

FCC Radio Test Report

FCC ID: 2ABDK-VB2

This report concerns: Original Grant

Project No. : 1911C006
Equipment : Smart Watch
Brand Name : VitalThec
Test Model : VB2
Series Model : N/A
Applicant : Borqs BeiJing Ltd
Address : TowerA BuildingB23 Universal Business Park No 10 jiuxianqiao Road
Chaoyang District Beijing China
Manufacturer : Borqs BeiJing Ltd
Address : TowerA BuildingB23 Universal Business Park No 10 jiuxianqiao Road
Chaoyang District Beijing China
Factory : Borqs BeiJing Ltd
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Chaoyang District Beijing China
Date of Receipt : Nov. 04, 2019
Date of Test : Oct. 28, 2020 ~ Dec. 09, 2021
Issued Date : Jan. 07, 2022
Report Version : R01
Test Sample : Engineering Sample No.: DG2020102826 and DG20211022168 for conducted,
DG20211022165-3 for radiated.
Standard(s) : 47 CFR FCC Part 27 Subpart L
47 CFR FCC Part 27 Subpart H
47 CFR FCC Part 2
ANSI C63.26-2015
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.

Gabriel Zhu

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TESTING CERT #5123.02

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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.	Jan. 01, 2022
R01	Modified the comments of TCB.	Jan. 07, 2022

1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standard(s):

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

Note:

(1) "N/A" denotes test is not applicable in this test report.

1.1 TEST FACILITY

The test facilities used to collect the test data of radiated in this report is at the location of No. 3 Jinshagang 1st Rd. Shixia, Dalang Town Dongguan City, Guangdong 523792 People's Republic of China.

The test facilities used to collect the test data of frequency stability in this report is at the location of Room 108, Building 2, No.1, Yile Road, Songshan Lake Zone, Dongguan City, Guangdong, People's Republic of China.

BTL's Test Firm Registration Number for FCC: 357015

BTL's Designation Number for FCC: CN1240

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 %, $U=2 \times U_c(y)$.

The BTL measurement uncertainty as below table:

A. Radiated Measurement:

Test Site	Method	Measurement Frequency Range	U,(dB)
DG-CB01	CISPR	9kHz ~ 30MHz	2.36

Test Site	Method	Measurement Frequency Range	Ant. H / V	U,(dB)
DG-CB03	CISPR	30MHz ~ 200MHz	V	4.36
		30MHz ~ 200MHz	H	3.32
		200MHz ~ 1,000MHz	V	4.08
		200MHz ~ 1,000MHz	H	3.96
		1GHz ~ 6GHz	-	3.80
		6GHz ~ 18GHz	-	4.82
		18 GHz ~ 26.5 GHz	-	3.62

B. Other Measurement:

Parameter	Uncertainty
Spectrum Bandwidth	± 3.8 %
Maximum Output Power	± 0.95 dB
Power Spectral Density	± 0.86 dB
Frequency Stability	± 0.16 dB
Temperature	± 0.08 °C
Time	± 0.58 %
Supply voltages	± 0.3 %

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 & EIRP	23.2°C	45%	DC 3.8V	Tate Liu/Tim Yang
Occupied Bandwidth	23.2°C	45%	DC 3.8V	Tate Liu/Tim Yang
Conducted Spurious Emissions	23.2°C	45%	DC 3.8V	Tate Liu/Tim Yang
Radiated Spurious Emissions (9 kHz to 30 MHz)	25°C	60%	DC 3.8V	Sparrow Liu
Radiated Spurious Emissions (30 MHz to 1000 MHz)	26°C	52%	DC 3.8V	Kwok Guo
Radiated Spurious Emissions (Above 1000 MHz)	26°C	52%	DC 3.8V	Kwok Guo
Band Edge	23.2°C	45%	DC 3.8V	Tate Liu/Tim Yang
Peak To Average Ratio	23.2°C	45%	DC 3.8V	Tate Liu/Tim Yang
Frequency Stability	Normal & Extreme	45%	Normal & Extreme	Rick Liao

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	Smart Watch			
Brand Name	VitalThec			
Test Model	VB2			
Series Model	N/A			
Model Difference(s)	N/A			
Hardware Version	DVT2			
Software Version	SW_VB2_286.00_i_USERDEBUG			
Power Source	1# Supplied from USB port. 2# Battery supplied. Model: ZWD462527V			
Power Rating	1# DC 5V 2# DC 3.8V, 400mAh			
IEMI No.	Conducted	866027030892968/004400152020000		
	Radiated	004400152020002		
Modulation Type	LTE		UL: QPSK,16QAM DL: QPSK,16QAM,64QAM	
Max. EIRP	LTE	Channel Bandwidth (MHz)	QPSK (dBm)	16QAM (dBm)
	Band 4	1.4	15.21	14.41
		3	15.27	14.59
		5	15.19	14.23
		10	15.34	14.26
		15	15.28	14.76
		20	15.31	14.39
Max. ERP	Band 12	1.4	10.80	9.84
		3	10.78	9.79
		5	10.78	9.57
		10	10.82	9.85

Note:

- For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.

2. Channel List:

LTE Band 4					
Test Frequency ID	Bandwidth (MHz)	N _{UL}	Frequency of Uplink (MHz)	N _{DL}	Frequency of Downlink (MHz)
Low Range	1.4	19957	1710.7	1957	2110.7
	3	19965	1711.5	1965	2111.5
	5	19975	1712.5	1975	2112.5
	10	20000	1715	2000	2115
	15	20025	1717.5	2025	2117.5
	20	20050	1720	2050	2120
Mid Range	1.4/3/5/10/15/20	20175	1732.5	2175	2132.5
High Range	1.4	20393	1754.3	2393	2154.3
	3	20385	1753.5	2385	2153.5
	5	20375	1752.5	2375	2152.5
	10	20350	1750	2350	2150
	15	20325	1747.5	2325	2147.5
	20	20300	1740	2300	2145

LTE Band 12					
Test Frequency ID	Bandwidth (MHz)	N _{UL}	Frequency of Uplink (MHz)	N _{DL}	Frequency of Downlink (MHz)
Low Range	1.4	23017	699.7	5017	729.7
	3	23025	700.5	5025	730.5
	5	23035	701.5	5035	731.5
	10	23060	704.0	5060	734
Mid Range	1.4/3/5/10	23095	707.5	5095	737.5
High Range	1.4	23173	715.3	5173	745.3
	3	23165	714.5	5165	744.5
	5	23155	713.5	5155	743.5
	10	23130	711.0	5130	741

3. Table for Filed Antenna:

Brand	Model Name	Antenna Type	Connector	Gain (dBi)	Note
N/A	N/A	Loop	N/A	-6.8	LTE Band 4
N/A	N/A	Loop	N/A	-10	LTE Band 12

Note: The antenna gain is provided by the manufacturer.

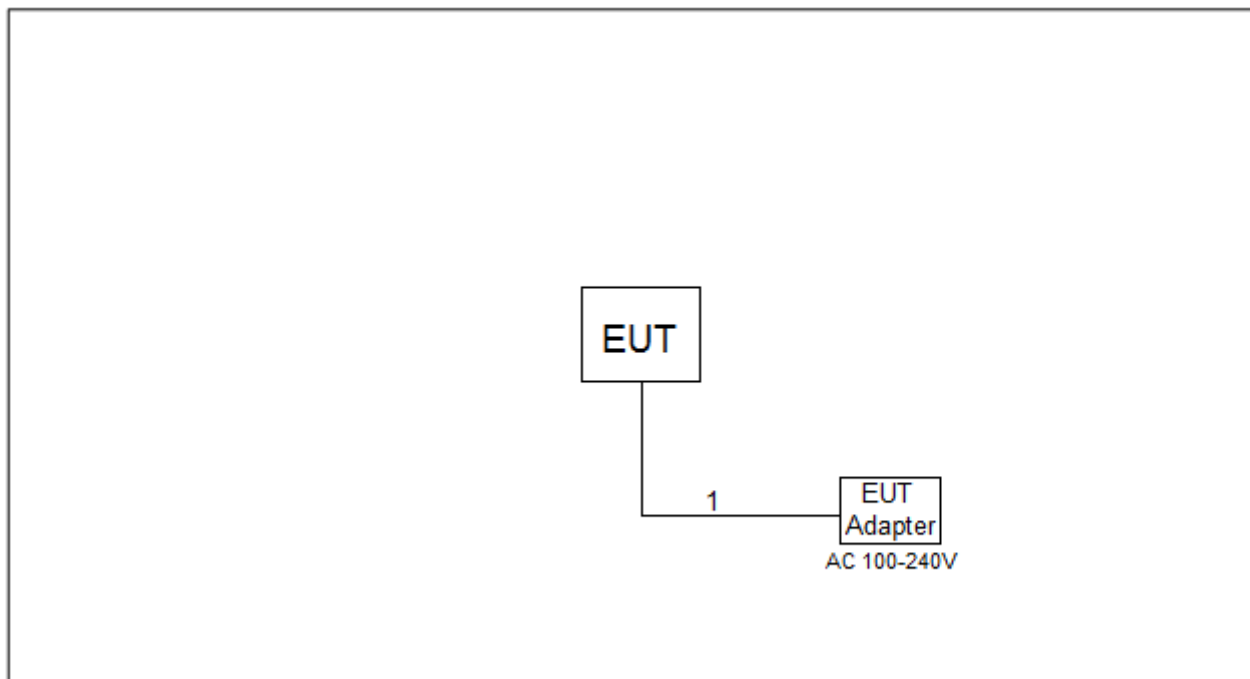
2.2 DESCRIPTION OF TEST MODES

Following mode(s) is (were) found to be the worst case(s) and selected for the final test.

