



FCC Part 15B TEST REPORT

Report No.: STS1810236E01

Issued for

THE GOOD BOX CO LABS LTD

Ground Floor Optimum House, Clippers Quay, Salford Quays
M50 3XP UK

Product Name:	GOODBOX CORE
Brand Name:	GOODBOX
Model Name:	GB CORE
Series Model:	Version 1
FCC ID:	2ASHQ-GB-CORE-V01
Test Standard:	FCC 47 CFR Part 15: Subpart B

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**TEST RESULT CERTIFICATION**

Applicant's Name: THE GOOD BOX CO LABS LTD
Address: Ground Floor Optimum House, Clippers Quay, Salford Quays M50 3XP UK
Manufacture's Name: THE GOOD BOX CO LABS LTD
Address: Ground Floor Optimum House, Clippers Quay, Salford Quays M50 3XP UK
Product Description:
Product Name.....: GOODBOX CORE
Brand Name: GOODBOX
Model Name: GB CORE
Series Model: Version 1
Standards: FCC 47 CFR Part 15: Subpart B
Test Procedure.....: ANSI C63.4-2014
This device described above has been tested by STS, 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 of Performance of Tests: 29 Oct. 2018 ~ 10 Nov. 2018
Date of Issue: 11 Nov. 2018
Test Result.....: **Pass**

Compiled by

:

(Mickey Deng)

Technical Manager

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(Chopin Xiao)

Authorized Signatory

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(Vita Li)





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**Revision History**

Rev.	Issue Date	Report No.	Effect Page	Contents
00	11 Nov. 2018	STS1810236E01	ALL	Initial Issue





1. SUMMARY OF THE TEST RESULTS

Test procedures according to the technical standards:

EMISSION			
Standard	Item	Result	Remarks
FCC 47 CFR Part 15: Subpart B	Conducted Emission	PASS	Meet Class B limit
	Radiated Emission	PASS	Meet Class B limit

NOTE:

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

1.1 TEST FACTORY

Company Name:	Shenzhen STS Test Services Co. Ltd.
Address:	1/F., Building B, Zhuoke Science Park, No.190, Chongqing Road, Fuyong Street, Bao'an District, Shenzhen, Guangdong, China
Telephone:	+86-755 3688 6288
Fax:	+86-755 3688 6277
Registration No.:	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)	$\pm 3.18\text{dB}$
2	Conducted Emission (150KHz-30MHz)	$\pm 2.70\text{dB}$
3	All emissions, radiated (<1G) 30MHz-200MHz	$\pm 3.43\text{dB}$
4	All emissions, radiated (<1G) 200MHz-1000MHz	$\pm 3.57\text{dB}$
5	All emissions, radiated (>1G)	$\pm 4.13\text{dB}$



2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF THE EUT

Product Name	GOODBOX CORE	
Brand Name	GOODBOX	
Model Name	GB CORE	
Series Model	Version 1	
Product Differences	Only different in model name.	
Test Sample Number	181026028	
Product Description	The EUT is a GOODBOX CORE Based on the application, features, or specification exhibited in User's Manual, the EUT is considered as an ITE/Digital Apparatus. More details of EUT technical specification, please refer to the User's Manual.	
Frequency Bands	WLAN	2.4GHz IEEE 802 11b/g/n(HT20):2412 MHz to 2462 MHz
	Bluetooth	2402~ 2480MHz
	GSM	GSM 850:824.2~848.8MHz PCS1900:1850.2~1909.8MHz
	WCDMA	Band V: 826.4~846.6MHz
	LTE	Band 5: 824~849MHz Band 7: 2500~2570MHz Band 38: 2570~2620MHz Band 40: 2300~2400MHz Band 41: 2496~2690MHz
	NFC	13.56MHz



Modulation Mode	WLAN	2.4GHz: 802.11b(DSSS):CCK,DQPSK,DBPSK 802.11g(OFDM):BPSK,QPSK,16-QAM,64-QAM 802.11n(OFDM):BPSK,QPSK,16-QAM,64-QAM
	Bluetooth	BT(1Mbps): GFSK BT EDR(2Mbps): $\pi/4$ -DQPSK BT EDR(3Mbps): 8DPSK
	BLE	GFSK
	NFC	ASK
Power Source	Input: AC 100~240 V, 450mA, 50/60 Hz Output: DC 12V, 2000 mA	
Battery	Rated Voltage: 3.63V Capacity: 10050mAh Charge Limit: 4.2V	
Hardware Version Number	GB-CORE-V01	
Software Version Number	GB-CORE-V1.0	

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



2.2 DESCRIPTION OF THE TEST MODES

To investigate the maximum EMI emission characteristics generated from EUT, the test system was pre-scanning tested based on the consideration of following EUT operation mode or test configuration mode which possibly 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	USB port communication with PC

