



FCC Test Report

Report Reference No.....: HK2409265637-11E
FCC ID.....: 2ALPX-OPYNMULTIPIB
Compiled by
(position+printedname+signature)....: Testing Engineer Len Liao

Supervised by
(position+printedname+signature)....: Technical Manager Sliver Wan

Approved by
(position+printedname+signature)....: Authorized Signatory Jason Zhou

Date of issue.....: Oct. 18, 2024

Testing Laboratory Name: Shenzhen HUAKE Testing Technology Co., Ltd.

Address: 1-2/F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park,
Heping, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

Applicant's name: Advanced Electronic Solutions Global Ltd.

Address: Unit 4C, Kilcronagh Business Park Cookstown County Tyrone,
United Kingdom

Test specification

Standard: FCC CFR Title 47 Part 2, Part 27

TRF Originator.....: Shenzhen HUAKE Testing Technology Co., Ltd.

Shenzhen HUAKE Testing Technology Co., Ltd.All rights reserved.

This publication may be reproduced in whole or in part for non-commercial purposes as long as the Shenzhen HUAKE Testing Technology Co., Ltd.as copyright owner and source of the material. Shenzhen HUAKE Testing Technology Co., Ltd.takes no responsibility for and will not assume liability for damages resulting from the reader's interpretation of the reproduced material due to its placement and context.

Test item description: Opyn Multi

Trade Mark: AES

Manufacturer.....: Advanced Electronic Solutions Global Ltd.

Model/Type reference.....: OPYN-MULTI-IP-IB

Series Models: N/A

Modulation Type: QPSK, 16QAM

Rating: DC 12V From DC Power or DC 48V From POE Power

Hardware version: V2.0

Software version.....: V2.0

Result.....: **PASS**

Len Liao

Sliver Wan

Jason Zhou

**TEST REPORT**

Test Report No. :	HK2409265637-11E	Oct. 18, 2024
		Date of issue

Equipment under Test : Opyn Multi

Model /Type : OPYN-MULTI-IP-IB

Series Models : N/A

Applicant : **Advanced Electronic Solutions Global Ltd.**

Address : Unit 4C, Kilcronagh Business Park Cookstown County Tyrone,
United Kingdom

Manufacturer : **Advanced Electronic Solutions Global Ltd.**

Address : Unit 4C, Kilcronagh Business Park Cookstown County Tyrone,
United Kingdom

Test Result:	PASS
---------------------	-------------

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.



Contents

1	Test Standards	5
2	Summary	6
2.1	General Remarks	6
2.2	Product Description	6
2.3	Equipment under Test	6
2.4	Normal Accessory setting	7
2.5	EUT configuration	7
2.6	Related Submittal(s) / Grant (s)	7
2.7	Modifications	7
2.8	General Test Conditions/Configurations	7
3	Test Environment	8
3.1	Information of The Test Laboratory	8
3.2	Test Description	8
3.3	Equipments Used during the Test	9
4	Test Conditions and Results	10
4.1	Output Power	10
4.2	Peak-to-Average Ratio (PAR)	16
4.3	Occupied Bandwidth and Emission Bandwidth	21
4.4	Band Edge compliance	26
4.5	Spurious Emission on Antenna Port	31
4.6	Radiated Spurious Emission	44
4.7	Frequency Stability	50
5	Test Setup Photos of the EUT	52
6	Photos of the EUT	53



**** Modified History ****

Revision	Description	Issued Data	Remark
Revision 1.0	Initial Test Report Release	Oct. 18, 2024	Jason Zhou



1 Test Standards

The tests were performed according to following standards:

[FCC Part 2](#): FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS

[FCC Part 27](#): MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES

[ANSI/TIA-603-E-2016](#): Land Mobile FM or PM Communications Equipment Measurement and Performance Standards.

[ANSI C63.26-2015](#): IEEE/ANSI Standard for Compliance Testing of Transmitters Used in Licensed Radio Services

[KDB 971168 D01 v03r01](#): Measurement Guidance For Certification Of Licensed Digital Transmitters



2 Summary

2.1 General Remarks

Date of receipt of test sample	:	Sept. 26, 2024
Testing commenced on	:	Sept. 26, 2024
Testing concluded on	:	Oct. 18, 2024

2.2 Product Description

The **Advanced Electronic Solutions Global Ltd.**'s Model: OPYN-MULTI-IP-IB or the "EUT" as referred to in this report; more general information as follows, for more details, refer to the user's manual of the EUT.

Name of EUT	Opy Multi
Model/Type reference:	OPYN-MULTI-IP-IB
Series Models:	N/A
Model Difference:	N/A
Power supply:	DC 12V From DC Power or DC 48V From POE Power
Modulation Type	QPSK, 16QAM
Antenna Type	External Antenna
Antenna Gain	2.5dBi
Operation Frequency Band	LTE Band 41
Operation frequency	LTE Band 41: 2535-2655 MHz
LTE Release	R8
Extreme temp. Tolerance	-30°C to +50°C
Extreme vol. Limits	10.2VDC to 13.8VDC (nominal: 12VDC)

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
2. Antenna gain Refer to the antenna specifications.
3. The cable loss data is obtained from the supplier.
4. The test results in the report only apply to the tested sample.

2.3 Equipment under Test

Power supply system utilised

Power supply voltage	:	☐ 120V/ 60 Hz	☐ 115V/60Hz
		☒ 12 V DC	☐ 24 V DC
		☐ Other (specified in blank below)	

DC 12V From DC Power or DC 48V From POE Power



2.4 Normal Accessory setting

Fully charged battery was used during the test.

2.5 EUT configuration

The following peripheral devices and interface cables were connected during the measurement:

● - supplied by the manufacturer

○ - supplied by the lab

○ Power Cable	Length (m) :	/
	Shield :	/
	Detachable :	/
○ Multimeter	Manufacturer :	/
	Model No. :	/

2.6 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended filing to comply with FCC Part 27, Rules.

2.7 Modifications

No modifications were implemented to meet testing criteria.

2.8 General Test Conditions/Configurations

2.9.1 Test Environment

Environment Parameter	Selected Values During Tests	
Relative Humidity	Ambient	
Temperature	TN	Ambient
Voltage	VL	10.2V
	VN	12V
	VH	13.8V

NOTE: VL=lower extreme test voltage VN=nominal voltage
VH=upper extreme test voltage TN=normal temperature



3 Test Environment

3.1 Information of The Test Laboratory

Shenzhen HUAKE Testing Technology Co., Ltd.
Add.: 1-2/F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping,
Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

Testing Laboratory Authorization:

A2LA Accreditation Code is 4781.01.
FCC Designation Number is CN1229.
Canada IC CAB identifier is CN0045.
CNAS Registration Number is L9589.

3.2 Test Description

Test Item	FCCRuleNo.	Verdict
Effective(Isotropic)RadiatedOutputPower	Part 2.1046 27.50(h)(2)	Pass
Peak-AverageRatio	Part 2.1046	Pass
ModulationCharacteristics	§2.1047	N/A
Bandwidth	Part 2.1049	Pass
BandEdgesCompliance	Part 2.1051 27.53(m)	Pass
SpuriousEmissionatAntennaTerminals	Part 2.1051 27.53(m)	Pass
Field Strengthof Spurious Radiation	Part 2.1053 27.53(m)	Pass
Frequency Stability	Part 2.1055 27.54	Pass
NOTE 1:For the verdict,the“N/A”denotes“not applicable”,the“N/T”denotes “nottested”.		

Remark:

1. The measurement uncertainty is not included in the test result.



3.3 Equipments Used during the Test

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Due Date
1	L.I.S.N.	R&S	ENV216	HKE-002	2024/02/20	2025/02/19
2	L.I.S.N.	R&S	ENV216	HKE-059	2024/02/20	2025/02/19
3	EMI Test Receiver	R&S	ESR	HKE-005	2024/02/20	2025/02/19
4	Spectrum analyzer	Agilent	N9020A	HKE-117	2024/02/20	2025/02/19
5	Spectrum analyzer	R&S	FSV3044	HKE-126	2024/02/20	2025/02/19
6	Preamplifier	EMCI	EMC051845S	HKE-006	2024/02/20	2025/02/19
7	Preamplifier	Schwarzbeck	BBV 9743	HKE-016	2024/02/20	2025/02/19
8	Preamplifier	A.H. Systems	SAS-574	HKE-182	2024/02/20	2025/02/19
9	6d Attenuator	Pasternack	6db	HKE-184	2024/02/20	2025/02/19
10	EMI Test Receiver	Rohde & Schwarz	ESR-7	HKE-010	2024/02/20	2025/02/19
11	Broadband Antenna	Schwarzbeck	VULB9168	HKE-167	2024/02/21	2026/02/20
12	Loop Antenna	COM-POWER	AL-130R	HKE-014	2024/02/21	2026/02/20
13	Horn Antenna	Schwarzbeck	9120D	HKE-013	2024/02/21	2026/02/20
14	EMI Test Software	Tonscend	JS32-CE 2.5.0.6	HKE-081	/	/
15	EMI Test Software	Tonscend	JS32-RE 5.0.0	HKE-082	/	/
16	RF Automatic control unit	Tonscend	JS0806-1	HKE-096	2024/02/20	2025/02/19
17	High pass filter unit	Tonscend	JS0806-F	HKE-055	2024/02/20	2025/02/19
18	Wireless Communication Test Set	R&S	CMU200	HKE-026	2024/02/20	2025/02/19
19	Wireless Communication Test Set	R&S	CMW500	HKE-027	2024/02/20	2025/02/19
20	High-low temperature chamber	Guangke	HT-80L	HKE-118	2024/06/10	2025/06/09
21	Temperature and humidity meter	Boyang	HTC-1	HKE-075	2024/06/10	2025/06/09
22	RF Test Software	Tonscend	JS1120 Version 3.1.46	HKE-183	/	/
23	RSE Test Software	Tonscend	JS36-RSE 5.0.0	HKE-184	/	/

The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAKE, this document cannot be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at <http://www.cer-mark.com>.

TEL : +86-755 2302 9901 FAX : +86-755 2302 9901 E-mail : service@cer-mark.com

Add: 1-2F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China



4 Test Conditions and Results

4.1 Output Power

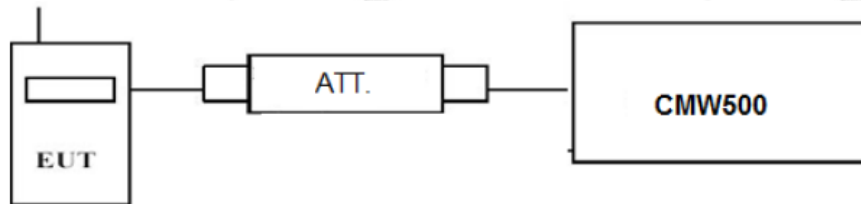
4.1.1 Conducted Output Power

TEST APPLICABLE

Part 27.50(h)(2), during the process of testing, the EUT was controlled via R&S Digital Radio Communication tester (CMW500) to ensure max power transmission and proper modulation. This result contains output power measurements for the EUT. In all cases, output power is within the specified limits.

TEST CONFIGURATION

Conducted Power Measurement:



TEST PROCEDURE

Conducted Power Measurement:

- Place the EUT on a bench and set it in transmitting mode.
- Connect a low loss RF cable from the antenna port to a CMW500 by an Att.
- EUT Communicate with CMW500 then selects a channel for testing.
- Add a correction factor to the display CMW500, and then test.

TEST RESULTS

Remark:

- We measured all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE Band 41;

LTE Band 41				
TX Channel Bandwidth	Frequency (MHz)	RB Size/Offset	Burst Average Power [dBm]	
			QPSK	16QAM
5 MHz	2537.5	1 RB low	22.80	22.07
		1 RB mid	22.72	22.09
		1 RB high	22.75	21.63
		50% RB low	21.89	20.82
		50% RB mid	21.85	20.78
		50% RB high	21.85	20.77
		100% RB	21.82	20.69
	2590.0	1 RB low	22.86	22.04
		1 RB mid	22.96	22.40
		1 RB high	22.89	22.01
		50% RB low	22.12	21.12
		50% RB mid	22.15	21.05
		50% RB high	22.08	21.05
		100% RB	22.18	21.19
	2652.5	1 RB low	22.76	22.15
		1 RB mid	22.83	22.26
		1 RB high	22.82	21.92
		50% RB low	21.86	20.86
		50% RB mid	21.88	20.86
		50% RB high	21.95	20.93
		100% RB	21.92	20.91



10 MHz	2540.0	1 RB low	22.64	21.73
		1 RB mid	22.77	21.77
		1 RB high	22.63	21.60
		50% RB low	21.92	20.82
		50% RB mid	21.82	20.83
		50% RB high	21.71	20.70
		100% RB	21.82	20.79
	2590.0	1 RB low	22.81	22.07
		1 RB mid	23.28	22.11
		1 RB high	22.93	22.16
		50% RB low	22.07	21.02
		50% RB mid	22.17	21.02
		50% RB high	22.15	21.20
		100% RB	22.04	21.04
	2650.0	1 RB low	22.75	22.02
		1 RB mid	22.89	22.21
		1 RB high	22.84	21.82
		50% RB low	21.96	21.00
		50% RB mid	21.95	20.97
		50% RB high	21.94	21.00
		100% RB	22.02	21.01
15 MHz	2542.5	1 RB low	22.41	21.60
		1 RB mid	22.41	21.42
		1 RB high	22.31	21.51
		50% RB low	21.58	21.58
		50% RB mid	21.58	21.58
		50% RB high	21.58	21.58
		100% RB	21.59	20.59
	2590.0	1 RB low	22.55	21.78
		1 RB mid	22.58	21.80
		1 RB high	22.50	21.80
		50% RB low	21.75	21.75
		50% RB mid	21.74	21.75
		50% RB high	21.96	21.95
		100% RB	21.94	20.97
	2647.5	1 RB low	22.50	21.77
		1 RB mid	22.52	21.95
		1 RB high	22.44	21.68
		50% RB low	21.68	21.67
		50% RB mid	21.67	21.67
		50% RB high	21.79	21.79
		100% RB	21.79	20.96
20 MHz	2545.0	1 RB low	22.45	21.88
		1 RB mid	22.65	22.34
		1 RB high	22.34	22.04
		50% RB low	21.65	20.77
		50% RB mid	21.68	20.78
		50% RB high	21.58	20.67
		100% RB	21.59	20.64
	2590.0	1 RB low	22.63	22.35
		1 RB mid	23.01	22.64
		1 RB high	22.63	22.44
		50% RB low	22.92	21.05
		50% RB mid	22.94	21.05
		50% RB high	22.87	21.09
		100% RB	22.90	21.00

The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAKE, this document cannot be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at <http://www.cer-mark.com>.

TEL : +86-755 2302 9901 FAX : +86-755 2302 9901 E-mail : service@cer-mark.com

Add: 1-2F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China



	2645.0	1 RB low	22.61	22.19
		1 RB mid	22.98	22.44
		1 RB high	22.49	22.47
		50% RB low	21.74	20.98
		50% RB mid	21.74	20.97
		50% RB high	21.84	21.00
		100% RB	21.89	20.89



4.1.2. Radiated Output Power

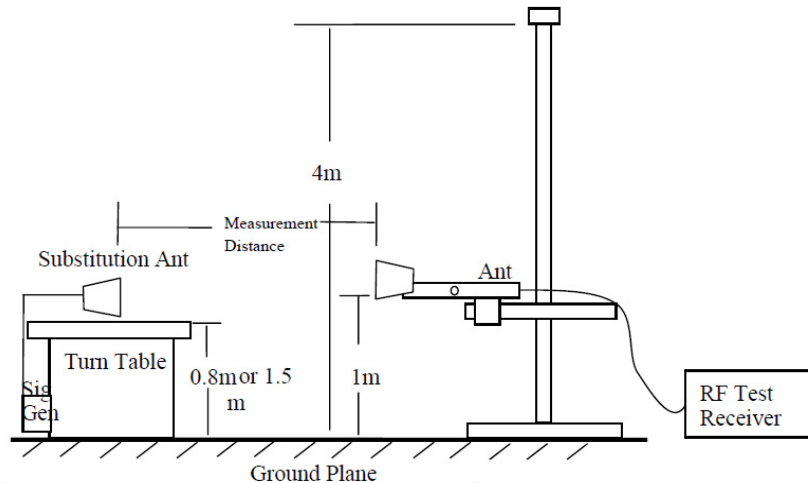
LIMIT

This is the test for the maximum radiated power from the EUT.

TEST CONFIGURATION

RadiatedPowerMeasurement:

remark : 0.8m for below 1GHz, 1.5m for above 1GHz



TEST PROCEDURE

The EUT was setup according to EIA/TIA 603D

- The EUT shall be placed at the specified height on a support, and in the position closest to normal use as declared by provider.
- The test antenna shall be oriented initially for vertical polarization and shall be chosen to correspond to the frequency of the transmitter.
- The output of the test antenna shall be connected to the measuring receiver.
- The transmitter shall be switched on and the measuring receiver shall be tuned to the frequency of the transmitter under test.
- The test antenna shall be raised and lowered through the specified range of height until a maximum signal level is detected by the measuring receiver.
- The transmitter shall then be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
- The test antenna shall be raised and lowered again through the specified range of height until a maximum signal level is detected by the measuring receiver.
- The maximum signal level detected by the measuring receiver shall be noted.
- The transmitter shall be replaced by a substitution antenna.
- The substitution antenna shall be orientated for vertical polarization and the length of the substitution antenna shall be adjusted to correspond to the frequency of the transmitter.
- The substitution antenna shall be connected to a calibrated signal generator.
- If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
- The test antenna shall be raised and lowered through the specified range of height to ensure that the maximum signal is received.
- The input signal to the substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, that is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuator setting of the measuring receiver.
- The measurement shall be repeated with the test antenna and the substitution antenna orientated for horizontal polarization.
- The measure of the effective radiated power is the larger of the two levels recorded at the input to the substitution antenna, corrected for gain of the substitution antenna if necessary.
- Test site anechoic chamber refer to ANSI C63.4.

**TEST RESULTS****Radiated Measurement:***Remark:*

1. We measured all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE Band 41; recorded worst case for each Channel Bandwidth of LTE Band 41.
2. $EIRP = P_s(dBm) - P_{cl}(dB) + G_a(dBi)$
3. We measured both Horizontal and Vertical direction, recorded worst case direction.

