Produkte
Products

TÜVRheinland®

Prüfbericht - Nr.: *Test Report No.:*	**17029714 001**	**Seite 1 von 49** *Page 1 of 49*
Auftraggeber: *Client:*	Seikaku Technical Group Limited Offshor Chambers, P.O. Box 217, Apia, Samoa	
Gegenstand der Prüfung: *Test item:*	Wireless Microphone	
Bezeichnung: *Identification:*	UP-83H, UP-81H, UP-881H, UP-86H TMW-9144T	**Serien-Nr.:** *Serial No.:* n.a.
Wareneingangs-Nr.: *Receipt No.:*	164001346	**Eingangsdatum:** *Date of receipt:* 2012-11-22
Zustand des Prüfgegenstandes bei Anlieferung: **Condition of test item at delivery:**	The sample is OK for testing and not damaged	
Prüfort: *Testing location:*	Shenzhen Huatongwei International Inspection Co., Ltd Keji Nan No. 12 Road, Hi-Tech Park, Shenzhen, China (FCC Registration No.: 662850) (Industry Canada Test Site No.: 5377A-1)	
Prüfgrundlage: *Test specification:*	Code of Federal Regulations, Title 47, 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:*		
2013-05-15	Winnie Hou/ Project Manager		2013-05-20	Sam Lin/ Senior Project Manager	
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*

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

Shenzhen Huatongwei International Inspection Co., Ltd
(FCC Registration No.: 662850 & 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
Modulation Characteristics Test (Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory)				
RF Communication Test Set	HP	8920A	3813A10206	2013-10-23
Spurious Emissions & Radio Spectrum (Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory)				
EMI TEST RECEIVER	Rohde & Schwarz	ESI 26	100009	2013-10-27
RF TEST PANEL	Rohde & Schwarz	TS / RSP	335015/ 0017	2013-10-27
EMI TEST SOFTWARE	Rohde & Schwarz	ESK1	N/A	2013-10-27
Ultra-Broadband Antenna	SCHWARZBECK	VULB9163	538	2013-10-27
Ultra-Broadband Antenna	SCHWARZBECK	VULB9163	539	2013-10-27
HORN ANTENNA	SCHWARZBECK	9120D	1011	2013-10-27
HORN ANTENNA	SCHWARZBECK	9120D	1012	2013-10-27
TURNTABLE	MATURO	TT2.0	----	2013-10-27
ANTENNA MAST	MATURO	TAM-4.0-P	----	2013-10-27
Spectrum Analyzer	Rohde & Schwarz	FSP40	1164.4391.40	2013-10-27
Climate Chamber	ESPEC	EL-10KA	05107008	2013-10-27
RF Communication Test Set	HP	8920A	3813A10206	2013-10-27

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 Shenzhen Huatongwei International Inspection Co., Ltd facility located at 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 638~662MHz frequency range.

All models are handheld microphone, these models have similar radio circuit, RF output filter and audio circuit, the difference is enclosure and model name, trademark. Details of difference refer to following table.

Model	Description		Difference
	Trademark	Electrical & Enclosure	
UP-83H	SHOW	PCB Identical, Different construction,	1. Different Trademark 2. Different model name 3. UP-86H is identical with UP-81H 4. UP-81H is identical with UP-83H in PCB except enclosure and model name
UP-81H, UP-881H, UP-86H	SHOW		
TMW-9144T	TOPP PRO	Identical with UP-83H	

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:	UP-83H, UP-81H, UP-881H, UP-86H, TMW-9144T
FCC ID	H38UP-83H

Table 3: Technical Specification of EUT

Technical Specification	Value
Operating Frequency:	638~662MHz
Operation Voltage:	DC 3V (via 'AA' ALKALINE battery)
Rated RF output power:	32mW
Modulation:	FM (F3E)
Rated Frequency Deviation:	10kHz @ 1000Hz
Antenna Type:	Integrated Antenna
Number of Antenna:	1
Number of Channels:	12 channels per group, total 10 group

Table 4: List of Channel

Item	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8	Group 9	Group 10
Channel 1	638.125	638.325	638.525	638.725	638.925	639.125	639.325	639.525	639.725	639.925
Channel 2	640.125	640.325	640.525	640.725	640.925	641.125	641.325	641.525	641.725	641.925
Channel 3	642.125	642.325	642.525	642.725	642.925	643.125	643.325	643.525	643.725	643.925
Channel 4	644.125	644.325	644.525	644.725	644.925	645.125	645.325	645.525	645.725	645.925
Channel 5	646.125	646.325	646.525	646.725	646.925	647.125	647.325	647.525	647.725	647.925
Channel 6	648.125	648.325	648.525	648.725	648.925	649.125	649.325	649.525	649.725	649.925
Channel 7	650.125	650.325	650.525	650.725	650.925	651.125	651.325	651.525	651.725	651.925
Channel 8	652.125	652.325	652.525	652.725	652.925	653.125	653.325	653.525	653.725	653.925
Channel 9	654.125	654.325	654.525	654.725	654.925	655.125	655.325	655.525	655.725	655.925
Channel 10	656.125	656.325	656.525	656.725	656.925	657.125	657.325	657.525	657.725	657.925
Channel 11	658.125	658.325	658.525	658.725	658.925	659.125	659.325	659.525	659.725	659.925
Channel 12	660.125	660.325	660.525	660.725	660.925	661.125	661.325	661.525	661.725	661.925

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 CFR Title 47 Part 74 Subpart H, ANSI C63.4-2009 and TIA-603-C-2004.

Table 5: List of Test Channel

Test Channel	Frequency (MHz)
Low Channel	638.125
Middle Channel	649.925
High Channel	661.925

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

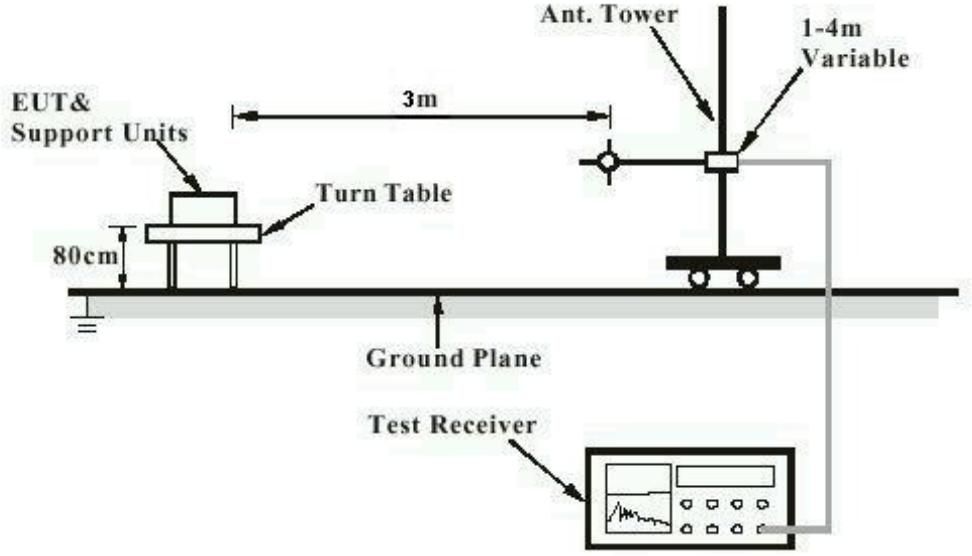
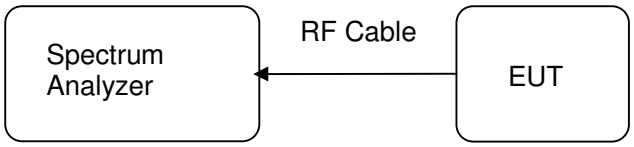
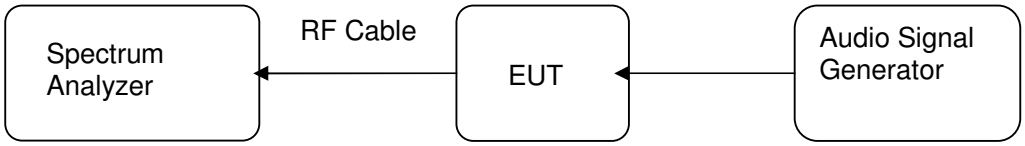


Diagram of Measurement Equipment Configuration for Transmitter Measurement

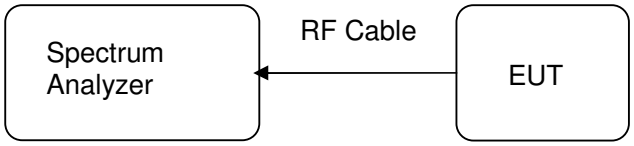
Output power:



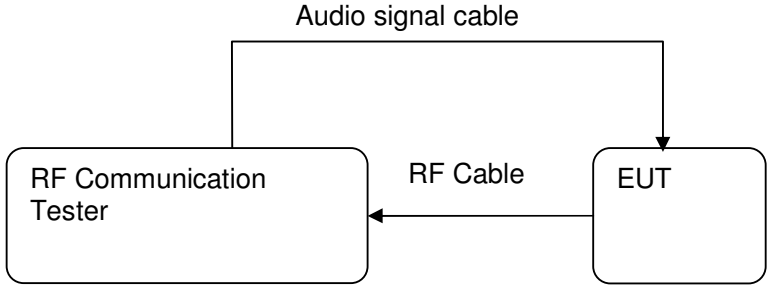
Operating bandwidth and Emissions mask:



Frequency Tolerance:



Modulation Characteristics:



5. Test Results

5.1 Transmitter Requirement & Test Suites

5.1.1 Transmitter Output Power

RESULT: **Passed**

Test date	:	2013-01-10 to 2013-04-18
Test standard	:	FCC Part 74.861(e)(1)
Limit	:	250mW
Kind of test site	:	Shielded room

Test setup

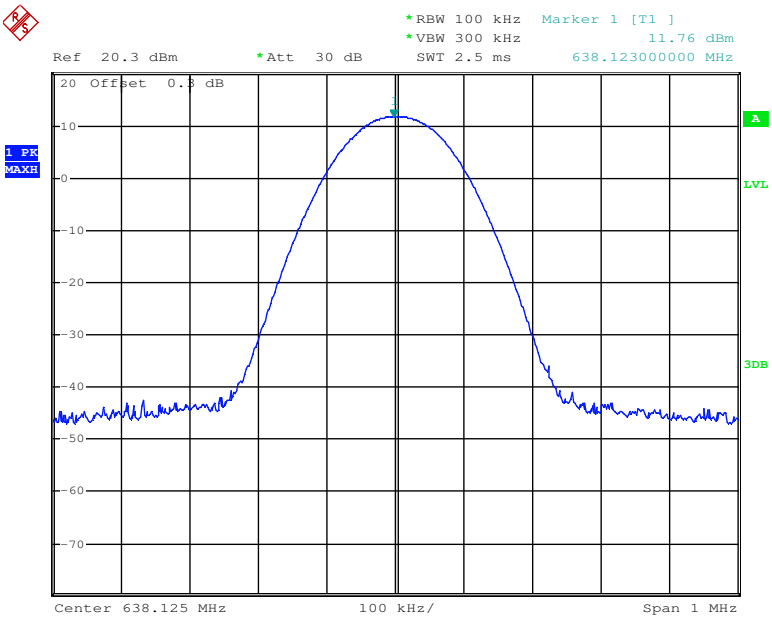
Test Channel	:	Low/ Middle/ High
Operation Mode	:	A
Modulation	:	unmodulated carrier
Duty cycle	:	100%
Ambient temperature	:	23℃
Relative humidity	:	50%
Atmospheric pressure	:	101.0 kPa

Table 6: Test results of Transmitter Output Power

Channel	Channel Frequency (MHz)	Peak Output Power		Limit
		(dBm)	(mW)	(mW)
Low Channel	638.125	11.76	15.00	250
Middle Channel	649.925	10.76	11.91	250
High Channel	661.925	9.05	8.04	250

Test Graph of Peak Output Power

Low Channel



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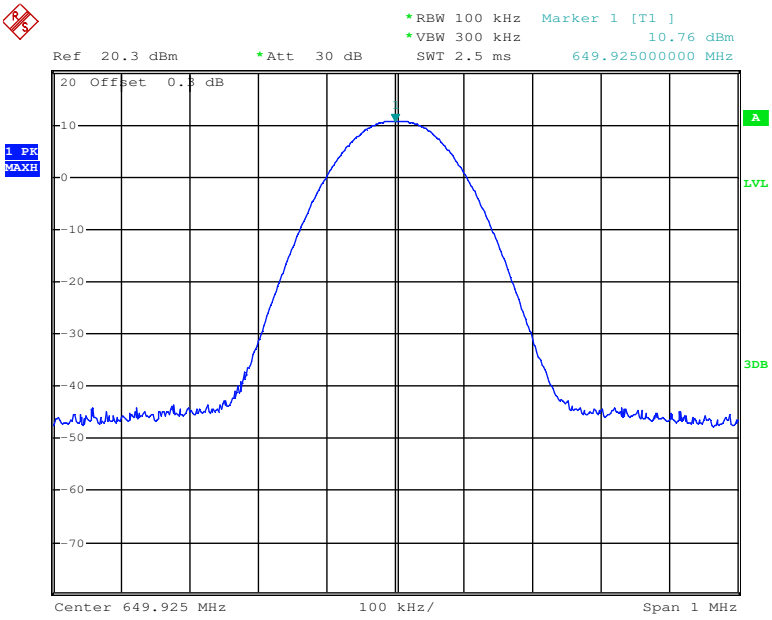
Middle Channel



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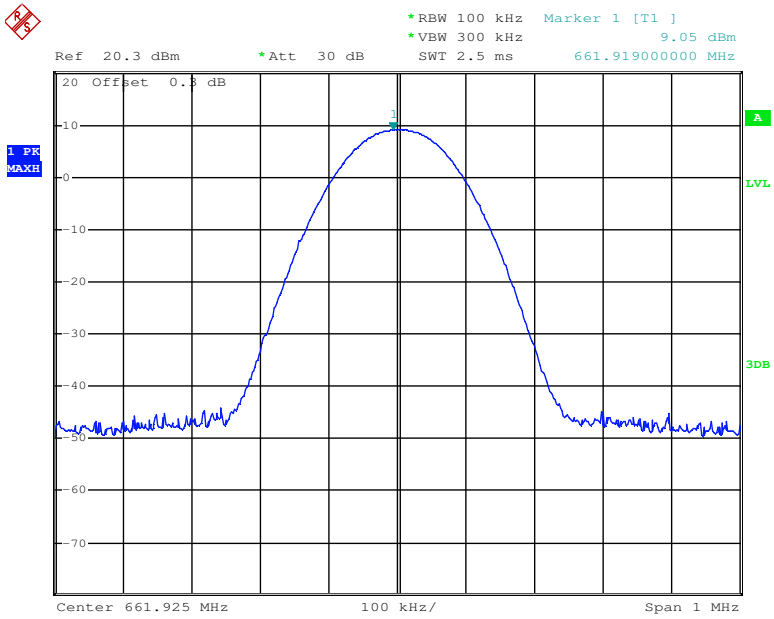
High Channel



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5.1.2 Spurious Radiation Emissions

RESULT: **Passed**

Date of testing	:	2013-01-10 to 2013-04-18
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 ~ 6GHz
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)	Attenuation (dB)	Absolute Limit (dBm)
Low Channel	15.00	17.5	-13
Mid Channel	11.91	21.0	-13
High Channel	8.04	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)**
1276.25	H	-43.16	-13	-30.16
1914.375	H	-51.35	-13	-38.35
1276.25	V	-44.82	-13	-31.82
1914.375	V	-55.77	-13	-42.77

Middle Channel				
Frequency (MHz)	**Polarization of Antenna (V/H)**	**Result (dBm)**	**Limit (dBm)**	**Margin (dB)**
1299.85	H	-44.07	-13	-31.07
3899.55	H	-44.58	-13	-31.58
1299.85	V	-45.76	-13	-32.76
1949.775	V	-55.33	-13	-42.33

High Channel				
Frequency (MHz)	**Polarization of Antenna (V/H)**	**Result (dBm)**	**Limit (dBm)**	**Margin (dB)**
1323.85	H	-48.2	-13	-35.2
3309.625	H	-48.85	-13	-35.85
3971.55	H	-40.21	-13	-27.21
1323.85	V	-50.62	-13	-37.62
3309.625	V	-56.28	-13	-43.28
3971.55	V	-50.22	-13	-37.22
1323.85	H	-48.2	-13	-35.2
3309.625	H	-48.85	-13	-35.85
3971.55	H	-40.21	-13	-27.21

5.1.3 Operating Bandwidth and Emissions Mask

RESULT: **Passed**

Date of testing	:	2013-01-10 to 2013-04-18
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	638.125	56.23	±75
Middle	649.925	56.25	±75
High	661.925	56.28	±75

Table 10: Test results of Operating Bandwidth

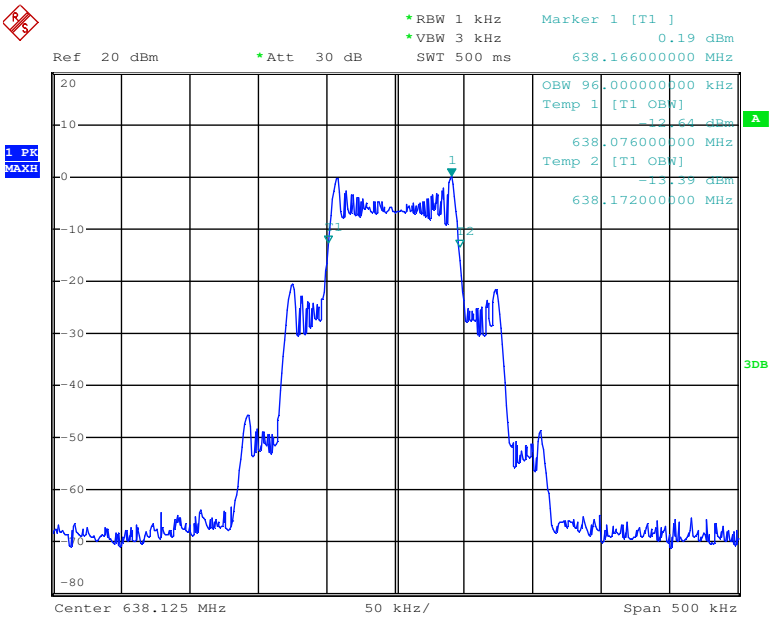
Channel	Frequency (MHz)	Result (kHz)	Limit (kHz)
Low	638.125	96	200
Middle	649.925	103	200
High	661.925	109	200

