FCC Radio Test Report

FCC ID: 2AVVT-AD00A10057

Report No.	:	BTL-FCCP-3-2004T194
Equipment	:	Connectivity Control Unit - iTraMS
Model Name	:	AD00A10057, CU-304-0503
Brand Name	:	Bosch
Applicant	:	Robert Bosch Engineering and Business Solutions Private Limited
Address	:	RBEI/Pac, Ban601, Post Box No 3000 Hosur Road, Adugodi Bengaluru 560030 India (Republic Of)
Radio Function	:	LTE Band 4 & Band 12
FCC Rule Part(s)	:	47 CFR FCC Part 27 Subpart L 47 CFR FCC Part 27 Subpart H 47 CFR FCC Part 2 ANSI/TIA/EIA-603-E-2016 KDB 971168 D01 Power Meas License Digital Systems v03r01
Measurement Procedure(s)	:	ANSI C63.10-2013
Date of Receipt	:	2020/5/13
Date of Test	:	2020/5/13 ~ 2020/7/23
Issued Date	:	2020/7/23

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

Prepared by : Peter Chen, Engineer

Approved by : Scott Hsu , Manager

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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.

The report must not be used by the client to claim product certification, approval, or endorsement by NIST, A2LA, or any agency of the U.S. Government.

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BTL's laboratory quality assurance procedures are in compliance with the **ISO/IEC 17025** requirements, and accredited by the conformity assessment authorities listed in this test report.

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 are not use in determining the Pass/Fail results.

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REPORT ISSUED HISTORY

Report Version	Description	Issued Date
R00	Original Issue.	2020/7/15
R01	Revised report to address TCB's comments.	2020/7/23

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 27.50(d)(4) 27.50(c)(10)	Effective Radiated Power & Equivalent Isotropic Radiated Power	PASS	------
2.1049	Occupied Bandwidth	PASS	------
2.1051 27.53(h) 27.53(g) 27.53(c)(2)(4)	Conducted Spurious Emissions	PASS	------
2.1053 27.53(h) 27.53(g) 27.53(c)(2)(4)	Radiated Spurious Emissions	PASS	------
2.1051 27.53(h) 27.53(g) 27.53(c)(2)(4)	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.

(2) The report format version is TP.1.1.1

1.1 TEST FACILITY

The test facilities used to collect the test data in this report:

No. 68-1, Ln. 169, Sec. 2, Datong Rd., Xizhi Dist., New Taipei City 221, Taiwan
The test sites and facilities are covered under FCC RN: 674415 and DN: TW0659.

☐ C05 ☐ CB08 ☐ CB11 ☒ CB15 ☐ CB16
☒ SR06

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement **y** ± **U**, where expanded uncertainty **U** is based on a standard uncertainty multiplied by a coverage factor of **k = 2**, providing a level of confidence of approximately **95 %**. The measurement instrumentation uncertainty considerations contained in CISPR 16-4-2. The BTL measurement uncertainty is less than the CISPR 16-4-2 U_{cispr} requirement.

A. Radiated emissions test :

Test Site	Measurement Frequency Range	U,(dB)
CB18	0.03 GHz ~ 0.2 GHz	4.17
	0.2 GHz ~ 1 GHz	4.72
	1 GHz ~ 6 GHz	5.21
	6 GHz ~ 18 GHz	5.51
	18 GHz ~ 26 GHz	3.69
	26 GHz ~ 40 GHz	4.23

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	Environment Condition	Test Voltage	Tested by
Output Power	24.4 °C, 42 %	DC 32V	William Wei
ERP & EIRP	22 °C, 65 %	DC 32V	Hunter Chiang
Occupied Bandwidth	24.4 °C, 42 %	DC 32V	William Wei
Conducted Spurious Emissions	24.4 °C, 42 %	DC 32V	William Wei
Radiated Spurious Emissions	22 °C, 65 %	DC 32V	Hunter Chiang
Band Edge	24.4 °C, 42 %	DC 32V	William Wei
Peak to Average Ratio	24.4 °C, 42 %	DC 32V	William Wei
Frequency Stability	Normal and Extreme		William Wei

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	Connectivity Control Unit - iTraMS
Brand Name	Bosch
Model Name	AD00A10057
Series Model	CU-304-0503
Model Difference(s)	Different model distribute to different area.
Hardware Version	B2LTE
Software Version	CCU_REL9.0 (uuu_512MB_FCC_wifi100_eMMC166_OnEngine)
RAM and eMMC details	512MB and 8GB
Power Source	Supplied from Battery.
Power Rating	DC 9-32V
Test Model	AD00A10057
Sample Status	Engineering Sample
EUT Modification(s)	N/A
Modulation Type	UL: QPSK,16QAM DL: QPSK,16QAM

Note:

1. 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	1745	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	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	5130	741

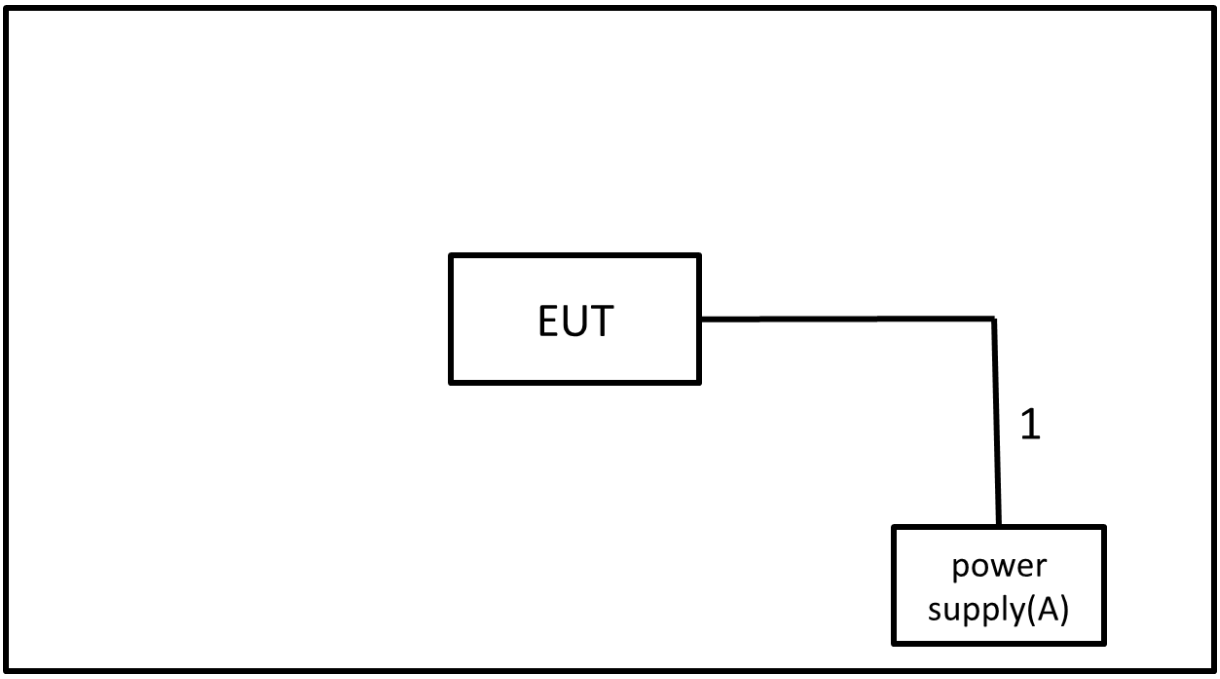
2.2 DESCRIPTION OF TEST MODES

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	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
EIRP	20050 to 20300	20050, 20175, 20300	20MHz	QPSK	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
	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
Radiated Spurious Emissions	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	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 12 MODE					
Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
Output Power	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
ERP	23060 to 23130	23060, 23095, 23130	10MHz	QPSK	1RB/25RB/50RB
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
Conducted Spurious Emissions	23017 to 23173	23095	1.4MHz	QPSK	1RB
	23025 to 23165	23095	3MHz	QPSK	1RB
	23035 to 23155	23095	5MHz	QPSK	1RB
	23060 to 23130	23095	10MHz	QPSK	1RB
Radiated Spurious Emissions	23060 to 23130	23095	10MHz	QPSK	1RB
Band Edge	23017 to 23173	23017, 23173	1.4MHz	QPSK, 16QAM	1RB/6RB
	23025 to 23165	23025, 23165	3MHz	QPSK, 16QAM	1RB/15RB
	23035 to 23155	23035, 23155	5MHz	QPSK, 16QAM	1RB/25RB
	23060 to 23130	23060, 23130	10MHz	QPSK, 16QAM	1RB/50RB
Peak To Average Ratio	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	23017 to 23173	23095	1.4MHz	QPSK	1RB
	23025 to 23165	23095	3MHz	QPSK	1RB
	23035 to 23155	23095	5MHz	QPSK	1RB
	23060 to 23130	23095	10MHz	QPSK	1RB

