

APPLICATION CERTIFICATION
On Behalf of
TQL TRADING INC

SPEAKER

Model No.: TQ-KY21501, TQ-KY21003, TQ-KY41001, TQ-KY21002, TQ-KY21201,
TQ-KY21202, TQ-KY31201, TQ-KY60801, TQ-KY31202, TQ-KY21008

FCC ID: 2AKNJ-TQ-KY21501

Prepared for : TQL TRADING INC.
Address : 334 S LOS ANGELES ST #9002, LOS ANGELES,
CALIFORNIA, 90013, United States
Prepared by : ACCURATE TECHNOLOGY CO., LTD
Address : F1, Bldg. A, Changyuan New Material Port, Keyuan Rd.
Science & Industry Park, Nanshan, Shenzhen, Guangdong
P.R. China

Tel: (0755) 26503290
Fax: (0755) 26503396

Report Number : ATE20161344
Date of Test : July 01--Dec. 28, 2016
Date of Report : Dec. 29, 2016

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. SUMMARY OF TEST RESULTS	8
4. CARRIER POWER	9
4.1. Block Diagram of Test Setup.....	9
4.2. The Requirement For Section FCC part 74	9
4.3. EUT Configuration on Measurement	10
4.4. Operating Condition of EUT	10
4.5. Test Procedure	10
4.6. Test Result	12
5. THE FIELD STRENGTH OF RADIATION EMISSION	13
5.1. Block Diagram of Test Setup.....	13
5.2. The Field Strength of Radiation Emission Measurement Limits.....	14
5.3. Test description.....	14
5.4. Configuration of EUT on Measurement	14
5.5. Operating Condition of EUT	15
5.6. Test Procedure	15
5.7. The Field Strength of Radiation Emission Measurement Results	16
6. EMISSION BANDWIDTH	22
6.1. Block Diagram of Test Setup.....	22
6.2. The Bandwidth of Emission Limit According To FCC Part 74 Section 74.861(e)-5.....	22
6.3. EUT Configuration on Measurement	22
6.4. Operating Condition of EUT	22
6.5. Test Procedure	23
6.6. Measurement Result	23
7. FREQUENCY TOLERANCE & STABILITY	24
7.1. Block Diagram of Test Setup.....	24
7.2. Test description.....	24
7.3. Measurement method 1	25
7.4. Measurement method 2.....	25
7.5. Measurement Result	25
8. MODULATION CHARACTERISTICS	27
8.1. Block Diagram of Test Setup.....	27
8.2. Test description.....	27
8.3. Measurement method.....	27
8.4. Measurement Result	28
9. ANTENNA REQUIREMENT	31
9.1. The Requirement	31

9.2. Antenna Construction 31

Test Report Certification

Applicant : TQL TRADING INC.
Manufacturer : TQL TRADING INC.
Product : SPEAKER
Model No. : TQ-KY21501, TQ-KY21003, TQ-KY41001, TQ-KY21002,
TQ-KY21201, TQ-KY21202, TQ-KY31201, TQ-KY60801,
TQ-KY31202, TQ-KY21008
(Note: they are identical in interior structure, electrical circuits and components, and
Product model is different because of different Color of product appearance. So we
prepare the TQ-KY21501 for test.)
Trade name : H&A

Measurement Procedure Used:

FCC Rules and Regulations Part 74H
ANSI C63.10:2013
ANSI/TIA/EIA-603

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 74H. 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.

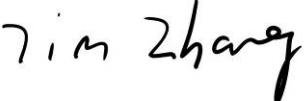
This report applies to above tested sample only. This report shall not be reproduced in part without written approval of ACCURATE TECHNOLOGY CO., LTD.

Date of Test :
Date of Report :

July 01--Dec. 28, 2016

Dec. 29, 2016

Prepared by :


(Tim.zhang, Engineer)

Approved & Authorized Signer :


(Sean Liu, Manager)

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

EUT : SPEAKER

Model Number : TQ-KY21501, TQ-KY21003, TQ-KY41001, TQ-KY21002, TQ-KY21201, TQ-KY21202, TQ-KY31201, TQ-KY60801, TQ-KY31202, TQ-KY21008

Power Supply : DC 3V(Powered by battery)

Modulation: : FM

antenna gain : 1dBi

TX Frequency : 210.3MHz

Type of Antenna : Integral antenna

Applicant : TQL TRADING INC.

Address : 334 S LOS ANGELES ST #9002, LOS ANGELES, CALIFORNIA, 90013, United States

Manufacturer : TQL TRADING INC.

Address : 334 S LOS ANGELES ST #9002, LOS ANGELES, CALIFORNIA, 90013, United States

Date of sample received : July 01, 2016

Date of Test : July 01--Dec. 28, 2016

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	Cal. Interval
EMI Test Receiver	Rohde&Schwarz	ESCS30	100307	Jan. 09, 2016	One Year
EMI Test Receiver	Rohde&Schwarz	ESPI3	101526/003	Jan. 09, 2016	One Year
Spectrum Analyzer	Agilent	E7405A	MY45115511	Jan. 09, 2016	One Year
Pre-Amplifier	Rohde&Schwarz	CBLU118354 0-01	3791	Jan. 09, 2016	One Year
Loop Antenna	Schwarzbeck	FMZB1516	1516131	Jan. 14, 2016	One Year
Bilog Antenna	Schwarzbeck	VULB9163	9163-323	Jan. 14, 2016	One Year
Horn Antenna	Schwarzbeck	BBHA9120D	9120D-655	Jan. 14, 2016	One Year
Horn Antenna	Schwarzbeck	BBHA9120D	9120D-1067	Jan. 14, 2016	One Year
LISN	Rohde&Schwarz	ESH3-Z5	100305	Jan. 09, 2016	One Year
LISN	Schwarzbeck	NSLK8126	8126431	Jan. 09, 2016	One Year
Highpass Filter	Wainwright Instruments	WHKX3.6/18 G-10SS	N/A	Jan. 09, 2016	One Year
Band Reject Filter	Wainwright Instruments	WRCG2400/2 485-2375/2510 -60/11SS	N/A	Jan. 09, 2016	One Year
Audio Signal Generator	HP	3325A	N/A	Jan. 09, 2016	One Year
Modulation Analyzer	HP	8920B	N/A	Jan. 09, 2016	One Year
Attenuator	MINI CIRCUITS	MCL BW-S20W2	N/A	Jan. 09, 2016	One Year
DC Power Supply	LONGWEI	WYK-605	N/A	Jan. 09, 2016	One Year
Temperature Chamber	SHIHIN	BM50-CB	N/A	Jan. 09, 2016	One Year

3. SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
Section 15.207	Conducted Emission	N/A
Section 74.861(e)-1	Carrier Power	Compliant
Section 74.861(e)-5	Emission Bandwidth	Compliant
Section 74.861(e)-3	Modulation Characteristics	Compliant
Section 74.861(e)-4	Frequency Tolerance	Compliant
Section 74.861(e)-6	The field strength of radiation emission	Compliant
Section 15.203	Antenna Requirement	Compliant

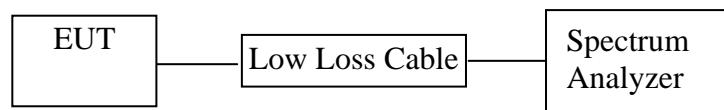
Note: The power supply mode of the EUT is DC 3V, According to the FCC standard requirements, conducted emission is not applicable

All normal using modes of the normal function were tested but only the worst test data of the worst mode is recorded by this report.