Table 11: Test results of Emission Mask

Channel	Frequency (MHz)	Result	Remark
Low	638.125	PASS	Refer to following test graphs for details
Middle	649.925	PASS	Refer to following test graphs for details
High	661.925	PASS	Refer to following test graphs for details

Test Graph of Operating bandwidth

Low Channel



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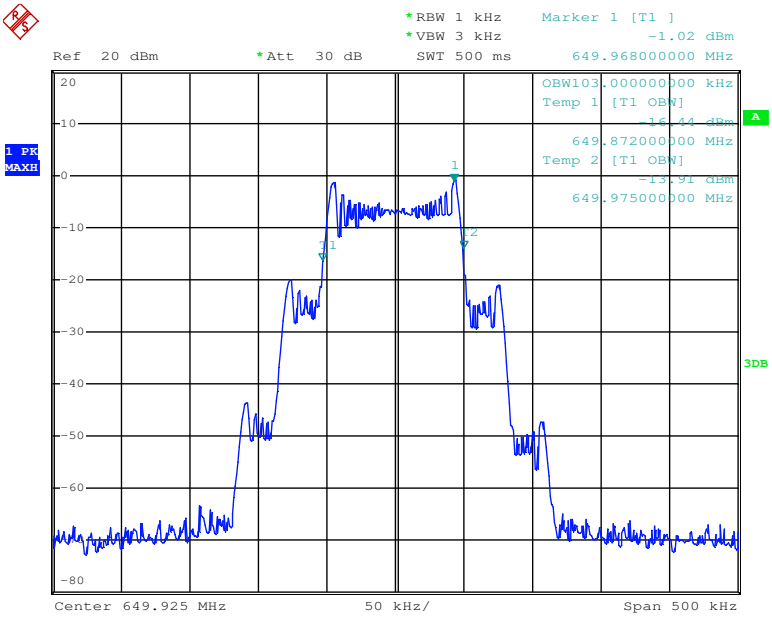
Middle Channel



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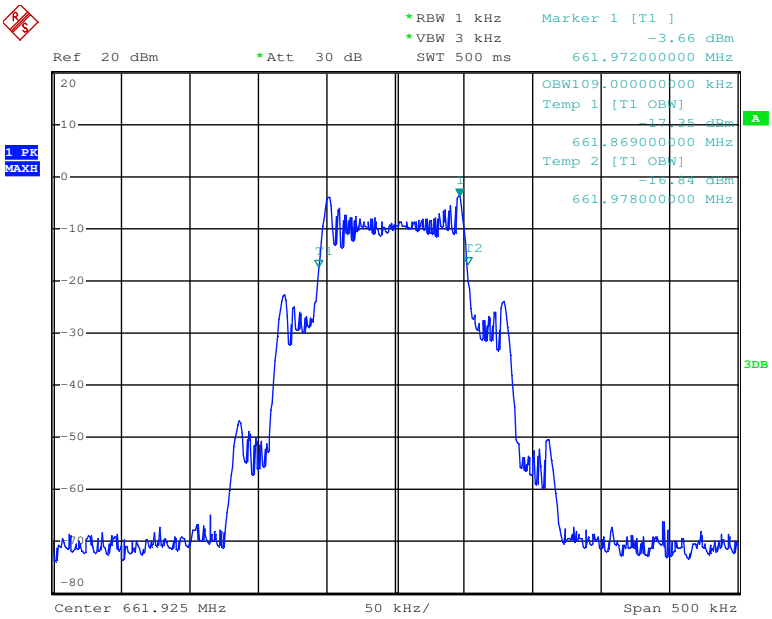
High Channel



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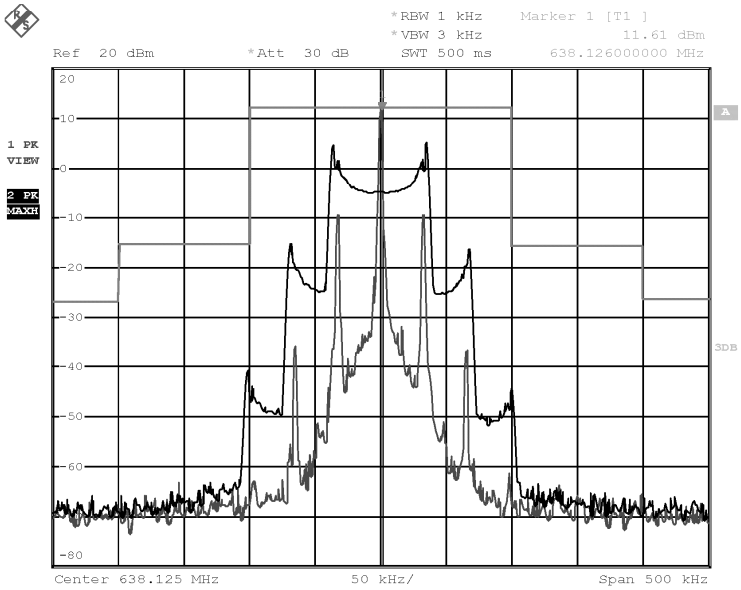
Test Graph of Emissions mask
Low Channel

Input Audio signal:500Hz



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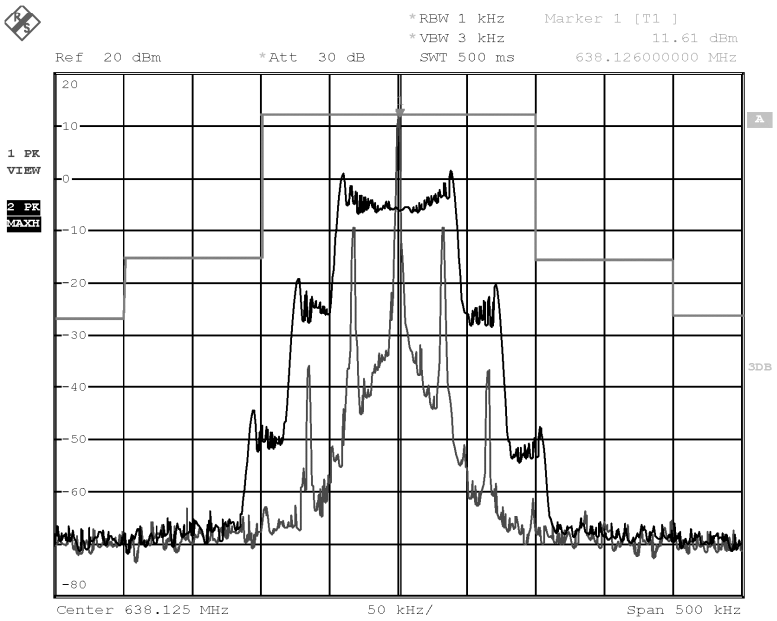
Input Audio signal:800Hz



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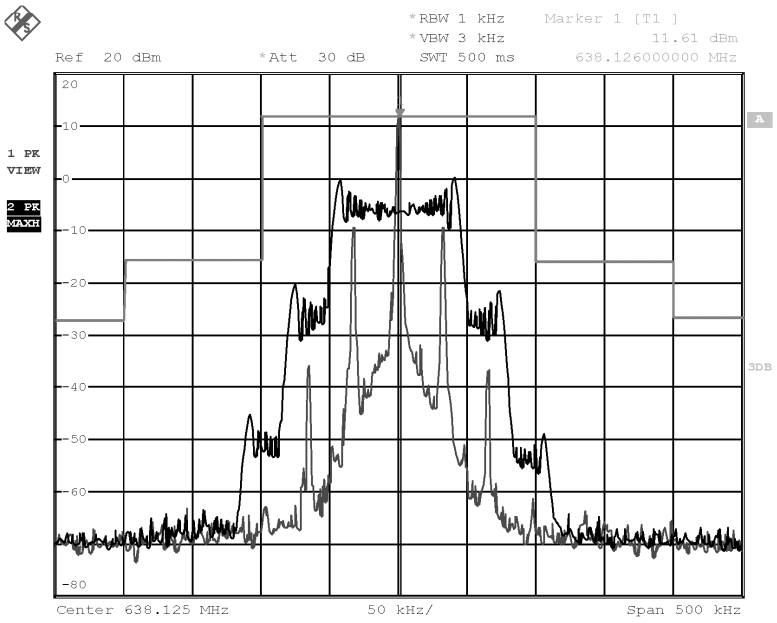
Input Audio signal:1kHz



