

# ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

## UN-INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART B REQUIREMENT

OF

**Product Name:** 850/900/1800/1900 GSM/GPRS+GPS module

**Brand Name:** SIMCOM

**Model Name:** SIM548C

**Market Name:** N/A

**Report No.:** EH/2008/50037

**Issue Date:** Jun. 10, 2008

**FCC Rule Part:** Part 15 B

**Prepared for:** Shanghai Simcom Ltd.

SIM Technology Building, 700 Yishan Rd.,  
Shanghai 200233

**Prepared by:** SGS Taiwan Ltd.

Electronics & Communication Laboratory  
No. 134, Wu Kung Rd., Wuku Industrial  
Zone, Taipei County, Taiwan.

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台灣檢驗科技股份有限公司 t (886-2) 2299-3939 f (886-2) 2299-3279 [www.sgs.com.tw](http://www.sgs.com.tw)

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## VERIFICATION OF COMPLIANCE

**Applicant:** Shanghai Simcom Ltd.  
SIM Technology Building, 700 Yishan Rd., Shanghai 200233

**Product Description:** 850/900/1800/1900 GSM/GPRS+GPS module

**Brand Name:** SIMCOM

**Model No.:** SIM548C

**Model Difference:** N/A

**File Number:** EH/2008/50037




**Date of test:** May. 30, 2007 ~ Jun. 09, 2008

**Date of EUT Receive:** May. 29, 2008

**We hereby certify that:**

The above equipment was tested by SGS Taiwan Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4 (2003) and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 15B.

The test results of this report relate only to the tested sample identified in this report.

<b>Test By:</b>		<b>Date</b>	Jun. 10, 2008
	<b>Bondi Liu / Engineer</b>		
<b>Prepared By:</b>		<b>Date</b>	Jun. 10, 2008
	<b>Gigi Yeh / Clerk</b>		
<b>Approved By:</b>		<b>Date</b>	Jun. 10, 2008
	<b>Vincent Su/Manager</b>		

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## Version

Version No.	Date
00	Jun. 10, 2008

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## 1. GENERAL INFORMATION

### 1.1 Product Description

General:

Product Name:	850/900/1800/1900 GSM/GPRS+GPS module
Brand Name:	SIMCOM
Model Name:	SIM548C
Model Difference:	N/A
Data Cable (USB):	One provide, Model: N/A
Power Supply	4.0 Vdc

GSM:

Cellular Phone Standards Frequency Range and Power	GSM/GPRS 850	824 MHz– 849MHz	33 dBm
	E-GSM/GPRS 900	880MHz – 915MHz	32.5 dBm
	GSM/GPRS 1800	1710MHz-1785MHz	29.5 dBm
	GSM/GPRS 1900	1850MHz – 1910MHz	29.5 dBm
Type of Emission	GSM: 300KGXW		
IMEI	3521340047694465		
Hardware Version	V1.02		
Software Version	ADI 16.0		
Antenna Designation	Dipole, Gain: 1.5dBi		

This test report applies for GSM /GPRS 850/1900.

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## GPS:

Receiver Frequency	L1 Band, 1575.42MHz
Frequency Conversion oscillator	12MHz and 32.768kHz
Antenna Designation	mono pole: 1.5dBi

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## 1.2 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC Part15 Subpart B is authorized under a Verification procedure.

## 1.3 Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4 (2003). Radiated testing was performed at an antenna to EUT distance 3 meters.

## 1.4 Test Facility

The measurement facilities used to collect the 3m Radiated Emission and AC power line conducted data are located on the address of SGS Taiwan Ltd. Electronics & Communication Laboratory No. 134, Wu Kung Rd., Wuku Industrial Zone, Taipei Country, Taiwan which are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4: 2003. FCC Registration Number are: 990257 and 236194, Canada Registration Number: 4620A-1

The 10 m Open Area Test Sites located on the address of SGS Taiwan Ltd. Electronics & Communication Laboratory No. 29, Pau-Tou-Tsuo Valley Chia-Pau Tsuen, Linkou Hsiang, Taipei county, which is constructed and calibrated to meet the CISPR 22/EN 55022 requirements. SGS Site No. 1(3 &10 meters) and FCC Registration Number: 94644.

## 1.5 Special Accessories

Not available for this EUT intended for grant.

## 1.6 Equipment Modifications

Not available for this EUT intended for grant.

## 2. System Test Configuration

### 2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

### 2.2 EUT Exercise

The EUT was operated in the normal continuous transmitting.

### 2.3 Test Procedure

#### 2.3.1 Conducted Emissions

The EUT is placed on a turn table which is 0.8 m above ground plane. According to the requirements in Section 7 of ANSI C63.4-2003. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak and average detector mode.

#### 2.3.2 Radiated Emissions

The EUT is placed on a turn table which is 0.8 m above ground plane. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." is still within the 3dB illumination BW of the measurement antenna. according to the requirements in Section 8 and 13 and Subclause 8.3.1.2 of ANSI C63.4-2003.



## 2.4 Limitation

### (1) Conducted Emission

According to section 15.107(a) Conducted Emission Limits is as following.

Frequency range MHz	Class B Limits dB (uV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50
Note		
1.The lower limit shall apply at the transition frequencies		
2.The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.		

### (2) Radiated Emission

According to section 15.109(a) Radiated Emission Class B Limits is as following:

Frequency (MHz)	Field strength $\mu\text{V/m}$	Distance (m)	Field strength at 3m $\text{dB}\mu\text{V/m}$
30-88	100	3	40
88-216	150	3	43.5
216-960	200	3	46
Above 960	500	3	54

Standard	Date	Description
EN55022	1998+ A1:2000+ A2:2003	Limits and methods of measurement of radio interference characteristics of information technology equipment.

