

FCC PART 24 TYPE APPROVAL EMI MEASUREMENT AND TEST REPORT

For

Cellphone-Mate, Inc.

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Fremont, CA 94536

FCC ID: RSNCM2000

This Report Concerns: ☒ Original Report	Equipment Type: RF Amplifier
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Report No.: R0408232	
Report Date: 2004-09-08	
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GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

The CELLPHONE-MATE, INC. product, FCC ID: RSNCM2000, or “EUT” as referred to in this report, is a dual band RF amplifier. The EUT transmit and receive signals to improve communications of cellular band (850MHz) and PCS band (1900MHz) cellular phones. The EUT operates at the frequency 824.2 - 848.8/1850.2-1909.8 MHz (GSM), 824.73-848.19/1851.25-1908.75 MHz (CDMA), and 824.02-848.8/1850.2-1909.8 MHz (AMPS). The maximum output power 31.4 dBm (1.38W) per carrier, frequency tolerance 2.5ppm and emission designator GXW.

** The test data gathered are from typical production sample, serial number: 101, provided by the manufacturer.*

Objective

This type approval report is prepared on behalf of *CELLPHONE-MATE, INC.* in accordance with Part 2, Subpart J, and Part 24 Subpart E of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC rules for output power, modulation characteristic, occupied bandwidth, spurious emission at antenna terminal, field strength of spurious radiation, frequency stability, band edge and radiated margin.

Related Submittal(s)/Grant(s)

No related submittals.

Test Methodology

All tests and measurements indicated in this document were performed in accordance with the Code of Federal Regulations Title 47 Part 2, Sub-part J as well as the following parts:

Part 24 Subpart E - PCS

Applicable Standards: TIA EIA 137-A, TIA EIA 98-C, ANSI 63.4-1992, and TIA/EIA-603A.

All radiated and conducted emissions measurements were performed at Bay Area Compliance Laboratory, Corp. The radiated testing was performed at an antenna-to-EUT distance of 3 meters, except as noted below.

Test Facility

The Test site used by Bay Area Compliance Laboratory Corporation to collect radiated and conducted emission measurement data is located in the building at 230 Commercial Street, Sunnyvale, CA 94085.

Additionally, Bay Area Compliance Laboratory Corporation is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (NVLAP). The scope of the accreditation covers the FCC Method - 47 CFR Part 15 - Digital Devices, CISPR 22: 1997, and AS/NZS 3548: Electromagnetic Interference - Limits and Methods of Measurement of Information Technology Equipment test methods under NVLAP Lab Code 200167-0.

SYSTEM TEST CONFIGURATION

Justification

The EUT was configured for testing according to TIA/EIA 603A.

The final qualification test was performed with the EUT operating at normal mode.

Block Diagram

Please refer to Exhibit D.

Equipment Modifications

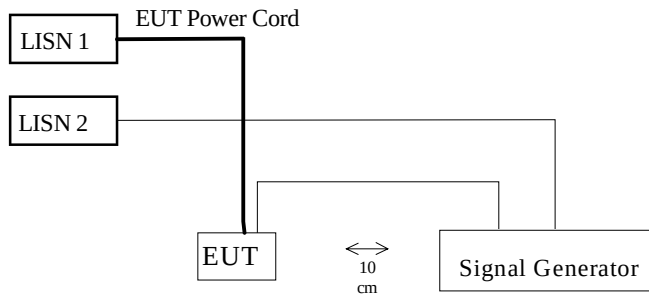
No modifications were made to the EUT.

External I/O Cabling List and Details

Cable Description	Length (M)	Port/From	To
Shielded cable	2.0	RF Output / Generator	RF Port / EUT

Power Supply Information

Manufacturer	Description	Model	Serial Number	FCC ID
Cellphone-Mate	AC Adapter	N/A	N/A	DOC

Test Setup Block Diagram

SUMMARY OF TEST RESULTS

Results reported relate only to the product tested, serial number: 101.

FCC RULE	DESCRIPTION OF TEST	Result
§2.1046 § 24.232	RF power output	Compliant
§ 2.1047	Modulation Characteristics	N/A
§ 2.1049 § 24.238(b)	Emission Bandwidth	Compliant
2.1051 § 24.238(a)	Spurious emissions at antenna terminals	Compliant
2.1051 § 24.238 (a)	Two-Tone Test (Spurious emissions at antenna terminals)	N/A
2.1053 § 24.238 (a)	Radiated Spurious Emissions	Compliant
§ 2.1055 § 24.235	Frequency stability vs. temperature Frequency stability vs. voltage	N/A
§24.238	Band Edge	Compliant

§2.1047 - MODULATION CHARACTERISTIC

This EUT is an amplifier, not a transmitter. There is no modulating circuit in the EUT, therefore there is no modulating characteristics measurement required.

