

FCC PART 15C
Measurement and Test Report
For
Shenzhen Huihaikang Intelligent Equipment Co., Ltd

FCC ID:2BEQT-EM9GC

FCC Rule(s)/Methods:	FCC CFR Title 47 Part 15 Subpart C Section 15.249 ANSI C63.10:2013	
Product Description:	WIRELESS MOUSE	
Trademark	KYSONA	
Model/Type reference.:	EM9GC, EM9GX, EM11Pro, EM11GX, EM11GC, ET7, EM20, EM30, M101.	
Report No.:	BSL2401318275081F-1	
Date of receipt of test item	:	Jan. 15, 2024
Date of sampling	:	Jan. 15, 2024
Tested Date:	Jan. 15, 2024 to Jan. 26, 2024	
Issued Date:	Jan. 26, 2024	
Tested By:	Lris Yao/ Engineer	<i>Lris Yao</i>
Reviewed By:	Levi Xiao/ EMC Manager	<i>Levi Xiao</i>
Approved & Authorized By:	Salon Ouyang / PSQ Manager	<i>Salon Ouyang</i>
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1.VERSION

Report No.	Version	Description	Approved
BSL2401318275081F-1	Rev.01	Initial issue of report	Jan. 26, 2024

2. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15 (15.249) , Subpart C			
Standard Section	Test Item	Judgment	Remark
FCC part 15.203/15.249 (c)	Antenna requirement	PASS	
FCC part 15.207	AC Power Line Conducted Emission	PASS	
FCC part 15.15.249 (a)	Field strength of the fundamental signal	PASS	
FCC part 15.15.249 (a) (d)/15.209	Spurious emissions	PASS	
FCC part 15.249 (d)/15.205	Band edge	PASS	
FCC part 15.215 (c)	20dB Occupied Bandwidth	PASS	

NOTE:

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

2.1 TEST FACILITY

BSL TESTING CO., LTD

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

FCC Test Firm Registration Number: 562200

Designation Number: CN1338

IC Registered No.: 11093A

Designation Number: CN0019

2.2 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	3m chamber Radiated spurious emission(9KHz-30MHz)	U=4.5dB
2	3m chamber Radiated spurious emission(30MHz-1GHz)	U=4.8dB
3	3m chamber Radiated spurious emission(1GHz-6GHz)	U=4.9dB
4	3m chamber Radiated spurious emission(6GHz-40GHz)	U=5.0dB
5	Conducted disturbance	U=3.2dB
6	RF Band Edge	U=1.68dB
7	RF power conducted	U=1.86dB
8	RF conducted Spurious Emission	U=2.2dB
9	RF Occupied Bandwidth	U=1.8dB
10	RF Power Spectral Density	U=1.75dB
11	humidity uncertainty	U=5.3%
12	Temperature uncertainty	U=0.59°C

3. GENERAL INFORMATION**3.1 GENERAL DESCRIPTION**

Applicant:	Shenzhen Huihaikang Intelligent Equipment Co., Ltd
Address of applicant:	Building 12, Baoneng Science and Technology Industrial Park, Longgang District, Shenzhen, Guangdong, China
Manufacturer:	Shenzhen Huihaikang Intelligent Equipment Co., Ltd
Address of manufacturer:	Building 12, Baoneng Science and Technology Industrial Park, Longgang District, Shenzhen, Guangdong, China
Product Name:	WIRELESS MOUSE
Model No.:	EM9GC, EM9GX, EM11Pro, EM11GX, EM11GC, ET7, EM20, EM30, M101.(Main test model: EM9GC)
Model Different.:	Only the model names are different.
Hardware version	V1.0
Software version	V1.0
Serial No.:	N/A
Sample(s) Status:	Engineer sample
Operation Frequency:	2403MHz~2480MHz
Channel Numbers:	16
Modulation Type:	GFSK
Antenna Type:	PCB antenna
Antenna gain:	3.85dBi
Power supply:	DC 3.7V for Battery DC 5V for USB Port
SWITCHING POWER ADAPTER:	N/A

Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2403 MHz	11	2453 MHz				
2	2407 MHz	12	2459 MHz				
3	2414 MHz	13	2463 MHz				
4	2419 MHz	14	2466 MHz				
5	2422 MHz	15	2473 MHz				
6	2426 MHz	16	2480 MHz				
7	2436 MHz						
8	2439 MHz						
9	2441 MHz						
10	2445 MHz						

Note:

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, and the selected channel see below:

Channel	Frequency
The lowest channel	2403MHz
The middle channel	2441MHz
The Highest channel	2480MHz

3.2 DESCRIPTION OF TEST MODES

Transmitting mode	Keep the EUT in continuously transmitting mode
Remark: During the test, the test voltage was tuned from 85% to 115% of the nominal rated supply voltage, and found that the worst case was under the nominal rated supply condition. So the report just shows that condition's data.	

Test Software	BLE Test Tool
Power level setup	<0dBm

3.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Conducted Emission



Radiated Emission



Conducted Spurious



3.4 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE)

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

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Note
/	ADAPTER	/	ADS-5001000C	/	DC 5V/1A

Item	Shielded Type	Ferrite Core	Length	Note

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.

3.5 EQUIPMENTS LIST FOR ALL TEST ITEMS

Radiation Test equipment

Item	Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	Communication Tester	Rohde & Schwarz	CMW500	100358 Fireware: 4.43 SP4	Oct. 22, 2023	Oct. 21, 2024
2	Spectrum Analyzer	KEYSIGHT	9020A	MY55370835	Oct. 22, 2023	Oct. 21, 2024
3	Test Receiver	R&S	ESCI7	US47140102 Fireware: 4.42 SP3	Oct. 22, 2023	Oct. 21, 2024
4	Signal Generator	HP	83630B	3844A01028	Oct. 22, 2023	Oct. 21, 2024
5	Signal Generator	IFR	2023A	202307/242	Oct. 22, 2023	Oct. 21, 2024
6	Amplifier	Agilent	8449B	4035A00116	Oct. 22, 2023	Oct. 21, 2024
7	Amplifier	HP	8447E	2945A02770	Oct. 22, 2023	Oct. 21, 2024
8	Broadband Antenna	SCHAFFNER	2774	2774	Feb.28,2022	Feb.27,2025
9	Biconical and log periodic antennas	ELECTRO-METRICS	EM-6917B-1	171	Feb.28,2022	Feb.27,2025
10	Horn Antenna	R&S	HF906	100253	Feb.28,2022	Feb.27,2025
11	Horn Antenna	Schwarzbeck	BBHA9170	00814	Feb.28,2022	Feb.27,2025
12	Horn Antenna	EM	EM-6961	6462	Feb.28,2022	Feb.27,2025
13	3m Semi-Anechoic Chamber	Chengyu Electron	9 (L)*6 (W)* 6 (H)	BSL086	Feb.28,2022	Feb.27,2025
14	Loop Antenna	ZHINAN	ZN30900C	20073	Feb.28,2022	Feb.27,2025
15	power meter	DARE	RPR3006W	15I00041SNO0	Oct.27,2023	Oct.26,2024
16	RF Control Unit	MWRFtest	Mw100	-	Oct.27,2023	Oct.26,2024
17	Test software	MWRFtest	V8310	-	-	-
18	Turntable	MF	MF-7802BS	N/A	\	\
19	Antenna tower	MF	MF-7802BS	N/A	\	\
20	Signal Generator	Agilent	N5182A	N/A	Oct.27,2023	Oct.26,2024