2.3 BLOCK DIGRAM SHOWING THECONFIGURATIONOFSYSTEMTESTED



3.4 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	Power supply	Twinex	TP-6010	1616AP051502100

Item	Cable Type	Shielded Type	Ferrite Core	Length
1	Power cable	NA	NA	1.5m

3. TEST RESULT

3.1 OUTPUT POWER MEASUREMENT

3.1.1 LIMIT

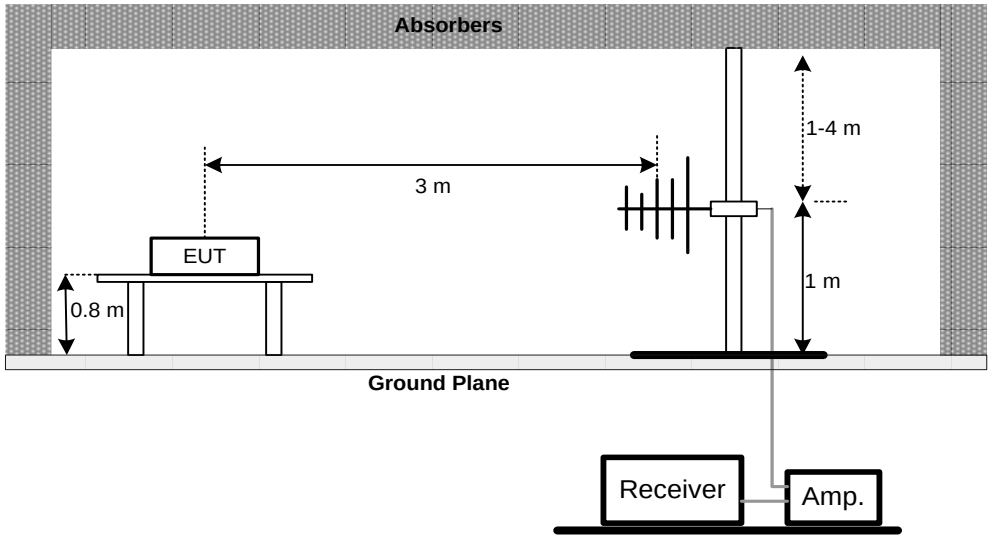
Mobile / Portable station are limited to 1 watts e.i.r.p. (Part 27 Subpart L)
Mobile / Portable station are limited to 3 watts e.r.p. (Part 27 Subpart H)

3.1.2 TEST PROCEDURES

1. Substitution method is used for E.I.R.P measurement. 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.R.P power - 2.15dBi.
5. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1MHz/3MHz.

3.1.3 TEST SETUP LAYOUT

Radiated Power Measurement



3.1.4 TEST DEVIATION

No deviation

3.1.5 TEST RESULTS

Please refer to the APPENDIX A.

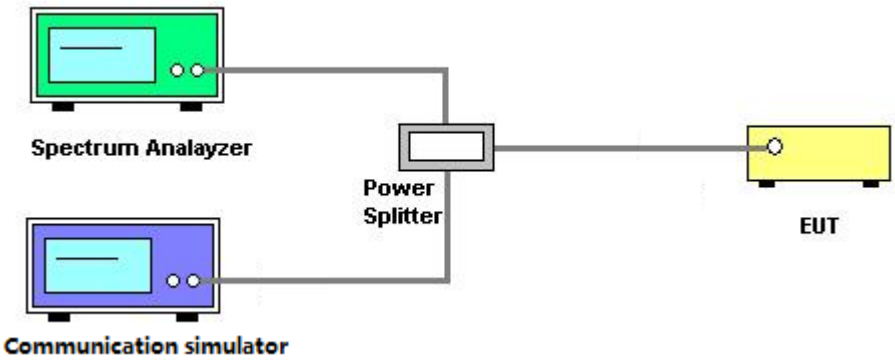
3.2 OCCUPIED BANDWIDTH MEASUREMENT

3.2.1 TEST PROCEDURES

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% ~ 5%)*EBW
   VBW≥3* 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

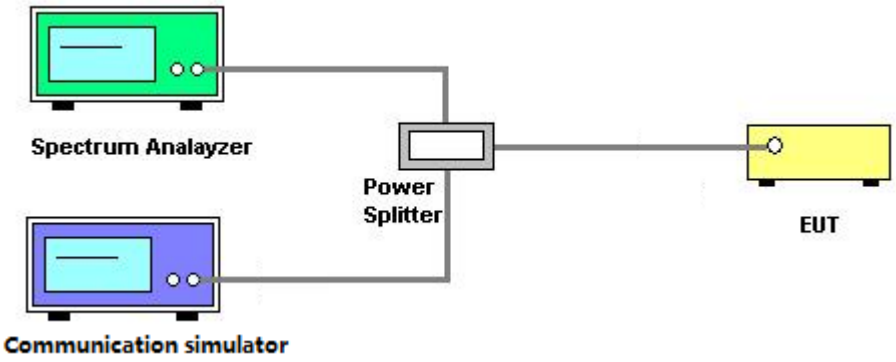
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB. The emission limit equal to -13dBm. (Part 27 Subpart L & H)

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>=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 & H)

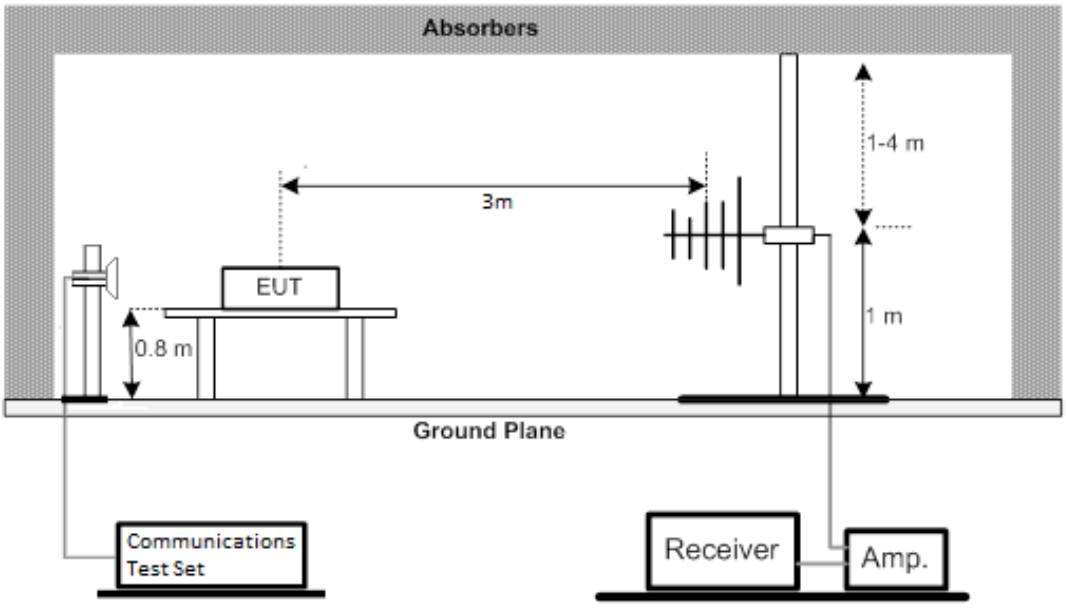
3.4.2 TEST PROCEDURES

The testing follows FCC KDB 971168 v03r01 Section 6.2.

