FCC TEST REPORT

Test report
On Behalf of
SANWA LIMITED
For
Bluetooth Keyboard
Model No.: GSKBBT30BK

FCC ID: 2AMSUBT30BK

Prepared for :	**SANWA LIMITED** **Room 1005, 10/F., Tower 2, Silvercord, 30 Canton Road, Tsim Sha Tsui, Kowloon, Hong Kong, China**
Prepared By :	**Shenzhen HUAK Testing Technology Co., Ltd.** **1F, B2 Building, Junfeng Zhongcheng Zhizao Innovation Park, Fuhai Street,** **Bao'an District, Shenzhen City, China**
Date of Test:	**Oct. 08, 2018 ~ Oct. 16, 2018**
Date of Report:	**Oct. 23, 2018**
Report Number:	**HK1810231334E**

TEST RESULT CERTIFICATION

Applicant's name	:	SANWA LIMITED
Address	:	Room 1005, 10/F., Tower 2, Silvercord, 30 Canton Road, Tsim Sha Tsui, Kowloon, Hong Kong, China
Manufacture's Name	:	Shenzhen Hangshi Technology Co., Ltd
Address	:	Hangshi Technology Park, Democracy West Industry Area, Shajing Town, Bao'an District, Shenzhen, China.
Product description		
Trade Mark	:	SANWA
Product Name	:	Bluetooth Keyboard
Model and/or type reference	:	GSKBBT30BK
Series Model	:	400-SKB061
Difference Description	:	All the same except for the shell and keyboard arrangement.
Standards	:	FCC Rules and Regulations Part 15 Subpart C Section 15.249 ANSI C63.10: 2013

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Date of Test	:	
Date (s) of performance of tests	:	Oct. 08, 2018 ~ Oct. 16, 2018
Date of Issue	:	Oct. 23, 2018
Test Result	:	**Pass**

Testing Engineer :

(Gary Qian)

Technical Manager :

(Eden Hu)

Authorized Signatory :

(Jason Zhou)

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1. TEST SUMMARY

1.1. TEST PROCEDURES AND RESULTS

DESCRIPTION OF TEST	RESULT
CONDUCTED EMISSIONS TEST	COMPLIANT
RADIATED EMISSION TEST	COMPLIANT
BAND EDGE	COMPLIANT
OCCUPIED BANDWIDTH MEASUREMENT	COMPLIANT
ANTENNA REQUIREMENT	COMPLIANT

1.2. TEST FACILITY

Test Firm : Shenzhen HUAK Testing Technology Co., Ltd.

Address : 1F, B2 Building, Junfeng Zhongcheng Zhizao Innovation Park, Fuhai Street, Bao'an District, Shenzhen City, China

Designation Number: : CN1229

Test Firm Registration Number : 616276

1.3. MEASUREMENT UNCERTAINTY

Measurement Uncertainty

Conducted Emission Expanded Uncertainty	=	2.23dB, k=2
Radiated emission expanded uncertainty(9kHz-30MHz)	=	3.08dB, k=2
Radiated emission expanded uncertainty(30MHz-1000MHz)	=	4.42dB, k=2
Radiated emission expanded uncertainty(Above 1GHz)	=	4.06dB, k=2

2. GENERAL INFORMATION

2.1. GENERAL DESCRIPTION OF EUT

Operation Frequency	2.402 GHz to 2.480GHz
Bluetooth Version	V3.0
Modulation	BR ☒GFSK, EDR ☐π /4-DQPSK, ☐8DPSK BLE ☐GFSK
Number of channels	79 for BR
Hardware Version	V1.1
Software Version	V1.0
Antenna Designation	PCB Antenna
Antenna Gain	1.87dBi
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. CARRIER FREQUENCY OF CHANNELS

BR Channel List

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

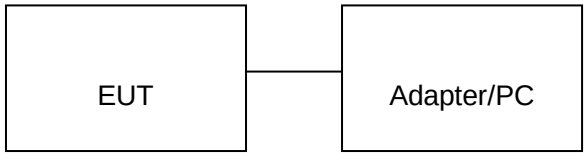
2.3. OPERATION OF EUT DURING TESTING

NO.	TEST MODE DESCRIPTION
1	Low channel GFSK
2	Middle channel GFSK
3	High channel GFSK
4	BT Link with charging
5	BT Link(Hopping mode)

Note:
1. All the test modes can be supply by battery, 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.

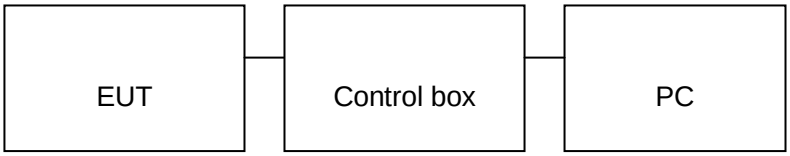
2.4. DESCRIPTION OF TEST SETUP

Configure 1: (Normal hopping)



Note: Owing to the EUT has own battery, and testing may be performed while adapter or PC removed.

Configure 2: (Control continuous TX)



2.5. EQUIPMENT USED IN EUT SYSTEM

Item	Equipment	Mfr/Brand	Model/Type No.	Remark
1	Bluetooth Keyboard	SANWA	GSKBBT30BK	EUT
2	Battery	TW	302323	Accessory
3	PC	APPLE	A1465	A.E
4	Control box	DOFLY	N/A	A.E
5	Adapter	IPRO	NTR-S01	A.E
6	USB Cable	N/A	1m unshielded	A.E
7	IPOD	APPLE	A1367	A.E

2.6. MEASUREMENT INSTRUMENTS LIST

TEST EQUIPMENT OF CONDUCTED EMISSION TEST

Item	Equipment	Manufacturer	Model No.	Lab Equipment No.	Last Cal.	Cal. Interval
1.	L.I.S.N. Artificial Mains Network	R&S	ENV216	HKE-002	Dec. 28, 2017	1 Year
2.	Receiver	R&S	ESCI 7	HKE-010	Dec. 28, 2017	1 Year

TEST EQUIPMENT OF RADIATED EMISSION TEST

Item	Equipment	Manufacturer	Model No.	Lab Equipment No.	Last Cal.	Cal. Interval
1.	Spectrum analyzer	Agilent	N9020A	HKE-048	Dec. 28, 2017	1 Year
2.	Preamplifier	Schwarzbeck	BBV 9743	HKE-006	Dec. 28, 2017	1 Year
3.	EMI Test Receiver	Rohde & Schwarz	ESCI 7	HKE-010	Dec. 28, 2017	1 Year
4.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	HKE-012	Dec. 28, 2017	1 Year
5.	Loop Antenna	Schwarzbeck	FMZB 1519 B	HKE-014	Dec. 28, 2017	1 Year
6.	Horn Antenna	Schewarzbeck	9120D	HKE-013	Dec. 28, 2017	1 Year
7.	Broad-band Horn Antenna	A-INFOMW	LB-180400-KF	HKE-031	Dec. 28, 2017	1 Year
8.	Pre-amplifier	EMCI	EMC051845SE	HKE-015	Dec. 28, 2017	1 Year
9.	Pre-amplifier	Agilent	83051A	HKE-016	Dec. 28, 2017	1 Year
10.	Filter (2.4-2.483GHz)	Micro-tronics	087	--	N/A	N/A
11.	Radiation Cable 1	MXT	HK1	R05	N/A	N/A
12.	Radiation Cable 2	MXT	HK1	R06	N/A	N/A

3. CONDUCTED EMISSIONS TEST

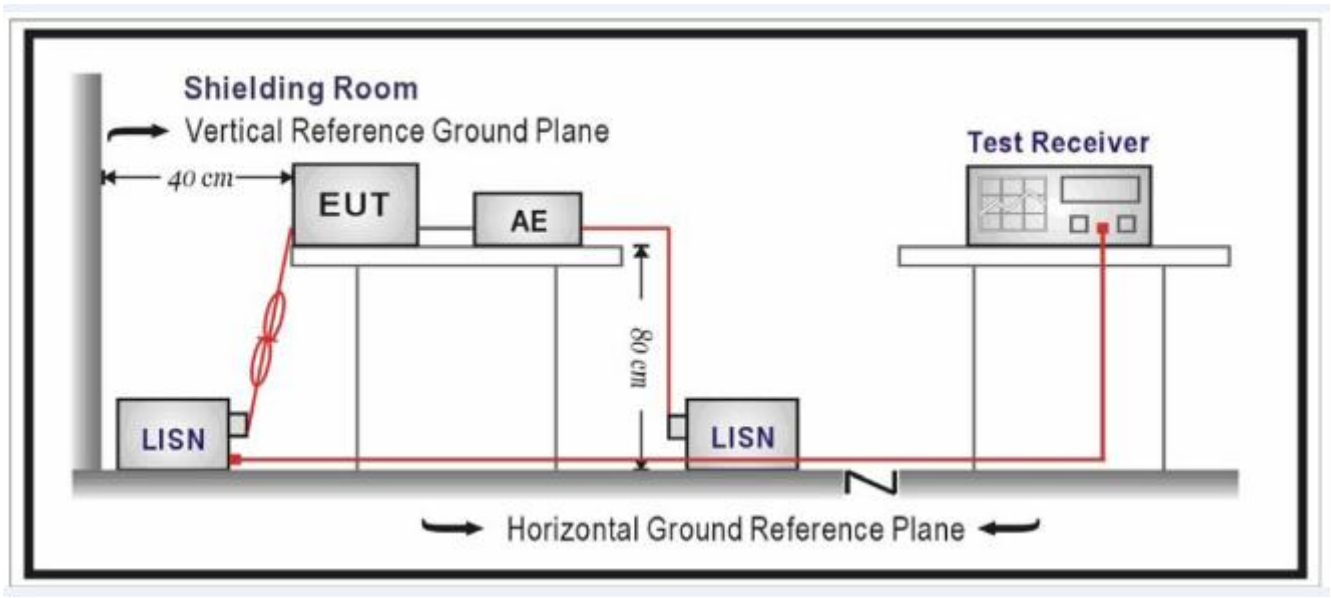
3.1. LIMITS OF LINE CONDUCTED EMISSION TEST

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.

3.2. BLOCK DIAGRAM OF LINE CONDUCTED EMISSION TEST



3.3. 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 C63.10-2013 (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 C63.10-2013.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10-2013.
4. All support equipments received AC120V/60Hz power from a LISN, if any.
5. The EUT received DC charging voltage by adapter or 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.

3.4. FINAL PROCEDURE OF LINE CONDUCTED EMISSION TEST

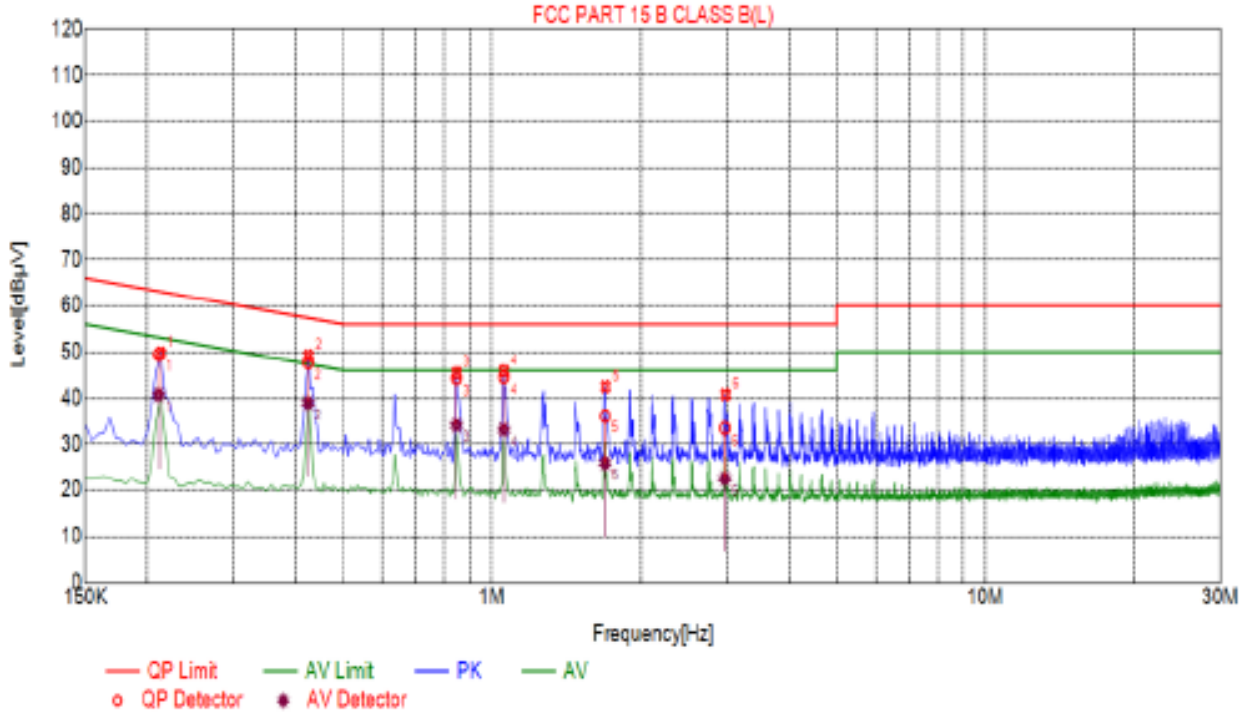
1. EUT and support equipment was set up on the test bench as per step 2 of the preliminary test.
2. A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used 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.

3.5. TEST RESULT OF LINE CONDUCTED EMISSION TEST

BT Link with charging

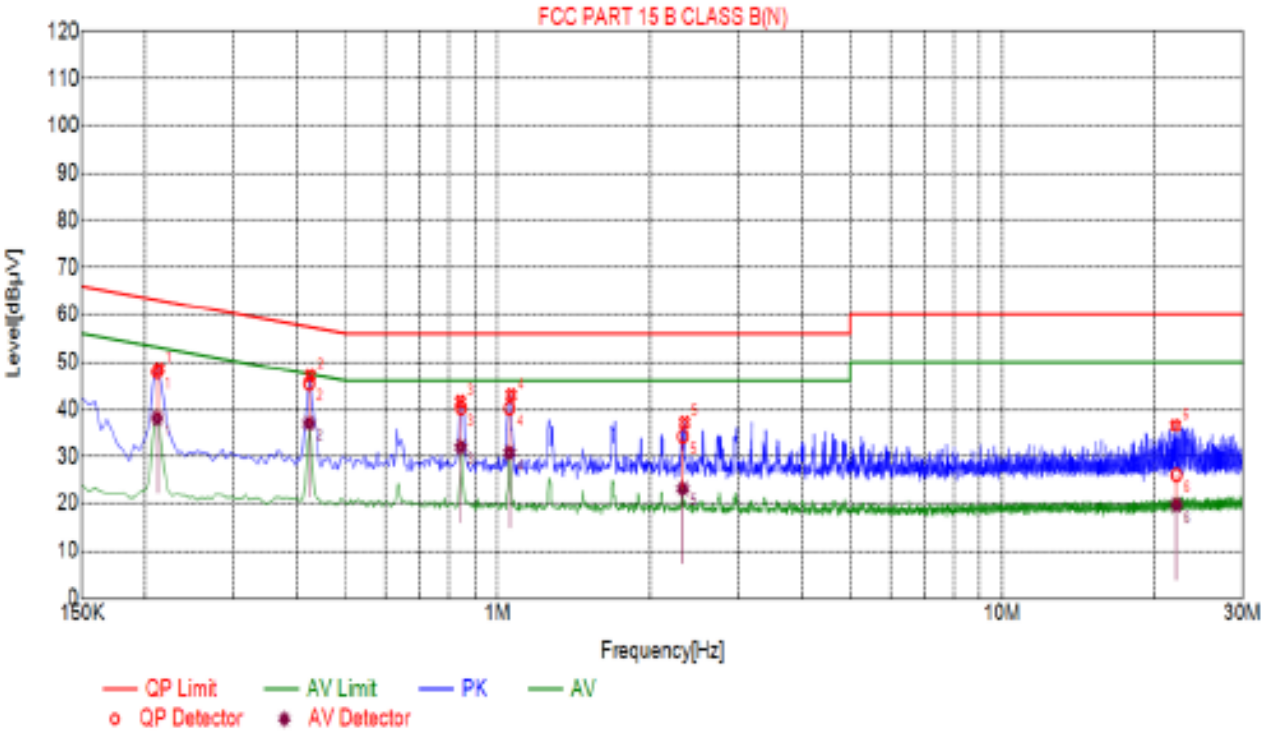
By adapter(worst case)

Line Conducted Emission Test Line 1-L



Final Data List								
NO.	Freq. [MHz]	Factor [dB]	QP Value [dBµV]	QP Limit [dBµV]	QP Margin [dB]	AV Value [dBµV]	AV Limit [dBµV]	AV Margin [dB]
1	0.2113	10.04	49.49	63.15	13.66	40.76	53.15	12.39
2	0.4239	10.04	47.72	57.37	9.65	38.96	47.37	8.41
3	0.8466	10.06	44.30	56.00	11.70	34.11	46.00	11.89
4	1.0577	10.07	44.56	56.00	11.44	33.10	46.00	12.90
5	1.6941	10.13	36.11	56.00	19.89	25.92	46.00	20.08
6	2.9620	10.21	33.45	56.00	22.55	22.54	46.00	23.46

Line Conducted Emission Test Line 2-N



Final Data List

NO.	Freq. [MHz]	Factor [dB]	QP Value [dBuV]	QP Limit [dBuV]	QP Margin [dB]	AV Value [dBuV]	AV Limit [dBuV]	AV Margin [dB]
1	0.2114	10.04	47.91	63.15	15.24	38.19	53.15	14.96
2	0.4227	10.04	45.37	57.40	12.03	37.09	47.40	10.31
3	0.8446	10.06	40.31	56.00	15.69	31.98	46.00	14.02
4	1.0556	10.07	40.25	56.00	15.75	30.77	46.00	15.23
5	2.3257	10.18	34.18	56.00	21.82	23.20	46.00	22.80
6	22.1468	10.16	26.15	60.00	33.85	19.68	50.00	30.32

4. RADIATED EMISSION TEST

4.1TEST 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.