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 Emissions	19957 to 20393	20175	1.4MHz	QPSK	1RB
	19975 to 20375	20175	5MHz	QPSK	1RB
	20050 to 20300	20175	20MHz	QPSK	1RB
Radiated Spurious Emissions	19957 to 20393	20175	1.4MHz	QPSK	1RB
	19975 to 20375	20175	5MHz	QPSK	1RB
	20050 to 20300	20175	20MHz	QPSK	1RB
Band Edge	19957 to 20393	19957, 20393	1.4MHz	QPSK	1RB/6RB
	19965 to 20385	19965, 20385	3MHz	QPSK	1RB/15RB
	19975 to 20375	19975, 20375	5MHz	QPSK	1RB/25RB
	20000 to 20350	20000, 20350	10MHz	QPSK	1RB/50RB
	20025 to 20325	20025, 20325	15MHz	QPSK	1RB/75RB
	20050 to 20300	20050, 20300	20MHz	QPSK	1RB/100RB
Peak To Average Ratio	19957 to 20393	19957, 20175, 20393	1.4MHz	QPSK, 16QAM	1RB
	19965 to 20385	19965, 20175, 20385	3MHz	QPSK, 16QAM	1RB
	19975 to 20375	19975, 20175, 20375	5MHz	QPSK, 16QAM	1RB
	20000 to 20350	20000, 20175, 20350	10MHz	QPSK, 16QAM	1RB
	20025 to 20325	20025, 20175, 20325	15MHz	QPSK, 16QAM	1RB
	20050 to 20300	20050, 20175, 20300	20MHz	QPSK, 16QAM	1RB
Frequency Stability	20050 to 20300	20050, 20300	20MHz	QPSK	1RB

LTE BAND 12 MODE					
Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
Output Power & ERP	23017 to 23173	23017, 23095, 23173	1.4MHz	QPSK, 16QAM	1RB/3RB/6RB
	23025 to 23165	23025, 23095, 23165	3MHz	QPSK, 16QAM	1RB/8RB/15RB
	23035 to 23155	23035, 23095, 23155	5MHz	QPSK, 16QAM	1RB/12RB/25RB
	23060 to 23130	23060, 23095, 23130	10MHz	QPSK, 16QAM	1RB/25RB/50RB
Frequency Stability	23060 to 23130	23060,23130	10MHz	QPSK	1 RB
Occupied Bandwidth	23017 to 23173	23017, 23095, 23173	1.4MHz	QPSK, 16QAM	6RB
	23025 to 23165	23025, 23095, 23165	3MHz	QPSK, 16QAM	15RB
	23035 to 23155	23035, 23095, 23155	5MHz	QPSK, 16QAM	25RB
	23060 to 23130	23060, 23095, 23130	10MHz	QPSK, 16QAM	50RB
Peak to Average Ratio	23017 to 23173	23017, 23095, 23173	1.4MHz	QPSK, 16QAM	1 RB
	23025 to 23165	23025, 23095, 23165	3MHz	QPSK, 16QAM	1 RB
	23035 to 23155	23035, 23095, 23155	5MHz	QPSK, 16QAM	1 RB
	23060 to 23130	23060, 23095, 23130	10MHz	QPSK, 16QAM	1 RB
Band Edge	23017 to 23173	23017,23173	1.4MHz	QPSK	1RB/6RB
	23025 to 23165	23025,23165	3MHz	QPSK	1RB/15RB
	23035 to 23155	23035,23155	5MHz	QPSK	1RB/25RB
	23060 to 23130	23060,23130	10MHz	QPSK	1RB/50RB
Conducted Emission	23017 to 23173	23095	1.4MHz	QPSK	1 RB
	23025 to 23165	23095	3MHz	QPSK	1 RB
	23035 to 23155	23095	5MHz	QPSK	1 RB
	23060 to 23130	23095	10MHz	QPSK	1 RB
Radiated Emission	23017 to 23173	23095	1.4MHz	QPSK	1 RB
	23017 to 23173	23095	5MHz	QPSK	1 RB
	23060 to 23130	23095	10MHz	QPSK	1 RB

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.
-	-	-	-	-

Item	Cable Type	Shielded Type	Ferrite Core	Length
1	USB Cable	NO	NO	1.2m

3. TEST RESULT

3.1 OUTPUT POWER MEASUREMENT

3.1.1 LIMIT

Mobile / Portable station are limited to 1 watts e.i.r.p. (Part 27 Subpart L)

Mobile / Portable station are limited to 3 watts e.r.p (Part 27 Subpart H)

3.1.2 TEST PROCEDURE

The testing follows FCC KDB 971168 v03r01 Section 5.

EIRP:

$EIRP = \text{Output Power} + \text{Antenan gain}$

ERP:

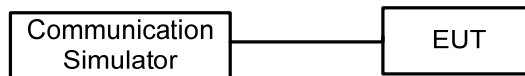
$ERP = EIRP - 2.15$

Output Power:

The EUT was set up for the maximum power with WCDMA and 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

Output Power Measurement



3.1.4 TEST DEVIATION

No deviation

3.1.5 TEST RESULTS

Please refer to the APPENDIX A.

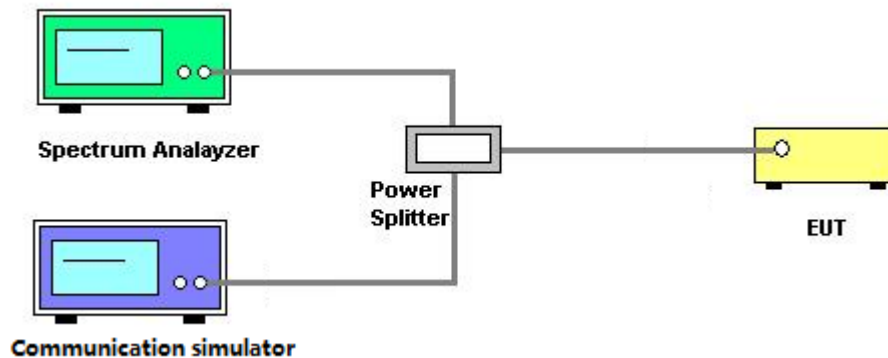
3.2 OCCUPIED BANDWIDTH MEASUREMENT

3.2.1 TEST PROCEDURE

The testing follows FCC KDB 971168 v03r01 Section 4.

1. 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.
2. The EUT was connected to spectrum analyzer and system simulator via a power divider.
3. $RBW = (1\% \sim 5\%) \cdot EBW$
 $VBW \geq 3 \cdot RBW$
4. Set spectrum analyzer with Peak detector.

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 SPURIOUS EMISSIONS MEASUREMENT

3.3.1 LIMIT

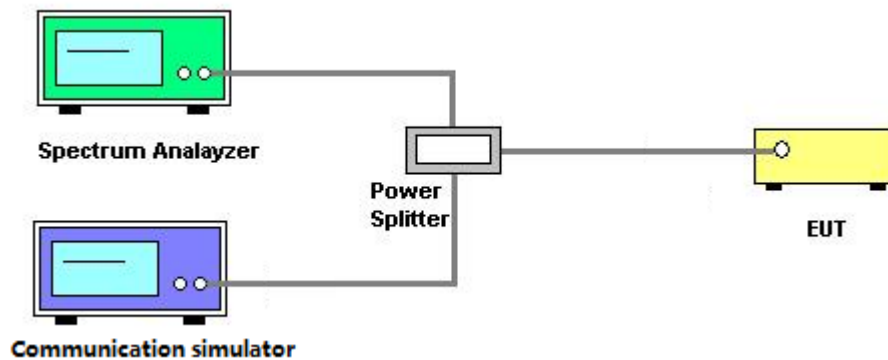
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB. The emission limit equal to -13dBm. (Part 27 Subpart L)

3.3.2 TEST PROCEDURES

The testing follows FCC KDB 971168 v03r01 Section 6.

1. The EUT was connected to spectrum analyzer and system simulator via a power divider.
2. The band edges of low and high channels for the highest RF powers were measured. Set RBW $\geq 1\%$ EBW in the 1MHz band immediately outside and adjacent to the band edge.
3. Set spectrum analyzer with Peak detector.
4. 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 SPURIOUS 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. (Part 27 Subpart L)

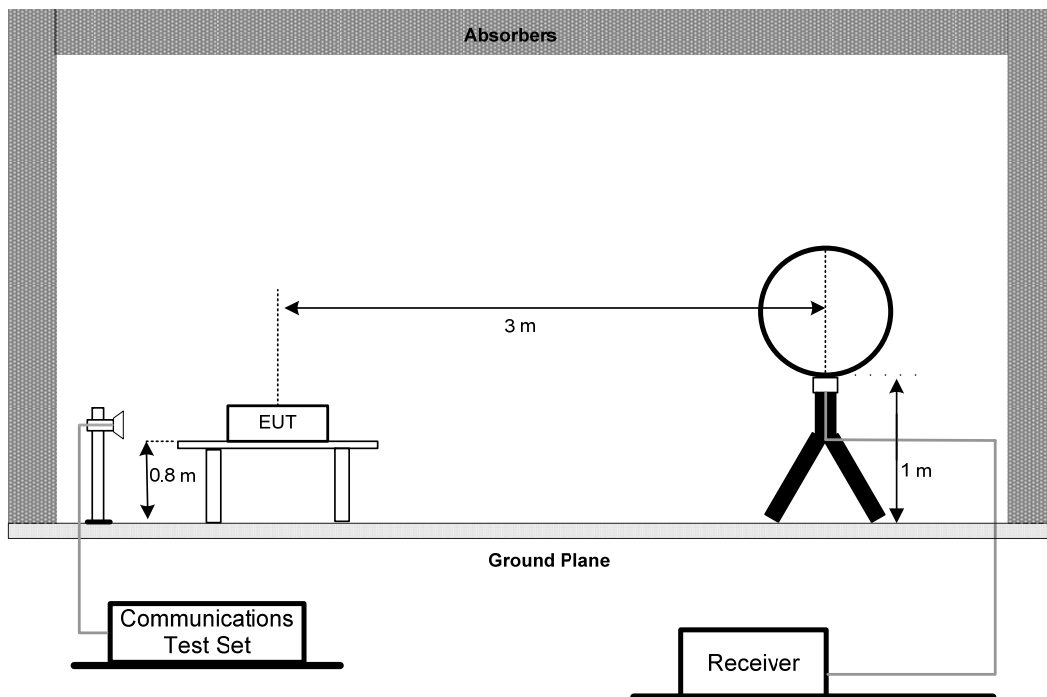
3.4.2 TEST PROCEDURES

The testing follows FCC KDB 971168 v03r01 Section 6.2.

