

FCC PART 15.249
MEASUREMENT AND TEST REPORT
For

EUT Name: Wireless Controller Plus
Item No.: TYW-1147B
FCC ID: X2DTYW1147BT
Serial No.: Not supplied by client



Prepared for : Hong Kong MTM Technology Ltd.
Unit 2103-Office Tower Langham Place-8,Argyle Street Mongkok-Kowloon,Hong Kong

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Report Number : **TB-F095960**
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TEST REPORT DECLARATION

Applicant : Hong Kong MTM Technology Ltd.
Manufacturer : Hong Kong MTM Technology Ltd.
EUT Description : Wireless Controller Plus
Model No. : TYW-1147B

The device described above is tested by SEM. Test Compliance Service Co., Ltd. to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart C limits for both radiation and conduction emissions.

The measurement results are contained in this test report and Shenzhen Toby Technology Co., Ltd. is assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT to be technically compliant with the FCC official limits.

This report applies to above tested sample only. This report shall not be reproduced in part without written approval of Shenzhen Toby Technology Co., Ltd.

Reported by: Jacky Wang Date: Dec. 24, 2009
(Jacky Wang)

Reviewer by: Benny Xu Date: Dec. 25, 2009
(Benny Xu)

Approved by: Justin Zhang Date: Dec. 28, 2009
(Justin Zhang)

1. GENERAL INFORMATION

1.1. Product Description for Equipment Under Test (EUT)

Client Information

Applicant: Hong Kong MTM Technology Ltd.
 Address of applicant : Unit 2103-Office Tower Langham Place-8,Argyle Street Mongkok-Kowloon,Hong Kong

Manufacturer: Hong Kong MTM Technology Ltd.
 Address of manufacturer: Unit 2103-Office Tower Langham Place-8,Argyle Street Mongkok-Kowloon,Hong Kong

General Description of E.U.T

Items	Description
EUT Description:	Wireless Controller Plus
Trade Name:	NITHO
Model No.:	TYW-1147B
Rated Voltage:	DC3V Batteries
Out Power:	<6 dBm
Frequency Range:	2405-2478MHz
No. of Channel:	91
Tape of Antenna:	Integral Antenna
Size:	11.0cm x 5.0cm x 4.0cm

For more information refer to the circuit diagram form and the user's manual.

The test data is gathered from a production sample, provided by the manufacturer.

1.2. Test Standards

The following report is prepared on behalf of the Hong Kong MTM Technology Ltd. in accordance with FCC Part 15, Subpart B, Subpart C, and section 15.107, 15.203, 15.205, 15.209 and 15.249 of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC Part 15, Subpart C, and section 15.107, 15.203, 15.205, 15.209 and 15.249 of the Federal Communication Commissions rules.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product, which results in lowering the emission, should be checked to ensure compliance has been

maintained.

1.3. Related Submittal(s)/Grant(s)

No Related Submittal(s).

1.4. Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2009, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

The equipment under test (EUT) was configured to measure its highest possible emission level. The test modes were adapted according to the Operating Instructions and let the EUT keep transmitting.

1.5. Accessories Equipment List and Details

Manufacturer	Description	Model	Serial Number
/	/	/	/

1.6. EUT Cable List and Details

Cable Description	Length (M)	Shielded/ Unshielded	With Core/ Without Core
/	/	/	/

1.7. Test Location

FCC – Registration No.: 994117

SEM. Test Compliance Service Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files and the Registration is 994117. SEM. Test Compliance Service Co., Ltd. Lab.

TOBY Tel: +86 0755 2804 5093 Fax: +86 0755 518055

2. SUMMARY OF TEST RESULTS

DESCRIPTION OF TEST	RESULT
§15.203 Antenna Requirement	Compliant
§15.207 Conducted Emission	N/A
§15.205 Restricted Band	Compliant
§15.209 General Requirement	Compliant
§15.249 (a) Field Strength	Compliant
§15.249 (d) Out of Band Emission	Compliant

3. §15.203 - ANTENNA REQUIREMENT

3.1. Standard Applicable

According to FCC 15.203, 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.

3.2. Test Result

This product has a permanent antenna, fulfill the requirement of this section.

4. §15. 205, §15.209, §15.249 (A) RADIATED EMISSION

4.1. Measurement Uncertainty

Base on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any radiation emissions measurement is + 3.0 dB.

4.2. Standard Applicable

According to §15.249(a) the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental Frequency	Field strength of fundamental (milli-volts/meter)	Field strength of fundamental (micro-volts/meter)
902-928 MHz	50	500
2400-2483.5 MHz	50	500
5725-5875 MHz	50	500
24.0-24.25 GHz	250	2500

The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply.

EMISSIONS RADIATED OUTSIDE OF THE SPECIFIED FREQUENCY BANDS, EXCEPT FOR HARMONICS, SHALL BE ATTENUATED BY AT LEAST 20 dB BELOW THE LEVEL OF THE FUNDAMENTAL OR TO THE GENERAL RADIATED EMISSION LIMITS IN §15.209, WHICHEVER IS THE LESSER ATTENUATION.

Emissions that fall in the restricted bands (15.205) must be less than 54dBuV/m otherwise the spurious and harmonics must be attenuated by at least 20dB.

