
FCC ID: NUW050SEK08

Prepared for:

CI WIRELESS INC.
1211 Ira E. Woods Avenue
Grapevine, Texas 76051

By:

Professional Testing (EMI), Inc.
1601 FM 1460, Suite B
Round Rock, Texas 78664

Submitted to:

Federal Communications Commission
Equipment Approval Services
P.O. Box 358315
Pittsburgh, Pennsylvania 15251-3315

June 1999

**FCC Application for Certification
of an Intentional Radiator**

CI WIRELESS INC.
EkoCel 800 MHz ESMR Band
50 Watt Antenna Extender
(Transmitter Portion)

Table of Contents

Title Page	1
Table of Contents.....	2
Certificate of Compliance.....	3
1.0 Equipment Under Test (EUT) Description.....	4
2.0 Occupied Bandwidth Measurements	5
2.1 Test Procedure	6
2.2 Test Criteria	6
2.3 Test Results.....	6
3.0 Effective Radiated Power (ERP) Measurements	6
3.1 Test Procedure	7
3.2 Test Criteria	7
3.3 Test Results.....	7
4.0 Out of Band Emissions - Radiated.....	8
4.1 Test Procedure	8
4.2 Test Criteria	9
4.3 Test Results.....	9
5.0 Out of Band Emissions - Conducted	10
5.1 Test Procedure	10
5.2 Test Criteria	10
5.3 Test Results.....	11
6.0 Radiofrequency Radiation Exposure Evaluation	11
6.1 Evaluation Procedure	11
6.2 Evaluation Results	12
7.0 Three Signal Intermodulation Test	12
8.0 Form 731 Information.....	13
8.1 Emission Designator	13
8.2 Output Power	14
8.4 Frequency Band of Operation.....	15
8.5 Grant Notes.....	15
9.0 Modifications	15
10.0 List of Test Equipment	16

Appendices

Appendix A - Sub-Model Index Data	17
Appendix B - Occupied Bandwidth Test Data.....	19
Appendix C - Effective Radiated Power (ERP) Test Data	24
Appendix D - Out of Band Emissions - Radiated Test Data	26
Appendix E - Out of Band Emissions - Conducted Test Data	38
Appendix F - Out of Band Emissions - Conducted Test Data.....	46



Certificate of Compliance

Applicant: CI Wireless Inc.

Applicant's Address: 1211 Ira E. Woods Avenue
Grapevine, Texas 76051

Model: 800 MHz ESMR Band 50 Watt Antenna Extender

Serial Number: H919005/M919010

Project Number: 00005-10

Test Dates: June 7, 8, 9 and 10, 1999

I, Jeffrey A. Lenk, for Professional Testing (EMI), Inc., being familiar with the FCC rules and test procedures have reviewed the test setup, measurement data and this report. I believe them to be true and accurate. The **CI Wireless Inc., 800 MHz ESMR Band 50 Watt Antenna Extender** was tested and found to be in compliance with FCC Part 90 for Intentional Radiators.

Jeffrey A. Lenk
President

1.0 Equipment Under Test (EUT) Description

The **CI Wireless Inc., 800 MHz ESMR Band 50 Watt Antenna Extender** is a 50 watt 800 MHz ESMR Band Repeater System. This system enhances the coverage of a cellular system by adding base station capability to traditional poor cellular coverage areas (i.e. subways, shopping malls, convention centers). The system has a set of automatic setup features, enabling the repeater to be installed & configured by one person. Automatic system monitoring is present to monitor system health & report/record any EUT problems. **CI Wireless Inc., 800 MHz ESMR Band 50 Watt Antenna Extender** supports IDEN (GSM) and TDMA communications in the ESMR band.

The EkoCell system is comprised of two components: a Hub unit and a Remote unit. The Hub is installed at a cellular base station while the remote unit is installed at the desired transmit/receive location and attached to an antenna assembly. The two pieces are connected by two fiber optic links (one for transmit, one for receive). Due to the low loss of the fiber link, the Remote is usually not installed at the same location as the Hub unit.

The **CI Wireless Inc., 800 MHz ESMR Band 50 Watt Antenna Extender** is intended for professional installation only in the type of environments described above. This device is intended for operation under the requirements of Part 90 (Subpart I). Specific test requirements include the following:

47 CFR 2.1049	Occupied Bandwidth
47 CFR 90.205	Effective Radiated Power (ERP)
47 CFR 90.210 (b) & (g)	Out of Band Emissions - Radiated
47 CFR 90.210 (b) & (g)	Out of Band Emissions - Conducted
47 CFR 1.1310	Radiofrequency Radiation Exposure Limits

The **CI Wireless Inc., 800 MHz ESMR Band 50 Watt Antenna Extender** was tested in the transmit mode of operation for TDMA and IDEN (GSM) modes of operation. This unit does not possess frequency shifting components and does not re-modulate or re-key the signal. Based on the lack of frequency shifting or re-keying/re-modulation circuitry, the following tests were not performed:

47 CFR 2.1055(a) & 47 CFR 90.213 (a)	Frequency Stability vs. Temperature
47 CFR 2.1055(a) & 47 CFR 90.213 (a)	Frequency Stability vs. AC Power
47 CFR 90.209	Bandwidth Limitations*
47 CFR 90.211	Modulation Requirements

* Addressed in areas covering 47 CFR 90.210 (c) for conducted and radiated out of band emissions.

The system tested consisted of the following:

<u>Manufacturer & Model</u>	<u>Serial #</u>	<u>FCC ID #</u>	<u>Description</u>
CI Wireless, Inc., Eko-8H0B0-DB0000	H919005	NUW050SEK08	800M/1900M MHz Hub Unit
CI Wireless, Inc., Eko-8M0SR-DAC000	M919010	NUW050SEK08	800 MHz EMSR Band Remote Unit
Multimode Fiber Optic Cables (10 Ft.) (2 ea.)	N/A	N/A	Hub/Remote Interconnect cables
<u>System Peripherals:</u>			
Bird Model 8073-1	542	N/A	50 ohm Load

Cables and Cords:

Unshielded Power Cord (6 Ft.) (2 ea.)
RG-223 Coaxial Cable (1 M) (2 ea.)

The two models for the system components tested are:

Hub Unit: Eko-8H0B0-DB0000
Remote Unit: Eko-8M0SR-DAC000

The test covered under this report address all subseries of these models. The base model designators for the components of this system are Model Eko-8HXBX-XXXXXX for the Hub unit and Model Eko-8MXSR-XXXXXX for the Remote Units. An index of the sub-model designations for the **CI Wireless Inc., 800 MHz EMSR Band 50 Watt Antenna Extender** is shown in Appendix A. The two particular models used for this test were loaded with all active circuit options available, providing a worst case configuration for emissions testing. The options sub-model options available for this product have no impact of the strength, bandwidth or spurious output of the intended transmission signal.

The equipment within this report was tested to verify its compliance with FCC Rule Parts 2, and 90, for Intentional Radiators. A separate verification report pursuant to Part 15, Subpart B has been prepared for the **CI Wireless Inc., 800 MHz EMSR Band 50 Watt Antenna Extender** as a Digital Device and as a receiver.

2.0 Occupied Bandwidth Measurements

Measurements were made on the **CI Wireless Inc., 800 MHz EMSR Band 50 Watt Antenna Extender** to determine the occupied bandwidth in accordance with Part 2.1049.

2.1 Test Procedure

All measurements were performed in a controlled laboratory environment. The occupied bandwidth of the **CI Wireless Inc., 800 MHz ESMR Band 50 Watt Antenna Extender** was measured using a Hewlett Packard HP 8566 Spectrum Analyzer with a test signal provided to the EUT from a Rhode-Schwartz signal generator. Occupied bandwidth plots were made for the test generator by itself to use as a comparison for possible spectral regrowth.

Occupied bandwidth was plotted for each of the data types (IDEN (GSM) and TDMA). The shape of the occupied bandwidth was checked for each of the three channels for each modulation type. No change was detected versus channel for each modulation type. The occupied bandwidth was measured based on the emission width 26 dB below the peak emission level.

2.2 Test Criteria

Section 2.989 requires that the occupied bandwidth for Type Accepted units be measured and reported as part of the device filing.

2.3 Test Results

Data for occupied bandwidth testing is located in Appendix B of this report. Data for the occupied bandwidth of the generator by itself is also contained in this appendix. The widest bandwidths for each of the modulation types used by the **CI Wireless Inc., 800 MHz ESMR Band 50 Watt Antenna Extender** are listed below.

Service Type	Reference Frequency	Occupied Bandwidth
IDEN (GSM)	881.0 MHz	33.76 kHz
TDMA	881.0 MHz	34.50 kHz

No variation was seen between the emission bandwidth of the EUT and the generator.

3.0 Effective Radiated Power (ERP) Measurements

Measurements were made on the **CI Wireless Inc., 800 MHz ESMR Band 50 Watt Antenna Extender** to verify compliance with the maximum effective radiated power (ERP) requirements of §90.205 and §90.219.

ERP measurements were made at the Professional Testing "Open Field" Site 1, located in Marble Falls, Texas, to determine the radio noise radiated from the EUT. A "Description of Measurement Facilities" has been submitted to the FCC and approved pursuant to Section 2.948 of CFR 47 of the FCC rules.

3.1 Test Procedure

The EUT was placed on a non-conductive table 0.8 meters above the ground plane. The table was centered on a motorized turntable which allows 360 degree rotation. A measurement antenna was positioned at a distance of 3 meters as measured from the closest point of the EUT. The radiated emissions were maximized by configuring the EUT, by rotating the EUT, and by raising and lowering the antenna from 1 to 4 meters.

A Spectrum Analyzer with peak detection was used to find the maximums of the radiated emissions during the variability testing. All final measurements were taken using a Quasi-Peak Adapter with a measurement bandwidth of 120 kHz.

ERP testing of the **CI Wireless Inc., 800 MHz ESMR Band 50 Watt Antenna Extender** was performed at 3 channel settings for IDEN (GSM) and TDMA transmission modes.

3.2 Test Criteria

Section 90.205 lists various levels for the maximum effective radiated power of Part 90 transmitters. Based on this specification, the lowest allowed ERP is 500 watts. Since the EUT does not include an antenna, a typical antenna (a whip type antenna) was attached to the EUT and used for the ERP measurements. This process was also used for the spurious emission measurements. ERP testing was performed by measuring the maximum electric field from the **CI Wireless Inc., 800 MHz ESMR Band 50 Watt Antenna Extender** and translating this level to ERP using the following formula:

$$ERP = \{(E \cdot r)^2\} / (30)$$

Where:

E = Electric Field in v/m

r = distance from the measurement antenna to the EUT in meters

This formula was obtained from the Industry Canada document, 'Guidelines for Measurement of Radio Frequency Fields at Frequencies from 10 kHz to 300 GHz, Document Reference NIR-E, dated January 1994'.

3.3 Test Results

Measurements were performed utilizing a spectrum analyzer IF/video bandwidth of 3 kHz/10 kHz. For final measurements, the frequency span was set for 3 MHz and was centered on the peak of the output signal.

Data for ERP testing is located in Appendix C of this report **CI Wireless Inc., 800 MHz ESMR Band 50 Watt Antenna Extender** met the §90.205 ERP requirements.

