



FCC RADIO TEST REPORT

FCC ID: 2ACJ8E110

Product : MorphoBT - Morpho Biometric Terminal

Trade Name : Morpho

Model Number : E110

Serial Model : N/A

Report No. : BZT140608F04

Prepared for

Morpho

11 boulevard Gallieni 92130 ISSY LES MOULINEAUX FRANCE

Prepared by

BZT Testing Technology Co., Ltd.

TEST RESULT CERTIFICATION

Applicant's name : Morpho
Address : 11 boulevard Gallieni 92130 ISSY LES MOULINEAUX
FRANCE
Manufacture's Name : WIATEC INTERNATIONAL LTD.
Address : Unit 601-605, TaoJinDi Electronic Commercial Plaza B,
TengLong Road,LongHua, Shenzhen, China 518131

Product description

Product name..... : MorphoBT - Morpho Biometric Terminal
Model and/or type reference : E110
Serial Model..... : N/A

Standards..... : FCC Part15.247

Test procedure ANSI C63.4-2009

This device described above has been tested by BZT, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

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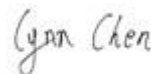
Date of Test..... :

Date (s) of performance of tests..... : May 11, 2014 ~May 29, 2014

Date of Issue : June 05, 2014

Test Result : **Pass**

Testing Engineer :



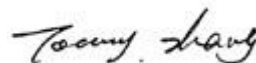
(Lynn Chen)

Technical Manager :



(Carlen Liu)

Authorized Signatory :



(Tommy zhang)

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1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15 (15.247) , Subpart C			
Standard Section	Test Item	Judgment	Remark
15.207	Conducted Emission	PASS	
15.247 (a)(2)	6dB Bandwidth	PASS	
15.247 (b)	Peak Output Power	PASS	
15.247 (c)	Radiated Spurious Emission	PASS	
15.247 (d)	Power Spectral Density	PASS	
15.205	Band Edge Emission	PASS	
15.203	Antenna Requirement	PASS	

NOTE:

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

1.1 TEST FACILITY

BZT Testing Technology Co., Ltd

Add.:1/F, Building E, Fenda Science Park, Sanwei Community, Xixiang Street, Bao'an District, Shenzhen P.R. China.

FCC Registration No.: 701733

1.2 MEASUREMENT UNCERTAINTY

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 %** .

No.	Item	Uncertainty
1	Conducted Emission Test	$\pm 1.38\text{dB}$
2	RF power,conducted	$\pm 0.16\text{dB}$
3	Spurious emissions,conducted	$\pm 0.21\text{dB}$
4	All emissions,radiated(<1G)	$\pm 4.68\text{dB}$
5	All emissions,radiated(>1G)	$\pm 4.89\text{dB}$
6	Temperature	$\pm 0.5^{\circ}\text{C}$
7	Humidity	$\pm 2\%$

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	MorphoBT - Morpho Biometric Terminal	
Trade Name	Morpho	
Model Name	E110	
Serial Model	N/A	
Model Difference	N/A	
Product Description	The EUT is a MorphoBT - Morpho Biometric Terminal	
	Operation Frequency:	2402~2480 MHz
	Modulation Type:	GFSK
	Radio Technology	Bluetooth 4.0
	Number Of Channel	40
	Antenna Designation:	Please see Note 3.
	Antenna Gain (dBi)	0 dBi
	Based on the application, features, or specification exhibited in User's Manual, the EUT is considered as an ITE/Computing Device. More details of EUT technical specification, please refer to the User's Manual.	
Channel List	Please refer to the Note 2.	
Ratings	DC 5V	
Adapter	Power supply and ADP (rating) : Model No.: GFP121-0520BX-1 Input:100-240V AC,50/60Hz Output:5.0V,2.0A	
Battery	3.7V 5400mAh	
Connecting I/O Port(s)	Please refer to the User's Manual	

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

2.

Channel List							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	2402	11	2422	21	2442	31	2462
02	2404	12	2424	22	2444	32	2464
03	2406	13	2426	23	2446	33	2466
04	2408	14	2428	24	2448	34	2468
05	2410	15	2430	25	2450	35	2470
06	2412	16	2432	26	2452	36	2472
07	2414	17	2434	27	2454	37	2474
08	2416	18	2436	28	2456	38	2476
09	2418	19	2438	29	2458	39	2478
10	2420	20	2440	30	2460	40	2480

3.

Table for Filed Antenna

Ant	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	NOTE
A	N/A	N/A	Chip Antenna	N/A	0.8	N/A

2.2 DESCRIPTION OF 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.

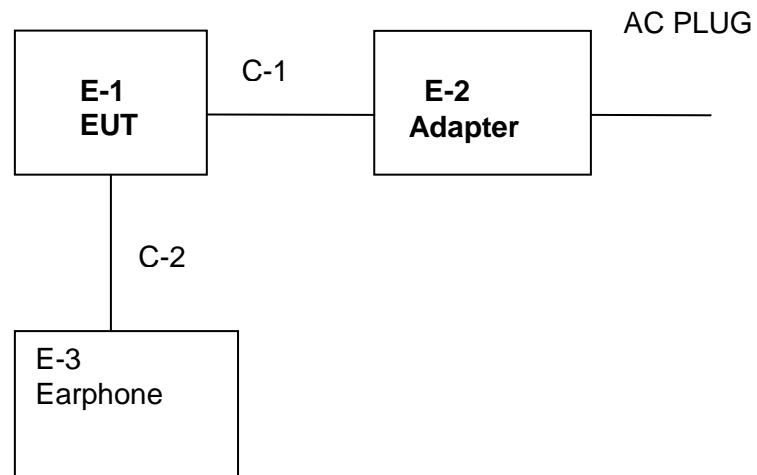
Pretest Mode	Description
Mode 1	TX CH1/CH20/CH40
Mode 2	Link Mode

For Conducted Emission	
Final Test Mode	Description
Mode 2	Link Mode

For Radiated Emission	
Final Test Mode	Description
Mode 1	TX CH1/CH20/CH40
Mode 2	Link Mode

Note:

- (1) The measurements are performed at the highest, middle, lowest available channels.
- (2) The measurements are performed at all Bit Rate of Transmitter, the worst data was reported

2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

2.4 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE)

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.	Note
E-1	MorphoBT - Morpho Biometric Terminal	N/A	E110	N/A	EUT
E-2	Adapter	N/A	GFP121-0520BX-1	N/A	
E-3	Earphone	N/A	N/A	N/A	

Item	Shielded Type	Ferrite Core	Length	Note
C-1	NO	YES	1.5m	
C-2	NO	NO	1.2m	

Note:

- (1) The support equipment was authorized by Declaration of Confirmation.
- (2) For detachable type I/O cable should be specified the length in cm in 『Length』 column.

2.5 EQUIPMENTS LIST FOR ALL TEST ITEMS

Radiation Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	Agilent	E4407B	160400005	Jul. 06. 2014
2	Test Receiver	R&S	ESPI	101318	Jul. 06. 2014
3	Bilog Antenna	TESEQ	CBL6111D	31216	Nov.23. 2014
4	50Ω Coaxial Switch	Anritsu	MP59B	6200264416	Jul. 06. 2014
5	Spectrum Analyzer	ADVANTEST	R3132	150900201	Jul. 06. 2014
6	Horn Antenna	EM	EM-AH-10180	2011071402	Nov.23. 2014
7	Horn Ant	Schwarzbeck	BBHA 9170	9170-181	Jul. 06. 2014
8	Amplifier	EM	EM-30180	060538	Jul. 06. 2014
9	Loop Antenna	ARA	PLA-1030/B	1029	Jul. 06. 2014
10	Power Meter	R&S	NRVS	100696	Jul. 06. 2014
11	Power Sensor (Peak)	R&S	NRV-Z31	0396.0101.19	Jul. 06. 2014

Conduction Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Test Receiver	R&S	ESCI	101160	Jul. 06. 2014
2	LISN	R&S	ENV216	101313	Jul. 06. 2014
3	LISN	EMCO	3816/2	00042990	Jul. 06. 2014
4	50Ω Coaxial Switch	Anritsu	MP59B	6200264417	Jul. 06. 2014
5	Passive Voltage Probe	R&S	ESH2-Z3	100196	Jul. 06. 2014
6	Absorbing clamp	R&S	MOS-21	100423	Jul. 06. 2014

