



FCC Part 15C Test Report

FCC ID: 2AHSIK81

Product Name:	Speakers
Trademark:	N/A
Model Name :	K81 SBX-21000, BT-170, PBX-10700, PBX-10701, PBX-21001, BT-3165LM, BT-3265LM, BT-3365LM, CS-3025BL, TS-30110, TS-30212D, TS-31212D, K51, K51A, K51B, K51C, K51D, K6, K6B, K6C, K6D, K6A, K61, K61A, K61C, K61B, K61D, K18, K18A, K21, K21A, K82, K6T, K61T, K22, K22A, K1-K3, K8-K50, K30, A12, A13, A15, A11, A10, A3, A18, A14, A16, A17, A19, A20, A21, A22, A23, A24, A25, K166, K225, K286, K288, K212, K288D, K286D, K231A, K231, K212D, K516, K217.
Prepared For :	LARK ELECTRONICS CO., LTD.
Address :	Building B Yushang Industrial Zone, Shiyan, Bao'an, Shenzhen, China
Prepared By :	Shenzhen BCTC Technology Co., Ltd.
Address :	No.101,Yousong Road,Longhua New District, Shenzhen,China
Test Date:	Mar. 16 - Mar. 22, 2016
Date of Report :	Mar. 22, 2016
Report No.:	BCTC-160303249E



VERIFICATION OF COMPLIANCE

Applicant's name : **LARK ELECTRONICS CO., LTD.**

Address..... : Building B Yushang Industrial Zone, Shiyan, Bao'an,
Shenzhen, China

Manufacture's Name : **WANG XING DA(FENGSHUN) ELECTRONICS CO., LTD.**

Address..... : Wang Xing Da Technology Park, Tongpan Village, Tangkeng
Town, Fengshun county, Meizhou City, Guangdong Province,
China

Product description

Product name..... : Speakers

Trademark: N/A
K81

Model Name:

SBX-21000, BT-170, PBX-10700, PBX-10701, PBX-21001,
BT-3165LM, BT-3265LM, BT-3365LM, CS-3025BL,
TS-30110, TS-30212D, TS-31212D, K51, K51A, K51B,
K51C, K51D, K6, K6B, K6C, K6D, K6A, K61, K61A, K61C,
K61B, K61D, K18, K18A, K21, K21A, K82, K6T, K61T, K22,
K22A, K1-K3, K8-K50, K30, A12, A13, A15, A11, A10, A3,
A18, A14, A16, A17, A19, A20, A21, A22, A23, A24,
A25, K166, K225, K286, K288, K212, K288D, K286D, K231A,
K231, K212D, K516, K217.

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.

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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	7
2.5 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE)	7
2.6 EQUIPMENTS LIST FOR ALL TEST ITEMS	8
3 . EMC EMISSION TEST	9
3.1 CONDUCTED EMISSION MEASUREMENT	9
3.1.1 POWER LINE CONDUCTED EMISSION LIMITS	9
3.1.2 TEST PROCEDURE	10
3.1.3 DEVIATION FROM TEST STANDARD	10
3.1.4 TEST SETUP	10
3.1.5 EUT OPERATING CONDITIONS	10
3.1.6 TEST RESULTS	11
3.2 RADIATED EMISSION MEASUREMENT	13
3.2.1 RADIATED EMISSION LIMITS	13
3.2.2 TEST PROCEDURE	14
3.2.3 DEVIATION FROM TEST STANDARD	14
3.2.4 TEST SETUP	15
3.2.5 EUT OPERATING CONDITIONS	16
3.2.6 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 . BAND EDGE EMISSION	28
5.1 DEVIATION FROM STANDARD	28
5.2 EUT OPERATION CONDITIONS	28
5.3 TEST RESULTS	29
6 . ANTENNA REQUIREMENT	32
6.1 STANDARD REQUIREMENT	32
6.2 EUT ANTENNA	32
7 . EUT TEST PHOTO	33
8 . PHOTOS OF THE EUT	35



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

Equipment	Speakers										
Trade Name	N/A										
Model Name	K81										
Serial Model	SBX-21000, BT-170, PBX-10700, PBX-10701, PBX-21001, BT-3165LM, BT-3265LM, BT-3365LM, CS-3025BL, TS-30110, TS-30212D, TS-31212D, K51, K51A, K51B, K51C, K51D, K6, K6B, K6C, K6D, K6A, K61, K61A, K61C, K61B, K61D, K18, K18A, K21, K21A, K82, K6T, K61T, K22, K22A, K1-K3, K8-K50, K30, A12, A13, A15, A11, A10, A3, A18, A14, A16, A17, A19, A20, A21, A22, A23, A24, A25, K166, K225, K286, K288, K212, K288D, K286D, K231A, K231, K212D, K516, K217.										
Model Difference	The product is different for model number and outlook color.										
Product Description	<table border="1"> <tr> <td>Operation Frequency:</td><td>2402~2480 MHz</td></tr> <tr> <td>Modulation Type:</td><td>GFSK, PI/4 DPSK, 8DPSK</td></tr> <tr> <td>Bit Rate of Transmitter</td><td>1/2/3M</td></tr> <tr> <td>Number Of Channel</td><td>79CH</td></tr> <tr> <td>Antenna Designation:</td><td>Please see Note 3.</td></tr> </table> Based on the application, features, or specification exhibited in User's Manual, the EUT is considered as an ITE/Computing Device. More details of EUT technical specification, please refer to the User's Manual.	Operation Frequency:	2402~2480 MHz	Modulation Type:	GFSK, PI/4 DPSK, 8DPSK	Bit Rate of Transmitter	1/2/3M	Number Of Channel	79CH	Antenna Designation:	Please see Note 3.
Operation Frequency:	2402~2480 MHz										
Modulation Type:	GFSK, PI/4 DPSK, 8DPSK										
Bit Rate of Transmitter	1/2/3M										
Number Of Channel	79CH										
Antenna Designation:	Please see Note 3.										
Channel List	Please refer to the Note 2.										
Power	DC 9V from adapter										
Adapter	Model:KZ0901000 I/P:AC100-240V 50/60Hz 0.5A max O/P: DC 9V 1A										
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	2441
02	2403	12	2414	39	2441
03	2404	13	2415	40	2442
~	~	~	~	~	~
09	2411	19	2421	77	2479
10	2412	20	2422	78	2480



Table for Filed Antenna

3.	Ant	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	NOTE
	1	N/A	N/A	PCB Antenna	N/A	0	

2.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible 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 TEXT SOFTWARE SETTING

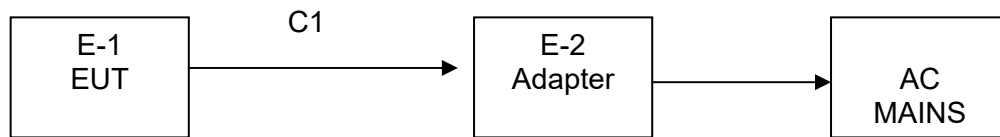
During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final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

Frequency	2402 MHz	2441 MHz	2480 MHz
Channel	Low	Middle	High



2.4 BLOCK DIGRAM 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	Speakers	N/A	K81	N/A	EUT
E-2	Adapter	N/A	KZ0901000	N/A	

Item	Shielded Type	Ferrite Core	Length	Note
C1	NO Shielded	NO	0.8M	AC 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

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Test Receiver	R&S	ESCI	1166.5950K03-101165-ha	2015.06.05	2016.06.05	1 year
2	LISN	R&S	NSLK8126	8126466	2015.08.24	2016.08.23	1 year
3	LISN	R&S	NSLK8126	8126487	2015.08.24	2016.08.23	1 year
4	50Ω Coaxial Switch	Anritsu	MP59B	6200264417	2015.06.05	2016.06.05	1 year
5	RF cables	R&S	R204	R20X	2015.06.05	2016.06.05	1 year

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

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Spectrum Analyzer	Agilent	E4407B	MY45108040	2015.06.05	2016.06.05	1 year
2	Test Receiver	R&S	ESPI	101318	2015.06.05	2016.06.05	1 year
3	Bilog Antenna	R&S	VULB9168	VULB9168-438	2015.06.05	2016.06.05	1 year
4	50Ω Coaxial Switch	Anritsu	MP59B	6200264416	2015.06.05	2016.06.05	1 year
5	Spectrum Analyzer	ADVANTEST	R3132	150900201	2015.06.05	2016.06.05	1 year
6	Horn Antenna	R&S	HF906	10027	2015.06.05	2016.06.05	1 year
7	Horn Ant	Schwarzbeck	BBHA 9170	9170-181	2015.06.05	2016.06.05	1 year
8	Amplifier	R&S	BBV9743	9743-019	2015.12.22	2016.12.21	1 year
9	Loop Antenna	ARA	PLA-1030/B	1029	2015.06.05	2016.06.05	1 year
10	RF cables	R&S	R203	R20X	2015.06.05	2016.06.05	1 year
11	Antenna connector	Florida RFLabs	Lab-Fle	RF 01#	2015.06.05	2016.06.05	1 year



