Shenzhen EBO Technology Co., Ltd.

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FCC REPORT

Applicant:	Jackson Global Private Limited
Address of Applicant:	29 Tai Seng Street, Jackson Design Hub, Singapore 534120

Equipment Under Test (EUT)

Product Name:	Remote Control Device
Model No.:	AP868
FCC ID:	A52-AP868
Applicable standards:	FCC CFR Title 47 Part 15 Subpart C Section 15.231:2010
Date of sample receipt:	09 Dec., 2011
Date of Test:	09-12 Dec., 2011
Date of report issue:	13 Dec., 2011
Test Result :	Pass *

* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:

Kavin Yu
Laboratory Manager

2 Version

Version No.	Date	Description
00	*2011-12-13*	*Original*

Prepared By: Collin.He ***Date:*** *2011-12-13*

Project Engineer

Check By: Hans.Hu ***Date:*** *2011-12-13*

Reviewer

3 Contents

4 Test Summary

Test Item	Section in CFR 47	Result
AC Power Line Conducted Emission	15.207	Pass
Antenna requirement	15.203	Pass
Field strength of the fundamental signal	15.231 (b)	Pass
Spurious emissions	15.231 (b)/15.209	Pass
20dB Bandwidth	15.231 (c)	Pass
Dwell time	15.231 (a)	Pass

Remark:

Pass: The EUT complies with the essential requirements in the standard.

5 General Information

5.1 Client Information

Applicant:	Jackson Global Private Limited
Address of Applicant:	29 Tai Seng Street, Jackson Design Hub, Singapore 534120
Manufacturer/ Factory:	Jackson Global Private Limited
Address of Manufacturer/ Factory:	29 Tai Seng Street, Jackson Design Hub, Singapore 534120

5.2 General Description of E.U.T.

Product Name:	Remote Control Device
Model No.:	AP868
Operation Frequency:	433.88MHz
Channel numbers:	1
Modulation type:	ASK
Antenna Type:	Integral
Antenna gain:	2dBi
Power supply:	DC 3.7V

5.3 E.U.T Operation mode

Operating Environment:	
Temperature:	25.0 °C
Humidity:	63 % RH
Atmospheric Pressure:	1050 mbar
Test mode:	
Transmitting mode:	Keep the EUT in transmitting mode with modulation.

GTS has verified the construction and function in typical operation, The EUT was placed on three different polar directions; i.e. X axis, Y axis, Z axis. which was shown in this test report and defined as follows:

Pre-Test Mode:

Axis	X	Y	Z
Field Strength(dBuV/m)	80.18	83.05	82.35

Final Test Mode:

According to ANSI C63.4 standards, the test results are both the “worst case” and “worst setup”

Y axis

5.4 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

● **FCC —Registration No.: 600491**

Global United Technology Services Co., Ltd., Shenzhen EMC Laboratory has been registered and fuly described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in files. Registration 600491, July 20, 2010.

● **Industry Canada (IC)**

The 3m Semi-anechoic chamber of Global United Technology Services Co., Ltd. has been Registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 9079A-1.

5.5 Test Location

All tests were performed at:
Global United Technology Services Co., Ltd.
Address: 2nd Floor, Block No.2, Laodong Industrial Zone, Xixiang Road Baoan District, Shenzhen, China
Tel: 0755-27798480
Fax: 0755-27798960

5.6 Other Information Requested by the Customer

None.

