

Report No.: GSM10109360M01

Issue Date: 02-05,2010

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MPE Evaluation Report

Applicant Name: Sierra Wireless Inc

Applicant Address: 13811 Wireless Way Richmond, British Columbia Canada, V6V 3A4

The following samples were submitted and identified on behalf of the client as:

Sample Description	Module
SGS Ref	GSM10109360M01
Model Number	MC8700
FCC ID	N7NMC8700
IC ID	2417C-MC8700
Final Hardware Version Tested	Rev 1.0
Final Software Version Tested	M2.0.9.3B
Date Initial Sample Received	10-11,2009
Testing Start Date	10-12,2009
Testing End Date	10-12,2009

According to:

FCC Rules 47 CFR §2.1091, FCC OET Bulletin 65 supplement C

FCC Rules 47 CFR §22.913, FCC Rules 47 CFR §24.232

Radio Standards Specification 102 (RSS-102)

Comments/ Conclusion:

The configuration tested complied to the certification requirements specified in this report.

Signed for on behalf of SGS

Ken Wang

Peter Xue

Project Manager

Technical Manager

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Change History

Version	Change Contents	Author	Date
V1.0	First edition	Ken	01-15,2010
V1.1	State IC standard	Ken	02-05,2010

1. Report Overview

This report details the results of testing carried out on the samples listed in section 15, the results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

This report may only be reproduced and distributed in full. If the product in this test report is used in any configuration other than that detailed in the test report, the manufacturer must ensure the new configuration complies with all relevant standards and certification requirements. Any mention of SGS Shanghai Wireless Telecommunications lab or testing done by SGS Shanghai Wireless Telecommunications lab made in connection with the distribution or use of the tested product must be approved in writing by SGS Shanghai Wireless Telecommunications lab.

2. Test Lab Declaration or Comments

None

3. Applicant Declaration or Comments

None

4. Measurement Uncertainty

Measurements and results are all in compliance with the standards listed in section 10 of this report. All measurements and results are recorded and maintained at the laboratory performing the tests and measurement uncertainties are taken into account when comparing measurements to pass/ fail criteria.

5. Testing Environment

Normal Temperature	+20 to +24 °C
Relative Humidity	35 to 60 %

6. Primary Test Laboratory

Name:	Wireless Telecommunications Laboratory SGS-CSTC Standards Technical Services(Shanghai) Co., Ltd
Address:	9F, 3rd Building, No.889, Yishan Rd, Xuhui District, Shanghai, China 200233
Telephone:	+86 (0) 21 6140 2666
Fax:	+86 (0) 21 5450 0149
Internet:	http://www.cn.sgs.com
Contact:	Mr. Peter Xue
Email:	peter.xue@sgs.com

7. Details of Applicant

Company Name	Sierra Wireless Inc
Address	13811 Wireless WayRichmond, British Columbia Canada, V6V 3A4
Telephone	+1-604-232-1440
Contact	Ying Wang
Fax	+1-604-231-1109
Email	ywang@sierrawireless.com .

8. Details of Manufacturer

Company Name	Flextronics Industrial(Zhuhai) Co.Ltd
Address	NO.168,zhu feng Road Xin Qing Science &Technology Industrial Park Jing An,Doumen Zhuhai China
Telephone	+86 756 5168000-68003
Contact	Jacky Huang
Fax	+86 756 6168200
Email	jacky.huangDMN@cn.flextronics.com

9. Other testing Locations

Name:	Not Required
Address:	--
Telephone:	--
Contact:	--
Email:	--

10. Referenced Documents

The Equipment under Test (EUT) has been tested at SGS's (own or subcontracted) laboratories according to

FCC Rules 47 CFR §2.1091 & FCC OET Bulletin 65 supplement C

The following table summarizes the specific reference documents such as harmonized standards or test specifications which were used for testing at SGS's (own or subcontracted) laboratories.