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

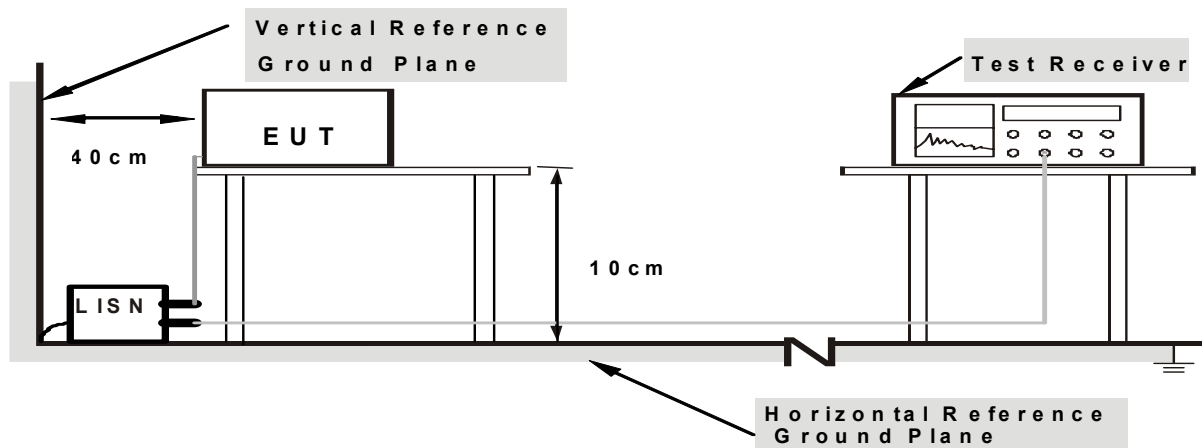
3.1.2 TEST PROCEDURE

- 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.

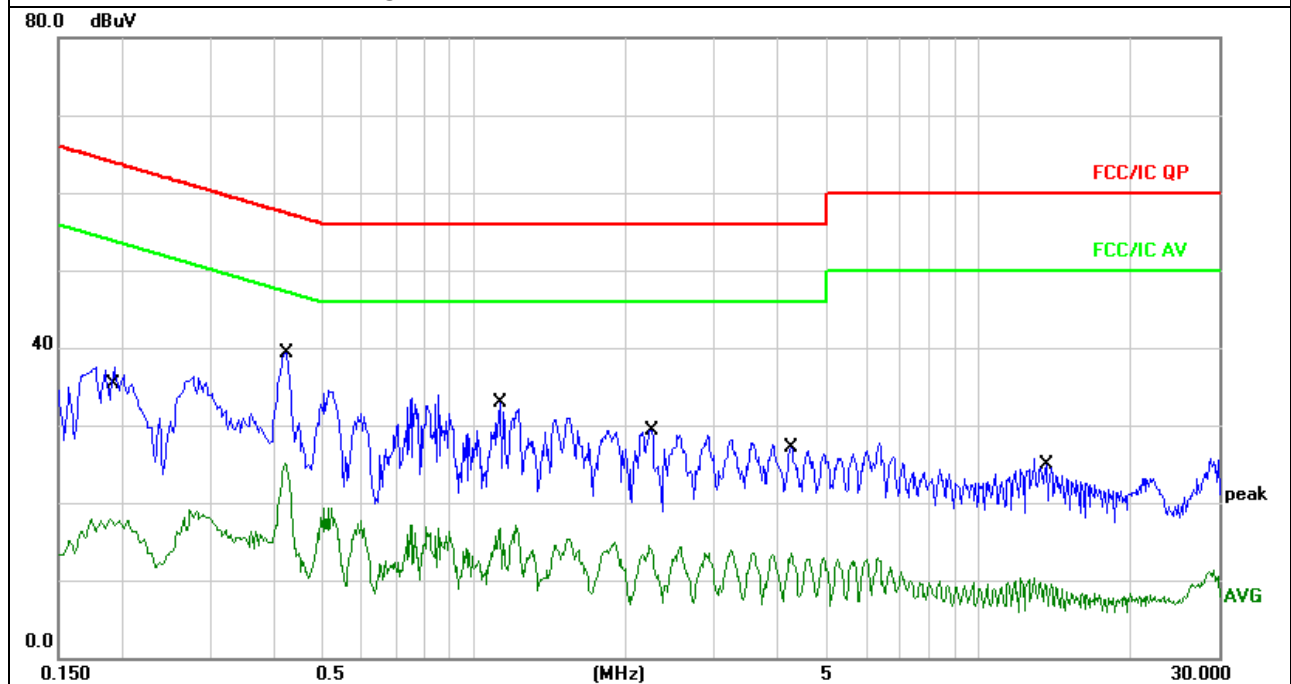
**3.1.6 TEST RESULTS**

EUT :	Speakers	Model Name. :	K81
Temperature :	26℃	Relative Humidity :	54%
Pressure :	1010hPa	Phase :	L
Test Voltage :	AC120V/60Hz	Test Mode :	Mode 4

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV)	(dBμV)	(dB)	
0.1900	27.43	10.06	37.49	64.03	-26.54	QP
0.1900	7.85	10.06	17.91	54.03	-36.12	AVG
0.4220	29.29	10.11	39.40	57.41	-18.01	QP
0.4220	14.96	10.11	25.07	47.41	-22.34	AVG
1.1260	22.71	10.17	32.88	56.00	-23.12	QP
1.1260	6.49	10.17	16.66	46.00	-29.34	AVG
2.2260	19.17	10.18	29.35	56.00	-26.65	QP
2.2260	4.29	10.18	14.47	46.00	-31.53	AVG
4.2660	16.57	10.16	26.73	56.00	-29.27	QP
4.2660	3.27	10.16	13.43	46.00	-32.57	AVG
13.5700	14.74	10.14	24.88	60.00	-35.12	QP
13.5700	-0.61	10.14	9.53	50.00	-40.47	AVG

Remark:

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



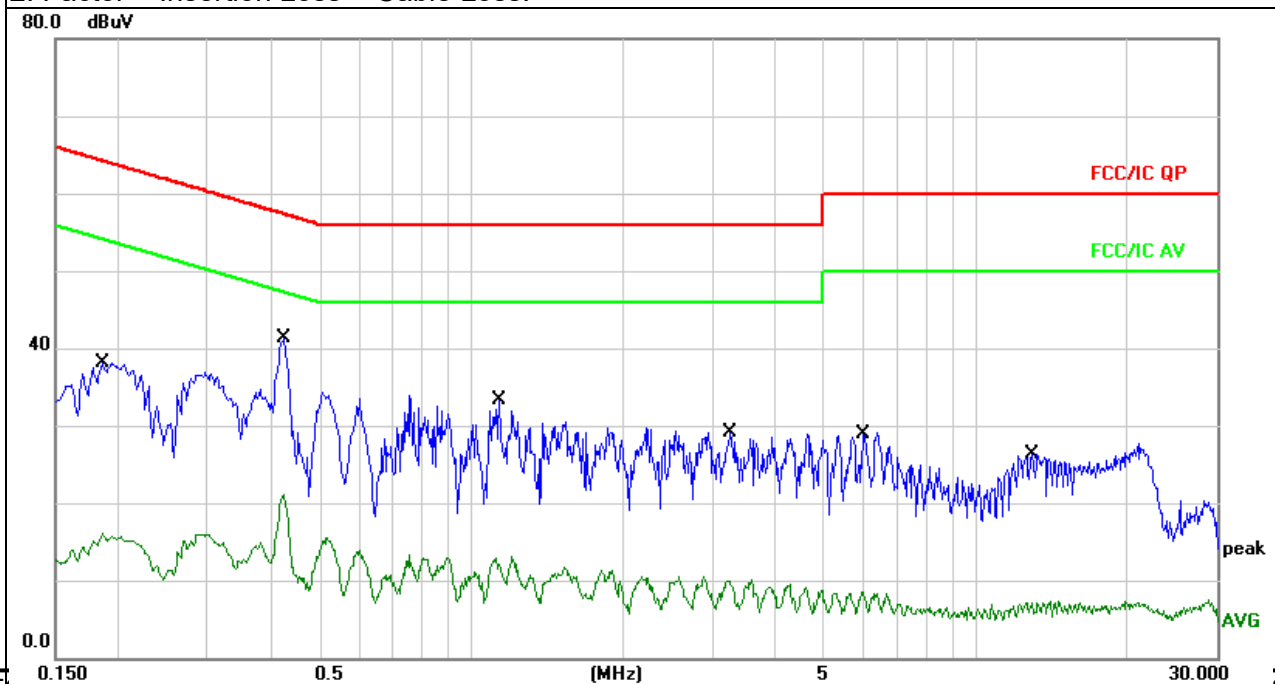


EUT :	Speakers	Model Name. :	K81
Temperature :	26℃	Relative Humidity :	54%
Pressure :	1010hPa	Phase :	N
Test Voltage :	AC120V/60Hz	Test Mode :	Mode 4

