+

FCC Test Report

Report No.: AGC05038150801FE03

FCC ID	:	2ACP4SPBT1
APPLICATION PURPOSE	:	Original Equipment
PRODUCT DESIGNATION	:	Bluetooth Speaker
BRAND NAME	:	Sentry
MODEL NAME	:	SPBT1
CLIENT	:	Sentry Industries Limited
DATE OF ISSUE	:	Aug.26,2015
STANDARD(S) **TEST PROCEDURE(S)**	:	FCC Part 15 Rules
REPORT VERSION	:	V1.0

Attestation of ***G***lobal ***C***ompliance (Shenzhen) Co., Ltd

Report Revise Record

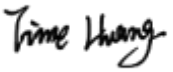
Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Aug.26,2015	Valid	Original Report

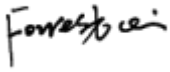
TABLE OF CONTENTS

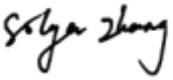
1. VERIFICATION OF CONFORMITY

Applicant	Sentry Industries Limited
Address	507 Houston Centre,63 Mody Road,TST,HK
Manufacturer	Sentry Industries Limited
Address	507 Houston Centre,63 Mody Road,TST,HK
Product Designation	Bluetooth Speaker
Brand Name	Sentry
Test Model	SPBT1
Date of test	Aug.24,2015 to Aug.25,2015
Deviation	None
Condition of Test Sample	Normal
Report Template	AGCRT-US-BR/RF

We hereby certify that:
The above equipment was tested by Compliance Certification Service(Shenzhen) Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4 (2009) and the energy emitted by the sample EUT tested as described in this report is in compliance with radiated emission limits of FCC Rules Part 15.249.

Tested By 
Time Huang(Huang Nanhui) Aug.26,2015

Reviewed By 
Forrest Lei(Lei Yonggang) Aug.26,2015

Approved By 
Solger Zhang(Zhang Hongyi)
Authorized Officer Aug.26,2015

2. GENERAL INFORMATION

2.1. PRODUCT DESCRIPTION

A major technical description of EUT is described as following

Operation Frequency	2.402 GHz to 2.480GHz
RF Output Power	-0.41dBm(Max)
Bluetooth Version	V2.1+EDR
Modulation	GFSK, π /4-DQPSK, 8DPSK
Number of channels	79
Hardware Version	V1.0
Software Version	1.0
Antenna Designation	PCB Antenna (Met 15.203 Antenna requirement)
Antenna Gain	0dBi
Power Supply	DC 3.7V by battery
Note: The USB port only used for charging and can't be used to transfer data with PC.	

2.2. TABLE OF CARRIER FREQUENCYS

Frequency Band	Channel Number	Frequency
2400~2483.5MHZ	0	2402MHZ
	1	2403MHZ
	:	:
	38	2440 MHZ
	39	2441 MHZ
	40	2442 MHZ
	:	:
	77	2479 MHZ
	78	2480 MHZ

3. MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement y ±U，where expended 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 Test	±3.18dB
2	All emissions,radiated	±3.91dB
3	Temperature	±0.5°C
4	Humidity	±2%

4. DESCRIPTION OF TEST MODES

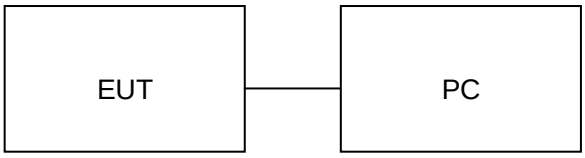
NO.	TEST MODE DESCRIPTION
1	Low channel GFSK
2	Middle channel GFSK
3	High channel GFSK
4	Low channel π /4-DQPSK
5	Middle channel π /4-DQPSK
6	High channel π /4-DQPSK
7	Low channel 8DPSK
8	Middle channel 8DPSK
9	High channel 8DPSK
10	Normal operation (BT)

Note:
1. Only the result of the worst case was recorded in the report, if no other cases.
2. For Radiated Emission, 3axis were chosen for testing for each applicable mode.
3.The EUT used fully-charged battery when tested.

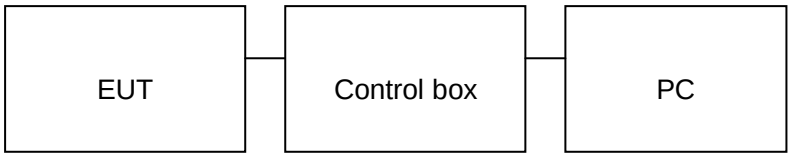
5. SYSTEM TEST CONFIGURATION

5.1. CONFIGURATION OF EUT SYSTEM

Configure 1: (Normal hopping)



Configure 2: (Control continuous TX)



5.2. EQUIPMENT USED IN EUT SYSTEM

Item	Equipment	Model No.	ID or Specification	Remark
1	Bluetooth Speaker	Sentry	SPBT1	EUT
2	Control box	N/A	N/A	A.E
3	PC	Dell	INSPIRON	A.E
4	USB Cable	N/A	1.1m, unshielded	A.E
5	Audio Cable	N/A	0.3m, unshielded	A.E
6	IPOD	APPLE	A1367	A.E

5.3. SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.249	Radiated Emission	Compliant
§15.249	Band Edges	Compliant
§15.207	Conduction Emission	Compliant
N/A	BANDWITH	Compliant

6. TEST FACILITY

Site	Compliance Certification Service(Shenzhen) Inc.
Location	No.10-1 Mingkeda Logistics Park, No.18 Huanguan South RD. Guan lan Town,Baoan Distr
FCC Registration No.	441872
Description	The test site is constructed and calibrated to meet the FCC requirements in documents ANSI C63.4:2009.

7 ALL TEST EQUIPMENT LIST

Radiated Emission Test Site 966(2)					
Name of Equipment	**Manufacturer**	**Model Number**	**Serial Number**	**Last Calibration**	**Due Calibration**
PSA Series Spectrum Analyzer	Agilent	E4446A	US44300399	03/01/2015	03/01/2016
EMI TEST RECEIVER	ROHDE&SCHWARZ	ESCI	100783	03/09/2015	03/08/2016
Amplifier	MITEQ	AM-1604-3000	1123808	03/18/2015	03/17/2016
High Noise Amplifier	Agilent	8449B	3008A01838	03/18/2015	03/17/2016
Board-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170-497	07/10/2015	07/09/2016
Bilog Antenna	SCHAFFNER	CBL6143	5082	03/01/2015	03/01/2016
Horn Antenna	SCHWARZBECK	BBHA9120	D286	03/01/2015	03/01/2016
Loop Antenna	COM-POWER	AL-130	121044	09/27/2014	09/26/2015
Turn Table	N/A	N/A	N/A	N.C.R	N.C.R
Controller	Sunol Sciences	SC104V	022310-1	N.C.R	N.C.R
Controller	CT	N/A	N/A	N.C.R	N.C.R
Temp. / Humidity Meter	Anymetre	JR913	N/A	02/28/2015	02/27/2016
Antenna Tower	SUNOL	TLT2	N/A	N.C.R	N.C.R
Test S/W	FARAD	LZ-RF / CCS-SZ-3A2			

Conducted Emission Test Site					
Name of Equipment	**Manufacturer**	**Model Number**	**Serial Number**	**Last Calibration**	**Due Calibration**
EMI TEST RECEIVER	ROHDE&SCHWARZ	ESCI	100783	03/09/2015	03/08/2016
LISN(EUT)	ROHDE&SCHWARZ	ENV216	101543-WX	03/09/2015	03/08/2016
LISN	EMCO	3825/2	8901-1459	03/09/2015	03/08/2016
Temp. / Humidity Meter	VICTOR	HTC-1	N/A	03/04/2015	03/03/2016
Test S/W	FARAD	EZ-EMC/ CCS-3A1-CE			

8. RADIATED EMISSION

8.1TEST LIMIT

Standard FCC15.249

Fundamental Frequency	Field Strength of Fundamental (millivolts/meter)	Field Strength of Harmonics (microvolts/meter)
900-928MHz	50	500
2400-2483.5MHz	50	500
5725-5875MHz	50	500
24.0-24.25GHz	250	2500

Standard FCC 15.209

Frequency (MHz)	Distance Meters	Field Strengths Limit	
		μ V/m	dB(μV)/m
0.009 ~ 0.490	300	2400/F(kHz)	---
0.490 ~ 1.705	30	24000/F(kHz)	---
1.705 ~ 30	30	30	---
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000	3	Other:74.0 dB(μV)/m (Peak) 54.0 dB(μV)/m (Average)	

Remark： (1) Emission level dBμ V = 20 log Emission level μ V/m

(2) The smaller limit shall apply at the cross point between two frequency bands.

(3) Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system.

8.2. MEASUREMENT PROCEDURE

1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1.5MHz VBW and RBW for peak reading. Then 1.5MHz RBW and 10Hz VBW for average reading in spectrum analyzer.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.
8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High - Low scan is not required in this case.

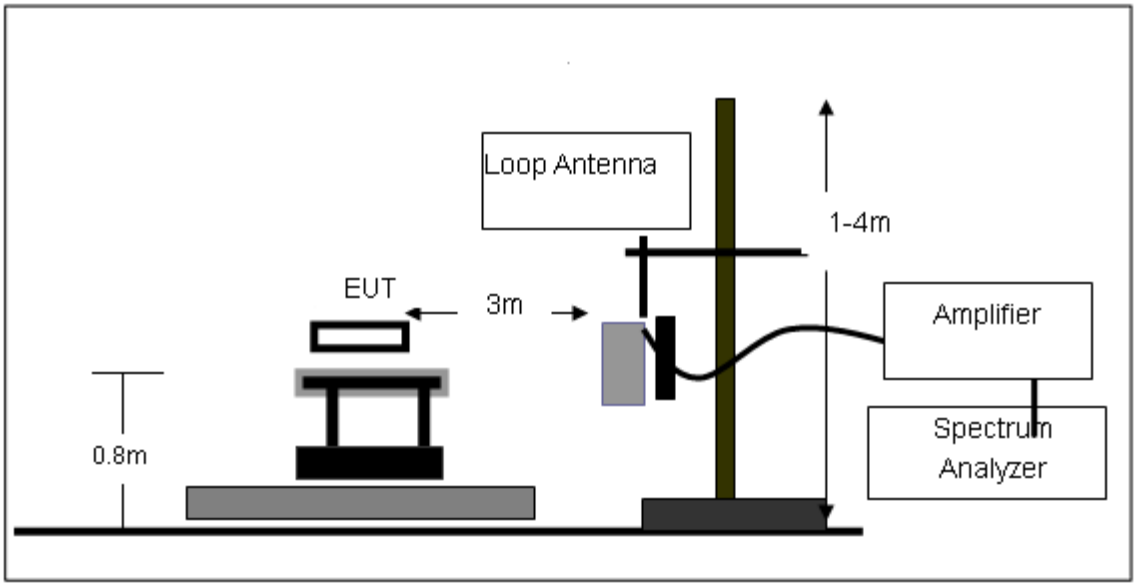
The following table is the setting of spectrum analyzer and receiver.

Spectrum Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP
Start ~Stop Frequency	1GHz~26.5GHz 1.5MHz/1.5MHz for Peak, 1.5MHz/10Hz for Average

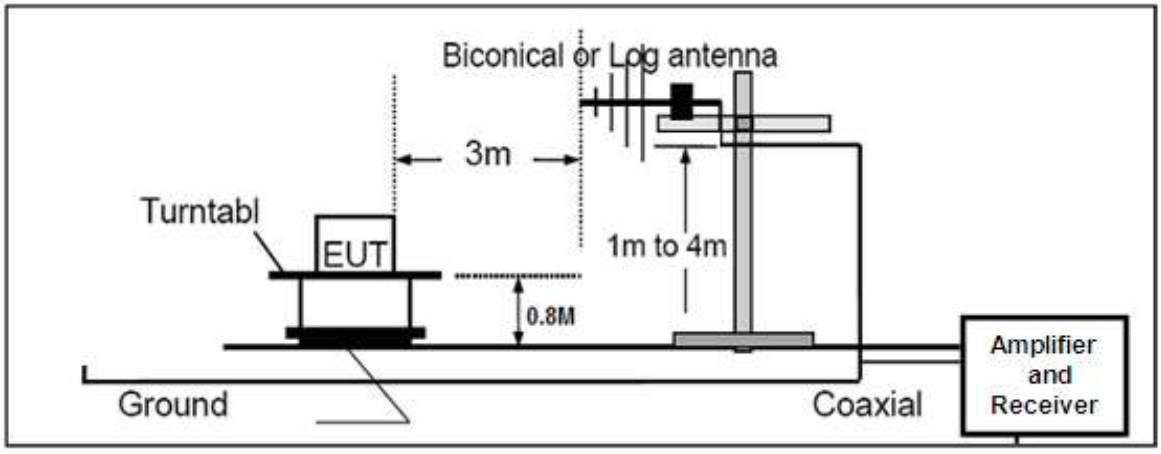
Receiver Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP

8.3. TEST SETUP

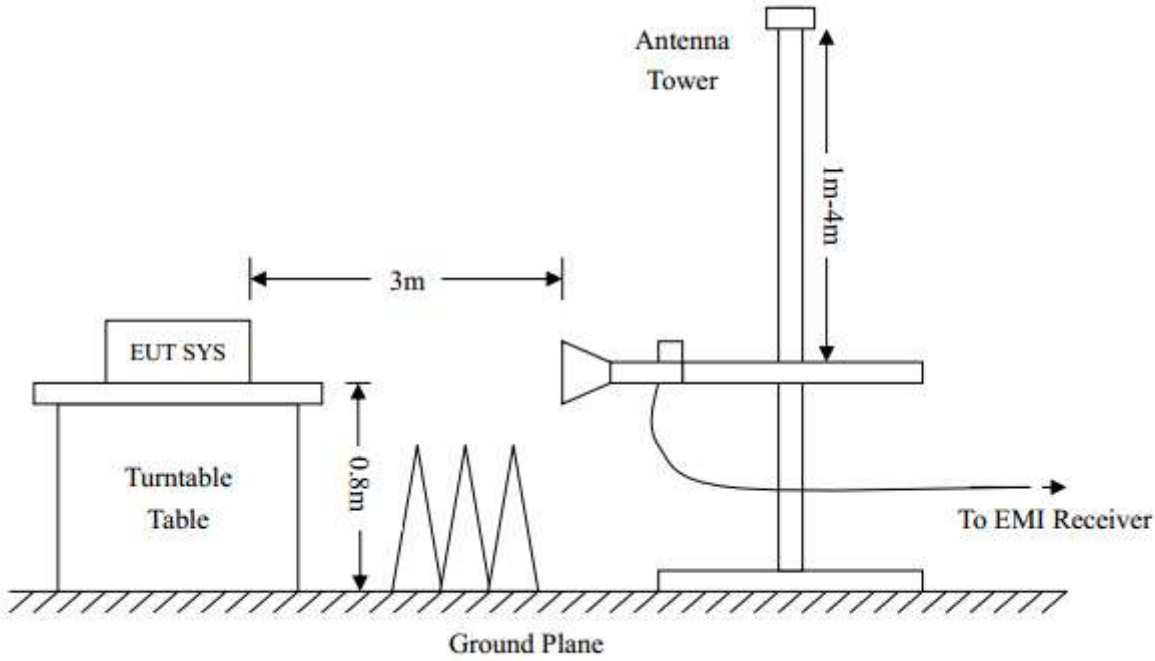
Radiated Emission Test-Setup Frequency Below 30MHz



