FCC PART 22 TYPE APPROVAL
EMI MEASUREMENT AND TEST REPORT

For

MAXON ELECTRONICS AUSTRALIA PTY. LTD.

36A Gibson Ave, Padstow
New South Wales 2212, Australia

FCC ID: Q2FMM-5100U

2004-02-13

This Report Concerns:	**Equipment Type:**
☒ Original Report	CDMA Voice/Data Modem

Test Engineer:	Ling Zhang /
Report No.:	R0401121
Test Date:	2004-01-30
Reviewed By:	Hans Mellberg/
Prepared By:	Bay Area Compliance Laboratory Corporation (BACL) 230 Commercial Street Sunnyvale, CA 94085 Tel: (408) 732-9162 Fax: (408) 732 9164

Note: This test report is specially limited to the above client company and the product model only. It may not be duplicated without prior written consent of Bay Area Compliance Laboratory Corporation. This report **must not** be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government.

TABLE OF CONTENTS

GENERAL INFORMATION **4**
PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT) 4
OBJECTIVE 4
RELATED SUBMITTAL(S)/GRANT(S) 4
TEST METHODOLOGY 4
TEST FACILITY 5
SUPPORT EQUIPMENT LIST AND DETAILS 5
EXTERNAL I/O CABLING LIST AND DETAILS 5
POWER SUPPLY INFORMATION 5
SYSTEM TEST CONFIGURATION **6**
JUSTIFICATION 6
BLOCK DIAGRAM 6
EQUIPMENT MODIFICATIONS 6
CONFIGURATION OF TEST SYSTEM 6
TEST SETUP BLOCK DIAGRAM 6
SUMMARY OF TEST RESULTS **7**
§2.1047 - MODULATION CHARACTERISTIC **8**
APPLICABLE STANDARD 8
TEST PROCEDURE 8
TEST EQUIPMENT LIST AND DETAILS 8
ENVIRONMENTAL CONDITIONS 8
TEST RESULTS 8
§2.1053 - SPURIOUS RADIATED EMISSIONS **10**
APPLICABLE STANDARD 10
TEST PROCEDURE 10
TEST EQUIPMENT LIST AND DETAILS 10
ENVIRONMENTAL CONDITIONS 10
TEST RESULT 11
§15.107 - CONDUCTED EMISSIONS **12**
MEASUREMENT UNCERTAINTY 12
EUT SETUP 12
SPECTRUM ANALYZER SETUP 12
TEST EQUIPMENT LIST AND DETAILS 12
TEST PROCEDURE 12
SUMMARY OF TEST RESULTS 13
CONDUCTED EMISSIONS TEST DATA 13
PLOT OF CONDUCTED EMISSIONS TEST DATA 13
§2.1046, §22.913(A) - RF POWER OUTPUT **16**
APPLICABLE STANDARD 16
TEST PROCEDURE 16
TEST EQUIPMENT LIST AND DETAILS 17
ENVIRONMENTAL CONDITIONS 17
TEST RESULTS 17
§2.1046, §22.913(A) – CONDUCTED OUTPUT POWER **18**
APPLICABLE STANDARD 18
TEST PROCEDURE 18
TEST EQUIPMENT LIST AND DETAILS 18
ENVIRONMENTAL CONDITIONS 18
TEST RESULTS 18
§2.1049, §22.917(D) - OCCUPIED BANDWIDTH **20**
APPLICABLE STANDARD 20
TEST PROCEDURE 20

TEST EQUIPMENT LIST AND DETAILS....20
ENVIRONMENTAL CONDITIONS....20
TEST RESULTS....20

§2.1051, §22.917 - SPURIOUS EMISSIONS AT ANTENNA TERMINALS....23

APPLICABLE STANDARD....23
TEST PROCEDURE....23
TEST EQUIPMENT LIST AND DETAILS....23
ENVIRONMENTAL CONDITIONS....23
TEST RESULTS....23

§2.1055 (A), §2.1055 (D), §22.355 - FREQUENCY STABILITY....26

APPLICABLE STANDARD....26
TEST PROCEDURE....26
TEST EQUIPMENT LIST AND DETAILS....26
ENVIRONMENTAL CONDITIONS....27
TEST RESULTS....27

§22.917 – BAND EDGE....28

APPLICABLE STANDARD....28
TEST PROCEDURE....28
TEST EQUIPMENT LIST AND DETAILS....28
ENVIRONMENTAL CONDITIONS....28
TEST RESULTS....28

GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

The *Maxon Electronics Australia Pty. Ltd 's* product, FCC ID:Q2FMM-5100U or the "EUT" as referred to in this report is a CDMA Voice/Data Modem, which is measured approximately 58mm L x 38mm W x 12mm H.

** The test data gathered are from typical production sample, serial number: 3B003776, provided by the manufacturer.*

Objective

This type approval report is prepared on behalf of *Maxon Electronics Australia Pty. Ltd* in accordance with Part 2, Subpart J, Part 22 Subpart H 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, and conducted 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 15 Subpart B – Unintentional Radiators
Part 22 Subpart H - Public Mobile Services

Applicable Standards: TIA EIA 137-A, TIA EIA 98-C, ANSI 63.4-1992, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratory, Corp. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Test Facility

The Open Area Test site used by BACL Corp. to collect radiated and conducted emission measurement data is located in the back parking lot of the building at 230 Commercial Street, Sunnyvale, California, USA.

Test site at BACL Corp. has been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports has been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 11 and December 10, 1997 and Article 8 of the VCCI regulations on December 25, 1997. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-1992.

The Federal Communications Commission and Voluntary Control Council for Interference has the reports on file and is listed under FCC file 31040/SIT 1300F2 and VCCI Registration No.: C-1298 and R-1234. The test site has been approved by the FCC and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

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

Support Equipment List and Details

Manufacturer	Description	Model	Serial Number	FCC ID
ACER	Notebook PC	Z12	N/A	DOC
HP	Printer	2225C	N/A	DOC

External I/O Cabling List and Details

Cable Description	Length (M)	Port/From	To
Shielded Printer Cable	2.0	Parallel Port/Notebook PC	Printer

Power Supply Information

Manufacturer	Description	Model	Serial Number	FCC ID
DELTA	AC Adapter	ADP-75FB	S4W0311012681	DOC

SYSTEM TEST CONFIGURATION

Justification

The EUT was configured for testing according to ANSI C63.4-2001.

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

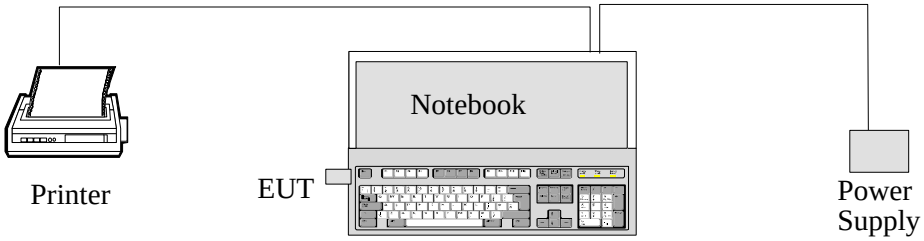
Block Diagram

Please refer to Exhibit D.

