



# RADIO TEST REPORT

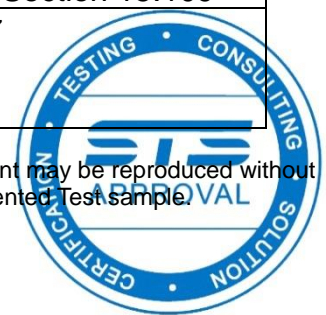
Report No.: STS1901292W01

Issued for

**Shenzhen Videotimes Technology Co.,Ltd**

Room 601, Building B, Union Financial Building, No 1 Shihua Road, Fubao Street, Futian Free Trade Zone, Shenzhen, Guangdong, China.

<b>Product Name:</b>	2.4GHz Digital Wireless Video Baby Monitor(Camera)
<b>Brand Name:</b>	HelloBaby
<b>Model Name:</b>	HB248TX
<b>Series Model:</b>	HB65TX
<b>FCC ID:</b>	2AF2R-HB65TX
<b>IC ID:</b>	20674-HB65TX
<b>HVIN:</b>	HB65
<b>Test Standard:</b>	CFR47 FCC Part 15: Subpart C Section 15.247 CFR47 FCC Part 15: Subpart C Section 15.207 CFR47 FCC Part 15: Subpart C Section 15.209 CFR47 FCC Part 15: Subpart B Section 15.107 CFR47 FCC Part 15: Subpart B Section 15.109 RSS-247 Issue 2 February 2017 RSS-Gen Issue 5 April 2018 ICES-003 Issue 6 January 2016



Any reproduction of this document must be done in full. No single part of this document may be reproduced without permission from STS, All Test Data Presented in this report is only applicable to presented Test sample.



### TEST RESULT CERTIFICATION

**Applicant's name** ..... : **Shenzhen Videotimes Technology Co.,Ltd**  
 Address ..... : Room 601, Building B, Union Financial Building, No 1 Shihua Road, Fubao Street, Futian Free Trade Zone, Shenzhen, Guangdong, China.  
**Manufacture's Name** ..... : **Shenzhen Videotimes Technology Co.,Ltd**  
 Address ..... : Room 601, Building B, Union Financial Building, No 1 Shihua Road, Fubao Street, Futian Free Trade Zone, Shenzhen, Guangdong, China.

#### Product description

Product Name ..... : 2.4GHz Digital Wireless Video Baby Monitor(Camera)  
 Brand Name ..... : HelloBaby  
 Model Name ..... : HB248TX  
 Series Model ..... : HB65TX

**Test Standards** ..... : CFR47 FCC Part 15: Subpart C Section 15.247  
 CFR47 FCC Part 15: Subpart C Section 15.207  
 CFR47 FCC Part 15: Subpart C Section 15.209  
 CFR47 FCC Part 15: Subpart B Section 15.107  
 CFR47 FCC Part 15: Subpart B Section 15.109  
 RSS-247 Issue 2 February 2017  
 RSS-Gen Issue 5 April 2018  
 ICES-003 Issue 6 January 2016

Test procedure ..... : ANSI C63.10: 2013, ANSI C63.4: 2014

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

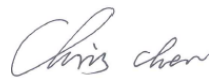
This report shall not be reproduced except in full, without the written approval of STS, this document only be altered or revised by STS, personal only, and shall be noted in the revision of the document.


**Date of Test** .....


Date (s) of performance of tests ..... : 30 Jan. 2019 -23 Apr. 2019

Date of Issue ..... : 24 Apr. 2019

Test Result ..... : **Pass**

Testing Engineer :   
 \_\_\_\_\_  
 ( Chris Chen )

Technical Manager :   
 \_\_\_\_\_  
 ( Sunday Hu )

Authorized Signatory :   
 \_\_\_\_\_  
 ( Vita Li )





## Table of Contents

Page

<b>1</b>	<b>SUMMARY OF TEST RESULTS</b>	<b>6</b>
1.1	TEST FACTORY	7
1.2	MEASUREMENT UNCERTAINTY	7
<b>2</b>	<b>GENERAL INFORMATION</b>	<b>8</b>
2.1	GENERAL DESCRIPTION OF EUT	8
2.2	DESCRIPTION OF TEST MODES	10
2.3	BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED	11
2.4	DESCRIPTION OF NECESSARY ACCESSORIES AND SUPPORT UNITS	11
2.5	EQUIPMENTS LIST	12
<b>3</b>	<b>EMC EMISSION TEST</b>	<b>13</b>
3.1	CONDUCTED EMISSION MEASUREMENT	13
3.2	RADIATED EMISSION MEASUREMENT	19
3.3	RADIATED SPURIOUS EMISSION MEASUREMENT	25
<b>4</b>	<b>CONDUCTED SPURIOUS &amp; BAND EDGE EMISSION</b>	<b>39</b>
4.1	APPLIED PROCEDURES / LIMIT	39
4.2	TEST PROCEDURE	39
4.3	DEVIATION FROM STANDARD	39
4.4	TEST SETUP	39
4.5	EUT OPERATION CONDITIONS	39
4.6	TEST RESULTS	40
<b>5</b>	<b>NUMBER OF HOPPING CHANNEL</b>	<b>44</b>
5.1	APPLIED PROCEDURES / LIMIT	44
5.2	TEST PROCEDURE	44
5.3	DEVIATION FROM STANDARD	44
5.4	TEST SETUP	44
5.5	EUT OPERATION CONDITIONS	44
5.6	TEST RESULTS	45
<b>6</b>	<b>AVERAGE TIME OF OCCUPANCY</b>	<b>46</b>
6.1	APPLIED PROCEDURES / LIMIT	46
6.2	TEST PROCEDURE	46
6.3	DEVIATION FROM STANDARD	46
6.4	TEST SETUP	46
6.5	EUT OPERATION CONDITIONS	46
6.6	TEST RESULTS	47



<b>7</b>	<b>HOPPING CHANNEL SEPARATION MEASUREMENT</b>	<b>48</b>
7.1	APPLIED PROCEDURES / LIMIT	48
7.2	TEST PROCEDURE	48
7.3	DEVIATION FROM STANDARD	48
7.4	TEST SETUP	48
7.5	EUT OPERATION CONDITIONS	48
7.6	TEST RESULTS	49
<b>8</b>	<b>BANDWIDTH TEST</b>	<b>51</b>
8.1	APPLIED PROCEDURES / LIMIT	51
8.2	TEST PROCEDURE	51
8.3	DEVIATION FROM STANDARD	51
8.4	TEST SETUP	51
8.5	EUT OPERATION CONDITIONS	51
8.6	TEST RESULTS	52
<b>9</b>	<b>PEAK OUTPUT POWER TEST</b>	<b>54</b>
9.1	APPLIED PROCEDURES / LIMIT	54
9.2	TEST PROCEDURE	54
9.3	DEVIATION FROM STANDARD	54
9.4	TEST SETUP	54
9.5	EUT OPERATION CONDITIONS	54
9.6	TEST RESULTS	55
<b>10</b>	<b>ANTENNA REQUIREMENT</b>	<b>56</b>
10.1	STANDARD REQUIREMENT	56
10.2	EUT ANTENNA	56
<b>11</b>	<b>APPENDIX - PHOTOS OF TEST SETUP</b>	<b>57</b>



**Revision History**

Rev.	Issue Date	Report NO.	Effect Page	Contents
00	19 Mar. 2019	STS1901292W01	ALL	Initial Issue





