FCC PART 15 SUBPART C TEST REPORT

FCC PART 15.249

Report Reference No.....	**: BSL23081401-P01R01**
FCC ID.....	**: 2AYJK-R40**
Compiled by (position+printed name+signature)..	: Engineer/ Cindy Zheng Cindy zheng
Supervised by (position+printed name+signature)..	: Manager/Haley Wen Haley wen
Approved by (position+printed name+signature)..	: RF Manager/ Vivian Jiang Vivian Jiang
Date of issue.....	: September 5, 2023
Testing Laboratory Name.....	**: BSL Testing Co., Ltd.**
Address.....	: 1/F, Building B, Xinshidai GR Park,Shiyan Street, Bao'an District, Shenzhen,Guangdong, 518052, People’s Republic of China
Applicant’s name.....	**: Shenzhen Warsong Technology Co., Ltd.**
Address.....	: D3.Tongfuyu Industrial Area , Street Community of Shajing Town, BaoAn,ShenZhen, China
Test specification.....	**:**
Standard.....	: **FCC CFR Title 47 Part 15 Subpart C Section 15.249** **ANSI C63.10:2013**

BSL Testing Co., Ltd. All rights reserved.
This publication may be reproduced in whole or in part for non-commercial purposes as long as the BSL Testing Co., Ltd.. is acknowledged as copyright owner and source of the material. BSL Testing Co., Ltd.. takes no responsibility for and will not assume liability for damages resulting from the reader's interpretation of the reproduced material due to its placement and context.

Equipment description.....	**: wireless adapter**
Trade Mark.....	: BIGBIG WON
Manufacturer.....	: Shenzhen Warsong Technology Co., Ltd.
Model/Type reference.....	: R40
Listed Models	: R40 Pro
Modulation	: GFSK
Frequency.....	From 2402MHz to 2480MHz
Ratings.....	: DC 5.0V from USB Port
Result.....	: **PASS**

TEST REPORT

Equipment under Test	:	wireless adapter
Model /Type	:	R40
Listed Models	:	R40Pro
Applicant	:	Shenzhen Warsong Technology Co., Ltd.
Address	:	D3.Tongfuyu Industrial Area , Street Community of Shajing Town, BaoAn,ShenZhen, China
Manufacturer	:	Shenzhen Warsong Technology Co., Ltd.
Address	:	D3.Tongfuyu Industrial Area , Street Community of Shajing Town, BaoAn,ShenZhen, China

Test Result:	**PASS**

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

Contents

1 TEST STANDARDS 4

2 SUMMARY 5

2.1 General Remarks 5
2.2 Product Description 5
2.3 Equipment Under Test 5
2.4 Short description of the Equipment under Test (EUT) 5
2.5 EUT operation mode 6
2.6 Block Diagram of Test Setup 7
2.7 Related Submittal(s) / Grant (s) 7
2.8 Modifications 7

3 TEST ENVIRONMENT 8

3.1 Address of the test laboratory 8
3.2 Test Facility 8
3.3 Environmental conditions 8
3.4 Summary of measurement results 9
3.5 Statement of the measurement uncertainty 9
3.6 Equipments Used during the Test 10

4 TEST CONDITIONS AND RESULTS 12

4.1 AC Power Conducted Emission 12
4.2 Radiated Emissions and Band Edge 15
4.3 Bandwidth of Frequncy Band Edge 15
4.4 Channel Bandwidth 22
4.5 Antenna Requirement 25

5 TEST SETUP PHOTOS OF THE EUT 29

6 PHOTOS OF THE EUT 30

1 TEST STANDARDS

The tests were performed according to following standards:

FCC Rules Part 15.249: Frequency Hopping, Direct Spread Spectrum and Hybrid Systems that are in operation within the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz and 24.0-24.25 GHz
ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices

2 SUMMARY

2.1 General Remarks

Date of receipt of test sample	:	August 14, 2023
Testing commenced on	:	August 15, 2023
Testing concluded on	:	September 5, 2023

2.2 Product Description

Product Description:	wireless adapter
Model/Type reference:	R40
Listed Models:	R40Pro
Model Different.:	PCB board, structure and internal of these model(s) are the same,So no additional models were tested.
Power supply:	DC 5.0V from USB Port
Notebook information (Auxiliary test supplied by testing Lab):	Model: D108-DA01 Brand: Samsung Firmware Version: V2.1 Manufacture: uzhou Samsung Electronics Co., Ltd
Testing sample ID：	BSL23081401-P01R01-1#
2.4G	
Supported type:	2.4G
Modulation:	GFSK
Operation frequency:	2402MHz to 2480MHz
Channel number:	40
Channel separation:	2MHz
Antenna type:	Ceramic antenna
Antenna gain:	0dBi

2.3 Equipment Under Test

Power supply system utilised

Power supply voltage	:	○	230V / 50 Hz	○	120V / 60Hz
		○	12 V DC	○	24 V DC
		●	Other (specified in blank below)		

DC 5V From external circuit

2.4 Short description of the Equipment under Test (EUT)

This is a 2.4G wireless adapter.
For more details, refer to the user's manual of the EUT.

2.5 EUT operation mode

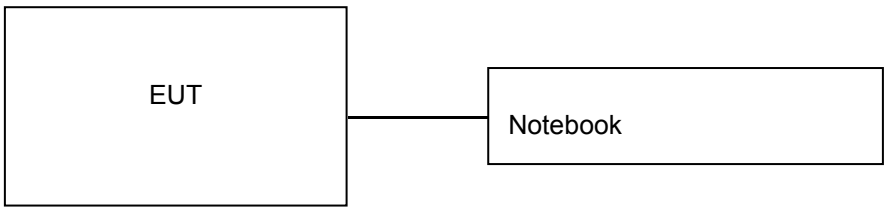
The Applicant provides communication tools software(Engineer mode) to control the EUT for staying in continuous transmitting (Duty Cycle more than 98%) and receiving mode for testing .There are 79 channels provided to the EUT and Channel 00/19/39 were selected to test.

Operation Frequency：

Channel	Frequency (MHz)
00	**2402**
01	2404
02	2406
⋮	⋮
19	**2440**
⋮	⋮
37	2476
38	2478
39	**2480**

Channel	Frequency
The lowest channel	2402 MHz
The middle channel	2440 MHz
The Highest channel	2480 MHz

2.6 Block Diagram of Test Setup



2.7 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for the device filing to comply with Section 15.249 of the FCC Part 15, Subpart C Rules.

