



TEST REPORT

FCC Rules and Regulations Part 15 Subpart C Section 15.247

ANSI C63.10: 2013

RSS-GEN: Issue 5

RSS-247: Issue 2

Test report

On Behalf of

Alpine Electronics of America Inc

For

DSP Subwoofer with built-in 4-Channel Amplifier

Model No.: BT-001

FCC ID: DVU-PWD-X5

IC: 700A-PWDX5

Prepared for : **Alpine Electronics of America Inc**

19145 Gramercy Place, Torrance, California 90501, United States

Prepared By : **Shenzhen HUAKE Testing Technology Co., Ltd.**

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

Date of Test: **Oct. 26, 2018 ~ Nov. 06,, 2018**

Date of Report: **Nov. 08, 2018**

Report Number: **HK1811061479E**



TEST RESULT CERTIFICATION

Applicant's name : Alpine Electronics of America Inc
Address..... : 19145 Gramercy Place, Torrance, California 90501, United States
Manufacture's Name..... : ALPINE ELECTRONICS (CHINA) CO.,LTD.
Address..... : 28F, East Tower, Hanwei Plaza, No.7 Guanghua Road, Chaoyang District Beijing, China

Product description

Trade Mark: ALPINE
Product Name..... : DSP Subwoofer with built-in 4-Channel Amplifier
Model and/or type reference... : BT-001
FCC Rules and Regulations Part 15 Subpart C Section 15.247
Standards..... : ANSI C63.10: 2013
RSS-GEN: Issue 5
RSS-247: Issue 2

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Date of Test..... :
Date (s) of performance of tests..... : Oct. 26, 2018 ~ Nov. 06,, 2018
Date of Issue..... : Nov. 08, 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
Antenna Requirement	Compliant
Radiated Emission	Compliant
Band Edges	Compliant
6 dB Bandwidth	Compliant
Conducted Output Power	Compliant
Conducted Spurious Emission	Compliant
Conducted Power Spectral Density	Compliant
Line Conduction Emission	N/A

Note: N/A means it's not applicable to this item.

1.2. TEST FACILITY

1.2.1 Address of the test laboratory

Shenzhen HUAKE Testing Technology Co., Ltd.

Add.:1F, B2 Building, Junfeng Zhongcheng Zhizao Innovation Park,Heping Community, Fuhai Street, Bao'an District, Shenzhen, China

There is one 3m semi-anechoic chamber and two line conducted labs for final test. The Test Sites meet the requirements in documents ANSI C63.4 and CISPR 32/EN 55032 requirements.

1.2.2 Laboratory accreditation

The test facility is recognized, certified, or accredited by the following organizations:

IC Registration No.: 21210

The 3m alternate test site of Shenzhen HUAKE Testing Technology Co., Ltd. EMC Laboratory has been registered by Certification and Engineer Bureau of Industry Canada for the performance of with Registration No.: 21210 on May 24, 2016.

FCC Registration No.: 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
RF Output Power	4.12dBm(Max)
Bluetooth Version	V4.2
Modulation	BR ☐ GFSK, EDR ☐ π /4-DQPSK, ☐ 8DPSK BLE ☒ GFSK
Number of channels	40 for BLE
Hardware Version	V1.01
Software Version	V1.08
Antenna Designation	Ceramic Antenna
Antenna Gain	0dBi
Power Supply	DC 5V by 4.1 Channel DSP Subwoofer



2.2. CARRIER FREQUENCY OF CHANNELS

BLE Channel List

Frequency Band	Channel Number	Frequency
2400~2483.5MHz	0	2402MHz
	1	2404MHz
	:	:
	38	2478 MHz
	39	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(Hopping mode)

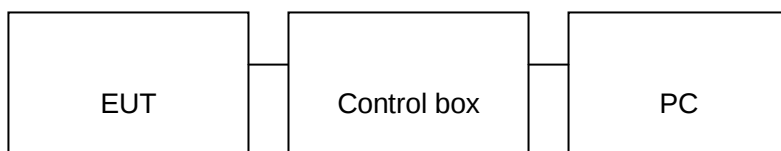


2.4. DESCRIPTION OF TEST SETUP

Configure 1: (Normal hopping)



Configure 2: (Control continuous TX)



2.5. EQUIPMENT USED IN EUT SYSTEM

Item	Equipment	Mfr/Brand	Model/Type No.	Remark
1	DSP Subwoofer with built-in 4-Channel Amplifier	ALPINE	BT-001	EUT
2	4.1 Channel DSP	ALPINE	BT-001	Accessory
3	USB Cable	N/A	4.8m unshielded	Accessory
4	AUX in Cable	N/A	1m unshielded	A.E
5	PC	APPLE	A1465	A.E
6	Control box	CSR	USB_SPI_TOOLS	A.E
7	USB Cable	N/A	1m unshielded	A.E
8	Mobile Phone	Huawei	V8	A.E
9	Speaker	My music	B61	A.E
10	Battery	SAIL	12V 60Ah 356A	A.E
11	Temporary Antenna Connector	T10	N/A	A.E

Note: The temporary antenna connector is a RF SMA connector with fifty ohm resistor, which is welded to the PCB board or module.

**2.6. MEASUREMENT INSTRUMENTS LIST****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	Schwarzbeck	9120D	HKE-013	Dec. 28, 2017	1 Year
7.	Broad-band Horn Antenna	A-INFOMW	LB-180400-K F	HKE-031	Dec. 28, 2017	1 Year
8.	Pre-amplifier	EMCI	EMC051845S E	HKE-015	Dec. 28, 2017	1 Year
9.	Pre-amplifier	Agilent	83051A	HKE-016	Dec. 28, 2017	1 Year
10.	Radiation Cable 1	MXT	HK1	R05	N/A	N/A
11.	Radiation Cable 2	MXT	HK1	R06	N/A	N/A



3. ANTENNA REQUIREMENT

3.1. STANDARD APPLICABLE

According to FCC 15.203, An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. 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. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sections 15.211, 15.213, 15.217, 15.219, or 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with Section 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this Part are not exceeded.

3.2. TEST RESULT

This product has a ceramic antenna, fulfill the requirement of this section.



4. RADIATED EMISSION

4.1 LIMITS

Frequency (MHz)	Distance Meters	Field Strengths Limit	
		$\mu\text{V/m}$	$\text{dB}(\mu\text{V})/\text{m}$
0.009 ~ 0.490	300	$2400/F(\text{kHz})$	---
0.490 ~ 1.705	30	$24000/F(\text{kHz})$	---
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 $\text{dB}(\mu\text{V})/\text{m}$ (Peak) 54.0 $\text{dB}(\mu\text{V})/\text{m}$ (Average)	

Remark : (1) Emission level $\text{dB } \mu\text{V} = 20 \log \text{ Emission level } \mu\text{V/m}$
(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.

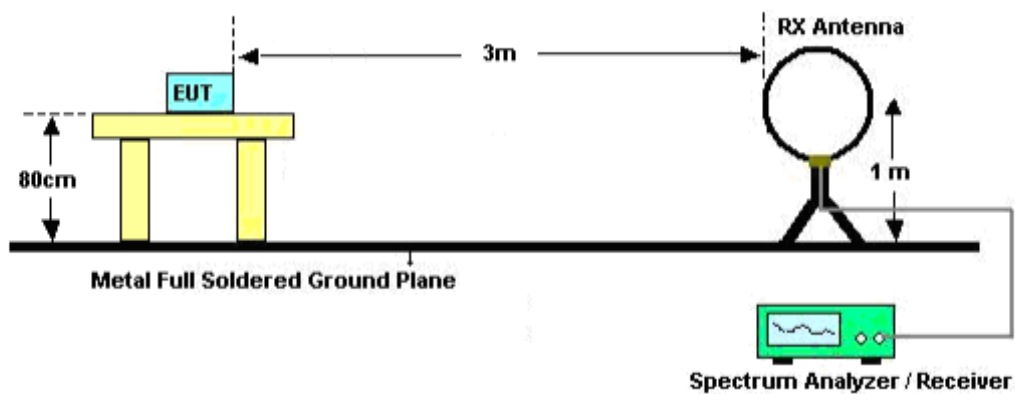
4.2 MEASUREMENT PROCEDURE

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 be 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)

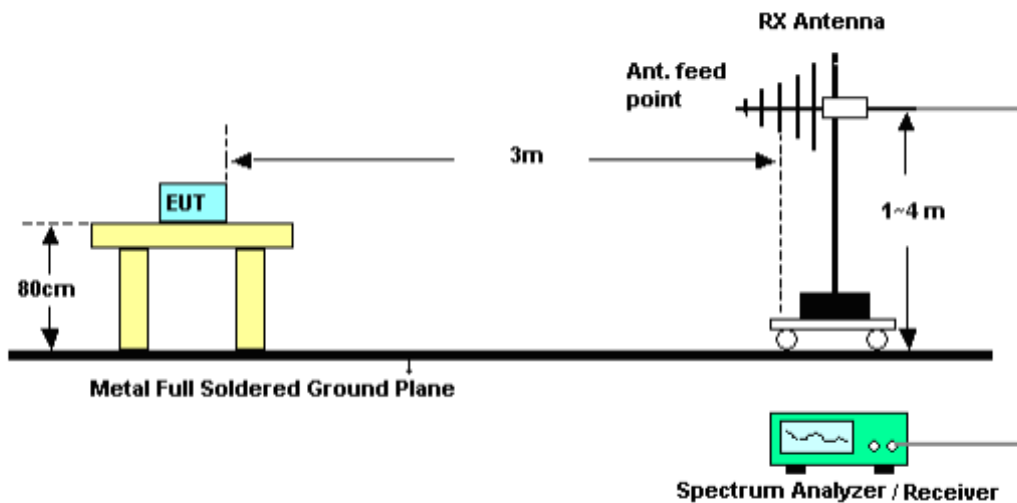


4.3 TEST SETUP

RADIATED EMISSION TEST SETUP BELOW 30MHz

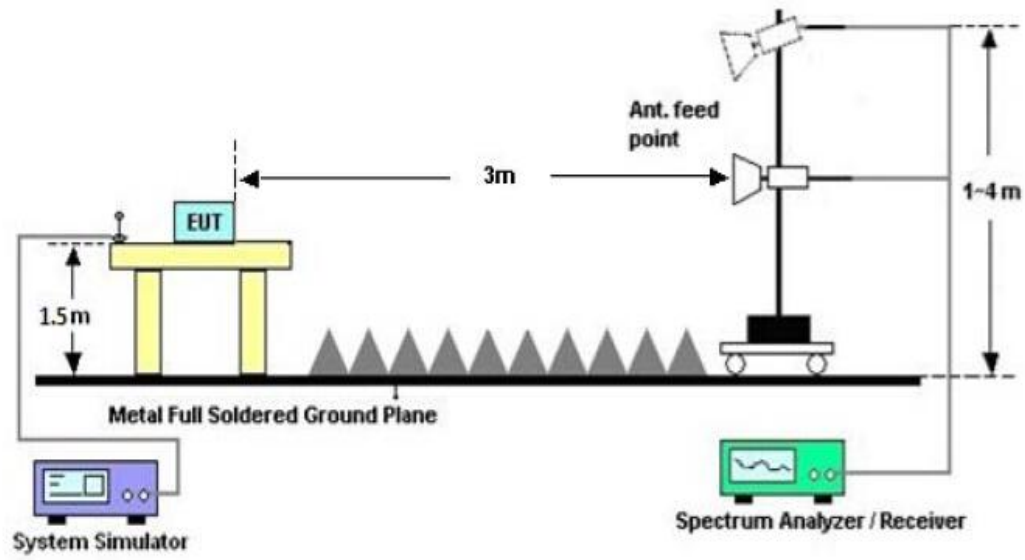


RADIATED EMISSION TEST SETUP 30MHz-1000MHz





RADIATED EMISSION TEST SETUP ABOVE 1000MHz





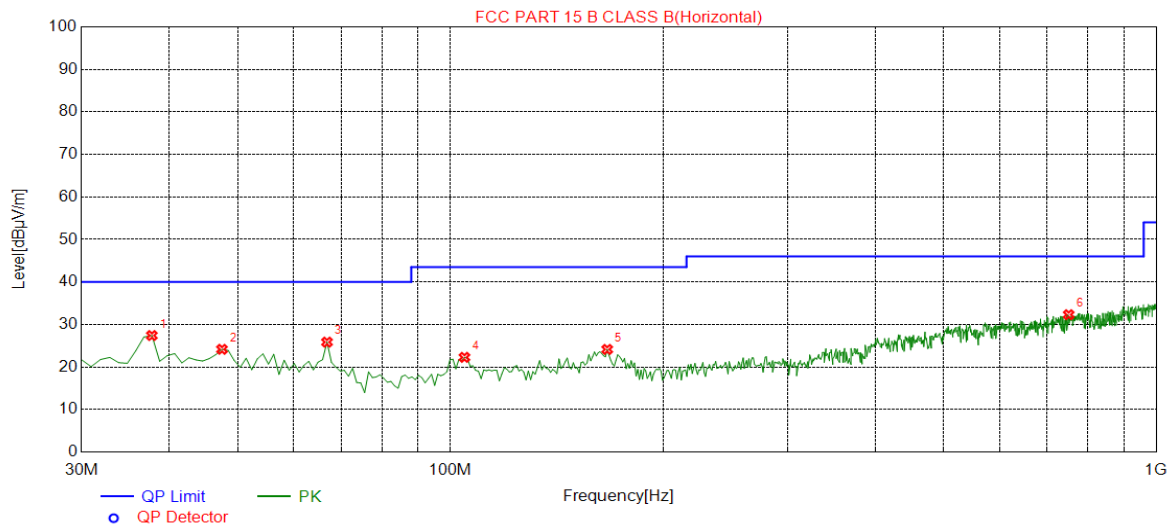
4.4 TEST RESULT

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



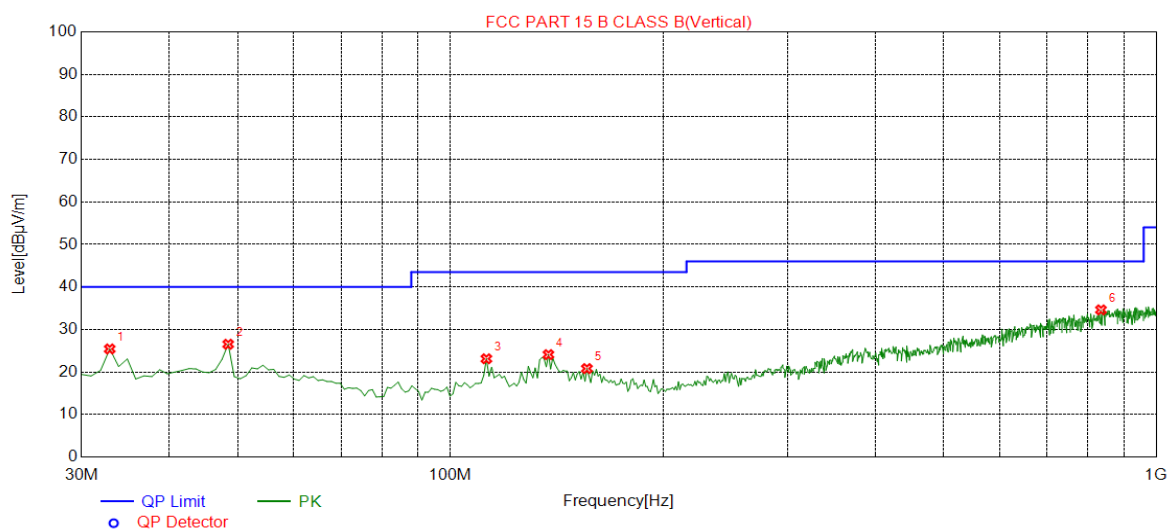
Suspected Data List

NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	37.7600	27.40	14.11	40.00	12.60	200	360	Horizontal
2	47.4600	24.16	14.42	40.00	15.84	150	10	Horizontal
3	66.8600	25.85	12.37	40.00	14.15	200	140	Horizontal
4	104.690	22.27	11.34	43.50	21.23	100	10	Horizontal
5	166.770	24.14	13.59	43.50	19.36	150	350	Horizontal
6	751.680	32.30	25.64	46.00	13.70	200	280	Horizontal