4.3. Test Equipment List and Details

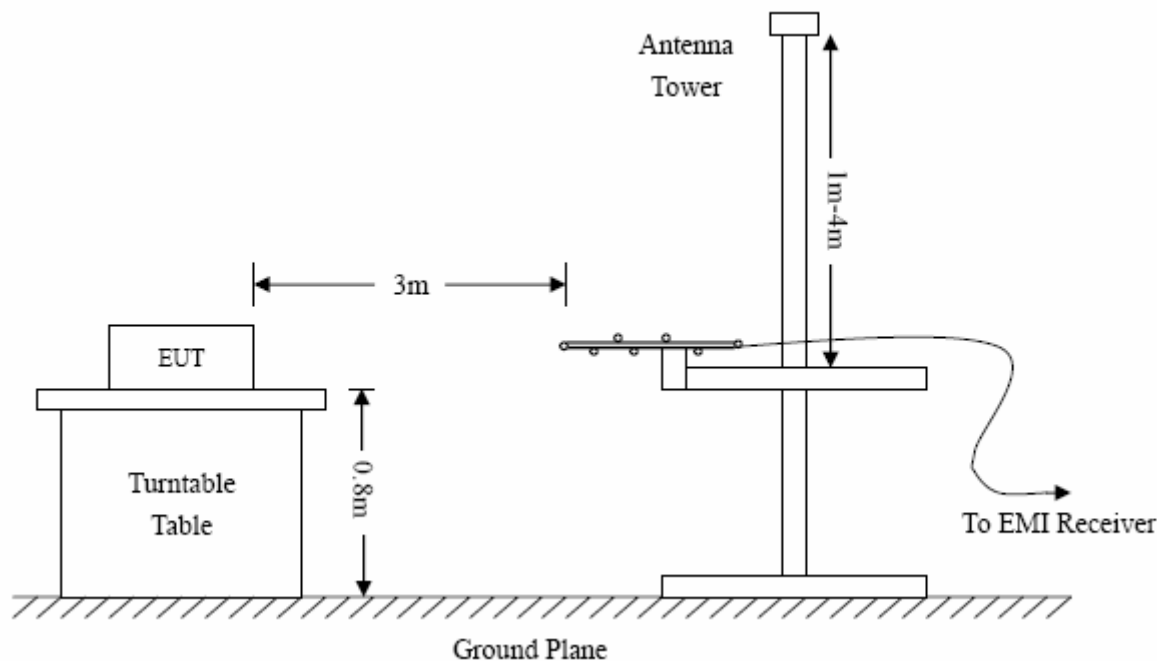
Description	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Date
Spectrum Analyzer	ROHDE& SCHWARZ	FSEA20	DE25181	2009-08-12	2010-08-11
Positioning Controller	C&C	CC-C-1F	N/A	2009-08-12	2010-08-11
Trilog Broadband Antenna	SCHWARZBECK	VULB9163	9163-333	2009-07-21	2010-07-20
Horn Antenna	SCHWARZBECK	BBHX 9120	9120-426	2009-07-21	2010-07-20
RF Switch	EM	EMSW18	SW060023	2009-08-12	2010-08-11
Amplifier	Agilent	8447F	3113A06717	2009-08-12	2010-08-11
Coaxial Cable	SCHWARZBECK	AK9513	9513-10	2009-08-12	2010-08-11
EMI Test Receiver	ROHDE& SCHWARZ	ESPI	25498514	2009-08-12	2010-08-11
EMI Test Receiver	ROHDE& SCHWARZ	ESI26	838786/103	2009-08-12	2010-08-11
Receiver Horn Antenna	ROHDE& SCHWARZ	HF906	100013	2009-08-12	2010-08-11

Statement of Traceability: All calibrations have been performed per the NVLAP requirements traceable to the NIST.

4.4. Test Procedure

The setup of EUT is according with per ANSI C63.4-2009 measurement procedure. The specification used was with the FCC Part 15.205 15.247(a) and FCC Part 15.209 Limit.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle. The spacing between the peripherals was 10 cm.



4.5. Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and the Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Ant. Loss} + \text{Cab. Loss} - \text{Ampl. Gain}$$

The “Margin” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -6dB μ V means the emission is 6dB μ V below the maximum limit for Class B. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{FCC Part 15 Limit}$$

4.6. Environmental Conditions

Temperature:	21° C
Relative Humidity:	55 %
ATM Pressure:	1018 mbar

4.7. Summary of Test Results/ Plots

According to the data below, the FCC Part15.205, 15.209 and 15.249 standards, and had the worst margin is:

-6.05 dB μ V at 838.8870 MHz in the Vertical polarization, 30 MHz to 25 GHz, 3Meters

