



# FCC RF Test Report

APPLICANT : Hewlett-Packard Company  
EQUIPMENT : Tablet PC  
BRAND NAME : hp  
MODEL NAME : HSTNN-C78C  
FCC ID : B94HNC78BWTXN  
STANDARD : FCC 47 CFR Part 2, and 90(S)  
CLASSIFICATION : PCS Licensed Transmitter (PCB)

The product was received on Sep. 05, 2013 and testing was completed on Oct. 13, 2013. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI / TIA / EIA-603-C-2004 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: Joseph Lin / Supervisor

Approved by: Jones Tsai / Manager



## SPORTON INTERNATIONAL INC.

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



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### SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	§2.1046 §90.635	Conducted Output Power	< 100 Watts	PASS(*)	-
3.2	§2.1053 §90.691	Field Strength of Spurious Radiation	$< 43 + 10 \log_{10}(P[\text{Watts}])$	PASS(*)	Under limit 39.14 dB at 3282.000 MHz

**Note:**

1. The “\*” means the FW392719-15 report reuses data from the certified FW392719 report.
2. Due to the antenna-gains of the module in host evaluated in all dedicated bands are less than those in the module report in accordance with MPE value so that we do not perform the procedure for RSE measurement.



# 1 General Description

## 1.1 Applicant

Hewlett-Packard Company  
3000 Hanover Street, Palo Alto, California 94304, USA

## 1.2 Manufacturer

COMPAL ELECTRONICS, INC.  
No. 581, Ruiguang Rd., Neihu District, Taipei City 11492, Taiwan (R.O.C.)

## 1.3 Feature of Equipment Under Test

Product Feature	
Equipment	Tablet PC
Brand Name	hp
Model Name	HSTNN-C78C
Integrated WWAN Module	Brand Name: SIERRA WIRELESS Model Name: EM7355
FCC ID	B94HNC78BWTXN
EUT supports Radios application	CDMA/EV-DO/GSM/EGPRS/WCDMA/HSPA/LTE
EUT Stage	Identical Prototype

**Remark:**

1. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.
2. There have two batteries for EUT, The Battery 1 (model name: HSTNN-IB5O) and Battery 2 (model name: HSTNN-LB5O) are identical on power rating. The only differences are vendor and model name. All the tests were performed with Battery 1.



### 1.4 Product Specification of Equipment Under Test

Product Specification subjective to this standard	
<b>Tx Frequency</b>	817.9 MHz ~ 823.1 MHz
<b>Rx Frequency</b>	862.9 MHz ~ 868.1 MHz
<b>Maximum Output Power to Antenna</b>	23.78 dBm
<b>Antenna Type</b>	Main Antenna :PIFA Antenna Aux. Antenna :Coupling Type Antenna
<b>Type of Modulation</b>	CDMA2000 : QPSK CDMA2000 1xEV-DO : QPSK/8PSK

**Remark:** This test report recorded only product characteristics and test results of PCS Licensed Transmitter (PCB).

### 1.5 Modification of EUT

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

### 1.6 Testing Site

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code : 1190) and the FCC designation No. TW1022 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC Test.

<b>Test Site</b>	SPORTON INTERNATIONAL INC.	
<b>Test Site Location</b>	No. 52, Hwa Ya 1 <sup>st</sup> Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL: +886-3-327-3456 FAX: +886-3-328-4978	
<b>Test Site No.</b>	<b>Sporton Site No.</b>	
	TH02-HY	03CH07-HY



## 1.7 Applied Standards

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

- ♦ FCC 47 CFR Part 2, 90
- ♦ ANSI / TIA / EIA-603-C-2004
- ♦ FCC KDB 971168 D01 Power Meas. License Digital Systems v02r01

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



## 2 Test Configuration of Equipment Under Test

### 2.1 Test Mode

Antenna port conducted and radiated test items were performed according to KDB 971168 D01 Power Meas. License Digital Systems v02r01 with maximum output power.

Radiated measurements were performed with rotating EUT in different three orthogonal test planes to find the maximum emission.

Frequency range investigated for radiated emission is 30 MHz to 9000 MHz for CDMA2000 BC10.

