



ADDENDUM TO FC02-031A

FOR THE

BASE STATION, IP1B

**FCC PART 90 AND PART 15 SUBPART B
SECTIONS 15.107, 15.109 AND 15.111 CLASS B**

COMPLIANCE

DATE OF ISSUE: MAY 2, 2002

PREPARED FOR:

IP Mobilenet Inc.
11909 East Telegraph Road
Santa Fe Springs, CA 90670

P.O. No.: 001867-00
W.O. No.: 78639

PREPARED BY:

Mary Ellen Clayton
CKC Laboratories, Inc.
5473A Clouds Rest
Mariposa, CA 95338

Date of test: March 26 - April 8, 2002

Report No.: FC02-031A

This report contains a total of 43 pages and may be reproduced in full only. Partial reproduction may only be done with the written consent of CKC Laboratories, Inc. The results in this report apply only to the items tested, as identified herein.

TABLE OF CONTENTS

Administrative Information	3
Summary of Results.....	4
Conditions for Compliance.....	4
Approvals.....	4
Equipment Under Test (EUT) Description.....	5
Equipment Under Test.....	5
Peripheral Devices.....	5
Temperature and Humidity During Testing	5
2.1033(c)(3) User's Manual	5
2.1033(c)(4) Type of Emissions	6
2.1033(c)(5) Frequency Range	6
2.1033(c)(6) Operating Power.....	6
2.1033(c)(7) Maximum Power Rating.....	6
2.1033(c)(8) DC Voltages	6
2.1033(c)(9) Tune-Up Procedure	6
2.1033(c)(10) Schematics and Circuitry Description	6
2.1033(c)(11) Label and Placement.....	6
2.1033(c)(12) Submittal Photos.....	6
2.1033(c)(13) Modulation Information	6
2.1033(c)(14)/2.1046/90.205(d) - RF Power Output.....	7
2.1055/90.205(d) – Voltage Variations on Power Output.....	9
2.1033(c)(14)/2.1047(b) - Modulation - Audio Frequency Response.....	10
2.1033(c)(14)/2.1047(b) - Modulation - Modulation Limiting Response	10
2.1033(c)(14)/2.1049(i)/90.209/90.210 - Occupied Bandwidth.....	11
2.1033(c)(14)/2.1051/90.210 - Spurious Emissions at Antenna Terminal.....	18
2.1033(c)(14)/2.1053/90.210- Field Strength of Spurious Radiation.....	21
2.1033(c)(14)/2.1055/90.213 - Frequency Stability	25
90.214 – Transient Frequency Behavior.....	28
15.107 – AC Conducted Emissions – Receiver/Digital	33
15.109 – Radiated Emissions – Receiver/Digital	38
15.111 – Antenna Power Conducted Emissions – Receiver/Digital	42

CKC Laboratories, Inc. has received Certificates of Accreditation from the following agencies:
A2LA (USA); BSMI (Taiwan); Nemko (Norway); and GOST (Russia).

CKC Laboratories, Inc has received test site Registration Acceptance from the following agencies:
FCC (USA); VCCI (Japan); and Industry Canada.

CKC Laboratories, Inc. has received Letters of Acceptance through an MRA for the following agencies:
ACA/NATA (Australia); SABS (South Africa); SWEDAC (Sweden); Radio Communications Agency (RA); HOKLAS (Hong Kong); Bakom (Swiss); BIPT (Belgium); Denmark Telestyrelsen; RvA (Netherlands); SEE (Luxembourg) SITTEL (Bolivia); and UKAS (UK).

ADMINISTRATIVE INFORMATION

DATE OF TEST: March 26 - April 8, 2002

DATE OF RECEIPT: March 26, 2002

PURPOSE OF TEST: To demonstrate the compliance of the Base Station, IP1B with the requirements for FCC Part 90 and Part 15 Subpart B Sections 15.107, 15.109 and 15.111 Class B devices. The purpose of this addendum is to revise the FCC ID number, add plots for 90.214 testing and revise the 90.213 table.

TEST METHOD: ANSI C63.4 (1992) and FCC Part 90

FREQUENCY RANGE TESTED: 450 kHz - 2 GHz

MANUFACTURER: IP Mobilenet Inc.
11909 East Telegraph Road
Santa Fe Springs, CA 90670

REPRESENTATIVE: Bobby Amin

TEST LOCATION: CKC Laboratories, Inc.
110 Olinda Place, Brea, CA 92621
5473A Clouds Rest, Mariposa, CA 95338

SUMMARY OF RESULTS

As received, the IP Mobilenet Inc. Base Station, IP1B was found to be fully compliant with the following standards and specifications:

United States

- FCC Part 90 and Part 15 Subpart B Sections 15.107, 15.109 and 15.111 Class B
- ANSI C63.4 (1992) and FCC Part 90 method

CONDITIONS FOR COMPLIANCE

No modifications to the EUT were necessary to comply.

APPROVALS

QUALITY ASSURANCE:



Steve Behm, Manager of Engineering Services



Joyce Walker, Quality Assurance Administrative Manager



Septimiu Apahidean, EMC/Lab Manager



Chuck Kendall, EMC/Lab Manager

TEST PERSONNEL:



Eddie Wong, EMC Engineer



Randy Clark, EMC Engineer

EQUIPMENT UNDER TEST (EUT) DESCRIPTION

The EUT tested by CKC Laboratories was a production unit. Base station for 150 MHz land mobile band data communications. This device is intended to be installed indoors. The output of this device is routed through an amplifier and then to an antenna. The amplifier and antenna are not part of IP Mobilenet's system.

EQUIPMENT UNDER TEST

Base Station

Manuf: IP Mobilenet
Model: IP1B
Product No.: 502 80219B
FCC ID: MI7-IPMNIP1B (pending)

PERIPHERAL DEVICES

The EUT was tested with the following peripheral device(s):

Power supply

Manuf: Astron
Model: RM50M
Serial: NA
FCC ID: DoC

TEMPERATURE AND HUMIDITY DURING TESTING

The temperature during testing was within +15°C and + 35°C.
The relative humidity was between 20% and 75%.

2.1033(c)(3) USER'S MANUAL

The necessary information is contained in a separate document.

2.1033 (c)(4) TYPE OF EMISSIONS

20K0F1D

2.1033(c)(5) FREQUENCY RANGE

The manufacturer declares that the EUT operates at 150-156 MHz.

2.1033(c)(6) OPERATING POWER

60 Watts set by manufacturer, but the device is capable of 85 Watts output power.

2.1033(c)(7) MAXIMUM POWER RATING

178 Watts allowed for service areas <13 km.

2.1033(c)(8) DC VOLTAGES

13.8 V at approximately 12 or 13 amps.

2.1033(c)(9) TUNE-UP PROCEDURE

Software controlled, no tune-up procedure over the power range or at specific operating power levels.

2.1033(c)(10) SCHEMATICS AND CIRCUITRY DESCRIPTION

The necessary information is contained in a separate document.

2.1033(c)(11) LABEL AND PLACEMENT

The necessary information is contained in a separate document.

2.1033(c)(12) SUBMITTAL PHOTOS

The necessary information is contained in a separate document.

2.1033(c)(13) MODULATION INFORMATION

The necessary information is contained in a separate document.

2.1033(c)(14)/2.1046/90.205(d) - RF POWER OUTPUT

Test Conditions:

EUT placed on the test bench. Parallel port is connected to Com 1 port of a support laptop via I/O board. All 3 Rx antenna ports left blank. The TX port is terminated to a 100 Watt, 50 ohm load. Transmitted power is evaluated via the monitor port of the load. The 13.8 V dc is obtained from a support power supply.

Transmit mode : EUT transmits text file to the dummy load.

Channel	Tx	Rx	Inj Freq
0	151 MHz,	155 MHz	200 MHz
1	153 MHz	155 MHz	200 MHz
2	156 MHz	155 MHz	200 MHz

Spec limit : 178 Watts = 160 dBuV.

Freq Range : Fundamental, Modulation is OFF. VR2 Transmit power adjusted from Maximum to Minimum.

Bandwidth : RBW = 120 kHz, VBW=120 kHz.

Note: 1The monitor port has a 40 dB insertion loss, internal attenuator of spectrum analyzer is set at 30 dB Total insertion loss of 70 dB is compensated for.

2 RX antenna cable re-routed.

3 PLL algorithm numbers 151MHz=N:1812, R=144: 153 MHz, N = 1683, R=132: 156 MHz N=1560, R=120

16°C, 62% relative humidity.

150-174 MHz.

Criteria: Antenna terminal up to 178 Watts allowed for service area < 13km

Results:

The following table demonstrates the EUT fulfils with the above requirement at the minimum and maximum transmit power of the EUT.

