FCC Test Report

Report No.: AGC03285180601FE08

FCC ID	:	2AP2S-FSC-BT616
APPLICATION PURPOSE	:	Original Equipment
PRODUCT DESIGNATION	:	Bluetooth Module
BRAND NAME	:	SX3
MODEL NAME	:	FSC-BT616, SX3/FSC_BT616
CLIENT	:	SpaceSense Corporation
DATE OF ISSUE	:	Jun. 14, 2018
STANDARD(S)	:	FCC Part 15 Subpart C Section 15.247
REPORT VERSION	:	V1.0

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

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Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Jun. 14, 2018	Valid	Initial release

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1. VERIFICATION OF COMPLIANCE

Applicant	SpaceSense Corporation
Address	200 CentrePort Drive, Suite 150, Greensboro NC, 27409 USA
Manufacturer	Shenzhen Feasycom Technology Co.,LTD
Address	Room 2004A, 20th Floor, Huichao Technology Building, Jinhai Road, Xixiang, Baoan District, Shenzhen, China
Product Designation	Bluetooth Module
Brand Name	SX3
Test Model	FSC-BT616
Series Model	SX3/FSC_BT616
Difference description	All the same except for the model name
Date of test	Jun. 06, 2018 to Jun. 14, 2018
Deviation	None
Condition of Test Sample	Normal
Report Template	AGCRT-US-BLE/RF (2013-03-01)

We hereby certify that:
The above equipment was tested by Attestation of Global Compliance (Shenzhen) Co., Ltd. The test data, the energy emitted by the sample tested as described in this report is in compliance with the requirements of FCC Rules Part 15.247. The test results of this report relate only to the tested sample identified in this report.

Tested By Henry Zhang
Henry Zhang(Zhang Zhuorui) Jun. 14, 2018

Reviewed By Cool Cheng
Cool Cheng(Cheng Mengguo) Jun. 14, 2018

Approved By Forrest Lei
Forrest Lei(Lei Yonggang)
Authorized Officer Jun. 14, 2018

2.GENERAL INFORMATION

2.1PRODUCT DESCRIPTION

The EUT is a Bluetooth Module designed as a “Communication Device”. It is designed by way of utilizing the FHSS technology to achieve the system operation.

A major technical description of EUT is described as following

Operation Frequency	2.402 GHz to 2.480GHz
RF Output Power	5.69dBm(Max)
Bluetooth Version	V5.0
Modulation	GFSK for BLE
Number of channels	40 Channels(37 Hopping Channel,3 advertising Channel)
Antenna Designation	PCB Antenna
Antenna Gain	2dBi
Hardware Version	V1.3
Software Version	V1.3
Power Supply	DC 3.3V
Note: The EUT didn’t support BR/EDR, 2M bandwidth and BLE new feature.	

2.2TEST METHOD

All measurements contained in this report were conducted with ANSI C63.10-2013.

2.3 EQUIPMENT MODIFICATIONS

Not available for this EUT intended for grant.

2.4 MEASUREMENT UNCERTAINTY

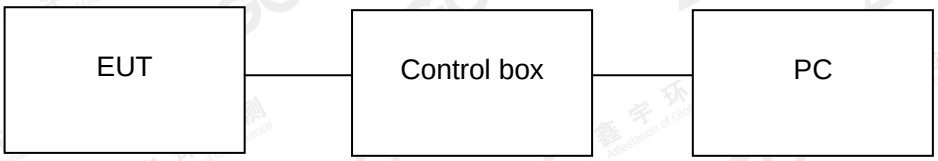
The reported uncertainty of measurement y ±U, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95%.

- Uncertainty of Conducted Emission, Uc = ±3.2 dB
- Uncertainty of Radiated Emission below 1GHz, Uc = ±3.9 dB
- Uncertainty of Radiated Emission above 1GHz, Uc = ±4.8 dB

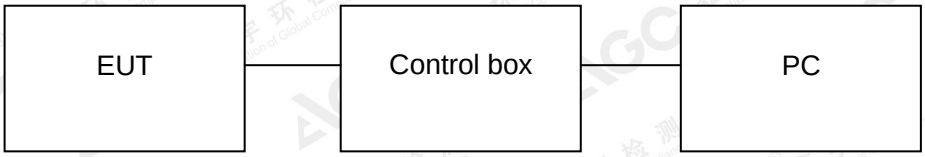
3. SYSTEM TEST CONFIGURATION

3.1 CONFIGURATION OF TESTED SYSTEM

Configure 1: (Normal hopping)



Configuration: Continuous TX



3.2 EQUIPMENT USED IN TESTED SYSTEM

Item	Equipment	Mfr/Brand	Model/Type No.	Remark
1	Bluetooth Module	SX3	FSC-BT616	EUT
2	PC	APPLE	A1465	A.E
3	PC Adapter	APPLE	A1436	A.E
4	Control box	SERIAL	N/A	A.E
5	USB Cable	N/A	1m Unshielded	A.E
6	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.

3.3. SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.203	Antenna Requirement	Compliant
§15.209 §15.247(d)	Radiated Emission	Compliant
§15.247(d)	Band Edges	Compliant
§15.247(a) (2)	6 dB Bandwidth	Compliant
§15.247(b)	Conducted Output Power	Compliant
§15.247(d)	Conducted Spurious Emission	Compliant
§15.247(e)	Conducted Power Spectral Density	Compliant
§15.207	Line Conduction Emission	Compliant

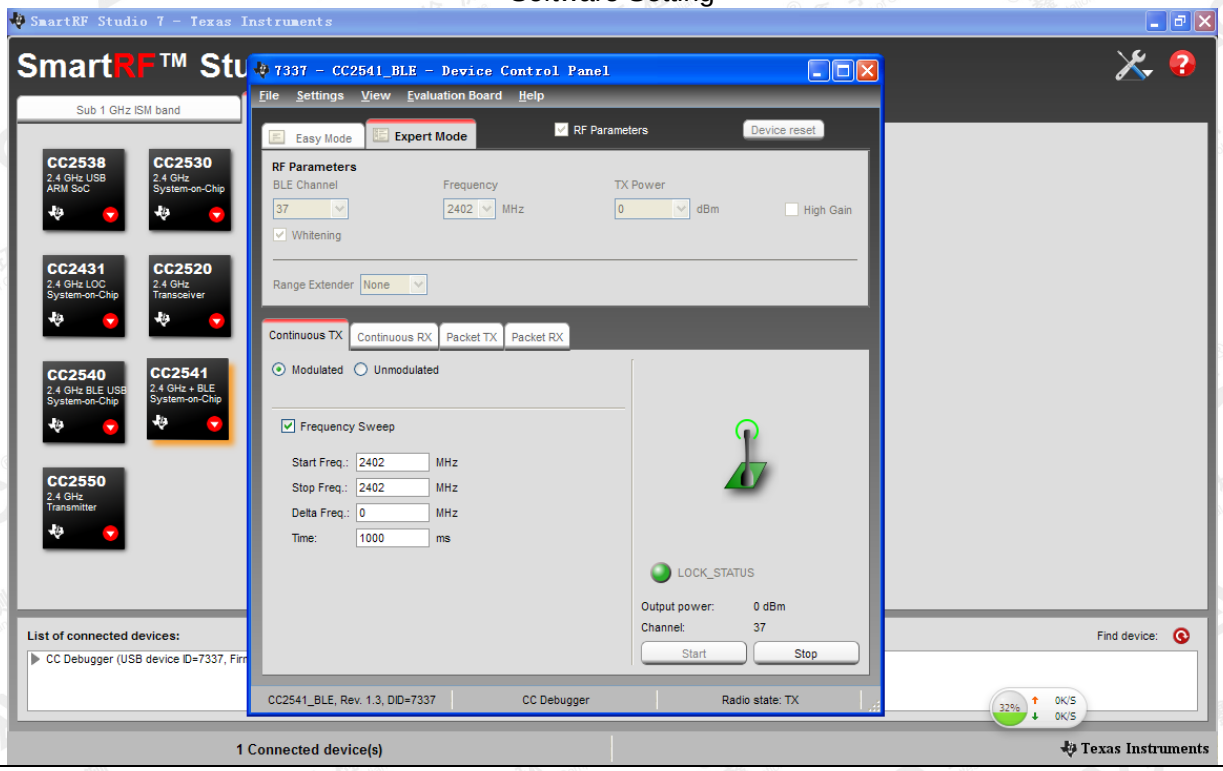
4. DESCRIPTION OF TEST MODES

The EUT has been operated in one modulation: GFSK.

NO.	TEST MODE DESCRIPTION
1	Low channel GFSK
2	Middle channel GFSK
3	High channel GFSK
4	BT Link

Note:
1. Only the result of the worst case was recorded in the report if no any records.
2. Transmitting duty cycle >98%, The average correction factor is about -0.18.

Software Setting



5. TEST FACILITY

Test Site	Attestation of Global Compliance (Shenzhen) Co., Ltd
Location	1-2F., Bldg.2, No.1-4, Chaxi Sanwei Technical Industrial Park, Gushu, Xixiang, Bao'an District B112-B113, Bldg.12, Baoan Bldg Materials Center, No.1 of Xixiang Inner Ring Road, Baoan District, Shenzhen 518012
NVLAP Lab Code	600153-0
Designation Number	CN5028
Test Firm Registration Number	682566
Description	Attestation of Global Compliance(Shenzhen) Co., Ltd is accredited by National Voluntary Laboratory Accreditation program, NVLAP Code 600153-0

6. TEST EQUIPMENT LIST

TEST EQUIPMENT OF CONDUCTED EMISSION TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESPI	101206	Jun.20, 2017	Jun.19, 2018
LISN	R&S	ESH2-Z5	100086	Aug.21, 2017	Aug.20, 2018

TEST EQUIPMENT OF RADIATED EMISSION TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESCI	10096	Jun.20, 2017	Jun.19, 2018
EXA Signal Analyzer	Aglient	N9010A	MY53470504	Dec.08, 2017	Dec.07, 2018
Horn antenna	SCHWARZBECK	BBHA 9170	#768	Sep.20, 2017	Sep.19, 2018
preamplifier	ChengYi	EMC184045SE	980508	Sep.15, 2017	Sep.14, 2018
Double-Ridged Waveguide Horn	ETS LINDGREN	3117	00034609	May 18, 2017	May 17, 2019
Broadband Preamplifier	SCHWARZBECK	BBV 9718	9718-205	Jun.20, 2017	Jun.19, 2018
ANTENNA	SCHWARZBECK	VULB9168	D69250	Sep.28, 2017	Sep.27, 2018
Radiation Cable 1	MXT	RS1	R005	June 6, 2018	June 5, 2019
Radiation Cable 2	MXT	RS1	R006	June 6, 2018	June 5, 2019
Loop Antenna	A.H.Systems,Inc	SAS-562B	--	Mar. 01, 2018	Feb. 28, 2020

7. ANTENNA REQUIREMENT

7.1. 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.

7.2. TEST RESULT

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

8. RADIATED EMISSION

8.1 LIMITS

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. 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)

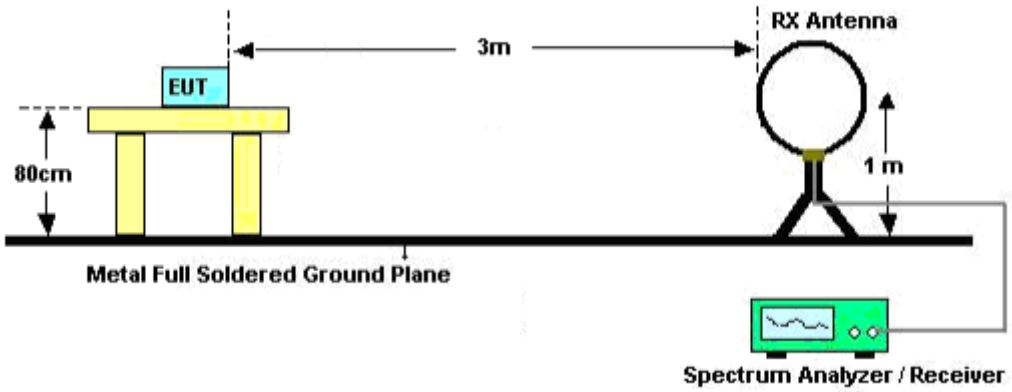
The following table is the setting of spectrum analyzer and receiver.

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	1GHz~26.5GHz RBW 2MHz/ VBW 6MHz for Peak, RBW 1.5MHz/ VBW 10Hz for Average

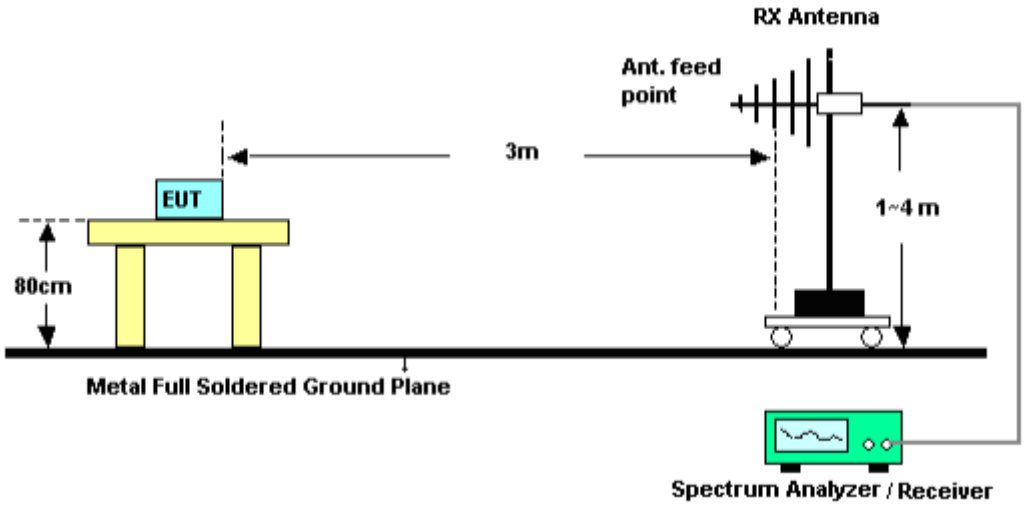
Receiver Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP

8.3 TEST SETUP

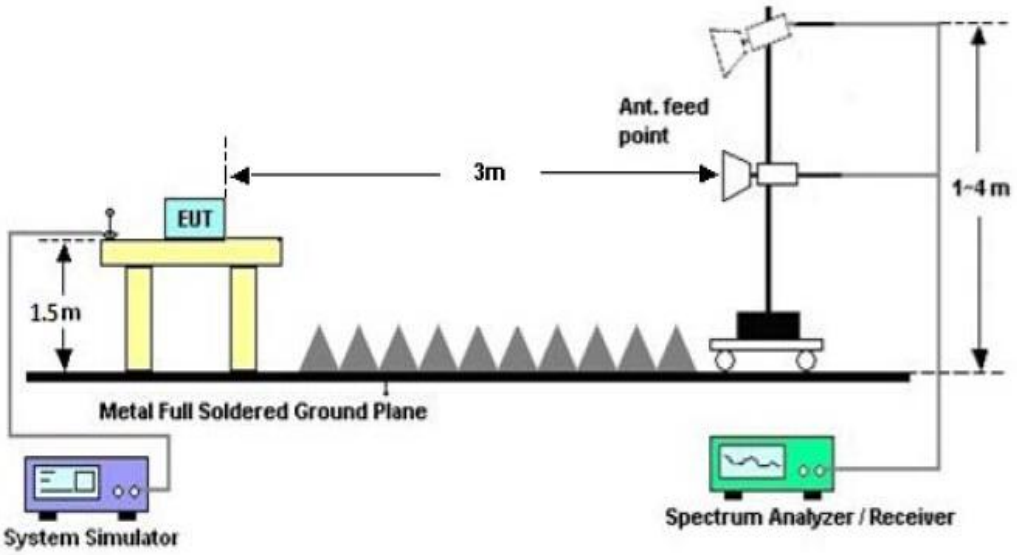
RADIATED EMISSION TEST SETUP BELOW 30MHz



