FCC Test Report

APPLICANT	:	Texas Instruments Incorporated
EQUIPMENT	:	WiFi and Bluetooth Module
BRAND NAME	:	Texas Instruments
MODEL NAME	:	WL18MODGB
FCC ID	:	Z64-WL18SBMOD
STANDARD	:	FCC 47 CFR FCC Part 15 Subpart B
CLASSIFICATION	:	Verification

The product was received on Nov. 27, 2013 and testing was completed on Dec. 13, 2013. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.4-2009 and shown to be compliant with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC., the test report shall not be reproduced except in full.

Louis Wu

Reviewed by: Louis Wu / Manager

Jones Tsai

Approved by: Jones Tsai / Manager

Testing Laboratory 1190

SPORTON INTERNATIONAL INC.
No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FV3N2752-01	Rev. 01	Initial issue of report	Jan. 27, 2014

SUMMARY OF TEST RESULT

Report Section	FCC Rule	IC Rule	Description	Limit	Result	Remark
3.1	15.107	ICES003 Section 6.1	AC Conducted Emission	< 15.107 limits < ICES003 6.1 limits	PASS	Under limit 8.60 dB at 0.350 MHz
3.2	15.109	ICES003 Section 6.2	Radiated Emission	< 15.109 limits < ICES003 6.2 limits	PASS	Under limit 6.70 dB at 32.700 MHz

1. General Description

1.1. Applicant

Texas Instruments Incorporated
12500 TI Boulevard, M/S 8751, Dallas, TX 75243, USA

1.2. Manufacturer

Jorjin Technologies Inc.
17F, No.239, Sec. 1, Datong Rd, Xizhi Dist. New Taipei City 221, Taiwan. R.O.C.

1.3. Feature of Equipment Under Test

Product Feature	
Equipment	WiFi and Bluetooth Module
Brand Name	Texas Instruments
Model Name	WL18MODGB
FCC ID	Z64-WL18SBMOD
EUT supports Radios application	WLAN 11bgn / Bluetooth v3.0 + EDR/v4.0 + LE
EUT Stage	Production Unit

Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

1.4. Product Specification of Equipment Under Test

Product Specification subjective to this standard	
Tx Frequency	802.11b/g/n: 2412 MHz ~ 2462 MHz Bluetooth: 2402 MHz ~ 2480 MHz
Rx Frequency	802.11b/g/n: 2412 MHz ~ 2462 MHz Bluetooth: 2402 MHz ~ 2480 MHz
Antenna Type	WLAN : Chip Antenna Bluetooth : Chip Antenna
Type of Modulation	802.11b : DSSS (DBPSK / DQPSK / CCK) 802.11g/n : OFDM (BPSK / QPSK / 16QAM / 64QAM) Bluetooth 4.0 - LE : GFSK Bluetooth 3.0 EDR : GFSK, π/4-DQPSK, 8-DPSK

1.5. Modification of EUT

No modifications are made to the EUT during all test items.

1.6. Test Site

Test Site	SPORTON INTERNATIONAL INC.		
Test Site Location	No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL: +886-3-327-3456 FAX: +886-3-328-4978		
Test Site No.	Sporton Site No.		FCC/IC Registration No.
	CO05-HY	03CH06-HY	TW1022/4086B-1

1.7. Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC 47 CFR FCC Part 15 Subpart B
- ANSI C63.4-2009

Remark: All test items were verified and recorded according to the standards and without any deviation during the test.

2. Test Configuration of Equipment Under Test

2.1. Test Mode

The EUT has been associated with peripherals pursuant to ANSI C63.4-2009 and configuration operated in a manner tended to maximize its emission characteristics in a typical application.

Frequency range investigated: conduction (150 kHz to 30 MHz), radiation (30MHz to the 5th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower).

The following tables are showing the test modes as the worst cases and recorded in this report.

