

APPLICATION CERTIFICATION
On Behalf of
SHENZHEN ACADIA ELECTRONIC CO., LTD

Shower Speaker
Model No.: BTS-06

FCC ID: 2AAVABTS-06

Prepared for : SHENZHEN ACADIA ELECTRONIC CO., LTD
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Report Number : ATE20140151
Date of Test : Feb 21-27, 2014
Date of Report : Feb 27, 2014

TABLE OF CONTENTS

Description	Page
Test Report Certification	
1. GENERAL INFORMATION	5
1.1. Description of Device (EUT).....	5
1.2. Description of Test Facility	6
1.3. Measurement Uncertainty	6
2. MEASURING DEVICE AND TEST EQUIPMENT	7
3. OPERATION OF EUT DURING TESTING	8
3.1. Operating Mode	8
3.2. Configuration and peripherals	8
4. TEST PROCEDURES AND RESULTS	9
5. 20DB BANDWIDTH TEST.....	10
5.1. Block Diagram of Test Setup.....	10
5.2. The Requirement For Section 15.247(a)(1).....	10
5.3. EUT Configuration on Measurement	10
5.4. Operating Condition of EUT	10
5.5. Test Procedure	11
5.6. Test Result	11
6. CARRIER FREQUENCY SEPARATION TEST.....	13
6.1. Block Diagram of Test Setup.....	13
6.2. The Requirement For Section 15.247(a)(1).....	13
6.3. EUT Configuration on Measurement	13
6.4. Operating Condition of EUT	13
6.5. Test Procedure	14
6.6. Test Result	14
7. NUMBER OF HOPPING FREQUENCY TEST	16
7.1. Block Diagram of Test Setup.....	16
7.2. The Requirement For Section 15.247(a)(1)(iii).....	16
7.3. EUT Configuration on Measurement	16
7.4. Operating Condition of EUT	16
7.5. Test Procedure	17
7.6. Test Result	17
8. DWELL TIME TEST	18
8.1. Block Diagram of Test Setup.....	18
8.2. The Requirement For Section 15.247(a)(1)(iii).....	18
8.3. EUT Configuration on Measurement	18
8.4. Operating Condition of EUT	18
8.5. Test Procedure	19
8.6. Test Result	19
9. MAXIMUM PEAK OUTPUT POWER TEST	25
9.1. Block Diagram of Test Setup.....	25
9.2. The Requirement For Section 15.247(b)(1).....	25
9.3. EUT Configuration on Measurement	25
9.4. Operating Condition of EUT	25
9.5. Test Procedure	26

9.6.	Test Result	26
10.	RADIATED EMISSION TEST	28
10.1.	Block Diagram of Test Setup.....	28
10.2.	The Limit For Section 15.247(d)	28
10.3.	Restricted bands of operation	29
10.4.	Configuration of EUT on Measurement	29
10.5.	Test Procedure.....	30
10.6.	The Field Strength of Radiation Emission Measurement Results	31
11.	BAND EDGE COMPLIANCE TEST	43
11.1.	Block Diagram of Test Setup.....	43
11.2.	The Requirement For Section 15.247(d)	43
11.3.	EUT Configuration on Measurement	43
11.4.	Operating Condition of EUT	43
11.5.	Test Procedure	44
11.6.	Test Result	44
12.	AC POWER LINE CONDUCTED EMISSION FOR FCC PART 15 SECTION 15.207(A) ..	52
12.1.	Block Diagram of Test Setup.....	52
12.2.	The Emission Limit	52
12.3.	Configuration of EUT on Measurement	53
12.4.	Operating Condition of EUT	53
12.5.	Test Procedure	53
12.6.	Power Line Conducted Emission Measurement Results	53
13.	ANTENNA REQUIREMENT.....	56
13.1.	The Requirement	56
13.2.	Antenna Construction	56

Test Report Certification

Applicant : SHENZHEN ACADIA ELECTRONIC CO., LTD
 Manufacturer : SHENZHEN ACADIA ELECTRONIC CO., LTD
 EUT Description : Shower Speaker
 (A) MODEL NO.: BTS-06
 (B) SERIAL NO.: N/A
 (C) POWER SUPPLY: DC 3.7V (Lithium ion battery) & DC 5V
 (D) Measurement Procedure Used:

FCC Rules and Regulations Part 15 Subpart C Section 15.247
 ANSI C63.4- 2009

The device described above is tested by ACCURATE TECHNOLOGY CO. LTD to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart C Section 15.247 limits. The measurement results are contained in this test report and ACCURATE TECHNOLOGY CO. LTD is assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the Equipment Under Test (EUT) is to be technically compliant with the FCC requirements.

This report applies to above tested sample only. This report shall not be reproduced in part without written approval of ACCURATE TECHNOLOGY CO. LTD.

Date of Test : Feb 21-27, 2014

Prepared by : 
 (Engineer)

Approved & Authorized Signer : 
 (Manager)

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

EUT	:	Shower Speaker
Model Number	:	BTS-06
Frequency Band	:	2402MHz-2480MHz
Number of Channels	:	79
Modulation type	:	GFSK
Antenna Gain	:	-1.0dBi
Antenna type	:	PCB Antenna
Power Supply	:	DC 3.7V&DC 5V
Applicant	:	SHENZHEN ACADIA ELECTRONIC CO., LTD
Address	:	39 Building, B Industry Zone,Tang Lang, Xili Lake, Shenzhen, China
Manufacturer	:	SHENZHEN ACADIA ELECTRONIC CO., LTD
Address	:	39 Building, B Industry Zone,Tang Lang, Xili Lake, Shenzhen, China
Date of sample received	:	Feb 21, 2014
Date of Test	:	Feb 21-27, 2014

1.2. Description of Test Facility

EMC Lab	:	Accredited by TUV Rheinland Shenzhen
		Listed by FCC
		The Registration Number is 752051
		Listed by Industry Canada
		The Registration Number is 5077A-2
		Accredited by China National Accreditation Committee for Laboratories
		The Certificate Registration Number is L3193
Name of Firm	:	ACCURATE TECHNOLOGY CO. LTD
Site Location	:	F1, Bldg. A, Changyuan New Material Port, Keyuan Rd. Science & Industry Park, Nanshan, Shenzhen, Guangdong P.R. China

1.3. Measurement Uncertainty

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

2. MEASURING DEVICE AND TEST EQUIPMENT

Table 1: List of Test and Measurement Equipment

Kind of equipment	Manufacturer	Type	S/N	Calibrated dates	Calibrated until
EMI Test Receiver	Rohde&Schwarz	ESCS30	100307	Jan. 11, 2014	Jan. 10, 2015
EMI Test Receiver	Rohde&Schwarz	ESPI3	101526/003	Jan. 11, 2014	Jan. 10, 2015
Spectrum Analyzer	Agilent	E7405A	MY45115511	Jan. 11, 2014	Jan. 10, 2015
Pre-Amplifier	Rohde&Schwarz	CBLU118354 0-01	3791	Jan. 11, 2014	Jan. 10, 2015
Loop Antenna	Schwarzbeck	FMZB1516	1516131	Jan. 15, 2014	Jan. 14, 2015
Bilog Antenna	Schwarzbeck	VULB9163	9163-323	Jan. 15, 2014	Jan. 14, 2015
Horn Antenna	Schwarzbeck	BBHA9120D	9120D-655	Jan. 15, 2014	Jan. 14, 2015
Horn Antenna	Schwarzbeck	BBHA9120D	9120D-1067	Jan. 15, 2014	Jan. 14, 2015
LISN	Rohde&Schwarz	ESH3-Z5	100305	Jan. 11, 2014	Jan. 10, 2015
LISN	Schwarzbeck	NSLK8126	8126431	Jan. 11, 2014	Jan. 10, 2015
Highpass Filter	Wainwright Instruments	WHKX3.6/18 G-10SS	N/A	Jan. 11, 2014	Jan. 10, 2015
Band Reject Filter	Wainwright Instruments	WRCG2400/2 485-2375/2510 -60/11SS	N/A	Jan. 11, 2014	Jan. 10, 2015

3. OPERATION OF EUT DURING TESTING

3.1.Operating Mode

The mode is used: Transmitting mode

Low Channel: 2402MHz

Middle Channel: 2441MHz

High Channel: 2480MHz

Hopping

3.2.Configuration and peripherals

EUT

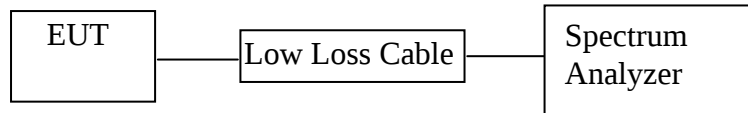
(EUT: Shower Speaker)

4. TEST PROCEDURES AND RESULTS

FCC Rules	Description of Test	Result
Section 15.207	Conducted Emission Test	Compliant
Section 15.247(a)(1)	20dB Bandwidth Test	Compliant
Section 15.247(a)(1)	Carrier Frequency Separation Test	Compliant
Section 15.247(a)(1)(iii)	Number Of Hopping Frequency Test	Compliant
Section 15.247(a)(1)(iii)	Dwell Time Test	Compliant
Section 15.247(b)(1)	Maximum Peak Output Power Test	Compliant
Section 15.247(d) Section 15.209	Radiated Emission Test	Compliant
Section 15.247(d)	Band Edge Compliance Test	Compliant
Section 15.203	Antenna Requirement	Compliant

5. 20DB BANDWIDTH TEST

5.1. Block Diagram of Test Setup



(EUT: Shower Speaker)

5.2. The Requirement For Section 15.247(a)(1)

Section 15.247(a)(1): Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

5.3. EUT Configuration on Measurement

The equipment are installed on the emission measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

5.4. Operating Condition of EUT

5.4.1. Setup the EUT and simulator as shown as Section 5.1.

5.4.2. Turn on the power of all equipment.

5.4.3. Let the EUT work in TX (Hopping off) modes measure it. The transmit frequency are 2402-2480MHz. We select 2402MHz, 2441MHz, and 2480MHz TX frequency to transmit.

5.5. Test Procedure

5.5.1. The transmitter output was connected to the spectrum analyzer through a low loss cable.

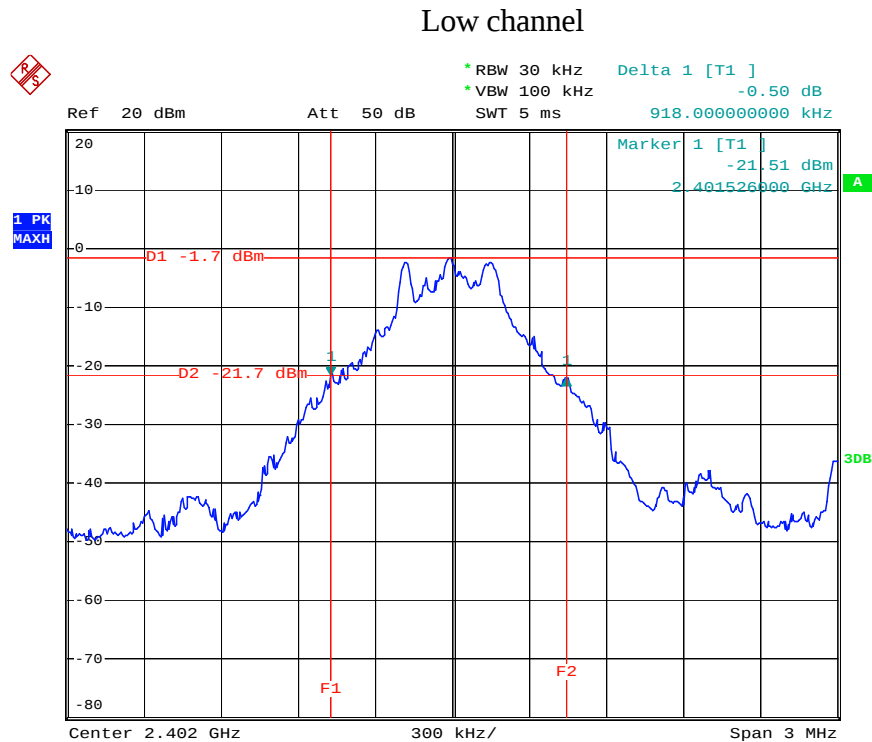
5.5.2. Set RBW of spectrum analyzer to 30 kHz and VBW to 100 kHz.

5.5.3. The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

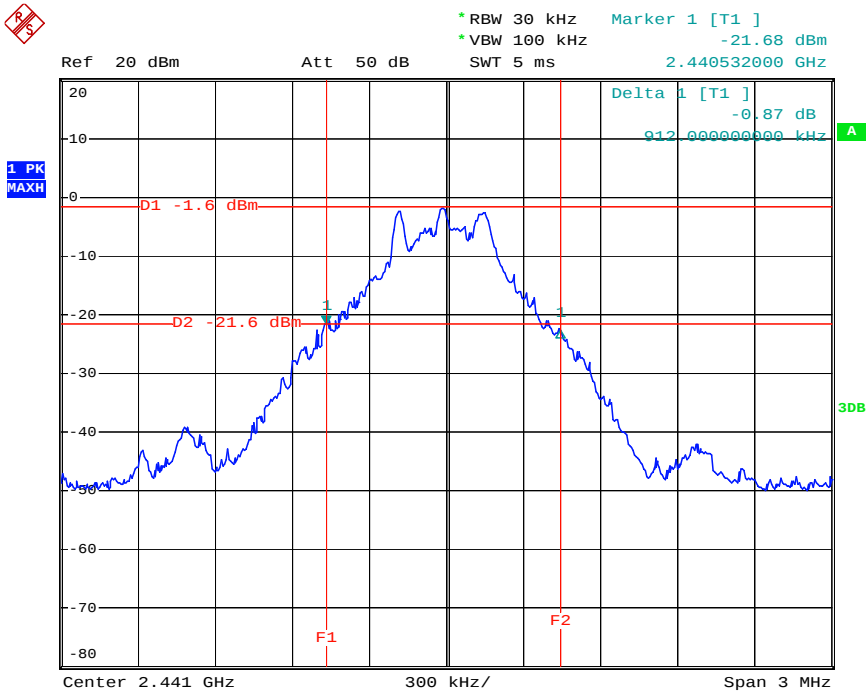
5.6. Test Result

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	Result
Low	2402	0.918	Pass
Middle	2441	0.912	Pass
High	2480	0.900	Pass

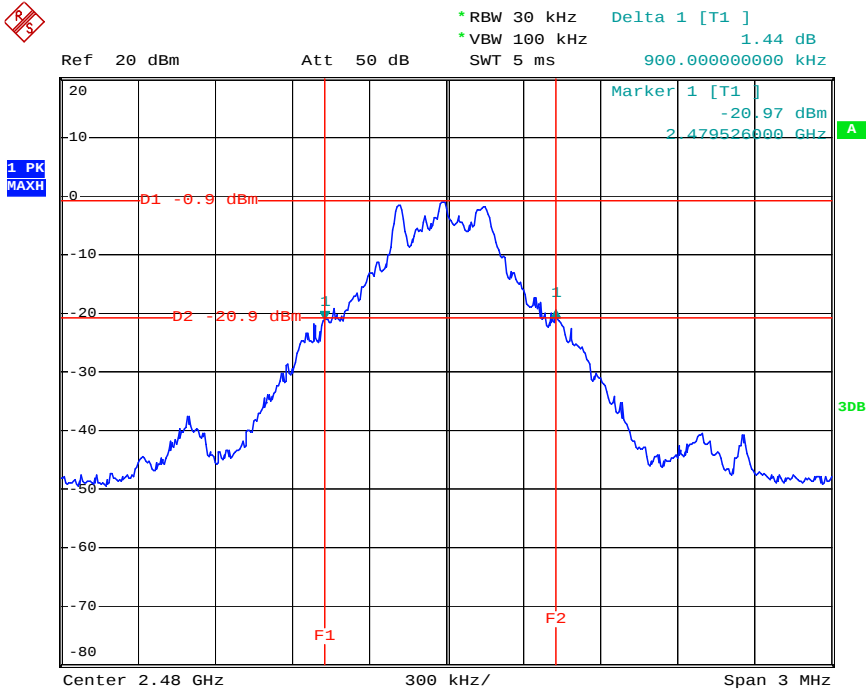
The spectrum analyzer plots are attached as below.