RESULT: PASS



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



Suspected Data List

NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	32.9100	25.42	13.10	40.00	14.58	100	10	Vertical
2	48.4300	26.53	14.39	40.00	13.47	150	350	Vertical
3	112.450	23.11	12.13	43.50	20.39	150	260	Vertical
4	137.670	24.09	14.08	43.50	19.41	100	10	Vertical
5	156.100	20.80	14.26	43.50	22.70	200	220	Vertical
6	835.100	34.61	27.32	46.00	11.39	100	260	Vertical

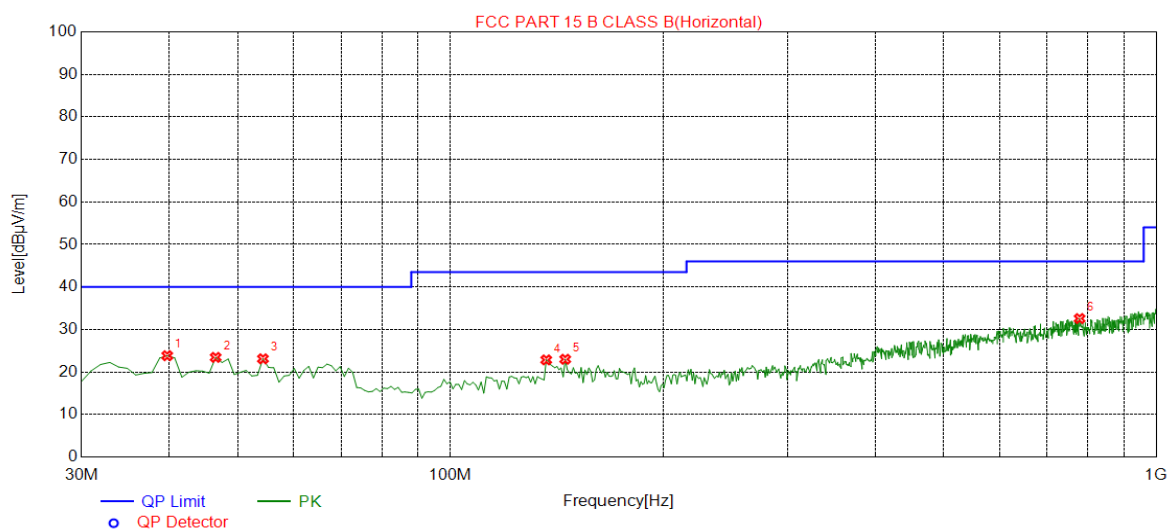
RESULT: PASS

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



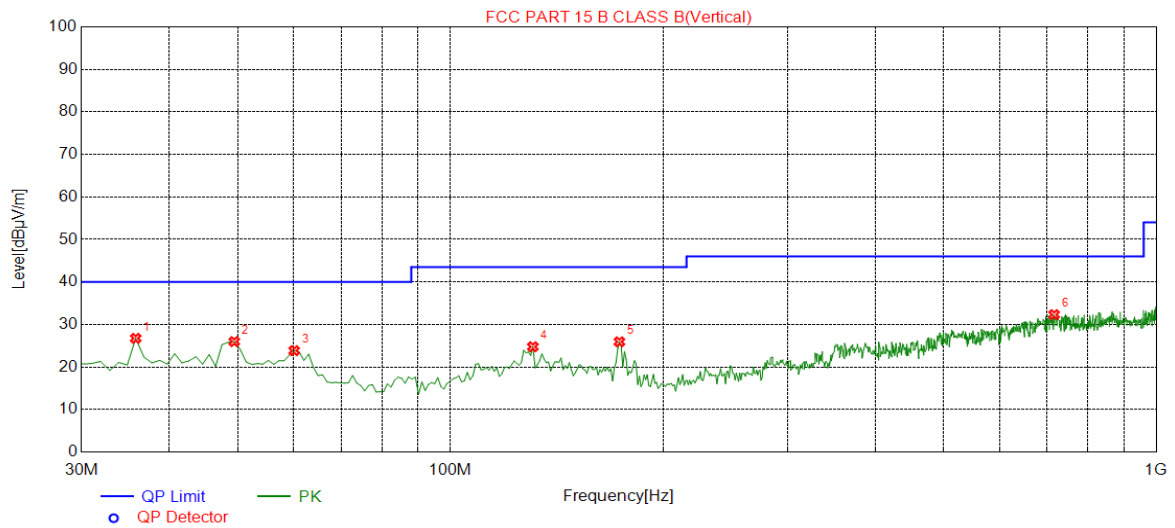
Suspected Data List

NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	39.7000	23.83	14.57	40.00	16.17	150	300	Horizontal
2	46.4900	23.44	14.45	40.00	16.56	100	340	Horizontal
3	54.2500	23.10	14.00	40.00	16.90	150	200	Horizontal
4	136.700	22.85	14.02	43.50	20.65	150	40	Horizontal
5	145.430	23.00	14.25	43.50	20.50	200	190	Horizontal
6	778.840	32.57	26.29	46.00	13.43	200	10	Horizontal

RESULT: PASS



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



Suspected Data List

NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	35.8200	26.74	13.66	40.00	13.26	200	60	Vertical
2	49.4000	25.98	14.36	40.00	14.02	100	10	Vertical
3	60.0700	23.84	13.53	40.00	16.16	150	150	Vertical
4	130.880	24.76	13.63	43.50	18.74	200	310	Vertical
5	173.560	25.93	12.92	43.50	17.57	150	350	Vertical
6	716.760	32.32	24.84	46.00	13.68	200	100	Vertical

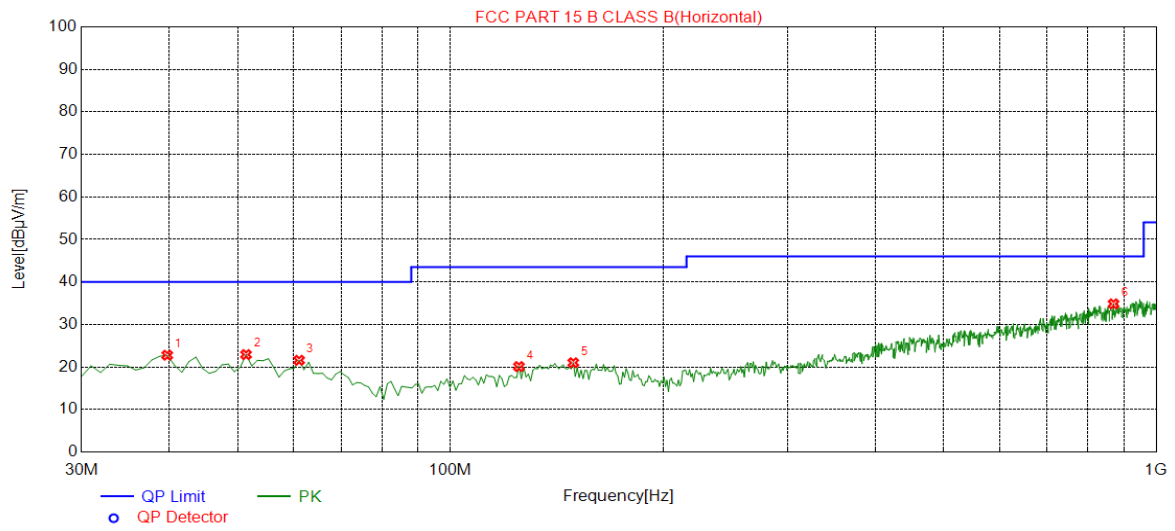
RESULT: PASS

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

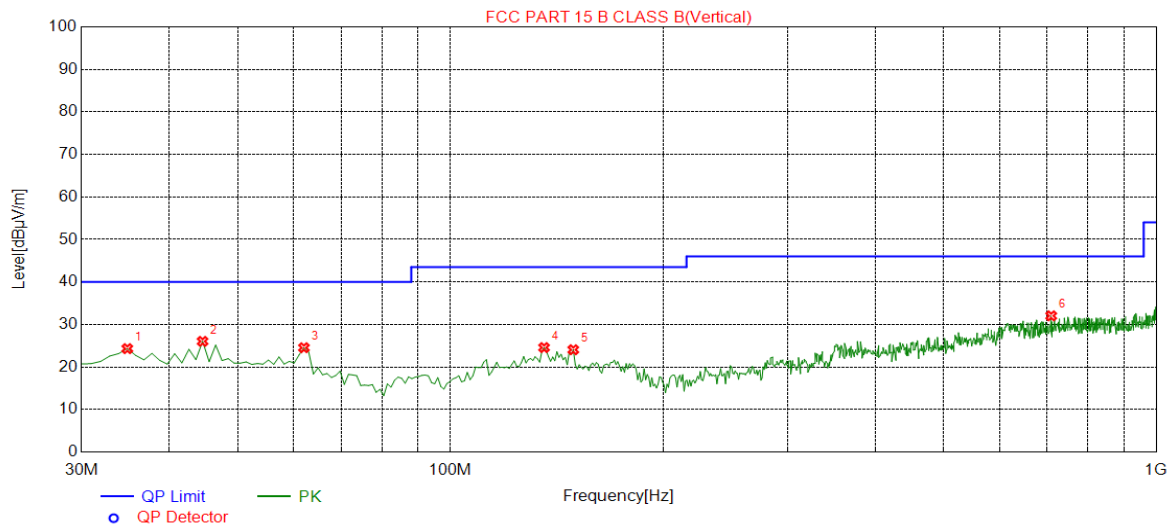


Suspected Data List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	39.7000	22.77	14.57	40.00	17.23	150	300	Horizontal
2	51.3400	22.92	14.23	40.00	17.08	100	290	Horizontal
3	61.0400	21.58	13.36	40.00	18.42	100	140	Horizontal
4	125.060	20.10	13.24	43.50	23.40	150	100	Horizontal
5	149.310	21.00	14.25	43.50	22.50	150	180	Horizontal
6	870.020	34.85	27.84	46.00	11.15	100	320	Horizontal

RESULT: PASS



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

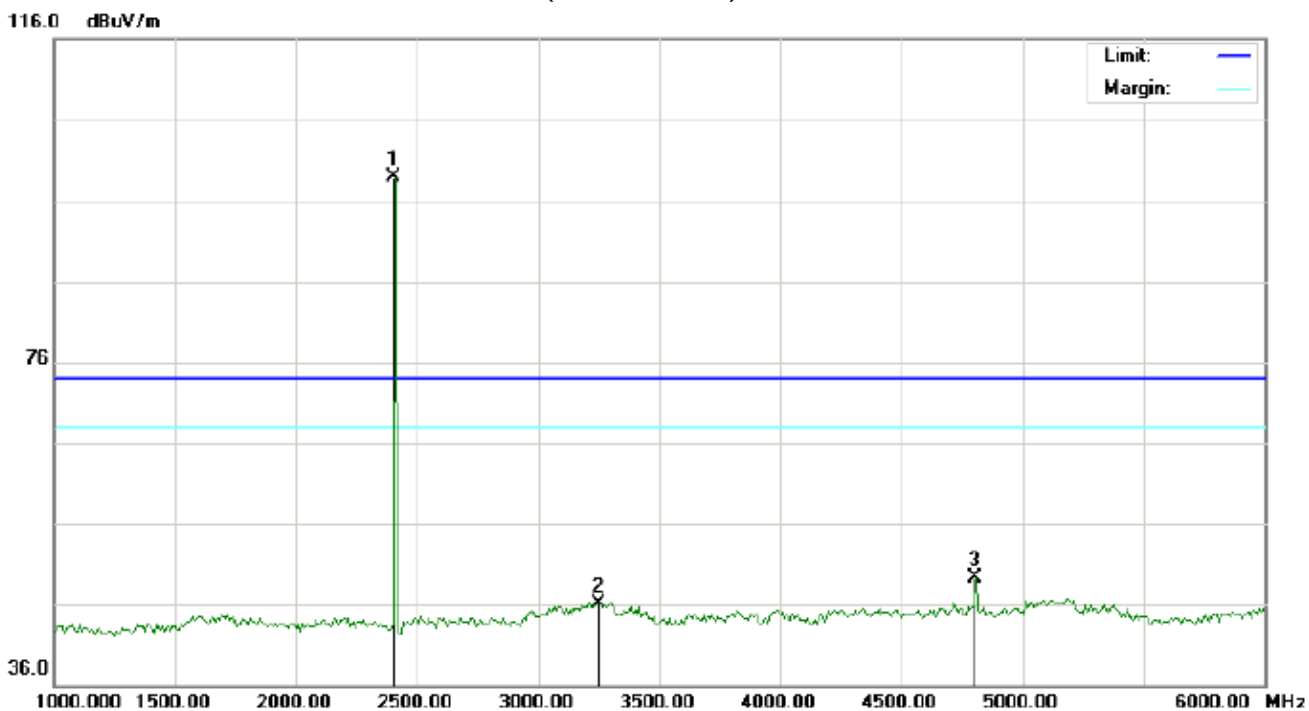


Suspected Data List

NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	34.8500	24.32	13.44	40.00	15.68	150	220	Vertical
2	44.5500	26.03	14.50	40.00	13.97	100	330	Vertical
3	62.0100	24.53	13.20	40.00	15.47	200	200	Vertical
4	135.730	24.57	13.95	43.50	18.93	100	10	Vertical
5	149.310	24.06	14.25	43.50	19.44	150	0	Vertical
6	709.970	32.03	24.67	46.00	13.97	150	280	Vertical

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.

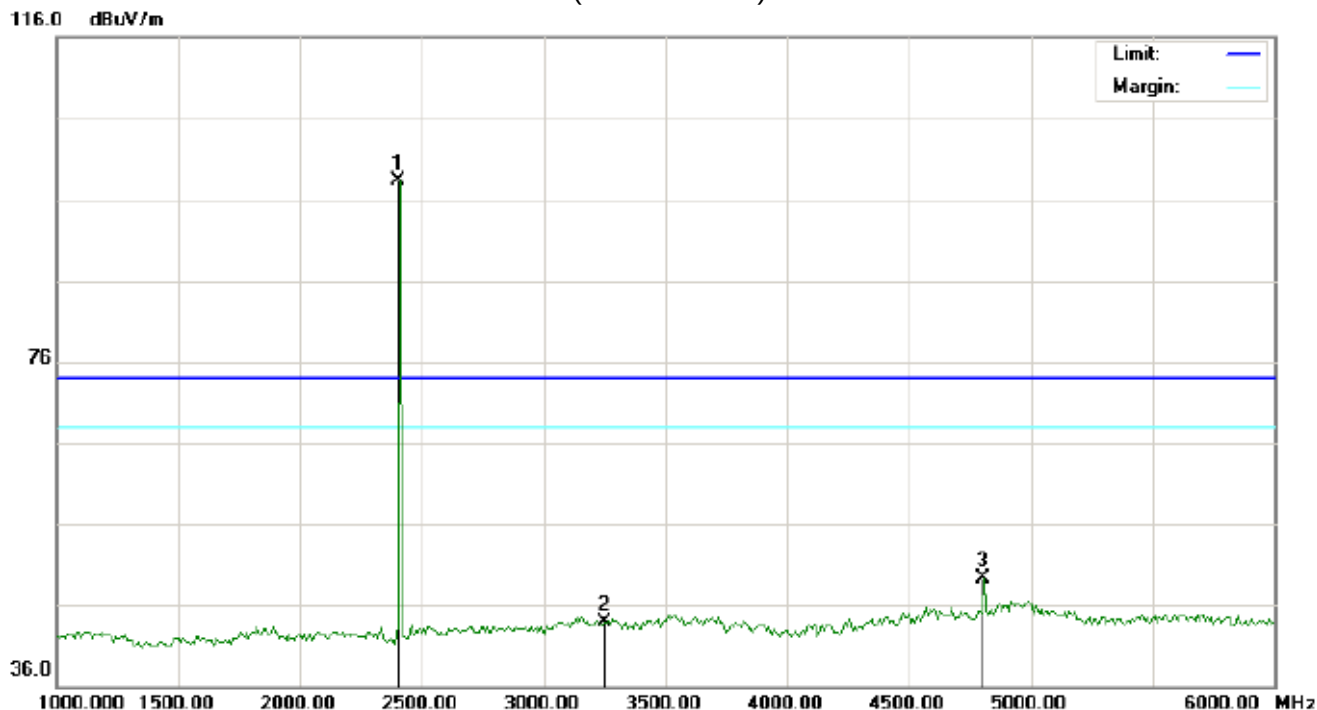
**RADIATED EMISSION ABOVE 1GHz****RADIATED EMISSION TEST- (ABOVE 1GHz)-LOW CHANNEL-HORIZONTAL**

