

FCC TEST REPORT (PART 24)

REPORT NO.: RF980505L11-1
 MODEL NO.: WHIT100
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 TESTED: Jun. 18 ~ Jul. 08, 2009
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APPLICANT: HTC Corporation

ADDRESS: No. 23, Xinghua Rd., Taoyuan City, Taiwan, R.O.C.

ISSUED BY: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch

- LAB ADDRESS: No. 47, 14th Ling, Chia Pau Tsuen, Lin Kou Hsiang, Taipei Hsien 244, Taiwan, R.O.C.
- **TEST LOCATION:** No. 19, Hwa Ya 2nd Rd, Wen Hwa Tsuen, Kwei Shan Hsiang, Taoyuan Hsien 333, Taiwan, R.O.C.

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1 CERTIFICATION

PRODUCT : Pocket PC Phone MODEL : WHIT100 APPLICANT : HTC Corporation TESTED : Jun. 18 ~ Jul. 08, 2009 TEST SAMPLE : ENGINEERING SAMPLE TEST STANDARDS : FCC Part 24, Subpart E ANSI C63.4-2003

The above equipment (model: WHIT100) has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

PREPARED BY

Andrea Hsia / Specialist

TECHNICAL ACCEPTANCE : Responsible for RF L

Long Chen / Senior Engineer

APPROVED BY

: <u>Gary Charg</u>, **DATE**: Jul. 13, 2009 Gary Chang / Assistant Manager

, DATE: Jul. 13, 2009



2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

	APPLIED STANDARD: FCC Part 24 & Part 2 / IC RSS-133							
STANDARD SECTION	TEST TYPE AND LIMIT	RESULT	REMARK					
2.1046 24.232	Maximum Peak Output Power Limit: max. 2 watts e.i.r.p peak power	PASS	Meet the requirement of limit. Minimum passing margin is 23.73dBm at 1908.75MHz.					
2.1055 24.235	Frequency Stability AFC Freq. Error vs. Voltage AFC Freq. Error vs. Temperature Limit: max. ±2.5ppm	PASS	Meet the requirement of limit.					
2.1049 24.238(b)	Occupied Bandwidth	PASS	Meet the requirement of limit.					
24.238(b)	Band Edge Measurements	PASS	Meet the requirement of limit.					
2.1051 24.238	Conducted Spurious Emissions	PASS	Meet the requirement of limit.					
2.1053 24.238	Radiated Spurious Emissions	PASS	Meet the requirement of limit. Minimum passing margin is –11.96dB at 3817.50MHz.					

2.1 MEASUREMENT UNCERTAINTY

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

MEASUREMENT	FREQUENCY	UNCERTAINTY		
Conducted emissions	150kHz~30MHz	2.44 dB		
	30MHz ~ 200MHz	3.19 dB		
Padiated emissions	200MHz ~1000MHz	3.21 dB		
	1GHz ~ 18GHz	2.26 dB		
	18GHz ~ 40GHz	1.94 dB		

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

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3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT PRODUCT Pocket PC Phone MODEL NO. WHIT100 FCC ID NM8WHIT100 3.7Vdc from rechargeable lithium battery **POWER SUPPLY** 5.0Vdc from power adapter 5.0Vdc from host equipment **MODULATION TYPE** OQPSK, HPSK **OPERATING FREQUENCY** 1851.25MHz ~ 1908.75MHz NUMBER OF CHANNEL 1151 23.73dBm (0.236Watts) MAX. EIRP POWER

ANTENNA TYPE	PIFA antenna with 0dBi gain
DATA CABLE	1.25m non-shielded USB cable without core (Brand: MEC & Foxlink)
I/O PORTS	Refer to user's manual
ACCESSORY DEVICES	Adapter, Battery, USB cable
EUT EXTREME VOL. RANGE	3.6Vdc to 4.2Vdc

NOTE:

1. The applicant defined the normal working voltage of the battery is from 3.6Vdc to 4.2Vdc.

2. The EUT is a Pocket PC Phone. The functions of EUT listed as below:

	TEST STANDARD	REFERENCE REPORT		
CDMA 850	FCC Part 22	RF980505L11		
CDMA 1900	FCC Part 24	RF980505L11-1		
WLAN 802.11b/g	FCC Part 15	RF980505L11-2		
BLUETOOTH	(Section 15.247)	RF980505L11-3		

3. The communicated functions of EUT listed as below:

		850MHz	1900MHz	
	CDMA	\checkmark	\checkmark	With WLAN 802.11b/g + BT 2.0
3G	1*EVDO Release A	\checkmark	\checkmark	with EDR + GPS

4. The following accessory is for support units only.

PRODUCT	MODEL	DESCRIPTION				
Earphone	RC E150	3.5mm connector 1.3m non-shielded without core				



