



BUREAU VERITAS

Test Report No.: FC120410N020

# TEST REPORT

Applicant:	MING JI TOYS FACTORY
Address:	CHENGHAI DISTRICT, SHANTOU CITY, GUANGDONG PROVINCE, CHINA

Manufacturer or Supplier	MING JI TOYS FACTORY
Address	CHENGHAI DISTRICT, SHANTOU CITY, GUANGDONG PROVINCE, CHINA
Product:	Remote control plane series
Brand Name:	N/A
Model:	503
Additional Model & Model Difference	N/A
Date of tests:	April 11 ~ May 18, 2012



the tests have been carried out according to the requirements of the following standards:

FCC Part 15, Subpart C (Section 15.249)

**CONCLUSION: The submitted sample was found to COMPLY with the test requirement**

Prepared by Glyn He Project Engineer / EMC Department	Approved by Sam Tung Manager / EMC Department
Date: May 18, 2012	

This report is for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence, provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents. Unless specific mention, the uncertainty of measurement has been explicitly taken into account to declare the compliance or non-compliance to the specification



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**Test Report No.: FC120410N020**

## RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
Original release	N/A	May 18, 2012



## 1 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC PART 15, SUBPART C (SECTION 15.249)			
STANDARD SECTION	TEST TYPE AND LIMIT	RESULT	REMARK
§15.203	Antenna Requirement	PASS	Compliant
§15.207 (a)	Conducted Emission	N/A	N/A
§15.205	Restricted Band of Operation	PASS	Compliant
§15.209 §15.249(a)	Radiated Emission	PASS	Compliant
§15.215(c)	20dB Bandwidth Test	PASS	Compliant

## 2 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

MEASUREMENT	FREQUENCY	UNCERTAINTY
Conducted emissions	9kHz~30MHz	2.44dB
Radiated emissions	30MHz ~ 200MHz	3.19dB
	200MHz ~1000MHz	3.21dB
	1GHz ~ 18GHz	2.26dB
	18GHz ~ 40GHz	1.94dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of  $k = 2$ .



### 3 GENERAL INFORMATION

#### 3.1 GENERAL DESCRIPTION OF EUT

<b>PRODUCT</b>	Remote control plane series
<b>MODEL NO.</b>	503
<b>FCC ID</b>	NWB13923902862
<b>NOMINAL VOLTAGE</b>	DC 9V By Battery
<b>MODULATION TYPE</b>	GFSK
<b>OPERATING FREQUENCY</b>	2413-2471MHz
<b>ANTENNA TYPE</b>	Integral PCB Antenna;
<b>I/O PORTS</b>	N/A
<b>DATA CABLE SUPPLIED</b>	N/A

**NOTE:**

1. The EUT was powered by the following adapters:

ADAPTER	
BRAND:	N/A
MODEL:	N/A
INPUT:	N/A
OUTPUT:	N/A
DC LINE:	N/A

2. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.



### 3.2 DESCRIPTION OF TEST MODES

Following channel(s) was (were) selected for the test as listed below.

TESTED CHANNEL	TESTED FREQUENCY
Low	2413 MHz
Mid.	2442 MHz
High	2471 MHz

### 3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

**FCC Part 15, Subpart C (15.249)**

**ANSI C63.4-2003**

**ANSI C63.10-2009**

All test items have been performed and recorded as per the above standards.

### 3.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	N/A	N/A	N/A	N/A	N/A

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	N/A

**NOTE:** N/A



## 4. TEST TYPES AND RESULTS

### 4.1 RADIATED EMISSION MEASUREMENT

#### 4.1.1 LIMITS OF RADIATED EMISSION MEASUREMENT

Emissions radiated outside of the specified bands, shall be according to the general radiated limits in 15.209 as following:

FREQUENCIES (MHz)	FIELD STRENGTH (microvolts/meter)	MEASUREMENT DISTANCE (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

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 harmonics (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.

**NOTE:**

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.



