

FCC PART 15.249
EMI MEASUREMENT AND TEST REPORT

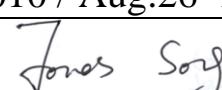
For

JULONG EDUCATIONAL TECHNOLOGY CO.,LTD.

4/F, Building T3,Keji Road South, Hi-Tech Industrial Park, NanShan District, Shenzhen

FCC ID: WJK-L-RFBT1

Aug.30, 2010

This Report Concerns: Original Report	Equipment Type: wireless module transmitter
Test Engineer: Eric Li	
Report No.: BATT201008301R-3	
Receive EUT Date/Test Date: Aug.26, 2010 / Aug.26- Aug.30, 2010	
Reviewed By: Jones song	
Prepared By: 	SHENZHEN BATT TESTING TECHNOLOGY CO.,LTD. Room B1104,Bldg.B,Xinbaoyuan, Xinanhu Commercial city, Bao'an District,Shenzhen,Guangdong,China Tel: 86-755-27754004 Fax: 86-755-27754182

Note: The test report is specially limited to the above company and this particular sample only.
It may not be duplicated without prior written consent of SHENZHEN BATT TESTING TECHNOLOGY CO.,LTD.
This report must not be used by the client to claim product certification,approval,or
endorsement by NVLAP, NIST or any agency of the US Government.

TABLE OF CONTENTS

1.	GENERAL INFORMATION	3
1.1.	Report information.....	3
1.2.	Measurement Uncertainty	3
2.	PRODUCT DESCRIPTION	4
2.1.	EUT Description	4
2.2.	Block Diagram of EUT Configuration.....	4
2.3.	Support Equipment List	4
2.4.	Test Conditions	5
3.	FCC ID LABEL.....	6
4.	TEST RESULTS SUMMARY.....	7
	Modifications	7
5.	TEST EQUIPMENT USED	8
6.	CONDUCTED POWER LINE TEST.....	9
6.1.	Test Equipment	9
6.2.	Test Procedure.....	9
6.3.	Test Setup.....	9
6.4.	Configurating of the EUT	9
6.5.	EUT Operating Condition.....	11
6.6.	Conducted Power line Emission Limits.....	11
6.7.	Conducted Power Line Test Result.....	11
7.	RADIATED EMISSION TEST	15
7.1.	Test Equipment	15
7.2.	Test Procedure.....	15
7.3.	Radiated Test Setup	15
7.4.	Confihuration of the EUT	15
7.5.	EUT Operating Condition.....	15
7.6.	Radiated Emission Limit.....	16
7.7.	Radiated Emission Test Result	17
8.	BAND EDGE	19
8.1.	Test Equipment	19
8.2.	Test Procedure.....	19
8.3.	Configuration of The EUT	19
8.4.	EUT Operating Condition	19
8.5.	Band Edge FCC 15.249(d) Limit	19
8.6.	Band Edge Test Result	19

1. GENERAL INFORMATION

1.1. Report information

1.1.1. This report is not a certificate of quality; it only applies to the sample of the specific product/equipment given at the time of its testing. The results are not used to indicate or imply that they are application to the similar items. In addition, such results must not be used to indicate or imply that BATT approves recommends or endorses the manufacture, supplier or use of such product/equipment, or that BATT in any way guarantees the later performance of the product/equipment.

1.1.2. The sample/s mentioned in this report is/are supplied by Applicant, BATT therefore assumes no responsibility for the accuracy of information on the brand name, model number, origin of manufacture or any information supplied.

Additional copies of the report are available to the Applicant at an additional fee. No third part can obtain a copy of this report through BATT, unless the applicant has authorized BATT in writing to do so.

Test Facility -

The test site used to collect the radiated data is located on the address of

Shenzhen EMTEK Co., Ltd.

(FCC Registered Test Site Number: 709623) on

Bldg.69, Majialong Industry Zone, Nanshan District

Shenzhen, Guangdong, China

The Test Site is constructed and calibrated to meet the FCC requirements.

1.2. Measurement Uncertainty

Available upon request.

2. PRODUCT DESCRIPTION

2.1. EUT Description

Description : wireless module transmitter
Applicant : JULONG EDUCATIONAL TECHNOLOGY CO.,LTD.
4/F, Building T3,Keji Road South, Hi-Tech Industrial
Park, NanShan District, Shenzhen
Model Number : L-RFBT1, JL-RFBT4
product
information : All models have the same constructions, circuit diagram
and PCB layout. Only model name are different.