RADIATED EMISSION TEST SETUP 30MHz-1000MHz



RADIATED EMISSION TEST SETUP ABOVE 1000MHz



8.4. TEST RESULT

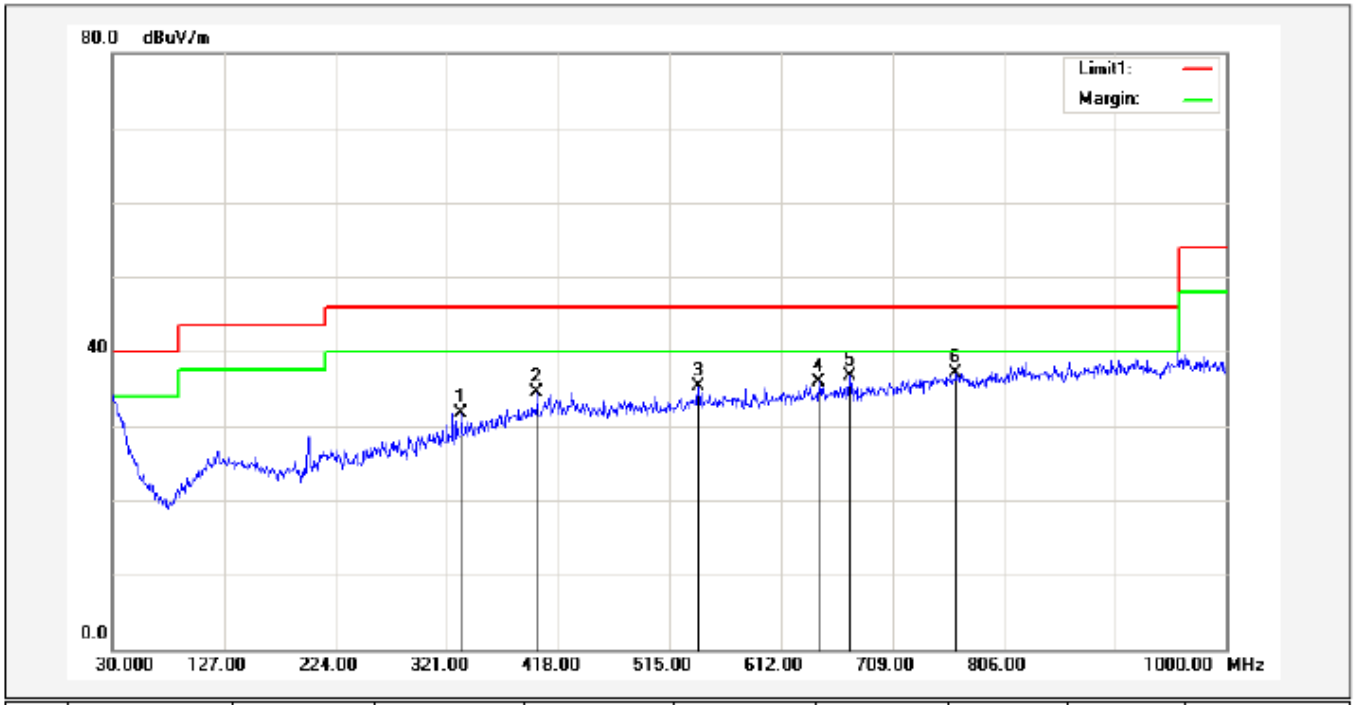
(Worst modulation:GFSK)

RADIATED EMISSION BELOW 30MHZ

No emission found between lowest internal used/generated frequencies to 30MHz.

RADIATED EMISSION BELOW 1GHZ

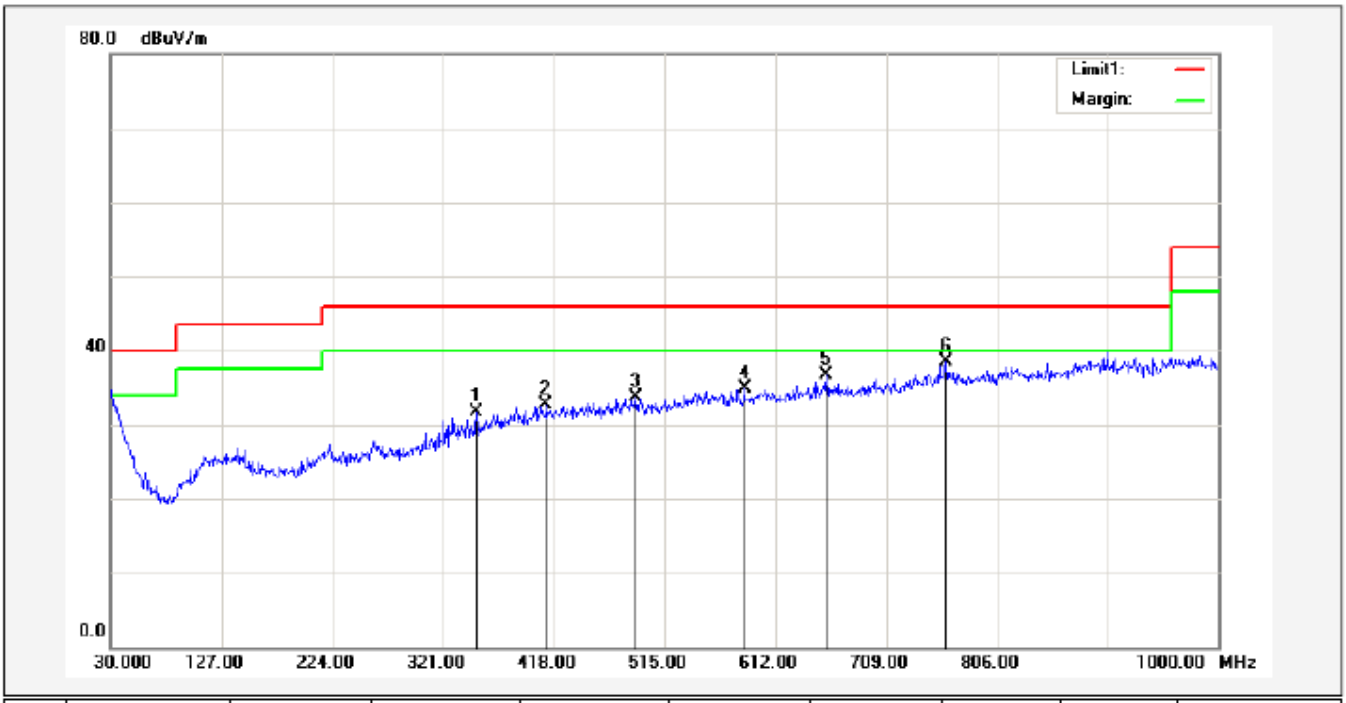
RADIATED EMISSION TEST- (30MHZ-1GHZ)-LOW CHANNEL-HORIZONTAL



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Remark
1	333.6100	50.08	-18.31	31.77	46.00	-14.23			peak
2	399.5700	50.60	-16.10	34.50	46.00	-11.50			peak
3	540.2200	48.61	-13.28	35.33	46.00	-10.67			peak
4	644.9800	48.35	-12.49	35.86	46.00	-10.14			peak
5	672.1400	48.81	-12.19	36.62	46.00	-9.38			peak
6*	764.2900	48.19	-11.07	37.12	46.00	-8.88			peak

RESULT: PASS

RADIATED EMISSION TEST- (30MHZ-1GHZ)-LOW CHANNEL -VERTICAL



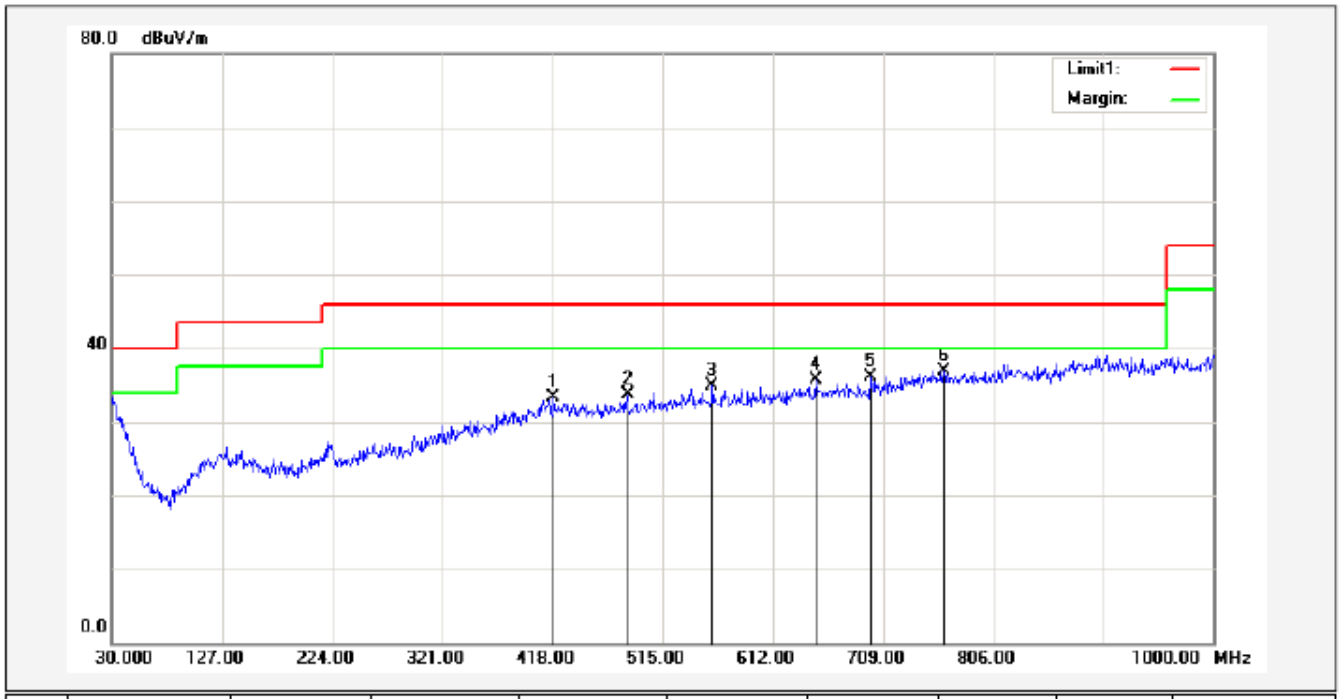
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Remark
1	350.1000	49.30	-17.66	31.64	46.00	-14.36			peak
2	411.2100	48.26	-15.59	32.67	46.00	-13.33			peak
3	489.7800	48.05	-14.36	33.69	46.00	-12.31			peak
4	584.8400	48.05	-13.08	34.97	46.00	-11.03			peak
5	656.6200	49.21	-12.43	36.78	46.00	-9.22			peak
6*	761.3800	49.51	-11.04	38.47	46.00	-7.53			peak

RESULT: PASS

Note: 1. Factor=Antenna Factor + Cable loss, Margin=Measurement-Limit.

2. The “Factor” value can be calculated automatically by software of measurement system.

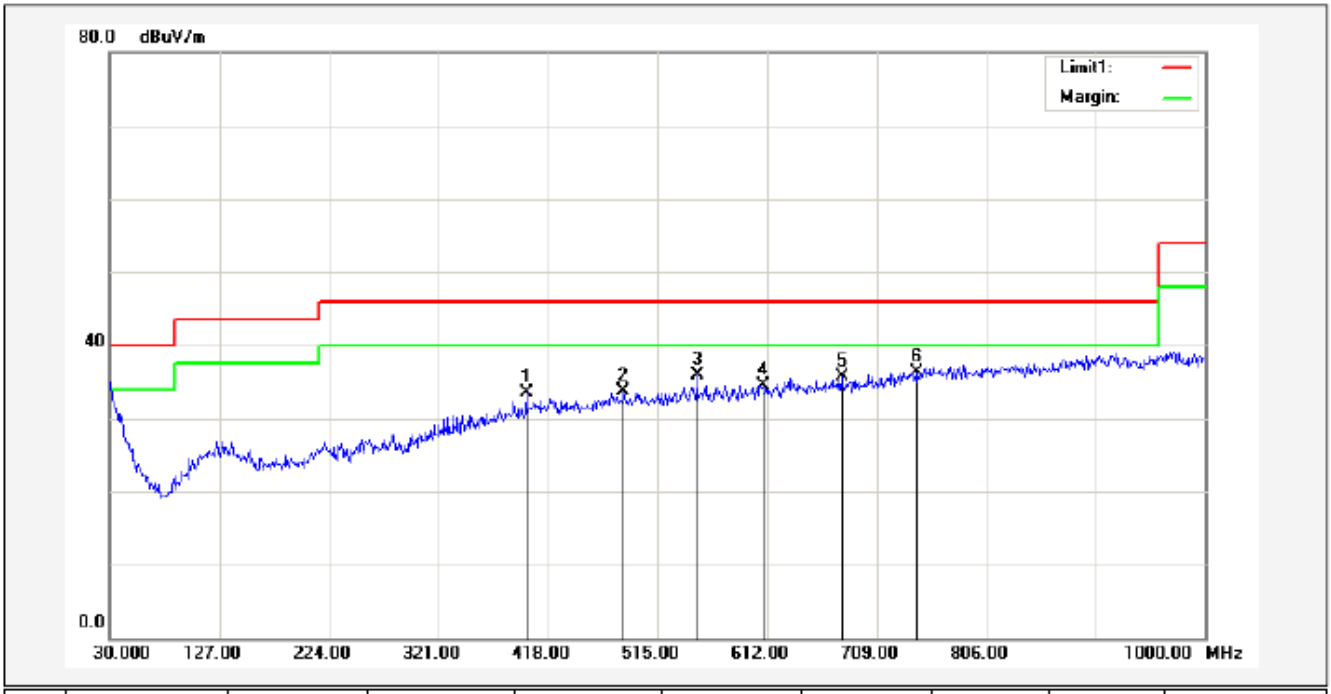
RADIATED EMISSION TEST- (30MHZ-1GHZ)-MIDDLE CHANNEL-HORIZONTAL



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Remark
1	418.9700	48.72	-15.44	33.28	46.00	-12.72			peak
2	483.9600	48.01	-14.36	33.65	46.00	-12.35			peak
3	558.6500	48.21	-13.24	34.97	46.00	-11.03			peak
4	649.8300	48.24	-12.52	35.72	46.00	-10.28			peak
5	697.3600	48.05	-12.01	36.04	46.00	-9.96			peak
6*	762.3500	48.03	-11.05	36.98	46.00	-9.02			peak

RESULT: PASS

RADIATED EMISSION TEST- (30MHZ-1GHZ)- MIDDLE CHANNEL -VERTICAL



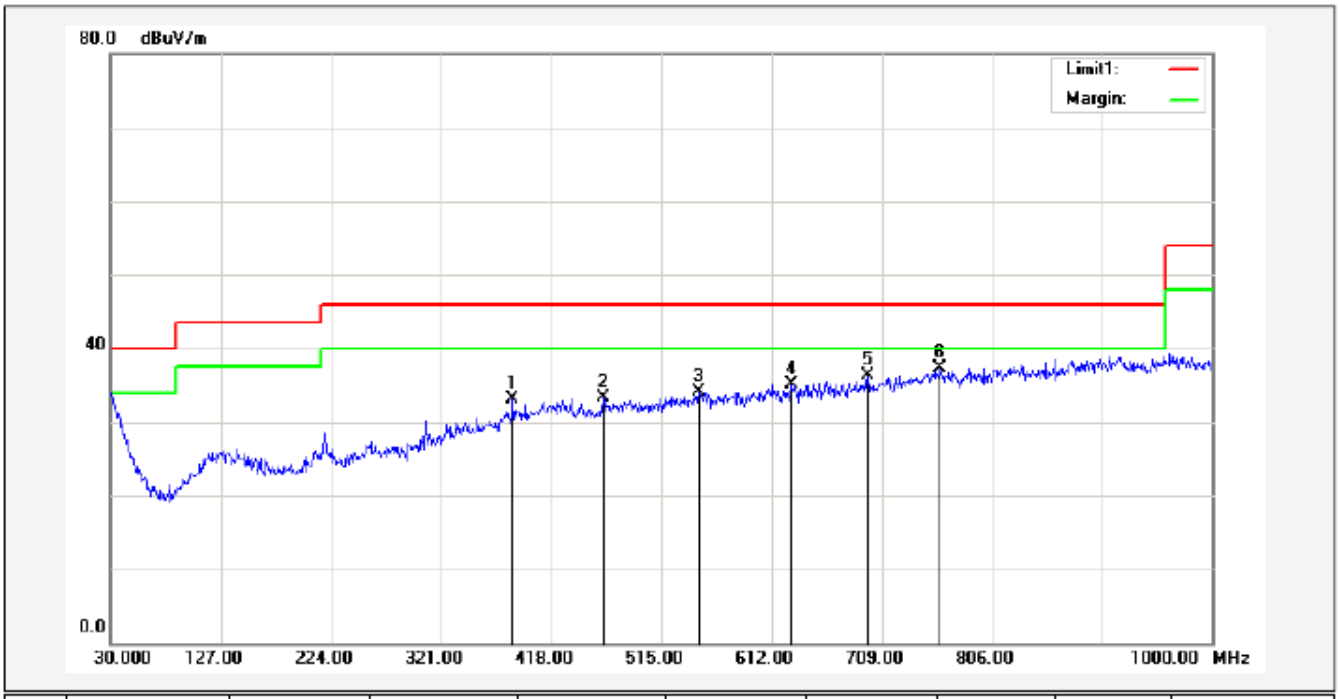
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Remark
1	398.6000	49.60	-16.14	33.46	46.00	-12.54			peak
2	484.9300	48.04	-14.36	33.68	46.00	-12.32			peak
3	549.9200	48.92	-13.10	35.82	46.00	-10.18			peak
4	608.1200	47.23	-12.66	34.57	46.00	-11.43			peak
5	677.9600	47.98	-12.37	35.61	46.00	-10.39			peak
6*	744.8900	47.53	-11.27	36.26	46.00	-9.74			peak

RESULT: PASS

Note: 1. Factor=Antenna Factor + Cable loss, Margin=Measurement-Limit.

