

Variant FCC RF Test Report

APPLICANT : Honeywell International Inc.
EQUIPMENT : Dolphin 9700 Mobile computer
BRAND NAME : Honeywell
MODEL NAME : Dolphin 9700
FCC ID : HD59700LUP
STANDARD : FCC 47 CFR Part 2, 22(H), 24(E)
CLASSIFICATION : PCS Licensed Transmitter Held to Ear (PCE)
Tx/Rx FREQUENCY RANGE : GSM850 : 824.2 ~ 848.8 MHz /
869.2 ~ 893.8 MHz
GSM1900 : 1850.2 ~ 1909.8 MHz /
1930.2 ~ 1989.8 MHz
WCDMA Band V : 826.4 ~ 846.6 MHz /
871.4 ~ 891.6 MHz
WCDMA Band II : 1852.4 ~ 1907.6 MHz /
1932.4 ~ 1987.6 MHz
MAX. ERP/EIRP POWER : GSM850 (GSM) : 0.50 W
GSM1900 (GSM) : 0.58 W

This is a variant report which is only valid together with the original test report. The product was received on Jul. 30, 2011 and completely tested on Aug. 23, 2011. 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:



Jones Tsai / Manager



SPORTON INTERNATIONAL INC.

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



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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FG903036-03	Rev. 01	This is a variant report which can be referred Product Equality Declaration as appendix C. All the test cases were performed on original report which can be referred to Sporton Report Number FG903036 as appendix D. Based on the original report, the worst case of radiation tests was verified.	Sep. 02, 2011

SUMMARY OF TEST RESULT

Report Section	FCC Rule	IC Rule	Description	Limit	Result	Remark
3.1	§22.913(a)(2)	RSS-132(4.4) SRSP-503(5.1.3)	Effective Radiated Power	< 7 Watts	PASS	-
3.1	§24.232(c)	RSS-133 (6.4) SRSP-510(5.1.2)	Equivalent Isotropic Radiated Power	< 2 Watts	PASS	-
3.2	§2.1053 §22.917(a) §24.238(a)	RSS-132 (4.5.1) RSS-133 (6.5.1)	Field Strength of Spurious Radiation	< $43+10\log_{10}(P[\text{Watts}])$	PASS	Under limit 13.11 dB at 1672 MHz



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	Dolphin 9700 Mobile computer
Brand Name	Honeywell
Model Name	Dolphin 9700
FCC ID	HD59700LUP
Tx Frequency	GSM850 : 824 MHz ~ 849 MHz GSM1900 : 1850 MHz ~ 1910 MHz WCDMA Band V : 824 MHz ~ 849 MHz WCDMA Band II : 1850 MHz ~ 1910 MHz
Rx Frequency	GSM850 : 869 MHz ~ 894 MHz GSM1900 : 1930 MHz ~ 1990 MHz WCDMA Band V : 869 MHz ~ 894 MHz WCDMA Band II : 1930 MHz ~ 1990 MHz
Maximum Output Power to Antenna	GSM850 : 31.61 dBm GSM1900 : 28.94 dBm WCDMA Band V : 21.81 dBm WCDMA Band II : 22.51 dBm
Maximum ERP/EIRP	<EUT with Keypad 2 and Scanner 1> GSM850 (GSM) : 0.50 W (27.02 dBm) <EUT with Keypad 2 and Scanner 1> GSM1900 (GSM) : 0.58 W (27.64 dBm)
Antenna Type	Fixed Internal Antenna
HW Version	2.1
SW Version	0 1
Type of Modulation	GSM / GPRS : GMSK EDGE : 8PSK WCDMA : QPSK HSDPA : QPSK / 16QAM
EUT Stage	Production Unit

Remark:

1. For other wireless features of this EUT, the test report will be issued separately.
2. This test report recorded only product characteristics and test results of PCS Licensed Transmitter Held to Ear (PCE).
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: +886-3-327-3456 FAX: +886-3-328-4978		
Test Site No.	Sporton Site No.		FCC/IC Registration No.
	TH02-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:

- ♦ Preliminary Guidance for Receiving Applications for Certification of 3G Device. May 9, 2006.
- ♦ FCC 47 CFR Part 2, 22(H), 24(E)
- ♦ ANSI / TIA / EIA-603-C-2004
- ♦ IC RSS-132 Issue 2
- ♦ IC RSS-133 Issue 5

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 No.	FCC ID	Data Cable	Power Cord
1.	System Simulator	R&S	CMU200	N/A	N/A	Unshielded, 1.8 m

2 Test Configuration of Equipment Under Test

2.1 Test Mode

During all testing, EUT is in link mode with base station emulator at maximum power level. The spurious emission measurements were carried out in semi-anechoic chamber with 3-meter test range, and EUT is rotated on three test planes to find out the worst emission.

Frequency range investigated for radiated emission is as follows:

1. 30 MHz to 9000 MHz for GSM850 and WCDMA Band V.
2. 30 MHz to 19000 MHz for GSM1900 and WCDMA Band II.

Test Modes	
Band	Radiated TCs
GSM 850	■ GSM Link + RS232 Cable 2 for EUT with Keypad 1 and Scanner 2
GSM 1900	■ GSM Link + RS232 Cable 2 for EUT with Keypad 2 and Scanner 1

Note:

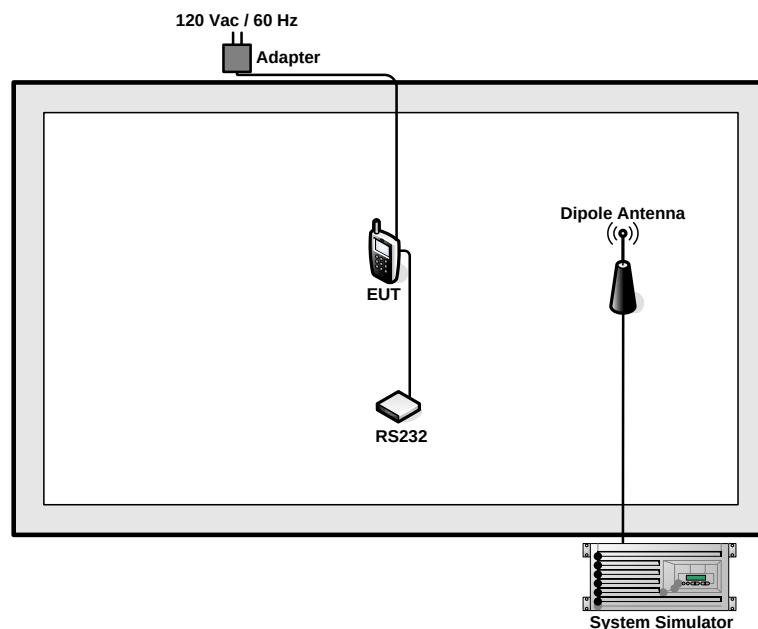
1. The maximum power levels are GSM mode for GMSK link, only these modes were used for all tests.
2. Because there are individual antennas for each WWAN, WLAN, and Bluetooth, the co-location test modes are not required.

The conducted power tables are as follows:

Conducted Power (*Unit: dBm)						
Band	GSM850			GSM1900		
Channel	128	189	251	512	661	810
Frequency	824.2	836.4	848.8	1850.2	1880.0	1909.8
NOM	31.45	31.54	31.61	28.89	28.94	28.54
GPRS 8	31.47	31.52	31.59	28.87	28.91	28.57
GPRS 10	29.87	30.01	30.04	27.34	27.43	27.39
EGPRS 8	26.51	26.54	26.67	25.7	25.72	25.42
EGPRS 10	24.49	24.58	24.68	23.61	23.71	23.33

Conducted Power (*Unit: dBm)						
Band	WCDMA Band V			WCDMA Band II		
Channel	4132	4182	4233	9262	9400	9538
Frequency	826.4	836.4	846.6	1852.4	1880.0	1907.6
12.2K	21.52	21.67	21.81	20.04	22.31	22.08
HSDPA Sub Test1	21.56	21.66	21.79	22.14	22.45	22.09
HSDPA Sub Test2	21.67	21.71	21.04	22.12	22.51	22.09
HSDPA Sub Test3	20.21	20.41	20.75	21.98	21.22	20.91
HSDPA Sub Test4	19.18	19.44	19.51	19.85	20.25	20.1