**4.1.2 TEST INSTRUMENTS**

<b>DESCRIPTION &amp; MANUFACTURER</b>	<b>MODEL NO.</b>	<b>SERIAL NO.</b>	<b>DATE OF CALIBRATION</b>	<b>DUE DATE OF CALIBRATION</b>
Spectrum Analyzer ROHDE & SCHWARZ	E4446A	MY46180622	May 02, 12	May 01, 13
Test Receiver ROHDE & SCHWARZ	ESVD	847398/003	May 15,12	May 14,13
Bilog Antenna TESEQ	CBL 6111D	25758	Nov.07,11	Nov.07,12
Horn Antenna EMCO	3117	00062558	Nov.07,11	Nov.07,12
10m Semi-anechoic Chamber ETS-LINDGREN	21.4m*12.1m*8.8m	NSEMC006	Mar 24,12	Mar 23,13
RF Cable IMRO	IMRO-400	10m Cable 1#10m	May 16,12	May 15,13
RF Cable IMRO	IMRO-400	10m Cable 2#3m	May 16,12	May 15,13
Signal Amplifier EMCI	EMC330	980095	Nov 07,11	Nov 07,12
Signal Amplifier EMCI	EMC 012645	980077	Nov 07,11	Nov 07,12
RF Cable DRAKA	M06/25-RG102	10m Cable 2#	May 16,12	May 15,13
Test software ADT	ADT_Radiated_V7.6.15	N/A	N/A	N/A

- NOTE:**
1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA and NIM/CHINA.
  2. The test was performed in Dongguan Chamber 10m.
  3. The horn antenna are used only for the measurement of emission frequency above 1GHz if tested.





#### 4.1.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meters semi-anechoic chamber. 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 is a broadband antenna, and its 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 lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

**NOTE:**

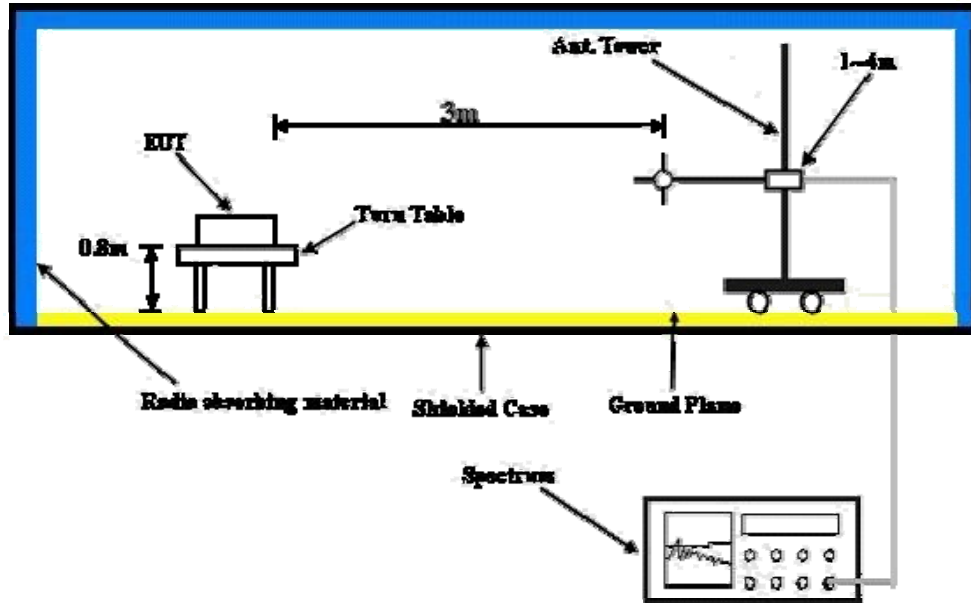
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

#### 4.1.4 DEVIATION FROM TEST STANDARD

No deviation



#### 4.1.5 TEST SETUP



For the actual test configuration, please refer to the attached file (Test Setup Photo).

