



FCC Part 15C Test Report

FCC ID: 2AHLUSL-2015

Product Name:	Speaker
Trademark:	N/A
Model Name :	SL-2015, BLUETANK2, BLUETANK3, BLUETANK20, BLUETANK30, BLUETANK50, BIGGBOXX, DSK-400, SL-6, SL-8, SL-9, EL20-MB, RED-718
Prepared For :	GUANGZHOU SHILE ELECTRONIC CO., LTD
Address :	No.8, FuYuan 1st Road, Jinghu industrial park, Shitang Village , Huadu District, Guangzhou City, China
Prepared By :	Shenzhen BCTC Technology Co., Ltd.
Address :	No.101, Yousong Road, Longhua New District, Shenzhen, China
Test Date:	Feb. 20 – Feb. 28, 2016
Date of Report :	Feb. 28, 2016
Report No.:	BCTC-160100985E



VERIFICATION OF COMPLIANCE

Applicant's name : **GUANGZHOU SHILE ELECTRONIC CO., LTD**
Address..... : No.8, FuYuan 1st Road, Jinghu industrial park, Shitang
Village , Huadu District, Guangzhou City, China

Manufacture's Name : **GUANGZHOU SHILE ELECTRONIC CO., LTD**
Address..... : No.8, FuYuan 1st Road, Jinghu industrial park, Shitang
Village , Huadu District, Guangzhou City, China

Product description

Product name : Speaker

Trademark: N/A

Model Name: SL-2015, BLUETANK2, BLUETANK3, BLUETANK20,
BLUETANK30, BLUETANK50, BIGGBOXX, DSK-400, SL-6, SL-8,
SL-9, EL20-MB, RED-718

Test procedure FCC Part15.249

Standards ANSI C63.10-2013

This device described above has been tested by BCTC, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

This report shall not be reproduced except in full, without the written approval of BCTC, this document may be altered or revised by BCTC, personal only, and shall be noted in the revision of the document.

Test Result.....: **Pass**

Testing Engineer :

Eric Yang

(Eric Yang)

Technical Manager :

Sophie Lee

(Sophia Lee)

Authorized Signatory :

Carson. Zhang



(Carson. Zhang)



Table of Contents	Page
1 . SUMMARY OF TEST RESULTS	4
1.1 TEST FACILITY	4
1.2 MEASUREMENT UNCERTAINTY	4
2 . GENERAL INFORMATION	5
2.1 GENERAL DESCRIPTION OF EUT	5
2.2 DESCRIPTION OF TEST MODES	6
2.3 TABLE OF PARAMETERS OF TEXT SOFTWARE SETTING	6
2.4 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED	6
2.5 EQUIPMENTS LIST FOR ALL TEST ITEMS	8
3 . EMC EMISSION TEST	9
3.1 RADIATED EMISSION MEASUREMENT	13
3.1.1 RADIATED EMISSION LIMITS	13
3.1.2 TEST PROCEDURE	14
3.1.3 DEVIATION FROM TEST STANDARD	14
3.1.4 TEST SETUP	15
3.1.5 EUT OPERATING CONDITIONS	16
3.1.6 TEST RESULTS	17
4 . BANDWIDTH TEST	23
4.1 APPLIED PROCEDURES / LIMIT	23
4.1.1 TEST PROCEDURE	23
4.1.2 DEVIATION FROM STANDARD	23
4.1.3 TEST SETUP	23
4.1.4 EUT OPERATION CONDITIONS	23
4.1.5 TEST RESULTS	24
5 . 100 KHZ BANDWIDTH OF FREQUENCY BAND EDGE	28
5.1 DEVIATION FROM STANDARD	28
5.2 TEST SETUP	28
5.3 EUT OPERATION CONDITIONS	28
5.4 TEST RESULTS	29
6 . ANTENNA REQUIREMENT	33
6.1 STANDARD REQUIREMENT	33
6.2 EUT ANTENNA	33
7 . EUT TEST PHOTO	34



1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15 (15.249) , Subpart C			
Standard Section	Test Item	Judgment	Remark
15.207	Conducted Emission	PASS	
15.249	Fundamental & Radiated Spurious Emission Measurement	PASS	
15.249	Bandwidth	PASS	
15.205	Band Edge Emission	PASS	
15.203	Antenna Requirement	PASS	

NOTE:

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

1.1 TEST FACILITY

Shenzhen BCTC Technology Co., Ltd.

Add.: No. 101, Yousong Road, Longhua New District, Shenzhen, China

FCC Registration No.: 187086

1.2 MEASUREMENT UNCERTAINTY

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

No.	Item	Uncertainty
1	Conducted Emission Test	$\pm 1.38\text{dB}$
2	RF power, conducted	$\pm 0.16\text{dB}$
3	Spurious emissions, conducted	$\pm 0.21\text{dB}$
4	All emissions, radiated (<1G)	$\pm 4.68\text{dB}$
5	All emissions, radiated (>1G)	$\pm 4.89\text{dB}$
6	Temperature	$\pm 0.5^\circ\text{C}$
7	Humidity	$\pm 2\%$



2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Product Name:	Speaker
Model No.:	SL-2015, BLUETANK2, BLUETANK3, BLUETANK20, BLUETANK30, BLUETANK50, BIGGBOXX, DSK-400, SL-6, SL-8, SL-9, EL20-MB, RED-718
Operation Frequency:	BT:2402~2480MHz
Modulation technology:	GFSK, PI/4 DPSK, 8DPSK
BT Version	3.0+EDR
Antenna Type:	Integral Antenna
Antenna gain:	1.0 dBi
Power supply:	DC 15V from adapter Rechargeable lithium-ion battery 15V
Adapter	Model:GPUSW1503000WD00 I/P:100-240V 50/60Hz 1.2A O/P: DC 15V/3A
Connecting I/O Port(s)	Please refer to the User's Manual
hardware version	--
Software version	--
Serial number	--

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
- 2.

Channel List					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	2402	11	2413	38	2440
02	2403	12	2414	39	2441
03	2404	13	2415	40	2442
~	~	~	~	~	~
09	2411	19	2421	77	2479
10	2412	20	2422	78	2480

3. The product are different for mode names,outlook color, screen size and panel material.



2.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generated from EUT, the test system was pre-scanning tested based on the consideration of following EUT operation mode or test configuration mode which possibly have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

For Conducted & Radiated Emission		
Final Test Mode	Description	
Mode 1	CH01	GFSK, PI/4 DPSK 8DPSK
Mode 2	CH39	
Mode 3	CH78	
Mode 4	Normal Link	

Note:

- (1) The measurements are performed at the highest, middle, lowest available channels.
- (2) Fully-charged battery is used during the test

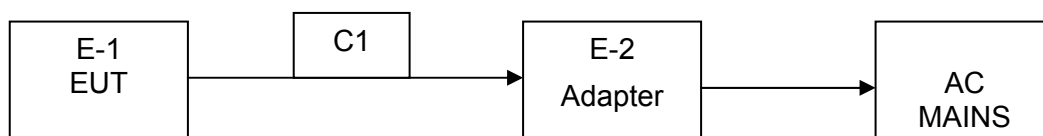
2.3 TABLE OF PARAMETERS OF TEST SOFTWARE SETTING

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product power parameters of FHSS

Frequency	2402 MHz	2441 MHz	2480 MHz
Channel	Low	Middle	High

2.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Emission Test





2.5 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE)

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

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Note
E-1	Speaker	N/A	SL-2015	N/A	EUT
E-2	Adapter	N/A	GPUSW1503000WD00	N/A	N/A

Item	Shielded Type	Ferrite Core	Length	Note
C1	No Shielded	NO	0.8M	DC Line

Note:

- (1) The support equipment was authorized by Declaration of Confirmation.
- (2) For detachable type I/O cable should be specified the length in cm in 『Length』 column.
- (3) “YES” is means “shielded” “with core”; “NO” is means “unshielded” “without core”.



2.6 EQUIPMENTS LIST FOR ALL TEST ITEMS

Conduction Test equipment

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Test Receiver	R&S	ESCI	101160	2015.06.07	2016.06.06
LISN	SCHWARZBECK	ENV216	101313	2015.08.25	2016.08.24
LISN	EMCO	3816/2	00042990	2015.08.25	2016.08.24
50Ω Coaxial Switch	Anritsu	MP59B	6200264417	2015.06.07	2016.06.06
RF cables	R&S	R204	R20X	2015.07.06	2015.07.05