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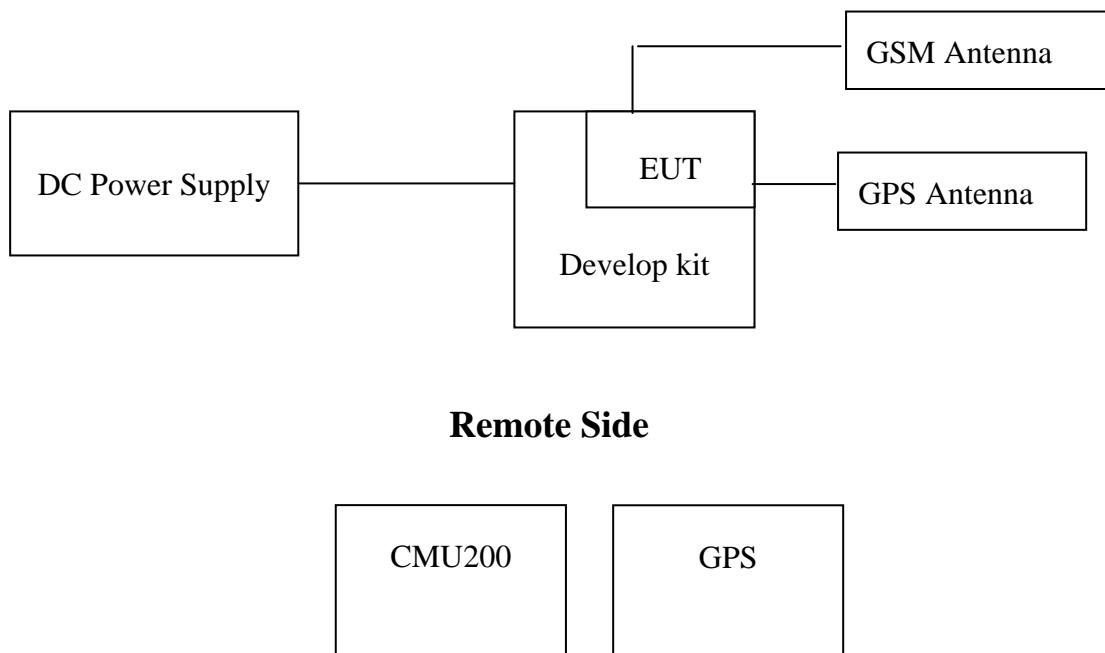
EN55022 Limit:

Frequency range MHz	Limits dBuV/m (10m)
	Quasi-peak
30 to 230	30
230 to 1000	37

- Remark: 1. Emission level in dBuV/m=20 log (uV/m)  
2. Measurement was performed at an antenna to the closed point of EUT distance of 3 meters.

## 2.5 Configuration of Tested System

**Fig. 2-1 Configuration of Tested System**



**Table 2-1 Equipment Used in Tested System**

Item	Equipment	Mfr/Brand	Model/ Type No.	Series No.	Data Cable	Power Cord
1	DC Power Supply	Topward	3303D	981327	N/A	Un-shielded
2.	Universal Radio Communication Tester	R&S	CMU200	102189	shielded	Un-shielded
3.	Develop Kit	N/A	N/A	N/A	N/A	N/A
4.	GPS Signal	WELNAVIGATE	GS-50	607492	N/A	N/A

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### 3. Summary of Test Results

FCC Rules	Description Of Test	Result
§15.107	Conducted Emission Class B	N/A
§15.109	Radiated Emission Class B	Compliant

### 4. Description of test modes

The EUT is stay in normal GSM/GPS link modes.

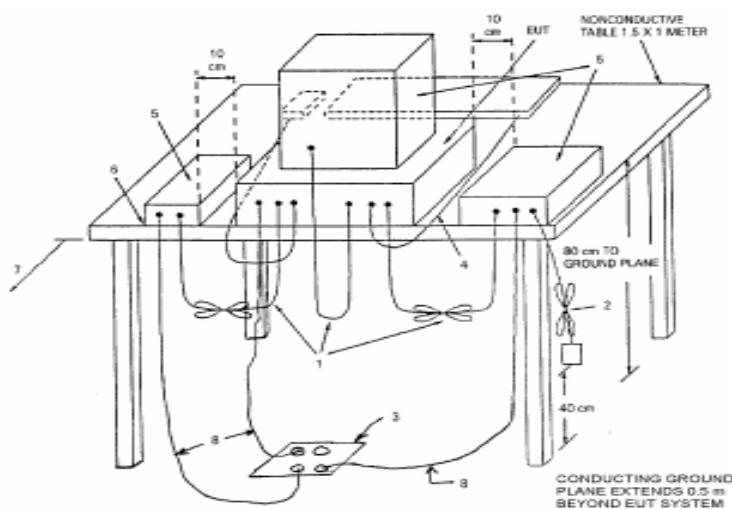
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## 5. Conducted Emissions Test

