995	1M09G7D	0.1552	1M09W7D
3	1711.5 ~ 1753.5	0.2061	2M71G7D	0.1538	2M72W7D
5	1712.5 ~ 1752.5	0.2046	4M49G7D	0.1535	4M49W7D
10	1715.0 ~ 1750.0	0.2028	8M99G7D	0.1542	9M01W7D
15	1717.5 ~ 1747.5	0.2046	13M4G7D	0.1552	13M3W7D
20	1720.0 ~ 1745.0	0.2075	17M8G7D	0.1574	17M8W7D
LTE Band 5		QPSK		16QAM	
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	0.0728	1M10G7D	0.0581	1M09W7D
3	825.5 ~ 847.5	0.0731	2M72G7D	0.0582	2M72W7D
5	826.5 ~ 846.5	0.0724	4M48G7D	0.0568	4M50W7D
10	829.0 ~ 844.0	0.0746	8M97G7D	0.0592	8M97W7D
LTE Band 13		QPSK		16QAM	
BW (MHz)	Frequency Range (MHz)	Maximum ERP(W)	Emission Designator (99%OBW)	Maximum ERP(W)	Emission Designator (99%OBW)
5	779.5 ~ 784.5	0.0326	4M47G7D	0.0258	4M50W7D
10	782.0	0.0331	8M99G7D	0.0261	9M01W7D

LTE Band 66		QPSK		16QAM	
BW (MHz)	Frequency Range (MHz)	Maximum EIRP(W)	Emission Designator (99%OBW)	Maximum EIRP(W)	Emission Designator (99%OBW)
1.4	1710.7 ~ 1779.3	0.2075	1M09G7D	0.1596	1M09W7D
3	1711.5 ~ 1778.5	0.2075	2M71G7D	0.1629	2M72W7D
5	1712.5 ~ 1777.5	0.2004	4M49G7D	0.1633	4M49W7D
10	1715.0 ~ 1775.0	0.2070	8M99G7D	0.1633	9M01W7D
15	1717.5 ~ 1772.5	0.2000	13M4G7D	0.1652	13M3W7D
20	1720.0 ~ 1770.0	0.2089	17M8G7D	0.1663	17M8W7D

Note: 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.

1.8 Testing Location

<FCC>

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

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

<ISED>

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

Test Firm	Sporton International Inc. (KunShan)		
Test Site Location	No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China TEL: +86-512-57900158		
Test Site No.	**Sporton Site No.**	**Company Number**	**CAB identifier**
	03CH04-KS TH01-KS	4086E	CN0050

1.9 Test Software

Item	Site	Manufacture	Name	Version
1.	TH01-KS	SPORTON	FCC LTE_Ver2.0 Auto_china_210503	2.0
2.	03CH04-KS	AUDIX	E3	210616

1.10 Applicable Standards

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

<FCC>

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

<ISED>

- ANSI C63.26-2015
- FCC KDB 971168 D01 Power Meas. License Digital Systems v03r01
- FCC KDB 412172 D01 Determining ERP and EIRP v01r01
- ISED RSS-130 Issue 2
- ISED RSS-132 Issue 4
- ISED RSS-133 Issue 6
- ISED RSS-139 Issue 4
- ISED RSS-Gen Issue 5

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/ ICES-003, recorded in a separate test report.

2 Test Configuration of Equipment Under Test

2.1 Test Mode

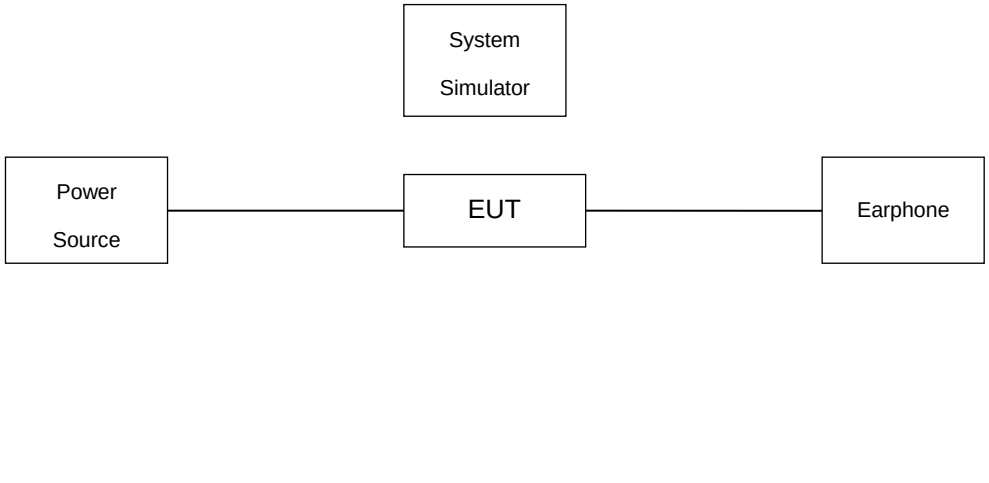
Antenna port conducted and radiated test items listed below are performed according to KDB 971168 D01 Power Meas License Digital Systems v03r01 with maximum output power.

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

Test Items	Band	Bandwidth (MHz)						Modulation			RB #			Test Channel		
		1.4	3	5	10	15	20	QPSK	16QAM	64QAM	1	Half	Full	L	M	H
Max. Output Power	2	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
	5	v	v	v	v	-	-	v	v	-	v	v	v	v	v	v
	13	-	-	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
Peak-to-Average Ratio	2						v	v	v	-			v		v	
	5				v	-	-	v	v	-			v		v	
	13	-	-		v	-	-	v	v	-			v		v	
	66						v	v	v	-			v		v	
26dB and 99% Bandwidth	2	v	v	v	v	v	v	v	v	-			v		v	
	5	v	v	v	v	-	-	v	v	-			v		v	
	13	-	-	v	v	-	-	v	v	-			v		v	
	66	v	v	v	v	v	v	v	v	-			v		v	
Conducted Band Edge	2	v	v	v	v	v	v	v	v	-	v		v	v		v
	5	v	v	v	v	-	-	v	v	-	v		v	v		v
	13	-	-	v	v	-	-	v	v	-	v		v	v		v
	66	v	v	v	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	16QAM	64QAM	1	Half	Full	L	M	H
Conducted Spurious Emission	2	v	v	v	v	v	v	v		-	v			v	v	v
	5	v	v	v	v	-	-	v		-	v			v	v	v
	13	-	-	v	v	-	-	v		-	v			v	v	v
	66	v	v	v	v	v	v	v		-	v			v	v	v
Frequency Stability	2				v			v		-			v		v	
	5				v	-	-	v		-			v		v	
	13	-	-		v	-	-	v		-			v		v	
	66				v			v		-			v		v	
E.R.P / E.I.R.P	2	v	v	v	v	v	v	v	v	-	v			v	v	v
	5	v	v	v	v	-	-	v	v	-	v			v	v	v
	13	-	-	v	v	-	-	v	v	-	v			v	v	v
	66	v	v	v	v	v	v	v	v	-	v			v	v	v
Radiated Spurious Emission	2	Worst Case												v	v	v
	5	Worst Case												v	v	v
	13	Worst Case												v	v	v
	66	Worst Case												v	v	v
Note	1. The mark "**v** " means that this configuration is chosen for testing 2. The mark "-" means that this bandwidth is not supported. 3. 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. 4. 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.															

2.2 Connection Diagram of Test System



This example is connection diagram of EUT test configurations.

. For detail, please refer to test mode configuration and setup photographs for each test item.

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	MT8820/8821	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 5.8 dB.

Example :

Offset(dB) = RF cable loss(dB).

= 5.8 (dB)

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 13 Channel and Frequency List				
BW [MHz]	Channel/Frequency(MHz)	Lowest	Middle	Highest
10	Channel	-	23230	-
	Frequency	-	782	-
5	Channel	23205	23230	23255
	Frequency	779.5	782	784.5

LTE Band 66 Channel and Frequency List				
BW [MHz]	Channel/Frequency(MHz)	Lowest	Middle	Highest
20	Channel	132072	132322	132572
	Frequency	1720	1745	1770
15	Channel	132047	132322	132597
	Frequency	1717.5	1745	1772.5
10	Channel	132022	132322	132622
	Frequency	1715	1745	1775
5	Channel	131997	132322	132647
	Frequency	1712.5	1745	1777.5
3	Channel	131987	132322	132657
	Frequency	1711.5	1745	1778.5
1.4	Channel	131979	132322	132665
	Frequency	1710.7	1745	1779.3

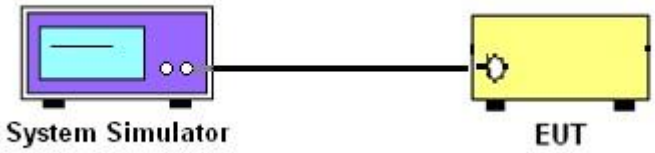
3 Conducted Test Items

3.1 Measuring Instruments

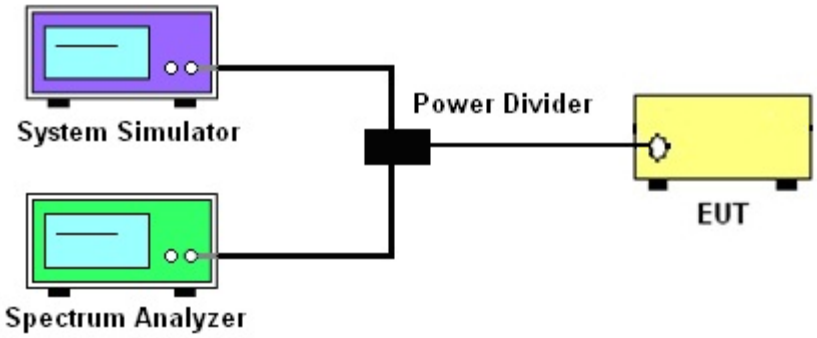
See list of measuring instruments of this test report.

3.2 Test Setup

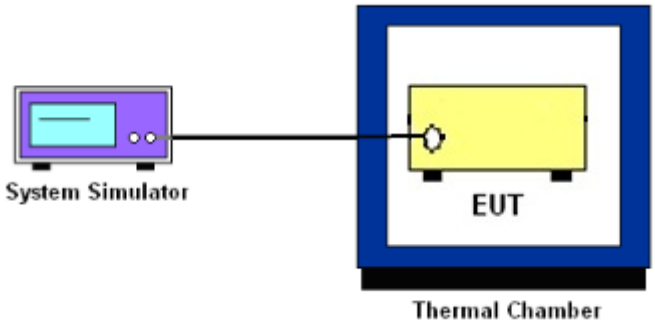
3.2.1 Conducted Output Power



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.

The ERP of mobile transmitters must not exceed 3 Watts for LTE Band 13.

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

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

FCC

22.917(a)

For operations in the 824 – 849 MHz band, the FCC limit is 43 + $10\log_{10}$(P[Watts]) dB below the transmitter power P(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[Watts]) dB below the transmitter power P(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 (c)

For operations in the 776-788 MHz band, the FCC limit is 43 + $10\log_{10}$(P[Watts]) dB below the transmitter power P(Watts) in a 100 kHz bandwidth. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 30 kHz may be employed. In addition, the power of any unwanted emissions in any 6.25 kHz bandwidth for all frequencies between 763-775 MHz and 793-806 MHz shall be attenuated below the transmitter power, P (dBW), by at least 65 + 10 log10 p(watts), dB, for mobile and portable equipment.

27.53 (h)

For operations in the 1710 – 1755 MHz band, the FCC limit is 43 + $10\log_{10}$(P[Watts]) dB below the transmitter power P(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.

ISED

RSS-132 (Section 5.5)

In the first 1.0 MHz band immediately outside and adjacent to each of the sub-bands specified in Section 5.1, the power of emissions per any 1% of the occupied bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least 43 + 10 log10 p (watts). After the first 1.0 MHz immediately outside and adjacent to each of the sub-bands, the power of emissions in any 100 kHz bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least 43 + 10 log10 p (watts).

RSS-133 (Section 6.5)

In the 1.0 MHz bands immediately outside and adjacent to the equipment's operating frequency block, the emission power per any 1% of the emission bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least 43 + 10 log10 p(watts). After the first 1.0 MHz, the emission power in any 1 MHz bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least 43 + 10 log10 p(watts).

RSS-130 (Section 4.7)

The unwanted emissions in any 100 kHz bandwidth on any frequency outside the frequency range(s) within which the equipment is designed to operate shall be attenuated below the transmitter power, P (dBW), by at least 43 + 10 log10 p (watts), dB. However, in the 100 kHz band immediately outside the equipment's operating frequency range, a resolution bandwidth of 30 kHz may be employed.

In addition to the limit outlined above, equipment operating in the frequency bands 746-756 MHz and 777-787 MHz shall also comply with the following restrictions: the power of any unwanted emissions in any 6.25 kHz bandwidth for all frequencies between 763-775 MHz and 793-806 MHz shall be attenuated below the transmitter power, P (dBW), by at least 65 + 10 log10 p(watts), dB, for mobile and portable equipment.

RSS-139 (Section 6.6)

In the first 1.0 MHz bands immediately outside and adjacent to the equipment's smallest operating frequency block, which can contain the equipment's occupied bandwidth, the emission power per any 1% of the emission bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least 43 + 10 log10 p (watts) dB. After the first 1.0 MHz outside the equipment's smallest operating frequency block, which can contain the equipment's occupied bandwidth, the emission power in any 1 MHz bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least 43 + 10 log10 p (watts) dB.

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 >= 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 or a narrower RBW was used and the measured power was integrated over the full required measurement bandwidth of 1 MHz.
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 + 10log(P)dB below the transmitter power P(Watts)
   = P(W)- [43 + 10log(P)] (dB)
   = [30 + 10log(P)] (dBm) - [43 + 10log(P)] (dB) = -13dBm.
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^{th} 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 + 10log(P)dB below the transmitter power P(Watts)
    = P(W)- [43 + 10log(P)] (dB)
    = [30 + 10log(P)] (dBm) - [43 + 10log(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 ±0.00025% (±2.5ppm) 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°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°C step up to 50°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±5°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.

3.9.4 Test Procedures for Frequency Stability

1. The testing follows the Section 6.11 of RSS-GEN.
2. The EUT was connected to spectrum analyzer and system simulator via a power divider.
3. The EUT was operated at the lowest and highest channel.
4. For RSS-132,133,139, the frequency range shall be within the frequency range.
5. For RSS-130, the frequency at these points shall be recorded as fL and fH respectively. The frequency stability by showing that fL minus the frequency offset and fH plus the frequency offset shall be within the frequency range that the equipment is designed to operate.

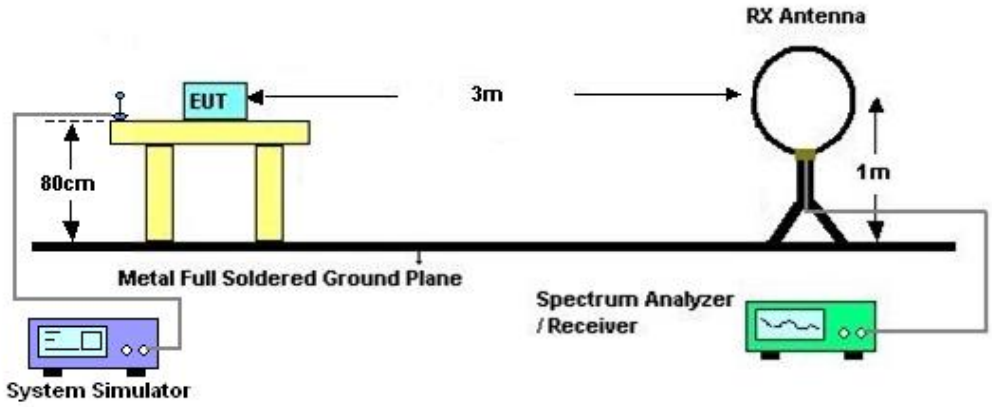
4 Radiated Test Items

4.1 Measuring Instruments

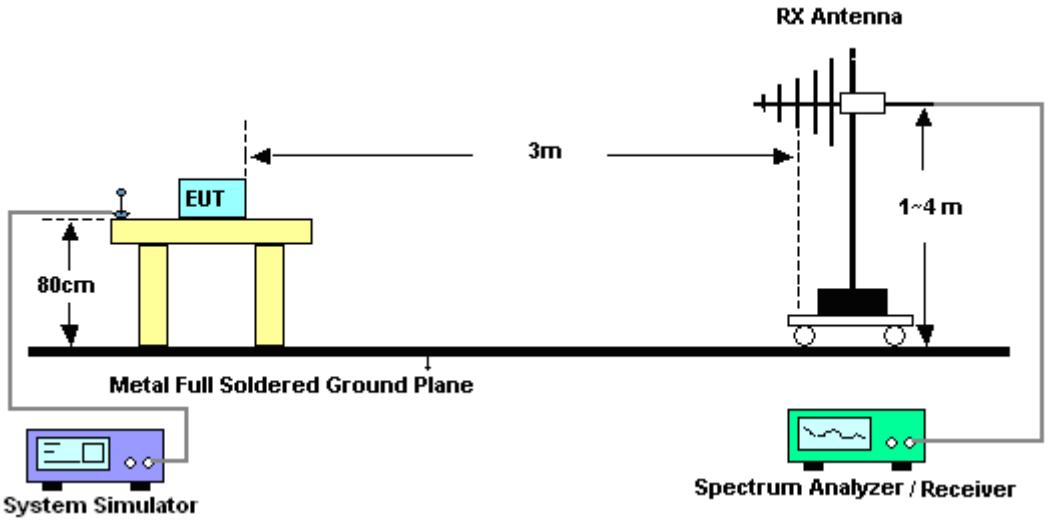
See list of measuring instruments of this test report.

4.2 Test Setup

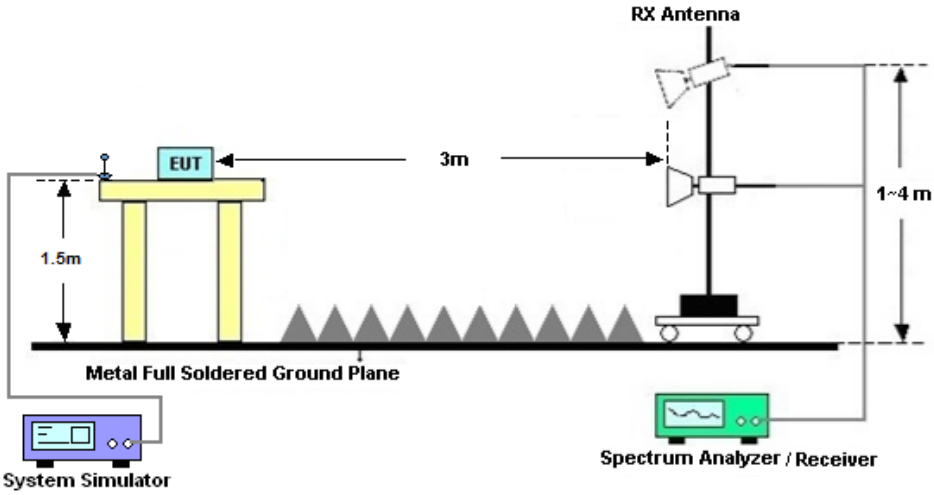
4.2.1 For radiated test below 30MHz



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.

For LTE Band 13

For operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands, emissions 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.

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 (dBm) = S.G. Power – Tx Cable Loss + Tx Antenna Gain
11. ERP (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 + 10log(P)dB below the transmitter power P(Watts)
    = P(W)- [43 + 10log(P)] (dB)
    = [30 + 10log(P)] (dBm) - [43 + 10log(P)] (dB)
    = -13dBm.