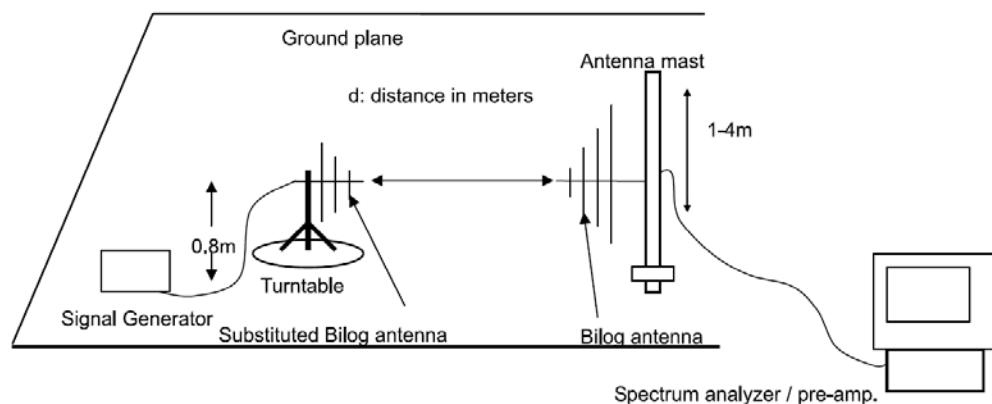
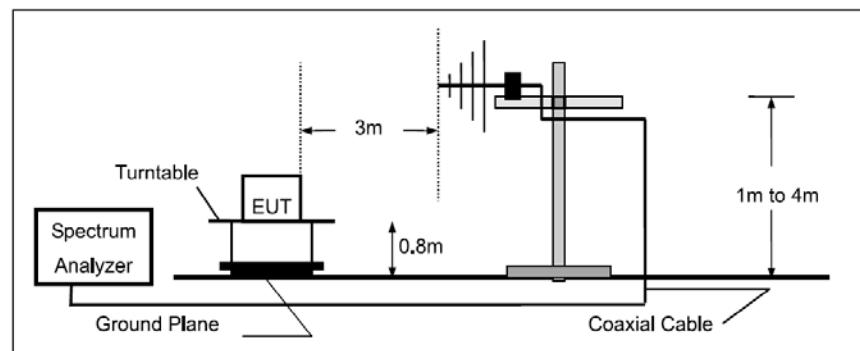
4. CARRIER POWER

4.1. Block Diagram of Test Setup

Conducted method:



Radiated method:



(EUT: SPEAKER)

4.2. The Requirement For Section FCC part 74

According to FCC part 74 Section 74.861(e)-1: The power of the measured unmodulated carrier power at the output of the transmitter power amplifier may not exceed 50mW.

4.3.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.

4.4.Operating Condition of EUT

4.4.1.Setup the EUT and simulator as shown as Section 4.1.

4.4.2.Turn on the power of all equipment.

4.4.3.Let the EUT work in TX modes measure it. The transmit frequency is 210.3MHz.

4.5.Test Procedure

Conducted method:

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

4.5.2.Set RBW of spectrum analyzer to 100KHz and VBW to 300KHz.

4.5.3.Measurement the maximum peak output power.

Radiated method:

4.5.4.On a test site, the EUT shall be placed on a turntable, and in the position closest to the normal use as declared by the user.

4.5.5.The test antenna shall be oriented initially for vertical polarization located 3m from the EUT to correspond to the transmitter.

4.5.6.The output of the antenna shall be connected to the measuring receiver and either a peak or QP detector was used for the measurement as indicated on the report. The detector selection is based on how close the emission level was approaching the limit.

4.5.7.The transmitter shall be switched on; if possible, without the modulation and the measurement receiver shall be tuned to the frequency of the transmitter under test.

4.5.8.The test antenna shall be raised and lowered again though the specified range of height until the measuring receiver detects a maximum signal level.

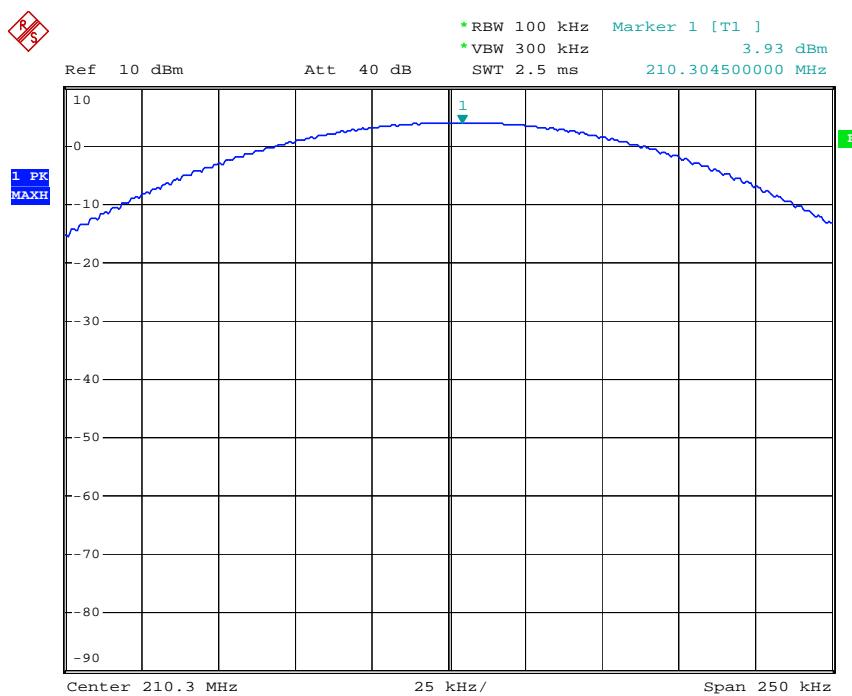
- 4.5.9.The test antenna shall be raised and lowered again though the specified range of height until the measuring receiver detects a maximum signal level.
- 4.5.10.The maximum signal level detected by the measuring receiver shall be noted.
- 4.5.11.Replace the antenna with a proper antenna(substitution antenna)
- 4.5.12.The substitution antenna shall be oriented for vertical polarization and, if necessary, the length of the substitution antenna shall be adjusted to correspond to the frequency of transmitting
- 4.5.13.The substitution antenna shall be connected to a calibrated signal generator.
- 4.5.14.If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
- 4.5.15.The test antenna shall be raised and lowered through the specified range of the height to ensure that the maximum signal is received.
- 4.5.16.The input signal to substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, that is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuation setting of the measuring receiver.
- 4.5.17.The input level to the substitution antenna shall be recorded as power level in dBm, corrected for any change of input attenuator setting of the measuring receiver.
- 4.5.18.The measurement shall be repeated with the test antenna and the substitution antenna oriented for horizontal polarization.
- 4.5.19.The measure of the effective radiated power is the larger of the two levels recorded, at the input to the substitution antenna, corrected for the gain of the substitution antenna if necessary.

