



# Variant FCC RF Test Report

APPLICANT : Universal Scientific Industrial Co., Ltd.  
EQUIPMENT : UNA\_850  
BRAND NAME : Universal Global Scientific Industrial Co., Ltd.  
MODEL NAME : UNA\_850  
MARKETING NAME : UNA\_850  
FCC ID : IXM-UNA850  
STANDARD : FCC 47 CFR Part 2, 22(H), 24(E)  
CLASSIFICATION : PCS Licensed Transmitter (PCB)

This is a variant report which is only valid together with the original test report. The product was received on Mar. 17, 2012 and completely tested on Nov. 02, 2012. 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 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
FG231721-03	Rev. 01	This is a variant report which can be referred to Product Equality Declaration as Appendix C. All the test cases were performed on original report which can be referred to Sporton Report Number FG231721-01 as appendix D. Based on original report, only the worst cases of radiation test was verified.	Nov. 19, 2012



### SUMMARY OF TEST RESULT

Report Section	FCC Rule	IC Rule	Description	Limit	Result	Remark
3.1	§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 22.12 dB at 7520.000 MHz



# 1 General Description

## 1.1 Applicant

Universal Scientific Industrial Co., Ltd.

141, Lane 351, Taiping Road, Sec. 1, Tsao Tuen, Nan-Tou, Taiwan

## 1.2 Manufacturer

Universal Scientific Industrial Co., Ltd.

141, Lane 351, Taiping Road, Sec. 1, Tsao Tuen, Nan-Tou, Taiwan

## 1.3 Feature of Equipment Under Test

Product Feature	
Equipment	UNA_850
Brand Name	Universal Global Scientific Industrial Co., Ltd.
Model Name	UNA_850
Marketing Name	UNA_850
FCC ID	IXM-UNA850
EUT supports Radios application	GSM/EGPRS/WCDMA/HSPA
HW Version	V2.3
SW Version	V3.1a
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.

Product Specification subjective to this standard	
Tx Frequency	GSM850: 824.2 MHz ~ 848.8 MHz GSM1900: 1850.2 MHz ~ 1909.8MHz WCDMA Band V: 826.4 MHz ~ 846.6 MHz
Rx Frequency	GSM850: 869.2 MHz ~ 893.8 MHz GSM1900: 1930.2 MHz ~ 1989.8 MHz WCDMA Band V: 871.4 MHz ~ 891.6 MHz
Maximum Output Power to Antenna	GSM850 : 31.94 dBm GSM1900 : 28.15 dBm WCDMA Band V : 23.19 dBm
Type of Modulation	GSM: GMSK GPRS: GMSK EDGE: GMSK / 8PSK WCDMA: QPSK (Uplink) HSDPA: QPSK (Uplink) HSUPA: QPSK (Uplink)

## 1.4 Testing Site

<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>		<b>FCC/IC Registration No.</b>
	TH02-HY	03CH06-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)
- ♦ FCC KDB 971168 D01 Power Meas. License Digital Systems v01
- ♦ FCC KDB 412172 D01 Determining ERP and EIRP v01
- ♦ 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, 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.	Notebook	DELL	Latitude E6320	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
3.	Evaluation Board	N/A	N/A	N/A	N/A	N/A



## 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

Frequency range investigated for radiated emission is as follows:

1. 30 MHz to 9000 MHz for GSM850.
2. 30 MHz to 19000 MHz for GSM1900

Test Modes	
Band	Radiated TCs
GSM 850	■ GPRS 8 Link
GSM 1900	■ GPRS 8 Link

**Note:** The maximum power levels are GPRS multi-slot class 8 modes for GMSK link, only these modes were used for all tests.



