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FCC TEST REPORT

Report No:STS1805058W01

Issued for

Cabletime Limited

64 Greenham Road, Newbury, Berkshire, RG14 7HX, Britain

Product Name:	2.4G air mouse USB dongle
Brand Name:	Cabletime
Model Name:	642-1000
Series Model:	N/A
FCC ID:	2APSA-6421000
IC ID:	23879-6421000
Test Standard:	FCC Part 15.249
	RSS 210 Issue 9

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TEST RESULT CERTIFICATION

Applicant's name : Cabletime Limited
Address : 64 Greenham Road, Newbury, Berkshire, RG14 7HX, Britain
Manufacture's Name : Shenzhen C&D Electronics Co., Ltd.
Address : 9/F, Tower 9A, Baoneng Science&Technology Park, Qinghu Industrial Park, Qingxiang Road, Longhua Street, Longhua New District, Shenzhen City, Guangdong Province , P.R.China

Product description

Product Name: 2.4G air mouse USB dongle
Brand Name: Cabletime
Model Name.....: 642-1000
Series Model: N/A

Test Standards.....: FCC Part15.249
RSS 210 Issue 9

Test procedure : ANSI C63.10-2013

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 of performance of tests : 07 May 2018 ~28 May 2018
Date of Issue : 29 May 2018
Test Result : Pass

Testing Engineer : Chris chen
(Chris chen)

Technical Manager : Sean She
(Sean she)

Authorized Signatory : Vita Li
(Vita Li)





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Revision History

Rev.	Issue Date	Report NO.	Effect Page	Contents
00	29 May 2018	STS1805058W01	ALL	Initial Issue





1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part 15.249 , Subpart C RSS 210 Issue 9			
Standard Section	Test Item	Judgment	Remark
15.207 RSS-Gen Issue 4 (8.8)	Conducted Emission	Pass	--
15.203 RSS-Gen Issue 4	Antenna Requirement	Pass	--
15.249 RSS 210 Issue 9 (B.10)	Radiated Spurious Emission	Pass	--
15.205	Radiated Band Edge Emission	Pass	--
15.249 RSS-Gen Issue 4	Occupied Bandwidth	Pass	--

NOTE:

- (1) "N/A" denotes test is not applicable in this Test Report
- (2) All tests are according to ANSI C63.10-2013



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

CNAS Registration No.: L7649; FCC Registration No.: 625569

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)	$\pm 3.97\text{dB}$



2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Product Name	2.4G air mouse USB dongle
Trade Name	Cabletime
Model Name	642-1000
Series Model	N/A
Model Difference	N/A
Product Description	The EUT is a 2.4G air mouse USB dongle
	Operation Frequency: 2402-2480MHz
	Modulation Type: GFSK
	Antenna Designation: PCB Antenna
	Antenna Gain(Peak): -3.15 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.
Power Rating	DC 5V
Hardware version number	RF082F-RX-V01
Software version number	V3.0

Note:

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



2.

Channel List for BLE							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2402	21	2422	41	2442	61	2462
2	2403	22	2423	42	2443	62	2463
3	2404	23	2424	43	2444	63	2464
4	2405	24	2425	44	2445	64	2465
5	2406	25	2426	45	2446	65	2466
6	2407	26	2427	46	2447	66	2467
7	2408	27	2428	47	2448	67	2468
8	2409	28	2429	48	2449	68	2469
9	2410	29	2430	49	2450	69	2470
10	2411	30	2431	50	2451	70	2471
11	2412	31	2432	51	2452	71	2472
12	2413	32	2433	52	2453	72	2473
13	2414	33	2434	53	2454	73	2474
14	2415	34	2435	54	2455	74	2475
15	2416	35	2436	55	2456	75	2476
16	2417	36	2437	56	2457	76	2477
17	2418	37	2438	57	2458	77	2478
18	2419	38	2439	58	2459	78	2479
19	2420	39	2440	59	2460	79	2480
20	2421	40	2441	60	2461		

3. Table for Filed Antenna

Ant	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	NOTE
1	Cabletime	642-1000	PCB	NA	-3.15	Antenna



2.2 DESCRIPTION OF TEST MODES

For conducted test items and radiated spurious emissions

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

Pretest Mode	Description	Data/Modulation
Mode 1	TX CH01	GFSK
Mode 2	TX CH39	GFSK
Mode 3	TX CH79	GFSK

Note:

(1) All above mode have been measurement, only 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,50/60Hz is shown in the report

For AC Conducted Emission

Test Case	
AC Conducted Emission	Mode 4 : Keeping TX

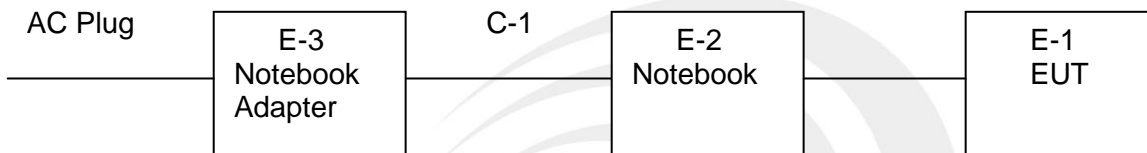
2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product power parameters

Radiated Spurious Emission Test



Conducted Emission Test





2.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Mfr/Brand	Model/Type No.	Serial No.	Note
E-2	Notebook	HP	500-320cx	N/A	N/A
E-3	Notebook Adapter	HP	HSTNN-CA15	N/A	N/A

Item	Shielded Type	Ferrite Core	Length	Note
C-1	DC Cable	NO	100cm	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.



2.5 EQUIPMENTS LIST FOR ALL TEST ITEMS

Radiation Test equipment

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
EMI Test Receiver	R&S	ESCI	102086	2017.10.15	2018.10.14
Bilog Antenna	TESEQ	CBL6111D	34678	2017.11.02	2018.11.01
Horn Antenna	Schwarzbeck	BBHA 9120D (1201)	9120D-1343	2017.10.27	2018.10.26
Passive Loop (9K--30MHz)	ZHNAN	ZN3090C	16035	2018.03.11	2019.03.10
Pre-mpplier (0.1M-3GHz)	EM	EM330	60538	2018.03.11	2019.03.10
PreAmplifier	Agilent	8449B	60538	2017.10.15	2018.10.14
USB RF power sensor	DARE	RPR3006W	15I00041SNO0 3	2017.10.15	2018.10.14
Semi-anechoic chamber	Changling	966	N/A	2017.10.15	2018.10.14

Conduction Test equipment

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
Test Receiver	R&S	ESCI	101427	2017.10.15	2018.10.14
LISN	R&S	ENV216	101242	2017.10.15	2018.10.14
conduction Cable	EM	C01	N/A	2018.03.11	2019.03.10
Temperature & Humidity	Mieo	HH660	N/A	2017.10.15	2018.10.14

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 15.249& RSS-Gen Issue 4 (8.8) limit in the table below has to be followed.