Freq (MHz)	Voltage level dBuV	Power Watts	Notes
151	156.3	85.32	Max Transmit Power
151	135.5	0.71	Min Transmit Power
153	156.2	83.37	Max Transmit Power
153	137.9	1.23	Min Transmit Power
156	155.5	70.96	Max Transmit Power
156	139.2	1.66	Min Transmit Power

Voltage level (dBuV) to Power conversion

$$V = \text{Antilog (dBuV/20)} \times 10^{-6}$$

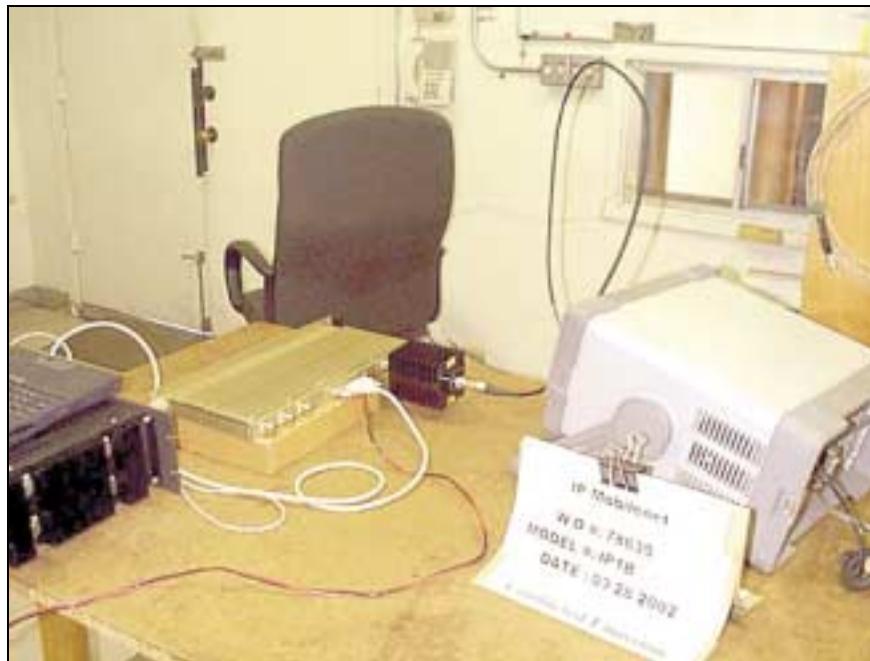
$$\text{Power} = V^2 / R$$

Test Equipment

Spectrum Analyzer	02467	Agilent	E7405A	US40240225	041001	041002
1/4" Heliax Coaxial Cable	NA	Andrew	FSJ-50A-4	Cable#7 (6 ft)	071701	071702



Antenna Terminal Test Setup - Front View



Antenna Terminal Test Setup - Back View

2.1055/90.205(d) – VOLTAGE VARIATIONS ON POWER OUTPUT

Test Conditions

EUT is located inside of the temperature chamber with support equipment located outside. Spectrum analyzer is connected directly to the antenna port of the EUT. Temperature monitoring equipment is affixed to the outside of the EUT enclosure. EUT is powered through an external DC power source.

Voltage Variations

Ambient Temperature is 21.0 °C

Channel 1			
Voltage	Frequency MHz	Frequency Error (Hz)	Pass/Fail
11.7	150.999734	-266	PASS
13.8	150.999762	-238	PASS
15.9	150.999734	-266	PASS

Channel 2			
Voltage	Frequency MHz	Frequency Error (Hz)	Pass/Fail
11.7	152.999691	-309	PASS
13.8	152.999804	-196	PASS
15.9	152.999686	-314	PASS

Channel 3			
Voltage	Frequency MHz	Frequency Error (Hz)	Pass/Fail
11.7	155.999696	-304	PASS
13.8	155.999690	-310	PASS
15.9	155.999688	-312	PASS

Frequency (MHz)	Voltage (VDC)	Power Output (dBm)	Power Output (Watts)
151	11.7	48.3	67.6
	13.8	49.3	85.1
	15.9	49.6	91.2
153	11.7	47.9	61.7
	13.8	49.2	83.2
	15.9	50.2	104.7
156	11.7	47.0	50.1
	13.8	48.5	70.8
	15.9	49.3	85.1

Test Equipment

<i>Equipment</i>	<i>Manufacturer</i>	<i>Model #</i>	<i>Serial #</i>	<i>Asset #</i>	<i>Cal Date</i>	<i>Cal Due</i>
QP Adapter	HP	85650A	2811A01267	00478	1/30/02	1/30/03
S/A Display	HP	8566B	2403A08241	00489	1/30/02	1/30/03
Spectrum Analyzer	HP	8566B	2209A01404	00490	1/30/02	1/30/03
Temp Chamber	Thermotron	S-1.2 MiniMax	11899	01879	3/29/2001	3/29/02
Thermometer	Omega	HH-26K	T-202884	02242	7/26/01	7/26/02
Power Supply, DC	Sorensen	DCR-60-30B	176	00765	7/17/01	7/17/02
Attenuator	Bird	100-SA-MFN-30	9949	P01572	3/21/02	3/21/03


2.1033(c)(14)/2.1047(a) - MODULATION CHARACTERISTICS - AUDIO FREQUENCY RESPONSE

Not applicable to this unit.

2.1033(c)(14)/2.1047(b) MODULATION CHARACTERISTICS – Modulation Limiting Response

Not applicable to this unit.

2.1033(c)(14)/2.1049(i)/90.209/90.210- OCCUPIED BANDWIDTH

Emission Mask C Calculation

Rated power output : 60 watt.
 Authorized band width : 20 kHz

FCC Part 90.210 (c) 1

On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 5 kHz but less than 10 kHz:

At least $83 \log (f_d / 5)$ dB

FCC Part 90.210 (c) 2

On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 10 kHz but not more than 250% of the authorized bandwidth: at least $29 \log (f_d^2 / 11)$ dB or 50 dB, which ever is the lesser attenuation

$$\begin{aligned}
 29 \log (f_d^2 / 11) \text{ dB} &= 50 \text{ dB} \\
 f_d &= \text{SQRT} (11 \times \text{antilog } 50/29) \\
 &= 24 \text{ kHz}
 \end{aligned}$$

therefore at $f_d = 24$ kHz to 250% of authorized band width

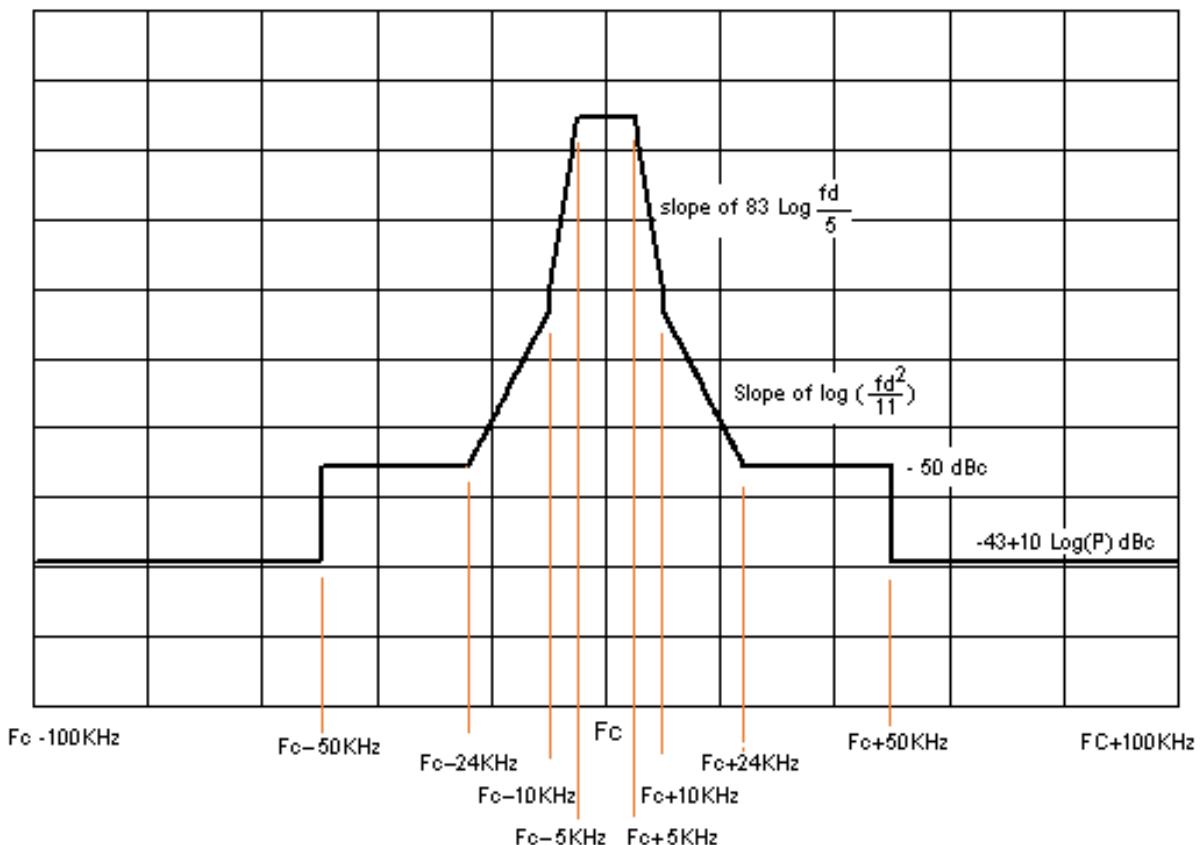
required attenuation = 50 dB.

FCC part 90.210 (c) 3

On any frequency removed from the center of the authorized bandwidth by more than 250% : at least $43 + 10 \log P$.

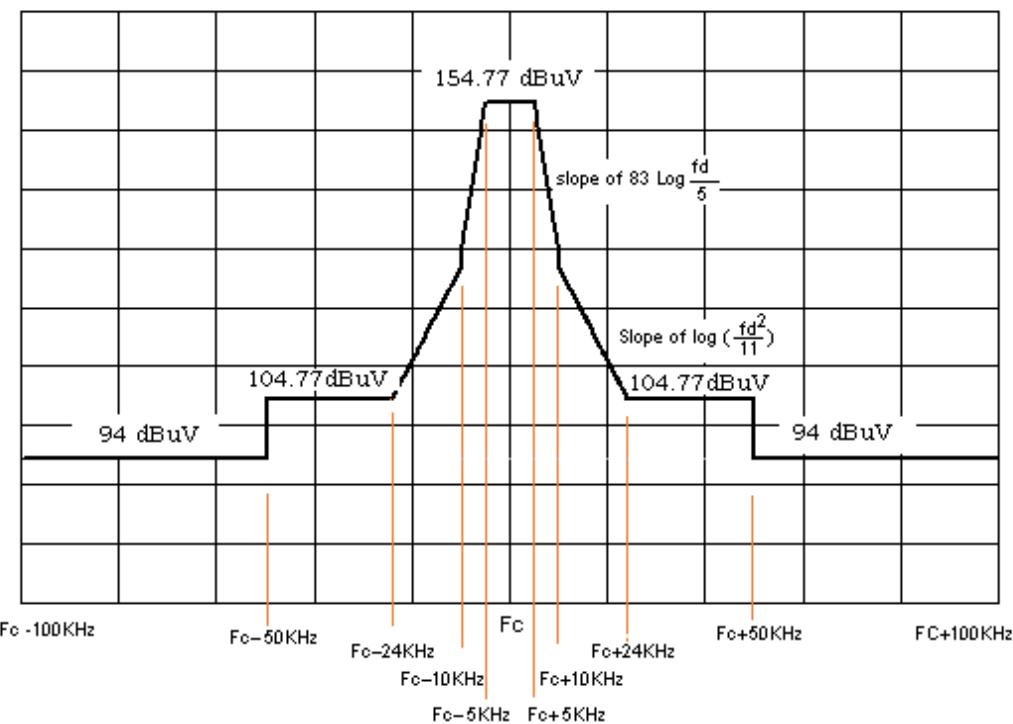
$$\begin{aligned}
 \text{Required attenuation} &= 43 + 10 \log (60) \\
 &= 50.78 \text{ dB}
 \end{aligned}$$

$$\begin{aligned}
 250\% \text{ of authorized band width} &= 20 \text{ kHz} \times 250\% \\
 &= 50 \text{ kHz.}
 \end{aligned}$$