Radiation test, Band-edge test and 20db bandwidth test equipment

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Test Receiver	R&S	ESPI	101318	2015.06.07	2016.06.06
System Simulator	Agilent	E5515C	GB43130252	2015.06.07	2016.06.06
Power Splitter	Weinschel	1506A	NW534	2015.06.07	2016.06.06
Bilog Antenna	TESEQ	CBL6111D	31216	2015.07.06	2016.07.05
Bilog Antenna	TESEQ	CBL6111D	31217	2015.06.07	2017.06.06
Loop antenna	ARA	PLA-1030/B	1029	2015.06.07	2016.06.06
Spectrum Analyzer	Agilent	E4411B	MY4511235	2015.07.06	2016.07.05
Signal Amplifier	SONOMA	313	187022	2015.07.06	2016.07.05
Signal Amplifier	Agilent	8449B	3008A00213	2015.07.06	2016.07.05
RF Cable	R&S	R203	R20X	2015.07.06	2016.07.05
MULTI-DEVICE Controller	ETS-LINDGREEN	31250	126821	N/A	N/A
Horn Antenna	EM	EM-AH-10180	2011071402	2015.07.06	2016.07.05
Horn Antenna	EM	EM-AH-10180	2011071401	2015.06.07	2017.06.06
Horn Antenna	Schwarzbeck	BBHA 9170	9170-181	2015.07.06	2016.07.05
Spectrum Analyzer	Agilent	8593E	3911A03928	2015.07.06	2016.07.05
Spectrum Analyzer	Agilent	E4407B	MY45108040	2015.07.06	2016.07.05
Signal Amplifier	DAZE	ZN3380B	11235	2015.08.25	2016.08.24
High Pass filter	KANGMAI	WHKX1.0/1.5G-10SS	40	2015.08.25	2016.08.24
Filter	COM-MW	ZBSF-C836.5-25-X	BCTC042	2015.08.25	2016.08.24
Filter	COM-MW	ZBSF-C1747.5-75-X2	BCTC045	2015.08.25	2016.08.24
Filter	COM-MW	ZBSF-C1880-60-X2	BCTC047	2015.08.25	2016.08.24
DC Power Supply	LongWei	PS-305D	010965682	2015.07.06	2016.07.05
Constant temperature and humidity box	GF	GTH-800-40-2P	MAA9906-012	2015.06.07	2016.06.06
Universal radio communication tester	R&S	CMU200	115295	2015.08.25	2016.08.24
Splitter	Agilent	11435B	1125162	2015.07.06	2016.07.05



3. EMC EMISSION TEST

3.1 CONDUCTED EMISSION MEASUREMENT

3.1.1 POWER LINE CONDUCTED EMISSION Limits (Frequency Range 150KHz-30MHz)

FREQUENCY (MHz)	Class A (dBuV)		Class B (dBuV)		Standard
	Quasi-peak	Average	Quas -peak	Average	
0.15 -0.5	79.00	66.00	66 - 56 *	56 - 46 *	CISPR
0.50 -5.0	73.00	60.00	56.00	46.00	CISPR
5.0 -30.0	73.00	60.00	60.00	50.00	CISPR

0.15 -0.5	79.00	66.00	66 - 56 *	56 - 46 *	FCC
0.50 -5.0	73.00	60.00	56.00	46.00	FCC
5.0 -30.0	73.00	60.00	60.00	50.00	FCC

Note:

- (1) The tighter limit applies at the band edges.
- (2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

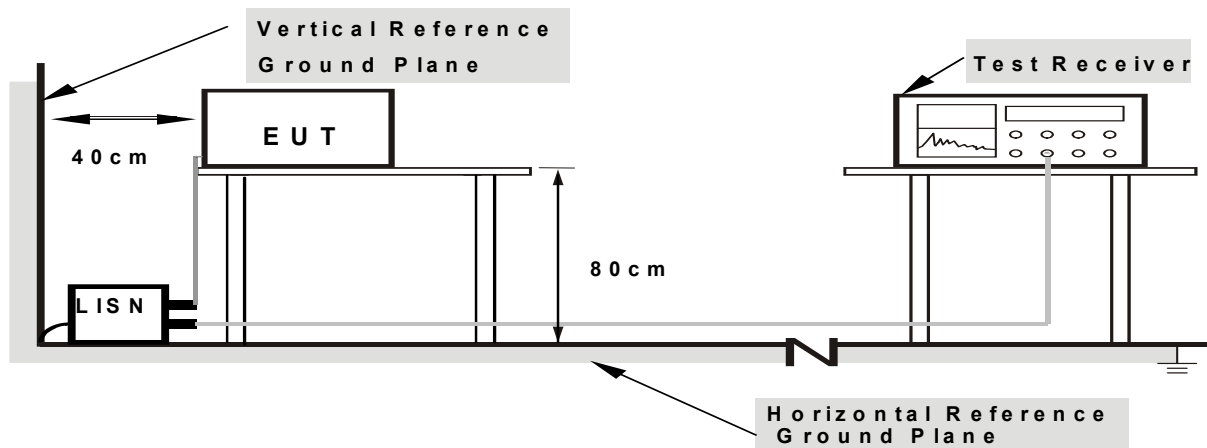
3.1.2 TEST PROCEDURE

- The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- LISN at least 80 cm from nearest part of EUT chassis.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.1.3 DEVIATION FROM TEST STANDARD

No deviation

3.1.4 TEST SETUP



Note: 1.Support units were connected to second LISN.

2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes

3.1.5 EUT OPERATING CONDITIONS

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

We pretest AC 120V and AC 240V, the worst voltage was AC 120V and the data recording in the report.



3.1.6 TEST RESULTS

EUT :	Speaker	Model Name. :	SL-2015
Temperature :	26℃	Relative Humidity :	54%
Pressure :	1010hPa	Phase :	L
Test Voltage :	AC120V/60Hz	Test Mode :	Mode 4

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector Comment
1	*	0.1660	45.92	10.06	55.98	65.15	-9.17	QP
2		0.1660	33.77	10.06	43.83	55.15	-11.32	AVG
3		0.2260	36.87	10.07	46.94	62.59	-15.65	QP
4		0.2260	27.25	10.07	37.32	52.59	-15.27	AVG
5		0.6780	32.95	10.13	43.08	56.00	-12.92	QP
6		0.6780	20.71	10.13	30.84	46.00	-15.16	AVG
7		2.7940	31.90	10.19	42.09	56.00	-13.91	QP
8		2.7940	17.75	10.19	27.94	46.00	-18.06	AVG
9		5.1100	33.47	10.14	43.61	60.00	-16.39	QP
10		5.1100	22.73	10.14	32.87	50.00	-17.13	AVG
11		7.3540	28.69	10.10	38.79	60.00	-21.21	QP
12		7.3540	17.80	10.10	27.90	50.00	-22.10	AVG

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.



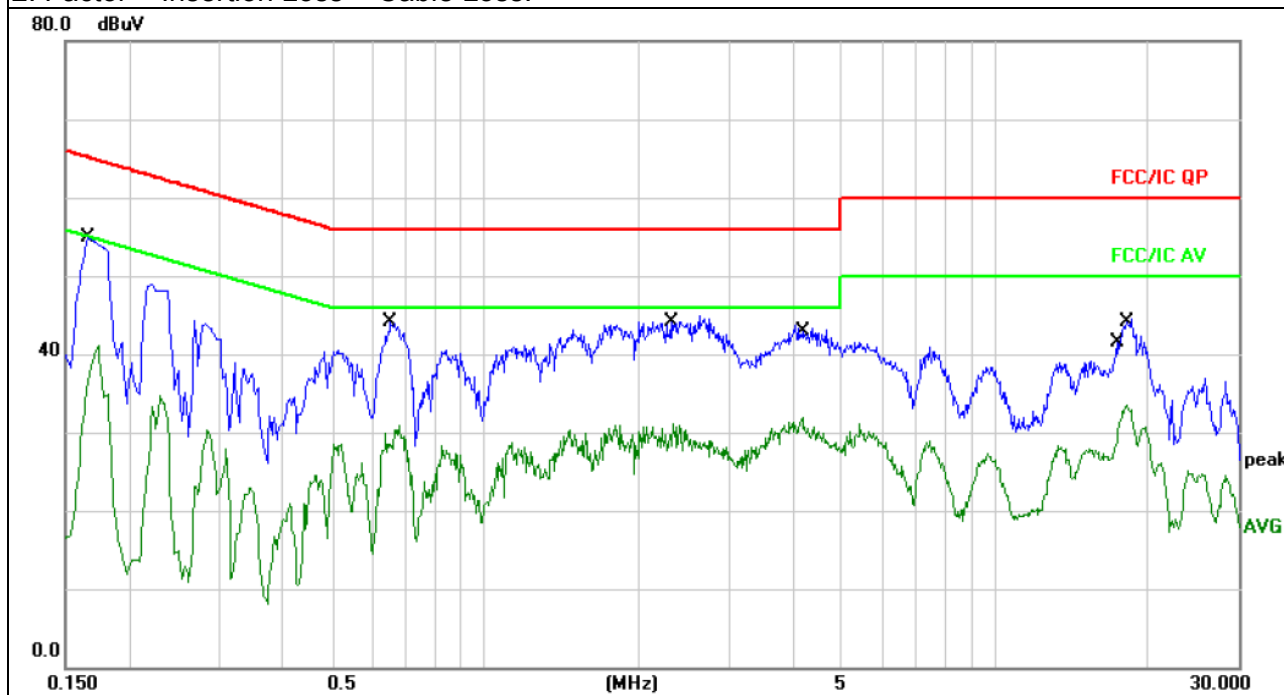


EUT :	Speaker	Model Name. :	SL-2015
Temperature :	26℃	Relative Humidity :	54%
Pressure :	1010hPa	Phase :	N
Test Voltage :	AC120V/60Hz	Test Mode :	Mode 4

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	Detector	Comment
		MHz	dBuV	dB	dBuV	dBuV	dB		
1	*	0.1660	44.78	10.06	54.84	65.15	-10.31	QP	
2		0.1660	31.04	10.06	41.10	55.15	-14.05	AVG	
3		0.6540	33.90	10.13	44.03	56.00	-11.97	QP	
4		0.6540	20.87	10.13	31.00	46.00	-15.00	AVG	
5		2.3420	34.71	10.18	44.89	56.00	-11.11	QP	
6		2.3420	20.83	10.18	31.01	46.00	-14.99	AVG	
7		4.1860	31.33	10.16	41.49	56.00	-14.51	QP	
8		4.1860	21.79	10.16	31.95	46.00	-14.05	AVG	
9		17.3380	31.33	10.16	41.49	60.00	-18.51	QP	
10		17.3380	22.46	10.16	32.62	50.00	-17.38	AVG	
11		18.1500	34.30	10.16	44.46	60.00	-15.54	QP	
12		18.1500	23.24	10.16	33.40	50.00	-16.60	AVG	

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.