5. The EUT has following accessories.

NO.	PRODUCT	BRAND	MODEL	DESCRIPTION		
1	Power Adapter bTC	Power Adapter hTC TC P300	I/P: 100-240Vac, 50-60Hz, 0.2A O/P: 5Vdc, 1A 1.25m non-shielded cable without core Manufacturer: Delta			
2				I/P: 100-240Vac, 50-60Hz, 0.2A O/P: 5Vdc, 1A 1.25m non-shielded cable without core Manufacturer: Foxlink		
3	Battery	hTC RHOD160	RHOD160	Rating: 3.7Vdc, 1500mAh, 5.55Whr P/N: 35H00123-00M Manufacturer: HT		
4	Duttery		THICE ISS	Rating: 3.7Vdc, 1500mAh, 5.55Whr P/N: 35H00123-02M Manufacturer: Formosa		
5	LISB cable	MEC		1.25m shielded cable without core		
6		Foxlink	DC 0200			
7	Camera	Foxconn CER968-5M_AF_ASSY				
8	Gamera	Liteon	08PM15	-		
9	LCM	EID	L4F00390T00	-		
10	LOW	AUO	H361VL01V0	-		

* Item 3, 7, 9 were the worst for the final test.

6. Refer to following table for MEID no.:

	MEID NO.	
35	191703*****	ŧ.

7. Hardware version: NA

8. Software version: NA

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



3.2 DESCRIPTION OF TEST MODES

1151 channels are provided to this EUT in the CDMA1900 band. Therefore, the low, middle and high channels are chosen for testing.

	CHANNEL	FREQUENCY	TX MODE	
LOW 25		1851.25 MHz	SO55	
MIDDLE	600	1880.00 MHz	SO55	
HIGH	1175	1908.75 MHz	SO55	

NOTE:

- 1. Below 1 GHz, the channel 25, 600 and 1175 were pre-tested in chamber. The channel 25 was the worst case and chosen for final test.
- 2. Above 1 GHz, the channel 25, 600 and 1175 were tested individually.
- 3. The channel space is 0.05MHz.
- 4. In this report, CDMA2000 (SO55) was the worst case for all test items, therefore, only the data was recorded in the following section.

3.2.1 CONFIGURATION OF SYSTEM UNDER TEST





3.2.2 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

	EUT	APPLICABLE TO						DECODIDEION		1	
	MODE	OP	FS	ОВ	BE	CE	RE<1G	RE≥1G	DESC	SRIPTION	
	-	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	_		
Where	/here OP: Output power FS: Frequency stability										_
	OB: Occupi	ed bandwi	dth		BE:	Band edg	le				
	CE: Conduc	ted spurio	us emissic		RE«	:1G: Radia	ated emiss	ion below	1GHz		
	REZIG. Na		551011 2001	e IGHz							
<u>OUT</u>		R MEAS	UREME	<u>NT</u> :							
F	Pre-Scan has	been co	nducted	to deter	mine the	e worst-o	case mo	de from a	all possibl	e combinatio	ons
b	etween avail	able mo	dulations	s, XYZ a	xis and a	antenna	ports (if	EUT with	n antenna	diversity	
F 🛛	Following cha	nnel(s) v	vas (wer	e) selec	ted for th	ie final t	est as lis	sted belo	W.		
	AVAILABLE	HANNEL	TE	STED CH	ANNEL	мс	DULATIO	N TECHN	OLOGY	AXIS	
	25 to 1	175		25, 600, 1	25, 600, 1175			CDMA		Y	
FRE	QUENCY ST Pre-Scan has between avail	been cc able mo	MEASI Moducted dulations vas (wer	to deter s and an re) selec	NT : mine the tenna po ted for th	e worst-o orts (if El ne final t	case moo UT with a est as lis	de from a antenna sted belo	all possibl diversity a w.	e combinatio architecture)	ons).
	AVAILAB	LE CHAN	NEL	Т	ESTED C	HANNEL		MODULA	TION TECH	INOLOGY	
	25	to 1175			600)			CDMA		
•		אדטושם			NT.						
 Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and antenna ports (if EUT with antenna diversity architecture). Following channel(s) was (were) selected for the final test as listed below. 											
	AVAILAB	LE CHAN	NEL	т	ESTED C	HANNEL		MODULA	TION TECH	INOLOGY	
	25	to 1175			25, 600,	1175			CDMA		
-											



BAND EDGE MEASUREMENT:

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and antenna ports (if EUT with antenna diversity architecture).

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

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY
25 to 1175	25, 1175	CDMA

CONDUCTED SPURIOUS EMISSIONS MEASUREMENT:

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and antenna ports (if EUT with antenna diversity architecture).

