Variant FCC RF Test Report

APPLICANT	:	Honeywell International Inc.
EQUIPMENT	:	99EX Mobile computer
BRAND NAME	:	Honeywell
MODEL NAME	:	99EX
FCC ID	:	HD599EXLG
STANDARD	:	FCC Part 15 Subpart C §15.247
CLASSIFICATION	:	Digital Spread Spectrum (DSS)

This is a variant report which is only valid combine with the original test report. The product was received on Dec. 06, 2010 and completely tested on Dec. 31, 2010. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.4-2003 and shown the compliance 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.

Reviewed by:

Anderson Chiu

Anderson Chiu / Deputy 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.

TABLE OF CONTENTS

REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR0D0904-03A	Rev. 01	This is a variant report for adding three types of keypad of the equipment. All the test cases were performed on Sample 1 in original report which can be referred to Sporton Report No. FR0D0904A as appendix C. Based on original report, only the worst case of the Radiated Emission and Conducted Emission tests with new types of keypad of equipment were verified.	Apr. 13, 2011

SUMMARY OF TEST RESULT

Report Section	FCC Rule	IC Rule	Description	Limit	Result	Remark
3.1	15.247(d)	A8.5	Frequency Band Edges	≤ 20dBc	Pass	-
3.2	15.207	Gen 7.2.2	AC Conducted Emission	15.207(a)	Pass	Under limit 15.9 dB at 0.35 MHz
3.3	15.247(d)	A8.5	Transmitter Radiated Emission	15.209(a) & 15.247(d)	Pass	Under limit 7.79 dB at 2483.5 MHz
3.4	15.203 & 15.247(b)	A8.4	Antenna Requirement	N/A	Pass	-

1 General Description

1.1 Applicant

Honeywell International Inc.
9680 Old Bailes Road, Fort Mill, SC 29707 USA

1.2 Manufacturer

Honeywell International Inc.
9680 Old Bailes Road, Fort Mill, SC 29707 USA

1.3 Feature of Equipment Under Test

Product Feature & Specification	
Equipment	99EX Mobile computer
Brand Name	Honeywell
Model Name	99EX
FCC ID	HD599EXLG
Sample 1	EUT with 55 keypad options
Sample 2	EUT with 43 keypad options
Sample 3	EUT with 34 keypad options
Sample 4	EUT with UPS 52 keypad options
Tx/Rx Frequency Range	2400 MHz ~ 2483.5 MHz
Number of Channels	79
Carrier Frequency of Each Channel	2402+n*1 MHz; n=0~78
Channel Spacing	1 MHz
Antenna Type	PIFA Antenna with gain 2.5 dBi
HW Version	5
SW Version	26.02
Type of Modulation	Bluetooth (1Mbps) : GFSK Bluetooth EDR (2Mbps) : π/4-DQPSK Bluetooth EDR (3Mbps) : 8-DPSK
EUT Stage	Production Unit

Remark:

1. This test report recorded only product characteristics and test results of Digital Spread Spectrum (DSS).
2. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.
3. The test of sample 1 was performed in original report, and this report was performed with sample 2 to 4.

1.4 Testing 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: +886-3-3273456 / FAX: +886-3-3284978		
Test Site No.	Sporton Site No.		FCC/IC Registration No.
	CO05-HY	03CH07-HY	722060/4086B-1

1.5 Applied Standards

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

- FCC Part 15 Subpart C §15.247
- FCC Public Notice DA 00-705
- ANSI C63.4-2003
- IC RSS-210 Issue 8

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B (DoC), recorded in a separate test report.

1.6 Ancillary Equipment List

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	System Simulator	R&S	CMU 200	N/A	N/A	Unshielded, 1.8 m
2.	GPS Station	T&E	GS-50	N/A	N/A	Unshielded, 1.8 m
3.	WLAN AP	D-Link	DIR-628	KA2DIR628A2	N/A	Unshielded, 1.8 m
4.	Bluetooth Earphone	Nokia	BH-102	PYAHS-107W	N/A	N/A
5.	Notebook	DELL	Vostro 1510	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
6.	LCD Monitor	Lenovo	6135-AB1	FCC DoC	Shielded, 1.6 m	Unshielded, 1.8 m
7.	iPod	Apple	A1285	FCC DoC	Shielded, 1.0 m	N/A
8.	Cradle	Honeywell	99EX-HB	N/A	N/A	N/A
9.	Adapter	ENG	3A-902DB12	N/A	N/A	N/A
10.	USB Cable	N/A	N/A	N/A	N/A	N/A

2 Test Configuration of Equipment Under Test

2.1 Test Mode

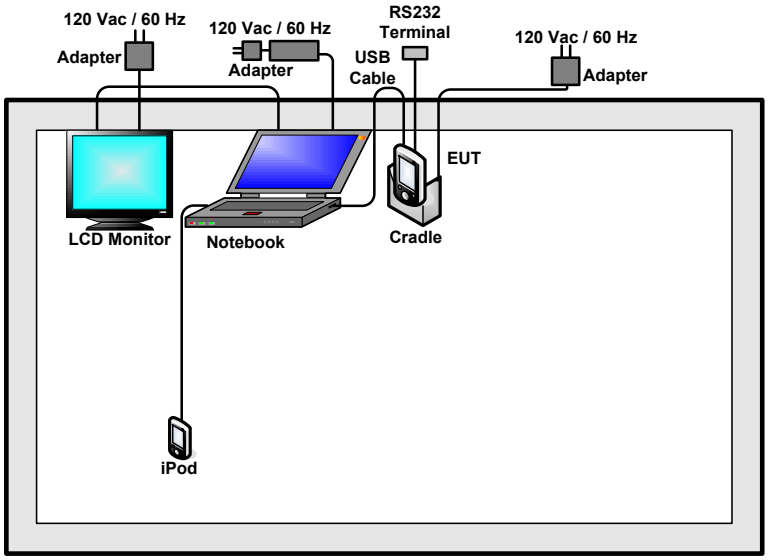
The EUT has been associated with peripherals pursuant to ANSI C63.4-2003 and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conduction (150 kHz to 30 MHz), radiation (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower).

Pre-scanned tests were conducted to determine the final configuration from all possible combinations. The following tables are showing the test modes as the worst cases and recorded in this report.

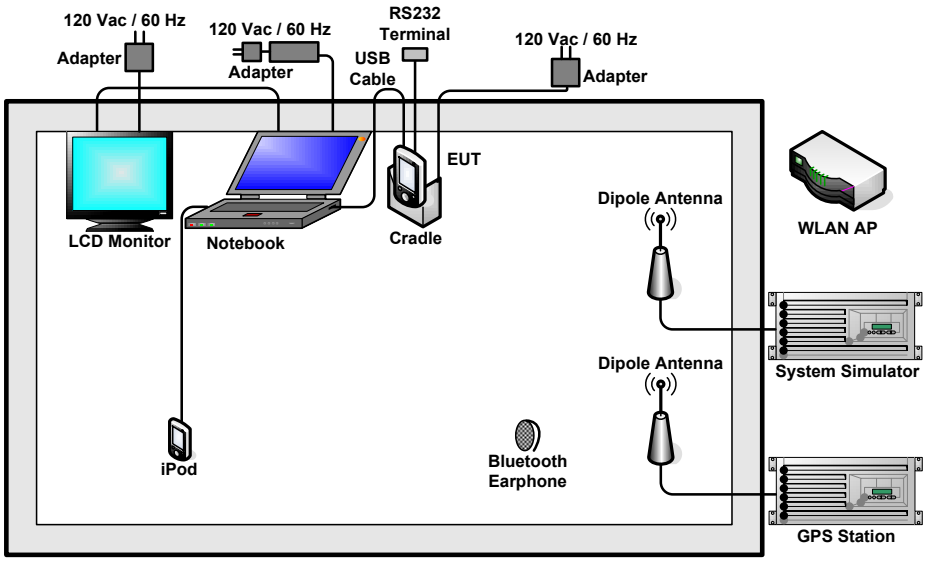
Test Cases	
Test Item	**Data Rate / Modulation**
	Bluetooth EDR 3Mbps 8-DPSK
Radiated TCs	Mode 1: CH78_2480 MHz + TC for Sample 2 Mode 2: CH78_2480 MHz + TC for Sample 3 Mode 3: CH78_2480 MHz + TC for Sample 4
AC Conducted Emission	Mode 1 :WCDMA Band II Idle + Bluetooth Link + WLAN (2.4G) Link + GPS Rx + Scanner + Cradle + Adapter + RS232 Terminal + USB Cable (Link with Notebook) for Sample 2 Mode 2 :WCDMA Band II Idle + Bluetooth Link + WLAN (2.4G) Link + GPS Rx + Scanner + Cradle + Adapter + RS232 Terminal + USB Cable (Link with Notebook) for Sample 3 Mode 3 :WCDMA Band II Idle + Bluetooth Link + WLAN (2.4G) Link + GPS Rx + Scanner + Cradle + Adapter + RS232 Terminal + USB Cable (Link with Notebook) for Sample 4
Remark: **1.** TC stands for Test Configuration, and consists of USB cable, RS232 terminal, cradle, and adapter. **2.** For conducted emission, the worst case is mode 1; only the test data of this mode was reported.	

2.2 Connection Diagram of Test System

<Bluetooth Tx Mode>



<AC Conducted Emission Mode>



2.3 RF Utility

For Bluetooth function, the RF utility, “BT Tester” was installed in EUT which can send transmitting signal for all testing.

3 Test Result

3.1 Band Edges Measurement

3.1.1 Limit of Band Edges

In any 100 kHz bandwidth outside the intentional radiation frequency band, the radio frequency power shall be at least 20 dB below the highest level of the radiated power. In addition, radiated emissions which fall in the restricted bands must also comply with the radiated emission limits.

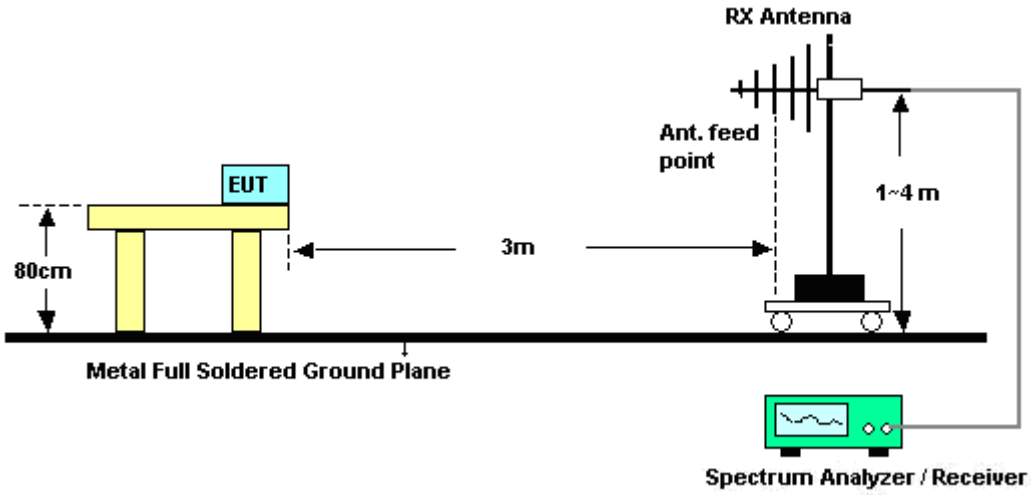
3.1.2 Measuring Instruments

See list of measuring instruments of this test report.

3.1.3 Test Procedures

1. The testing follows the guidelines in ANSI C63.4-2003 and FCC Public Notice DA 00-705 Measurement Guidelines.
2. RF antenna conducted test: Set RBW = 300kHz, Video bandwidth (VBW) ≥ RBW. Band edge emissions must be at least 20 dB down from the highest emission level within the authorized band as measured with a 300k Hz RBW. Note: If the device complies with the use of power option 2 the attenuation under this paragraph shall be 30 dB instead of 20 dB.
3. Radiated emission test: Applies to band edge emissions that fall in the restricted bands listed in FCC Section 15.205. The maximum permitted average field strength is listed in FCC Section 15.209. A pre-amp is necessary for this measurement. For measurements above 1 GHz, set RBW = 1MHz, VBW = 1MHz, Sweep: Auto for Peak; set RBW = 1MHz, VBW = 10 Hz, Sweep: Auto for Average. If the emission is pulsed, modify the unit for continuous operation; use the settings shown above, then correct the reading by subtracting the peak-average correction factor, derived from the appropriate duty cycle calculation. See FCC Section 15.35(b) and (c).
4. In case the emission is fail due to the used RBW / VBW is too wide, marker-delta method of FCC Public Notice DA 00-705 will be followed.

3.1.4 Test Setup



3.1.5 Test Result of Radiated Band Edges

Test Mode :	Mode 1	Temperature :	23~25°C
Test Channel :	78	Relative Humidity :	48~50%
		Test Engineer :	Ivan Chiang

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2483.5	64.64	-9.36	74	60.08	32.28	6.18	33.9	100	14	Peak
2483.5	42.71	-11.29	54	38.15	32.28	6.18	33.9	100	14	Average

Summary results of marker-delta method:

Test mode	Maximum field strength of the fundamental emission (dBµV/m)	Delta Result (dB)	Average Result (dBµV/m)	Average Limit (dBµV/m)	Margin (dB)	Result
Single Carrier Mode	96.29	54.88	41.41	54	-12.59	Pass
Hopping Mode	96.29	53.58	42.71	54	-11.29	Pass

Note : Average result = Maximum field strength – Delta result

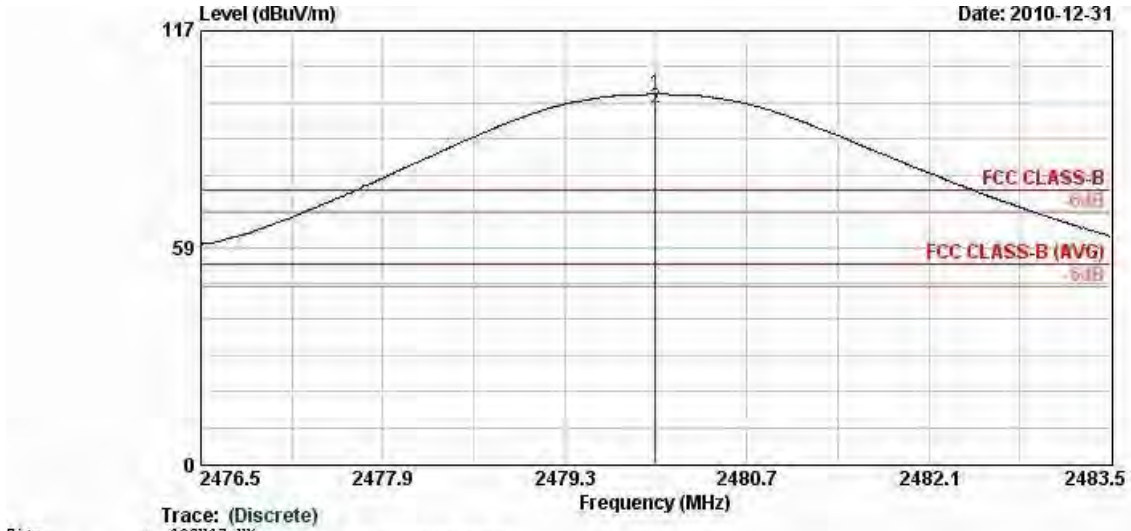
ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2483.5	60.2	-13.8	74	55.64	32.28	6.18	33.9	124	10	Peak
2483.5	39.13	-14.87	54	34.57	32.28	6.18	33.9	124	10	Average

Summary results of marker-delta method:

Test mode	Maximum field strength of the fundamental emission (dBµV/m)	Delta Result (dB)	Average Result (dBµV/m)	Average Limit (dBµV/m)	Margin (dB)	Result
Single Carrier Mode	91.88	52.77	39.11	54	-14.89	Pass
Hopping Mode	91.88	52.75	39.13	54	-14.87	Pass

Note : Average result = Maximum field strength – Delta result

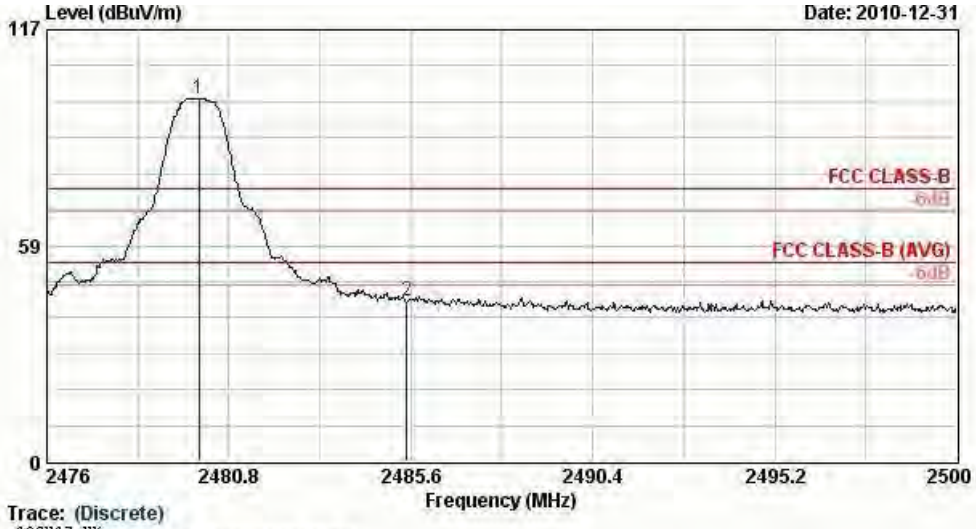
Test Mode :	Mode 1	Temperature :	23~25°C
Test Channel :	78	Relative Humidity :	48~50%
Test Engineer :	Ivan Chiang	Polarization :	Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1 @	2480.00	99.91	25.91	74.00	95.35	32.28	6.18	33.90	100	14	Peak
2 @	2480.00	96.29	42.29	54.00	91.73	32.28	6.18	33.90	100	14	Average

* Maximum field strength of the fundamental emission

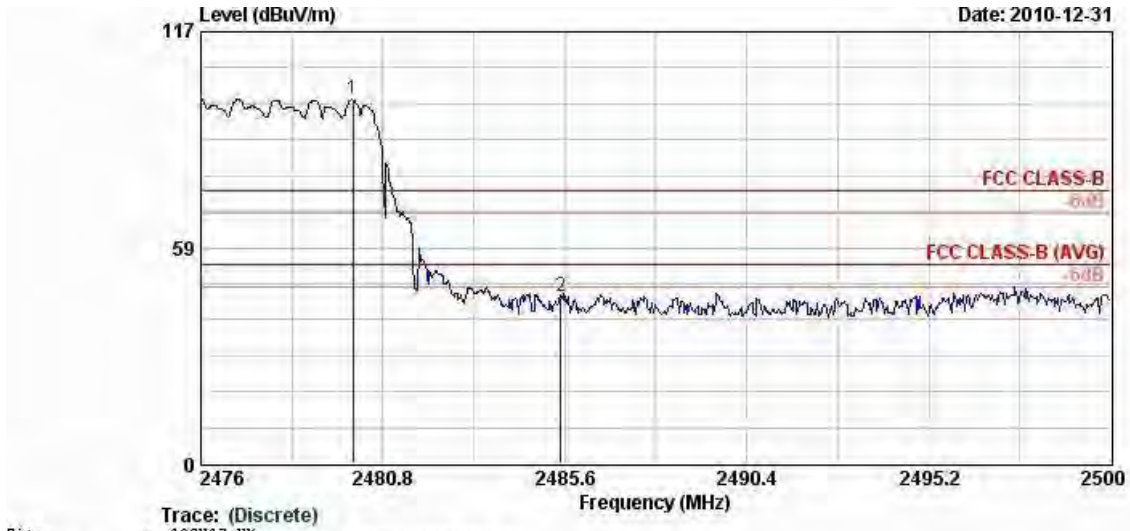
Test Mode :	Mode 1	Temperature :	23~25°C
Test Channel :	78	Relative Humidity :	48~50%
Test Engineer :	Ivan Chiang	Polarization :	Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1 @	2480.00	98.31	24.31	74.00	93.75	32.28	6.18	33.90	100	14	Peak
2	2485.50	43.43	-30.57	74.00	38.87	32.28	6.18	33.90	100	14	Peak

* Marker-Delta Method (RBW/VBW=100KHz): 54.88 dB , single carrier Mode

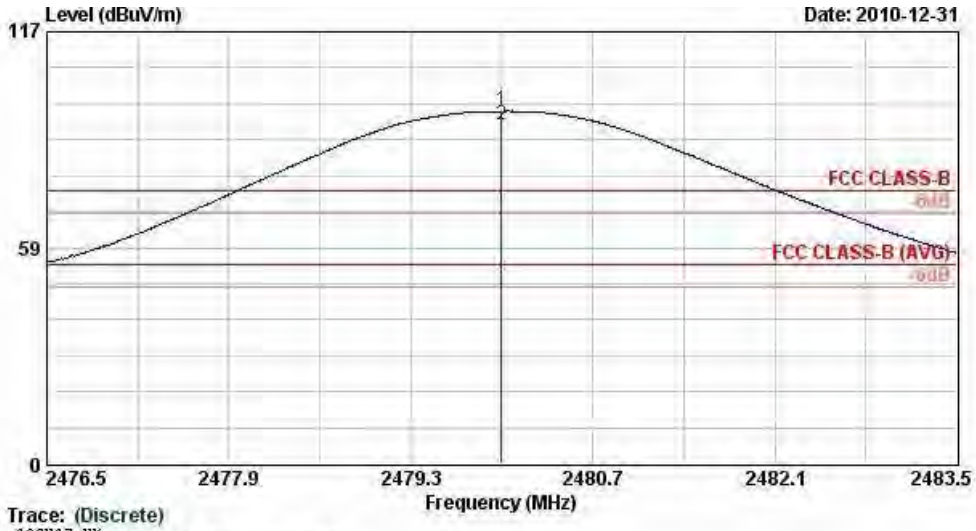
Test Mode :	Mode 1	Temperature :	23~25°C
Test Channel :	78	Relative Humidity :	48~50%
Test Engineer :	Ivan Chiang	Polarization :	Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1 @	2480.00	98.85	24.85	74.00	94.29	32.28	6.18	33.90	100	14	Peak
2	2485.50	45.27	-28.73	74.00	40.71	32.28	6.18	33.90	100	14	Peak

* Marker-Delta Method (RBW/VBW=100KHz): 53.58 dB , Hopping Mode

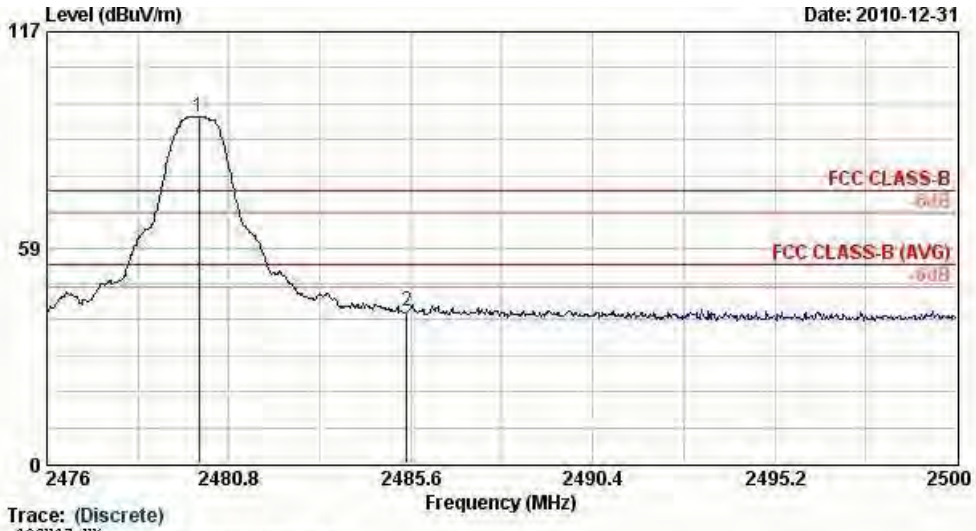
Test Mode :	Mode 1	Temperature :	23~25°C
Test Channel :	78	Relative Humidity :	48~50%
Test Engineer :	Ivan Chiang	Polarization :	Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1 @	2480.00	95.50	21.50	74.00	90.95	32.28	6.18	33.90	124	10	Peak
2 @	2480.00	91.88	37.88	54.00	87.32	32.28	6.18	33.90	124	10	Average

* Maximum field strength of the fundamental emission

Test Mode :	Mode 1	Temperature :	23~25°C
Test Channel :	78	Relative Humidity :	48~50%
Test Engineer :	Ivan Chiang	Polarization :	Vertical

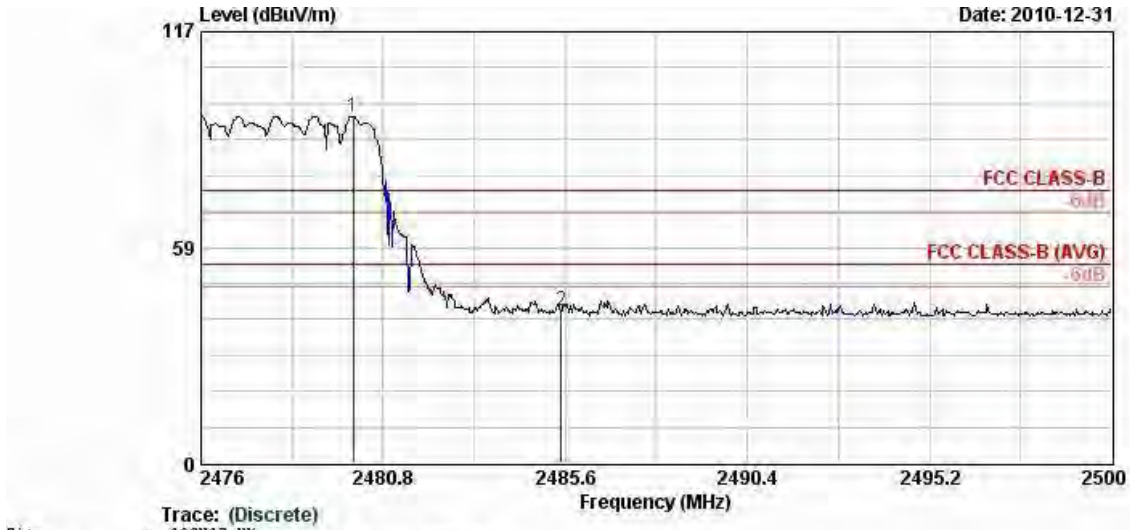


Site : 03CH07-HY
Condition : FCC CLASS-B HF_ANT_100824 VERTICAL
Project : FR 0D0904

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1 X	2480.00	93.93	19.93	74.00	89.37	32.28	6.18	33.90	124	10	Peak
2	2485.50	41.16	-32.84	74.00	36.60	32.28	6.18	33.90	124	10	Peak

* Marker-Delta Method (RBW/VBW=100KHz): 52.77 dB , single carrier Mode

Test Mode :	Mode 1	Temperature :	23~25°C
Test Channel :	78	Relative Humidity :	48~50%
Test Engineer :	Ivan Chiang	Polarization :	Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1 @	2480.00	94.13	20.13	74.00	89.57	32.28	6.18	33.90	124	10	Peak
2	2485.50	41.38	-32.62	74.00	36.82	32.28	6.18	33.90	124	10	Peak

* Marker-Delta Method (RBW/VBW=100KHz): 52.75 dB , Hopping Mode

Test Mode :	Mode 2	Temperature :	23~25°C
Test Channel :	78	Relative Humidity :	48~50%
		Test Engineer :	Ivan Chiang

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2483.5	64.97	-9.03	74	60.41	32.28	6.18	33.9	123	358	Peak
2483.5	46.21	-7.79	54	41.65	32.28	6.18	33.9	123	358	Average

Summary results of marker-delta method:

Test mode	Maximum field strength of the fundamental emission (dBµV/m)	Delta Result (dB)	Average Result (dBµV/m)	Average Limit (dBµV/m)	Margin (dB)	Result
Single Carrier Mode	96.95	56.45	40.5	54	-13.5	Pass
Hopping Mode	96.95	50.74	46.21	54	-7.79	Pass

Note : Average result = Maximum field strength – Delta result

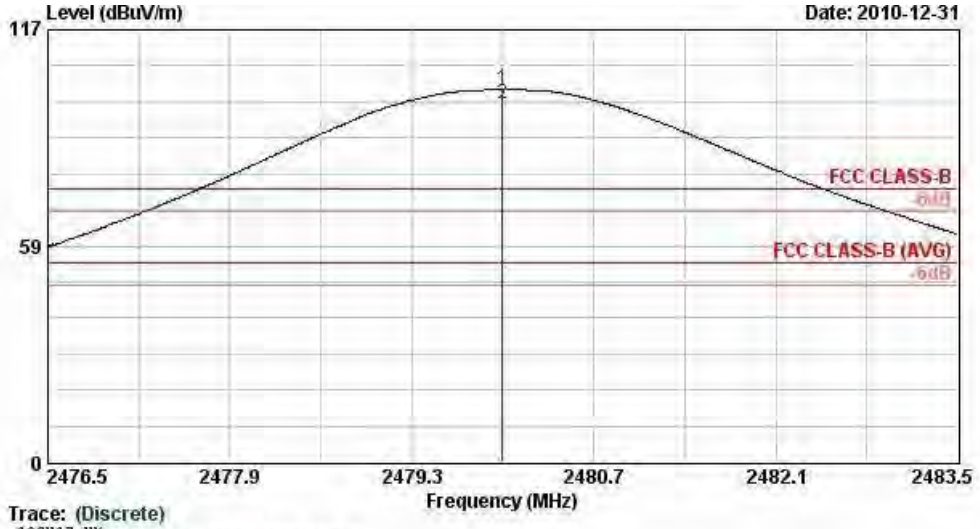
ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2483.5	57.69	-16.31	74	53.13	32.28	6.18	33.9	104	11	Peak
2483.5	43.05	-10.95	54	38.49	32.28	6.18	33.9	104	11	Average

Summary results of marker-delta method:

Test mode	Maximum field strength of the fundamental emission (dBµV/m)	Delta Result (dB)	Average Result (dBµV/m)	Average Limit (dBµV/m)	Margin (dB)	Result
Single Carrier Mode	89.69	50.55	39.14	54	-14.86	Pass
Hopping Mode	89.69	46.64	43.05	54	-10.95	Pass

Note : Average result = Maximum field strength – Delta result

Test Mode :	Mode 2	Temperature :	23~25°C
Test Channel :	78	Relative Humidity :	48~50%
Test Engineer :	Ivan Chiang	Polarization :	Horizontal

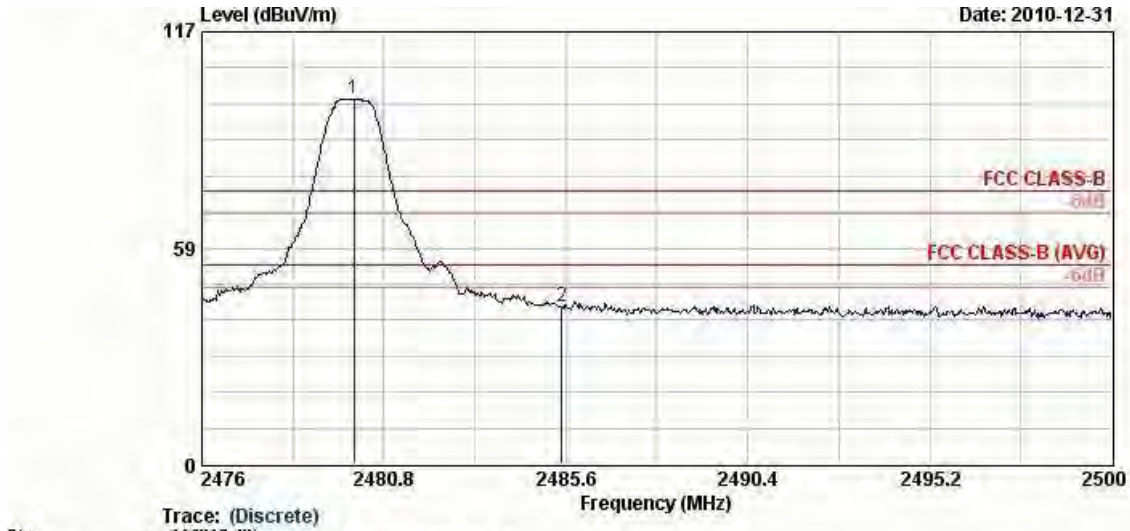


Site : 03CH07-HY
Condition : FCC CLASS-B HF_ANT_100824 HORIZONTAL
Project : FR 0D0904

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1 @	2480.00	100.93	26.93	74.00	96.37	32.28	6.18	33.90	123	358	Peak
2 @	2480.00	96.95	42.95	54.00	92.39	32.28	6.18	33.90	123	358	Average

* Maximum field strength of the fundamental emission

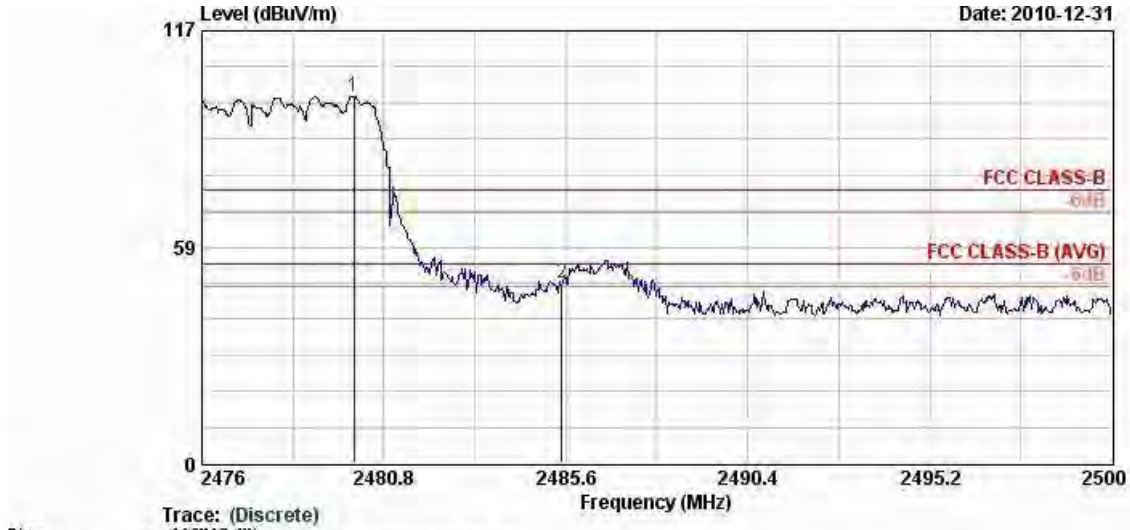
Test Mode :	Mode 2	Temperature :	23~25°C
Test Channel :	78	Relative Humidity :	48~50%
Test Engineer :	Ivan Chiang	Polarization :	Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1 @	2480.00	98.89	24.89	74.00	94.34	32.28	6.18	33.90	123	358	Peak
2	2485.50	42.44	-31.56	74.00	37.88	32.28	6.18	33.90	123	358	Peak

* Marker-Delta Method (RBW/VBW=100KHz): 56.45 dB , single carrier Mode

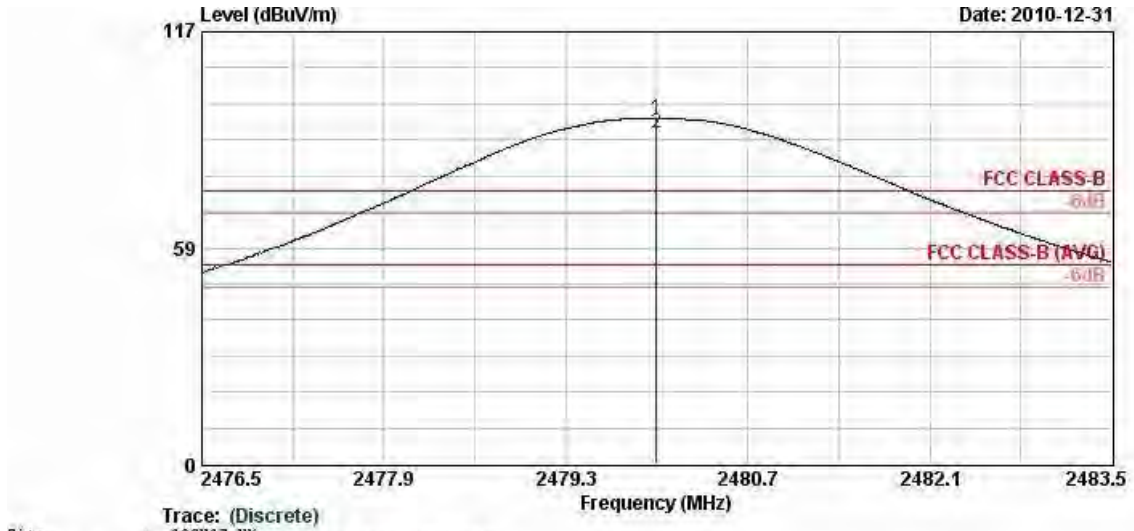
Test Mode :	Mode 2	Temperature :	23~25°C
Test Channel :	78	Relative Humidity :	48~50%
Test Engineer :	Ivan Chiang	Polarization :	Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1 @	2480.00	99.33	25.33	74.00	94.77	32.28	6.18	33.90	123	358	Peak
2	2485.50	48.59	-25.41	74.00	44.03	32.28	6.18	33.90	123	358	Peak

