FCC Radio Test Report

FCC ID: XMR202112EC200AAU

This report concerns: Original Grant

Project No.	:	2110H020
Equipment	:	LTE Module
Brand Name	:	Quectel
Test Model	:	EC200A-AU
Series Model	:	N/A
Applicant	:	Quectel Wireless Solutions Co., Ltd
Address	:	Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai, China 200233.
Manufacturer	:	Quectel Wireless Solutions Co., Ltd
Address	:	Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai, China 200233.
Date of Receipt	:	Nov. 15, 2021
Date of Test	:	Nov. 16, 2021 ~ Dec. 06, 2021
Issued Date	:	Dec. 09, 2021
Report Version	:	R00
Test Sample	:	Engineering Sample No.: SH20211115155 for EUT, SH20211115153-3 for adapter.
Standard(s)	:	47 CFR FCC Part 27 Subpart L 47 CFR FCC Part 27 Subpart M ANSI/TIA/EIA-603-E-2016 FCC KDB 971168 D01 Power Meas License Digital Systems v03r01

The above equipment has been tested and found compliance with the requirement of the relative standards by BTL Inc.

Maker Qi

Prepared by : Maker Qi

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TESTING CERT #5123.03

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Declaration

BTL represents to the client that testing is done in accordance with standard procedures as applicable and that test instruments used has been calibrated with standards traceable to international standard(s) and/or national standard(s).

BTL's reports apply only to the specific samples tested under conditions. It is manufacture's responsibility to ensure that additional production units of this model are manufactured with the identical electrical and mechanical components. **BTL** shall have no liability for any declarations, inferences or generalizations drawn by the client or others from **BTL** issued reports.

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BTL is not responsible for the sampling stage, so the results only apply to the sample as received.

The information, data and test plan are provided by manufacturer which may affect the validity of results, so it is manufacturer's responsibility to ensure that the apparatus meets the essential requirements of applied standards and in all the possible configurations as representative of its intended use.

Limitation

For the use of the authority's logo is limited unless the Test Standard(s)/Scope(s)/Item(s) mentioned in this test report is (are) included in the conformity assessment authorities acceptance respective.
Please note that the measurement uncertainty is provided for informational purpose only and is not use in determining the Pass/Fail results.

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REPORT ISSUED HISTORY

Report Version	Description	Issued Date
R00	Original Issue.	Dec. 09, 2021

1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standard(s):

FCC Part 27 Subpart L,M,H,E			
Standard(s) Section	Test Item	Judgment	Remark
2.1046 27.50(d)(4) 27.50(h)(2) 27.50(b)(10) 27.50(c)(10)	Effective Radiated Power & Equivalent Isotropic Radiated Power	PASS	------
2.1049	Occupied Bandwidth	PASS	------
2.1051 27.53(c)(2)(4) 27.53(g) 27.53(h) 27.53(m)(4)	Conducted Spurious Emissions	PASS	------
2.1053 27.53(c)(2) 27.53(f) 27.53(g) 27.53(h) 27.53(m)(4)	Radiated Spurious Emissions	PASS	------
2.1051 27.53(c)(2)(4) 27.53(g) 27.53(h) 27.53(m)(4)	Band Edge Measurements	PASS	------
-	Peak To Average Ratio	PASS	------
2.1055 27.54	Frequency Stability	PASS	------

Note:

For the verdict, the “N/A” denotes “not applicable”, the “N/T” denotes “not tested”.

1.1 TEST FACILITY

The test facilities used to collect the test data in this report is at the location of No. 29, Jintang Road, Tangzhen Industry Park, Pudong New Area, Shanghai 201210, China.
BTL's Test Firm Registration Number for FCC: 476765
BTL's Designation Number for FCC: CN1241

1.2 MEASUREMENT UNCERTAINTY

The measurement uncertainty figures shall be calculated according the methods described in the ETSI TR 100 028 and shall correspond to an expansion factor (coverage factor) k=1.96 or k=2(which provide confidence levels of respectively 90% and 95.45% in the case where the distributions characterizing the actual measurement uncertainties are normal (Gaussian)).
Measurement Uncertainty for a Level of Confidence of 95 %, U=2xUc(y).
The BTL measurement uncertainty as below table:

A. Radiated Measurement :

Test Site	Method	Measurement Frequency Range	Ant. H / V	U,(dB)
SH-CB02	CISPR	9 KHz~30 MHz	-	2.16
		30 MHz~200 MHz	V	4.04
		30 MHz~200 MHz	H	2.90
		200 MHz~1,000 MHz	V	3.76
		200 MHz~1,000 MHz	H	3.82

Test Site	Method	Measurement Frequency Range	U,(dB)
SH-CB02 (3m)	CISPR	1GHz ~ 6GHz	4.56
		6GHz ~ 18GHz	4.14

Note: Unless specifically mentioned, the uncertainty of measurement has not been taken into account to declare the compliance or non-compliance to the specification.

1.3 TEST ENVIRONMENT CONDITIONS

Test Item	Temperature	Humidity	Test Voltage	Tested By
Output Power & ERP	24°C	35%	DC 3.8V	Danny Dang
Occupied Bandwidth	24°C	35%	DC 3.8V	Danny Dang
Conducted Spurious Emissions	24°C	35%	DC 3.8V	Danny Dang
Radiated Spurious Emissions	26°C	61%	DC 3.8V	Jane Wang
Band Edge	24°C	35%	DC 3.8V	Danny Dang
Peak to Average Ratio	24°C	35%	DC 3.8V	Danny Dang
Frequency Stability	Normal and Extreme			Danny Dang

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	LTE Module	
Brand Name	Quectel	
Test Model	EC200A-AU	
Series Model	N/A	
Model Difference(s)	N/A	
Software Version	EC200AAUHAR01A01M16	
Hardware Version	R1.0	
Power Source	DC Voltage supplied from AC/DC adapter(support unit)	
Power Rating	Supply voltage: 3.4–4.5V， Typical supply voltage: 3.8 V	
Antenna Type	Dipole	
Antenna Gain	WCDMA IV	2 dBi
	LTE Band 4 & 66	
	LTE Band 7	3 dBi
Modulation Type	WCDMA	UL: QPSK DL: QPSK,16QAM
	WCDMA(HSDPA/HSUPA/DC-HSDPA/HSPA+)	16QAM
	LTE	UL: QPSK,16QAM DL: QPSK,16QAM, 64QAM
Operation Frequency	WCDMA IV	1712.4MHz ~ 1752.6MHz
	LTE Band 4 (Channel Bandwidth: 1.4MHz)	1710.7MHz ~ 1754.3MHz
	LTE Band 4 (Channel Bandwidth: 3MHz)	1711.5MHz ~ 1753.5MHz
	LTE Band 4 (Channel Bandwidth: 5MHz)	1712.5MHz ~ 1752.5MHz
	LTE Band 4 (Channel Bandwidth: 10MHz)	1715.0MHz ~ 1750.0MHz
	LTE Band 4 (Channel Bandwidth: 15MHz)	1717.5MHz ~ 1747.5MHz
	LTE Band 4 (Channel Bandwidth: 20MHz)	1720.0MHz ~ 1745.0MHz
	LTE Band 7 (Channel Bandwidth: 5MHz)	2502.5MHz ~ 2567.5MHz
	LTE Band 7 (Channel Bandwidth: 10MHz)	2505.0MHz ~ 2565.0MHz
	LTE Band 7 (Channel Bandwidth: 15MHz)	2507.5MHz ~ 2562.5MHz
	LTE Band 7 (Channel Bandwidth: 20MHz)	2510.0MHz ~ 2560.0MHz
	LTE Band 66 (Channel Bandwidth: 1.4MHz)	1710.7MHz ~ 1779.5MHz
	LTE Band 66 (Channel Bandwidth: 3MHz)	1711.5MHz ~ 1778.5MHz
	LTE Band 66 (Channel Bandwidth: 5MHz)	1712.5MHz ~ 1777.5MHz
	LTE Band 66 (Channel Bandwidth: 10MHz)	1715.0MHz ~ 1775.0MHz
	LTE Band 66 (Channel Bandwidth: 15MHz)	1717.5MHz ~ 1772.5MHz
	LTE Band 66 (Channel Bandwidth: 20MHz)	1720.0MHz ~ 1770.0MHz

EIRP	WCDMA	QPSK	24.85	dBm
	WCDMA_HSDPA	16QAM	25.87	dBm
	WCDMA_HSUPA	16QAM	25.97	dBm
	LTE Band 4 (Channel Bandwidth: 1.4MHz)	QPSK	26.80	dBm
		16QAM	25.20	dBm
	LTE Band 4 (Channel Bandwidth: 3MHz)	QPSK	25.50	dBm
		16QAM	25.00	dBm
	LTE Band 4 (Channel Bandwidth: 5MHz)	QPSK	25.50	dBm
		16QAM	25.00	dBm
	LTE Band 4 (Channel Bandwidth: 10MHz)	QPSK	25.80	dBm
		16QAM	25.50	dBm
	LTE Band 4 (Channel Bandwidth: 15MHz)	QPSK	25.60	dBm
		16QAM	25.20	dBm
	LTE Band 4 (Channel Bandwidth: 20MHz)	QPSK	25.70	dBm
		16QAM	25.30	dBm
	LTE Band 7 (Channel Bandwidth: 5MHz)	QPSK	27.57	dBm
		16QAM	27.49	dBm
	LTE Band 7 (Channel Bandwidth: 10MHz)	QPSK	27.88	dBm
		16QAM	27.14	dBm
	LTE Band 7 (Channel Bandwidth: 15MHz)	QPSK	27.50	dBm
		16QAM	27.36	dBm
	LTE Band 7 (Channel Bandwidth: 20MHz)	QPSK	28.27	dBm
		16QAM	27.26	dBm
	LTE Band 66 (Channel Bandwidth: 1.4MHz)	QPSK	26.42	dBm
		16QAM	25.81	dBm
	LTE Band 66 (Channel Bandwidth: 3MHz)	QPSK	26.50	dBm
		16QAM	25.84	dBm
	LTE Band 66 (Channel Bandwidth: 5MHz)	QPSK	26.66	dBm
		16QAM	25.96	dBm
	LTE Band 66 (Channel Bandwidth: 10MHz)	QPSK	26.36	dBm
		16QAM	25.75	dBm
	LTE Band 66 (Channel Bandwidth: 15MHz)	QPSK	26.38	dBm
		16QAM	25.67	dBm
	LTE Band 66 (Channel Bandwidth: 20MHz)	QPSK	26.62	dBm
		16QAM	25.90	dBm

Note:
1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.
2. LTE (UL:QPSK; DL: QPSK) mode was found to be the worst case and recorded.

2.2 DESCRIPTION OF TEST MODES AND TEST CONDITION

Following channel(s) was (were) selected for the final test as listed below:

WCDMA MODE			
Test Item	Available Channel	Tested Channel	Mode
EIRP	1312 to 1513	1312, 1413, 1513	WCDMA,HSDPA, HSUPA
Output Power	1312 to 1513	1312, 1413, 1513	WCDMA,HSDPA, HSUPA
Occupied Bandwidth	1312 to 1513	1312, 1413, 1513	WCDMA,HSDPA, HSUPA
Conducted Emission	1312 to 1513	1413	WCDMA
Radiated Emission	1312 to 1513	1413	WCDMA
Band Edge	1312 to 1513	1312, 1513	WCDMA
Peak to Average Ratio	1312 to 1513	1312, 1413, 1513	WCDMA
Frequency Stability	1312 to 1513	1413	WCDMA

LTE BAND 4 MODE					
Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
Output Power & EIRP	19957 to 20393	19957, 20175, 20393	1.4MHz	QPSK, 16QAM	1RB/3RB/6RB
	19965 to 20385	19965, 20175, 20385	3MHz	QPSK, 16QAM	1RB/8RB/15RB
	19975 to 20375	19975, 20175, 20375	5MHz	QPSK, 16QAM	1RB/12RB/25RB
	20000 to 20350	20000, 20175, 20350	10MHz	QPSK, 16QAM	1RB/25RB/50RB
	20025 to 20325	20025, 20175, 20325	15MHz	QPSK, 16QAM	1RB/36RB/75RB
	20050 to 20300	20050, 20175, 20300	20MHz	QPSK, 16QAM	1RB/50RB/100RB
Occupied Bandwidth	19957 to 20393	19957, 20175, 20393	1.4MHz	QPSK, 16QAM	6RB
	19965 to 20385	19965, 20175, 20385	3MHz	QPSK, 16QAM	15RB
	19975 to 20375	19975, 20175, 20375	5MHz	QPSK, 16QAM	25RB
	20000 to 20350	20000, 20175, 20350	10MHz	QPSK, 16QAM	50RB
	20025 to 20325	20025, 20175, 20325	15MHz	QPSK, 16QAM	75 RB
	20050 to 20300	20050, 20175, 20300	20MHz	QPSK, 16QAM	100RB
Conducted Spurious Emission	19957 to 20393	20175	1.4MHz	QPSK	1RB
	19975 to 20375	20175	5MHz	QPSK	1RB
	20050 to 20300	20175	20MHz	QPSK	1RB
Radiated Spurious Emission	19957 to 20393	20175	1.4MHz	QPSK	1RB
	19975 to 20375	20175	5MHz	QPSK	1RB
	20050 to 20300	20175	20MHz	QPSK	1RB