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. 11, 2023	Feb. 22, 2024~ Feb. 23, 2024	Oct. 10, 2024	Conducted (TH01-KS)
Power divider	STI	STI08-0055	-	0.5~40GHz	NCR	Feb. 22, 2024~ Feb. 23, 2024	NCR	Conducted (TH01-KS)
Temperature & humidity chamber	Hongzhan	LP-150U	H2014011440	-40~+150°C 20%~95%RH	Jul. 06, 2023	Feb. 22, 2024~ Feb. 23, 2024	Jul. 05, 2024	Conducted (TH01-KS)
RF Cable	HUBER+SUHNER	SUCOFLEX 104	TH01KS001	30MHz~40GHz	Jun. 17, 2023	Feb. 22, 2024~ Feb. 23, 2024	Jun. 16, 2024	Conducted (TH01-KS)
RF Cable	HUBER+SUHNER	SUCOFLEX 104	TH01KS002	30MHz~40GHz	Jun. 17, 2023	Feb. 22, 2024~ Feb. 23, 2024	Jun. 16, 2024	Conducted (TH01-KS)
RF Cable	HUBER+SUHNER	SUCOFLEX 104	TH01KS003	30MHz~40GHz	Jun. 17, 2023	Feb. 22, 2024~ Feb. 23, 2024	Jun. 16, 2024	Conducted (TH01-KS)
EXA Spectrum Analyzer	Keysight	N9010B	MY57471079	10Hz-44G,MAX 30dB	Oct. 10, 2023	Feb. 20, 2024	Oct. 09, 2024	Radiation (03CH04-KS)
Loop Antenna	R&S	HFH2-Z2E	101125	9kHz~30MHz	Sep. 11 2023	Feb. 20, 2024	Sep. 10, 2024	Radiation (03CH04-KS)
Bilog Antenna	TeseQ	CBL6111D	49922	30MHz-1GHz	Apr. 09, 2023	Feb. 20, 2024	Apr. 08, 2024	Radiation (03CH04-KS)
Horn Antenna	Schwarzbeck	BBHA9120D	1284	1GHz~18GHz	Oct. 10, 2023	Feb. 20, 2024	Oct. 09, 2024	Radiation (03CH04-KS)
SHF-EHF Horn	Com-power	AH-840	101070	18GHz~40GHz	Jan. 05, 2024	Feb. 20, 2024	Jan. 04, 2025	Radiation (03CH04-KS)
Amplifier	SONOMA	310N	380827	9KHz-1GHz	Jul. 06, 2023	Feb. 20, 2024	Jul. 05, 2024	Radiation (03CH04-KS)
Amplifier	MITEQ	EM18G40GGA	060728	18~40GHz	Jan. 05, 2024	Feb. 20, 2024	Jan. 04, 2025	Radiation (03CH04-KS)
high gain Amplifier	EM	EM01G18GA	060840	1Ghz-18Ghz	Oct. 10, 2023	Feb. 20, 2024	Oct. 09, 2024	Radiation (03CH04-KS)
Amplifier	Agilent	8449B	3008A02370	1Ghz-18Ghz	Oct. 10, 2023	Feb. 20, 2024	Oct. 09, 2024	Radiation (03CH04-KS)
AC Power Source	Chroma	61601	F104090004	N/A	NCR	Feb. 20, 2024	NCR	Radiation (03CH04-KS)
Turn Table	ChamPro	EM 1000-T	060762-T	0~360 degree	NCR	Feb. 20, 2024	NCR	Radiation (03CH04-KS)
Antenna Mast	ChamPro	EM 1000-A	060762-A	1 m~4 m	NCR	Feb. 20, 2024	NCR	Radiation (03CH04-KS)
RF Cable	HUBER+SUHNER	SUCOFLEX 104	03CH04KS01	30Mhz-40Ghz	Jun. 29, 2023	Feb. 20, 2024	Jun. 28, 2024	Radiation (03CH04-KS)
RF Cable	HUBER+SUHNER	SUCOFLEX 104	03CH04KS02	30Mhz-40Ghz	Jun. 29, 2023	Feb. 20, 2024	Jun. 28, 2024	Radiation (03CH04-KS)
Low Pass Filter	Wainwright Instruments Gmbh	WLK4-1000-1530-8000-40SS	2	1G Low Pass	Jun. 29, 2023	Feb. 20, 2024	Jun. 28, 2024	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 Spurious Emission & Bandedge	±2.26 dB
Occupied Channel Bandwidth	±0.1%
Conducted Power	±0.46 dB
Peak to Average Ratio	±0.46 dB
Frequency Stability	±0.4 Hz

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	3.82 dB

Uncertainty of Radiated Emission Measurement (1 GHz ~ 18 GHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	3.56 dB

Uncertainty of Radiated Emission Measurement (18 GHz ~ 40 GHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	3.54 dB

---------- THE END ----------

Appendix A. Test Results of Conducted Test

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

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)		
Channel				18700	18900	19100			
Frequency (MHz)				1860	1880	1900	L	M	H
20	QPSK	1	0	23.31	23.35	23.26	0.1702	0.1718	0.1683
20	QPSK	1	99	23.00	23.09	22.99	0.1585	0.1618	0.1581
20	QPSK	100	0	22.08	22.33	22.29	0.1282	0.1358	0.1346
20	16QAM	1	0	22.17	22.20	22.00	0.1309	0.1318	0.1259
Channel				18675	18900	19125	EIRP(W)		
Frequency (MHz)				1857.5	1880	1902.5	L	M	H
15	QPSK	1	0	23.11	23.29	23.16	0.1626	0.1694	0.1644
15	16QAM	1	0	22.07	22.06	21.80	0.1279	0.1276	0.1202
Channel				18650	18900	19150	EIRP(W)		
Frequency (MHz)				1855	1880	1905	L	M	H
10	QPSK	1	0	23.13	23.18	23.27	0.1633	0.1652	0.1687
10	16QAM	1	0	22.15	22.16	21.98	0.1303	0.1306	0.1253
Channel				18625	18900	19175	EIRP(W)		
Frequency (MHz)				1852.5	1880	1907.5	L	M	H
5	QPSK	1	0	23.27	23.33	23.10	0.1687	0.1710	0.1622
5	16QAM	1	0	22.16	22.14	21.90	0.1306	0.1300	0.1230
Channel				18615	18900	19185	EIRP(W)		
Frequency (MHz)				1851.5	1880	1908.5	L	M	H
3	QPSK	1	0	23.14	23.23	23.11	0.1637	0.1671	0.1626
3	16QAM	1	0	22.06	22.18	22.01	0.1276	0.1312	0.1262
Channel				18607	18900	19193	EIRP(W)		
Frequency (MHz)				1850.7	1880	1909.3	L	M	H
1.4	QPSK	1	0	23.22	23.33	23.14	0.1667	0.1710	0.1637
1.4	16QAM	1	0	22.19	22.15	22.20	0.1315	0.1303	0.1318

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			
Frequency (MHz)				1720	1732.5	1745	L	M	H
20	QPSK	1	0	23.26	23.37	23.30	0.2023	0.2075	0.2042
20	QPSK	1	99	23.21	23.18	23.26	0.2000	0.1986	0.2023
20	QPSK	100	0	22.00	22.22	22.21	0.1514	0.1592	0.1589
20	16QAM	1	0	22.01	22.17	22.05	0.1517	0.1574	0.1531
Channel				20025	20175	20325	EIRP(W)		
Frequency (MHz)				1717.5	1732.5	1747.5	L	M	H
15	QPSK	1	0	23.14	23.31	23.08	0.1968	0.2046	0.1941
15	16QAM	1	0	22.02	22.11	21.85	0.1521	0.1552	0.1462
Channel				20000	20175	20350	EIRP(W)		
Frequency (MHz)				1715	1732.5	1750	L	M	H
10	QPSK	1	0	23.11	23.27	23.13	0.1954	0.2028	0.1963
10	16QAM	1	0	21.83	22.08	21.85	0.1455	0.1542	0.1462
Channel				19975	20175	20375	EIRP(W)		
Frequency (MHz)				1712.5	1732.5	1752.5	L	M	H
5	QPSK	1	0	23.25	23.31	23.17	0.2018	0.2046	0.1982
5	16QAM	1	0	21.89	22.06	21.89	0.1476	0.1535	0.1476
Channel				19965	20175	20385	EIRP(W)		
Frequency (MHz)				1711.5	1732.5	1753.5	L	M	H
3	QPSK	1	0	23.15	23.34	23.30	0.1972	0.2061	0.2042
3	16QAM	1	0	21.86	22.07	21.98	0.1466	0.1538	0.1507
Channel				19950	20175	20393	EIRP(W)		
Frequency (MHz)				1710	1732.5	1754.3	L	M	H
1.4	QPSK	1	0	23.20	23.15	23.11	0.1995	0.1972	0.1954
1.4	16QAM	1	0	21.85	22.11	22.04	0.1462	0.1552	0.1528

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			
Frequency (MHz)				829	836.5	844	L	M	H
10	QPSK	1	0	23.66	23.78	23.69	0.0726	0.0746	0.0731
10	QPSK	1	49	23.50	23.72	23.51	0.0700	0.0736	0.0701
10	QPSK	50	0	22.60	22.74	22.70	0.0569	0.0587	0.0582
10	16QAM	1	0	22.71	22.64	22.77	0.0583	0.0574	0.0592
Channel				20425	20525	20625	ERP(W)		
Frequency (MHz)				826.5	836.5	846.5	L	M	H
5	QPSK	1	0	23.54	23.64	23.65	0.0706	0.0723	0.0724
5	16QAM	1	0	22.59	22.43	22.56	0.0568	0.0547	0.0564
Channel				20415	20525	20635	ERP(W)		
Frequency (MHz)				825.5	836.5	847.5	L	M	H
3	QPSK	1	0	23.64	23.57	23.69	0.0723	0.0711	0.0731
3	16QAM	1	0	22.70	22.62	22.63	0.0582	0.0571	0.0573
Channel				20407	20525	20643	ERP(W)		
Frequency (MHz)				824.7	836.5	848.3	L	M	H
1.4	QPSK	1	0	23.61	23.67	23.48	0.0718	0.0728	0.0697
1.4	16QAM	1	0	22.58	22.50	22.69	0.0566	0.0556	0.0581

LTE Band 13									
BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	ERP(W)		
Channel				23230					
Frequency (MHz)				782				M	
10	QPSK	1	0		24.15			0.0331	
10	QPSK	1	49		24.06			0.0324	
10	QPSK	50	0		23.06			0.0258	
10	16QAM	1	0		23.11			0.0261	
Channel				23205	23230	23255	ERP(W)		
Frequency (MHz)				779.5	782	784.5	L	M	H
5	QPSK	1	0	24.04	23.96	24.08	0.0323	0.0317	0.0326
5	16QAM	1	0	23.07	23.02	22.95	0.0258	0.0255	0.0251

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	132322	132572			
Frequency (MHz)				1720	1745	1770	L	M	H
20	QPSK	1	0	23.31	23.40	23.35	0.2046	0.2089	0.2065
20	QPSK	1	99	23.11	23.32	23.27	0.1954	0.2051	0.2028
20	QPSK	100	0	22.43	22.57	22.24	0.1671	0.1726	0.1600
20	16QAM	1	0	22.21	22.41	22.22	0.1589	0.1663	0.1592
Channel				132047	132322	132597	EIRP(W)		
Frequency (MHz)				1717.5	1745	1772.5	L	M	H
15	QPSK	1	0	23.18	23.20	23.21	0.1986	0.1995	0.2000
15	16QAM	1	0	22.16	22.38	22.18	0.1570	0.1652	0.1578
Channel				132022	132322	132622	EIRP(W)		
Frequency (MHz)				1715	1745	1775	L	M	H
10	QPSK	1	0	23.15	23.36	23.30	0.1972	0.2070	0.2042
10	16QAM	1	0	22.16	22.33	22.22	0.1570	0.1633	0.1592
Channel				131997	132322	132647	EIRP(W)		
Frequency (MHz)				1712.5	1745	1777.5	L	M	H
5	QPSK	1	0	23.21	23.22	23.18	0.2000	0.2004	0.1986
5	16QAM	1	0	22.23	22.33	22.13	0.1596	0.1633	0.1560
Channel				131987	132322	132657	EIRP(W)		
Frequency (MHz)				1711.5	1745	1778.5	L	M	H
3	QPSK	1	0	23.30	23.36	23.37	0.2042	0.2070	0.2075
3	16QAM	1	0	22.12	22.32	22.10	0.1556	0.1629	0.1549
Channel				131979	132322	132665	EIRP(W)		
Frequency (MHz)				1710.7	1745	1779.3	L	M	H
1.4	QPSK	1	0	23.31	23.37	23.25	0.2046	0.2075	0.2018
1.4	16QAM	1	0	22.06	22.23	22.15	0.1535	0.1596	0.1567

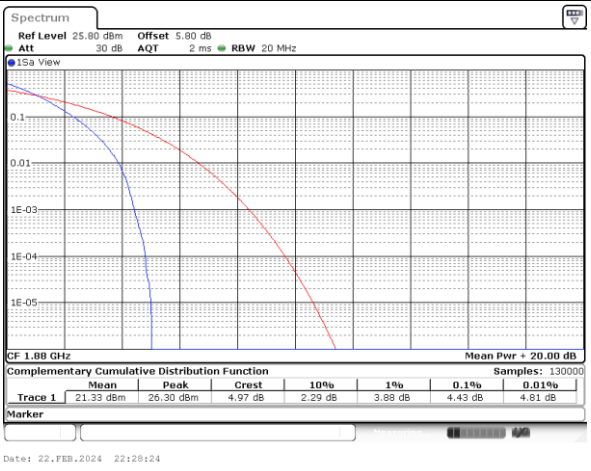
LTE Band 2

Peak-to-Average Ratio

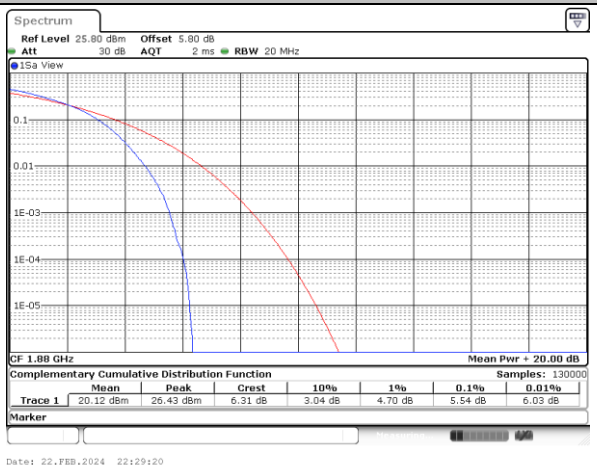
Mode	LTE Band 2 / 20MHz		
Mod.	QPSK	16QAM	Limit: 13dB
RB Size	Full RB	Full RB	Result
Middle CH	4.43	**5.54**	PASS

LTE Band 2 / 20MHz

Middle Channel / Full RB/ QPSK



Middle Channel / Full RB/ 16QAM

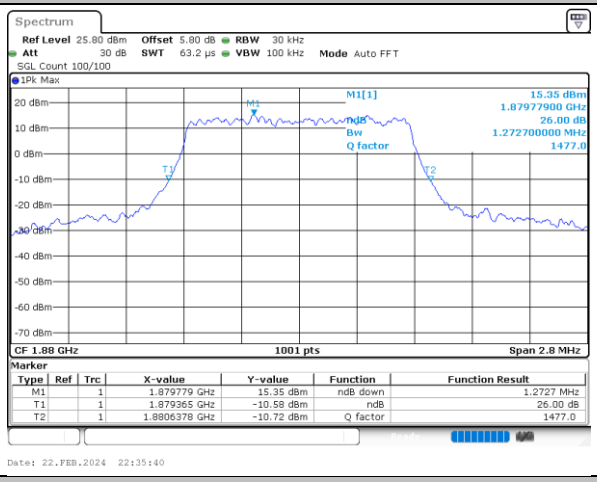


26dB Bandwidth

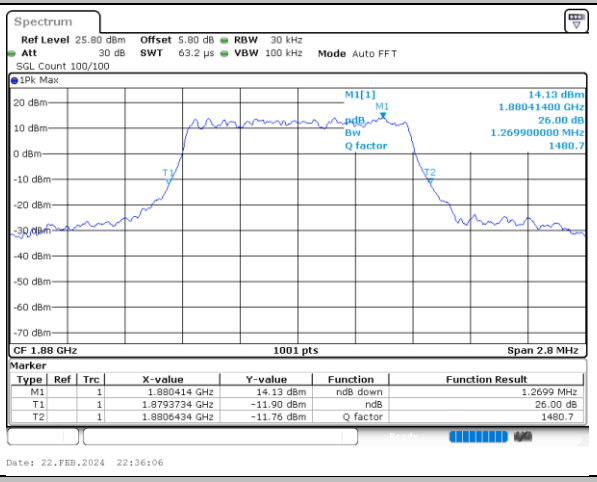
Mode	LTE Band 2 : 26dB BW(MHz)	
BW	1.4MHz	
Mod.	QPSK	16QAM
Middle CH	1.27	1.27
Mode	LTE Band 2 : 26dB BW(MHz)	
BW	3MHz	
Mod.	QPSK	16QAM
Middle CH	3.03	3.03
Mode	LTE Band 2 : 26dB BW(MHz)	
BW	5MHz	
Mod.	QPSK	16QAM
Middle CH	4.92	4.90
Mode	LTE Band 2 : 26dB BW(MHz)	
BW	10MHz	
Mod.	QPSK	16QAM
Middle CH	9.71	9.85
Mode	LTE Band 2 : 26dB BW(MHz)	
BW	15MHz	
Mod.	QPSK	16QAM
Middle CH	14.36	14.15
Mode	LTE Band 2 : 26dB BW(MHz)	
BW	20MHz	
Mod.	QPSK	16QAM
Middle CH	18.86	18.98