2.2 Connection Diagram of Test System



3 Test Result

3.1 Effective Radiated Power and Effective Isotropic Radiated Power Measurement

3.1.1 Description of the ERP/EIRP Measurement

ERP/EIRP is measured by substitution method according to ANSI / TIA / EIA-603-C-2004. The ERP of mobile transmitters must not exceed 7 Watts and the EIRP of mobile transmitters are limited to 2 Watts.

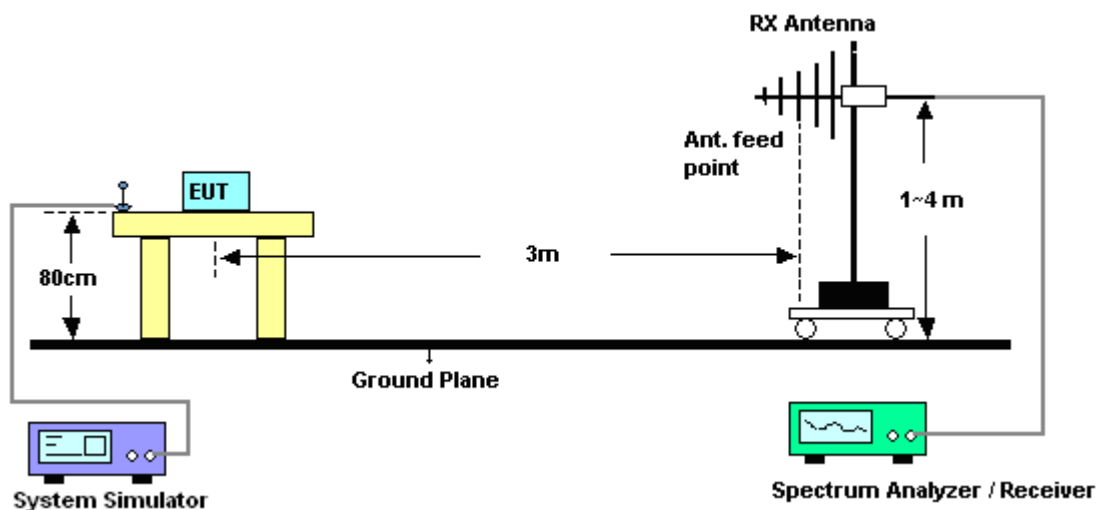
3.1.2 Measuring Instruments

See list of measuring instruments of this test report.

3.1.3 Test Procedures

1. The EUT was placed on an non-conductive rotating platform with 0.8 meter height in a semi-anechoic chamber. The radiated emission at the fundamental frequency was measured at 3 m with a test antenna and a spectrum analyzer with RBW= 3MHz,VBW= 3MHz, and peak detector settings.
2. During the measurement, the EUT was enforced in maximum power and linked with a base station. The highest emission was recorded from analyzer power level (LVL) from the 360 degrees rotation of the turntable and the test antenna raised and lowered over a range from 1 to 4 meters in both horizontally and vertically polarized orientations.
3. Effective Isotropic Radiated Power (EIRP) was measured by substitution method according to TIA/EIA-603-C. The EUT was replaced by dipole antenna (substitution antenna) at same location, and then a known power from S.G. was applied into the dipole antenna through a Tx cable, and then recorded the maximum Analyzer reading through raised and lowered the test antenna. The correction factor (in dB) = S.G. - Tx Cable loss + Substitution antenna gain - Analyzer reading. Then the EUT's EIRP was calculated with the correction factor, $EIRP = LVL + \text{Correction factor}$ and $ERP = EIRP - 2.15$.