4.6. Test Result

Conducted method test result:

Frequency (MHz)	Output Power (dBm)	Output Power Limit (mW)	Output Power Limit (dBm)	Pass / Fail
210.3	3.93	2.472	16.99	PASS

The spectrum analyzer plots are attached as below.



Date: 16.DEC.2016 09:52:22

Radiated method test result:

Indicated		Table Angle Degree	Test Antenna		Substituted			Antenna Gain Correction (dBi)	Cable Loss (dB)	Absolute Level (dBm)	Part 74H Limit (dBm)
Frequency (MHz)	S.A. Reading (dB μ V/m)		Height (m)	Polar (H/V)	Frequency (MHz)	S.G. Level (dBm)	Polar (H/V)				
Low Channel											
210.3	58.74	179	1.0	H	210.3	-6.22	H	0	0.5	-6.72	16.99
210.3	52.67	203	1.0	V	210.3	-11.03	V	0	0.5	-11.53	16.99

5. THE FIELD STRENGTH OF RADIATION EMISSION

5.1. Block Diagram of Test Setup

5.1.1. Block diagram of connection between the EUT and peripherals

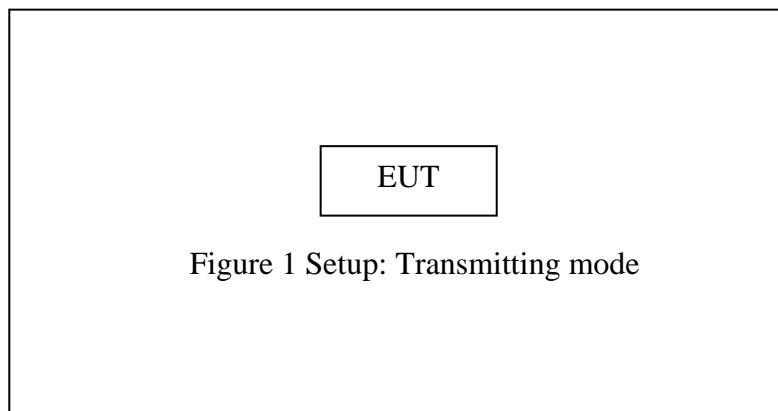
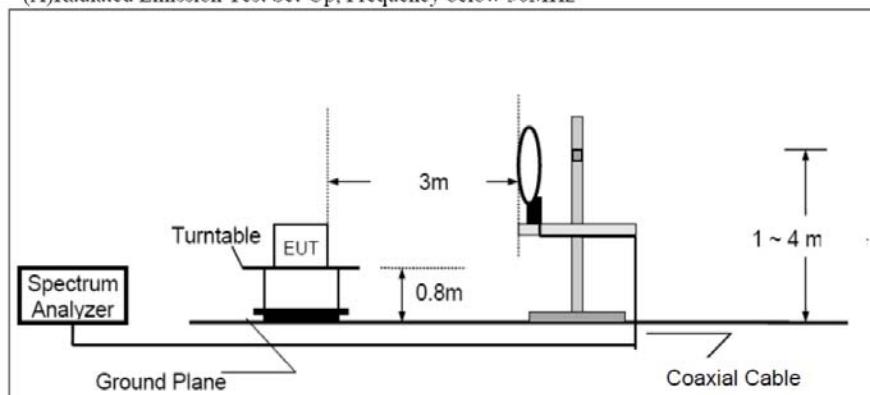


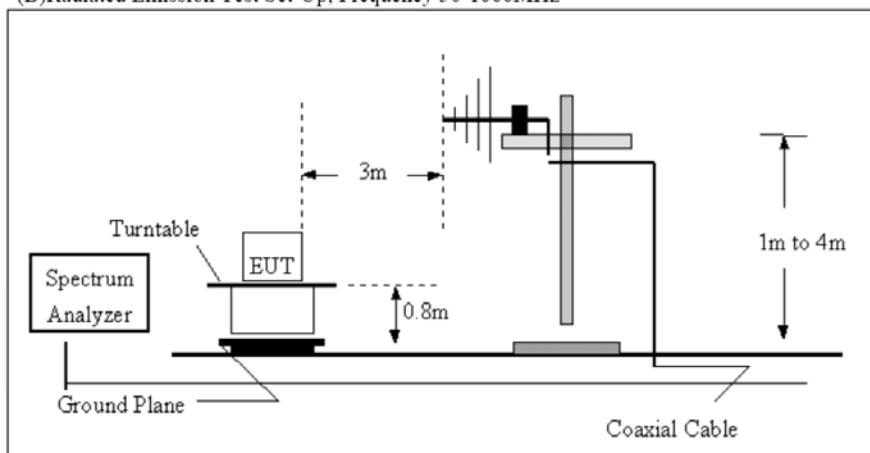
Figure 1 Setup: Transmitting mode

5.1.2. Semi-Anechoic Chamber Test Setup Diagram

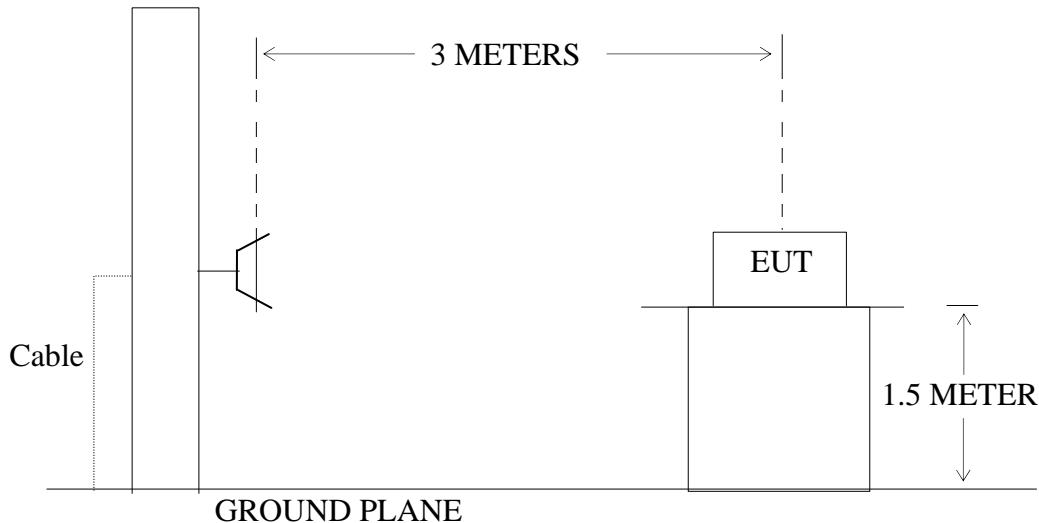
(A) Radiated Emission Test Set-Up, Frequency below 30MHz



(B) Radiated Emission Test Set-Up, Frequency 30-1000MHz



(C) Radiated Emission Test Set-Up, Frequency above 1GHz



5.2. The Field Strength of Radiation Emission Measurement Limits

5.2.1. Radiation Emission Measurement Limits According to FCC Part 74

5.3. Test description

According to Section 74.861(e)-6, the mean power of emissions shall be attenuated below the output of the transmitter in accordance with the following schedule:

1. On any frequency removed from the operating frequency by more than 50 percent up to and including 100 percent of the authorized bandwidth: at least 25dB;
2. On any frequency removed from the operating frequency by more than 100 percent up to and including 250 percent of the authorized bandwidth: at least 35dB;
3. On any frequency removed from the operating frequency by more than 250 percent of the authorized bandwidth: at least $43+10\log_{10}(TP)$ dB;

5.4. Configuration of EUT on Measurement

The following equipment is 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.