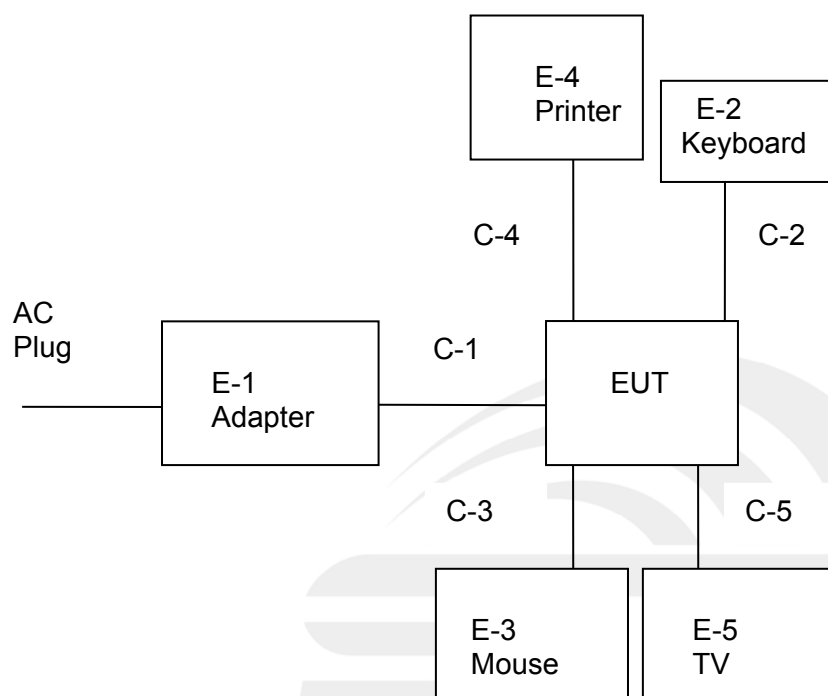
For Conducted Test	
Final Test Mode	Description
Mode 1	USB port communication with PC

For Radiated Test	
Final Test Mode	Description
Mode 1	USB port communication with PC

NOTE:

1. The test modes were carried out for all operation modes. Only worst case will be shown in this report.
2. We have been tested for all available U.S. voltage and frequencies (For 120V, 50/60Hz) for which the device is capable of operation.

2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF THE SYSTEM TESTED





2.4 DESCRIPTION OF THE 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.

Accessories equipment

Item	Equipment	Mfr/Brand	Model/Type No.
E-1	Adapter	JHD	JHD-AD024D-120200AA-A

Auxiliary equipment

Item	Equipment	Mfr/Brand	Model/Type No.
E-2	Keyboard	HP	PR1101U
E-3	Mouse	MOTOSPEED	F66
E-4	Printer	HP	HP1020
E-5	TV	N/A	N/A

Cable

Item	Type	Shielded Type	Ferrite Core	Length
C-1	DC Cable	Shielded	NO	80cm
C-2	USB Cable (FTP)	Shielded	NO	110cm
C-3	USB Cable (FTP)	Shielded	NO	105cm
C-4	USB Cable (FTP)	Shielded	NO	115cm
C-5	HDMI Cable	Shielded	NO	110cm

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”.
- (4) PC is the FCC DOC is approved.



2.5 EQUIPMENTS LIST FOR ALL TEST ITEMS

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.

Radiation Test equipment

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last Calibration	Calibrated Until
EMI Test Receiver	R&S	ESCI	102086	2018.10.13	2019.10.12
Bilog Antenna	TESEQ	CBL6111D	45873	2017.11.02	2020.11.01
Horn Antenna	SCHWARZB ECK	BBHA 9120D	1201	2018.10.13	2019.10.12
Pre-mpifier(1G-18G)	SKET	LNPA-01018G- 45	SK2018080901	2018.10.13	2019.10.12
Spectrum Analyzer	R&S	FSP60	100363	2018.07.10	2019.07.09
Pre-mpifier(0.1M-3G Hz)	EM	EM330	060665	2018.03.09	2019.03.08
RE Cable (9K-1G)	N/A	R01	N/A	2018.10.13	2019.10.12
RE Cable (1G-18G)	N/A	R02	N/A	2018.10.13	2019.10.12
Temperature & Humidity	Mieo	HH660	N/A	2018.10.11	2019.10.10
Horn Antenna(18-40GHz)	A-INFO	LB-180400-KF	J211020657	2018.03.11	2019.03.10

Conduction Test equipment

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last Calibration	Calibrated Until
EMI Test Receiver	R&S	ESCI	102086	2018.10.13	2019.10.12
LISN	R&S	ENV216	101242	2018.10.13	2019.10.12
LISN	ETS	3810/2NM	00023625	2018.10.13	2019.10.12
Absorbing Clamp	R&S	MDS-21	100668	2018.10.17	2019.10.16
CE Cable	N/A	C01	N/A	2018.10.13	2019.10.12
Temperature & Humidity	Mieo	HH660	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

