Produkte
Products

TÜVRheinland®

Prüfbericht - Nr.: *Test Report No.:*	**17024816 001**	**Seite 1 von 31** *Page 1 of 31*
Auftraggeber: *Client:*	Seikaku Technical Group Limited Offshor Chambers, P.O. Box 217, Apia, Samoa	
Gegenstand der Prüfung: *Test item:*	Wireless Microphone	
Bezeichnung: *Identification:*	WL-200H	**Serien-Nr.:** *Serial No.:* n.a.
Wareneingangs-Nr.: *Receipt No.:*	163089214	**Eingangsdatum:** *Date of receipt:* 2012-02-13
Zustand des Prüfgegenstandes bei Anlieferung: **Condition of test item at delivery:**	The sample is OK for testing and not damaged	
Prüfort: *Testing location:*	• TÜV Rheinland (Guangdong) Ltd. EMC Laboratory (FCC Registration No.: 833845) (Industry Canada Test Site No.: 2932C-1) • Shenzhen Huatongwei International Inspection Co., Ltd (FCC Registration No.: 662850) (Industry Canada Test Site No.: 5377A-1)	
Prüfgrundlage: *Test specification:*	FCC Title 47 CFR Part 74 Subpart H	
Prüfergebnis: *Test Result:*	**Der Prüfgegenstand entspricht oben genannter Prüfgrundlage(n).** *The test item passed the test specification(s).*	
Prüflaboratorium: *Testing Laboratory:*	TÜV Rheinland (Shenzhen) Co., Ltd.	

geprüft/ *tested by:*			**kontrolliert/** *reviewed by:*		
2012-06-25	Sam Lin/ Project Manager		2012-07-04	Shawn Peng/ Technical Certifier	
Datum *Date*	**Name/Stellung** *Name/Position*	**Unterschrift** *Signature*	**Datum** *Date*	**Name/Stellung** *Name/Position*	**Unterschrift** *Signature*

Sonstiges/ *Other Aspects:*

Abkürzungen:				*Abbreviations:*			
	P(ass)	=	*entspricht Prüfgrundlage*		*P(ass)*	=	*passed*
	F(ail)	=	*entspricht nicht Prüfgrundlage*		*F(ail)*	=	*failed*
	N/A	=	*nicht anwendbar*		*N/A*	=	*not applicable*
	N/T	=	*nicht getestet*		*N/T*	=	*not tested*

Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens.

This test report relates to the a. m. test item. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any safety mark on this or similar products.

TEST SUMMARY

5.1.1 TRANSMITTER OUTPUT POWER
RESULT: Passed

5.1.2 SPURIOUS RADIATION EMISSIONS
RESULT: Passed

5.1.3 OPERATING BANDWIDTH AND EMISSIONS MASK
RESULT: Passed

5.1.4 FREQUENCY TOLERANCE
RESULT: Passed

5.1.5 MODULATION CHARACTERISTICS
RESULT: Passed

6.1.1 ELECTROMAGNETIC FIELDS
RESULT: Passed

Contents

1. General Remarks

1.1 Complementary Materials

None.

2. Test Sites

2.1 Test Facilities

TÜV Rheinland (Guangdong) Ltd. EMC Laboratory
(FCC Registration No.: 833845 & Test Site Industry Canada No.: 2932C-1)

Guangzhou Auto Market, Yuan Gang Section, Guangshan Road, Guangzhou, P.R. China

Shenzhen Huatongwei International Inspection Co., Ltd
(FCC Registration No.: 663850 & Test Site Industry Canada No.: 5377A-1**)**

Keji Nan No. 12 Road, Hi-tech Park, Shenzhen, China

The tests at the test site have been conducted under the supervision of a TÜV engineer.

2.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
Spurious emissions (TÜV Rheinland (Guangdong) Ltd. EMC Laboratory)				
EMI Test Receiver	Rohde & Schwarz	ESCI-3	100216	2013-03-12
Spectrum Analyzer	Rohde & Schwarz	FSP30	100286	2013-03-12
Trilog-Broadband Antenna	SCHWARZBECK	VULB9168	209	2013-03-12
Double-Ridged Waveguide Horn Antenna	Rohde & Schwarz	HF906	100385	2012-08-23
Pre-amplifier	MITEQ	AFS42-00101800-25-S-42	1101599	2012-07-30
Radio Spectrum Test (TÜV Rheinland (Guangdong) Ltd. EMC Laboratory)				
Spectrum Analyzer	Agilent	E4404B	MY41440753	2013-03-12
Climatic Chamber	GZ-ESPEC	EL-04KA	6107116	2013-03-12
Modulation Characteristics Test (Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory)				
RF Communication Test Set	HP	8920A	3813A10206	2012-10-23

2.3 Traceability

All measurement equipment calibrations are traceable to NIST or where calibration is performed outside the United States, to equivalent nationally recognized standards organizations.

2.4 Calibration

Equipment requiring calibration is calibrated periodically by the manufacturer or according to manufacturer's specifications. Additionally all equipment is verified for proper performance on a regular basics using in house standards or comparisons.

2.5 Measurement Uncertainty

The estimated combined standard uncertainty for radiated emissions and conducted emissions measurements as below table,

Items		Extended Uncertainty
RE (30-1000MHz)	Field strength (dBuV/m)	U=4.94dB, k=2, σ=95%
RE (above 1000MHz)	Field strength (dBuV/m)	U=4.88dB, k=2, σ=95%

2.6 Location of Original Data

The original copies of all test data taken during actual testing were attached at Appendix1 of this report and delivered to the applicant. A copy has been retained in the TÜV Rheinland (Shenzhen) file for certification follow-up purposes.

2.7 Status of Facility Used for Testing

The TÜV Rheinland (Guangdong) Ltd. EMC Laboratory & Shenzhen Huatongwei International Inspection Co., Ltd facility located at Guangzhou Auto Market, Yuan Gang Section, Guangshan Road, Guangzhou, P.R. China & Keji Nan No. 12 Road, Hi-tech Park, Shenzhen, China are listed on the US Federal Communications Commission list of facilities approved to perform measurements.

3. General Product Information

3.1 Product Function and Intended Use

The EUT is transmitter in wireless microphone system. It can be operated in 175 ~ 186MHz frequency range.

Model WL-200H is the delicately designed VHF, PLL synthesized system, with antenna built inside.

For details refer to the User Manual and Circuit Diagram.

3.2 Ratings and System Details

Table 2: Rating of EUT

Kind of Equipment:	Wireless Microphone
Type Designation:	WL-200H
FCC ID	H38WL-200H

Table 3: Technical Specification of EUT

Technical Specification	**Value**
Operating Frequency:	175-186MHz
Operation Voltage:	DC 3V (via ‘AA’ ALKALINE battery)
Rated RF output power:	10mW
Modulation:	FM (F3E)
Rated Frequency Deviation:	9kHz @ 1000Hz
Antenna Type:	Integrated Antenna
Number of Antenna:	1
Number of Channels:	16

Table 4: List of Operating Channel

Item	WL-200H
Channel	Frequency (MHz)
CH 0	175.125
CH 1	175.375
CH 2	175.775
CH 3	175.975
CH 4	176.175
CH 5	176.525
CH 6	176.975
CH 7	177.925
CH 8	178.125
CH 9	178.925
CH A	180.725
CH B	181.525
CH C	182.025
CH D	183.225
CH E	184.525
CH F	185.125

3.3 Independent Operation Modes

The basic operation modes are:

A. On, Transmitting
    1. Low channel
    2. Middle channel
    3. High channel
B. Off

3.4 Noise Generating and Noise Suppressing Parts

Refer to the Circuit Diagram.

3.5 Submitted Documents

- Bill of Material
- PCB Layout
- Photo Document
- Circuit Diagram
- Instruction Manual
- Rating Label

4. Test Set-up and Operation Modes

4.1 Principle of Configuration Selection

The equipment under test (EUT) was configured to measure its maximum power level. The test modes were adapted accordingly in reference to the instructions for use.

