

CFR 47 FCC Part 15.231

TEST REPORT

E.U.T. : **Remote Control**

Trade Name : N/A

Model Number : A-01

FCC ID : S8M441045T

Prepared for

Apek Secure Lite Co., Ltd.

No. 171, 13F/2, Sungteh Road, Taipei, Taiwan

TEL. : +886 2 2727 3637

FAX. : +886 2 2727 3078

Prepared by

Interocean EMC Technology Corp.

244 No.5-2, Lin 1, Tin-Fu Tsun, Lin-Kou Hsiang,

Taipei County, Taiwan, R.O.C.

TEL.: +886 2 2600 6861

FAX.: +886 2 2600 6859

Remark :

1. The test report consists of **24** pages in total. It shall not be reproduced except in full, without the written approval of IETC. This document may be altered or revised by IETC only, and shall be noted in the revision section of the document. The test results in the report only to the tested sample.
2. The report prohibit used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

Statement of Compliance

Applicant: Apek Secure Lite Co., Ltd.
Manufacturer: Ningbo Luxpert Electronics Industrial Co., Ltd.
EUT Description: Remote Control
Model No.: A-01
Serial No.: N/A
Tested Power Supply: 12Vdc Battery
Date of Final Test: Jan. 25, 2008
Configuration of Measurements and Standards Used :
FCC Rules and Regulations Part 15 Subpart C

I HEREBY CERTIFY THAT: The data shown in this report were made in accordance with the procedures given in ANSI C63.4, and the energy emitted by the device was founded to be within the limits applicable. I assume full responsibility for accuracy and completeness of these data.

Note: 1. The result of the testing report relate only to the item tested.
2. The testing report shall not be reproduced expect in full, without the written approval of IETC

Report Issued: 2008/02/21

Test Engineer: Anya Lee
Anya Lee

Checked: Danny Tang
Danny Tang

Approved: Jerry Liu
Jerry Liu

Table of Contents

1	Summary of Measurement	4
2	General Information	5
2.1	Description of Equipment Under Test	5
2.2	Details of tested peripheral equipment	6
2.3	Test Facility	7
3	Test specifications	8
3.1	Test standard	8
3.2	Operation mode	8
3.3	Test Equipment	9
4	Radiated emission test	10
4.1	Limit	10
4.2	Calculation of Average Factor	11
4.3	Configuration of Measurement	15
4.4	Test Procedure	15
4.5	Test Result	15
5	Emission bandwidth	18
5.1	Limit	18
5.2	Test Result	18
6	Photographs of Test	20
6.1	Radiated Emission Measurement	20
7	Photographs of EUT	22

1 Summary of Measurement

Report Clause	Test Parameter	Reference Document CFR47 Part15	Results
4	Radiated Emission	§15.231(b), 15.209	Pass
5	Emission bandwidth	§15.231(c)	Pass

2 General Information

2.1 Description of Equipment Under Test

Equipment Under Test : Remote Control

Model Number : A-01

Serial Number : N/A

Type of Sample Tested : ☒Proto-type ☐Pre-Production ☐Mass Production

Applicant : **Apek Secure Lite Co., Ltd.**

No. 171, 13F/2, Sungteh Road, Taipei, Taiwan

Manufacturer : **Ningbo Luxpert Electronics Industrial Co., Ltd.**

Ninghai Technology Industry Park, Ningbo, Zhejiang, China

Power Supply : 12Vdc Battery

Operating Frequency : 433.92MHz

Channel Number : 1 channel

Type of Modulation : ASK

Antenna description : This device uses PCB Printed antenna.

Antenna Gain	:	0 dBi
Connector type	:	N/A

Sample Receive date : Dec. 05, 2007

Date of Test : Dec. 06, 2007 ~ Jan. 25, 2008

Description of E.U.T. : 1) The EUT is **Remote Control**.
2) The Model Number "**A-01**" is representative selected in the test and included in this report.