LTE BAND 4 MODE					
Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
Band Edge	19957 to 20393	19957	1.4MHz	QPSK	1RB/6RB
		20393	1.4MHz	QPSK	
	19965 to 20385	19965	3MHz	QPSK	1RB/15RB
		20385	3MHz	QPSK	
	19975 to 20375	19975	5MHz	QPSK	1RB/25RB
		20375	5MHz	QPSK	
	20000 to 20350	20000	10MHz	QPSK	1RB/50RB
		20350	10MHz	QPSK	
	20025 to 20325	20025	15MHz	QPSK	1RB/75RB
		20325	15MHz	QPSK	
	20050 to 20300	20050	20MHz	QPSK	1RB/100RB
		20300	20MHz	QPSK	
Peak To Average Ratio	19957 to 20393	19957, 20175, 20393	1.4MHz	QPSK, 16QAM	6RB
	19965 to 20385	19965, 20175, 20385	3MHz	QPSK, 16QAM	15RB
	19975 to 20375	19975, 20175, 20375	5MHz	QPSK, 16QAM	25RB
	20000 to 20350	20000, 20175, 20350	10MHz	QPSK, 16QAM	50RB
	20025 to 20325	20025, 20175, 20325	15MHz	QPSK, 16QAM	75 RB
	20050 to 20300	20050, 20175, 20300	20MHz	QPSK, 16QAM	100RB
Frequency Stability	19957 to 20393	20175	1.4MHz	QPSK	1RB
	19965 to 20385	20175	3MHz	QPSK	1RB
	19975 to 20375	20175	5MHz	QPSK	1RB
	20000 to 20350	20175	10MHz	QPSK	1RB
	20025 to 20325	20175	15MHz	QPSK	1RB
	20050 to 20300	20175	20MHz	QPSK	1RB

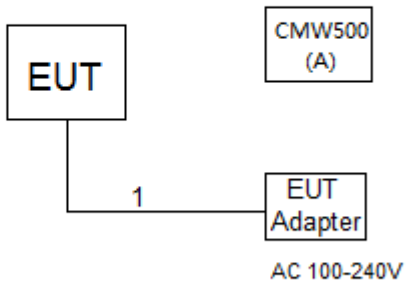
LTE BAND 7 MODE					
Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
Output Power & EIRP	20775 to 21425	20775, 21100, 21425	5MHz	QPSK, 16QAM	1RB/12RB/25RB
	20800 to 21400	20800, 21100, 21400	10MHz	QPSK, 16QAM	1RB/25RB/50RB
	20825 to 21375	20825, 21100, 21375	15MHz	QPSK, 16QAM	1RB/36RB/75RB
	20850 to 21350	20850, 21100, 21350	20MHz	QPSK, 16QAM	1RB/50RB/100RB
Occupied Bandwidth	20775 to 21425	20775, 21100, 21425	5MHz	QPSK, 16QAM	25RB
	20800 to 21400	20800, 21100, 21400	10MHz	QPSK, 16QAM	50RB
	20825 to 21375	20825, 21100, 21375	15MHz	QPSK, 16QAM	75RB
	20850 to 21350	20850, 21100, 21350	20MHz	QPSK, 16QAM	100RB
Conducted Spurious Emission	20775 to 21425	21100	5MHz	QPSK	1 RB
	20850 to 21350	21100	20MHz	QPSK	1 RB
Radiated Spurious Emission	20775 to 21425	21100	5MHz	QPSK	1 RB
	20850 to 21350	21100	20MHz	QPSK	1 RB
Band Edge	20775 to 21425	20775	5MHz	QPSK	1RB/25RB
		21425	5MHz	QPSK	
	20800 to 21400	20800	10MHz	QPSK	1RB/50RB
		21400	10MHz	QPSK	
	20825 to 21375	20825	15MHz	QPSK	1RB/75RB
		21375	15MHz	QPSK	
	20850 to 21350	20850	20MHz	QPSK	1RB/100RB
		21350	20MHz	QPSK	
Peak To Average Ratio	20775 to 21425	20775, 21100, 21425	5MHz	QPSK, 16QAM	25RB
	20800 to 21400	20800, 21100, 21400	10MHz	QPSK, 16QAM	50RB
	20825 to 21375	20825, 21100, 21375	15MHz	QPSK, 16QAM	75RB
	20850 to 21350	20850, 21100, 21350	20MHz	QPSK, 16QAM	100RB
Frequency Stability	20775 to 21425	21100	5MHz	QPSK	1RB
	20800 to 21400	21100	10MHz	QPSK	1RB
	20825 to 21375	21100	15MHz	QPSK	1RB
	20850 to 21350	21100	20MHz	QPSK	1RB

LTE BAND 66 MODE					
Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
Output Power & EIRP	131979 to 132665	131979, 132322, 132665	1.4MHz	QPSK, 16QAM	1RB/3RB/6RB
	131987 to 132657	131987, 132322, 132657	3MHz	QPSK, 16QAM	1RB/8RB/15RB
	131997 to 132647	131997, 132322, 132647	5MHz	QPSK, 16QAM	1RB/12RB/25RB
	132022 to 132622	132022, 132322, 132622	10MHz	QPSK, 16QAM	1RB/25RB/50RB
	132047 to 132597	132047, 132322, 132597	15MHz	QPSK, 16QAM	1RB/36RB/75RB
	132072 to 132572	132072, 132322, 132572	20MHz	QPSK, 16QAM	1RB/50RB/100RB
Occupied Bandwidth	131979 to 132665	131979, 132322, 132665	1.4MHz	QPSK, 16QAM	6RB
	131987 to 132657	131987, 132322, 132657	3MHz	QPSK, 16QAM	15RB
	131997 to 132647	131997, 132322, 132647	5MHz	QPSK, 16QAM	25RB
	132022 to 132622	132022, 132322, 132622	10MHz	QPSK, 16QAM	50RB
	132047 to 132597	132047, 132322, 132597	15MHz	QPSK, 16QAM	75 RB
	132072 to 132572	132072, 132322, 132572	20MHz	QPSK, 16QAM	100RB
Conducted Spurious Emission	131979 to 132665	132322	1.4MHz	QPSK	1RB
	131997 to 132647	132322	5MHz	QPSK	1RB
	132072 to 132572	132322	20MHz	QPSK	1RB
Radiated Spurious Emission	131979 to 132665	132665	1.4MHz	QPSK	1RB
	131997 to 132647	132647	5MHz	QPSK	1RB
	132072 to 132572	132572	20MHz	QPSK	1RB

LTE BAND 66 MODE					
Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
Band Edge	131979 to 132665	131979	1.4MHz	QPSK	1RB/6RB
		132665	1.4MHz	QPSK	
	131987 to 132657	131987	3MHz	QPSK	1RB/15RB
		132657	3MHz	QPSK	
	131997 to 132647	131997	5MHz	QPSK	1RB/25RB
		132647	5MHz	QPSK	
	132022 to 132622	132022	10MHz	QPSK	1RB/50RB
		132622	10MHz	QPSK	
	132047 to 132597	132047	15MHz	QPSK	1RB/75RB
		132597	15MHz	QPSK	
	132072 to 132572	132072	20MHz	QPSK	1RB/100RB
		132572	20MHz	QPSK	
Peak To Average Ratio	131979 to 132665	131979, 132322, 132665	1.4MHz	QPSK, 16QAM	1RB
	131987 to 132657	131987, 132322, 132657	3MHz	QPSK, 16QAM	1RB
	131997 to 132647	131997, 132322, 132647	5MHz	QPSK, 16QAM	1RB
	132022 to 132622	132022, 132322, 132622	10MHz	QPSK, 16QAM	1RB
	132047 to 132597	132047, 132322, 132597	15MHz	QPSK, 16QAM	1RB
	132072 to 132572	132072, 132322, 132572	20MHz	QPSK, 16QAM	1RB
Frequency Stability	131979 to 132665	132322	1.4MHz	QPSK	1RB
	131987 to 132657	132322	3MHz	QPSK	1RB
	131997 to 132647	132322	5MHz	QPSK	1RB
	132022 to 132622	132322	10MHz	QPSK	1RB
	132047 to 132597	132322	15MHz	QPSK	1RB
	132072 to 132572	132322	20MHz	QPSK	1RB

Note: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.

2.3 BLOCK DIGRAM SHOWING THECONFIGURATIONOFSYSTEMTESTED



2.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.
A	CMW500	N/A	N/A	129246

Item	Cable Type	Shielded Type	Ferrite Core	Length
1	DC	N/A	N/A	1m

3. TEST RESULT

3.1 OUTPUT POWER MEASUREMENT

3.1.1 LIMIT

Mobile / Portable station are limited to 1 watts e.i.r.p. (WCDMA Band IV & LTE Band 4 & LTE Band 66)
Mobile / Portable station are limited to 2 watts e.i.r.p. (LTE Band 7)

3.1.2 TEST PROCEDURE

The testing follows FCC KDB 971168 v03r01 Section 5.

EIRP/ERP:

EIRP= Conducted Power +Antenan gain
ERP power=EIPR power-2.15dBi.

Output Power:

The EUT was set up for the maximum power with LTE link data modulation and link up with simulator. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

3.1.3 TEST SETUP LAYOUT

Conducted Power Measurement

3.1.4 TEST DEVIATION

No deviation

3.1.5 TEST RESULTS

Please refer to the Appendix A.

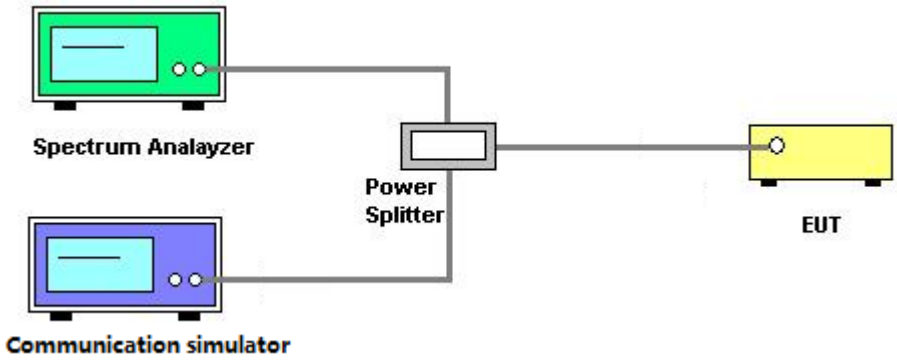
3.2 OCCUPIED BANDWIDTH MEASUREMENT

3.2.1 TEST PROCEDURE

The testing follows FCC KDB 971168 v03r01 Section 4.

The EUT makes a call to the communication simulator. All measurements were done at low, middle and high operational frequency range. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth and 26dB bandwidth.

3.2.2 TEST SETUP LAYOUT



3.2.3 TEST DEVIATION

No deviation

3.2.4 TEST RESULTS

Please refer to the Appendix B.

3.3 CONDUCTED EMISSIONS MEASUREMENT

3.3.1 LIMIT

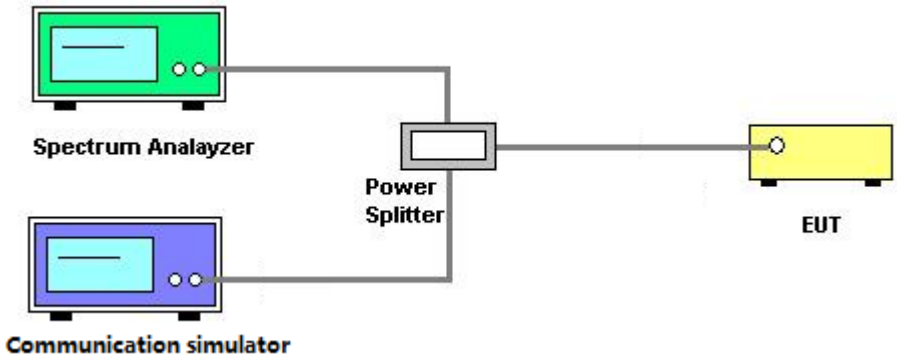
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB. The emission limit equal to -13dBm. (WCDMA Band IV,LTE Band 4, Band 66.)

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 55 + 10 log(P) dB. The emission limit equal to -25dBm. (LTE Band 7)

3.3.2 TEST PROCEDURES

1. The testing follows FCC KDB 971168 v03r01 Section 6.0.
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. Set RBW>=1% EBW in the 1MHz band immediately outside and adjacent to the band edge.
4. Set spectrum analyzer with RMS detector.
5. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

3.3.3 TEST SETUP LAYOUT



3.3.4 TEST DEVIATION

No deviation

3.3.5 TEST RESULTS

Please refer to the Appendix C.