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

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY
25 to 1175	25, 600, 1175	CDMA

RADIATED EMISSION MEASUREMENT (BELOW 1 GHz):

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, XYZ axis and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	AXIS
25 to 1175	25	CDMA	Y

RADIATED EMISSION MEASUREMENT (ABOVE 1 GHz):

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, XYZ axis and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	AXIS
25 to 1175	25, 600, 1175	CDMA	Y



3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

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

FCC 47 CFR Part 2 FCC 47 CFR Part 24 ANSI C63.4-2003 ANSI/TIA/EIA-603-C 2004

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

3.4 DESCRIPTION OF SUPPORT UNITS

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

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	CAL. DATE
1	EARPHONE	NA	RC E150	NA	NA
2	UNIVERSAL RADIO COMMUNICATION TESTER	R&S	CMU200	104484	Feb. 02, 2010

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	1.3m non-shielded without core
2	NA

NOTE:

1. All power cords of the above support units are non shielded (1.8m).

- 2. Item 2 acted as a communication partners to transfer data.
- 3. Item 1 was supplied from the client.



4 TEST TYPES AND RESULTS

4.1 OUTPUT POWER MEASUREMENT

4.1.1 LIMITS OF OUTPUT POWER MEASUREMENT

The radiated peak output power shall be according to the specific rule Part 24.232(b) that "Mobile / Portable station are limited to 2 watts e.i.r.p" and 24.232(c) specific that "Peak transmit power must be measure over any interval of continuous transmission using instrumentation calibration in terms of rms-equivalent voltage."



4.1.2 TEST INSTRUMENTS

	-			
DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	ESI7	838496/016	Dec. 29, 2008	Dec. 28, 2009
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100039	Dec. 08, 2008	Dec. 07, 2009
BILOG Antenna SCHWARZBECK	VULB9168	9168-155	Apr. 30, 2008	Apr. 28, 2010
HORN Antenna SCHWARZBECK	BBHA 9120D	9120D-408	Dec. 29, 2008	Dec. 28, 2009
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170242	Jan. 06, 2009	Jan. 05, 2010
Preamplifier Agilent	8449B	3008A01960	Nov. 03, 2008	Nov. 02, 2009
Preamplifier Agilent	8447D	2944A10631	Nov. 03, 2008	Nov. 02, 2009
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	274041/4	Aug. 21, 2008	Aug. 20, 2009
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	283397/4	Aug. 21, 2008	Aug. 20, 2009
Software ADT.	ADT_Radiated_ V7.6.15.9.2	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	010303	NA	NA
Antenna Tower Controller inn-co GmbH	CO2000	019303	NA	NA
Turn Table ADT.	TT100.	TT93021704	NA	NA
Turn Table Controller	SC100.	SC93021704	NA	NA

NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

- 2. The test was performed in HwaYa Chamber 4.
- 3. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
- 4. The FCC Site Registration No. is 988962.
- 5. The IC Site Registration No. is IC7450F-4.



4.1.3 TEST PROCEDURES

- a. The power was measured with R&S Spectrum Analyzer. All measurements were done at 3 channels: 25, 600 and 1175 (low, middle and high operational frequency range.)
- b. The conducted peak output power used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer. The path loss included the splitter loss, cable loss and 20dB pad loss. The spectrum set RB/VB 3MHz,then read peak power value and record to the test. (All transmitted path loss shall be considered in the test report data.)
- c. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The "Read Value" is the spectrum reading the maximum power value.
- d. The substitution horn antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a TX cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to "Read Value" of step b. Record the power level of S.G
- e. EIRP = Output power level of S.G TX cable loss + Antenna gain of substitution horn.
- **NOTE:** The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 3MHz/10MHz.



4.1.4 TEST SETUP

EIRP POWER MEASUREMENT:



For the actual test configuration, please refer to the attached file (Test Setup Photo). **CONDUCTED POWER MEASUREMENT:**



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

4.1.5 EUT OPERATING CONDITIONS

- a. The EUT makes a phone call to the communication simulator.
- b. The communication simulator station system controlled an EUT to export maximum output power under transmission mode and specific channel frequency.



4.1.6 TEST RESULTS

MODE	TX connected	DETECTOR FUNCTION	Average
INPUT POWER (SYSTEM)	120Vac, 60Hz	ENVIRONMENTAL CONDITIONS	23deg. C, 60%RH, 982hPa
TESTED BY	Mark Liao		

WORST CASE CONDUCTED POWER OF 1x EV-DO										
	FRFO	Rev. A	Rev. 0	CORR	Rev. A		Re	<i>ı</i> . O		
CHANNEL	(MHz)			FACTOR (dB)		OUTPUT		POWER		
		RAW VAL	UE (dBm)		dBm	Watt	dBm	Watt		
25	1851.25	18.36	18.30	4.50	22.86	0.193	22.80	0.191		
600	1880.00	18.61	18.52	4.50	23.11	0.205	23.02	0.200		
1175	1908.75	18.33	18.15	4.50	22.83	0.192	22.65	0.184		

