FCC PART 74

EMI MEASUREMENT AND TEST REPORT

For

ARRAY ELECTRONIC CO., LTD.

XISHANQIAO, YUHUATAI ZONE, NANJING, 210041, CHINA

FCC ID: TOFAUT210

October 19, 2005

This Report Concerns:	Equipment Type:
☒ Original Report	Wireless Microphone

Test Engineer:	Louise Lu
Report No.:	RSZ05092303
Test Date:	October 11-13, 2005
Reviewed By:	Chris Zeng
Prepared By:	Bay Area Compliance Lab Corp. (ShenZhen) 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone, ShenZhen, Guangdong 518038, P.R.China Tel: +86-755-33320018 Fax: +86-755-33320008

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GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

The *ARRAY ELECTRONIC CO., LTD.*'s product, model number: AUH210 or the "EUT" as referred to in this report is a Wireless Microphone. The EUT is measured approximately 12.8 cm L x 2.6 cm W x 2.4 cm H, rated input voltage: DC 1.5V battery.

** The test data gathered are from production sample, serial number: A08CF09001 provided by the manufacturer, we receive the EUT on 2005-9-23.*

Objective

The following test report is prepared on behalf of *ARRAY ELECTRONIC CO., LTD.* in accordance with Part 74 Subpart H of the Federal Communication Commissions rules.

The objective of the manufacturer is to determine compliance with FCC rules.

Related Submittal(s)/Grant(s)

No related submittal(s).

Test Methodology

Measurements contained in this report were also conducted with TIA/EIA Standard 603, Telecommunications Industry Association Land Mobile FM or PM Communications Equipment Measurement and Performance Standards.

All emissions measurement was performed at Bay Area Compliance Lab Corp. (ShenZhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Test Facility

The Test site used by Bay Area Compliance Lab Corp. (ShenZhen) to collect test data is located in the 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone, ShenZhen, Guangdong 518038, P.R.China.

Test site at Bay Area Compliance Lab Corp. (ShenZhen) has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on November 04, 2004. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2003& TIA/EIA-603.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 382179. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, Bay Area Compliance Lab Corp. (ShenZhen) is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (Lab Code 200707-0). The current scope of accreditations can be found at http://ts.nist.gov/ts/htdocs/210/214/scopes/2007070.htm

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in a typical fashion (as normally used by a typical user).

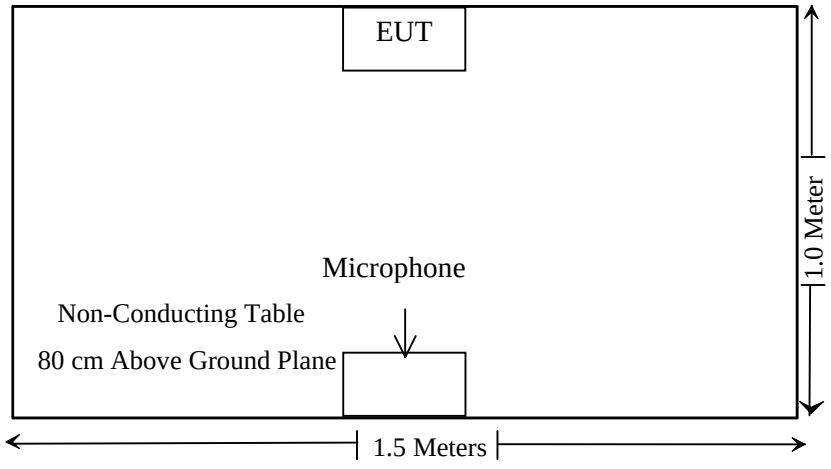
Equipment Modifications

Bay Area Compliance Lab Corp. (ShenZhen) has not done any modification on the EUT.

Configuration of Test Setup

EUT

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§74.861(e)(1)(ii)	Output Power Measurement	Compliant
§74.861(e)(3)	Modulation Characteristics	Compliant
§74.861(e)(5)	Occupied Bandwidth Emission	Compliant
§74.861(e)(6)	Radiated Spurious Emission	Compliant *
§2.1051	Spurious Emission at Antenna Port	Compliant
§74.86(e)(4)	Frequency Stability	Compliant

* Within measurement uncertainty

§74.861(e)(1)(ii) – OUTPUT POWER MEASUREMENT

Standard Applicable

According to §74.861(e)(1)(ii), for low power auxiliary station operating in the 614-806MHz band, the power of the measured unmodulated carrier power ant the output of the transmitter power amplifier (antenna input power) may not exceed 250mW.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2005-8-17	2006-8-17

*** Statement of Traceability:** Bay Area Compliance Lab Corp. (ShenZhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

Test Procedure

The maximum peak output power was measured with an EMI Test Receiver connected to the antenna terminal while EUT was operating in normal situation. Set RBW of EMI Test Receiver to 100 kHz and VBW to 300 kHz.

Test Data

Environmental Conditions

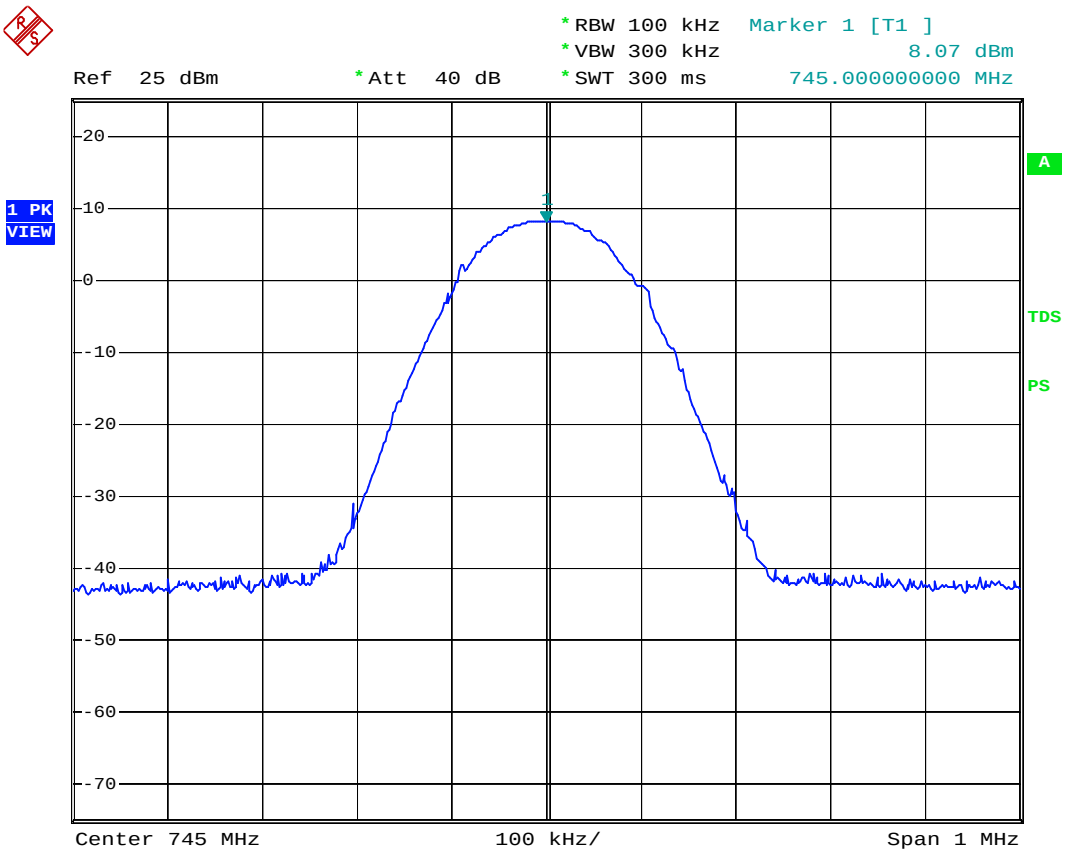
Temperature:	27 °C
Relative Humidity:	50 %
ATM Pressure:	1009 mbar

The testing was performed by Louise Lu on 2005-10-12.

