

FCC Test Report

On Model Name: Watch Style Active Tag

Model Numbers: ES-Tag1355、 ES-Tag1355P

Brand Name: 

FCC ID Number: YMFESTAG1355

Prepared for
GuangZhou ESquare Electronic Equipment Co., Ltd

Test Specification : FCC Part 15(2009), Subpart C

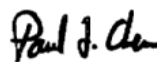
Test Report #: GUA-1007-10460-FCC

Prepared by: May Wang

Reviewed by: Jawen Yin

QC Manager: Paul Chen

Test Report Released by:



Paul Chen

2010, August 8

Date

List of Attached Files

<i>Exhibit Type</i>	<i>File Description</i>	<i>File Name</i>
<i>Test Report</i>	<i>Test Report</i>	YMFESTAG1355_ <i>Test report.pdf</i>
<i>Operation Description</i>	<i>Technical Description</i>	YMFESTAG1355_ <i>operation description.pdf</i>
<i>External Photos</i>	<i>External Photos</i>	YMFESTAG1355_ <i>External Photos.pdf</i>
<i>Internal Photos</i>	<i>Internal Photos</i>	YMFESTAG1355_ <i>Internal Photos.pdf</i>
<i>Block Diagram</i>	<i>Block Diagram</i>	YMFESTAG1355_ <i>Block_Rev1 Diagram.pdf</i>
<i>Schematics</i>	<i>Circuit Diagram</i>	YMFESTAG1355_ <i>Schematics.pdf</i>
<i>ID Label/Location</i>	<i>Label Artwork and Location</i>	YMFESTAG1355_ <i>Label & Location.pdf</i>
<i>User Manual</i>	<i>User Manual</i>	YMFESTAG1355_ <i>User Manual.pdf</i>
<i>Test setup photos</i>	<i>Test setup photos</i>	YMFESTAG1355_ <i>Test Setup Photos.pdf</i>

Test Location

Tests performed in a Certified ANSI Semi-Anechoic Chamber and Shielded Room.

Test Site Location : Guangdong Galanz Enterprise Co. Ltd

*25 South Ronggui Rd., Shunde, Foshan,
Guangdong, China*

Tel : 86-757-23612785

Fax : 86-757-23612537

FCC Registration Number : 580210

CNAS Registration Number : L2244

List of Test and Measurement Instruments

<i>Equipment</i>	<i>Manufacturer</i>	<i>Model No.</i>	<i>Serial No.</i>	<i>Calibrated Untill</i>
<i>Spectrum Analyzer</i>	<i>R&S</i>	<i>FSP30</i>	<i>100755</i>	<i>2010-11-30</i>
<i>EMI Receiver</i>	<i>SCHAFFNER</i>	<i>SMR4503</i>	<i>11725</i>	<i>2010-11-30</i>
<i>Double-ridged Wave guide horn</i>	<i>ETS</i>	<i>3115</i>	<i>6587</i>	<i>2010-11-30</i>
<i>Amplifier</i>	<i>Agilent</i>	<i>83017A</i>	<i>MY39500438</i>	<i>2010-11-30</i>
<i>Biconilog Antenna</i>	<i>ETS</i>	<i>3142C</i>	<i>00042672</i>	<i>2010-11-30</i>
<i>Semi-anechoic Chamber</i>	<i>ETS</i>	<i>N/A</i>	<i>N/A</i>	<i>2011-11-30</i>

Table of Contents

GOVERNMENT DISCLAIMER NOTICE	1
REPRODUCTION CLAUSE	1
ADMINISTRATIVE DATA	2
EUT DESCRIPTION	3
TEST SUMMARY	4
TEST MODE JUSTIFICATION	5
TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL	5
EUT EXERCISE SOFTWARE	5
EQUIPMENT MODIFICATION	5
TEST SYSTEM DETAILS	6
TEST SET-UP DIAGRAM	7
EUT SAMPLE PHOTOS	8
ATTACHMENT 1 – ANTENNA REQUIREMENT	11
ATTACHMENT 2– FIELD STRENGTH OF FUNDAMENTAL AND SPURIOUS EMISSION	13
ATTACHMENT 3– OUT OF BAND EMISSIONS	21
ATTACHMENT 4 – 20 DB BANDWIDTH	24
ATTACHMENT 5– TEST SET-UP PHOTOGRAPH	26

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Administrative Data

Test Sample : *Watch Style Active Tag*

Model Name : *ES-TAG1355、ES-TAG1355P*

Model Tested : *ES-TAG1355*

Serial Number : *Engineering Sample*

Date Tested : *2010 , August 2 to 5*

Applicant : *GuangZhou Esquare Electronic Equipment Co., Ltd*
501 North Ladder, No.27, Nanti West Road, Panyu District, Guangzhou

Mobile Phone : *+86-18922405166*

EUT Description

GuangZhou Esquare Electronic Equipment Co., Ltd, model tested ES-TAG1355(referred to as the EUT in this report) is a Watch Style Active Tag.