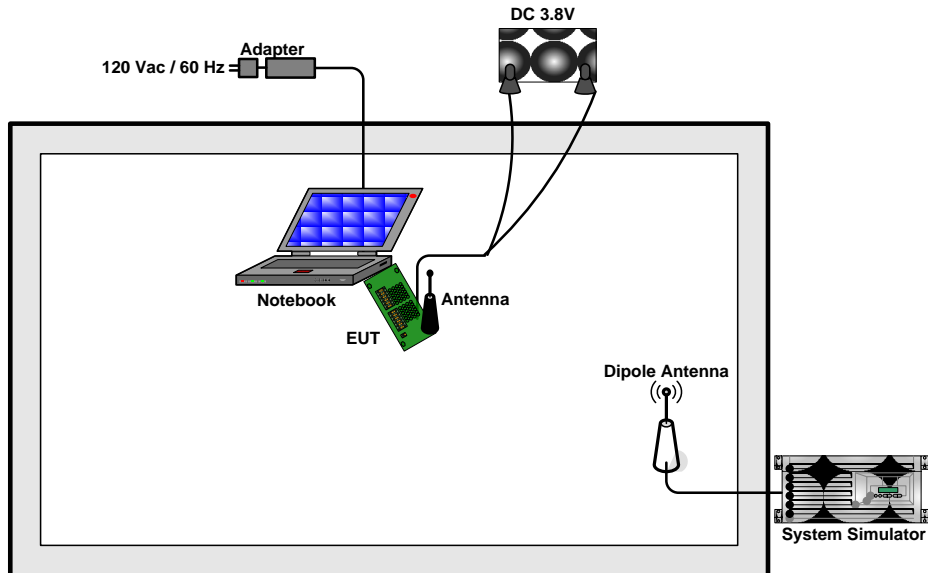
The conducted power tables are as follows:

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
GPRS 8	31.94	31.73	31.82	28.02	28.04	28.15
GPRS 10	31.21	31.00	31.10	27.37	27.35	27.49
GPRS 12	28.45	28.24	28.34	24.73	24.55	24.76
EGPRS 8	25.20	25.31	25.35	23.79	23.93	23.96
EGPRS 10	24.19	24.27	24.29	22.65	22.85	22.94
EGPRS 12	21.03	21.10	21.13	19.37	19.56	19.70

Conducted Power (*Unit: dBm)			
Band	WCDMA Band V		
Channel	4132	4182	4233
Frequency	826.4	836.4	846.6
RMC 12.2K	23.19	23.13	23.04
HSDPA Subtest-1	21.19	21.19	21.09
HSDPA Subtest-2	21.17	21.18	21.08
HSDPA Subtest-3	21.13	21.12	21.04
HSDPA Subtest-4	21.13	21.11	21.03
HSUPA Subtest-1	21.58	21.59	21.59
HSUPA Subtest-2	20.21	20.23	20.15
HSUPA Subtest-3	20.71	20.73	20.59
HSUPA Subtest-4	20.96	20.97	20.91
HSUPA Subtest-5	22.27	22.28	22.24



## 2.2 Connection Diagram of Test System





### **3 Test Result**

#### **3.1 Field Strength of Spurious Radiation Measurement**

##### **3.1.1 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.

##### **3.1.2 Measuring Instruments**

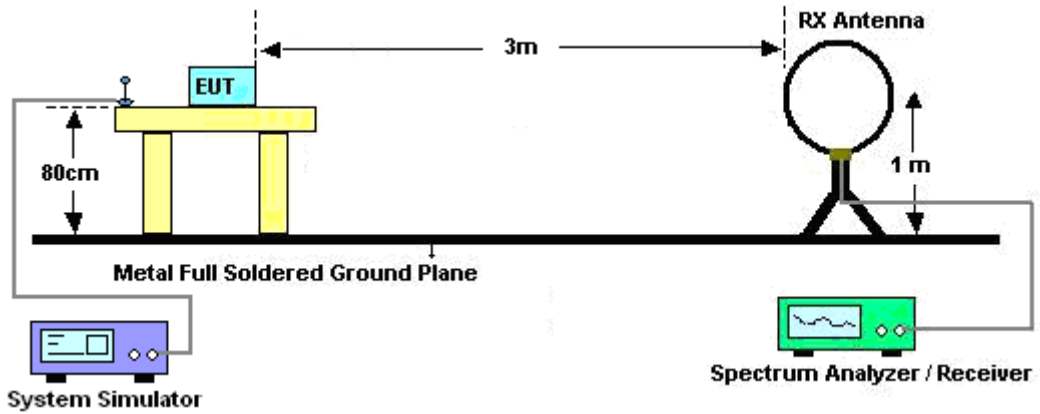
See list of measuring instruments of this test report.