No.	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	*	2402.000	88.49	10.32	98.81	74.00	24.81	peak			
2		3251.000	34.21	11.88	46.09	74.00	-27.91	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	*	2402.000	88.01	10.32	98.33	74.00	24.33	peak			
2		3251.000	32.06	11.88	43.94	74.00	-30.06	peak			
3		4804.000	41.55	7.69	49.24	74.00	-24.76	peak			

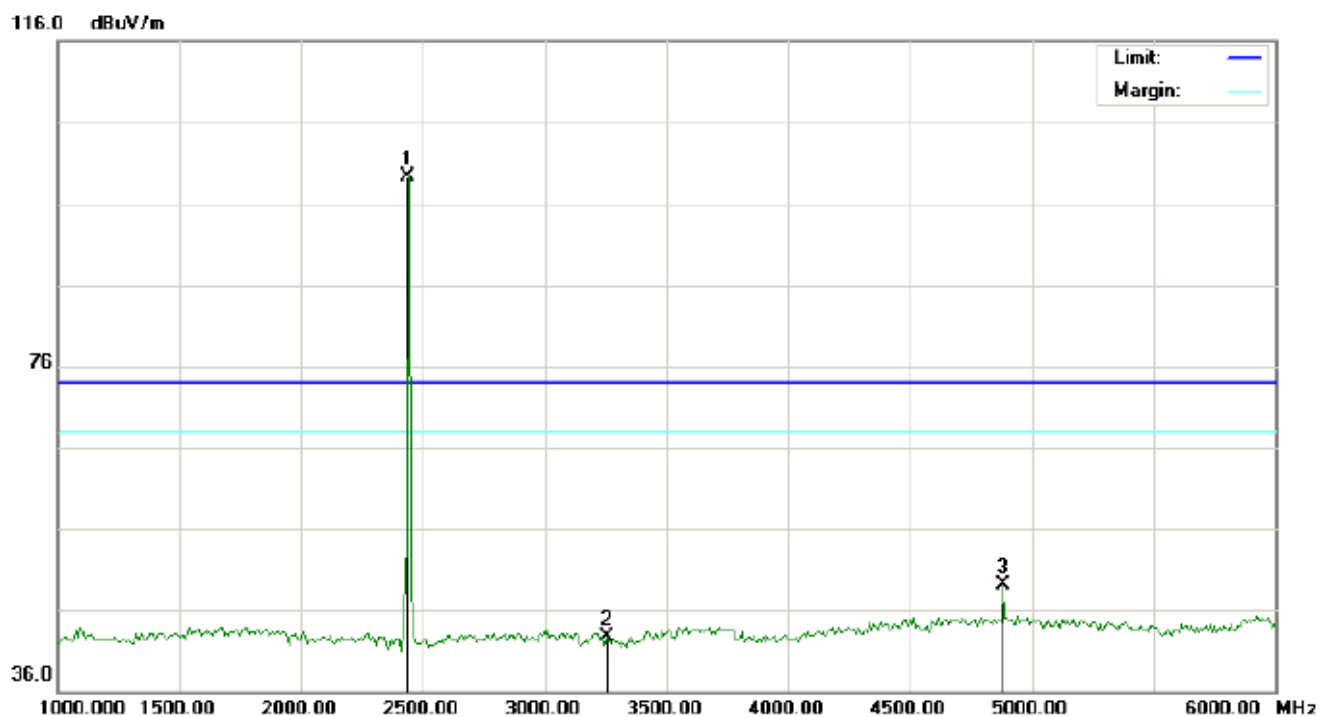
RESULT: PASS

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-(ABOVE 1GHz)-MIDDLE CHANNEL-HORIZONTAL

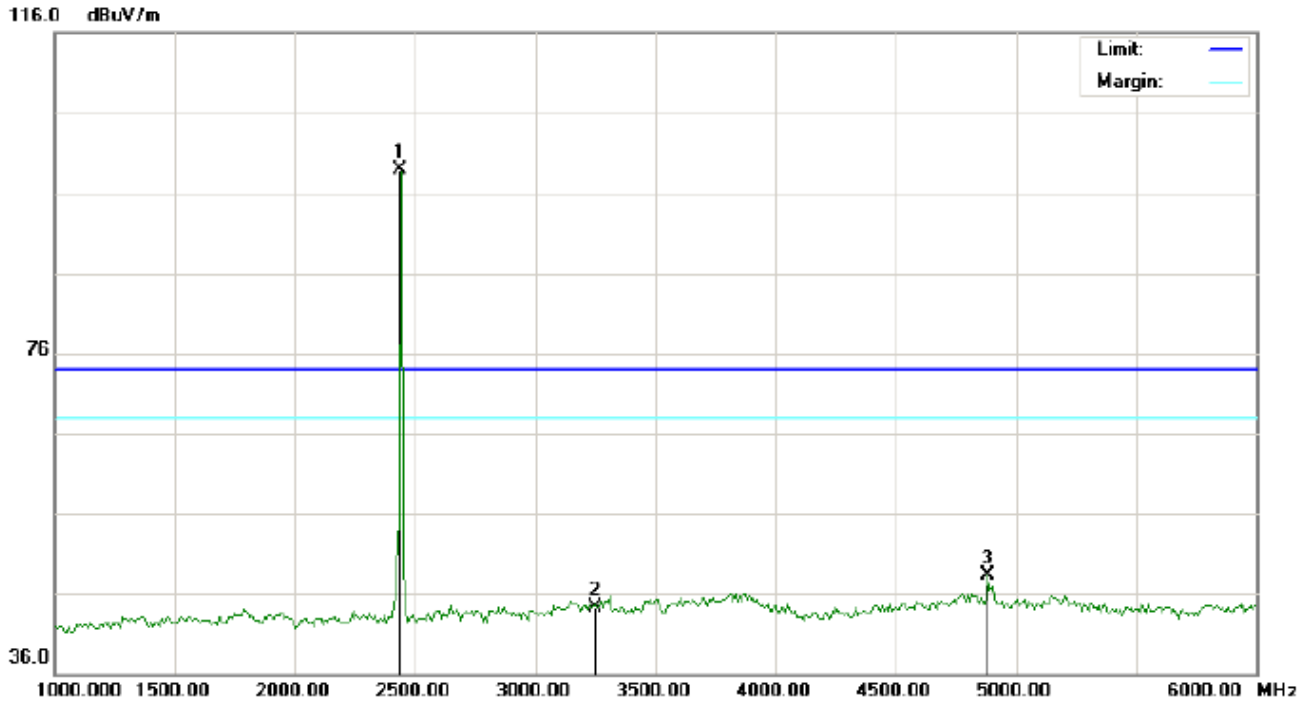


No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	*	2440.000	88.99	10.36	99.35	74.00	25.35	peak			
2		3256.000	30.73	11.88	42.61	74.00	-31.39	peak			
3		4880.000	41.16	7.89	49.05	74.00	-24.95	peak			

RESULT: PASS



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



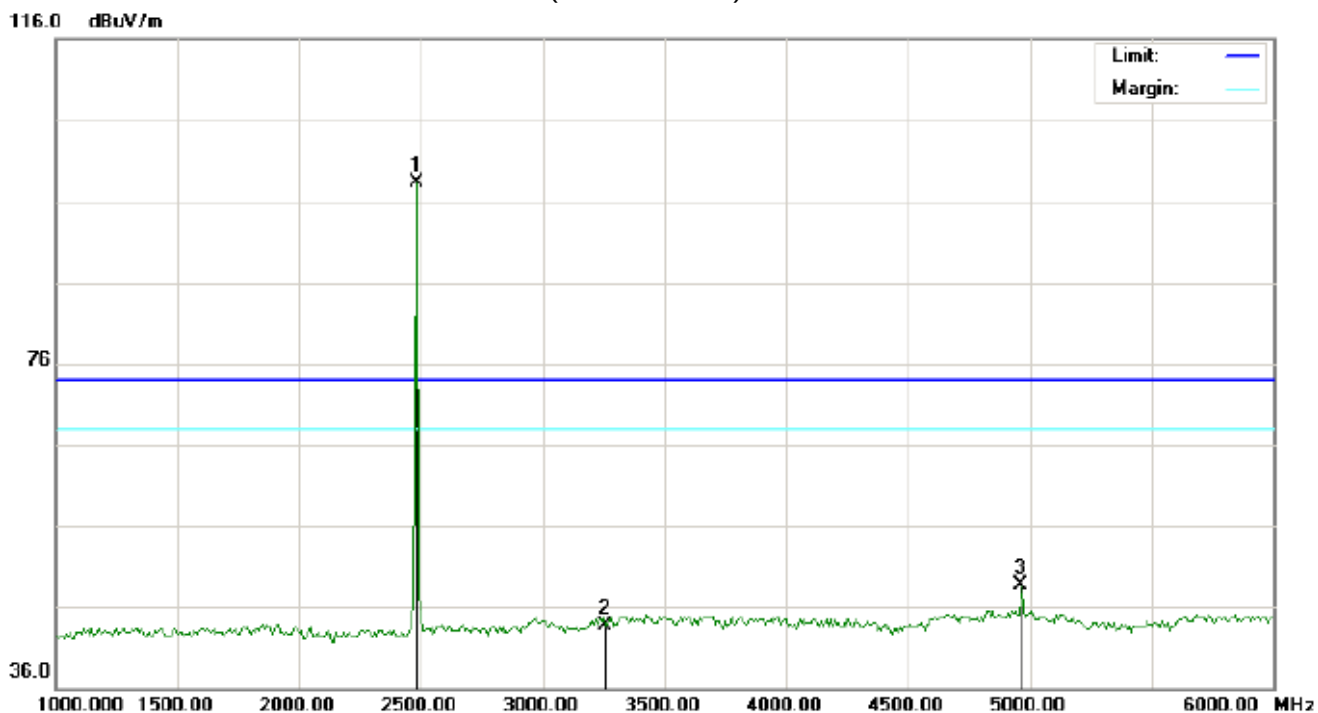
No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	*	2440.000	88.50	10.36	98.86	74.00	24.86	peak			
2		3251.000	32.37	11.88	44.25	74.00	-29.75	peak			
3		4880.000	40.39	7.89	48.28	74.00	-25.72	peak			

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-(ABOVE 1GHz)-HIGH CHANNEL-HORIZONTAL

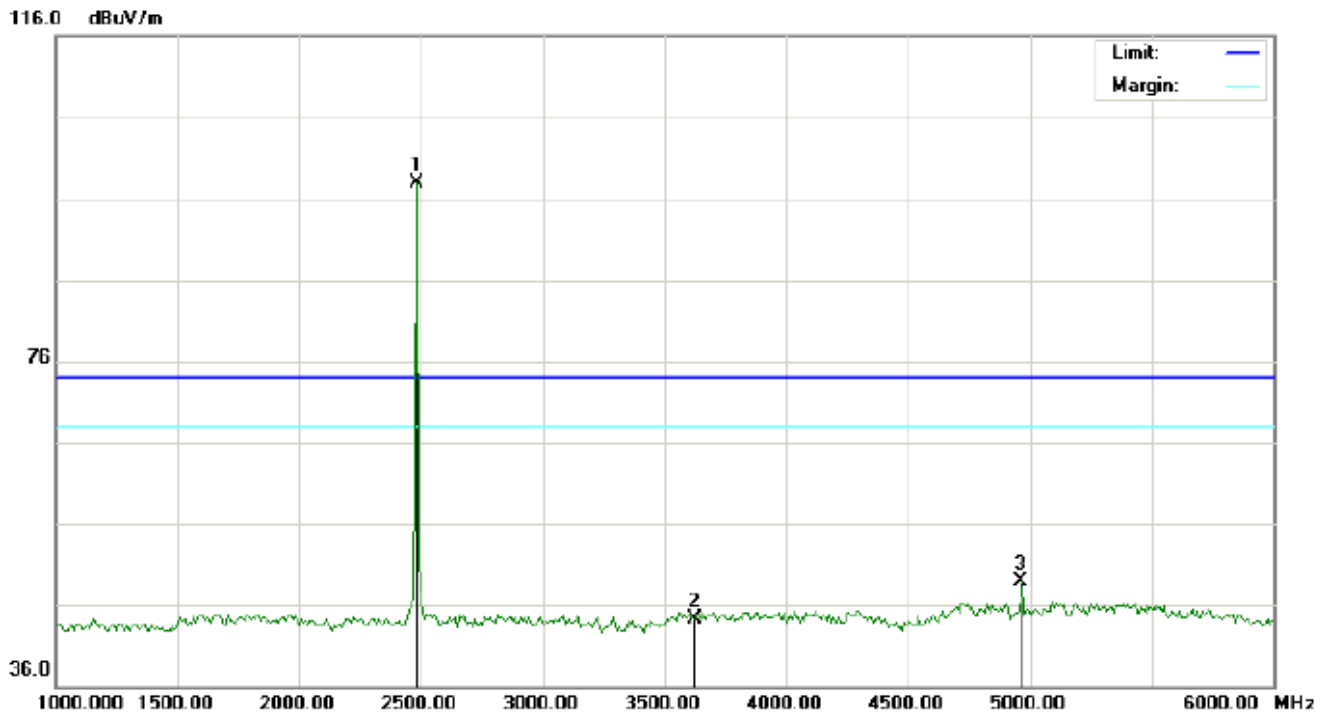


No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	*	2480.000	87.96	10.41	98.37	74.00	24.37	peak			
2		3256.000	31.91	11.88	43.79	74.00	-30.21	peak			
3		4960.000	40.60	8.09	48.69	74.00	-25.31	peak			

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	*	2480.000	87.53	10.41	97.94	74.00	23.94	peak			
2		3625.000	31.42	12.88	44.30	74.00	-29.70	peak			
3		4960.000	40.91	8.09	49.00	74.00	-25.00	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.

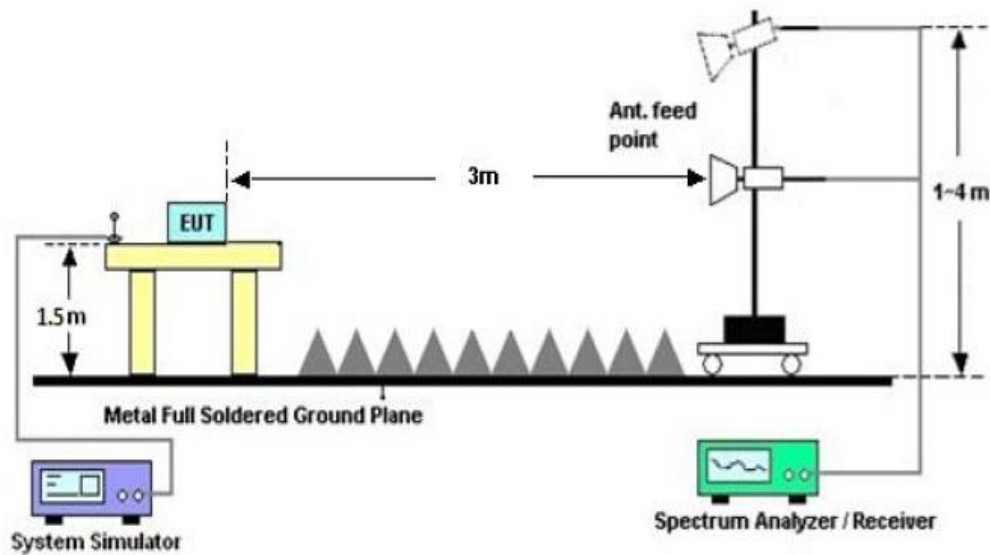
The "Factor" value can be calculated automatically by software of measurement system.