* Marker-Delta Method (RBW/VBW=100KHz): 50.74 dB , Hopping Mode

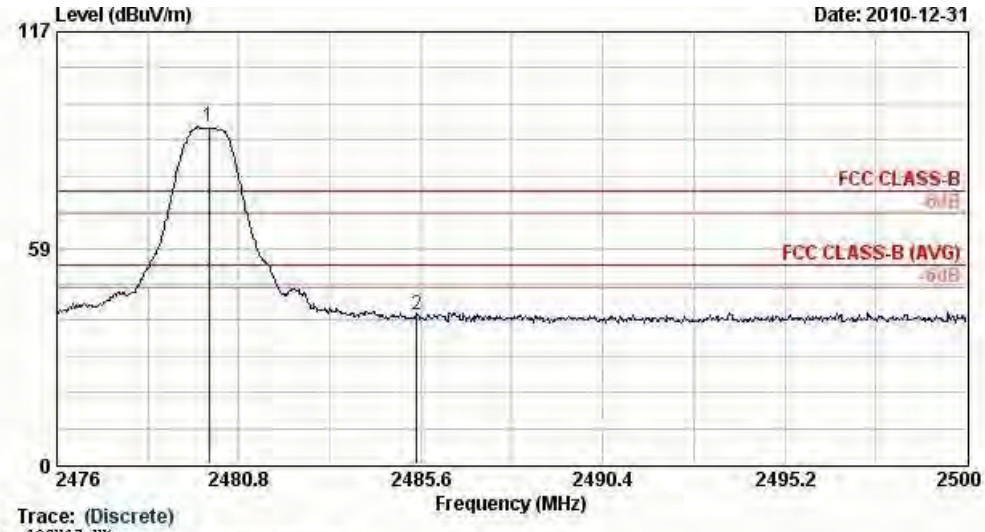
Test Mode :	Mode 2	Temperature :	23~25°C
Test Channel :	78	Relative Humidity :	48~50%
Test Engineer :	Ivan Chiang	Polarization :	Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1 @	2480.00	93.64	19.64	74.00	89.08	32.28	6.18	33.90	104	11	Peak
2 @	2480.00	89.69	35.69	54.00	85.13	32.28	6.18	33.90	104	11	Average

* Maximum field strength of the fundamental emission

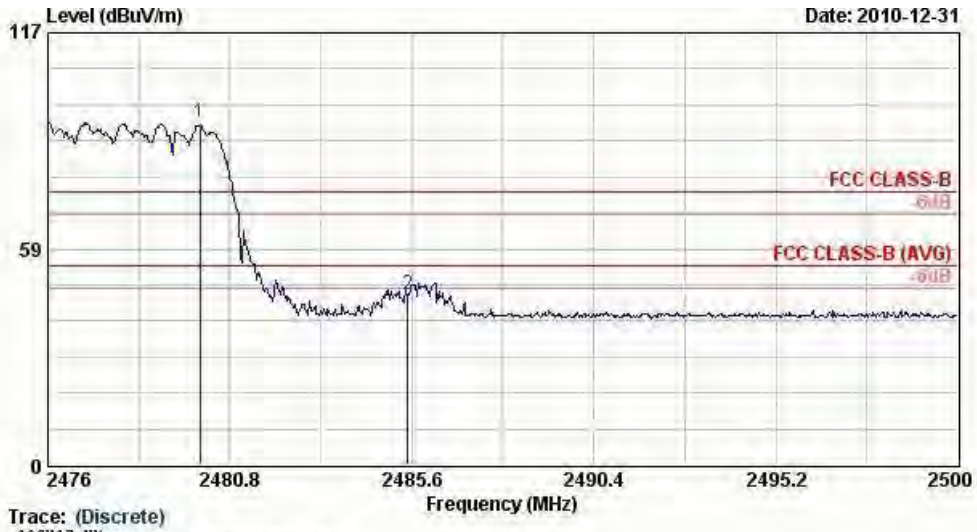
Test Mode :	Mode 2	Temperature :	23~25°C
Test Channel :	78	Relative Humidity :	48~50%
Test Engineer :	Ivan Chiang	Polarization :	Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1 X	2480.00	91.15	17.15	74.00	86.59	32.28	6.18	33.90	104	11	Peak
2	2485.50	40.60	-33.40	74.00	36.04	32.28	6.18	33.90	104	11	Peak

* Marker-Delta Method (RBW/VBW=100KHz): 50.55 dB , single carrier Mode

Test Mode :	Mode 2	Temperature :	23~25°C
Test Channel :	78	Relative Humidity :	48~50%
Test Engineer :	Ivan Chiang	Polarization :	Vertical



Site : 03CH07-HY
Condition : FCC CLASS-B HF_ANT_100824 VERTICAL
Project : FR 0D0904

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1 @	2480.00	92.74	18.74	74.00	88.18	32.28	6.18	33.90	104	11	Peak
2	2485.50	46.10	-27.90	74.00	41.54	32.28	6.18	33.90	104	11	Peak

* Marker-Delta Method (RBW/VBW=100KHz): 46.64 dB , Hopping Mode

Test Mode :	Mode 3	Temperature :	23~25°C
Test Channel :	78	Relative Humidity :	48~50%
		Test Engineer :	Ivan Chiang

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2483.5	57.67	-16.33	74	53.11	32.28	6.18	33.9	104	80	Peak
2483.5	39.12	-14.88	54	34.56	32.28	6.18	33.9	104	80	Average

Summary results of marker-delta method:

Test mode	Maximum field strength of the fundamental emission (dBµV/m)	Delta Result (dB)	Average Result (dBµV/m)	Average Limit (dBµV/m)	Margin (dB)	Result
Single Carrier Mode	97.3	55.54	41.76	54	-12.24	Pass
Hopping Mode	97.3	53.73	43.57	54	-10.43	Pass

Note : Average result = Maximum field strength – Delta result

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2483.5	65.6	-8.4	74	61.04	32.28	6.18	33.9	103	66	Peak
2483.5	43.57	-10.43	54	39.01	32.28	6.18	33.9	103	66	Average

Summary results of marker-delta method:

Test mode	Maximum field strength of the fundamental emission (dBµV/m)	Delta Result (dB)	Average Result (dBµV/m)	Average Limit (dBµV/m)	Margin (dB)	Result
Single Carrier Mode	89.22	50.1	39.12	54	-14.88	Pass
Hopping Mode	89.22	52.13	37.09	54	-16.91	Pass

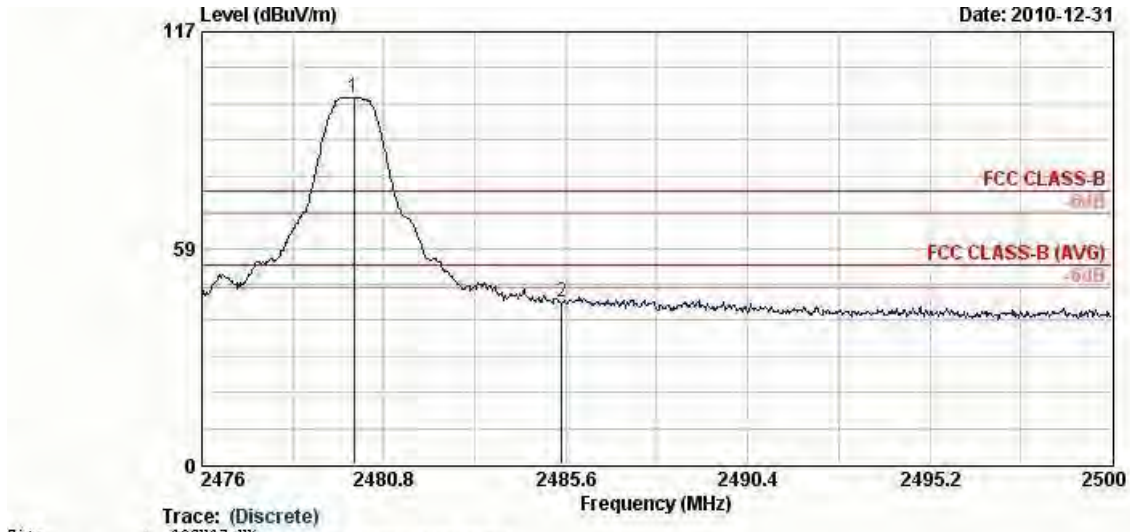
Note : Average result = Maximum field strength – Delta result

Test Mode :	Mode 3	**Temperature :**	23~25°C
Test Channel :	78	**Relative Humidity :**	48~50%
Test Engineer :	Ivan Chiang	**Polarization :**	Horizontal

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1 @	2480.00	100.97	26.97	74.00	96.41	32.28	6.18	33.90	103	66	Peak
2 @	2480.00	97.30	43.30	54.00	92.74	32.28	6.18	33.90	103	66	Average

* Maximum field strength of the fundamental emission

Test Mode :	Mode 3	Temperature :	23~25°C
Test Channel :	78	Relative Humidity :	48~50%
Test Engineer :	Ivan Chiang	Polarization :	Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1 @	2480.00	99.30	25.30	74.00	94.74	32.28	6.18	33.90	103	66	Peak
2	2485.50	43.76	-30.24	74.00	39.20	32.28	6.18	33.90	103	66	Peak

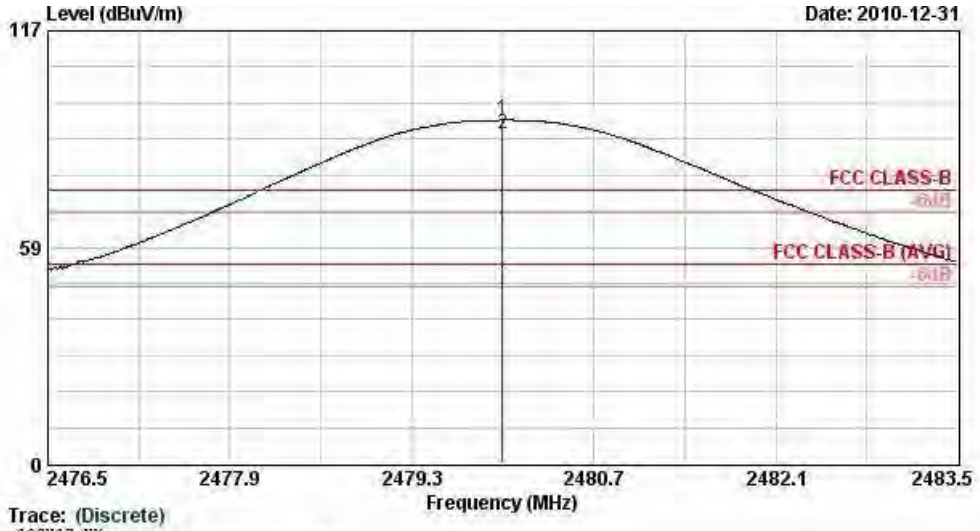
* Marker-Delta Method (RBW/VBW=100KHz): 55.54 dB , single carrier Mode

Test Mode :	Mode 3	Temperature :	23~25°C
Test Channel :	78	Relative Humidity :	48~50%
Test Engineer :	Ivan Chiang	Polarization :	Horizontal

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1 @	2480.00	99.64	25.64	74.00	95.08	32.28	6.18	33.90	103	66	Peak
2	2485.50	45.91	-28.09	74.00	41.35	32.28	6.18	33.90	103	66	Peak

* Marker-Delta Method (RBW/VBW=100KHz): 53.73 dB , Hopping Mode

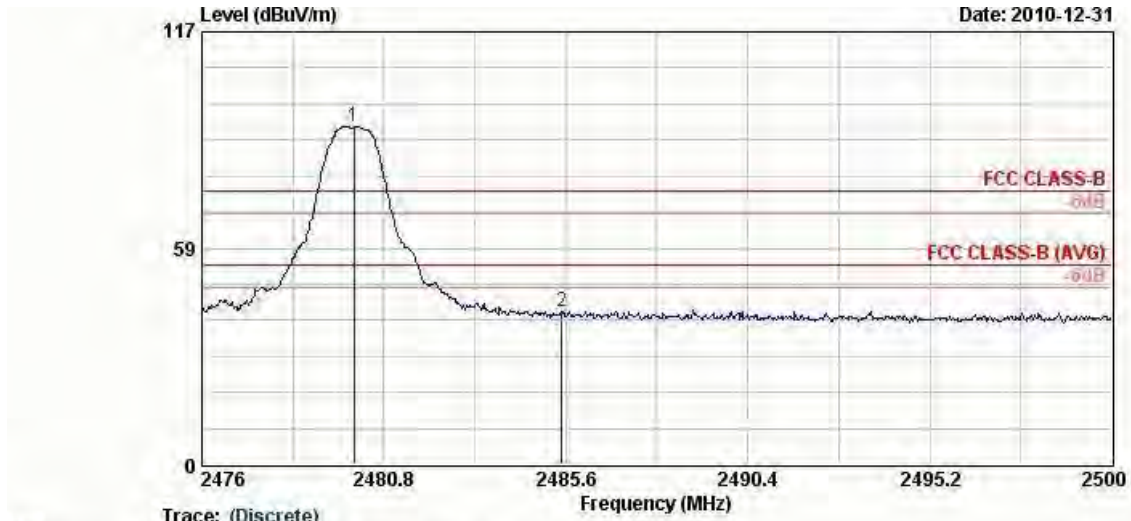
Test Mode :	Mode 3	Temperature :	23~25°C
Test Channel :	78	Relative Humidity :	48~50%
Test Engineer :	Ivan Chiang	Polarization :	Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1 @	2480.00	92.92	18.92	74.00	88.36	32.28	6.18	33.90	104	80	Peak
2 @	2480.00	89.22	35.22	54.00	84.66	32.28	6.18	33.90	104	80	Average

* Maximum field strength of the fundamental emission

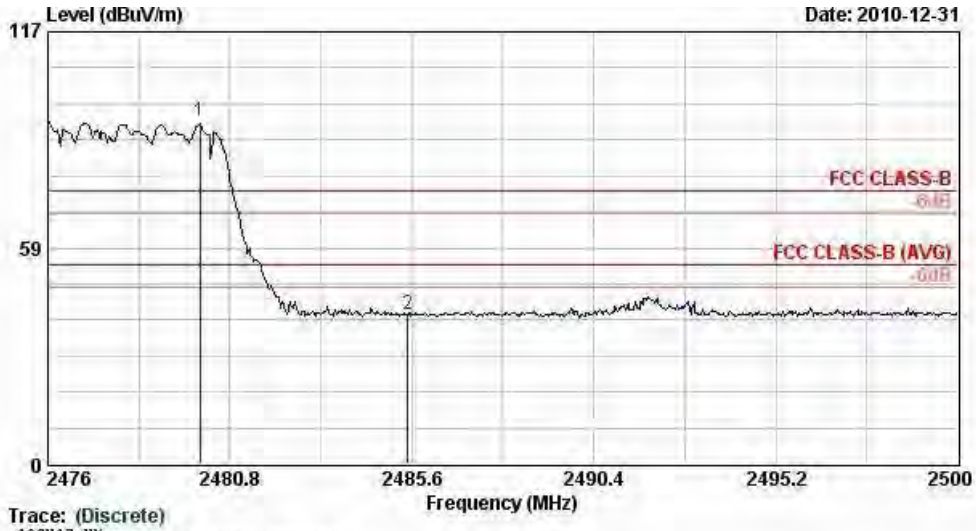
Test Mode :	Mode 3	Temperature :	23~25°C
Test Channel :	78	Relative Humidity :	48~50%
Test Engineer :	Ivan Chiang	Polarization :	Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1 X	2480.00	91.23	17.23	74.00	86.67	32.28	6.18	33.90	104	80	Peak
2	2485.50	41.13	-32.87	74.00	36.57	32.28	6.18	33.90	104	80	Peak

* Marker-Delta Method (RBW/VBW=100KHz): 50.1 dB , single carrier Mode

Test Mode :	Mode 3	Temperature :	23~25°C
Test Channel :	78	Relative Humidity :	48~50%
Test Engineer :	Ivan Chiang	Polarization :	Vertical



Site : 03CH07-HY
Condition : FCC CLASS-B HF_ANT_100824 VERTICAL
Project : FR 0D0904

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1 @	2480.00	92.61	18.61	74.00	88.05	32.28	6.18	33.90	104	80	Peak
2	2485.50	40.48	-33.52	74.00	35.92	32.28	6.18	33.90	104	80	Peak

* Marker-Delta Method (RBW/VBW=100KHz): 52.13 dB , Hopping Mode

3.2 AC Conducted Emission Measurement

3.2.1 Limit 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.

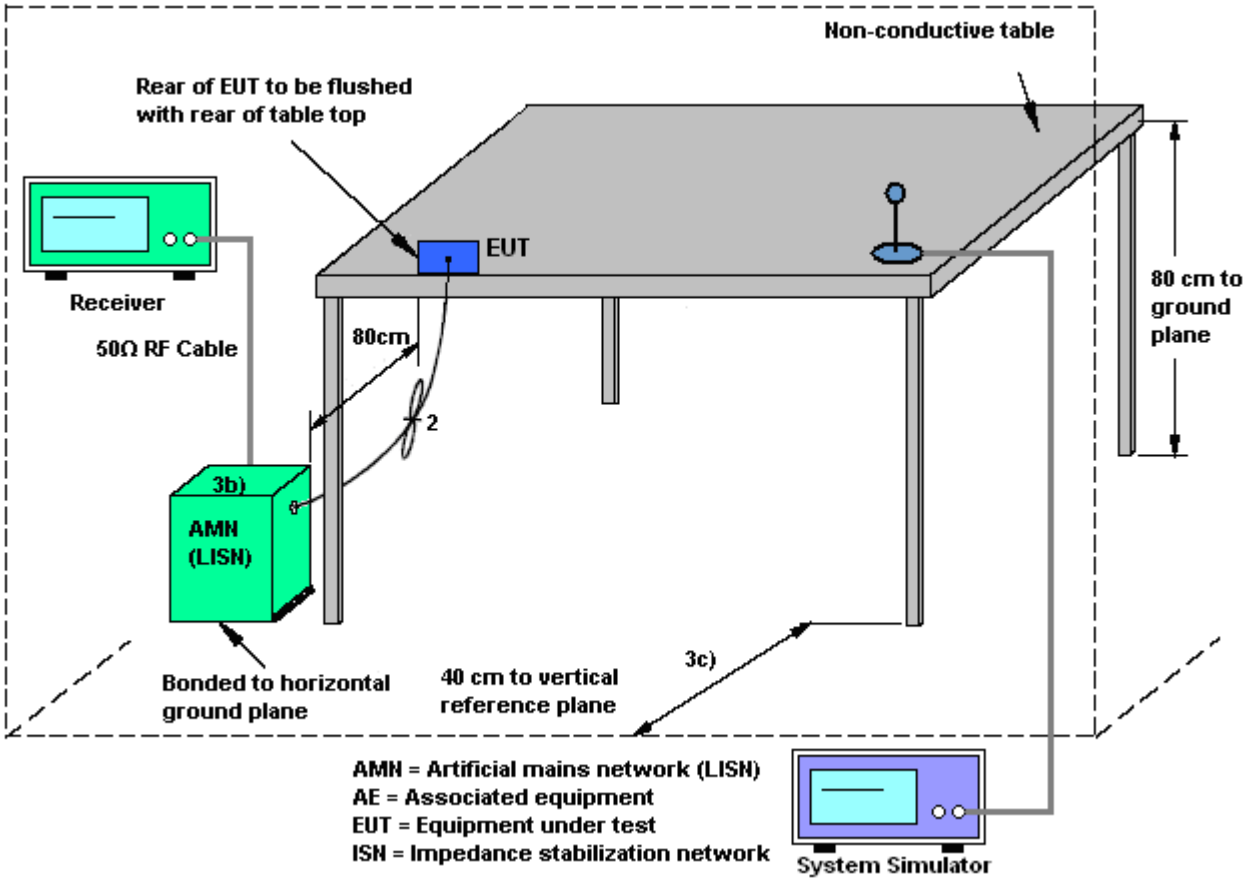
3.2.2 Measuring Instruments

See list of measuring instruments of this test report.

3.2.3 Test Procedures

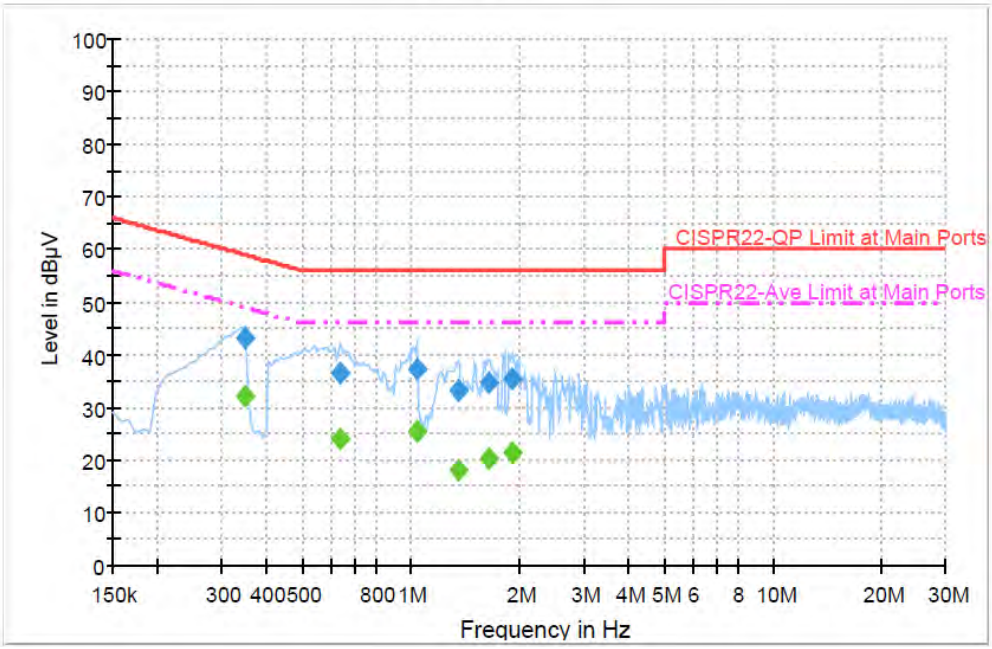
1. Please follow the guidelines in ANSI C63.4-2003.
2. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
1. Connect EUT to the power mains through a line impedance stabilization network (LISN).
2. All the support units are connecting to the other LISN.
3. The LISN provides 50 ohm coupling impedance for the measuring instrument.
4. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
5. Both sides of AC line were checked for maximum conducted interference.
6. The frequency range from 150 kHz to 30 MHz was searched.
7. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode.

3.2.4 Test Setup



3.2.5 Test Result of AC Conducted Emission

Test Mode :	Mode 1	**Temperature :**	20~23℃
Test Engineer :	Cona Huang	**Relative Humidity :**	43~48%
Test Voltage :	120Vac / 60Hz	**Phase :**	Line
Function Type :	WCDMA Band II Idle + Bluetooth Link + WLAN (2.4G) Link + GPS Rx + Scanner + Cradle + Adapter + RS232 Terminal + USB Cable (Link with Notebook) for Sample 2		
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



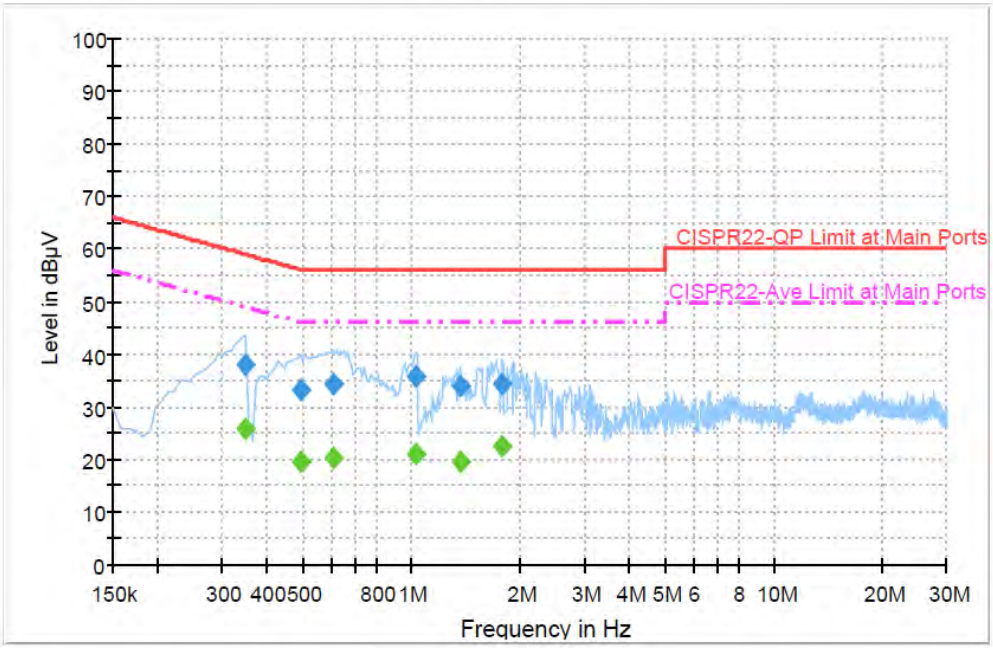
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.350000	43.1	Off	L1	19.3	15.9	59.0
0.638000	36.6	Off	L1	19.4	19.4	56.0
1.038000	37.4	Off	L1	19.4	18.6	56.0
1.350000	33.2	Off	L1	19.4	22.8	56.0
1.646000	34.9	Off	L1	19.4	21.1	56.0
1.894000	35.4	Off	L1	19.5	20.6	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.350000	32.2	Off	L1	19.3	16.8	49.0
0.638000	24.0	Off	L1	19.4	22.0	46.0
1.038000	25.6	Off	L1	19.4	20.4	46.0
1.350000	18.1	Off	L1	19.4	27.9	46.0
1.646000	20.1	Off	L1	19.4	25.9	46.0
1.894000	21.4	Off	L1	19.5	24.6	46.0

Test Mode :	Mode 1	**Temperature :**	20~23℃
Test Engineer :	Cona Huang	**Relative Humidity :**	43~48%
Test Voltage :	120Vac / 60Hz	**Phase :**	Neutral
Function Type :	WCDMA Band II Idle + Bluetooth Link + WLAN (2.4G) Link + GPS Rx + Scanner + Cradle + Adapter + RS232 Terminal + USB Cable (Link with Notebook) for Sample 2		
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.350000	37.8	Off	N	19.3	21.2	59.0
0.494000	33.4	Off	N	19.3	22.7	56.1
0.606000	34.2	Off	N	19.4	21.8	56.0
1.030000	35.6	Off	N	19.4	20.4	56.0
1.374000	33.8	Off	N	19.5	22.2	56.0
1.774000	34.2	Off	N	19.5	21.8	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.350000	25.8	Off	N	19.3	23.2	49.0
0.494000	19.7	Off	N	19.3	26.4	46.1
0.606000	20.2	Off	N	19.4	25.8	46.0
1.030000	21.1	Off	N	19.4	24.9	46.0
1.374000	19.7	Off	N	19.5	26.3	46.0
1.774000	22.6	Off	N	19.5	23.4	46.0

3.3 Radiated Emission Measurement

3.3.1 Limit of Radiated Emission

In any 100 kHz bandwidth outside the intentional radiator frequency band, all harmonics/spurious must be at least 20 dB below the highest emission level within the authorized band. In addition, radiated emissions which fall in the restricted bands must also comply with the FCC section 15.209 limits as below.

Frequency (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

3.3.2 Measuring Instruments

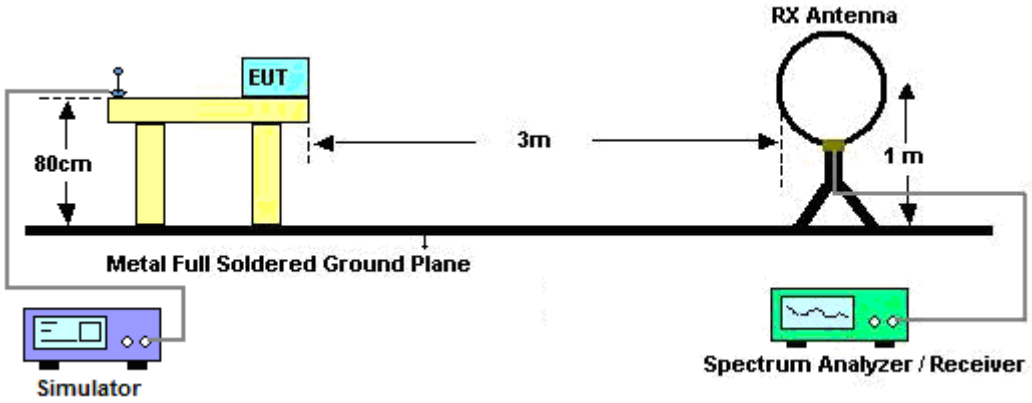
See list of measuring instruments of this test report.

3.3.3 Test Procedures

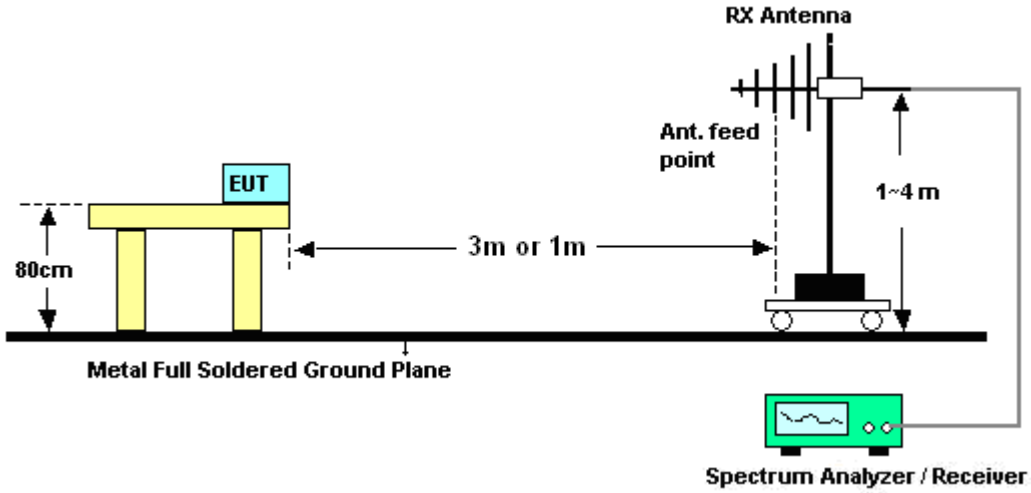
1. The testing follows the guidelines in FCC Public Notice DA 00-705 Measurement Guidelines.
2. Use the following spectrum analyzer settings:
   (1) Span = wide enough to fully capture the emission being measured; RBW = 1 MHz for f ≥ 1 GHz, 100 kHz for f < 1 GHz; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold.
   (2) Above 18 GHz shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade from 3m to 1m.
   Distance extrapolation factor = 20 log (specific distance [3m] / test distance [1m]) (dB)
3. Follow the guidelines in ANSI C63.4-2003 with respect to maximizing the emission by rotating the EUT, measuring the emission for three EUT orthogonal planes, and adjusting the measurement antenna height and polarization. A pre-amp and a high pass filter are used for this test in order to get the good signal level.

3.3.4 Test Setup

For radiated emissions below 30MHz



For radiated emissions above 30MHz



3.3.5 Test Results of Radiated Emissions (9 kHz ~ 30 MHz)

Test Engineer :	Ivan Chiang	Temperature :	23~25°C
		Relative Humidity :	48~50%

Frequency (MHz)	Level (dBuV)	Over Limit (dB)	Limit Line (dBuV)	Remark
-	-	-	-	See Note

Note:

The amplitude of spurious emissions that are attenuated by more than 20dB below the permissible value has no need to be reported.

Distance extrapolation factor = 40 log (specific distance / test distance) (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor.

3.3.6 Test Result of Radiated Emission (30 MHz ~ 10th Harmonic)

Test Mode :	Mode 1	Temperature :	23~25°C
Test Channel :	78	Relative Humidity :	48~50%
Test Engineer :	Ivan Chiang	Polarization :	Horizontal
Remark :	2480 MHz is Fundamental Signals which can be ignored.		

Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
128.82	26.8	-16.7	43.5	45.66	11.57	1.14	31.57	100	132	Peak
186.06	25.89	-17.61	43.5	47.08	9.06	1.27	31.52	-	-	Peak
221.97	26.81	-19.19	46	46.16	10.68	1.43	31.46	-	-	Peak
802.6	24.71	-21.29	46	29.75	22.49	3.15	30.68	-	-	Peak
886.6	25.86	-20.14	46	29.78	23.47	3.32	30.71	-	-	Peak
998.6	27.78	-26.22	54	29.97	24.88	3.51	30.58	-	-	Peak
2374	45.08	-28.92	74	40.77	32.16	5.99	33.84	100	14	Peak
2374	33.27	-20.73	54	28.96	32.16	5.99	33.84	100	14	Average
2480	96.23	-	-	91.67	32.28	6.18	33.9	100	14	Average
2480	99.85	-	-	95.29	32.28	6.18	33.9	100	14	Peak
2483.5	64.64	-9.36	74	60.08	32.28	6.18	33.9	100	14	Peak
2483.5	42.71	-11.29	54	38.15	32.28	6.18	33.9	100	14	Average

Test Mode :	Mode 1	Temperature :	23~25°C
Test Channel :	78	Relative Humidity :	48~50%
Test Engineer :	Ivan Chiang	Polarization :	Vertical
Remark :	2480 MHz is Fundamental Signals which can be ignored.		

Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
80.22	24.48	-15.52	40	47.91	7.22	0.88	31.53	144	199	Peak
117.21	25.33	-18.17	43.5	44.52	11.28	1.09	31.56	-	-	Peak
184.98	25.12	-18.38	43.5	46.32	9.06	1.26	31.52	-	-	Peak
635.3	22.94	-23.06	46	30.86	20.16	2.8	30.88	-	-	Peak
844.6	24.84	-21.16	46	29.32	22.99	3.26	30.73	-	-	Peak
995.8	27.33	-26.67	54	29.56	24.84	3.51	30.58	-	-	Peak
2326	45.53	-28.47	74	41.34	32.09	5.92	33.82	124	10	Peak
2326	33.16	-20.84	54	28.97	32.09	5.92	33.82	124	10	Average
2480	91.84	-	-	87.28	32.28	6.18	33.9	124	10	Average
2480	95.41	-	-	90.85	32.28	6.18	33.9	124	10	Peak
2483.5	60.2	-13.8	74	55.64	32.28	6.18	33.9	124	10	Peak
2483.5	39.13	-14.87	54	34.57	32.28	6.18	33.9	124	10	Average

Test Mode :	Mode 2	Temperature :	23~25°C
Test Channel :	78	Relative Humidity :	48~50%
Test Engineer :	Ivan Chiang	Polarization :	Horizontal
Remark :	2480 MHz is Fundamental Signals which can be ignored.		

Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
129.09	26.58	-16.92	43.5	45.44	11.57	1.14	31.57	133	50	Peak
182.01	26.33	-17.17	43.5	47.55	9.05	1.26	31.53	-	-	Peak
220.89	28.91	-17.09	46	48.33	10.61	1.43	31.46	-	-	Peak
609.4	23.95	-22.05	46	32.27	19.87	2.72	30.91	-	-	Peak
843.9	24.86	-21.14	46	29.35	22.98	3.25	30.72	-	-	Peak
987.4	27.11	-26.89	54	29.46	24.73	3.5	30.58	-	-	Peak
2350	45.35	-28.65	74	41.12	32.11	5.95	33.83	123	358	Peak
2350	33.15	-20.85	54	28.92	32.11	5.95	33.83	123	358	Average
2480	100.9	-	-	96.34	32.28	6.18	33.9	123	358	Peak
2480	96.94	-	-	92.38	32.28	6.18	33.9	123	358	Average
2483.5	64.97	-9.03	74	60.41	32.28	6.18	33.9	123	358	Peak
2483.5	46.21	-7.79	54	41.65	32.28	6.18	33.9	123	358	Average

Test Mode :	Mode 2	Temperature :	23~25°C
Test Channel :	78	Relative Humidity :	48~50%
Test Engineer :	Ivan Chiang	Polarization :	Vertical
Remark :	2480 MHz is Fundamental Signals which can be ignored.		

Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
115.86	25.22	-18.28	43.5	44.5	11.2	1.08	31.56	-	-	Peak
134.49	25.93	-17.57	43.5	44.73	11.59	1.17	31.56	105	19	Peak
186.06	25.3	-18.2	43.5	46.49	9.06	1.27	31.52	-	-	Peak
573.7	24.08	-21.92	46	33.04	19.37	2.62	30.95	-	-	Peak
850.2	26.78	-19.22	46	31.18	23.06	3.27	30.73	-	-	Peak
982.5	27.48	-26.52	54	29.9	24.67	3.49	30.58	-	-	Peak
2318	45.54	-28.46	74	41.35	32.09	5.92	33.82	104	11	Peak
2318	33.11	-20.89	54	28.92	32.09	5.92	33.82	104	11	Average
2480	89.89	-	-	85.33	32.28	6.18	33.9	104	11	Average
2480	93.6	-	-	89.04	32.28	6.18	33.9	104	11	Peak
2483.5	57.69	-16.31	74	53.13	32.28	6.18	33.9	104	11	Peak
2483.5	43.05	-10.95	54	38.49	32.28	6.18	33.9	104	11	Average

Test Mode :	Mode 3	Temperature :	23~25°C
Test Channel :	78	Relative Humidity :	48~50%
Test Engineer :	Ivan Chiang	Polarization :	Horizontal
Remark :	2480 MHz is Fundamental Signals which can be ignored.		

Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
54.3	28.3	-11.7	40	51.89	7.24	0.72	31.55	112	218	Peak
115.86	26.1	-17.4	43.5	45.38	11.2	1.08	31.56	-	-	Peak
187.41	24.21	-19.29	43.5	45.4	9.06	1.27	31.52	-	-	Peak
632.5	24.15	-21.85	46	32.12	20.13	2.79	30.89	-	-	Peak
822.9	25.98	-20.02	46	30.75	22.73	3.2	30.7	-	-	Peak
971.3	26.86	-27.14	54	29.43	24.52	3.48	30.57	-	-	Peak
2342	45.77	-28.23	74	41.54	32.11	5.95	33.83	104	80	Peak
2342	33.18	-20.82	54	28.95	32.11	5.95	33.83	104	80	Average
2480	89.22	-	-	84.66	32.28	6.18	33.9	104	80	Average
2480	92.85	-	-	88.29	32.28	6.18	33.9	104	80	Peak
2483.5	57.67	-16.33	74	53.11	32.28	6.18	33.9	104	80	Peak
2483.5	39.12	-14.88	54	34.56	32.28	6.18	33.9	104	80	Average

Test Mode :	Mode 3	Temperature :	23~25°C
Test Channel :	78	Relative Humidity :	48~50%
Test Engineer :	Ivan Chiang	Polarization :	Vertical
Remark :	2480 MHz is Fundamental Signals which can be ignored.		

Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
133.41	30.31	-13.19	43.5	49.12	11.58	1.17	31.56	153	121	Peak
221.97	28.14	-17.86	46	47.49	10.68	1.43	31.46	-	-	Peak
292.98	25.7	-20.3	46	41.96	13.35	1.71	31.32	-	-	Peak
802.6	25.69	-20.31	46	30.73	22.49	3.15	30.68	-	-	Peak
925.8	26.59	-19.41	46	29.86	23.96	3.4	30.63	-	-	Peak
996.5	27.62	-26.38	54	29.85	24.84	3.51	30.58	-	-	Peak
2340	44.83	-29.17	74	40.6	32.11	5.95	33.83	103	66	Peak
2340	33.23	-20.77	54	29	32.11	5.95	33.83	103	66	Average
2480	97.28	-	-	92.72	32.28	6.18	33.9	103	66	Average
2480	100.93	-	-	96.37	32.28	6.18	33.9	103	66	Peak
2483.5	65.6	-8.4	74	61.04	32.28	6.18	33.9	103	66	Peak
2483.5	43.57	-10.43	54	39.01	32.28	6.18	33.9	103	66	Average

3.4 Antenna Requirements

3.4.1 Standard Applicable

If directional gain of transmitting antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi. 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 FCC rule.

3.4.2 Antenna Connected Construction

The antennas type used in this product is PIFA Antenna without connector and it is considered to meet antenna requirement.

3.4.3 Antenna Gain

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.

4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Due Date	Remark
EMI Test Receive	R&S	ESCS 30	100356	9KHz – 2.75GHz	Aug. 16, 2010	Aug. 15, 2011	Conduction (CO05-HY)
Two-LISN	R&S	ENV216	11-100081	9KHz – 30MHz	Dec. 03, 2010	Dec. 02, 2011	Conduction (CO05-HY)
Two-LISN	R&S	ENV216	11-100080	9KHz – 30MHz	Dec. 01, 2010	Nov. 30, 2011	Conduction (CO05-HY)
AC Power Source	APC	APC-1000W	N/A	N/A	N/A	N/A	Conduction (CO05-HY)
ISN	Teseq GmbH	ISN T400A	25696	N/A	Jun. 19, 2010	Jun. 18, 2011	Conduction (CO05-HY)
ISN	Teseq GmbH	ISN T800	27134	N/A	Jun. 19, 2010	Jun. 18, 2011	Conduction (CO05-HY)
DC- LISN	R&S	ESH3-26	1000485	0.1MHz~200MHz	Jun. 17, 2010	Jun. 16, 2011	Conduction (CO05-HY)
DC- LISN	R&S	ESH3-26	1000484	0.1MHz~200MHz	Jun. 17, 2010	Jun. 16, 2011	Conduction (CO05-HY)
System Simulator	R&S	CMU200	117997	N/A	May 14, 2009	May 13, 2011	Conduction (CO05-HY)
GPS Station	T&E	GS-50	N/A	N/A	N/A	N/A	Conduction (CO05-HY)
Bilog Antenna	SCHAFFNER	CBL6111C	2726	30MHz ~ 1GHz	Oct. 31, 2010	Oct. 30, 2011	Radiation (03CH07-HY)
Spectrum Analyzer	R&S	FSP	101067	9KHz ~ 30GHz	Dec. 03, 2010	Dec. 02, 2011	Radiation (03CH07-HY)
Double Ridge Horn Antenna	ESCO	3117	00075962	1GHz ~ 18GHz	Aug. 19, 2010	Aug. 18, 2011	Radiation (03CH07-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170251	15GHz- 40GHz	Oct. 18, 2010	Oct. 17, 2011	Radiation (03CH07-HY)
Pre Amplifier	Agilent	8449B	3008A02362	1GHz~ 26.5GHz	Dec. 06, 2010	Dec. 05, 2011	Radiation (03CH07-HY)
Pre Amplifier	COM-POWER	PA-103A	161241	10-1000MHz.32 dB.GAIN	Mar. 27, 2010	Mar. 26, 2011	Radiation (03CH07-HY)
Loop Antenna	R&S	HFH2-Z2	860004/001	9 kHz~30 MHz	Jul. 29, 2010	Jul. 28, 2011	Radiation (03CH07-HY)

5 Uncertainty of Evaluation

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

Contribution	Uncertainty of X_i		$u(X_i)$
	dB	Probability Distribution	
Receiver Reading	0.10	Normal (k=2)	0.05
Cable Loss	0.10	Normal (k=2)	0.05
AMN Insertion Loss	2.50	Rectangular	0.63
Receiver Specification	1.50	Rectangular	0.43
Site Imperfection	1.39	Rectangular	0.80
Mismatch	+0.34 / -0.35	U-Shape	0.24
Combined Standard Uncertainty Uc(y)	**1.13**		
Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**2.26**		

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

Contribution	Uncertainty of X_i		$u(X_i)$
	dB	Probability Distribution	
Receiver Reading	0.41	Normal (k=2)	0.21
Antenna Factor Calibration	0.83	Normal (k=2)	0.42
Cable Loss Calibration	0.25	Normal (k=2)	0.13
Pre-Amplifier Gain Calibration	0.27	Normal (k=2)	0.14
RCV/SPA Specification	2.50	Rectangular	0.72
Antenna Factor Interpolation for Frequency	1.00	Rectangular	0.29
Site Imperfection	1.43	Rectangular	0.83
Mismatch	+0.39 / -0.41	U-Shape	0.28
Combined Standard Uncertainty Uc(y)	**1.27**		
Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**2.54**		

Uncertainty of Radiated Emission Measurement (1 GHz ~ 40 GHz)

Contribution	Uncertainty of X_i		$u(X_i)$	C_i	$C_i * u(X_i)$
	dB	Probability Distribution			
Receiver Reading	±0.10	Normal (k=2)	0.10	1	0.10
Antenna Factor Calibration	±1.70	Normal (k=2)	0.85	1	0.85
Cable Loss Calibration	±0.50	Normal (k=2)	0.25	1	0.25
Receiver Correction	±2.00	Rectangular	1.15	1	1.15
Antenna Factor Directional	±1.50	Rectangular	0.87	1	0.87
Site Imperfection	±2.80	Triangular	1.14	1	1.14
Mismatch Receiver VSWR Γ1 = 0.197 Antenna VSWR Γ2 = 0.194 Uncertainty = 20Log(1-Γ1*Γ2)	+0.34 / -0.35	U-Shape	0.244	1	0.244
Combined Standard Uncertainty Uc(y)	**2.36**				
Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**4.72**				

Appendix A. Photographs of EUT

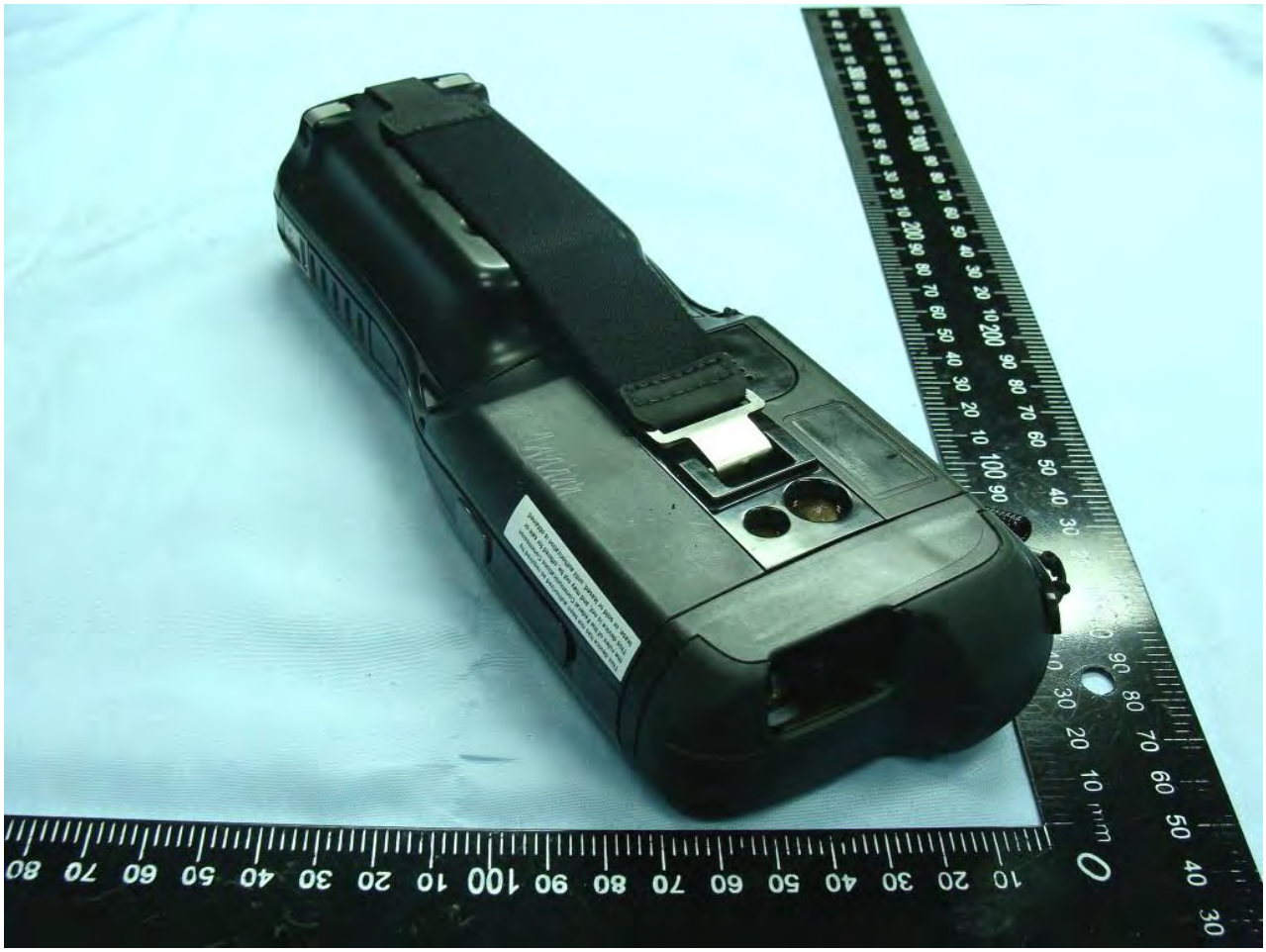
Please refer to Sporton report number EP0D0904-03 as below.

1. External Photograph of EUT

Sample 2

Sample 3


SCAN
ESC
TAB
ENT
1
2 ABC
3 DEF
4 GHI
5 JKL
6 MNO
7 PQRS
8 TUV
9 WXYZ
. *
0
, #
F1
F2
F3
F4
SFT
SP
BKSP
DEL
ALT CTRL
ALPHA




Sample 4

2. Photograph of Accessory

List of Accessory:

Specification of Accessory		
Battery	**Brand Name**	Honeywell
	Model Name	99EX-BTEC
Holster 1	**Model Name**	99EX-Holster
Holster 2	**Model Name**	99EX-Holster-UPS
LCD Panel	**Brand Name**	Casio
	Model Name	OM37H3M04XLC
Camera	**Brand Name**	LITE-ON Semiconductor Corp.
	Model Name	DCM-300MCB
WWAN Module	**Brand Name**	Sierra wireless
	Model Name	Gobi3000

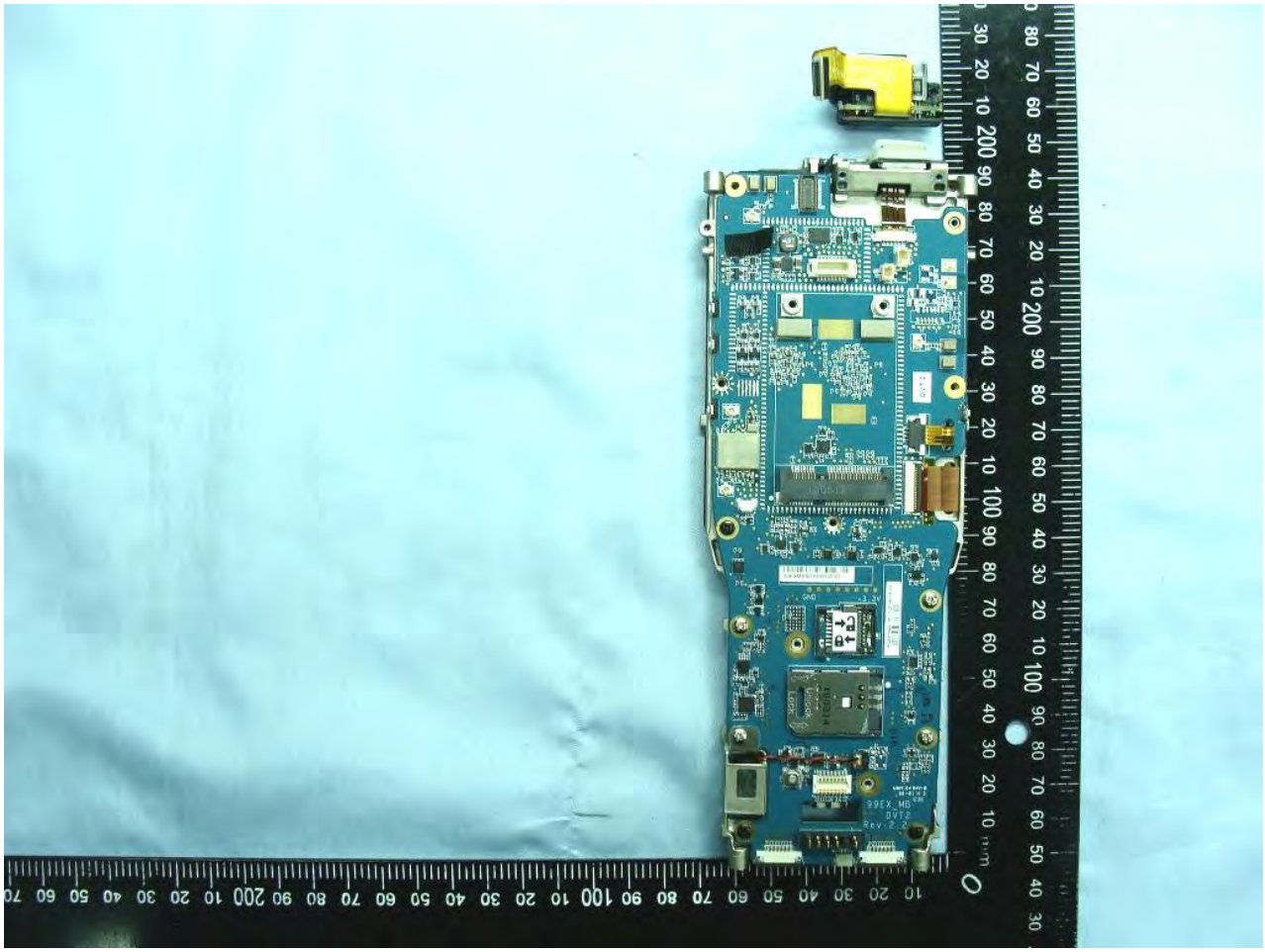
Remark: For accessories equipped with this EUT, please refer to the following photos.

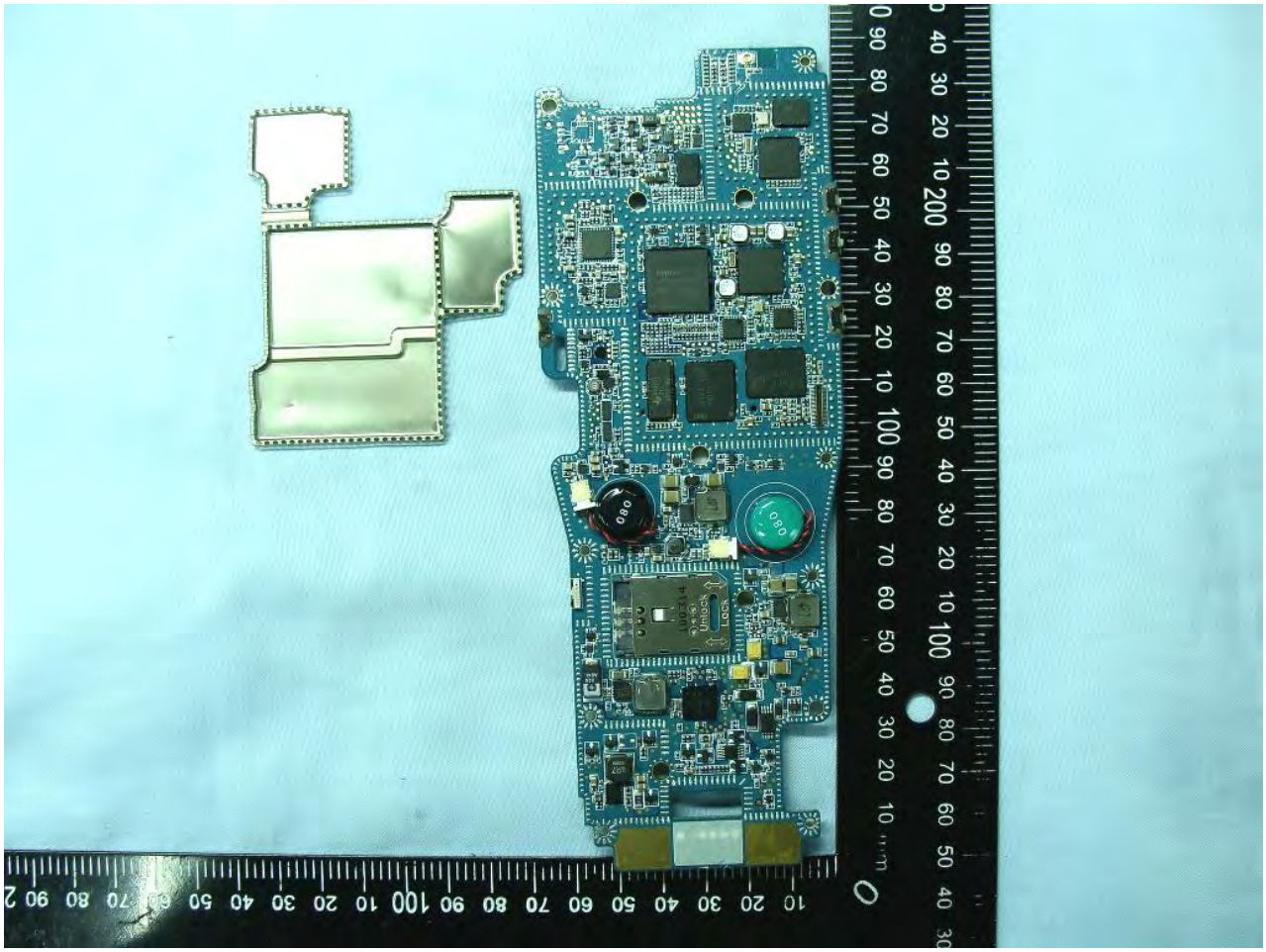
Holster 1


Holster 2

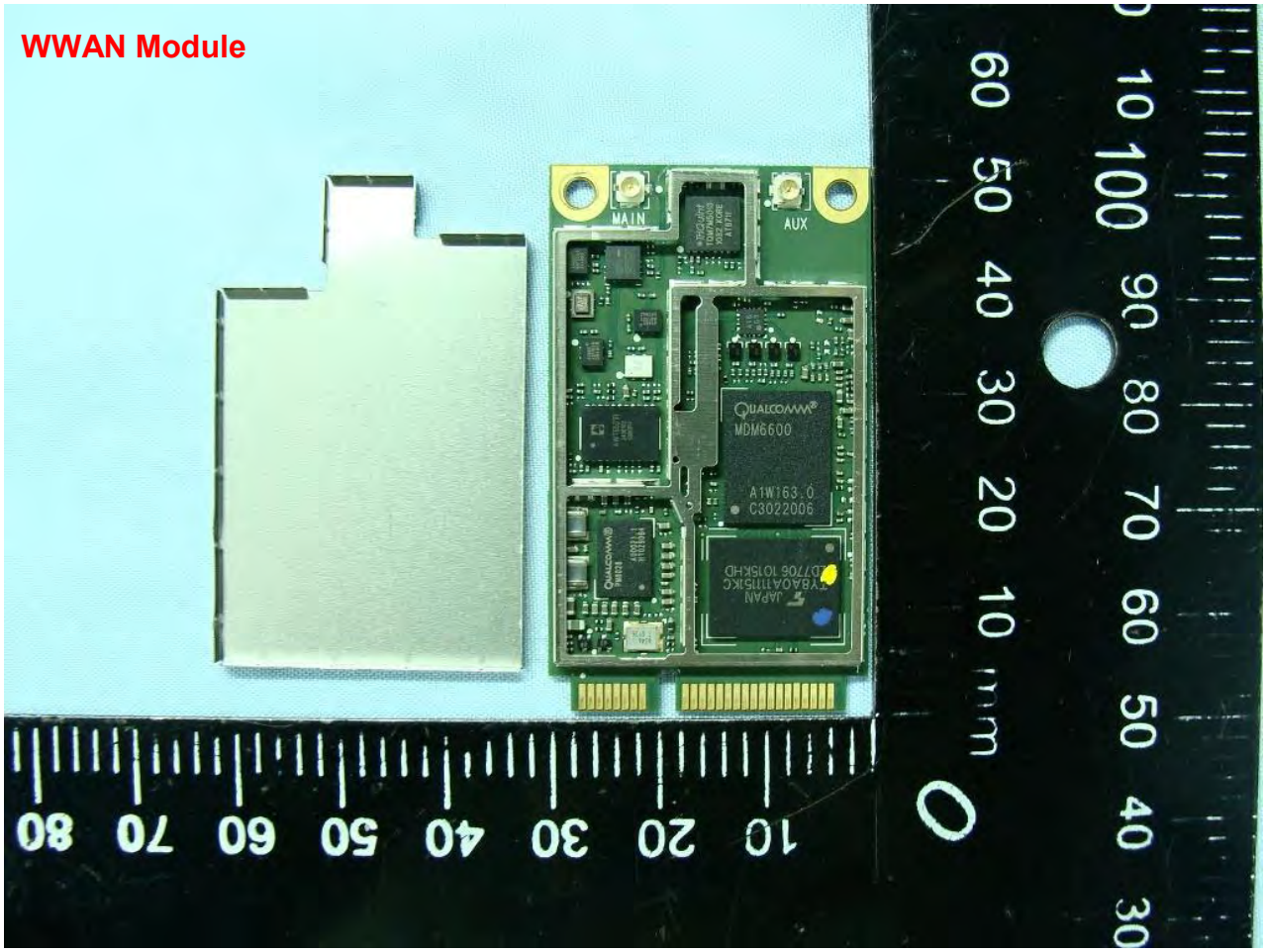

警示：请不要烧弃，损毁，短路，拆解电池。
WARNING: DO NOT INCINERATE, MUTILATE, SHORT CIRCUIT OR DISASSEMBLE PACK.
中国制造
Made in China
Manufactured for: Honeywell International Inc
Skaneateles Falls, NY 13153
www.honeywellaidc.com
型号:(MODEL): 99EX-BTEC
ITEM: 99EX-BTEC-1
US LISTED
19JW
Li-ion 3.7V, 18.5 Wh, 5000mAh
Li-ion
廢電池請回收
S/N
PSSA102170014