LTE Band 2

Middle Channel / 1.4MHz / QPSK

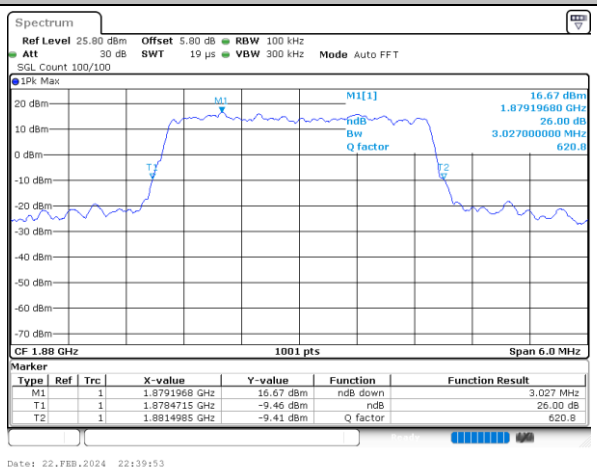


Middle Channel / 1.4MHz / 16QAM

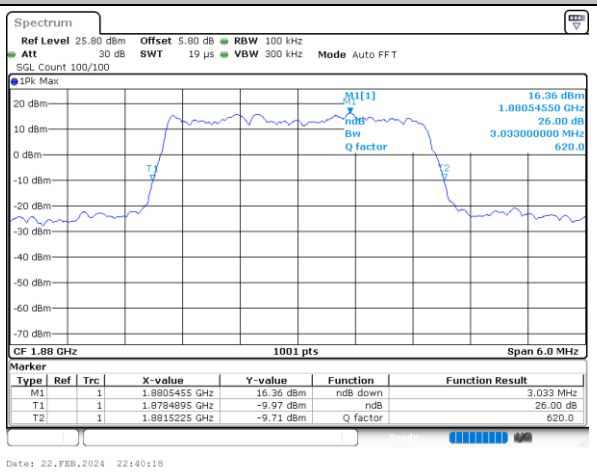


LTE Band 2

Middle Channel / 3MHz / QPSK

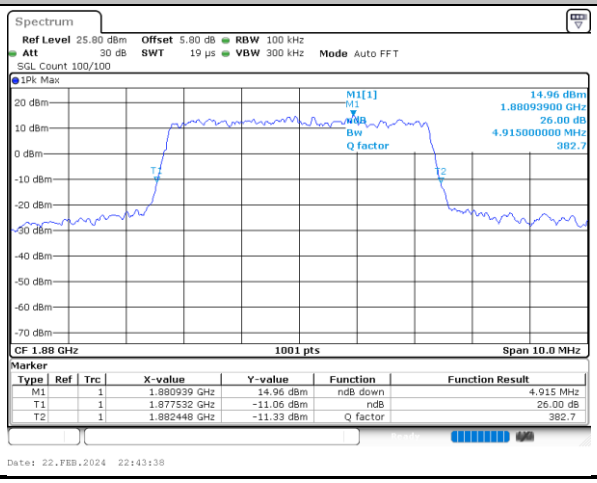


Middle Channel / 3MHz / 16QAM

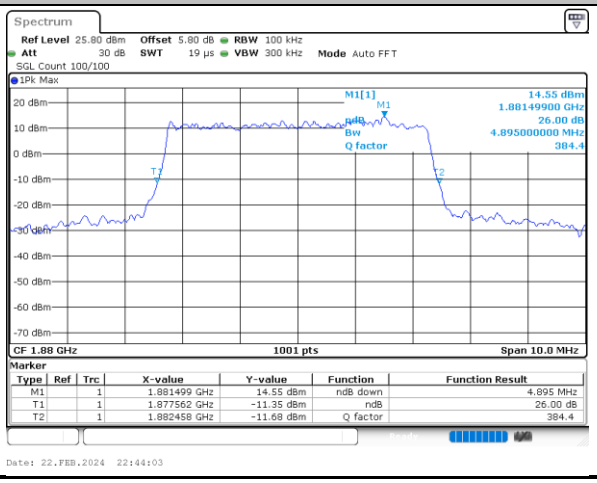


LTE Band 2

Middle Channel / 5MHz / QPSK

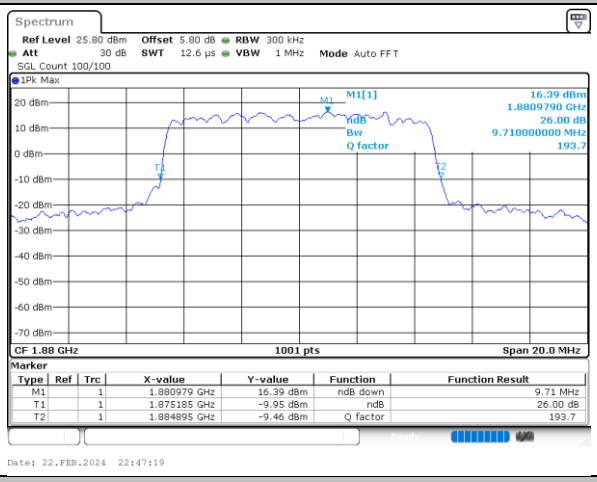


Middle Channel / 5MHz / 16QAM

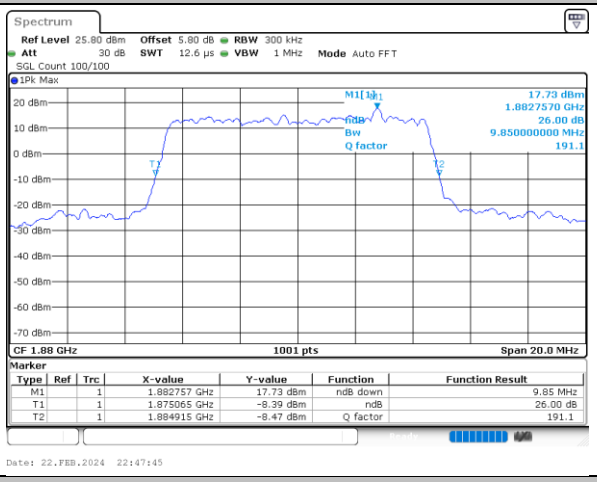


LTE Band 2

Middle Channel / 10MHz / QPSK

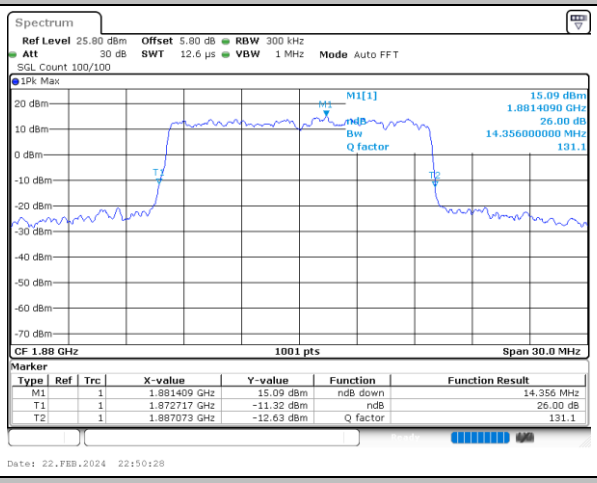


Middle Channel / 10MHz / 16QAM

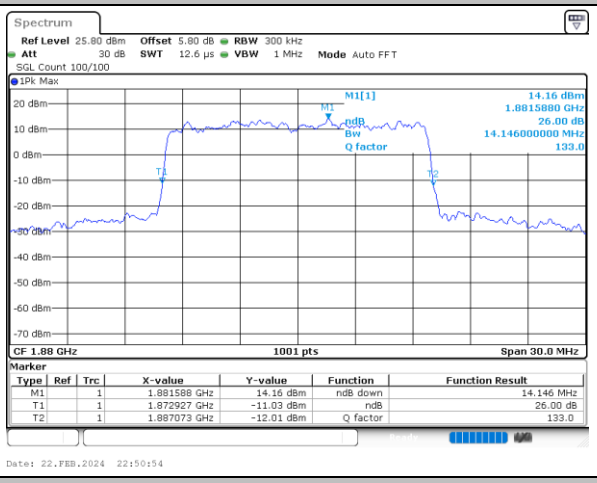


LTE Band 2

Middle Channel / 15MHz / QPSK

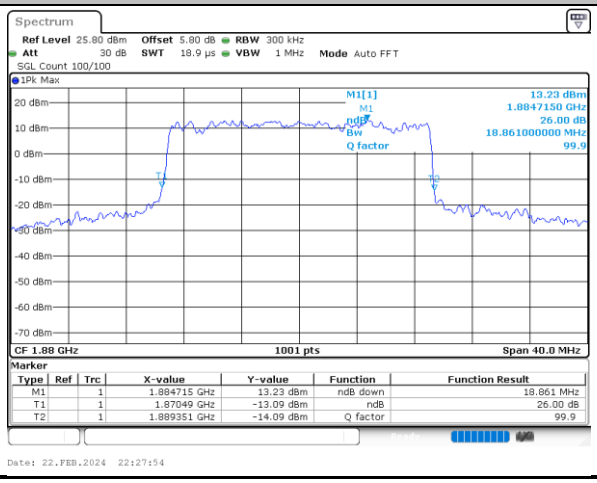


Middle Channel /15MHz / 16QAM

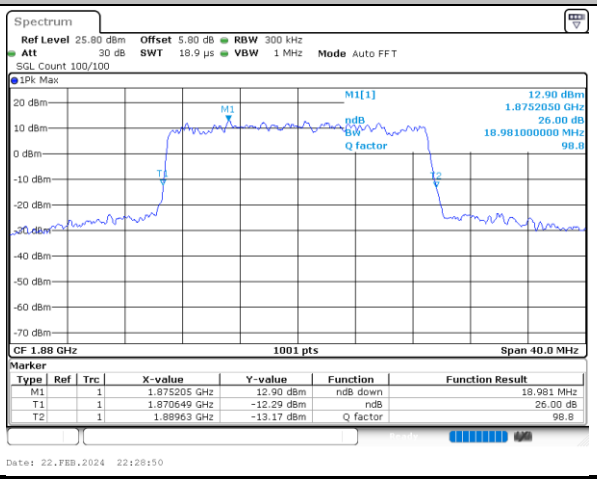


LTE Band 2

Middle Channel / 20MHz / QPSK

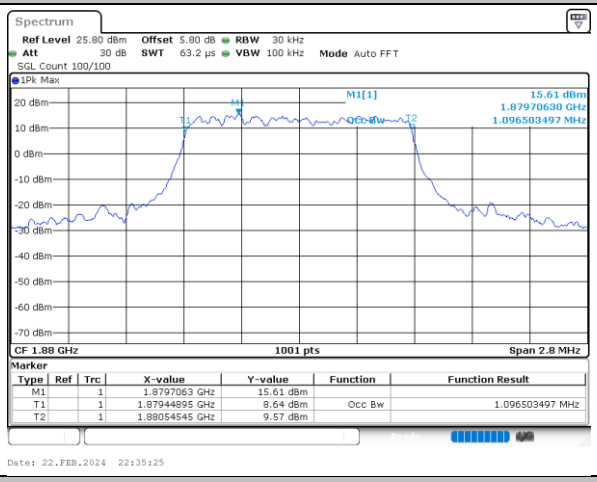
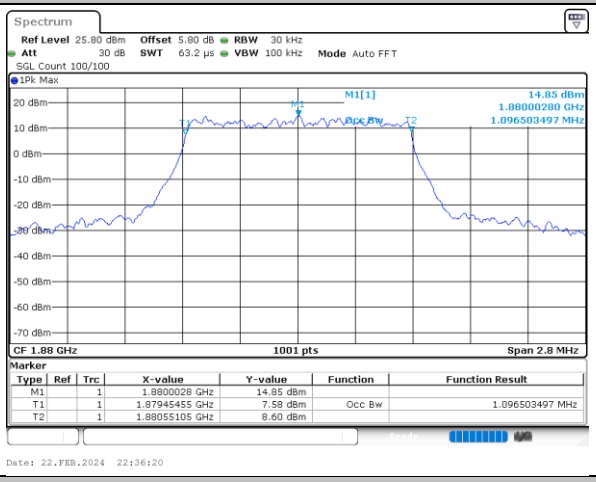
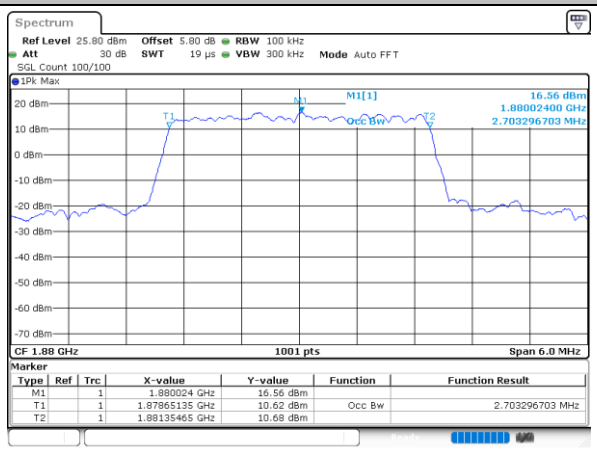
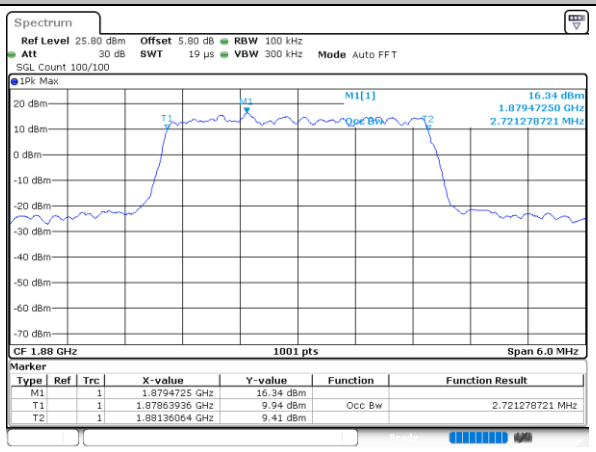
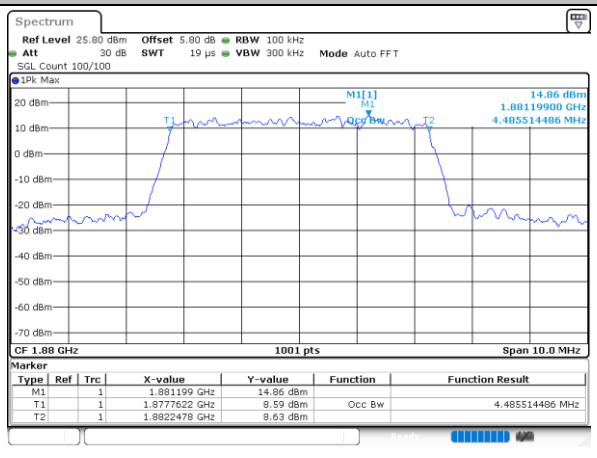
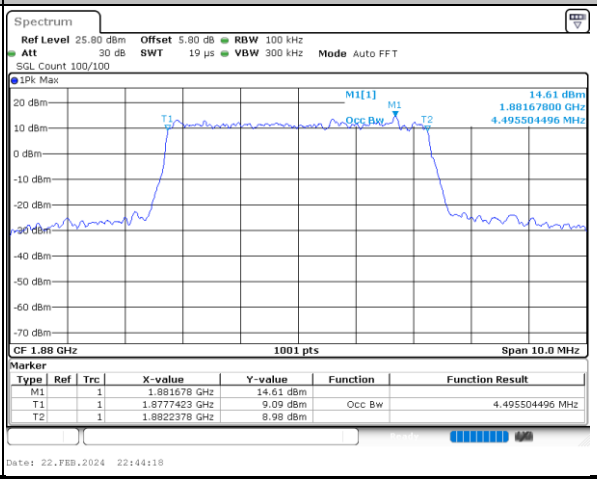


Middle Channel / 20MHz / 16QAM



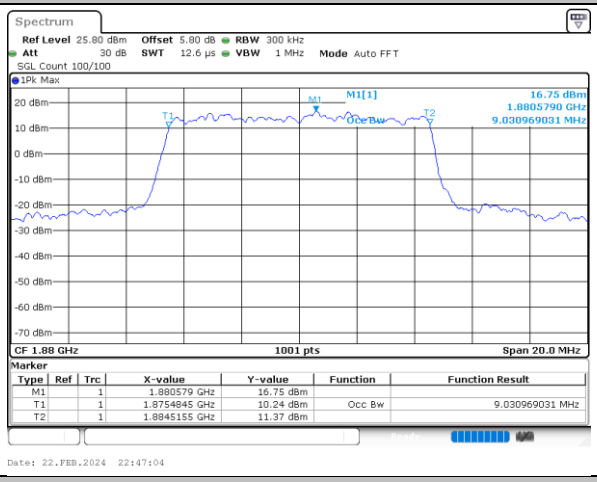
Occupied Bandwidth

Mode	LTE Band 2 : 99%OBW(MHz)	
BW	1.4MHz	
Mod.	QPSK	16QAM
Middle CH	1.10	1.10
Mode	LTE Band 2 : 99%OBW(MHz)	
BW	3MHz	
Mod.	QPSK	16QAM
Middle CH	2.70	2.72
Mode	LTE Band 2 : 99%OBW(MHz)	
BW	5MHz	
Mod.	QPSK	16QAM
Middle CH	4.49	4.50
Mode	LTE Band 2 : 99%OBW(MHz)	
BW	10MHz	
Mod.	QPSK	16QAM
Middle CH	9.03	8.95
Mode	LTE Band 2 : 99%OBW(MHz)	
BW	15MHz	
Mod.	QPSK	16QAM
Middle CH	13.43	13.46
Mode	LTE Band 2 : 99%OBW(MHz)	
BW	20MHz	
Mod.	QPSK	16QAM
Middle CH	17.86	17.82

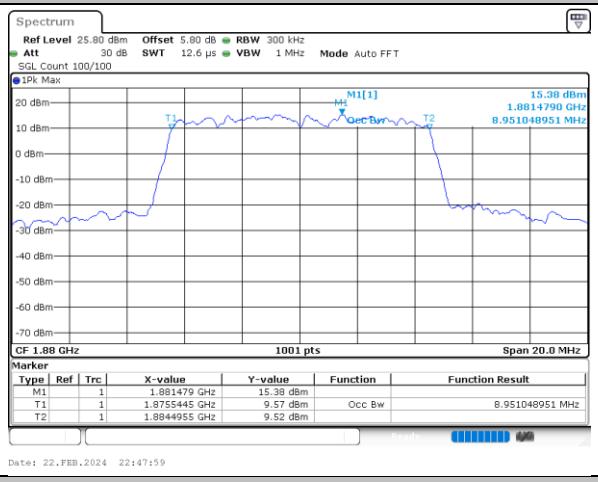
LTE Band 2	
Middle Channel / 1.4MHz / QPSK	**Middle Channel / 1.4MHz / 16QAM**
	
