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Electromagnetic Emissions Test Report and Application for Grant of Equipment Authorization pursuant to FCC Part 15, Subpart C (15.247) FHSS Specifications and Industry Canada RSS 210 Issue 5 for an Intentional Radiator on the PalmOne, Inc. Model: BCM-2035

GRANTEE:	PalmOne, Inc. 400 N. McCarthy Blvd. Milpitas, CA 95035-5112
TEST SITE:	Elliott Laboratories, Inc. 41039 Boyce Road Fremont, CA 94538-2435
REPORT DATE:	August 24, 2004
FINAL TEST DATE:	August 6 and August 11, 2004
AUTHORIZED SIGNATORY:	Juan Martinez Senior EMC Engineer

ACCREDITED

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SCOPE

An electromagnetic emissions test has been performed on the PalmOne, Inc. model BCM-2035 pursuant to Subpart C of Part 15 of FCC Rules for intentional radiators and RSS-210 Issue 5 for licence-exempt low power devices. Conducted and radiated emissions data has been collected, reduced, and analyzed within this report in accordance with measurement guidelines set forth in ANSI C63.4-1992 as outlined in Elliott Laboratories test procedures.

The intentional radiator above has been tested in a simulated typical installation to demonstrate compliance with the relevant FCC performance and procedural standards.

Final system data was gathered in a mode that tended to maximize emissions by varying orientation of EUT, orientation of power and I/O cabling, antenna search height, and antenna polarization.

Every practical effort was made to perform an impartial test using appropriate test equipment of known calibration. All pertinent factors have been applied to reach the determination of compliance.

The test results recorded herein are based on a single type test of the PalmOne, Inc. model BCM-2035 and therefore apply only to the tested sample. The sample was selected and prepared by David Waitt of PalmOne, Inc.

OBJECTIVE

The primary objective of the manufacturer is compliance with Subpart C of Part 15 of FCC Rules and RSS-210 Issue 5 for license-exempt low power devices for the radiated and conducted emissions of intentional radiators. Certification of these devices is required as a prerequisite to marketing as defined in Part 2 the FCC Rules.

Certification is a procedure where the manufacturer or a contracted laboratory makes measurements and submits the test data and technical information to the FCC. The FCC issues a grant of equipment authorization upon successful completion of their review of the submitted documents. Once the equipment authorization has been obtained, the label indicating compliance must be attached to all identical units that are subsequently manufactured.

SUMMARY OF RESULTS

Note – remove references in the table below that do not apply to the radio tested

FCC Part 15 Section	RSS 210 Section	Description	Measured Value	Comments	Result
	6.2.2(o)(a)	20dB Bandwidth	825 kHz	The channel spacing shall be greater than the 20dB bandwidth	Complies
	6.2.2(o)(a)	Channel Separation	1000 kHz		Complies
	6.2.2(o)(a)	Number of Channels	79	**2400- 2483.5 MHz**: 75 hopping frequencies: average time of occupancy <0.4 second within a 30 second period. *Less than 75 hopping frequencies: The total span of hopping channels shall be at least 75 MHz. The time of occupancy on any one channel shall be no greater than 0.4 seconds within the time period required to hop through all channels*	Complies
	6.2.2(o)(a)	Channel Dwell Time	0.026 seconds per 31.6 seconds		Complies
	6.2.2(o)(a)	Channel Utilization	All channels are used equally	BlueTooth Devices: The system uses the BlueTooth algorithm and, therefore, meets all requirements for channel utilization.	Complies
15.247 (b) (3)	6.2.2(o)(a)	Output Power, 2400 - 2483.5 MHz	-2.2 dBm (0.0006 Watts) ACE CDMA	**2400 – 2483.5 MHz** Maximum permitted is 1Watt, with EIRP limited to 4 Watts for a 50-	Complies

			-2.3 dBm (0.00059 Watts) ACE GSM	channel system. Maximum permitted is *0.125 Watts for a system that uses less than 75 channels*	
15.247(c)	6.2.2(o)(e1)	Spurious Emissions – 30MHz – 25GHz	All spurious emissions < -20dBc	All spurious emissions < -20dBc.	Complies
15.247(c) / 15.209		Radiated Spurious Emissions 30MHz – 25GHz	48.5 dBuV/m @ 17928.52 MHz (-5.5 dB)	Emissions in restricted bands must meet the radiated emissions limits detailed in 15.207. All others must be < -20dBc	Complies
15.207		AC Conducted Emissions	43.4 dBuV @ 0.666 MHz (-12.6 dB)		Complies
	6.6	AC Conducted Emissions	43.4dBuV @ 0. 0.666 MHz (-4.6 dB)		Complies
15.247 (b) (5)		RF Exposure Requirements	Refer to SAR Report	Refer to SAR Report	N/A
15.203		RF Connector	Describe antenna	Integral antenna to device	Complies

MEASUREMENT UNCERTAINTIES

ISO Guide 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level and were calculated in accordance with NAMAS document NIS 81.

Measurement Type	Frequency Range (MHz)	Calculated Uncertainty (dB)
Conducted Emissions	0.15 to 30	± 2.4
Radiated Emissions	30 to 1000	± 3.6

EQUIPMENT UNDER TEST (EUT) DETAILS

GENERAL

The EUT is a PDA w/ Bluetooth capability which is designed to provide wireless communications to other bluetooth devices. Normally, the EUT would be placed on a table top during operation. The EUT was, therefore, treated as table-top equipment during testing to simulate the end-user environment. The electrical rating of the EUT is 120/240 V, 50/60 Hz, .2 Amps.

The sample was received on and tested on August 6 and August 11, 2004. The EUT consisted of the following component(s):

Manufacturer/Model/Description	Serial Number	Proposed FCC ID #
Broadcom BCM-2035 bluetooth device	-	-

ENCLOSURE

The EUT has no enclosure. It is designed to be installed within the enclosure of a host PDA.

MODIFICATIONS

The EUT did not require modifications during testing in order to comply with the emission specifications.

SUPPORT EQUIPMENT

The following equipment was used as local support equipment for emissions testing:

Manufacturer	Model	Description	Serial Number	FCC ID
Wavetex	4400M	Communication Test	1011020511134	N/A
Rhode & Schwarz	S18512RPP	Communication Test	N/A	N/A
Cushcraft	S18512RPP	Patch Antenna	N/A	N/A
PalmOne	N/A	Dipole	N/A	N/A

No equipment was used as remote support equipment for emissions testing.

EUT INTERFACE PORTS

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
DC in	AC/DC adaptor	multiwire	Unshielded	1.7

EUT OPERATION DURING TESTING

EUT was transmitting at full power on the low, middle, and high channel.

TEST SITE

GENERAL INFORMATION

Final test measurements were taken on August 6 and August 11, 2004 at the Elliott Laboratories Chamber #5 located at 41039 Boyce Road, Fremont, California. The test site contains separate areas for radiated and conducted emissions testing. Pursuant to section 2.948 of the Rules, construction, calibration, and equipment data has been filed with the Federal Communications Commission. In accordance with Industry Canada rules detailed in RSS 210 Issue 5 and RSS-212, construction, calibration, and equipment data for the test sites have been filed with the Federal Communications Commission.

The FCC recommends that ambient noise at the test site be at least 6 dB below the allowable limits. Ambient levels are below this requirement with the exception of predictable local TV, radio, and mobile communications traffic. The test site contains separate areas for radiated and conducted emissions testing. Considerable engineering effort has been expended to ensure that the facilities conform to all pertinent FCC requirements.

CONDUCTED EMISSIONS CONSIDERATIONS

Conducted emissions testing is performed in conformance with ANSI C63.4-1992. Measurements are made with the EUT connected to the public power network through a nominal, standardized RF impedance, which is provided by a line impedance stabilization network, known as a LISN. A LISN is inserted in series with each current-carrying conductor in the EUT power cord.

RADIATED EMISSIONS CONSIDERATIONS

The FCC has determined that radiation measurements made in a shielded enclosure are not suitable for determining levels of radiated emissions. Radiated measurements are performed in an open field environment. The test site is maintained free of conductive objects within the CISPR defined elliptical area incorporated in ANSI C63.4 guidelines.

MEASUREMENT INSTRUMENTATION

RECEIVER SYSTEM

An EMI receiver as specified in CISPR 16-1 is used for emissions measurements. The receivers used can measure over the frequency range of 9 kHz up to 2000 MHz. These receivers allow both ease of measurement and high accuracy to be achieved. The receivers have Peak, Average, and CISPR (Quasi-peak) detectors built into their design so no external adapters are necessary. The receiver automatically sets the required bandwidth for the CISPR detector used during measurements.

For measurements above the frequency range of the receivers, a spectrum analyzer is utilized because it provides visibility of the entire spectrum along with the precision and versatility required to support engineering analysis. Average measurements above 1000MHz are performed on the spectrum analyzer using the linear-average method with a resolution bandwidth of 1 MHz and a video bandwidth of 10 Hz.

INSTRUMENT CONTROL COMPUTER

The receivers utilize either a Rohde and Schwarz EZM Spectrum Monitor/Controller or contain an internal Spectrum Monitor/Controller to view and convert the receiver measurements to the field strength at an antenna or voltage developed at the LISN measurement port, which is then compared directly with the appropriate specification limit. This provides faster, more accurate readings by performing the conversions described under Sample Calculations within the Test Procedures section of this report. Results are printed in a graphic and/or tabular format, as appropriate. A personal computer is used to record all measurements made with the receivers.