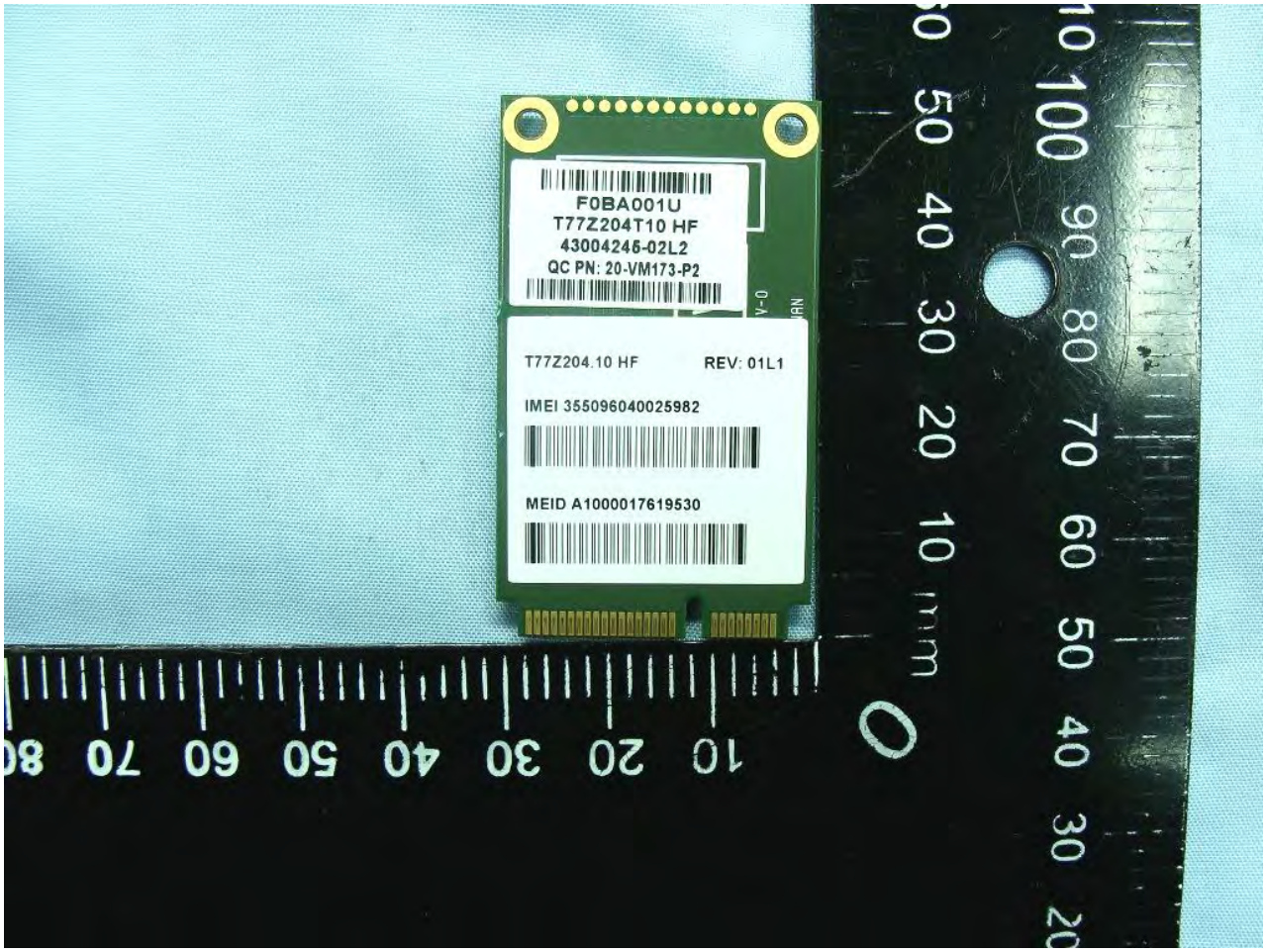
3. Internal Photograph of EUT

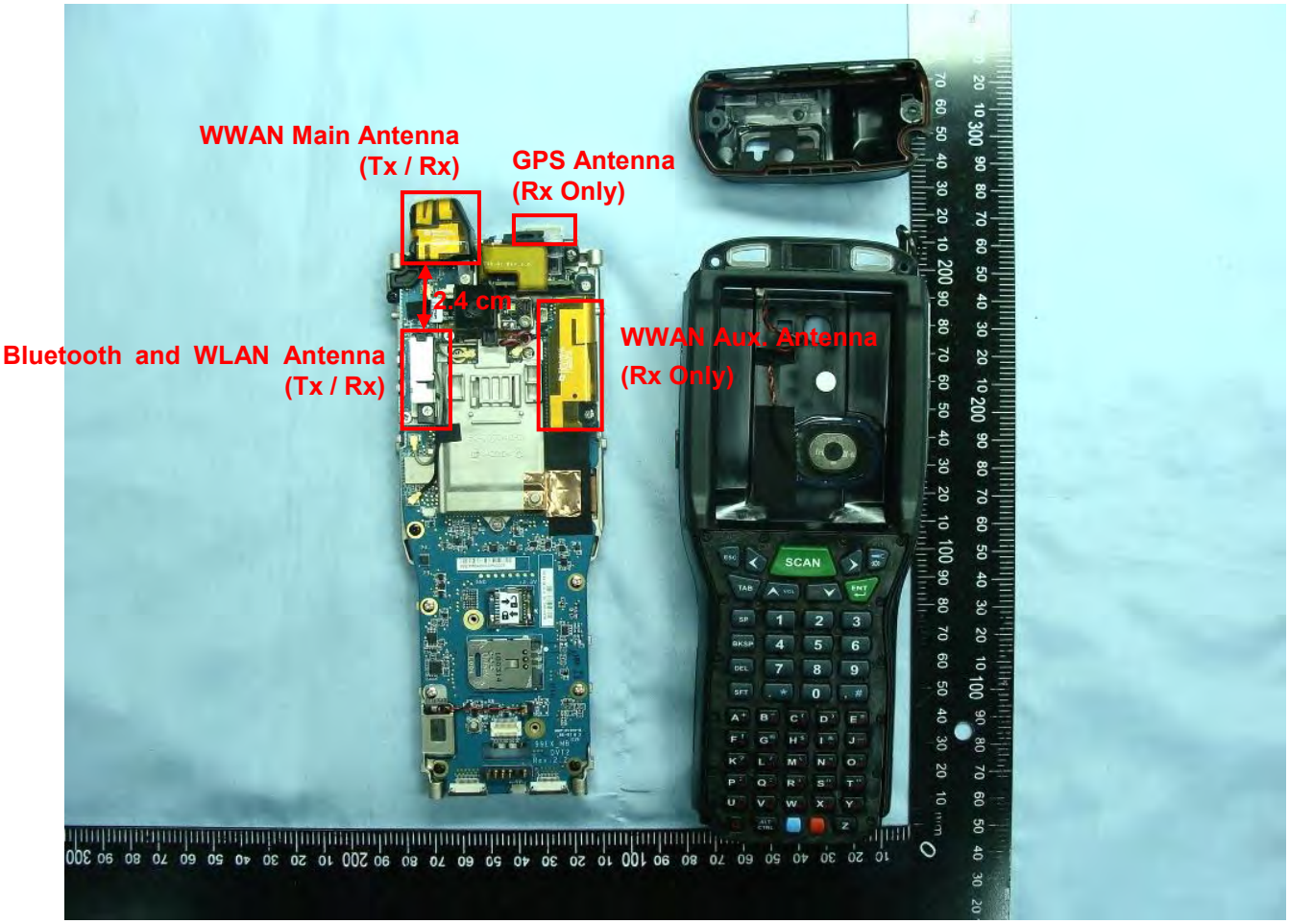




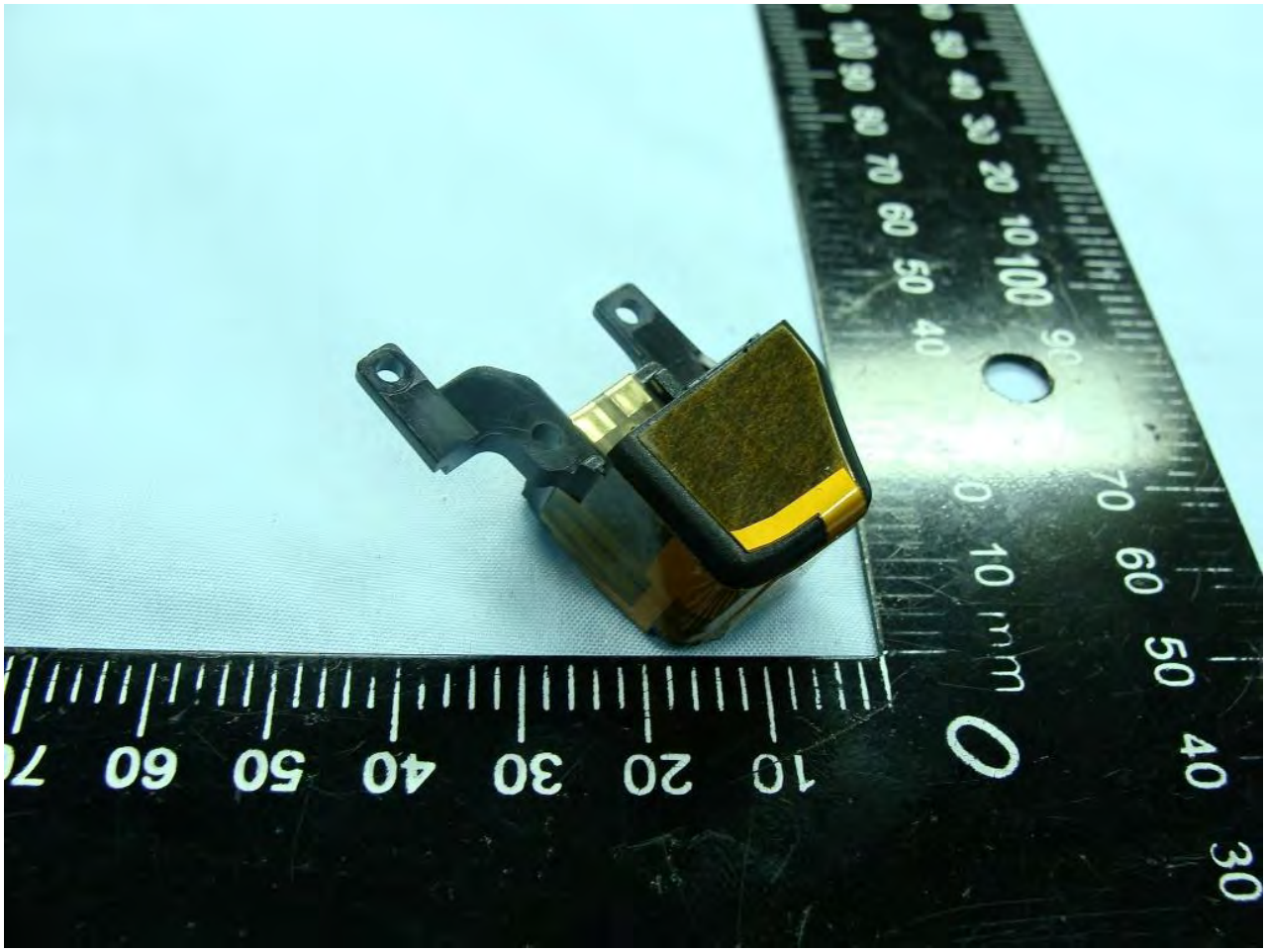
WWAN Module



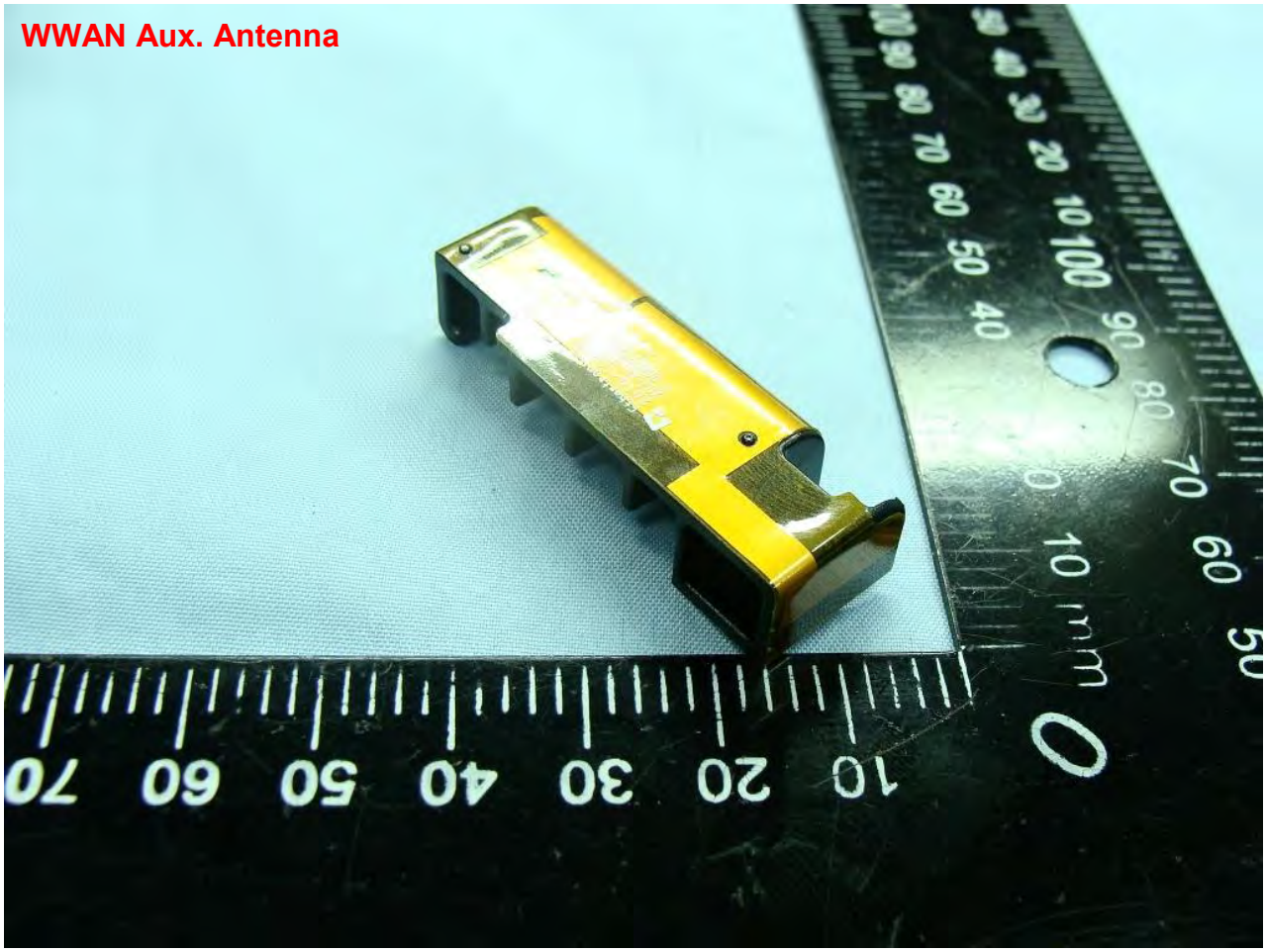

F0BA001U
T77Z204T10 HF
43004246-02L2
QC PN: 20-VM173-P2
T77Z204.10 HF
REV: 01L1
IMEI 355096040025982
MEID A1000017619530

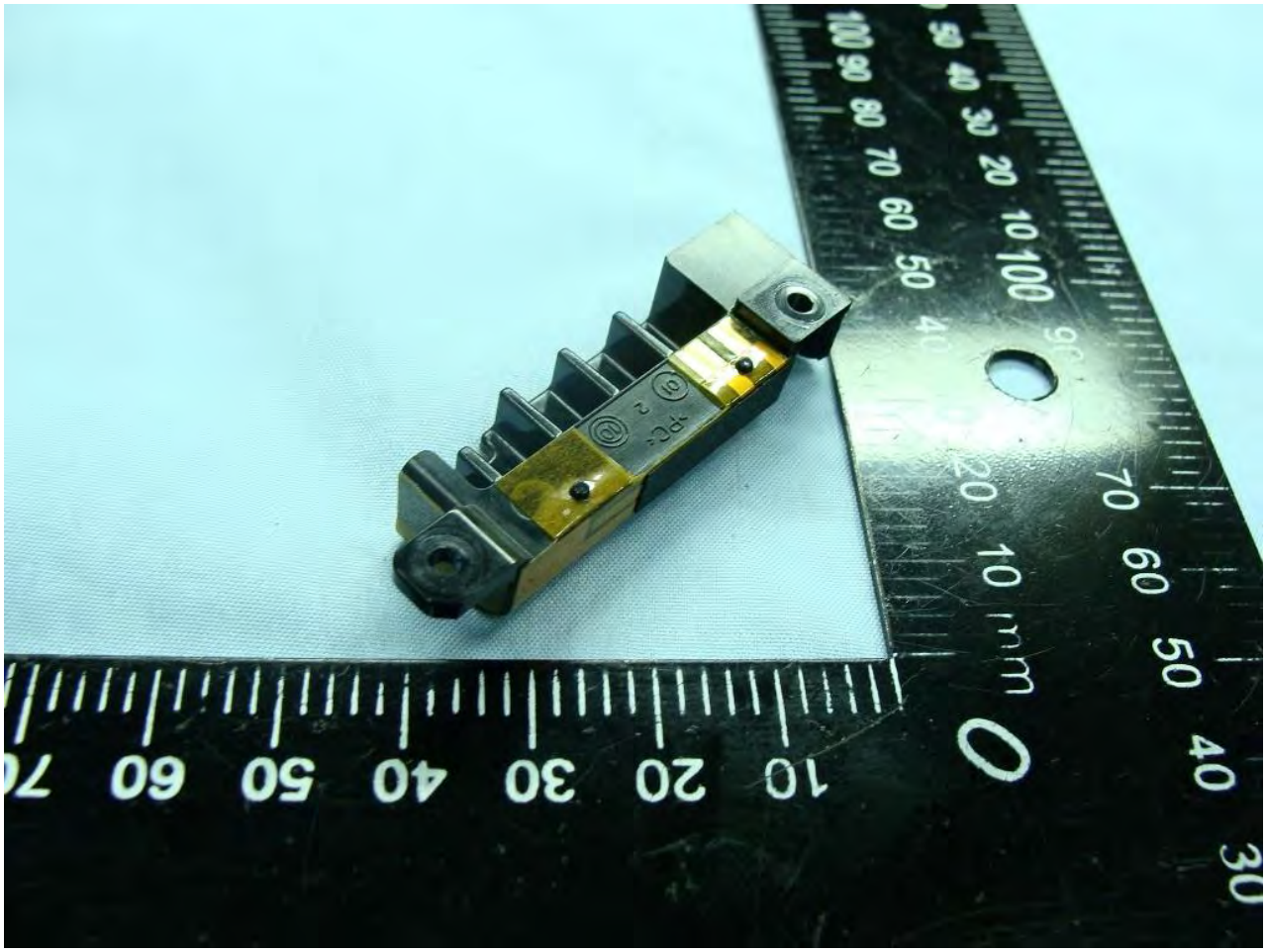

WWAN Main Antenna
(Tx / Rx)
GPS Antenna
(Rx Only)
2.4 cm
Bluetooth and WLAN Antenna
(Tx / Rx)
WWAN Aux. Antenna
(Rx Only)
SCAN

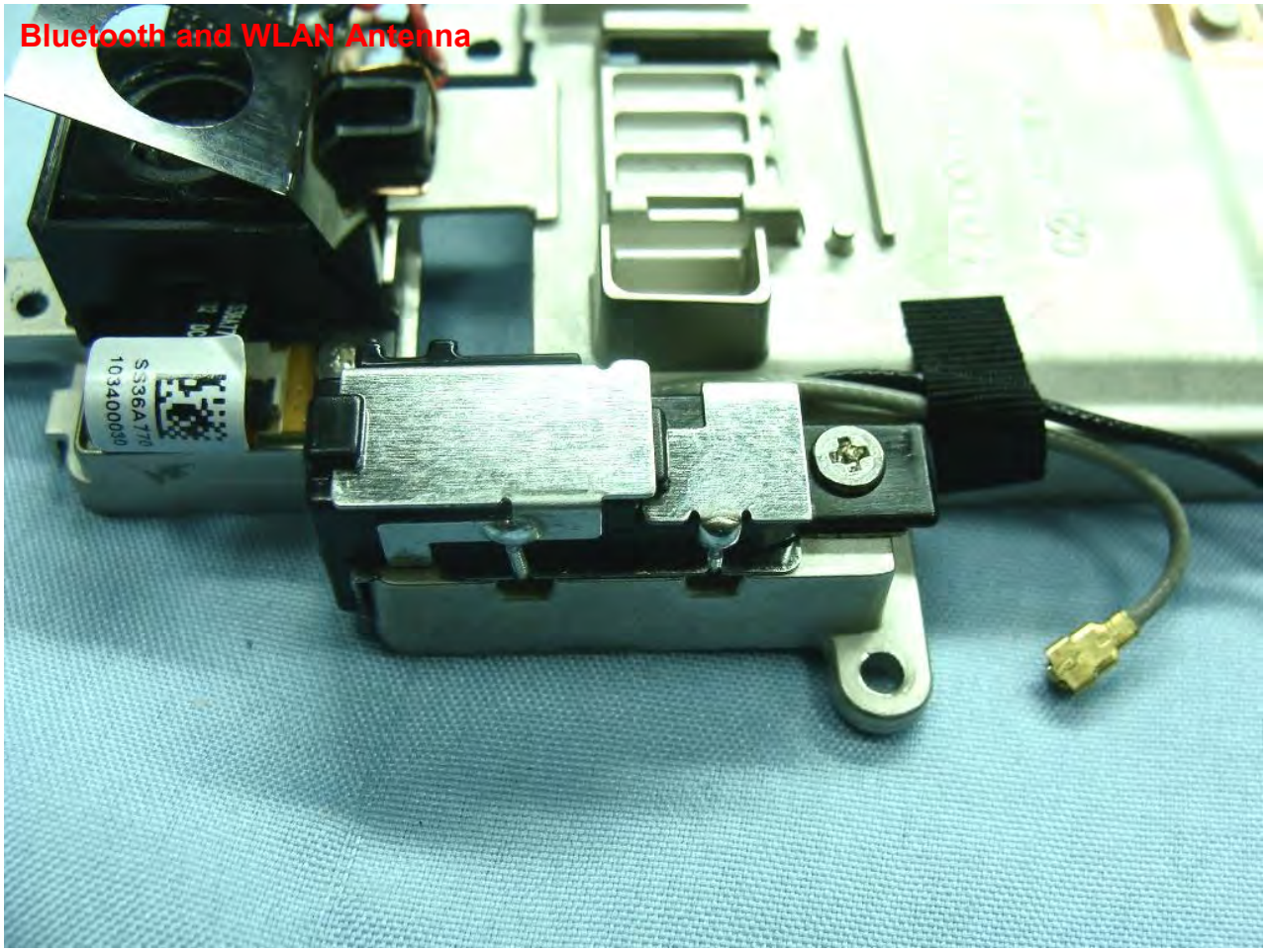
WWAN Main Antenna

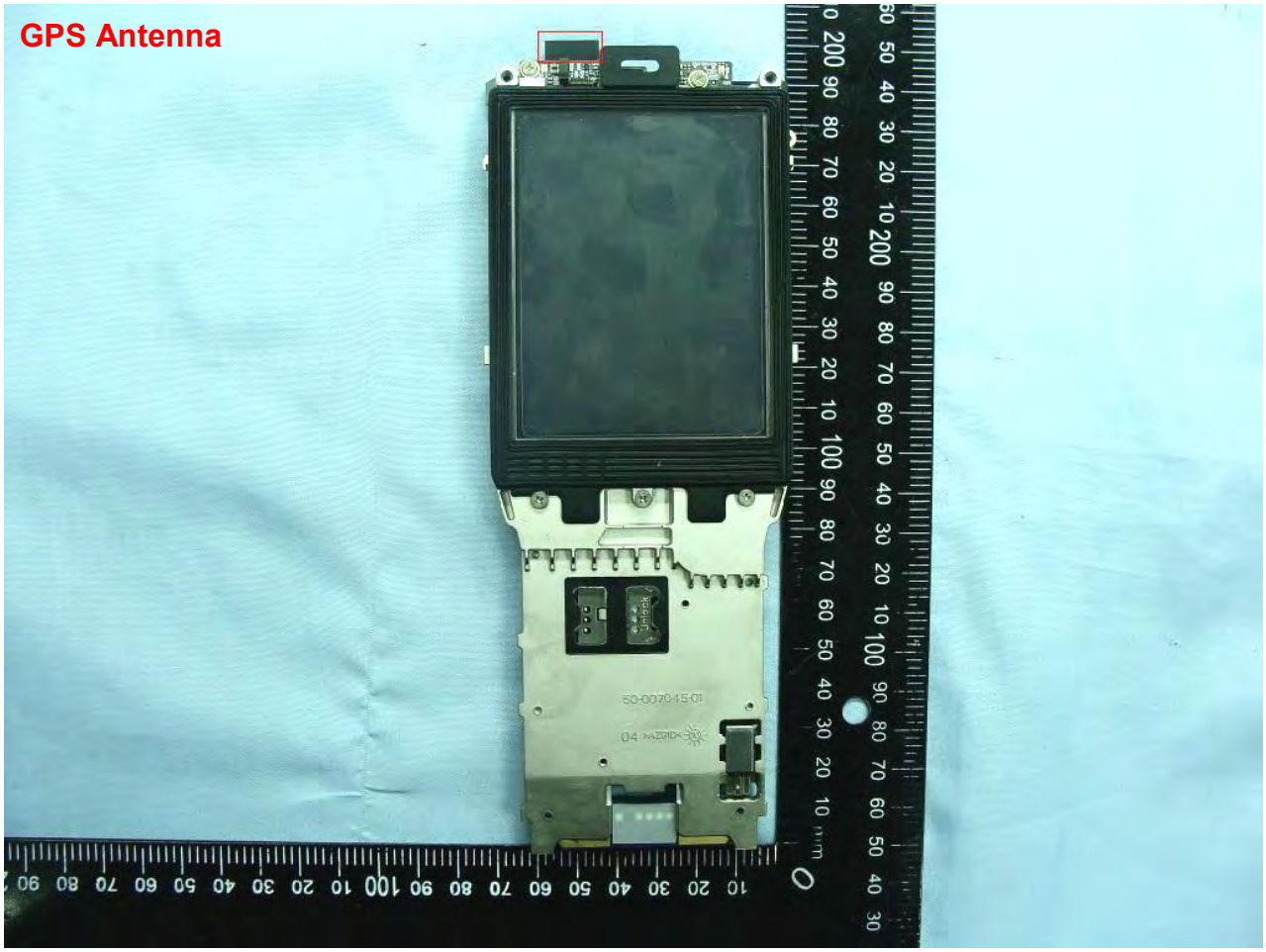

mm

WWAN Aux. Antenna




100 90 80 70 60 50 40 30 20 10
70 60 50 40 30
10 20 30 40 50 60 70
mm


Bluetooth and WLAN Antenna


GPS Antenna

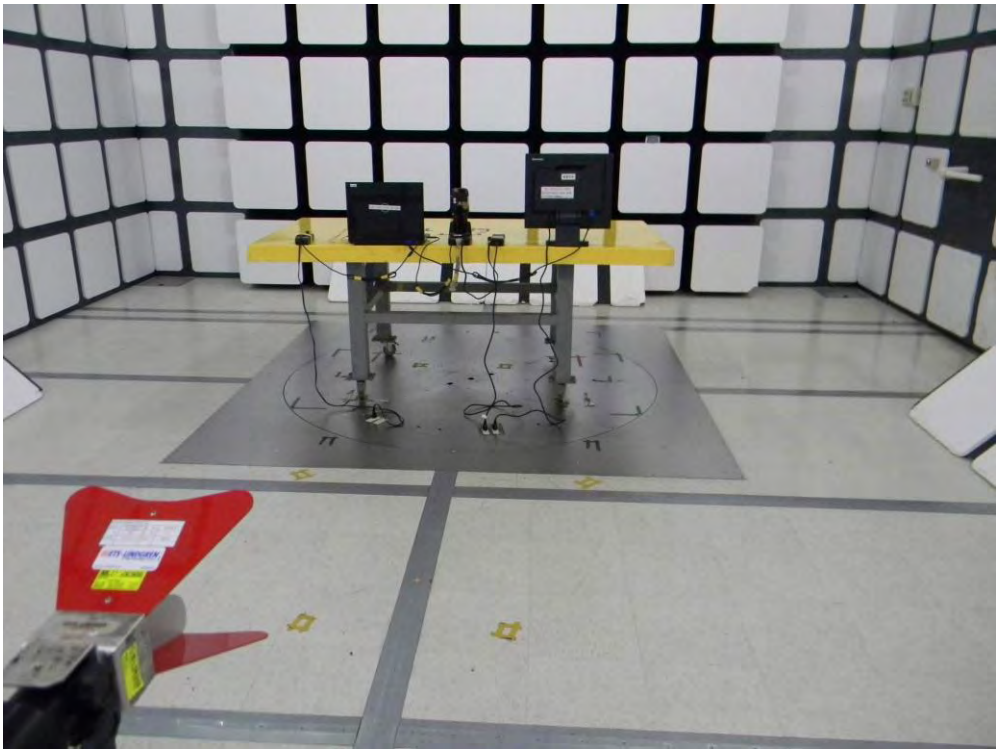
Appendix B. Setup Photographs

<Conducted Emission>

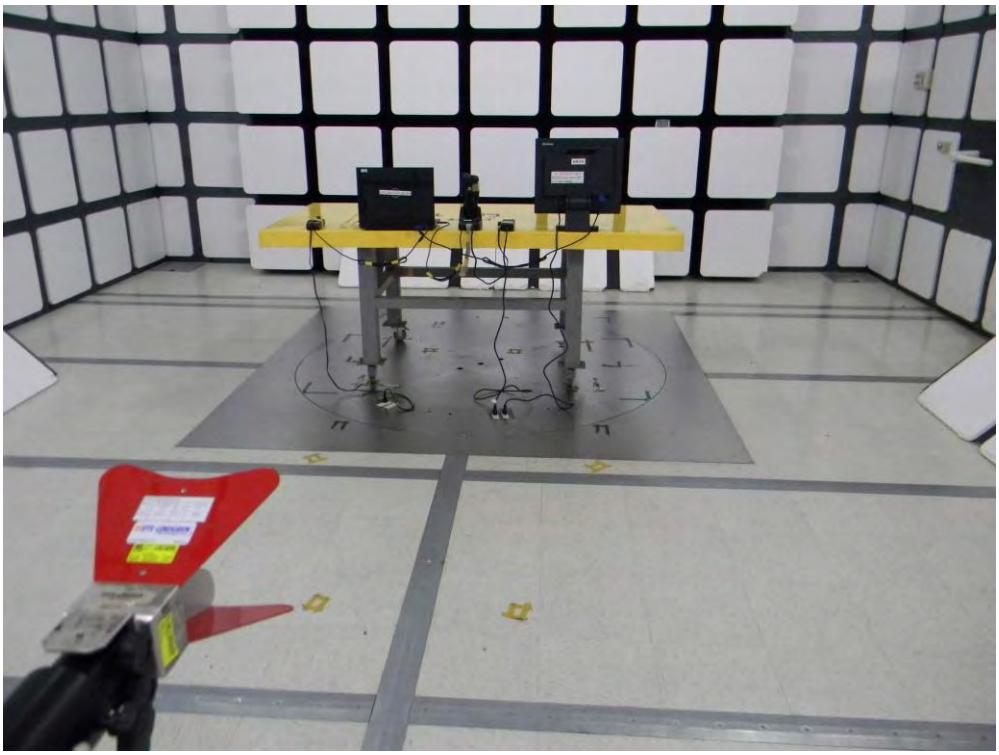
Mode 1

<Radiated Emission>

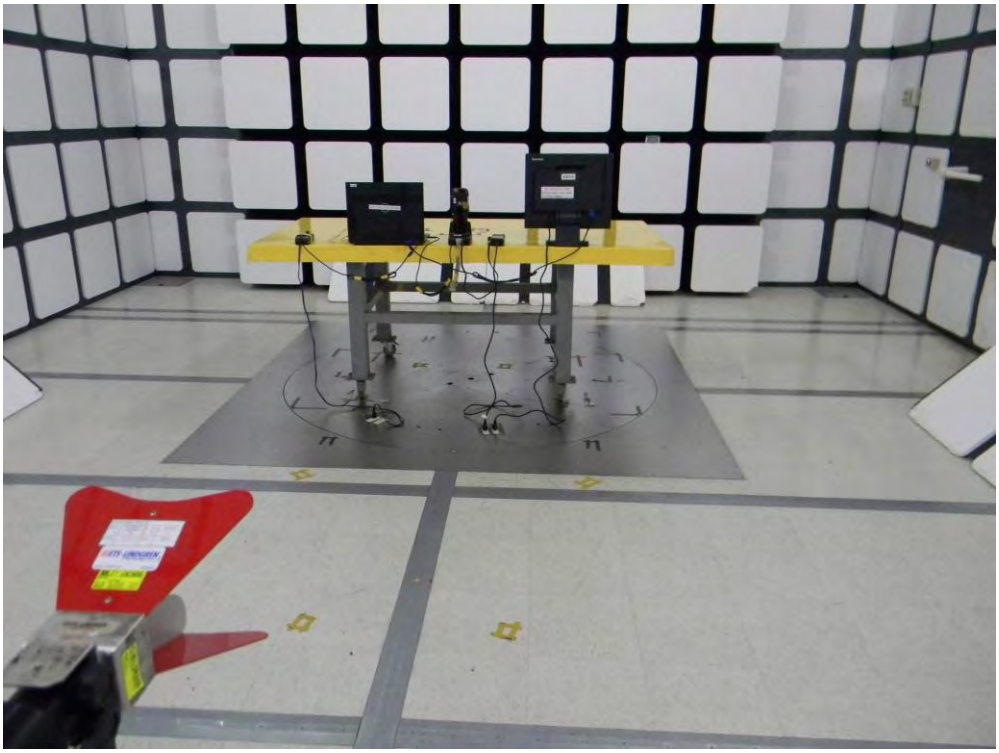
Mode 1



Mode 2



Mode 3



Appendix C. Original Report

Please refer to Sporton report number FR0D0904A as below.

FCC RF Test Report

APPLICANT	:	Honeywell International Inc.
EQUIPMENT	:	99EX Mobile computer
BRAND NAME	:	Honeywell
MODEL NAME	:	99EX
FCC ID	:	HD599EXLG
STANDARD	:	FCC Part 15 Subpart C §15.247
CLASSIFICATION	:	Digital Spread Spectrum (DSS)

The product was received on Dec. 06, 2010 and completely tested on Dec. 31, 2010. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.4-2003 and shown the compliance 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.

Reviewed by:

Anderson Chiu

Anderson Chiu / Deputy 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.

TABLE OF CONTENTS

REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR0D0904A	Rev. 01	Initial issue of report	Feb. 11, 2011
FR0D0904A	Rev. 02	Update report for revising address of applicant and manufacturer	Feb. 18, 2011

SUMMARY OF TEST RESULT

Report Section	FCC Rule	IC Rule	Description	Limit	Result	Remark
3.1	15.247(a)(1)	A8.4(2)	Number of Channels	≥ 15Chs	Pass	-
3.2	15.247(a)(1)	A8.1(a)	20dB Bandwidth	NA	Pass	-
3.2	-	Gen 4.4.1	99% Bandwidth	-	Pass	-
3.3	15.247(a)(1)	A8.1(b)	Channel Separation	≥ 2/3 of 20dB BW	Pass	-
3.4	15.247(a)(1)	A8.1(d)	Dwell Time of Each Channel	≤ 0.4sec in 31.6sec period	Pass	-
3.5	15.247(b)(1)	A8.1(b)	Peak Output Power	≤ 125 mW	Pass	-
3.6	15.247(d)	A8.5	Frequency Band Edges	≤ 20dBc	Pass	-
3.7	15.247(d)	A8.5	Spurious Emission	< 20 dBc	Pass	-
3.8	15.207	Gen 7.2.2	AC Conducted Emission	15.207(a)	Pass	Under limit 17.7 dB at 0.342 MHz
3.9	15.247(d)	A8.5	Transmitter Radiated Emission	15.209(a) & 15.247(d)	Pass	Under limit 5.74 dB at 2483.50 MHz
3.10	15.203 & 15.247(b)	A8.4	Antenna Requirement	N/A	Pass	-

1 General Description

1.1 Applicant

Honeywell International Inc.
9680 Old Bailes Road, Fort Mill, SC 29707 USA

1.2 Manufacturer

Honeywell International Inc.
9680 Old Bailes Road, Fort Mill, SC 29707 USA

1.3 Feature of Equipment Under Test

Product Feature & Specification	
Equipment	99EX Mobile computer
Brand Name	Honeywell
Model Name	99EX
FCC ID	HD599EXLG
Tx/Rx Frequency Range	2400 MHz ~ 2483.5 MHz
Number of Channels	79
Carrier Frequency of Each Channel	2402+n*1 MHz; n=0~78
Channel Spacing	1 MHz
Maximum Output Power to Antenna	Bluetooth (1Mbps) : 2.60 dBm (0.0018 W) Bluetooth EDR (2Mbps) : 2.99 dBm (0.0020 W) Bluetooth EDR (3Mbps) : 3.64 dBm (0.0023 W)
Antenna Type	PIFA Antenna with gain 2.5 dBi
HW Version	5
SW Version	26.02
Type of Modulation	Bluetooth (1Mbps) : GFSK Bluetooth EDR (2Mbps) : π /4-DQPSK Bluetooth EDR (3Mbps) : 8-DPSK
EUT Stage	Production Unit

Remark:

1. For other wireless features of this EUT, test report will be issued separately.
2. This test report recorded only product characteristics and test results of Digital Spread Spectrum (DSS).
3. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

1.4 Testing 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: +886-3-3273456 / FAX: +886-3-3284978		
Test Site No.	Sporton Site No.		FCC/IC Registration No.
	CO05-HY	03CH07-HY	722060/4086B-1

1.5 Applied Standards

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

- FCC Part 15 Subpart C §15.247
- FCC Public Notice DA 00-705
- ANSI C63.4-2003
- IC RSS-210 Issue 8

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B (DoC), recorded in a separate test report.

1.6 Ancillary Equipment List

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	System Simulator	R&S	CMU 200	N/A	N/A	Unshielded, 1.8 m
2.	GPS Station	T&E	GS-50	N/A	N/A	Unshielded, 1.8 m
3.	WLAN AP	D-Link	DIR-628	KA2DIR628A2	N/A	Unshielded, 1.8 m
4.	Bluetooth Earphone	Nokia	BH-102	PYAHS-107W	N/A	N/A
5.	Notebook	DELL	Vostro 1510	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
6.	LCD Monitor	Lenovo	6135-AB1	FCC DoC	Shielded, 1.6 m	Unshielded, 1.8 m
7.	iPod	Apple	A1285	FCC DoC	Shielded, 1.0 m	N/A
8.	Cradle	Honeywell	99EX-HB	N/A	N/A	N/A
9.	Adapter	ENG	3A-902DB12	N/A	N/A	N/A
10.	USB Cable	N/A	N/A	N/A	N/A	N/A

2 Test Configuration of Equipment Under Test

2.1 RF Output Power

Preliminary tests were performed in different data rate and recorded the RF output power in the following table:

Channel	Frequency	Bluetooth RF Output Power		
		Data Rate / Modulation		
		GFSK	π /4-DQPSK	8-DPSK
		1Mbps	2Mbps	3Mbps
Ch00	2402MHz	2.40 dBm	2.67 dBm	3.38 dBm
Ch39	2441MHz	2.60 dBm	2.99 dBm	**3.64 dBm**
Ch78	2480MHz	2.09 dBm	2.51 dBm	3.23 dBm

Remark:

1. The data rate was set in 3Mbps for all the test items due to the highest RF output power.
2. The EUT is programmed to transmit signals continuously for all testing.

2.2 Test Mode

The EUT has been associated with peripherals pursuant to ANSI C63.4-2003 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 (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower).

Pre-scanned tests were conducted to determine the final configuration from all possible combinations. The following tables are showing the test modes as the worst cases and recorded in this report.

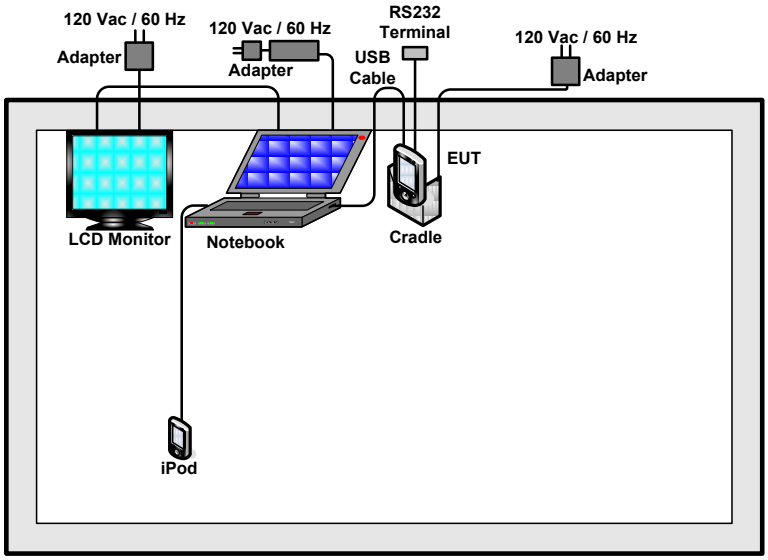
Test Cases			
Test Item	**Data Rate / Modulation**		
	Bluetooth 1Mbps GFSK	**Bluetooth EDR 2Mbps π /4-DQPSK**	**Bluetooth EDR 3Mbps 8-DPSK**
Conducted TCs	Mode 1: CH00_2402 MHz Mode 2: CH39_2441 MHz Mode 3: CH78_2480 MHz	Mode 4: CH00_2402 MHz Mode 5: CH39_2441 MHz Mode 6: CH78_2480 MHz	Mode 7: CH00_2402 MHz Mode 8: CH39_2441 MHz Mode 9: CH78_2480 MHz
Radiated TCs	N/A	N/A	Mode 1: CH00_2402 MHz + TC Mode 2: CH39_2441 MHz + TC Mode 3: CH78_2480 MHz + TC
AC Conducted Emission	Mode 1 :WCDMA Band II Idle + Bluetooth Link + WLAN (2.4G) Link + GPS Rx + Scanner + Cradle + Adapter + RS232 Terminal + USB Cable (Link with Notebook)		

Remark:

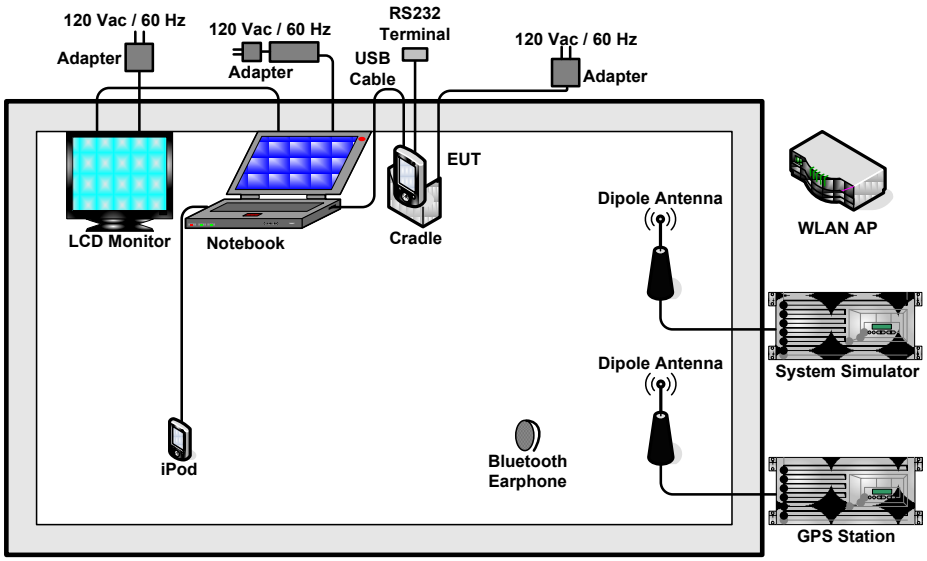
1. TC stands for Test Configuration, and consists of USB cable, RS232 terminal, cradle, and adapter.
2. For radiated TCs, the data rate was set in 3Mbps due to the highest RF output power; only the data of these modes was reported.

2.3 Connection Diagram of Test System

<Bluetooth Tx Mode>



<AC Conducted Emission Mode>



2.4 RF Utility

For Bluetooth function, the RF utility, “BT Tester” was installed in EUT which can send transmitting signal for all testing.

3 Test Result

3.1 Number of Channel Measurement

3.1.1 Limits of Number of Hopping Frequency

Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

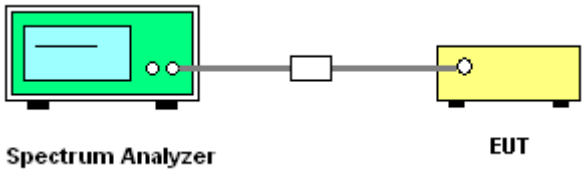
3.1.2 Measuring Instruments

See list of measuring instruments of this test report.

3.1.3 Test Procedure

1. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
2. The RF output of EUT was connected to the spectrum analyzer by a low loss cable.
3. The modulation types of EUT are irrelevant to number of hopping channels deviation.
4. The EUT must have its hopping function enabled. Use the following spectrum analyzer settings: Span = the frequency band of operation; RBW ≥ 1% of the span; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold.
5. The number of hopping frequency used is defined as the device has the numbers of total channel.

3.1.4 Test Setup

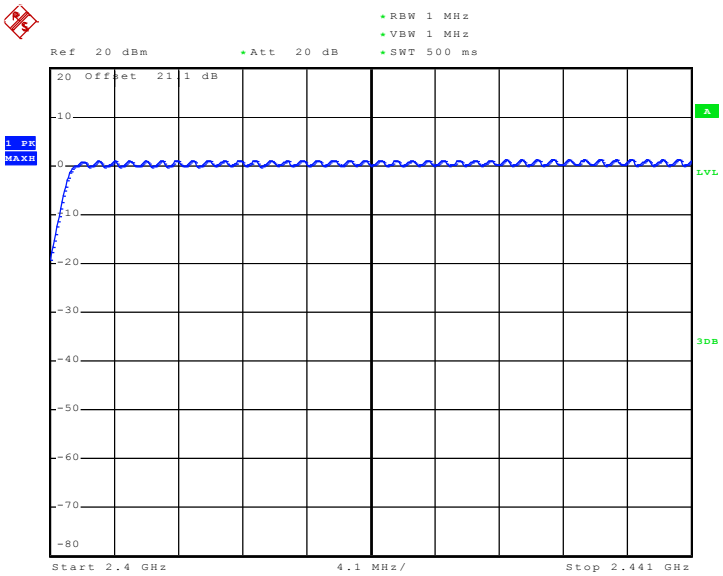


3.1.5 Test Result of Number of Hopping Frequency

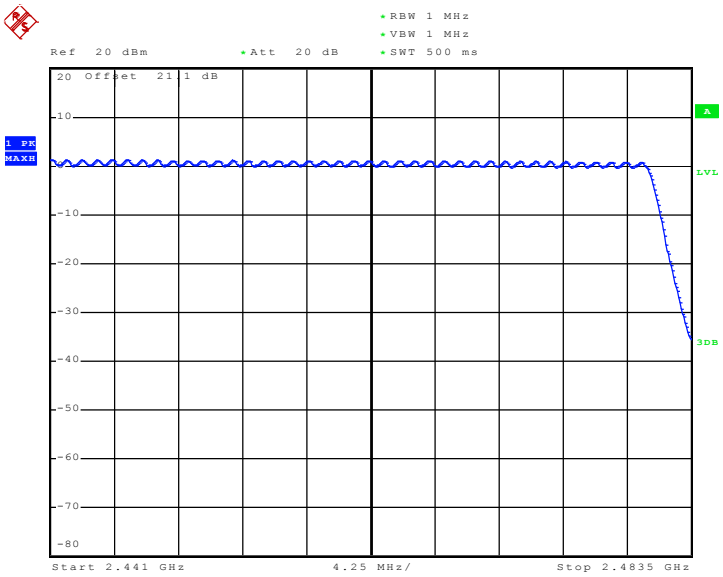
Test Mode :	Mode 7~9	Temperature :	22~24℃
Test Engineer :	Hank Yu	Relative Humidity :	40~43%

Number of Hopping Channels (Channel)	Limits (Channel)	Pass/Fail
79	> 15	Pass

Number of Hopping Channel Plot on Channel 00 - 78



Date: 22.DEC.2010 20:48:43



Date: 22.DEC.2010 20:56:58

3.2 20dB and 99% Bandwidth Measurement

3.2.1 Limit of 20dB Bandwidth

N/A

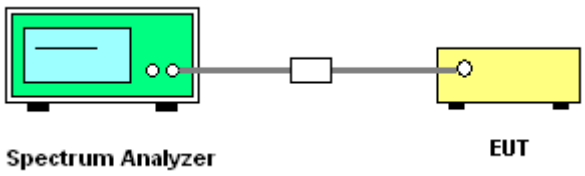
3.2.2 Measuring Instruments

See list of measuring instruments of this test report.

