

# FCC Test Report

APPLICANT : Gradys LLC  
EQUIPMENT : 3G module  
BRAND NAME : Gradys LLC  
MODEL NAME : X1-Device  
FCC ID : X8E-1459  
STANDARD : FCC 47 CFR FCC Part 15 Subpart B  
CLASSIFICATION : Declaration of Conformity

The product was received on Jul. 15, 2010 and completely tested on Jul. 30, 2010. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.4-2003 and shown the compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC., the test report shall not be reproduced except in full.

Reviewed by:



Anderson Chiu / Deputy 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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## REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FD071535	Rev. 01	Initial issue of report	Sep. 30, 2010

## SUMMARY OF TEST RESULT

Report Section	FCC Rule	IC Rule	Description	Limit	Result	Remark
3.1	15.109	7.2.3.2	Radiated Emission	< 15.109 limits or < RSS-Gen table 1 limits (Section 6)	PASS	Under limit 13.88 dB at 8718.00 MHz

## 1. General Description

### 1.1. Applicant

Gradys LLC

### 1.2. Feature of Equipment Under Test

Product Feature & Specification	
Equipment	3G module
Brand Name	Gradys LLC
Model Name	X1-Device
FCC ID	X8E-1459
Tx Frequency Range	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 Range	GSM850 : 869 MHz ~ 894 MHz GSM1900 : 1930 MHz ~ 1990 MHz WCDMA Band V : 869 MHz ~ 894 MHz WCDMA Band II : 1930 MHz ~ 1990 MHz
Antenna Type	Fixed External Antenna
Antenna Connector Type	N/A
HW Version	DVT
SW Version	Pre-production
Type of Modulation	GSM / GPRS : GMSK EDGE : 8PSK WCDMA : QPSK HSDPA : QPSK / 16QAM
EUT Stage	Identical Prototype

**Remark:** The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

### 1.3. Test Site

Test Site	SPORTON INTERNATIONAL INC.	
Test Site Location	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	
Test Site No.	Sporton Site No.	FCC/IC Registration No.
	03CH06-HY	TW1022/4086B-1

### 1.4. Applied Standards

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

- FCC 47 CFR FCC Part 15 Subpart B
- ANSI C63.4-2003
- IC RSS-Gen Issue 2

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

### 1.5. 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.	DC Power Supply	Topward	3303D	N/A	N/A	Unshielded, 1.8 m

## 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: radiation (30MHz to the 5th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower).

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

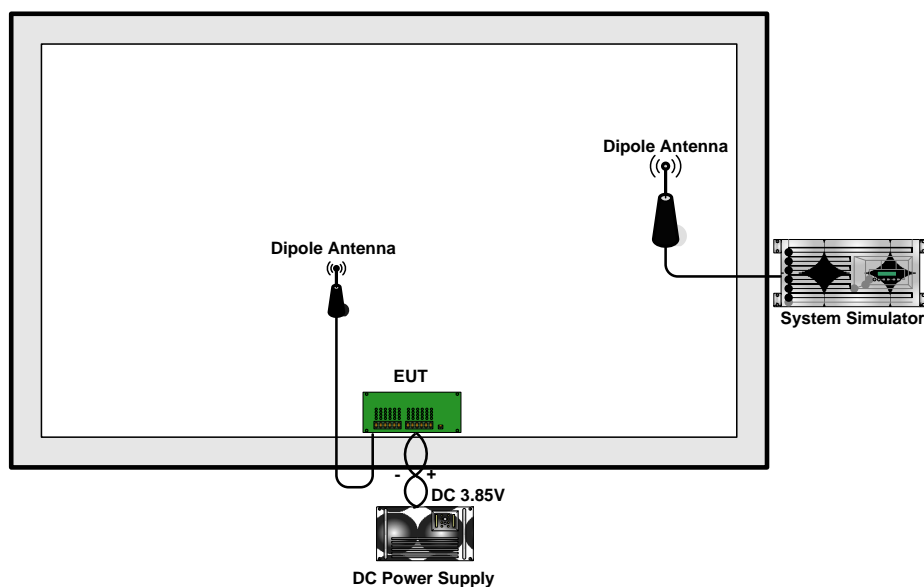
Item	EUT Configuration	Test Condition	
		EMI RE<1G	EMI RE≥1G
1.	Operating Mode (EUT with DC 3.85V))	☒	☒

#### Abbreviations:

- EMI RE ≥ 1G: EUT radiated emissions ≥ 1GHz
- EMI RE < 1G: EUT radiated emissions < 1GHz

Test Items	EUT Configure Mode	Function Type
Radiated Emissions < 1GHz	1	Mode 1 : GSM850 Idle Mode 2 : GSM1900 Idle Mode 3 : WCDMA Band V Idle
Radiated Emissions ≥ 1GHz	1	Mode 1 : GSM850 Idle
<b>Remark:</b> The worst case of RE < 1G is mode 1; only the test data of this mode was reported.		

