

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 E
CLASSIFICATION : Unlicensed National Information Infrastructure (UNII)

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. 17, 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 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 / Deputy Manager



SPORTON INTERNATIONAL INC.

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

SPORTON INTERNATIONAL INC.

TEL : 886-3-327-3456

FAX : 886-3-328-4978

FCC ID : HD599EXLG

Page Number : 1 of 30

Report Issued Date : Apr. 13, 2011

Report Version : Rev. 01



TABLE OF CONTENTS

REVISION HISTORY	3
SUMMARY OF TEST RESULT	4
1 GENERAL DESCRIPTION	5
1.1 Applicant	5
1.2 Manufacturer	5
1.3 Feature of Equipment Under Test	5
1.4 Testing Site	6
1.5 Applied Standards	6
1.6 Ancillary Equipment List	7
2 TEST CONFIGURATION OF EQUIPMENT UNDER TEST	8
2.1 Test Mode	8
2.2 Connection Diagram of Test System	9
2.3 RF Utility	9
3 TEST RESULT	10
3.1 Band Edges Measurement	10
3.2 AC Conducted Emission Measurement	13
3.3 Radiated Emission Measurement	17
3.4 Antenna Requirements	27
4 LIST OF MEASURING EQUIPMENTS	28
5 UNCERTAINTY OF EVALUATION	29
APPENDIX A. PHOTOGRAPHS OF EUT	
APPENDIX B. SETUP PHOTOGRAPHS	
APPENDIX C. ORIGINAL REPORT	



REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR0D0904-03B	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. FR0D0904C 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	15.407(b)	A9.3	Frequency Band Edges	$\leq -17, -27$ dBm (depend on band)&15.209(a)	Pass	-
3.2	15.207	Gen 7.2.2	AC Conducted Emission	15.207(a)	Pass	Under limit 15.2 dB at 0.35 MHz
3.3	15.407(b)	A9.3	Transmitter Radiated Emission	$\leq -17, -27$ dBm (depend on band)&15.209(a)	Pass	Under limit 7.99 dB at 34.86 MHz
3.4	15.203 & 15.407(a)	A9.2	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	5150 MHz ~ 5250 MHz 5250 MHz ~ 5350 MHz 5470 MHz ~ 5725 MHz
Antenna Type	PIFA Antenna with gain 3.5 dBi
HW Version	5
SW Version	26.02
Type of Modulation	OFDM (BPSK / QPSK / 16QAM / 64QAM)
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 Unlicensed National Information Infrastructure (UNII).
3. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.
4. 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 1 st 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 E
- FCC Public Notice DA 02-2138, (Measurement Guidelines of UNII)
- ANSI C63.4-2003
- IC RSS-210 Issued 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).

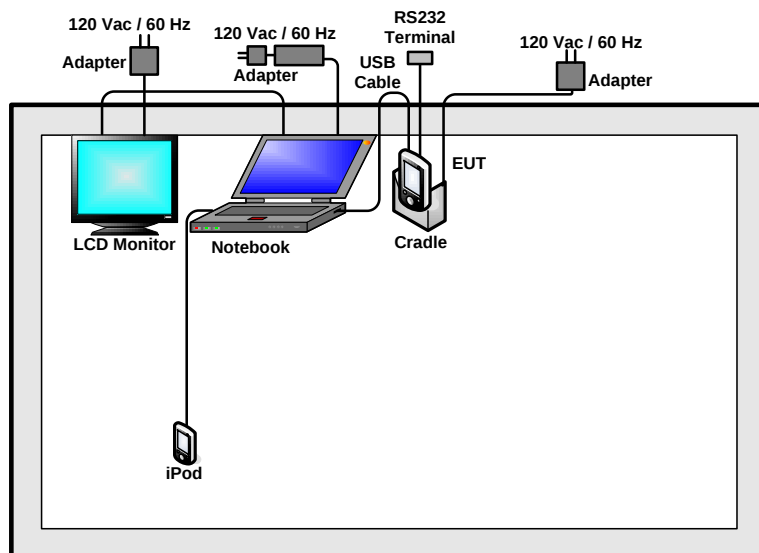
Pre-scanned tests were conducted to determine the final configuration from all possible combinations.

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

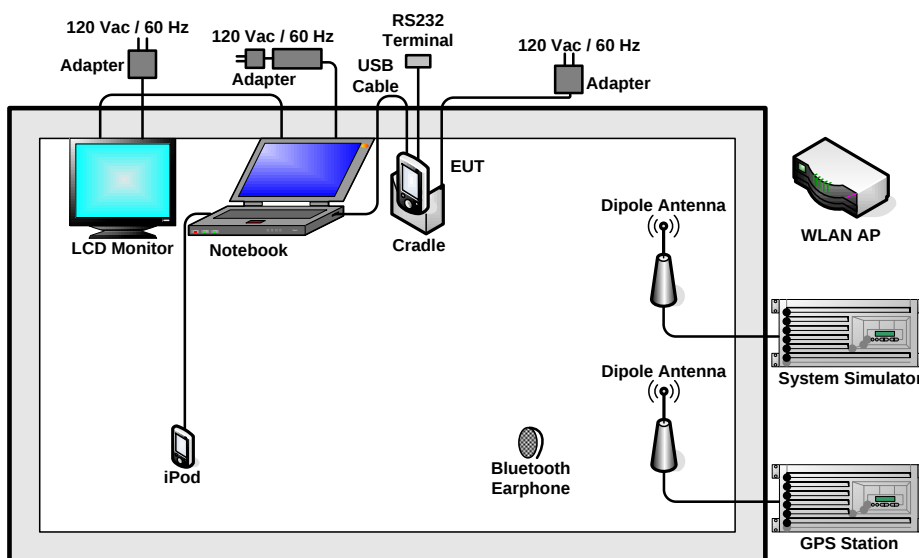
Test Cases	
Test Item	802.11a/n (Modulation : OFDM)
Radiated TCs	Mode 1: 802.11a_CH36_5180 MHz + TC for Sample 2 Mode 2: 802.11a_CH36_5180 MHz + TC for Sample 3 Mode 3: 802.11a_CH36_5180 MHz + TC for Sample 4
AC Conducted Emission	Mode 1 : WCDMA Band II Idle + Bluetooth Link + WLAN (5G) Link + GPS Rx + Scanner + Cradle + Adapter + RS232 Terminal + USB Cable (Link with Notebook) for Sample 2 Mode 2 : WCDMA Band II Idle + Bluetooth Link + WLAN (5G) 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 (5G) 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. The worst case of conducted emission is mode 3; only the test data of it was reported.	

2.2 Connection Diagram of Test System

<WLAN Tx Mode>



<AC Conducted Emission Mode>



2.3 RF Utility

The programmed RF Utility “TI1273 WLAN FCC” is installed in EUT to provide channel selection, power level, data rate and the application type. RF utility can send transmitting signal for all testing. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product.

3 Test Result

3.1 Band Edges Measurement

3.1.1 Limit of Band Edges

- (1) For transmitters operating in the 5.15–5.25 GHz band: all emissions outside of the 5.15–5.35 GHz band shall not exceed an EIRP of –27 dBm/MHz. For transmitters operating in the 5.25–5.35 GHz band: all emissions outside of the 5.15–5.35 GHz band shall not exceed an EIRP of –27 dBm/MHz. Devices operating in the 5.25–5.35 GHz band that generate emissions in the 5.15–5.25 GHz band must meet all applicable technical requirements for operation in the 5.15–5.25 GHz band (including indoor use) or alternatively meet an out-of-band emission EIRP limit of –27 dBm/MHz in the 5.15–5.25 GHz band. For transmitters operating in the 5.47–5.725 GHz band: all emissions outside of the 5.47–5.725 GHz band shall not exceed an EIRP of –27 dBm/MHz.
- (2) The provisions of Section 15.205 Restricted bands of operation of this part apply to intentional radiators operating under this section.

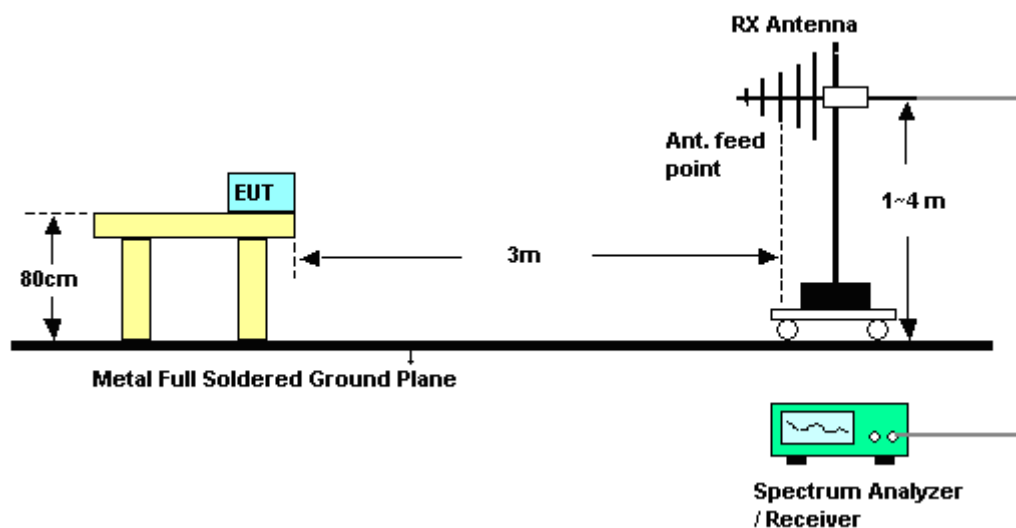
3.1.2 Measuring Instruments

See list of measuring instruments of this test report.

3.1.3 Test Procedures

1. Set both RBW and VBW of spectrum analyzer to 1MHz with convenient frequency span including 1MHz bandwidth from band edge.
2. The band edges was measured and recorded.

3.1.4 Test Setup



3.1.5 Test Result of Radiated Band Edges

Test Mode :	Mode 1	Temperature :	23~24°C
Test Band :	802.11a	Relative Humidity :	49~50%
Test Channel :	36	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
5150	61.68	-12.32	74	51.67	34.25	9.41	33.65	100	295	Peak
5150	43.75	-10.25	54	33.74	34.25	9.41	33.65	100	295	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
5150	62.15	-11.85	74	52.14	34.25	9.41	33.65	101	30	Peak
5150	44.24	-9.76	54	34.23	34.25	9.41	33.65	101	30	Average



Test Mode :	Mode 2	Temperature :	23~24°C
Test Band :	802.11a	Relative Humidity :	49~50%
Test Channel :	36	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
5150	64.31	-9.69	74	54.3	34.25	9.41	33.65	105	256	Peak
5150	43.88	-10.12	54	33.87	34.25	9.41	33.65	105	256	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
5150	64.98	-9.02	74	54.97	34.25	9.41	33.65	124	24	Peak
5150	45.42	-8.58	54	35.41	34.25	9.41	33.65	124	24	Average

Test Mode :	Mode 3	Temperature :	23~24°C
Test Band :	802.11a	Relative Humidity :	49~50%
Test Channel :	36	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
5150	63.79	-10.21	74	53.78	34.25	9.41	33.65	104	261	Peak
5150	43.89	-10.11	54	33.88	34.25	9.41	33.65	104	261	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
5150	62.03	-11.97	74	52.02	34.25	9.41	33.65	113	30	Peak
5150	43.82	-10.18	54	33.81	34.25	9.41	33.65	113	30	Average

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.

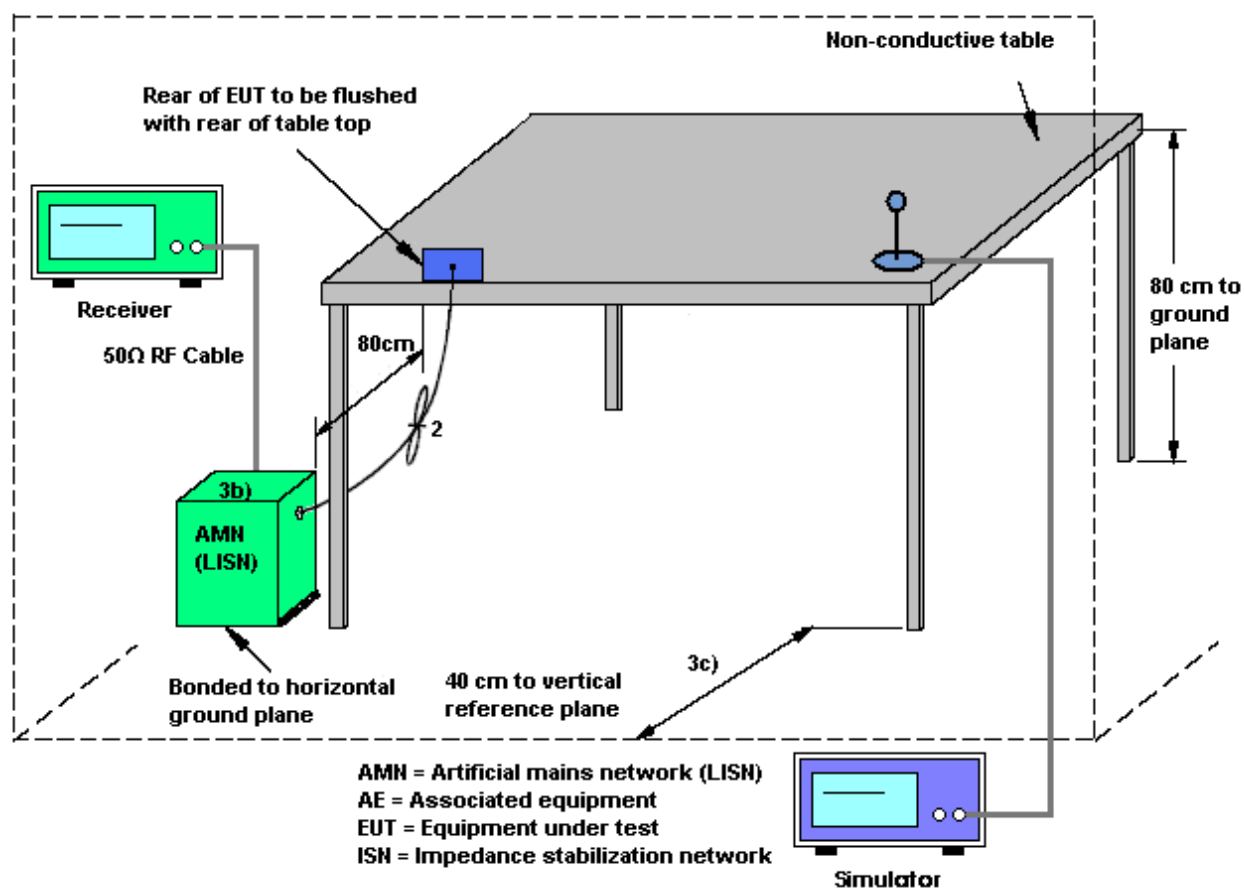
3.2.2 Measuring Instruments

See list of measuring instruments of this test report.