Conduction Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	LISN	R&S	ENV216	101471	Oct.27,2023	Oct.26,2024
2	LISN	CYBERTEK	EM5040A	E1850400149	Oct.27,2023	Oct.26,2024
3	Test Cable	N/A	C01	N/A	Oct.27,2023	Oct.26,2024
4	Test Cable	N/A	C02	N/A	Oct.27,2023	Oct.26,2024
5	EMI Test Receiver	R&S	ESCI3	101393	Oct.27,2023	Oct.26,2024
6	Absorbing Clamp	DZ	ZN23201	15034	Oct.27,2023	Oct.26,2024

7	EMC Software	Frad	EZ-EMC	Ver.EMC-CON 3A1.1	\	\
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RF Conduction Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	Spectrum Analyzer (9kHz-26.5GHz)	KEYSIGHT	9020A	MY55370835	Oct.27,2023	Oct.26,2024
2	MWRF Power Meter Test system	MW	MW100-RPCB	N/A	Oct.27,2023	Oct.26,2024
3	D.C. Power Supply	LongWei	TPR-6405D	N/A	\	\
4	RF Software	MW	MTS8310	V2.0.0.0	\	\

4. EMC EMISSION TEST

4.1 CONDUCTED EMISSION MEASUREMENT

Test Requirement:	FCC Part15 C Section 15.207
Test Method:	ANSI C63.10:2013
Test Frequency Range:	150KHz to 30MHz
Receiver setup:	RBW=9KHz, VBW=30KHz, Sweep time=auto

4.1.1 POWER LINE CONDUCTED EMISSION Limits

FREQUENCY (MHz)	Limit (dBuV)		Standard
	Quas-peak	Average	
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) *Decreases with the logarithm of the frequency.

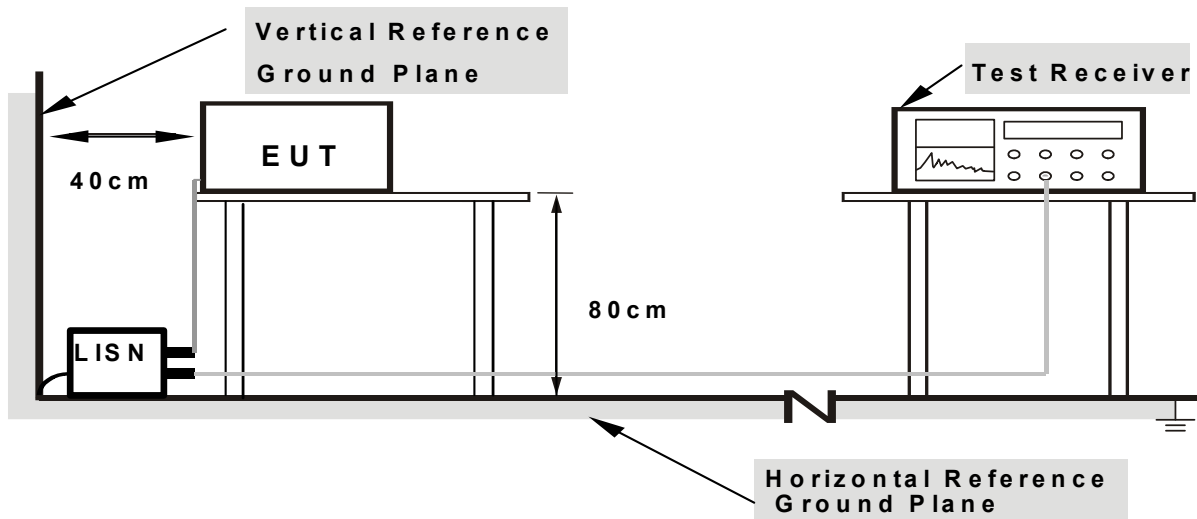
4.1.2 TEST PROCEDURE

- a. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- 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.

4.1.3 DEVIATION FROM TEST STANDARD

No deviation

4.1.4 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 cm from other units and other metal planes

4.1.5 EUT OPERATING CONDITIONS

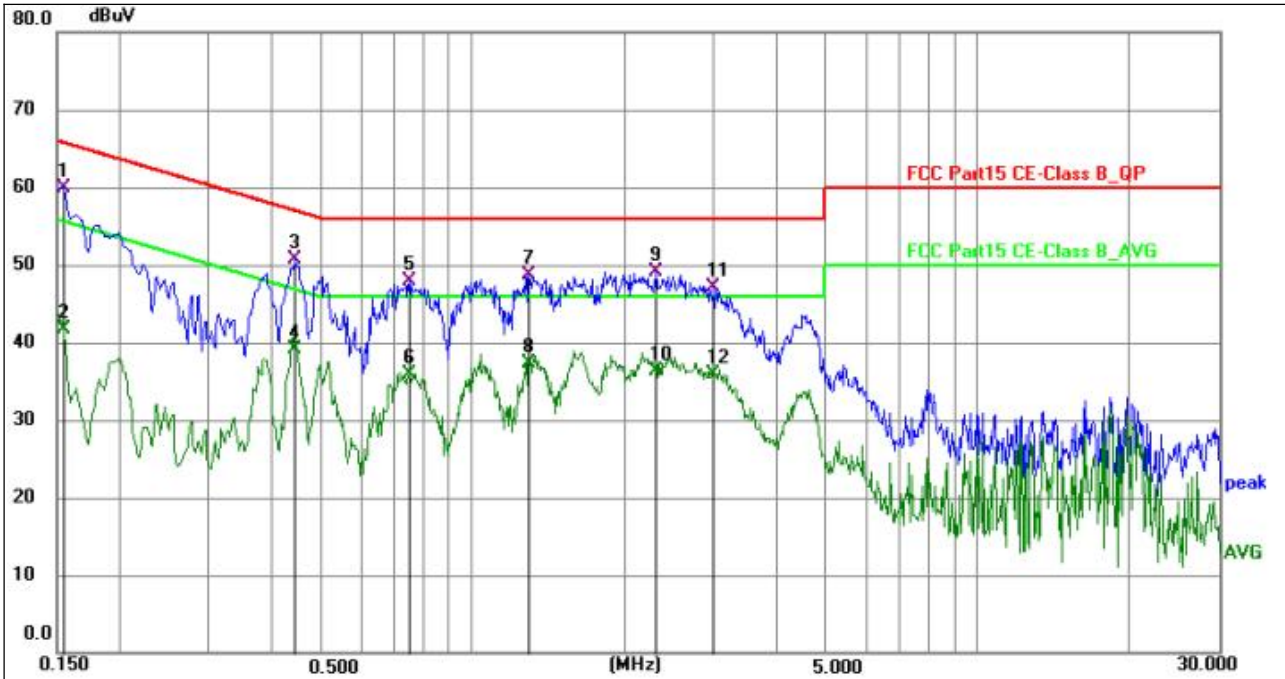
The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to Charging during test. This operating condition was tested and used to collect the included data.