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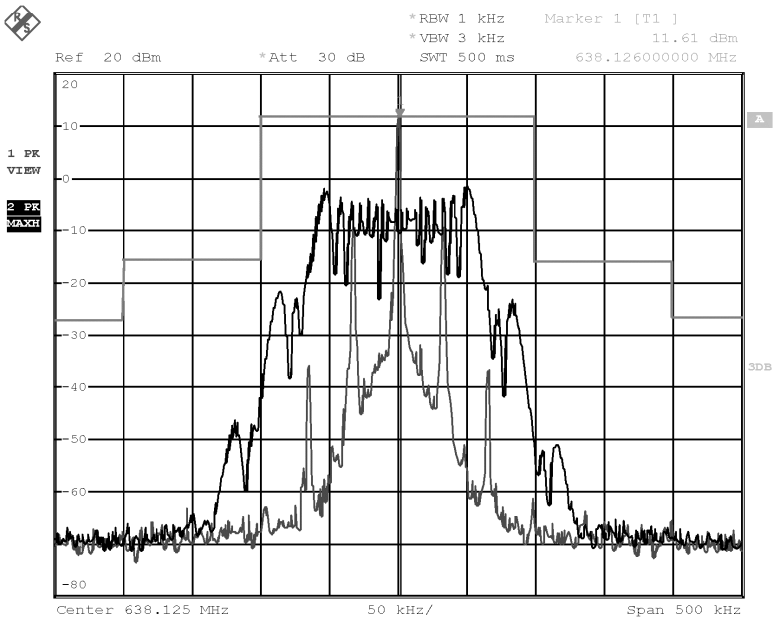
Input Audio signal:2kHz



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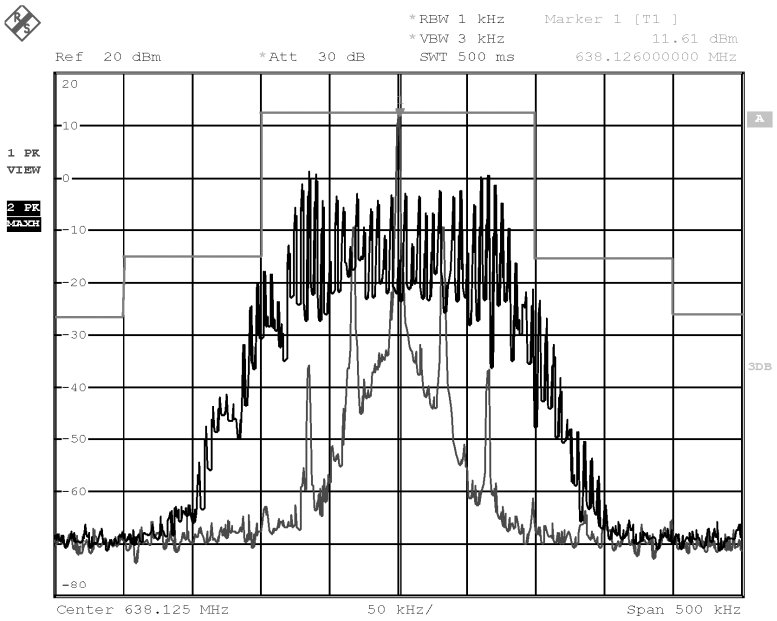
Input Audio signal:5kHz



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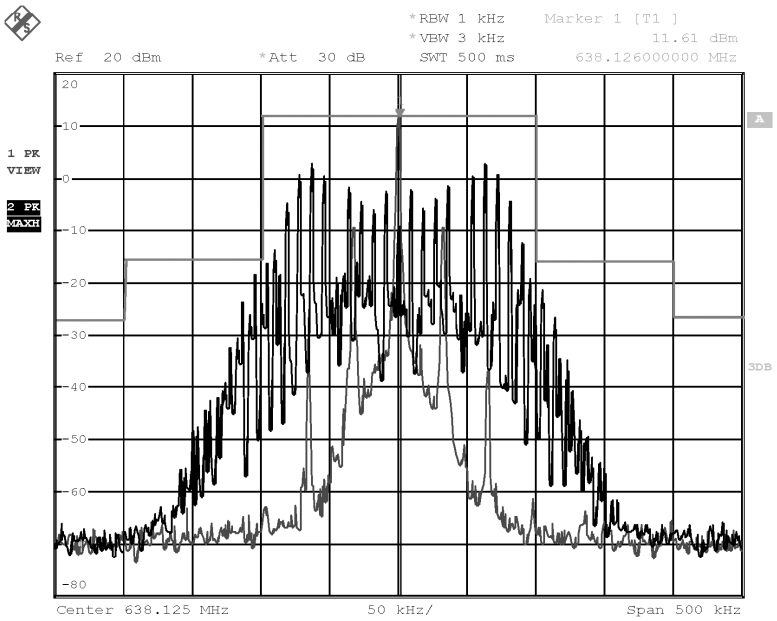
Input Audio signal:9kHz



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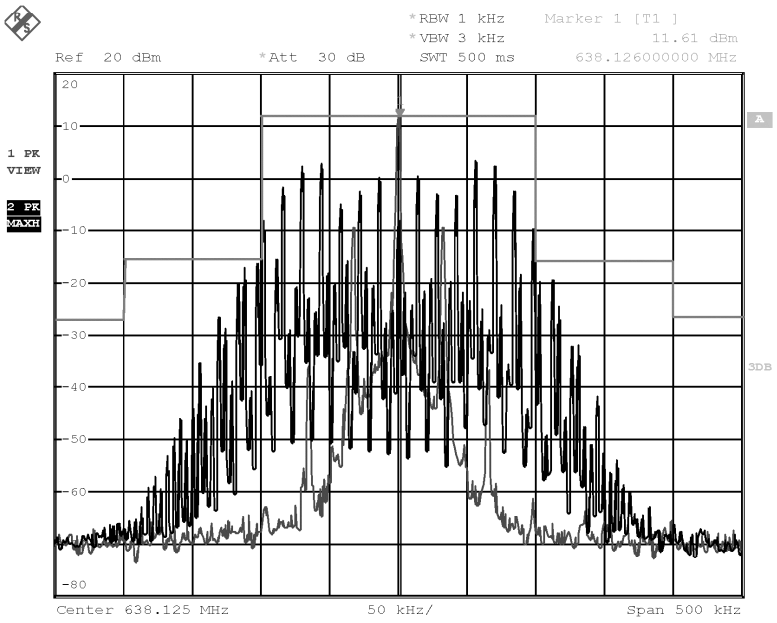
Input Audio signal:14kHz



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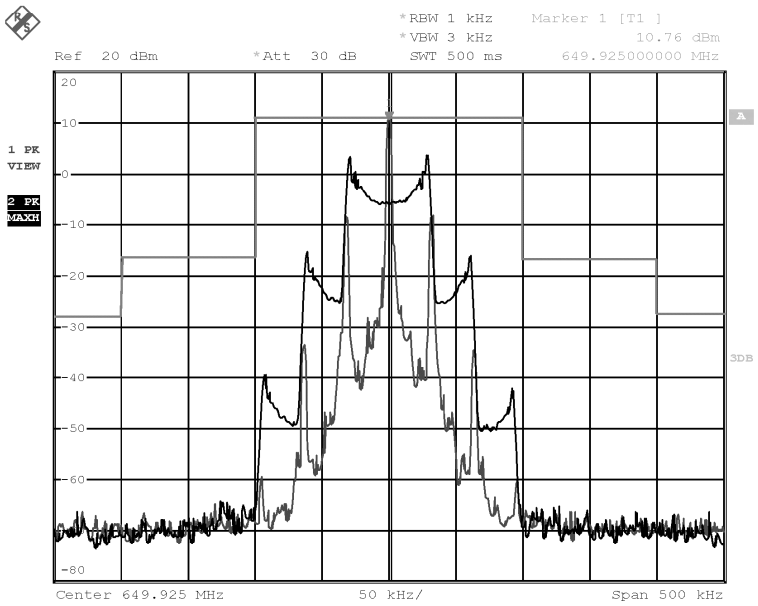
Middle Channel