§2.1053 - SPURIOUS RADIATED EMISSIONS

Applicable Standard

Requirements: CFR 47, § 24.238 (a), on any frequency outside a licensee's frequency block. The power of any emission shall be attenuated below the transmitter power (P) by at least $43+10\lg(P)$ dB, equivalent to -13dBm.

In the event it is either impractical or impossible to make open field measurement [e.g. a broadcast transmitter installed in a building] measurement will be accepted of equipment as installed.

Test Procedure

The EUT was placed beside the base station and connected to the base station transmitter. The transmitter was RF enabled and the EUT amplified the signal into a non-radiating load. The test antenna was placed at a distance of 3 meters from the EUT. In order to identify the maximum level of emissions from the EUT, the antenna height and polarization were varied during the test, and the antenna azimuth was varied by moving the antenna around the EUT.

The frequency range up to tenth harmonic of the fundamental frequency was investigated.

The EUT was replaced with a substitution antenna, and a signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured.

Spurious emissions in dB = $10 \lg(\text{TXpwr in Watts}/0.001)$ – the absolute level

Spurious attenuation limit in dB = $43 + 10 \lg(\text{power out in Watts})$

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
HP	Spectrum Analyzer	8568B	2601A02165	2004-07-03
HP	Amplifier	8447E	2944A10187	2003-09-23
HP	Quasi-Peak Adapter	85650A	3019A05393	2004-06-13
EMCO	Biconical Antenna	3110B	9309-1165	2003-10-11
EMCO	Log Periodic Antenna	3146	2101	2003-10-11
AH System	Horn Antenna	SAS-200/511	261	2004-08-02
HP	Spectrum Analyzer	HP8564E	3943A01781	2004-08-01

* **Statement of Traceability:** BACL Corp. attests that all calibrations have been performed per the NVLAP requirements, traceable to NIST.

Environmental Conditions

Temperature:	28° C
Relative Humidity:	37%
ATM Pressure:	1032 mbar

The testing was performed by Ming Jin on 2004-08-25

Test Result**Data for GSM Cell 800**

Low Frequency: -4.9 dB at 1648.4 MHz

Middle Frequency: -5.2 dB at 1673.2 MHz

High Frequency: -5.3 dB at 1697.6 MHz

EUT							Generator			Standard	
Indicated		Table	Test Antenna		Substitution		Antenna	Cable	Absolute	FCC	FCC
Frequency MHz	Ampl. dBuV/m	Angle Degree	Height Meter	Polar H/V	Frequency MHz	Level dBm	Gain Corrected	Loss dB	Level dBm	Limit dBm	Margin dB
Low Channel											
824.2	103.6	60	1.2	V	824.2	26.9	5.6	0.8	31.7		
824.2	91.2	0	1.5	H	824.2	17.7	5.6	0.8	22.5		
1648.4	52.4	180	1.5	V	1648.4	-23.5	6.8	1.2	-17.9	-13	-4.9
1648.4	50.3	210	1.2	H	1648.4	-24.9	6.8	1.2	-19.3	-13	-6.3
2472.6	35.7	30	1.5	V	2472.6	-36.1	7.6	1.5	-30	-13	-17
2472.6	33.8	180	1.5	H	2472.6	-37.9	7.6	1.5	-31.8	-13	-18.8
MIDDLE CHANNEL											
836.6	102.5	120	1.6	V	836.6	25.7	5.6	0.8	30.5		
836.6	89.3	45	1.5	H	836.6	16.4	5.6	0.8	21.2		
1673.2	52.2	110	1.6	V	1673.2	-23.8	6.8	1.2	-18.2	-13	-5.2
1673.2	50.1	180	1.5	H	1673.2	-25.1	6.8	1.2	-19.5	-13	-6.5
2509.8	35.4	45	1.6	V	2509.8	-36.4	7.6	1.5	-30.3	-13	-17.3
2509.8	33.5	150	1.5	H	2509.8	-38.3	7.6	1.5	-32.2	-13	-19.2
HIGH CHANNEL											
848.8	100.7	270	1.5	V	848.8	23.5	5.6	0.8	28.3		
848.8	88.9	290	1.6	H	848.8	15.3	5.6	0.8	20.1		
1697.6	52.1	0	1.4	V	1697.6	-23.9	6.8	1.2	-18.3	-13	-5.3
1697.6	49.9	15	1.5	H	1697.6	-25.4	6.8	1.2	-19.8	-13	-6.8
2546.4	35.2	0	1.2	V	2546.4	-36.7	7.6	1.5	-30.6	-13	-17.6
2546.4	33.1	270	1.5	H	2546.4	-38.9	7.6	1.5	-32.8	-13	-19.8