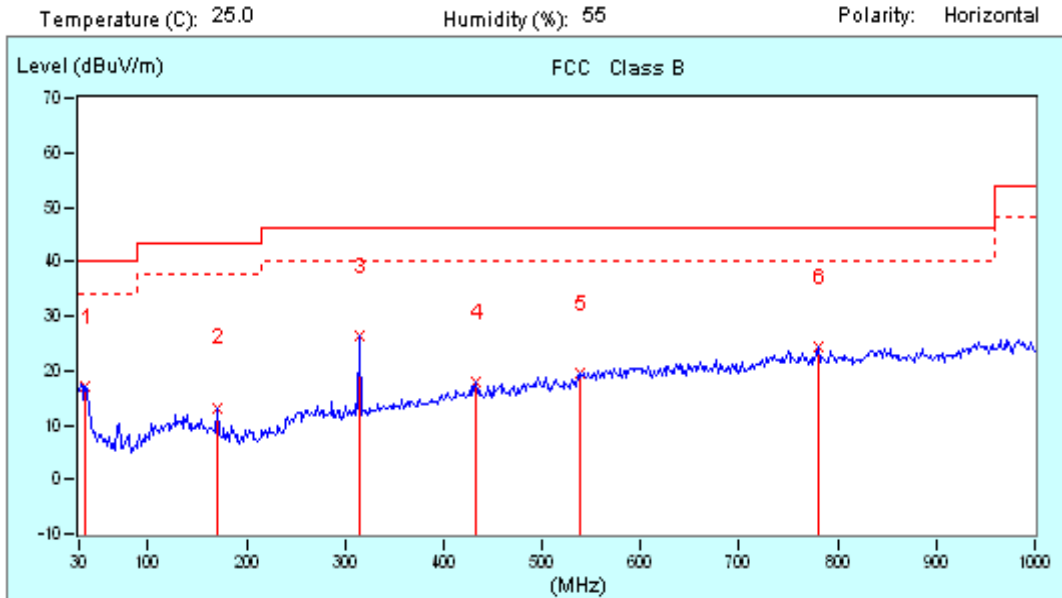
#### 4.1.6 EUT OPERATING CONDITIONS

- a. Turned on the power of equipment.
- b. Hold down the TX of button, then the EUT was operating.
- c. EUT was operated according to the type used was description in manufacturer's specifications or the User's Manual.



### 4.1.7 TEST RESULTS

#### BELOW 1GHz WORST-CASE DATA: Middle channel



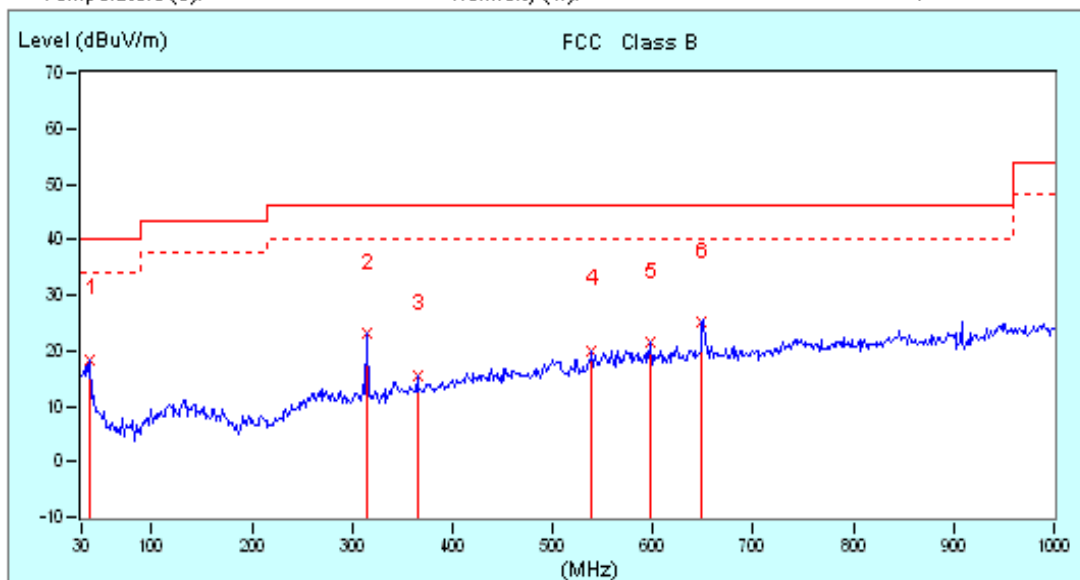
No.	Frequency MHz	Factor dB/m	Reading dBuV	Emission dBuV/m	Limit dBuV/m	Margin dB	Tower / Table cm deg	
1	36.47	16.24	0.64	16.88	40.00	-23.12	207	193
2	170.65	10.97	2.16	13.13	43.50	-30.37	191	208
*	314.53	15.32	10.87	26.19	46.00	-19.81	176	223
4	432.55	18.75	-0.86	17.89	46.00	-28.11	272	123
5	537.63	21.40	-1.94	19.46	46.00	-26.54	249	150
6	780.13	25.40	-1.15	24.25	46.00	-21.75	230	170