3.2 RADIATED EMISSION MEASUREMENT

3.2.1 RADIATED EMISSION LIMITS (Frequency Range 9kHz-1000MHz)

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

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

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

FREQUENCY (MHz)	Class B (dBuV/m) (at 3M)	
	PEAK	AVERAGE
Above 1000	74	54

Notes:

- (1) The limit for radiated test was performed according to FCC PART 15C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).

FREQUENCY RANGE OF RADIATED MEASUREMENT (For unintentional radiators)

Highest frequency generated or Upper frequency of measurement used in the device or on which the device operates or tunes (MHz)	Range (MHz)
Below 1.705	30
1.705 – 108	1000
108 – 500	2000
500 – 1000	5000
Above 1000	5 th harmonic of the highest frequency or 40 GHz, whichever is lower



Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (emission in restricted band)	1 MHz / 1 MHz for Peak, 1 MHz / 10Hz for Average

Receiver Parameter	Setting
Attenuation	Auto
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

3.2.2 TEST PROCEDURE

- The measuring distance of at 3 m shall be used for measurements at frequency up to 25GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
- The EUT was placed on the top of a rotating table 0.8 and 1.5 meters above the ground at a 3 meter semi-chamber test. The table was rotated 360 degrees to determine the position of the highest radiation.
- The height of the equipment or of the substitution antenna shall be 0.8 m; above 1GHz, the height was 1.5m, the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.
- For the radiated emission test above 1GHz:
Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response.
The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.

Note:

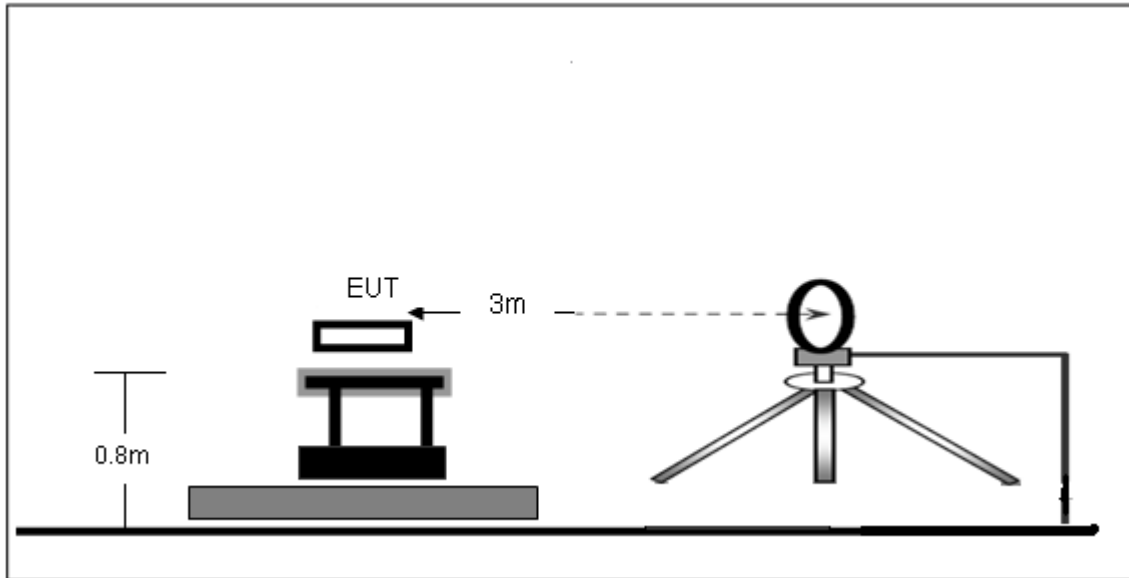
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

3.2.3 DEVIATION FROM TEST STANDARD

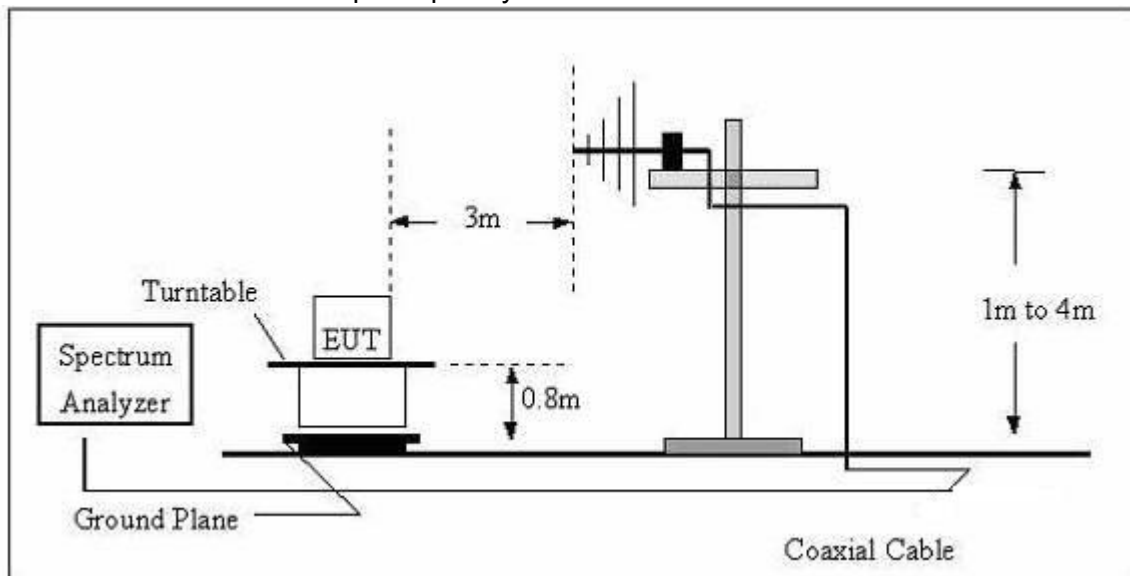
No deviation

3.2.4 TEST SETUP

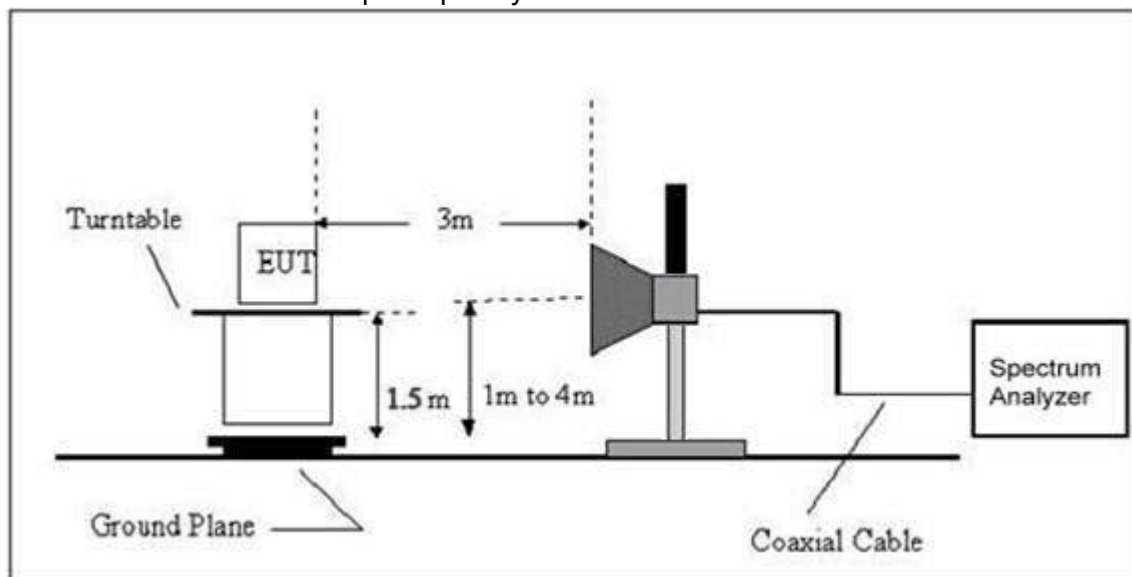
(A) Radiated Emission Test-Up Frequency Below 30MHz



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



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



3.2.5 EUT OPERATING CONDITIONS

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



3.2.6 TEST RESULTS

Radiated Spurious Emission (Below 30MHz)

EUT :	Speaker	Model Name :	SL-2015
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Polarization :	---
Test Voltage :	AC 120V/60Hz		
Test Mode :	Mode 4		

Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
--	--	--	--	PASS
--	--	--	--	PASS

NOTE:

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Distance extrapolation factor = $40 \log (\text{specific distance/test distance})(\text{dB})$;

Limit line = specific limits(dBuv) + distance extrapolation factor.