Frequency band	Required attenuation
$F_c - 5 \text{ kHz}$ to $F_c + 5 \text{ kHz}$	0 dB
$F_c - 10 \text{ kHz}$ to $F_c - 5 \text{ kHz}$, $F_c + 5 \text{ kHz}$ to $F_c + 10 \text{ kHz}$	$83 \text{ Log}(f_d / 5) \text{ dB}$
$F_c - 24 \text{ kHz}$ to $F_c - 10 \text{ kHz}$ $F_c + 10 \text{ kHz}$ to $F_c + 24 \text{ kHz}$	$29 \log(f_d^2 / 11) \text{ dB}$
$F_c - 50 \text{ kHz}$ to $F_c - 24 \text{ kHz}$ $F_c + 24 \text{ kHz}$ to $F_c + 50 \text{ kHz}$	50 dB
4 MHz to $F_c - 50 \text{ kHz}$, $F_c + 50 \text{ kHz}$ to 2000 MHz	$43 + 10 \text{ Log}(\text{Power})$ $= 60.78 \text{ dB}$ (Power = 60)

Power = 60 Watts
 Authorized BA = 20 KHz

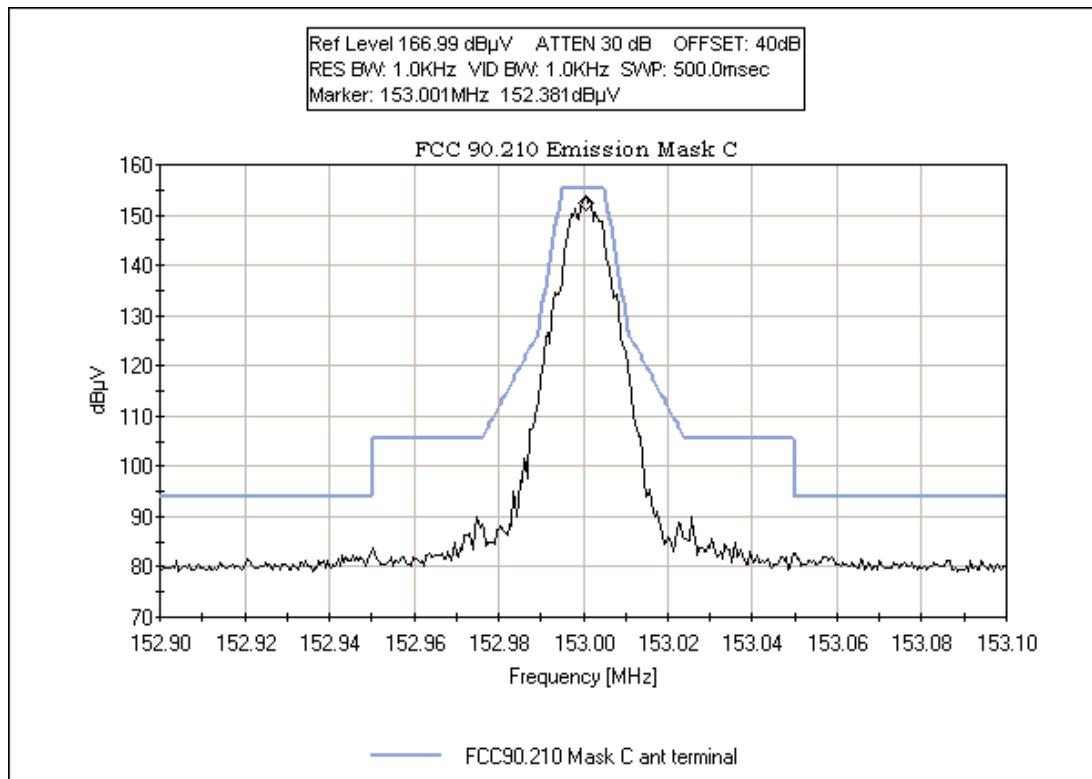
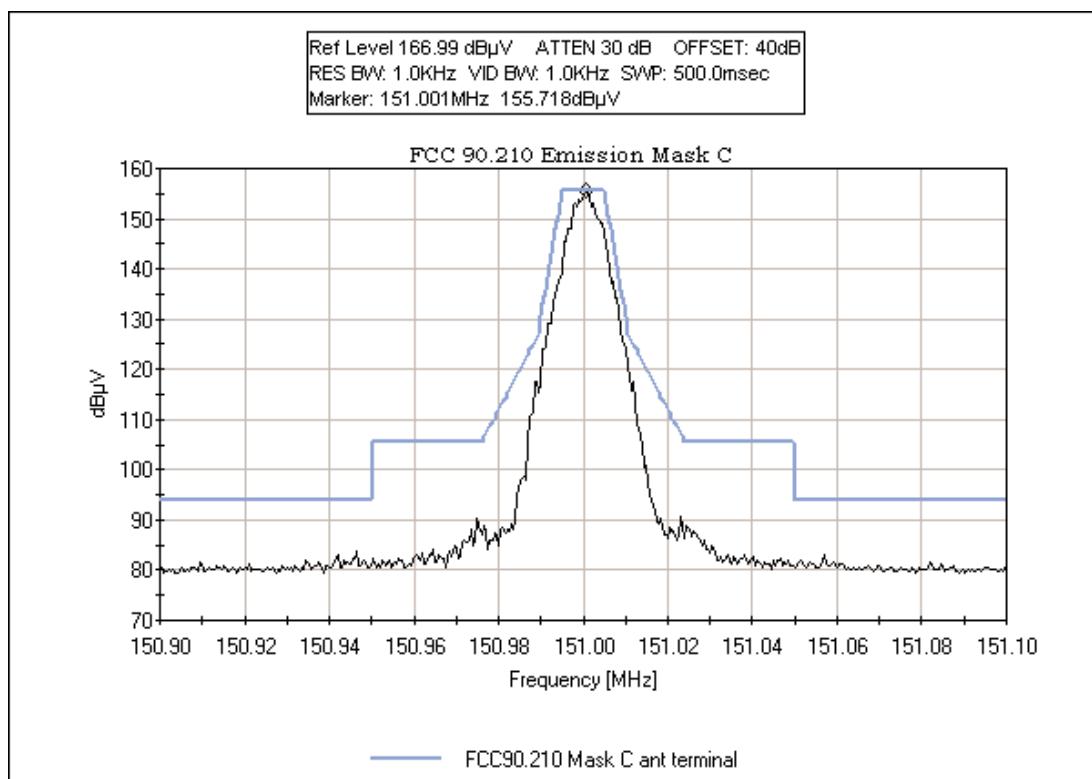