CONDUCTED POWER (1x EV-DO)								
EREO			Rev. A		Rev. 0			
CHANNEL	(MHz)	RETAP: 128kbps (dBm)	RETAP: 2048kbps (dBm)	RETAP: 12288kbps (dBm)	EVDO-UL: 9.6kbps (dBm)	EVDO-UL: 38.4kbps (dBm)	EVDO-UL: 153.6kbps (dBm)	
25	1851.25	22.99	22.84	22.86	22.88	22.80	22.92	
600	1880.00	23.05	23.05	23.11	23.00	23.02	23.01	
1175	1908.75	22.82	22.81	22.83	22.50	22.65	22.61	

CDMA 2000 CONDUCTED POWER													
	CDMA 2000		RAW VALUE (dBm)					OUTPUT POWER (dBm)					
CHAN.	FREQ. (MHz)	RC	SO2	SO55	TDSO SO32 (FCH)	TDSO SO32 (FCH+ SCH)	SO3	FACTOR (dB)	SO2	SO55	TDSO SO32 (FCH)	TDSO SO32 (FCH+ SCH)	SO3
25	1951 25	RC1	18.54	18.35	-	-	18.68	4.50	23.04	22.85	-	-	23.18
25	1001.20	RC3	18.59	18.40	18.39	18.37	18.52	4.50	23.09	22.90	22.89	22.87	23.02
600	1990.00	RC1	18.55	18.47	-	-	18.51	4.50	23.05	22.97	-	-	23.01
600 1880.00	RC3	18.60	18.72	18.63	18.45	18.48	4.50	23.10	23.22	23.13	22.95	22.98	
4475 4000 75	RC1	18.33	18.11	-	-	18.35	4.50	22.83	22.61	-	-	22.85	
1175	1300.75	RC3	18.32	18.29	18.45	18.35	18.27	4.50	22.82	22.79	22.95	22.85	22.77

REMARKS: 1. Peak Output Power (dBm) = Raw Value (dBm) + Correction Factor (dB). 2. Correction Factor (dB) = Power Splitter Loss (dB) + Cable Loss (dB).

3. The value in bold is the worst.



MODE	TX connected	DETECTOR FUNCTION	Average
INPUT POWER (SYSTEM)	120Vac, 60Hz	ENVIRONMENTAL CONDITIONS	23deg. C, 60%RH, 982hPa
TESTED BY	Mark Liao		

	EIRP POWER (1x EV-DO)								
EREO		S.G. VALUE (dBm)		CORR	OUTPUT POWER				
CHANNEL	(MHz)		. ,	FACTOR (dB)	Rev. A		Re	Rev. 0	
		Rev. A	Rev. 0		dBm	Watt	dBm	Watt	
25	1851.25	14.90	14.75	8.40	23.30	0.214	23.15	0.207	
60	1880.00	14.52	14.79	8.56	23.08	0.203	23.35	0.216	
1175	1908.75	15.15	14.61	8.50	23.65	0.232	23.11	0.205	

EIRP POWER (SO55)						
CHANNEL NO.	FREQUENCY (MHz)	CORRECTION	OUTPUT	POWER		
			FACTOR (dB)	dBm	Watt	
25	1851.25	15.13	8.40	23.53	0.225	
600	1880.00	15.00	8.56	23.56	0.227	
1175	1908.75	15.23	8.50	23.73	0.236	

REMARKS: 1. Peak Output Power (dBm) = Raw Value (dBm) + Correction Factor (dB).

- 2. Correction Factor (dB) = Receiver Antenna Gain (dBi) + Cable Loss (dB) + Free Space Loss (dB).
- 3. The value in bold is the worst.



4.2 FREQUENCY STABILITY MEASUREMENT

4.2.1 LIMITS OF FREQUENCY STABILIITY MEASUREMENT

According to the FCC part 24.235 shall be tested the frequency stability. The rule is defined that" The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block." The frequency error rate is according to the JTC standard that the frequency error rate shall be accurate to within 2.5ppm of the received frequency from the base station. The test extreme voltage is according to the 2.1055(d)(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment and the extreme temperature rule is comply with the 2.1055(a)(1) –30°C ~50°C.

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL	CALIBRATED UNTIL
* ROHDE & SCHWARZ Spectrum Analyzer	FSP40	100041	May 13, 2009	May 12, 2010
* Hewlett Packard RF cable	8120-6192	01428251	NA	NA
* Suhner RF cable	Sucoflex104	204850/4	NA	NA
* WIT Standard Temperature & Humidity Chamber	TH-4S-C	W981030	Jun. 28, 2008	Jun. 27, 2009

4.2.2 TEST INSTRUMENTS

NOTE: 1. The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to NML/ROC and NIST/USA.