3.4 RADIATED EMISSIONS MEASUREMENT

3.4.1 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 43 + 10 log(P) dB. The emission limit equal to -13dBm. (WCDMA Band IV, LTE Band 4, Band 66.)

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 55 + 10 log(P) dB. The emission limit equal to -25dBm. (LTE Band 7.)

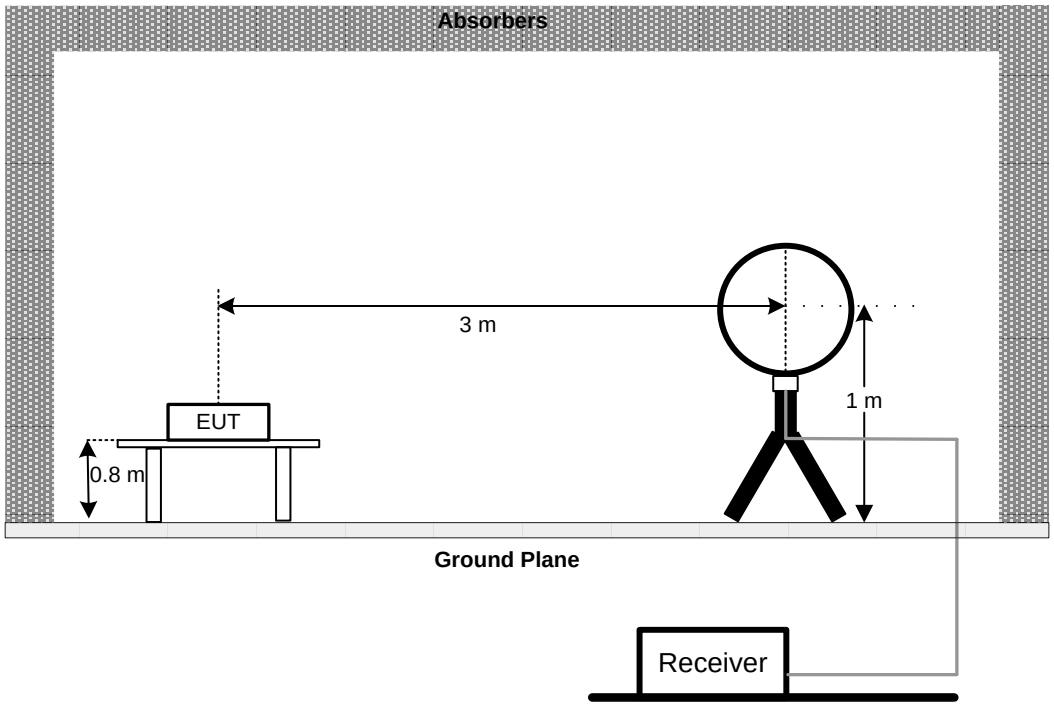
3.4.2 TEST PROCEDURES

The testing follows FCC KDB 971168 v03r01 Section 6.2.

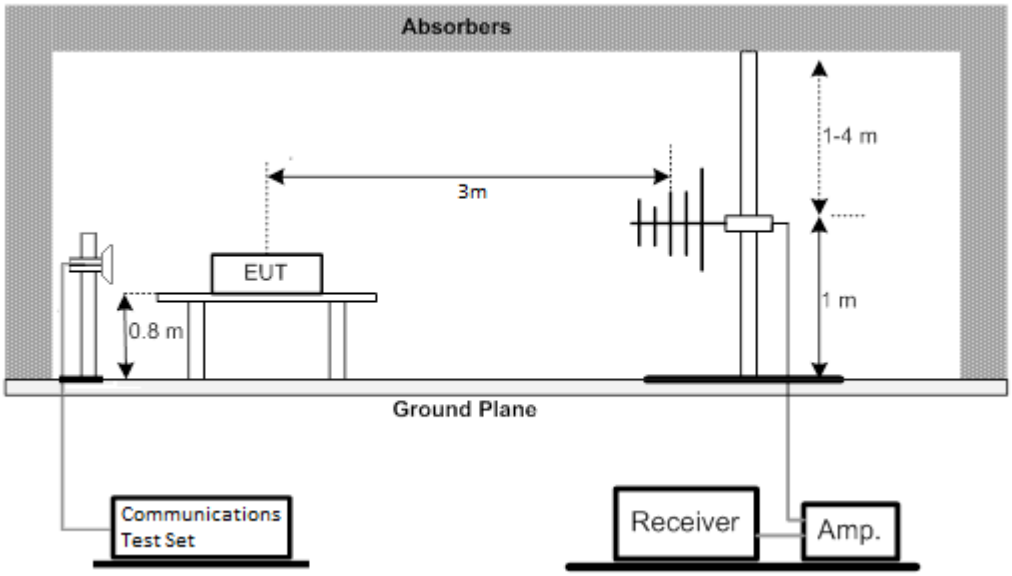
1. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The “Read Value” is the spectrum reading the maximum power value.
2. The substitution horn antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a TX cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to “Read Value” of step a. Record the power level of S.G
3. EIRP = Output power level of S.G – TX cable loss + Antenna gain of substitution horn.
4. E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole, E.R.P power = E.I.P.R power - 2.15dBi.
5. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1MHz/3MHz.

3.4.3 TEST SETUP LAYOUT

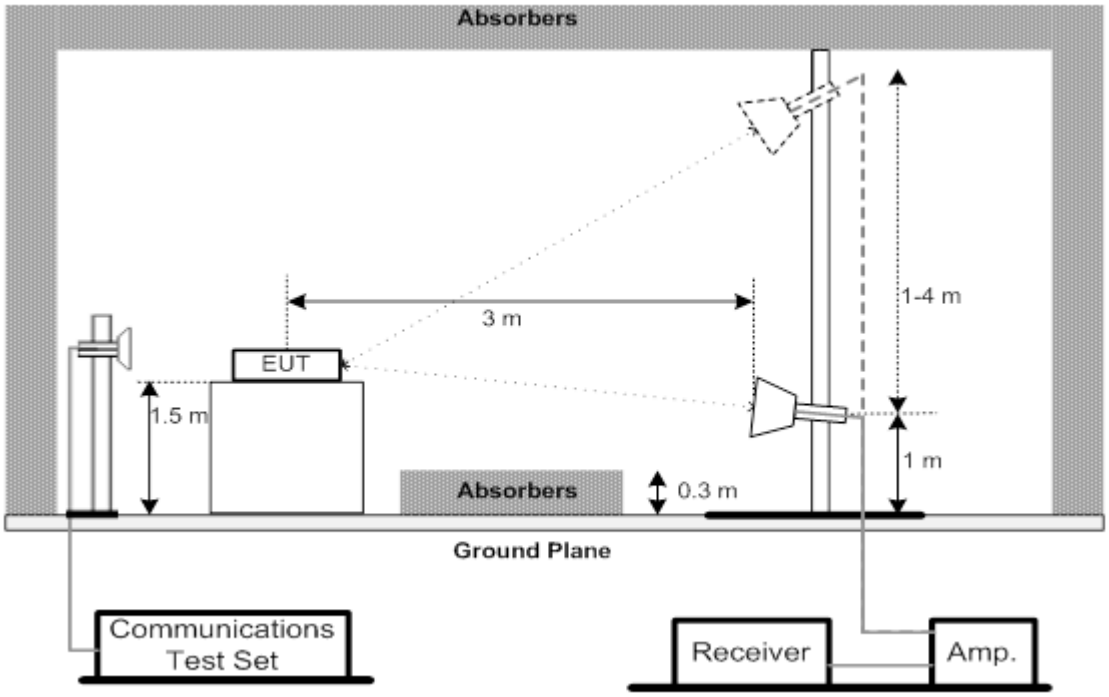
Below 30MHz



30MHz to 1GHz



Above 1GHz



3.4.4 TEST RESULTS (9KHZ TO 30MHZ)

Please refer to the APPENDIX D.

3.4.5 TEST RESULTS (30MHZ TO 1000MHZ)

Please refer to the APPENDIX E.

3.4.6 TEST RESULTS (ABOVE 1000MHZ)

Please refer to the APPENDIX F.

3.5 BAND EDGE MEASUREMENT

3.5.1 LIMIT

The power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least 43 + 10 log (P) dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed. (LTE Band 4, Band 66.)

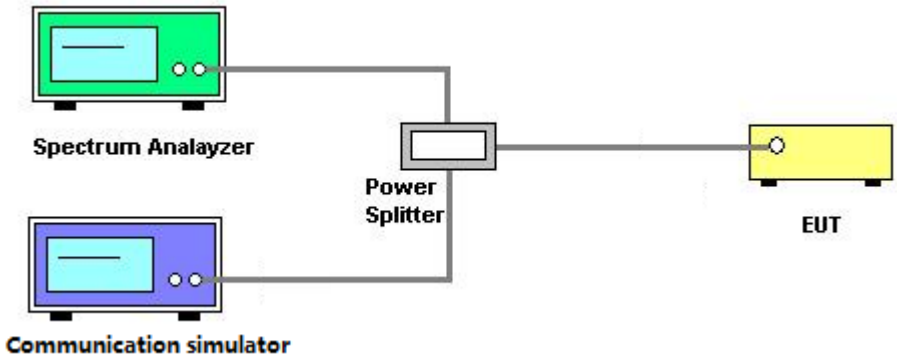
For mobile digital stations, the attenuation factor shall be not less than 40 + 10 log (P) dB on all frequencies between the channel edge and 5 megahertz from the channel edge,
43 + 10 log (P) dBon all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less that 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 MHz. Mobile SatelliteService licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees. (LTE Band 7)

3.5.2 TEST PROCEDURES

The testing follows FCC KDB 971168 v03r01 Section 6.

1. All measurements were done at low and high operational frequency range.
2. The center frequency of spectrum is the band edge frequency and span is 2MHz. RB of the spectrum is 15kHz and VB of the spectrum is 43kHz (LTE Bandwidth 1.4MHz).
3. The center frequency of spectrum is the band edge frequency and span is 2MHz. RB of the spectrum is 30kHz and VB of the spectrum is 91kHz (LTE Bandwidth 3MHz).
4. The center frequency of spectrum is the band edge frequency and span is 2MHz. RB of the spectrum is 51kHz and VB of the spectrum is 150kHz (LTE Bandwidth 5MHz).
5. The center frequency of spectrum is the band edge frequency and span is 2MHz. RB of the spectrum is 100kHz and VB of the spectrum is 300kHz (LTE Bandwidth 10MHz).
6. The center frequency of spectrum is the band edge frequency and span is 2MHz. RB of the spectrum is 150kHz and VB of the spectrum is 470kHz (LTE Bandwidth 15MHz).
7. The center frequency of spectrum is the band edge frequency and span is 2MHz. RB of the spectrum is 200kHz and VB of the spectrum is 620kHz (LTE Bandwidth 20MHz).
8. Record the max trace plot into the test report.

3.5.3 TEST SETUP LAYOUT



3.5.4 TEST DEVIATION

No deviation

3.5.5 TEST RESULTS

Please refer to the Appendix G.

3.6 PEAK TO AVERAGE RATIO MEASUREMENT

3.6.1 LIMIT

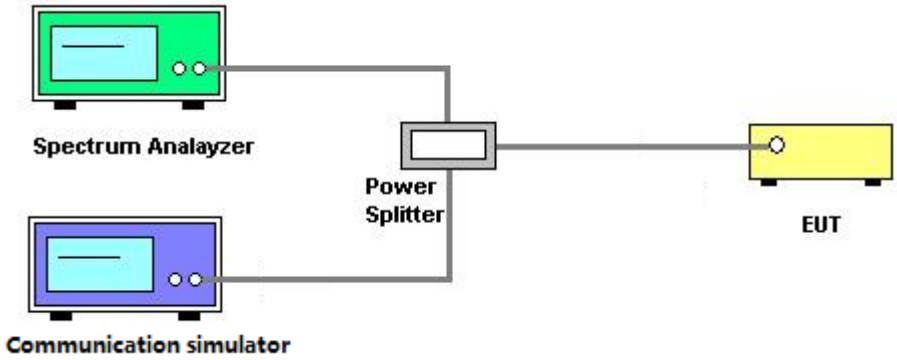
In measuring transmissions in this band using an average power technique, the peak to-average ratio (PAR) of the transmission may not exceed 13 dB.

3.6.2 TEST PROCEDURES

The testing follows FCC KDB 971168 v03r01 Section 5.7.

1. Set resolution/measurement bandwidth ≥ signal's occupied bandwidth;
2. Set the number of counts to a value that stabilizes the measured CCDF curve;
3. Record the maximum PAPR level associated with a probability of 0.1%.

3.6.3 TEST SETUP LAYOUT



3.6.4 TEST DEVIATION

No deviation

3.6.5 TEST RESULTS

Please refer to the Appendix H.