3.2.3 Test Procedures

1. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
2. The RF output of EUT was connected to the spectrum analyzer by a low loss cable.
3. The EUT should be transmitting at its maximum data rate as the worst cases.
4. Use the following spectrum analyzer settings:
   Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel;
   RBW ≥ 1% of the 20 dB bandwidth; VBW ≥ RBW; Sweep = auto; Detector function = peak;
   Trace = max hold.
5. The marker-delta reading at this point is the 20 dB bandwidth of the emission.

3.2.4 Test Setup

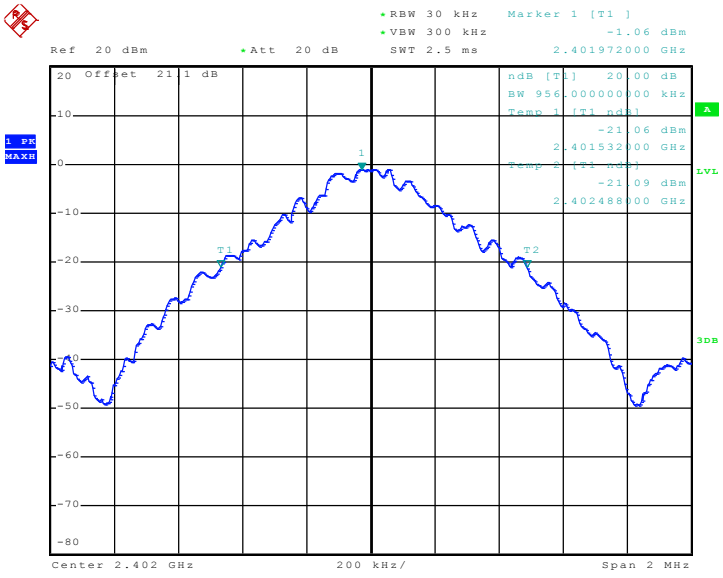


3.2.5 Test Result of 20dB Bandwidth

Test Mode :	Mode 1~3	Temperature :	22~24℃
Test Engineer :	Hank Yu	Relative Humidity :	40~43%

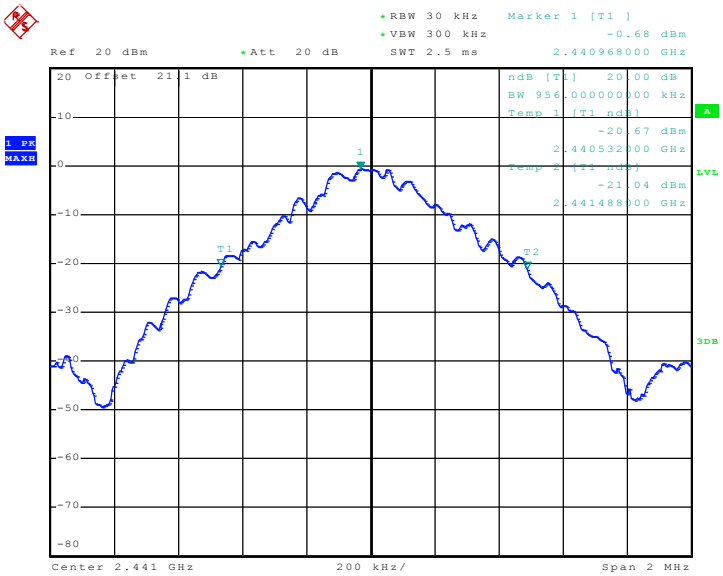
Channel	Frequency (MHz)	20dB Bandwidth (MHz)
00	2402	0.956
39	2441	0.956
78	2480	0.956

20 dB Bandwidth Plot on Channel 00



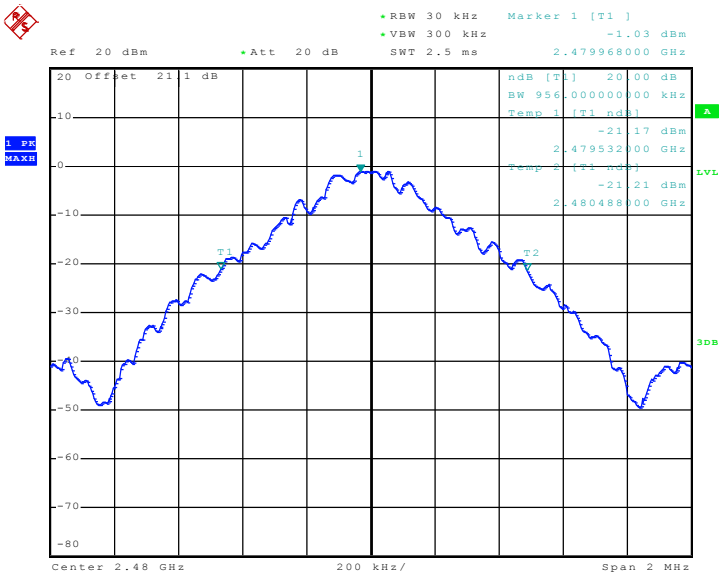
Date: 22.DEC.2010 21:17:52

20 dB Bandwidth Plot on Channel 39



Date: 22.DEC.2010 21:16:42

20 dB Bandwidth Plot on Channel 78

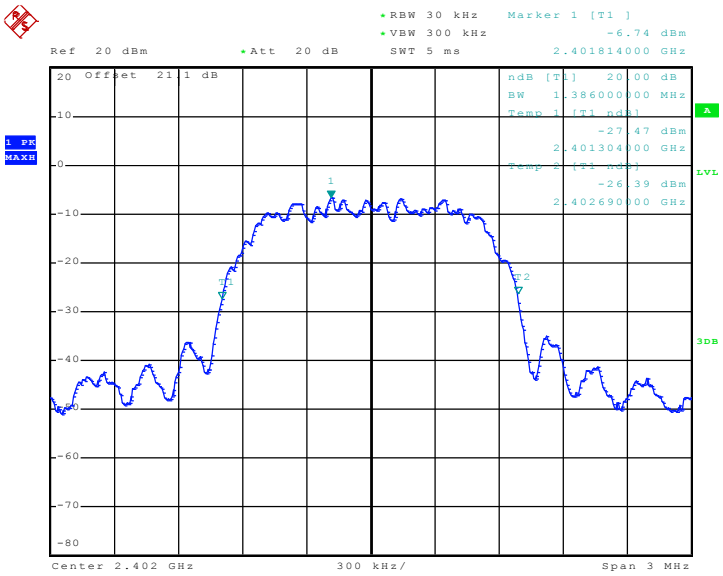


Date: 22.DEC.2010 21:15:03

Test Mode :	Mode 4~6	Temperature :	22~24℃
Test Engineer :	Hank Yu	Relative Humidity :	40~43%

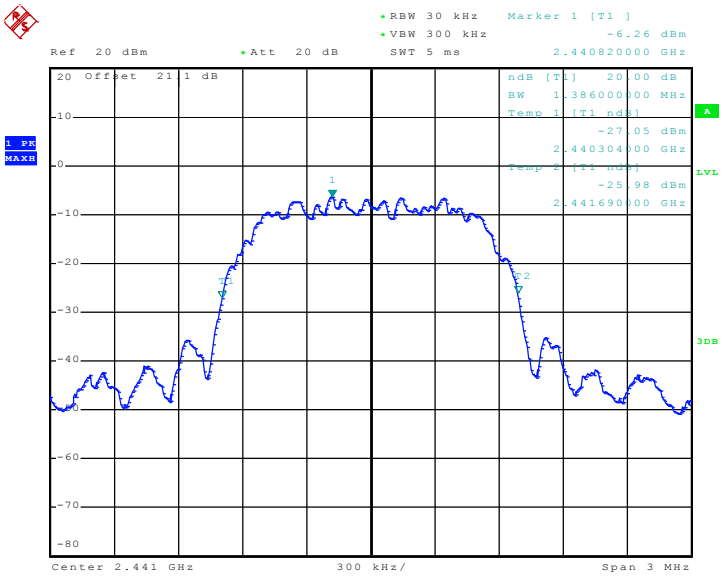
Channel	Frequency (MHz)	20dB Bandwidth (MHz)
00	2402	1.386
39	2441	1.386
78	2480	1.386

20 dB Bandwidth Plot on Channel 00



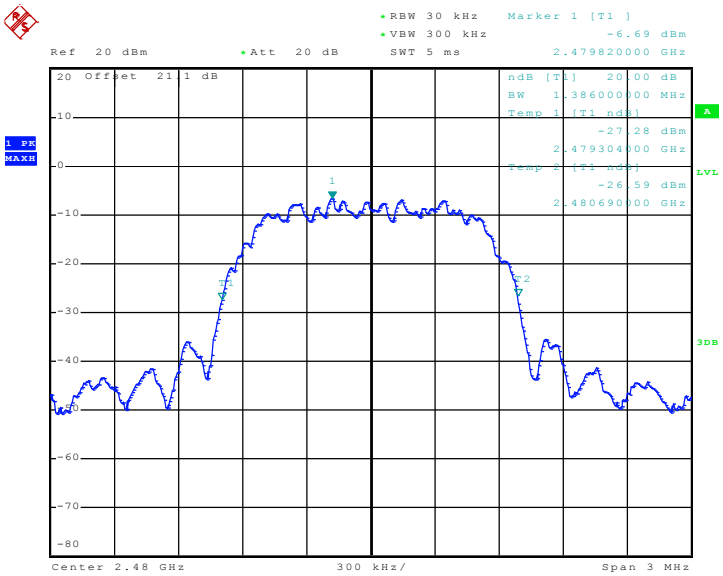
Date: 22.DEC.2010 21:11:35

20 dB Bandwidth Plot on Channel 39



Date: 22.DEC.2010 21:12:46

20 dB Bandwidth Plot on Channel 78

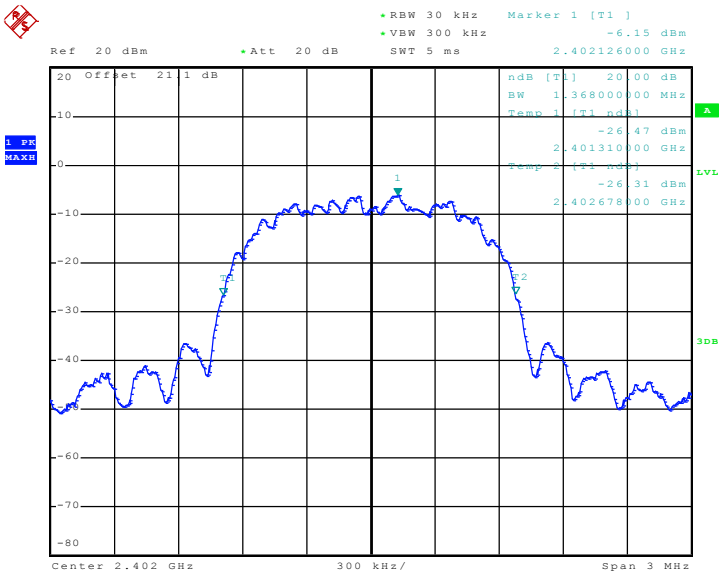


Date: 22.DEC.2010 21:13:48

Test Mode :	Mode 7~9	Temperature :	22~24℃
Test Engineer :	Hank Yu	Relative Humidity :	40~43%

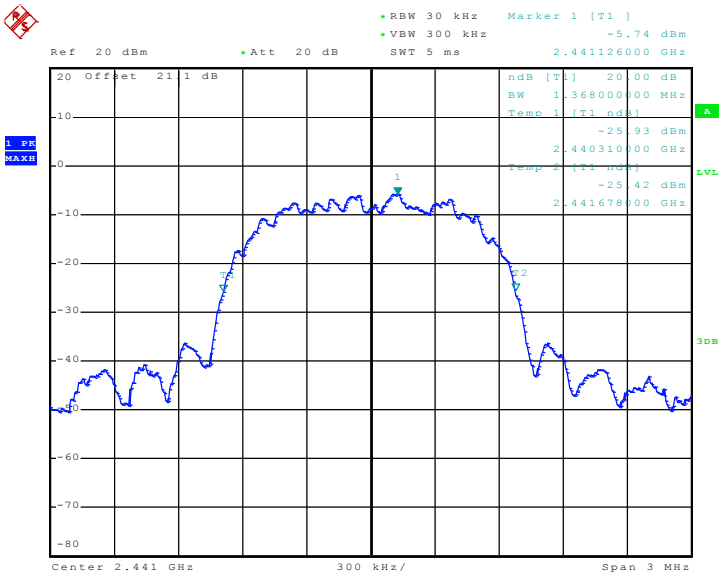
Channel	Frequency (MHz)	20dB Bandwidth (MHz)
00	2402	1.368
39	2441	1.368
78	2480	1.362

20 dB Bandwidth Plot on Channel 00



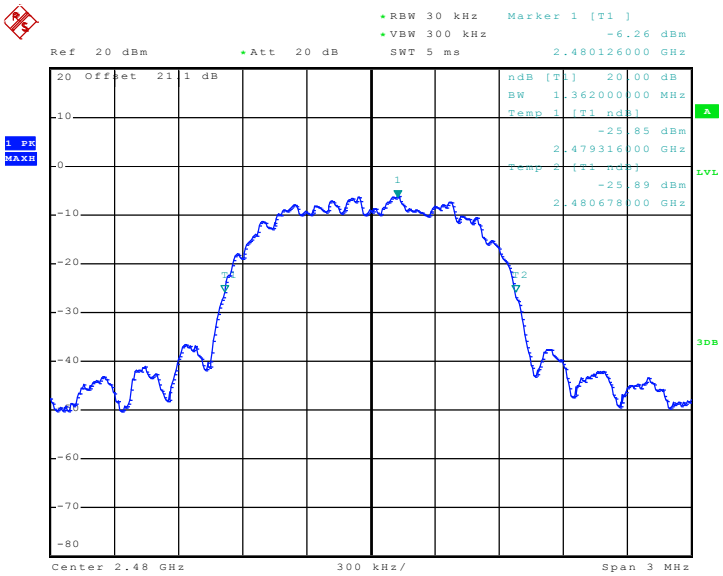
Date: 22.DEC.2010 21:10:24

20 dB Bandwidth Plot on Channel 39



Date: 22.DEC.2010 21:07:42

20 dB Bandwidth Plot on Channel 78



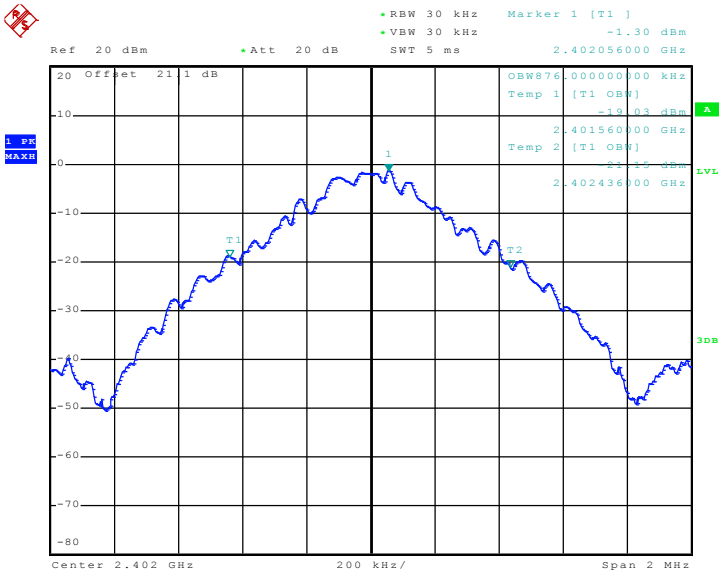
Date: 22.DEC.2010 21:09:11

3.2.6 Test Result of 99% Occupied Bandwidth

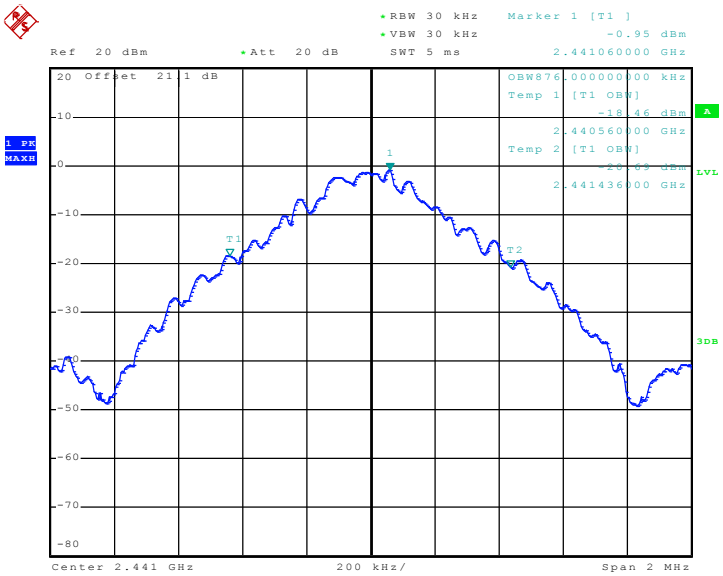
Test Mode :	Mode 1~3	Temperature :	22~24℃
Test Engineer :	Hank Yu	Relative Humidity :	40~43%

Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
00	2402	0.876
39	2441	0.876
78	2480	0.876

99% Bandwidth Plot on Channel 00

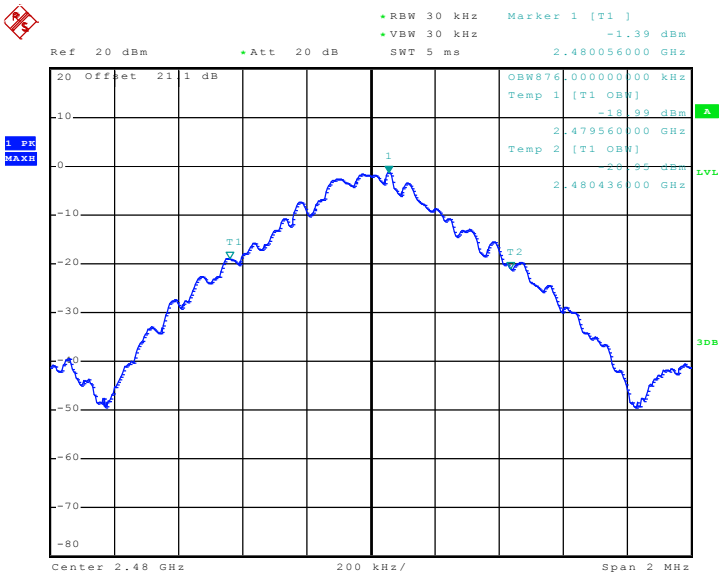


99% Occupied Bandwidth Plot on Channel 39



Date: 22.DEC.2010 21:29:14

99% Occupied Bandwidth Plot on Channel 78

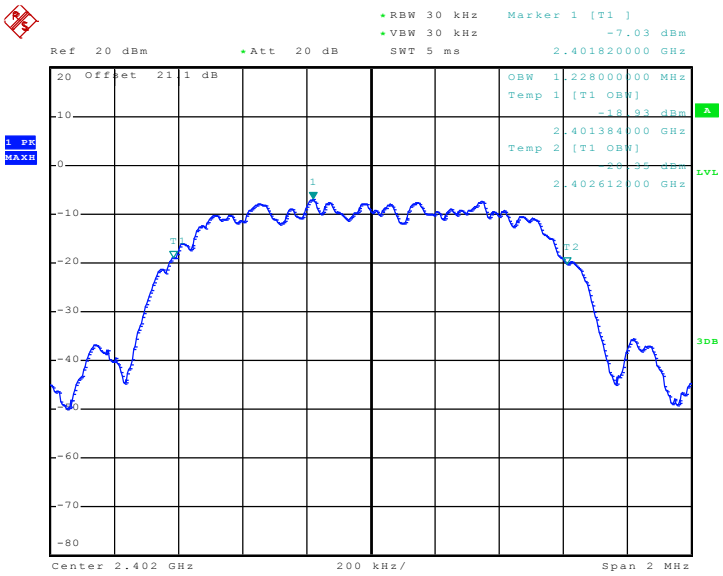


Date: 22.DEC.2010 21:26:54

Test Mode :	Mode 4~6	Temperature :	22~24℃
Test Engineer :	Hank Yu	Relative Humidity :	40~43%

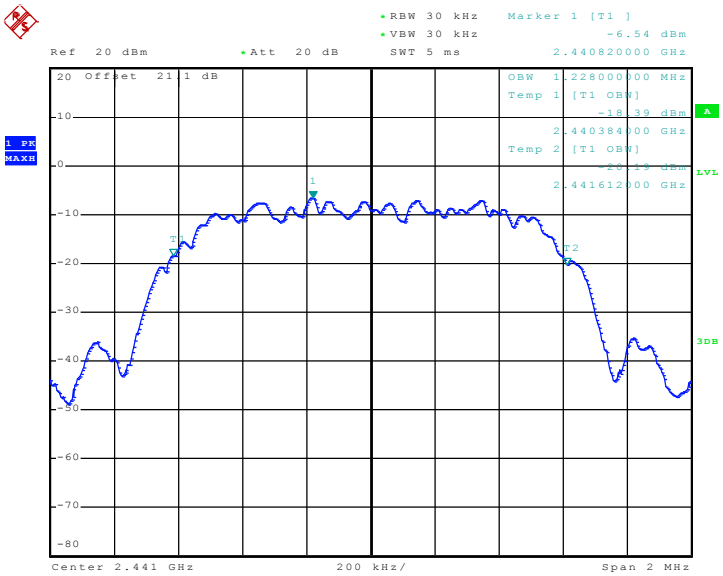
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
00	2402	1.228
39	2441	1.228
78	2480	1.228

99% Bandwidth Plot on Channel 00



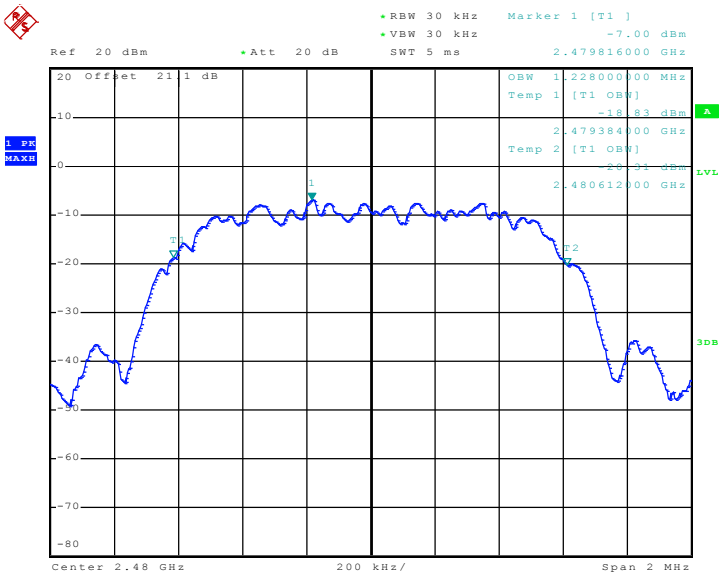
Date: 22.DEC.2010 21:35:19

99% Occupied Bandwidth Plot on Channel 39



Date: 22.DEC.2010 21:30:37

99% Occupied Bandwidth Plot on Channel 78

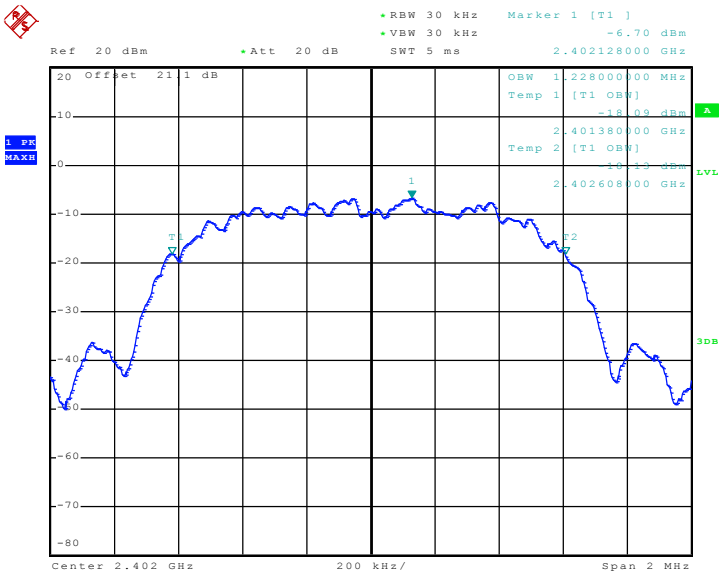


Date: 22.DEC.2010 21:34:21

Test Mode :	Mode 7~9	Temperature :	22~24℃
Test Engineer :	Hank Yu	Relative Humidity :	40~43%

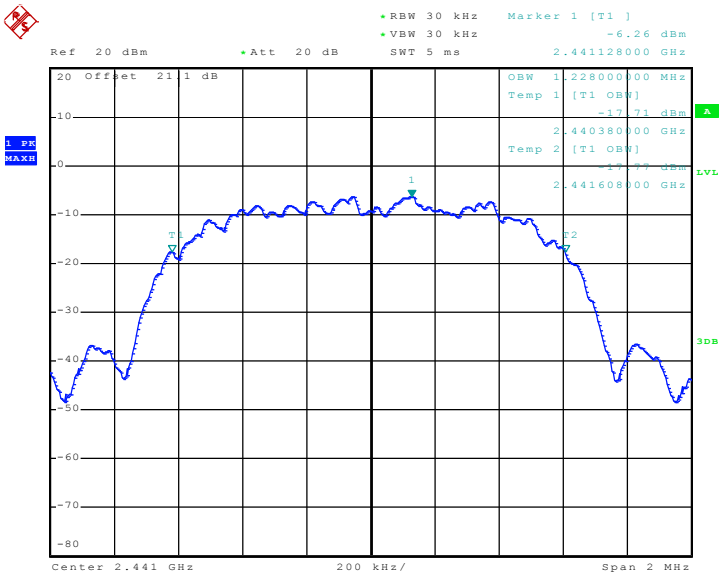
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
00	2402	1.228
39	2441	1.228
78	2480	1.228

99% Bandwidth Plot on Channel 00



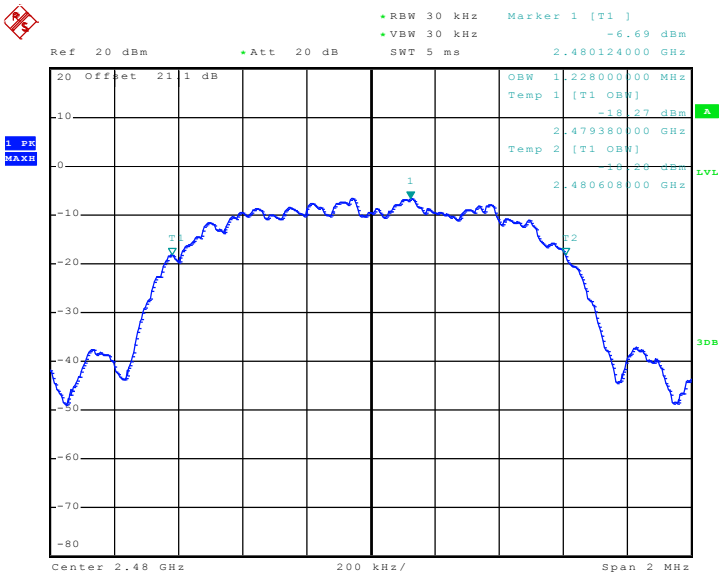
Date: 22.DEC.2010 21:36:18

99% Occupied Bandwidth Plot on Channel 39



Date: 22.DEC.2010 21:32:19

99% Occupied Bandwidth Plot on Channel 78



Date: 22.DEC.2010 21:33:19

3.3 Hopping Channel Separation Measurement

3.3.1 Limit of Hopping Channel Separation

Frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater.

3.3.2 Measuring Instruments

See list of measuring instruments of this test report.

3.3.3 Test Procedures

1. Please refer FCC Public Notice DA 00-705 Measurement Guidelines.
2. The RF output of EUT was connected to the spectrum analyzer by a low loss cable.
3. The EUT should be transmitting at its maximum data rate as the worst cases.
4. Use the following spectrum analyzer settings:
   Span = wide enough to capture the peaks of two adjacent channels; RBW ≥ 1% of the span; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold.
5. Use the marker-delta function to determine the separation between the peaks of the adjacent channels.

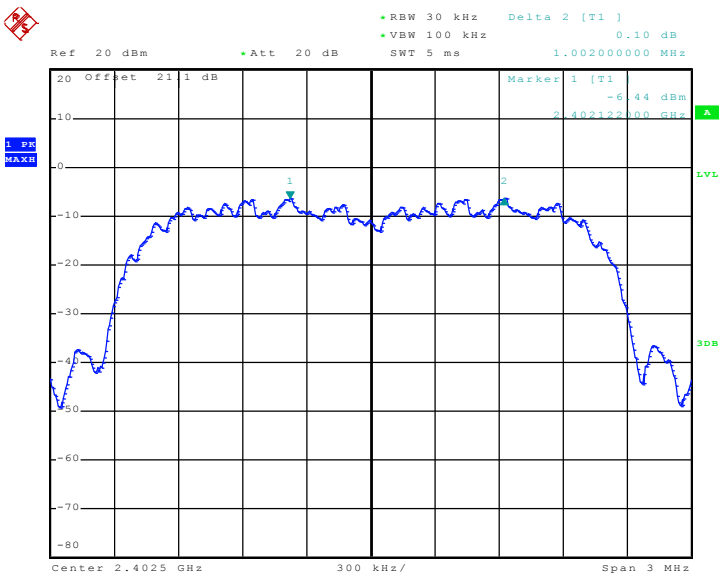
3.3.4 Test Setup

3.3.5 Test Result of Hopping Channel Separation

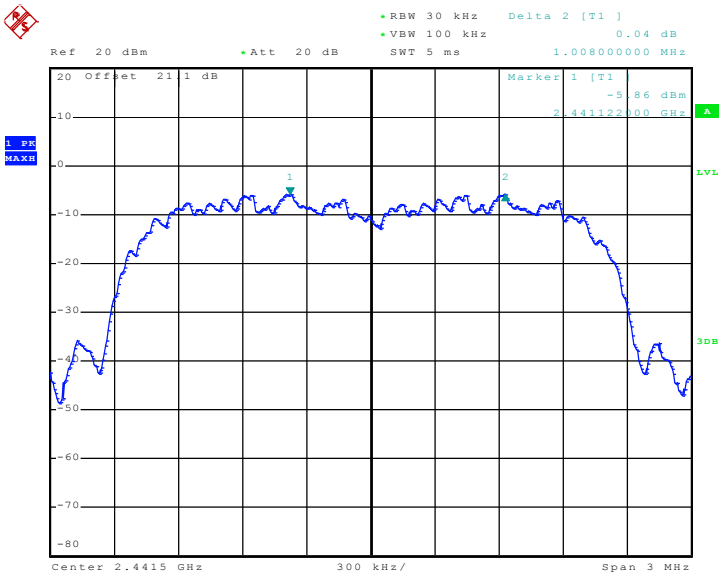
Test Mode :	Mode 7~9	Temperature :	22~24℃
Test Engineer :	Hank Yu	Relative Humidity :	40~43%

Channel	Frequency (MHz)	Frequency Separation (MHz)	(2/3 of 20dB BW) Limits (MHz)	Pass/Fail
00	2402	1.002	0.912	Pass
39	2441	1.008	0.912	Pass
78	2480	1.002	0.908	Pass

Channel Separation Plot on Channel 00 - 01

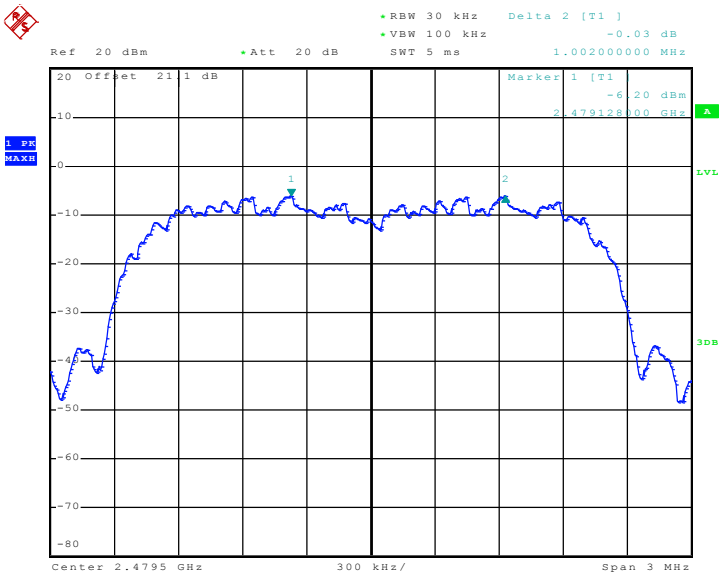


Channel Separation Plot on Channel 39 - 40



Date: 22.DEC.2010 22:24:29

Channel Separation Plot on Channel 77 - 78



Date: 22.DEC.2010 22:20:51

3.4 Dwell Time Measurement

3.4.1 Limit of Dwell Time

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

3.4.2 Measuring Instruments

See list of measuring instruments of this test report.

3.4.3 Test Procedures

1. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
2. The RF output of EUT was connected to the spectrum analyzer by a low loss cable.
3. The EUT should be transmitting at its maximum data rate as the worst cases.
4. The EUT must have its hopping function enabled. Use the following spectrum analyzer settings: Span = zero span, centered on a hopping channel; RBW = 1 MHz; VBW ≥ RBW; Sweep = as necessary to capture the entire dwell time per hopping channel; Detector function = peak; Trace = max hold.
5. Use the marker-delta function to calculate the dwell time.

3.4.4 Test Setup

3.4.5 Test Result of Dwell Time

Test Mode :	Mode 8	Temperature :	22~24℃
Test Engineer :	Hank Yu	Relative Humidity :	40~43%

Package Mode	Average Hopping Channel	Package Transfer Time (usec)	Dwell Time (sec)	Limits (sec)	Pass/Fail
3DH5	3.30	1176.50	0.12	0.4	Pass

Remark:

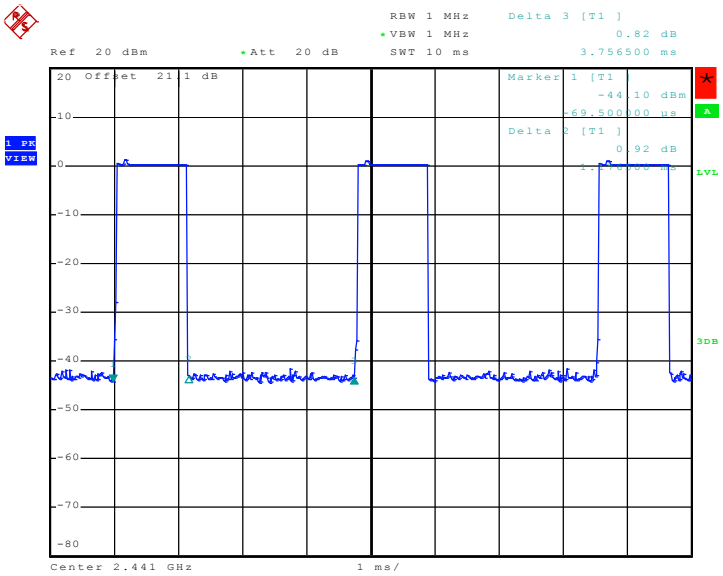
1. Dwell Time=79(channels) x 0.4(s) x average hopping channel x package transfer time

2. 79 channels come from the Hopping Channel number.

