

# FCC Radio Test Report

## FCC ID: M82-AIM10W

This report concerns: Original Grant

**Project No.** : 1710083  
**Equipment** : Computer  
**Test Model** : AIM-10W  
**Series Model** : AIM-10WXXXXXXXXXXXXXXXXXX  
(where X may be any alphanumeric character , blank or "-".)  
**Applicant** : Advantech Co., Ltd.  
**Address** : No.1, Alley 20, Lane 26, Rueiguang Road, Neihu District, Taipei 11491, Taiwan, R.O.C.

**Date of Receipt** : Nov. 13, 2017  
**Date of Test** : Nov. 13, 2017 ~ Feb. 27, 2018  
**Issued Date** : Mar. 01, 2018  
**Tested by** : BTL Inc.

**Technical Manager** :   
(James Chiu)

**Authorized Signatory** :   
(Sean Chen)

# B T L I N C .

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**REPORT ISSUED HISTORY**

Issue No.	Description	Issued Date
BTL-FCCP-8-1710083	Original Issue.	Mar. 01, 2018

## 1 CERTIFICATION

Equipment : Computer  
Brand Name : ADVANTECH  
Test Model : AIM-10W  
Series Model : AIM-10WXXXXXXXXXXXXXXXXXX  
(where X may be any alphanumeric character , blank or "-".)  
Applicant : Advantech Co., Ltd.  
Manufacturer : Advantech Co., Ltd.  
Address : No.1, Alley 20, Lane 26, Rueiguang Road, Neihu District, Taipei 11491, Taiwan, R.O.C.  
Date of Test : Nov. 13, 2017 ~ Feb. 27, 2018  
Test Sample : Production Unit  
Standard(s) : 47 CRF FCC Part 2  
47 CRF FCC Part 24, Subpart E  
KDB 971168 D01 Power Meas License Digital Systems v03  
ANSI/TIA-603-D-2010

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

The test data, data evaluation, and equipment configuration contained in our test report (Ref No. BTL-FCCP-8-1710083) were obtained utilizing the test procedures, test instruments, test sites that has been accredited by the Authority of TAF according to the ISO-17025 quality assessment standard and technical standard(s).

**Test result included in this report is only for the WCDMA Band II, LTE Band 2 and 25 part.**

## 2 SUMMARY OF TEST RESULTS

Test procedures according to the technical standards.

FCC Clause No	Description	Test Result	Judgement	Tested By
§2.1046 §24.232(c)	RF Power Output	APPENDIX A	Pass	Kenji Lin
§24.232(d)	Peak-to-Average Ratio (PAR)	APPENDIX B	Pass	Kenji Lin
§2.1049 §24.238(b)	Occupied Bandwidth	APPENDIX C	Pass	Kenji Lin
§2.1051 §24.238(a)	Out of Band Emissions	APPENDIX D	Pass	Kenji Lin
§2.1051 §24.238(a)	Spurious Emissions at Antenna Terminals	APPENDIX E	Pass	Kenji Lin
§2.1053 §24.238(a)	Field strength of spurious radiation	APPENDIX F	Pass	Kenji Lin
§2.1055 §24.235	Frequency stability	APPENDIX G	Pass	Kenji Lin

**NOTE:**

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

## 2.1 TEST FACILITY

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

- CB08:** (FCC RN:674415; FCC DN:TW0659; IC Assigned Code:20088-1)  
No. 68-1, Ln. 169, Sec. 2, Datong Rd., Xizhi Dist., New Taipei City 221, Taiwan (R.O.C.)
- CB11:** (FCC RN:674415; FCC DN:TW0659; IC Assigned Code:20088-2)  
No. 68-1, Ln. 169, Sec. 2, Datong Rd., Xizhi Dist., New Taipei City 221, Taiwan (R.O.C.)
- CB15:** (FCC RN:674415; FCC DN:TW0659; IC Assigned Code:20088-5)  
No. 68-1, Ln. 169, Sec. 2, Datong Rd., Xizhi Dist., New Taipei City 221, Taiwan (R.O.C.)
- CB16:** (FCC RN:674415; FCC DN:TW0659; IC Assigned Code:20088-6)  
No. 68-1, Ln. 169, Sec. 2, Datong Rd., Xizhi Dist., New Taipei City 221, Taiwan (R.O.C.)
- TR03:** (FCC RN:674415; FCC DN:TW0659)  
No. 68-1, Ln. 169, Sec. 2, Datong Rd., Xizhi Dist., New Taipei City 221, Taiwan (R.O.C.)

## 2.2 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. The BTL measurement uncertainty is less than the CISPR 16-4-2  $U_{CISPR}$  requirement.

The reported uncertainty of measurement  $y \pm U$ , 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 %.

### A. Conducted test:

Applied	Parameter	Uncertainty
<input checked="" type="checkbox"/>	RF Power Output	$\pm 0.24$ dB
<input checked="" type="checkbox"/>	Frequency stability	$\pm 1.2 \times 10^{-7}$
<input checked="" type="checkbox"/>	Occupied Bandwidth	$\pm 3.8$ %
<input checked="" type="checkbox"/>	Spurious Emissions at Antenna Terminals	$\pm 2.71$ dB
<input checked="" type="checkbox"/>	Temperature	$\pm 0.08$ °C



B. Radiated emissions below 1 GHz test:

Applied	Test Site	Method	Measurement Frequency Range	Ant. H / V	U (dB)
<input type="checkbox"/>	CB08 (10m)	CISPR	30 MHz ~ 200 MHz	V	3.48
			30 MHz ~ 200 MHz	H	3.08
			200 MHz ~ 1,000 MHz	V	3.94
			200 MHz ~ 1,000 MHz	H	3.46
<input type="checkbox"/>	CB08 (3m)	CISPR	30 MHz ~ 200 MHz	V	3.68
			30 MHz ~ 200 MHz	H	3.28
			200 MHz ~ 1,000 MHz	V	4.26
			200 MHz ~ 1,000 MHz	H	3.92
<input type="checkbox"/>	CB11 (3m)	CISPR	30 MHz ~ 200 MHz	V	4.26
			30 MHz ~ 200 MHz	H	3.76
			200 MHz ~ 1,000 MHz	V	4.46
			200 MHz ~ 1,000 MHz	H	3.84
<input checked="" type="checkbox"/>	CB15 (3m)	CISPR	30 MHz ~ 200 MHz	V	4.20
			30 MHz ~ 200 MHz	H	3.64
			200 MHz ~ 1,000 MHz	V	4.56
			200 MHz ~ 1,000 MHz	H	3.90
<input type="checkbox"/>	CB16 (3m)	CISPR	30 MHz ~ 200 MHz	V	4.20
			30 MHz ~ 200 MHz	H	3.64
			200 MHz ~ 1,000 MHz	V	4.56
			200 MHz ~ 1,000 MHz	H	3.90

C. Radiated emissions above 1 GHz test:

Applied	Test Site	Method	Measurement Frequency Range	Ant. H / V	U (dB)
<input type="checkbox"/>	CB08 (3m)	CISPR	1 GHz ~ 6 GHz	V	4.40
			1 GHz ~ 6 GHz	H	3.88
			6 GHz ~18 GHz	V	4.70
			6 GHz ~18 GHz	H	4.08
<input type="checkbox"/>	CB11 (3m)	CISPR	1 GHz ~ 6 GHz	V	4.44
			1 GHz ~ 6 GHz	H	4.40
			6 GHz ~18 GHz	V	4.02
			6 GHz ~18 GHz	H	4.00
<input checked="" type="checkbox"/>	CB15 (3m)	CISPR	1 GHz ~ 6 GHz	V	4.46
			1 GHz ~ 6 GHz	H	4.40
			6 GHz ~18 GHz	V	3.88
			6 GHz ~18 GHz	H	4.00
<input type="checkbox"/>	CB16 (3m)	CISPR	1 GHz ~ 6 GHz	V	4.46
			1 GHz ~ 6 GHz	H	4.40
			6 GHz ~18 GHz	V	3.88
			6 GHz ~18 GHz	H	4.00

Applied	Test Site	Method	Measurement Frequency Range	U (dB)
<input type="checkbox"/>	CB08 (1m)	CISPR	18 GHz ~ 26.5 GHz	4.68
			26.5 GHz ~ 40 GHz	5.16
<input type="checkbox"/>	CB11 (1m)	CISPR	18 GHz ~ 26.5 GHz	4.76
			26.5 GHz ~ 40 GHz	5.24
<input checked="" type="checkbox"/>	CB15 (1m)	CISPR	18 GHz ~ 26.5 GHz	4.62
			26.5 GHz ~ 40 GHz	5.12
<input type="checkbox"/>	CB16 (1m)	CISPR	18 GHz ~ 26.5 GHz	4.62
			26.5 GHz ~ 40 GHz	5.12

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

Our calculated Measurement Instrumentation Uncertainty is shown in the tables above. These are our  $U_{lab}$  values in CISPR 16-4-2 terminology.