Additional Information

Frequency : 2402-2480MHz
Power Supply : DC 5V
Transmitter : The antenna is Fix antenna, no consideration of
Antenna
replacement.Refer to the product photo.
Current
Consumption : N/A

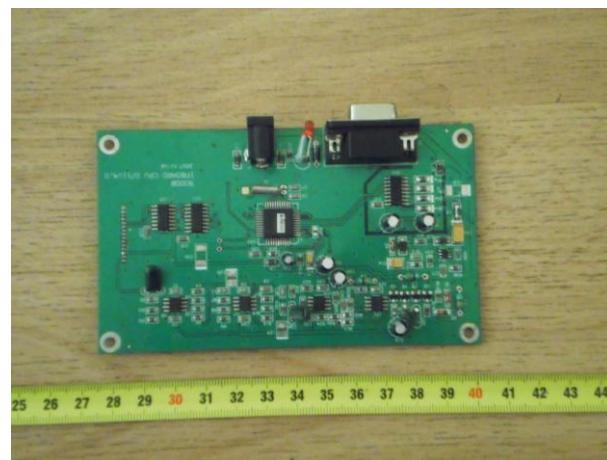
2.2. Block Diagram of EUT Configuration



2.3. Support Equipment List

Name	Model No	S/N	Manufacturer	Used “√”
AC ADAPTER	NLA100050W1A	-	JULONG	√

The Supported Board Photograph:



2.4. Test Conditions

Temperature: 23~25°C

Relative Humidity: 55~63 %

3. FCC ID LABEL

FCC ID: WJK-L-RFBT1

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.

Label Location on EUT

EUT Top View/ FCC ID Label Location



4. TEST RESULTS SUMMARY

FCC 15 Subpart C,Paragraph 15.249

Test Standards	Test Items	Test Results
FCC Part 15,Paragraph 15.207	Conducted Test	Pass
FCC Part 15 Subpart C, Paragraph 15.249(a) and 15.249(b)	Field Strength of Fundamental	Pass
FCC Part 15,Paragraph 15.209	Radiated Test	Pass
FCC Part 15 Subpart C, Paragraph 15.249(d)	Measured Band Edges	Pass

Remark: "N/A" means "Not applicable."

Modifications

No modification was made.

5. TEST EQUIPMENT USED

EQUIPMENT/FACILITIES	MANUFACTURER	MODEL #	SERIAL NO.	DATE OF CAL.	CAL. INTERVAL
Cable	Resenberger	N/A	NO.1	Mar 10, 2010	1 Year
Cable	SCHWARZBECK	N/A	NO.2	Mar 10, 2010	1 Year
Cable	SCHWARZBECK	N/A	NO.3	Mar 10, 2010	1 Year
LISN	Rohde & Schwarz	ESH3-Z5	100305	Mar 10, 2010	1 Year
50Ω Coaxial Switch	ANRITSU CORP	MP59B	6200283933	Mar 10, 2010	1 Year
EMI Test Receiver	Rohde & Schwarz	ESP13	100180	Oct.18,2009	1 Year
Spectrum Analyzer	Rohde & Schwarz	FSP40	100273	Sep.10,2009	1 Year
3m Semi-Anechoic Chamber	Albatross Projects	9mx6mx6m	N/A	Feb.20,2010	1 Year
Signal Generator	FLUKE	PM5418 + Y/C	LO747012	Feb.20,2010	1 Year
Signal Generator	FLUKE	PM5418TX	LO738007	Feb.20,2010	1 Year
Loop Antenna	SCHWARZBECK	FMZB1516	113	Jan.30,2010	1 Year
Trilog-Super Broadband Antenna	SCHWARZBECK	VULB9161	9161-4079	Sep.22,2009	1 Year
Broad-Band Horn Antenna	SCHWARZBECK	BBHA9120D	9120D-564	Sep.22,2009	1 Year
Ultra Broadband Antenna	Rohde & Schwarz	HL-562	100110	June.15,2010	1 Year
AMN	Rohde & Schwarz	ESH3-Z5	100196	Oct.11,2009	1 Year
AMN	Rohde & Schwarz	ESH3-Z5	100197	Oct.11,2009	1 Year
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	N/A	N/A	N/A
Power Meter	Rohde & Schwarz	NRVD	100041	Feb.20,2010	1 Year
EMI Test Receiver	Rohde & Schwarz	ESCS30	100003	Feb.20,2010	1 Year
Coaxial Cable with N-connectors	SCHWARZBECK	AK9515H	95549	Sep.22,2009	1 Year
Radio Communication Test Set	Rohde & Schwarz	CMS 54	846621/024	Feb.20,2010	1 Year
Modulation Analyzer	Hewlett-Packard	8901B	2303A00362	Feb.20,2010	1 Year
Absorbing clamp	Rohde & Schwarz	MDS-21	N/A	Oct.29,2009	1 Year