2.8 Modifications

No modifications were implemented to meet testing criteria.

3 TEST ENVIRONMENT

3.1 Address of the test laboratory

BSL Testing Co., Ltd..
1/F, Building B, Xinshidai GR Park,Shiyan Street, Bao'an District, Shenzhen,Guangdong, 518052, People's Republic of China

3.2 Test Facility

FCC-Registration No.: 562200 Designation Number: CN1338
BSL Testing Co.,Ltd. has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements.

Industry Canada Registration Number. Is: 11093A CAB identifier: CN0019
The Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing.

A2LA-Lab Cert. No.: 4707.01
BSL Testing Co.,Ltd. has been listed by American Association for Laboratory Accreditation to perform electromagnetic emission measurement.

The 3m-Semi anechoic test site fulfils CISPR 16-1-4 according to ANSI C63.10 and CISPR 16-1-4:2010.

3.3 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:
Radiated Emission:

Temperature:	23 ° C
Humidity:	44 %
Atmospheric pressure:	950-1050mbar

AC Main Conducted testing：

Temperature:	24 ° C
Humidity:	47 %
Atmospheric pressure:	950-1050mbar

Conducted testing：

Temperature:	24 ° C
Humidity:	46 %
Atmospheric pressure:	950-1050mbar

3.4 Summary of measurement results

FCC Part15 (15.249) , Subpart C			
Standard Section	Test Item	Judgment	Remark
FCC part 15.203	Antenna requirement	PASS	
FCC part 15.207	AC Power Line Conducted Emission	PASS	
FCC part 15.249	Fundamental &Radiated Spurious Emission Measurement	PASS	
FCC part 15.215	20dB Channel Bandwidth	PASS	
FCC part 15.205	Band Edge	PASS	

Remark:
1. The measurement uncertainty is not included in the test result.
2. We tested all test mode and recorded worst case in report
3. " N/A" denotes test is not applicable in this Test Report

3.5 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to TR-100028-01" Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 1" and TR-100028-02 "Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 2 " and is documented in the BSL Testing Co., Ltd.. quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for BSL Testing Co., Ltd.. :

Test	Range	Measurement Uncertainty	Notes
Radiated Emission	9KHz~30MHz	3.82 dB	(1)
Radiated Emission	30~1000MHz	4.06 dB	(1)
Radiated Emission	1~18GHz	5.14 dB	(1)
Radiated Emission	18-40GHz	5.38 dB	(1)
Conducted Disturbance	0.15~30MHz	2.14 dB	(1)
Transmitter power conducted	1~40GHz	0.57 dB	(1)
Conducted spurious emission	1~40GHz	1.60 dB	(1)
OBW	1~40GHz	25 Hz	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

3.6 Equipments Used during the Test

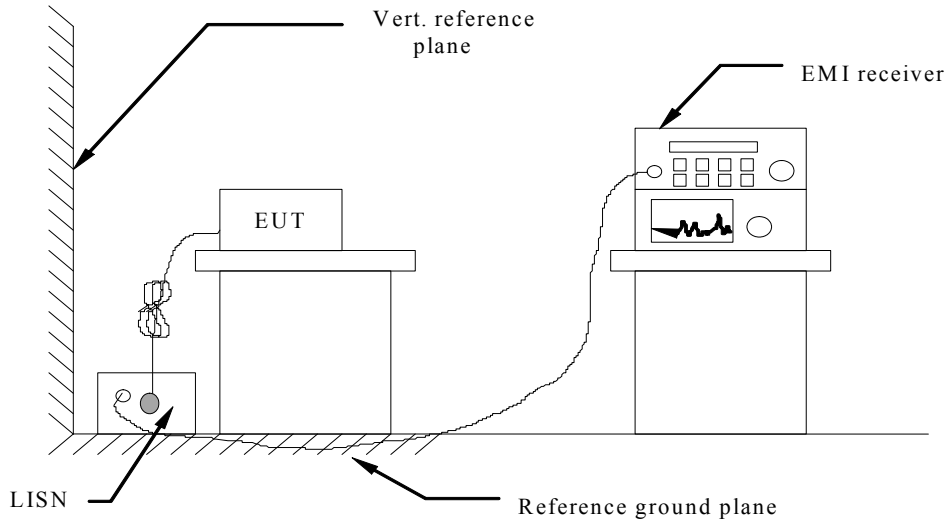
Instrument Type	Manufacturer	Model	Serial No.	Date of Cal.	Due Date
ESPI Test Receiver	ROHDE&SCHWARZ	ESPI 3	100379	2022-10-28	2023-10-27
Absorbing Clamp	ROHDE&SCHWARZ	MDS-21	100126	2022-10-28	2023-10-27
Electrostatic analog generator	LIONCEL	ESD-203B	0210502	2022-10-28	2023-10-27
Signal Generator	HP	8648A	3633A02081	2022-10-28	2023-10-27
Amplifier	A&R	500A100	17034	2022-10-28	2023-10-27
Amplifier	A&R	100W/1000M1	17028	2022-10-28	2023-10-27
Isotropic Field Monitor	A&R	FM2000	16829	2022-10-28	2023-10-27
Isotropic Field Probe	A&R	FLW220100	16755	2022-10-28	2023-10-27
Biconic Antenna	EMCO	EVOD PROTANK8	9507-2534	2022-10-28	2023-10-27
Log-periodic Antenna	A&R	AT1080	16812	2022-10-28	2023-10-27
Injection Clamp	EMTEST	F-2031-23MM	368	2022-10-28	2023-10-27
Attenuator	EMTEST	ATT6	0010222a	2022-10-28	2023-10-27
Computer	IBM	8434	1S8434KCE99BLXLO*	-	-
Oscillator	KENWOOD	AG-203D	3070002	2022-10-28	2023-10-27
Spectrum Analyzer	HAMEG	HM5012	-	-	-
Power Supply	LW	APS1502	-	-	-
5K VA AC Power Source	California Instruments	5001iX	56060	2022-10-28	2023-10-27
CDN	EM TEST	CDN M2/M3	-	2022-10-28	2023-10-27
Attenuation	EM TEST	ATT6/75	-	2022-10-28	2023-10-27
Resistance	EM TEST	R100	-	2022-10-28	2023-10-27
Electromagnetic Injection Clamp	LITTHI	EM101	35708	2022-10-28	2023-10-27
Inductive Components	EM TEST	MC2630	-	2022-10-28	2023-10-27
Antenna	EM TEST	MS100	-	2022-10-28	2023-10-27
Signal Generator	ROHDE&SCHWARZ	SMT03	100029	2022-10-28	2023-10-27
Power DJ MIXER	AR	150W1000	300999	2022-10-28	2023-10-27
Field probe	Holaday	HI-6005	105152	2022-10-28	2023-10-27
Bilog Antenna	Chase	CBL6111C	2576	2022-10-28	2023-10-27
Loop Antenna	EMCO	6502	00042960	2022-10-28	2023-10-27
ESPI Test Receiver	ROHDE&SCHWARZ	ESI7	838786/013	2022-10-28	2023-10-27
3m OATS	--	--	N/A	2022-10-28	2023-10-27
Horn Antenna	SCHWARZBECK	VULB9168	N/A	2022-10-28	2023-10-27
Horn Antenna	SCHWARZBECK	BBHA9120D	N/A	2022-10-28	2023-10-27
Power meter	Anritsu	ML2487A	6K00003613	2022-10-28	2023-10-27
Power sensor	Anritsu	MA2491A	32263	2022-10-28	2023-10-27
Bilog Antenna	Schwarebeck	VULB9163	9163/340	2022-10-28	2023-10-27
9*6*6 Anechoic	--	--	N/A	2021-08-21	2024-8-20
Test Receiver	Rohde&Schwarz	ESC17(9kHz-7GHz)	100336	2022-10-28	2023-10-27
Broadband antenna	Schwarzbeck	VULB9168	01222	2022-10-28	2023-10-27
Horn antenna	Schwarzbeck	BBHA9120D	02476	2022-10-28	2023-10-27
Preamplifier	Schwarzbeck	BBV9745	00250	2022-10-28	2023-10-27
Preamplifier	N/A	TRLA-01018G440B	21081001	2022-10-28	2023-10-27