3.7 FREQUENCY STABILITY MEASUREMENT

3.7.1 LIMIT

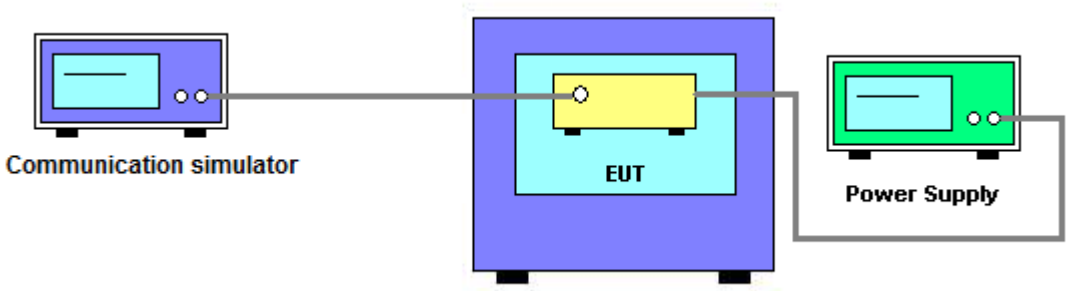
±1.5 ppm is for base and fixed station. ±2.5 ppm is for mobile station.

3.7.2 TEST PROCEDURES

The testing follows FCC KDB 971168 v03r01 Section 9.

1. Device is placed at the oven room. The oven room could control the temperatures and humidity. Power warm up is at least 15 min and power applied should perform before recording frequency error.
2. EUT is connected the external power supply to control the DC input power. The test voltage range is from minimum to maximum working voltage. Each step shall be record the frequency error rate.
3. The temperature range step is 10 degrees in this test items. All temperature levels shall be hold the ±0.5°C during the measurement testing. The each temperature step shall be at least 0.5 hours, consider the EUT could be test under the stability condition.
4. The frequency error was recorded frequency error from the communication simulator.

3.7.3 TEST SETUP LAYOUT



3.7.4 TEST DEVIATION

No deviation

3.7.5 TEST RESULTS

Please refer to the Appendix I.

4. LIST OF MEASUREMENT EQUIPMENTS

Radiated Emission Measurement(9K-30M)					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Loop Antenna	EMCI	EMCI LPA600	275	May. 20, 2022
2	MXE EMI Receiver	Keysight	N9038A	MY56400088	Mar. 21, 2022
3	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A
4	Wideband Radio Communication Test	R&S	CMW500	129246	Aug. 23, 2022

Radiated Emission Measurement(30M-1G)					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	TRILOG Broadband Antenna	Schwarzbeck	VULB 9160	9160-3233	Mar. 26, 2022
2	Pre-Amplifier	emci	EMC9135	980401	Mar. 20, 2022
3	MXE EMI Receiver	Keysight	N9038A	MY56400088	Mar. 21, 2022
4	Test Cable	emci	EMC104-SM-SM-7000	181020	Apr. 11, 2022
5	Test Cable	emci	EMC104-SM-SM-2500	170618	Apr. 11, 2022
6	Test Cable	emci	EMC104-SM-SM-800	170647	Apr. 11, 2022
7	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A
8	Wideband Radio Communication Test	R&S	CMW500	129246	Aug. 23, 2022

Radiated Emission Measurement(1G-18G)					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Double Ridged Broadband Horn Antenna	Schwarzbeck	BBHA 9120D	9120D-1817	Mar. 26, 2022
2	Pre-Amplifier	emci	EMC051845SE	980725	Aug. 23, 2022
3	EXA Spectrum Analyzer	Keysight	N9010A	MY56480579	Mar. 21, 2022
4	Test Cable	emci	EMC104-SM-SM-7000	181020	Apr. 11, 2022
5	Test Cable	emci	EMC104-SM-SM-2500	170618	Apr. 11, 2022
6	Test Cable	emci	EMC104-SM-SM-800	170647	Apr. 11, 2022
7	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A
8	Wideband Radio Communication Test	R&S	CMW500	129246	Aug. 23, 2022

Conducted Emission & Band Edge & Occupied Bandwidth Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Wideband Radio Communication Test	R&S	CMW500	129246	Aug. 23, 2022
2	EXA Spectrum Analyzer	Keysight	N9010A	MY56480579	Mar. 21, 2022
3	Power Divider	JUK	PD-2SF-2060	N/A	N/A

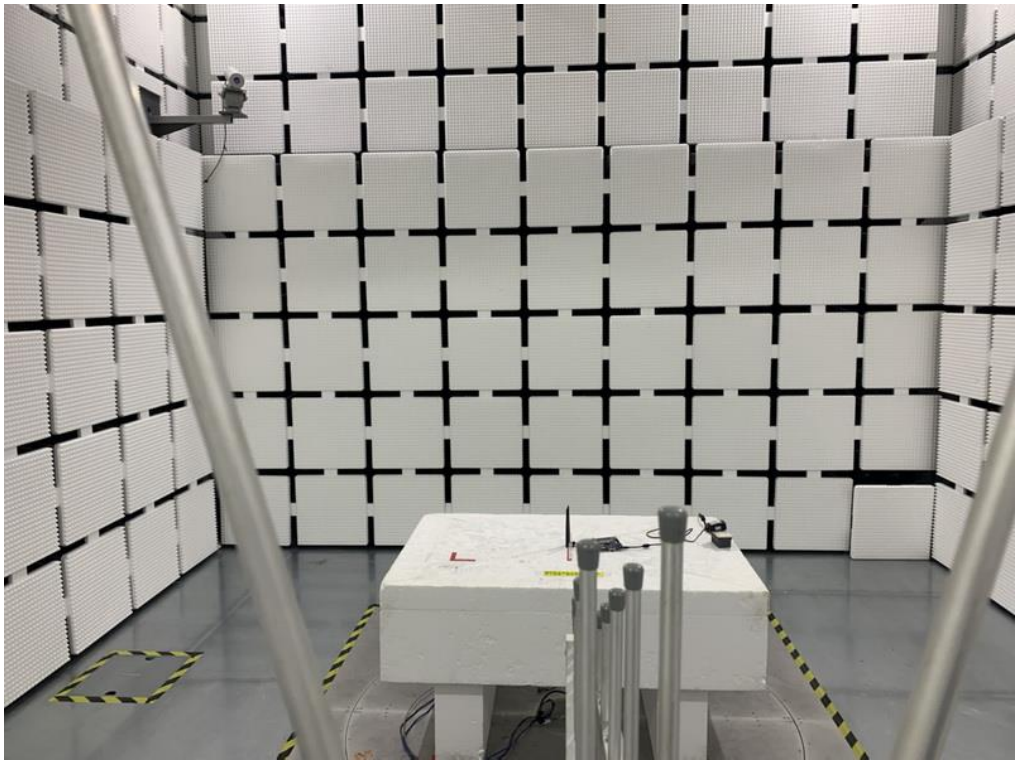
Frequency Stability Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Wideband Radio Communication Test	R&S	CMW500	129246	Aug. 23, 2022
2	EXA Spectrum Analyzer	Keysight	N9010A	MY56480579	Mar. 21, 2022
3	Power Divider	JUK	PD-2SF-2060	N/A	N/A
4	Temperature And Humidity Box	Blue pand	BPHS-120B	170616454	Aug. 23, 2022

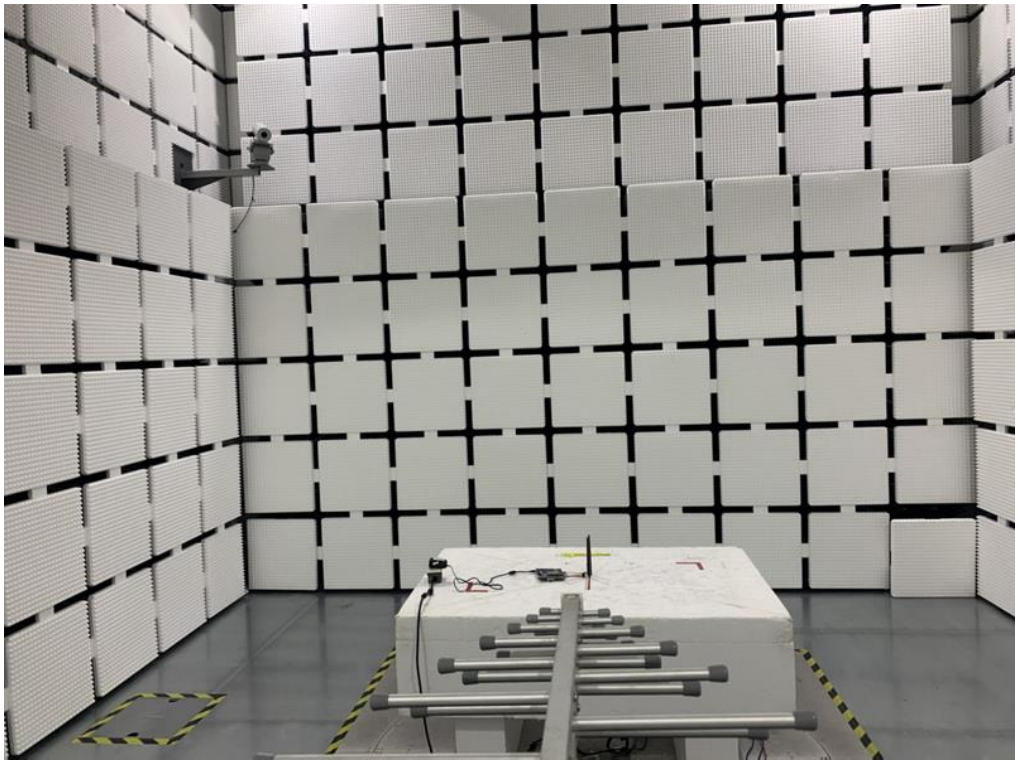
Remark: ”N/A” denotes no model name, serial no. or calibration specified.
All calibration period of equipment list is one year.