### 5.1 Measurement Procedure:

1. The EUT was placed on a table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.

### 5.2 Test SET-UP (Block Diagram of Configuration)

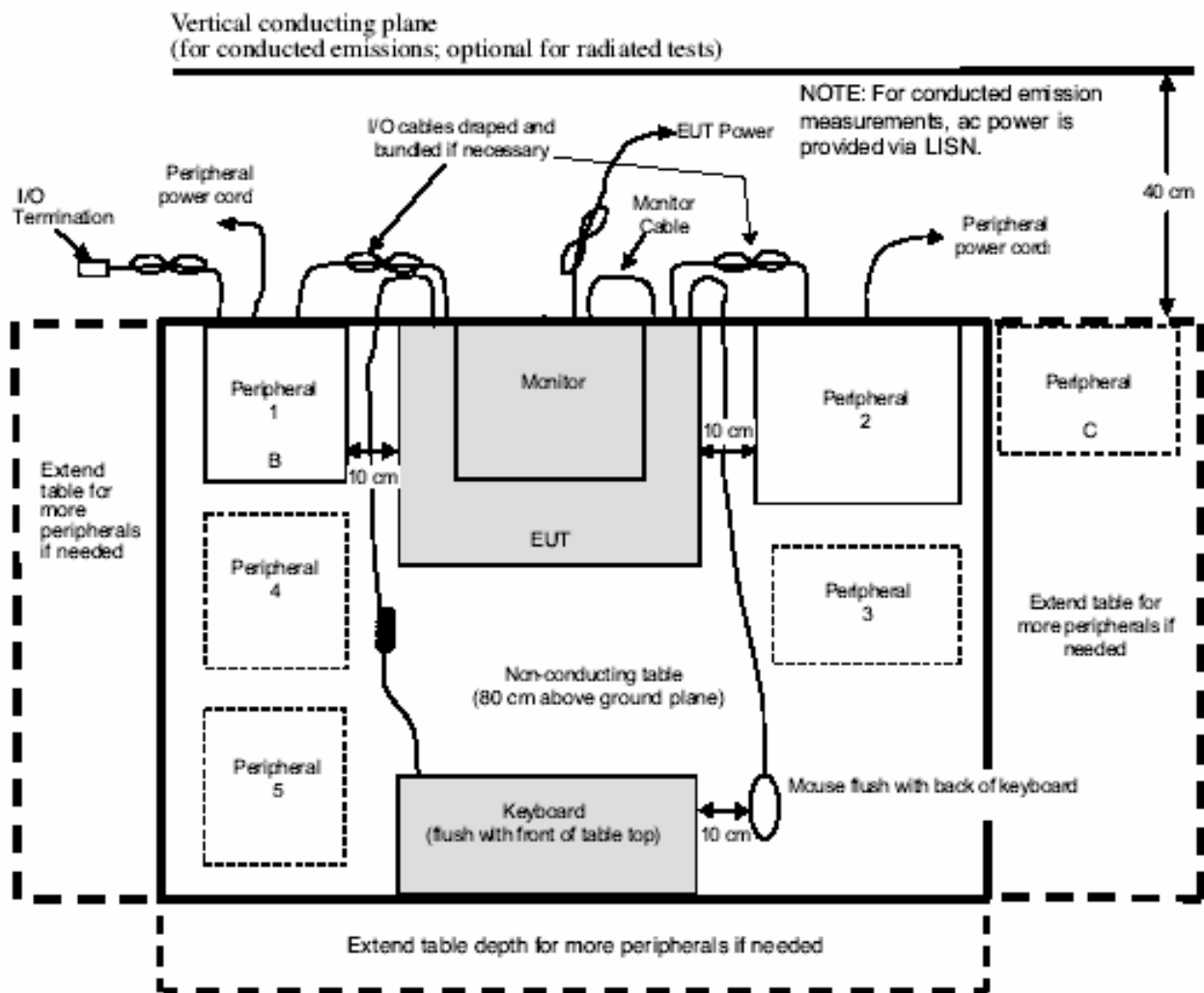


#### LEGEND:

- 1) Interconnecting cables that hang closer than 40 cm to the groundplane shall be folded back and forth in the center, forming a bundle 30 to 40 cm long (see 6.1.4 and 11.2.4).
- 2) I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated if required using the correct terminating impedance. The total length shall not exceed 1 m (see 6.1.4).
- 3) If LISNs are kept in the test setup for radiated emissions, it is preferred that they be installed under the groundplane with the receptacle flush with the groundplane (see 6.1.4).
- 4) Cables of hand-operated devices, such as keyboards, mice, etc., shall be placed as for normal use (see 6.2.1.3 and 11.2.4).
- 5) Non-EUT components of EUT system being tested (see also Figure 13).
- 6) Rear of EUT, including peripherals, shall all be aligned and flush with rear of tabletop (see 6.2.1.1 and 6.2.1.2).
- 7) No vertical conducting plane used (see 5.2.2).
- 8) Power cords drape to the floor and are routed over to receptacle (see 6.1.4).

**Figure 11a—Test arrangement for radiated emissions tabletop equipment**

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### 5.3 Measurement Result:

N/ A

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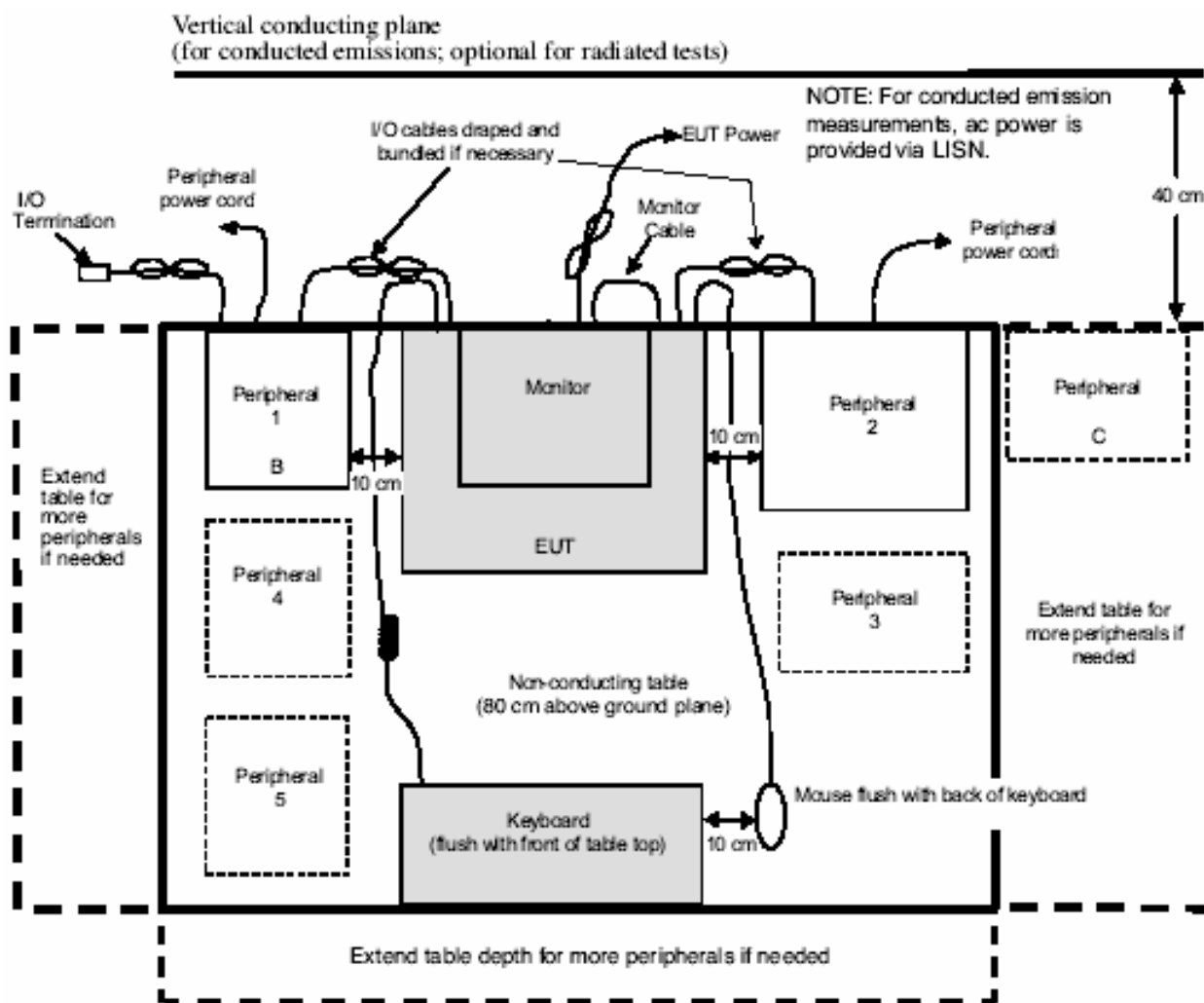
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## 6. Radiated Emission Test