3M method semi anechoic chamber	SKET	9m*6m*6m	2021082304	2021-8-23	2024-8-22
Pointer hygrometer	M&G	ARC92570	N/A	2022-10-28	2023-10-27
Spectrometer	ROHDE&SCHWARZ	FSP 9kHz-40GHz	N/A	2022-10-28	2023-10-27
Synthesizer	ROHDE&SCHWARZ	CMW500	N/A	2022-10-28	2023-10-27
LISN	R&S	ENV216	308	2022-10-28	2023-10-27
LISN	R&S	ENV216	314	2022-10-28	2023-10-27

4 TEST CONDITIONS AND RESULTS

4.1 AC Power Conducted Emission

TEST CONFIGURATION



TEST PROCEDURE

1 The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10-2013.
2 Support equipment, if needed, was placed as per ANSI C63.10-2013
3 All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10-2013
4 The EUT received power from adapter, the adapter received AC120V/60Hz and AC 240V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
5 All support equipments received AC power from a second LISN, if any.
6 The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT.The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7 Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.
8 During the above scans, the emissions were maximized by cable manipulation.

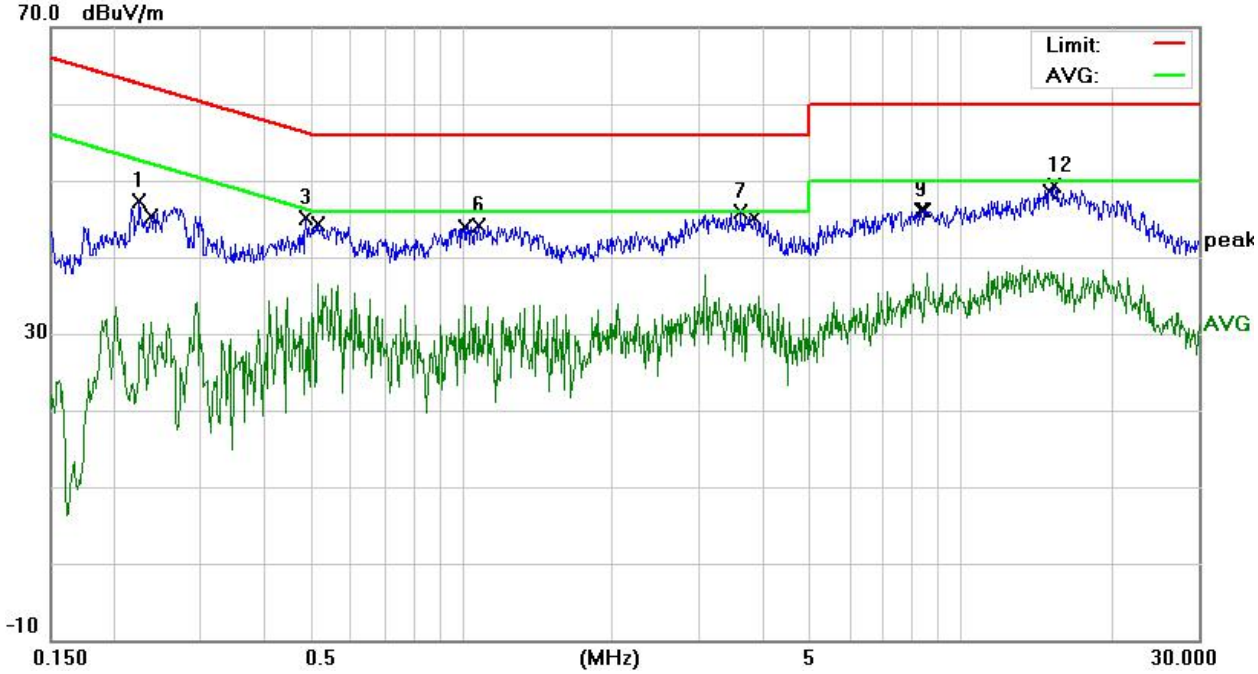
AC Power Conducted Emission Limit

For intentional device, according to § 15.207(a) AC Power Conducted Emission Limits is as following：

Frequency range (MHz)	Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50
* Decreases with the logarithm of the frequency.		