## 1 SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

KDB 558074 D01 DTS Meas Guidance v05r01

<b>FCC Part 15, Subpart C RSS-247 Issue 2</b>			
<b>Standard Section</b>	<b>Test Item</b>	<b>Judgment</b>	<b>Remark</b>
FCC Part 15.207(a) RSS-Gen Clause 8.8	Conducted Emission	PASS	
FCC Part 15.247(a)(1) RSS-247 Clause 5.1(b)	20dB Bandwidth	PASS	
RSS-Gen Clause 6.7	99% Bandwidth	PASS	
FCC Part 15.247(a)(1) RSS-247 Clause 5.4(b)	Output Power	PASS	
FCC Part 15.247(d) RSS-247 Clause 3.3	Radiated Spurious Emission	PASS	
FCC Part 15.247(d) RSS-247 Clause 5.5	Conducted Spurious & Band Edge Emission	PASS	
FCC Part 15.247(a)(1) RSS-247 Clause 5.1(b)	Hopping Channel Separation	PASS	
FCC Part 15.247(a)(1) RSS-247 Clause 5.1(d)	Number of Hopping Frequency	PASS	
FCC Part 15.247(a)(1) RSS-247 Clause 5.1(d)	Dwell Time	PASS	
FCC Part 15.205	Restricted Band Edge Emission	PASS	
FCC Part 15.247(d) & 15.209(a) RSS-247 Clause 5.5	Band Edge Emission	PASS	
FCC Part 15.247(b)(4) & 15.203	Antenna Requirement	PASS	
RSS-Gen Clause 6.11	Frequency Stability	PASS	

<b>FCC Part 15, Subpart B ICES-003 Issue 6</b>			
<b>Standard Section</b>	<b>Test Item</b>	<b>Judgment</b>	<b>Remark</b>
FCC Part 15.107(a) ICES-003	Conducted Emission	PASS	Class B limit
FCC Part 15.109(a) ICES-003	Radiated Emission	PASS	Class B limit

NOTE:

- 1) 'N/A' denotes test is not applicable in this test report
- 2) All tests were performed according to the procedures in ANSI C63.10: 2013 and ANSI C63.4: 2014.



## 1.1 TEST FACTORY

Shenzhen STS Test Services Co., Ltd.  
Add. : 1/F., Building B, Zhuoke Science Park, No.190, Chongqing Road, Fuyong Street, Bao'an District, Shenzhen, Guangdong, China

FCC Registration No.: CN1203

IC Registration No.: 12108A

A2LA Certificate No.: 4338.01

## 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 (9KHz-150KHz)	$\pm 2.88\text{dB}$
2	Conducted Emission (150KHz-30MHz)	$\pm 2.67\text{dB}$
3	RF power,conducted	$\pm 0.71\text{dB}$
4	Spurious emissions,conducted	$\pm 0.63\text{dB}$
5	All emissions,radiated (9KHz-30MHz)	$\pm 3.02\text{dB}$
6	All emissions,radiated (30MHz-200MHz)	$\pm 3.80\text{dB}$
7	All emissions,radiated (200MHz-1000MHz)	$\pm 3.97\text{dB}$
8	All emissions,radiated(>1G)	$\pm 3.03\text{dB}$





## 2 GENERAL INFORMATION

### 2.1 GENERAL DESCRIPTION OF EUT

Product Name	2.4GHz Digital Wireless Video Baby Monitor(Camera)	
Trade Name	HelloBaby	
Model Name	HB248TX	
Series Model	HB65TX	
Model Difference	They are fully identical except model number.	
Product Description	The EUT is a camera (TX) of one of the 2.4GHz Digital Wireless Video Baby Monitor which supports 2.4GHz FHSS wireless technology.	
	Operation Frequency:	2403.5 - 2475.5 MHz
	Modulation Type:	GFSK
	Bit Rate of Transmitter:	1.5 Mbps
	Number Of Channel:	49 channels
	Antenna Designation:	Please see Note 4
	Antenna Gain (dBi):	1.2dBi
Channel List	Please refer to the Note 2.	
Adapter	Model: K05S050100U(US) Input: 100~240V 50/60Hz 0.2A Output: 5V@1A	
Battery	N/A	
Test Software	SecureCRT	
RF Power Setting TEST Software (power class)	1	
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

RF Channel and Frequency			
RF Channel	Freq.(MHz)	RF Channel	Freq.(MHz)
<b>01</b>	<b>2403.5</b>	26	2441.0
02	2405.0	27	2442.5
03	2406.5	28	2444.0
04	2408.0	29	2445.5
05	2409.5	30	2447.0
06	2411.0	31	2448.5
07	2412.5	32	2450.0
08	2414.0	33	2451.5
09	2415.5	34	2453.0
10	2417.0	35	2454.5
11	2418.5	36	2456.0
12	2420.0	37	2457.5
13	2421.5	38	2459.0
14	2423.0	39	2460.5
15	2424.5	40	2462.0
16	2426.0	41	2463.5
17	2427.5	42	2465.0
18	2429.0	43	2466.5
19	2430.5	44	2468.0
20	2432.0	45	2469.5
21	2433.5	46	2471.0
22	2435.0	47	2472.5
23	2436.5	48	2474.0
24	2438.0	<b>49</b>	<b>2475.5</b>
<b>25</b>	<b>2439.5</b>		

3 Note:

- 1) In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test;
- 2) Test frequencies are lowest channel: 2403.5 MHz, middle channel: 2439.5 MHz and highest channel: 2475.5 MHz

4

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	NOTE
1	HelloBaby	HB248TX	Integral antenna	N/A	1.2	2.4G Antenna



## 2.2 DESCRIPTION OF TEST MODES

Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

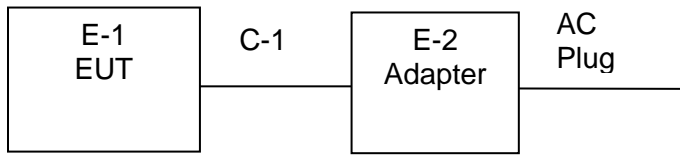
Worst Mode	Description	Data Rate
Mode 1	TX GFSK CH01	/
Mode 2	TX GFSK CH25	/
Mode 3	TX GFSK CH49	/
Mode 4	Operating mode	/

Note:

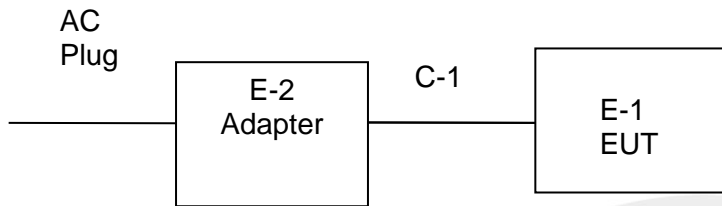
- 1) The measurements are performed at all Bit Rate of Transmitter, the worst data was reported
- 2) We have be tested for all avaiable U.S. voltage and frequencies(For 120V,50/60Hz and 240V, 50/60Hz) for which the device is capable of operation, and the worst case of 120V/60Hz is shown in the report
- 3) Controlled using a bespoke application on the laptop PC supplied by the customer. The application was used to enable a continuous transmission mode and to select the test channels, data rates and modulation schemes as required.

### 2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Radiation Test Set



Conduction Test Set



### 2.4 DESCRIPTION OF NECESSARY ACCESSORIES AND 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.	Serial No.	Note
E-2	Adapter	GuanJin	K05S050100U(US)	N/A	Accessories Equipment
E-3	Personal computer	HP	500-320cx	4CV428DQYN	N/A

Item	Shielded Type	Ferrite Core	Length	Note
C-1	Adapter DC Cable	NO	200cm	N/A

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.
- 3) “YES” is means “shielded” “with core”; “NO” is means “unshielded” “without core”.