2. "*" = These equipments are used for the final measurement.

3. The test was performed in ADT RF OVEN room.



4.2.3 TEST PROCEDURE

- a. Because of the measure the carrier frequency under the condition of the AFC lock, it shall be used the mobile station in the CDMA link mode. This is accomplished with the use of the communication simulator station. The oven room could control the temperatures and humidity. The link channel is the 600.
- b. Power must be removed when changing from one temperature to another or one voltage to another voltage. Power warm up is at least 15 min and power applied should perform before recording frequency error.
- c. EUT is connected the external power supply to control the DC input power. The various Volts from the minimum 3.6 Volts to 4.2 Volts. Each step shall be record the frequency error rate.
- d. The temperature range step is 10 degrees in this test items. All temperature levels shall be hold the $\pm 0.5^{\circ}$ C during the measurement testing.
- e. The each temperature step shall be at least 0.5 hours, consider the EUT could be test under the stability condition.

NOTE: The frequency error was recorded frequency error from the communication simulator.

4.2.4 TEST SETUP





4.2.5 TEST RESULTS

MODE	Channel 600	ENVIRONMENTAL CONDITIONS	23deg. C, 60%RH, 982hPa
INPUT POWER (SYSTEM)	120Vac, 60Hz	TESTED BY	Mark Liao

AFC FREQUENCY ERROR vs. VOLTAGE						
VOLTAGE (Volts) FREQUENCY ERROR (Hz) FREQUENCY ERROR (ppm) LIMIT (ppm)						
4.2	-4	-0.002	2.5			
3.6	-9	-0.005	2.5			

NOTE: The applicant defined the normal working voltage of the battery is from 3.6Vdc to 4.2Vdc.

AFC FREQUENCY ERROR vs. TEMP.					
ТЕМР. (℃)	FREQUENCY ERROR (Hz)	LIMIT (ppm)			
50	-4	-0.002	2.5		
40	-8	-0.004	2.5		
30	-9	-0.005	2.5		
20	-3	-0.002	2.5		
10	-2	-0.001	2.5		
0	1	0.001	2.5		
-10	-2	-0.001	2.5		
-20	-5	-0.003	2.5		
-30	-4	-0.002	2.5		



4.3 OCCUPIED BANDWIDTH MEASUREMENT

4.3.1 LIMITS OF OCCUPIED BANDWIDTH MEASUREMENT

According to FCC 24.238(b) specified that emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26dB below the transmitter power.

4.3.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
* ROHDE & SCHWARZ Spectrum Analyzer	FSP40	100041	May 13, 2009	May 12, 2010
* Mini-Circuits Power Splitter	ZN2PD-9G	NA	Jun. 26, 2009	Jun. 25, 2010
* RF cable	SUCOFLEX 104	274403/4	Aug. 22, 2008	Aug. 21, 2009
* RF cable	SUCOFLEX 104	250729/4	Aug. 21, 2008	Aug. 20, 2009
* RF cable	SUCOFLEX 104	214377/4	Aug. 21, 2008	Aug. 20, 2009
* JFW 20dB attenuation	50HF-020-SMA	NA	NA	NA

NOTE: 1. The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to NML/ROC and NIST/USA.

2. "*" = These equipments are used for the final measurement.

4.3.3 TEST SETUP





4.3.4 TEST PROCEDURES

- a. The EUT makes a phone call to the communication simulator. The power was measured with R&S Spectrum Analyzer. All measurements were done at 3 channels, 25, 600 and 1175 (low, middle and high operational frequency range.)
- b. The conducted occupied bandwidth used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer. This splitter loss and cable loss are the worst loss 4.5dB in the transmitted path track.
- c. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. FCC 24.238(b) required a measurement bandwidth is the fundamental emission below 26dB bandwidth.



4.3.5 TEST RESULTS

FOR SO55:

CHANNEL	FREQUENCY (MHz)	MAX. OUTPUT POWER -26 dBc BANDWIDTH (MHz)
25	1851.25	1.432
600	1880.00	1.429
1175	1908.75	1.433

















CHANNEL	FREQUENCY (MHz)	MAX. OUTPUT POWER -26 dBc BANDWIDTH (MHz)
25	1851.25	1.441
600	1880.00	1.438
1175	1908.75	1.440

FOR EV-DO Rev. A:







CH 600









FOR EV-DO Rev. 0:

CHANNEL	FREQUENCY (MHz)	MAX. OUTPUT POWER -26 dBc BANDWIDTH (MHz)
25	1851.25	1.437
600	1880.00	1.436
1175	1908.75	1.431

















4.4 BAND EDGE MEASUREMENT

4.4.1 LIMITS OF BAND EDGE MEASUREMENT

The PCS frequency bands refer to the FCC 24.229 rule. According to FCC 24.238(a) specified that power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
* ROHDE & SCHWARZ Spectrum Analyzer	FSP40	100041	May 13, 2009	May 12, 2010
* Mini-Circuits Power Splitter	ZN2PD-9G	NA	Jun. 26, 2009	Jun. 25, 2010
* RF cable	SUCOFLEX 104	274403/4	Aug. 22, 2008	Aug. 21, 2009
* RF cable	SUCOFLEX 104	250729/4	Aug. 21, 2008	Aug. 20, 2009
* RF cable	SUCOFLEX 104	214377/4	Aug. 21, 2008	Aug. 20, 2009
* JFW 20dB attenuation	50HF-020-SMA	NA	NA	NA

4.4.2 TEST INSTRUMENTS

NOTE: 1. The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to NML/ROC and NIST/USA.

2. "*" = These equipments are used for the final measurement.

4.4.3 TEST SETUP





4.4.4 TEST PROCEDURES

- a. The EUT was set up for the maximum peak power with CDMA link data modulation. The power was measured with R&S Spectrum Analyzer. All measurements were done at 2 channels, 25 and 1175 (low and high operational frequency range.)
- b. The band edge measurement used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer. This splitter loss and cable loss are the worst loss 4.5dB in the transmitted path track.
- c. The center frequency of spectrum is the band edge frequency and span is 3 MHz. RB of the spectrum is 15kHz and VB of the spectrum is 15kHz.
- d. Record the max trace plot into the test report.

4.4.5 EUT OPERATING CONDITION

- a. The EUT makes a phone call to the communication simulator.
- b. The communication simulator station system controlled an EUT to export maximum output power under transmission mode and specific channel frequency.



4.4.6 TEST RESULTS

FOR SO55:

LOWER BAND EDGE



HIGHER BAND EDGE





FOR EV-DO Rev. A:

LOWER BAND EDGE



HIGHER BAND EDGE





FOR EV-DO Rev. 0:

LOWER BAND EDGE



HIGHER BAND EDGE





4.5 CONDUCTED SPURIOUS EMISSIONS

4.5.1 LIMITS OF CONDUCTED SPURIOUS EMISSIONS MEASUREMENT

In the FCC 24.238(a), On any frequency outside a licensee's frequency block within USPCS spectrum, the power of any emission shall be attenuated below the transmitter power (P) by at least 43 +10 log (P) dB. The limit of emission equal to -13dBm.

4.5.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
* ROHDE & SCHWARZ Spectrum Analyzer	FSP40	100041	May 13, 2009	May 12, 2010
* Wainwright Instruments Band Reject Filter	WRCG 1850/1910-1830/1930-6 0/9SS	SN1	Mar. 26, 2009	Mar. 25, 2010
* WI Highpass filter	WHK3.1/18G-10SS	SN1	Apr. 13, 2009	Apr. 12, 2010
* Mini-Circuits Power Splitter	ZN2PD-9G	NA	Jun. 26, 2009	Jun. 25, 2010
* RF cable	SUCOFLEX 104	274403/4	Aug. 22, 2008	Aug. 21, 2009
* RF cable	SUCOFLEX 104	250729/4	Aug. 21, 2008	Aug. 20, 2009
* RF cable	SUCOFLEX 104	214377/4	Aug. 21, 2008	Aug. 20, 2009

NOTE: 1. The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to NML/ROC and NIST/USA.

2. "*" = These equipments are used for the final measurement.



4.5.3 TEST PROCEDURE

- a. The EUT was set up for the maximum peak power with CDMA link data modulation. The power was measured with R&S Spectrum Analyzer. All measurements were done at 3 channels, 25, 600 and 1175 (low, middle and high operational frequency range.)
- b. The conducted spurious emission used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer. This splitter loss and cable loss are the worst loss 4.5dB in the transmitted path track.
- c. When the spectrum scanned from 9kHz to 3GHz, it shall be connected to the band reject filter attenuated the carried frequency. The spectrum set RB=1MHz, VB=3MHz.
- d. When the spectrum scanned from 3GHz to 20GHz, it shall be connected to the high pass filter attenuated the carried frequency. The spectrum set RB=1MHz, VB=3MHz.



4.5.4 TEST SETUP

4.5.5 EUT OPERATING CONDITIONS

- a. The EUT makes a phone call to the communication simulator.
- b. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency.