LTE Band 2	
Middle Channel / 3MHz / QPSK	**Middle Channel / 3MHz / 16QAM**
	
LTE Band 2	
Middle Channel / 5MHz / QPSK	**Middle Channel / 5MHz / 16QAM**
	

LTE Band 2

Middle Channel / 10MHz / QPSK

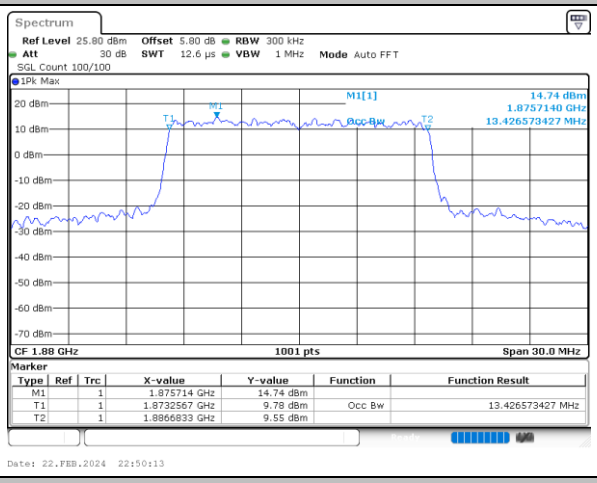


Middle Channel / 10MHz / 16QAM

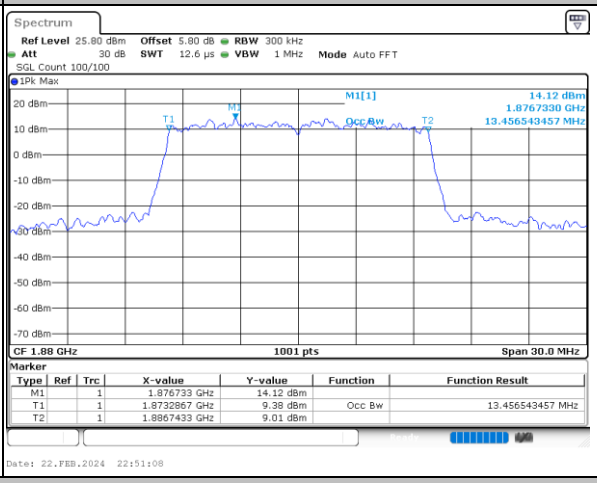


LTE Band 2

Middle Channel / 15MHz / QPSK

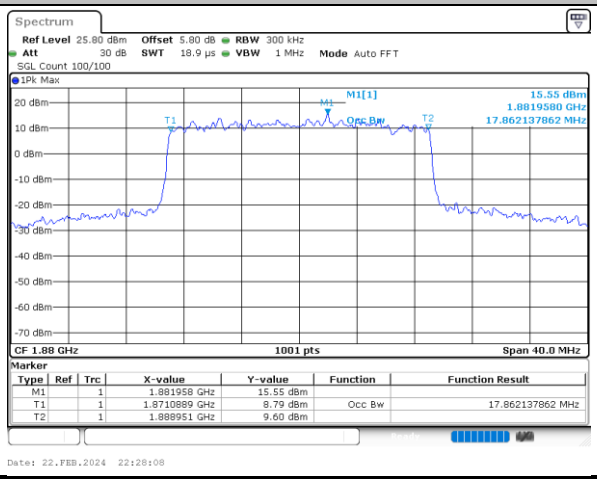


Middle Channel /15MHz / 16QAM

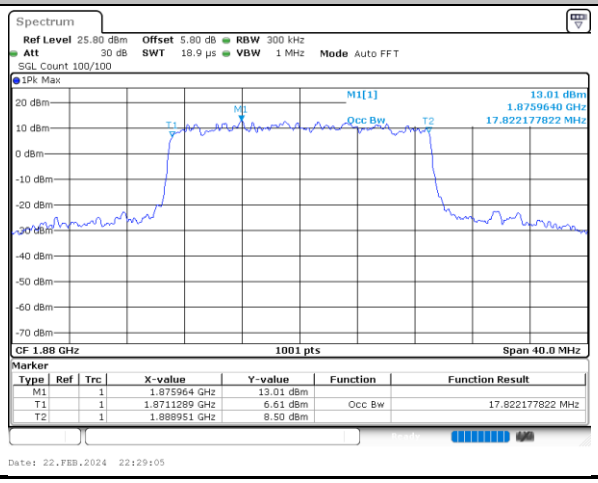


LTE Band 2

Middle Channel / 20MHz / QPSK



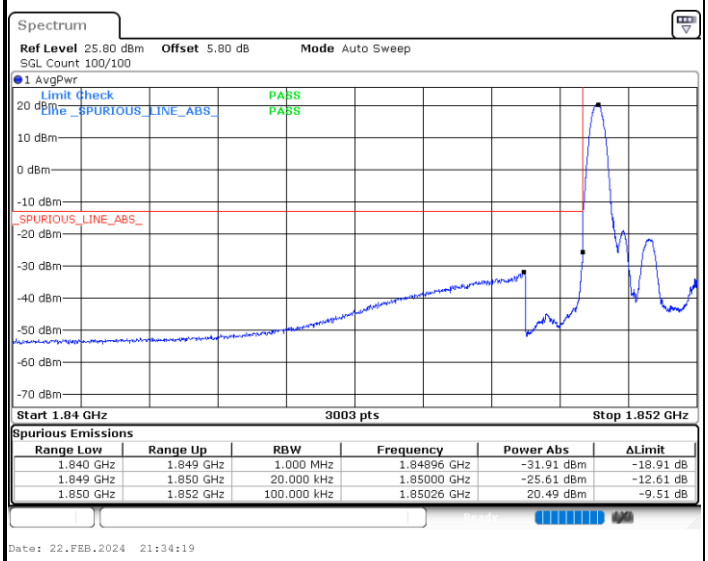
Middle Channel / 20MHz / 16QAM



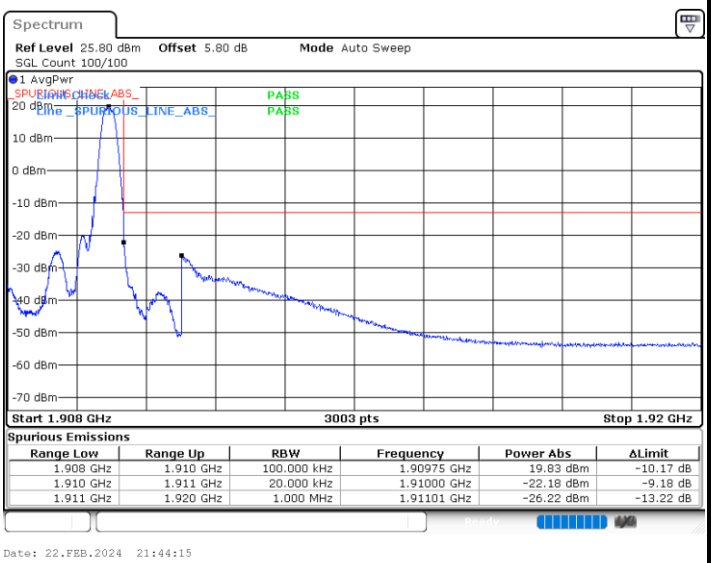
Conducted Band Edge

LTE Band 2 / 1.4MHz / QPSK

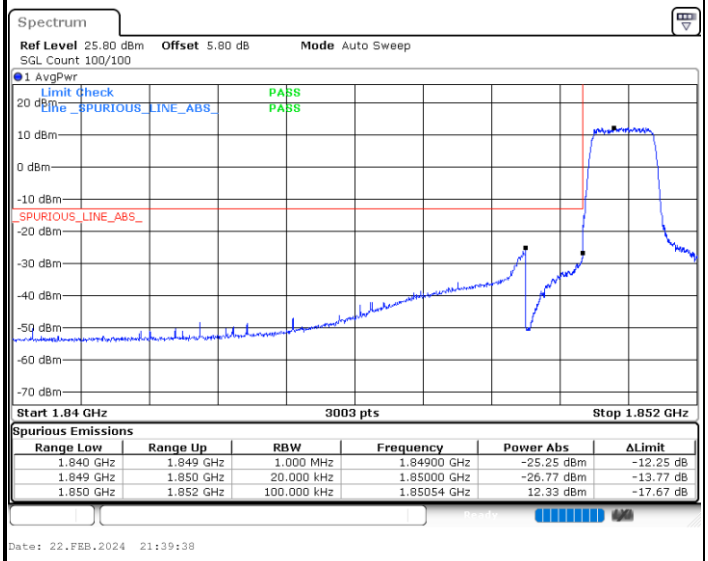
Lowest Band Edge / 1RB



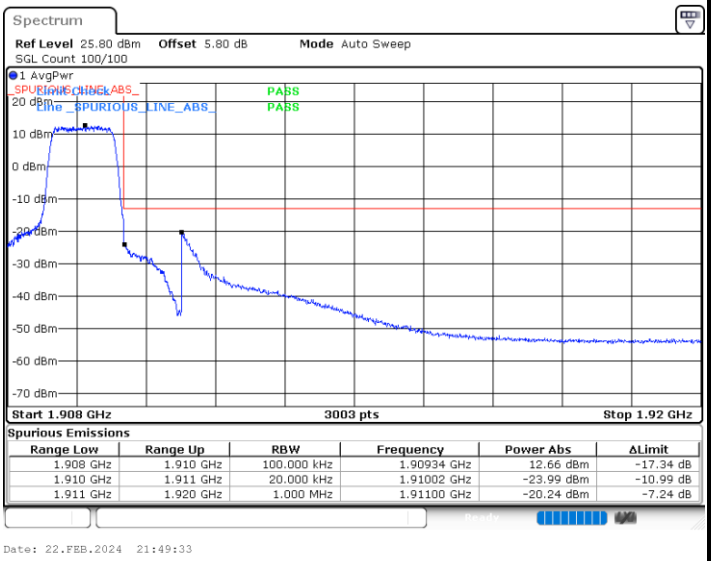
Highest Band Edge / 1RB

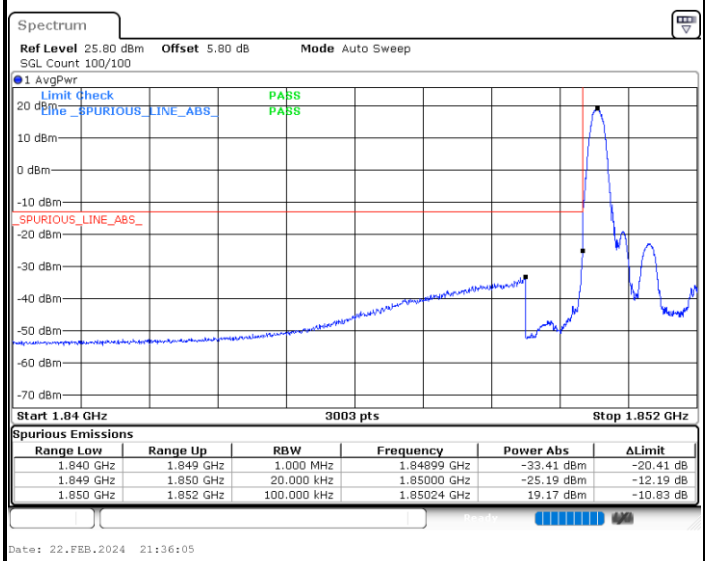
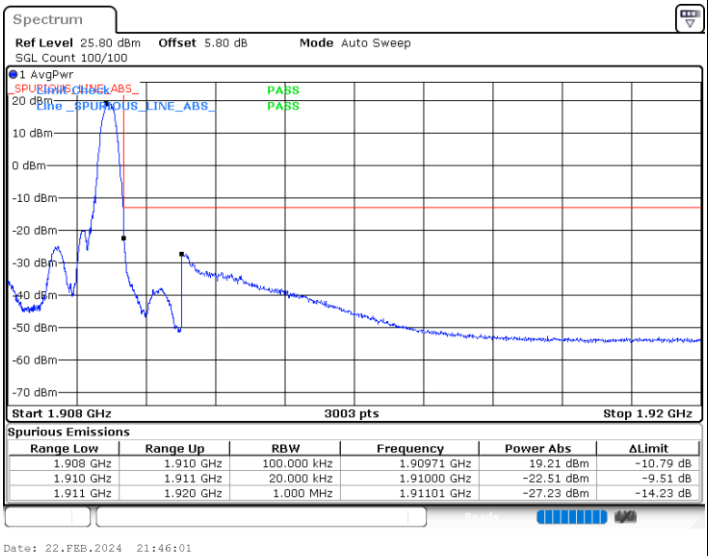
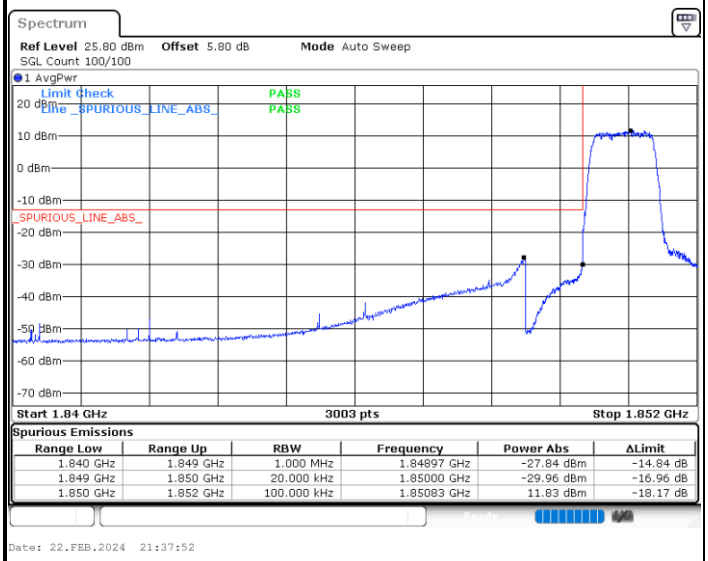
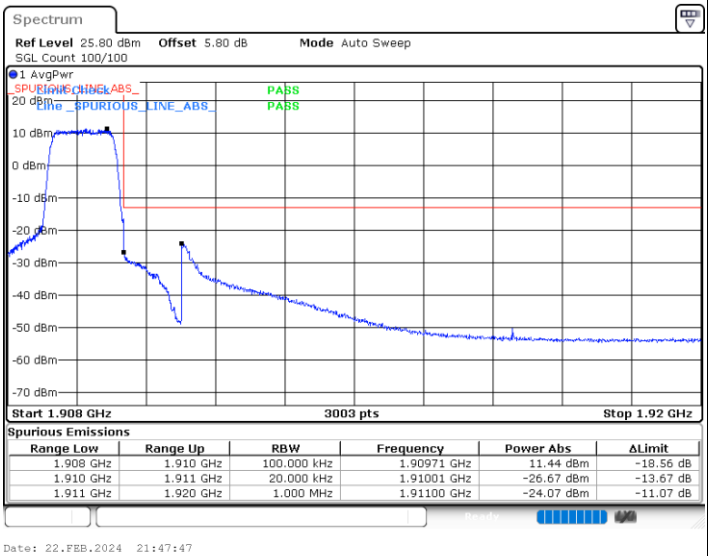


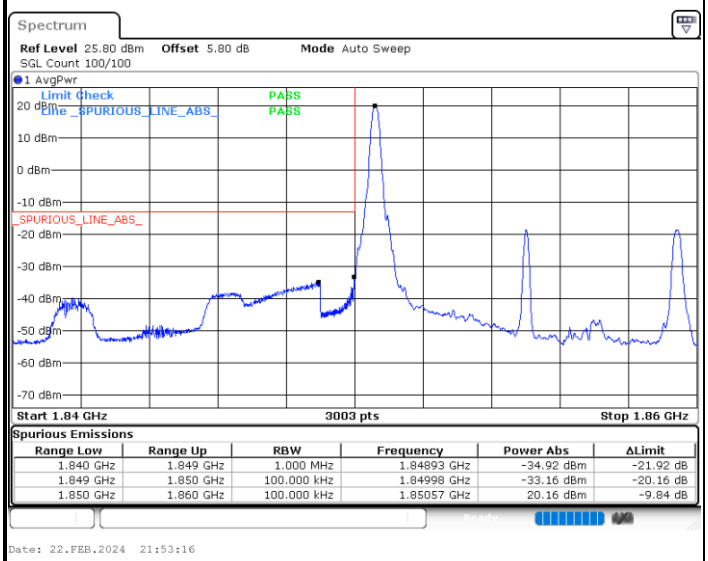
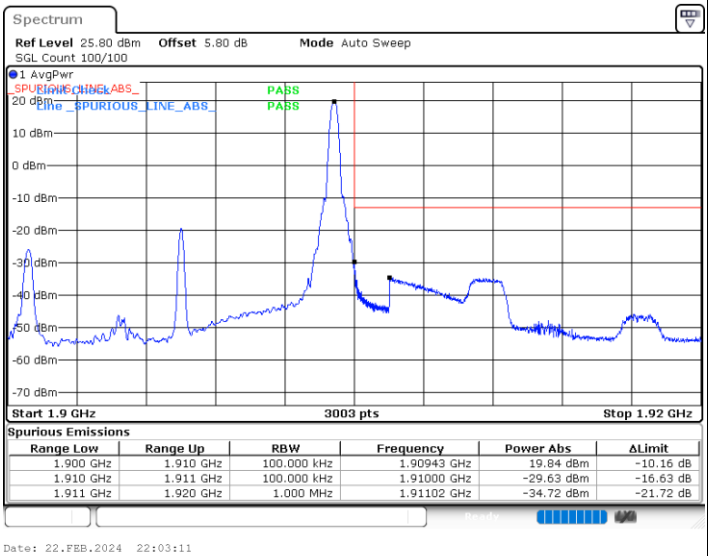
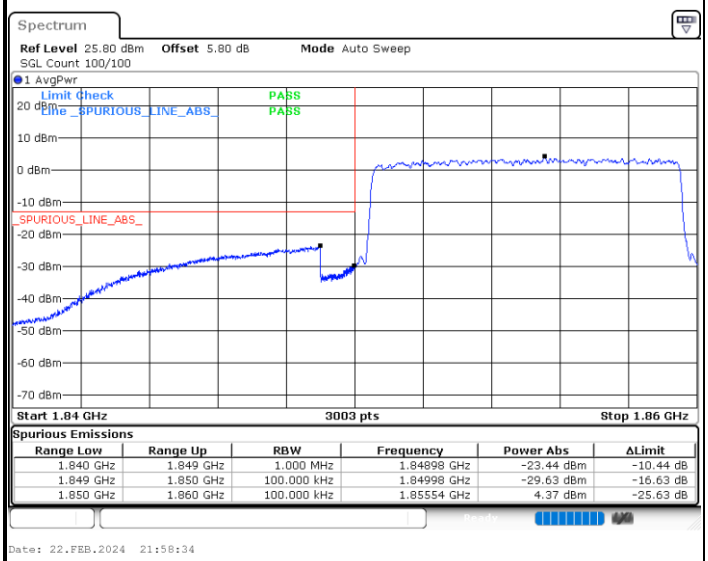
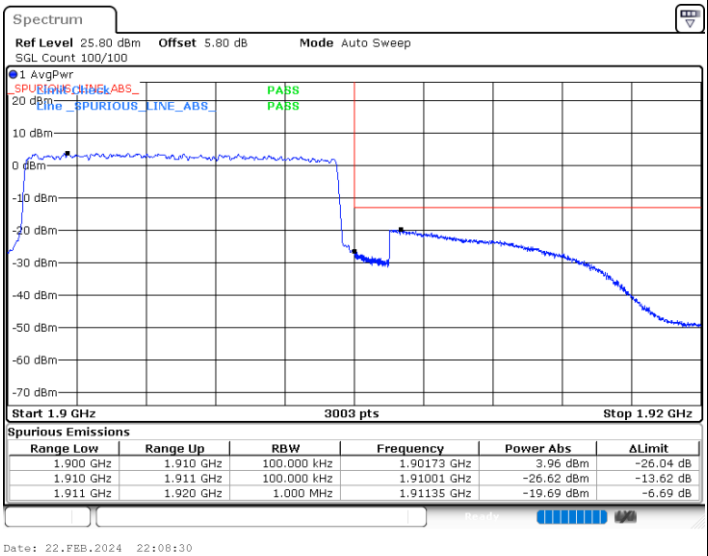
Lowest Band Edge / Full RB



Highest Band Edge / Full RB

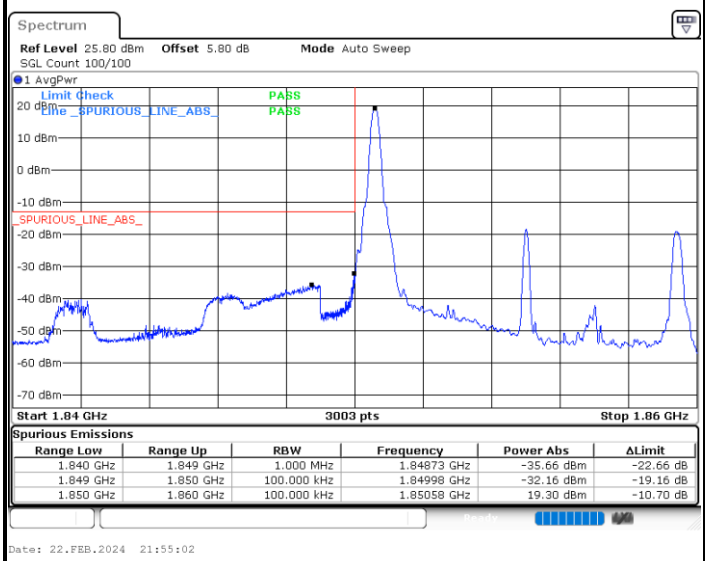


LTE Band 2 / 1.4MHz / 16QAM	
Lowest Band Edge / 1 RB	**Highest Band Edge / 1 RB**
	