3.1.4 Test Setup



3.1.5 Test Result of ERP

GSM850 (GSM) Radiated Power ERP for EUT with Keypad 2 and Scanner 1				
Horizontal Polarization				
Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	ERP (dBm)	ERP (W)
824.2	-2.21	30.89	26.53	0.45
836.4	-3.92	31.13	25.06	0.32
848.8	-4.13	31.62	25.34	0.34
Vertical Polarization				
Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	ERP (dBm)	ERP (W)
824.2	-6.76	35.93	27.02	0.50
836.4	-7.57	34.95	25.23	0.33
848.8	-7.61	34.71	24.95	0.31

* ERP = LVL (dBm) + Correction Factor (dB) – 2.15

3.1.6 Test Result of EIRP

GSM1900 (GSM) Radiated Power EIRP for EUT with Keypad 2 and Scanner 1				
Horizontal Polarization				
Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (W)
1850.2	-13.60	41.24	27.64	0.58
1880.0	-14.35	41.46	27.11	0.51
1909.8	-15.35	41.21	25.86	0.39
Vertical Polarization				
Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (W)
1850.2	-16.26	41.52	25.26	0.34
1880.0	-17.66	43.10	25.44	0.35
1909.8	-18.67	42.73	24.06	0.25

* EIRP = LVL (dBm) + Correction Factor (dB)

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

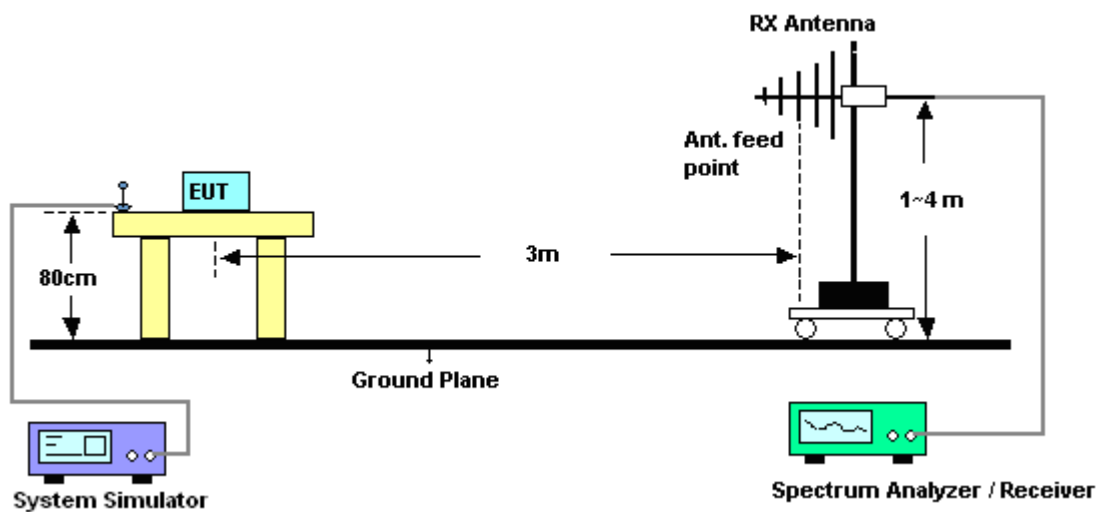
3.2.2 Measuring Instruments

See list of measuring instruments of this test report.