4.0 Out of Band Emissions - Radiated

Radiated emissions measurements were made to determine out of band radiated noise produced by the **CI Wireless Inc., 800 MHz ESMR Band 50 Watt Antenna Extender** in accordance with Section 90.210 (b). Evaluation of the spurious emissions for this device was based primarily on Mask B criteria using representative traffic signals. Particular attention was paid to possible spectral regrowth determine if regrowth was present. If no regrowth is present, the device could be used with other types of traffic (i.e. those which would require Emission Mask G) if a need arose.

Radiated emissions measurements were made at the Professional Testing "Open Field" Site 1, located in Marble Falls, Texas, to determine the radio noise radiated from the EUT. A "Description of Measurement Facilities" has been submitted to the FCC and approved pursuant to Section 2.948 of CFR 47 of the FCC rules.

4.1 Test Procedure

The spurious emissions for the device were measured using test signals for TDMA and IDEN (GSM) injected into the EUT using a Rhode-Schwartz signal generator. These signals were selected for use for this test based on the criteria described in 47 CRF 2.989 (h).

The EUT was placed on a non-conductive table 0.8 meters above the ground plane. The table was centered on a motorized turntable which allows 360 degree rotation. A measurement antenna was positioned at a distance of 3 meters as measured from the closest point of the EUT. For measurements above 1 GHz, the antenna distance was decreased to 1 meter. The radiated emissions were maximized by configuring the EUT, by rotating the EUT, and by raising and lowering the antenna from 1 to 4 meters.

The Spectrum Analyzer was used to find the maximums of the conducted emissions during the testing. All final measurements were made using a peak measurement method. The final measurements provided were determined by using the following formula:

$$\text{Corrected Level} = \text{Recorded Level} - \text{Pre-Amp Gain} + \text{Antenna Factor} + \text{Cable Loss}$$

Measurement of the fundamental signal was performed with a sample antenna attached to the EUT. Measurement of spurious radiated emissions was performed with a shielded load attached to the device (no antenna). The **CI Wireless Inc., 800 MHz ESMR Band 50 Watt Antenna Extender** does not include an antenna as part of the EUT, so the interest regarding spurious for this device is case radiation.

4.2 Test Criteria

For this EUT, the data obtained for the occupied bandwidth tests indicated that the emissions from the **CI Wireless Inc., 800 MHz ESMR Band 50 Watt Antenna Extender** were due to the generator, not the EUT (no spectral regrowth observed). In order to evaluate the EUT versus the out of band emission criteria of §90.210, a representative emission mask suitable for this band (Emission mask B) was selected. For emissions beyond the immediate area of the intended emission, the attenuation required by §90.210 does not vary ($43 + 10 \log(P)$) versus emission type. Based on this criteria, transmitter related emissions for the **CI Wireless Inc., 800 MHz ESMR Band 50 Watt Antenna Extender** shall be reduced by the following amount with respect to the level of the fundamental:

<u>Frequency offset versus the fundamental (% of BW)</u>	<u>Attenuation versus the fundamental (dB)</u>
50 to 100	25
100 to 250	35
250 to $10f_c$	$43 + 10 \log(P)$

Based on the figures obtained from the occupied bandwidth tests, the peak power of this unit is 50 watts, which translates the $43 + 10 \log(P)$ term to a minimum attenuation of -60 dB. Emission mask G, which can also be applied over this frequency range, has basically the same upper and lower limits of attenuation, but is more stringent (67 dB worst case for a 50 watt transmitter) over the 100%BW to 250%BW section.

4.3 Test Results

The **CI Wireless Inc., 800 MHz ESMR Band 50 Watt Antenna Extender** was tested for radiated spurious emissions at three channel settings for IDEN (GSM) & TDMA transmission modes. The signals were fully modulated for all tests. The test frequencies used for each modulation type are listed below.

Service Type	Test Channel	Test Frequency (MHz)
IDEN (GSM) & TDMA	Lower	852.0
IDEN (GSM) & TDMA	Middle	860.0
IDEN (GSM) & TDMA	Upper	866.0

Radiated emission data sheets are contained in Appendix D of this report. The **CI Wireless Inc., 800 MHz ESMR Band 50 Watt Antenna Extender** met the §90.210(b) radiated emission requirements. No significant spectral regrowth was detected. Documentation of the immediate area surrounding the intended emission is shown as part of the occupied bandwidth plots.

5.0 Out of Band Emissions - Conducted

Radiated emissions measurements were made to determine out of band radiated noise produced by the **CI Wireless Inc., 800 MHz ESMR Band 50 Watt Antenna Extender** in accordance with Section 90.210 (b). Evaluation of the spurious emissions for this device was based primarily on Mask B criteria using representative traffic signals. Particular attention was paid to possible spectral regrowth determine if regrowth was present. If no regrowth is present, the device could be used with other types of traffic (i.e. those which would require Emission Mask G) if a need arose.

Conducted emissions measurements were made at Professional Testing's Round Rock, Texas laboratory. All measurements were made in an environmentally controlled setting.

5.1 Test Procedure

The spurious emissions for the device were measured using test signals for TDMA and IDEN (GSM) injected into the EUT using a Rhode-Schwartz signal generator. These signals were selected for use for this test based on the criteria described in 47 CRF 2.989 (h).

The conducted spurious emissions of the **CI Wireless Inc., 800 MHz ESMR Band 50 Watt Antenna Extender** was measured using a Hewlett Packard HP 8566 Spectrum Analyzer with a test signal provided to the EUT from a Rhode-Schwartz signal generator.

The Spectrum Analyzer was used to find the maximums of the conducted emissions during the testing. All final measurements were made using a peak measurement method. The final measurements provided were determined by using the following formula:

$$\text{Corrected Level} = \text{Recorded Level} - \text{Pre-Amp Gain} + \text{Antenna Factor} + \text{Cable Loss}$$

5.2 Test Criteria

For this EUT, the data obtained for the occupied bandwidth tests indicated that the emissions from the **CI Wireless Inc., 800 MHz ESMR Band 50 Watt Antenna Extender** were due to the generator, not the EUT (no spectral regrowth observed). In order to evaluate the EUT versus the out of band emission criteria of §90.210, a representative emission mask suitable for this band (Emission mask B) was selected. For emissions beyond the immediate area of the intended emission, the attenuation required by §90.210 does not vary ($43 + 10 \log(P)$) versus emission type. Based on this criteria, transmitter related emissions for the **CI Wireless Inc., 800 MHz ESMR Band 50 Watt Antenna Extender** shall be reduced by the following amount with respect to the level of the fundamental:

<u>Frequency offset versus the fundamental (kHz)</u>	<u>Attenuation versus the fundamental (dB)</u>
20 to 45	26
45 to $2f_c$	60 or $43 + 10 \log(P)$
$2f_c$ to $10f_c$	$43 + 10 \log(P)$

Based on the figures obtained from the occupied bandwidth tests, the peak power of this unit is 50 watts, which translates the $43 + 10 \log(P)$ term to a minimum attenuation of -60 dB. Emission mask G, which can also be applied over this frequency range, has basically the same upper and lower limits of attenuation, but is more stringent (67 dB worst case for a 50 watt transmitter) over the 100%BW to 250%BW section.

5.3 Test Results

The **CI Wireless Inc., 800 MHz ESMR Band 50 Watt Antenna Extender** was tested for conducted spurious emissions at three channel settings for IDEN (GSM) & TDMA transmission modes. The test frequencies used for each modulation type are listed below.

Service Type	Test Channel	Test Frequency (MHz)
IDEN (GSM) & TDMA	Lower	852.0
IDEN (GSM) & TDMA	Middle	860.0
IDEN (GSM) & TDMA	Upper	866.0

Conducted emission data sheets are contained in Appendix E of this report. The **CI Wireless Inc., 800 MHz ESMR Band 50 Watt Antenna Extender** met the §90.210(b) conducted emission requirements.

6.0 Radiofrequency Radiation Exposure Evaluation

An evaluation was performed to provide data regarding the **CI Wireless Inc., 800 MHz ESMR Band 50 Watt Antenna Extender** with respect to the Radiofrequency Radiation Exposure requirements of 47 CFR 1.1310.

6.1 Evaluation Procedure

The primary method of controlling radio frequency radiation exposure from the **CI Wireless Inc., 800 MHz ESMR Band 50 Watt Antenna Extender** will be the responsibility of the installer of the equipment. The device is to be professionally installed by personnel trained and familiar with installation and configuration of wireless systems. The installer is responsible for antenna selection, site selection and final site configuration. Final compliance with Commission RF exposure regulations for this type of site is the responsibility of the installer and is addressed under separate OET documents.

This device is not marketed outside the wireless communications community. In order to install this system properly, the maximum output power versus the frequency range should be reported in the User's Manual for the device such that this issue can be addressed when the installation site of this device is designed.

6.2 Evaluation Results

The output power level for the **CI Wireless Inc., 800 MHz ESMR Band 50 Watt Antenna Extender** is reported in the User's Manual as being 50 watts. In addition, the frequency range for this device is reported as being 851.0 to 866.0 MHz. Based on this information, the **CI Wireless Inc., 800 MHz ESMR Band 50 Watt Antenna Extender** meets the necessary requirements regarding RF exposure.

7.0 Three Signal Intermodulation Test

The **CI Wireless Inc., 800 MHz ESMR Band 50 Watt Antenna Extender** is intended to handle multiple channels, then three signal intermodulation tests are required for each emission kind. This test is a single test using three emission types of the same kind (i.e. three TDMA signals on three separate TDMA channels). The intent of this test is to determine if intermodulation products generated by multiple carriers will generate products which are over the conducted spurious emission limits. While this test is not documented in the Rules, it is a requirement for multiple channel equipment. The test configuration of this test should be:

- (1) Configure 3 signal sources using the same modulation type to provide a multiple channel signal to the device. The recommended channel settings are:
 - (a) One channel at the lowest allowed frequency in the band
 - (b) One channel at the highest allowed frequency in the band
 - (c) One channel at either the 3rd lowest or 3rd highest channel setting. This will provide a 1 channel guard band from the end channel.

The total power for combined output signal should be maximized to the power rating of the EUT. All input channel settings should be equal.

- (2) Measure (or plot) all intermodulation products inside and outside the allowed channel band. All intermodulation products must meet the $43 + 10 \log (P)$ requirement for spurious emissions. This figure should come out to a maximum intermod (or spur) level of -13 dBm. Most measurements of the intermod levels are made using a peak method, however, fully accurate measurements of the intermod levels should be made using the following detection methods:

Modulation Type	Detector/Measurement Method
IDEN (GSM)	Peak
TDMA	Average

Repeat this test for all modulation types which the EUT will be licensed/authorized for.

ALTERNATE METHOD:

Due to the difficulty in providing three identical fully modulated signals, a method using two intermodulation sources (rather than 3) is allowed. The test was configured in the following manner:

- (1) Set one carrier to either the highest or lowest allowed channel in the band.
- (2) Set the second carrier two channels away from the first channel (this will either be the 3rd highest or lowest in the band, again providing a one channel guard band).
- (3) Configure the output power for the signals such that the total output power is at the maximum rating of the EUT. Also, verify that the input levels for all signals are equal.
- (4) Measure (or plot) all intermodulation products inside and outside the allowed channel band. All intermodulation products must meet the $43 + 10 \log (P)$ requirement for spurious emissions. This figure should come out to a maximum intermod (or spur) level of -13 dBm. Most measurements of the intermod levels were made using a peak method, however, fully accurate measurements of the intermod levels were made using the following detection methods:

Modulation Type	Detector/Measurement Method
IDEN (GSM)	Peak
TDMA	Average

- (5) Repeat this test for all modulation types which the EUT will be licensed/authorized for.