5.7 Test Instruments list

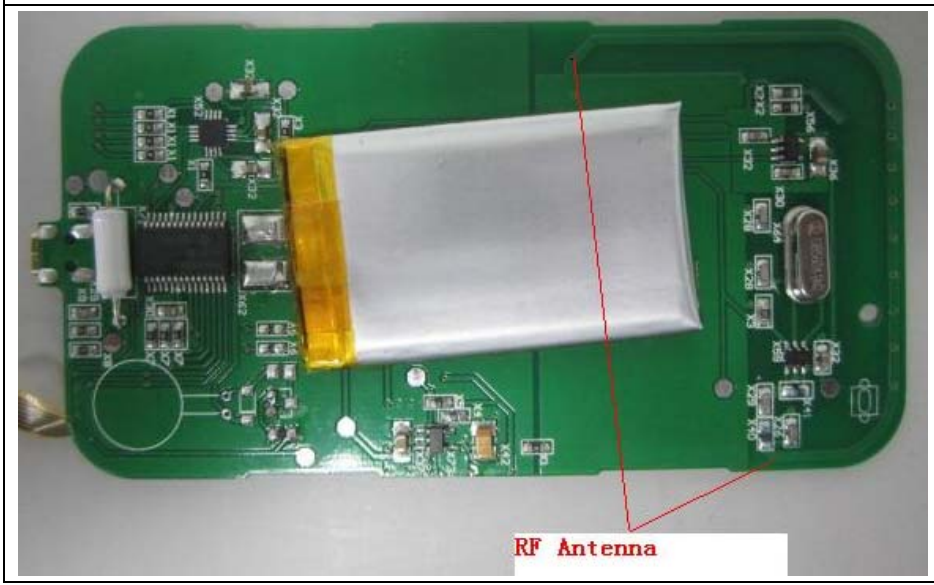
Radiated Emission:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	3m Semi- Anechoic Chamber	ZhongYu Electron	9.2(L)*6.2(W)* 6.4(H)	GTS250	Mar. 30 2011	Mar. 29 2012
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS251	N/A	N/A
3	EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	Jul. 04 2011	Jul. 03 2012
4	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	GTS214	Feb. 26 2011	Feb. 25 2012
5	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	9120D-829	GTS208	June 30 2011	June 29 2012
6	Horn Antenna	ETS-LINDGREN	3160	GTS217	Mar. 30 2011	Mar. 29 2012
7	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
8	Coaxial Cable	GTS	N/A	GTS213	Apr. 01 2011	Mar. 31 2012
9	Coaxial Cable	GTS	N/A	GTS211	Apr. 01 2011	Mar. 31 2012
9	Coaxial cable	GTS	N/A	GTS210	Apr. 01 2011	Mar. 31 2012
11	Coaxial Cable	GTS	N/A	GTS212	Apr. 01 2011	Mar. 31 2012
12	Amplifier(100kHz-3GHz)	HP	8347A	GTS204	Jul. 04 2011	Jul. 03 2012
13	Amplifier(2GHz-20GHz)	HP	8349B	GTS206	Jul. 04 2011	Jul. 03 2012
14	Pre-amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	June 30 2011	June 29 2012
15	Band filter	Amindeon	82346	GTS219	June 30 2011	June 29 2012

Conducted Emission:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	Shielding Room	ZhongYu Electron	7.0(L)x3.0(W)x3.0(H)	GTS252	Jul. 04 2011	Jul. 03 2012
2	EMI Test Receiver	Rohde & Schwarz	ESCS30	GTS223	Jul. 04 2011	Jul. 03 2012
3	10dB Pulse Limita	Rohde & Schwarz	N/A	GTS224	Jul. 04 2011	Jul. 03 2012
4	LISN	SCHWARZBECK MESS-ELEKTRONIK	NSLK 8127	GTS226	Jul. 04 2011	Jul. 03 2012
5	Coaxial Cable	GTS	N/A	GTS227	Apr. 01 2011	Mar. 31 2012
6	EMI Test Software	AUDIX	E3	N/A	N/A	N/A

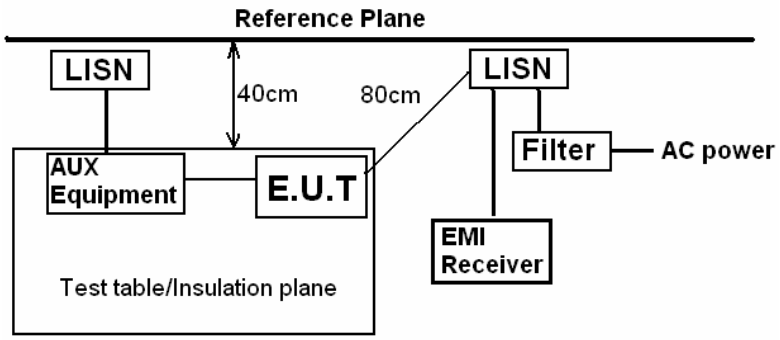
6 Test results and Measurement Data

6.1 Antenna requirement:

Standard requirement:	FCC Part15 C Section 15.203
15.203 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, 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.*	
E.U.T Antenna:	
The EUT make use of an integral antenna,The typical gain of the antenna is 2dBi.	