Plot of Radiation Emissions Test Data

Radiated Disturbance

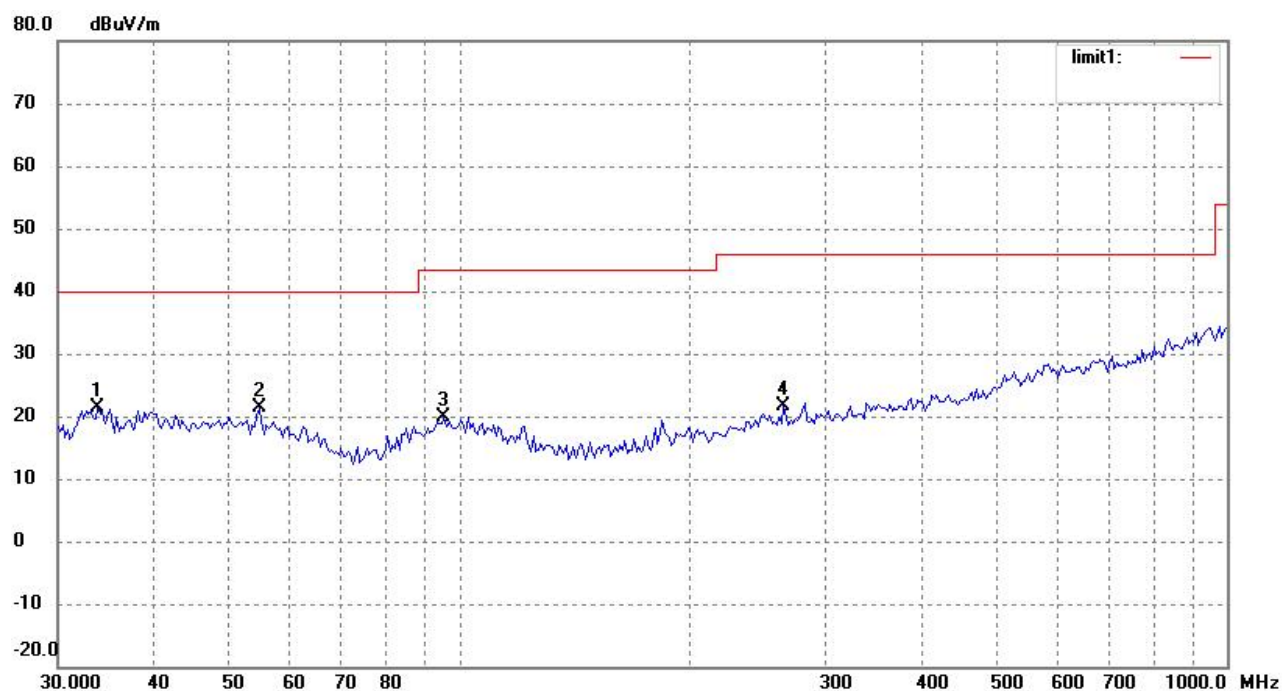
EUT: Wireless Controller Plus

M/N: TYW-1147B

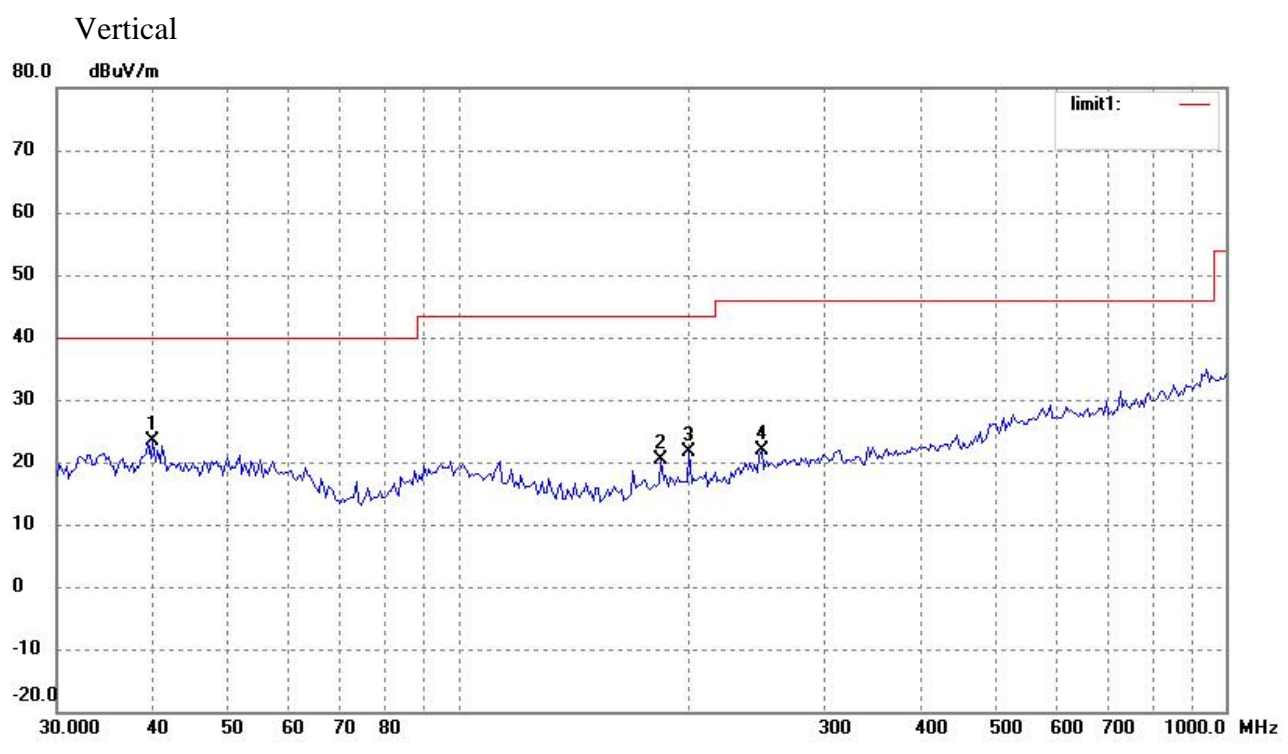
Operating Condition: Transmitting below 1GHz (Lowest CH)

Test Specification: Horizontal & Vertical

Comment: DC3V

Horizontal

No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	33.8067	14.88	6.61	21.49	40.00	-18.51	115	100	Peak
2	54.9011	13.82	7.46	21.28	40.00	-18.72	99	100	Peak
3	95.6485	12.30	7.51	19.81	43.50	-23.69	160	100	Peak
4	264.9709	13.53	8.06	21.59	46.00	-24.41	35	100	Peak