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

0.15 -0.5	66 - 56 *	56 - 46 *	FCC
0.50 -5.0	56.00	46.00	FCC
5.0 -30.0	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.

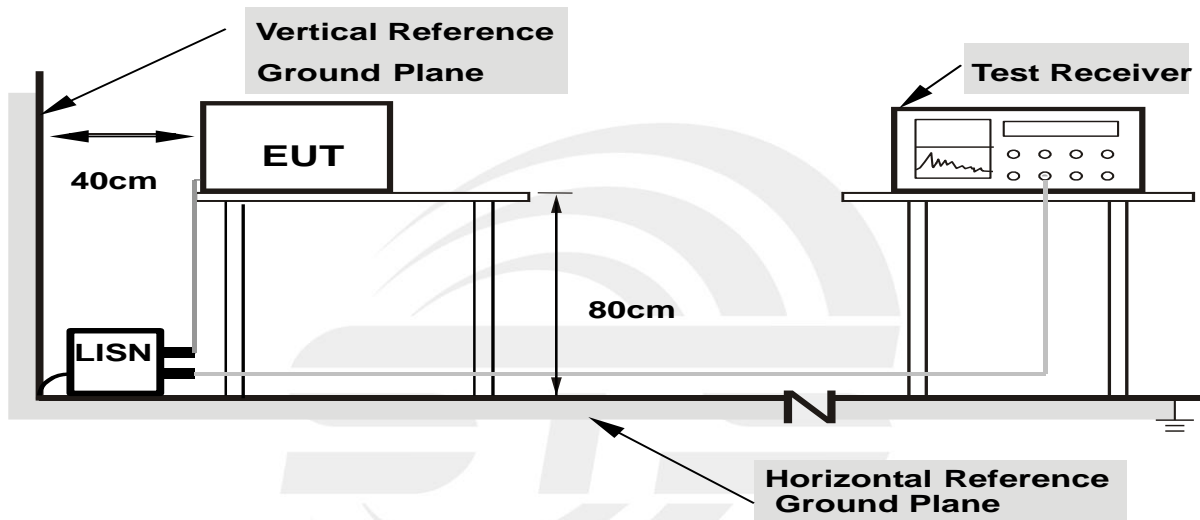
The following table is the setting of the receiver

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

3.1.2 TEST PROCEDURE

- 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 cm 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 RESULTS

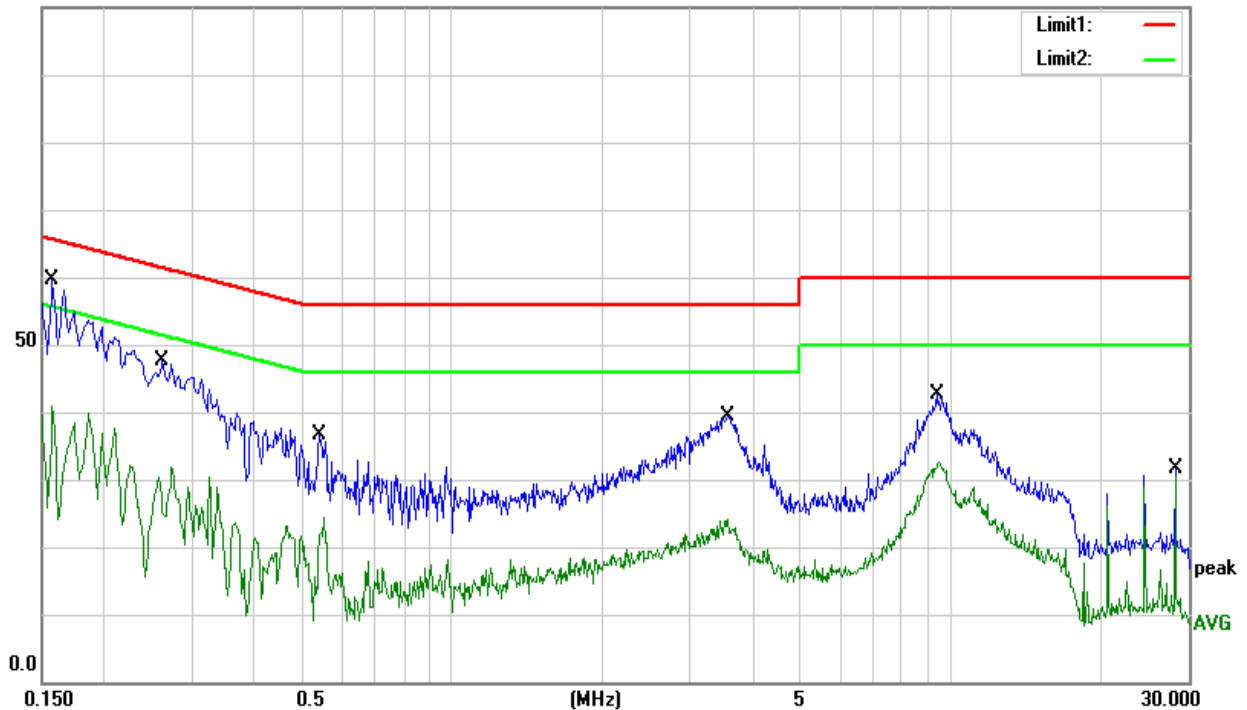
Temperature:	24°C	Relative Humidity:	60%
Test Voltage:	AC 120V/60Hz	Phase:	L
Test Mode:	Mode 4		

Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
0.1580	49.88	9.79	59.67	65.57	-5.90	QP
0.1580	31.04	9.79	40.83	55.57	-14.74	AVG
0.2620	37.66	10.06	47.72	61.37	-13.65	QP
0.2620	14.94	10.06	25.00	51.37	-26.37	AVG
0.5420	26.74	9.99	36.73	56.00	-19.27	QP
0.5420	11.88	9.99	21.87	46.00	-24.13	AVG
3.5660	29.65	9.82	39.47	56.00	-16.53	QP
3.5660	14.37	9.82	24.19	46.00	-21.81	AVG
9.3860	32.41	10.15	42.56	60.00	-17.44	QP
9.3860	22.39	10.15	32.54	50.00	-17.46	AVG
28.2260	21.47	10.24	31.71	60.00	-28.29	QP
28.2260	2.86	10.24	13.10	50.00	-36.90	AVG

Remark:

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

100.0 dBuV





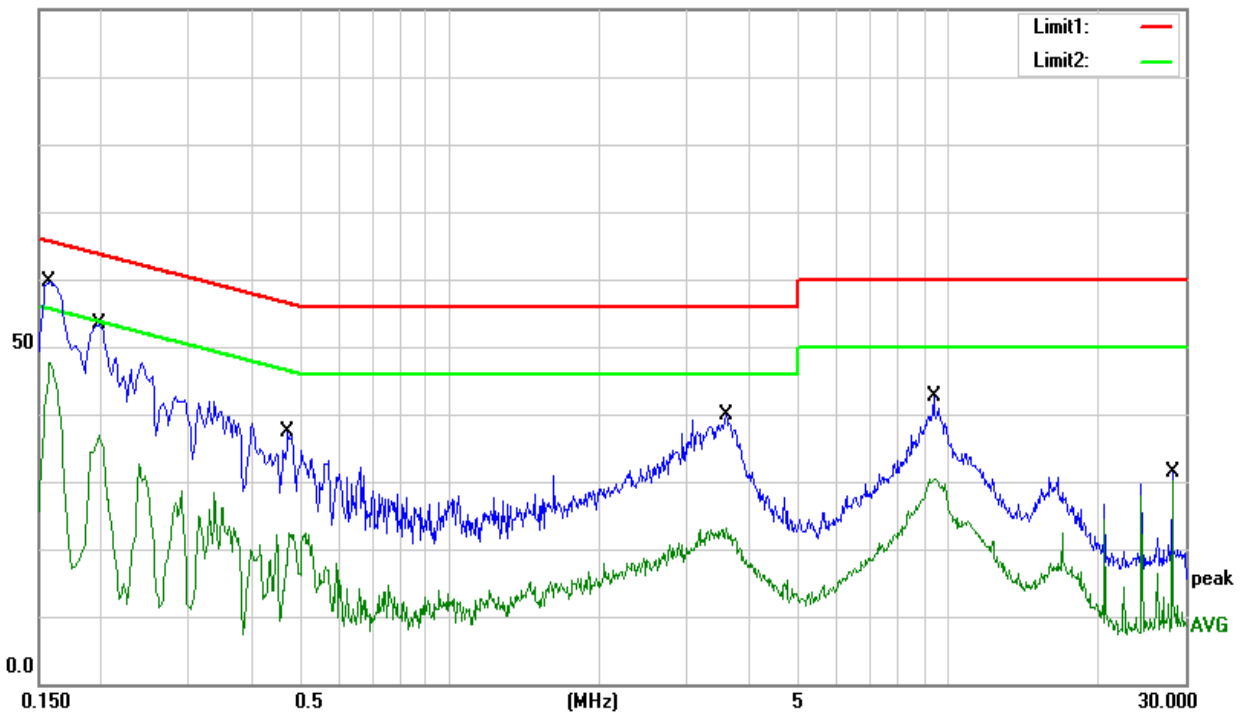
Temperature:	24°C	Relative Humidity:	60%
Test Voltage:	AC 120V/60Hz	Phase:	N
Test Mode:	Mode 4		

Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
0.1580	49.83	9.79	59.62	65.57	-5.95	QP
0.1580	37.92	9.79	47.71	55.57	-7.86	AVG
0.1980	43.48	9.78	53.26	63.69	-10.43	QP
0.1980	27.01	9.78	36.79	53.69	-16.90	AVG
0.4740	27.44	10.03	37.47	56.44	-18.97	QP
0.4740	12.24	10.03	22.27	46.44	-24.17	AVG
3.5940	30.00	9.82	39.82	56.00	-16.18	QP
3.5940	13.28	9.82	23.10	46.00	-22.90	AVG
9.3780	32.50	10.15	42.65	60.00	-17.35	QP
9.3780	20.31	10.15	30.46	50.00	-19.54	AVG
28.2260	21.17	10.24	31.41	60.00	-28.59	QP
28.2260	19.81	10.24	30.05	50.00	-19.95	AVG

Remark:

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

100.0 dBuV





3.2 RADIATED EMISSION MEASUREMENT

3.2.1 RADIATED EMISSION LIMITS

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on Part 15.249 and the Part 15.209(a) limit in the table below has to be followed.

Standard FCC 15.209

Frequencies (MHz)	Field Strength (micovolts/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
960~1000	500	3
Above 1000	Other:74.0 dB(μ V)/m (Peak) 54.0 dB(μ V)/m (Average)	3

Standard FCC 15.249

Frequency of Emission (MHz)	Field Strength of fundamental (millivolts /meter)	Field Strength of Harmonics (microvolts/meter)
900~928	50	500
2400~2483.5	50	500
5725~5875	50	500
24000~242500	250	2500

Notes:

- (1) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

In case the emission fall within the restricted band specified on RSS-Gen Issue 4 limit in the followed

. In measuring unwanted emissions, the spectrum shall be investigated from 30 MHz or the lowest radio frequency signal generated in the equipment, whichever is lower, without going below 9 kHz, up to at least the frequency given below:

(a) If the equipment operates below 10 GHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

(b) If the equipment operates at or above 10 GHz: to the fifth harmonic of the highest fundamental frequency or to 100 GHz, whichever is lower.

Particular attention should be paid to harmonics and sub-harmonics of the carrier frequency, as well as to those frequencies removed from the carrier by multiples of the oscillator frequency. Radiation at the frequencies of multiplier stages should also be checked.

The amplitude of spurious emissions attenuated more than 20 dB below the permissible value need not be reported.

When limits are expressed in absolute terms, compliance with the emission limits below 1000 MHz shall be demonstrated using a CISPR quasi-peak detector and the related measurement bandwidth. As an alternative to CISPR quasi-peak measurement, compliance with the emission limits can be demonstrated using measuring equipment employing a peak detector function properly adjusted for factors such as pulse desensitization as required, with an equal or greater measurement bandwidth relative to the applicable CISPR quasi-peak bandwidth.

Above 1000 MHz, compliance with the emission limits shall be demonstrated using an average detector with a minimum resolution bandwidth of 1 MHz.

In case the emission fall within the restricted band specified on RSS 210 Issue 9 (B.10) limit in the followed

1. The field strength of fundamental and harmonic emissions, measured at 3 m, shall not exceed 50 mV/m and 0.5 mV/m respectively.

The field strength limits shall be measured using an average detector, except for the fundamental emission in the frequency band 902-928 MHz, which is based on measurements using an International Special Committee on Radio Interference (CISPR) quasi-peak detector.

2. Emissions radiated outside of the specified frequency bands, except for harmonic emissions, shall be attenuated by at least 50 dB below the level of the fundamental emissions or to the general field strength limits listed in RSS-Gen, whichever is less stringent.

NOTE:

(1)The limit for radiated test was performed according to RSS 210 Issue 9

(2)Emission level (dBuV/m)=20log Emission level (uV/m).



