RF Exposure Evaluation Declaration

Product Name	:	Wireless Module
Model No.	:	SIM5320AD
FCC ID	:	UDV-1103022011009

Applicant	:	Shanghai Simcom Ltd.
Address	:	Building A, SIM Technology Building No.633, Jinzhong Road, Shanghai, China

Date of Receipt	:	17/11/2011
Issued Date	:	28/11/2011
Report No.	:	11BS053R-RF-US
Report Version	:	V1.1

Test Report Certification

Issued Date : 28/11/2011
Report No. : 11BS053R-RF-US

QuieTek

Product Name	:	Wireless Module
Applicant	:	Shanghai Simcom Ltd.
Address	:	Building A, SIM Technology Building No.633, Jinzhong Road, Shanghai, China
Manufacturer	:	Shanghai Simcom Ltd.
Address	:	Building A, SIM Technology Building No.633, Jinzhong Road, Shanghai, China
Model No.	:	SIM5320AD
FCC ID	:	UDV-1103022011009
EUT Voltage	:	DC 3.8V
Trade Name	:	SIMCom
Applicable Standard	:	FCC OET Bulletin 65
Test Result	:	Complied
Performed Location	:	Suzhou EMC Laboratory No.99 Hongye Rd., Suzhou Industrial Park Loufeng Hi-Tech Development Zone., Suzhou, China TEL: +86-512-6251-5088 / FAX: +86-512-6251-5098 FCC Registration Number: 800392

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Approved By : Marlin Chen
(Engineering Supervisor: Marlin Chen)

Laboratory Information

We, **QuieTek Corporation**, are an independent EMC and safety consultancy that was established the whole facility in our laboratories. The test facility has been accredited/accepted(audited or listed) by the following related bodies in compliance with ISO 17025, EN 45001 and specified testing scope:

Taiwan R.O.C.	**:**	**BSMI, NCC, TAF**
Germany	**:**	**TUV Rheinland**
Norway	**:**	**Nemko, DNV**
USA	**:**	**FCC, NVLAP**
Japan	**:**	**VCCI**

The related certificate for our laboratories about the test site and management system can be downloaded from QuieTek Corporation's Web Site : http://www.quietek.com/tw/ctg/cts/accreditations.htm
The address and introduction of QuieTek Corporation's laboratories can be founded in our Web site : http://www.quietek.com/
If you have any comments, Please don't hesitate to contact us. Our contact information is as below:

HsinChu Testing Laboratory :
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TEL:+886-3-592-8858 / FAX:+886-3-592-8859 E-Mail : service@quietek.com

NVLAP Lab Code : 200347-0

Testing Laboratory 1313

LinKou Testing Laboratory :
No. 5-22, Ruei-Shu Valley, Ruei-Ping Tsuen, Lin-Kou Shiang, Taipei, Taiwan, R.O.C.
TEL : 886-2-8601-3788 / FAX : 886-2-8601-3789 E-Mail : service@quietek.com

NVLAP Lab Code: 200533-0

Testing Laboratory 0914

Suzhou (China) Testing Laboratory :
No. 99 Hongye Rd., Suzhou Industrial Park Loufeng Hi-Tech Development Zone., Suzhou,China.
TEL : +86-512-6251-5088 / FAX : +86-512-6251-5098 E-Mail : service@quietek.com

NVLAP Lab Code : 200743-0

Testing Laboratory 1596

1. RF Exposure Evaluation

1.1. Limits

According to FCC 1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in 1.1307(b)

LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm2)	Average Time (Minutes)
(A) Limits for Occupational/ Control Exposures				
300-1500	--	--	F/300	6
1500-100,000	--	--	5	6
(B) Limits for General Population/ Uncontrolled Exposures				
300-1500	--	--	F/1500	6
1500-100,000	--	--	1	30

F= Frequency in MHz

Friis Formula

Friis transmission formula: Pd = (Pout*G)/(4*pi*r2)

Where

Pd = power density in mW/cm2

Pout = output power to antenna in mW

G = gain of antenna in linear scale

Pi = 3.1416

R = distance between observation point and center of the radiator in cm

Pd id the limit of MPE, 1 mW/cm2 . If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.

1.2. Test Procedure

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.
The temperature and related humidity: 18℃and 78％ RH.