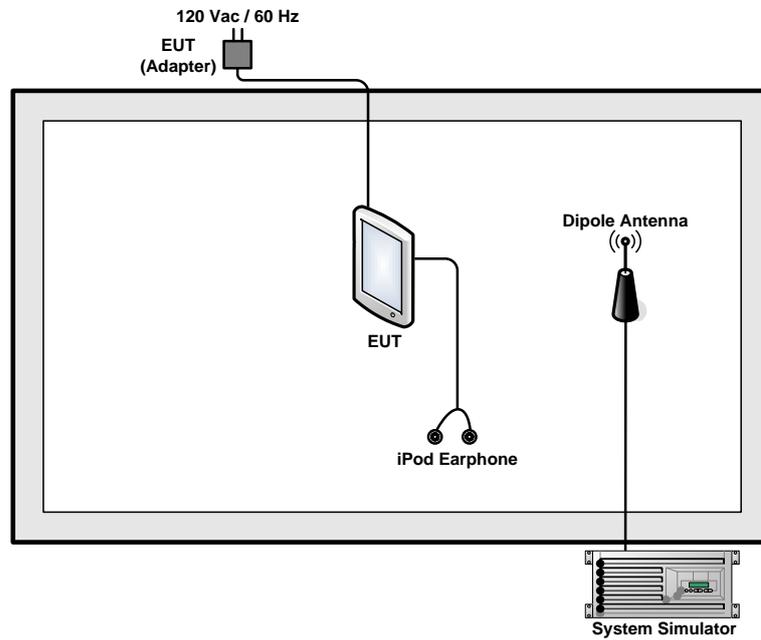
Test Modes	
Band	Radiated TCs
CDMA2000 BC10	■ 1xEV-DO Rev. 0 Link

**Note:** The maximum power levels are 1xEV-DO Rev. 0mode for CDMA2000 BC10; only these modes were used for all tests.

The conducted power table is as follows:

Conducted Power (*Unit: dBm)			
Band	CDMA2000 BC10		
Channel	476	580	684
Frequency	817.90	820.50	823.10
1xRTT RC1+SO55	23.74	23.76	23.66
1xRTT RC3+SO55	23.63	23.72	23.70
1xEVDO RTAP 153.6K	23.75	23.78	23.77
1xEVDO RETAP 4096K	23.70	23.63	23.75

## 2.2 Connection Diagram of Test System



## 2.3 Support Unit used in test configuration

Item	Equipment	Trade Name	Model No.	FCC ID	Data Cable	Power Cord
1.	System Simulator	R&S	CMU 200	N/A	N/A	Unshielded, 1.8 m
2.	iPod Earphone	Apple	N/A	Verification	Unshielded, 1.0 m	N/A

### 3 Test Result

#### 3.1 Conducted Output Power Measurement

##### 3.1.1 Description of the Conducted Output Power Measurement

A system simulator was used to establish communication with the EUT. Its parameters were set to enforce EUT transmitting at the maximum power. The measured power in the radio frequency on the transmitter output terminals shall be reported.

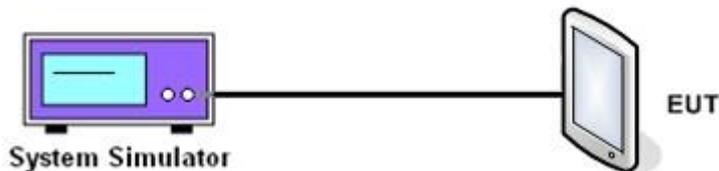
##### 3.1.2 Measuring Instruments

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

##### 3.1.3 Test Procedures

1. The transmitter output port was connected to the system simulator.
2. Set EUT at maximum power through system simulator.
3. Select lowest, middle, and highest channels for each band and different modulation.

##### 3.1.4 Test Setup



##### 3.1.5 Test Result of Conducted Output Power

CDMA 2000 BC10			
Modes	CDMA 2000 1xEV-DO Rev. 0		
Test Status	RTAP 153.6K		
Channel	476 (Low)	580 (Mid)	684 (High)
Frequency (MHz)	817.9	820.5	823.1
Conducted Power (dBm)	23.75	23.78	23.77

**Note:** maximum average power for CDMA2000.



## 3.2 Field Strength of Spurious Radiation Measurement

### 3.2.1 Description of Field Strength of Spurious Radiated Measurement

The radiated spurious emission was measured by substitution method according to ANSI / TIA / EIA-603-C-2004. The power of any emission FCC Part 90.691 on any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth at least  $43 + 10 \log (P)$  dB. The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least  $43+10\log_{10}(P[\text{Watts}])$  dB. The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