5. BAND EDGE EMISSION

5.1. MEASUREMENT PROCEDURE

1. Set the EUT Work on the top, the bottom operation frequency individually.
2. Set SPA Start or Stop Frequency=Operation Frequency,
For unrestricted band: RBW=100kHz, VBW=300kHz
For restricted band: RBW=1MHz, VBW=3*RBW
Center frequency =Operation frequency
3. The band edges was measured and recorded.

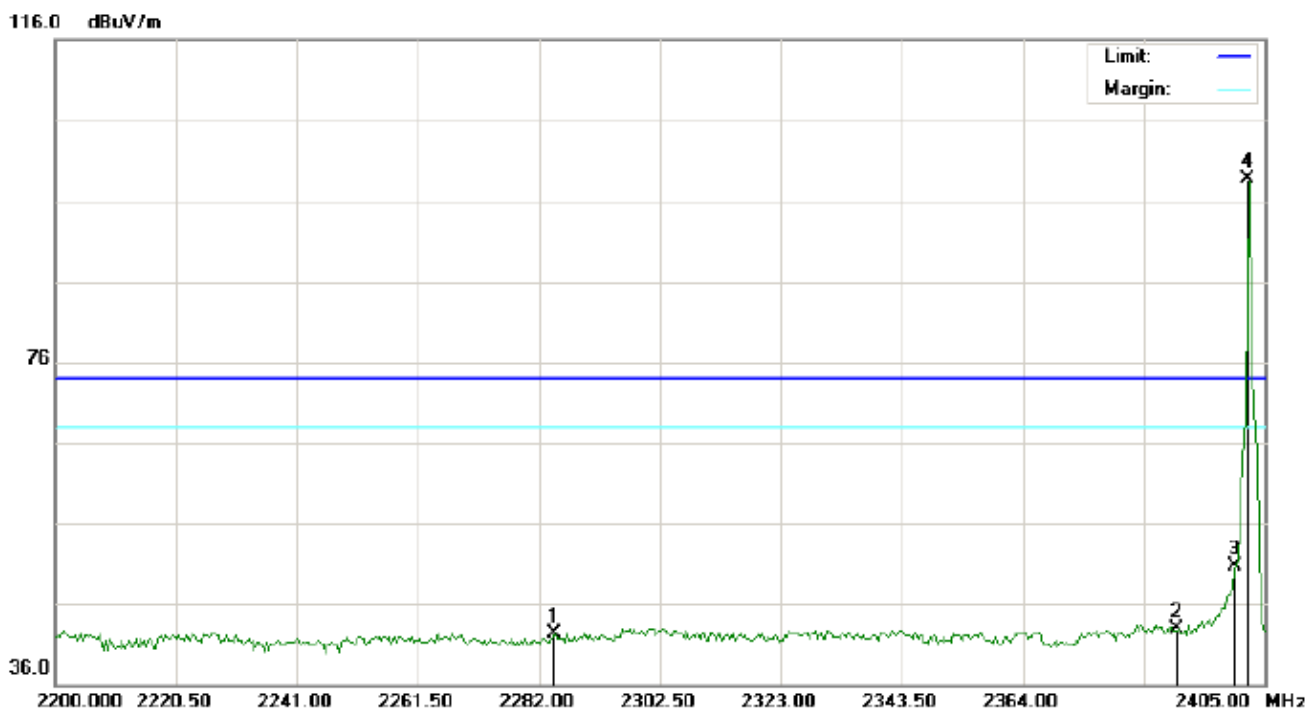
5.2. TEST SET-UP





5.3. TEST RESULT

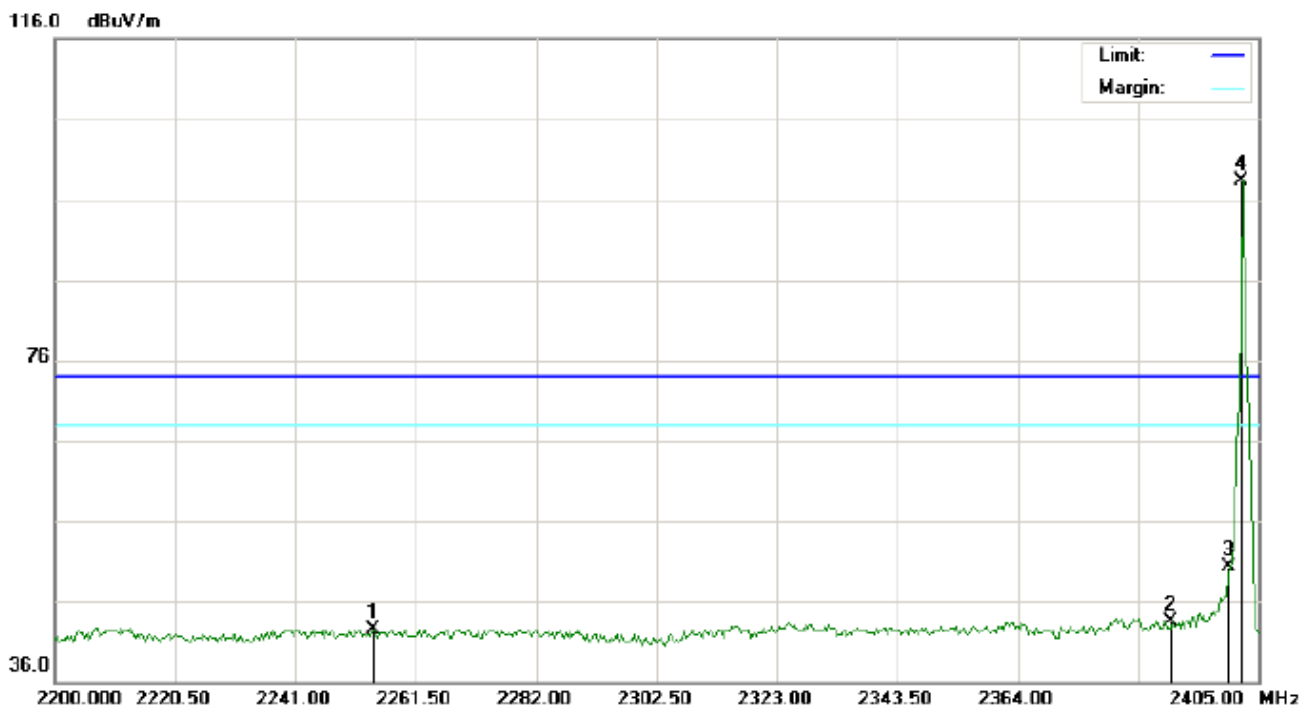
TEST PLOT OF BAND EDGE FOR LOW CHANNEL -Horizontal



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		2284.733	32.11	10.19	42.30	74.00	-31.70	peak			
2		2390.000	32.50	10.31	42.81	74.00	-31.19	peak			
3		2400.000	40.47	10.32	50.79	74.00	-23.21	peak			
4	*	2402.000	88.35	10.32	98.67	74.00	24.67	peak			



TEST PLOT OF BAND EDGE FOR LOW CHANNEL - Vertical

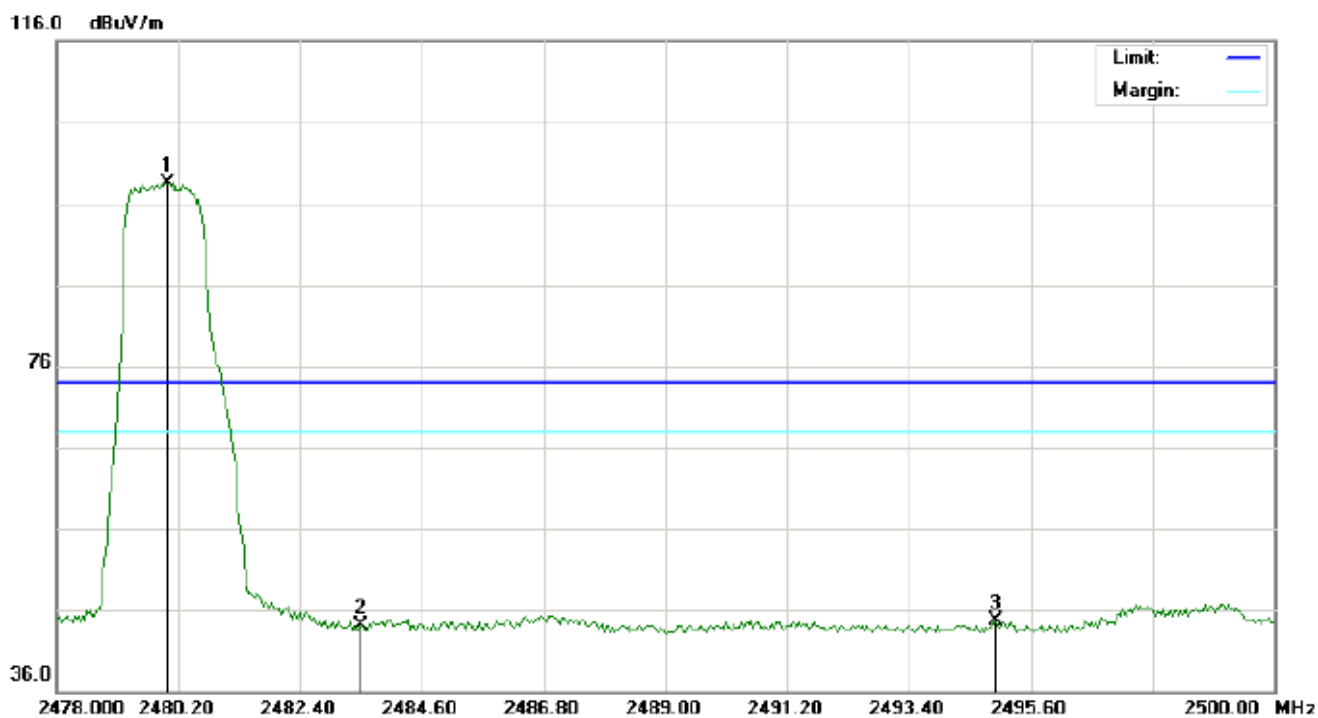


No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		2254.325	32.31	10.16	42.47	74.00	-31.53	peak			
2		2390.000	33.21	10.31	43.52	74.00	-30.48	peak			
3		2400.000	40.06	10.32	50.38	74.00	-23.62	peak			
4	*	2402.000	87.97	10.32	98.29	74.00	24.29	peak			

RESULT: PASS



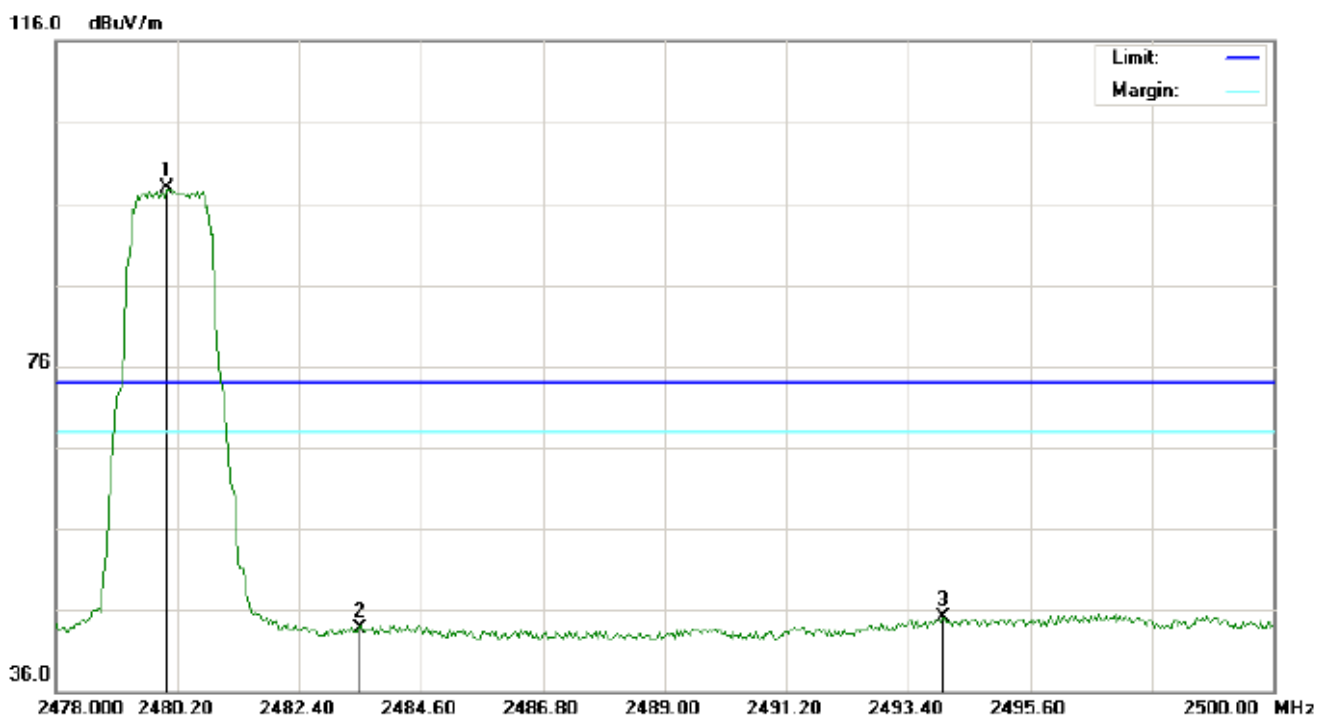
TEST PLOT OF BAND EDGE FOR HIGH CHANNEL –Horizontal



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	*	2480.000	88.00	10.41	98.41	74.00	24.41	peak			
2		2483.500	33.69	10.41	44.10	74.00	-29.90	peak			
3		2494.977	34.25	10.42	44.67	74.00	-29.33	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	*	2480.000	87.50	10.41	97.91	74.00	23.91	peak			
2		2483.500	33.26	10.41	43.67	74.00	-30.33	peak			
3		2494.023	34.62	10.42	45.04	74.00	-28.96	peak			

RESULT: PASS



6. 6DB BANDWIDTH

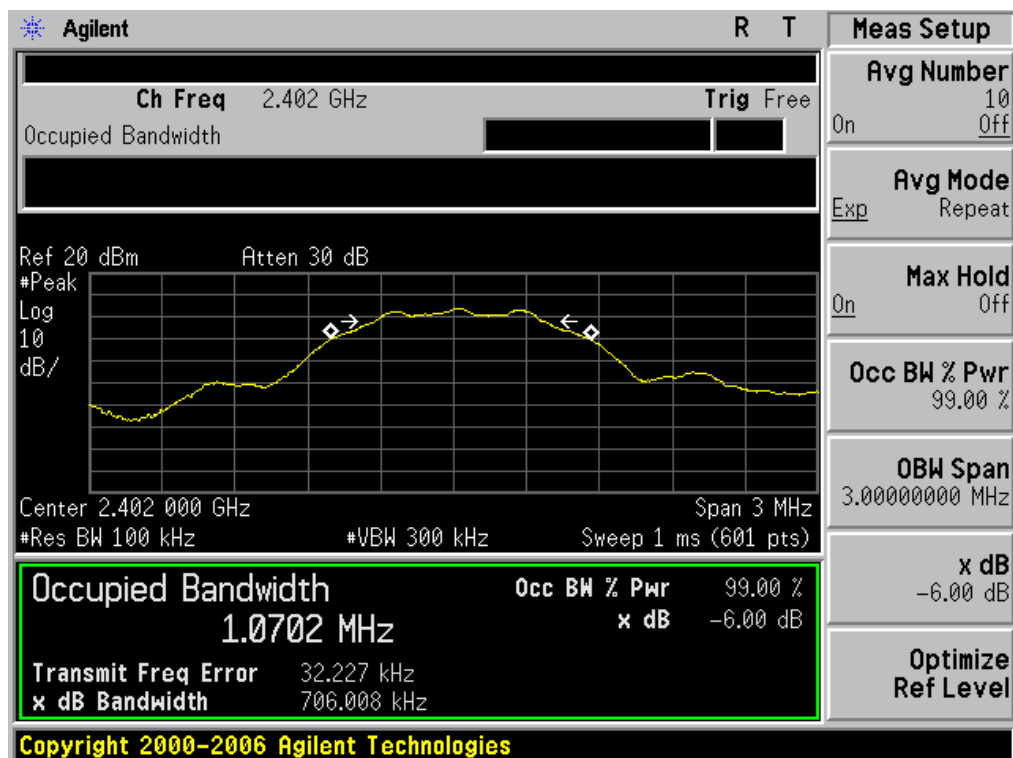
6.1. TEST PROCEDURE

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 SPA Centre Frequency = Operation Frequency, RBW= 100 KHz, VBW $\geq 3 \times$ RBW.
4. Set SPA Trace 1 Max hold, then View.