Test Result: Pass

Test mode: Transmitting

Channel	Spec Frequency (MHz)	Peak Output Power (dBm)	Limit (dBm)	Margin (dBm)
High	754.3	6.48	24	-17.52
Low	745.0	8.07	24	-15.93



ARRAY Wireless Microphone M/N: AUT210 Output Power Low c
hannel

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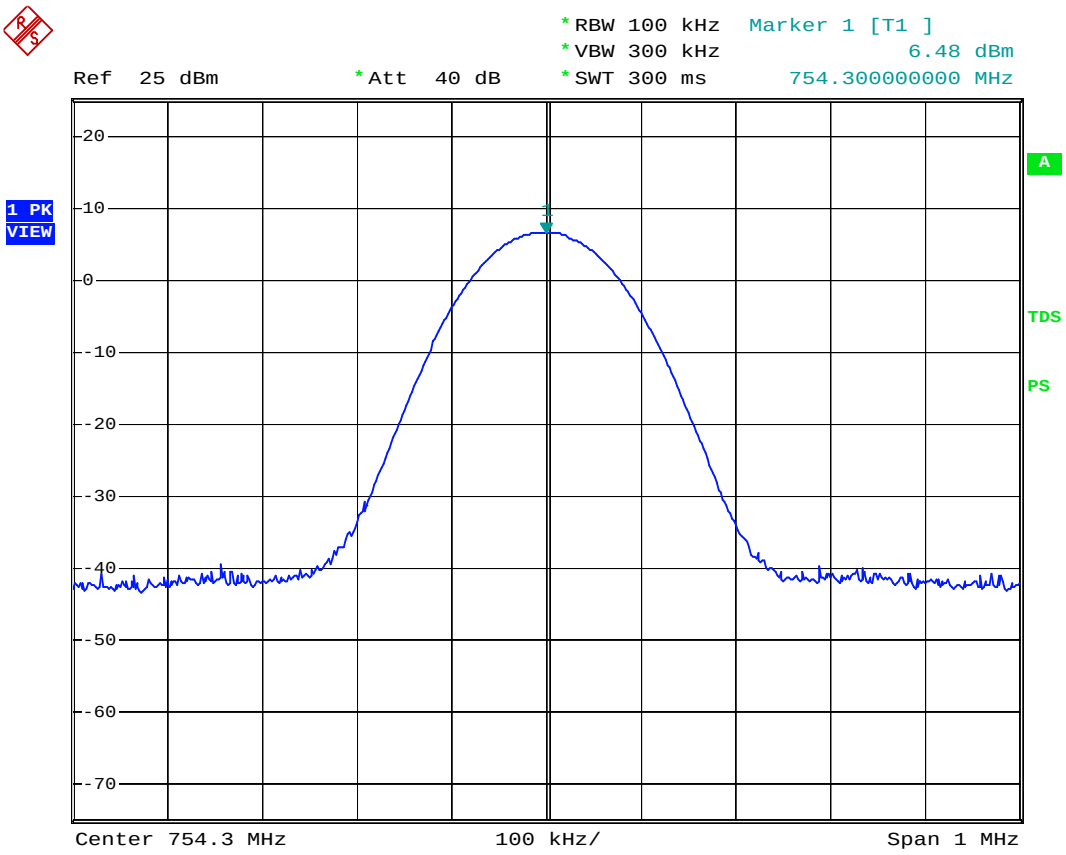

ARRAY Wireless Microphone M/N: AUT210 Output Power High channel

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§74.861(e)(3) – MODULATION CHARACTERISTICS

Standard Applicable

According to FCC 2.1047 (a), for Voice Modulated Communication Equipment, the frequency response of the audio modulating circuit over a range of 100Hz to 5000Hz shall be measured. For equipment required to have an audio low-pass filter, the frequency response of the filter, or of all circuitry installed between the modulation limiter and the modulated stage shall be measured.

According to §74.861(e)(3), any form of modulation may be used. A maximum deviation of ±75 kHz is permitted when frequency modulation is employed.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
HP	Modulation Analyzer	8901B	3438A05208	2005-2-28	2006-2-28
NANYAN	Audio Generator	NY2201	019829	2004-12-23	2005-12-23

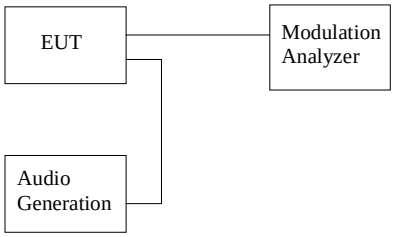
*** Statement of Traceability:** Bay Area Compliance Lab Corp. (ShenZhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

Test Procedure

Frequency response of audio circuits

1) Position the EUT as shown in figure 1

Figure 1
Modulation Characteristic
Measurement Configuration



2) Adjust the audio input frequency for 100, 200, 500, 1000, 3000 and 5000Hz in sequence and the input level from 0V to maximum permitted input voltage with recording the change in output responding to respective input level

Modulation Limit

1) Position the EUT as shown in figure 1, adjust the audio input frequency to 100 Hz and the input level from 0V to maximum permitted input voltage with recording each carrier frequency deviation responding to respective input level.
2) Repeat step 1 with changing the input frequency for 100, 300, 1000, 2500 and 3000 Hz in sequence.

Test Data

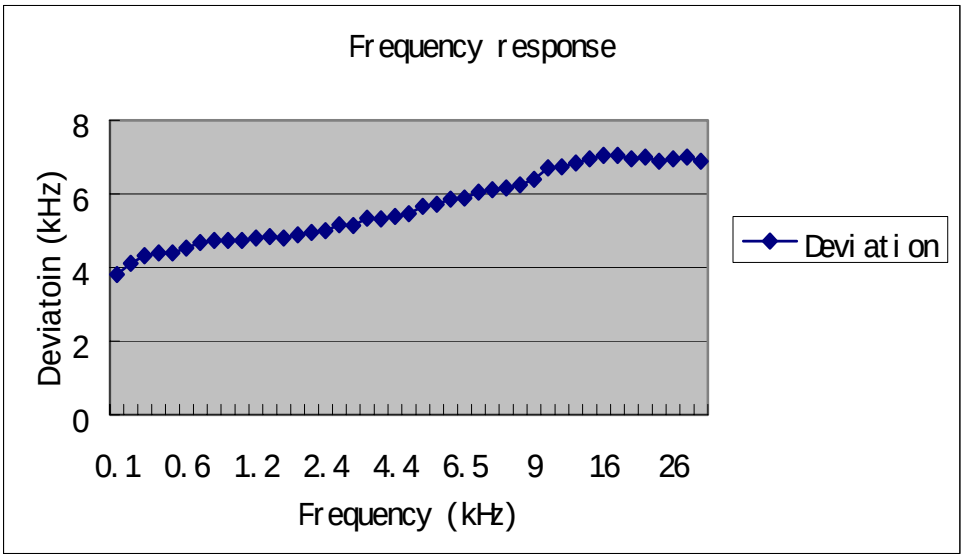
Environmental Conditions

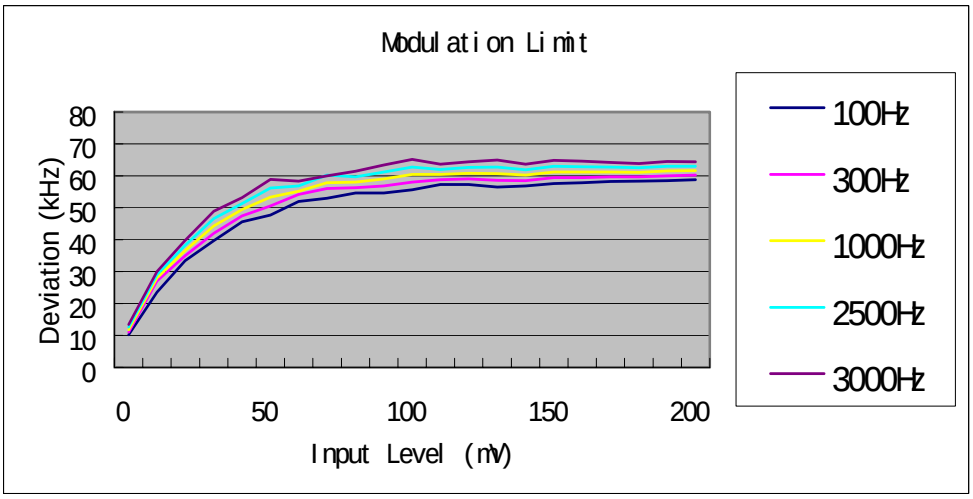
Temperature:	27 °C
Relative Humidity:	50 %
ATM Pressure:	1009 mbar

The testing was performed by Louise Lu on 2005-10-12.