2.2 Details of tested peripheral equipment

N/A

2.3 Test Facility

Site Description	:	☒ OATS 2 ☒ Conduction 1
Name of Firm	:	Interocean EMC Technology Corp.
Company web	:	http://www.ietc.com.tw
Site 1, 2 Location	:	No.5-2, Lin 1, Tin-Fu Tsun, Lin-Kou Hsiang, Taipei County, Taiwan, R.O.C.
Site 3, 4 Location	:	No. 12, Ruei-Shu Valley, Ruei-Ping Tsun, Lin-Kou Hsiang, Taipei County, Taiwan, R.O.C.
Site Filing	:	● Federal Communication Commissions – USA Registration No.: 96399 (OATS 1 & 2) Registration No.: 518958 (OATS 3 & 4) ● Voluntary Control Council for Interference by Information Technology Equipment (VCCI) – Japan Registration No. (Conducted Room): C-1094 Registration No. (Conducted Room): T-271 Registration No. (OATS 1): R-1040 Registration No. (OATS 2): R-1041 ● Industry Canada (IC) Submission: 113543 ● Japan Electrical Safety & Environment Technology Laboratories (JET) Registration No.: 04S03-01
Site Accreditation	:	● Bureau of Standards and Metrology and Inspection (BSMI) – Taiwan, R.O.C. Accreditation No.: SL2-IN-E-0026 for CNS13438 / CISPR22 SL2-R1-E-0026 for CNS13439 / CISPR13 SL2-R2-E-0026 for CNS13439 / CISPR13 SL2-A1-E-0026 for CNS13783-1 / CISPR14-1 ● National Voluntary Laboratory Accreditation Program (NVLAP) - USA NVLAP LAB CODE 200458 ● Nemko AS Authorization No.: ELA 181A Authorization No.: ELA 181B ● Taiwan Accreditation Foundation (TAF) Accrditation No.: 1113



3 Test specifications

3.1 Test standard

The EUT was performed according to FCC Part 15 Subpart C Section 15.231 procedure and setup followed by ANSI C63.4, 2003 requirements.

3.2 Operation mode

From preliminary test verifying three axis position (X, Y and Z) found the worse mode was “X axis mode”, then the final mode was executed under this condition and recorded in this report



X axis mode



Y axis mode



Z axis mode

The EUT operated in continuously transmitting signal during all of the tests.

3.3 Test Equipment

Instrument	Manufacturer	Model	Serial No.	Last Calibration
EMI Test Receiver	Rohde & Schwarz	ESCS 30	100135	2007/08/03
L.I.S.N.	Schwarzbeck	NNLK8121	8121417	2007/07/17
L.I.S.N.	Rohde & Schwarz	ESH3-Z5	100176	2007/02/14
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	843602/02	2007/09/10
RF Cable	HARBOUR	RG400	CBL04	2007/08/09
Spectrum Analyzer	Agilent	8564EC	4046A00331	2007/03/29
Spectrum Analyzer	R&S	FSQ	200406	2007/03/29
Biconical Antenna	Schwarzbeck	VHA 9103	2484	2007/09/06
Log Antenna	Schwarzbeck	UHALP 9108	A 0765	2007/09/06
Pre-Amplifier	HP	8447D	2944A10321	2007/07/17
Preamplifier	Agilent	8449B	3008A01434	2007/04/03
RF Cable	Ultra Link	CBL02	CBL02	2007/05/04
Cable	IETC	CBL07	CBL07	2007/05/08
Power Meter	Anritsu	ML2495A	0736010	2007/10/29
Wide Bandwidth Sensor	Anritsu	MA2491A	0728133	2007/10/29

Note: All instrument upon which need to be calibrated are within calibration period of 1 year.

Instrument	Manufacturer	Model	Serial No.	Last Calibration
Horn Antenna	COM-POWER	AH-118	10081	2006/05/16
Horn Antenna	SCHWARZBECK	BBHA9120	9120D-583	2006/12/18

Note: All instrument upon which need to be calibrated are within calibration period of 2 year.