The two channel method was used for this test. Plots of the data for this test are shown in the Appendix F.

8.0 Form 731 Information

The following information is provided for inclusion in the FCC Form 731 for the **CI Wireless Inc., 800 MHz ESMR Band 50 Watt Antenna Extender**.

8.1 Emission Designator

Bandwidth:

The **CI Wireless Inc., 800 MHz ESMR Band 50 Watt Antenna Extender** does not possess any circuitry which remodulates or changes the bandwidth of the signal that it receives and repeats. The only potential issue that can arise in this type of product regarding bandwidth is spectral regrowth immediately around the primary emission. This is due to the design and power handling capability of the amplifier.

The data contained in the occupied bandwidth test data does not indicate any spectral regrowth. Based on this information, the bandwidth of emissions from the **CI Wireless Inc., 800 MHz ESMR Band 50 Watt Antenna Extender** would be that of the signal received by the repeater. Since the EUT does not contribute or modify the emission bandwidth, a bandwidth designator will not be included in the overall emission designators for the product. This procedure follows that used during Type Acceptance of the initial CI Wireless Repeater (FCC ID: NUW003EKO19).

Emission Designator::

As with the emission bandwidth, the emission type emitted by the **CI Wireless Inc., 800 MHz ESMR Band 50 Watt Antenna Extender** are depended on the service that it operates with. Due to the intended installation of the system, the RF output signals of the **CI Wireless Inc., 800 MHz ESMR Band 50 Watt Antenna Extender** are complaint with the TDMA and IDEN (GSM) protocol requirements. This output emission designators (based on Part 2.201) for these services are:

Service Type	Emission Description	Emission Designator
IDEN (GSM)	(1) Modulation Type: Phase Modulation (2) Nature of Modulating Signal: Case not covered (combination may not match that addressed in the available selections) (3) Type of data being transmitted can be a combination of digital, voice, telegraphy, television, or facsimile	GXW
TDMA	(1) Modulation Type: Main carrier is angle modulated in a simultaneous or preset sequence. (2) Nature of Modulating Signal: Case not covered (combination may not match that addressed in the available selections) (3) Type of data being transmitted can be a combination of digital, voice, telegraphy, television, or facsimile	DXW

Based on the bandwidth and emission type discussions, the emission designators used for the FCC Form 731 are:

IDEN(GSM) Mode

GXW - All data modes and types

TDMA Mode

DXW - All data modes and types

8.2 Output Power

In the conducted power tests, the highest power attained for each of the power settings was 47.00 dBm (50 watts). This level was achieved at each of the 3 test frequencies for each of the 3 modulation types. Since the system automatically controls the maximum output power, this level should be constant for all single carrier operations.

Due to the operating features of the EUT, this is the maximum composite power available from the device. Therefore, the power rating requested for the grant for the **CI Wireless Inc., 800 MHz ESMR Band 50 Watt Antenna Extender** is:

50 watts

8.3 Output Power Ratings for Multi-channel Operation

The total composite power for this device is 50 watts. The EUT has a power regulation system which will reduce the total individual channel power for the carriers to provide a constant 50 watt composite power regardless of the number of carriers. The worst peak power level is single channel operation, which results in a peak output power of 50 watts (composite power divided by 1). As channels are added to the EUT, the individual channel power is based on the composite power divided by the number of channels. For this reason, the individual channel powers used in the intermod test was 25 watts output per channel ($50/2 = 25$).

8.4 Frequency Band of Operation

The **CI Wireless Inc., 800 MHz ESMR Band 50 Watt Antenna Extender** is rated to be used through the entire 800 MHz cellular (base station) communication band. Based on this requirement, the transmission range of the **CI Wireless Inc., 800 MHz ESMR Band 50 Watt Antenna Extender** is:

851.0 to 866.0 MHz

8.5 Grant Notes

The only exceptions or notes that would normally be listed for this device are:

- (1) The center frequency of the emissions for the IDEN (GSM) should not be less than 1.25 MHz from the band edge (standard guard band).
- (2) The power listed in the grant is the composite power for the device for all carriers.

9.0 Modifications

The **CI Wireless Inc., 800 MHz ESMR Band 50 Watt Antenna Extender** was modified during the performance of the test by installing ferrite 83-10-Y850-1000 and ferrite 83-10-Y379-1000 on the DC line of the remote unit to meet the unintended radiated and conducted emission requirement.

10.0 List of Test Equipment

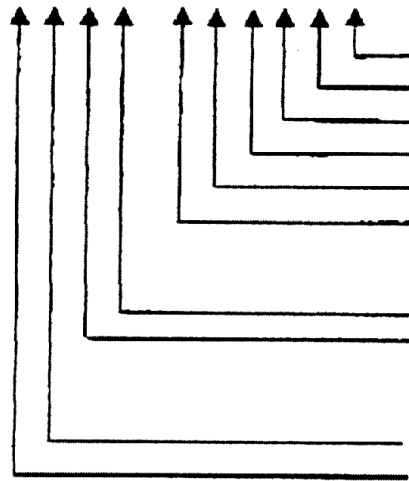
A list of the test equipment utilized to perform the conducted and radiated emission measurements is given below. The date of calibration is given for each.

<u>Device</u>	<u>Description</u>	<u>Date Last Calibrated</u>	<u>Calibration Due</u>
HP 8596E	Spectrum Analyzer	10/9/98	10/9/99
HP 8566B	Spectrum Analyzer	10/30/98	10/30/99
HP 85650A	Quasi Peak Adapter	10/30/98	10/30/99
MITEQ AFS4-00101800-40-10P-N	Preamplifier	05/10/99	05/10/00
EMCO 3108	Biconical Antenna	07/22/98	07/22/99
EMCO 3146	Log Periodic Antenna	07/22/98	07/22/99
EMCO 3115	Double Ridged Horn Antenna	05/10/99	05/10/00
Rohde-Schwartz Model SMI 03E	RF Generator S/N DE23670	11/3/98	11/3/99
Rohde-Schwartz Model SMI 03E	RF Generator S/N DE22176	1/30/98	1/30/00
HP 436A	Power Meter	01/25/99	01/25/00
HP 8482H	Power Meter Head	01/25/99	01/25/00
Mini-Circuits ZAPD-2	RF Splitter	CNR	CNR

CNR = Calibration Not Required

Appendix A

Sub-Model Index Data

800 Hub**Example:** Eko-8HEB0-0AC000**Eko-8H X X X - X X X X X X****Option Designators** (Include only equipped options)

Combiner 0 2 4

Wave Division Multiplex Option

Heater Option (N/A for Hub)

Crossband Coupler Option (1.9 and 800)

AC Power Option (DC Standard)

Duplexer Option

Standard Nomenclature

Reserved

B-Both

C - Cellular

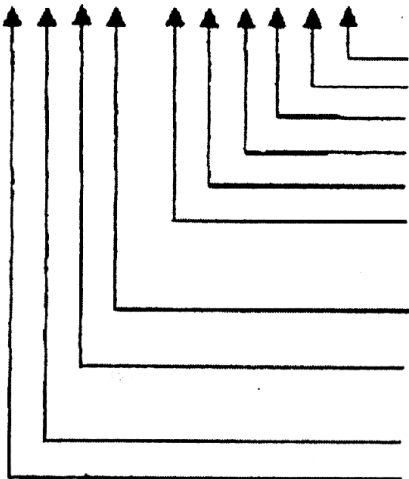
S - Trunking/Cellular

Expansion Configured Hub Unit

H - Hub Unit Only 1.9 GHz, Non-Expandable

Microcell (Remote)**Examples:** Eko-8M0C0-DAC000

Eko-8M0S0-DAC000

Eko-8M X X X - X X X X X X**Option Designators** (Include only equipped options)

Combiner 0 2 4 (N/A)

Wave Division Multiplex

Heater Option

Crossband Coupler Option

AC Power - Standard

Duplexer - Standard

Standard Nomenclature

Reserved

C - Cellular

S - Trunking/ESMR

Expansion or Slave Unit*

M - Standard Power Microcell Unit

R - Microcell Unit, 1900 MHz, 8 watt

* Slave Unit is equipped to interconnect with Eko-1.9M which includes the Eko-M-X option