Test Result: Pass

Test mode: Transmitting





§74.861(e)(5) - OCCUPIED BANDWIDTH OF EMISSION

Standard Applicable

According to FCC 2.1049 (c) (1), for radiotelephone transmitter, other than single sideband or independent sideband transmitter, when modulated by a 2.5 kHz tone at an input level 16 dB greater than that necessary to produce 50 percent modulation.

According to §74.861(e)(5), the operating bandwidth shall not exceed 200 kHz.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2005-8-17	2006-8-17

*** Statement of Traceability:** Bay Area Compliance Lab Corp. (ShenZhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

Test Procedure

1. Check the calibration of the measuring instrument using a known signal from an external generator.
2. Position the EUT without connection to the tunable table. Turn on the EUT. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 26 dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

Test Data

Environmental Conditions

Temperature:	27 °C
Relative Humidity:	50 %
ATM Pressure:	1009 mbar

The testing was performed by Louise Lu on 2005-10-12.

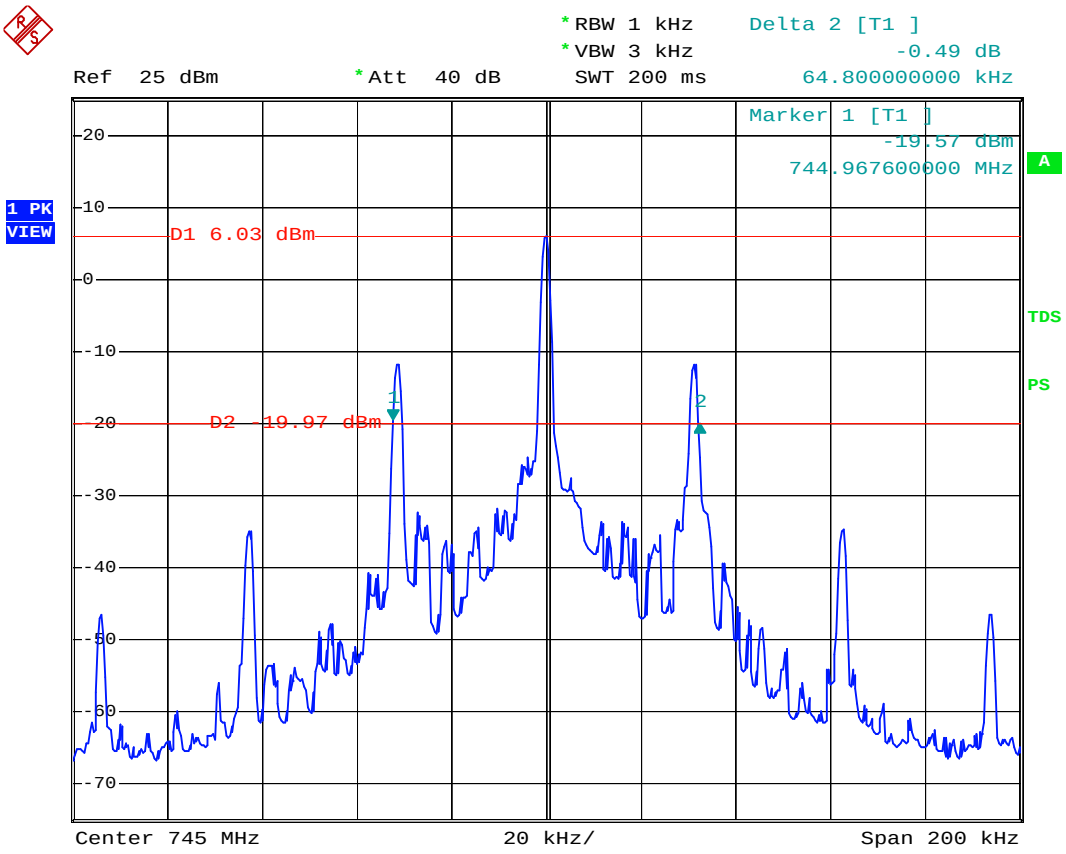
Test Result: Pass

Test mode: Transmitting

Spec Freq (MHz)	Occupied Bandwidth (KHz)	Limit (KHz)	Margin (KHz)
745.0	64.8	200	-135.2
754.3	64.8	200	-135.2

Emission Designator

2M + 2D = (2x15kHz) + (2x75kHz) = 180KF3E



ARRAY Wireless Microphone M/N: AUT210 band width Low channel

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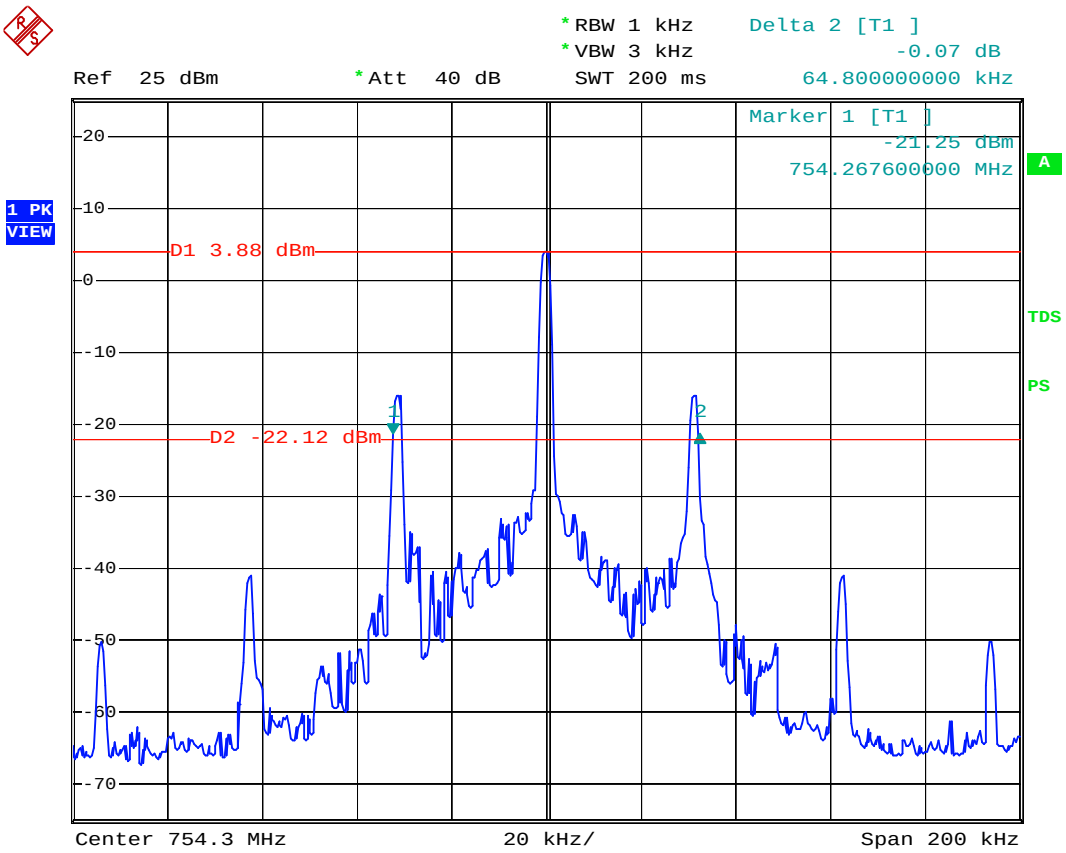