5.4.1. SPEAKER (EUT)

Model Number : TQ-KY21501
Serial Number : N/A
Manufacturer : TQL TRADING INC.

5.5.Operating Condition of EUT

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

5.5.2.Turn on the power of all equipment.

5.5.3.Let the EUT work in TX mode measure it.

5.6.Test Procedure

The EUT and its simulators are placed on a turntable, which is 0.8 meter high above ground(Below 1GHz). The EUT and its simulators are placed on a turntable, which is 1.5 meter high above ground(Above 1GHz). 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 bi-log 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 EUT location must be manipulated according to ANSI C63.10:2013 on radiated emission measurement. The EUT was tested in 3 orthogonal planes.

The bandwidth of test receiver is set at 120 kHz in 30-1000 MHz, and 1 MHz in 1000-3000 MHz.

The frequency range from 9KHz to 3GHz is checked.

5.7.The Field Strength of Radiation Emission Measurement Results

PASS.

Calculation: Limit(dBm)=EL-43-10log(TP)

Note: TP= $\lfloor 10 \times (EL/10) \rfloor /1000W$.

Limit(dBm)=EL-43-10log(TP)=-13dBm

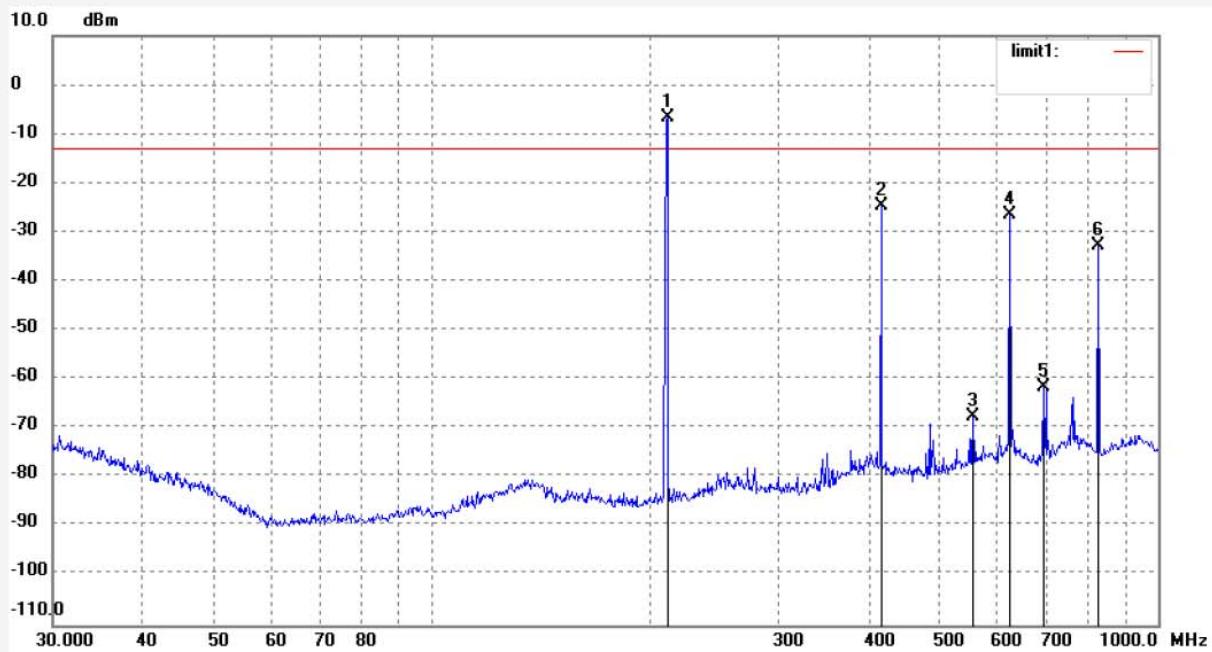
Note:

1. Emissions attenuated more than 20 dB below the permissible value are not reported.
2. The EUT is tested radiation emission in three axes(X,Y,Z). The worst emissions are reported in three axes.
3. The radiation emissions from 9KHz-30MHz are not reported, because the test values lower than the limits of 20dB.

Job No.: STAR2016 #1938
 Standard: FCC MIC(-13dBm)
 Test item: Radiation Test
 Temp.(C)/Hum.(%) 25 C / 55 %
 EUT: SPEAKER
 Mode: TX 210.3MHz
 Model: TQ-KY21501
 Manufacturer: TQL TRADING INC

Polarization: Horizontal
 Power Source: DC 3V
 Date: 2016/12/16
 Time: 9/55/50
 Engineer Signature: alen
 Distance: 3m