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV)	(dBμV)	(dB)	
0.1860	28.11	10.06	38.17	64.21	-26.04	QP
0.1860	5.96	10.06	16.02	54.21	-38.19	AVG
0.4260	31.12	10.11	41.23	57.33	-16.10	QP
0.4260	11.05	10.11	21.16	47.33	-26.17	AVG
1.1380	23.05	10.17	33.22	56.00	-22.78	QP
1.1380	2.91	10.17	13.08	46.00	-32.92	AVG
3.2340	18.89	10.18	29.07	56.00	-26.93	QP
3.2340	-0.25	10.18	9.93	46.00	-36.07	AVG
5.9740	18.92	10.09	29.01	60.00	-30.99	QP
5.9740	-1.66	10.09	8.43	50.00	-41.57	AVG
12.9460	16.21	10.14	26.35	60.00	-33.65	QP
12.9460	-2.88	10.14	7.26	50.00	-42.74	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 meters above the ground at a 3 meter chamber test site. 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; 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:

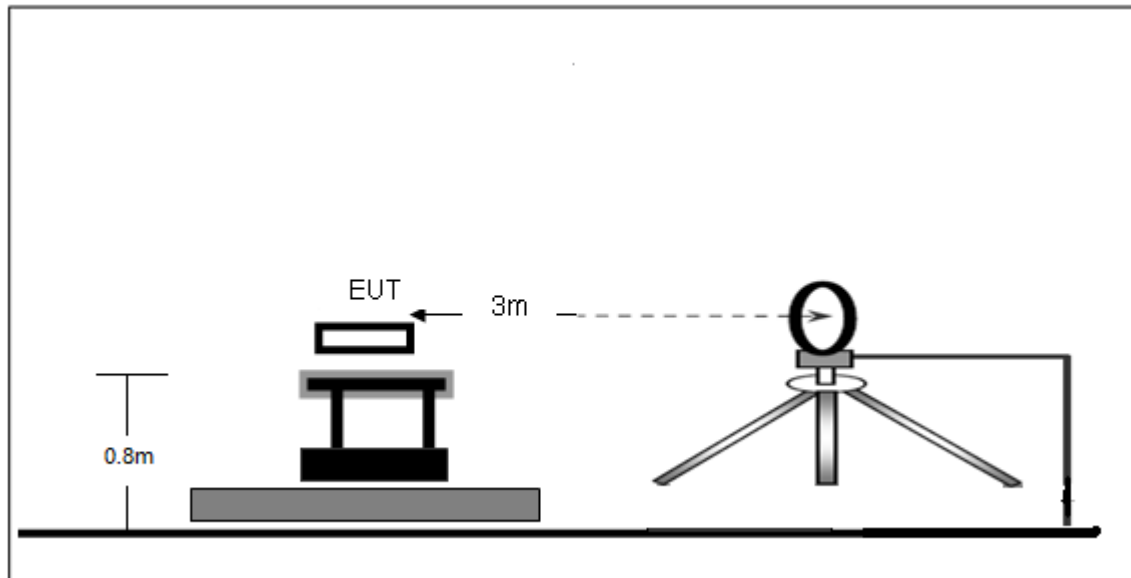
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

3.2.3 DEVIATION FROM TEST STANDARD

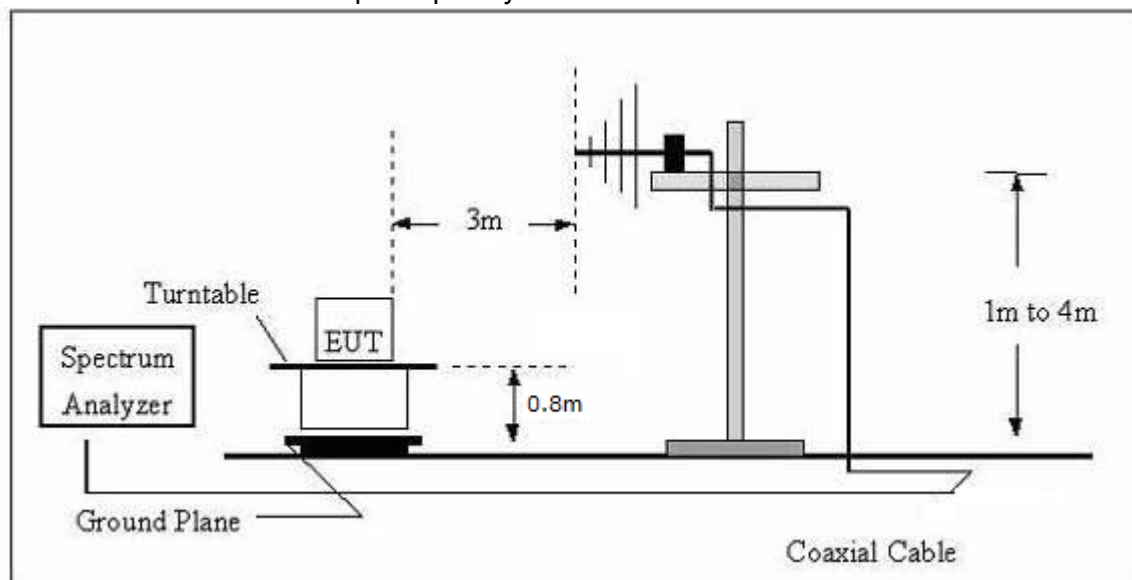
No deviation

3.2.4 TEST SETUP

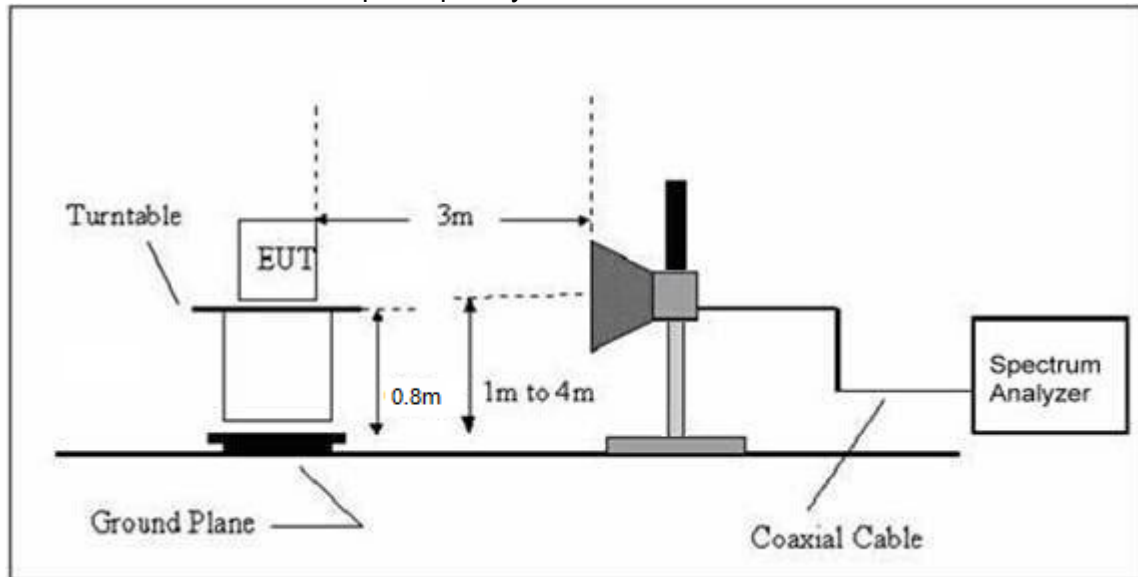
(A) Radiated Emission Test-Up Frequency Below 30MHz