Lowest Band Edge / Full RB	**Highest Band Edge / Full RB**
	

LTE Band 2 / 10MHz / QPSK	
Lowest Band Edge / 1 RB	**Highest Band Edge / 1 RB**
	
Lowest Band Edge / Full RB	**Highest Band Edge / Full RB**
	

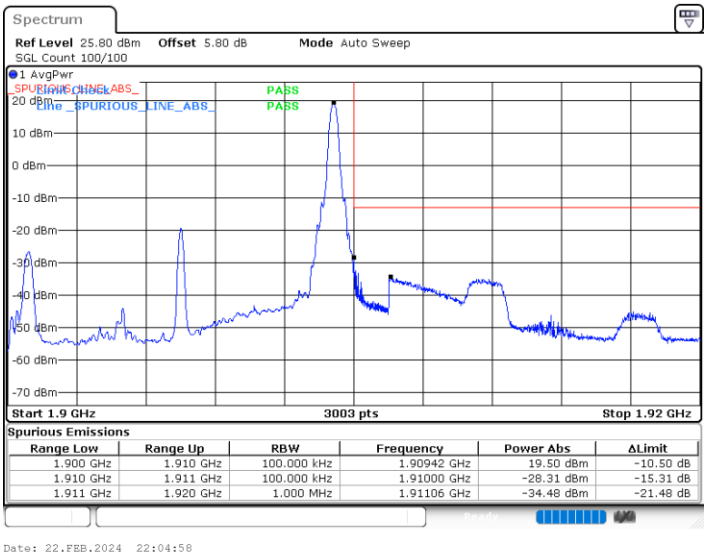
LTE Band 2 / 10MHz / 16QAM

Lowest Band Edge / 1 RB



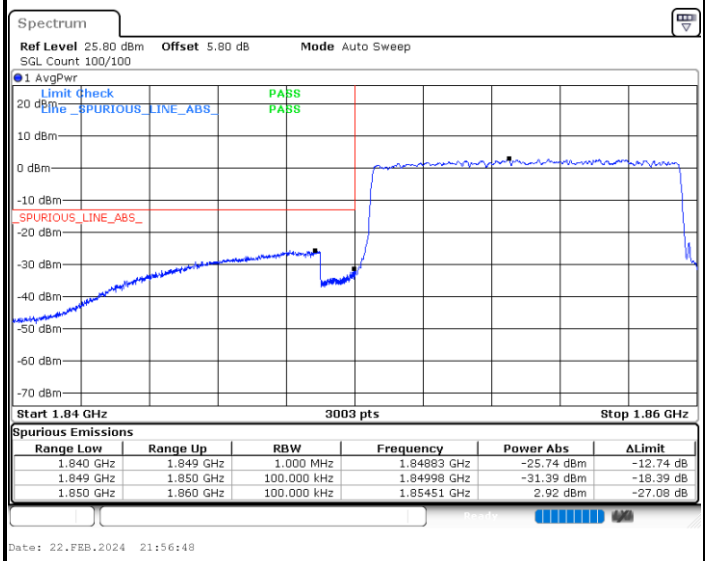
Date: 22.FEB.2024 21:55:02

Highest Band Edge / 1 RB



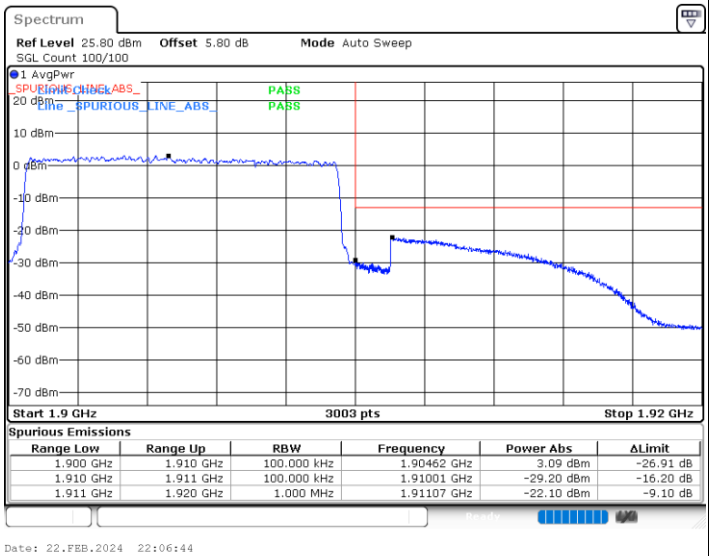
Date: 22.FEB.2024 22:04:58

Lowest Band Edge / Full RB

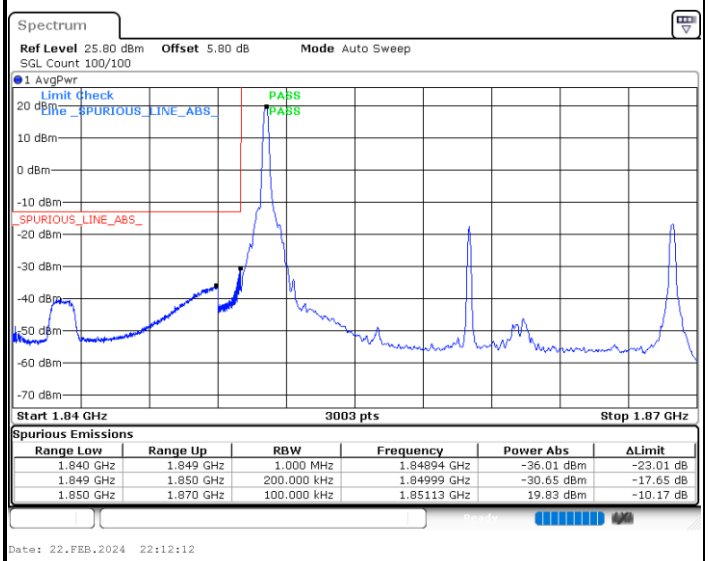
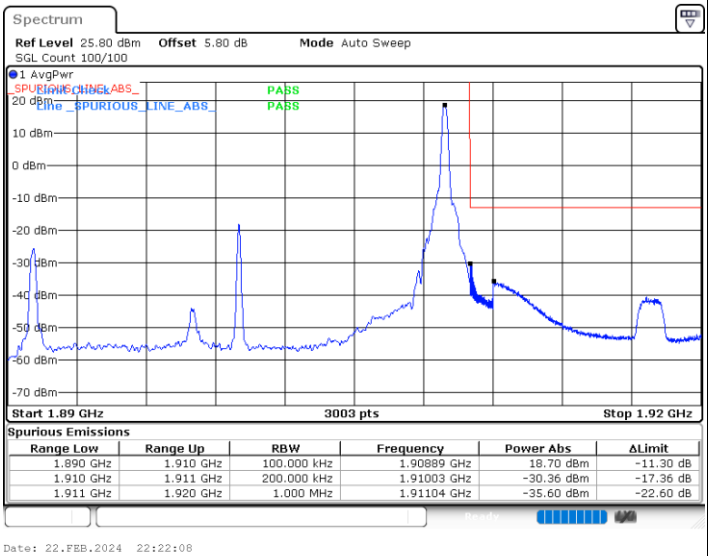
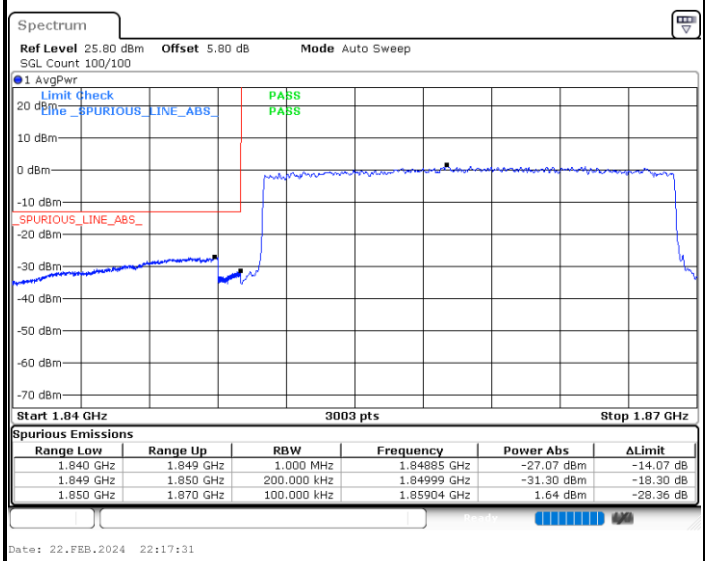
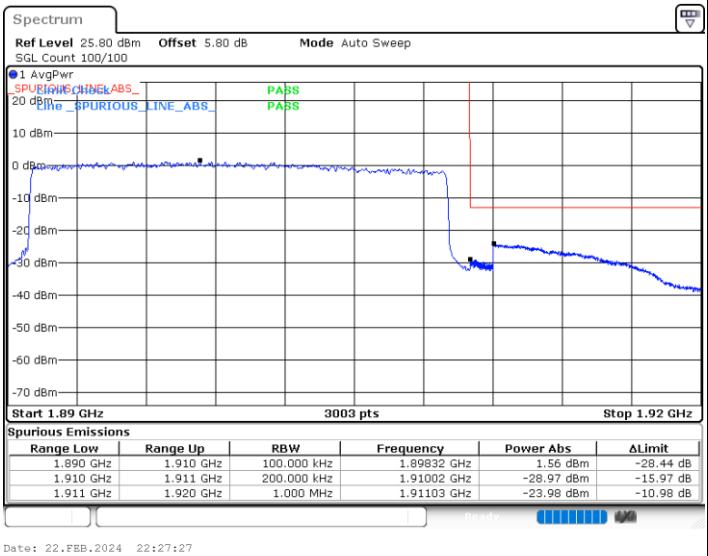


Date: 22.FEB.2024 21:56:48

Highest Band Edge / Full RB

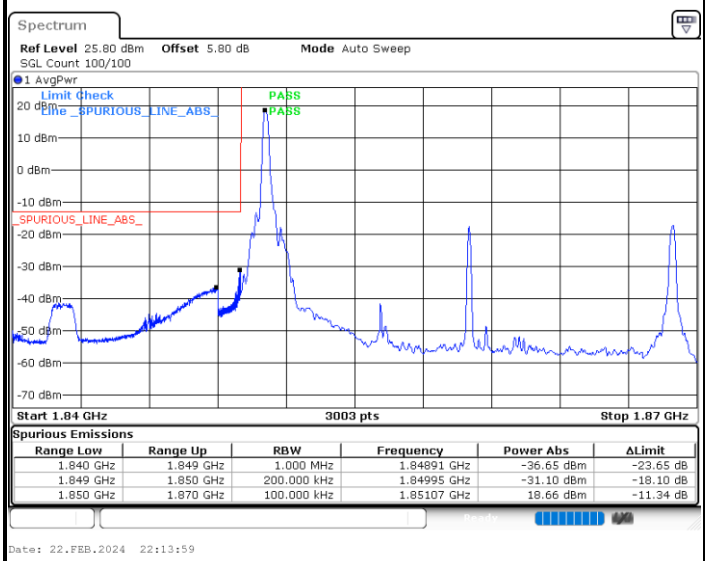


Date: 22.FEB.2024 22:06:44

LTE Band 2 / 20MHz / QPSK	
Lowest Band Edge / 1 RB	**Highest Band Edge / 1 RB**
	
Lowest Band Edge / Full RB	**Highest Band Edge / Full RB**
	

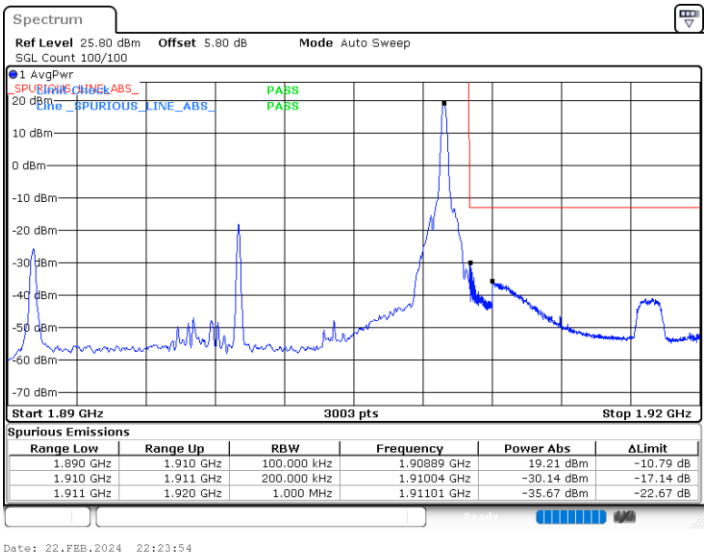
LTE Band 2 / 20MHz / 16QAM

Lowest Band Edge / 1 RB



Date: 22.FEB.2024 22:13:59

Highest Band Edge / 1 RB



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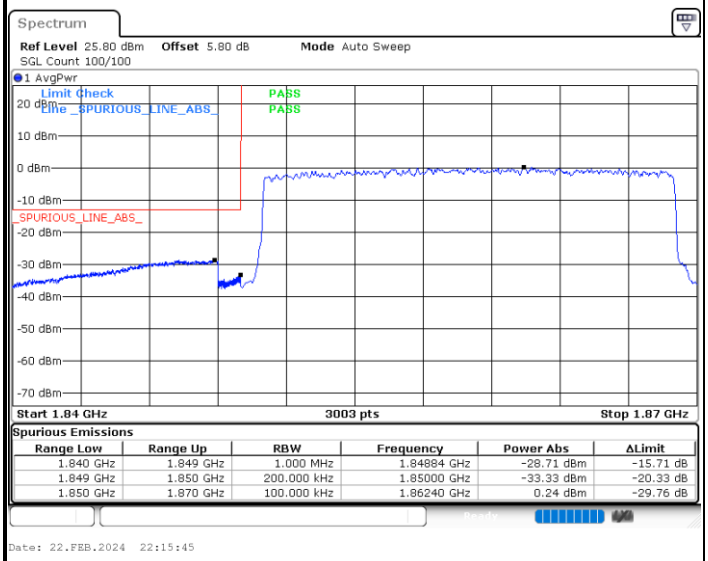
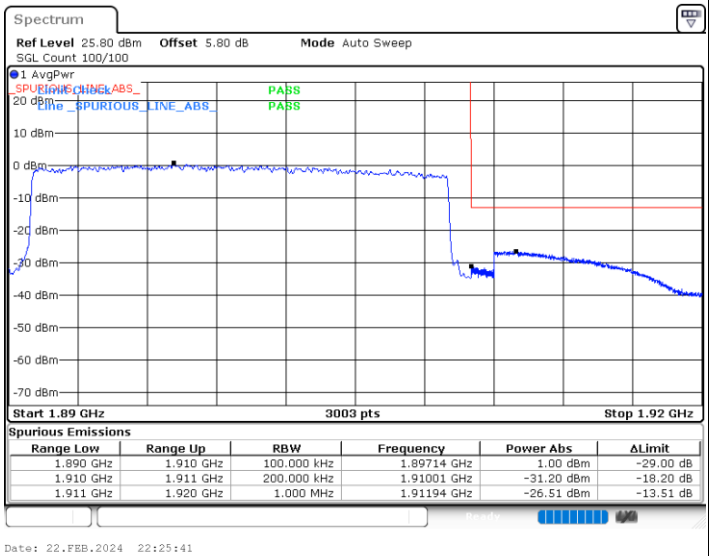
Lowest Band Edge / Full RB



Date: 22.FEB.2024 22:15:45

Highest Band Edge / Full RB

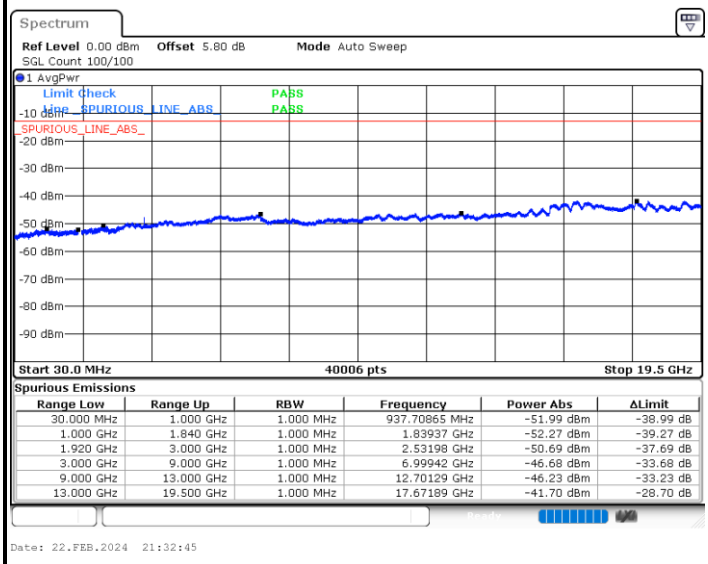


Date: 22.FEB.2024 22:25:41

Conducted Spurious Emission

LTE Band 2 / 1.4MHz

Lowest Channel / QPSK

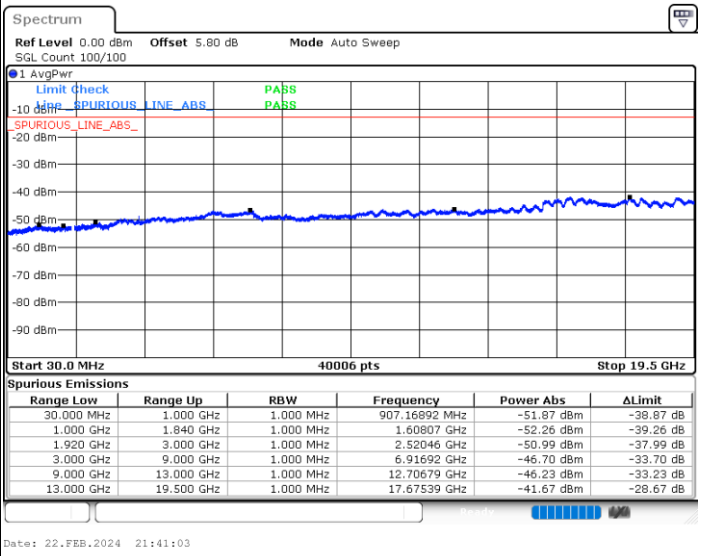


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	937.70865 MHz	-51.99 dBm	-38.99 dB
1.000 GHz	1.840 GHz	1.000 MHz	1.83937 GHz	-52.27 dBm	-39.27 dB
1.920 GHz	3.000 GHz	1.000 MHz	2.53198 GHz	-50.69 dBm	-37.69 dB
3.000 GHz	9.000 GHz	1.000 MHz	6.99942 GHz	-46.68 dBm	-33.68 dB
9.000 GHz	13.000 GHz	1.000 MHz	12.70129 GHz	-46.23 dBm	-33.23 dB
13.000 GHz	19.500 GHz	1.000 MHz	17.67189 GHz	-41.70 dBm	-28.70 dB

Date: 22.FEB.2024 21:32:45

Middle Channel / QPSK

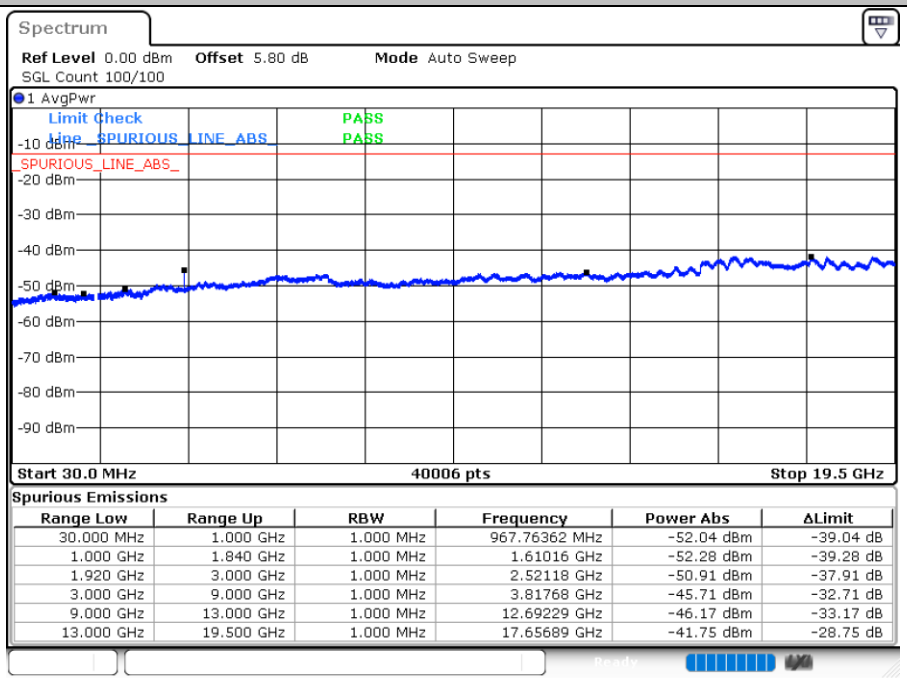


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	907.16892 MHz	-51.87 dBm	-38.87 dB
1.000 GHz	1.840 GHz	1.000 MHz	1.60807 GHz	-52.26 dBm	-39.26 dB
1.920 GHz	3.000 GHz	1.000 MHz	2.52046 GHz	-50.99 dBm	-37.99 dB
3.000 GHz	9.000 GHz	1.000 MHz	6.91692 GHz	-46.70 dBm	-33.70 dB
9.000 GHz	13.000 GHz	1.000 MHz	12.70679 GHz	-46.23 dBm	-33.23 dB
13.000 GHz	19.500 GHz	1.000 MHz	17.67539 GHz	-41.67 dBm	-28.67 dB