Note: Report No.:ATE20161344

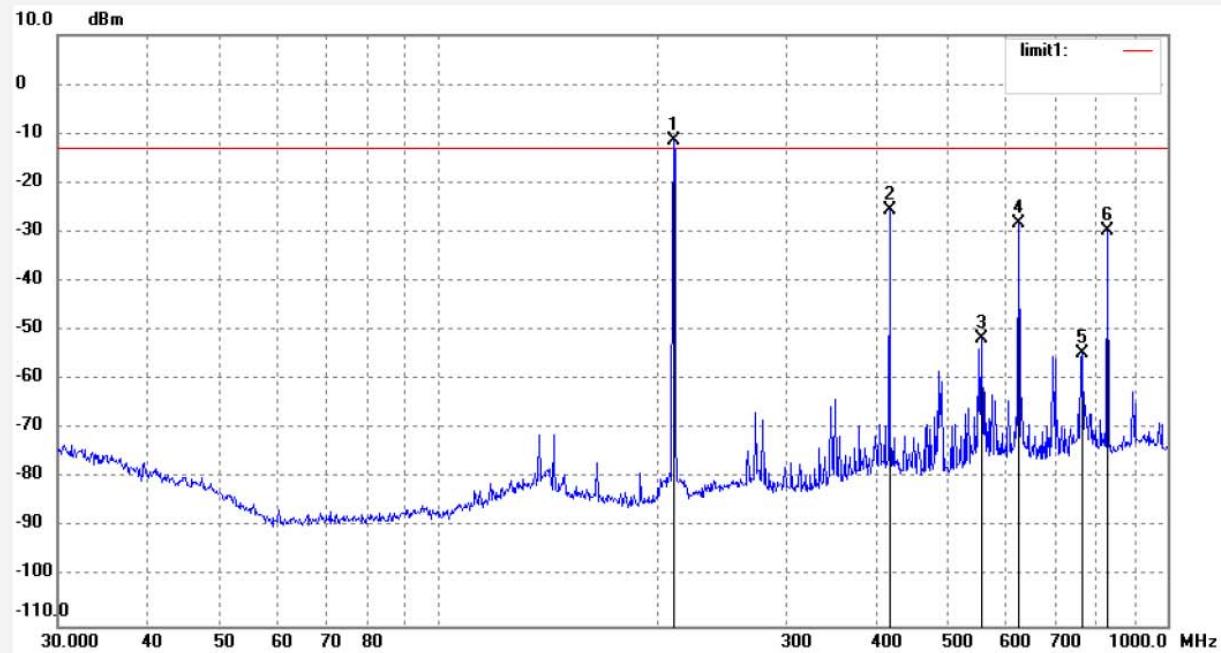


No.	Freq. (MHz)	Reading (dBm)	Factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	210.3094	3.44	-10.16	-6.72			peak			
2	420.6188	-22.09	-2.49	-24.58	-13.00	-11.58	peak			
3	556.1213	-66.13	-1.28	-67.41	-13.00	-54.41	peak			
4	630.9282	-27.86	1.32	-26.54	-13.00	-13.54	peak			
5	696.3523	-62.32	0.66	-61.66	-13.00	-48.66	peak			
6	841.2376	-36.18	3.37	-32.81	-13.00	-19.81	peak			

Job No.: STAR2016 #1937
 Standard: FCC MIC(-13dBm)
 Test item: Radiation Test
 Temp.(C)/Hum.(%) 25 C / 55 %
 EUT: SPEAKER
 Mode: TX 210.3MHz
 Model: TQ-KY21501
 Manufacturer: TQL TRADING INC

Polarization: Vertical
 Power Source: DC 3V
 Date: 2016/12/16
 Time: 9/54/31
 Engineer Signature: alen
 Distance: 3m

Note: Report No.:ATE20161344

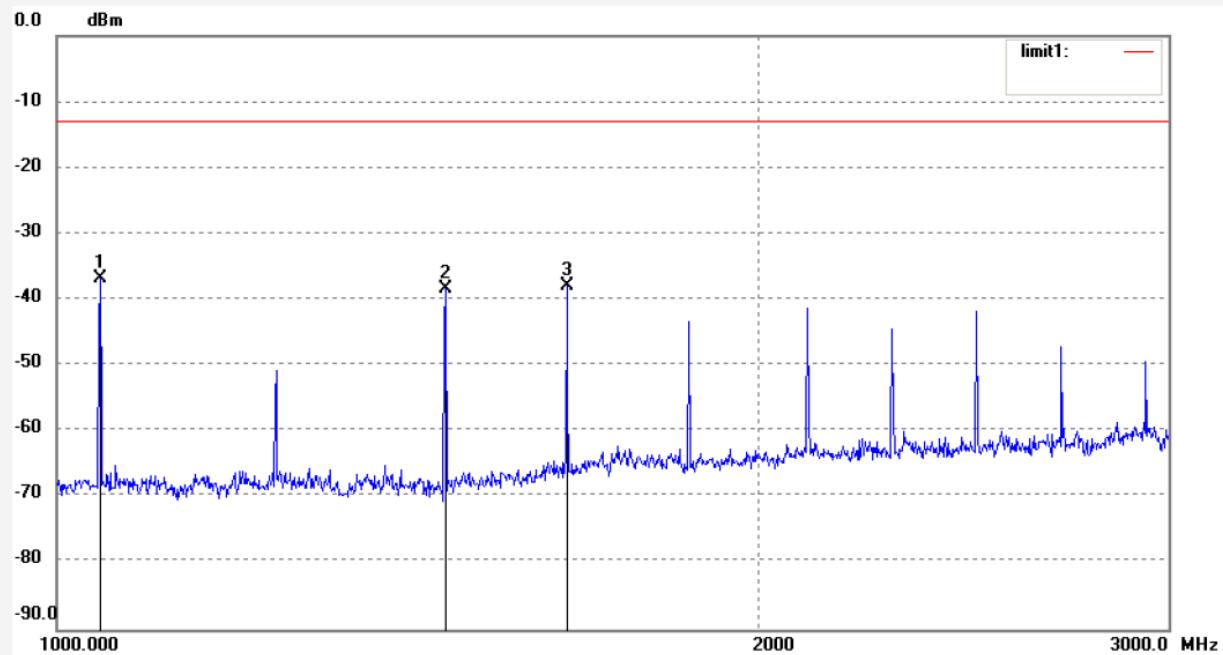


No.	Freq. (MHz)	Reading (dBm)	Factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	210.3094	0.65	-12.18	-11.53			peak			
2	420.6188	-21.57	-3.92	-25.49	-13.00	-12.49	peak			
3	556.1213	-51.03	-0.52	-51.55	-13.00	-38.55	peak			
4	630.9282	-29.36	1.02	-28.34	-13.00	-15.34	peak			
5	765.6480	-58.37	3.81	-54.56	-13.00	-41.56	peak			
6	841.2376	-33.11	3.29	-29.82	-13.00	-16.82	peak			

Job No.: STAR2016 #1939
 Standard: FCC MIC(-13dBm)
 Test item: Radiation Test
 Temp. (C)/Hum.(%) 25 C / 55 %
 EUT: SPEAKER
 Mode: TX 210.3MHz
 Model: TQ-KY21501
 Manufacturer: TQL TRADING INC

Polarization: Horizontal
 Power Source: DC 3V
 Date: 16/12/16/
 Time: 10/05/12
 Engineer Signature: alen
 Distance: 3m