## 2.5 EQUIPMENTS LIST

### Radiation Test Equipment

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last Calibration	Calibrated Until
Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
Test Receiver	R&S	ESCI	101427	2018.10.13	2019.10.12
Signal Analyzer	Agilent	N9020A	MY51110105	2019.03.02	2020.03.01
Active loop Antenna	ZHINAN	ZN30900C	16035	2018.03.11	2021.03.10
Bilog Antenna	TESEQ	CBL6111D	34678	2017.11.02	2020.11.1
Horn Antenna	SCHWARZBECK	BBHA 9120D(1201)	9120D-1343	2018.10.19	2021.10.18
SHF-EHF Horn Antenna (18G-40GHz)	A-INFO	LB-180400-KF	J211020657	2018.03.11	2021.03.10
Pre-Amplifier(0.1M-3GHz)	EM	EM330	060665	2018.10.13	2019.10.12
Pre-Amplifier (1G-18GHz)	SKET	LNPA-01018G-45	SK201808090 1	2018.10.13	2019.10.12
Temperature & Humidity	HH660	Mieo	N/A	2018.10.11	2019.10.10
turn table	EM	SC100_1	60531	N/A	N/A
Antenna mast	EM	SC100	N/A	N/A	N/A

### Conduction Test Equipment

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last Calibration	Calibrated Until
Test Receiver	R&S	ESCI	101427	2018.10.13	2019.10.12
LISN	R&S	ENV216	101242	2018.10.11	2019.10.10
LISN	EMCO	3810/2NM	23625	2018.10.11	2019.10.10
Temperature & Humidity	HH660	Mieo	N/A	2018.10.11	2019.10.10

### RF Connected Test

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last Calibration	Calibrated Until
USB RF power sensor	DARE	RPR3006W	15I00041SNO03	2018.10.13	2019.10.12
Signal Analyzer	Agilent	N9020A	MY49100060	2018.10.13	2019.10.12
Temperature & Humidity	HH660	Mieo	N/A	2018.10.11	2019.10.10



### 3 EMC EMISSION TEST

#### 3.1 CONDUCTED EMISSION MEASUREMENT

##### 3.1.1 POWER LINE CONDUCTED EMISSION LIMITS

operating frequency band. In case the emission fall within the restricted band specified on Part 15. 207(a), 107(a), RSS-Gen Table3 and ICES-003 Table2 limit in the table below has to be followed.

This item was performed according to the procedures in ANSI C63.10: 2013 and ANSI C63.4: 2014.

FREQUENCY (MHz)	Conducted Emission limit (dBuV)	
	Quasi-peak	Average
0.15 -0.5	66 - 56 *	56 - 46 *
0.50 -5.0	56.00	46.00
5.0 -30.0	60.00	50.00

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.

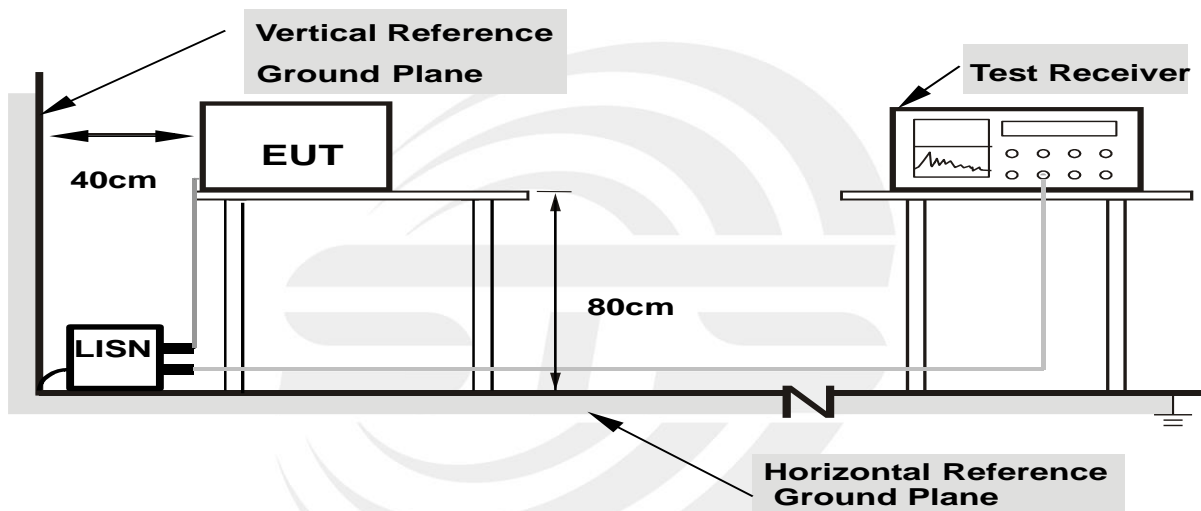
The following table is the setting of the receiver

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

### 3.1.2 TEST PROCEDURE

- a. The EUT was 0.8 meters from the horizontal ground plane and 0.4 meters from the vertical 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.
- b. 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.
- c. 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.
- d. LISN at least 80 cm from nearest part of EUT chassis.
- e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

### 3.1.3 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**

### 3.1.4 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.



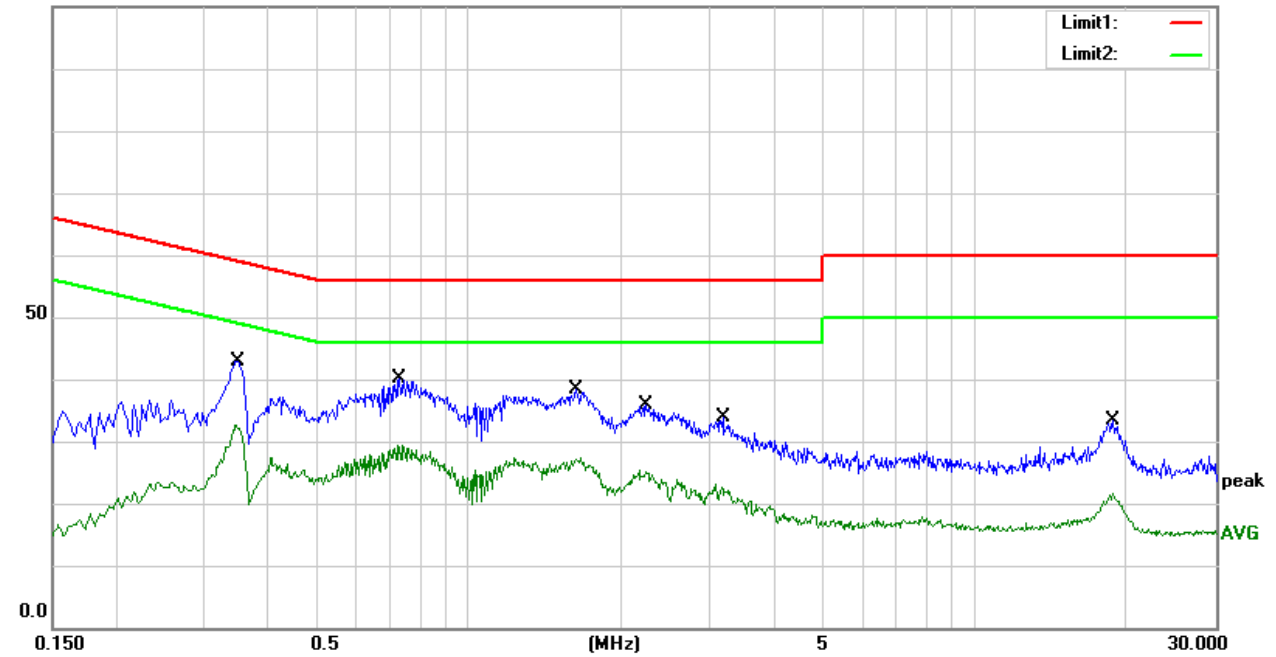
3.1.5 TEST RESULT

Temperature:	21.3 °C	Relative Humidity:	44%
Test Voltage:	AC 120V/60Hz	Phase:	L
Test Mode:	Mode 1/2/3 (Mode 1 worst case)		
Note:	GuanJin		

Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
0.3500	22.39	20.61	43.00	58.96	-15.96	QP
0.3500	12.12	20.61	32.73	48.96	-16.23	AVG
0.7300	19.90	20.24	40.14	56.00	-15.86	QP
0.7300	8.54	20.24	28.78	46.00	-17.22	AVG
1.6340	18.18	20.10	38.28	56.00	-17.72	QP
1.6340	7.20	20.10	27.30	46.00	-18.70	AVG
2.2380	15.73	20.04	35.77	56.00	-20.23	QP
2.2380	4.61	20.04	24.65	46.00	-21.35	AVG
3.1500	13.33	19.97	33.30	56.00	-22.70	QP
3.1500	2.56	19.97	22.53	46.00	-23.47	AVG
18.8180	13.39	19.95	33.34	60.00	-26.66	QP
18.8180	1.57	19.95	21.52	50.00	-28.48	AVG