The Spectrum Monitor provides a visual display of the signal being measured. In addition, the controller or a personal computer run automated data collection programs which control the receivers. This provides added accuracy since all site correction factors, such as cable loss and antenna factors are added automatically.

LINE IMPEDANCE STABILIZATION NETWORK (LISN)

Line conducted measurements utilize a fifty microhenry Line Impedance Stabilization Network as the monitoring point. The LISN used also contains a 250 uH CISPR adapter. This network provides for calibrated radio frequency noise measurements by the design of the internal low pass and high pass filters on the EUT and measurement ports, respectively.

POWER METER

A power meter and peak power sensor are used for all direct output power measurements from transmitters as they provide a broadband indication of the power output.

FILTERS/ATTENUATORS

External filters and precision attenuators are often connected between the receiving antenna or LISN and the receiver. This eliminates saturation effects and non-linear operation due to high amplitude transient events.

ANTENNAS

A biconical antenna is used to cover the range from 30 MHz to 300 MHz and a log periodic antenna is utilized from 300 MHz to 1000 MHz. Narrowband tuned dipole antennas are used over the entire 30 to 1000 MHz range for precision measurements of field strength. Above 1000 MHz, a horn antenna is used. The antenna calibration factors are included in site factors programmed into the test receivers.

ANTENNA MAST AND EQUIPMENT TURNTABLE

The antennas used to measure the radiated electric field strength are mounted on a non-conductive antenna mast equipped with a motor-drive to vary the antenna height.

ANSI C63.4 specifies that the test height above ground for table mounted devices shall be 80 centimeters. Floor mounted equipment shall be placed on the ground plane if the device is normally used on a conductive floor or separated from the ground plane by insulating material from 3 to 12 mm if the device is normally used on a non-conductive floor. During radiated measurements, the EUT is positioned on a motorized turntable in conformance with this requirement.

INSTRUMENT CALIBRATION

All test equipment is regularly checked to ensure that performance is maintained in accordance with the manufacturer's specifications. All antennas are calibrated at regular intervals with respect to tuned half-wave dipoles. An exhibit of this report contains the list of test equipment used and calibration information.

TEST PROCEDURES

EUT AND CABLE PLACEMENT

The FCC requires that interconnecting cables be connected to the available ports of the unit and that the placement of the unit and the attached cables simulate the worst case orientation that can be expected from a typical installation, so far as practicable. To this end, the position of the unit and associated cabling is varied within the guidelines of ANSI C63.4, and the worst case orientation is used for final measurements.

CONDUCTED EMISSIONS

Conducted emissions are measured at the plug end of the power cord supplied with the EUT. Excess power cord length is wrapped in a bundle between 30 and 40 centimeters in length near the center of the cord. Preliminary measurements are made to determine the highest amplitude emission relative to the specification limit for all the modes of operation. Placement of system components and varying of cable positions are performed in each mode. A final peak mode scan is then performed in the position and mode for which the highest emission was noted on all current carrying conductors of the power cord.

RADIATED EMISSIONS

Radiated emissions measurements are performed in two phases as well. A preliminary scan of emissions is conducted in which all significant EUT frequencies are identified with the system in a nominal configuration. At least two scans are performed from 30 MHz up to the frequency required by the regulation specified on page 1. One or more of these is with the antenna polarized vertically while the one or more of these is with the antenna polarized horizontally. During the preliminary scans, the EUT is rotated through 360°, the antenna height is varied and cable positions are varied to determine the highest emission relative to the limit.

A speaker is provided in the receiver to aid in discriminating between EUT and ambient emissions. Other methods used during the preliminary scan for EUT emissions involve scanning with near field magnetic loops, monitoring I/O cables with RF current clamps, and cycling power to the EUT.

Final maximization is a phase in which the highest amplitude emissions identified in the spectral search are viewed while the EUT azimuth angle is varied from 0 to 360 degrees relative to the receiving antenna. The azimuth which results in the highest emission is then maintained while varying the antenna height from one to four meters. The result is the identification of the highest amplitude for each of the highest peaks. Each recorded level is corrected in the receiver using appropriate factors for cables, connectors, antennas, and preamplifier gain. Emissions which have values close to the specification limit may also be measured with a tuned dipole antenna to determine compliance.

CONDUCTED EMISSIONS FROM ANTENNA PORT

Direct measurements are performed with the antenna port of the EUT connected to either the power meter or spectrum analyzer via a suitable attenuator and/or filter. These are used to ensure that the front end of the measurement instrument is not overloaded by the fundamental transmission.

Measurement bandwidths (video and resolution) are set in accordance with FCC procedures for the type of radio being tested.

SPECIFICATION LIMITS AND SAMPLE CALCULATIONS

The limits for conducted emissions from the AC power port are given in units of microvolts, the limits for radiated electric field emissions are given in units of microvolts per meter at a specified test distance and the output power limits are given in temrs of Watts, milliwatts or dBm. Data is measured in the logarithmic form of decibels relative to one microvolt, or dB microvolts (dBuV). For radiated emissions, the measured data is converted to the field strength at the antenna in dB microvolts per meter (dBuV/m). The results are then converted to the linear forms of uV and uV/m for comparison to published specifications.

Where the radiated electric field strength is expressed in terms of the equivalent isotropic radiated power (eirp) the following formula is used to determine the field strength limit in terms of microvolts per meter at a distance of 3m from the equipment under test:

$$E = \frac{1000000 \text{ v } 30\ P}{3} \quad \text{microvolts per meter}$$

where P is the eirp (Watts)

For reference, converting the voltage and electric field strength specification limits from linear to decibel form is accomplished by taking the base ten logarithm, then multiplying by 20. Conversion of power specification limits from linear units (in milliwatts) to decibel form (in dBm) is accomplished by taking the base ten logarithm, then multiplying by 10.

FCC 15.407 (a)and RSS 210 (o) OUTPUT POWER LIMITS

The table below shows the limits for output power and output power density. Where the signal bandwidth is less than 20 MHz the maximum output power is reduced to the power spectral density limit plus 10 times the log of the bandwidth (in MHz).

Operating Frequency (MHz)	Number Of Channels	Output Power
902 – 928	>=50	1 W (30 dBm)
902 – 928	< 50	0.25 W (24 dBm)
2400 – 2483.5	>= 75	1 W (30 dBm)
2400 – 2483.5	>= 75	0.125 W (21 dBm)
5725 – 5850	>=75	1 W (30 dBm)

The maximum permitted output power is reduced by 1dB for every dB the antenna gain exceeds 6dBi. Fixed point-to-point applications using the 5725 – 5850 MHz band are not subject to this restriction.

RSS 210 (o) AND FCC 15.247 SPURIOUS RADIATED EMISSIONS LIMITS

T limits for unwanted (spurious) emissions from the transmitter falling in the restricted bands detailed in Part 15.205 and for all spurious emissions from the receiver are:

Frequency Range (MHz)	Limit (uV/m @ 3m)	Limit (dBuV/m @ 3m)
30 to 88	100	40
88 to 216	150	43.5
216 to 960	200	46.0
Above 960	500	54.0

All other unwanted (spurious) emissions shall be at least 20dB below the level of the highest in-band signal level.

FCC AC POWER PORT CONDUCTED EMISSIONS LIMITS

The table below shows the limits for emissions on the AC power line as detailed in FCC Part 15.207.

Frequency (MHz)	Average Limit (dBuV)	Quasi Peak Limit (dBuV)
0.150 to 0.500	Linear decrease on logarithmic frequency axis between 56.0 and 46.0	Linear decrease on logarithmic frequency axis between 66.0 and 56.0
0.500 to 5.000	46.0	56.0
5.000 to 30.000	50.0	60.0

RSS-210 SECTION 6.6 AC POWER PORT CONDUCTED EMISSIONS LIMITS

The table below shows the limits for emissions on the AC power line as detailed in Industry Canada RSS-210 section 6.6.

Frequency Range (MHz)	Limit (uV)	Limit (dBuV)
0.450 to 30.000	250	48

SAMPLE CALCULATIONS - CONDUCTED EMISSIONS

Receiver readings are compared directly to the conducted emissions specification limit (decibel form) as follows:

$$R_r - B = C$$

and

$$C - S = M$$

where:

R_r = Receiver Reading in dBuV

B = Broadband Correction Factor*

C = Corrected Reading in dBuV

S = Specification Limit in dBuV

M = Margin to Specification in +/- dB

* Broadband Level - Per ANSI C63.4, 13 dB may be subtracted from the quasi-peak level if it is determined that the emission is broadband in nature. If the signal level in the average mode is six dB or more below the signal level in the peak mode, the emission is classified as broadband.