Note: Report No.:ATE20161344

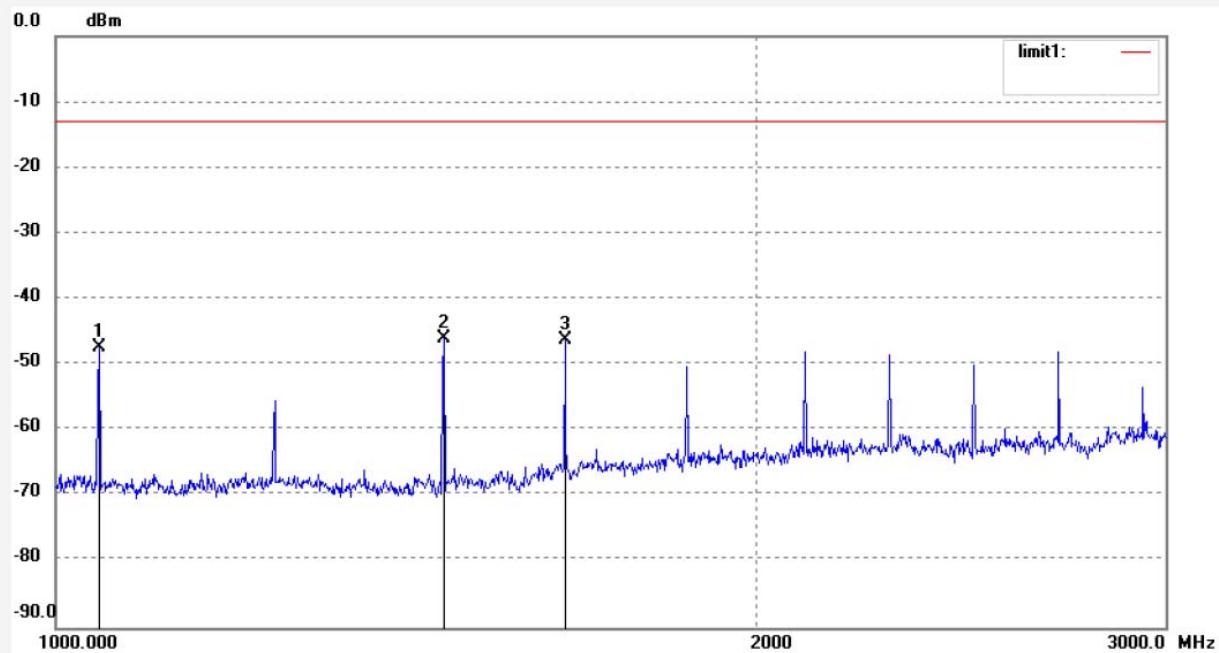


No.	Freq. (MHz)	Reading (dBm)	Factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	1051.567	-37.20	0.31	-36.89	-13.00	-23.89	peak			
2	1472.116	-39.36	1.02	-38.34	-13.00	-25.34	peak			
3	1682.415	-40.73	2.75	-37.98	-13.00	-24.98	peak			

Job No.: STAR2016 #1940
 Standard: FCC MIC(-13dBm)
 Test item: Radiation Test
 Temp.(C)/Hum.(%) 25 C / 55 %
 EUT: SPEAKER
 Mode: TX 210.3MHz
 Model: TQ-KY21501
 Manufacturer: TQL TRADING INC

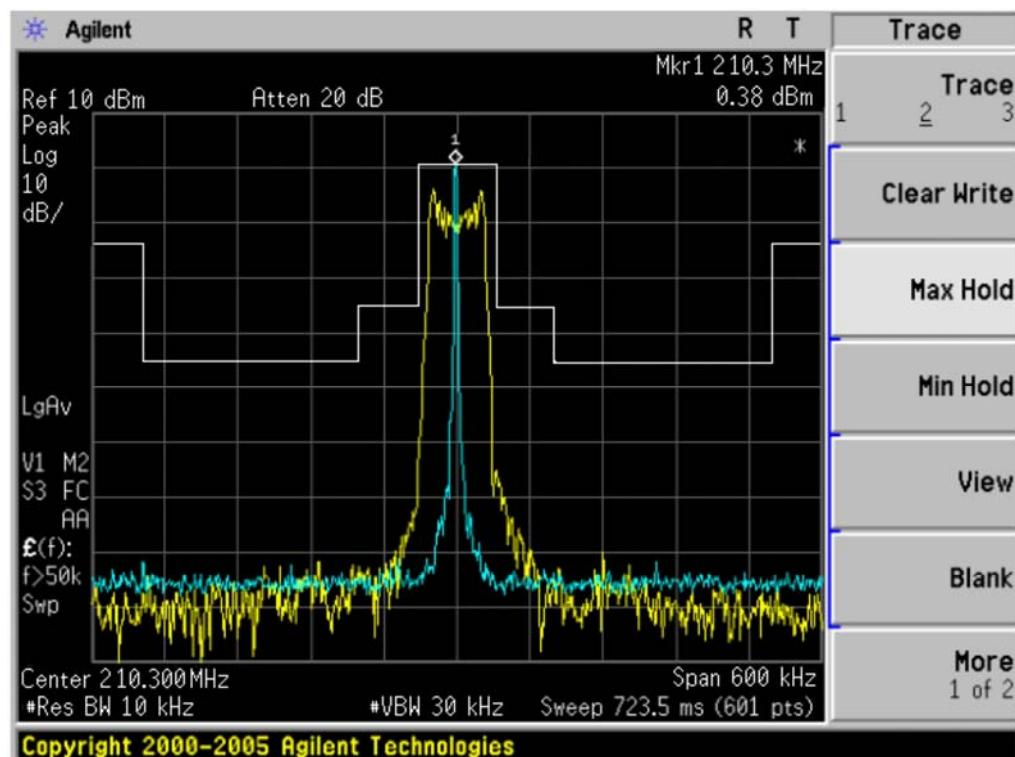
Polarization: Vertical
 Power Source: DC 3V
 Date: 16/12/16/
 Time: 10/11/21
 Engineer Signature: alen
 Distance: 3m

Note: Report No.:ATE20161344



No.	Freq. (MHz)	Reading (dBm)	Factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	1051.567	-47.56	0.31	-47.25	-13.00	-34.25	peak			
2	1472.116	-47.02	1.02	-46.00	-13.00	-33.00	peak			
3	1682.415	-48.92	2.75	-46.17	-13.00	-33.17	peak			

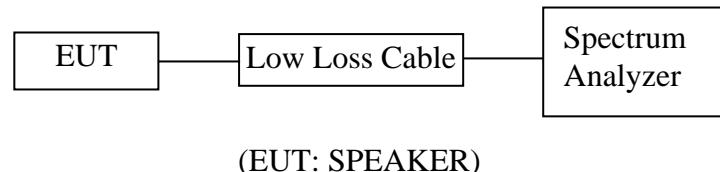
Emission Mask



6. EMISSION BANDWIDTH

6.1. Block Diagram of Test Setup

6.1.1. Block diagram of connection between the EUT and simulators



6.2. The Bandwidth of Emission Limit According To FCC Part 74 Section

74.861(e)-5

The operation bandwidth shall not exceed 200KHz.

6.3. EUT Configuration on Measurement

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

6.3.1. SPEAKER (EUT)

Model Number : TQ-KY21501
Serial Number : N/A
Manufacturer : TQL TRADING INC.

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 mode measure it.

6.5. Test Procedure

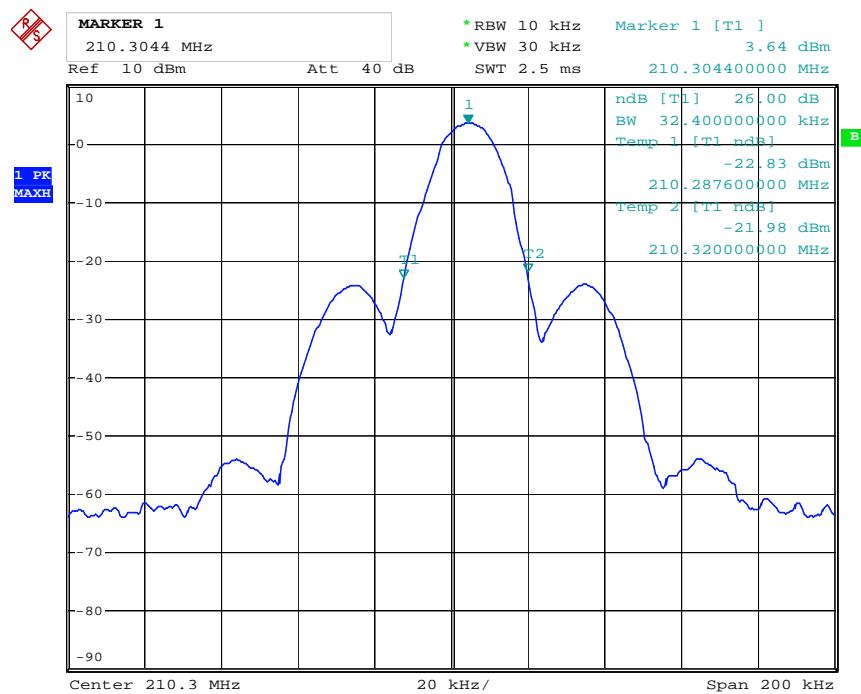
6.5.1. Set SPA Center Frequency = Fundamental frequency, RBW = 10 kHz, VBW = 30 kHz, Span = 0.2MHz.