Remark:

1. All readings are Quasi-Peak and Average values.
2. Margin = Result (Result = Reading + Factor ) – Limit





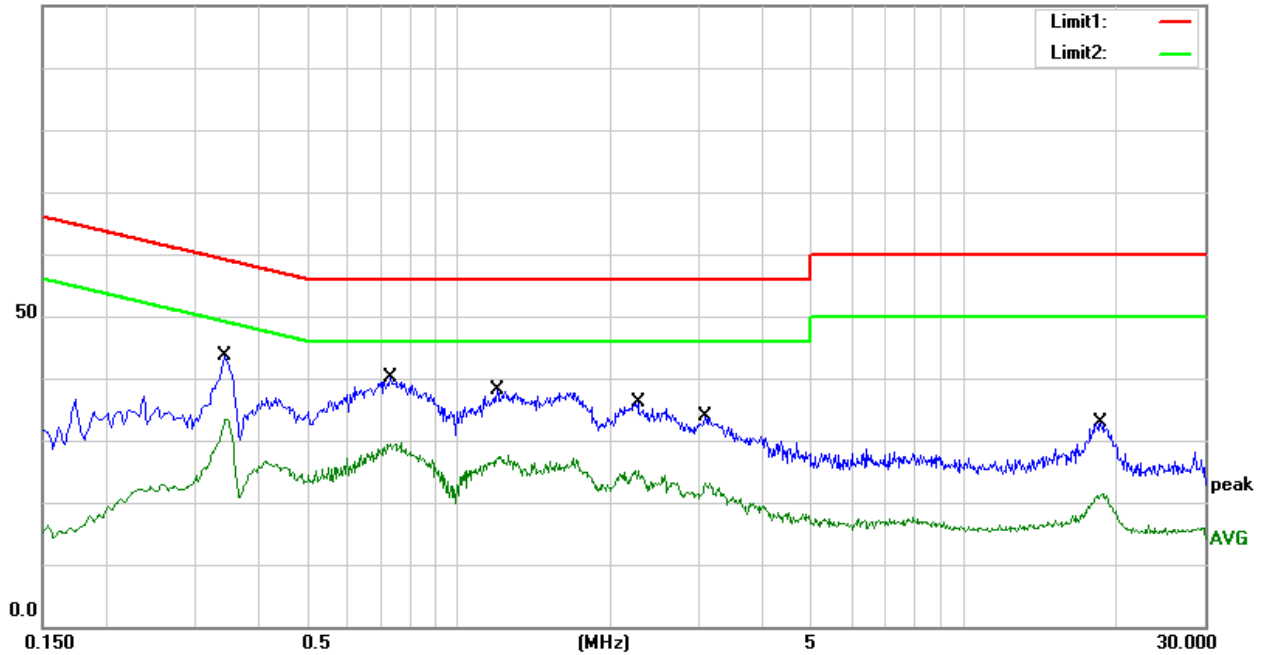


Temperature:	21.3 °C	Relative Humidity:	44%
Test Voltage:	AC 120V/60Hz	Phase:	N
Test Mode:	Mode 1/2/3 (Mode 1 worst case)		
Note:	GuanJin		

Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
0.3460	22.92	20.61	43.53	59.06	-15.53	QP
0.3460	12.81	20.61	33.42	49.06	-15.64	AVG
0.7340	19.86	20.24	40.10	56.00	-15.90	QP
0.7340	9.44	20.24	29.68	46.00	-16.32	AVG
1.1940	17.93	20.14	38.07	56.00	-17.93	QP
1.1940	7.42	20.14	27.56	46.00	-18.44	AVG
2.2620	16.17	20.04	36.21	56.00	-19.79	QP
2.2620	4.26	20.04	24.30	46.00	-21.70	AVG
3.0820	13.79	19.98	33.77	56.00	-22.23	QP
3.0820	3.08	19.98	23.06	46.00	-22.94	AVG
18.7140	12.86	19.95	32.81	60.00	-27.19	QP
18.7140	1.45	19.95	21.40	50.00	-28.60	AVG

Remark:

- All readings are Quasi-Peak and Average values.
- Margin = Result (Result = Reading + Factor) – Limit





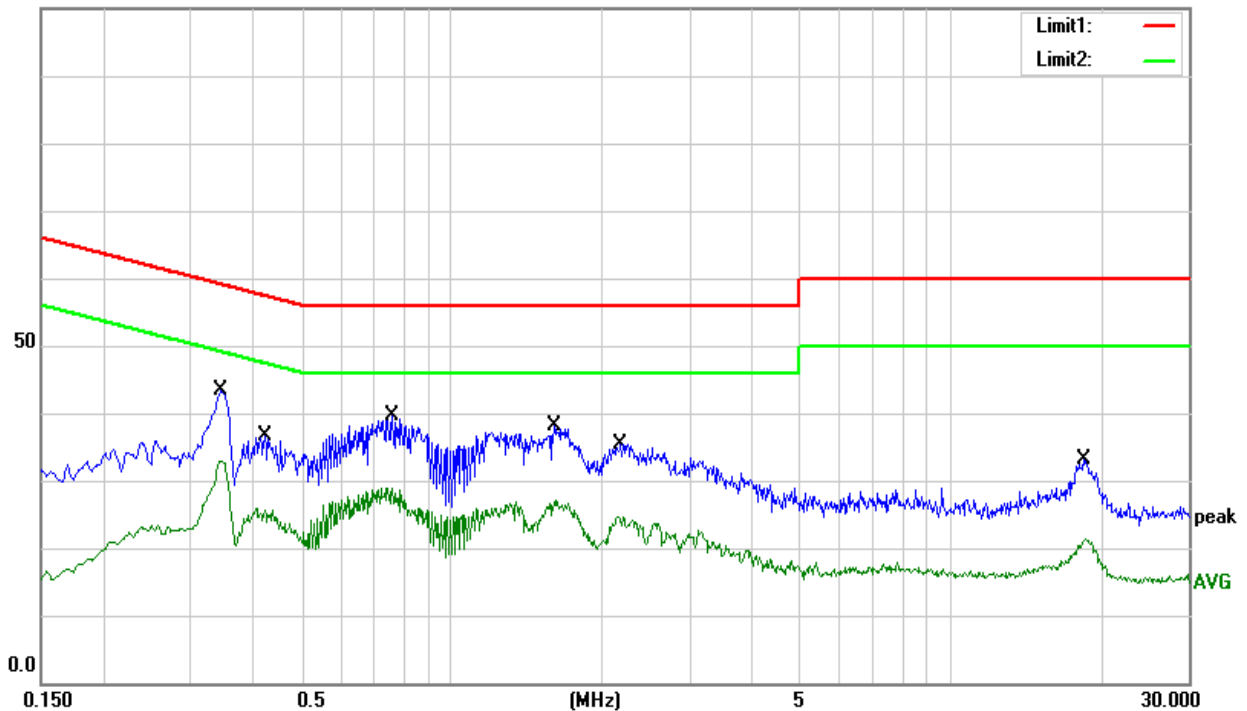
Temperature:	21.3 °C	Relative Humidity:	44%
Test Voltage:	AC 120V/60Hz	Phase:	L
Test Mode:	Mode 4 (Part 15B & ICES-003)		
Note:	GuanJin		

Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
0.3460	22.85	20.61	43.46	59.06	-15.60	QP
0.3460	12.38	20.61	32.99	49.06	-16.07	AVG
0.4220	16.21	20.49	36.70	57.41	-20.71	QP
0.4220	5.02	20.49	25.51	47.41	-21.90	AVG
0.7620	19.48	20.24	39.72	56.00	-16.28	QP
0.7620	8.30	20.24	28.54	46.00	-17.46	AVG
1.6020	18.02	20.10	38.12	56.00	-17.88	QP
1.6020	6.97	20.10	27.07	46.00	-18.93	AVG
2.1860	15.43	20.04	35.47	56.00	-20.53	QP
2.1860	4.61	20.04	24.65	46.00	-21.35	AVG
18.4940	13.09	19.95	33.04	60.00	-26.96	QP
18.4940	1.38	19.95	21.33	50.00	-28.67	AVG