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	40.0173	15.51	7.93	23.44	40.00	-16.56	108	100	Peak
2	183.8660	15.37	5.12	20.49	43.50	-23.01	45	100	Peak
3	200.0432	16.02	5.68	21.70	43.50	-21.80	206	100	Peak
4	248.7319	14.31	7.65	21.96	46.00	-24.04	254	100	Peak

Plot of Radiation Emissions Test Data

Radiated Disturbance

EUT: Wireless Controller Plus

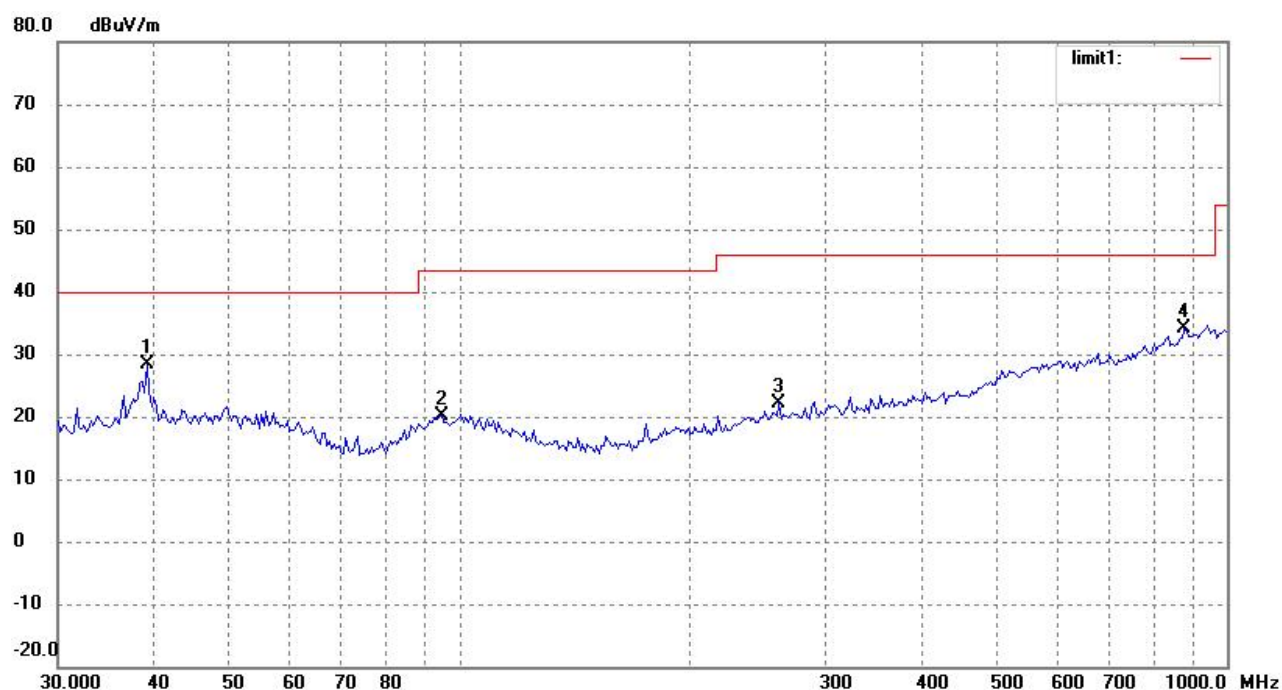
M/N: TYW-1147B

Operating Condition: Transmitting below 1GHz (Middle CH)

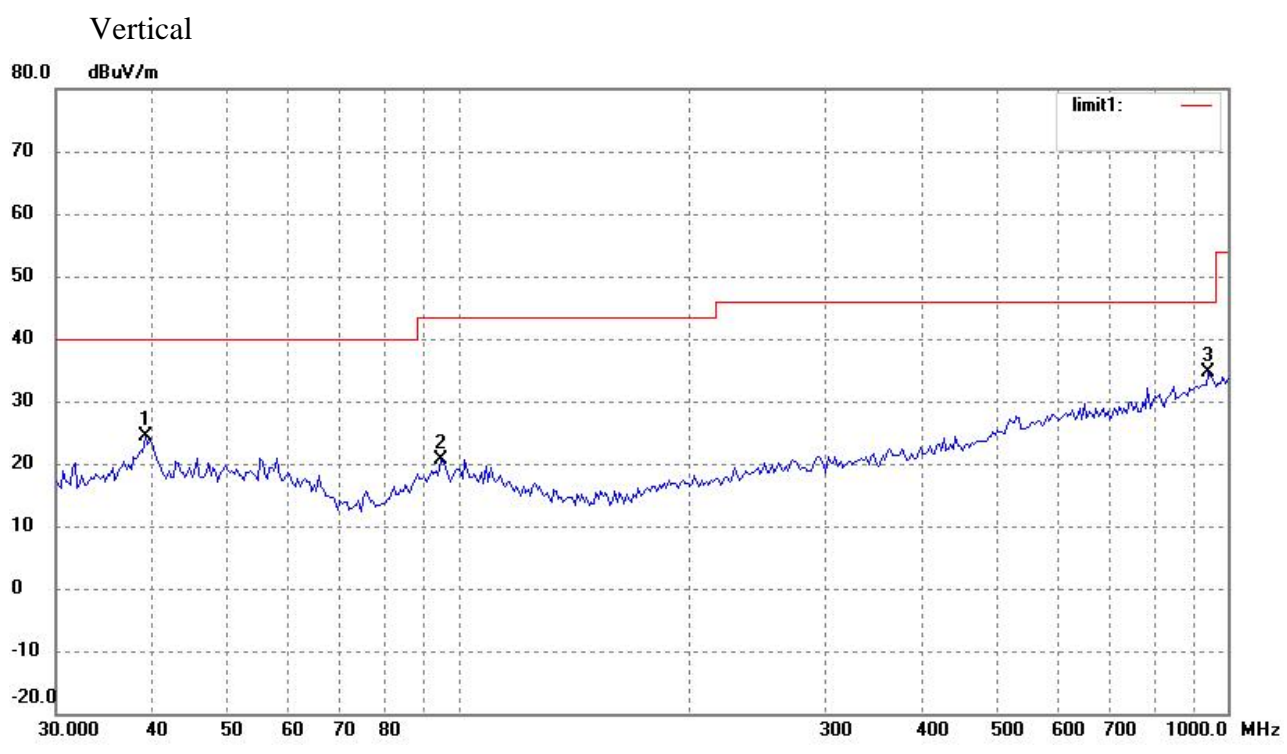
Test Specification: Horizontal & Vertical