LTE Band 41 Channel Bandwidth 5MHz_QPSK_1RB#0

Frequency (MHz)	P_s (dBm)	P_{cl} (dB)	G_a Antenna Gain(dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
2537.5	11.95	3.41	15.12	23.66	33.01	9.35	V
2590.0	12.36	3.49	15.12	23.99	33.01	9.02	V
2652.5	11.54	3.55	15.12	23.11	33.01	9.9	V

LTE Band 41 Channel Bandwidth 10MHz_QPSK_1RB#0

Frequency (MHz)	P_s (dBm)	P_{cl} (dB)	G_a Antenna Gain(dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
2540.0	12.72	3.41	15.12	24.43	33.01	8.58	V
2590.0	12.97	3.49	15.12	24.6	33.01	8.41	V
2650.0	11.22	3.55	15.12	22.79	33.01	10.22	V

LTE Band 41 Channel Bandwidth 15MHz_QPSK_1RB#0

Frequency (MHz)	P_s (dBm)	P_{cl} (dB)	G_a Antenna Gain(dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
2542.5	12.55	3.41	15.12	24.26	33.01	8.75	V
2590.0	13.05	3.49	15.12	24.68	33.01	8.33	V
2647.5	12.02	3.55	15.12	23.59	33.01	9.42	V

LTE Band 41 Channel Bandwidth 20MHz_QPSK_1RB#0

Frequency (MHz)	P_s (dBm)	P_{cl} (dB)	G_a Antenna Gain(dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
2545.0	12.27	3.41	15.12	23.98	33.01	9.03	V
2590.0	13.39	3.49	15.12	25.02	33.01	7.99	V
2645.0	10.83	3.55	15.12	22.4	33.01	10.61	V

**LTE Band 41 Channel Bandwidth 5MHz 16QAM 1RB#0**

Frequency (MHz)	P _s (dBm)	P _{cl} (dB)	G _a Antenna Gain(dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
2537.5	12.16	3.41	15.12	23.87	33.01	9.14	V
2590.0	11.79	3.49	15.12	23.42	33.01	9.59	V
2652.5	11.48	3.55	15.12	23.05	33.01	9.96	V

LTE Band 41 Channel Bandwidth 10MHz 16QAM 1RB#0

Frequency (MHz)	P _s (dBm)	P _{cl} (dB)	G _a Antenna Gain(dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
2540.0	12.36	3.41	15.12	24.07	33.01	8.94	V
2590.0	12.09	3.49	15.12	23.72	33.01	9.29	V
2650.0	11.82	3.55	15.12	23.39	33.01	9.62	V

LTE Band 41 Channel Bandwidth 15MHz 16QAM 1RB#0

Frequency (MHz)	P _s (dBm)	P _{cl} (dB)	G _a Antenna Gain(dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
2542.5	11.68	3.41	15.12	23.39	33.01	9.62	V
2590.0	12.54	3.49	15.12	24.17	33.01	8.84	V
2647.5	11.31	3.55	15.12	22.88	33.01	10.13	V

LTE Band 41 Channel Bandwidth 20MHz 16QAM 1RB#0

Frequency (MHz)	P _s (dBm)	P _{cl} (dB)	G _a Antenna Gain(dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
2545.0	12.89	3.41	15.12	24.6	33.01	8.41	V
2590.0	12.12	3.49	15.12	23.75	33.01	9.26	V
2645.0	10.92	3.55	15.12	22.49	33.01	10.52	V

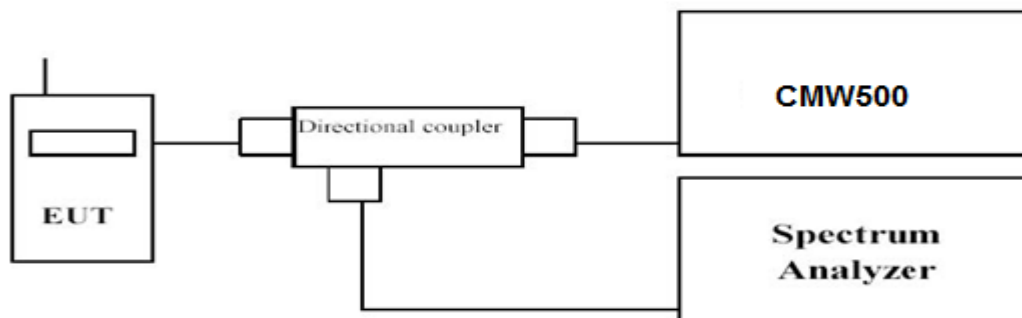


4.2 Peak-to-Average Ratio (PAR)

LIMIT

The Peak-to-Average Ratio (PAR) of the transmission may not exceed 13 dB.

TEST CONFIGURATION



TEST PROCEDURE

1. Refer to instrument's analyzer instruction manual for details on how to use the power statistics/CCDF function;
2. Set resolution/measurement bandwidth $\geq$ signal's occupied bandwidth;
3. Set the number of counts to a value that stabilizes the measured CCDF curve;
4. Set the measurement interval as follows:
 - 1). for continuous transmissions, set to 1 ms,
 - 2). for burst transmissions, employ an external trigger that is synchronized with the EUT burst timing sequence, or use the internal burst trigger with a trigger level that allows the burst to stabilize and set the measurement interval to a time that is less than or equal to the burst duration.
5. Record the maximum PAPR level associated with a probability of 0.1%.

TEST RESULTS

Remark:

1. We measured all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE Band 41; recorded worst case for each Channel Bandwidth of LTE Band 41.

TX Channel Bandwidth	Frequency (MHz)	RB Size/Offset	PAPR(dB)	
			QPSK	16QAM
5 MHz	2537.5	1RB#0	8.12	9.33
	2590.0		8.48	9.42
	2652.5		8.80	9.31
10 MHz	2540.0	1RB#0	8.10	8.92
	2590.0		8.64	9.26
	2650.0		8.48	9.39
15 MHz	2542.5	1RB#0	8.38	9.67
	2590.0		8.32	9.53
	2647.5		8.03	9.39
20 MHz	2545.0	1RB#0	8.15	8.70
	2590.0		8.92	8.76
	2645.0		8.81	9.69

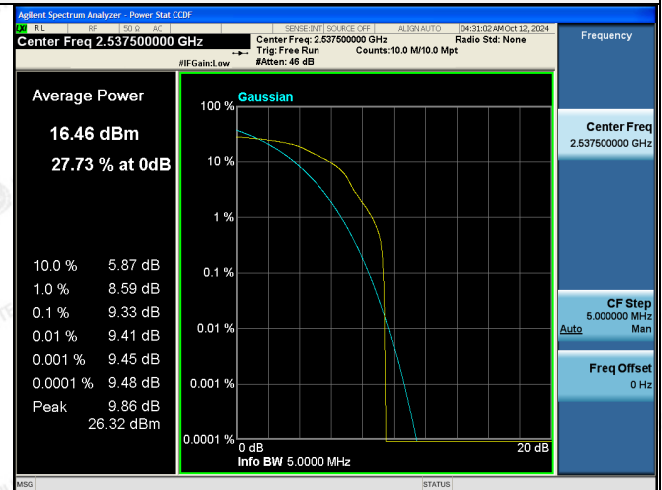
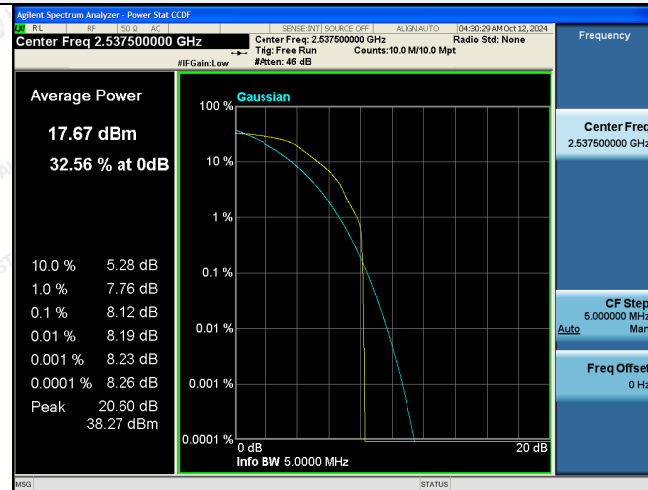


LTE Band 41-5MHz Channel BandwidthPAPR

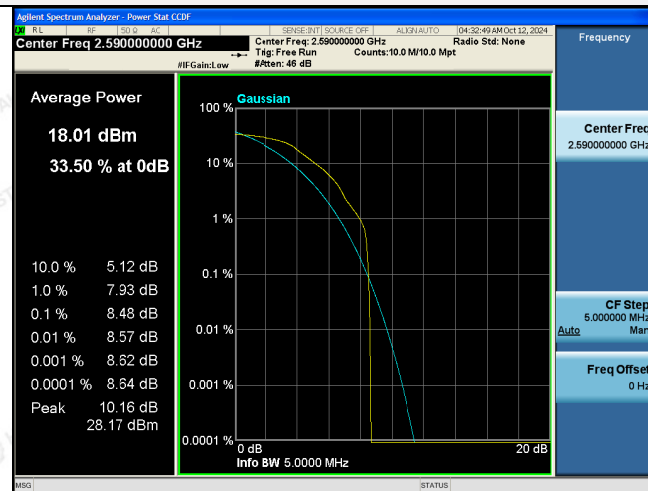
QPSK

16QAM

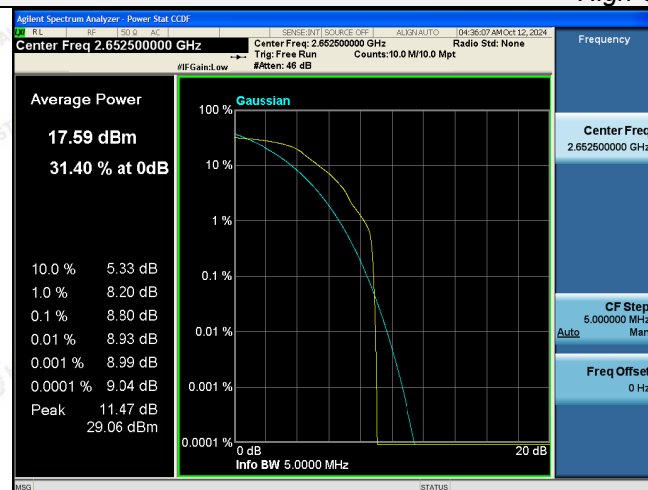
Low Channel



Middle Channel



High Channel



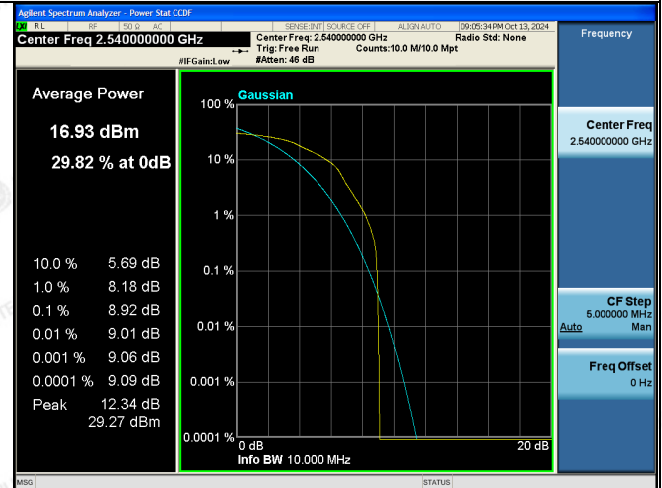
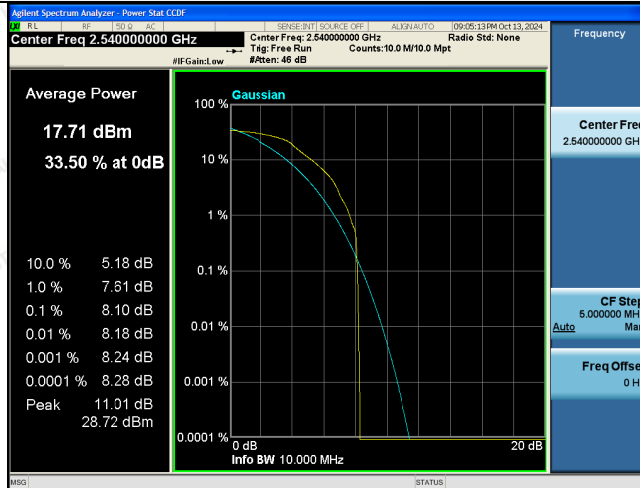


LTE Band 41-10MHz Channel BandwidthPAPR

QPSK

16QAM

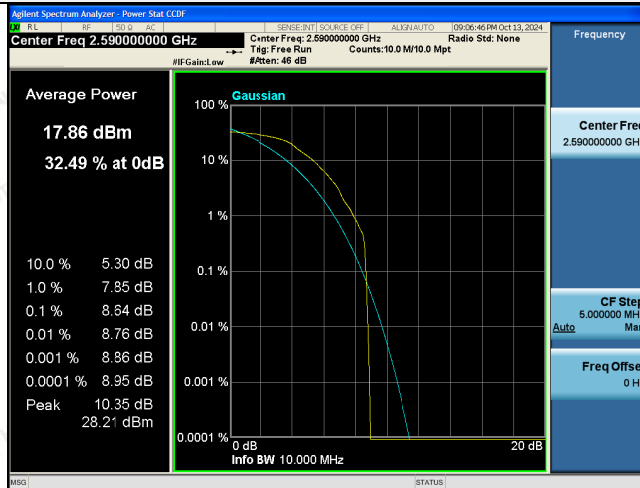
Low Channel



1RB#0

1RB#0

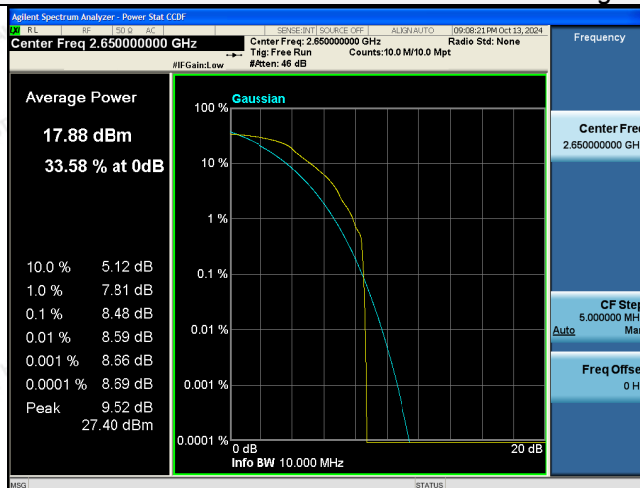
Middle Channel



1RB#0

1RB#0

High Channel



1RB#0

1RB#0

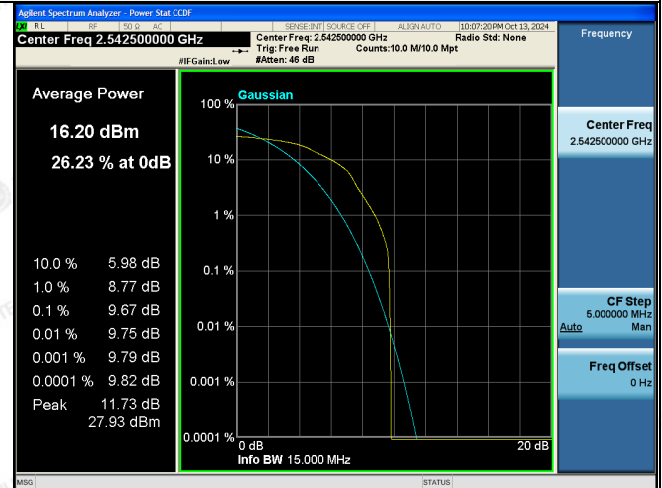
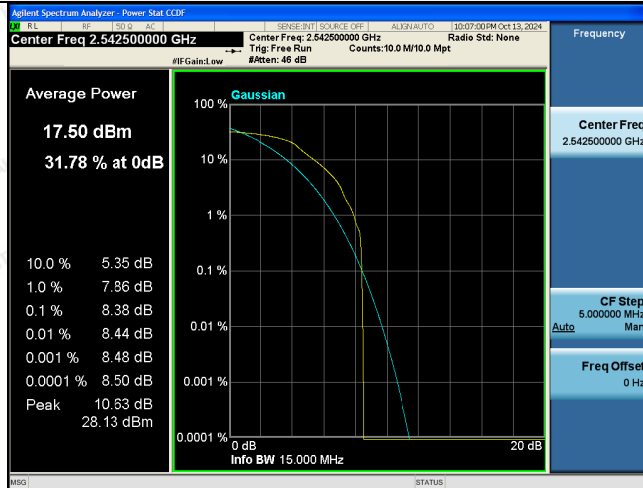


LTE Band 41- 15 MHz Channel BandwidthPAPR

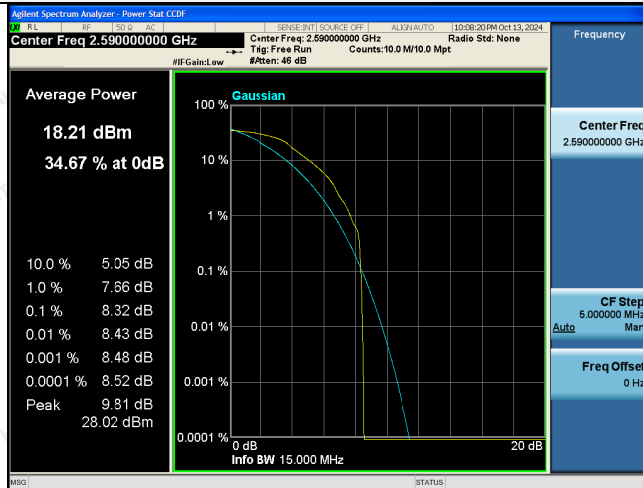
QPSK

16QAM

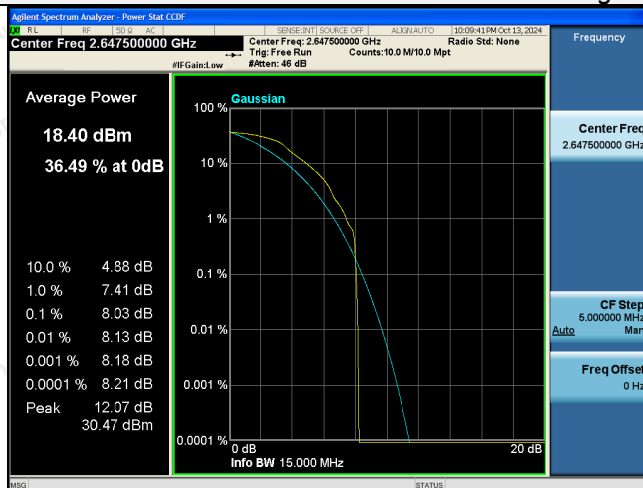
Low Channel



Middle Channel



High Channel



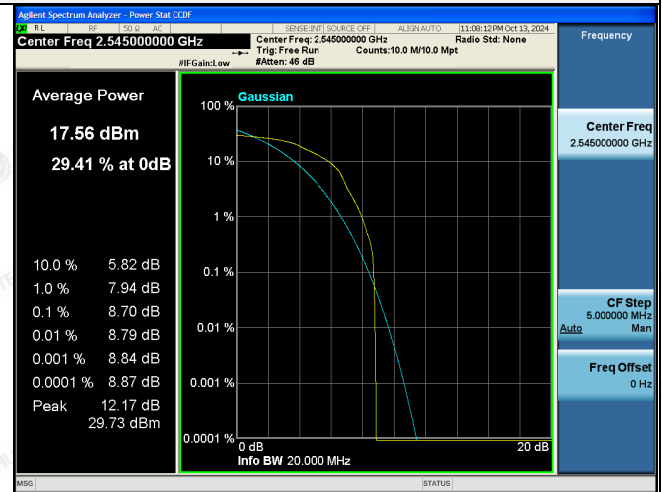
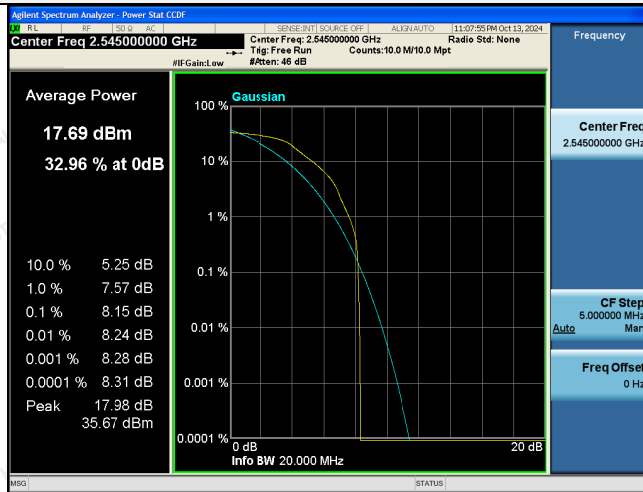