We pretest AC 120V and AC 230V, the worst voltage was AC 120V and the data recording in the report.

4.1.6 Test Result PASS

4.1.6 Test Result (Worst case GFSK 2403MHz)

Temperature :	26°C	Relative Humidity:	54%
Pressure :	101kPa	Phase :	L
Test Voltage :	AC 120V/60Hz		

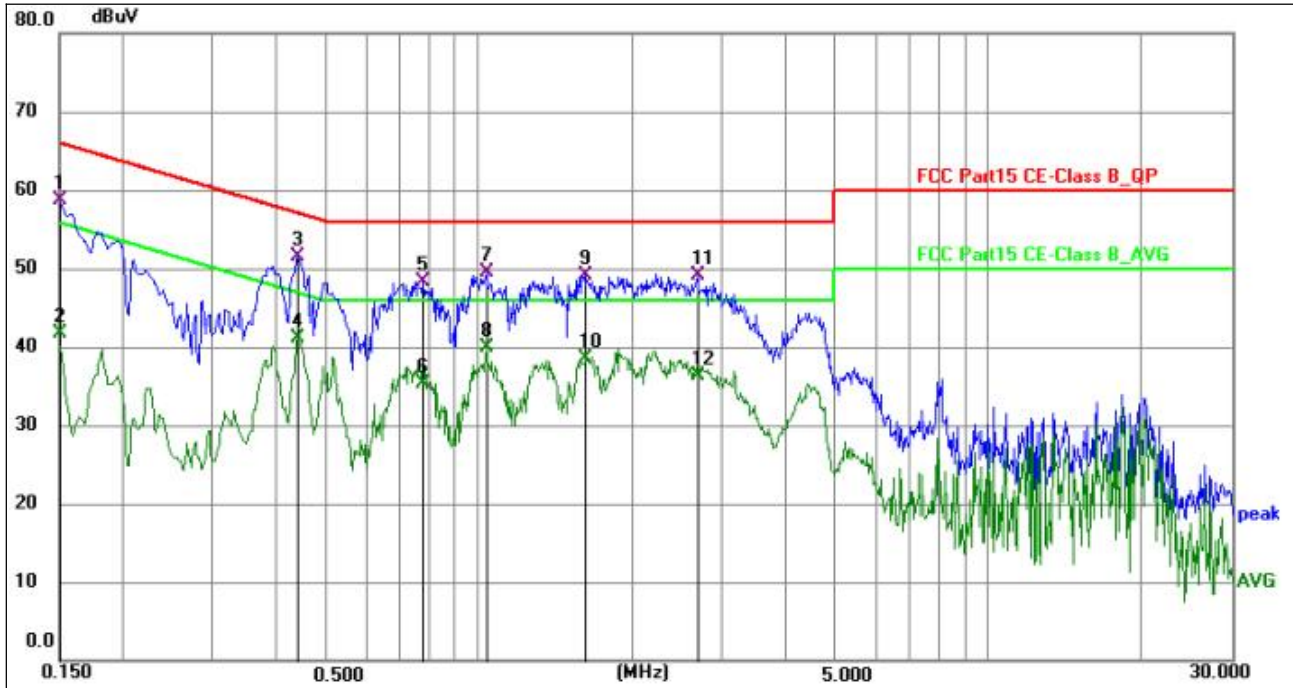


No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1 *	0.1544	50.35	9.53	59.88	65.76	-5.88	QP	P	
2	0.1544	32.22	9.53	41.75	55.76	-14.01	AVG	P	
3	0.4425	41.06	9.63	50.69	57.01	-6.32	QP	P	
4	0.4425	29.52	9.63	39.15	47.01	-7.86	AVG	P	
5	0.7485	38.13	9.69	47.82	56.00	-8.18	QP	P	
6	0.7485	26.13	9.69	35.82	46.00	-10.18	AVG	P	
7	1.2928	39.17	9.58	48.75	56.00	-7.25	QP	P	
8	1.2928	27.82	9.58	37.40	46.00	-8.60	AVG	P	
9	2.3054	39.41	9.69	49.10	56.00	-6.90	QP	P	
10	2.3054	26.68	9.69	36.37	46.00	-9.63	AVG	P	
11	2.9984	37.43	9.62	47.05	56.00	-8.95	QP	P	
12	2.9984	26.34	9.62	35.96	46.00	-10.04	AVG	P	

Notes:

- 1.An initial pre-scan was performed on the line and neutral lines with peak detector.
- 2.Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
- 3.Measurement Level = Reading level + Correct Factor

Temperature :	26°C	Relative Humidity:	54%
Pressure :	101kPa	Phase :	N
Test Voltage :	AC 120V/60Hz		



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1500	49.29	9.51	58.80	66.00	-7.20	QP	P	
2	0.1500	32.14	9.51	41.65	56.00	-14.35	AVG	P	
3 *	0.4380	41.95	9.63	51.58	57.10	-5.52	QP	P	
4	0.4380	31.55	9.63	41.18	47.10	-5.92	AVG	P	
5	0.7754	38.58	9.67	48.25	56.00	-7.75	QP	P	
6	0.7754	25.71	9.67	35.38	46.00	-10.62	AVG	P	
7	1.0363	39.97	9.53	49.50	56.00	-6.50	QP	P	
8	1.0363	30.35	9.53	39.88	46.00	-6.12	AVG	P	
9	1.6214	39.53	9.64	49.17	56.00	-6.83	QP	P	
10	1.6214	28.80	9.64	38.44	46.00	-7.56	AVG	P	
11	2.6880	39.45	9.65	49.10	56.00	-6.90	QP	P	
12	2.6880	26.73	9.65	36.38	46.00	-9.62	AVG	P	

Notes:

- 1.An initial pre-scan was performed on the line and neutral lines with peak detector.
- 2.Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
- 3.Measurement Level = Reading level + Correct Factor

4.2 RADIATED EMISSION MEASUREMENT and Field Strength of The Fundamental Signal

Test Requirement:	FCC Part15 C Section 15.209				
Test Method:	ANSI C63.10:2013				
Test Frequency Range:	9kHz to 25GHz				
Test site:	Measurement Distance: 3m				
Receiver setup:	Frequency	Detector	RBW	VBW	Value
	9KHz-150KHz	Quasi-peak	200Hz	600Hz	Quasi-peak
	150KHz-30MHz	Quasi-peak	9KHz	30KHz	Quasi-peak
	30MHz-1GHz	Quasi-peak	100KHz	300KHz	Quasi-peak
	Above 1GHz	Peak	1MHz	3MHz	Peak
Peak		1MHz	10Hz	Average	

4.2.1 RADIATED EMISSION LIMITS

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

LIMITS OF RADIATED EMISSION MEASUREMENT

FREQUENCY (MHz)	Limit (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).

