FCC PART 74

MEASUREMENT AND TEST REPORT

FOR

GUANGDONG TAKSTAR ELECTRONIC CO., LTD

XIALIAO LONGXI BOLUO HUIZHOU GUANGDONG CHINA

FCC ID: WRATS-6310HH

Report Concerns: Original Report	**Equipment Type:** Wireless Microphone
Model:	TS-6310HH
Report No.:	STR11078184I
Test Date:	2011-07-22 to 2011-08-18
Issue Date:	2011-08-26
Tested By:	Susan Su/ Engineer
Reviewed By:	Lahm Peng / EMC Manager
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1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant:	GUANGDONG TAKSTAR ELECTRONIC CO., LTD
Address of applicant:	XIALIAO LONGXI BOLUO HUIZHOU GUANGDONG CHINA
Manufacturer:	GUANGDONG TAKSTAR ELECTRONIC CO., LTD
Address of manufacturer:	XIALIAO LONGXI BOLUO HUIZHOU GUANGDONG CHINA

General Description of E.U.T

Items	Description
EUT Description:	Wireless Microphone
Trade Name:	TAKSTAR
Model No.:	TS-6310HH
Adding Models:	TS-6700HH, TS-3310HH, TS-6700PP, TS-3310PP, TS-3320, TS-331, TC-2R, TC-4R, VS710, VK810, TS-6720, TC-TD, TC-TH, TC-TL, TS-6820, TS-6920, TS-6850, TS-6950
Rated Voltage:	TX: DC 9V RX: DC 12V
RF Output Power:	Max. -10.38 dBm
Frequency Range:	174.1-215.8MHz
Channel Bandwidth:	200kHz
Antenna Type:	Integral Antenna
For more information refer to the circuit diagram form and the user's manual.	

The test data gathered are from a production sample, provided by the manufacturer. Test is carried out with TS-6310HH since the other models listed in this report are different appearance without circuit and electronic construction changed, declared by the manufacture.

1.2 Test Standards

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

The objective is to determine compliance with the Federal Communication Commissions rules.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product, which result in lowering the emission, should be checked to ensure compliance has been maintained.

1.3 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 and ANSI C63.4-2003, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

The equipment under test (EUT) was configured to measure its highest possible emission level. The test modes were adapted with Low Channel, Middle Channel and High Channel, accordingly in reference to the Operating Instructions.

1.4 Test Facility

- **FCC – Registration No.: 994117**
  SEM.Test Compliance Services Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files and the Registration is 994117.

- **Industry Canada (IC) Registration No.: 7673A**
  The 3m Semi-anechoic chamber of SEM.Test Compliance Services Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 7673A.

1.5 EUT Exercise Software

The EUT exercise program used during the testing was designed to exercise the system components. The test software is started while the whole system is on.

1.6 Accessories Equipment List and Details

Description	Manufacturer	Model	Serial Number
/	/	/	/

1.7 EUT Cable List and Details

Cable Description	Length (M)	Shielded/Unshielded	With Cord/Without Cord
Audio Cable	1.5m	Unshielded	Without Core

2. 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

3. §74.861(e)(1)(i)-OUTPUT POWER MEASUREMENT

3.1 Standard Applicable

According to FCC 74.861(e)(1)(ii), for low power auxiliary station operating in the 54–72, 76–88, and 174–216 MHz bands, the power of the measured unmodulated carrier power ant the output of the transmitter power amplifier (antenna input power) may not exceed 50mW.

3.1 Test Equipment List and Detail

Manufacturer	Description	Model	Serial Number	Cal. Date	Due. Date
Agilent	Spectrum Analyzer	E4402B	US41192821	2010-12-20	2011-12-19
VICTOR	Multimeter	VC9801A	98965350	2010-12-20	2011-12-19
FLUKE	Multimeter	15B	91280239	2010-12-20	2011-12-19

Statement of Traceability: All calibrations have been performed per the NVLAP requirements traceable to the NIST.

3.3 Test Procedure

1. The maximum peak output power was measured with a Spectrum Analyzer connected to the antenna terminal while EUT was operating in unmodulated situation.

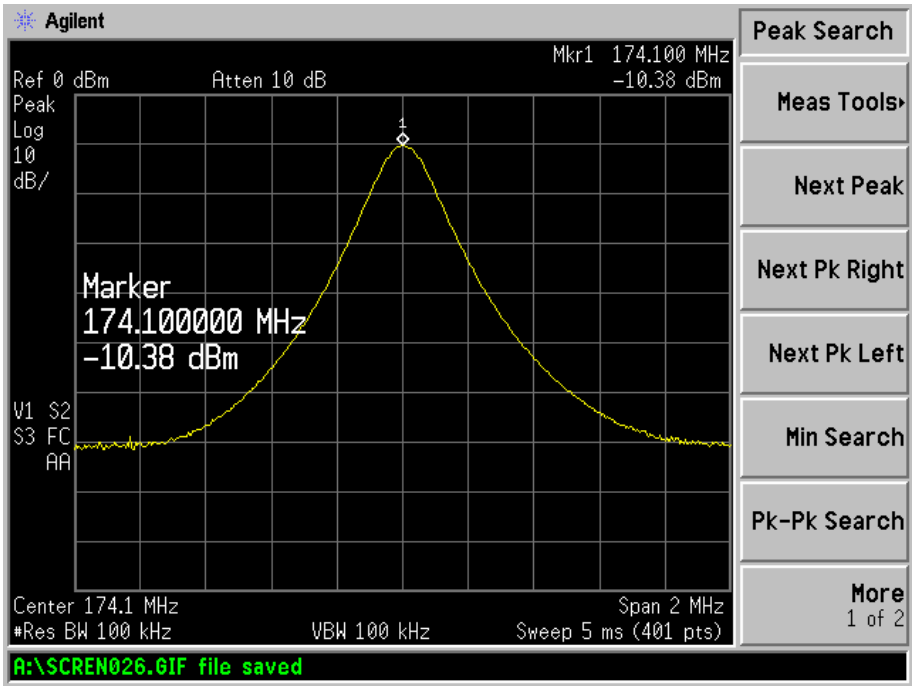
2. Power was supplied to the battery input connector a power supply. The power supply was set for +3.0VDC. The Spectrum Analyzer was connected at antenna terminal to measure RF power of the carrier.

3. A Multimeter was connected in series with final RF Stage to measure the current; A Multimeter was used to measure final RF Stage supply voltage. Then the voltage v.s. current of the final RF Stage can be showed.

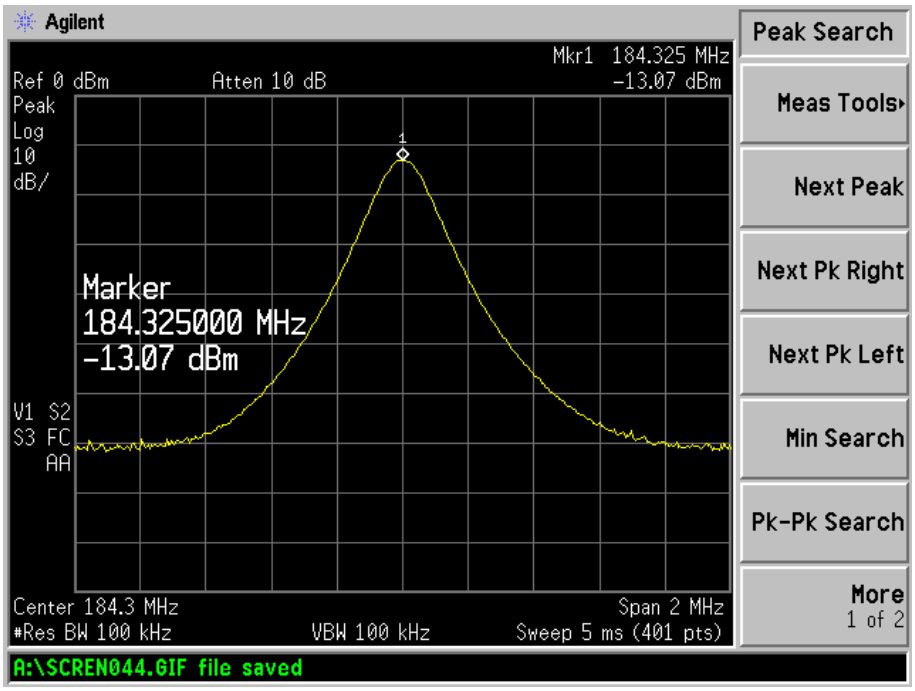
3.2 Test Result/Plots

Channel	Frequency (MHz)	RF Stage Voltage (Vdc)	Collected Current (mA)	Output Power (dBm)	Limit (dBm)
Low channel	174.100	9.00	0.28	-10.38	17
Middle channel	184.325	9.00	0.23	-13.07	17
High channel	215.800	9.00	0.25	-22.60	17