3.2.3 Test Procedures

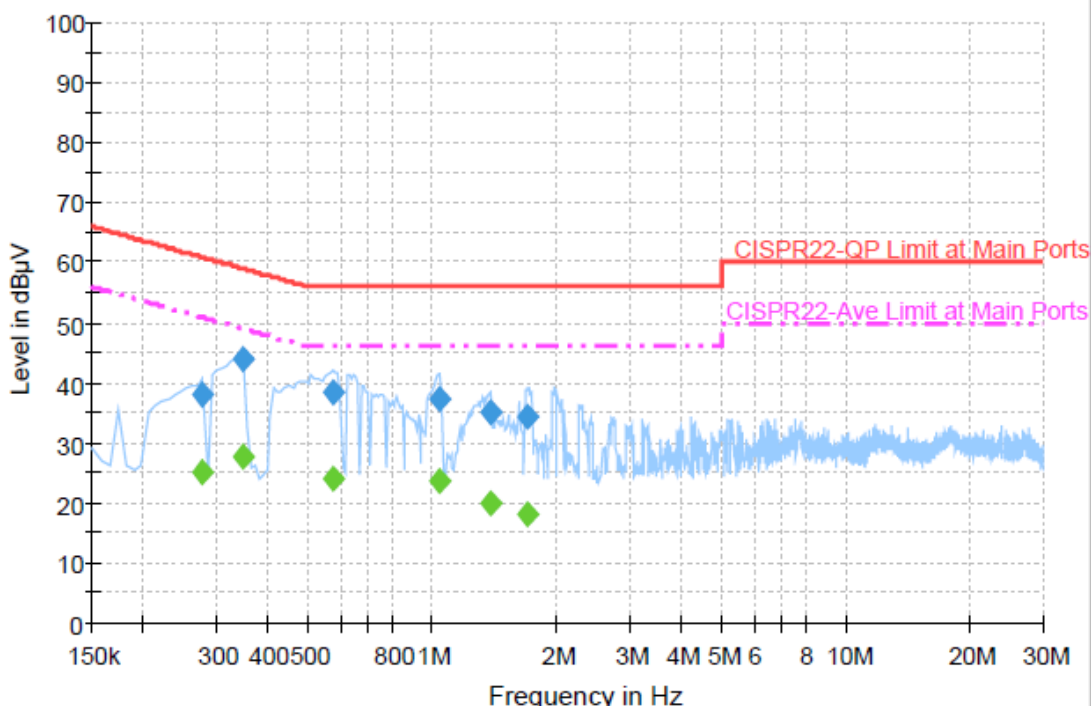
1. Please follow the guidelines in ANSI C63.4-2003.
2. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
3. Connect EUT to the power mains through a line impedance stabilization network (LISN).
4. All 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.

3.2.4 Test Setup



3.2.5 Test Result of AC Conducted Emission

Test Mode :	Mode 3	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 (5G) Link + GPS Rx + Scanner + Cradle + Adapter + RS232 Terminal + USB Cable (Link with Notebook) for Sample 4		
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		

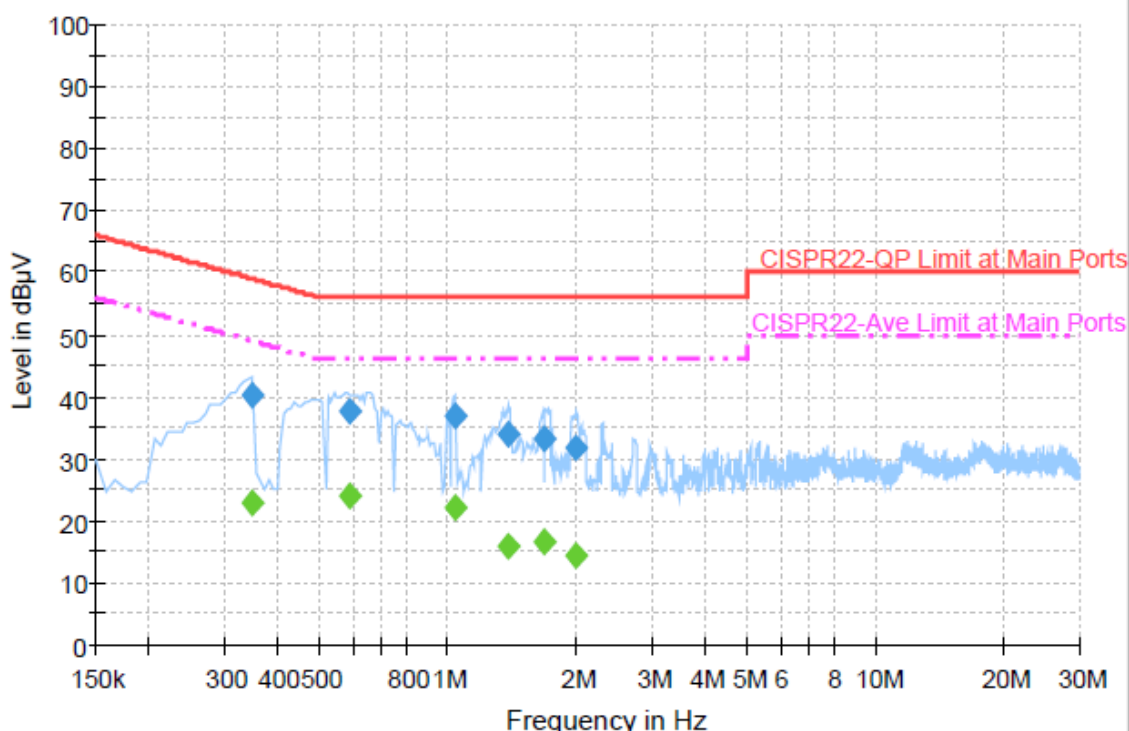

Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.278000	38.1	Off	L1	19.3	22.8	60.9
0.350000	43.8	Off	L1	19.3	15.2	59.0
0.574000	38.5	Off	L1	19.3	17.5	56.0
1.046000	37.4	Off	L1	19.4	18.6	56.0
1.390000	34.9	Off	L1	19.4	21.1	56.0
1.702000	34.4	Off	L1	19.4	21.6	56.0

Final Result 2

Frequency (MHz)	Average (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.278000	25.1	Off	L1	19.3	25.8	50.9
0.350000	27.7	Off	L1	19.3	21.3	49.0
0.574000	24.1	Off	L1	19.3	21.9	46.0
1.046000	23.7	Off	L1	19.4	22.3	46.0
1.390000	20.1	Off	L1	19.4	25.9	46.0
1.702000	18.0	Off	L1	19.4	28.0	46.0

Test Mode :	Mode 3	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 (5G) Link + GPS Rx + Scanner + Cradle + Adapter + RS232 Terminal + USB Cable (Link with Notebook) for Sample 4		
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	40.1	Off	N	19.3	18.9	59.0
0.590000	37.6	Off	N	19.3	18.4	56.0
1.038000	37.1	Off	N	19.4	18.9	56.0
1.382000	33.9	Off	N	19.5	22.1	56.0
1.686000	33.2	Off	N	19.5	22.8	56.0
1.998000	31.6	Off	N	19.5	24.4	56.0

Final Result 2

Frequency (MHz)	Average (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.350000	22.9	Off	N	19.3	26.1	49.0
0.590000	23.9	Off	N	19.3	22.1	46.0
1.038000	22.3	Off	N	19.4	23.7	46.0
1.382000	15.7	Off	N	19.5	30.3	46.0
1.686000	16.7	Off	N	19.5	29.3	46.0
1.998000	14.5	Off	N	19.5	31.5	46.0

3.3 Radiated Emission Measurement

3.3.1 Limit of Radiated Emission

Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in § 15.209.

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

- (1) For transmitters operating in the 5.15–5.25 GHz band: all emissions outside of the 5.15–5.35 GHz band shall not exceed an EIRP of –27 dBm/MHz.
- (2) For transmitters operating in the 5.25–5.35 GHz band: all emissions outside of the 5.15–5.35 GHz band shall not exceed an EIRP of –27 dBm/MHz. Devices operating in the 5.25–5.35 GHz band that generate emissions in the 5.15–5.25 GHz band must meet all applicable technical requirements for operation in the 5.15–5.25 GHz band (including indoor use) or alternatively meet an out-of-band emission EIRP limit of –27 dBm/MHz in the 5.15–5.25 GHz band.
- (3) For transmitters operating in the 5.47–5.725 GHz band: all emissions outside of the 5.47–5.725 GHz band shall not exceed an EIRP of –27 dBm/MHz.
- (4) The provisions of Section 15.205 Restricted bands of operation of this part apply to intentional radiators operating under this section.

3.3.2 Measuring Instruments

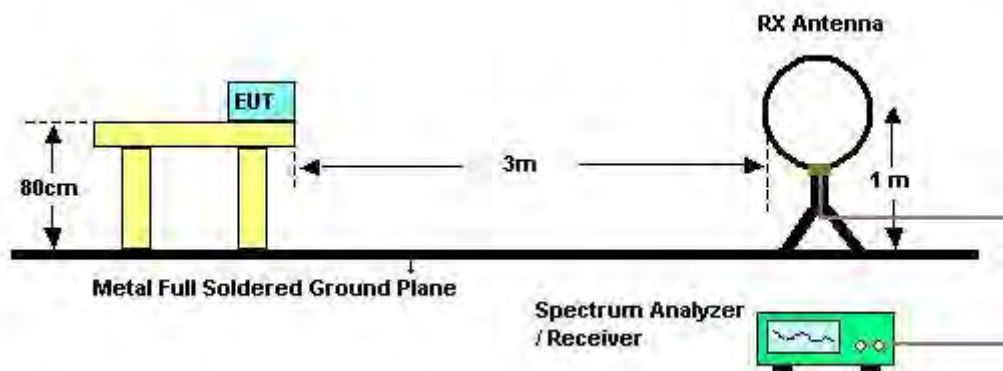
See list of measuring instruments of this test report.

3.3.3 Test Procedures

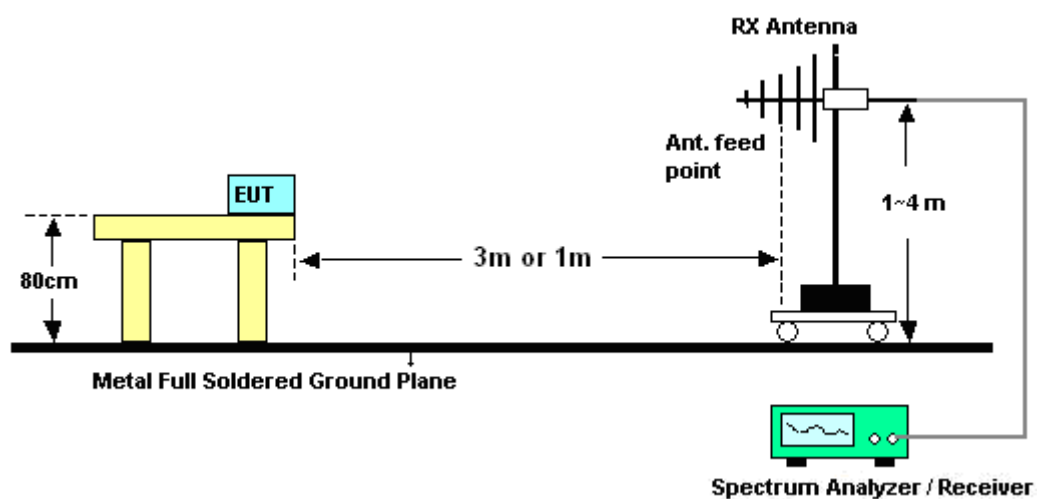
1. The testing follows the guidelines in FCC Public Notice DA 02-2138, (Measurement Guidelines of UNII)
2. The EUT was placed on a rotatable table top 0.8 meter above ground.
3. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
4. The table was rotated 360 degrees to determine the position of the highest radiation.
5. The antenna is a broadband antenna and its height is adjusted between one meter and four meters above ground to find the maximum value of the field strength for both horizontal polarization and vertical polarization of the antenna.
6. For each suspected emission, the EUT was arranged to its worst case and then adjust the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading.
7. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function and specified bandwidth with Maximum Hold Mode.
8. For testing below 1GHz, If the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be repeated one by one using the quasi-peak method and reported.
9. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in average mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

3.3.4 Test Setup

For radiated emissions below 30MHz



For radiated emissions above 30MHz



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

Temperature	23~24°C	Humidity	49~50%
Test Engineer	Ivan Jiang		

Freq. (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 = $40 \log (\text{specific distance} / \text{test distance})$ (dB);

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

3.3.6 Test Result of Radiated Emission (30MHz ~ 25GHz)

Test Mode :	Mode 1	Temperature :	23~24°C
Test Channel :	36	Relative Humidity :	49~50%
Test Engineer :	Ivan Jiang	Polarization :	Horizontal
Remark :	5180 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
173.1	27.01	-16.49	43.5	47.76	9.53	1.24	31.52	-	-	Peak
207.93	33.59	-9.91	43.5	54.06	9.65	1.35	31.47	124	310	Peak
298.65	35.39	-10.61	46	51.52	13.44	1.76	31.33	-	-	Peak
310.5	34.16	-11.84	46	49.9	13.79	1.79	31.32	-	-	Peak
363	33.1	-12.9	46	46.88	15.42	2.07	31.27	-	-	Peak
889.4	33.8	-12.2	46	37.67	23.51	3.33	30.71	-	-	Peak
5150	43.75	-10.25	54	33.74	34.25	9.41	33.65	100	295	Average
5150	61.68	-12.32	74	51.67	34.25	9.41	33.65	100	295	Peak
5180	99.27	-	-	89.14	34.28	9.45	33.6	100	295	Average
5180	110.46	-	-	100.33	34.28	9.45	33.6	100	295	Peak
5350	54.11	-19.89	74	43.18	34.45	9.74	33.26	100	295	Peak
5350	40.59	-13.41	54	29.66	34.45	9.74	33.26	100	295	Average