4.2. MEASUREMENT PROCEDURE

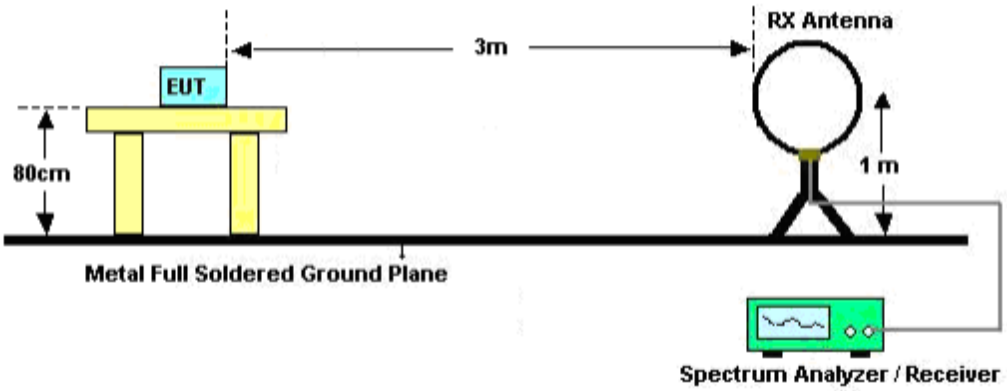
1. The measuring distance of 3m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation(Below 1GHz)
2. The measuring distance of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

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

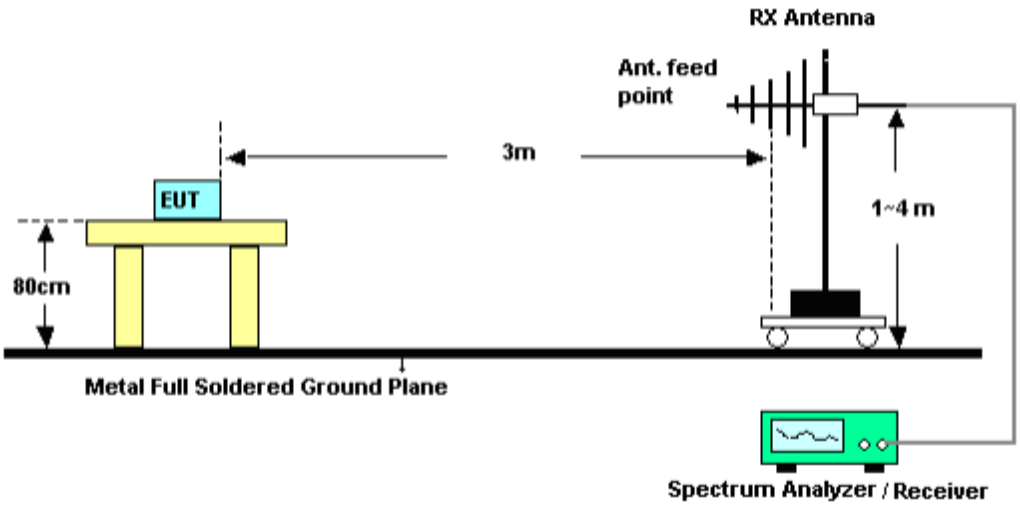
Spectrum Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP
Start ~Stop Frequency	Fundamental: 2.4~2.483GHz RBW 1.5MHz/ VBW 5MHz for Peak, RBW 1.5MHz/ VBW 10Hz for Average Harmonics: 1GHz~25GHz RBW 1MHz/ VBW 3MHz for Peak, RBW 1MHz/ VBW 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

4.3. TEST SETUP

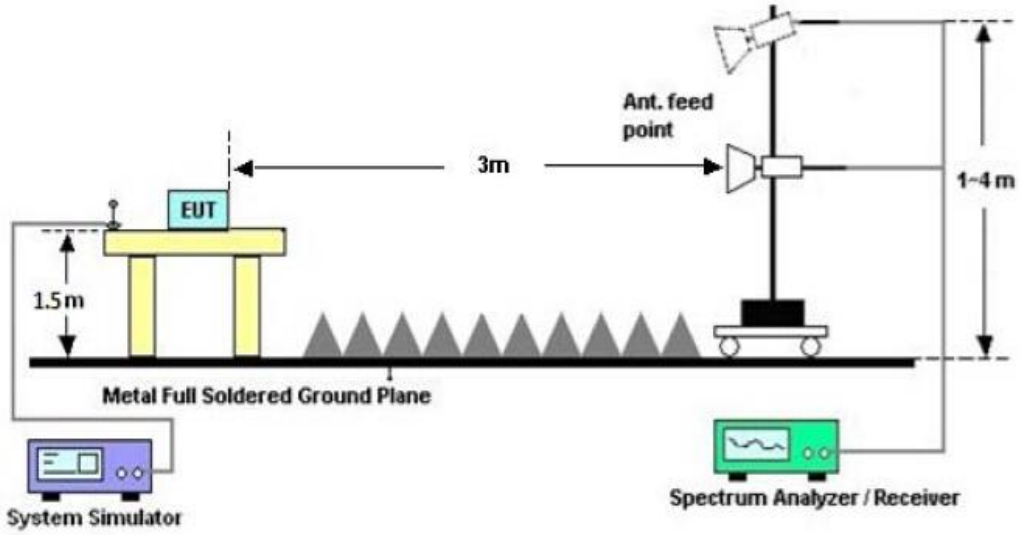
Radiated Emission Test-Setup Frequency Below 30MHz



RADIATED EMISSION TEST SETUP 30MHz-1000MHz



RADIATED EMISSION TEST SETUP ABOVE 1000MHz



4.4. TEST RESULT

FOR BR

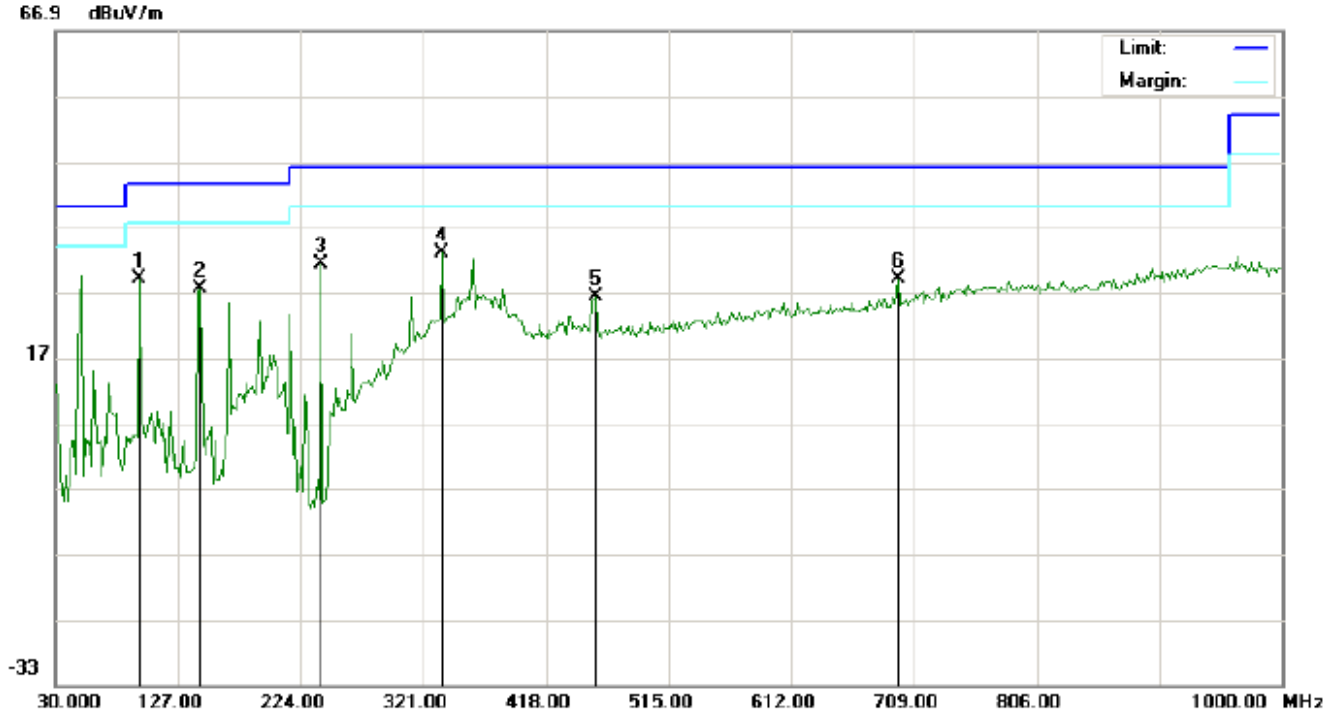
(Worst modulation: GFSK)

RADIATED EMISSION BELOW 30MHz

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

RADIATED EMISSION BELOW 1GHz

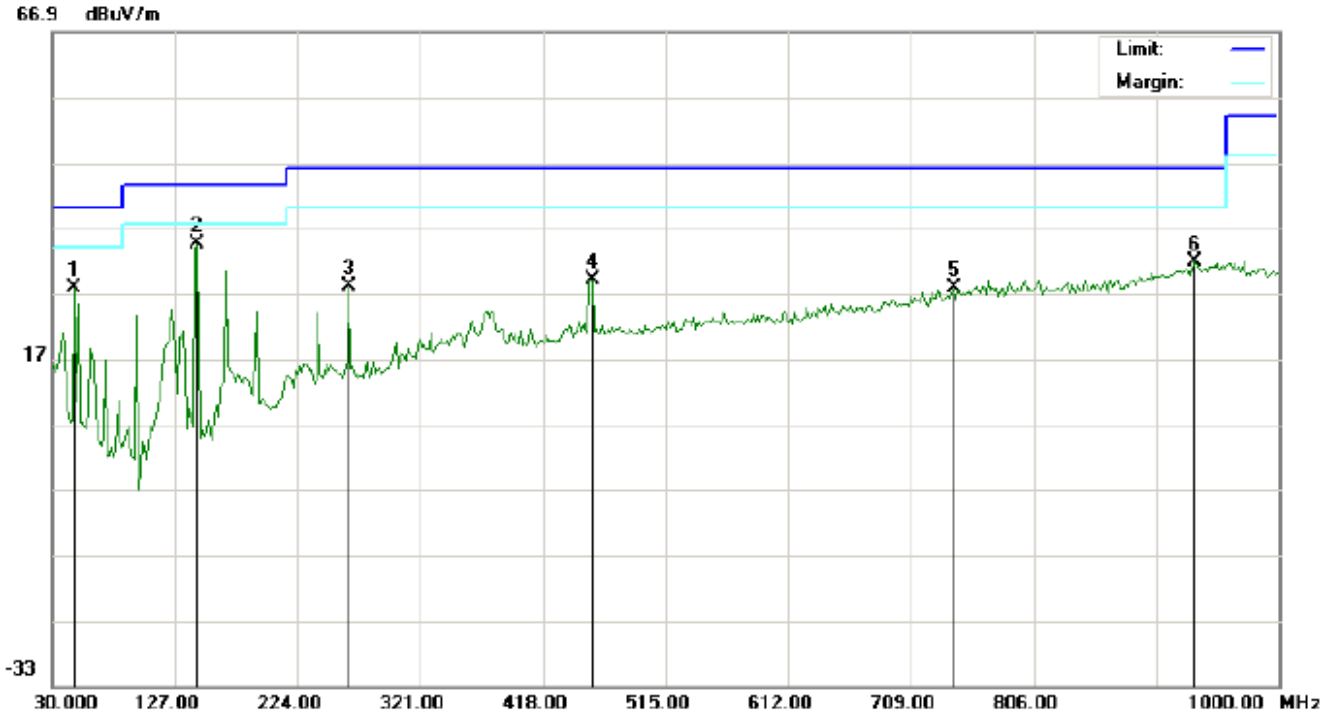
RADIATED EMISSION TEST- (30MHz-1GHz)-LOW CHANNEL-HORIZONTAL



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		96.2833	22.27	6.77	29.04	43.50	-14.46	peak			
2		144.7833	13.50	14.04	27.54	43.50	-15.96	peak			
3		240.1667	23.48	7.90	31.38	46.00	-14.62	peak			
4	*	335.5500	15.18	17.78	32.96	46.00	-13.04	peak			
5		456.8000	5.72	20.66	26.38	46.00	-19.62	peak			
6		696.0667	3.91	25.11	29.02	46.00	-16.98	peak			

RESULT: PASS

RADIATED EMISSION TEST- (30MHz-1GHz)-LOW CHANNEL -VERTICAL



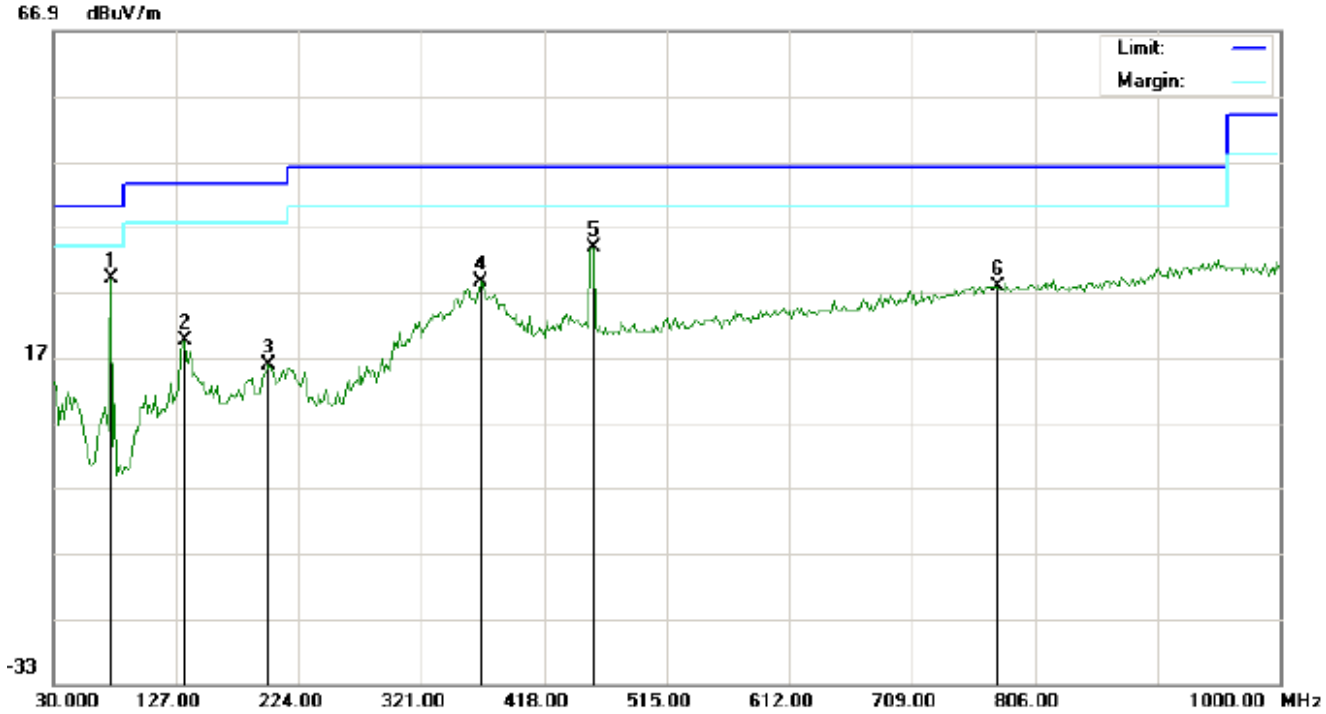
No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
	-	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		47.7833	19.41	8.39	27.80	40.00	-12.20	peak			
2	*	144.7833	19.20	15.23	34.43	43.50	-9.07	peak			
3		264.4166	13.75	14.34	28.09	46.00	-17.91	peak			
4		456.8000	8.35	20.66	29.01	46.00	-16.99	peak			
5		742.9500	1.41	26.43	27.84	46.00	-18.16	peak			
6		933.7167	2.25	29.55	31.80	46.00	-14.20	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.