Middle channel

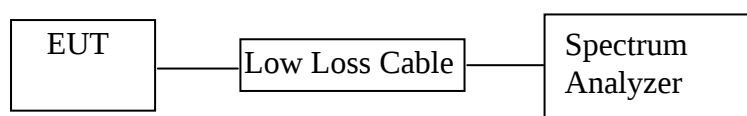


High channel



6. CARRIER FREQUENCY SEPARATION TEST

6.1. Block Diagram of Test Setup



(EUT: Shower Speaker)

6.2. The Requirement For Section 15.247(a)(1)

Section 15.247(a)(1): Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudorandomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

6.3. EUT Configuration on Measurement

The equipment are installed on the emission measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

6.4. Operating Condition of EUT

6.4.1. Setup the EUT and simulator as shown as Section 6.1.

6.4.2. Turn on the power of all equipment.

6.4.3. Let the EUT work in TX (Hopping on) modes measure it. The transmit frequency are 2402-2480MHz. We select 2402MHz, 2441MHz, and 2480MHz TX frequency to transmit.

6.5. Test Procedure

6.5.1. The transmitter output was connected to the spectrum analyzer through a low loss cable.

6.5.2. Set RBW of spectrum analyzer to 30 kHz and VBW to 100 kHz. Adjust Span to 2 MHz.

6.5.3. Set the adjacent channel of the EUT maxhold another trace.

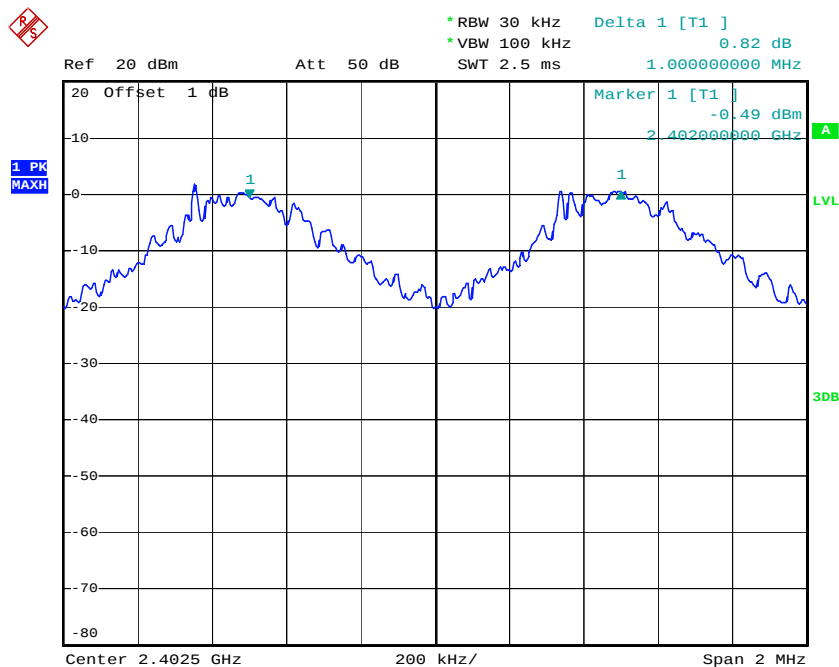
6.5.4. Measurement the channel separation

6.6. Test Result

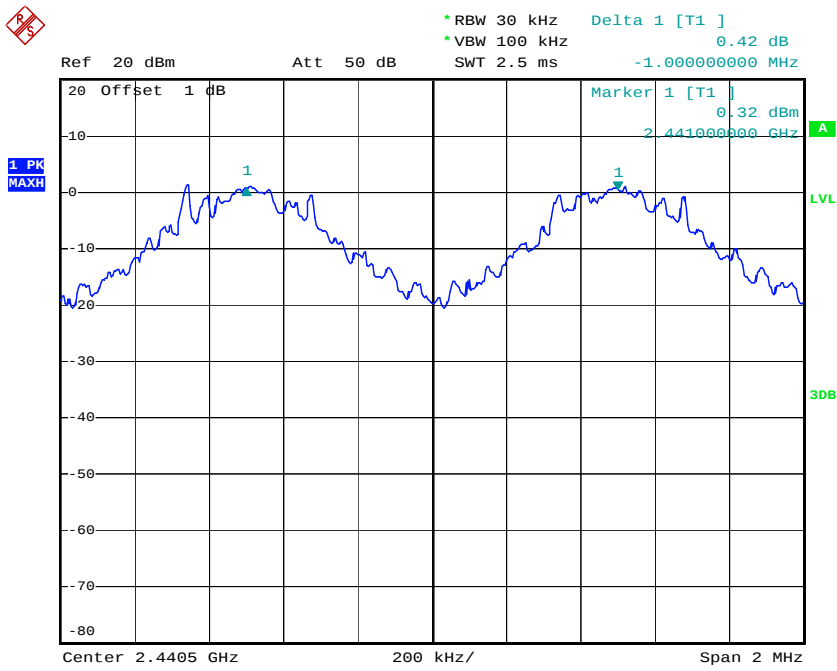
Channel	Frequency (MHz)	Channel Separation(MHz)	Limit (MHz)	Result
Low	2402	1.000	25KHz or 20dB bandwidth	PASS
	2403			
Middle	2440	1.000	25KHz or 20dB bandwidth	PASS
	2441			
High	2479	1.000	25KHz or 20dB bandwidth	PASS
	2480			

The spectrum analyzer plots are attached as below.

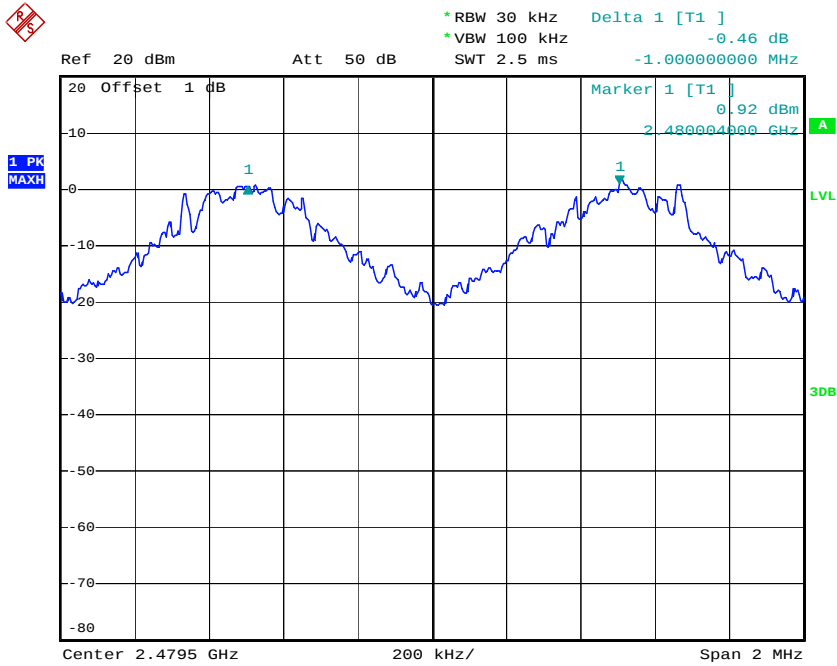
Low channel



Middle channel

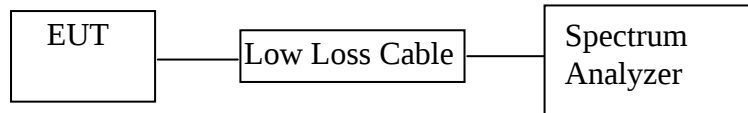


High channel



7. NUMBER OF HOPPING FREQUENCY TEST

7.1. Block Diagram of Test Setup



(EUT: Shower Speaker)

7.2. The Requirement For Section 15.247(a)(1)(iii)

Section 15.247(a)(1)(iii): Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

7.3. EUT Configuration on Measurement

The equipment are installed on the emission measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

7.4. Operating Condition of EUT

7.4.1. Setup the EUT and simulator as shown as Section 7.1.

7.4.2. Turn on the power of all equipment.

7.4.3. Let the EUT work in TX (Hopping on) modes measure it.

7.5. Test Procedure

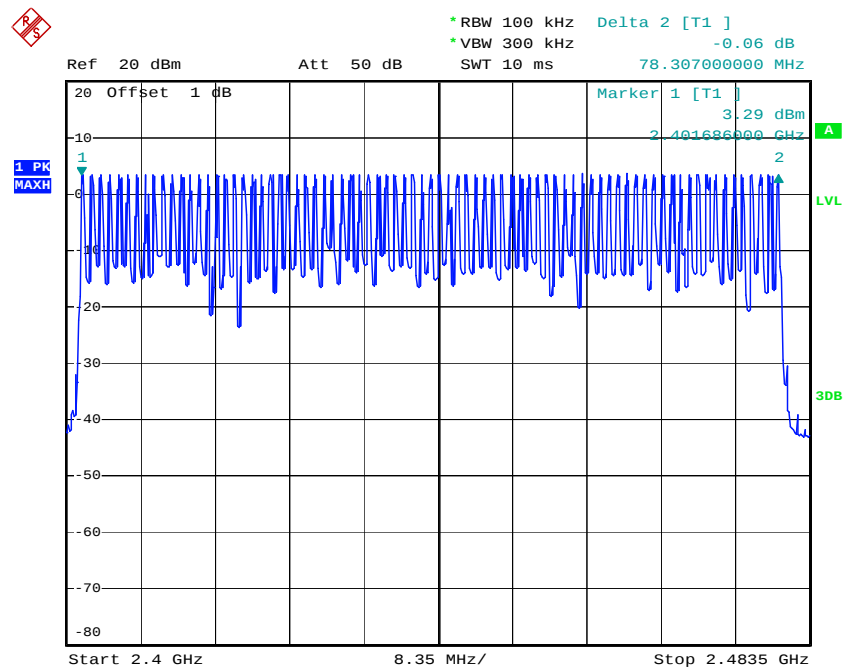
- 7.5.1. The transmitter output was connected to the spectrum analyzer through a low loss cable.
- 7.5.2. Set the spectrum analyzer as Span=83.5MHz, RBW=100 kHz, VBW=300 kHz.
- 7.5.3. Max hold, view and count how many channel in the band.

7.6. Test Result

Total number of hopping channel	Measurement result(CH)	Limit(CH)
	79	≥ 15

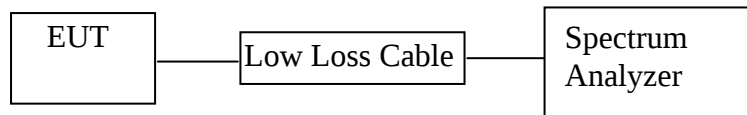
The spectrum analyzer plots are attached as below.

Number of hopping channels



8. DWELL TIME TEST

8.1. Block Diagram of Test Setup



(EUT: Shower Speaker)

8.2. The Requirement For Section 15.247(a)(1)(iii)

Section 15.247(a)(1)(iii): Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

8.3. EUT Configuration on Measurement

The equipment are installed on the emission measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

8.4. Operating Condition of EUT

8.4.1. Setup the EUT and simulator as shown as Section 8.1.

8.4.2. Turn on the power of all equipment.

8.4.3. Let the EUT work in TX (Hopping on) modes measure it. The transmit frequency are 2402-2480MHz. We select 2402MHz, 2441MHz, and 2480MHz TX frequency to transmit.

8.5. Test Procedure

8.5.1. The transmitter output was connected to the spectrum analyzer through a low loss cable.

8.5.2. Set center frequency of spectrum analyzer = operating frequency.

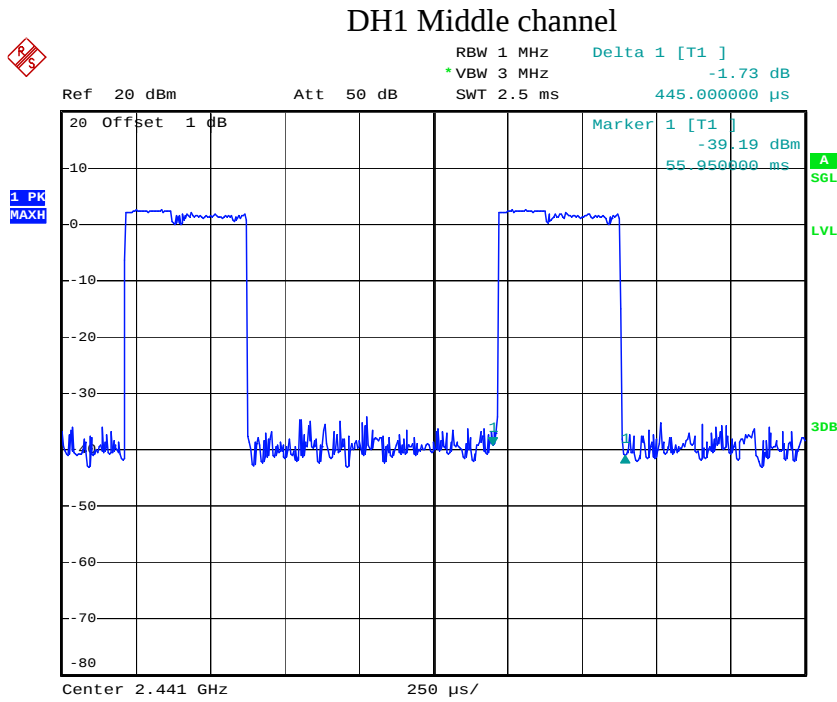
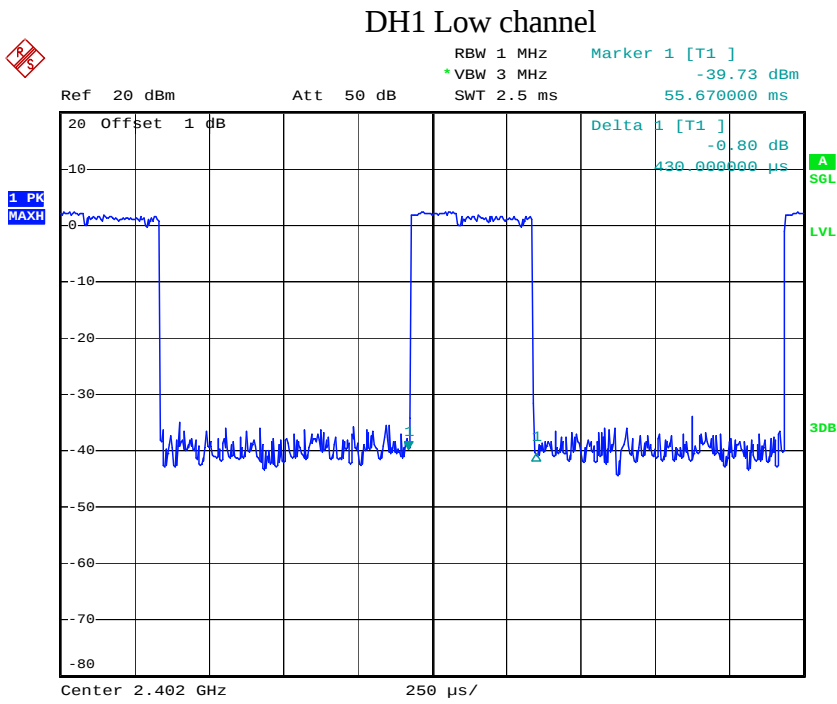
8.5.3. Set the spectrum analyzer as RBW=1MHz, VBW=3MHz, Span=0Hz, Get the pulse time.