6. CONDUCTED POWER LINE TEST

6.1. Test Equipment

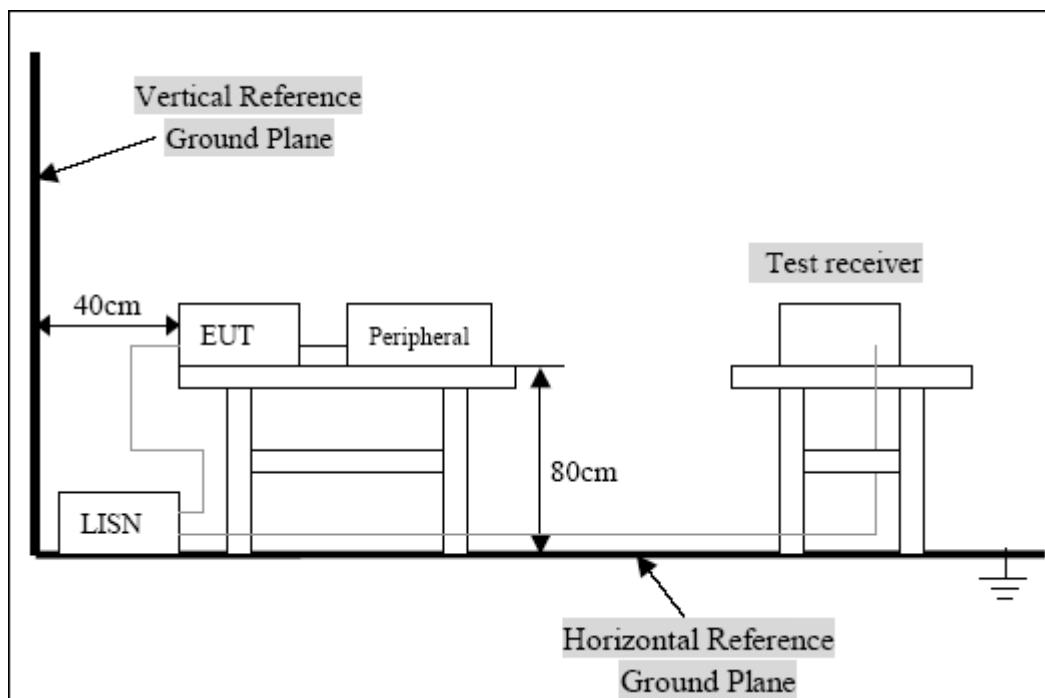
Please refer to section 4 this report.

6.2. Test Procedure

The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.) This provides 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.

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 ASIN C63.4:2003 on conducted measurement. Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9Khz.

6.3. Test Setup



For the actual test configuration, Please refer to the related items-Photos of testing

6.4. Configuring of the EUT

The EUT was configured according to ASIN C63.4:4-2003. Enable the signal transmitted from the external antenna from EUT to receiver. All interface ports were connected to the appropriate peripherals. All peripherals and cables are listed below.

Note:

Below 1GHZ, the channel low, middle, high were pre-tested. The channel low, worst case one, was chosen for conducted and radiated emission test.

Above 1GHZ, the channel low, middle, high were tested individually.

A.EUT

Device	Manufacturer	Model #	FCC ID
Wireless module transmitter	JULONG EDUCATIONAL TECHNOLOGY CO.,LTD.	L-RFBT1	WJK-L-RFBT1

B.Internal Devices

Device	Manufacturer	Model #	FCC ID
N/A			

C.Peripherals

Device	Manufacturer	Model # Serial #	FCC ID/ Doc	Cable
N/A				

6.5. EUT Operating Condition

Operating condition is according to ANSI C63.4-2003.

Setup the EUT and simulators as shown on follow.

Enable RF signal and confirm EUT active.

Modulate output capacity of EUT up to specification.



6.6. Conducted Power line Emission Limits

FCC Part 15 Paragraph 15.207 (dBuV)		
Frequency Range (MHZ)	Class A QP/AV	Class B QP/AV
0.15-0.5	79/66	65-56/56-46
0.5-5.0	73/60	56-46
5.0-3.0	73/60	60-50

Note: In the above table, the tighter limit applies at the band edges.