3. EMC EMISSION TEST

3.1 CONDUCTED EMISSION MEASUREMENT

3.1.1 POWER LINE CONDUCTED EMISSION Limits (Frequency Range 150KHz-30MHz)

FREQUENCY (MHz)	Class A (dBuV)		Class B (dBuV)		Standard
	Quasi-peak	Average	Quasi-peak	Average	
0.15 -0.5	79.00	66.00	66 - 56 *	56 - 46 *	CISPR
0.50 -5.0	73.00	60.00	56.00	46.00	CISPR
5.0 -30.0	73.00	60.00	60.00	50.00	CISPR

0.15 -0.5	79.00	66.00	66 - 56 *	56 - 46 *	FCC
0.50 -5.0	73.00	60.00	56.00	46.00	FCC
5.0 -30.0	73.00	60.00	60.00	50.00	FCC

Note:

- (1) The tighter limit applies at the band edges.
- (2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

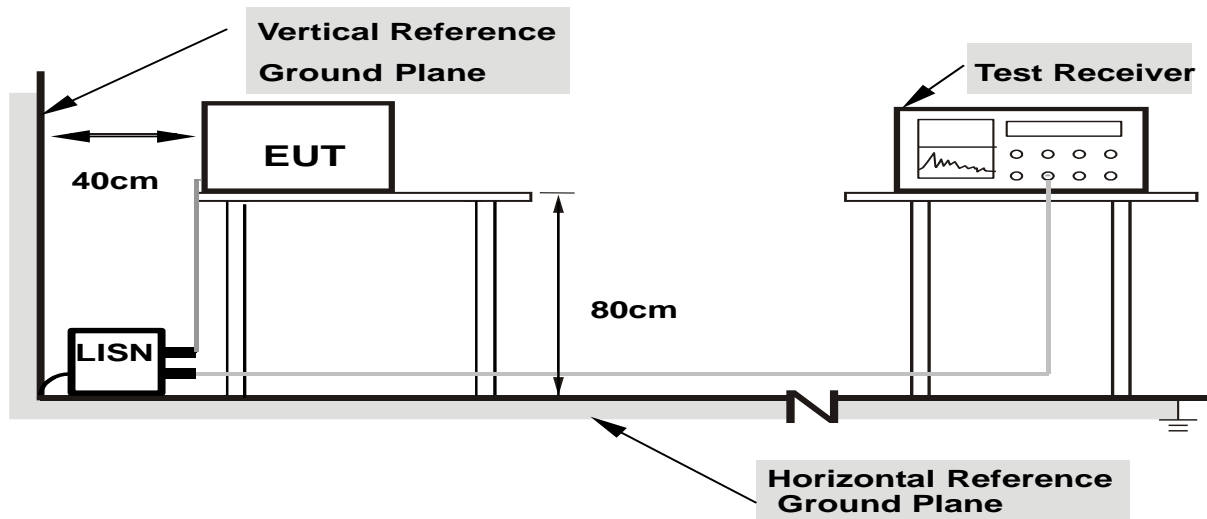
3.1.2 TEST PROCEDURE

- The EUT was placed 0.4 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- LISN at least 80 cm from nearest part of EUT chassis.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.1.3 DEVIATION FROM TEST STANDARD

No deviation

3.1.4 TEST SETUP



Note: 1.Support units were connected to second LISN.

2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

3.1.5 EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

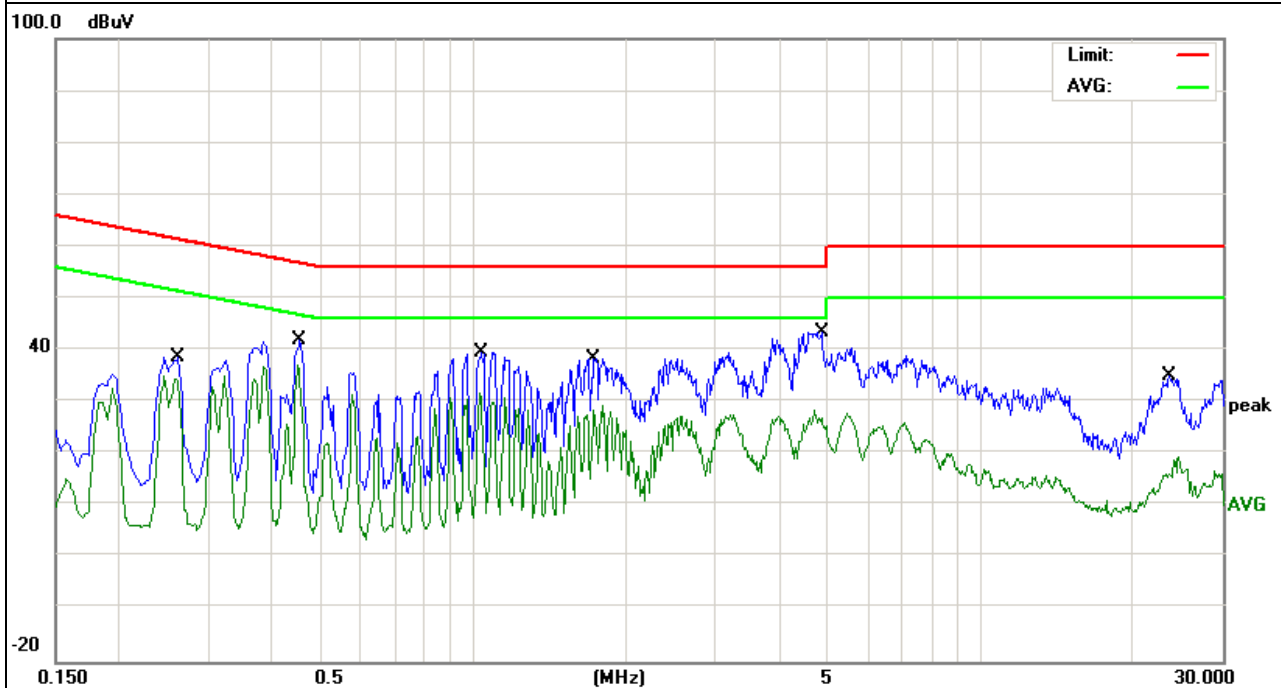
3.1.6 TEST RESULTS

EUT :	MorphoBT - Morpho Biometric Terminal	Model Name. :	E110
Temperature :	26 °C	Relative Humidity :	54%
Pressure :	1010hPa	Phase :	L
Test Voltage :	DC 5V from Adapter with AC 120V/60Hz	Test Mode :	Mode 2

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
0.262	29.2	9.49	38.69	61.36	-22.67	QP
0.262	25.06	9.49	34.55	51.36	-16.81	AVG
0.45	32.48	9.51	41.99	56.87	-14.88	QP
0.45	27.64	9.51	37.15	46.87	-9.72	AVG
1.038	29.99	9.53	39.52	56	-16.48	QP
1.038	22.31	9.53	31.84	46	-14.16	AVG
1.734	28.91	9.54	38.45	56	-17.55	QP
1.734	19.79	9.54	29.33	46	-16.67	AVG
4.8619	33.97	9.61	43.58	56	-12.42	QP
4.8619	18.89	9.61	28.5	46	-17.5	AVG
23.534	24.7	10.22	34.92	60	-25.08	QP
23.534	9.22	10.22	19.44	50	-30.56	AVG

Remark:

1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.