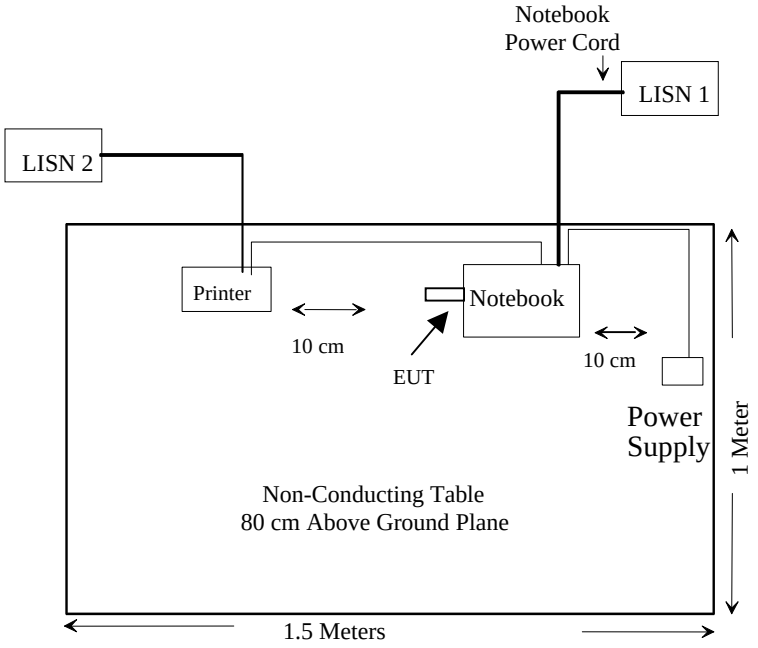
Equipment Modifications

No modifications were made to the EUT.

Configuration of Test System



Test Setup Block Diagram



SUMMARY OF TEST RESULTS

Results reported relate only to the product tested, serial number: 0309K1597156.

FCC RULE	DESCRIPTION OF TEST	RESULT
§ 2.1047	Modulation Characteristics	Compliant
§ 2.1053	Field Strength of Spurious Radiation	Compliant
§2.1093	RF Exposure	Compliant
§ 15.107	Conducted Emissions	Compliant
§ 2.1046, § 22.912 (d)	RF Output Power	Compliant
§ 2.1046, § 22.913 (a)	Conducted Output Power	Compliant
§ 2.1049 § 22.917 § 22.905	Out of Band Emission, Occupied Bandwidth	Compliant
§ 2.1051, § 22.917	Spurious Emissions at Antenna Terminals	Compliant
§ 2.1055 (a) § 2.1055 (d) § 22.355	Frequency stability vs. temperature Frequency stability vs. voltage	Compliant
§ 22.917	Band Edge	Compliant

§2.1047 - MODULATION CHARACTERISTIC

Applicable Standard

Requirement: FCC § 2.1047.

Test Procedure

CDMA digital mode is used by EUT.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
HP	Spectrum Analyzer	HP8564E	3943A01781	2003-08-01
HP	Plotter	HP7470A	2541A49659	Not Required

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

Environmental Conditions

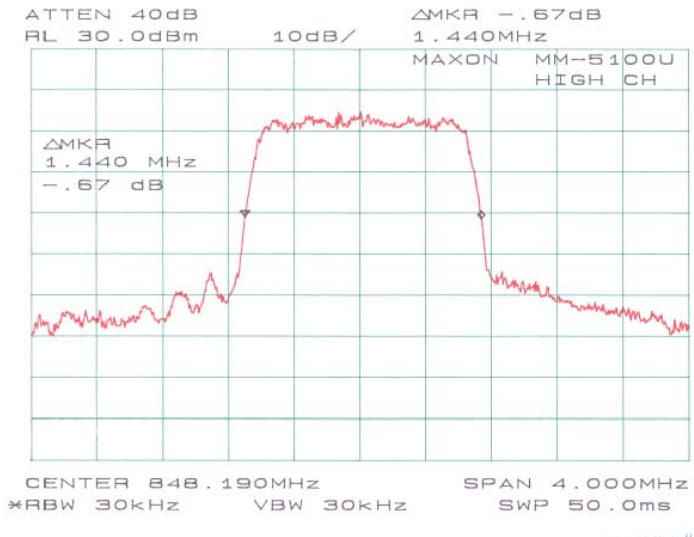
Temperature:	15° C
Relative Humidity:	48%
ATM Pressure:	1035 mbar

Test Results

Please refer to the hereinafter plots.

ATTEN 40dB
RL 30.0dBm
10dB/
ΔMKR 0dB
1.440MHz
MAXON MM-5100U
LOW CH
ΔMKR
1.440 MHz
0 dB
CENTER 824.730MHz
SPAN 4.000MHz
*RBW 30kHz
VBW 30kHz
SWP 50.0ms

ATTEN 40dB
RL 30.0dBm
10dB/
ΔMKR -.16dB
1.433MHz
MAXON MM-5100U
MID CH
ΔMKR
1.433 MHz
-.16 dB
CENTER 836.400MHz
SPAN 4.000MHz
*RBW 30kHz
VBW 30kHz
SWP 50.0ms


ATTEN 40dB
RL 30.0dBm
10dB/
ΔMKR -.67dB
1.440MHz
MAXON MM-5100U
HIGH CH
ΔMKR
1.440 MHz
-.67 dB
CENTER 848.190MHz
SPAN 4.000MHz
*RBW 30kHz
VBW 30kHz
SWP 50.0ms

§2.1053 - SPURIOUS RADIATED EMISSIONS

Applicable Standard

Requirements: CFR 47, § 2.1053.

Test Procedure

The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load which was also placed on the turntable.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.

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

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

Spurious emissions in dB = 10 lg (TXpwr in Watts/0.001) – the absolute level

Spurious attenuation limit in dB = 43 + 10 Log_{10} (power out in Watts)

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
HP	Amplifier, Microwave	8449B	3147A00400	2003-03-14
HP	Analyzer, Spectrum	8565EC	3946A00131	2003-06-30
A. H. Systems	Antenna, Horn, DRG	SAS-200/571	2455-261	2003-01-08
HP	Amplifier, Pre	8447E	1937A01046	2003-08-02
HP	Amplifier, Pre	8447E	1937A01057	2003-08-04
A.R.A.	Antenna, Horn, DRG	DRG-118/A	1132	2003-09-30
ETS	Antenna, logperiodic	3148	0004-1155	2003-10-11
ETS	Antenna, Biconical	3110B	9603-2315	2003-10-11

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

Environmental Conditions

Temperature:	12° C
Relative Humidity:	63%
ATM Pressure:	1020 mbar

Test Result

FCC Part 22: CDMA 800

Low Frequency: -15.1 dBm at 1649.46 MHz
Middle Frequency: -14.9 dBm at 1672.8 MHz
High Frequency: -15 dBm at 1696.38 MHz