### 3.2.2 Measuring Instruments

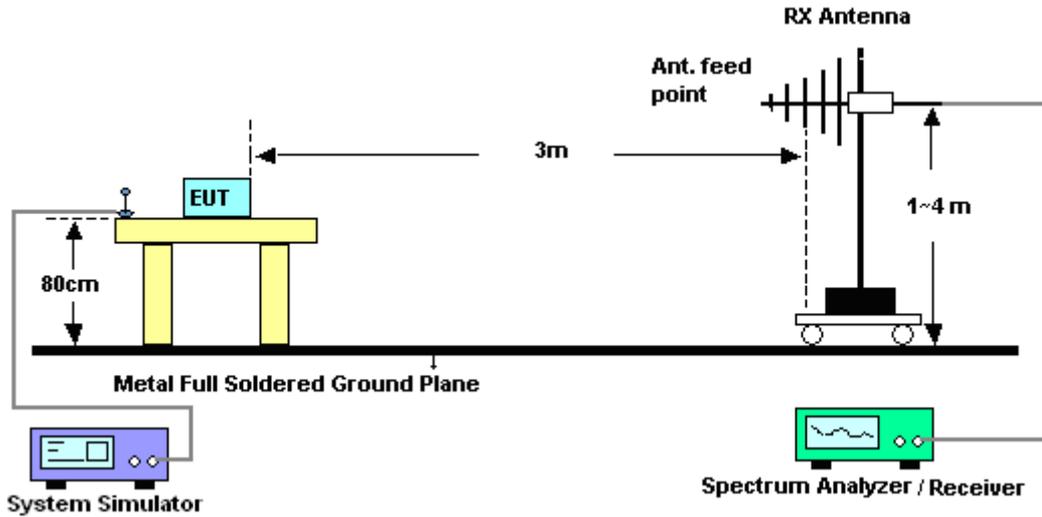
The measuring equipment is listed in the section 4 of this test report.

### 3.2.3 Test Procedures

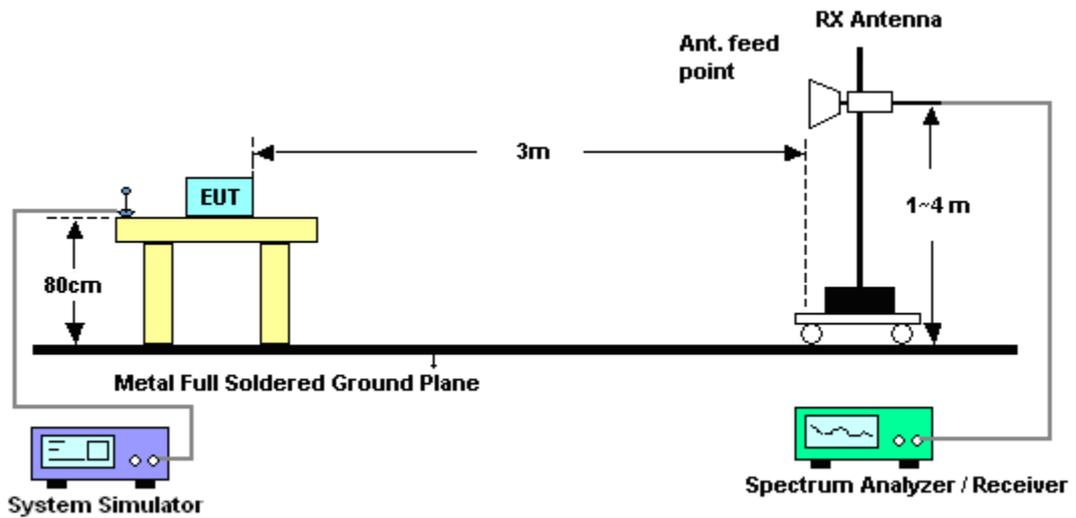
1. The EUT was placed on a rotatable wooden table with 0.8 meter about ground.
2. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest spurious emission.
4. The height of the receiving antenna is varied between one meter and four meters to search the maximum spurious emission for both horizontal and vertical polarizations.
5. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, Sweep = 500ms, Taking the record of maximum spurious emission.
6. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
7. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
8. Taking the record of output power at antenna port.
9. Repeat step 7 to step 8 for another polarization.
10.  $\text{EIRP (dBm)} = \text{S.G. Power} - \text{Tx Cable Loss} + \text{Tx Antenna Gain}$
11.  $\text{ERP (dBm)} = \text{EIRP} - 2.15$
12. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
13. The limit line is derived from  $43 + 10\log(P)$  dB below the transmitter power P(Watts)  
 $= P(W) - [43 + 10\log(P)]$  (dB)  
 $= [30 + 10\log(P)]$  (dBm) -  $[43 + 10\log(P)]$  (dB)  
 $= -13\text{dBm}$ .