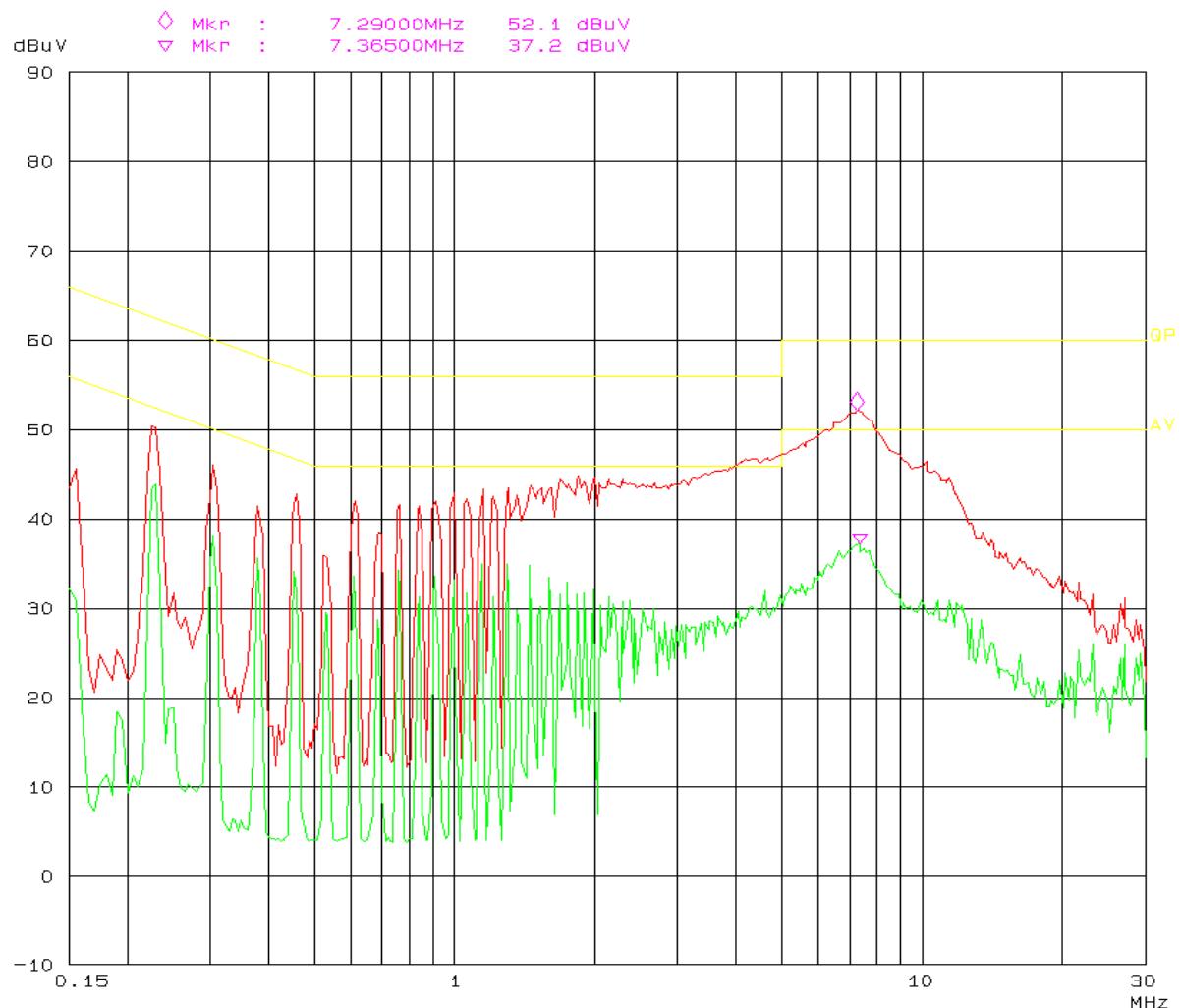
6.7. Conducted Power Line Test Result

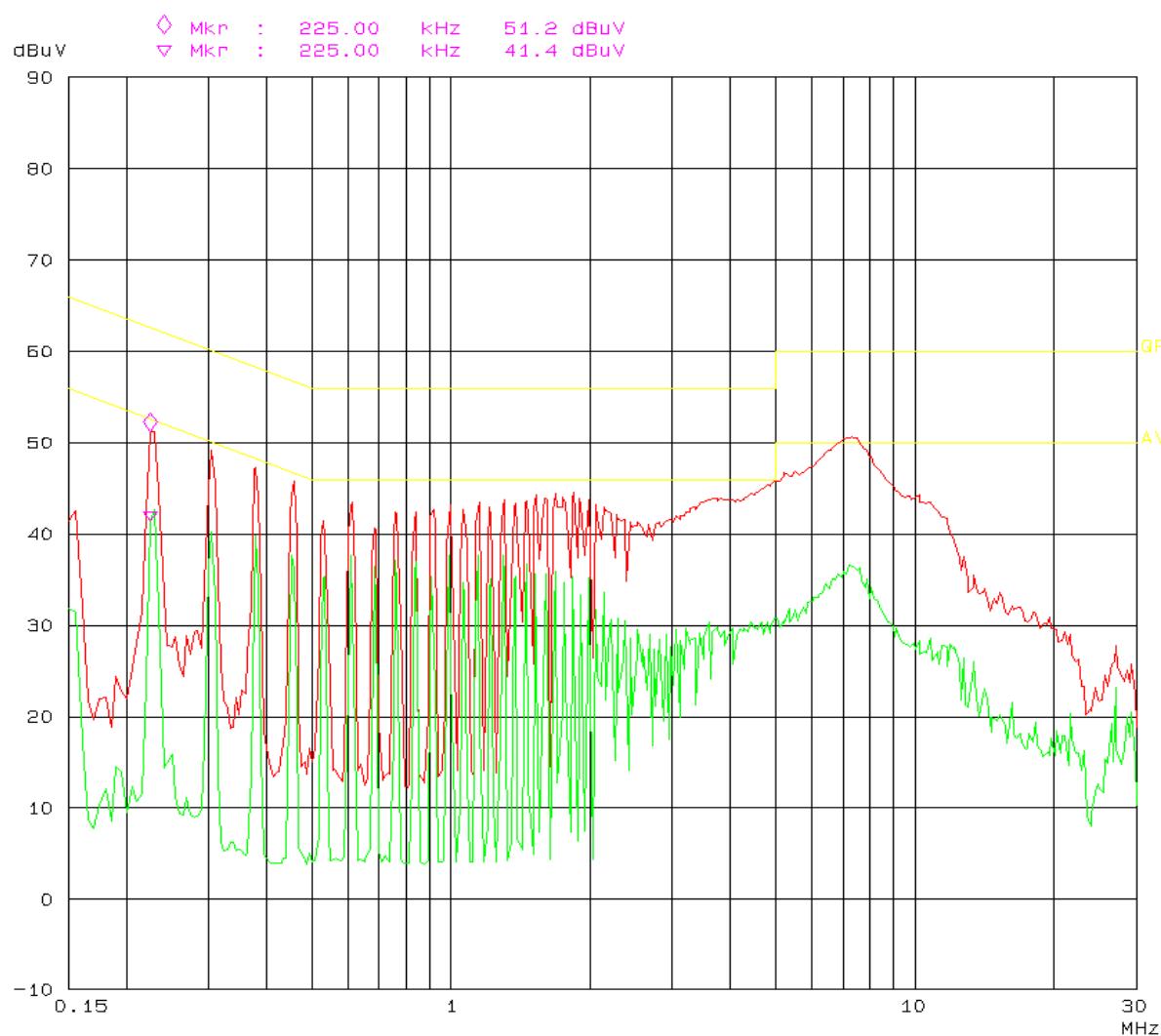
Test Mode: Transmitting (worse case mode)