Radiated Spurious Emission (Between 30MHz – 1GHz)

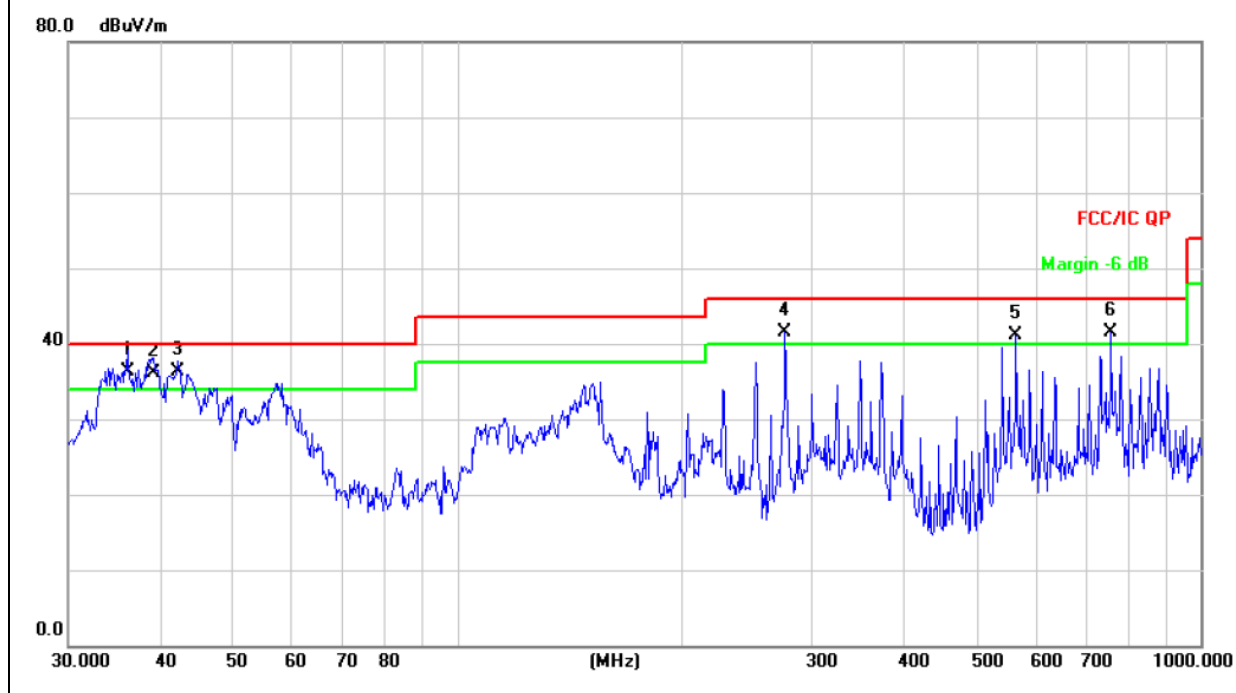
EUT :	Speaker	Model Name :	SL-2015
Temperature :	26 °C	Relative Humidity :	54%
Pressure :	1010 hPa	Polarization :	Horizontal
Test Voltage :	AC 120V/60Hz		
Test Mode : (Worst)	Mode 4		

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB/m	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Antenna Height cm	Table Degree degree	Comment
1	!	36.0007	44.80	-8.59	36.21	40.00	-3.79	QP		
2	!	39.0245	44.85	-8.80	36.05	40.00	-3.95	QP		
3	*	42.1542	45.45	-9.12	36.33	40.00	-3.67	QP		
4	!	276.1235	54.72	-13.27	41.45	46.00	-4.55	QP		
5	!	564.6389	47.84	-6.69	41.15	46.00	-4.85	QP		
6	!	758.0408	44.73	-3.24	41.49	46.00	-4.51	QP		

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

All interfaces was connected, and BT TX mode was link.





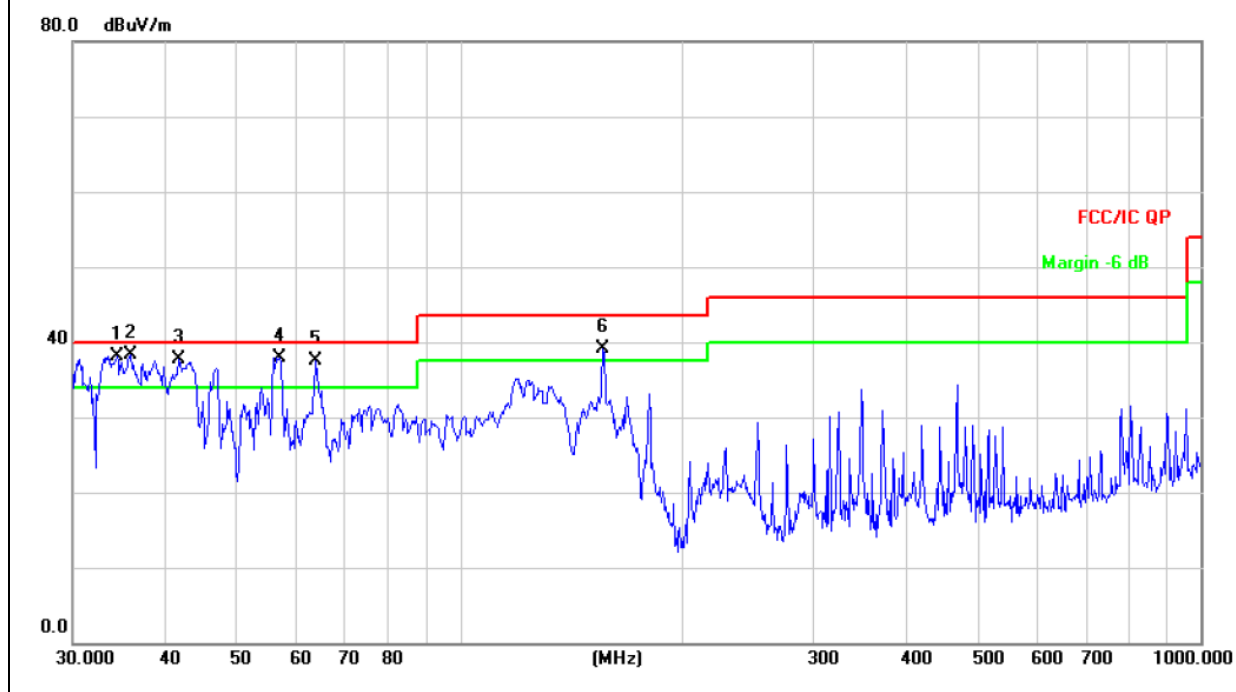
EUT :	Speaker	Model Name :	SL-2015
Temperature :	26 °C	Relative Humidity :	54%
Pressure :	1010 hPa	Polarization :	Vertical
Test Voltage :	AC 120V/60Hz		
Test Mode : (Worst)	Mode 4		

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	cm	degree
1	!	34.3964	46.50	-8.48	38.02	40.00	-1.98	QP		
2	*	35.8746	46.96	-8.58	38.38	40.00	-1.62	QP		
3	!	41.7129	46.70	-9.06	37.64	40.00	-2.36	QP		
4	!	56.9912	49.28	-11.28	38.00	40.00	-2.00	QP		
5	!	63.7588	49.72	-12.28	37.44	40.00	-2.56	QP		
6	!	155.9101	52.01	-12.87	39.14	43.50	-4.36	QP		

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

All interfaces was connected, and BT TX mode was link.




Radiated Spurious Emission (1GHz to 10th harmonics)
GFSK

	Freq.	Receiver Reading	Detector	Polar	Corrected Factor	Emission Level	Limit	Result
	(MHz)	(dBμV)	(PK/QP/Ave)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	
Lower Channel 2402MHz	2402.00	103.47	PK	H	1.31	104.78	114.00	Pass
	2402.00	89.31	Ave	H	1.31	90.62	94.00	Pass
	4804.00	56.51	PK	H	-1.06	55.45	74.00	Pass
	4804.00	46.57	Ave	H	-1.06	45.51	54.00	Pass
	2402.00	103.31	PK	V	1.31	104.62	114.00	Pass
	2402.00	88.54	Ave	V	1.31	89.85	94.00	Pass
	4804.00	55.54	PK	V	-1.06	54.48	74.00	Pass
	4804.00	45.66	Ave	V	-1.06	44.60	54.00	Pass
	2441.00	102.73	PK	H	0.85	103.58	114.00	Pass
	2441.00	88.06	Ave	H	0.85	88.91	94.00	Pass
Middle Channel 2441MHz	4882.00	57.41	PK	H	-0.62	56.79	74.00	Pass
	4882.00	48.33	Ave	H	-0.62	47.71	54.00	Pass
	2441.00	103.01	PK	V	0.85	103.86	114.00	Pass
	2441.00	88.10	Ave	V	0.85	88.95	94.00	Pass
	4882.00	57.33	PK	V	-0.62	56.71	74.00	Pass
	4882.00	47.76	Ave	V	-0.62	47.14	54.00	Pass
	2480.00	103.21	PK	H	0.53	103.74	114.00	Pass
	2480.00	88.67	Ave	H	0.53	89.20	94.00	Pass
Upper Channel 2480MHz	4960.00	57.63	PK	H	-0.24	57.39	74.00	Pass
	4960.00	49.53	Ave	H	-0.24	49.29	54.00	Pass
	2480.00	102.62	PK	V	0.53	103.15	114.00	Pass
	2480.00	88.05	Ave	V	0.53	88.58	94.00	Pass
	4960.00	57.59	PK	V	-0.24	57.35	74.00	Pass
	4960.00	49.19	Ave	V	-0.24	48.95	54.00	Pass

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Emission Level = Meter Reading + Factor

Margin = Emission Level - Limit

Other harmonics emissions are lower than 20dB below the allowable limit.



