



Nemko USA, Inc.
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Class II Permissive Change to Append New Antenna

Test Report: 2007 065331 M200 FCC

Project number: 5331-1

Applicant: Kyocera Wireless
10300 Campus Point Drive
San Diego, CA 92121

Equipment Under Test (EUT): Module

Model: M200

Antenna Model: Mobile Mark Antenna (MRM3-900/1900)

FCC ID: FCC ID # OVFKWC-M200

In Accordance With: FCC Part 22, Subpart H
FCC Part 24, Subpart E

Tested By: Nemko USA Inc.
11696 Sorrento Valley Road, Suite F
San Diego, CA 92121

Authorized By: 
Michael T. Krumweide, EMC Supervisor

Date: JUNE 20, 2007

Total Number of Pages: 19

Report Summary

All measurements are traceable to national standards. These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with FCC Part 22, Subpart H and FCC Part 24, Subpart E.

The assessment summary is as follows:

Apparatus Assessed:	M200 Module
Specification:	FCC Part 22, Subpart H FCC Part 24, Subpart E
Compliance Status:	Complies
Exclusions:	None
Non-compliances:	None

Report Release History:

REVISION	DATE	COMMENTS
-	June 20, 2007	Prepared By: Ferdinand Custodio
-	June 20, 2007	Initial Release: Michael T. Krumweide

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

This test report has been completed in accordance with the requirements of ISO/IEC 17025.

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Section 1: Equipment Under Test

1.1 Product Identification

The Equipment Under Test was identified as follows:

Kyocera RF Module M200 with Serial Number: 45264736



1.2 Samples Submitted for Assessment

The following antenna has been submitted for assessment with the EUT:

Mobile Mark®MRM-900/1900 / US 850 & 1900 Band



1.3 Technical Specifications of the EUT

Manufacturer:	Kyocera Wireless
Operating Frequency:	824.70 to 848.31 MHz 824.04 to 849.97 MHz 1851.25 to 1908.75 MHz
Date Received in Laboratory	June 18, 2007
RF Output (Limit)	Part 22: 7 watts / Part 24: 2 watts
RF Output (Grant)	Part 22: 1.1 watts / Part 24: 0.35 watts
RF Output (Measured)	Part 22: 0.080 watt / Part 24: 0.336 watt
Emission Designator	1M25F9W, and 40KDF1D
Antenna Data:	Mobile Mark® MRM3-900/1900, US 850 & 1900 Band US GSM/CDMA, EV-DO, 1xRTT 824-894 MHz & 1850-1990 MHz, 800/900 Bands Unity Gain 1.8/1.9 GHz Bands 2.5 dBi peak
Antenna Connector:	MMCX sub-miniature RF connector
Power Source:	4.2VDC

Section 2: Test Conditions

2.1 Specifications

The apparatus was assessed against the following specifications:

- FCC Part 22, Subpart H Cellular Radiotelephone Service
- FCC Part 24, Subpart E Broadband PCS

2.2 Deviations From Laboratory Test Procedures

No deviations were made from laboratory test procedures.

2.3 Test Environment

All tests were performed under the following environmental conditions:

Temperature range	:	13-19 °C
Humidity range	:	59-73 %
Pressure range	:	86 - 106 kPa

2.4 Test Equipment

Nemko ID	Device	Manufacturer	Model	Serial Number	Cal Date	Cal Due Date
529	Antenna, DRWG	EMCO	3115	2505	8/31/2006	08/31/07
765	Antenna Set, Dipole	EMCO	3121C	1214	6/27/2006	06/27/07
836	Signal Generator	Agilent	E8254A	US41140229	7/27/2006	07/27/07
111	Antenna, LPA	EMCO	3146	1382	8/7/2006	08/07/07
110	Antenna, LPA	Electrometrics	LPA-25	1217	12/18/2006	12/18/07
877	Antenna, DRG Horn, .7-18GHz	AH Systems	SAS-571	688	6/20/06	6/20/07
842	Preamplifier	NA	Nemko	NA	Verified 06/18/2007	
915	EMI Test Receiver 20 Hz- 26.5	Rohde & Schwarz	1088.7490.26	837491/0002	2/6/2007	02/06/08

Section 3: Observations

3.1 Modifications Performed During Assessment

No modifications were performed during assessment.

3.2 Record of Technical Judgements

No technical judgements were made during the assessment.

3.3 EUT Parameters Affecting Compliance

The user of the apparatus could not alter parameters that would affect compliance.

3.4 Test Deleted

Please refer to Section 4: Results Summary for list of tests deleted or not performed.

3.5 Additional Observations

There were no additional observations made during this assessment.