Date: 22.FEB.2024 21:41:03

Highest Channel / QPSK



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	967.76362 MHz	-52.04 dBm	-39.04 dB
1.000 GHz	1.840 GHz	1.000 MHz	1.61016 GHz	-52.28 dBm	-39.28 dB
1.920 GHz	3.000 GHz	1.000 MHz	2.52118 GHz	-50.91 dBm	-37.91 dB
3.000 GHz	9.000 GHz	1.000 MHz	3.81768 GHz	-45.71 dBm	-32.71 dB
9.000 GHz	13.000 GHz	1.000 MHz	12.69229 GHz	-46.17 dBm	-33.17 dB
13.000 GHz	19.500 GHz	1.000 MHz	17.65689 GHz	-41.75 dBm	-28.75 dB

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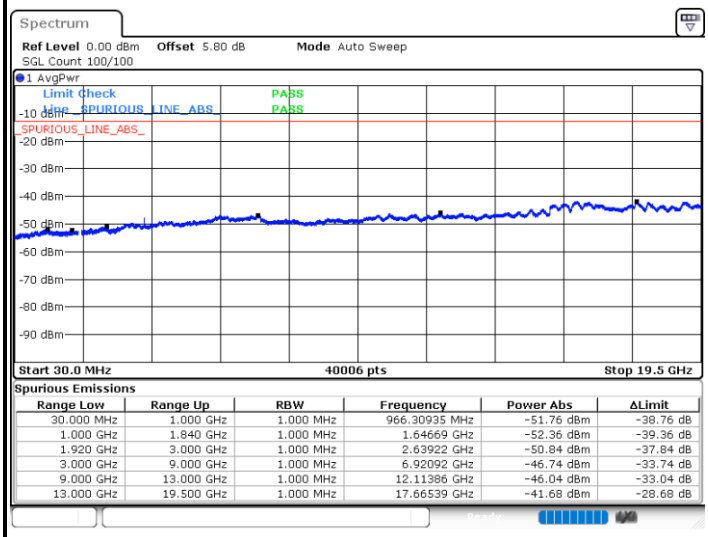
LTE Band 2 / 10MHz

Lowest Channel / QPSK



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	966.30935 MHz	-51.76 dBm	-38.76 dB
1.000 GHz	1.840 GHz	1.000 MHz	1.64669 GHz	-52.36 dBm	-39.36 dB
1.920 GHz	3.000 GHz	1.000 MHz	2.63922 GHz	-50.84 dBm	-37.84 dB
3.000 GHz	9.000 GHz	1.000 MHz	6.92092 GHz	-46.74 dBm	-33.74 dB
9.000 GHz	13.000 GHz	1.000 MHz	12.11386 GHz	-46.04 dBm	-33.04 dB
13.000 GHz	19.500 GHz	1.000 MHz	17.66539 GHz	-41.68 dBm	-28.68 dB

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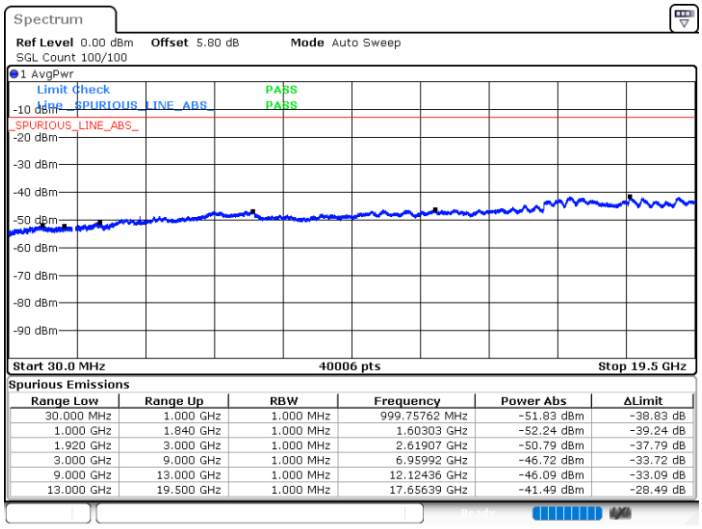
Middle Channel / QPSK



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	999.75762 MHz	-51.83 dBm	-38.83 dB
1.000 GHz	1.840 GHz	1.000 MHz	1.60303 GHz	-52.24 dBm	-39.24 dB
1.920 GHz	3.000 GHz	1.000 MHz	2.61907 GHz	-50.79 dBm	-37.79 dB
3.000 GHz	9.000 GHz	1.000 MHz	6.95992 GHz	-46.72 dBm	-33.72 dB
9.000 GHz	13.000 GHz	1.000 MHz	12.12436 GHz	-46.09 dBm	-33.09 dB
13.000 GHz	19.500 GHz	1.000 MHz	17.65639 GHz	-41.49 dBm	-28.49 dB

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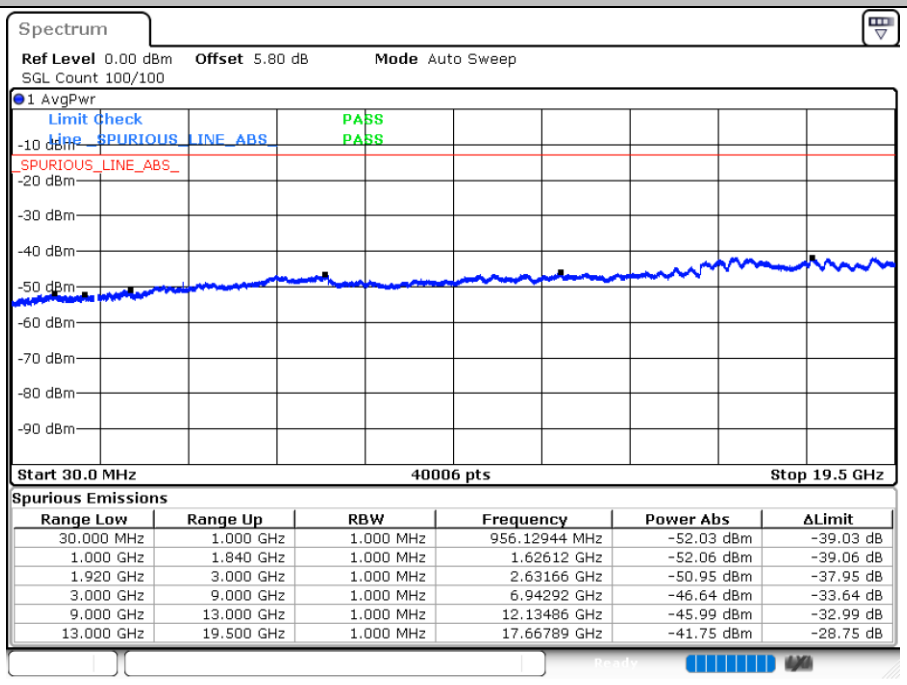
Highest Channel / QPSK



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	956.12944 MHz	-52.03 dBm	-39.03 dB
1.000 GHz	1.840 GHz	1.000 MHz	1.62612 GHz	-52.06 dBm	-39.06 dB
1.920 GHz	3.000 GHz	1.000 MHz	2.63166 GHz	-50.95 dBm	-37.95 dB
3.000 GHz	9.000 GHz	1.000 MHz	6.94292 GHz	-46.64 dBm	-33.64 dB
9.000 GHz	13.000 GHz	1.000 MHz	12.13486 GHz	-45.99 dBm	-32.99 dB
13.000 GHz	19.500 GHz	1.000 MHz	17.66789 GHz	-41.75 dBm	-28.75 dB

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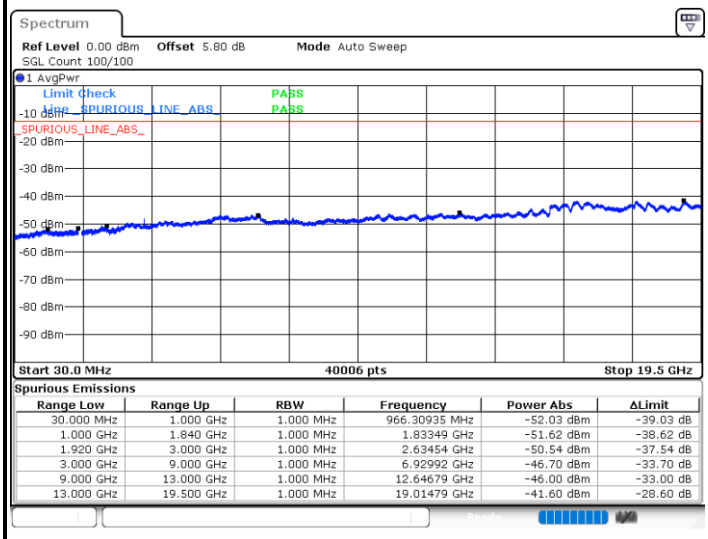
LTE Band 2 / 20MHz

Lowest Channel / QPSK



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	966.30935 MHz	-52.03 dBm	-39.03 dB
1.000 GHz	1.840 GHz	1.000 MHz	1.83349 GHz	-51.62 dBm	-38.62 dB
1.920 GHz	3.000 GHz	1.000 MHz	2.63454 GHz	-50.54 dBm	-37.54 dB
3.000 GHz	9.000 GHz	1.000 MHz	6.92992 GHz	-46.70 dBm	-33.70 dB
9.000 GHz	13.000 GHz	1.000 MHz	12.64679 GHz	-46.00 dBm	-33.00 dB
13.000 GHz	19.500 GHz	1.000 MHz	19.01479 GHz	-41.60 dBm	-28.60 dB

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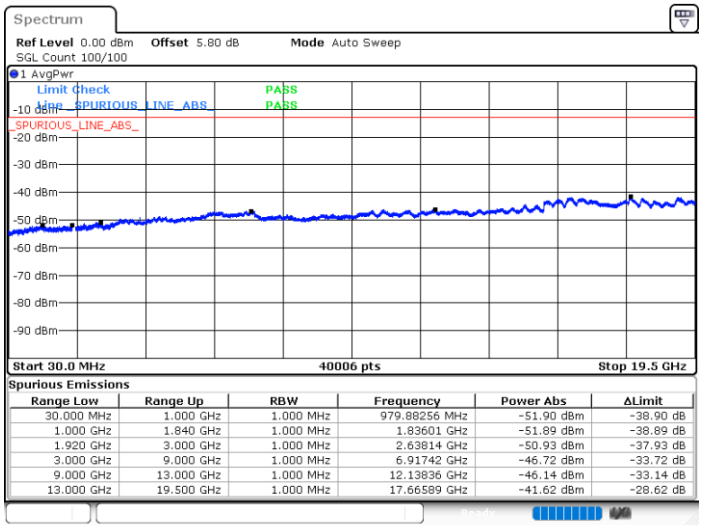
Middle Channel / QPSK



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	979.88256 MHz	-51.90 dBm	-38.90 dB
1.000 GHz	1.840 GHz	1.000 MHz	1.83601 GHz	-51.89 dBm	-38.89 dB
1.920 GHz	3.000 GHz	1.000 MHz	2.63814 GHz	-50.93 dBm	-37.93 dB
3.000 GHz	9.000 GHz	1.000 MHz	6.91742 GHz	-46.72 dBm	-33.72 dB
9.000 GHz	13.000 GHz	1.000 MHz	12.13836 GHz	-46.14 dBm	-33.14 dB
13.000 GHz	19.500 GHz	1.000 MHz	17.66589 GHz	-41.62 dBm	-28.62 dB

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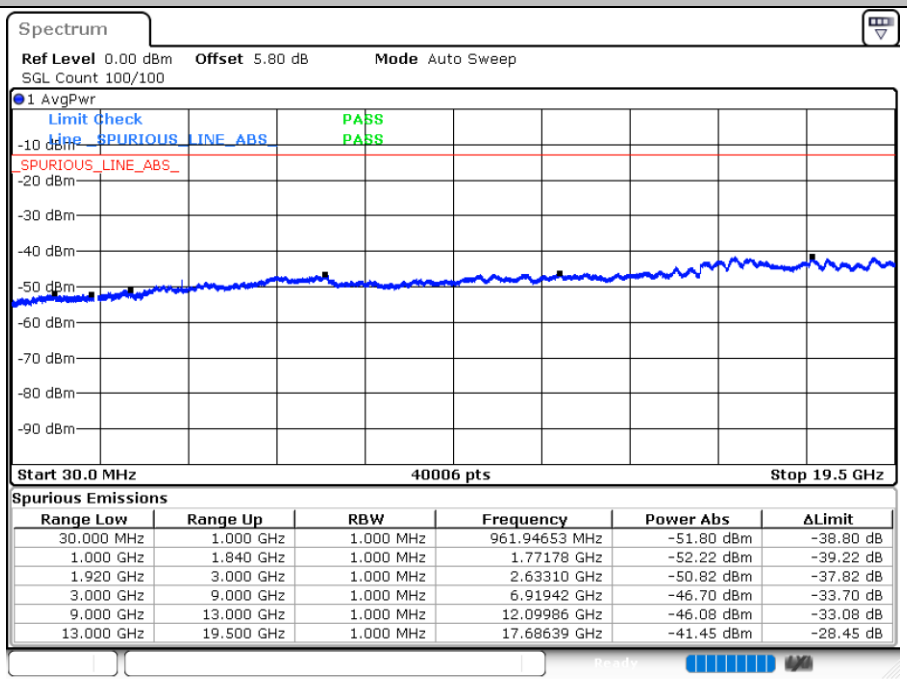
Highest Channel / QPSK



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	961.94653 MHz	-51.80 dBm	-38.80 dB
1.000 GHz	1.840 GHz	1.000 MHz	1.77178 GHz	-52.22 dBm	-39.22 dB
1.920 GHz	3.000 GHz	1.000 MHz	2.63310 GHz	-50.82 dBm	-37.82 dB
3.000 GHz	9.000 GHz	1.000 MHz	6.91942 GHz	-46.70 dBm	-33.70 dB
9.000 GHz	13.000 GHz	1.000 MHz	12.09986 GHz	-46.08 dBm	-33.08 dB
13.000 GHz	19.500 GHz	1.000 MHz	17.68639 GHz	-41.45 dBm	-28.45 dB

Date: 22.FEB.2024 22:20:22

Frequency Stability

Test Conditions		LTE Band 2 (QPSK) / Middle Channel	Limit
Temperature (°C)	Voltage (Volt)	BW 10MHz	Note 2.
		Deviation (ppm)	Result
50	Normal Voltage	0.0022	PASS
40	Normal Voltage	0.0027	
30	Normal Voltage	0.0045	
20(Ref.)	Normal Voltage	0.0000	
10	Normal Voltage	0.0013	
0	Normal Voltage	0.0029	
-10	Normal Voltage	0.0035	
-20	Normal Voltage	0.0031	
-30	Normal Voltage	0.0017	
20	Maximum Voltage	0.0022	
20	Normal Voltage	0.0014	
20	Minimum Voltage	0.0034	

Note:

1. Normal Voltage = 3.8 V. ; Minimum Voltage =3.4 V. ; Maximum Voltage = 4.35 V.

2. The frequency fundamental emissions stay within the authorized frequency block.

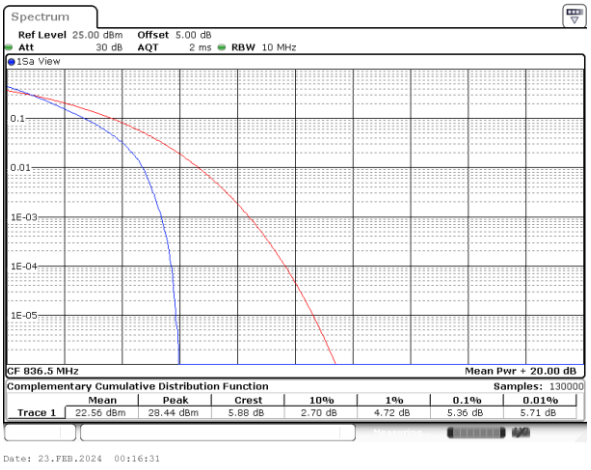
LTE Band 5

Peak-to-Average Ratio

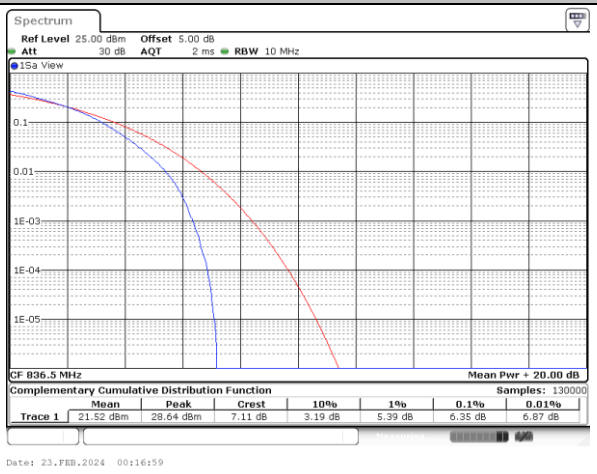
Mode	LTE Band 5 / 10MHz		
Mod.	QPSK	16QAM	Limit: 13dB
RB Size	Full RB	Full RB	Result
Middle CH	5.36	6.35	PASS