Input Audio signal:500Hz



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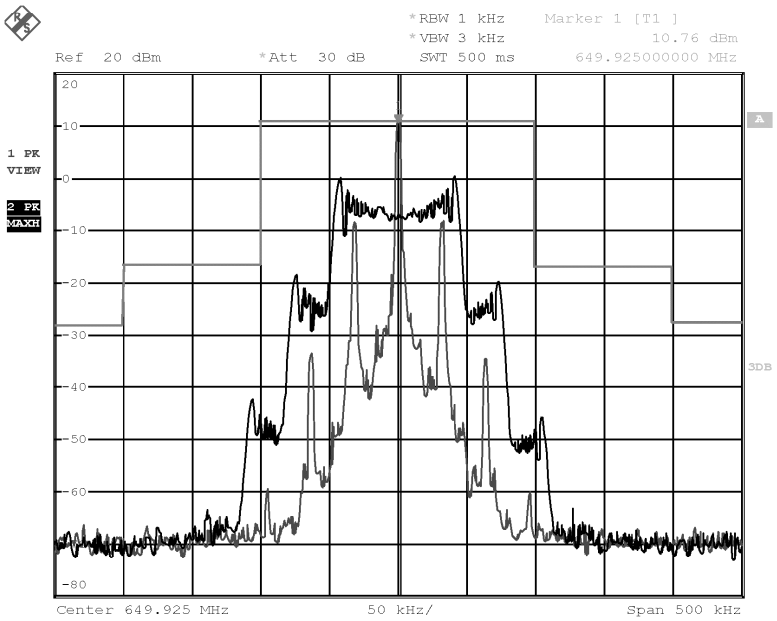
Input Audio signal:800Hz



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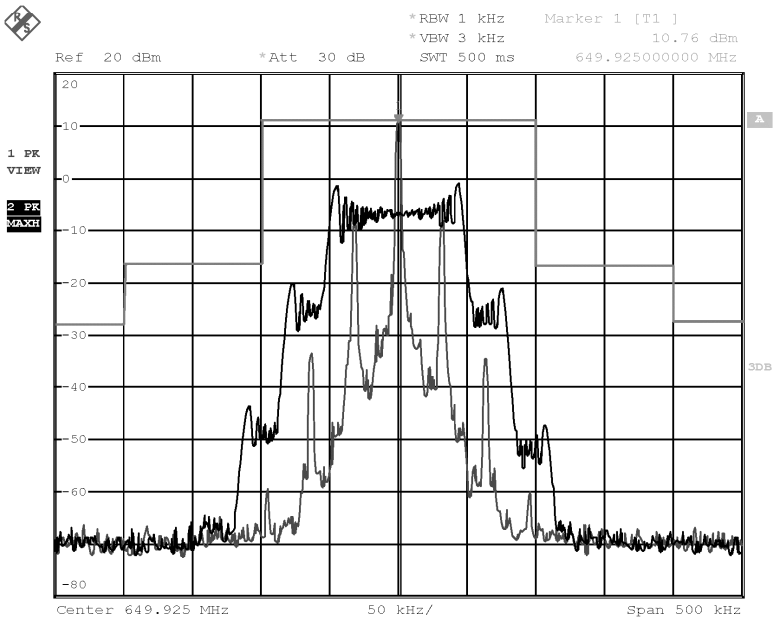
Input Audio signal:1kHz



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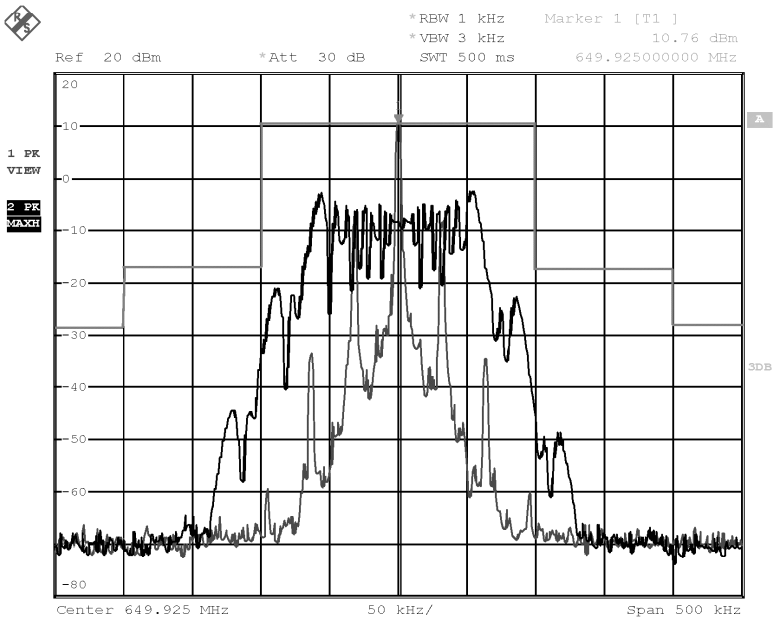
Input Audio signal:2kHz



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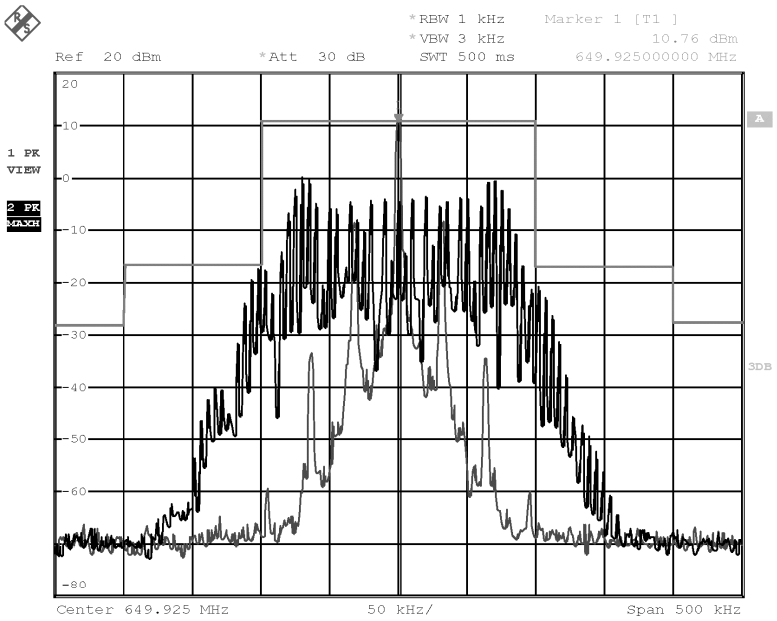
Input Audio signal:5kHz



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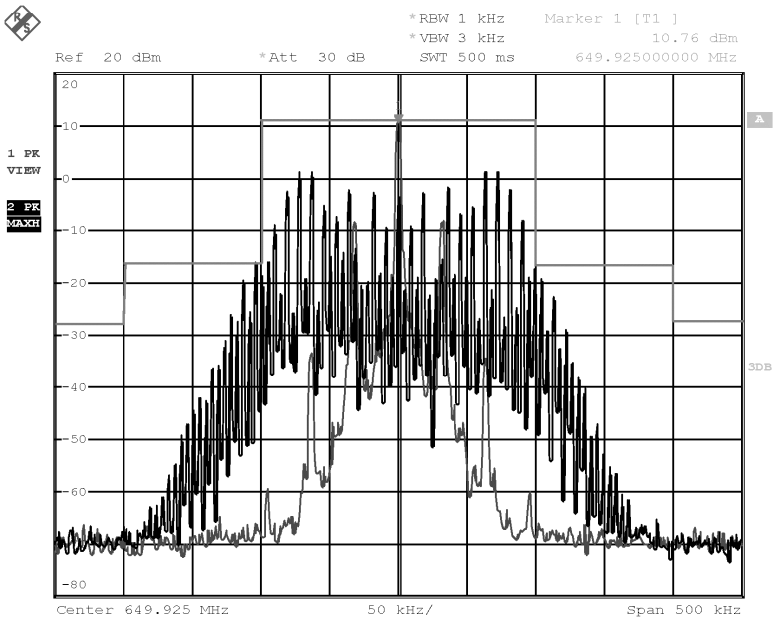
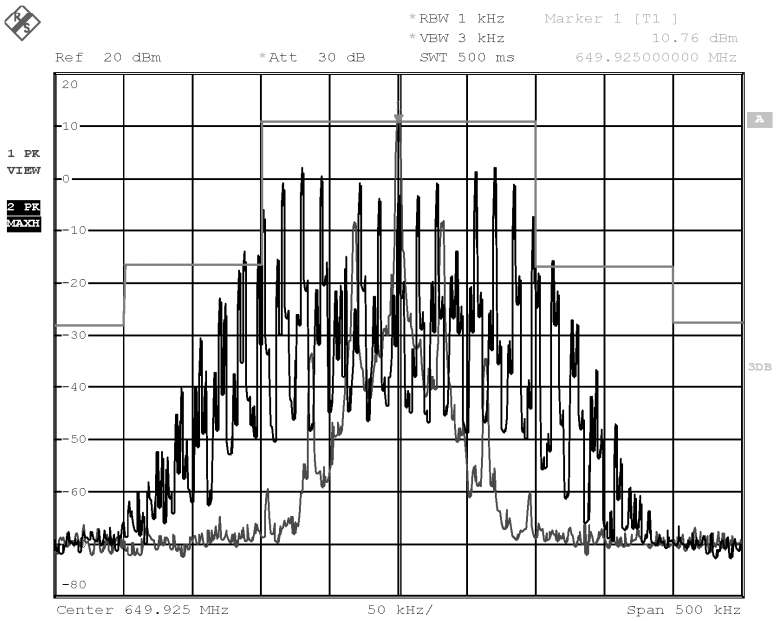
Input Audio signal:9kHz