LTE Band 41-20MHz Channel Bandwidth PAPR

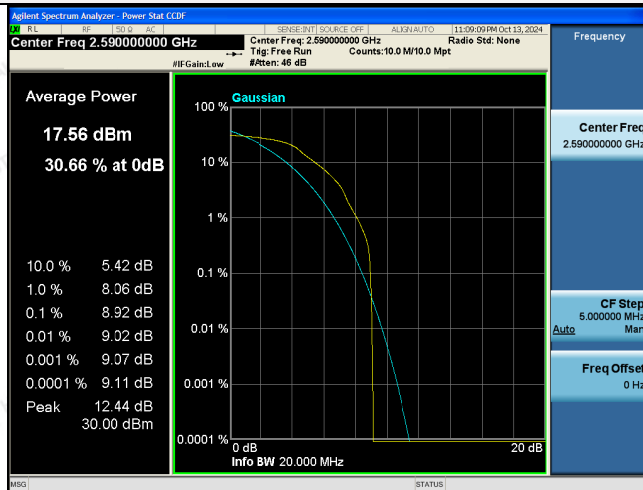
QPSK

16QAM

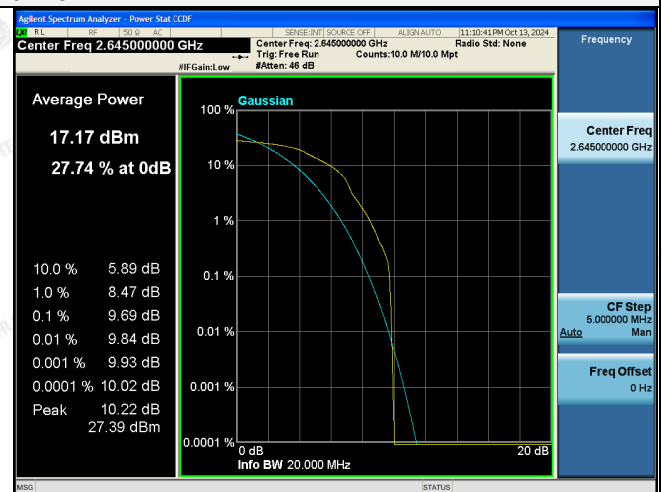
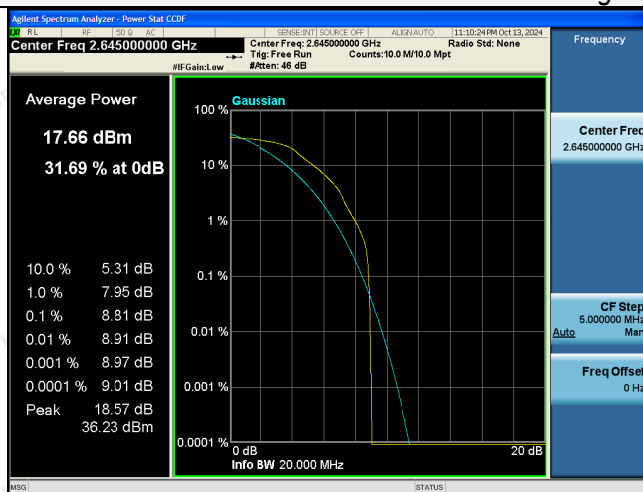
Low Channel



Middle Channel



High Channel



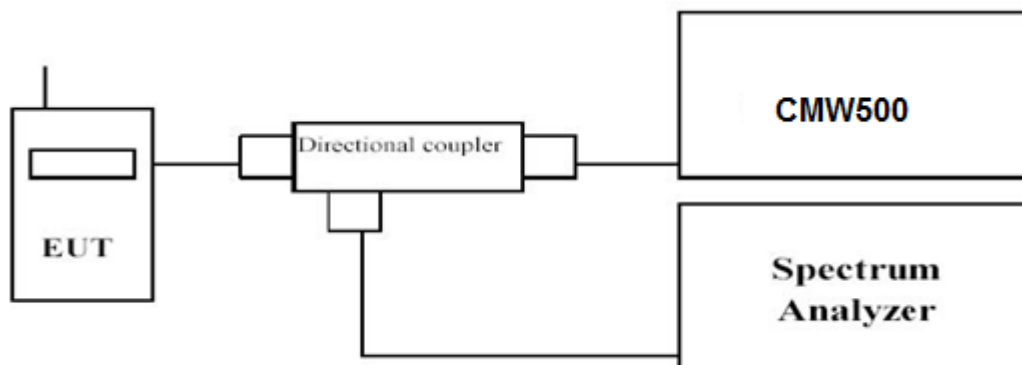


4.3 Occupied Bandwidth and Emission Bandwidth

LIMIT

N/A

TEST CONFIGURATION



TEST PROCEDURE

The transmitter output was connected to a calibrated coaxial cable and coupler, the other end of which was connected to a spectrum analyzer. The occupied bandwidth was measured with the spectrum analyzer at low, middle and high channel in each band. The -26dBc Emission bandwidth was also measured and recorded.

Set RBW was set to about 1% of emission BW, VBW ≥ 3 times RBW.

-26dBc display line was placed on the screen (or 99% bandwidth), the occupied bandwidth is the delta frequency between the two points where the display line intersects the signal trace.

TEST RESULTS

Remark:

1. We were tested all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE Band 41; recorded worst case for each Channel Bandwidth of LTE Band 41.

LTE Band 41						
TX Channel Bandwidth	RB Size/Offset	Frequency (MHz)	99% Occupied bandwidth (MHz)		-26dBc Emission bandwidth (MHz)	
			QPSK	16QAM	QPSK	16QAM
5 MHz	25RB#0	2537.5	4.4981	4.4993	5.009	5.118
		2590.0	4.5016	4.5028	5.005	4.992
		2652.5	4.4957	4.5013	5.012	5.003
10 MHz	50RB#0	2540.0	8.9850	8.9536	10.41	9.813
		2590.0	8.9725	8.9585	10.01	9.823
		2650.0	8.9683	8.9589	10.25	9.780
15 MHz	75RB#0	2542.5	13.462	13.464	16.02	16.04
		2590.0	13.472	13.450	15.62	15.93
		2647.5	13.462	13.446	15.86	15.97
20 MHz	100RB#0	2545.0	17.895	17.876	19.37	19.80
		2590.0	17.928	17.881	19.34	19.67
		2645.0	17.949	17.900	19.34	19.96

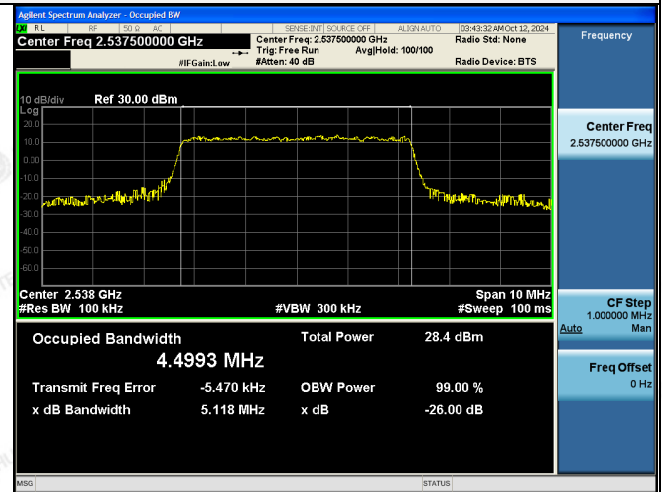
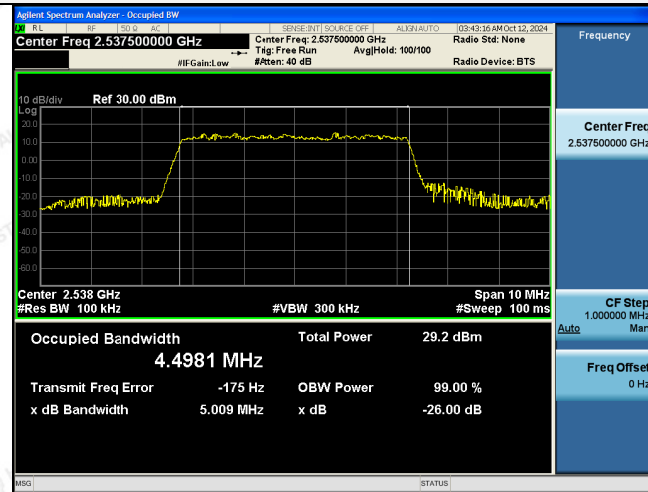


LTE Band 41-5MHz Channel Bandwidth Occupied Bandwidth and Emission Bandwidth

QPSK

16QAM

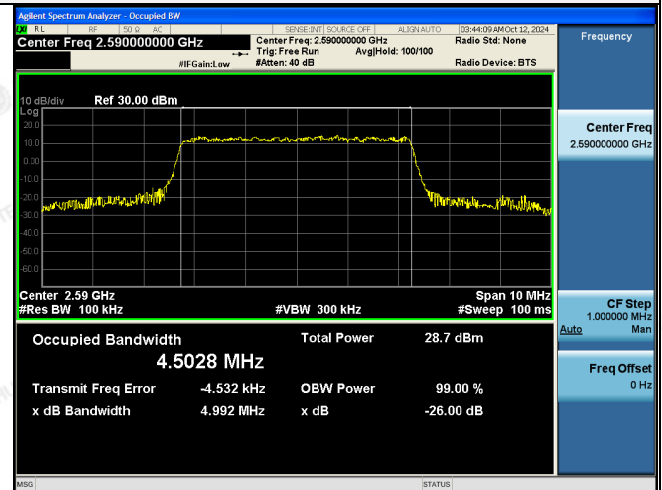
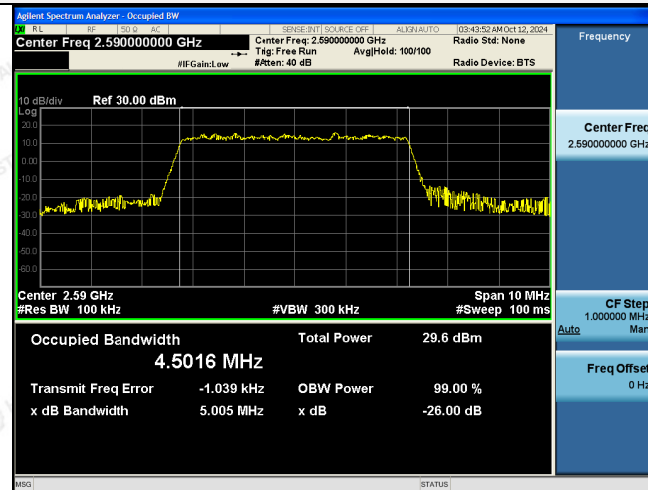
Low Channel



25RB#0

25RB#0

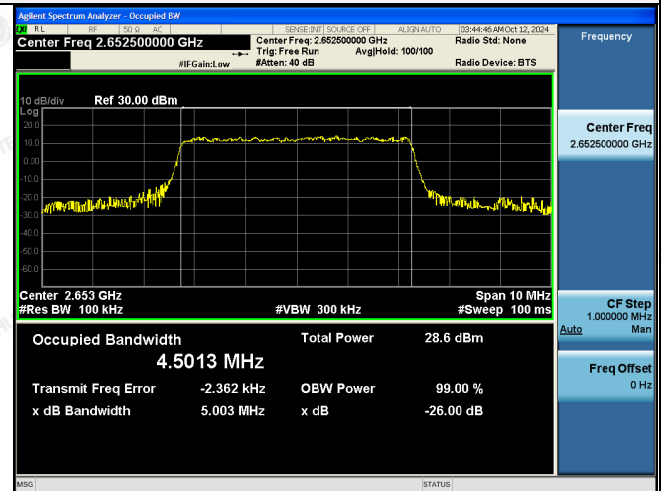
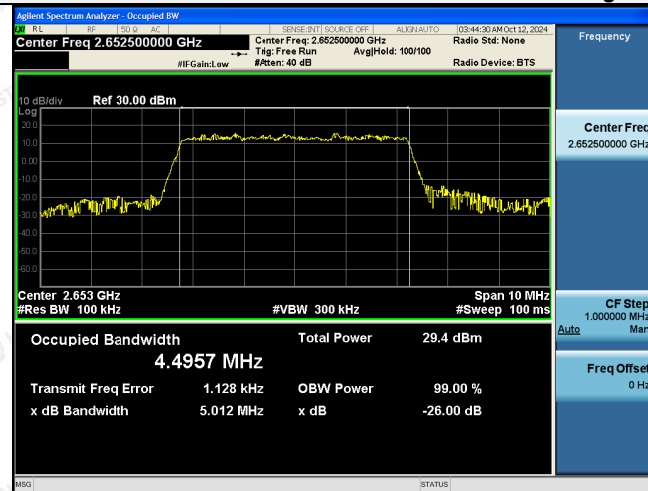
Middle Channel



25RB#0

25RB#0

High Channel



25RB#0

25RB#0

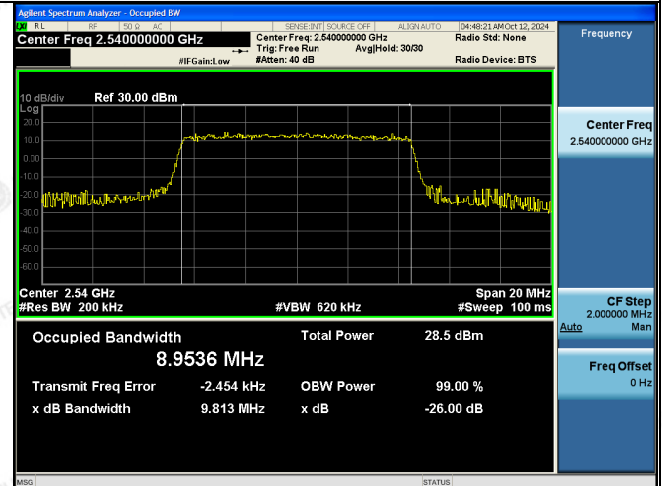
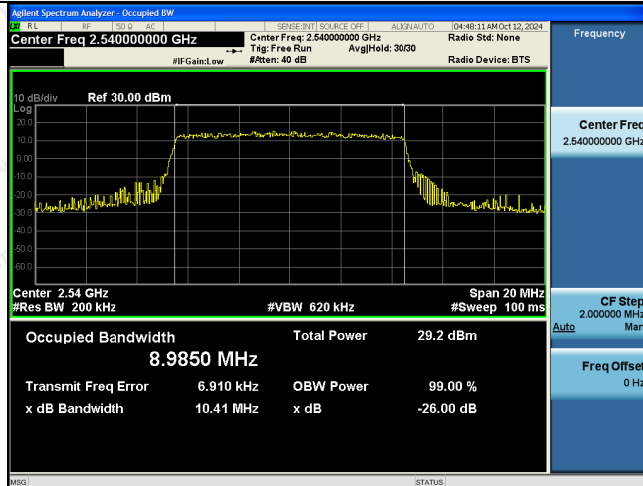


LTE Band 41-10MHz Channel Bandwidth Occupied Bandwidth and Emission Bandwidth

QPSK

16QAM

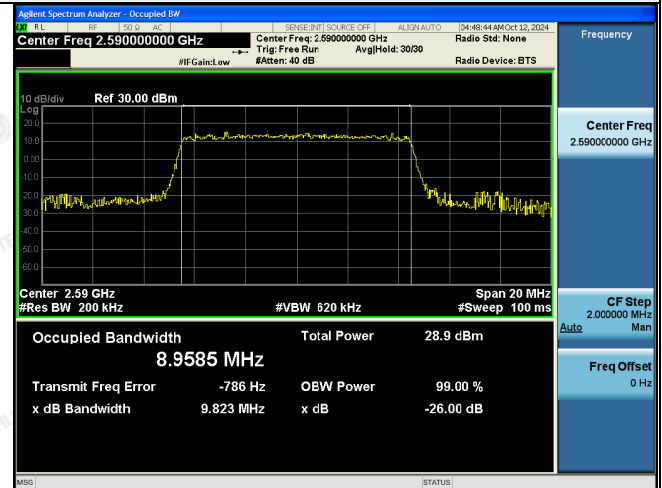
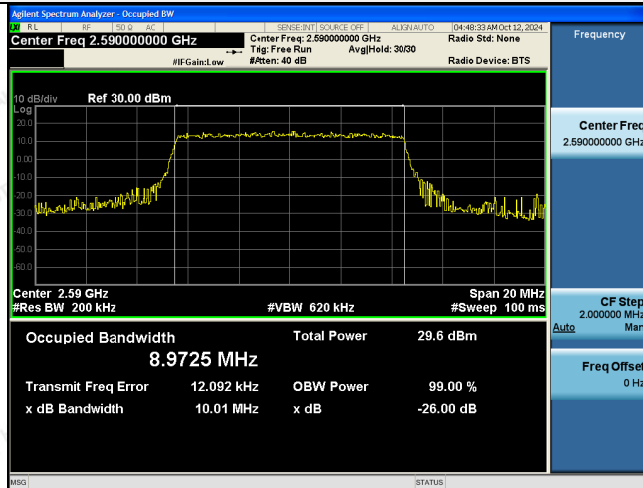
Low Channel



50RB#0

50RB#0

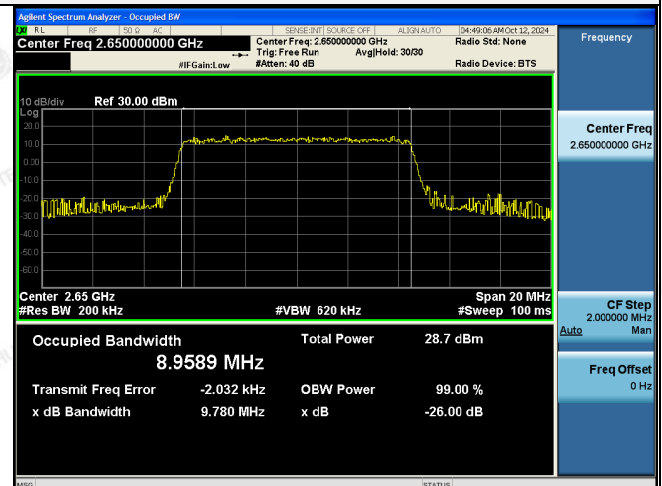
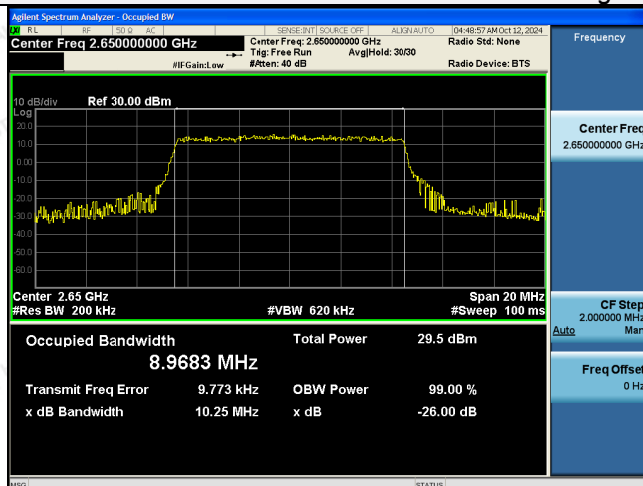
Middle Channel



50RB#0

50RB#0

High Channel



50RB#0

50RB#0

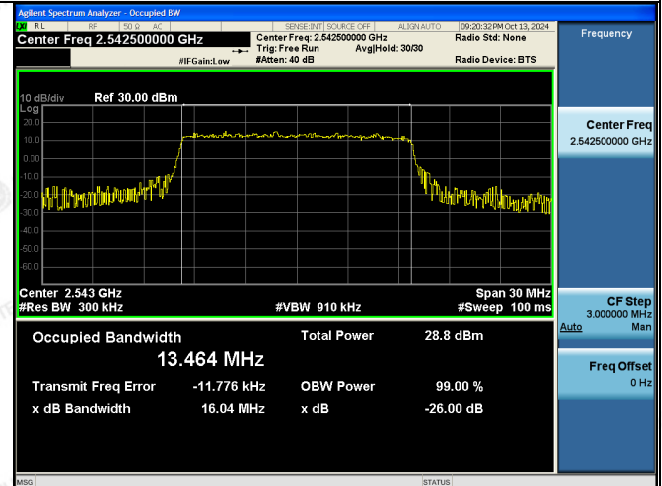
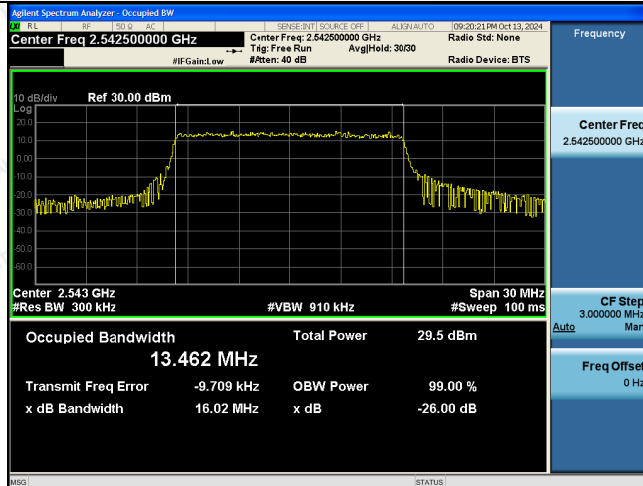