Comment: DC3V

Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	33.1825	20.64	7.71	28.35	40.00	-11.65	146	100	Peak
2	94.9788	12.66	7.47	20.13	43.50	-23.37	175	100	Peak
3	261.2730	14.20	7.95	22.15	46.00	-23.85	210	100	Peak
4	881.1838	15.56	18.47	34.03	46.00	-11.97	70	100	Peak



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	39.1825	16.77	7.71	24.48	40.00	-15.52	145	100	Peak
2	94.9788	13.14	7.47	20.61	43.50	-22.89	105	100	Peak
3	945.3336	15.06	19.57	34.63	46.00	-11.37	120	100	Peak

Plot of Radiation Emissions Test Data

Radiated Disturbance

EUT: Wireless Controller Plus

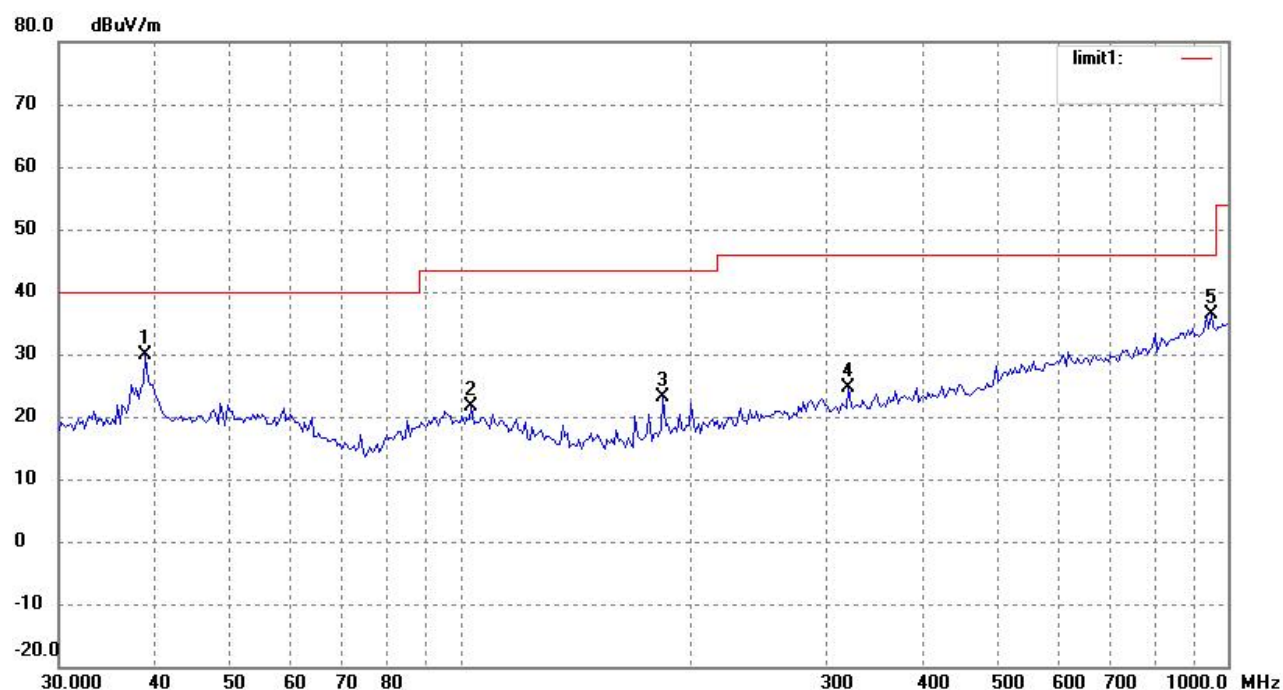
M/N: TYW-1147B

Operating Condition: Transmitting below 1GHz (Hihg CH)