6.5.2. Set SPA Max hold, Mark peak, -26 dB.

6.6. Measurement Result

The EUT does meet the FCC requirement.

-26 dB bandwidth = 32.4 kHz <200 kHz.

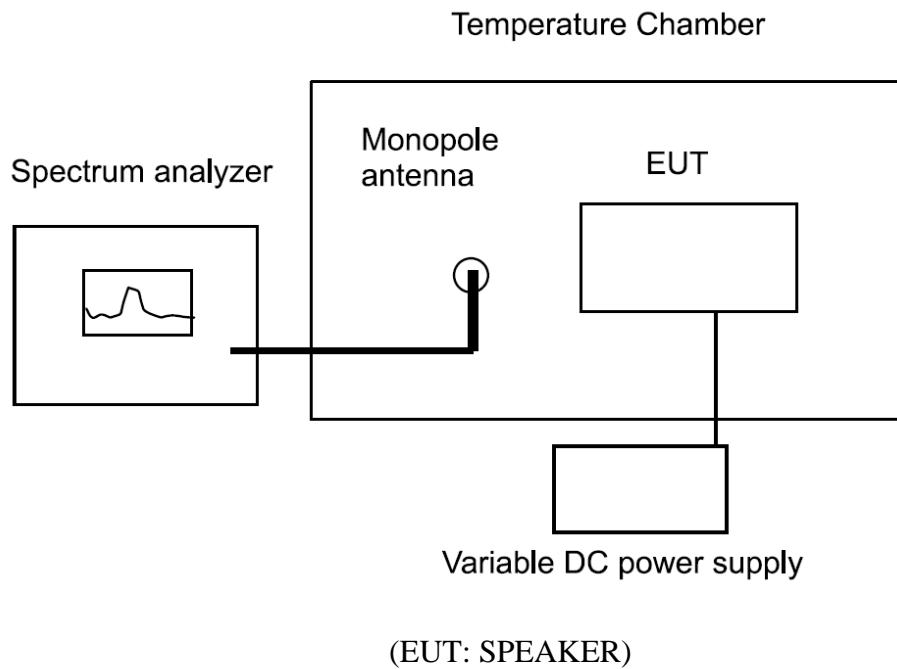


Date: 16.DEC.2016 09:49:39

7. FREQUENCY TOLERANCE & STABILITY

7.1. Block Diagram of Test Setup

7.1.1. Block diagram of connection between the EUT and simulators



7.2. Test description

7.2.1. According to FCC rule part 2 Section 2.1055(a)(1), the frequency stability shall be measured with variation of ambient temperature from -30 to +50 centigrade.

7.2.2. According to FCC rule part 2 section 2.1055(d)(2), for hand carried battery powered equipment, the frequency stability shall be measured with reducing primary supply voltage to the battery operating end point, which is specified by the manufacturer.

7.2.3. According to FCC rule part 74 section 74.861(e)-4, the frequency tolerance must be maintained within 0.005%

7.3.Measurement method 1

- 7.3.1. Setup the configuration per figure 7.1 for frequencies measurement inside an environment chamber, install new battery in the EUT,
- 7.3.2. Turn on EUT and set SA center frequency to the EUT radiated frequency. Set SA Resolution Bandwidth to 1KHz and Video Resolution Bandwidth to 1KHz and Frequency Span to 50KHz. Record this frequency as reference frequency.
- 7.3.3. Set the temperature of chamber to 50°C, Allow sufficient time(approximately 30 min) for the temperature of the chamber to stabilize. While maintaining a constant temperature inside the chamber, turn the EUT on and measure the EUT operating frequency.
- 7.3.4. Repeat step 2 with a 10°C decreased per stage until the lowest temperature -30°C is measured, record all measured frequencies on each temperature step.

7.4.Measurement method 2

- 7.4.1. Setup the configuration per figure 7.1 for frequencies measurement at temperature if it is within 15°C to 25°C. Otherwise, an environment chamber set for a temperature of 20°C shall be used. Install new battery in the EUT,
- 7.4.2. Turn on EUT and set SA center frequency to the EUT radiated frequency. Set SA Resolution Bandwidth to 1KHz and Video Resolution Bandwidth to 1KHz and Frequency Span to 50KHz. Record this frequency as reference frequency.
- 7.4.3. For battery operated only device, supply the EUT primary voltage at the operating end point which is specified by manufacturer and record the frequency.

7.5.Measurement Result

1. Frequency stability versus input (battery operation end point voltage is 3V)

Reference Frequency:	Frequency measured at End point Voltage	Limit(%)	Frequency Error(%)
210.3(MHz)	210.301783	0.005	0.00085

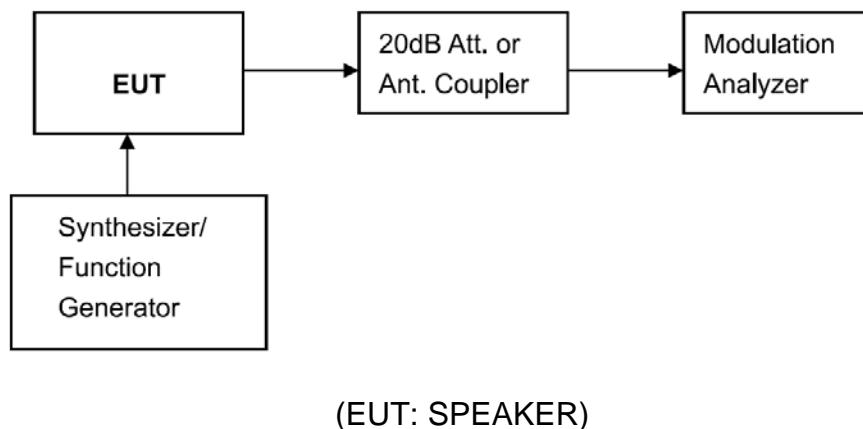
2. Frequency stability versus ambient temperature

Reference Frequency: 210.3(MHz)			Limit: $\pm 0.005\%$
Environment Temperature(° C)	Power supply	Frequency deviation measured with time Elapsed(30 minutes)	
		(MHz)	%
50	DC 3V	210.301756	0.00083
40	DC 3V	210.301698	0.00081
30	DC 3V	210.301714	0.00082
20	DC 3V	210.301689	0.00081
10	DC 3V	210.301735	0.00083
0	DC 3V	210.301684	0.00080
-10	DC 3V	210.301756	0.00083
-20	DC 3V	210.301814	0.00086
-30	DC 3V	210.301795	0.00085

8. MODULATION CHARACTERISTICS

8.1. Block Diagram of Test Setup

8.1.1. Block diagram of connection between the EUT and simulators



8.2. Test description

8.2.1. Per FCC rule part 2.1047(a) the modulation characteristics of the radio were measured across its rated audio input voltage and frequency ranges. For Voice Modulation Communication Equipment, the frequency response of the audio modulation circuit over a range of 100 to 5000Hz shall be measured.