Spectrum Parameter	Setting
Detector	Peak/AV
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB (emission in restricted band)	>20BW
VB (emission in restricted band)	=3xRB

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

3.2.2 TEST PROCEDURE

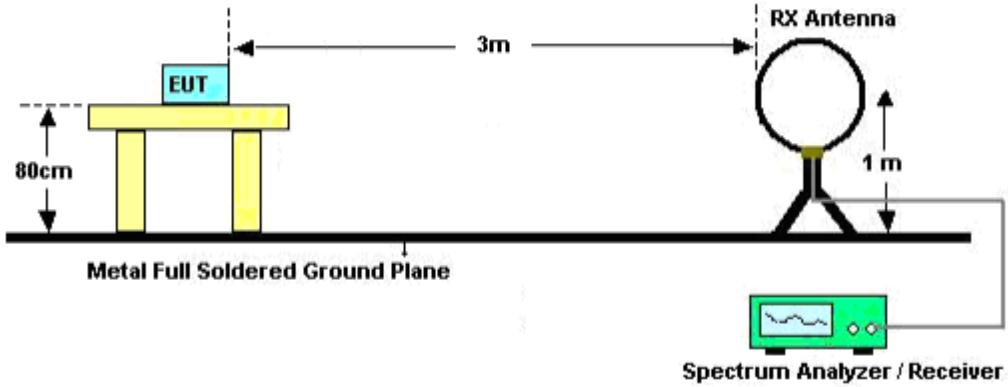
- a. The measuring distance of 3m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation (Below 1GHz)
- b. The measuring distance of 3m shall be used for measurements. The EUT was placed on the top of a rotating table 1.5 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation (Above 1GHz)
- c. The height of the test antenna shall vary between 1m to 4m. Both horizontal and vertical polarization of the antenna are set to make the measurement.
- d. The initial step in collecting radiated emission data is a receive peak detector mode. Pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- e. All readings are peak unless otherwise stated QP in column of Note. Peak denoted that the Peak reading compliance with the QP limits and then QP Mode measurement didn't perform (Below 1GHz)
- f. All readings are Peak mode value unless otherwise stated AVG in column of Note. If the Peak mode measured value compliance with the Peak limits and lower than AVG Limits, the EUT shall be deemed to meet Peak & AVG limits and then only Peak mode was measured, but AVG mode didn't perform. (Above 1GHz)
- g. 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

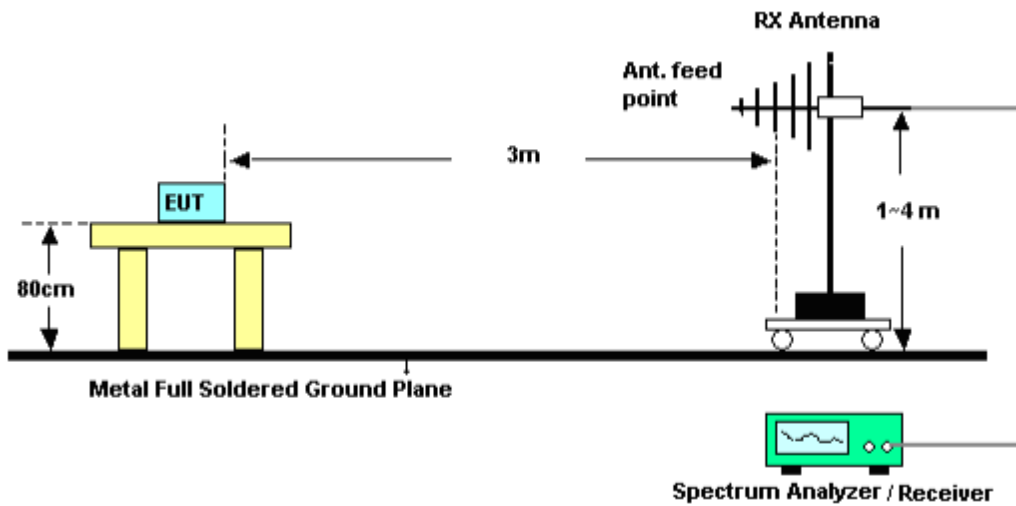
No deviation

3.2.4 TEST SETUP

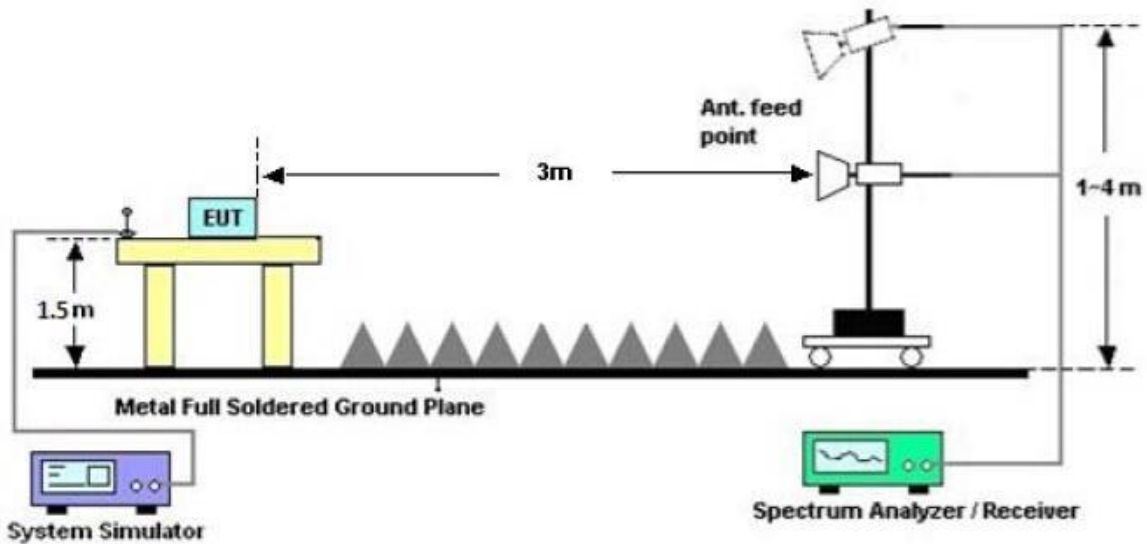
(A) Radiated Emission Test-Up Frequency Below 30MHz



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



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





3.2.5 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 μ V/m)	RA (dB μ V/m)	AF (dB)	CL (dB)	AG (dB)	Factor (dB)
300	40	58.1	12.2	1.6	31.9	-18.1

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

3.2.6 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.

Below 30 MHz

Temperature:	24 °C	Relative Humidity:	60%
Test Voltage:	DC 5V From Notebook	Polarization:	---
Test Mode:	--		

Freq. (MHz)	Reading (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	State 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 (specific distance/test distance)(dB);

Limit line = specific limits(dB μ v) + distance extrapolation factor.