4.2.2 TEST PROCEDURE

- a. The measuring distance of at 3 m shall be used for measurements at frequency up to 25GHz. 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 semi-chamber test. 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 0.8m; above 1GHz, the height was 1.5m, the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- e. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
- f. For the actual test configuration, please refer to the related Item –EUT Test Photos.
- g. For the radiated emission test above 1GHz:
Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response.

The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.

Note:

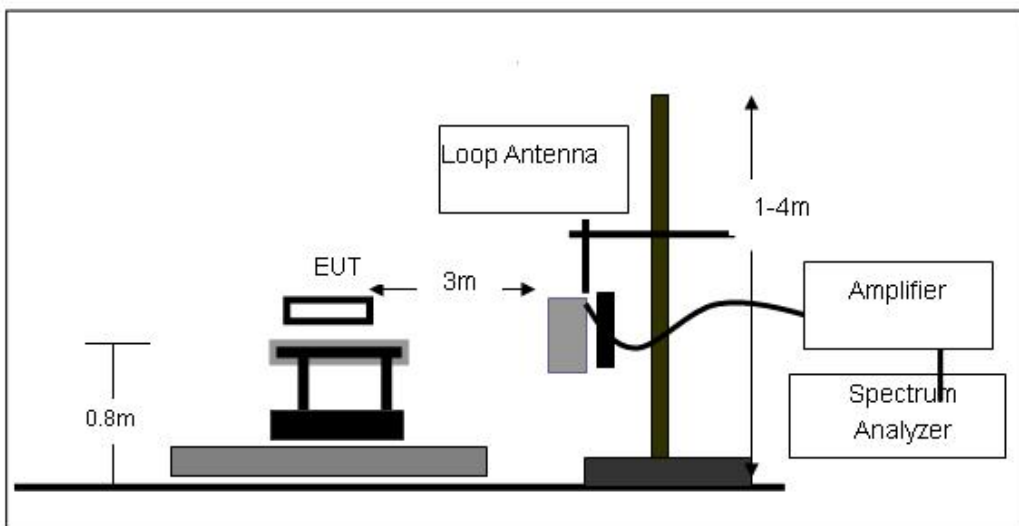
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

4.2.3 DEVIATION FROM TEST STANDARD

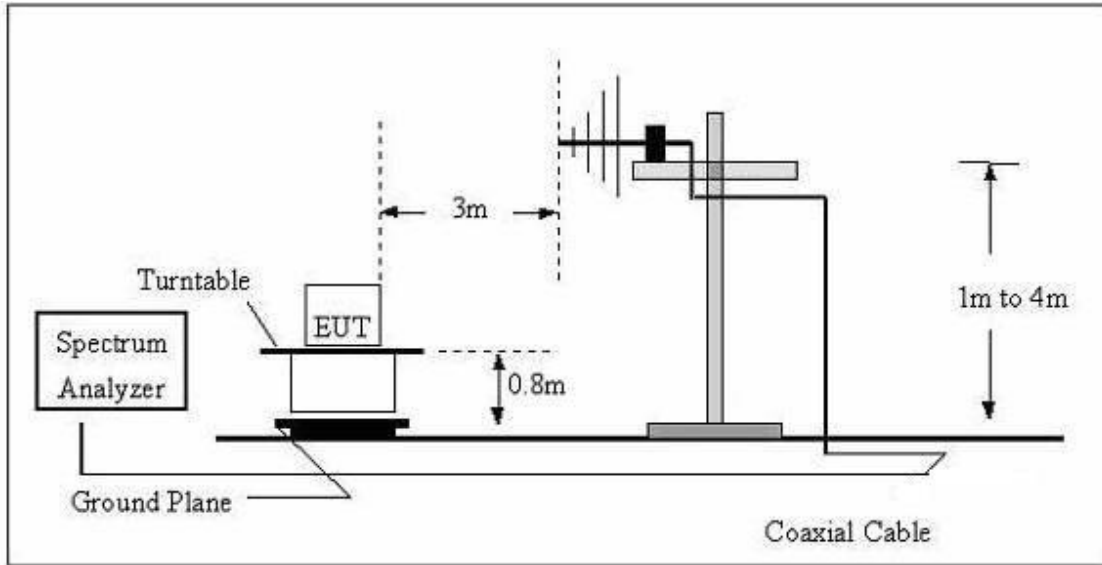
No deviation

4.2.4 TEST SETUP

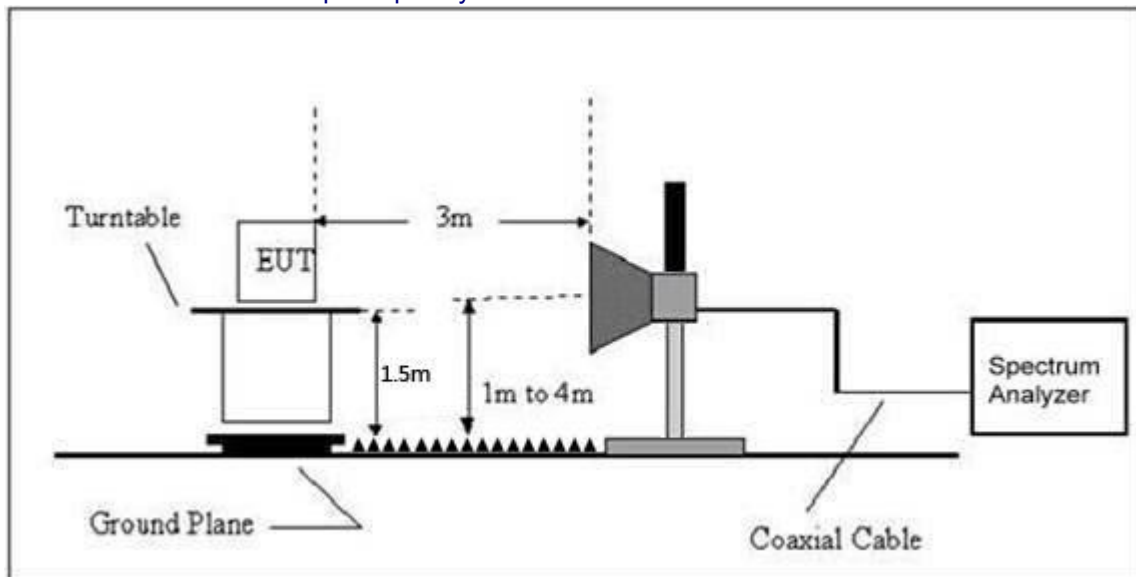
(A) Radiated Emission Test-Up Frequency Below 30MHz