Since Table 1 of CISPR 16-4-2 has values of measurement instrumentation uncertainty, called  $U_{CISPR}$ , as follows:

Conducted Disturbance (mains port) – 150 kHz – 30 MHz : 3.6 dB

Radiated Disturbance (electric field strength on an open area test site or alternative test site) – 30 MHz – 1000 MHz : 5.2 dB

### 3 GENERAL INFORMATION

#### 3.1 DESCRIPTION OF EUT

Equipment	Computer					
Brand Name	ADVANTECH					
Test Model	AIM-10W					
Series Model	AIM-10WXXXXXXXXXXXXXXXXXXXX (where X may be any alphanumeric character , blank or “-”.)					
Model Difference	Different model distribute to different area.					
Power Source	DC Voltage supplied from AC/DC adapter.					
Power Rating	I/P: AC 100-240V~, 1.5A, 50~60Hz, 1.5A O/P: DC 19V---3.42A					
Products Covered						
AC Adapter Manufacturer	TAMURA	Model	XEW1934N			
WWAN Module Manufacturer	Sierra Wireless	Model	EM7455 (FCC ID: N7NEM7455)			
Specification information						
Modulation Type	WCDMA	UL: BPSK DL: QPSK				
	LTE	UL: QPSK,16QAM DL: QPSK,16QAM				
Band	Operation Frequency	Modulation Type	Maximum EIRP RF Power Output		Maximum Frequency Tolerance	Emission Designator
	MHz		dBm	W		
WCDMA Band II	1852.4 to 1907.6	BPSK	14.93	0.031	0.0038	4M17F9W
LTE Band 2	1850.7 to 1909.3	QPSK	15.12	0.033	0.0052	18M0G7D
		16QAM	14.39	0.027		18M0W7D
LTE Band 25	1850.7 to 1914.3	QPSK	15.41	0.035	/	18M6G7D
		16QAM	14.81	0.030		18M6W7D

**NOTE:**

- (1) For a more detailed features description, please refer to the manufacturer’s specifications or the user’s manual.

(2) Table for Filed Antenna:

Ant.	Brand	Model	Type	Connector	Frequency Range (MHz)	Gain w/ Cable loss (dBi)	Gain w/o Cable Loss (dBi)	Cable Loss (dBi)
MAIN	INPAQ Corporation	P/N: 6036B0207401 (WA-F-LTE12-02-001)	PIFA	I-PEX MHF4-L	699-715	-3.70	-3.34	0.36
					704-716	-3.67	-3.21	0.36
					824-849	-5.77	-5.39	0.38
					777-787	-5.44	-5.07	0.37
					832-862	-7.24	-6.86	0.38
					880-915	-11.97	-11.38	0.59
					1710-1755	-2.29	-1.7	0.59
					1710-1785	-2.45	-1.86	0.59
					1710-1780	-2.15	-1.56	0.59
					1850-1910	-7.51	-6.91	0.6
					1920-1980	-5.71	-5.10	0.61
					2305-2315	-5.27	-4.58	0.69
					2500-2570	-6.37	-5.66	0.71
					2496-2690	-5.57	-4.86	0.71
AUX	INPAQ Corporation	P/N: 6036B0207201 (WA-F-LTE12LB G1-12-001)	PIFA	I-PEX MHF4-L	2620-2690	-5.38	-4.67	0.71
					717-728	-11.63	-11.53	0.10
					729-745	-11.03	-10.93	0.10
					734-746	-10.89	-10.79	0.10
					746-756	-10.46	-10.35	0.11
					869-894	-11.61	-11.5	0.11
					791-821	-4.85	-4.74	0.11
					925-960	-6.54	-6.42	0.12
					1805-1880	-2.91	-2.75	0.16
					1930-1990	-2.71	-2.54	0.17
					2110-2155	-1.72	-1.55	0.17
					2110-2200	-1.73	-1.55	0.18
					2350-2360	-2.88	-2.7	0.18
					2496-2690	0.19	0.38	0.19
2620-2690	0.19	0.38	0.19					

### 3.2 TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

The EUT system operated these modes were found to be the worst case during the pre-scanning test as following:

WCDMA				
Test Items	Band	Test Channel		
		L	M	H
RF Power Output	II	V	V	V
Peak-to-Average Ratio (PAR)	II	V	V	V
Occupied Bandwidth	II	V	V	V
Out of Band Emissions	II	V		V
Spurious Emissions at Antenna Terminals	II		V	
Field strength of spurious radiation	II		V	
Frequency stability	II		V	

LTE															
Test Items	Band	Bandwidth (MHz)						Modulation		RB Size			Test Channel		
		1.4	3	5	10	15	20	QPSK	16QAM	1	Half	Full	L	M	H
RF Power Output	2	V	V	V	V	V	V	V	V	V	V	V	V	V	V
	25	V	V	V	V	V	V	V	V	V	V	V	V	V	V
Peak-to-Average Ratio (PAR)	2	V	V	V	V	V	V	V	V	V			V	V	V
	25	V	V	V	V	V	V	V	V	V			V	V	V
Occupied Bandwidth	2	V	V	V	V	V	V	V	V			V	V	V	V
	25	V	V	V	V	V	V	V	V			V	V	V	V
Out of Band Emissions	2	V	V	V	V	V	V	V	V	V		V	V		V
	25	V	V	V	V	V	V	V	V	V		V	V		V
Spurious Emissions at Antenna Terminals	2	V	V	V	V	V	V	V	V	V				V	
	25	V	V	V	V	V	V	V	V	V				V	
Field strength of spurious radiation	2	V	V	V	V	V	V	V		V				V	
	25	V	V	V	V	V	V	V		V				V	
Frequency stability	2	V	V	V	V	V	V	V		V				V	
	25	V	V	V	V	V	V	V		V				V	

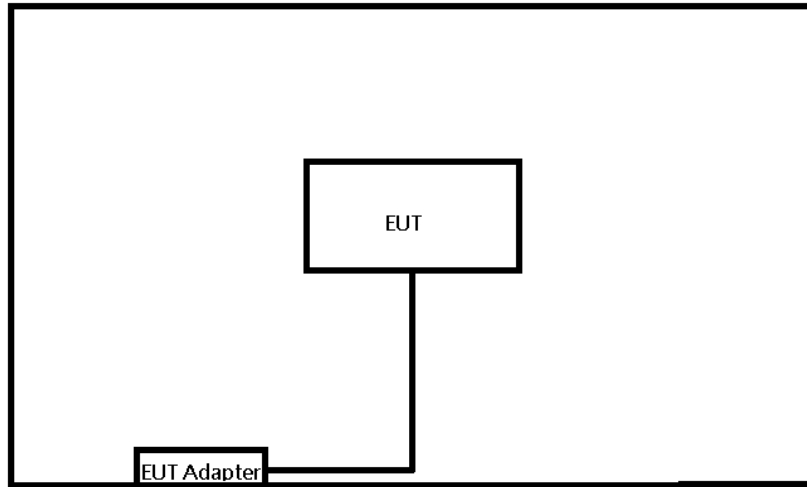
**NOTE:**

(1) The marker “V” means this configuration is used for testing.

**EUT TEST CONDITIONS:**

Test Item	Environmental Conditions	Test Voltage
RF Power Output	25 °C, 60 % RH	AC 120V/60Hz
Peak-to-Average Ratio (PAR)	25 °C, 60 % RH	AC 120V/60Hz
Occupied Bandwidth	25 °C, 60 % RH	AC 120V/60Hz
Out of Band Emissions	25 °C, 60 % RH	AC 120V/60Hz
Spurious Emissions at Antenna Terminals	25 °C, 60 % RH	AC 120V/60Hz
Field strength of spurious radiation	23 °C, 70 % RH	AC 120V/60Hz
Frequency stability	Normal and Extreme	Normal and Extreme

**3.3 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED**



**3.4 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	Brand	Model/Type No.	FCC ID	Series No.
-	-	-	-	-	-

Item	Shielded Type	Ferrite Core	Length	Note
-	-	-	-	-

## 4 RF POWER OUTPUT TEST

### 4.1 LIMIT

Mobile and portable stations are limited to 2 watts EIRP.

### 4.2 TEST PROCEDURE

#### EIRP / ERP Power Measurement:

EIRP = Conducted Power + Antenna gain.