SAMPLE CALCULATIONS - RADIATED EMISSIONS

Receiver readings are compared directly to the specification limit (decibel form). The receiver internally corrects for cable loss, preamplifier gain, and antenna factor. The calculations are in the reverse direction of the actual signal flow, thus cable loss is added and the amplifier gain is subtracted. The Antenna Factor converts the voltage at the antenna coaxial connector to the field strength at the antenna elements. A distance factor, when used for electric field measurements, is calculated by using the following formula:

$$F_d = 20*LOG_{10} (D_m/D_s)$$

where:

F_d = Distance Factor in dB

D_m = Measurement Distance in meters

D_s = Specification Distance in meters

Measurement Distance is the distance at which the measurements were taken and Specification Distance is the distance at which the specification limits are based. The antenna factor converts the voltage at the antenna coaxial connector to the field strength at the antenna elements.

The margin of a given emission peak relative to the limit is calculated as follows:

$$R_c = R_r + F_d$$

and

$$M = R_c - L_s$$

where:

R_r = Receiver Reading in dBuV/m

F_d = Distance Factor in dB

R_c = Corrected Reading in dBuV/m

L_s = Specification Limit in dBuV/m

M = Margin in dB Relative to Spec

EXHIBIT 1: Test Equipment Calibration Data

1 Page

Radiated Spurious Emissions, 80 - 9,000MHz, 21-Jul-04
Engineer: Chris Byleckie

Manufacturer	Description	Model #	Asset #	Cal Due
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	263	08-Jan-05
Hewlett Packard	EMC Spectrum Analyzer 9KHz-26.5GHz, non programmable	8563E	284	15-Mar-05
EMCO	Horn Antenna, D. Ridge 1-18GHz	3115	868	20-Apr-06
Rohde & Schwarz	EMI Test Receiver, 20Hz-7GHz	ESIB7	1538	26-May-05
Sunol Sciences	Biconilog, 30-3000MHz	JB3	1548	29-Mar-05
Com-Power	Pre Amplifier , 30-1000MHz	PA-103	1633	27-Jan-05

Radiated Emissions & Conducted Emissions, 22-Jul-04
Engineer: Elijah Garcia

Manufacturer	Description	Model #	Asset #	Cal Due
EMCO	LISN, 10kHz-100MHz	3825/2	1292	25-Jun-05
EMCO	LISN, 10kHz-100MHz	3825/2	1293	25-Jun-05
Com-Power	Pre Amplifier, 30-1000MHz	PA-103	1543	26-Nov-04
Rohde& Schwarz	Pulse Limiter	ESH3 Z2	1594	04-May-05
Rohde & Schwarz	EMI Test Receiver, 20Hz-7GHz	ESIB7	1630	05-Jan-05
Sunol Sciences	Biconilog, 30-3000MHz	JB3	1657	24-Feb-05

Radiated and Antenna conducted emission, 12-Aug-04
Engineer: Juan Martinez

Manufacturer	Description	Model #	Asset #	Cal Due
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	263	08-Jan-05
Hewlett Packard	EMC Spectrum Analyzer 9KHz-26.5GHz, non programmable	8563E	284	15-Mar-05
EMCO	Horn Antenna, D. Ridge 1-18GHz	3115	868	20-Apr-06
Rohde & Schwarz	EMI Test Receiver, 20Hz-7GHz	ESIB7	1538	26-May-05
Sunol Sciences	Biconilog, 30-3000MHz	JB3	1548	29-Mar-05
Sunol Sciences	Biconilog, 30-3000MHz	JB3	1549	13-Apr-05
Rohde & Schwarz	EMI Test Receiver, 20Hz-7GHz	ESIB7	1630	05-Jan-05

Substitution Method, 12-Aug-04
Engineer: Juan Martinez

Manufacturer	Description	Model #	Asset #	Cal Due
Elliott Laboratories	Tunable Dipole Antenna	(White) (410-1000 MHz)	323	16-Mar-05
Hewlett Packard	EMC Spectrum Analyzer, 9KHz-26.5GHz	8593EM	1141	23-Mar-05
Hewlett Packard	Signal Generator (sweep) 0.01 - 26.5 GHz	8340A	1244	N/A
Rohde & Schwarz	Power Meter, Single Channel	NRVS	1290	22-Apr-05
Rohde & Schwarz	Peak Power Sensor 100uW - 2 Watts	NRV-Z32	1423	18-Mar-05

EXHIBIT 2: Test Data Log Sheets

ELECTROMAGNETIC EMISSIONS

TEST LOG SHEETS

AND

MEASUREMENT DATA

T56055 24 Pages

Elliott

EMC Test Data

Client:	Palm One	Job Number:	J55850
Model:	BCM-2035	T-Log Number:	T56055
		Project Manager:	
Contact:	David Waitt		
Emissions Spec:	15.247 & RSS-210	Class:	Radio
Immunity Spec:		Environment:	-

EMC Test Data

For The

Palm One

Model

BCM-2035

Date of Last Test: 8/11/2004

Client:	Palm One	Job Number:	J55850
Model:	BCM-2035	T-Log Number:	T56055
		Account Manager:	
Contact:	David Waitt		
Emissions Spec:	15.247 & RSS-210	Class:	Radio
Immunity Spec:	Enter immunity spec on cover	Environment:	-

EUT INFORMATION

General Description

The EUT is a PDA w/ Bluetooth capability which is designed to provide wireless communications to other bluetooth devices. Normally, the EUT would be placed on a table top during operation. The EUT was, therefore, treated as table-top equipment during testing to simulate the end-user environment. The electrical rating of the EUT is 120/240 V, 50/60 Hz, .2 Amps.

Equipment Under Test

Manufacturer	Model	Description	Serial Number	FCC ID
Broadcom	BCM-2035	Bluetooth transmitter	N/A	TBD

Other EUT Details

EUT Enclosure

The EUT does not have an enclosure as it is designed to be installed within the enclosure of a host PDA

Modification History

Mod. #	Test	Date	Modification
1			
2			
3			

Modifications applied are assumed to be used on subsequent tests unless otherwise stated as a further modification.

Client:	Palm One	Job Number:	J55850
Model:	BCM-2035	T-Log Number:	T56055
		Account Manager:	
Contact:	David Waitt		
Emissions Spec:	15.247 & RSS-210	Class:	Radio
Immunity Spec:	Enter immunity spec on cover	Environment:	-

Test Configuration #1

Local Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
Wavetex	4400M	Communication Test	1011020511134	N/A
Cushcraft	S18512RPP	Patch Antenna	N/A	N/A
PalmOne	N/A	Dipole	N/A	N/A
Rhode & Schwarz	CMU	Communication Test Set	N/A	N/A

Remote Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
None				

Interface Cabling and Ports

		Cable(s)		
Port	Connected To	Description	Shielded or Unshielded	Length(m)
DC in	AC/DC adaptor	multiwire	Unshielded	1.7

EUT Operation During Emissions

EUT was transmitting at full power on the low, middle, and high channel.

Client:	Palm One	Job Number:	J55850
Model:	BCM-2035	T-Log Number:	T56055
		Account Manager:	-
Contact:	David Waitt		
Spec:	15.247 & RSS-210	Class:	Radio

Radiated Emissions

Test Specifics

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 8/11/2004
Test Engineer: Juan Martinez
Test Location: Fremont Chamber #5
Config. Used: 1
Config Change: None
EUT Voltage: 120V/60Hz

General Test Configuration

The EUT and all local support equipment were located on the turntable for radiated spurious emissions testing.

For radiated emissions testing the measurement antenna was located 3 meters from the EUT.

Unless stated otherwise the EUT was operating such that it constantly hopped on either the low, center or high channels.

Ambient Conditions:

Temperature: 19 °C
Rel. Humidity: 51 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	20dB Bandwidth	15.247(a)	Pass	825 kHz
2	Separation	15.247(a)	Pass	1000 kHz
2	Occupancy Time	15.247(a)	Pass	0.0263 seconds
3	Number of Channels	15.247(a)	Pass	79
5	Bandedge	15.247(c)	Pass	Refer to Run

Modifications Made During Testing:

No modifications were made to the EUT during testing

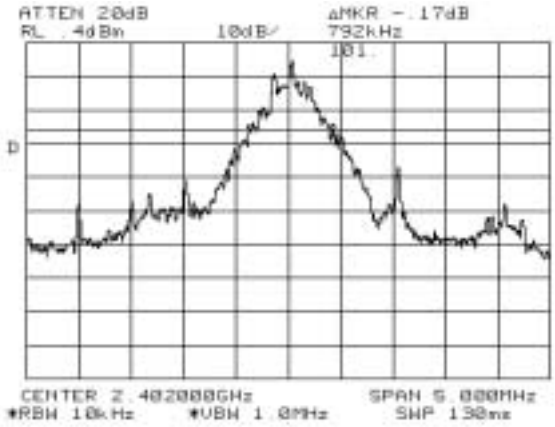
Deviations From The Standard

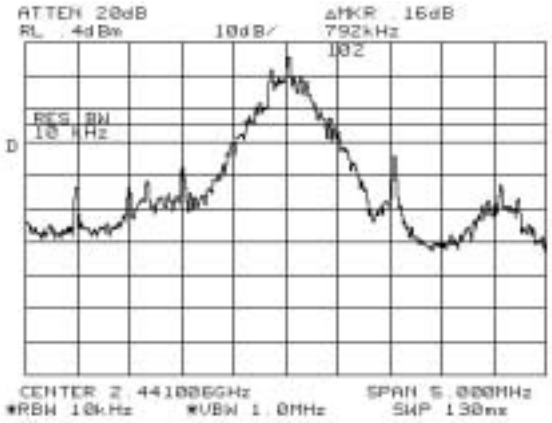
No deviations were made from the requirements of the standard.