Technical Specification :

<i>Product Name</i>	<i>Watch Style Active Tag</i>
<i>Carried Frequency</i>	<i>2418MHz</i>
<i>Frequency range</i>	<i>2400 ~ 2483.5MHz</i>
<i>Modulation Type</i>	<i>GFSK</i>
<i>Peak Transmitting Power</i>	<i>1mW</i>
<i>Operating Temperature</i>	<i>-20°C ~ +55°C</i>
<i>Battery Voltage</i>	<i>3.6Vdc from built-in lithium battery</i>

NOTE: For more detailed informations please refer to the user's manual of EUT.

Model of Derived:

Please refer to difference statement letter provided by client.

Test Summary

The Electromagnetic Compatibility requirements on tested model ES-TAG1355 for this test is stated below. All results listed in this report relate exclusively to this above-mentioned model as the Equipment Under Test. This report confers no approval or endorsement upon any other component, host or subsystem used in the test set-up.

ES-TAG1355 has been tested to conform to the following parts of the Part 15(2009) ,Subpart C. as detailed below:

<i>FCC Rules</i>	<i>Requirement</i>	<i>Result</i>	<i>Remark</i>
<i>§15.203</i>	<i>Antenna requirement</i>	<i>Compliant</i>	<i>Attachment 1</i>
<i>§15.207(a)</i>	<i>Not applicable, because EUT only employ battery power for operation.</i>		
<i>§15.205(a), §15.209(a), §15.249(a)</i>	<i>Radiated Emissions</i>	<i>Compliant</i>	<i>Attachment 2</i>
<i>§15.249(d)</i>	<i>Out of Band Emissions</i>	<i>Compliant</i>	<i>Attachment 3</i>
<i>§15.215(c)</i>	<i>20dB Bandwidth</i>	<i>Compliant</i>	<i>Attachment 4</i>

Test Mode Justification

This device complies with part 15 of the FCC Rules, Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Test Mode Applicability And Tested Channel Detail

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, and X.Y.Z. axis.

Following mode(or channel) was selected for final test as listed below.

<i>Carried Frequency</i>	<i>Channel Number</i>	<i>Duty cycle</i>	<i>Modulation Type</i>	<i>Axis</i>
2418MHz	1	100%	GFSK	X-Axis

NOTE:

- 1) The worst-case X-Axis was selected for final test.*
- 2) A fresh battery with a DC 3.6V was used for final test.*

EUT Exercise Software

No Software was used in during the test.

Equipment Modification

Any modifications installed previous to testing by GuangZhou ESquare Electronic Equipment Co., Ltd will be incorporated in each production model sold or leased in United States.

There were no modifications for this EUT intended for grant.