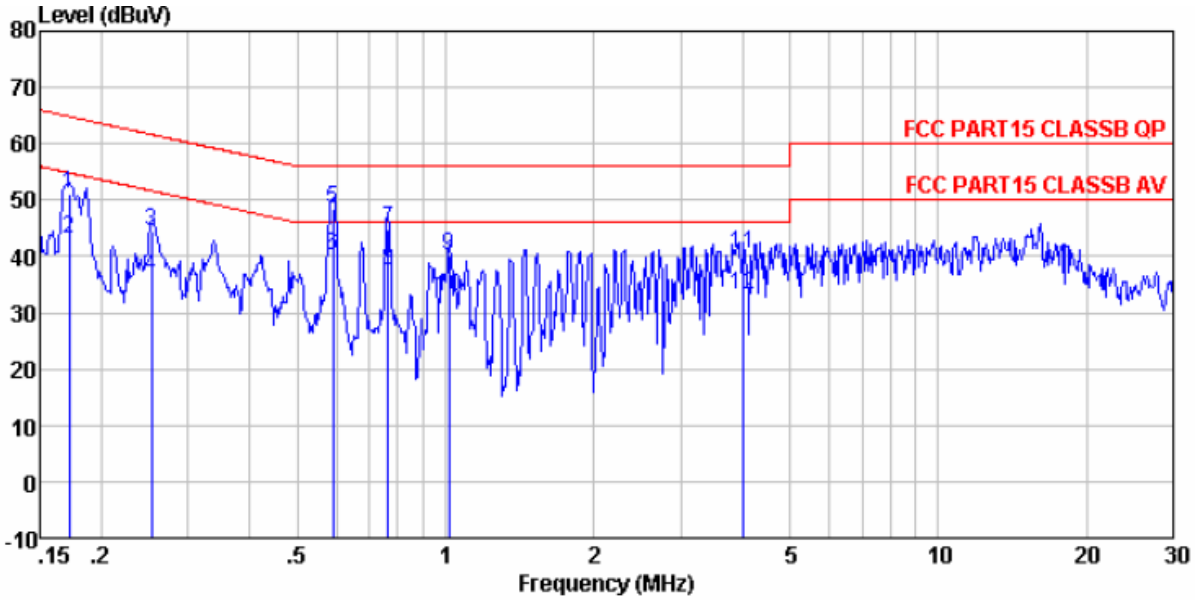


6.2 Conducted Emissions

Test Requirement:	FCC Part15 C Section 15.207
Test Method:	ANSI C63.4:2003
Test Frequency Range:	150KHz to 30MHz
Class / Severity:	Class B
Receiver setup:	RBW=9KHz, VBW=30KHz
Limit:	Frequency range (MHz) / Limit (dBuV): Quasi-peak / Average 0.15-0.5: 66 to 56* / 56 to 46* 0.5-5: 56 / 46 5-30: 60 / 50 * Decreases with the logarithm of the frequency.
Test procedure	The E.U.T and simulators are connected to the main power through a line impedance stabilization network(L.I.S.N.). The provide a 50ohm/50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refers to the block diagram of the test setup and photographs). Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4: 2003 on conducted measurement.
Test setup:	 *Remark:* *E.U.T: Equipment Under Test* *LISN: Line Impedence Stabilization Network* *Test table height=0.8m*
Test Instruments:	Refer to section 5.7 for details
Test mode:	Transmitting mode
Test results:	Passed

Measurement Data

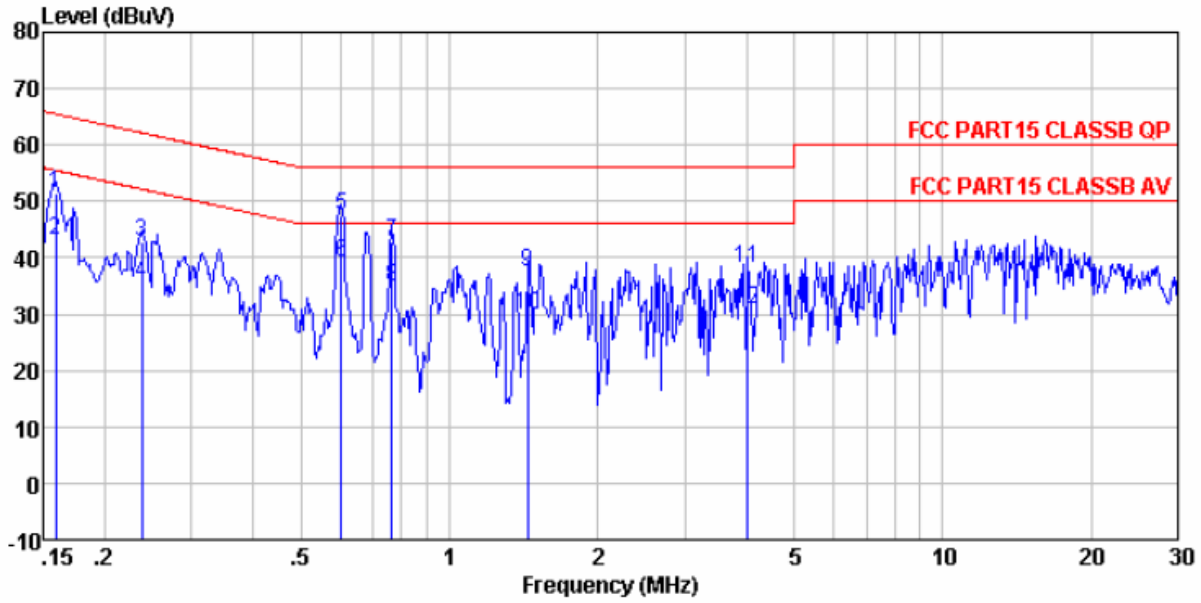
Line:



Condition : FCC PART15 CLASSB QP LISN(2011) LINE
Job No. : 983RF
Test Mode : Transmitting mode
Test Engineer: Aarons

	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.172	50.46	0.67	0.10	51.23	64.86	-13.63	QP
2	0.172	42.37	0.67	0.10	43.14	54.86	-11.72	Average
3	0.253	43.65	0.63	0.10	44.38	61.64	-17.26	QP
4	0.253	35.69	0.63	0.10	36.42	51.64	-15.22	Average
5	0.592	47.69	0.54	0.10	48.33	56.00	-7.67	QP
6	0.592	39.64	0.54	0.10	40.28	46.00	-5.72	Average
7	0.763	44.07	0.51	0.10	44.68	56.00	-11.32	QP
8	0.763	36.81	0.51	0.10	37.42	46.00	-8.58	Average
9	1.016	39.61	0.48	0.10	40.19	56.00	-15.81	QP
10	1.016	32.18	0.48	0.10	32.76	46.00	-13.24	Average
11	4.027	40.19	0.32	0.10	40.61	56.00	-15.39	QP
12	4.027	32.67	0.32	0.10	33.09	46.00	-12.91	Average

Neutral:



Condition : FCC PART15 CLASSB QP LISN(2011) NEUTRAL
Job No. : 983RF
Test Mode : Transmitting mode
Test Engineer: Aarons

	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.159	50.78	0.68	0.10	51.56	65.52	-13.96	QP
2	0.159	42.34	0.68	0.10	43.12	55.52	-12.40	Average
3	0.238	42.21	0.64	0.10	42.95	62.17	-19.22	QP
4	0.238	34.67	0.64	0.10	35.41	52.17	-16.76	Average
5	0.604	46.87	0.53	0.10	47.50	56.00	-8.50	QP
6	0.604	38.67	0.53	0.10	39.30	46.00	-6.70	Average
7	0.763	42.28	0.51	0.10	42.89	56.00	-13.11	QP
8	0.763	34.38	0.51	0.10	34.99	46.00	-11.01	Average
9	1.441	36.95	0.44	0.10	37.49	56.00	-18.51	QP
10	1.441	29.15	0.44	0.10	29.69	46.00	-16.31	Average
11	4.027	37.65	0.32	0.10	38.07	56.00	-17.93	QP
12	4.027	30.28	0.32	0.10	30.70	46.00	-15.30	Average