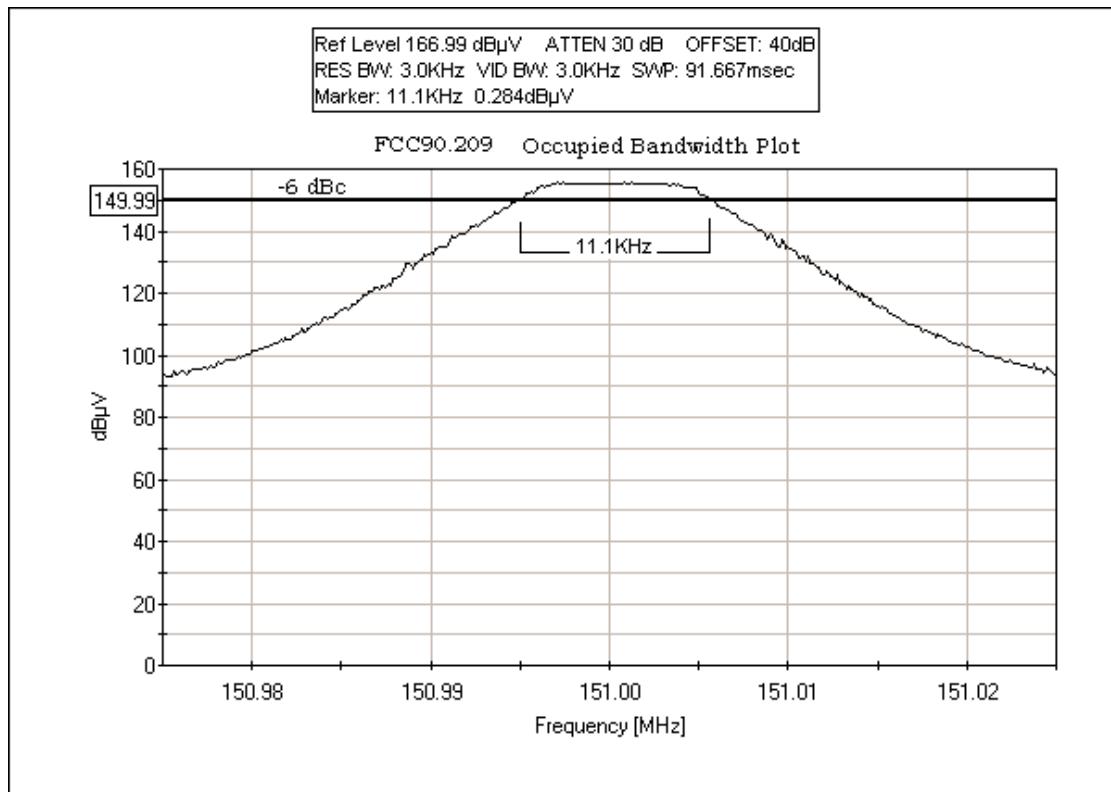
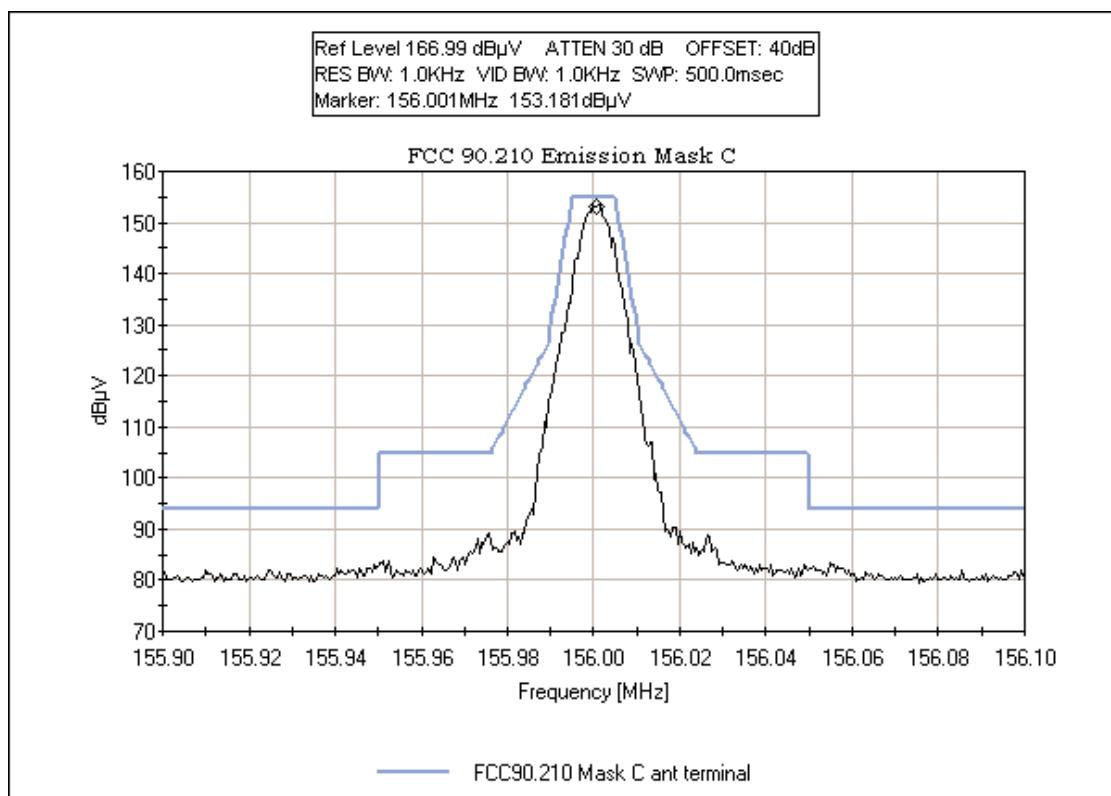
Rated Power = 60watt
 Authorized band width = 20 kHz

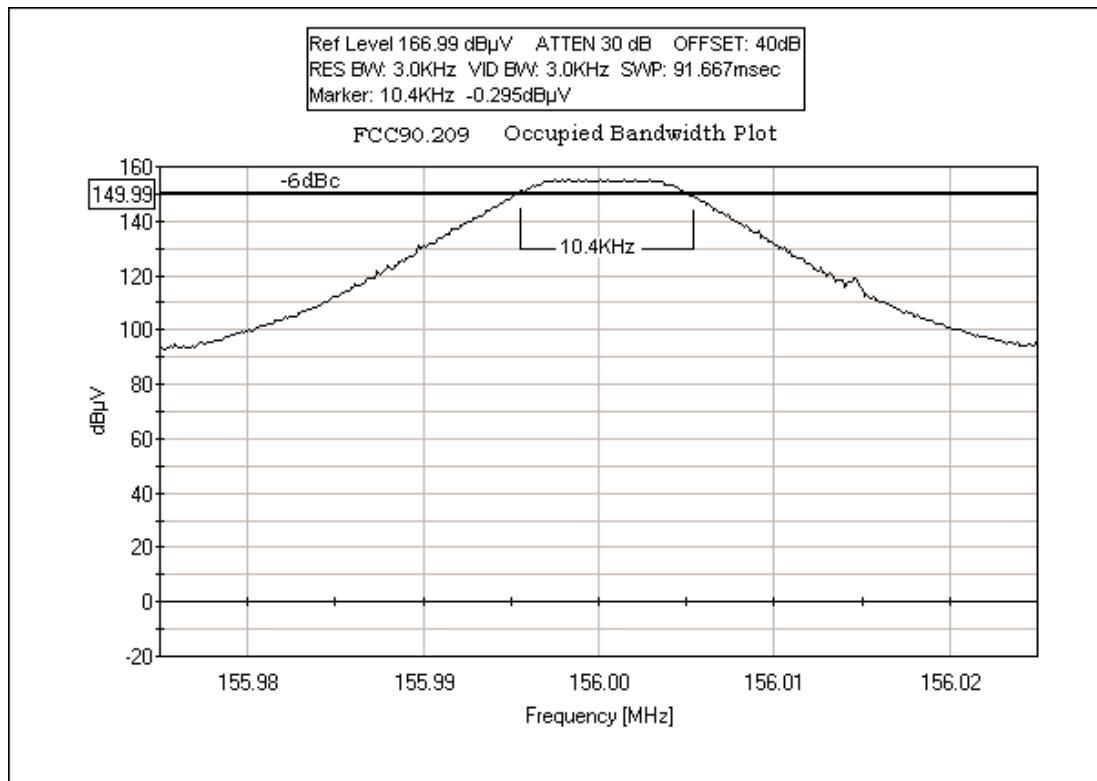
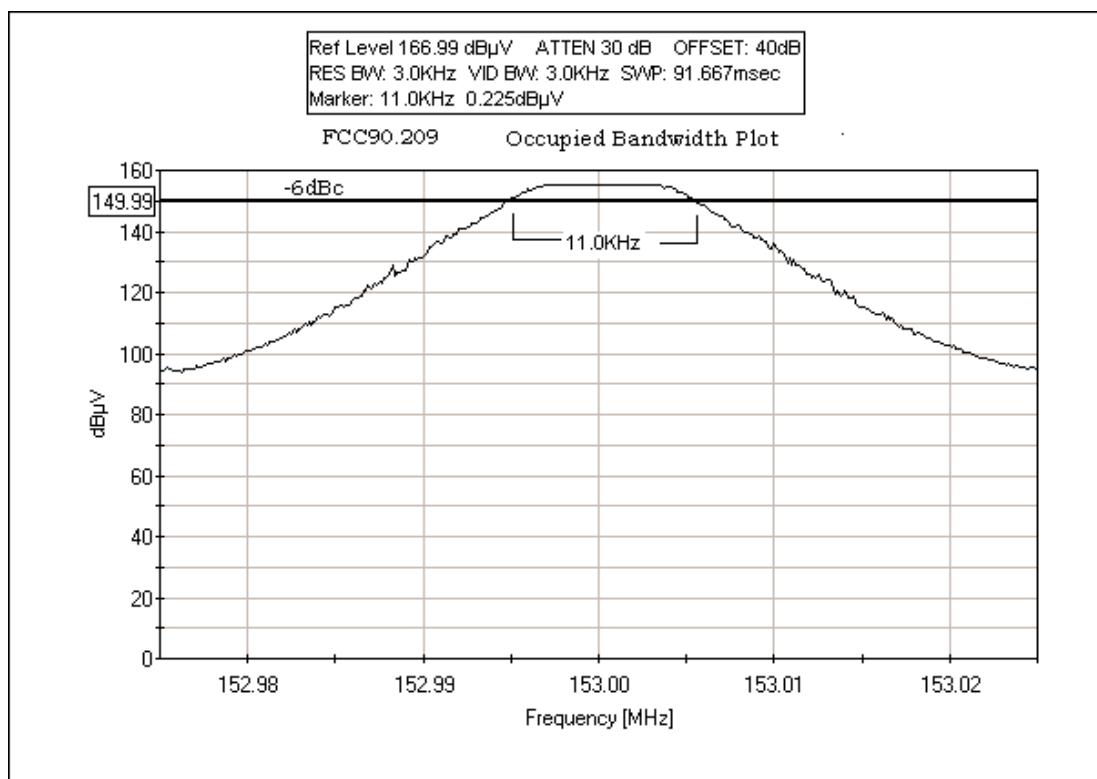
Frequency band	Required attenuation	Limit line for EMI test
Fc - 5 kHz to Fc + 5 kHz	0 dB	154.77 dBuV
Fc - 10 kHz to Fc - 5 kHz,	$83 \log (f_d / 5)$ dB	
Fc + 5 kHz to Fc + 10 kHz		
Fc - 24 kHz to Fc - 10 kHz	$29 \log (f_d^2 / 11)$ dB	
Fc + 10 kHz to FC + 24 kHz		
Fc - 50 kHz to Fc - 24 kHz	50 dB	104.77 dBuV
Fc + 24 kHz to Fc + 50 kHz		
4 MHz to Fc - 50 kHz,	$43 + 10 \log (60)$	94 dBuV
Fc + 50 kHz to 6000 MHz	$= 60.78$ dB	

Power to voltage level (dBuV) conversion

Power	=	V^2 / R
Rate power	=	60 watts
R	=	50 Ohm
V	=	SQRT (Power x R)
	=	SQRT (60 x 50)
	=	54.77 V
V (dBuV)	=	$20 \log (54.77 / 1 \times 10^{-6})$
	=	154.77 dBuV