5. EUT TEST PHOTO

Radiated Emissions Test Photos

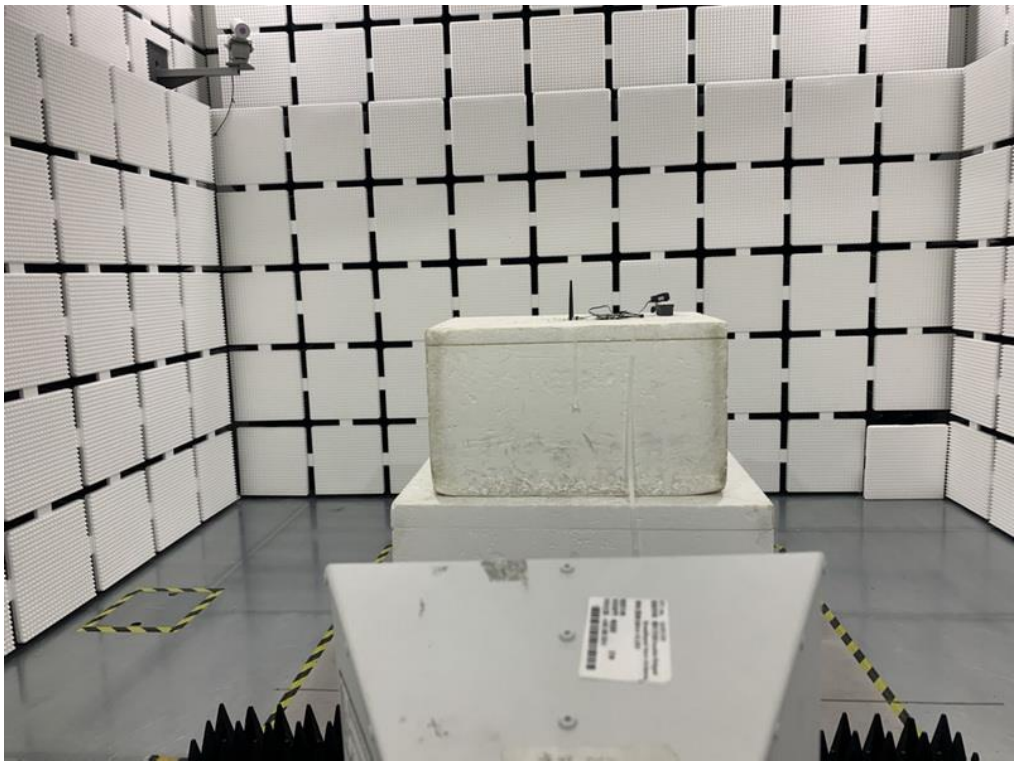
30 MHz to 1000 MHz

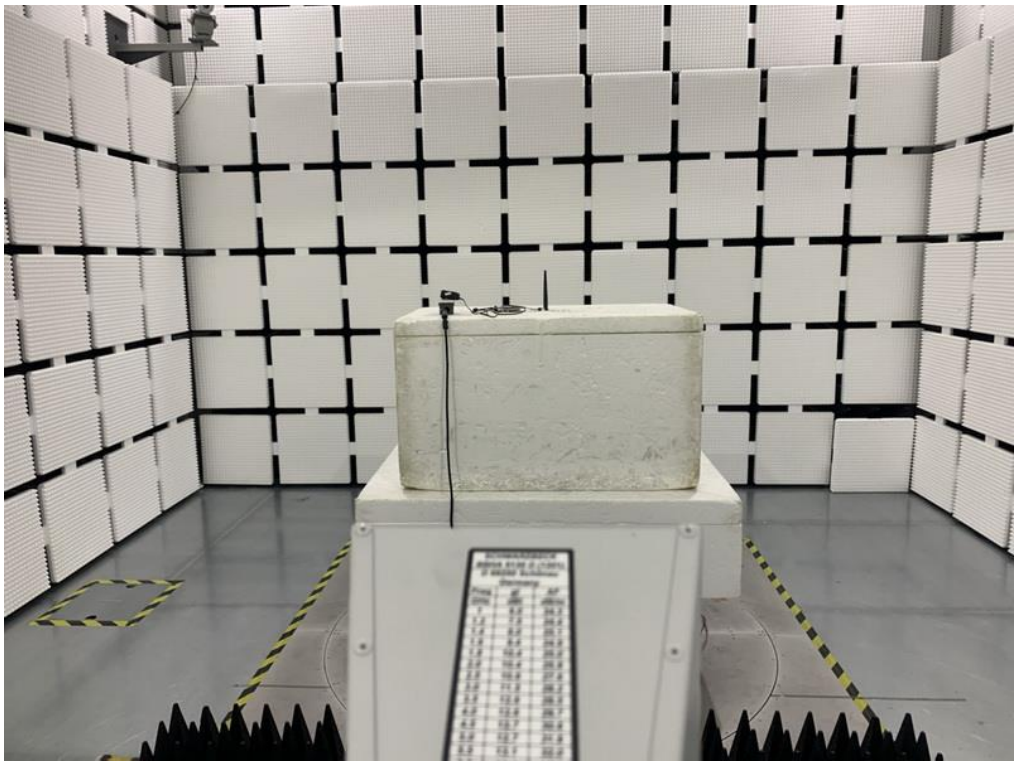




Radiated Emissions Test Photos

Above 1 GHz





APPENDIX A - OUTPUT POWER

Output Power (dBm):

Modulation	Band	WCDMA Band IV		
	Tx Channel	1312CH	1413CH	1513CH
	Frequency	1712.4MHz	1732.6MHz	1752.6MHz
QPSK	RMC 12.2K	22.19	22.48	22.25
	RMC 64K	22.38	21.99	21.94
	RMC 144K	22.85	22.13	22.84
	RMC 384K	22.37	21.15	22.82
	HSDPA Subtest-1	23.55	23.87	23.43
	HSDPA Subtest-2	23.05	23.35	22.96
	HSDPA Subtest-3	22.54	22.8	22.5
	HSDPA Subtest-4	22.51	22.8	22.48
	HSUPA Subtest-1	23.49	23.87	23.54
	HSUPA Subtest-2	23.44	23.84	23.49
	HSUPA Subtest-3	23.01	23.34	23.02
	HSUPA Subtest-4	23.45	23.88	23.45
	HSUPA Subtest-5	22.98	23.33	23.97

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				19957CH	20175CH	20393CH
				1710.7MHz	1732.5MHz	1754.3MHz
4 / 1.4M	QPSK	1	0	23.60	23.50	23.20
		1	2	23.40	23.30	23.00
		1	5	23.60	23.50	23.30
		3	0	23.50	23.40	22.90
		3	1	23.50	23.40	24.80
		3	2	23.50	23.30	23.00
		6	0	22.40	22.40	22.00
	16QAM	1	0	23.20	23.10	22.90
		1	2	22.80	22.90	22.50
		1	5	23.20	23.10	22.80
		3	0	22.60	22.50	22.10
		3	1	22.60	22.50	22.10
		3	2	22.50	22.50	22.10
		6	0	21.80	21.80	21.30

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				19965CH	20175CH	20385CH
				1711.5MHz	1732.5MHz	1753.5MHz
4 / 3M	QPSK	1	0	23.30	23.50	22.90
		1	7	23.30	23.30	22.90
		1	14	23.20	23.30	23.00
		8	0	22.40	22.40	21.90
		8	4	22.40	22.40	22.10
		8	7	22.40	22.30	22.00
		15	0	22.40	22.40	22.00
	16QAM	1	0	23.00	23.00	22.40
		1	7	22.90	22.80	22.50
		1	14	22.90	22.90	22.50
		8	0	21.40	21.50	21.00
		8	4	21.40	21.40	21.10
		8	7	21.40	21.50	21.00
		15	0	21.40	21.50	21.00

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				19975CH	20175CH	20375CH
				1712.5MHz	1732.5MHz	1752.5MHz
4 / 5M	QPSK	1	0	23.50	23.50	23.10
		1	13	23.20	23.30	22.90
		1	24	23.20	23.20	23.20
		12	0	22.40	22.50	21.90
		12	6	22.40	22.40	23.30
		12	11	22.90	22.30	22.00
		25	0	22.30	22.40	22.00
	16QAM	1	0	23.00	23.00	22.60
		1	13	22.80	22.90	22.60
		1	24	22.90	22.80	22.70
		12	0	21.40	21.60	21.20
		12	6	21.40	21.60	21.10
		12	11	21.30	21.40	21.20
		25	0	21.20	21.50	21.00

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				20000CH	20175CH	20350CH
				1715MHz	1732.5MHz	1750MHz
4 / 10M	QPSK	1	0	23.60	23.50	22.60
		1	25	23.80	23.20	22.80
		1	49	22.80	23.00	23.10
		25	0	22.10	22.30	21.60
		25	13	23.10	22.20	21.80
		25	25	22.70	21.90	21.80
		50	0	23.00	22.10	21.70
	16QAM	1	0	23.00	23.10	22.30
		1	25	23.50	22.70	22.30
		1	49	22.40	22.60	22.70
		25	0	21.00	21.30	20.70
		25	13	21.90	21.40	20.80
		25	25	21.60	21.10	20.80
		50	0	21.80	21.30	20.80

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				20025CH	20175CH	20325CH
				1717.5MHz	1732.5MHz	1747.5MHz
4 / 15M	QPSK	1	0	23.30	23.30	22.20
		1	38	23.60	23.20	22.70
		1	74	23.50	22.50	23.00
		36	0	23.10	22.40	21.40
		36	18	22.80	22.40	21.70
		36	39	22.60	21.90	21.80
		75	0	22.70	22.10	21.80
	16QAM	1	0	22.90	22.80	21.70
		1	38	23.20	22.80	22.30
		1	74	23.10	21.90	22.60
		36	0	21.90	21.30	20.50
		36	18	21.80	21.40	20.80
		36	39	21.50	21.00	20.90
		75	0	21.60	21.30	20.80

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				20050CH	20175CH	20300CH
				1720MHz	1732.5MHz	1745MHz
4 / 20M	QPSK	1	0	23.50	23.50	23.20
		1	50	23.40	23.20	22.50
		1	99	23.70	22.60	23.20
		50	0	22.90	22.30	20.80
		50	25	22.70	22.30	21.50
		50	50	22.40	21.50	21.80
		100	0	22.70	22.00	21.30
	16QAM	1	0	23.10	23.20	22.70
		1	50	23.10	22.80	22.00
		1	99	23.30	22.20	22.80
		50	0	21.70	21.20	20.00
		50	25	21.60	21.40	20.60
		50	50	21.40	20.70	20.90
		100	0	21.60	21.20	20.50

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				20775CH	21100CH	21425CH
				2502.5MHz	2535MHz	2567.5MHz
7 / 5M	QPSK	1	0	24.57	24.53	24.18
		1	13	24.51	24.07	24.45
		1	24	24.38	24.00	24.14
		12	0	23.63	23.42	24.16
		12	6	23.69	23.22	23.89
		12	11	23.54	23.17	23.67
		25	0	23.58	23.15	23.80
	16QAM	1	0	23.78	23.83	24.18
		1	13	23.67	23.22	24.49
		1	24	23.43	23.26	24.05
		12	0	22.80	22.57	24.01
		12	6	22.80	22.38	23.68
		12	11	22.66	22.25	23.63
		25	0	22.63	22.27	23.78

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				20800CH	21100CH	21400CH
				2505MHz	2535MHz	2565MHz
7 / 10M	QPSK	1	0	24.59	24.16	24.88
		1	25	23.73	23.98	24.01
		1	49	23.76	23.82	23.49
		25	0	23.14	23.56	23.33
		25	13	22.96	23.60	23.27
		25	25	22.60	22.86	23.72
		50	0	22.90	22.94	23.07
	16QAM	1	0	23.86	23.71	24.14
		1	25	23.01	23.21	23.42
		1	49	22.99	23.12	23.09
		25	0	22.40	22.62	22.33
		25	13	22.13	22.19	22.32
		25	25	21.75	21.91	22.74
		50	0	22.08	22.07	22.14

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				20825CH	21100CH	21375CH
				2507.5MHz	2535MHz	2562.5MHz
7 / 15M	QPSK	1	0	24.50	24.37	24.36
		1	38	23.63	23.90	23.99
		1	74	23.78	23.76	23.83
		36	0	23.10	23.87	23.81
		36	18	22.75	23.20	23.12
		36	39	22.49	22.88	22.77
		75	0	22.77	22.86	22.81
	16QAM	1	0	23.86	23.79	24.36
		1	38	22.76	23.51	23.97
		1	74	23.03	23.43	23.83
		36	0	22.30	22.79	23.84
		36	18	21.98	22.18	23.12
		36	39	21.58	21.65	22.83
		75	0	21.95	21.93	22.87

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				20850CH	21100CH	21350CH
				2510MHz	2535MHz	2560MHz
7 / 20M	QPSK	1	0	24.73	25.27	24.17
		1	50	23.28	24.76	24.56
		1	99	24.33	24.09	23.60
		50	0	22.86	24.01	23.17
		50	25	22.54	23.16	23.70
		50	50	22.86	22.73	23.20
		100	0	22.69	22.73	23.57
	16QAM	1	0	23.95	24.26	23.22
		1	50	22.55	23.31	23.75
		1	99	23.54	23.40	23.21
		50	0	21.88	22.82	22.35
		50	25	21.59	22.10	22.80
		50	50	21.81	21.63	22.18
		100	0	21.71	21.66	22.69

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				131979CH	132322CH	132665CH
				1710.7MHz	1745MHz	1779.3MHz
66 / 1.4M	QPSK	1	0	24.19	24.41	24.42
		1	2	23.83	24.09	24.11
		1	5	24.30	24.37	24.36
		3	0	23.90	24.12	24.10
		3	1	23.93	24.19	24.18
		3	2	23.95	24.17	24.17
		6	0	22.91	24.04	23.06
	16QAM	1	0	23.21	23.74	23.65
		1	2	23.24	23.48	23.18
		1	5	23.68	23.30	23.81
		3	0	22.78	23.12	22.98
		3	1	22.86	23.12	23.04
		3	2	22.98	23.12	23.15
		6	0	22.01	22.27	22.25

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				131987CH	132322CH	132657CH
				1711.5MHz	1745MHz	1778.5MHz
66 / 3M	QPSK	1	0	23.99	24.13	24.50
		1	7	24.04	24.19	24.40
		1	14	24.11	24.26	23.17
		8	0	22.97	23.10	23.51
		8	4	23.08	23.24	23.43
		8	7	23.06	23.25	23.30
		15	0	23.03	23.10	23.38
	16QAM	1	0	23.23	23.44	23.84
		1	7	23.07	23.51	23.50
		1	14	23.22	23.61	22.37
		8	0	22.09	22.14	22.42
		8	4	22.00	22.20	22.49
		8	7	22.02	22.31	22.33
		15	0	21.88	22.31	22.45

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				131997CH	132322CH	132647CH
				1712.5MHz	1745MHz	1777.5MHz
66 / 5M	QPSK	1	0	24.04	24.11	24.66
		1	13	24.05	24.22	24.51
		1	24	24.25	24.40	23.38
		12	0	22.98	23.05	23.50
		12	6	23.11	23.13	23.49
		12	11	23.10	23.29	23.50
		25	0	23.06	23.04	23.58
	16QAM	1	0	23.47	23.03	23.75
		1	13	23.55	23.65	23.96
		1	24	23.58	23.42	22.92
		12	0	21.99	21.95	22.45
		12	6	22.02	22.23	22.60
		12	11	22.01	22.14	22.52
		25	0	21.91	22.14	22.60

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				132022CH	132322CH	132622CH
				1715MHz	1745MHz	1775MHz
66 / 10M	QPSK	1	0	24.25	24.02	24.30
		1	25	24.03	24.09	24.36
		1	49	24.35	23.76	23.54
		25	0	22.79	22.69	22.99
		25	13	22.86	22.97	23.34
		25	25	22.79	23.08	23.29
		50	0	22.75	22.85	23.19
	16QAM	1	0	23.16	23.05	23.74
		1	25	22.78	23.42	23.75
		1	49	23.44	23.11	22.36
		25	0	21.60	21.86	21.94
		25	13	21.94	22.09	22.36
		25	25	21.84	21.99	22.17
		50	0	21.68	21.95	22.11