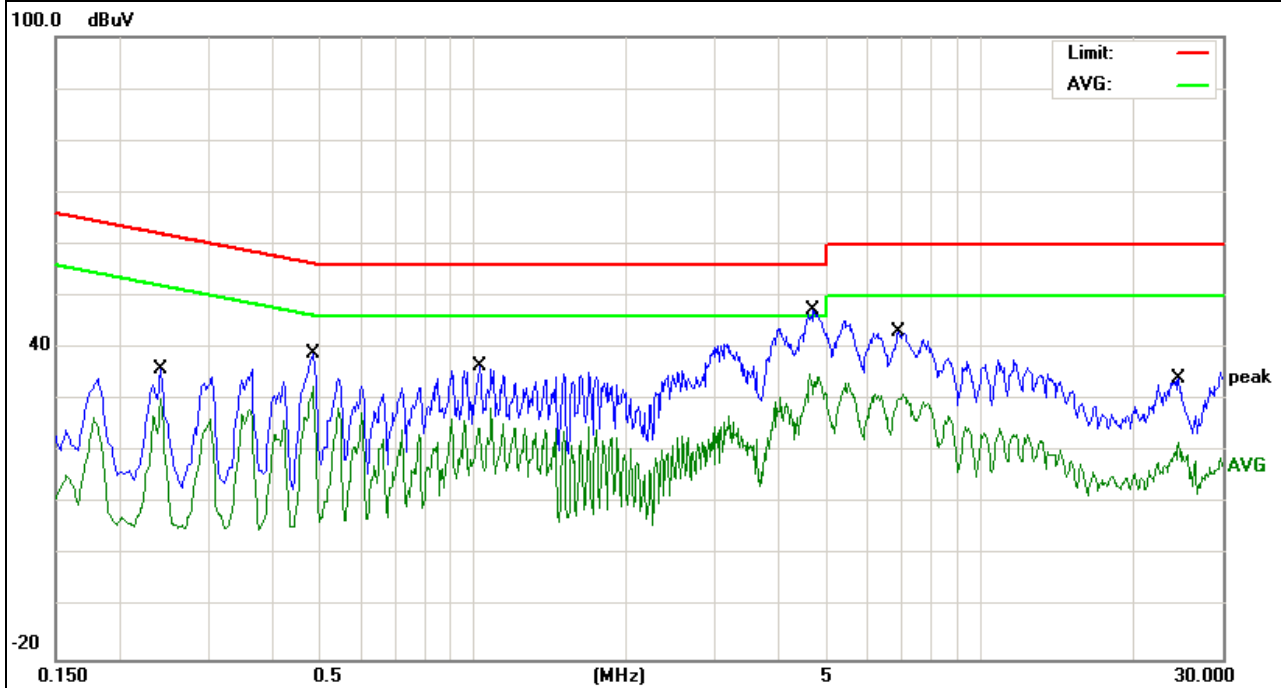


EUT :	MorphoBT - Morpho Biometric Terminal	Model Name. :	E110
Temperature :	26 °C	Relative Humidity :	54%
Pressure :	1010hPa	Phase :	N
Test Voltage :	DC 5V from Adapter with AC 120V/60Hz	Test Mode :	Mode 2

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
0.242	26.36	9.49	35.85	62.02	-26.17	QP
0.242	20.78	9.49	30.27	52.02	-21.75	AVG
0.486	29.31	9.51	38.82	56.24	-17.42	QP
0.486	23.18	9.51	32.69	46.24	-13.55	AVG
1.03	26.94	9.53	36.47	56	-19.53	QP
1.03	16.59	9.53	26.12	46	-19.88	AVG
4.6779	37.61	9.61	47.22	56	-8.78	QP
4.6779	25.42	9.61	35.03	46	-10.97	AVG
6.9099	33.34	9.67	43.01	60	-16.99	QP
6.9099	21.33	9.67	31	50	-19	AVG
24.638	24.05	10.19	34.24	60	-25.76	QP
24.638	11.76	10.19	21.95	50	-28.05	AVG

Remark:

1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.



3.2 RADIATED EMISSION MEASUREMENT

3.2.1 RADIATED EMISSION LIMITS (Frequency Range 9kHz-1000MHz)

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

FREQUENCY (MHz)	Class A (dBuV/m) (at 3M)		Class B (dBuV/m) (at 3M)	
	PEAK	AVERAGE	PEAK	AVERAGE
Above 1000	80	60	74	54

Notes:

- (1) The limit for radiated test was performed according to FCC PART 15C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (emission in restricted band)	1 MHz / 1 MHz for Peak, 1 MHz / 10Hz for Average

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

3.2.2 TEST PROCEDURE

- a. The measuring distance of at 3 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
- b. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The height of the equipment or of the substitution antenna shall be 0.8 m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- e. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
- f. For the actual test configuration, please refer to the related Item –EUT Test Photos.

Note:

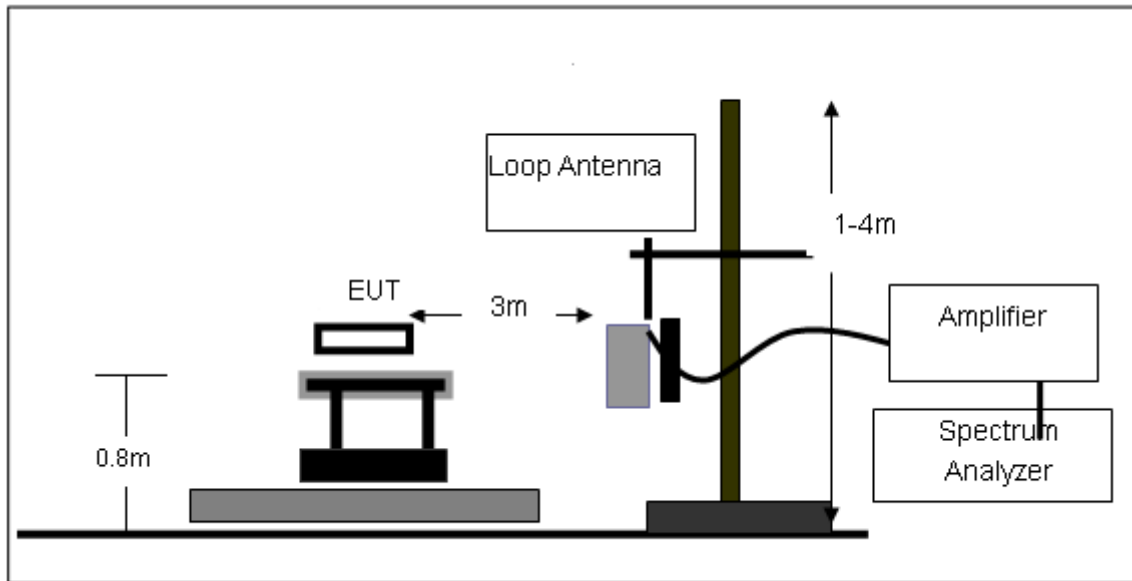
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