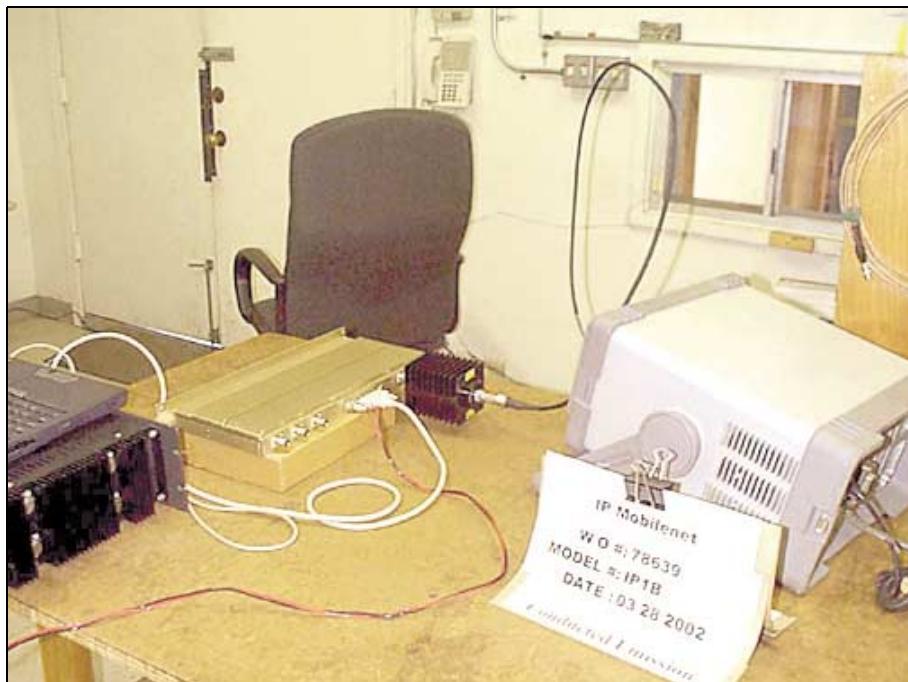


Test Equipment

Spectrum Analyzer	02467	Agilent	E7405A	US40240225	041001	041002
1/4" Heliax Coaxial Cable	NA	Andrew	FSJ-50A-4	Cable#7 (6 ft)	071701	071702



Antenna Terminal Test Setup - Front View



Antenna Terminal Test Setup - Back View

2.1033(c)(14)/2.1051/90.210 - SPURIOUS EMISSIONS AT ANTENNA TERMINAL

Test Conditions

EUT placed on the test bench. Parallel port is connected to Com 1 port of a support laptop via I/O board. All 3 Rx antenna ports left blank. The TX port is terminated to a 100 Watt, 50 ohm load. Transmitted power is evaluated via the monitor port of the load. The 13.8 V dc is obtained from a support power supply.

Transmit mode: CW

Channel	Tx	Rx	Inj Freq	
0	151 MHz,	155 MHz	200 MHz	PLL algorithm with new counter number N = 1812 R= 144
1	153MHz	155MHz	200MHz	PLL algorithm with new counter number N = 1683, R= 132
2	156MHz	155MHz	200MHz	PLL algorithm with new counter number N = 1560, R= 120

Measured unmodulated Power = 60 Watts

Spec limit : required attenuation = $-43+10\log P = -60.78$ dB

Spec limit : 94 dBuV = 0.00005 watts

Freq Range : 4MHz- 2GHz

Measurement Bandwidth

4 MHz - 30 MHz RBW = 9KHz , VBW = 9 kHz

30 MHz- 100MHz RBW = 120 kHz, VBW=120 kHz.

1GHz - 2 GHz RBW=1 MHz , VBW=1 MHz

Note:1. The monitor port has a 40 dB insertion loss, internal attenuator of spectrum analyzer is set at 30 dB. Total insertion loss of 70 dB is compensated for.

2. RX antenna cable re-routed.

16°C, 62% relative humidity.

Transmit Frequency = 151 MHz

Freq MHz	Voltage level dBuV	Power Watts	Spec Limit Watts	Margin	
132.0	86.6	0.0000091	0.00005	-0.00004	Peak
134.0	87.8	0.0000121	0.00005	-0.00004	Peak
144.0	91.8	0.0000303	0.00005	-0.00002	Ave
158.0	92.8	0.0000381	0.00005	-0.00001	Ave
168.0	89.8	0.0000191	0.00005	-0.00003	Ave
170.0	89.8	0.0000191	0.00005	-0.00003	Ave
182.0	88.5	0.0000142	0.00005	-0.00004	Peak
192.0	80.3	0.0000021	0.00005	-0.00005	Peak
194.0	85.9	0.0000078	0.00005	-0.00004	Peak
302.0	83.8	0.0000048	0.00005	-0.00005	Peak
604.0	84.3	0.0000054	0.00005	-0.00004	Peak

Transmit Frequency = 153 MHz

Freq MHz	Voltage level dBuV	Power Watts	Spec Limit Watts	Margin	
138.0	91.4	0.0000276	0.00005	-0.00002	Peak
144.0	91.9	0.0000310	0.00005	-0.00002	Ave
162.0	93.8	0.0000480	0.00005	0.00000	Ave
168.0	90.9	0.0000246	0.00005	-0.00003	Ave
174.0	89.7	0.0000187	0.00005	-0.00003	Peak
186.0	88.5	0.0000142	0.00005	-0.00004	Peak
192.0	84.4	0.0000055	0.00005	-0.00004	Peak
198.0	82.3	0.0000034	0.00005	-0.00005	Peak
306.0	89.8	0.0000191	0.00005	-0.00003	Peak
459.0	80.2	0.0000021	0.00005	-0.00005	Peak

Transmit Frequency = 156 MHz

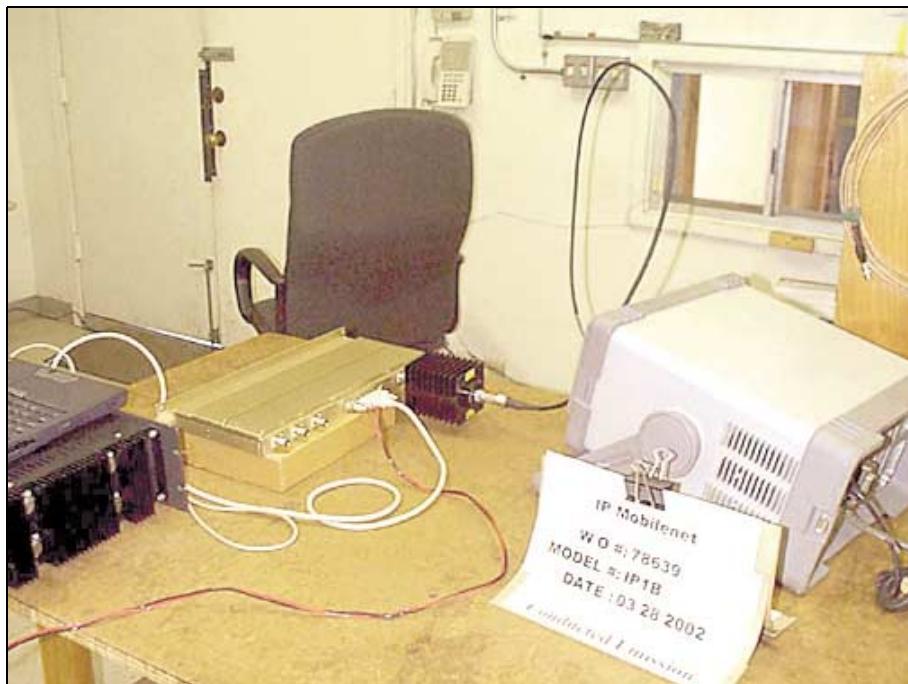
Freq MHz	Voltage level dBuV	Power Watts	Spec Limit Watts	Margin	
144.0	90.9	0.0000246	0.00005	-0.00003	Peak
168.0	91.8	0.0000303	0.00005	-0.00002	Ave
180.0	91.3	0.0000270	0.00005	-0.00002	Peak
192.0	88.0	0.0000126	0.00005	-0.00004	Peak
204.0	84.8	0.0000060	0.00005	-0.00004	Peak
312.0	91.9	0.0000310	0.00005	-0.00002	Peak
624.0	86.0	0.0000080	0.00005	-0.00004	Peak

Test Equipment

Spectrum Analyzer	02467	Agilent	E7405A	US40240225	041001	041002
1/4" Heliax Coaxial Cable	NA	Andrew	FSJ-50A-4	Cable#7 (6 ft)	071701	071702



Antenna Terminal Test Setup - Front View



Antenna Terminal Test Setup - Back View

2.1033(c)(14)/2.1053/90.210- FIELD STRENGTH OF SPURIOUS RADIATION

Test Conditions:

EUT placed on the test bench. Parallel port is connected to Com 1 port of a support laptop via I/O board. All 3 Rx antenna ports left blank. The TX port is terminated to a 100 Watt, 50 ohm load. . The 13.8 V dc is obtained from a support power supply.

Transmit mode: CW

Channel	Tx	Rx	Inj Freq
0	151 MHz,	155 MHz	200 MHz PLL algorithm with new counter number N = 1812 R= 144
1	153MHz	155MHz	200MHz PLL algorithm with new counter number N = 1683, R= 132
2	156MHz	155MHz	200MHz PLL algorithm with new counter number N = 1560, R= 120

Measured unmodulated Power = 60 Watts

Spec limit : required attenuation = $-43+10\log P = -60.78$ dB

Note:1 RX antenna cable re-routed.

16°C, 62% relative humidity.