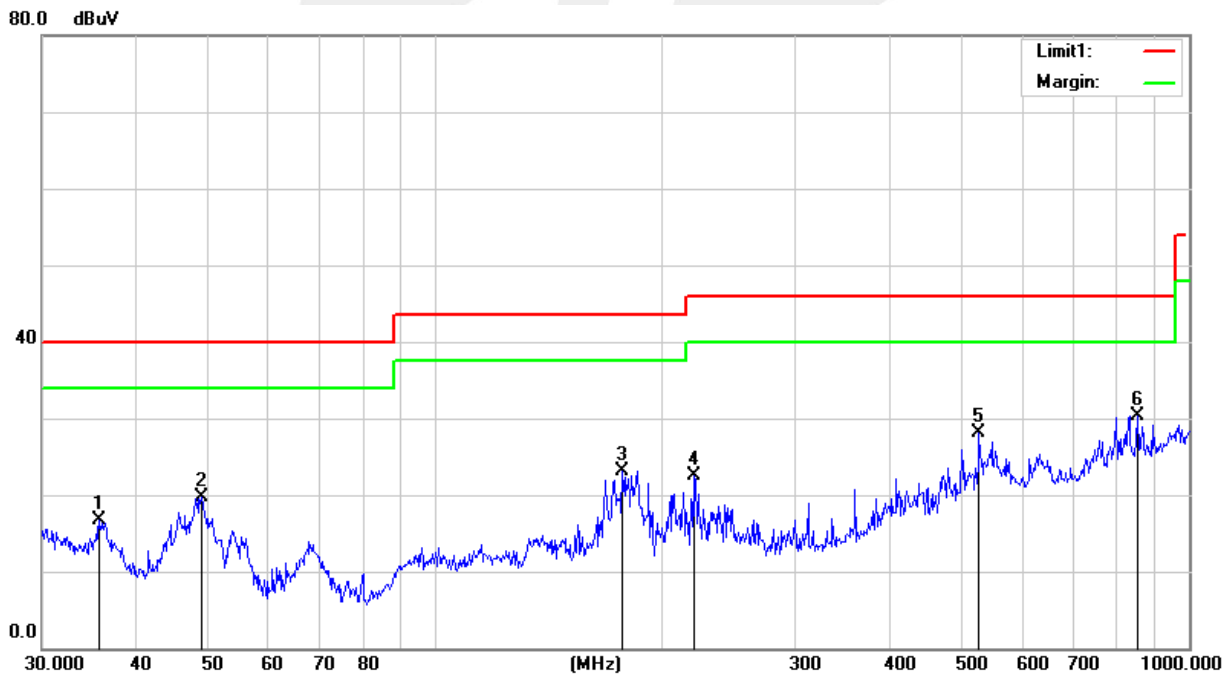
Between 30MHz – 1000 MHz Radiation Spurious

Temperature:	26.1 °C	Relative Humidity:	64%
Test Voltage:	DC 5V From Notebook	Phase:	Horizontal
Test Mode:	Mode 1/2/3(Model 1 worst)		

Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
35.7490	30.79	-14.14	16.65	40.00	-23.35	QP
48.8430	40.67	-20.89	19.78	40.00	-20.22	QP
176.8878	42.53	-19.41	23.12	43.50	-20.38	QP
219.8450	41.60	-19.13	22.47	46.00	-23.53	QP
526.3967	36.44	-8.26	28.18	46.00	-17.82	QP
854.0247	32.97	-2.70	30.27	46.00	-15.73	QP

Remark:

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



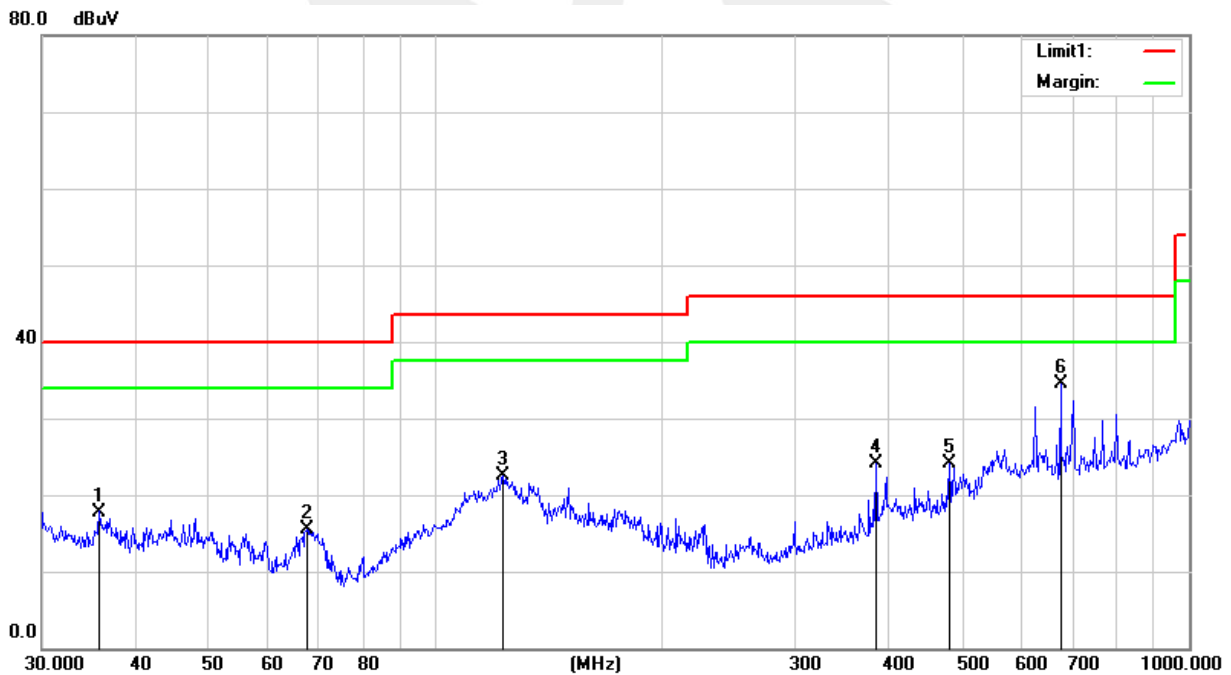


Temperature:	26.1 °C	Relative Humidity:	64%
Test Voltage:	DC 5V From Notebook	Phase:	Vertical
Test Mode:	Mode 1/2/3(Model 1 worst)		

Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
35.7490	31.94	-14.14	17.80	40.00	-22.20	QP
67.4382	39.60	-24.16	15.44	40.00	-24.56	QP
122.8340	40.06	-17.65	22.41	43.50	-21.09	QP
383.9318	36.42	-12.35	24.07	46.00	-21.93	QP
480.5276	33.56	-9.38	24.18	46.00	-21.82	QP
675.2080	40.45	-5.87	34.58	46.00	-11.42	QP

Remark:

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





Fundamental frequency:

PK

Frequency (MHz)	Reading (dB μ V/m)	Amplifier (dB)	Loss (dB)	Antenna Factor (dB/m)	Factor(dB) Corr.	Result (dB μ V/m)	Limit (dB μ V/m)	Margin(dB)	Polarization
	PEAK					PEAK	PEAK		
2402	95.734	44.40	6.03	27.60	-10.77	84.97	114	-29.03	Vertical
2402	93.687	44.40	6.03	27.60	-10.77	82.92	114	-31.08	Horizontal
2440	87.176	44.40	6.04	27.63	-10.73	76.45	114	-37.55	Vertical
2440	85.263	44.40	6.04	27.63	-10.73	74.54	114	-39.46	Horizontal
2480	91.414	44.40	6.06	27.66	-10.68	80.74	114	-33.26	Vertical
2480	89.243	44.40	6.06	27.66	-10.68	78.57	114	-35.43	Horizontal