4.2 Test Operation and Test Software

Test operation refers to test setup in chapter 5.
All test items have been performed according to FCC Title 47 CFR Part 74 Subpart H and TIA-603-C-2004.

Table 5: List of Test Channel

Test Channel	WL-200H
Low Channel	175.125 (CH 0)
Middle Channel	180.725 (CH A)
High Channel	185.125 (CH F)

4.3 Special Accessories and Auxiliary Equipment

None.

4.4 Countermeasures to achieve EMC Compliance

The test sample which has been tested contained the noise suppression parts as described in the Constructional Data Form or the Technical Construction File. No additional measures were employed to achieve compliance.

4.5 Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test

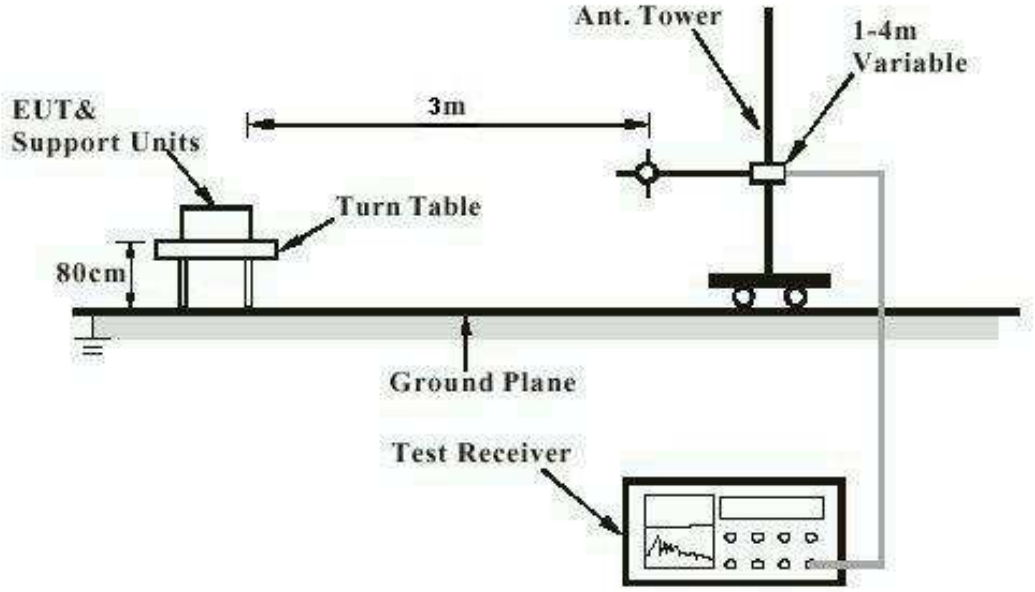
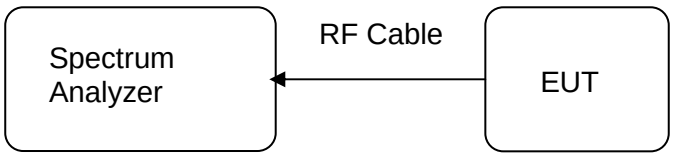
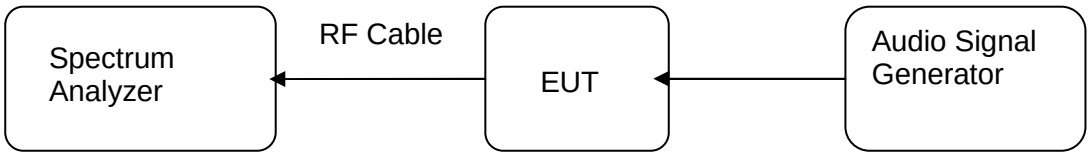


Diagram of Measurement Equipment Configuration for Transmitter Measurement

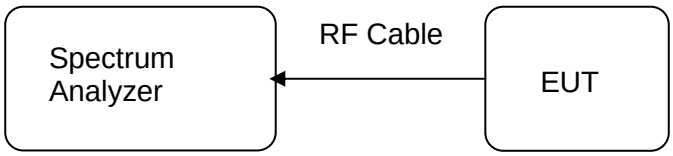
Output power:



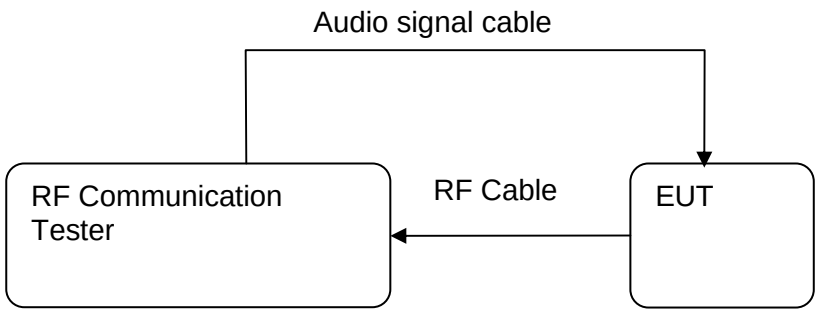
Operating bandwidth and Emissions mask:



Frequency Tolerance:



Modulation Characteristics:



5. Test Results

5.1 Transmitter Requirement & Test Suites

5.1.1 Transmitter Output Power

RESULT: **Passed**

Test date	:	2012-03-16 to 2012-05-20
Test standard	:	FCC Part 74.861(e)(1)
Limit	:	50mW
Kind of test site	:	Shielded room

Test setup

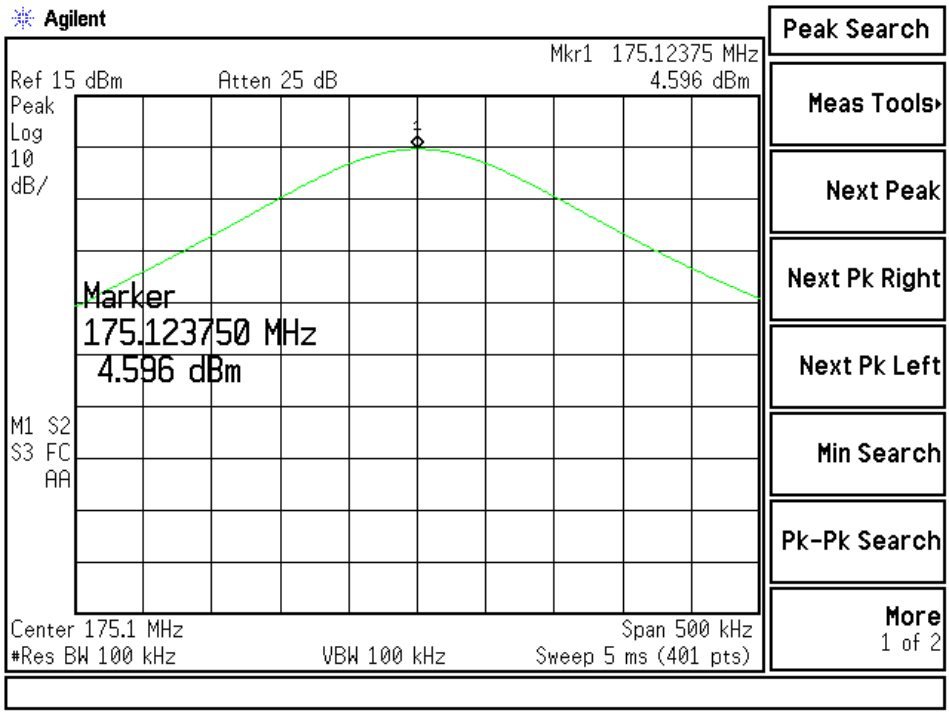
Test Channel	:	Low/ Middle/ High
Operation Mode	:	A
Modulation	:	unmodulated carrier
Duty cycle	:	100%
Ambient temperature	:	23℃
Relative humidity	:	50%
Atmospheric pressure	:	101.0 kPa