Test Data for CDMA800

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 dBm	Level dB	Limit dBm	Margin DBm
Low Channel											
824.73	127.83	90	1.5	V	824.73	23.6	0	0.1	23.5		
824.73	126.67	330	2	H	824.73	22.5	0	0.1	22.4		
1649.46	38.17	270	1.5	H	1649.46	-35.0	7.4	0.5	-28.1	-13	-15.1
1649.46	37.83	100	2.3	V	1649.46	-35.2	7.4	0.5	-28.3	-13	-15.3
2474.19	36.83	200	1.8	H	2474.19	-36.2	8.1	0.7	-28.8	-13	-15.8
2474.19	36.5	90	1.7	V	2474.19	-36.5	8.1	0.7	-29.1	-13	-16.1
MIDDLE CHANNEL											
836.4	128	30	2.1	V	836.4	23.7	0	0.1	23.6		
836.4	127	150	2	H	836.4	22.8	0	0.1	22.7		
1672.8	38.5	270	1.7	H	1672.8	-34.8	7.4	0.5	-27.9	-13	-14.9
1672.8	38.17	330	1.5	V	1672.8	-35.0	7.4	0.5	-28.1	-13	-15.1
2509.2	37.5	0	1.7	V	2509.2	-35.5	8.1	0.7	-28.1	-13	-15.1
2509.2	37.17	100	1.5	H	2509.2	-35.8	8.1	0.7	-28.4	-13	-15.4
HIGH CHANNEL											
848.19	127.67	30	2.5	V	848.19	23.5	0	0.1	23.4		
848.19	126.83	180	2	H	848.19	22.7	0	0.1	22.6		
1696.38	38.33	0	2.1	V	1696.38	-34.9	7.4	0.5	-28	-13	-15.0
1696.38	37.67	100	2	H	1696.38	-35.3	7.4	0.5	-28.4	-13	-15.4
2544.57	37.17	150	1.8	H	2544.57	-36.5	8.1	0.7	-29.1	-13	-16.1
2544.57	36.33	60	1.8	V	2544.57	-36.9	8.1	0.7	-29.5	-13	-16.5

§15.107 - CONDUCTED EMISSIONS

Measurement Uncertainty

All measurements involve certain levels of uncertainties. The factors contributing to uncertainties are spectrum analyzer, cable loss, and LISN.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement at BACL is $\pm$2.4 dB.

EUT Setup

The measurement was performed in the shield room, using the same setup per ANSI C63.4-2001 measurement procedure. The specification used was FCC 15 Subpart B limits.

The spacing between the peripherals was 10 centimeters.

External I/O cables were draped along the edge of the test table and bundle when necessary.

Spectrum Analyzer Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30Mhz.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal Date
Rohde & Schwarz	Artificial-Mains Network	ESH2-Z5	871884/039	2003-03-28
Rohde & Schwarz	EMI Test Receiver	ESCS30	100176	2003-05-06
Fluke	Calibrated Voltmeter	189	18485-38	2003-07-18

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

Test Procedure

During the conducted emission test, the power cord of the host system was connected to the auxiliary outlet of the first LISN.

Maximizing procedure was performed on the six (6) highest emissions of each modes tested to ensure EUT is compliant with all installation combination.

All data was recorded in the peak detection mode. Quasi-peak readings were only performed when an emission was found to be marginal (within -4 dBμV of specification limits). Quasi-peak readings are distinguished with a "**Qp**".

Summary of Test Results

According to the recorded data in following table, the EUT complies with the FCC Conducted margin for a Class B device, with the *worst* margin reading of:

-6.7 dB at 3.790 in the Neutral mode

Environmental Conditions

Temperature:	15°C
Relative Humidity:	48%
ATM Pressure:	1035 mbar

Conducted Emissions Test Data

LINE CONDUCTED EMISSIONS				FCC PART 15 CLASS B	
Frequency MHz	Amplitude dBμV	Detector Qp/Ave/Peak	Phase Line/Neutral	Limit dBμV	Margin dB
3.790	39.3	AVG	Line	46	-6.7
3.530	38.1	AVG	Neutral	46	-7.9
0.400	39.2	AVG	Line	47.9	-8.7
0.150	56.9	QP	Neutral	66	-9.1
0.160	54.1	QP	Line	65.5	-11.4
0.270	39.6	AVG	Neutral	51.1	-11.5
3.790	40.6	QP	Line	56	-15.4
3.530	39.8	QP	Neutral	56	-16.2
0.255	43.5	QP	Neutral	61.6	-18.1
0.400	39.2	QP	Line	57.9	-18.7
0.160	36.2	AVG	Line	55.5	-19.3
0.155	32.2	AVG	Neutral	55.7	-23.5

Plot of Conducted Emissions Test Data

Plot(s) of Conducted Emissions Test Data is presented hereinafter as reference.

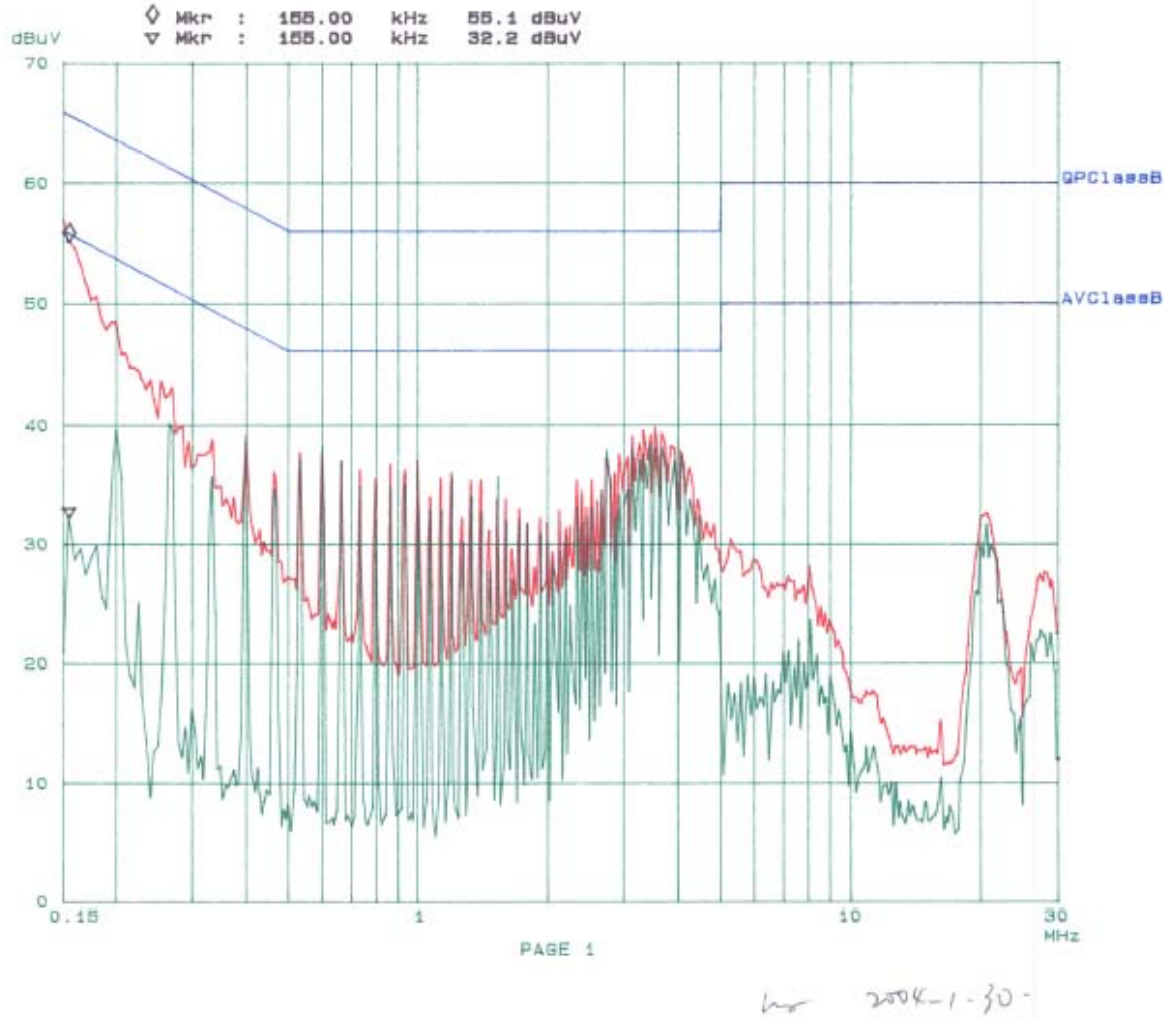
Bay Area Compliance Laboratory Corp 30. Jan 04 16:01
Class B