Identity	Document Title	Version
FCC Rules 47 CFR§2.1091	Radiofrequency radiation exposure evaluation:mobile devices	-
FCC OET Bulletin 65 supplement C	Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields	2001

(B) Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f ²)*	30
30-300	27.5	0.073	0.2	30
300-1500	--	--	f/1500	30
1500-100,000	--	--	1.0	30

f = frequency in MHz *Plane-wave equivalent power density

RF Exposure Limits

11. Primary Laboratory Accreditation Details



12. SGS Shanghai Wireless Telecommunications lab, Personnel

SGS Wireless Shanghai Project Management Team and list of approved Testers for SGS Wireless Shanghai.

Surname	Forename	Initials
CAI	CAI	CAICAI
Xue	Peter	PETERXUE
Xu	Anya	ANYA
Ni	Lemon	LEMONNI
Tao	Kevin	KEVINTAO

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Wang	Lawrence	LAWRENCE
Zhang	Sean	SEANZH
Liu	Felix	FILEX
Ruan	Roger	ROGER
Tan	Terry	TERRY
Zhang	Zenger	ZENGER
Wang	Ken	KENWANG
Gao	Keilefen	KEILEFENGGAO
Tang	Eva	EVATANG
Ho	James	JAMESHO
Tang	Kenny	KENNY
Hailiang	Cai	HAILIANG
Kuang	Connie	CONNIE
Chan	Hik Kwong	HKC
Nie	Neo	Neo

Version 2009-10-20

13. Test Equipment Information

Equipment	Model	S/N	Cal. date	Cal. due date
R&S Universal Radio Communication Tester	CMU200	103633	2009-11-26	2010-11-25

14. Detailed Results

14.1 Measurement of RF conducted Power

Mode		GPRS (GMSK)			
Slot (Uplink)		1	2	3	4
Duty factor		1/8	1/4	3/8	1/2
Band	Channel	Peak Power (dBm)			
850	128	31.4	28.2	26.9	25.8
	189	31.4	28.2	26.9	25.9
	251	31.2	28.3	27.0	25.9
1900	512	29.5	26.5	24.6	23.5
	661	29.3	26.3	24.4	23.3
	810	29.1	26.1	24.2	23.1

Mode		EGPRS(8PSK)			
Slot (Uplink)		1	2	3	4
Duty factor		1/8	1/4	3/8	1/2
Band	Channel	Peak Power (dBm)			
850	128	30.1	30.2	30.1	29.0
	189	30.2	30.2	30.2	29.2
	251	30.2	30.1	30.1	29.2
1900	512	29.3	28.9	27.9	26.6
	661	29.1	29.1	27.7	26.4
	810	28.9	28.9	27.4	26.2

Mode		WCDMA	
Band	Channel	Peak_Avg	RMS_Avg
FDDII	9262	24.66	21.44
	9400	25.33	22.04
	9538	24.56	21.76
FDD V	4132	25.96	23.07
	4182	25.66	22.88
	4233	25.87	22.97

14.2 Calculation of time-averaged power

$10\log 1/8 = -9.0$, $10\log 1/4 = -6.0$, $10\log 3/8 = -4.3$, $10\log 1/2 = -3.0$, $10\log 1 = 0$

Mode		GPRS (GMSK)			
Slot (Uplink)		1	2	3	4
Duty factor		1/8	1/4	3/8	1/2
Band	Channel	Time-averaged Power (dBm)			
850	128	22.4	22.2	22.6	22.8
	189	22.4	22.2	22.6	22.9
	251	22.2	22.3	22.7	22.9
1900	512	20.5	20.5	20.3	20.5
	661	20.3	20.3	20.1	20.3
	810	20.1	20.1	19.9	20.1