6.2. SUMMARY OF TEST RESULTS/PLOTS

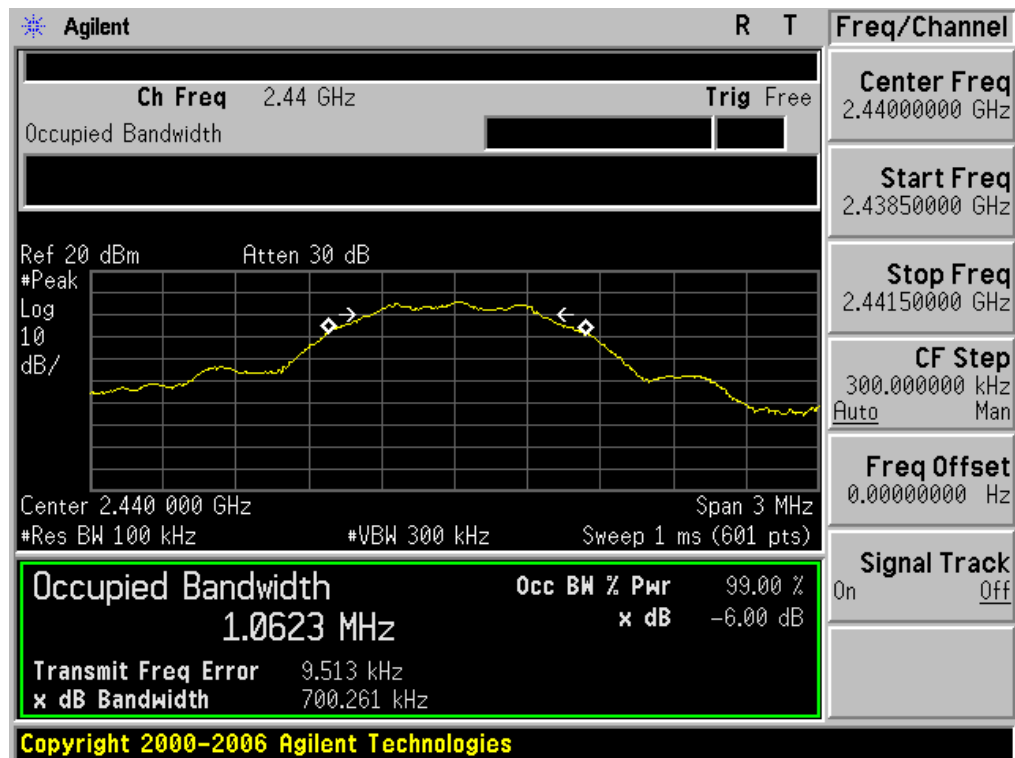
Channel	6dB Bandwidth (KHz)	Minimum Limit (KHz)	Pass/Fail
Low	706	500KHz	Pass
Middle	700		Pass
High	705		Pass

TEST PLOT OF BANDWIDTH FOR LOW CHANNEL

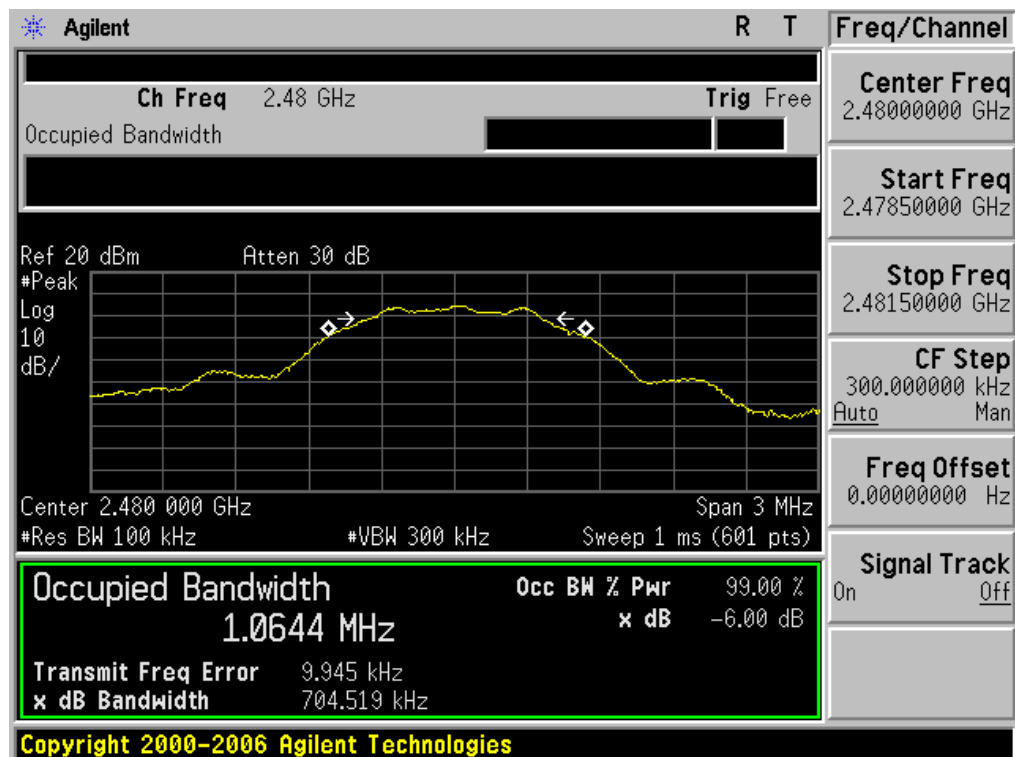




TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



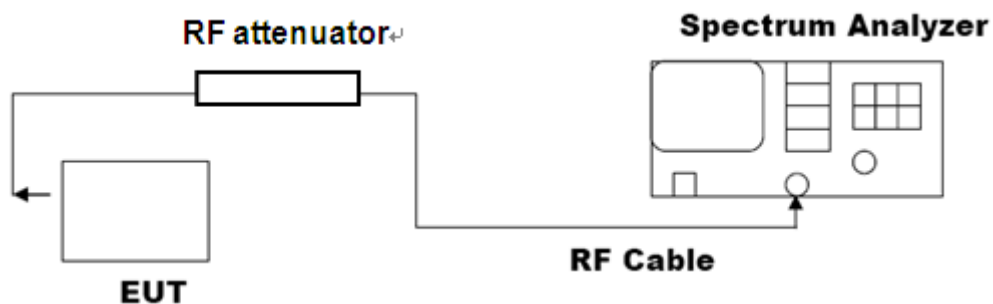


7. CONDUCTED OUTPUT POWER

7.1. MEASUREMENT PROCEDURE

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2. Set the EUT Work on the top, middle and the bottom operation frequency individually.
3. Use the following spectrum analyzer settings:
 - a) Set the RBW $\geq$ DTS bandwidth.
 - b) Set VBW $\geq$ 3 RBW.
 - c) Set span $\geq$ 3 x RBW
 - d) Sweep time = auto couple.
 - e) Detector = peak.
 - f) Trace mode = max hold.
 - g) Allow trace to fully stabilize.
 - h) Use peak marker function to determine the peak amplitude level.
4. Allow the trace to stabilize.
5. Record the result form the Spectrum Analyzer.

7.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

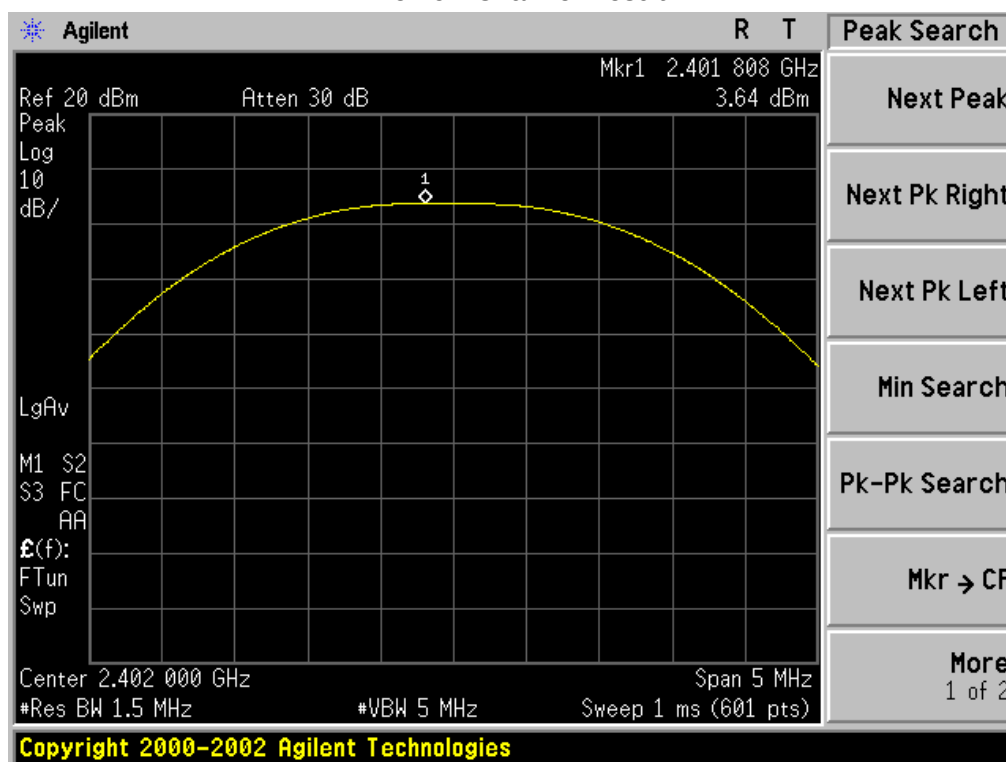




7.3. LIMITS AND MEASUREMENT RESULT

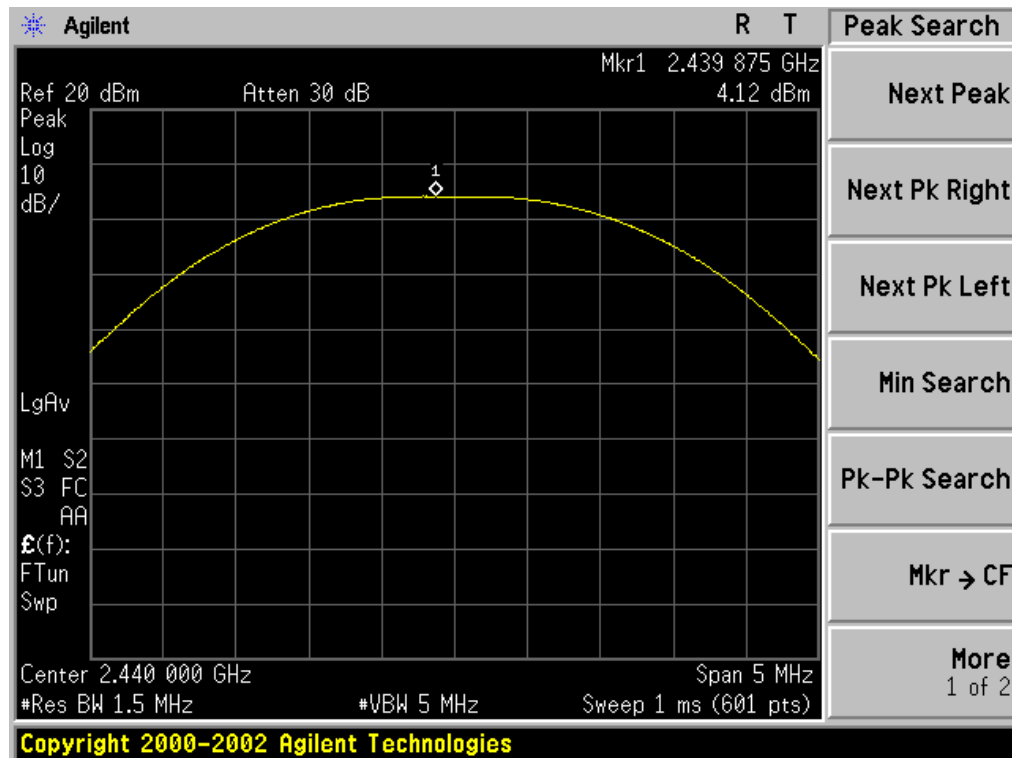
Channel	Peak Power (dBm)	Applicable Limits (dBm)	Pass/Fail
Low Channel	3.64	30	Pass
Middle Channel	4.12	30	Pass
High Channel	3.19	30	Pass

The Low Channel Result

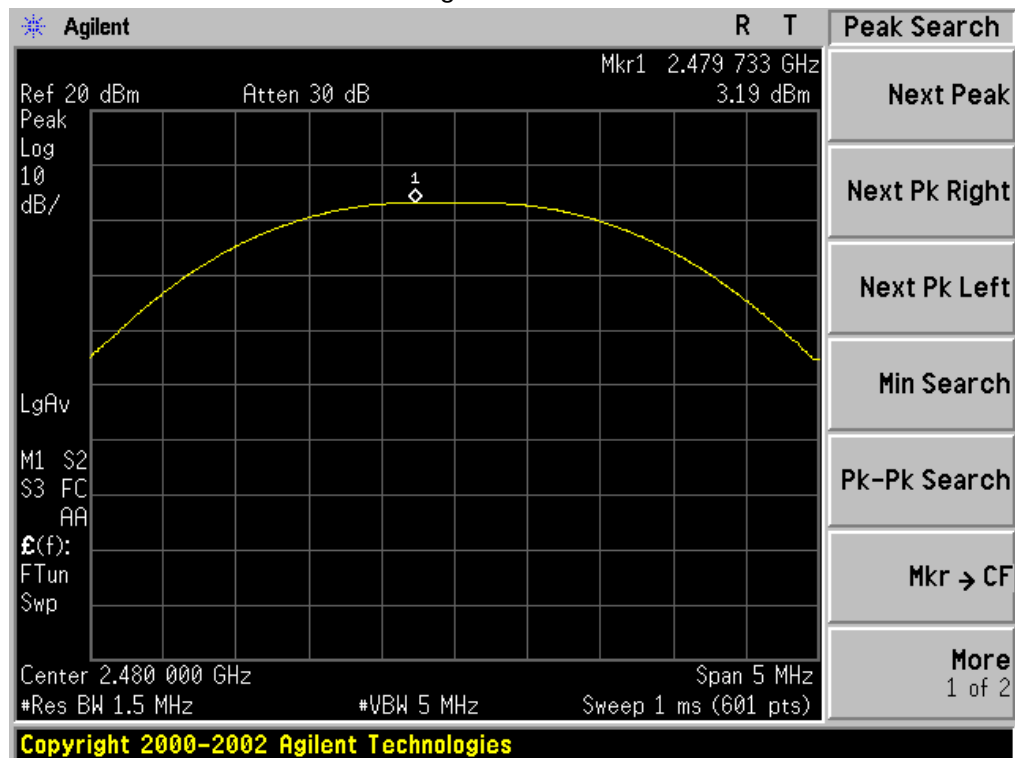




The Middle Channel Result



The High Channel Result



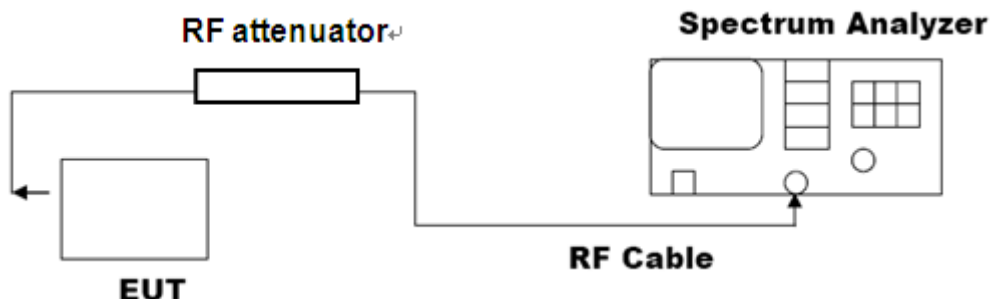


8. CONDUCTED SPURIOUS EMISSION

8.1. 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 the Span = wide enough to capture the peak level of the in-band emission and all spurious emissions from the lowest frequency generated in the EUT up through the 10th harmonic.
RBW = 100kHz; VBW $\geq$ 3 RBW; Sweep = auto; Detector function = peak.
4. Set SPA Trace 1 Max hold, then View.