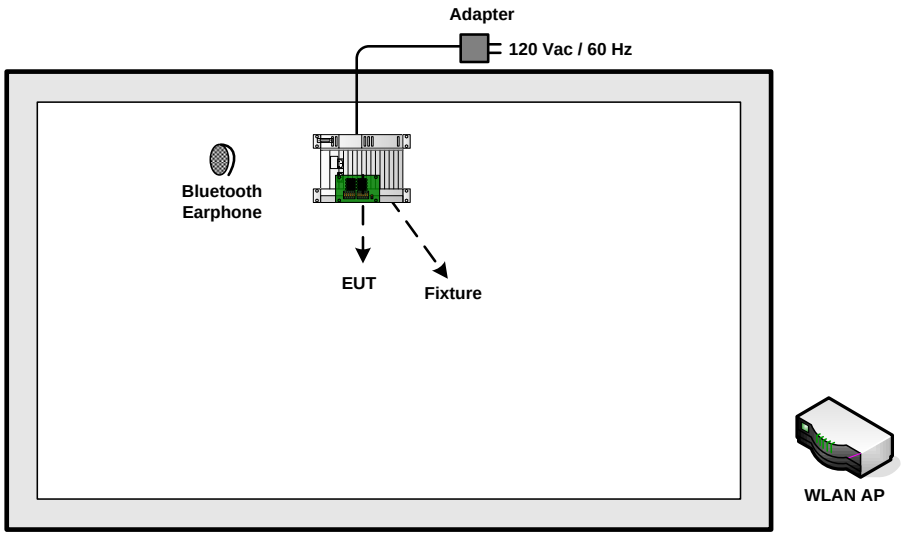
Item	EUT Configuration	Test Condition	
		EMI AC	EMI RE
1.	Charging Mode (EUT with adapter)	☒	☒

Abbreviations:

- EMI AC: AC conducted emission
- EMI RE: EUT radiated emission

Test Items	EUT Configure Mode	Function Type
AC Conducted Emission	1	Mode 1: WLAN (2.4GHz) Idle + Bluetooth Idle + Adapter
Radiated Emission	1	Mode 1: WLAN (2.4GHz) Idle + Bluetooth Idle + Adapter

2.2. Connection Diagram of Test System



2.3. Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	WLAN AP	D-Link	DIR-628	KA2DIR628A2	N/A	Unshielded, 1.8 m
2.	Bluetooth Earphone	Sony Ericsson	MW600	PY7DDA-2029	N/A	N/A
3.	Fixture	N/A	WG7XXXT01	N/A	N/A	N/A
4.	Adapter	Aviv Energy	HK-IP15-A05	N/A	N/A	Unshielded, 1.8 m

2.4. EUT Operation Test Setup

The EUT was attached to the Bluetooth earphone and WLAN AP.

3. Test Result

3.1. Test of AC Conducted Emission Measurement

3.1.1 Limits of AC Conducted Emission

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

Frequency of emission (MHz)	Conducted 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.

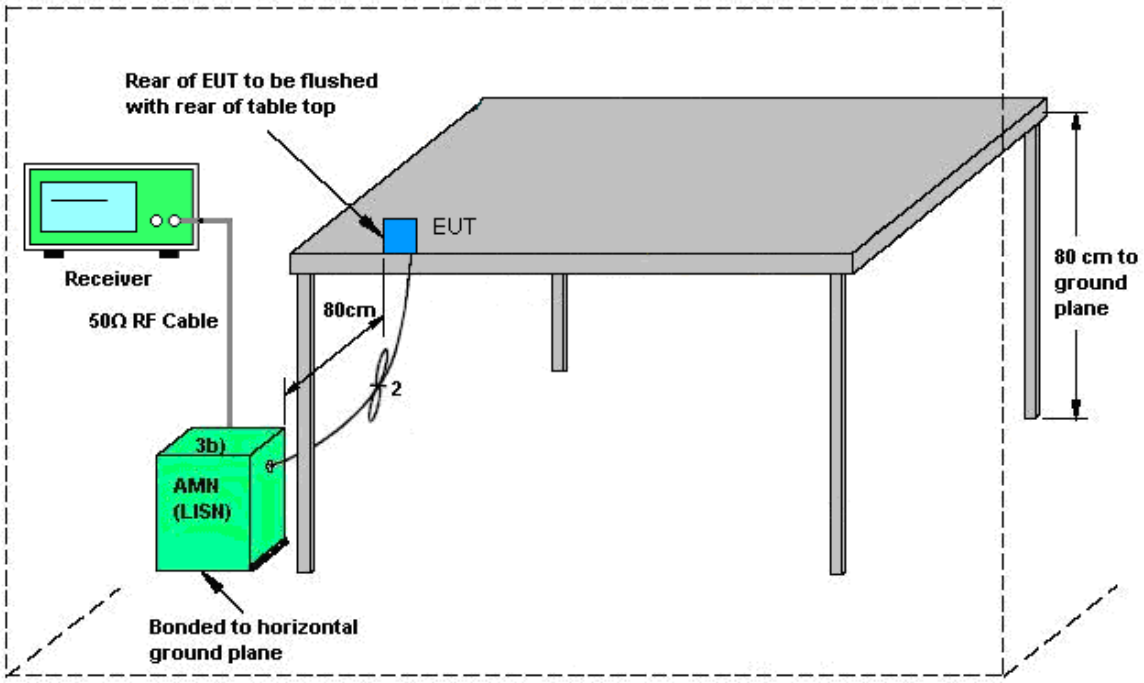
3.1.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.1.3 Test Procedure