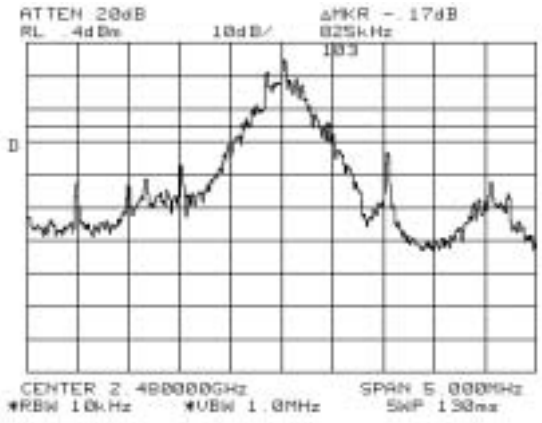
Client:	Palm One	Job Number:	J55850
Model:	BCM-2035	T-Log Number:	T56055
		Account Manager:	-
Contact:	David Waitt		
Spec:	15.247 & RSS-210	Class:	Radio

Run #1: Signal Bandwidth

Channel	Frequency (MHz)	Resolution Bandwidth	20dB Signal Bandwidth	Graph reference #
Low	2402	10kHz	792 kHz	101
Mid	2441	10kHz	792 kHz	102
High	2480	10kHz	825 kHz	103







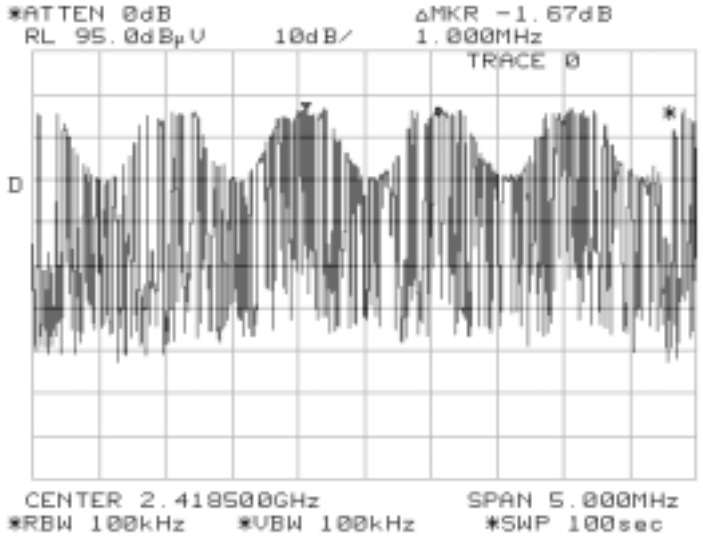
Client:	Palm One	Job Number:	J55850
Model:	BCM-2035	T-Log Number:	T56055
		Account Manager:	-
Contact:	David Waitt		
Spec:	15.247 & RSS-210	Class:	Radio

Run #2: Channel Occupancy And Spacing

The channel occupancy was measured with the radio transmitting normally (i.e. In hopping mode)

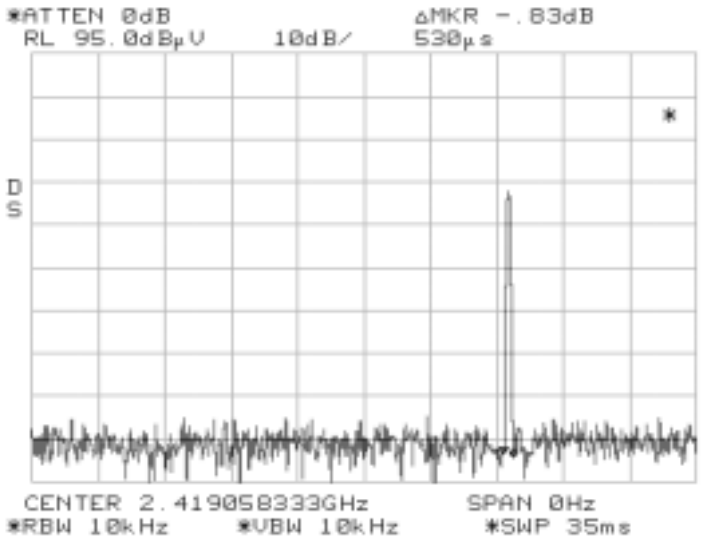
The channel spacing was:	1000	kHz	**Plot# 201**
The minimum channel separation permitted is:	1000	kHz	
The total number of channels (N) was:	79	channels	
The dwell time (Dt) on the center channel was:	0.00100	Seconds	**Plot# 202**
Time between succesive occupancy of a channel (Ot):	1.200	Seconds	**Plot# 203**
Time between succesive occupancy of a channel:	0.079	Seconds	Calculated (Dt * N)
Dwell time calculated :	0.0152	Seconds	Calculated (Ot /* N)
Average time per 31.6 seconds:	0.400	Seconds	Calculated (31.6 / N)
Average time per 31.6 seconds:	0.02633	Seconds	Measured (31.6/Ot * Dt)
The maximum permitted dwell time in a 31.6 (0.4s * Channels) second period for FCC Part 15.247(a)(1)(iii)/RSS 210(o):	0.4	Seconds	

Channel Seperation (Plot# 201)

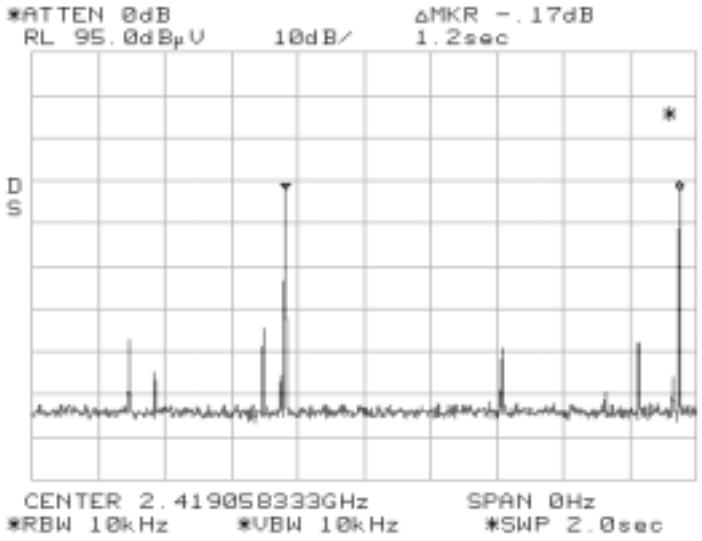


Client:	Palm One	Job Number:	J55850
Model:	BCM-2035	T-Log Number:	T56055
		Account Manager:	-
Contact:	David Waitt		
Spec:	15.247 & RSS-210	Class:	Radio

Dwell Time (Plot# 202)



Time Occupancy (Plot# 203)



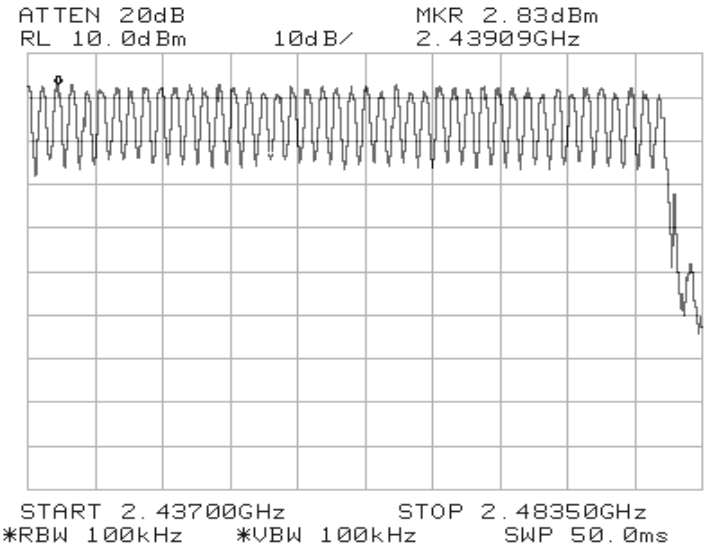
Client:	Palm One	Job Number:	J55850
Model:	BCM-2035	T-Log Number:	T56055
		Account Manager:	-
Contact:	David Waitt		
Spec:	15.247 & RSS-210	Class:	Radio

Run #3: Number of Channels

The number of channels was verified with the radio transmitting normally (i.e. In hopping mode)