ERP power = EIPR power - 2.15 dBi.

#### Conducted Power Measurement:

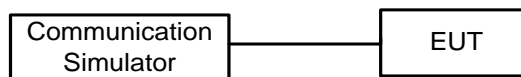
The EUT was set up for the maximum power with WCDMA and LTE link data modulation and link up with simulator. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

### 4.3 DEVIATION FROM TEST STANDARD

No deviation.

### 4.4 TEST SETUP

#### Conducted Power Measurement:



### 4.5 TEST RESULT

Please refer to the APPENDIX A.



**5 PEAK-TO-AVERAGE RATIO (PAR) TEST**

**5.1 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.

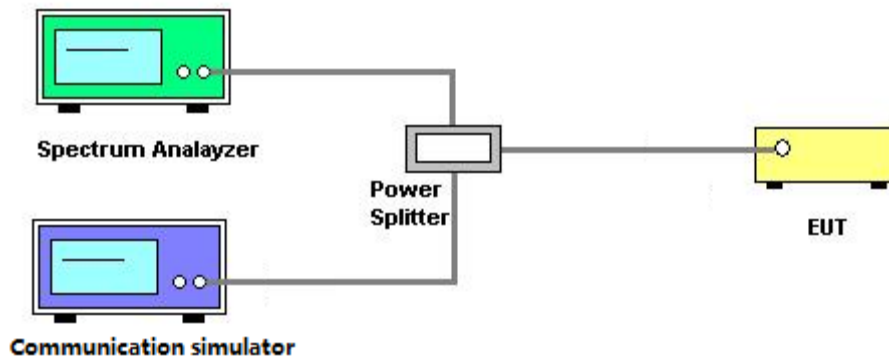
**5.2 TEST PROCEDURE**

- a. Set resolution/measurement bandwidth  $\geq$  signal's occupied bandwidth.
- b. Set the number of counts to a value that stabilizes the measured CCDF curve.
- c. Record the maximum PAPR level associated with a probability of 0.1%.

**5.3 DEVIATION FROM TEST STANDARD**

No deviation.

**5.4 TEST SETUP**



**5.5 TEST RESULT**

Please refer to the APPENDIX B.

**6 OCCUPIED BANDWIDTH TEST**

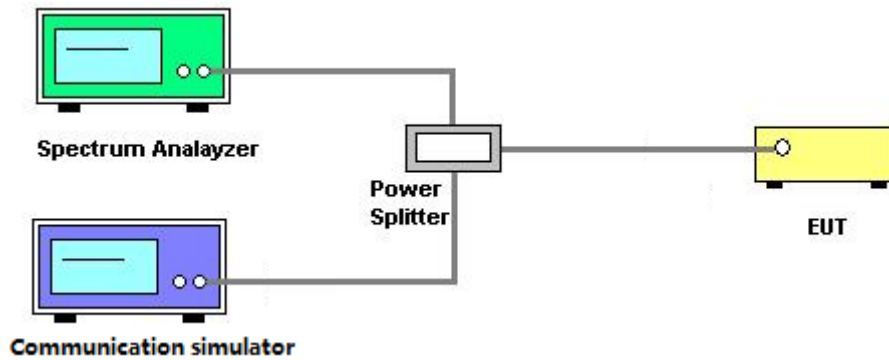
**6.1 TEST PROCEDURE**

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 26 dB bandwidth.

**6.2 DEVIATION FROM TEST STANDARD**

No deviation.

**6.3 TEST SETUP**



**6.4 TEST RESULT**

Please refer to the APPENDIX C.

## 7 OUT OF BAND EMISSIONS TEST

### 7.1 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.

In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

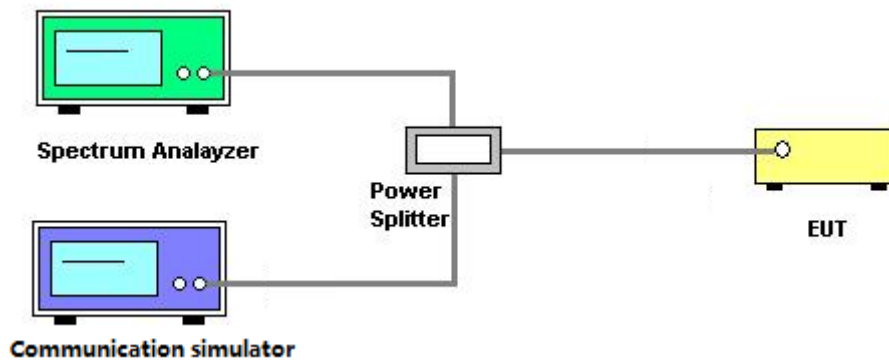
### 7.2 TEST PROCEDURE

- a. All measurements were done at low and high operational frequency range.
- b. The center frequency of spectrum is the band edge frequency and span is 5 MHz. RB of the spectrum is 100 kHz and VB of the spectrum is 300 kHz (WCDMA).
- c. The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 13 kHz and VB of the spectrum is 51 kHz (LTE Bandwidth 1.4MHz).
- d. The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 30 kHz and VB of the spectrum is 100 kHz (LTE Bandwidth 3MHz).
- e. The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 100 kHz and VB of the spectrum is 300 kHz (LTE Bandwidth 5MHz/10MHz).
- f. The center frequency of spectrum is the band edge frequency and span is 1MHz. RB of the spectrum is 150 kHz and VB of the spectrum is 470 kHz (LTE Bandwidth 15MHz).
- g. The center frequency of spectrum is the band edge frequency and span is 1MHz. RB of the spectrum is 180 kHz and VB of the spectrum is 560 kHz (LTE Bandwidth 20MHz).
- h. Record the max trace plot into the test report.

### 7.3 DEVIATION FROM TEST STANDARD

No deviation.

### 7.4 TEST SETUP



### 7.5 TEST RESULT

Please refer to the APPENDIX D.

## 8 SPURIOUS EMISSIONS AT ANTENNA TERMINALS TEST

### 8.1 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 is equal to -13 dBm.

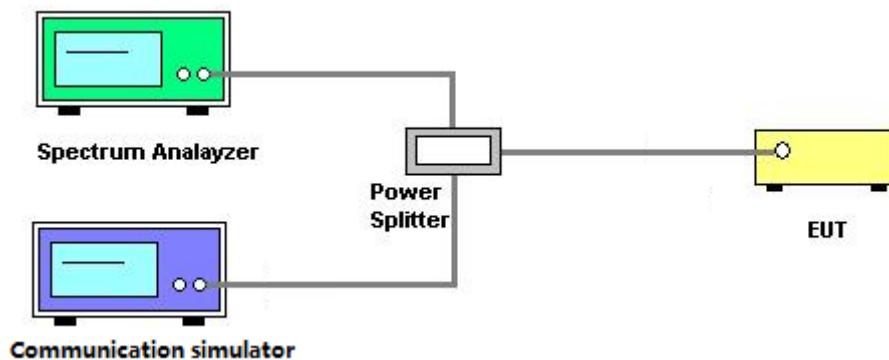
### 8.2 TEST PROCEDURE

- a. The testing follows FCC KDB 971168 D01 Power Meas License Digital Systems v03.
- b. The EUT was connected to spectrum analyzer and system simulator via a power divider.
- c. The band edges of low and high channels for the highest RF powers were measured. Set RBW  $\geq 1\%$  EBW in the 1 MHz band immediately outside and adjacent to the band edge.
- d. Set spectrum analyzer with RMS detector.
- e. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
- f. The limit line is derived from  $43 + 10\log(P)$  dB below the transmitter power P (Watts)
  - =  $P(W) - [43 + 10 \log(P)]$  (dB)
  - =  $[30 + 10 \log(P)]$  (dBm) -  $[43 + 10 \log(P)]$  (dB)
  - = - 13 dBm

### 8.3 DEVIATION FROM TEST STANDARD

No deviation.

### 8.4 TEST SETUP



### 8.5 TEST RESULT

Please refer to the APPENDIX E.