Temperature (C): 25.0

Humidity (%): 55

Polarity: Vertical



No.	Frequency MHz	Factor dB/m	Reading dBUV	Emission dBUV/m	Limit dBUV/m	Margin dB	Tower / Table	
							cm	deg
1	38.08	15.33	3.14	18.47	40.00	-21.53	100	0
2	314.53	15.32	7.78	23.10	46.00	-22.90	100	0
3	364.65	16.71	-1.15	15.56	46.00	-30.44	100	0
4	539.25	21.51	-1.56	19.95	46.00	-26.05	100	0
5	597.45	22.57	-1.14	21.43	46.00	-24.57	100	0
*	649.18	23.26	1.78	25.04	46.00	-20.96	100	0

REMARKS: 1. Emission level (dBUV/m) = Reading (dBUV) + Factor (dB/m).  
2. Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).  
3. The other emission levels were very low against the limit.  
4. Margin value = Emission level – Limit value.



ABOVE 1GHz WORST-CASE DATA: Low channel

Frequency MHz	Detector	Raw Value dBuV	Polar H / V	Correction factor dB/m	Emission level dBuV/m	Limit dBuV/m	Margin dB
4826.0	AV	-0.63	V	49.25	48.62	54	-5.38
4826.0	AV	-3.65	H	49.25	45.60	54	-8.40
4826.0	PK	14.60	V	49.25	63.85	74	-10.15
4826.0	PK	17.29	H	49.25	66.54	74	-7.46
2413.0*	AV	12.51	V	36.61	49.12	94	-44.88
2413.0*	AV	10.04	H	36.61	46.65	94	-47.35
2413.0*	PK	50.96	V	36.61	87.57	114	-26.43
2413.0*	PK	39.51	H	36.61	76.12	114	-37.88
2390.0	AV	5.21	V	36.41	41.62	54	-12.38
2390.0	AV	4.36	H	36.41	40.77	54	-13.23
2390.0	PK	18.47	V	36.41	54.88	74	-19.12
2390.0	PK	12.33	H	36.41	48.74	74	-25.26

ABOVE 1GHz WORST-CASE DATA: Middle channel

Frequency MHz	Detector	Raw Value dBuV	Polar H / V	Correction factor dB/m	Emission level dBuV/m	Limit dBuV/m	Margin dB
4884.0	AV	-4.38	V	49.23	44.85	54	-9.15
4884.0	AV	-4.25	H	49.23	44.98	54	-9.02
4884.0	PK	13.31	V	49.23	62.54	74	-11.46
4884.0	PK	13.62	H	49.23	62.85	74	-11.15
2442.0*	AV	12.08	V	36.87	48.95	94	-45.05
2442.0*	AV	10.21	H	36.87	47.08	94	-46.92
2442.0*	PK	45.09	V	36.87	81.96	114	-32.04
2442.0*	PK	47.38	H	36.87	84.25	114	-29.75



ABOVE 1GHz WORST-CASE DATA: High channel

Frequency MHz	Detector	Raw Value dBuV	Polar H / V	Correction factor dB/m	Emission level dBuV/m	Limit dBuV/m	Margin dB
4942.0	AV	-6.67	V	49.22	42.55	54	-11.45
4942.0	AV	-6.86	H	49.22	42.36	54	-11.64
4942.0	PK	14.34	V	49.22	63.56	74	-10.44
4942.0	PK	15.34	H	49.22	64.56	74	-9.44
2471.0*	AV	11.52	V	37.13	48.65	94	-45.35
2471.0*	AV	8.61	H	37.13	45.74	94	-48.26
2471.0*	PK	44.65	V	37.13	81.78	114	-32.22
2471.0*	PK	45.34	H	37.13	82.47	114	-31.53
2483.5	AV	5.62	V	37.24	42.86	54	-11.14
2483.5	AV	4.38	H	37.24	41.62	54	-12.38
2483.5	PK	19.57	V	37.24	56.81	74	-17.19
2483.5	PK	17.88	H	37.24	55.12	74	-18.88

- REMARKS:**
1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
  2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
  3. The other emission levels were very low against the limit.
  4. Margin value = Emission level – Limit value.
  5. “ \* “: Fundamental frequency.