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				132047CH	132322CH	132597CH
				1717.5MHz	1745MHz	1772.5MHz
66 / 15M	QPSK	1	0	24.18	24.02	24.22
		1	38	24.38	24.14	24.25
		1	74	22.92	23.62	23.38
		36	0	23.08	22.65	22.93
		36	18	23.27	23.09	23.21
		36	39	23.28	23.36	23.28
		75	0	23.18	22.91	23.01
	16QAM	1	0	23.08	23.16	23.67
		1	38	23.51	23.23	23.32
		1	74	22.28	22.89	22.72
		36	0	21.97	21.74	21.84
		36	18	22.41	22.14	22.16
		36	39	22.28	22.26	22.30
		75	0	22.19	21.97	22.05

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				132072CH	132322CH	132572CH
				1720MHz	1745MHz	1770MHz
66 / 20M	QPSK	1	0	24.38	24.56	24.62
		1	50	24.20	24.13	23.96
		1	99	24.00	23.93	23.65
		50	0	22.94	22.41	22.99
		50	25	23.14	23.05	22.95
		50	50	22.75	23.43	23.17
		100	0	23.14	22.88	22.75
	16QAM	1	0	23.30	23.54	23.90
		1	50	23.04	23.35	23.13
		1	99	23.18	23.40	22.66
		50	0	21.83	21.42	22.00
		50	25	22.20	22.07	21.83
		50	50	21.85	22.41	22.13
		100	0	22.09	21.94	21.64

EIRP Power (dBm):

Modulation	Band	WCDMA Band IV		
	Tx Channel	1312CH	1413CH	1513CH
	Frequency	1712.4MHz	1732.6MHz	1752.6MHz
QPSK	RMC 12.2K	24.19	24.48	24.25
	RMC 64K	24.38	23.99	23.94
	RMC 144K	24.85	24.13	24.84
	RMC 384K	24.37	23.15	24.82
	HSDPA Subtest-1	25.55	25.87	25.43
	HSDPA Subtest-2	25.05	25.35	24.96
	HSDPA Subtest-3	24.54	24.80	24.50
	HSDPA Subtest-4	24.51	24.80	24.48
	HSUPA Subtest-1	25.49	25.87	25.54
	HSUPA Subtest-2	25.44	25.84	25.49
	HSUPA Subtest-3	25.01	25.34	25.02
	HSUPA Subtest-4	25.45	25.88	25.45
	HSUPA Subtest-5	24.98	25.33	25.97

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				19957CH	20175CH	20393CH
				1710.7MHz	1732.5MHz	1754.3MHz
4 / 1.4M	QPSK	1	0	25.60	25.50	25.20
		1	2	25.40	25.30	25.00
		1	5	25.60	25.50	25.30
		3	0	25.50	25.40	24.90
		3	1	25.50	25.40	26.80
		3	2	25.50	25.30	25.00
		6	0	24.40	24.40	24.00
	16QAM	1	0	25.20	25.10	24.90
		1	2	24.80	24.90	24.50
		1	5	25.20	25.10	24.80
		3	0	24.60	24.50	24.10
		3	1	24.60	24.50	24.10
		3	2	24.50	24.50	24.10
		6	0	23.80	23.80	23.30

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				19965CH	20175CH	20385CH
				1711.5MHz	1732.5MHz	1753.5MHz
4 / 3M	QPSK	1	0	25.30	25.50	24.90
		1	7	25.30	25.30	24.90
		1	14	25.20	25.30	25.00
		8	0	24.40	24.40	23.90
		8	4	24.40	24.40	24.10
		8	7	24.40	24.30	24.00
		15	0	24.40	24.40	24.00
	16QAM	1	0	25.00	25.00	24.40
		1	7	24.90	24.80	24.50
		1	14	24.90	24.90	24.50
		8	0	23.40	23.50	23.00
		8	4	23.40	23.40	23.10
		8	7	23.40	23.50	23.00
		15	0	23.40	23.50	23.00

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				19975CH	20175CH	20375CH
				1712.5MHz	1732.5MHz	1752.5MHz
4 / 5M	QPSK	1	0	25.50	25.50	25.10
		1	13	25.20	25.30	24.90
		1	24	25.20	25.20	25.20
		12	0	24.40	24.50	23.90
		12	6	24.40	24.40	25.30
		12	11	24.90	24.30	24.00
		25	0	24.30	24.40	24.00
	16QAM	1	0	25.00	25.00	24.60
		1	13	24.80	24.90	24.60
		1	24	24.90	24.80	24.70
		12	0	23.40	23.60	23.20
		12	6	23.40	23.60	23.10
		12	11	23.30	23.40	23.20
		25	0	23.20	23.50	23.00

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				20000CH	20175CH	20350CH
				1715MHz	1732.5MHz	1750MHz
4 / 10M	QPSK	1	0	25.60	25.50	24.60
		1	25	25.80	25.20	24.80
		1	49	24.80	25.00	25.10
		25	0	24.10	24.30	23.60
		25	13	25.10	24.20	23.80
		25	25	24.70	23.90	23.80
		50	0	25.00	24.10	23.70
	16QAM	1	0	25.00	25.10	24.30
		1	25	25.50	24.70	24.30
		1	49	24.40	24.60	24.70
		25	0	23.00	23.30	22.70
		25	13	23.90	23.40	22.80
		25	25	23.60	23.10	22.80
		50	0	23.80	23.30	22.80

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				20025CH	20175CH	20325CH
				1717.5MHz	1732.5MHz	1747.5MHz
4 / 15M	QPSK	1	0	25.30	25.30	24.20
		1	38	25.60	25.20	24.70
		1	74	25.50	24.50	25.00
		36	0	25.10	24.40	23.40
		36	18	24.80	24.40	23.70
		36	39	24.60	23.90	23.80
		75	0	24.70	24.10	23.80
	16QAM	1	0	24.90	24.80	23.70
		1	38	25.20	24.80	24.30
		1	74	25.10	23.90	24.60
		36	0	23.90	23.30	22.50
		36	18	23.80	23.40	22.80
		36	39	23.50	23.00	22.90
		75	0	23.60	23.30	22.80

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				20050CH	20175CH	20300CH
				1720MHz	1732.5MHz	1745MHz
4 / 20M	QPSK	1	0	25.50	25.50	25.20
		1	50	25.40	25.20	24.50
		1	99	25.70	24.60	25.20
		50	0	24.90	24.30	22.80
		50	25	24.70	24.30	23.50
		50	50	24.40	23.50	23.80
		100	0	24.70	24.00	23.30
	16QAM	1	0	25.10	25.20	24.70
		1	50	25.10	24.80	24.00
		1	99	25.30	24.20	24.80
		50	0	23.70	23.20	22.00
		50	25	23.60	23.40	22.60
		50	50	23.40	22.70	22.90
		100	0	23.60	23.20	22.50

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				20775CH	21100CH	21425CH
				2502.5MHz	2535MHz	2567.5MHz
7 / 5M	QPSK	1	0	27.57	27.53	27.18
		1	13	27.51	27.07	27.45
		1	24	27.38	27.00	27.14
		12	0	26.63	26.42	27.16
		12	6	26.69	26.22	26.89
		12	11	26.54	26.17	26.67
		25	0	26.58	26.15	26.80
	16QAM	1	0	26.78	26.83	27.18
		1	13	26.67	26.22	27.49
		1	24	26.43	26.26	27.05
		12	0	25.80	25.57	27.01
		12	6	25.80	25.38	26.68
		12	11	25.66	25.25	26.63
		25	0	25.63	25.27	26.78

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				20800CH	21100CH	21400CH
				2505MHz	2535MHz	2565MHz
7 / 10M	QPSK	1	0	27.59	27.16	27.88
		1	25	26.73	26.98	27.01
		1	49	26.76	26.82	26.49
		25	0	26.14	26.56	26.33
		25	13	25.96	26.60	26.27
		25	25	25.60	25.86	26.72
		50	0	25.90	25.94	26.07
	16QAM	1	0	26.86	26.71	27.14
		1	25	26.01	26.21	26.42
		1	49	25.99	26.12	26.09
		25	0	25.40	25.62	25.33
		25	13	25.13	25.19	25.32
		25	25	24.75	24.91	25.74
		50	0	25.08	25.07	25.14

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				20825CH	21100CH	21375CH
				2507.5MHz	2535MHz	2562.5MHz
7 / 15M	QPSK	1	0	27.50	27.37	27.36
		1	38	26.63	26.90	26.99
		1	74	26.78	26.76	26.83
		36	0	26.10	26.87	26.81
		36	18	25.75	26.20	26.12
		36	39	25.49	25.88	25.77
		75	0	25.77	25.86	25.81
	16QAM	1	0	26.86	26.79	27.36
		1	38	25.76	26.51	26.97
		1	74	26.03	26.43	26.83
		36	0	25.30	25.79	26.84
		36	18	24.98	25.18	26.12
		36	39	24.58	24.65	25.83
		75	0	24.95	24.93	25.87

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				20850CH	21100CH	21350CH
				2510MHz	2535MHz	2560MHz
7 / 20M	QPSK	1	0	27.73	28.27	27.17
		1	50	26.28	27.76	27.56
		1	99	27.33	27.09	26.60
		50	0	25.86	27.01	26.17
		50	25	25.54	26.16	26.70
		50	50	25.86	25.73	26.20
		100	0	25.69	25.73	26.57
	16QAM	1	0	26.95	27.26	26.22
		1	50	25.55	26.31	26.75
		1	99	26.54	26.40	26.21
		50	0	24.88	25.82	25.35
		50	25	24.59	25.10	25.80
		50	50	24.81	24.63	25.18
		100	0	24.71	24.66	25.69

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				131979CH	132322CH	132665CH
				1710.7MHz	1745MHz	1779.3MHz
66 / 1.4M	QPSK	1	0	26.19	26.41	26.42
		1	2	25.83	26.09	26.11
		1	5	26.30	26.37	26.36
		3	0	25.90	26.12	26.10
		3	1	25.93	26.19	26.18
		3	2	25.95	26.17	26.17
		6	0	24.91	26.04	25.06
	16QAM	1	0	25.21	25.74	25.65
		1	2	25.24	25.48	25.18
		1	5	25.68	25.30	25.81
		3	0	24.78	25.12	24.98
		3	1	24.86	25.12	25.04
		3	2	24.98	25.12	25.15
		6	0	24.01	24.27	24.25

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				131987CH	132322CH	132657CH
				1711.5MHz	1745MHz	1778.5MHz
66 / 3M	QPSK	1	0	25.99	26.13	26.50
		1	7	26.04	26.19	26.40
		1	14	26.11	26.26	25.17
		8	0	24.97	25.10	25.51
		8	4	25.08	25.24	25.43
		8	7	25.06	25.25	25.30
		15	0	25.03	25.10	25.38
	16QAM	1	0	25.23	25.44	25.84
		1	7	25.07	25.51	25.50
		1	14	25.22	25.61	24.37
		8	0	24.09	24.14	24.42
		8	4	24.00	24.20	24.49
		8	7	24.02	24.31	24.33
		15	0	23.88	24.31	24.45

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				131997CH	132322CH	132647CH
				1712.5MHz	1745MHz	1777.5MHz
66 / 5M	QPSK	1	0	26.04	26.11	26.66
		1	13	26.05	26.22	26.51
		1	24	26.25	26.40	25.38
		12	0	24.98	25.05	25.50
		12	6	25.11	25.13	25.49
		12	11	25.10	25.29	25.50
		25	0	25.06	25.04	25.58
	16QAM	1	0	25.47	25.03	25.75
		1	13	25.55	25.65	25.96
		1	24	25.58	25.42	24.92
		12	0	23.99	23.95	24.45
		12	6	24.02	24.23	24.60
		12	11	24.01	24.14	24.52
		25	0	23.91	24.14	24.60

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				132022CH	132322CH	132622CH
				1715MHz	1745MHz	1775MHz
66 / 10M	QPSK	1	0	26.25	26.02	26.30
		1	25	26.03	26.09	26.36
		1	49	26.35	25.76	25.54
		25	0	24.79	24.69	24.99
		25	13	24.86	24.97	25.34
		25	25	24.79	25.08	25.29
		50	0	24.75	24.85	25.19
	16QAM	1	0	25.16	25.05	25.74
		1	25	24.78	25.42	25.75
		1	49	25.44	25.11	24.36
		25	0	23.60	23.86	23.94
		25	13	23.94	24.09	24.36
		25	25	23.84	23.99	24.17
		50	0	23.68	23.95	24.11