## 9 FIELD STRENGTH OF SPURIOUS RADIATION TEST

### 9.1 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 is equal to -13 dBm.

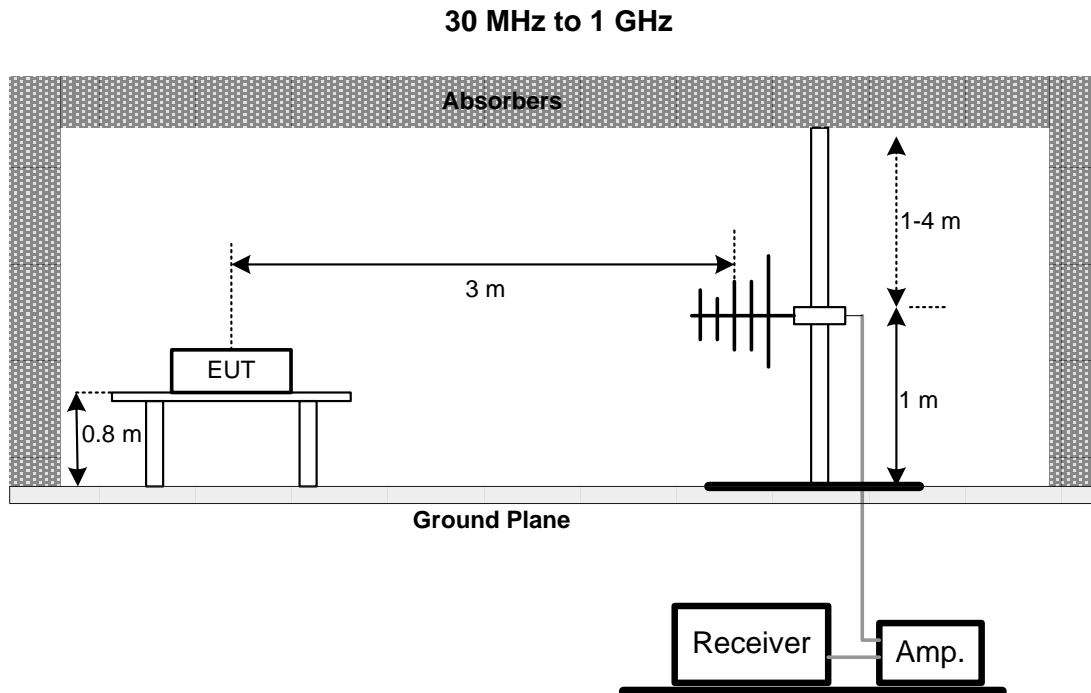
### 9.2 TEST PROCEDURE

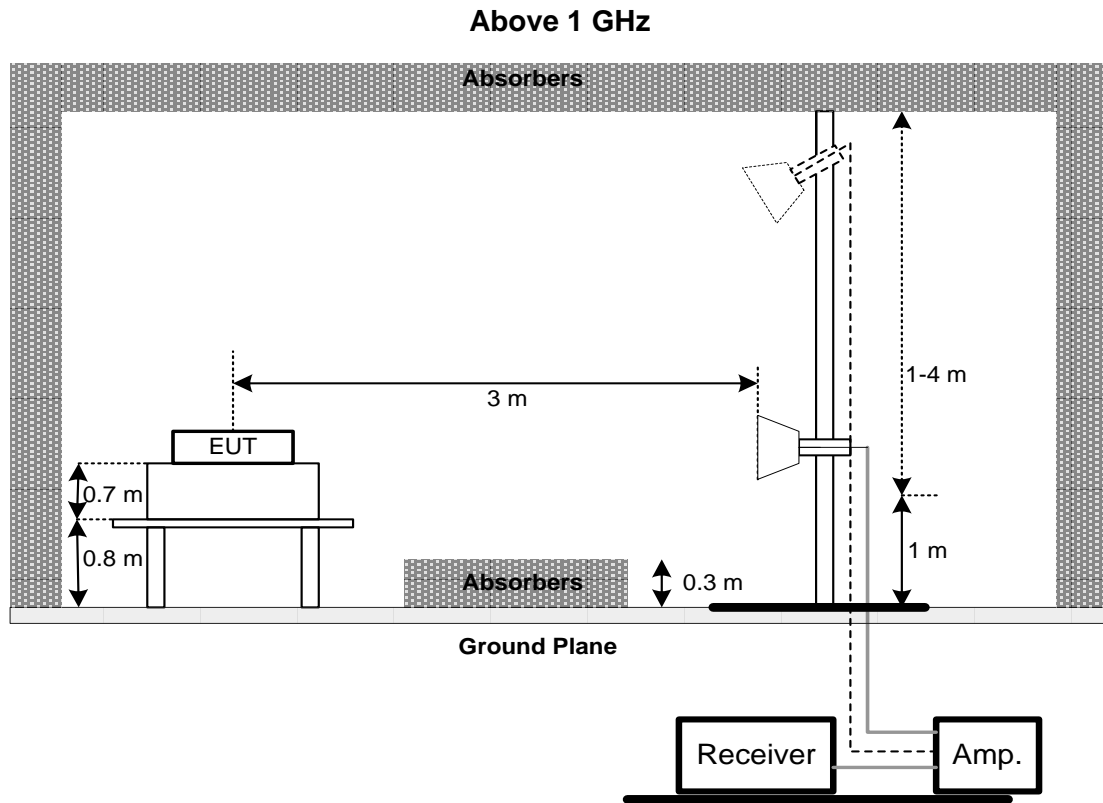
- In the semi-anechoic chamber, EUT placed on the 0.8 m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1 m to 4 m to find the maximum polar radiated power.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

### 9.3 DEVIATION FROM TEST STANDARD

No deviation.

### 9.4 TEST SETUP





## 9.5 TEST RESULT

Please refer to the APPENDIX F.

## 10 FREQUENCY STABILITY TEST

### 10.1 LIMIT

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

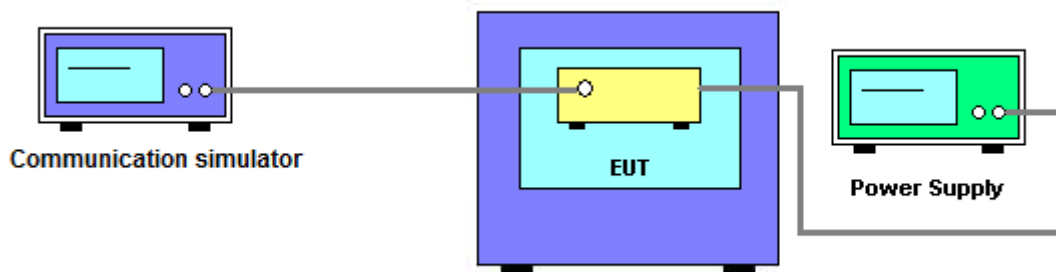
### 10.2 TEST PROCEDURE

- a. 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.
- b. 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.
- c. The temperature range step is 10 degrees in this test items. All temperature levels shall be hold the  $\pm 0.5^{\circ}\text{C}$  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.
- d. The frequency error was recorded frequency error from the communication simulator.

### 10.3 DEVIATION FROM TEST STANDARD

No deviation.

### 10.4 TEST SETUP



### 10.5 TEST RESULT

Please refer to the APPENDIX G.

## 11 LIST OF MEASURING EQUIPMENTS

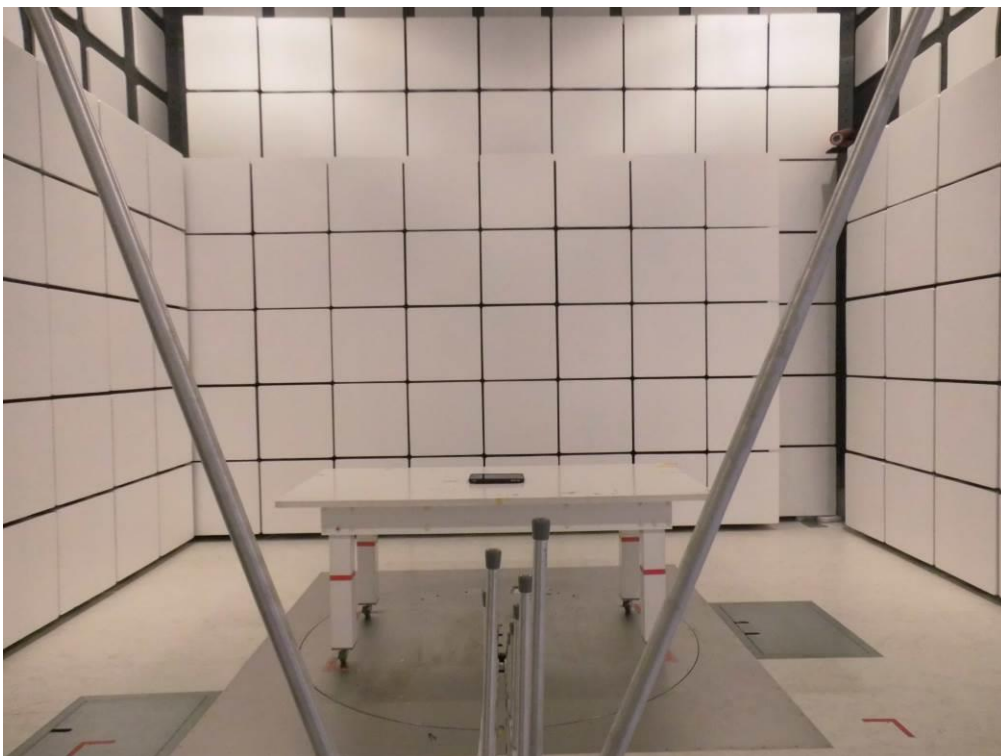
RF Power Output and Frequency stability					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Wireless Communications Test Set (WCDMA)	Agilent	8960	US38080149	Oct. 16, 2018
2	Radio Communication Analyzer (LTE)	Anritsu	MT8820C	6201525878	Nov. 04, 2018