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

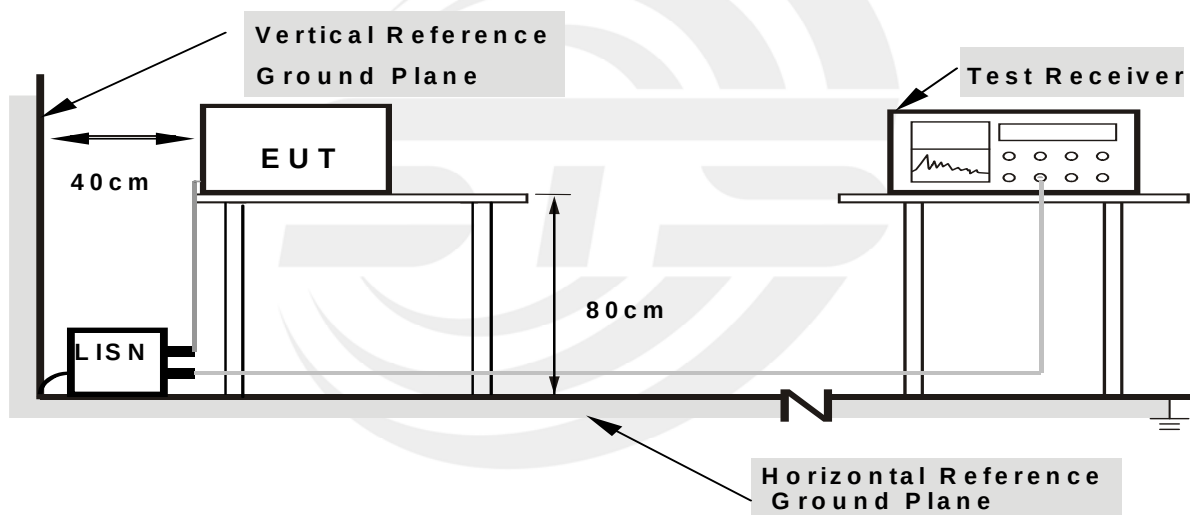
3.1.2 TEST PROCEDURE

- 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.
- 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.
- 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

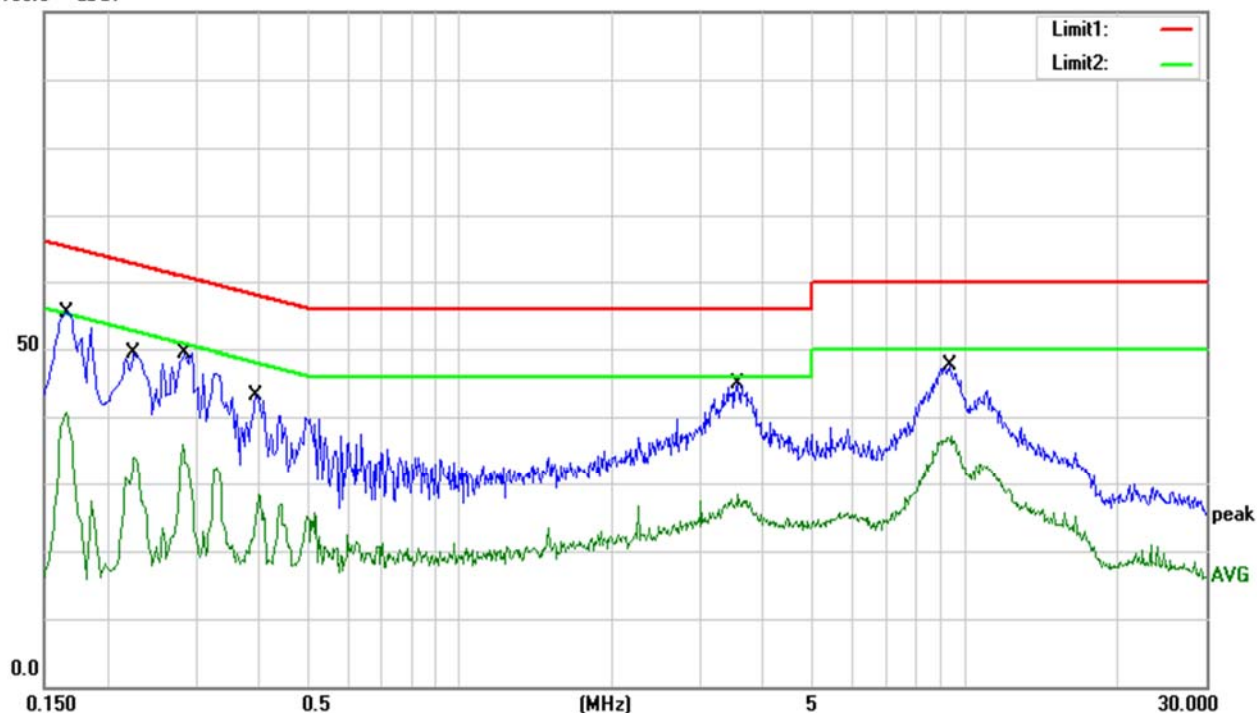
Temperature:	25.1 °C	Relative Humidity:	60%
Phase:	L	Test Mode:	Mode 1
Test Voltage:	DC 5V from PC		