1.3. Test Result of RF Exposure Evaluation

1.3.1. Conducted Power Analysis

Table 1: Duty Cycle of TDMA Signal

No. of timeslots	1	2	3	4
Duty Cycle	1 : 8	1 : 4	1 : 2.66	1 : 2
Timebased avg. power compared to slotted avg. power	-9 dB	-6 dB	-4.25 dB	-3 dB

The following table shows the conducted power measured and time based average power calculated:

Table 2

Frequency Band	Modulation	Timeslots	Avg. Burst Power (dBm)	Time based average power (Calculated)
GSM850	GMSK	1	**32.65**	23.65
GSM850	GMSK	2	30.21	24.21
GSM850	GMSK	3	29.15	24.90
GSM850	GMSK	4	30.47	**27.47**
GSM850	8PSK	1	**26.82**	17.82
GSM850	8PSK	2	26.23	20.23
GSM850	8PSK	3	25.18	20.93
GSM850	8PSK	4	24.21	**21.21**
PCS1900	GMSK	1	**29.14**	20.14
PCS1900	GMSK	2	27.81	21.81
PCS1900	GMSK	3	25.79	21.54
PCS1900	GMSK	4	27.70	**24.70**
PCS1900	8PSK	1	**24.69**	15.69
PCS1900	8PSK	2	24.97	18.97
PCS1900	8PSK	3	23.88	19.63
PCS1900	8PSK	4	22.86	**19.86**
FDD II (1900)	QPSK	---	**22.31**	**22.31**
FDD V (850)	QPSK	---	**23.30**	**23.30**

1.3.2. Host Platform Analysis

The MPE calculation was performed for the maximum antenna gain maybe used of stand-alone condition. According to FCC Part2.1091(c) requirement, the maximum ERP (below 1.5GHz) is 1.5W and (above 1.5GHz) is 3W. Conjunction with FCC Part22H&24E requirements, the following table shows the maximum antenna gain allowed for stand-alone situation.

According to FCC rules, maximum ERP allowed is 7W (38.45dBm) for Part22H, maximum EIRP is 2W (33dBm) for Part24E.

Compliance with MPE limits was calculated as below shows:

GSM850 Band / WCDMA FDD V

Maximum time avg. power input to the antenna:	559 mW
ERP power limit according to §2.1091	1.5 W
G_1 Antenna gain (dBi) to comply with ERP limits: (ERP = Maximum time avg. power x Antenna gain / 1.64)	6.4dBi
ERP power limit according to §22.913	7 W
Maximum avg. burst power input to the antenna:	1841 mW
G_2 Antenna gain (dBi) to comply with ERP limits: (ERP = Maximum avg. burst output power x Antenna gain / 1.64)	7.9 dBi

$G_{850\ MHz\ band}$ Min (G_1, G_2) = 6.4 dBi

PCS1900 Band / WCDMA FDD II

Maximum time avg. power input to the antenna:	295 mW
ERP power limit according to §2.1091	3 W
G_1 Antenna gain (dBi) to comply with ERP limits: (ERP = Maximum time avg. power x Antenna gain / 1.64)	12.2 dBi
EIRP power limit according to §24.232	2 W
Maximum avg. burst power input to the antenna:	820 mW
G_2 Antenna gain (dBi) to comply with ERP limits: (ERP = Maximum avg. burst output power x Antenna gain / 1.64)	3.9 dBi

$G_{1900\ MHz\ band}$ Min (G_1, G_2) = 3.9 dBi

1.3.3. MPE Evaluation Result

The device used should cover the following conditions:

1) The antenna-to-user distance of all transmitters(for example: WLAN, Bluetooth) above is 20cm or larger;
2) The maximum antenna gain of the device does not exceed the values listed in table 3.

Note: other antennas of different communication systems may be installed in the host platform as long as they are not collocated to the device antenna (distance > 20cm).

Table 3

Frequency Band (MHz)	Max Time avg. power (dBm)	Antenna Gain (dBi)	Max EIRP (dBm)	Distance (cm)	Power Density Seq (mW/cm^2)	MPE Limit (mW/cm^2)
GSM850 / WCDMA FDD V	27.47	6.4	33.87	20	0.48	0.55
PCS1900 / WCDMA FDD II	24.70	3.9	28.60	20	0.14	1.00

Note: Maximum antenna gain 6.4dBi allowed for GSM850/WCDMA FDD V and maximum antenna gain 3.9dBi for PCS1900/WCDMA FDD II are compliance with MPE limit.