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



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



4.2.5 EUT OPERATING CONDITIONS

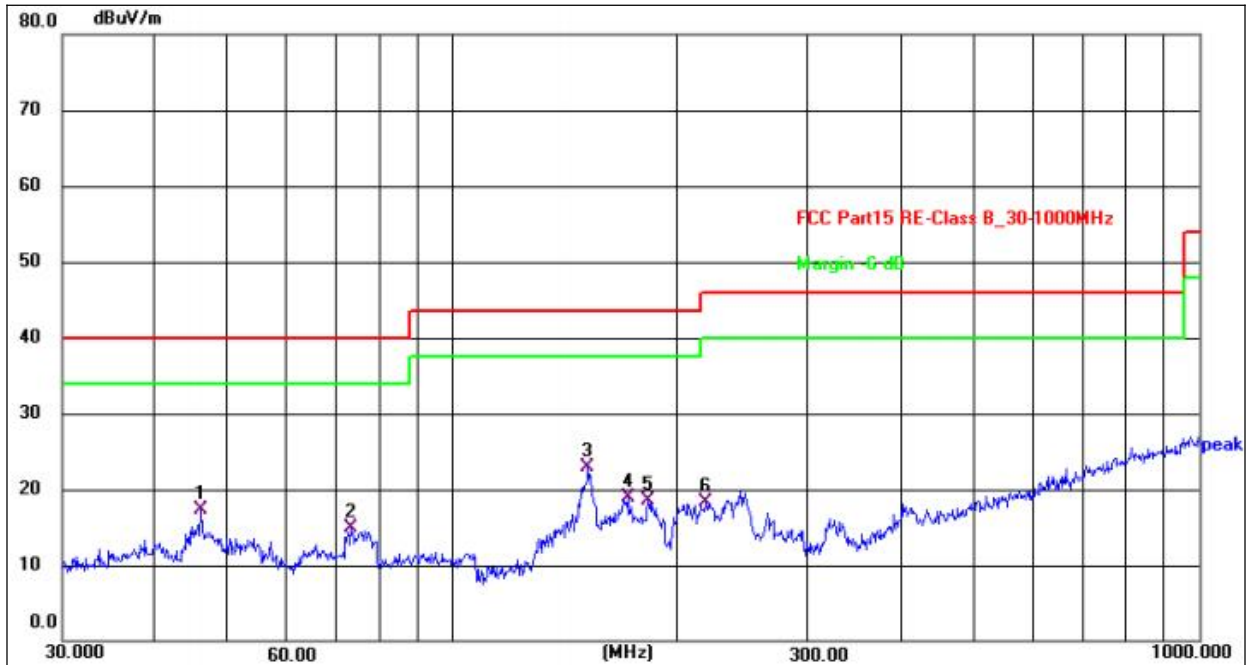
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

4.2.6 TEST RESULTS (Between 9KHz – 30 MHz)

The emission from 9 kHz to 30MHz was pre-tested and found the result was 20dB lower than the limit, and according to 15.31(o) & RSS-Gen 6.13, the test result no need to reported.

Between 30MHz – 1GHz (Worst case GFSK 2403MHz)

Temperature:	26°C	Relative Humidity:	54%
Pressure:	101kPa	Polarization:	Horizontal
Test Voltage:	DC 3.7V		



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	46.0360	33.40	-16.10	17.30	40.00	-22.70	QP
2	73.1677	34.16	-19.21	14.95	40.00	-25.05	QP
3 *	151.8432	38.66	-15.81	22.85	43.50	-20.65	QP
4	171.6918	35.59	-16.69	18.90	43.50	-24.60	QP
5	182.8895	36.83	-18.25	18.58	43.50	-24.92	QP
6	218.7426	37.50	-19.24	18.26	46.00	-27.74	QP

Temperature:	26°C	Relative Humidity:	54%
Pressure:	101kPa	Polarization:	Vertical
Test Voltage:	DC 3.7V		



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	40.7140	41.21	-15.73	25.48	40.00	-14.52	QP
2 *	45.8746	41.89	-16.07	25.82	40.00	-14.18	QP
3	56.6290	42.25	-17.11	25.14	40.00	-14.86	QP
4	91.5970	43.82	-20.16	23.66	43.50	-19.84	QP
5	151.8432	44.43	-15.81	28.62	43.50	-14.88	QP
6	164.6102	37.82	-16.16	21.66	43.50	-21.84	QP

Remarks:

- 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.

1GHz~25GHz

Polar (H/V)	Frequency	Meter Reading	Pre-ampli fier	Cable Loss	Antenna Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
Low Channel:2403MHz									
V	4806	53.24	30.55	5.77	24.66	53.12	74.00	-20.88	Pk
V	4806	43.39	30.55	5.77	24.66	43.27	54.00	-10.73	AV
V	7209	51.26	30.33	6.32	24.55	51.80	74.00	-22.20	Pk
V	7209	43.76	30.33	6.32	24.55	44.30	54.00	-9.70	AV
V	9612	52.94	30.85	7.45	24.69	54.23	74.00	-19.77	Pk
V	9612	43.08	30.85	7.45	24.69	44.37	54.00	-9.63	AV
V	12015	54.60	31.02	8.99	25.57	58.14	74.00	-15.86	Pk
V	12015	43.13	31.02	8.99	25.57	46.67	54.00	-7.33	AV
H	4806	52.20	30.55	5.77	24.66	52.08	74.00	-21.92	Pk
H	4806	43.83	30.55	5.77	24.66	43.71	54.00	-10.29	AV
H	7209	54.92	30.33	6.32	24.55	55.46	74.00	-18.54	Pk
H	7209	43.70	30.33	6.32	24.55	44.24	54.00	-9.76	AV
H	9612	51.74	30.85	7.45	24.69	53.03	74.00	-20.97	Pk
H	9612	43.88	30.85	7.45	24.69	45.17	54.00	-8.83	AV
H	12015	54.58	31.02	8.99	25.57	58.12	74.00	-15.88	Pk
H	12015	43.16	31.02	8.99	25.57	46.70	54.00	-7.30	AV