3.2.3 DEVIATION FROM TEST STANDARD

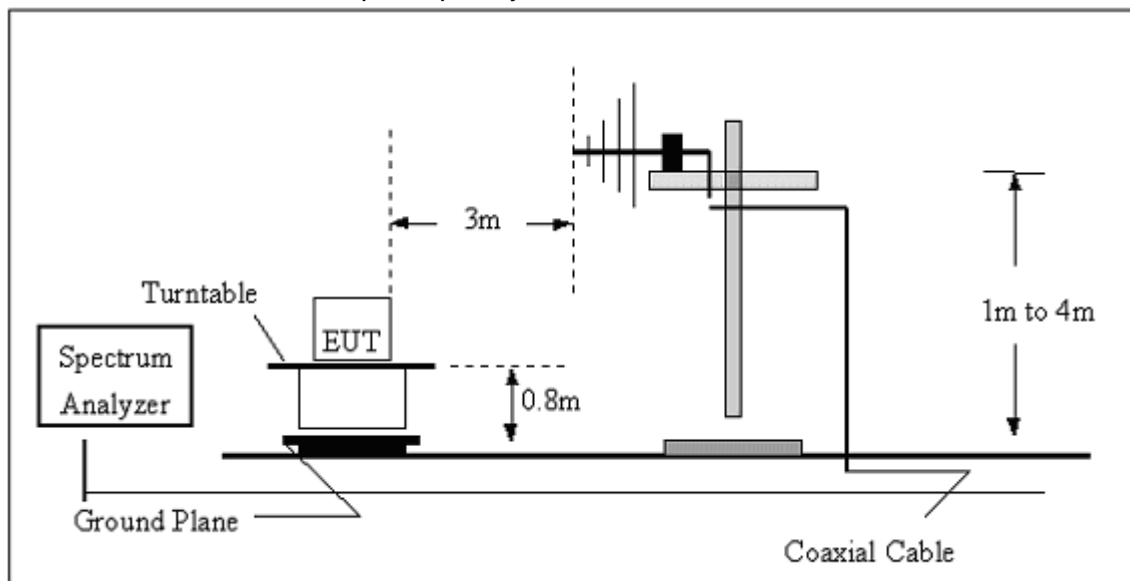
No deviation

3.2.4 TEST SETUP

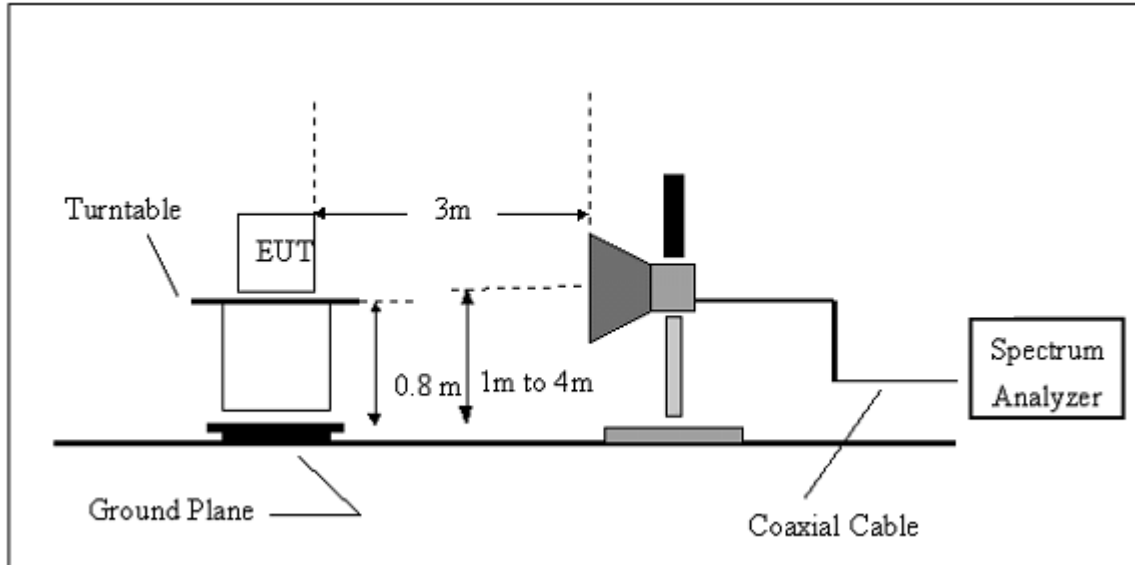
(A) Radiated Emission Test-Up Frequency Below 30MHz



(B) Radiated Emission Test-Up Frequency 30MHz~1GHz



(C) Radiated Emission Test-Up Frequency Above 1GHz



3.2.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

3.2.6 TEST RESULTS (BETWEEN 9KHZ – 30 MHZ)

EUT:	MorphoBT - Morpho Biometric Terminal	Model Name. :	E110
Temperature:	20 °C	Relative Humidity:	48%
Pressure:	1010 hPa	Test Voltage :	DC 5V From Adapter AC 120/60Hz
Test Mode :	Link mode	Polarization :	--

Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
--	--	--	--	PASS
--	--	--	--	PASS

NOTE:

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Distance extrapolation factor = $40 \log (\text{specific distance/test distance})(\text{dB})$;

Limit line = specific limits(dBuv) + distance extrapolation factor.

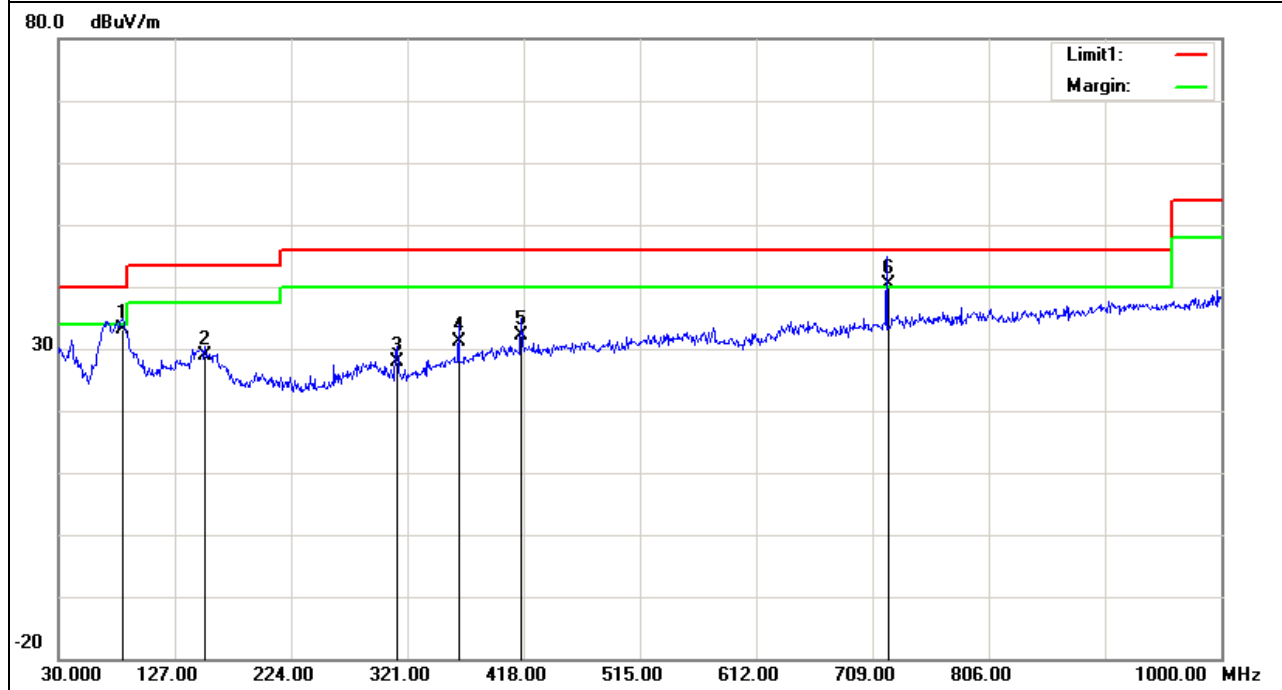
3.2.7 TEST RESULTS (BETWEEN 30MHZ – 1GHZ)

EUT :	MorphoBT - Morpho Biometric Terminal	Model Name :	E110
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 5V From Adapter AC 120/60Hz
Test Mode :	Link mode	Polarization :	Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
83.3500	23.87	9.25	33.12	40.00	-6.88	QP
152.2200	14.39	14.54	28.93	43.50	-14.57	QP
312.2700	13.72	14.20	27.92	46.00	-18.08	QP
363.6800	14.23	17.02	31.25	46.00	-14.75	QP
416.0600	13.72	18.53	32.25	46.00	-13.75	QP
722.7700	18.04	22.28	40.32	46.00	-5.68	QP

Remark:

1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.