RADIATED EMISSION TEST SETUP 30MHz-1000MHz



RADIATED EMISSION TEST SETUP ABOVE 1000MHz



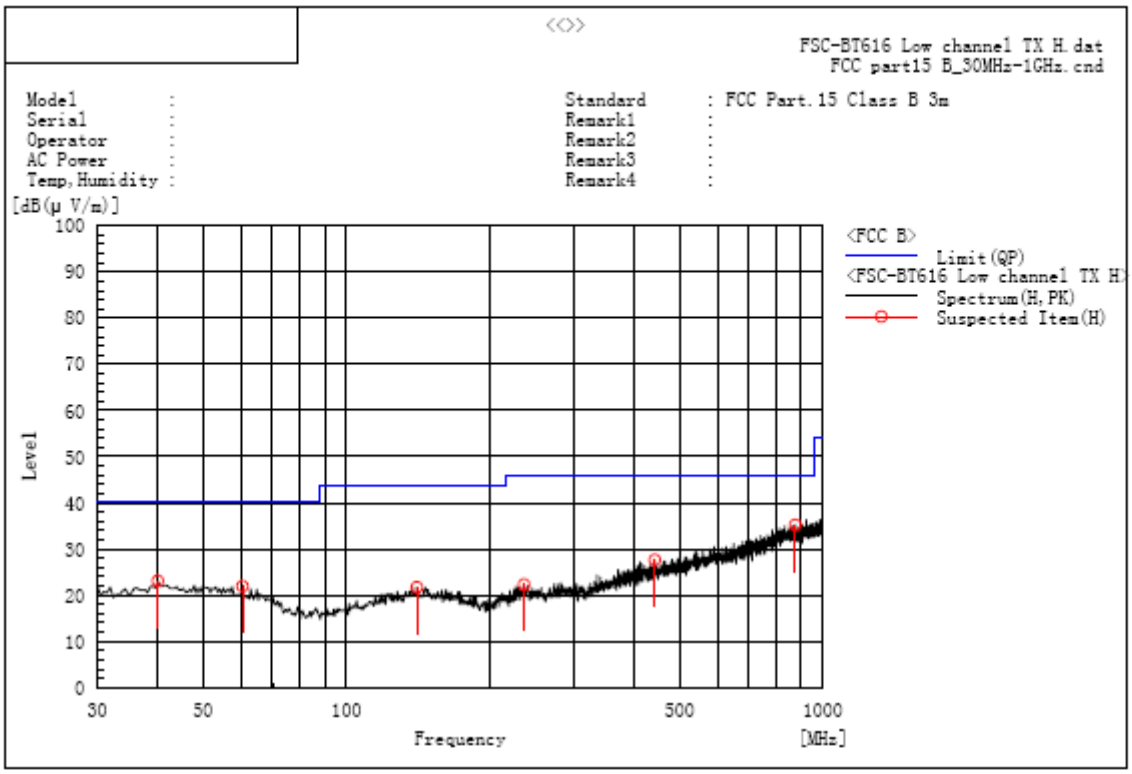
8.4 TEST RESULT

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

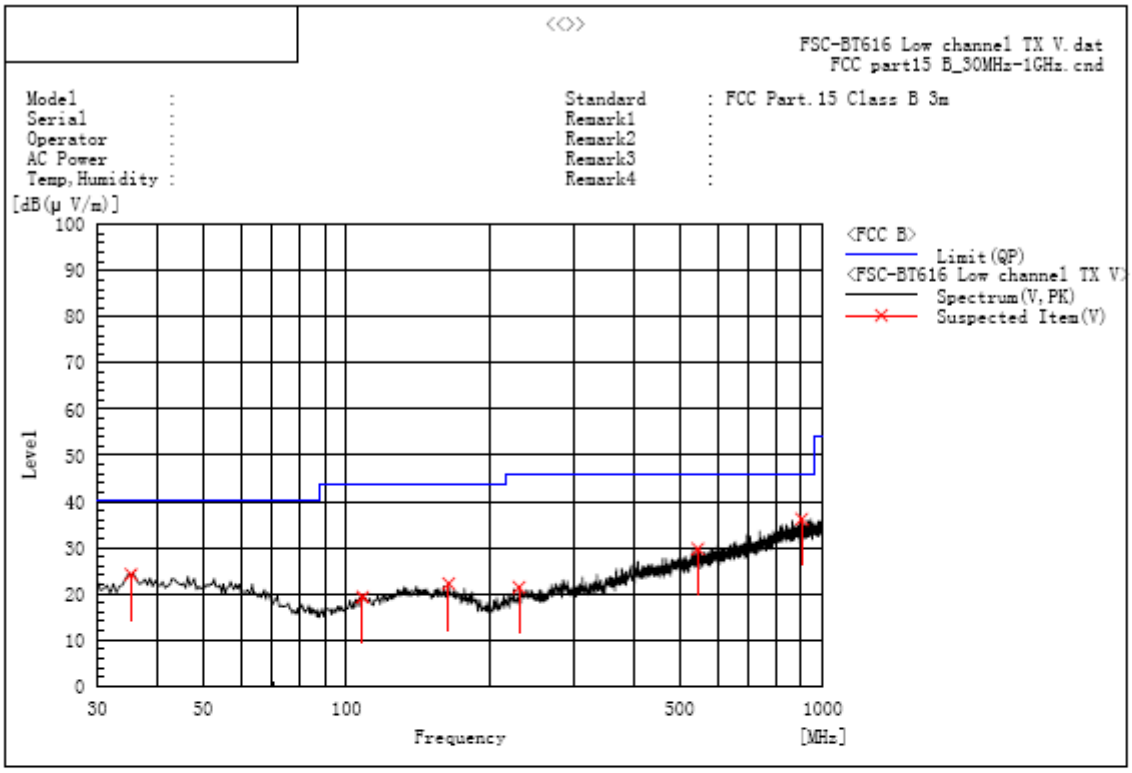


A. Suspected List:

Frequency MHz	Polarization	Reading dB(uV)	Factor dB (1/m)	Level dB(uV/m) PK	Limit dB(uV/m) QP	Margin dB	Pass/Fail	Height cm	Angle deg
40.185	H	5.7	17.4	23.1	40.0	16.9	Pass	100.0	344.3
60.555	H	5.8	16.1	21.9	40.0	18.1	Pass	100.0	126.6
140.580	H	5.1	16.6	21.7	43.5	21.8	Pass	200.0	305.1
236.125	H	6.2	16.1	22.3	46.0	23.7	Pass	200.0	273.2
443.705	H	5.6	22.0	27.6	46.0	18.4	Pass	100.0	126.6
875.355	H	5.3	29.9	35.2	46.0	10.8	Pass	100.0	91.1

RESULT: PASS

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



A. Suspected List:

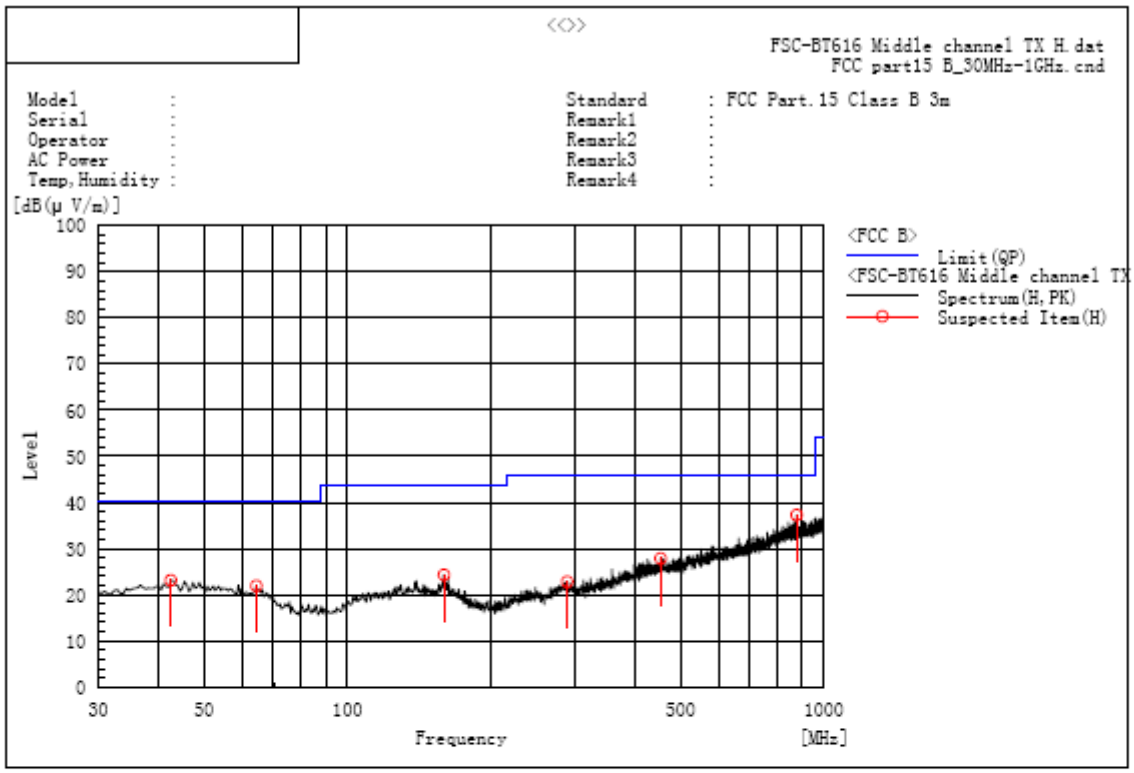
Frequency MHz	Polarization	Reading dB(uV)	Factor dB (1/m)	Level dB(uV/m) PK	Limit dB(uV/m) QP	Margin dB	Pass/Fail	Height cm	Angle deg
35.335	V	7.9	16.3	24.2	40.0	15.8	Pass	100.0	119.6
108.085	V	5.0	14.3	19.3	43.5	24.2	Pass	150.0	48.5
163.860	V	5.7	16.5	22.2	43.5	21.3	Pass	150.0	192.8
230.305	V	5.7	15.7	21.4	46.0	24.6	Pass	200.0	266.9
546.040	V	5.9	23.8	29.7	46.0	16.3	Pass	100.0	264.9
902.515	V	6.0	30.2	36.2	46.0	9.8	Pass	200.0	266.9

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

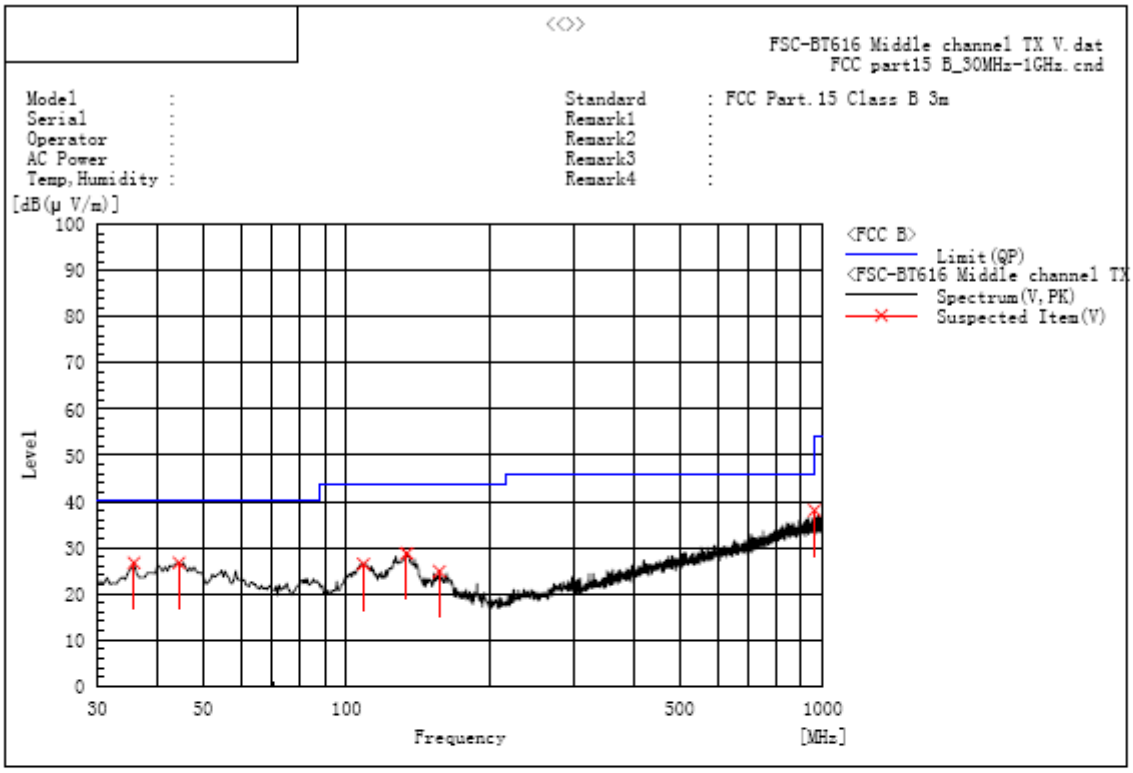


A. Suspected List:

Frequency MHz	Polarization	Reading dB(uV)	Factor dB (1/m)	Level dB(uV/m) PK	Limit dB(uV/m) QP	Margin dB	Pass/Fail	Height cm	Angle deg
42.610	H	5.7	17.4	23.1	40.0	16.9	Pass	100.0	358.5
64.435	H	6.2	15.7	21.9	40.0	18.1	Pass	200.0	92.1
159.495	H	7.7	16.6	24.3	43.5	19.2	Pass	200.0	92.1
289.475	H	5.2	17.6	22.8	46.0	23.2	Pass	200.0	92.1
454.375	H	5.7	22.2	27.9	46.0	18.1	Pass	100.0	286.3
876.325	H	7.4	29.9	37.3	46.0	8.7	Pass	100.0	72.5

RESULT: PASS

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



A. Suspected List:

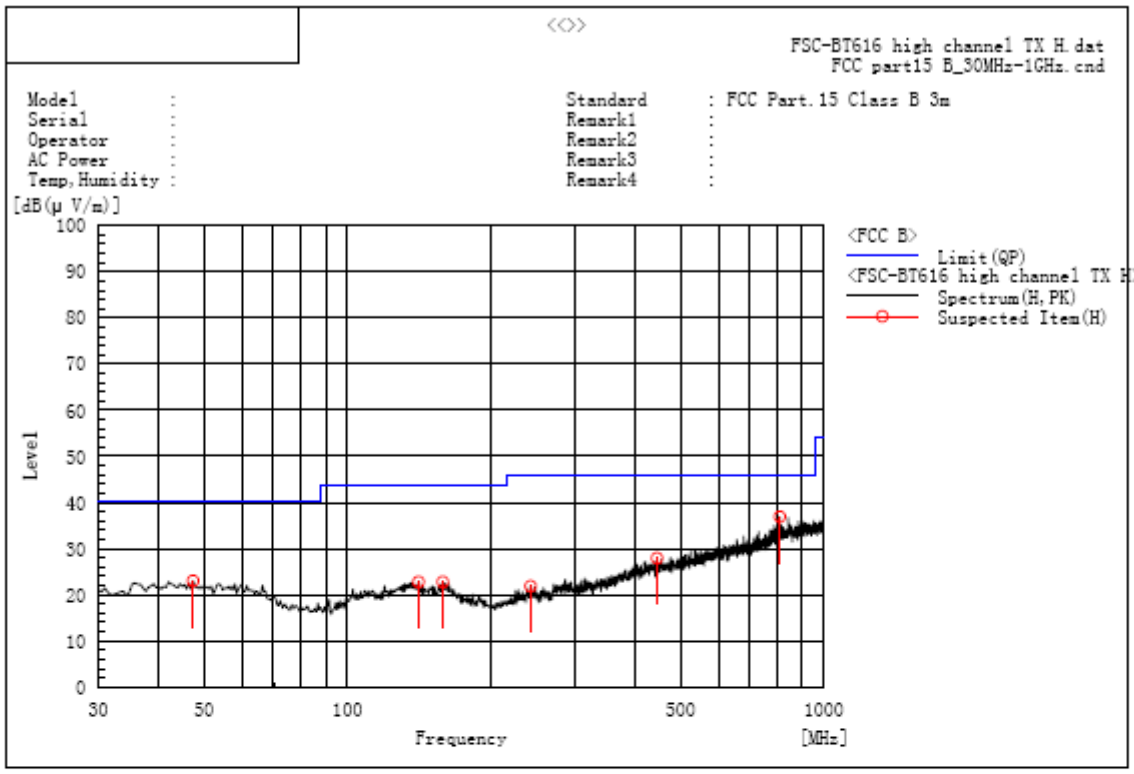
Frequency MHz	Polarization	Reading dB(uV)	Factor dB (1/m)	Level dB(uV/m) PK	Limit dB(uV/m) QP	Margin dB	Pass/Fail	Height cm	Angle deg
35.820	V	10.2	16.5	26.7	40.0	13.3	Pass	200.0	213.3
44.550	V	9.4	17.3	26.7	40.0	13.3	Pass	100.0	342.3
108.570	V	12.1	14.4	26.5	43.5	17.0	Pass	150.0	216.4
133.790	V	12.3	16.5	28.8	43.5	14.7	Pass	150.0	71.5
156.585	V	8.2	16.6	24.8	43.5	18.7	Pass	100.0	269.0
959.745	V	7.4	30.7	38.1	46.0	7.9	Pass	200.0	70.6

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

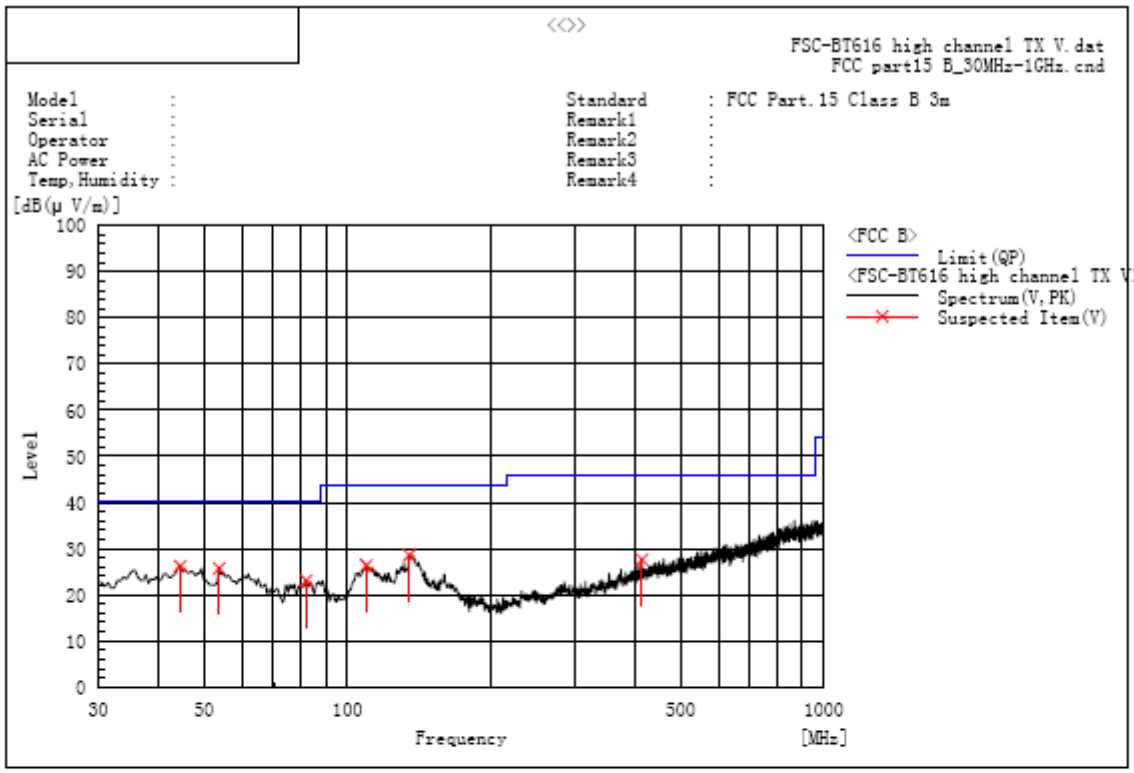


A. Suspected List:

Frequency MHz	Polarization	Reading dB(uV)	Factor dB (1/m)	Level dB(uV/m) PK	Limit dB(uV/m) QP	Margin dB	Pass/Fail	Height cm	Angle deg
47.460	H	5.8	17.2	23.0	40.0	17.0	Pass	150.0	179.9
141.065	H	6.2	16.6	22.8	43.5	20.7	Pass	200.0	180.0
158.525	H	6.2	16.6	22.8	43.5	20.7	Pass	100.0	268.8
242.430	H	5.7	16.2	21.9	46.0	24.1	Pass	100.0	51.7
446.615	H	5.9	22.0	27.9	46.0	18.1	Pass	100.0	302.9
807.940	H	8.0	28.9	36.9	46.0	9.1	Pass	100.0	265.7