No.	Frequency (MHz)	Reading (dBUV)	Correct Factor (dB)	Result (dBUV)	Limit (dBUV)	Margin (dB)	Detector
1	0.1660	35.24	20.23	55.47	65.16	-9.69	QP
2	0.1660	20.29	20.23	40.52	55.16	-14.64	AVG
3	0.2260	28.93	20.36	49.29	62.60	-13.31	QP
4	0.2260	13.59	20.36	33.95	52.60	-18.65	AVG
5	0.2860	28.80	20.66	49.46	60.64	-11.18	QP
6	0.2860	15.12	20.66	35.78	50.64	-14.86	AVG
7	0.3940	22.60	20.51	43.11	57.98	-14.87	QP
8	0.3940	7.80	20.51	28.31	47.98	-19.67	AVG
9	3.5500	24.85	19.96	44.81	56.00	-11.19	QP
10	3.5500	8.31	19.96	28.27	46.00	-17.73	AVG
11	9.3060	27.50	20.09	47.59	60.00	-12.41	QP
12	9.3060	17.05	20.09	37.14	50.00	-12.86	AVG

Remark:

1. All readings are Quasi-Peak and Average values.
2. Margin = Result (Result = Reading + Factor) – Limit
3. Factor = Cable Loss + Antenna Factor - Amplifier Gain

100.0 dBUV





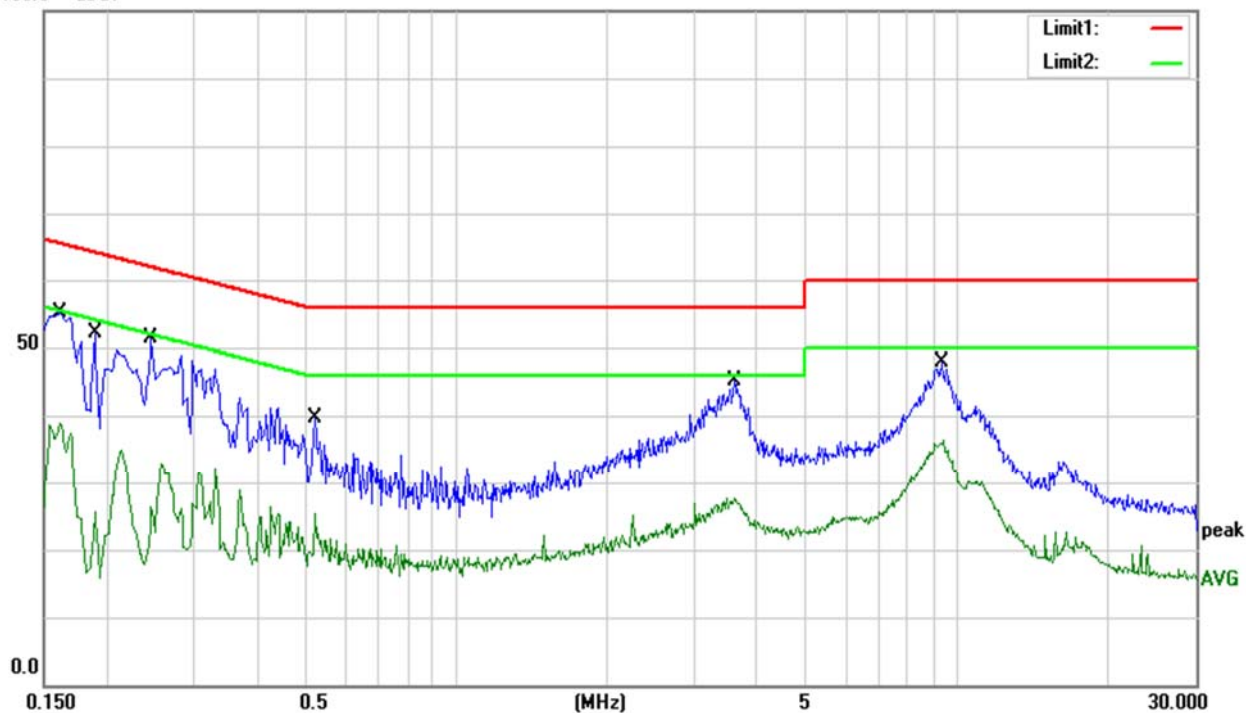
Temperature:	25.1 °C	Relative Humidity:	60%
Phase:	N	Test Mode:	Mode 1
Test Voltage:	DC 5V from PC		