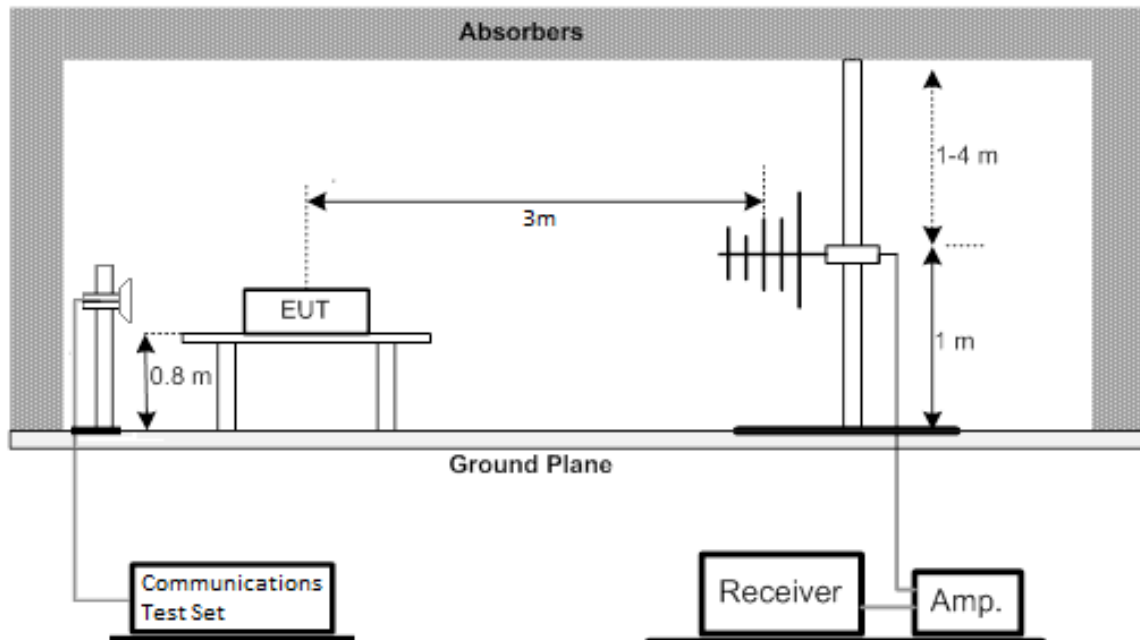
1. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. 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. $EIRP = \text{Output power level of S.G} - \text{TX cable loss} + \text{Antenna gain of substitution horn}.$
4. ERP can be calculated form EIRP by subtracting the gain of dipole, $ERP = EIPR - 2.15\text{dBi}.$
5. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1MHz/3MHz.

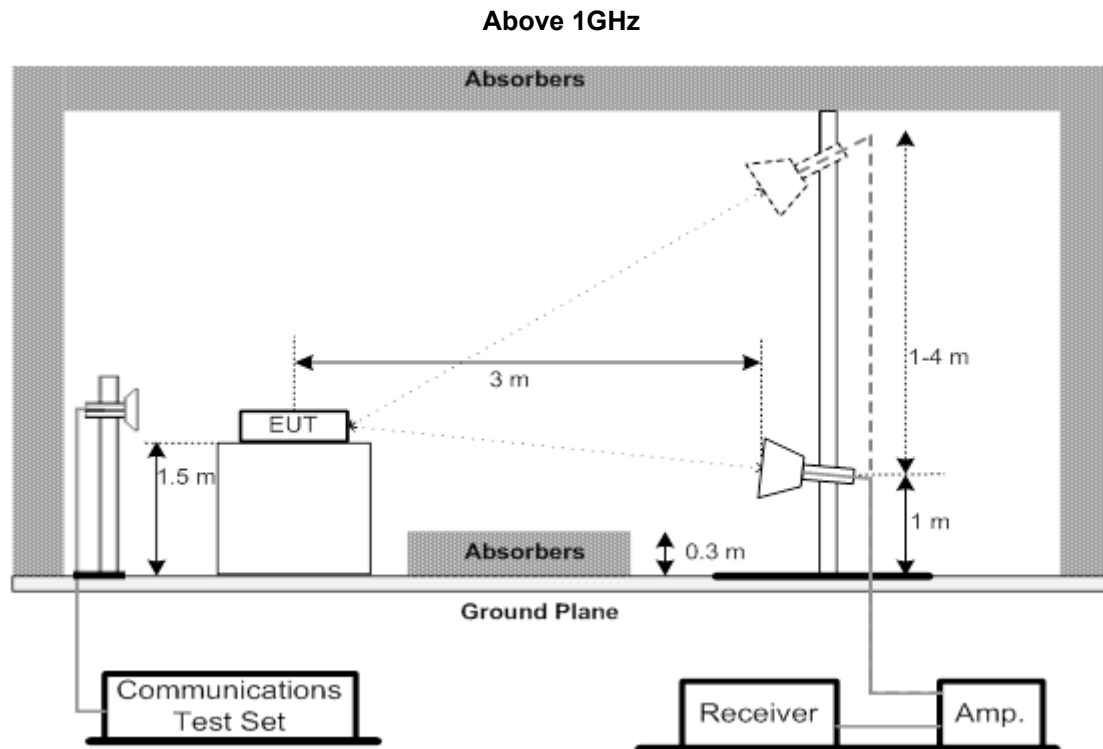
3.4.3 TEST SETUP LAYOUT

Below 30MHz



30MHz to 1GHz





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

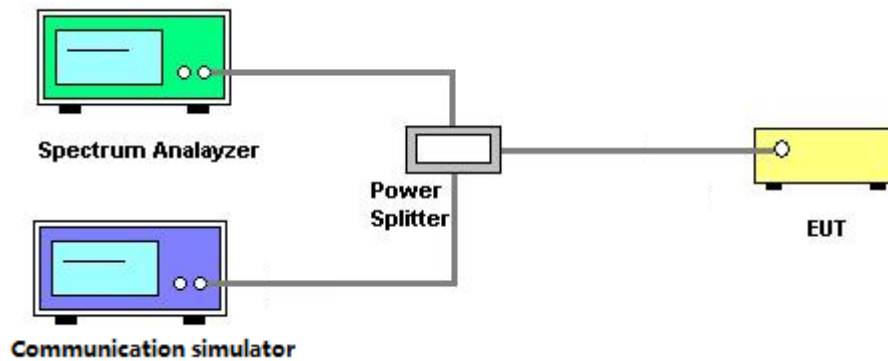
The power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least $43 + 10 \log (P)$ dB. Compliance with this provision is based on the use of measurement instrumentation 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. (Part 27 Subpart L)

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. 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

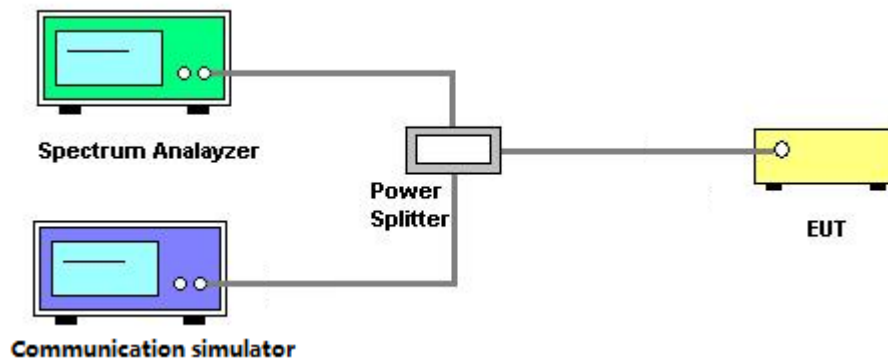
In measuring transmissions in this band using an average power technique, the peak to-average ratio (PAR) of the transmission may not exceed 13 dB.

3.6.2 TEST PROCEDURES

The testing follows FCC KDB 971168 v03r01 Section 5.7.