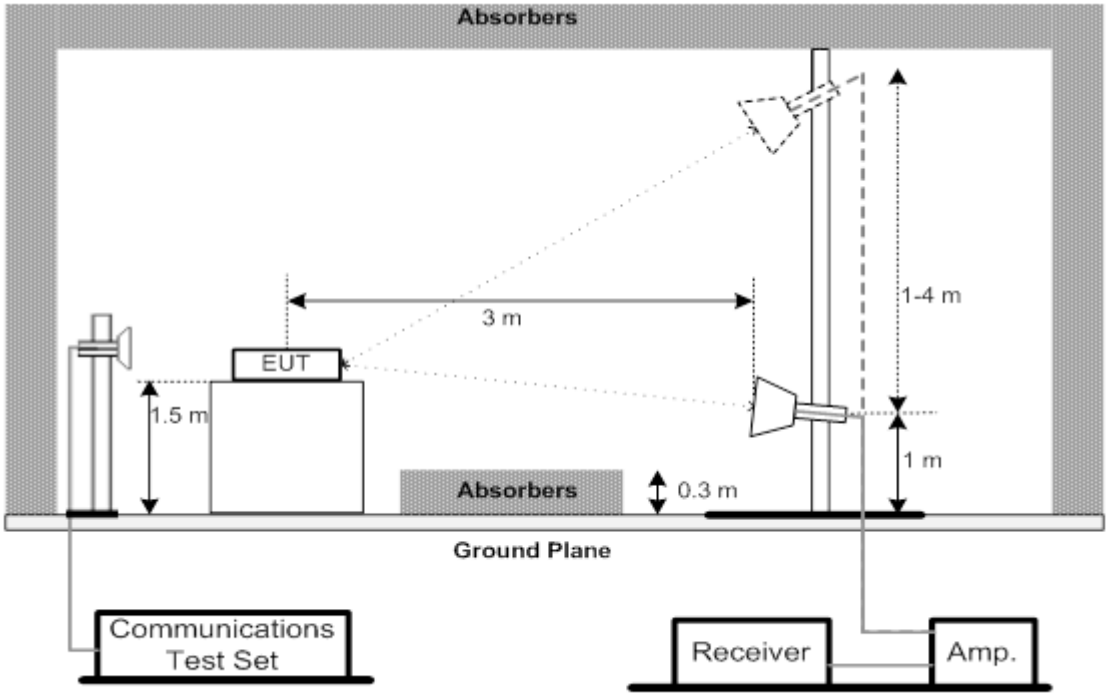
1. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power.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

3.4.3 TEST SETUP LAYOUT

30MHz to 1GHz



Above 1GHz



3.4.4 TEST RESULTS (30MHZ TO 1000MHZ)

Please refer to the APPENDIX D.

3.4.5 TEST RESULTS (ABOVE 1000MHZ)

Please refer to the APPENDIX E.

3.5 BAND EDGE MEASUREMENT

3.5.1 LIMIT

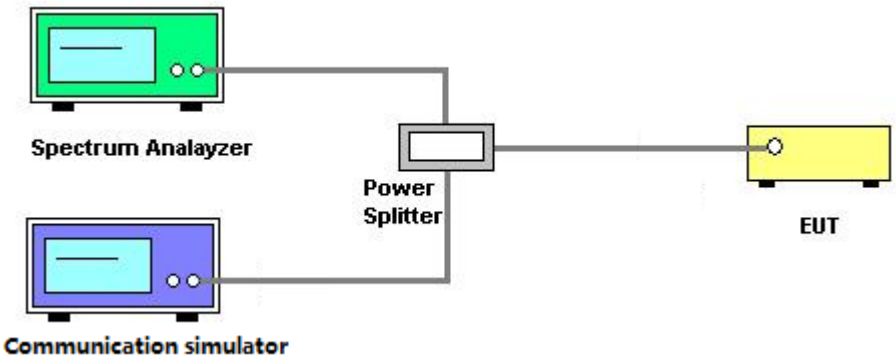
The power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least 43 + 10 log (P) dB. Compliance with this provision is based on the use of measurement instrumentation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

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 F.

3.6 PEAK TO AVERAGE RATIO MEASUREMENT

3.6.1 LIMIT

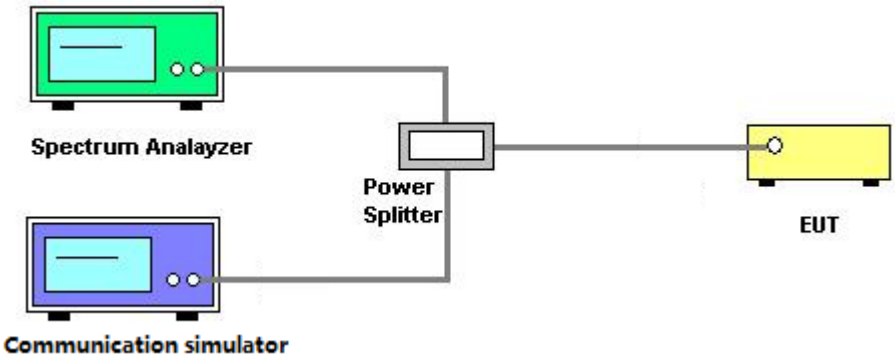
In measuring transmissions in this band using an average power technique, the peak to-average ratio (PAR) of the transmission may not exceed 13 dB.

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 G.

3.7 FREQUENCY STABILITY MEASUREMENT

3.7.1 LIMIT

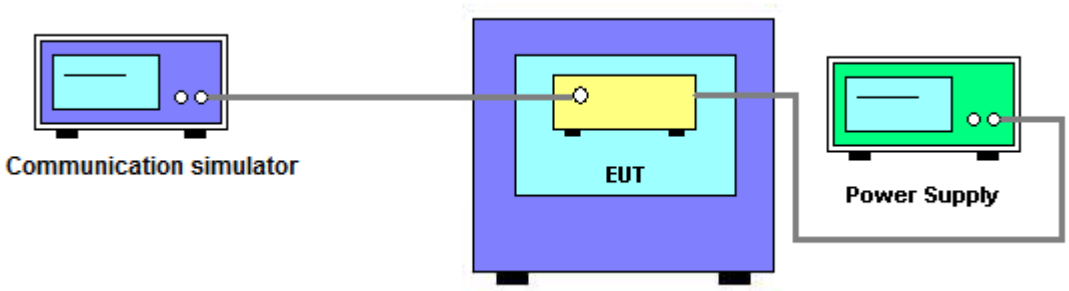
±1.5 ppm is for base and fixed station. ±2.5 ppm is for mobile station.

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 H.