LTE Band 41-15MHz Channel Bandwidth Occupied Bandwidth and Emission Bandwidth

QPSK

16QAM

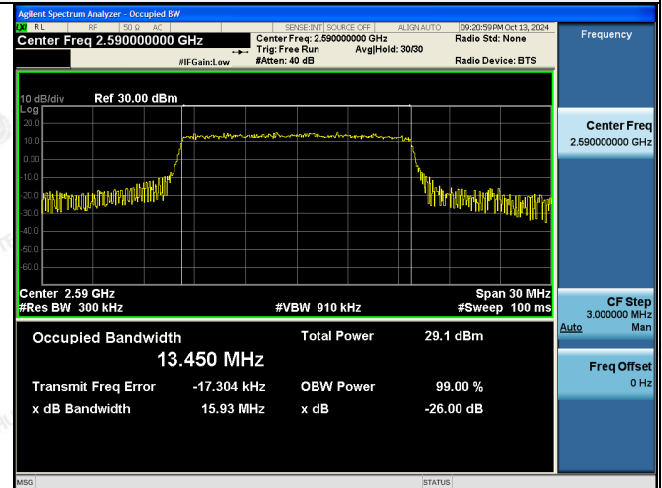
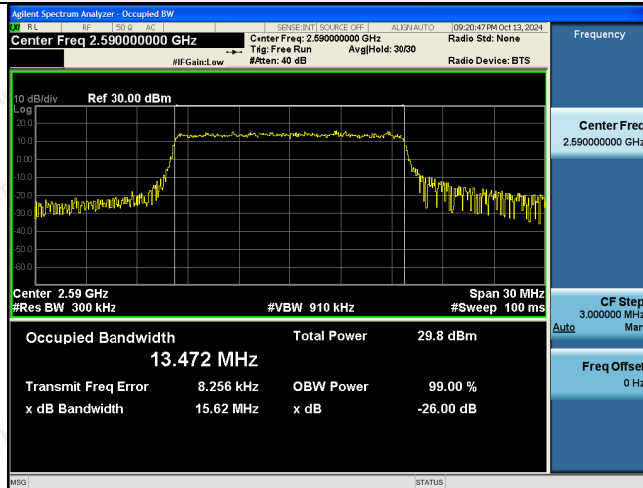
Low Channel



75RB#0

75RB#0

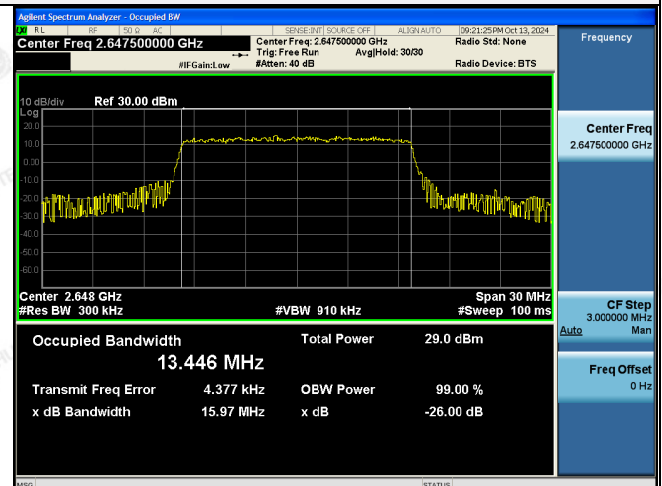
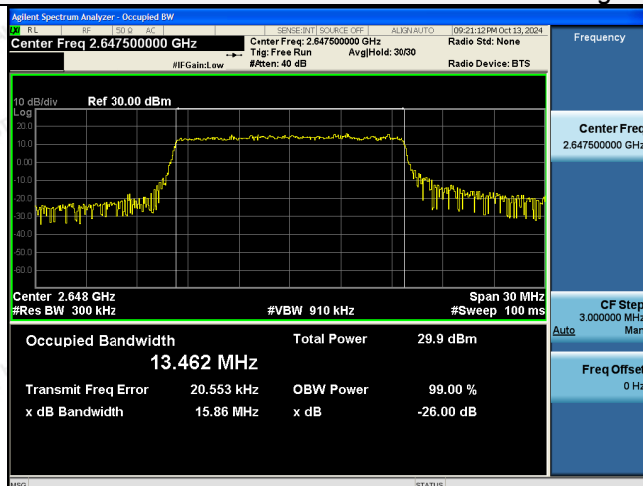
Middle Channel



75RB#0

75RB#0

High Channel



75RB#0

75RB#0

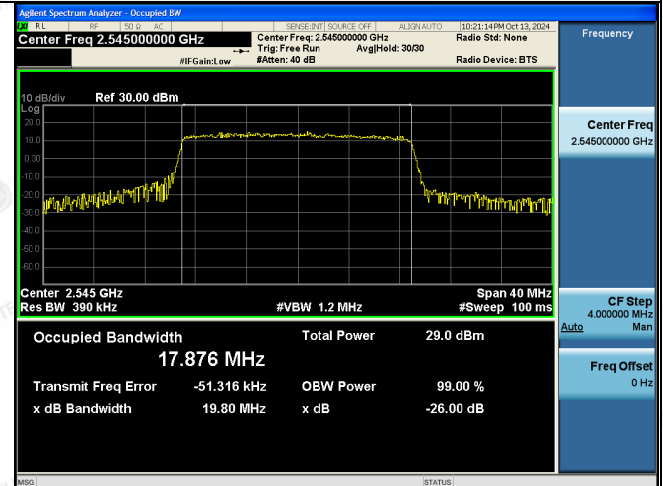
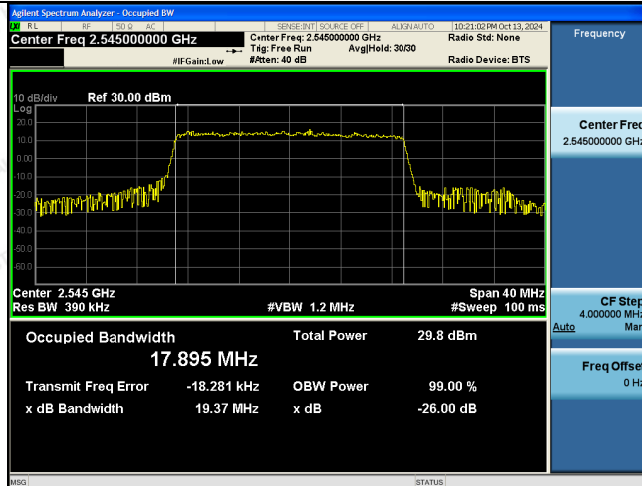


LTE Band 41-20MHz Channel Bandwidth Occupied Bandwidth and Emission Bandwidth

QPSK

16QAM

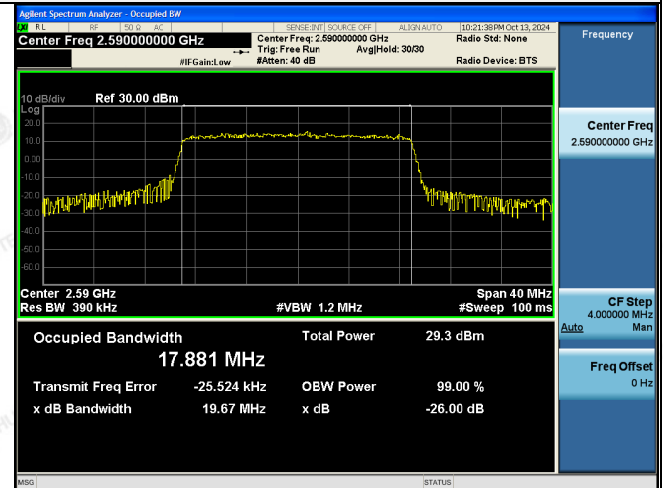
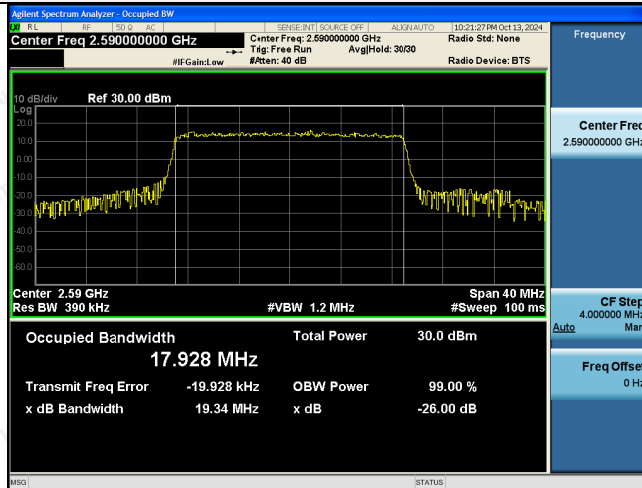
Low Channel



100RB#0

100RB#0

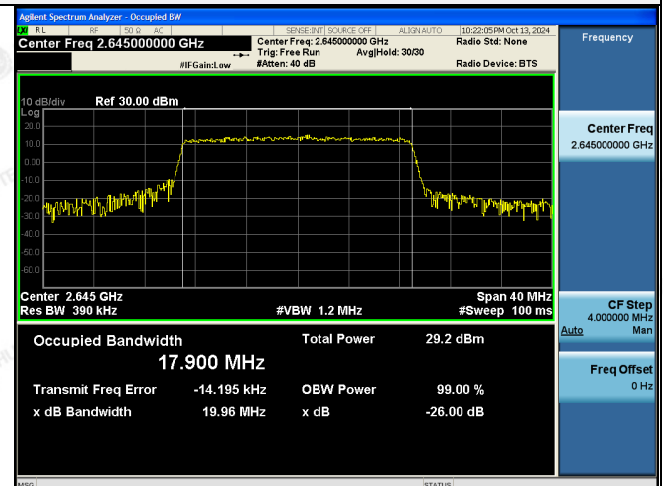
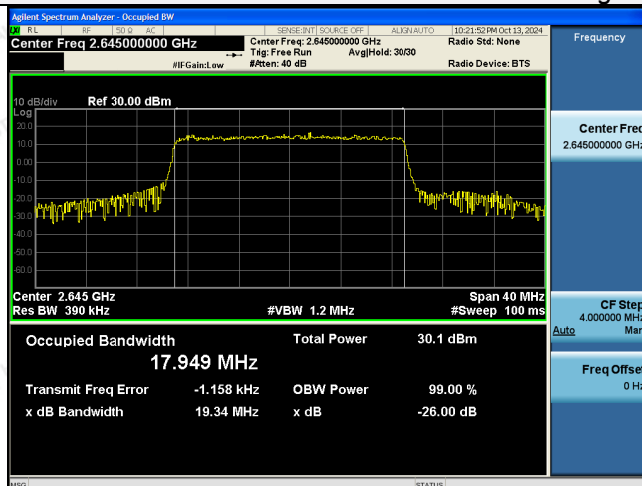
Middle Channel



100RB#0

100RB#0

High Channel



100RB#0

100RB#0

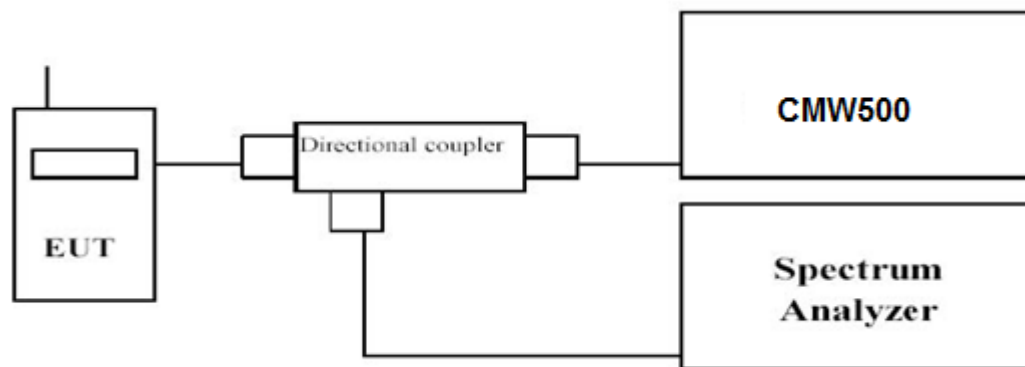


4.4 Band Edge compliance

LIMIT

the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $40 + 10 \log P$ dB (−10 dBm, 100 nW) on all frequencies between the channel edge and 5 MHz from the channel edge, $43 + 10 \log P$ dB (−13 dBm, 50 nW) on all frequencies between 5 MHz and X MHz from the channel edge, and $55 + 10 \log P$ dB (−25 dBm, 3 nW) on all frequencies more than 20 MHz from the channel edge, where XMHz is the greater of 6 MHz or the actual emission bandwidth (26 dB).

TEST CONFIGURATION



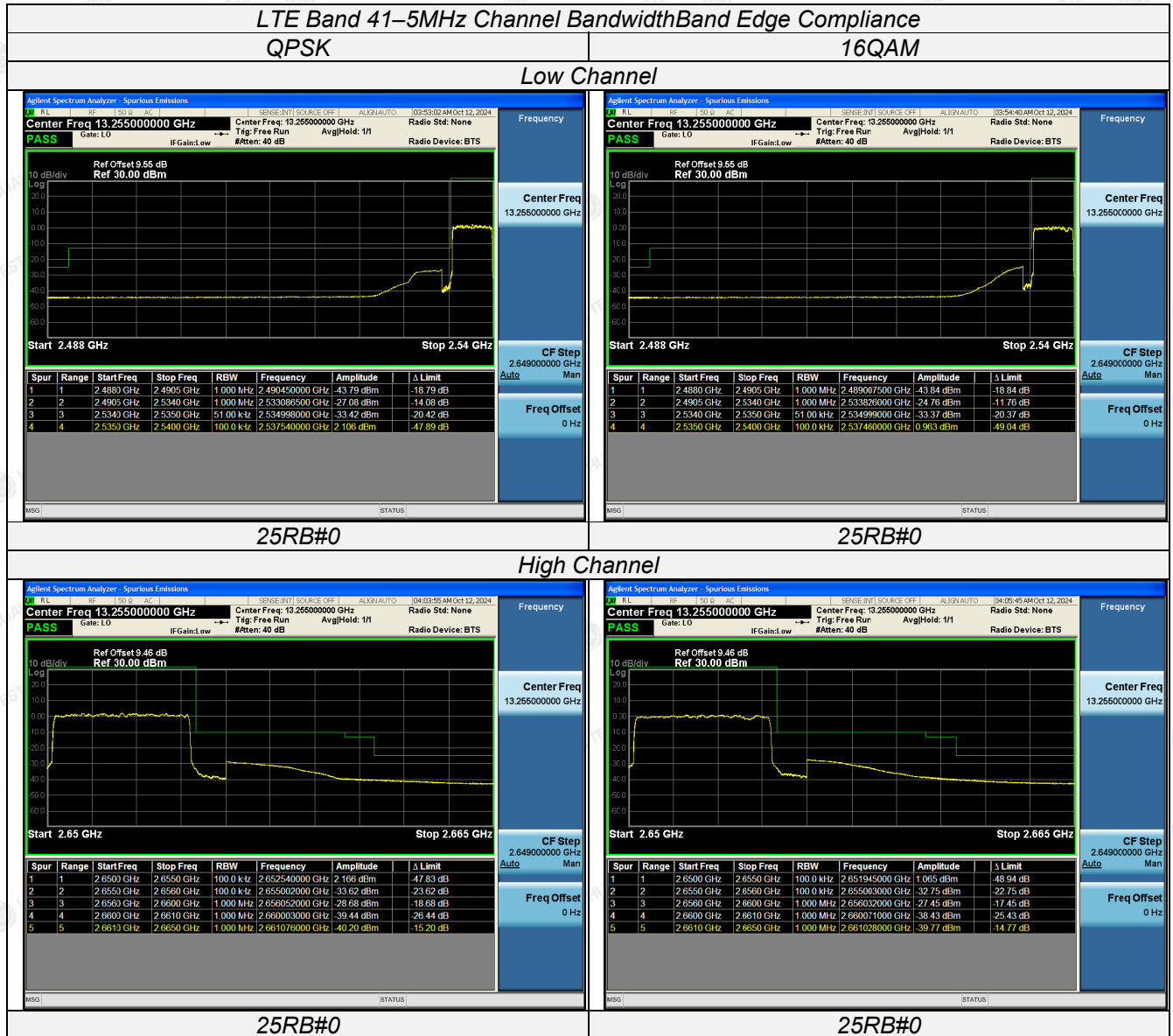
TEST PROCEDURE

1. The transmitter output port was connected to base station.
2. The RF output of EUT was connected to the power meter by RF cable and attenuator, the path loss was compensated to the results for each measurement.
3. Set EUT at maximum power through base station.
4. Select lowest and highest channels for each band and different modulation.
5. Measure Band edge using RMS (Average) detector by spectrum
6. Set RBW = 100 kHz, VBW=300 kHz, Span=50MHz Peak Detector.

TEST RESULTS

Remark:

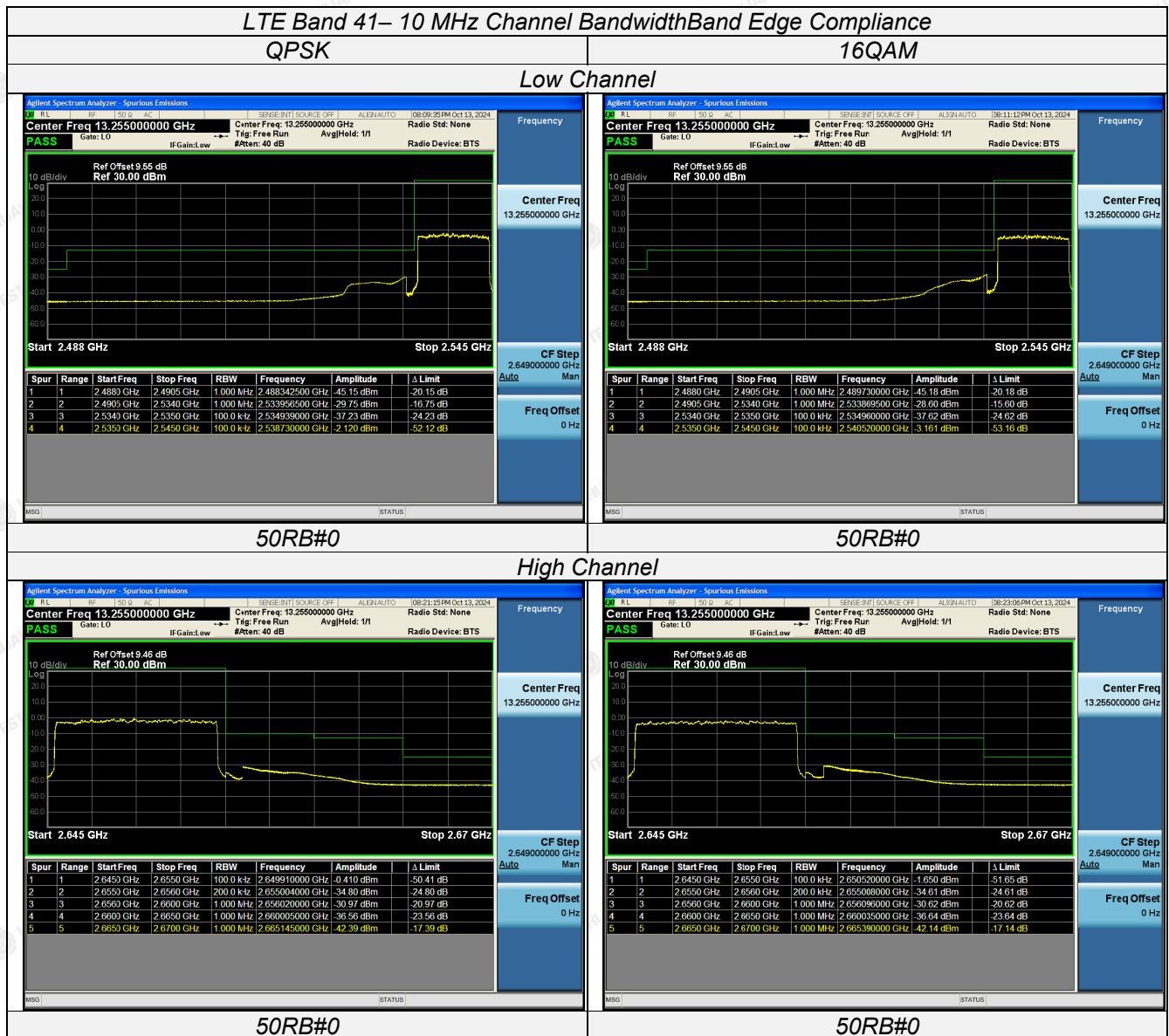
1. We were tested all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE Band 41; recorded worst case for each Channel Bandwidth of LTE Band 41.