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode.

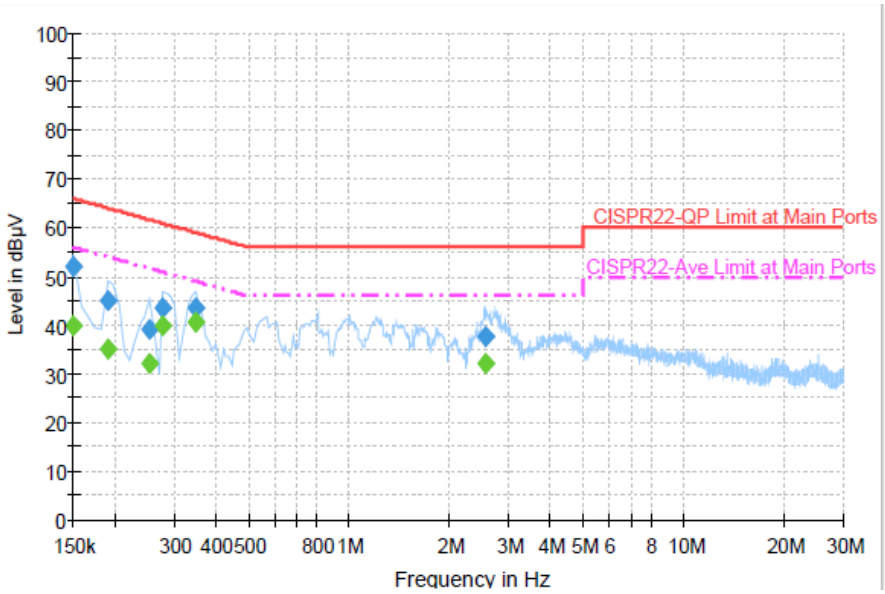
3.1.4 Test Setup



AMN = Artificial mains network (LISN)
AE = Associated equipment
EUT = Equipment under test
ISN = Impedance stabilization network

3.1.5 Test Result of AC Conducted Emission

Test Mode :	Mode 1	Temperature :	20~22℃
Test Engineer :	Cosmo Xu	Relative Humidity :	45~47%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	WLAN (2.4GHz) Idle + Bluetooth Idle + Adapter		