Peak-to-Average Ratio (PAR), Occupied Bandwidth, Out of Band Emissions and Spurious Emissions at Antenna Terminals					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	EXA Signal Analyzer	Agilent	N9010A	MY54200240	Oct. 01, 2018
2	Wireless Communications Test Set (WCDMA)	Agilent	8960	US38080149	Oct. 16, 2018
3	Radio Communication Analyzer (LTE)	Anritsu	MT8820C	6201525878	Nov. 04, 2018

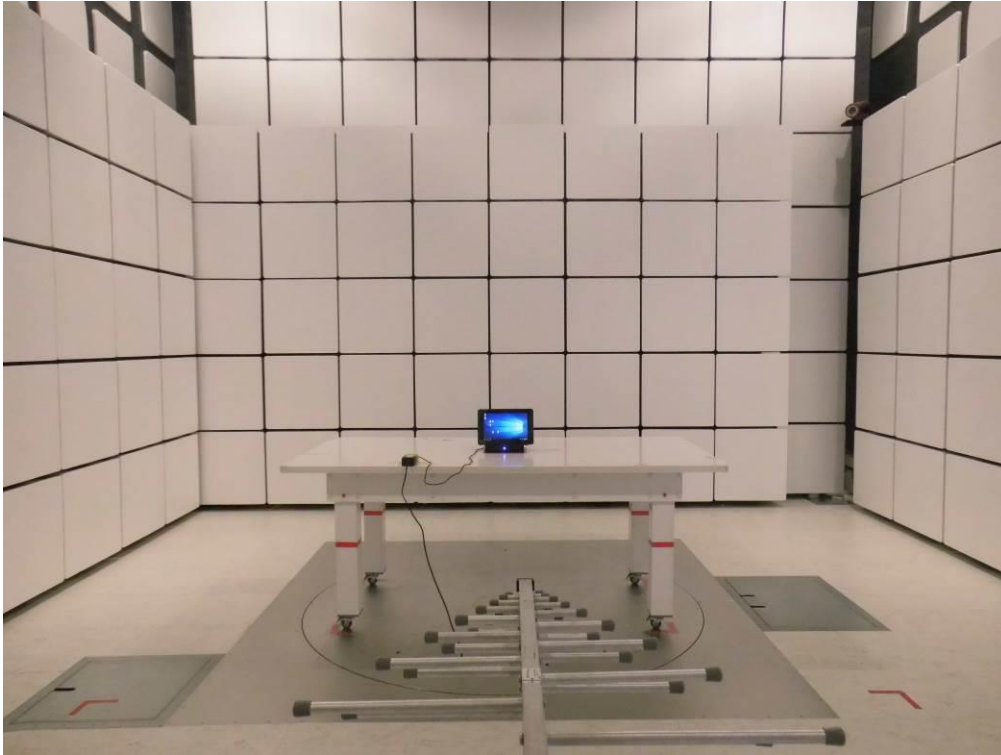
Field strength of spurious radiation					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Preamplifier	EMCI	012645B	980267	Feb. 27, 2019
2	Preamplifier	EMCI	EMC02325	980217	Dec. 27, 2019
3	Test Cable	EMCI	EMC104-SM-SM-8000	8m	Jan. 03, 2019
4	Test Cable	EMCI	EMC104-SM-SM-800	150207	Jan. 03, 2019
5	Test Cable	EMCI	EEMC104-SM-SM-3000	151205	Jan. 03, 2019
6	MXE EMI Receiver	Agilent	N9038A	MY55420127	Jan. 08, 2019
7	Signal Analyzer	Agilent	N9010A	MY52220990	Feb. 21, 2019
8	Loop Ant	EMCO	6502	42960	Nov. 23, 2018
9	Horn Ant	SCHWARZBECK	BBHA 9120D	9120D-1342	Feb. 27, 2019
10	Trilog-Broadband Antenna	Schwarzbeck	VULB 9168	9168-548	Jan. 15, 2019
11	5dB Attenuator	EMCI	EMCI-N-6-05	AT-N0623	Jan. 15, 2019
12	Wireless Communications Test Set (WCDMA)	Agilent	8960	US38080149	Oct. 16, 2018
13	Radio Communication Analyzer (LTE)	Anritsu	MT8820C	6201525878	Nov. 04, 2018

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

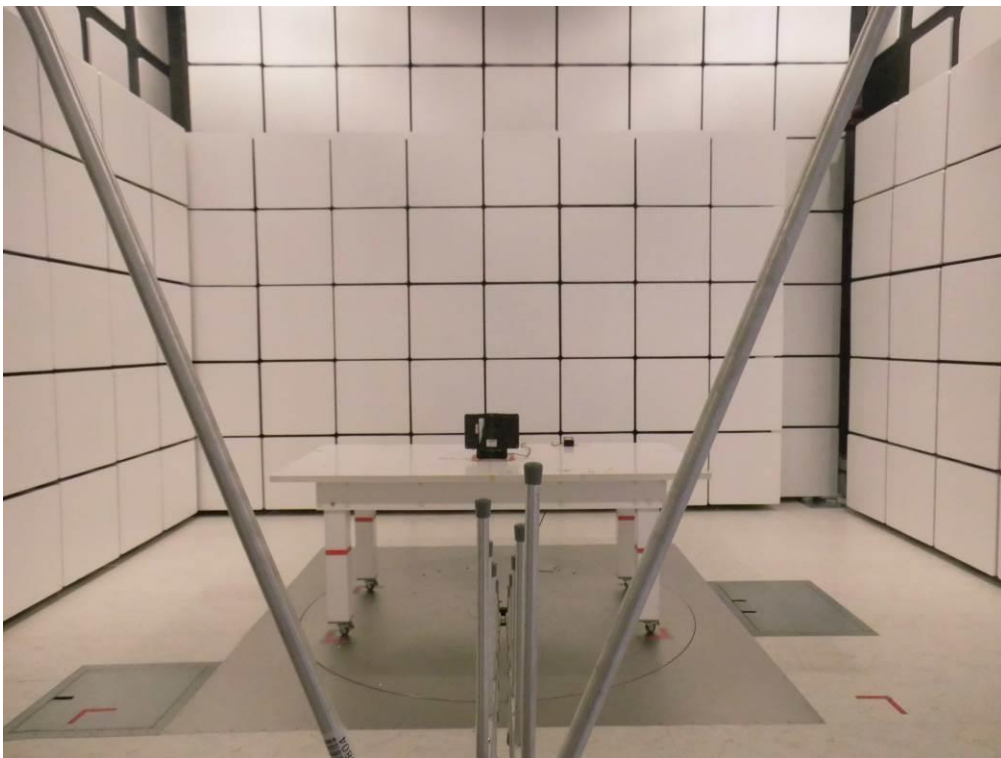
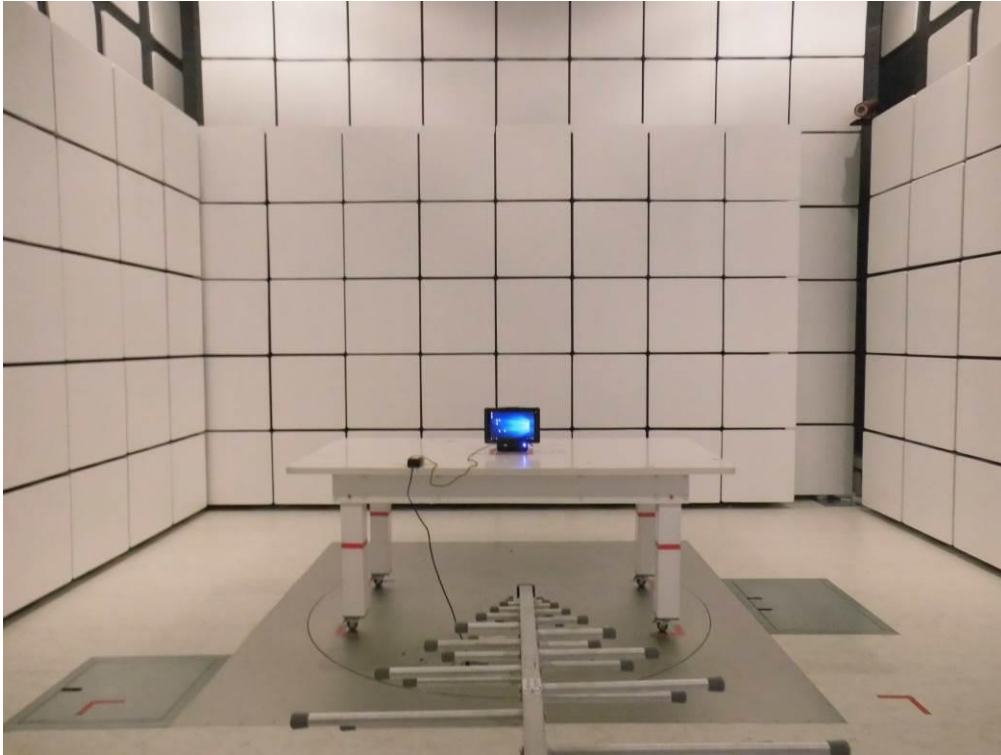