4 Radiated emission test

4.1 Limit

According to FCC 15.231(b) requirement:

In addition to the provisions of §15.205, the field strength of emissions from intentional radiator operated under this section shall not exceed the following:

Fundamental and harmonics emission limits

Frequency	Field Strength of Fundamental		Field Strength of Harmonics	
(MHz)	(μ V/m@3m)	(dB μ V/m@3m)	(μ V/m@3m)	(dB μ V/m@3m)
433.92	10996	80.8	1099.6	60.8

General Radiated emission Limit

Spurious Emission tested through until 10th harmonic. Radiated emissions, which fall in the restricted bands, as defined in §15.205 (a), comply with the radiated emission limits specified in §15.209 (a).

Frequency	15.209 Limits	
(MHz)	(μ V/m@3m)	(dB μ V/m@3m)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

Remark :

1. The table above tighter limit applies at the band edges.
2. The measurement distance in meters, which that between form closest point of EUT to instrument antenna.

4.2 Calculation of Average Factor

The output field strengths of specification in accordance with the FCC rules specify measurements with an average detector. During the test, a spectrum analyzer incorporating a peak detector was used. Therefore, a reduction factor can be applied to the resultant peak signal level and compared to the limit for measurement instrumentation incorporating an average detector.

The duty cycle is measured in 100 ms or the repetition cycle period, whichever is a shorter time frame. The duty cycle is measured by placing the spectrum analyzer to set zero span at 100kHz resolution bandwidth.

Averaging factor in dB = $20 \log_{10} (\text{duty cycle})$

The duty cycle is simply the on-time divided by the period:

The duration of one cycle = 58ms

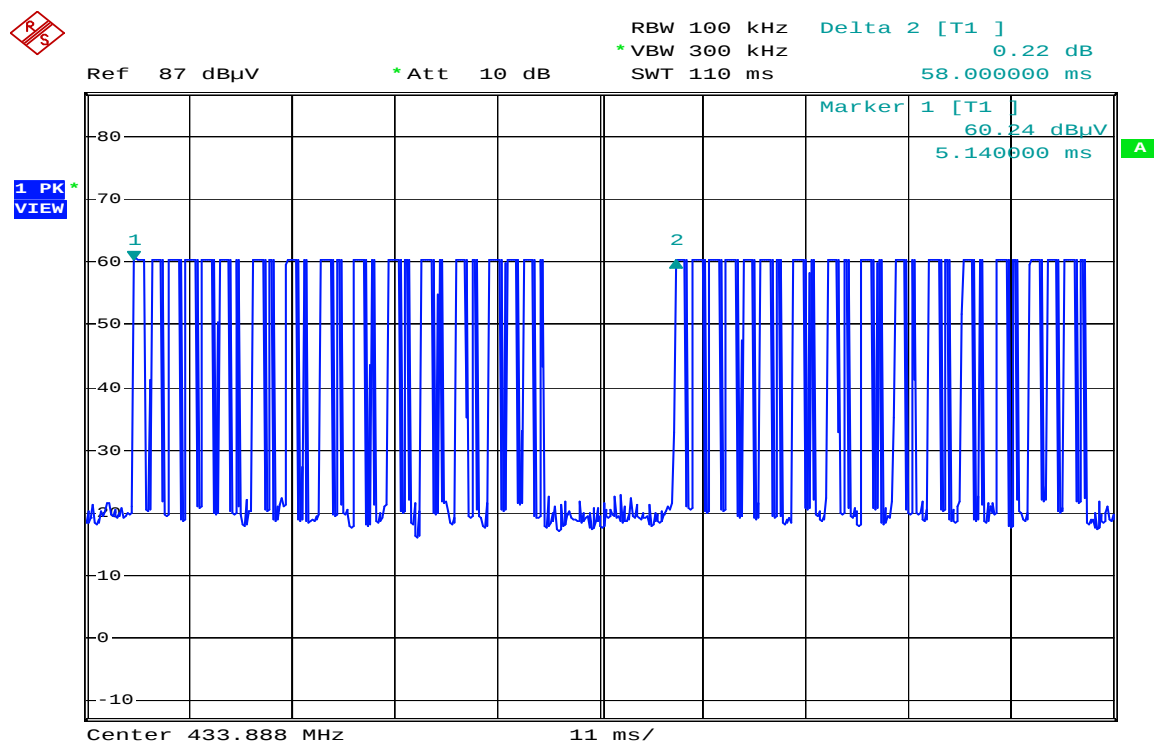
Duty Cycle = $(1.2\text{ms} \times 16 + 0.399\text{ms} \times 9) / 58\text{ms} = 0.392$