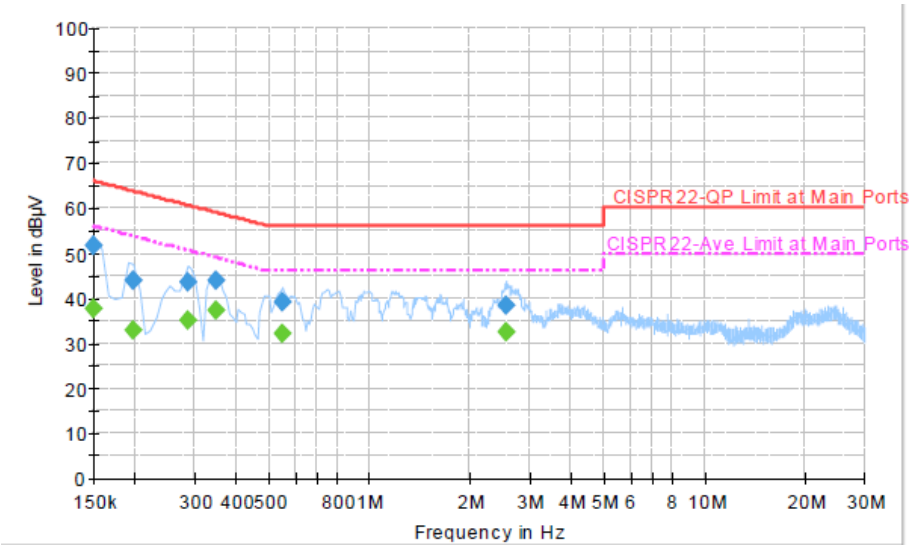
Final Result : Quasi-Peak

Frequency (MHz)	Quasi-Peak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	52.0	Off	L1	19.4	14.0	66.0
0.190000	45.0	Off	L1	19.4	19.0	64.0
0.254000	39.0	Off	L1	19.5	22.6	61.6
0.278000	43.6	Off	L1	19.3	17.3	60.9
0.350000	43.7	Off	L1	19.4	15.3	59.0
2.574000	37.7	Off	L1	19.6	18.3	56.0

Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	40.0	Off	L1	19.4	16.0	56.0
0.190000	35.0	Off	L1	19.4	19.0	54.0
0.254000	32.0	Off	L1	19.5	19.6	51.6
0.278000	40.0	Off	L1	19.3	10.9	50.9
0.350000	40.4	Off	L1	19.4	8.6	49.0
2.574000	32.1	Off	L1	19.6	13.9	46.0

Test Mode :	Mode 1	Temperature :	20~22℃
Test Engineer :	Cosmo Xu	Relative Humidity :	45~47%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	WLAN (2.4GHz) Idle + Bluetooth Idle + Adapter		



Final Result : Quasi-Peak

Frequency (MHz)	Quasi-Peak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	51.5	Off	N	19.4	14.5	66.0
0.198000	44.0	Off	N	19.3	19.7	63.7
0.286000	43.5	Off	N	19.4	17.1	60.6
0.350000	44.0	Off	N	19.4	15.0	59.0
0.550000	39.1	Off	N	19.4	16.9	56.0
2.558000	38.3	Off	N	19.6	17.7	56.0

Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	37.6	Off	N	19.4	18.4	56.0
0.198000	32.7	Off	N	19.3	21.0	53.7
0.286000	35.1	Off	N	19.4	15.5	50.6
0.350000	37.3	Off	N	19.4	11.7	49.0
0.550000	32.1	Off	N	19.4	13.9	46.0
2.558000	32.3	Off	N	19.6	13.7	46.0

3.2. Test of Radiated Emission Measurement

3.2.1. Limit of Radiated Emission

The emissions from an unintentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
30 – 88	100	3
88 – 216	150	3
216 - 960	200	3
Above 960	500	3

3.2.2. Measuring Instruments

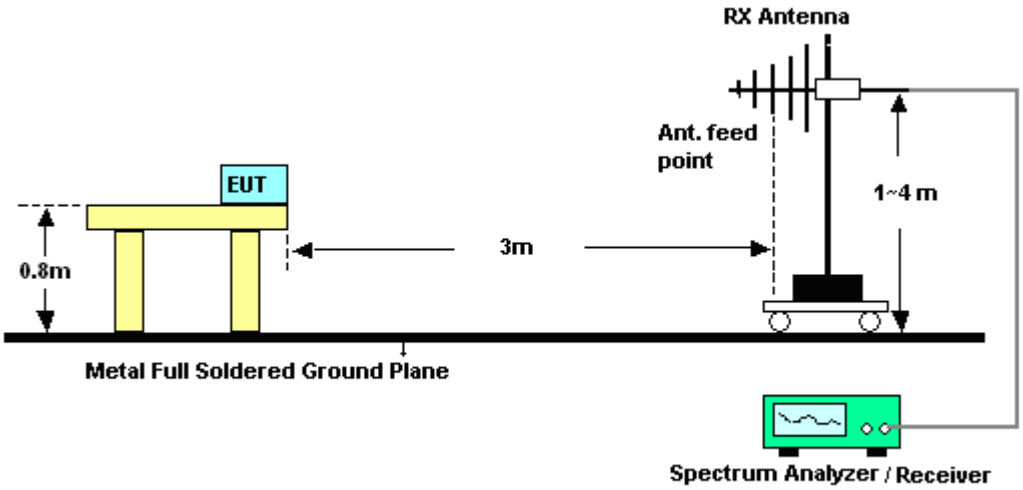
The measuring equipment is listed in the section 4 of this test report.