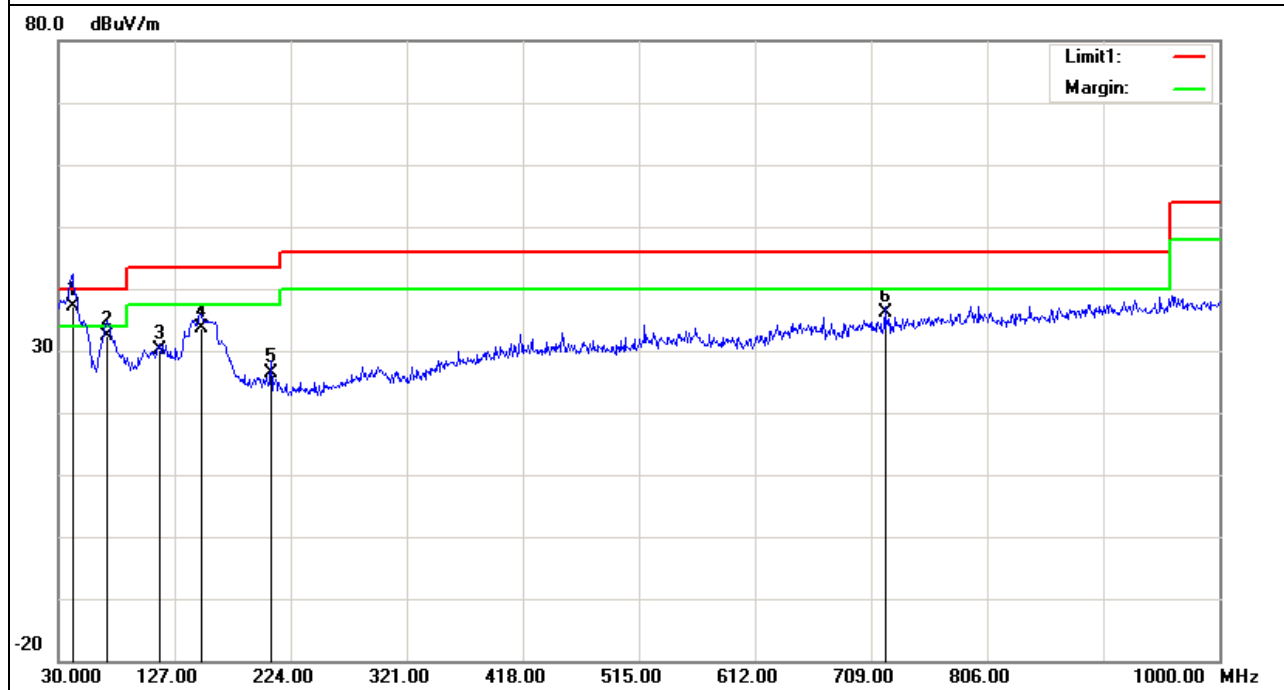


EUT :	MorphoBT - Morpho Biometric Terminal	Model Name :	E110
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 5V From Adapter AC 120/60Hz
Test Mode :	Link mode	Polarization :	Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
41.6400	24.14	13.11	37.25	40.00	-2.75	QP
70.7400	23.24	9.09	32.33	40.00	-7.67	QP
114.3900	17.27	12.98	30.25	43.50	-13.25	QP
149.3100	18.91	14.61	33.52	43.50	-9.98	QP
207.5100	13.84	12.48	26.32	43.50	-17.18	QP
720.6400	14.00	22.25	36.25	46.00	-9.75	QP

Remark:

1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.



3.2.8 TEST RESULTS (ABOVE 1000 MHZ)

EUT :	MorphoBT - Morpho Biometric Terminal	Model Name :	E110
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 5V From Adapter AC 120/60Hz
Test Mode :	CH1:2402MHz	Polarization :	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
4804	43.37	10.44	53.81	74	-20.19	peak
4804	32.18	10.44	42.62	54	-11.38	AVG
7206	41.15	12.39	53.54	74	-20.46	peak
7206	31.58	12.39	43.97	54	-10.03	AVG

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

EUT :	MorphoBT - Morpho Biometric Terminal	Model Name :	E110
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 5V From Adapter AC 120/60Hz
Test Mode :	CH1:2402MHz	Polarization :	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
4804	41.34	10.4	51.74	74	-22.26	peak
4804	29.33	10.4	39.73	54	-14.27	AVG
7206	31.48	12.75	44.23	74	-29.77	peak
7206	25.29	12.75	38.04	54	-15.96	AVG

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

EUT :	MorphoBT - Morpho Biometric Terminal	Model Name :	E110
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 5V From Adapter AC 120/60Hz
Test Mode :	CH20:2440MHz	Polarization :	Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4884	43.25	10.4	53.65	74	-20.35	peak
4884	32.36	10.4	42.76	54	-11.24	AVG
7326	41.92	12.75	54.67	74	-19.33	peak
7326	32.52	12.75	45.27	54	-8.73	AVG

Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.

EUT :	MorphoBT - Morpho Biometric Terminal	Model Name :	E110
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 5V From Adapter AC 120/60Hz
Test Mode :	CH20:2440MHz	Polarization :	Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4884	45.32	10.39	55.71	74	-18.29	peak
4884	32.47	10.44	42.91	54	-11.09	AVG
7326	32.56	12.68	45.24	74	-28.76	peak
7326	32.22	12.68	44.9	54	-9.1	AVG

Remark:
1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.
2. No emission detected above 18GHz

EUT :	MorphoBT - Morpho Biometric Terminal	Model Name :	E110
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 5V From Adapter AC 120/60Hz
Test Mode :	CH40:2480MHz	Polarization :	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
4960	36.93	10.39	47.32	74	-26.68	peak
4960	25.36	10.39	35.75	54	-18.25	AVG
7440	42.42	12.68	55.1	74	-18.9	peak
7440	31.68	12.68	44.36	54	-9.64	AVG

Remark:

1 Factor = Antenna Factor + Cable Loss – Pre-amplifier.

2 No emission detected above 18GHz

EUT :	MorphoBT - Morpho Biometric Terminal	Model Name :	E110
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 5V From Adapter AC 120/60Hz
Test Mode :	CH40:2480MHz	Polarization :	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
4960	45.28	10.39	55.67	74	-18.33	peak
4960	34.42	10.39	44.81	54	-9.19	AVG
7440	44.72	12.68	57.4	74	-16.6	peak
7440	25.22	12.68	37.9	54	-16.1	AVG

Remark:

1 Factor = Antenna Factor + Cable Loss – Pre-amplifier.

2 No emission detected above 18GHz

3.2.9 TEST RESULTS (RESTRICTED BANDS REQUIREMENTS)

EUT :	MorphoBT - Morpho Biometric Terminal	Model Name :	E110
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 5V From Adapter AC 120/60Hz
Test Mode :	GFSK	Polarization :	Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type	Comment
GFSK							
2390	63.25	-12.99	50.26	74	-23.74	peak	Vertical
2390	65.52	-12.99	52.53	74	-21.47	peak	Horizontal
2483.5	63.83	-12.78	51.05	74	-22.95	peak	Vertical
2483.5	56.86	-12.78	44.08	74	-29.92	peak	Horizontal

4. POWER SPECTRAL DENSITY TEST

4.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247	Power Spectral Density	8 dBm (in any 3KHz)	2400-2483.5	PASS

4.1.1 TEST PROCEDURE

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS channel bandwidth.
3. Set the RBW ≥ 3 kHz.
4. Set the VBW $\geq 3 \times$ RBW.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

4.1.2 DEVIATION FROM STANDARD

No deviation.