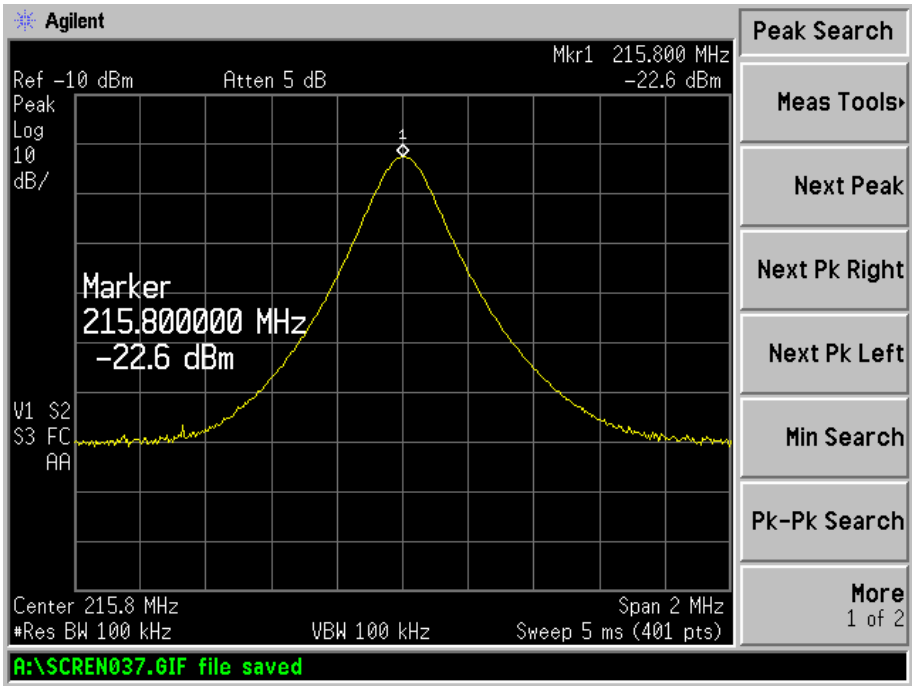
Low channel (174.100MHz)



Middle channel (184.325MHz)



High channel (215.800MHz)



4. §74.861(e)(3)-MODULATION CHARACTERISTICS

4.1 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.

4.2 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Modulation Analyzer	Rohde & Schwarz	FAM 54	334.2015.54	2010-12-20	2011-12-19
Audio Generator	MEILI	MFG-3005	200612187	2010-12-20	2011-12-19

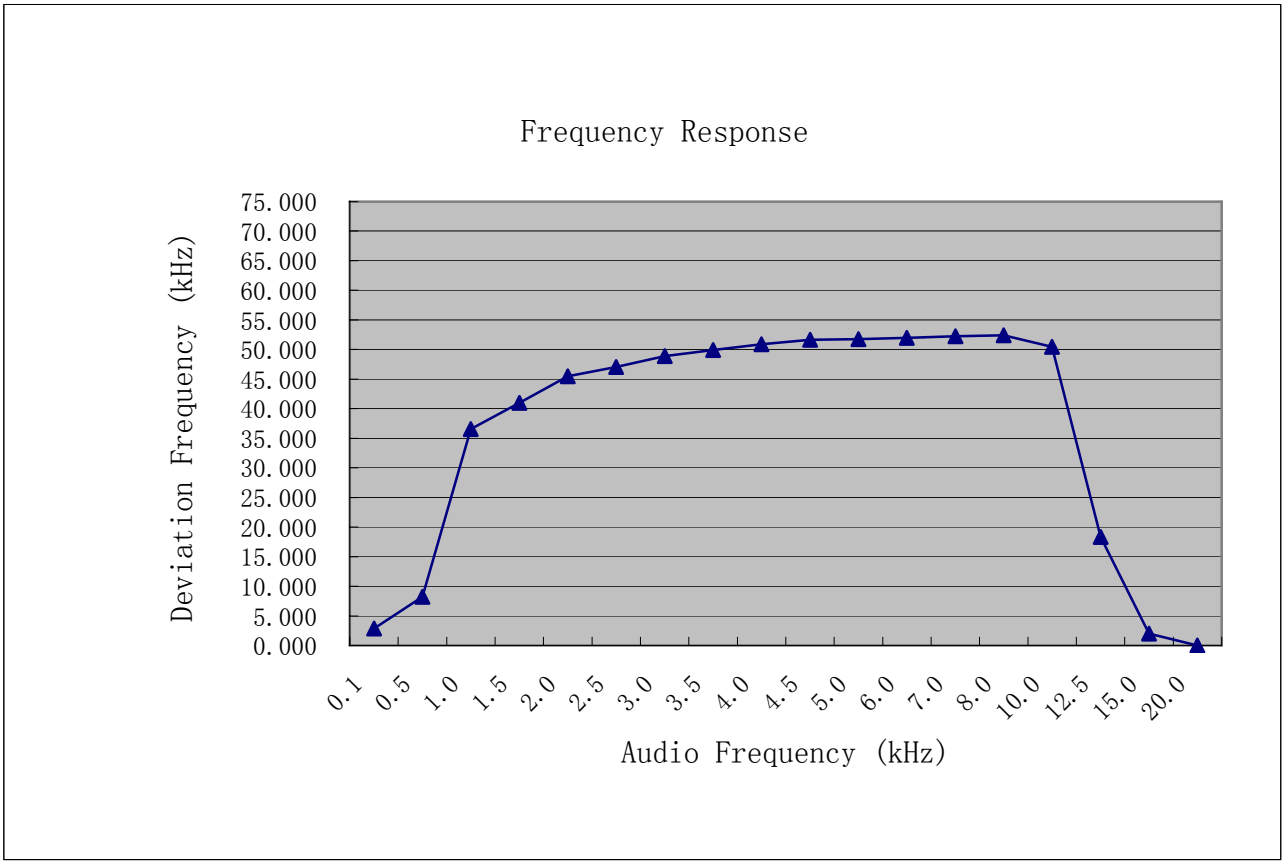
Statement of Traceability: All calibrations have been performed per the NVLAP requirements traceable to the NIST.

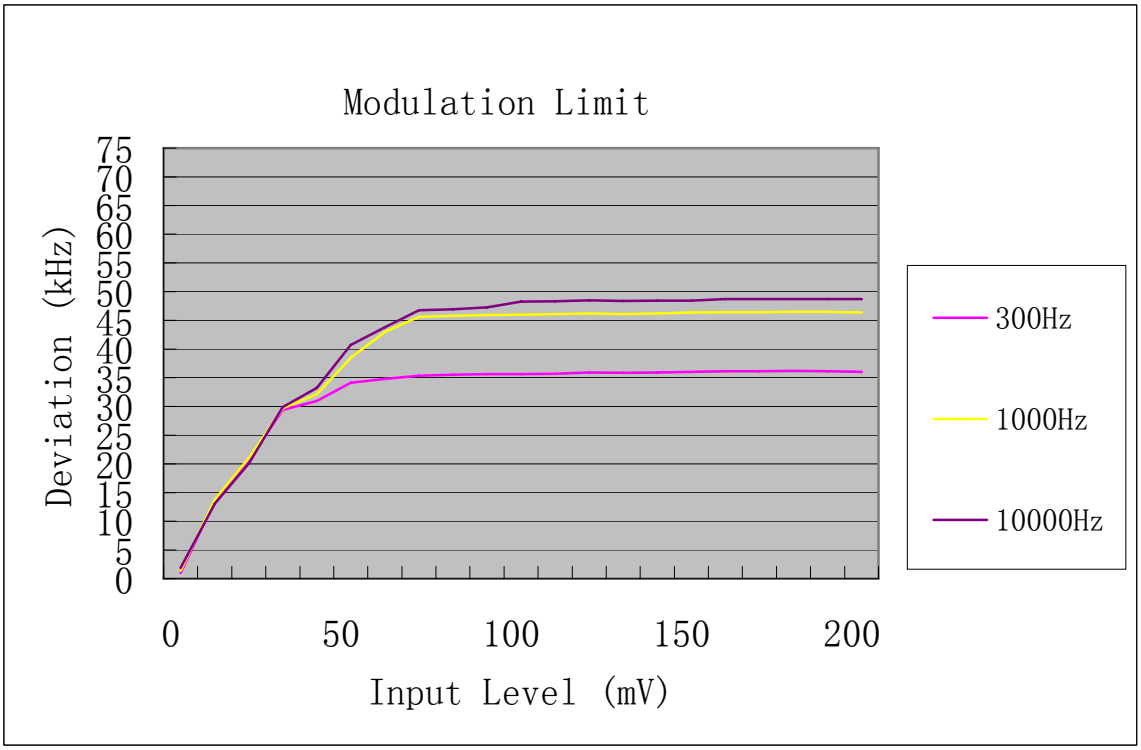
4.3 Test Procedure

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.