3. Average Hopping Channel = hops/sweep time

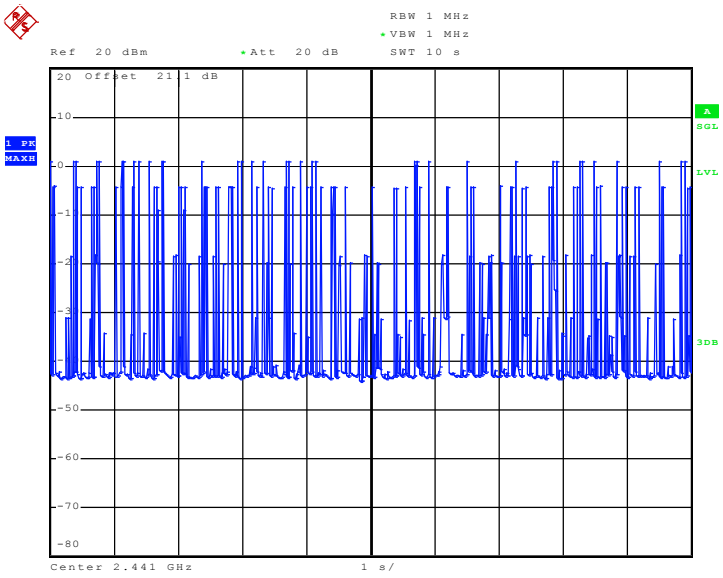
4. t: Package Transfer Time(us)

3DH5 Dwell Time (One Pulse) Plot on Channel 39



Date: 22.DEC.2010 19:37:16

3DH5 Dwell Time (Count Pulses) Plot on Channel 39



Date: 22.DEC.2010 19:53:24

3.5 Peak Output Power Measurement

3.5.1 Limit of Peak Output Power

Frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW (20.97dBm).

3.5.2 Measuring Instruments

See list of measuring instruments of this test report.

3.5.3 Test Procedures

1. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
2. The RF output of EUT was connected to the spectrum analyzer by a low loss cable.

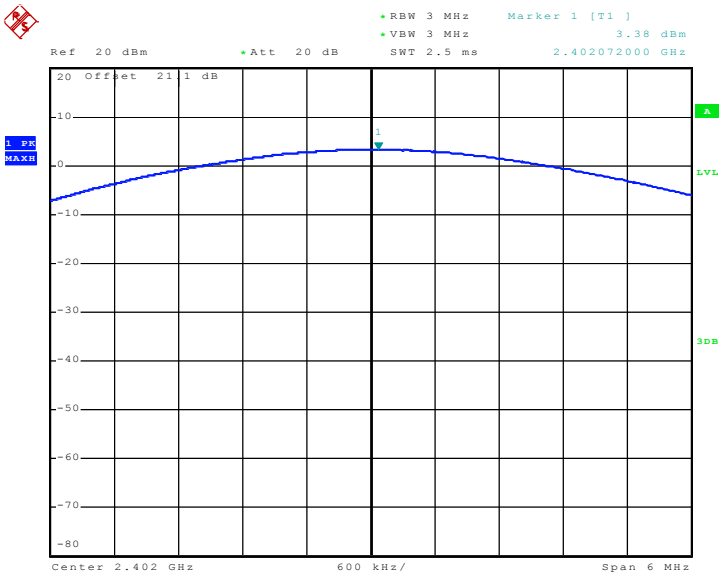
3.5.4 Test Setup

3.5.5 Test Result of Peak Output Power

Test Mode :	Mode 7~9	Temperature :	22~24℃
Test Engineer :	Hank Yu	Relative Humidity :	40~43%

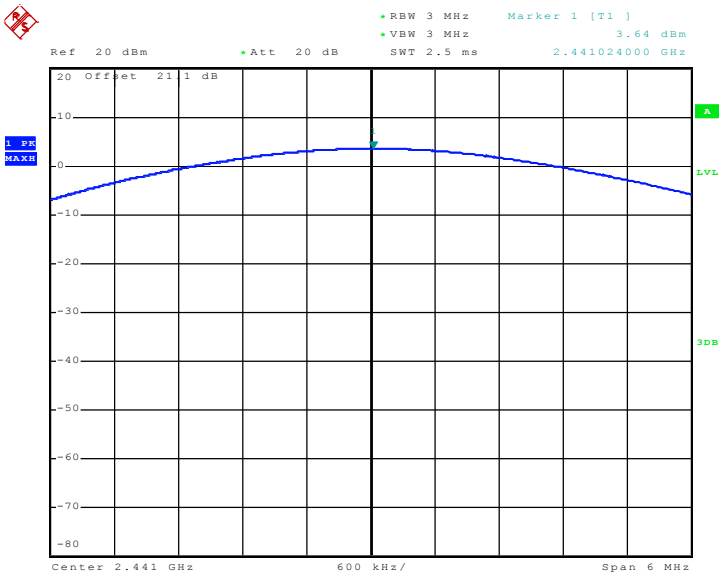
Channel	Frequency (MHz)	RF Power (dBm)		
		8-DPSK 3 Mbps	Max. Limits (dBm)	Pass/Fail
00	2402	3.38	20.97	Pass
39	2441	3.64	20.97	Pass
78	2480	3.23	20.97	Pass

Peak Output Power Plot on Channel 00



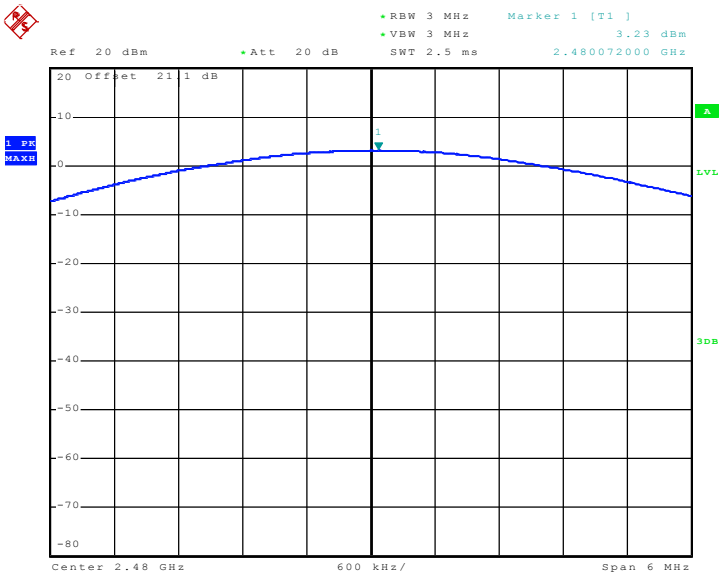
Date: 17.DEC.2010 16:45:32

Peak Output Power Plot on Channel 39



Date: 17.DEC.2010 16:51:09

Peak Output Power Plot on Channel 78



Date: 17.DEC.2010 16:53:09

3.6 Band Edges Measurement

3.6.1 Limit of Band Edges

In any 100 kHz bandwidth outside the intentional radiation frequency band, the radio frequency power shall be at least 20 dB below the highest level of the radiated power. In addition, radiated emissions which fall in the restricted bands must also comply with the radiated emission limits.

3.6.2 Measuring Instruments

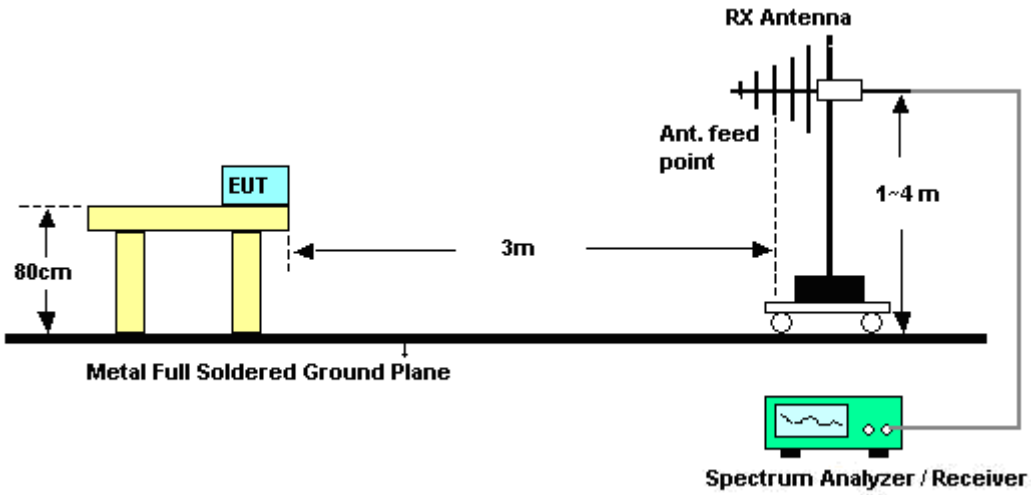
See list of measuring instruments of this test report.

3.6.3 Test Procedures

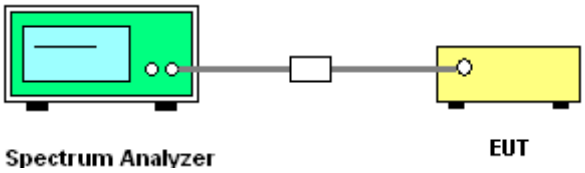
1. The testing follows the guidelines in ANSI C63.4-2003 and FCC Public Notice DA 00-705 Measurement Guidelines.
2. RF antenna conducted test: Set RBW = 300kHz, Video bandwidth (VBW) ≥ RBW. Band edge emissions must be at least 20 dB down from the highest emission level within the authorized band as measured with a 300k Hz RBW. Note: If the device complies with the use of power option 2 the attenuation under this paragraph shall be 30 dB instead of 20 dB.
3. Radiated emission test: Applies to band edge emissions that fall in the restricted bands listed in FCC Section 15.205. The maximum permitted average field strength is listed in FCC Section 15.209. A pre-amp is necessary for this measurement. For measurements above 1 GHz, set RBW = 1MHz, VBW = 1MHz, Sweep: Auto for Peak; set RBW = 1MHz, VBW = 10 Hz, Sweep: Auto for Average. If the emission is pulsed, modify the unit for continuous operation; use the settings shown above, then correct the reading by subtracting the peak-average correction factor, derived from the appropriate duty cycle calculation. See FCC Section 15.35(b) and (c).
4. In case the emission is fail due to the used RBW / VBW is too wide, marker-delta method of FCC Public Notice DA 00-705 will be followed.

3.6.4 Test Setup

<Radiated Band Edges>



<Conducted Band Edges>



3.6.5 Test Result of Radiated Band Edges

Test Mode :	Mode 1	Temperature :	23~25°C
Test Channel :	00	Relative Humidity :	48~50%
		Test Engineer :	Ivan Jiang

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2388.85	48.94	-25.06	74.00	44.58	32.18	6.03	33.85	101	288	Peak
2388.85	33.15	-20.85	54.00	28.79	32.18	6.03	33.85	101	288	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2368.33	45.83	-28.17	74.00	41.55	32.13	5.99	33.84	100	109	Peak
2368.33	32.68	-21.32	54.00	28.40	32.13	5.99	33.84	100	109	Average

Test Mode :	Mode 3	Temperature :	23~25°C
Test Channel :	78	Relative Humidity :	48~50%
		Test Engineer :	Ivan Jiang

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2483.50	65.39	-8.61	74.00	60.83	32.28	6.18	33.90	100	273	Peak
2483.50	48.26	-5.74	54.00	43.70	32.28	6.18	33.90	100	273	Average

Summary results of marker-delta method:

Test mode	Maximum field strength of the fundamental emission (dBµV/m)	Delta Result (dB)	Average Result (dBµV/m)	Average Limit (dBµV/m)	Margin (dB)	Result
Single Carrier Mode	97.26	49.00	48.26	54.00	-5.74	Pass
Hopping Mode	97.26	51.01	46.25	54.00	-7.75	Pass

Note : Average result = Maximum field strength – Delta result

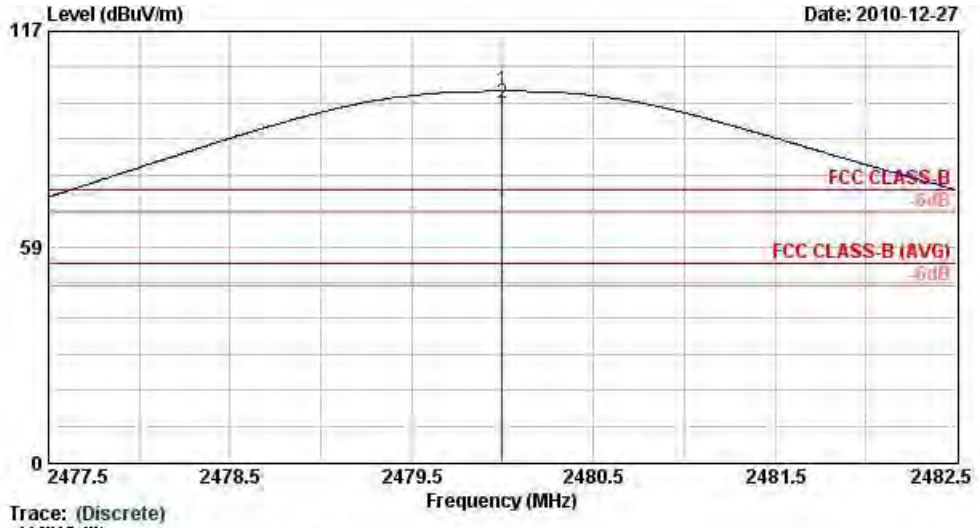
ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2483.50	59.54	-14.46	74.00	54.98	32.28	6.18	33.90	100	358	Peak
2483.50	43.66	-10.34	54.00	39.10	32.28	6.18	33.90	100	358	Average

Summary results of marker-delta method:

Test mode	Maximum field strength of the fundamental emission (dBµV/m)	Delta Result (dB)	Average Result (dBµV/m)	Average Limit (dBµV/m)	Margin (dB)	Result
Single Carrier Mode	90.98	47.32	43.66	54.00	-10.34	Pass
Hopping Mode	90.98	48.58	42.40	54.00	-11.60	Pass

Note : Average result = Maximum field strength – Delta result

Test Mode :	Mode 3	Temperature :	23~25°C
Test Channel :	78	Relative Humidity :	48~50%
Test Engineer :	Ivan Jiang	Polarization :	Horizontal



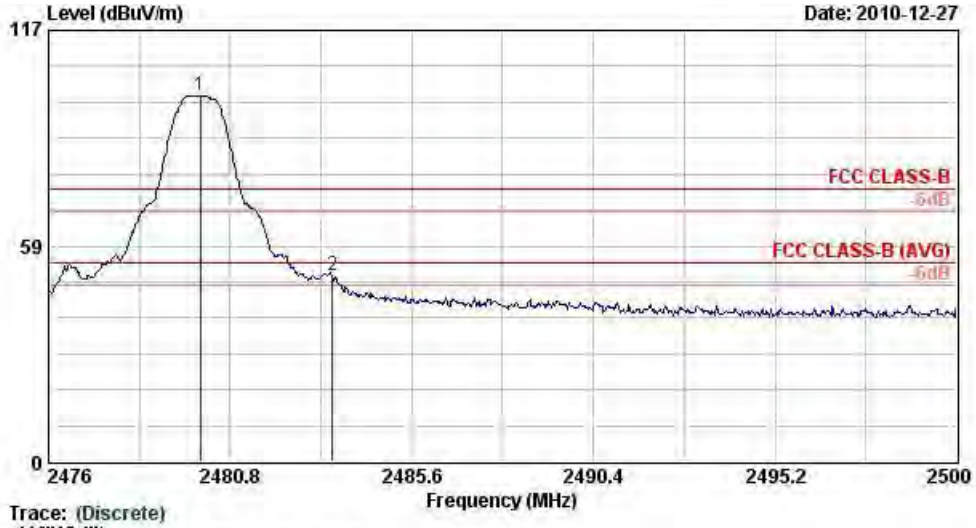
Trace: (Discrete)

Site : 03CH07-HY
Condition : FCC CLASS-B HF_ANT_100824 HORIZONTAL
Project : FR 0D0904
Mode : Mode 3

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1 @	2480.00	100.83	26.83	74.00	96.27	32.28	6.18	33.90	100	273	Peak
2 @	2480.00	97.26	43.26	54.00	92.70	32.28	6.18	33.90	100	273	Average

* Maximum field strength of the fundamental emission

Test Mode :	Mode 3	Temperature :	23~25°C
Test Channel :	78	Relative Humidity :	48~50%
Test Engineer :	Ivan Jiang	Polarization :	Horizontal



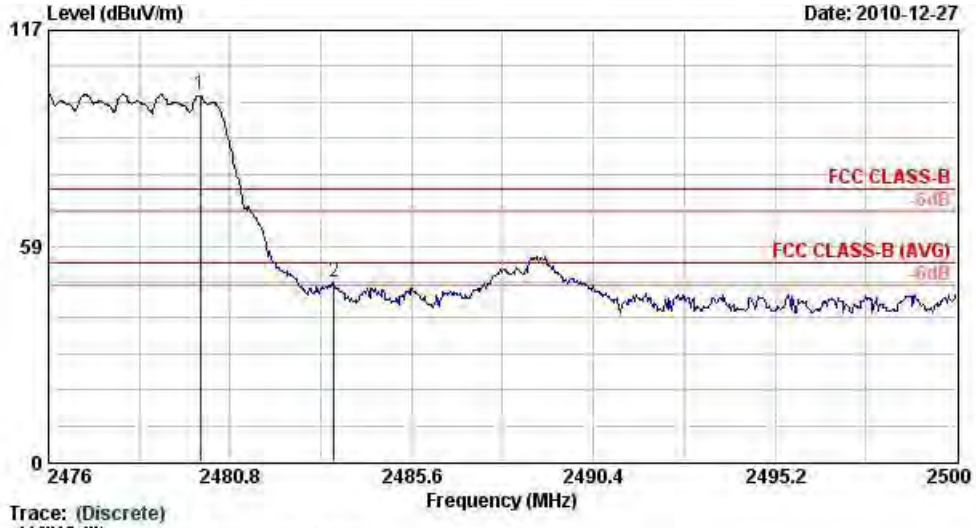
Trace: (Discrete)

Site : 03CH07-HY
Condition : FCC CLASS-B HF_ANT_100824 HORIZONTAL
Project : FR 0D0904
Mode : Mode 3

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1 @	2480.00	99.25	25.25	74.00	94.69	32.28	6.18	33.90	100	273	Peak
2	2483.50	50.25	-23.75	74.00	45.69	32.28	6.18	33.90	100	273	Peak

* Marker-Delta Method (RBW/VBW=100KHz): 49.00 dB , single carrier Mode

Test Mode :	Mode 3	Temperature :	23~25°C
Test Channel :	78	Relative Humidity :	48~50%
Test Engineer :	Ivan Jiang	Polarization :	Horizontal

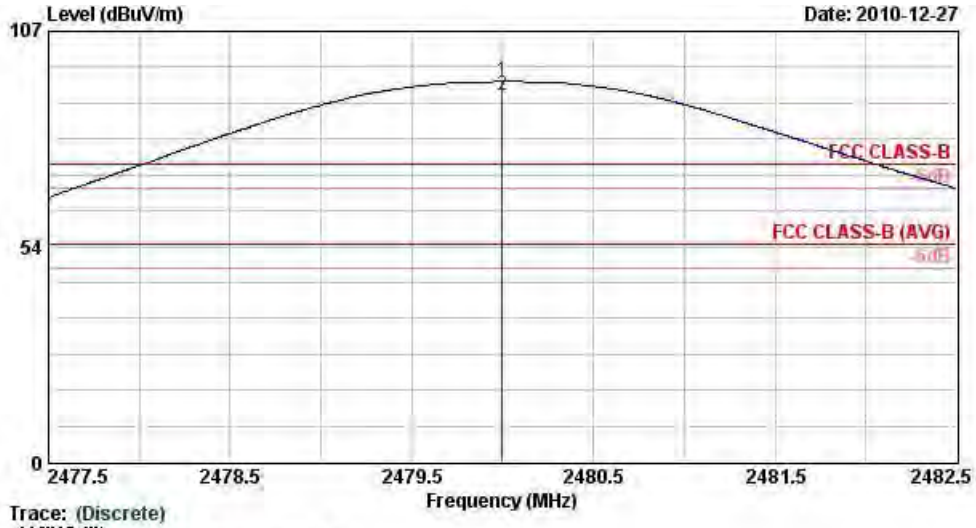


Site : 03CH07-HY
Condition : FCC CLASS-B HF_ANT_100824 HORIZONTAL
Project : FR 0D0904
Mode : Mode 3

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1 @	2480.00	99.55	25.55	74.00	94.99	32.28	6.18	33.90	100	273	Peak
2	2483.54	48.54	-25.46	74.00	43.98	32.28	6.18	33.90	100	273	Peak

* Marker-Delta Method (RBW/VBW=100KHz): 51.01 dB , Hopping Mode

Test Mode :	Mode 3	Temperature :	23~25°C
Test Channel :	78	Relative Humidity :	48~50%
Test Engineer :	Ivan Jiang	Polarization :	Vertical



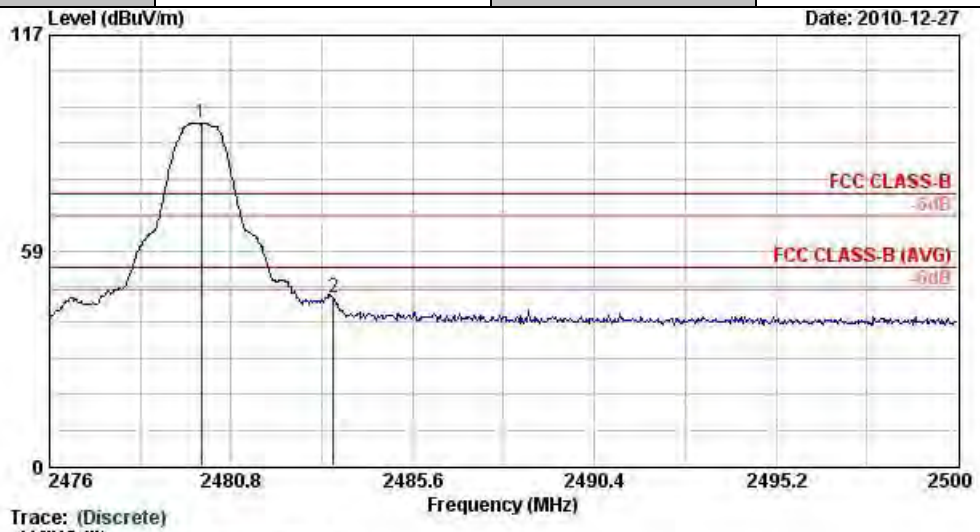
Trace: (Discrete)

Site : 03CH07-HY
Condition : FCC CLASS-B HF_ANT_100824 VERTICAL
Project : FR 0D0904
Mode : Mode 3

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1 @	2480.00	94.55	20.55	74.00	89.99	32.28	6.18	33.90	100	358	Peak
2 @	2480.00	90.98	36.98	54.00	86.42	32.28	6.18	33.90	100	358	Average

* Maximum field strength of the fundamental emission

Test Mode :	Mode 3	Temperature :	23~25°C
Test Channel :	78	Relative Humidity :	48~50%
Test Engineer :	Ivan Jiang	Polarization :	Vertical

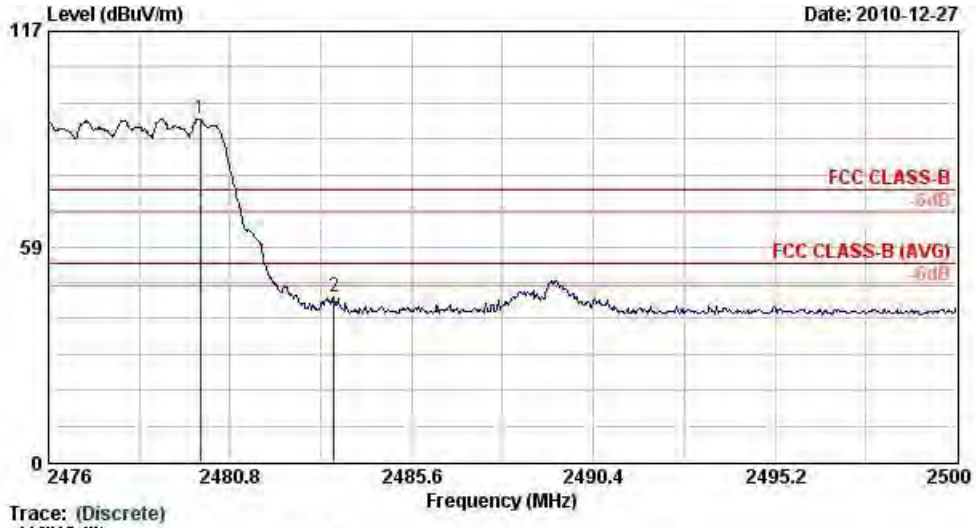


Site : 03CH07-HY
Condition : FCC CLASS-B HF_ANT_100824 VERTICAL
Project : FR 0D0904
Mode : Mode 3

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1 @	2480.00	93.01	19.01	74.00	88.45	32.28	6.18	33.90	100	358	Peak
2	2483.50	45.69	-28.31	74.00	41.13	32.28	6.18	33.90	100	358	Peak

* Marker-Delta Method (RBW/VBW=100KHz): 47.32 dB , single carrier Mode

Test Mode :	Mode 3	Temperature :	23~25°C
Test Channel :	78	Relative Humidity :	48~50%
Test Engineer :	Ivan Jiang	Polarization :	Vertical



Trace: (Discrete)

Site : 03CH07-HY
Condition : FCC CLASS-B HF_ANT_100824 VERTICAL
Project : FR 0D0904
Mode : Mode 3

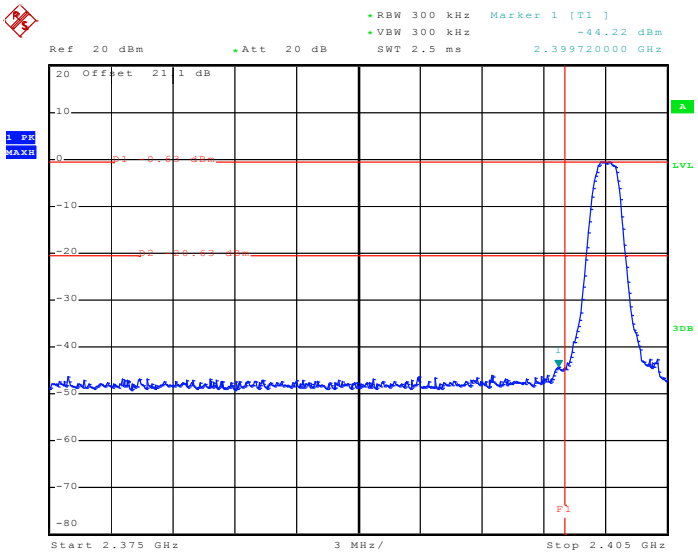
	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1 @	2480.00	93.18	19.18	74.00	88.62	32.28	6.18	33.90	100	358	Peak
2	2483.54	44.60	-29.40	74.00	40.04	32.28	6.18	33.90	100	358	Peak

* Marker-Delta Method (RBW/VBW=100KHz): 48.58 dB , Hopping Mode

3.6.6 Test Result of Conducted Band Edges

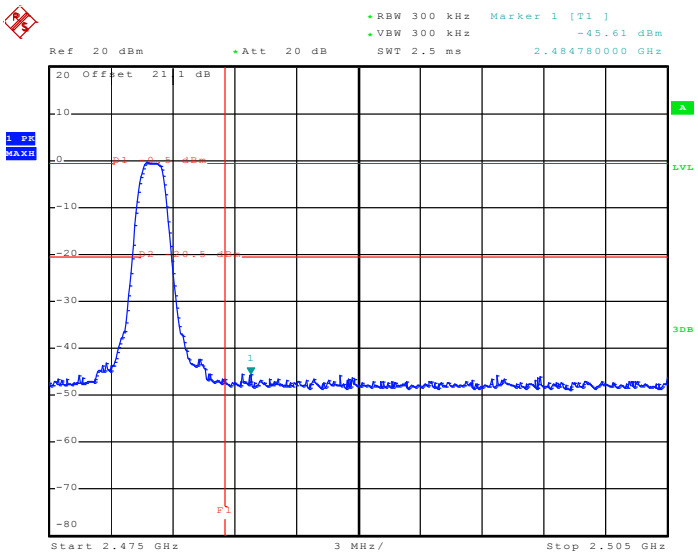
Test Mode :	Mode 7 and 9	Temperature :	22~24℃
Test Channel :	00 and 78	Relative Humidity :	40~43%
		Test Engineer :	Hank Yu

Low Band Edge Plot on Channel 00



Date: 22.DEC.2010 23:13:25

High Band Edge Plot on Channel 78



Date: 22.DEC.2010 23:03:52

3.7 Spurious Emission Measurement

3.7.1 Limit of Spurious Emission Measurement

All harmonics/spurs must be at least 20 dB down from the highest emission level within the authorized band.

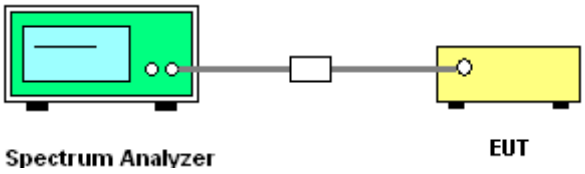
3.7.2 Measuring Instruments

See list of measuring instruments of this test report.

3.7.3 Test Procedure

1. The transmitter output was connected to the spectrum analyzer via a low lose cable.
2. Set RBW = 100 kHz, Video bandwidth (VBW) ≥ RBW, scan up through 10th harmonic. All harmonics / spurs must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100 kHz RBW.

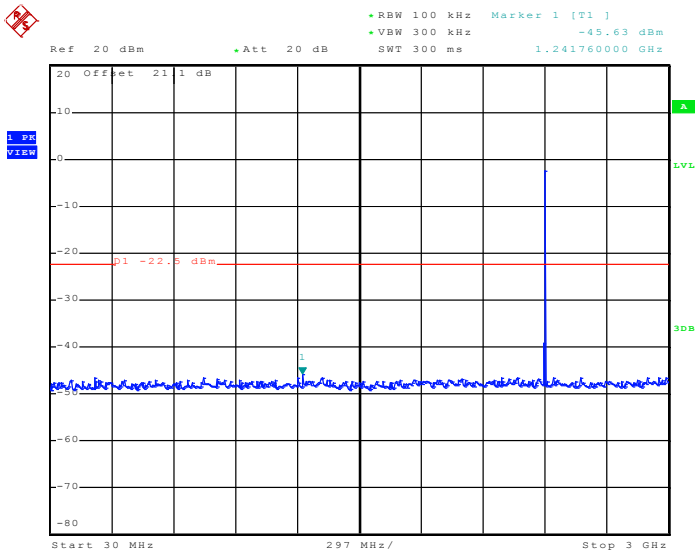
3.7.4 Test Setup



3.7.5 Test Result

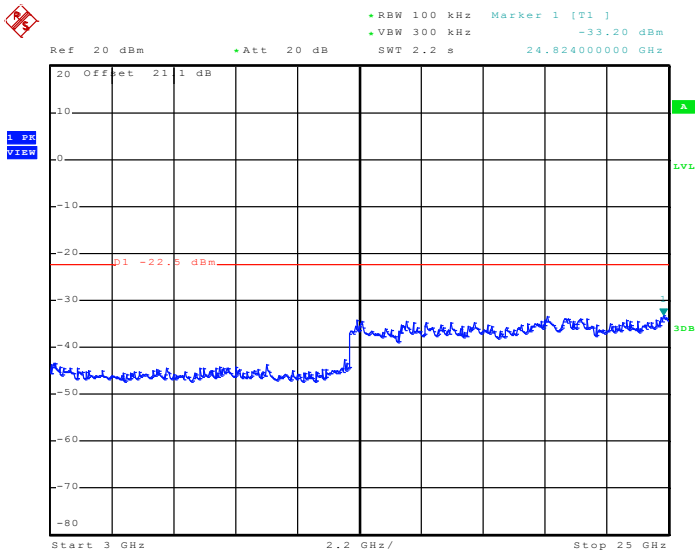
Test Mode :	Mode 7	Temperature :	22~24℃
Test Channel :	00	Relative Humidity :	40~43%
		Test Engineer :	Hank Yu

Conducted Spurious Emission Plot between 30MHz ~ 3 GHz



Date: 22.DEC.2010 23:57:33

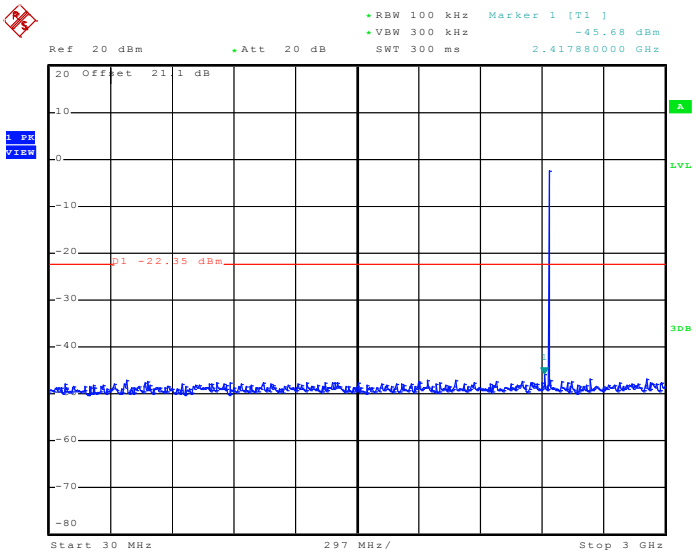
Conducted Spurious Emission Plot between 3 GHz ~ 25 GHz



Date: 22.DEC.2010 23:58:42

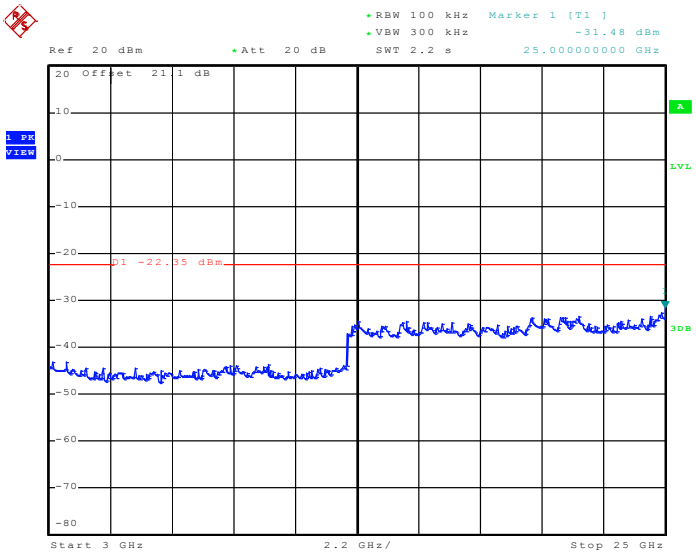
Test Mode :	Mode 8	**Temperature :**	22~24℃
Test Channel :	39	**Relative Humidity :**	40~43%
		Test Engineer :	Hank Yu

Conducted Spurious Emission Plot between 30MHz ~ 3 GHz



Date: 23.DEC.2010 00:03:43

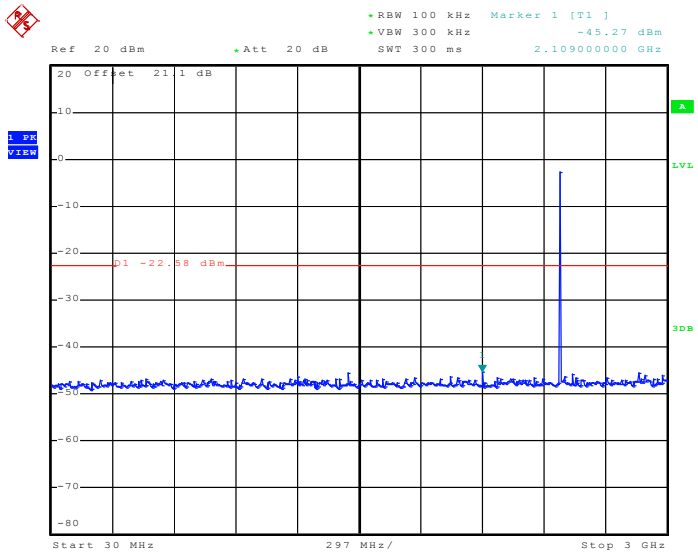
Conducted Spurious Emission Plot between 3 GHz ~ 25 GHz



Date: 23.DEC.2010 00:04:21

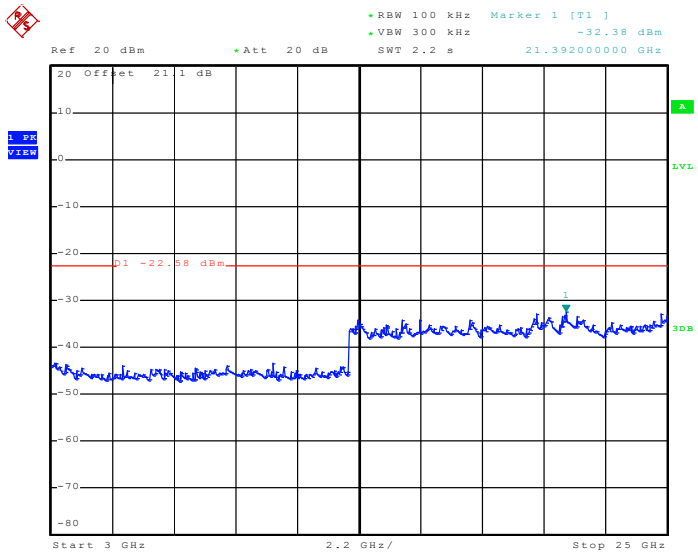
Test Mode :	Mode 9	**Temperature :**	22~24℃
Test Channel :	78	**Relative Humidity :**	40~43%
		Test Engineer :	Hank Yu

Conducted Spurious Emission Plot between 30MHz ~ 3 GHz



Date: 23.DEC.2010 00:01:37

Conducted Spurious Emission Plot between 3 GHz ~ 25 GHz



Date: 23.DEC.2010 00:02:17

3.8 AC Conducted Emission Measurement

3.8.1 Limit 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.

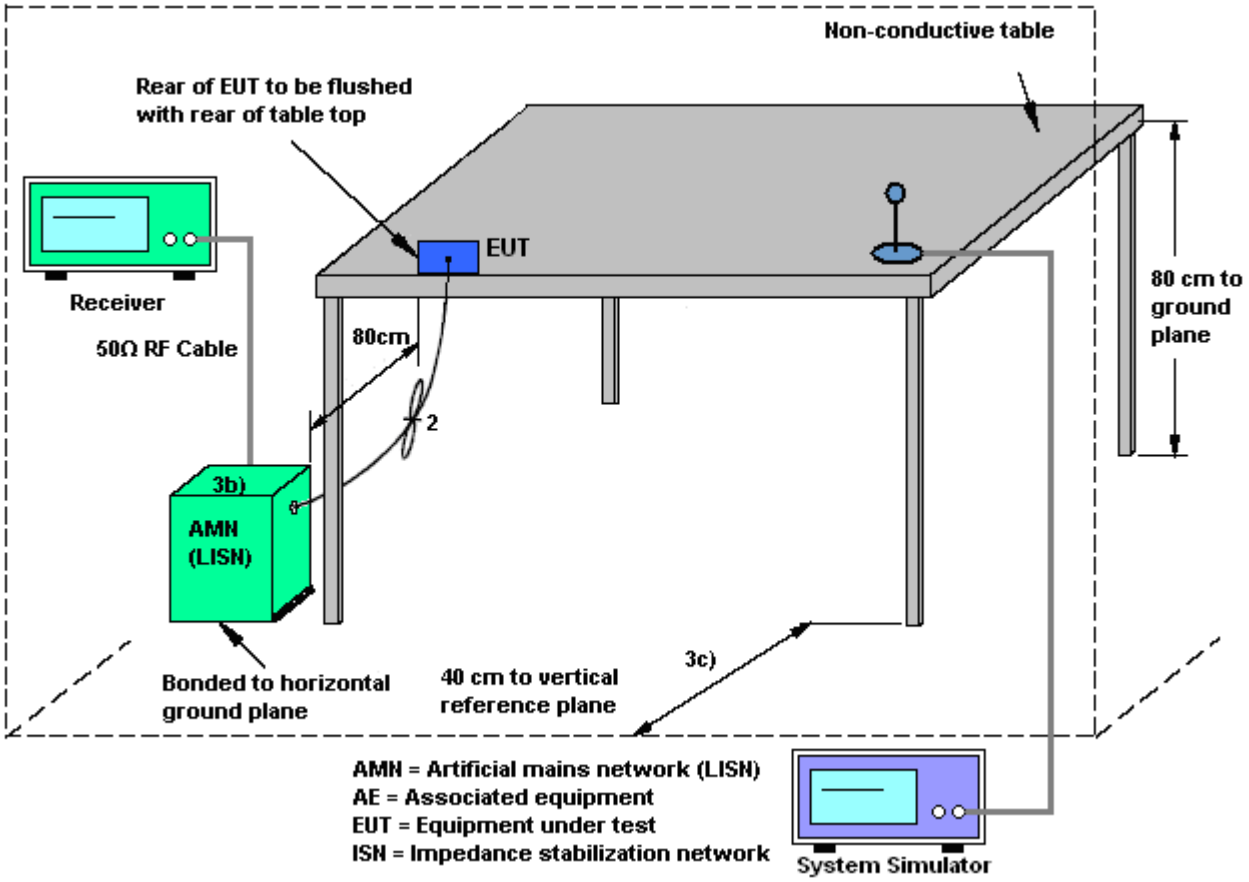
3.8.2 Measuring Instruments

See list of measuring instruments of this test report.