3.2.3. Test Procedures

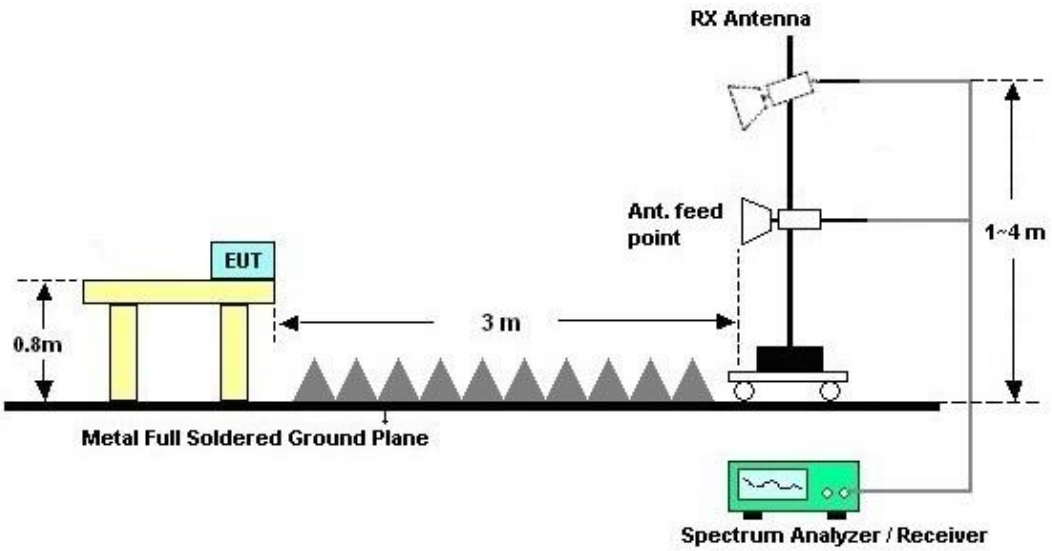
1. The EUT was placed on a turntable with 0.8 meter above ground.
2. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest radiation.
4. The antenna is a Bi-Log antenna and its height is adjusted between one to four meters above ground to find the maximum value of the field strength for both horizontal polarization and vertical polarization of the antenna.
5. For each suspected emission, the EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading.
6. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode.
7. If the emission level of the EUT in peak mode was 3 dB lower than the limit specified, peak values of EUT will be reported. Otherwise, the emission will be repeated by using the quasi-peak method and reported.
8. Emission level (dBμV/m) = 20 log Emission level (μV/m)
9. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level