Line Conducted Emissions				FCC Part 15.207	
Frequency (MHz)	Amplitude (dB μ V)	Detector (QP/AV)	Conductor (Line/Neutral)	Limit (dB μ V)	Margin (dB)
7.2900	52.10	QP	Line	60.00	7.90
0.6150	37.70	AV	Neutral	46.00	8.30
0.2300	44.00	AV	Line	52.45	8.45
0.3800	39.80	AV	Neutral	48.28	8.48
0.4550	37.70	AV	Neutral	46.78	9.08
7.2700	50.50	QP	Neutral	60.00	9.50
0.3050	40.30	AV	Neutral	50.11	9.81
0.4600	45.90	QP	Neutral	56.69	10.79
0.3050	49.30	QP	Neutral	60.11	10.81
0.3800	47.20	QP	Neutral	58.28	11.08
1.1450	34.90	AV	Line	46.00	11.10
1.4450	34.80	AV	Line	46.00	11.20
0.2250	51.20	QP	Neutral	62.63	11.43
0.2250	41.40	AV	Neutral	52.63	11.23
0.3050	38.10	AV	Line	50.11	12.01
0.2300	50.30	QP	Line	62.45	12.15
1.4550	43.80	QP	Line	56.00	12.20
0.6150	33.70	AV	Line	46.00	12.30
0.6150	43.40	QP	Neutral	56.00	12.60
1.1500	43.20	QP	Line	56.00	12.80
7.3650	37.20	AV	Line	50.00	12.80
7.2050	36.60	AV	Neutral	50.00	13.40
0.6150	42.00	QP	Line	56.00	14.00
0.3050	46.10	QP	Line	60.11	14.01

Plot(s) of Test Data

Plot(s) of Test Data is presented hereinafter as reference.





7. RADIATED EMISSION TEST

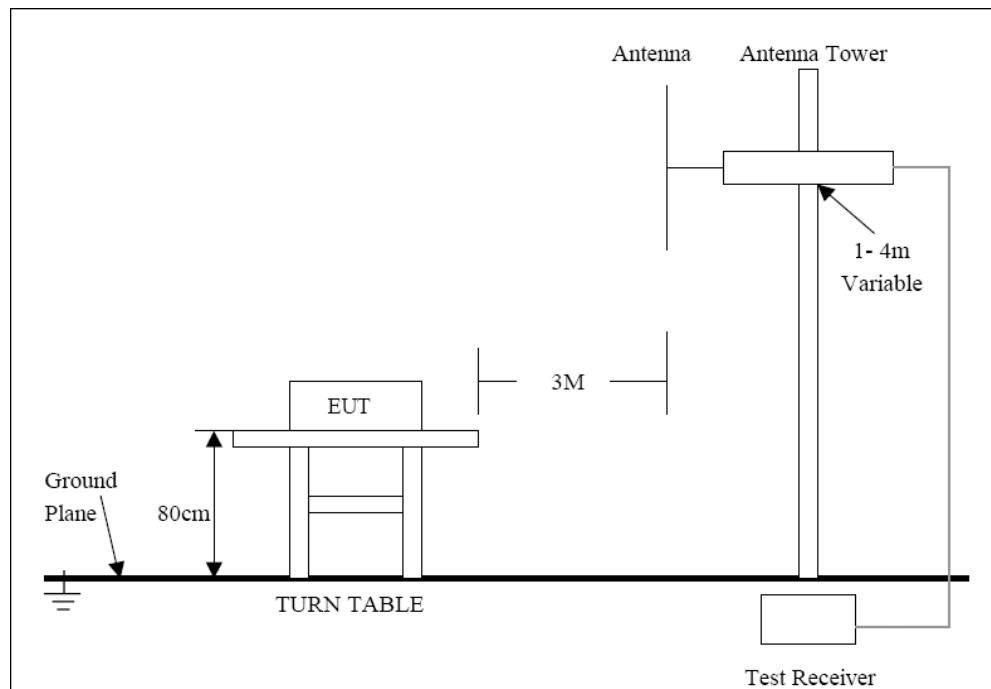
7.1. Test Equipment

Please refer to section 4 this report.