Mode		EGPRS(8PSK)			
Slot (Uplink)		1	2	3	4
Duty factor		1/8	1/4	3/8	1/2
Band	Channel	Time-averaged Power (dBm)			
850	128	21.1	24.2	25.8	26.0
	189	21.2	24.2	25.9	26.2
	251	21.2	24.1	25.8	26.2
1900	512	20.3	22.9	23.6	23.6
	661	20.1	23.1	23.4	23.4
	810	19.9	22.9	23.1	23.2

Mode		WCDMA	
Band	Channel	Peak_Time-averaged Power (dBm)	RMS_Time-averaged Power (dBm)
FDDII	9262	24.66	21.44
	9400	25.33	22.04
	9538	24.56	21.76
FDD V	4132	25.96	23.07
	4182	25.66	22.88
	4233	25.87	22.97

14.3 MPE Evaluation

$$S = PG * \text{Duty factor} / 4\pi R^2$$

P = Peak Power Input to antenna (milli watts)

G =Antenna Gain (numeric)

R = distance to the center of radiation of antenna (in meter) =20 cm

Note:

1) P (milli watts)= $10^{\frac{dBm}{10}}$

2) G (Antenna gain in numeric) = $10^{\text{(Antenna gain in dBi /10)}}$

3) Duty factor

Mode		Duty factor
GSM/GPRS/EGPRS	1 Slot uplink	1/8
	2 Slot uplink	1/4
	3Slot uplink	3/8
	4 Slot uplink	1/2

4) $\pi=3.142$

1.4.2.1 calculation of the acceptable maximum gain

1)According FCC OET Bulletin 65 supplement C the limits are for the following frequency:

300-1500MHz: $f/1500 \text{ mW/ cm}^2$,therefore 850MHz: 0.55 mW/ cm^2

1500MHz-100000MHz: 1mW/ cm^2

The maximum sourced based time-averaged transmit power for 850 MHz cellular band is 0.416 Watts (EGPRS 4 uplink slot,29.2dBm,duty factor=1/2)

The maximum sourced based time-averaged transmit power for 1900MHz cellular band is 0.341 Watts (FDD II,25.33 dBm, duty factor=1)

a.calculation for 850MHz

$$G=10\log(0.55*4*\pi*400/ \text{ duty factor })-29.2=8.22 \text{ dBi (duty factor=1/2)}$$

b. calculation for 1900 MHz

$$G=10\log(1*4*\pi*400/ \text{ duty factor })-25.33=11.68 \text{ dBi (duty factor=1)}$$

2)According FCC Rules 47 CFR the limits are for the following frequency:

850MHz:ERP 7W

1900MHz:EIRP 2W

The maximum transmit power for this product in the 850 MHz cellular band is 1.38 Watts (31.4dBm)

The maximum transmit power for this product in the 1900 MHz cellular band is 0.89 Watts (29.5dBm)

a. calculation for 850MHz

$$G=10\log(7000)-31.4+2.15=9.2 \text{ dBi}$$

b. calculation for 1900 MHz

$$G=10\log(2000)-29.5=3.5 \text{ dBi}$$

So the acceptable maximum gain is 8.22 dBi for 850MHz,3.5dBi for 1900MHz

1.4.2.2 MPE Evaluation

The maximum power density for 850 MHz is shown as below:

Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Duty factor	The maximum sourced based time-averaged transmit power(mW)	Calculated RF Exposure (mW/cm ²)	Limit (mW/cm ²)
8.22	6.63	29.2	832	1/2	416	0.548	0.55

The maximum power density for 1900MHz is shown as below:

Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Duty factor	The maximum sourced based time-averaged transmit power(mW)	Calculated RF Exposure (mW/cm ²)	Limit (mW/cm ²)
3.5	2.24	25.33	341	1	341	0.152	1

If the maximum antenna gain is less than 8.22 dBi for 850MHz, and 3.5dBi for 1900MHz, the product complies the FCC Rules 47 CFR and MPE limit

14.4 Measurement Uncertainty

Extended Uncertainty (k=2) 95%	0.5dB
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15. Identification of Samples