Data for GSM PCS 1900

Low Frequency: -5.0 dB at 3700.4 MHz

Middle Frequency: -5.4 dB at 3760.0 MHz

High Frequency: -5.6 dB at 3819.6 MHz

EUT					Generator					Standard	
Indicated		Table	Test Antenna		Substitution		Antenna	Cable	Absolute	FCC	FCC
Frequency MHz	Ampl. dBuV/m	Angle Degree	Height Meter	Polar H/V	Frequency MHz	Level dBm	Gain Corrected	Loss dB	Level dBm	Limit dBm	Margin dB
Low Channel											
1850.2	92.3	120	1.5	V	1850.2	21.4	8.3	1.30	28.40		
1850.2	81.9	90	1.5	H	1850.2	12.5	8.3	1.30	19.50		
3700.4	50.3	0	1.2	V	3700.4	-26.3	10.3	2.00	-18.00	-13	-5.00
3700.4	48.4	310	1.6	H	3700.4	-27.5	10.3	2.00	-19.20	-13	-6.20
5550.6	33.9	180	1.6	V	5550.6	-38.8	10.6	2.55	-30.75	-13	-17.75
5550.6	31.7	270	1.5	H	5550.6	-40.1	10.6	2.55	-32.05	-13	-19.05
MIDDLE CHANNEL											
1880	90.5	270	1.6	V	1880	20.3	8.3	1.30	27.3		
1880	81.4	330	1.4	H	1880	12.5	8.3	1.30	19.5		
3760	49.8	90	1.4	V	3760	-26.7	10.3	2.00	-18.4	-13	-5.4
3760	47.2	90	2.2	H	3760	-28.2	10.3	2.00	-19.9	-13	-6.9
5640	33.6	60	2	V	5640	-39.1	10.6	2.55	-31.05	-13	-18.05
5640	31.5	60	1.5	H	5640	-40.3	10.6	2.55	-32.25	-13	-19.25
HIGH CHANNEL											
1909.8	89.8	300	2.2	V	1909.8	19.9	8.3	1.30	26.9		
1909.8	80.2	330	1.8	H	1909.8	11.8	8.3	1.30	18.8		
3819.6	49.5	60	1.6	V	3819.6	-26.9	10.3	2.00	-18.6	-13	-5.6
3819.6	47.1	90	2	H	3819.6	-28.3	10.3	2.00	-20.0	-13	-7.0
5729.4	33.2	60	2.2	V	5729.4	-40.3	10.6	2.55	-32.25	-13	-19.25
5729.4	31.4	0	1.8	H	5729.4	-40.7	10.6	2.55	-32.65	-13	-19.65