3.2.4. Test Setup of Radiated Emission

For radiated emissions from 30MHz to 1GHz

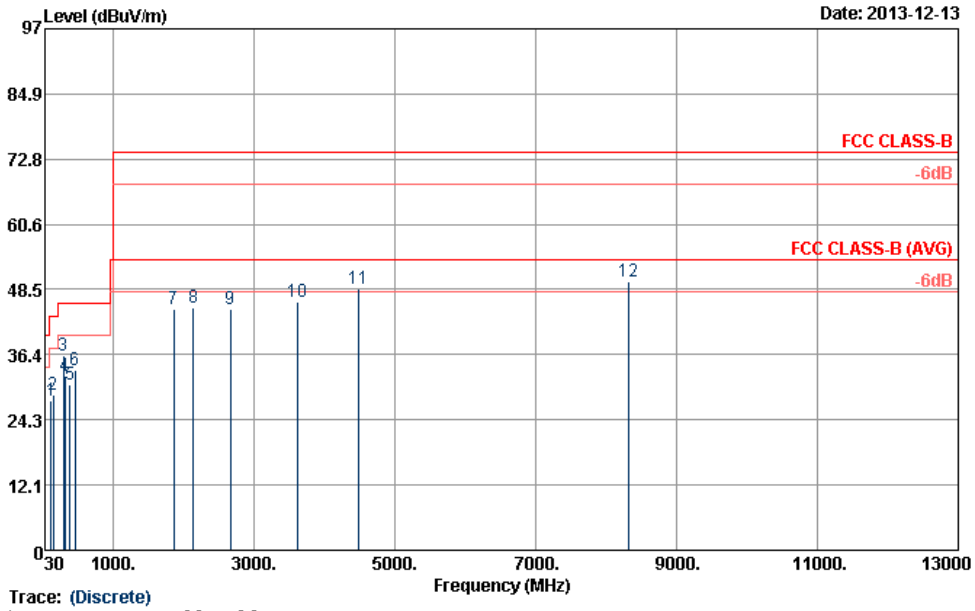


For radiated emissions above 1GHz



3.2.5. Test Result of Radiated Emission

Test Mode :	Mode 1	Temperature :	23~24°C
Test Engineer :	Marlboro Hsu and Slash Huang	Relative Humidity :	41~42%
Test Distance :	3m	Polarization :	Horizontal
Function Type :	WLAN (2.4GHz) Idle + Bluetooth Idle + Adapter		



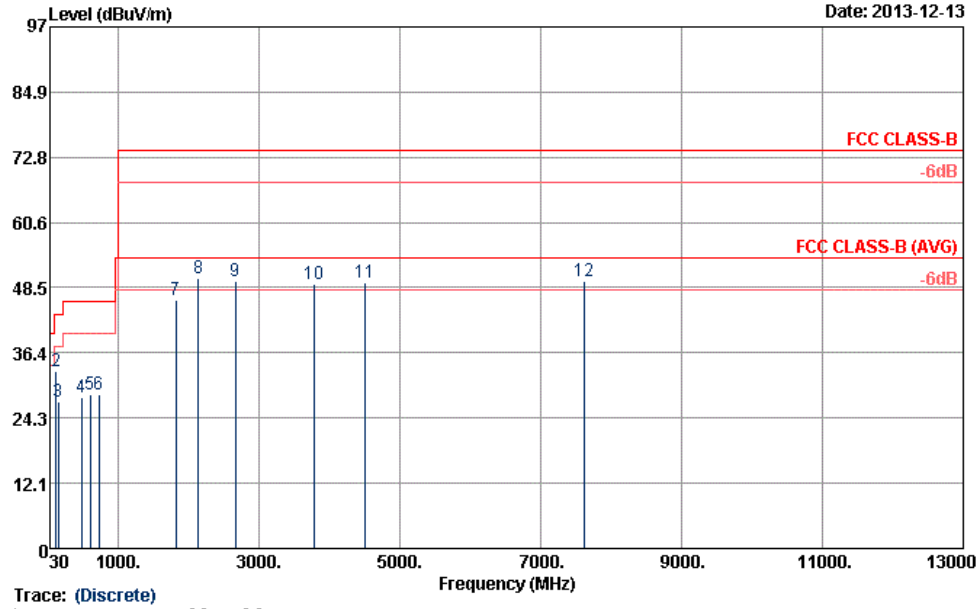
Trace: (Discrete)

