

MPE REPORT

REPORT NUMBER: I09GW6944-FCC-MPE-3

ON

Type of Equipment: PCI Express Mini Card

Type of Designation: MC8795V

Manufacturer: Flextronics

ACCORDING TO

FCC CFR 47, Part 2, FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS

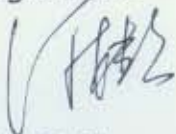
Section 2.1091 Radiofrequency radiation exposure evaluation:
mobile devices

China Telecommunication Technology Labs.

Month date, year

Apr, 13, 2010

Signature



He Guili
Director

FCC ID: N7NMC8795

Report Date: 2010-04-13

Test Firm Name: China Telecommunication Technology Labs

Registration Number: 840587

Statement

The report is a Maximum Permissible Exposure evaluation report according to FCC CFR part 2.1091.

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1 General Information

1.1 Notes

The MPE report was carried out on a sample equipment to demonstrate limited compliance with FCC CFR 47 Part 2.1091.

The test results of this report relate exclusively to the item(s) tested as specified in section 2.

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CTTL Test Report

FCC Part 2.1091
Equipment: MC8795V

REPORT NO.: I09GW6944-FCC-MPE-3

1.2 Editor

Editor of this test report:

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Signature: 李国庆

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Date: 2010-04-13
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1.3 Testing Laboratory information

1.3.1 Location

Name: China Telecommunication Technology Labs.
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1.3.2 Details of accreditation status

Accredited by: DATech Deutsche Akkreditierungsstelle Technik in der
TGA GmbH (German Accreditation Body for Technology
in the TGA)
Lab number: DA7130
DAR Registration number: DAT-PL-162/04-01
Standard: ISO/IEC 17025:2005

1.3.3 Test location, where different from section 1.3.1

Name: -----
Address: -----

1.4 Details of applicant or manufacturer

1.4.1 Applicant

Name: Sierra Wireless, Inc.
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Country: Canada
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Contact: Ying Wang
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1.4.2 Manufacturer (if different from applicant in section 1.4.1)

Name: Flextronics
Address: Flextronics Zhuhai Industrial Park (B16), Xin Qing
Science & Technology Industrial Park, Jing An,
Doumen, Zhuhai, GD, China.

1.4.3 Manufactory (if different from applicant in section 1.4.1)

Name: --
Address: --

2 Test Item

2.1 General Information

Manufacturer: Flextronics
 Name: PCI Express Mini Card
 Model Number: MC8795V
 Serial Number: 1201477-1.0
 Production Status: Product
 Receipt date of test item: 2009-8-3

2.2 Outline of EUT

EUT is a PCI Express Mini Card supporting GPRS/EGPRS 850/1900 and WCDMA FDD II and V.

2.3 Modifications Incorporated in EUT

The EUT has not been modified from what is described by the brand name and unique type identification stated above.

2.4 Equipment Configuration

Equipment configuration list:

Item	Generic Description	Manufacturer	Type	Serial No.	Remarks
A	PCI Express Mini Card	Flextronics	MC8795V	1201477-1.0	None
B	adapter	--	--	--	None
C	battery	--	--	--	None
D	Earphone	--	--	--	None
E	Antenna	--	3G101	--	None

Cables:

Item	Cable Type	Manufacturer	Length	Shield	Quantity	Remarks
1	DC cable on Adapter	--	--	--	--	None

Note: the EUT has no adaptor, battery, earphone and cable.

2.5 Other Information

HW Version: Rev1.0

SW Version: K2.0.7.7

Antenna information (provided by applicant):

3G101 Antenna:



Electrical, Mechanical and Environmental Specifications:

- Mechanical Structure: Detachable hinged whip antenna
- RF connector: SSMB female connector
- Impedance: 50 Ohms at RF connector
- Bands of Operation:

824-894MHz North America	GSM/GPRS/EDGE, UMTS, CDMA
880-960MHz EGSM Europe	GSM/GPRS/EDGE
1710-1880MHz DCS Europe	GSM/GPRS/EDGE
1850-1990MHz PCS North America	GSM/GPRS/EDGE, UMTS, CDMA
1920-2170MHz IMT Europe	UMTS

- VSWR: $\leq 2:1$ for all bands
- Typical Antenna Gain: 5dBi (peak) and 0dBi (avg.) for Low-band
3dBi (peak) and -4dBi (avg.) for high-band
- Typical Total Efficiency: 50% low and high bands
- Power Handling: 2W low-band and 1W high-band
- ESD Protection: IEC61000-4-2 (+8kV contact and +15kV air discharge)
- Operating Temperature: -30C to +85C
- Storage Temperature: -30C to +85C
- Humidity: 95% (non-condensing)
- Vibration: 15g peak 10H-2000Hz

3 Summary of Results

A brief summary of the tests carried out is shown as following.