PI/4 DPSK

	Freq.	Receiver Reading	Detector	Polar	Corrected Factor	Emission Level	Limit	Result
	(MHz)	(dBμV)	(PK/QP/Ave)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	
Lower Channel 2402MHz	2402.00	102.02	PK	H	1.31	103.33	114.00	Pass
	2402.00	87.96	Ave	H	1.31	89.27	94.00	Pass
	4804.00	57.08	PK	H	-1.06	56.02	74.00	Pass
	4804.00	48.20	Ave	H	-1.06	47.14	54.00	Pass
	2402.00	100.95	PK	V	1.31	102.26	114.00	Pass
	2402.00	87.24	Ave	V	1.31	88.55	94.00	Pass
	4804.00	58.09	PK	V	-1.06	57.03	74.00	Pass
	4804.00	46.72	Ave	V	-1.06	45.66	54.00	Pass
Middle Channel 2441MHz	2441.00	101.88	PK	H	0.85	102.73	114.00	Pass
	2441.00	87.49	Ave	H	0.85	88.34	94.00	Pass
	4882.00	53.95	PK	H	-0.62	53.33	74.00	Pass
	4882.00	43.23	Ave	H	-0.62	42.61	54.00	Pass
	2441.00	101.79	PK	V	0.85	102.64	114.00	Pass
	2441.00	86.88	Ave	V	0.85	87.73	94.00	Pass
	4882.00	54.85	PK	V	-0.62	54.23	74.00	Pass
	4882.00	44.29	Ave	V	-0.62	43.67	54.00	Pass
Upper Channel 2480MHz	2480.00	102.09	PK	H	0.53	102.62	114.00	Pass
	2480.00	87.57	Ave	H	0.53	88.10	94.00	Pass
	4960.00	52.09	PK	H	-0.24	51.85	74.00	Pass
	4960.00	43.13	Ave	H	-0.24	42.89	54.00	Pass
	2480.00	101.24	PK	V	0.53	101.77	114.00	Pass
	2480.00	86.85	Ave	V	0.53	87.38	94.00	Pass
	4960.00	54.25	PK	V	-0.24	54.01	74.00	Pass
	4960.00	43.33	Ave	V	-0.24	43.09	54.00	Pass

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Emission Level = Meter Reading + Factor

Margin = Emission Level - Limit

Other harmonics emissions are lower than 20dB below the allowable limit.

8DPSK



	Freq.	Receiver Reading	Detector	Polar	Corrected Factor	Emission Level	Limit	Result
	(MHz)	(dBμV)	(PK/QP/Ave)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	
Lower Channel 2402MHz	2402.00	102.76	PK	H	1.31	104.07	114.00	Pass
	2402.00	88.60	Ave	H	1.31	89.91	94.00	Pass
	4804.00	57.49	PK	H	-1.06	56.43	74.00	Pass
	4804.00	48.55	Ave	H	-1.06	47.49	54.00	Pass
	2402.00	101.69	PK	V	1.31	103.00	114.00	Pass
	2402.00	87.88	Ave	V	1.31	89.19	94.00	Pass
	4804.00	58.51	PK	V	-1.06	57.45	74.00	Pass
	4804.00	47.06	Ave	V	-1.06	46.00	54.00	Pass
Middle Channel 2441MHz	2441.00	102.62	PK	H	0.85	103.47	114.00	Pass
	2441.00	88.13	Ave	H	0.85	88.98	94.00	Pass
	4882.00	54.34	PK	H	-0.62	53.72	74.00	Pass
	4882.00	43.54	Ave	H	-0.62	42.92	54.00	Pass
	2441.00	102.53	PK	V	0.85	103.38	114.00	Pass
	2441.00	87.51	Ave	V	0.85	88.36	94.00	Pass
	4882.00	55.25	PK	V	-0.62	54.63	74.00	Pass
	4882.00	44.61	Ave	V	-0.62	43.99	54.00	Pass
Upper Channel 2480MHz	2480.00	102.83	PK	H	0.53	103.36	114.00	Pass
	2480.00	88.21	Ave	H	0.53	88.74	94.00	Pass
	4960.00	52.46	PK	H	-0.24	52.22	74.00	Pass
	4960.00	43.44	Ave	H	-0.24	43.20	54.00	Pass
	2480.00	101.98	PK	V	0.53	102.51	114.00	Pass
	2480.00	87.48	Ave	V	0.53	88.01	94.00	Pass
	4960.00	54.65	PK	V	-0.24	54.41	74.00	Pass
	4960.00	43.65	Ave	V	-0.24	43.41	54.00	Pass

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Emission Level = Meter Reading + Factor

Margin = Emission Level - Limit

Other harmonics emissions are lower than 20dB below the allowable limit.



4. BANDWIDTH TEST

4.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.249) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.249	Bandwidth	(20dB bandwidth)	2400-2483.5	PASS

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	> Measurement Bandwidth or Channel Separation
RB	100KHz
VB	$\geq$ RBW
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

4.1.1 TEST PROCEDURE

- The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- Spectrum Setting : RBW= 100KHz, VBW $\geq$ RBW, Sweep time = Auto.

4.1.2 DEVIATION FROM STANDARD

No deviation.

4.1.3 TEST SETUP



4.1.4 EUT OPERATION CONDITIONS

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



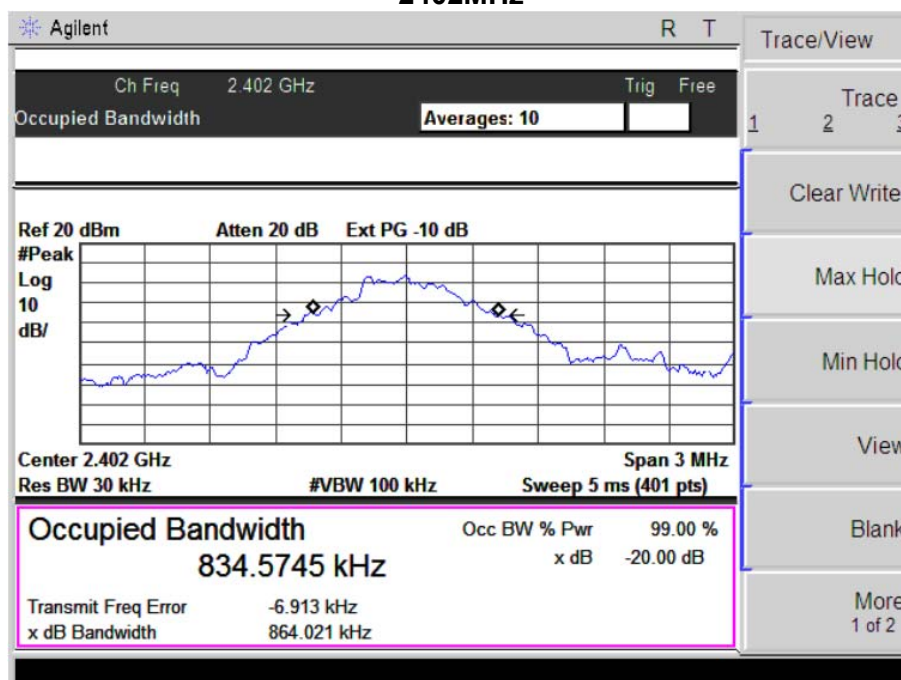
4.1.5 TEST RESULTS

EUT :	Speaker	Model Name :	SL-2015
Temperature :	25 °C	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	AC 120V/60Hz
Test Mode :	CH01 / CH39 /CH78		

	Frequency	20dB Bandwidth (MHz)	Result
GFSK	2402 MHz	0.864	PASS
	2441 MHz	0.864	PASS
	2480 MHz	0.860	PASS
PI/4 DPSK	2402 MHz	1.177	PASS
	2441 MHz	1.207	PASS
	2480 MHz	1.215	PASS
8DPSK	2402 MHz	1.215	PASS
	2441 MHz	1.232	PASS
	2480 MHz	1.210	PASS