TEST RESULTS

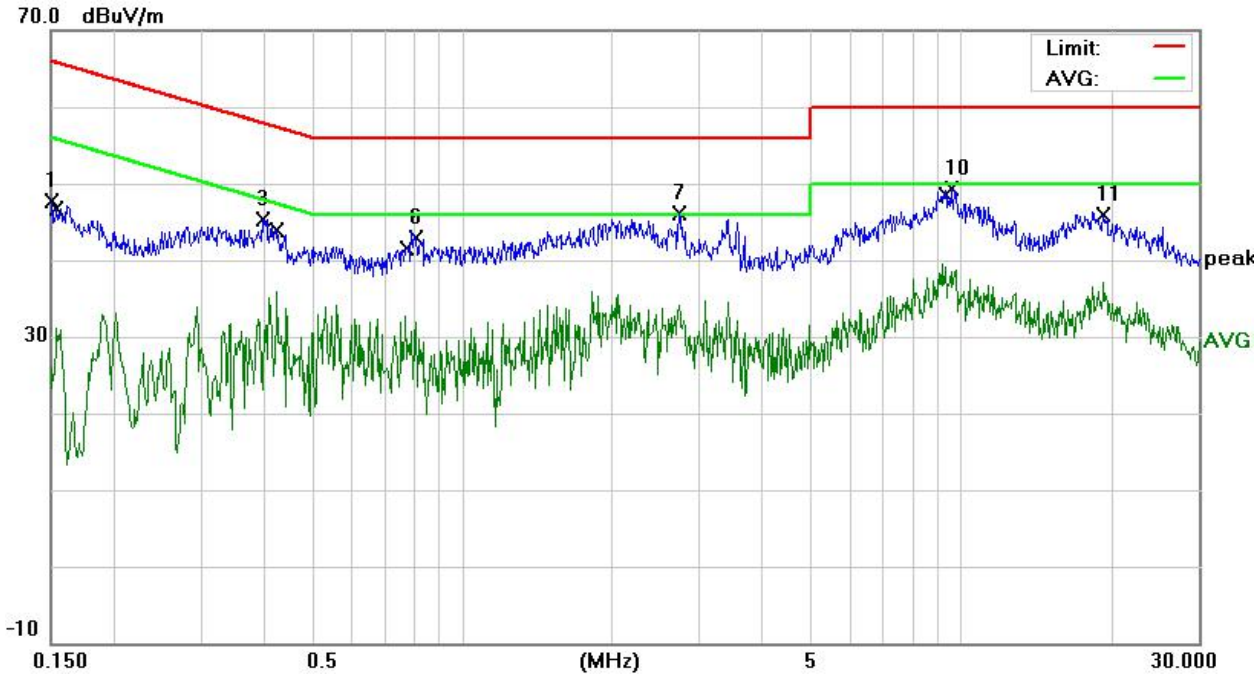
Power supply:	DC 5V from Adapter AC 120V/60Hz	Polarization	L



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector
1		0.2255	37.57	9.83	47.40	62.61	-15.21	peak
2		0.2378	21.71	9.83	31.54	52.17	-20.63	AVG
3		0.4863	35.21	9.89	45.10	56.23	-11.13	peak
4	*	0.5127	26.65	9.89	36.54	46.00	-9.46	AVG
5		1.0100	23.87	9.90	33.77	46.00	-12.23	AVG
6		1.0766	34.30	9.90	44.20	56.00	-11.80	peak
7		3.6225	35.99	9.91	45.90	56.00	-10.10	peak
8		3.8807	23.99	9.91	33.90	46.00	-12.10	AVG
9		8.3228	36.15	9.95	46.10	60.00	-13.90	peak
10		8.5462	27.91	9.95	37.86	50.00	-12.14	AVG
11		15.1455	37.20	1.00	38.20	50.00	-11.80	AVG
12		15.3879	48.40	1.00	49.40	60.00	-10.60	peak

Note:1).Level (dBμV)= Reading (dBμV)+ Factor (dB)
2). Factor (dB)=insertion loss of LISN (dB) + Cable loss (dB)
3). Margin(dB) = Limit (dBμV) - Level (dBμV)

Power supply:	DC 5V from Adapter AC 120V/60Hz	Polarization	N



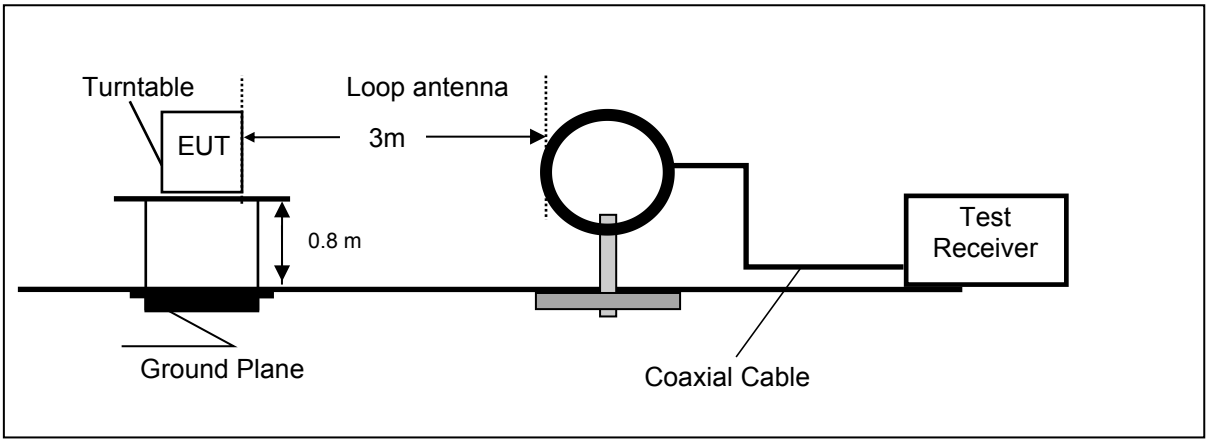
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector
1		0.1507	37.81	9.89	47.70	65.96	-18.26	peak
2		0.1539	21.25	9.87	31.12	55.78	-24.66	AVG
3		0.3976	35.53	9.87	45.40	57.90	-12.50	peak
4		0.4259	25.97	9.88	35.85	47.33	-11.48	AVG
5		0.7711	22.80	9.89	32.69	46.00	-13.31	AVG
6		0.8084	33.11	9.89	43.00	56.00	-13.00	peak
7	*	2.7210	36.17	9.93	46.10	56.00	-9.90	peak
8		2.7210	24.19	9.93	34.12	46.00	-11.88	AVG
9		9.1554	29.47	9.95	39.42	50.00	-10.58	AVG
10		9.5518	39.44	9.96	49.40	60.00	-10.60	peak
11		19.3257	44.90	1.00	45.90	60.00	-14.10	peak
12		19.3257	36.03	1.00	37.03	50.00	-12.97	AVG