Section 4: Results Summary

The results contained in this section are representative of the operation of the apparatus as originally submitted.

Name of Test/Requirements	Para. No.	Result
RF Power Output	2.1046	COMPLIES
Audio Low Pass Filter Response	2.1047	NA ¹
Audio Frequency Response	2.1047	NA ¹
Modulation Limiting	2.1047	NA ¹
Occupied Bandwidth (WB Data)	2.1049	NA ²
Spurious Emissions at antenna Terminals	2.1051	NA ²
Field Strength of Spurious Emissions	2.1053	COMPLIES
Frequency Stability	2.1055	NA ²
Radiofrequency radiation exposure evaluation: mobile devices	2.1091	NA ²

Footnotes for N/A's:¹Digital Modulation²Not tested, per customer's instructions

Appendix A: Test Results/Requirements

Para. No. : 2.1046 RF Power Output

Para.22.913(a). The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts. & Para.24.232, the EIRP must not exceed 2 Watts.

Test Conditions:

Sample Number:	45264736	Temperature:	19°C
Date:	June 20, 2007	Humidity:	73 %
Modification State:	CDMA and PCS	Tester:	Ferdinand Custodio
		Laboratory:	Nemko NOATS

Test Results:

Complies, see tables below

Measurement Data:

Modulation	Frequency (MHz)	Measured (dBm)	Substituted Result (dBm)	Substituted Result Watts
CDMA	824.70	17.0	16.64	0.046
	836.49	17.0	17.36	0.054
	848.97	18.3	19.04	0.080
PCS	1851.25	25.2	24.58	0.287
	1880.00	25.7	23.16	0.207
	1908.75	26.1	25.26	0.336



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Substitution Method For Radiated Emissions

Complete X
Preliminary

Job # : 5331-1
Page 1

Test # : 2
of 1

Client Name : Kvocera-Wireless

EUT Name : RF Module with new antenna

EUT Model # : M200 with Mobile Mark antenna

EUT Part # : MRM-900/1900 (antenna PN)

EUT Serial # :

EUT Config. :

Specification : FCC Part 22 and 24

Reference :

Rod. Ant. # : NA

Temp. (deg. C) : 19

Date : 6/202007

Bicon Ant.# : NA

Humidity (%) : 73

Time :

Log Ant.# : 110

EUT Voltage : NA

Staff : FSCustodio

DRG Ant. # : 529

EUT Frequency : NA

Photo ID :

Dipole Ant.# : 765

Phase : NA

Peak Bandwidth: RBW-1MHz, VBW-1MHz

Cable# : 40ft

Location: RN# 329550-01

Preamp# : NA

Distance: 3m

Spec An.# : 915

QP # : 915

PreSelect# : NA

Part 22 Substitution

Target		dipole	Cable loss dB	Signal Generator dBm	Total (ERP) dBm	Spec dBm	Margin dBm	
Frequency MHz	Level dBuV/m							
824.70	87.0		3.33	19.97	16.64	38.4	-21.8	
836.49	87.2		3.40	20.76	17.36	38.4	-21.0	
849.00	88.6		3.54	22.58	19.04	38.4	-19.4	CDMA-800

Part 24 Substitution

Target		Horn Gain dBi	Cable loss dB	Signal Generator dBm	Total (EIRP) dBm	Spec dBm	Margin dBm	
Frequency MHz	Level dBuV/m							
1851.25	90.24	7.71	6.94	23.81	24.58	33	-8.4	
1880.00	90.7	7.73	7.92	23.35	23.16	33	-9.8	
1908.75	91.1	7.75	7.68	25.19	25.26	33	-7.7	PCS-Fund
3702.50	70.82	9.26	9.82	-32.58	-33.14	-13	-20.1	PCS-Fund
3760.00	72.97	9.31	9.94	-27.86	-28.49	-13	-15.5	PCS-Fund
3817.50	74.83	9.35	10.07	-27.1	-27.84	-13	-14.8	PCS-Harm

Para. No.:2.1053 Field Strength of Spurious

Minimum Standard is Part 22.917 and Part 24.238:

Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

Test Conditions:

Sample Number:	45264736	Temperature:	13°C
Date:	June 18, 2007	Humidity:	59 %
Modification State:	CDMA and PCS	Tester:	Ferdinand Custodio
		Laboratory:	Nemko NOATS

Test Results:

- The maximum spurious field strength in CDMA mode is 23.9 dB below the limit @ 4123.5 MHz
- The maximum spurious field strength in PCS mode is 16.7 dB below the limit @ 3817.5 MHz