Polar (H/V)	Frequency	Meter Reading	Pre-ampli fier	Cable Loss	Antenna Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
Middle Channel:2441MHz									
V	4882	50.36	30.55	5.77	24.66	50.24	74.00	-23.76	Pk
V	4882	43.27	30.55	5.77	24.66	43.15	54.00	-10.85	AV
V	7323	51.46	30.33	6.32	24.55	52.00	74.00	-22.00	Pk
V	7323	43.29	30.33	6.32	24.55	43.83	54.00	-10.17	AV
V	9764	53.33	30.85	7.45	24.69	54.62	74.00	-19.38	Pk
V	9764	43.75	30.85	7.45	24.69	45.04	54.00	-8.96	AV
V	12205	54.24	31.02	8.99	25.57	57.78	74.00	-16.22	Pk
V	12205	43.69	31.02	8.99	25.57	47.23	54.00	-6.77	AV
H	4882	50.11	30.55	5.77	24.66	49.99	74.00	-24.01	Pk
H	4882	43.23	30.55	5.77	24.66	43.11	54.00	-10.89	AV
H	7323	50.28	30.33	6.32	24.55	50.82	74.00	-23.18	Pk
H	7323	43.43	30.33	6.32	24.55	43.97	54.00	-10.03	AV
H	9764	50.38	30.85	7.45	24.69	51.67	74.00	-22.33	Pk
H	9764	43.34	30.85	7.45	24.69	44.63	54.00	-9.37	AV
H	12205	54.28	31.02	8.99	25.57	57.82	74.00	-16.18	Pk
H	12205	43.26	31.02	8.99	25.57	46.80	54.00	-7.20	AV

Polar (H/V)	Frequency	Meter Reading	Pre-ampli fier	Cable Loss	Antenna Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
High Channel:2480MHz									
V	4960	50.35	30.55	5.77	24.66	50.23	74.00	-23.77	Pk
V	4960	43.12	30.55	5.77	24.66	43.00	54.00	-11.00	AV
V	7440	50.23	30.33	6.32	24.55	50.77	74.00	-23.23	Pk
V	7440	43.59	30.33	6.32	24.55	44.13	54.00	-9.87	AV
V	9920	51.21	30.85	7.45	24.69	52.50	74.00	-21.50	Pk
V	9920	43.81	30.85	7.45	24.69	45.10	54.00	-8.90	AV
V	12400	52.81	31.02	8.99	25.57	56.35	74.00	-17.65	Pk
V	12400	43.37	31.02	8.99	25.57	46.91	54.00	-7.09	AV
H	4960	52.11	30.55	5.77	24.66	51.99	74.00	-22.01	Pk
H	4960	43.61	30.55	5.77	24.66	43.49	54.00	-10.51	AV
H	7440	52.40	30.33	6.32	24.55	52.94	74.00	-21.06	Pk
H	7440	43.91	30.33	6.32	24.55	44.45	54.00	-9.55	AV
H	9920	50.73	30.85	7.45	24.69	52.02	74.00	-21.98	Pk
H	9920	43.73	30.85	7.45	24.69	45.02	54.00	-8.98	AV
H	12400	51.38	31.02	8.99	25.57	54.92	74.00	-19.08	Pk
H	12400	43.03	31.02	8.99	25.57	46.57	54.00	-7.43	AV

Remark:

1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier,
Margin= Emission Level - Limit
2. If peak below the average limit, the average emission was no test.
3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Field Strength of The Fundamental Signal Data

Low CH

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	Limit	Margin
				Height	Polar				
(MHz)	(dB μ V)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dB μ V/m)	(dB μ V/m)	(dB)
GFSK Low Channel 2403MHz									
2403.00	88.63	PK	191	1.7	V	-1.06	87.57	114.00	-26.43
2403.00	84.69	Ave	191	1.7	V	-1.06	83.63	94.00	-10.37
2403.00	85.37	PK	76	1.9	H	1.33	86.70	114.00	-27.30
2403.00	81.57	Ave	76	1.9	H	1.33	82.90	94.00	-11.10

Mid CH

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	Limit	Margin
				Height	Polar				
(MHz)	(dB μ V)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dB μ V/m)	(dB μ V/m)	(dB)
GFSK Low Channel 2441MHz									
2441.00	87.69	PK	12	1.0	V	-1.06	86.63	114.00	-27.37
2441.00	82.64	Ave	12	1.0	V	-1.06	81.58	94.00	-12.42
2441.00	85.93	PK	196	1.5	H	1.33	87.26	114.00	-26.74
2441.00	82.04	Ave	196	1.5	H	1.33	83.37	94.00	-10.63

High CH

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	Limit	Margin
				Height	Polar				
(MHz)	(dB μ V)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dB μ V/m)	(dB μ V/m)	(dB)
GFSK Low Channel 2480MHz									
2480.00	87.66	PK	236	1.3	V	-1.06	86.60	114.00	-27.40
2480.00	83.24	Ave	236	1.3	V	-1.06	82.18	94.00	-11.82
2480.00	86.21	PK	265	1.2	H	1.33	87.54	114.00	-26.46
2480.00	81.27	Ave	265	1.2	H	1.33	82.60	94.00	-11.40

5.RADIATED BAND EMISSION MEASUREMENT

5.1 TEST REQUIREMENT:

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

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

FREQUENCY (MHz)	Limit (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).

5.2 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:

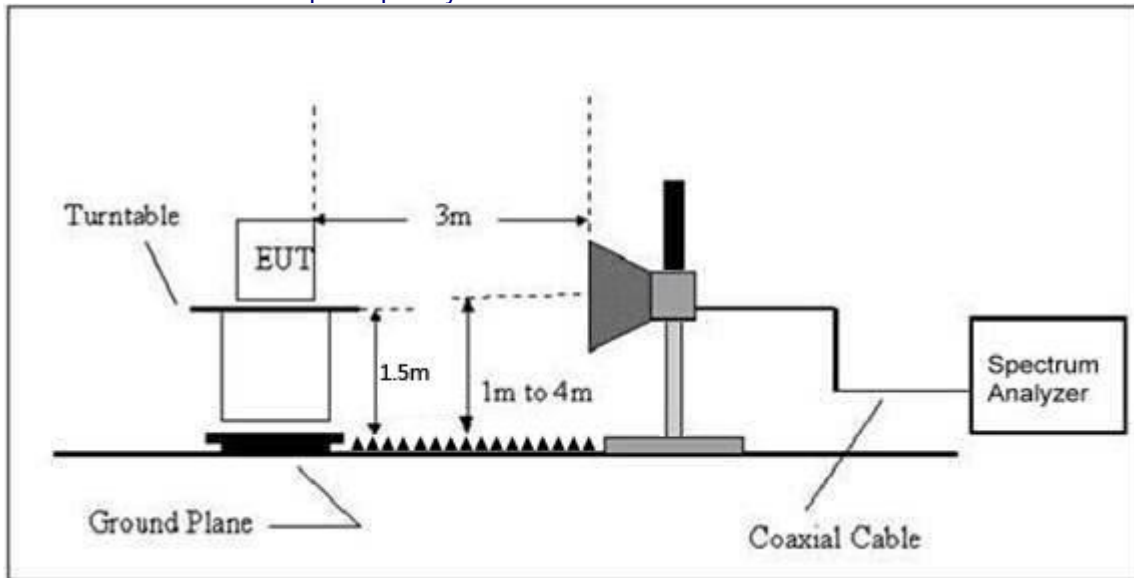
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