4.1.3 TEST SETUP



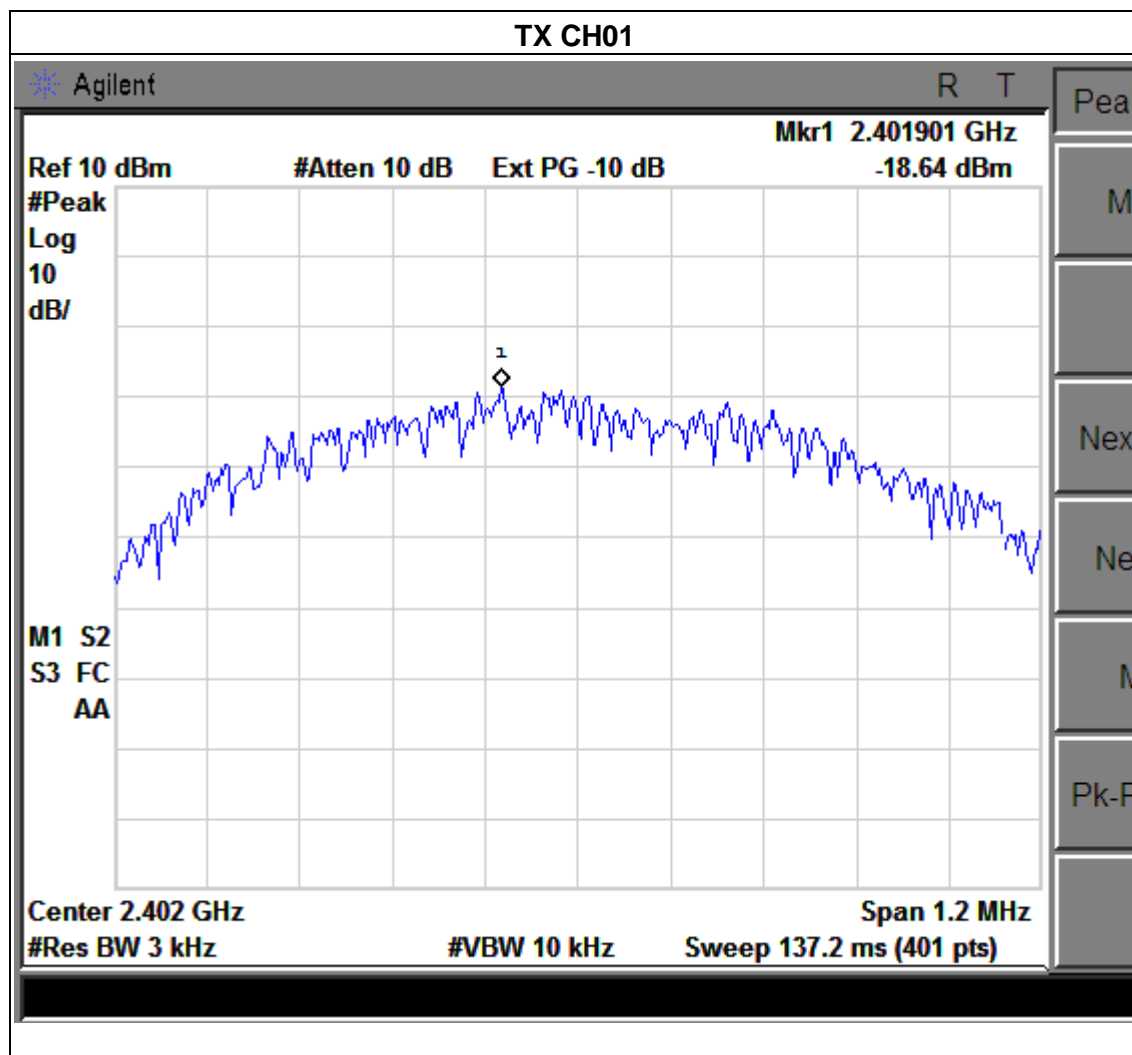
4.1.4 EUT OPERATION CONDITIONS

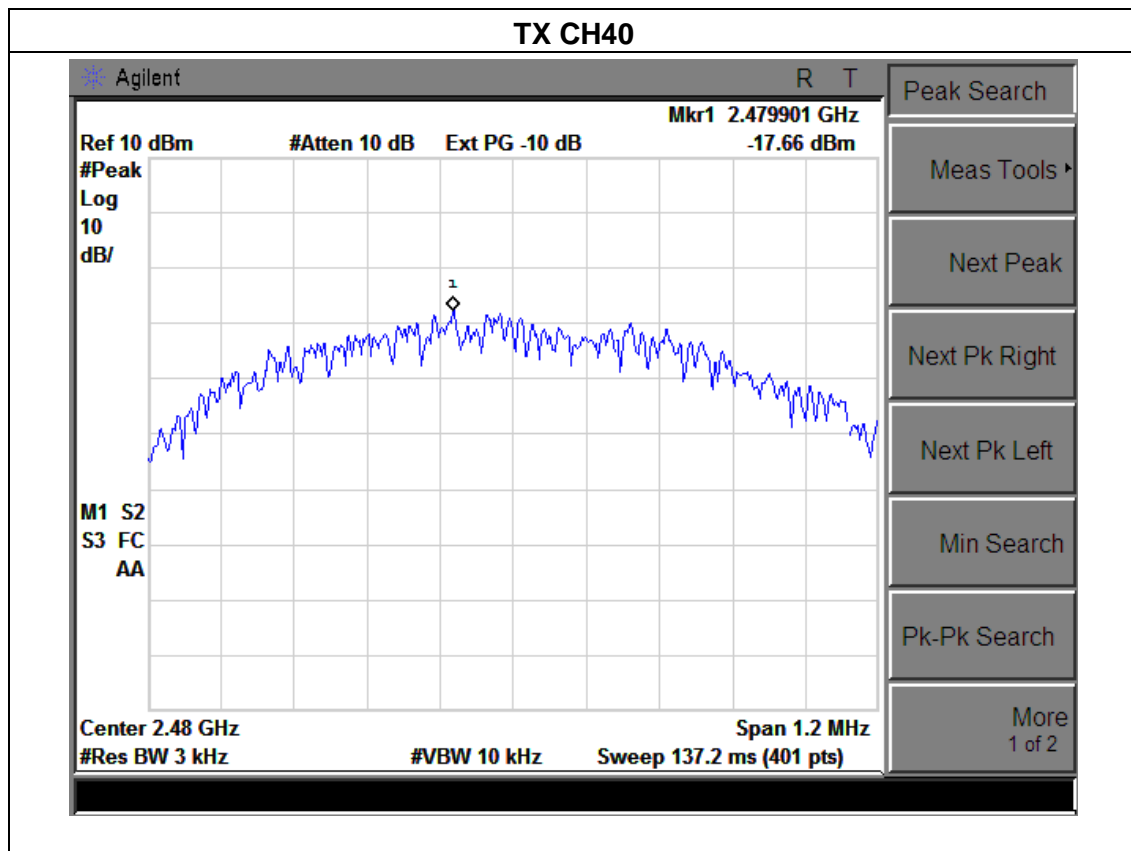
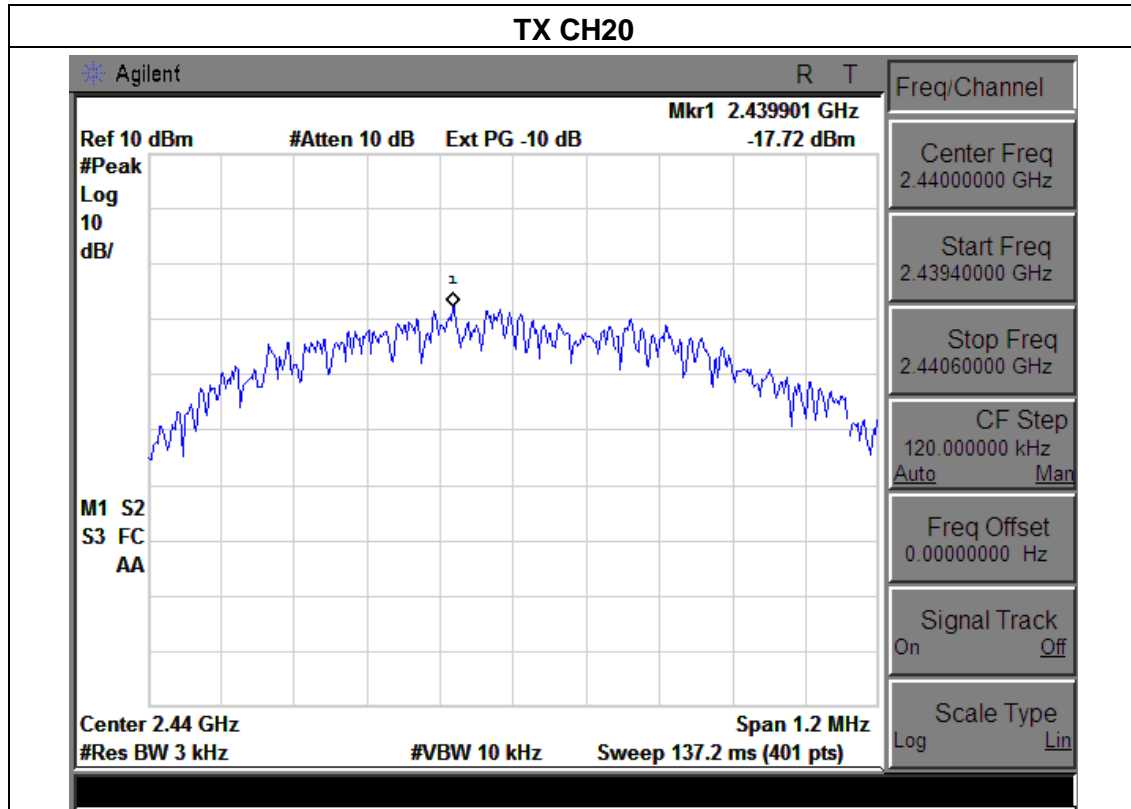
The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