Table 6: Test results of Transmitter Output Power

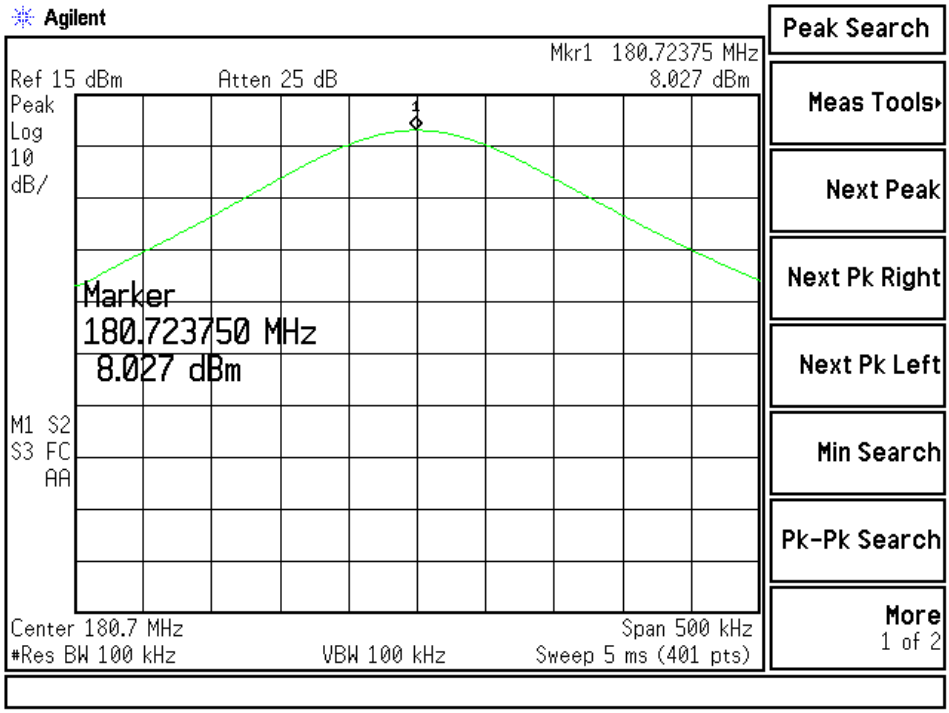
Channel	Channel Frequency (MHz)	Peak Output Power		Limit
		(dBm)	(mW)	(mW)
Low Channel	175.125	4.596	2.88	50
Middle Channel	180.725	8.027	6.35	50
High Channel	185.125	9.424	8.76	50

Test Graph of Peak Output Power

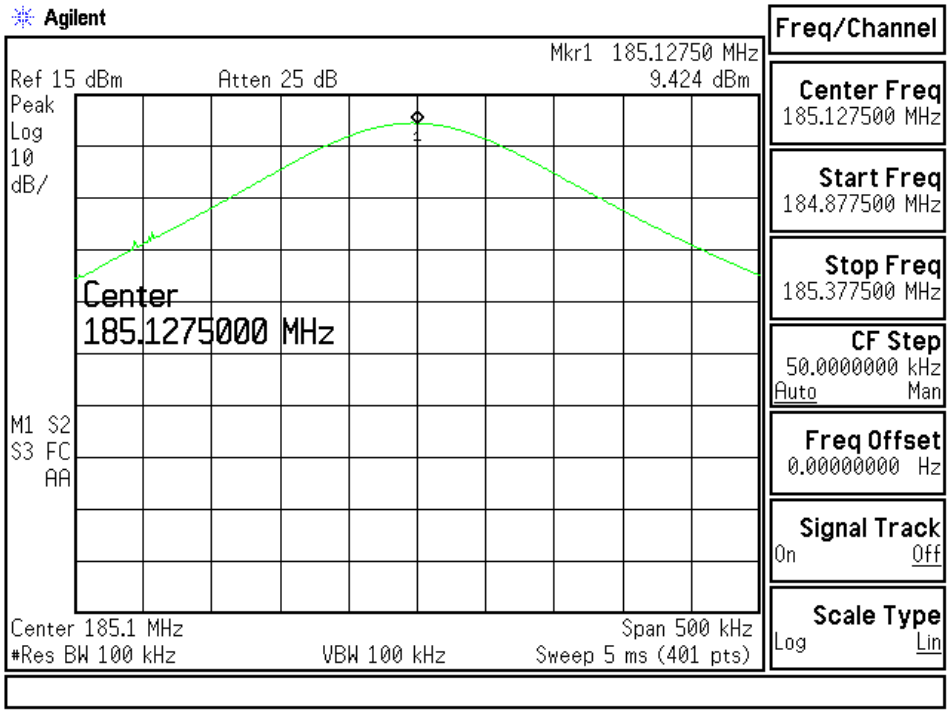
Low Channel



Middle Channel



High Channel



5.1.2 Spurious Radiation Emissions

RESULT: **Passed**

Date of testing	:	2012-03-16 to 2012-05-20
Test standard	:	FCC Part 74.861(e)(6)(iii)
Limit	:	On any frequency removed from the operating frequency by more than 250 percent of the authorized bandwidth: at least $43+10\log_{10}$(output power in watts) dB
Frequency range	:	30MHz ~ 5GHz
Kind of test site	:	3m Seim-Anechoic Chamber

Test setup

Test Channel	:	Low/ Middle/ High
Operation Mode	:	A
Modulation	:	Modulation
Ambient temperature	:	24℃
Relative humidity	:	52%
Atmospheric pressure	:	101.0 kPa

Table 7: Limit Calcualtion

Channel	Output Power (mW)	Formula	Attenuation (dB)	Absolute Limit (dBm)
Low Channel	2.88	$43+10\log_{10}$(P) dB	17.5	-13
Mid Channel	6.35	$43+10\log_{10}$(P) dB	21.0	-13
High Channel	8.76	$43+10\log_{10}$(P) dB	22.4	-13

Table 8: Test results of Spurious Radiation Emissions

Low Channel				
Frequency (MHz)	**Polarization of Antenna (V/H)**	**Result (dBm)**	**Limit (dBm)**	**Margin (dB)**
34.50	H	-67.3	-13	-54.3
54.75	H	-64.9	-13	-51.9
147.85	H	-69.1	-13	-56.1
302.45	H	-67.5	-13	-54.5
350.20	H	-57.9	-13	-44.9
848.80	H	-69.4	-13	-56.4
45.65	V	-73.2	-13	-60.2
61.30	V	-65.1	-13	-52.1
105.40	V	-64.6	-13	-51.6
350.20	V	-52.7	-13	-39.7
525.35	V	-48.2	-13	-35.2

700.50	V	-60.6	-13	-47.6
1051.00	V	-57.1	-13	-44.1
2102.00	V	-57.3	-13	-44.3
4027.00	V	-50.7	-13	-37.7
4903.00	V	-49.3	-13	-36.3
1559.00	H	-62.8	-13	-49.8
4029.00	H	-51.6	-13	-38.6
4203.00	H	-47.7	-13	-34.7
4729.00	H	-51.8	-13	-38.8

Middle Channel				
Frequency (MHz)	**Polarization of Antenna (V/H)**	**Result (dBm)**	**Limit (dBm)**	**Margin (dB)**
45.75	H	-66.1	-13	-53.1
66.00	H	-65.4	-13	-52.4
150.75	H	-69.9	-13	-56.9
356.30	H	-58.0	-13	-45.0
584.60	H	-68.1	-13	-55.1
874.50	H	-56.2	-13	-43.2
40.45	V	-76.2	-13	-63.2
156.00	V	-68.1	-13	-55.1
356.30	V	-51.7	-13	-38.7
534.40	V	-54.8	-13	-41.8
712.65	V	-55.6	-13	-42.6
890.75	V	-56.3	-13	-43.3
1069.00	V	-58.5	-13	-45.5
1425.00	V	-52.8	-13	-39.8
1959.00	V	-61.3	-13	-48.3
2138.00	V	-59.2	-13	-46.2
2137.00	H	-60.6	-13	-47.6
4097.00	H	-51.7	-13	-38.7
4275.00	H	-44.3	-13	-31.3
4810.00	H	-48.1	-13	-35.1