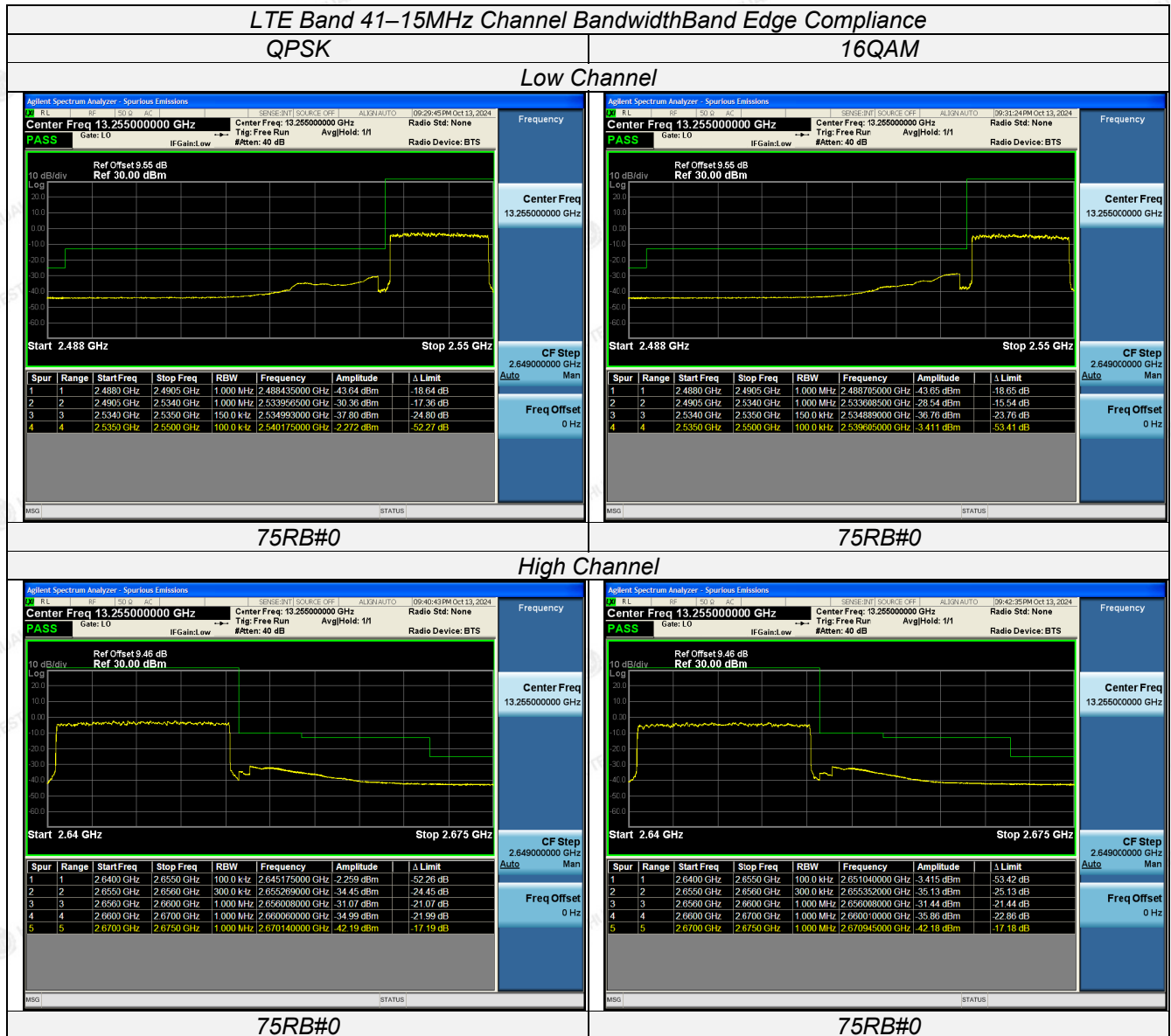


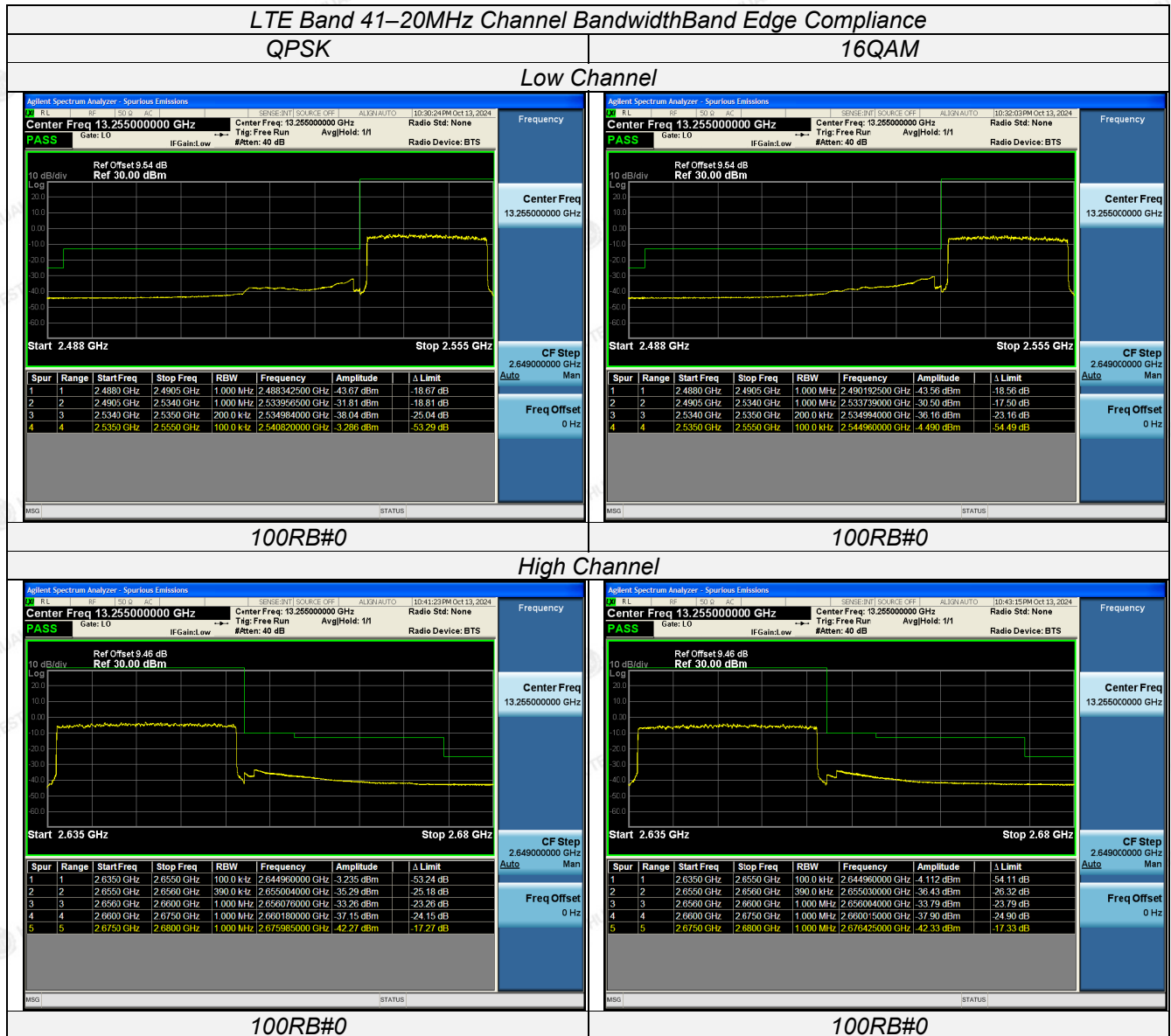
The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAKE, this document cannot be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at <http://www.cer-mark.com>.

TEL : +86-755 2302 9901 FAX : +86-755 2302 9901 E-mail : service@cer-mark.com

Add: 1-2F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China







The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAKE, this document cannot be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at <http://www.cer-mark.com>.

TEL : +86-755 2302 9901 FAX : +86-755 2302 9901 E-mail : service@cer-mark.com

Add: 1-2F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

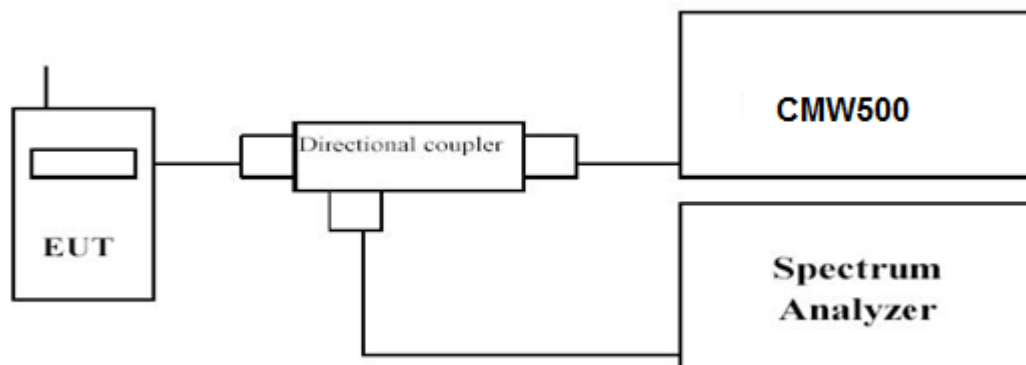


4.5 Spurious Emission on Antenna Port

LIMIT

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $40 + 10 \log P$ dB (–10 dBm, 100 nW) on all frequencies between the channel edge and 5 MHz from the channel edge, $43 + 10 \log P$ dB (–13 dBm, 50 nW) on all frequencies between 5 MHz and X MHz from the channel edge, and $55 + 10 \log P$ dB (–25 dBm, 3 nW) on all frequencies more than 20 MHz from the channel edge, where X MHz is the greater of 6 MHz or the actual emission bandwidth (26 dB).

TEST CONFIGURATION



TEST PROCEDURE

The EUT was setup according to EIA/TIA 603D

- Place the EUT on a bench and set it in transmitting mode.
- Connect a low loss RF cable from the antenna port to a spectrum analyzer and CMW500 by a Directional Couple.
- EUT Communicate with CMW500, then select a channel for testing.
- Add a correction factor to the display of spectrum, and then test.
- The resolution bandwidth of the spectrum analyzer was set sufficient scans were taken to show the out of band Emission if any up to 10^{th} harmonic.
- Please refer to following tables for test antenna conducted emissions.

Working Frequency	Sub range (GHz)	RBW	VBW	Sweep time (s)
LTE Band 41	0.03~1	100 KHz	300 KHz	Auto
	1~27	1 MHz	3 MHz	Auto

TEST RESULTS

Remark:

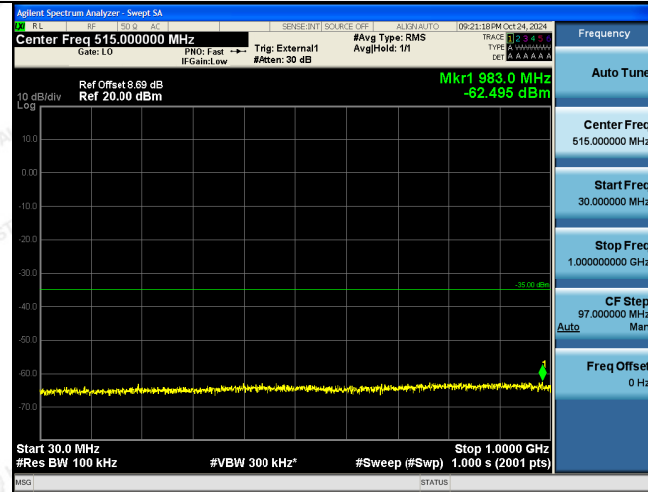
- We were tested all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE Band 41; recorded worst case at the QPSK Mode for each Channel Bandwidth of LTE Band 41