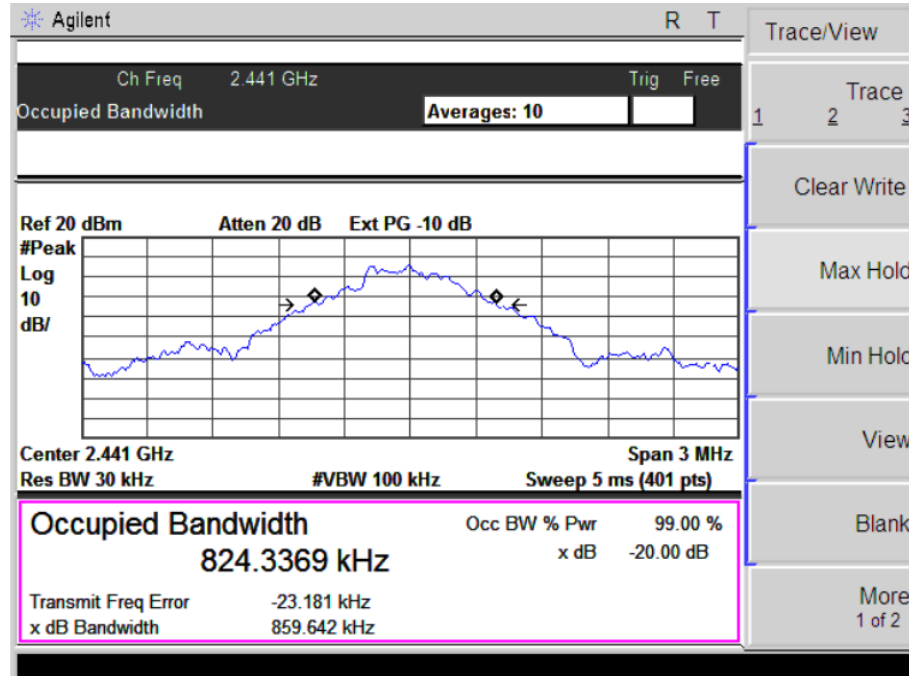
GFSK

2402MHz

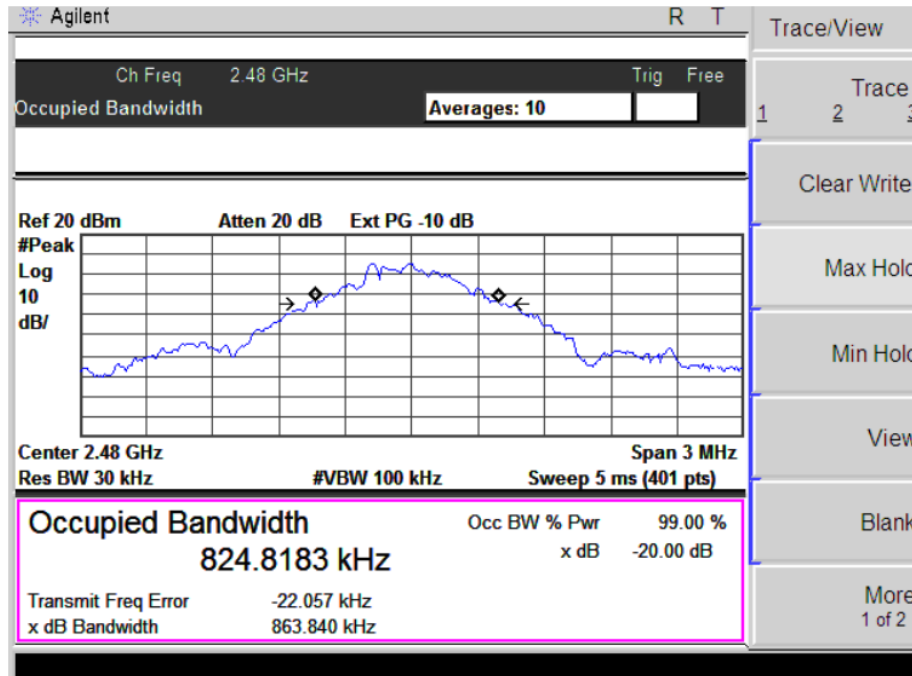




2441 MHz



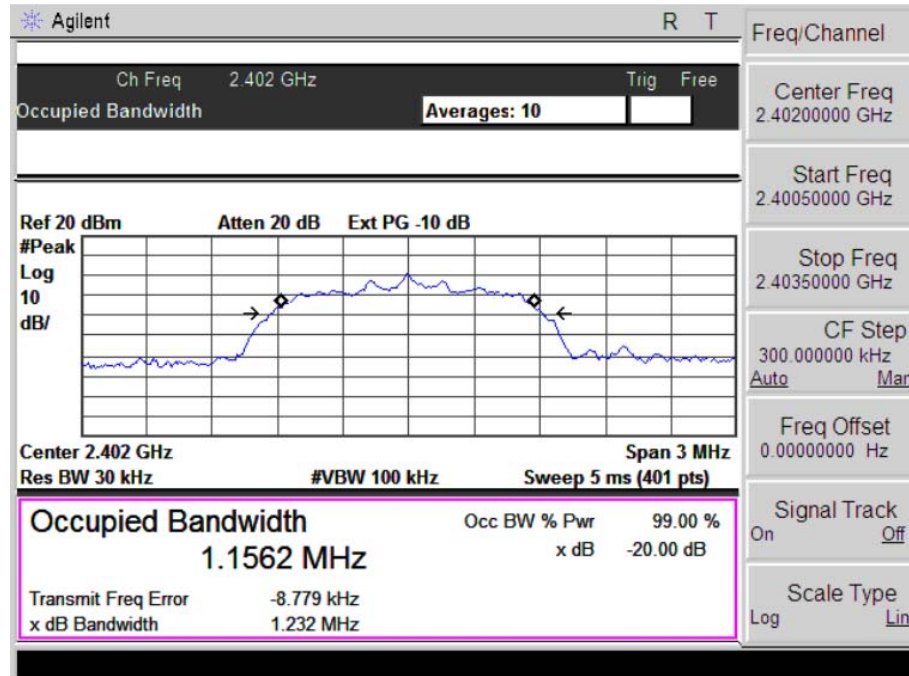
2480 MHz



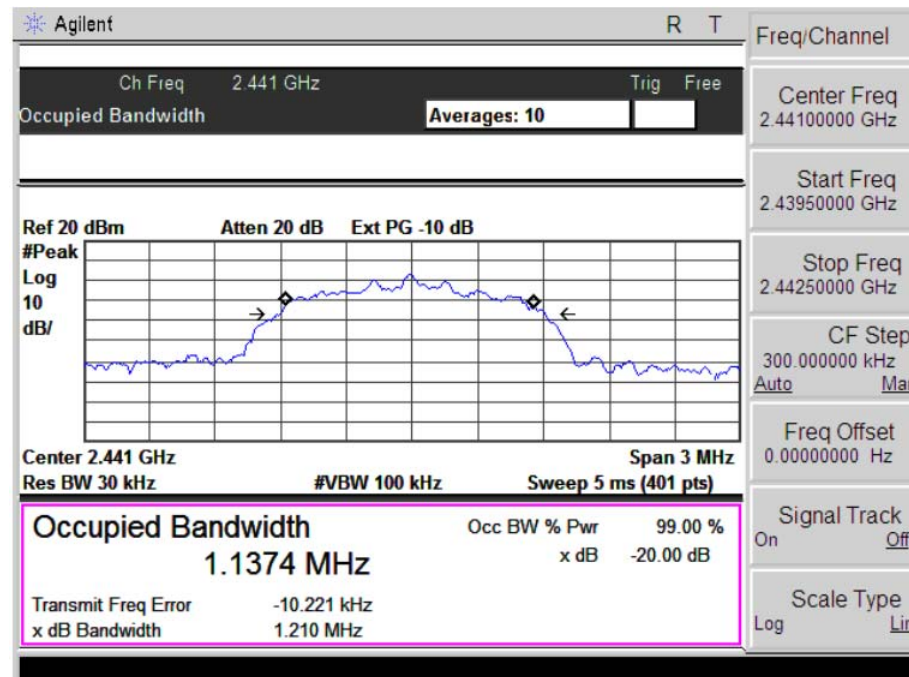


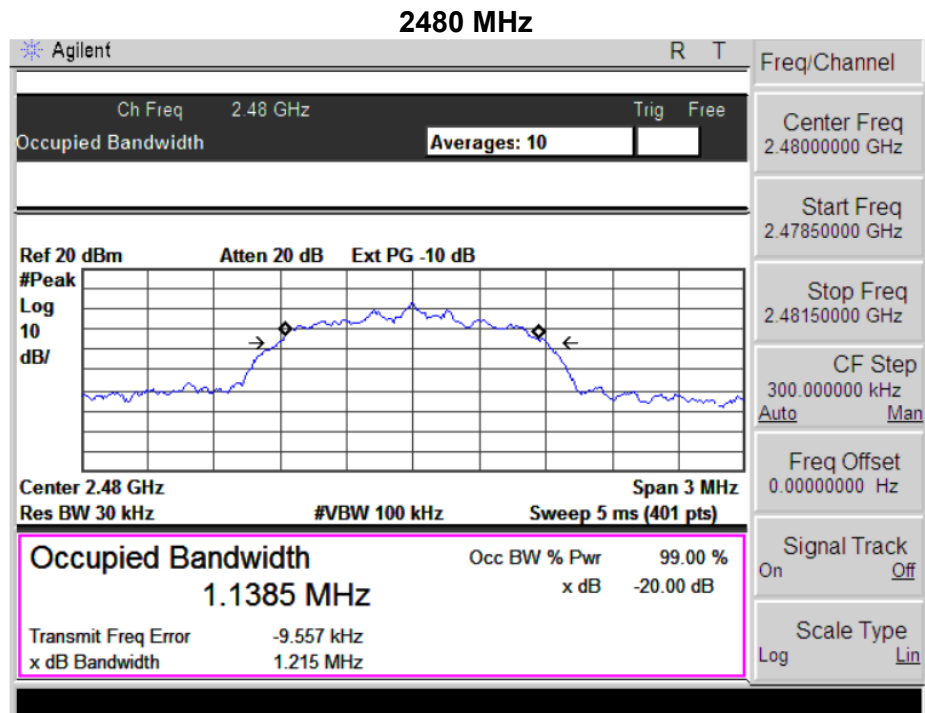
8DPSK

2402MHz



2441 MHz







5. 100 KHZ BANDWIDTH OF FREQUENCY BAND EDGE APPLICABLE STANDARD

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated 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) (see §15.205(c)).

TEST PROCEDURE

- a. For radiated, please see item 3.2.2
- b. For conducted, please see item 4.1.4

5.1 DEVIATION FROM STANDARD

No deviation.