8.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

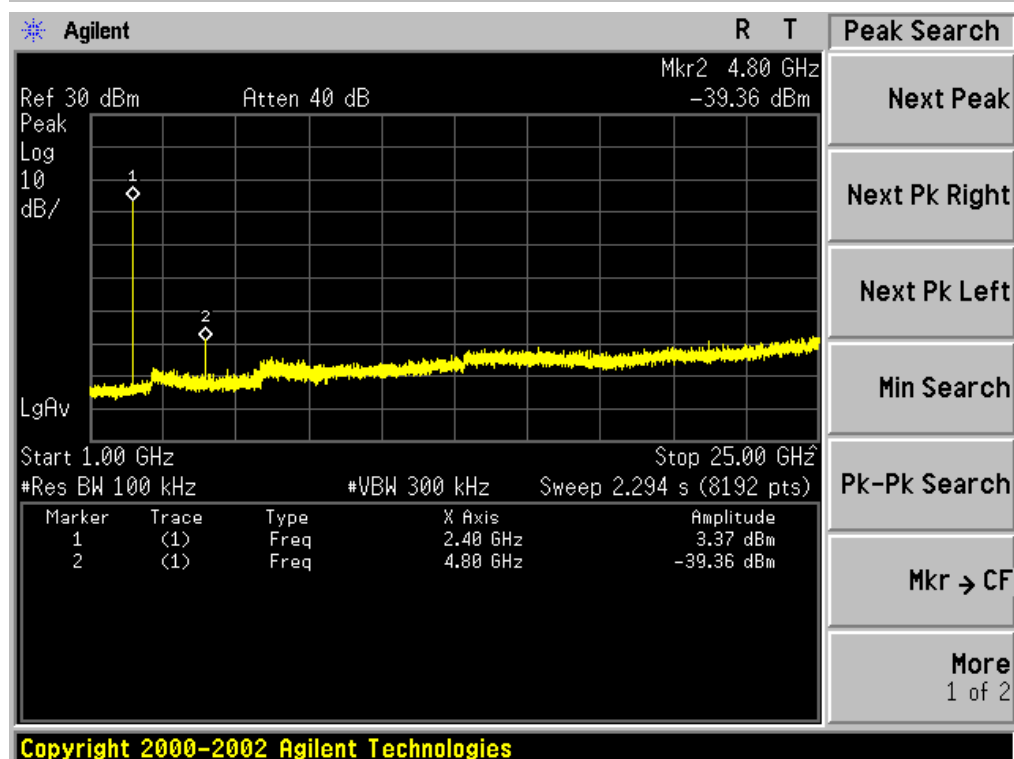
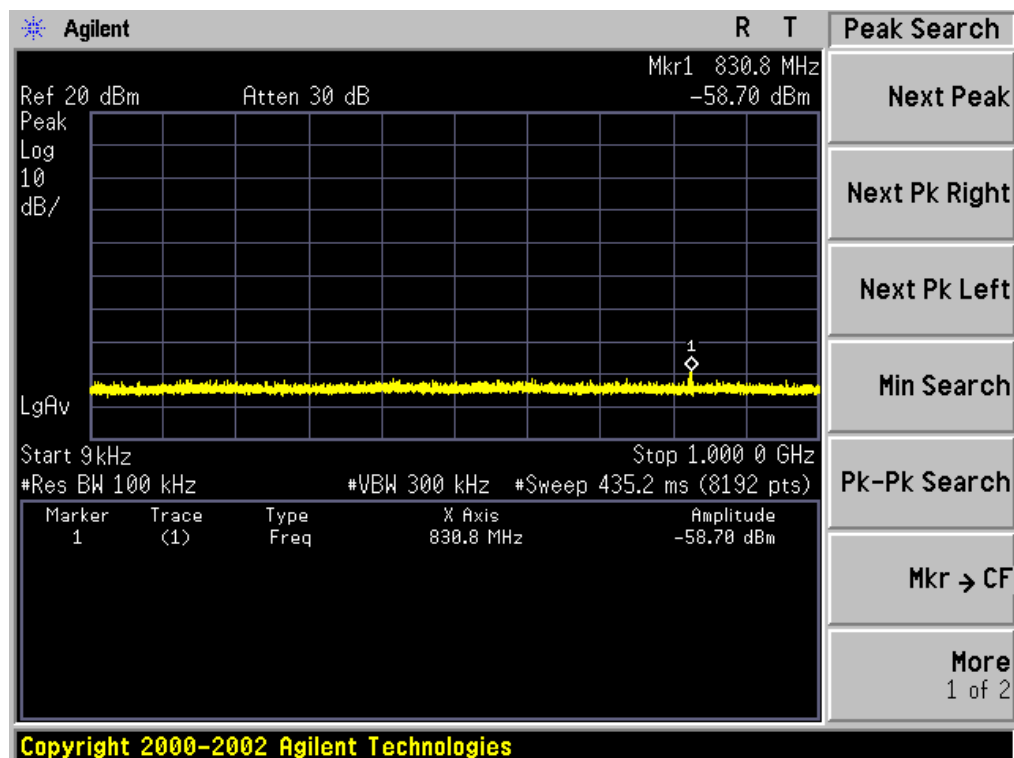


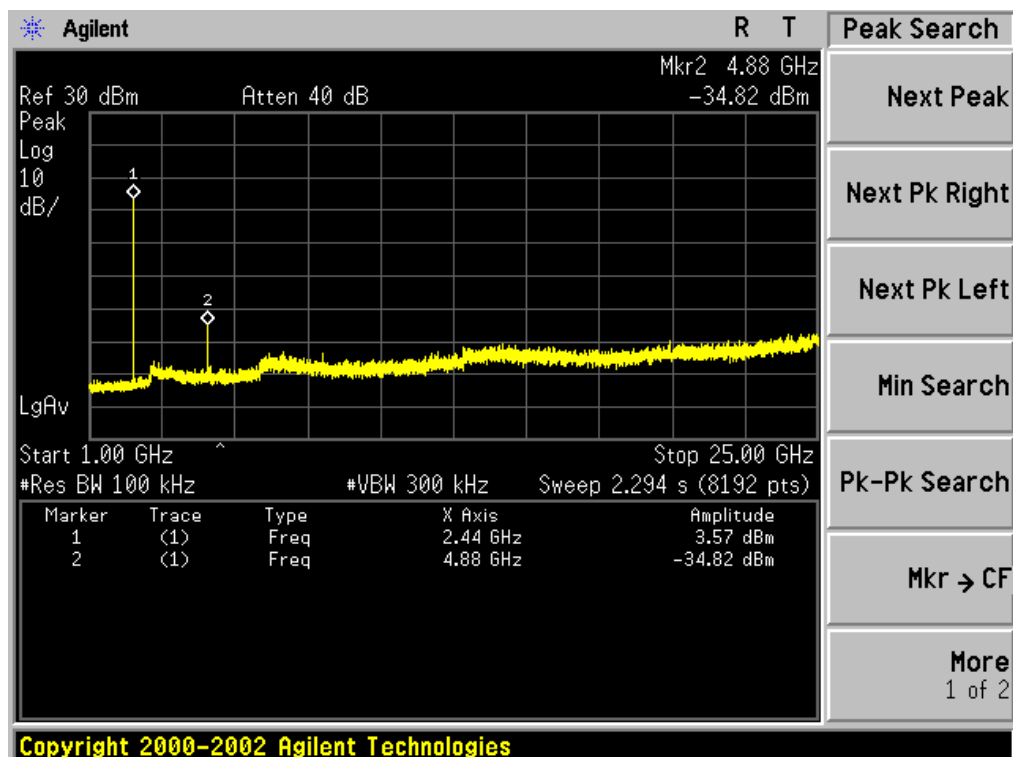
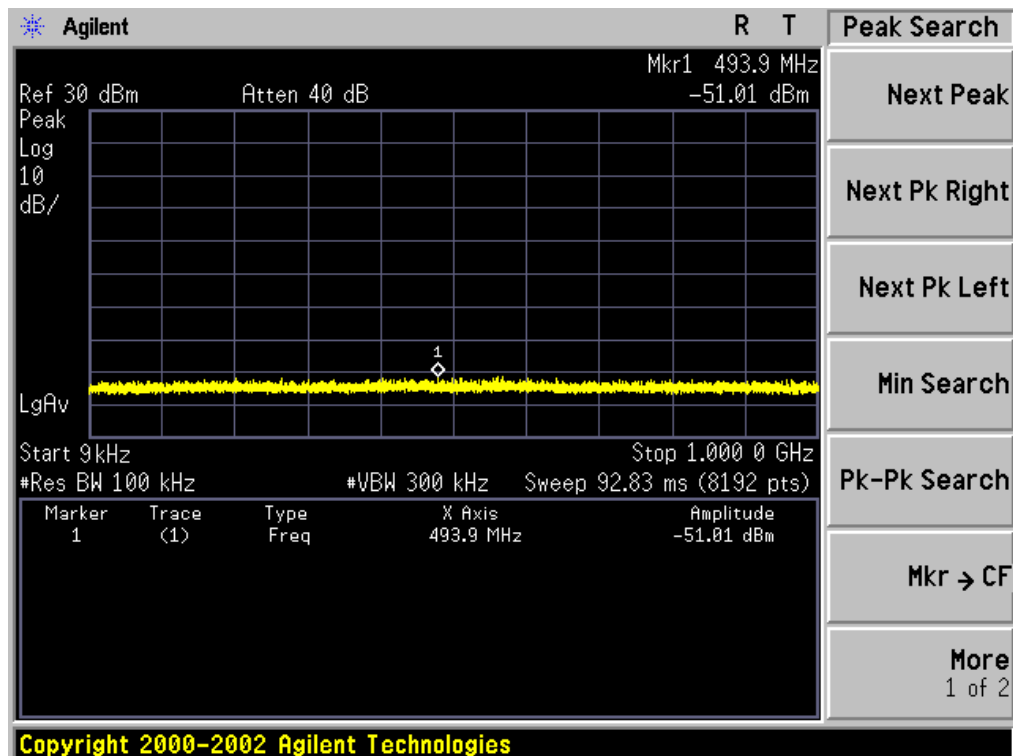
8.3. LIMITS AND MEASUREMENT RESULT

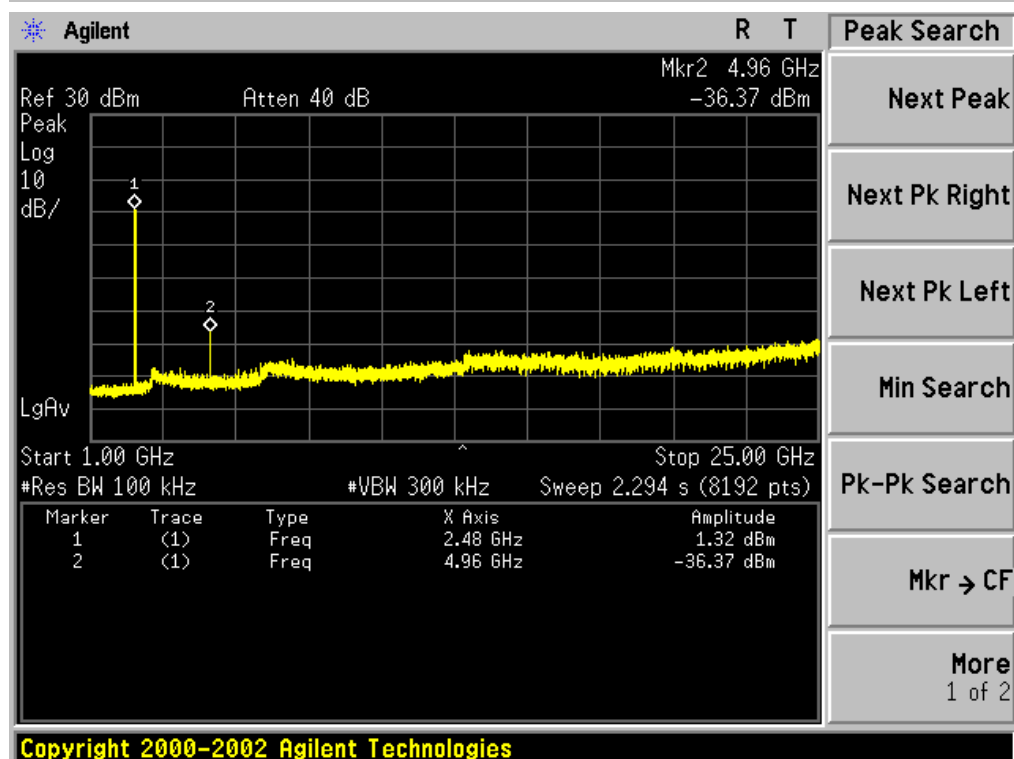
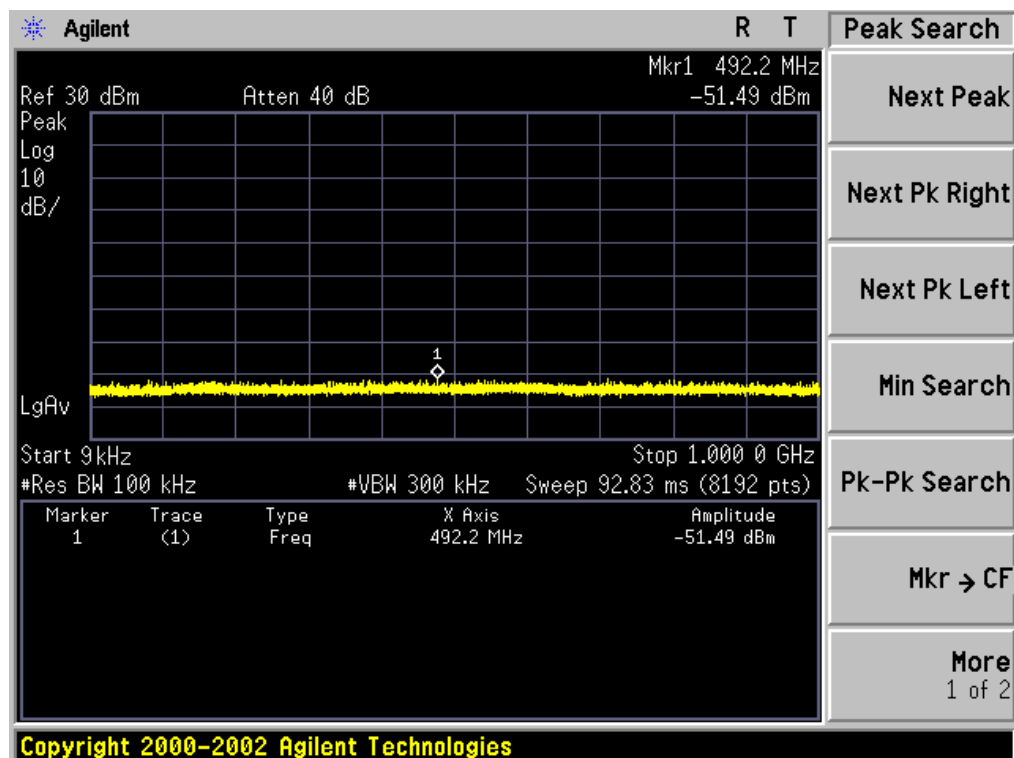
LIMITS AND MEASUREMENT RESULT		
Applicable Limits	Measurement Result	
	Test Data	Result
In any 100 KHz Bandwidth Outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produce by the intentional radiator shall be at least 20 dB below that in 100KHz bandwidth within the band that contains the highest level of the desired power. In addition, radiation emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in§15.209(a))	At least -20dBc than the limit Specified on the BOTTOM Channel	PASS
	At least -20dBc than the limit Specified on the TOP Channel	PASS