3.2.3 Test Procedures

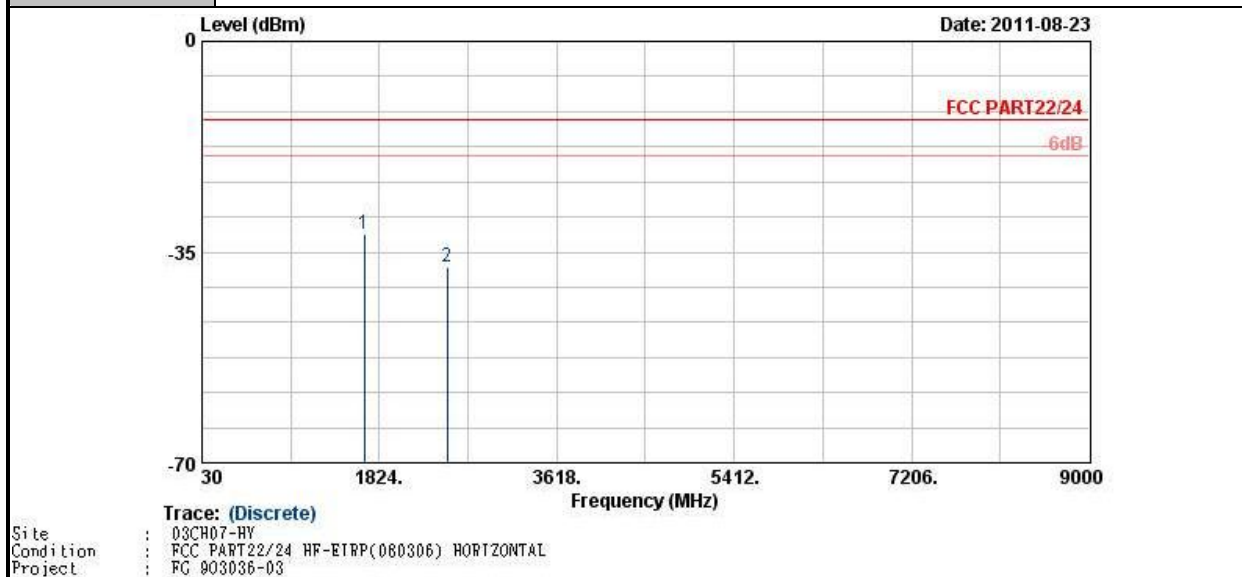
1. The EUT was placed on a rotatable wooden table with 0.8 meter about ground.
2. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest spurious emission.
4. The height of the receiving 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. $EIRP \text{ (dBm)} = S.G. \text{ Power} - Tx \text{ Cable Loss} + Tx \text{ Antenna Gain}$
11. $ERP \text{ (dBm)} = EIRP - 2.15$

3.2.4 Test Setup



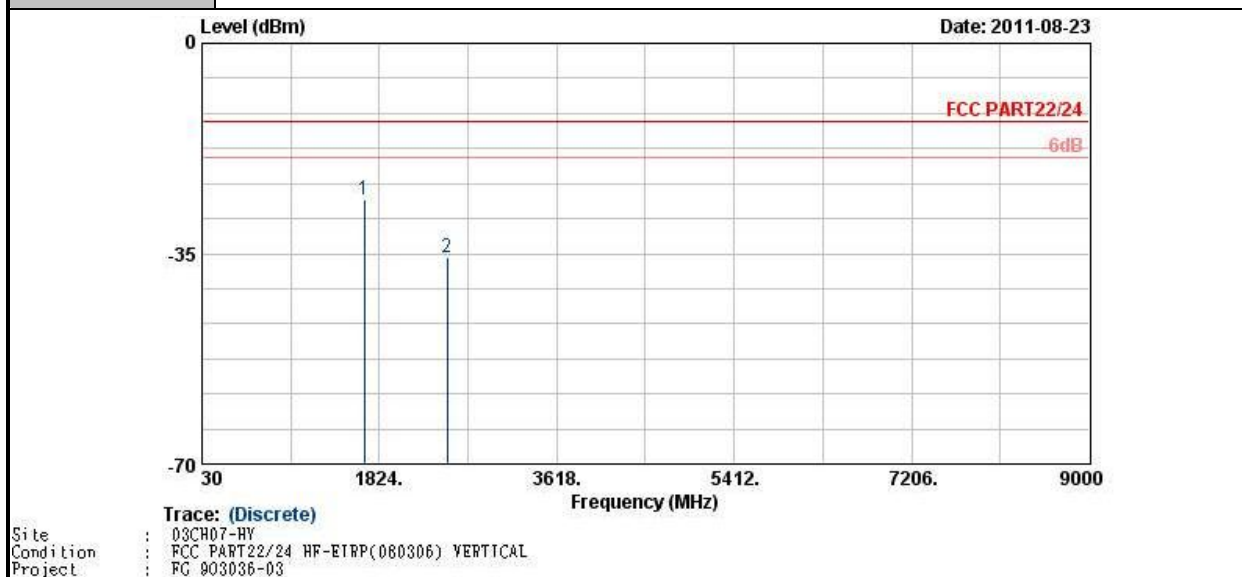
3.2.5 Test Result of Field Strength of Spurious Radiated