## 2.2. Connection Diagram of Test System



## 2.3. Test Software

The EUT was in GSM or WCDMA idle mode during the testing. The EUT was synchronized to the BCCH, and is in continuous receiving mode by setting system simulator's paging reorganization.



### 3. Test Result

#### 3.1. Test of Radiated Emission Measurement

##### 3.1.1. Limit of Radiated Emission

The emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30
30 – 88	100	3
88 – 216	150	3
216 - 960	200	3
Above 960	500	3

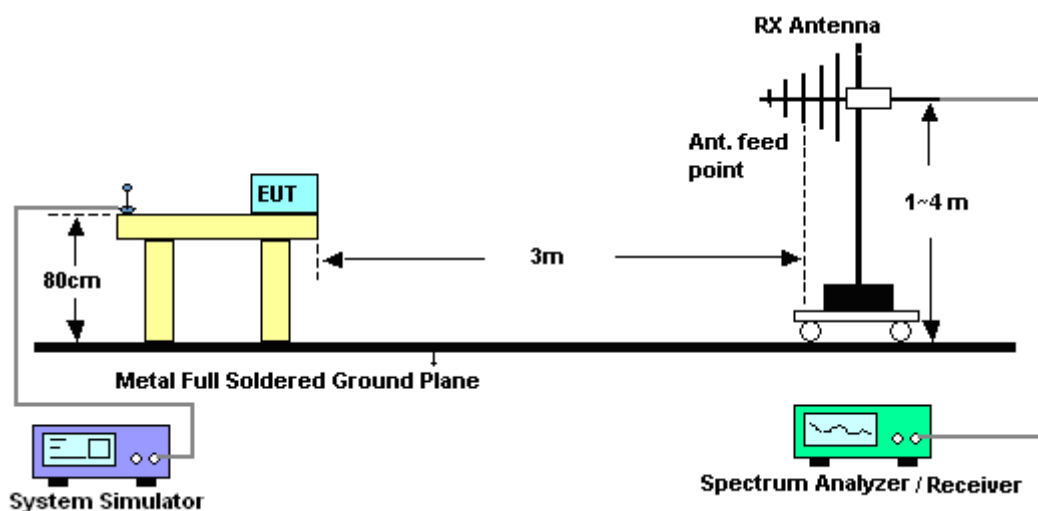
##### 3.1.2. Measuring Instruments

See list of measuring instruments of this test report.

### 3.1.3. Test Procedures

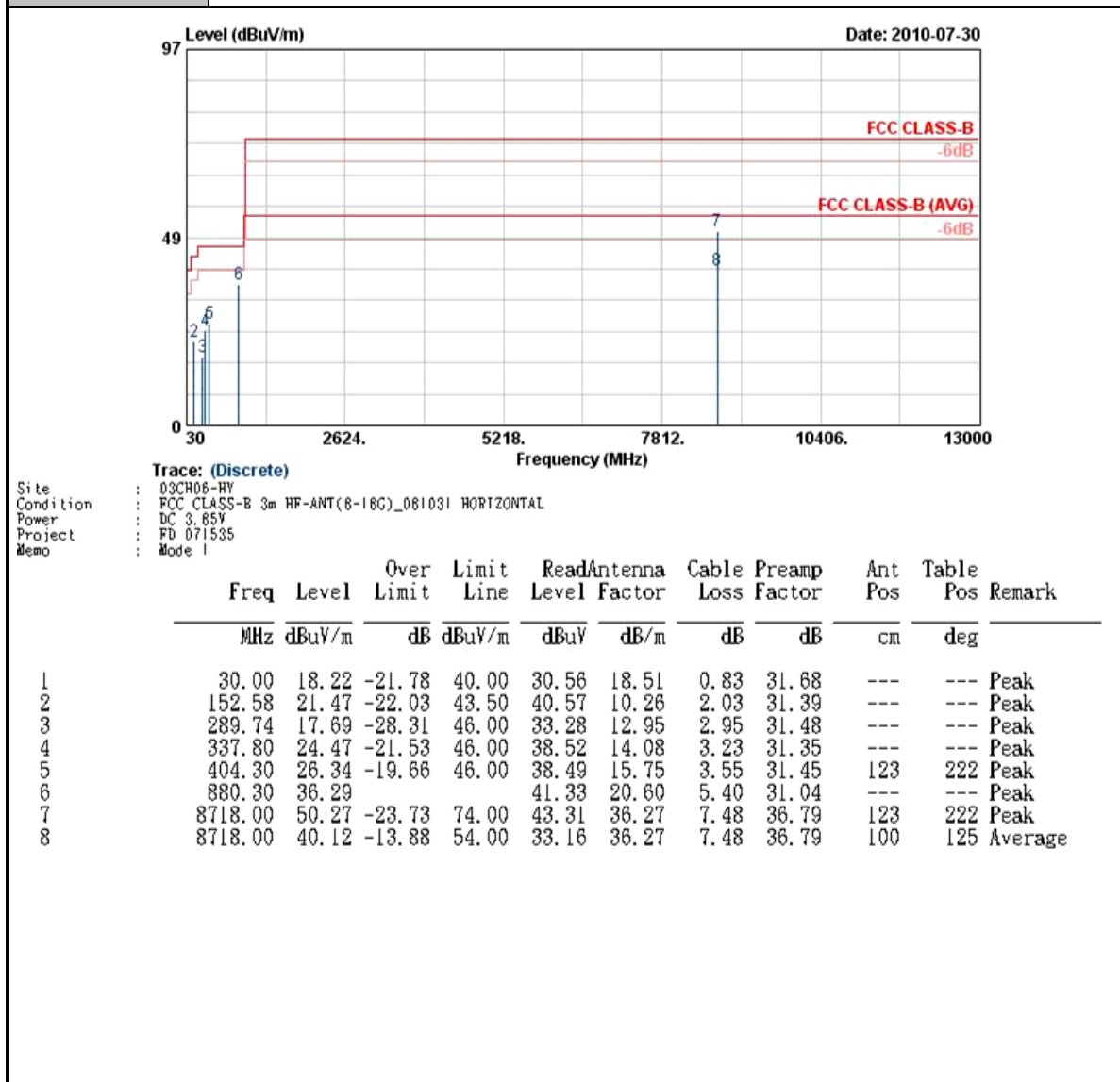
1. The EUT was placed on a turntable with 0.8 meter above ground.
2. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest radiation.
4. The antenna is a Bi-Log 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.
5. For each suspected emission, the EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading.
6. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode.
7. 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
8. Emission level (dBuV/m) = 20 log Emission level (uV/m)
9. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level