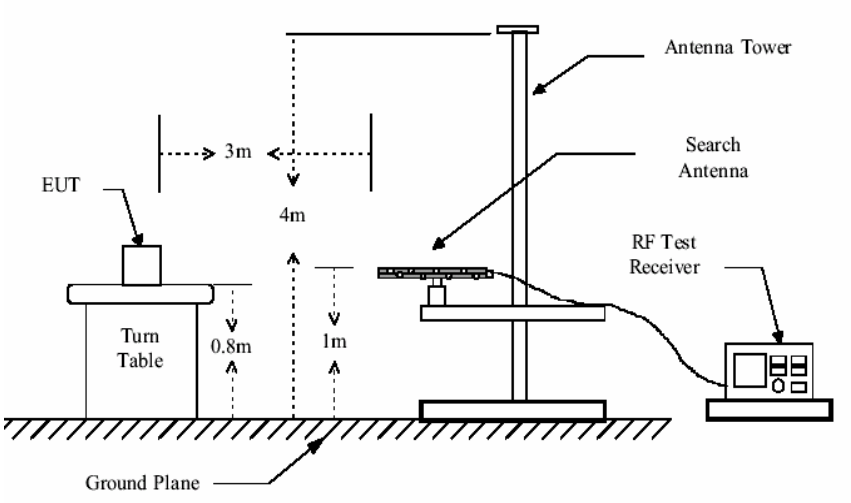
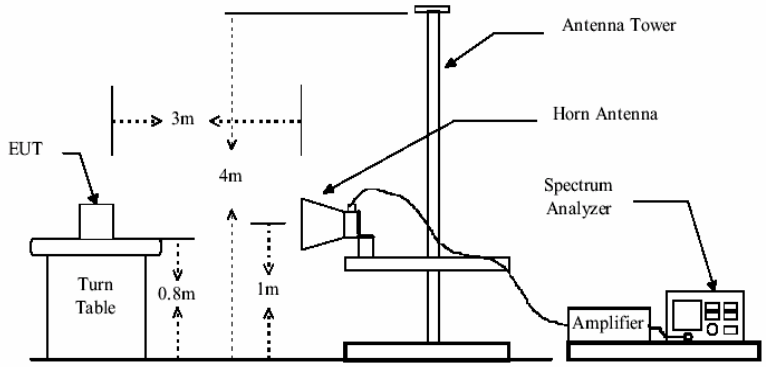
Notes:

1. The following Quasi-Peak and Average measurements were performed on the EUT:

2. Final Test Level =Receiver Reading + LISN Factor + Cable Loss.

6.3 Radiated Emission

<table>
<tr><td>Test Requirement:</td><td>FCC Part15 C Section 15.231(b) and 15.209</td></tr>
<tr><td>Test Method:</td><td>ANSI C63.4:2003</td></tr>
<tr><td>Test Frequency Range:</td><td>30MHz to 5000MHz</td></tr>
<tr><td>Test site:</td><td>Measurement Distance: 3m (Semi-Anechoic Chamber)</td></tr>
<tr><td>Receiver setup:</td><td>
<table>
<tr><td>Frequency</td><td>Detector</td><td>RBW</td><td>VBW</td><td>Remark</td></tr>
<tr><td>30MHz-1GHz</td><td>Quasi-peak</td><td>100KHz</td><td>300KHz</td><td>Quasi-peak Value</td></tr>
<tr><td>Above 1GHz</td><td>Peak</td><td>1MHz</td><td>3MHz</td><td>Peak Value</td></tr>
</table>
</td></tr>
<tr><td>Limit:
(Field strength of the fundamental signal)</td><td>
<table>
<tr><td>Frequency</td><td>Limit (dBuV/m @3m)</td><td>Remark</td></tr>
<tr><td rowspan="2">433.88MHz</td><td>80.8</td><td>Average Value</td></tr>
<tr><td>100.8</td><td>Peak Value</td></tr>
</table>
</td></tr>
<tr><td>Limit:
(Spurious Emissions)</td><td>
<table>
<tr><td>Frequency</td><td>Limit (dBuV/m @3m)</td><td>Remark</td></tr>
<tr><td>30MHz-88MHz</td><td>40.0</td><td>Quasi-peak Value</td></tr>
<tr><td>88MHz-216MHz</td><td>43.5</td><td>Quasi-peak Value</td></tr>
<tr><td>216MHz-960MHz</td><td>46.0</td><td>Quasi-peak Value</td></tr>
<tr><td>960MHz-1GHz</td><td>54.0</td><td>Quasi-peak Value</td></tr>
<tr><td rowspan="2">Above 1GHz</td><td>54.0</td><td>Average Value</td></tr>
<tr><td>74.0</td><td>Peak Value</td></tr>
</table>
Or The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level
whichever limit permits a higher field strength.
</td></tr>
<tr><td>Test Procedure:</td><td>a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.
b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-</td></tr>
</table>

	peak or average method as specified and then reported in a data sheet.
Test setup:	Below 1GHz  Above 1GHz 
Test Instruments:	Refer to section 5.7 for details
Test mode:	Transmitting mode
Test results:	Passed

Note:
The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Final Test Level =Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor

Measurement Data

6.3.1 Field Strength Of The Fundamental Signal

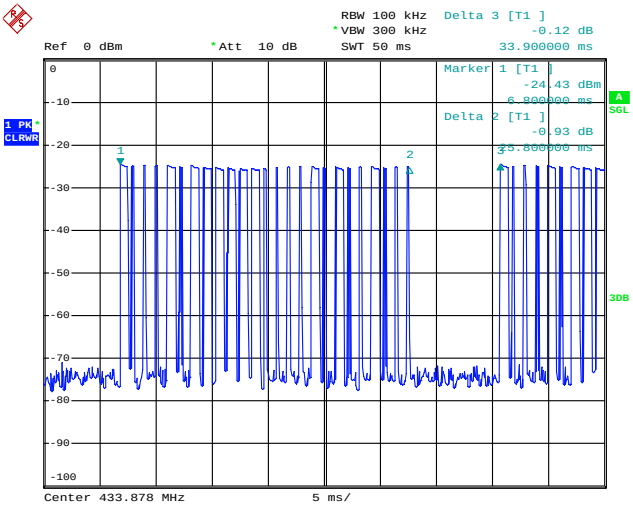
Peak value:								
Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Preamp Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
433.88	1.32	15.49	32.07	97.44	82.18	100.80	-18.62	Horizontal
433.88	1.32	15.49	32.07	98.31	83.05	100.80	-17.75	Vertical

Average value:						
Frequency (MHz)	Level (dBuV/m)	duty cycle factor	Average value (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
433.88	82.18	-8.72	73.46	80.8	-7.34	Horizontal
433.88	83.05	-8.72	74.33	80.8	-6.47	Vertical

Average value:	
Calculate Formula:	Average value=Peak value + duty cycle factor
	duty cycle factor=20 log(Duty cycle)
	Duty cycle= T on time / T period
Test data:	Ton time =(1.575-0.770)*11+(2.120-1.865)*14=12.425ms
	T period =33.90ms
	Duty cycle= 36.65%
	duty cycle factor= -8.72

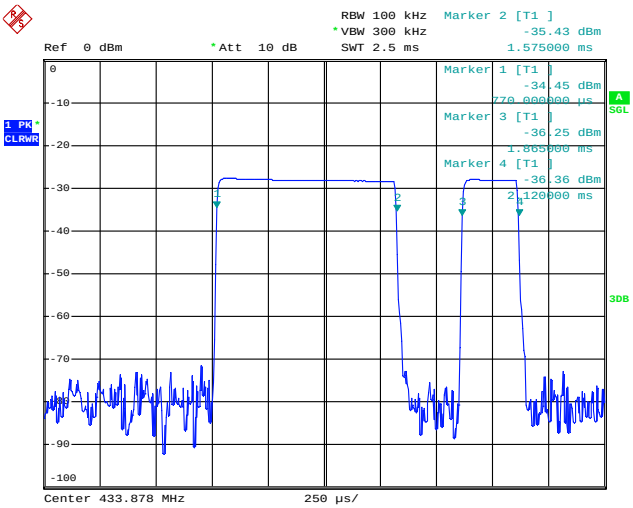
Test plot as follows:

T period:



Date: 12.DEC.2011 04:36:34

T on time slot:



Date: 12.DEC.2011 04:38:17

6.3.2 Spurious Emissions

QP value:

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Preamp Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
41.28	0.27	15.57	32.12	38.37	22.09	40.00	-17.91	Vertical
59.23	0.36	15.67	31.95	38.56	22.64	40.00	-17.36	Vertical
92.79	0.46	13.84	31.73	37.37	19.94	43.50	-23.56	Vertical
282.00	1.02	12.65	32.29	39.15	20.53	46.00	-25.47	Vertical
867.84	2.12	20.78	31.47	52.41	43.84	60.80	-16.96	Vertical
39.44	0.26	15.41	32.16	35.79	19.30	40.00	-20.70	Horizontal
55.81	0.34	15.99	31.97	35.49	19.85	40.00	-20.15	Horizontal
103.81	0.49	12.78	31.72	35.47	17.02	43.50	-26.48	Horizontal
336.04	1.14	13.95	32.31	35.71	18.49	46.00	-27.51	Horizontal
867.84	2.12	20.78	31.47	53.00	44.43	60.80	-16.37	Horizontal

Peak value:

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Preamp Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
1301.64	2.75	25.52	34.58	58.02	51.71	74.00	-22.29	Vertical
1735.52	3.25	25.04	34.66	56.59	50.22	80.80	-30.58	Vertical
2169.40	3.65	27.66	34.76	53.17	49.72	80.80	-31.08	Vertical
2603.28	3.97	27.80	34.90	54.76	51.63	80.80	-29.17	Vertical
3037.16	4.42	28.65	35.01	53.76	51.82	80.80	-28.98	Vertical
3471.04	4.84	28.76	35.15	52.81	51.26	80.80	-29.54	Vertical
1301.64	2.75	25.52	34.58	56.66	50.35	74.00	-23.65	Horizontal
1735.52	3.25	25.04	34.66	52.91	46.54	80.80	-34.26	Horizontal
2169.40	3.65	27.66	34.76	52.40	48.95	80.80	-31.85	Horizontal
2603.28	3.97	27.80	34.90	53.52	50.39	80.80	-30.41	Horizontal
3037.16	4.40	28.59	35.01	50.88	48.86	80.80	-31.94	Horizontal
3471.04	4.84	28.76	35.15	52.38	50.83	80.80	-29.97	Horizontal

Average value:						
Frequency (MHz)	Level (dBuV/m)	duty cycle factor	Average value (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
1301.64	51.71	-8.72	42.99	54.00	-11.01	Vertical
1735.52	50.22	-8.72	41.50	60.80	-19.30	Vertical
2169.40	49.72	-8.72	41.00	60.80	-19.80	Vertical
2603.28	51.63	-8.72	42.91	60.80	-17.89	Vertical
3037.16	51.82	-8.72	43.10	60.80	-17.70	Vertical
3471.04	51.26	-8.72	42.54	60.80	-18.26	Vertical
1301.64	50.35	-8.72	41.63	54.00	-12.37	Horizontal
1735.52	46.54	-8.72	37.82	60.80	-22.98	Horizontal
2169.40	48.95	-8.72	40.23	60.80	-20.57	Horizontal
2603.28	50.39	-8.72	41.67	60.80	-19.13	Horizontal
3037.16	48.86	-8.72	40.14	60.80	-20.66	Horizontal
3471.04	50.83	-8.72	42.11	60.80	-18.69	Horizontal

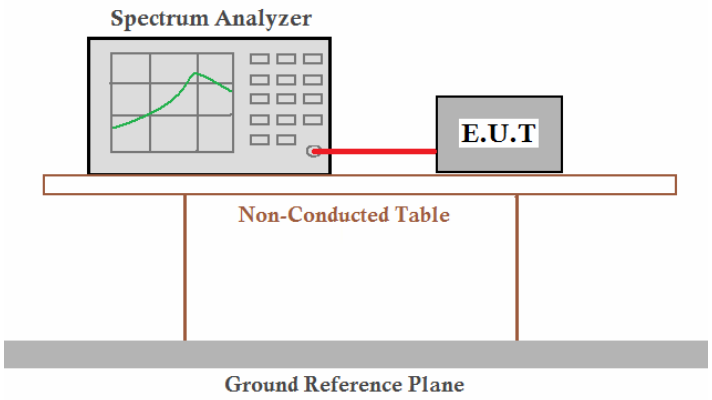
Note:

Peak Limit=Average Limit+20dB

Average value=Peak value + duty cycle factor

duty cycle factor=20 log(Duty cycle)

6.4 20dB Bandwidth

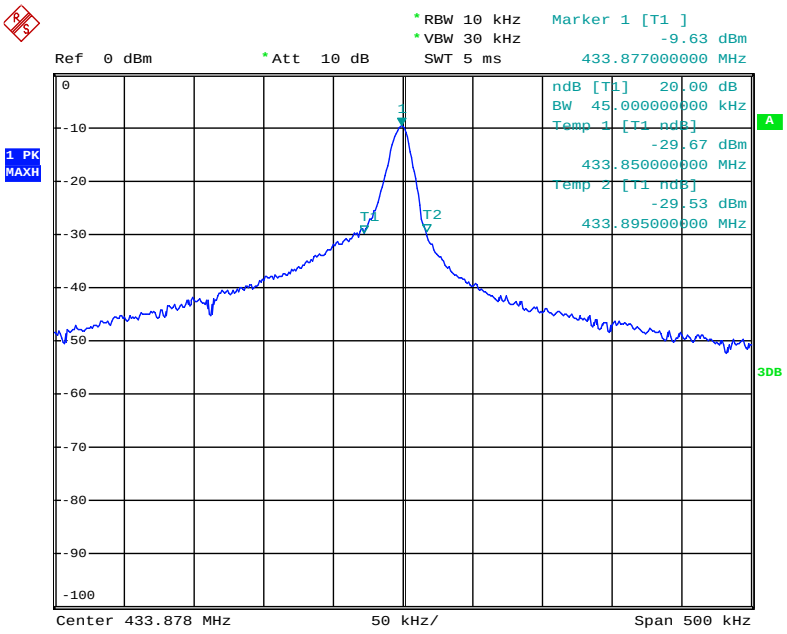
Test Requirement:	FCC Part15 C Section 15.231 (c)
Test Method:	ANSI C63.4:2003
Receiver setup:	RBW=30KHz, VBW=100KHz, detector: Peak
Limit:	The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.
Test mode:	Transmitting mode
Test Procedure:	1. According to the follow Test-setup, keep the relative position between the artificial antenna and the EUT. 2. Set the EUT to proper test channel. 3. Max hold the radiated emissions, mark the peak power frequency point and the -20dB upper and lower frequency points. 4. Read 20dB bandwidth.
Test setup:	
Test Instruments:	Refer to section 5.7 for details
Test results:	Passed