Band :	GSM850	Temperature :	22~23°C
Test Mode :	GSM Link + RS232 Cable 2 for EUT with Keypad 1 and Scanner 2	Relative Humidity :	45~47%
Test Engineer :	David Yang	Polarization :	Horizontal
Remark :	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
1672	-31.90	-13	-18.90	-41.38	-33.62	1.62	5.49	H	Pass
2509	-37.48	-13	-24.48	-51.39	-39.45	2.1	6.22	H	Pass

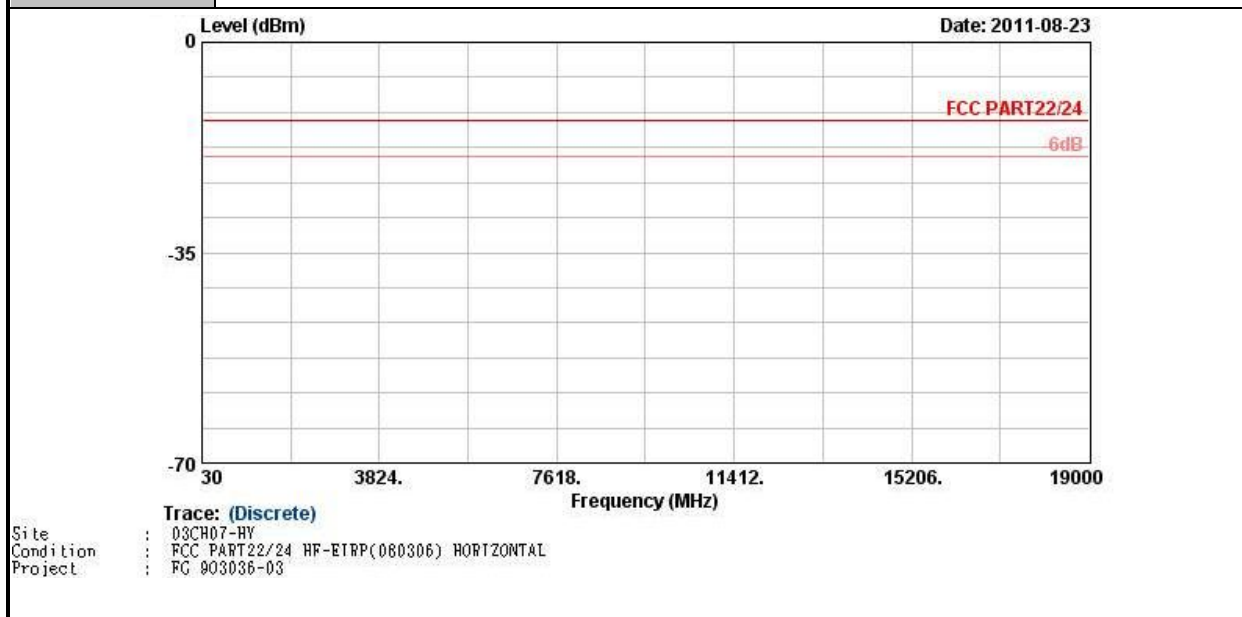
Band :	GSM850	Temperature :	22~23°C
Test Mode :	GSM Link + RS232 Cable 2 for EUT with Keypad 1 and Scanner 2	Relative Humidity :	45~47%
Test Engineer :	David Yang	Polarization :	Vertical
Remark :	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.		



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
1672	-26.11	-13	-13.11	-37.2	-27.83	1.62	5.49	V	Pass
2509	-35.71	-13	-22.71	-50.19	-37.68	2.1	6.22	V	Pass



Band :	GSM1900	Temperature :	22~23°C
Test Mode :	GSM Link + RS232 Cable 2 for EUT with Keypad 2 and Scanner 1	Relative Humidity :	45~47%
Test Engineer :	David Yang	Polarization :	Horizontal
Remark :	Spurious emissions within 30-1000MHz were found more than 20dB below limit line. Spurious emissions within 1000MHz ~ 10th harmonic were not found any signals.		