Data for CDMA Cell 800

Low Frequency: -5.1 dB at 1649.46 MHz

Middle Frequency: -6.3 dB at 1672.8 MHz

High Frequency: -5.5 dB at 1696.38 MHz

EUT							Generator			Standard	
Indicated		Table	Test Antenna		Substitution		Antenna	Cable	Absolute	FCC	FCC
Frequency MHz	Ampl. dBuV/m	Angle Degree	Height Meter	Polar H/V	Frequency MHz	Level dBm	Gain Corrected	Loss dB	Level dBm	Limit dBm	Margin dB
Low Channel											
824.73	102.7	30	1.5	V	824.73	25.8	5.6	0.8	30.6		
824.73	90.4	0	1.5	H	824.73	17.1	5.6	0.8	21.9		
1649.46	52.2	120	1.5	V	1649.46	-23.7	6.8	1.2	-18.1	-13	-5.1
1649.46	50.1	210	1.2	H	1649.46	-25.2	6.8	1.2	-19.6	-13	-6.6
2474.19	35.5	60	1.5	V	2474.19	-36.1	7.6	1.5	-30.0	-13	-17.0
2474.19	33.6	90	1.5	H	2474.19	-38.3	7.6	1.5	-32.2	-13	-19.2
MIDDLE CHANNEL											
836.4	102.1	90	1.6	V	836.4	25.1	5.6	0.8	29.9		
836.4	88.9	45	1.5	H	836.4	15.8	5.6	0.8	20.6		
1672.8	52.1	180	1.6	V	1672.8	-24.9	6.8	1.2	-19.3	-13	-6.3
1672.8	49.8	0	1.5	H	1672.8	-25.3	6.8	1.2	-19.7	-13	-6.7
2509.2	35.2	30	1.6	V	2509.2	-36.7	7.6	1.5	-30.6	-13	-17.6
2509.2	33.4	150	1.5	H	2509.2	-38.5	7.6	1.5	-32.4	-13	-19.4
HIGH CHANNEL											
848.19	100.5	230	1.5	V	848.19	23.3	5.6	0.8	28.1		
848.19	88.6	290	1.2	H	848.19	15.1	5.6	0.8	19.9		
1696.38	51.9	60	1.4	V	1696.38	-24.1	6.8	1.2	-18.5	-13	-5.5
1696.38	49.7	0	1.5	H	1696.38	-25.8	6.8	1.2	-20.2	-13	-7.2
2544.57	35.1	45	1.2	V	2544.57	-36.9	7.6	1.5	-30.8	-13	-17.8
2544.57	32.8	120	1.5	H	2544.57	-39.1	7.6	1.5	-33.0	-13	-20.0

Data for CDMA PCS 1900

Low Frequency: -5.2 dB at 3702.5 MHz

Middle Frequency: -5.6 dB at 3760.0 MHz

High Frequency: -5.8 dB at 3817.5 MHz

EUT							Generator			Standard	
Indicated		Table	Test Antenna		Substitution		Antenna	Cable	Absolute	FCC	FCC
Frequency MHz	Ampl. dBuV/m	Angle Degree	Height Meter	Polar H/V	Frequency MHz	Level dBm	Gain Corrected	Loss dB	Level dBm	Limit dBm	Margin dB
Low Channel											
1851.25	92.1	110	1.5	V	1851.25	21.2	8.3	1.30	28.20		
1851.25	81.6	70	1.2	H	1851.25	12.3	8.3	1.30	19.30		
3702.5	50.2	0	1.5	V	3702.50	-26.5	10.3	2.00	-18.20	-13	-5.20
3702.5	48.1	330	1.6	H	3702.50	-27.7	10.3	2.00	-19.40	-13	-6.40
5553.75	33.7	150	1.6	V	5553.75	-40.1	10.6	2.55	-32.05	-13	-19.05
5553.75	31.5	290	1.5	H	5553.75	-40.3	10.6	2.55	-32.25	-13	-19.25
MIDDLE CHANNEL											
1880	90.3	220	1.5	V	1880	20.1	8.3	1.30	27.10		
1880	81.2	330	1.4	H	1880	11.9	8.3	1.30	18.90		
3760	49.7	0	1.5	V	3760	-26.9	10.3	2.00	-18.60	-13	-5.60
3760	47.1	90	2.0	H	3760	-28.4	10.3	2.00	-20.10	-13	-7.10
5640	33.4	60	1.8	V	5640	-39.3	10.6	2.55	-31.25	-13	-18.25
5640	31.2	210	1.5	H	5640	-40.5	10.6	2.55	-32.45	-13	-19.45
HIGH CHANNEL											
1908.75	89.7	310	1.5	V	1908.75	19.6	8.3	1.30	26.60		
1908.75	80.1	0	1.8	H	1908.75	11.6	8.3	1.30	18.60		
3817.5	49.3	60	1.6	V	3817.5	-27.1	10.3	2.00	-18.80	-13	-5.80
3817.5	46.8	120	2	H	3817.5	-28.5	10.3	2.00	-20.20	-13	-7.20
5726.25	33.1	0	1.5	V	5726.25	-40.5	10.6	2.55	-32.45	-13	-19.45
5726.25	31.2	15	1.8	H	5726.25	-40.9	10.6	2.55	-32.85	-13	-19.85

§2.1046, & §24.232 –CONDCUTED POWER OUTPUT

Applicable Standard

According to FCC §2.1046 and §24.232 (a), in no case may the peak output power of a base station transmitter exceed 100 watt.

Test Procedure

The GSM and EDGE signals were provided by the Nortel S8000 Base Transceiver Station (BTS). The EUT output was connected to a calibrated coaxial attenuator (50 Ohm), which was then connected to an Agilent Power Sensor. The EUT output power was calculated by adding the value observed on the Power Meter (dBm) with the measurement loss of the attenuator.