(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 :	Speakers	Model Name :	K81
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Polarization :	---
Test Voltage :	DC7.4V		
Test Mode :	Normal Link		

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

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



Radiated Spurious Emission (Between 30MHz – 1GHz)

We pretest AC 120V and DC7.4V, the worst voltage was AC 120V and the data recording in the report

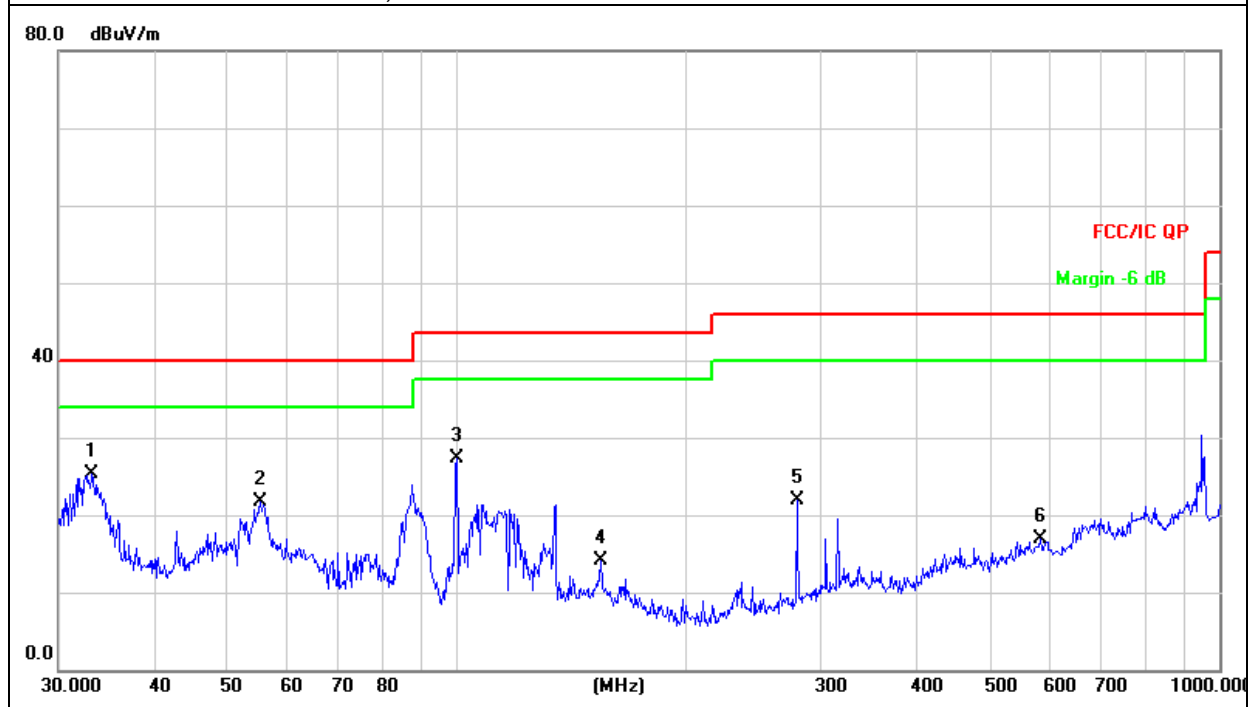
EUT :	Speakers	Model Name :	K81
Temperature :	26 °C	Relative Humidity :	54%
Pressure :	1010 hPa	Polarization :	Horizontal
Test Voltage :	AC120V/60Hz		
Test Mode : (Worst)	Normal Link		

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
33.2112	33.75	-8.41	25.34	40.00	-14.66	QP
55.2207	32.79	-11.15	21.64	40.00	-18.36	QP
99.8777	43.73	-16.49	27.24	43.50	-16.26	QP
154.2786	27.06	-12.86	14.20	43.50	-29.30	QP
279.0436	35.08	-13.13	21.95	46.00	-24.05	QP
582.7425	23.05	-6.20	16.85	46.00	-29.15	QP

Remark:

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

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





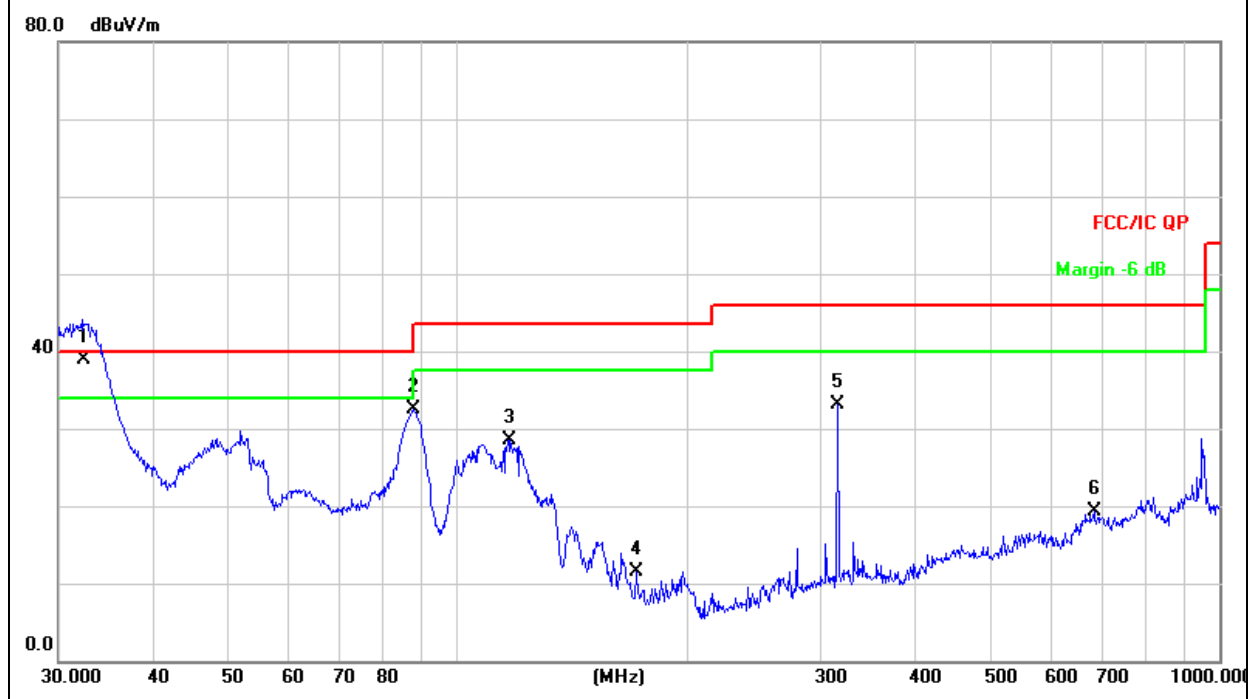
EUT :	Speakers	Model Name :	K81
Temperature :	26 °C	Relative Humidity :	54%
Pressure :	1010 hPa	Polarization :	Vertical
Test Voltage :	AC120V/60Hz		
Test Mode : (Worst)	Normal Link		