2. The “Factor” value can be calculated automatically by software of measurement system.

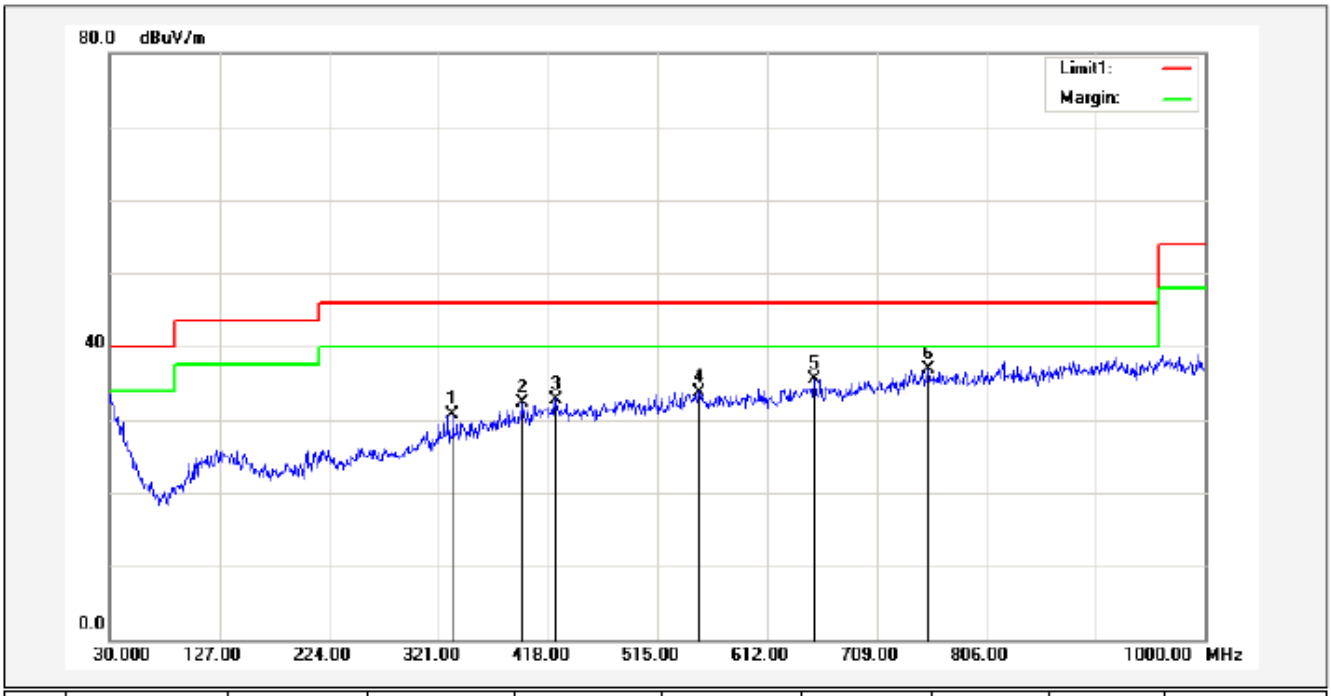
RADIATED EMISSION TEST- (30MHZ-1GHZ)-HIGH CHANNEL-HORIZONTAL



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Remark
1	384.0500	49.47	-16.45	33.02	46.00	-12.98			peak
2	463.5900	48.32	-15.01	33.31	46.00	-12.69			peak
3	547.9800	47.28	-13.14	34.14	46.00	-11.86			peak
4	629.4600	47.62	-12.52	35.10	46.00	-10.90			peak
5	696.3900	48.29	-12.03	36.26	46.00	-9.74			peak
6*	760.4100	48.43	-11.03	37.40	46.00	-8.60			peak

RESULT: PASS

RADIATED EMISSION TEST- (30MHZ-1GHZ)-HIGH CHANNEL -VERTICAL



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Remark
1	333.6100	49.08	-18.31	30.77	46.00	-15.23			peak
2	395.6900	48.60	-16.24	32.36	46.00	-13.64			peak
3	424.7900	48.30	-15.50	32.80	46.00	-13.20			peak
4	551.8600	46.93	-13.13	33.80	46.00	-12.20			peak
5	653.7100	48.00	-12.47	35.53	46.00	-10.47			peak
6*	754.5900	48.06	-11.12	36.94	46.00	-9.06			peak

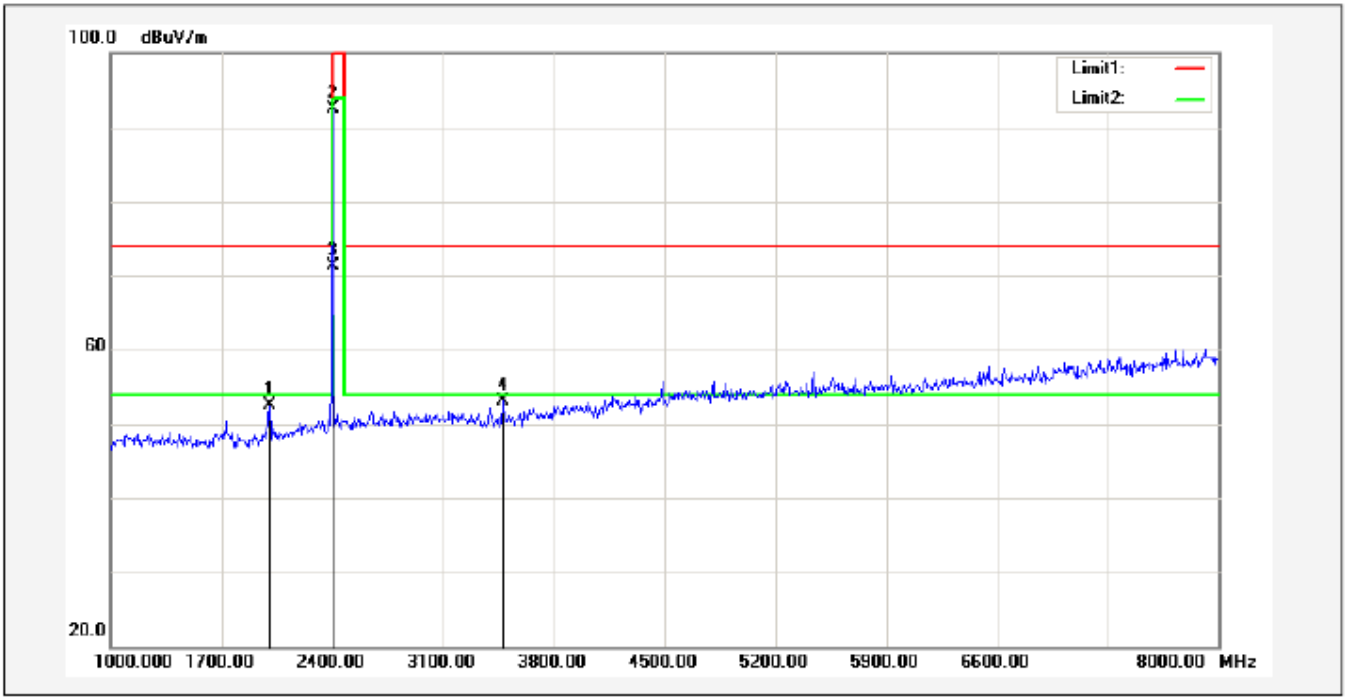
RESULT: PASS

Note: 1. Factor=Antenna Factor + Cable loss, Margin=Measurement-Limit.

2. The “Factor” value can be calculated automatically by software of measurement system.

RADIATED EMISSION ABOVE 1GHZ

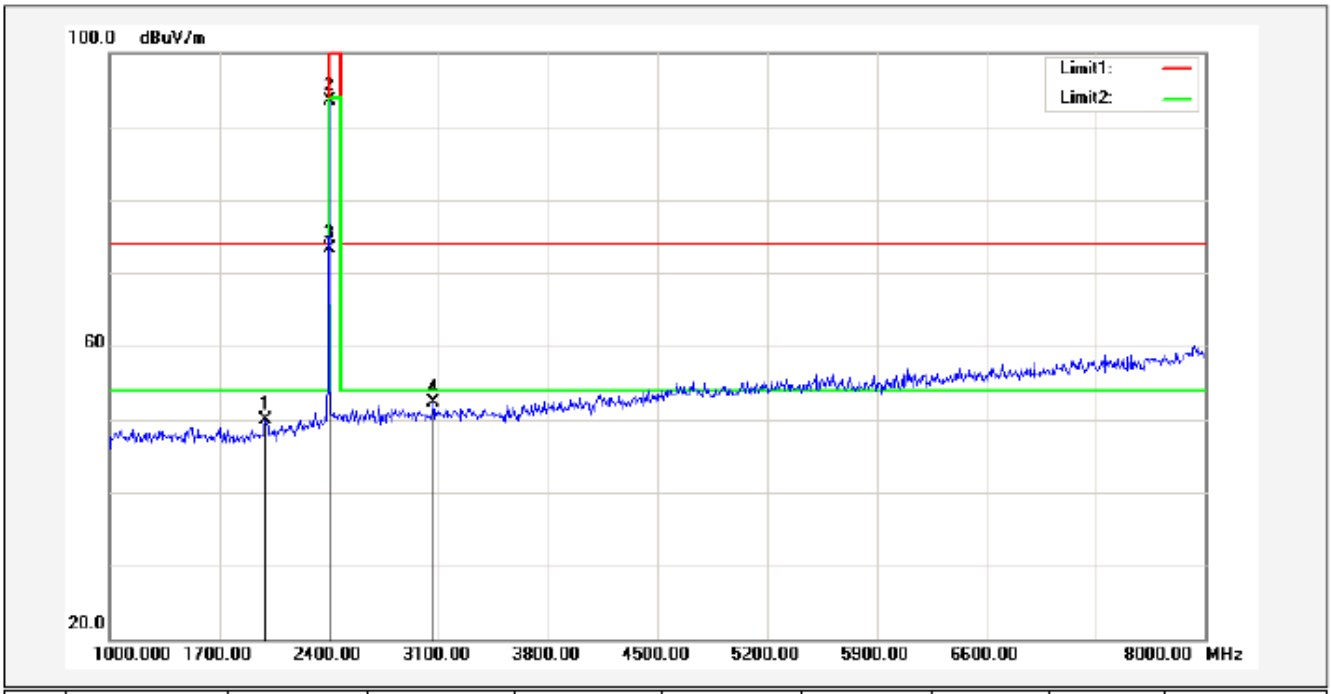
RADIATED EMISSION TEST- (ABOVE 1GHZ)-LOW CHANNEL-HORIZONTAL



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Remark
1	2001.000	57.42	-4.99	52.43	74.00	-21.57			peak
2*	2402.000	95.23	-2.81	92.42	114.00	-21.58			peak
3X	2402.000	74.11	-2.81	71.30	94.00	-22.70			AVG
4	3478.000	53.59	-0.56	53.03	74.00	-20.97			peak

RESULT: PASS

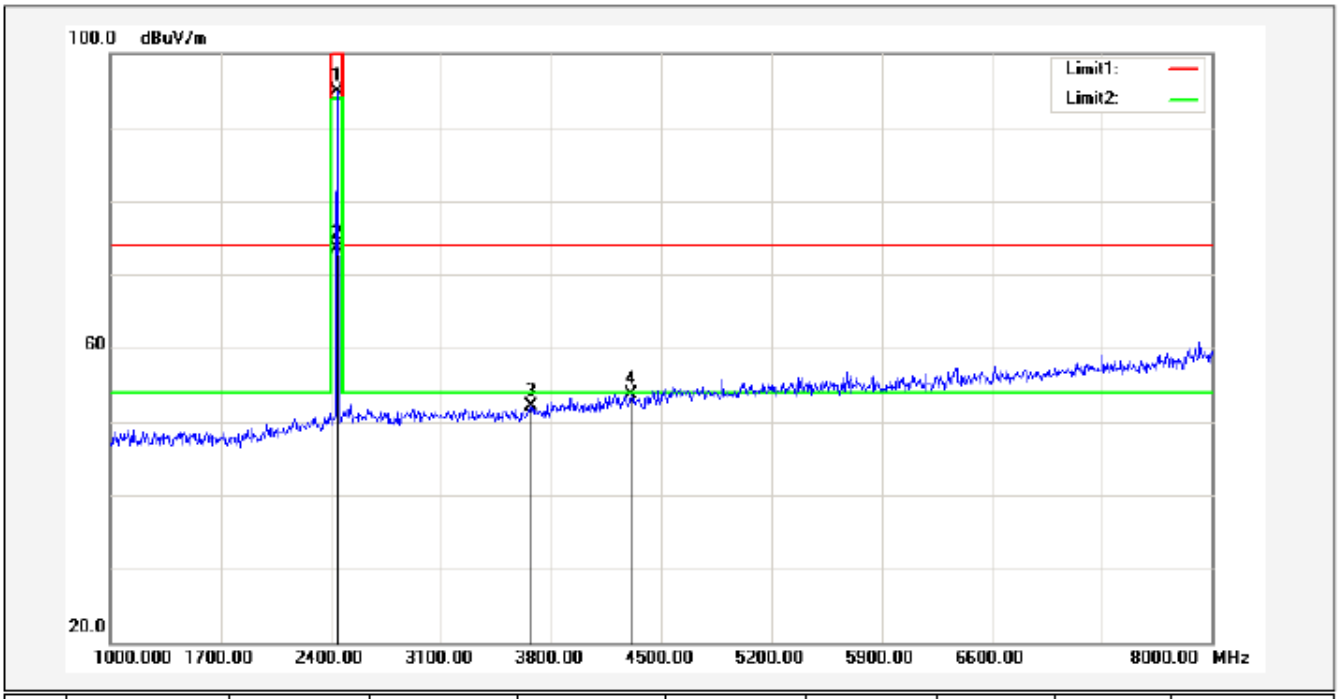
RADIATED EMISSION TEST- (ABOVE 1GHZ)-LOW CHANNEL- VERTICAL



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Remark
1	1994.000	54.86	-5.04	49.82	74.00	-24.18			peak
2*	2402.000	96.33	-2.81	93.52	114.00	-20.48			peak
3X	2402.000	76.14	-2.81	73.33	94.00	-20.67			AVG
4	3065.000	53.50	-1.25	52.25	74.00	-21.75			peak