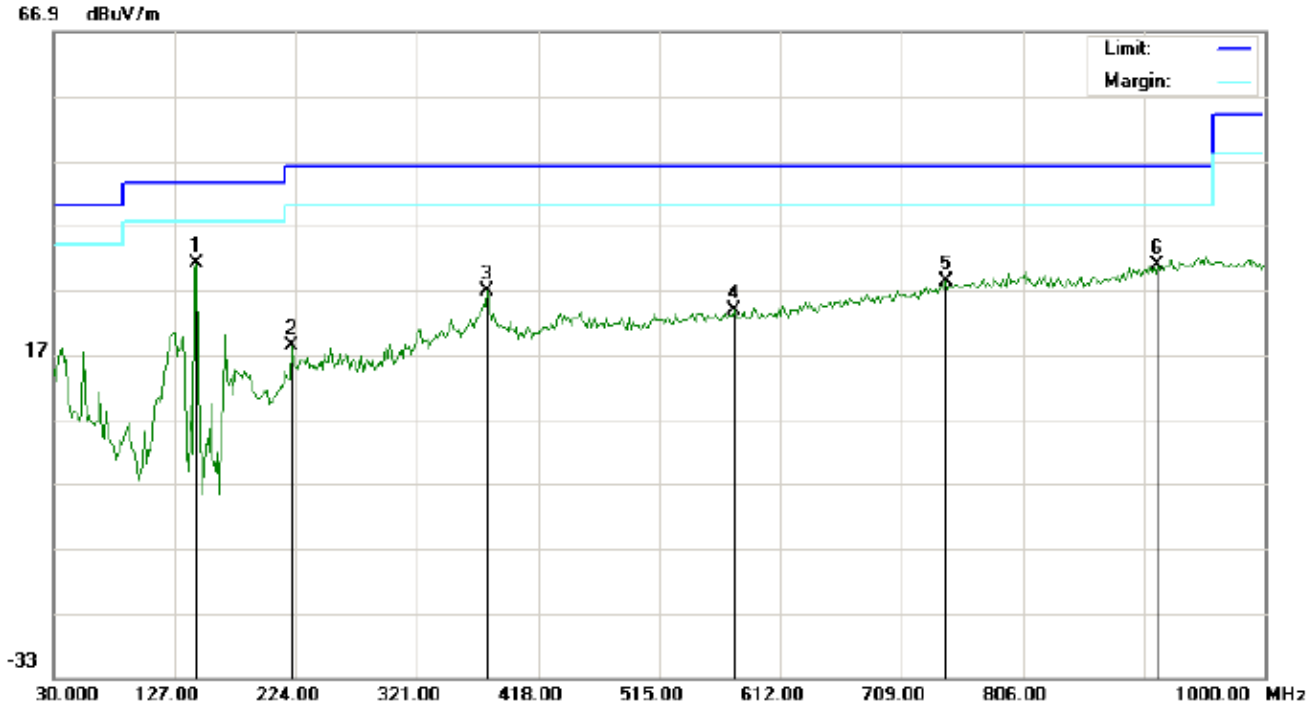
RADIATED EMISSION TEST- (30MHz-1GHz)-MIDDLE CHANNEL-HORIZONTAL



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	*	75.2667	23.85	5.12	28.97	40.00	-11.03	peak			
2		133.4667	7.29	12.15	19.44	43.50	-24.06	peak			
3		199.7500	3.67	11.99	15.66	43.50	-27.84	peak			
4		367.8833	9.61	18.86	28.47	46.00	-17.53	peak			
5		456.8000	13.00	20.66	33.66	46.00	-12.34	peak			
6		776.9000	0.88	27.00	27.88	46.00	-18.12	peak			

RESULT: PASS

RADIATED EMISSION TEST- (30MHz-1GHz)- MIDDLE CHANNEL -VERTICAL



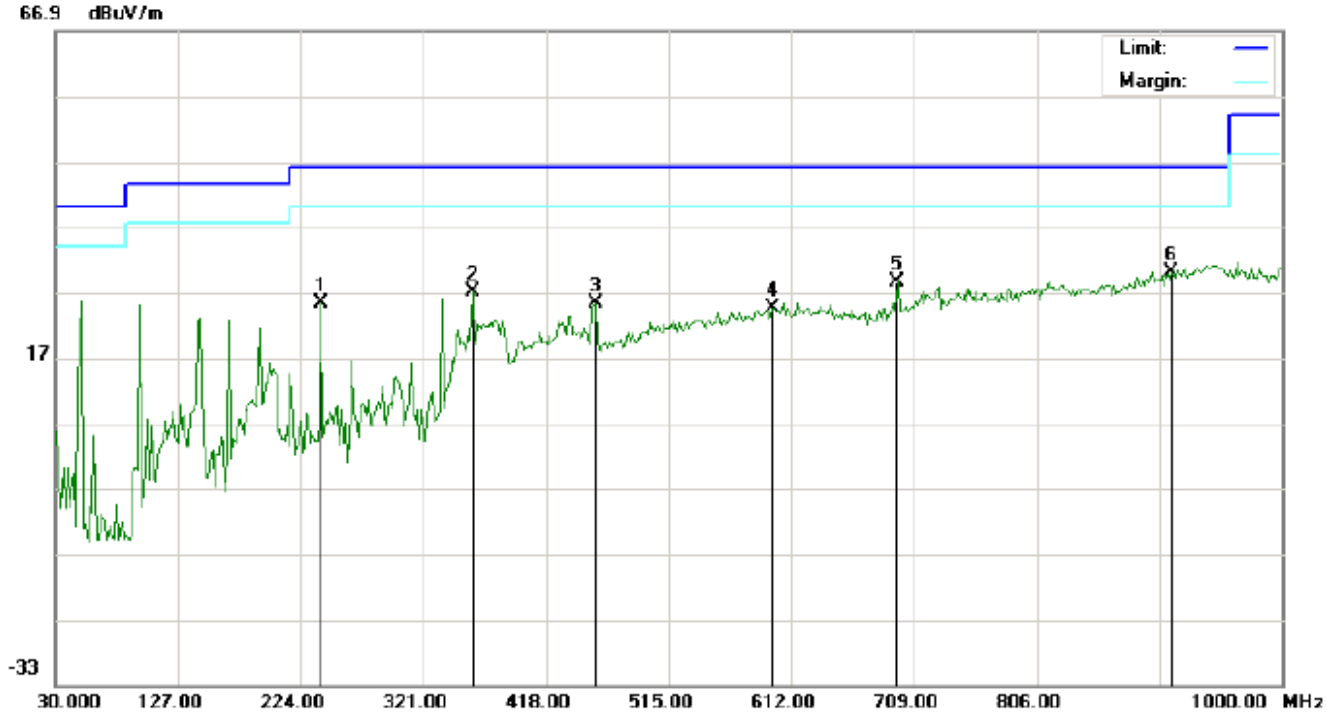
No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	*	144.7833	15.69	15.23	30.92	43.50	-12.58	peak			
2		220.7667	7.12	11.04	18.16	46.00	-27.84	peak			
3		377.5833	7.76	18.92	26.68	46.00	-19.32	peak			
4		574.8167	1.16	22.60	23.76	46.00	-22.24	peak			
5		744.5667	1.76	26.47	28.23	46.00	-17.77	peak			
6		914.3167	1.80	29.01	30.81	46.00	-15.19	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.

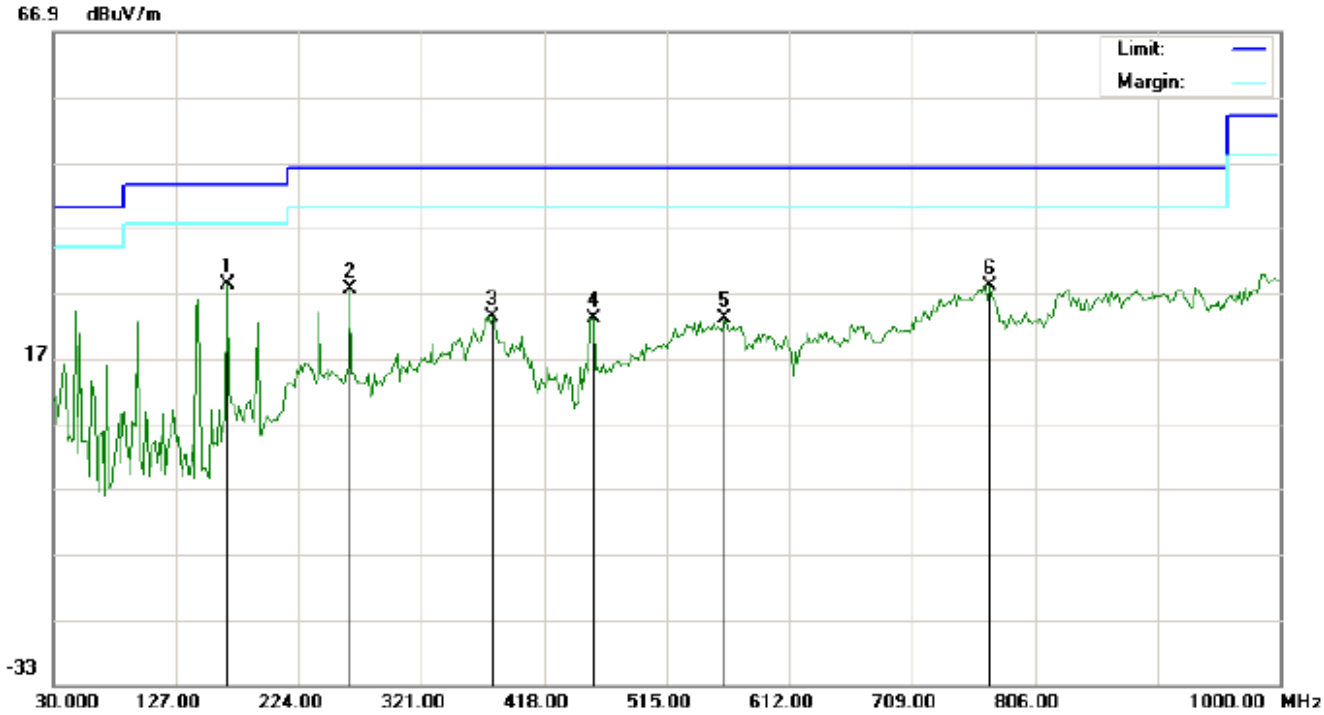
RADIATED EMISSION TEST- (30MHz-1GHz)-HIGH CHANNEL-HORIZONTAL



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
	.	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		240.1666	17.48	7.90	25.38	46.00	-20.62	peak			
2		359.8000	8.19	18.80	26.99	46.00	-19.01	peak			
3		456.8000	4.72	20.66	25.38	46.00	-20.62	peak			
4		597.4500	0.82	23.67	24.49	46.00	-21.51	peak			
5		696.0666	3.41	25.11	28.52	46.00	-17.48	peak			
6	*	912.7000	1.07	28.96	30.03	46.00	-15.97	peak			

RESULT: PASS

RADIATED EMISSION TEST- (30MHz-1GHz)-HIGH CHANNEL -VERTICAL



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	*	167.4166	13.32	14.86	28.18	43.50	-15.32	peak			
2		264.4166	13.25	14.34	27.59	46.00	-18.41	peak			
3		377.5833	4.44	18.92	23.36	46.00	-22.64	peak			
4		456.8000	2.35	20.66	23.01	46.00	-22.99	peak			
5		560.2667	0.43	22.53	22.96	46.00	-23.04	peak			
6		770.4333	1.12	26.91	28.03	46.00	-17.97	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.

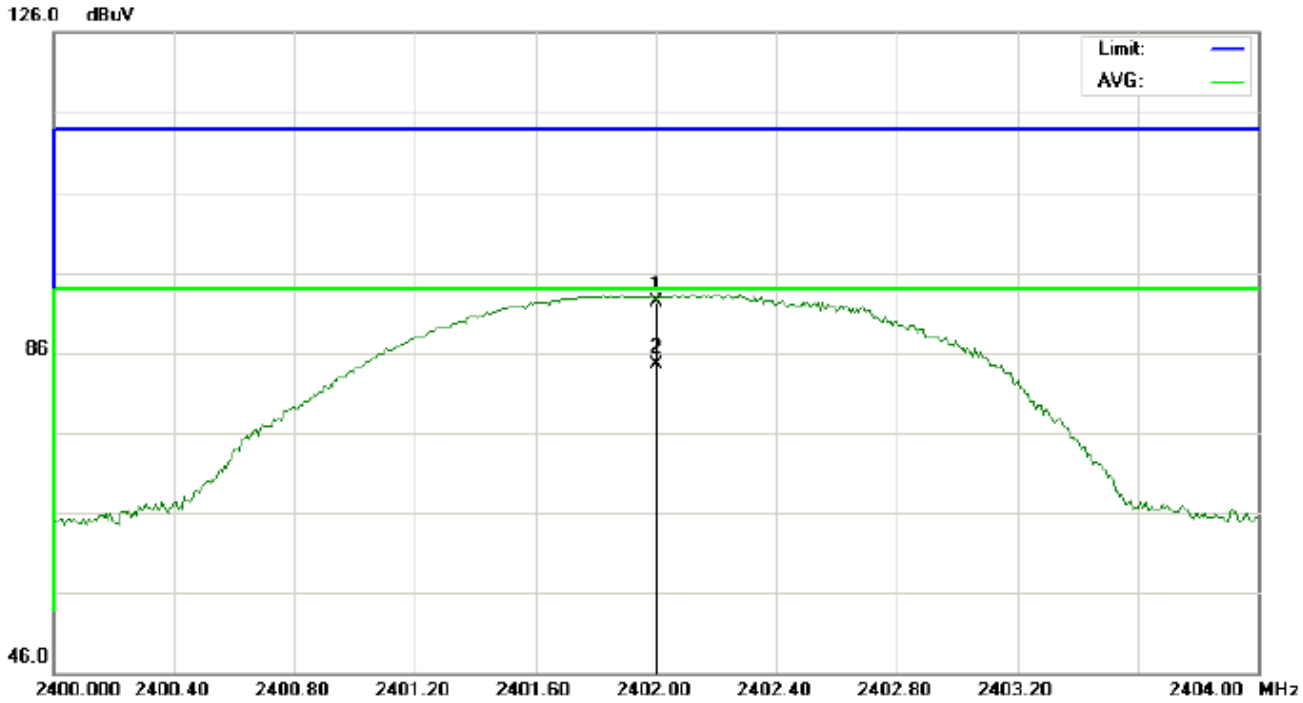
RADIATED EMISSION ABOVE 1GHz

FOR BR

(Worst modulation: GFSK)

For Fundamental

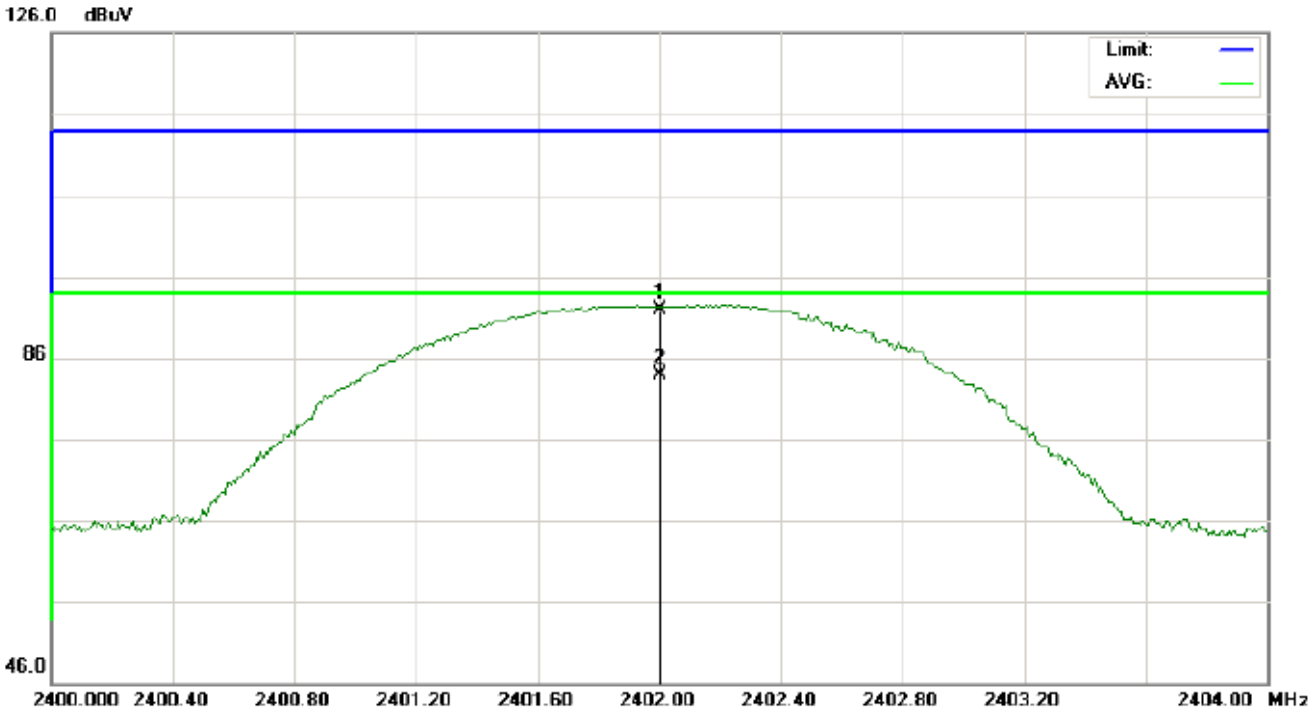
RADIATED EMISSION TEST- (ABOVE 1GHz)-LOW CHANNEL-HORIZONTAL