The duration of one cycle = 0.392

Therefore, the averaging factor is found by $20 \log_{10} 0.392 = -8.11\text{dB}$

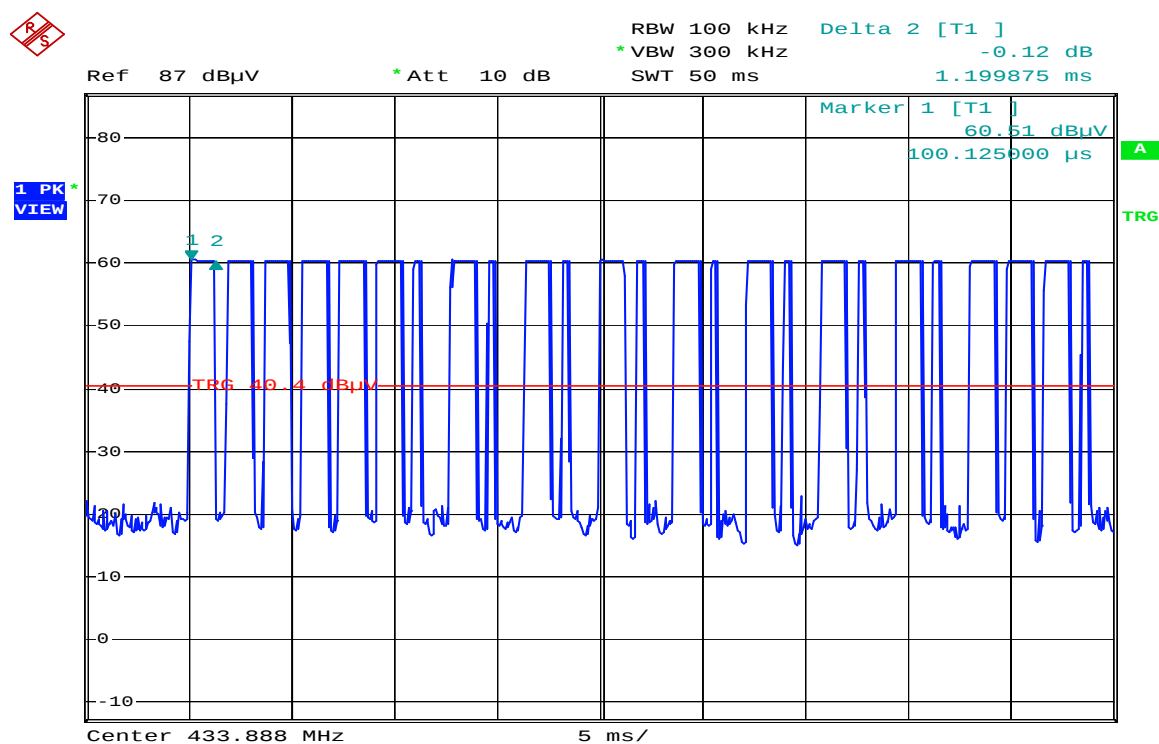
Please see the diagrams below.

