

MPE Evaluation Report

Applicant Name: MOTOROLA INC.

Applicant Address: 1301 E ALGONQUIN ROAD, SCHAUMBURG ILLINOIS 60196-1078
 UNITED STATES

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

Sample Description	GSM Module
SGS Ref	GSM10094716M02
Model Number	G30
FCC ID	IHDT56KT1
Final Hardware Version Tested	P4
Final Software Version Tested	G30_G_00.01.0FD
Date Initial Sample Received	11-13, 2009
Testing Start Date	11-13, 2009
Testing End Date	12-05, 2009

According to:

FCC Rules 47 CFR §1.1310, FCC Rules 47 CFR §2.1091
 FCC Rules 47 CFR §22.913, FCC Rules 47 CFR §24.232
 FCC OET Bulletin 65 supplement C

Comments/ Conclusion:

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

Signed for on behalf of SGS



Project Manager



Technical Manager

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SHGSM

Table of Contents

Change History	3
1. Report Overview	4
2. Test Lab Declaration or Comments.....	4
3. Applicant Declaration or Comments.....	4
4. Measurement Uncertainty	4
5. Testing Environment	4
6. Primary Test Laboratory	5
7. Details of Applicant	5
8. Details of Manufacturer.....	5
9. Other testing Locations	5
10. Referenced Documents.....	6
11. Primary Laboratory Accreditation Details	7
12. SGS Shanghai Wireless Telecommunications lab, Personnel	8
13. Test Equipment Information	8
14. Detailed Results.....	9
14.1 Summary of Results	9
14.2 Measurement of RF conducted Power.....	9
14.3 Calculation of time-averaged power	9
14.4 MPE Evaluation.....	10
14.5 Measurement Uncertainty	11
15. Identification of Samples	11
16. Photographs of EUT.....	12
Annex The acceptable maximum antenna gain.....	13
END OF REPORT	13

Change History

Version	Change Contents	Author	Date
V1.0	First edition	Ken Wang	2010-01-14

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

Name:	MOTOROLA INC.
Address:	1301 E ALGONQUIN ROAD, SCHAUMBURG ILLINOIS 60196-1078 UNITED STATES
Telephone:	972-3-5684075
Contact:	Avraham Hasid
Email:	BAH015@motorola.com

8. Details of Manufacturer

Name:	MOTOROLA INC.
Address:	1301 E ALGONQUIN ROAD, SCHAUMBURG ILLINOIS 60196-1078 UNITED STATES
Telephone:	972-3-5684075
Contact:	Avraham Hasid
Email:	BAH015@motorola.com

9. Other testing Locations

None

10. Referenced Documents

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

FCC Rules 47 CFR §1.1310, §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 as SGS's (own or subcontracted) laboratories.

Identity	Document Title	Version
FCC Rules 47 CFR §1.1310	Radiofrequency radiation exposure limits	-
FCC Rules 47 CFR §2.1091	Radiofrequency radiation exposure evaluation: mobile devices	2001
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
Wang	Lawrence	LAWRENCE
Zhang	Sean	SEANZH
Liu	Felix	FILEX
Ruan	Roger	ROGER
Tan	Terry	TERRY
Zhang	Zenger	ZENGER
Wang	Ken	KENWANG
Gao	Keilefen	KEILEFENGAO
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 Summary of Results

Frequency Band	Limit (mW/ cm ²)	Result (mW/ cm ²)	Verdict
GSM850	0.55	0.54	Passed
PCS1900	1.0	0.25	Passed

14.2 Measurement of RF conducted Power

Mode		GPRS			
Slot (Uplink)		1	2	3	4
Band	Channel	Peak average power(dBm)			
GSM850	128	33.7	33.5	-	-
	190	33.6	33.5	-	-
	251	33.4	33.3	-	-
PCS1900	512	30.3	30.2	-	-
	661	30.4	30.3	-	-
	810	30.5	30.4	-	-

14.3 Calculation of time-averaged power

$$10\log 1/8=-9.0$$

$$10\log 1/4=-6.0$$

Mode		GPRS			
Slot (Uplink)		1	2	3	4
Duty factor		1/8	1/4		
Band	Channel	Time-averaged power(dBm)			
GSM850	128	24.7	27.5	-	-
	190	24.6	27.5	-	-
	251	24.4	27.3	-	-
PCS1900	512	21.3	24.2	-	-
	661	21.4	24.3	-	-
	810	21.5	24.4	-	-

14.4 MPE Evaluation

$$S = E_f \cdot P_G \cdot \text{Duty factor} / 4\pi R^2$$

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) E_f =enhancement factor to account for ground reflections is 2.56