Remark:

1. All readings are Quasi-Peak and Average values.
2. Margin = Result (Result = Reading + Factor) – Limit

100.0 dBuV





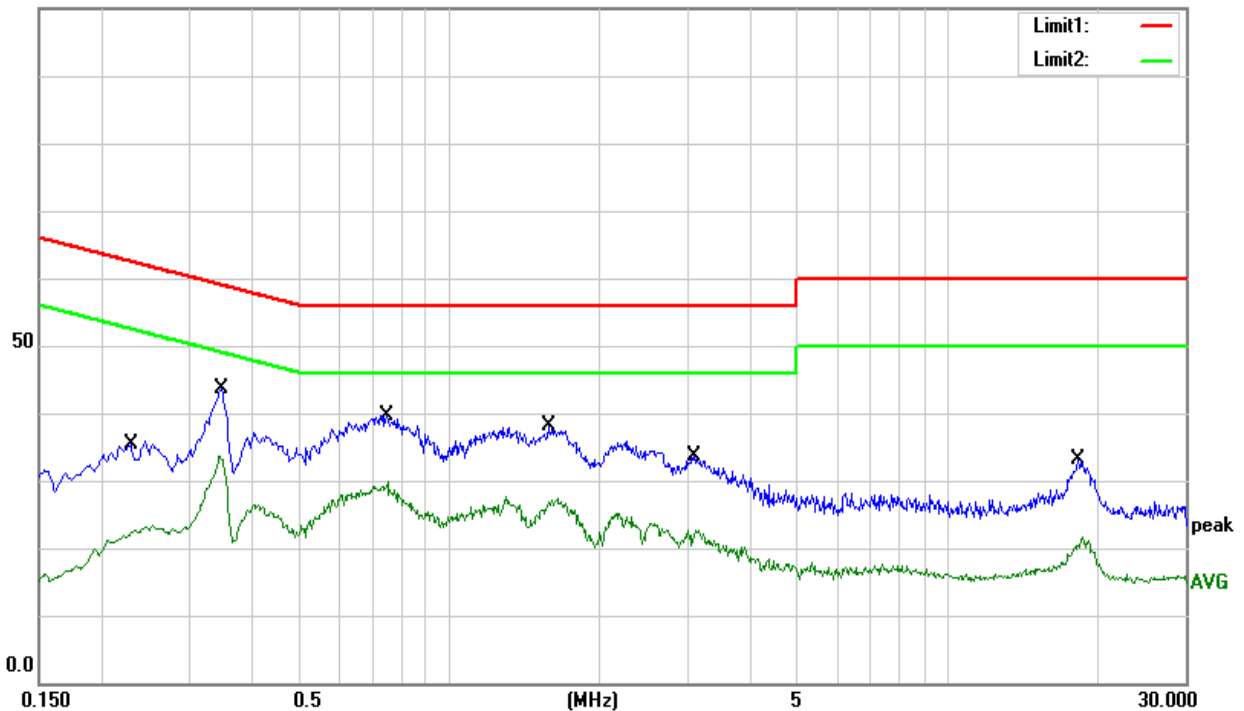
Temperature:	21.3 °C	Relative Humidity:	44%
Test Voltage:	AC 120V/60Hz	Phase:	N
Test Mode:	Mode 4 (Part 15B & ICES-003)		
Note:	GuanJin		

Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
0.2300	15.07	20.38	35.45	62.45	-27.00	QP
0.2300	2.98	20.38	23.36	52.45	-29.09	AVG
0.3500	22.98	20.61	43.59	58.96	-15.37	QP
0.3500	12.93	20.61	33.54	48.96	-15.42	AVG
0.7500	19.41	20.24	39.65	56.00	-16.35	QP
0.7500	9.51	20.24	29.75	46.00	-16.25	AVG
1.5820	18.12	20.10	38.22	56.00	-17.78	QP
1.5820	7.23	20.10	27.33	46.00	-18.67	AVG
3.1060	13.66	19.97	33.63	56.00	-22.37	QP
3.1060	2.68	19.97	22.65	46.00	-23.35	AVG
18.2420	13.18	19.95	33.13	60.00	-26.87	QP
18.2420	1.65	19.95	21.60	50.00	-28.40	AVG

Remark:

- All readings are Quasi-Peak and Average values.
- Margin = Result (Result = Reading + Factor) – Limit

100.0 dBuV





## 3.2 RADIATED EMISSION MEASUREMENT

### 3.2.1 RADIATED EMISSION LIMITS

Frequencies (MHz)	Class A (at 10m) dBuV/m	Class B (at 3m) dBuV/m
30~88	39.0	40.0
88~216	43.5	43.5
216~960	46.5	46.0
Above 960	49.5	54.0

#### 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

Note:

- 1) The tighter limit applies at the band edges.
- 2) Emission level (dBuV/m)=20log Emission level (uV/m).

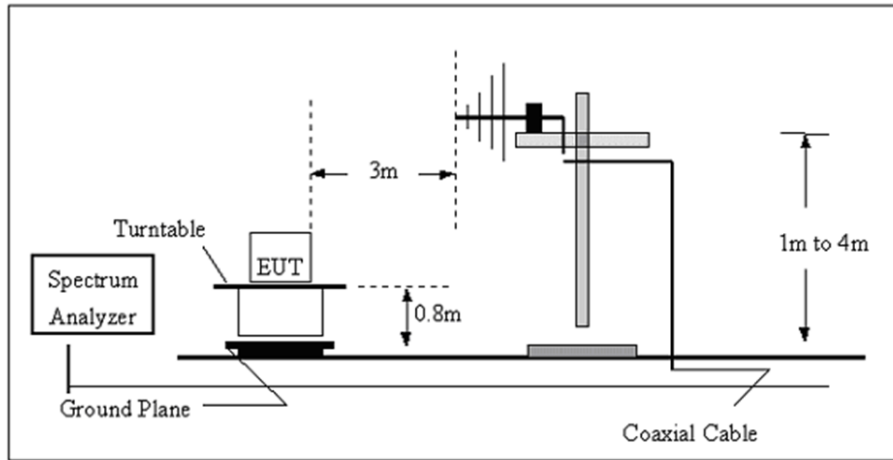
### 3.2.2 TEST PROCEDURE

- 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 0.8 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.

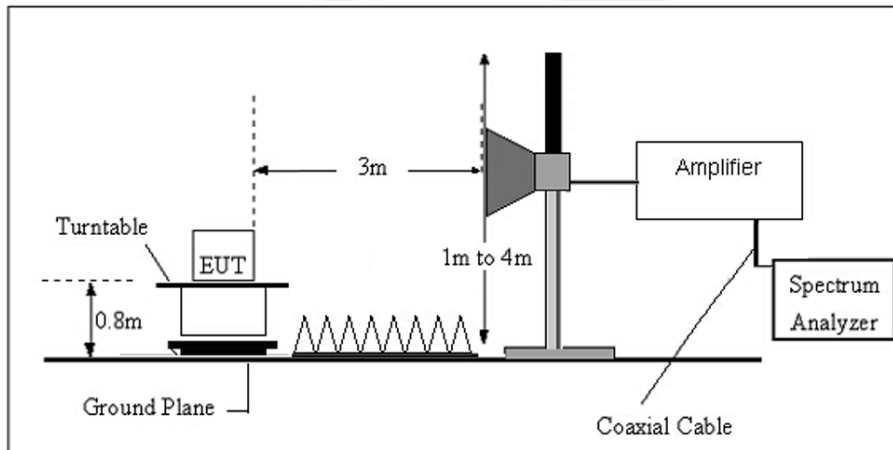
*Note: Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported*