7.2. Test Procedure

1. The EUT was tested according C63.4-2003. The radiated test was performed at FCC Registration laboratory .
2. The EUT,peripherals were put on the turntable which table size od 1m×1.5m,table high 0.8m.All set up is according tl ANSI C63.4-2003.
3. The frequency spectrum from 30MHZ to 1 GHZ was investigated.All readings from 30MHZ to 1 GHZ are quasi-peak values with a resolution bandwidth of 120 KHZ. All readings are above 1GHZ ,prak values with a resolution bandwidth of 1 MHZ.Measurements were made at 3 merers.
4. The antenna high is varied from 1m to 4m high to find the maximum emission for each frequency.
5. Maximizing procedure was performed on the six(6)highest emissions to ensure EUT compliance is with all installation combinations.All data was recorded in the peak detection mode.Quasi-peak readings was performed only when an emission was found to be marginal (within -4 Db of specification limit),and are distinguished with a “QP”in the data table.
6. The antenna polarization:Vertical polarization and Horizontal polarization.

7.3. Radiated Test Setup



For the accrual test configuration,pleas refer to the related items-photos of Testing.

7.4. Configuration of the EUT

Same as section 5.4 of this report

7.5. EUT Operating Condition

Same as section 5.5 of this report.

7.6. Radiated Emission Limit

All emission from a digital device,including any network of conductors and apparatus connected thereto,shall not exceed the level of field strength specified below :

A. FCC Part 15 Subpart C Paragraph 15.249(a) Limit

Frequency (MHZ)	Distance (m)	Field Strength (dBuV/m)
30-88	3	40.0
88-*216	3	43.5
216-960	3	46.0
ABOVE 960	3	54.0

Note: (1) RF Voltage (dBuV)=20 log Voltage(uV)

(2) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

(3) The emission limit in this paragraph is based on measurement instrumentation employing an average detector. Measurement using instrumentation with a peak detector function,corresponding to 20dB above the maximum permitted average limit.

B.Frequencies in restricted band are complied to limit on Paragraph 15.209.

Note: (1) RF Voltage (dBuV)=20 log Voltage(uV)

(2) In the Above Table,the tighter limit applies at the band edges.

(3) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

Fundamental Frequency (MHZ)	Field as strength of Fundamental(3m)			Field as strength of Harmonics(3m)		
	mV/m	dBuV/m		uV/ m	dBuV/m	
902~928	50	94(Average)	114(Peak)	500	54(Average)	74(Peak)
2400~2483.5	50	94(Average)	114(Peak)	500	54(Average)	74(Peak)

7.7. Radiated Emission Test Result

A. Fundamental Radiated Emission Data

Product:	wireless module transmitter	Test mode:	transmitting
Test Item:	Fundamental Radiated Emission Data	Temperature:	25°C
Test Voltage:	DC5V	Humidity:	56%RH
Test Result:	PASS		

CH Low

Freq. (MHz)	Emission(dBuV/m) Peak Detector/ AV	HORIZ/ VERT	Limits(dBuV/m) Peak/ Average	Margin (dB)
2402.00	90.8/ 72.7	HORIZ	114/94	23.2/21.3
2402.00	93.8 / 75.4	VERT	114/94	20.2/18.6

CH Middle

Freq. (MHz)	Emission(dBuV/m) Peak Detector/ AV	HORIZ/ VERT	Limits(dBuV/m) Peak/ Average	Margin (dB)
2441.00	91.0/72.4	HORIZ	114/94	23.0/21.6
2441.00	92.9/73.7	VERT	114/94	21.1/20.3

CH High

Freq. (MHz)	Emission(dBuV/m) Peak Detector/ AV	HORIZ/ VERT	Limits(dBuV/m) Peak/ Average	Margin (dB)
2480.0	91.5/74.8	HORIZ	114/94	22.5/19.2
2480.0	93.7/76.4	VERT	114/94	20.3/17.6

B. Harmonics Radiated Emission Data

Product:	wireless module transmitter	Test mode:	transmitting
Test Item:	Radiated Emission Data	Temperature:	25°C
Test Voltage:	DC 5V	Humidity:	56%RH
Test Result:	PASS		

CH Low

Freq. (MHz)	Emission(dBuV/m) Peak Detector	HORIZ/ VERT	Limits(dBuV/m) Peak/Average	Margin (dB)
4804.12	-	H/V	74.0/54.0	-
7206.18	-	H/V	74.0/54.0	-
9608.24	-	H/V	74.0/54.0	-
12010.3	-	H/V	74.0/54.0	-
14412.36	-	H/V	74.0/54.0	-
16814.42	-	H/V	74.0/54.0	-
19216.48	-	H/V	74.0/54.0	-
21618.54	-	H/V	74.0/54.0	-
24020.6	-	H/V	74.0/54.0	-