1. Set resolution/measurement bandwidth $\geq$ 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

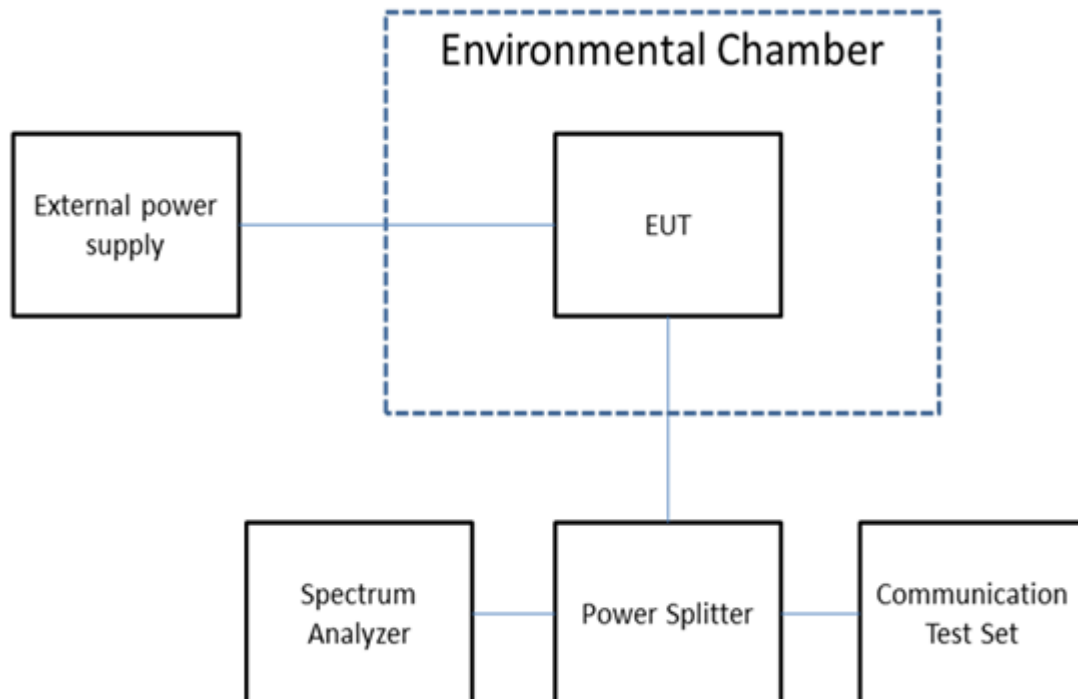
The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

3.7.2 TEST PROCEDURES

The testing follows ANSI C63.26-2015 Section 5.6.

1. A reference point shall be established at the applicable unwanted emissions limit using a RBW equal to the RBW required by the unwanted emissions specification of the applicable regulatory standard. These reference points measured using the lowest and highest channel of operation shall be identified as f_L and f_H respectively. The worst-case frequency offset determined in the above methods shall be added or subtracted from the values of f_L and f_H and the resulting frequencies must remain within the band.
2. The EUT was set up in the thermal chamber and connected with the system simulator.
3. With power OFF, the temperature was decreased to -30°C and the EUT was stabilized before testing. Power was applied and the maximum change in frequency was recorded within one minute.
4. With power OFF, the temperature was raised in 10°C step up to 50°C . The EUT was stabilized at each step for at least half an hour. Power was applied and the maximum frequency change was recorded within one minute.

3.7.3 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 Emissions - 9 kHz to 30 MHz					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	MXE EMI Receiver	Keysight	N9038A	MY56400091	Feb. 27, 2022
2*	Active Loop Antenna	R&S	HFH2-Z2	830749/020	Aug. 23, 2024
3	Cable	N/A	RG 213/U(9kHz~1GHz)	N/A	May 27, 2022
4	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A
5	wideband radio communication tester	R&S	CMW500	152372	Feb. 27, 2022
6	Wireless Communication Test SET	Agilent	E5515C	MY48364183	Feb. 28, 2022
7	966 Chamber Room	ETS	9*6*6	N/A	Jul. 17, 2022

Radiated Emissions - 30 MHz to 1 GHz					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Antenna	Schwarzbeck	VULB9160	9160-3232	Mar. 15, 2022
2	Amplifier	HP	8447D	2944A08742	Feb. 28, 2022
3	Cable	emci	LMR-400	N/A	Nov. 30, 2022
4	Controller	CT	SC100	N/A	N/A
5	Controller	MF	MF-7802	MF780208416	N/A
6	Receiver	Agilent	N9038A	MY52130039	Mar. 19, 2022
7	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A
8	wideband radio communication tester	R&S	CMW500	152372	Feb. 27, 2022
9	Wireless Communication Test SET	Agilent	E5515C	MY48364183	Feb. 28, 2022
10	966 Chamber Room	RM	9*6*6	N/A	Jul. 24, 2022

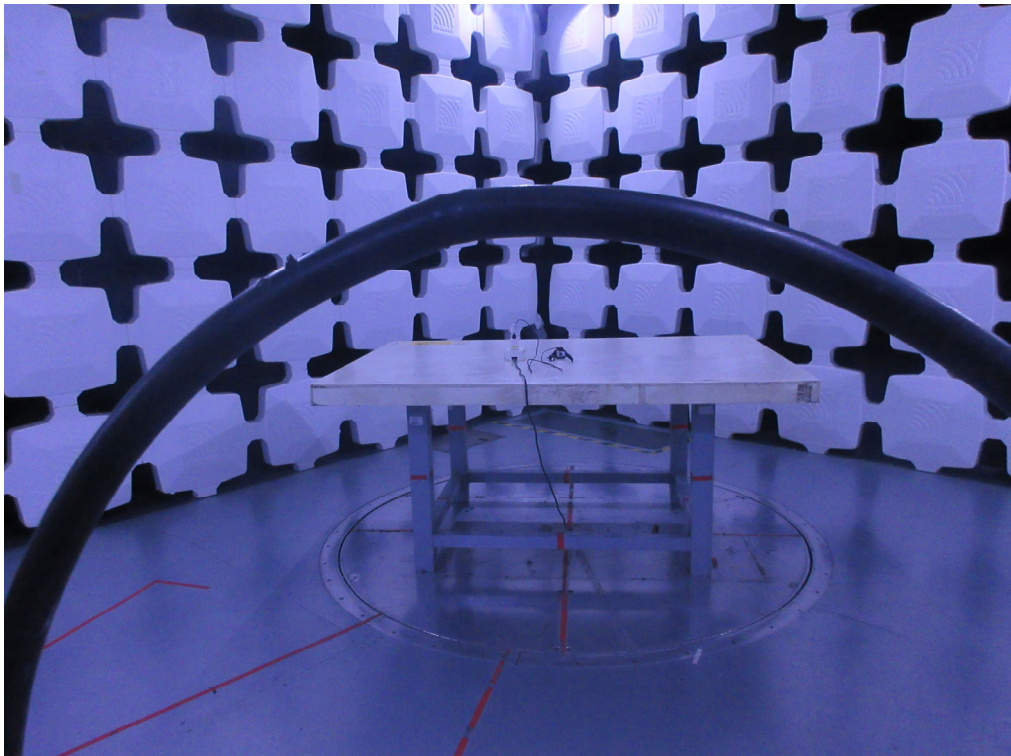
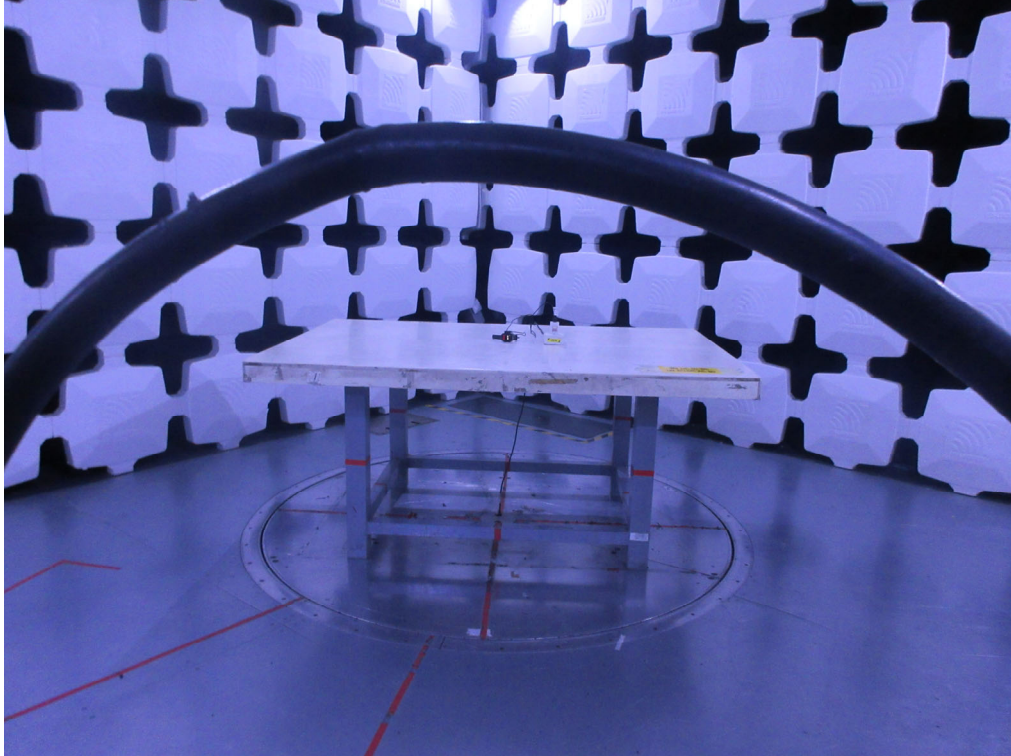
Radiated Emissions - Above 1 GHz					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Double Ridged Horn Antenna	ARA	DRG-118A	16554	Apr. 21, 2022
2	Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170319	Jun. 30, 2022
3	Amplifier	Agilent	8449B	3008A02584	Jul. 10, 2022
4	Controller	CT	SC100	N/A	N/A
5	Controller	MF	MF-7802	MF780208416	N/A
6	Receiver	Agilent	N9038A	MY52130039	Mar. 19, 2022
7	EXA Spectrum Analyzer	Keysight	N9010A	MY56480488	Feb. 28, 2022
8	Low Noise Amplifier	CONNPHY	CLN-18G40G-4330-K	619413	Jul. 16, 2022
9	Cable	N/A	A81-SMAMSMAM-12.5M	N/A	Oct. 15, 2022
10	Cable	Talent microwave	A40-2.92M2.92M-2.5M	N/A	Nov. 30, 2022
11	Filter	STI	STI15-9912	N/A	Jul. 10, 2022
12	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A
13	wideband radio communication tester	R&S	CMW500	152372	Feb. 27, 2022
14	Wireless Communication Test SET	Agilent	E5515C	MY48364183	Feb. 28, 2022
15	966 Chamber Room	RM	9*6*6	N/A	Jul. 24, 2022