Test Mode :	Mode 1	Temperature :	23~24°C
Test Channel :	36	Relative Humidity :	49~50%
Test Engineer :	Ivan Jiang	Polarization :	Vertical
Remark :	5180 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
38.1	31.24	-8.76	40	48.22	13.91	0.6	31.49	-	-	Peak
188.49	35.27	-8.23	43.5	56.45	9.06	1.27	31.51	141	178	Peak
232.5	34.18	-11.82	46	52.68	11.43	1.5	31.43	-	-	Peak
344.1	33.72	-12.28	46	48.25	14.84	1.92	31.29	-	-	Peak
388.2	31.54	-14.46	46	44.44	16.2	2.12	31.22	-	-	Peak
749.4	32.57	-13.43	46	38.54	21.67	3.06	30.7	-	-	Peak
5150	44.24	-9.76	54	34.23	34.25	9.41	33.65	101	30	Average
5150	62.15	-11.85	74	52.14	34.25	9.41	33.65	101	30	Peak
5180	100.1	-	-	89.97	34.28	9.45	33.6	101	30	Average
5180	110.68	-	-	100.55	34.28	9.45	33.6	101	30	Peak
5350	52.02	-21.98	74	41.09	34.45	9.74	33.26	101	30	Peak
5350	40.36	-13.64	54	29.43	34.45	9.74	33.26	101	30	Average



Test Mode :	Mode 2	Temperature :	23~24°C
Test Channel :	36	Relative Humidity :	49~50%
Test Engineer :	Ivan Jiang	Polarization :	Horizontal
Remark :	5180 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
162.57	29.3	-14.2	43.5	49.4	10.2	1.22	31.52	-	-	Peak
195.78	31.25	-12.25	43.5	52.35	9.09	1.3	31.49	-	-	Peak
293.25	35.21	-10.79	46	51.47	13.35	1.71	31.32	131	254	Peak
310.5	34.29	-11.71	46	50.03	13.79	1.79	31.32	-	-	Peak
813.8	31.74	-14.26	46	36.62	22.63	3.18	30.69	-	-	Peak
886.6	31.35	-14.65	46	35.27	23.47	3.32	30.71	-	-	Peak
5150	64.31	-9.69	74	54.3	34.25	9.41	33.65	105	256	Peak
5150	43.88	-10.12	54	33.87	34.25	9.41	33.65	105	256	Average
5180	110.97	-	-	100.84	34.28	9.45	33.6	105	256	Peak
5180	99.6	-	-	89.47	34.28	9.45	33.6	105	256	Average
5350	40.35	-13.65	54	29.42	34.45	9.74	33.26	105	256	Average
5350	52.42	-21.58	74	41.49	34.45	9.74	33.26	105	256	Peak



Test Mode :	Mode 2	Temperature :	23~24°C
Test Channel :	36	Relative Humidity :	49~50%
Test Engineer :	Ivan Jiang	Polarization :	Vertical
Remark :	5180 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
34.86	32.01	-7.99	40	47.57	15.33	0.58	31.47	110	87	Peak
75.9	28.62	-11.38	40	52.5	6.8	0.86	31.54	-	-	Peak
225.21	35.12	-10.88	46	54.23	10.89	1.45	31.45	-	-	Peak
313.3	30.39	-15.61	46	46.03	13.88	1.8	31.32	-	-	Peak
566	26.54	-19.46	46	35.65	19.25	2.6	30.96	-	-	Peak
836.9	32.1	-13.9	46	36.68	22.9	3.24	30.72	-	-	Peak
5150	45.42	-8.58	54	35.41	34.25	9.41	33.65	124	24	Average
5150	64.98	-9.02	74	54.97	34.25	9.41	33.65	124	24	Peak
5180	101.98	-	-	91.85	34.28	9.45	33.6	124	24	Average
5180	112.95	-	-	102.82	34.28	9.45	33.6	124	24	Peak
5350	52.69	-21.31	74	41.76	34.45	9.74	33.26	124	24	Peak
5350	40.24	-13.76	54	29.31	34.45	9.74	33.26	124	24	Average



Test Mode :	Mode 3	Temperature :	23~24°C
Test Channel :	36	Relative Humidity :	49~50%
Test Engineer :	Ivan Jiang	Polarization :	Horizontal
Remark :	5180 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
121.26	28.78	-14.72	43.5	47.69	11.54	1.11	31.56	-	-	Peak
232.77	29.28	-16.72	46	47.78	11.43	1.5	31.43	-	-	Peak
297.3	34.97	-11.03	46	51.12	13.43	1.75	31.33	-	-	Peak
330.1	35.01	-10.99	46	50.08	14.39	1.85	31.31	144	351	Peak
778.1	31.87	-14.13	46	37.34	22.12	3.1	30.69	-	-	Peak
934.9	32.55	-13.45	46	35.67	24.07	3.42	30.61	-	-	Peak
5150	43.89	-10.11	54	33.88	34.25	9.41	33.65	104	261	Average
5150	63.79	-10.21	74	53.78	34.25	9.41	33.65	104	261	Peak
5180	99.49	-	-	89.36	34.28	9.45	33.6	104	261	Average
5180	110.77	-	-	100.64	34.28	9.45	33.6	104	261	Peak
5350	52.56	-21.44	74	41.63	34.45	9.74	33.26	104	261	Peak
5350	40.61	-13.39	54	29.68	34.45	9.74	33.26	104	261	Average



Test Mode :	Mode 3	Temperature :	23~24°C
Test Channel :	36	Relative Humidity :	49~50%
Test Engineer :	Ivan Jiang	Polarization :	Vertical
Remark :	5180 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
33.78	30.19	-9.81	40	45.52	15.57	0.57	31.47	-	-	Peak
198.21	34.32	-9.18	43.5	55.41	9.09	1.31	31.49	121	145	Peak
234.93	33.46	-12.54	46	51.82	11.57	1.5	31.43	-	-	Peak
354.6	31.21	-14.79	46	45.29	15.18	2.02	31.28	-	-	Peak
565.3	26.96	-19.04	46	36.1	19.23	2.59	30.96	-	-	Peak
820.1	32.95	-13.05	46	37.75	22.71	3.19	30.7	-	-	Peak
1332	53.44	-20.56	74	55.35	27.84	4.31	34.06	100	212	Peak
1332	33.44	-20.56	54	35.35	27.84	4.31	34.06	100	212	Average
5150	43.82	-10.18	54	33.81	34.25	9.41	33.65	113	30	Average
5150	62.03	-11.97	74	52.02	34.25	9.41	33.65	113	30	Peak
5180	100.7	-	-	90.57	34.28	9.45	33.6	113	30	Average
5180	111.25	-	-	101.12	34.28	9.45	33.6	113	30	Peak
5350	51.82	-22.18	74	40.89	34.45	9.74	33.26	113	30	Peak
5350	40.02	-13.98	54	29.09	34.45	9.74	33.26	113	30	Average



3.4 Antenna Requirements

3.4.1 Standard Applicable

According to FCC 47 CFR Section 15.407(a)(1)(2), if transmitting antenna directional gain is greater than 6 dBi, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

3.4.2 Antenna Connected Construction

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

3.4.3 Antenna Gain

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

4 List of Measuring Equipments

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)
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 (150kHz ~ 30MHz)

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 $U_c(y)$	1.13		
Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_c(y)$)	2.26		

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

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 $U_c(y)$	1.27		
Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_c(y)$)	2.54		

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

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 $\Gamma_1 = 0.197$ Antenna VSWR $\Gamma_2 = 0.194$ Uncertainty = $20\text{Log}(1-\Gamma_1*\Gamma_2)$	+0.34 / -0.35	U-Shape	0.244	1	0.244
Combined Standard Uncertainty $U_c(y)$	2.36				
Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_c(y)$)	4.72				