### 6.1 Measurement Procedure

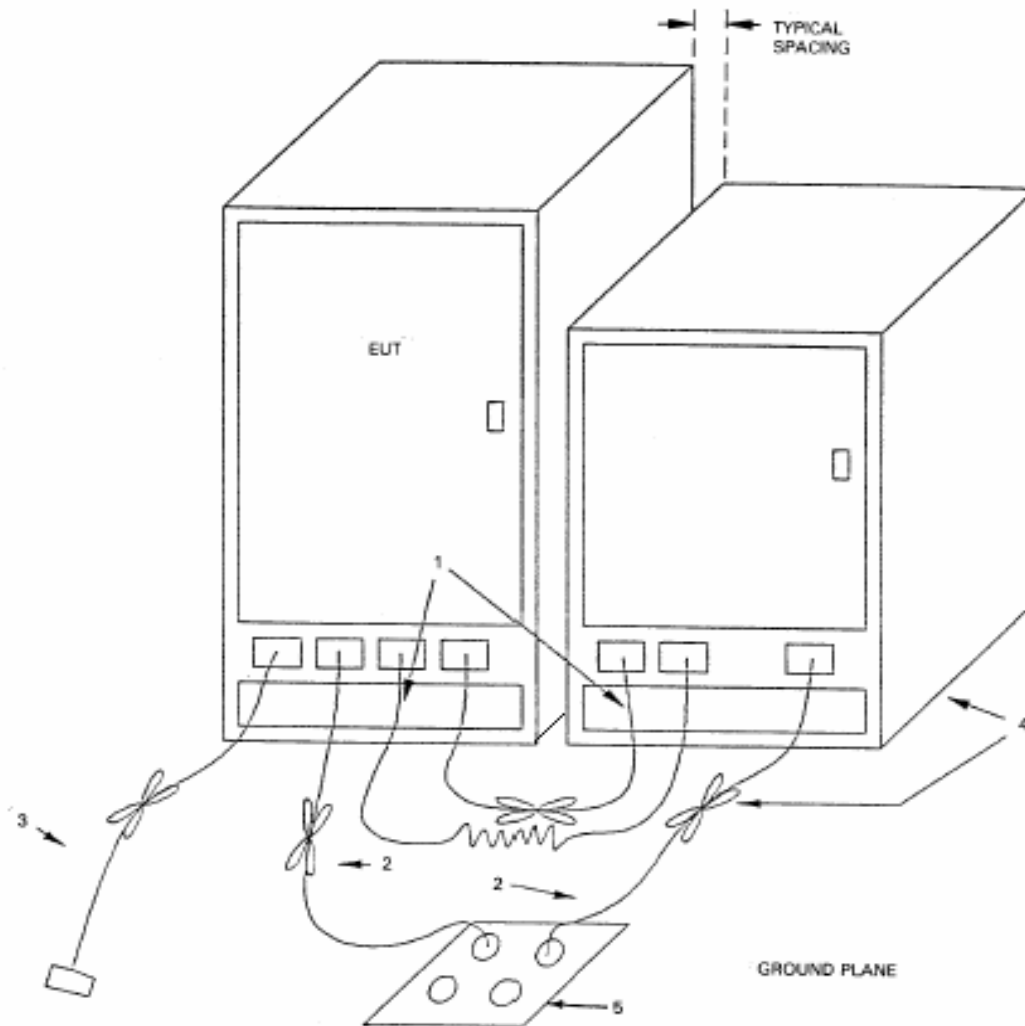
1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measured were complete.

## 6.2 Test SET-UP (Block Diagram of Configuration)



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## LEGEND:

- 1) Excess I/O cables shall be bundled in center. If bundling is not possible, the cables shall be arranged in serpentine fashion. Bundling not to exceed 40 cm in length (see 6.1.4).
- 2) Excess power cords shall be bundled in the center or shortened to appropriate length (see 7.2.1).
- 3) I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. If bundling is not possible, the cable shall be arranged in a serpentine fashion (see 6.1.4).
- 4) EUT and all cables shall be insulated, if required, from the groundplane by up to 12 mm of insulating material (see 6.1.4 and 6.2.2).
- 5) If LISNs are kept in the test setup for radiated emissions, it is preferred that they be installed under the groundplane with the receptacle flush with the ground plane (see 5.2.3 and 8.1).

**Figure 11b—Test arrangement for radiated emissions floor-standing equipment**

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### 6.3 Measurement Equipment Used:

966 Chamber					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	R&S	FSP 40	100034	05/27/2007	05/26/2008
Spectrum Analyzer	Agilent	E7405A	US41160416	08/27/2007	08/27/2008
Loop Antenna	Messtec	FLA30	03/10086	03/06/2008	03/05/2008
Bilog Antenna	SCHWAZBECK	VULB9163	152	06/03/2007	06/02/2008
Bilog Antenna	SCHWAZBECK	VULB9160		06/03/2007	06/02/2008
Pre-Amplifier	HP	8447D	2944A09469	07/19/2007	07/18/2008
Turn Table	HD	DT420	N/A	N.C.R	N.C.R
Antenna Tower	HD	MA240-N	240/657	N.C.R	N.C.R
Controller	HD	HD100	N/A	N.C.R	N.C.R
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA-10M	10m	10/09/2007	10/08/2008
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA-3M	3m	10/09/2007	10/08/2008
Site NSA	SGS	966 chamber	N/A	11/17/2007	11/16/2008

### 6.4 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

Where	FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
	RA = Reading Amplitude	AG = Amplifier Gain
	AF = Antenna Factor	