For the 1900 MHz unit, the 8 shown in these descriptions is replaced by 1.9

Appendix B

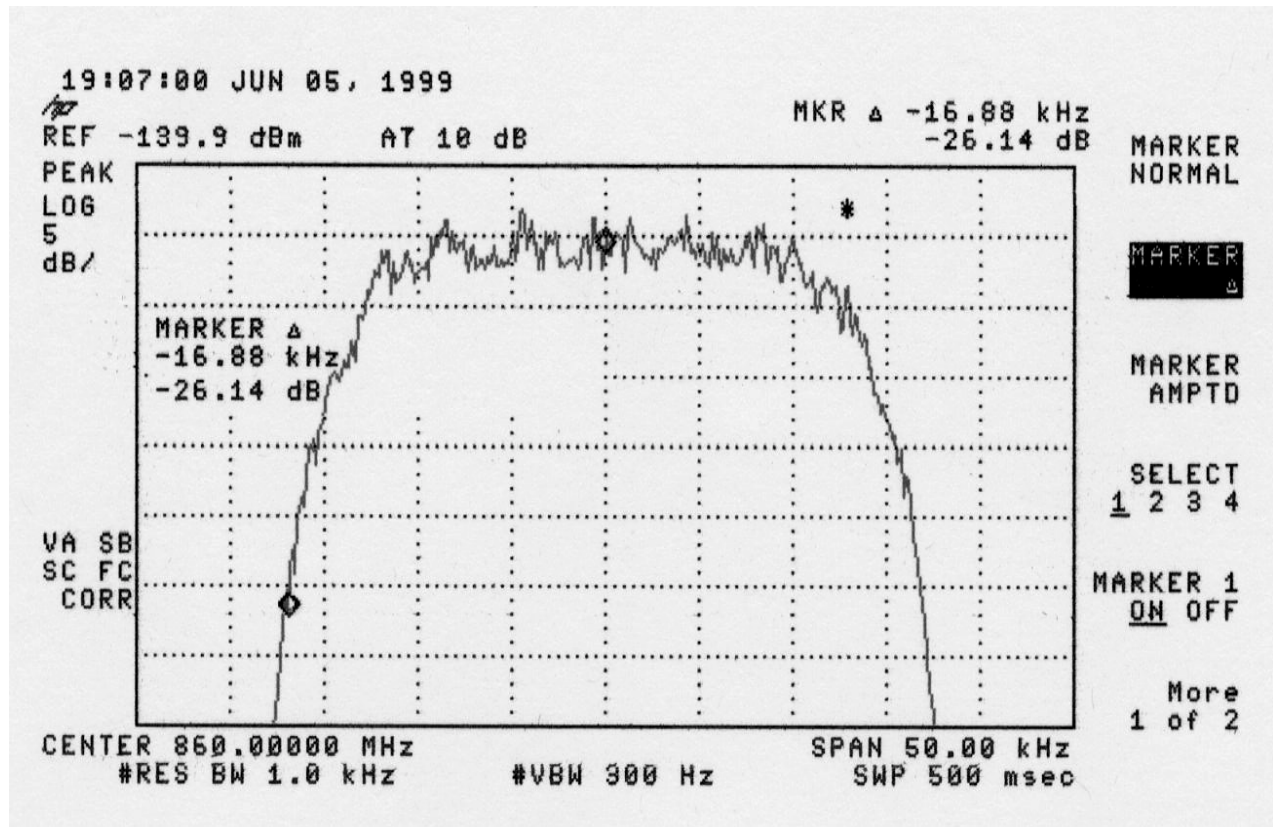
Occupied Bandwidth Test Data

Occupied Bandwidth Data Sheet

CI Wireless Inc. 800 MHz ESMR Band 50 Watt Antenna Extender

SERIAL #: H919005/M919010
DATE: June 9, 1999
CONFIGURATION: EUT

PROJECT #: 00005-10
MODE: TDMA



COMMENT #1: Channel Setting = Middle

COMMENT #2: 26 dB Bandwidth = 33.76 kHz

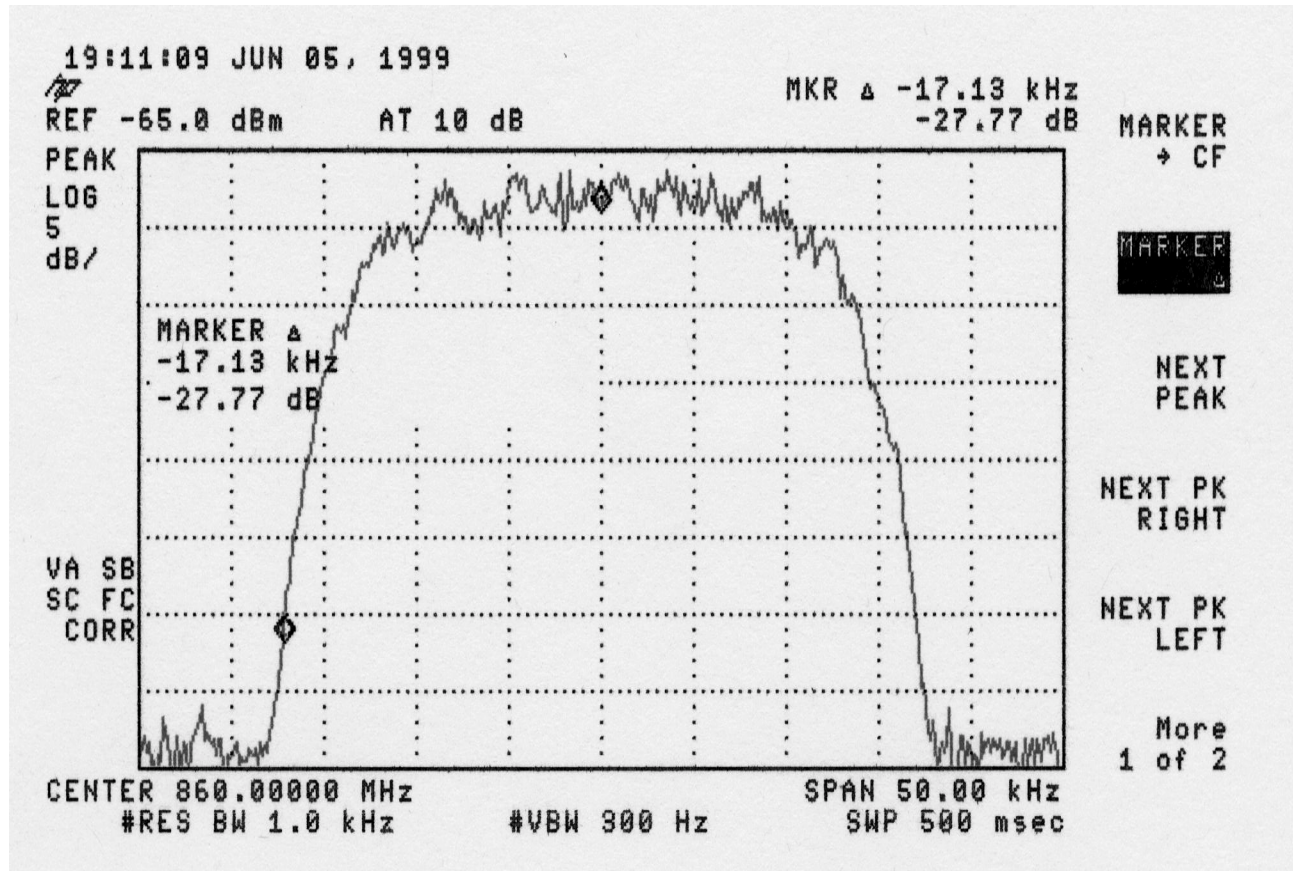
TEST ENGINEER: _____ APPROVED BY: _____
Larry Zhou Jeffrey A. Lenk

Occupied Bandwidth Data Sheet

**CI Wireless Inc.
800 MHz ESMR Band 50 Watt Antenna Extender**

SERIAL #: H919005/M919010
DATE: June 9, 1999
CONFIGURATION: Generator Only

PROJECT #: 00005-10
MODE: TDMA

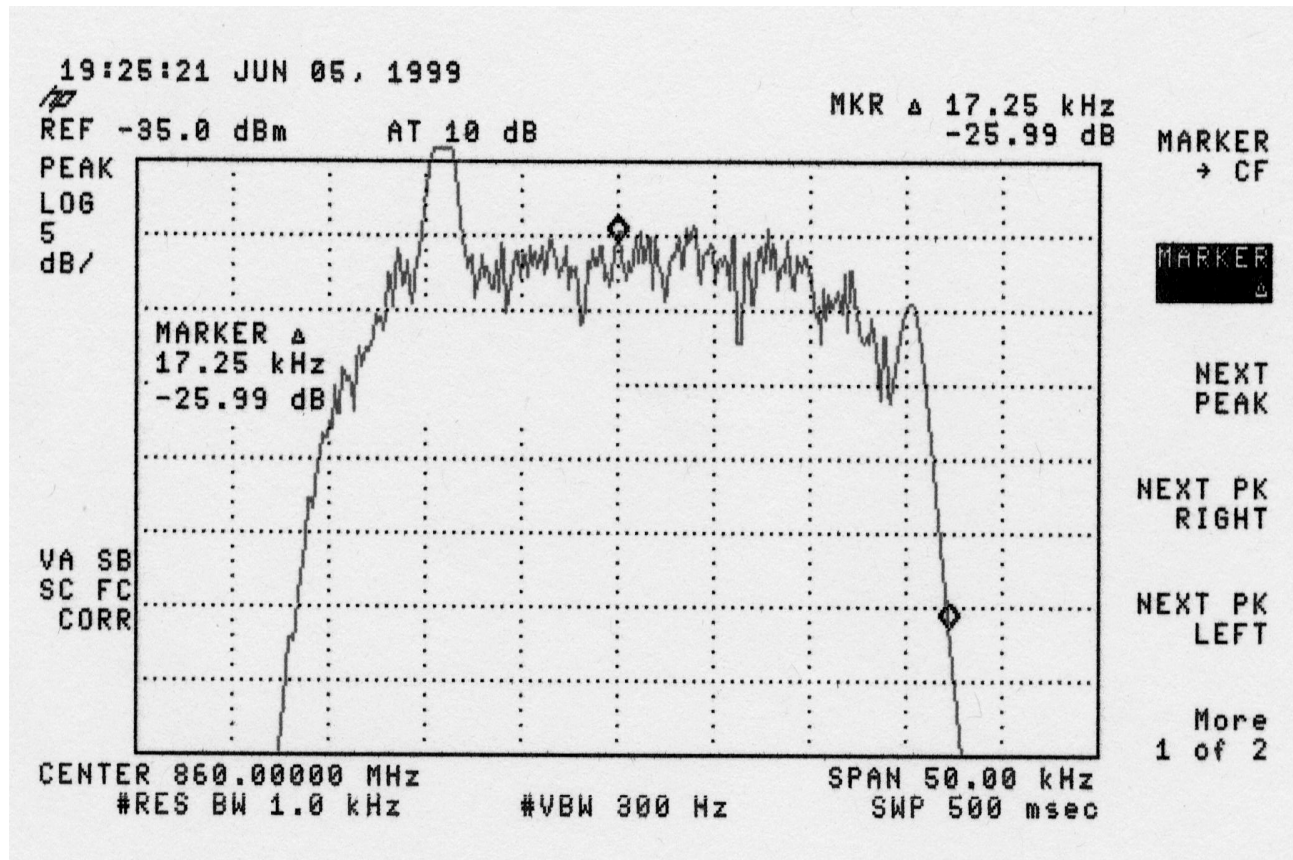


COMMENT #1: Channel Setting = Middle

COMMENT #2: 26 dB Bandwidth = 34.26 kHz

TEST ENGINEER: _____ APPROVED BY: _____
Larry Zhou Jeffrey A. Lenk

Occupied Bandwidth Data Sheet

CI Wireless Inc.
800 MHz ESMR Band 50 Watt Antenna ExtenderSERIAL #: H919005/M919010
DATE: June 9, 1999
CONFIGURATION: EUTPROJECT #: 00005-10
MODE: IDEN (GSM)