Duty Cycle



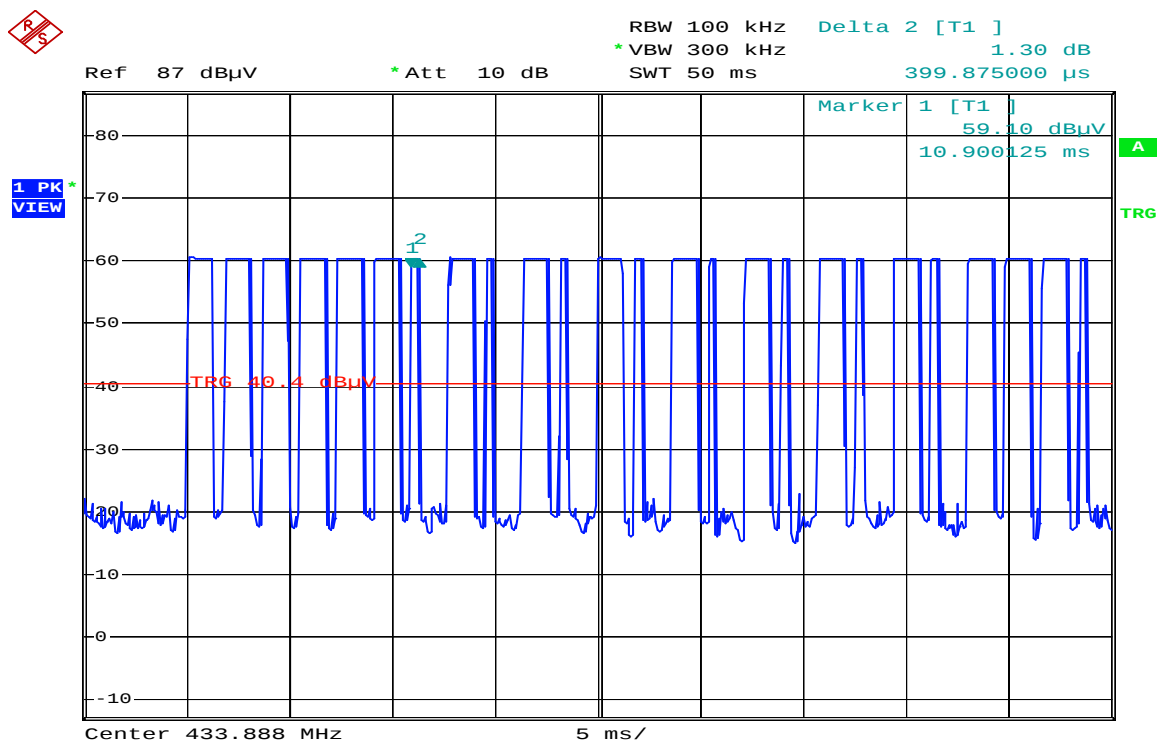
Comment: 802.11a 5180MHz Limit:16.989700
Date: 23.JAN.2008 14:07:33