Measurement Data

20dB bandwidth (MHz)	Limit (MHz)	Results
0.045MHz	1.085 MHz	Passed

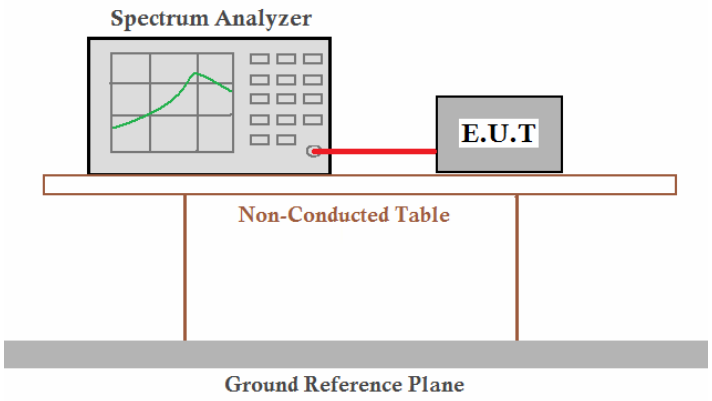
Note: Limit= Fundamental frequency×0.25%=433.88×0.25%=1.085MHz

Test plot as follows:



Date: 12.DEC.2011 04:33:27

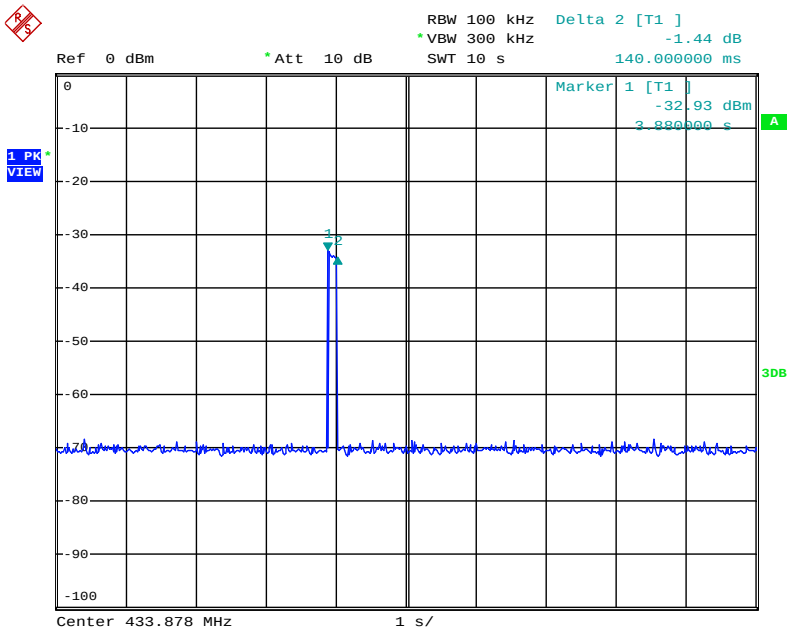
6.5 Dwell Time:

Test Requirement:	FCC Part15 C Section 15.231 (a)
Test Method:	ANSI C63.4:2003
Receiver setup:	RBW=100KHz, VBW=300KHz, span=0Hz, detector: Peak
Limit:	Not more than 5 seconds
Test mode:	Transmitting mode
Test Procedure:	1. According to the follow Test-setup, keep the relative position between the artificial antenna and the EUT. 2. Set the EUT to proper test channel. 3. single scan the transmit, and read the transmission time.
Test setup:	
Test Instruments:	Refer to section 5.7 for details
Test results:	Passed

Measurement Data

Test item	Test data	Limit (second)
Transmitting time	0.14s	<5s

Test plot as follows:



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