Date: 16.JAN.2013 17:39:43

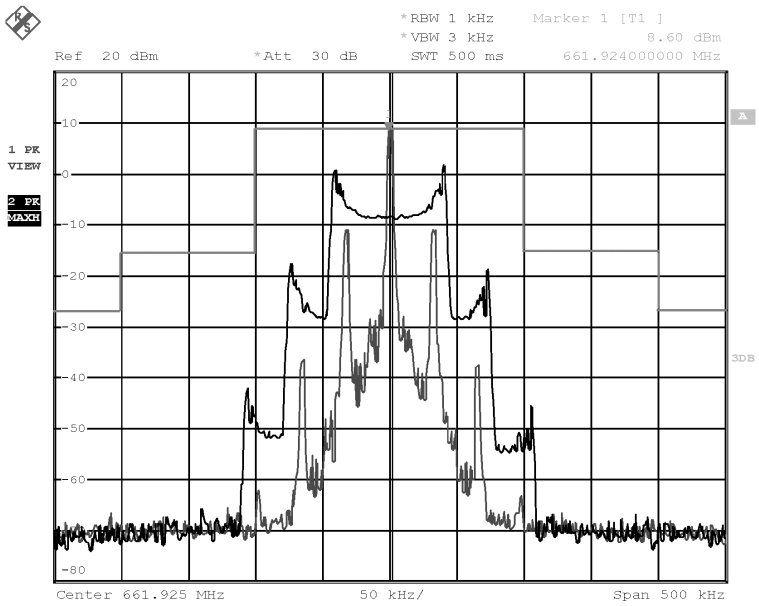
Input Audio signal:14kHz



Date: 16.JAN.2013 17:39:58

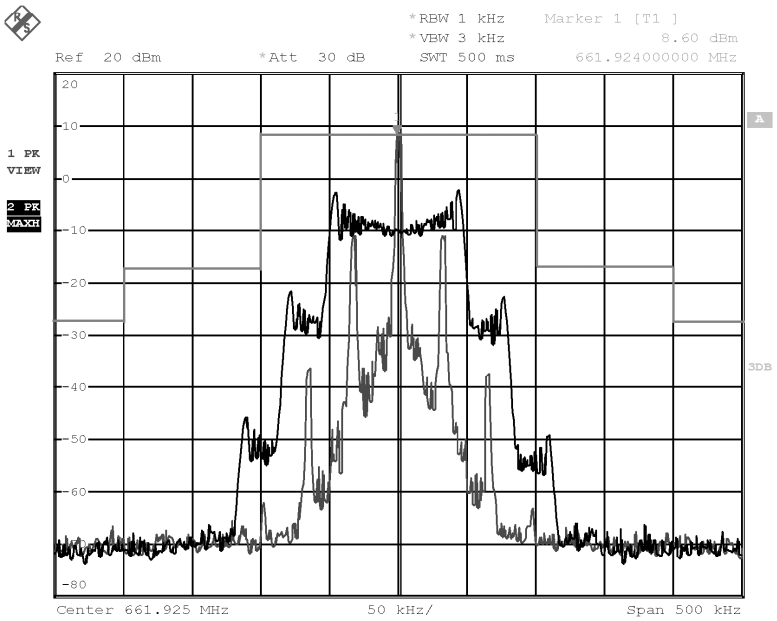
High Channel

Input Audio signal:500Hz



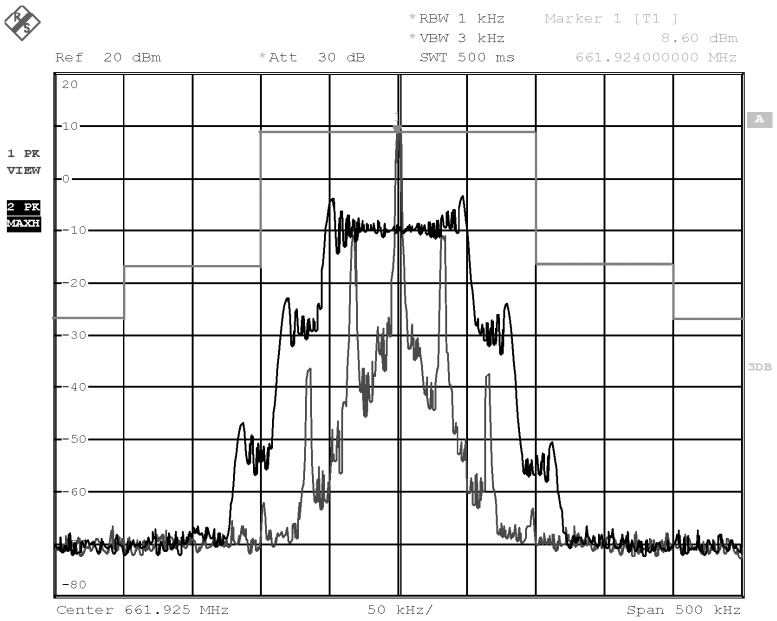
Date: 16.JAN.2013 17:47:26

Input Audio signal:800Hz



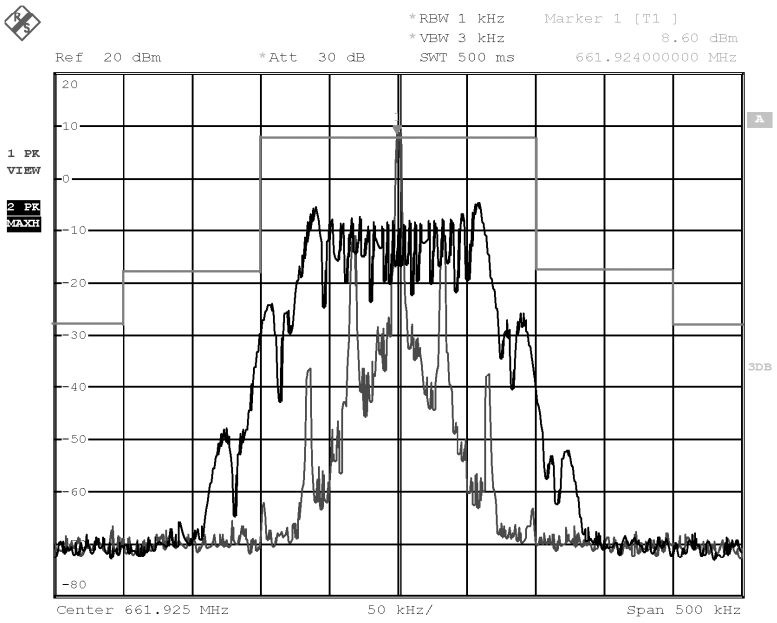
Date: 16.JAN.2013 17:47:14

Input Audio signal:1kHz



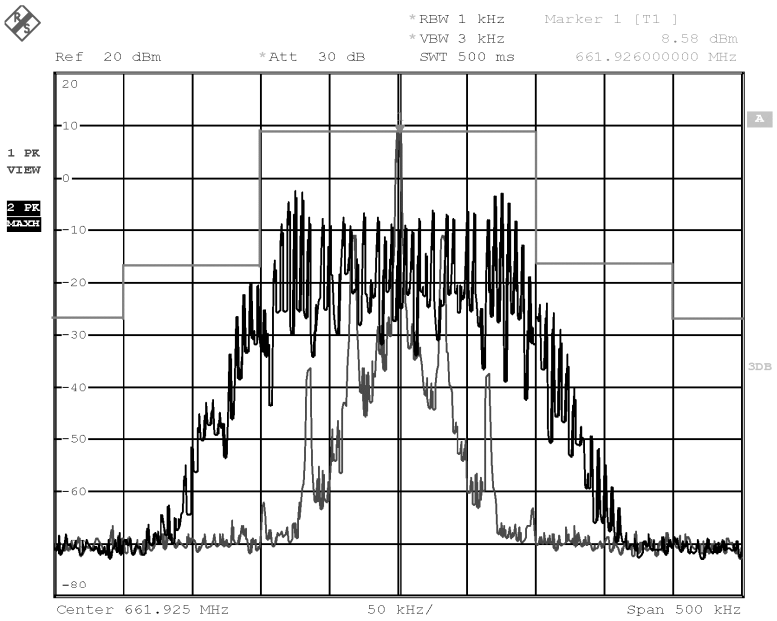
Date: 16.JAN.2013 17:46:47

Input Audio signal:2kHz



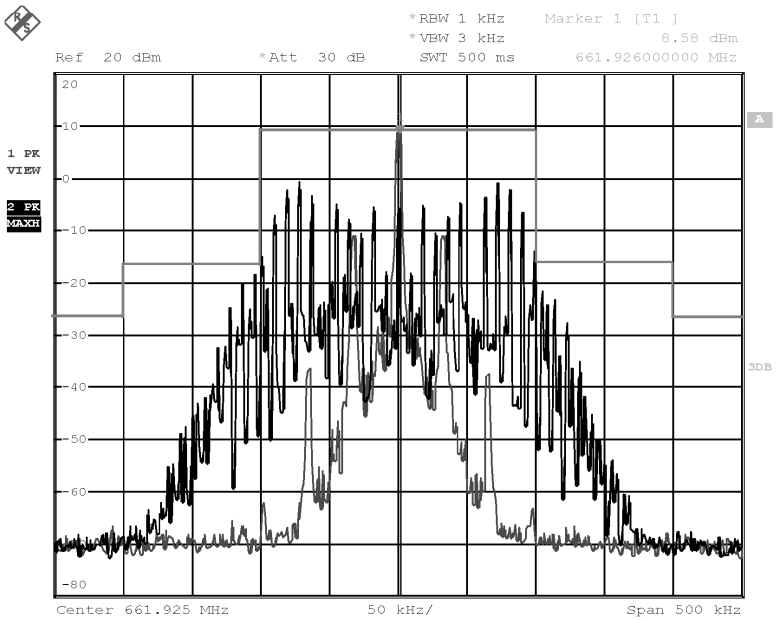
Date: 16.JAN.2013 17:46:30

Input Audio signal:5kHz



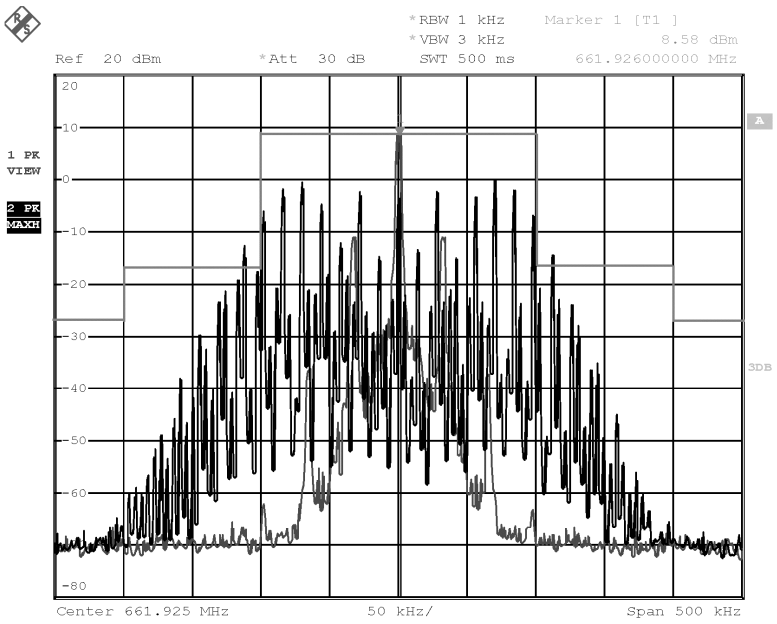
Date: 16.JAN.2013 17:46:02

Input Audio signal:9kHz



Date: 16.JAN.2013 17:45:48

Input Audio signal:14kHz



Date: 16.JAN.2013 17:45:31

5.1.4 Frequency Tolerance

RESULT: **Passed**

Date of testing : 2013-01-10 to 2013-04-18
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 conditions		Frequency error (%)		
Voltage(V)	Temp(℃)	638.125MHz	649.925 MHz	661.925 MHz
3.00	-30	0.0003	0.0003	0.0003
	-20	0.0002	0.0002	0.0002
	-10	0.0002	0.0002	0.0002
	0	0.0002	0.0001	0.0001
	10	0.0002	0.0002	0.0002
	20	0.0001	0.0001	0.0001
	30	0.0001	0.0002	0.0002
	40	0.0002	0.0003	0.0002
	50	0.0003	0.0003	0.0003
2.20(End point)	20	0.0002	0.0002	0.0003
2.55 (85% Rated)	20	0.0003	0.0003	0.0003
3.45(115% Rated)	20	0.0002	0.0003	0.0002
Limit		0.005%		

5.1.5 Modulation Characteristics

RESULT: **Passed**

Date of testing	:	2013-01-10 to 2013-04-18
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