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB	dBuV	dBuV	dB		cm	degree	
1		2402.000	78.93	13.46	92.39	114.00	-21.61	peak			
2	*	2402.000	70.96	13.46	84.42	94.00	-9.58	AVG	100	75	

RESULT: PASS

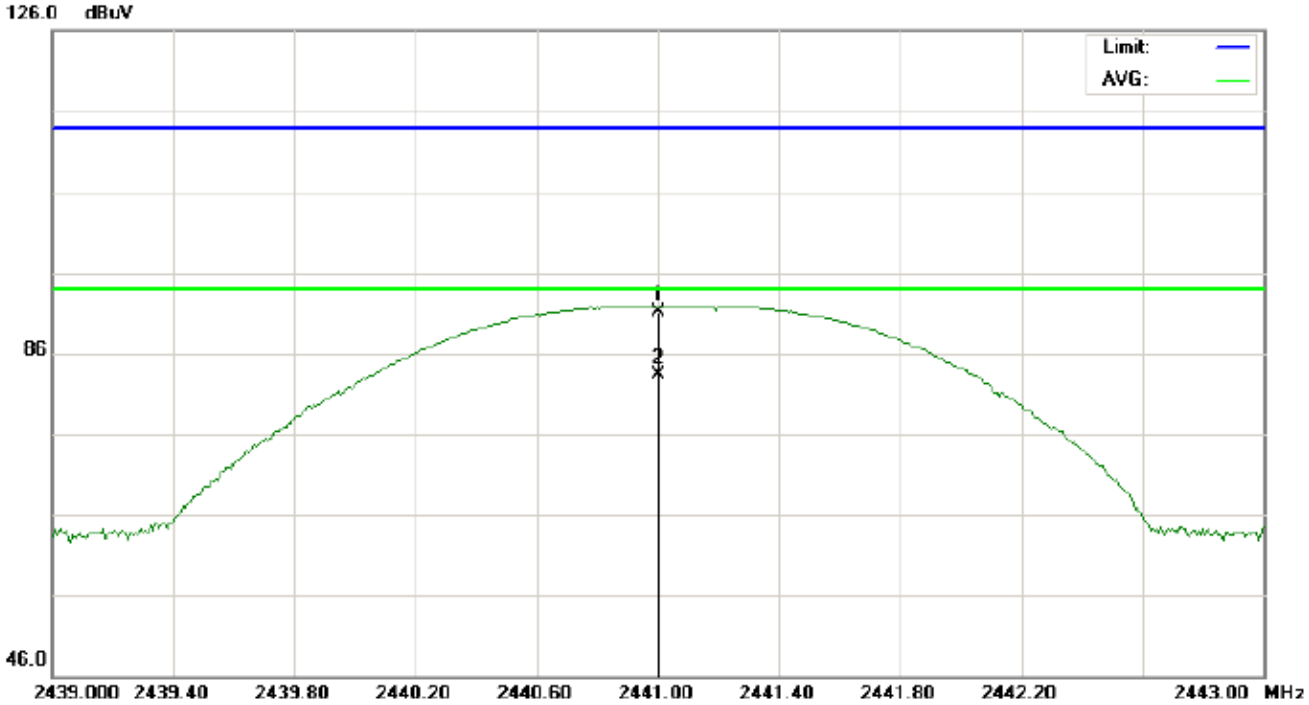
RADIATED EMISSION TEST- (ABOVE 1GHz)-LOW CHANNEL- VERTICAL



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
	-	MHz	dBuV	dB	dBuV	dBuV	dB		cm	degree	
1		2402.000	78.47	13.46	91.93	114.00	-22.07	peak			
2	*	2402.000	70.47	13.46	83.93	94.00	-10.07	AVG	100	335	

RESULT: PASS

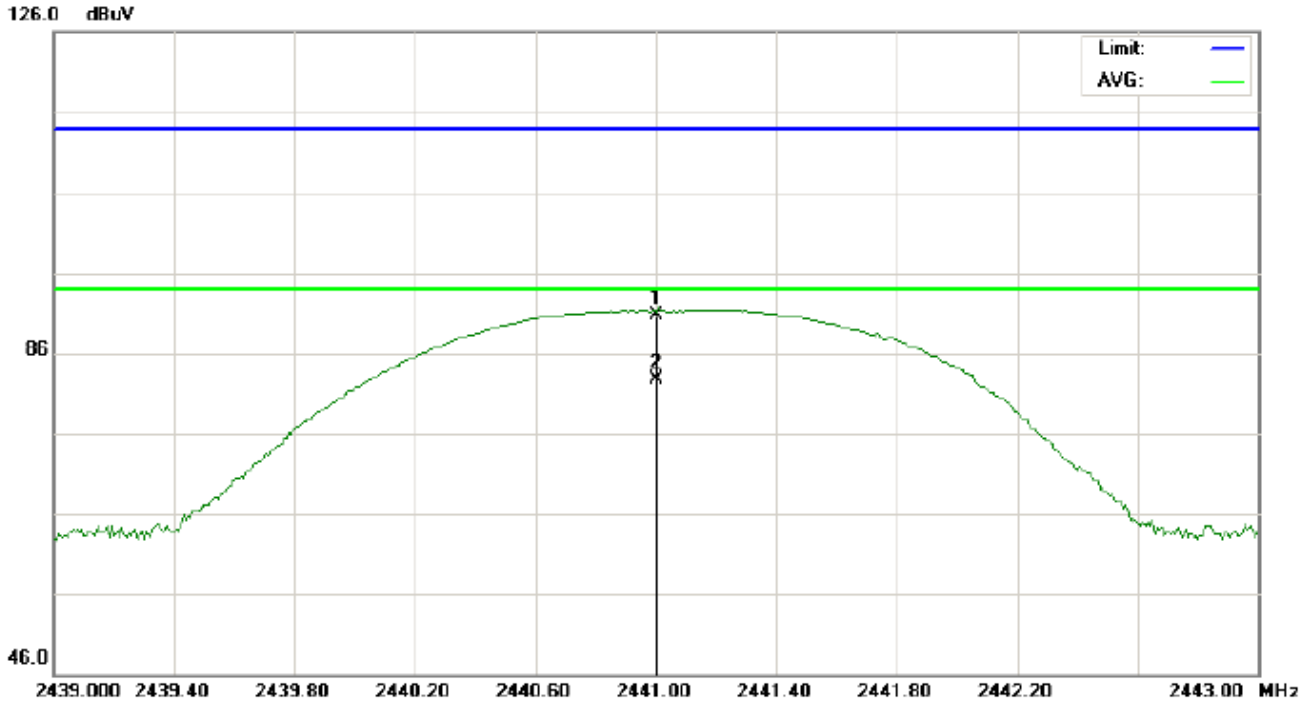
RADIATED EMISSION TEST- (ABOVE 1GHz)-MIDDLE CHANNEL-HORIZONTAL



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
	-	MHz	dBuV	dB	dBuV	dBuV	dB		cm	degree	
1		2441.000	77.29	13.88	91.17	114.00	-22.83	peak			
2	*	2441.000	69.36	13.88	83.24	94.00	-10.76	AVG	100	77	

RESULT: PASS

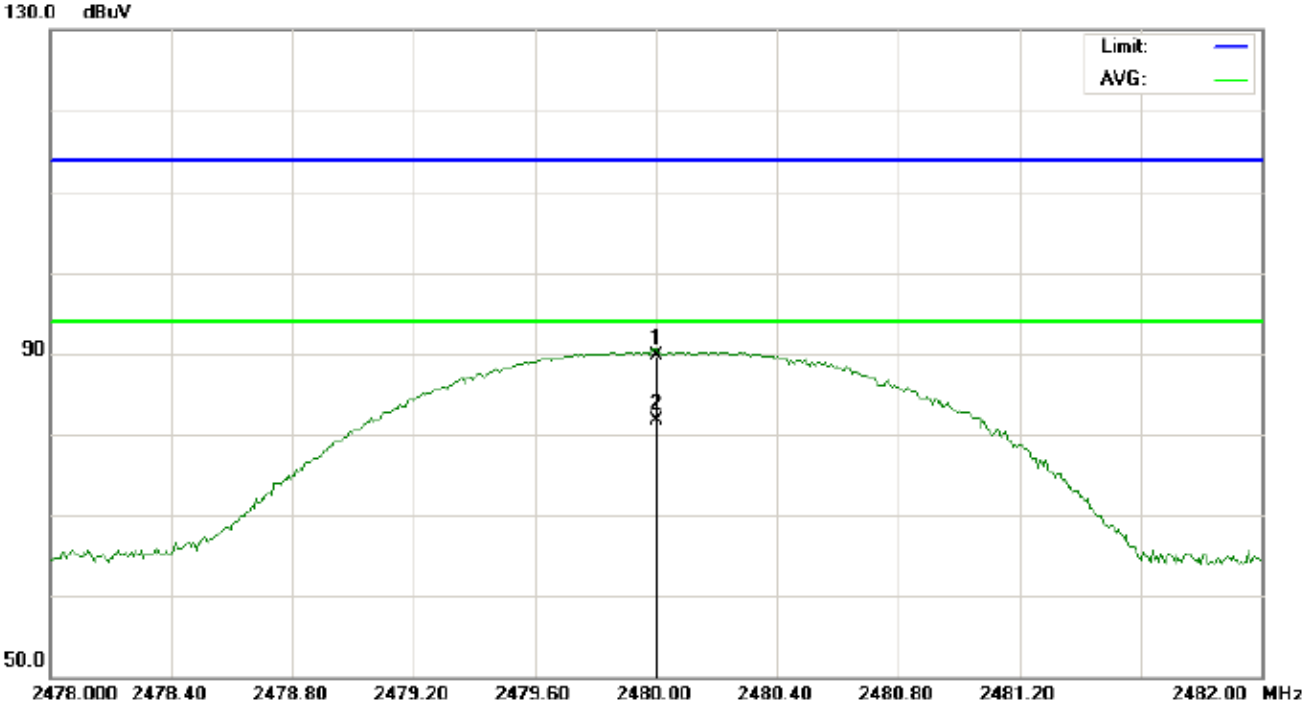
RADIATED EMISSION TEST- (ABOVE 1GHz)-MIDDLE CHANNEL- VERTICAL



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB	dBuV	dBuV	dB		cm	degree	
1		2441.000	76.83	13.88	90.71	114.00	-23.29	peak			
2	*	2441.000	68.88	13.88	82.76	94.00	-11.24	AVG	100	208	

RESULT: PASS

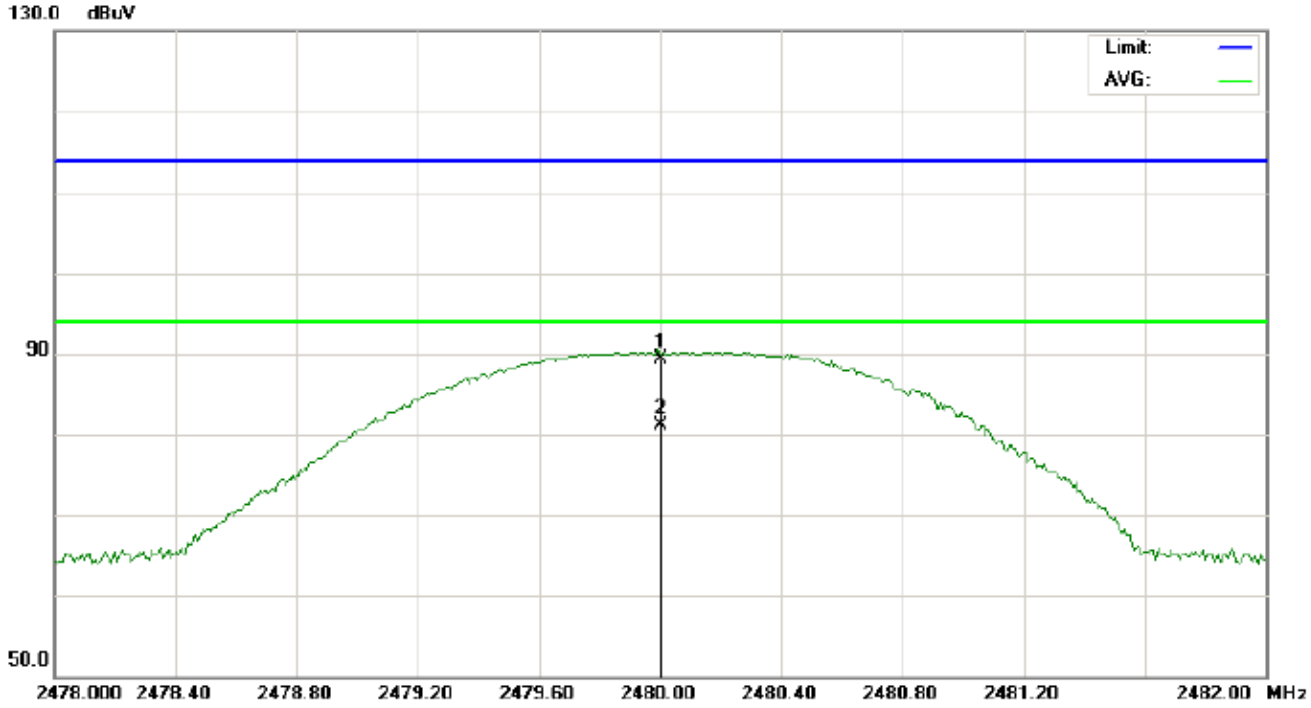
RADIATED EMISSION TEST- (ABOVE 1GHz)-HIGH CHANNEL-HORIZONTAL



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB	dBuV	dBuV	dB		cm	degree	
1		2480.000	75.55	14.11	89.66	114.00	-24.34	peak			
2	*	2480.000	67.64	14.11	81.75	94.00	-12.25	AVG	100	79	

RESULT: PASS

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



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB	dBuV	dBuV	dB		cm	degree	
1		2480.000	75.12	14.11	89.23	114.00	-24.77	peak			
2	*	2480.000	67.09	14.11	81.20	94.00	-12.80	AVG	100	339	

RESULT: PASS

Note: 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

1Mbps Result:

Peak value

Frequency	Reading Level	Factor	Measurement	Limit	Over	Antenna
(MHz)	(dBuv)	(dB/m)	(dBuv/m)	(dBuv/m)	(dB)	Polarization
2402	78.93	13.46	92.39	114	-21.61	Horizontal
2402	78.47	13.46	91.93	114	-22.07	Vertical
2441	77.29	13.88	91.17	114	-22.83	Horizontal
2441	76.83	13.88	90.71	114	-23.29	Vertical
2480	75.55	14.11	89.66	114	-24.34	Horizontal
2480	75.12	14.11	89.23	114	-24.77	Vertical

Average value

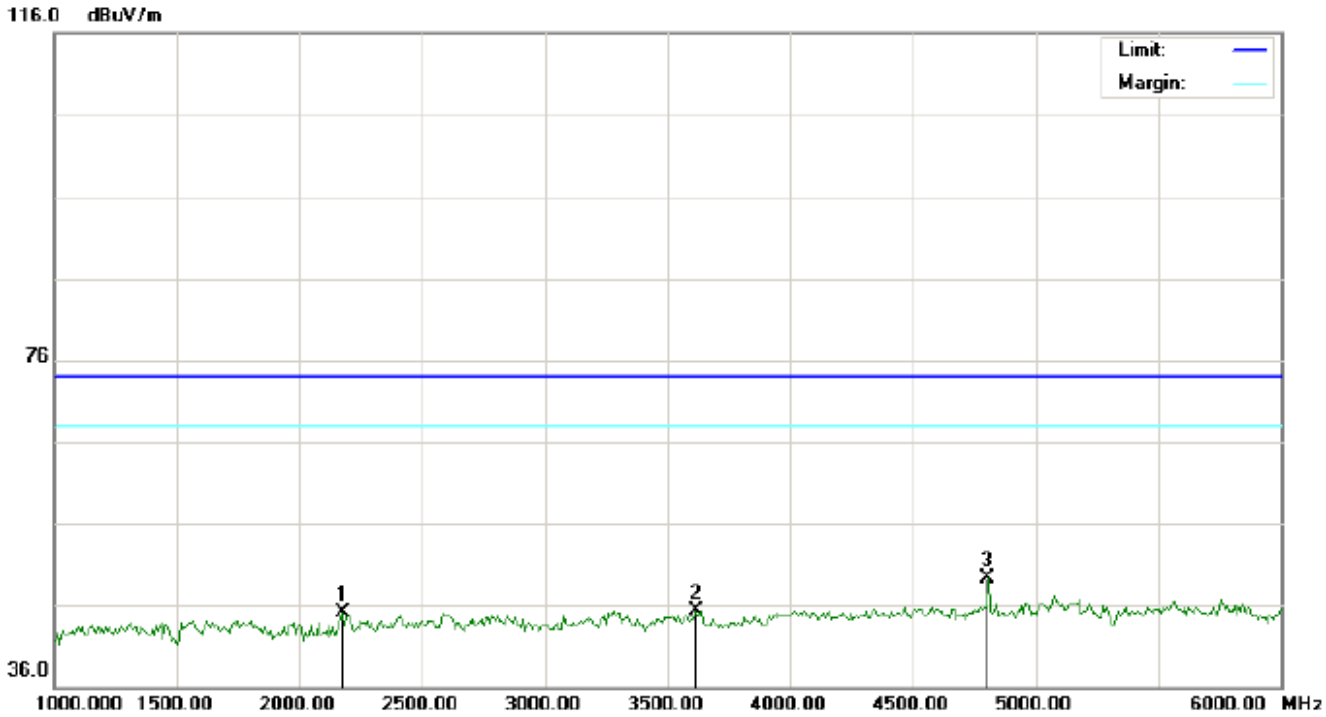
Frequency	Reading Level	Factor	Measurement	Limit	Over	Antenna
(MHz)	(dBuv)	(dB/m)	(dBuv/m)	(dBuv/m)	(dB)	Polarization
2402	70.96	13.46	84.42	94	-9.58	Horizontal
2402	70.47	13.46	83.93	94	-10.07	Vertical
2441	69.36	13.88	83.24	94	-10.76	Horizontal
2441	68.88	13.88	82.76	94	-11.24	Vertical
2480	67.64	14.11	81.75	94	-12.25	Horizontal
2480	67.09	14.11	81.20	94	-12.80	Vertical