Specification Clause	Name of Test	Result
2.1091	MPE	Pass
Note: --		

4 Results

4.1 Applicable Standards

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess limit for maximum permissible exposure. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as a mobile device whereby a distance of 0.2m normally can be maintained between the user and the device.

(a) Limits for Occupational / Controlled Exposure

Frequency Range [MHz]	Electric Field Strength (E) [V/m]	Magnetic Field Strength (H) [A/m]	Power Density (S) [mW/cm ²]	Averaging Times E ² , H ² or S [minutes]
0.3 – 3.0	614	1.63	(100)*	6
3.0 – 30	1824/f	4.89/f	(900/f)*	6
30 – 300	61.4	0.163	1.0	6
300 – 1500	--	--	F/300	6
1500 - 100000	--	--	5	6

(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 Times 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)*	30
30 – 300	27.5	0.073	0.2	30
300 – 1500	--	--	F/1500	30
1500 - 100000	--	--	1.0	30

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

For the DUT, the limits for General Population / Uncontrolled Exposure are applicable.

4.2 Conducted RF Power Output

Test Results for GPRS mode:

1 slot:

ARFCN	Peak output power [dBm]
128	31.98
190	31.29
251	31.79
512	29.05
661	29.40
810	29.57

Test Results for EGPRS mode:

1 slot:

ARFCN	Peak output power [dBm]
128	31.97
190	31.29
251	31.79
512	29.41
661	29.81
810	29.98

Test Results for WCDMA mode:

ARFCN	Peak output power [dBm]	RMS power [dBm]
4132	24.53	22.98
4175	24.65	22.77
4233	24.21	22.54
9262	23.48	22.30
9400	22.63	22.08
9538	22.09	21.72

Release 6 HSDPA mode:

The following 4 Sub-Test were completed according to the test requirements outlined in section 5.2A of the 3Gpp TS34.121 V8.4.0 specification. All TX RMS power requirements for power Class 3 were met according to table 5.2AA.5 and 5.2b.5. All UE channels and power ratio are set according to table C10.1.4&11.1.3 in the 3Gpp34.121 V8.4.0. RMC12.2kps is used for this testing.

HSDPA SUB-TEST Setting:

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{hs}	CM(dB)	MPR(dB)
1	2/15	15/15	64	2/15	4/15	0.0	0.0
2	12/15	15/15	64	12/15	24/15	1.0	0.0
3	15/15	8/15	64	15/8	30/15	1.5	0.5
4	15/15	4/15	64	15/4	30/15	1.5	0.5

Note: the recommended HSDPA MPRs are implemented as per following sub-test.

Result:

Sub-test	RMS power [dBm]					
	Band V channel			Band II channel		
	4132	4175	4233	9262	9400	9538
1	21.72	21.55	21.46	21.29	22.00	22.12
2	21.39	21.17	21.02	21.35	21.73	21.85
3	20.62	20.69	20.62	20.61	21.03	20.83
4	20.61	20.6	20.41	20.45	20.99	20.82

Release 6 HSUPA mode:

The following 5 Sub-Test were completed according to the test requirements outlined in section 5.2A of the 3Gpp TS34.121 V8.4.0 specification. All TX RMS power requirements for power Class 3 were met according to table 5.2AA.5 and 5.2B.5. All UE channels and power ratio are set according to table C11.1.3 in the 3Gpp34.121 V8.4.0. RMC12.2kps is used for this testing.

HSUPA SUB-TEST Setting:

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{hs}	β_{ec}
1	11/15	15/15	64	11/15	22/15	209/225
2	6/15	15/15	64	6/15	12/15	12/15
3	15/15	9/15	64	15/9	30/15	30/15
4	2/15	15/15	64	2/15	4/15	2/15
5	15/15	15/15	64	15/15	30/15	24/15

Sub-test	β_{ed} (SF)	β_{ed} (Codes)	CM (dB)	MPR (dB)	AG Index	E-TFCI
1	4	1	1.0	0.0	20	75
2	4	1	3.0	2.0	12	67
3	4	2	2.0	1.0	15	92
4	4	1	3.0	2.0	17	71
5	4	1	1.0	0.0	21	81

Note: the recommended HSUPA MPRs are implemented as per following sub-test.