Spec limit : 94 dBuV = 0.00005 watts

Freq Range : 4MHz- 2GHz

Measurement Bandwidth

4 MHz - 30 MHz RBW = 9KHz , VBW = 9 kHz

30 MHz- 100MHz RBW = 120 kHz, VBW=120 kHz.

1GHz - 2 GHz RBW=1 MHz , VBW=1 MHz

Transmit Frequency = 151 MHz

Freq MHz	Voltage level dBuV	Power Watts	Spec Limit Watts	Margin	
18.8	36.4	0.000000000087	0.00005	-0.00004999991	Peak
468.0	32.7	0.000000000037	0.00005	-0.00004999996	Peak
1974.0	30.0	0.000000000020	0.00005	-0.00004999998	Peak

Transmit Frequency = 153 MHz

Freq MHz	Voltage level dBuV	Power Watts	Spec Limit Watts	Margin	
23.8	35.5	0.000000000071	0.00005	-0.00004999993	Peak
999.0	31.5	0.000000000028	0.00005	-0.00004999997	Peak
1974.0	32.6	0.000000000036	0.00005	-0.00004999996	Peak

Transmit Frequency = 156 MHz

Freq MHz	Voltage level dBuV	Power Watts	Spec Limit Watts	Margin	
20.3	35.3	0.000000000068	0.00005	-0.00004999993	Peak
459.0	35.4	0.000000000069	0.00005	-0.00004999993	Peak
1350.0	29.2	0.000000000017	0.00005	-0.00004999998	Peak

Voltage level (dBuV) to Power conversion

$$\text{Power} = \frac{V^2}{R}$$

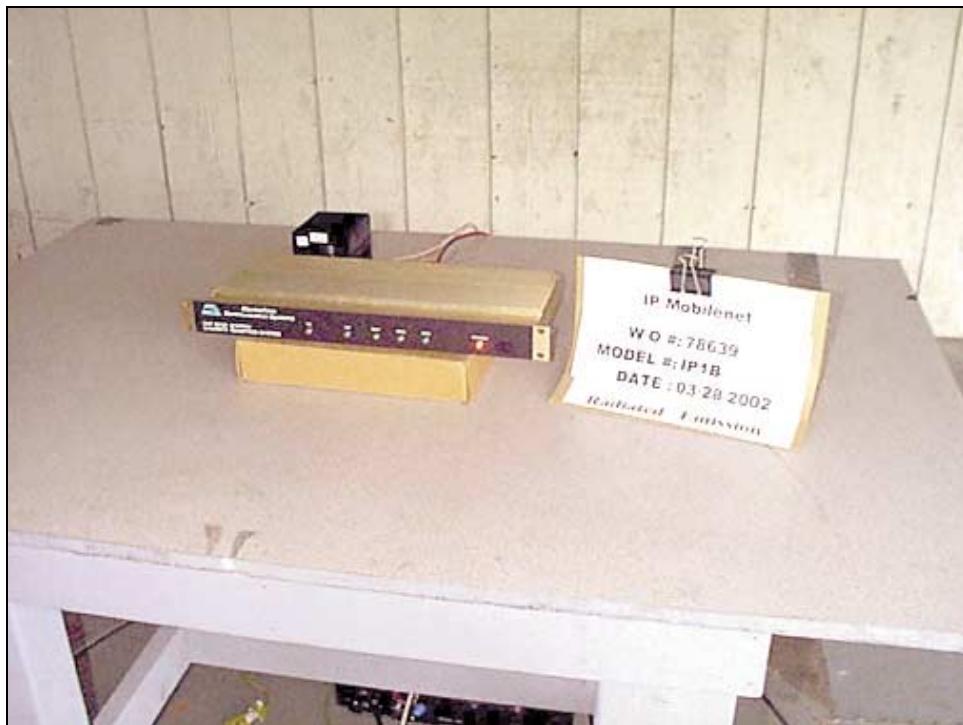
$$-43 + 10 \log P \text{ (at +/- 250 % of authorized band width)} = 94 \text{ dBuV}$$

$$\begin{aligned} V &= \text{Antilog (dBuV/20)} \times 10^{-6} \\ &= \text{AntiLog (94/20)} \times 10^{-6} \\ &= 0.05012V \end{aligned}$$

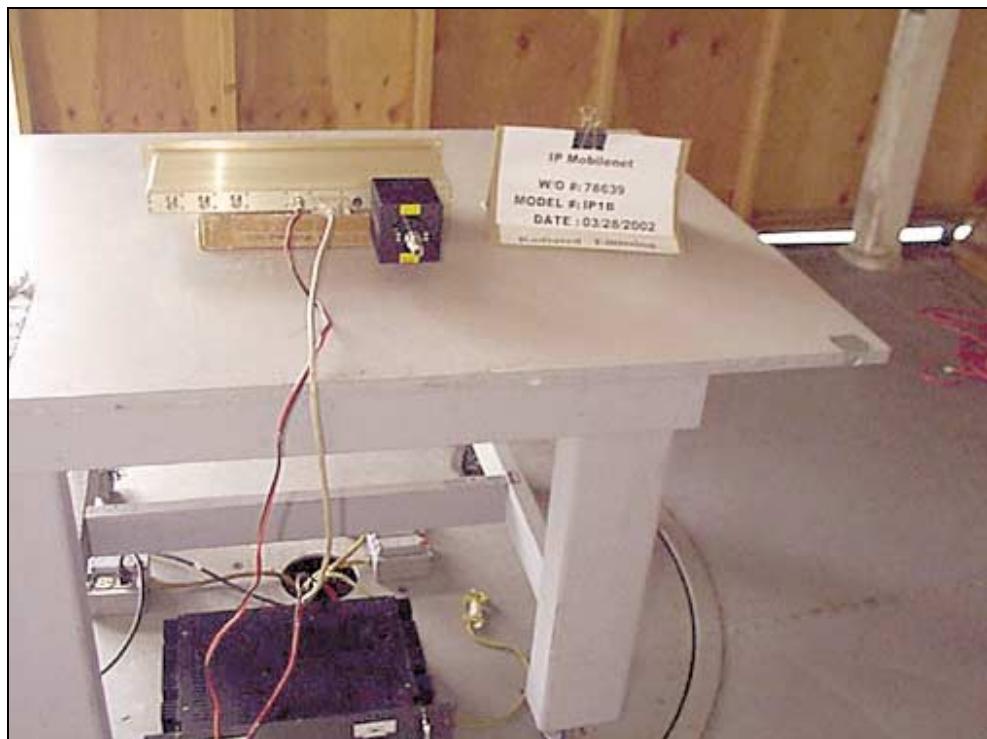
$$\begin{aligned} \text{Power} &= \frac{0.05012^2}{50} \\ &= 0.00005 \text{ Watts} \end{aligned}$$

Test Equipment

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
4- 30 MHz						
Spectrum Analyzer	02467	Agilent	E7405A	US40240225	041001	041002
Antenna cable	NA	NA	RG214	Cable#15	122001	122002
Loop Antenna	00314	EMCO	6502	2014	073101	073102
30- 1 GHz						
Spectrum Analyzer	02467	Agilent	E7405A	US40240225	041001	041002
Antenna cable	NA	NA	RG214	Cable#15	122001	122002
Bicon Antenna	306	AH	SAS200/540	220	092401	092402
Log Periodic Antenna	331	AH	SAS 00/516	330	092401	092402
Pre-amp	00309	HP	8447D	1937A02548	090501	090502
1 -2 GHz						
Horn Antenna	0849	EMCO	3115	6246	091201	091202
Microwave Pre-amp	00786	HP	83017A	3123A00281	091201	091202
1/4" Heliax Coaxial Cable	NA	Andrew	LDF1-50	Cable#18 (70 ft)	091101	091102
Spectrum Analyzer	02467	Agilent	E7405A	US40240225	041001	041002



Radiated Emissions - Front View



Radiated Emissions - Back View

2.1033(c)(14)/2.1055/90.213- FREQUENCY STABILITY

Test Conditions:

EUT is located inside of the temperature chamber with support equipment located outside. Spectrum analyzer is connected directly to the antenna port of the EUT. Temperature monitoring equipment is affixed to the outside of the EUT enclosure. EUT is powered through an external DC power source.

Frequency Stability

Customer:	IP MobileNet
WO:	78639
Model:	IP1B
FCC Part:	2.1055 / 90.213
Test Engineer:	Randal Clark
Date:	05/02/2002

Ambient Temperature:	70	21.1 °C
Relative Humidity:	65	%
Authorized Band:	151-156	MHz
CH1 Operating Frequency in MHz:	151.00	MHz
CH2 Operating Frequency in MHz:	153.00	MHz
CH3 Operating Frequency in MHz:	156.00	MHz
CH1 Frequency Limit:	378	(2.5 ppm)
CH2 Frequency Limit:	383	(2.5 ppm)
CH3 Frequency Limit:	390	(2.5 ppm)
Nominal Operating Voltage:	13.80	VAC/VDC
85% of Nominal (V-)	11.73	VAC/VDC
115% of Nominal (V+)	15.87	VAC/VDC
Maximum Deviation:	379.00	Hz
		2.47 ppm

Temperature Stability

Channel 1

Frequency MHz	Frequency Error (Hz)	Pass/Fail
-30°	151.000341	340 PASS
-20°C	151.000369	369 PASS
-10°C	151.000290	290 PASS
0°C	151.000292	292 PASS
+10°C	150.999976	-24 PASS
+20°C	150.999842	-158 PASS
+30°C	150.999766	-234 PASS
+40°C	150.999906	-94 PASS
+50°C	151.000046	46 PASS

Channel 2

Frequency MHz	Frequency Error (Hz)	Pass/Fail
-30°	153.000339	339 PASS
-20°C	153.000379	379 PASS
-10°C	153.000306	306 PASS
0°C	153.000364	364 PASS
+10°C	153.000010	10 PASS
+20°C	152.999796	-204 PASS
+30°C	152.999700	-300 PASS
+40°C	152.999900	-100 PASS
+50°C	153.000040	40 PASS

Channel 3

Frequency MHz	Frequency Error (Hz)	Pass/Fail
-30°	156.000336	336 PASS
-20°C	156.000308	308 PASS
-10°C	156.000251	251 PASS
0°C	156.000282	282 PASS
+10°C	156.000110	110 PASS
+20°C	155.999756	-244 PASS
+30°C	155.999710	-290 PASS
+40°C	155.999896	-104 PASS
+50°C	156.000036	36 PASS

Test Equipment

<i>Equipment</i>	<i>Manufacturer</i>	<i>Model #</i>	<i>Serial #</i>	<i>Asset #</i>	<i>Cal Date</i>	<i>Cal Due</i>
QP Adapter	HP	85650A	2811A01267	00478	1/30/02	1/30/03
S/A Display	HP	8566B	2403A08241	00489	1/30/02	1/30/03
Spectrum Analyzer	HP	8566B	2209A01404	00490	1/30/02	1/30/03
Temp Chamber	Thermotron	S-1.2 MiniMax	11899	01879	8/28/01	8/28/02
Thermometer	Omega	HH-26K	T-202884	02242	7/26/01	7/26/02
Power Supply, DC	Sorensen	DCR-60-30B	176	00765	7/17/01	7/17/02
Attenuator	Bird	100-SA-MFN-30	9949	P01572	3/21/02	3/21/03