High Channel				
Frequency (MHz)	**Polarization of Antenna (V/H)**	**Result (dBm)**	**Limit (dBm)**	**Margin (dB)**
44.55	H	-66.3	-13	-53.3
52.65	H	-64.2	-13	-51.2
136.70	H	-68.8	-13	-55.8
370.25	H	-57.3	-13	-44.3
700.90	H	-59.1	-13	-46.1
947.75	H	-55.1	-13	-42.1
38.50	V	-65.6	-13	-52.6
114.65	V	-63.9	-13	-50.9
242.05	V	-48.2	-13	-35.2
370.25	V	-45.9	-13	-32.9
555.40	V	-50.0	-13	-37.0
925.65	V	-48.8	-13	-35.8
1111.00	V	-47.9	-13	-34.9
2037.00	V	-51.6	-13	-38.6
2222.00	V	-52.9	-13	-39.9
4814.00	V	-50.2	-13	-37.2
1110.50	H	-52.7	-13	-39.7
4072.50	H	-48.1	-13	-35.1
4258.01	H	-43.4	-13	-30.4
4813.50	H	-47.7	-13	-34.7

5.1.3 Operating Bandwidth and Emissions Mask

RESULT: **Passed**

Date of testing	:	2012-03-16 to 2012-05-20
Test standard	:	FCC Part 74.861(e)(3) & (5) , (6)(i)(ii)
Limit	:	Part 74.861(e)(3), Maximum deviation of ±75kHz Part 74.861(e)(5), operating bandwidth shall not exceed 200kHz Part 74.861(e)(6)(i) & (ii)
Kind of test site	:	Shield room

Test setup

Test Channel	:	Low/ Middle/ High
Operation mode	:	A
Ambient temperature	:	24℃
Relative humidity	:	52%
Atmospheric pressure	:	101.0 kPa

Table 9: Test results of Maximum Deviation

Channel	Frequency (MHz)	Result (kHz)	Limit (kHz)
Low	175.125	14.2	±75
Middle	180.725	14.31	±75
High	185.125	15.02	±75

Table 10: Test results of Operating Bandwidth

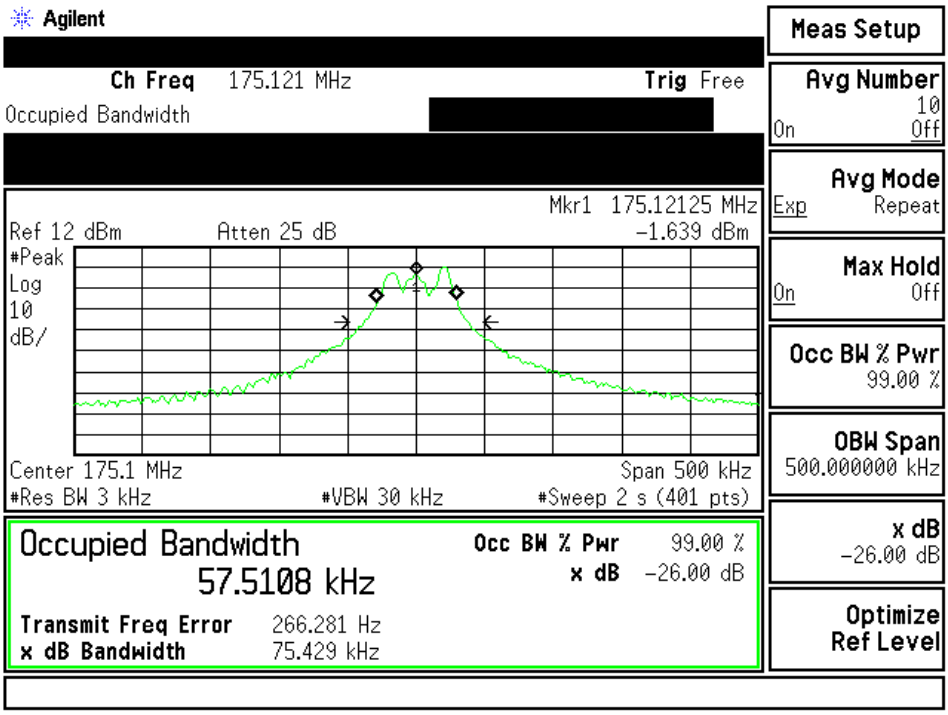
Channel	Frequency (MHz)	Result (kHz)	Limit (kHz)
Low	175.125	57.5108	200
Middle	180.725	67.3685	200
High	185.125	58.2263	200

Table 11: Test results of Emission Mask

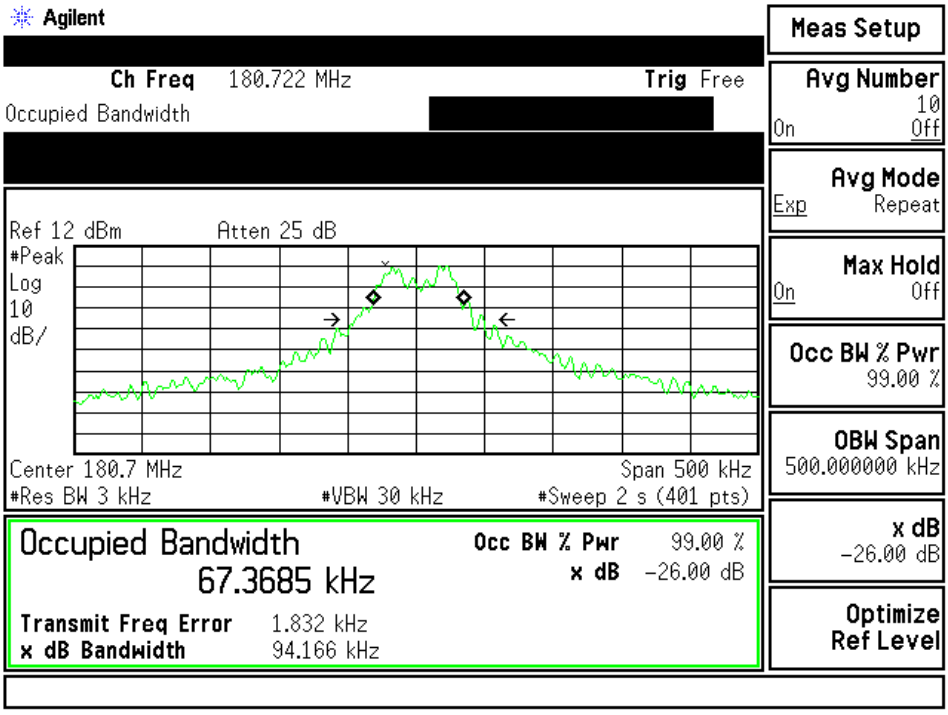
Channel	Frequency (MHz)	Result	Remark
Low	175.125	PASS	Refer to following test graphs for details
Middle	180.725	PASS	Refer to following test graphs for details
High	185.125	PASS	Refer to following test graphs for details