**12 EUT TEST PHOTO****Transmitter Radiated Emissions Test Photos  
30 MHz to 1000 MHz  
Without Docking**

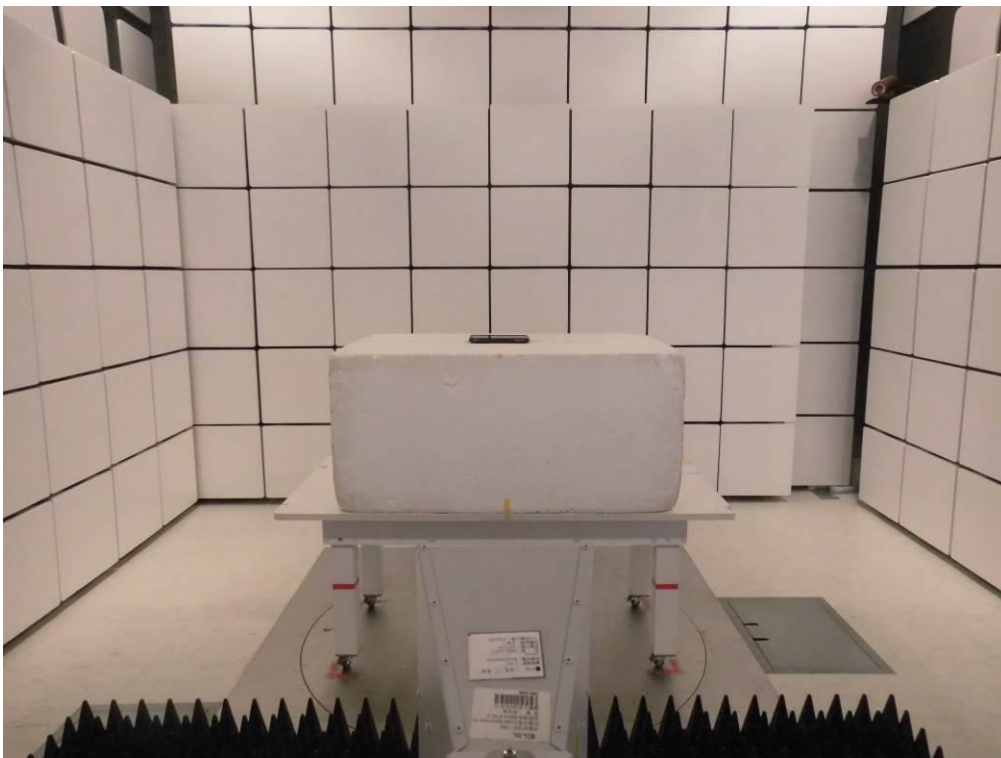
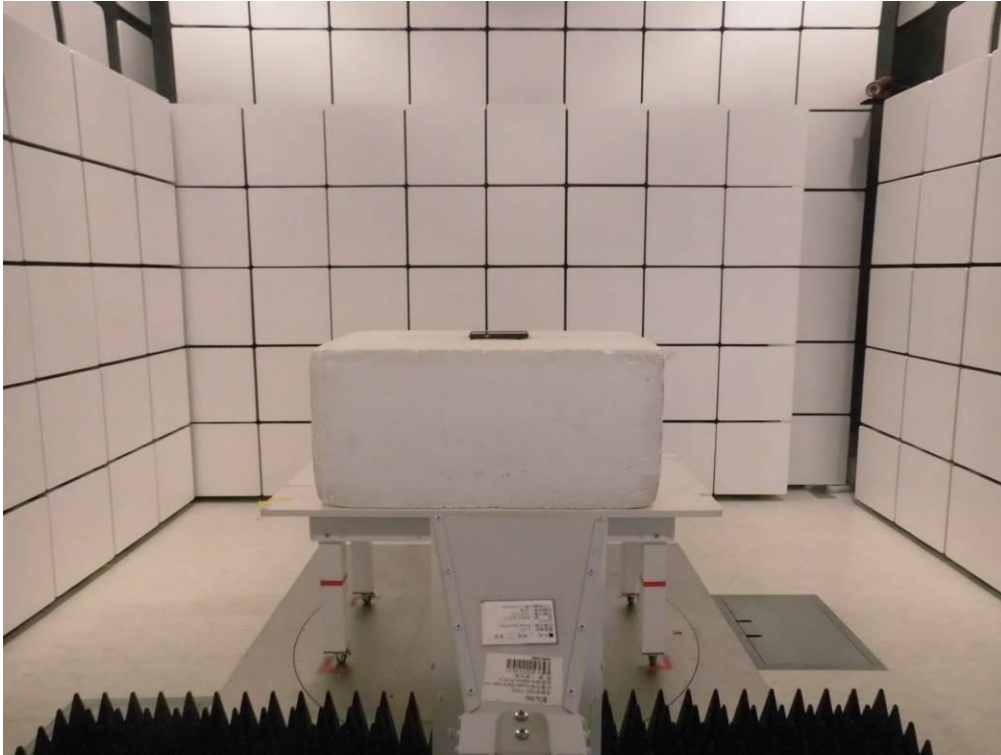
**Transmitter Radiated Emissions Test Photos**  
**30 MHz to 1000 MHz**  
**With Desk Docking**



**Transmitter Radiated Emissions Test Photos**  
**30 MHz to 1000 MHz**  
**With VESA Docking**



**Transmitter Radiated Emissions Test Photos**  
**Above 1000 MHz**  
**Without Docking**



## APPENDIX A RF POWER OUTPUT

CONTINUE ON NEXT PAGE

Band		WCDMA Band II					
Antenna Gain (dBi)	-7.51	Conducted Power (dBm)			EIRP Power (dBm)		
Tx Channel		9262	9400	9538	9262	9400	9538
Rx Channel		9662	9800	9938	9662	9800	9938
Frequency (MHz)		1852.4	1880	1907.6	1852.4	1880	1907.6
RMC 12.2K		22.41	22.43	22.44	14.90	14.92	<b>14.93</b>
HSDPA Subtest-1		21.14	21.29	21.35	13.63	13.78	13.84
HSDPA Subtest-2		21.34	21.42	21.43	13.83	13.91	13.92
HSDPA Subtest-3		20.92	20.91	20.94	13.41	13.40	13.43
HSDPA Subtest-4		20.90	20.93	20.91	13.39	13.42	13.40
HSUPA Subtest-1		21.23	21.20	21.28	13.72	13.69	13.77
HSUPA Subtest-2		20.55	20.52	20.60	13.04	13.01	13.09
HSUPA Subtest-3		20.51	20.48	20.56	13.00	12.97	13.05
HSUPA Subtest-4		20.98	20.95	21.03	13.47	13.44	13.52
HSUPA Subtest-5		21.57	21.54	21.62	14.06	14.03	14.11

Remark: EIRP power = Conducted Power + Antenna gain.