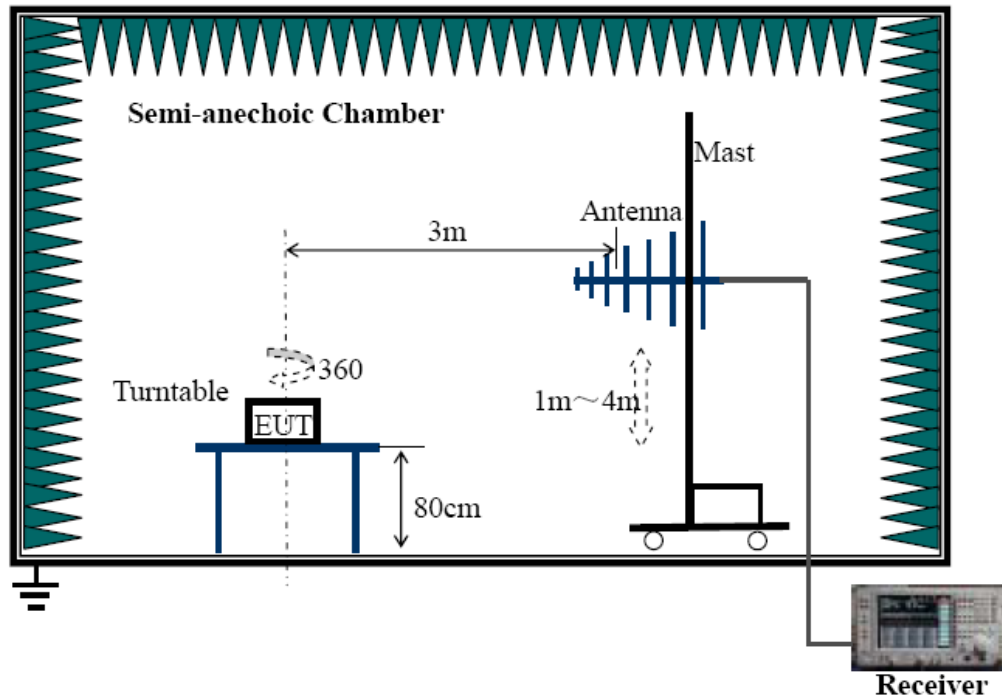
Test System Details

<i>EUT</i>				
<i>Model Name:</i>	<i>ES-TAG1355,ES-TAG1355P</i>			
<i>Tested Model:</i>	<i>ES-TAG1355</i>			
<i>Serial Number:</i>	<i>Engineering Sample</i>			
<i>Input Voltage:</i>	<i>3.6Vdc from battery</i>			
<i>Description:</i>	<i>Watch Style Active Tag</i>			
<i>Applicant:</i>	<i>GuangZhou ESquare Electronic Equipment Co., Ltd</i>			
<i>Support Equipment</i>				
<i>Description</i>	<i>Model Number</i>	<i>Serial Number</i>	<i>Manufacturer</i>	<i>Power Cable Description</i>
<i>None</i>				
<i>Power Cable Description</i>				
<i>From</i>	<i>To</i>	<i>Length (Meters)</i>	<i>Shielded (Y/N)</i>	<i>Ferrite Loaded (Y/N)</i>
<i>None</i>				

NOTE:

The EUT has been tested as an independent unit together with other necessary accessories or support units.the above support units or accessories were used to form a representative test configuration during the test tests.