ARRAY Wireless Microphone M/N: AUT210 band width High ch
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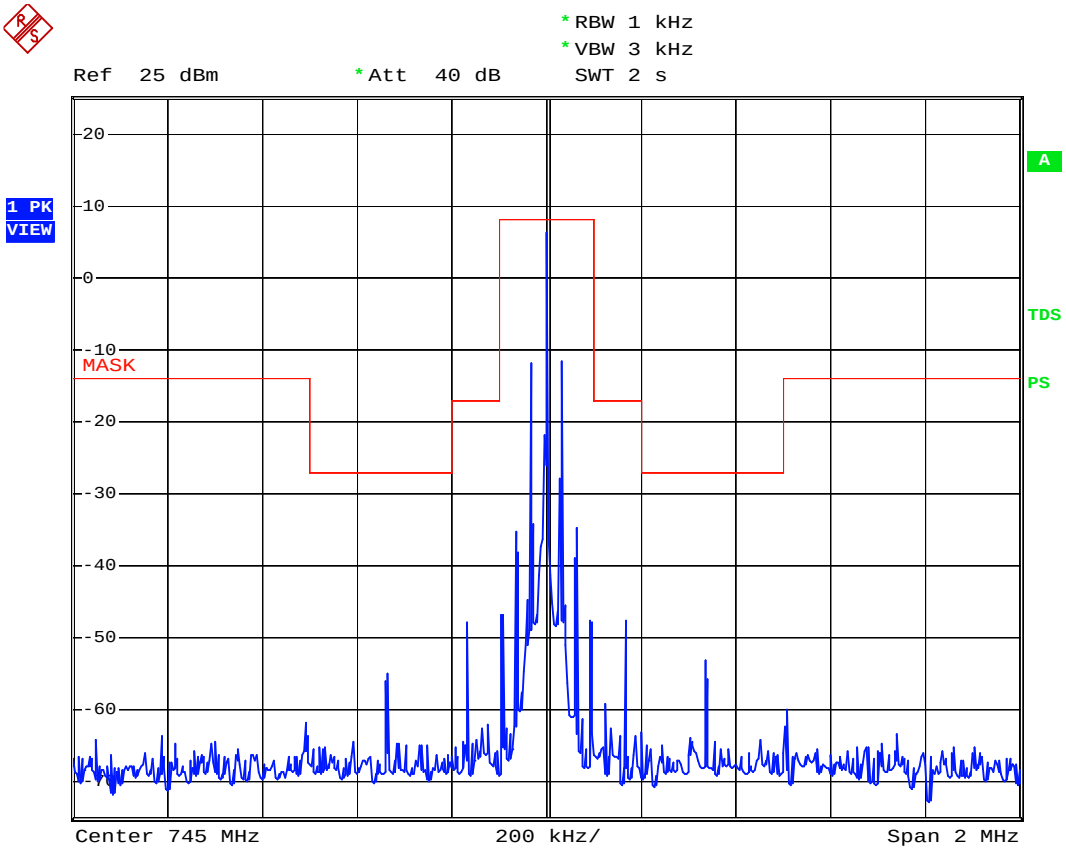
Emission Mask



ARRAY Wireless Microphone M/N: AUT210 Low channel

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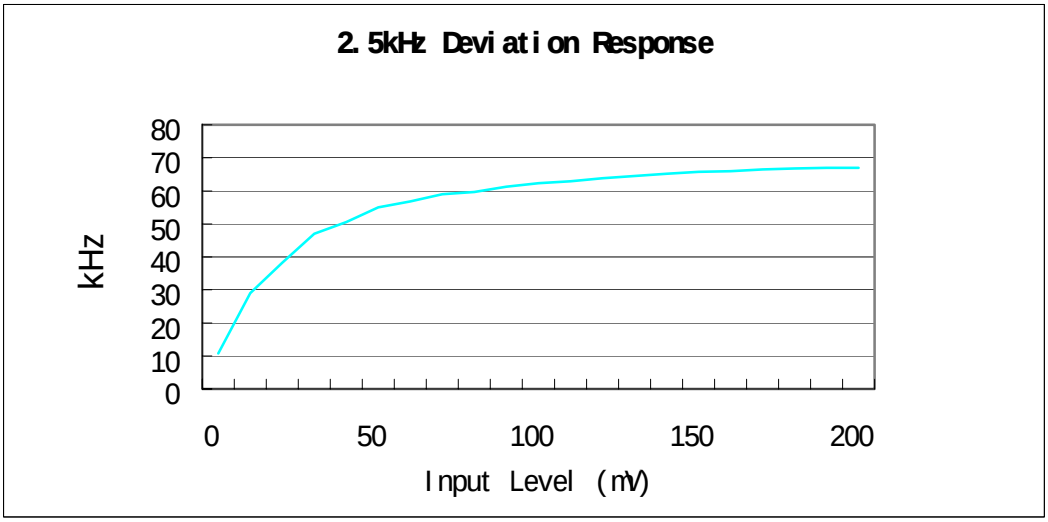