##### **3.1.3 Test Procedures**

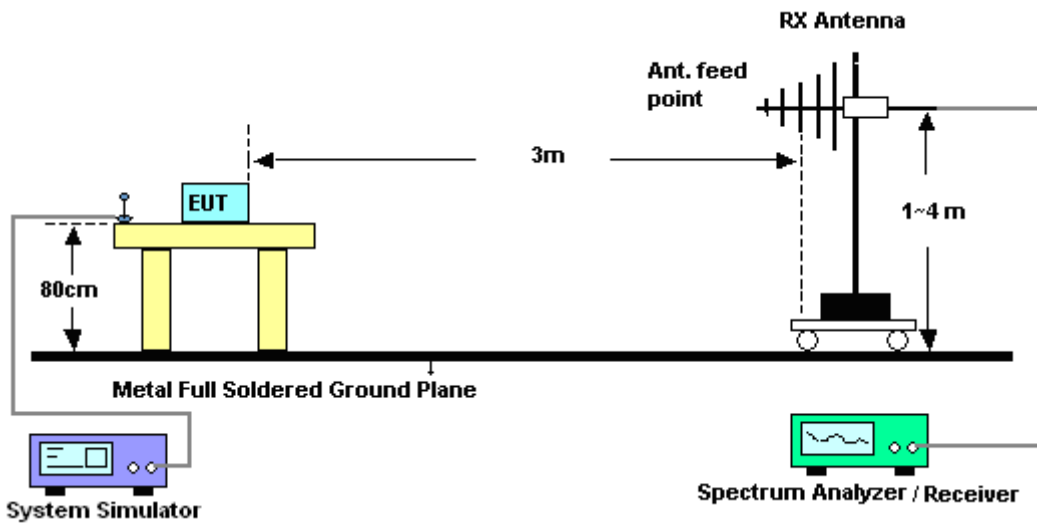
1. The EUT was placed on a rotatable wooden table with 0.8 meter above ground.
2. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest spurious emission.
4. The height of the receiving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

### 3.1.4 Test Setup

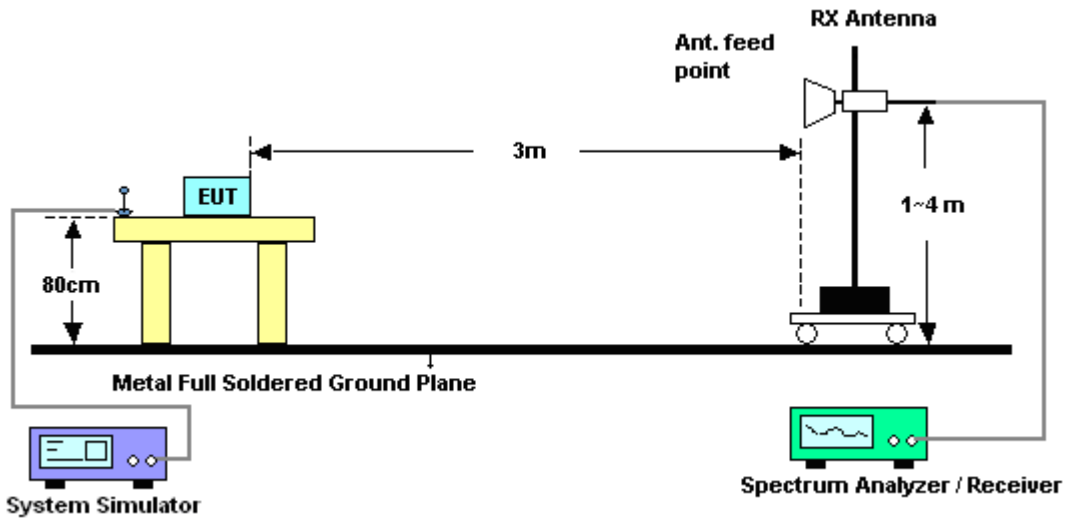
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