Note:1).Level (dBμV)= Reading (dBμV)+ Factor (dB)
2). Factor (dB)=insertion loss of LISN (dB) + Cable loss (dB)
3). Margin(dB) = Limit (dBμV) - Level (dBμV)

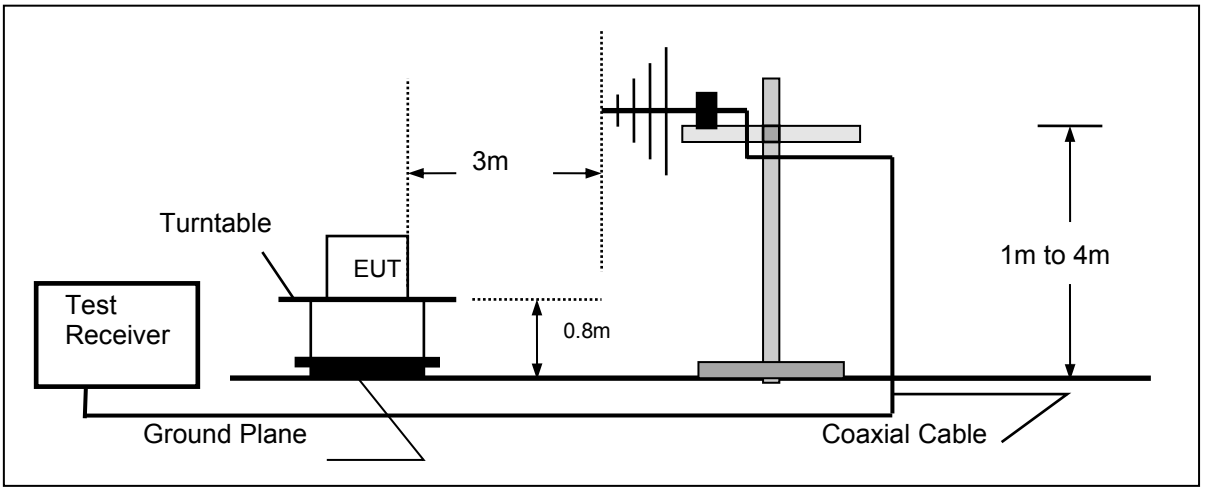
4.2 Radiated Emissions and Band Edge

TEST CONFIGURATION

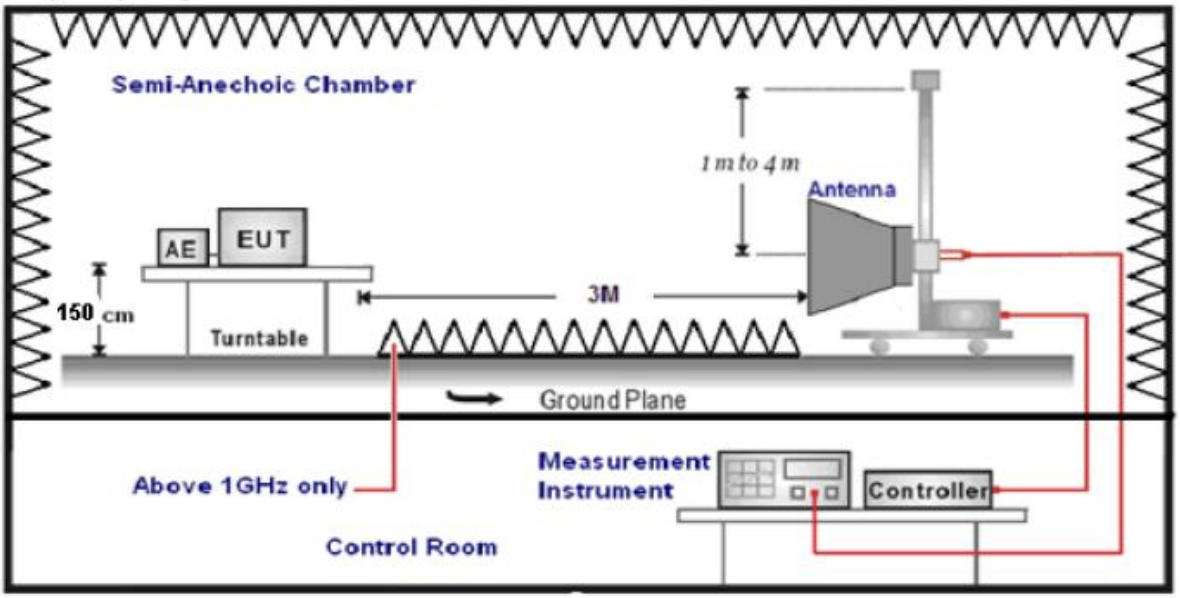
Frequency range 9 KHz – 30MHz



Frequency range 30MHz – 1000MHz



Frequency range above 1GHz-25GHz



TEST PROCEDURE

1. The EUT was placed on a turn table which is 0.8m above ground plane when testing frequency range 9 KHz –1GHz;the EUT was placed on a turn table which is 1.5m above ground plane when testing frequency range 1GHz – 25GHz.
2. Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0℃ to 360℃ to acquire the highest emissions from EUT.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measurements have been completed.
5. The EUT minimum operation frequency was 32.768KHz and maximum operation frequency was 2480MHz.so radiated emission test frequency band from 9KHz to 25GHz.
6. The distance between test antenna and EUT as following table states:

Test Frequency range	Test Antenna Type	Test Distance
9KHz-30MHz	Active Loop Antenna	3
30MHz-1GHz	Ultra-Broadband Antenna	3
1GHz-18GHz	Double Ridged Horn Antenna	3
18GHz-25GHz	Horn Anternna	1

7. Setting test receiver/spectrum as following table states:

Test Frequency range	Test Receiver/Spectrum Setting	Detector
9KHz-150KHz	RBW=200Hz/VBW=3KHz,Sweep time=Auto	QP
150KHz-30MHz	RBW=9KHz/VBW=100KHz,Sweep time=Auto	QP
30MHz-1GHz	RBW=120KHz/VBW=1000KHz,Sweep time=Auto	QP
1GHz-40GHz	Peak Value: RBW=1MHz/VBW=3MHz, Sweep time=Auto Average Value: RBW=1MHz/VBW=10Hz, Sweep time=Auto	Peak

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	

Transd=AF +CL-AG

RADIATION LIMIT

For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emission from intentional radiators at a distance of 3 meters shall not exceed the following table. According to § 15.247(d), in any 100kHz bandwidth outside the frequency band in which the EUT is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the100kHz bandwidth within the band that contains the highest level of desired power.