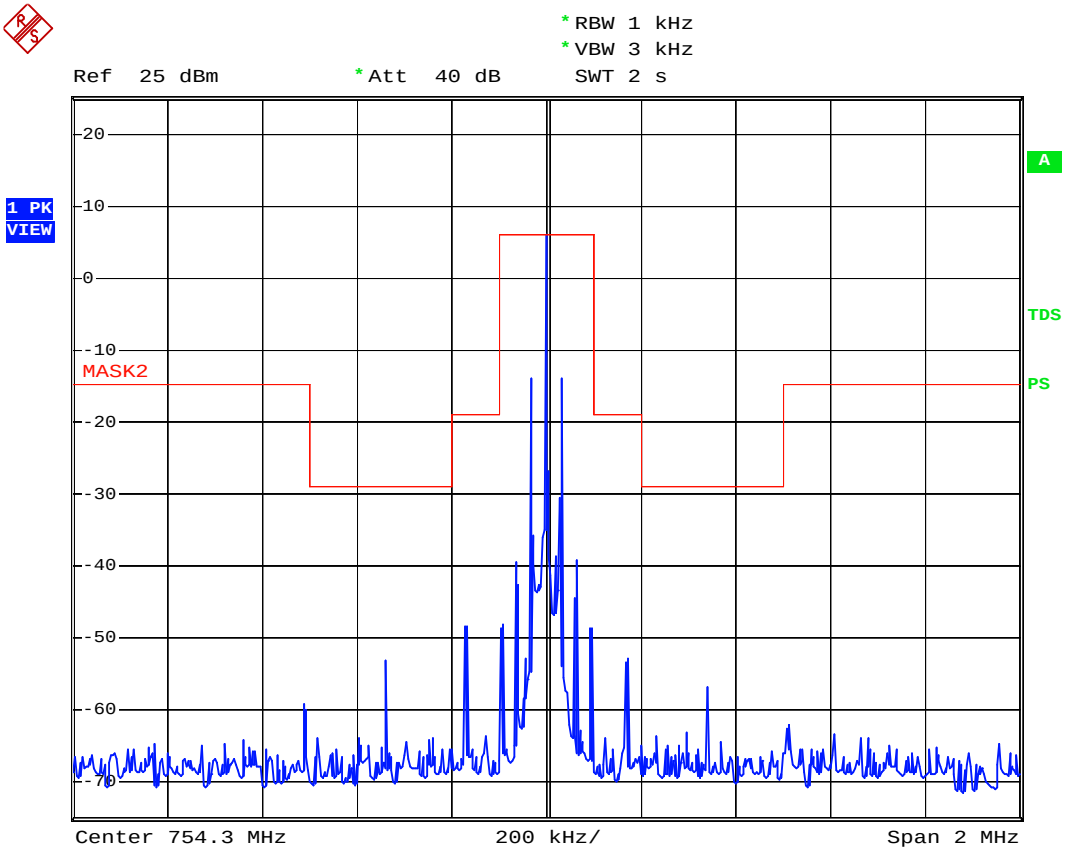

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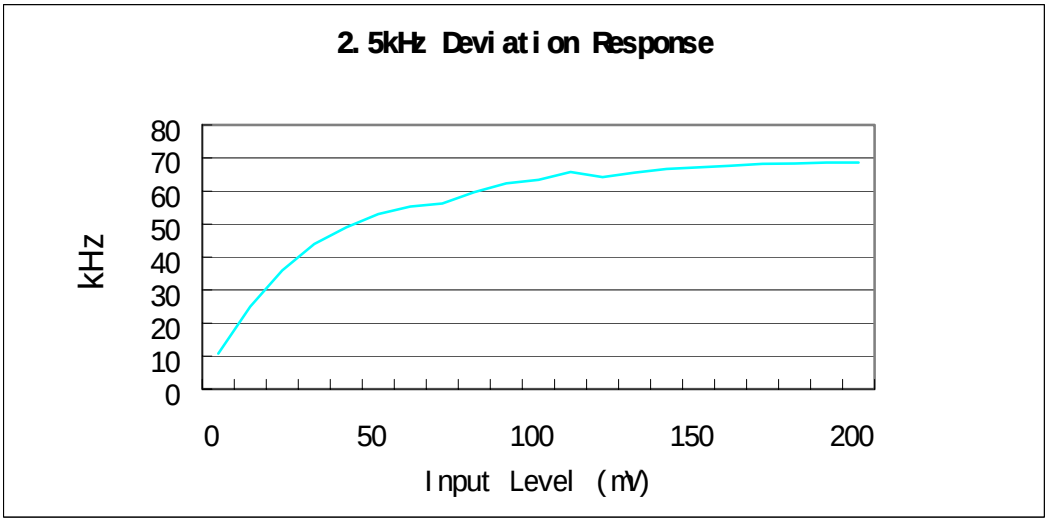


§74.861 (e)(6)(iii) – RADIATED SPURIOUS EMISSION

Standard Applicable

According to FCC2.1053, measurements shall be made to detect spurious emission that may be radiated directly from the cabinet, control circuits, power leads, or intermediated circuit elements under normal condition of installation and operation. Information submitted shall include the relative radiated power of spurious emission with reference to the rated power output of the transmitter, assuming all emissions are radiated from a halfwave dipole antenna.

According to FCC74.861 (e)(6), the mean power of emissions shall be attenuated below the mean output power 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 25 dB.

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 35 dB.

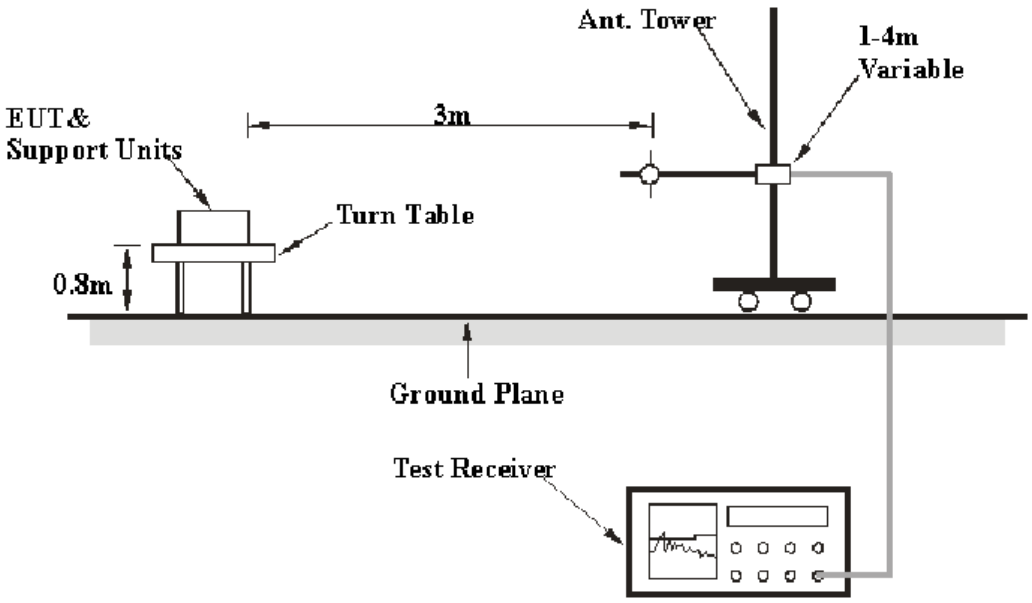
3. on any frequency removed from the operating frequency by more than 250 percent up to and the authorized bandwidth shall be attenuated below the un-modulated carrier by at least 43 plus 10 Log (output power in watts)dB.

Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement at Bay Area Compliance Lab Corp. (ShenZhen) is $\pm$4.4 dB.

EUT Setup



The radiated emission tests were performed in the 3-meter Chamber, using the setup accordance with the ANSI C63.4-2003.

EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 8 GHz.

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

Frequency Range	***RBW***	***Video B/W***
30MHz – 1000 MHz	100 kHz	300 kHz
1000 MHz – 8 GHz	1 MHz	3 MHz

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
A.H. System	Horn Antenna	SAS-200/571	135	2005-4-28	2006-4-28
COM POWER	Dipole Antenna	AD-100	041000	N/A	N/A
Giga-tronics	Signal Generator	1026	270801	2005-2-28	2006-2-28
HP	Amplifier	HP8447D	2944A09795	2005-8-17	2006-8-17
HP	Preamplifier	8449B	3008A00277	2005-8-17	2006-8-17
HP	Signal Generator	8657A	2849U00982	2005-2-28	2006-2-28
Rohde & Schwarz	Spectrum Analyzer	FSEM30	849720/019	2004-11-10	2005-11-10
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2005-8-17	2006-8-17
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2005-4-28	2006-4-28
Sunol Sciences	Horn Antenna	DRH-118	A052604	2005-7-20	2006-7-20

*** Statement of Traceability:** Bay Area Compliance Lab Corp. (ShenZhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

Test Procedure

The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load which was also placed on the turntable.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.

The frequency range up to tenth harmonic of the fundamental frequency was investigated.

Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

Spurious emissions in dB = 10 lg (TXpwr in Watts/0.001) – the absolute level

Spurious attenuation limit in dB = 43 + 10 Log_{10} (power out in Watts)

Test Data

Environmental Conditions

Temperature:	27 °C
Relative Humidity:	50 %
ATM Pressure:	1009 mbar

The testing was performed by Louise Lu on 2005-10-12.