Product Name	MC8700
Brand Name	Sierra Wireless
Model Name	MC8700
FCC ID	N7NMC8700
IC ID	2417C-MC8700
Final Hardware Version	Rev 1.0
Final Software Version	M2.0.9.3B

Normal Voltage	3.3V	
Low Voltage	3.0V	
High Voltage	3.6V	
Antenna Type	external Antenna	
GSM Frequency Bands	GSM850(tested)	Tx: 824~849 MHz
		Rx: 869~894 MHz
	GSM900	Tx: 880~915 MHz
		Rx: 925~960MHz
	DCS1800	Tx: 1710~1785MHz
		Rx: 1805~1880 MHz
	PCS1900(tested)	Tx: 1850~1910 MHz
		Rx: 1930~1990 MHz
UMTS Frequency Bands	FDD I	Tx: 1920~1980 MHz
		Rx: 2110~2170MHz
	FDD II(tested)	Tx: 1850~1910 MHz
		Rx: 1930~1990 MHz
	FDD V(tested)	Tx: 824~849 MHz
		Rx: 869~894 MHz
	FDD VIII	Tx: 880~915 MHz
		Rx: 925~960MHz
Modulation Mode	GMSK,8PSK,QPSK,16QAM,64QAM	
GSM Power Class	GSM 850	4: 33dBm(Nominal)
	GSM900	4: 33dBm(Nominal)
	DCS1800	1: 30dBm(Nominal)
	PCS 1900	1: 30dBm(Nominal)
UMTS Power Class	FDD I	3: 24 dBm(Nominal)
	FDD II	3: 24 dBm(Nominal)
	FDD V	3: 24 dBm(Nominal)
	FDD VIII	3: 24 dBm(Nominal)
GPRS Multislot Class	Class12	
EGPRS Multislot Class	Class12	
Reference Number	GSM10109360M01	
Serial Number	LM007AA01	
IMEI	--	

16. Photographs of EUT



Fig.16-1 Front View

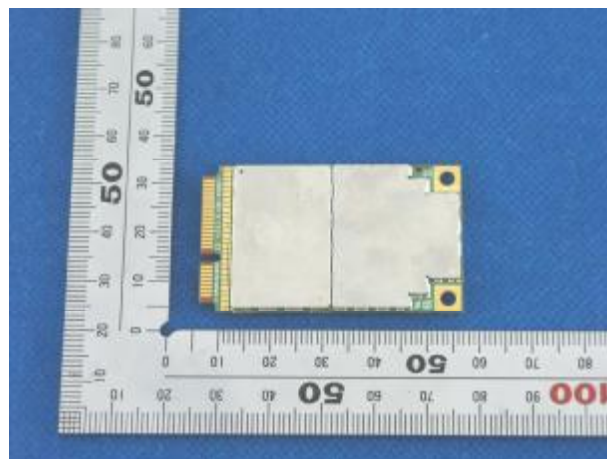


Fig.16-2 Back View

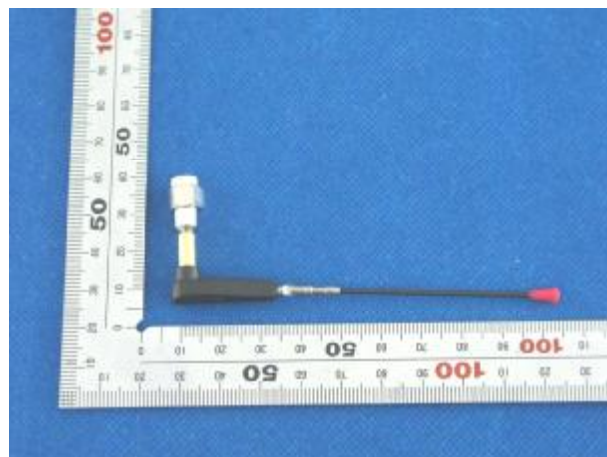


Fig.16-3 Antenna

END OF REPORT

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