No.	Frequency (MHz)	Reading (dBUV)	Correct Factor (dB)	Result (dBUV)	Limit (dBUV)	Margin (dB)	Detector
1	0.1620	34.92	20.23	55.15	65.36	-10.21	QP
2	0.1620	18.72	20.23	38.95	55.36	-16.41	AVG
3	0.1900	31.83	20.23	52.06	64.04	-11.98	QP
4	0.1900	14.66	20.23	34.89	54.04	-19.15	AVG
5	0.2460	31.02	20.46	51.48	61.89	-10.41	QP
6	0.2460	12.43	20.46	32.89	51.89	-19.00	AVG
7	0.5220	19.13	20.46	39.59	56.00	-16.41	QP
8	0.5220	5.00	20.46	25.46	46.00	-20.54	AVG
9	3.5980	25.15	19.96	45.11	56.00	-10.89	QP
10	3.5980	7.56	19.96	27.52	46.00	-18.48	AVG
11	9.3300	27.73	20.09	47.82	60.00	-12.18	QP
12	9.3300	16.22	20.09	36.31	50.00	-13.69	AVG

Remark:

1. All readings are Quasi-Peak and Average values.
2. Margin = Result (Result = Reading + Factor) - Limit
3. Factor = Cable Loss + Antenna Factor - Amplifier Gain

100.0 dBUV



Note: The test voltage is 100-240V, both of which have assessment tests, and the worst test data is in the report.



3.2 RADIATED EMISSION MEASUREMENT

3.2.1 Radiated Emission Limits

Class A: ITE that meets the conditions for Class A operation defined in Section 2.2 shall comply with the Class A radiated limits set out in Table 4 determined at a distance of 10 metres.

Class A Radiated Limits Below 1 GHz:

Frequencies (MHz)	Class A (dB μ V/m)
	Quasi-peak
30~88	39
88~216	43.5
216~960	46.4
960~1000	49.5

Class B: ITE that does not meet the conditions for Class A operation shall comply with the Class B radiated limits set out in Table 5 determined at a distance of 3 metres.

Class B Radiated Limits Below 1 GHz:

Frequencies (MHz)	Class B (dB μ V/m)
	Quasi-peak
30~88	40
88~216	43.5
216~960	46
960~1000	54

In case the emission 109(a) limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (microrvolts/meter)	Measurement Distance (meters)
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3



LIMITS OF RADIATED EMISSION MEASUREMENT

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 limit for radiated test was performed in the following: FCC PART 15B.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).

FREQUENCY RANGE OF THE RADIATED MEASUREMENT (For unintentional radiators)

Highest frequency generated or Upper frequency of measurement used in the device or on which the device operates or tunes (MHz)	Range (MHz)
Below 1.705	30
1.705 – 108	1000
108 – 500	2000
500 – 1000	5000
Above 1000	5th harmonic of the highest frequency or 40 GHz, whichever is lower



Spectrum Parameter	Setting
Attenuation	Auto
Detector	Peak
Start Frequency	1000 MHz(Peak/AV)
Stop Frequency	5th harmonic (Peak/AV)
RB / VB (emission in restricted band)	30MHz to 1000MHz: 100 KHz / 300 KHz Above 1000MHz: 1 MHz / 3 MHz

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	30MHz to 1000MHz: 100 KHz / 300 KHz Above 1000MHz: 1 MHz / 3 MHz

3.2.2 TEST PROCEDURE

- The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The height of antenna is varied from 1 meter to 4 meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1GHz.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

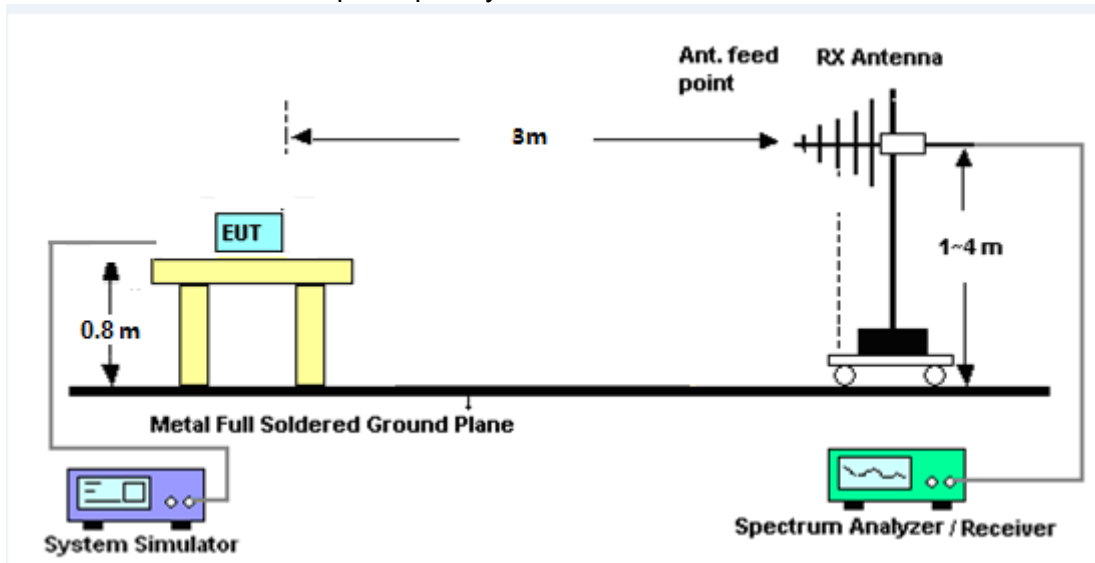
Note: Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