5.2 TEST SETUP

5.3 EUT OPERATION CONDITIONS

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

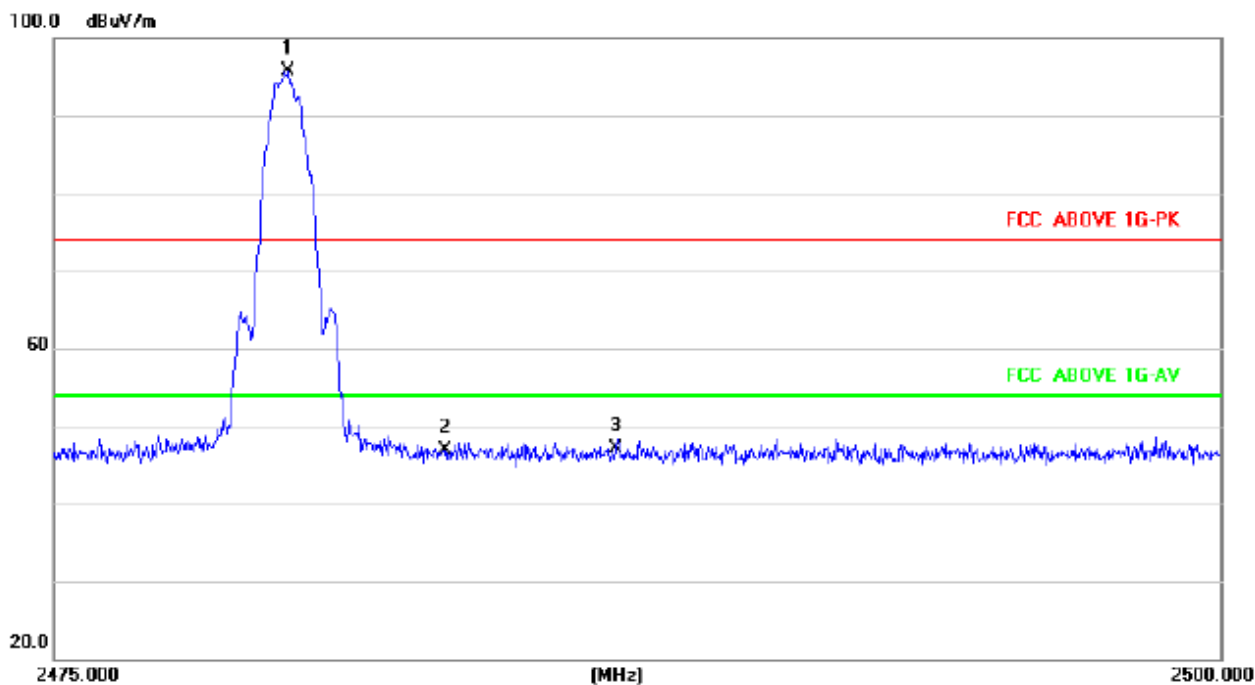
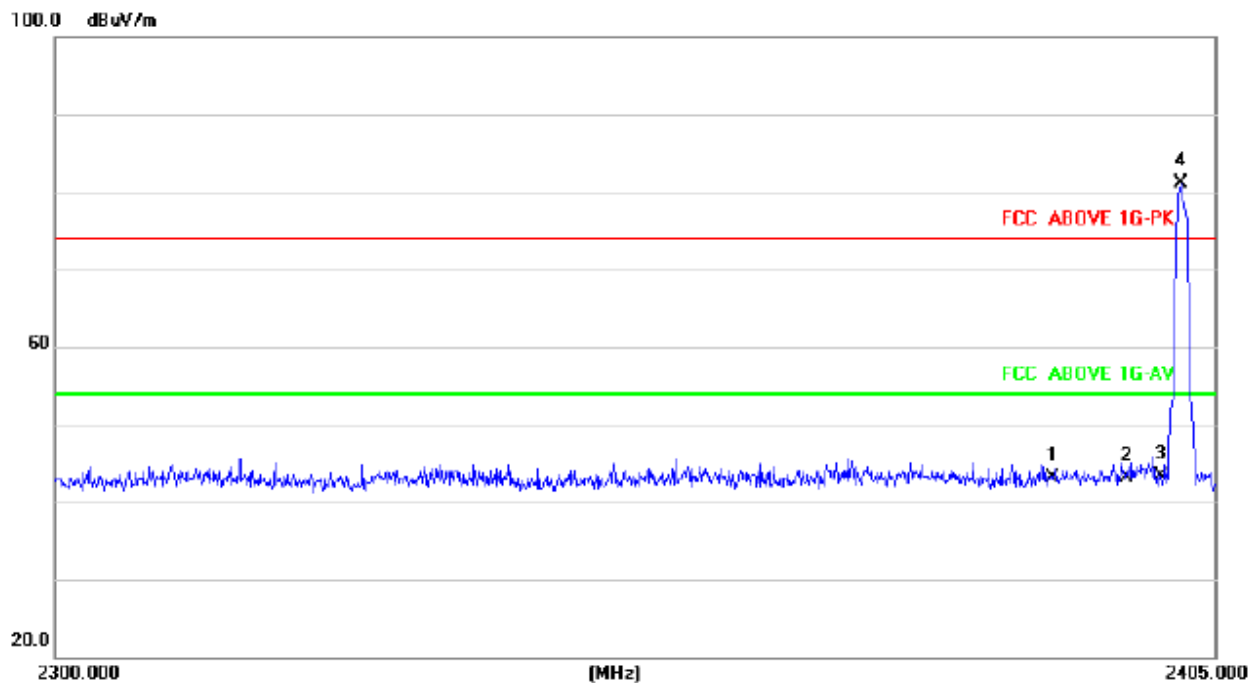


5.4 TEST RESULTS

EUT :	Speaker	Model Name :	SL-2015
Temperature :	25 °C	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	AC 120V/60Hz
Test Mode :	CH01/ CH78	Polarization :	Horizontal

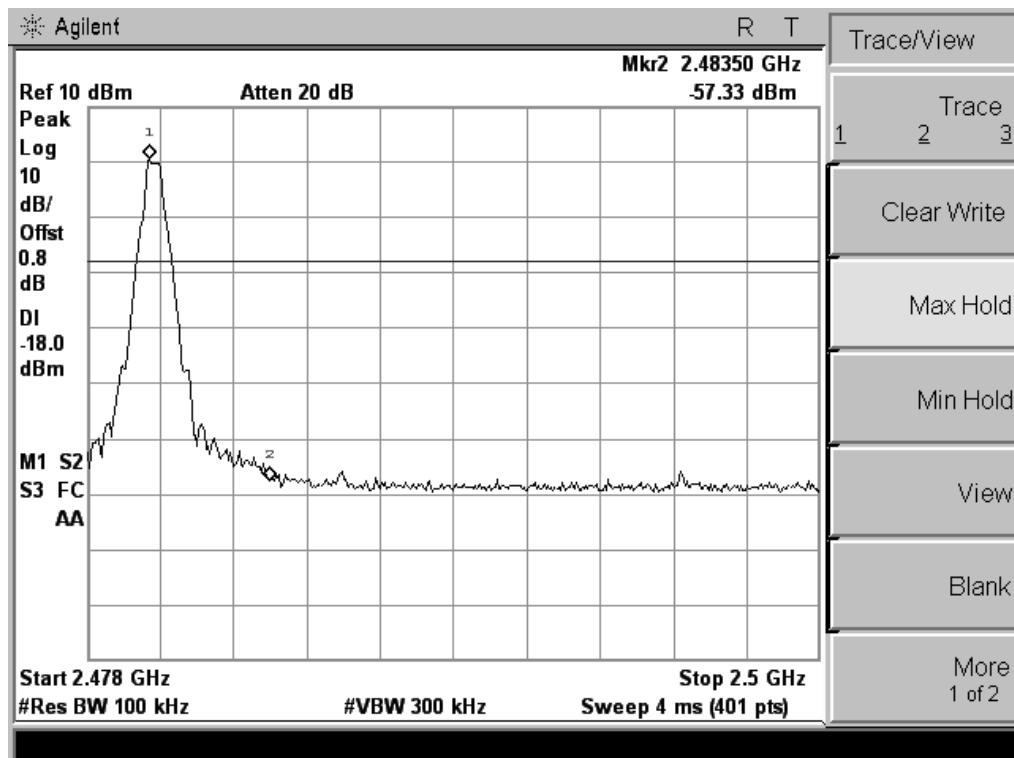
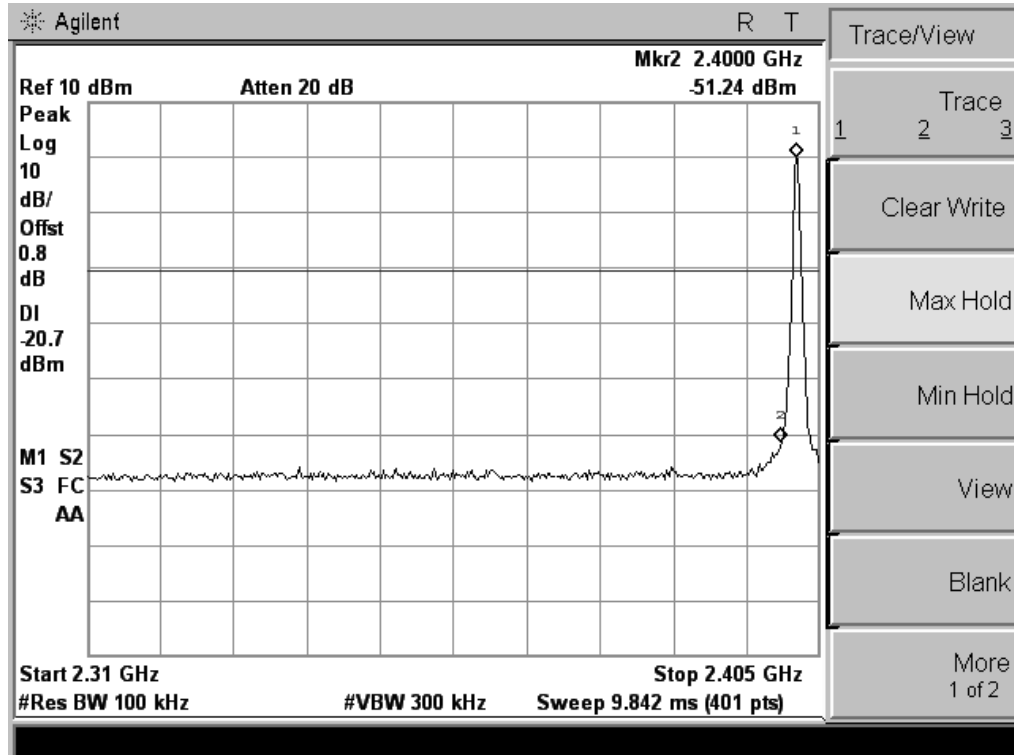
	Frequency (MHz)	Antenna polarization (H/V)	Worst Frequency (MHz)	Factor	Emission (dBuV/m)	Band edge Limit (dBuV/m)		Result
				dB		PK	AV	
Hopping	<2400	H	2400.00	1.31	44.65	74.00	54.00	Pass
	<2400	V	2400.00	1.31	44.38	74.00	54.00	Pass
	>2483.5	H	2485.30	1.29	44.76	74.00	54.00	Pass
	>2483.5	V	2485.30	1.29	44.28	74.00	54.00	Pass
Unhopping	<2400	H	2400.00	1.31	43.68	74.00	54.00	Pass
	<2400	V	2400.00	1.31	43.33	74.00	54.00	Pass
	>2483.5	H	2485.30	1.29	44.43	74.00	54.00	Pass
	>2483.5	V	2485.30	1.29	43.52	74.00	54.00	Pass