4.1.5 TEST RESULTS

EUT :	MorphoBT - Morpho Biometric Terminal	Model Name :	E110
Temperature :	25 °C	Relative Humidity :	60%
Pressure :	1015 hPa	Test Voltage :	DC 5V From Adapter AC 120/60Hz
Test Mode :	TX Mode /CH01, CH20, CH40		

Frequency	Power Density (dBm)	Limit (dBm)	Result
2402 MHz	-18.64	8	PASS
2440 MHz	-17.72	8	PASS
2480 MHz	-17.66	8	PASS





5. BANDWIDTH TEST

5.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(a)(2)	Bandwidth	$\geq 500\text{KHz}$ (6dB bandwidth)	2400-2483.5	PASS

5.1.1 TEST PROCEDURE

1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW) $\geq 3 \times$ RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

5.1.2 DEVIATION FROM STANDARD

No deviation.

5.1.3 TEST SETUP



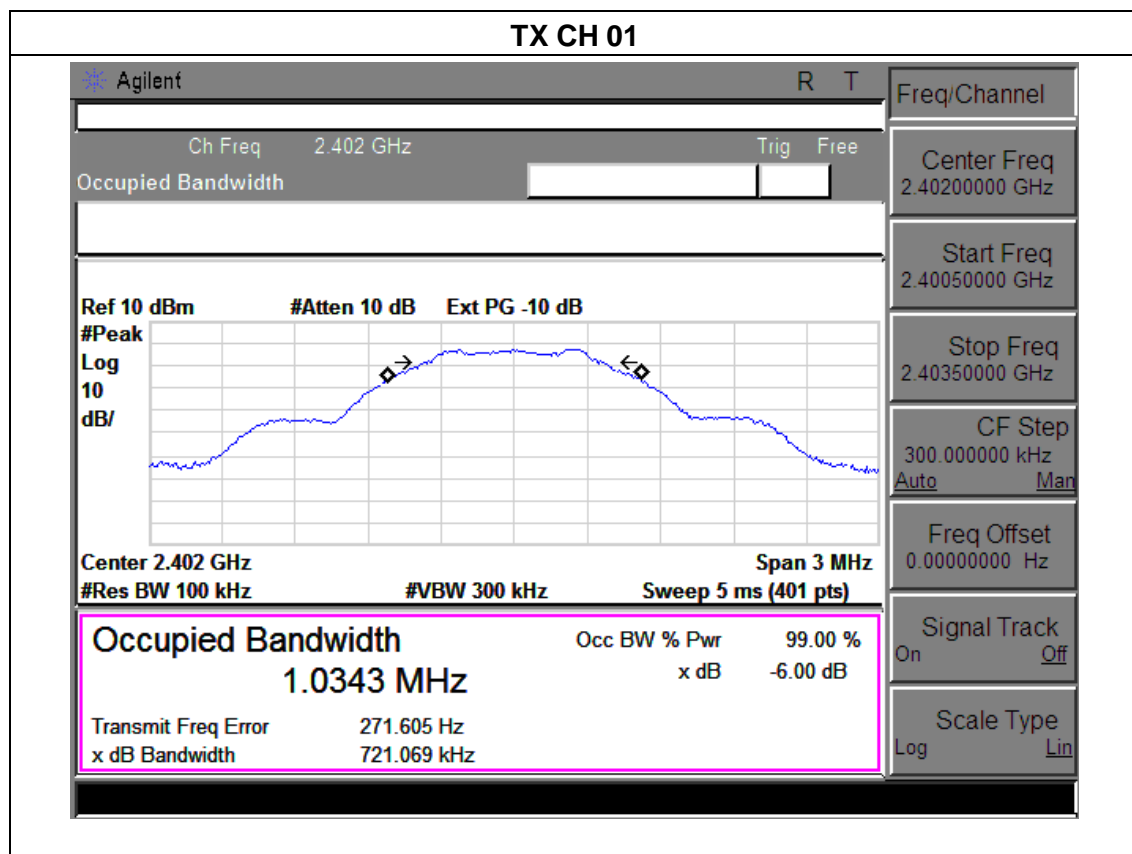
5.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

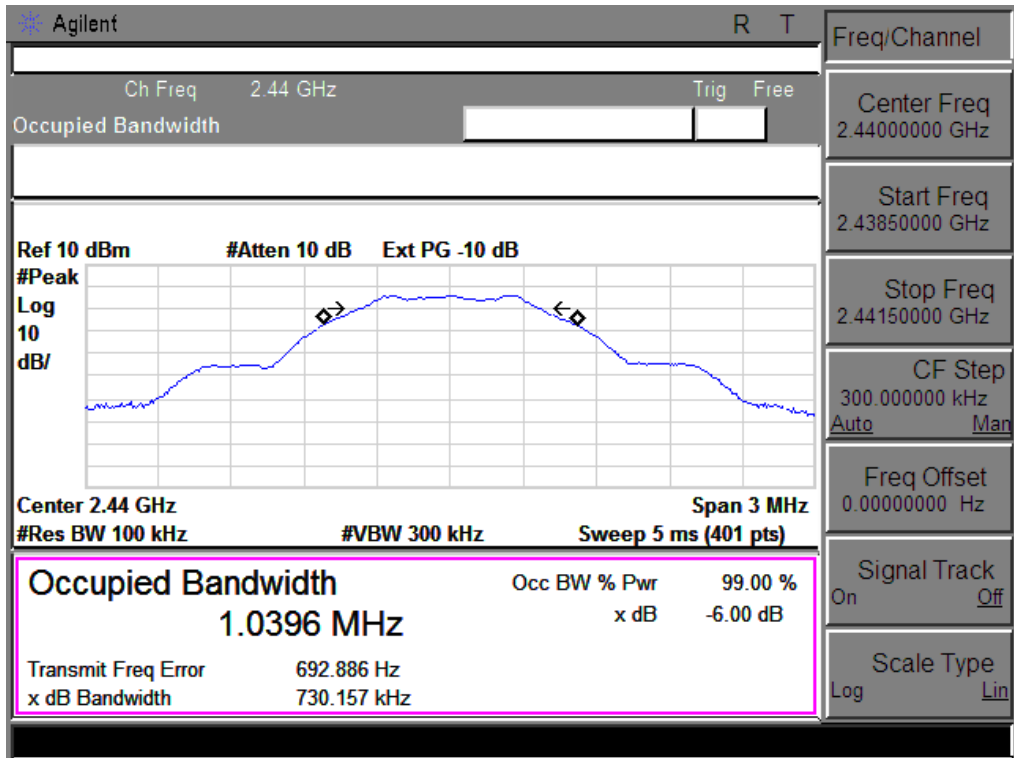
5.1.5 TEST RESULTS

EUT :	MorphoBT - Morpho Biometric Terminal	Model Name :	E110
Temperature :	25 °C	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	DC 5V From Adapter AC 120/60Hz
Test Mode :	TX Mode /CH01, CH20, CH40		