Appendix A. Photographs of EUT

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



1. External Photograph of EUT

Sample 1





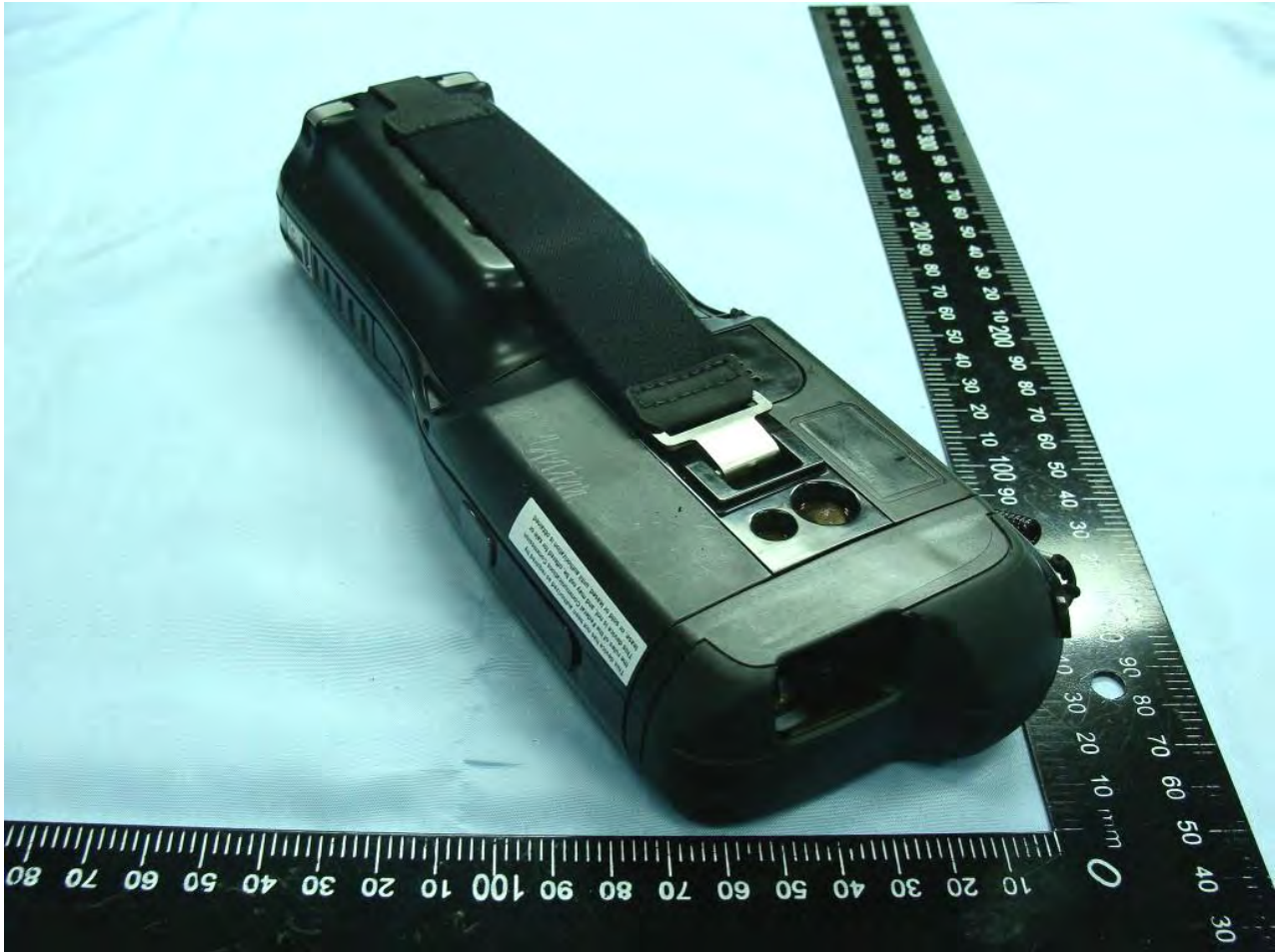
Sample 2





Sample 3







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





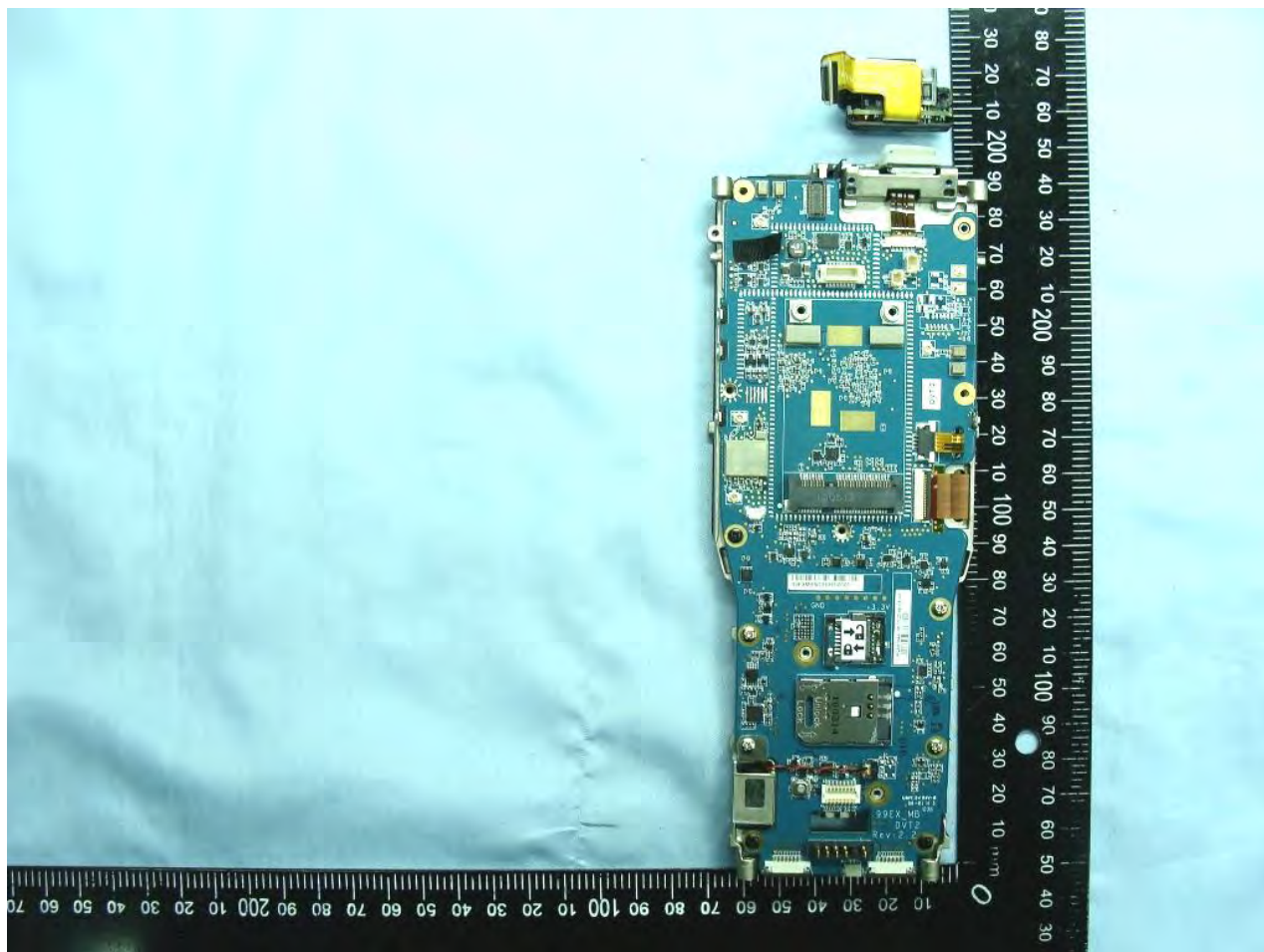
Holster 2

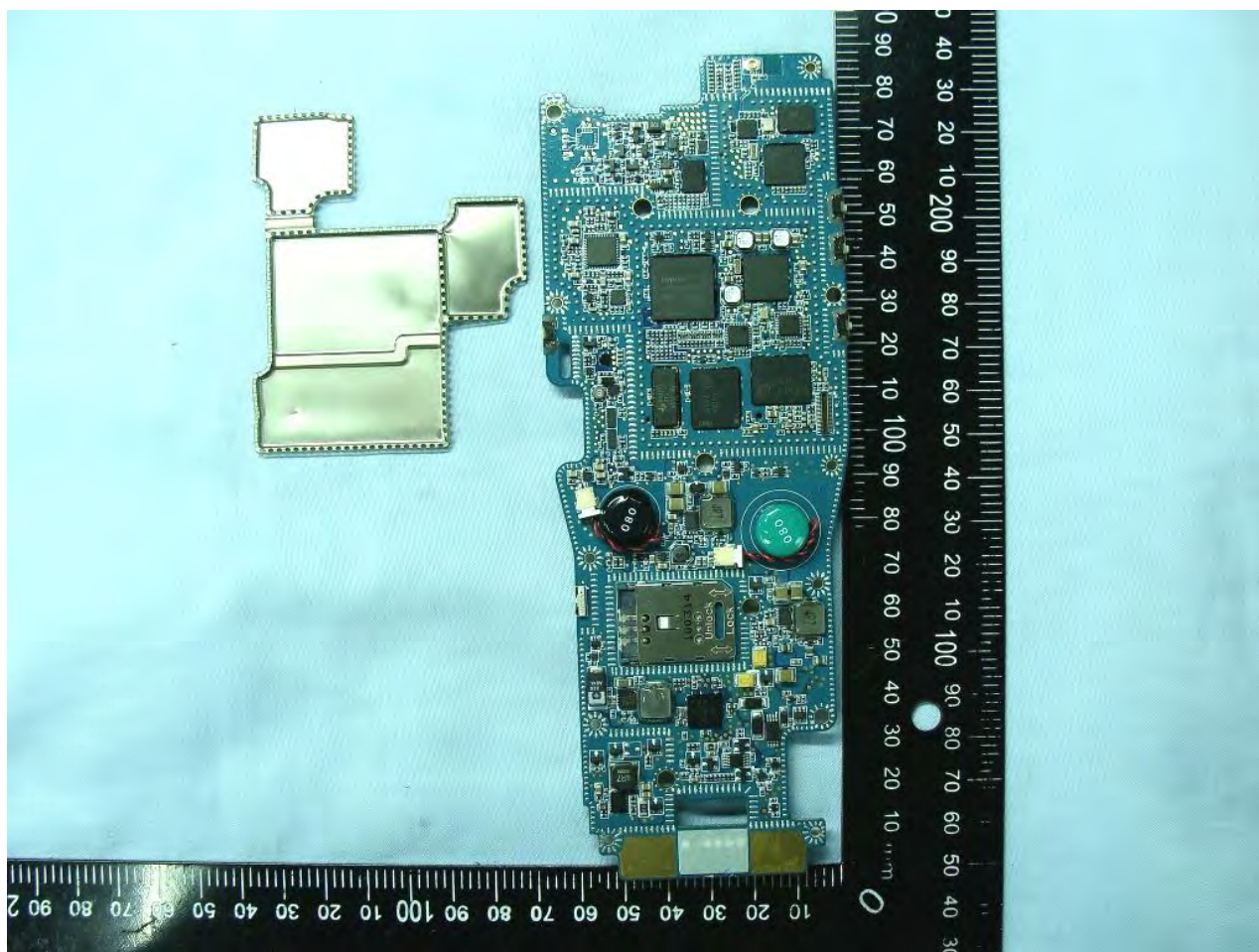




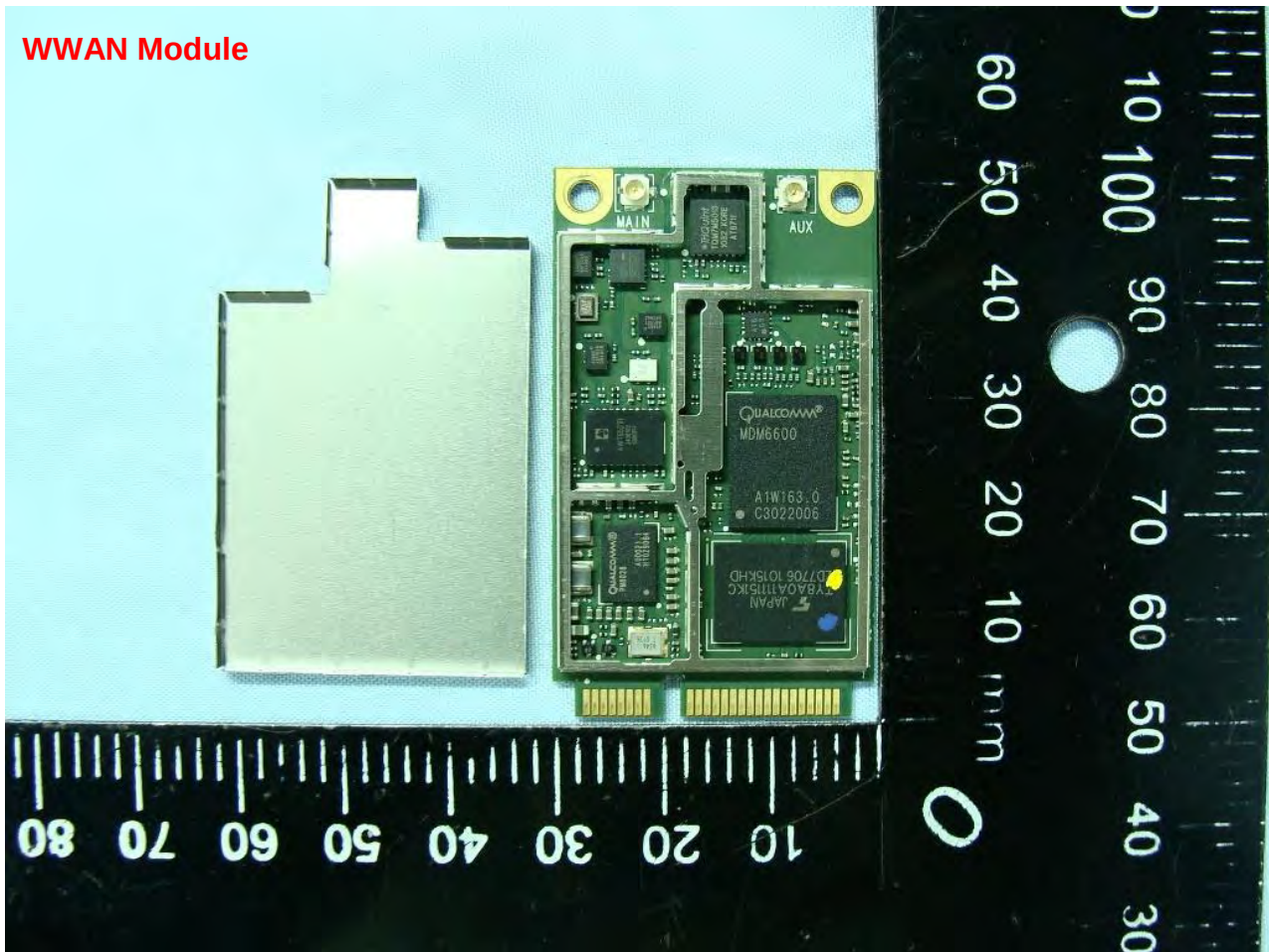


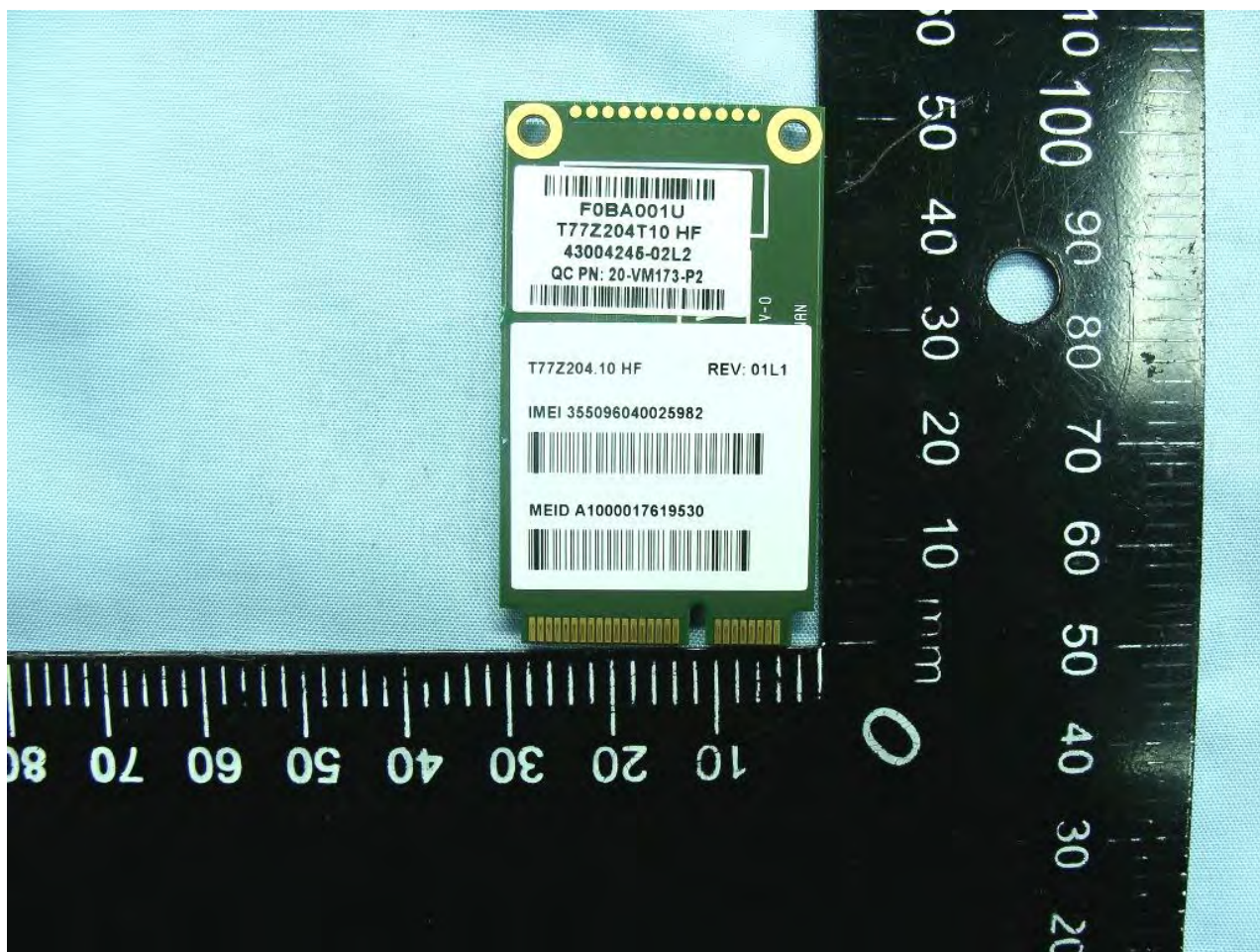
3. Internal Photograph of EUT