RESULT: PASS

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



A. Suspected List:

Frequency MHz	Polarization	Reading dB(uV)	Factor dB (1/m)	Level dB(uV/m) PK	Limit dB(uV/m) QP	Margin dB	Pass/Fail	Height cm	Angle deg
44.550	V	8.9	17.3	26.2	40.0	13.8	Pass	200.0	267.9
53.765	V	8.9	16.8	25.7	40.0	14.3	Pass	200.0	127.7
81.895	V	10.8	12.3	23.1	40.0	16.9	Pass	100.0	267.9
109.540	V	11.9	14.5	26.4	43.5	17.1	Pass	100.0	199.8
134.760	V	12.1	16.5	28.6	43.5	14.9	Pass	100.0	305.1
415.090	V	6.3	21.3	27.6	46.0	18.4	Pass	150.0	91.6

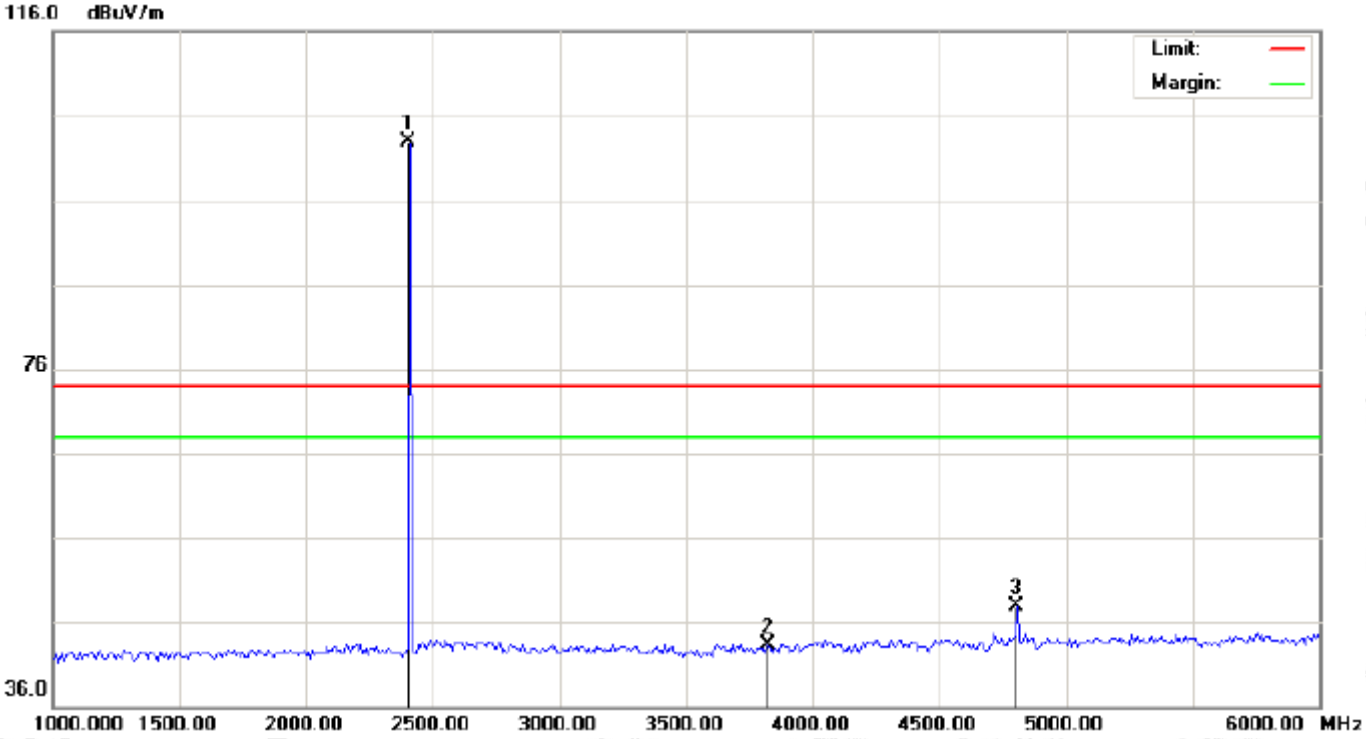
RESULT: PASS

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

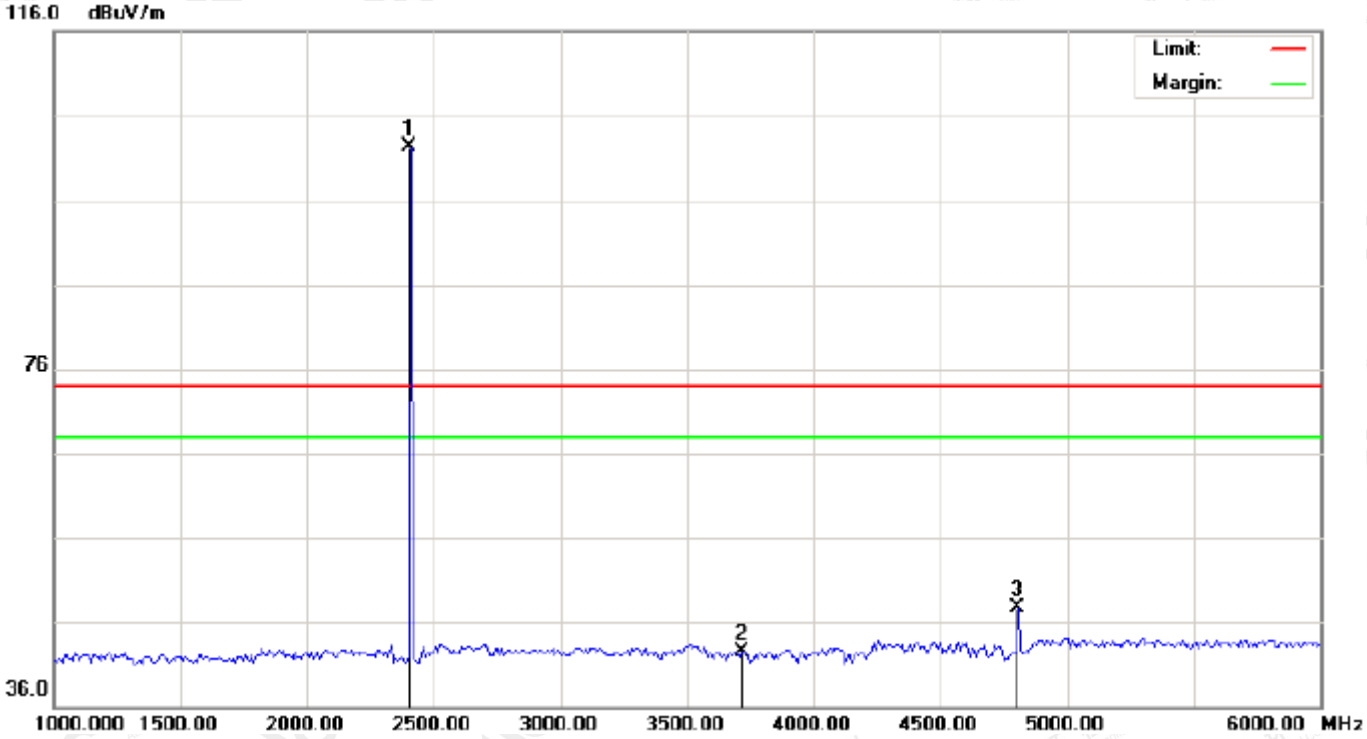
RADIATED EMISSION TEST- (ABOVE 1GHz)-LOW CHANNEL-HORIZONTAL



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	92.51	10.32	102.83	74.00	28.83	peak			
2		3825.000	29.20	14.11	43.31	74.00	-30.69	peak			
3		4804.000	40.21	7.69	47.90	74.00	-26.10	peak			

RESULT: PASS

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



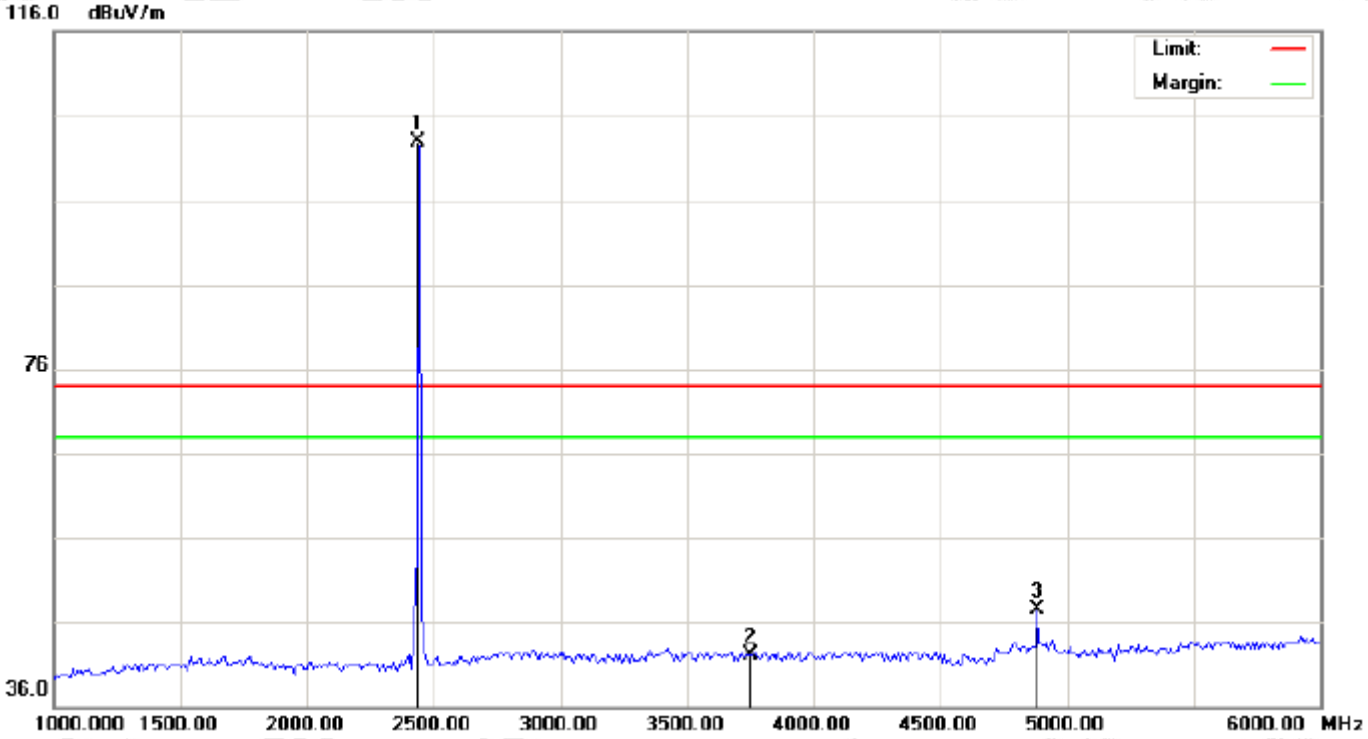
No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	*	2402.000	92.04	10.32	102.36	74.00	28.36	peak			
2		3716.667	29.08	13.44	42.52	74.00	-31.48	peak			
3		4804.000	40.05	7.69	47.74	74.00	-26.26	peak			

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.

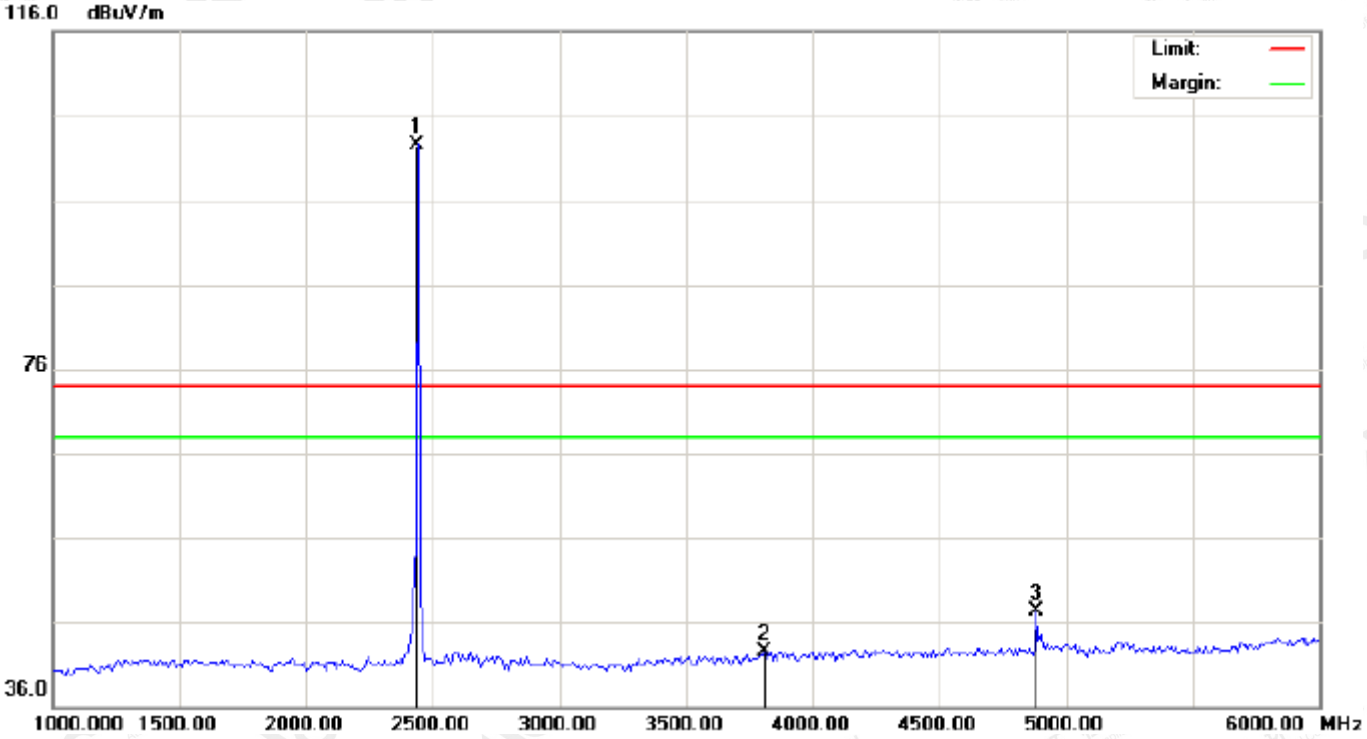
RADIATED EMISSION TEST-(ABOVE 1GHz)-MIDDLE CHANNEL-HORIZONTAL



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	92.57	10.36	102.93	74.00	28.93	peak			
2		3750.000	28.48	13.65	42.13	74.00	-31.87	peak			
3		4880.000	39.66	7.89	47.55	74.00	-26.45	peak			

RESULT: PASS

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



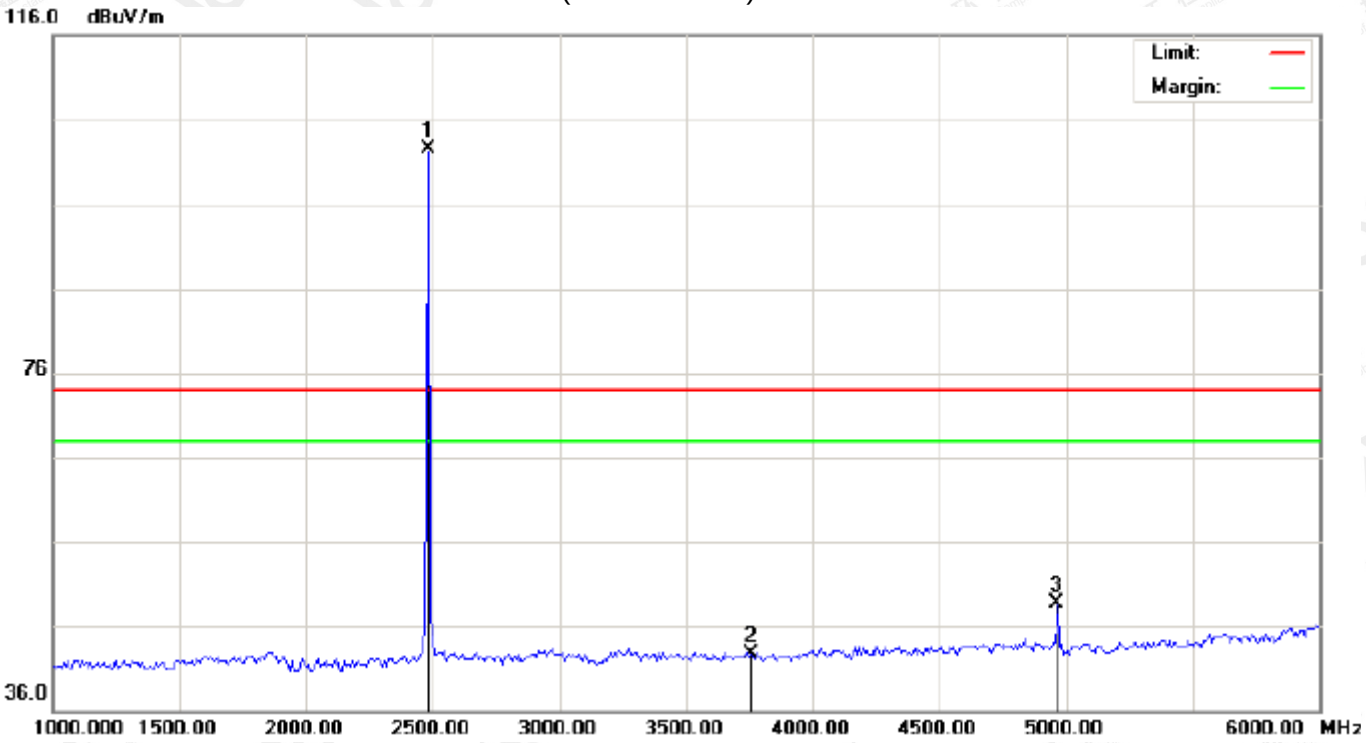
No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
	-	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	*	2440.000	92.14	10.36	102.50	74.00	28.50	peak			
2		3808.333	28.49	14.01	42.50	74.00	-31.50	peak			
3		4880.000	39.39	7.89	47.28	74.00	-26.72	peak			

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.