The pre-test have done for the EUT in three axes and found the worst emission at position shown in test setup photos.

Frequency (MHz)	Distance (Meters)	Radiated (dBμV/m)	Radiated (μV/m)
0.009-0.49	3	20log(2400/F(KHz))+40log(300/3)	2400/F(KHz)
0.49-1.705	3	20log(24000/F(KHz))+ 40log(30/3)	24000/F(KHz)
1.705-30	3	20log(30)+ 40log(30/3)	30
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

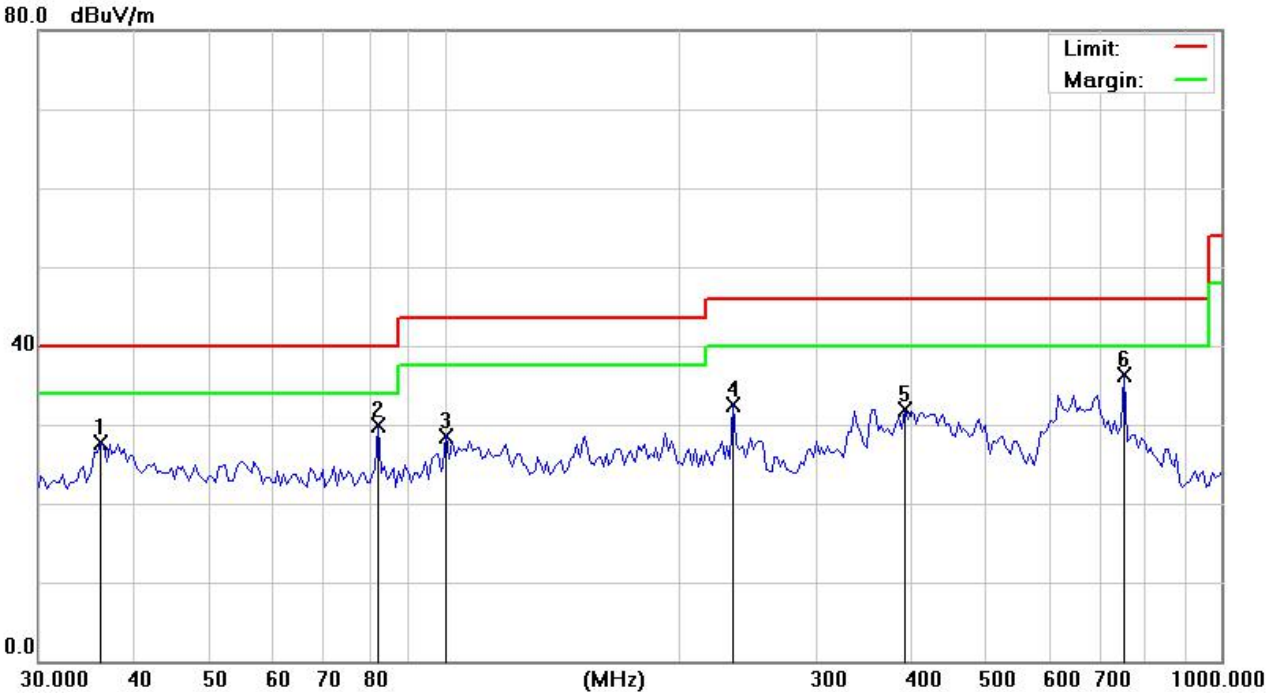
TEST RESULTS

Remark:

1. This test was performed with EUT in X, Y, Z position and the worse case was found when EUT in X position.
2. 2.4G were tested at Low, Middle, and High channel and recorded worst mode at 2.4G 1Mpbs.
3. Radiated emission test from 9 KHz to 10th harmonic of fundamental was verified, and no emission found except system noise floor in 9 KHz to 30MHz and not recorded in this report.

For 30MHz-1GHz

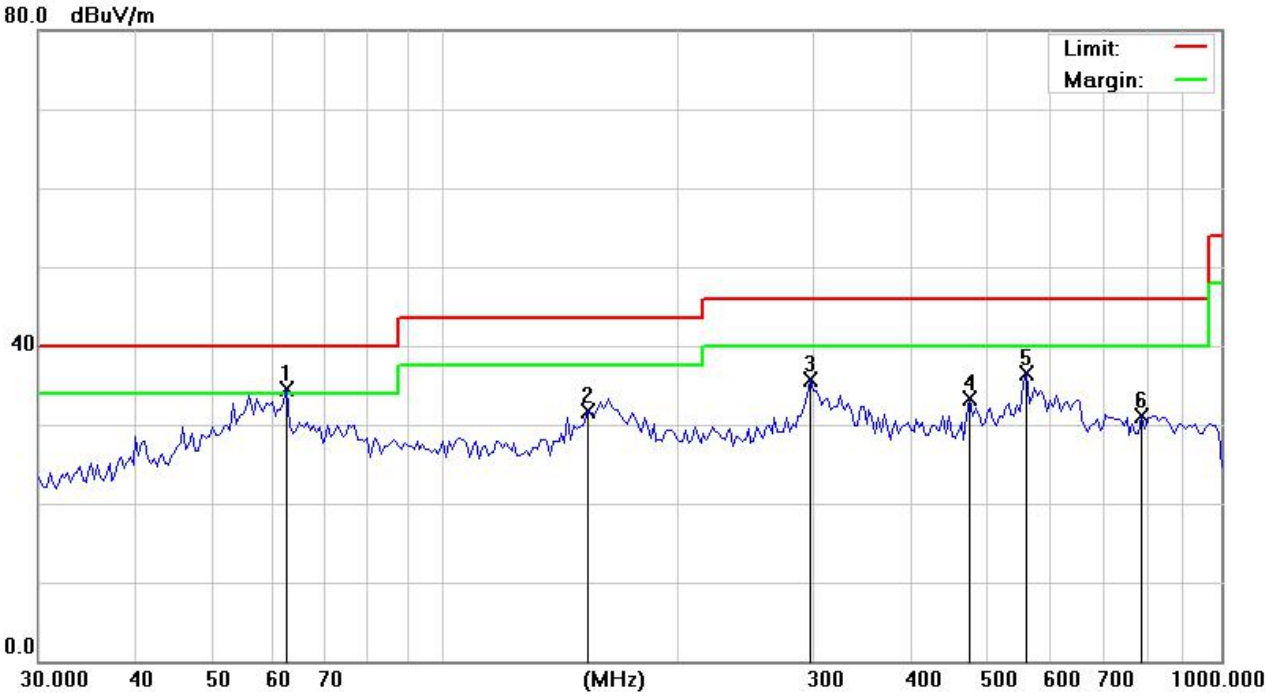
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		36.0638	17.70	10.00	27.70	40.00	-12.30	peak
2		82.2146	20.23	9.67	29.90	40.00	-10.10	peak
3		100.5806	17.26	11.34	28.60	43.50	-14.90	peak
4		235.4033	17.75	14.85	32.60	46.00	-13.40	peak
5		391.4082	12.30	19.70	32.00	46.00	-14.00	peak
6	*	748.7943	10.30	26.10	36.40	46.00	-9.60	peak