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				132047CH	132322CH	132597CH
				1717.5MHz	1745MHz	1772.5MHz
66 / 15M	QPSK	1	0	26.18	26.02	26.22
		1	38	26.38	26.14	26.25
		1	74	24.92	25.62	25.38
		36	0	25.08	24.65	24.93
		36	18	25.27	25.09	25.21
		36	39	25.28	25.36	25.28
		75	0	25.18	24.91	25.01
	16QAM	1	0	25.08	25.16	25.67
		1	38	25.51	25.23	25.32
		1	74	24.28	24.89	24.72
		36	0	23.97	23.74	23.84
		36	18	24.41	24.14	24.16
		36	39	24.28	24.26	24.30
		75	0	24.19	23.97	24.05

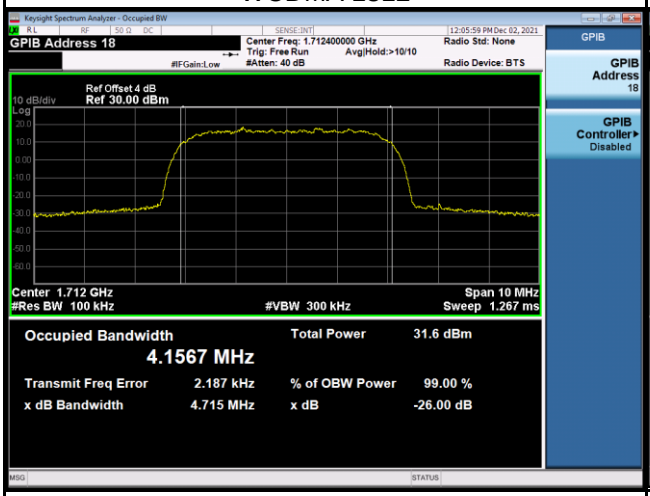
LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				132072CH	132322CH	132572CH
				1720MHz	1745MHz	1770MHz
66 / 20M	QPSK	1	0	26.38	26.56	26.62
		1	50	26.20	26.13	25.96
		1	99	26.00	25.93	25.65
		50	0	24.94	24.41	24.99
		50	25	25.14	25.05	24.95
		50	50	24.75	25.43	25.17
		100	0	25.14	24.88	24.75
	16QAM	1	0	25.30	25.54	25.90
		1	50	25.04	25.35	25.13
		1	99	25.18	25.40	24.66
		50	0	23.83	23.42	24.00
		50	25	24.20	24.07	23.83
		50	50	23.85	24.41	24.13
		100	0	24.09	23.94	23.64

APPENDIX B - OCCUPIED BANDWIDTH

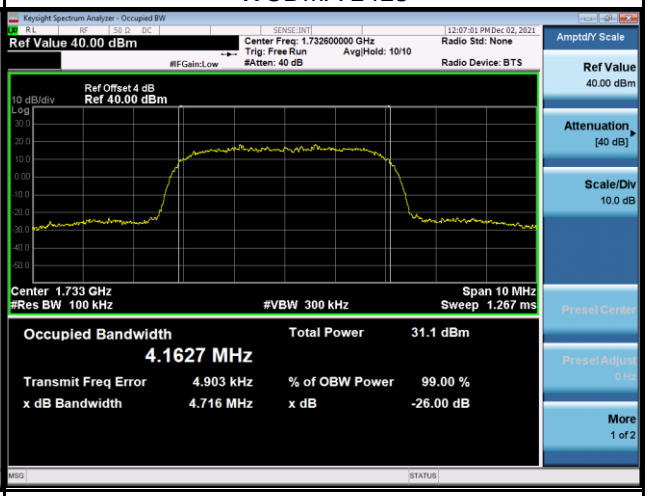
WCDMA Band IV					
QPSK					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)
1312	1712.4	4.1567	1312	1712.4	4.715
1413	1732.6	4.1627	1413	1732.6	4.716
1513	1752.6	4.1643	1513	1752.6	4.714

Spectrum Plot

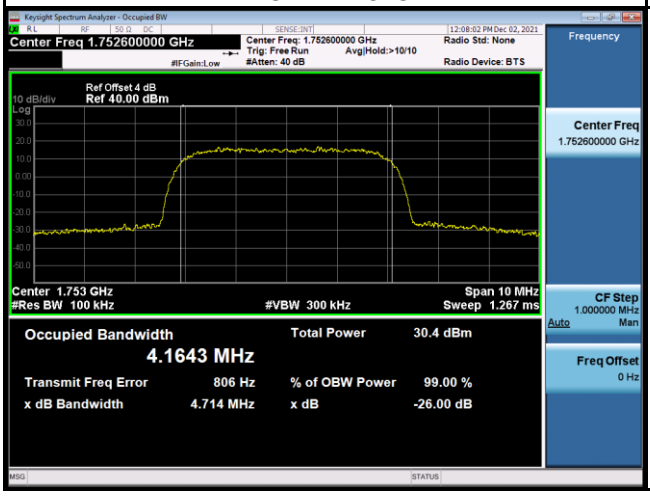
WCDMA 1312



WCDMA 1413



WCDMA 1513



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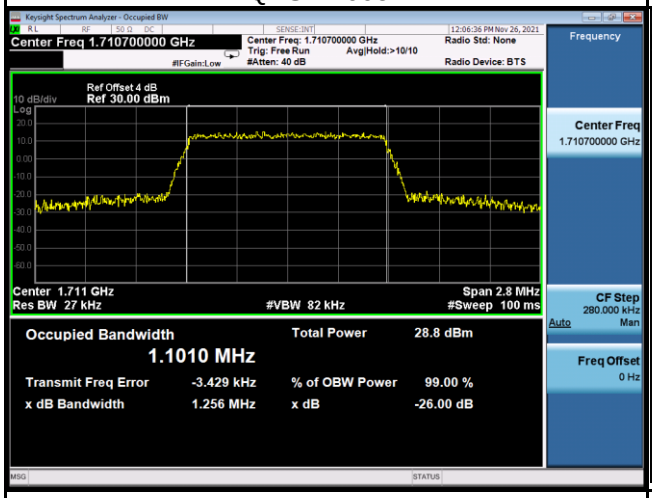
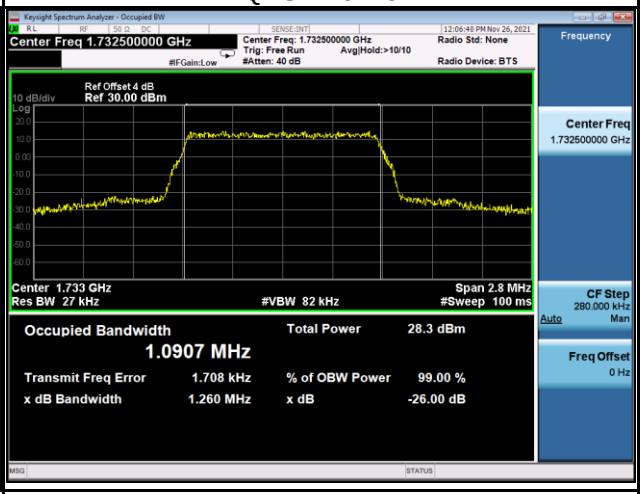
LTE Band 4_1.4M					
QPSK			16QAM		
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
19957	1710.7	1.1010	19957	1710.7	1.1024
20175	1732.5	1.0907	20175	1732.5	1.0951
20393	1754.3	1.0979	20393	1754.3	1.1004
Channel	Frequency (MHz)	26dB Bandwidth (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)
19957	1710.7	1.256	19957	1710.7	1.260
20175	1732.5	1.260	20175	1732.5	1.261
20393	1754.3	1.257	20393	1754.3	1.259

Spectrum Plot

QPSK-19957



QPSK-20175



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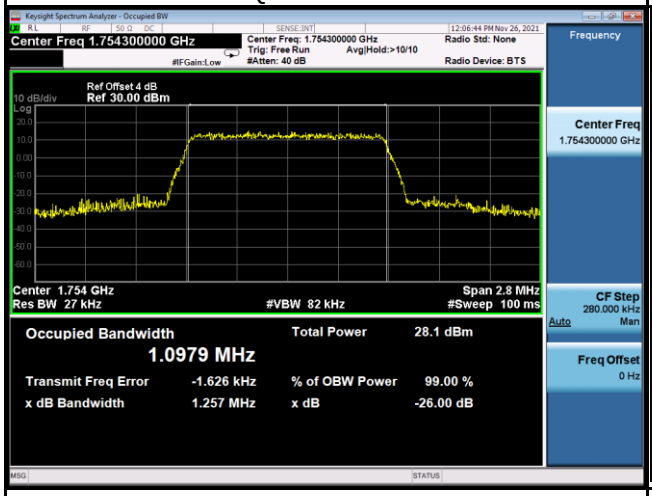
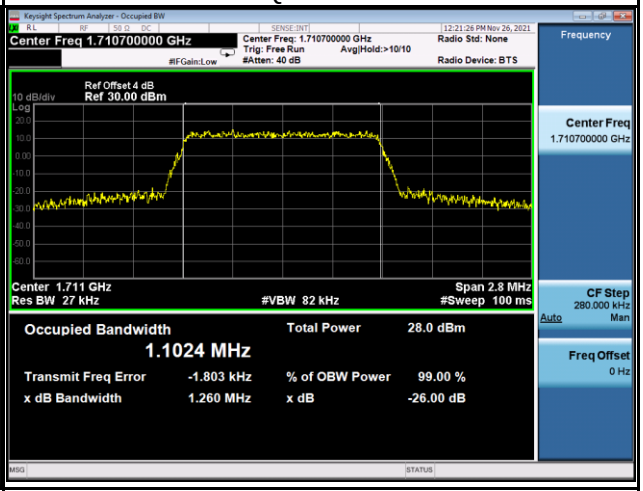


16QAM-19957



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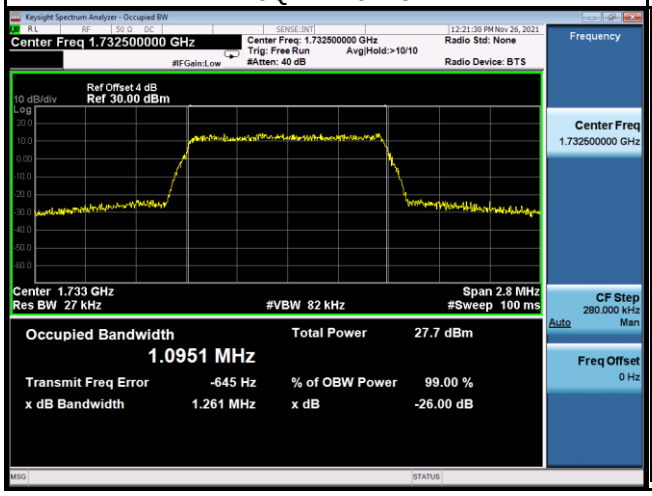

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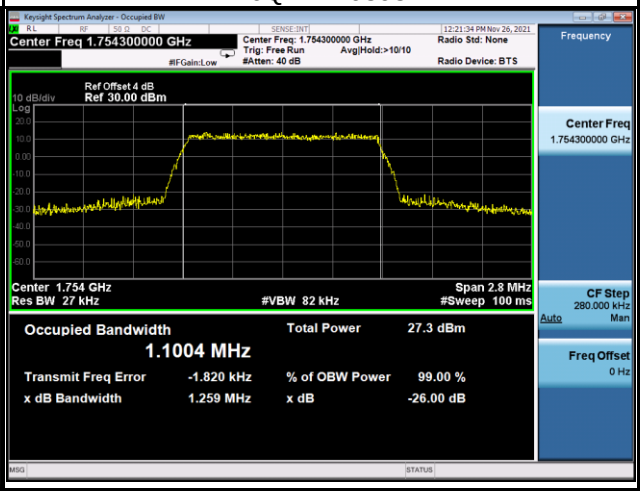
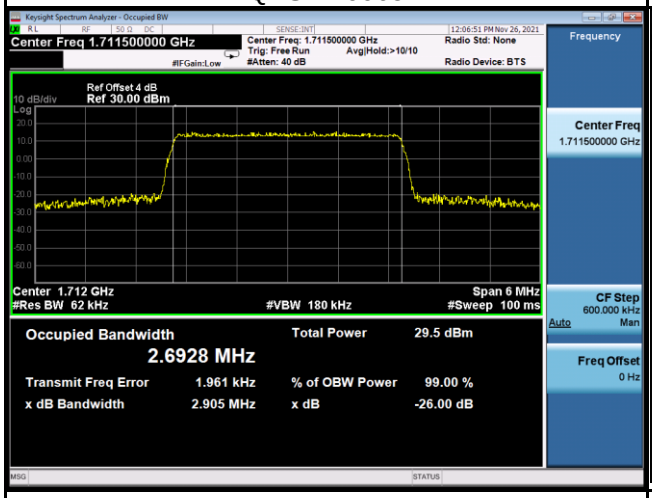