4. LIST OF MEASUREMENT EQUIPMENTS

ERP Power Measurement						
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated Date	Calibrated Until
1	Radio Communication Analyzer	Anritsu	MT8820C	6201525878	2019/6/5	2020/6/4

Radiated Emissions Measurement						
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated Date	Calibrated Until
1	Preamplifier	EMCI	EMC001340	980555	2020/4/10	2021/4/9
2	Preamplifier	EMCI	EMC02325B	980217	2020/4/10	2021/4/9
3	Preamplifier	EMCI	EMC012645B	980267	2020/4/10	2021/4/9
4	Preamplifier	EMCI	EMC2654045	980030	2020/1/31	2021/1/30
5	Test Cable	EMCI	EMC104-SM-SM-800	150207	2020/4/10	2021/4/9
6	Test Cable	EMCI	EMC104-SM-SM-3000	151205	2020/4/10	2021/4/9
7	Test Cable	EMCI	EMC-SM-SM-7000	180408	2020/4/10	2021/4/9
8	MXE EMI Receiver	Agilent	N9038A	MY55420127	2020/3/24	2021/3/23
9	Signal Analyzer	Agilent	N9010A	MY56480554	2019/6/6	2020/6/5
10	Horm Ant	SCHWARZBECK	BBHA 9120D	9120D-1342	2019/6/10	2020/6/9
11	Horm Ant	Schwarzbeck	BBHA 9170	187	2019/12/21	2020/12/20
12	Trilog-Broadband Antenna	Schwarzbeck	VULB 9168	000992	2019/5/29	2020/5/28
13	5dB Attenuator	EMCI	EMCI-N-6-05	AT-N0508	2019/5/29	2020/5/28

Frequency Stability Measurement						
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated Date	Calibrated Until
1	Radio Communication Analyzer	Anritsu	MT8820C	6201525878	2019/6/5	2020/6/4
2	Thermal Chamber	HOLINK	H-TH-2SP-B	H1/EK04101902	2018/7/26	2019/7/25

Others Conducted Measurement						
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated Date	Calibrated Until
1	Spectrum Analyzer	R&S	FSP40	100129	2020/5/22	2021/5/21

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

5. EUT TEST PHOTOS

Please refer to document Appendix No.: TP-2004T194-FCCP-1 (APPENDIX-TEST PHOTOS).

6. EUT PHOTOS

Please refer to document Appendix No.: EP-2004T194-1 (APPENDIX-EUT PHOTOS).

APPENDIX A - RADIATED 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	23.1	23.1	23.3
		1	2	22.5	22.8	22.8
		1	5	22.4	22.5	22.5
		3	0	23.1	23.1	23.3
		3	1	22.5	22.8	22.8
		3	2	22.4	22.5	22.5
		6	0	21.6	21.6	21.6
	16QAM	1	0	22.2	22.4	22.4
		1	2	21.8	21.9	22.1
		1	5	21.7	21.7	21.6
		3	0	22.2	22.4	22.4
		3	1	21.8	21.9	22.1
		3	2	21.7	21.7	21.6
		6	0	20.6	20.6	20.6

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	23.1	23.1	23.3
		1	7	22.6	22.8	22.8
		1	14	22.5	22.6	22.6
		8	0	22.4	22.3	22.4
		8	4	21.9	22.0	22.1
		8	7	21.6	21.7	21.7
		15	0	21.6	21.7	21.7
	16QAM	1	0	22.3	22.4	22.4
		1	7	21.8	22.0	22.1
		1	14	21.7	21.7	21.7
		8	0	21.3	21.3	21.4
		8	4	20.7	20.9	21.0
		8	7	20.7	20.7	20.8
		15	0	20.6	20.7	20.7

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	23.2	23.2	23.4
		1	12	22.6	22.9	22.9
		1	24	22.5	22.6	22.6
		12	0	22.4	22.4	22.4
		12	6	21.9	22.1	22.2
		12	11	21.6	21.7	21.7
		25	0	21.7	21.7	21.7
	16QAM	1	0	22.3	22.5	22.5
		1	12	21.9	22.0	22.2
		1	24	21.8	21.8	21.7
		12	0	21.4	21.3	21.5
		12	6	20.7	20.9	21.0
		12	11	20.7	20.8	20.9
		25	0	20.7	20.8	20.7

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	23.2	23.2	23.4
		1	24	22.7	22.9	22.9
		1	49	22.6	22.7	22.7
		25	0	22.5	22.4	22.5
		25	12	22.0	22.1	22.2
		25	24	21.7	21.8	21.8
		50	0	21.7	21.8	21.8
	16QAM	1	0	22.4	22.5	22.5
		1	24	21.9	22.1	22.2
		1	49	21.8	21.8	21.8
		25	0	21.4	21.4	21.5
		25	12	20.8	21.0	21.1
		25	24	20.8	20.8	20.9
		50	0	20.7	20.8	20.8

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	23.3	23.3	23.5
		1	37	22.7	23.0	23.0
		1	74	22.6	22.7	22.7
		36	0	22.5	22.5	22.5
		36	18	22.0	22.2	22.3
		36	35	21.7	21.8	21.8
		75	0	21.8	21.8	21.8
	16QAM	1	0	22.4	22.6	22.6
		1	37	22.0	22.1	22.3
		1	74	21.9	21.9	21.8
		36	0	21.5	21.4	21.6
		36	18	20.8	21.0	21.1
		36	35	20.8	20.9	21.0
		75	0	20.8	20.9	20.8

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	23.3	23.3	23.5
		1	49	22.8	23.0	23.0
		1	99	22.7	22.8	22.8
		50	0	22.6	22.5	22.6
		50	24	22.1	22.2	22.3
		50	49	21.8	21.9	21.9
		100	0	21.8	21.9	21.9
	16QAM	1	0	22.5	22.6	22.6
		1	49	22.0	22.2	22.3
		1	99	21.9	21.9	21.9
		50	0	21.5	21.5	21.6
		50	24	20.9	21.1	21.2
		50	49	20.9	20.9	21.0
		100	0	20.8	20.9	20.9

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	23.4	23.4	23.5
		1	2	23.4	23.5	23.5
		1	5	23.4	23.4	23.5
		3	0	23.4	23.4	23.5
		3	1	23.4	23.5	23.5
		3	2	23.4	23.4	23.5
		6	0	22.5	22.5	22.7
	16QAM	1	0	22.5	22.5	22.8
		1	2	22.7	22.5	22.6
		1	5	22.4	22.6	22.6
		3	0	22.5	22.5	22.8
		3	1	22.7	22.5	22.6
		3	2	22.4	22.6	22.6
		6	0	21.4	21.7	21.6

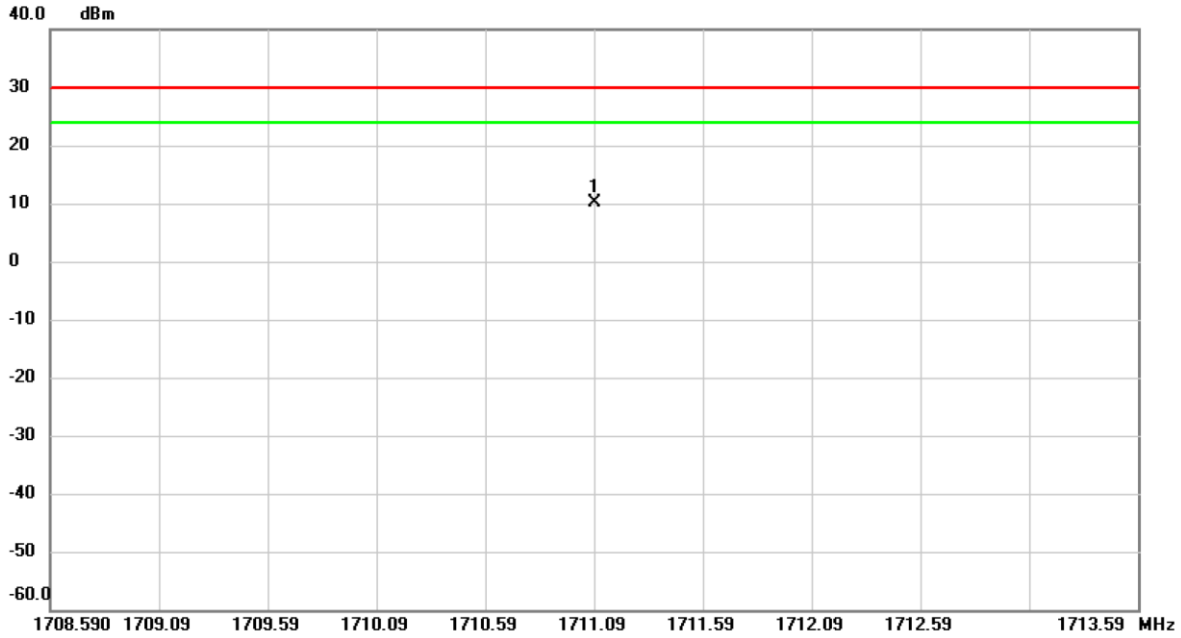
LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				23025CH	23095CH	23165CH
				700.5MHz	707.5MHz	714.5MHz
12 / 3M	QPSK	1	0	23.4	23.5	23.6
		1	7	23.5	23.6	23.5
		1	14	23.4	23.4	23.6
		8	0	22.5	22.5	22.7
		8	4	22.6	22.7	22.5
		8	7	22.6	22.6	22.7
		15	0	22.5	22.5	22.7
	16QAM	1	0	22.5	22.5	22.8
		1	7	22.7	22.6	22.7
		1	14	22.5	22.6	22.6
		8	0	21.5	21.6	21.8
		8	4	21.6	21.7	21.8
		8	7	21.6	21.7	21.8
		15	0	21.4	21.6	21.6