Site : 03CH06-HY
Condition : FCC CLASS-B 3m HF-ANT_583_130802 HORIZONTAL

Power : 120Vac/60Hz
Mode : Mode 1

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1	120.45	27.79	-15.71	43.50	46.12	12.20	1.22	31.75	---	---	Peak
2	144.75	28.92	-14.58	43.50	48.67	10.68	1.32	31.75	---	---	Peak
3	288.66	36.15	-9.85	46.00	53.03	12.98	1.86	31.72	100	226	Peak
4	312.60	32.54	-13.46	46.00	48.87	13.46	1.94	31.73	---	---	Peak
5	385.40	30.91	-15.09	46.00	45.28	15.30	2.14	31.81	---	---	Peak
6	462.40	33.49	-12.51	46.00	45.80	17.25	2.33	31.89	---	---	Peak
7	1864.00	44.83	-29.17	74.00	62.64	30.59	5.57	53.97	---	---	Peak
8	2140.00	45.14	-28.86	74.00	61.29	31.71	6.11	53.97	---	---	Peak
9	2662.00	44.93	-29.07	74.00	59.71	32.23	6.92	53.93	---	---	Peak
10	3608.00	46.33	-27.67	74.00	59.44	32.92	8.24	54.27	---	---	Peak
11	4492.00	48.76	-25.24	74.00	59.14	34.56	10.06	55.00	---	---	Peak
12	8320.00	49.86	-24.14	74.00	59.48	35.60	10.81	56.03	100	0	Peak

Test Mode :	Mode 1	Temperature :	23~24°C
Test Engineer :	Marlboro Hsu and Slash Huang	Relative Humidity :	41~42%
Test Distance :	3m	Polarization :	Vertical
Function Type :	WLAN (2.4GHz) Idle + Bluetooth Idle + Adapter		



Site : 03CH06-HY
Condition : FCC CLASS-B 3m HF-ANT_583_130802 VERTICAL

Power : 120Vac/60Hz
Mode : Mode 1

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1	32.70	33.30	-6.70	40.00	47.72	16.70	0.67	31.79	100	145	Peak
2	120.45	33.06	-10.44	43.50	51.39	12.20	1.22	31.75	---	---	Peak
3	144.75	27.23	-16.27	43.50	46.98	10.68	1.32	31.75	---	---	Peak
4	475.00	28.12	-17.88	46.00	40.21	17.50	2.31	31.90	---	---	Peak
5	601.00	28.76	-17.24	46.00	38.64	19.41	2.77	32.06	---	---	Peak
6	721.40	28.59	-17.41	46.00	37.80	19.84	2.96	32.01	---	---	Peak
7	1814.00	46.30	-27.70	74.00	64.60	30.21	5.45	53.96	---	---	Peak
8	2142.00	50.13	-23.87	74.00	66.28	31.71	6.11	53.97	100	0	Peak
9	2662.00	49.64	-24.36	74.00	64.42	32.23	6.92	53.93	---	---	Peak
10	3786.00	49.30	-24.70	74.00	62.18	33.15	8.54	54.57	---	---	Peak
11	4504.00	49.32	-24.68	74.00	59.66	34.60	10.06	55.00	---	---	Peak
12	7612.00	49.77	-24.23	74.00	59.19	35.52	10.91	55.85	---	---	Peak