Test Graph of Operating bandwidth

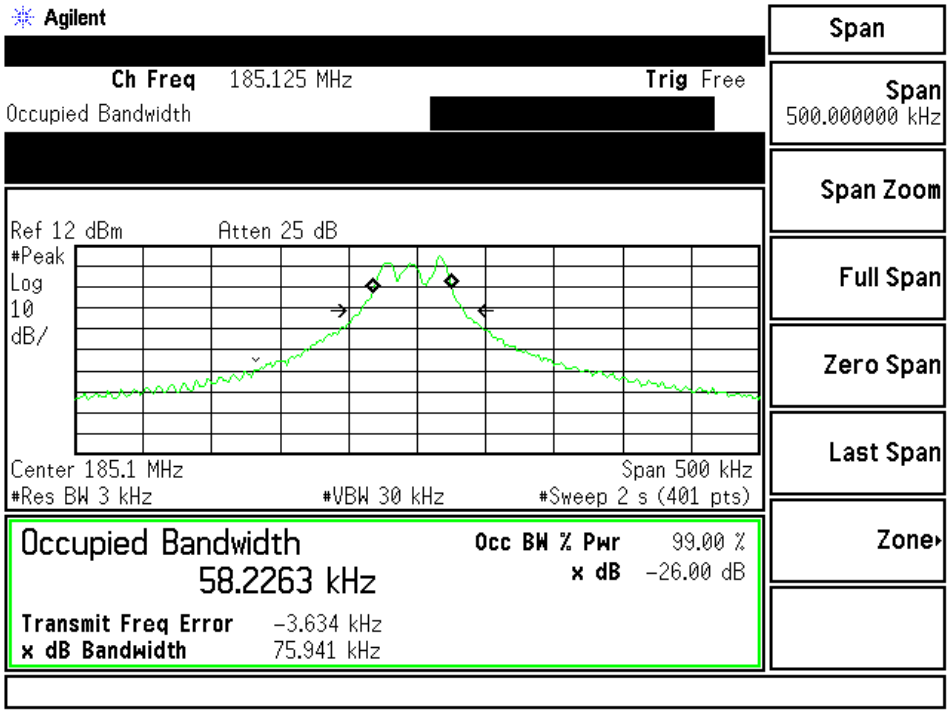
Low Channel



Middle Channel

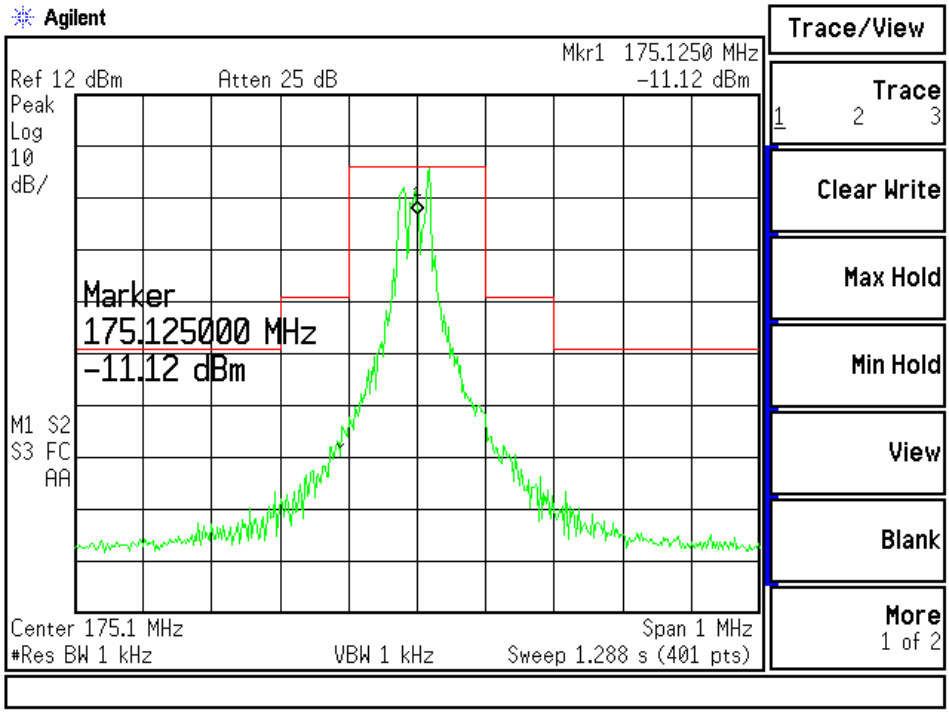


High Channel

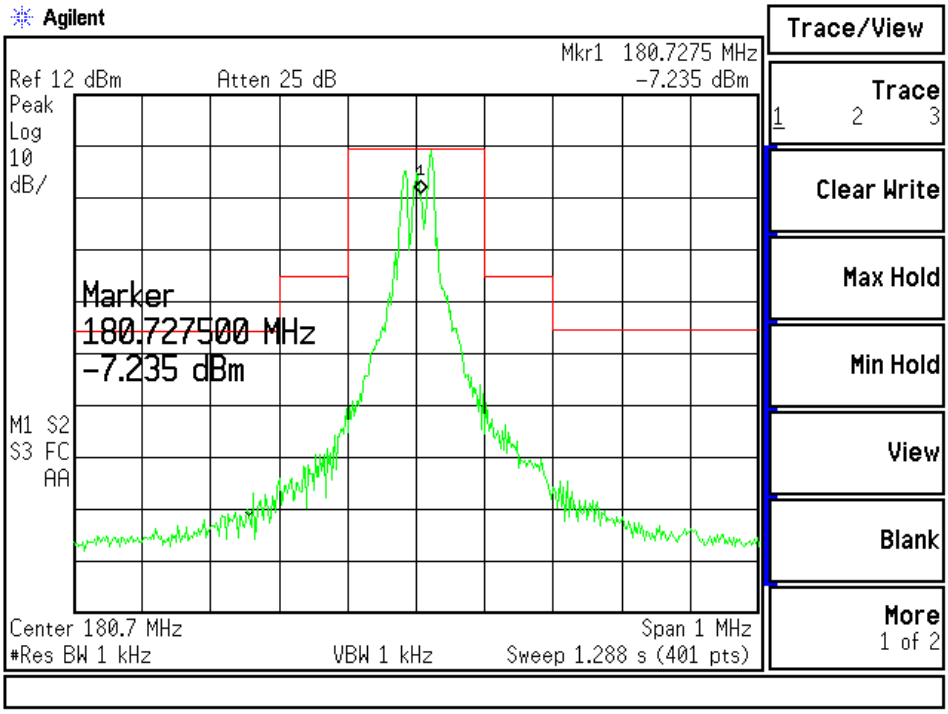


Test Graph of Emissions mask

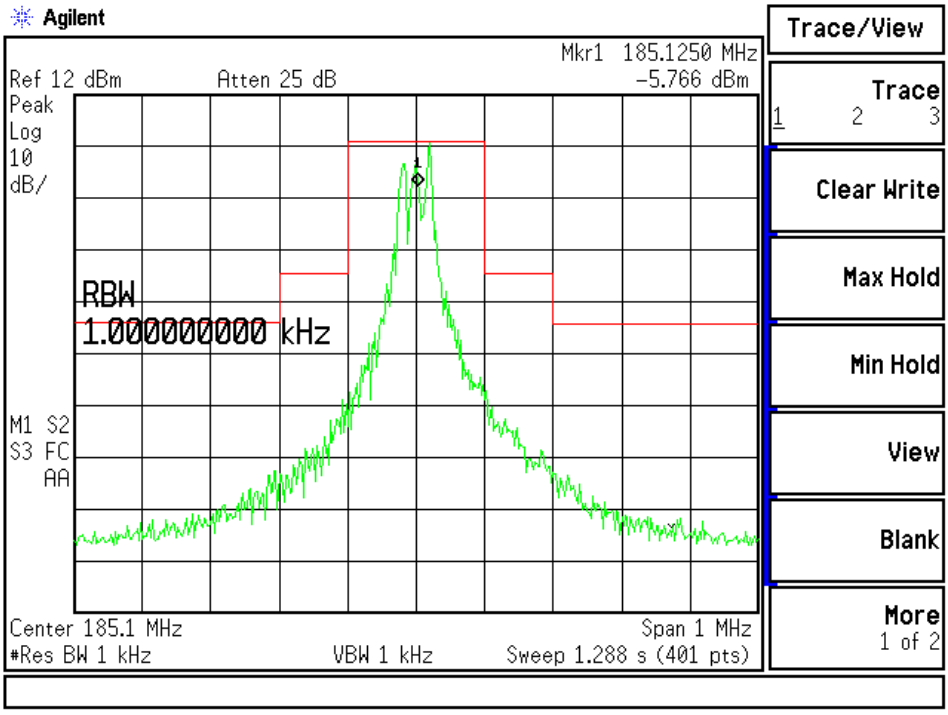
Low Channel



Middle Channel

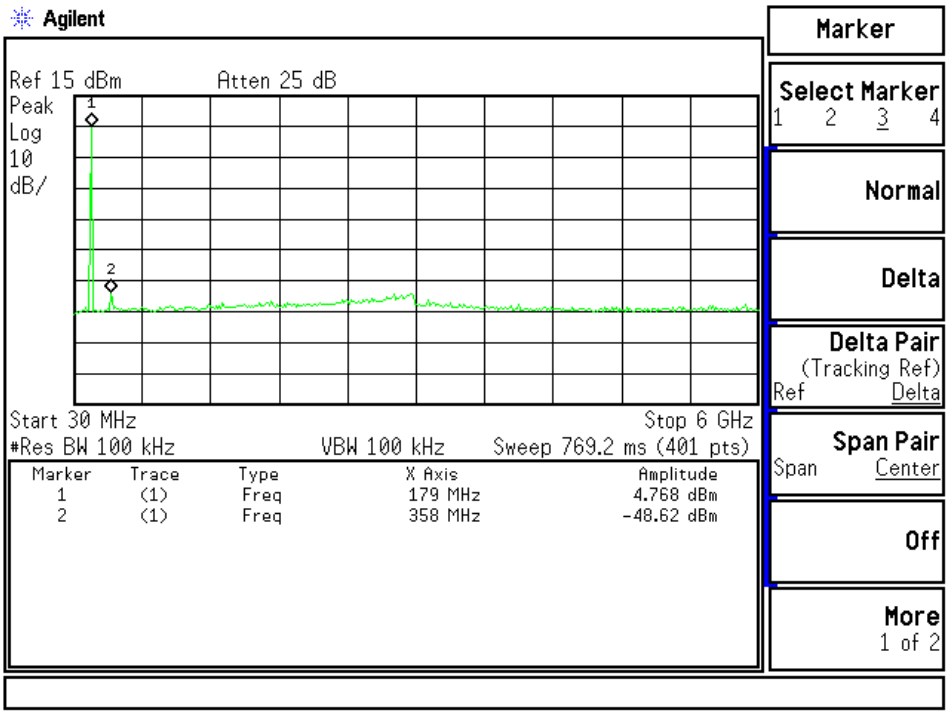


High Channel

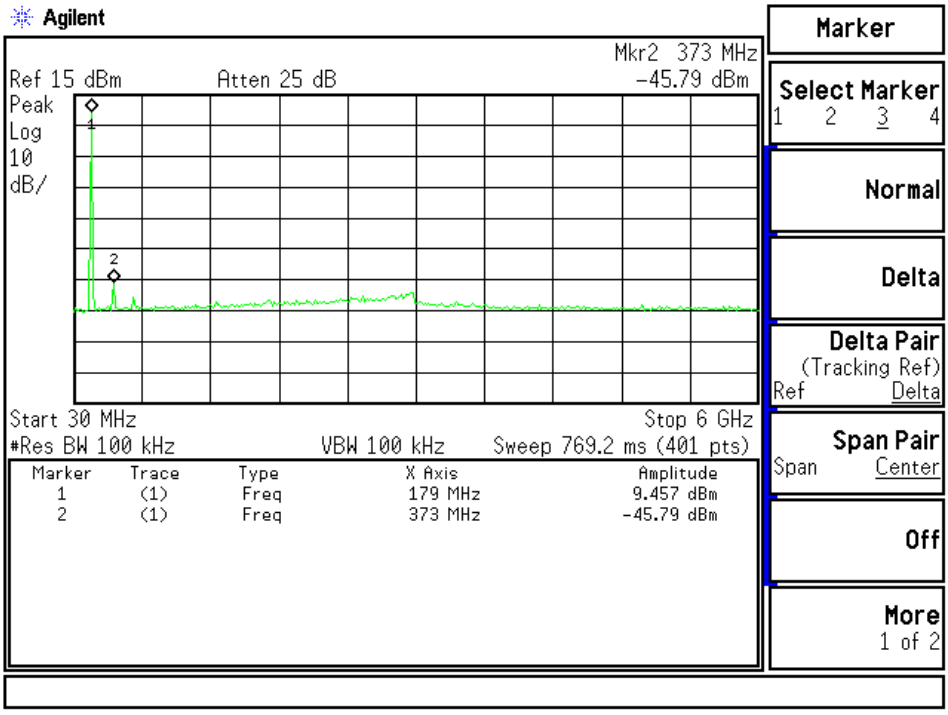


Test Graph of Conducted spurious emissions

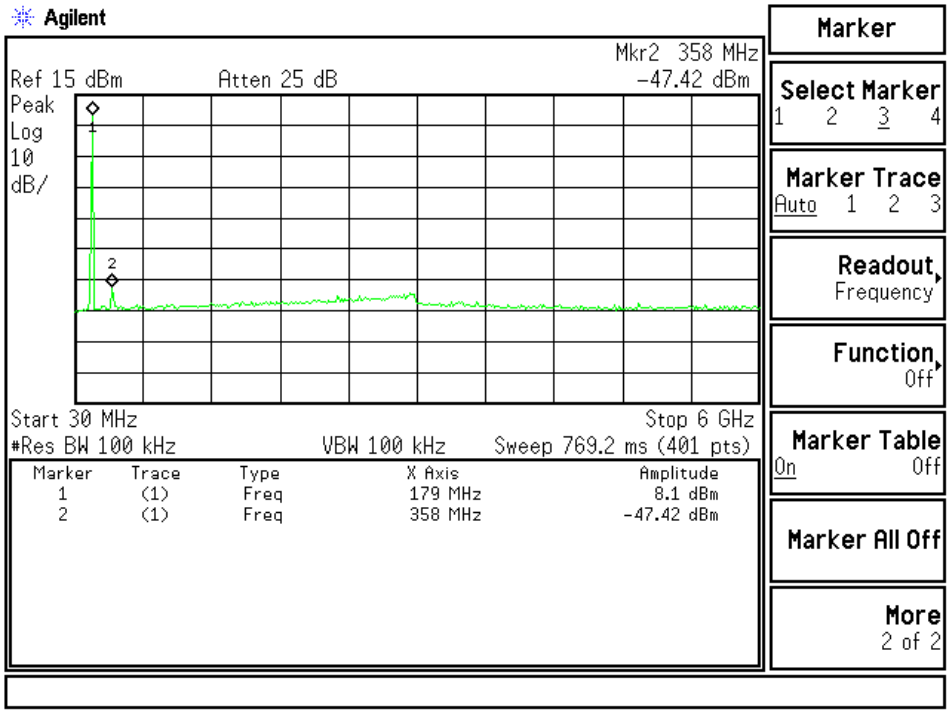
Low Channel



Middle Channel



High Channel



5.1.4 Frequency Tolerance

RESULT: **Passed**

Date of testing	:	2012-03-16 to 2012-05-20
Test standard	:	FCC Part 74.861(e)(4)
Limits	:	0.005 percent
Kind of test site	:	Shield room

Test setup

Test Channel	:	Low/ Middle/ High
Operation mode	:	A
Ambient temperature	:	24℃
Relative humidity	:	52%
Atmospheric pressure	:	101.0 kPa

Table 12: Test results of Frequency Tolerance

Test Condition	Power Supply (V)	Low Frequency (MHz) (175.125MHz)	Middle Frequency (MHz) (180.725MHz)	High Frequency (MHz) (185.125MHz)
-30℃	DC 3.0	175.124750	180.725000	185.124500
-20℃	DC 3.0	175.125250	180.725500	185.125500
-10℃	DC 3.0	175.125500	180.725500	185.125500
0℃	DC 3.0	175.125250	180.725250	185.125250
10℃	DC 3.0	175.125250	180.725000	185.125250
20℃	DC 3.0	175.125000	180.725000	185.125000
30℃	DC 3.0	175.124750	180.724750	185.124750
40℃	DC 3.0	175.124250	180.724250	185.124725
50℃	DC 3.0	175.124000	180.724000	185.124250
20℃	DC 3.3	175.125000	180.724875	185.124875
20℃	DC 3.0	175.124875	180.725000	185.124875
20℃	DC 2.7	175.124875	180.724875	185.125000
Maximum Frequency error (MHz)		-0.001	-0.001	-0.00075
Frequency tolerance		0.00057%	0.00055%	0.00041%
Limit		0.005%		