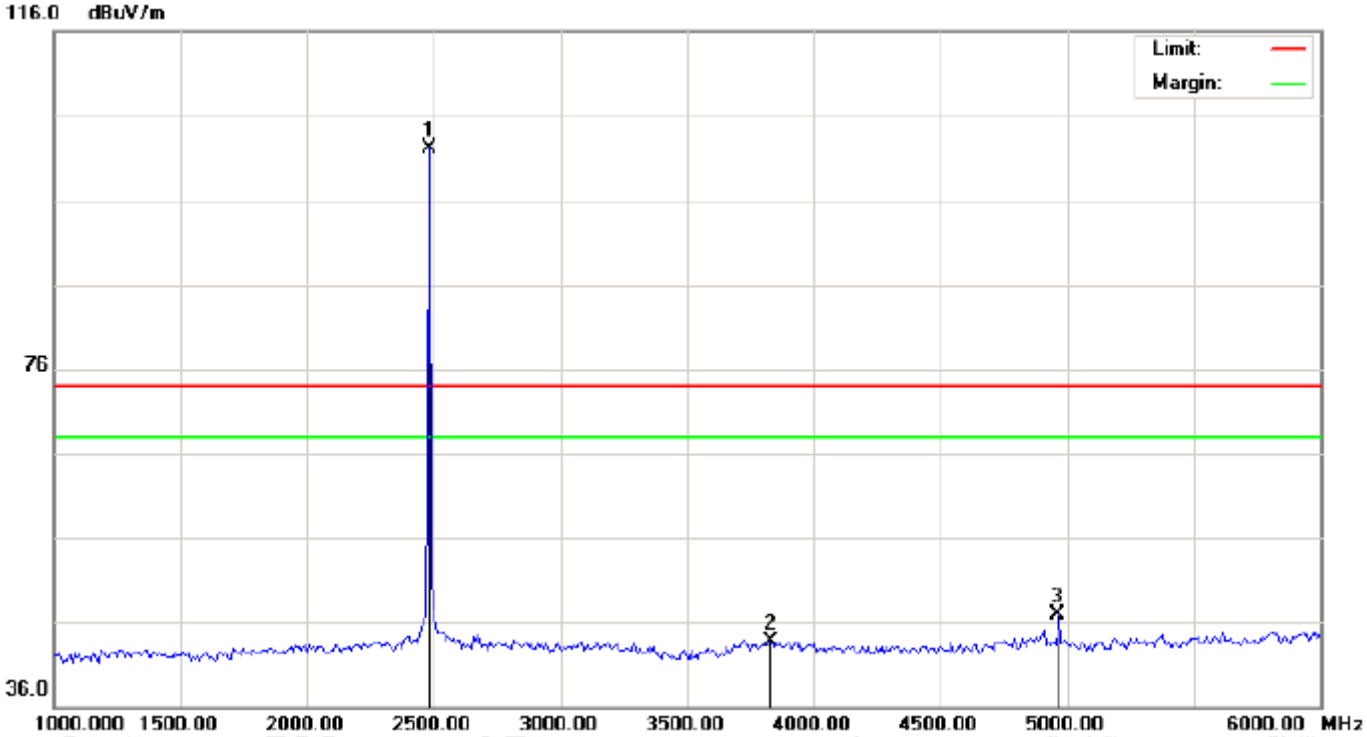
RADIATED EMISSION TEST-(ABOVE 1GHz)-HIGH CHANNEL-HORIZONTAL



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	92.17	10.41	102.58	74.00	28.58	peak			
2		3758.333	29.10	13.70	42.80	74.00	-31.20	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	91.75	10.41	102.16	74.00	28.16	peak			
2		3833.333	29.53	14.16	43.69	74.00	-30.31	peak			
3		4960.000	38.91	8.09	47.00	74.00	-27.00	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.

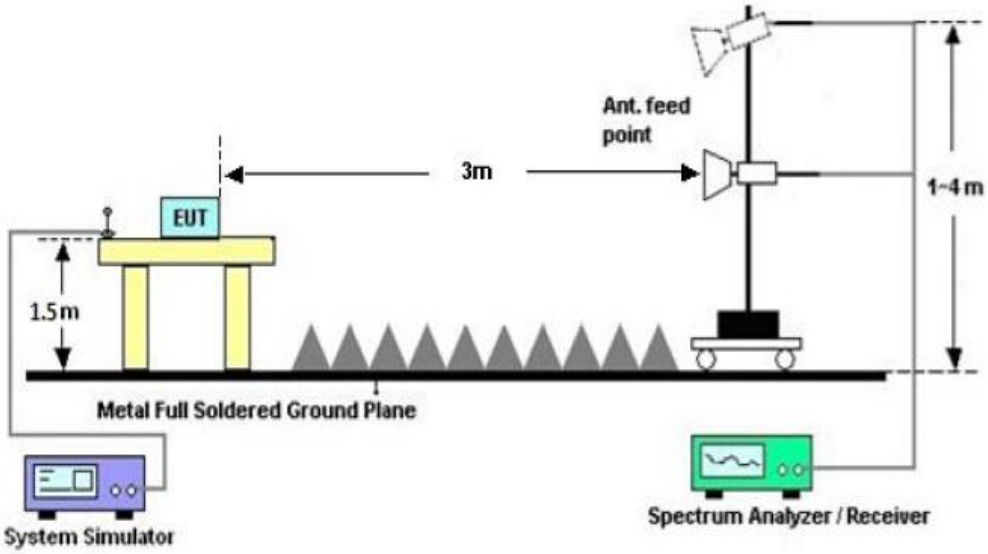
The “Factor” value can be calculated automatically by software of measurement system.

9. BAND EDGE EMISSION

9.1. MEASUREMENT PROCEDURE

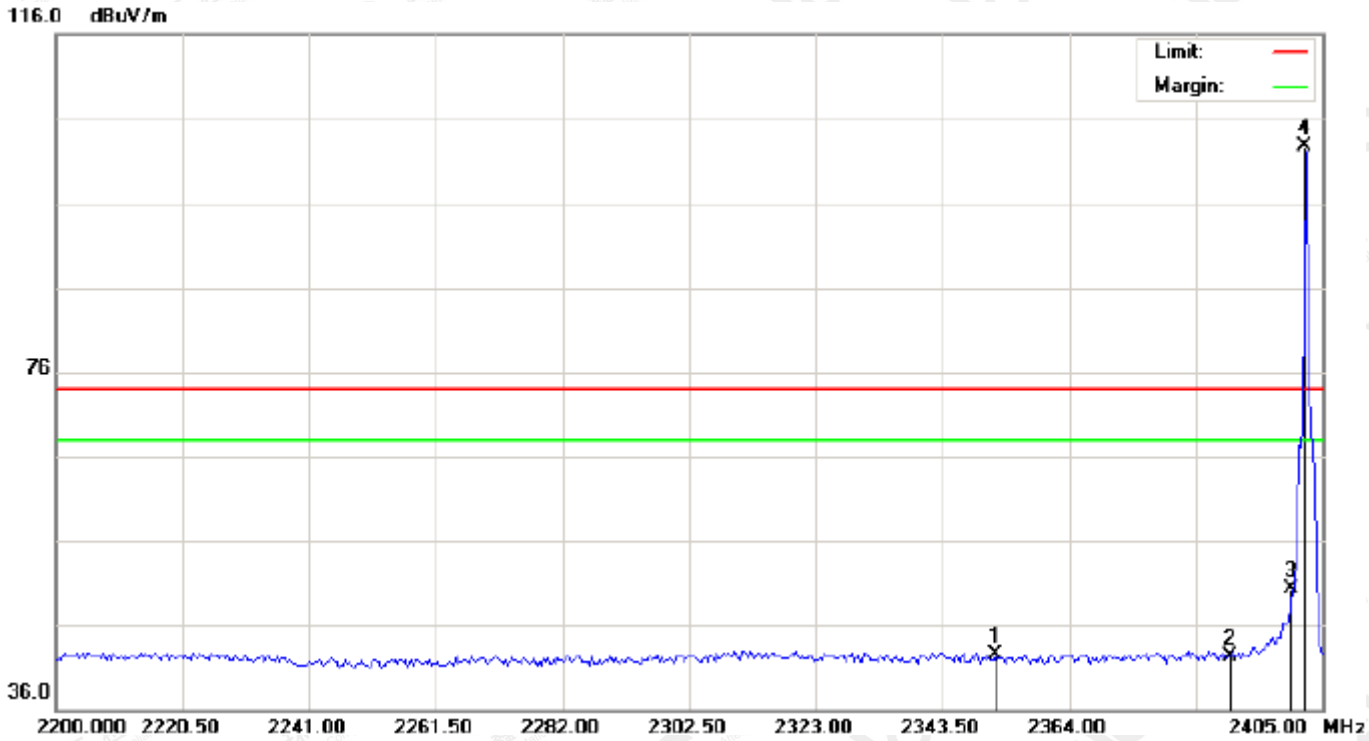
1. Set the EUT Work on the top, the bottom operation frequency individually.
2. Set SPA Start or Stop Frequency=Operation Frequency,
   For unrestricted band: RBW=100kHz, VBW=300kHz
   For restricted band: RBW=1MHz, VBW=3*RBW
   Center frequency =Operation frequency
3. The band edges was measured and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

9.2. TEST SET-UP



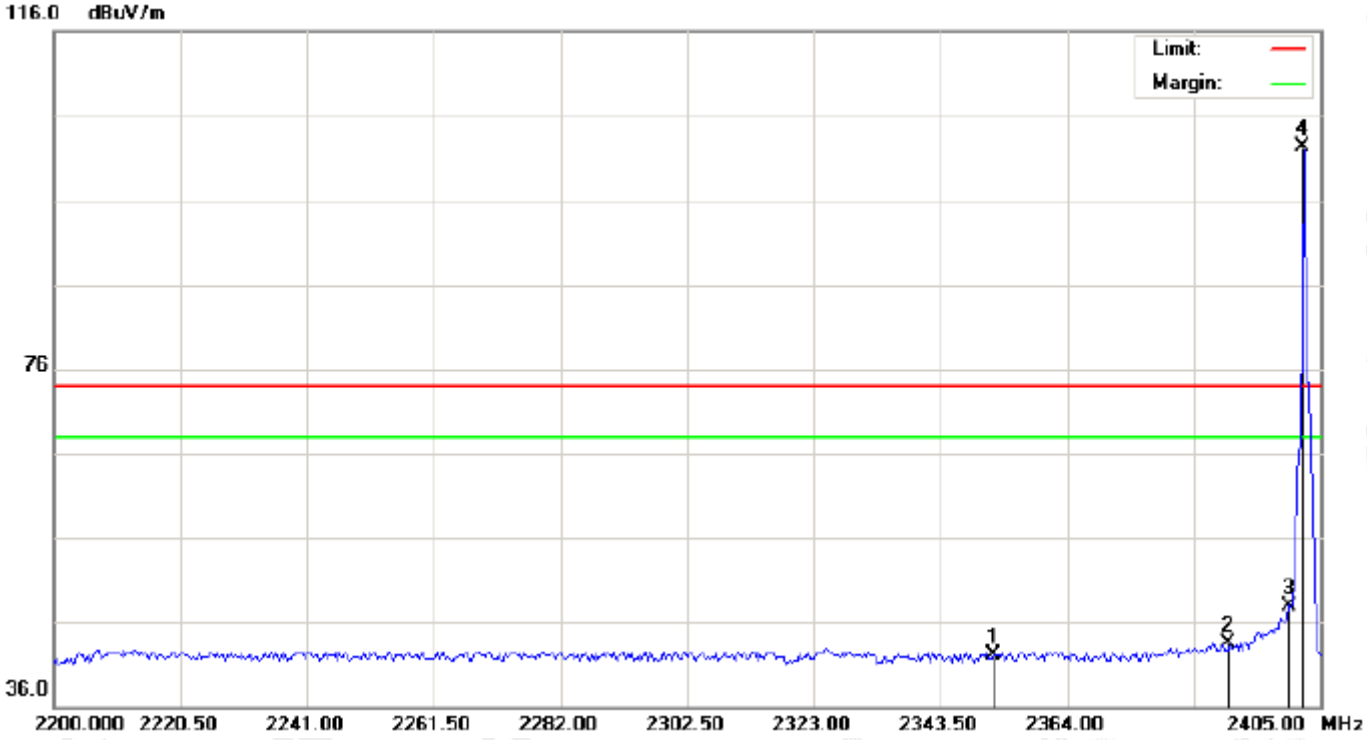
9.3. TEST RESULT

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		2352.042	32.19	10.27	42.46	74.00	-31.54	peak			
2		2390.000	32.00	10.31	42.31	74.00	-31.69	peak			
3		2400.000	39.97	10.32	50.29	74.00	-23.71	peak			
4	*	2402.000	92.48	10.32	102.80	74.00	28.80	peak			

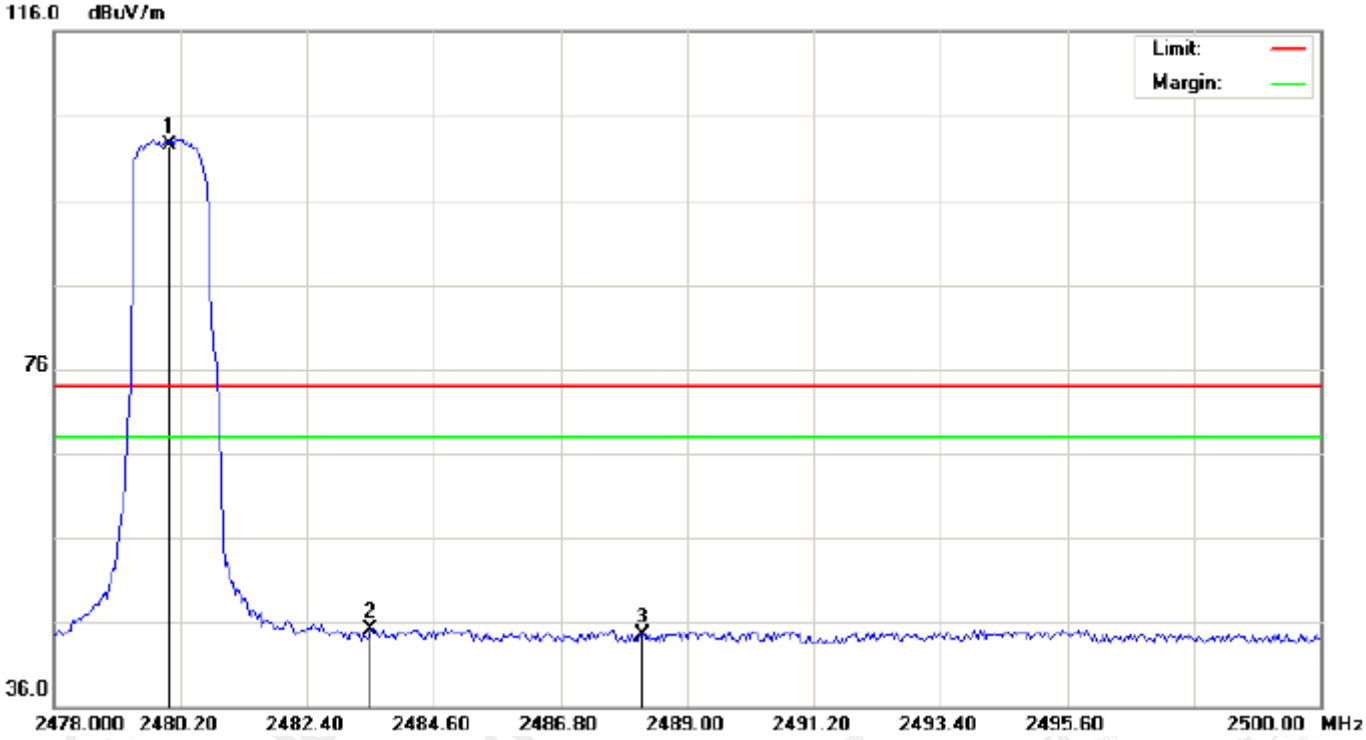
TEST PLOT OF BAND EDGE FOR LOW CHANNEL - Vertical



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		2352.042	31.80	10.27	42.07	74.00	-31.93	peak			
2		2390.000	33.21	10.31	43.52	74.00	-30.48	peak			
3		2400.000	37.56	10.32	47.88	74.00	-26.12	peak			
4	*	2402.000	92.00	10.32	102.32	74.00	28.32	peak			

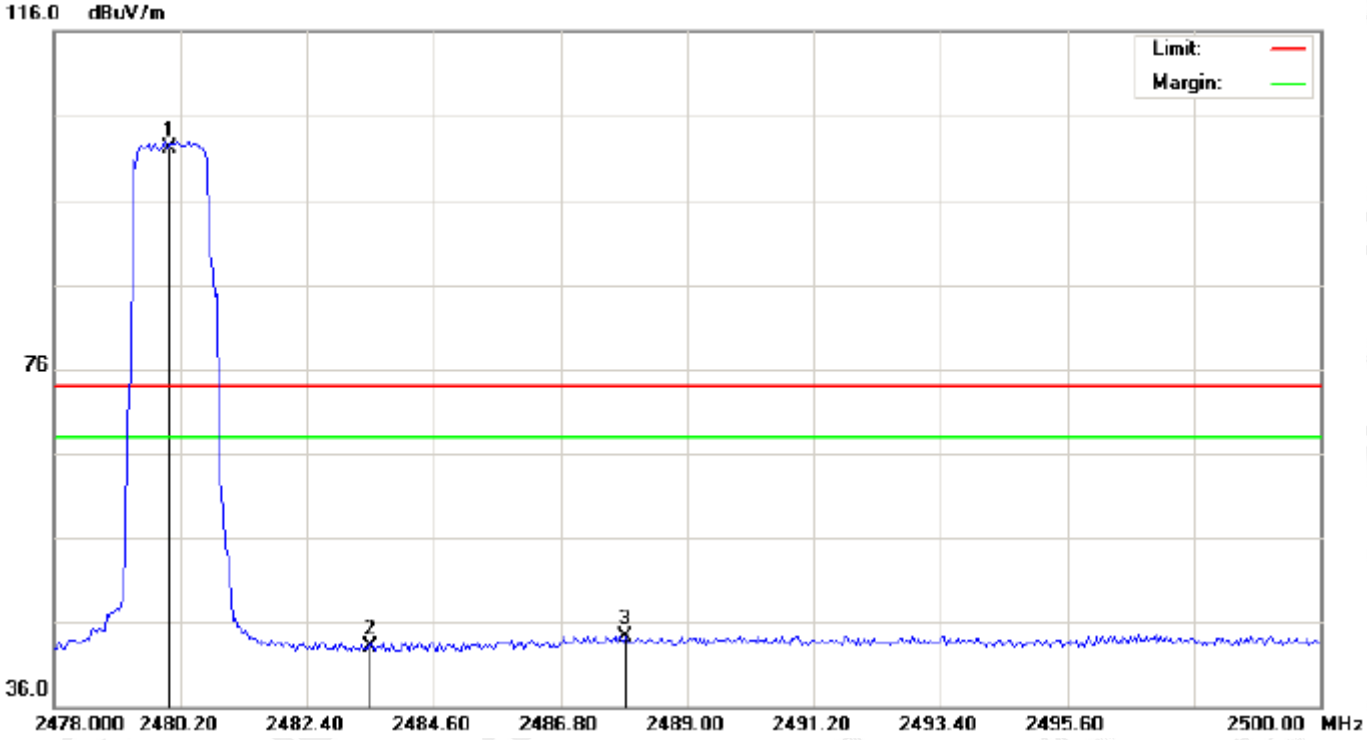
RESULT: PASS

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	92.14	10.41	102.55	74.00	28.55	peak			
2		2483.500	34.69	10.41	45.10	74.00	-28.90	peak			
3		2488.230	34.16	10.42	44.58	74.00	-29.42	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	91.79	10.41	102.20	74.00	28.20	peak			
2		2483.500	32.76	10.41	43.17	74.00	-30.83	peak			
3		2487.937	33.87	10.42	44.29	74.00	-29.71	peak			