5.3 DEVIATION FROM TEST STANDARD

No deviation

5.4 TEST SETUP

Radiated Emission Test-Up Frequency Above 1GHz

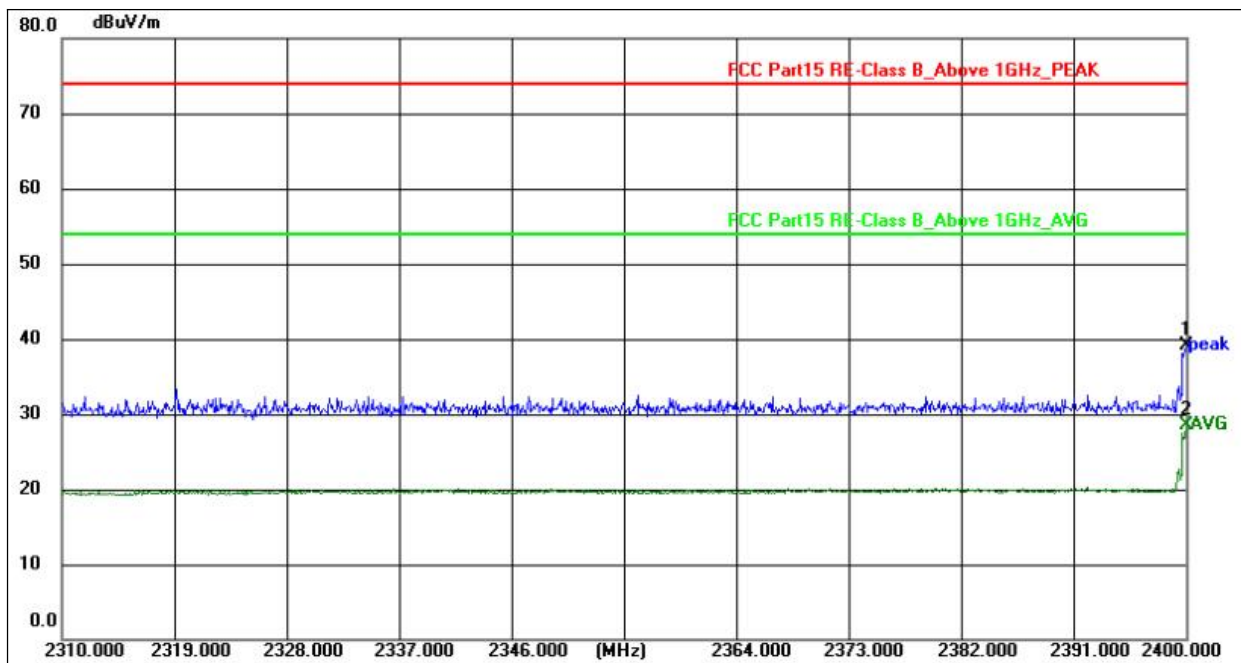


5.5 EUT OPERATING CONDITIONS

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.