CH Midde

Freq. (MHz)	Emission(dBuV/m) Peak Detector	HORIZ / VERT	Limits(dBuV/m) Peak/ACERAGE	Margin (dB)
4882.18	-	H/V	74.0/54.0	-
7323.27	-	H/V	74.0/54.0	-
9764.36	-	H/V	74.0/54.0	-
12205.45	-	H/V	74.0/54.0	-
14646.54	-	H/V	74.0/54.0	-
17087.63	-	H/V	74.0/54.0	-
19528.72	-	H/V	74.0/54.0	-
21969.81	-	H/V	74.0/54.0	-
24410.9	-	H/V	74.0/54.0	-

CH High

Freq. (MHz)	Emission(dBuV/m) Peak Detector	HORIZ / VERT	Limits(dBuV/m) Peak/ACERAGE	Margin (dB)
4960.26	-	H/V	74.0/54.0	-
7440.39	-	H/V	74.0/54.0	-
9920.52	-	H/V	74.0/54.0	-
12400.65	-	H/V	74.0/54.0	-
14880.78	-	H/V	74.0/54.0	-
17360.91	-	H/V	74.0/54.0	-
19841.04	-	H/V	74.0/54.0	-
22321.17	-	H/V	74.0/54.0	-
24801.3	-	H/V	74.0/54.0	-

Note: - means the emission is too low at least 20dB to the limit.

C. General Radiated Emission Data

Product:	wireless module transmitter	Test mode:	transmitting
Test Item:	Radiated Emission Data	Temperature:	25°C
Test Voltage:	DC 5V	Humidity:	56%RH
Test Result:	PASS		

Freq. (MHz)	Emission(dBuV/m) Peak Detector	HORIZ / VERT	Limits(dBuV/m) Peak/ACERAGE	Margin (Db)
96.82	30.0	HORIZ	43.5	13.5
96.82	31.9	VERT	43.5	11.6
195.53	27.5	HORIZ	43.5	16.0
195.53	30.1	VERT	43.5	13.4
432.43	29.8	HORIZ	46	16.2
432.43	32.5	VERT	46	13.5

8. BAND EDGE

8.1. Test Equipment

Please refer to Section 4 this report.

8.2. Test Procedure

1. The EUT was tested according C63.4-2003. The radiated test was performed at FCC Registration laboratory .

2. The transmitter output was connected to the spectrum analyzer via a low loss cable.

Set both RBW and VBW of spectrum analyzer to 100 kHz with suitable frequency span including 100 MHz bandwidth from band edge. The band edges was measured and recorded.

3. As the radiation test ,set the Lowest and Highest Transmitting Channel,observed the outside band of 2400MHz to 2438.5MHz,than mark the higher-level emission for comparing with the FCC rules.