## 4.2 20dB BANDWIDTH MEASUREMENT

### 4.2.1 LIMITS OF 20dB BANDWIDTH MEASUREMENT

According to FCC 15.215(c), must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

### 4.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Spectrum Analyzer ROHDE & SCHWARZ	E4446A	MY46180622	May 02, 12	May 01, 13
Horn Antenna EMCO	3117	00062558	Nov.07,11	Nov.07,12
10m Semi-anechoic Chamber ETS-LINDGREN	21.4m*12.1m*8.8m	NSEMC006	Mar 24,12	Mar 23,13
RF Cable IMRO	IMRO-400	10m Cable 2#3m	May 16,12	May 15,13
Signal Amplifier EMCI	EMC 012645	980077	Nov 07,11	Nov 07,12
RF Cable DRAKA	M06/25-RG102	10m Cable 2#	May 16,12	May 15,13
Test software ADT	ADT_Radiated_V7.6.15	N/A	N/A	N/A

**NOTE:** 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA and NIM/CHINA

2. The test was performed in Dongguan Chamber 10m.



#### 4.2.3 TEST PROCEDURE

The EUT was placed on a turn table which was 0.8 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was set 3 meters away from the receiving antenna which was mounted on a antenna tower. At the frequency band of 30MHz to 1GHz, The measuring antenna moved up and down to find out the maximum emission level. It moved from 1 to 4 m for horizontal and vertical polarizations.

The spectrum analyzer was receiving the maximum emission level. The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

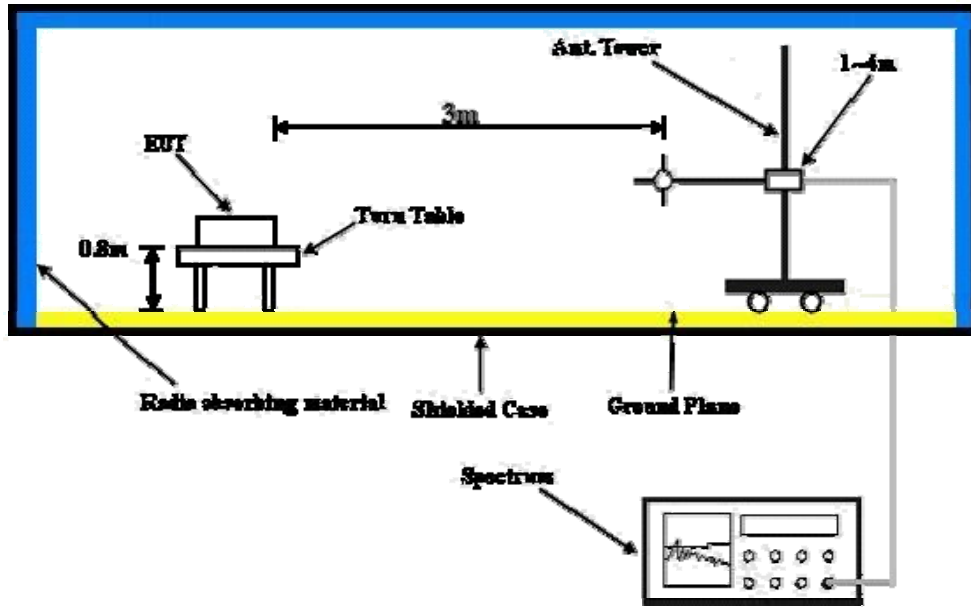
#### 4.2.4 DEVIATION FROM TEST STANDARD

No deviation.





### 4.2.5 TEST SETUP



### 4.2.6 EUT OPERATING CONDITIONS

Same as item 4.1.6.