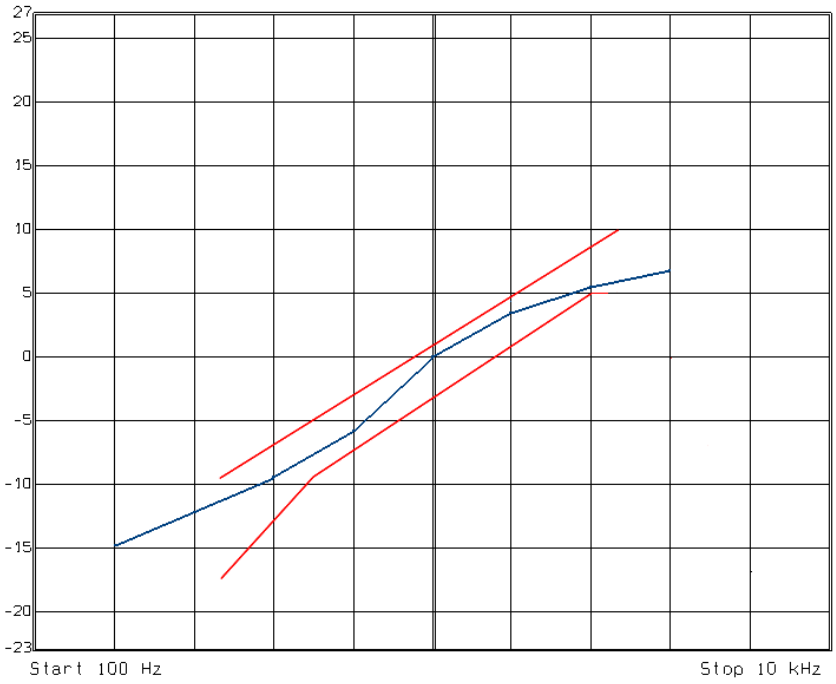
4.4 Test Results/Plots

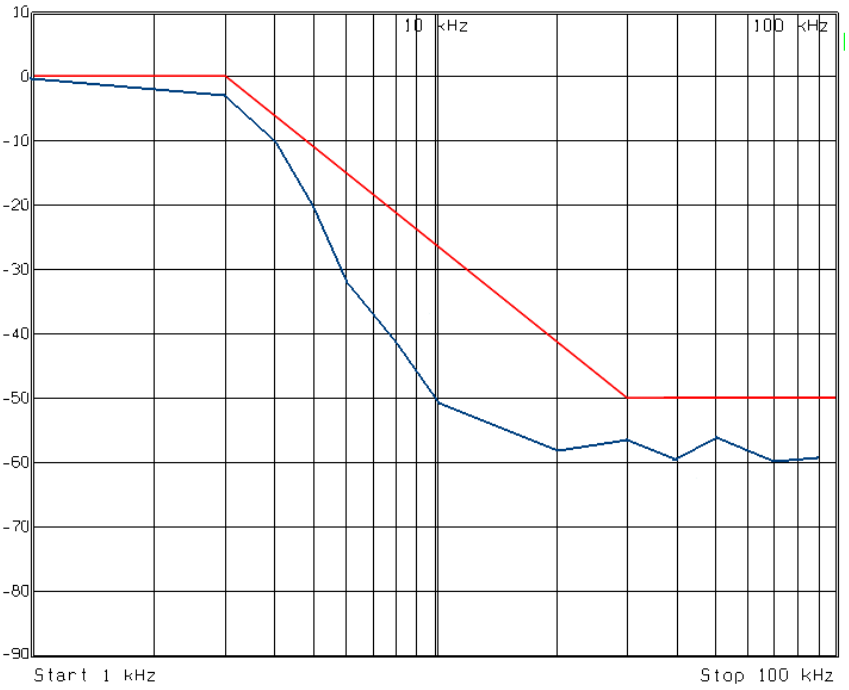
For Middle Channel (184.325MHz)





Audio Low Pass Filter Characteristic Curve





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

5.1 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.

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Agilent	Spectrum Analyzer	E4402B	US41192821	2010-12-20	2011-12-19
Audio Generator	MEILI	MFG-3005	200612187	2010-12-20	2011-12-19

Statement of Traceability: All calibrations have been performed per the NVLAP requirements traceable to the NIST.

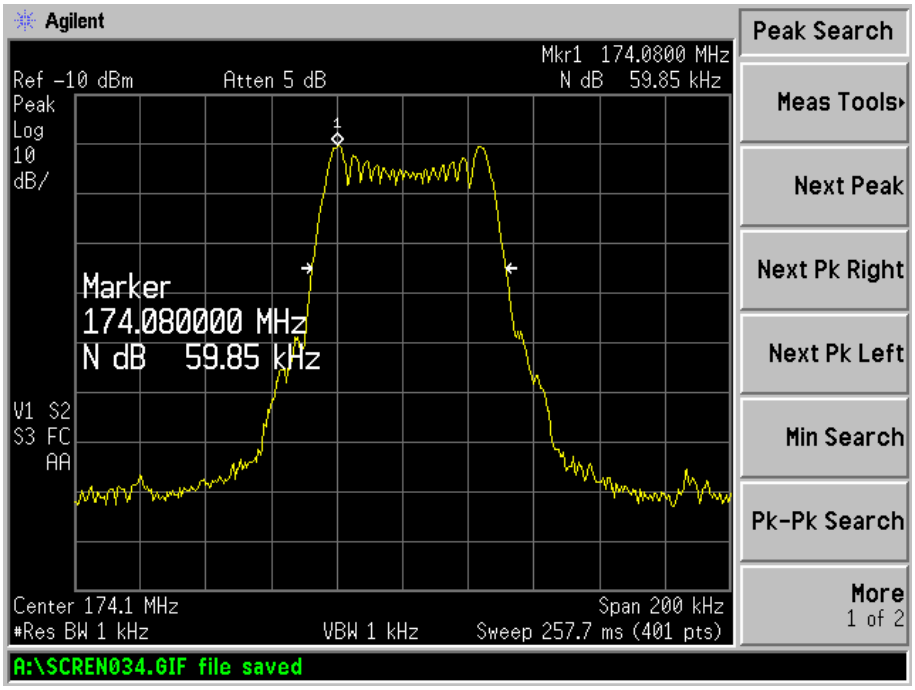
5.2 Test Procedure

According to TIA-603 for additional Test Set-Up procedures, the occupied bandwidth of emission was measured with a Spectrum Analyzer connected to the antenna terminal while EUT was operating in 2.5kHz tone at an input level 16 dB greater than that necessary to produce 50 percent modulation. Then mark the –26dB Bandwidth and record it.

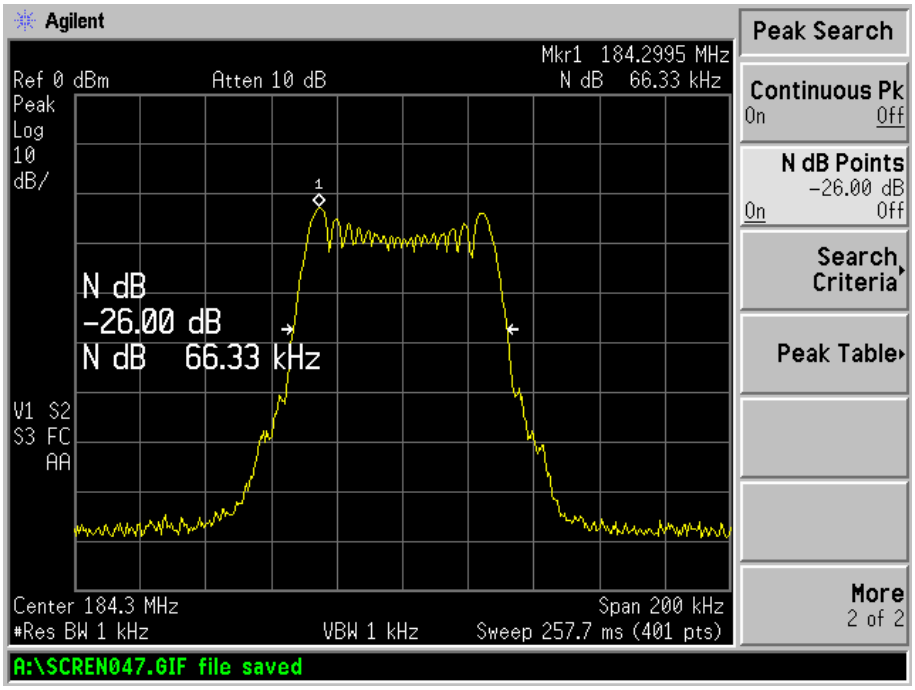
5.3 Test Results/Plots

Test Channel	Freq (MHz)	Measured Bandwidth (kHz)	Limit (kHz)
Low channel	174.100	59.85	200
Middle channel	184.325	66.33	200
High channel	215.800	52.87	200

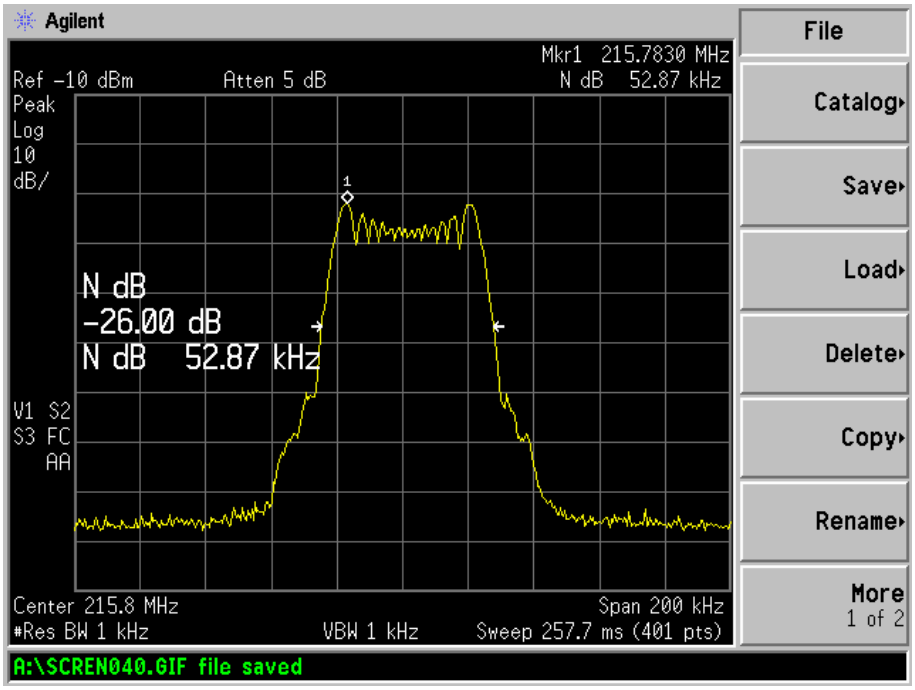
Low channel (174.100MHz)