8.2.2. According to CFR 47 section 74.861(e)-3, any form of modulation may be used. A maximum deviation of $\pm 75\text{KHz}$ is permitted when frequency modulation is employed.

8.3. Measurement method

8.3.1. Modulation limit

1. Configure the EUT as shown in figure 8.1.1, adjust the audio input for 60% of rated system deviation at 1KHz using this level as a reference(0dB) and vary the input level from -20 to +20dB. Record the frequency deviation obtained as a function of the input level.

2. Repeat step 1 with input frequency changing to 300, 1000, 3000, and 12000Hz in sequence.

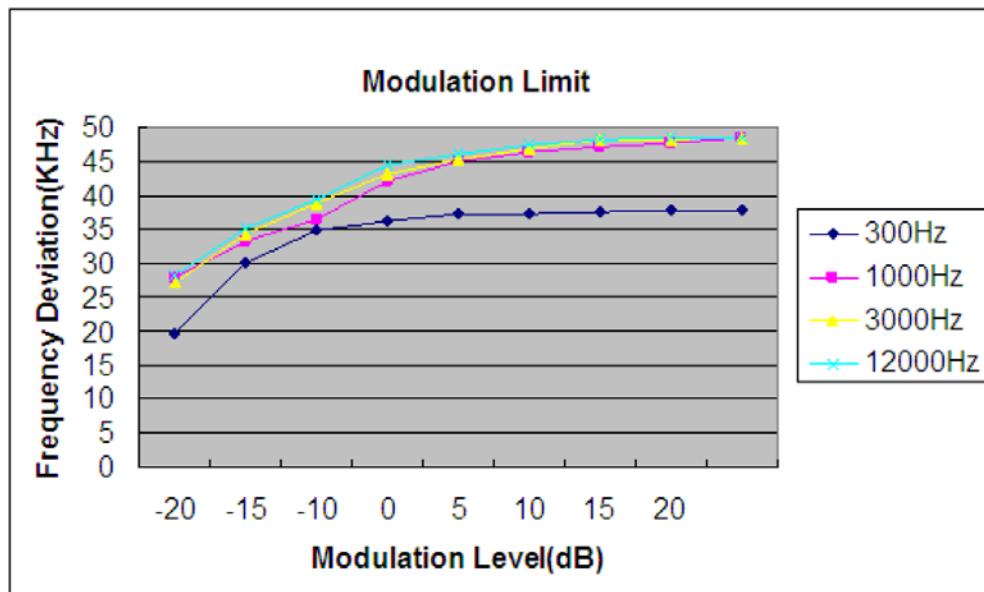
8.3.2. Audio frequency response

1. Configure the EUT as shown in figure
2. Adjust the audio input for 20% of rated system deviation at 1KHz using this level as a reference(0dB).
3. Vary the Audio frequency from 100Hz to 30KHz and record the frequency deviation.
4. $\text{Audio Frequency Response} = 20\log_{10}(\text{Deviation of test frequency}/\text{Deviation of 1KHz reference})$.

8.4. Measurement Result

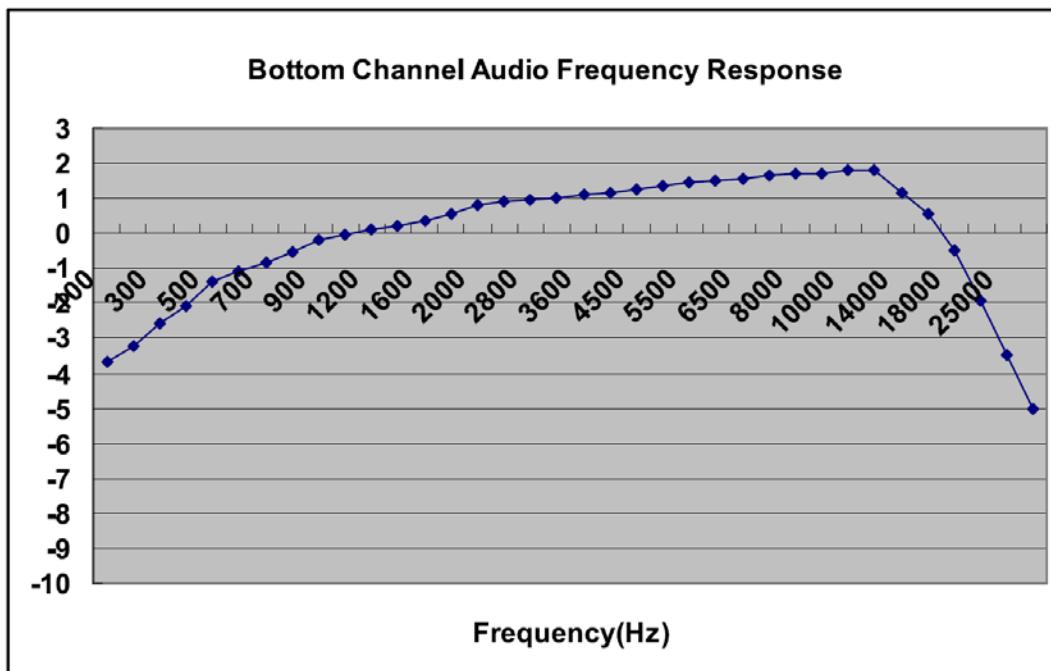
1. Modulation Limit:

Modulation Level(dB)	Peak Freq. Deviation At 300Hz (KHz)	Peak Freq. Deviation At 1000Hz (KHz)	Peak Freq. Deviation At 3000Hz (KHz)	Peak Freq. Deviation At 12000Hz (KHz)
-30	18.45	27.73	26.07	27.47
-15	28.97	32.08	33.15	32.43
-10	34.06	35.15	37.35	35.93
-5	34.92	40.04	42.03	44.17
+5	35.17	44.08	45.37	46.07
+10	36.13	46.41	47.09	47.21
+15	36.42	46.86	47.15	47.36
+20	36.56	47.17	47.23	47.41



2. Audio Frequency Response:

Frequency(Hz)	Deviation(KHz)
100	10.28
200	10.41
300	11.03
400	11.56
500	12.68
600	12.03
700	13.16
800	14.02
900	14.65
1000	15.07
1200	15.29
1400	15.25
1600	15.36
1800	15.54
2000	16.13
2400	16.47
2800	16.53
3200	16.65
3600	16.39
4000	17.04
4500	17.07
5000	17.24
5500	17.68
6000	17.79
6500	17.66
7000	18.06
8000	18.08
9000	18.14
10000	18.18
12000	18.29
14000	17.11
16000	16.28
18000	14.16
20000	12.08
25000	10.09
30000	9.07



9. ANTENNA REQUIREMENT

9.1. 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.

9.2. Antenna Construction

Device is equipped with Integral antenna, which isn't displaced by other antenna. The Antenna gain of EUT is 1dBi. Therefore, the equipment complies with the antenna requirement of Section 15.203.