Test Result: Pass

Test mode: Transmitting

Indicated		Table	Test Antenna		Substituted			Antenna	Cable	Absolute	Limit	Margin
Frequency	Meter Reading	Angle	Height	Polar	Frequency	Level	Polar	Gain	Loss	Level		
MHz	dBuV	Degree	Meter	H/V	MHz	dBm	H/V	dBi	dB	dBm	dBm	dBm
Low Channel												
1490	79.66	180	1.2	V	1490	-23.3	V	8.4	0.3	-15.2	-13	-2.20
1490	77.85	180	1.2	H	1490	-27.3	H	8.4	0.3	-19.2	-13	-6.20
2980	63.11	60	1.0	V	2980	-40.7	V	9.4	0.3	-31.6	-13	-18.60
2235	63.24	45	1.2	V	2235	-41.6	V	8.4	0.3	-33.5	-13	-20.50
2980	59.47	60	1.0	H	2980	-45.8	H	9.4	0.3	-36.7	-13	-23.70
2235	59.43	45	1.2	H	2235	-46.1	H	8.4	0.3	-38.0	-13	-25.00
5215	51.07	45	1.0	V	5215	-53.4	V	10.4	0.3	-43.3	-13	-30.30
4470	49.73	180	1.2	H	4470	-54.2	H	10.7	0.3	-43.8	-13	-30.80
4470	49.36	180	1.2	V	4470	-56.1	V	10.7	0.3	-45.7	-13	-32.70
3725	49.72	45	1.0	V	3725	-55.8	V	9.0	0.3	-47.1	-13	-34.10
5215	47.52	45	1.0	H	5215	-57.3	H	10.4	0.3	-47.2	-13	-34.20
3725	49.28	45	1.0	H	3725	-56.4	H	9.0	0.3	-47.7	-13	-34.70
High channel												
1508.6	80.63	45	1.0	V	1508.6	-23.8	V	8.4	0.3	-15.7	-13	-2.70
1508.6	73.91	180	1.2	H	1508.6	-30.5	H	8.4	0.3	-22.4	-13	-9.40
3017.2	63.12	180	1.2	V	3017.2	-41.2	V	9.4	0.3	-32.1	-13	-19.10
2262.9	65.24	45	1.2	H	2262.9	-44.2	H	8.4	0.3	-36.1	-13	-23.10
2262.9	61.82	45	1.0	V	2262.9	-44.4	V	8.4	0.3	-36.3	-13	-23.30
3017.2	57.86	60	1.0	H	3017.2	-53.1	H	9.4	0.3	-44.0	-13	-31.00
3771.5	49.36	45	1.0	V	3771.5	-54.3	V	8.8	0.3	-45.8	-13	-32.80
4525.8	48.36	60	1.0	V	4525.8	-56.7	V	10.7	0.3	-46.3	-13	-33.30
4525.8	48.7	180	1.2	H	4525.8	-57.6	H	10.7	0.3	-47.2	-13	-34.20
5280.1	46.53	45	1.2	H	5280.1	-58.2	H	10.1	0.3	-48.4	-13	-35.40
5280.1	47.64	45	1.2	V	5280.1	-59.3	V	10.1	0.3	-49.5	-13	-36.50
3771.5	48.61	45	1.2	H	3771.5	-58.4	H	8.8	0.3	-49.9	-13	-36.90

§2.1051 - SPURIOUS EMISSION AT ANTENNA TERMINAL

Standard Applicable

According to §2.1051, the radio frequency voltage or powers generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with a suitable artificial antenna. Curves or equivalent data shall show the magnitude of each harmonic and other spurious emission that can be detected when the equipment is operated under the conditions specified in §2.1049 as appropriate. The magnitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be specified.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
A.H. System	Horn Antenna	SAS-200/571	135	2005-4-28	2006-4-28
HP	Amplifier	HP8447D	2944A09795	2005-8-17	2006-8-17
HP	Preamplifier	8449B	3008A00277	2005-8-17	2006-8-17
Rohde & Schwarz	Spectrum Analyzer	FSEM30	849720/019	2004-11-10	2005-11-10
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2005-8-17	2006-8-17
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2005-4-28	2006-4-28

*** Statement of Traceability:** Bay Area Compliance Lab Corp. (ShenZhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

Test Procedure

1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
2. Position the EUT as shown in figure 4 without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set the SA on Max-Hold Mode, and then keep the EUT in transmitting mode. Record all the signals from each channel until each one has been recorded.
4. Set the SA on View mode and then plot the result on SA screen.
5. Repeat above procedures until all frequencies measured were complete.