COMMENT #1: Channel Setting = Middle

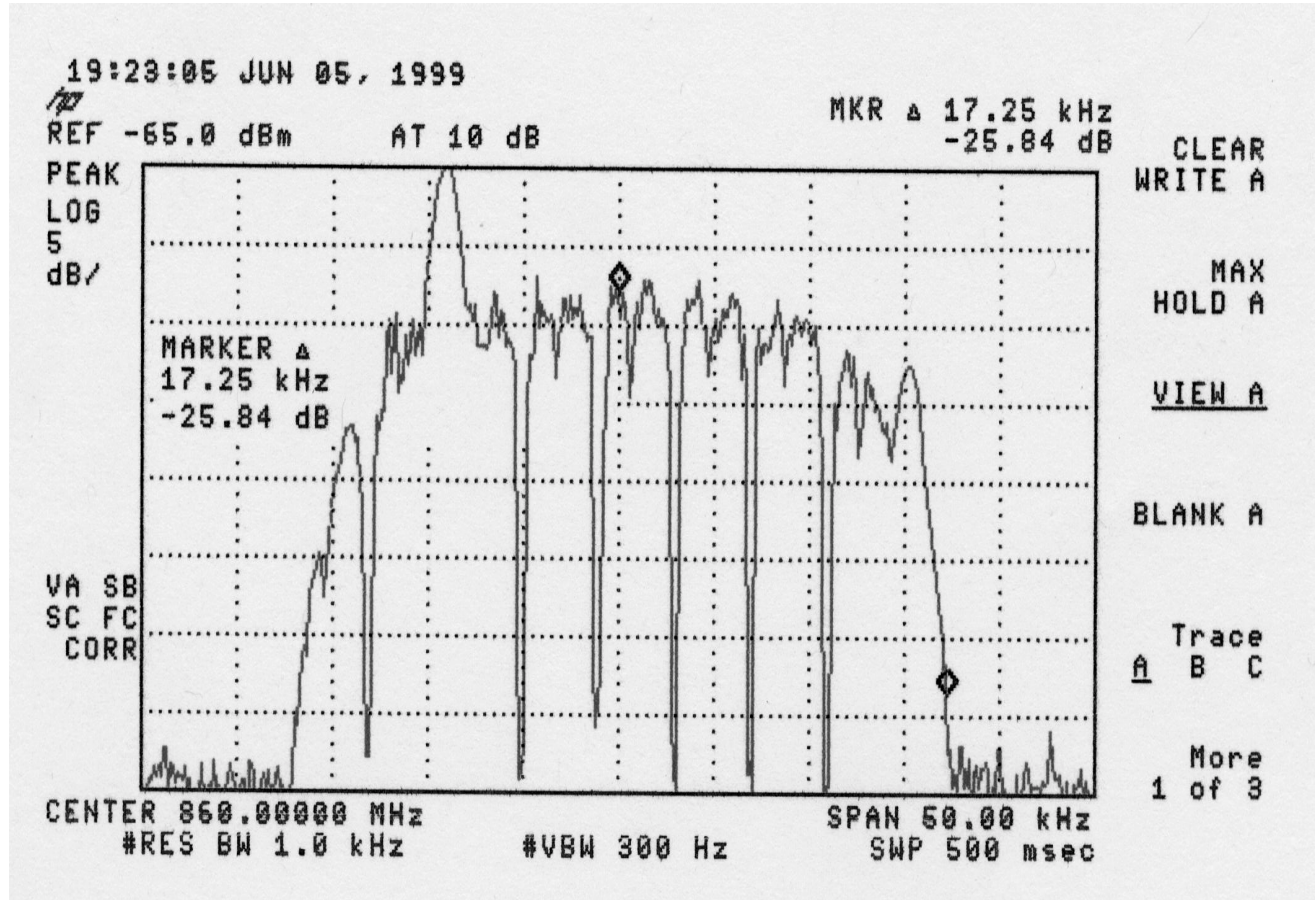
COMMENT #2: 26 dB Bandwidth = 34.50 kHz

TEST ENGINEER: _____ APPROVED BY: _____
Larry Zhou Jeffrey A. Lenk

Occupied Bandwidth Data Sheet**CI Wireless Inc.
800 MHz ESMR Band 50 Watt Antenna Extender**

SERIAL #: H919005/M919010
DATE: June 9, 1999
CONFIGURATION: Generator Only

PROJECT #: 00005-10
MODE: IDEN (GSM)



COMMENT #1: Channel Setting = Middle

COMMENT #2: 26 dB Bandwidth = 34.50 kHz

TEST ENGINEER: _____ APPROVED BY: _____
Larry Zhou Jeffrey A. Lenk

Appendix C

Effective Radiated Power Test Data

Effective Radiated Power Data Sheet

CI Wireless Inc.
800 MHz ESMR Band 50 Watt Antenna Extender

SERIAL #: H911005/M919010

PROJECT #: 00005-10

DATE: June 9, 1999

IDEN (GSM) Mode

Freq. (MHz)	Recorded Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Corrected Level (dBuV/m)	Level ERP (watts)	Limit (watts)	Margin (watts)
852.00	112.00	22.10	6.60	140.70	35.247	500.00	-464.75
860.00	112.40	22.40	6.40	141.20	39.548	500.00	-460.45
868.00	112.00	22.40	6.40	140.80	36.068	500.00	-463.93

TDMA Mode

Freq. (MHz)	Recorded Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Corrected Level (dBuV/m)	Level ERP (watts)	Limit (watts)	Margin (watts)
852.00	112.10	22.10	6.60	140.80	36.068	500.00	-463.93
860.00	112.90	22.40	6.40	141.70	44.373	500.00	-455.63
868.00	112.10	22.40	6.40	140.90	36.908	500.00	-463.09

COMMENT #1: Worst Case Height (All modulations): 1.0 meters

COMMENT #2: Worst case emission direction for all measurements was 180 degrees.

TEST ENGINEER: _____ APPROVED BY: _____
 Larry Zhou Jeffrey A. Lenk

Appendix D

Out of Band Emissions (Radiated) Test Data

Out of Band Emission - Radiated Data Sheet

**CI Wireless Inc.
800 MHz ESMR Band 50 Watt Antenna Extender**

SERIAL #: H919005/M919010
DATE: June 9, 1999
MODE: IDEN (GSM)

PROJECT #: 00005-10
POLARIZATION: Vertical

Freq. (MHz)	EUT Direction (Deg)	Recorded Level (dBuV)	Cable Loss (dB)	Antenna Factor (dBuV/m)	Corrected Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
852.000	0.0	112.00	6.6	22.1	140.7	Ref	Ref
852.017	0.0	72.30	6.6	22.1	101.0	115.7	-14.7
852.034	0.0	49.90	6.6	22.1	78.6	105.7	-27.1
852.085	0.0	45.80	6.6	22.1	74.5	80.7	-6.2
1704.000	0.0	25.60	4.5	25.7	55.8	90.2	-34.4
2556.00	0.0	8.10	3.3	29.2	40.6	90.2	-49.6
3408.00	0.0	7.90	6.0	31.5	45.4	90.2	-44.8
4260.00	0.0	7.90	6.1	33.2	47.2	90.2	-43.0
5112.00	0.0	7.40	6.8	34.2	48.4	90.2	-41.8
5964.00	0.0	10.10	8.7	35.7	54.5	90.2	-35.7
6816.00	0.0	9.40	9.5	35.7	54.6	90.2	-35.6
7668.00	0.0	8.80	9.4	36.1	54.3	90.2	-35.9
8520.00	0.0	9.00	10.4	36.4	55.8	90.2	-34.4

COMMENT #1: Channel = Low Setting, 852.0 MHz

COMMENT #2: Measurements < 1 GHz made at 3 meters. Measurements made > 1 GHz made at 1 meter. No EUT emissions detected from > 1 MHz from the fundamental.

COMMENT #3: Worst case emissions were for EUT antenna in vertical position. Data is presented for this configuration.

TEST ENGINEER: _____ APPROVED BY: _____
Larry Zhou Jeffrey A. Lenk

Out of Band Emission - Radiated Data Sheet

**CI Wireless Inc.
800 MHz ESMR Band 50 Watt Antenna Extender**

SERIAL #: H919005/M919010
DATE: June 9, 1999
MODE: IDEN (GSM)

PROJECT #: 00005-10
POLARIZATION: Horizontal

Freq. (MHz)	EUT Direction (Deg)	Recorded Level (dBuV)	Cable Loss (dB)	Antenna Factor (dBuV/m)	Corrected Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
852.000	0.0	99.30	6.6	22.1	128.0	Ref	Ref
852.017	0.0	61.50	6.6	22.1	90.2	103.0	-12.8
852.034	0.0	39.80	6.6	22.1	68.5	93.0	-24.5
852.085	0.0	35.00	6.6	22.1	63.7	68.0	-4.3
1704.000	0.0	9.60	4.5	25.7	39.8	77.5	-37.7
2556.00	0.0	8.50	3.3	29.2	41.0	77.5	-36.5
3408.00	0.0	7.20	6.0	31.5	44.7	77.5	-32.8
4260.00	0.0	7.10	6.1	33.2	46.4	77.5	-31.1
5112.00	0.0	7.80	6.8	34.2	48.8	77.5	-28.7
5964.00	0.0	9.40	8.7	35.7	53.8	77.5	-23.7
6816.00	0.0	7.50	9.5	35.7	52.7	77.5	-24.8
7668.00	0.0	9.40	9.4	36.1	54.9	77.5	-22.6
8520.00	101.0	7.70	10.4	36.4	54.5	77.5	-23.0

COMMENT #1: Channel = Low Setting, 852.0 MHz

COMMENT #2: Measurements < 1 GHz made at 3 meters. Measurements made > 1 GHz made at 1 meter. No EUT emissions detected from > 1 MHz from the fundamental.

COMMENT #3: Worst case emissions were for EUT antenna in vertical position. Data is presented for this configuration.

TEST ENGINEER: _____ APPROVED BY: _____
Larry Zhou Jeffrey A. Lenk

Out of Band Emission - Radiated Data Sheet

CI Wireless Inc.
800 MHz ESMR Band 50 Watt Antenna Extender

SERIAL #: H919005/M919010
 DATE: June 9, 1999
 MODE: IDEN (GSM)

PROJECT #: 00005-10
 POLARIZATION: Vertical

Freq. (MHz)	EUT Direction (Deg)	Recorded Level (dBuV)	Cable Loss (dB)	Antenna Factor (dBuV/m)	Corrected Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
860.000	180.0	112.40	6.4	22.4	141.2	Ref	Ref
860.017	180.0	71.90	6.4	22.4	100.7	116.2	-15.5
860.034	180.0	51.00	6.4	22.4	79.8	106.2	-26.4
860.085	180.0	46.70	6.4	22.4	75.5	81.2	-5.7
1720.000	180.0	23.70	4.5	25.7	53.9	90.7	-36.8
2580.00	180.0	7.00	3.3	29.2	39.5	90.7	-51.2
3440.00	180.0	7.80	6.0	31.5	45.3	90.7	-45.4
4300.00	180.0	7.90	6.1	33.2	47.2	90.7	-43.5
5160.00	180.0	7.90	6.8	34.2	48.9	90.7	-41.8
6020.00	180.0	5.00	8.7	35.7	49.4	90.7	-41.3
6880.00	180.0	10.30	9.5	35.7	55.5	90.7	-35.2
7740.00	180.0	9.60	9.4	36.1	55.1	90.7	-35.6
8600.00	180.0	9.40	10.4	36.4	56.2	90.7	-34.5

COMMENT #1: Channel = Middle Setting, 860.0 MHz

COMMENT #2: Measurements < 1 GHz made at 3 meters. Measurements made > 1 GHz made at 1 meter. No EUT emissions detected from > 1 MHz from the fundamental.

COMMENT #3: Worst case emissions were for EUT antenna in vertical position. Data is presented for this configuration.

TEST ENGINEER: _____ APPROVED BY: _____
 Larry Zhou Jeffrey A. Lenk

Out of Band Emission - Radiated Data Sheet

CI Wireless Inc.
800 MHz ESMR Band 50 Watt Antenna Extender

SERIAL #: H919005/M919010
DATE: June 9, 1999
MODE: IDEN (GSM)

PROJECT #: 00005-10
POLARIZATION: Horizontal

Freq. (MHz)	EUT Direction (Deg)	Recorded Level (dBuV)	Cable Loss (dB)	Antenna Factor (dBuV/m)	Corrected Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
860.000	0.0	98.70	6.4	22.4	127.5	Ref	Ref
860.017	0.0	60.10	6.4	22.4	88.9	102.5	-13.6
860.034	0.0	39.00	6.4	22.4	67.8	92.5	-24.7
860.085	0.0	34.10	6.4	22.4	62.9	67.5	-4.6
1720.000	0.0	11.40	4.5	25.7	41.6	77.0	-35.4
2580.00	0.0	7.90	3.3	29.2	40.4	77.0	-36.6
3440.00	0.0	6.90	6.0	31.5	44.4	77.0	-32.6
4300.00	0.0	7.20	6.1	33.2	46.5	77.0	-30.5
5160.00	0.0	7.70	6.8	34.2	48.7	77.0	-28.3
6020.00	0.0	9.70	8.7	35.7	54.1	77.0	-22.9
6880.00	0.0	9.20	9.5	35.7	54.4	77.0	-22.6
7740.00	0.0	10.10	9.4	36.1	55.6	77.0	-21.4
8600.00	0.0	9.20	10.4	36.4	56.0	77.0	-21.0

COMMENT #1: Channel = Middle Setting, 860.0 MHz

COMMENT #2: Measurements < 1 GHz made at 3 meters. Measurements made > 1 GHz made at 1 meter. No EUT emissions detected from > 1 MHz from the fundamental.