RESULT: PASS

10. 6DB BANDWIDTH

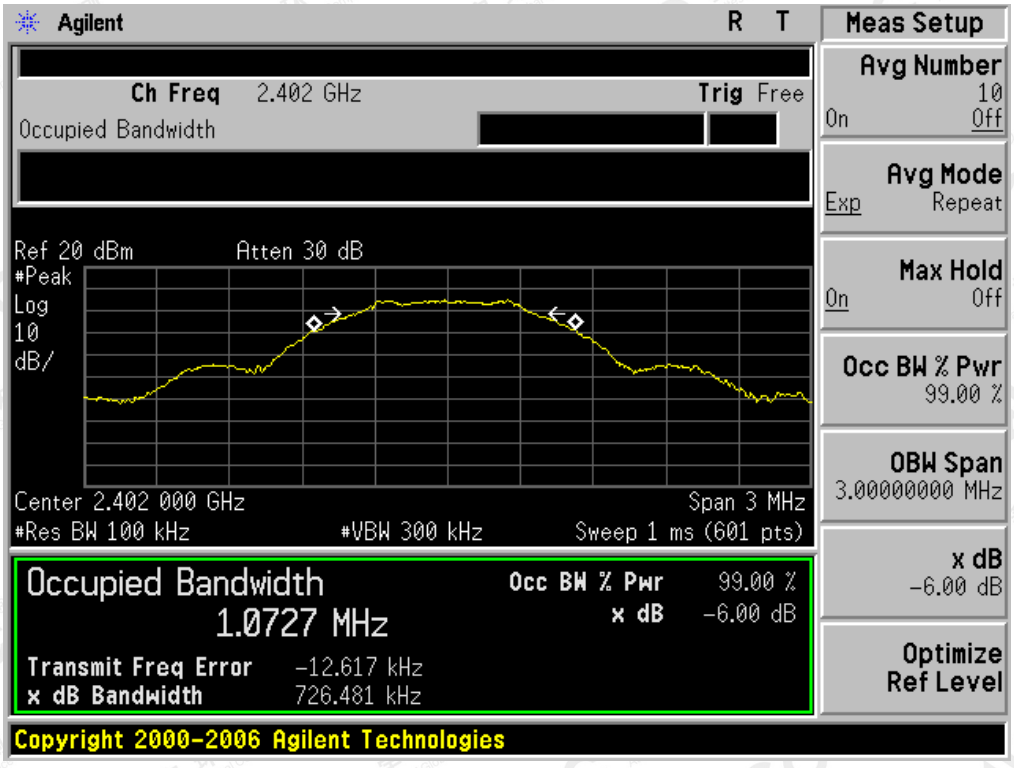
10.1. TEST PROCEDURE

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⩾3*RBW.
4. Set SPA Trace 1 Max hold, then View.

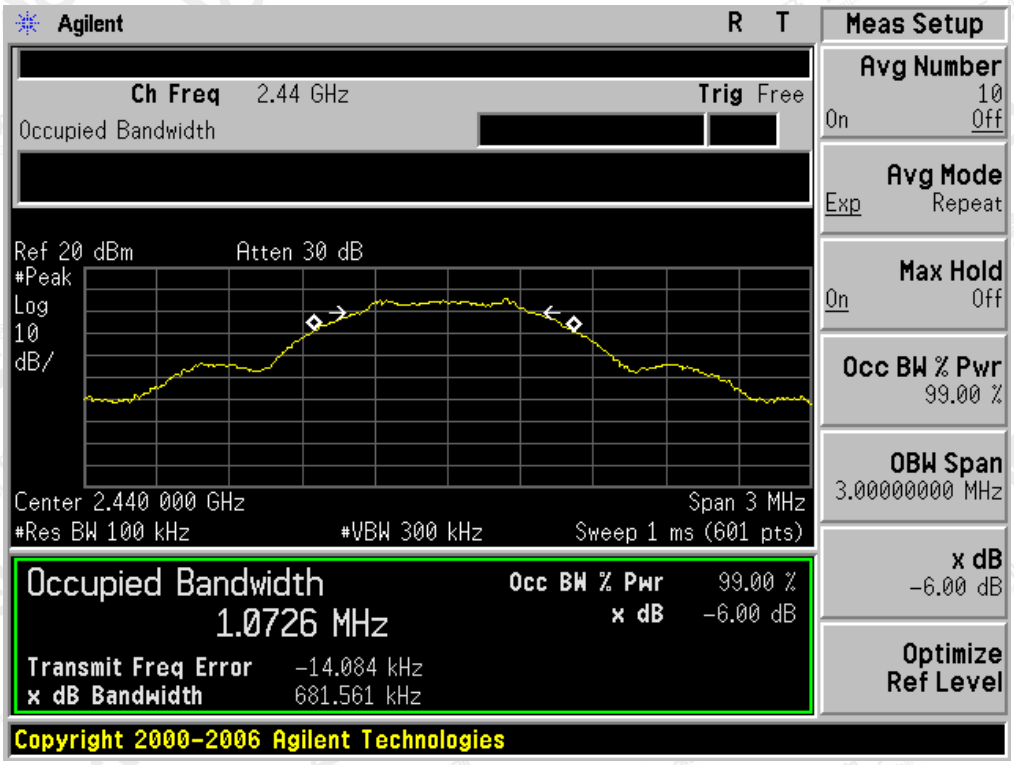
10.2. SUMMARY OF TEST RESULTS/PLOTS

Channel	6dB Bandwidth (KHz)	Minimum Limit (KHz)	Pass/Fail
Low	726	500KHz	Pass
Middle	682		Pass
High	742		Pass

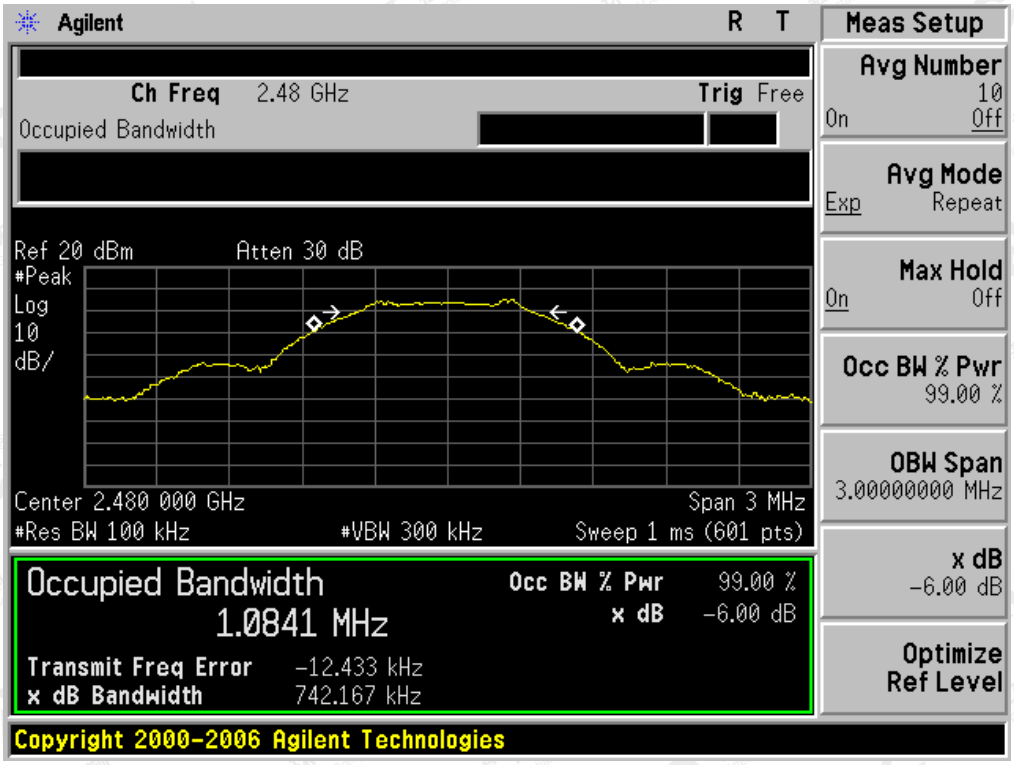
TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL

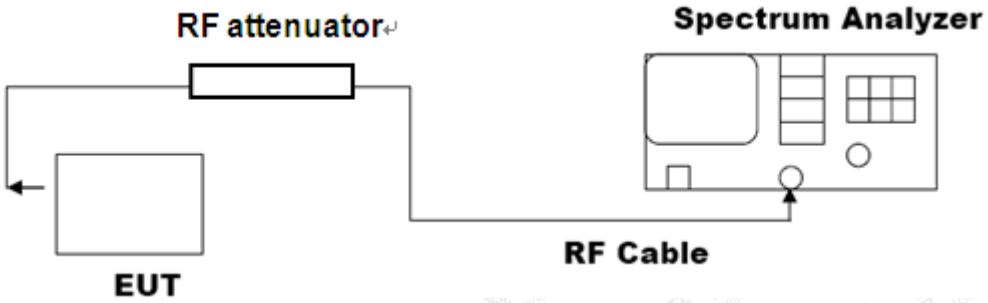


11. CONDUCTED OUTPUT POWER

11.1. 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 ≥ DTS bandwidth.
   b) Set VBW ≥ 3 RBW.
   c) Set span ≥ 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.

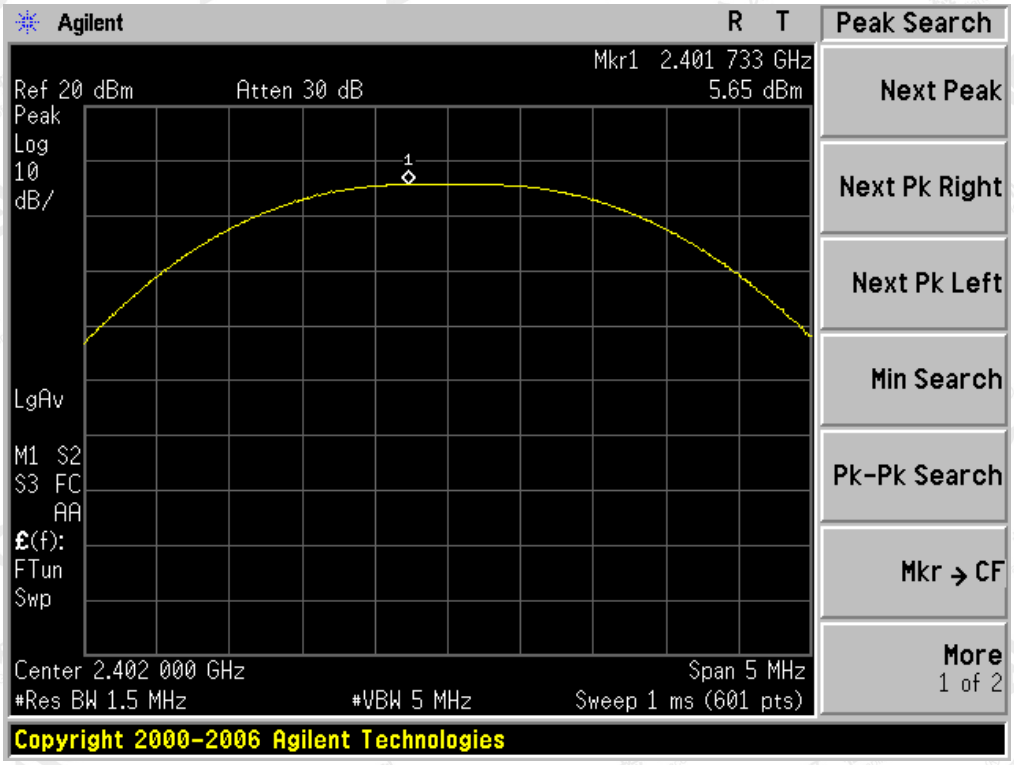
11.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)



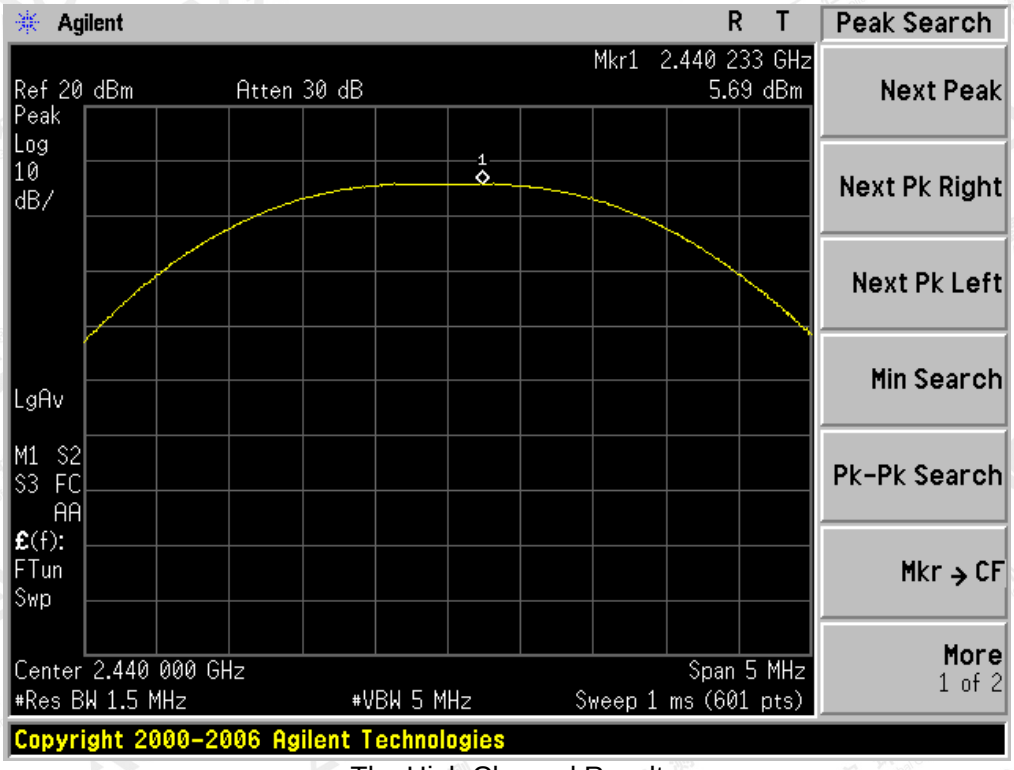
11.3. LIMITS AND MEASUREMENT RESULT

Channel	Peak Power (dBm)	Applicable Limits (dBm)	Pass/Fail
Low Channel	5.65	30	Pass
Middle Channel	5.69	30	Pass
High Channel	5.43	30	Pass

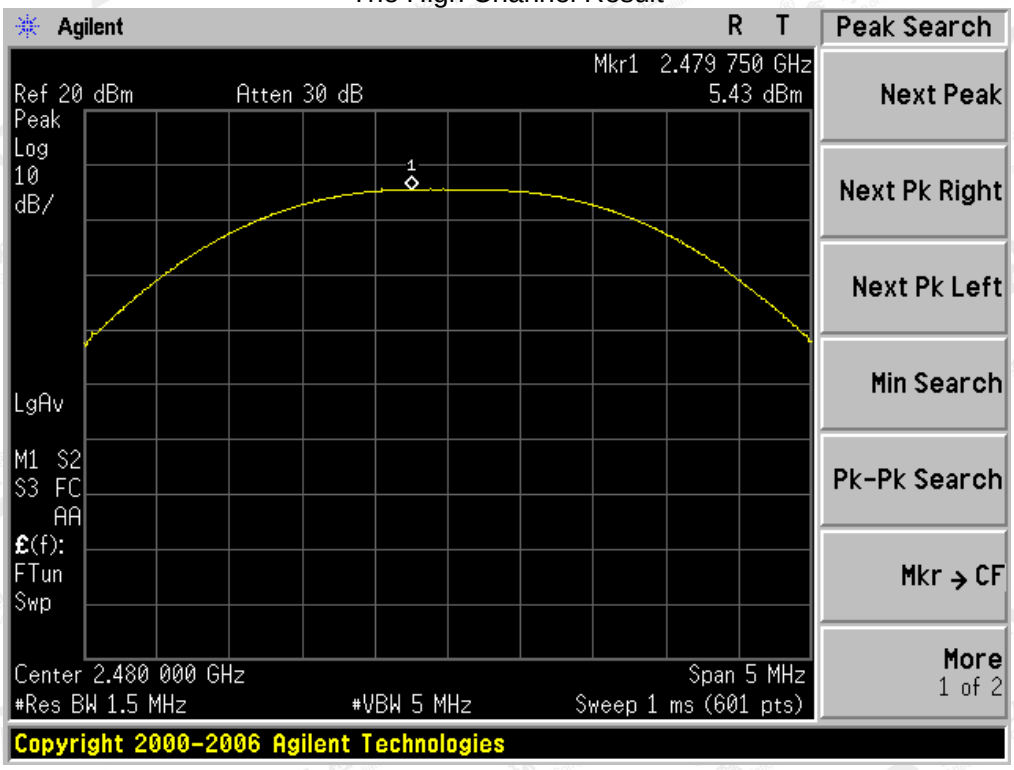
The Low Channel Result



The Middle Channel Result



The High Channel Result

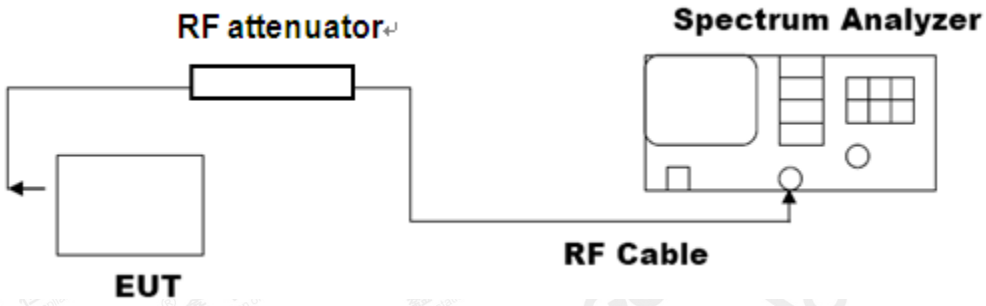


12. CONDUCTED SPURIOUS EMISSION

12.1. 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 = 300kHz; Sweep = auto; Detector function = peak.
4. Set SPA Trace 1 Max hold, then View.