3.2.3 DEVIATION FROM TEST STANDARD

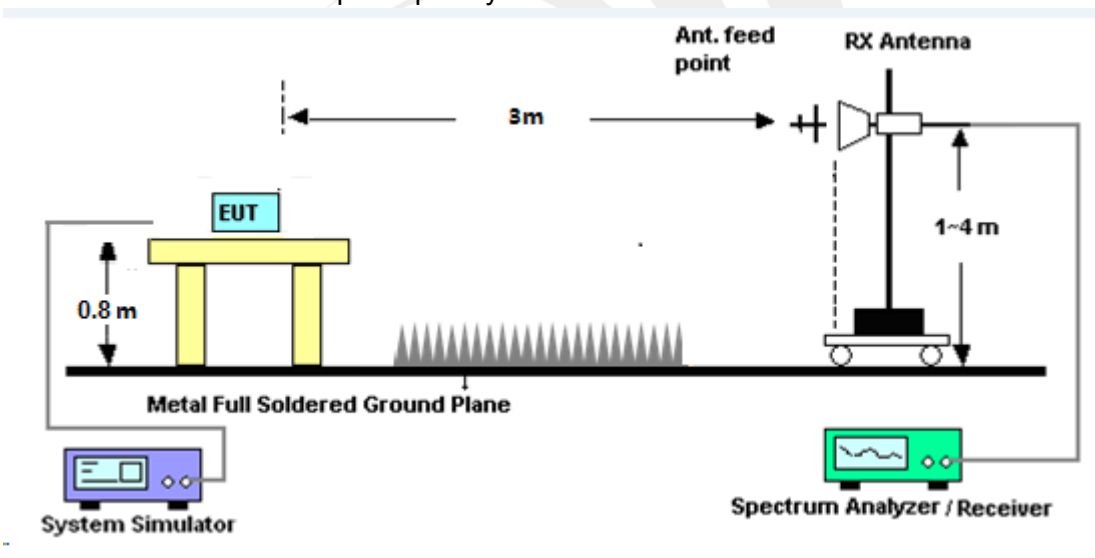
No deviation

3.2.4 TEST SETUP

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



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



3.2.5 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 following during the testing.



3.2.6 TEST RESULTS

30MHz -1000MHz

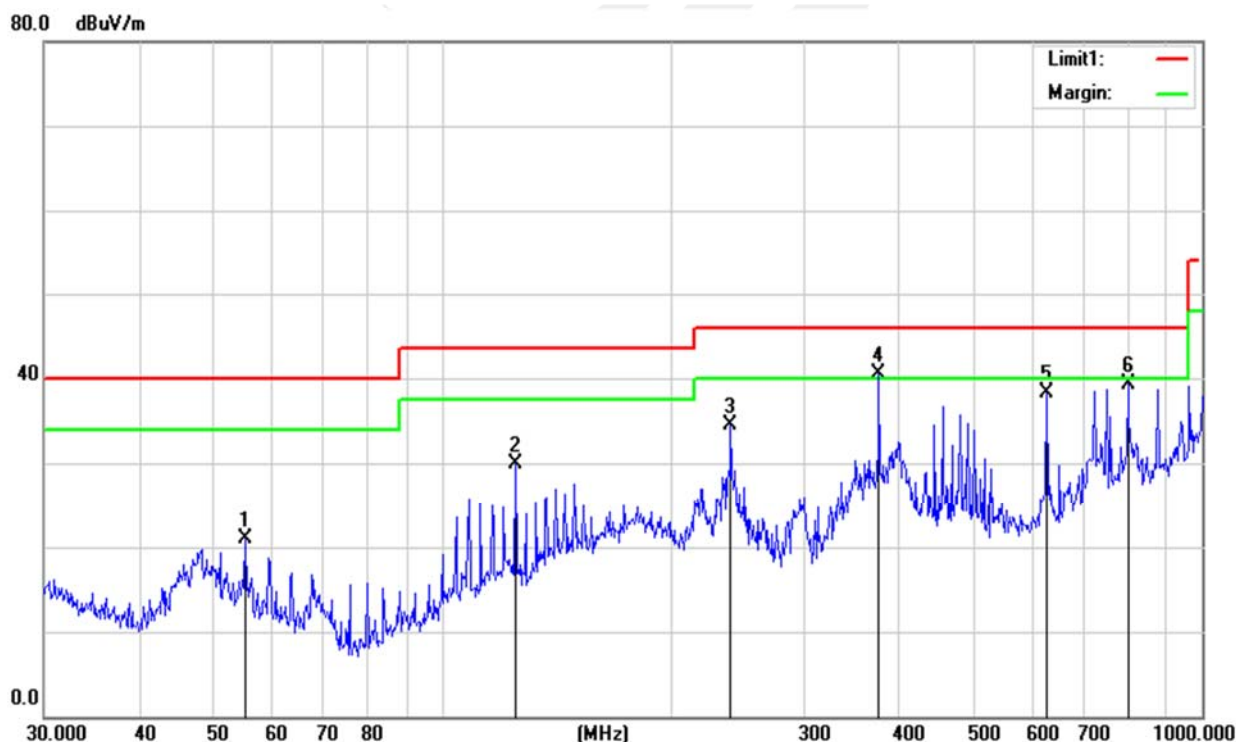
Temperature:	23.2 °C	Relative Humidity:	40%
Phase:	Horizontal	Test Mode:	Mode 1
Test Voltage:	DC 5V from PC		