Test Set-up Diagram



EUT Sample Photos

EUT Model: ES-Tag1355



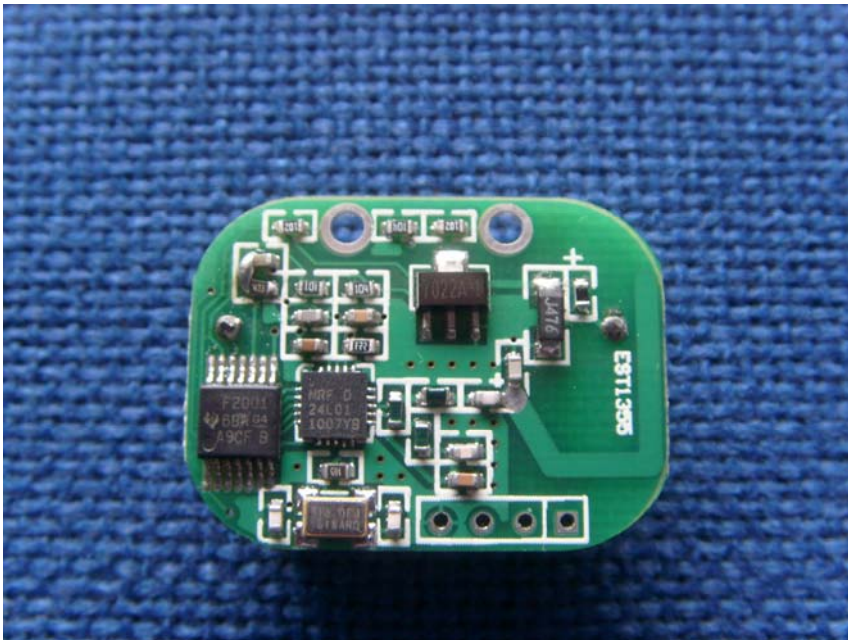
Front View



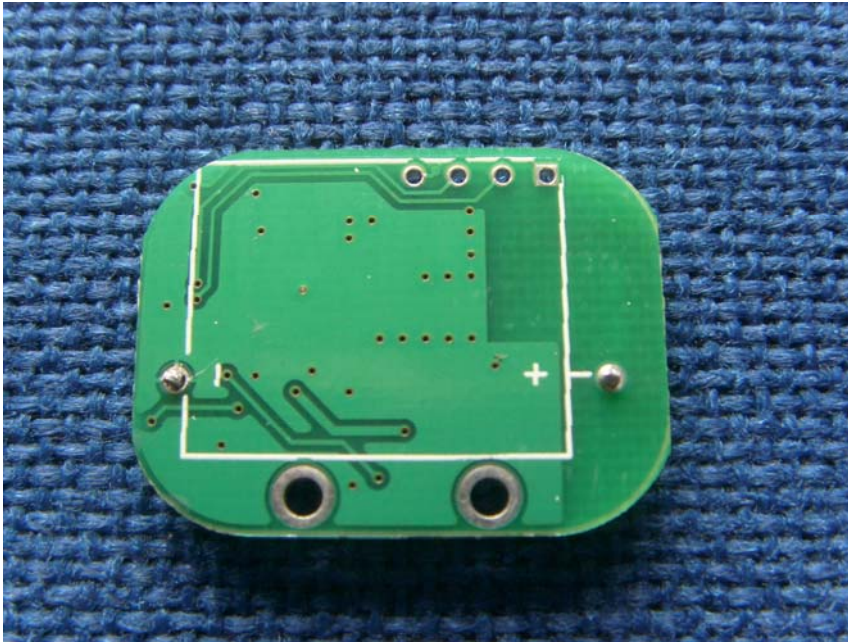
Rear View



Inside View



Front View of PCB



Rear View of PCB

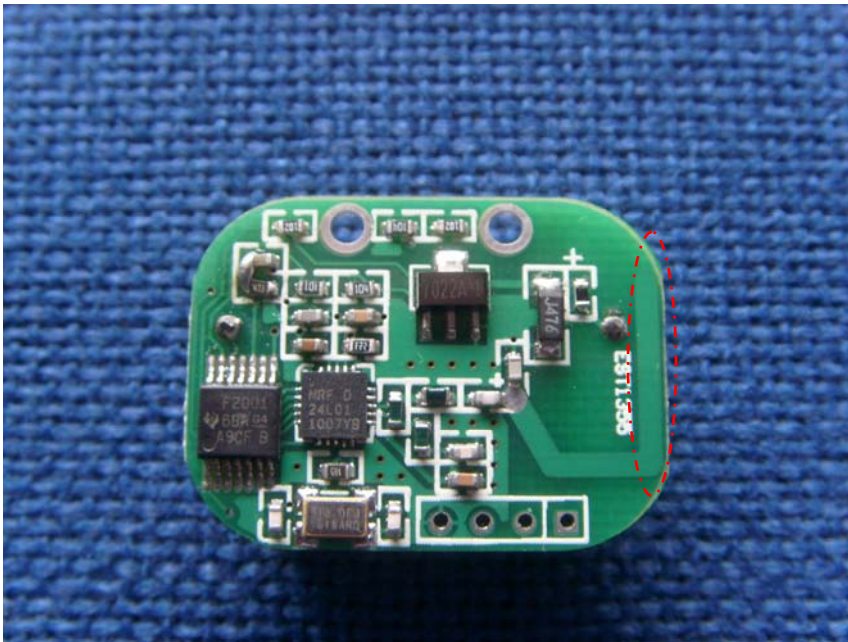
Attachment 1 – Antenna Requirement

Requirement:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sections 15.211, 15.213, 15.217, 15.219, or 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with Section 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this Part are not exceeded.

<i>FCC Section</i>	<i>FCC Rules</i>	<i>Conclusion</i>
<i>§15.203</i>	<p><i>Described how the EUT complies with the requirement that either its antenna is permanently attached, or that it employs a unique antenna connector, for every antenna proposed for use with the EUT.</i></p> <p><i>The exception is in those cases where EUT must be professionally installed. In order to demonstrate that professional installation is required, the following 3 points must be addressed:</i></p> <ol style="list-style-type: none"> <i>1. The application (or intended use) of the EUT</i> <i>2. The installation requirements of the EUT</i> <i>3. The method by which the EUT will be marketed</i> 	<i>The RF Device uses an integral antenna without connector</i>

Integral Antenna without Connector View:



Attachment 2– Field Strength of Fundamental and Spurious Emission

Requirement:

§15.205: Restricted bands of operation.

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	(²)
13.36 - 13.41			

¹ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

² Above 38.6

NOTE:

The fundamental is not in a restricted band, and the fundamental&spurious emission in the restricted bands comply with the general emission limits of 15.209.

Field strength limits of §15.209(a):

The emissions from an intentional radiator shall strength levels specified in the following table:

Other Frequency (MHz)	Field strength	
	(uV/meter)	dB uV/meter
30-88	100	40.0
88-216	150	43.5
216-960	200	46.0
Above 960	500	54.0

NOTE:

- 1) Field Strength (dBmV/m)=20log Field Strength (mV/m).*
- 2) In the emission tables above,the tighter limit applies at the band edge.*

Requirements of §15.249(a):

Except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

<i>Fundamental Frequency</i>	<i>Field Strength of Fundamental (millivolts/meter)</i>	<i>Field Strength of Harmonics (microvolts/meter)</i>
902-928MHz	50	500
2400-2483.5MHz	50	500
5725-5875MHz	50	500
24.0-24.25GHz	250	2500
<i>Note: Field strength limits are specified at a distance of 3 meters.</i>		

Test Equipment set up:

The spectrum analyzer or receiver is set as:

Below 1GHz: RBW=100KHz/VBW=300KHz/Sweep=auto

Above 1GHz:

- 1) Peak: RBW=1MHz/VBW=1MHz/Sweep=auto;*
- 2) Average: RBW=1MHz/VBW=10Hz/Sweep=auto.*

Test Procedure as below:

According to ANSI C63.4(2003) Section 13.1.4, The test procedure for filed strength of emission as follow:

- 1. Setup the configuration per figure 1 and 2 for frequencies measured below and above 1 GHz respectively.*
- 2. For emission frequencies measured below 1 GHz, a pre-scan is performed in a shielded chamber to determine the accurate frequencies of higher emissions will be checked on a anechoic chamber. As the same purpose, for emission frequencies measured above 1 GHz, a pre-scan also be performed with a 3 meter measuring distance before final test.*
- 3. For emission frequencies measured below and above 1 GHz, set the spectrum analyzer on a 100 kHz and 1 MHz resolution bandwidth respectively for each frequency measured in step 2.*
- 4. The search antenna is to be raised and lowered over a range from 1 to 4 meters in horizontally polarized orientation. Position the highness when the highest value is indicated on spectrum analyzer, then change the orientation of EUT on test table over a range from 0 degree to 360 degree With a speed as slow as possible, and keep the azimuth that highest emission is indicated on the spectrum analyzer. Vary the antenna position again and record the highest value as a final reading. A RF test receiver is also used to confirm emissions measured.*
- 5. Repeat step 4 until all frequencies need to be measured were complete.*

6. Repeat step 5 with search antenna in vertical polarized orientations. Check the three frequencies of highest emission with varying the placement of cables associated with EUT to obtain the worse case and record the result.