The test was performed at three frequencies (GSM channels 513, 661, and 809) with the BTS power set to 39dBm.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
Agilent	Power Meter	E4419B	MY41291511	2004-04-29

* **Statement of Traceability:** **BACL Corp.** certifies that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

Environmental Conditions

Temperature:	28.9° C
Relative Humidity:	37%
ATM Pressure:	1032 mbar

The testing was performed by Ming Jin on 2004-08-25.

Test Results

Modulation	Band	Channel	Frequency MHz	Input Power dBm	Output Power dBm	Output Power W
GSM	Cellular 850	Low	824.02	15	31.2	1.318
		Mid	836.60	15	31.4	1.380
		High	848.80	15	28.5	0.708
	PCS 1900	Low	1850.20	13	24.1	0.257
		Mid	1880.00	13	26.8	0.479
		High	1909.80	13	23.7	0.234
CDMA	Cellular 850	Low	824.73	15	30.9	1.230
		Mid	836.40	15	31.1	1.288
		High	848.19	15	28.2	0.661
	PCS 1900	Low	1851.25	13	23.8	0.240
		Mid	1880.00	13	26.2	0.417
		High	1908.75	13	23.1	0.204
AMPS	Cellular 850	Low	824.02	15	31.1	1.288
		Mid	836.60	15	31.3	1.349
		High	848.80	15	28.4	0.692
	PCS 1900	Low	1850.20	13	23.9	0.245
		Mid	1880.00	13	26.5	0.447
		High	1909.80	13	23.4	0.219

§2.1049, & §24.238(b) - EMISSION BANDWIDTH

Applicable Standards

According to FCC §2.1049 and §24.238 (b), the emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26dB below the transmitter power.

Test Procedure

The EUT output was connected to the input of the Spectrum Analyzer through a calibrated attenuator.

The resolution bandwidth of the Spectrum Analyzer was set to 30Khz.

Test Equipment

Manufacturer	Description	Model	Serial Number	Cal. Date
HP	Spectrum Analyzer	HP8564E	3943A01781	2003-08-01
HP	Plotter	HP7470A	2541A49659	Not Required
Weinschel	Attenuator	MS015	58633	N/A

*** Statement of Traceability:** **BACL Corp.** certifies that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

Environmental Conditions

Temperature:	28° C
Relative Humidity:	37%
ATM Pressure:	1032 mbar

The testing was performed by Ming Jin on 2004-08-25.

Test Results

Modulation	BAND	Channel	Type	Measurement (KHz)	Result
GSM	Cellular 850	Low	26dB Bandwidth	363	Compliant
			99% Bandwidth	256.7	Compliant
		Mid	26dB Bandwidth	367	Compliant
			99% Bandwidth	256.7	Compliant
		High	26dB Bandwidth	363	Compliant
			99% Bandwidth	256.7	Compliant
	PCS 1900	Low	26dB Bandwidth	353	Compliant
			99% Bandwidth	253.3	Compliant
		Mid	26dB Bandwidth	350	Compliant
			99% Bandwidth	253.3	Compliant
		High	26dB Bandwidth	343	Compliant
			99% Bandwidth	256.7	Compliant

Modulation	BAND	Channel	Type	Measurement (MHz)	Result
CDMA	Cellular 850	Low	26dB Bandwidth	1533	Compliant
			99% Bandwidth	1325	Compliant
		Mid	26dB Bandwidth	1450	Compliant
			99% Bandwidth	1325	Compliant
		High	26dB Bandwidth	1450	Compliant
			99% Bandwidth	1333	Compliant
	PCS 1900	Low	26dB Bandwidth	1542	Compliant
			99% Bandwidth	1292	Compliant
		Mid	26dB Bandwidth	1493	Compliant
			99% Bandwidth	1293	Compliant
		High	26dB Bandwidth	1493	Compliant
			99% Bandwidth	1287	Compliant

Modulation	BAND	Channel	Type	Measurement (KHz)	Result
AMPS	Cellular 850	Low	26dB Bandwidth	11.50	Compliant
		Mid	26dB Bandwidth	11.67	Compliant
		High	26dB Bandwidth	11.50	Compliant
	PCS 1900	Low	26dB Bandwidth	11.50	Compliant
		Mid	26dB Bandwidth	11.67	Compliant
		High	26dB Bandwidth	11.58	Compliant

Please refer to plots hereinafter.