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	55.2207	43.78	-22.97	20.81	40.00	-19.19	QP
2	125.0066	47.49	-17.61	29.88	43.50	-13.62	QP
3	239.9873	52.24	-17.76	34.48	46.00	-11.52	QP
4	375.9384	53.31	-12.73	40.58	46.00	-5.42	QP
5	625.0780	44.66	-6.43	38.23	46.00	-7.77	QP
6	798.9796	42.67	-3.45	39.22	46.00	-6.78	QP

Remark:

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

2. Factor = Cable Loss + Antenna Factor - Amplifier Gain





Temperature:	23.2 °C	Relative Humidity:	40%
Phase:	Vertical	Test Mode:	Mode 1
Test Voltage:	DC 5V from PC		

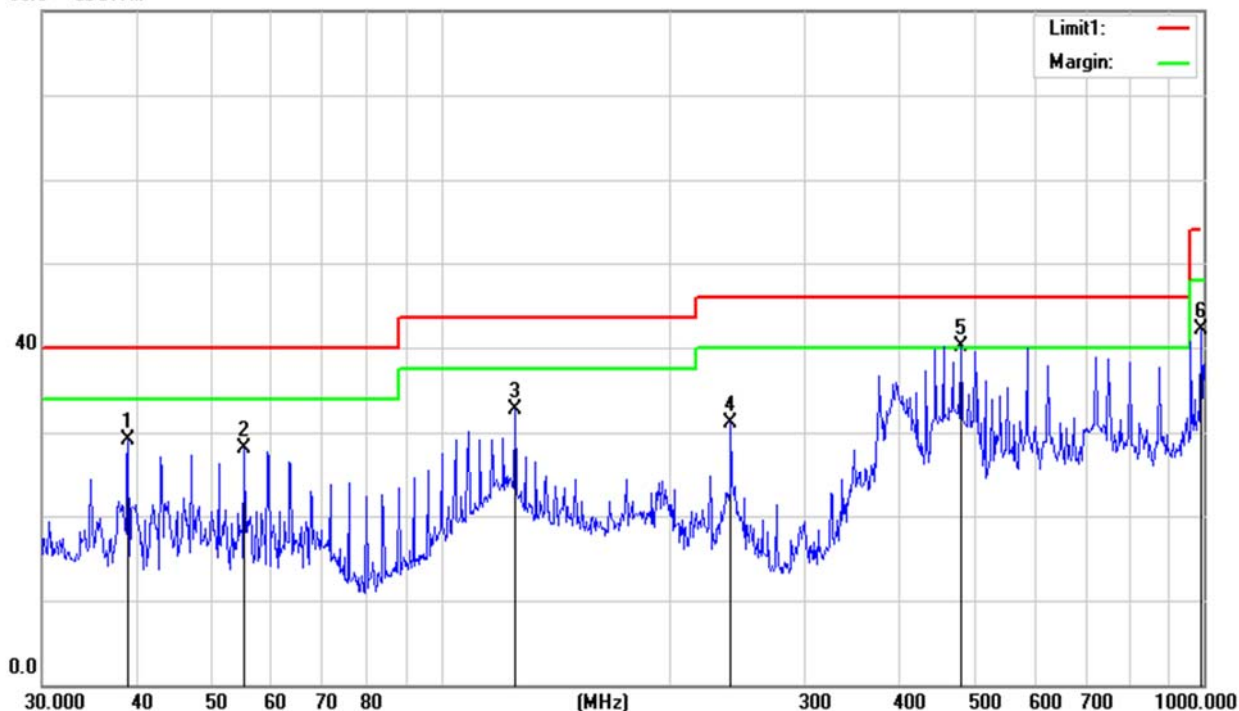
No.	Frequency (MHz)	Reading (dBUV)	Correct Factor (dB)	Results (dBUV/m)	Limit (dBUV/m)	Margin (dB)	Detector
1	38.8880	44.83	-15.75	29.08	40.00	-10.92	QP
2	55.2207	51.02	-22.97	28.05	40.00	-11.95	QP
3	125.0066	50.38	-17.61	32.77	43.50	-10.73	QP
4	239.9873	48.82	-17.76	31.06	46.00	-14.94	QP
5	480.5276	49.54	-9.38	40.16	46.00	-5.84	QP
6	993.0113	42.29	-0.10	42.19	54.00	-11.81	QP

Remark:

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

2. Factor = Cable Loss + Antenna Factor - Amplifier Gain

80.0 dBUV/m





(1 GHz to 25GHz.)