90.214 - TRANSIENT FREQUENCY BEHAVIOR

Frequency Range 151MHz to 156MHz

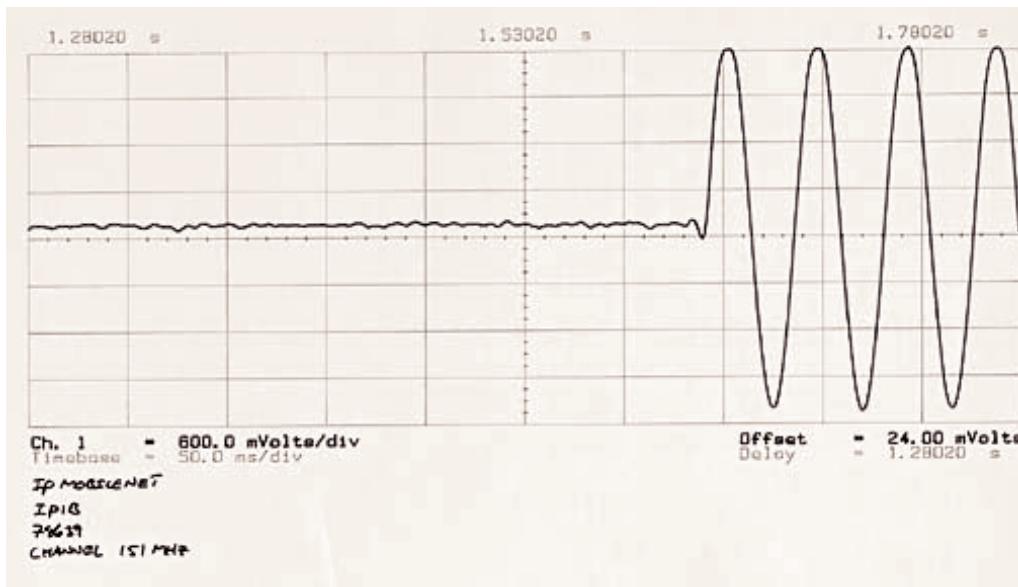
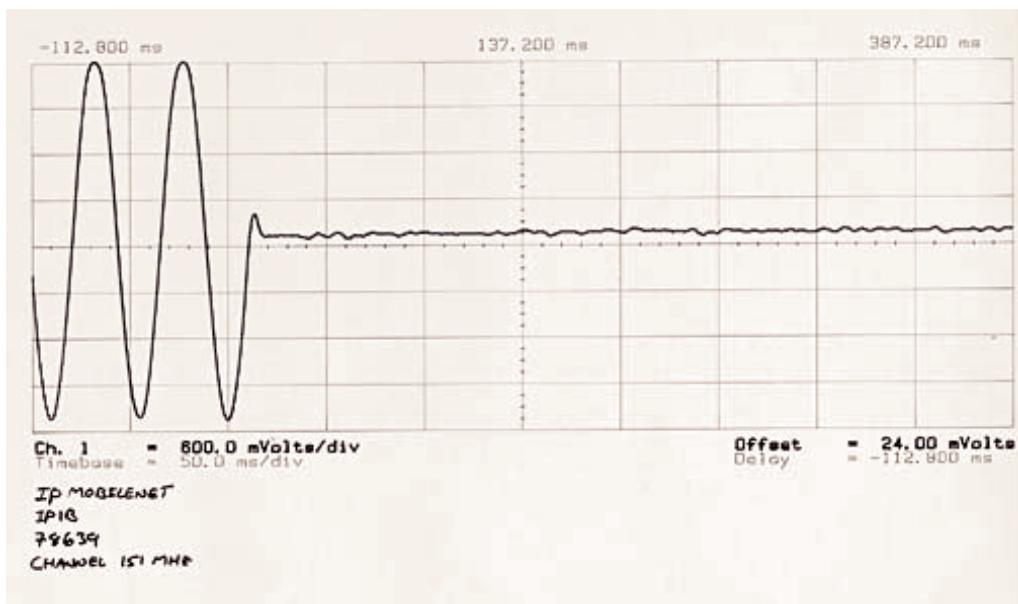
T1 ± 25 kHz 5ms

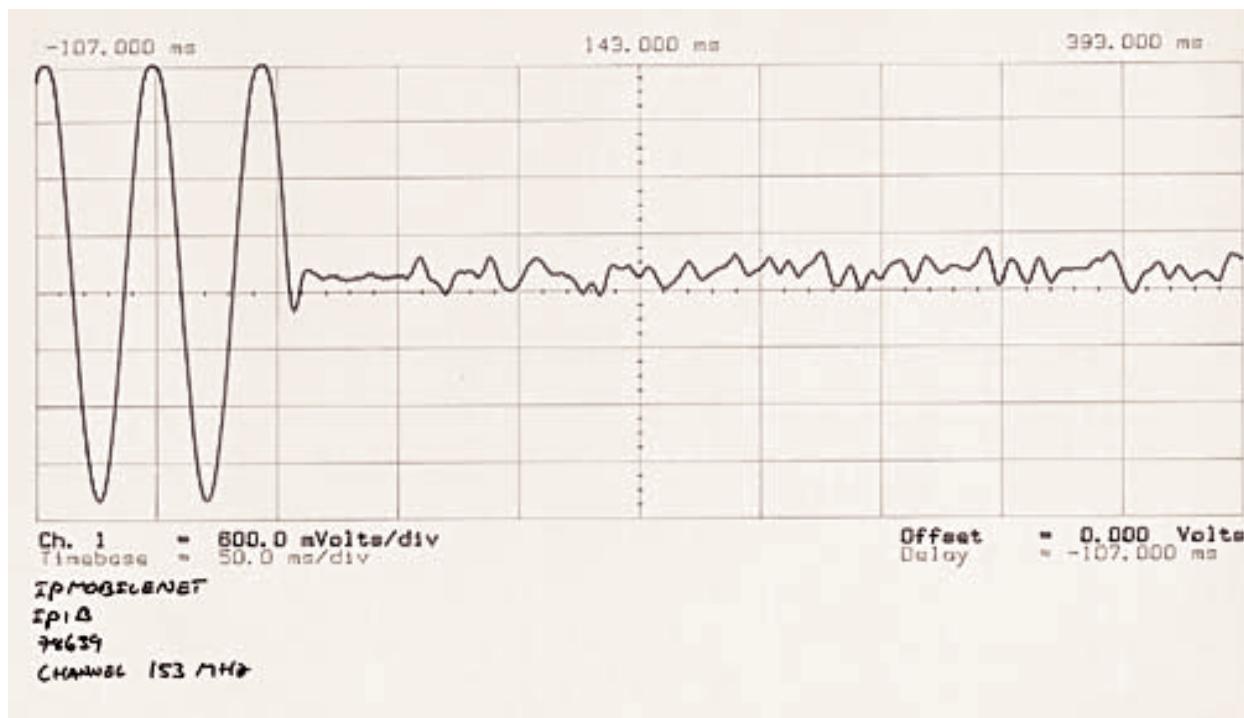
T2 ± 12.5 kHz 20ms

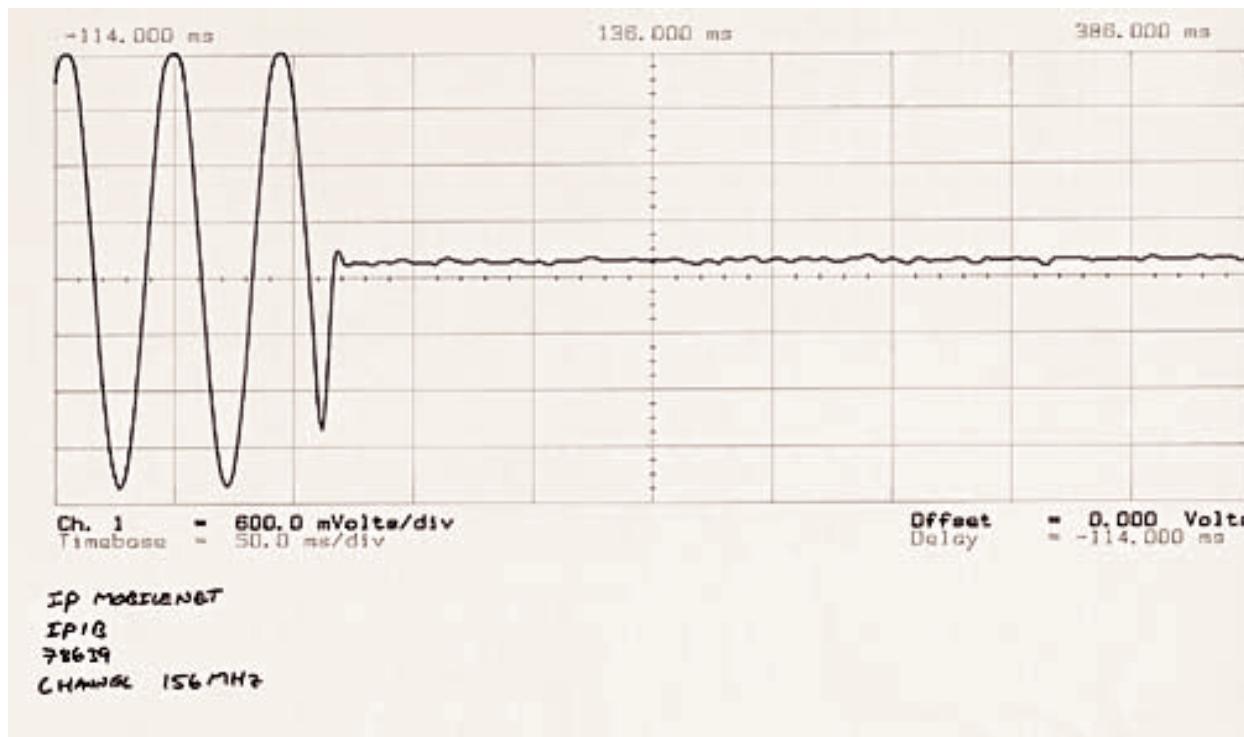
T3 ± 25 kHz 5ms

Test Conditions

Test performed in accordance with TIA/EIA 603.