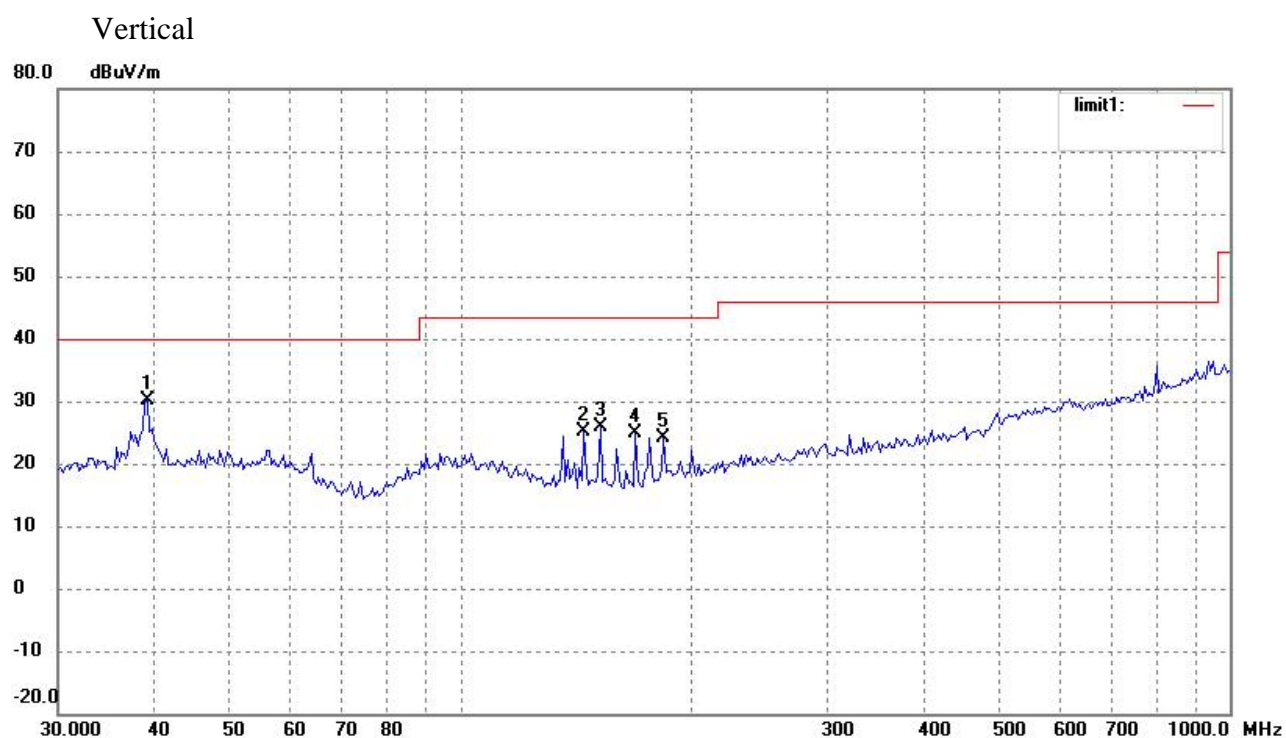
Test Specification: Horizontal & Vertical

Comment: DC3V

Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	38.9081	22.29	7.64	29.93	40.00	-10.07	213	100	Peak
2	103.3353	14.00	7.52	21.52	43.50	-21.98	115	100	Peak
3	183.8660	17.96	5.12	23.08	43.50	-20.42	170	100	Peak
4	320.3306	15.89	8.83	24.72	46.00	-21.28	320	100	Peak
5	952.0001	16.61	19.69	36.30	46.00	-9.70	105	100	Peak



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	39.1825	22.37	7.71	30.08	40.00	-9.92	275	100	Peak
2	144.7899	21.84	3.26	25.10	43.50	-18.40	130	100	Peak
3	152.0902	22.36	3.40	25.76	43.50	-17.74	210	100	Peak
4	168.9970	20.76	4.03	24.79	43.50	-18.71	165	100	Peak
5	183.8660	19.08	5.12	24.20	43.50	-19.30	70	100	Peak

Note: Testing is carried out with frequency rang 30MHz to the tenth harmonics, which above 5th Harmonics is close to the noise base even antenna close up to 1meter distance according the measurement of ANSI C63.4. Emissions 20dB lower than the limit are not reported.