4.5.6 TEST RESULTS





3GHz ~ 10GHz





10GHz ~ 20GHz



CH 600: 9kHz ~ 3GHz





3GHz ~ 10GHz



¹⁰GHz ~ 20GHz





CH 1175: 9kHz ~ 3GHz



3GHz ~ 10GHz





10GHz ~ 20GHz





4.6 RADIATED EMISSION MEASUREMENT (BELOW 1GHz)

4.6.1 LIMITS OF RADIATED EMISSION MEASUREMENT

In the FCC 24.238(a), On any frequency outside a licensee's frequency block within USPCS spectrum, the power of any emission shall be attenuated below the transmitter power (P) by at least 43 +10 log (P) dB. The limit of emission equal to -13dBm. So the limit of emission is the same absolute specified line.

LIMIT (dBm)	EQUIVALENT FIELD STRENGTH AT 3m (dBuV/m) (NOTE)	
-13	82.22	

NOTE: The following formula is used to convert the equipment radiated power to field strength.

E = [1000000 $\sqrt{(30P)}$] / 3 uV/m, where P is Watts.

4.6.2 TEST INSTRUMENTS

Same as 4.1.2.



4.6.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meters semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
- **NOTE:** The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1MHz/3MHz.

4.6.4 DEVIATION FROM TEST STANDARD

No deviation



4.6.5 TEST SETUP



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

4.6.6 EUT OPERATING CONDITIONS

- a. The EUT makes a phone call to the communication simulator.
- b. The communication simulator station system controlled an EUT to export maximum output power under transmission mode and specific channel frequency.



4.6.7 TEST RESULTS

MODE	TX channel 25	FREQUENCY RANGE	Below 1000MHz
ENVIRONMENTAL CONDITIONS	25deg. C, 70%RH, 982hPa	INPUT POWER (SYSTEM)	120Vac, 60Hz
TESTED BY	Lori Chiu		

	ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M							
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	Correction Factor (dB/m)
1	64.99	39.89	82.22	-42.33	2.00 H	259	27.14	12.75
2	261.32	39.94	82.22	-42.28	2.00 H	160	26.22	13.72
3	900.86	37.99	82.22	-44.23	1.25 H	64	9.77	28.23
4	935.85	38.35	82.22	-43.87	1.25 H	187	9.81	28.54
5	951.40	38.36	82.22	-43.86	2.00 H	88	9.67	28.69
6	996.11	38.87	82.22	-43.35	1.25 H	10	9.54	29.33
		ANTENNA		Y & TEST DI	STANCE: V	ERTICAL A	Т 3 М	
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE	RAW VALUE (dBuV)	CORRECTION FACTOR
		((Degree)		(ub/iii)
1	53.33	50.20	82.22	-32.02	1.25 V	(Degree) 10	37.22	12.99
1 2	53.33 63.05	50.20 48.37	82.22 82.22	-32.02 -33.85	1.25 V 1.00 V	(Degree) 10 10	37.22 35.52	12.99 12.85
1 2 3	53.33 63.05 131.08	50.20 48.37 42.96	82.22 82.22 82.22	-32.02 -33.85 -39.26	1.25 V 1.00 V 1.00 V	(Degree) 10 10 199	37.22 35.52 30.28	12.99 12.85 12.68
1 2 3 4	53.33 63.05 131.08 181.62	50.20 48.37 42.96 39.22	82.22 82.22 82.22 82.22 82.22	-32.02 -33.85 -39.26 -43.00	1.25 V 1.00 V 1.00 V 1.25 V	(Degree) 10 10 199 340	37.22 35.52 30.28 26.56	12.99 12.85 12.68 12.67
1 2 3 4 5	53.33 63.05 131.08 181.62 265.21	50.20 48.37 42.96 39.22 42.04	82.22 82.22 82.22 82.22 82.22 82.22	-32.02 -33.85 -39.26 -43.00 -40.18	1.25 V 1.00 V 1.00 V 1.25 V 1.00 V	(Degree) 10 10 199 340 241	37.22 35.52 30.28 26.56 28.14	12.99 12.85 12.68 12.67 13.90

NOTE:

- 1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB).
- 2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
- 3. The other emission levels were very low against the limit.
- 4. Margin value = Emission level Limit value.
- 5. This is valid for all 3 channels.



4.7 EFFECTIVE RADIATED POWER MEASUREMENT (ABOVE 1GHz)

4.7.1 LIMITS OF RADIATED EMISSION MEASUREMENT

In the FCC 24.238(a), On any frequency outside a licensee's frequency block within USPCS spectrum, the power of any emission shall be attenuated below the transmitter power (P) by at least 43 +10 log (P) dB. The limit of emission equal to -13dBm.

4.7.2 TEST INSTRUMENTS

Same as 4.1.2.



4.7.3 TEST PROCEDURES

- a. The power was measured with R&S Spectrum Analyzer. All measurements were done at 3 channels: 25, 600 and 1175 (low, middle and high operational frequency range.)
- b. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The "Read Value" is the spectrum reading the maximum power value.
- c. The substitution horn antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a TX cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to "Read Value" of step b. Record the power level of S.G
- d. EIRP = Output power level of S.G TX cable loss + Antenna gain of substitution horn.
- **NOTE:** The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1MHz/3MHz.