COMMENT #3: Worst case emissions were for EUT antenna in vertical position. Data is presented for this configuration.

TEST ENGINEER: _____ APPROVED BY: _____
Larry Zhou Jeffrey A. Lenk

Out of Band Emission - Radiated Data Sheet

CI Wireless Inc.
800 MHz ESMR Band 50 Watt Antenna Extender

SERIAL #: H919005/M919010
 DATE: June 9, 1999
 MODE: IDEN (GSM)

PROJECT #: 00005-10
 POLARIZATION: Vertical

Freq. (MHz)	EUT Direction (Deg)	Recorded Level (dBuV)	Cable Loss (dB)	Antenna Factor (dBuV/m)	Corrected Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
866.000	175.0	112.00	6.4	22.4	140.8	Ref	Ref
866.017	175.0	70.90	6.4	22.4	99.7	115.8	-16.1
866.034	175.0	52.30	6.4	22.4	81.1	105.8	-24.7
866.085	175.0	47.80	6.4	22.4	76.6	80.8	-4.2
1732.000	175.0	28.50	4.5	25.7	58.7	90.3	-31.6
2598.00	175.0	7.90	3.3	29.2	40.4	90.3	-49.9
3464.00	175.0	6.90	6.0	31.5	44.4	90.3	-45.9
4330.00	175.0	7.90	6.1	33.2	47.2	90.3	-43.1
5196.00	175.0	7.50	6.8	34.2	48.5	90.3	-41.8
6062.00	175.0	9.60	8.7	35.7	54.0	90.3	-36.3
6928.00	175.0	9.60	9.5	35.7	54.8	90.3	-35.5
7794.00	175.0	9.50	9.4	36.1	55.0	90.3	-35.3
8660.00	175.0	10.20	10.4	36.4	57.0	90.3	-33.3

COMMENT #1: Channel = High Setting, 866.0 MHz

COMMENT #2: Measurements < 1 GHz made at 3 meters. Measurements made > 1 GHz made at 1 meter. No EUT emissions detected from > 1 MHz from the fundamental.

COMMENT #3: Worst case emissions were for EUT antenna in vertical position. Data is presented for this configuration.

TEST ENGINEER: _____ APPROVED BY: _____
 Larry Zhou Jeffrey A. Lenk

Out of Band Emission - Radiated Data Sheet

CI Wireless Inc.
800 MHz ESMR Band 50 Watt Antenna Extender

SERIAL #: H919005/M919010
 DATE: June 9, 1999
 MODE: IDEN (GSM)

PROJECT #: 00005-10
 POLARIZATION: Horizontal

Freq. (MHz)	EUT Direction (Deg)	Recorded Level (dBuV)	Cable Loss (dB)	Antenna Factor (dBuV/m)	Corrected Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
866.000	0.0	98.40	6.4	22.4	127.2	Ref	Ref
866.017	0.0	58.90	6.4	22.4	87.7	102.2	-14.5
866.034	0.0	39.30	6.4	22.4	68.1	92.2	-24.1
866.085	0.0	35.20	6.4	22.4	64.0	67.2	-3.2
1732.000	0.0	12.10	4.5	25.7	42.3	76.7	-34.4
2598.00	0.0	7.50	3.3	29.2	40.0	76.7	-36.7
3464.00	0.0	7.30	6.0	31.5	44.8	76.7	-31.9
4330.00	0.0	8.20	6.1	33.2	47.5	76.7	-29.2
5196.00	0.0	4.00	6.8	34.2	45.0	76.7	-31.7
6062.00	0.0	5.40	8.7	35.7	49.8	76.7	-26.9
6928.00	0.0	6.50	9.5	35.7	51.7	76.7	-25.0
7794.00	0.0	5.00	9.4	36.1	50.5	76.7	-26.2
8660.00	0.0	6.40	10.4	36.4	53.2	76.7	-23.5

COMMENT #1: Channel = High Setting, 866.0 MHz

COMMENT #2: Measurements < 1 GHz made at 3 meters. Measurements made > 1 GHz made at 1 meter. No EUT emissions detected from > 1 MHz from the fundamental.

COMMENT #3: Worst case emissions were for EUT antenna in vertical position. Data is presented for this configuration.

TEST ENGINEER: _____ APPROVED BY: _____
 Larry Zhou Jeffrey A. Lenk

Out of Band Emission - Radiated Data Sheet

**CI Wireless Inc.
800 MHz ESMR Band 50 Watt Antenna Extender**

SERIAL #: H919005/M919010
DATE: June 9, 1999
MODE: TDMA

PROJECT #: 00005-10
POLARIZATION: Vertical

Freq. (MHz)	EUT Direction (Deg)	Recorded Level (dBuV)	Cable Loss (dB)	Antenna Factor (dBuV/m)	Corrected Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
852.000	199.0	112.10	6.6	22.1	140.8	Ref	Ref
852.017	199.0	72.90	6.6	22.1	101.6	115.8	-14.2
852.034	199.0	50.80	6.6	22.1	79.5	105.8	-26.3
852.085	199.0	42.80	6.6	22.1	71.5	80.8	-9.3
1704.000	199.0	24.00	4.5	25.7	54.2	90.3	-36.1
2556.00	199.0	8.10	3.3	29.2	40.6	90.3	-49.7
3408.00	199.0	6.40	6.0	31.5	43.9	90.3	-46.4
4260.00	199.0	7.60	6.1	33.2	46.9	90.3	-43.4
5112.00	199.0	7.10	6.8	34.2	48.1	90.3	-42.2
5964.00	199.0	12.10	8.7	35.7	56.5	90.3	-33.8
6816.00	199.0	13.70	9.5	35.7	58.9	90.3	-31.4
7668.00	199.0	12.50	9.4	36.1	58.0	90.3	-32.3
8520.00	199.0	12.00	10.4	36.4	58.8	90.3	-31.5

COMMENT #1: Channel = Low Setting, 852.0 MHz

COMMENT #2: Measurements < 1 GHz made at 3 meters. Measurements made > 1 GHz made at 1 meter. No EUT emissions detected from > 1 MHz from the fundamental.

COMMENT #3: Worst case emissions were for EUT antenna in vertical position. Data is presented for this configuration.

TEST ENGINEER: _____ APPROVED BY: _____
Larry Zhou **Jeffrey A. Lenk**

Out of Band Emission - Radiated Data Sheet

CI Wireless Inc.
800 MHz ESMR Band 50 Watt Antenna Extender

SERIAL #: H919005/M919010
 DATE: June 9, 1999
 MODE: TDMA

PROJECT #: 00005-10
 POLARIZATION: Horizontal

Freq. (MHz)	EUT Direction (Deg)	Recorded Level (dBuV)	Cable Loss (dB)	Antenna Factor (dBuV/m)	Corrected Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
852.000	0.0	99.20	6.6	22.1	127.9	Ref	Ref
852.017	0.0	62.60	6.6	22.1	91.3	102.9	-11.6
852.034	0.0	34.50	6.6	22.1	63.2	92.9	-29.7
852.085	0.0	34.00	6.6	22.1	62.7	67.9	-5.2
1704.000	0.0	6.70	4.5	25.7	36.9	77.4	-40.5
2556.00	0.0	6.50	3.3	29.2	39.0	77.4	-38.4
3408.00	0.0	7.70	6.0	31.5	45.2	77.4	-32.2
4260.00	0.0	7.40	6.1	33.2	46.7	77.4	-30.7
5112.00	0.0	6.30	6.8	34.2	47.3	77.4	-30.1
5964.00	0.0	15.00	8.7	35.7	59.4	77.4	-18.0
6816.00	0.0	13.90	9.5	35.7	59.1	77.4	-18.3
7668.00	0.0	13.40	9.4	36.1	58.9	77.4	-18.5
8520.00	101.0	11.20	10.4	36.4	58.0	77.4	-19.4

COMMENT #1: Channel = Low Setting, 852.0 MHz

COMMENT #2: Measurements < 1 GHz made at 3 meters. Measurements made > 1 GHz made at 1 meter. No EUT emissions detected from > 1 MHz from the fundamental.

COMMENT #3: Worst case emissions were for EUT antenna in vertical position. Data is presented for this configuration.

TEST ENGINEER: _____ APPROVED BY: _____
 Larry Zhou Jeffrey A. Lenk

Out of Band Emission - Radiated Data Sheet

CI Wireless Inc.
800 MHz ESMR Band 50 Watt Antenna Extender

SERIAL #: H919005/M919010
 DATE: June 9, 1999
 MODE: TDMA

PROJECT #: 00005-10
 POLARIZATION: Vertical

Freq. (MHz)	EUT Direction (Deg)	Recorded Level (dBuV)	Cable Loss (dB)	Antenna Factor (dBuV/m)	Corrected Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
860.000	183.0	112.90	6.4	22.4	141.7	Ref	Ref
860.017	183.0	66.80	6.4	22.4	95.6	116.7	-21.1
860.034	183.0	59.50	6.4	22.4	88.3	106.7	-18.4
860.085	183.0	42.90	6.4	22.4	71.7	81.7	-10.0
1720.000	183.0	23.70	4.5	25.7	53.9	91.2	-37.3
2580.00	183.0	7.60	3.3	29.2	40.1	91.2	-51.1
3440.00	183.0	7.40	6.0	31.5	44.9	91.2	-46.3
4300.00	183.0	6.70	6.1	33.2	46.0	91.2	-45.2
5160.00	183.0	14.30	6.8	34.2	55.3	91.2	-35.9
6020.00	183.0	14.90	8.7	35.7	59.3	91.2	-31.9
6880.00	183.0	14.20	9.5	35.7	59.4	91.2	-31.8
7740.00	183.0	13.60	9.4	36.1	59.1	91.2	-32.1
8600.00	183.0	12.50	10.4	36.4	59.3	91.2	-31.9

COMMENT #1: Channel = Middle Setting, 860.0 MHz

COMMENT #2: Measurements < 1 GHz made at 3 meters. Measurements made > 1 GHz made at 1 meter. No EUT emissions detected from > 1 MHz from the fundamental.

COMMENT #3: Worst case emissions were for EUT antenna in vertical position. Data is presented for this configuration.

TEST ENGINEER: _____ APPROVED BY: _____
 Larry Zhou Jeffrey A. Lenk

Out of Band Emission - Radiated Data Sheet

CI Wireless Inc.
800 MHz ESMR Band 50 Watt Antenna Extender

SERIAL #: H919005/M919010
 DATE: June 9, 1999
 MODE: TDMA

PROJECT #: 00005-10
 POLARIZATION: Horizontal

Freq. (MHz)	EUT Direction (Deg)	Recorded Level (dBuV)	Cable Loss (dB)	Antenna Factor (dBuV/m)	Corrected Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
860.000	0.0	101.70	6.4	22.4	130.5	Ref	Ref
860.017	0.0	51.90	6.4	22.4	80.7	105.5	-24.8
860.034	0.0	34.80	6.4	22.4	63.6	95.5	-31.9
860.085	0.0	34.30	6.4	22.4	63.1	70.5	-7.4
1720.000	0.0	9.50	4.5	25.7	39.7	80.0	-40.3
2580.00	0.0	7.80	3.3	29.2	40.3	80.0	-39.7
3440.00	0.0	7.50	6.0	31.5	45.0	80.0	-35.0
4300.00	0.0	7.40	6.1	33.2	46.7	80.0	-33.3
5160.00	0.0	6.80	6.8	34.2	47.8	80.0	-32.2
6020.00	0.0	13.90	8.7	35.7	58.3	80.0	-21.7
6880.00	0.0	13.30	9.5	35.7	58.5	80.0	-21.5
7740.00	0.0	13.10	9.4	36.1	58.6	80.0	-21.4
8600.00	0.0	13.10	10.4	36.4	59.9	80.0	-20.1

COMMENT #1: Channel = Middle Setting, 860.0 MHz

COMMENT #2: Measurements < 1 GHz made at 3 meters. Measurements made > 1 GHz made at 1 meter. No EUT emissions detected from > 1 MHz from the fundamental.