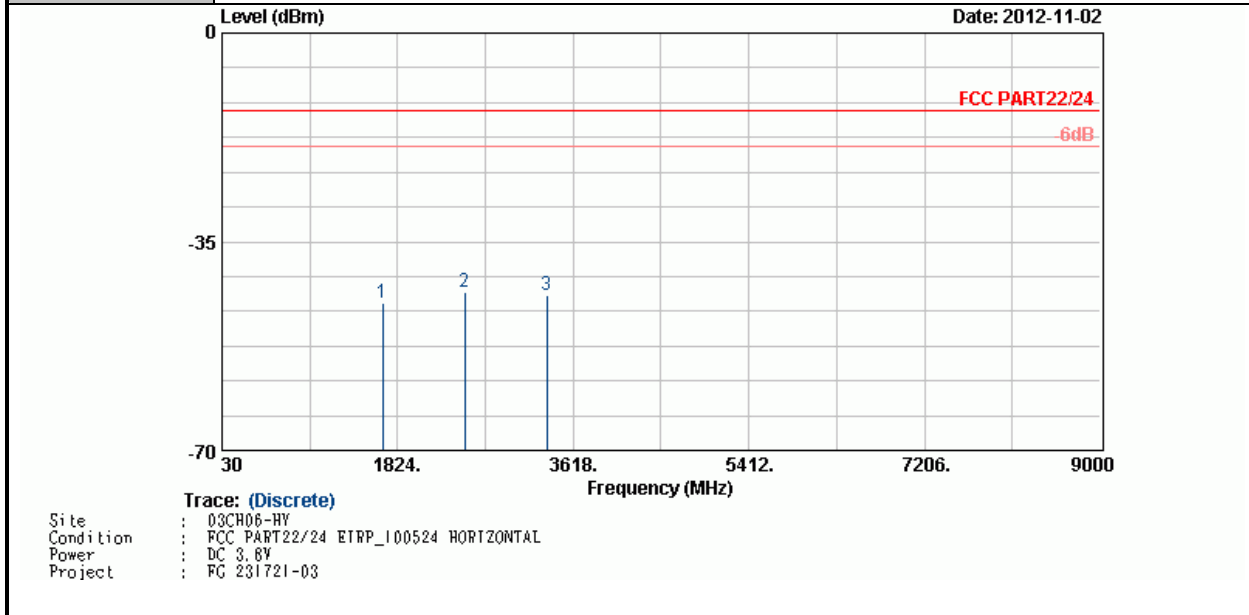
### 3.1.5 Test Results of Radiated Emissions (9 KHz ~ 30 MHz)

The low frequency, which started from 9 KHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.



3.1.6 Test Result of Field Strength of Spurious Radiated

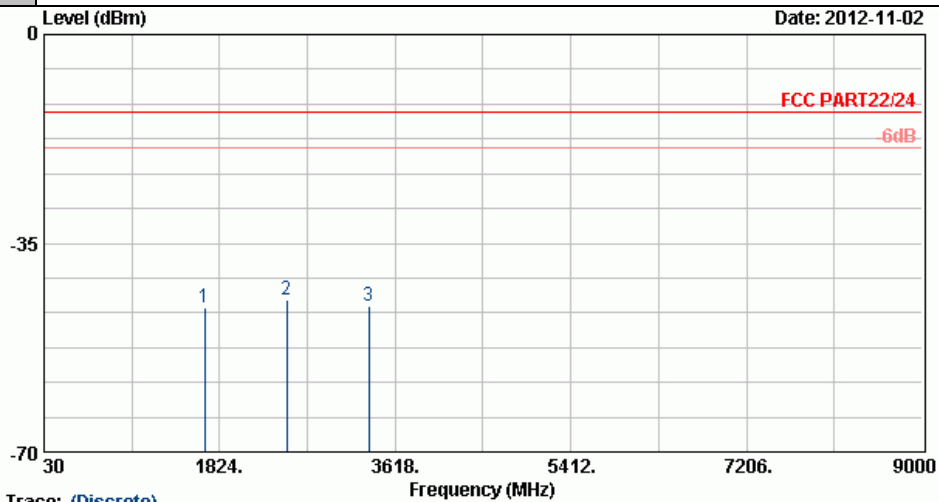
Band :	GSM850	Temperature :	27~28°C
Test Mode :	GPRS 8 Link	Relative Humidity :	45~46%
Test Engineer :	Kai Wang	Polarization :	Horizontal
Remark :	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.		



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	-45.27	-13	-32.27	-55.90	-46.73	1.88	5.49	H	Pass
2506	-43.33	-13	-30.33	-55.70	-44.96	2.44	6.22	H	Pass
3346	-44.04	-13	-31.04	-60.27	-47.49	2.47	8.07	H	Pass



<b>Band :</b>	GSM850	<b>Temperature :</b>	27~28°C
<b>Test Mode :</b>	GPRS 8 Link	<b>Relative Humidity :</b>	45~46%
<b>Test Engineer :</b>	Kai Wang	<b>Polarization :</b>	Vertical
<b>Remark :</b>	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.		