### 3.2.3 TEST SETUP

#### a) Radiated Emission Test-Up Frequency 30MHz~1GHz



#### b) Radiated Emission Test-Up Frequency Above 1GHz



### 3.2.4 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.



### 3.2.5 TEST RESULTS

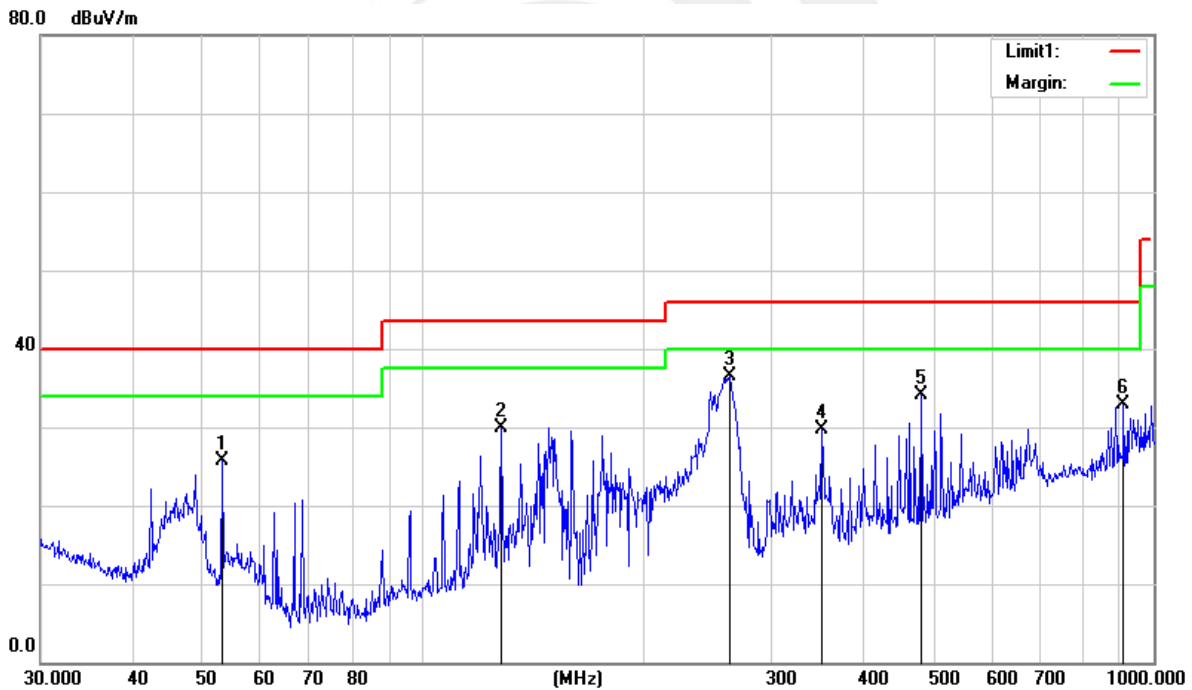
Between 30-1000MHz:

Temperature:	24.7 °C	Relative Humidity:	58%
Pressure:	1010hPa	Phase:	Horizontal
Test Voltage:	AC 120V/60Hz	Test Mode:	Mode 4 (Part 15B & ICES-003)

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	53.1313	48.09	-22.38	25.71	40.00	-14.29	QP
2	128.1130	47.56	-17.58	29.98	43.50	-13.52	QP
3	262.8955	51.76	-15.17	36.59	46.00	-9.41	QP
4	351.7080	43.20	-13.51	29.69	46.00	-16.31	QP
5	480.5276	43.46	-9.38	34.08	46.00	-11.92	QP
6	909.6667	34.87	-1.93	32.94	46.00	-13.06	QP

**Remark:**

1. All readings are Quasi-Peak .
2. Margin = Result (Result =Reading + Factor )-Limit



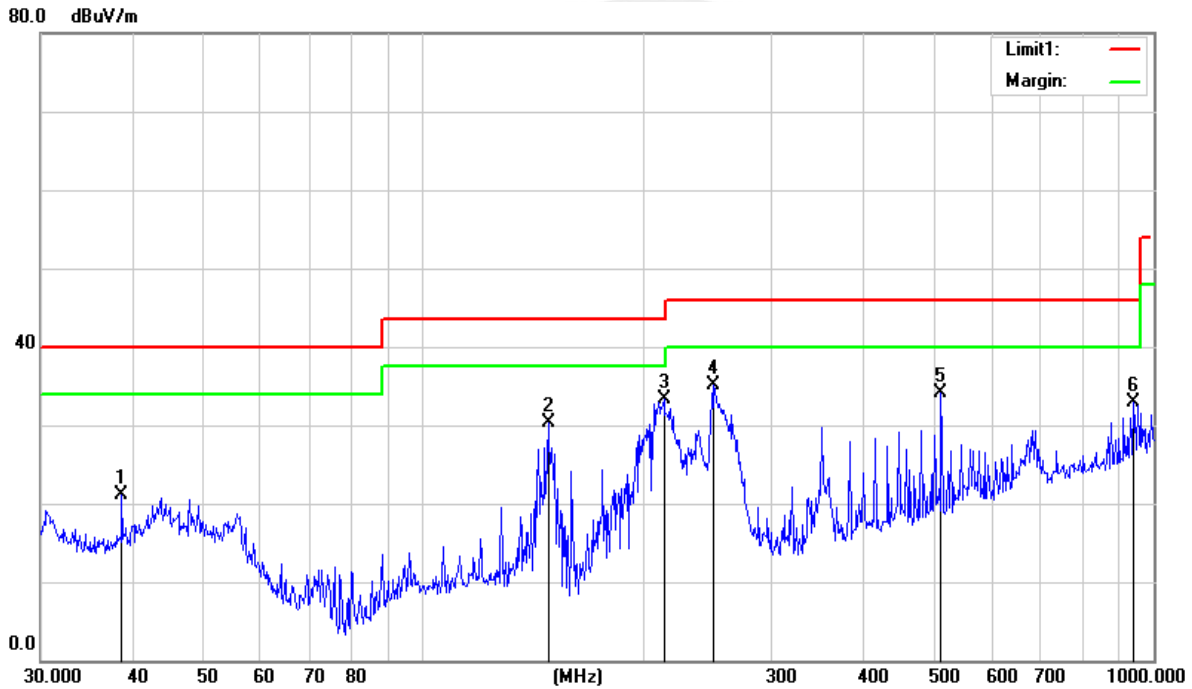


Temperature:	24.7 °C	Relative Humidity:	58%
Pressure:	1010hPa	Phase:	Vertical
Test Voltage:	AC 120V/60Hz	Test Mode:	Mode 4 (Part 15B & ICES-003)

No.	Frequency (MHz)	Reading (dBUV)	Factor (dB)	Results (dBUV/m)	Limit (dBUV/m)	Margin (dB)	Detector
1	38.7518	36.77	-15.68	21.09	40.00	-18.91	QP
2	148.4410	48.23	-17.89	30.34	43.50	-13.16	QP
3	213.7634	52.76	-19.50	33.26	43.50	-10.24	QP
4	250.3012	51.47	-16.29	35.18	46.00	-10.82	QP
5	511.8352	43.05	-8.88	34.17	46.00	-11.83	QP
6	938.8326	33.65	-0.75	32.90	46.00	-13.10	QP

**Remark:**

1. All readings are Quasi-Peak .
2. Margin = Result (Result =Reading + Factor )–Limit

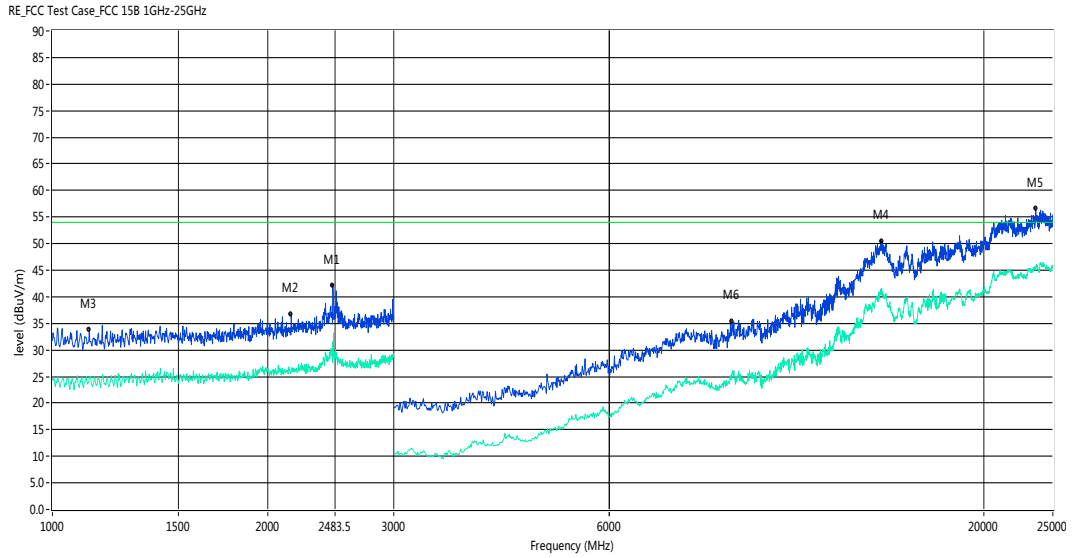






Above 1GHz:

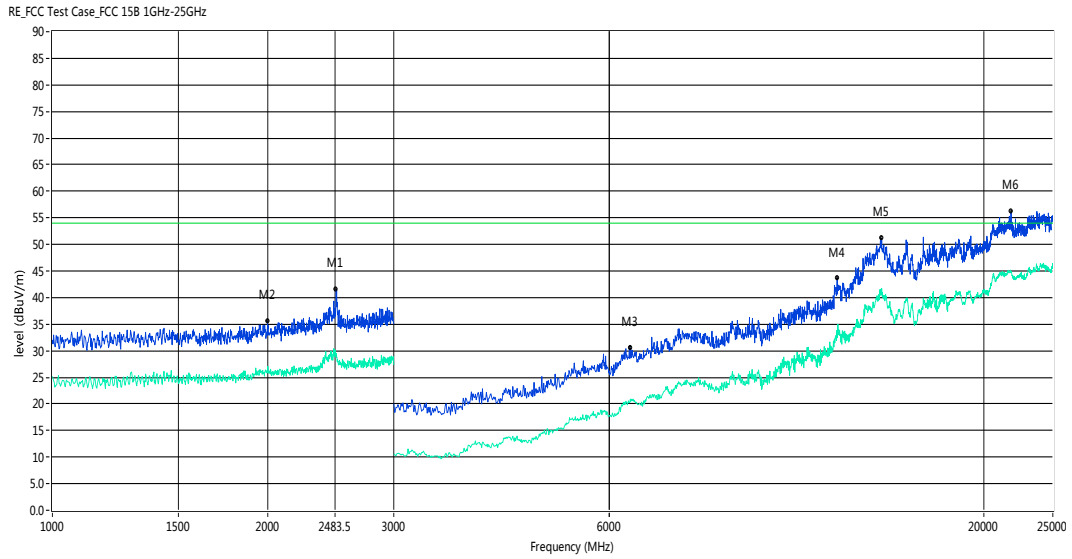
Horizontal



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	ANT	Verdict
1**	2464.000	27.64	1.28	54.0	-26.36	AV	H	Pass
1	2464.000	42.17	1.28	74.0	-31.83	Peak	H	Pass
2**	2156.000	25.94	-1.94	54.0	-28.06	AV	H	Pass
2	2156.000	36.73	-1.94	74.0	-37.27	Peak	H	Pass
3**	1132.000	24.43	-4.89	54.0	-29.57	AV	H	Pass
3	1132.000	31.60	-4.89	74.0	-42.40	Peak	H	Pass
4**	14428.000	41.13	25.10	54.0	-12.87	AV	H	Pass
4	14428.000	50.47	25.10	74.0	-23.53	Peak	H	Pass
5**	23668.001	45.35	23.41	54.0	-8.65	AV	H	Pass
5	23668.001	56.53	23.41	74.0	-17.47	Peak	H	Pass
6**	8910.000	25.90	12.48	54.0	-28.10	AV	H	Pass
6	8910.000	35.31	12.48	74.0	-38.69	Peak	H	Pass



Vertical



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	ANT	Verdict
1**	2492.000	28.75	1.57	54.0	-25.25	AV	V	Pass
1	2492.000	41.53	1.57	74.0	-32.47	Peak	V	Pass
2**	1998.000	25.86	-2.33	54.0	-28.14	AV	V	Pass
2	1998.000	35.52	-2.33	74.0	-38.48	Peak	V	Pass
3**	6430.000	20.46	6.18	54.0	-33.54	AV	V	Pass
3	6430.000	30.58	6.18	74.0	-43.42	Peak	V	Pass
4**	12490.000	32.98	18.68	54.0	-21.02	AV	V	Pass
4	12490.000	43.73	18.68	74.0	-30.27	Peak	V	Pass
5**	14416.000	41.72	25.52	54.0	-12.28	AV	V	Pass
5	14416.000	51.14	25.52	74.0	-22.86	Peak	V	Pass
6**	21856.000	44.91	23.92	54.0	-9.09	AV	V	Pass
6	21856.000	56.13	23.92	74.0	-17.87	Peak	V	Pass



### 3.3 RADIATED SPURIOUS EMISSION MEASUREMENT

#### 3.3.1 RADIATED EMISSION LIMITS

in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the Restricted band specified on Part15.205(a)&209(a) and RSS-247 Issue 2 limit in the table and according to ANSI C63.10-2013 below has to be followed.

LIMITS OF RADIATED EMISSION MEASUREMENT (0.009MHz - 1000MHz)

Frequencies (MHz)	Field Strength (microvolts/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 (1000MHz-25GHz)

FREQUENCY (MHz)	(dBuV/m) (at 3M)	
	PEAK	AVERAGE
Above 1000	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).

For Radiated Emission

Spectrum Parameter	Setting
Attenuation	Auto
Detector	Peak/AV
Start Frequency	1000 MHz(Peak/AV)
Stop Frequency	10th carrier hamonic(Peak/AV)
RB / VB (emission in restricted	1 MHz /3MHz

For Band edge

Spectrum Parameter	Setting
Detector	Peak/AV
Start/Stop Frequency	Lower Band Edge: 2300 to 2422 MHz Upper Band Edge: 2452 to 2500 MHz
RB / VB (emission in restricted band)	1 MHz /3MHz



Receiver Parameter	Setting
Start ~ Stop Frequency	9kHz~90kHz / RB 200Hz for PK & AV
Start ~ Stop Frequency	90kHz~110kHz / RB 200Hz for QP
Start ~ Stop Frequency	110kHz~490kHz / RB 200Hz for PK & AV
Start ~ Stop Frequency	490kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

### 3.3.2 TEST PROCEDURE

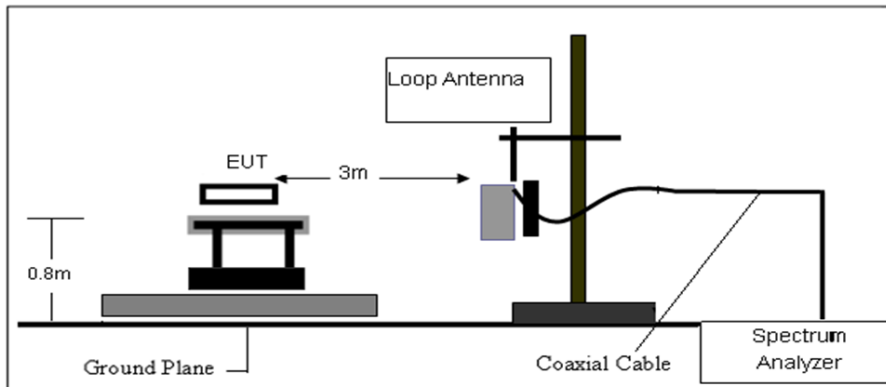
- a) The measuring distance of at 3 m shall be used for measurements at frequency 0.009MHz up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
- b) The EUT was placed on the top of a rotating table 0.8 meters(above 1GHz is 1.5 m) above the ground at a 3 meter anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- c) The height of the equipment shall be 0.8 m(above 1GHz is 1.5 m); the height of the test antenna shall vary between 1 m to 4 m. 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:

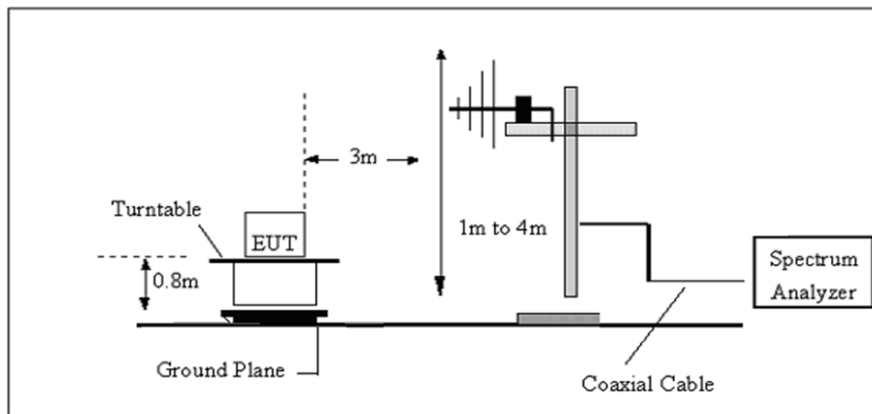
*Both horizontal and vertical antenna polarities were tested and performed test to three orthogonal axis. The worst case emissions were reported*

### 3.3.3 TEST SETUP

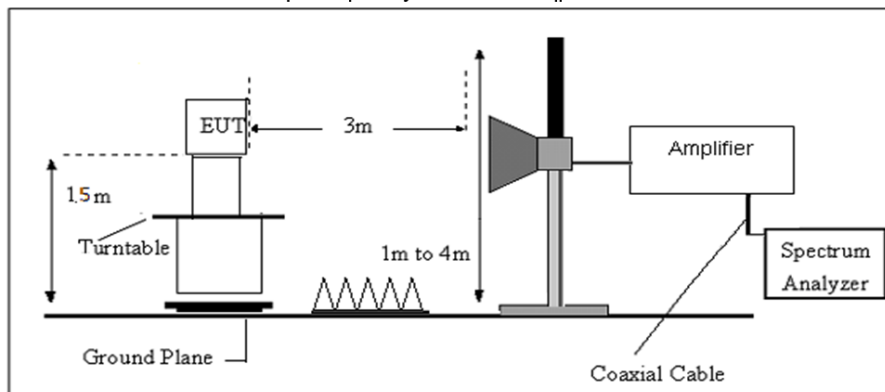
#### a) Radiated Emission Test-Up Frequency Below 30MHz



#### b) Radiated Emission Test-Up Frequency 30MHz~1GHz



#### c) Radiated Emission Test-Up Frequency Above 1GHz



### 3.3.4 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.



### 3.3.5 FIELD STRENGTH CALCULATION

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

Where

FS = Field Strength

CL = Cable Attenuation Factor (Cable Loss)

RA = Reading Amplitude

AG = Amplifier Gain

AF = Antenna Factor

For example

Frequency (MHz)	FS (dB $\mu$ V/m)	RA (dB $\mu$ V/m)	AF (dB)	CL (dB)	AG (dB)	Factor (dB)
300	40	58.1	12.2	1.6	31.9	-18.1

$$\text{Factor} = \text{AF} + \text{CL} - \text{AG}$$

### 3.3.6 TEST RESULT

9KHz-30MHz

Temperature:	25.8 °C	Relative Humidity:	51%
Test Voltage:	AC 120V/60Hz	Polarization:	--
Test Mode:	TX Mode		

Freq. (MHz)	Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	State P/F	Test Result
--	--	--	--	--	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 =  $40 \log(\text{specific distance}/\text{test distance})$ (dB);

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



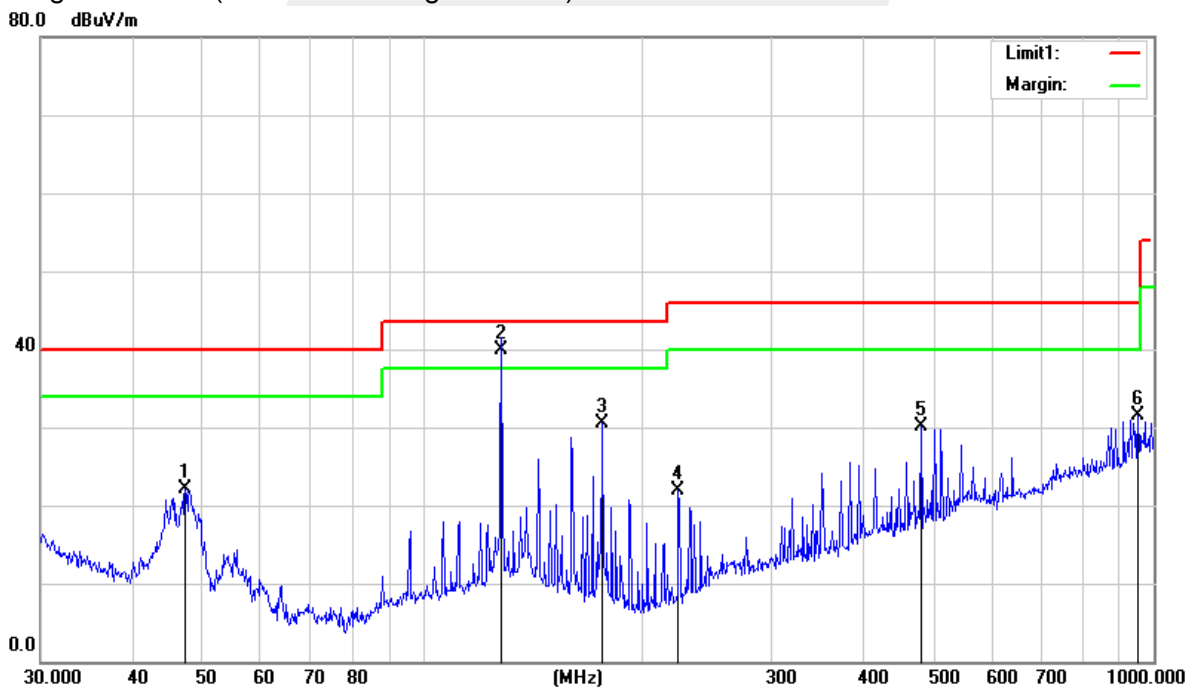
(30MHz - 1000MHz)

Temperature:	25.8 °C	Relative Humidity:	51%
Test Voltage:	AC 120V/60Hz	Polarization:	Horizontal
Test Mode:	Mode 1/2/3 (Mode 1 worst mode)		
Note:	GuanJin		

Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
47.3255	42.16	-20.10	22.06	40.00	-17.94	QP
128.0330	57.46	-17.58	39.88	43.50	-3.62	QP
176.2686	49.82	-19.41	30.41	43.50	-13.09	QP
223.7334	40.77	-18.89	21.88	46.00	-24.12	QP
480.5276	39.49	-9.38	30.11	46.00	-15.89	QP
952.0937	31.89	-0.36	31.53	46.00	-14.47	QP

Remark:

1. Margin = Result (Result =Reading + Factor )–Limit







Temperature:	25.8 °C	Relative Humidity:	51%
Test Voltage:	AC 120V/60Hz	Polarization:	Vertical
Test Mode:	Mode 1/2/3 (Mode 1 worst mode)		
Note:	GuanJin		

Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
44.2751	38.69	-18.53	20.16	40.00	-19.84	QP
128.1130	52.96	-17.58	35.38	43.50	-8.12	QP
176.2685	46.99	-19.41	27.58	43.50	-15.92	QP
191.7450	45.11	-20.24	24.87	43.50	-18.63	QP
511.8351	39.91	-8.88	31.03	46.00	-14.97	QP
938.8325	32.75	-0.75	32.00	46.00	-14.00	QP

Remark:.

1. Margin = Result (Result =Reading + Factor )–Limit

80.0 dBuV/m