The number of channels was: 79

35 channels

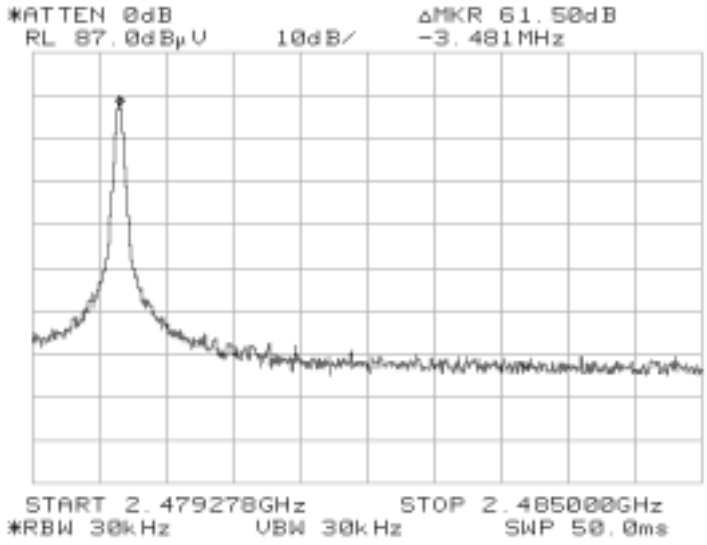


44 channels

Client:	Palm One	Job Number:	J55850
Model:	BCM-2035	T-Log Number:	T56055
		Account Manager:	-
Contact:	David Waitt		
Spec:	15.247 & RSS-210	Class:	Radio

Run #4: Bandedges

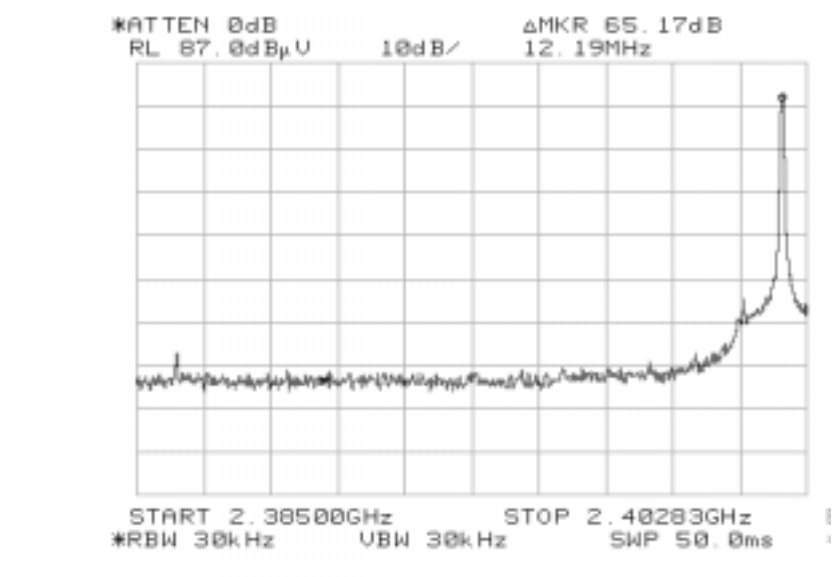
High Channel (2480MHz)



	H	V	
Fundamental emission level @ 3m in 1MHz RBW:	91.6	90.1	Peak Measurement (RBW=VBW = 1MHz)
Fundamental emission level @ 3m in 1MHz RBW:	91.4	90	Average Measurement (RBW=VBW = 10Hz)
Delta Marker - Peak	61.5 dB		
Delta Marker - Average	61.5 dB		
Calculated Band-Edge Measurement:	30.1 dBuV/m		Peak Measurement (RBW=VBW = 1MHz)
Calculated Band-Edge Measurement:	29.9 dBuV/m		Average Measurement (RBW=VBW = 10Hz)

Client:	Palm One	Job Number:	J55850
Model:	BCM-2035	T-Log Number:	T56055
		Account Manager:	-
Contact:	David Waitt		
Spec:	15.247 & RSS-210	Class:	Radio

Low Channel (2402MHz)



	H	V	
Fundamental emission level @ 3m in 1MHz RBW:	89.3	85.1	Peak Measurement (RBW=VBW = 1MHz)
Fundamental emission level @ 3m in 1MHz RBW:	89.1	84.9	Average Measurement (RBW=VBW = 10Hz)
Delta Marker - Peak	65.17 dB		
Delta Marker - Average	65.17 dB		
Calculated Band-Edge Measurement:	24.13 dBuV/m		Peak Measurement (RBW=VBW = 1MHz)
Calculated Band-Edge Measurement:	23.93 dBuV/m		Average Measurement (RBW=VBW = 10Hz)

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EMC Test Data

Client:	Palm One	Job Number:	J55850
Model:	BCM-2035	T-Log Number:	T56055
		Account Manager:	-
Contact:	David Waitt		
Spec:	15.247 & RSS-210	Class:	Radio

Radiated Emissions-ACE CDMA

Test Specifics

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 8/8/2004
Test Engineer: Juan Martinez
Test Location: Fremont Chamber #5
Config. Used: 1
Config Change: None
EUT Voltage: 120V/60Hz

General Test Configuration

The EUT and all local support equipment were located on the turntable for radiated spurious emissions testing.

For radiated emissions testing the measurement antenna was located 3 meters from the EUT.

Unless stated otherwise the EUT was operating such that it constantly hopped on either the low, center or high channels.

Output Power was calculated from the field strenght @ 3 meters. The field strenght was then converted to a dBm value by subtracting 95.2 dB.

Ambient Conditions:

Temperature: 18 °C
Rel. Humidity: 49 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	RE, 30 - 20,000 MHz - Spurious Emissions	FCC Part 15.209 / 15.247(c)	-	-5.5dB @ 17928.52 MHz
2	Output Power	15.247(b)	Pass	-2.2 dBm

Modifications Made During Testing:

No modifications were made to the EUT during testing

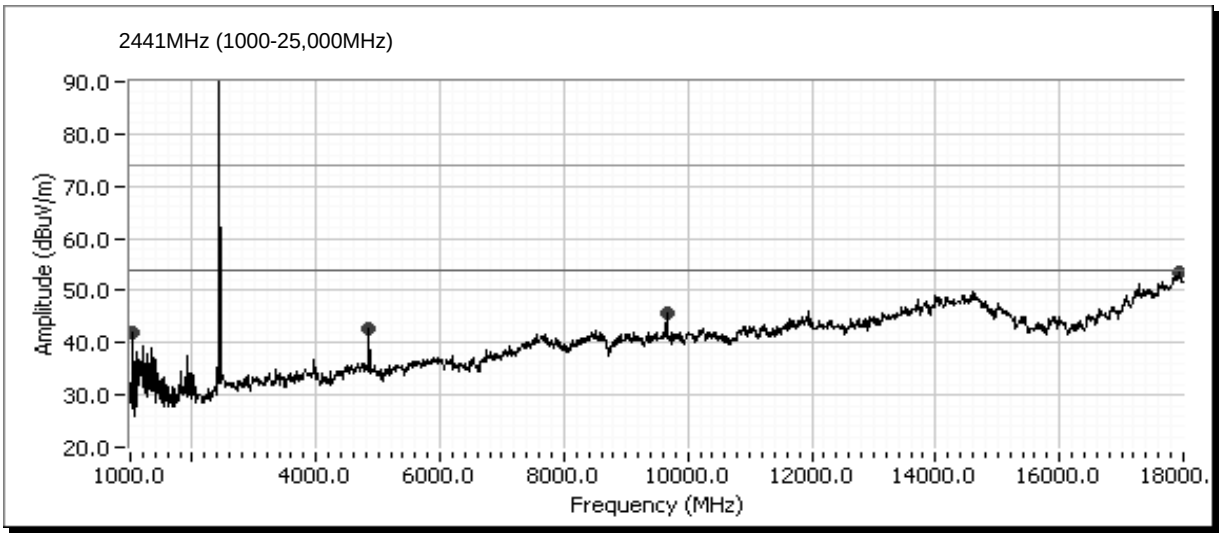
Deviations From The Standard

No deviations were made from the requirements of the standard.

EMC Test Data

Client:	Palm One	Job Number:	J55850
Model:	BCM-2035	T-Log Number:	T56055
		Account Manager:	-
Contact:	David Waitt		
Spec:	15.247 & RSS-210	Class:	Radio

Run #1: Radiated Spurious Emissions, 30 - 25,000 MHz. Center Channel @ 2441 MHz



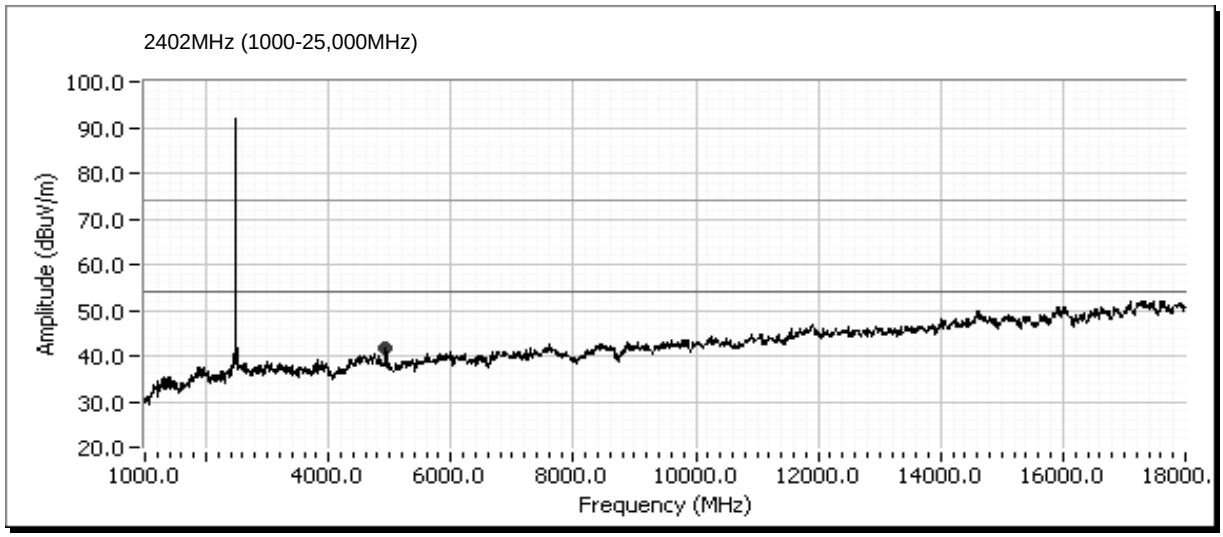
Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
4837.865	40.3	V	54.0	-13.7	AVG	100	1.6	
4837.865	45.1	V	74.0	-28.9	PK	100	1.6	
1088.952	31.2	V	54.0	-22.8	AVG	124	1.4	
1088.952	37.5	V	74.0	-36.5	PK	124	1.4	
9675.930	43.1	V	54.0	-10.9	AVG	0	1.6	
9675.930	50.1	V	74.0	-23.9	PK	0	1.6	
17928.52	48.5	V	54.0	-5.5	AVG	14	1.4	Noise Floor
17928.52	60.4	V	74.0	-13.6	PK	14	1.4	Noise Floor