8.3. Configuration of The EUT

Same as section 5.4 of this report

8.4. EUT Operating Condition

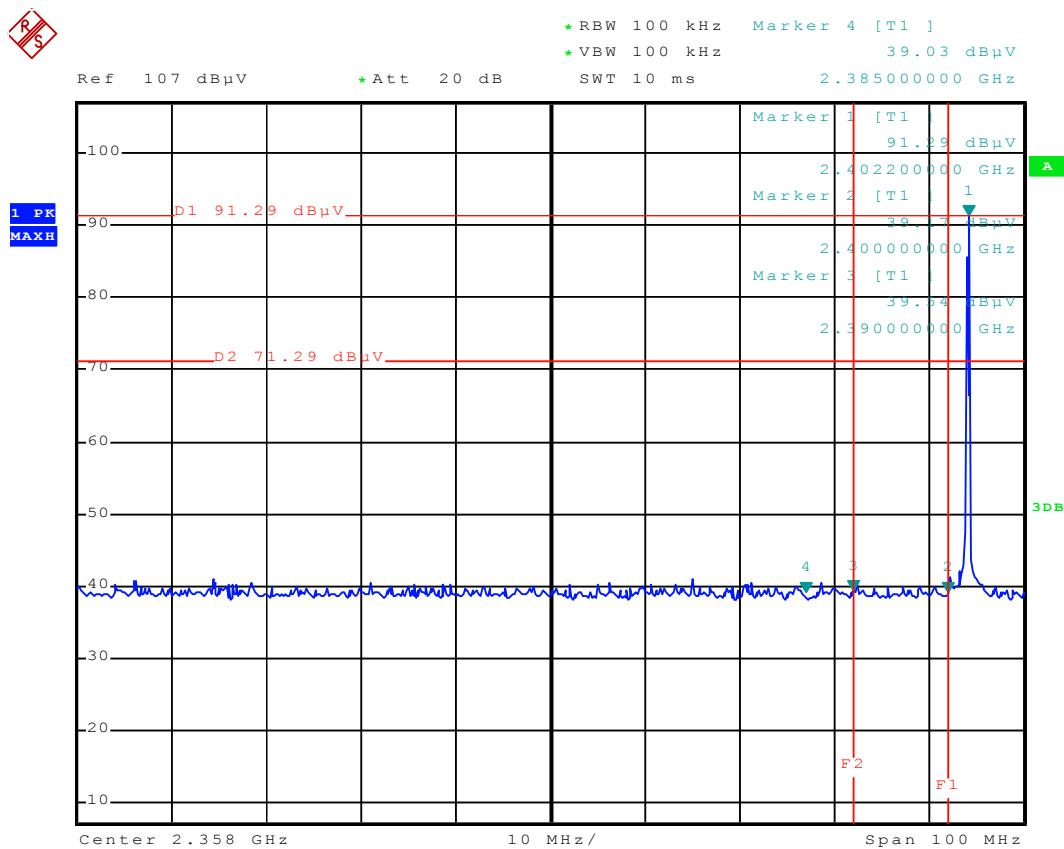
Same as section 5.5 of this report

8.5. Band Edge FCC 15.249(d) Limit

In any 100kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 50dB below that in the 100kHz bandwidth within the band that contains the desired power, based on either an RF conducted or a radited measurement, Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

8.6. Band Edge Test Result

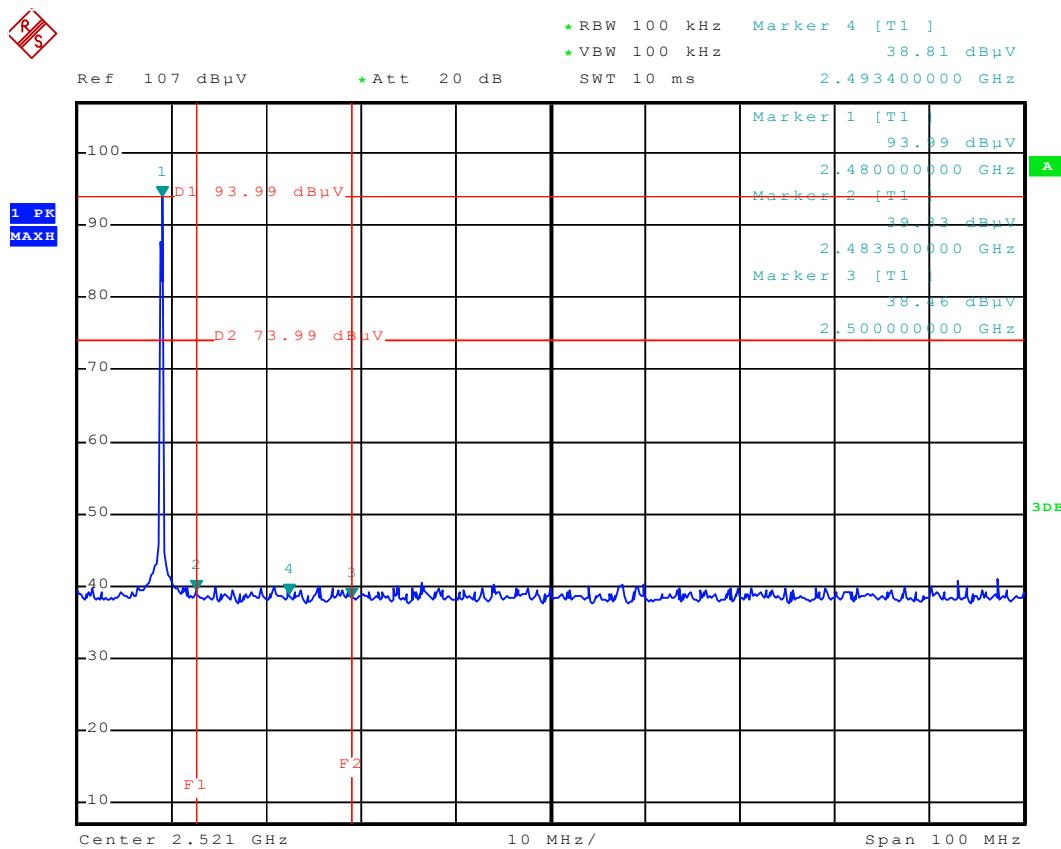
Product:	wireless module transmitter	Test mode:	transmitting
Test Item:	Band Edge	Temperature:	25°C
Test Voltage:	DC 5V	Humidity:	56%RH
Test Result:	PASS		



Emission in the Restricted Bands

Frequency [MHz]	dBc [dB]	AV [dB μ V/m]	Polarity (H/V)	AV limit [dB μ V/m]
2380	-	34.5	V	54
2390	-	34.8	V	54
2400	-	34.1	V	54

The above field strength levels were measured in Vertical polarity which is the worst case.



Emission in the Restricted Bands

Frequency [MHz]	dBc [dB]	AV [dB μ V/m]	Polarity (H/V)	AV limit [dB μ V/m]
2483.5	-	33.09	V	54
2393.4	-	33.76	V	54
2500	-	33.69	V	54

The above field strength levels were measured in Vertical polarity which is the worst case.

****END OF REPORT****