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
32.4059	47.25	-8.36	38.89	40.00	-1.11	QP
87.7248	50.24	-17.79	32.45	40.00	-7.55	QP
117.3603	43.47	-14.96	28.51	43.50	-14.99	QP
171.9946	25.23	-13.64	11.59	43.50	-31.91	QP
315.4808	45.24	-12.18	33.06	46.00	-12.94	QP
684.7454	24.01	-4.63	19.38	46.00	-26.62	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	102.65	PK	H	1.31	103.96	114.00	Pass
	2402.00	88.25	Ave	H	1.31	89.56	94.00	Pass
	4804.00	55.52	PK	H	-1.06	54.46	74.00	Pass
	4804.00	45.57	Ave	H	-1.06	44.51	54.00	Pass
	2402.00	102.36	PK	V	1.31	103.67	114.00	Pass
	2402.00	88.75	Ave	V	1.31	90.06	94.00	Pass
	4804.00	54.68	PK	V	-1.06	53.62	74.00	Pass
	4804.00	45.37	Ave	V	-1.06	44.31	54.00	Pass
	2441.00	102.77	PK	H	0.85	103.62	114.00	Pass
	2441.00	88.32	Ave	H	0.85	89.17	94.00	Pass
Middle Channel 2441MHz	4880.00	57.23	PK	H	-0.62	56.61	74.00	Pass
	4880.00	48.33	Ave	H	-0.62	47.71	54.00	Pass
	2441.00	103.22	PK	V	0.85	104.07	114.00	Pass
	2441.00	87.27	Ave	V	0.85	88.12	94.00	Pass
	4880.00	56.86	PK	V	-0.62	56.24	74.00	Pass
	4880.00	48.04	Ave	V	-0.62	47.42	54.00	Pass
	2480.00	103.61	PK	H	0.53	104.14	114.00	Pass
	2480.00	87.87	Ave	H	0.53	88.4	94.00	Pass
Upper Channel 2480MHz	4960.00	57.52	PK	H	-0.24	57.28	74.00	Pass
	4960.00	48.63	Ave	H	-0.24	48.39	54.00	Pass
	2480.00	103.24	PK	V	0.53	103.77	114.00	Pass
	2480.00	88.24	Ave	V	0.53	88.77	94.00	Pass
	4960.00	57.28	PK	V	-0.24	57.04	74.00	Pass
	4960.00	47.32	Ave	V	-0.24	47.08	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	101.59	PK	H	1.31	102.90	114.00	Pass
	2402.00	87.59	Ave	H	1.31	88.90	94.00	Pass
	4804.00	56.84	PK	H	-1.06	55.78	74.00	Pass
	4804.00	48.00	Ave	H	-1.06	46.94	54.00	Pass
	2402.00	100.52	PK	V	1.31	101.83	114.00	Pass
	2402.00	86.88	Ave	V	1.31	88.19	94.00	Pass
	4804.00	57.84	PK	V	-1.06	56.78	74.00	Pass
	4804.00	46.52	Ave	V	-1.06	45.46	54.00	Pass
	2441.00	101.45	PK	H	0.85	102.30	114.00	Pass
	2441.00	87.13	Ave	H	0.85	87.98	94.00	Pass
Middle Channel 2441MHz	4882.00	53.72	PK	H	-0.62	53.10	74.00	Pass
	4882.00	43.05	Ave	H	-0.62	42.43	54.00	Pass
	2441.00	101.36	PK	V	0.85	102.21	114.00	Pass
	2441.00	86.52	Ave	V	0.85	87.37	94.00	Pass
	4882.00	54.61	PK	V	-0.62	53.99	74.00	Pass
	4882.00	44.10	Ave	V	-0.62	43.48	54.00	Pass
	2480.00	101.66	PK	H	0.53	102.19	114.00	Pass
	2480.00	87.20	Ave	H	0.53	87.73	94.00	Pass
Upper Channel 2480MHz	4960.00	51.87	PK	H	-0.24	51.63	74.00	Pass
	4960.00	42.95	Ave	H	-0.24	42.71	54.00	Pass
	2480.00	100.81	PK	V	0.53	101.34	114.00	Pass
	2480.00	86.49	Ave	V	0.53	87.02	94.00	Pass
	4960.00	54.02	PK	V	-0.24	53.78	74.00	Pass
	4960.00	43.15	Ave	V	-0.24	42.91	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	102.33	PK	H	1.31	103.64	114.00	Pass
	2402.00	88.23	Ave	H	1.31	89.54	94.00	Pass
	4804.00	57.25	PK	H	-1.06	56.19	74.00	Pass
	4804.00	48.34	Ave	H	-1.06	47.28	54.00	Pass
	2402.00	101.26	PK	V	1.31	102.57	114.00	Pass
	2402.00	87.51	Ave	V	1.31	88.82	94.00	Pass
	4804.00	58.26	PK	V	-1.06	57.20	74.00	Pass
	4804.00	46.86	Ave	V	-1.06	45.80	54.00	Pass
Middle Channel 2441MHz	2441.00	102.18	PK	H	0.85	103.03	114.00	Pass
	2441.00	87.76	Ave	H	0.85	88.61	94.00	Pass
	4882.00	54.11	PK	H	-0.62	53.49	74.00	Pass
	4882.00	43.35	Ave	H	-0.62	42.73	54.00	Pass
	2441.00	102.09	PK	V	0.85	102.94	114.00	Pass
	2441.00	87.15	Ave	V	0.85	88.00	94.00	Pass
	4882.00	55.01	PK	V	-0.62	54.39	74.00	Pass
	4882.00	44.42	Ave	V	-0.62	43.80	54.00	Pass
Upper Channel 2480MHz	2480.00	102.40	PK	H	0.53	102.93	114.00	Pass
	2480.00	87.84	Ave	H	0.53	88.37	94.00	Pass
	4960.00	52.24	PK	H	-0.24	52.00	74.00	Pass
	4960.00	43.25	Ave	H	-0.24	43.01	54.00	Pass
	2480.00	101.55	PK	V	0.53	102.08	114.00	Pass
	2480.00	87.12	Ave	V	0.53	87.65	94.00	Pass
	4960.00	54.42	PK	V	-0.24	54.18	74.00	Pass
	4960.00	43.46	Ave	V	-0.24	43.22	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

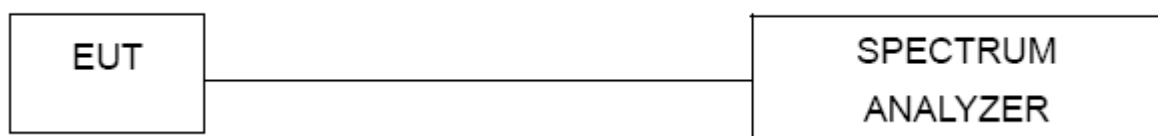
4.1.1 TEST PROCEDURE

- 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.

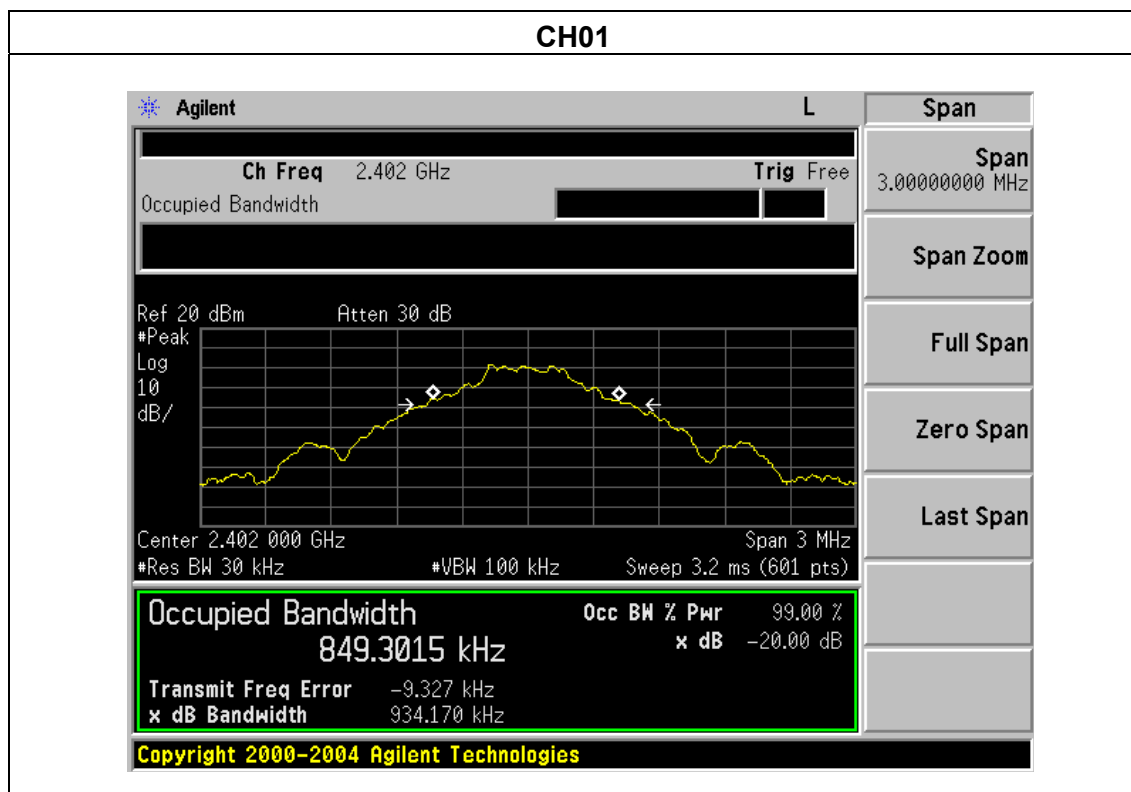


4.1.5 TEST RESULTS

EUT :	Speakers	Model Name :	K81
Temperature :	25 °C	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	AC120V/60Hz
Test Mode :	CH01 / CH20 /CH78		