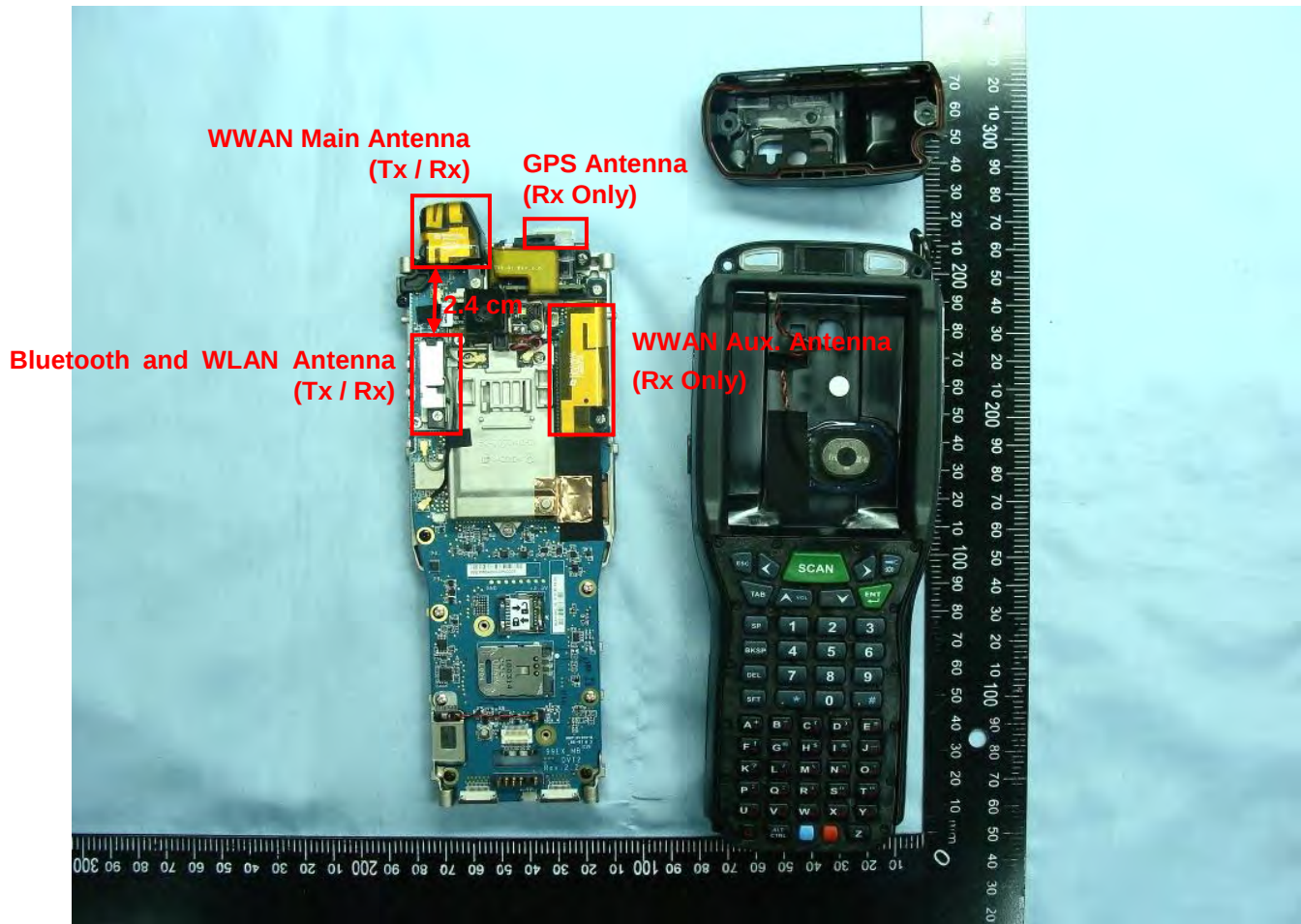




WWAN Module

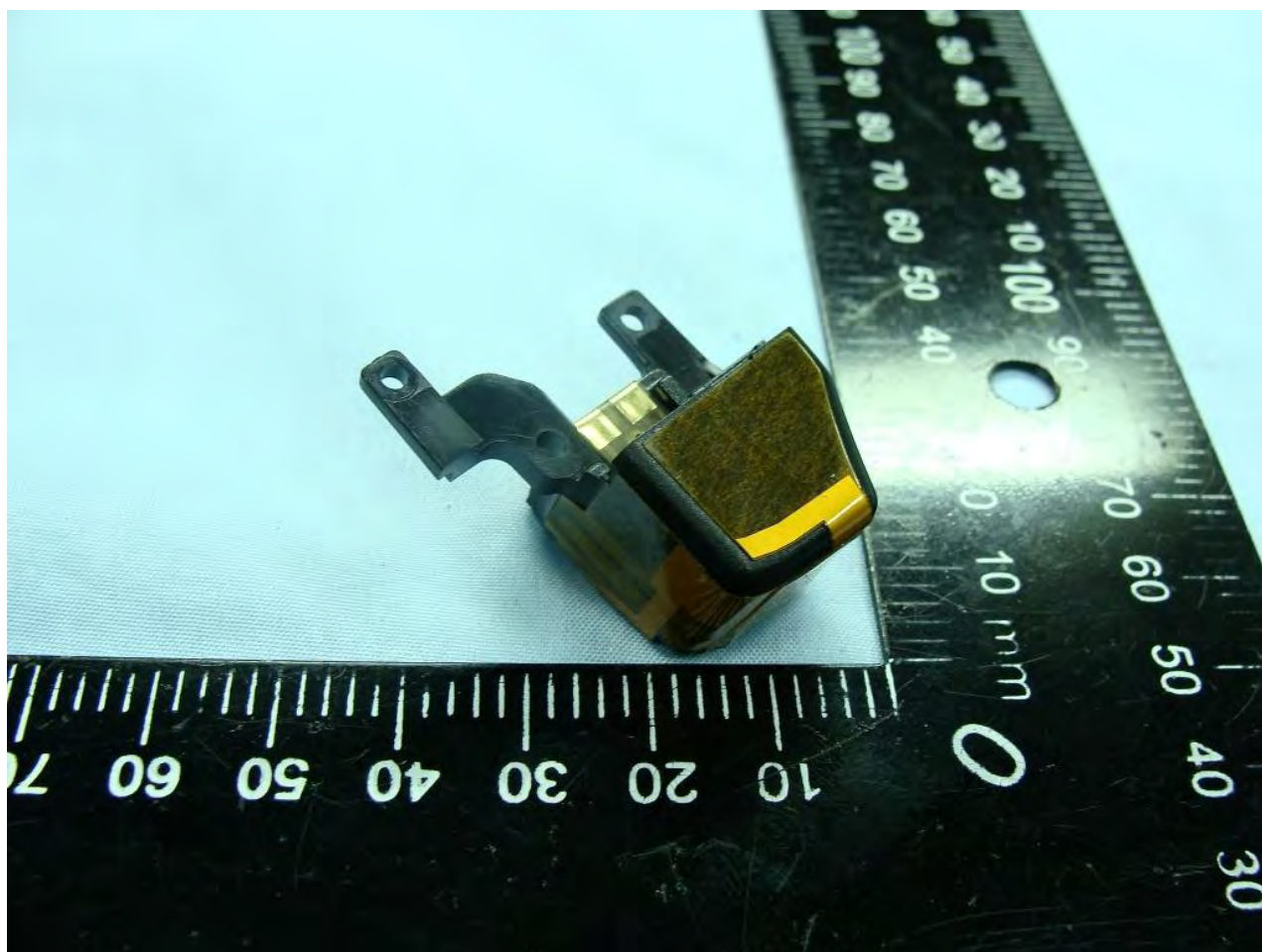






WWAN Main Antenna

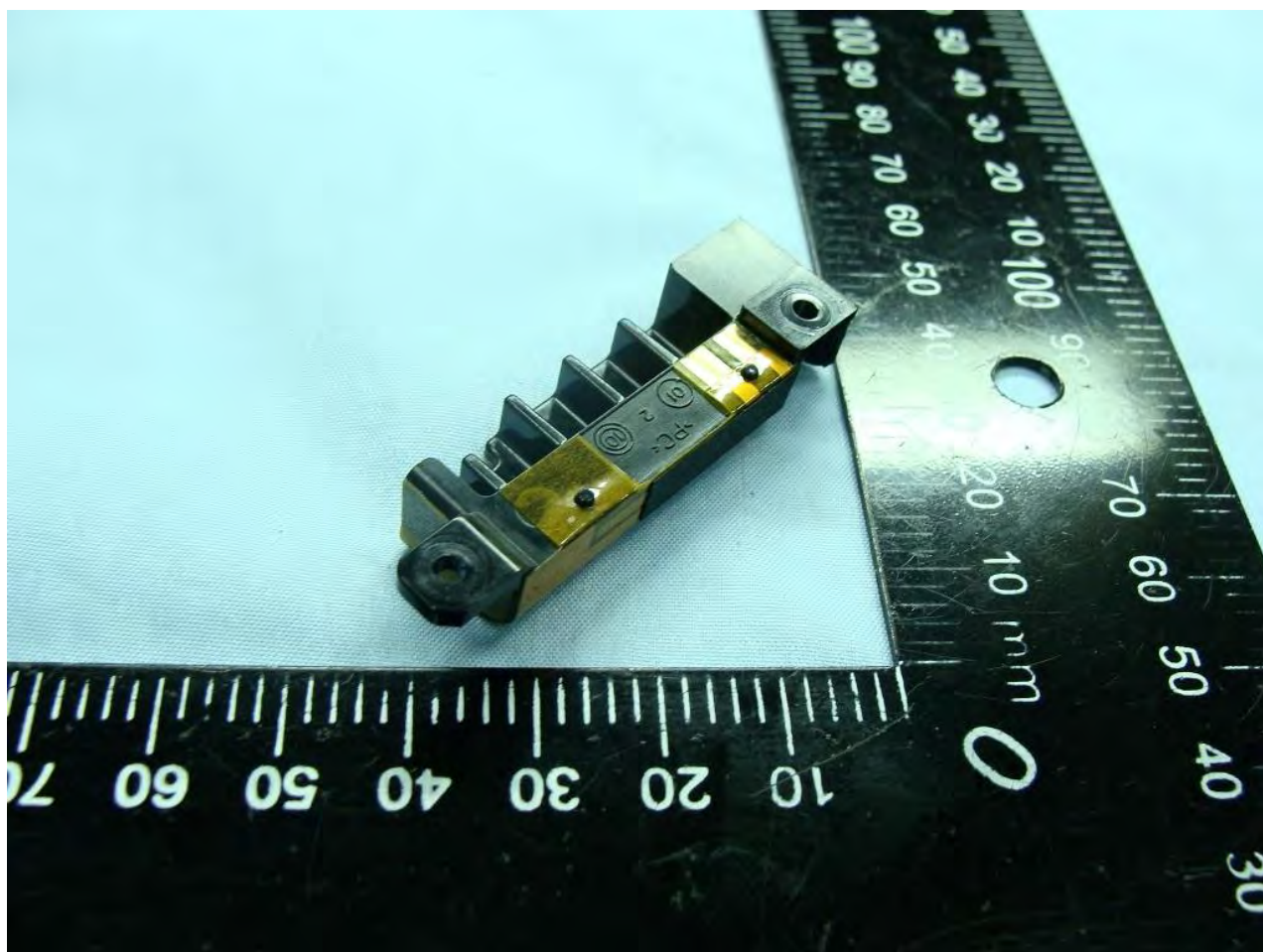




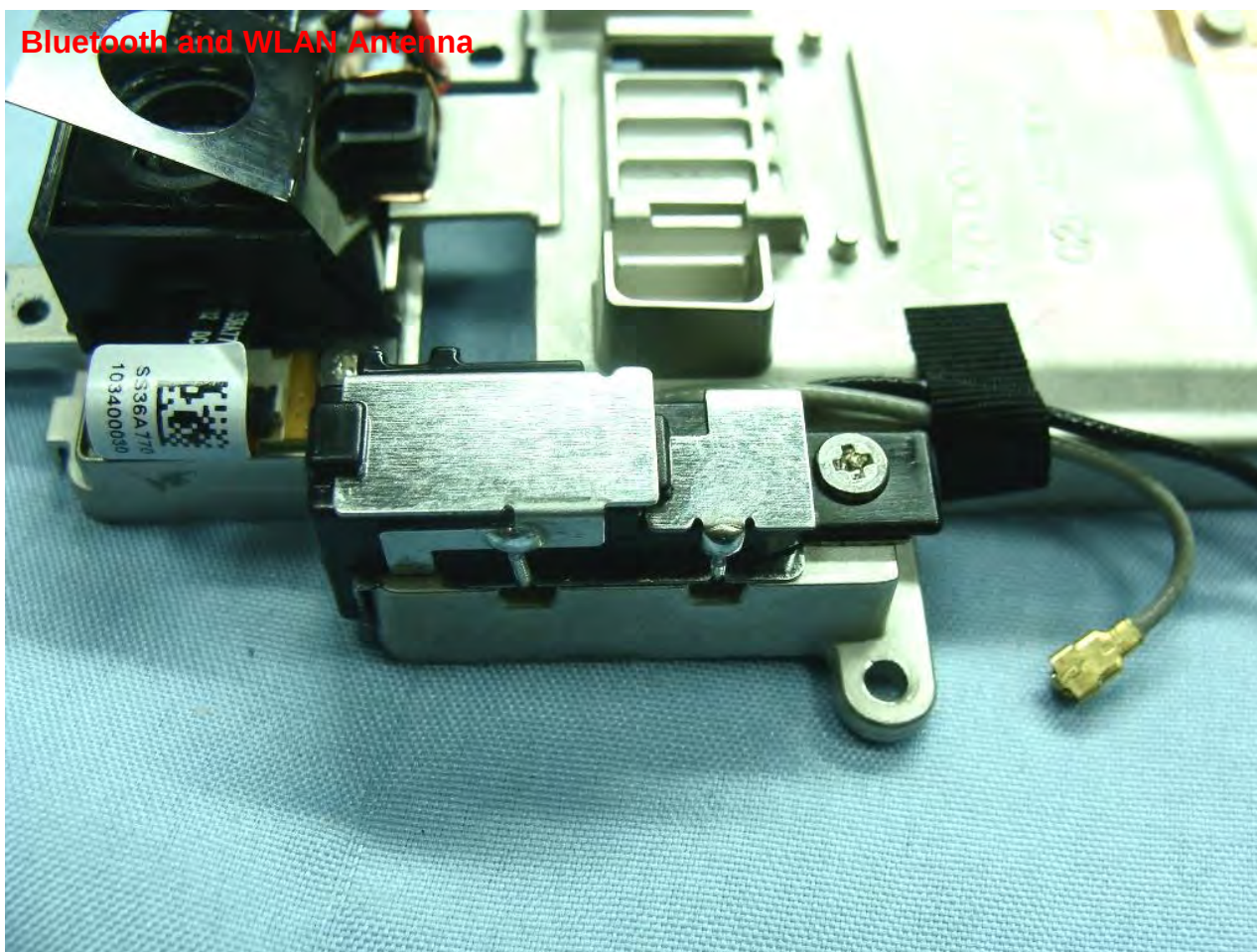


WWAN Aux. Antenna



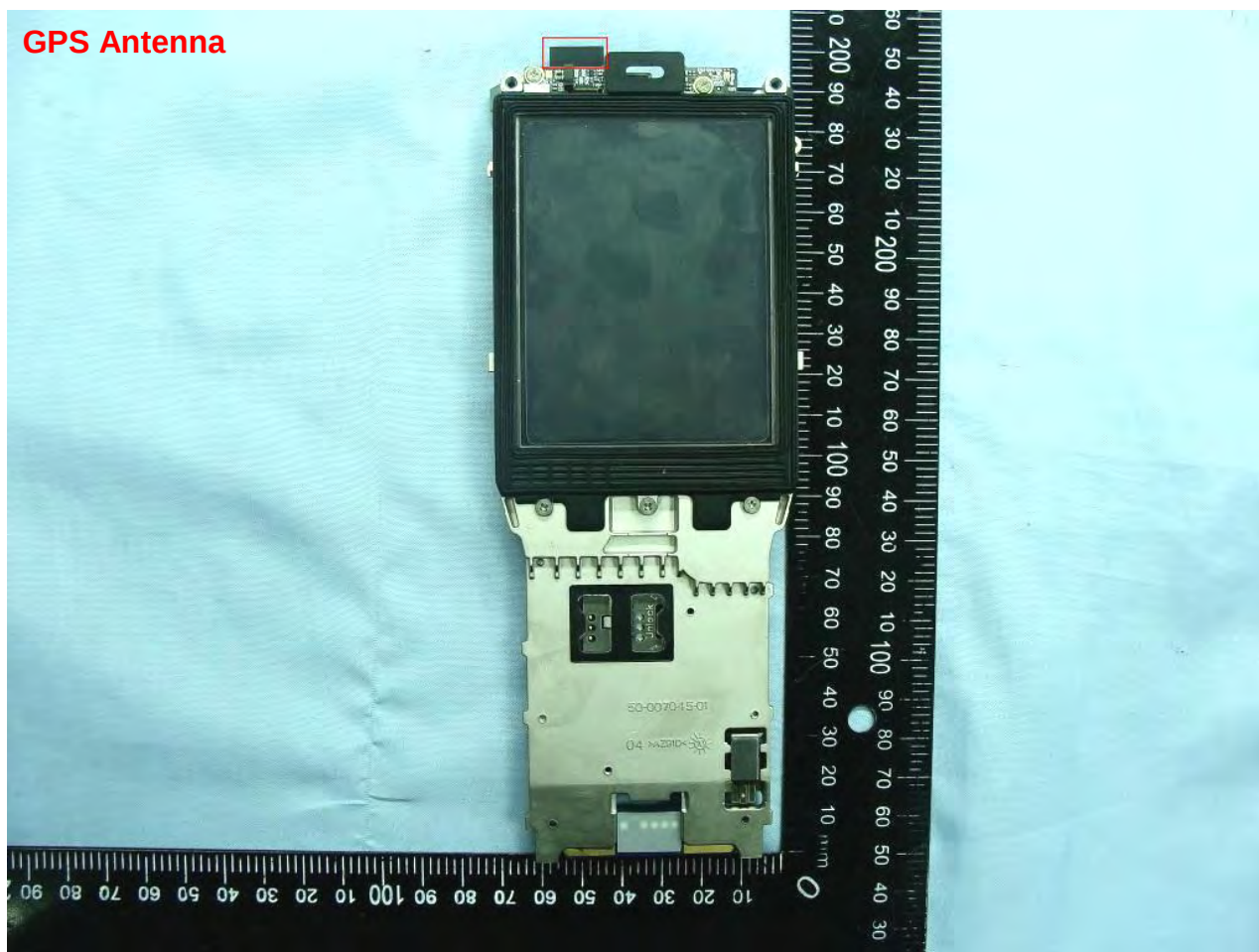


Bluetooth and WLAN Antenna





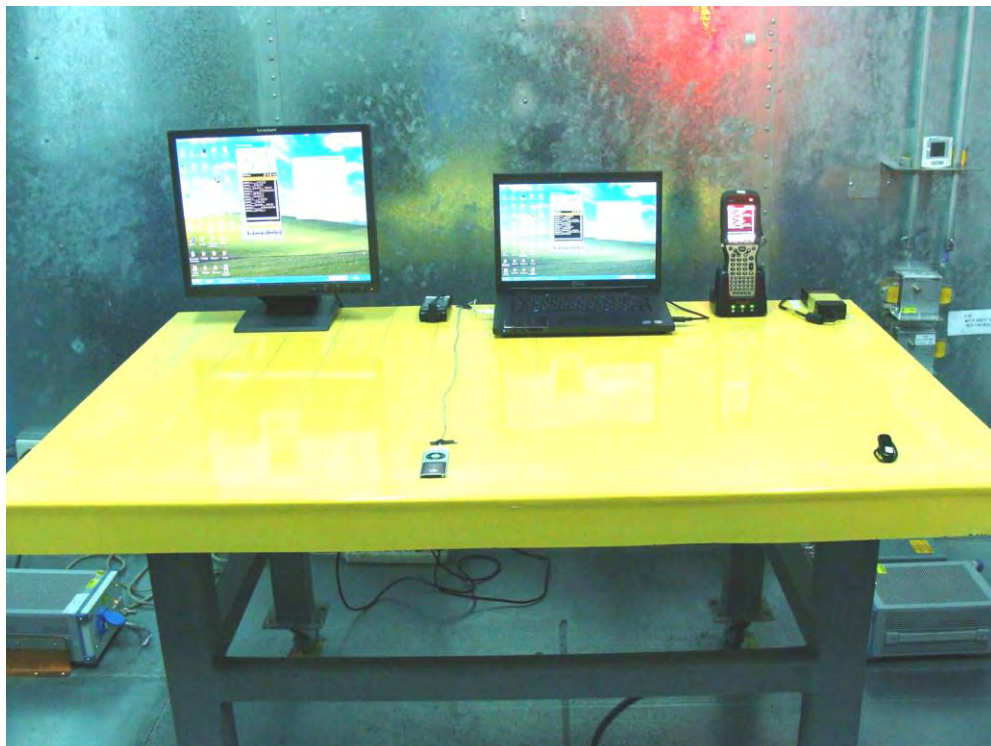
GPS Antenna



Appendix B. Setup Photographs

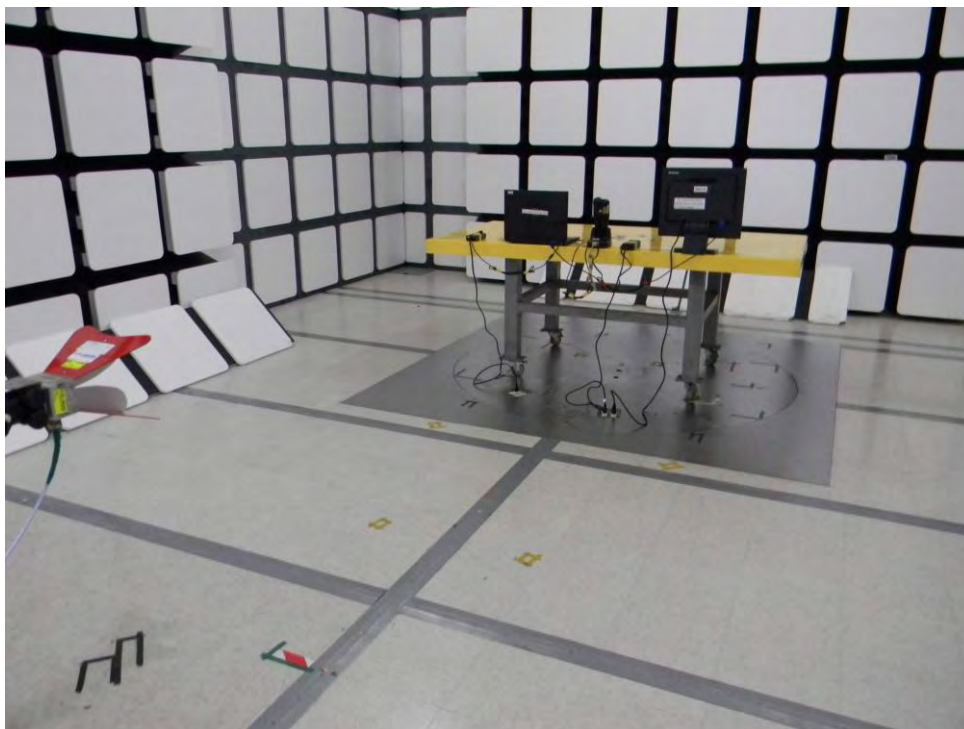
<Conducted Emission>

Mode 3

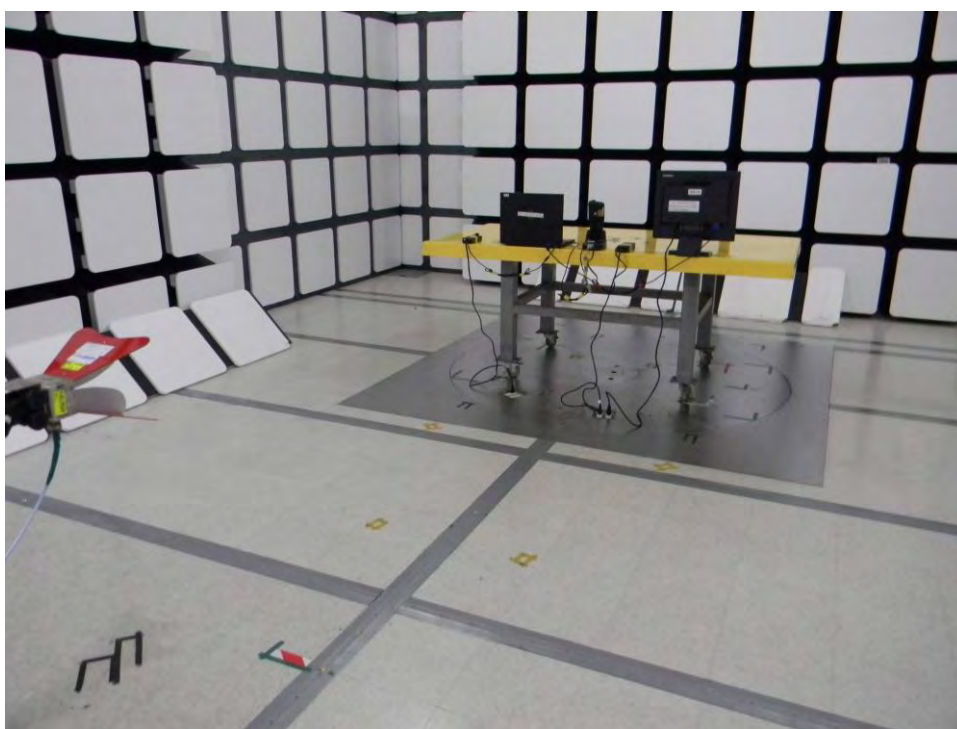