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	23.5	23.5	23.6
		1	12	23.5	23.6	23.6
		1	24	23.5	23.5	23.6
		12	0	22.5	22.6	22.7
		12	6	22.7	22.8	22.6
		12	11	22.6	22.6	22.8
		25	0	22.6	22.6	22.8
	16QAM	1	0	22.6	22.6	22.9
		1	12	22.8	22.6	22.7
		1	24	22.5	22.7	22.7
		12	0	21.5	21.6	21.9
		12	6	21.7	21.8	21.9
		12	11	21.6	21.7	21.8
		25	0	21.5	21.6	21.6

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	23.5	23.6	23.7
		1	24	23.6	23.7	23.6
		1	49	23.5	23.5	23.7
		25	0	22.6	22.6	22.8
		25	12	22.7	22.8	22.6
		25	24	22.7	22.7	22.8
		50	0	22.6	22.6	22.8
	16QAM	1	0	22.6	22.6	22.9
		1	24	22.8	22.7	22.8
		1	49	22.6	22.7	22.7
		25	0	21.6	21.7	21.9
		25	12	21.7	21.8	21.9
		25	24	21.7	21.8	21.9
		50	0	21.5	21.7	21.7

EIRP (dBm):

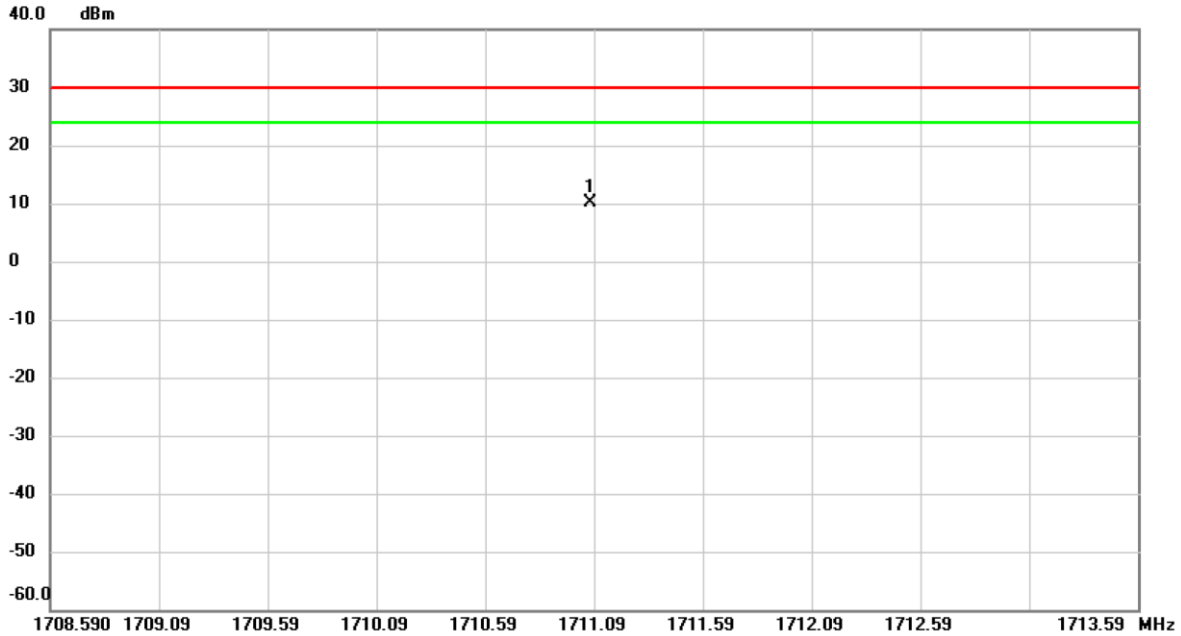
Test Mode	LTE Band 4	Test Date	2020/5/20
Test Channel	CH20050	Polarization	Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1	*	1711.090	17.20	-6.98	10.22	30.00	-19.78	peak	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

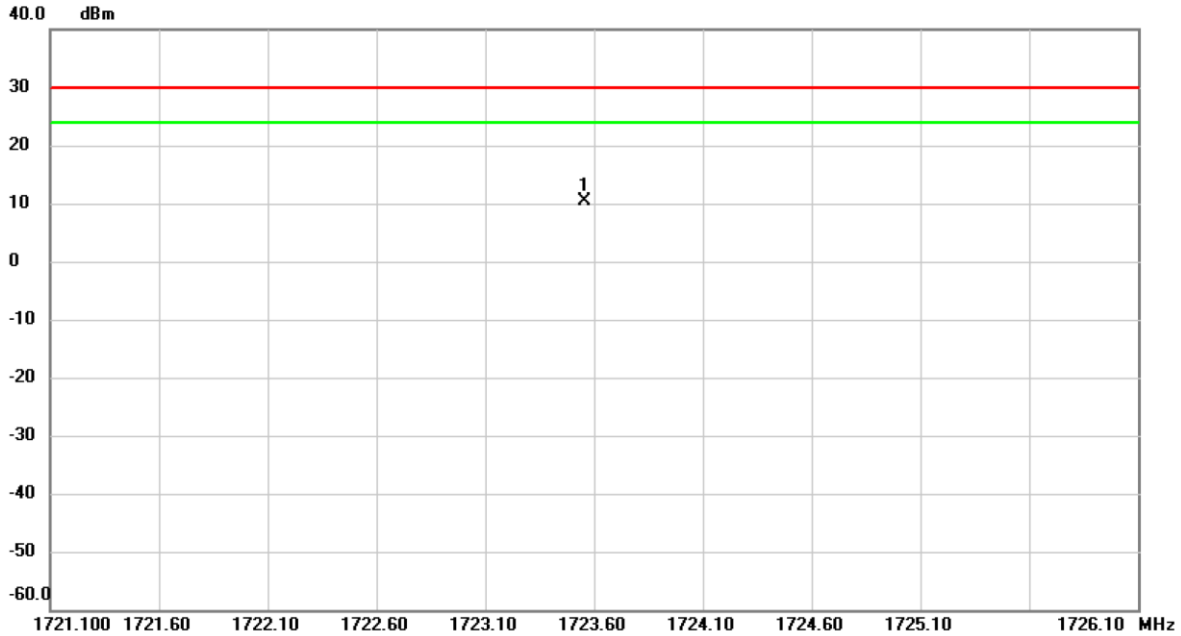
Test Mode	LTE Band 4	Test Date	2020/5/20
Test Channel	CH20050	Polarization	Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1	*	1711.070	17.16	-6.95	10.21	30.00	-19.79	peak	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