5.1.5 Modulation Characteristics

RESULT: **Passed**

Date of testing	:	2012-03-16 to 2012-05-20
Test standard	:	FCC Part 2.1047(a) & (b)
Limit	:	FCC Part 2.1047(a) & (b)
Test method	:	According to clause 2.2.6.2.2 of TIA 603-C for Audio Frequency response testing According to clause 2.2.3.2 of TIA 603-C for Modulation Limiting testing
Kind of test site	:	Shield room

Test setup

Test Channel	:	Low/ Middle/ High
Operation Mode	:	A
Ambient temperature	:	24℃
Relative humidity	:	52%
Atmospheric pressure	:	101.0 kPa

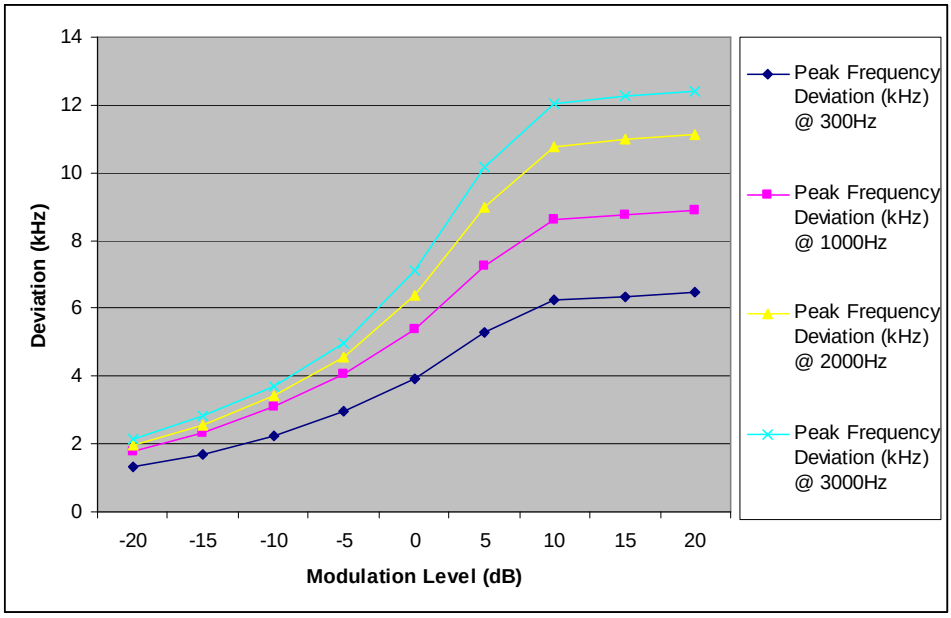
Table 13: Test results of Modulation Characteristics

Audio Frequency Response, Low channel		
Audio Frequency (Hz)	Input Level (mV)	Audio Frequency Response (dB)
100	1.09	-0.60
300	1.09	-0.39
500	1.09	-0.24
700	1.09	-0.10
1000	1.09	0.00
1500	1.09	0.47
2000	1.09	1.00
3500	1.09	2.20
4000	1.09	2.61
4500	1.09	3.13
5000	1.09	3.33
Audio Frequency Response, Middle channel		
Audio Frequency (Hz)	Input Level (mV)	Audio Frequency Response (dB)
100	0.98	-0.34
300	0.98	-0.20
500	0.98	-0.15
700	0.98	-0.05
1000	0.98	0.00
1500	0.98	0.87
2000	0.98	1.13
3500	0.98	2.20

4000	0.98	2.53
4500	0.98	3.26
5000	0.98	3.42
Audio Frequency Response, High channel		
Audio Frequency (Hz)	Input Level (mV)	Audio Frequency Response (dB)
100	1.09	-0.24
300	1.09	-0.20
500	1.09	-0.15
700	1.09	-0.05
1000	1.09	0.00
1500	1.09	0.28
2000	1.09	0.61
3500	1.09	1.86
4000	1.09	2.43
4500	1.09	2.99
5000	1.09	3.23

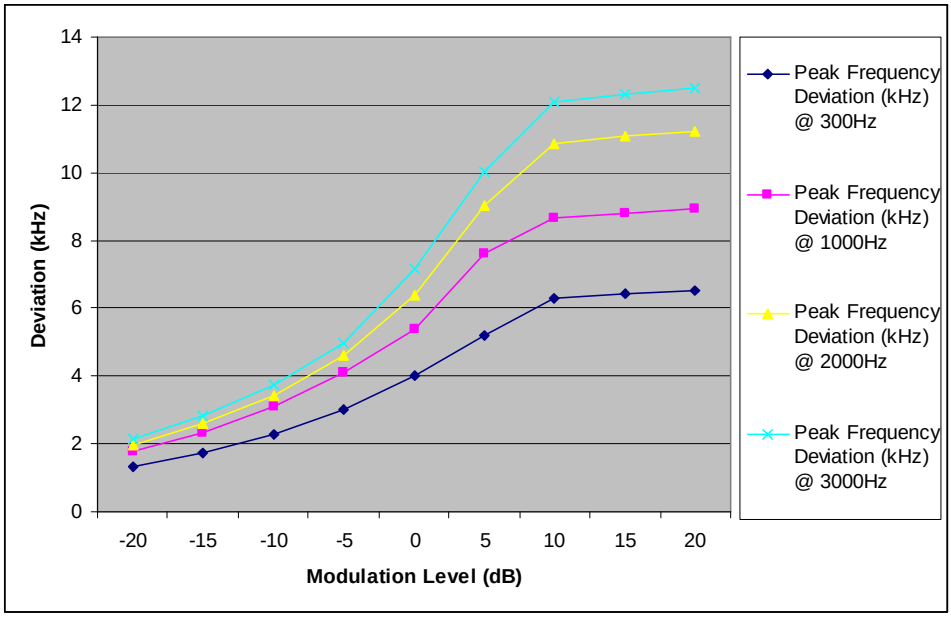
Modulation Limiting, Low channel

Modulation Level (dB)	Peak Frequency Deviation (kHz)			
	300Hz	1000Hz	2000Hz	3000Hz
-20	1.31	1.77	1.94	2.15
-15	1.71	2.32	2.56	2.83
-10	2.25	3.08	3.4	3.7
-5	2.97	4.07	4.57	4.95
0	3.94	5.39	6.37	7.11
+5	5.27	7.27	8.98	10.16
+10	6.25	8.6	10.77	12.05
+15	6.36	8.77	10.98	12.28
+20	6.46	8.9	11.12	12.41