FOR BR

(Worst modulation: GFSK)

For Harmonics

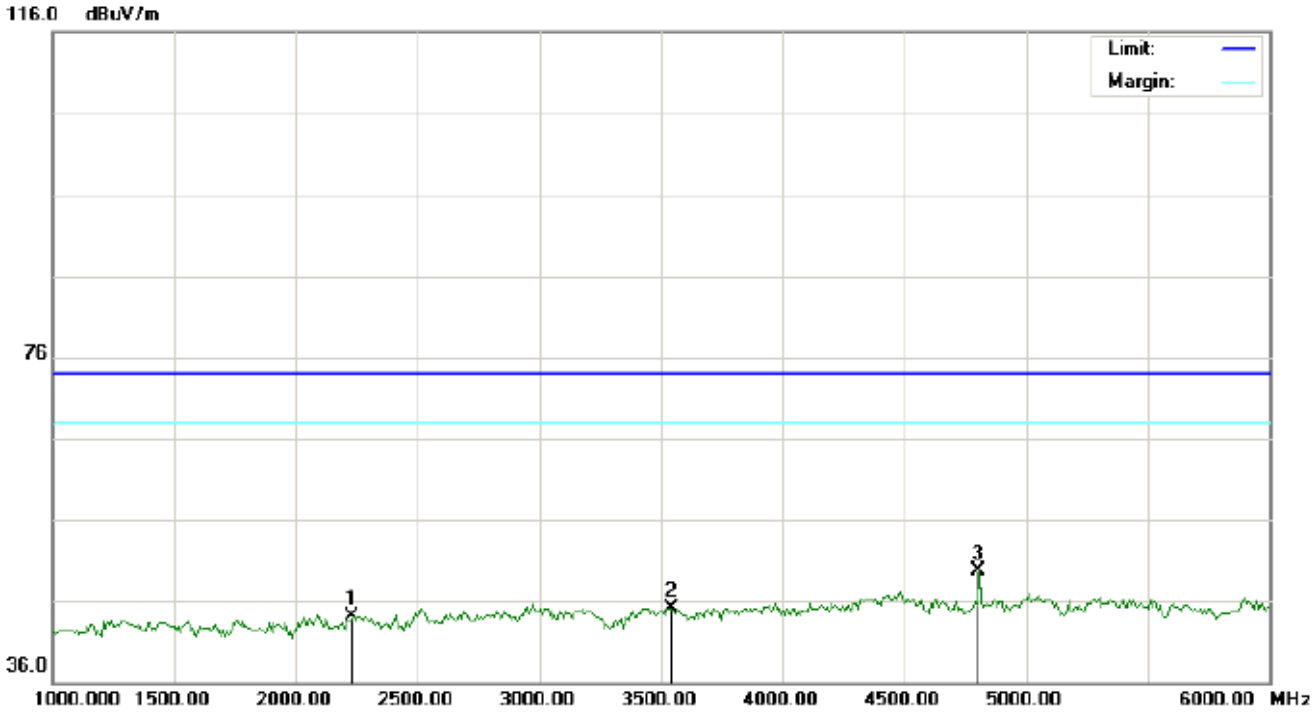
RADIATED EMISSION TEST- (ABOVE 1GHz)-LOW CHANNEL-HORIZONTAL



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		2175.000	35.00	10.07	45.07	74.00	-28.93	peak			
2		3616.667	32.55	12.83	45.38	74.00	-28.62	peak			
3	*	4804.000	41.71	7.69	49.40	74.00	-24.60	peak			

RESULT: PASS

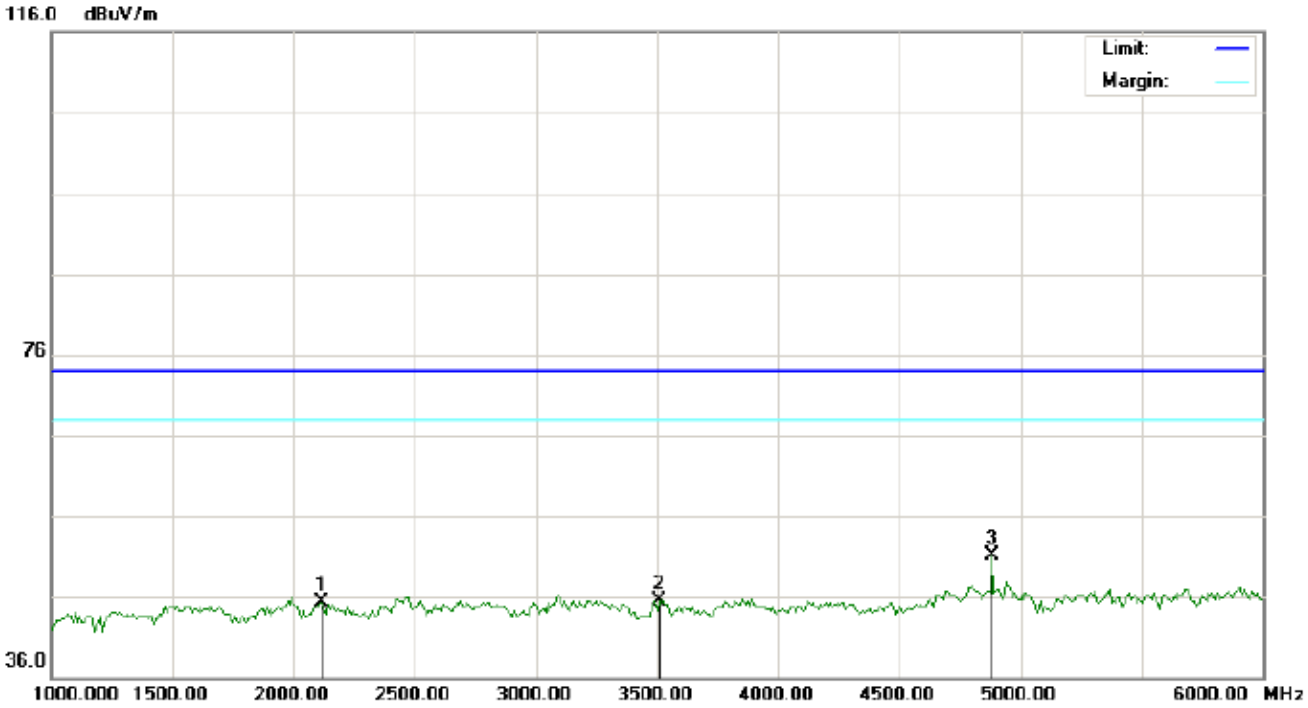
RADIATED EMISSION TEST- (ABOVE 1GHz)-LOW CHANNEL- VERTICAL



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		2233.333	34.05	10.14	44.19	74.00	-29.81	peak			
2		3541.667	32.82	12.37	45.19	74.00	-28.81	peak			
3	*	4804.000	42.05	7.69	49.74	74.00	-24.26	peak			

RESULT: PASS

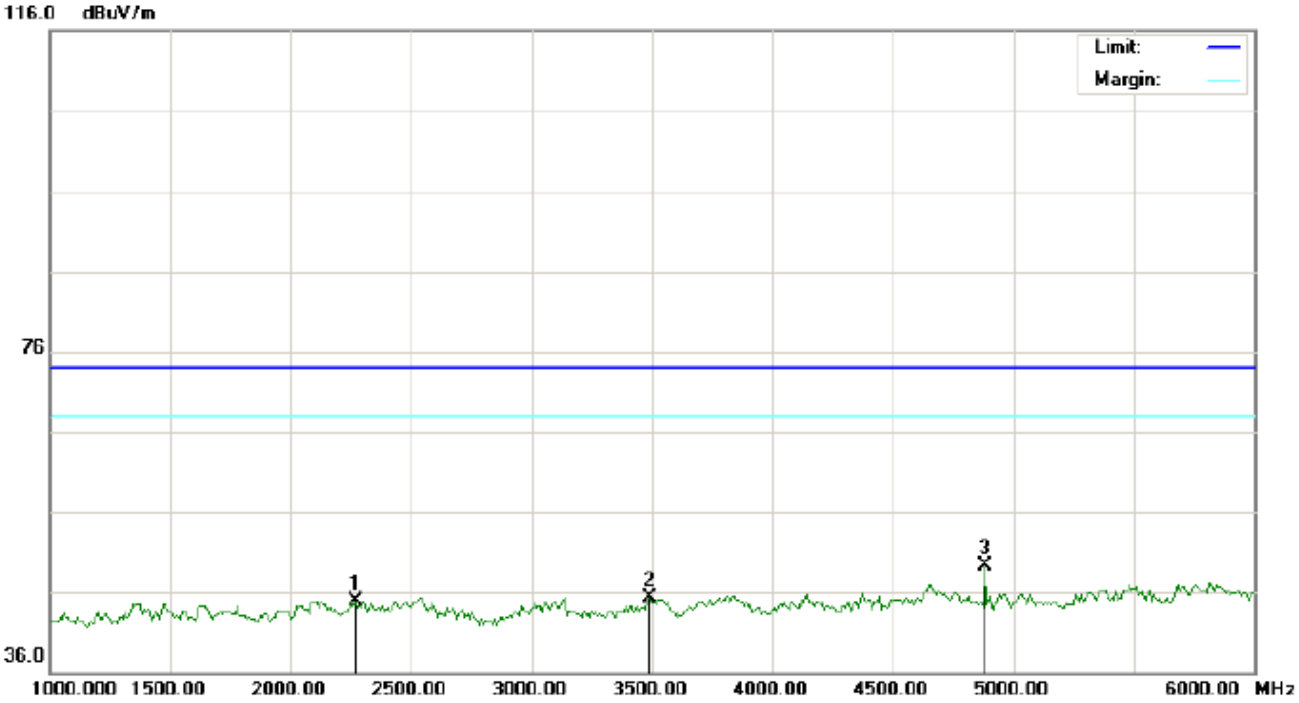
RADIATED EMISSION TEST- (ABOVE 1GHz)-MIDDLE CHANNEL-HORIZONTAL



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		2116.667	35.33	10.01	45.34	74.00	-28.66	peak			
2		3508.333	33.32	12.16	45.48	74.00	-28.52	peak			
3	*	4882.000	43.16	7.89	51.05	74.00	-22.95	peak			

RESULT: PASS

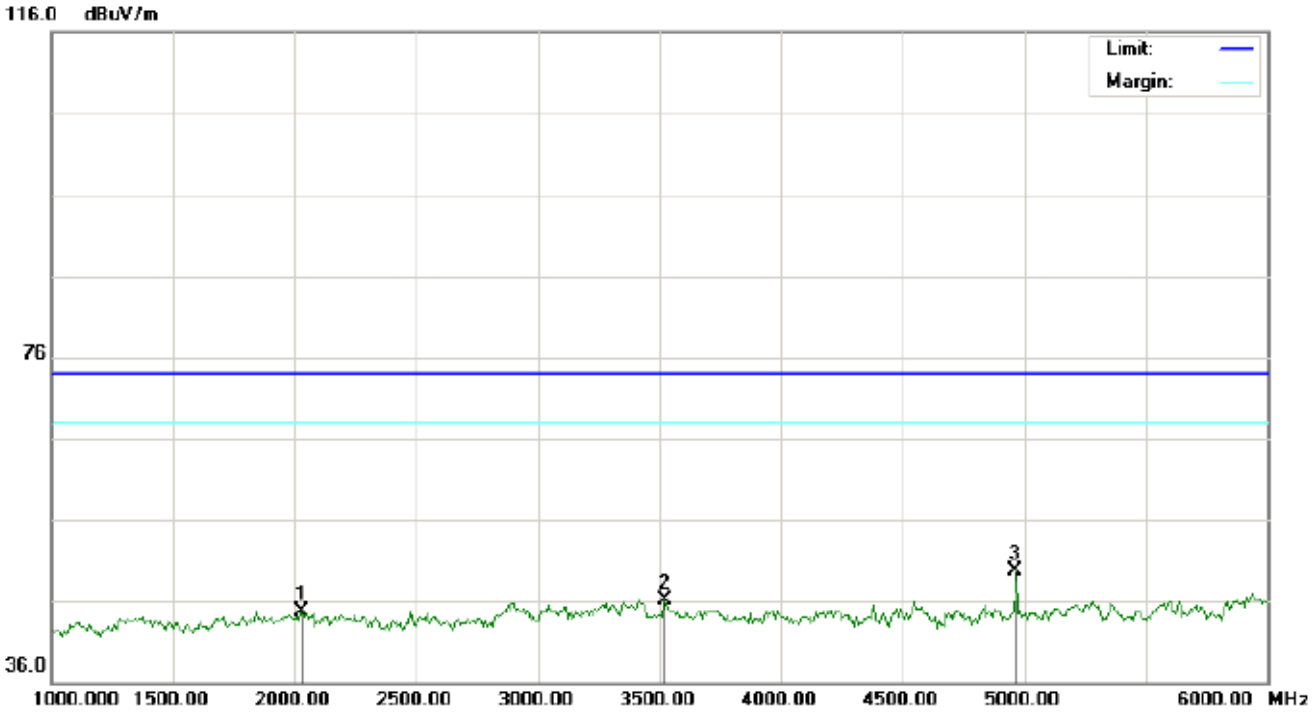
RADIATED EMISSION TEST- (ABOVE 1GHz)-MIDDLE CHANNEL- VERTICAL



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		2266.667	34.83	10.17	45.00	74.00	-29.00	peak			
2		3491.667	33.15	12.10	45.25	74.00	-28.75	peak			
3	*	4882.000	41.39	7.89	49.28	74.00	-24.72	peak			

RESULT: PASS

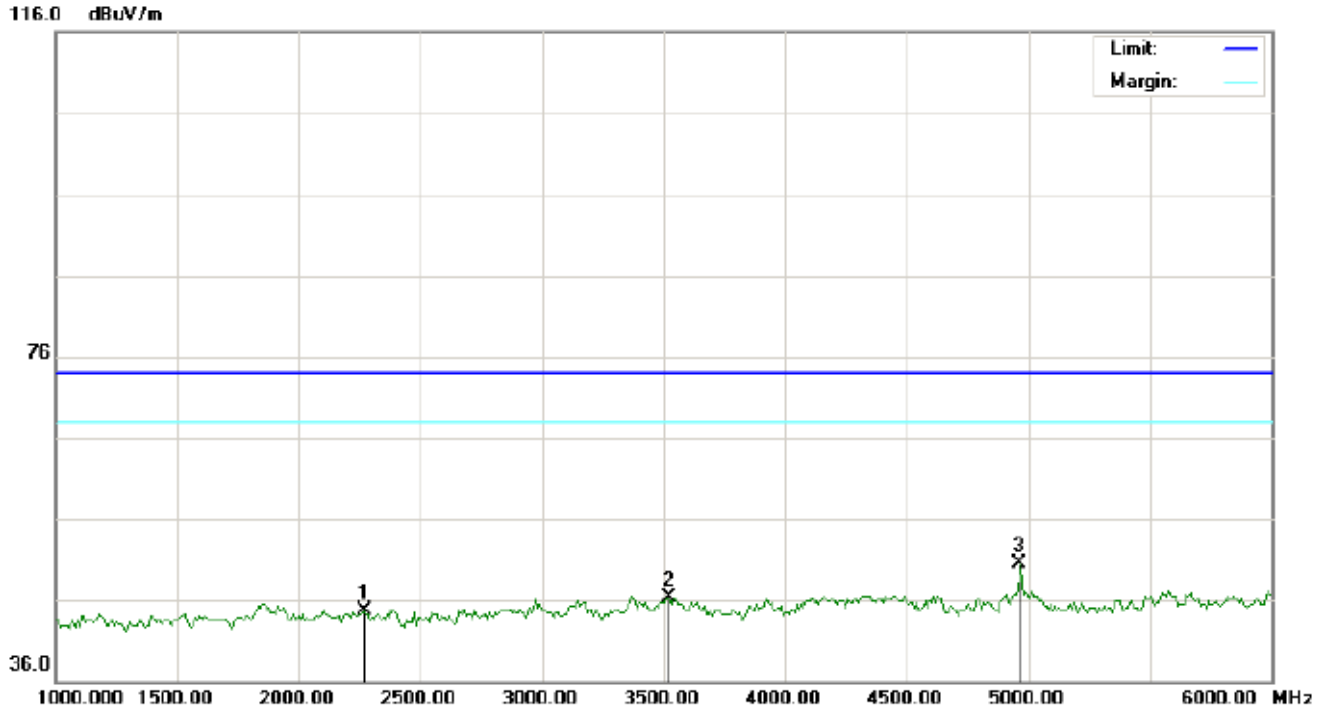
RADIATED EMISSION TEST- (ABOVE 1GHz)-HIGH CHANNEL-HORIZONTAL



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		2033.333	34.84	9.92	44.76	74.00	-29.24	peak			
2		3525.000	33.79	12.26	46.05	74.00	-27.95	peak			
3	*	4960.000	41.60	8.09	49.69	74.00	-24.31	peak			

RESULT: PASS

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



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		2266.667	34.51	10.17	44.68	74.00	-29.32	peak			
2		3525.000	34.02	12.26	46.28	74.00	-27.72	peak			
3	*	4960.000	42.41	8.09	50.50	74.00	-23.50	peak			

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.