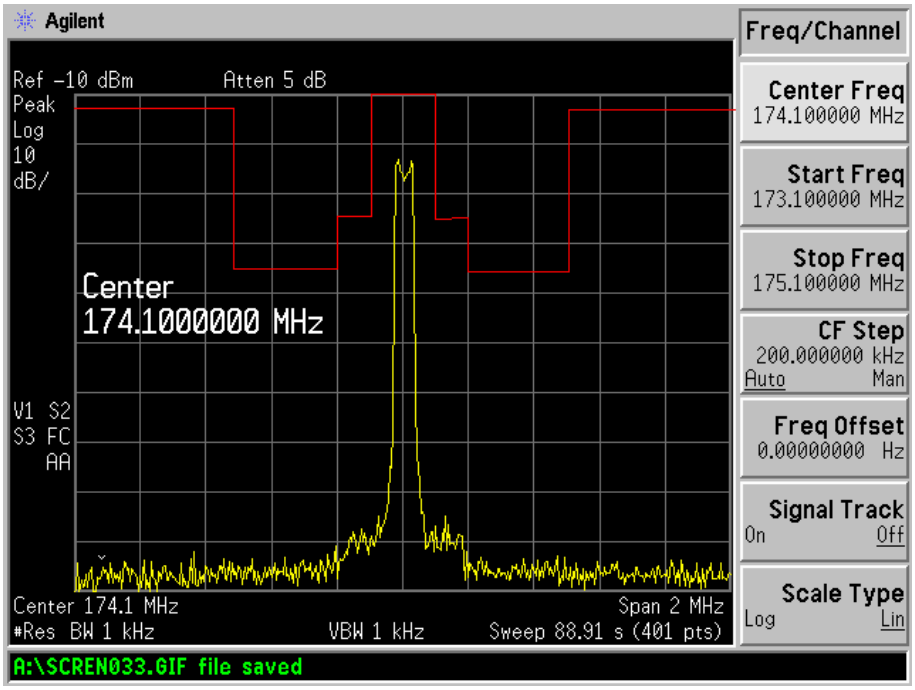
Middle channel (184.325MHz)



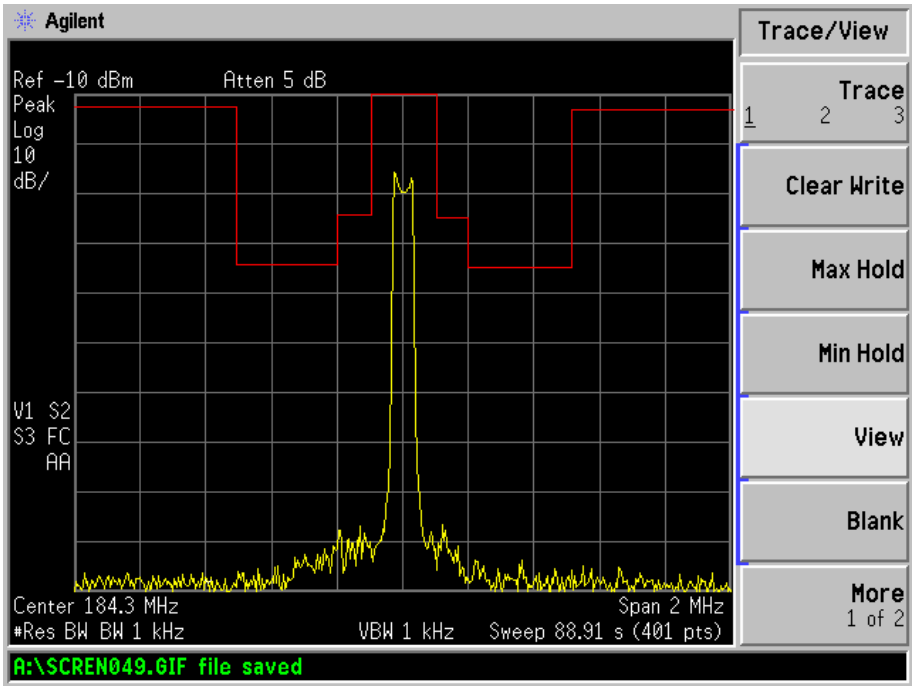
High channel (215.800MHz)



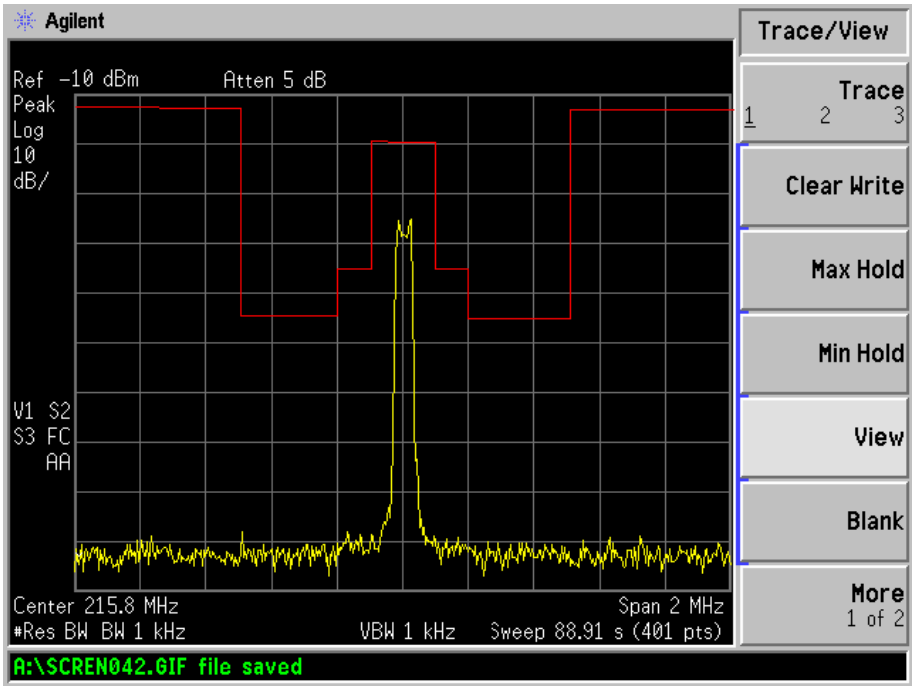
Emission Mask (174.100MHz)



Emission Mask (184.325MHz)



Emission Mask (215.800MHz)



6. §74.861 (e)(6)(iii)- RADIATED SPURIOUS EMISSION

6.1 Measurement Uncertainty

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement is ±3.0 dB.

6.2 Standard Applicable

According to FCC 2.1053, 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.

6.3 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	R&S	FSP	836079/035	2010-12-20	2011-12-19
Positioning Controller	C&C	CC-C-1F	N/A	2010-12-20	2011-12-19
RF Switch	EM	EMSW18	SW060023	2010-12-20	2011-12-19
Pre-amplifier	Agilent	8447F	3113A06717	2010-12-20	2011-12-19
Pre-amplifier	Compliance Direction	PAP-0118	24002	2010-12-20	2011-12-19
Trilog Broadband Antenna	SCHWARZBECK	VULB9163	9163-333	2011-01-09	2012-01-08
Horn Antenna	ETS	3117	00086197	2011-01-09	2012-01-08
Signal Generator	Rohde & Schwarz	SMR20	100047	2011-01-09	2012-01-08

Statement of Traceability: All calibrations have been performed per the NVLAP requirements traceable to the NIST.

6.4 Test Procedure

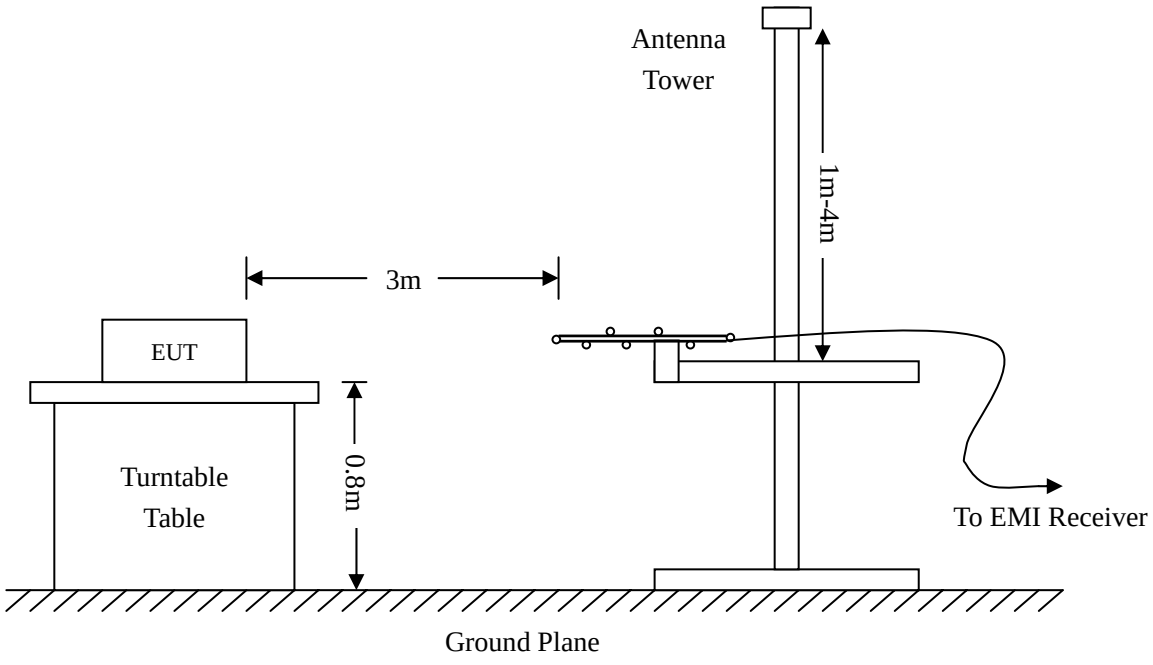
The setup of EUT is according with per TIA/EIA Standard 603 and ANSI C63.4-2003 measurement procedure.