Spurious Emission Above 1GHz

Frequency	Detector	Meter Reading	Direction Degree	Polar	Antenna loss	Cable loss	Amplifier	Correction Amplitude	Limit	Margin
MHz		dBuV	Meter	H/V	dB	dB	dB	dBuV/m	dBuV/m	dB
Low Channel (1G to 25GHz)										
2405	AV	89.7	20	V	29.1	3.7	34	88.5	94	-5.5
2405	AV	84.6	35	H	29.1	3.7	34	83.4	94	-10.6
2405	PK	94.9	44	V	29.1	3.7	34	93.7	114	-20.3
2405	PK	91.1	63	H	29.1	3.7	34	89.9	114	-24.1
4810	AV	42.2	360	V	34.1	5.2	33	48.5	54	-5.5
4810	AV	39.0	360	H	34.1	5.2	33	45.3	54	-8.7
4810	PK	49.9	360	V	34.1	5.2	33	56.2	74	-17.8
4810	PK	46.2	360	H	34.1	5.2	33	52.5	74	-21.5
7215	AV	34.3	45	V	37.4	6.1	33.5	44.3	54	-9.7
7215	AV	31.8	36	H	37.4	6.1	33.5	41.8	54	-12.2
7215	PK	42.8	350	V	37.4	6.1	33.5	52.8	74	-21.2
7215	PK	39.4	360	H	37.4	6.1	33.5	49.4	74	-24.6
Middle Channel (1G to 25GHz)										
2441	AV	90.0	54	V	29.1	3.7	34	88.8	94	-5.2
2441	AV	85.4	69	H	29.1	3.7	34	84.2	94	-9.8
2441	PK	95.1	56	V	29.1	3.7	34	93.9	114	-20.1
2441	PK	91.5	42	H	29.1	3.7	34	90.3	114	-23.7
4882	AV	41.1	265	V	34.1	5.2	33	47.7	54	-6.3
4882	AV	37.6	352	H	34.1	5.2	33	43.9	54	-10.1
4882	PK	50.3	350	V	34.1	5.2	33	56.6	74	-17.4
4882	PK	47.0	67	H	34.1	5.2	33	53.3	74	-20.7
7323	AV	33.8	352	V	37.4	6.1	33.5	43.8	54	-10.2
7323	AV	31.2	257	H	37.4	6.1	33.5	41.2	54	-12.8
7323	PK	41.3	49	V	37.4	6.1	33.5	51.3	74	-22.7
7323	PK	38.5	68	H	37.4	6.1	33.5	48.5	74	-25.5
High Channel (1G to 25GHz)										
2477	AV	91.8	55	V	29.1	3.7	34	90.6	94	-3.4
2477	AV	86.8	51	H	29.1	3.7	34	85.6	94	-8.4
2477	PK	97.1	12	V	29.1	3.7	34	95.9	114	-18.1
2477	PK	92.8	15	H	29.1	3.7	34	91.6	114	-22.4
4954	AV	43.0	98	V	34.1	5.2	33	49.3	54	-4.7
4954	AV	40.6	56	H	34.1	5.2	33	46.9	54	-7.1
4954	PK	51.6	44	V	34.1	5.2	33	57.9	74	-16.1
4954	PK	47.9	45	H	34.1	5.2	33	54.2	74	-19.8
7431	AV	35.7	69	V	37.4	6.1	33.5	45.7	54	-8.3
7431	AV	32.2	72	H	37.4	6.1	33.5	42.2	54	-11.8
7431	PK	43.4	64	V	37.4	6.1	33.5	53.4	74	-20.6
7431	PK	38.4	69	H	37.4	6.1	33.5	48.4	74	-25.6

Note: Testing is carried out with frequency rang 30MHz to the tenth harmonics, which above 5th Harmonics is close to the noise base even antenna close up to 1meter distance according the measurement of ANSI C63.4. Emissions 20dB lower than the limit are not reported.

5. §15. 249(B) OUT OF BAND EMISSIONS

5.1. Standard Applicable

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 §15.209, whichever is the lesser attenuation.

5.2. Test Equipment List and Details

Description	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Date
Agilent	Spectrum Analyzer	E4402B	US41192821	2009-08-12	2010-08-11
EMI Test Receiver	Rohde & Schwarz	ESPI	25498514	2009-08-12	2010-08-11
Spectrum Analyzer	ROHDE & SCHWARZ	FSEA20	DE25181	2009-08-12	2010-08-11
Positioning Controller	C&C	CC-C-1F	N/A	2009-08-12	2010-08-11
Trilog Broadband Antenna	SCHWARZBECK	VULB9163	9163-333	2009-07-21	2010-07-20
Horn Antenna	SCHWARZBECK	BBHX 9120	9120-426	2009-07-21	2010-07-20
RF Switch	EM	EMSW18	SW060023	2009-08-12	2010-08-11
Amplifier	Agilent	8447F	3113A06717	2009-08-12	2010-08-11
Coaxial Cable	SCHWARZBECK	AK9513	9513-10	2009-08-12	2010-08-11

Statement of Traceability: All calibrations have been performed per the NVLAP requirements traceable to the NIST.

5.3. Test Procedure

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.

5.4. Environmental Conditions

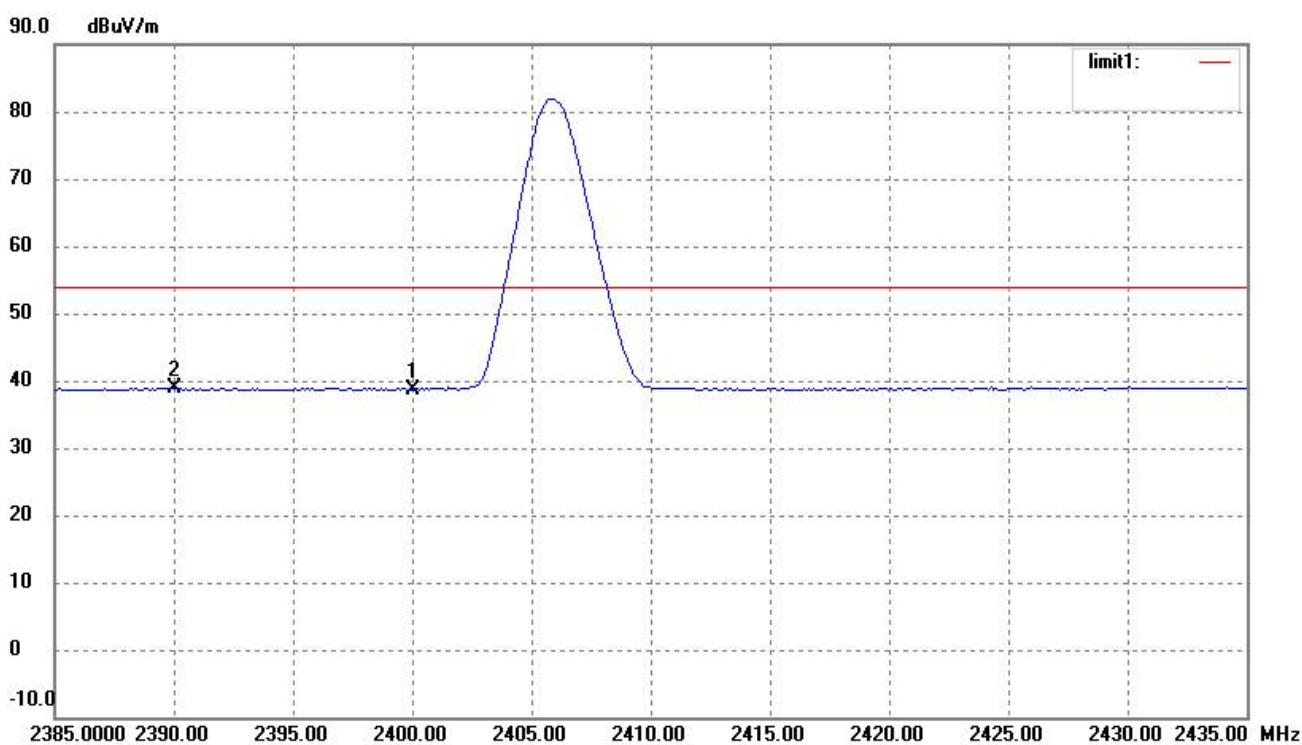
Temperature:	22° C
Relative Humidity:	55 %
ATM Pressure:	1016 mbar