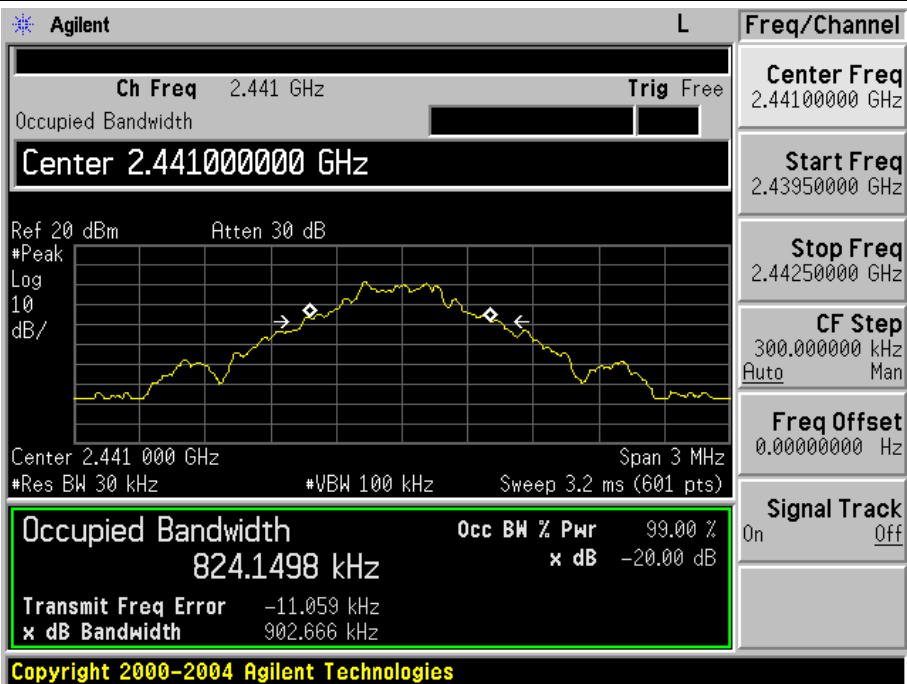
	Frequency	20dB Bandwidth (MHz)	Result
GFSK	2402 MHz	0.934	PASS
	2441 MHz	0.903	PASS
	2480 MHz	0.903	PASS
PI/4 DPSK	2402 MHz	1.119	PASS
	2441 MHz	1.157	PASS
	2480 MHz	1.119	PASS
8DPSK	2402 MHz	1.297	PASS
	2441 MHz	1.297	PASS
	2480 MHz	1.296	PASS

GFSK

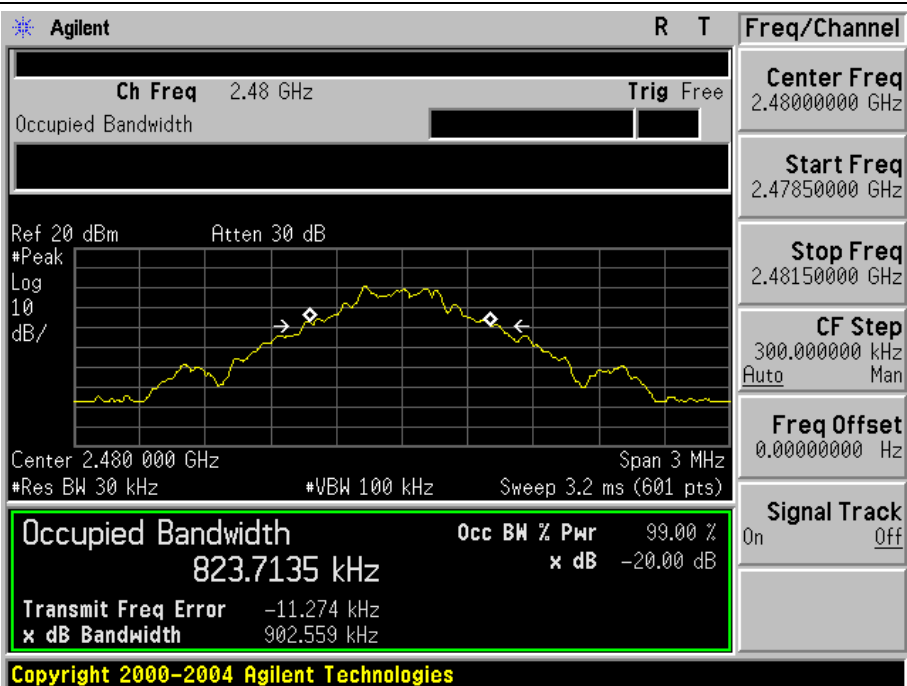




CH20

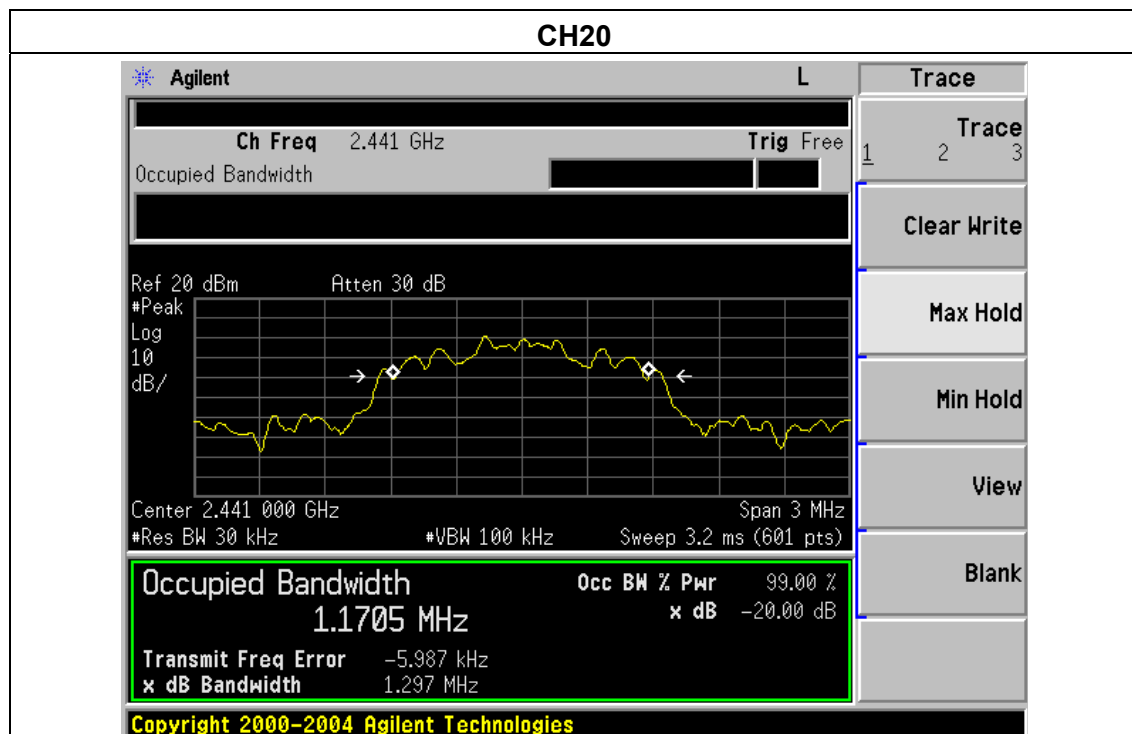
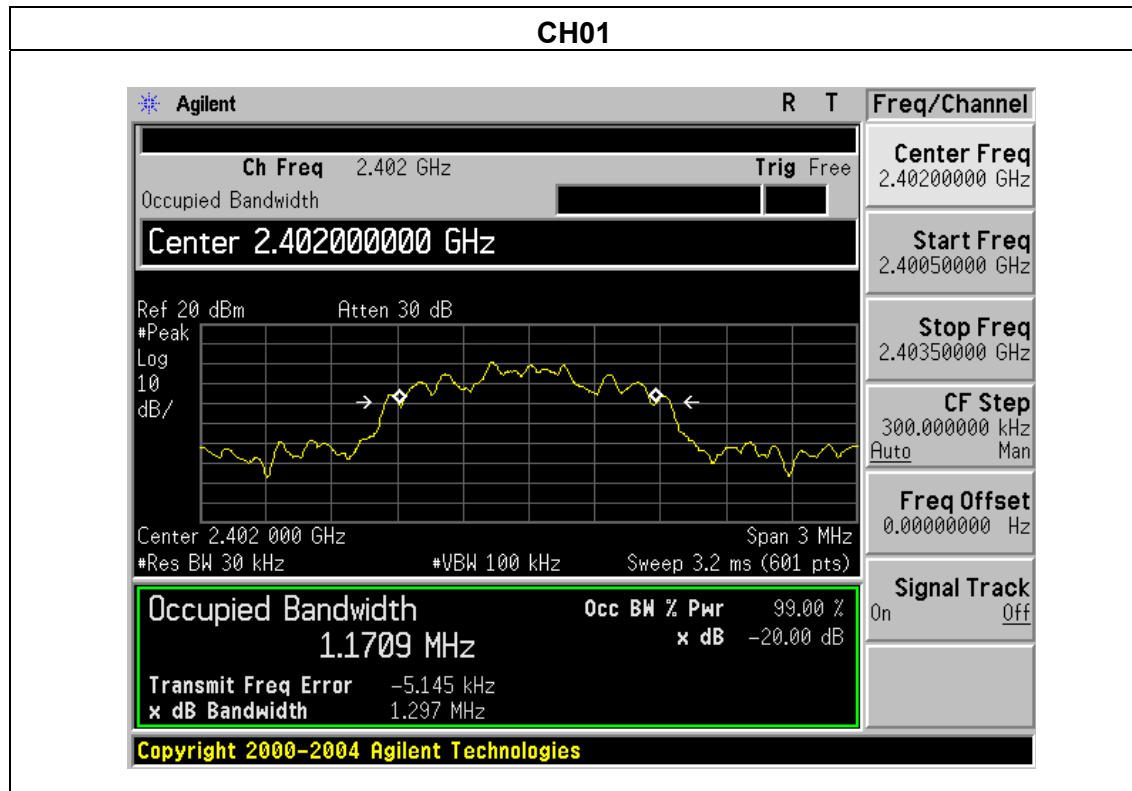