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



6.5 Environmental Conditions

Temperature:	26° C
Relative Humidity:	52%
ATM Pressure:	1022 mbar

6.6 Summary of Test Results/Plots

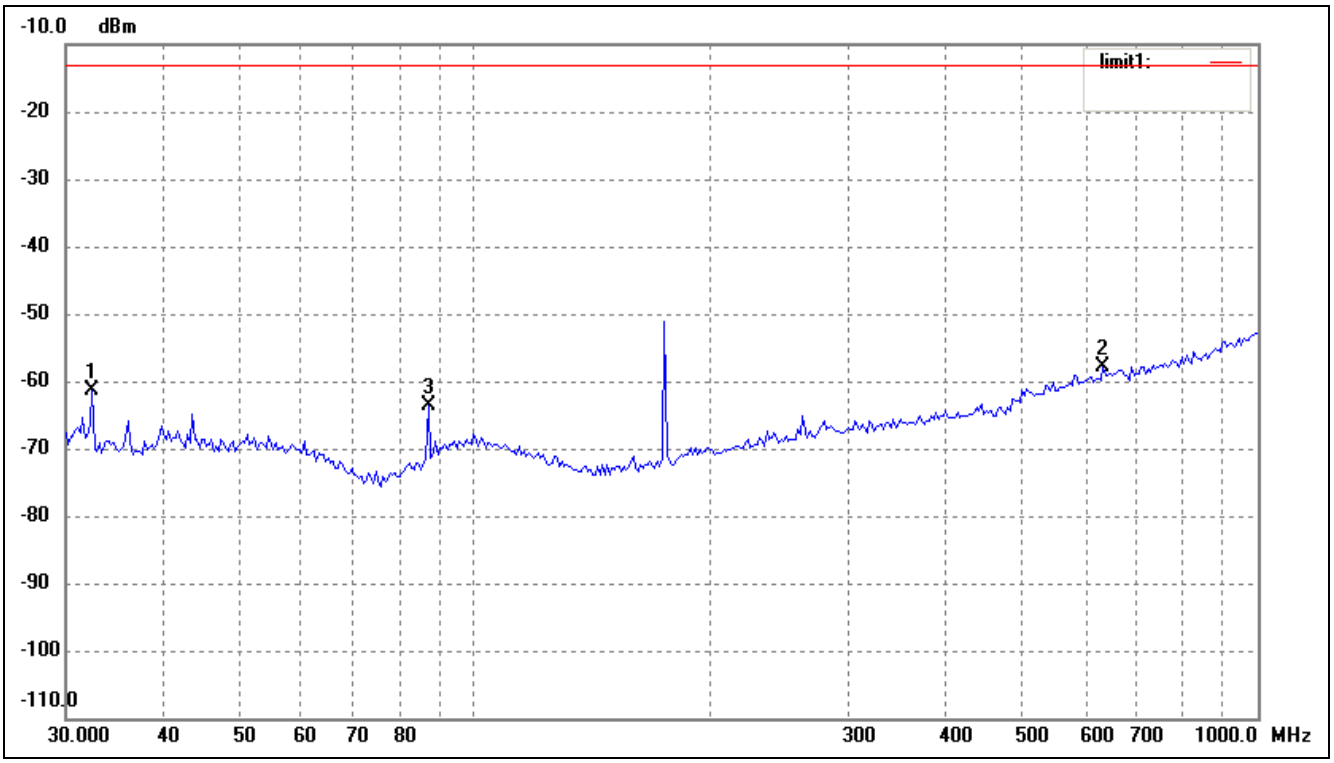
According to the data below, the FCC Part 74.861 standards, and had the worst margin of:

-37.35 dBμV at **261.9753 MHz** in the **Vertical** polarization, **30 MHz to 3 GHz, Substitute.**

Spurious Emission from 30MHz to 1GHz

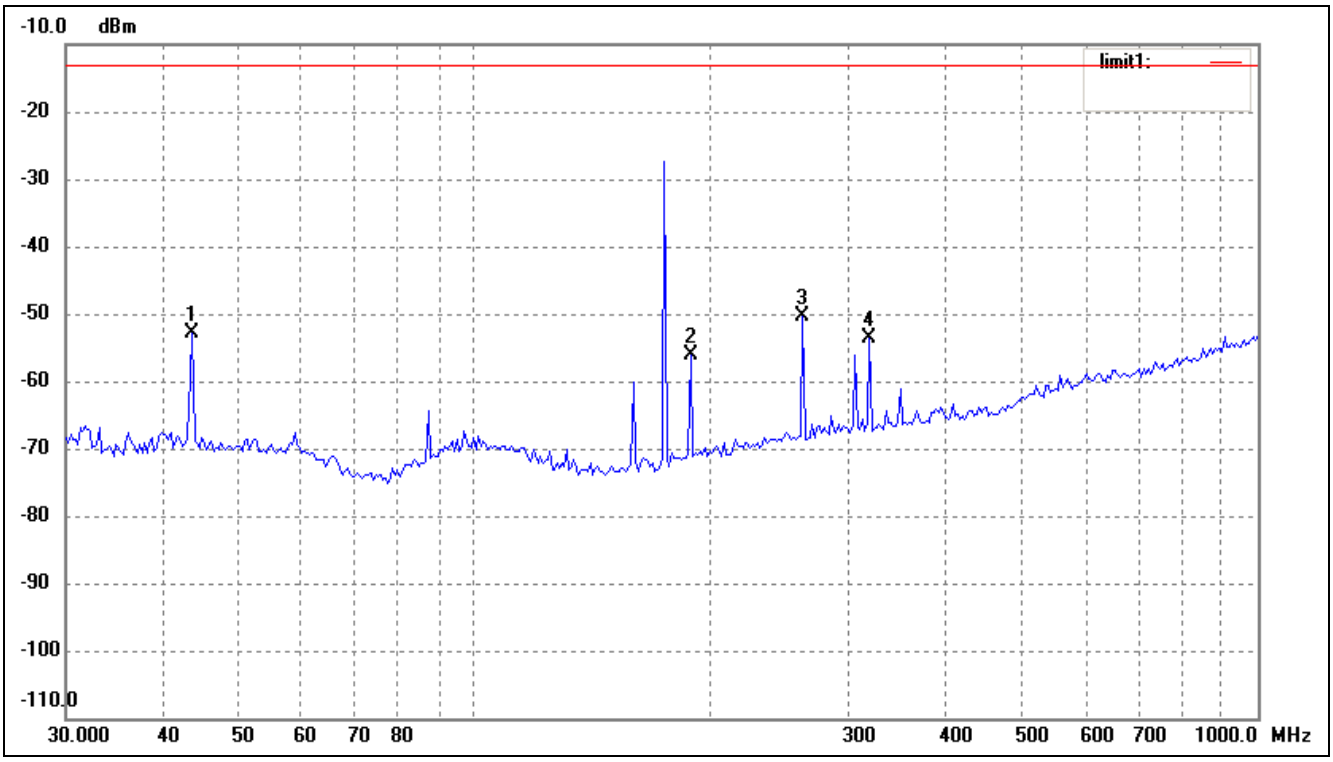
Test Mode: Transmitting-Low channel

Horizontal:



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	
1	32.4059	-79.86	18.57	-61.29	-13.00	-48.29	ERP
2	633.9073	-86.68	28.75	-57.93	-13.00	-44.93	ERP
3	87.1117	-81.51	17.95	-63.56	-13.00	-50.56	ERP

Vertical:

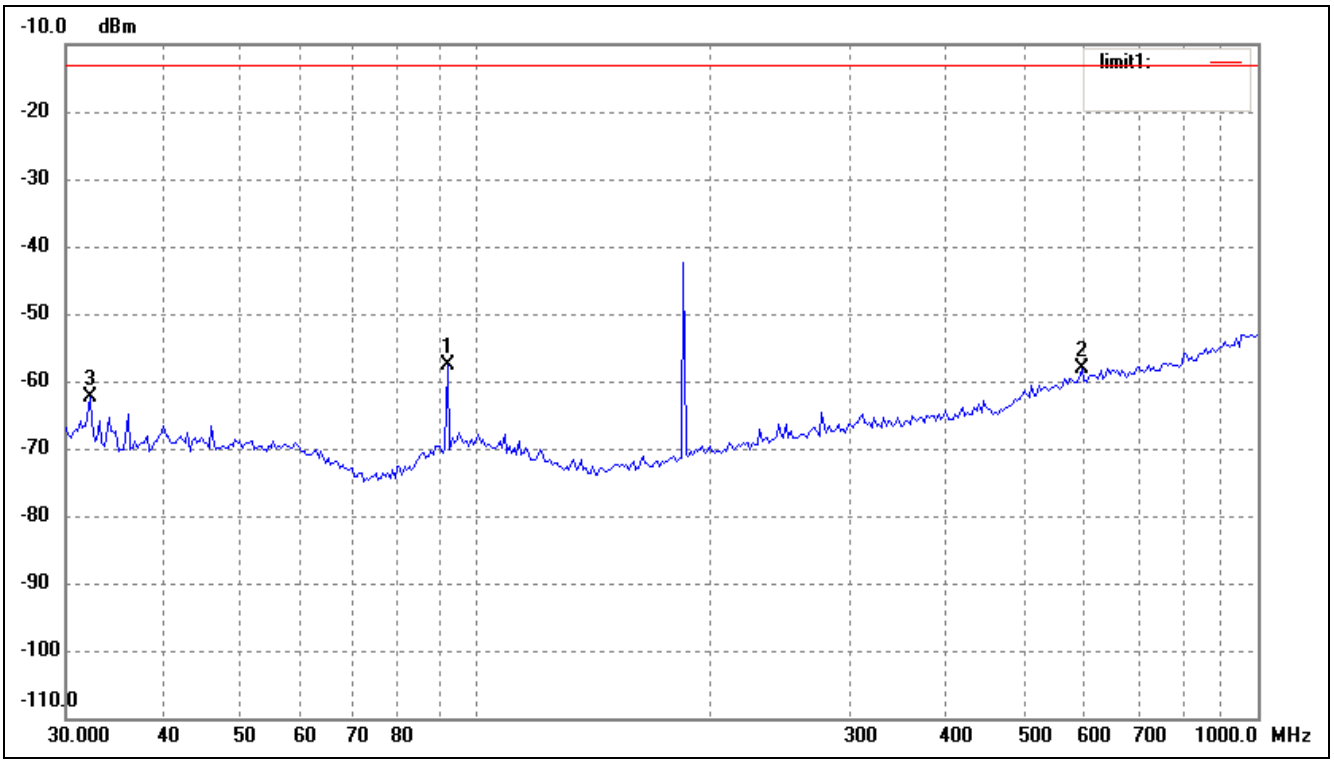


No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	
1	43.5057	-72.94	20.00	-52.94	-13.00	-39.94	ERP
2	188.4125	-74.40	18.20	-56.20	-13.00	-43.20	ERP
3	261.9753	-71.15	20.80	-50.35	-13.00	-37.35	ERP
4	318.8170	-75.33	21.78	-53.55	-13.00	-40.55	ERP

Spurious Emission from 30MHz to 1GHz

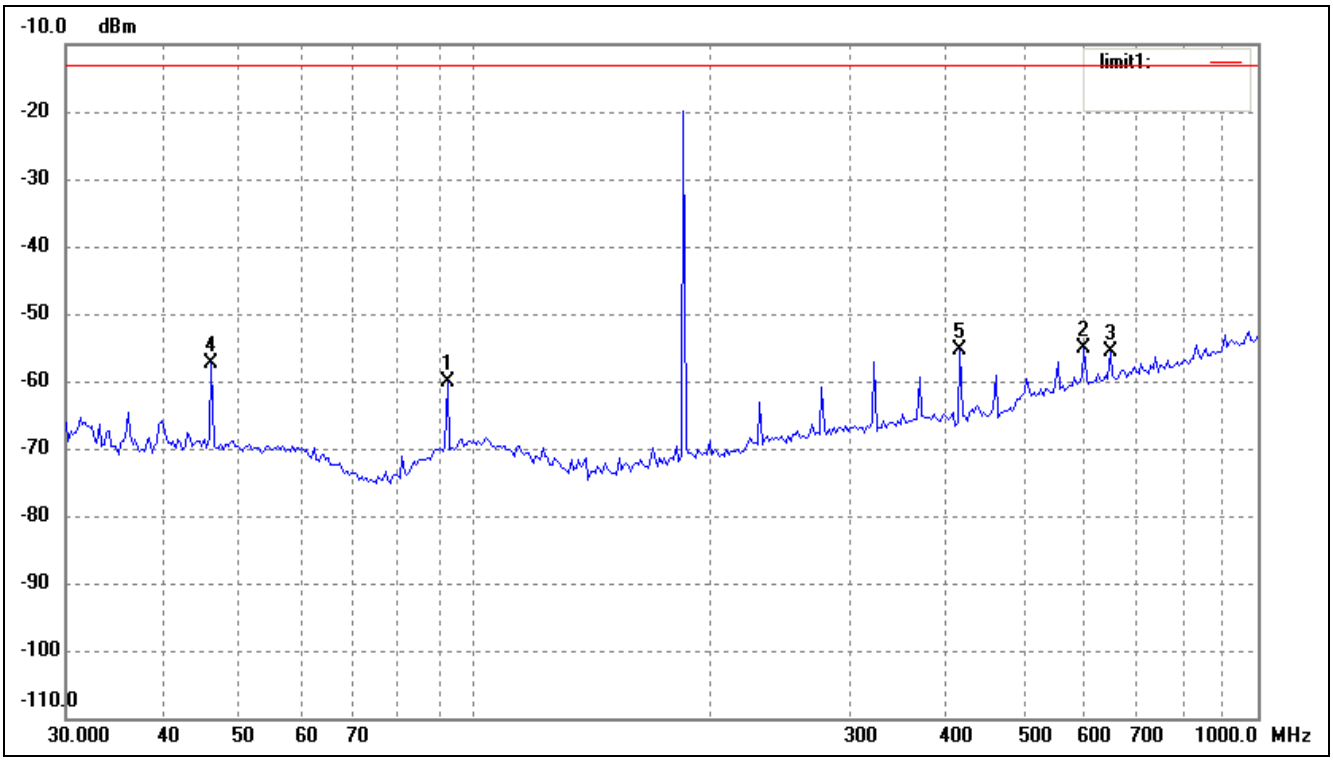
Test Mode: Transmitting-Middle channel

Horizontal:



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	
1	92.1388	-76.92	19.30	-57.62	-13.00	-44.62	ERP
2	595.1329	-86.58	28.35	-58.23	-13.00	-45.23	ERP
3	32.1794	-80.95	18.57	-62.38	-13.00	-49.38	ERP

Vertical:

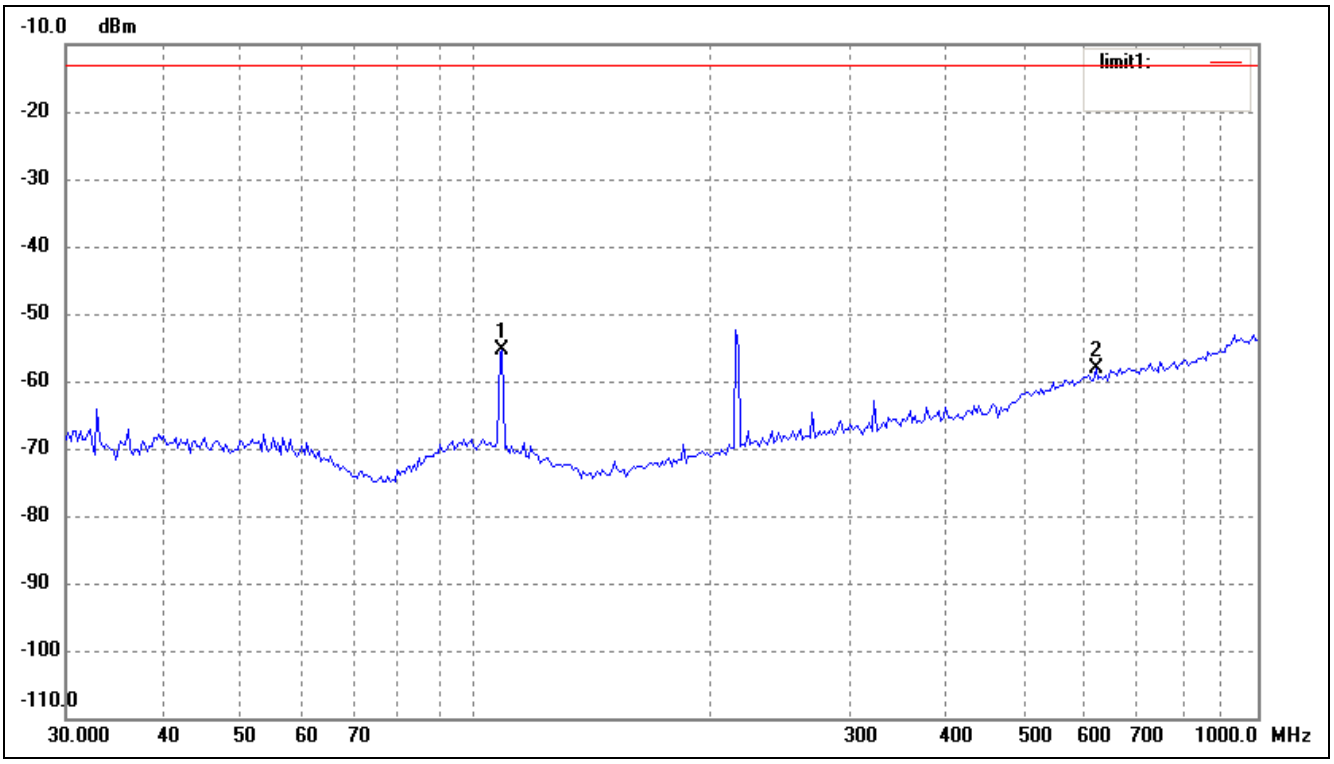


No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	
1	92.1388	-79.40	19.30	-60.10	-13.00	-47.10	ERP
2	599.3212	-83.56	28.45	-55.11	-13.00	-42.11	ERP
3	647.3856	-84.60	28.87	-55.73	-13.00	-42.73	ERP
4	46.0163	-77.39	19.98	-57.41	-13.00	-44.41	ERP
5	416.1791	-78.52	23.17	-55.35	-13.00	-42.35	ERP