### 3.1.4. Test Setup of Radiated Emission

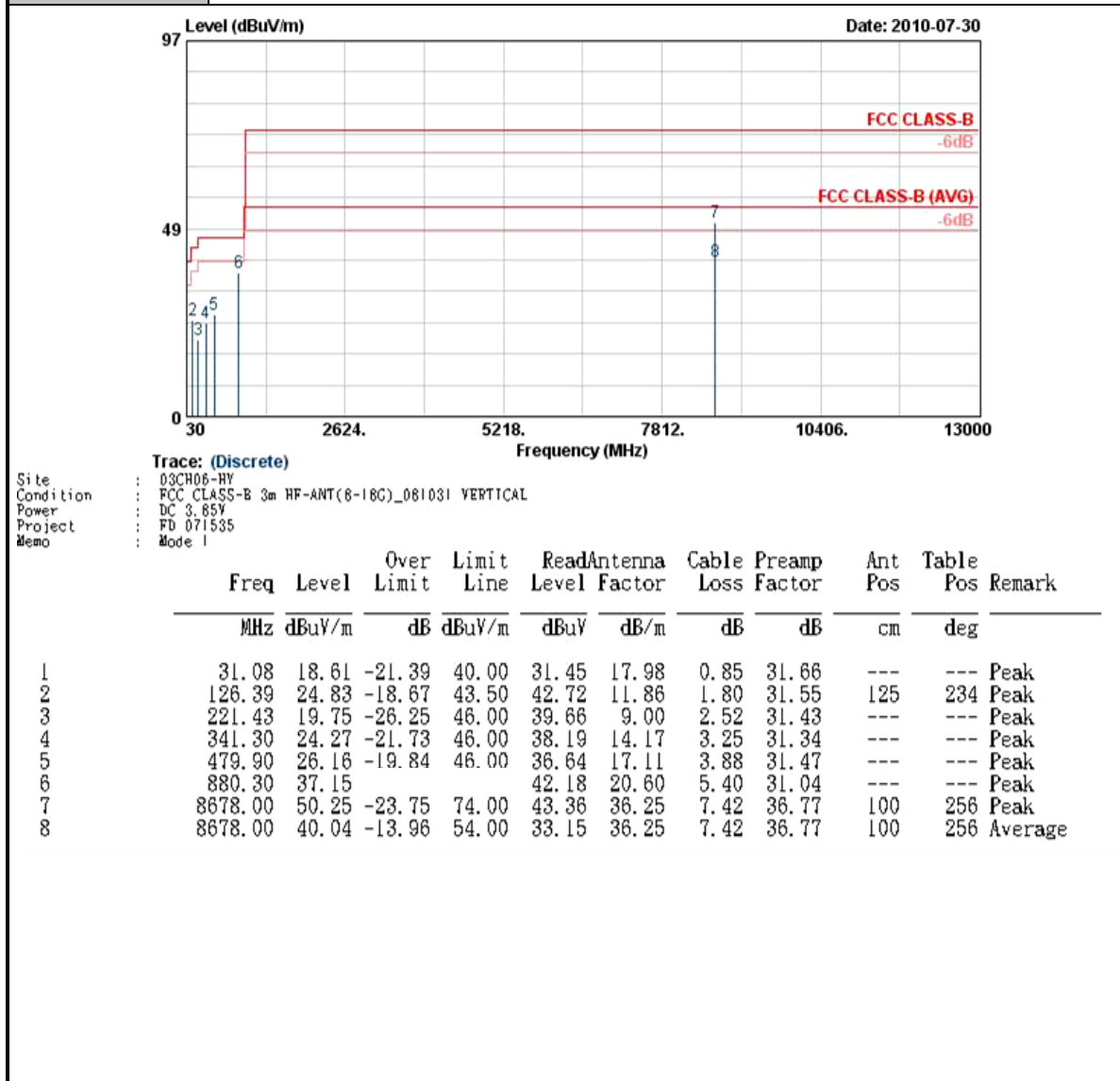


**3.1.5. Test Result of Radiated Emission**

<b>Test Mode :</b>	Mode 1	<b>Temperature :</b>	22~23°C
<b>Test Engineer :</b>	Hayden Wu	<b>Relative Humidity :</b>	45~46%
<b>Test Distance :</b>	3m	<b>Polarization :</b>	Horizontal
<b>Function Type :</b>	GSM850 Idle		
<b>Remark :</b>	#6 is System Simulator signal which can be ignored.		



<b>Test Mode :</b>	Mode 1	<b>Temperature :</b>	22~23°C
<b>Test Engineer :</b>	Hayden Wu	<b>Relative Humidity :</b>	45~46%
<b>Test Distance :</b>	3m	<b>Polarization :</b>	Vertical
<b>Function Type :</b>	GSM850 Idle		
<b>Remark :</b>	#6 is System Simulator signal which can be ignored.		



## 4. List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Due Date	Remark
Spectrum Analyzer	Agilent	E4408B	MY44211030	9KHz-26.5GHz	Oct. 23, 2009	Oct. 22, 2010	Radiation (03CH06-HY)
Spectrum Analyzer	R&S	FSP40	100057	9KHz-40GHz	Oct. 20, 2009	Oct. 19, 2010	Radiation (03CH06-HY)
EMI Test Receiver	R&S	ESVS10	834468/003	20MHz-1000M Hz	Apr. 28, 2010	Apr. 27, 2011	Radiation (03CH06-HY)
Bilog Antenna	SCHAFFNER	CBL6112B	2885	30MHz -2GHz	Oct. 31, 2009	Oct. 30, 2010	Radiation (03CH06-HY)
Double Ridge Horn Antenna	EMCO	3117	00066583	1GHz~18GHz	Aug. 20, 2009	Aug. 19, 2010	Radiation (03CH06-HY)