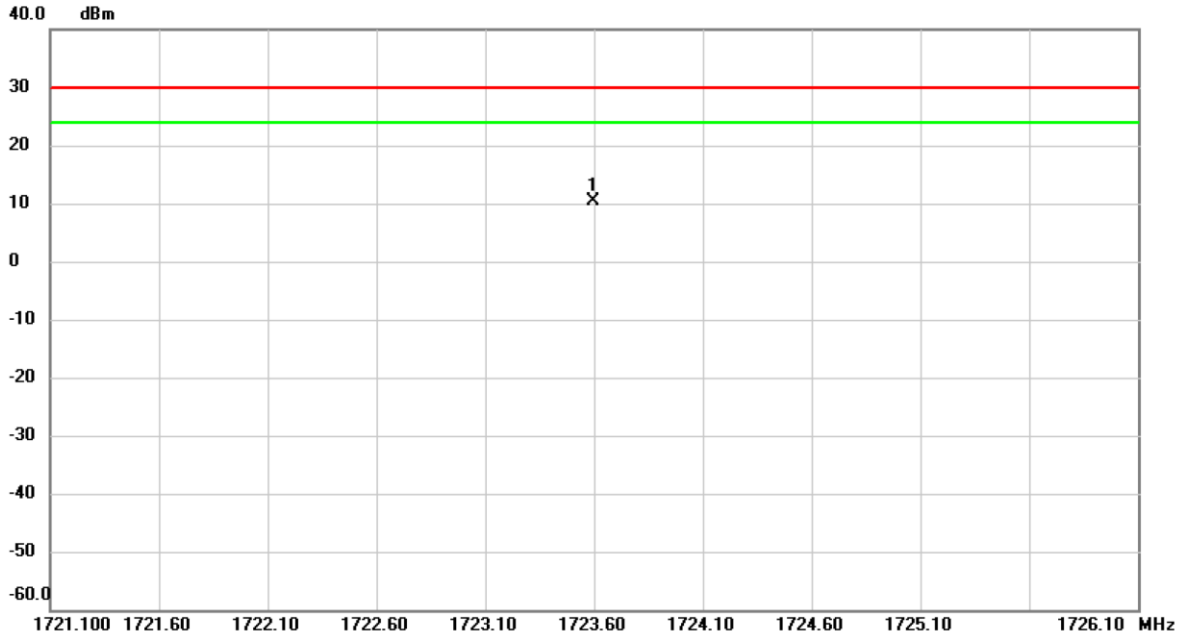
Test Mode	LTE Band 4	Test Date	2020/5/20
Test Channel	CH20175	Polarization	Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1	*	1723.555	17.22	-6.72	10.50	30.00	-19.50	peak	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

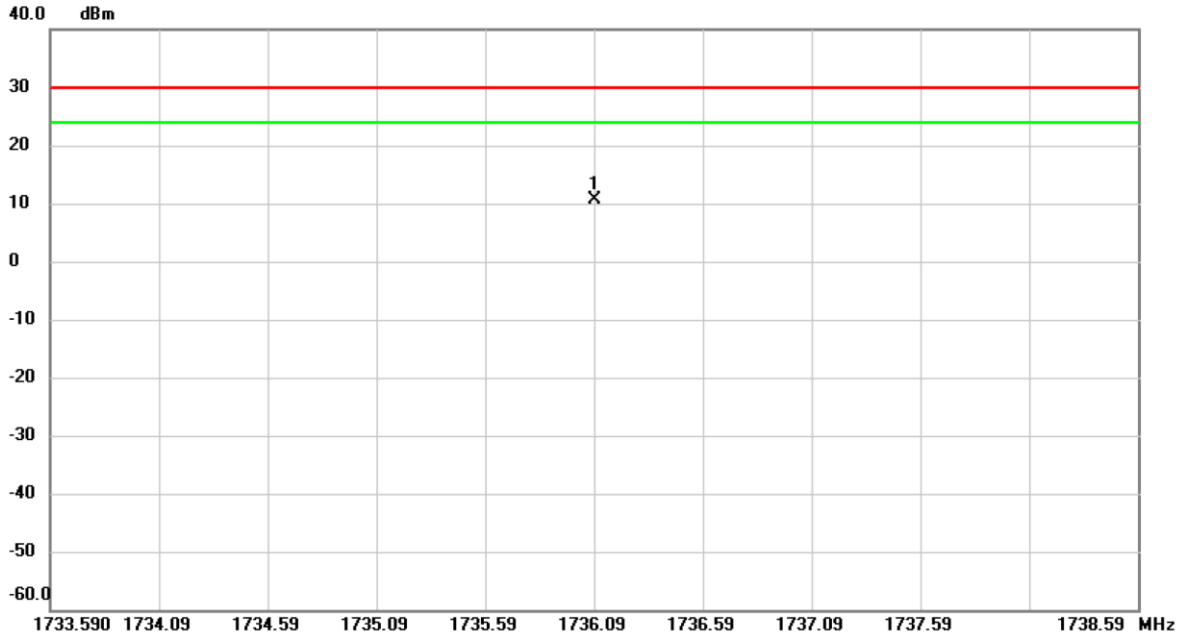
Test Mode	LTE Band 4	Test Date	2020/5/20
Test Channel	CH20175	Polarization	Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1	*	1723.595	17.20	-6.70	10.50	30.00	-19.50	peak	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

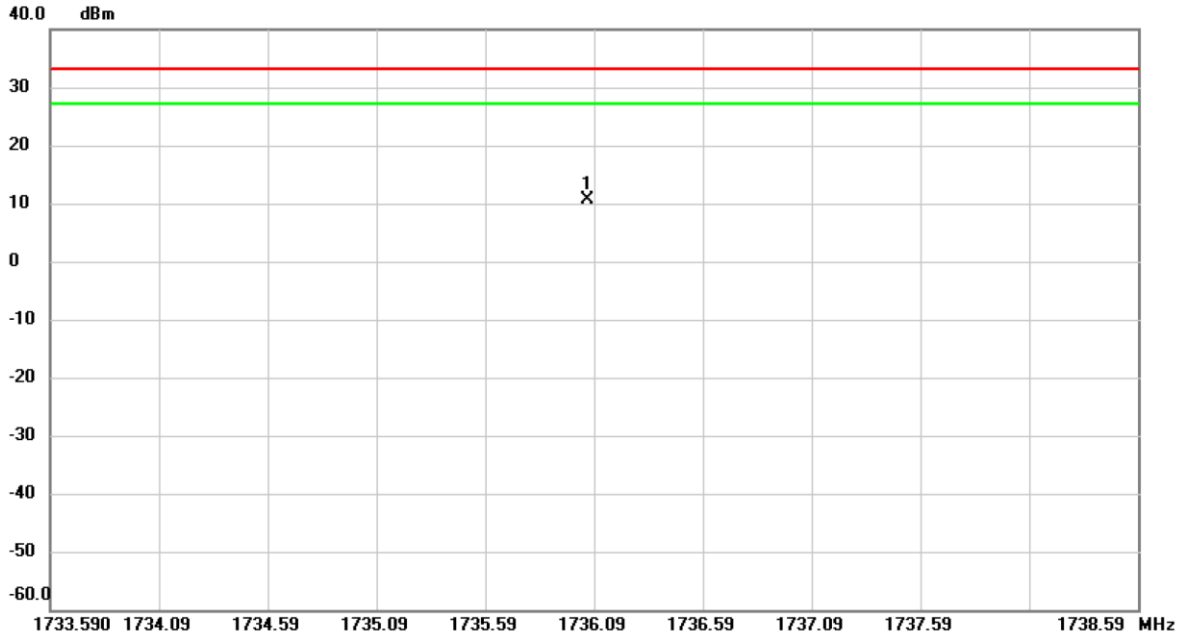
Test Mode	LTE Band 4	Test Date	2020/5/20
Test Channel	CH20300	Polarization	Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1	*	1736.095	17.20	-6.47	10.73	30.00	-19.27	peak	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

Test Mode	LTE Band 4	Test Date	2020/5/20
Test Channel	CH20300	Polarization	Horizontal