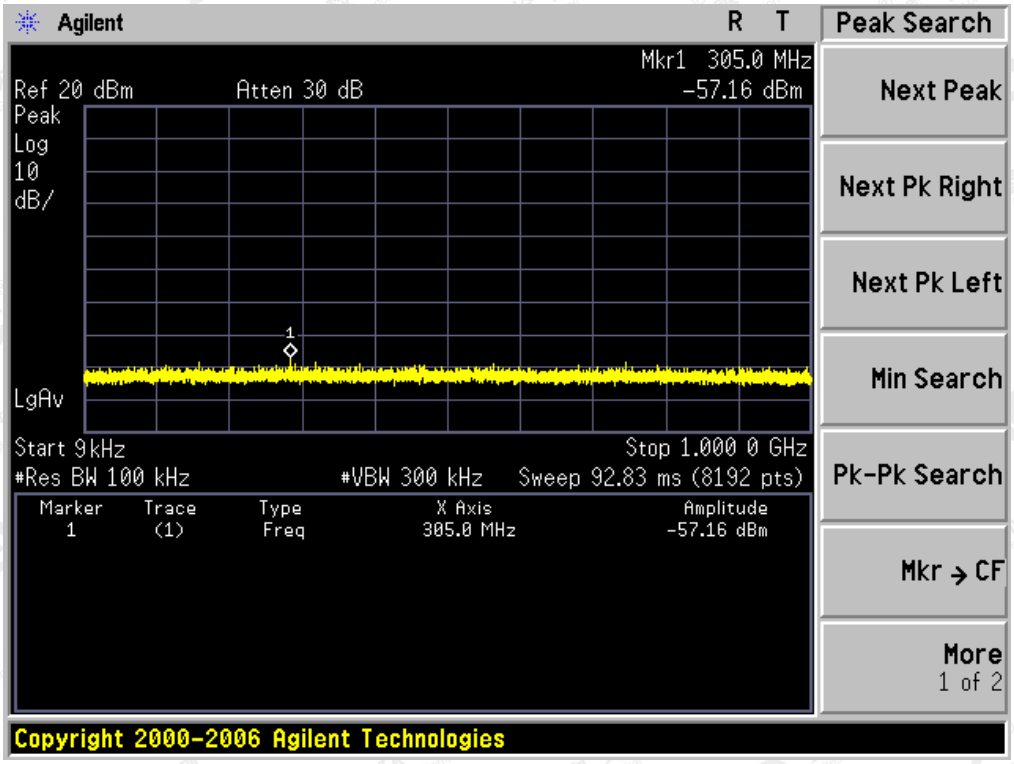
12.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

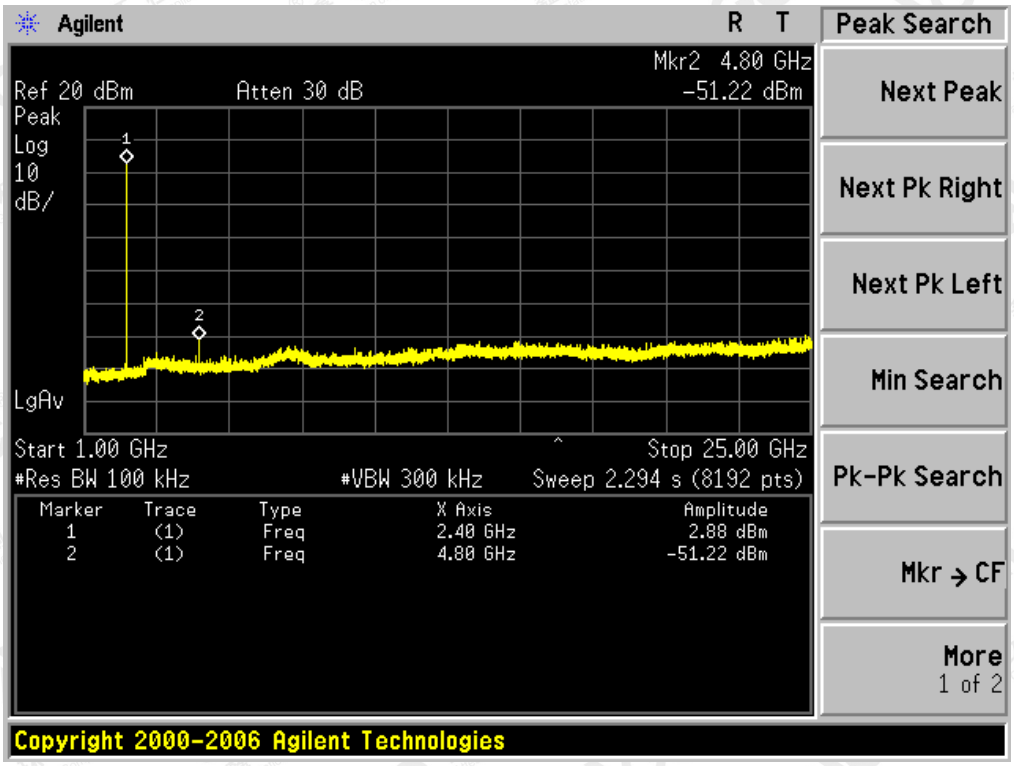


12.3. LIMITS AND MEASUREMENT RESULT

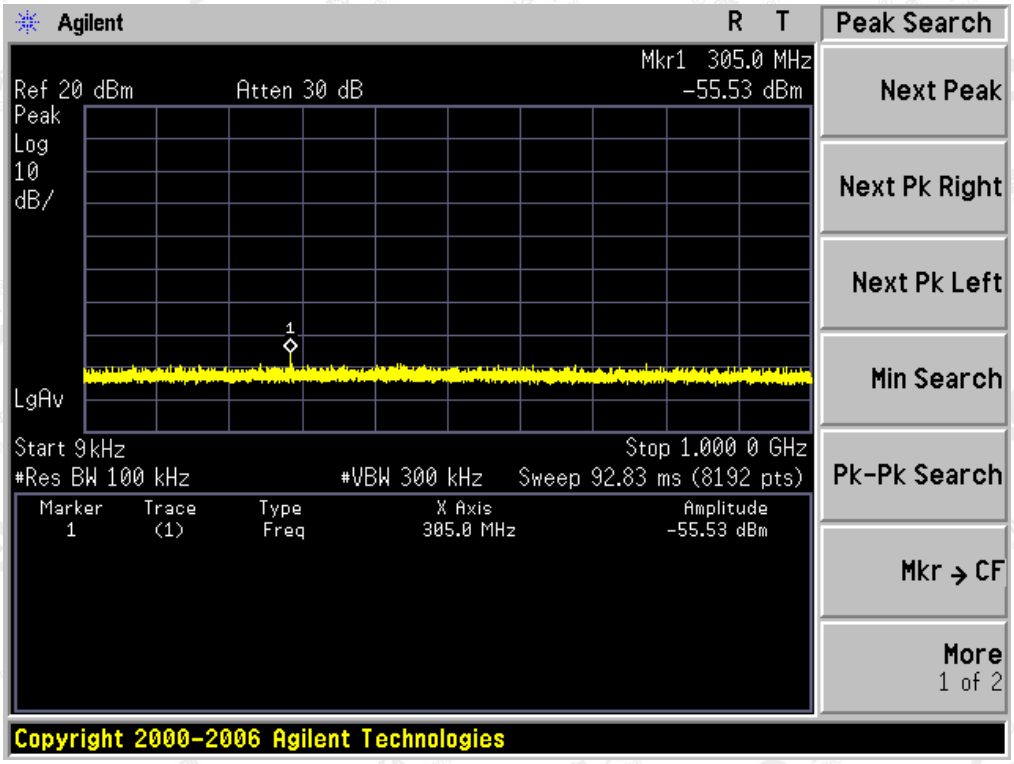
LIMITS AND MEASUREMENT RESULT		
Applicable Limits	**Measurement Result**	
	Test Data	**Result**
In any 100 KHz Bandwidth Outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produce by the intentional radiator shall be at least 20 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

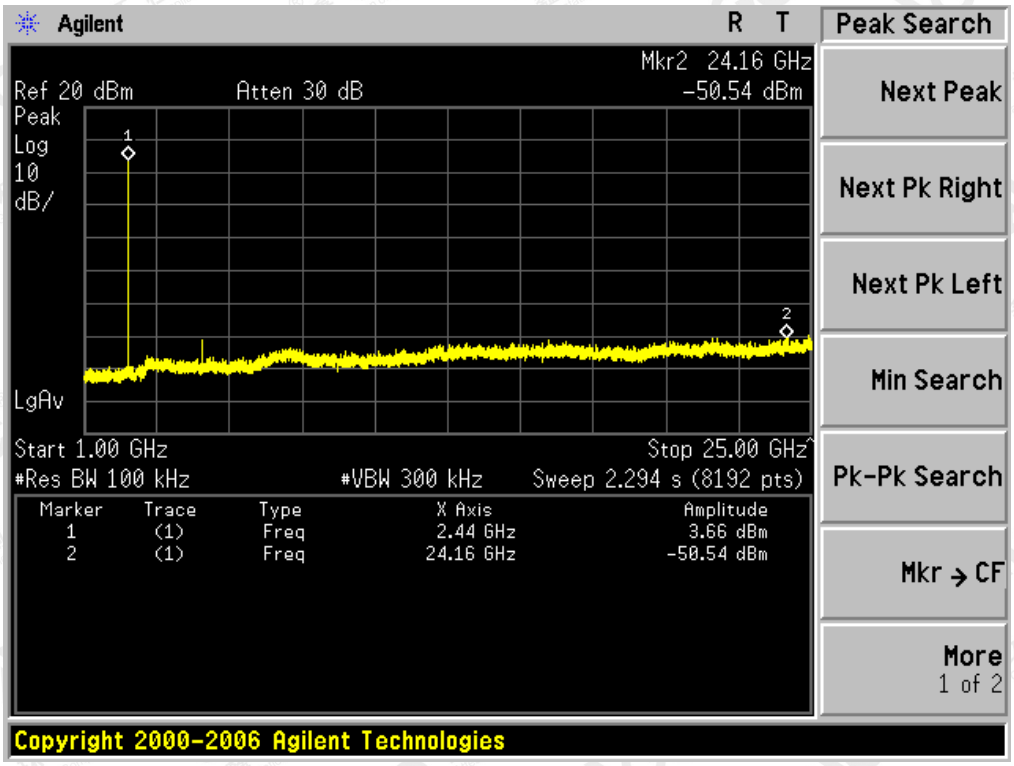
TEST PLOT OF OUT OF BAND EMISSIONS WITH THE WORST CASE OF GFSK MODULATION IN LOW CHANNEL



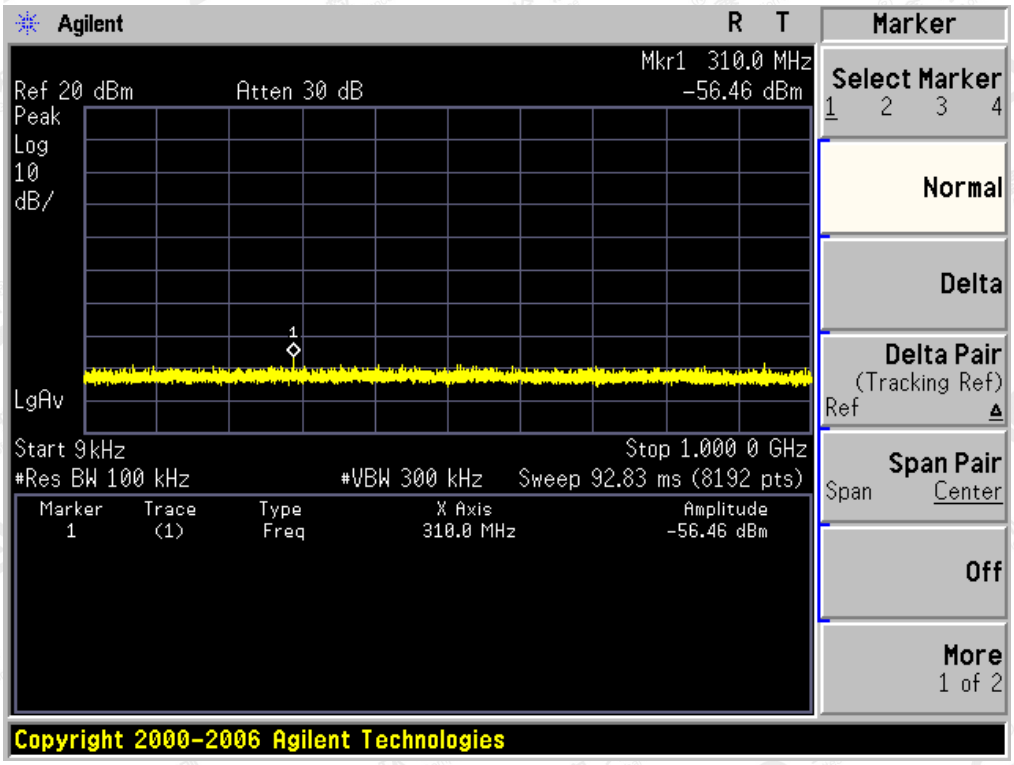


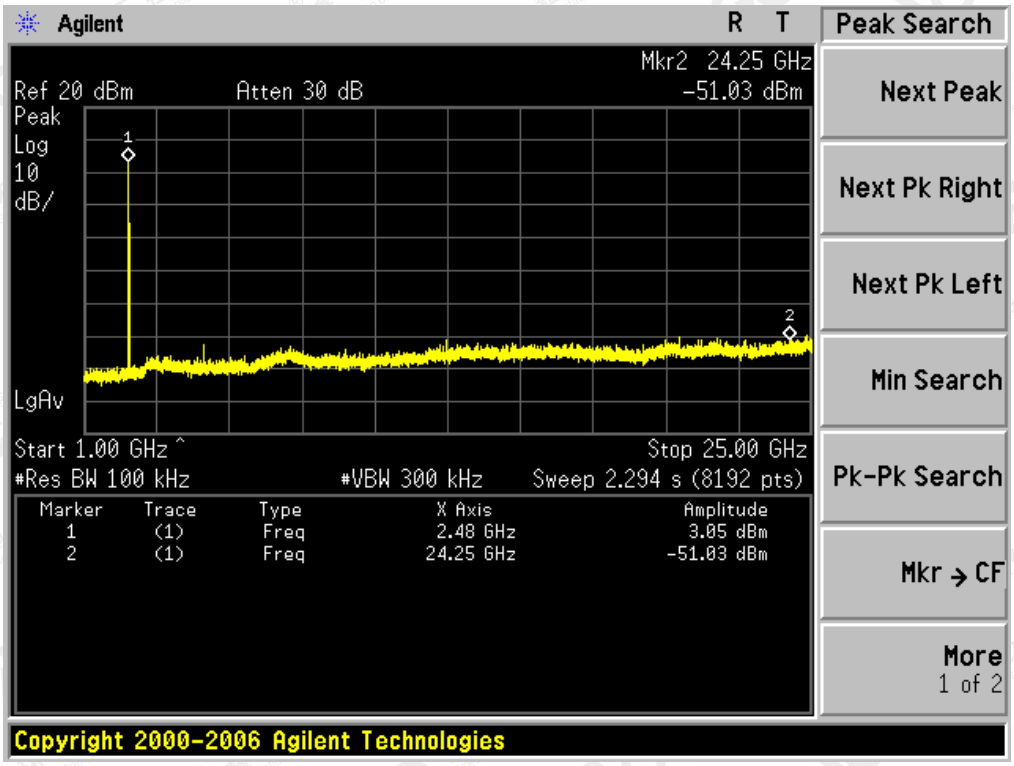
TEST PLOT OF OUT OF BAND EMISSIONS
OF GFSK MODULATION IN MIDDLE CHANNEL





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



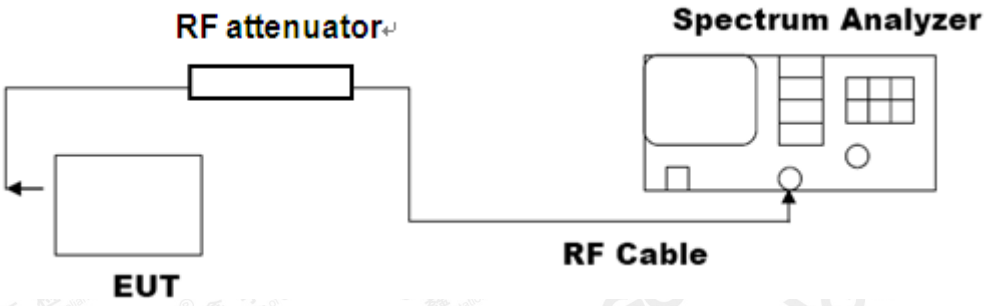


13. CONDUCTED OUTPUT POWER SPECTRAL DENSITY

13.1 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: 3kHz<=RBW<=100KHz, VBW>=3*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.