EUT: MM-5100U
Manuf: MAXON
Op Cond: Normal
Operator: LING
Comment: N

Scan Settings (3 Ranges)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp
150k	1M	5k	9k	QP+AV	20ms	15dBLN	OFF
1M	5M	10k	9k	QP+AV	1ms	15dBLN	OFF
5M	30M	100k	9k	QP+AV	1ms	15dBLN	OFF

Final Measurement: x QP / + AV
Meas Time: 1 s
Subranges: 25
Acc Margin: 6dB



PAGE 1

2004-1-30

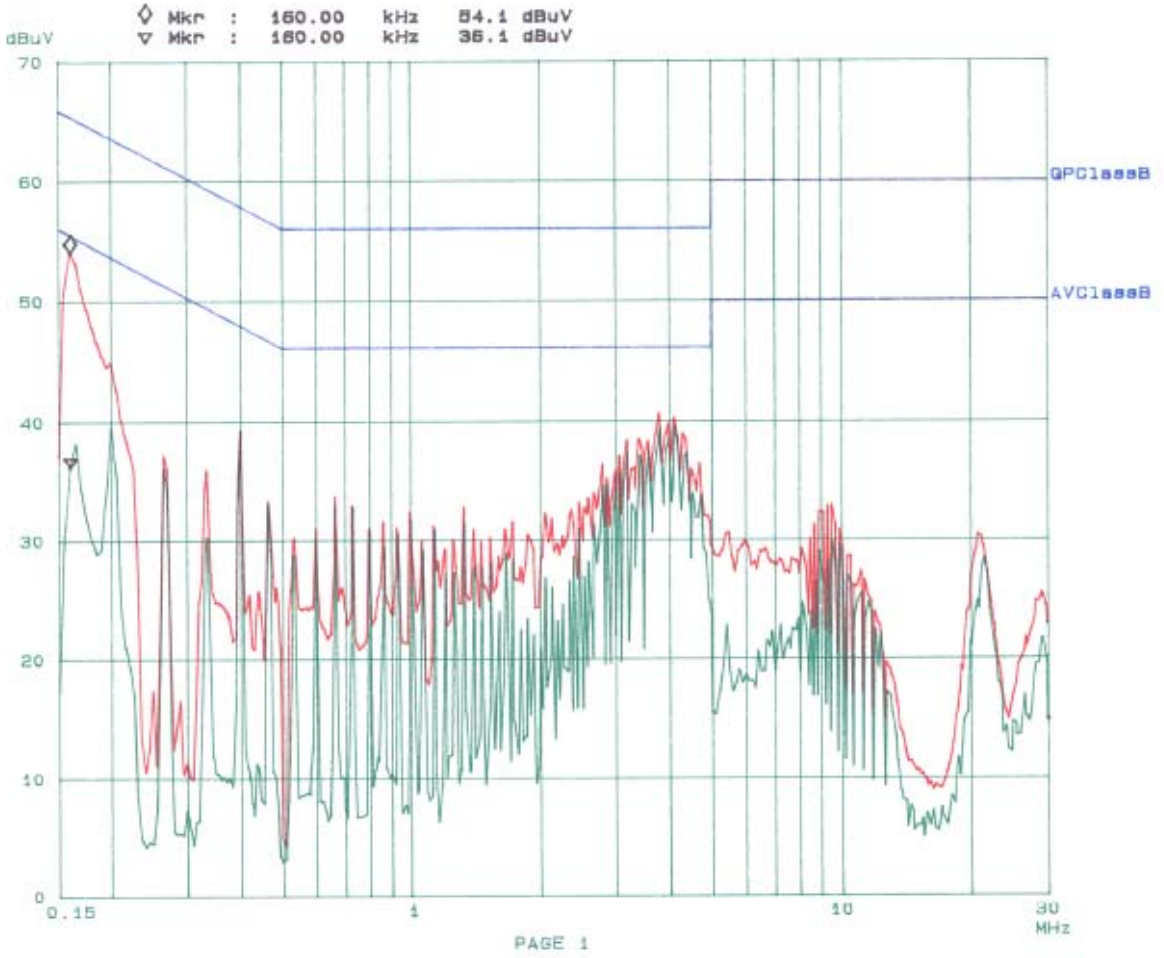
Bay Area Compliance Laboratory Corp 30. Jan 04 15:17
Class B

EUT: MM-5100U
Manuf: MAXON
Op Cond: Normal
Operator: LING
Comment: L

Scan Settings (3 Ranges)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp
150k	1M	5k	9k	QP+AV	20ms	15dBLN	OFF
1M	5M	10k	9k	QP+AV	1ms	15dBLN	OFF
5M	30M	100k	9k	QP+AV	1ms	15dBLN	OFF

Final Measurement: x QP / + AV
Meas Time: 1 s
Subranges: 25
Acc Margin: 6dB



PAGE 1

2004-1-30

§2.1046, §22.913(a) - RF POWER OUTPUT

Applicable Standard

According to FCC §2.1046 & §22.913(a), the ERP of mobile transmitters must not exceed 7 watts.