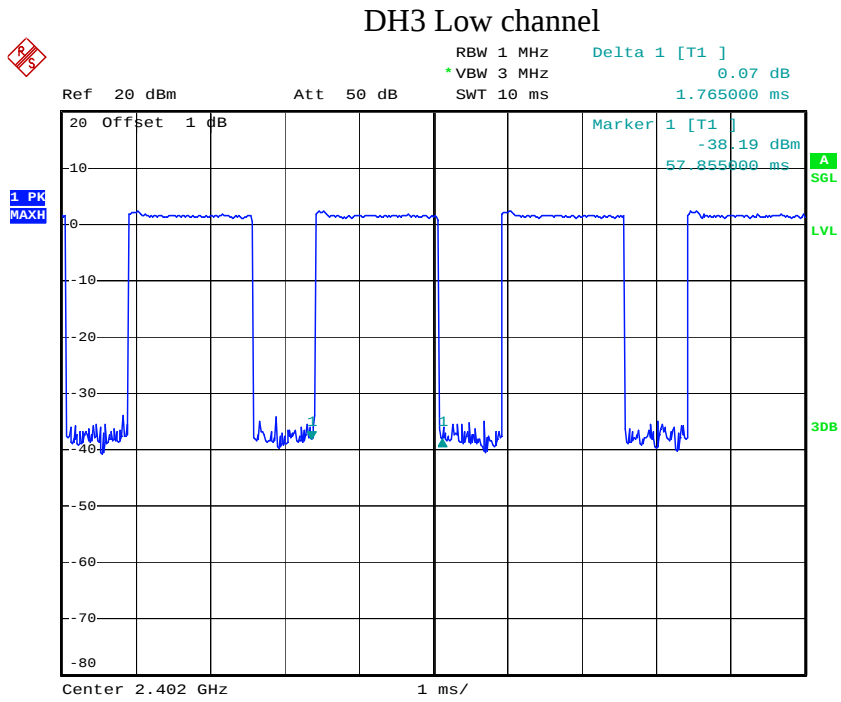
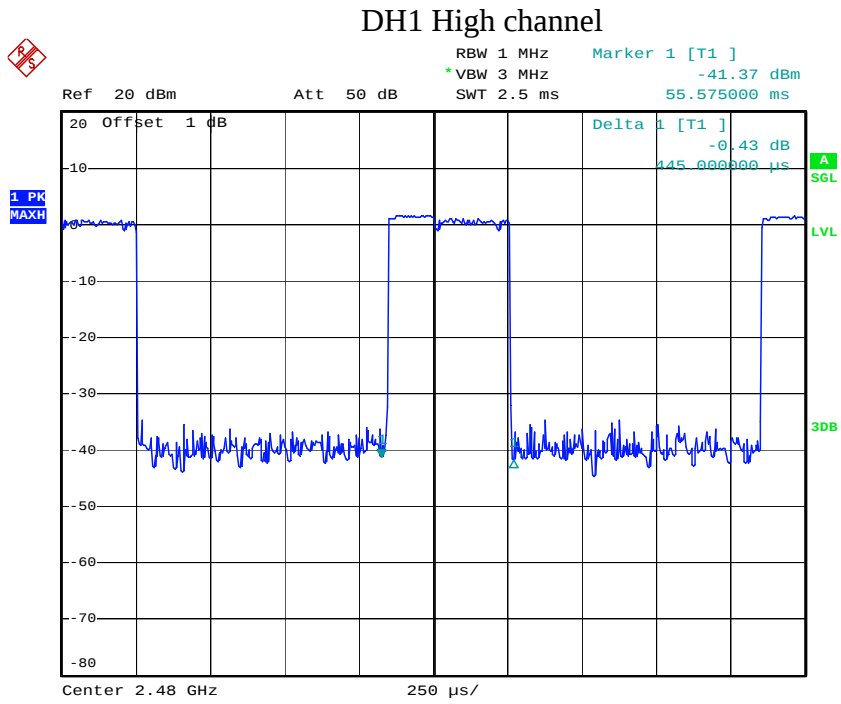
8.5.4. Repeat above procedures until all frequency measured were complete.

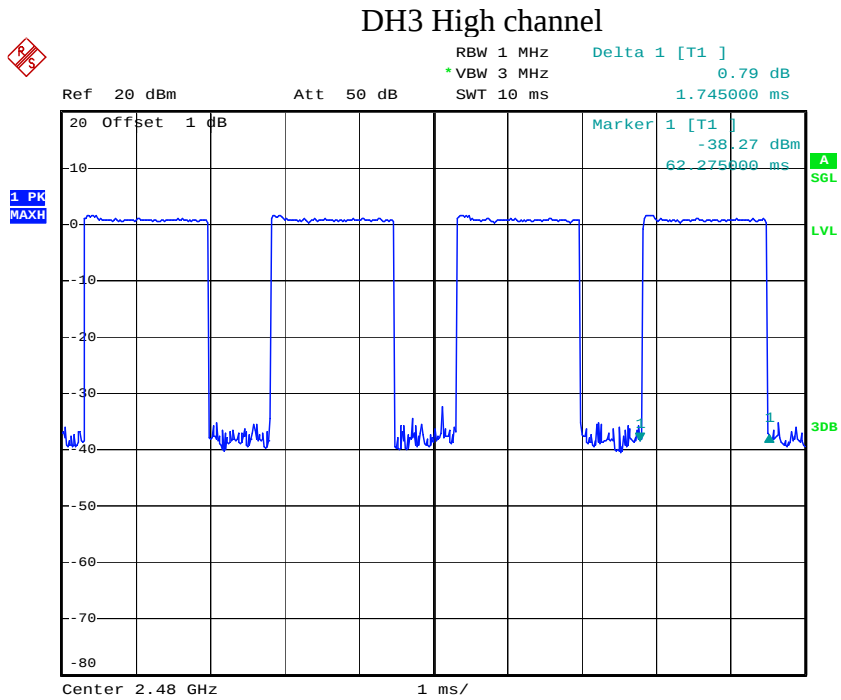
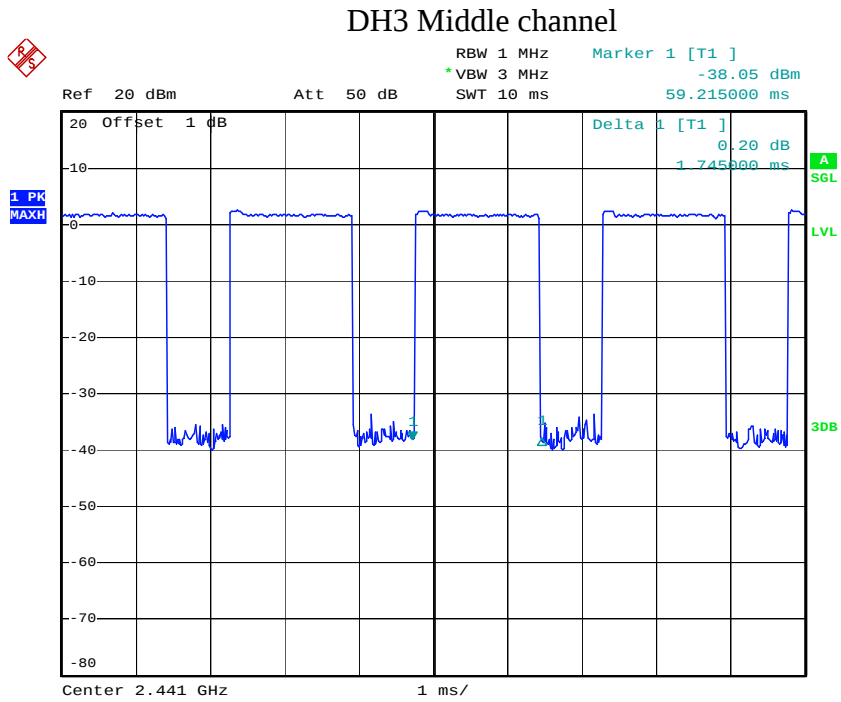
8.6. Test Result

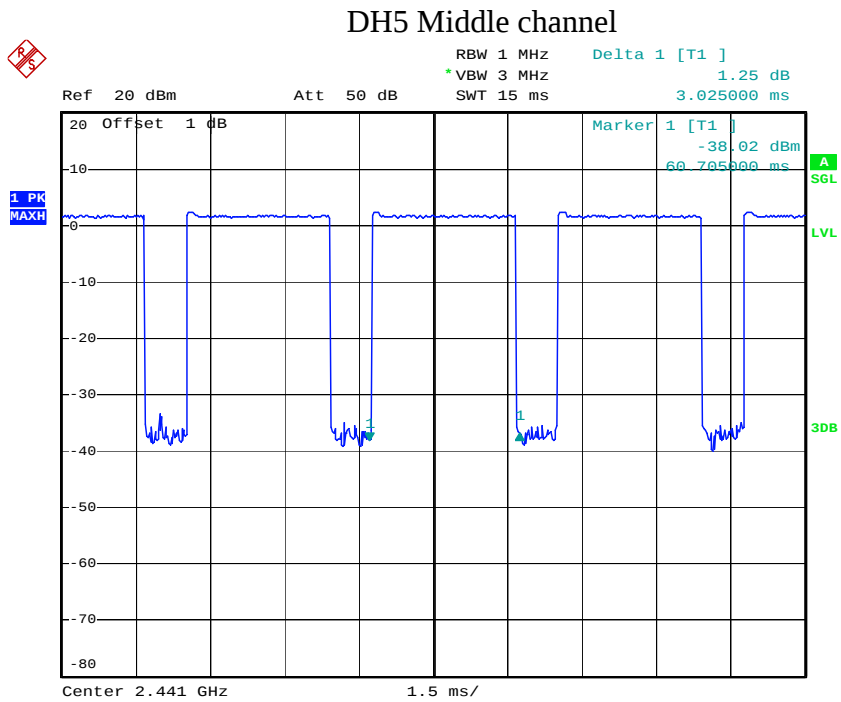
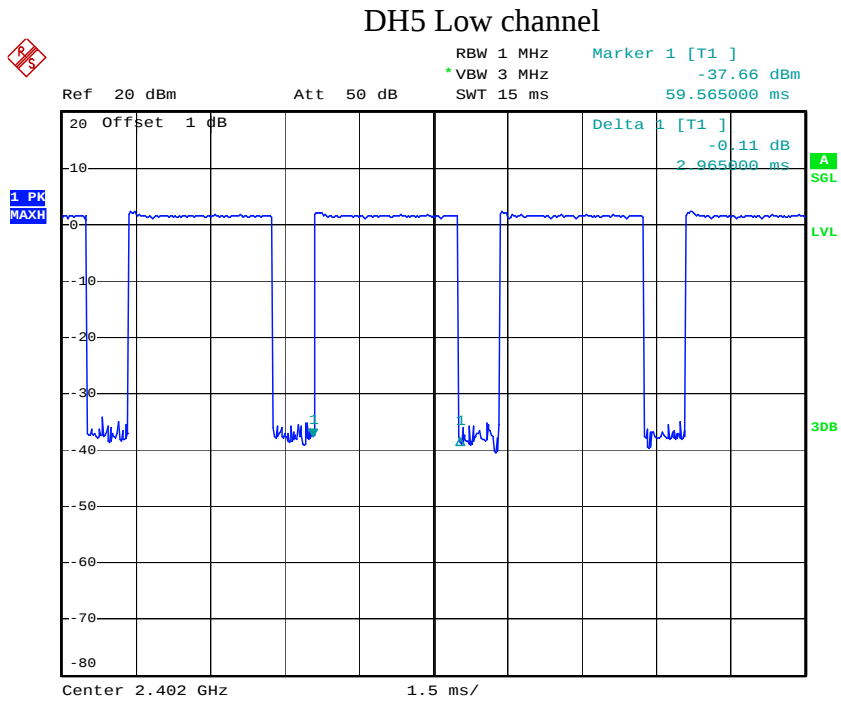
Mode	Channel Frequency (MHz)	Pulse Time (ms)	Dwell Time (ms)	Limit (ms)
DH1	2402	0.430	137.60	400
	2441	0.445	142.40	400
	2480	0.445	142.40	400
A period transmit time = $0.4 \times 79 = 31.6$ Dwell time = pulse time $\times (1600/(2 \times 79)) \times 31.6$				
DH3	2402	1.765	282.40	400
	2441	1.745	279.20	400
	2480	1.745	279.20	400
A period transmit time = $0.4 \times 79 = 31.6$ Dwell time = pulse time $\times (1600/(4 \times 79)) \times 31.6$				
DH5	2402	2.965	316.27	400
	2441	3.025	322.67	400
	2480	2.995	319.47	400
A period transmit time = $0.4 \times 79 = 31.6$ Dwell time = pulse time $\times (1600/(6 \times 79)) \times 31.6$				

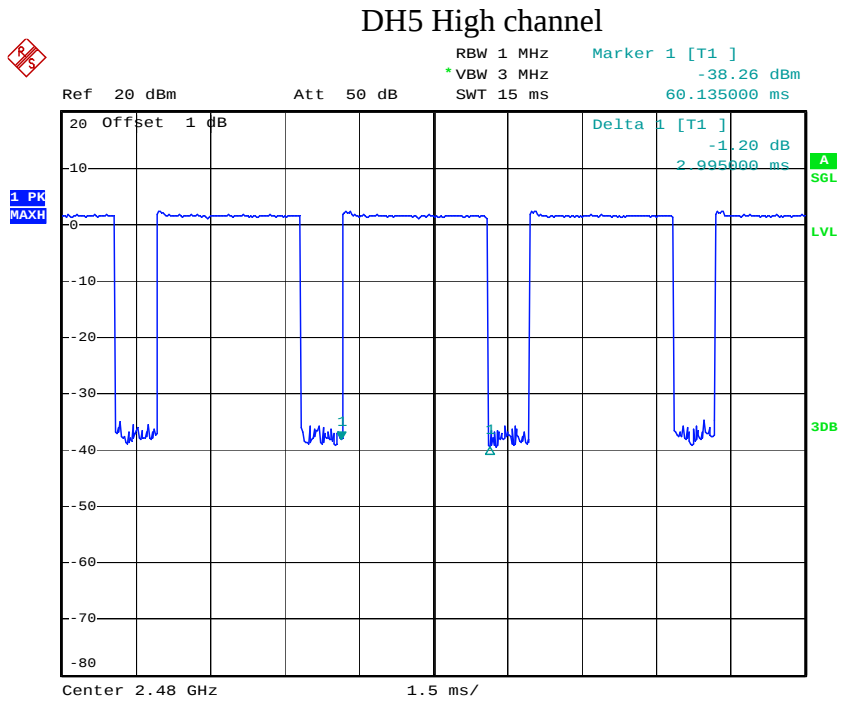
The spectrum analyzer plots are attached as below.





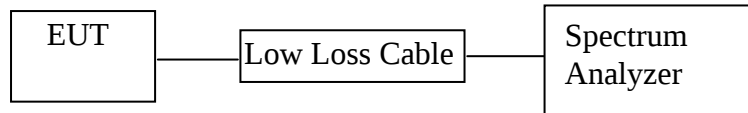






9. MAXIMUM PEAK OUTPUT POWER TEST

9.1. Block Diagram of Test Setup



(EUT: Shower Speaker)

9.2. The Requirement For Section 15.247(b)(1)

Section 15.247(b)(1): For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

9.3. EUT Configuration on Measurement

The equipment are installed on the emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

9.4. Operating Condition of EUT

9.4.1. Setup the EUT and simulator as shown as Section 9.1.

9.4.2. Turn on the power of all equipment.

9.4.3. Let the EUT work in TX (Hopping off) modes measure it. The transmit frequency are 2402-2480MHz. We select 2402MHz, 2441MHz, and 2480MHz TX frequency to transmit.

9.5. Test Procedure

9.5.1. The transmitter output was connected to the spectrum analyzer through a low loss cable.

9.5.2. Set RBW of spectrum analyzer to 1MHz and VBW to 3MHz

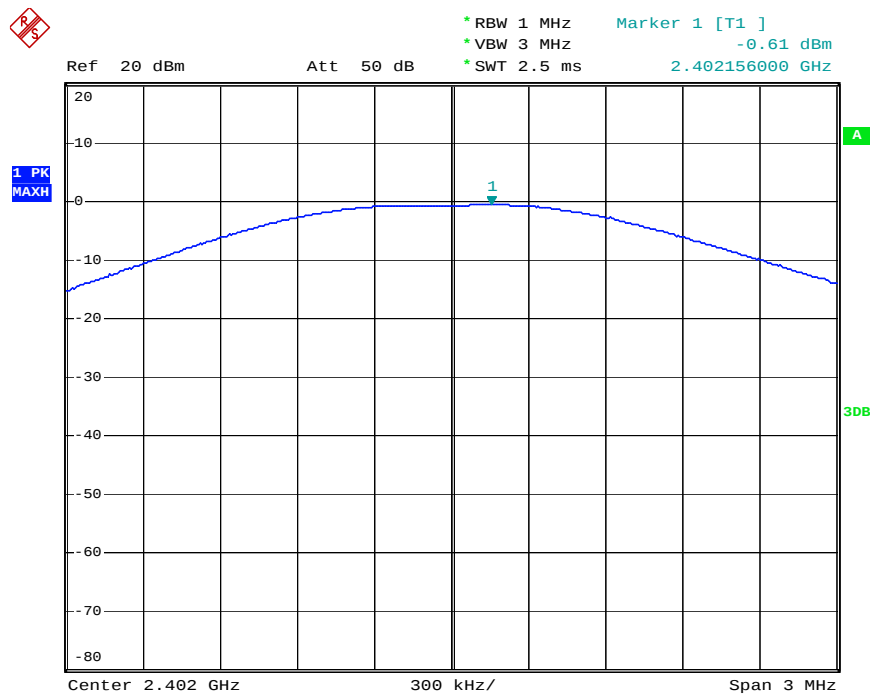
9.5.3. Measurement the maximum peak output power.