Figure 1 : Frequencies measured below 1 GHz configuration

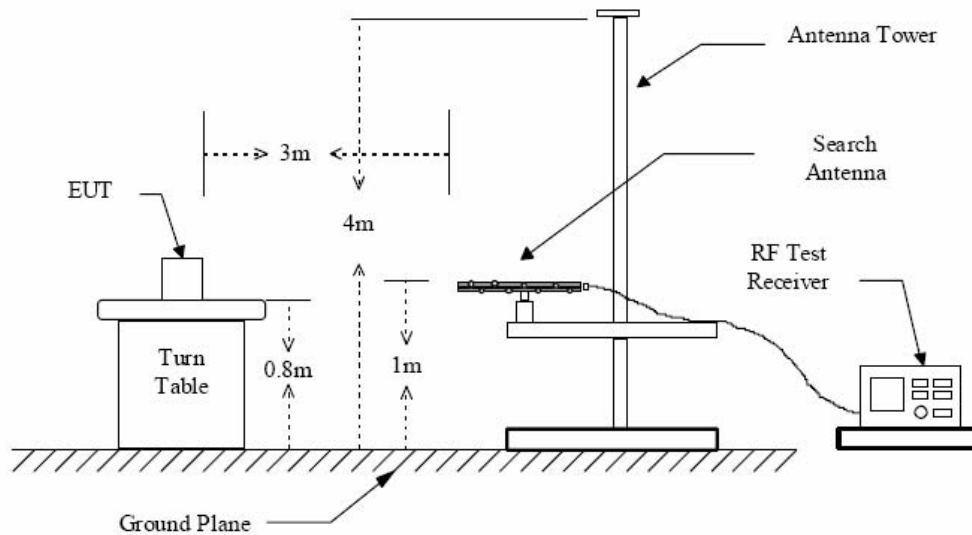
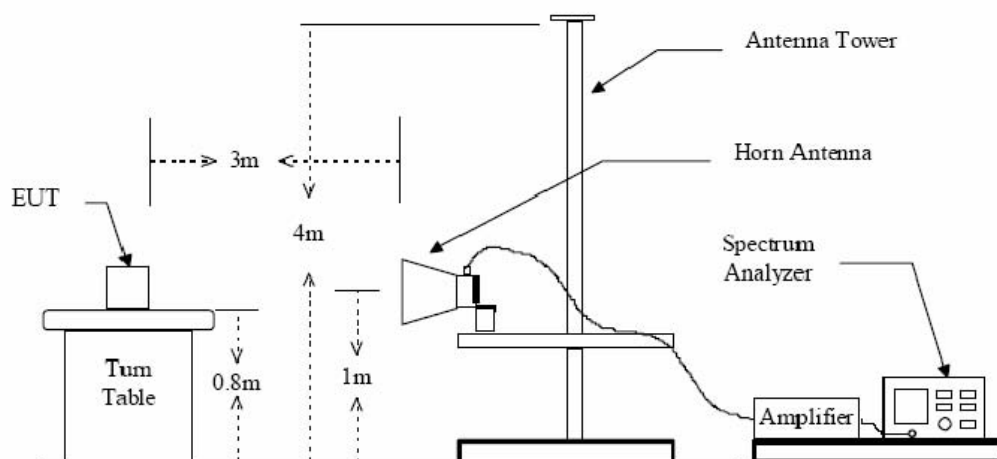


Figure 2 : Frequencies measured above 1 GHz configuration



Test Results Summary:

According to the data in the following, the EUT complied with the FCC Part 15.209 & 15.249, with the worst margin reading of:

30- 1000MHz:

***24.30 dB** at 951.520MHz of X-Axis in the horizontal Polarization.*

Above 1GHz:

***6.76 dB** at 12041.940MHz of X-Axis in the horizontal Polarization.*

NOTE:

More detailed informations please refer to radiated emission test data of the next page.

Test Environmental Conditions:

<i>Temperature</i>	<i>22 °C</i>
<i>Relative Humidity</i>	<i>65 %</i>
<i>ATM Pressure</i>	<i>100.2 KPa</i>

Radiated Emission Test Data:

30MHz – 1000MHz:

X-Axis								
Horizontal								
Signal	Frequency (MHz)	Reading Level dB (uV/m)	Corrected Factor(dB)	Corrected QP Level dB(uV/m)	3 Meter Limits dB (uV/m)	Margin (dB)	Angle of Turner (degree)	Height of Tower(cm)
1	644.160	-1.46	19.66	18.20	46.0	-27.80	130	101
2	833.360	-3.48	23.08	19.60	46.0	-26.40	220	180
3	951.520	-1.48	23.18	21.70	46.0	-24.30	190	233
Vertical								
Signal	Frequency (MHz)	Reading Level dB (uV/m)	Corrected Factor(dB)	Corrected QP Level dB(uV/m)	3 Meter Limits dB (uV/m)	Margin (dB)	Angle of Turner (degree)	Height of Tower(cm)
1	34.640	-2.69	17.19	14.50	40.0	-25.5	200	108
2	627.200	-0.84	19.34	18.50	46.0	-27.5	80	201
3	837.280	-3.58	23.18	19.60	46.00	-26.4	130	183
Note: 1) All readings are quasi-peak unless stated otherwise, using a QP bandwidth of 120kHz, with a 60 s sweep time. A video filter was not used. 2) Corrected Level = reading level + corrected factor, Margin = limits - corrected level. 3) The other emission levels are too low against official limits that are not reported.								

Continue on to next page...

Above 1GHz:

X-Axis									
Horizontal									
Frequency (MHz)	Reading AV Level dB (uV/m)	Corrected Factor(dB)	Corrected AV Level dB(uV/m)	Limits dB (uV/m)	Margin (dB) AV	Reading PK Level dB(uV/m)	Corrected PK Level dB(uV/m)	Limits dB (uV /m)	Margin (dB)PK
2393.96	40.44	-6.21	34.23	54.0	-19.77	52.80	46.59	74.0	-27.41
5730.32	26.86	5.99	32.85	54.0	-21.15	40.12	46.11	74.0	-27.89
* 12041.94	34.23	13.01	47.24	54.0	-6.76	49.00	62.01	74.0	-11.99
Vertical									
Frequency (MHz)	Reading AV Level dB (uV/m)	Corrected Factor(dB)	Corrected AV Level dB(uV/m)	Limits dB (uV/m)	Margin (dB) AV	Reading PK Level dB(uV/m)	Corrected PK Level dB(uV/m)	Limits dB (uV /m)	Margin (dB)PK
2393.96	43.41	-6.21	37.20	54.0	-16.80	57.46	51.25	74.0	-22.75
5730.32	29.13	5.99	35.12	54.0	-18.88	43.11	49.10	74.0	-24.90
* 12041.94	33.99	13.01	47.00	54.0	-7.00	49.26	62.27	74.0	-11.73
Note: 1) All readings are average and peak unless stated otherwise, using a bandwidth of 1MHz, with a 60 s sweep time, A video filter was not used. 2) Corrected Level = reading level + corrected factor, Margin = limits - corrected level. 3) The other emission levels are too low against official limit that are not reported. 4) “ * ” means that this frequency drops into section 15.205(a) restricted band.									

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X-Axis										
Fundamental										
Ant. Polar (H/V)	Freq. (MHz)	Reading AV Level dB(uV/m)	Corrected Factor (dB)	Corrected AV Level dB(uV/m)	Limits dB (uV/m)	Margin (dB) AV	Reading PK Level dB(uV/m)	Corrected PK Level dB(uV/m)	Limits dB (uV /m)	Margin (dB) PK
H	2418	-7.78	48.33	40.55	94.0	-53.45	35.07	83.40	114.0	-30.60
V	2418	-8.13	48.33	40.20	94.0	-53.80	36.26	84.59	114.0	-29.41
Note: 1) All readings are average and peak unless stated otherwise, using a bandwidth of 1MHz, with a 60 s sweep time. A video filter was not used. 2) Corrected Level = reading level + corrected factor, Margin = limits - corrected level.										

X-Axis										
Harmonics										
Ant. Polar (H/V)	Freq. (MHz)	Reading Level dB(uV/m)	Corrected Factor(dB)	Corrected AV Level dB(uV/m)	Limits dB (uV/m)	Margin (dB) AV	Reading PK Level dB(uV/m)	Corrected PK Level dB(uV/m)	Limits dB (uV /m)	Margin (dB)PK
H	4846.360	34.13	3.27	37.40	54.0	-16.60	56.85	60.12	74.0	-13.88
H	7264.060	32.58	6.68	39.26	54.0	-14.74	43.34	50.02	74.0	-23.98
H	9833.960	33.23	11.18	44.41	54.0	-9.59	51.34	62.52	74.0	-11.48
V	4846.360	34.55	3.27	37.82	54.0	-16.18	47.32	50.59	74.0	-23.41
V	7269.840	36.56	6.73	43.29	54.0	-10.71	53.47	60.20	74.0	-13.80
V	9643.940	32.80	11.21	44.01	54.0	-9.99	47.79	59.00	74.0	-15.00
Note: 1) All readings are average and peak unless stated otherwise, using a bandwidth of 1MHz, with a 60 ms sweep time. A video filter was not used. 2) Corrected Level =reading level + corrected factor, Margin = limits - corrected level. 3) The other emission levels are too low against official limit that are not reported.										