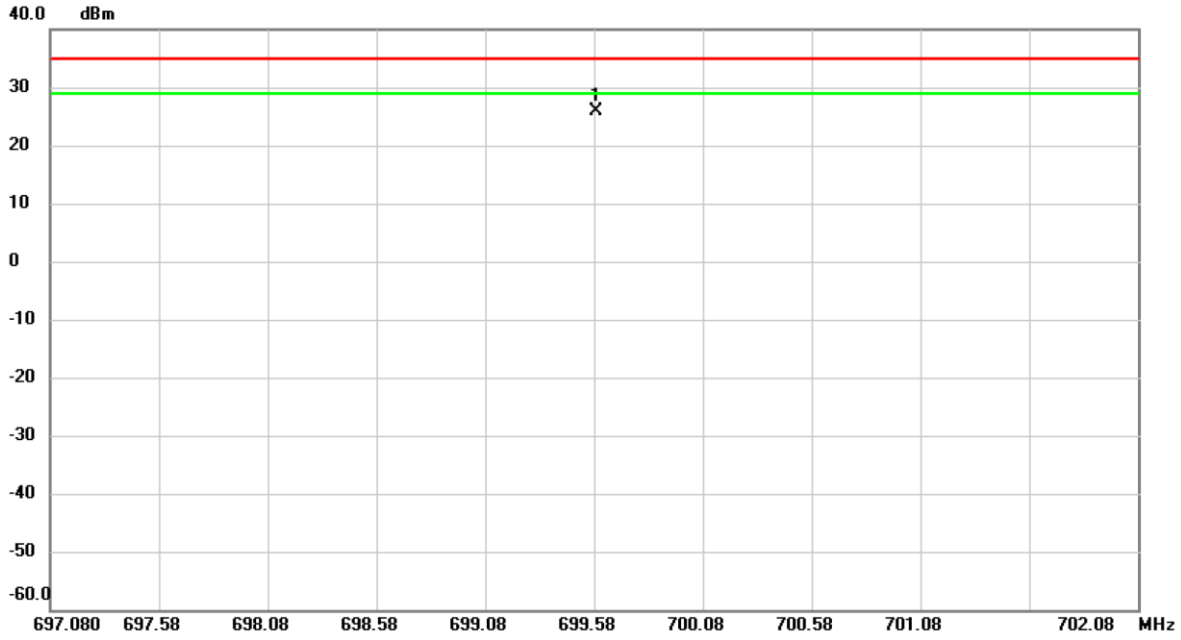


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1	*	1736.060	17.18	-6.45	10.73	33.01	-22.28	peak	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

ERP (dBm):

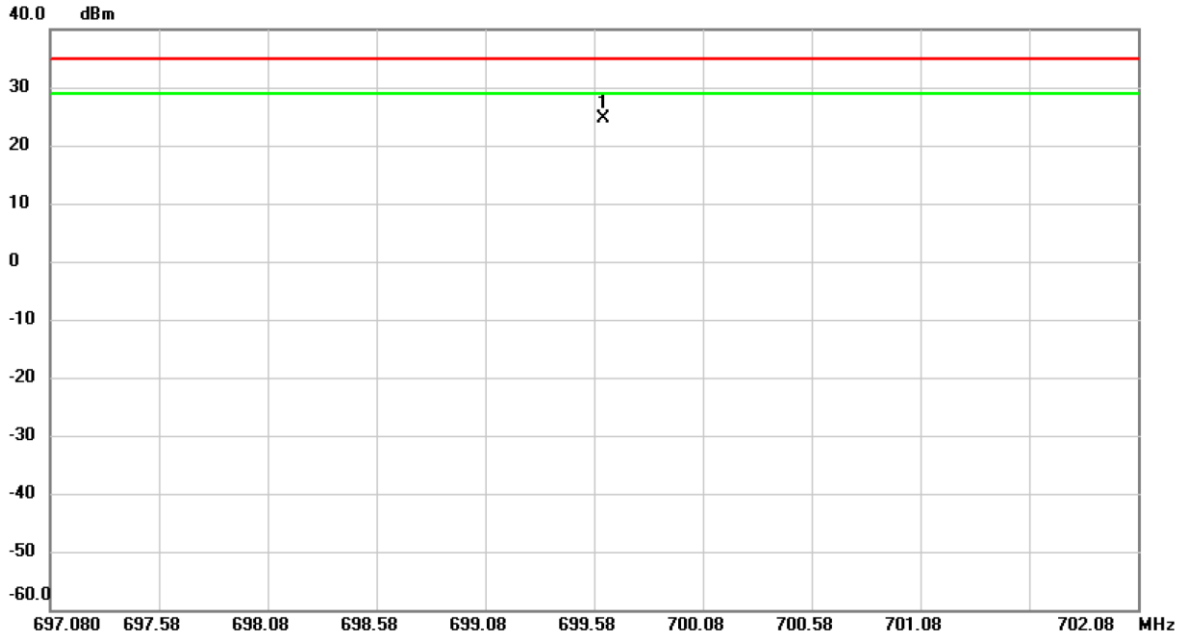
Test Mode	LTE Band 12	Test Date	2020/6/1
Test Channel	CH23060	Polarization	Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1	*	699.5900	13.30	12.66	25.96	34.77	-8.81	peak	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

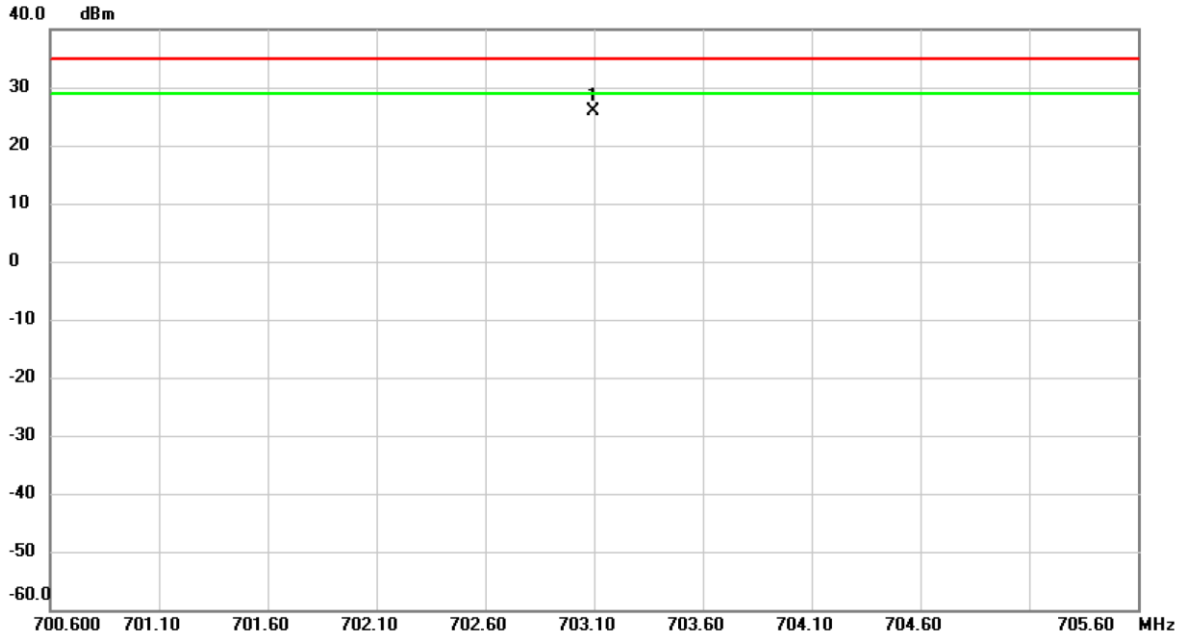
Test Mode	LTE Band 12	Test Date	2020/6/1
Test Channel	CH23060	Polarization	Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1	*	699.6250	15.24	9.36	24.60	34.77	-10.17	peak	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