Test Procedure

1. On a test site, the EUT shall be placed at 1.5m height on a turn table, and in the position closest to normal use as declared by the applicant.
2. The test antenna shall be oriented initially for vertical polarization located 3m from EUT to correspond to the frequency of the transmitter.
3. The output of the test antenna shall be connected to the measuring receiver and the quasi-peak detector is used for the measurement.
4. The transmitter shall be switched on, if possible, without modulation and the measuring receiver shall be tuned to the frequency of the transmitter under test.
5. The test antenna shall be raised and lowered through the specified range of height until a maximum signal level is detected by the measuring receiver.
6. The transmitter shall then the rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
7. The test antenna shall be raised and lowered again through the specified range of height until a maximum signal level is detected by the measuring receiver.
8. The maximum signal level detected by the measuring receiver shall be noted.
9. The transmitter shall be replaced by a horn (substitution antenna).
10. The substitution antenna shall be orientated for vertical polarization and the length of the substitution antenna shall be adjusted to correspond to the frequency of the transmitter.
11. The substitution antenna shall be connected to a calibrated signal generator.
12. In necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
13. The test antenna shall be raised and lowered through the specified range of height to ensure that the maximum signal is received.
14. The input signal to the substitution antenna shall be adjusted to the level that produces a level detected by the measuring received, which is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuator setting of the measuring receiver.
15. The input level to the substitution antenna shall be recorded as power level in dBm, corrected for any change of input attenuator setting of the measuring receiver.
16. The measurement shall be repeated with the test antenna and the substitution antenna orientated for horizontal polarization.
17. The measure of the effective radiated power is the large of the two levels recorded, at the input to the substitution antenna, corrected for gain of the substitution antenna if necessary.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
HP	Amplifier, Microwave	8449B	3147A00400	2003-03-14
HP	Analyzer, Spectrum	8565EC	3946A00131	2003-06-30
A. H. Systems	Antenna, Horn, DRG	SAS-200/571	2455-261	2003-01-08
HP	Amplifier, Pre	8447E	1937A01046	2003-08-02
HP	Amplifier, Pre	8447E	1937A01057	2003-08-04
A.R.A.	Antenna, Horn, DRG	DRG-118/A	1132	2003-09-30
APREL	Antenna Dipole	D900V2	122	2003-03-10
ETS	Antenna, logperiodic	3148	0004-1155	2003-10-11
ETS	Antenna, Biconical	3110B	9603-2315	2003-10-11

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

Environmental Conditions

Temperature:	15° C
Relative Humidity:	48%
ATM Pressure:	1035 mbar

Test Results

For CDMA800:

FREQUENCY (MHZ)	SUBSTITUTION READING (dBm)	SUBSTITUTION ANTENNA GAIN	SUBSTITUTION CALBE LOSS (dBm)	ERP (dBm)
824.73	23.6	0	0.1	23.5
836.40	23.7	0	0.1	23.6
848.19	23.5	0	0.1	23.4

Sample calculation:

Absolute level = substitution reading + antenna gain - cable loss

For example:

23.5 = 23.6 + 0 – 0.1

§2.1046, §22.913(a) – CONDUCTED OUTPUT POWER

Applicable Standard

According to FCC §2.1046 and §22.913 (a), the ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 watts.

Test Procedure

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
HP	Analyzer, Spectrum	8565EC	3946A00131	2003-06-30

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

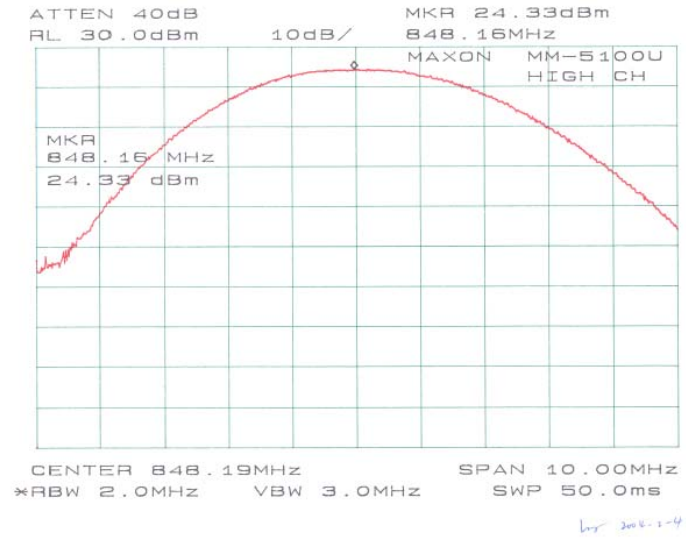
Environmental Conditions

Temperature:	15° C
Relative Humidity:	48%
ATM Pressure:	1035 mbar

Test Results

Channel	Frequency (MHz)	Output Power in dBm	Output Power in W	Limit in W
LOW	824.73	24.50	0.281	7
MIDDLE	836.40	24.50	0.281	7
HIGH	848.19	24.33	0.271	7

Plots of Conducted Output Power for Part 22



§2.1049, §22.917(d) - OCCUPIED BANDWIDTH

Applicable Standard

Requirements: CFR 47, Section 2.1049 and 22.917(d).

Test Procedure

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

The resolution bandwidth of the spectrum analyzer was set at 30 KHz and the 26 dB bandwidth was recorded.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
HP	Spectrum Analyzer	HP8564E	3943A01781	2003-08-01
HP	Plotter	HP7470A	2541A49659	Not Required

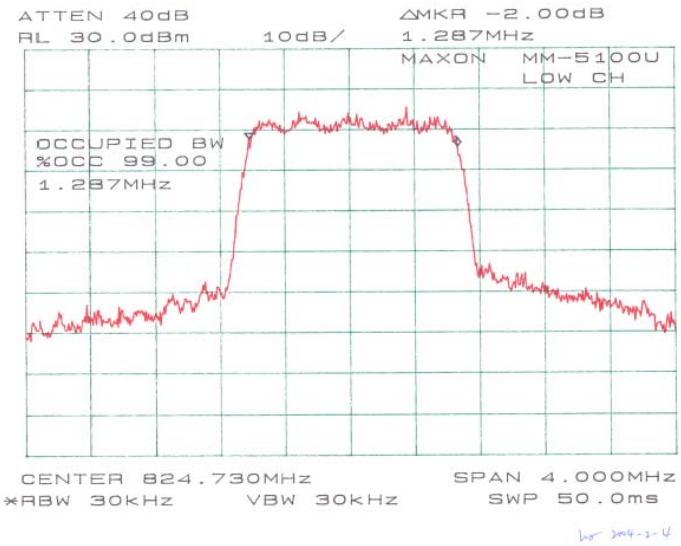
*** Statement of Traceability: BACL Corp.** certifies that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