Attachment 3– Out of Band Emissions

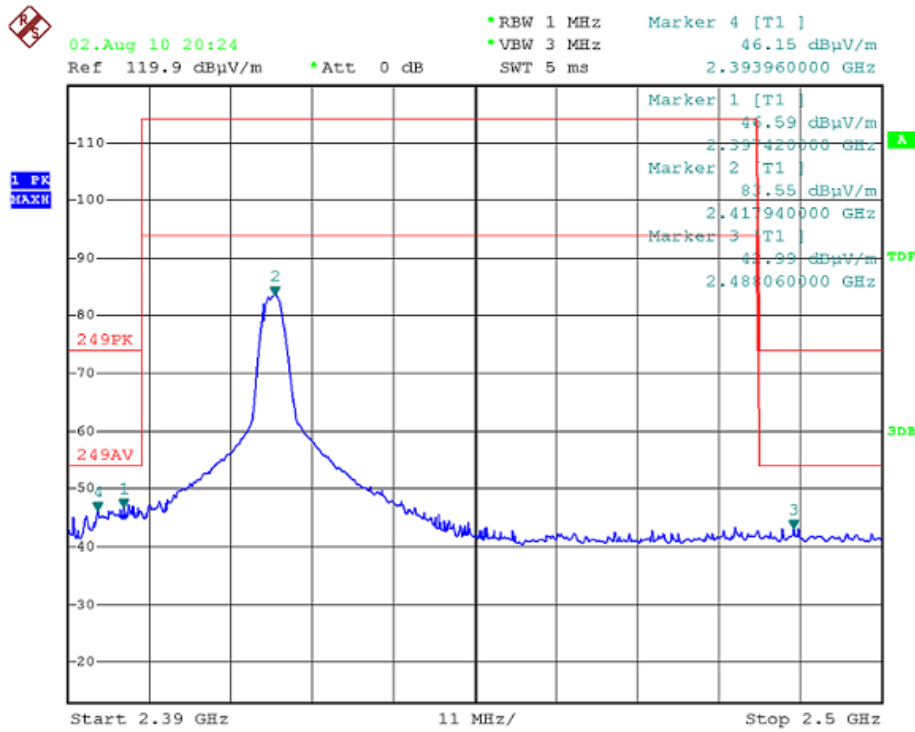
Applicable standard:

15.249(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

Test procedure:

- 1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.*
- 2. Position the EUT without connection to measurement instrument. turn on the EUT and set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.*
- 3. Set RBW to 1MHz and VBW of spectrum analyzer to 3MHz with a convenient frequency span including the specified frequencies of band edges.*
- 4. Measure the highest amplitude appearing on spectral display and set it as a reference level. plot the graph with marking the highest point and edge frequency.*
- 5. Repeat above procedures until all measured frequencies were completed.*

Out of Band Emission Test Plot:



Out of Band Emission Test Data:

Horizontal									
Freq. (MHz)	Reading AV Level dB (uV/m)	Corrected Factor(dB)	Corrected AV Level dB(uV/m)	Limits dB (uV/m)	Margin (dB) AV	Reading PK Level dB(uV/m)	Corrected PK Level dB(uV/m)	Limits dB (uV /m)	Margin (dB) PK
2385.7	39.41	-6.18	33.23	54	-23.77	43.28	37.10	74	-36.90
2345.3	37.13	-6.01	31.12	54	-24.88	40.76	34.75	74	-39.25
2485.2	-16.72	49.20	32.48	54	-21.52	-10.90	38.30	74	-35.70
2489.5	-15.93	49.21	33.28	54	-20.72	-9.96	39.25	74	-34.75
Vertical									
Freq. (MHz)	Reading AV Level dB (uV/m)	Corrected Factor(dB)	Corrected AV Level dB(uV/m)	Limits dB (uV/m)	Margin (dB) AV	Reading PK Level dB(uV/m)	Corrected PK Level dB(uV/m)	Limits dB (uV /m)	Margin (dB) PK
2385.7	38.71	-6.18	32.53	54	-22.47	43.30	37.12	74	-36.88
2345.3	36.39	-6.01	30.38	54	-23.72	41.29	35.28	74	-38.72
2485.2	-15.91	49.20	33.29	54	-20.71	-9.33	39.87	74	-34.13
2489.5	-15.54	49.21	33.67	54	-20.33	-8.98	40.23	74	-33.77
<p>Note:</p> <ol style="list-style-type: none"> 1) All readings are average and peak unless stated otherwise, using a bandwidth of 1MHz, with a 60 s sweep time. A video filter was not used. 2) Corrected Level =reading level + corrected factor, Margin = limits - corrected level. 3) The other emission levels are too low against official limit that are not reported. 									