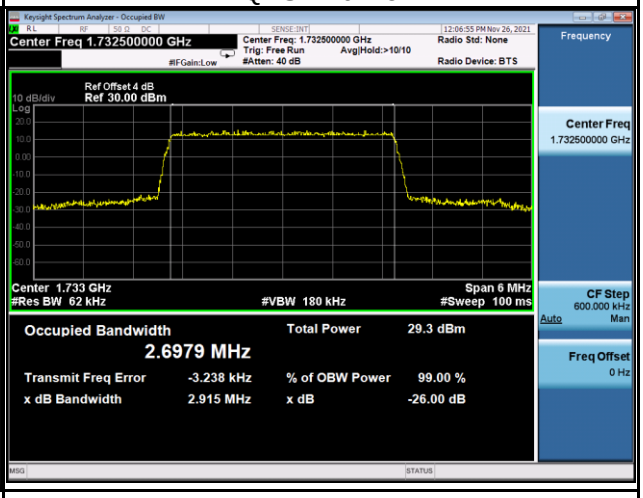
LTE Band 4_3M					
QPSK			16QAM		
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
19965	1711.5	2.6928	19965	1711.5	2.6982
20175	1732.5	2.6979	20175	1732.5	2.7018
20385	1753.5	2.6982	20385	1753.5	2.6938
Channel	Frequency (MHz)	26dB Bandwidth (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)
19965	1711.5	2.905	19965	1711.5	2.911
20175	1732.5	2.915	20175	1732.5	2.906
20385	1753.5	2.919	20385	1753.5	2.920

Spectrum Plot

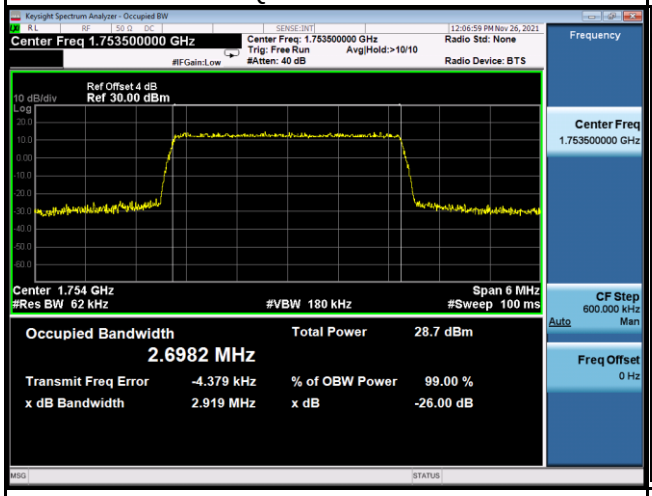
QPSK-19965



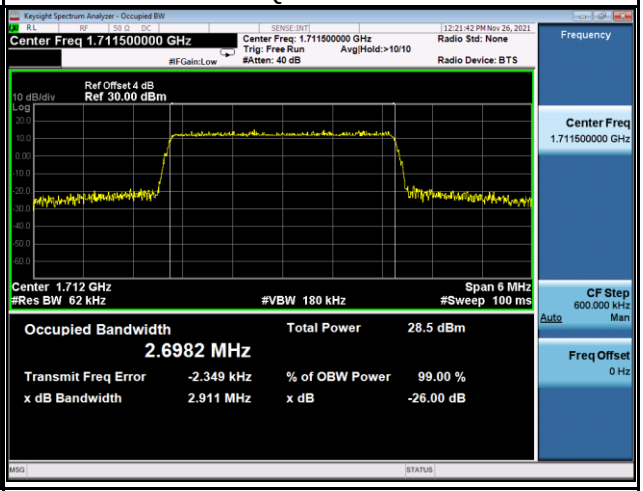
QPSK-20175



QPSK-20385



16QAM-19965



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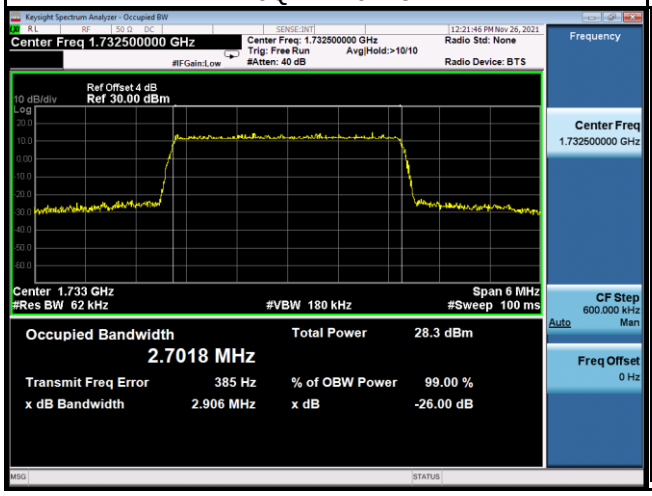
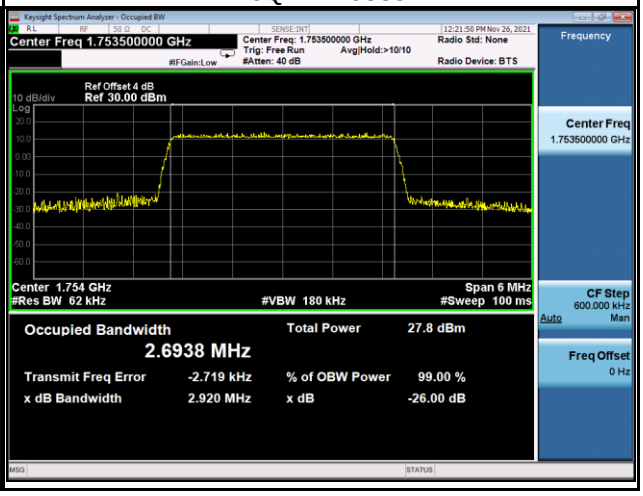


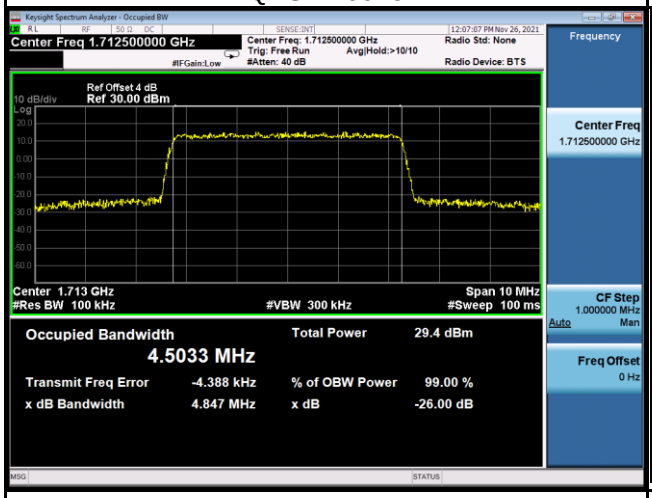
16QAM-20385



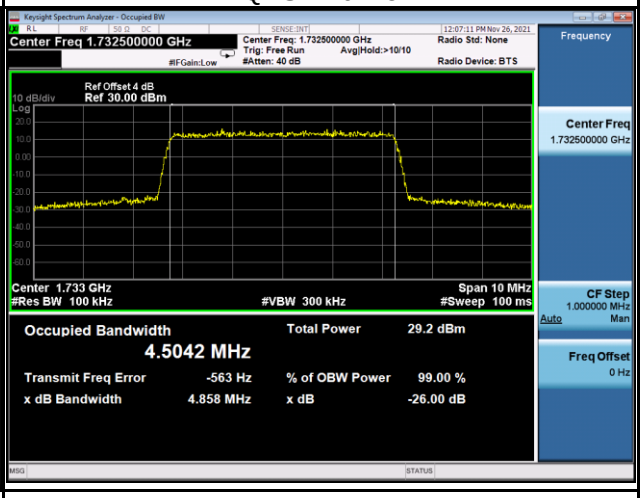
LTE Band 4_5M					
QPSK			16QAM		
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
19975	1712.5	4.5033	19975	1712.5	4.4979
20175	1732.5	4.5042	20175	1732.5	4.4956
20375	1752.5	4.5029	20375	1752.5	4.4891
Channel	Frequency (MHz)	26dB Bandwidth (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)
19975	1712.5	4.847	19975	1712.5	4.869
20175	1732.5	4.858	20175	1732.5	4.858
20375	1752.5	4.824	20375	1752.5	4.841

Spectrum Plot

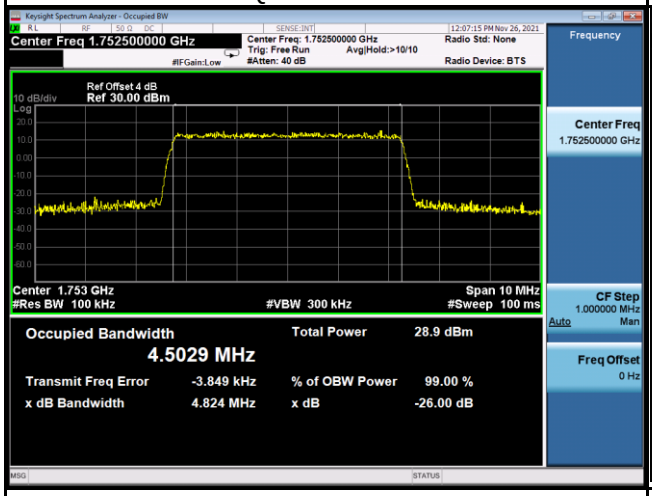
QPSK-19975



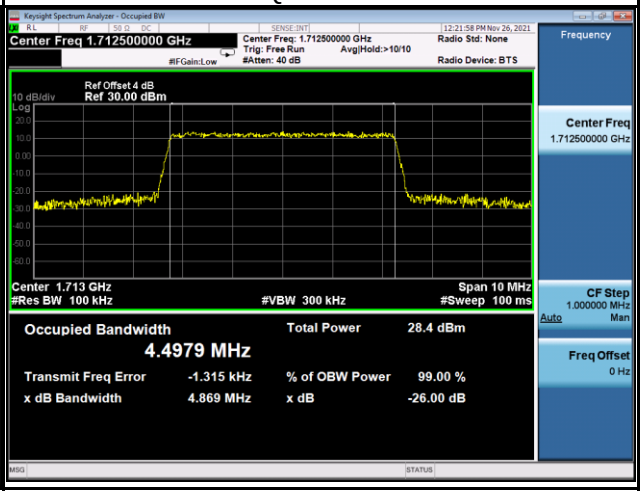
QPSK-20175



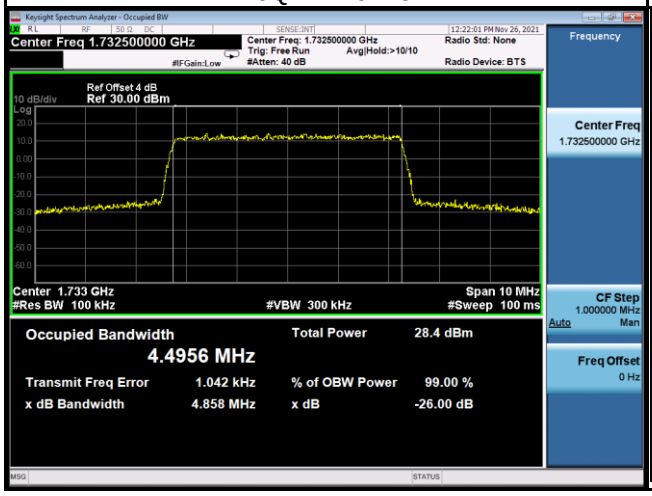
QPSK-20375



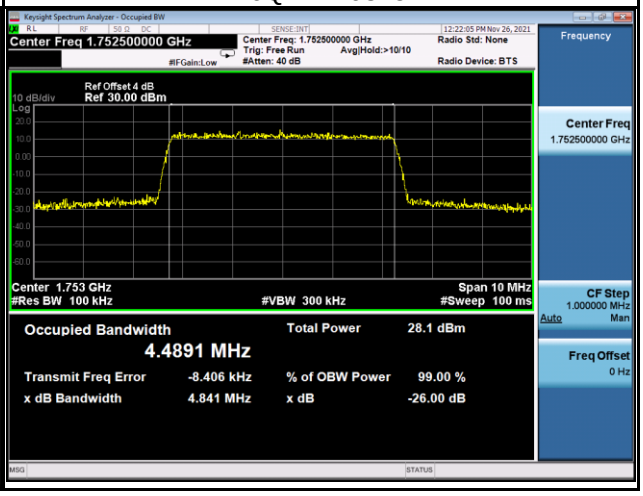
16QAM-19975



16QAM-20175



16QAM-20375



LTE Band 4_10M					
QPSK			16QAM		
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
20000	1715	8.9530	20000	1715	8.9707
20175	1732.5	8.9456	20175	1732.5	8.9386
20350	1750	8.9755	20350	1750	8.9665
Channel	Frequency (MHz)	26dB Bandwidth (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)
20000	1715	9.702	20000	1715	9.665
20175	1732.5	9.667	20175	1732.5	9.640
20350	1750	9.656	20350	1750	9.625