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 20dB below the level of the fundamental.
Note 2:	

EMC Test Data

Client:	Palm One	Job Number:	J55850
Model:	BCM-2035	T-Log Number:	T56055
		Account Manager:	-
Contact:	David Waitt		
Spec:	15.247 & RSS-210	Class:	Radio

Run #2: Radiated Spurious Emissions, 30 - 25,000 MHz. Low Channel @ 2402 MHz



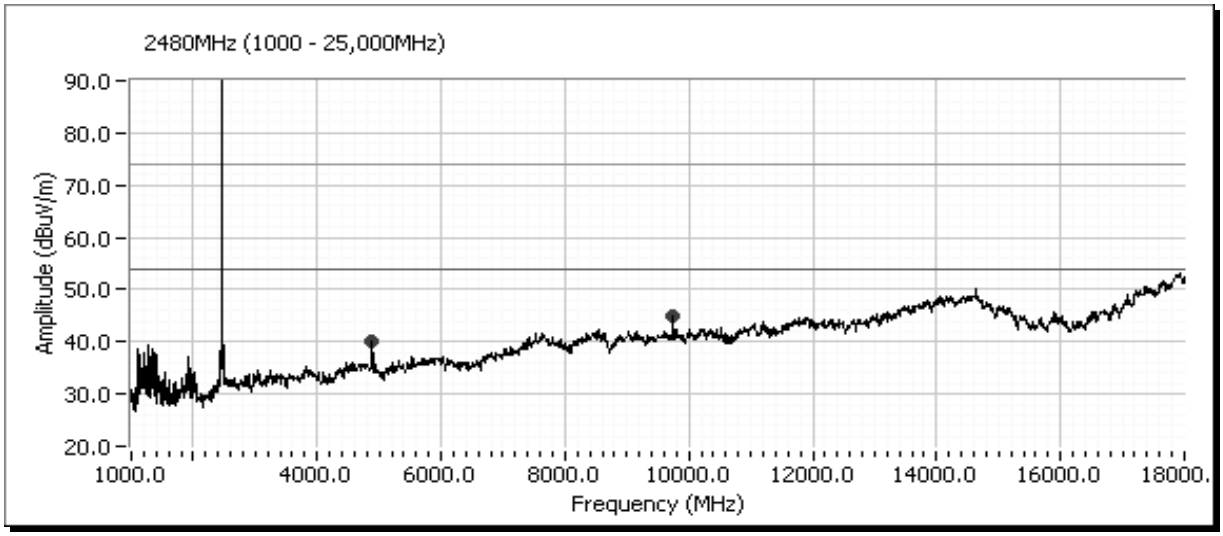
Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
No emissions detected.								RBW=VBW=1MHz (Peak Mode)

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 20dB below the level of the fundamental.
Note 2:	

EMC Test Data

Client:	Palm One	Job Number:	J55850
Model:	BCM-2035	T-Log Number:	T56055
		Account Manager:	-
Contact:	David Waitt		
Spec:	15.247 & RSS-210	Class:	Radio

Run #3: Radiated Spurious Emissions, 30 - 25,000 MHz. High Channel @ 2480 MHz



Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
4960.000	35.2	V	54.0	-18.8	AVG	10	1.2	
4960.000	41.2	V	74.0	-32.8	PK	10	1.2	
9920.000	44.2	H	54.0	-9.8	AVG	120	1.2	
9920.000	50.2	H	74.0	-23.8	PK	120	1.2	

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 20dB below the level of the fundamental.
Note 2:	

Client:	Palm One	Job Number:	J55850
Model:	BCM-2035	T-Log Number:	T56055
		Account Manager:	-
Contact:	David Waitt		
Spec:	15.247 & RSS-210	Class:	Radio

Run #2: Output Power

Channel	Frequency (MHz)	Field Strength at 3m	Antenna Pol. (H/V)	Res BW	Output Power (dBm)
Standing					
Low	2402	86.1	V	1MHz	-9.2
Low	2402	89.4	H	1MHz	-5.9
On its Side					
Low	2402	88.4	V	1MHz	-6.9
Low	2402	87.1	H	1MHz	-8.2
Flat					
Low	2402	84.7	V	1MHz	-10.6
Low	2402	88.1	H	1MHz	-7.2

Channel	Frequency (MHz)	Field Strength at 3m	Antenna Pol. (H/V)	Res BW	Output Power (dBm)
Standing					
Middle	2441	90.9	V	1MHz	-4.4
Middle	2441	93.1	H	1MHz	-2.2
On its Side					
Middle	2441	89.7	V	1MHz	-5.6
Middle	2441	84.3	H	1MHz	-11
Flat					
Middle	2441	93.1	V	1MHz	-2.2
Middle	2441	91.2	H	1MHz	-4.1

Channel	Frequency (MHz)	Field Strength at 3m	Antenna Pol. (H/V)	Res BW	Output Power (dBm)
Standing					
High	2480	90.4	V	1MHz	-4.9
High	2480	91.7	H	1MHz	-3.6
On its Side					
High	2480	86.8	V	1MHz	-8.5
High	2480	83.2	H	1MHz	-12.1
Flat					
High	2480	90.1	V	1MHz	-5.2
High	2480	91.8	H	1MHz	-3.5

Client:	Palm One	Job Number:	J55850
Model:	BCM-2035	T-Log Number:	T56055
		Account Manager:	-
Contact:	David Waitt		
Spec:	15.247 & RSS-210	Class:	Radio

Radiated Emissions-ACE GSM

Test Specifics

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 8/6/2004
Test Engineer: Juan Martinez
Test Location: Fremont Chamber #5
Config. Used: 1
Config Change: None
EUT Voltage: 120V/60Hz

General Test Configuration

The EUT and all local support equipment were located on the turntable for radiated spurious emissions testing.

For radiated emissions testing the measurement antenna was located 3 meters from the EUT.

Unless stated otherwise the EUT was operating such that it constantly hopped on either the low, center or high channels.

Output Power was calculated from the field strenght @ 3 meters. The field strenght was then converted to a dBm value by subtracting 95.2 dB.

Ambient Conditions:

Temperature: 19 °C
Rel. Humidity: 51 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	RE, 30 - 20,000 MHz - Spurious Emissions	FCC Part 15.209 / 15.247(c)	-	-5.8dB @ 17928 MHz
2	Output Power	15.247(b)	Pass	-2.3dBm

Modifications Made During Testing:

No modifications were made to the EUT during testing

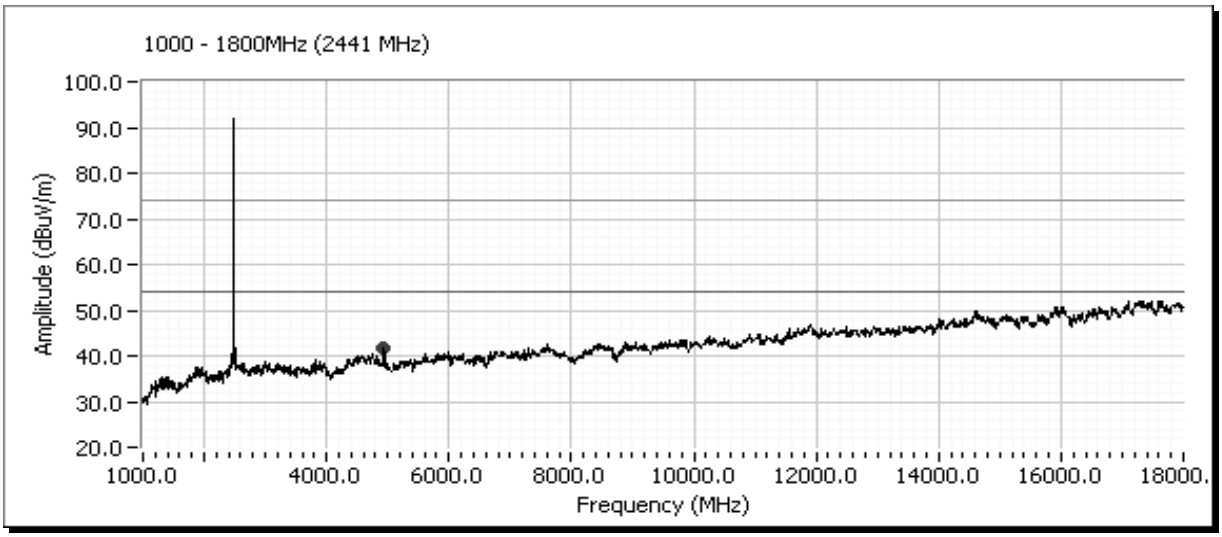
Deviations From The Standard

No deviations were made from the requirements of the standard.