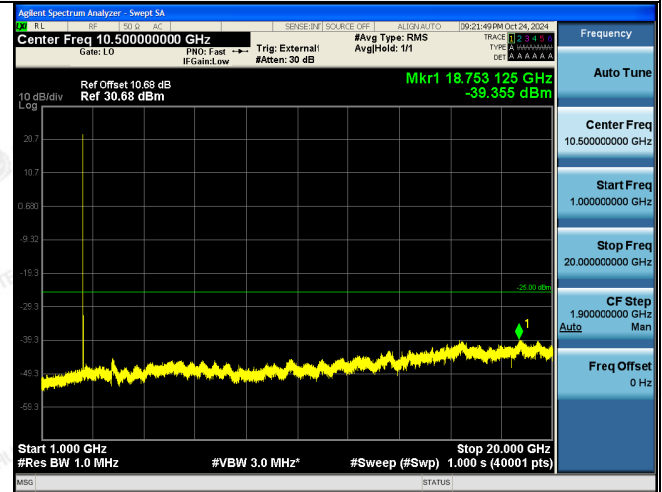
LTE Band 41-5 MHz Channel Bandwidth

Low Channel

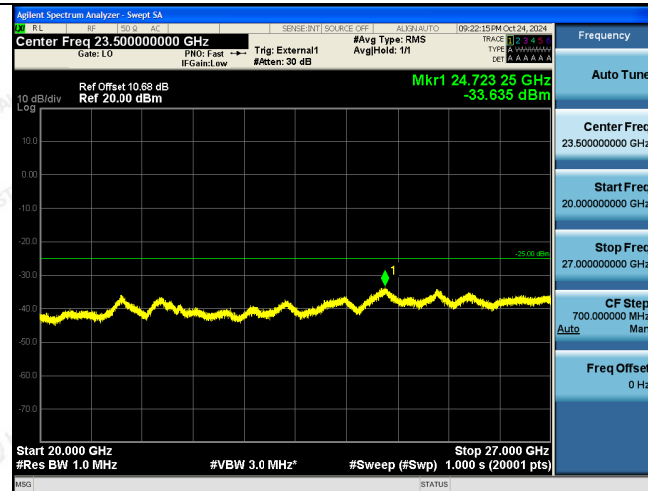
QPSK



30MHz~1GHz



1GHz ~20GHz



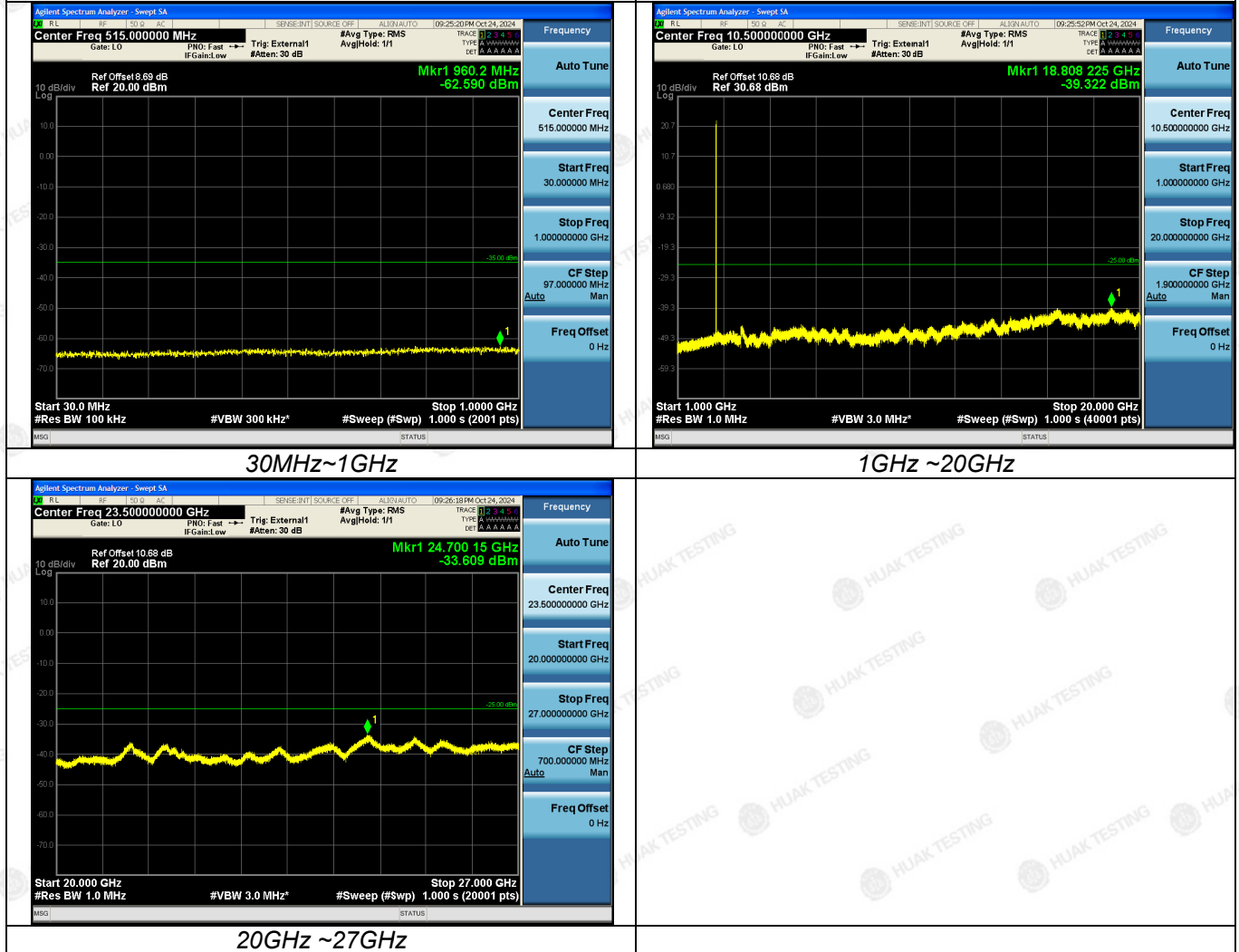
20GHz ~27GHz



LTE Band 41-5 MHz Channel Bandwidth

Middle Channel

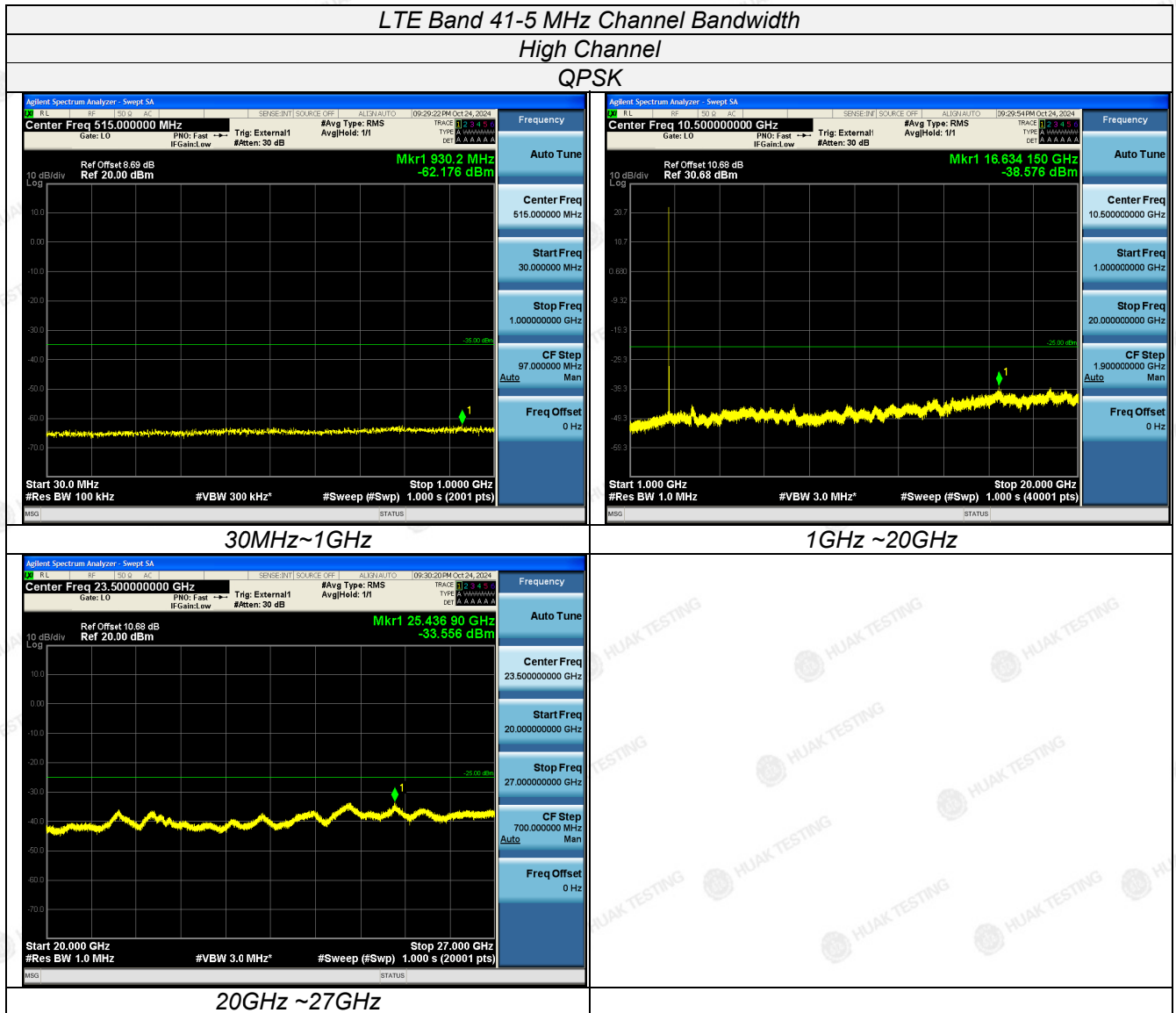
QPSK



The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAKE, this document cannot be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at <http://www.cer-mark.com>.