TEST PLOT OF OUT OF BAND EMISSIONS WITH THE WORST CASE
OF GFSK MODULATION IN LOW CHANNEL



TEST PLOT OF OUT OF BAND EMISSIONS
OF GFSK MODULATION IN MIDDLE CHANNEL

TEST PLOT OF OUT OF BAND EMISSIONS
OF GFSK MODULATION IN HIGH CHANNEL



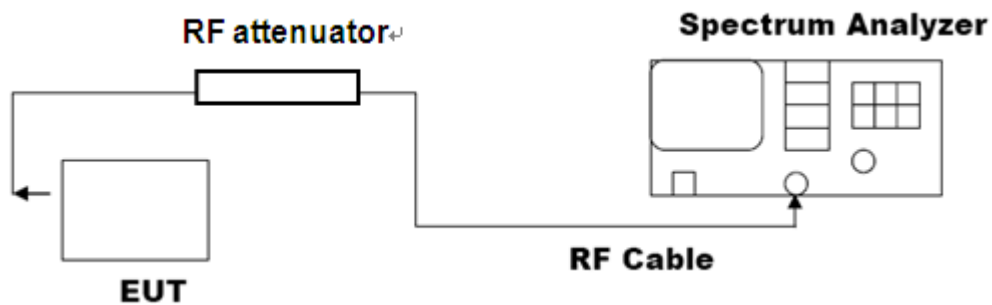
9. CONDUCTED OUTPUT POWER SPECTRAL DENSITY

9.1 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 the span to 1.5times the DTS bandwidth, RBW: $3\text{kHz} \leq \text{RBW} \leq 100\text{kHz}$, VBW $\geq 3 \times \text{RBW}$
- (4). Set SPA Trace 1 Max hold, then View.

Note: The EUT was tested according to KDB 558074 for compliance to FCC 47CFR 15.247 requirements.

9.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

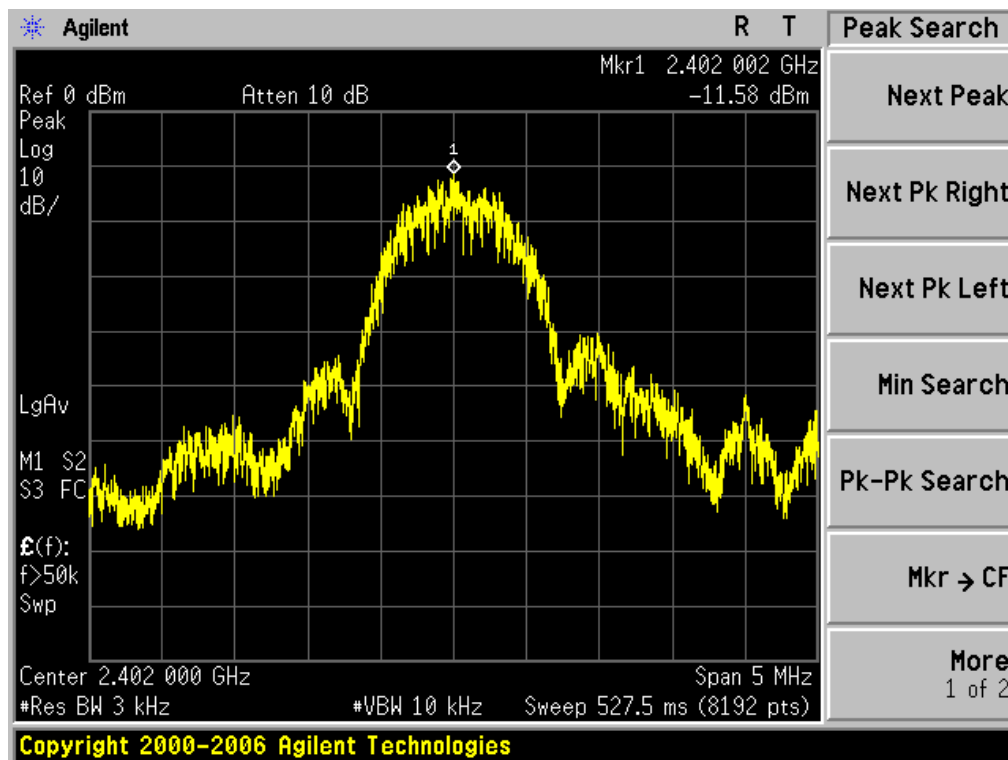


9.3 LIMITS AND MEASUREMENT RESULT

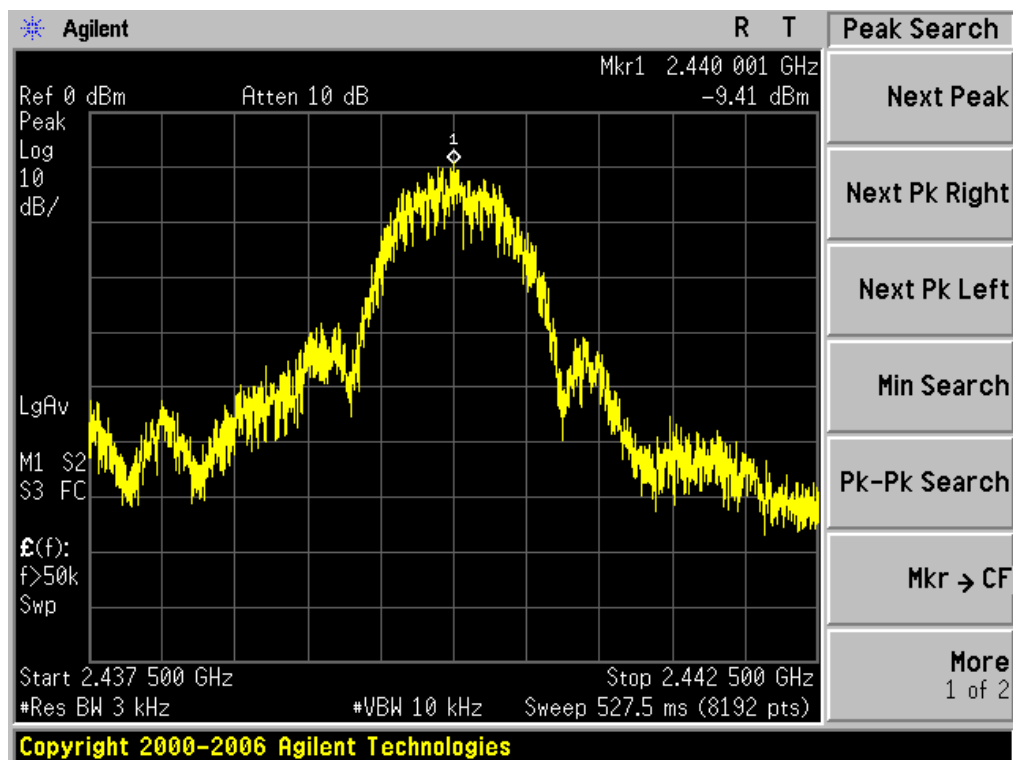
Channel No.	PSD (dBm/3KHz)	Limit (dBm/3KHz)	Result
Low Channel	-11.58	8	Pass
Middle Channel	-9.41	8	Pass
High Channel	-10.27	8	Pass



TEST PLOT OF SPECTRAL DENSITY FOR LOW CHANNEL

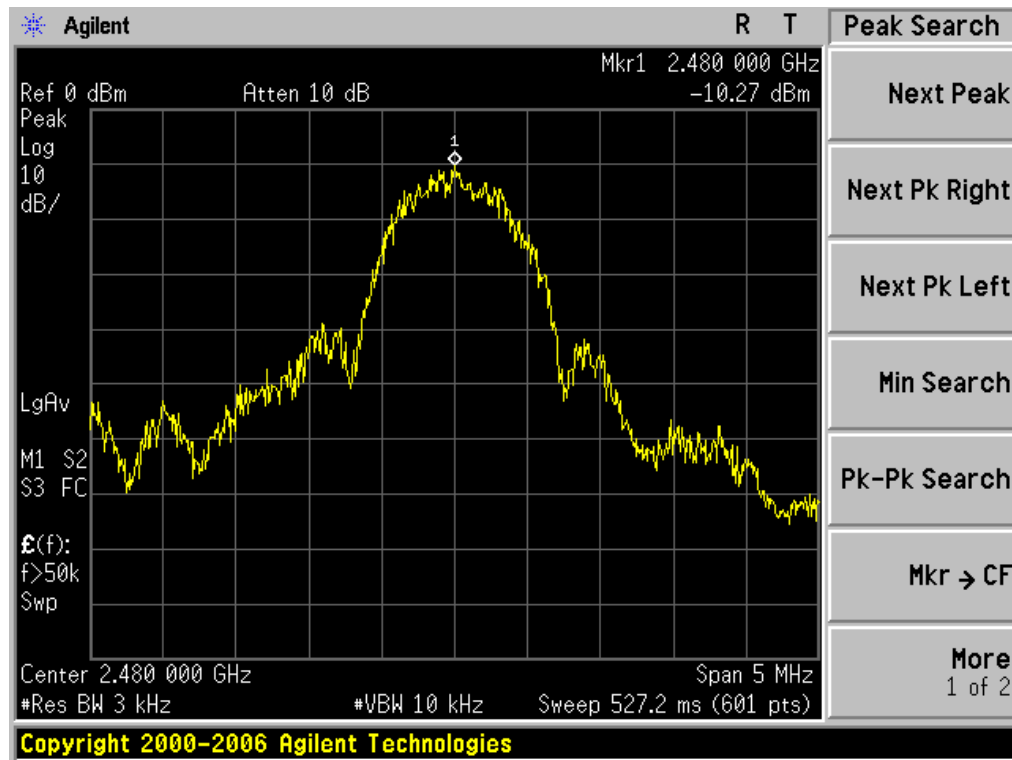


TEST PLOT OF SPECTRAL DENSITY FOR MIDDLE CHANNEL





TEST PLOT OF SPECTRAL DENSITY FOR HIGH CHANNEL



10. LINE CONDUCTED EMISSION TEST

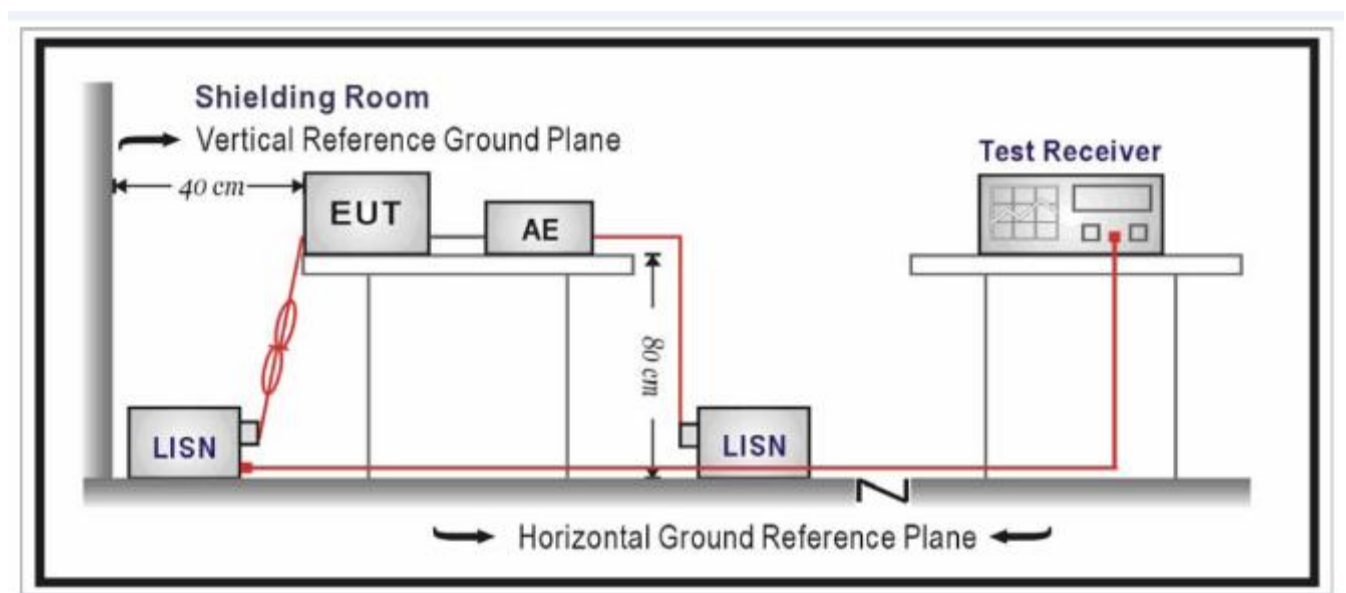
10.1 LIMITS

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

10.2 TEST SETUP





10.3 PRELIMINARY PROCEDURE

- 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 (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.
- 3) All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.
- 4) All support equipments received AC120V/60Hz power from a LISN, if any.
- 5) The EUT received DC charging voltage by adapter which received 120V/60Hz power 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 following 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.

10.4 FINAL TEST PROCEDURE

- 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.

10.5 TEST RESULT OF POWER LINE

N/A

Note: The BT was supplied by DC source, it's not applicable to this item.

11. ANTENNA REQUIREMENT

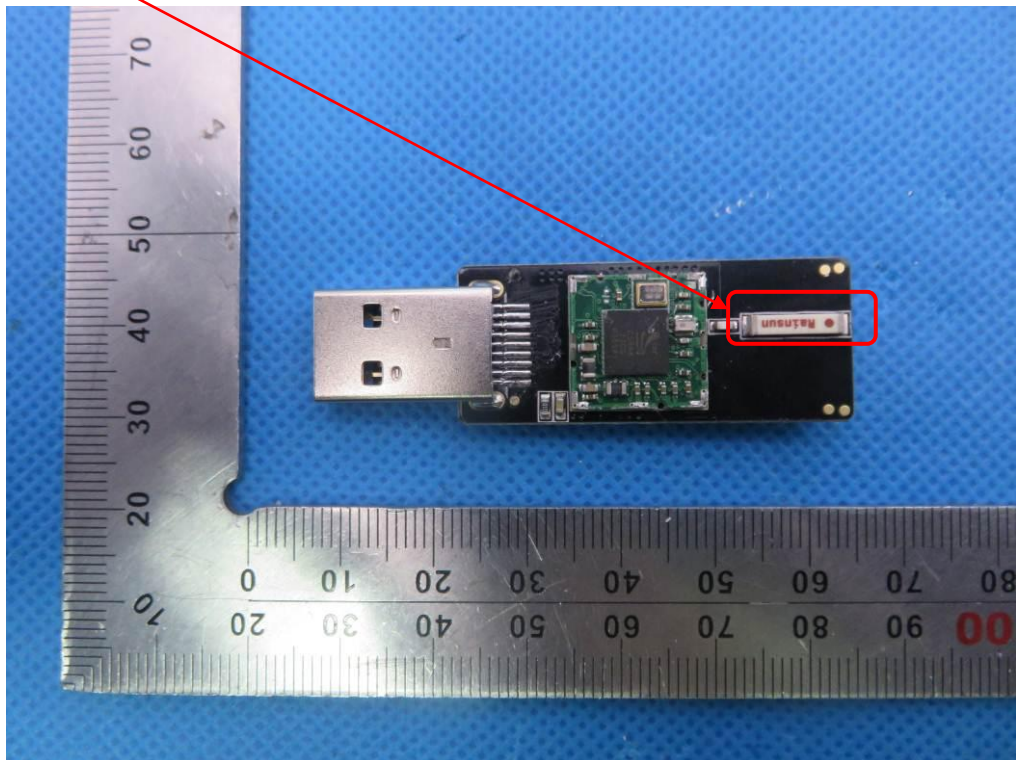
Standard Applicable

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.