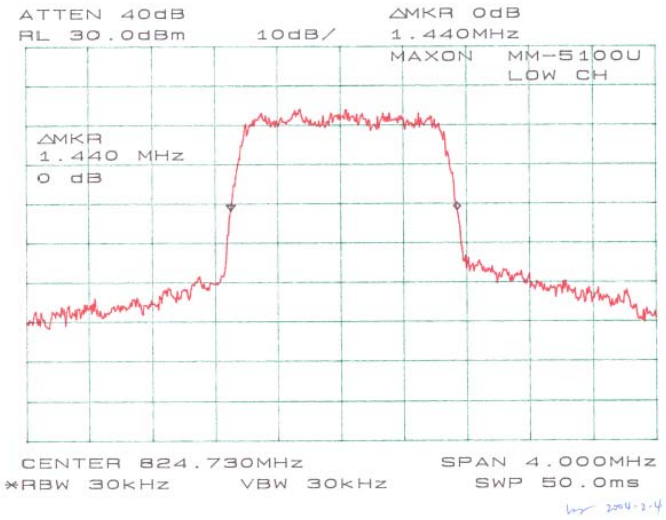
Environmental Conditions

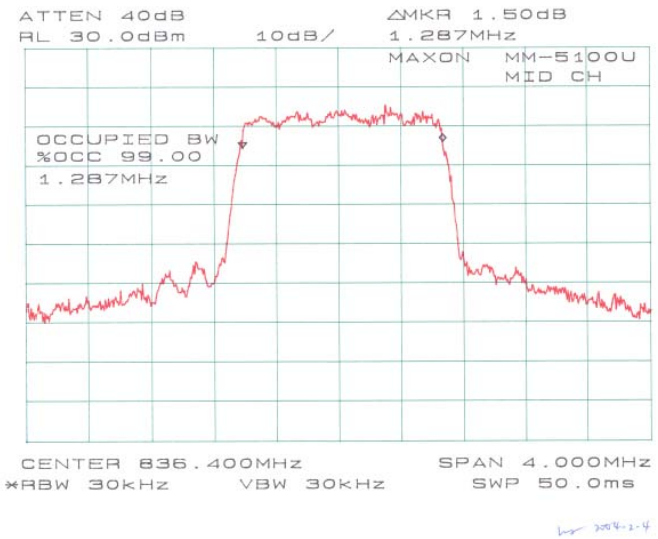
Temperature:	15° C
Relative Humidity:	48%
ATM Pressure:	1035 mbar

Test Results

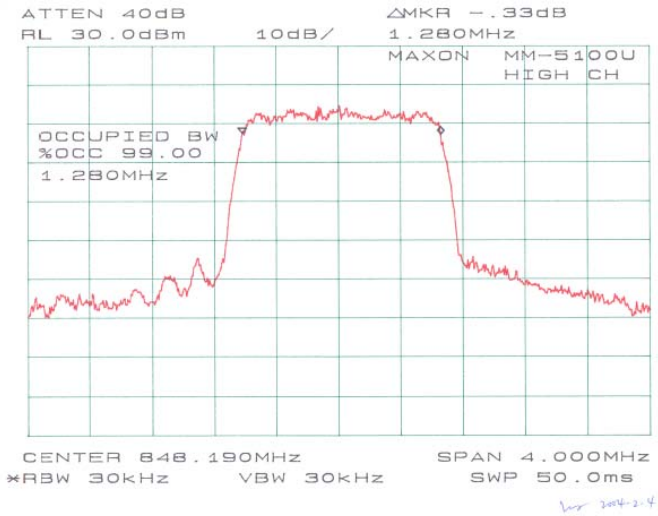
Please refer to the following plots.


ATTEN 40dB
RL 30.0dBm
10dB/
ΔMKR -2.00dB
1.287MHz
MAXON MM-5100U
LOW CH
OCCUPIED BW
%OCC 99.00
1.287MHz
CENTER 824.730MHz
SPAN 4.000MHz
*RBW 30kHz
VBW 30kHz
SWP 50.0ms


ATTEN 40dB
RL 30.0dBm
10dB/
ΔMKR 0dB
1.440MHz
MAXON MM-5100U
LOW CH
ΔMKR
1.440 MHz
0 dB
CENTER 824.730MHz
SPAN 4.000MHz
*RBW 30kHz
VBW 30kHz
SWP 50.0ms


ATTEN 40dB
RL 30.0dBm
10dB/
ΔMKR 1.50dB
1.287MHz
MAXON MM-5100U
MID CH
OCCUPIED BW
%OCC 99.00
1.287MHz
CENTER 836.400MHz
SPAN 4.000MHz
*RBW 30kHz
VBW 30kHz
SWP 50.0ms

ATTEN 40dB
RL 30.0dBm
10dB/
ΔMKR -.16dB
1.433MHz
MAXON MM-5100U
MID CH
ΔMKR
1.433 MHz
-.16 dB
CENTER 836.400MHz
SPAN 4.000MHz
*RBW 30kHz
VBW 30kHz
SWP 50.0ms


ATTEN 40dB
RL 30.0dBm
10dB/
ΔMKR -.33dB
1.280MHz
MAXON MM-5100U
HIGH CH
OCCUPIED BW
%OCC 99.00
1.280MHz
CENTER 848.190MHz
SPAN 4.000MHz
*RBW 30kHz
VBW 30kHz
SWP 50.0ms

ATTEN 40dB
RL 30.0dBm
10dB/
ΔMKR -.67dB
1.440MHz
MAXON MM-5100U
HIGH CH
ΔMKR
1.440 MHz
-.67 dB
CENTER 848.190MHz
SPAN 4.000MHz
*RBW 30kHz
VBW 30kHz
SWP 50.0ms

§2.1051, §22.917 - SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Applicable Standard

Requirements: CFR 47, § 2.1051, § 22.917.
The spectrum was to be investigated to the tenth harmonics of the highest fundamental frequency as specified in § 2.1057.

Test Procedure

The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 100 kHz. Sufficient scans were taken to show any out of band emissions up to 10^{th} harmonic.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
HP	Spectrum Analyzer	HP8564E	3943A01781	2003-08-01
HP	Plotter	HP7470A	2541A49659	Not Required

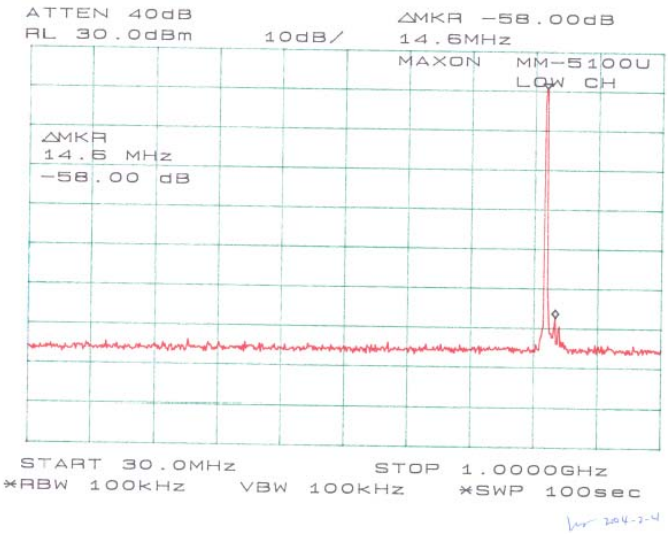
*** Statement of Traceability: BACL Corp.** certifies that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