4.7.4 DEVIATION FROM TEST STANDARD

No deviation



4.7.5 TEST SETUP



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

4.7.6 EUT OPERATING CONDITIONS

- a. The EUT makes a phone call to the communication simulator.
- b. The communication simulator station system controlled an EUT to export maximum output power under transmission mode and specific channel frequency.



4.7.7 TEST RESULTS

MODE	Channel 25	FREQUENCY RANGE	Above 1000MHz
INPUT POWER (SYSTEM)	120Vac, 60Hz	ENVIRONMENTAL CONDITIONS	23deg°C, 60%RH, 988hPa
TESTED BY	Mark Liao		

	ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M							
NO. FREQ. (MHz) EMISSION LEVEL (dBuV) LIMIT (dBm) S.G POWER CORRECTION FACTOR (dB)				POWER VALUE (dBm)				
1	3702.50	69.94	-13.00	-38.84	9.90	-28.94		
2	5553.75	50.55	-13.00	-54.08	9.73	-44.35		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M							
NO. FREQ. (MHz) EMISSION LEVEL (dBuV) LIMIT (dBm) S.G POWER VALUE (dBm) FACTOR (dB)			POWER VALUE (dBm)				
1	3702.50	66.28	-13.00	-38.46	9.90	-28.56	
2	5553.75	49.81	-13.00	-54.84	9.73	-45.11	

NOTE: Power Value (dBum) = S.G Power Value (dBm) + Correction Factor (dB).



MODE	Channel 600	FREQUENCY RANGE	Above 1000MHz
INPUT POWER (SYSTEM)	120Vac, 60Hz	ENVIRONMENTAL CONDITIONS	23deg°C, 60%RH, 988hPa
TESTED BY	Mark Liao		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M							
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV)	LIMIT (dBm)	S.G POWER VALUE (dBm)	CORRECTION FACTOR (dB)	POWER VALUE (dBm)	
1	3760.00	64.51	-13.00	-40.12	9.88	-30.24	
2	5640.00	53.13	-13.00	-51.31	9.64	-41.67	

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M							
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV)	LIMIT (dBm)	S.G POWER VALUE (dBm)	CORRECTION FACTOR (dB)	POWER VALUE (dBm)	
1	3760.00	64.79	-13.00	-39.96	9.88	-30.08	
2	5640.00	52.11	-13.00	-52.38	9.64	-42.74	

NOTE: Power Value (dBum) = S.G Power Value (dBm) + Correction Factor (dB).



MODE	Channel 1175	FREQUENCY RANGE	Above 1000MHz
INPUT POWER (SYSTEM)	120Vac, 60Hz	ENVIRONMENTAL CONDITIONS	23deg°C, 60%RH, 988hPa
TESTED BY	Mark Liao		

	ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M							
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV)	LIMIT (dBm)	S.G POWER VALUE (dBm)	CORRECTION FACTOR (dB)	POWER VALUE (dBm)		
1	3817.50	68.64	-13.00	-36.16	9.85	-26.31		
2	5726.25	55.23	-13.00	-49.26	9.62	-39.64		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M							
NO.	D. FREQ. (MHz) EMISSION LEVEL (dBuV) LIMIT (dBm) S.G POWER VALUE (dBm) FACTOR (dB) (dBm)					POWER VALUE (dBm)	
1	3817.50	69.93	-13.00	-34.81	9.85	-24.96	
2	5726.25	51.41	-13.00	-53.06	9.62	-43.44	

NOTE: Power Value (dBum) = S.G Power Value (dBm) + Correction Factor (dB).



5 INFORMATION ON THE TESTING LABORATORIES

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025.

USA	FCC, NVLAP
GERMANY	TUV Rheinland
JAPAN	VCCI
NORWAY	NEMKO
CANADA	INDUSTRY CANADA, CSA
R.O.C.	TAF, BSMI, NCC
NETHERLANDS	Telefication
SINGAPORE	GOST-ASIA (MOU)
RUSSIA	CERTIS (MOU)

Copies of accreditation certificates of our laboratories obtained from approval agencies can be downloaded from our web site: <u>www.adt.com.tw/index.5/phtml</u>. If you have any comments, please feel free to contact us at the following:

Linko EMC/RF Lab: Tel: 886-2-26052180 Fax: 886-2-26051924 Hsin Chu EMC/RF Lab: Tel: 886-3-5935343 Fax: 886-3-5935342

Hwa Ya EMC/RF/Safety/Telecom Lab: Web Site: www.adt.com.tw Tel: 886-3-3183232 Fax: 886-3-3185050

The address and road map of all our labs can be found in our web site also.



6 APPENDIX A – MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

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

---END----