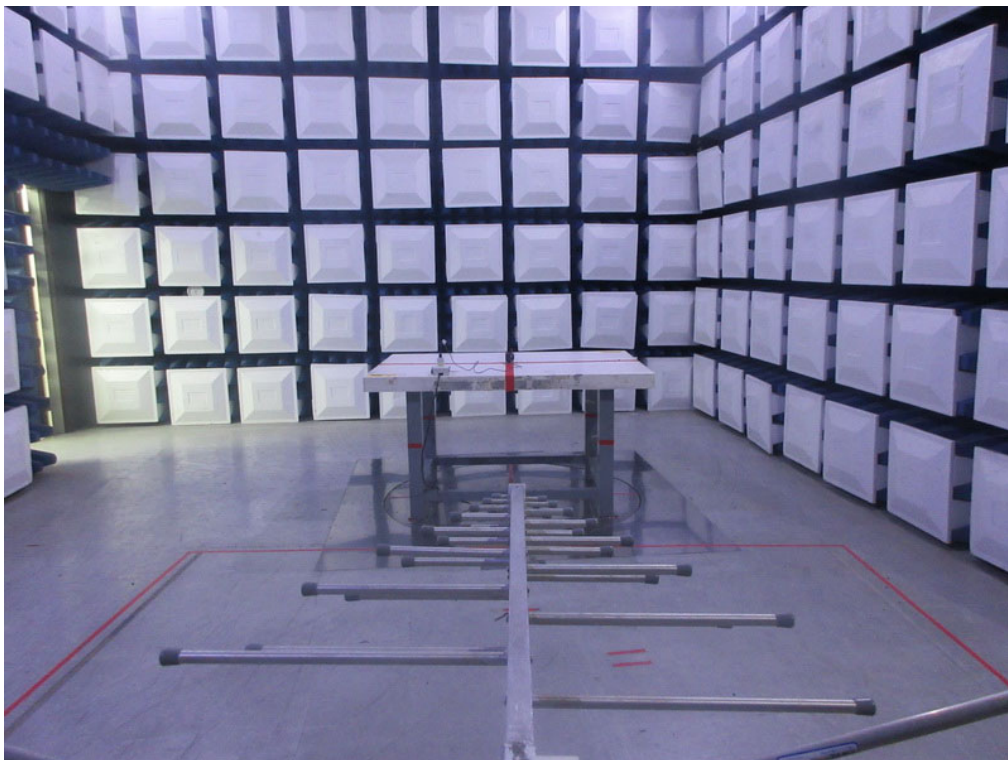
Conducted Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	8960 Series 10 Wireless Com Test set	Agilent	E5515E	MY52112163	Jul. 24, 2022
2	MXA Signal Analyzer	Keysight	N9020A	MY49100060	Jul. 24, 2022
3	Power Splitter	Mini-Circuits	ZFRSC-183-S+	SF103501511S	Jul. 24, 2022
4	wideband radio communication tester	R&S	CMW500	104462	Jul. 24, 2022
5	Const Temp. & Humidity Chamber	Bell	BTH-50C	20170306001	Feb. 27, 2022
6*	Multi-output DC Power Supply	GW Instek	GPC-3030DN	EK880675	Jul. 25, 2023

Remark: "N/A" denotes no model name, serial no. or calibration specified.

Except * item, all calibration period of equipment list is one year.

"*" calibration period of equipment list is three year.

5. EUT TEST PHOTO**Radiated Emissions Test Photos****9 kHz to 30 MHz**

Radiated Emissions Test Photos**30 MHz to 1 GHz**

Radiated Emissions Test Photos**Above 1 GHz**

APPENDIX A - OUTPUT POWER

Output Power (dBm)

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	21.76	21.96	21.81
		1	2	22.01	21.83	21.82
		1	5	21.92	21.70	21.74
		3	0	21.89	21.86	21.67
		3	1	21.93	21.86	21.90
		3	2	21.88	21.82	21.77
		6	0	20.73	20.99	20.66
	16QAM	1	0	20.80	21.09	20.84
		1	2	20.97	21.09	20.86
		1	5	20.91	21.05	20.92
		3	0	20.82	20.84	21.16
		3	1	20.87	20.86	21.21
		3	2	20.85	20.80	20.95
		6	0	20.33	20.05	20.26

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	21.74	21.92	21.85
		1	7	22.04	22.05	21.89
		1	14	22.07	22.07	21.73
		8	0	20.83	20.92	20.76
		8	4	20.80	20.96	20.78
		8	7	20.78	20.94	20.75
		15	0	20.83	20.92	20.76
	16QAM	1	0	21.01	21.13	20.86
		1	7	21.19	21.39	20.82
		1	14	20.75	21.21	20.71
		8	0	19.78	20.14	20.05
		8	4	19.82	20.18	19.94
		8	7	19.80	20.16	19.96
		15	0	19.81	20.13	19.73

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	21.73	21.76	21.69
		1	13	21.84	21.83	21.77
		1	24	21.75	21.99	21.63
		12	0	20.78	21.02	20.81
		12	6	20.85	20.99	20.84
		12	11	20.83	20.97	20.77
		25	0	20.82	20.93	20.96
	16QAM	1	0	20.59	20.78	20.77
		1	13	20.75	21.03	20.45
		1	24	20.67	20.94	20.59
		12	0	19.87	19.77	19.90
		12	6	19.94	19.83	19.82
		12	11	19.92	19.82	19.77
		25	0	19.77	20.03	19.87

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	21.88	21.97	21.74
		1	25	22.14	22.11	21.97
		1	49	22.14	21.84	21.77
		25	0	20.93	20.92	20.93
		25	13	20.86	20.98	20.98
		25	25	20.89	20.85	20.80
		50	0	20.91	20.82	20.83
	16QAM	1	0	21.03	20.39	20.74
		1	25	20.92	20.76	21.01
		1	49	21.06	20.34	20.81
		25	0	20.02	20.07	20.11
		25	13	19.89	20.19	20.03
		25	25	19.95	19.99	19.90
		50	0	19.98	19.96	19.74

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	22.01	21.87	21.89
		1	38	22.08	21.89	22.02
		1	74	21.97	21.80	21.80
		36	0	20.84	20.84	20.90
		36	18	20.93	20.94	20.96
		36	39	20.86	20.76	20.75
		75	0	20.90	20.83	20.84
	16QAM	1	0	21.09	20.42	21.56
		1	38	20.72	21.31	21.42
		1	74	21.07	20.59	21.03
		36	0	19.96	19.89	19.96
		36	18	19.83	19.92	19.96
		36	39	19.83	19.97	19.87
		75	0	19.84	19.85	19.91

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	21.39	21.75	21.75
		1	50	21.94	22.06	22.11
		1	99	21.75	21.74	21.58
		50	0	20.99	20.92	21.01
		50	25	20.90	20.94	21.02
		50	50	20.84	20.79	20.84
		100	0	20.94	20.83	21.00
	16QAM	1	0	20.75	20.90	20.90
		1	50	20.68	21.19	21.00
		1	99	20.45	20.92	20.69
		50	0	19.90	19.96	19.92
		50	25	19.76	20.07	20.02
		50	50	19.73	19.82	19.81
		100	0	19.88	19.86	19.91

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				23017CH	23095CH	23173CH
				699.7MHz	707.5MHz	715.3MHz
12 / 1.4M	QPSK	1	0	22.77	22.92	22.76
		1	2	22.85	22.93	22.82
		1	5	22.94	22.95	22.54
		3	0	22.91	22.65	22.77
		3	1	22.94	22.70	22.82
		3	2	22.95	22.92	22.74
		6	0	21.98	21.81	21.78
	16QAM	1	0	21.65	21.80	21.65
		1	2	21.95	21.65	21.79
		1	5	21.89	21.75	21.52
		3	0	21.92	21.42	21.26
		3	1	21.99	21.67	21.31
		3	2	21.87	21.68	21.20
		6	0	20.91	20.51	20.76

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				23025CH	23095CH	23165CH
				700.5MHz	707.5MHz	714.5MHz
12 / 3M	QPSK	1	0	22.93	22.79	22.64
		1	7	22.92	22.91	22.87
		1	14	22.92	22.71	22.56
		8	0	21.96	21.86	21.77
		8	4	21.85	21.83	21.79
		8	7	21.88	21.80	21.85
		15	0	21.89	21.88	21.65
	16QAM	1	0	21.86	21.85	21.38
		1	7	21.84	21.94	21.63
		1	14	21.91	21.79	21.38
		8	0	20.68	20.78	20.71
		8	4	20.66	20.72	20.84
		8	7	20.62	20.65	20.80
		15	0	20.81	20.64	20.63