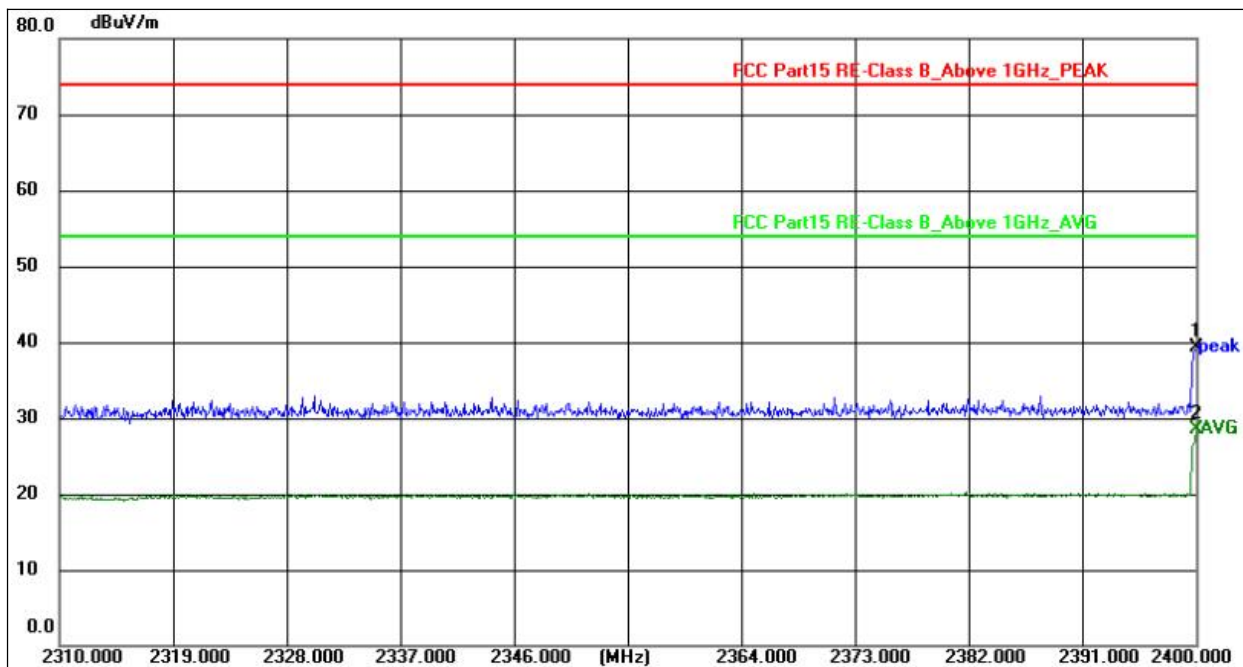
5.6 TEST RESULT

Polarization: H



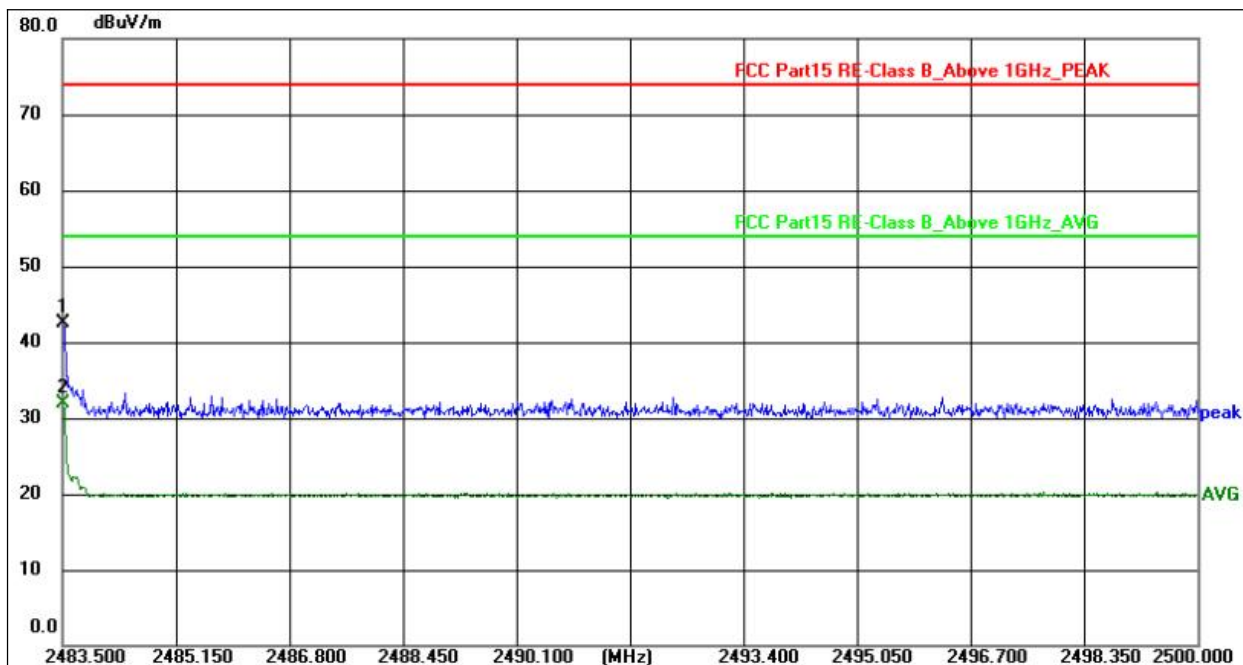
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	2400.000	43.17	-4.09	39.08	74.00	-34.92	peak			P	
2 *	2400.000	32.55	-4.09	28.46	54.00	-25.54	AVG			P	

Polarization: V



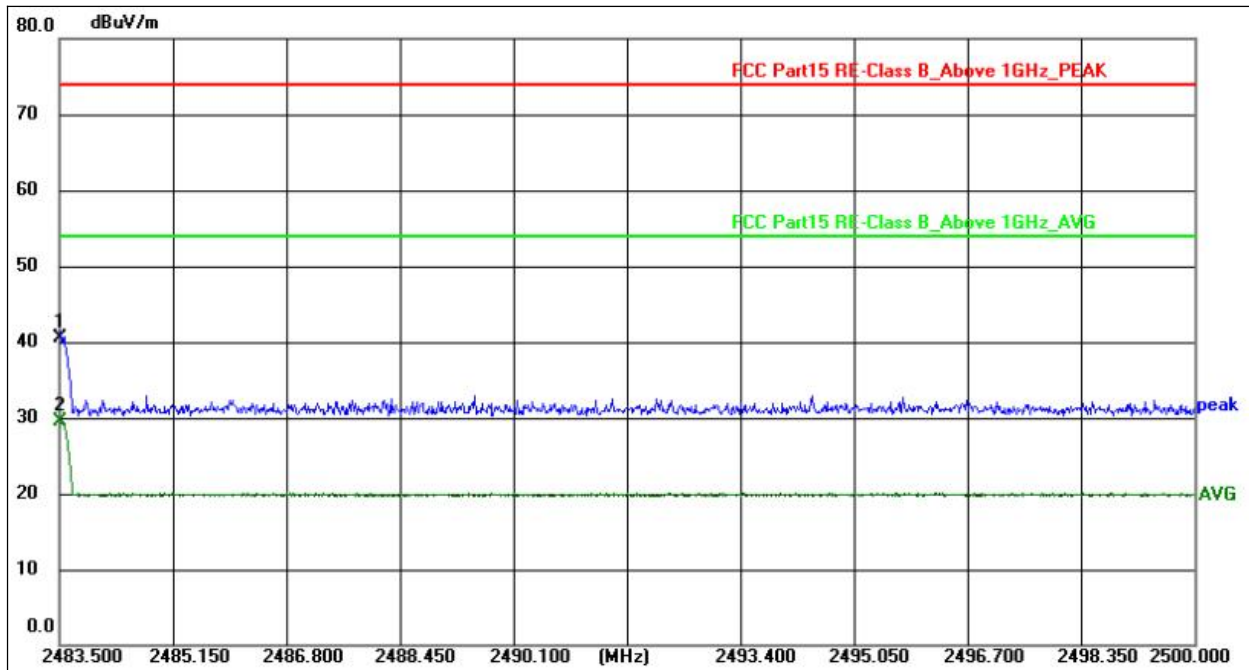
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	2400.000	43.23	-3.93	39.30	74.00	-34.70	peak			P	
2 *	2400.000	32.35	-3.93	28.42	54.00	-25.58	AVG			P	

Polarization: H



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	2483.500	46.26	-3.85	42.41	74.00	-31.59	peak			P	
2 *	2483.500	35.79	-3.85	31.94	54.00	-22.06	AVG			P	

Polarization: V V



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	2483.500	44.11	-3.58	40.53	74.00	-33.47	peak			P	
2 *	2483.500	33.03	-3.58	29.45	54.00	-24.55	AVG			P	

6. CHANNEL BANDWIDTH

Test Requirement:	FCC Part15 C Section 15.249
Test Method:	KDB558074 D0115.249 Meas Guidance v05r02

6.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.249) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.249	Bandwidth	(-20dB bandwidth)	2403-2480	PASS

6.2 TEST PROCEDURE

1. Set RBW = 47 kHz.
2. Set the video bandwidth (VBW) $\geq 3 \times$ RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

6.3 DEVIATION FROM STANDARD

No deviation.

6.4 TEST SETUP



6.5 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.

6.6 TEST RESULT

Temperature :	26°C	Relative Humidity :	54%
Test Mode :	GFSK	Test Voltage :	DC 3.7V

Test channel	-20dB Channel Bandwidth (MHz)	Result
Lowest	2.281	Pass
Middle	2.287	
Highest	2.265	



-20dB Bandwidth 2403MHz Ant1



-20dB Bandwidth 2441MHz Ant1



-20dB Bandwidth 2480MHz Ant1

8.ANTENNA REQUIREMENT

Standard requirement:	FCC Part15 C Section 15.203 /249(c)
<p>15.203 requirement: 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.</p> <p>15.247(c) (1)(i) requirement: (i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.</p>	
EUT Antenna:	
The antenna is a PCB antenna, the best case gain of the antenna is 3.85dBi, reference to the appendix II for details	

11. TEST SETUP PHOTO

Reference to the appendix I for details.

12. EUT CONSTRUCTIONAL DETAILS

Reference to the appendix II for details.

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