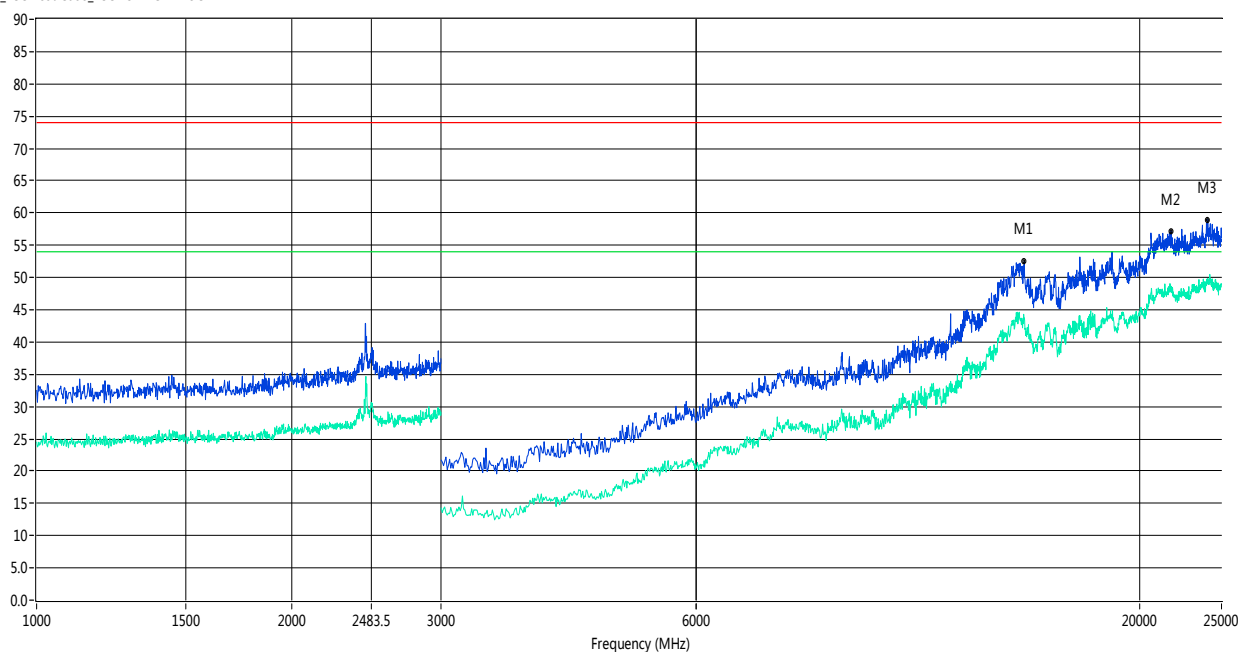
Temperature:	25 °C	Relative Humidity:	65%
Phase:	Horizontal	Test Mode:	Mode 1
Test Voltage:	DC 5V from PC		

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector
1**	14631.999	43.72	23.56	54.0	-10.28	AV
1	14631.999	52.51	23.56	74.0	-21.49	Peak
2**	21808.001	48.11	23.93	54.0	-5.89	AV
2	21808.001	57.25	23.93	74.0	-16.75	Peak
3**	24088.001	48.98	23.28	54.0	-5.02	AV
3	14631.999	43.72	23.56	54.0	-10.28	Peak

Remark:

1. All readings are Peak and Average values.
2. Margin = Result (Result = Reading + Factor) – Limit
3. Factor = Cable Loss + Antenna Factor – Amplifier Gain

RE_FCC Test Case_FCC 15B 1GHz-25GHz





Temperature:	25 °C	Relative Humidity:	65%
Phase:	Vertical	Test Mode:	Mode 1
Test Voltage:	AC 120V/60Hz		

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector
1**	14332.000	43.91	24.28	54.0	-10.09	AV
1	14332.000	52.79	24.28	74.0	-21.21	Peak
2**	21628.000	48.80	23.98	54.0	-5.20	AV
2	21628.000	58.53	23.98	74.0	-15.47	Peak
3**	24220.000	49.58	23.23	54.0	-4.42	AV
3	14332.000	43.91	24.28	54.0	-10.09	Peak

Remark:

1. All readings are Peak and Average values.
2. Margin = Result (Result = Reading + Factor) - Limit
3. Factor = Cable Loss + Antenna Factor - Amplifier Gain

RE_FCC Test Case_FCC 15B 1GHz-25GHz



Notes:

1. Measuring frequencies from 1 GHz to 25GHz.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode of the emission shown in Actual FS column.

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