Test Data

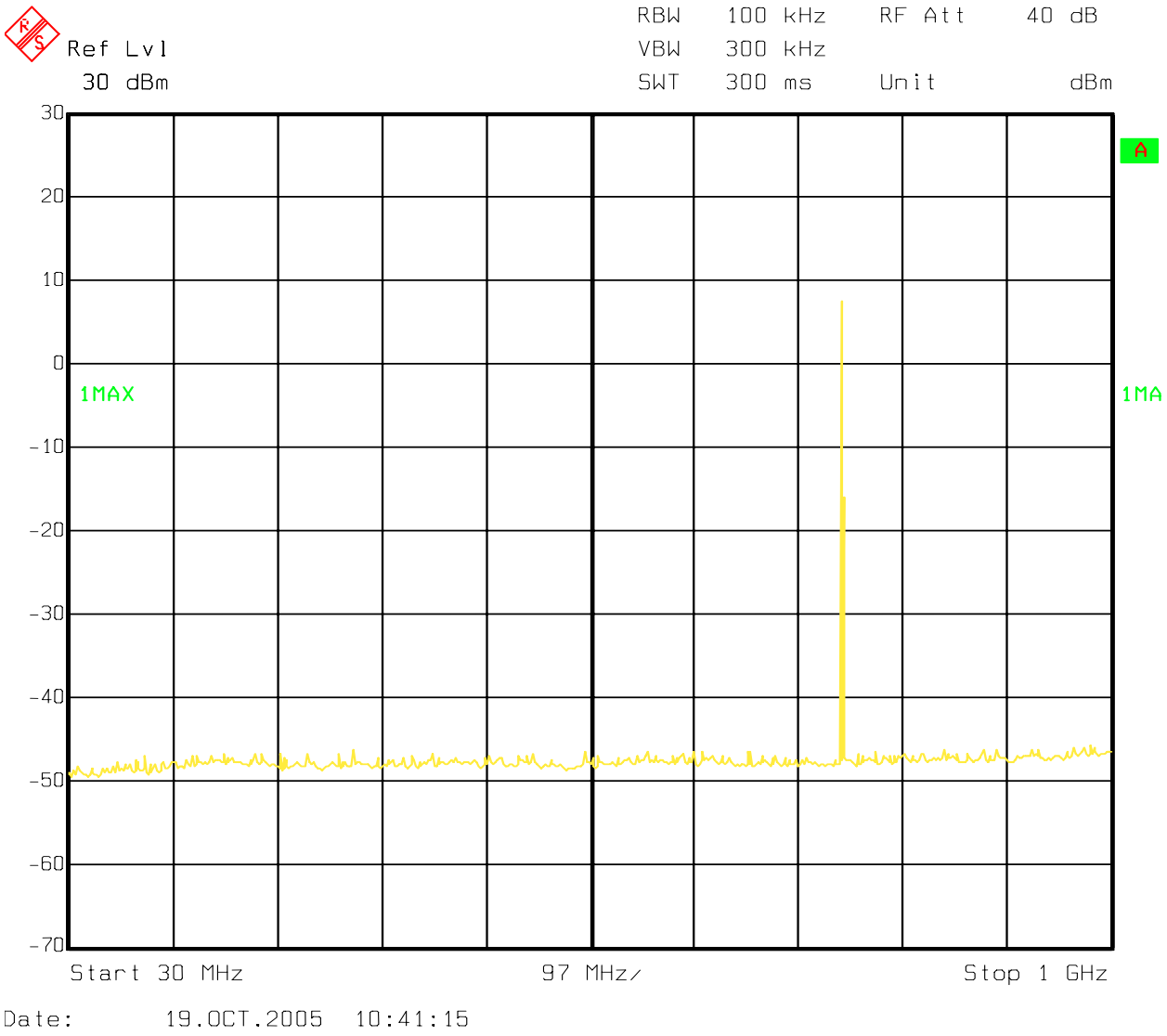
Environmental Conditions

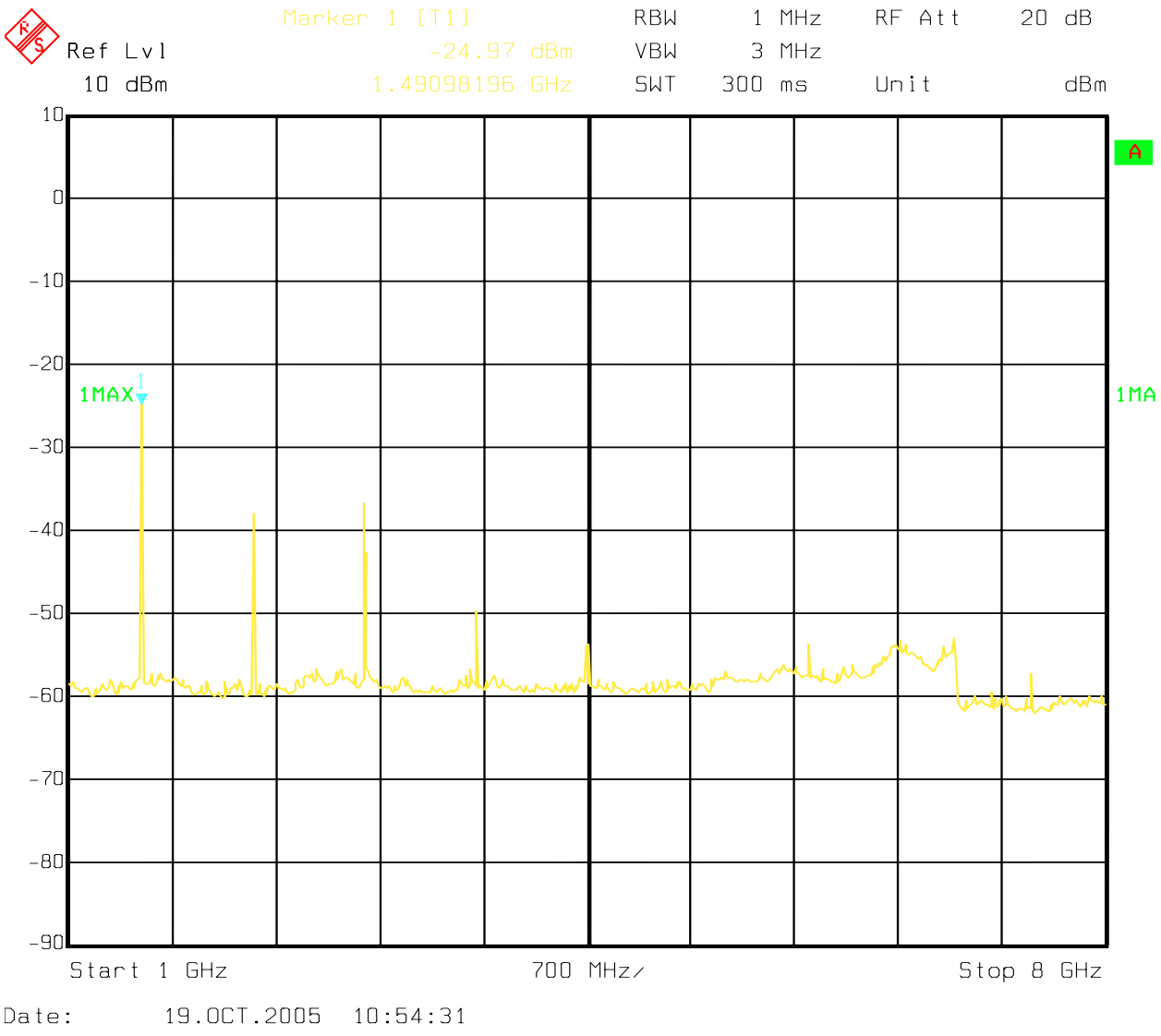
Temperature:	27 °C
Relative Humidity:	50 %
ATM Pressure:	1009 mbar

The testing was performed by Louise Lu on 2005-10-19.

Test Result: Pass

Test mode: Transmitting

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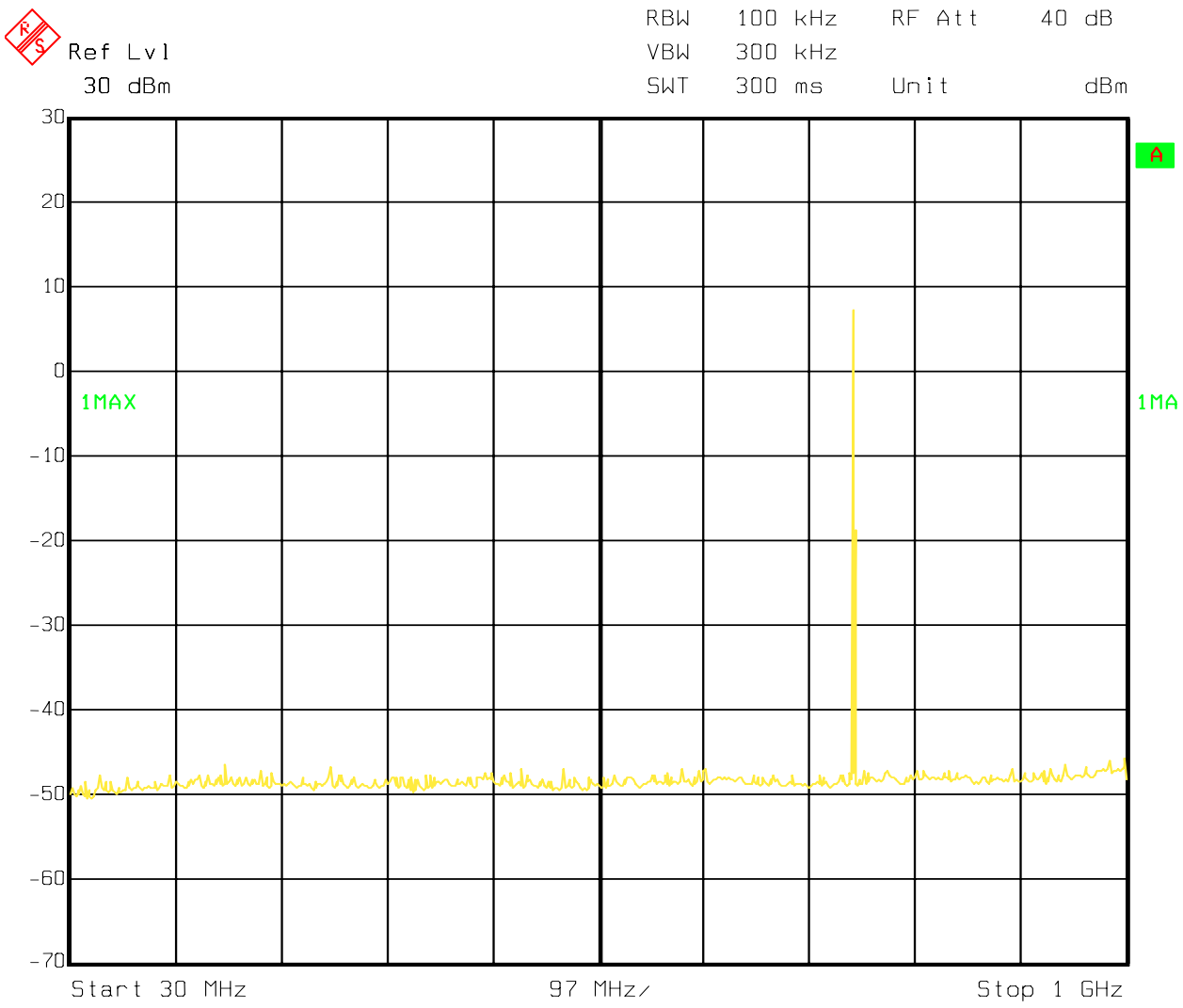
RBW 1 MHz
RF Att 20 dB
Ref Lvl
-24.97 dBm
VBW 3 MHz
10 dBm
1.49098196 GHz
SWT 300 ms
Unit dBm
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
1MAX
A
1MA
Start 1 GHz
700 MHz/
Stop 8 GHz
Date: 19.OCT.2005 10:54:31