RESULT: PASS

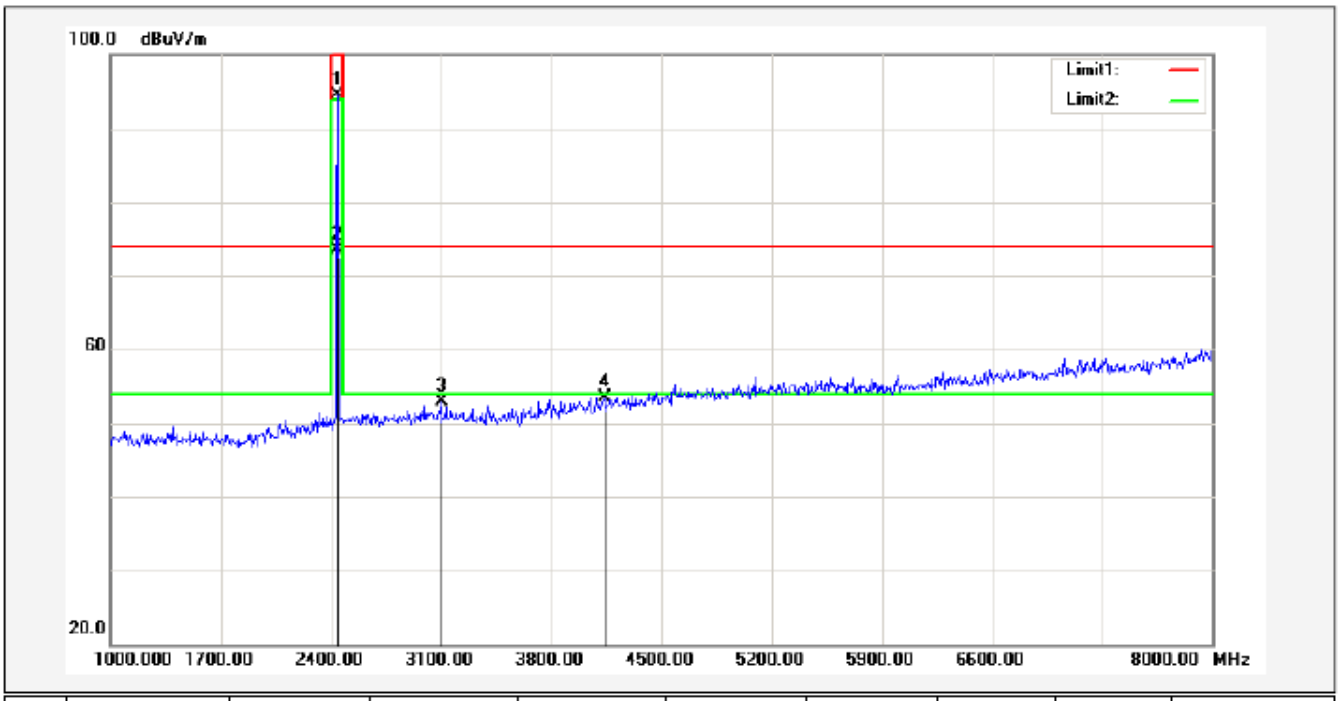
RADIATED EMISSION TEST- (ABOVE 1GHZ)-MIDDLE CHANNEL-HORIZONTAL



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Remark
1*	2441.000	97.44	-2.58	94.86	114.00	-19.14			peak
2	2441.000	76.01	-2.58	73.43	94.00	-20.57			AVG
3	3674.000	51.96	0.21	52.17	74.00	-21.83			peak
4	4311.000	51.01	2.68	53.69	74.00	-20.31			peak

RESULT: PASS

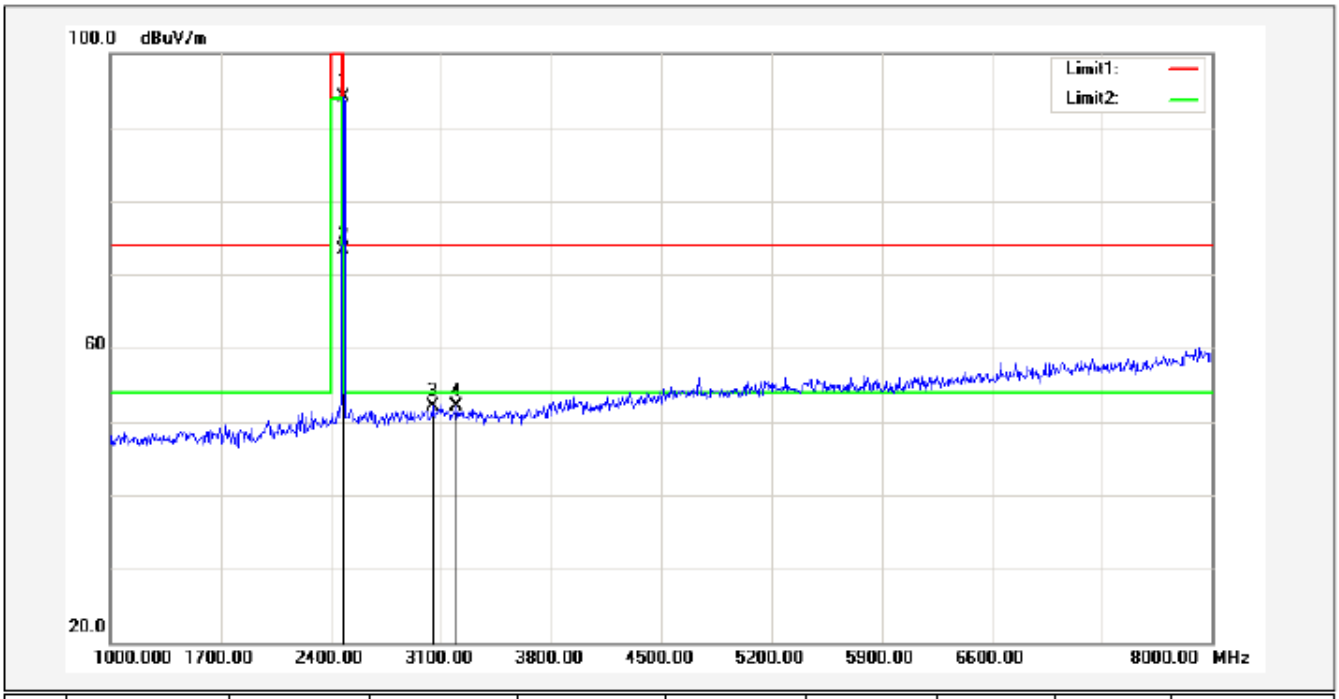
RADIATED EMISSION TEST- (ABOVE 1GHZ)-MIDDLE CHANNEL- VERTICAL



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Remark
1*	2441.000	97.14	-2.58	94.56	114.00	-19.44			peak
2	2441.000	76.00	-2.58	73.42	94.00	-20.58			AVG
3	3100.000	54.00	-1.19	52.81	74.00	-21.19			peak
4	4136.000	51.47	2.07	53.54	74.00	-20.46			peak

RESULT: PASS

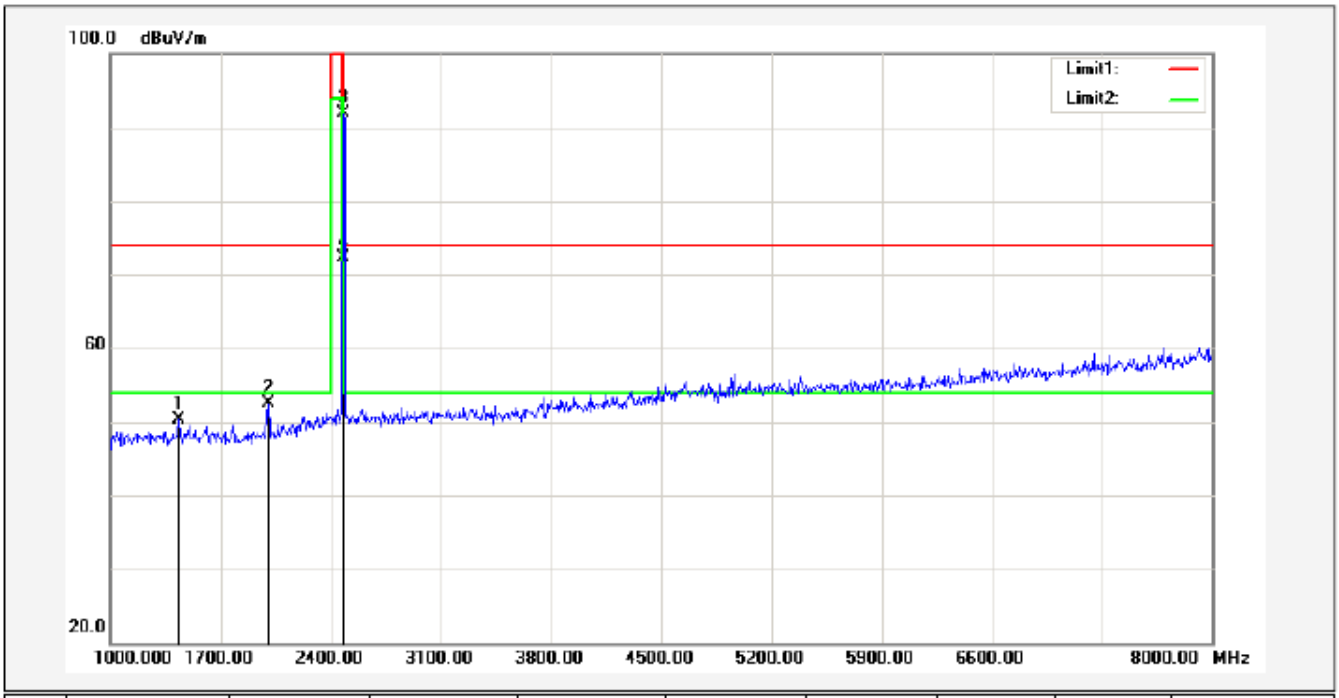
RADIATED EMISSION TEST- (ABOVE 1GHZ)-HIGH CHANNEL-HORIZONTAL



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Remark
1*	2480.000	96.54	-2.39	94.15	114.00	-19.85			peak
2	2480.000	75.78	-2.39	73.39	94.00	-20.61			AVG
3	3044.000	53.34	-1.29	52.05	74.00	-21.95			peak
4	3198.000	53.08	-1.03	52.05	74.00	-21.95			peak

RESULT: PASS

RADIATED EMISSION TEST- (ABOVE 1GHZ)-HIGH CHANNEL- VERTICAL



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Remark
1	1434.000	57.31	-7.00	50.31	74.00	-23.69			peak
2*	2001.000	57.43	-4.99	52.44	74.00	-21.56			peak
3	2480.000	94.39	-2.39	92.00	114.00	-22.00			peak
4	2480.000	74.73	-2.39	72.34	94.00	-21.66			AVG

RESULT: PASS

Note: 6~25GHz at least have 20dB margin. No recording in the test report.

Factor=Antenna Factor + Cable loss - Amplifier gain, Margin=Measurement-Limit.

The “Factor” value can be calculated automatically by software of measurement system.

Field strength of the fundamental signal

Peak value

Frequency	Reading Level	Factor	Measurement	Limit	Over	Antenna
(MHz)	(dBuv)	(dB/m)	(dBuv/m)	(dBuv/m)	(dB)	Polarization
2402	95.23	-2.81	92.42	114	-21.58	Horizontal
2402	96.33	-2.81	93.52	114	-20.48	Vertical
2441	97.44	-2.58	94.86	114	-19.14	Horizontal
2441	97.14	-2.58	94.56	114	-19.44	Vertical
2480	96.54	-2.39	94.15	114	-19.85	Horizontal
2480	94.39	-2.39	92.00	114	-22.00	Vertical

Average value

Frequency	Reading Level	Factor	Measurement	Limit	Over	Antenna
(MHz)	(dBuv)	(dB/m)	(dBuv/m)	(dBuv/m)	(dB)	Polarization
2402	74.11	-2.81	71.30	94	-22.70	Horizontal
2402	76.14	-2.81	73.33	94	-20.67	Vertical
2441	76.01	-2.58	73.43	94	-20.57	Horizontal
2441	76.00	-2.58	73.42	94	-20.58	Vertical
2480	75.78	-2.39	73.39	94	-20.61	Horizontal
2480	74.73	-2.39	72.34	94	-21.66	Vertical

9. BAND EDGE EMISSION

9.1. MEASUREMENT PROCEDURE

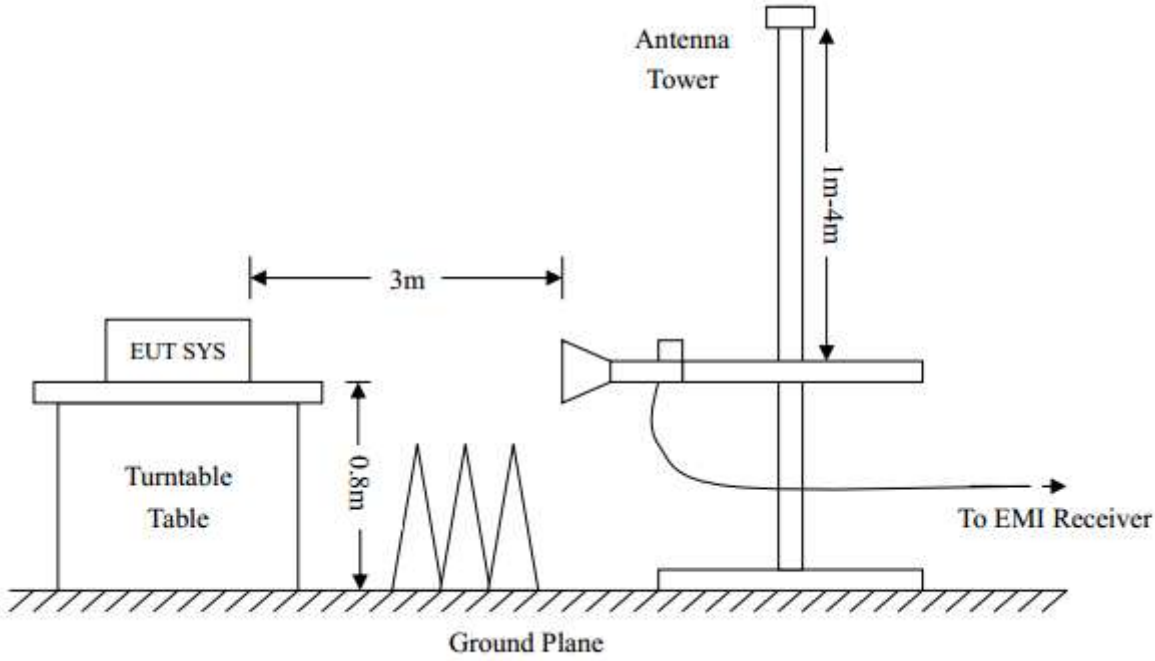
1The EUT operates at hopping-off test mode. The lowest or highest channels are tested to verify the largest transmission and spurious emissions power at the continuous transmission mode.

2Max hold the trace of the setp 1,and the EUT operates at hopping-on test mode to verify the largest spurious emissions power.