5. BAND EDGE

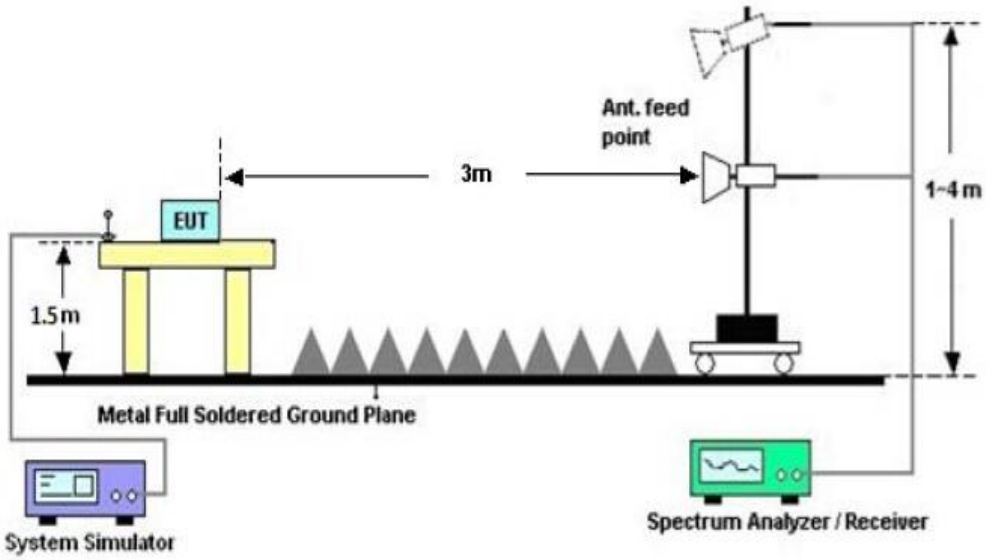
5.1. MEASUREMENT PROCEDURE

1. The 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.
2. Max hold the trace of the setup 1, and the EUT operates at hopping-on test mode to verify the largest spurious emissions power.
3. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission.

Start frequency(MHz)	Stop frequency(MHz)
2200	2405
2478	2500

5.2 TEST SETUP

RADIATED EMISSION TEST SETUP

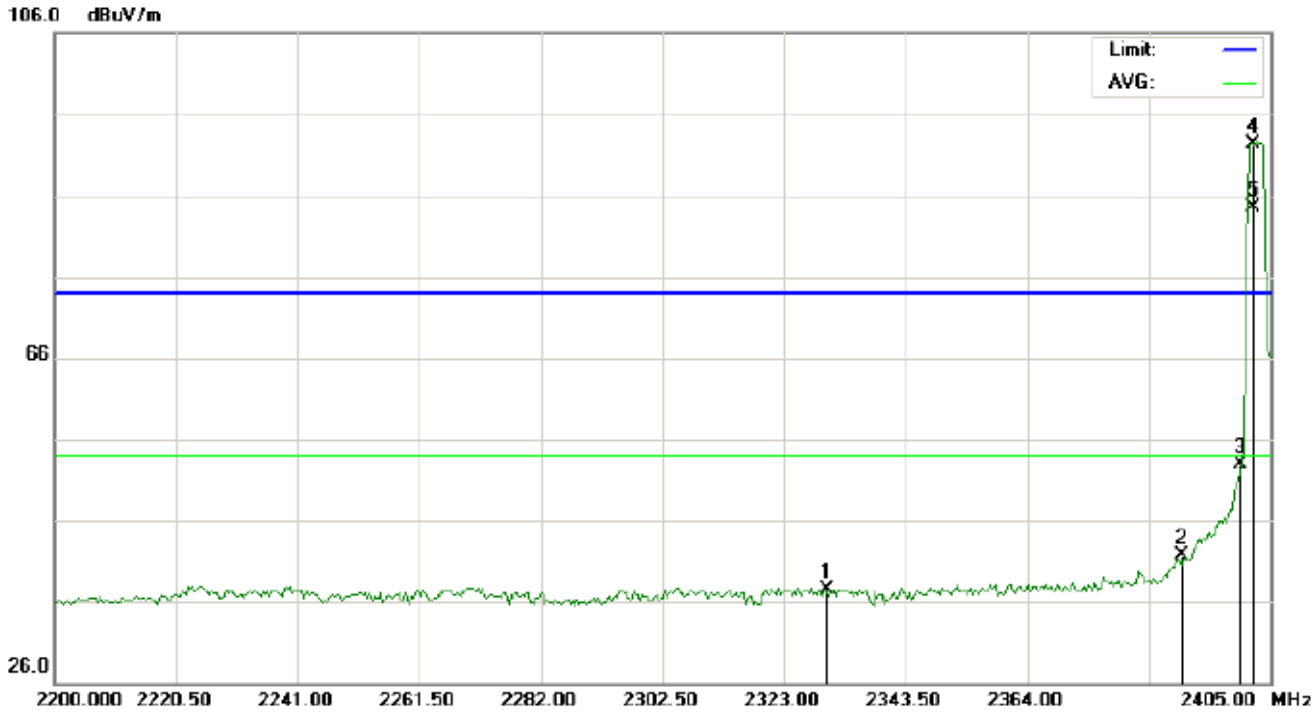


5.3 RADIATED TEST RESULT

FOR BR

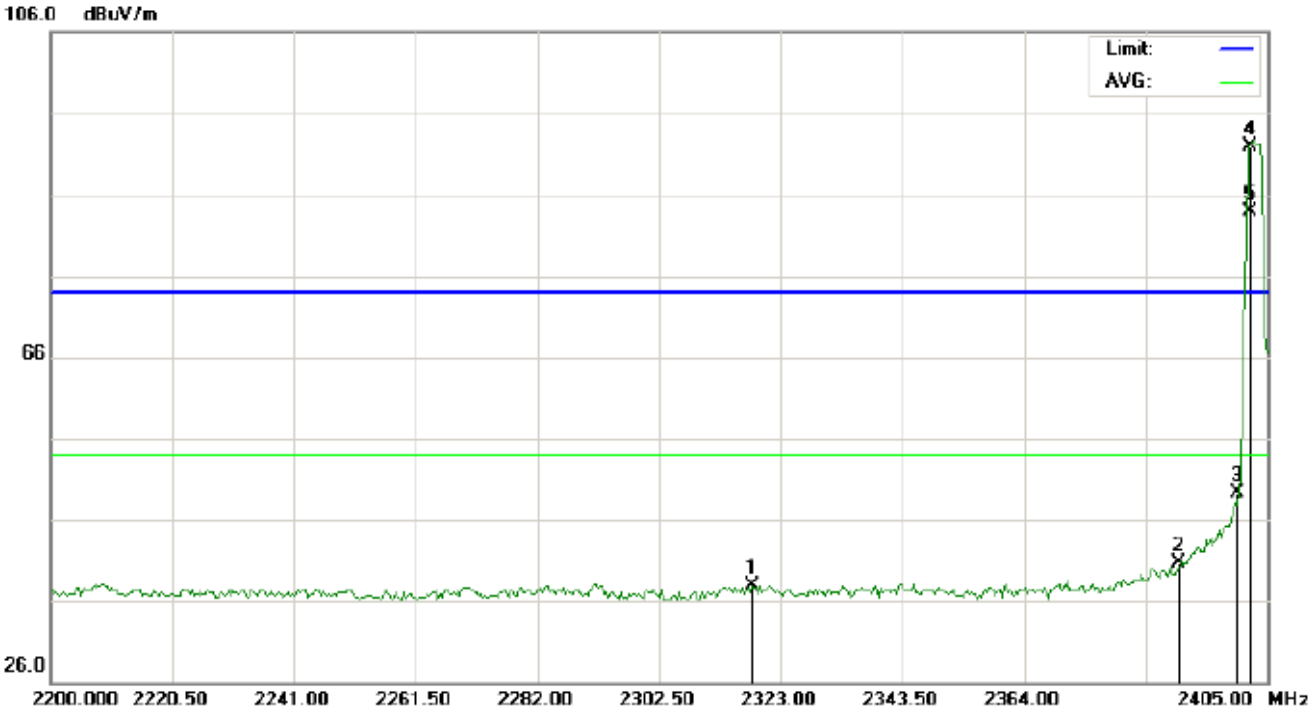
(Worst modulation: GFSK)

TEST PLOT OF BAND EDGE FOR LOW CHANNEL-Horizontal



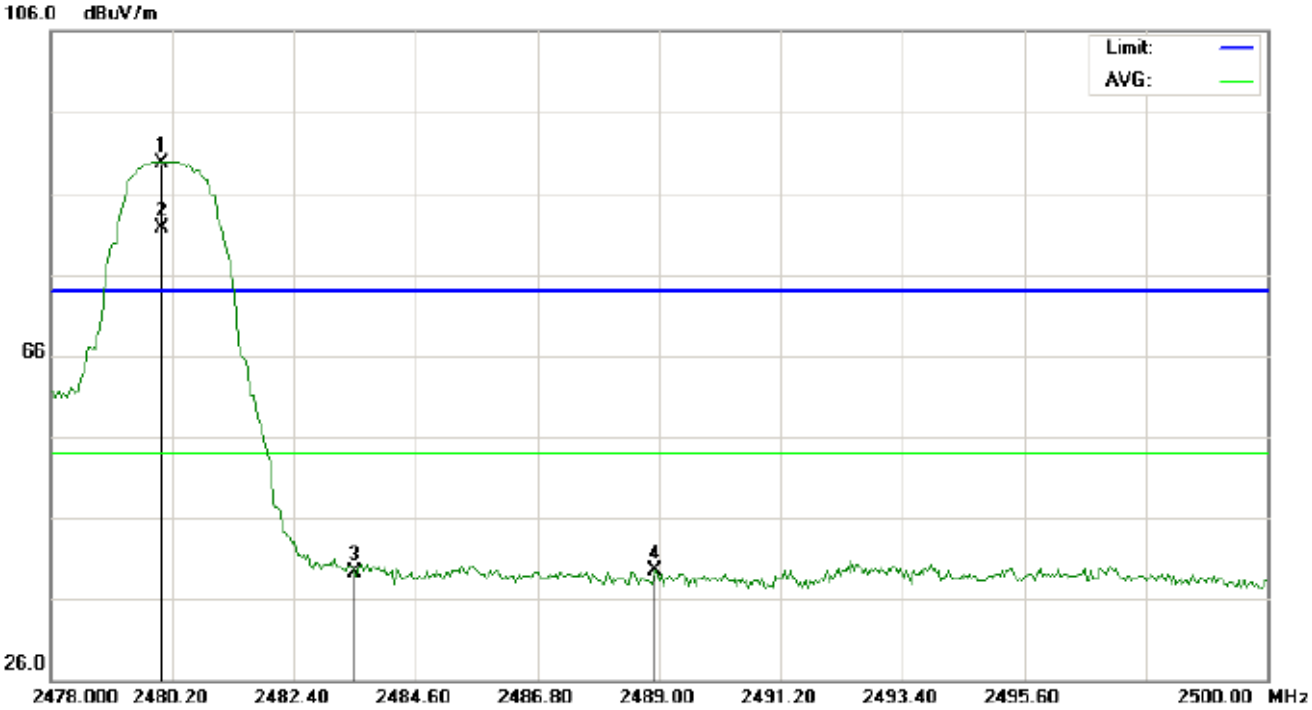
No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		2330.175	24.11	13.46	37.57	74.00	-36.43	peak			
2		2390.000	28.17	13.46	41.63	74.00	-32.37	peak			
3		2400.000	39.44	13.46	52.90	74.00	-21.10	peak			
4	X	2402.000	78.89	13.46	92.35	74.00	18.35	peak			
5	*	2402.000	70.99	13.46	84.45	54.00	30.45	AVG	100	73	

TEST PLOT OF BAND EDGE FOR LOW CHANNEL -Vertical



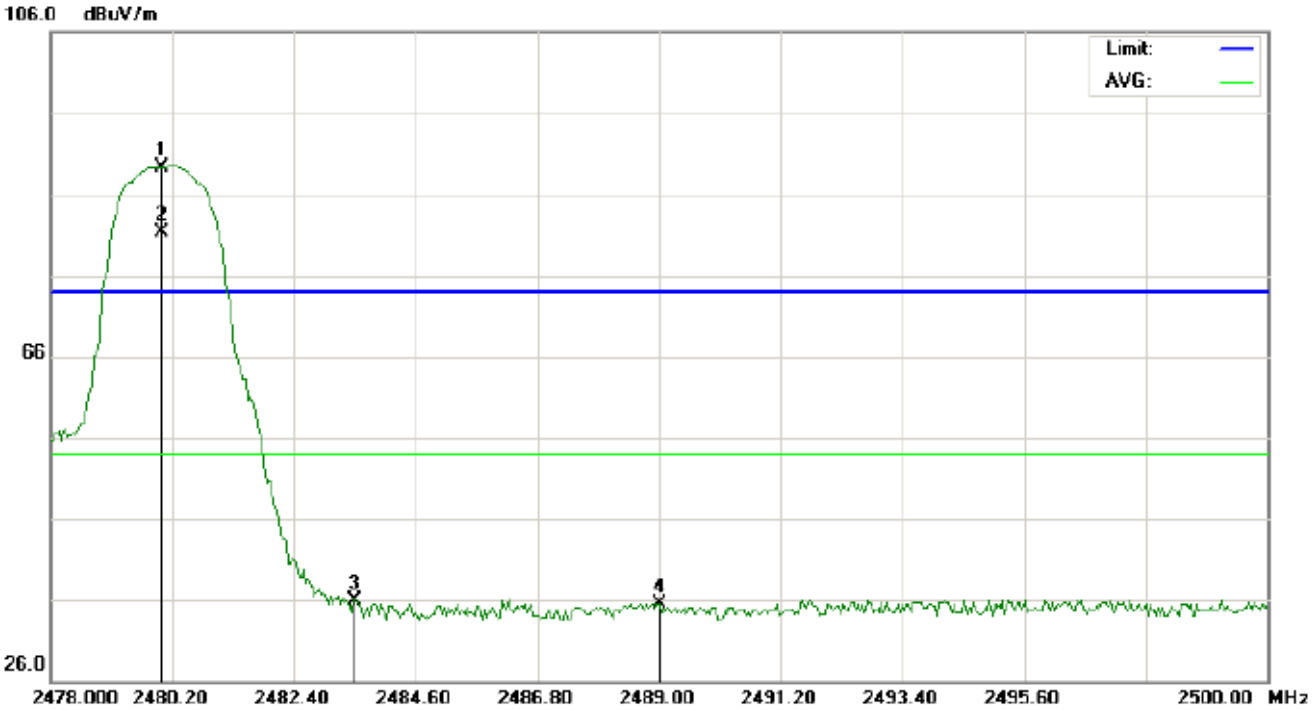
No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		2318.217	24.42	13.46	37.88	74.00	-36.12	peak			
2		2390.000	27.17	13.46	40.63	74.00	-33.37	peak			
3		2400.000	35.94	13.46	49.40	74.00	-24.60	peak			
4	X	2402.000	78.49	13.46	91.95	74.00	17.95	peak			
5	*	2402.000	70.49	13.46	83.95	54.00	29.95	AVG	100	333	

TEST PLOT OF BAND EDGE FOR HIGH CHANNEL -Horizontal



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
	.	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	X	2480.000	75.54	14.11	89.65	74.00	15.65	peak			
2	*	2480.000	67.63	14.11	81.74	54.00	27.74	AVG	100	71	
3		2483.500	25.16	14.13	39.29	74.00	-34.71	peak			
4		2488.927	25.32	14.16	39.48	74.00	-34.52	peak			

TEST PLOT OF BAND EDGE FOR HIGH CHANNEL-Vertical



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	X	2480.000	75.14	14.11	89.25	74.00	15.25	peak			
2	*	2480.000	67.14	14.11	81.25	54.00	27.25	AVG	100	331	
3		2483.500	21.72	14.13	35.85	74.00	-38.15	peak			
4		2489.000	21.42	14.16	35.58	74.00	-38.42	peak			

RESULT: PASS

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

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

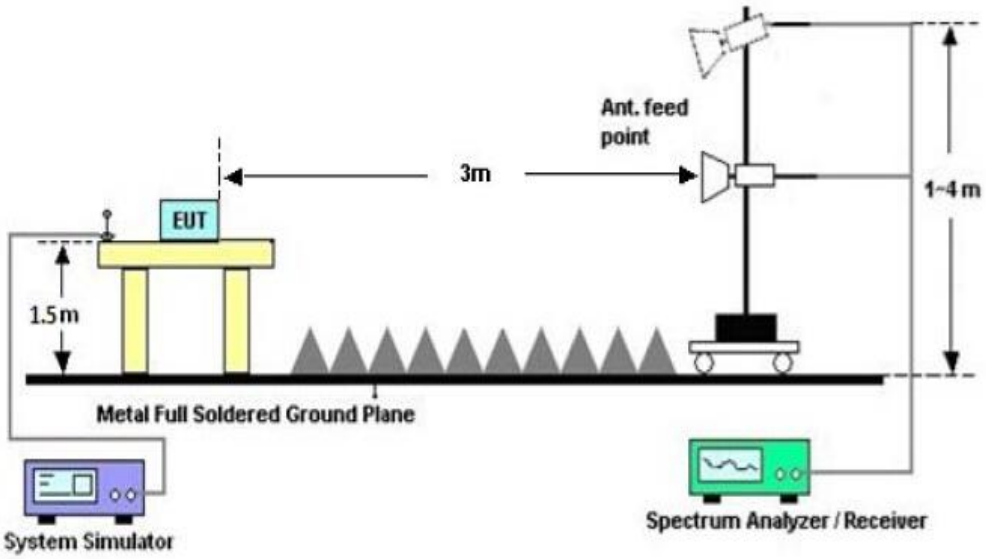
Hopping on mode and Hopping off mode have been tested, but only worst case reported.