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				23035CH	23095CH	23155CH
				701.5MHz	707.5MHz	713.5MHz
12 / 5M	QPSK	1	0	22.79	22.57	22.54
		1	13	22.93	22.54	22.47
		1	24	22.88	22.20	22.29
		12	0	21.76	21.81	21.79
		12	6	21.90	21.80	21.71
		12	11	21.92	21.71	21.75
		25	0	21.82	21.83	21.55
	16QAM	1	0	21.30	21.72	21.30
		1	13	21.39	21.16	21.34
		1	24	21.44	21.08	20.94
		12	0	20.79	20.61	20.51
		12	6	20.94	20.66	20.60
		12	11	20.91	20.45	20.65
		25	0	20.55	20.68	20.24

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				23060CH	23095CH	23130CH
				704MHz	707.5MHz	711MHz
12 / 10M	QPSK	1	0	22.94	22.76	22.72
		1	25	22.83	22.97	22.84
		1	49	22.66	22.87	22.65
		25	0	21.73	21.92	21.82
		25	13	21.88	21.77	21.68
		25	25	21.76	21.59	21.64
		50	0	21.75	21.77	21.63
	16QAM	1	0	21.78	22.00	21.60
		1	25	21.97	21.99	21.77
		1	49	21.76	21.88	21.58
		25	0	20.67	20.84	20.70
		25	13	20.62	20.76	20.86
		25	25	20.59	20.54	20.78
		50	0	20.60	20.80	20.62

EIRP (dBm)

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	14.96	15.16	15.01
		1	2	15.21	15.03	15.02
		1	5	15.12	14.90	14.94
		3	0	15.09	15.06	14.87
		3	1	15.13	15.06	15.10
		3	2	15.08	15.02	14.97
		6	0	13.93	14.19	13.86
	16QAM	1	0	14.00	14.29	14.04
		1	2	14.17	14.29	14.06
		1	5	14.11	14.25	14.12
		3	0	14.02	14.04	14.36
		3	1	14.07	14.06	14.41
		3	2	14.05	14.00	14.15
		6	0	13.53	13.25	13.46

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	14.94	15.12	15.05
		1	7	15.24	15.25	15.09
		1	14	15.27	15.27	14.93
		8	0	14.03	14.12	13.96
		8	4	14.00	14.16	13.98
		8	7	13.98	14.14	13.95
		15	0	14.03	14.12	13.96
	16QAM	1	0	14.21	14.33	14.06
		1	7	14.39	14.59	14.02
		1	14	13.95	14.41	13.91
		8	0	12.98	13.34	13.25
		8	4	13.02	13.38	13.14
		8	7	13.00	13.36	13.16
		15	0	13.01	13.33	12.93

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	14.93	14.96	14.89
		1	13	15.04	15.03	14.97
		1	24	14.95	15.19	14.83
		12	0	13.98	14.22	14.01
		12	6	14.05	14.19	14.04
		12	11	14.03	14.17	13.97
		25	0	14.02	14.13	14.16
	16QAM	1	0	13.79	13.98	13.97
		1	13	13.95	14.23	13.65
		1	24	13.87	14.14	13.79
		12	0	13.07	12.97	13.10
		12	6	13.14	13.03	13.02
		12	11	13.12	13.02	12.97
		25	0	12.97	13.23	13.07

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	15.08	15.17	14.94
		1	25	15.34	15.31	15.17
		1	49	15.34	15.04	14.97
		25	0	14.13	14.12	14.13
		25	13	14.06	14.18	14.18
		25	25	14.09	14.05	14.00
		50	0	14.11	14.02	14.03
	16QAM	1	0	14.23	13.59	13.94
		1	25	14.12	13.96	14.21
		1	49	14.26	13.54	14.01
		25	0	13.22	13.27	13.31
		25	13	13.09	13.39	13.23
		25	25	13.15	13.19	13.10
		50	0	13.18	13.16	12.94

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	15.21	15.07	15.09
		1	38	15.28	15.09	15.22
		1	74	15.17	15.00	15.00
		36	0	14.04	14.04	14.10
		36	18	14.13	14.14	14.16
		36	39	14.06	13.96	13.95
		75	0	14.10	14.03	14.04
	16QAM	1	0	14.29	13.62	14.76
		1	38	13.92	14.51	14.62
		1	74	14.27	13.79	14.23
		36	0	13.16	13.09	13.16
		36	18	13.03	13.12	13.16
		36	39	13.03	13.17	13.07
		75	0	13.04	13.05	13.11

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	14.59	14.95	14.95
		1	50	15.14	15.26	15.31
		1	99	14.95	14.94	14.78
		50	0	14.19	14.12	14.21
		50	25	14.10	14.14	14.22
		50	50	14.04	13.99	14.04
		100	0	14.14	14.03	14.20
	16QAM	1	0	13.95	14.10	14.10
		1	50	13.88	14.39	14.20
		1	99	13.65	14.12	13.89
		50	0	13.10	13.16	13.12
		50	25	12.96	13.27	13.22
		50	50	12.93	13.02	13.01
		100	0	13.08	13.06	13.11

ERP(dBm)

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				23017CH	23095CH	23173CH
				699.7MHz	707.5MHz	715.3MHz
12 / 1.4M	QPSK	1	0	10.62	10.77	10.61
		1	2	10.70	10.78	10.67
		1	5	10.79	10.80	10.39
		3	0	10.76	10.50	10.62
		3	1	10.79	10.55	10.67
		3	2	10.80	10.77	10.59
		6	0	9.83	9.66	9.63
	16QAM	1	0	9.50	9.65	9.50
		1	2	9.80	9.50	9.64
		1	5	9.74	9.60	9.37
		3	0	9.77	9.27	9.11
		3	1	9.84	9.52	9.16
		3	2	9.72	9.53	9.05
		6	0	8.76	8.36	8.61

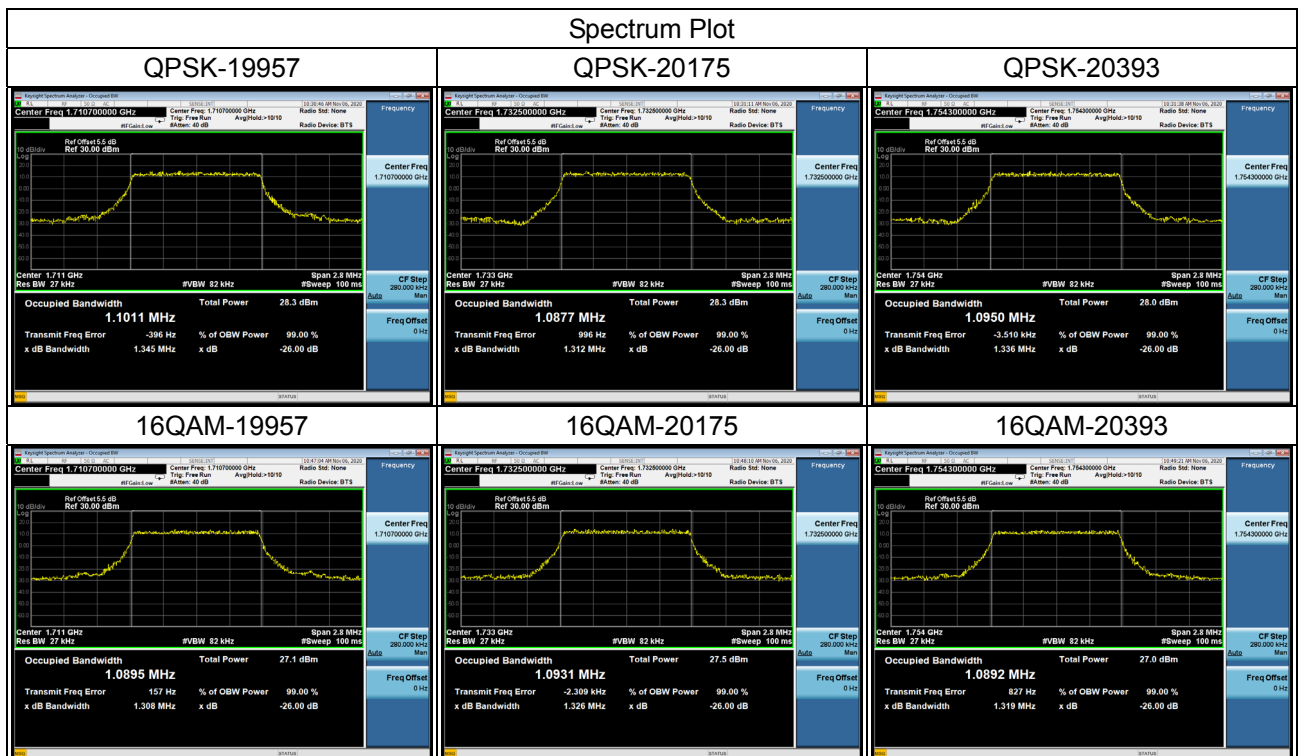
LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				23025CH	23095CH	23165CH
				700.5MHz	707.5MHz	714.5MHz
12 / 3M	QPSK	1	0	10.78	10.64	10.49
		1	7	10.77	10.76	10.72
		1	14	10.77	10.56	10.41
		8	0	9.81	9.71	9.62
		8	4	9.70	9.68	9.64
		8	7	9.73	9.65	9.70
		15	0	9.74	9.73	9.50
	16QAM	1	0	9.71	9.70	9.23
		1	7	9.69	9.79	9.48
		1	14	9.76	9.64	9.23
		8	0	8.53	8.63	8.56
		8	4	8.51	8.57	8.69
		8	7	8.47	8.50	8.65
		15	0	8.66	8.49	8.48