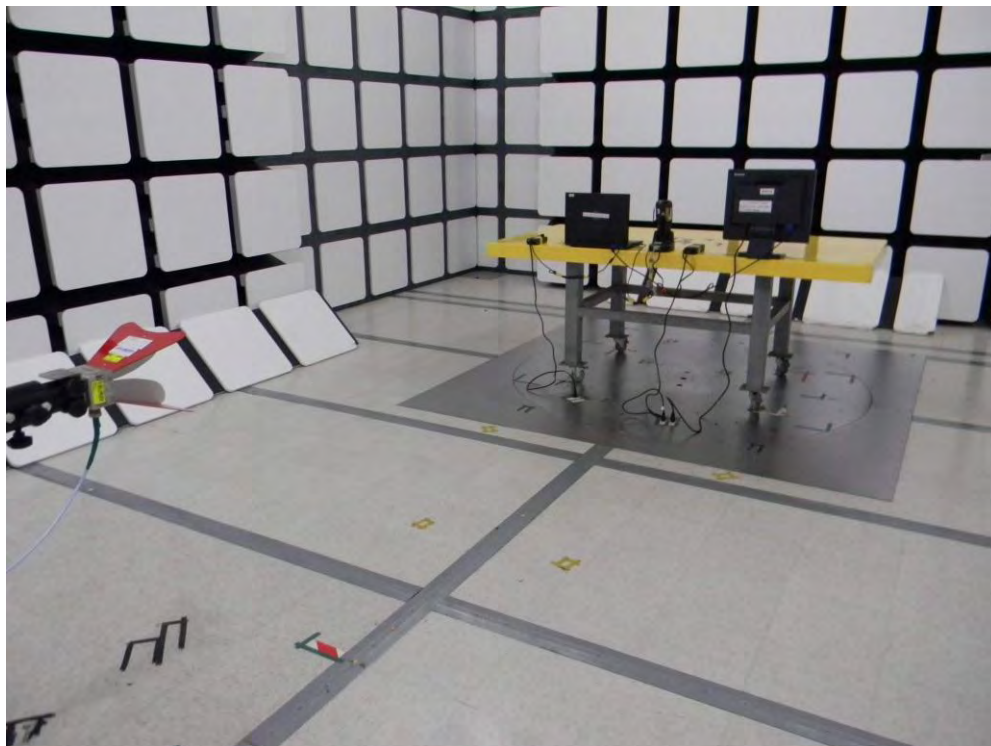
<Radiated Emission>

Mode 1



Mode 2



Mode 3



Appendix C. Original Report

Please refer to Sporton report number FR0D0904C 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 E
CLASSIFICATION : Unlicensed National Information Infrastructure (UNII)

The product was received on Dec. 06, 2010 and completely tested on Feb. 10, 2011. 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 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 / Deputy Manager