6. OCCUPIED BANDWIDTH MEASUREMENT

6.1. MEASUREMENT PROCEDURE

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

6.2. TEST SET-UP

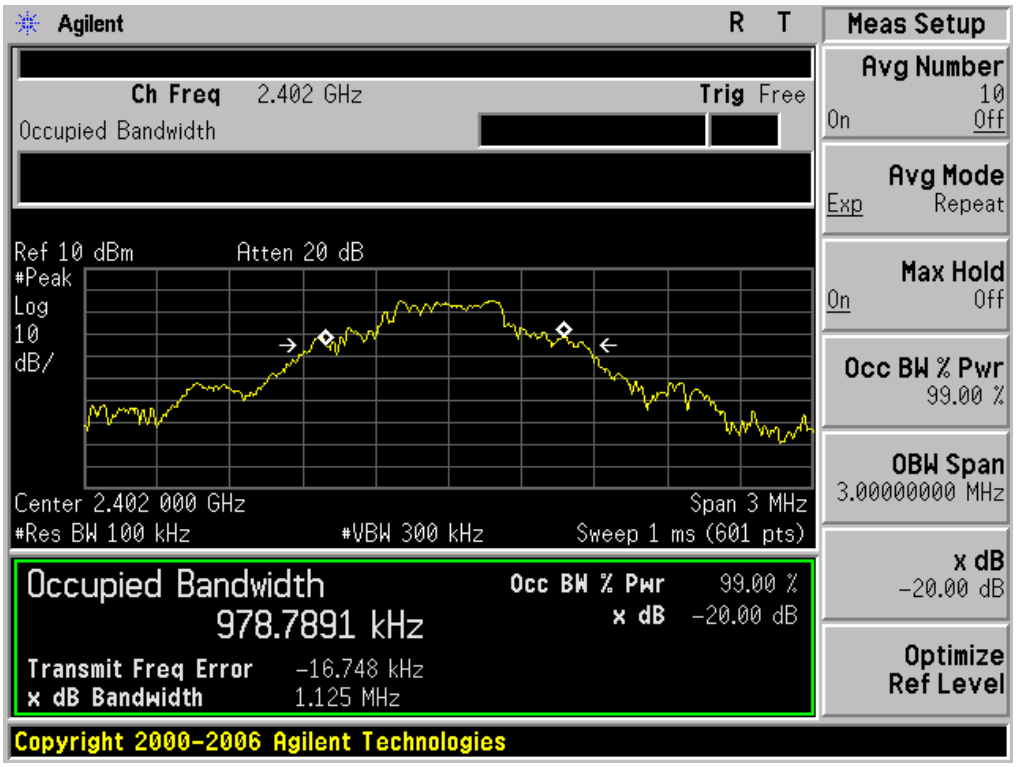


6.3. LIMITS AND MEASUREMENT RESULTS

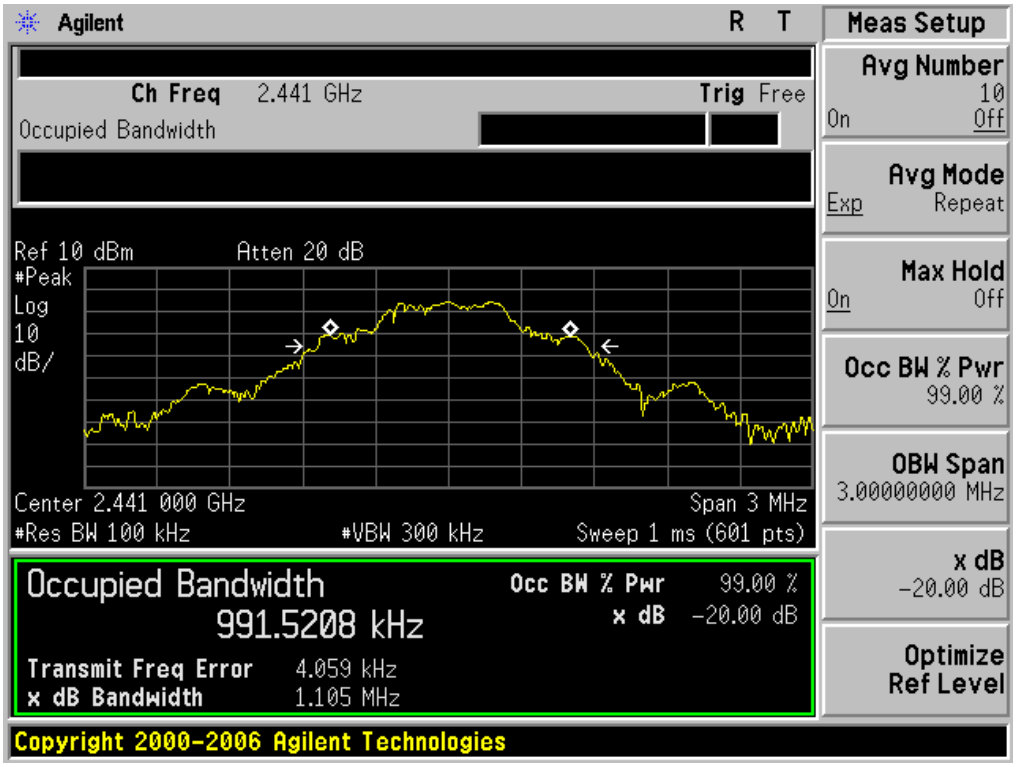
FOR BR

BLUETOOTH 1MBPS LIMITS AND MEASUREMENT RESULT				
Applicable Limits	Measurement Result			
	Test Data (MHz)			Result
		99%OBW (MHz)	-20dB BW(MHz)	
N/A	Low Channel	0.979	1.125	PASS
	Middle Channel	0.992	1.105	PASS
	High Channel	0.970	1.113	PASS

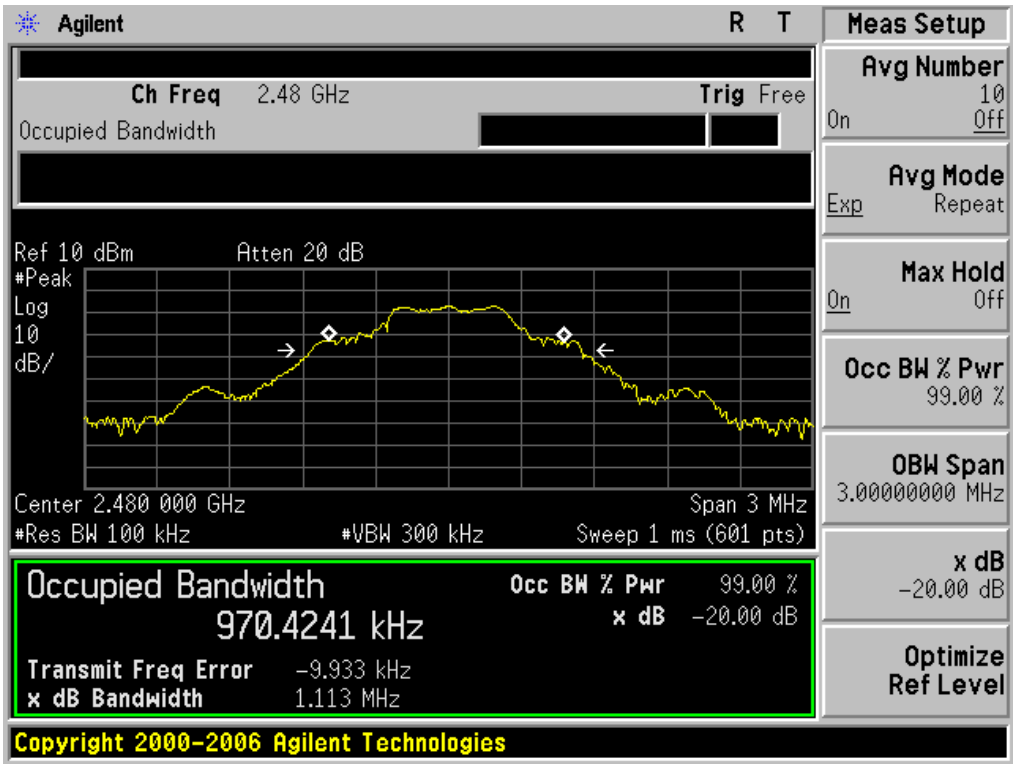
TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL

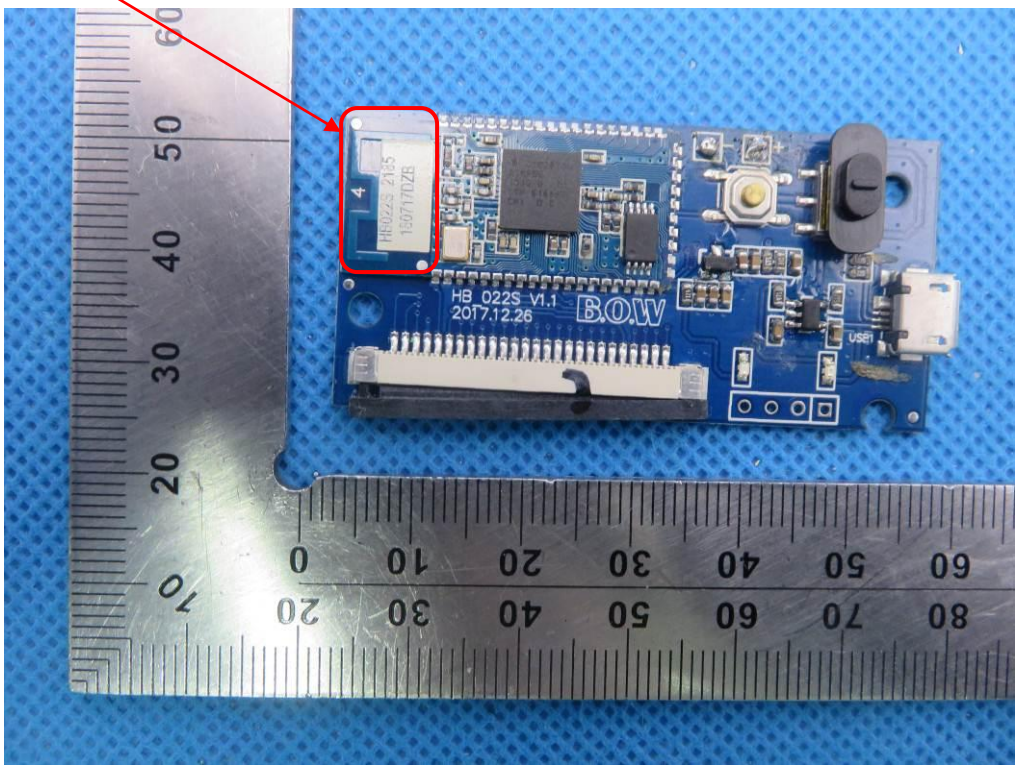


7. ANTENNA REQUIREMENT

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.

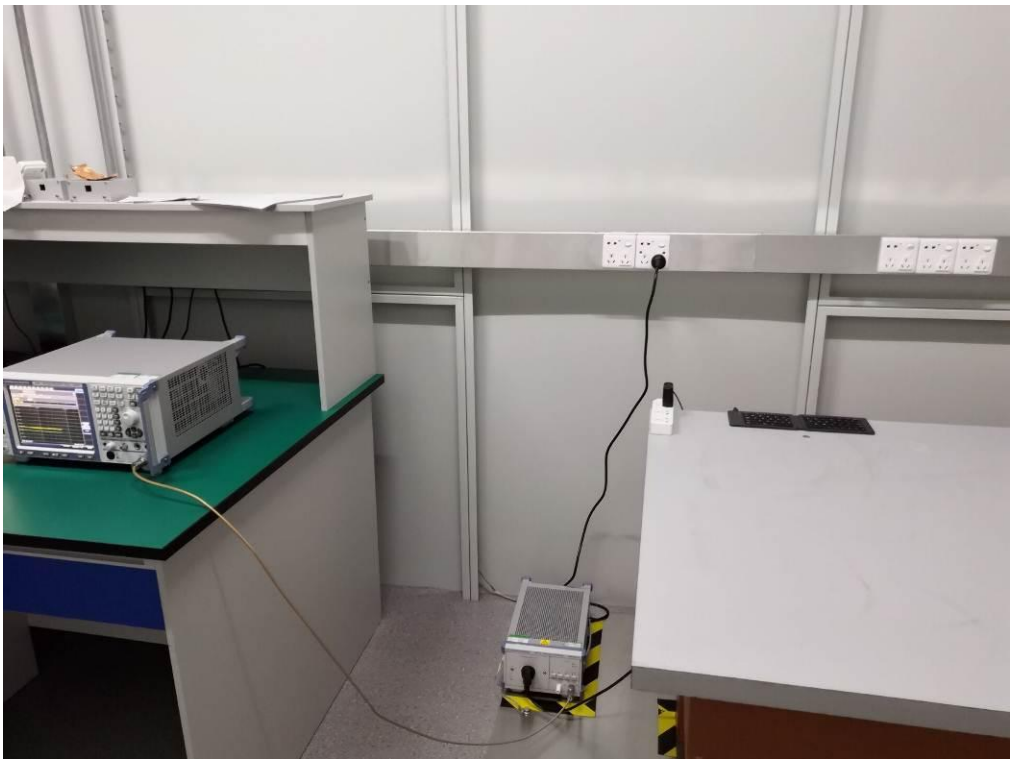
Refer to statement below for compliance.
The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed.