### 3.2.4 Test Setup

For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz





3.2.5 Test Result of Field Strength of Spurious Radiated

<b>Band :</b>	CDMA2000 BC10						<b>Temperature :</b>	21~24°C	
<b>Test Mode :</b>	1xEV-DO Rev. 0_RTAP 153.6K						<b>Relative Humidity :</b>	51~53%	
<b>Test Engineer :</b>	Kyle Jhuang						<b>Polarization :</b>	Horizontal	
<b>Remark :</b>	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.								
Frequency ( MHz )	ERP ( dBm )	Limit ( dBm )	Over Limit ( dB )	SPA Reading ( dBm )	S.G. Power ( dBm )	TX Cable loss ( dB )	TX Antenna Gain ( dBi )	Polarization ( H/V )	Result
1642	-59.03	-13	-46.03	-67.79	-60.87	1.51	5.50	H	Pass
2462	-55.74	-13	-42.74	-69.03	-57.66	2.04	6.11	H	Pass
3282	-53.49	-13	-40.49	-67.68	-56.74	2.45	7.85	H	Pass

<b>Band :</b>	CDMA2000 BC10						<b>Temperature :</b>	21~24°C	
<b>Test Mode :</b>	1xEV-DO Rev. 0_RTAP 153.6K						<b>Relative Humidity :</b>	51~53%	
<b>Test Engineer :</b>	Kyle Jhuang						<b>Polarization :</b>	Vertical	
<b>Remark :</b>	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.								
Frequency ( MHz )	ERP ( dBm )	Limit ( dBm )	Over Limit ( dB )	SPA Reading ( dBm )	S.G. Power ( dBm )	TX Cable loss ( dB )	TX Antenna Gain ( dBi )	Polarization ( H/V )	Result
1642	-56.22	-13	-43.22	-67.45	-58.06	1.51	5.50	V	Pass
2462	-55.16	-13	-42.16	-68.86	-57.08	2.04	6.11	V	Pass
3282	-52.14	-13	-39.14	-67.88	-55.39	2.45	7.85	V	Pass



## 4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
System Simulator	Rohde & Schwarz	CMU200	117591	N/A	Oct. 21, 2011	Sep. 05, 2013	Oct. 20, 2013	Conducted (TH02-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP30	101067	9KHz~30GHz	Nov. 30, 2012	Oct. 13, 2013	Nov. 29, 2013	Radiation (03CH07-HY)
Bilog Antenna	Schaffner	CBL6111C	2726	30MHz ~ 1GHz	Oct. 10, 2013	Oct. 13, 2013	Oct. 09, 2014	Radiation (03CH07-HY)
Double Ridge Horn Antenna	ESCO	3117	75962	1GHz~18GHz	Aug. 22, 2013	Oct. 13, 2013	Aug. 21, 2014	Radiation (03CH07-HY)
Preamplifier	COM-POWER	PA-103A	161241	30MHz~1GHz	Feb. 26, 2013	Oct. 13, 2013	Feb. 25, 2014	Radiation (03CH07-HY)
Preamplifier	Agilent	8449B	3008A02362	1GHz~26.5GHz	Dec. 01, 2012	Oct. 13, 2013	Nov. 30, 2013	Radiation (03CH07-HY)
Turn Table	ChainTek	ChainTek 3000	N/A	0 ~ 360 degree	N/A	Oct. 13, 2013	N/A	Radiation (03CH07-HY)
Antenna Mast	ChainTek	ChainTek 3000	N/A	N/A	N/A	Oct. 13, 2013	N/A	Radiation (03CH07-HY)



## 5 Uncertainty of Evaluation

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

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