TEL : +86-755 2302 9901 FAX : +86-755 2302 9901 E-mail : service@cer-mark.com

Add: 1-2F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

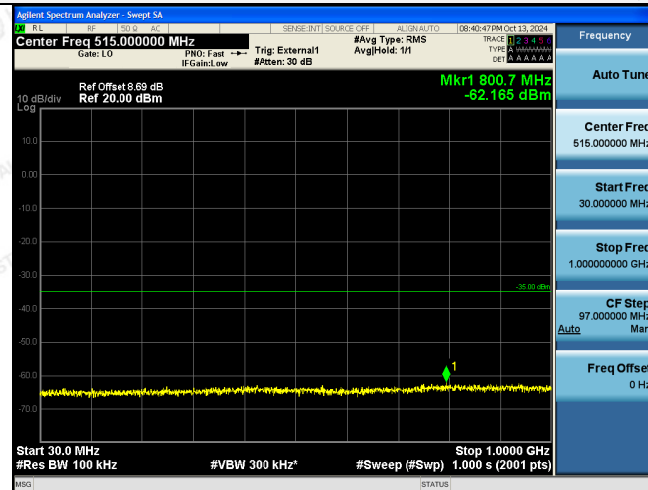




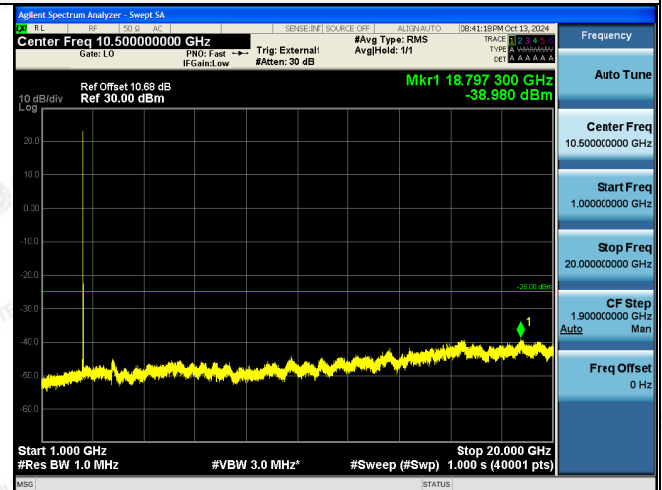
LTE Band 41-10 MHz Channel Bandwidth

Low Channel

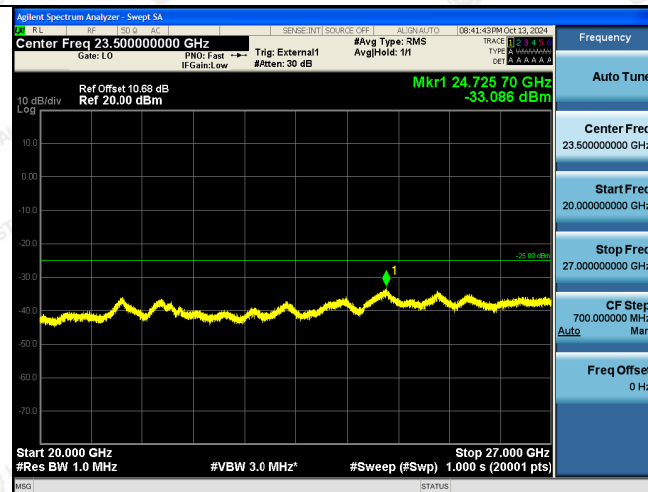
QPSK



30MHz~1GHz



1GHz ~20GHz



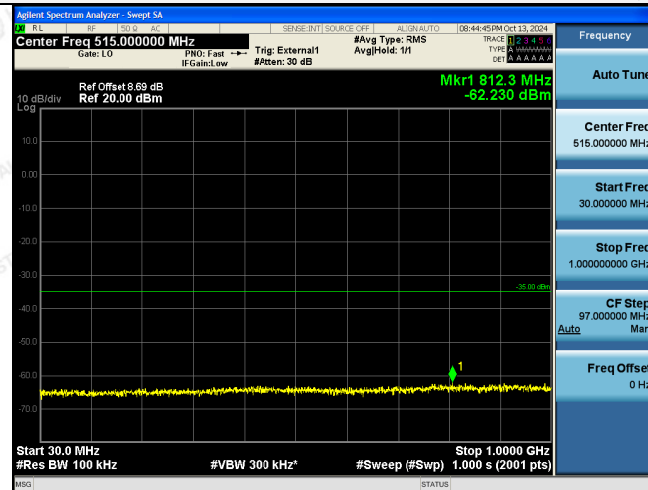
20GHz ~27GHz



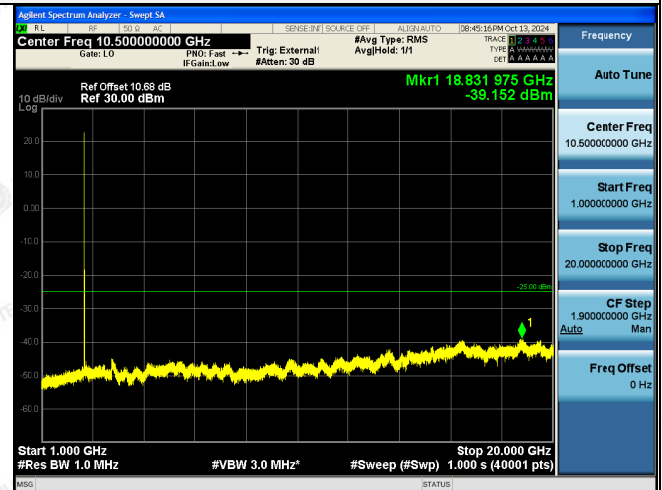
LTE Band 41-10 MHz Channel Bandwidth

Middle Channel

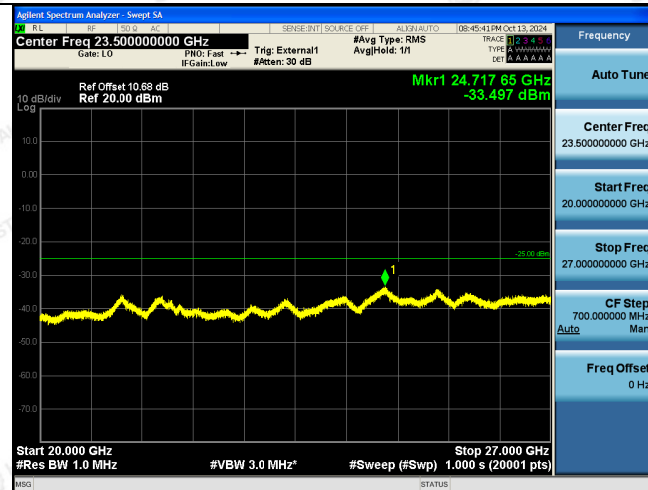
QPSK



30MHz~1GHz



1GHz ~20GHz



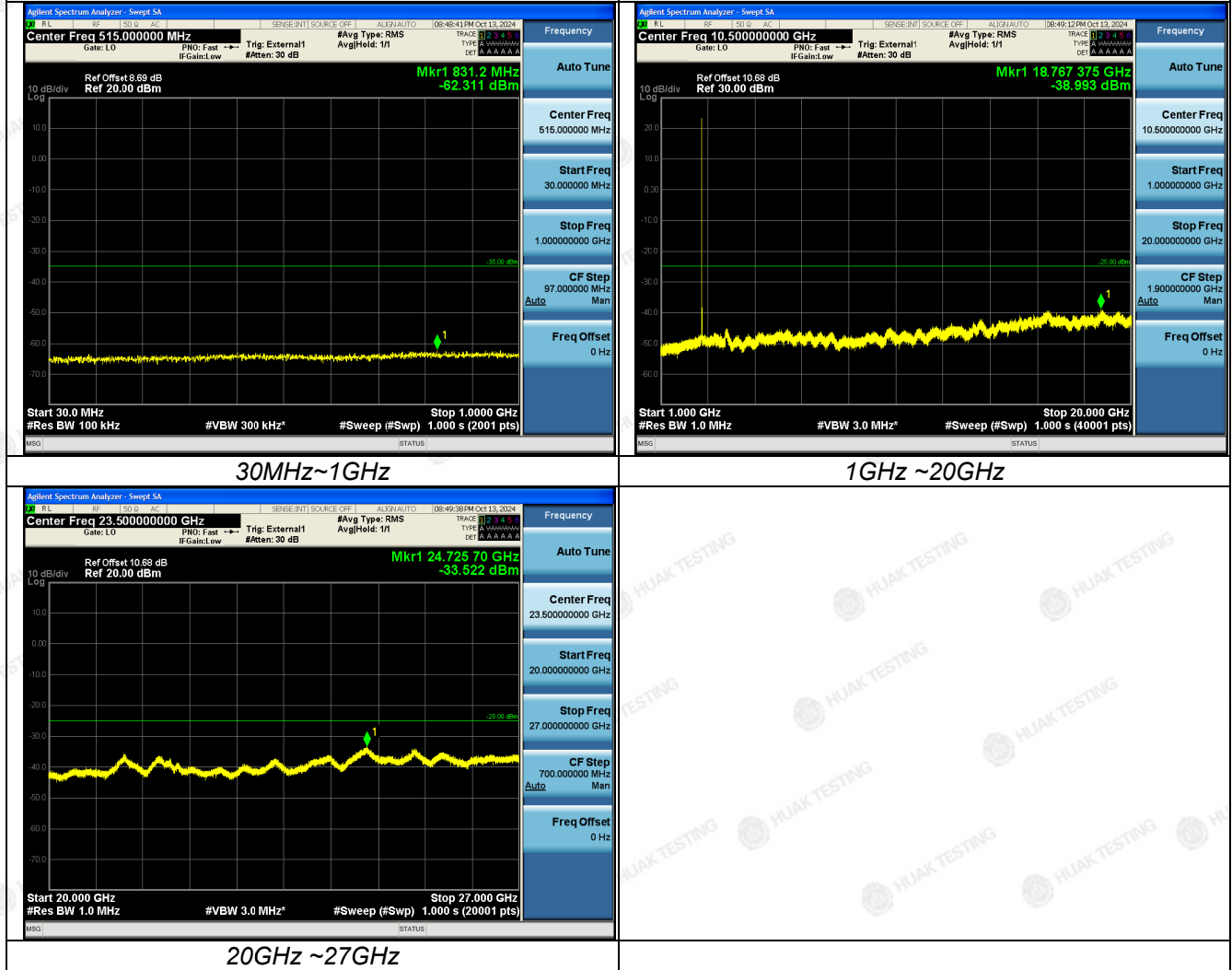
20GHz ~27GHz



LTE Band 41-10 MHz Channel Bandwidth

High Channel

QPSK

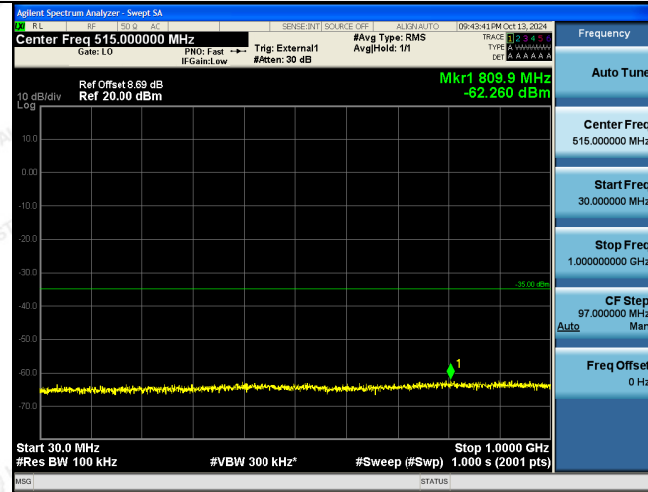




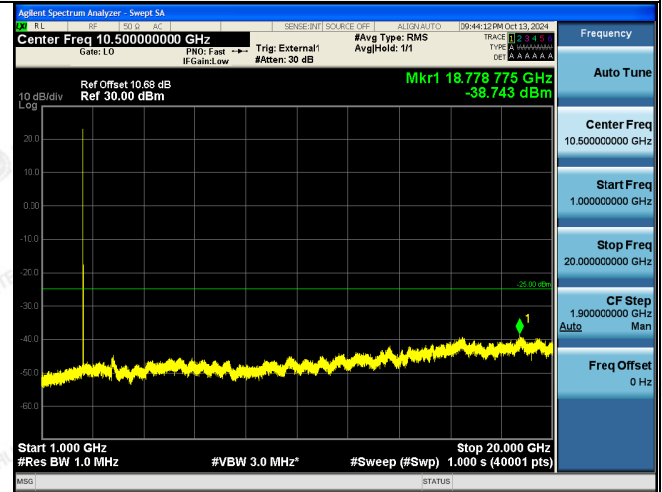
LTE Band 41-15 MHz Channel Bandwidth

Low Channel

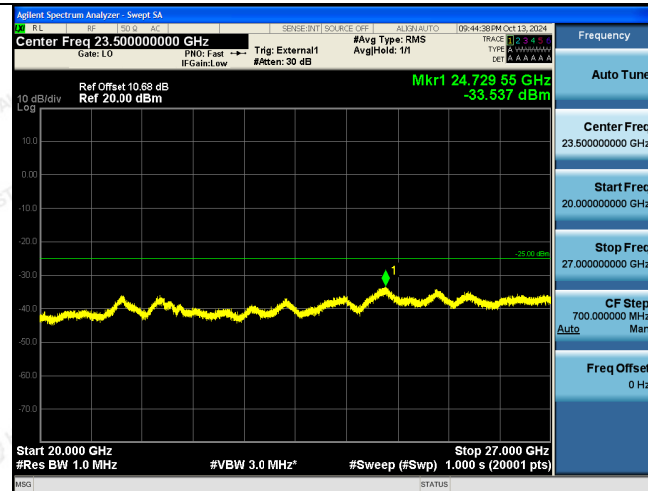
QPSK



30MHz~1GHz



1GHz ~20GHz



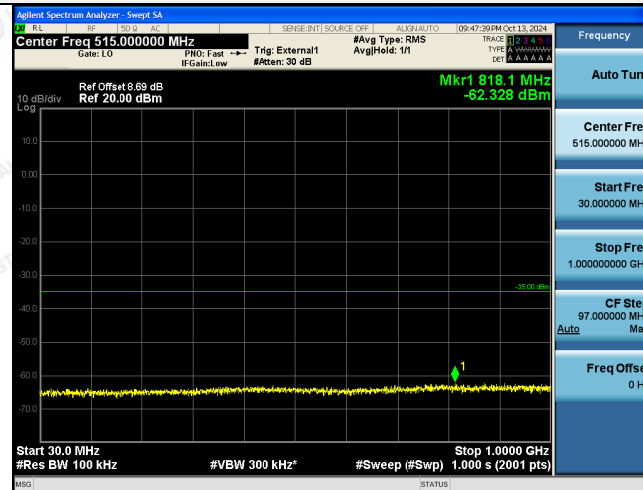
20GHz ~27GHz



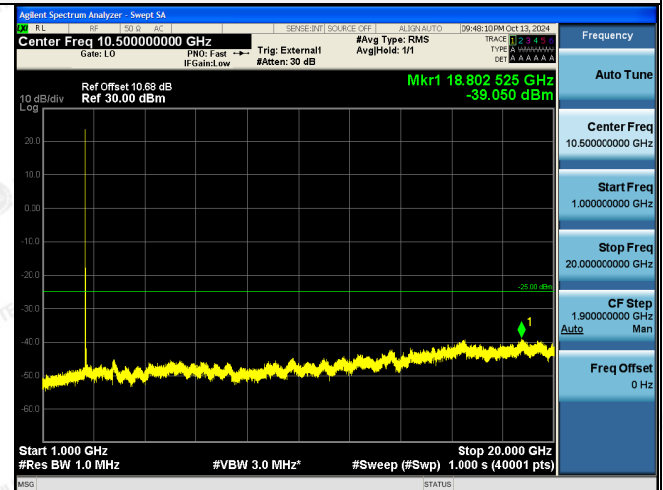
LTE Band 41-15 MHz Channel Bandwidth

Middle Channel

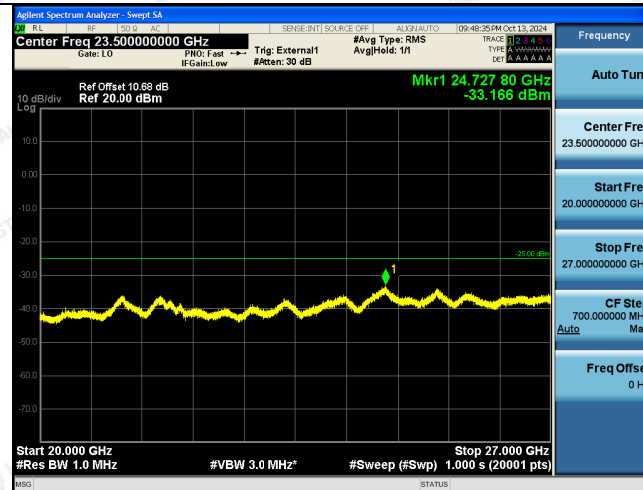
QPSK



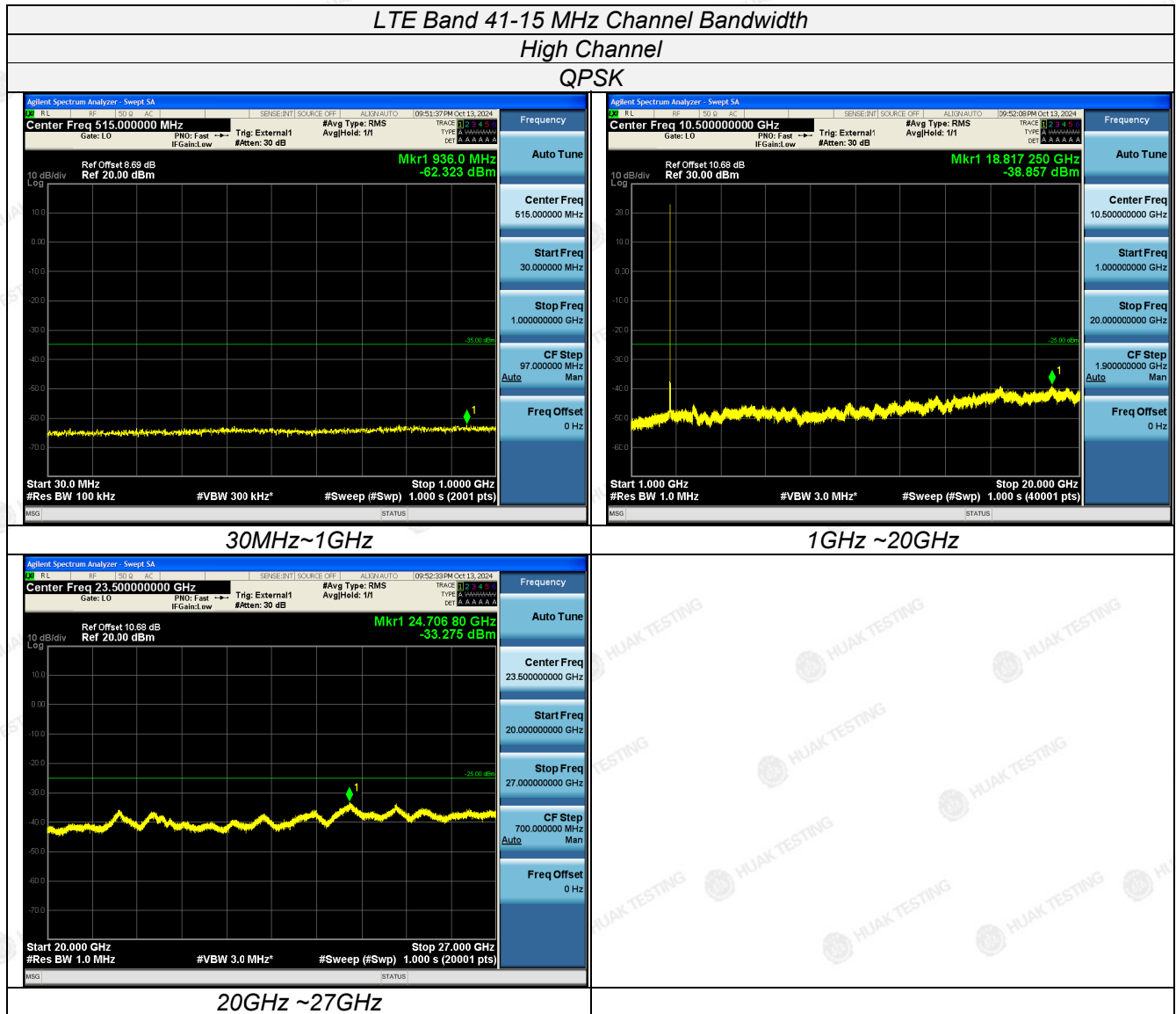
30MHz~1GHz



1GHz ~20GHz



20GHz ~27GHz

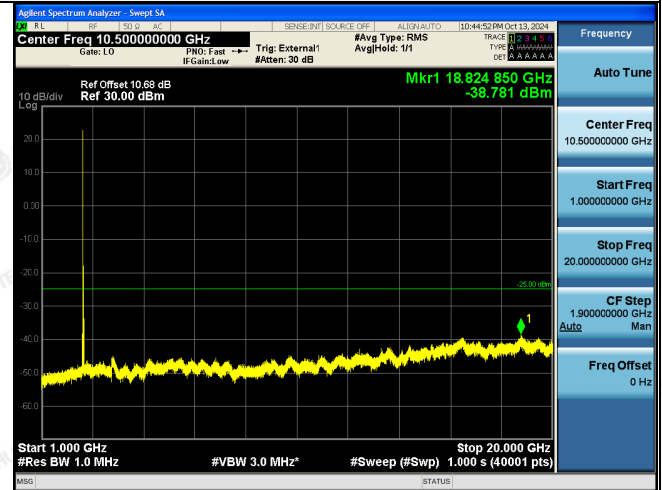
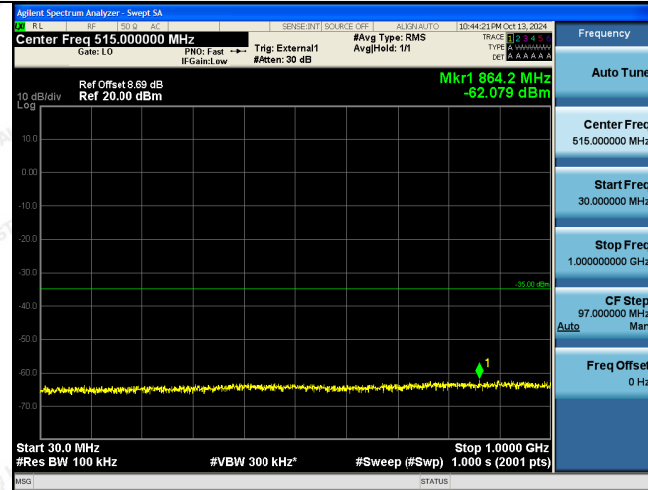




LTE Band 41-20 MHz Channel Bandwidth

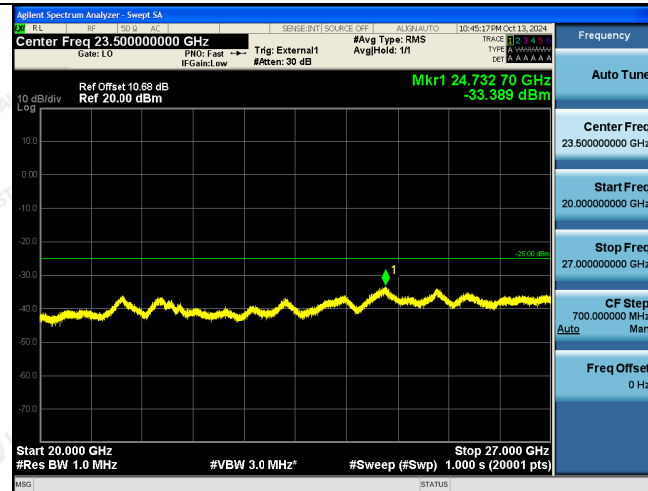
Low Channel

QPSK



30MHz~1GHz

1GHz~20GHz



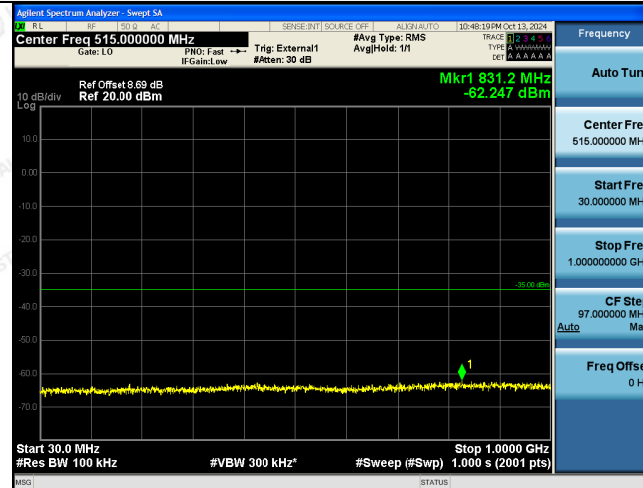
20GHz~27GHz



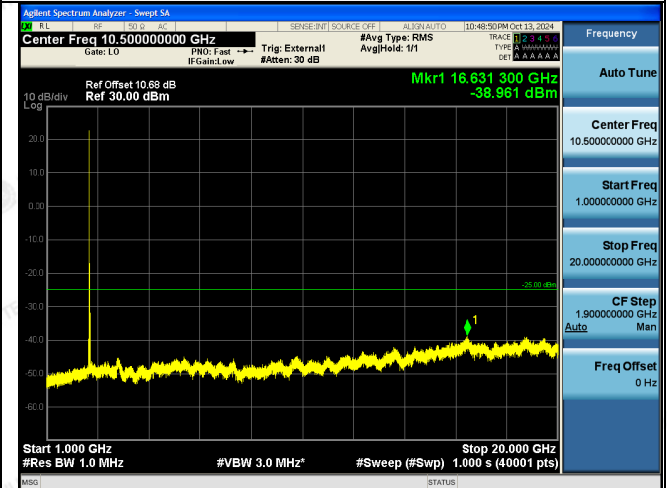
LTE Band 41-20 MHz Channel Bandwidth

Middle Channel

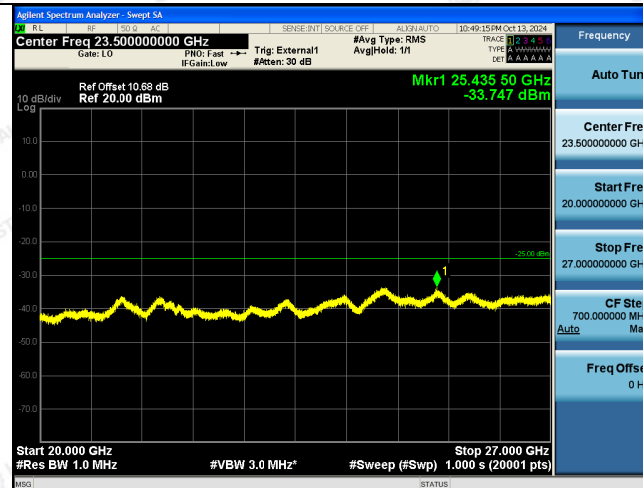
QPSK



30MHz~1GHz



1GHz ~20GHz



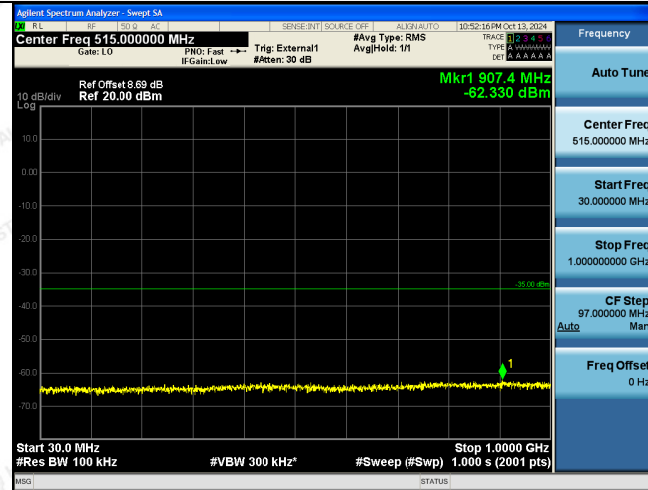
20GHz ~27GHz



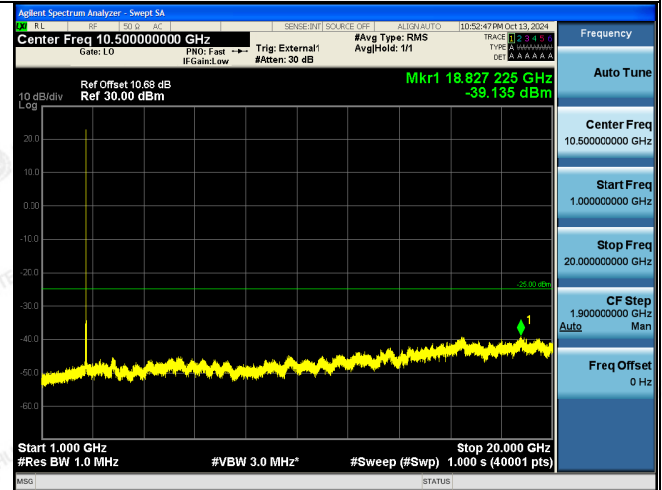
LTE Band 41-20 MHz Channel Bandwidth

High Channel

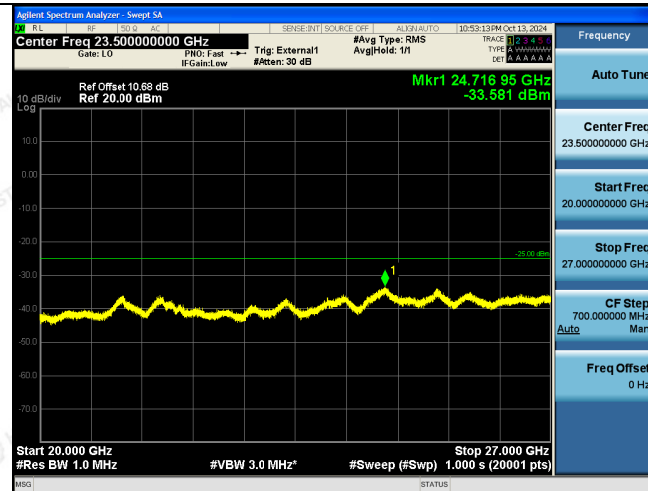
QPSK



30MHz~1GHz



1GHz~20GHz



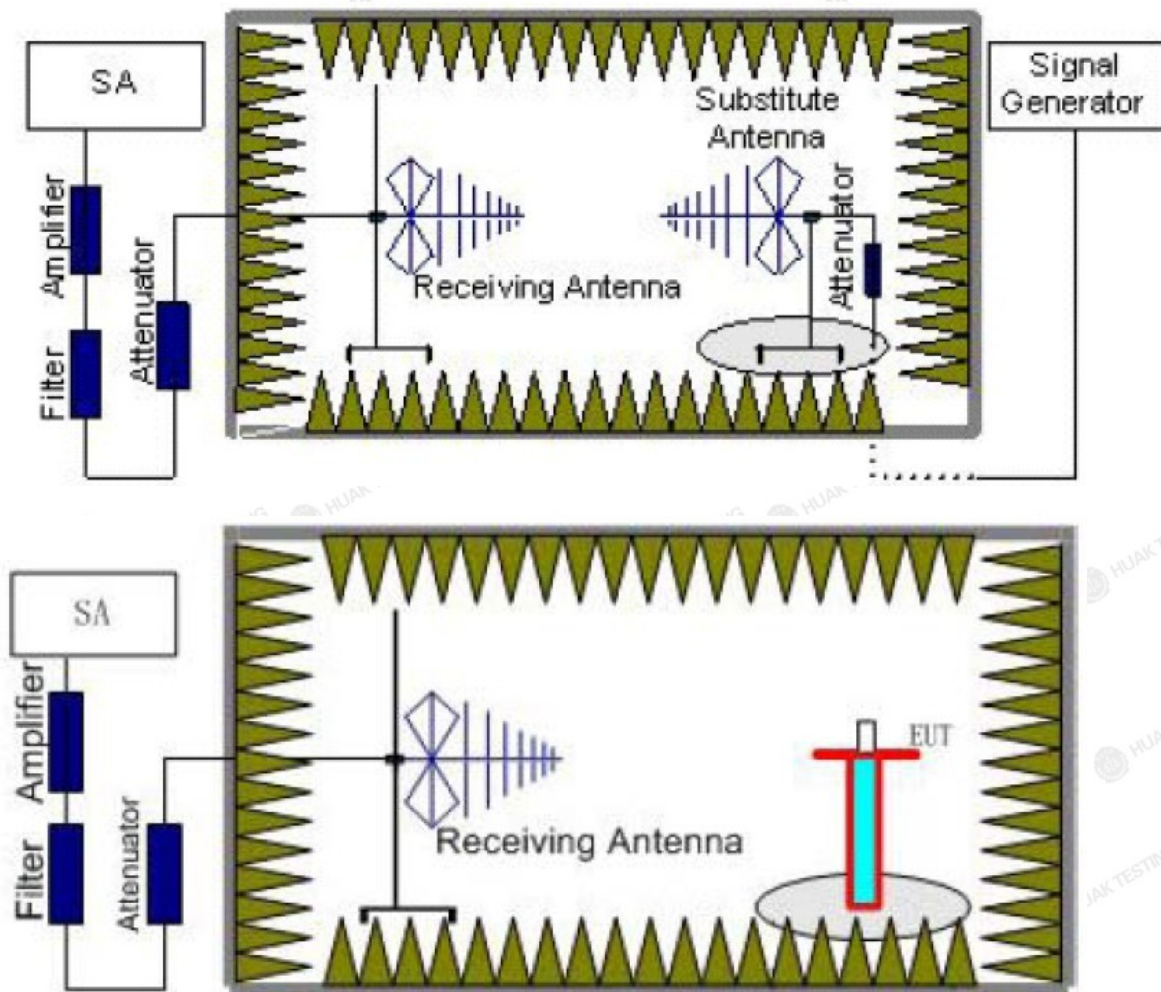
20GHz~27GHz

4.6 Radiated Spurious Emission

TEST APPLICABLE

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $40 + 10 \log P$ dB (–10 dBm, 100 nW) on all frequencies between the channel edge and 5 MHz from the channel edge, $43 + 10 \log P$ dB (–13 dBm, 50 nW) on all frequencies between 5 MHz and X MHz from the channel edge, and $55 + 10 \log P$ dB (–25 dBm, 3 nW) on all frequencies more than 20 MHz from the channel edge, where X MHz is the greater of 6 MHz or the actual emission bandwidth (26 dB).

TEST CONFIGURATION



TEST PROCEDURE

The EUT was setup according to EIA/TIA 603D

- The EUT shall be placed at the specified height on a support, and in the position closest to normal use as declared by provider.
- The test antenna shall be oriented initially for vertical polarization and shall be chosen to correspond to the frequency of the transmitter
- The output of the test antenna shall be connected to the measuring receiver.
- The transmitter shall be switched on and the measuring receiver shall be tuned to the frequency of the transmitter under test.



- e. The test antenna shall be raised and lowered through the specified range of height until a maximum signal level is detected by the measuring receiver.
- f. The transmitter shall then be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
- g. The test antenna shall be raised and lowered again through the specified range of height until a maximum signal level is detected by the measuring receiver.
- h. The maximum signal level detected by the measuring receiver shall be noted.
- i. The transmitter shall be replaced by a substitution antenna.
- j. The substitution antenna shall be orientated for vertical polarization and the length of the substitution antenna shall be adjusted to correspond to the frequency of the transmitter.
- k. The substitution antenna shall be connected to a calibrated signal generator.
- l. If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
- m. The test antenna shall be raised and lowered through the specified range of height to ensure that the maximum signal is received.
- n. The input signal to the substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, that is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuator setting of the measuring receiver.
- o. The measurement shall be repeated with the test antenna and the substitution antenna orientated for horizontal polarization.
- p. The measure of the effective radiated power is the larger of the two levels recorded at the input to the substitution antenna, corrected for gain of the substitution antenna if necessary.
- q. Test site anechoic chamber refer to ANSI C63.4:2014.