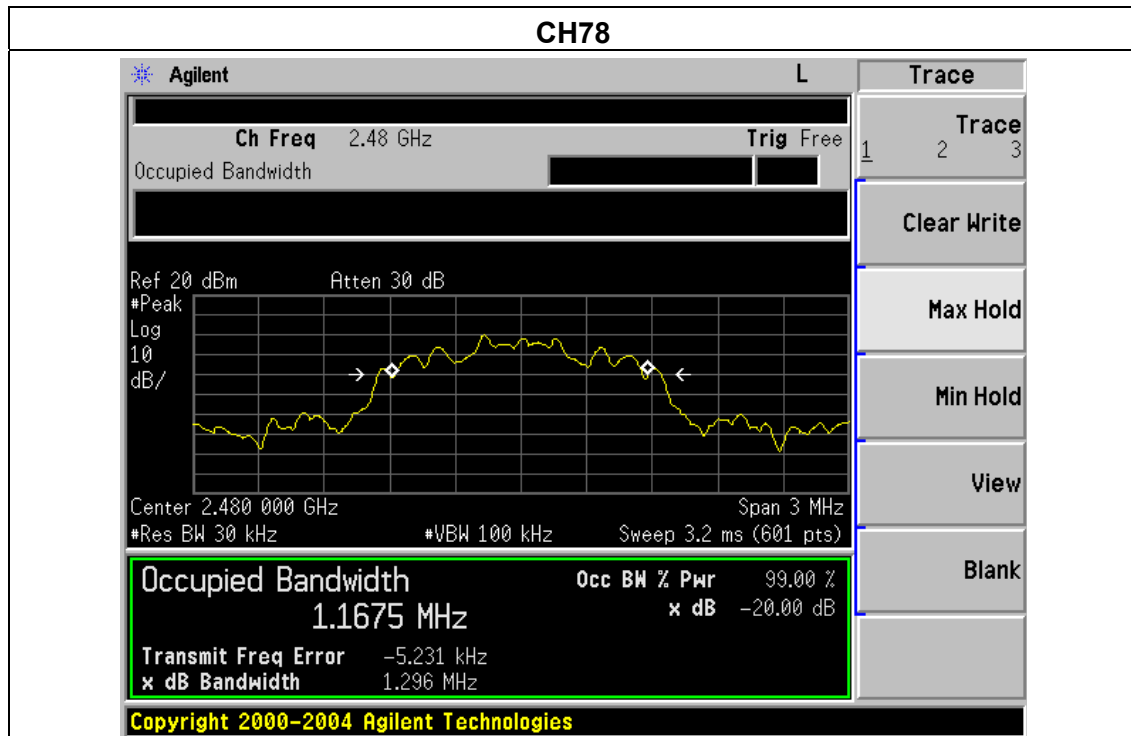
CH78





8DPSK







5. BAND EDGE EMISSION

APPLICABLE STANDARD

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

TEST PROCEDURE

- a. 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.
- b. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The height of the equipment or of the substitution antenna shall be 0.8 m; 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.
- d. 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.
- e. 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.
- f. For the actual test configuration, please refer to the related Item –EUT Test Photos.
- g. 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

5.1 DEVIATION FROM STANDARD

No deviation.

5.2 EUT OPERATION CONDITIONS

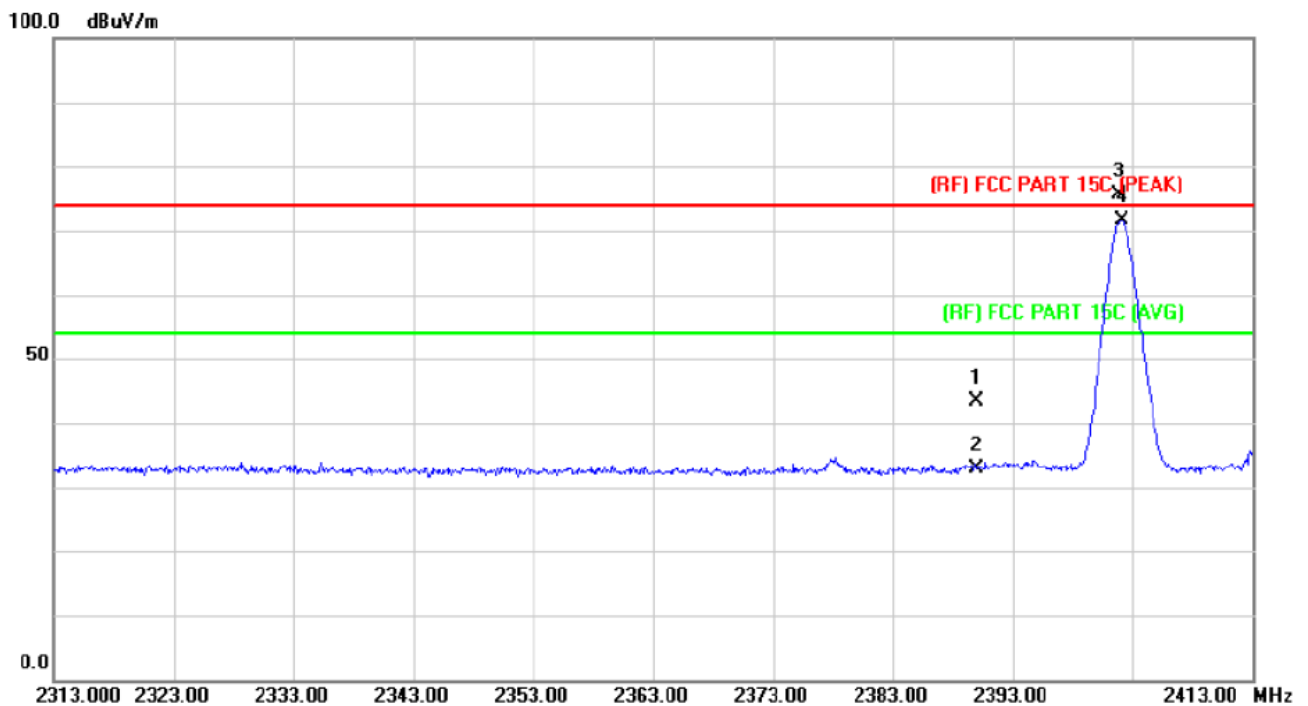
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

**5.3 TEST RESULTS**

EUT :	Speakers	Model Name :	K81
Temperature :	25 °C	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	AC120V/60Hz
Test Mode :	CH01/ CH78		