Spurious Emission from 30MHz to 1GHz

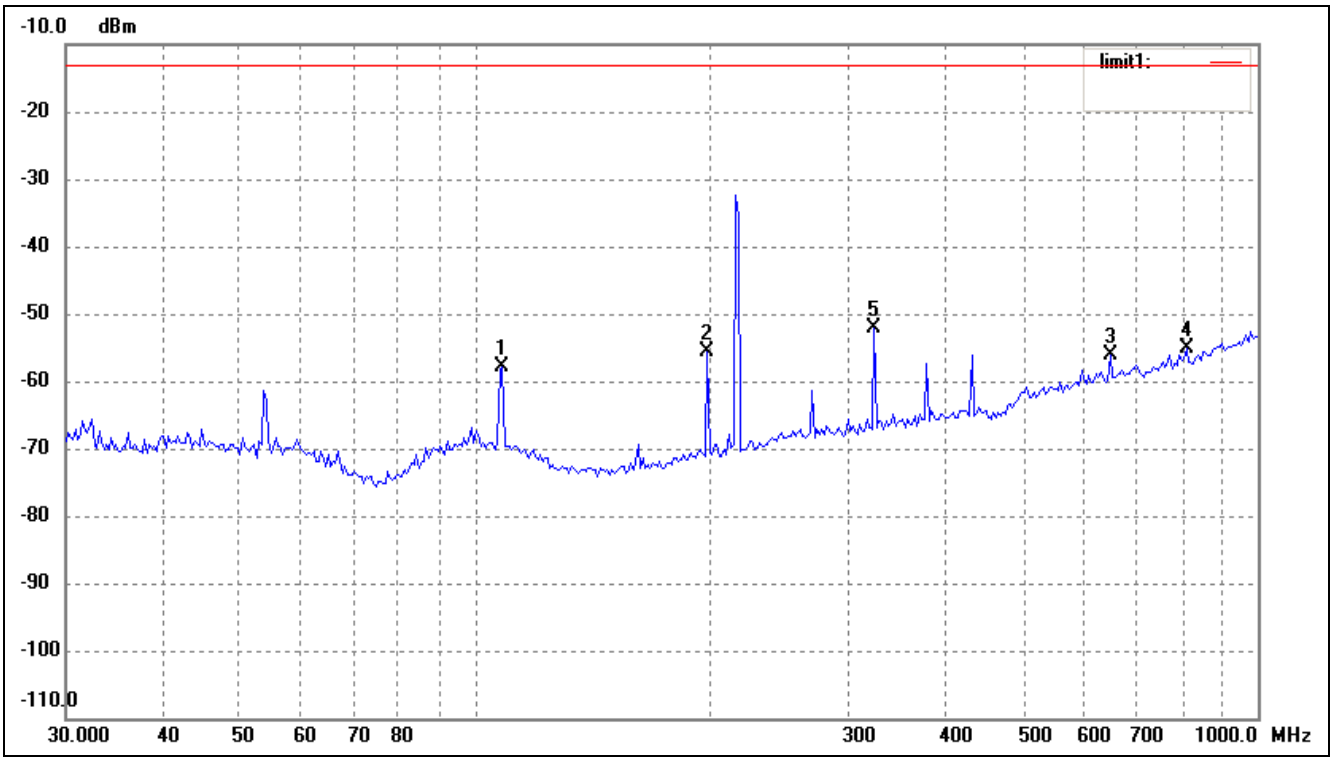
Test Mode: Transmitting-High channel

Horizontal:



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	
1	108.2667	-75.01	19.53	-55.48	-13.00	-42.48	ERP
2	620.7096	-86.66	28.64	-58.02	-13.00	-45.02	ERP

Vertical:



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	
1	108.2667	-77.37	19.53	-57.84	-13.00	-44.84	ERP
2	197.8928	-73.90	18.38	-55.52	-13.00	-42.52	ERP
3	647.3856	-84.89	28.87	-56.02	-13.00	-43.02	ERP
4	810.2654	-86.21	31.00	-55.21	-13.00	-42.21	ERP
5	323.3204	-74.04	21.86	-52.18	-13.00	-39.18	ERP

Note: Testing is carried out with frequency rang 30MHz to the tenth harmonics. Emissions undetected below the base noise are not reported.

7. §2.1051-SPURIOUS EMISSION AT ANTENNA TERMINAL

7.1 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.

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:

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.

7.2 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date	Due. Date
Agilent	Spectrum Analyzer	E4402B	US41192821	2010-12-20	2011-12-19
ETS	50 ohm Coaxial Cable	SUCOFLEX 104	25498514	2010-12-20	2011-12-19

Statement of Traceability: All calibrations have been performed per the NVLAP requirements traceable to the NIST.

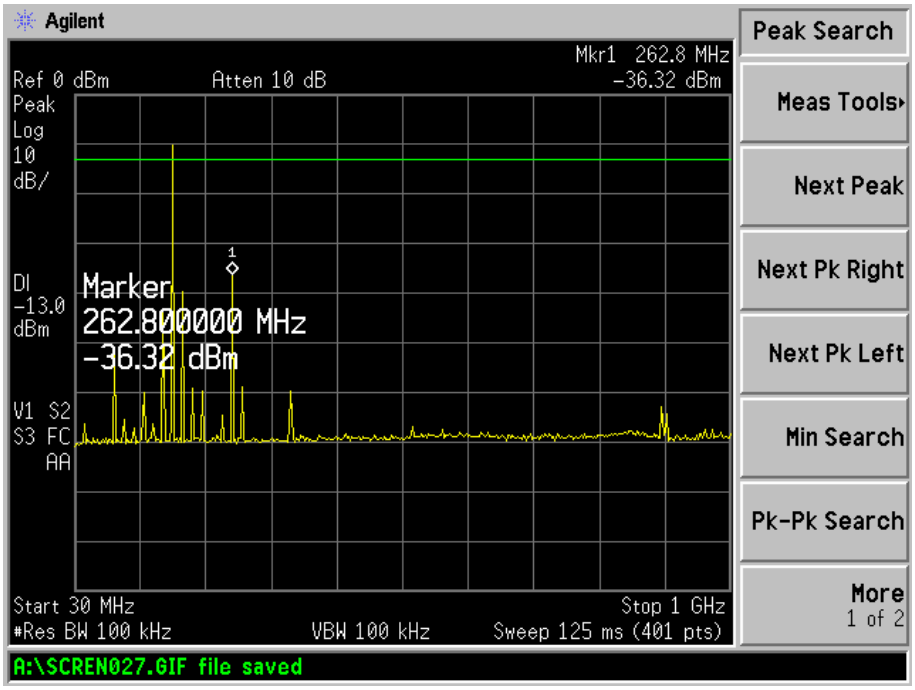
7.3 Test Procedure

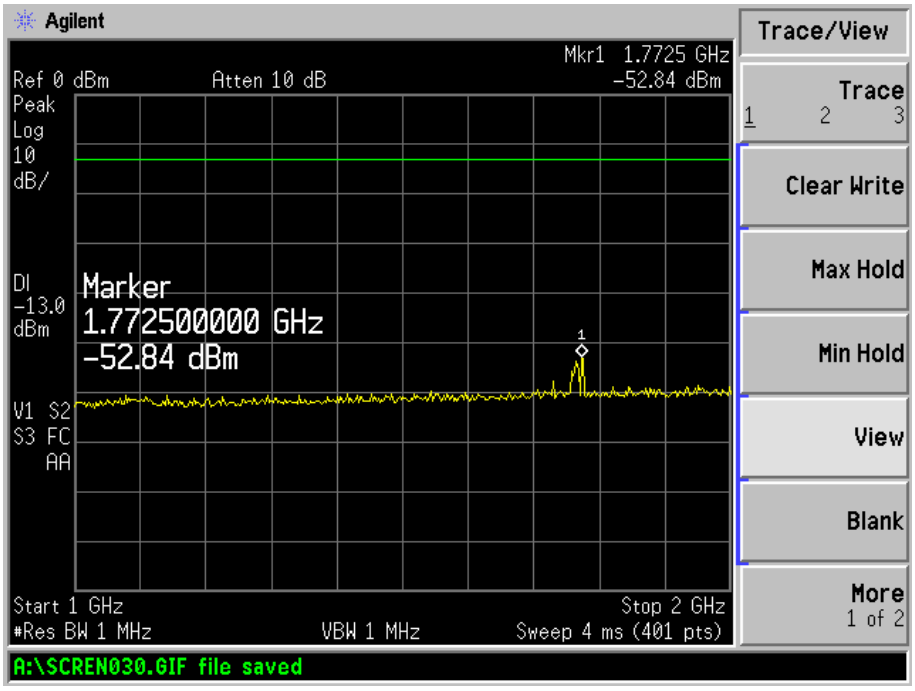
Connect a suitable artificial antenna properly, set the Low, Middle and High Transmitting Channel, observed the spurious emissions from antenna port, and then mark the higher-level emission for comparing with the FCC rules.