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## 6.5 Measurement Result

Test Mode: GSM link

Test Date : Jun. 03, 2008

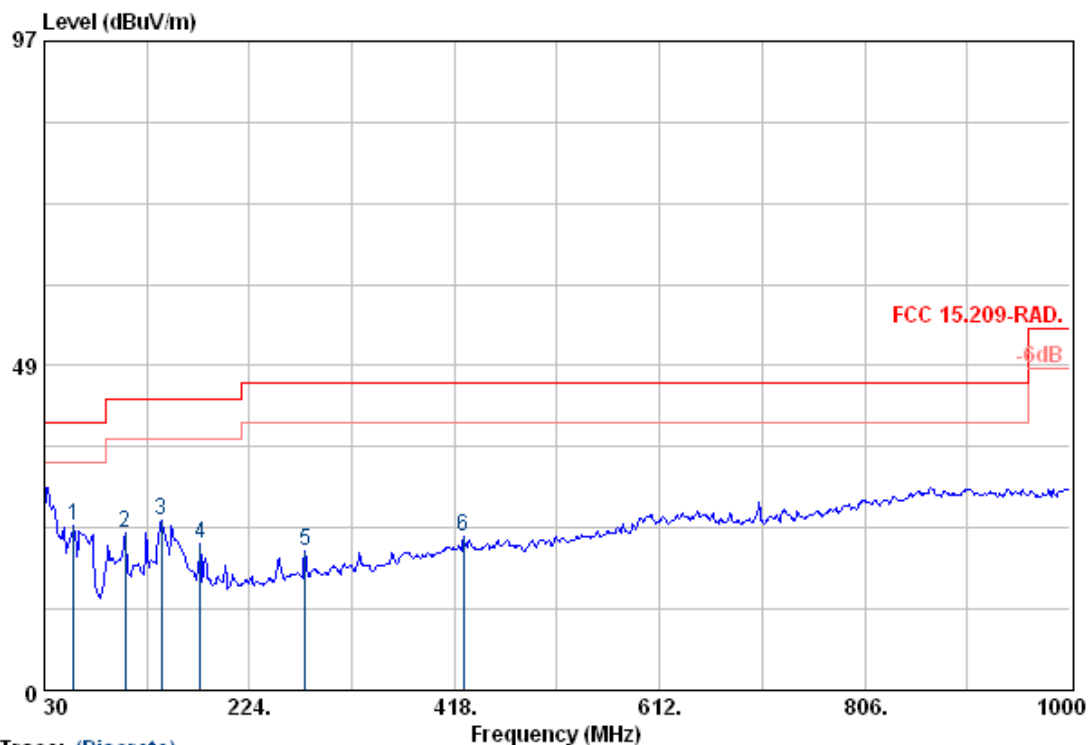
Detector Function: Peak/QP

Test By: Bondi

Frequency Range: 30MHz-1000MHz

Temperature : 25 °C Humidity : 65 %

Polarization: Vertical



Trace: (Discrete)

Site : RF SITE  
 Condition : FCC 15.209-RAD. 3m VULB9160 VERTICAL 150cm 360deg  
 Project No. : EH/2008/50037~38  
 Applicant : SGS 上海  
 EUT Description : 850/900/1800/1900 GSM/GPRS+GPS module  
 EUT Model : SIM548C  
 Test Mode : GPS LINK  
 Temp./Humid. : 25/65  
 Operator : DUKA

	Freq	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Factor	Level	Limit	Over	Remark
	MHz	dBuV	dB/m	dB	dB	dB/m	dBuV/m	dBuV/m	dB	
1	58.13	39.34	12.56	28.06	0.84	-14.66	24.68	40.00	-15.32	Peak
2	106.63	39.97	10.74	28.34	1.12	-16.48	23.49	43.50	-20.01	Peak
3	140.58	39.13	13.25	28.19	1.29	-13.65	25.48	43.50	-18.02	Peak
4	177.44	36.23	11.97	27.81	1.46	-14.38	21.85	43.50	-21.65	Peak
5	276.38	34.35	12.61	27.85	1.76	-13.48	20.87	46.00	-25.13	Peak
6	426.73	32.30	15.91	27.43	2.31	-9.21	23.09	46.00	-22.91	Peak

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Test Mode: GSM link

Test Date : Jun. 03, 2008

Detector Function: Peak/QP

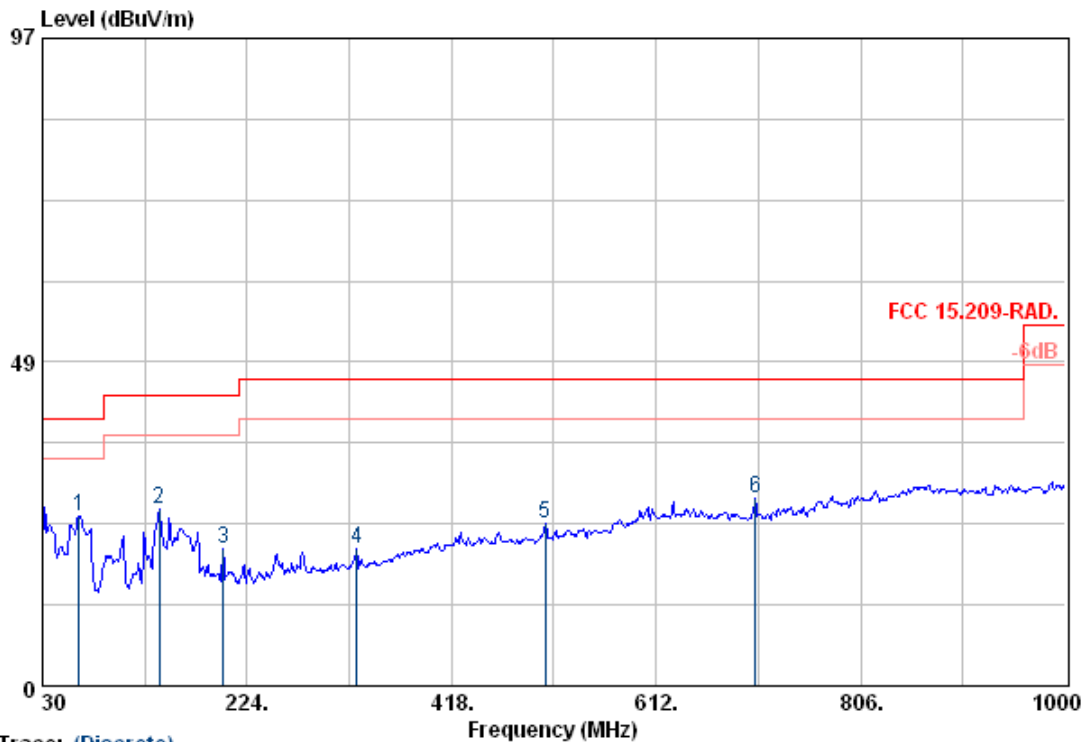
Test By: Bondi

Frequency Range: 30MHz-1000MHz

Temperature : 25 °C

Humidity : 65 %

Polarization: Horizontal



Trace: (Discrete)

Site : RF SITE  
 Condition : FCC 15.209-RAD. 3m VULB9160 HORIZONTAL 150cm 0deg  
 Project No. : EH/2008/50037~38  
 Applicant : SGS 上海  
 EUT Description : 850/900/1800/1900 GSM/GPRS+GPS module  
 EUT Model : SIM548C  
 Test Mode : GPS LINK  
 Temp./Humid. : 25/65  
 Operator : DUKA