Duty cycle 1



Comment: 802.11a 5180MHz Limit:16.989700
Date: 23.JAN.2008 14:24:46

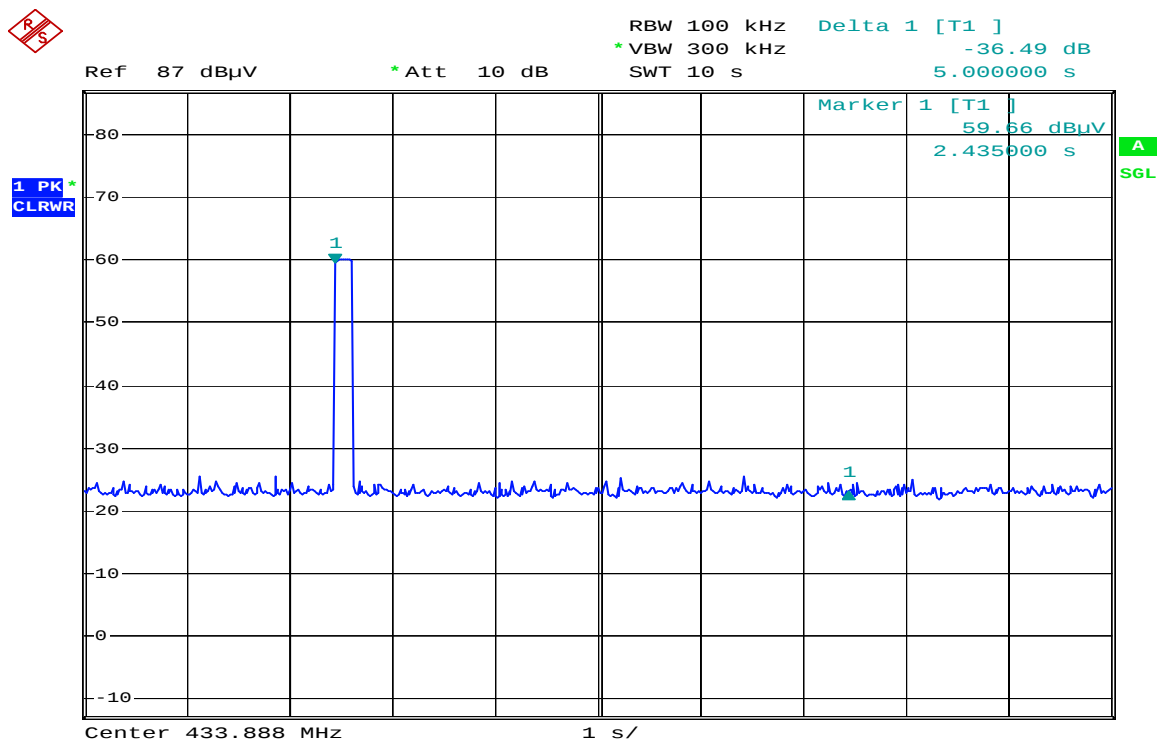
Duty cycle 2



Comment: 802.11a 5180MHz Limit:16.989700
Date: 23.JAN.2008 14:25:28

Duty cycle 3

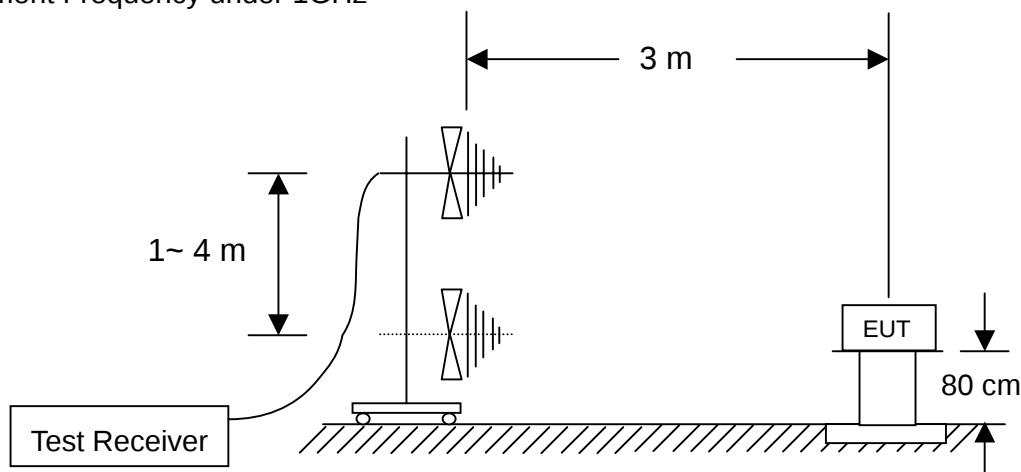
The EUT was complied with the requirement of FCC 15.231 (a)(1), which employed a switch that will automatically deactivate the transmitter within less than 5 seconds of being released.