4. List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
EMI Test Receiver	Rohde & Schwarz	ESCS 30	100356	9kHz ~ 2.75GHz	Nov. 15, 2013	Dec. 10, 2013	Nov. 14, 2014	Conduction (CO05-HY)
Two-LISN (for auxiliary equipment)	Rohde & Schwarz	ENV216	100081	9kHz ~ 30MHz	Dec. 12, 2012	Dec. 10, 2013	Dec. 11, 2013	Conduction (CO05-HY)
Two-LISN	Rohde & Schwarz	ENV216	100080	9kHz ~ 30MHz	Dec. 04, 2013	Dec. 10, 2013	Dec. 03, 2014	Conduction (CO05-HY)
AC Power Source	APC	APC-1000W	N/A	N/A	N/A	Dec. 10, 2013	N/A	Conduction (CO05-HY)
Spectrum Analyzer	R&S	FSP30	101067	9kHz ~ 30GHz	Nov. 20, 2013	Dec. 13, 2013	Nov. 19, 2014	Radiation (03CH06-HY)
Spectrum Analyzer	Agilent	E4408B	MY44211030	9kHz ~ 26.5GHz	Dec. 02, 2013	Dec. 13, 2013	Dec. 01, 2014	Radiation (03CH06-HY)
EMI Test Receiver	R&S	ESVS10	834468/0003	20MHz ~ 1GHz	May 06, 2013	Dec. 13, 2013	May 05, 2014	Radiation (03CH06-HY)
Bilog Antenna	Schaffner	CBL6112B	2885	30MHz -2GHz	Oct. 10, 2013	Dec. 13, 2013	Oct. 09, 2014	Radiation (03CH06-HY)
Double Ridge Horn Antenna	EMCO	3117	00066583	1GHz ~ 18GHz	Aug. 02, 2013	Dec. 13, 2013	Aug. 01, 2014	Radiation (03CH06-HY)
Amplifier	Agilent	310N	186713	9kHz ~ 1GHz	Apr. 12, 2013	Dec. 13, 2013	Apr. 11, 2014	Radiation (03CH06-HY)
Pre Amplifier	EMCI	EMC051845	SN980048	1GHz ~ 18GHz	Jul. 18, 2013	Dec. 13, 2013	Jul. 17, 2014	Radiation (03CH06-HY)
Turn Table	INN-CO	DS2000	420/650/00	0 - 360 degree	N/A	Dec. 13, 2013	N/A	Radiation (03CH06-HY)
Antenna Mast	MF	MF-7802	MF780208212	1 m ~ 4 m	N/A	Dec. 13, 2013	N/A	Radiation (03CH06-HY)

5. Uncertainty of Evaluation

Uncertainty of Conducted Emission Measurement (150 kHz ~ 30 MHz)

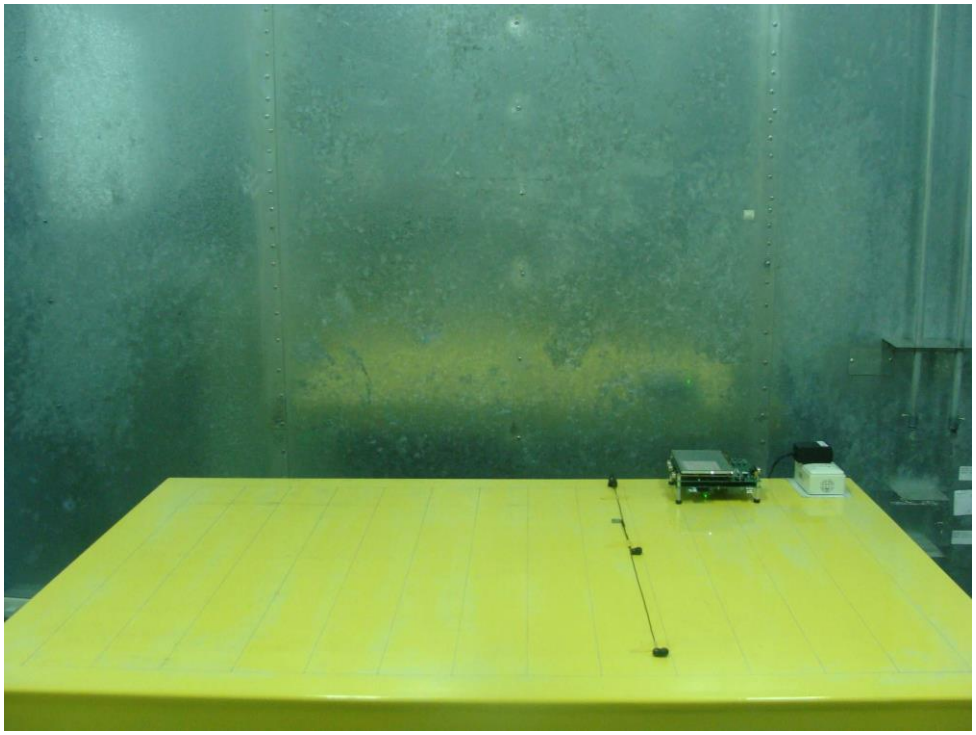
Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**2.26**

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**4.50**

Appendix A. Setup Photographs

<Conducted Emission>



<Radiated Emission>

LF

HF