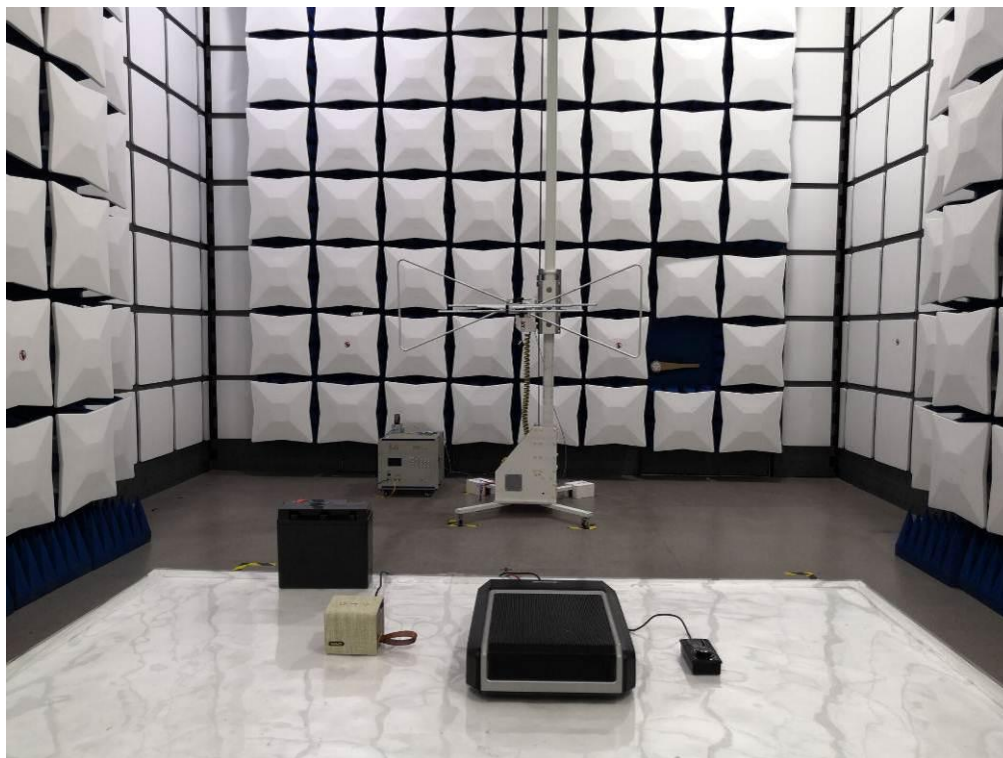
The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed.

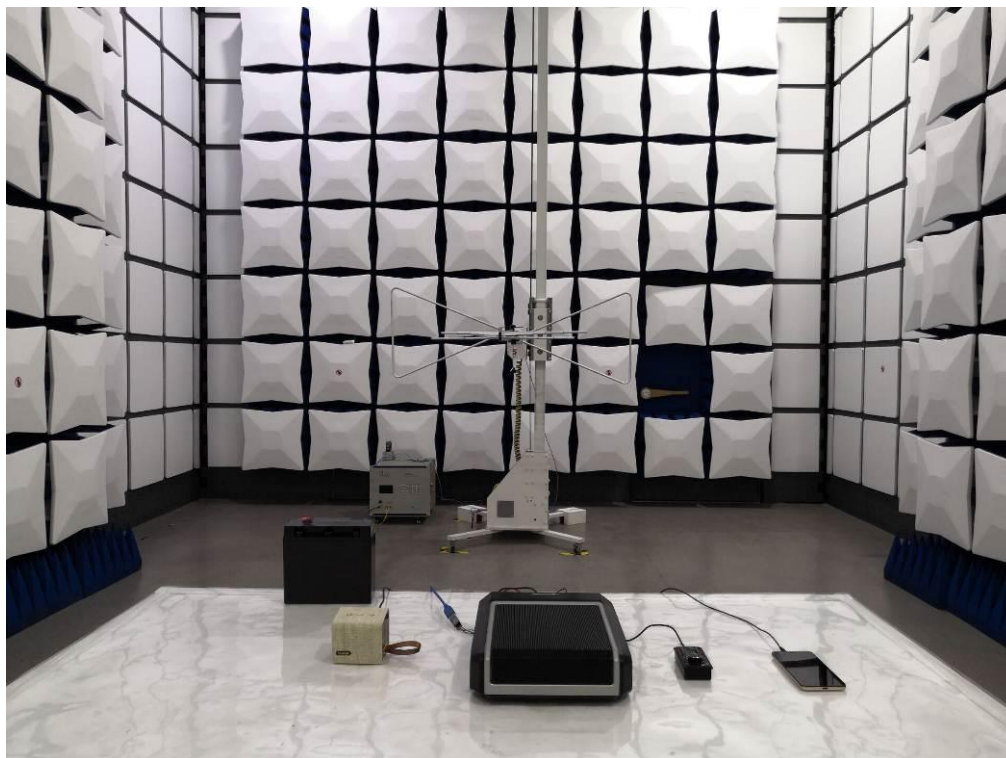
ANTENNA



12. PHOTOGRAPH OF TEST

FCC RADIATED EMISSION TEST SETUP









13. PHOTOGRAPHS OF EUT

TOTAL VIEW 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)

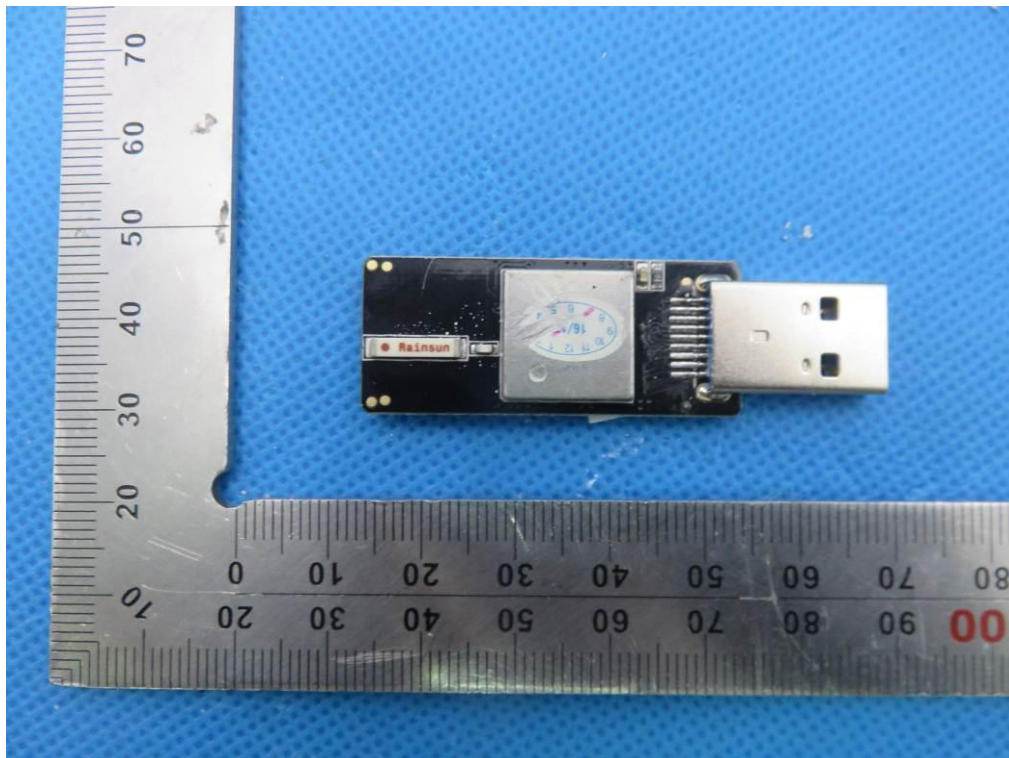




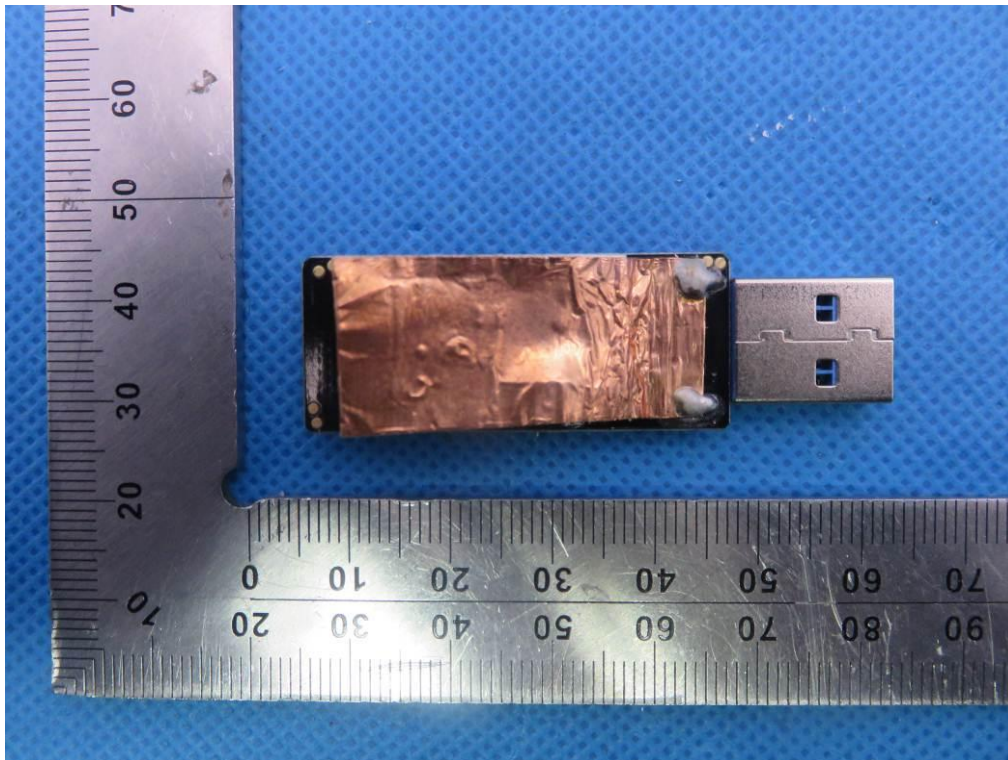
OPEN VIEW OF EUT



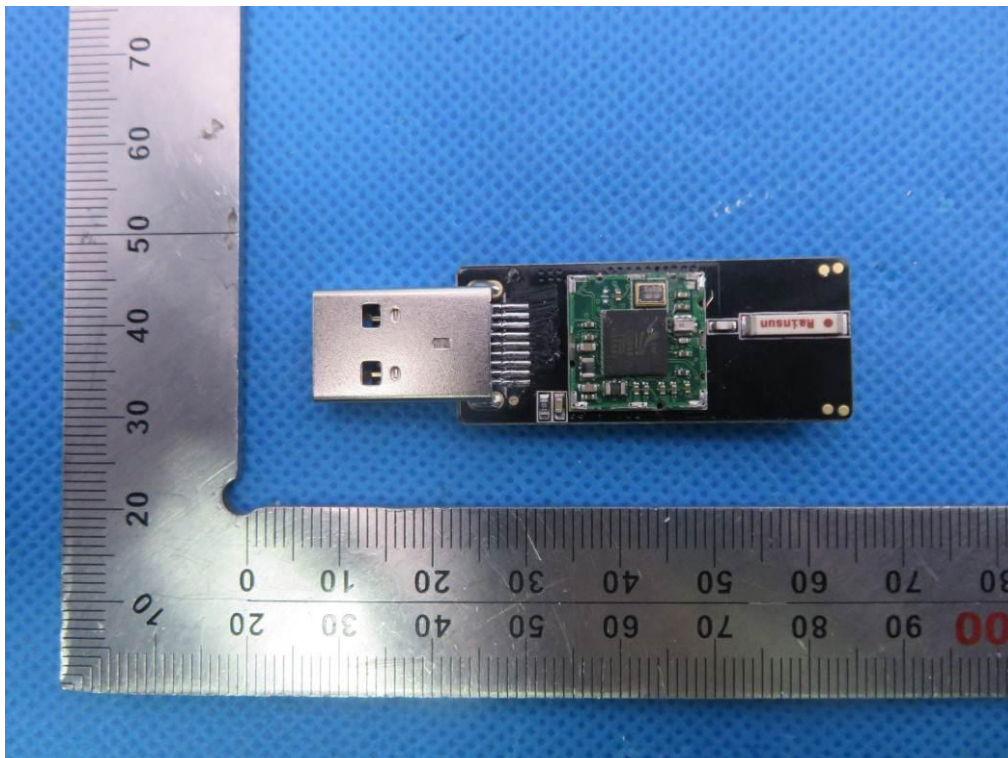
INTERNAL VIEW OF EUT-1



INTERNAL VIEW OF EUT-2

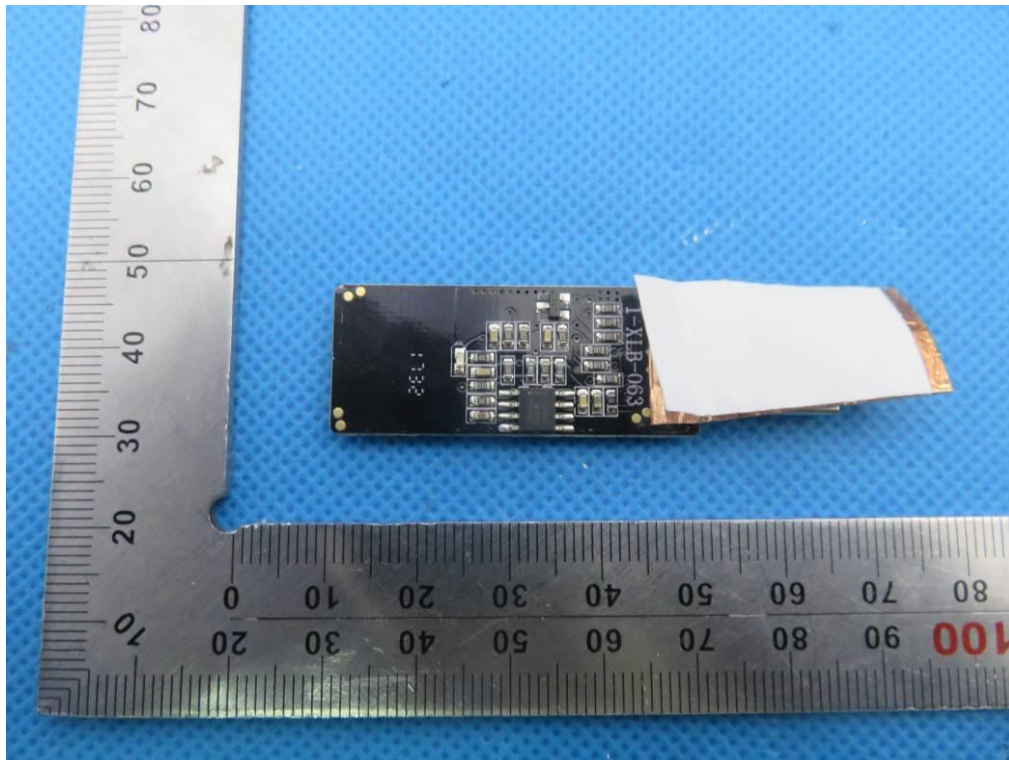


INTERNAL VIEW OF EUT-3





INTERNAL VIEW OF EUT-4



INTERNAL VIEW OF EUT-5



----END OF REPORT----