Frequency	Channel	Frequency Range	Verdict
LTE Band 41	Low	30MHz -26.5GHz	PASS
	Middle	30MHz -26.5GHz	PASS
	High	30MHz -26.5GHz	PASS

Radiated Measurement:

Remark:

1. We measured all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE Band 41; recorded worst case for each Channel Bandwidth of LTE Band 41.
2. $EIRP = P_S(dBm) - P_{cl}(dB) + G_a(dBi)$
3. Not recorded other points means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
4. $Margin = Limit - EIRP$

LTE Band 41 Channel Bandwidth 5MHz QPSK 1RB#0 Low Channel

Frequency (MHz)	P_S (dBm)	P_{cl} (dB)	Distance	G_a Antenna Gain (dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5075.0	-48.07	4.39	3.00	12.34	-40.12	-25.00	15.12	H
7612.5	-52.08	5.31	3.00	13.52	-43.87	-25.00	18.87	H
5075.0	-51.61	4.39	3.00	12.34	-43.66	-25.00	18.66	V
7612.5	-54.82	5.31	3.00	13.52	-46.61	-25.00	21.61	V

LTE Band 41 Channel Bandwidth 5MHz QPSK 1RB#0 Middle Channel

Frequency (MHz)	P_S (dBm)	P_{cl} (dB)	Distance	G_a Antenna Gain (dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5180.0	-46.78	4.41	3.00	12.34	-38.85	-25.00	13.85	H
7770.0	-49.75	5.38	3.00	13.58	-41.55	-25.00	16.55	H
5180.0	-47.29	4.41	3.00	12.34	-39.36	-25.00	14.36	V
7770.0	-43.94	5.38	3.00	13.58	-35.74	-25.00	10.74	V

*LTE Band 41 Channel Bandwidth 5MHz_QPSK_1RB#0_High Channel*

Frequency (MHz)	Ps (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5305.0	-48.2	4.45	3.00	12.45	-40.2	-25.00	15.2	H
7957.5	-46.03	5.47	3.00	13.66	-37.84	-25.00	12.84	H
5305.0	-46.64	4.45	3.00	12.45	-38.64	-25.00	13.64	V
7957.5	-44.12	5.48	3.00	13.66	-35.94	-25.00	10.94	V

LTE Band 41 Channel Bandwidth 10MHz_QPSK_1RB#0_Low Channel

Frequency (MHz)	Ps (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5080.0	-47.09	4.39	3.00	12.34	-39.14	-25.00	14.14	H
7620.0	-50.74	5.31	3.00	13.52	-42.53	-25.00	17.53	H
5080.0	-52.86	4.39	3.00	12.34	-44.91	-25.00	19.91	V
7620.0	-52.86	5.31	3.00	13.52	-44.65	-25.00	19.65	V

LTE Band 41 Channel Bandwidth 10MHz_QPSK_1RB#0_Middle Channel

Frequency (MHz)	Ps (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5180.0	-49.18	4.41	3.00	12.34	-41.25	-25.00	16.25	H
7770.0	-50.01	5.38	3.00	13.58	-41.81	-25.00	16.81	H
5180.0	-45.63	4.41	3.00	12.34	-37.7	-25.00	12.7	V
7770.0	-45.83	5.38	3.00	13.58	-37.63	-25.00	12.63	V

LTE Band 41 Channel Bandwidth 10MHz_QPSK_1RB#0_High Channel

Frequency (MHz)	Ps (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5300.0	-49.1	4.45	3.00	12.45	-41.1	-25.00	16.1	H
7950.0	-46.33	5.47	3.00	13.66	-38.14	-25.00	13.14	H
5300.0	-45.46	4.45	3.00	12.45	-37.46	-25.00	12.46	V
7950.0	-44.46	5.48	3.00	13.66	-36.28	-25.00	11.28	V

LTE Band 41 Channel Bandwidth 15MHz_QPSK_1RB#0_Low Channel

Frequency (MHz)	Ps (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5085.0	-50.03	4.39	3.00	12.34	-42.08	-25.00	17.08	H
7627.5	-51.39	5.31	3.00	13.52	-43.18	-25.00	18.18	H
5085.0	-51.85	4.39	3.00	12.34	-43.9	-25.00	18.9	V
7627.5	-54.04	5.31	3.00	13.52	-45.83	-25.00	20.83	V

LTE Band 41 Channel Bandwidth 15MHz_QPSK_1RB#0_Middle Channel

Frequency (MHz)	Ps (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5180.0	-48.61	4.41	3.00	12.34	-40.68	-25.00	15.68	H
7770.0	-48.49	5.38	3.00	13.58	-40.29	-25.00	15.29	H
5180.0	-46.14	4.41	3.00	12.34	-38.21	-25.00	13.21	V
7770.0	-45.73	5.38	3.00	13.58	-37.53	-25.00	12.53	V

*LTE Band 41 Channel Bandwidth 15MHz_QPSK_1RB#0_High Channel*

Frequency (MHz)	Ps (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5295.0	-48.78	4.45	3.00	12.45	-40.78	-25.00	15.78	H
7942.5	-45.18	5.47	3.00	13.66	-36.99	-25.00	11.99	H
5295.0	-45.54	4.45	3.00	12.45	-37.54	-25.00	12.54	V
7942.5	-44.94	5.48	3.00	13.66	-36.76	-25.00	11.76	V

LTE Band 41 Channel Bandwidth 20MHz_QPSK_1RB#0_Low Channel

Frequency (MHz)	Ps (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5090.0	-47.34	4.39	3.00	12.34	-39.39	-25.00	14.39	H
7635.0	-50.55	5.31	3.00	13.52	-42.34	-25.00	17.34	H
5090.0	-50.99	4.39	3.00	12.34	-43.04	-25.00	18.04	V
7635.0	-54.19	5.31	3.00	13.52	-45.98	-25.00	20.98	V

LTE Band 41 Channel Bandwidth 20MHz_QPSK_1RB#0_Middle Channel

Frequency (MHz)	Ps (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5180.0	-48.66	4.41	3.00	12.34	-40.73	-25.00	15.73	H
7770.0	-51.12	5.38	3.00	13.58	-42.92	-25.00	17.92	H
5180.0	-44.64	4.41	3.00	12.34	-36.71	-25.00	11.71	V
7770.0	-45.39	5.38	3.00	13.58	-37.19	-25.00	12.19	V

LTE Band 41 Channel Bandwidth 20MHz_QPSK_1RB#0_High Channel

Frequency (MHz)	Ps (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5290.0	-48.06	4.45	3.00	12.45	-40.06	-25.00	15.06	H
7935.0	-45.83	5.47	3.00	13.66	-37.64	-25.00	12.64	H
5290.0	-47.3	4.45	3.00	12.45	-39.3	-25.00	14.3	V
7935.0	-45.72	5.48	3.00	13.66	-37.54	-25.00	12.54	V

LTE Band 41 Channel Bandwidth 5MHz_16QAM_1RB#0_Low Channel

Frequency (MHz)	Ps (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5075.0	-47.87	4.39	3.00	12.34	-39.92	-25.00	14.92	H
7612.5	-49.49	5.31	3.00	13.52	-41.28	-25.00	16.28	H
5075.0	-52.88	4.39	3.00	12.34	-44.93	-25.00	19.93	V
7612.5	-54.03	5.31	3.00	13.52	-45.82	-25.00	20.82	V

LTE Band 41 Channel Bandwidth 5MHz_16QAM_1RB#0_Middle Channel

Frequency (MHz)	Ps (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5180.0	-48.62	4.41	3.00	12.34	-40.69	-25.00	15.69	H
7770.0	-51.24	5.38	3.00	13.58	-43.04	-25.00	18.04	H
5180.0	-47.39	4.41	3.00	12.34	-39.46	-25.00	14.46	V
7770.0	-46.82	5.38	3.00	13.58	-38.62	-25.00	13.62	V

*LTE Band 41 Channel Bandwidth 5MHz 16QAM 1RB#0 High Channel*

Frequency (MHz)	Ps (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5305.0	-47.66	4.45	3.00	12.45	-39.66	-25.00	14.66	H
7957.5	-45.79	5.47	3.00	13.66	-37.6	-25.00	12.6	H
5305.0	-44.51	4.45	3.00	12.45	-36.51	-25.00	11.51	V
7957.5	-45.12	5.48	3.00	13.66	-36.94	-25.00	11.94	V

LTE Band 41 Channel Bandwidth 10MHz 16QAM 1RB#0 Low Channel

Frequency (MHz)	Ps (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5080.0	-48.6	4.39	3.00	12.34	-40.65	-25.00	15.65	H
7620.0	-50.01	5.31	3.00	13.52	-41.8	-25.00	16.8	H
5080.0	-52.66	4.39	3.00	12.34	-44.71	-25.00	19.71	V
7620.0	-53.59	5.31	3.00	13.52	-45.38	-25.00	20.38	V

LTE Band 41 Channel Bandwidth 10MHz 16QAM 1RB#0 Middle Channel

Frequency (MHz)	Ps (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5180.0	-48.73	4.41	3.00	12.34	-40.8	-25.00	15.8	H
7770.0	-50.89	5.38	3.00	13.58	-42.69	-25.00	17.69	H
5180.0	-46.85	4.41	3.00	12.34	-38.92	-25.00	13.92	V
7770.0	-46.88	5.38	3.00	13.58	-38.68	-25.00	13.68	V

LTE Band 41 Channel Bandwidth 10MHz 16QAM 1RB#0 High Channel

Frequency (MHz)	Ps (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5300.0	-47.53	4.45	3.00	12.45	-39.53	-25.00	14.53	H
7950.0	-46.09	5.47	3.00	13.66	-37.9	-25.00	12.9	H
5300.0	-45.16	4.45	3.00	12.45	-37.16	-25.00	12.16	V
7950.0	-45.23	5.48	3.00	13.66	-37.05	-25.00	12.05	V

LTE Band 41 Channel Bandwidth 15MHz 16QAM 1RB#0 Low Channel

Frequency (MHz)	Ps (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5085.0	-48.94	4.39	3.00	12.34	-40.99	-25.00	15.99	H
7627.5	-49.96	5.31	3.00	13.52	-41.75	-25.00	16.75	H
5085.0	-52.34	4.39	3.00	12.34	-44.39	-25.00	19.39	V
7627.5	-55.58	5.31	3.00	13.52	-47.37	-25.00	22.37	V

LTE Band 41 Channel Bandwidth 15MHz 16QAM 1RB#0 Middle Channel

Frequency (MHz)	Ps (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5180.0	-47.99	4.41	3.00	12.34	-40.06	-25.00	15.06	H
7770.0	-49.17	5.38	3.00	13.58	-40.97	-25.00	15.97	H
5180.0	-44.57	4.41	3.00	12.34	-36.64	-25.00	11.64	V
7770.0	-45.35	5.38	3.00	13.58	-37.15	-25.00	12.15	V

**LTE Band 41 Channel Bandwidth 15MHz 16QAM 1RB#0 High Channel**

Frequency (MHz)	Ps (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5295.0	-47.15	4.45	3.00	12.45	-39.15	-25.00	14.15	H
7942.5	-46.57	5.47	3.00	13.66	-38.38	-25.00	13.38	H
5295.0	-46.37	4.45	3.00	12.45	-38.37	-25.00	13.37	V
7942.5	-46.08	5.48	3.00	13.66	-37.9	-25.00	12.9	V

LTE Band 41 Channel Bandwidth 20MHz 16QAM 1RB#0 Low Channel

Frequency (MHz)	Ps (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5090.0	-48.28	4.39	3.00	12.34	-40.33	-25.00	15.33	H
7635.0	-50.75	5.31	3.00	13.52	-42.54	-25.00	17.54	H
5090.0	-53.08	4.39	3.00	12.34	-45.13	-25.00	20.13	V
7635.0	-54.02	5.31	3.00	13.52	-45.81	-25.00	20.81	V

LTE Band 41 Channel Bandwidth 20MHz 16QAM 1RB#0 Middle Channel

Frequency (MHz)	Ps (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5180.0	-47.61	4.41	3.00	12.34	-39.68	-25.00	14.68	H
7770.0	-50.55	5.38	3.00	13.58	-42.35	-25.00	17.35	H
5180.0	-47.12	4.41	3.00	12.34	-39.19	-25.00	14.19	V
7770.0	-46.62	5.38	3.00	13.58	-38.42	-25.00	13.42	V

LTE Band 41 Channel Bandwidth 20MHz 16QAM 1RB#0 High Channel

Frequency (MHz)	Ps (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5290.0	-47.22	4.45	3.00	12.45	-39.22	-25.00	14.22	H
7935.0	-46.27	5.47	3.00	13.66	-38.08	-25.00	13.08	H
5290.0	-46.47	4.45	3.00	12.45	-38.47	-25.00	13.47	V
7935.0	-44.08	5.48	3.00	13.66	-35.9	-25.00	10.9	V

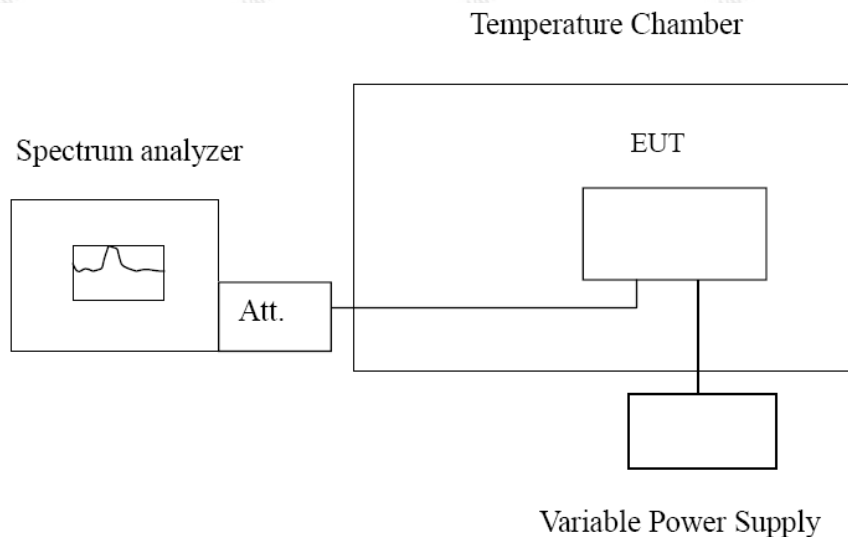


4.7 Frequency Stability

LIMIT

According to §2.1055 requirement, the frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation and should not exceed 2.5ppm.

TEST CONFIGURATION



TEST PROCEDURE

The EUT was setup according to EIA/TIA 603D

Frequency Stability Under Temperature Variations:

In order to measure the carrier frequency under the condition of AFC lock, it is necessary to make measurements with the EUT in a "call mode". This is accomplished with the use of R&S CMW500 DIGITAL RADIO COMMUNICATION TESTER.

1. Measure the carrier frequency at room temperature.
2. Subject the EUT to overnight soak at -30°C.
3. With the EUT, powered via nominal voltage, connected to the CMW500 and in a simulated call on middle channel for LTE band 41, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.
4. Repeat the above measurements at 10°C increments from -30°C to +50°C. Allow at least 1.5 hours at each temperature, unpowered, before making measurements.
5. Re-measure carrier frequency at room temperature with nominal voltage. Vary supply voltage from minimum voltage to maximum voltage, in 0.1Volt increments re-measuring carrier frequency at each voltage. Pause at nominal voltage for 1.5 hours unpowered, to allow any self-heating to stabilize, before continuing.
6. Subject the EUT to overnight soak at +50°C.
7. With the EUT, powered via nominal voltage, connected to the CMW500 and in a simulated call on the centre channel, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.
8. Repeat the above measurements at 10 °C increments from +50°C to -30°C. Allow at least 1.5 hours at each temperature, unpowered, before making measurements
9. At all temperature levels hold the temperature to +/- 0.5°C during the measurement procedure.

Frequency Stability Under Voltage Variations:

Set chamber temperature to 20°C. Use a variable AC power supply / DC power source to power the EUT and set the voltage to rated voltage. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency.

Reduce the input voltage to specify extreme voltage variation ($\pm 15\%$) and endpoint, record the maximum frequency change.

**TEST RESULTS**

Remark:

1. We tested all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE Band 41; recorded worst case.

LTE Band 41_5MHz bandwidth_QPSK_1RB#0 (worst case of all bandwidths)

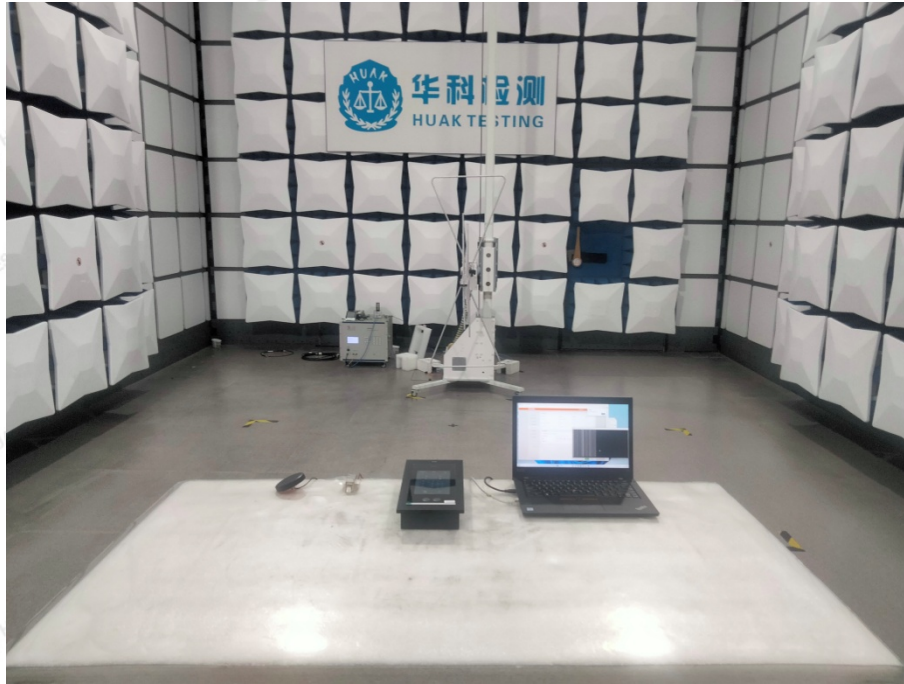
LTE Band 41					
DC Power	Temperature (°C)	Frequency error(Hz)	Frequency error(ppm)	Limit (ppm)	Verdict
10.2	20	10.91	0.004300	2.50	PASS
12	20	6.38	0.002514	2.50	PASS
13.8	20	6.01	0.002368	2.50	PASS
12	-30	8.51	0.003354	2.50	PASS
12	-20	9.74	0.003838	2.50	PASS
12	-10	6.49	0.002558	2.50	PASS
12	0	10.33	0.004071	2.50	PASS
12	10	6.04	0.002380	2.50	PASS
12	20	4.98	0.001963	2.50	PASS
12	30	-4.46	-0.001722	2.50	PASS
12	40	-8.35	-0.003224	2.50	PASS
12	50	7.44	0.002873	2.50	PASS

LTE Band 41_5MHz bandwidth_16QAM_1RB#0 (worst case of all bandwidths)

LTE Band 41					
DC Power	Temperature (°C)	Frequency error(Hz)	Frequency error(ppm)	Limit (ppm)	Verdict
10.2	20	5.15	0.002030	2.50	PASS
12	20	6.78	0.002672	2.50	PASS
13.8	20	7.35	0.002897	2.50	PASS
12	-30	8.18	0.003224	2.50	PASS
12	-20	-9.78	-0.003854	2.50	PASS
12	-10	7.25	0.002857	2.50	PASS
12	0	-5.14	-0.002026	2.50	PASS
12	10	-8.14	-0.003208	2.50	PASS
12	20	9.01	0.003551	2.50	PASS
12	30	-5.92	-0.002286	2.50	PASS
12	40	-4.09	-0.001579	2.50	PASS
12	50	-5.25	-0.002027	2.50	PASS



5 Test Setup Photos of the EUT





6 Photos of the EUT

Reference to the report :ANNEX A of external photos and ANNEX B of internal photos

.....End of Report.....