9.6. Test Result

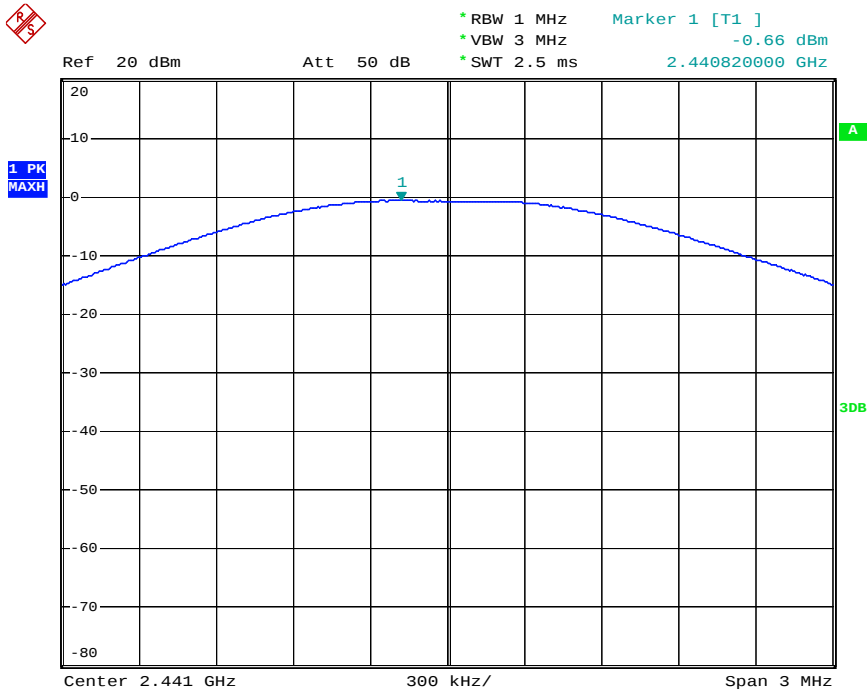
Channel	Frequency (MHz)	Peak Output Power (dBm)	Limits dBm / W
Low	2402	-0.61	30/1.0
Middle	2441	-0.66	30/1.0
High	2480	0.06	30/1.0

The spectrum analyzer plots are attached as below.

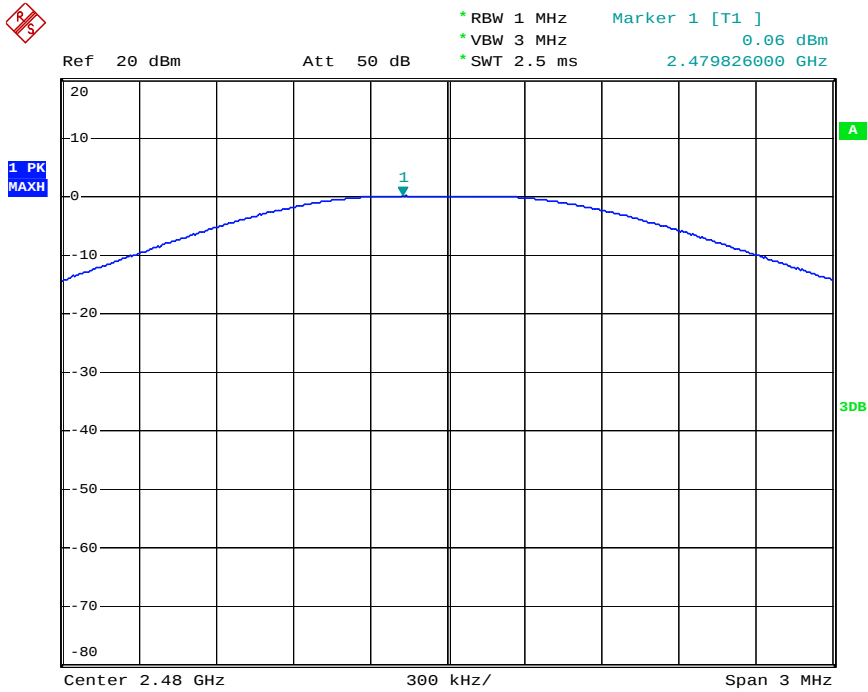
Low channel



Middle channel



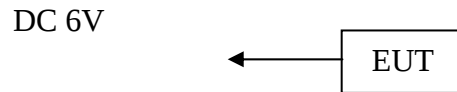
High channel



10.RADIATED EMISSION TEST

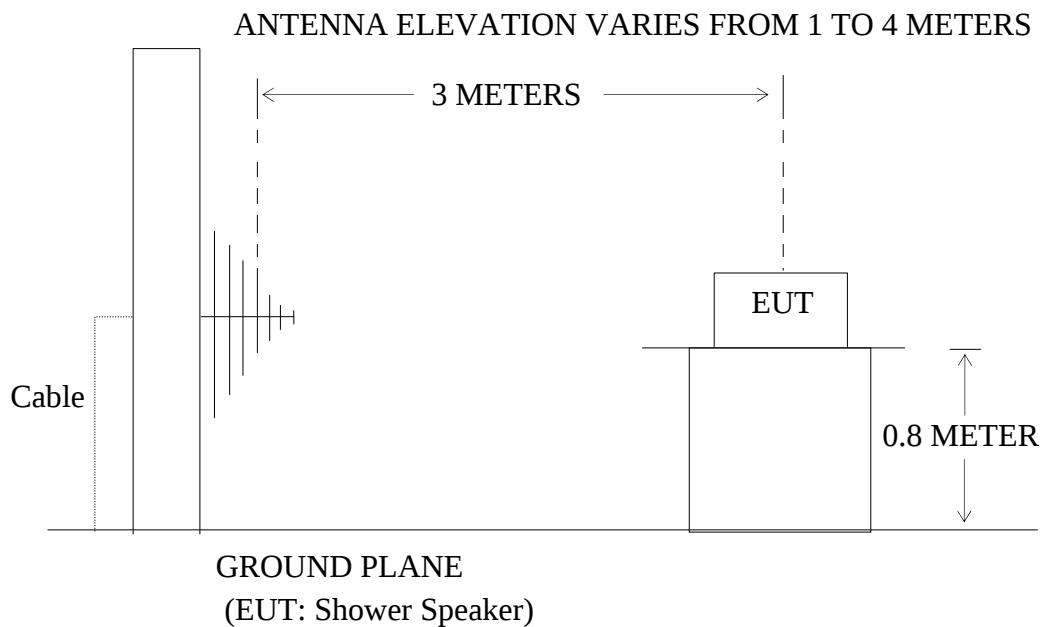
10.1.Block Diagram of Test Setup

10.1.1.Block diagram of connection between the EUT and simulators



(EUT: Shower Speaker)

10.1.2.Anechoic Chamber Test Setup Diagram



10.2.The Limit For Section 15.247(d)

Section 15.247(d): 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 Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a).

10.3.Restricted bands of operation

10.3.1.FCC Part 15.205 Restricted bands of operation

(a) Except as shown in paragraph (d) of this section, Only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
¹ 0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	(²)
13.36-13.41			

¹Until February 1, 1999, this restricted band shall be 0.490-0.510

²Above 38.6

(b) Except as provided in paragraphs (d) and (e), the field strength of emission appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000MHz, Compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

10.4.Configuration of EUT on Measurement

The equipment are installed on Radiated Emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

10.5. Test Procedure

The EUT and its simulators are placed on a turntable, which is 0.8 meter high above ground. The turntable can rotate 360 degrees to determine the position of the maximum emission level. EUT is set 3.0 meters away from the receiving antenna, which is mounted on an antenna tower. The antenna can be moved up and down between 1.0 meter and 4 meters to find out the maximum emission level. Broadband antenna (calibrated bilog antenna) is used as receiving antenna. Both horizontal and vertical polarizations of the antenna are set on measurement. In order to find the maximum emission levels, all of the interface cables must be manipulated according to ANSI C63.4- 2009 on radiated emission measurement.

The bandwidth of test receiver (R&S ESI26) is set at 120 KHz in 30-1000MHz. and set at 1MHz in above 1000MHz.

The frequency range from 30MHz to 25000MHz is checked.

The final measurement in band 9-90 kHz, 110-490 kHz and above 1000MHz is performed with Average detector. Except those frequency bands mention above, the final measurement for frequencies below 1000MHz is performed with Quasi Peak detector.

The field strength is calculated by adding the antenna factor, and cable loss, and subtracting the amplifier gain from the measured reading. The basic equation calculation is as follows:

Result = Reading + Corrected Factor

Where Corrected Factor = Antenna Factor + Cable Loss – Amplifier Gain

10.6.The Field Strength of Radiation Emission Measurement Results

Note:

1. The fundamental radiated emissions were reduced by 2.4G Band Reject Filter in the attached plots.
2. The 18-25GHz emissions are not reported, because the levels are too low against the limit.



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Tel:+86-0755-26503290

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Job No.: RICKY #104

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: Shower Speaker

Mode: TX2402MHz

Model: BTS-06

Manufacturer: ACADIA

Polarization: Vertical

Power Source: DC 5V

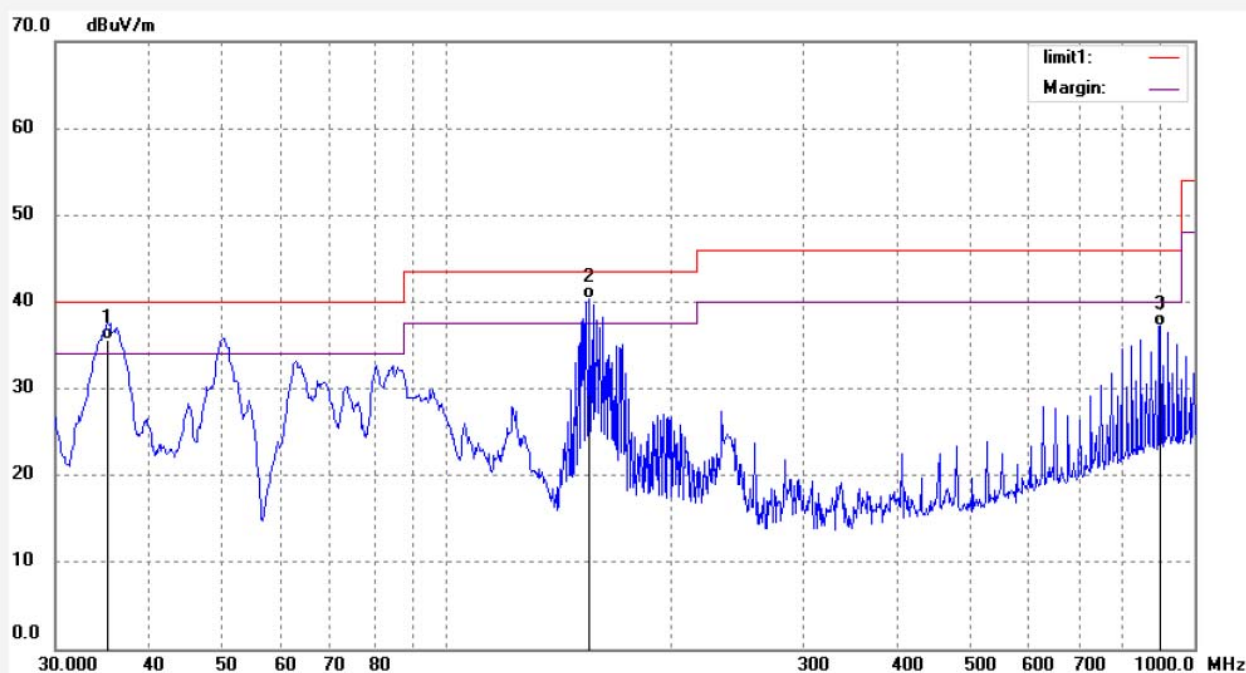
Date: 14/02/19/

Time: 8/47/06

Engineer Signature:

Distance: 3m

Note: Report No.:ATE20140151



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	35.2512	55.12	-19.53	35.59	40.00	-4.41	QP			
2	155.3644	63.60	-23.34	40.26	43.50	-3.24	QP			
3	900.1474	43.30	-6.11	37.19	46.00	-8.81	QP			



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Job No.: RICKY #105

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: Shower Speaker

Mode: TX2402MHz

Model: BTS-06

Manufacturer: ACADIA

Polarization: Horizontal

Power Source: DC 5V

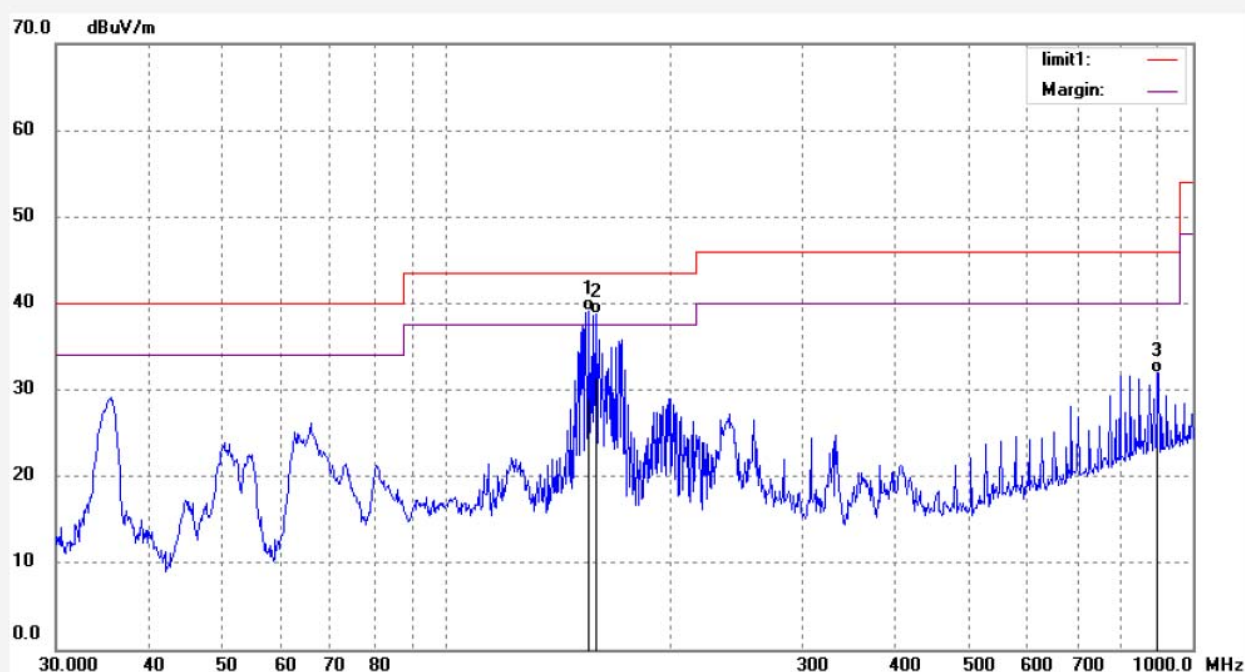
Date: 14/02/19/

Time: 8/49/45

Engineer Signature:

Distance: 3m

Note: Report No.: ATE20140151



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	155.3644	62.51	-23.34	39.17	43.50	-4.33	QP			
2	158.6677	61.73	-23.00	38.73	43.50	-4.77	QP			
3	896.9965	38.04	-6.15	31.89	46.00	-14.11	QP			



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Job No.: RICKY #106

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: Shower Speaker

Mode: TX2441MHz

Model: BTS-06

Manufacturer: ACADIA

Polarization: Horizontal

Power Source: DC 5V

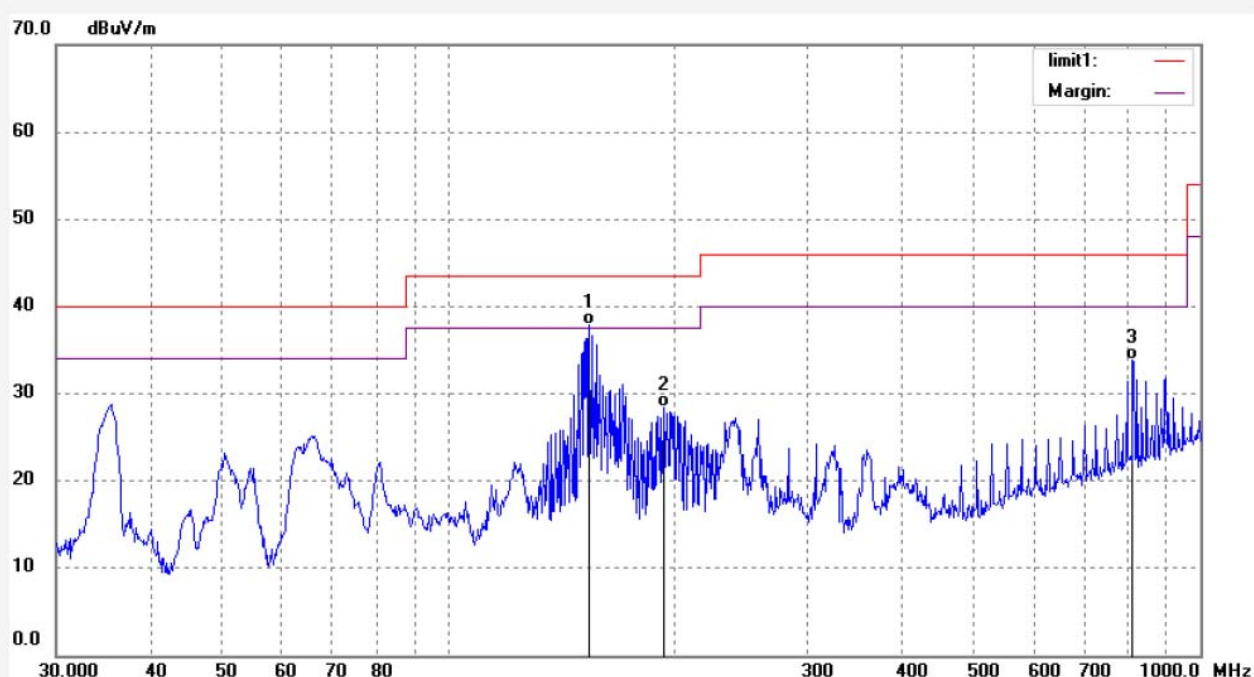
Date: 14/02/19/

Time: 8/53/23

Engineer Signature:

Distance: 3m

Note: Report No.: ATE20140151



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	153.7385	61.36	-23.49	37.87	43.50	-5.63	QP			
2	193.0945	49.09	-20.68	28.41	43.50	-15.09	QP			
3	813.1115	41.36	-7.55	33.81	46.00	-12.19	QP			



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Job No.: RICKY #107

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: Shower Speaker

Mode: TX2441MHz

Model: BTS-06

Manufacturer: ACADIA

Polarization: Vertical

Power Source: DC 5V

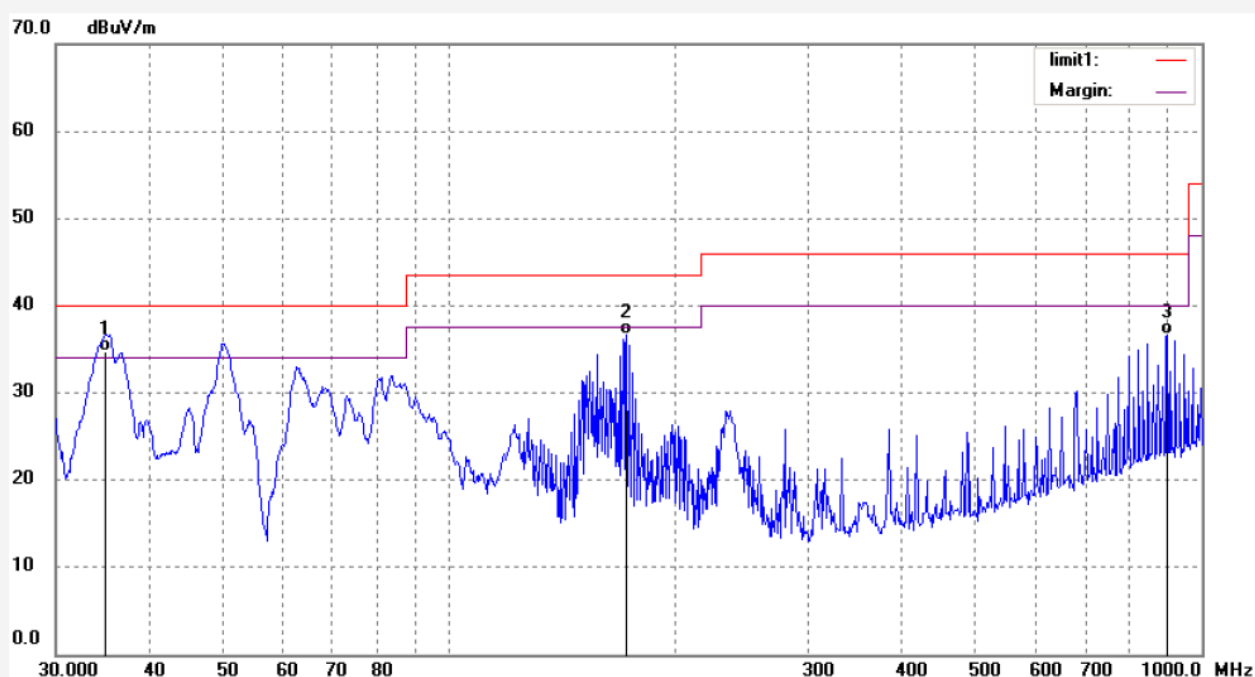
Date: 14/02/19/

Time: 8/54/35

Engineer Signature:

Distance: 3m

Note: Report No.:ATE20140151



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	34.8823	54.16	-19.47	34.69	40.00	-5.31	QP			
2	171.9946	58.71	-22.01	36.70	43.50	-6.80	QP			
3	900.1474	42.73	-6.11	36.62	46.00	-9.38	QP			



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Job No.: RICKY #108

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: Shower Speaker

Mode: TX2480MHz

Model: BTS-06

Manufacturer: ACADIA

Polarization: Vertical

Power Source: DC 5V

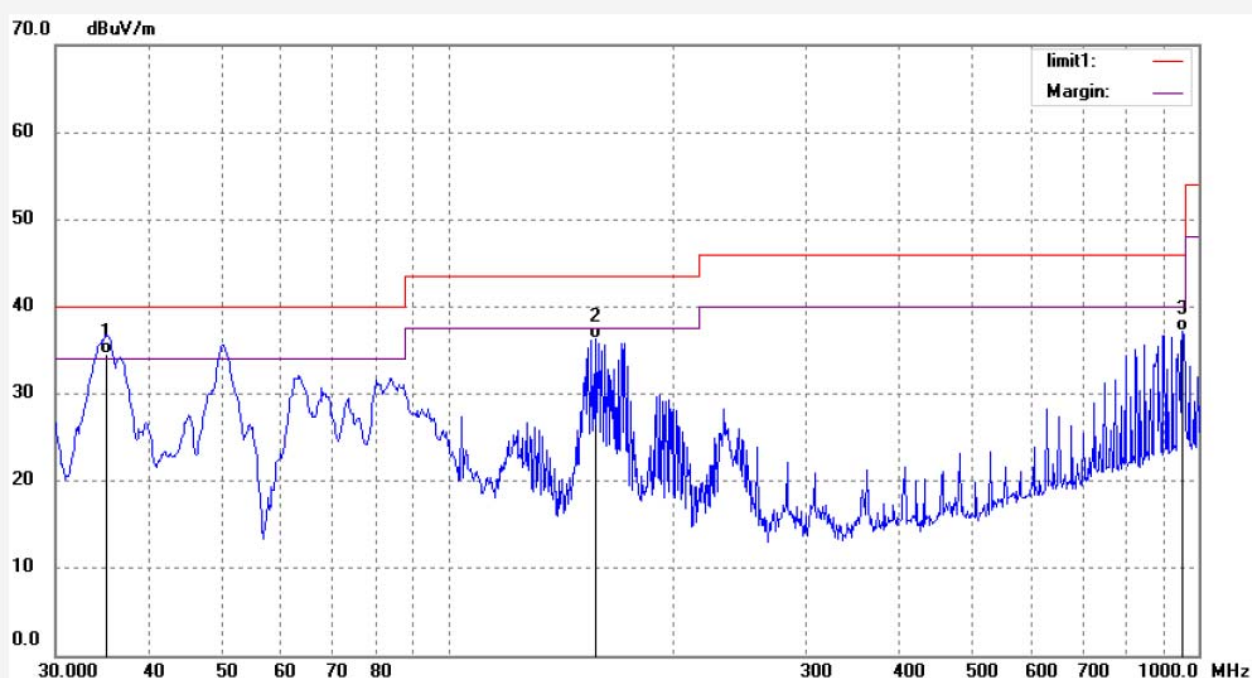
Date: 14/02/19/

Time: 8/55/55

Engineer Signature:

Distance: 3m

Note: Report No.:ATE20140151



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	35.1278	54.17	-19.52	34.65	40.00	-5.35	QP			
2	157.0074	59.44	-23.18	36.26	43.50	-7.24	QP			
3	952.0937	42.56	-5.37	37.19	46.00	-8.81	QP			



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Job No.: RICKY #109

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: Shower Speaker

Mode: TX2480MHz

Model: BTS-06

Manufacturer: ACADIA

Polarization: Horizontal

Power Source: DC 5V

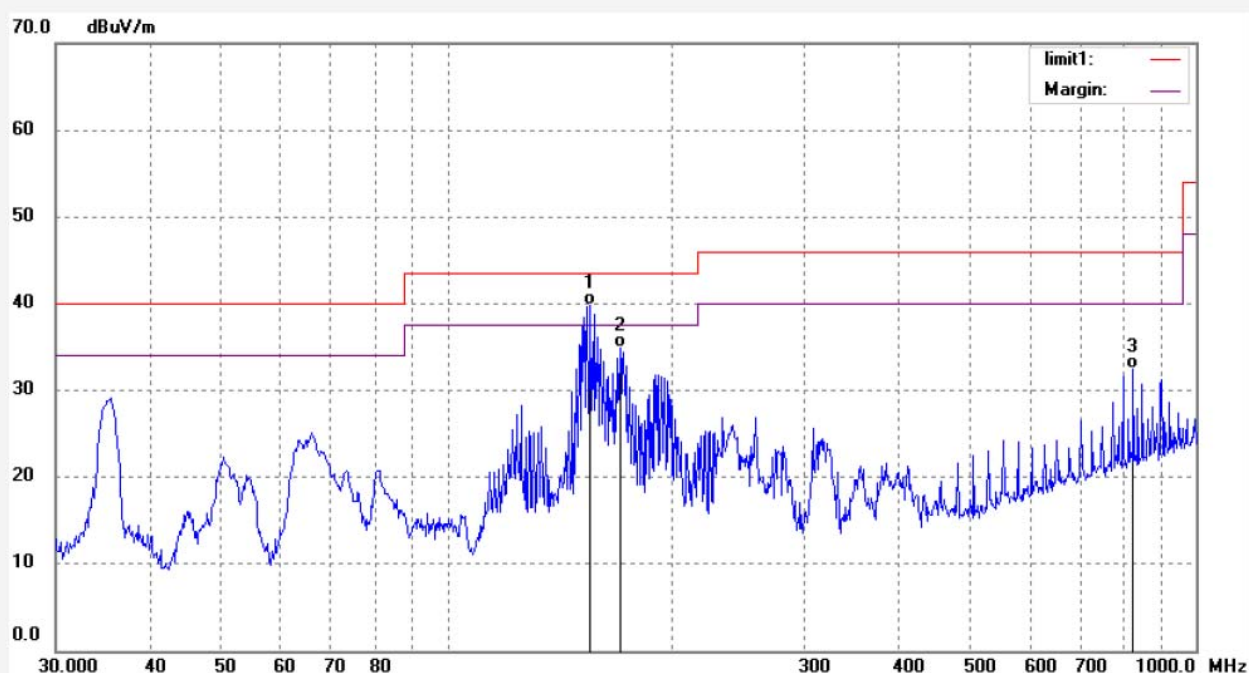
Date: 14/02/19/

Time: 8/57/32

Engineer Signature:

Distance: 3m

Note: Report No.:ATE20140151



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	155.3644	63.23	-23.34	39.89	43.50	-3.61	QP			
2	170.1948	56.72	-21.81	34.91	43.50	-8.59	QP			
3	824.5968	39.82	-7.39	32.43	46.00	-13.57	QP			



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Job No.: star #2805

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: Shower Speaker

Mode: TX 2402MHz

Model: BTS-06

Manufacturer: ACADIA

Polarization: Vertical

Power Source: DC 5V

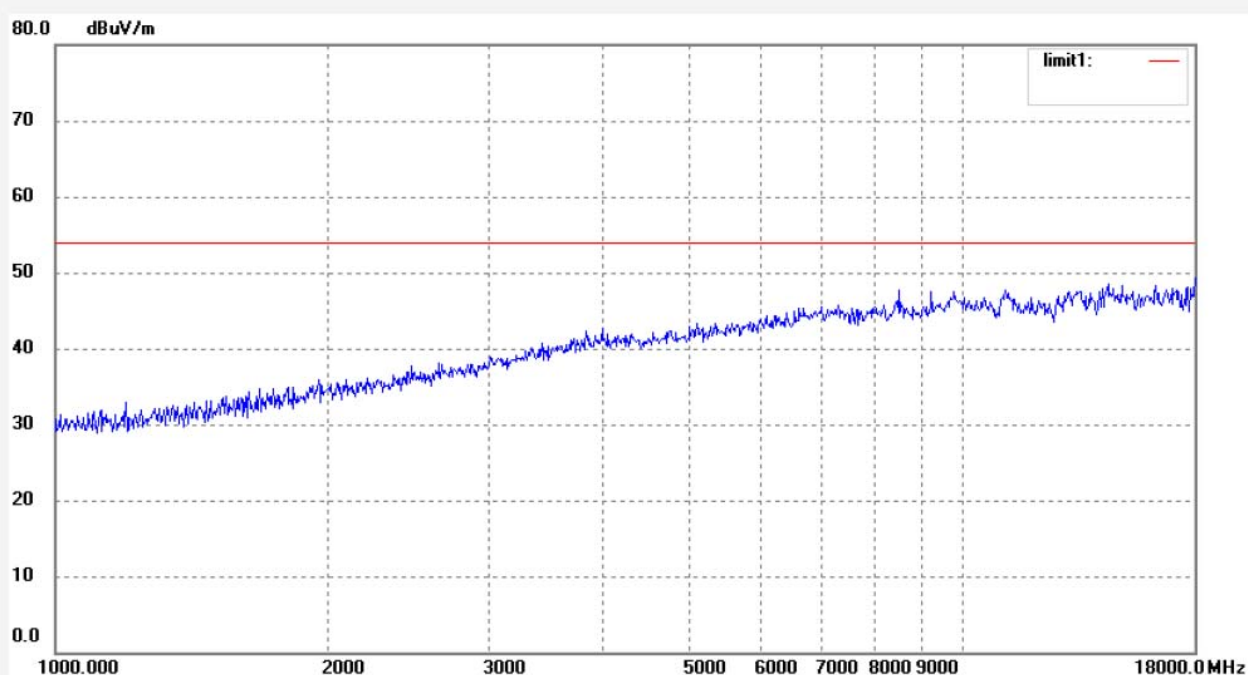
Date: 14/02/19/

Time: 9/22/09

Engineer Signature: STAR

Distance: 3m

Note: Report No.:ATE20140151



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
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Job No.: star #2804

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: Shower Speaker

Mode: TX 2402MHz

Model: BTS-06

Manufacturer: ACADIA

Polarization: Horizontal

Power Source: DC 5V

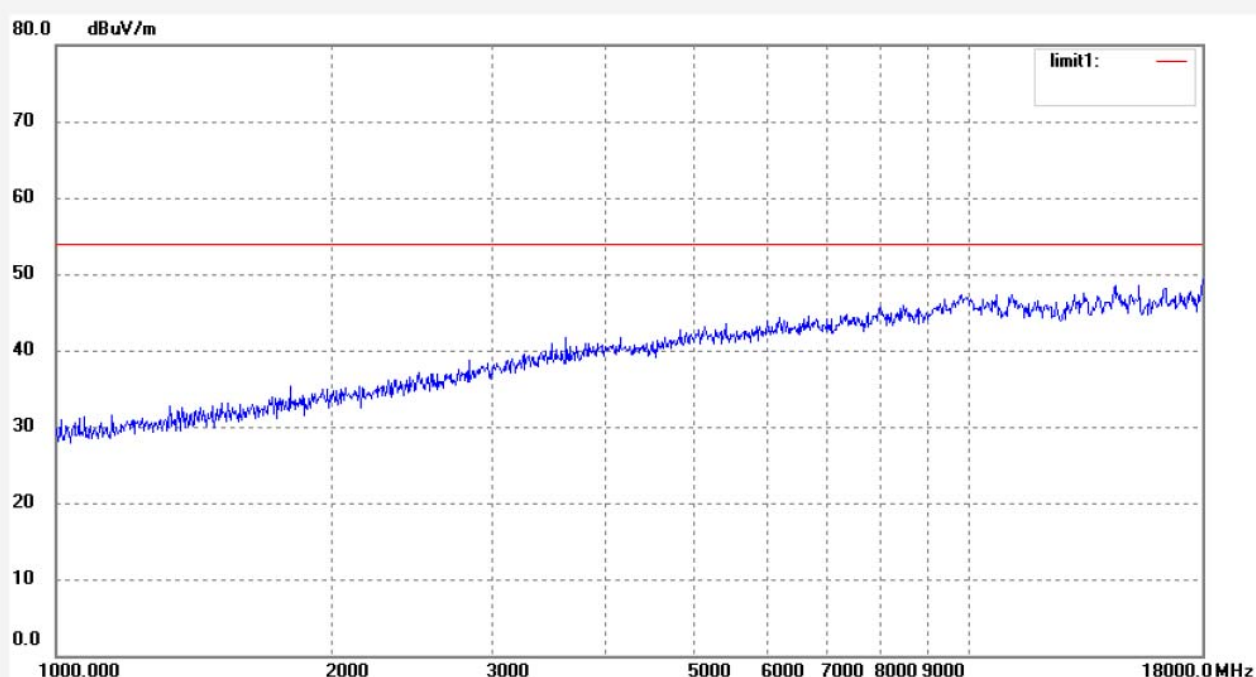
Date: 14/02/19/

Time: 9/19/38

Engineer Signature: STAR

Distance: 3m

Note: Report No.:ATE20140151



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
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Job No.: star #2806