2) P (milli watts) = $10^{(dBm / 10)}$

3) G (Antenna gain in numeric) = $10^{(Antenna gain in dBi / 10)}$

4) 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

5) $\pi = 3.142$

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	E_f	The maximum sourced based time-averaged transmit power(mW)	Calculated RF Exposure (mW/cm ²)	Limit (mW/cm ²)
2.85	1.93	33.5	2238.72	1/4	2.56	559.68	0.54	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	E_f	The maximum sourced based time-averaged transmit power(mW)	Calculated RF Exposure (mW/cm ²)	Limit (mW/cm ²)
2.5	1.78	30.4	1122.02	1/4	2.56	280.50	0.25	1

14.5 Measurement Uncertainty

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

Product Name	G30	
Brand Name	MOTOROLA	
Marketing Name	G30	
Final Hardware Version	P4	
Final Software Version	G30_G_00.01.0FD	
Normal Voltage	3.8 V	
Low Voltage	3.3 V	
High Voltage	4.2 V	
Battery Type	--	
Antenna Type	external Antenna	
Antenna gain	GSM850	2.85 dBi
	PCS1900	2.5 dBi
GSM Frequency Bands	GSM850	Tx: 824~849 MHz
		Rx: 869~894 MHz
	PCS1900	Tx: 1850~1910 MHz
		Rx: 1930~1990 MHz
Modulation Mode	GMSK	
GSM / GPRS Power Class	GSM850	4
	PCS1900	1
Reference Number	GSM10094716M02	
Serial Number	--	
IMEI	--	
Date of receipt	11-13, 2009	
Date of Testing Start	11-13, 2009	
Date of Testing End	12-05, 2009	

16. Photographs of EUT



Fig.16-1 Front View

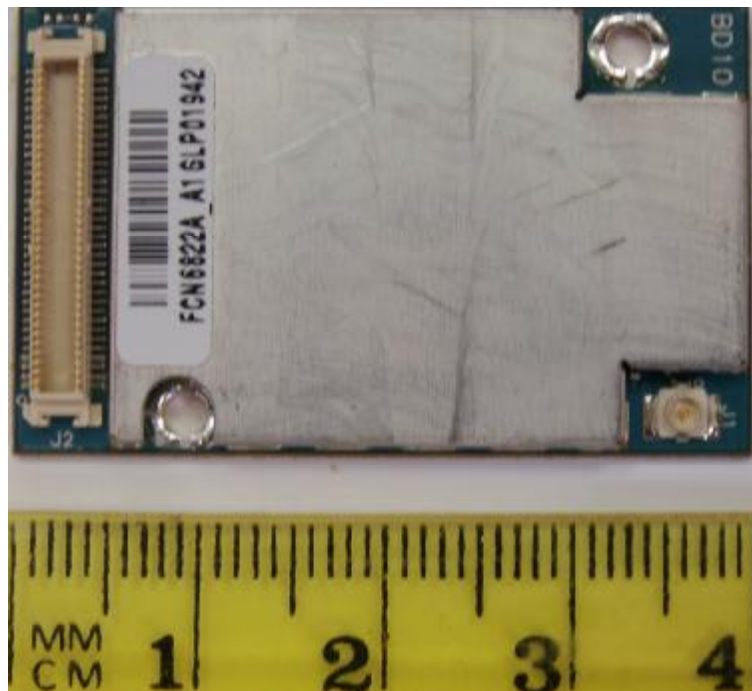


Fig.16-2 Back View

Annex The acceptable maximum antenna gain

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

300-1500MHz: f/1500 mW/ cm²,therefore 850MHz: 0.55 mW/ cm²

1500MHz-100000MHz:1mW/ cm²

The maximum sourced based time-averaged transmit power for 850 MHz cellular band is 0.56 Watts (GPRS 2 uplink slot,33.5dBm, duty factor=1/4)

The maximum sourced based time-averaged transmit power for 1900MHz cellular band is 0.28 Watts (GPRS 2 uplink slot,30.4dBm, duty factor=1/4)

a.calculation for 850MHz

$$G=10\log(0.55*4*\pi*400/ \text{duty factor} /E_f)= 2.85\text{dBi} (\text{duty factor}=1/4,E_f=2.56)$$

b. calculation for 1900 MHz

$$G=10\log(1*4*\pi*400/ \text{duty factor} /E_f)=8.55\text{dBi} (\text{duty factor}=1/4,E_f=2.56)$$

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

850MHz:ERP 7W (FCC Rules 47 CFR §22.913,)

1900MHz:EIRP 2W (FCC Rules 47 CFR §24.232)

The maximum transmit power for this product in the 850 MHz cellular band is 2.34Watts (GPRS 1 uplink slot, 33.7dBm)

The maximum transmit power for this product in the 1900 MHz cellular band is1.12 Watts (GPRS 1 uplink slot, 30.5dBm)

a. calculation for 850MHz

$$G=10\log(7000)-33.7+2.15=6.8\text{dBi}$$

b. calculation for 1900 MHz

$$G=10\log(2000)-30.5=2.5\text{dBi}$$

So the acceptable maximum gain is 2.85dBi for 850MHz, 2.5dBi for 1900MHz

END OF REPORT