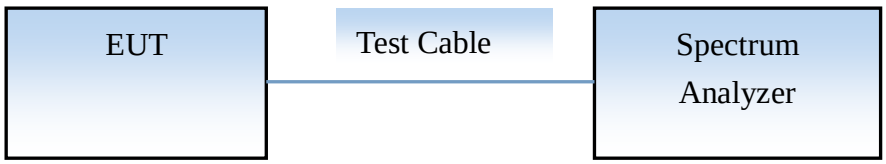
3Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission: (a) PEAK: RBW=VBW=1.5MHz / Sweep=AUTO

9.2 TEST SETUP

RADIATED EMISSION TEST SETUP



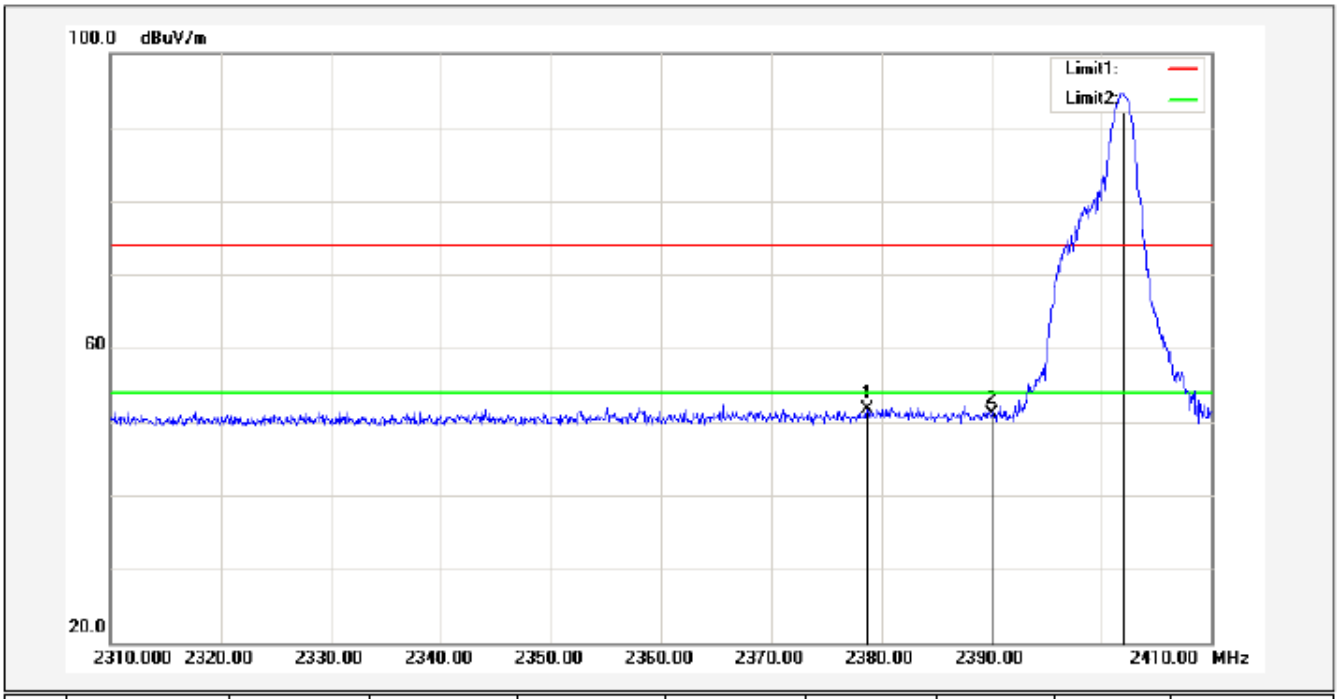
CONDUCTED TEST SETUP



9.3 RADIATED TEST RESULT

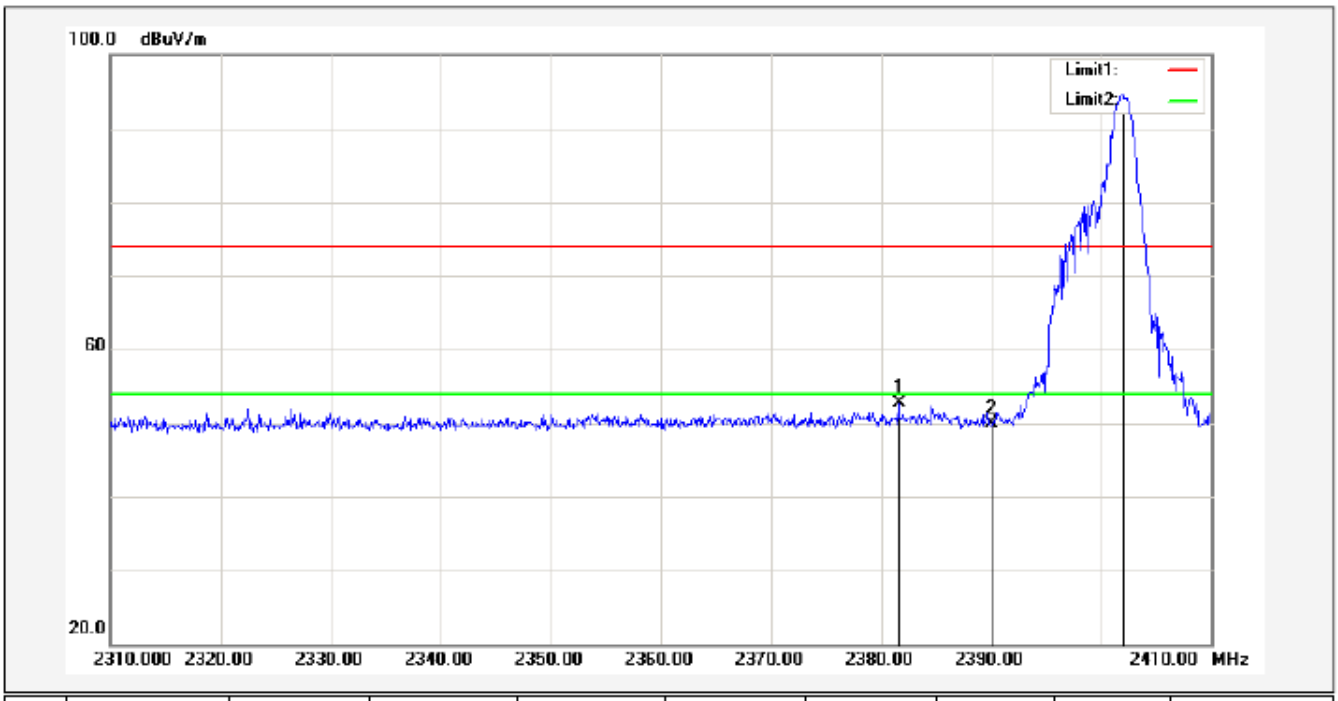
(Worst modulation:GFSK)

TEST PLOT OF BAND EDGE FOR LOW CHANNEL-Horizontal



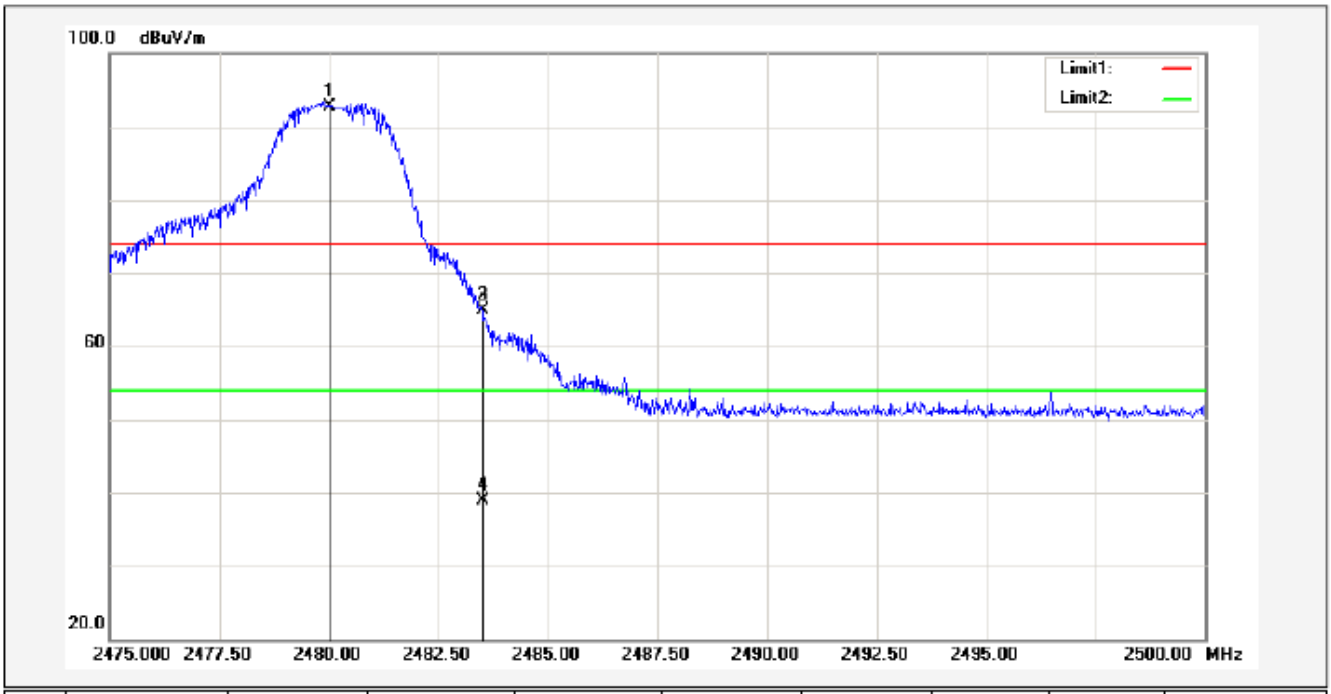
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Remark
1	2378.700	54.64	-2.92	51.72	74.00	-22.28			peak
2	2390.000	53.98	-2.86	51.12	74.00	-22.88			peak
3*	2402.000	97.23	-2.80	94.43	74.00	20.43			peak

TEST PLOT OF BAND EDGE FOR LOW CHANNEL -Vertical



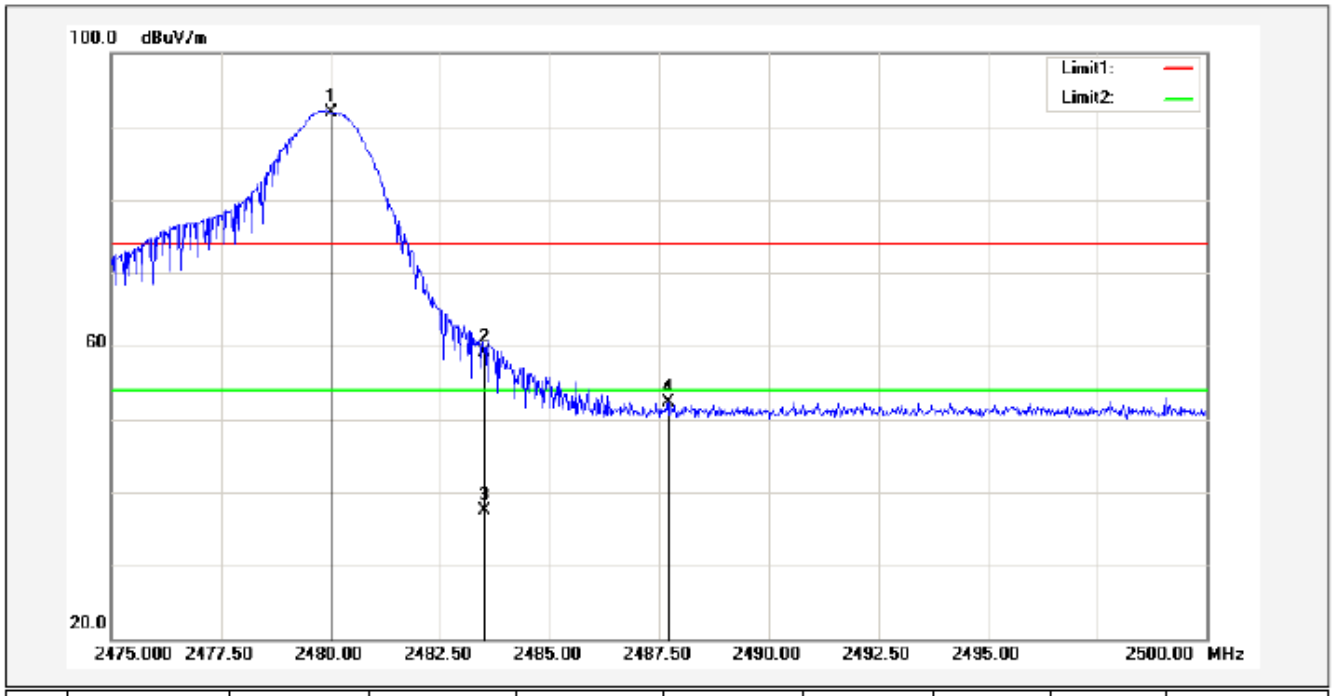
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Remark
1	2381.600	55.59	-2.91	52.68	74.00	-21.32			peak
2	2390.000	52.67	-2.86	49.81	74.00	-24.19			peak
3*	2402.000	97.24	-2.80	94.44	74.00	20.44			peak

TEST PLOT OF BAND EDGE FOR HIGH CHANNEL -Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Remark
1*	2480.000	95.09	-2.37	92.72	74.00	18.72			peak
2	2483.500	67.23	-2.35	64.88	74.00	-9.12			peak
3	2483.500	67.23	-2.35	64.88	74.00	-9.12			peak
4	2483.500	41.25	-2.35	38.90	54.00	-15.10			AVG

TEST PLOT OF BAND EDGE FOR HIGH CHANNEL-Vertical



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Remark
1*	2480.000	94.30	-2.37	91.93	74.00	17.93			peak
2	2483.500	61.55	-2.35	59.20	74.00	-14.80			peak
3	2483.500	39.85	-2.35	37.50	54.00	-16.50			AVG
4	2487.725	54.68	-2.33	52.35	74.00	-21.65			peak

RESULT: PASS

Note: The other modes radiation emission have enough 20dB margin.

Factor=Antenna Factor + Cable loss - Amplifier gain, Over=Measure-Limit.

The “Factor” value can be calculated automatically by software of measurement system.

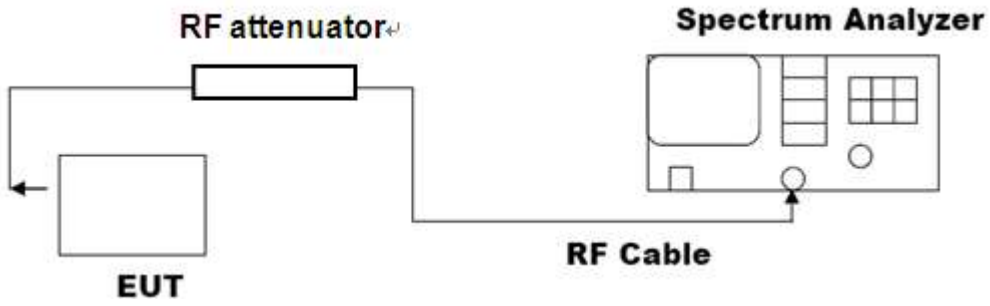
10. 20DB BANDWIDTH

10.1. MEASUREMENT PROCEDURE

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2, Set the EUT Work on the top, the middle and the bottom operation frequency individually.
3. Set Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hoping channel
   RBW ≥ 1% of the 20 dB bandwidth, VBW ≥ RBW; Sweep = auto; Detector function = peak
4. Set SPA Trace 1 Max hold, then View.