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	3
SUMMARY OF TEST RESULT	4
1 GENERAL DESCRIPTION	5
1.1 Applicant	5
1.2 Manufacturer	5
1.3 Feature of Equipment Under Test	5
1.4 Testing Site	6
1.5 Applied Standards	6
1.6 Ancillary Equipment List	7
2 TEST CONFIGURATION OF EQUIPMENT UNDER TEST	8
2.1 Carrier Frequency Channel	8
2.2 RF Power	9
2.3 Test Mode	10
2.4 Connection Diagram of Test System	12
2.5 RF Utility	12
3 TEST RESULT	13
3.1 26dB & 99% Bandwidth Measurement	13
3.2 Maximum Conducted Output Power Measurement	34
3.3 Power Spectral Density Measurement	36
3.4 Band Edges Measurement	47
3.5 Conducted Spurious Emission	57
3.6 AC Conducted Emission Measurement	88
3.7 Radiated Emission Measurement	92
3.8 Peak Excursion Ratio Measurement	132
3.9 Automatically Discontinue Transmission	143
3.10 Frequency Stability Measurement	144
3.11 Antenna Requirements	146
4 LIST OF MEASURING EQUIPMENTS	147
5 UNCERTAINTY OF EVALUATION	148
APPENDIX A. PHOTOGRAPHS OF EUT	
APPENDIX B. SETUP PHOTOGRAPHS	



REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR0D0904C	Rev. 01	Initial issue of report	Jan. 31, 2011
FR0D0904C	Rev. 02	Update report for revising test data from channel 120 to channel 116.	Feb. 11, 2011
FR0D0904C	Rev. 03	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	15.403(i)	A9.2	26dB & 99% Bandwidth	-	Pass	-
3.2	15.407(a)	A9.2	Maximum Conducted Output Power	$\leq 17, 24, 30$ dBm (depend on band)	Pass	-
3.3	15.407(a)	A9.2	Power Spectral Density	$\leq 4, 11, 17$ dBm (depend on band)	Pass	-
3.4	15.407(b)	A9.3	Frequency Band Edges	$\leq -17, -27$ dBm (depend on band)&15.209(a)	Pass	-
3.5	15.407(b)	A9.3	Spurious Emission	EIRP < -27 dBm/MHz	Pass	-
3.6	15.207	Gen 7.2.2	AC Conducted Emission	15.207(a)	Pass	Under limit 16.4 dB at 0.350 MHz
3.7	15.407(b)	A9.3	Transmitter Radiated Emission	$\leq -17, -27$ dBm (depend on band)&15.209(a)	Pass	Under limit 7.32 dB at 32.70 MHz
3.8	15.407(b)	A9.3	Peak Excursion Ratio	≤ 13 dB	Pass	-
3.9	15.407(c)	A9.5	Automatically Discontinue Transmission	Discontinue Transmission	Pass	-
3.10	15.407(g)	A9.5	Frequency Stability	Within Operation Band	Pass	-
3.11	15.203 & 15.407(a)	A9.2	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	5150 MHz ~ 5250 MHz 5250 MHz ~ 5350 MHz 5470 MHz ~ 5725 MHz
Maximum Output Power to Antenna	<5150 MHz ~ 5250 MHz> 802.11a : 15.29 dBm / 0.034 W 802.11n (BW 20MHz) : 15.10 dBm / 0.032 W <5250 MHz ~ 5350 MHz> 802.11a : 15.20 dBm / 0.033 W 802.11n (BW 20MHz) : 15.12 dBm / 0.033 W <5470 MHz ~ 5725 MHz> 802.11a : 15.40 dBm / 0.035 W 802.11n (BW 20MHz) : 15.40 dBm / 0.035 W
Antenna Type	PIFA Antenna with gain 3.5 dBi
HW Version	5
SW Version	26.02
Type of Modulation	OFDM (BPSK / QPSK / 16QAM / 64QAM)
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 Unlicensed National Information Infrastructure (UNII).
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 1 st 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 E
- FCC Public Notice DA 02-2138, (Measurement Guidelines of UNII)
- ANSI C63.4-2003
- IC RSS-210 Issued 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 Carrier Frequency Channel

802.11a Carrier Frequency Channel							
Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
36	5180	40	5200	44	5220	48	5240
52	5260	56	5280	60	5300	64	5320
100	5500	104	5520	108	5540	112	5560
116	5580	132	5660	136	5680	140	5700

802.11n (BW 20MHz) Carrier Frequency Channel							
Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
36	5180	40	5200	44	5220	48	5240
52	5260	56	5280	60	5300	64	5320
100	5500	104	5520	108	5540	112	5560
116	5580	132	5660	136	5680	140	5700

2.2 RF Power

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

Channel	Frequency	5GHz 802.11a RF Power (dBm)							
		Data Rate							
		6 Mbps	9 Mbps	12 Mbps	18 Mbps	24 Mbps	36 Mbps	48 Mbps	54 Mbps
CH 36	5180 MHz	15.29	15.27	14.29	14.22	13.23	13.15	11.67	11.69
CH 44	5220 MHz	15.27	15.26	14.30	14.31	13.33	13.25	11.66	11.73
CH 48	5240 MHz	15.27	15.22	14.31	14.24	13.28	13.15	11.74	11.60
CH 52	5260 MHz	15.08	15.03	14.21	14.05	13.12	13.03	11.90	11.88
CH 60	5300 MHz	15.08	15.07	14.16	14.09	13.08	13.11	11.51	11.53
CH 64	5320 MHz	15.20	15.16	14.25	14.17	13.14	13.11	11.54	11.57
CH 100	5500 MHz	15.11	15.07	14.10	14.08	13.02	13.45	11.88	11.82
CH 116	5580 MHz	15.40	15.37	14.53	14.43	13.37	13.23	11.70	11.62
CH 140	5700 MHz	15.20	15.18	14.22	14.07	13.12	13.01	11.92	11.87

Channel	Frequency	5GHz 802.11n (BW 20MHz) RF Power (dBm)							
		Data Rate							
		6.5 Mbps	13 Mbps	19.5 Mbps	26 Mbps	39 Mbps	52 Mbps	58.5 Mbps	65 Mbps
CH 36	5180 MHz	15.10	14.06	14.00	13.05	13.02	11.85	11.83	10.54
CH 44	5220 MHz	15.02	14.10	14.04	13.06	13.34	11.83	11.82	10.91
CH 48	5240 MHz	15.09	14.04	14.10	13.06	13.38	11.89	11.83	10.97
CH 52	5260 MHz	15.03	14.02	14.00	13.04	13.40	11.88	11.81	10.96
CH 60	5300 MHz	15.08	14.11	14.05	13.11	13.40	11.88	11.81	10.93
CH 64	5320 MHz	15.12	14.14	14.07	13.05	13.05	11.91	11.84	10.92
CH 100	5500 MHz	15.38	14.46	14.30	13.28	13.21	11.57	11.50	10.77
CH 116	5580 MHz	15.39	14.42	14.34	13.29	13.19	11.61	11.56	10.65
CH 140	5700 MHz	15.40	14.50	14.43	13.33	13.28	11.70	11.59	10.77

Remark:

1. The data rates of WLAN 802.11a/n were set in 6Mbps for 802.11a, and 6.5Mbps for 802.11n (BW 20MHz) for all the test cases due to the highest RF output power.
2. The EUT is programmed to transmit signal continuously for all testing.

2.3 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.

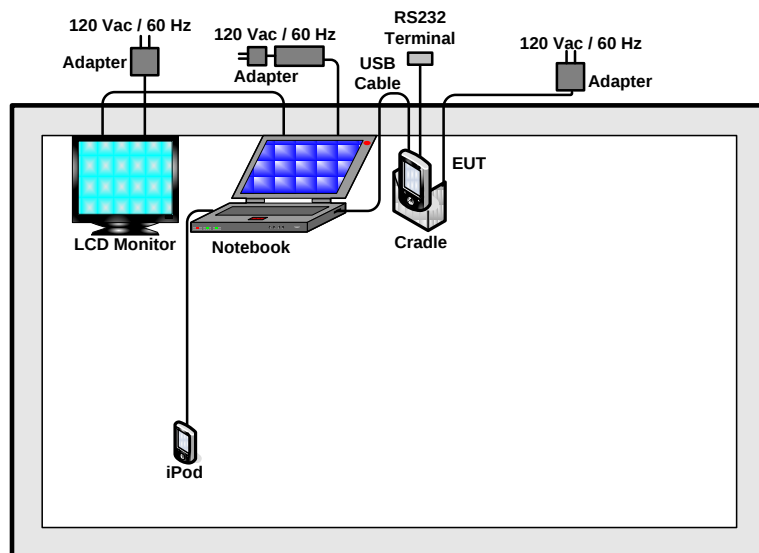
The following tables are showing the test modes as the worst cases and recorded in this report.

Test Cases	
Test Item	802.11a/n (Modulation : OFDM)
Conducted TCs	■ Mode 1: 802.11a_CH36_5180 MHz ■ Mode 2: 802.11a_CH44_5220 MHz ■ Mode 3: 802.11a_CH48_5240 MHz ■ Mode 4: 802.11a_CH52_5260 MHz ■ Mode 5: 802.11a_CH60_5300 MHz ■ Mode 6: 802.11a_CH64_5320 MHz ■ Mode 7: 802.11a_CH100_5500 MHz ■ Mode 8: 802.11a_CH116_5580 MHz ■ Mode 9: 802.11a_CH140_5700 MHz ■ Mode 10: 802.11n_CH36_5180 MHz (BW 20M) ■ Mode 11: 802.11n_CH44_5220 MHz (BW 20M) ■ Mode 12: 802.11n_CH48_5240 MHz (BW 20M) ■ Mode 13: 802.11n_CH52_5260 MHz (BW 20M) ■ Mode 14: 802.11n_CH60_5300 MHz (BW 20M) ■ Mode 15: 802.11n_CH64_5320 MHz (BW 20M) ■ Mode 16: 802.11n_CH100_5500 MHz (BW 20M) ■ Mode 17: 802.11n_CH116_5580 MHz (BW 20M) ■ Mode 18: 802.11n_CH140_5700 MHz (BW 20M)

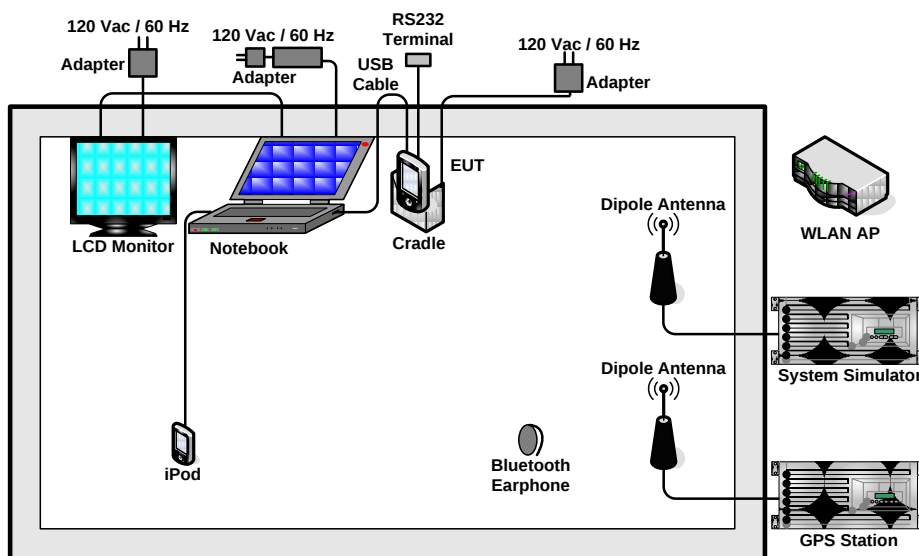
Test Item	802.11a/n (Modulation : OFDM)
Radiated TCs	■ Mode 1: 802.11a_CH36_5180 MHz + TC ■ Mode 2: 802.11a_CH44_5220 MHz + TC ■ Mode 3: 802.11a_CH48_5240 MHz + TC ■ Mode 4: 802.11a_CH52_5260 MHz + TC ■ Mode 5: 802.11a_CH60_5300 MHz + TC ■ Mode 6: 802.11a_CH64_5320 MHz + TC ■ Mode 7: 802.11a_CH100_5500 MHz + TC ■ Mode 8: 802.11a_CH116_5580 MHz + TC ■ Mode 9: 802.11a_CH140_5700 MHz + TC ■ Mode 10: 802.11n_CH36_5180 MHz (BW 20M) + TC ■ Mode 11: 802.11n_CH44_5220 MHz (BW 20M) + TC ■ Mode 12: 802.11n_CH48_5240 MHz (BW 20M) + TC ■ Mode 13: 802.11n_CH52_5260 MHz (BW 20M) + TC ■ Mode 14: 802.11n_CH60_5300 MHz (BW 20M) + TC ■ Mode 15: 802.11n_CH64_5320 MHz (BW 20M) + TC ■ Mode 16: 802.11n_CH100_5500 MHz (BW 20M) + TC ■ Mode 17: 802.11n_CH116_5580 MHz (BW 20M) + TC ■ Mode 18: 802.11n_CH140_5700 MHz (BW 20M) + TC
AC Conducted Emission	Mode 1 : WCDMA Band II Idle + Bluetooth Link + WLAN (5G) Link + GPS Rx + Scanner + Cradle + Adapter + RS232 Terminal + USB Cable (Link with Notebook)
Remark: TC stands for Test Configuration, and consists of USB cable, RS232 terminal, cradle, and adapter.	

2.4 Connection Diagram of Test System

<WLAN Tx Mode>



<AC Conducted Emission Mode>



2.5 RF Utility

The programmed RF Utility "TI1273 WLAN FCC" is installed in EUT to provide channel selection, power level, data rate and the application type. RF Utility can send transmitting signal for all testing. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product.

3 Test Result

3.1 26dB & 99% Bandwidth Measurement

3.1.1 Limit of 26dB & 99% Bandwidth

There is no restriction limits for bandwidth. The maximum conducted output power can be limited by measured emission bandwidth (B). For the band 5.15~5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW (17dBm) or 4 dBm + 10log B. For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW (24dBm) or 11 dBm + 10log B. For the band 5.725-5.825 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 1 W (30dBm) or 17 dBm + 10log B.

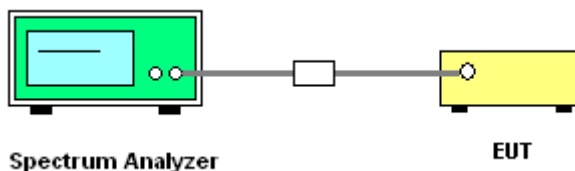
3.1.2 Measuring Instruments

See list of measuring instruments of this test report.