3.8.3 Test Procedures

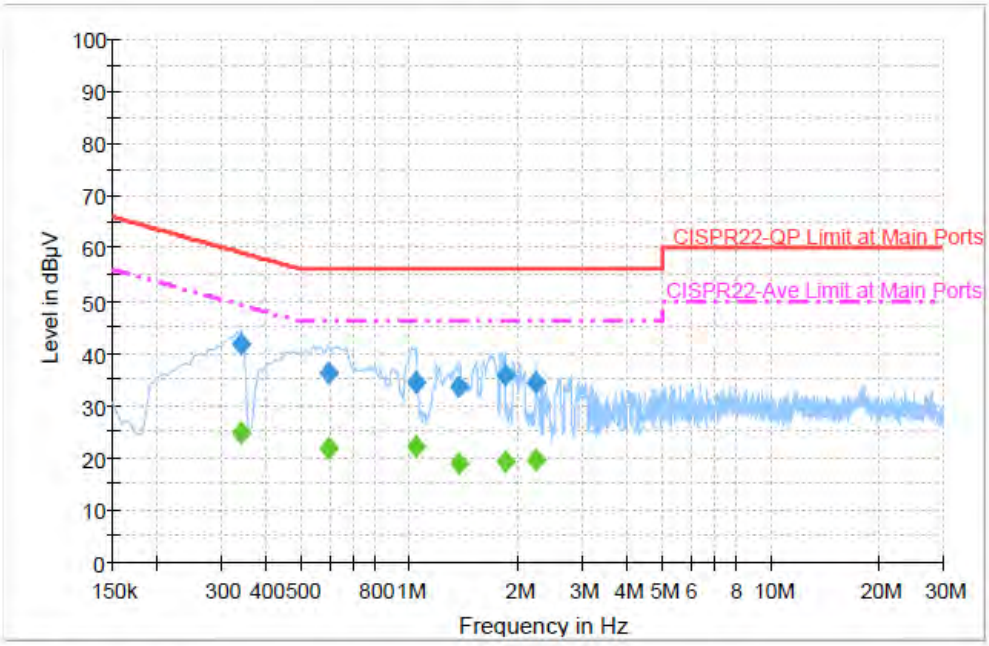
1. Please follow the guidelines in ANSI C63.4-2003.
2. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
3. Connect EUT to the power mains through a line impedance stabilization network (LISN).
4. All the support units are connecting to the other LISN.
5. The LISN provides 50 ohm coupling impedance for the measuring instrument.
6. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
7. Both sides of AC line were checked for maximum conducted interference.
8. The frequency range from 150 kHz to 30 MHz was searched.
9. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode.

3.8.4 Test Setup



3.8.5 Test Result of AC Conducted Emission

Test Mode :	Mode 1	**Temperature :**	20~22℃
Test Engineer :	Cona Huang	**Relative Humidity :**	43~48%
Test Voltage :	120Vac / 60Hz	**Phase :**	Line
Function Type :	WCDMA Band II Idle + Bluetooth Link + WLAN (2.4G) Link + GPS Rx + Scanner + Cradle + Adapter + RS232 Terminal + USB Cable (Link with Notebook)		
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



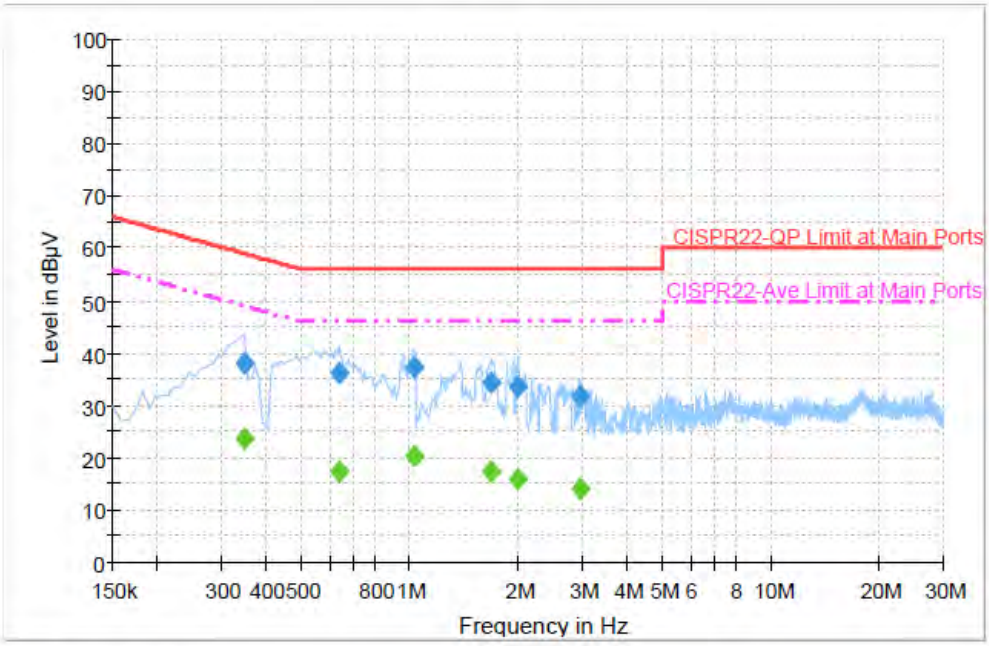
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.342000	41.5	Off	L1	19.3	17.7	59.2
0.598000	36.1	Off	L1	19.4	19.9	56.0
1.046000	34.5	Off	L1	19.4	21.5	56.0
1.374000	33.4	Off	L1	19.4	22.6	56.0
1.830000	35.8	Off	L1	19.5	20.2	56.0
2.230000	34.2	Off	L1	19.5	21.8	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.342000	24.6	Off	L1	19.3	24.6	49.2
0.598000	21.7	Off	L1	19.4	24.3	46.0
1.046000	22.2	Off	L1	19.4	23.8	46.0
1.374000	18.8	Off	L1	19.4	27.2	46.0
1.830000	19.1	Off	L1	19.5	26.9	46.0
2.230000	19.4	Off	L1	19.5	26.6	46.0

Test Mode :	Mode 1	**Temperature :**	20~22℃
Test Engineer :	Cona Huang	**Relative Humidity :**	43~48%
Test Voltage :	120Vac / 60Hz	**Phase :**	Neutral
Function Type :	WCDMA Band II Idle + Bluetooth Link + WLAN (2.4G) Link + GPS Rx + Scanner + Cradle + Adapter + RS232 Terminal + USB Cable (Link with Notebook)		
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.350000	37.9	Off	N	19.3	21.1	59.0
0.638000	36.0	Off	N	19.4	20.0	56.0
1.030000	37.4	Off	N	19.4	18.6	56.0
1.678000	34.2	Off	N	19.5	21.8	56.0
1.982000	33.5	Off	N	19.5	22.5	56.0
2.966000	31.8	Off	N	19.5	24.2	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.350000	23.6	Off	N	19.3	25.4	49.0
0.638000	17.5	Off	N	19.4	28.5	46.0
1.030000	20.4	Off	N	19.4	25.6	46.0
1.678000	17.2	Off	N	19.5	28.8	46.0
1.982000	16.0	Off	N	19.5	30.0	46.0
2.966000	14.1	Off	N	19.5	31.9	46.0

3.9 Radiated Emission Measurement

3.9.1 Limit of Radiated Emission

In any 100 kHz bandwidth outside the intentional radiator frequency band, all harmonics/spurious must be at least 20 dB below the highest emission level within the authorized band. In addition, radiated emissions which fall in the restricted bands must also comply with the FCC section 15.209 limits as below.

Frequency (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

3.9.2 Measuring Instruments

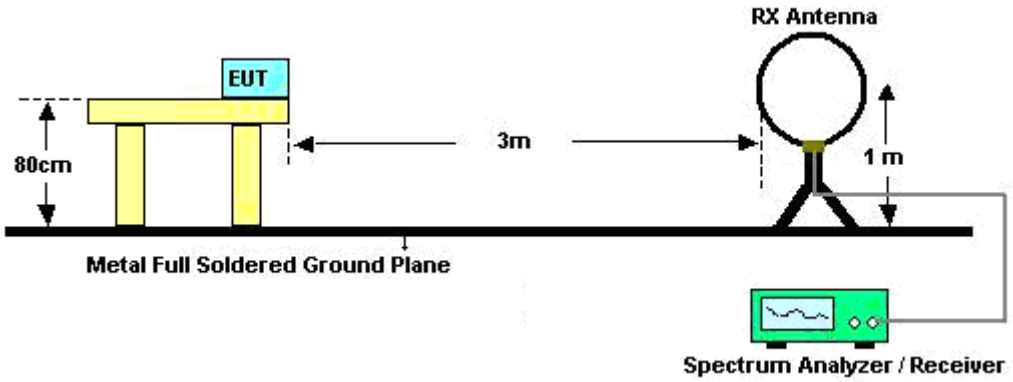
See list of measuring instruments of this test report.

3.9.3 Test Procedures

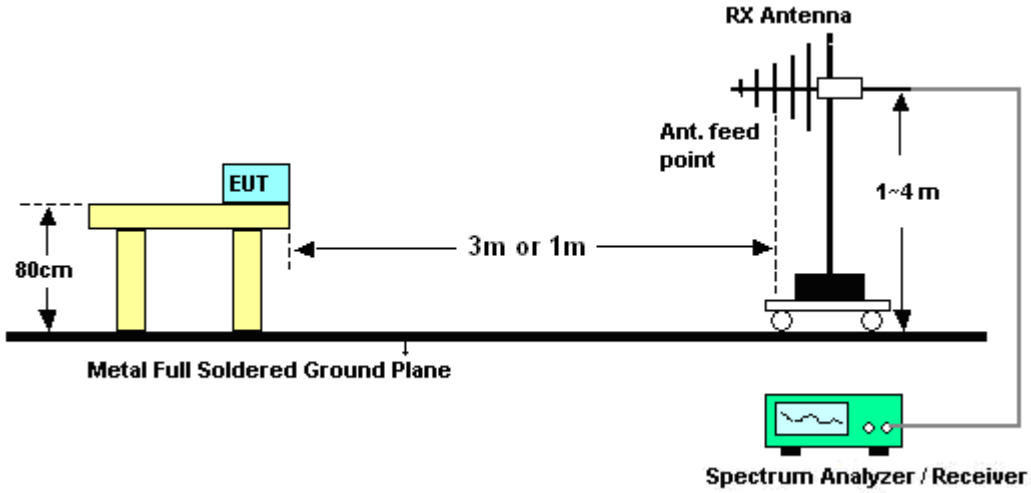
1. The testing follows the guidelines in FCC Public Notice DA 00-705 Measurement Guidelines.
2. Use the following spectrum analyzer settings:
   (1) Span = wide enough to fully capture the emission being measured; RBW = 1 MHz for f ≥ 1 GHz, 100 kHz for f < 1 GHz; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold.
   (2) Above 18 GHz shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade from 3m to 1m.
   Distance extrapolation factor = 20 log (specific distance [3m] / test distance [1m]) (dB)
3. Follow the guidelines in ANSI C63.4-2003 with respect to maximizing the emission by rotating the EUT, measuring the emission for three EUT orthogonal planes, and adjusting the measurement antenna height and polarization. A pre-amp and a high pass filter are used for this test in order to get the good signal level.

3.9.4 Test Setup

For radiated emissions below 30MHz



For radiated emissions above 30MHz



3.9.5 Test Results of Radiated Emissions (9 kHz ~ 30 MHz)

Test Engineer :	Ivan Jiang	Temperature :	23~25°C
		Relative Humidity :	48~50%

Frequency (MHz)	Level (dBuV)	Over Limit (dB)	Limit Line (dBuV)	Remark
-	-	-	-	See Note

Note:

The amplitude of spurious emissions that are attenuated by more than 20dB below the permissible value has no need to be reported.

Distance extrapolation factor = 40 log (specific distance / test distance) (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor.

3.9.6 Test Result of Radiated Emission (30 MHz ~ 10th Harmonic)

Test Mode :	Mode 1	Temperature :	23~25°C
Test Channel :	00	Relative Humidity :	48~50%
Test Engineer :	Ivan Jiang	Polarization :	Horizontal
Remark :	2402 MHz is Fundamental Signals which can be ignored.		

Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
170.94	26.28	-17.22	43.50	46.86	9.71	1.23	31.52	-	-	Peak
230.61	28.52	-17.48	46.00	47.17	11.30	1.49	31.44	-	-	Peak
287.58	38.83	-7.17	46.00	55.21	13.27	1.68	31.33	100	162	Peak
497.40	30.57	-15.43	46.00	41.02	18.18	2.44	31.07	-	-	Peak
822.20	30.82	-15.18	46.00	35.59	22.73	3.20	30.70	-	-	Peak
934.90	32.28	-13.72	46.00	35.40	24.07	3.42	30.61	-	-	Peak
2388.85	48.94	-25.06	74.00	44.58	32.18	6.03	33.85	101	288	Peak
2388.85	33.15	-20.85	54.00	28.79	32.18	6.03	33.85	101	288	Average
2402.00	98.61	-	-	94.25	32.18	6.03	33.85	101	288	Peak
2402.00	94.59	-	-	90.23	32.18	6.03	33.85	101	288	Average
2492.00	33.11	-20.89	54.00	28.53	32.30	6.18	33.90	101	288	Average
2492.00	44.87	-29.13	74.00	40.29	32.30	6.18	33.90	101	288	Peak

Test Mode :	Mode 1	Temperature :	23~25°C
Test Channel :	00	Relative Humidity :	48~50%
Test Engineer :	Ivan Jiang	Polarization :	Vertical
Remark :	2402 MHz is Fundamental Signals which can be ignored.		

Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
31.89	27.88	-12.12	40.00	42.75	16.04	0.55	31.46	126	301	Peak
148.26	25.20	-18.30	43.50	44.36	11.19	1.21	31.56	-	-	Peak
284.34	28.28	-17.72	46.00	44.75	13.21	1.66	31.34	-	-	Peak
590.50	31.53	-14.47	46.00	40.18	19.62	2.66	30.93	-	-	Peak
716.50	31.16	-14.84	46.00	37.81	21.15	2.98	30.78	-	-	Peak
898.50	31.43	-14.57	46.00	35.18	23.61	3.34	30.70	-	-	Peak
2368.33	45.83	-28.17	74.00	41.55	32.13	5.99	33.84	100	109	Peak
2368.33	32.68	-21.32	54.00	28.40	32.13	5.99	33.84	100	109	Average
2402.00	90.89	-	-	86.53	32.18	6.03	33.85	100	109	Peak
2402.00	86.97	-	-	82.61	32.18	6.03	33.85	100	109	Average
2500.00	33.00	-21.00	54.00	28.42	32.30	6.18	33.90	100	109	Average
2500.00	44.89	-29.11	74.00	40.31	32.30	6.18	33.90	100	109	Peak

Test Mode :	Mode 2	Temperature :	23~25°C
Test Channel :	39	Relative Humidity :	48~50%
Test Engineer :	Ivan Jiang	Polarization :	Horizontal
Remark :	2441 MHz is Fundamental Signals which can be ignored.		

Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
119.10	23.56	-19.94	43.50	42.57	11.45	1.10	31.56	-	-	Peak
162.30	28.39	-15.11	43.50	48.43	10.26	1.22	31.52	-	-	Peak
277.86	35.40	-10.60	46.00	51.99	13.12	1.64	31.35	114	74	Peak
399.40	30.58	-15.42	46.00	43.06	16.56	2.14	31.18	-	-	Peak
830.60	30.15	-15.85	46.00	34.82	22.82	3.22	30.71	-	-	Peak
995.80	34.70	-19.30	54.00	36.93	24.84	3.51	30.58	-	-	Peak
2350.00	44.66	-29.34	74.00	40.43	32.11	5.95	33.83	100	0	Peak
2350.00	32.77	-21.23	54.00	28.54	32.11	5.95	33.83	100	0	Average
2441.00	100.14	-	-	95.67	32.24	6.11	33.88	100	0	Peak
2441.00	96.39	-	-	91.92	32.24	6.11	33.88	100	0	Average
2494.00	45.06	-28.94	74.00	40.48	32.30	6.18	33.90	100	0	Peak
2494.00	33.18	-20.82	54.00	28.60	32.30	6.18	33.90	100	0	Average

Test Mode :	Mode 2	Temperature :	23~25°C
Test Channel :	39	Relative Humidity :	48~50%
Test Engineer :	Ivan Jiang	Polarization :	Vertical
Remark :	2441 MHz is Fundamental Signals which can be ignored.		

Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
85.62	22.83	-17.17	40.00	45.51	7.95	0.91	31.54	-	-	Peak
202.26	28.82	-14.68	43.50	49.66	9.31	1.33	31.48	-	-	Peak
262.74	33.25	-12.75	46.00	50.18	12.87	1.61	31.41	100	182	Peak
553.40	30.74	-15.26	46.00	40.11	19.05	2.56	30.98	-	-	Peak
766.20	30.11	-15.89	46.00	35.78	21.93	3.09	30.69	-	-	Peak
853.00	32.77	-13.23	46.00	37.15	23.08	3.27	30.73	-	-	Peak
2366.00	44.68	-29.32	74.00	40.40	32.13	5.99	33.84	126	358	Peak
2366.00	32.79	-21.21	54.00	28.51	32.13	5.99	33.84	126	358	Average
2441.00	95.67	-	-	91.20	32.24	6.11	33.88	126	358	Peak
2441.00	91.79	-	-	87.32	32.24	6.11	33.88	126	358	Average
2500.00	45.11	-28.89	74.00	40.53	32.30	6.18	33.90	126	358	Peak
2500.00	33.02	-20.98	54.00	28.44	32.30	6.18	33.90	126	358	Average

Test Mode :	Mode 3	Temperature :	23~25°C
Test Channel :	78	Relative Humidity :	48~50%
Test Engineer :	Ivan Jiang	Polarization :	Horizontal
Remark :	2480 MHz is Fundamental Signals which can be ignored.		

Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
180.66	24.77	-18.73	43.50	46.01	9.04	1.25	31.53	-	-	Peak
242.22	32.00	-14.00	46.00	49.77	12.12	1.53	31.42	-	-	Peak
283.53	35.53	-10.47	46.00	52.02	13.20	1.65	31.34	100	197	Peak
410.60	31.01	-14.99	46.00	43.25	16.74	2.18	31.16	-	-	Peak
495.30	29.03	-16.97	46.00	39.52	18.15	2.43	31.07	-	-	Peak
995.80	30.68	-23.32	54.00	32.91	24.84	3.51	30.58	-	-	Peak
2316.00	44.91	-29.09	74.00	40.74	32.07	5.92	33.82	100	273	Peak
2316.00	32.99	-21.01	54.00	28.82	32.07	5.92	33.82	100	273	Average
2480.00	100.82	-	-	96.26	32.28	6.18	33.90	100	273	Peak
2480.00	97.44	-	-	92.88	32.28	6.18	33.90	100	273	Average
2483.50	65.39	-8.61	74.00	60.83	32.28	6.18	33.90	100	273	Peak
2483.50	48.26	-5.74	54.00	43.70	32.28	6.18	33.90	100	273	Average

Test Mode :	Mode 3	Temperature :	23~25°C
Test Channel :	78	Relative Humidity :	48~50%
Test Engineer :	Ivan Jiang	Polarization :	Vertical
Remark :	2480 MHz is Fundamental Signals which can be ignored.		

Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
92.37	23.12	-20.38	43.50	44.78	8.90	0.96	31.52	-	-	Peak
176.61	24.18	-19.32	43.50	45.14	9.33	1.24	31.53	-	-	Peak
270.57	29.87	-16.13	46.00	46.60	13.00	1.64	31.37	-	-	Peak
372.10	31.99	-14.01	46.00	45.44	15.72	2.08	31.25	-	-	Peak
582.10	32.89	-13.11	46.00	41.70	19.49	2.64	30.94	106	224	Peak
822.90	31.66	-14.34	46.00	36.43	22.73	3.20	30.70	-	-	Peak
2340.00	46.46	-27.54	74.00	42.23	32.11	5.95	33.83	100	358	Peak
2340.00	33.21	-20.79	54.00	28.98	32.11	5.95	33.83	100	358	Average
2480.00	94.41	-	-	89.85	32.28	6.18	33.90	100	358	Peak
2480.00	91.15	-	-	86.59	32.28	6.18	33.90	100	358	Average
2483.50	59.54	-14.46	74.00	54.98	32.28	6.18	33.90	100	358	Peak
2483.50	43.66	-10.34	54.00	39.10	32.28	6.18	33.90	100	358	Average

3.10 Antenna Requirements

3.10.1 Standard Applicable

If directional gain of transmitting antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi. 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 FCC rule.

3.10.2 Antenna Connected Construction

The antennas type used in this product is PIFA Antenna without connector and it is considered to meet antenna requirement.

3.10.3 Antenna Gain

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.

4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Due Date	Remark
Spectrum Analyzer	R&S	FSP30	101329	9kHz~30GHz	Apr. 26, 2010	Apr. 25, 2011	Conducted (TH02-HY)
Power Meter	Anritsu	ML2495A	0932001	N/A	Sep. 13, 2010	Sep. 12, 2011	Conducted (TH02-HY)
Power Sensor	Anritsu	MA2411B	0846202	N/A	Sep. 14, 2010	Sep. 13, 2011	Conducted (TH02-HY)
EMI Test Receive	R&S	ESCS 30	100356	9KHz – 2.75GHz	Aug. 16, 2010	Aug. 15, 2011	Conduction (CO05-HY)
Two-LISN	R&S	ENV216	11-100081	9KHz – 30MHz	Dec. 03, 2010	Dec. 02, 2011	Conduction (CO05-HY)
Two-LISN	R&S	ENV216	11-100080	9KHz – 30MHz	Dec. 01, 2010	Nov. 30, 2011	Conduction (CO05-HY)
AC Power Source	APC	APC-1000W	N/A	N/A	N/A	N/A	Conduction (CO05-HY)
System Simulator	R&S	CMU200	117997	N/A	May 14, 2009	May 13, 2011	Conduction (CO05-HY)
GPS Station	T&E	GS-50	N/A	N/A	N/A	N/A	Conduction (CO05-HY)
Bilog Antenna	SCHAFFNER	CBL6111C	2726	30MHz ~ 1GHz	Oct. 31, 2010	Oct. 30, 2011	Radiation (03CH07-HY)
Spectrum Analyzer	R&S	FSP	101067	9KHz ~ 30GHz	Dec. 03, 2010	Dec. 02, 2011	Radiation (03CH07-HY)
Double Ridge Horn Antenna	ESCO	3117	00075962	1GHz ~ 18GHz	Aug. 19, 2010	Aug. 18, 2011	Radiation (03CH07-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170251	15GHz- 40GHz	Oct. 18, 2010	Oct. 17, 2011	Radiation (03CH07-HY)
Pre Amplifier	Agilent	8449B	3008A02362	1GHz~ 26.5GHz	Dec. 06, 2010	Dec. 05, 2011	Radiation (03CH07-HY)
Pre Amplifier	COM-POWER	PA-103A	161241	10-1000MHz.32 dB.GAIN	Mar. 27, 2010	Mar. 26, 2011	Radiation (03CH07-HY)
Loop Antenna	R&S	HFH2-Z2	860004/001	9 kHz~30 MHz	Jul. 29, 2010	Jul. 28, 2011	Radiation (03CH07-HY)

5 Uncertainty of Evaluation

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

Contribution	Uncertainty of X_i		$u(X_i)$
	dB	Probability Distribution	
Receiver Reading	0.10	Normal (k=2)	0.05
Cable Loss	0.10	Normal (k=2)	0.05
AMN Insertion Loss	2.50	Rectangular	0.63
Receiver Specification	1.50	Rectangular	0.43
Site Imperfection	1.39	Rectangular	0.80
Mismatch	+0.34 / -0.35	U-Shape	0.24
Combined Standard Uncertainty Uc(y)	**1.13**		
Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**2.26**		

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

Contribution	Uncertainty of X_i		$u(X_i)$
	dB	Probability Distribution	
Receiver Reading	0.41	Normal (k=2)	0.21
Antenna Factor Calibration	0.83	Normal (k=2)	0.42
Cable Loss Calibration	0.25	Normal (k=2)	0.13
Pre-Amplifier Gain Calibration	0.27	Normal (k=2)	0.14
RCV/SPA Specification	2.50	Rectangular	0.72
Antenna Factor Interpolation for Frequency	1.00	Rectangular	0.29
Site Imperfection	1.43	Rectangular	0.83
Mismatch	+0.39 / -0.41	U-Shape	0.28
Combined Standard Uncertainty Uc(y)	**1.27**		
Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**2.54**		

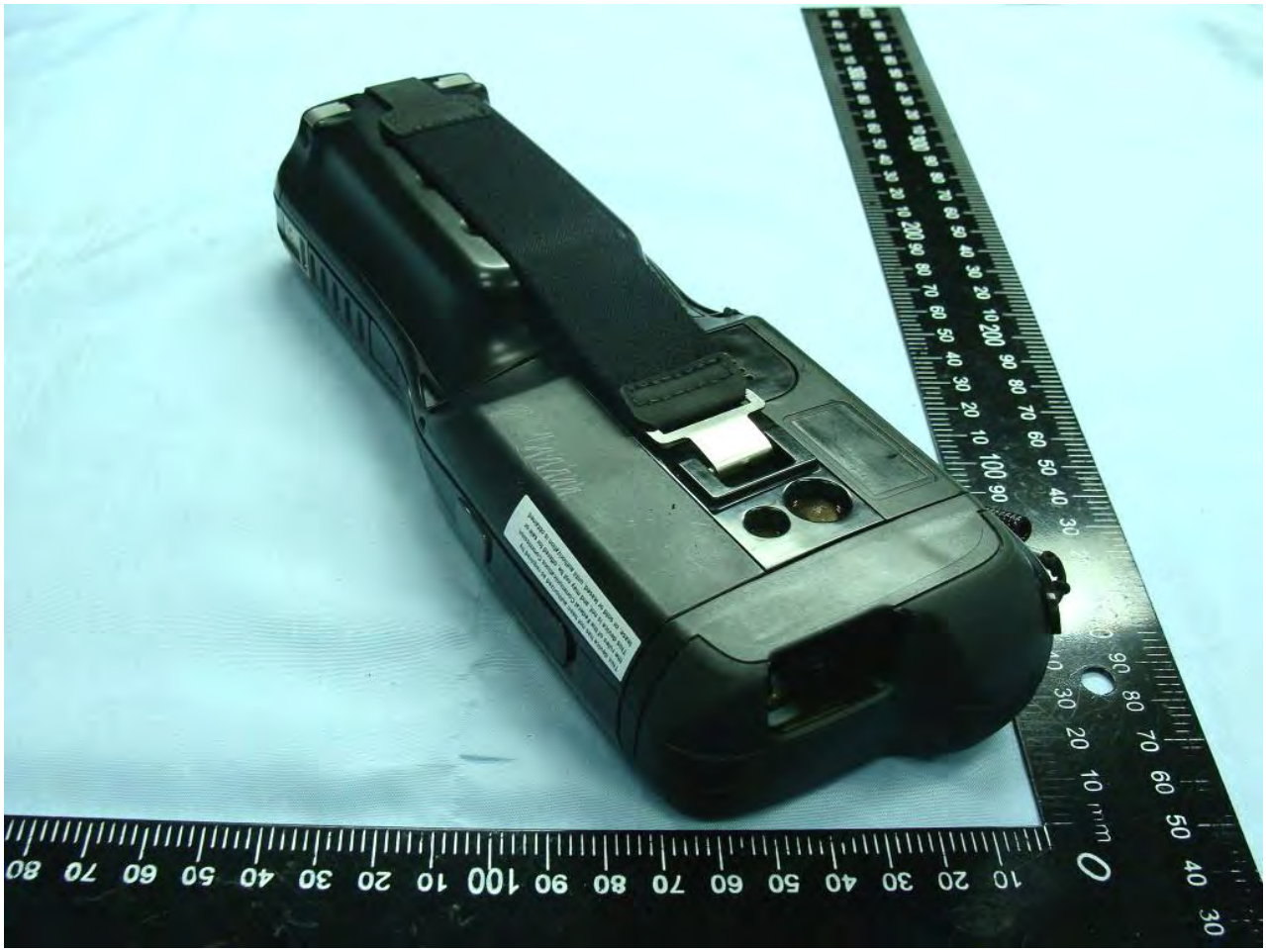
Uncertainty of Radiated Emission Measurement (1 GHz ~ 40 GHz)

Contribution	Uncertainty of X_i		$u(X_i)$	C_i	$C_i * u(X_i)$
	dB	Probability Distribution			
Receiver Reading	±0.10	Normal (k=2)	0.10	1	0.10
Antenna Factor Calibration	±1.70	Normal (k=2)	0.85	1	0.85
Cable Loss Calibration	±0.50	Normal (k=2)	0.25	1	0.25
Receiver Correction	±2.00	Rectangular	1.15	1	1.15
Antenna Factor Directional	±1.50	Rectangular	0.87	1	0.87
Site Imperfection	±2.80	Triangular	1.14	1	1.14
Mismatch Receiver VSWR Γ1 = 0.197 Antenna VSWR Γ2 = 0.194 Uncertainty = 20Log(1-Γ1*Γ2)	+0.34 / -0.35	U-Shape	0.244	1	0.244
Combined Standard Uncertainty Uc(y)	**2.36**				
Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**4.72**				

Appendix A. Photographs of EUT

Please refer to Sporton report number EP0D0904 as below.