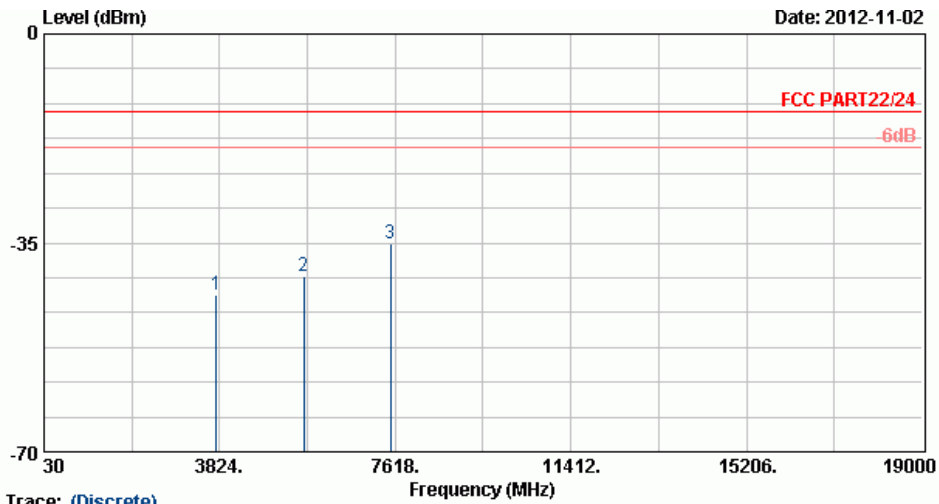


Trace: (Discrete)  
 Site : 03CH06-HY  
 Condition : FCC PART22/24 ETRP\_I00524 VERTICAL  
 Power : DC 3.8V  
 Project : FG 231721-03

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	-45.73	-13	-32.73	-56.14	-47.19	1.88	5.49	V	Pass
2506	-44.39	-13	-31.39	-56.87	-46.02	2.44	6.22	V	Pass
3345	-45.66	-13	-32.66	-61.59	-49.11	2.47	8.07	V	Pass



<b>Band :</b>	GSM1900	<b>Temperature :</b>	27~28°C
<b>Test Mode :</b>	GPRS 8 Link	<b>Relative Humidity :</b>	45~46%
<b>Test Engineer :</b>	Kai Wang	<b>Polarization :</b>	Horizontal
<b>Remark :</b>	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.		

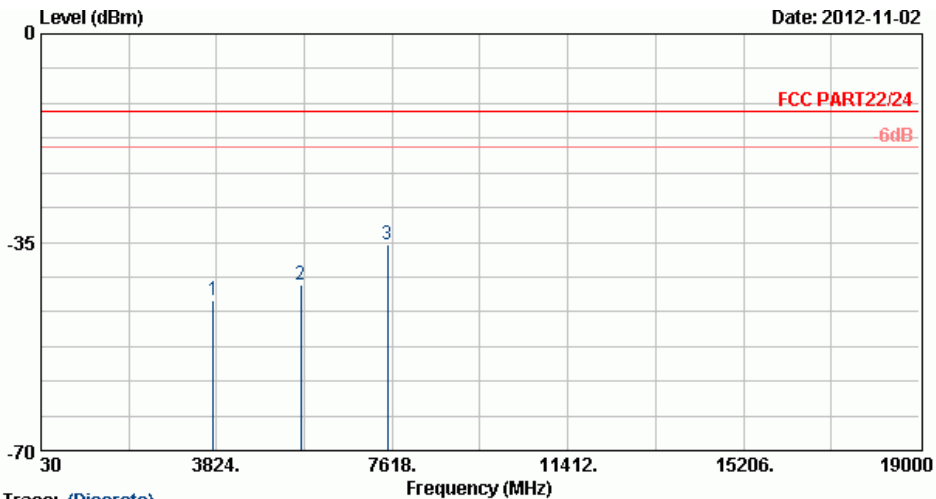


Trace: (Discrete)  
 Site : 03CH06-HY  
 Condition : FCC PART22/24 EIRP\_100524 HORIZONTAL  
 Power : DC 3.8V  
 Project : FG 231721-03

Frequency (MHz)	EIRP (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
3756	-43.61	-13	-30.61	-61.18	-49.86	2.56	8.81	H	Pass
5636	-40.50	-13	-27.50	-63.43	-48.24	2.96	10.70	H	Pass
7520	-35.12	-13	-22.12	-62.26	-44.02	3.22	12.12	H	Pass



<b>Band :</b>	GSM1900	<b>Temperature :</b>	27~28°C
<b>Test Mode :</b>	GPRS 8 Link	<b>Relative Humidity :</b>	45~46%
<b>Test Engineer :</b>	Kai Wang	<b>Polarization :</b>	Vertical
<b>Remark :</b>	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.		