Attachment 4 – 20 dB Bandwidth

Requirement:

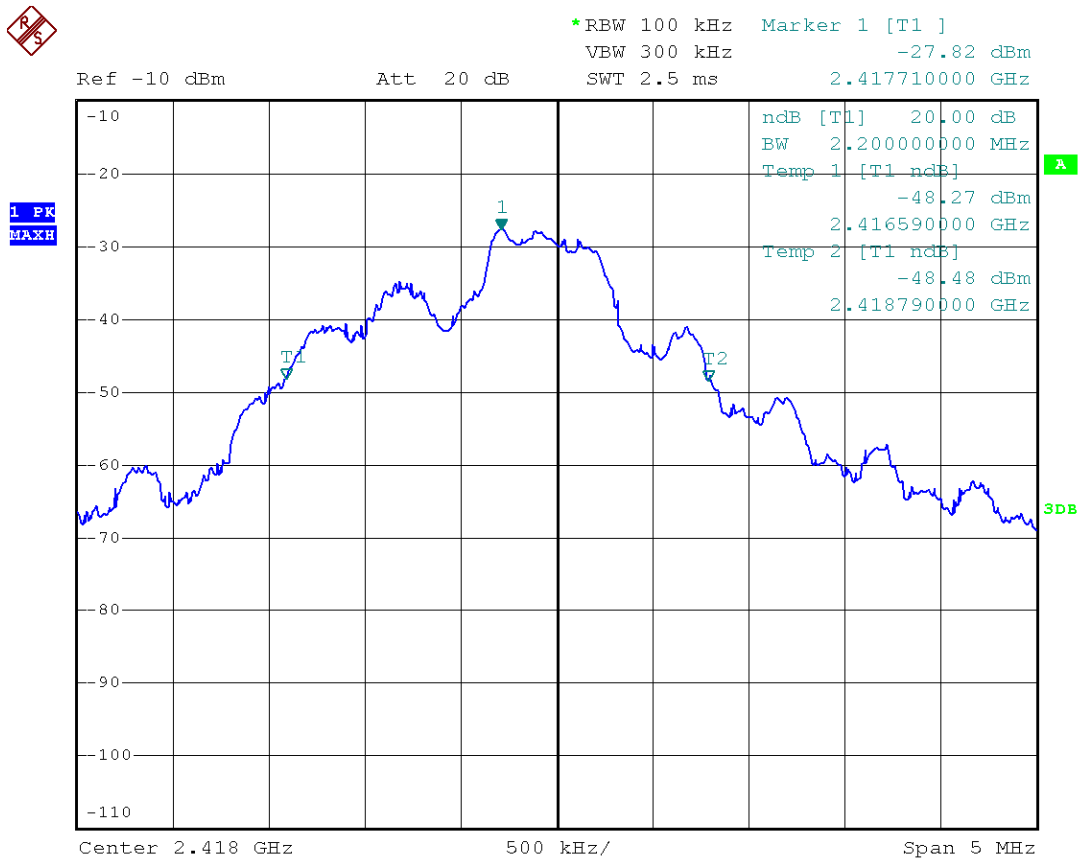
§ 15.215(c) Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

Test procedure:

According to ANSI C63.4(2003) Section 13.1.7, The test procedure for bandwidth measurement as follow:

- a. The center frequency of the receiver was set to the channel under investigation.*
- b. The antenna port of the EUT was connected to the input of a receiver.*
- c. Set receiver : RBW=100KHz, VBW=300KHz.*
- d. Max hold, peak detection.*

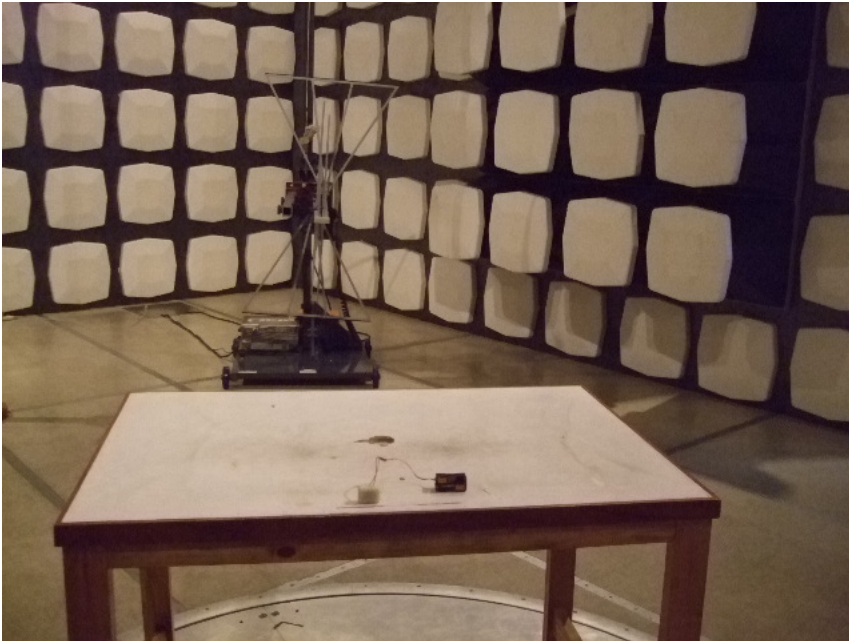
Test Plot of 20dB Bandwidth:



Vertical

Date: 3.AUG.2010 10:22:39

Attachment 5- Test Set-up Photograph



Radiated Emission Test Set-up -below 1GHz



Radiated Emission Test Set-up - Above 1GHz