3.1.3 Test Procedures

1. The testing follows FCC Public Notice DA 02-2138 (Measurement Guidelines of UNII).
2. The RF output of EUT was connected to the spectrum analyzer by a low loss cable.
3. Read RBW and repeat measurement as needed until the RBW/BW ratio is approximately 1%.
4. Use a RBW = approximately 1% of the emission bandwidth; Set the VBW > RBW; Use a peak detector.
5. Measure the maximum width of the emission that is 26 dB relative to the peak of the emission and 99% occupied bandwidth.

3.1.4 Test Setup

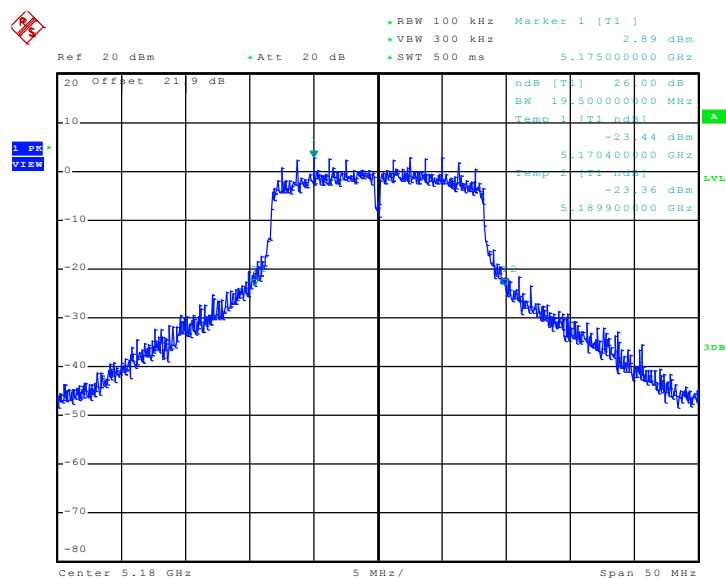


3.1.5 Test Result of 26dB Bandwidth

Test Mode :	Mode 1~9	Temperature :	25~27°C
Test Engineer :	Ken Hsu	Relative Humidity :	54~57%

Channel	Frequency (MHz)	802.11a 26dB Bandwidth (MHz)	Pass/Fail
36	5180	19.50	Pass
44	5220	19.10	Pass
48	5240	19.30	Pass
52	5260	18.65	Pass
60	5300	19.10	Pass
64	5320	18.70	Pass
100	5500	19.05	Pass
116	5580	19.05	Pass
140	5700	19.30	Pass

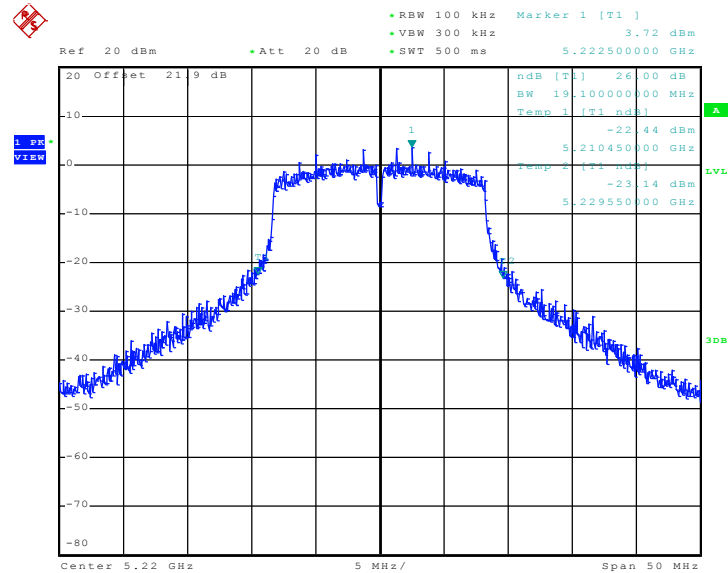
26 dB Bandwidth Plot on 802.11a Channel 36



Date: 10.DEC.2010 08:43:20

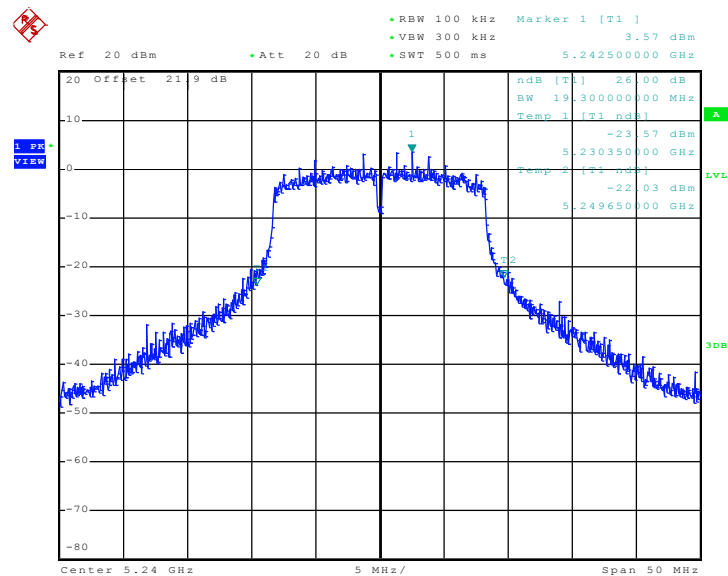


26 dB Bandwidth Plot on 802.11a Channel 44



Date: 10.DEC.2010 08:59:22

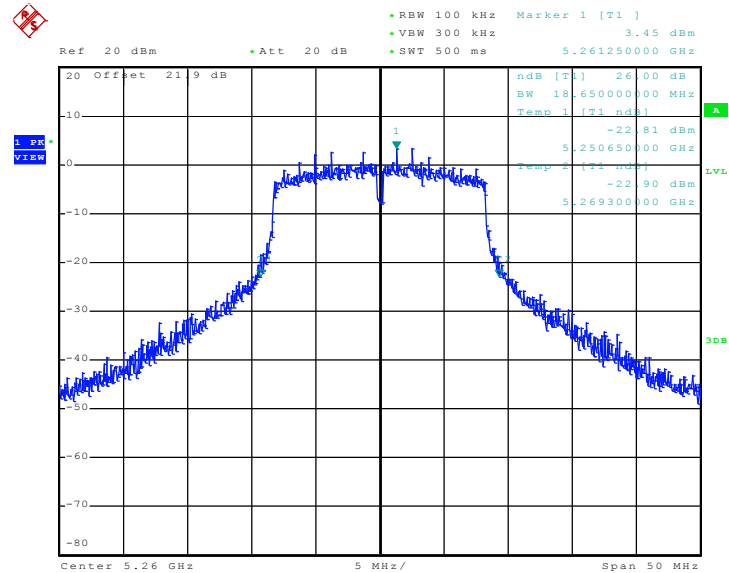
26 dB Bandwidth Plot on 802.11a Channel 48



Date: 10.DEC.2010 09:00:27

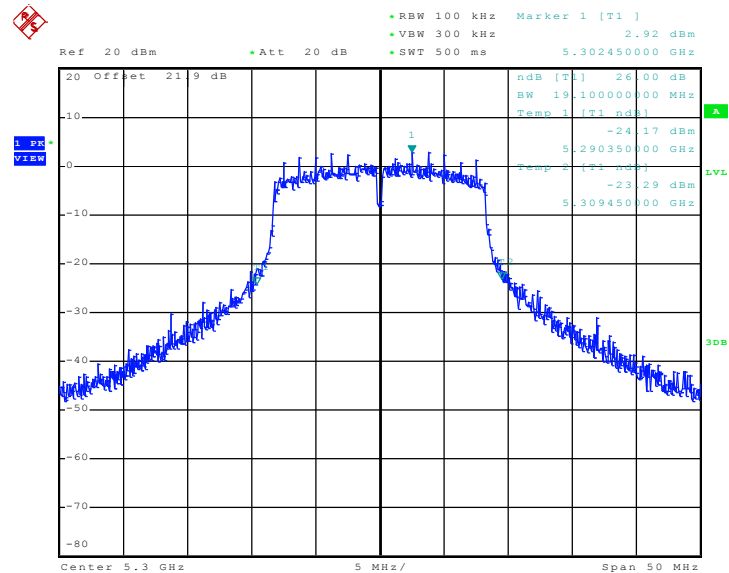


26 dB Bandwidth Plot on 802.11a Channel 52



Date: 10.DEC.2010 09:01:29

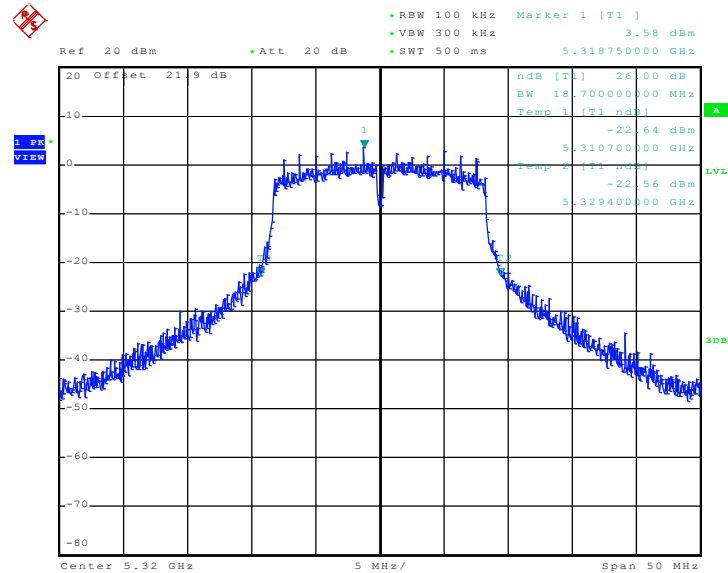
26 dB Bandwidth Plot on 802.11a Channel 60



Date: 10.DEC.2010 09:02:36

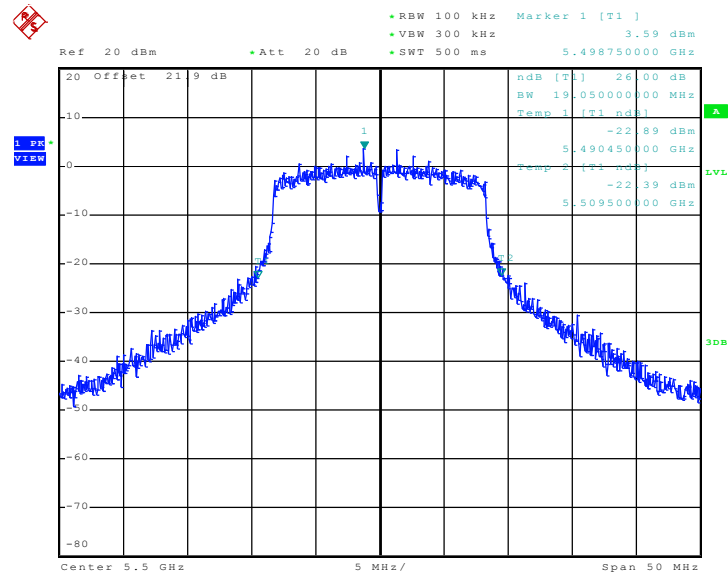


26 dB Bandwidth Plot on 802.11a Channel 64



Date: 10.DEC.2010 09:03:26

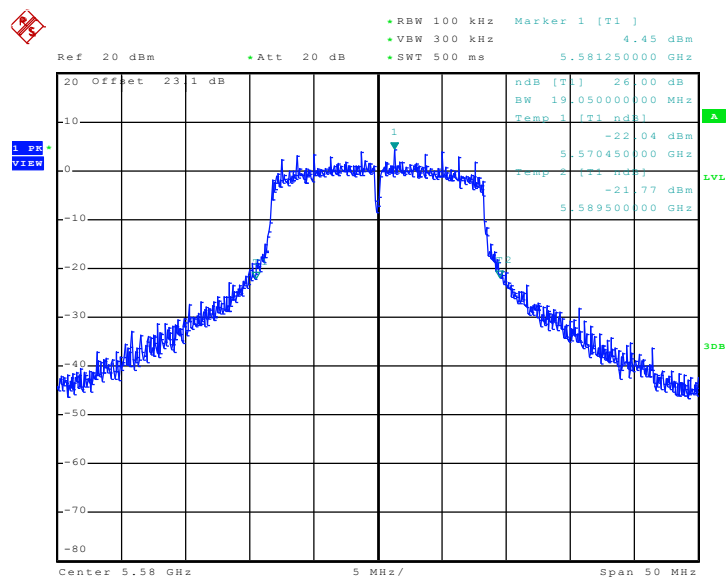
26 dB Bandwidth Plot on 802.11a Channel 100



Date: 10.DEC.2010 09:04:38

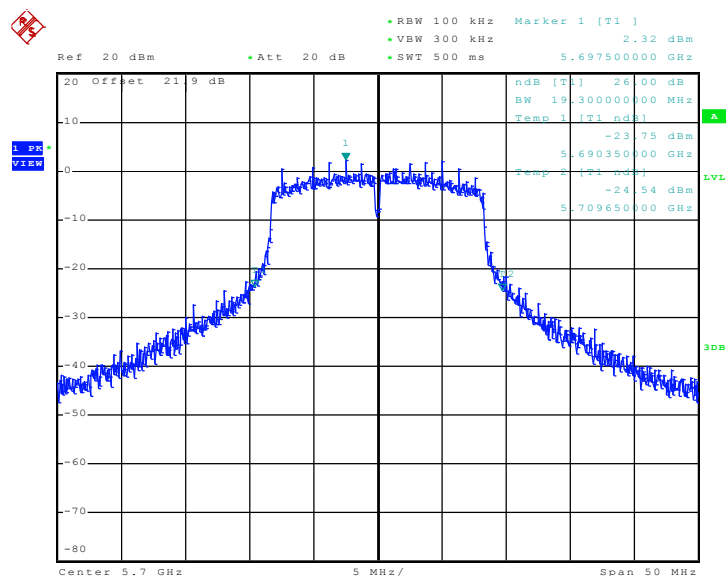


26 dB Bandwidth Plot on 802.11a Channel 116



Date: 10.FEB.2011 00:18:28

26 dB Bandwidth Plot on 802.11a Channel 140



Date: 10.DEC.2010 09:10:15