Note:1).Level (dBμV/m)= Reading (dBμV)+ Factor (dB/m)
2). Factor(dB/m)=Antenna Factor (dB/m) + Cable loss (dB) - Pre Amplifier gain (dB)
3). Margin(dB) = Limit (dBμV/m) - Level (dBμV/m)

Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1	*	62.6507	28.45	6.05	34.50	40.00	-5.50	peak
2		153.2004	21.96	9.84	31.80	43.50	-11.70	peak
3		295.6648	18.91	16.89	35.80	46.00	-10.20	peak
4		474.6662	11.95	21.45	33.40	46.00	-12.60	peak
5		560.6928	13.15	23.35	36.50	46.00	-9.50	peak
6		789.2335	3.84	27.36	31.20	46.00	-14.80	peak

Note:1).Level (dBμV/m)= Reading (dBμV)+ Factor (dB/m)
2). Factor(dB/m)=Antenna Factor (dB/m) + Cable loss (dB) - Pre Amplifier gain (dB)
3). Margin(dB) = Limit (dBμV/m) - Level (dBμV/m)

For 1GHz to 25GHz

GFSK (above 1GHz)

Frequency(MHz):			**2402**			**Peak value**		
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4804.00	55.25	21.52	3.52	33.12	47.17	74	-26.83	Vertical
4804.00	50.36	23.65	4.56	33.08	45.49	74	-28.51	Horizontal
7206.00	45.24	25.58	6.15	33.57	43.4	74	-30.6	Vertical
7206.00	40.62	27.68	6.98	33.26	42.02	74	-31.98	Horizontal

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4804.00	45.25	21.52	3.52	33.12	37.17	54	-16.83	Vertical
4804.00	40.18	23.65	4.56	33.08	35.31	54	-18.69	Horizontal
7206.00	35.69	25.58	6.15	33.57	33.85	54	-20.15	Vertical
7206.00	30.24	27.68	6.98	33.26	31.64	54	-22.36	Horizontal

Frequency(MHz):			**2440**			**Peak value**		
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4880.00	55.24	21.78	3.58	33.27	47.33	74	-26.67	Vertical
4880.00	50.26	24.15	4.57	33.87	45.11	74	-28.89	Horizontal
7320.00	45.63	26.04	6.24	33.19	44.72	74	-29.28	Vertical
7320.00	40.32	27.98	7.18	33.68	41.8	74	-32.2	Horizontal

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4880.00	45.24	21.78	3.58	33.27	37.33	54	-16.67	Vertical
4880.00	40.25	24.15	4.57	33.87	35.1	54	-18.9	Horizontal
7320.00	35.67	26.04	6.24	33.19	34.76	54	-19.24	Vertical
7320.00	30.16	27.98	7.18	33.68	31.64	54	-22.36	Horizontal

Frequency(MHz):			**2480**			**Peak value**		
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4960.00	55.14	22.56	4.17	33.75	48.12	74	-25.88	Vertical
4960.00	50.32	24.78	5.36	33.17	47.29	74	-26.71	Horizontal
7440.00	45.87	27.14	6.97	33.62	46.36	74	-27.64	Vertical
7440.00	40.21	28.16	7.65	33.58	42.44	74	-31.56	Horizontal

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4960.00	45.63	22.56	4.17	33.75	38.61	54	-15.39	Vertical
4960.00	40.21	24.78	5.36	33.17	37.18	54	-16.82	Horizontal
7440.00	35.21	27.14	6.97	33.62	35.7	54	-18.3	Vertical
7440.00	30.24	28.16	7.65	33.58	32.47	54	-21.53	Horizontal

Remark:

1. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
2. *The emission levels of other frequencies are very lower than the limit and not show in test report.*

4.3 BANDWIDTH OF FREQUENCY BAND EDGE

4.3.1 Test Requirement:

<table>
<tr><td>Test Requirement:</td><td colspan="5">FCC Part15 C Section 15.209 and 15.205</td></tr>
<tr><td>Test Method:</td><td colspan="5">ANSI C63.10: 2013</td></tr>
<tr><td>Test Frequency Range:</td><td colspan="5">All of the restrict bands were tested, only the worst band's (2310MHz to 2500MHz) data was showed.</td></tr>
<tr><td>Test site:</td><td colspan="5">Measurement Distance: 3m</td></tr>
<tr><td rowspan="3">Receiver setup:</td><td>Frequency</td><td>Detector</td><td>RBW</td><td>VBW</td><td>Value</td></tr>
<tr><td rowspan="2">Above 1GHz</td><td>Peak</td><td>1MHz</td><td>3MHz</td><td>Peak</td></tr>
<tr><td>Average</td><td>1MHz</td><td>3MHz</td><td>Average</td></tr>
</table>

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 § 15.209, whichever is the lesser attenuation

4.3.2 TEST PROCEDURE

Above 1GHz test procedure as below:

a. 1. The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.
b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c. The antenna height is varied from one meter to four 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.
d. 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 rota table was turned from 0 degrees to 360 degrees to find the maximum reading.
e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
g. Test the EUT in the lowest channel, the Highest channel

Note:

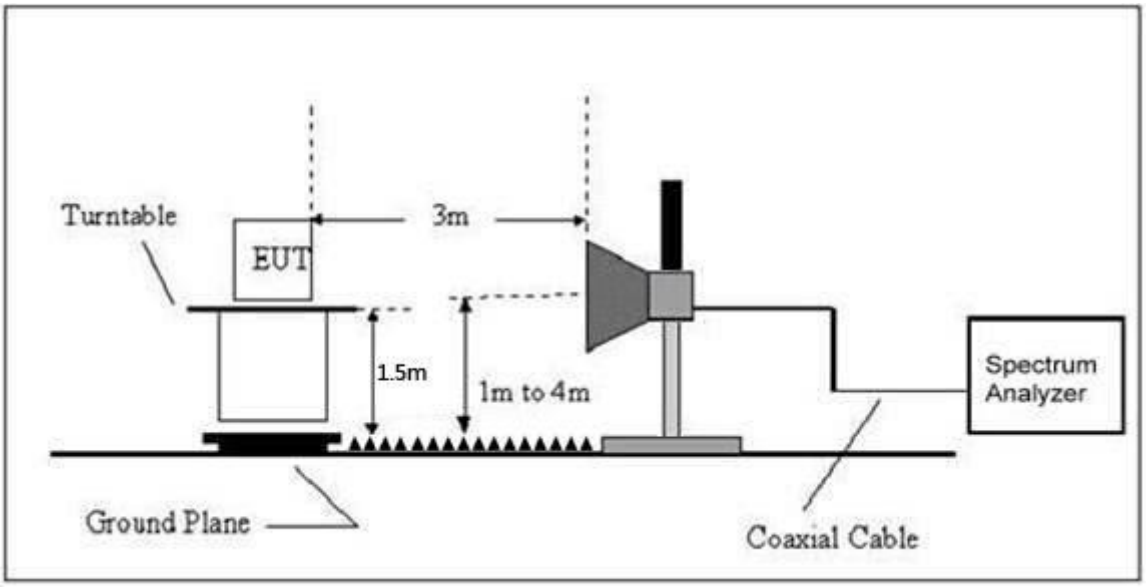
Both horizontal and vertical antenna polarities were tested
and performed pretest to three orthogonal axis. The worst case emissions were reported

4.3.3 DEVIATION FROM TEST STANDARD

No deviation

4.3.4 TEST SETUP

Radiated Emission Test-Up Frequency Above 1GHz



4.3.5 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.

4.3.6 TEST RESULT

2402MHz
Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2310	56.24	21.25	3.26	33.14	47.61	74	-26.39	Horizontal
2400	54.16	21.75	3.54	33.42	46.03	74	-27.97	Horizontal
2310	52.34	21.25	3.26	33.14	43.71	74	-30.29	Vertical
2400	50.14	21.75	3.54	33.42	42.01	74	-31.99	Vertical

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2310	53.24	21.25	3.26	33.14	44.61	54	-9.39	Horizontal
2400	51.36	21.75	3.54	33.42	43.23	54	-10.77	Horizontal
2310	48.36	21.25	3.26	33.14	39.73	54	-14.27	Vertical
2400	43.26	21.75	3.54	33.42	35.13	54	-18.87	Vertical

2480MHz
Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2483.5	55.24	22.12	3.65	33.54	47.47	74	-26.53	Horizontal
2500	52.36	22.35	3.98	33.27	45.42	74	-28.58	Horizontal
2483.5	50.14	22.12	3.65	33.54	42.37	74	-31.63	Vertical
2500	47.69	22.35	3.98	33.27	40.75	74	-33.25	Vertical

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2483.5	50.24	22.12	3.65	33.54	42.47	54	-11.53	Horizontal
2500	47.69	22.35	3.98	33.27	40.75	54	-13.25	Horizontal
2483.5	44.32	22.12	3.65	33.54	36.55	54	-17.45	Vertical
2500	41.36	22.35	3.98	33.27	34.42	54	-19.58	Vertical

Remark: Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
All of the restriction bands were tested, and only the data of worst case was exhibited.

Measurement data:
Field Strength of The Fundamental Signal

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
2402	103.15	22.55	3.25	33.45	95.50	114	-18.5	Vertical
2402	101.54	22.55	3.25	33.45	93.89	114	-20.11	Horizontal
2440	99.85	23.05	3.36	33.15	93.11	114	-20.89	Vertical
2440	96.34	23.05	3.36	33.15	89.60	114	-24.4	Horizontal
2480	94.32	23.57	3.67	33.68	87.88	114	-26.12	Vertical
2480	92.11	23.57	3.67	33.68	85.67	114	-28.33	Horizontal

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
2402	90.25	22.55	3.25	33.45	82.6	94	-11.4	Vertical
2402	88.45	22.55	3.25	33.45	80.8	94	-13.2	Horizontal
2440	86.34	23.05	3.36	33.15	79.6	94	-14.4	Vertical
2440	84.23	23.05	3.36	33.15	77.49	94	-16.51	Horizontal
2480	82.41	23.57	3.67	33.68	75.97	94	-18.03	Vertical
2480	80.36	23.57	3.67	33.68	73.92	94	-20.08	Horizontal

Remark:
1. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*

4.4 Channel Bandwidth

Test Requirement:	FCC Part15 C Section 15.215
Test Method:	ANSI C63.10: 2013

4.4.1 Applied procedures / limit

FCC Part15 (15.215) , Subpart C			
Section	Test Item	Frequency Range (MHz)	Result
15.215	Bandwidth	2400-2483.5	PASS

4.4.2 TEST PROCEDURE

1. Set resolution bandwidth (RBW) = 1-5% or DTS BW, not to exceed 100 kHz.
2. Set the video bandwidth (VBW) ⩾ 3 x 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) that are attenuated by 20 dB relative to the maximum level measured in the fundamental emission.

4.4.3 DEVIATION FROM STANDARD

No deviation.

4.4.4 TEST SETUP

4.4.5 EUT OPERATION 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.

4.4.6 TEST RESULTS

Temperature：	26℃	Relative Humidity：	54%
Test Mode ：	GFSK	Test Voltage ：	DC 5V

Test channel	Channel Bandwidth (MHz)	Result
Lowest	1.084	Pass
Middle	1.083	
Highest	1.083	

Lowest channel

Middle channel

Highest channel

4.5 Antenna Requirement

Standard Applicable

For intentional device, according to FCC 47 CFR Section 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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited

Antenna Connected Construction

The maximum gain of antenna is 0.00 dBi.

Remark:The antenna gain is provided by the customer , if the data provided by the customer is not accurate, BSL Testing Co., Ltd. does not assume any responsibility.