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				23035CH	23095CH	23155CH
				701.5MHz	707.5MHz	713.5MHz
12 / 5M	QPSK	1	0	10.64	10.42	10.39
		1	13	10.78	10.39	10.32
		1	24	10.73	10.05	10.14
		12	0	9.61	9.66	9.64
		12	6	9.75	9.65	9.56
		12	11	9.77	9.56	9.60
		25	0	9.67	9.68	9.40
	16QAM	1	0	9.15	9.57	9.15
		1	13	9.24	9.01	9.19
		1	24	9.29	8.93	8.79
		12	0	8.64	8.46	8.36
		12	6	8.79	8.51	8.45
		12	11	8.76	8.30	8.50
		25	0	8.40	8.53	8.09

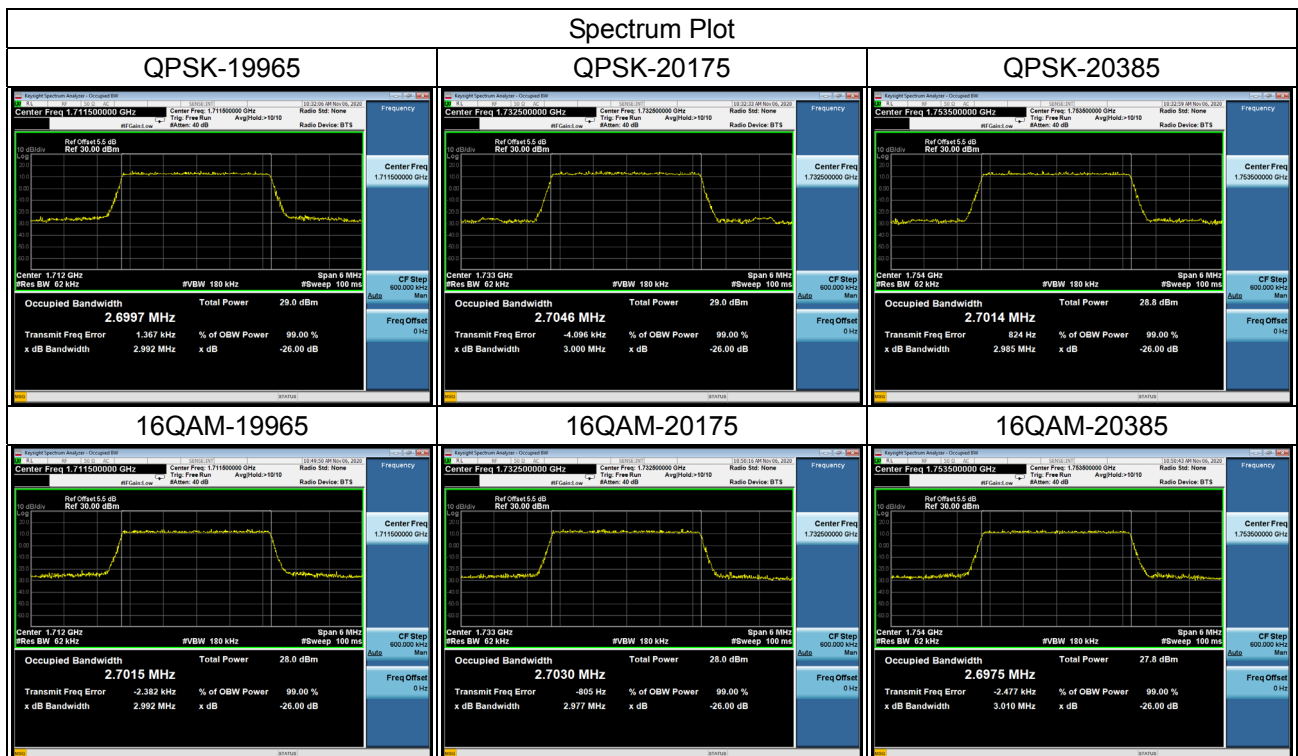
LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				23060CH	23095CH	23130CH
				704MHz	707.5MHz	711MHz
12 / 10M	QPSK	1	0	10.79	10.61	10.57
		1	25	10.68	10.82	10.69
		1	49	10.51	10.72	10.50
		25	0	9.58	9.77	9.67
		25	13	9.73	9.62	9.53
		25	25	9.61	9.44	9.49
		50	0	9.60	9.62	9.48
	16QAM	1	0	9.63	9.85	9.45
		1	25	9.82	9.84	9.62
		1	49	9.61	9.73	9.43
		25	0	8.52	8.69	8.55
		25	13	8.47	8.61	8.71
		25	25	8.44	8.39	8.63
		50	0	8.45	8.65	8.47

APPENDIX B - OCCUPIED BANDWIDTH

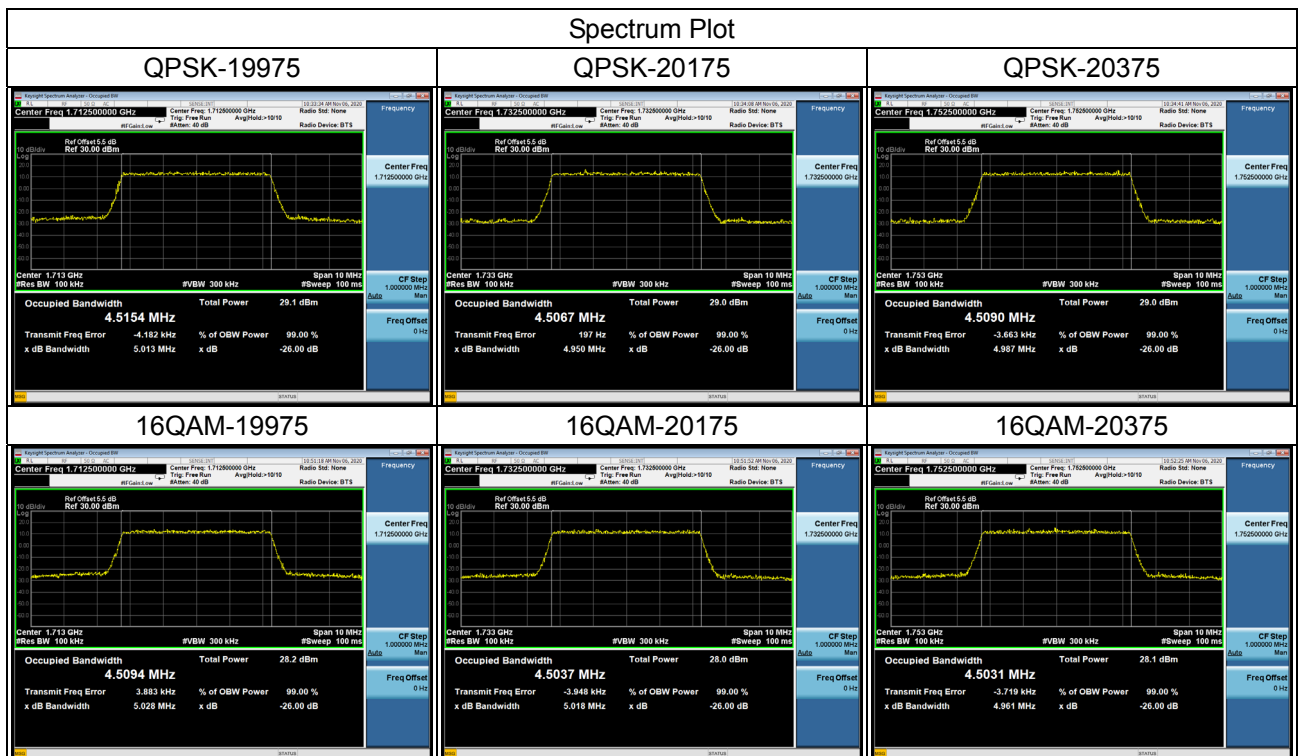
LTE Band 4_1.4MHz					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)		26dB Bandwidth (MHz)	
		QPSK	16QAM	QPSK	16QAM
19957	1710.7	1.1011	1.0895	1.345	1.308
20175	1732.5	1.0877	1.0931	1.312	1.326
20393	1754.3	1.0950	1.0892	1.336	1.319