10.2. TEST SET-UP

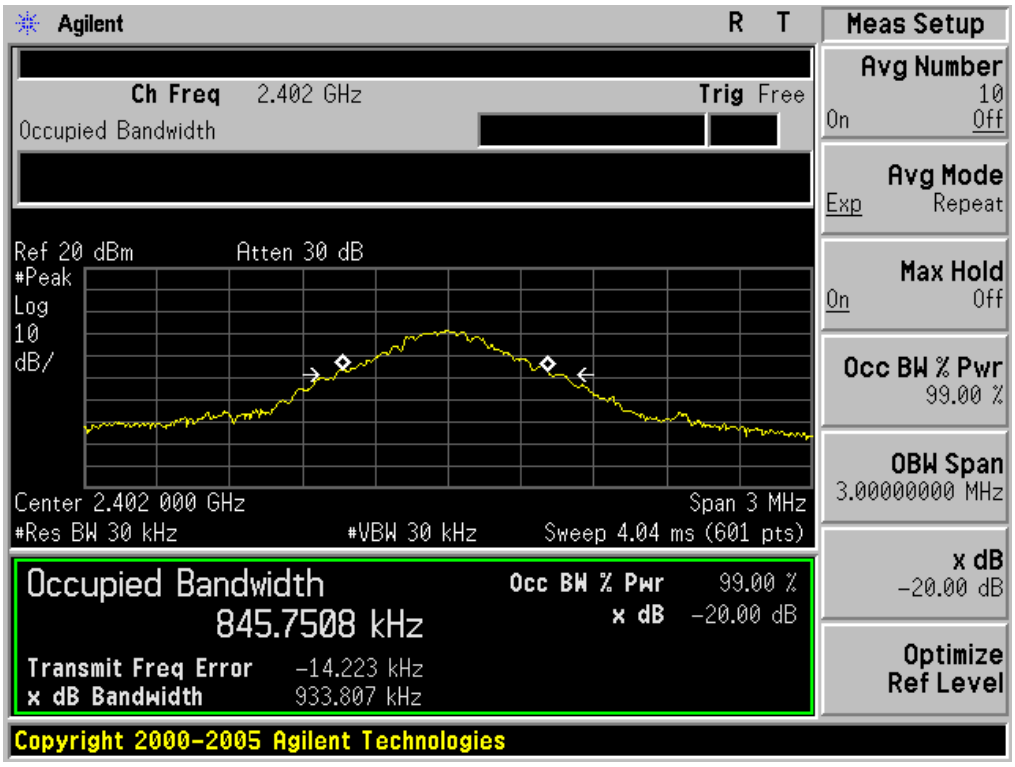
(BLOCK DIAGRAM OF CONFIGURATION)



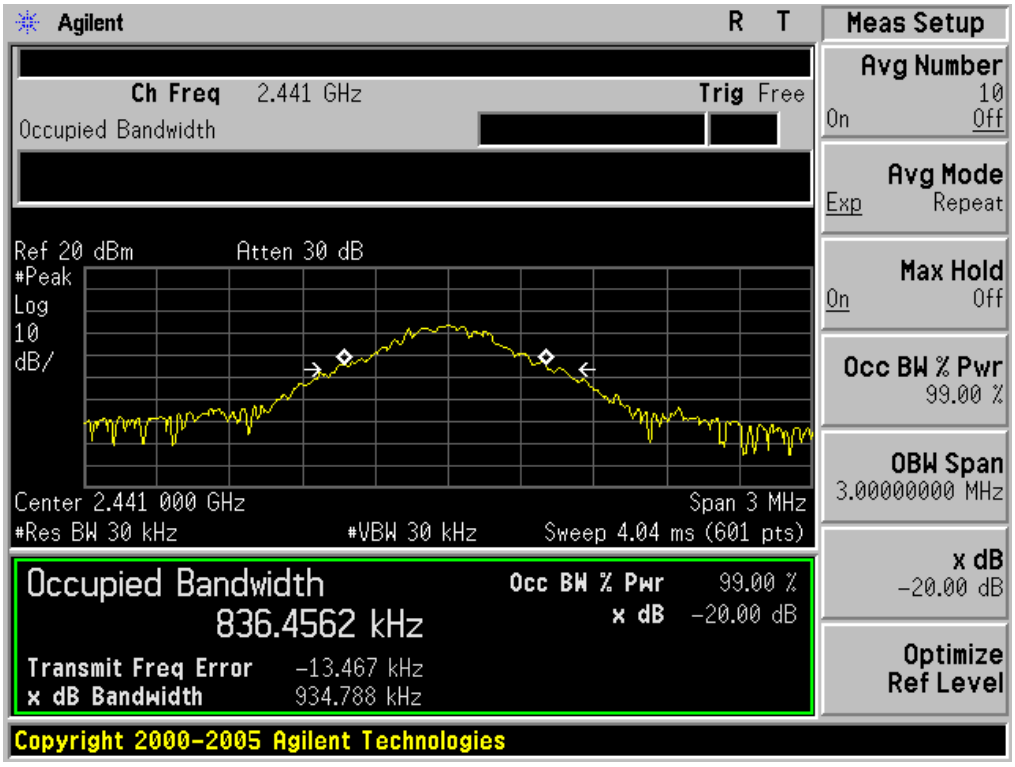
10.3. LIMITS AND MEASUREMENT RESULTS

BLUETOOTH 1MBPS LIMITS AND MEASUREMENT RESUL			
Applicable Limits	Measurement Result		
	Test Data (MHz)		Criteria
N/A	Low Channel	0.934	PASS
	Middle Channel	0.935	PASS
	High Channel	0.926	PASS

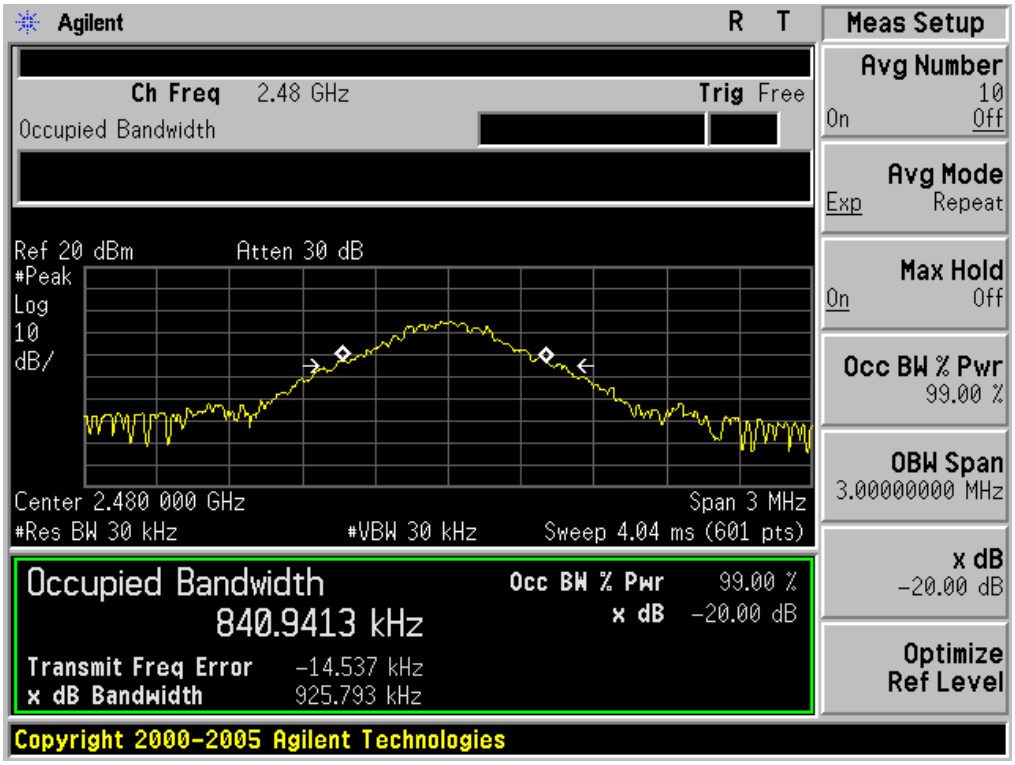
TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL

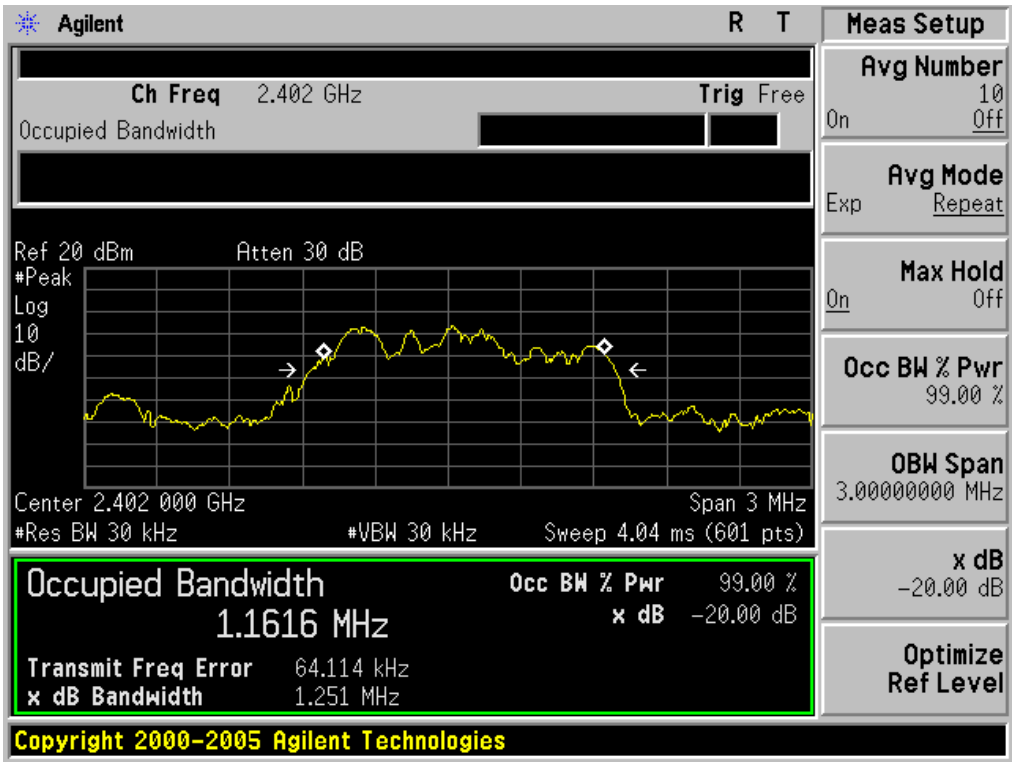


TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL

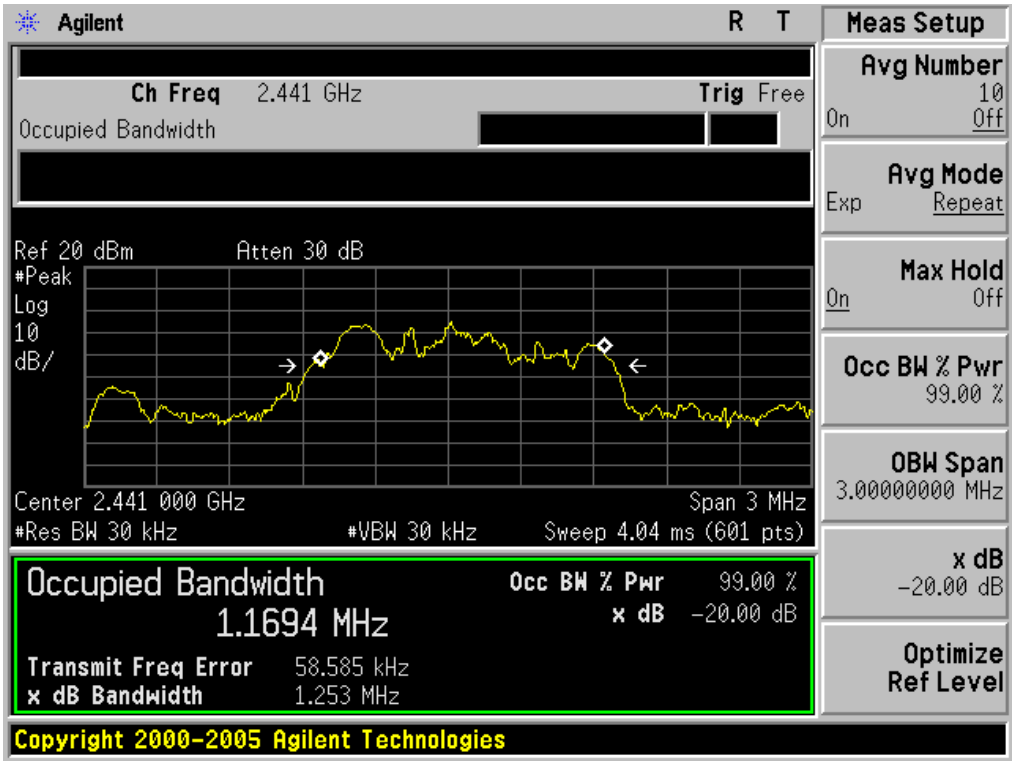


BLUETOOTH 2MBPS LIMITS AND MEASUREMENT RESUL			
Applicable Limits	Measurement Result		
	Test Data (MHz)		Criteria
N/A	Low Channel	1.251	PASS
	Middle Channel	1.253	PASS
	High Channel	1.253	PASS

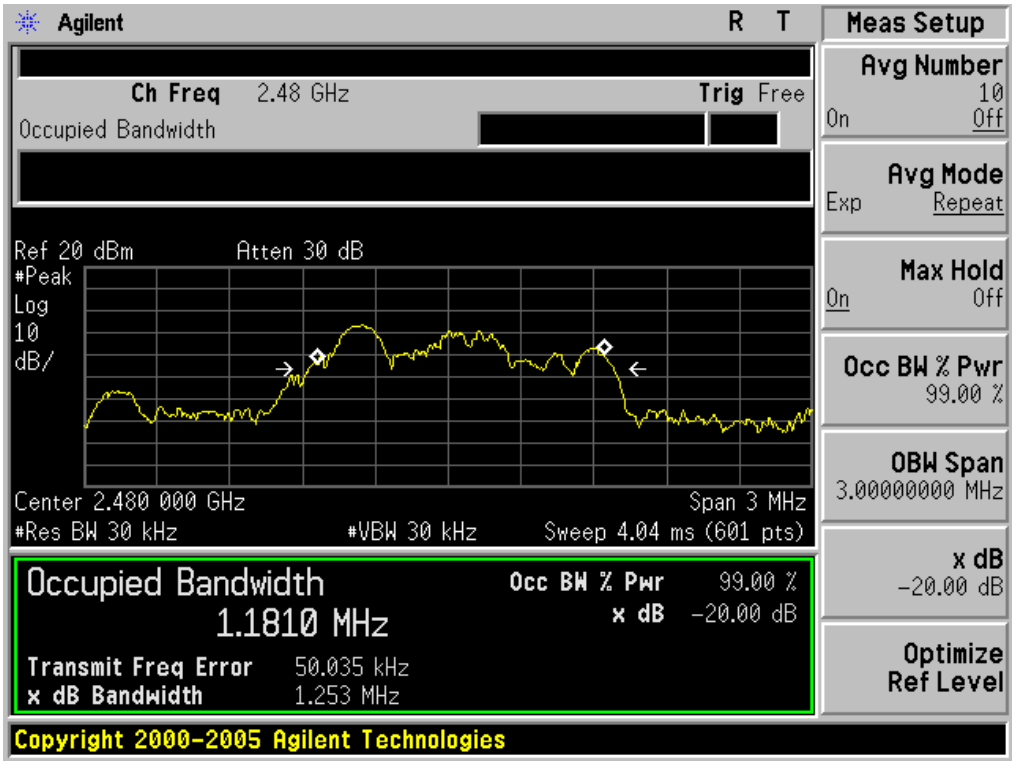
TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL

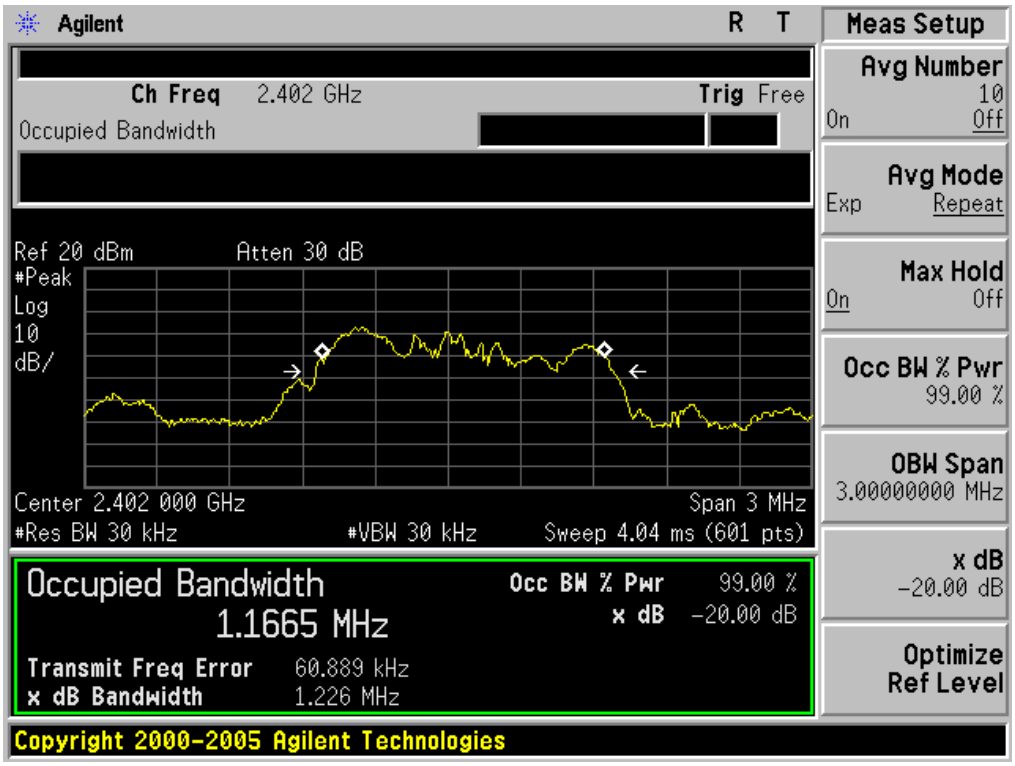


TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL

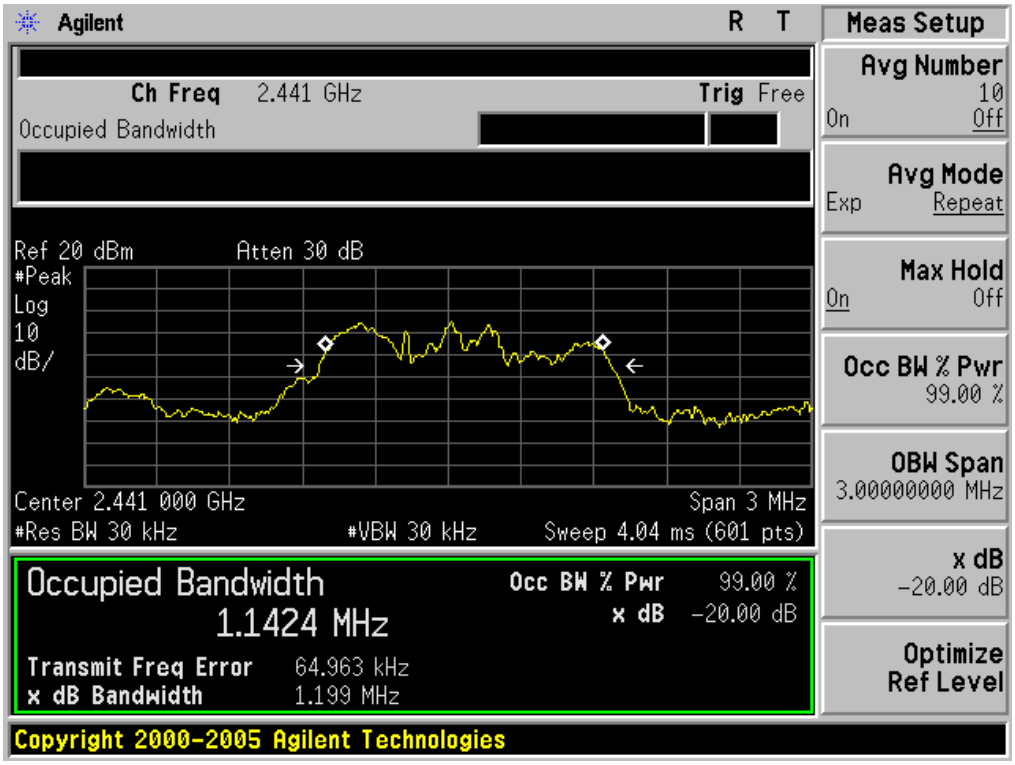


BLUETOOTH 3MBPS LIMITS AND MEASUREMENT RESUL			
Applicable Limits	**Measurement Result**		
	Test Data (MHz)		**Criteria**
N/A	Low Channel	1.226	PASS
	Middle Channel	1.199	PASS
	High Channel	1.214	PASS

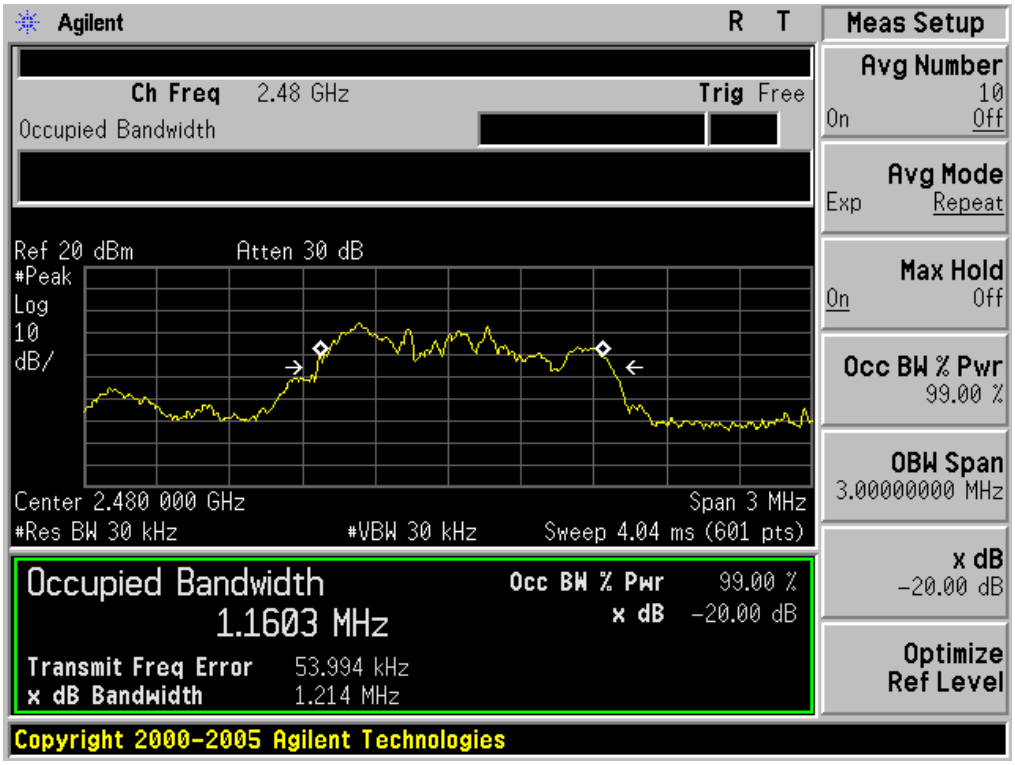
TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



11. FCC LINE CONDUCTED EMISSION TEST

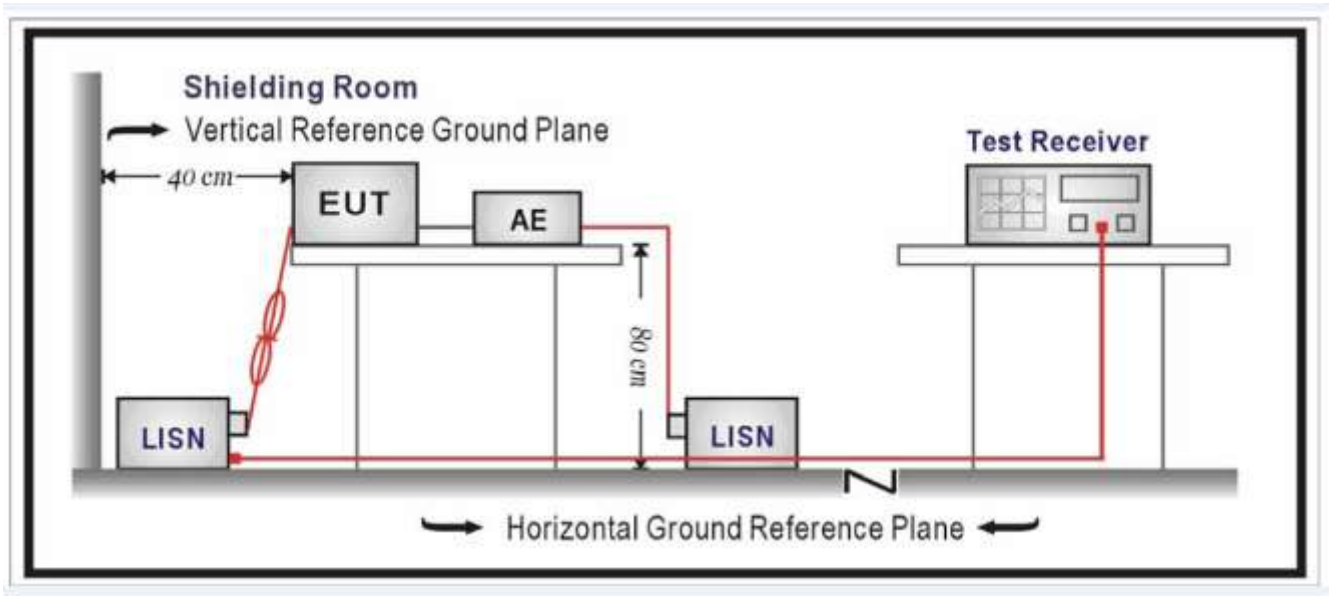
11.1. LIMITS OF LINE CONDUCTED EMISSION TEST

Frequency	Maximum RF Line Voltage	
	Q.P.(dBuV)	Average(dBuV)
150kHz~500kHz	66-56	56-46
500kHz~5MHz	56	46
5MHz~30MHz	60	50

Note:

1. The lower limit shall apply at the transition frequency.
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

11.2. BLOCK DIAGRAM OF LINE CONDUCTED EMISSION TEST



11.3. PRELIMINARY PROCEDURE OF LINE CONDUCTED EMISSION TEST

1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When 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 C63.4 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
2. Support equipment, if needed, was placed as per ANSI C63.4.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.4.
4. All support equipments received AC120V/60Hz power from a LISN, if any.
5. The EUT received DC charging voltage by PC which received 120V/60Hzpower by a LISN..
6. The 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.
9. The test mode(s) were scanned during the preliminary test.

Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.

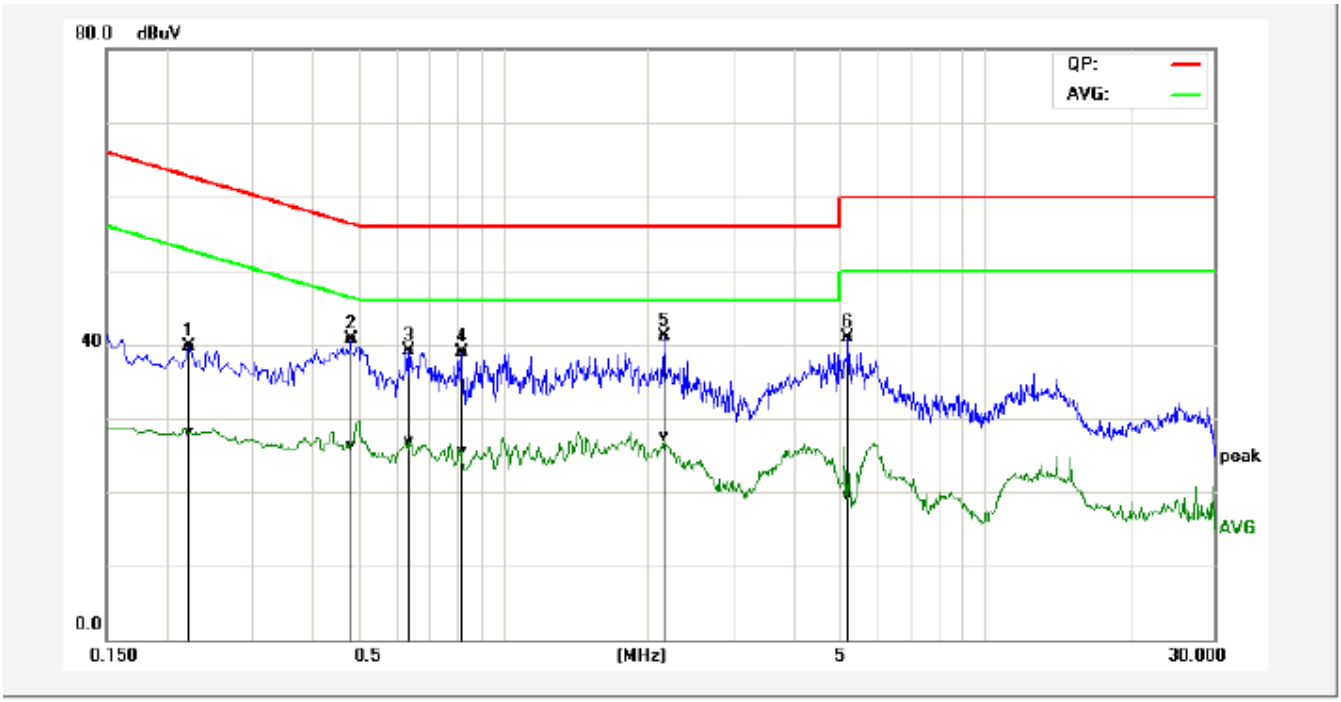
11.4. FINAL PROCEDURE OF LINE CONDUCTED EMISSION TEST

- EUT and support equipment was set up on the test bench as per step 2 of the preliminary test.

2. A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. If EUT emission level was less –2dB to the A.V. limit in Peak mode, then the emission signal was re-checked using Q.P and Average detector.
3. The test data of the worst case condition(s) was reported on the Summary Data page.

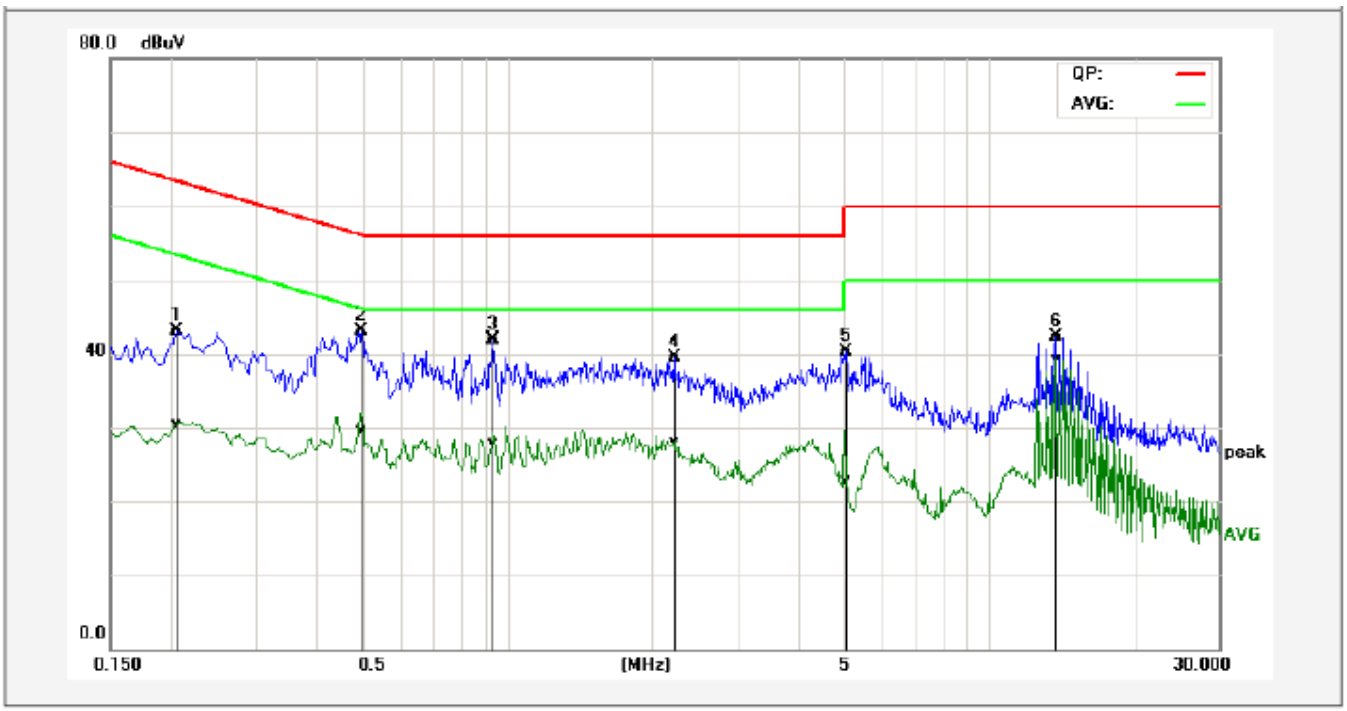
11.5. TEST RESULT OF LINE CONDUCTED EMISSION TEST