LTE Band 5 / 10MHz

Middle Channel / Full RB/ QPSK



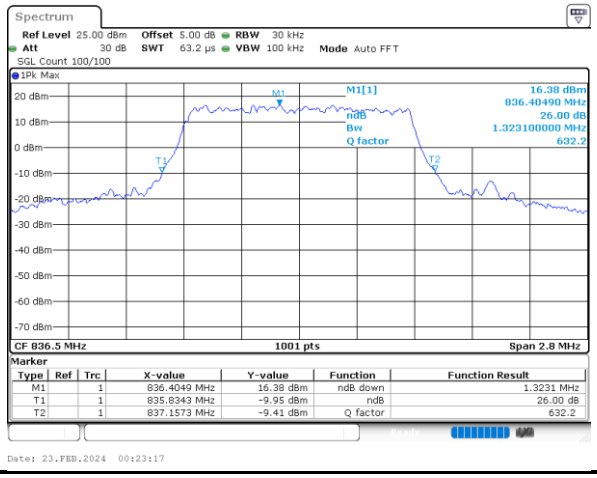
Middle Channel / Full RB/ 16QAM

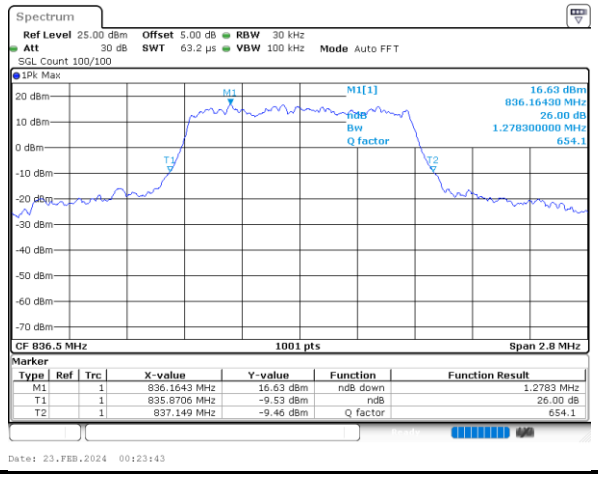


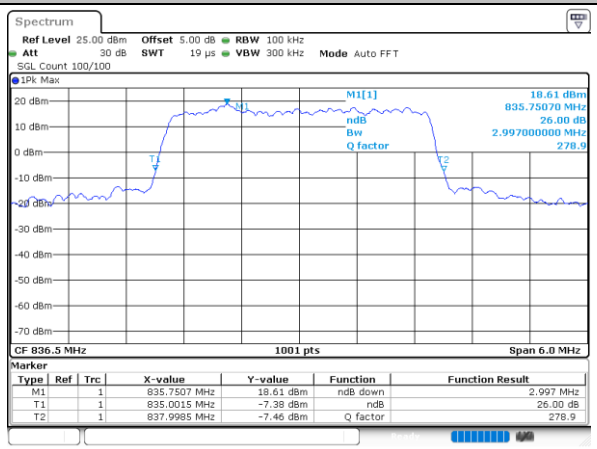
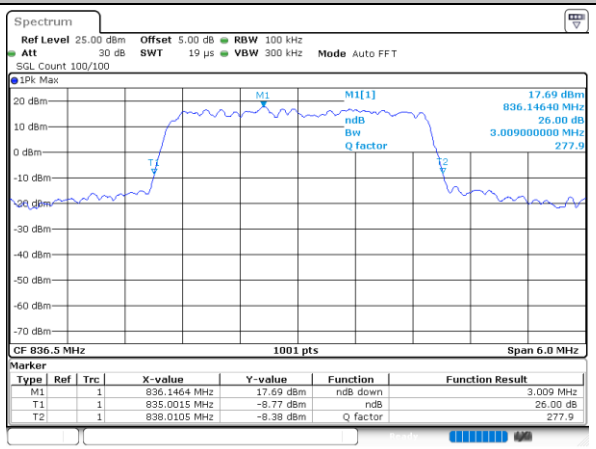
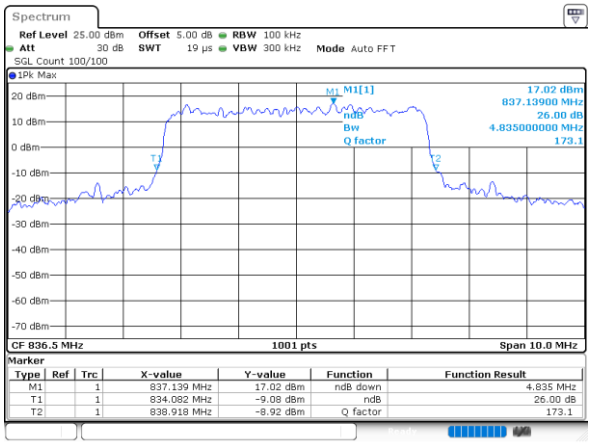
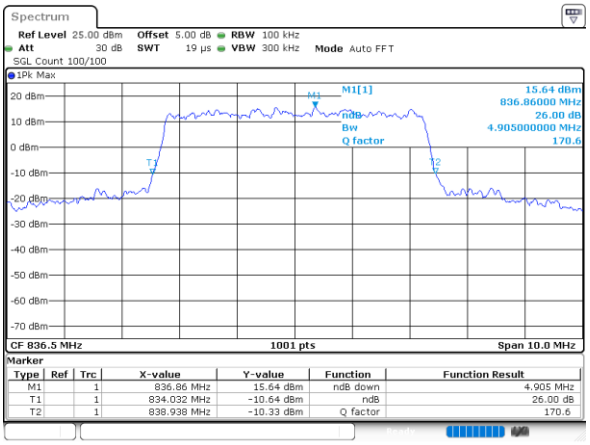
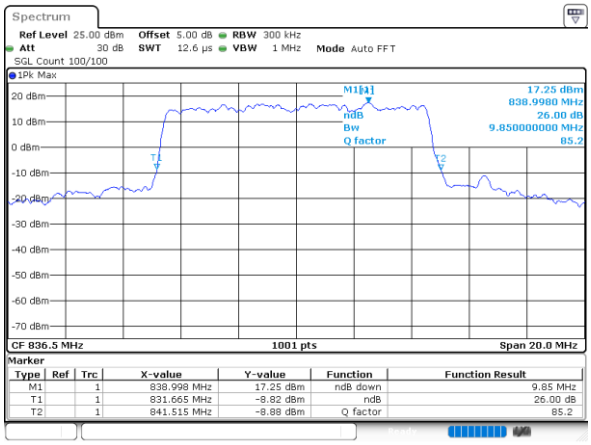
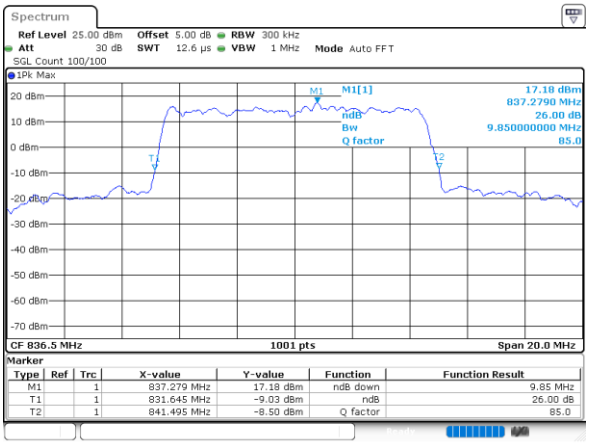
26dB Bandwidth

Mode	LTE Band 5 : 26dB BW(MHz)	
BW	1.4MHz	
Mod.	QPSK	16QAM
Middle CH	1.32	1.28
BW	3MHz	
Mod.	QPSK	16QAM
Middle CH	3.00	3.01
BW	5MHz	
Mod.	QPSK	16QAM
Middle CH	4.84	4.91
BW	10MHz	
Mod.	QPSK	16QAM
Middle CH	9.85	9.85

LTE Band 5	
Middle Channel / 1.4MHz / QPSK	Middle Channel / 1.4MHz / 16QAM



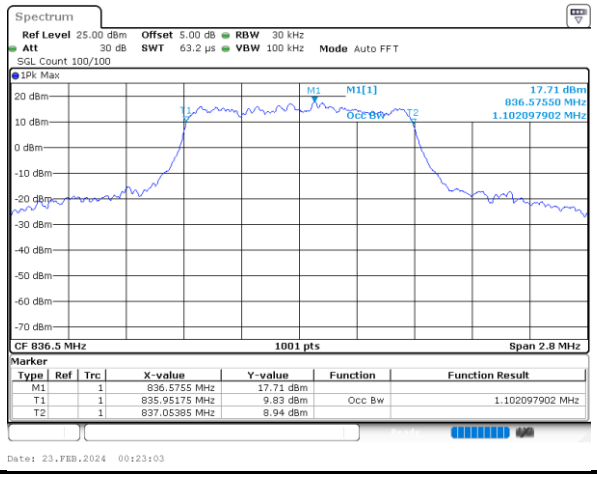


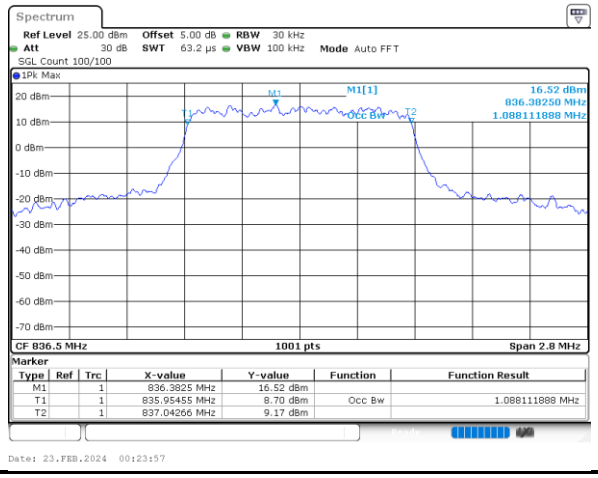
Middle Channel / 3MHz / QPSK	Middle Channel /3MHz / 16QAM
	
Middle Channel / 5MHz / QPSK	**Middle Channel / 5MHz / 16QAM**
	
Middle Channel / 10MHz / QPSK	**Middle Channel / 10MHz / 16QAM**
	

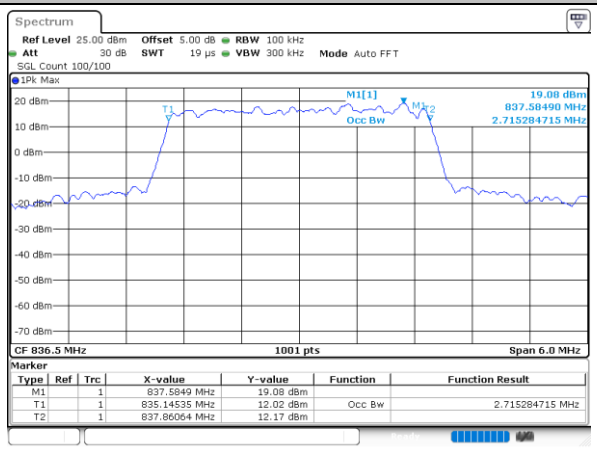
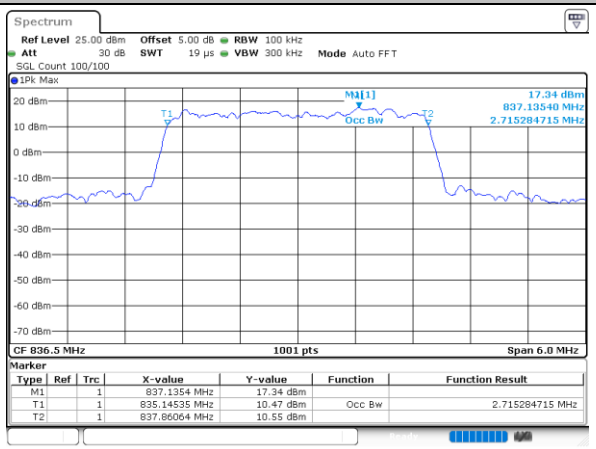
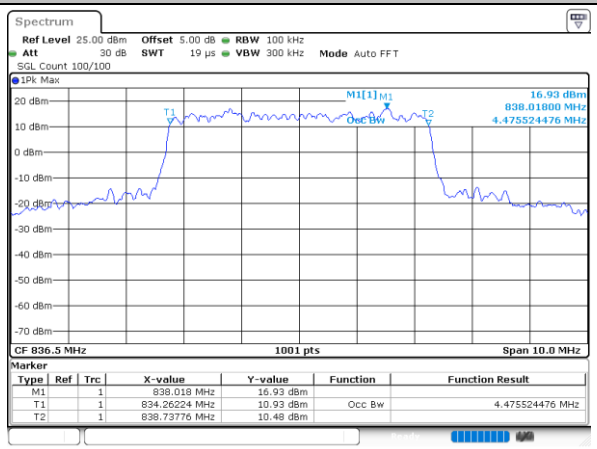
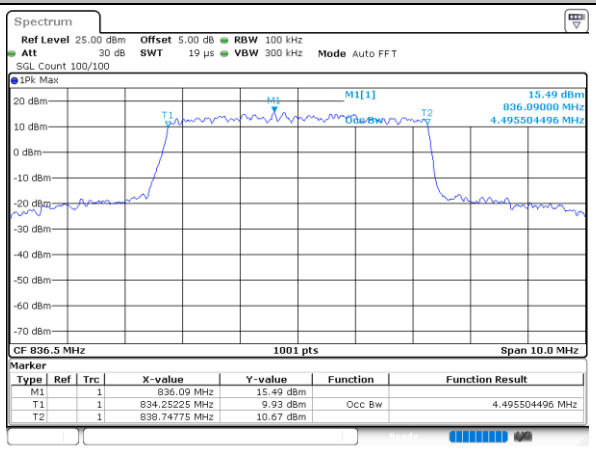
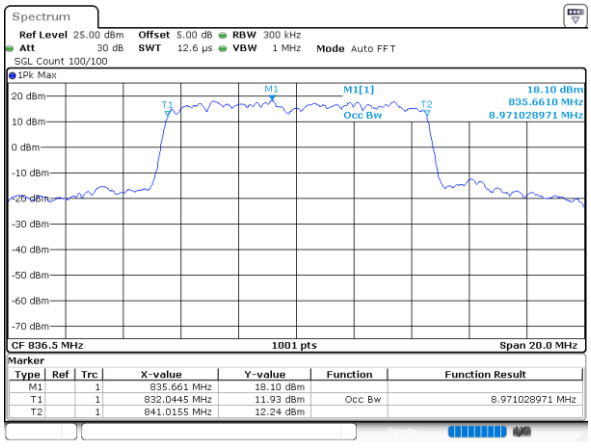
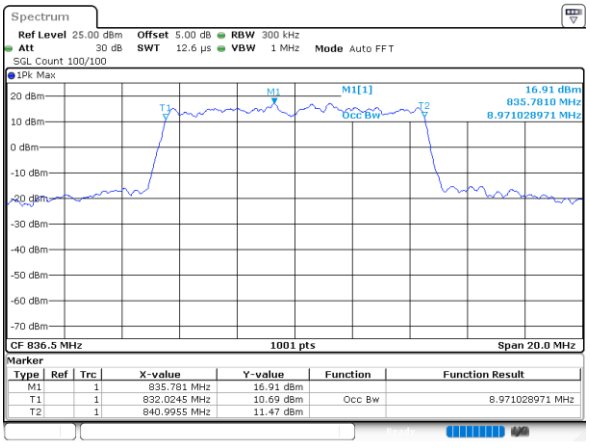
Occupied Bandwidth

Mode	LTE Band 5 : 99%OBW(MHz)	
BW	1.4MHz	
Mod.	QPSK	16QAM
Middle CH	1.10	1.09
BW	3MHz	
Mod.	QPSK	16QAM
Middle CH	2.72	2.72
BW	5MHz	
Mod.	QPSK	16QAM
Middle CH	4.48	4.50
BW	10MHz	
Mod.	QPSK	16QAM
Middle CH	8.97	8.97