	Freq	ReadAntenna	Preamp	Cable		Level	Limit	Over	Remar
	MHz	Level	Factor	Factor	Loss		Line	Limit	
		dBuV	dB/m	dB	dB	dB/m	dBuV/m	dB	
1	64.92	40.27	12.34	28.13	0.96	-14.83	25.44	40.00	-14.56 Peak
2	140.58	40.12	13.25	28.19	1.29	-13.65	26.47	43.50	-17.03 Peak
3	201.69	36.21	10.44	27.52	1.53	-15.55	20.66	43.50	-22.84 Peak
4	327.79	32.90	13.83	28.18	1.99	-12.36	20.54	46.00	-25.46 Peak
5	507.24	32.62	17.22	28.16	2.54	-8.40	24.22	46.00	-21.78 Peak
6	706.09	33.04	20.25	28.17	3.01	-4.91	28.13	46.00	-17.87 Peak

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## Measurement Result

Test Mode: GPS link

Test Date : Jun. 03, 2008

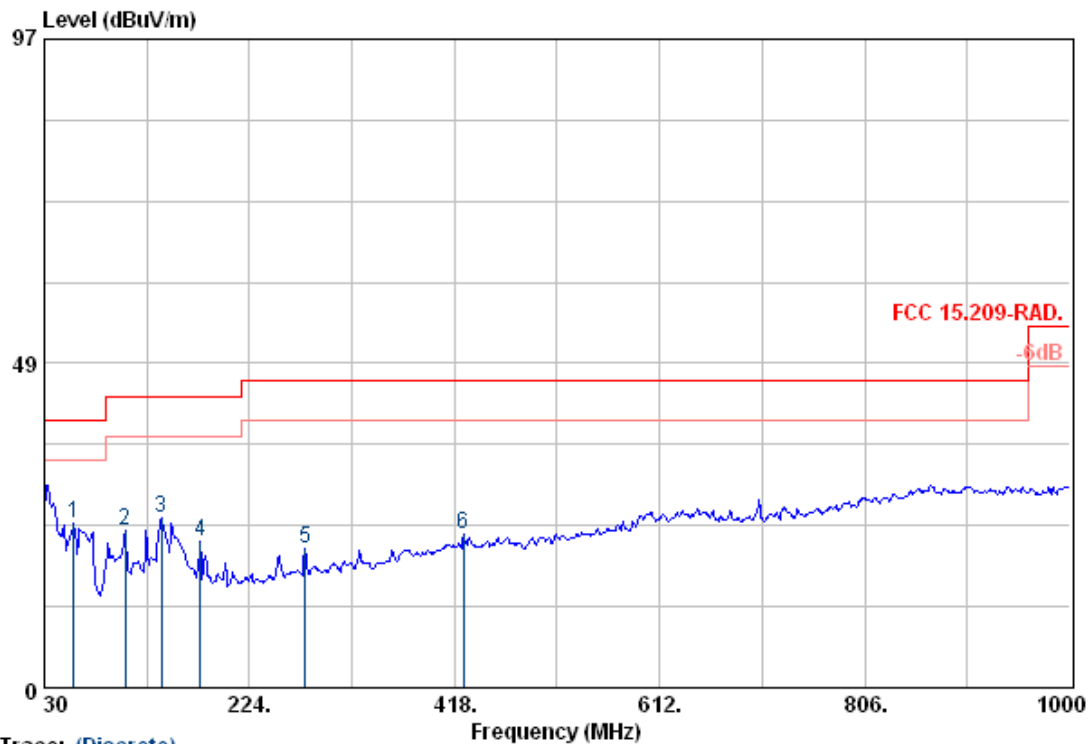
Detector Function: Peak/QP

Test By: Bondi

Frequency Range: 30MHz-1000MHz

Temperature : 25 °C Humidity : 65 %

Polarization: Vertical



Trace: (Discrete)

Site : RF SITE  
 Condition : FCC 15.209-RAD, 3m VULB9160 VERTICAL 150cm 360deg  
 Project No. : EH/2008/50037~38  
 Applicant : SGS 上海  
 EUT Description : 850/900/1800/1900 GSM/GPRS+GPS module  
 EUT Model : SIM548C  
 Test Mode : GPS LINK  
 Temp/Humid. : 25/65  
 Operator : DUKA

	Freq	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Factor	Level	Limit	Over	Remark
	MHz	dBuV	dB/m	dB	dB	dB/m	dBuV/m	dBuV/m	dB	
1	58.13	39.34	12.56	28.06	0.84	-14.66	24.68	40.00	-15.32	Peak
2	106.63	39.97	10.74	28.34	1.12	-16.48	23.49	43.50	-20.01	Peak
3	140.58	39.13	13.25	28.19	1.29	-13.65	25.48	43.50	-18.02	Peak
4	177.44	36.23	11.97	27.81	1.46	-14.38	21.85	43.50	-21.65	Peak
5	276.38	34.35	12.61	27.85	1.76	-13.48	20.87	46.00	-25.13	Peak
6	426.73	32.30	15.91	27.43	2.31	-9.21	23.09	46.00	-22.91	Peak