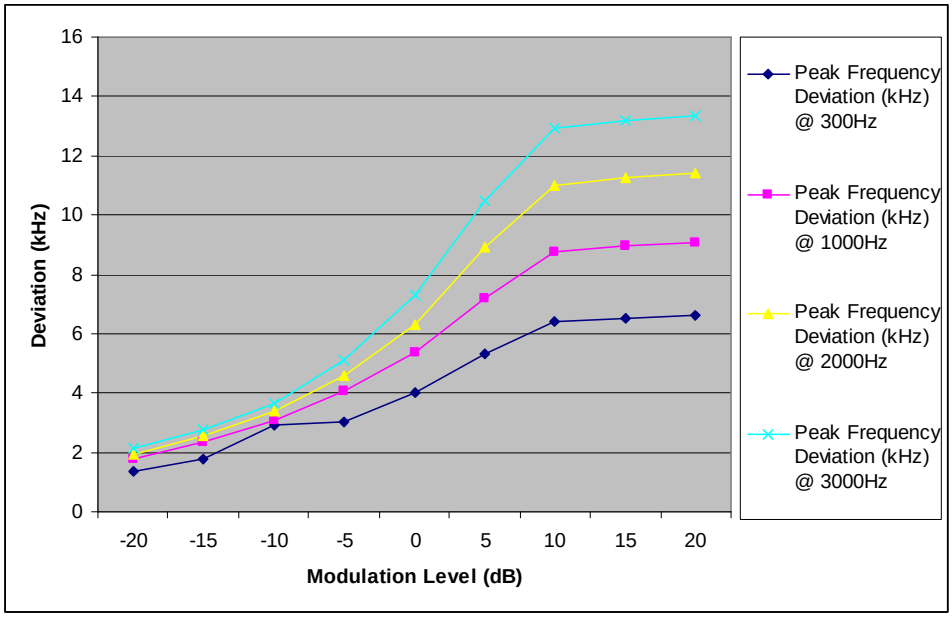
Modulation Limiting, Middle channel

Modulation Level (dB)	Peak Frequency Deviation (kHz)			
	300Hz	1000Hz	2000Hz	3000Hz
-20	1.33	1.77	1.95	2.16
-15	1.75	2.34	2.58	2.84
-10	2.3	3.1	3.41	3.73
-5	3.02	4.1	4.6	4.98
0	4	5.4	6.4	7.16
+5	5.21	7.62	9.01	10.05
+10	6.3	8.65	10.85	12.09
+15	6.41	8.81	11.06	12.32
+20	6.51	8.95	11.21	12.48



Modulation Limiting, High channel

Modulation Level (dB)	Peak Frequency Deviation (kHz)			
	300Hz	1000Hz	2000Hz	3000Hz
-20	1.33	1.76	1.94	2.12
-15	1.75	2.32	2.53	2.77
-10	2.9	3.07	3.4	3.65
-5	3	4.04	4.57	5.1
0	4	5.36	6.3	7.3
+5	5.3	7.2	8.9	10.5
+10	6.4	8.75	11	12.9
+15	6.53	8.97	11.25	13.16
+20	6.62	9.05	11.42	13.34



6. Safety Human exposure

6.1 Radio Frequency Exposure Compliance

6.1.1 Electromagnetic Fields

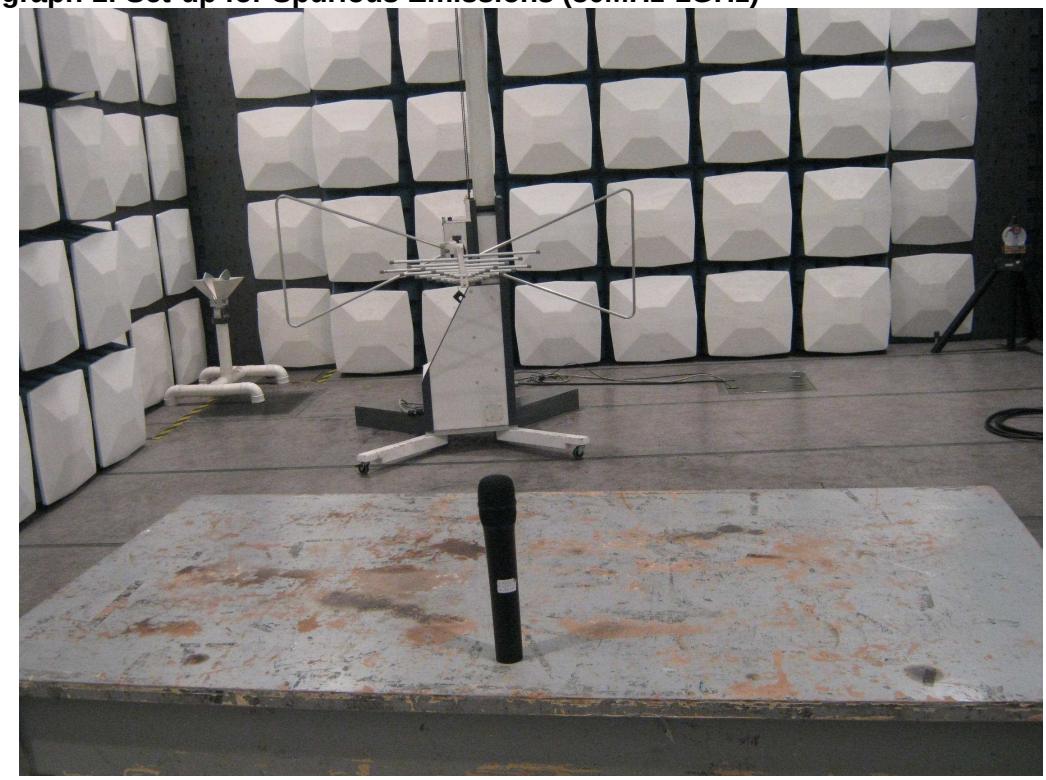
RESULT: **Passed**

Test standard : FCC KDB Publication 447498

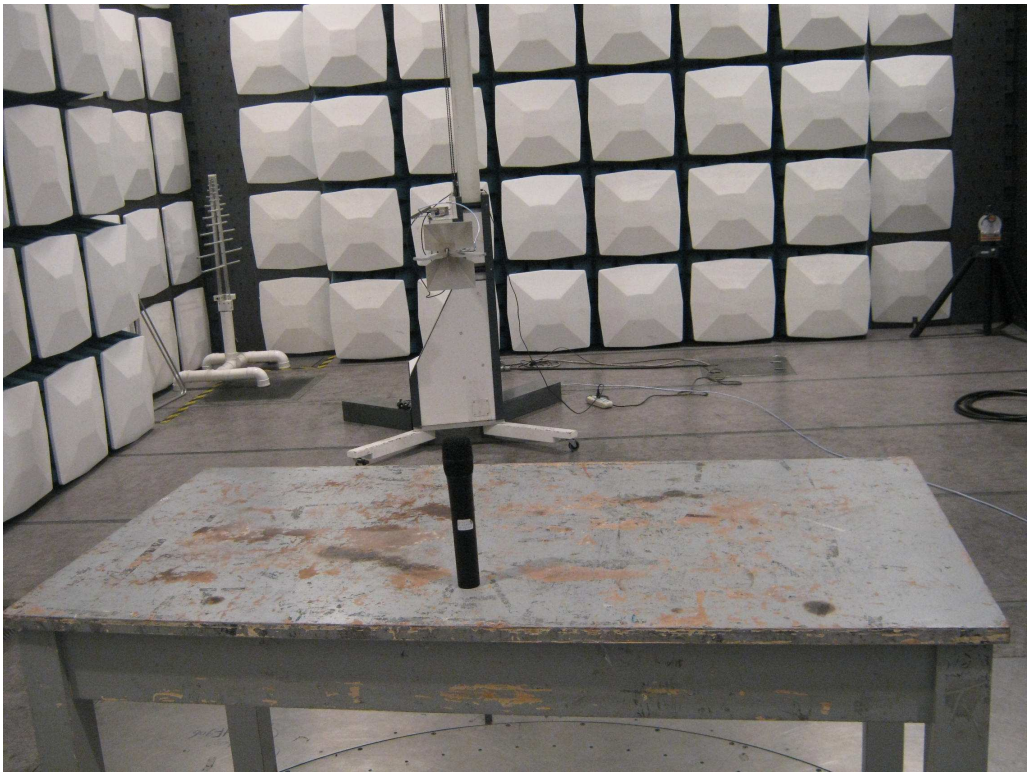
The maximum peak output power of the transmitter is 8.76mW (9.424dBm) only. Since maximum peak output power of the transmitter is <60/f(GHz) mW, i.e. 8.76mW<343(=60/0.175) mW, hence the EUT is exclueded from SAR evaluation according to FCC KDB publication 447498 D01: Mobile Portable RF Exposure.

7. Photographs of the Test Set-Up

Photograph 1: Set-up for Spurious Emissions (30MHz-1GHz)



Photograph 2: Set-up for Spurious Emissions (1GHz-5GHz)



8. List of Tables

9. List of Photographs