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: Shower Speaker

Mode: TX 2441MHz

Model: BTS-06

Manufacturer: ACADIA

Polarization: Vertical

Power Source: DC 5V

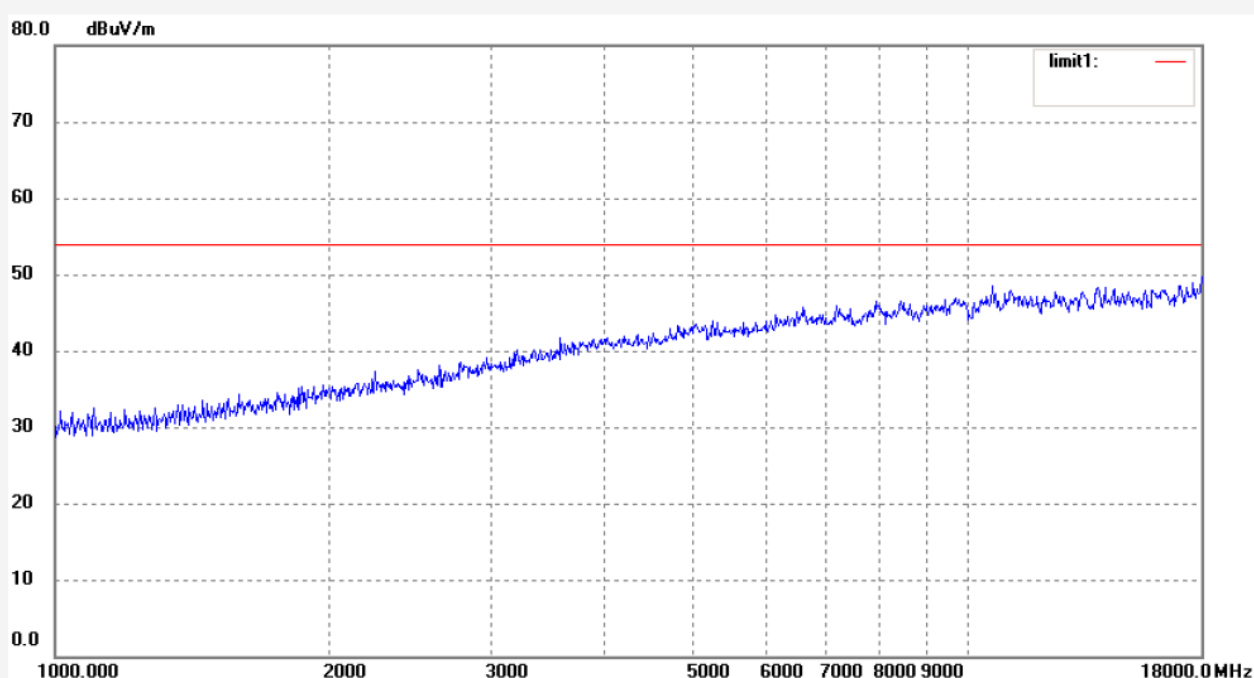
Date: 14/02/19/

Time: 9/25/47

Engineer Signature: STAR

Distance: 3m

Note: Report No.:ATE20140151



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
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Job No.: star #2807

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: Shower Speaker

Mode: TX 2441MHz

Model: BTS-06

Manufacturer: ACADIA

Polarization: Horizontal

Power Source: DC 5V

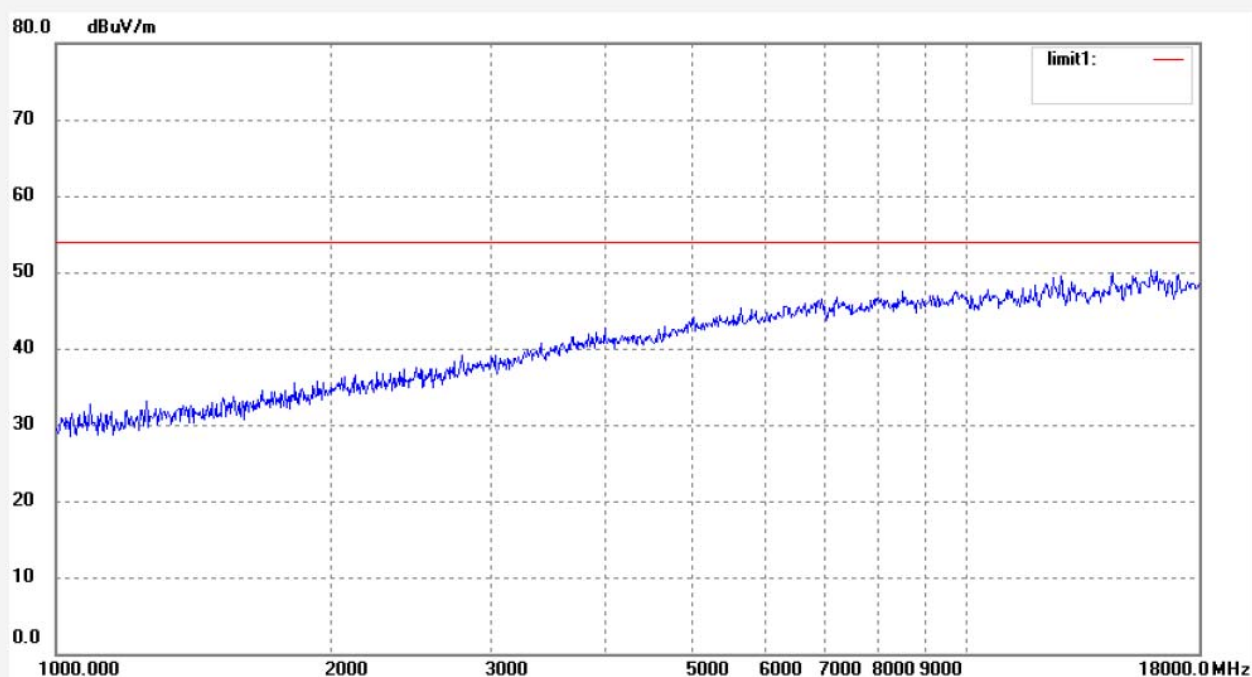
Date: 14/02/19/

Time: 9/28/28

Engineer Signature: STAR

Distance: 3m

Note: Report No.:ATE20140151



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
-----	----------------	---------------------	----------------	--------------------	-------------------	----------------	----------	----------------	------------------	--------


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Job No.: star #2808

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: Shower Speaker

Mode: TX 2480MHz

Model: BTS-06

Manufacturer: ACADIA

Polarization: Horizontal

Power Source: DC 5V

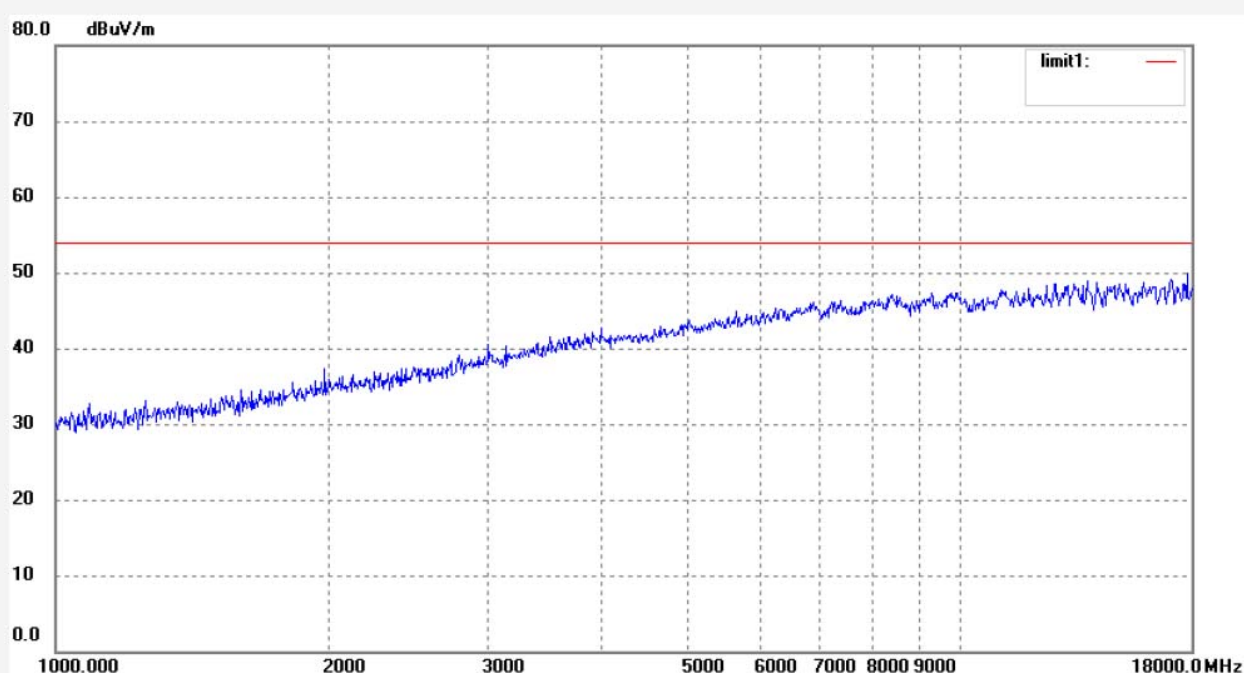
Date: 14/02/19/

Time: 9/32/01

Engineer Signature: STAR

Distance: 3m

Note: Report No.:ATE20140151



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
-----	----------------	---------------------	----------------	--------------------	-------------------	----------------	----------	----------------	------------------	--------



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Job No.: star #2809

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: Shower Speaker

Mode: TX 2480MHz

Model: BTS-06

Manufacturer: ACADIA

Polarization: Vertical

Power Source: DC 5V

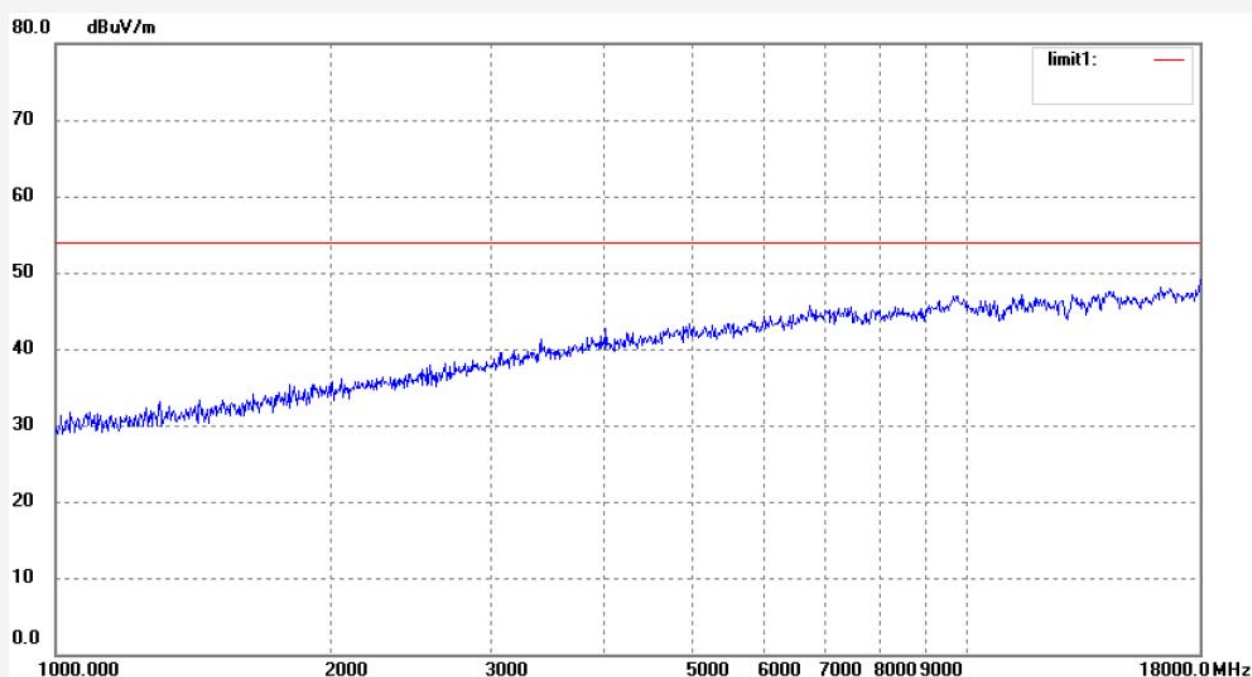
Date: 14/02/19/

Time: 9/36/44

Engineer Signature: STAR

Distance: 3m

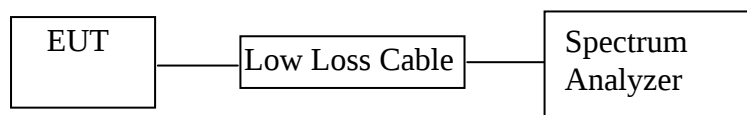
Note: Report No.:ATE20140151



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
-----	----------------	---------------------	----------------	--------------------	-------------------	----------------	----------	----------------	------------------	--------

11.BAND EDGE COMPLIANCE TEST

11.1.Block Diagram of Test Setup



(EUT: Shower Speaker)

11.2.The Requirement For Section 15.247(d)

Section 15.247(d): 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 Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a).

11.3.EUT Configuration on Measurement

The equipment are installed on the emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

11.4.Operating Condition of EUT

11.4.1.Setup the EUT and simulator as shown as Section 11.1.

11.4.2.Turn on the power of all equipment.

11.4.3.Let the EUT work in TX (Hopping off, Hopping on) modes measure it. The transmit frequency are 2402-2480MHz. We select 2402MHz, 2480MHz TX frequency to transmit.

11.5. Test Procedure

11.5.1. The transmitter output was connected to the spectrum analyzer via a low loss cable.

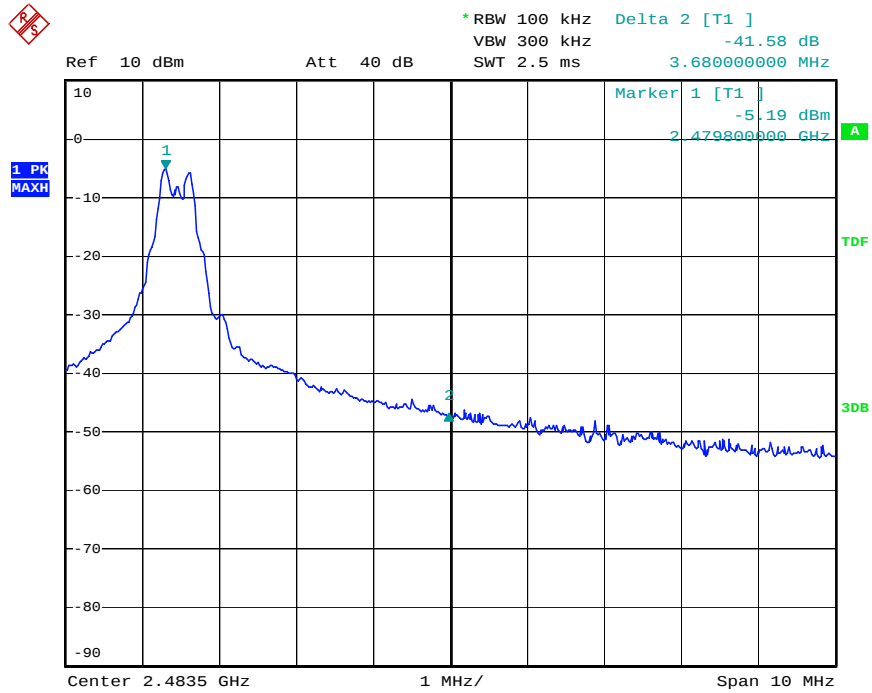
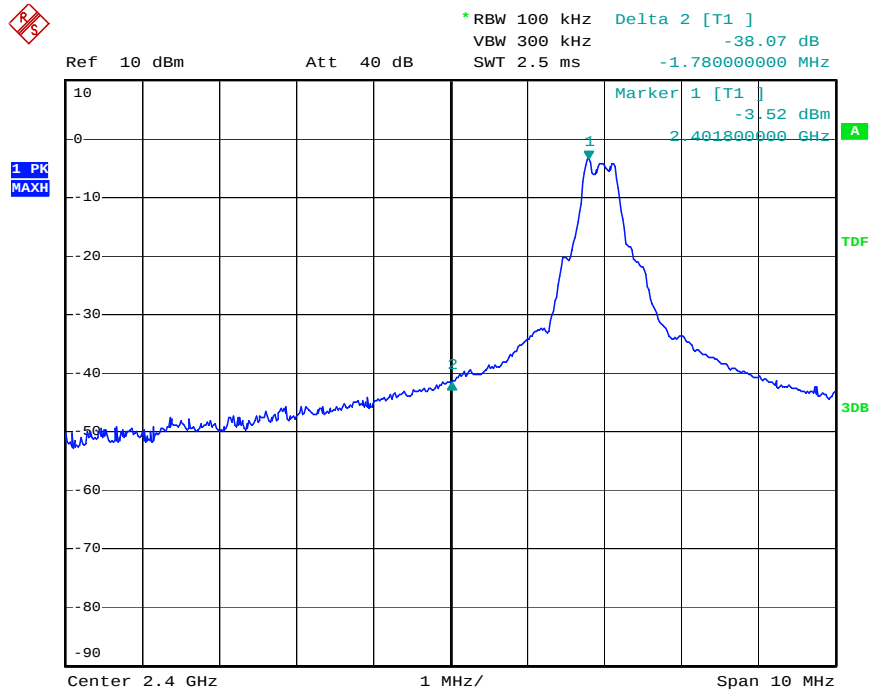
11.5.2. Set RBW of spectrum analyzer to 100 kHz and VBW to 300 kHz with convenient frequency span including 100 kHz bandwidth from band edge.