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## Measurement Result

Test Mode: GPS link

Test Date : Jun. 03, 2008

Detector Function: Peak/QP

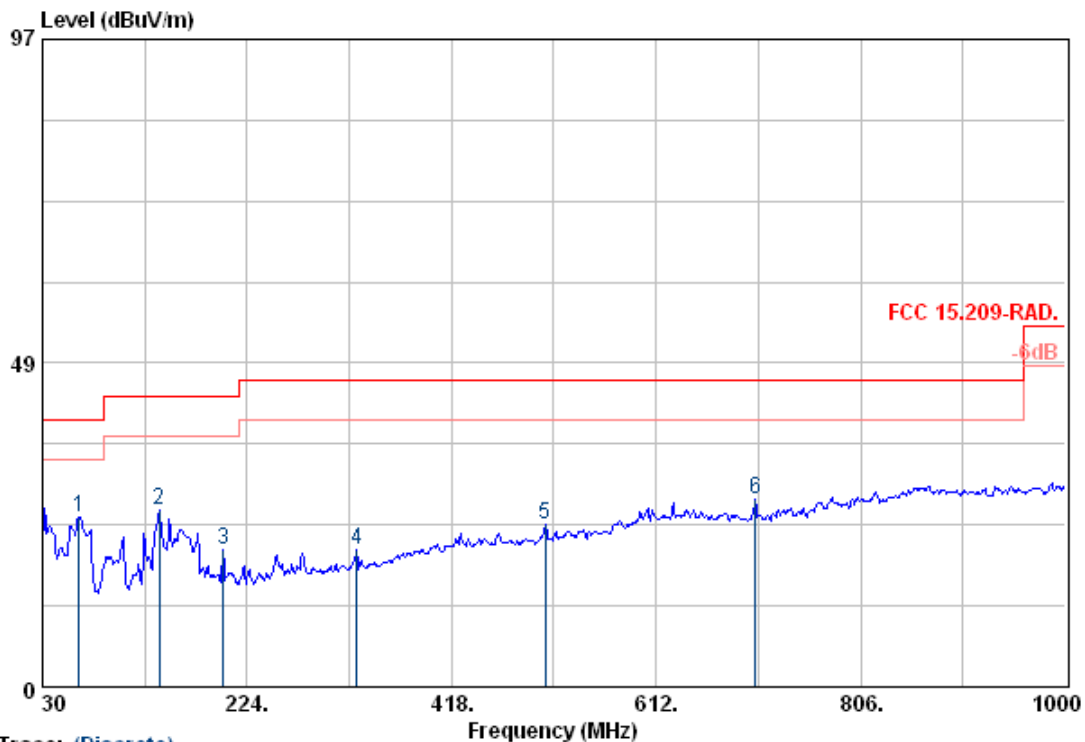
Test By: Bondi

Frequency Range: 30MHz-1000MHz

Temperature : 25 °C

Humidity : 65 %

Polarization: Horizontal



Trace: (Discrete)

Site : RF SITE  
 Condition : FCC 15.209-RAD. 3m VULB9160 HORIZONTAL 150cm 0deg  
 Project No. : EH/2008/50037~38  
 Applicant : SGS 上海  
 EUT Description : 850/900/1800/1900 GSM/GPRS+GPS module  
 EUT Model : SIM548C  
 Test Mode : GPS LINK  
 Temp./Humid. : 25/65  
 Operator : DUKA

	Freq	ReadAntenna	Preamp	Cable	Factor	Level	Limit	Over	Remark
	MHz	dBuV	dB/m	Factor	dB	dB/m	dBuV/m	dBuV/m	dB
1	64.92	40.27	12.34	28.13	0.96	-14.83	25.44	40.00	-14.56 Peak
2	140.58	40.12	13.25	28.19	1.29	-13.65	26.47	43.50	-17.03 Peak
3	201.69	36.21	10.44	27.52	1.53	-15.55	20.66	43.50	-22.84 Peak
4	327.79	32.90	13.83	28.18	1.99	-12.36	20.54	46.00	-25.46 Peak
5	507.24	32.62	17.22	28.16	2.54	-8.40	24.22	46.00	-21.78 Peak
6	706.09	33.04	20.25	28.17	3.01	-4.91	28.13	46.00	-17.87 Peak

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## Measurement Result Above 1GHz:

Test Mode : GSM link

Test Date : Jun. 03, 2008

Detector Function: Quasi-Peak

Test By: Bondi

Frequency Range: 1000MHz-13GHz

Temperature : 25

Humidity : 65 %

Freq. (MHz)	Ant.Pol. H/V	Detector Mode (PK/AV)	Reading (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limit3m (dBuV/m)	Safe Margin (dB)
---	V	Peak					
---	H	Peak					

### Remark :

- (1) Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency °
- (2) Datas of measurement within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (3) Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column °
- (4) Spectrum Peak Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200 ms.
- (5) Spectrum AV Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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# Measurement Result Above 1GHz:

Test Mode : GPS link

Test Date : Jun. 03, 2008

Detector Function: Quasi-Peak

Test By: Bondi

Frequency Range: 1000MHz-13GHz

Temperature : 25 °C

Humidity : 65 %

Freq. (MHz)	Ant.Pol. H/V	Detector Mode (PK/AV)	Reading (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limit3m (dBuV/m)	Safe Margin (dB)
---	V	Peak					
---	H	Peak					

## Remark :

- (1) Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency °
- (2) Datas of measurement within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (3) Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column °
- (4) Spectrum Peak Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200 ms.
- (5) Spectrum AV Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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# APPENDIX 1

## PHOTOGRAPHS OF SET UP

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*Radiated Emission Test Setup Photo*

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## APPENDIX 2

### PHOTOGRAPHS OF EUT

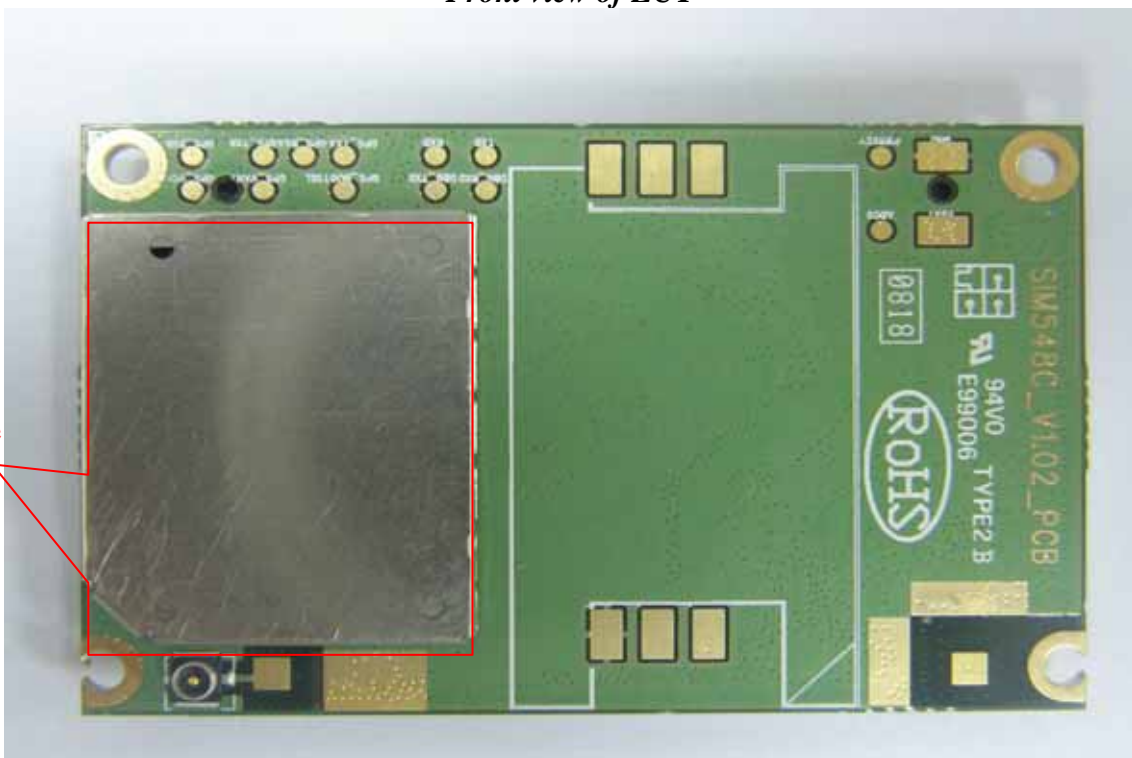
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## All of EUT