Test Data: See attached Tables



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Radiated Emissions Data

Job #: 5331-1 Test #: 6
Page 1 of 1

Client Name : Kyocera-Wireless
EUT Name : RF Module with new antenna
EUT Model #: RF Module M200
EUT Serial #: _____
EUT Config. : PCS TX Harmonics
Specification : FCC Part 24
Rod. Ant. #: _____ Temp. (°C) : 13
Bicon Ant. #: _____ Humidity (%) : 59
Log Ant. #: 111 EUT Voltage : NA
DRG Ant. #: 877 EUT Frequency : NA
Dipole Ant. #: _____ Phase: NA
Cable #: 40ft Location: RN # 329550-01
Preamp #: 842 Distance: 3m
Spec An. #: 915 EIRP conversion factor 5.5

Reference : _____ Date: 06/18/07
Staff : Ferdinand Custodio
Peak Bandwidth: 1 MHz
Video Bandwidth 1 MHz

Meas. Freq. (MHz)	Vertical (dBuV) pk	Horizontal (dBuV) pk	CF (db)	Max Level (dBm) pk	Spec. Limit (ERIP) (dBm) pk	Margin dB pk	EUT Rotation	Ant. Height	Pass Fail Unc.	Comment
3702.50	70.82	65.88	-8.0	-32.4	-13.0	-19.4		1.0	Pass	*
5553.75	61.67	56.58	-1.3	-34.9	-13.0	-21.9		1.0	Pass	*
7405.00	51.10	51.10	2.8	-41.4	-13.0	-28.4		1.0	Pass	NF
9256.25			9.3		-13.0					NF
11107.50			14.5		-13.0					NF
12958.75			18.8		-13.0					NF
14810.00			21.3		-13.0					NF
16661.25			32.6		-13.0					NF
18512.50			36.0		-13.0					NF
20363.75			40.4		-13.0					NF
3760.00	72.97	64.89	-8.0	-30.3	-13.0	-17.3		1.0	Pass	*
5640.00	62.78	58.54	-2.3	-34.8	-13.0	-21.8		1.0	Pass	*
7520.00	49.88	49.88	4.6	-40.8	-13.0	-27.8		1.0	Pass	NF
9400.00			9.4		-13.0					NF
11280.00			14.5		-13.0					NF
13160.00			19.5		-13.0					NF
15040.00			24.1		-13.0					NF
16920.00			32.6		-13.0					NF
18800.00			36.1		-13.0					NF
20680			39.8		-13.0					NF
3817.50	74.83	69.27	-9.3	-29.7	-13.0	-16.7		1.0	Pass	*
5726.25	64.32	61.10	-2.2	-33.1	-13.0	-20.1		1.0	Pass	*
7635.00	49.48	49.48	4.0	-41.8	-13.0	-28.8		1.0	Pass	NF
9543.75			10.4		-13.0					NF
11452.50			14.5		-13.0					NF
13361.25			19.5		-13.0					NF
15270.00			24.1		-13.0					NF
17178.75			38.6		-13.0					NF
19087.50			39.6		-13.0					NF
20996.25			40.3		-13.0					NF

* = Signal Measured NF = Noise Floor, no signal observed, even at lower RBW.



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Radiated Emissions Data

Job #: 5331-1 Test #: 4
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Client Name : Kyocera-Wireless
EUT Name : RF Module with new antenna
EUT Model #: RF Module M200
EUT Serial #:
EUT Config. : CDMA TX Harmonics

Specification : FCC Part 22 Reference :
Rod. Ant. #: Temp. (°C) : 13 Date : 06/18/07
Bicon Ant. #: Humidity (%) : 59 Staff : Ferdinand Custodio
Log Ant. #: 111 EUT Voltage : NA Peak Bandwidth: 1 MHz
DRG Ant. #: 877 EUT Frequency : NA Video Bandwidth 1 MHz
Dipole Ant. #: Phase: NA
Cable#: 40ft Location: RN # 329550-01
Preamp#: 842 Distance: 3m
Spec An. #: 915 ERP conversion factor 7