Double Ridge Horn Antenna	Training Research	AH-0801	95119	8GHz~18GHz	Nov. 02, 2009	Nov. 01, 2010	Radiation (03CH06-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170251	15GHz- 40GHz	Oct. 14, 2009	Oct. 13, 2010	Radiation (03CH06-HY)
Pre Amplifier	Agilent	8449B	3008A01917	1GHz- 26.5GHz	Nov. 11, 2009	Nov. 10, 2010	Radiation (03CH06-HY)
Amplifier	Agilent	310N	186713	9KHz~1GHz	Apr. 15, 2010	Apr. 14, 2011	Radiation (03CH06-HY)
System Simulator	R&S	CMU200	117591	N/A	Oct. 15, 2008	Oct. 14, 2010	Radiation (03CH06-HY)

## 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
<b>Combined Standard Uncertainty <math>U_c(y)</math></b>	<b>1.27</b>		
<b>Measuring Uncertainty for a Level of Confidence of 95% (<math>U = 2U_c(y)</math>)</b>	<b>2.54</b>		

### 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	$\pm 0.10$	Normal (k=2)	0.10	1	0.10
Antenna Factor Calibration	$\pm 1.70$	Normal (k=2)	0.85	1	0.85
Cable Loss Calibration	$\pm 0.50$	Normal (k=2)	0.25	1	0.25
Receiver Correction	$\pm 2.00$	Rectangular	1.15	1	1.15
Antenna Factor Directional	$\pm 1.50$	Rectangular	0.87	1	0.87
Site Imperfection	$\pm 2.80$	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
<b>Combined Standard Uncertainty <math>U_c(y)</math></b>	<b>2.36</b>				
<b>Measuring Uncertainty for a Level of Confidence of 95% (<math>U = 2U_c(y)</math>)</b>	<b>4.72</b>				