Band				LTE Band 2					
Antenna Gain (dBi)	-7.51			Conducted Power (dBm)			EIRP Power (dBm)		
Channel Bandwidth (MHz)	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH	Low CH	Mid CH	High CH
				18607	18900	19193	18607	18900	19193
				1850.7 MHz	1880 MHz	1909.3 MHz	1850.7 MHz	1880 MHz	1909.3 MHz
1.4	QPSK	1	0	22.52	22.50	22.46	15.01	14.99	14.95
		1	2	22.50	22.48	22.44	14.99	14.97	14.93
		1	5	22.53	22.51	22.47	<b>15.02</b>	15.00	14.96
		3	0	22.41	22.39	22.35	14.90	14.88	14.84
		3	1	22.34	22.32	22.28	14.83	14.81	14.77
		3	3	22.27	22.25	22.21	14.76	14.74	14.70
	16QAM	1	0	21.72	21.70	21.66	<b>14.21</b>	14.19	14.15
		1	2	21.69	21.67	21.63	14.18	14.16	14.12
		1	5	21.70	21.68	21.64	14.19	14.17	14.13
		3	0	21.42	21.40	21.36	13.91	13.89	13.85
		3	1	21.38	21.36	21.32	13.87	13.85	13.81
		3	3	21.39	21.37	21.33	13.88	13.86	13.82
		6	0	20.31	20.29	20.25	12.80	12.78	12.74

Band				LTE Band 2					
Antenna Gain (dBi)	-7.51			Conducted Power (dBm)			EIRP Power (dBm)		
Channel Bandwidth (MHz)	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH	Low CH	Mid CH	High CH
				18615	18900	19185	18615	18900	19185
				1851.5 MHz	1880 MHz	1908.5 MHz	1851.5 MHz	1880 MHz	1908.5 MHz
3	QPSK	1	0	22.46	22.34	22.28	<b>14.95</b>	14.83	14.77
		1	7	22.44	22.32	22.26	14.93	14.81	14.75
		1	14	22.02	21.90	21.84	14.51	14.39	14.33
		8	0	21.39	21.27	21.21	13.88	13.76	13.70
		8	3	21.37	21.25	21.19	13.86	13.74	13.68
		8	7	21.31	21.19	21.13	13.80	13.68	13.62
		15	0	21.32	21.20	21.14	13.81	13.69	13.63
	16QAM	1	0	21.73	21.61	21.55	<b>14.22</b>	14.10	14.04
		1	7	21.71	21.59	21.53	14.20	14.08	14.02
		1	14	21.24	21.12	21.06	13.73	13.61	13.55
		8	0	20.39	20.27	20.21	12.88	12.76	12.70
		8	3	20.35	20.23	20.17	12.84	12.72	12.66
		8	7	20.33	20.21	20.15	12.82	12.70	12.64
		15	0	20.29	20.17	20.11	12.78	12.66	12.60

Remark: EIRP power = Conducted Power + Antenna gain.

Band				LTE Band 2					
Antenna Gain (dBi)	-7.51			Conducted Power (dBm)			EIRP Power (dBm)		
Channel Bandwidth (MHz)	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH	Low CH	Mid CH	High CH
				18625	18900	19175	18625	18900	19175
				1852.5 MHz	1880 MHz	1907.5 MHz	1852.5 MHz	1880 MHz	1907.5 MHz
5	QPSK	1	0	22.50	22.45	22.56	14.99	14.94	<b>15.05</b>
		1	12	22.48	22.43	22.54	14.97	14.92	15.03
		1	24	22.06	22.01	22.12	14.55	14.50	14.61
		12	0	21.43	21.38	21.49	13.92	13.87	13.98
		12	6	21.41	21.36	21.47	13.90	13.85	13.96
		12	13	21.35	21.30	21.41	13.84	13.79	13.90
	16QAM	25	0	21.36	21.31	21.42	13.85	13.80	13.91
		1	0	21.77	21.72	21.83	14.26	14.21	<b>14.32</b>
		1	12	21.75	21.70	21.81	14.24	14.19	14.30
		1	24	21.28	21.23	21.34	13.77	13.72	13.83
		12	0	20.43	20.38	20.49	12.92	12.87	12.98
		12	6	20.39	20.34	20.45	12.88	12.83	12.94
		12	13	20.37	20.32	20.43	12.86	12.81	12.92
		25	0	20.33	20.28	20.39	12.82	12.77	12.88

Band				LTE Band 2					
Antenna Gain (dBi)	-7.51			Conducted Power (dBm)			EIRP Power (dBm)		
Channel Bandwidth (MHz)	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH	Low CH	Mid CH	High CH
				18650	18900	19150	18650	18900	19150
				1855 MHz	1880 MHz	1905 MHz	1855 MHz	1880 MHz	1905 MHz
10	QPSK	1	0	22.58	22.46	22.60	15.07	14.95	<b>15.09</b>
		1	24	22.56	22.44	22.58	15.05	14.93	15.07
		1	49	22.14	22.02	22.16	14.63	14.51	14.65
		25	0	21.51	21.39	21.53	14.00	13.88	14.02
		25	12	21.49	21.37	21.51	13.98	13.86	14.00
		25	25	21.43	21.31	21.45	13.92	13.80	13.94
		50	0	21.44	21.32	21.46	13.93	13.81	13.95
	16QAM	1	0	21.85	21.73	21.87	14.34	14.22	<b>14.36</b>
		1	24	21.83	21.71	21.85	14.32	14.20	14.34
		1	49	21.36	21.24	21.38	13.85	13.73	13.87
		25	0	20.51	20.39	20.53	13.00	12.88	13.02
		25	12	20.47	20.35	20.49	12.96	12.84	12.98
		25	25	20.45	20.33	20.47	12.94	12.82	12.96
		50	0	20.41	20.29	20.43	12.90	12.78	12.92

Remark: EIRP power = Conducted Power + Antenna gain.



Band				LTE Band 2					
Antenna Gain (dBi)	-7.51			Conducted Power (dBm)			EIRP Power (dBm)		
Channel Bandwidth (MHz)	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH	Low CH	Mid CH	High CH
				18675	18900	19125	18675	18900	19125
				1857.5 MHz	1880 MHz	1902.5 MHz	1857.5 MHz	1880 MHz	1902.5 MHz
15	QPSK	1	0	22.43	22.61	22.45	14.92	<b>15.10</b>	14.94
		1	37	22.41	22.59	22.43	14.90	15.08	14.92
		1	74	21.99	22.17	22.01	14.48	14.66	14.50
		36	0	21.36	21.54	21.38	13.85	14.03	13.87
		36	19	21.34	21.52	21.36	13.83	14.01	13.85
		36	39	21.28	21.46	21.30	13.77	13.95	13.79
	16QAM	75	0	21.29	21.47	21.31	13.78	13.96	13.80
		1	0	21.70	21.88	21.72	14.19	<b>14.37</b>	14.21
		1	37	21.68	21.86	21.70	14.17	14.35	14.19
		1	74	21.21	21.39	21.23	13.70	13.88	13.72
		36	0	20.36	20.54	20.38	12.85	13.03	12.87
		36	19	20.32	20.50	20.34	12.81	12.99	12.83
		36	39	20.30	20.48	20.32	12.79	12.97	12.81
		75	0	20.26	20.44	20.28	12.75	12.93	12.77

Band				LTE Band 2					
Antenna Gain (dBi)	-7.51			Conducted Power (dBm)			EIRP Power (dBm)		
Channel Bandwidth (MHz)	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH	Low CH	Mid CH	High CH
				18700	18900	19100	18700	18900	19100
				1860 MHz	1880 MHz	1900 MHz	1860 MHz	1880 MHz	1900 MHz
20	QPSK	1	0	22.45	22.63	22.50	14.94	<b>15.12</b>	14.99
		1	50	22.43	22.61	22.48	14.92	15.10	14.97
		1	99	22.01	22.19	22.06	14.50	14.68	14.55
		50	0	21.38	21.56	21.43	13.87	14.05	13.92
		50	25	21.36	21.54	21.41	13.85	14.03	13.90
		50	50	21.30	21.48	21.35	13.79	13.97	13.84
		100	0	21.31	21.49	21.36	13.80	13.98	13.85
	16QAM	1	0	21.72	21.90	21.77	14.21	<b>14.39</b>	14.26
		1	50	21.70	21.88	21.75	14.19	14.37	14.24
		1	99	21.23	21.41	21.28	13.72	13.90	13.77
		50	0	20.38	20.56	20.43	12.87	13.05	12.92
		50	25	20.34	20.52	20.39	12.83	13.01	12.88
		50	50	20.32	20.50	20.37	12.81	12.99	12.86
		100	0	20.28	20.46	20.33	12.77	12.95	12.82

Remark: EIRP power = Conducted Power + Antenna gain.