11.5.3. The band edges was measured and recorded.

11.6. Test Result

Frequency (MHz)	Result of Band Edge (dBc)	Limit of Band Edge (dBc)
2402	38.07	> 20dBc
2480	41.58	> 20dBc

The spectrum analyzer plots are attached as below.



Radiated Band Edge Result

Note:

1. Emissions attenuated more than 20 dB below the permissible value are not reported.
2. The field strength is calculated by adding the antenna factor, high pass filter loss(if used) and cable loss, and subtracting the amplifier gain(if any)from the measured reading. The basic equation calculation is as follows:

$$\text{Result} = \text{Reading} + \text{Corrected Factor}$$

3. Display the measurement of peak values.

Non-hopping



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Job No.: alen #583

Standard: FCC PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 26 C / 55 %

EUT: Shower Speaker

Mode: TX 2402MHz

Model: BTS-06

Manufacturer: ACADIA

Polarization: Vertical

Power Source: DC 5V

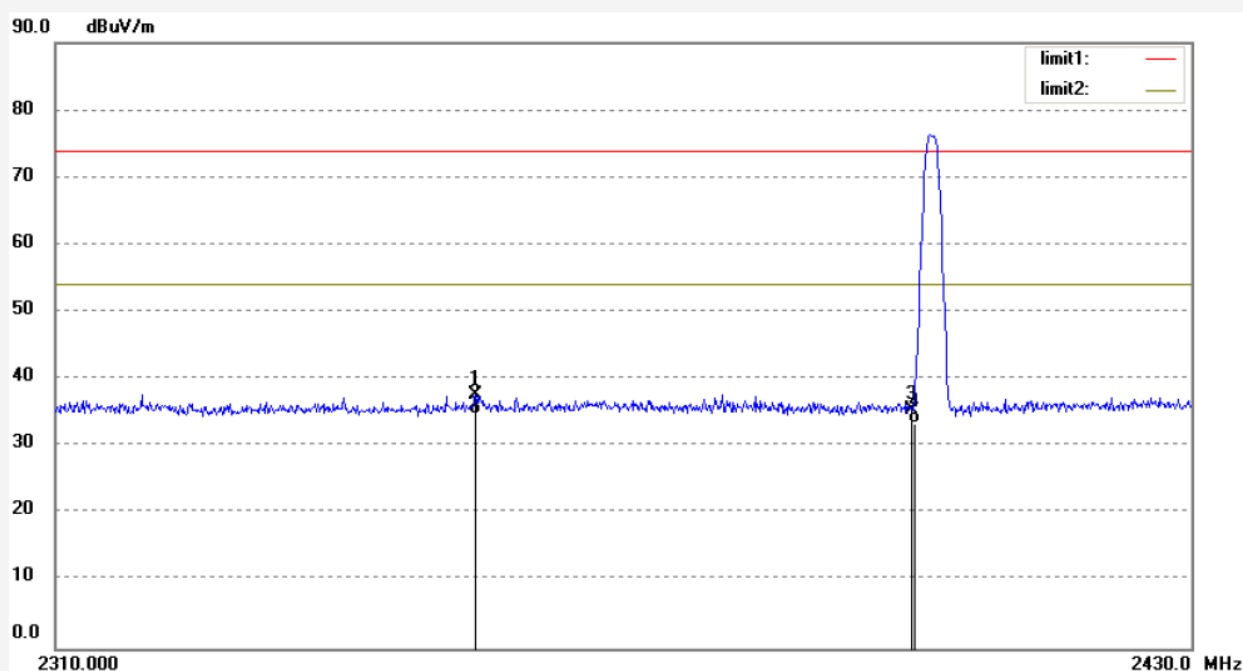
Date: 14/02/19/

Time: 12/31/10

Engineer Signature:

Distance: 3m

Note:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2353.800	44.58	-6.88	37.70	74.00	-36.30	peak			
2	2353.800	41.57	-6.88	34.69	54.00	-19.31	AVG			
3	2400.000	42.26	-6.76	35.50	74.00	-38.50	peak			
4	2400.000	40.24	-6.76	33.48	54.00	-20.52	AVG			



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Job No.: alen #582

Standard: FCC PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 26 C / 55 %

EUT: Shower Speaker

Mode: TX 2402MHz

Model: BTS-06

Manufacturer: ACADIA

Polarization: Horizontal

Power Source: DC 5V

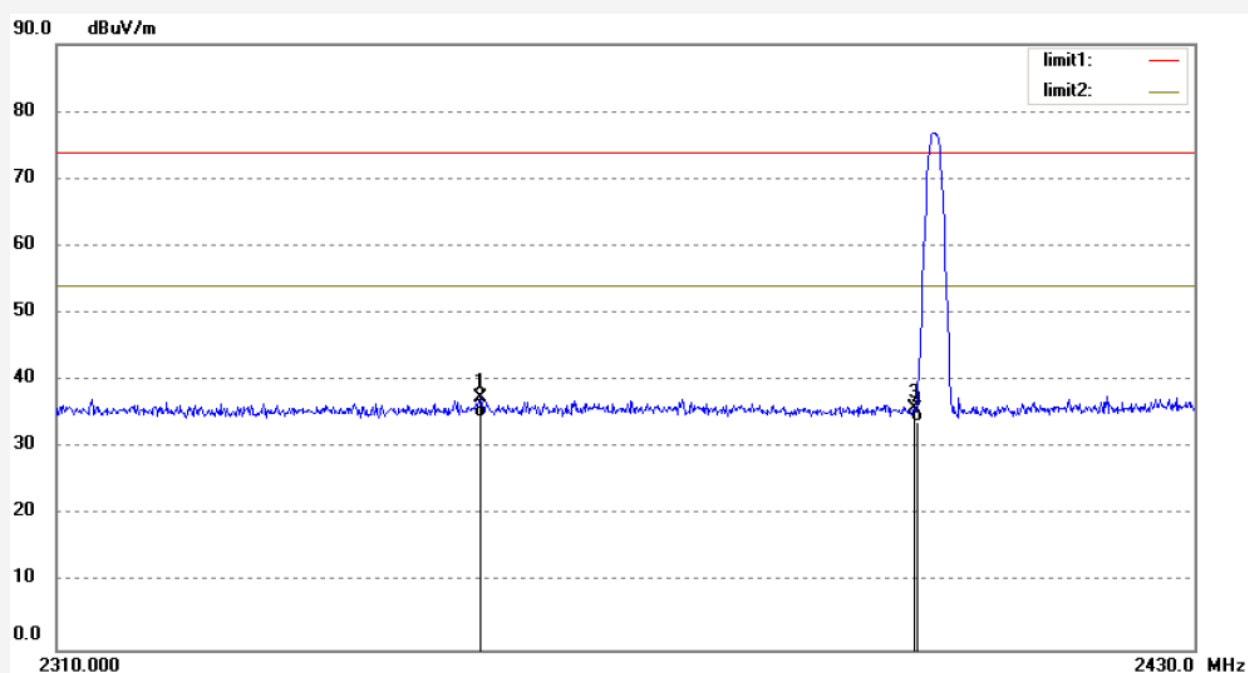
Date: 14/02/19/

Time: 12/30/19

Engineer Signature:

Distance: 3m

Note:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2354.160	44.31	-6.88	37.43	74.00	-36.57	peak			
2	2354.160	41.32	-6.88	34.44	54.00	-19.56	AVG			
3	2400.000	42.55	-6.76	35.79	74.00	-38.21	peak			
4	2400.000	40.52	-6.76	33.76	54.00	-20.24	AVG			



ACCURATE TECHNOLOGY CO., LTD.

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Site: 1# Chamber

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Fax:+86-0755-26503396

Job No.: alen #581

Standard: FCC PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 26 C / 55 %

EUT: Shower Speaker

Mode: TX 2480MHz

Model: BTS-06

Manufacturer: ACADIA

Polarization: Horizontal

Power Source: DC V

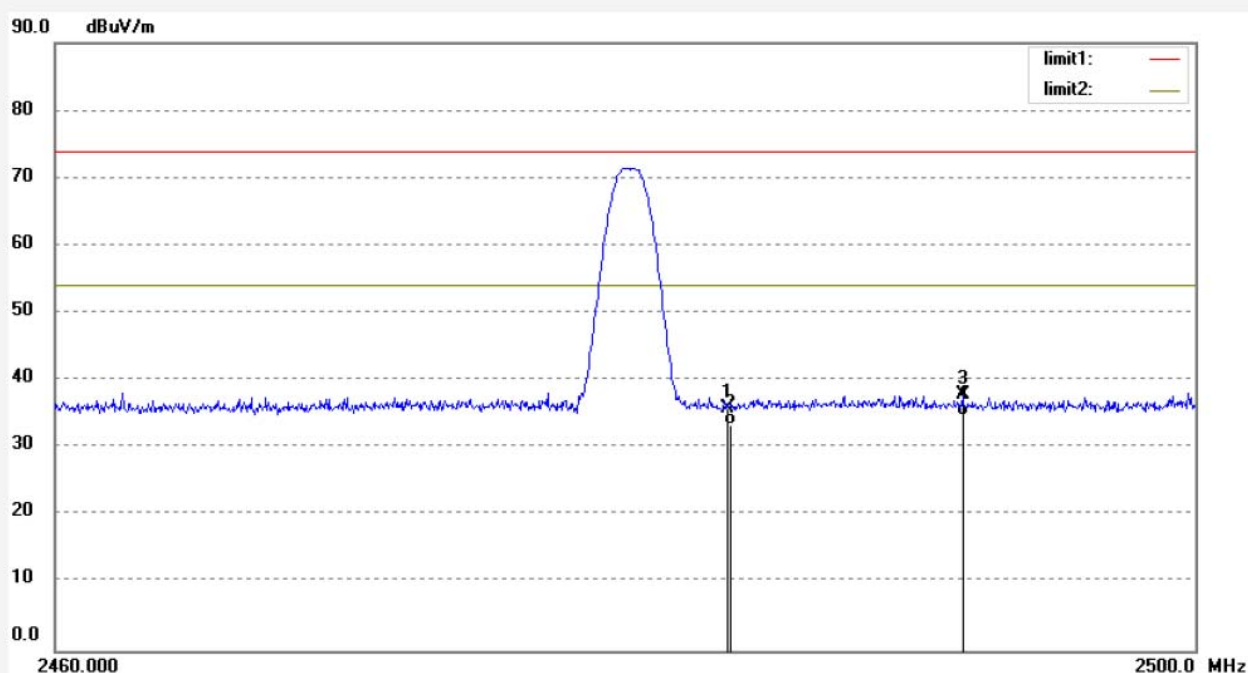
Date: 14/02/19/

Time: 12/27/17

Engineer Signature:

Distance: 3m

Note:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2483.520	42.44	-6.54	35.90	74.00	-38.10	peak			
2	2483.520	40.00	-6.54	33.46	54.00	-20.54	AVG			
3	2491.800	44.38	-6.51	37.87	74.00	-36.13	peak			
4	2491.800	41.32	-6.51	34.81	54.00	-19.19	AVG			



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Site: 1# Chamber

Tel:+86-0755-26503290

Fax:+86-0755-26503396

Job No.: alen #580

Standard: FCC PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 26 C / 55 %

EUT: Shower Speaker

Mode: TX 2480MHz

Model: BTS-06

Manufacturer: ACADIA

Polarization: Vertical

Power Source: DC 5V

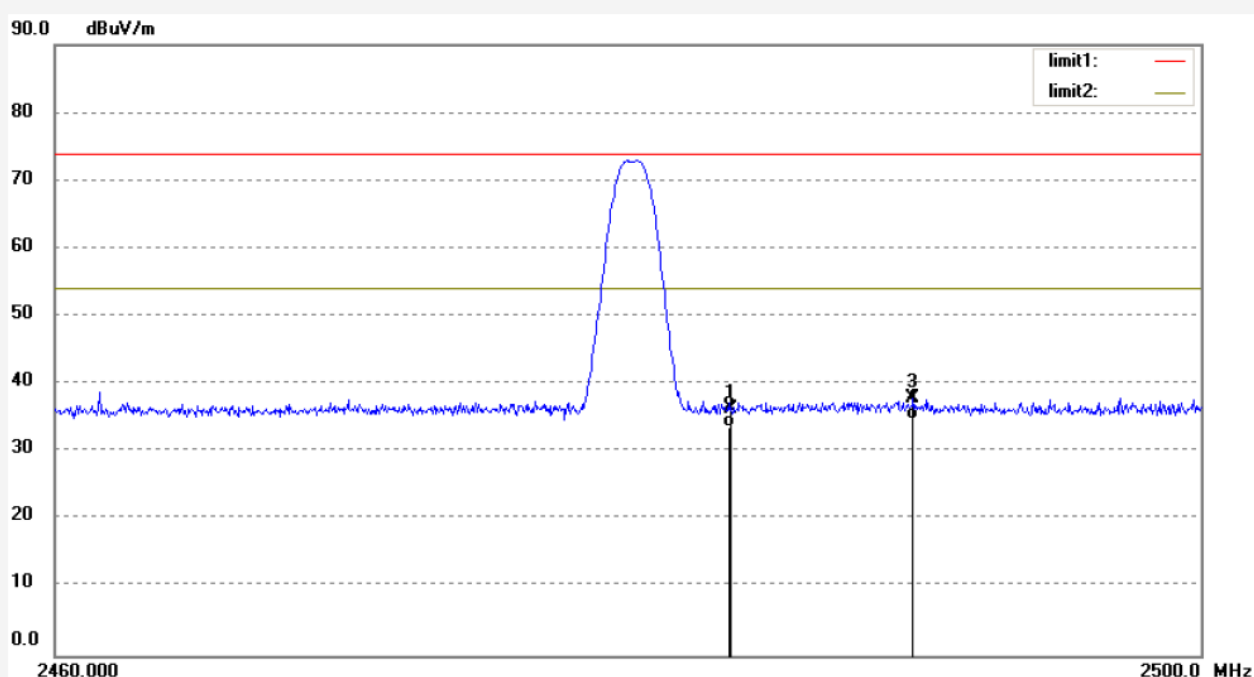
Date: 14/02/19/

Time: 12/26/22

Engineer Signature:

Distance: 3m

Note:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2483.520	42.80	-6.54	36.26	74.00	-37.74	peak			
2	2483.520	40.23	-6.54	33.69	54.00	-20.31	AVG			
3	2489.920	44.50	-6.52	37.98	74.00	-36.02	peak			
4	2489.920	41.32	-6.52	34.80	54.00	-19.20	AVG			

Hopping



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Job No.: STAR #3031

Standard: FCC PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: Shower Speaker