1. External Photograph of EUT



2. Photograph of Accessory

List of Accessory:

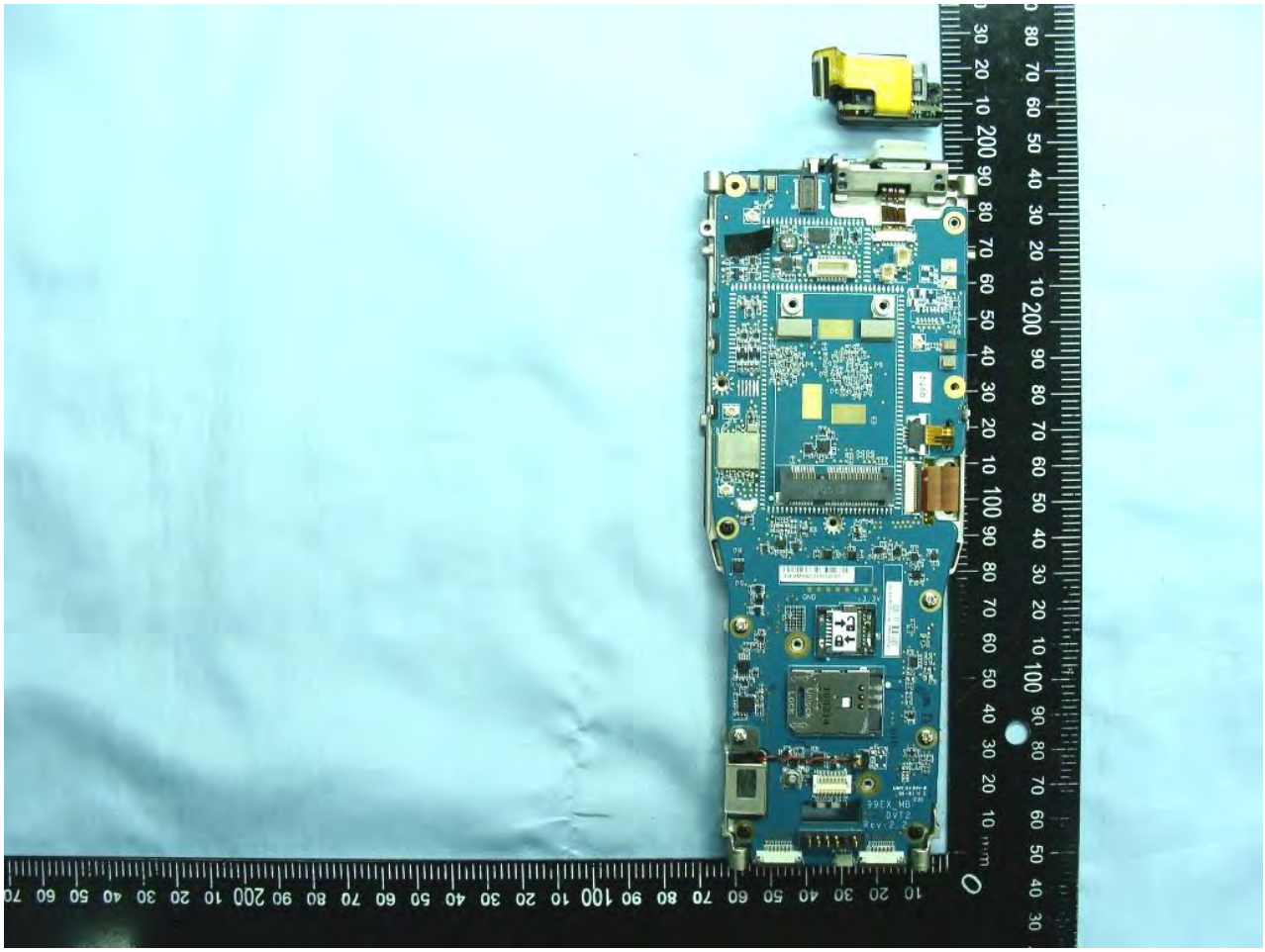
Specification of Accessory		
Battery	**Brand Name**	Honeywell
	Model Name	99EX-BTEC
Holster	**Model Name**	99EX-Holster
LCD Panel	**Brand Name**	Casio
	Model Name	OM37H3M04XLC
Camera	**Brand Name**	LITE-ON Semiconductor Corp.
	Model Name	DCM-300MCB
WWAN Module	**Brand Name**	Sierra wireless
	Model Name	Gobi3000

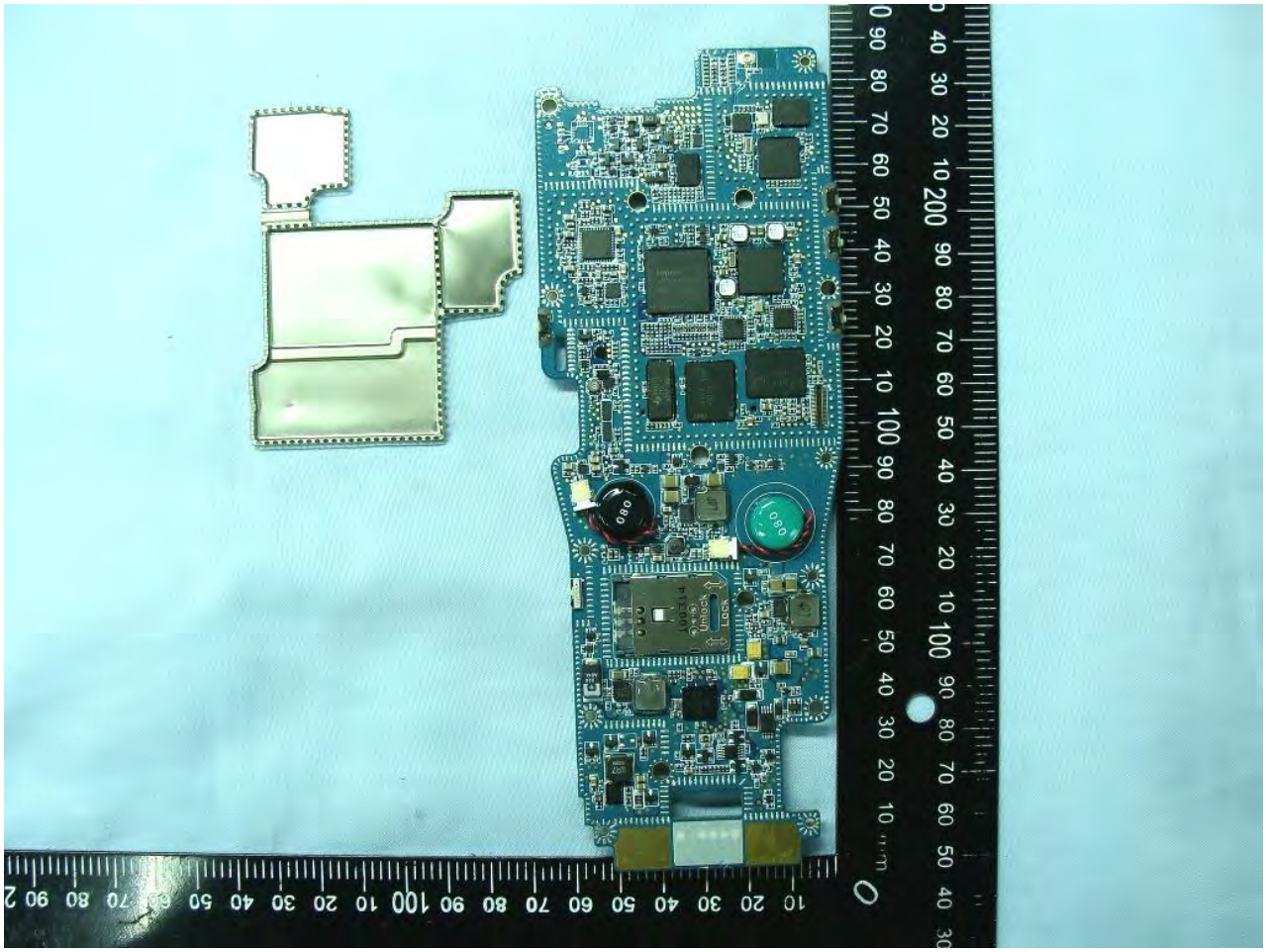
Remark: For accessories equipped with this EUT, please refer to the following photos.


Honeywell
SCAN
ESC
TAB
ENT
SP
BKSP
DEL
SFT
ALT CTRL

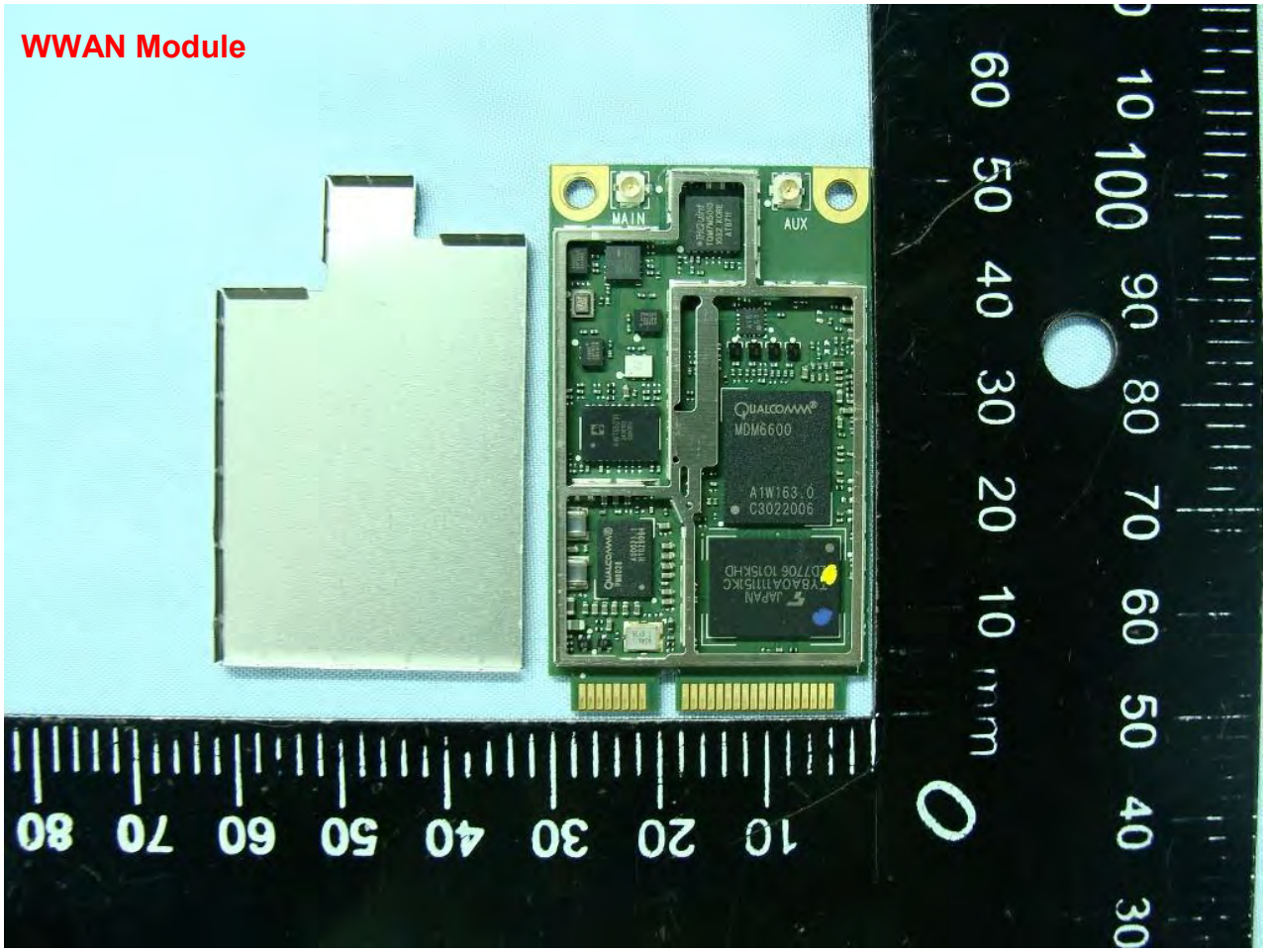

警示：请不要烧弃，损毁，短路，拆解电池。
WARNING: DO NOT INCINERATE, MUTILATE, SHORT CIRCUIT OR DISASSEMBLE PACK.
中国制造
Made in China
Manufactured for: Honeywell International Inc
Skaneateles Falls, NY 13153
www.honeywellaidc.com
型号: (MODEL): 99EX-BTEC
ITEM: 99EX-BTEC-1
US LISTED
19JW
Li-ion 3.7V, 18.5 Wh, 5000mAh
Li-ion
廢電池請回收
S/N
PSSA102170014

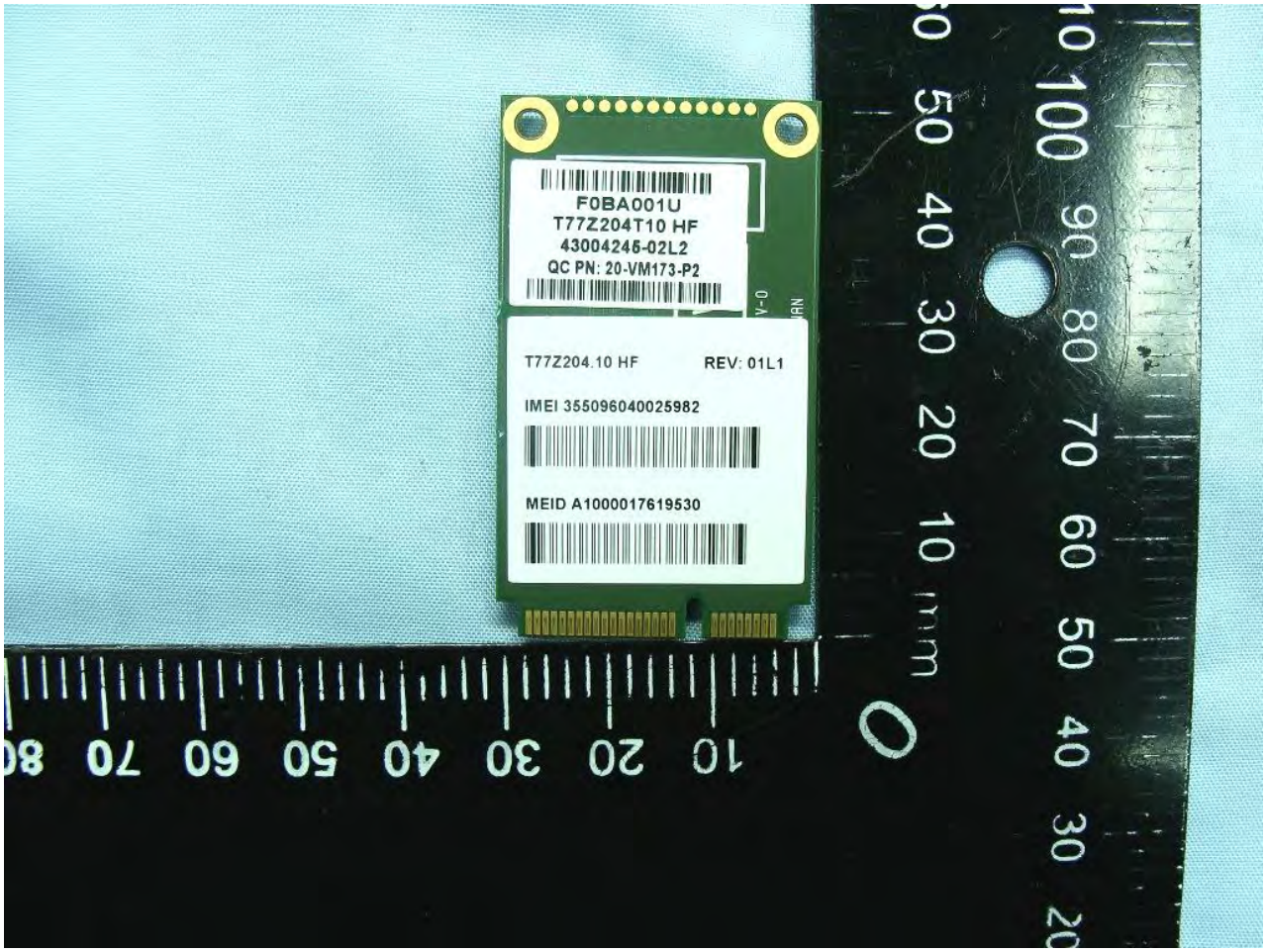
3. Internal Photograph of EUT

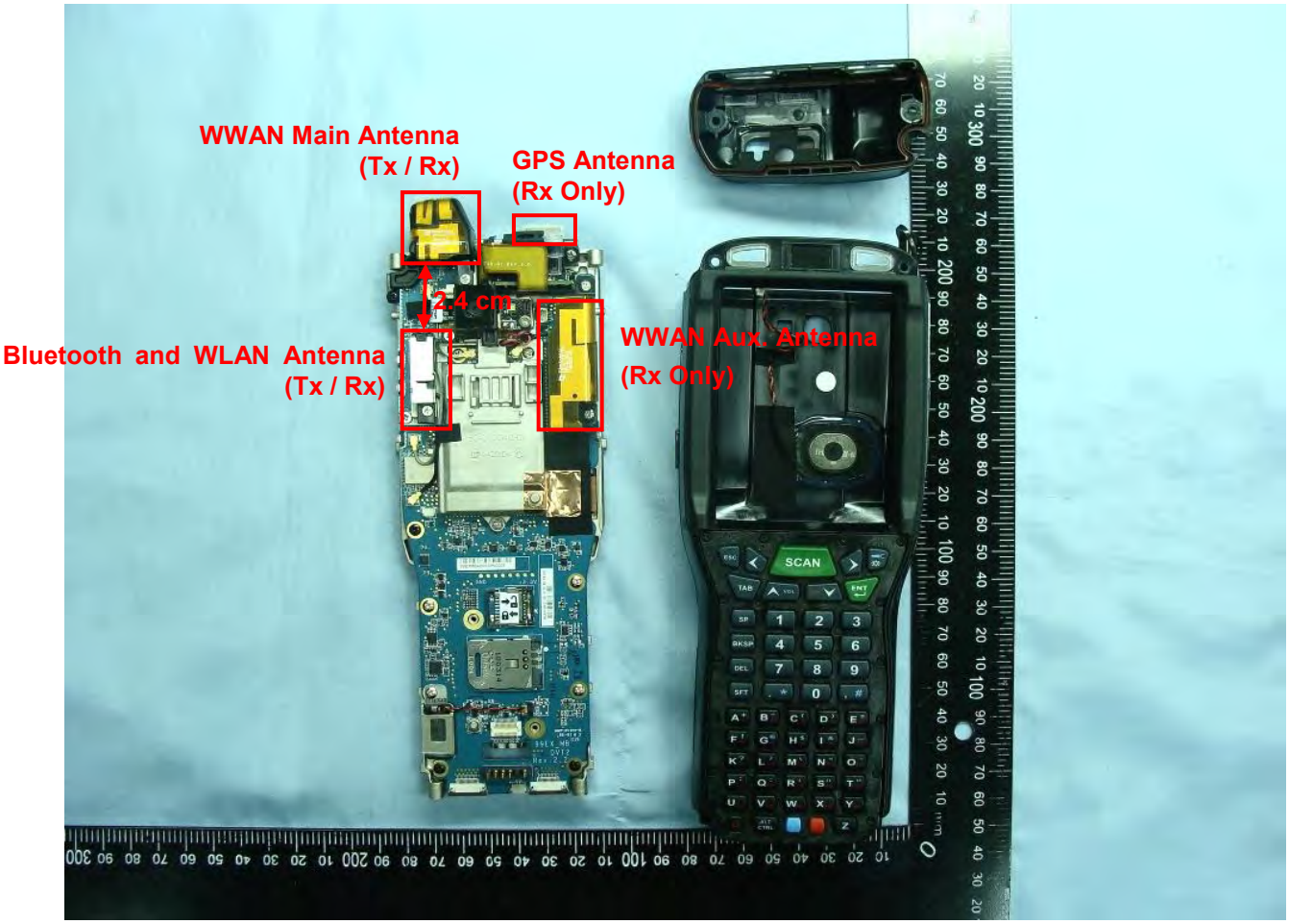




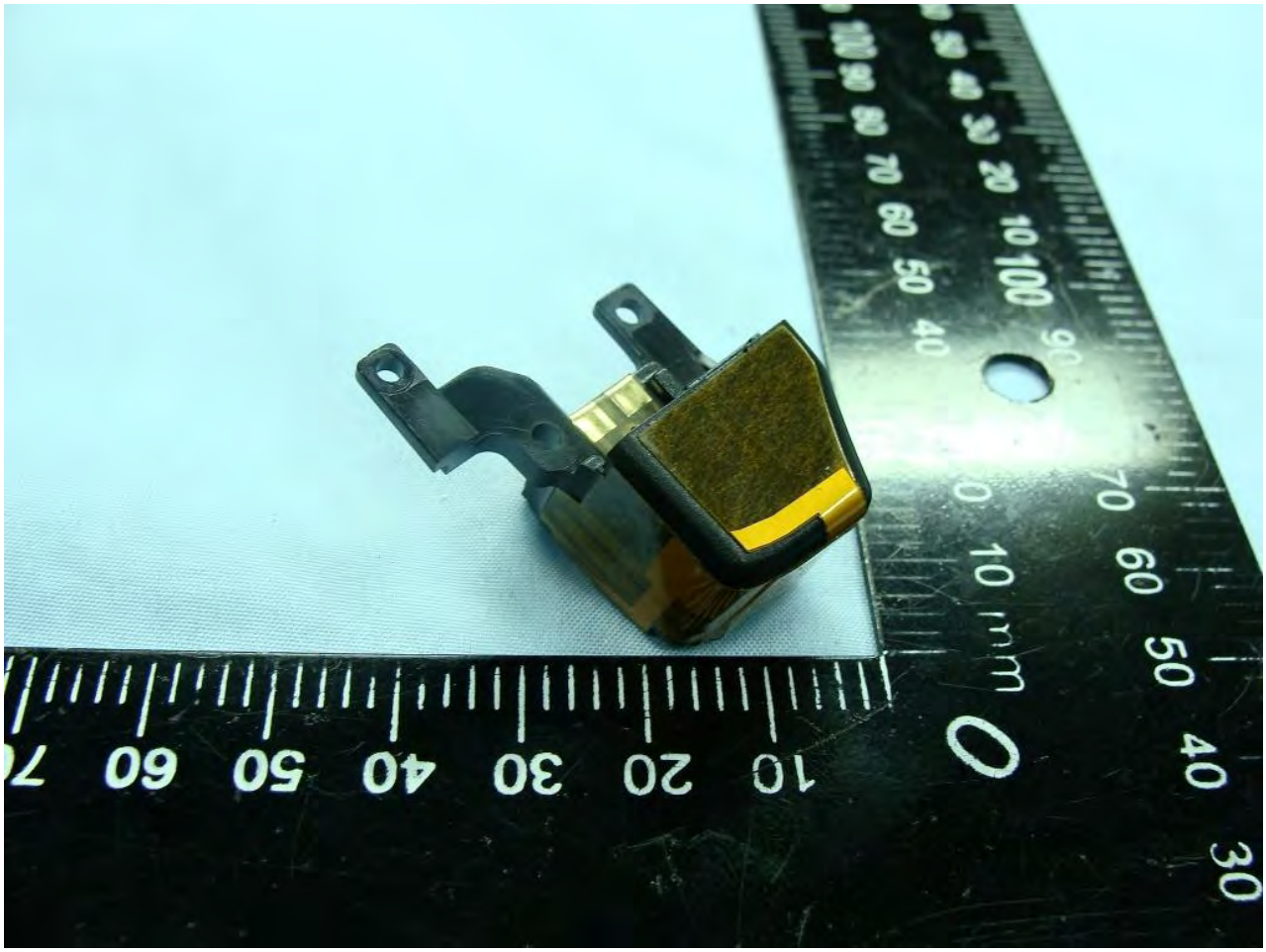
WWAN Module



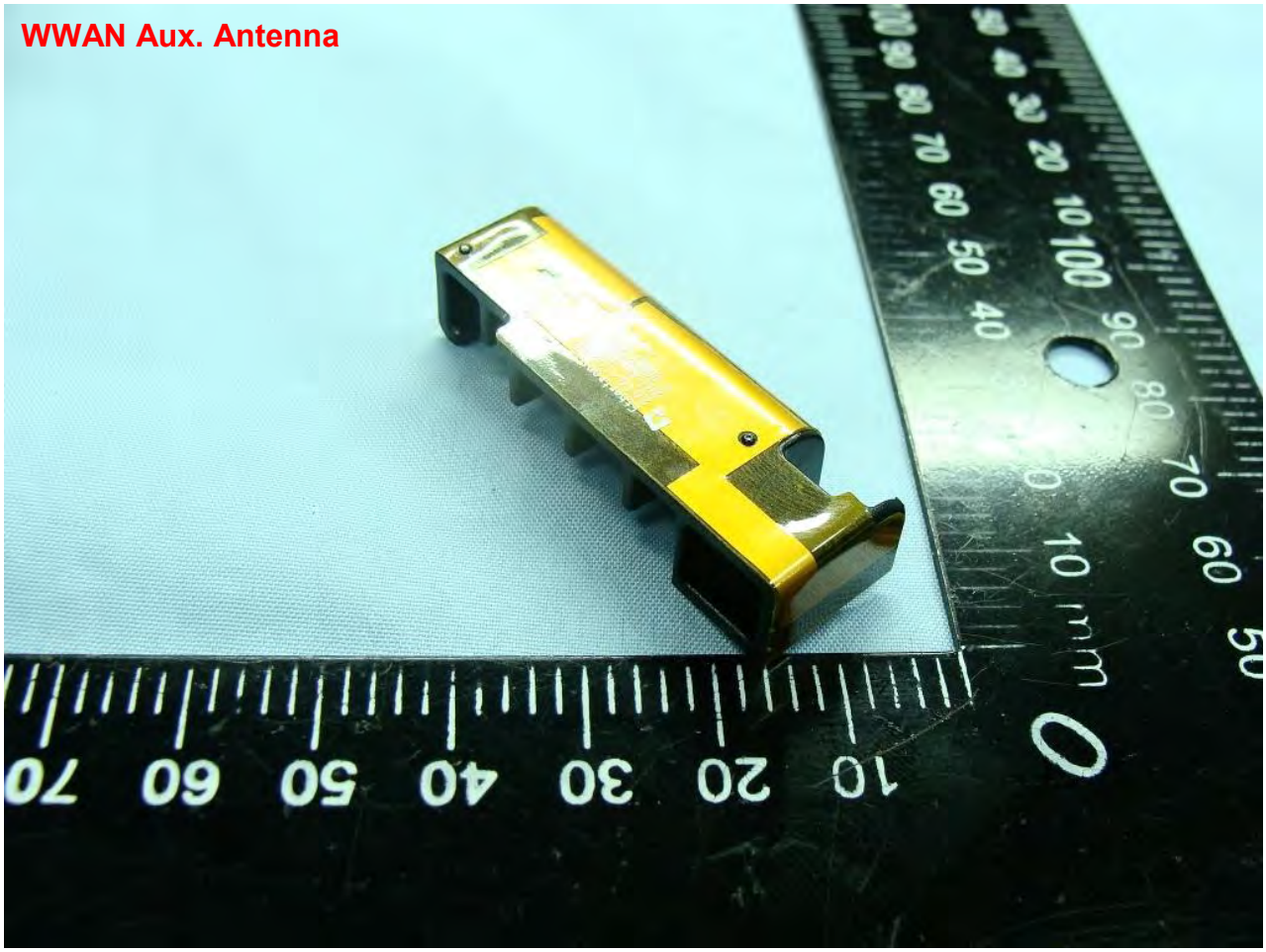

F0BA001U
T77Z204T10 HF
43004246-02L2
QC PN: 20-VM173-P2
T77Z204.10 HF
REV: 01L1
IMEI 355096040025982
MEID A1000017619530

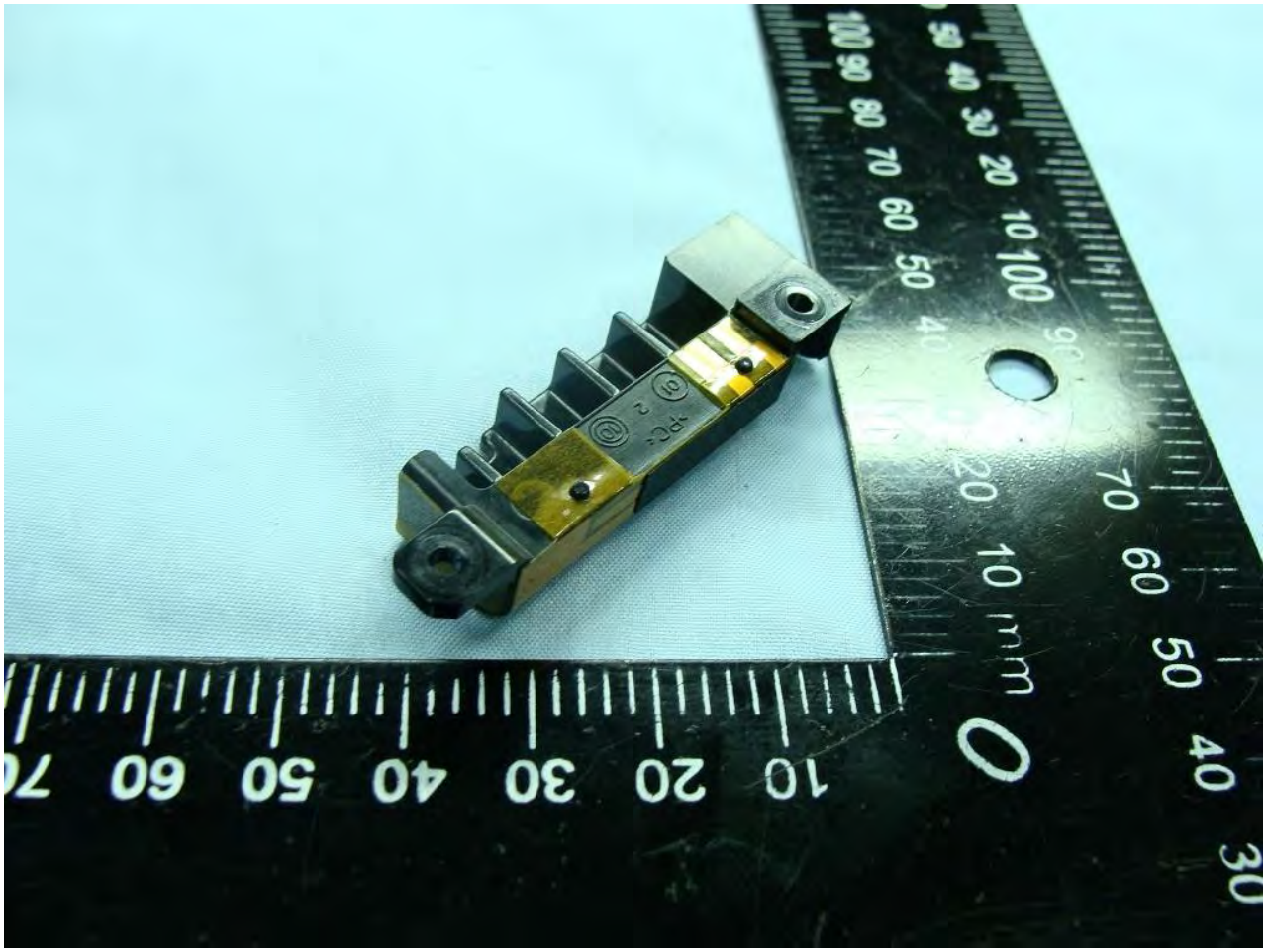

WWAN Main Antenna
(Tx / Rx)
GPS Antenna
(Rx Only)
2.4 cm
Bluetooth and WLAN Antenna
(Tx / Rx)
WWAN Aux. Antenna
(Rx Only)
SCAN

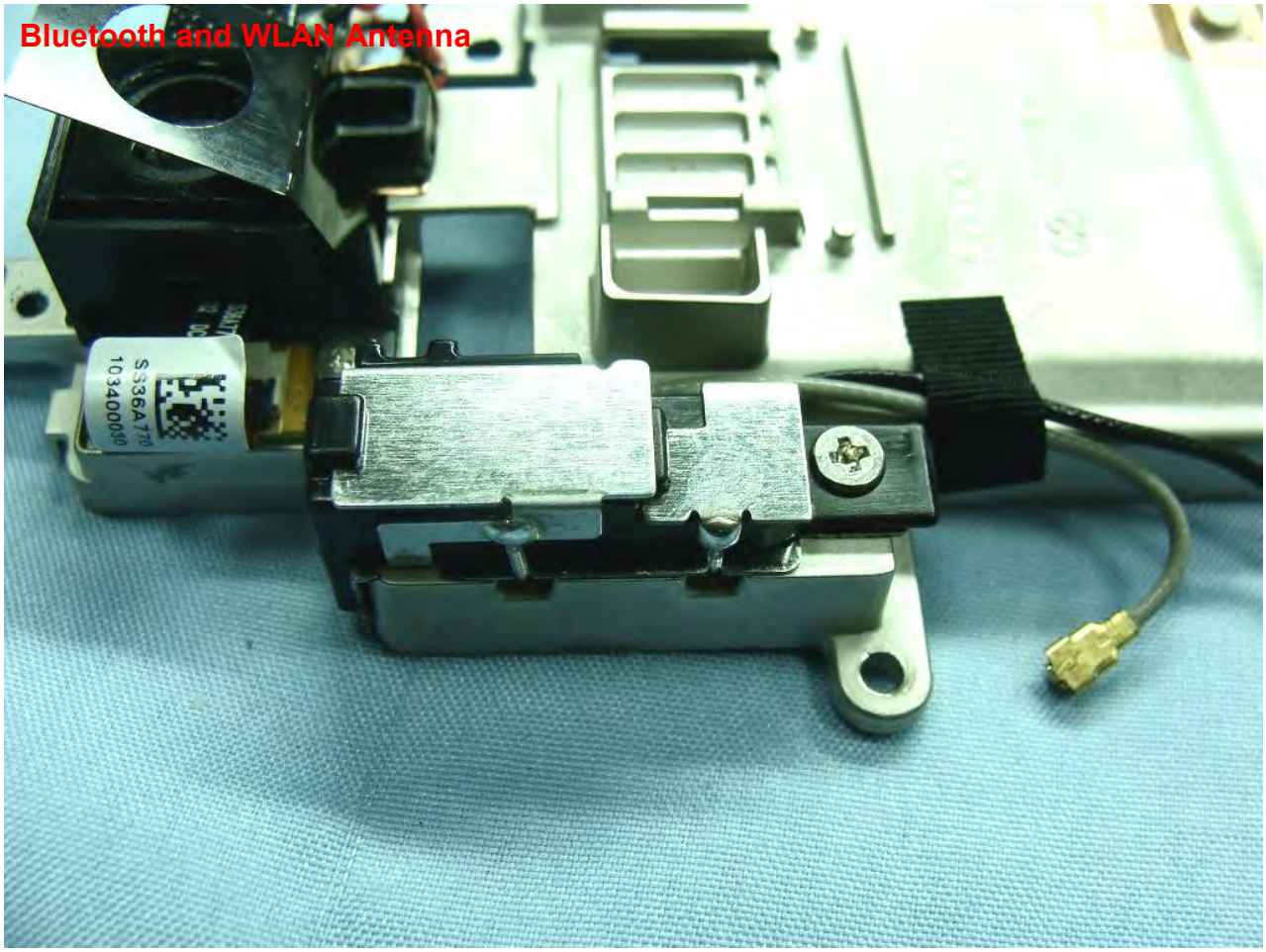

WWAN Main Antenna

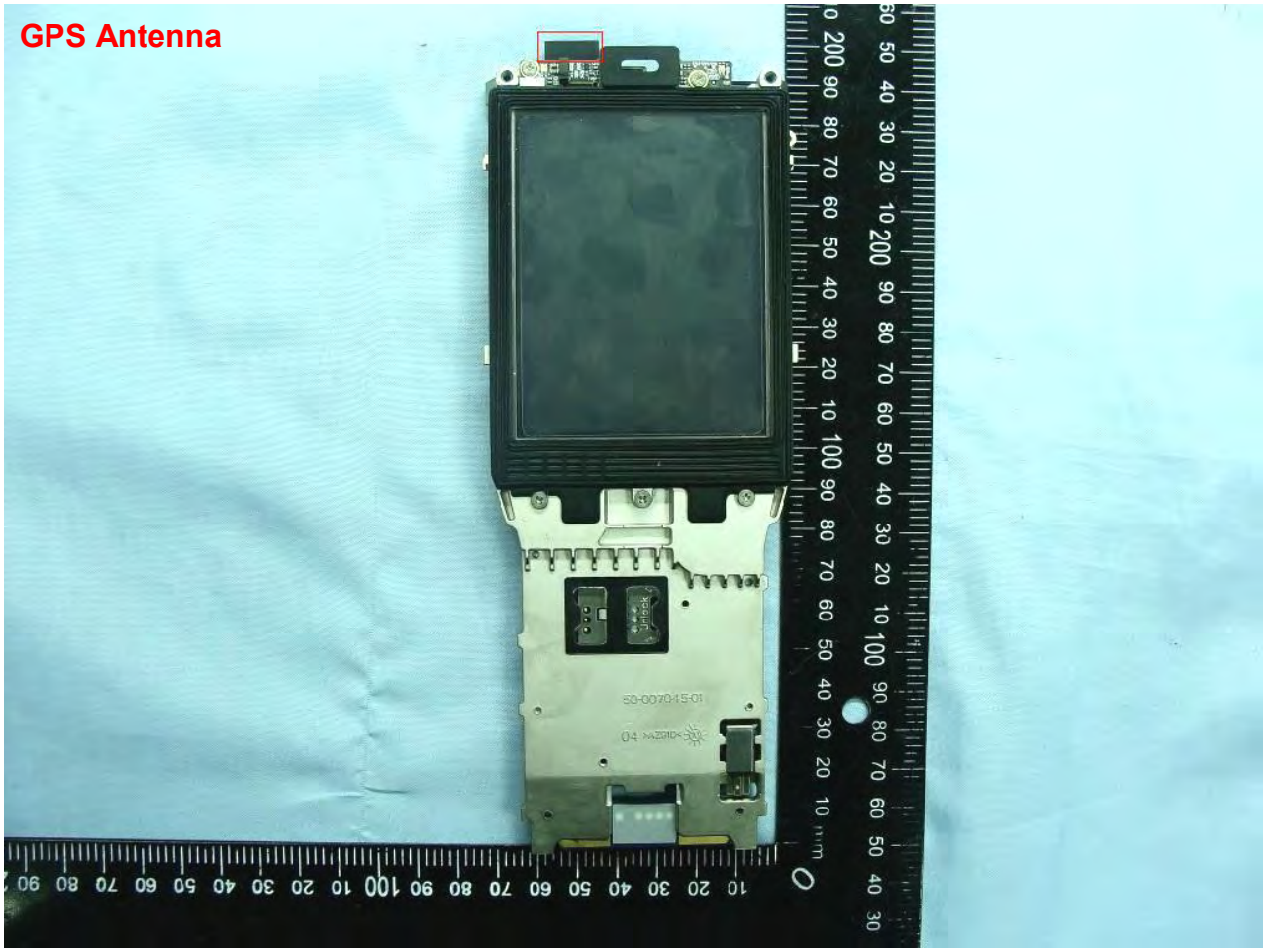

10 20 30 40 50 60 70
0 10 mm
70 60 50 40 30

WWAN Aux. Antenna






Bluetooth and WLAN Antenna


GPS Antenna

Appendix B. Setup Photographs

<Conducted Emission>

<Radiated Emission>