AV

Frequency (MHz)	Reading (dB μ V/m)	Amplifier (dB)	Loss (dB)	Antenna Factor (dB/m)	Factor(dB) Corr.	Result (dB μ V/m)	Limit (dB μ V/m)	Margin(dB)	Polarization
	AV					AV	AV		
2402	75.445	44.40	6.03	27.60	-10.77	64.68	94	-29.32	Vertical
2402	74.673	44.40	6.03	27.60	-10.77	63.91	94	-30.09	Horizontal
2440	67.882	44.40	6.04	27.63	-10.73	57.16	94	-36.84	Vertical
2440	65.134	44.40	6.04	27.63	-10.73	54.41	94	-39.59	Horizontal
2480	71.856	44.40	6.06	27.66	-10.68	61.18	94	-32.82	Vertical
2480	69.154	44.40	6.06	27.66	-10.68	58.48	94	-35.52	Horizontal

Note: RBW>20BW; VBW=3xRBW



Above 1G Radiation Spurious

Frequency (MHz)	Reading (dBμV)	Amplifier (dB)	Loss (dB)	Antenna Factor (dB/m)	Corrected Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type	Comment
Low Channel (2402 MHz)										
3264.84	48.67	44.70	6.70	28.20	-9.80	38.87	74.00	-35.13	PK	Vertical
3264.84	38.59	44.70	6.70	28.20	-9.80	28.79	54.00	-25.21	AV	Vertical
3264.83	48.53	44.70	6.70	28.20	-9.80	38.73	74.00	-35.27	PK	Horizontal
3264.83	38.43	44.70	6.70	28.20	-9.80	28.63	54.00	-25.37	AV	Horizontal
4804.33	58.21	44.20	9.04	31.60	-3.56	54.65	74.00	-19.35	PK	Vertical
4804.33	38.47	44.20	9.04	31.60	-3.56	34.91	54.00	-19.09	AV	Vertical
4804.58	59.01	44.20	9.04	31.60	-3.56	55.45	74.00	-18.55	PK	Horizontal
4804.58	39.53	44.20	9.04	31.60	-3.56	35.97	54.00	-18.03	AV	Horizontal
5359.78	45.59	44.20	9.86	32.00	-2.34	43.25	74.00	-30.75	PK	Vertical
5359.78	37.92	44.20	9.86	32.00	-2.34	35.58	54.00	-18.42	AV	Vertical
5359.85	45.27	44.20	9.86	32.00	-2.34	42.93	74.00	-31.07	PK	Horizontal
5359.85	37.82	44.20	9.86	32.00	-2.34	35.48	54.00	-18.52	AV	Horizontal
7223.95	50.61	43.50	11.40	35.50	3.40	54.01	74.00	-19.99	PK	Vertical
7223.95	33.32	43.50	11.40	35.50	3.40	36.72	54.00	-17.28	AV	Vertical
7223.91	51.73	43.50	11.40	35.50	3.40	55.13	74.00	-18.87	PK	Horizontal
7223.91	33.53	43.50	11.40	35.50	3.40	36.93	54.00	-17.07	AV	Horizontal



Frequency (MHz)	Reading (dB μ V)	Amplifier (dB)	Loss (dB)	Antenna Factor (dB/m)	Corrected Factor (dB)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector Type	Comment
Middle Channel (2440 MHz)										
3264.87	48.65	44.70	6.70	28.20	-9.80	38.85	74.00	-35.15	PK	Vertical
3264.87	39.39	44.70	6.70	28.20	-9.80	29.59	54.00	-24.41	AV	Vertical
3264.61	48.98	44.70	6.70	28.20	-9.80	39.18	74.00	-34.82	PK	Horizontal
3264.61	38.00	44.70	6.70	28.20	-9.80	28.20	54.00	-25.80	AV	Horizontal
4880.33	59.00	44.20	9.04	31.60	-3.56	55.44	74.00	-18.56	PK	Vertical
4880.33	39.59	44.20	9.04	31.60	-3.56	36.03	54.00	-17.97	AV	Vertical
4880.44	58.88	44.20	9.04	31.60	-3.56	55.32	74.00	-18.68	PK	Horizontal
4880.44	38.23	44.20	9.04	31.60	-3.56	34.67	54.00	-19.33	AV	Horizontal
5359.62	45.88	44.20	9.86	32.00	-2.34	43.54	74.00	-30.46	PK	Vertical
5359.62	38.13	44.20	9.86	32.00	-2.34	35.79	54.00	-18.21	AV	Vertical
5359.67	45.43	44.20	9.86	32.00	-2.34	43.09	74.00	-30.91	PK	Horizontal
5359.67	37.33	44.20	9.86	32.00	-2.34	34.99	54.00	-19.01	AV	Horizontal
7320.74	51.70	43.50	11.40	35.50	3.40	55.10	74.00	-18.90	PK	Vertical
7320.74	32.75	43.50	11.40	35.50	3.40	36.15	54.00	-17.85	AV	Vertical
7320.71	51.49	43.50	11.40	35.50	3.40	54.89	74.00	-19.11	PK	Horizontal
7320.71	33.26	43.50	11.40	35.50	3.40	36.66	54.00	-17.34	AV	Horizontal



Frequency (MHz)	Reading (dBμV)	Amplifier (dB)	Loss (dB)	Antenna Factor (dB/m)	Corrected Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type	Comment
High Channel (2480 MHz)										
3264.87	48.97	44.70	6.70	28.20	-9.80	39.17	74.00	-34.83	PK	Vertical
3264.87	38.92	44.70	6.70	28.20	-9.80	29.12	54.00	-24.88	AV	Vertical
3264.80	48.82	44.70	6.70	28.20	-9.80	39.02	74.00	-34.98	PK	Horizontal
3264.80	38.25	44.70	6.70	28.20	-9.80	28.45	54.00	-25.55	AV	Horizontal
4960.36	58.19	44.20	9.04	31.60	-3.56	54.63	74.00	-19.37	PK	Vertical
4960.36	38.67	44.20	9.04	31.60	-3.56	35.11	54.00	-18.89	AV	Vertical
4960.34	58.17	44.20	9.04	31.60	-3.56	54.61	74.00	-19.39	PK	Horizontal
4960.34	38.91	44.20	9.04	31.60	-3.56	35.35	54.00	-18.65	AV	Horizontal
5359.83	45.52	44.20	9.86	32.00	-2.34	43.18	74.00	-30.82	PK	Vertical
5359.83	37.20	44.20	9.86	32.00	-2.34	34.86	54.00	-19.14	AV	Vertical
5359.81	45.89	44.20	9.86	32.00	-2.34	43.55	74.00	-30.45	PK	Horizontal
5359.81	37.24	44.20	9.86	32.00	-2.34	34.90	54.00	-19.10	AV	Horizontal
7439.87	50.52	43.50	11.40	35.50	3.40	53.92	74.00	-20.08	PK	Vertical
7439.87	32.49	43.50	11.40	35.50	3.40	35.89	54.00	-18.11	AV	Vertical
7439.69	51.47	43.50	11.40	35.50	3.40	54.87	74.00	-19.13	PK	Horizontal
7439.69	32.80	43.50	11.40	35.50	3.40	36.20	54.00	-17.80	AV	Horizontal

Note:

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

Emission Level = Reading + Factor

2) The frequency emission of peak points that did not show above the forms are below the limit, the frequency emission is mainly from the environment noise.