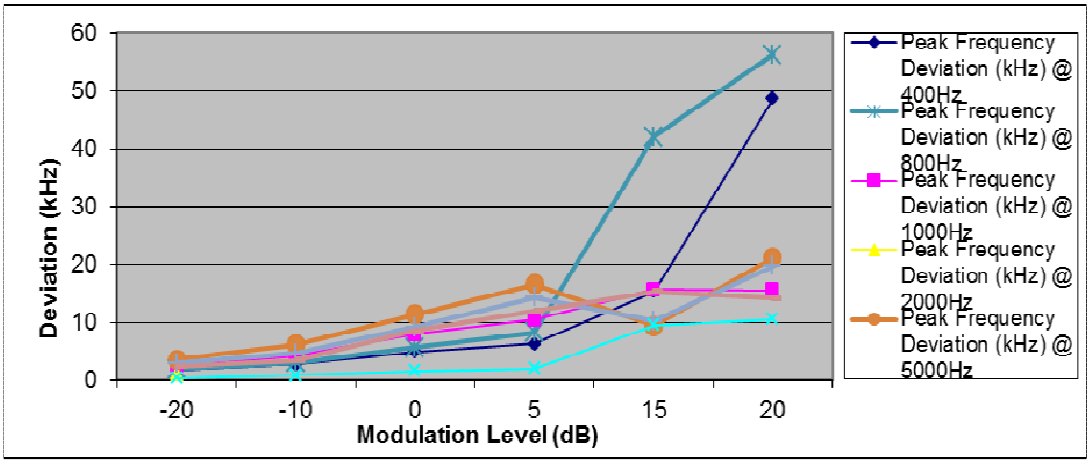
Audio Frequency Response, Low Channel	
Audio Frequency (Hz)	Audio Frequency Response (dB)
100	1.29
200	0.26
300	0.17
400	0.13
500	0.09
600	0.91
700	0.67
800	0.13
900	0.13
1000	0.00
1500	-1.11
2000	-1.11
3000	2.01
4000	1.97
5000	3.89
6000	4.43

7000	4.45
8000	-0.58
9000	0.09
10000	-1.83
12000	-10.17
13000	-30.46
14000	-33.98
Audio Frequency Response, Middle Channel	
Audio Frequency (Hz)	Audio Frequency Response (dB)
100	1.44
200	0.21
300	0.13
400	0.09
500	0.04
600	0.87
700	0.55
800	0.13
900	0.13
1000	0.00
1500	-0.87
2000	-0.87
3000	2.04
4000	2.64
5000	4.30
6000	4.71
7000	4.71
8000	-0.45
9000	0.13
10000	-1.72
12000	-9.76
13000	-32.04
14000	-32.04
Audio Frequency Response, High Channel	
Audio Frequency (Hz)	Audio Frequency Response (dB)
100	0.91
200	0.09
300	0.09
400	0.21
500	0.21

600	0.63
700	0.42
800	0.13
900	0.13
1000	0.00
1500	-0.49
2000	-0.82
3000	1.06
4000	1.44
5000	3.81
6000	4.08
7000	4.40
8000	-0.49
9000	0.51
10000	-1.31
12000	-7.74
13000	-21.94
14000	-33.98

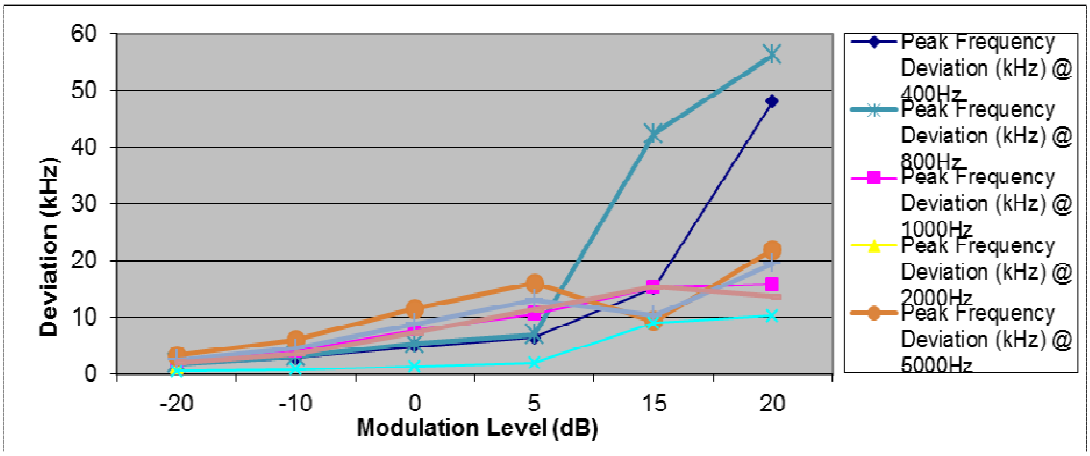
Modulation Limiting, Low Channel

Modulation Level (dB)	Peak Frequency Deviation (kHz)							
	400Hz	800Hz	1000Hz	2000Hz	5000Hz	8000Hz	9000Hz	14000Hz
-20	1.85	1.9	2.12	2.42	3.56	2.95	2.41	0.36
-10	2.75	3.05	3.26	4.36	6.14	4.66	3.52	0.85
0	4.95	5.63	5.85	7.95	11.41	9.25	8.55	1.65
5	6.32	8.25	9.2	10.47	16.63	14.3	12.05	2.02
15	15.32	42.1	25.3	15.62	9.41	10.2	15.36	9.57
20	48.72	56.23	52.04	15.53	21.2	19.74	14.23	10.56