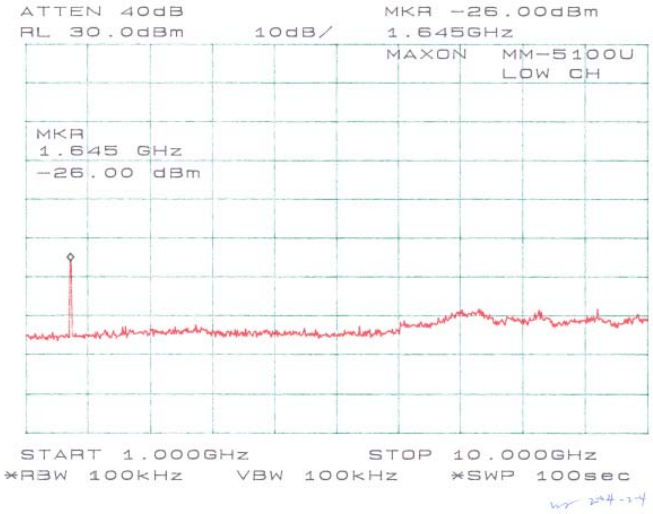
Environmental Conditions

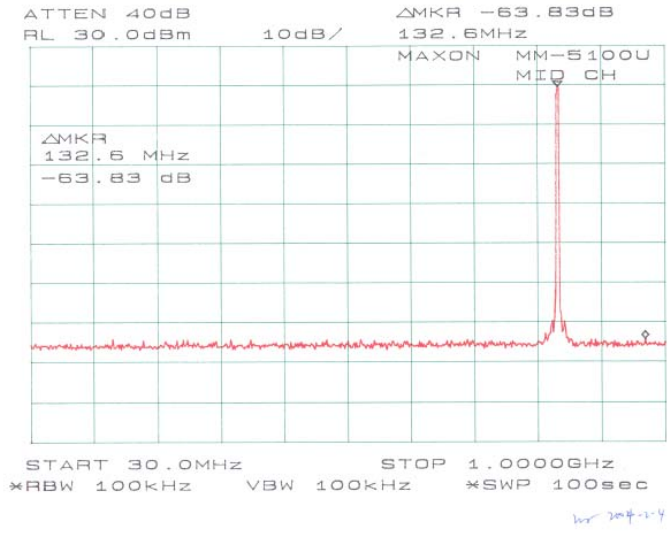
Temperature:	15° C
Relative Humidity:	48%
ATM Pressure:	1035 mbar

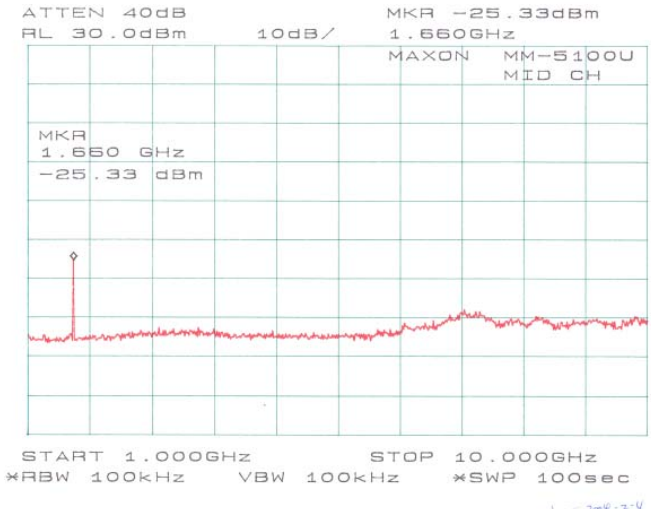
Test Results

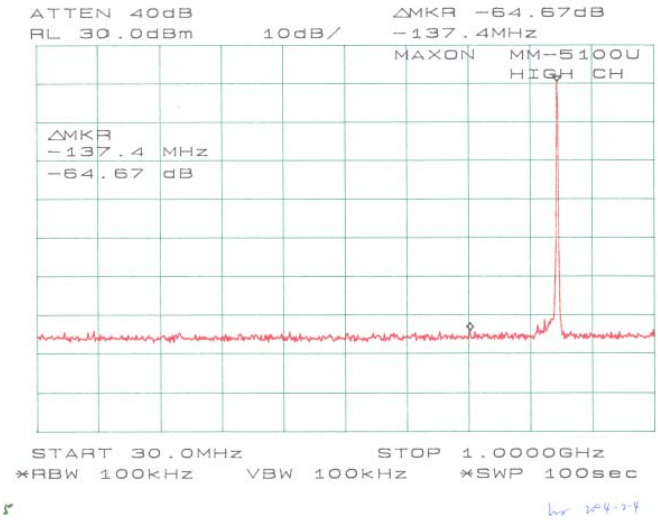
Please refer to the hereinafter plots.

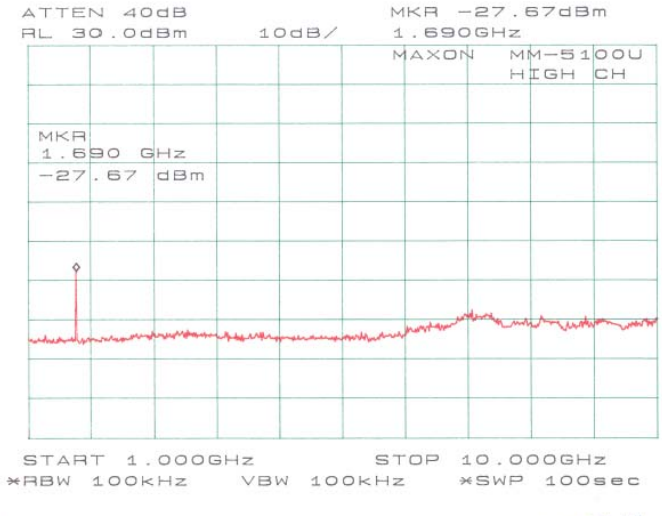

ATTEN 40dB
RL 30.0dBm
10dB/
ΔMKR -58.00dB
14.6MHz
MAXON MM-5100U
LOW CH
ΔMKR
14.6 MHz
-58.00 dB
START 30.0MHz
STOP 1.0000GHz
*RBW 100kHz
VBW 100kHz
*SWP 100sec


ATTEN 40dB
RL 30.0dBm
10dB/
MKR -26.00dBm
1.645GHz
MAXON MM-5100U
LOW CH
MKR
1.645 GHz
-26.00 dBm
START 1.000GHz
STOP 10.000GHz
*RBW 100kHz
VBW 100kHz
*SWP 100sec


ATTEN 40dB
RL 30.0dBm
10dB/
ΔMKR -63.83dB
132.6MHz
MAXON MM-5100U
MID CH
ΔMKR
132.6 MHz
-63.83 dB
START 30.0MHz
STOP 1.0000GHz
*RBW 100kHz
VBW 100kHz
*SWP 100sec


ATTEN 40dB
RL 30.0dBm
10dB/
MKR -25.33dBm
1.660GHz
MAXON MM-5100U
MID CH
MKR
1.650 GHz
-25.33 dBm
START 1.000GHz
STOP 10.000GHz
*RBW 100kHz
VBW 100kHz
*SWP 100sec


ATTEN 40dB
RL 30.0dBm
10dB/
ΔMKR -64.67dB
-137.4MHz
MAXON MM-5100U
HIGH CH
ΔMKR
-137.4 MHz
-64.67 dB
START 30.0MHz
STOP 1.0000GHz
*RBW 100kHz
VBW 100kHz
*SWP 100sec


ATTEN 40dB
RL 30.0dBm
10dB/
MKR -27.67dBm
1.690GHz
MAXON MM-5100U
HIGH CH
MKR
1.690 GHz
-27.67 dBm
START 1.000GHz
STOP 10.000GHz
*RBW 100kHz
VBW 100kHz
*SWP 100sec

§2.1055 (a), §2.1055 (d), §22.355 - FREQUENCY STABILITY

Applicable Standard

Requirements: FCC § 2.1055 (a), § 2.1055 (d) & following:

According to §22.355, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances given in Table C-1 of this section.