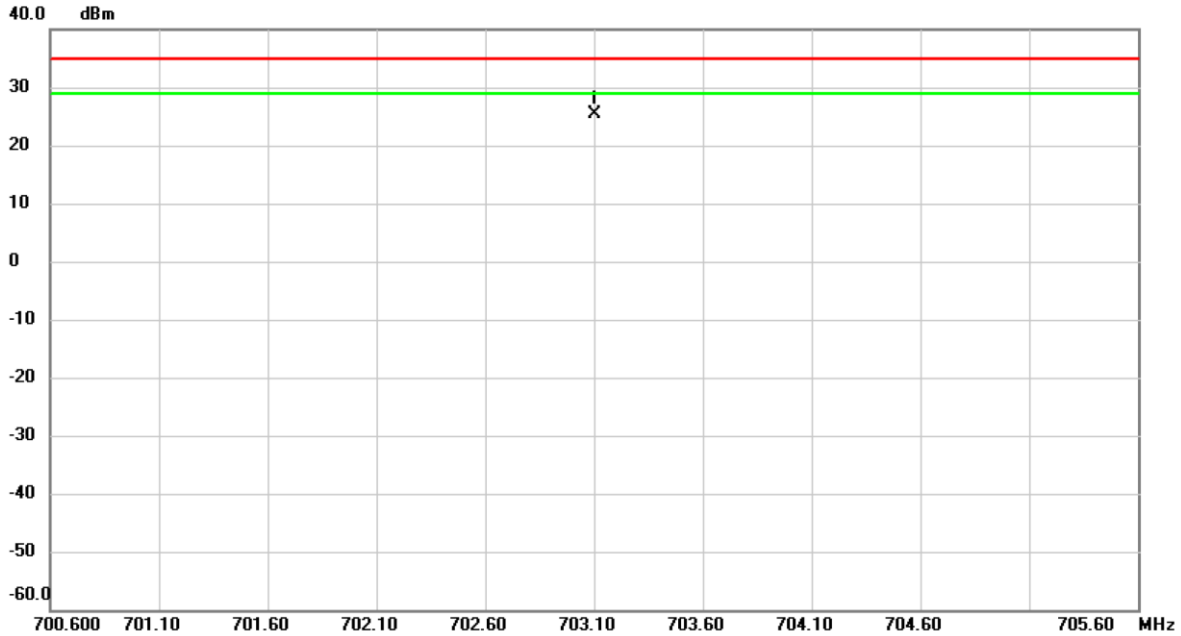
Test Mode	LTE Band 12	Test Date	2020/6/1
Test Channel	CH23095	Polarization	Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1	*	703.0950	13.24	12.59	25.83	34.77	-8.94	peak	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

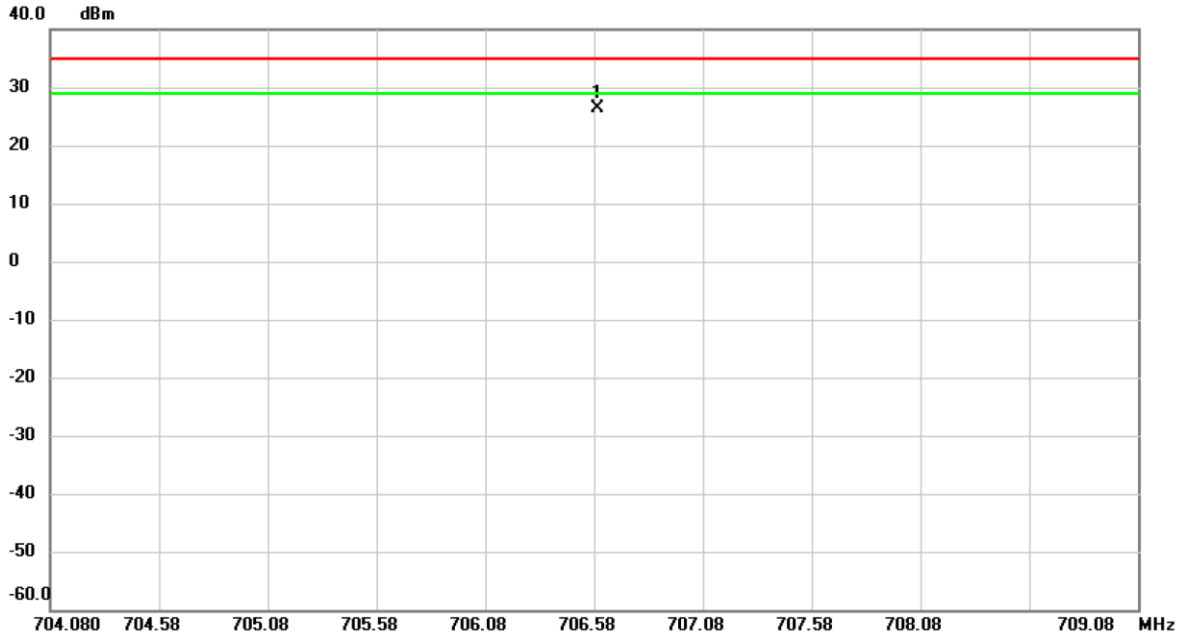
Test Mode	LTE Band 12	Test Date	2020/6/1
Test Channel	CH23095	Polarization	Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1	*	703.1000	15.90	9.59	25.49	34.77	-9.28	peak	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

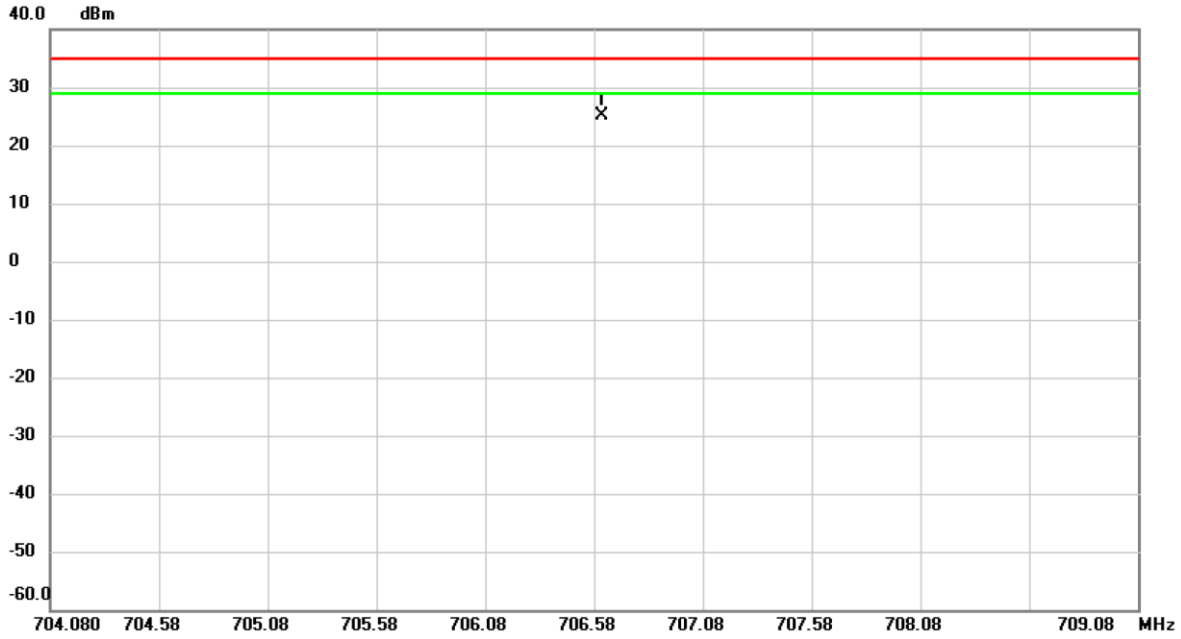
Test Mode	LTE Band 12	Test Date	2020/6/1
Test Channel	CH23130	Polarization	Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1	*	706.6000	13.88	12.51	26.39	34.77	-8.38	peak	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

Test Mode	LTE Band 12	Test Date	2020/6/1
Test Channel	CH23130	Polarization	Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1	*	706.6150	15.20	9.83	25.03	34.77	-9.74	peak	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.