Result:

Sub-test	RMS power [dBm]					
	Band V channel			Band II channel		
	4132	4175	4233	9262	9400	9538
1	21.05	20.65	20.85	21.67	21.03	20.6
2	19.71	19.9	19.76	19.92	19.5	19.48
3	20.38	20.2	20.22	20.36	20.13	20.15
4	19.83	19.45	19.39	19.99	19.95	20.03
5	21.05	21.08	21.41	19.58	20.5	20.32

From above tables, for GSM system 4 slots mode, the maximum power of low-band is 29.14 dBm and 25.15 dBm for high-band, and for 1 slot mode, they are 31.98 dBm and 29.98 dBm respectively.

4.3 Calculation Information

From the antenna specifications provided by the applicant, the typical antenna gain for low-band is 5 dBi or , and 3 dBi for high-band.

So for conservative evaluation consideration, only maximum power of each frequency band based on the tighter limits respectively are used to calculate the boundary power density.

Based on the FCC OET Bulletin 65 Supplement C and 47 CFR §2.1091, the DUT is evaluated as a mobile device.

4.4 Evaluation Result

(1) Operation in cellular band (824 – 849 MHz):

The peak conducted output power of DUT in Cellular band is 29.14 dBm for 4 slots and 31.98 dBm for 1 slot. Take the worst case as an example, in which an antenna with 5 dBi gain is used. The resulted power density at a distance of 20 cm can be deducted as follows:

For 4 slots:

$$\text{EIRP} = 29.14 + 5 = 34.14 \text{ dBm} = 2594 \text{ mW}$$

$$\text{Power Density} = \text{EIRP} \cdot \text{Duty Cycle} / (4 \pi R^2)$$

$$= 2594 \cdot 0.5 / (4 \cdot \pi \cdot 20^2) = 0.26 \text{ mW/cm}^2$$

where DutyCycle is 0.5 for GPRS operation (the worst case) and R is 20 cm.

For 1 slot:

$$\text{EIRP} = 31.98 + 5 = 36.98 \text{ dBm} = 4989 \text{ mW}$$

$$\begin{aligned} \text{Power Density} &= \text{EIRP} \times \text{Duty Cycle} / (4 \pi R^2) \\ &= 4989 \times 0.125 / (4 \times \pi \times 20^2) = 0.124 \text{ mW/cm}^2 \end{aligned}$$

where DutyCycle is 0.125 for GPRS operation (the worst case) and R is 20 cm.

Considering the worse case of above two modes, we can get:

$$\text{Power density}_{\max} = 0.26 \text{ mW/cm}^2$$

The MPE limit for General Population/Uncontrolled Exposure is shown in the FCC OET Bulletin 65 Supplement C and can be calculated as follows:

$$\text{MPE limit} = 824/1500 = 0.55 \text{ mW/cm}^2$$

As we can see the resulted power density is below the MPE limit, therefore the DUT in Cellular band is compliant with the FCC rules on RF exposure.

(2) Operation in PCS band (1850 – 1910 MHz):

The peak conducted output power of DUT in PCS band is 25.15 dBm for 4 slots and 26.79 dBm for 1 slot. Take the worst case as an example, in which an antenna with 3 dBi gain is used. The resulted ERP can be expressed as follows:

For 4 slots:

$$\text{ERP} = 25.15 + 3 - 2.15 = 26 \text{ dBm} (0.40 \text{ W}) < 3 \text{ W}$$

For 1 slot:

$$\text{ERP} = 29.98 + 3 - 2.15 = 30.83 \text{ dBm} (1.21 \text{ W}) < 3 \text{ W}$$

The FCC OET Bulletin 65 Supplement C states that mobile devices identified in 47 CFR §2.1091 that operate at frequencies above 1.5 GHz with an ERP of 3.0 watts or more are required to perform routine environmental evaluation for RF exposure prior to equipment authorization or use; otherwise, they are categorically excluded.

As we can see this resulted ERP is below 3 W, therefore routine environmental evaluation for RF exposure prior to equipment authorization or use for the DUT in PCS band is categorically excluded.

Note: The tighter limits are used for low and high band in above tables.

The End of this Report