Table C-1_Frequency Tolerance for Transmitters in the Public Mobile Services

Frequency range (MHz)	Base, fixed (ppm)	Mobile [SU][le][/ SU]3 watts (ppm)	Mobile [le]3 watts (ppm)
25 to 50	20.0	20.0	50.0
50 to 450	5.0	5.0	50.0
450 to 512	2.5	5.0	5.0
821 to 896	1.5	2.5	2.5
928 to 929	5.0	n/a	n/a
929 to 960	1.5	n/a	n/a
2110 to 2220	10.0	n/a	n/a

According to §24.235, The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Test Procedure

Frequency Stability vs. Temperature: The equipment under test was connected to an external DC power supply and the RF output was connected to a frequency counter via feed-through attenuators. The EUT was placed inside the temperature chamber. The DC leads and RF output cable exited the chamber through an opening made for the purpose.

After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from the counter.

Frequency Stability vs. Voltage: An external variable DC power supply was connected to the battery terminals of the equipment under test. The voltage was set to 115% of the nominal value and was then decreased until the transmitter light no longer illuminated; i.e., the battery end point. The output frequency was recorded for each battery voltage.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Due Date
HP	Spectrum Analyzer	HP8564E	3943A01781	2003-08-01
HP	Plotter	HP7470A	2541A49659	Not Required

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

Environmental Conditions

Temperature:	15° C
Relative Humidity:	48%
ATM Pressure:	1035 mbar

Test Results

Test Result for CDMA800

Frequency Stability Versus Temperature

Reference Frequency: 836.4 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (Vdc)	Frequency Measure with Time Elapsed	
		MHz	PPM Error
50	120	836.40036	0.43
40	120	836.40027	0.32
30	120	836.40015	0.18
20	120	836.40009	0.11
10	120	836.40004	0.05
0	120	836.40011	0.13
-10	120	836.40024	0.29
-20	120	836.40041	0.49
-30	120	836.40050	0.60

Frequency Stability Versus Battery Voltage

Reference Frequency: 836.4MHz, Limit: 2.5ppm			
Power Supplied (VDC)	Environment Temperature (°C)	MHz	ppm
102	20	836.40040	0.48
138	20	836.40012	0.14

§22.917 – BAND EDGE

Applicable Standard

According to § 22.917, 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 Procedure

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

The center of the spectrum analyzer was set to block edge frequency, RBW set to 30KHz.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
HP	Spectrum Analyzer	HP8564E	3943A01781	2003-08-01
HP	Plotter	HP7470A	2541A49659	Not Required

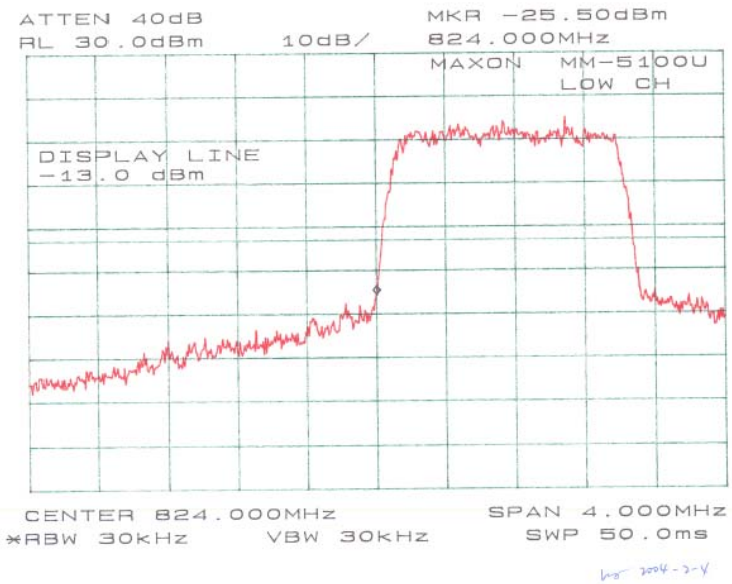
*** Statement of Traceability: BACL Corp.** certifies that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

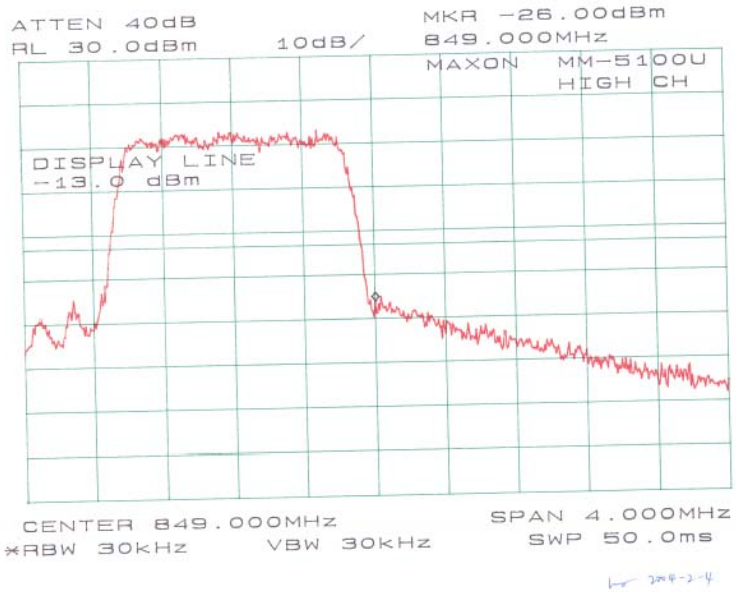
Environmental Conditions

Temperature:	15° C
Relative Humidity:	48%
ATM Pressure:	1035 mbar

Test Results

Please refer to the following plots.


ATTEN 40dB
RL 30.0dBm
10dB/
MKR -25.50dBm
824.000MHz
MAXON MM-5100U
LOW CH
DISPLAY LINE
-13.0 dBm
CENTER 824.000MHz
SPAN 4.000MHz
*RBW 30kHz
VBW 30kHz
SWP 50.0ms


ATTEN 40dB
RL 30.0dBm
10dB/
MKR -26.00dBm
849.000MHz
MAXON MM-5100U
HIGH CH
DISPLAY LINE
-13.0 dBm
CENTER 849.000MHz
SPAN 4.000MHz
*RBW 30kHz
VBW 30kHz
SWP 50.0ms