COMMENT #3: Worst case emissions were for EUT antenna in vertical position. Data is presented for this configuration.

TEST ENGINEER: _____ APPROVED BY: _____
 Larry Zhou Jeffrey A. Lenk

Out of Band Emission - Radiated Data Sheet

CI Wireless Inc.
800 MHz ESMR Band 50 Watt Antenna Extender

SERIAL #: H919005/M919010
 DATE: June 9, 1999
 MODE: TDMA

PROJECT #: 00005-10
 POLARIZATION: Vertical

Freq. (MHz)	EUT Direction (Deg)	Recorded Level (dBuV)	Cable Loss (dB)	Antenna Factor (dBuV/m)	Corrected Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
866.000	346.0	112.30	6.4	22.4	141.1	Ref	Ref
866.017	346.0	74.20	6.4	22.4	103.0	116.1	-13.1
866.034	346.0	54.80	6.4	22.4	83.6	106.1	-22.5
866.085	346.0	46.00	6.4	22.4	74.8	81.1	-6.3
1732.000	346.0	21.90	4.5	25.7	52.1	90.6	-38.5
2598.00	346.0	7.90	3.3	29.2	40.4	90.6	-50.2
3464.00	346.0	6.90	6.0	31.5	44.4	90.6	-46.2
4330.00	346.0	7.60	6.1	33.2	46.9	90.6	-43.7
5196.00	346.0	6.30	6.8	34.2	47.3	90.6	-43.3
6062.00	346.0	14.10	8.7	35.7	58.5	90.6	-32.1
6928.00	346.0	14.30	9.5	35.7	59.5	90.6	-31.1
7794.00	346.0	14.00	9.4	36.1	59.5	90.6	-31.1
8660.00	346.0	12.40	10.4	36.4	59.2	90.6	-31.4

COMMENT #1: Channel = High Setting, 866.0 MHz

COMMENT #2: Measurements < 1 GHz made at 3 meters. Measurements made > 1 GHz made at 1 meter. No EUT emissions detected from > 1 MHz from the fundamental.

COMMENT #3: Worst case emissions were for EUT antenna in vertical position. Data is presented for this configuration.

TEST ENGINEER: _____ APPROVED BY: _____
 Larry Zhou Jeffrey A. Lenk

Out of Band Emission - Radiated Data Sheet

CI Wireless Inc.
800 MHz ESMR Band 50 Watt Antenna Extender

SERIAL #: H919005/M919010
 DATE: June 9, 1999
 MODE: TDMA

PROJECT #: 00005-10
 POLARIZATION: Horizontal

Freq. (MHz)	EUT Direction (Deg)	Recorded Level (dBuV)	Cable Loss (dB)	Antenna Factor (dBuV/m)	Corrected Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
866.000	0.0	101.20	6.4	22.4	130.0	Ref	Ref
866.017	0.0	47.30	6.4	22.4	76.1	105.0	-28.9
866.034	0.0	35.20	6.4	22.4	64.0	95.0	-31.0
866.085	0.0	34.10	6.4	22.4	62.9	70.0	-7.1
1732.000	0.0	9.10	4.5	25.7	39.3	79.5	-40.2
2598.00	0.0	7.40	3.3	29.2	39.9	79.5	-39.6
3464.00	0.0	6.30	6.0	31.5	43.8	79.5	-35.7
4330.00	0.0	6.50	6.1	33.2	45.8	79.5	-33.7
5196.00	0.0	14.90	6.8	34.2	55.9	79.5	-23.6
6062.00	0.0	13.90	8.7	35.7	58.3	79.5	-21.2
6928.00	0.0	13.10	9.5	35.7	58.3	79.5	-21.2
7794.00	0.0	9.00	9.4	36.1	54.5	79.5	-25.0
8660.00	0.0	10.30	10.4	36.4	57.1	79.5	-22.4

COMMENT #1: Channel = High Setting, 866.0 MHz

COMMENT #2: Measurements < 1 GHz made at 3 meters. Measurements made > 1 GHz made at 1 meter. No EUT emissions detected from > 1 MHz from the fundamental.

COMMENT #3: Worst case emissions were for EUT antenna in vertical position. Data is presented for this configuration.

TEST ENGINEER: _____ APPROVED BY: _____
 Larry Zhou Jeffrey A. Lenk

Appendix E

Out of Band Emissions (Conducted) Test Data

Out of Band Emission - Conducted Data Sheet

**CI Wireless Inc.
800 MHz ESMR Band 50 Watt Antenna Extender**

SERIAL #: H919005/M919010

PROJECT #: 00005-10

DATE: Jun 10, 1999

MODE: IDEN (GSM)

Freq. (MHz)	Recorded Level (dBm)	Cable Loss (dB)	Corrected Level (dBm)	Limit (dBm)	Margin (dB)
852.000	46.00	1.0	47.0	Ref	Ref
852.017	8.20	1.0	9.2	22.0	-12.8
852.034	-17.10	1.0	-16.1	12.0	-28.1
852.085	-17.60	1.0	-16.6	-13.0	-3.6
1704.000	-15.90	1.0	-14.9	-13.0	-1.9
2556.00	-15.80	1.0	-14.8	-13.0	-1.8
3408.00	-17.20	1.0	-16.2	-13.0	-3.2
4260.00	-17.50	1.0	-16.5	-13.0	-3.5
5112.00	-17.90	1.0	-16.9	-13.0	-3.9
5964.00	-17.90	1.0	-16.9	-13.0	-3.9
6816.00	-20.10	1.0	-19.1	-13.0	-6.1
7668.00	-18.90	1.0	-17.9	-13.0	-4.9
8520.00	-19.40	1.0	-18.4	-13.0	-5.4

COMMENT #1: Channel = Lowest Setting, 852.00 MHz

COMMENT #2: Recorded Level adjusted to compensate for 60 dB attenuator installed in signal path prior to taking reading.

TEST ENGINEER: _____ **APPROVED BY:** _____
Larry Zhou **Jeffrey A. Lenk**

Out of Band Emission - Conducted Data Sheet

**CI Wireless Inc.
800 MHz ESMR Band 50 Watt Antenna Extender**

SERIAL #: H919005/M919010

PROJECT #: 00005-10

DATE: Jun 10, 1999

MODE: IDEN (GSM)

Freq. (MHz)	Recorded Level (dBm)	Cable Loss (dB)	Corrected Level (dBm)	Limit (dBm)	Margin (dB)
860.000	46.00	1.0	47.0	Ref	Ref
860.017	1.00	1.0	2.0	22.0	-20.0
860.034	-17.50	1.0	-16.5	12.0	-28.5
860.085	-19.70	1.0	-18.7	-13.0	-5.7
1720.000	-16.70	1.0	-15.7	-13.0	-2.7
2580.00	-16.30	1.0	-15.3	-13.0	-2.3
3440.00	-17.50	1.0	-16.5	-13.0	-3.5
4300.00	-17.90	1.0	-16.9	-13.0	-3.9
5160.00	-18.20	1.0	-17.2	-13.0	-4.2
6020.00	-17.20	1.0	-16.2	-13.0	-3.2
6880.00	-20.00	1.0	-19.0	-13.0	-6.0
7740.00	-19.20	1.0	-18.2	-13.0	-5.2
8600.00	-19.20	1.0	-18.2	-13.0	-5.2

COMMENT #1: Channel = Middle Setting, 860.00 MHz

COMMENT #2: Recorded Level adjusted to compensate for 60 dB attenuator installed in signal path prior to taking reading.

TEST ENGINEER: _____ APPROVED BY: _____
 Larry Zhou **Jeffrey A. Lenk**

Out of Band Emission - Conducted Data Sheet

**CI Wireless Inc.
800 MHz ESMR Band 50 Watt Antenna Extender**

SERIAL #: H919005/M919010

PROJECT #: 00005-10

DATE: Jun 10, 1999

MODE: IDEN (GSM)

Freq. (MHz)	Recorded Level (dBm)	Cable Loss (dB)	Corrected Level (dBm)	Limit (dBm)	Margin (dB)
866.000	46.00	1.0	47.0	Ref	Ref
866.017	-0.50	1.0	0.5	22.0	-21.5
866.034	-15.70	1.0	-14.7	12.0	-26.7
866.085	-16.40	1.0	-15.4	-13.0	-2.4
1732.000	-16.10	1.0	-15.1	-13.0	-2.1
2598.00	-16.20	1.0	-15.2	-13.0	-2.2
3464.00	-17.20	1.0	-16.2	-13.0	-3.2
4330.00	-17.50	1.0	-16.5	-13.0	-3.5
5196.00	-17.30	1.0	-16.3	-13.0	-3.3
6062.00	-17.50	1.0	-16.5	-13.0	-3.5
6928.00	-19.90	1.0	-18.9	-13.0	-5.9
7794.00	-19.00	1.0	-18.0	-13.0	-5.0
8660.00	-19.50	1.0	-18.5	-13.0	-5.5

COMMENT #1: Channel = High Setting, 866.00 MHz

COMMENT #2: Recorded Level adjusted to compensate for 60 dB attenuator installed in signal path prior to taking reading.

TEST ENGINEER: _____ **APPROVED BY:** _____
Larry Zhou **Jeffrey A. Lenk**

Out of Band Emission - Conducted Data Sheet

CI Wireless Inc.
800 MHz ESMR Band 50 Watt Antenna Extender

SERIAL #: H919005/M919010

PROJECT #: 00005-10

DATE: Jun 10, 1999

MODE: TDMA

Freq. (MHz)	Recorded Level (dBm)	Cable Loss (dB)	Corrected Level (dBm)	Limit (dBm)	Margin (dB)
852.000	46.00	1.0	47.0	Ref	Ref
852.017	12.20	1.0	13.2	22.0	-8.8
852.034	-16.90	1.0	-15.9	12.0	-27.9
852.085	-17.80	1.0	-16.8	-13.0	-3.8
1704.000	-16.60	1.0	-15.6	-13.0	-2.6
2556.00	-16.10	1.0	-15.1	-13.0	-2.1
3408.00	-17.30	1.0	-16.3	-13.0	-3.3
4260.00	-17.70	1.0	-16.7	-13.0	-3.7
5112.00	-17.90	1.0	-16.9	-13.0	-3.9
5964.00	-17.40	1.0	-16.4	-13.0	-3.4
6816.00	-19.90	1.0	-18.9	-13.0	-5.9
7668.00	-19.70	1.0	-18.7	-13.0	-5.7
8520.00	-19.30	1.0	-18.3	-13.0	-5.3

COMMENT #1: Channel = Lowest Setting, 852.00 MHz

COMMENT #2: Recorded Level adjusted to compensate for 60 dB attenuator installed in signal path prior to taking reading.