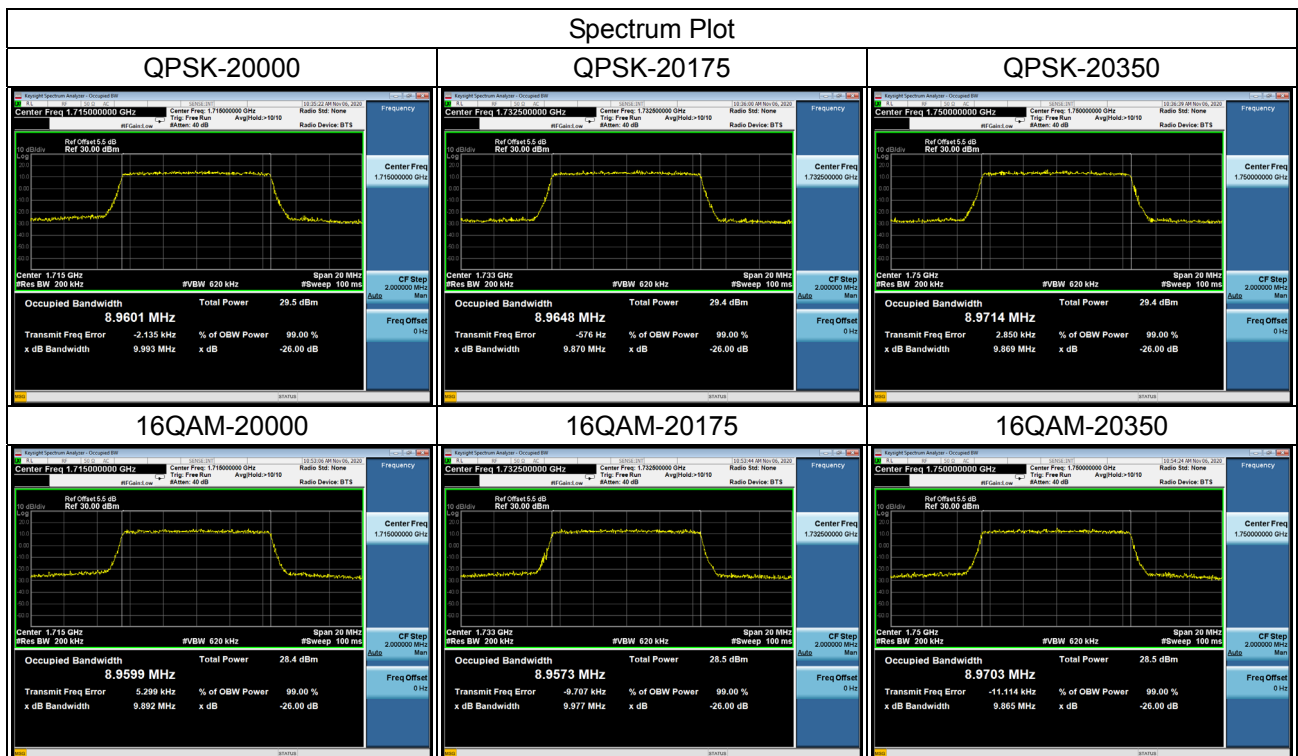
LTE Band 4_3MHz					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)		26dB Bandwidth (MHz)	
		QPSK	16QAM	QPSK	16QAM
19965	1711.5	2.6997	2.7015	2.992	2.992
20175	1732.5	2.7046	2.7030	3.000	2.977
20385	1753.5	2.7014	2.6975	2.985	3.010



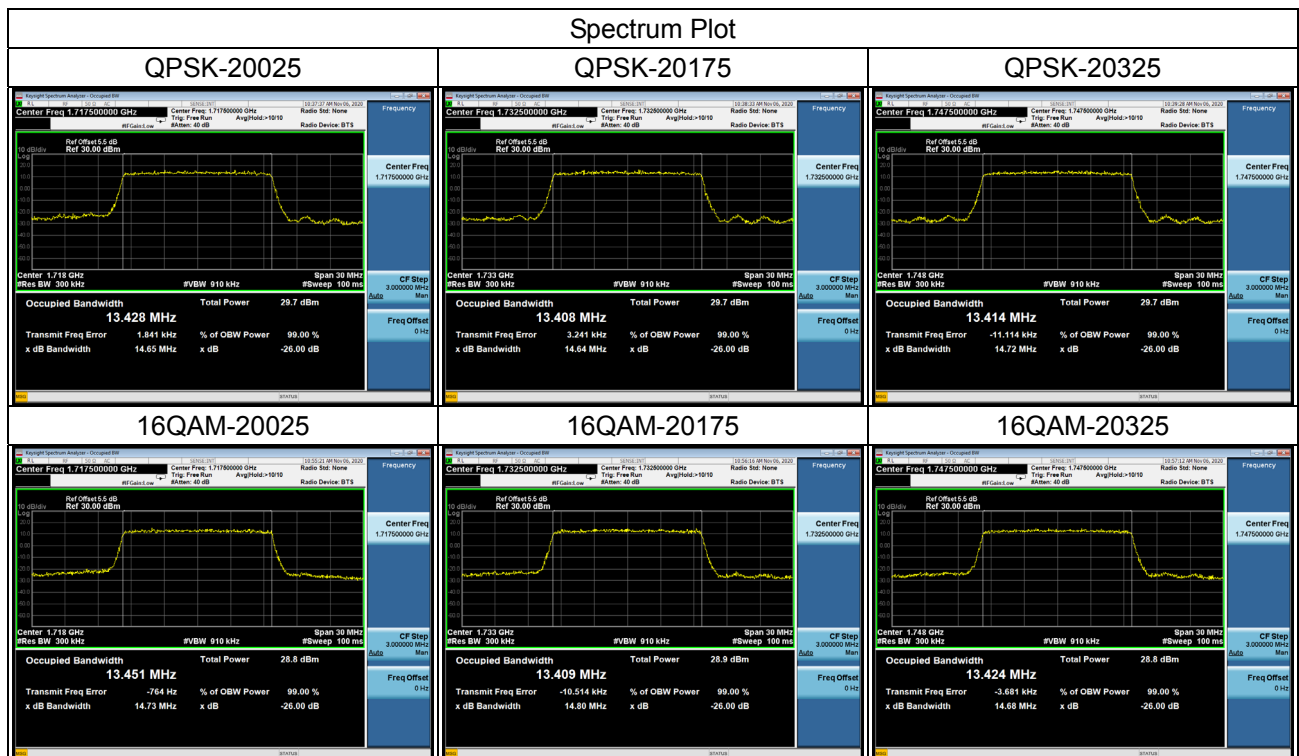
LTE Band 4_5MHz					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)		26dB Bandwidth (MHz)	
		QPSK	16QAM	QPSK	16QAM
19975	1712.5	4.5154	4.5094	5.013	5.028
20175	1732.5	4.5067	4.5037	4.950	5.018
20375	1752.5	4.5090	4.5031	4.987	4.961



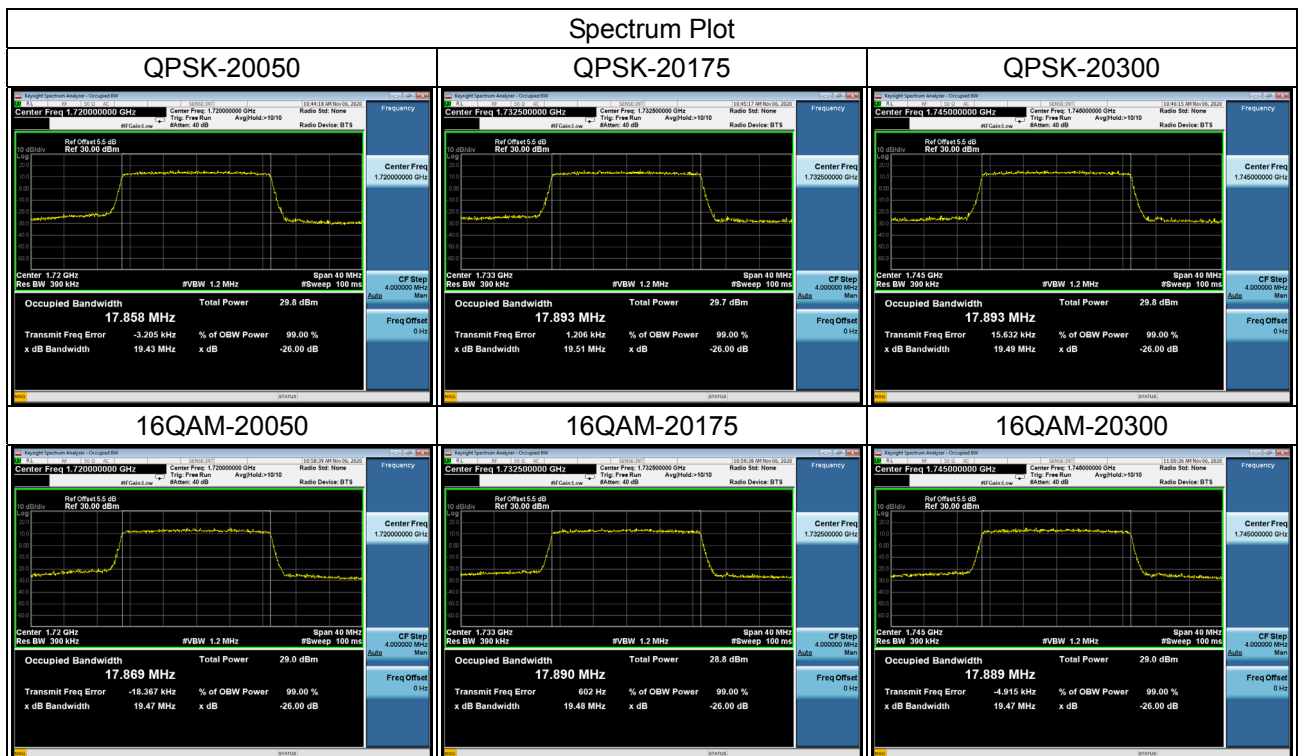
LTE Band 4_10MHz					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)		26dB Bandwidth (MHz)	
		QPSK	16QAM	QPSK	16QAM
20000	1715	8.9601	8.9599	9.993	9.892
20175	1732.5	8.9648	8.9573	9.870	9.977
20350	1715	8.9714	8.9703	9.869	9.865



LTE Band 4_15MHz					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)		26dB Bandwidth (MHz)	
		QPSK	16QAM	QPSK	16QAM
20025	1717.5	13.428	13.451	14.65	14.73
20175	1732.5	13.408	13.409	14.64	14.80
20325	1747.5	13.414	13.424	14.72	14.68



LTE Band 4_20MHz					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)		26dB Bandwidth (MHz)	
		QPSK	16QAM	QPSK	16QAM
20050	1720	17.858	17.869	19.43	19.47
20175	1732.5	17.893	17.890	19.51	19.48
20300	1740	17.893	17.889	19.49	19.47



LTE Band 12_1.4MHz					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)		26dB Bandwidth (MHz)	
		QPSK	16QAM	QPSK	16QAM
23017	699.7	1.0919	1.0922	1.289	1.309
23095	707.5	1.0876	1.0941	1.280	1.295
23173	715.3	1.0986	1.0933	1.310	1.293