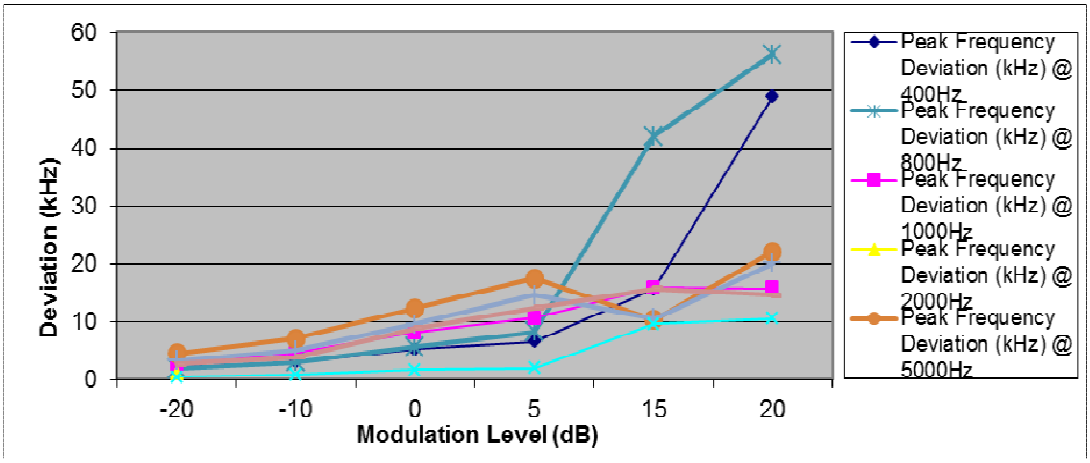
Modulation Limiting, Middle Channel

Modulation Level (dB)	Peak Frequency Deviation (kHz)							
	400Hz	800Hz	1000Hz	2000Hz	5000Hz	8000Hz	9000Hz	14000Hz
-20	1.78	1.91	2.01	2.37	3.28	2.47	2.05	0.54
-10	2.85	3.17	3.32	4.12	6.04	4.52	3.61	0.77
0	4.87	5.38	5.76	7.79	11.56	8.93	7.32	1.33
5	6.43	7.02	7.56	10.61	16.03	13.17	11.36	1.93
15	15.16	42.32	25.23	15.25	9.34	10.28	15.31	9.03
20	48.02	56.25	51.62	15.76	21.89	19.45	13.65	10.3



Modulation Limiting, High Channel

Modulation Level (dB)	Peak Frequency Deviation (kHz)							
	400Hz	800Hz	1000Hz	2000Hz	5000Hz	8000Hz	9000Hz	14000Hz
-20	2.17	1.95	2.75	2.64	4.51	3.31	2.77	0.41
-10	3.07	3.1	3.89	4.58	7.09	5.02	3.88	0.9
0	5.27	5.68	6.48	8.17	12.36	9.61	8.91	1.7
5	6.64	8.3	9.83	10.69	17.58	14.66	12.41	2.07
15	15.64	42.15	25.93	15.84	10.36	10.56	15.72	9.6
20	49.04	56.28	52.67	15.75	22.15	20.1	14.59	10.61



6. Safety Human exposure

6.1 Radio Frequency Exposure Compliance

6.1.1 Electromagnetic Fields

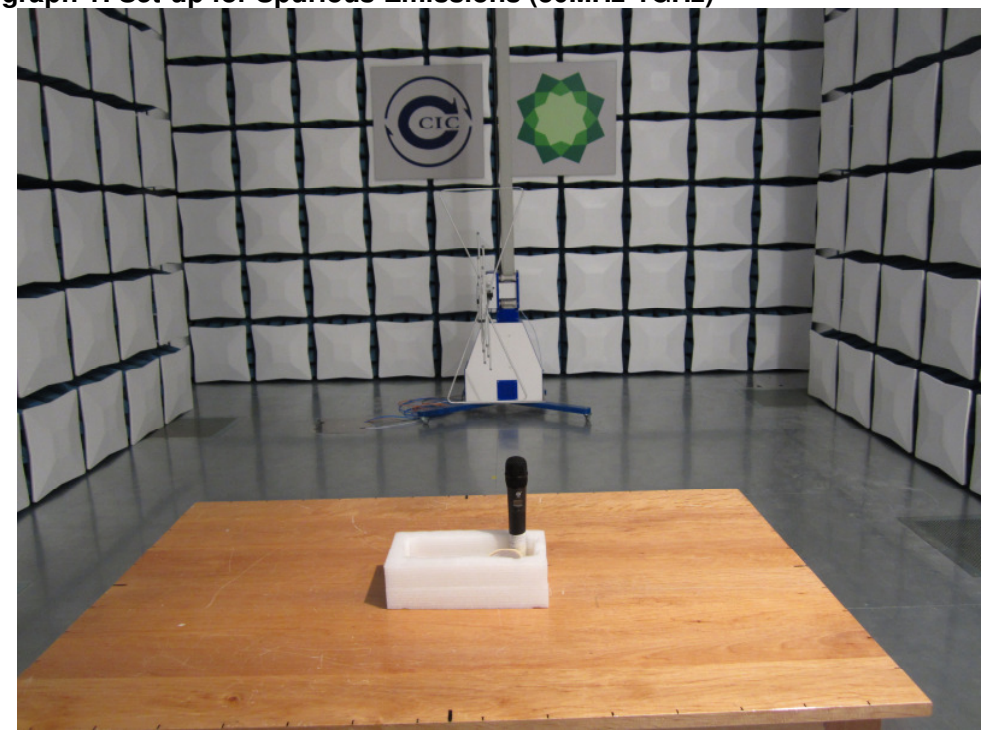
RESULT: **Passed**

Test standard : FCC KDB Publication 447498 D01 v05

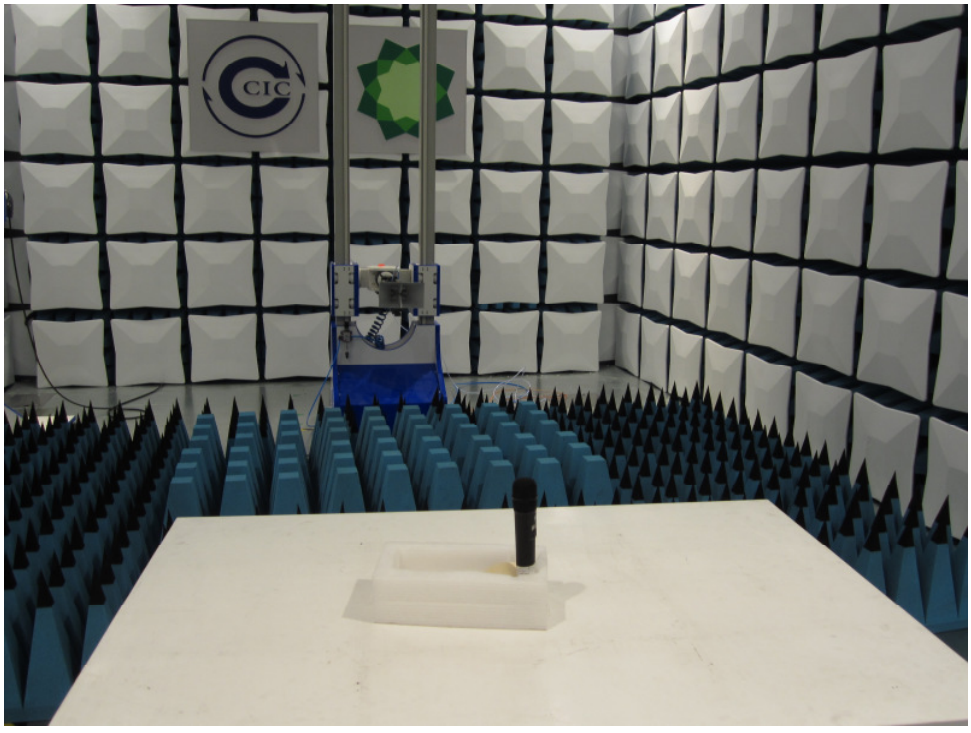
The minimum user distance to the EUT is 100mm, since maximum peak output power of the transmitter is 15mW < 344mW, hence the EUT is exclueded from SAR evaluation according to FCC KDB publication 447498 D01: Mobile Portable RF Exposure.

7. Photographs of the Test Set-Up

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



Photograph 2: Set-up for Spurious Emissions (1GHz-6GHz)



8. List of Tables

9. List of Photographs