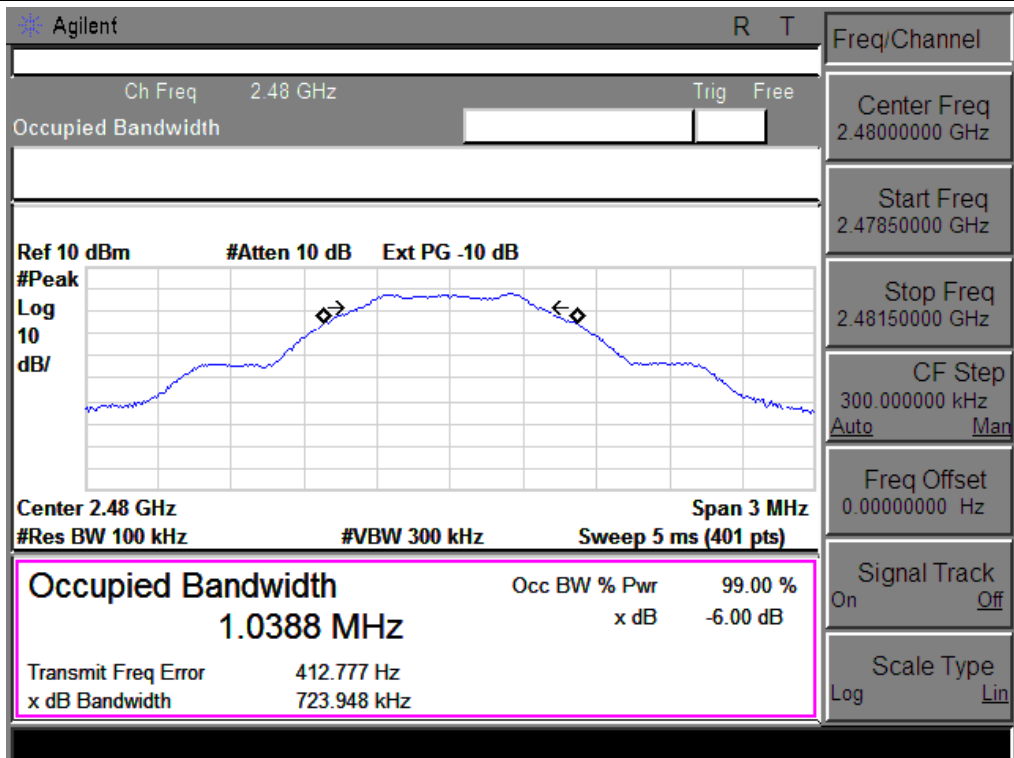
Frequency	6dB Bandwidth (MHz)	99% Occupied BW (MHz)	Channel Separation (MHz)	Result
2402 MHz	0.72	1.0343	>=500KHz	PASS
2440 MHz	0.73	1.0396	>=500KHz	PASS
2480 MHz	0.72	1.0388	>=500KHz	PASS



TX CH 20



TX CH 40



6. PEAK OUTPUT POWER TEST

6.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(b)(3)	Peak Output Power	1 watt or 30dBm	2400-2483.5	PASS

6.1.1 TEST PROCEDURE

- a. The EUT was directly connected to the Power meter

6.1.2 DEVIATION FROM STANDARD

No deviation.

6.1.3 TEST SETUP



6.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

6.1.5 TEST RESULTS

EUT :	MorphoBT - Morpho Biometric Terminal	Model Name :	E110
Temperature :	25 °C	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	DC 5V From Adapter AC 120/60Hz
Test Mode :	TX Mode /CH01, CH20, CH40		

TX Mode			
Test Channe	Frequency	Peak Conducted Output Power	LIMIT
	(MHz)	(dBm)	dBm
CH01	2402	0.42	30
CH20	2440	0.83	30
CH40	2480	0.38	30

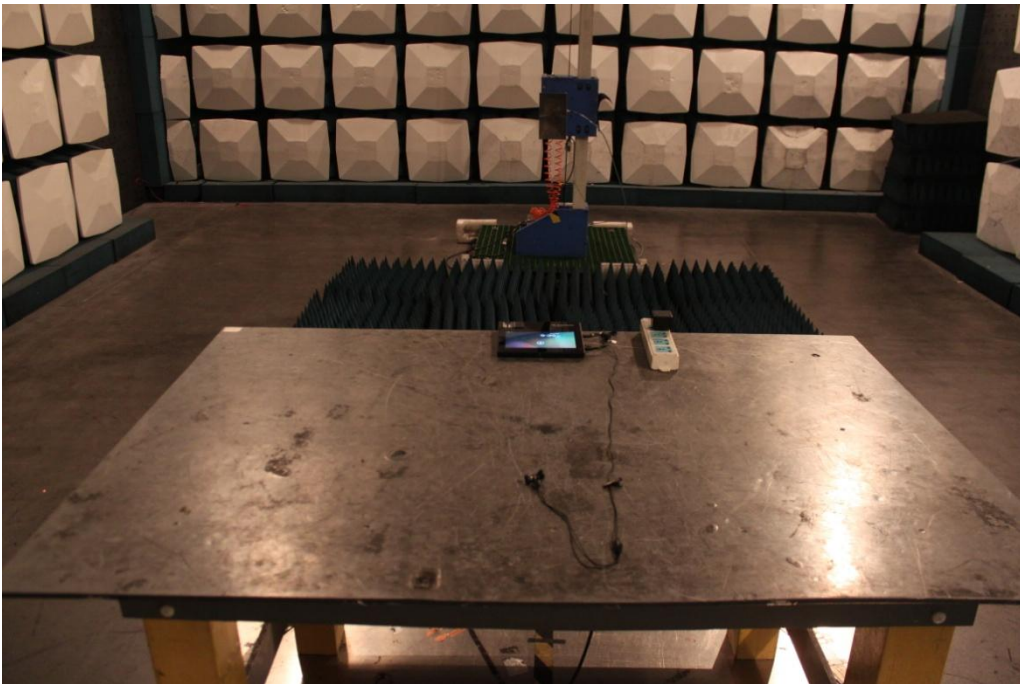
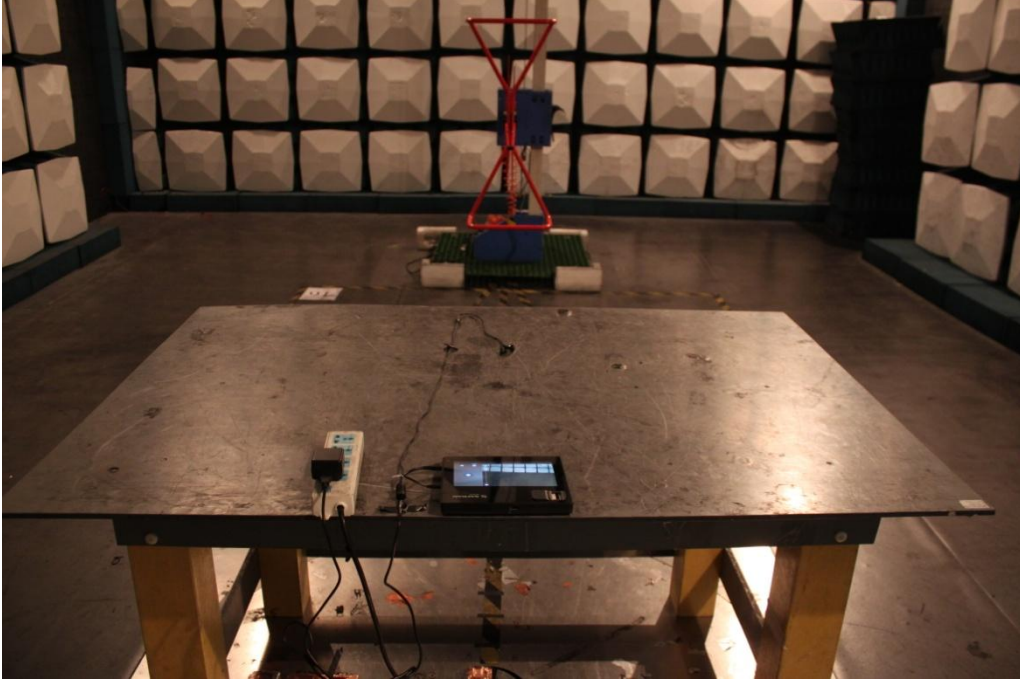
7. ANTENNA REQUIREMENT

7.1 STANDARD REQUIREMENT

15.203 requirement: For intentional device, according to 15.203: an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

7.2 EUT ANTENNA

The EUT antenna is Chip antenna. It comply with the standard requirement.

8. EUT TEST PHOTO**Radiated Measurement Photos**

Conducted Measurement Photos