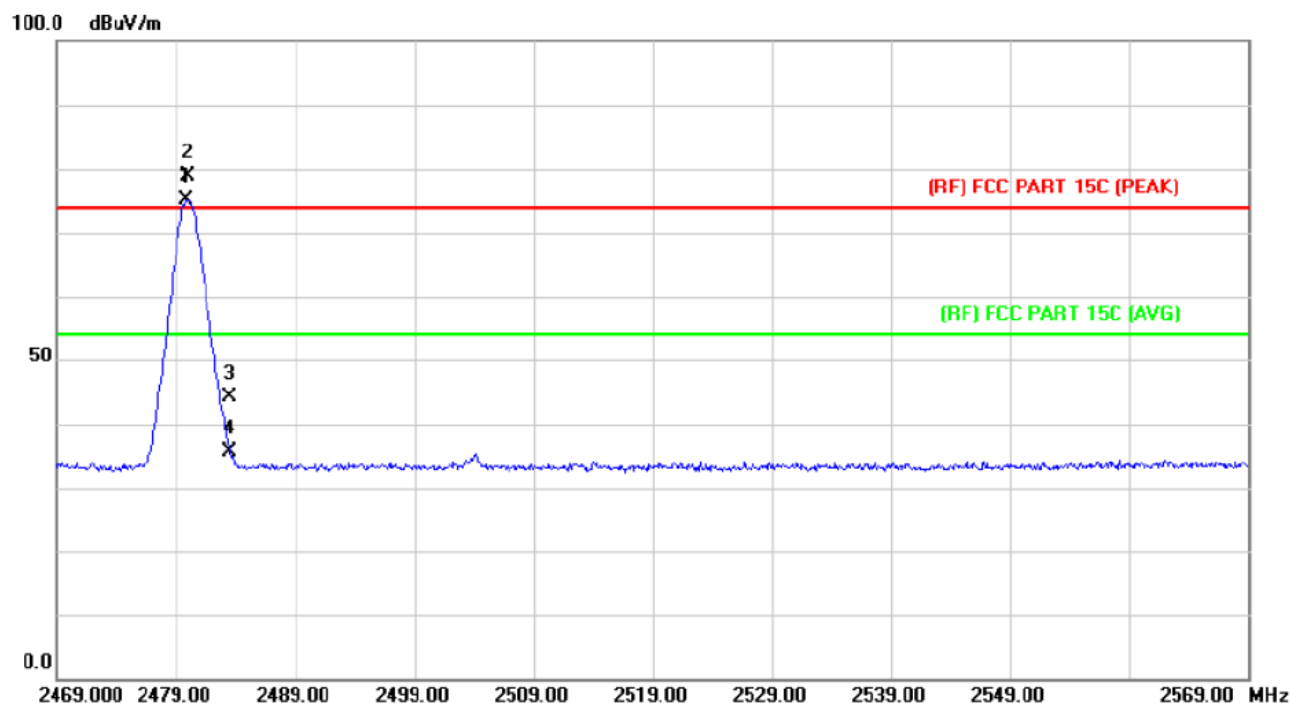
The worst mode was unhoppping for GFSK.

GFSK:



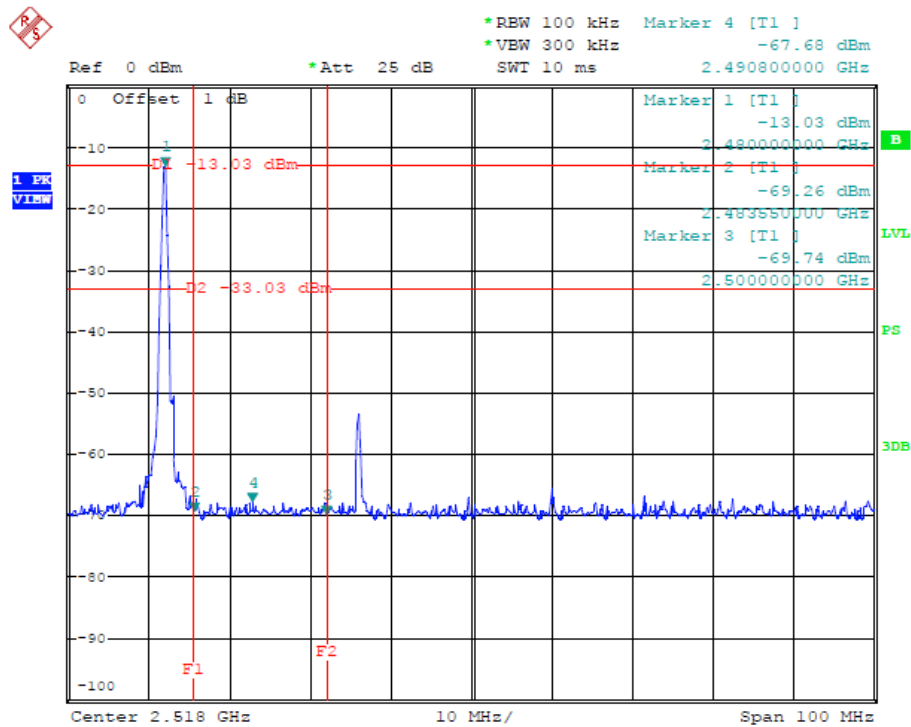
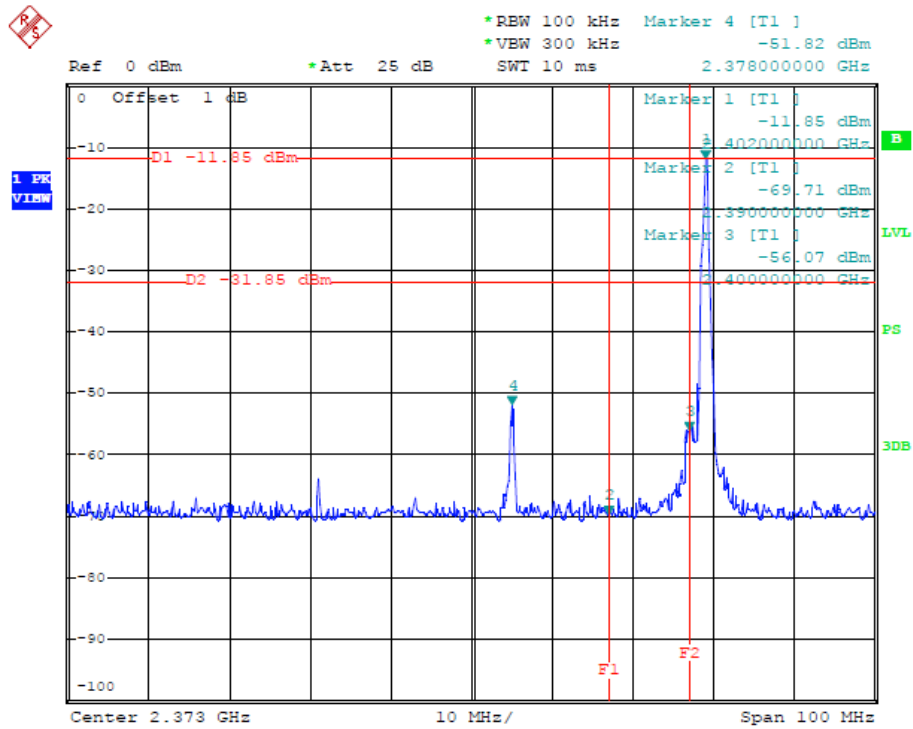
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB/m	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1		2390.000	42.70	0.77	43.47	74.00	-30.53	peak
2		2390.000	32.13	0.77	32.90	54.00	-21.10	AVG
3	X	2401.900	74.86	0.82	75.68	Fundamental Frequency		peak
4	*	2402.100	70.70	0.82	71.52	Fundamental Frequency		AVG

Emission Level= Read Level+ Correct Factor



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	2479.900	73.98	1.15	75.13	Fundamental Frequency		AVG
2	X	2480.000	77.80	1.15	78.95	Fundamental Frequency		peak
3		2483.500	42.85	1.17	44.02	74.00	-29.98	peak
4		2483.500	34.49	1.17	35.66	54.00	-18.34	AVG

Emission Level= Read Level+ Correct Factor





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 PCB antenna. It complies with the standard requirement.

7. EUT TEST PHOTO

Conducted Measurement Photos



Radiated Measurement Photos



8. PHOTOS OF THE EUT