### 4.2.7 TEST RESULTS

CHANNEL	CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (KHz)
Low	2413	985.5
Middle	2442	998.6
Hight	2471	933.4

#### Test Data: Low channel



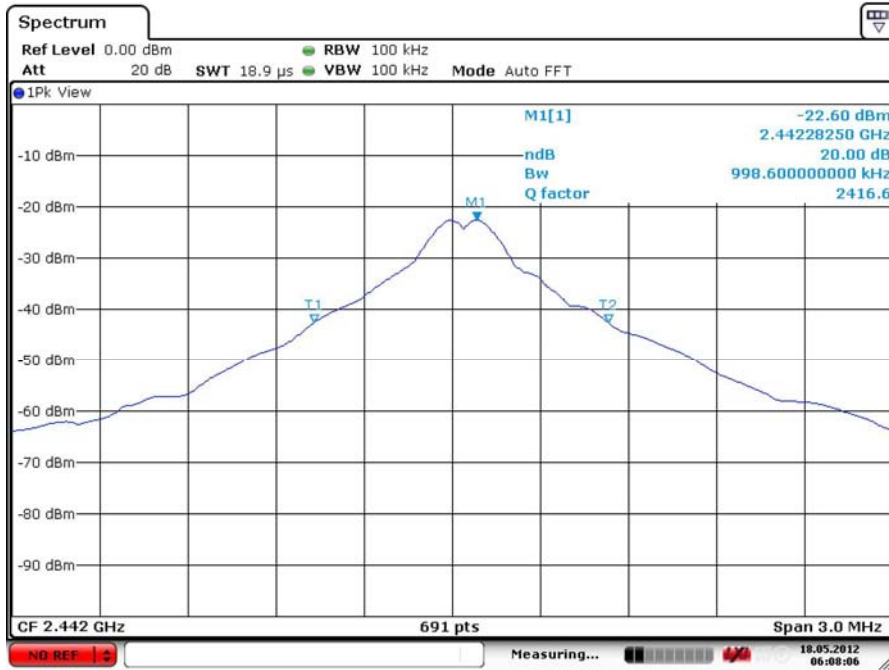
Date: 18.MAY.2012 06:06:38



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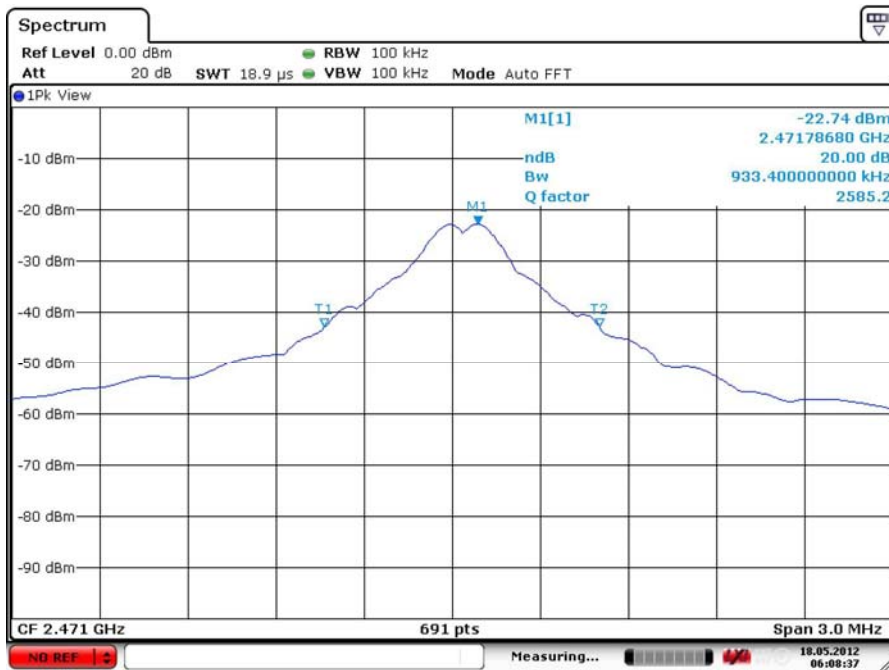
# Test Report No.: FC120410N020

## Test Data: Middle channel



Date: 18.MAY.2012 06:08:06

## Test Data: High channel



Date: 18.MAY.2012 06:08:37

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## **5 PHOTOGRAPHS OF THE TEST CONFIGURATION**

Please refer to the attached file (Test Setup Photo).



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**Test Report No.: FC120410N020**

## **6 APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB**

No any modifications are made to the EUT by the lab during the test.

**---END---**