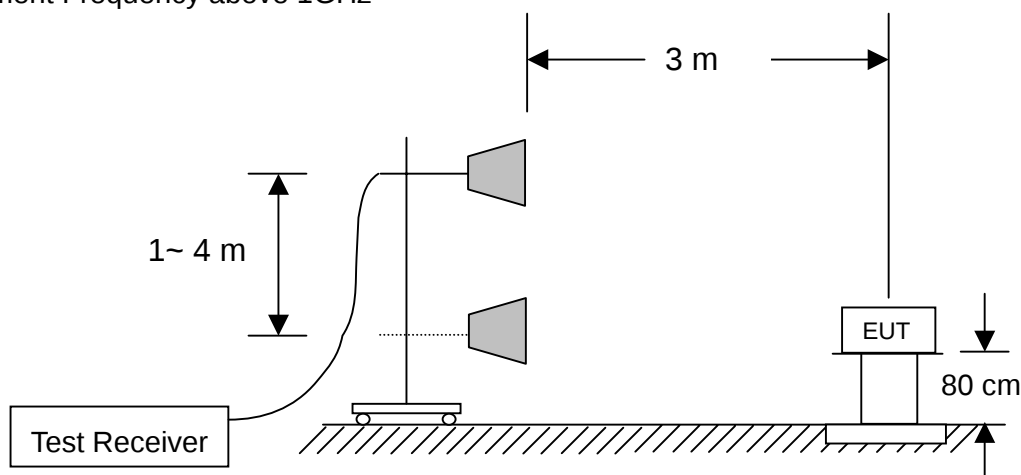
Comment: 802.11a 5180MHz Limit:16.989700
Date: 23.JAN.2008 14:36:44

4.3 Configuration of Measurement

Measurement Frequency under 1GHz



Measurement Frequency above 1GHz



4.4 Test Procedure

Radiated emission measurements frequency range were performed from 30MHz to 5GHz. Spectrum Analyzer Resolution Bandwidth set to 100kHz or greater for frequencies from 30MHz to 1GHz, and set 1MHz Resolution Bandwidth for frequencies above 1GHz.

The EUT is place on non-conductive turntable for the test. If peripheral devices apply to the EUT, the peripheral devices will be connected to EUT and whole system. During the emission test, the signal is maximized through rotation and all cables were present worst-case emissions. The height of antenna and polarization is constantly changed for exploring maximum signal reading. The height of antenna can be up form reference ground to 4 meter and down to 1 meter.

4.5 Test Result

PASS.

The final test emission data is shown on as following tables.

Radiated Emission below 1GHz

Frequency (MHz)	Antenna Polarization	Reading (dB μ V)	Preamp (dB)	Correction Factor (dB/m)	Corrected Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Det. Mode
81.64	H	34.45	25.78	8.66	17.33	40.0	-22.67	QP
126.50	H	37.25	25.78	14.40	25.87	43.5	-17.63	QP
434.40	H	33.22	25.78	18.19	25.63	46.0	-20.37	QP
774.60	H	31.17	25.78	22.85	28.24	46.0	-17.76	QP
62.24	V	36.56	25.78	8.22	19.00	40.0	-21.00	QP
156.20	V	35.25	25.78	16.49	25.96	43.5	-17.54	QP
447.00	V	32.15	25.78	18.42	24.79	46.0	-21.21	QP
631.80	V	31.07	25.78	21.39	26.68	46.0	-19.32	QP

Remark : Corrected Level = Reading – Preamp + Correction Factor
Correction Factor = Antenna Factor + Cable Loss

Fundamental and harmonics emissions

Freq. (MHz)	Antenna Polarization	Reading (dB μ V)	Preamp (dB)	Correction Factor (dB/m)	Average Factor (dB)	Corrected Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Det. Mode
433.88	H	71.88	25.78	18.18	--	64.28	100.8	-36.52	PK
433.88	H	71.88	25.78	18.18	-8.11	56.17	80.8	-24.63	AV
867.77	H	51.99	25.78	24.16	--	50.37	80.8	-30.43	PK
867.77	H	51.99	25.78	24.16	-8.11	42.26	60.8	-18.54	AV
1301.64	H	45.66	25.98	29.97	--	49.65	74.0	-24.35	PK
1301.64	H	45.66	25.98	29.97	-8.11	41.54	54.0	-12.46	AV
433.88	V	61.75	25.78	18.18	--	54.15	100.8	-46.65	PK
433.88	V	61.75	25.78	18.18	-8.11	46.04	80.8	-34.56	AV
867.77	V	41.98	25.78	24.16	--	40.36	80.8	-40.44	PK
867.77	V	41.98	25.78	24.16	-8.11	32.25	60.8	-28.55	AV
1301.64	V	41.38	25.98	29.97	--	45.37	74.0	-28.63	PK
1301.64	V	41.38	25.98	29.97	-8.11	37.26	54.0	-16.74	AV

Remark :

1. Corrected Level = Reading – Preamp + Correction Factor
2. Correction Factor = Antenna Factor + Cable Loss
3. The present spurious points only shows that above noise level and the frequency range test from 30MHz to 10th harmonic of frequency.