EMC Test Data

Client:	Palm One	Job Number:	J55850
Model:	BCM-2035	T-Log Number:	T56055
		Account Manager:	-
Contact:	David Waitt		
Spec:	15.247 & RSS-210	Class:	Radio

Run #1: Radiated Spurious Emissions, 30 - 25,000 MHz. Center Channel @ 2441 MHz



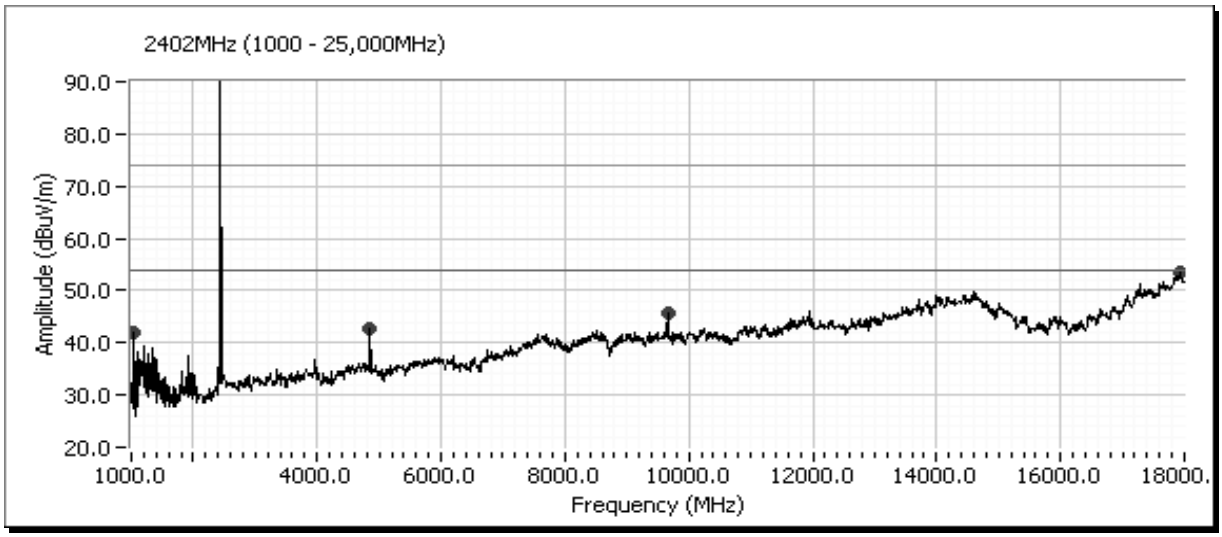
Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
No emissions detected.								RBW=VBW=1MHz (Peak Mode)

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 20dB below the level of the fundamental.
Note 2:	

EMC Test Data

Client:	Palm One	Job Number:	J55850
Model:	BCM-2035	T-Log Number:	T56055
		Account Manager:	-
Contact:	David Waitt		
Spec:	15.247 & RSS-210	Class:	Radio

Run #2: Radiated Spurious Emissions, 30 - 25,000 MHz. Low Channel @ 2402 MHz



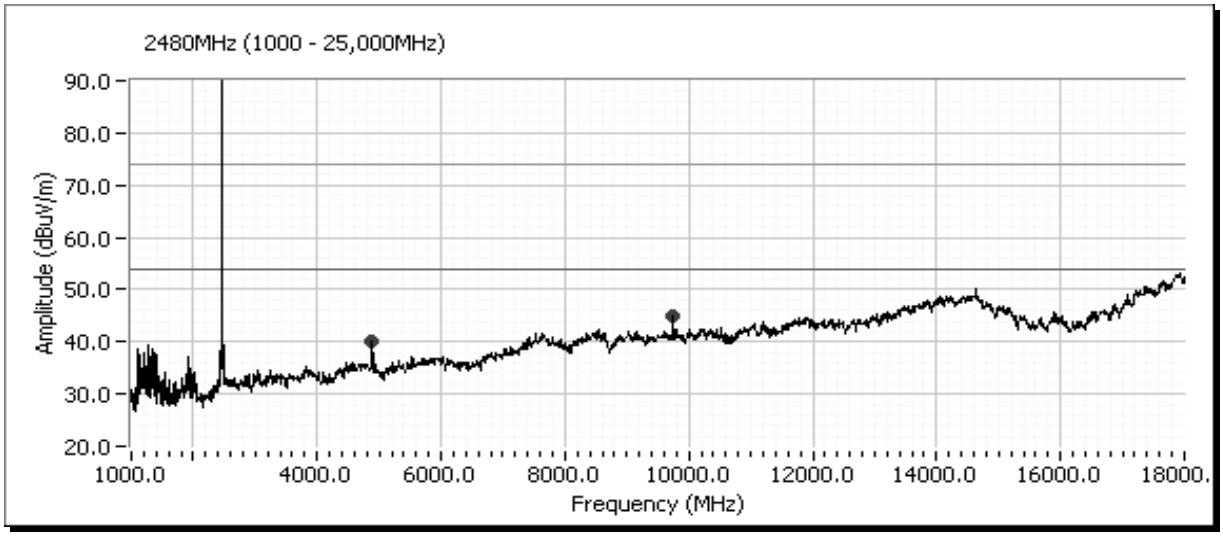
Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
4837.865	41.3	V	54.0	-12.8	AVG	133	1.6	
4837.865	46.3	V	74.0	-27.8	PK	133	1.6	
1088.952	33.1	V	54.0	-21.0	AVG	185	1.4	
1088.952	39.8	V	74.0	-34.2	PK	185	1.4	
9675.930	44.7	V	54.0	-9.3	AVG	225	1.6	
9675.930	51.6	V	74.0	-22.4	PK	225	1.6	
17928.52	48.2	V	54.0	-5.8	AVG	178	1.4	Noise Floor
17928.52	59.2	V	74.0	-14.8	PK	178	1.4	Noise Floor

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 20dB below the level of the fundamental.
Note 2:	

EMC Test Data

Client:	Palm One	Job Number:	J55850
Model:	BCM-2035	T-Log Number:	T56055
		Account Manager:	-
Contact:	David Waitt		
Spec:	15.247 & RSS-210	Class:	Radio

Run #3: Radiated Spurious Emissions, 30 - 25,000 MHz. High Channel @ 2480 MHz



Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
4960.000	37.4	V	54.0	-16.6	AVG	247	1.2	
4960.000	44.9	V	74.0	-29.1	PK	247	1.2	
9920.000	43.7	H	54.0	-10.3	AVG	242	1.2	
9920.000	51.7	H	74.0	-22.3	PK	242	1.2	

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 20dB below the level of the fundamental.
Note 2:	

Client:	Palm One	Job Number:	J55850
Model:	BCM-2035	T-Log Number:	T56055
		Account Manager:	-
Contact:	David Waitt		
Spec:	15.247 & RSS-210	Class:	Radio

Run #2: Output Power

Channel	Frequency (MHz)	Field Strength at 3m	Antenna Pol. (H/V)	Res BW	Output Power (dBm)
Standing					
Low	2402	85.1	V	1MHz	-10.2
Low	2402	89.3	H	1MHz	-5.96
On its Side					
Low	2402	87.7	V	1MHz	-7.63
Low	2402	87.0	H	1MHz	-8.3
Flat					
Low	2402	84.6	V	1MHz	-10.7
Low	2402	88.5	H	1MHz	-6.79

Channel	Frequency (MHz)	Field Strength at 3m	Antenna Pol. (H/V)	Res BW	Output Power (dBm)
Standing					
Middle	2441	90.9	V	1MHz	-4.36
Middle	2441	93.0	H	1MHz	-2.3
On its Side					
Middle	2441	89.5	V	1MHz	-5.76
Middle	2441	85.0	H	1MHz	-10.35
Flat					
Middle	2441	92.9	V	1MHz	-2.43
Middle	2441	90.5	H	1MHz	-4.77

Channel	Frequency (MHz)	Field Strength at 3m	Antenna Pol. (H/V)	Res BW	Output Power (dBm)
Standing					
High	2480	90.1	V	1MHz	-5.2
High	2480	91.6	H	1MHz	-3.66
On its Side					
High	2480	87.1	V	1MHz	-8.16
High	2480	84.6	H	1MHz	-10.66
Flat					
High	2480	89.3	V	1MHz	-5.99
High	2480	91.6	H	1MHz	-3.7

Client:	Palm One	Job Number:	J55850
Model:	BCM-2035	T-Log Number:	T56055
		Account Manager:	-
Contact:	David Waitt		
Spec:	15.247 & RSS-210	Class:	Radio

Conducted Emissions - Power Ports

Test Specifics

Objective: The objective of this test session is to perform engineering evaluation testing of the EUT with respect to the specification listed above.