ANTENNA

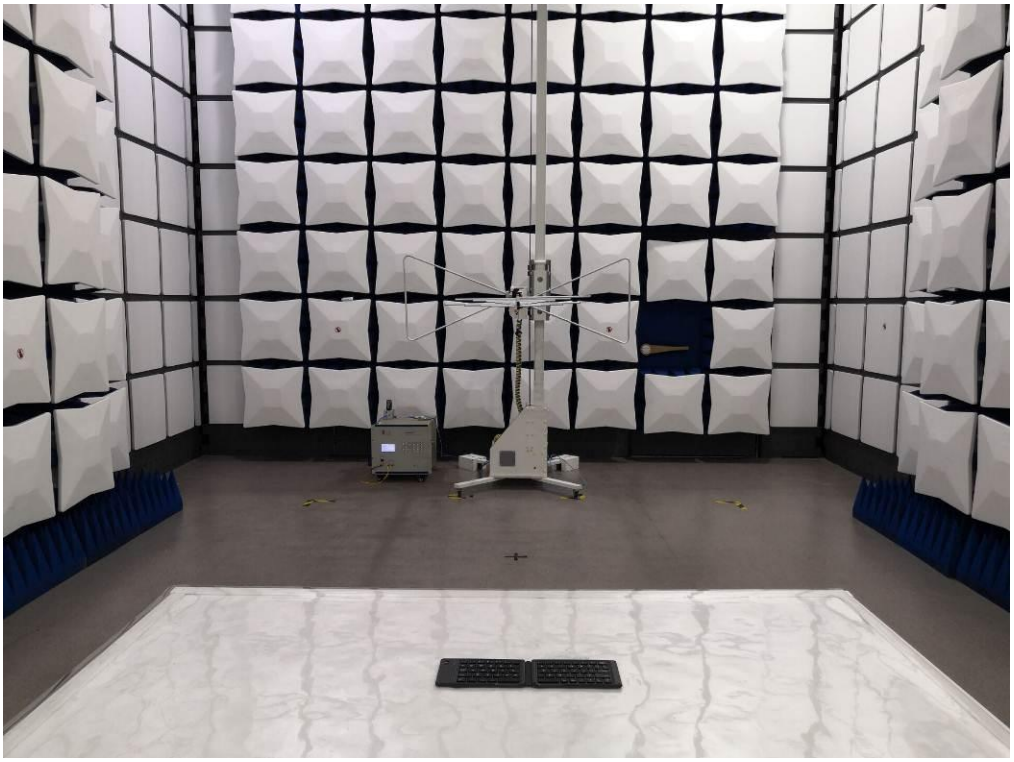


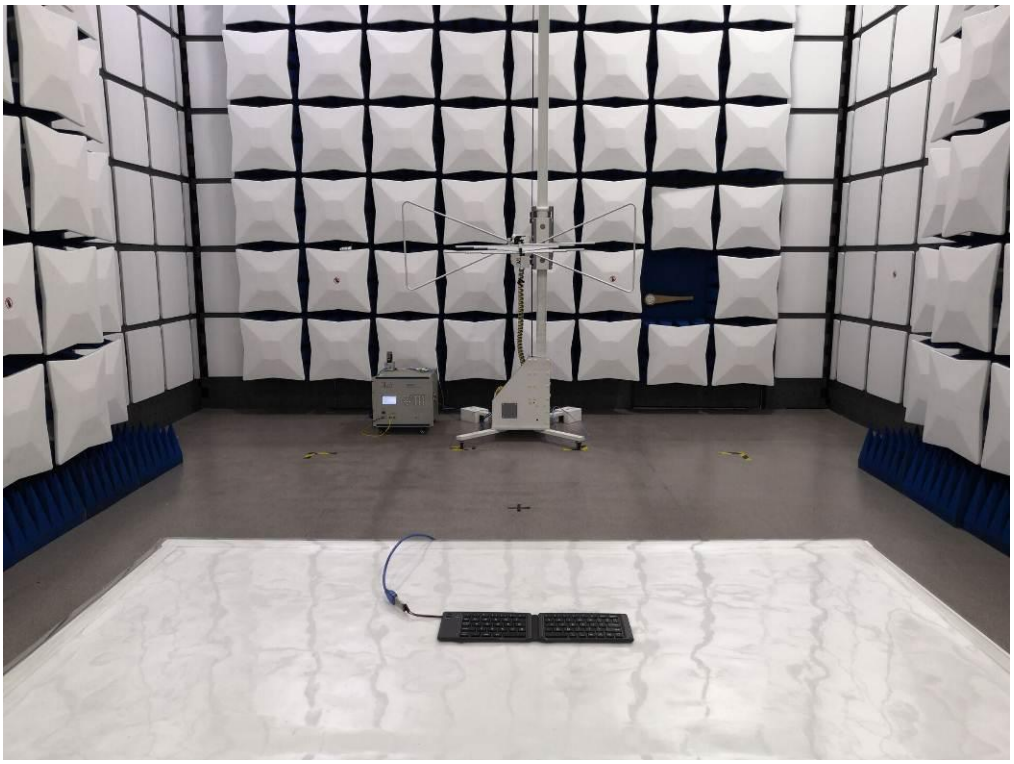
8. PHOTOGRAPH OF TEST

FCC LINE CONDUCTED EMISSION TEST SETUP



FCC RADIATED EMISSION TEST SETUP





9. PHOTOGRAPHS OF EUT

TOP VIEW OF EUT

BOTTOM VIEW OF EUT

FRONT VIEW OF EUT

BACK VIEW OF EUT

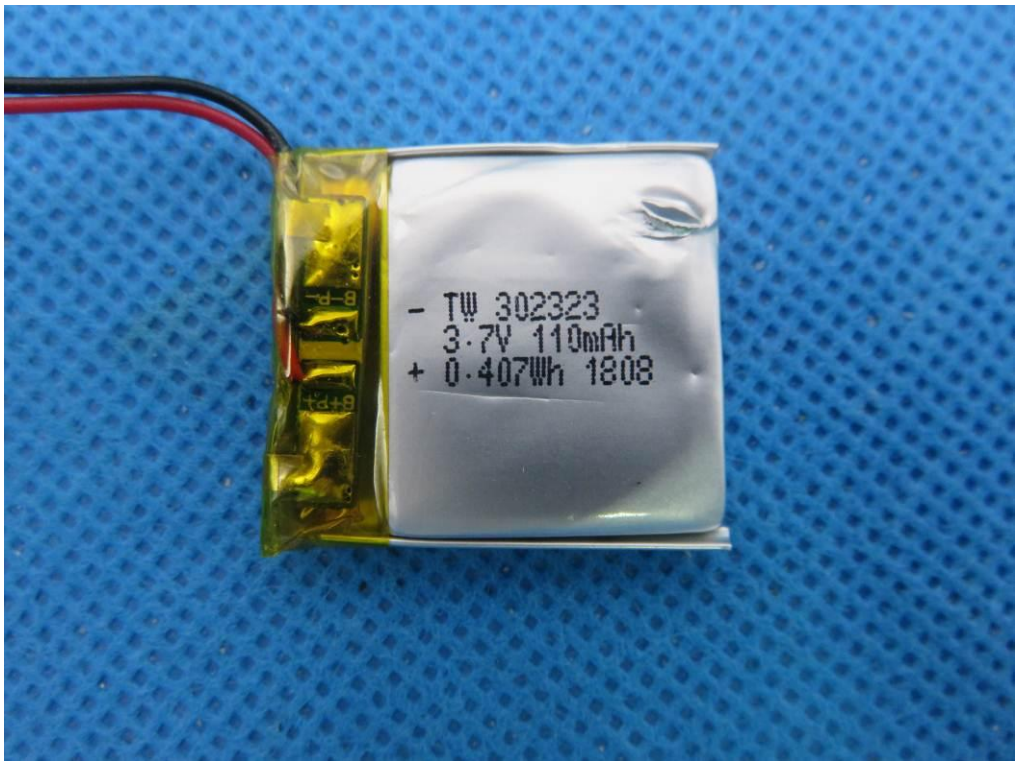
LEFT VIEW OF EUT

RIGHT VIEW OF EUT

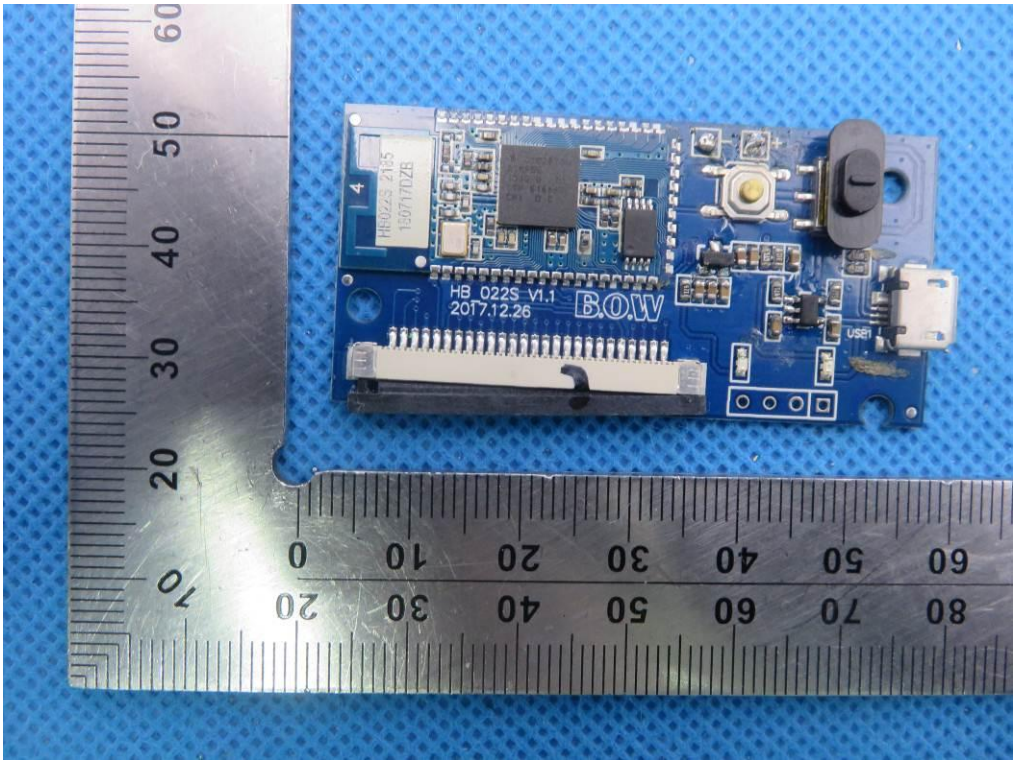
VIEW OF EUT (PORT)

OPEN VIEW OF EUT

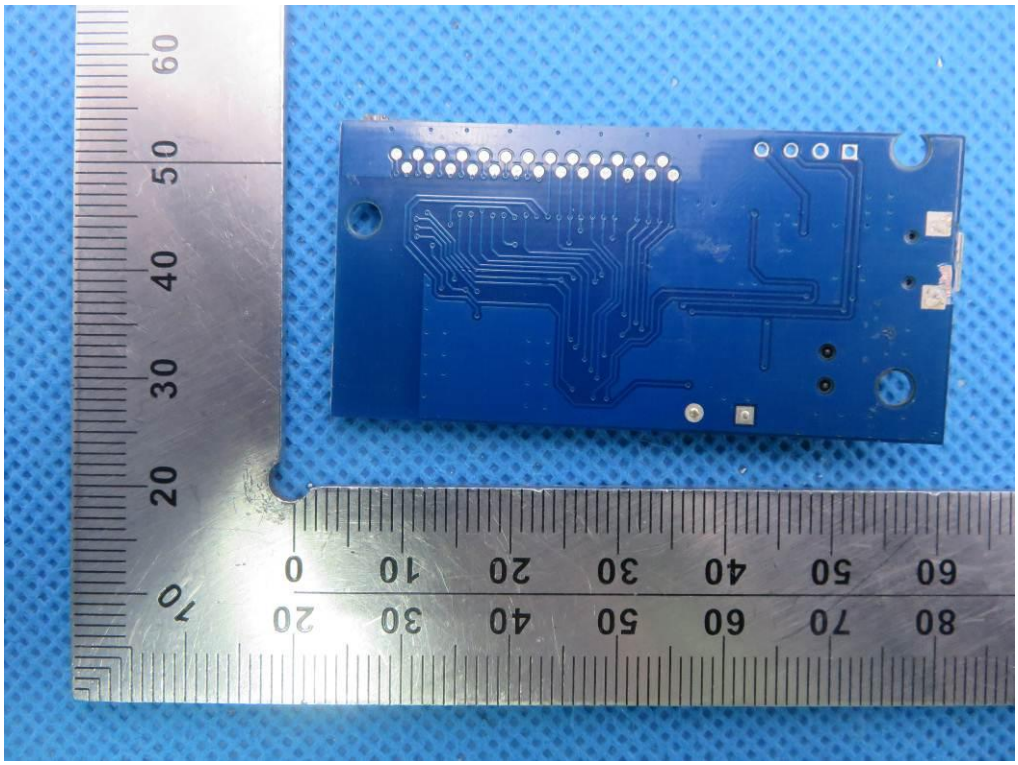
VIEW OF BATTERY



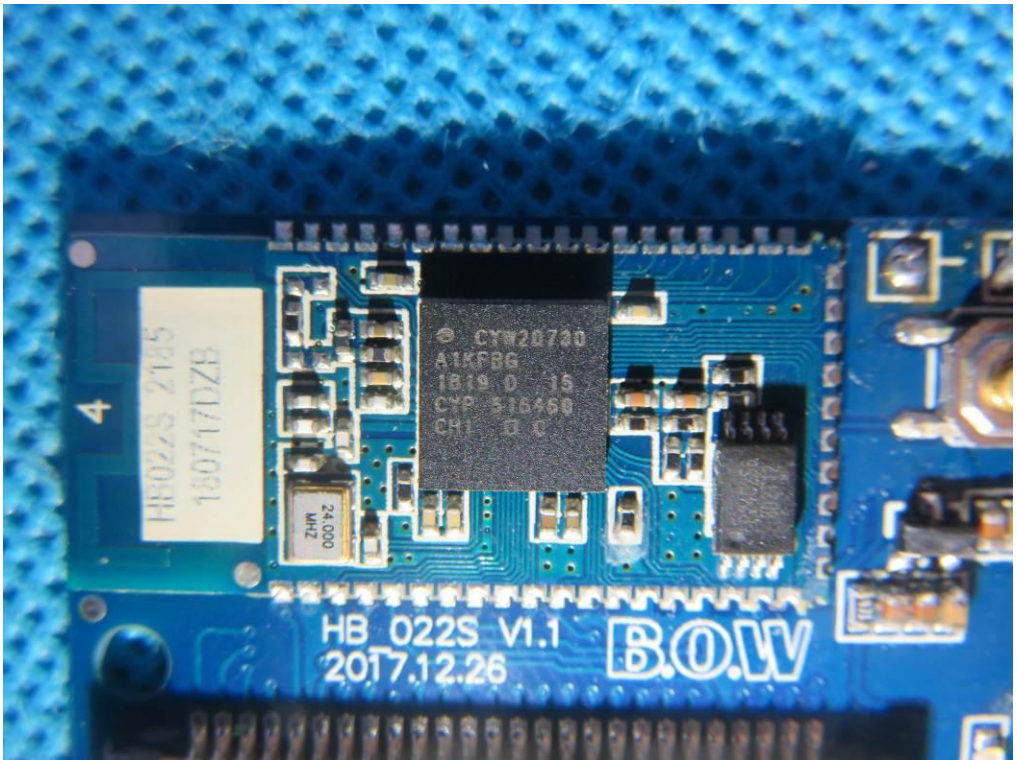
INTERNAL VIEW OF EUT-1



INTERNAL VIEW OF EUT-2



INTERNAL VIEW OF EUT-3



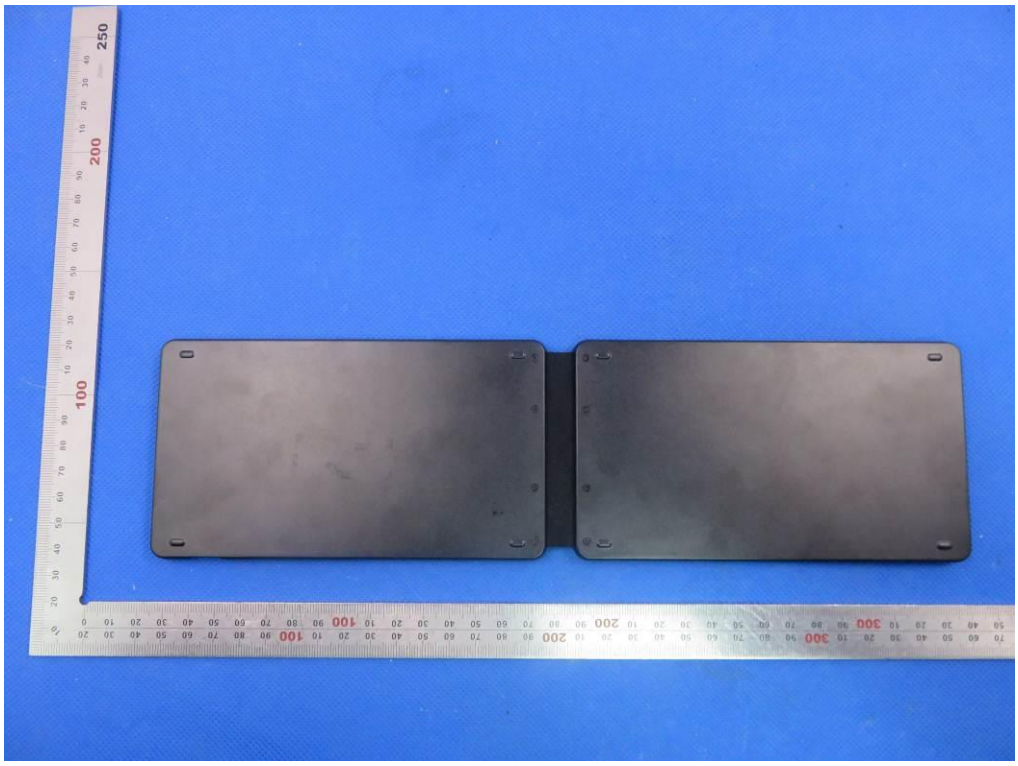
VIEW OF ADAPTER (AE)

The adapter was supplied by HUAK

Series Model--400-SKB061

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)

----END OF REPORT----