5 Emission bandwidth

5.1 Limit

According to FCC 15.231(c) requirement:

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating between 70 MHz to 900 MHz. Those devices operating above 900 MHz, the emission spurious shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

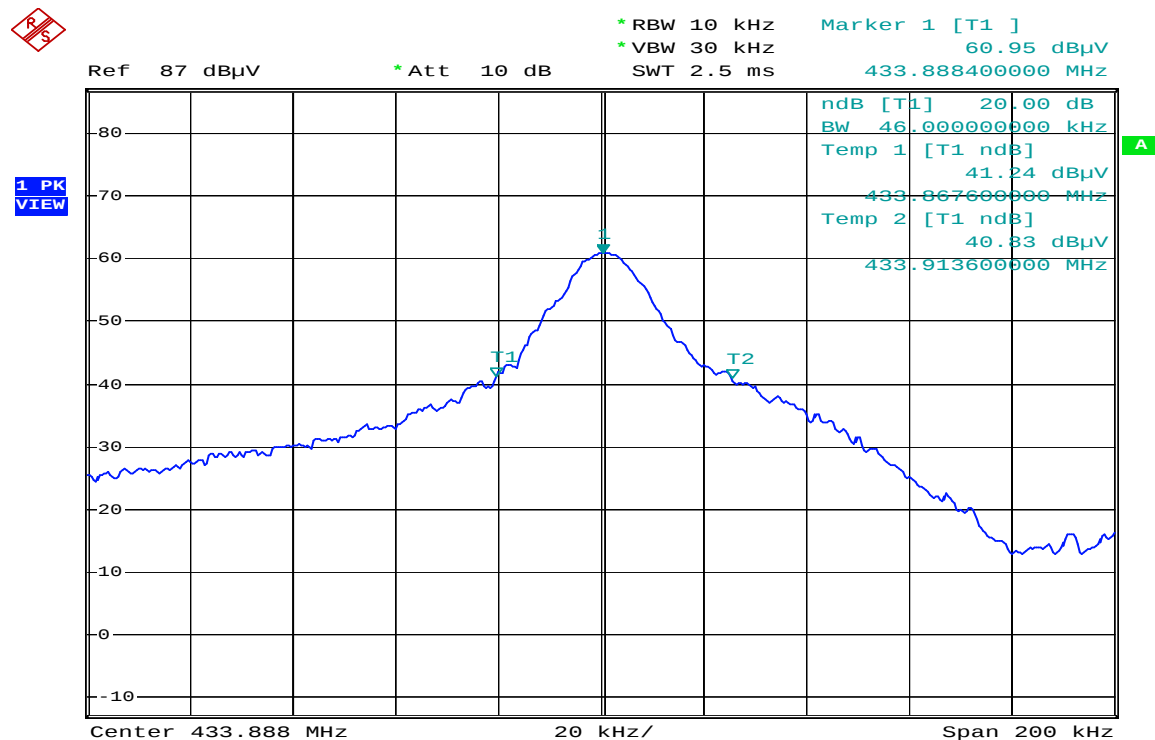
B.W (20dBc) Limit = $0.25\% * f(\text{MHz}) = 0.25\% * 433.92\text{MHz} = 10848\text{kHz}$

5.2 Test Result

PASS.

The final test data is shown on as following.

Channel Frequency (MHz)	Measured 20dB Bandwidth (kHz)	Limit (kHz)
433.92	46	10848



Comment: 802.11a 5180MHz Limit:16.989700
Date: 23.JAN.2008 14:05:09