(Radiation Band edge)

Frequency (MHz)	Reading (dB μ V)	Amplifier (dB)	Loss (dB)	Antenna Factor (dB/m)	Corrected Factor (dB)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector Type	Comment
GFSK										
2400.00	67.57	43.80	4.91	25.90	-12.99	54.58	74	-19.42	PK	Vertical
2400.00	53.09	43.80	4.91	25.90	-12.99	40.10	54	-13.90	AV	Vertical
2400.00	68.45	43.80	4.91	25.90	-12.99	55.46	74	-18.54	PK	Horizontal
2400.00	52.75	43.80	4.91	25.90	-12.99	39.76	54	-14.24	AV	Horizontal
2483.50	69.95	43.80	5.12	25.90	-12.78	57.17	74	-16.83	PK	Vertical
2483.50	52.69	43.80	5.12	25.90	-12.78	39.91	54	-14.09	AV	Vertical
2483.50	70.14	43.80	5.12	25.90	-12.78	57.36	74	-16.64	PK	Horizontal
2483.50	52.46	43.80	5.12	25.90	-12.78	39.68	54	-14.32	AV	Horizontal

Low measurement frequencies is range from 2310 to 2400 MHz, high measurement frequencies is range from 2483.5 to 2500 MHz.

Only show the worst point data of the emissions in the frequency 2310-2400 MHz and 2483.5-2500 MHz.



4. BANDWIDTH TEST

4.1 TEST PROCEDURE

- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- b. Spectrum Setting : RBW= 30KHz, VBW \geq RBW, Sweep time = Auto.

4.2 TEST SETUP



4.3 EUT OPERATION CONDITIONS

TX mode.



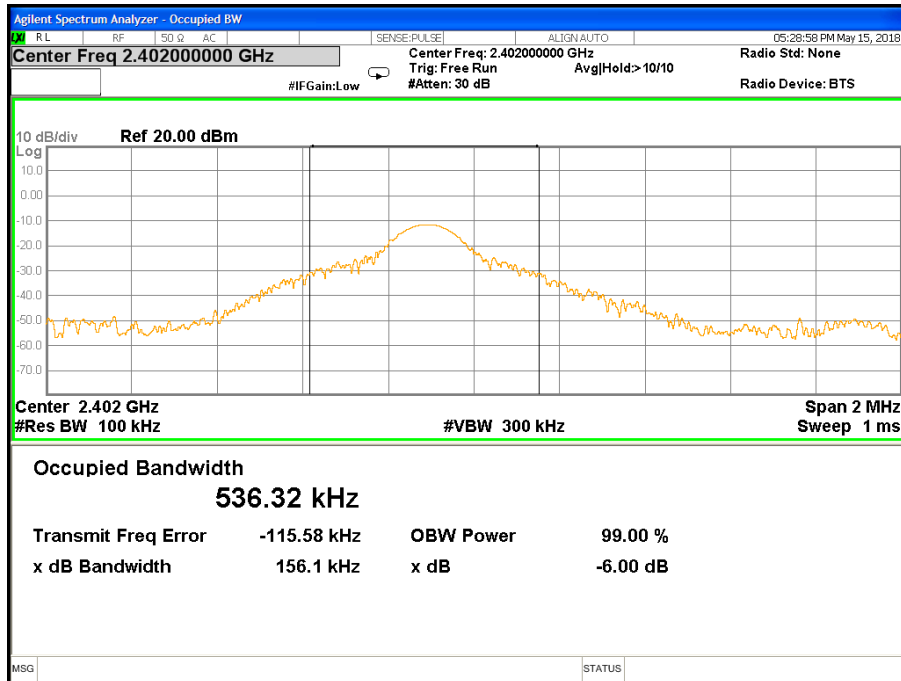


4.4 TEST RESULTS

Temperature:	25 °C	Relative Humidity:	50%
Test Voltage:	AC120V/60Hz		

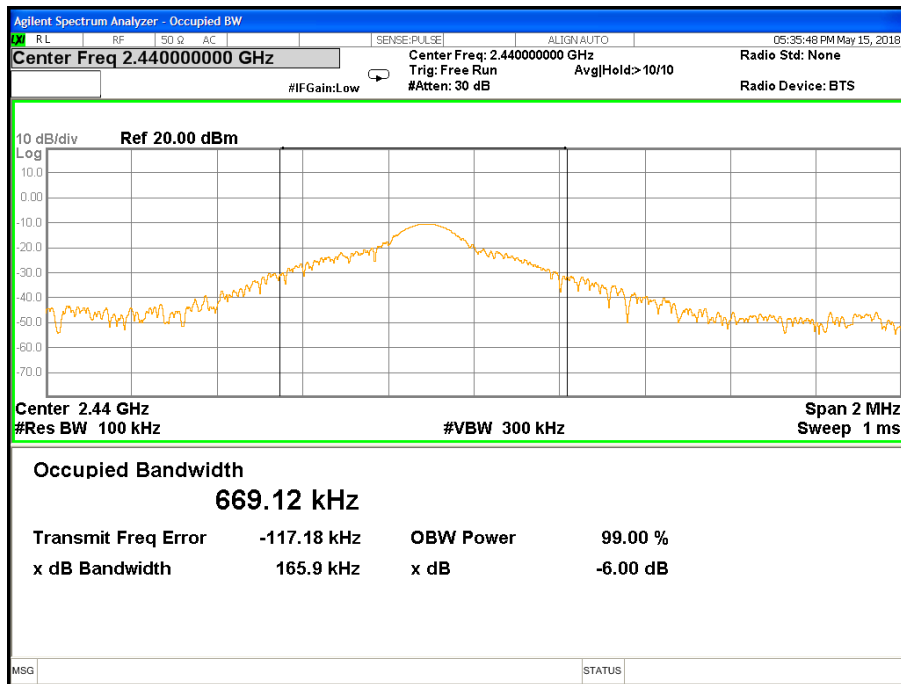
Test Channel	Frequency (MHz)	20 dBc Bandwidth (MHz)	99% Bandwidth (MHz)
CH01	2402	0.156	0.536
CH39	2440	0.166	0.669
CH79	2480	0.176	0.787