LTE Band 5	
Middle Channel / 1.4MHz / QPSK	Middle Channel / 1.4MHz / 16QAM



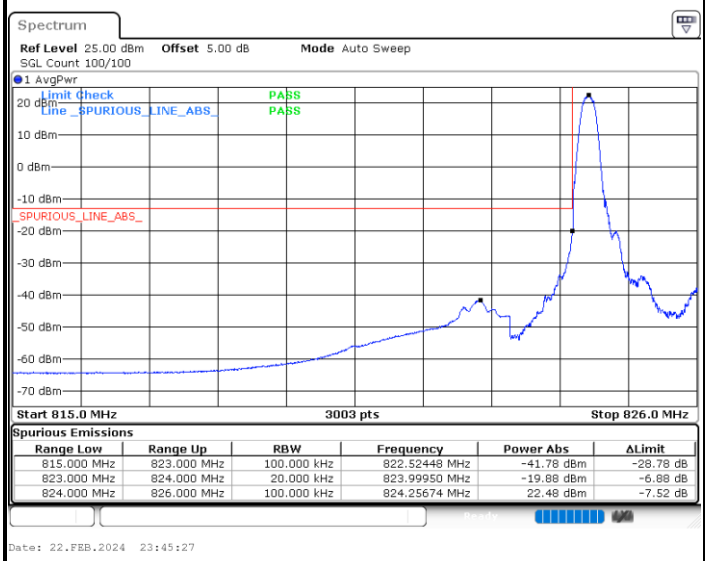


Middle Channel / 3MHz / QPSK	Middle Channel / 3MHz / 16QAM
	
Middle Channel / 5MHz / QPSK	Middle Channel / 5MHz / 16QAM
	
Middle Channel / 10MHz / QPSK	Middle Channel / 10MHz / 16QAM
	

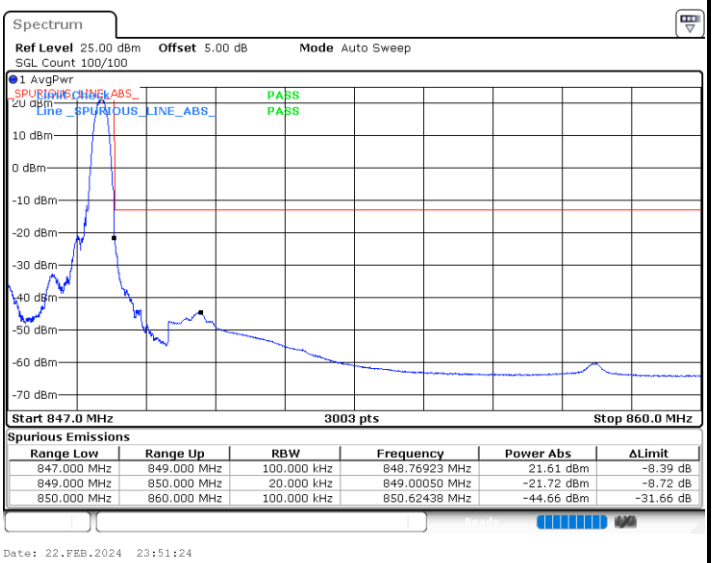
Conducted Band Edge

LTE Band 5 / 1.4MHz / QPSK

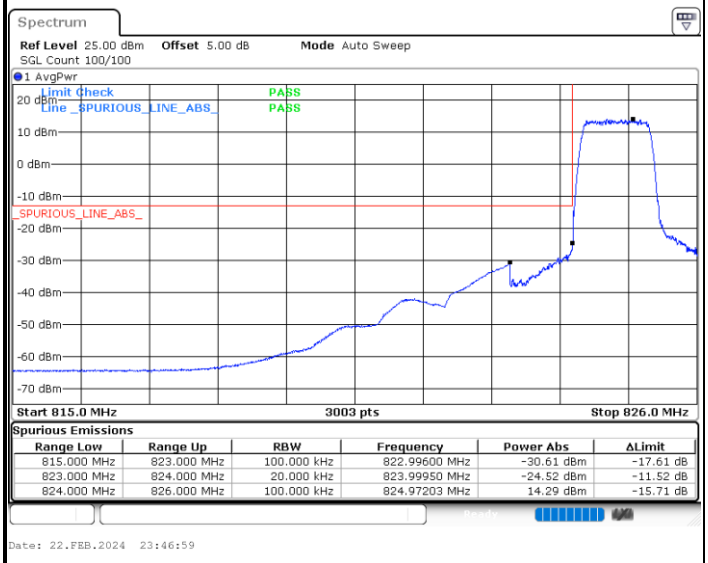
Lowest Band Edge / 1RB



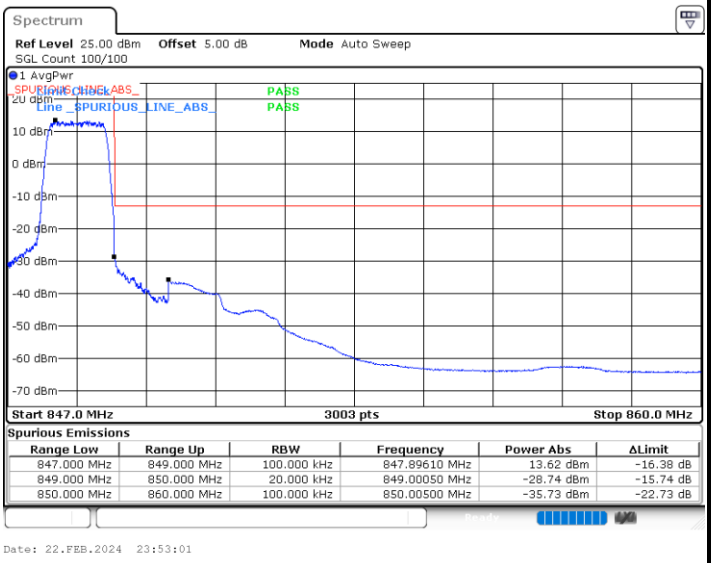
Highest Band Edge / 1RB

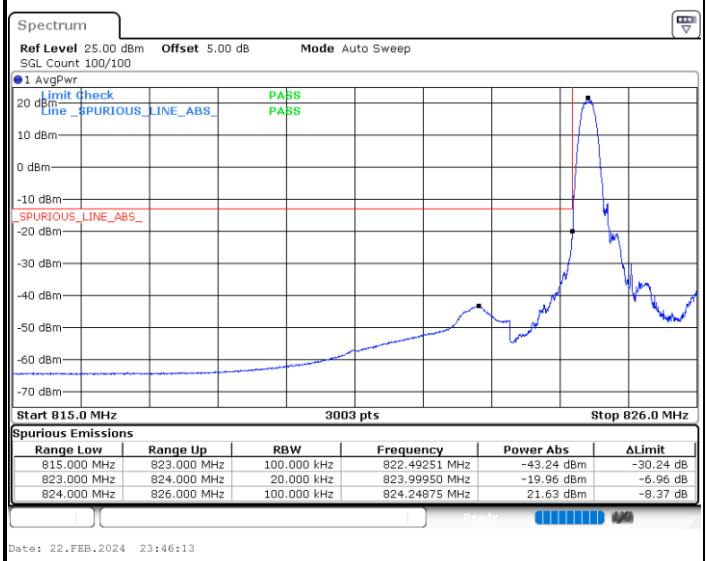
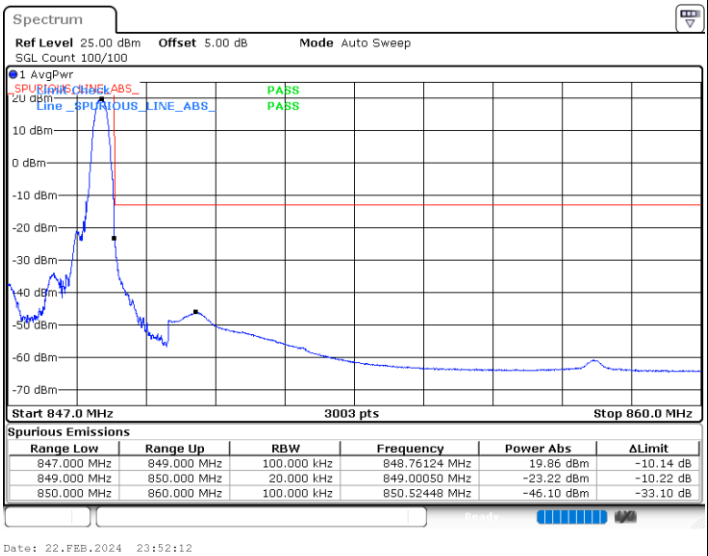
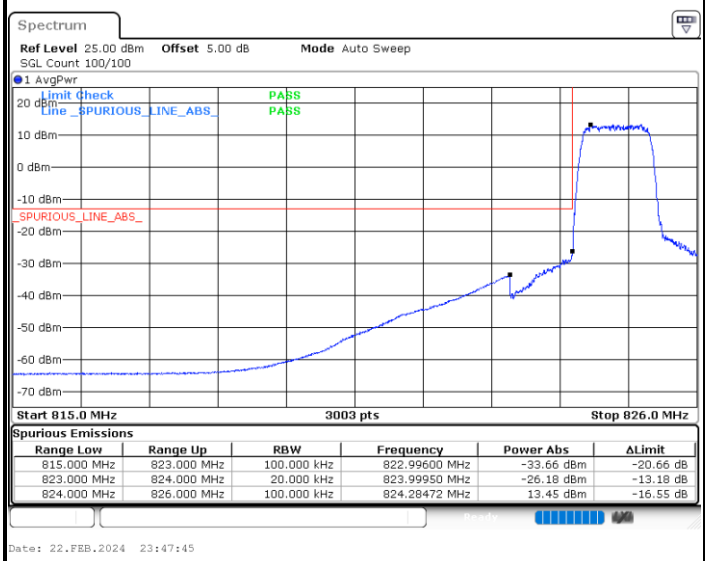
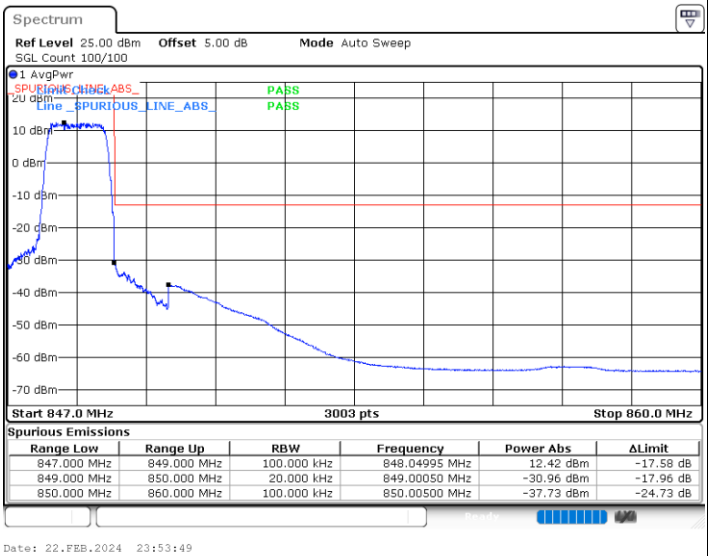


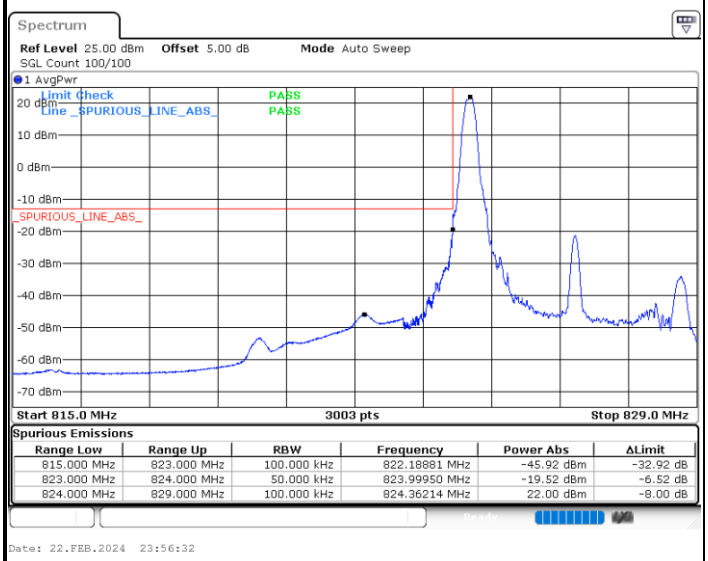
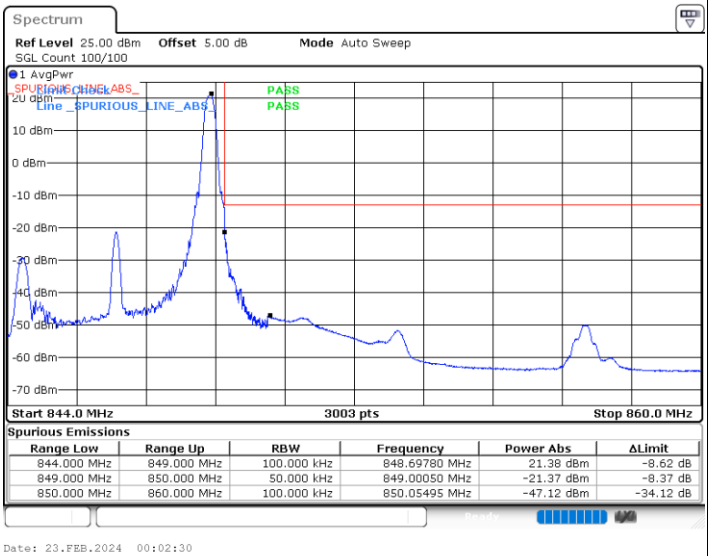
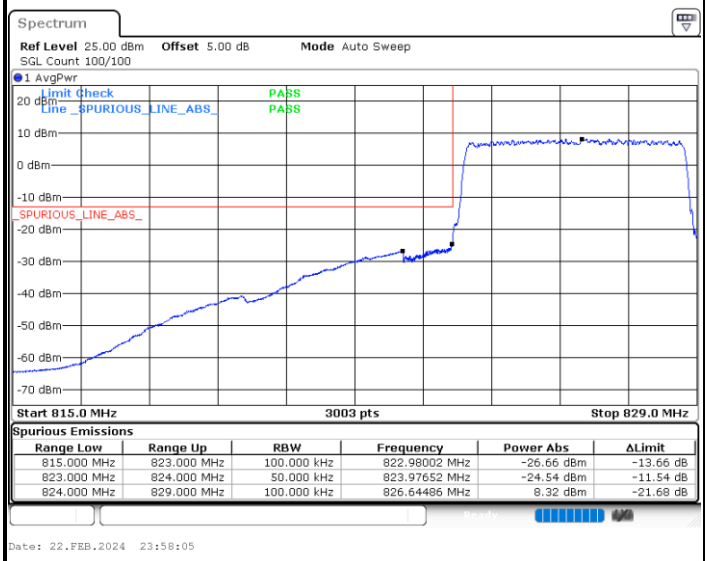
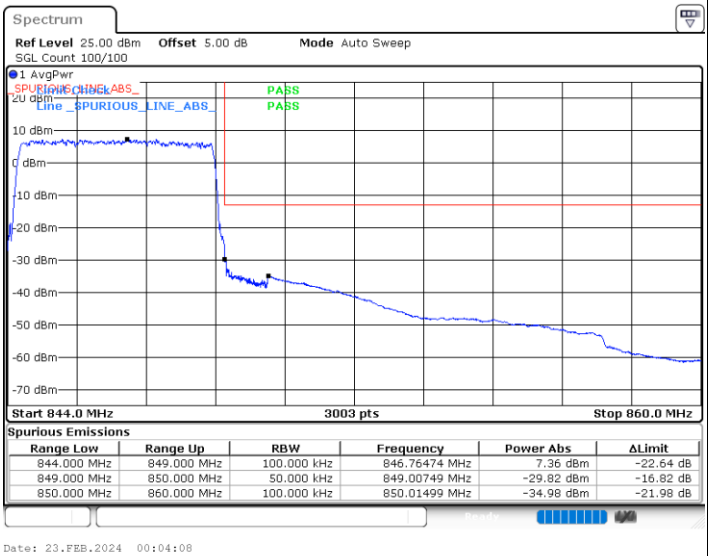
Lowest Band Edge / Full RB



Highest Band Edge / Full RB

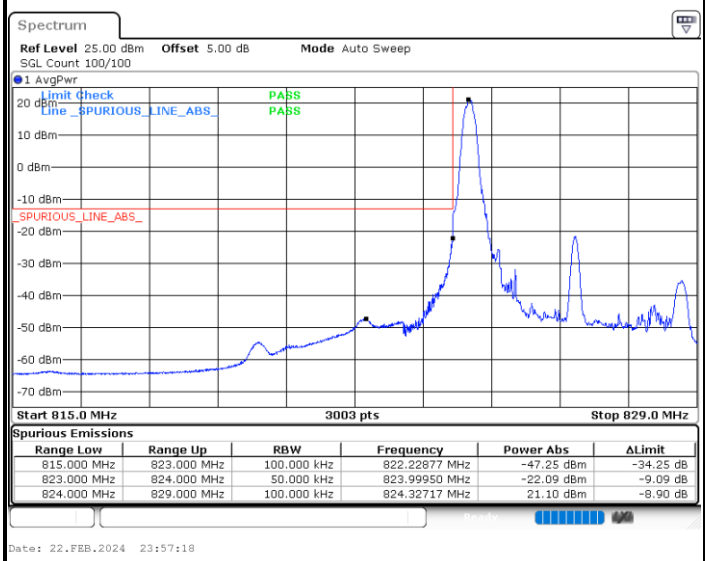


LTE Band 5 / 1.4MHz / 16QAM	
Lowest Band Edge / 1 RB	**Highest Band Edge / 1 RB**
	
Lowest Band Edge / Full RB	**Highest Band Edge / Full RB**
	

LTE Band 5 / 5MHz / QPSK	
Lowest Band Edge / 1 RB	**Highest Band Edge / 1 RB**
	
Lowest Band Edge / Full RB	**Highest Band Edge / Full RB**
	

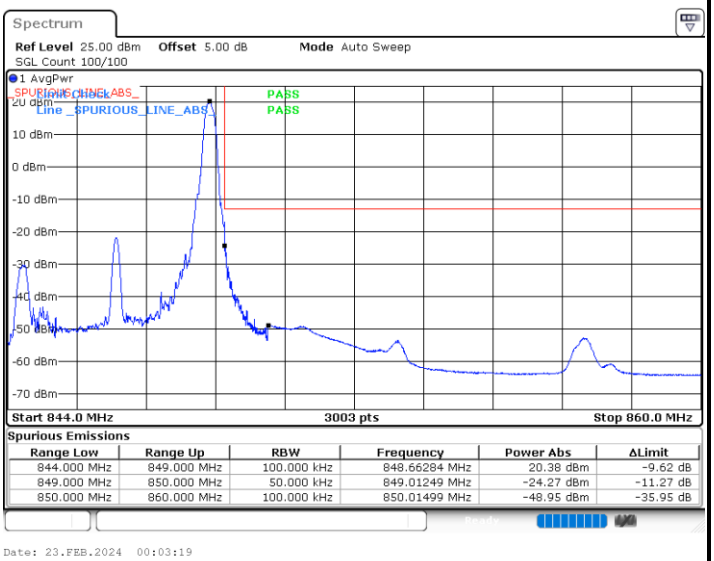
LTE Band 5 / 5MHz / 16QAM

Lowest Band Edge / 1RB



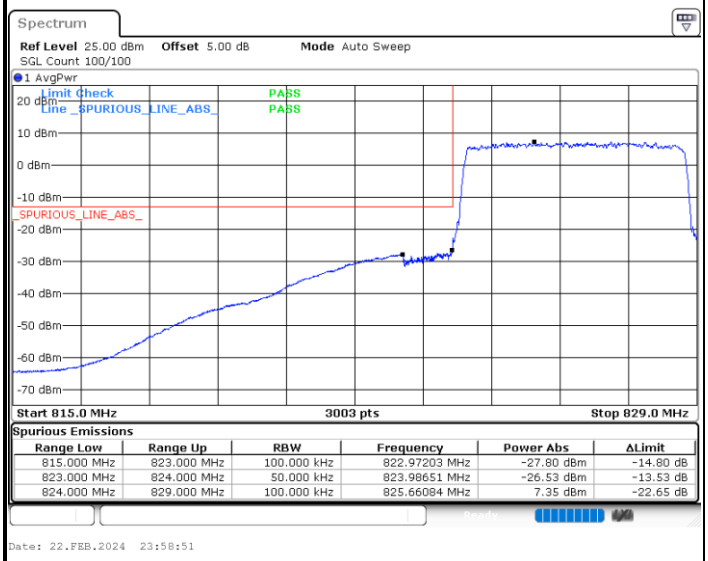
Date: 22.FEB.2024 23:57:18

Highest Band Edge / 1 RB



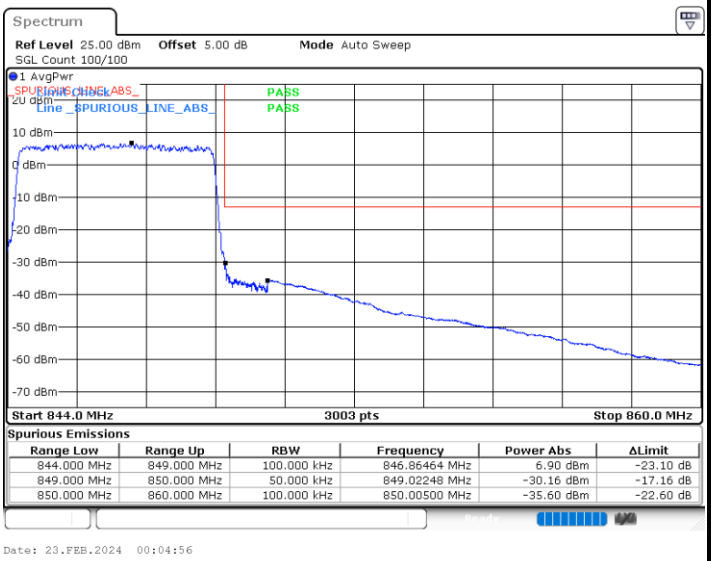
Date: 23.FEB.2024 00:03:19

Lowest Band Edge / Full RB

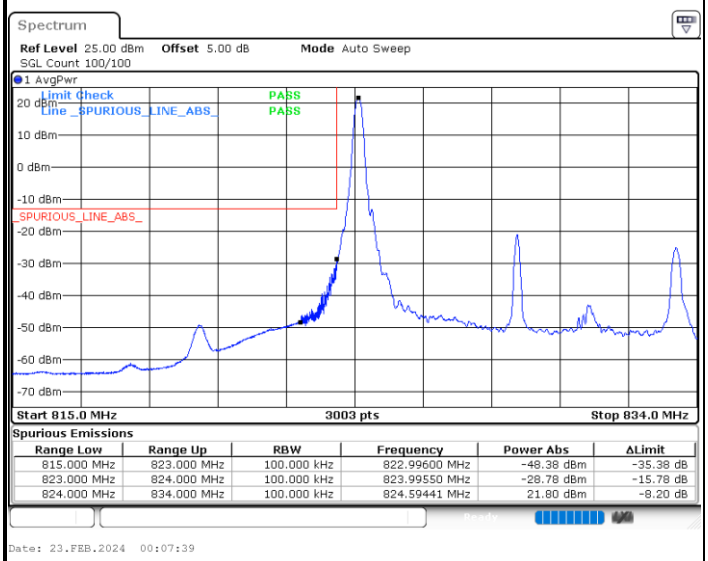
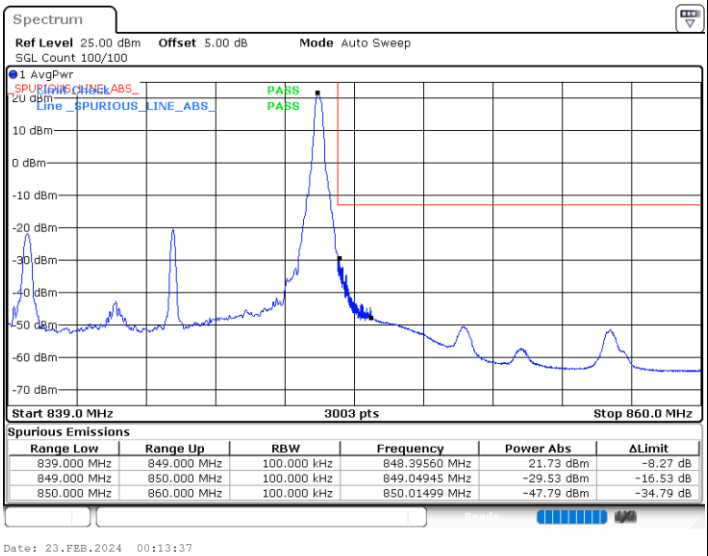


Date: 22.FEB.2024 23:58:51

Highest Band Edge / Full RB



Date: 23.FEB.2024 00:04:56

LTE Band 5 / 10MHz / QPSK	
Lowest Band Edge / 1 RB	**Highest Band Edge / 1 RB**
	
Lowest Band Edge / Full RB	**Highest Band Edge / Full RB**