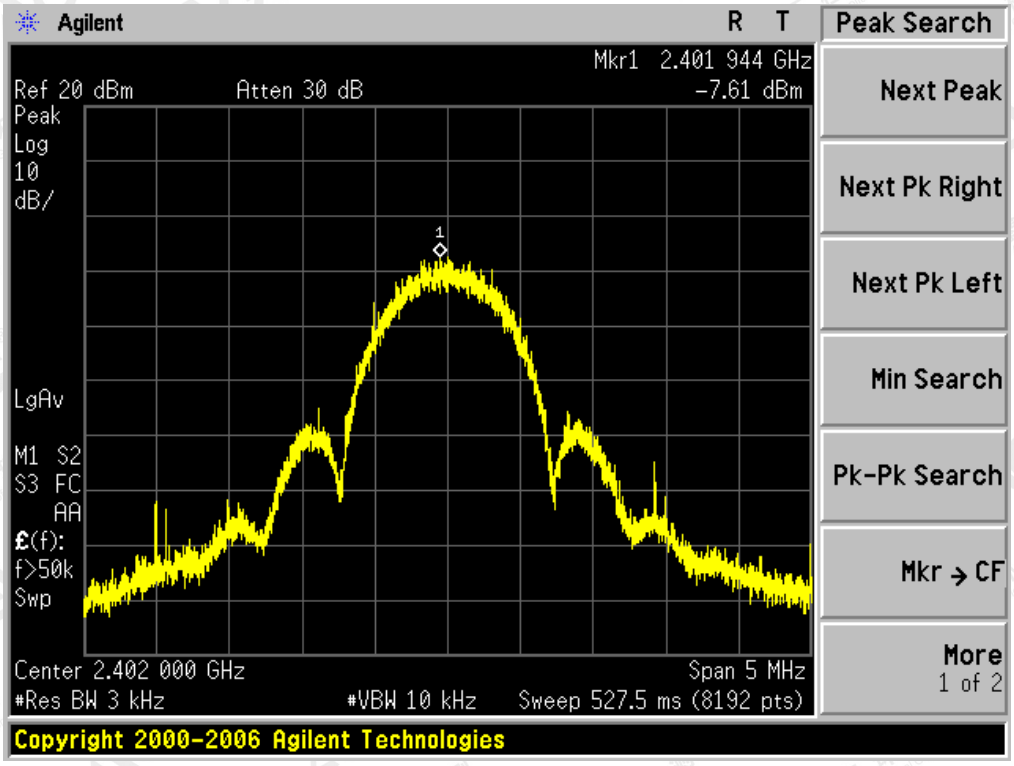
13.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)



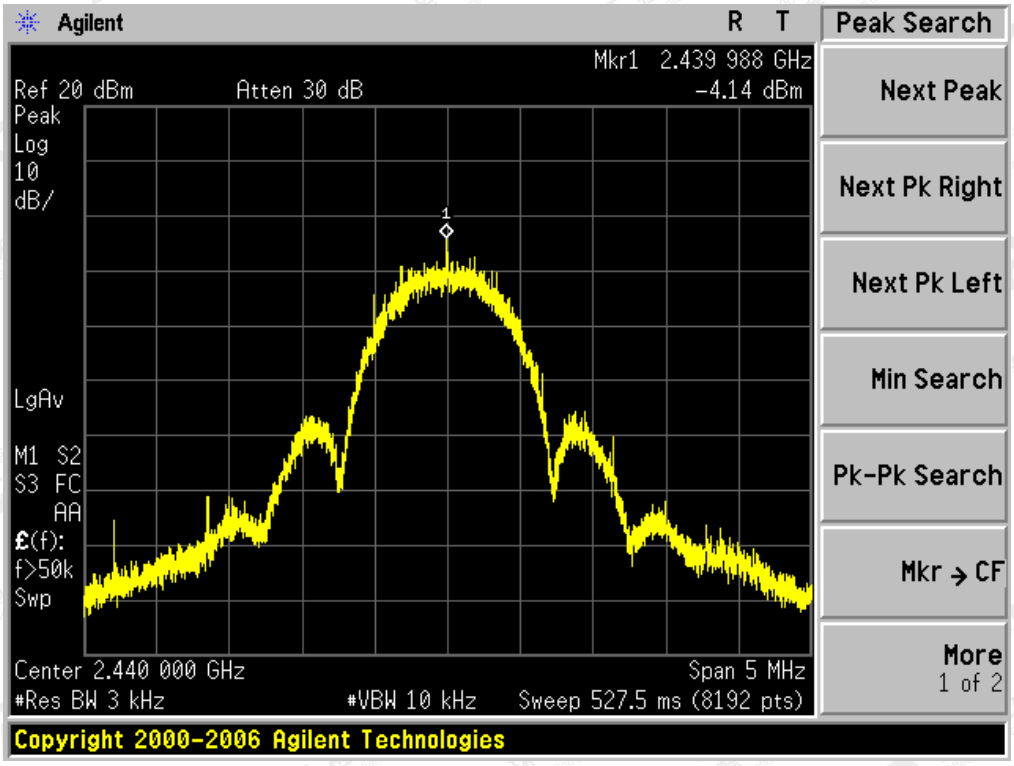
13.3 LIMITS AND MEASUREMENT RESULT

Channel No.	PSD (dBm/3KHz)	Limit (dBm/3KHz)	Result
Low Channel	-7.61	8	Pass
Middle Channel	-4.14	8	Pass
High Channel	-6.60	8	Pass

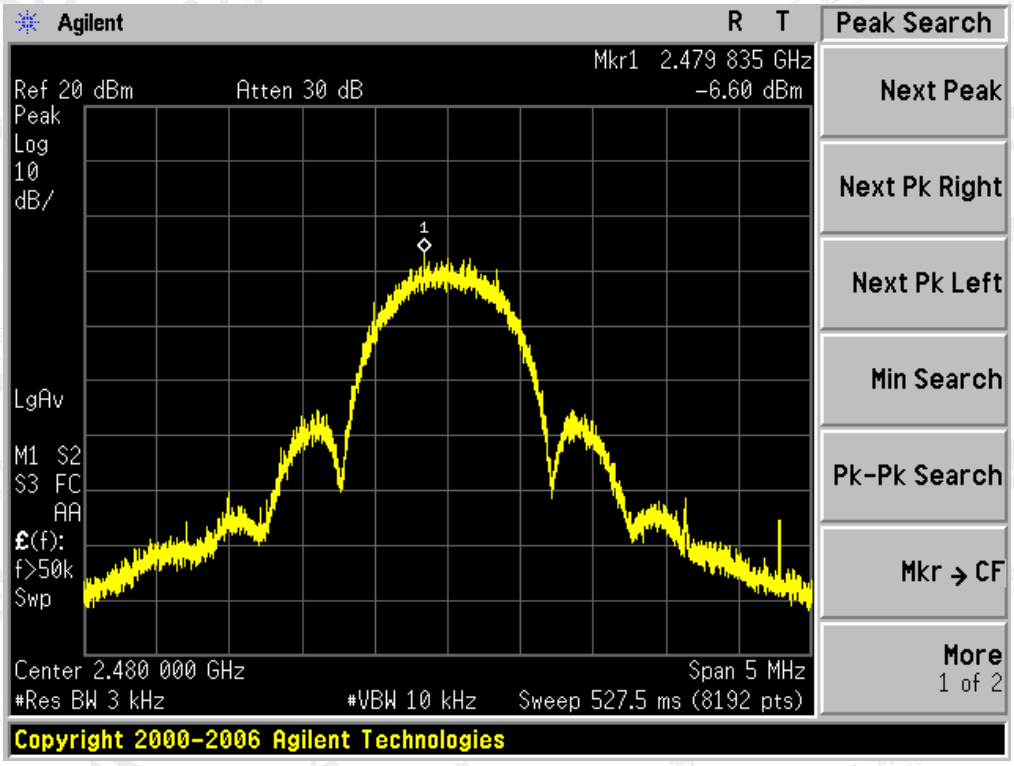
TEST PLOT OF SPECTRAL DENSITY FOR LOW CHANNEL



TEST PLOT OF SPECTRAL DENSITY FOR MIDDLE CHANNEL



TEST PLOT OF SPECTRAL DENSITY FOR HIGH CHANNEL



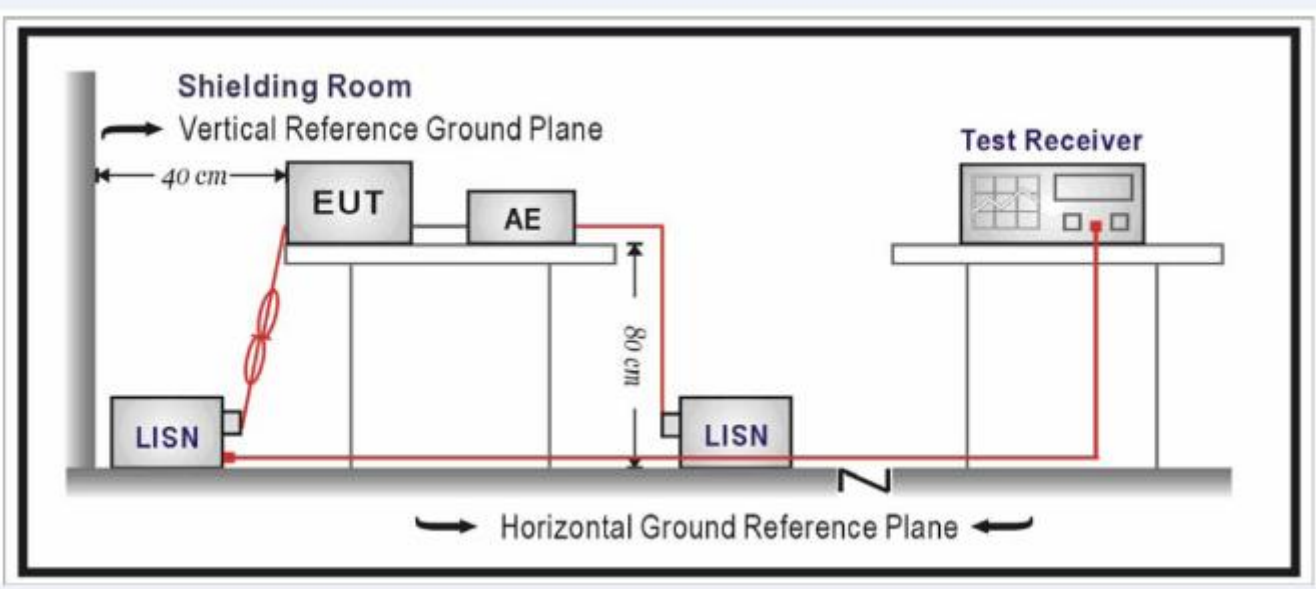
14. LINE CONDUCTED EMISSION TEST

14.1 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

14.2 TEST SETUP



14.3 PRELIMINARY PROCEDURE

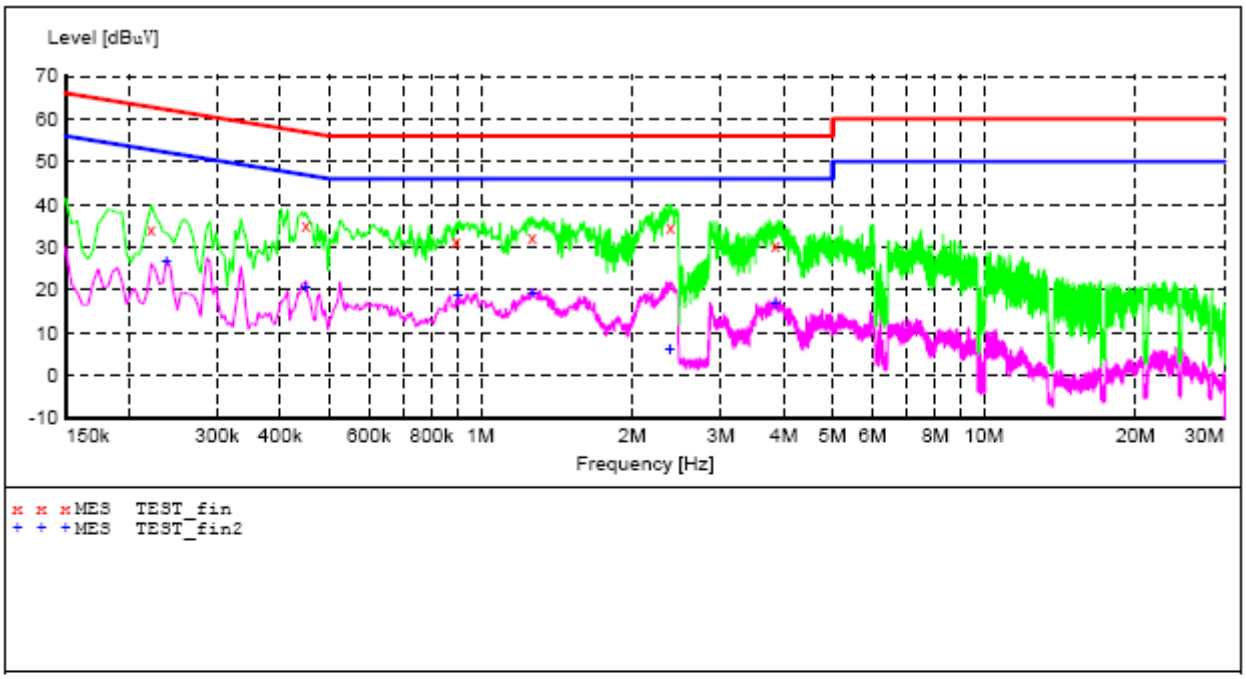
1) The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10 (see Test Facility for the dimensions of the ground 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 voltage by control box connected to 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 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.

14.4 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.

14.5 TEST RESULT OF POWER LINE

Line Conducted Emission Test Line 1-L



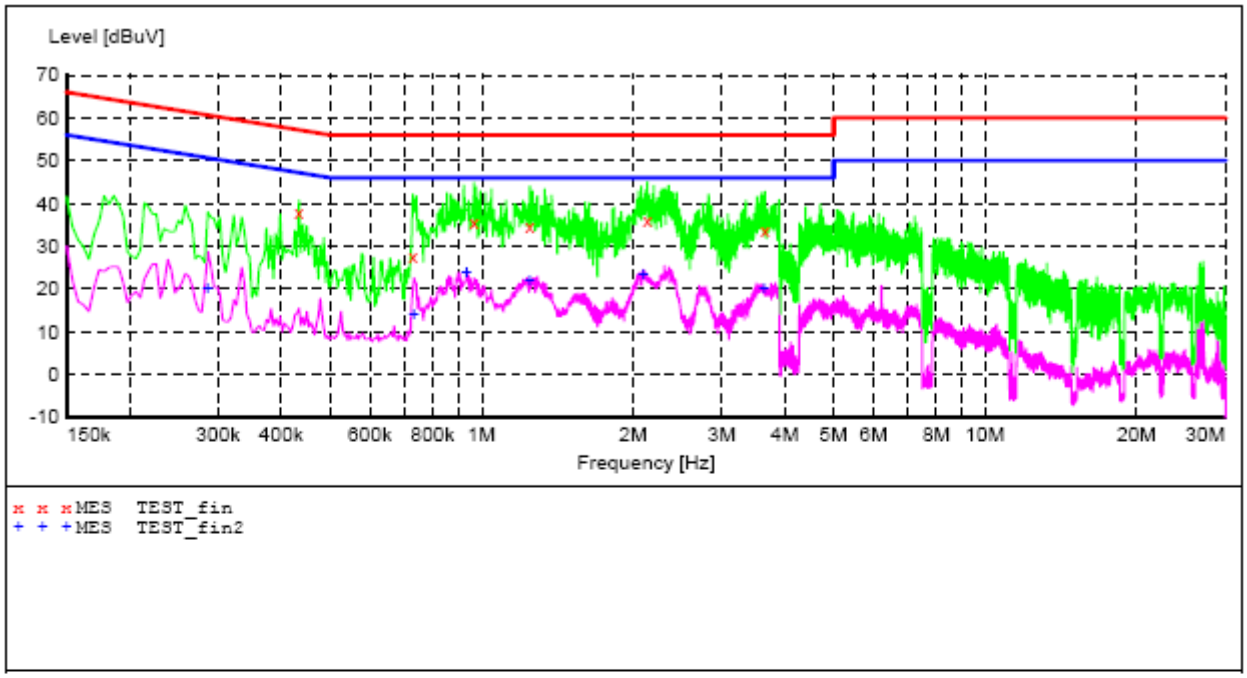
MEASUREMENT RESULT:

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.222000	34.20	10.1	63	28.5	QP	L1	FLO
0.450000	35.30	10.1	57	21.6	QP	L1	FLO
0.894000	31.50	10.2	56	24.5	QP	L1	FLO
1.266000	32.30	10.2	56	23.7	QP	L1	FLO
2.382000	34.70	10.1	56	21.3	QP	L1	FLO
3.850000	30.60	10.1	56	25.4	QP	L1	FLO

MEASUREMENT RESULT:

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.238000	26.70	10.1	52	25.5	AV	L1	FLO
0.450000	20.60	10.1	47	26.3	AV	L1	FLO
0.902000	18.60	10.2	46	27.4	AV	L1	FLO
1.270000	19.10	10.2	46	26.9	AV	L1	FLO
2.378000	6.30	10.1	46	39.7	AV	L1	FLO
3.850000	16.90	10.1	46	29.1	AV	L1	FLO

Line Conducted Emission Test Line 2-N



MEASUREMENT RESULT:

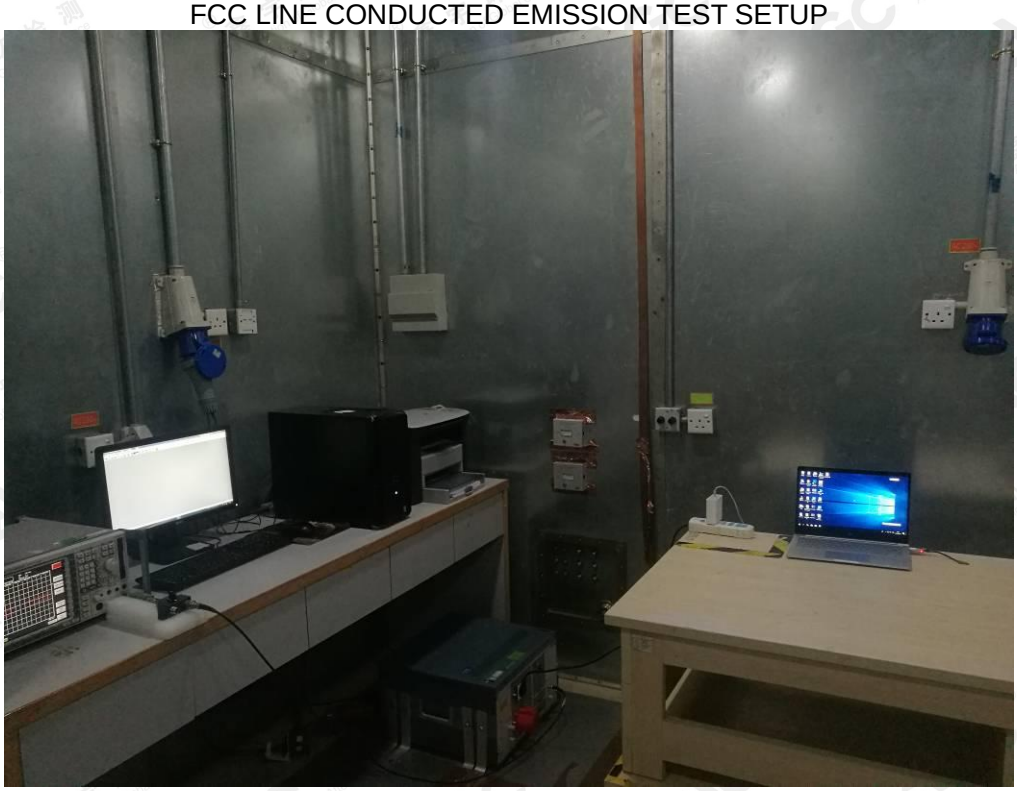
Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.434000	38.10	10.1	57	19.1	QP	N	FLO
0.730000	27.80	10.1	56	28.2	QP	N	FLO
0.966000	35.40	10.2	56	20.6	QP	N	FLO
1.246000	34.60	10.2	56	21.4	QP	N	FLO
2.134000	35.90	10.1	56	20.1	QP	N	FLO
3.654000	33.60	10.1	56	22.4	QP	N	FLO

MEASUREMENT RESULT:

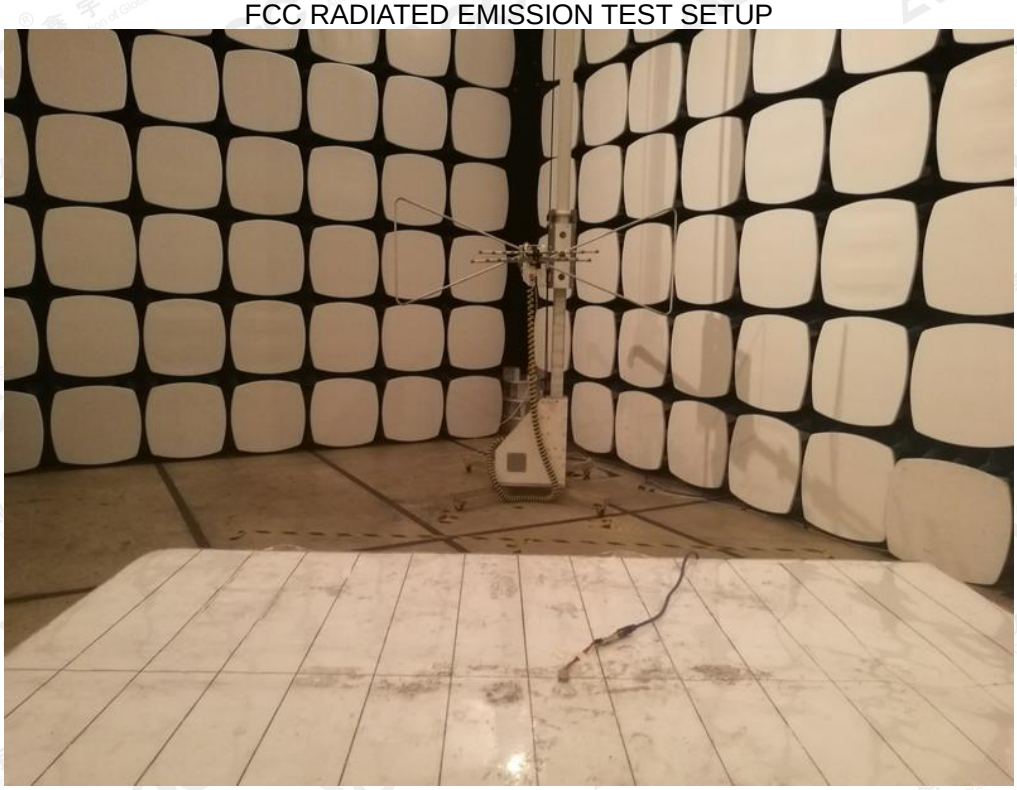
Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.286000	20.10	10.1	51	30.5	AV	N	FLO
0.734000	14.20	10.1	46	31.8	AV	N	FLO
0.934000	23.80	10.2	46	22.2	AV	N	FLO
1.246000	22.00	10.2	46	24.0	AV	N	FLO
2.098000	23.60	10.2	46	22.4	AV	N	FLO
3.634000	20.20	10.0	46	25.8	AV	N	FLO

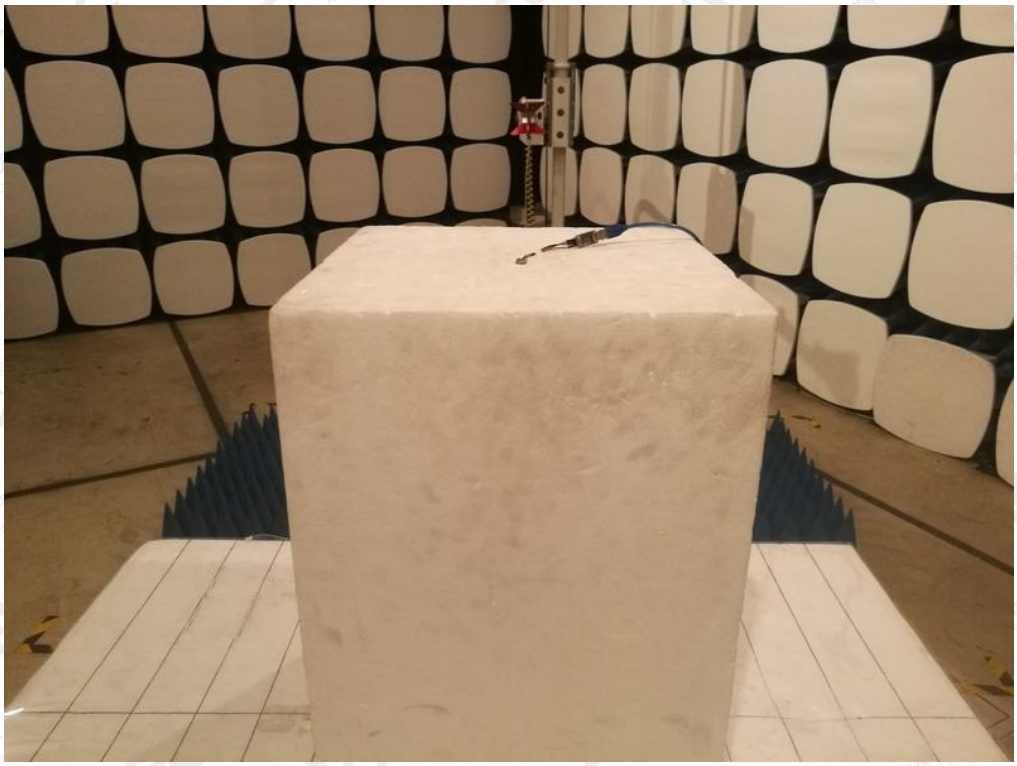
APPENDIX A: PHOTOGRAPHS OF TEST SETUP

FCC LINE CONDUCTED EMISSION TEST SETUP



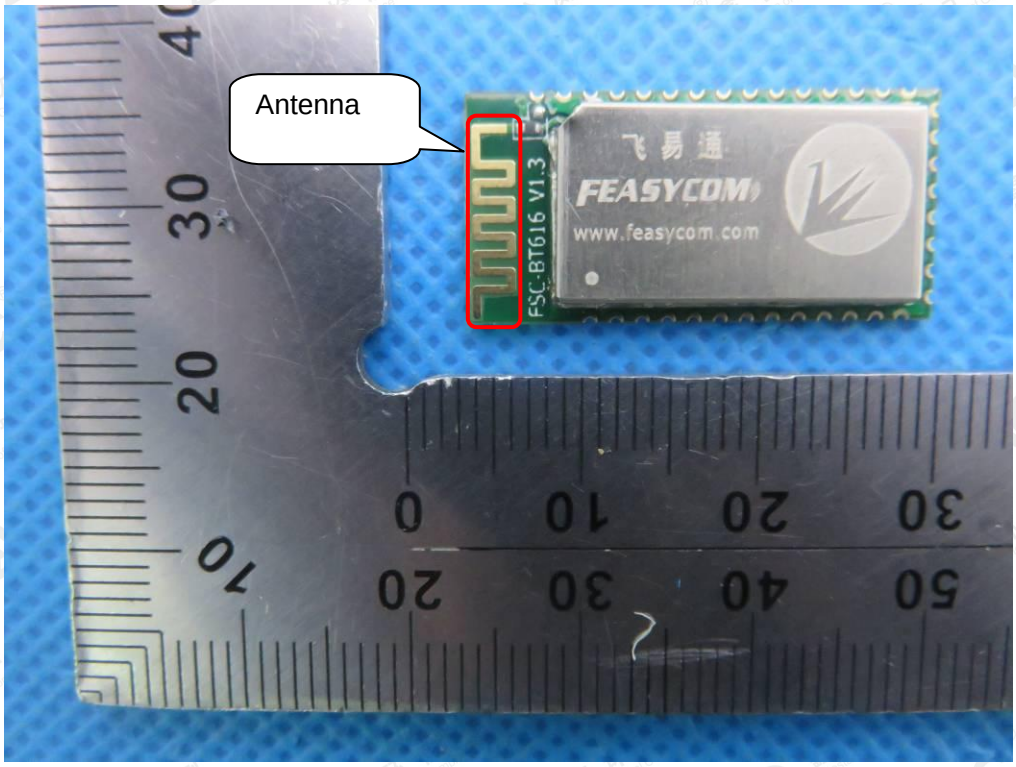
FCC RADIATED EMISSION TEST SETUP



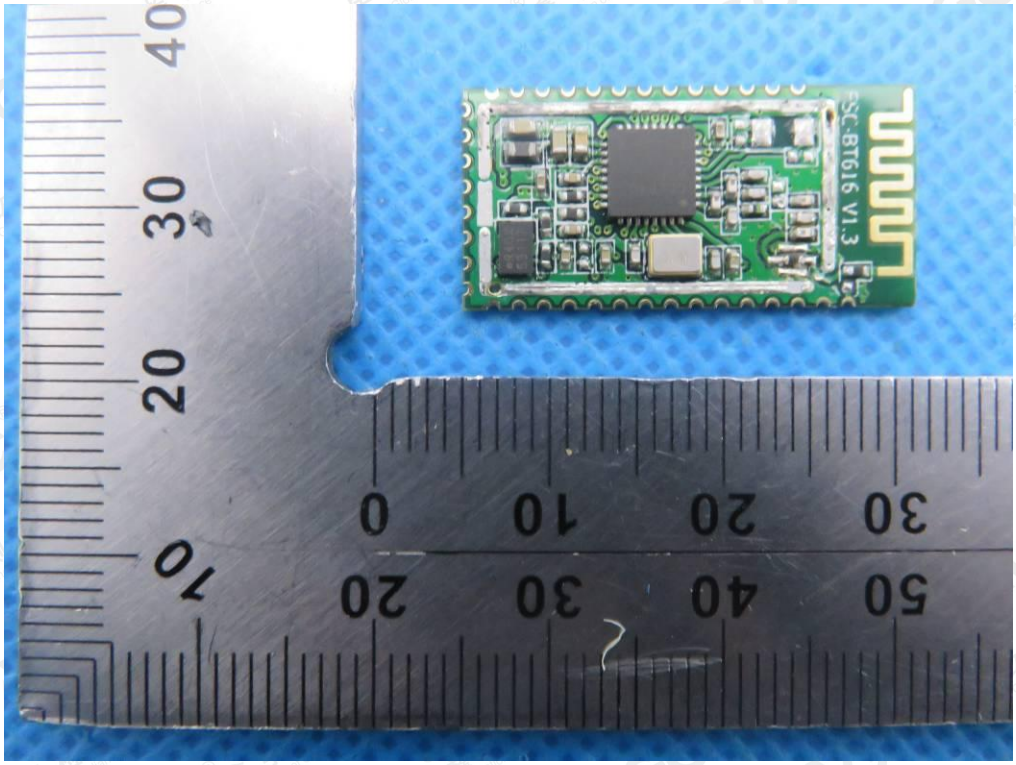


APPENDIX B: PHOTOGRAPHS OF EUT

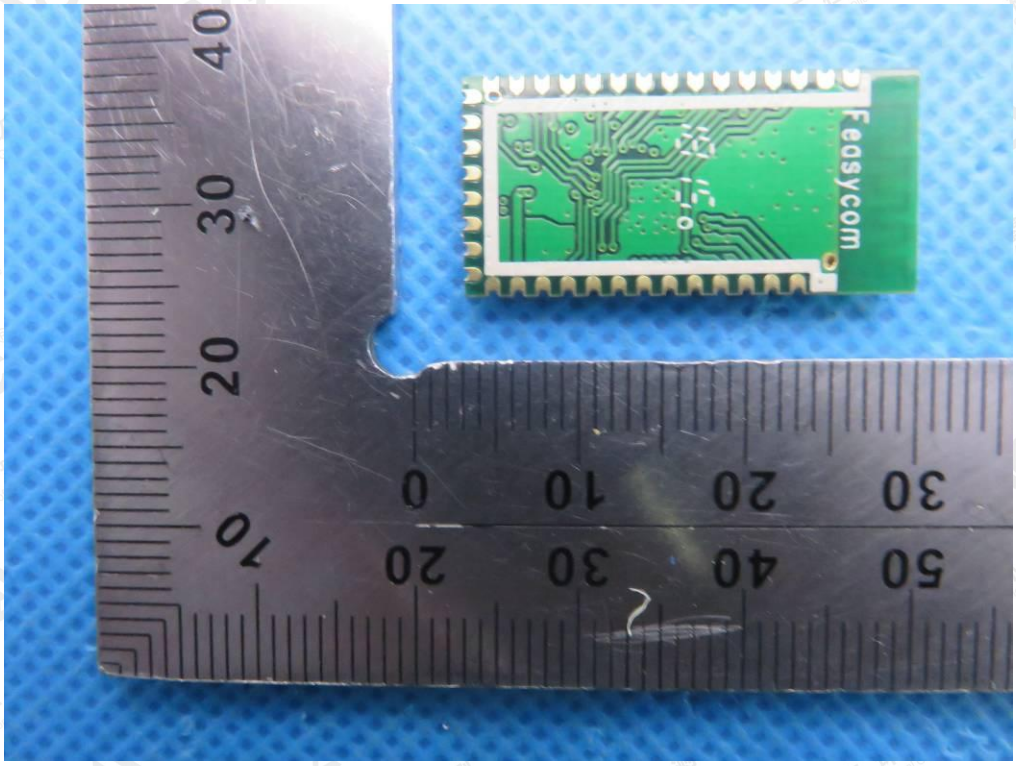
VIEW OF EUT-1



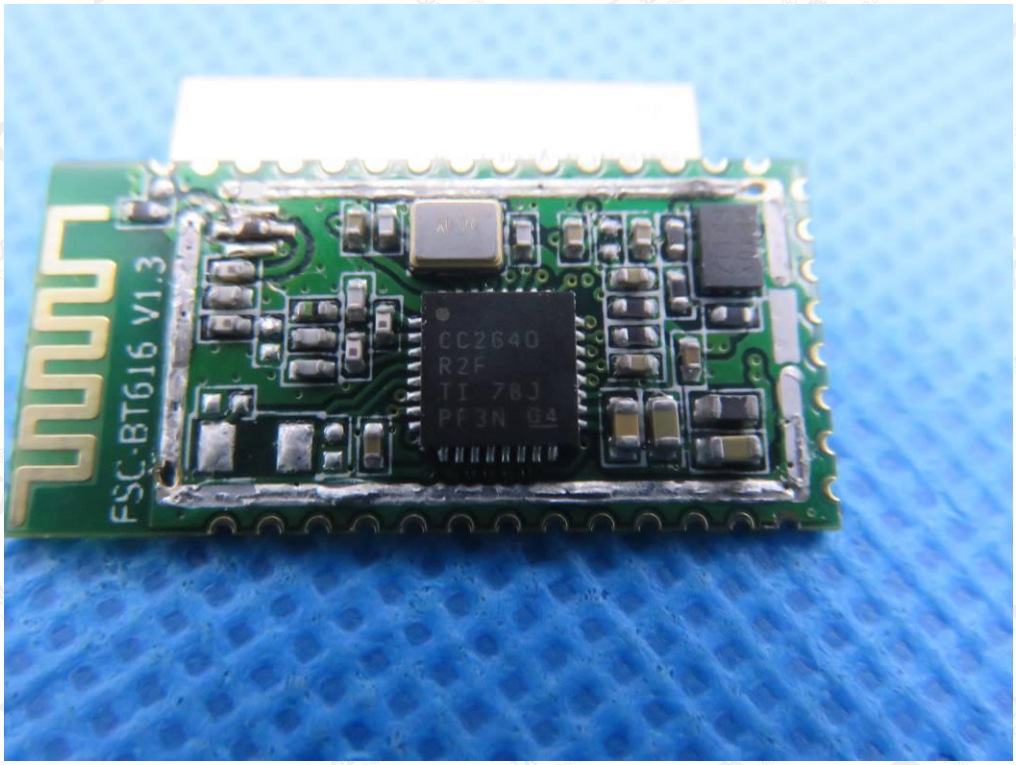
VIEW OF EUT-2



VIEW OF EUT-3



VIEW OF EUT-4



----END OF REPORT----