Meas. Freq. (MHz)	Vertical (dBuV) pk	Horizontal (dBuV) pk	CF (db)	Max Level (dBm) pk	Spec. Limit (ERP) (dBm) pk	Margin dB pk	EUT Rotation	Ant. Height	Pass Fail Unc.	Comment
1649.40	58.6	58.3	-23.2	-61.9	-13.0	-48.9		1.0	Pass	*
2474.10	56.7	54.2	-15.6	-56.2	-13.0	-43.2		1.0	Pass	*
3298.80	66.3	61.3	-9.7	-40.6	-13.0	-27.6		1.0	Pass	*
4123.50	65.8	59.3	-5.5	-36.9	-13.0	-23.9		1.0	Pass	*
4948.20	55.9	53.2	-6.5	-47.9	-13.0	-34.9		1.0	Pass	*
5772.90	51.0	51.0	-2.2	-48.5	-13.0	-35.5		1.0	Pass	NF
6597.60			-0.8		-13.0					NF
7422.30			2.8		-13.0					NF
8247.00			5.6		-13.0					NF
9071.70			8.44		-13.0					NF
1672.98	57.8	59.7	-23.2	-60.8	-13.0	-47.8		1.0	Pass	*
2509.47	62.0	60.0	-14.5	-49.7	-13.0	-36.7		1.0	Pass	*
3345.96	69.1	66.7	-10.5	-38.7	-13.0	-25.7		1.0	Pass	*
4182.45	65.7	58.8	-5.5	-37.1	-13.0	-24.1		1.0	Pass	*
5018.94	57.8	51.0	-1.4	-40.9	-13.0	-27.9		1.0	Pass	*
5855.43	52.8	52.8	-3.4	-47.9	-13.0	-34.9		1.0	Pass	NF
6691.92			0.3		-13.0					NF
7528.41			4.6		-13.0					NF
8364.90			5.4		-13.0					NF
9201.39			9.34		-13.0					NF
1696.62	59.6	58.7	-23.2	-60.8	-13.0	-47.8		1.0	Pass	*
2544.93	61.9	61.3	-14.5	-49.9	-13.0	-36.9		1.0	Pass	*
3393.24	70.2	69.9	-10.5	-37.6	-13.0	-24.6		1.0	Pass	*
4241.55	63.7	63.8	-5.6	-39.1	-13.0	-26.1		1.0	Pass	*
5089.86	59.2	58.1	-1.4	-39.4	-13.0	-26.4		1.0	Pass	*
5938.17	52.3	52.3	-1.4	-46.3	-13.0	-33.3		1.0	Pass	NF
6786.48			0.1		-13.0					NF
7634.79			4		-13.0					NF
8483.10			6.4		-13.0					NF
9331.41			9.44		-13.0					NF

* = Signal Measured NF = Noise Floor, no signal observed, even at lower RBW.

Para. No.:2.1053 Field Strength of Spurious (Substitution Method)



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Substitution Method For Radiated Emissions

Complete X
Preliminary

Job # : 5331-1
Page 1

Test # : 2
of 1

Client Name : Kyocera-Wireless

EUT Name : RF Module with new antenna

EUT Model # : M200 with Mobile Mark antenna

EUT Part # : MRM-900/1900 (antenna PN)

EUT Serial # :

EUT Config. :

Specification : FCC Part 22 and 24

Reference :

Rod. Ant. # : NA

Temp. (deg. C) : 19

Date : 6/202007

Bicon Ant.# : NA

Humidity (%) : 73

Time :

Log Ant.# : 110

EUT Voltage : NA

Staff : FSCustodio

DRG Ant. # : 529

EUT Frequency : NA

Photo ID :

Dipole Ant.# : 765

Phase : NA

Peak Bandwidth: RBW-1MHz, VBW-1MHz

Cable# : 40ft

Location: RN# 329550-01

Preamp# : NA

Distance: 3m

Spec An.# : 915

QP # : 915

PreSelect# : NA

Part 22 Substitution

Target		dipole	Cable loss dB	Signal Generator dBm	Total (ERP) dBm	Spec dBm	Margin dBm	
Frequency MHz	Level dBuV/m							
824.70	87.0		3.33	19.97	16.64	38.4	-21.8	
836.49	87.2		3.40	20.76	17.36	38.4	-21.0	
849.00	88.6		3.54	22.58	19.04	38.4	-19.4	CDMA-800

Part 24 Substitution

Target		Horn Gain dBi	Cable loss dB	Signal Generator dBm	Total (EIRP) dBm	Spec dBm	Margin dBm	
Frequency MHz	Level dBuV/m							
1851.25	90.24	7.71	6.94	23.81	24.58	33	-8.4	
1880.00	90.7	7.73	7.92	23.35	23.16	33	-9.8	
1908.75	91.1	7.75	7.68	25.19	25.26	33	-7.7	
3702.50	70.82	9.26	9.82	-32.58	-33.14	-13	-20.1	
3760.00	72.97	9.31	9.94	-27.86	-28.49	-13	-15.5	
3817.50	74.83	9.35	10.07	-27.1	-27.84	-13	-14.8	

Appendix B : Setup Photographs

1. Spurious Emissions Setup:



2. Fundamental Emissions Setup:



Appendix C: Block Diagram of Test Setups

Test Site For Radiated Emissions