The Lowest Channel:2402MHz

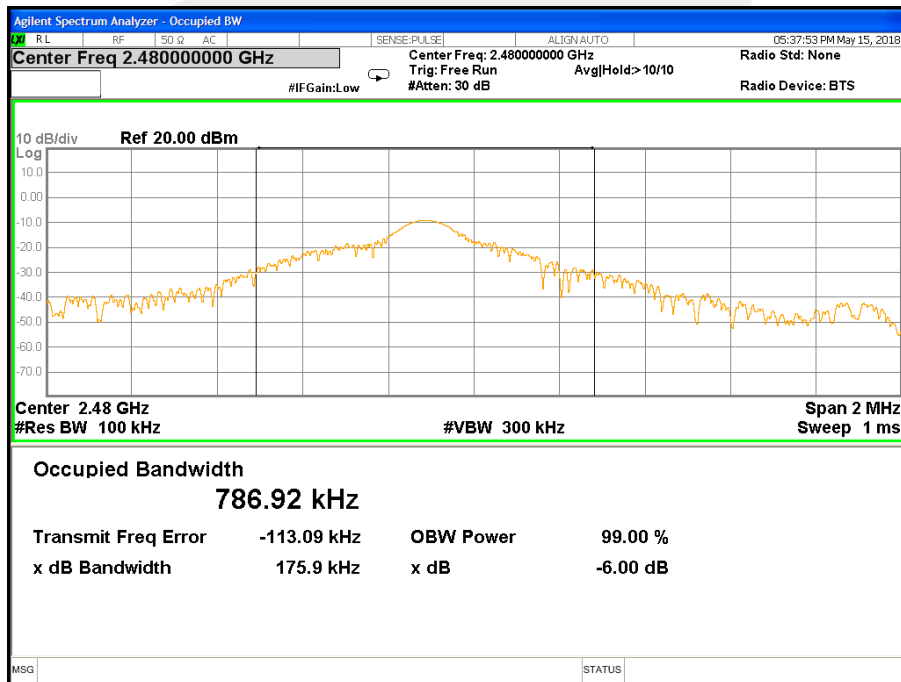




The Middle Channel:2440MHz



The High Channel: 2480MHz





5. ANTENNA REQUIREMENT

5.1 STANDARD REQUIREMENT

According to the FCC Part 15 Paragraph 15.203& RSS-Gen Issue 4, 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.

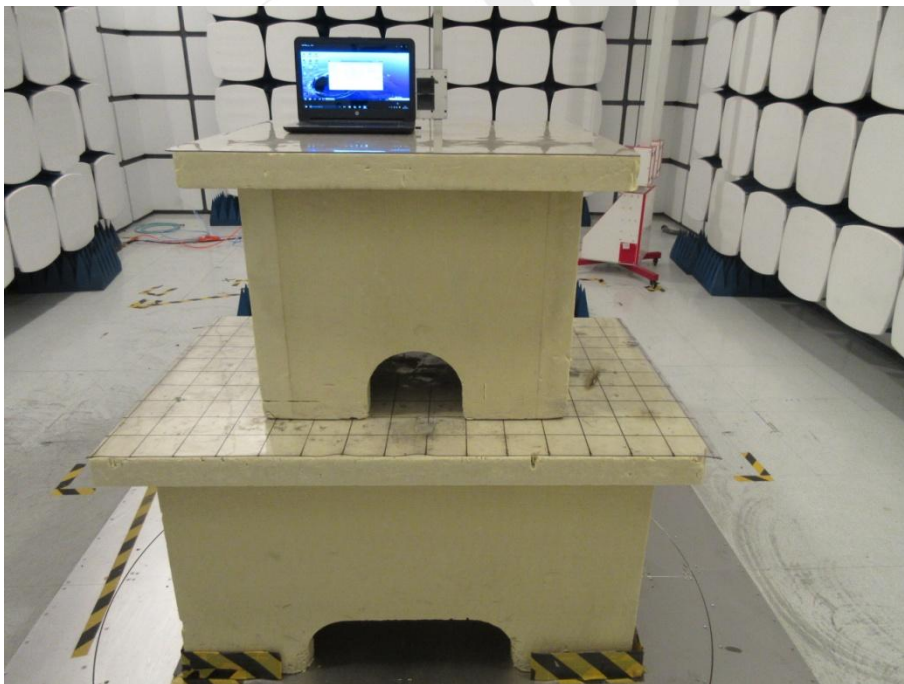
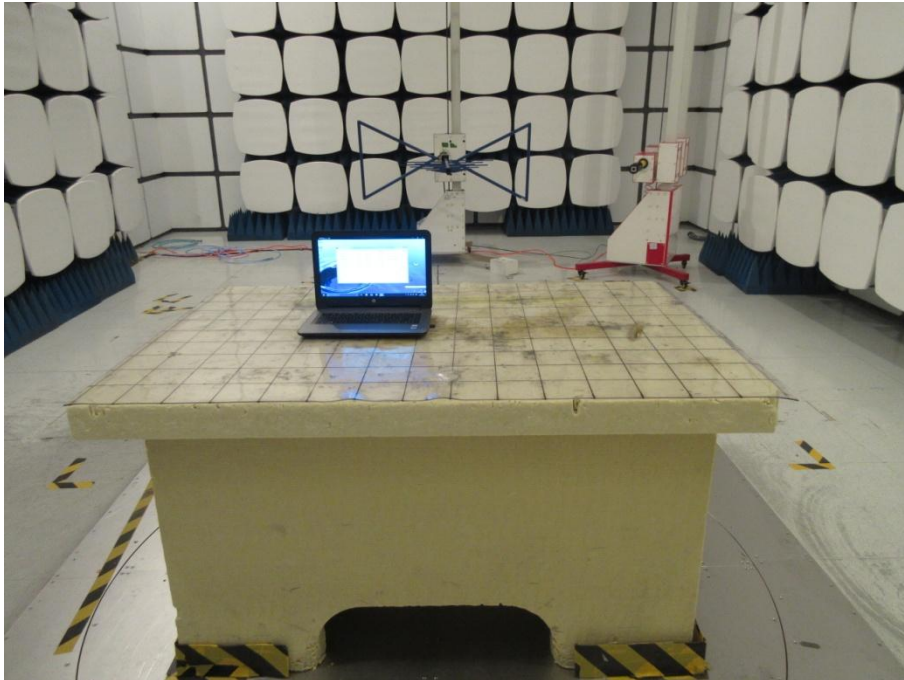
5.2 EUT ANTENNA

The EUT antenna is PCB Antenna.It conforms to the standard requirements.



APPENDIX- PHOTOS OF TEST SETUP

Radiated Measurement Photos



Conducted Measurement Photo



*****END OF THE REPORT*****