Trace: (Discrete)  
 Site : 03CH06-HY  
 Condition : FCC PART22/24 ETRP\_100524 VERTICAL  
 Power : DC 3.6V  
 Project : FG 231721-03

Frequency (MHz)	EIRP (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
3756	-44.87	-13	-31.87	-62.28	-51.12	2.56	8.81	V	Pass
5636	-42.20	-13	-29.20	-65.07	-49.94	2.96	10.70	V	Pass
7520	-35.51	-13	-22.51	-62.53	-44.41	3.22	12.12	V	Pass





## 4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
System Simulator	R&S	CMU200	117995	N/A	Jul. 30, 2012	Aug. 29, 2012 ~ Aug. 30, 2012	Jul. 29, 2013	Conducted (TH02-HY)
Spectrum Analyzer	R&S	FSP40	100055	9kHz~40GHz	Jun. 06, 2012	Aug. 29, 2012 ~ Aug. 30, 2012	Jun. 05, 2013	Conducted (TH02-HY)
Thermal Chamber	Ten Billion	TTH-D3SP	TBN-930701	N/A	Jul. 23, 2012	Aug. 29, 2012 ~ Aug. 30, 2012	Jul. 22, 2013	Conducted (TH02-HY)
Spectrum Analyzer	Agilent	E4408B	MY44211030	9KHz ~ 26.5GHz	Nov. 23, 2011	Nov. 02, 2012	Nov. 22, 2012	Radiation (03CH06-HY)
Spectrum Analyzer	R&S	P40	100055	9KHz~40GHz	Jun. 06, 2012	Nov. 02, 2012	Jun. 05, 2013	Radiation (03CH06-HY)
EMI Test Receiver	R&S	ESVS10	834468/003	20MHz ~ 1000MHz	May 04, 2012	Nov. 02, 2012	May. 03, 2013	Radiation (03CH06-HY)
Bilog Antenna	SCHAFFNER	CBL6112B	2885	30MHz ~ 2GHz	Oct. 06, 2012	Nov. 02, 2012	Oct. 05, 2013	Radiation (03CH06-HY)
Double Ridge Horn Antenna	EMCO	3117	00066583	1GHz ~ 18GHz	Aug. 01, 2012	Nov. 02, 2012	Jul. 31, 2013	Radiation (03CH06-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA917025 1	15GHz ~ 40GHz	Sep. 28, 2012	Nov. 02, 2012	Sep. 27, 2013	Radiation (03CH06-HY)
Preamplifier	Agilent	8449B	3008A01917	1GHz ~ 26.5GHz	Apr. 13, 2012	Nov. 02, 2012	Apr. 12, 2013	Radiation (03CH06-HY)
Amplifier	Agilent	310N	186713	9KHz ~ 1GHz	Apr. 11, 2012	Nov. 02, 2012	Apr. 10, 2013	Radiation (03CH06-HY)
Pre Amplifier	EMCI	EMC051845	SN980048	1GHz ~ 18GHz	Jul. 21, 2012	Nov. 02, 2012	Jul. 20, 2013	Radiation (03CH06-HY)
Pre Amplifier	MITEQ	AMF-7D-00 101800-30-1	159087	1GHz~18GHz	Feb. 27, 2012	Nov. 02, 2012	Feb. 26, 2013	Radiation (03CH06-HY)
Loop Antenna	R&S	HFH2-Z2	860004/001	9KHz ~ 30MHz	Jul. 03, 2012	Nov. 02, 2012	Jul. 02, 2014	Radiation (03CH06-HY)
System Simulator	R&S	CMU200	117995	N/A	Jul. 28, 2011	Nov. 02, 2012	Jul. 27, 2013	Radiation (03CH06-HY)



## 5 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	2.54
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### Uncertainty of Radiated Emission Measurement (1 GHz ~ 40 GHz)

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	4.72
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## Appendix A. Photographs of EUT

Please refer to Sporton report number EP231721-03 as below.



## **Appendix C. Product Equality Declaration**

The plots are shown as follows.



## **Appendix D. Original Report**

Please refer to Sporton report number FD231721-01 as below.