Line Conducted Emission Test Line 1-L



No.	Frequency	QuasiPeak reading	Average reading	Correction factor	QuasiPeak result	Average result	QuasiPeak limit	Average limit	QuasiPeak margin	Average margin	Remark
	(MHz)	(dBuV)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dBuV)	(dBuV)	(dB)	(dB)	
1P	0.2220	29.95	18.49	9.69	39.64	28.18	62.74	52.74	-23.10	-24.56	Pass
2P	0.4820	31.08	16.57	9.68	40.76	26.25	56.30	46.30	-15.54	-20.05	Pass
3P	0.6380	29.30	17.24	9.76	39.06	27.00	56.00	46.00	-16.94	-19.00	Pass
4P	0.8180	29.09	15.66	9.76	38.85	25.42	56.00	46.00	-17.15	-20.58	Pass
5*	2.1619	31.42	17.74	9.72	41.14	27.46	56.00	46.00	-14.86	-18.54	Pass
6P	5.2140	31.29	9.82	9.69	40.98	19.51	60.00	50.00	-19.02	-30.49	Pass

Line Conducted Emission Test Line 2-N



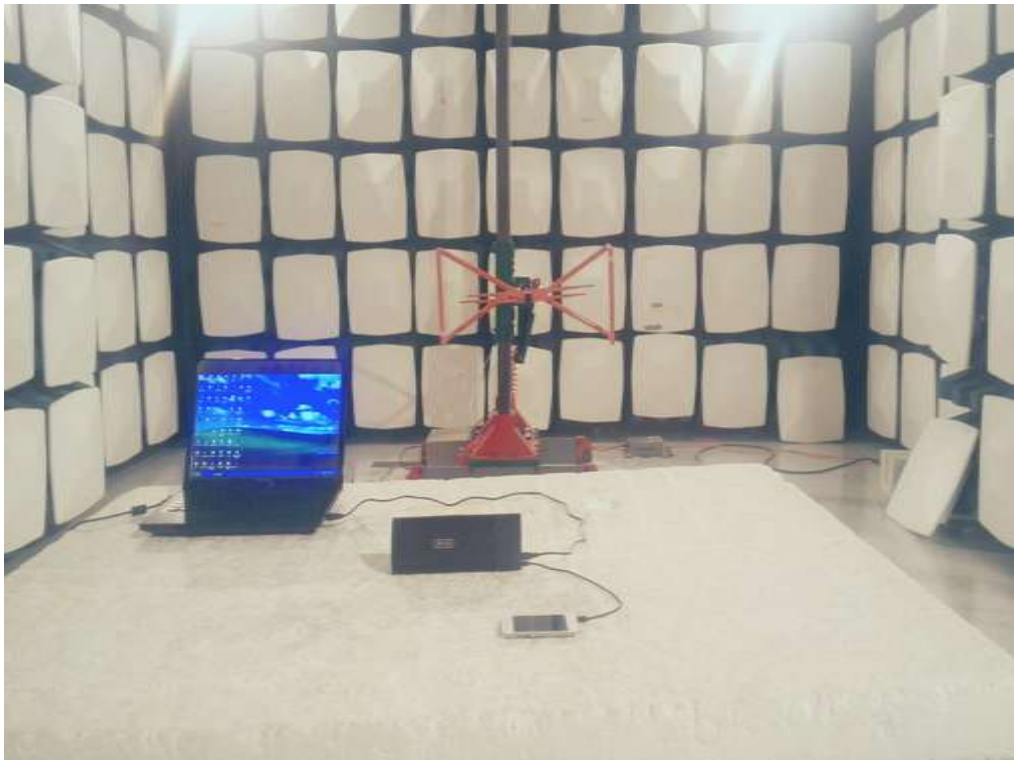
No.	Frequency	QuasiPeak reading	Average reading	Correction factor	QuasiPeak result	Average result	QuasiPeak limit	Average limit	QuasiPeak margin	Average margin	Remark
	(MHz)	(dBuV)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dBuV)	(dBuV)	(dB)	(dB)	
1P	0.2060	33.25	20.81	9.79	43.04	30.60	63.36	53.37	-20.32	-22.77	Pass
2P	0.4900	33.23	20.09	9.68	42.91	29.77	56.17	46.17	-13.26	-16.40	Pass
3P	0.9300	32.06	18.20	9.79	41.85	27.99	56.00	46.00	-14.15	-18.01	Pass
4P	2.2139	29.78	18.29	9.73	39.51	28.02	56.00	46.00	-16.49	-17.98	Pass
5P	5.0460	30.49	13.11	9.78	40.27	22.89	60.00	50.00	-19.73	-27.11	Pass
6*	13.6980	32.47	29.57	9.75	42.22	39.32	60.00	50.00	-17.78	-10.68	Pass

Note: The test mode of conduction is “BT Link with charging”.

APPENDIX A: PHOTOGRAPHS OF TEST SETUP

FCC LINE CONDUCTED EMISSION TEST SETUP

FCC RADIATED EMISSION TEST SETUP



APPENDIX B: PHOTOGRAPHS OF EUT

TOP VIEW OF EUT

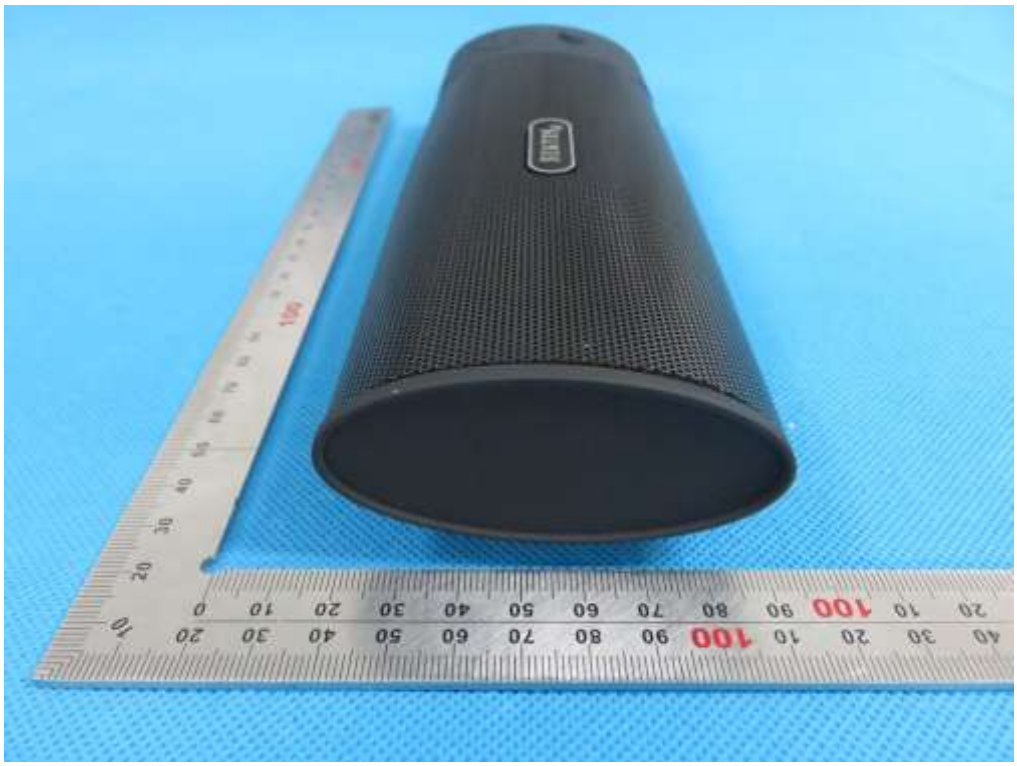
BOTTOM VIEW OF EUT

FRONT VIEW OF EUT

BACK VIEW OF EUT

LEFT VIEW OF EUT

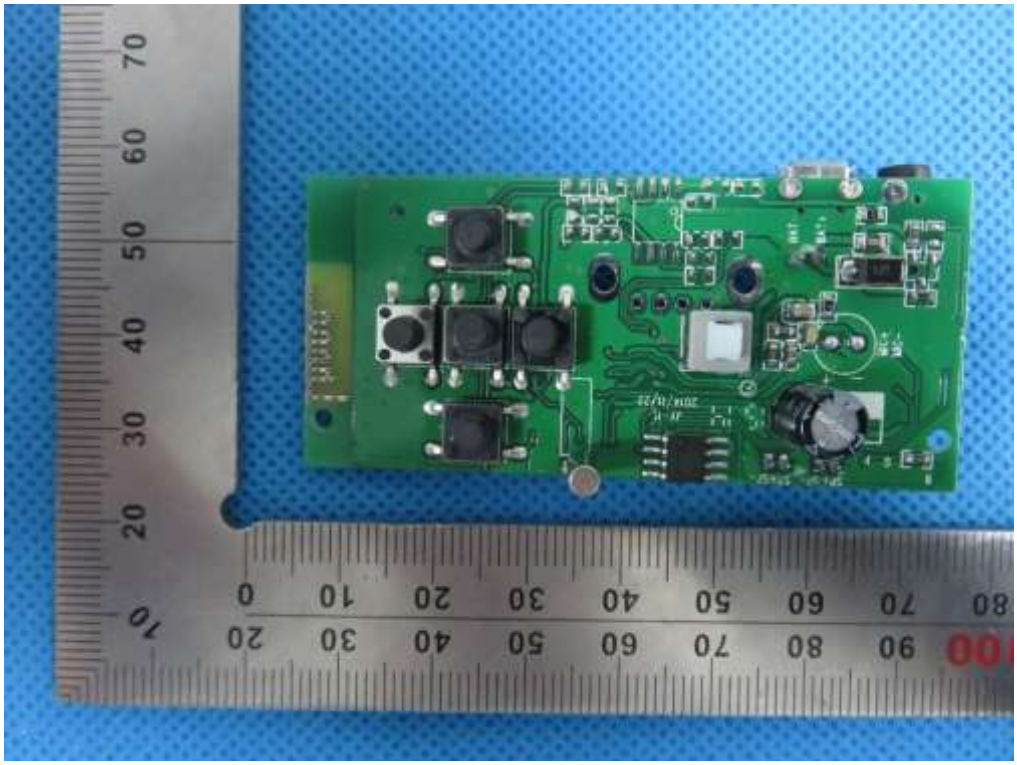
RIGHT VIEW OF EUT



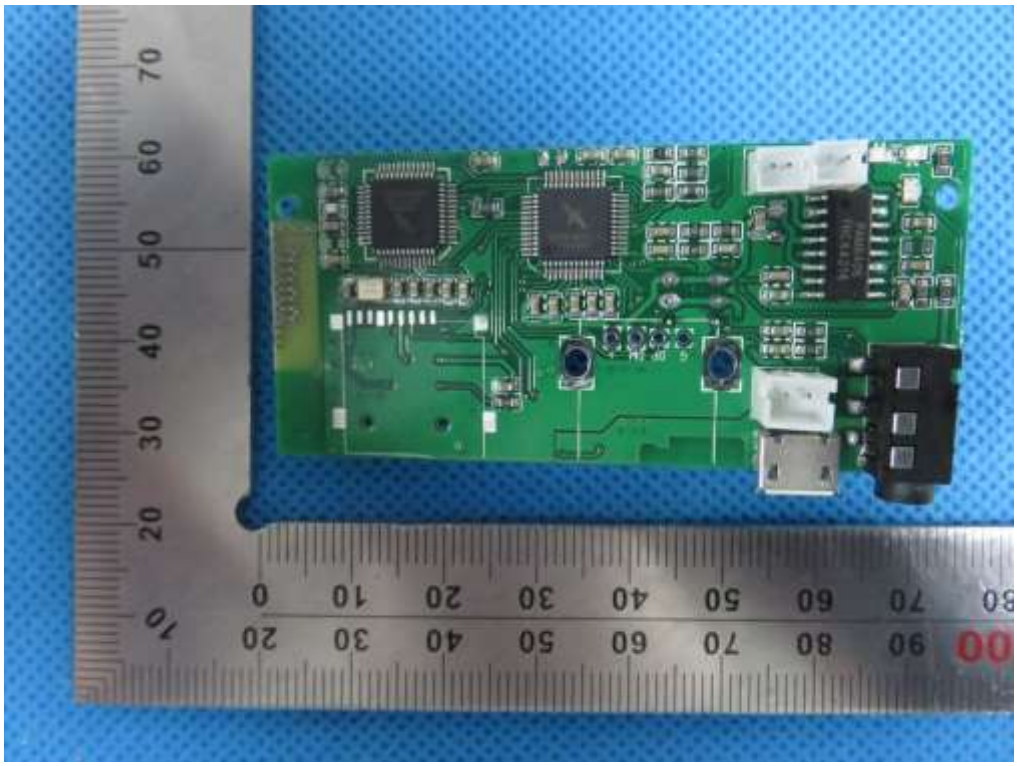
VIEW OF EUT (PORT)

OPEN VIEW OF EUT

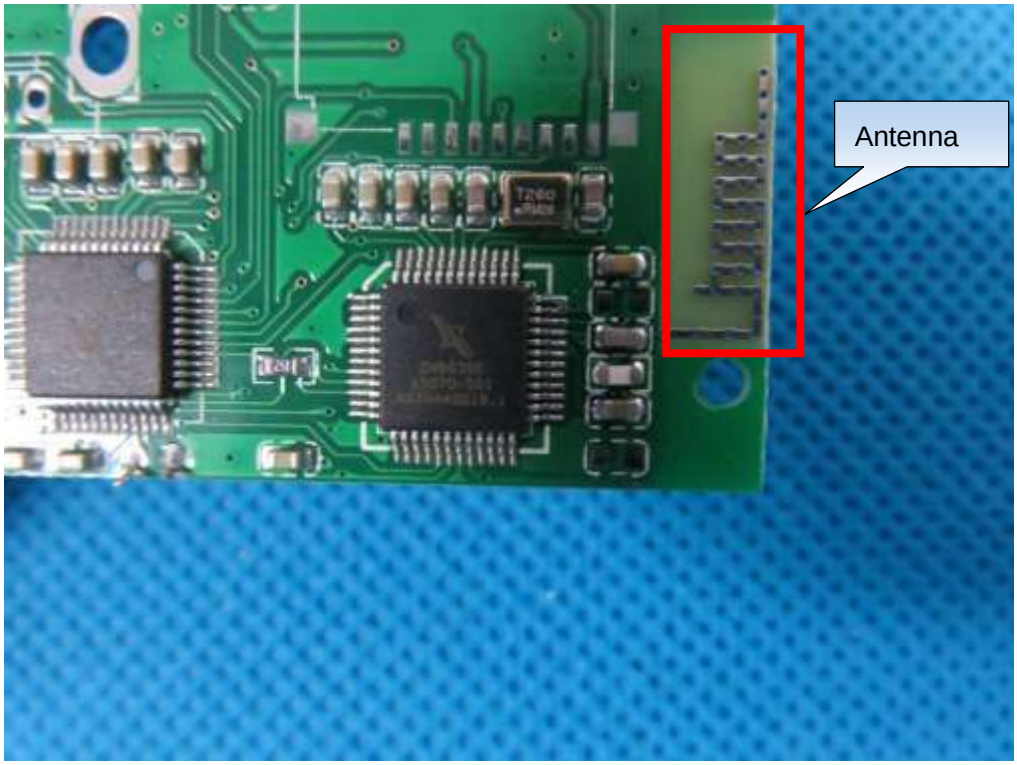
INTERNAL VIEW OF EUT-1



INTERNAL VIEW OF EUT-2



INTERNAL VIEW OF EUT-3



----END OF REPORT----