Band				LTE Band 25					
Antenna Gain (dBi)	-7.51			Conducted Power (dBm)			EIRP Power (dBm)		
Channel Bandwidth (MHz)	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH	Low CH	Mid CH	High CH
				26047	26365	26683	26047	26365	26683
				1850.7 MHz	1882.5 MHz	1914.3 MHz	1850.7 MHz	1882.5 MHz	1914.3 MHz
1.4	QPSK	1	0	22.21	22.17	22.15	14.70	14.66	14.64
		1	2	22.28	22.11	22.19	<b>14.77</b>	14.60	14.68
		1	5	21.92	21.81	21.79	14.41	14.30	14.28
		3	0	21.32	21.18	21.19	13.81	13.67	13.68
		3	1	21.29	21.21	21.19	13.78	13.70	13.68
		3	3	21.12	21.11	21.06	13.61	13.60	13.55
	16QAM	1	0	21.54	21.53	21.40	14.03	14.02	13.89
		1	2	21.68	21.56	21.66	<b>14.17</b>	14.05	14.15
		1	5	21.23	21.14	21.11	13.72	13.63	13.60
		3	0	20.29	20.20	20.18	12.78	12.69	12.67
		3	1	20.27	20.28	20.22	12.76	12.77	12.71
		3	3	20.07	20.11	20.09	12.56	12.60	12.58
		6	0	20.16	20.14	20.08	12.65	12.63	12.57

Band				LTE Band 25					
Antenna Gain (dBi)	-7.51			Conducted Power (dBm)			EIRP Power (dBm)		
Channel Bandwidth (MHz)	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH	Low CH	Mid CH	High CH
				26055	26365	26675	26055	26365	26675
				1851.5 MHz	1882.5 MHz	1913.5 MHz	1851.5 MHz	1882.5 MHz	1913.5 MHz
3	QPSK	1	0	22.33	22.29	22.27	14.82	14.78	14.76
		1	7	22.40	22.23	22.31	<b>14.89</b>	14.72	14.80
		1	14	22.04	21.93	21.91	14.53	14.42	14.40
		8	0	21.44	21.30	21.31	13.93	13.79	13.80
		8	3	21.41	21.33	21.31	13.90	13.82	13.80
		8	7	21.24	21.23	21.18	13.73	13.72	13.67
		15	0	21.25	21.25	21.27	13.74	13.74	13.76
	16QAM	1	0	21.66	21.65	21.52	14.15	14.14	14.01
		1	7	21.80	21.68	21.78	<b>14.29</b>	14.17	14.27
		1	14	21.35	21.26	21.23	13.84	13.75	13.72
		8	0	20.41	20.32	20.30	12.90	12.81	12.79
		8	3	20.39	20.40	20.34	12.88	12.89	12.83
		8	7	20.19	20.23	20.21	12.68	12.72	12.70
		15	0	20.28	20.26	20.20	12.77	12.75	12.69

Remark: EIRP power = Conducted Power + Antenna gain.

Band				LTE Band 25					
Antenna Gain (dBi)	-7.51			Conducted Power (dBm)			EIRP Power (dBm)		
Channel Bandwidth (MHz)	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH	Low CH	Mid CH	High CH
				26065	26365	26665	26065	26365	26665
				1852.5 MHz	1882.5 MHz	1912.5 MHz	1852.5 MHz	1882.5 MHz	1912.5 MHz
5	QPSK	1	0	22.46	22.42	22.40	14.95	14.91	14.89
		1	12	22.53	22.36	22.44	<b>15.02</b>	14.85	14.93
		1	24	22.17	22.06	22.04	14.66	14.55	14.53
		12	0	21.57	21.43	21.44	14.06	13.92	13.93
		12	6	21.54	21.46	21.44	14.03	13.95	13.93
		12	13	21.37	21.36	21.31	13.86	13.85	13.80
	16QAM	25	0	21.38	21.38	21.40	13.87	13.87	13.89
		1	0	21.79	21.78	21.65	14.28	14.27	14.14
		1	12	21.93	21.81	21.91	<b>14.42</b>	14.30	14.40
		1	24	21.48	21.39	21.36	13.97	13.88	13.85
		12	0	20.54	20.45	20.43	13.03	12.94	12.92
		12	6	20.52	20.53	20.47	13.01	13.02	12.96
		12	13	20.32	20.36	20.34	12.81	12.85	12.83
		25	0	20.41	20.39	20.33	12.90	12.88	12.82

Band				LTE Band 25					
Antenna Gain (dBi)	-7.51			Conducted Power (dBm)			EIRP Power (dBm)		
Channel Bandwidth (MHz)	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH	Low CH	Mid CH	High CH
				26090	26365	26640	26090	26365	26640
				1855 MHz	1882.5 MHz	1910 MHz	1855 MHz	1882.5 MHz	1910 MHz
10	QPSK	1	0	22.59	22.55	22.53	15.08	15.04	15.02
		1	24	22.66	22.49	22.57	<b>15.15</b>	14.98	15.06
		1	49	22.30	22.19	22.17	14.79	14.68	14.66
		25	0	21.70	21.56	21.57	14.19	14.05	14.06
		25	12	21.67	21.59	21.57	14.16	14.08	14.06
		25	25	21.50	21.49	21.44	13.99	13.98	13.93
		50	0	21.51	21.51	21.53	14.00	14.00	14.02
	16QAM	1	0	21.92	21.91	21.78	14.41	14.40	14.27
		1	24	22.06	21.94	22.04	<b>14.55</b>	14.43	14.53
		1	49	21.61	21.52	21.49	14.10	14.01	13.98
		25	0	20.67	20.58	20.56	13.16	13.07	13.05
		25	12	20.65	20.66	20.60	13.14	13.15	13.09
		25	25	20.45	20.49	20.47	12.94	12.98	12.96
		50	0	20.54	20.52	20.46	13.03	13.01	12.95

Remark: EIRP power = Conducted Power + Antenna gain.

Band				LTE Band 25					
Antenna Gain (dBi)	-7.51			Conducted Power (dBm)			EIRP Power (dBm)		
Channel Bandwidth (MHz)	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH	Low CH	Mid CH	High CH
				26115	26365	26615	26115	26365	26615
				1857.5 MHz	1882.5 MHz	1907.5 MHz	1857.5 MHz	1882.5 MHz	1907.5 MHz
15	QPSK	1	0	22.67	22.63	22.61	15.16	15.12	15.10
		1	37	22.74	22.57	22.65	<b>15.23</b>	15.06	15.14
		1	74	22.38	22.27	22.25	14.87	14.76	14.74
		36	0	21.78	21.64	21.65	14.27	14.13	14.14
		36	19	21.75	21.67	21.65	14.24	14.16	14.14
		36	39	21.58	21.57	21.52	14.07	14.06	14.01
		75	0	21.59	21.59	21.61	14.08	14.08	14.10
	16QAM	1	0	22.00	21.99	21.86	14.49	14.48	14.35
		1	37	22.14	22.02	22.12	<b>14.63</b>	14.51	14.61
		1	74	21.69	21.60	21.57	14.18	14.09	14.06
		36	0	20.75	20.66	20.64	13.24	13.15	13.13
		36	19	20.73	20.74	20.68	13.22	13.23	13.17
		36	39	20.53	20.57	20.55	13.02	13.06	13.04
		75	0	20.62	20.60	20.54	13.11	13.09	13.03

Band				LTE Band 25					
Antenna Gain (dBi)	-7.51			Conducted Power (dBm)			EIRP Power (dBm)		
Channel Bandwidth (MHz)	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH	Low CH	Mid CH	High CH
				26140	26365	26590	26140	26365	26590
				1860 MHz	1882.5 MHz	1905 MHz	1860 MHz	1882.5 MHz	1905 MHz
20	QPSK	1	0	22.85	22.81	22.79	15.34	15.30	15.28
		1	50	22.92	22.75	22.83	<b>15.41</b>	15.24	15.32
		1	99	22.56	22.45	22.43	15.05	14.94	14.92
		50	0	21.96	21.82	21.83	14.45	14.31	14.32
		50	25	21.93	21.85	21.83	14.42	14.34	14.32
		50	50	21.76	21.75	21.70	14.25	14.24	14.19
		100	0	21.77	21.77	21.79	14.26	14.26	14.28
	16QAM	1	0	22.18	22.17	22.04	14.67	14.66	14.53
		1	50	22.32	22.20	22.30	<b>14.81</b>	14.69	14.79
		1	99	21.87	21.78	21.75	14.36	14.27	14.24
		50	0	20.93	20.84	20.82	13.42	13.33	13.31
		50	25	20.91	20.92	20.86	13.40	13.41	13.35
		50	50	20.71	20.75	20.73	13.20	13.24	13.22
		100	0	20.80	20.78	20.72	13.29	13.27	13.21

Remark: EIRP power = Conducted Power + Antenna gain.

## APPENDIX B PEAK-TO-AVERAGE RATIO (PAR)

CONTINUE ON NEXT PAGE