Band :	GSM1900	Temperature :	22~23°C
Test Mode :	GSM Link + RS232 Cable 2 for EUT with Keypad 2 and Scanner 1	Relative Humidity :	45~47%
Test Engineer :	David Yang	Polarization :	Vertical
Remark :	Spurious emissions within 30-1000MHz were found more than 20dB below limit line. Spurious emissions within 1000MHz ~ 10th harmonic were not found any signals.		

Level (dBm)

Date: 2011-08-23

0

-35

-70

30

3824.

7618.

11412.

15206.

19000

Frequency (MHz)

Trace: (Discrete)

Site : 03CH07-HY
Condition : FCC PART22/24 HF-ETRP(060306) VERTICAL
Project : PG 903036-03

FCC PART22/24

6dB

4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Due Date	Remark
Power Meter	Anritsu	ML2495A	0932001	N/A	Sep. 13, 2010	Sep. 12, 2011	Conducted (TH02-HY)
Bilog Antenna	SCHAFFNER	CBL6111C	2726	30MHz ~ 1GHz	Oct. 30, 2010	Oct. 29, 2011	Radiation (03CH07-HY)
Spectrum Analyzer	R&S	FSP30	101067	9KHz ~ 30GHz	Dec. 03, 2010	Dec. 02, 2011	Radiation (03CH07-HY)
Double Ridge Horn Antenna	ESCO	3117	00075962	1GHz ~ 18GHz	Aug. 10, 2011	Aug. 09, 2012	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.32dB. GAIN	Mar. 29, 2011	Mar. 28, 2012	Radiation (03CH07-HY)
EMI TEST RECEIVER	R&S	ESCI 7	100724	9kHz~7GHz	Aug. 22, 2011	Aug. 21, 2012	Radiation (03CH07-HY)
Pre Amplifier	MITEQ	AMF-7D-00 101800-30-1	159088	1GHz ~ 18GHz	Feb. 21, 2011	Feb. 20, 2012	Radiation (03CH07-HY)
System Simulator	R&S	CMU200	117591	N/A	Oct. 18, 2010	Oct. 17, 2011	-

5 Uncertainty of Evaluation

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

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

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

Contribution	Uncertainty of X_i		$u(X_i)$	C_i	$C_i * u(X_i)$
	dB	Probability Distribution			
Receiver Reading	± 0.10	Normal (k=2)	0.10	1	0.10
Antenna Factor Calibration	± 1.70	Normal (k=2)	0.85	1	0.85
Cable Loss Calibration	± 0.50	Normal (k=2)	0.25	1	0.25
Receiver Correction	± 2.00	Rectangular	1.15	1	1.15
Antenna Factor Directional	± 1.50	Rectangular	0.87	1	0.87
Site Imperfection	± 2.80	Triangular	1.14	1	1.14
Mismatch Receiver VSWR $\Gamma_1 = 0.197$ Antenna VSWR $\Gamma_2 = 0.194$ Uncertainty = $20\log(1-\Gamma_1\Gamma_2)$	+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 EP903036-03 as below.



Appendix C. Product Equality Declaration



Honeywell International Inc
Honeywell Scanning and Mobility
9680 Old Bales Road
Fort Mill, SC 29707 USA

Date: September 1, 2011

Product Equality Declaration

We, Honeywell International Inc., declare on our sole responsibility for the product of Dolphin 9700 (model name) as below:

The difference of Dolphin 9700 is:

1. Change the battery cell and capacity
2. Change the adapter
3. Change Applicant and Manufacturer address

Except Listings above, the others are the same as previous version.

Should you have any questions or comments regarding this matter, please have my best attention.

Contact Person: Michael Robinson

Sincerely,

Product Compliance - Imaging Systems
Michael.Robinson3@honeywell.com
(315) 554-6000 telephone USA

Michael Robinson
Honeywell International Inc
Honeywell Scanning and Mobility
700 Visions Drive PO Box 208
Skaneateles Falls, NY 13153-0208 USA



Appendix D. Original Report

Please refer to Sporton report number FG903036 as below.