TEST ENGINEER: _____ **APPROVED BY:** _____
Larry Zhou **Jeffrey A. Lenk**

Out of Band Emission - Conducted Data Sheet

CI Wireless Inc.
800 MHz ESMR Band 50 Watt Antenna Extender

SERIAL #: H919005/M919010

PROJECT #: 00005-10

DATE: Jun 10, 1999

MODE: TDMA

Freq. (MHz)	Recorded Level (dBm)	Cable Loss (dB)	Corrected Level (dBm)	Limit (dBm)	Margin (dB)
860.000	46.00	1.0	47.0	Ref	Ref
860.017	1.10	1.0	2.1	22.0	-19.9
860.034	-16.20	1.0	-15.2	12.0	-27.2
860.085	-16.70	1.0	-15.7	-13.0	-2.7
1720.000	-16.60	1.0	-15.6	-13.0	-2.6
2580.00	-16.40	1.0	-15.4	-13.0	-2.4
3440.00	-17.50	1.0	-16.5	-13.0	-3.5
4300.00	-17.50	1.0	-16.5	-13.0	-3.5
5160.00	-17.50	1.0	-16.5	-13.0	-3.5
6020.00	-17.40	1.0	-16.4	-13.0	-3.4
6880.00	-20.50	1.0	-19.5	-13.0	-6.5
7740.00	-19.50	1.0	-18.5	-13.0	-5.5
8600.00	-18.90	1.0	-17.9	-13.0	-4.9

COMMENT #1: Channel = Middle Setting, 860.00 MHz

COMMENT #2: Recorded Level adjusted to compensate for 60 dB attenuator installed in signal path prior to taking reading.

TEST ENGINEER: _____ **APPROVED BY:** _____
Larry Zhou **Jeffrey A. Lenk**

Out of Band Emission - Conducted Data Sheet

CI Wireless Inc.
800 MHz ESMR Band 50 Watt Antenna Extender

SERIAL #: H919005/M919010

PROJECT #: 00005-10

DATE: Jun 10, 1999

MODE: TDMA

Freq. (MHz)	Recorded Level (dBm)	Cable Loss (dB)	Corrected Level (dBm)	Limit (dBm)	Margin (dB)
866.000	46.00	1.0	47.0	Ref	Ref
866.017	13.80	1.0	14.8	22.0	-7.2
866.034	-16.70	1.0	-15.7	12.0	-27.7
866.085	-17.40	1.0	-16.4	-13.0	-3.4
1732.000	-16.40	1.0	-15.4	-13.0	-2.4
2598.00	-16.50	1.0	-15.5	-13.0	-2.5
3464.00	-17.40	1.0	-16.4	-13.0	-3.4
4330.00	-17.50	1.0	-16.5	-13.0	-3.5
5196.00	-17.20	1.0	-16.2	-13.0	-3.2
6062.00	-17.20	1.0	-16.2	-13.0	-3.2
6928.00	-20.50	1.0	-19.5	-13.0	-6.5
7794.00	-19.20	1.0	-18.2	-13.0	-5.2
8660.00	-19.20	1.0	-18.2	-13.0	-5.2

COMMENT #1: Channel = High Setting, 866.00 MHz

COMMENT #2: Recorded Level adjusted to compensate for 60 dB attenuator installed in signal path prior to taking reading.

TEST ENGINEER: _____ **APPROVED BY:** _____
Larry Zhou **Jeffrey A. Lenk**

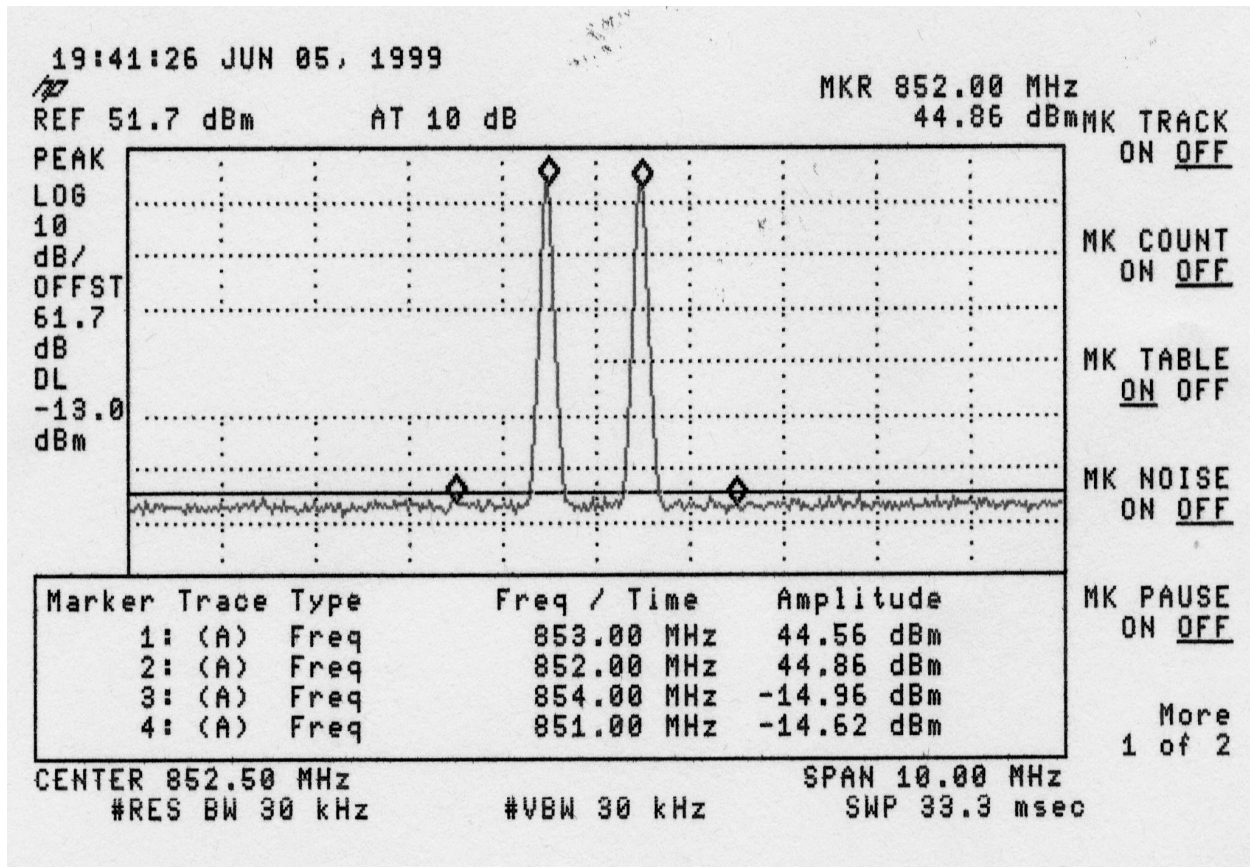
Appendix F

Intermodulation Product Data Sheets

Intermodulation Product Data Sheet**CI Wireless Inc.
800 MHz ESMR Band 50 Watt Antenna Extender**

SERIAL #: H919005/M919010
DATE: Jun 10, 1999
DETECTOR FUNCTION: Peak

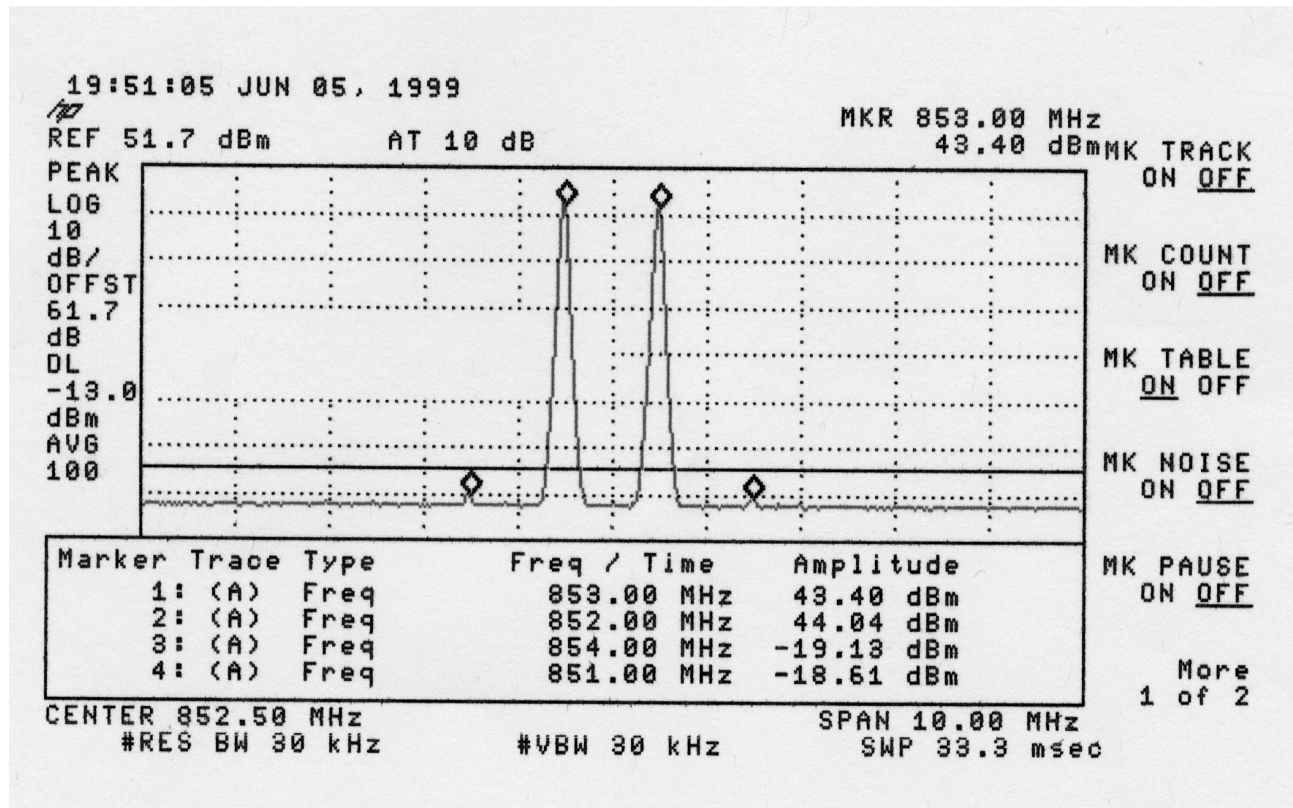
MODE: IDEN (GSM)
LINE MEASURED: Antenna
PROJECT #: 00005-10



COMMENT #1: Display Line Set to Limit of -13 dBm

TEST ENGINEER: _____ APPROVED BY: _____
Larry Zhou Jeffrey A. Lenk

Intermodulation Product Data Sheet

CI Wireless Inc.
800 MHz ESMR Band 50 Watt Antenna ExtenderSERIAL #: H919005/M919010
DATE: Jun 10, 1999
DETECTOR FUNCTION: AverageMODE: TDMA
LINE MEASURED: Antenna
PROJECT #: 00005-10

COMMENT #1: Display Line Set to Limit of -13 dBm

TEST ENGINEER: _____ APPROVED BY: _____
Larry Zhou Jeffrey A. Lenk