The plot only show the worst mode hopping mode on Horizontal



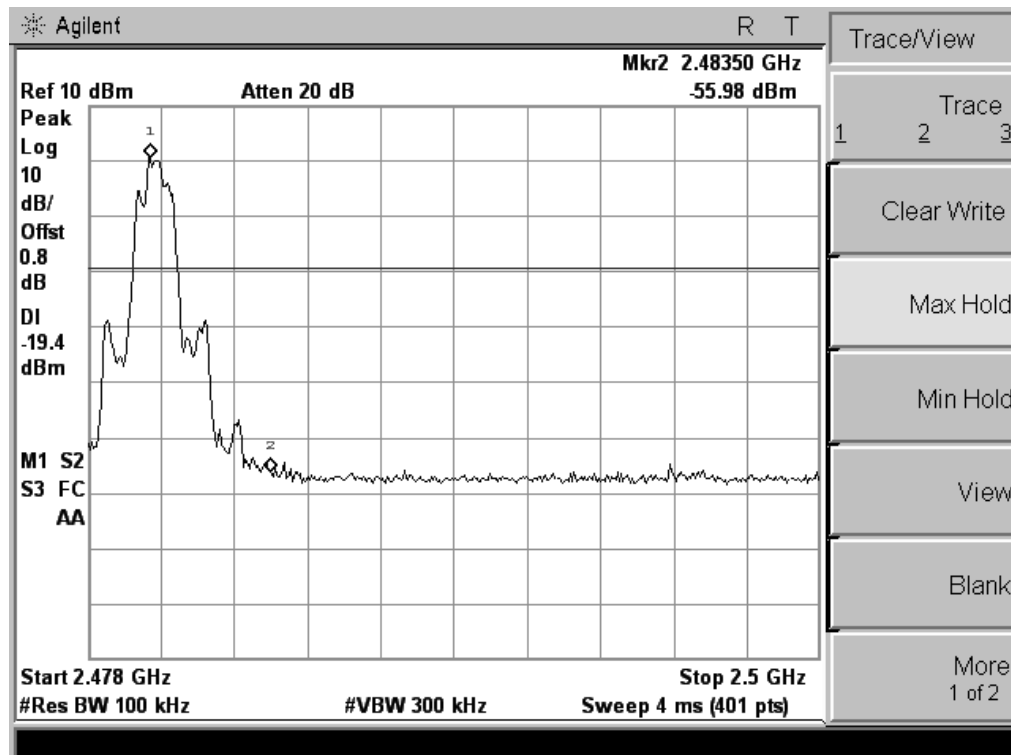
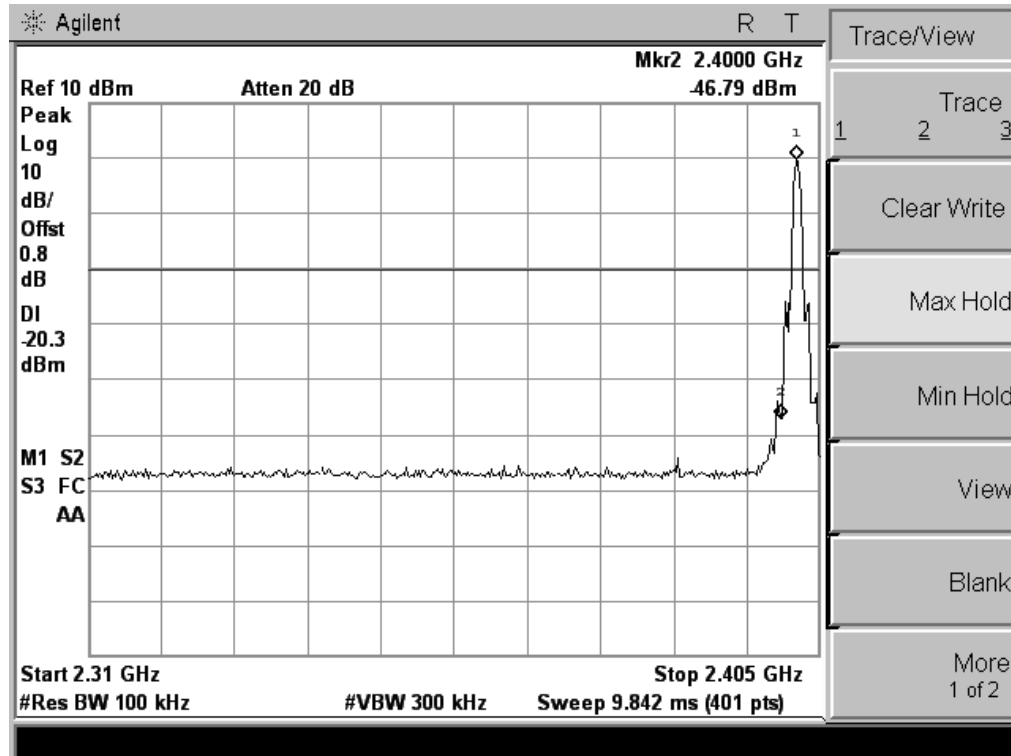


GFSK





8-DPSK





6. ANTENNA REQUIREMENT

6.1 STANDARD REQUIREMENT

15.203 requirement: For intentional device, according to 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.

6.2 EUT ANTENNA

The EUT antenna is internal antenna. It complies with the standard requirement.

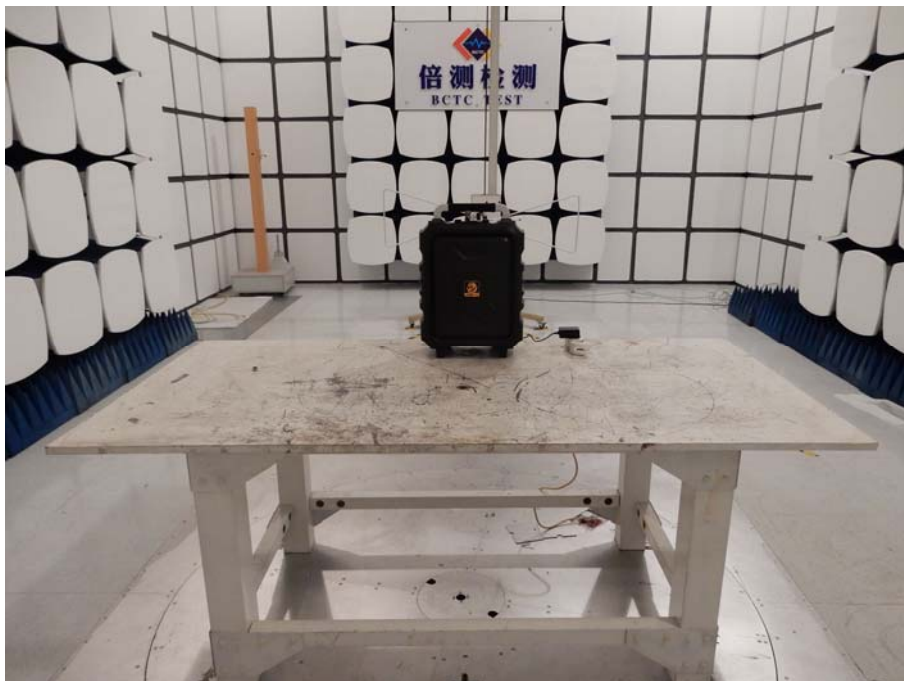
7. EUT TEST PHOTO

Conducted Measurement Photos





Radiated Measurement Photos



8. PHOTOS OF THE EUT