5.5. Summary of Test Results/Plots

Frequency MHz	Limit dBuV	Result
Low Edge	<54	Pass
High Edge	<54	Pass

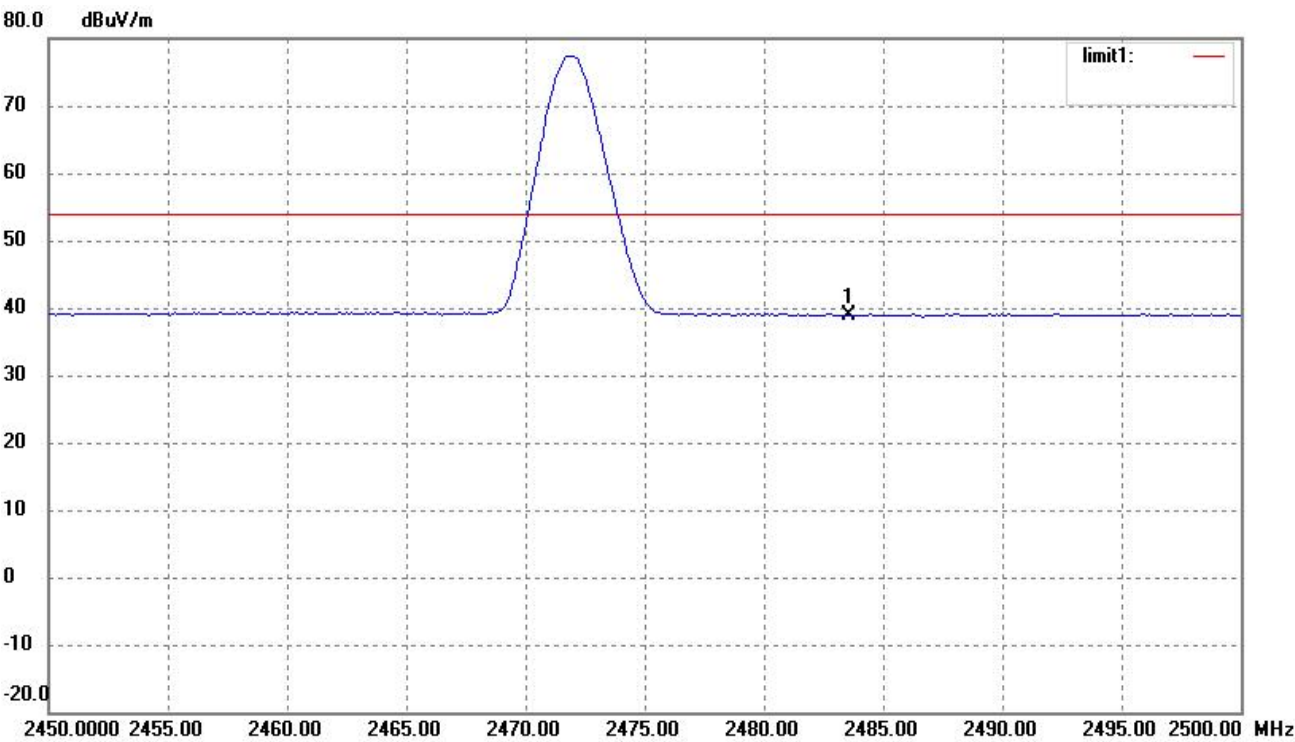
The edge emissions are below the FCC 15.209 Limits. Please refer to the test plots below.

Lowest Bandedge



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2386.751	13.35	34.57	47.92	74.00	-26.08	Peak Detector
	2386.751	8.89	34.57	43.46	54.00	-10.54	AVG Detector
2	2400.000	14.35	34.68	49.03	74.00	-24.97	Peak Detector
	2400.000	9.47	34.68	44.15	54.00	-9.85	AVG Detector

Highest Bandedge



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	
1	2483.500	11.87	34.97	46.84	74.00	-27.16	Peak Detector
	2483.500	6.68	34.97	41.65	54.00	-12.35	AVG Detector
2	2514.735	14.63	35.08	49.71	74.00	-24.29	Peak Detector
	2514.735	8.37	35.08	43.45	54.00	-10.55	AVG Detector

***** END OF REPORT *****