## Front view of EUT



GPS Module

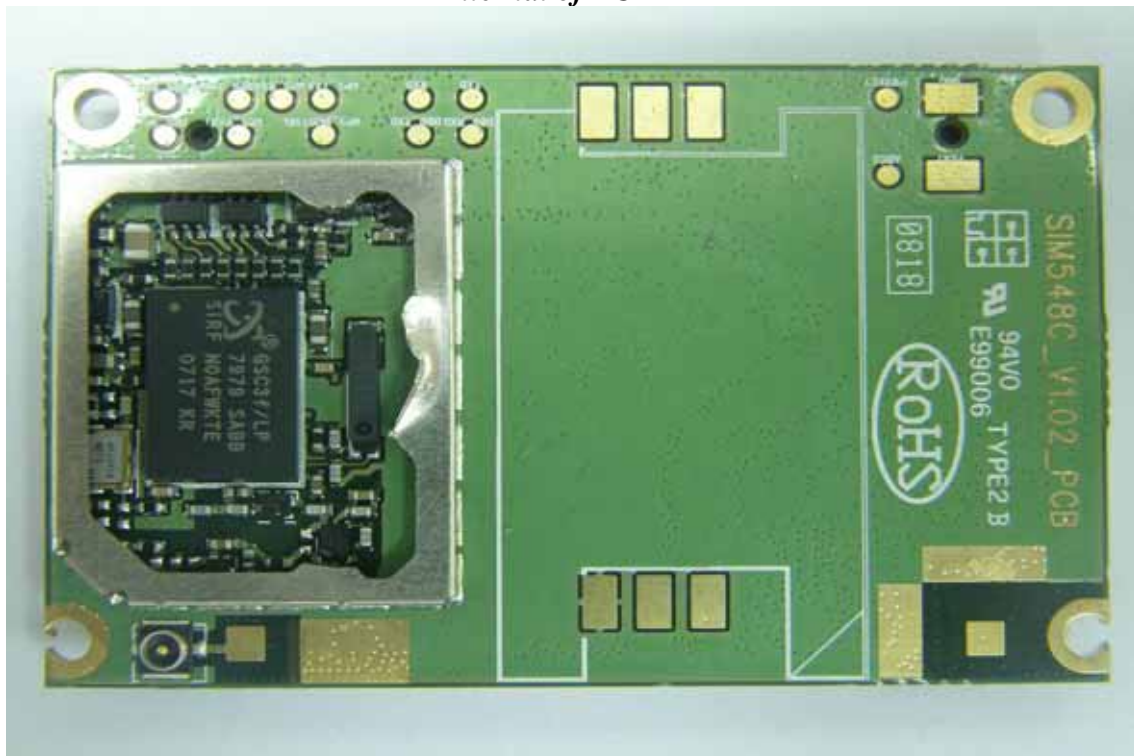
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## Back view of EUT

GSM Module

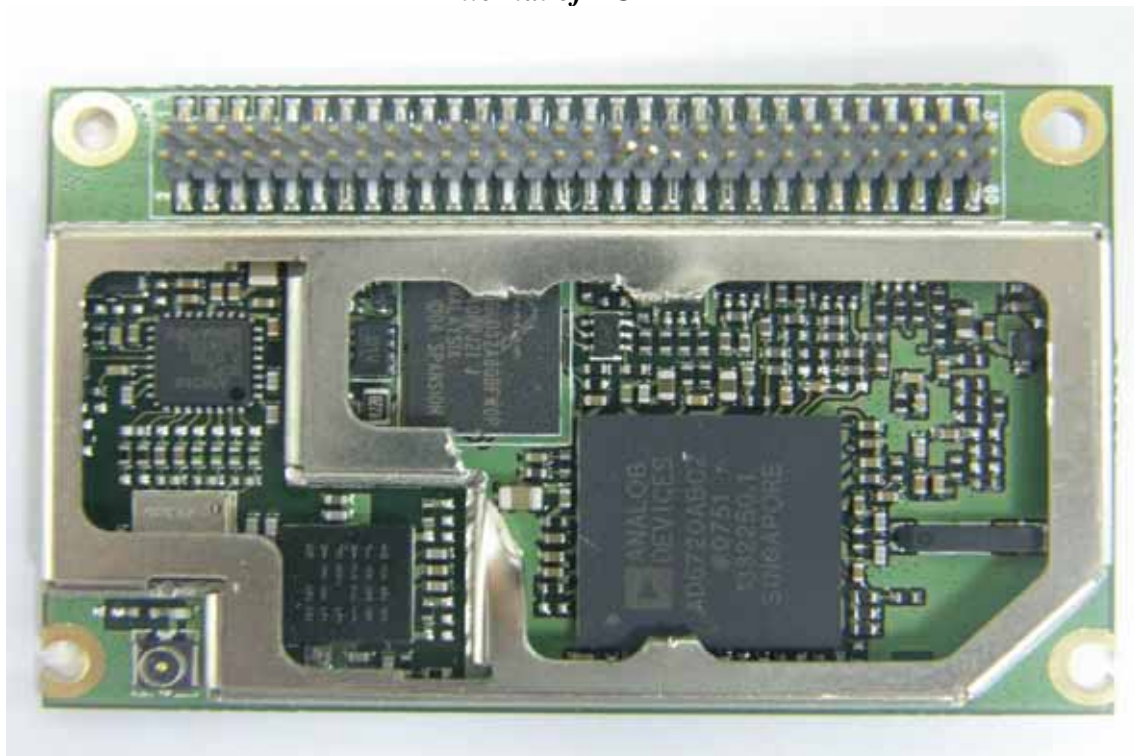


## Internal of EUT - 1



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## Internal of EUT – 2



~ End of Report ~

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