Date of Test: 8/12/2004
Test Engineer: Elijah Garcia
Test Location: Fremont Chamber #3
Config. Used: 1
Config Change: none
EUT Voltage: 120V/60Hz

General Test Configuration

For tabletop equipment, the EUT was located on a wooden table, 40 cm from a vertical coupling plane and 80cm from the LISN. A second LISN was used for all local support equipment.

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	CE, AC Power,120V/60Hz	EN 55022 Class B	Pass	-12.6dB @ 0666KHz
1	CE, AC Power,120V/60Hz	RSS-210	Pass	-4.6dB @ 0.666 kHz

Modifications Made During Testing:

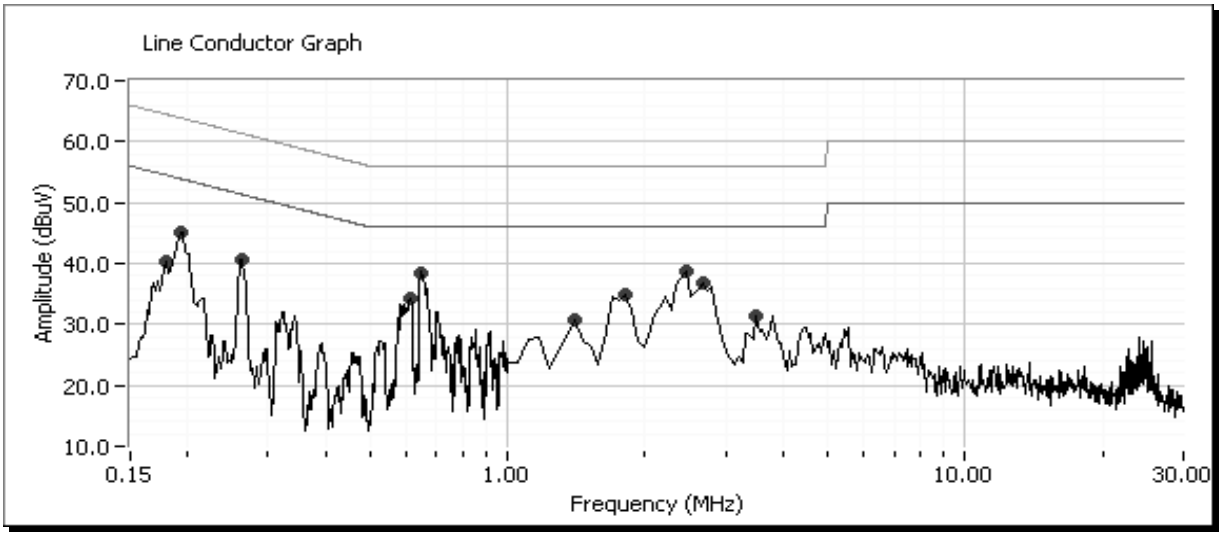
No modifications were made to the EUT during testing

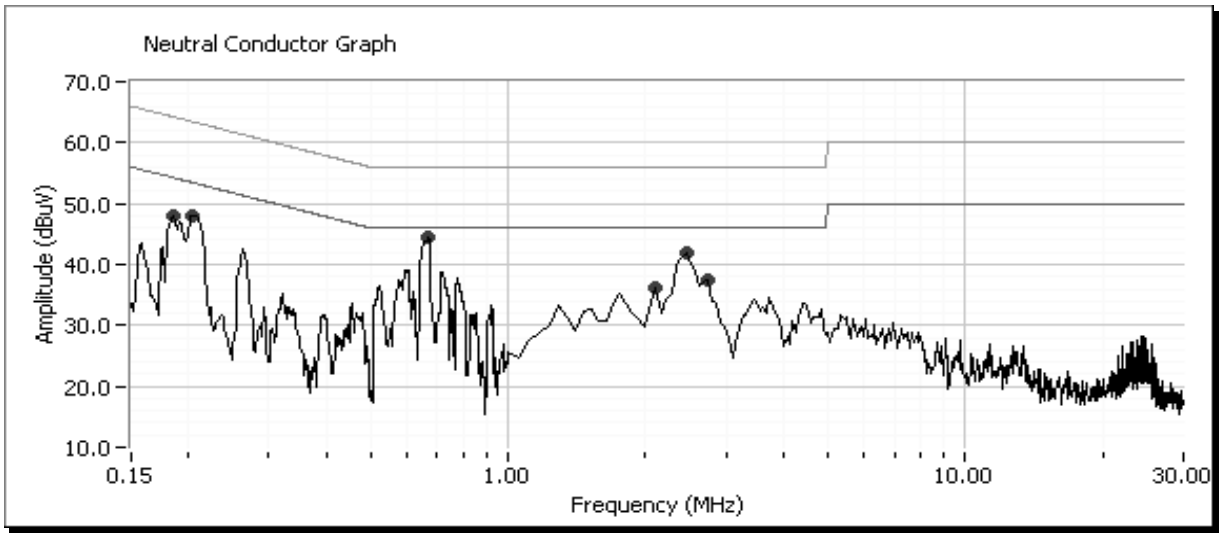
Deviations From The Standard

No deviations were made from the requirements of the standard.

Client:	Palm One	Job Number:	J55850
Model:	BCM-2035	T-Log Number:	T56055
		Account Manager:	-
Contact:	David Waitt		
Spec:	15.247 & RSS-210	Class:	Radio

Run #1: AC Power Port Conducted Emissions, 0.15 - 30MHz, 120V/60Hz
Phihong adapter. INTERNATIONAL SAMPLE B





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EMC Test Data

Client:	Palm One	Job Number:	J55850
Model:	BCM-2035	T-Log Number:	T56055
		Account Manager:	-
Contact:	David Waitt		
Spec:	15.247 & RSS-210	Class:	Radio

Run #1: AC Power Port Conducted Emissions, 0.15 - 30MHz, 120V/60Hz
Phihong adapter. INTERNATIONAL SAMPLE B

Frequency	Level	AC	EN55022 B		Detector	Comments
MHz	dBµV	Line	Limit	Margin	QP/Ave	
0.185	43.5	Line 1	64.3	-20.8	QP	
0.185	32.9	Line 1	54.3	-21.4	Average	
0.610	32.9	Line 1	56.0	-23.1	QP	
0.610	21.1	Line 1	46.0	-24.9	Average	
0.260	38.7	Line 1	61.4	-22.7	QP	
0.260	28.9	Line 1	51.4	-22.6	Average	
0.192	42.1	Line 1	63.9	-21.9	QP	
0.192	29.4	Line 1	53.9	-24.5	Average	
0.646	38.5	Line 1	56.0	-17.5	QP	
0.646	27.9	Line 1	46.0	-18.1	Average	
1.659	29.2	Line 1	56.0	-26.8	QP	
1.659	20.7	Line 1	46.0	-25.3	Average	
3.433	24.5	Line 1	56.0	-31.5	QP	
3.433	13.9	Line 1	46.0	-32.1	Average	
1.789	30.4	Line 1	56.0	-25.6	QP	
1.789	19.2	Line 1	46.0	-26.8	Average	
2.398	33.2	Line 1	56.0	-22.8	QP	
2.398	22.1	Line 1	46.0	-23.9	Average	
2.405	34.1	Line 1	56.0	-21.9	QP	
2.405	24.1	Line 1	46.0	-21.9	Average	
0.184	47.1	neutral	64.3	-17.3	QP	
0.184	39.5	neutral	54.3	-14.8	Average	
0.205	45.7	neutral	63.4	-17.7	QP	
0.205	37.3	neutral	53.4	-16.1	Average	
0.666	43.4	neutral	56.0	-12.6	QP	
0.666	31.5	neutral	46.0	-14.5	Average	
2.457	37.6	neutral	56.0	-18.5	QP	
2.457	25.9	neutral	46.0	-20.1	Average	
2.393	36.5	neutral	56.0	-19.5	QP	
2.393	26.5	neutral	46.0	-19.5	Average	

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EMC Test Data

Client:	Palm One	Job Number:	J55850
Model:	BCM-2035	T-Log Number:	T56055
		Account Manager:	-
Contact:	David Waitt		
Spec:	15.247 & RSS-210	Class:	Radio

Run #2: AC Power Port Conducted Emissions, 0.15 - 30MHz, 120V/60Hz
Phihong adapter. INTERNATIONAL SAMPLE B

Frequency	Level	AC	RSS-210		Detector	Comments
MHz	dBµV	Line	Limit	Margin	QP/Ave	
0.610	32.9	Line 1	48.0	-15.1	QP	
0.646	38.5	Line 1	48.0	-9.5	QP	
1.659	29.2	Line 1	48.0	-18.8	QP	
3.433	24.5	Line 1	48.0	-23.5	QP	
1.789	30.4	Line 1	48.0	-17.6	QP	
2.398	33.2	Line 1	48.0	-14.8	QP	
2.405	34.1	Line 1	48.0	-13.9	QP	
0.666	43.4	neutral	48.0	-4.6	QP	
2.457	37.6	neutral	48.0	-10.5	QP	
2.393	36.5	neutral	48.0	-11.5	QP	