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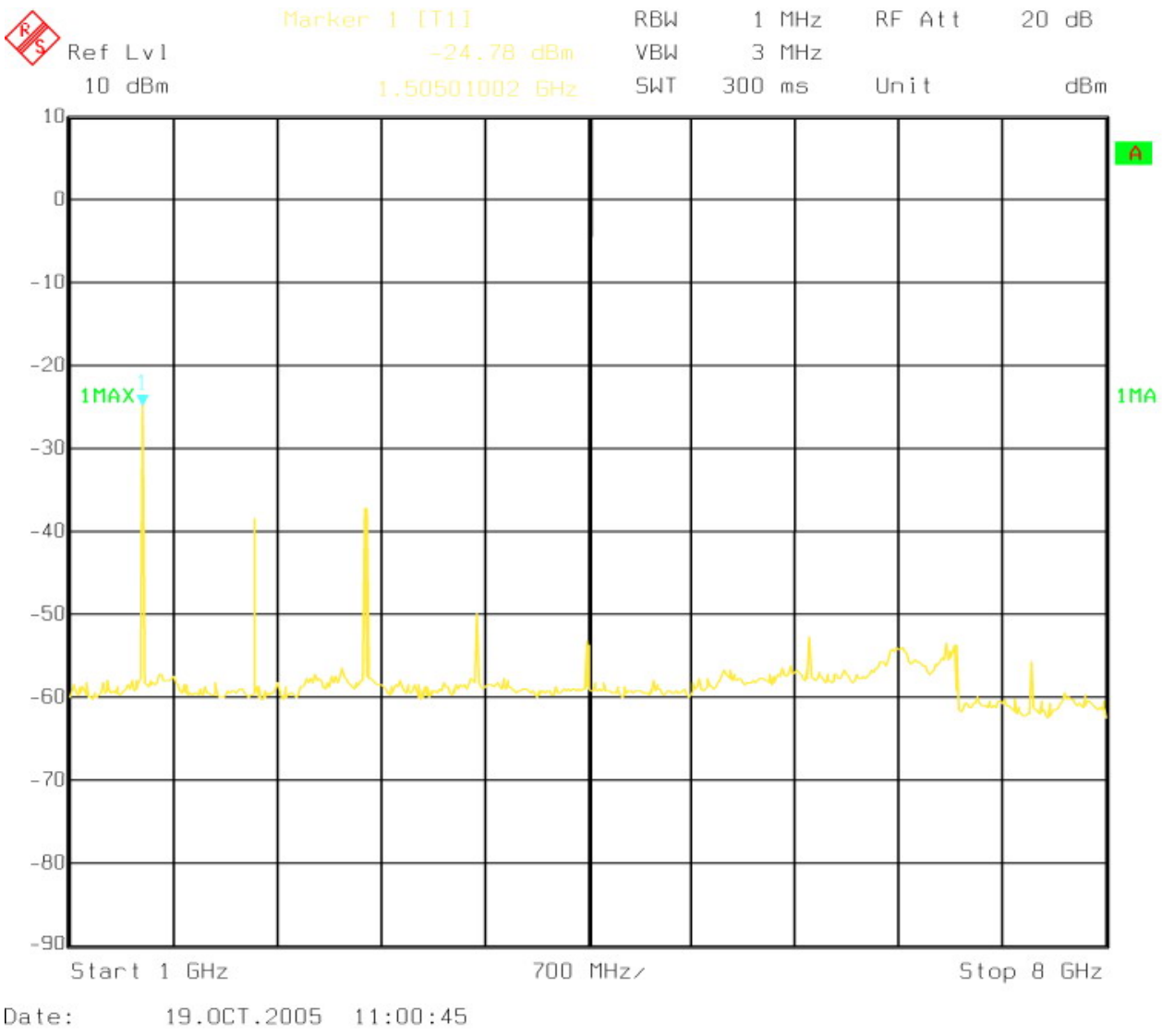
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-24.78 dBm
1.50501002 GHz
RBW 1 MHz
VBW 3 MHz
SWT 300 ms
RF Att 20 dB
Unit dBm
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
1MAX
A
1MA
Start 1 GHz
700 MHz/
Stop 8 GHz
Date: 19.OCT.2005 11:00:45

§74.86(e)(4) - FREQUENCY STABILITY MEASUREMENT

Standard Applicable

According to FCC 2.1055(a)(1), the frequency stability shall be measure with variation of ambient temperature from –30ºC to +50ºC, and according to FCC 2.1055(d)(2), the frequency stability shall be measured with reducing primary supply voltage to the battery operating end point which is specified by the manufacturer.

According to FCC 74.861, the frequency tolerance of the transmitter shall be 0.005 percent.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
WUHUAN	Temperature & Humidity Chamber	HTP205	20021115	2004-12-29	2005-12-29
ZHONGCE	DC Power supply	DF1731SL5A	N/A	N/A	N/A
Rohde&Schwarz	EMI Test Receiver	ESCI	100035	2005-8-17	2006-8-17

*** Statement of Traceability:** Bay Area Compliance Lab Corp. (ShenZhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

Test Procedure

A) Frequency stability versus environmental temperature

1. Setup the configuration per figure 7 for frequencies measured at ambient temperature if it is with 15ºC to 25ºC. otherwise, an environmental chamber set for a temperature of 20ºC shall be used. Install new batteries in the EUT.

2. Turn on EUT and set frequency counter center frequency to the right frequency needs to be measured, then set SA RBW to 30kHz, VBW to 100kHz and frequency span to 500 kHz. Record this frequency to be a reference.

3. Set the temperature of chamber to 50ºC. 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.

4. Repeat step 2 with a 10ºC decreased per stage until the lowest temperature -30ºC is measured, record all measurement frequencies.

B) Frequency stability versus input voltage

1. Setup the configuration per figure 7 for frequencies measured at ambient temperature if it is within 15ºC to 25ºC. otherwise, an environmental chamber set for a temperature of 20ºC shall be used. Install new batteries in the EUT.

2. Set frequency counter center frequency to the right frequency needs to be measured. Then set SA RBW to 30 kHz, VBW to 100kHz and frequency span to 500 kHz. Record this frequency to be a reference.

3. For battery operated only device, supply the EUT primary voltage at the battery operating end point which is specified by the manufactured and record the frequency.

Test Data

Environmental Conditions

Temperature:	27 °C
Relative Humidity:	50 %
ATM Pressure:	1009 mbar

The testing was performed by Louise Lu on 2005-10-11.

Test Result: Pass

Test mode: Transmitting

Frequency Stability vs. Voltage
Low Power supply: 1.0V

Channel	Spec Frequency MHz	Measured Frequency MHz	Frequency Error %	Limit %
High	754.3	754.282	-0.00238	0.005
Low	745	744.980	-0.00268	0.005

Frequency Stability vs. Temperature					
Temperature ℃	**Spec Frequency MHz**	**Measured Frequency MHz**	**Frequency Error %**	**Limit %**	**Result**
Low channel					
-30	745	744.9743	-0.00344	0.005	Pass
-20	745	744.9776	-0.003	0.005	Pass
-10	745	744.9828	-0.0023	0.005	Pass
0	745	744.9853	-0.0019	0.005	Pass
10	745	744.9946	-0.0007	0.005	Pass
20	745	744.9987	-0.0001	0.005	Pass
30	745	745.010	0.0013	0.005	Pass
40	745	745.0158	0.0021	0.005	Pass
50	745	745.0237	0.0031	0.005	Pass

Frequency Stability vs. Temperature					
Temperature ℃	**Spec Frequency MHz**	**Measured Frequency MHz**	**Frequency Error %**	**Limit %**	**Result**
High channel					
-30	754.3	754.2862	-0.0018	0.005	Pass
-20	754.3	754.2904	-0.00127	0.005	Pass
-10	754.3	754.2936	-0.0008	0.005	Pass
0	754.3	754.2974	-0.0003	0.005	Pass
10	754.3	754.2995	-0.00006	0.005	Pass
20	754.3	754.3019	0.0002	0.005	Pass
30	754.3	754.3154	0.00204	0.005	Pass
40	754.3	754.3176	0.00233	0.005	Pass
50	754.3	754.3214	0.00283	0.005	Pass