Mode: HOPPING

Model: BTS-06

Manufacturer: ACADIA

Polarization: Horizontal

Power Source: DC 5V

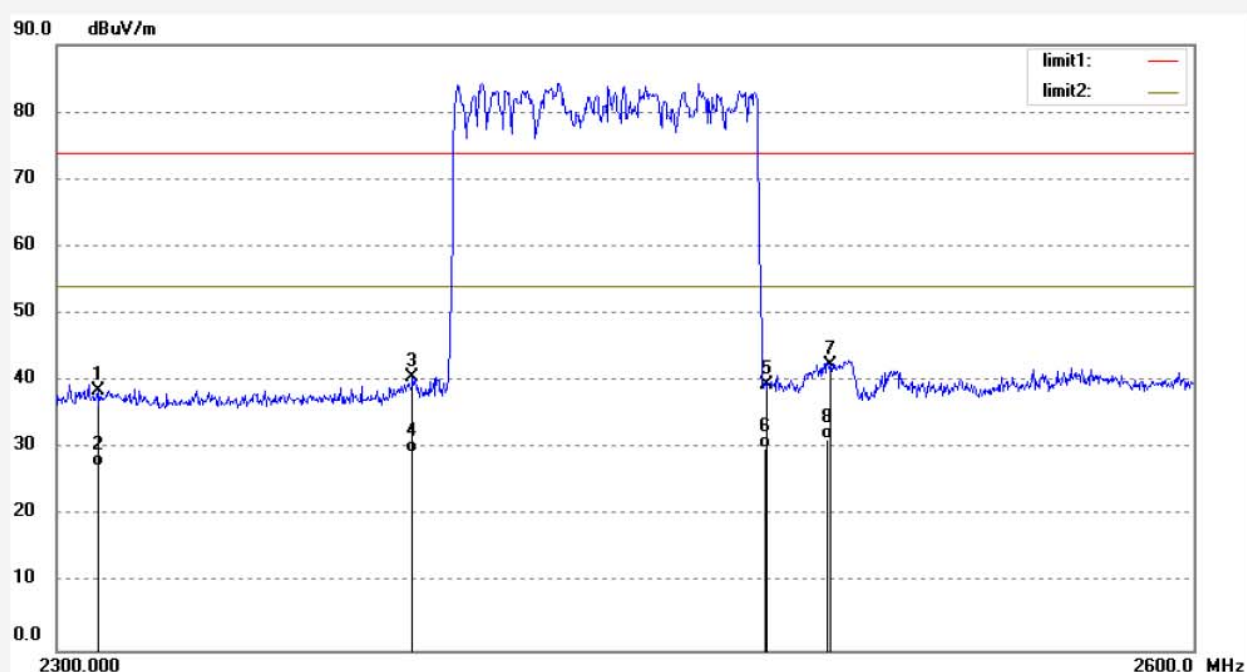
Date: 14/02/20/

Time: 11/36/34

Engineer Signature:

Distance: 3m

Note: Report No.:ATE20140151



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2310.000	45.68	-6.99	38.69	74.00	-35.31	peak			
2	2310.000	34.29	-6.99	27.30	54.00	-26.70	AVG			
3	2390.000	47.42	-6.78	40.64	74.00	-33.36	peak			
4	2390.000	36.10	-6.78	29.32	54.00	-24.68	AVG			
5	2483.500	45.92	-6.54	39.38	74.00	-34.62	peak			
6	2483.500	36.61	-6.54	30.07	54.00	-23.93	AVG			
7	2500.000	48.96	-6.50	42.46	74.00	-31.54	peak			
8	2500.000	37.88	-6.50	31.38	54.00	-22.62	AVG			



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Job No.: STAR #3032

Standard: FCC PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: Shower Speaker

Mode: HOPPING

Model: BTS-06

Manufacturer: ACADIA

Polarization: Vertical

Power Source: DC 5V

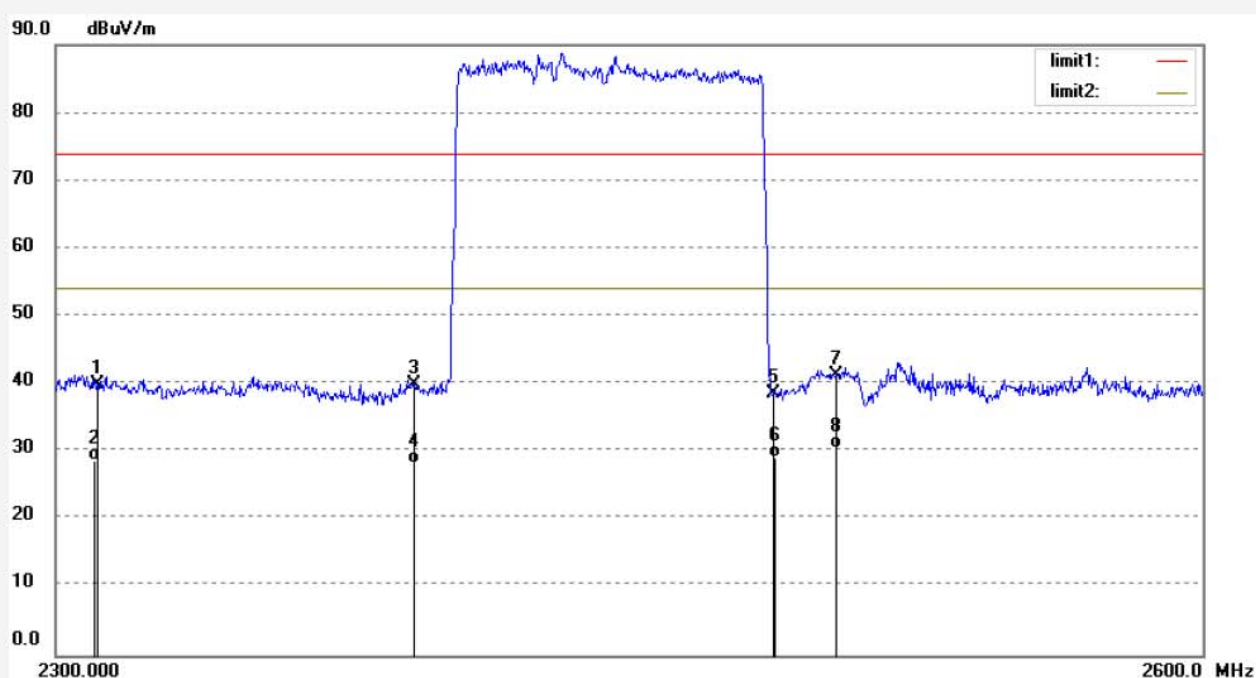
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Time: 11/39/37

Engineer Signature:

Distance: 3m

Note: Report No.:ATE20140151



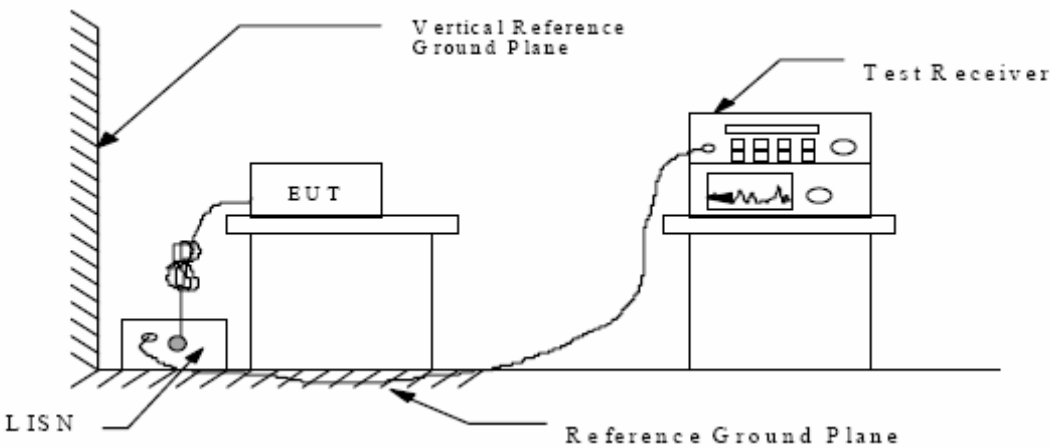
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2310.000	46.88	-6.99	39.89	74.00	-34.11	peak			
2	2310.000	35.60	-6.99	28.61	54.00	-25.39	AVG			
3	2390.000	46.74	-6.78	39.96	74.00	-34.04	peak			
4	2390.000	35.10	-6.78	28.32	54.00	-25.68	AVG			
5	2483.500	45.21	-6.54	38.67	74.00	-35.33	peak			
6	2483.500	35.66	-6.54	29.12	54.00	-24.88	AVG			
7	2500.000	47.76	-6.50	41.26	74.00	-32.74	peak			
8	2500.000	36.91	-6.50	30.41	54.00	-23.59	AVG			

12.AC POWER LINE CONDUCTED EMISSION FOR FCC PART 15 SECTION 15.207(A)

12.1.Block Diagram of Test Setup

12.1.1.Block diagram of connection between the EUT and simulators

12.1.2.Shielding Room Test Setup Diagram



(EUT: Shower Speaker)

12.2.The Emission Limit

12.2.1.Conducted Emission Measurement Limits According to Section 15.207(a)

Frequency (MHz)	Limit dB(μV)	
	Quasi-peak Level	Average Level
0.15 - 0.50	66.0 – 56.0 *	56.0 – 46.0 *
0.50 - 5.00	56.0	46.0
5.00 - 30.00	60.0	50.0

* Decreases with the logarithm of the frequency.

12.3.Configuration of EUT on Measurement

The equipment are installed on the Conducted Emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

12.4.Operating Condition of EUT

12.4.1.Setup the EUT and simulator as shown as Section 11.1.

12.4.2.Turn on the power of all equipment.

12.4.3.Let the EUT work in TX (Operation) mode measure it.

12.5.Test Procedure

The EUT is put on the plane 0.8m high above the ground by insulating support and is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs. Both sides of AC lines are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to ANSI C63.4- 2009 on Conducted Emission Measurement.

The bandwidth of test receiver (R & S ESCS30) is set at 9 kHz.

The frequency range from 150 kHz to 30MHz is checked.

12.6.Power Line Conducted Emission Measurement Results

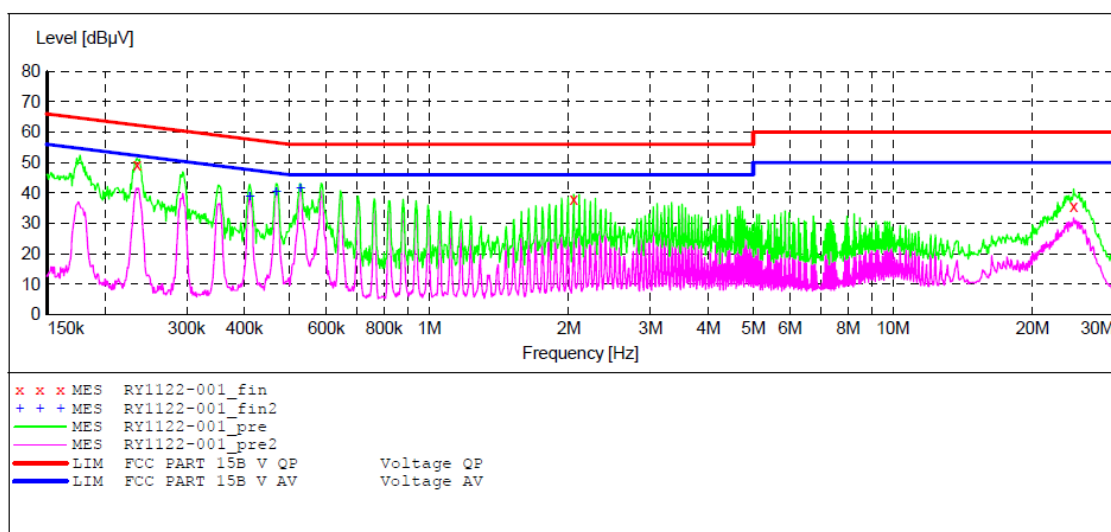
ACCURATE TECHNOLOGY CO.,LTD**CONDUCTED EMISSION STANDARD FCC PART 15 B**

EUT: Shower Speaker M/N:BTS-06
 Manufacturer: ACADIA
 Operating Condition: Charging
 Test Site: 1#Shielding Room
 Operator: star
 Test Specification: L 120V/60Hz
 Comment: Report No.:ATE20140151
 Start of Test: 2/17/2014 / 3:09:17PM

SCAN TABLE: "V 150K-30MHz fin"

Short Description: _SUB_STD_VTERM2 1.70

Start	Stop	Step	Detector	Meas. Time	IF Bandw.	Transducer
Frequency	Frequency	Width				
150.0 kHz	30.0 MHz	4.5 kHz	QuasiPeak	1.0 s	9 kHz	NSLK8126 2008
Average						

**MEASUREMENT RESULT: "RY1122-001_fin"**

2/17/2014 3:29PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.234567	49.30	10.6	62	13.0	QP	L1	GND
2.049619	37.80	11.0	56	18.2	QP	L1	GND
24.549492	35.60	11.5	60	24.4	QP	L1	GND

MEASUREMENT RESULT: "RY1122-001_fin2"

2/17/2014 3:29PM

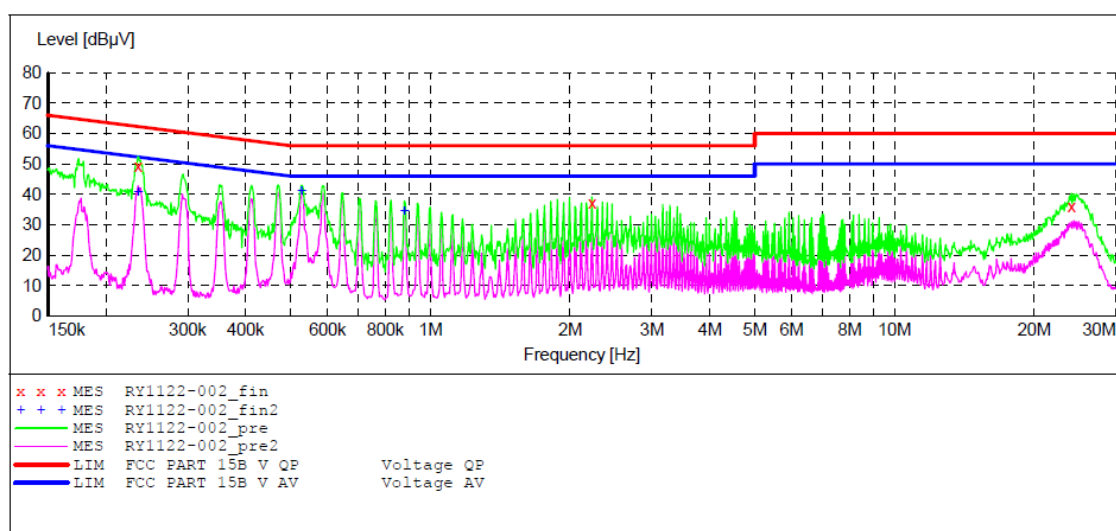
Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.410192	38.60	10.7	48	9.0	AV	L1	GND
0.467950	40.10	10.7	47	6.5	AV	L1	GND
0.527486	41.50	10.7	46	4.5	AV	L1	GND

ACCURATE TECHNOLOGY CO., LTD**CONDUCTED EMISSION STANDARD FCC PART 15 B**

EUT: Shower Speaker M/N:BTS-06
 Manufacturer: ACADIA
 Operating Condition: Charging
 Test Site: 1#Shielding Room
 Operator: star
 Test Specification: N 120V/60Hz
 Comment: Report No.:ATE20140151
 Start of Test: 2/17/2014 / 3:15:00PM

SCAN TABLE: "V 150K-30MHz fin"

Short Description: _SUB_STD_VTERM2 1.70
 Start Stop Step Detector Meas. IF Transducer
 Frequency Frequency Width Time Bandw.
 150.0 kHz 30.0 MHz 4.5 kHz QuasiPeak 1.0 s 9 kHz NSLK8126 2008
 Average

**MEASUREMENT RESULT: "RY1122-002_fin"**

2/17/2014 3:32PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.234567	49.30	10.6	62	13.0	QP	N	GND
2.228851	37.00	11.0	56	19.0	QP	N	GND
24.064340	35.90	11.5	60	24.1	QP	N	GND

MEASUREMENT RESULT: "RY1122-002_fin2"

2/17/2014 3:32PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.234567	40.70	10.6	52	11.6	AV	N	GND
0.527486	41.00	10.7	46	5.0	AV	N	GND
0.879278	34.40	10.8	46	11.6	AV	N	GND

13.ANTENNA REQUIREMENT

13.1.The Requirement

According to Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

13.2.Antenna Construction

The antenna is PCB Layout antenna, no consideration of replacement. Therefore, the equipment complies with the antenna requirement of Section 15.203.