7.4 Summary of Test Results/Plots

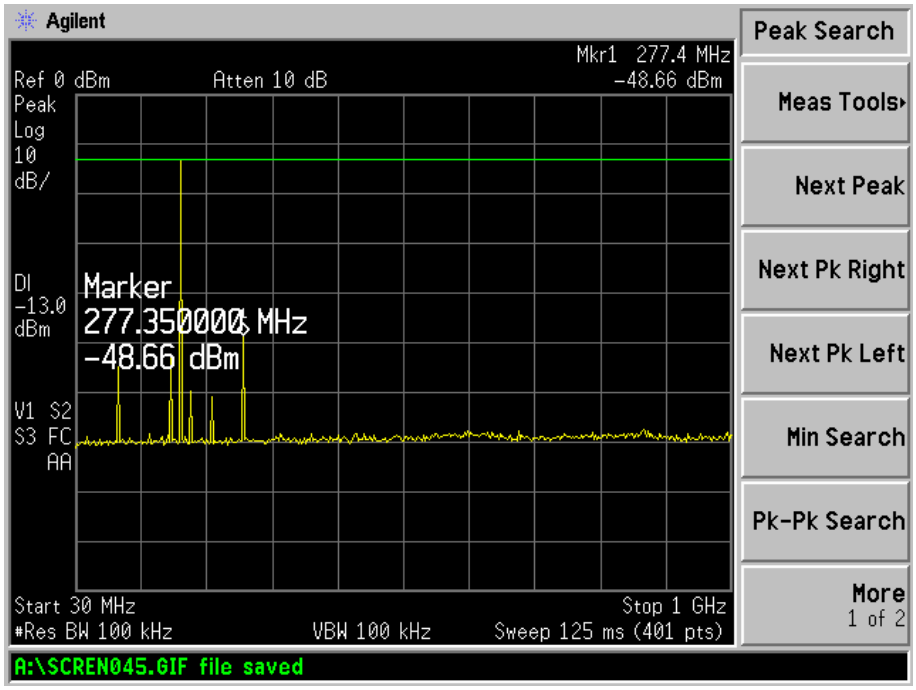
Refer to the attached plots.

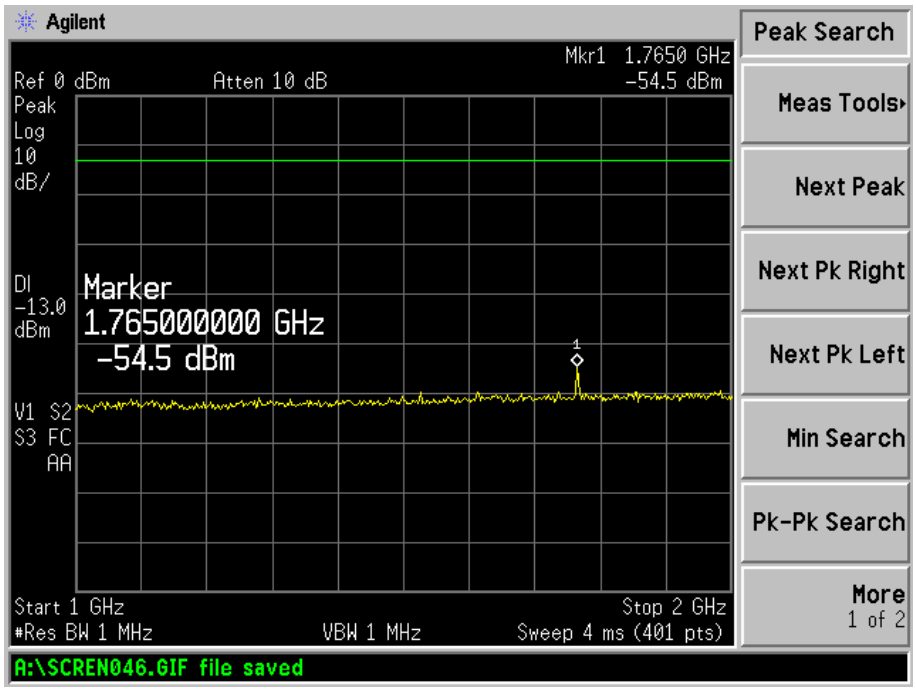
Low channel (174.100MHz)



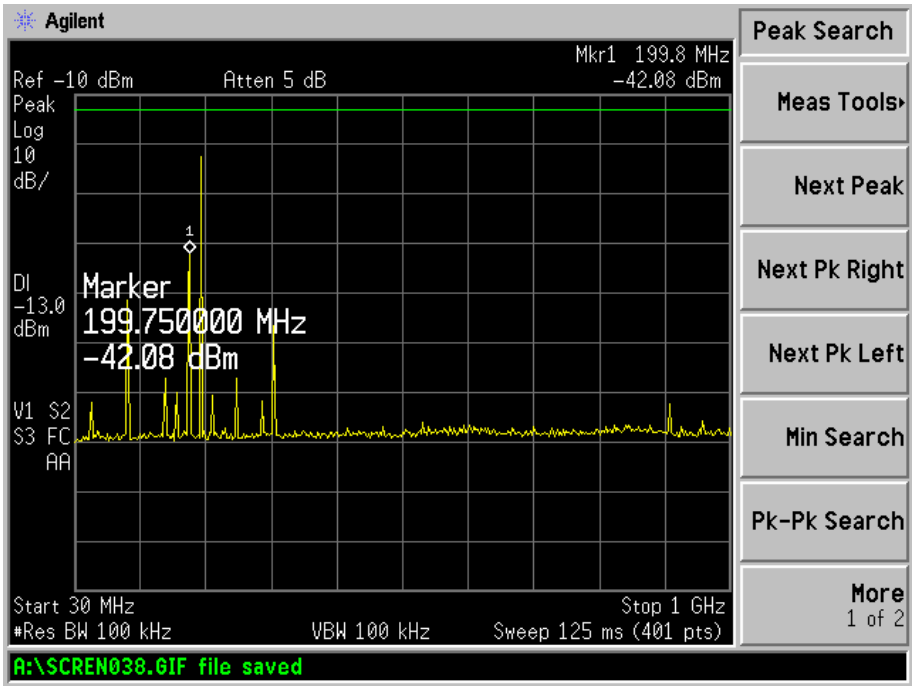


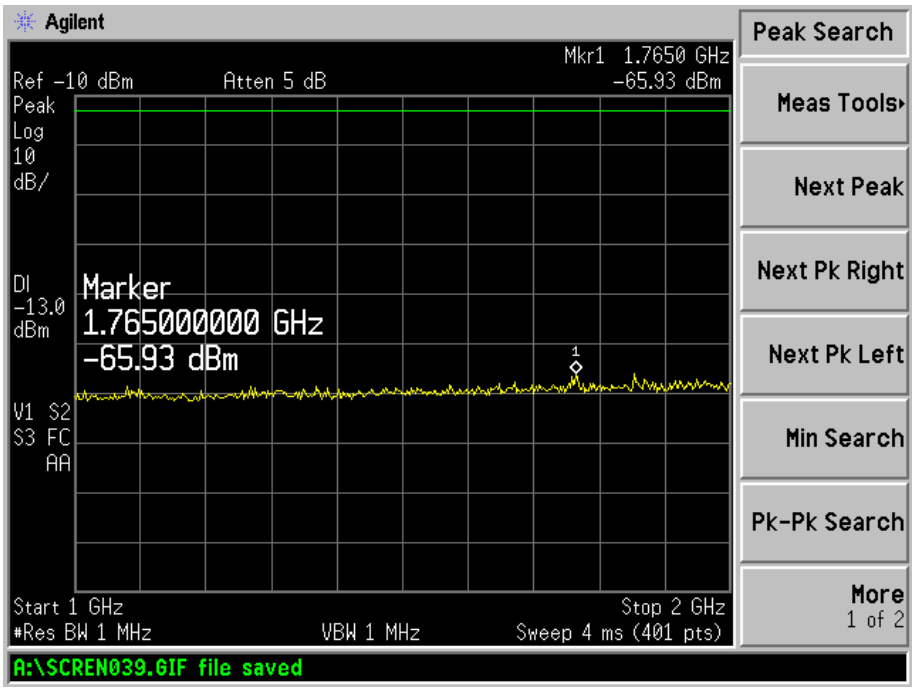
Middle channel (184.325MHz)





High channel (215.800MHz)





8. §74.86(e)(4) - FREQUENCY STABILITY MEASUREMENT

8.1 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.

8.2 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date	Due. Date
Agilent	Spectrum Analyzer	E4402B	US41192821	2010-12-20	2011-12-19
GONGWEN	Moisture Test Chamber	GDS-150	SEMT-0013	2010-12-20	2011-12-19

Statement of Traceability: All calibrations have been performed per the NVLAP requirements traceable to the NIST.

8.3 Test Procedure

1. Setup the configuration of the ambient temperature form -30ºC to 50ºC with sufficient time. And measure the different power of the EUT with an artificial power from highest to end point voltage.
2. Set frequency counter center frequency to the right frequency needs to be measured.

8.4 Test Results/Plots

Test conditions		Frequency Error		
		174.100 MHz	184.325 MHz	215.800 MHz
T_{min} (-30°C)	V_{min}(7.7V)	174.0671	184.3210	215.7966
	V_{max}(10.3V)	174.0969	184.3217	215.7968
T(-20°C)	V_{nom}(9.0V)	174.0989	184.3225	215.7979
T(-10°C)	V_{nom}(9.0V)	174.0984	184.3233	215.7985
T(0°C)	V_{nom}(9.0V)	174.0990	184.3245	215.7988
T(10°C)	V_{nom}(9.0V)	174.0995	184.3249	215.7992
T_{nom}(20°C)	V_{nom}(9.0V)	174.1000	184.3250	215.8000
T(30°C)	V_{nom}(9.0V)	174.1000	184.3250	215.8000
T(40°C)	V_{nom}(9.0V)	174.1009	184.3255	215.8005
T_{max}(50°C)	V_{min}(7.7V)	174.1015	184.3280	215.8036
	V_{max}(10.3V)	174.1022	184.3276	215.8035
Max. frequency error (ppm)		-17.8	-17.9	+16.7
Limit (ppm)		±50ppm		
End Point		DC 1.8V		

******* END OF REPORT *******