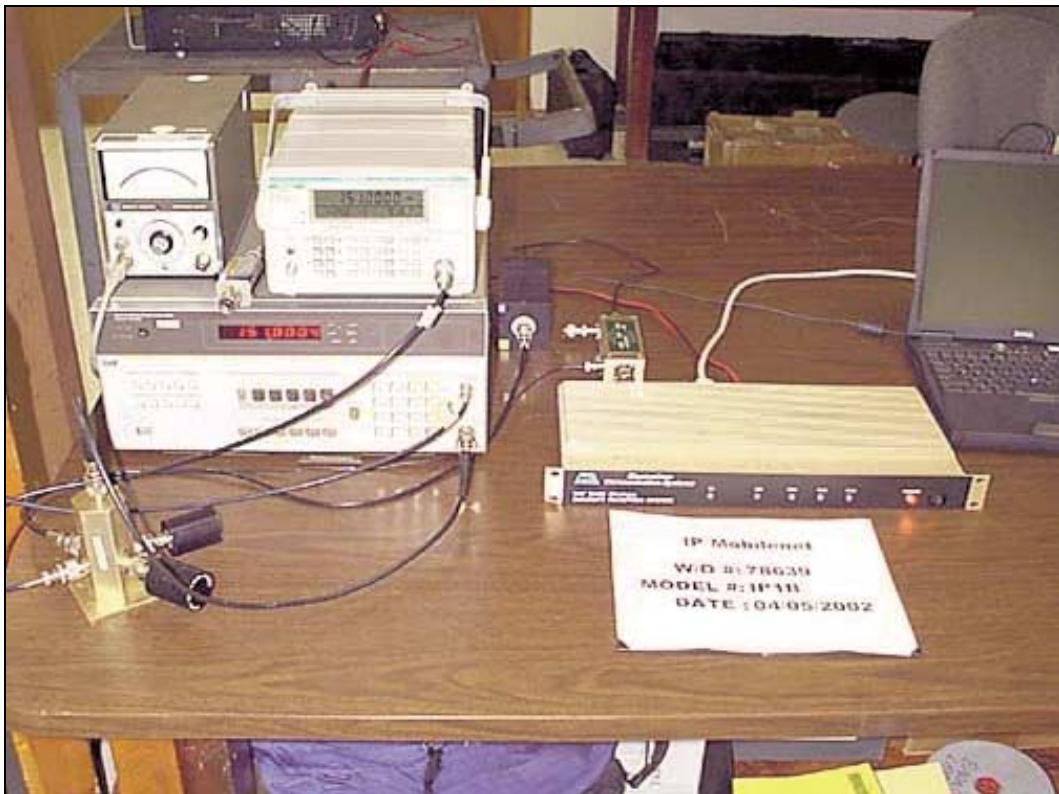


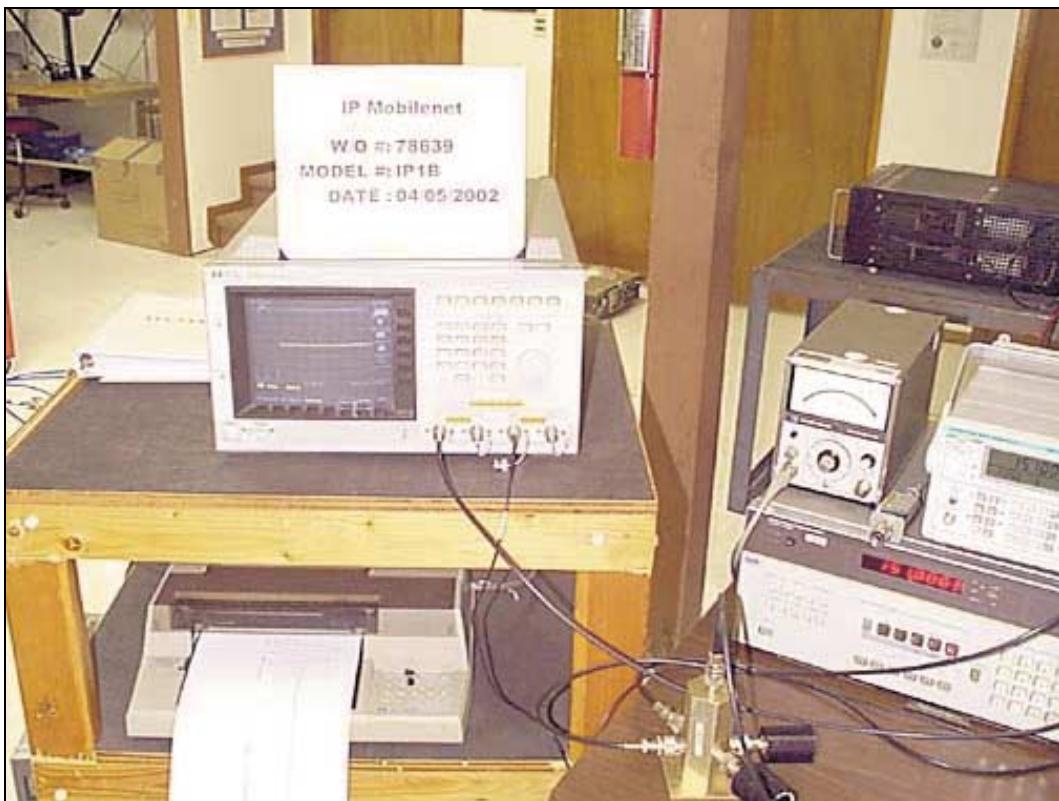




Test Equipment

<i>Equipment</i>	<i>Manufacturer</i>	<i>Model #</i>	<i>Serial #</i>	<i>Asset #</i>	<i>Cal Date</i>	<i>Cal Due</i>
Generator, Signal	Marconi	2022D	119259/016	01870	9/5/01	9/5/02
Analyzer/Modulation	HP	8901A	2751A05181	02072	11/20/01	11/20/02
Directional Coupler	Werlatone	C2630	3805	00713	4/16/01	4/16/02
Oscilloscope, Digital	HP	54111D	3051A03191	02008	9/28/01	9/28/02
Power Supply, DC	Sorenson	DCR-60-30B	176	00765	7/17/01	7/17/02
Attenuator	Bird	100-SA-MFN-30	9949	P01572	3/21/02	3/21/03
Power Meter	HP	435B	2342A08531	00174	7/27/01	7/27/02
Power Sensor	HP	7560	1551A01004	02036	7/27/01	7/27/02
Splitter	Motorola		549TR18HE	P01314	4/05/02	4/05/03





15.107 – AC CONDUCTED EMISSIONS – RECEIVER/DIGITAL

Test Location: CKC Laboratories, Inc. • 110 N. Olinda Place • Brea, CA 92823 • (714) 993-6112

Customer: **IP Mobilenet**
 Specification: **FCC 15.107 Class B**
 Work Order #: **78639** Date: 03/29/2002
 Test Type: **Conducted Emissions** Time: 4:26:16 PM
 Equipment: **Base Station** Sequence#: 8
 Manufacturer: IP Mobilenet Tested By: Eddie Wong
 Model: IP1B 120V 60Hz
 S/N: NA

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Base Station*	IP Mobilenet	IP1B	NA

Support Devices:

Function	Manufacturer	Model #	S/N
Power supply	Topward	6306D	988614

Test Conditions / Notes:

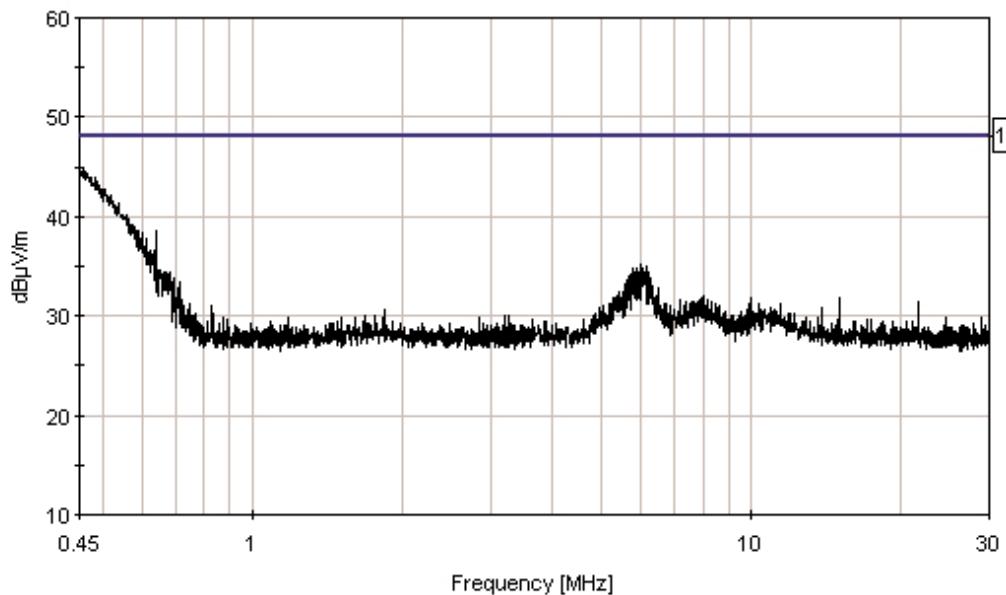
EUT placed on the test bench. Parallel port is connected to Com 1 port of a support laptop via I/O board. All Rx antenna ports left blank. The TX port is terminated to a 100 Watt, 50 ohm load. 13.8 Vdc is obtained from a support power supply. Receiver mode Channel Tx 153MHz, Rx 155MHz, Inj Freq 1 200MHz. Freq Range: 450KHz-30MHz. Measurement Bandwidth RBW=9KHz, VBW=9KHz. Note: 1 RX antenna cable re-routed. 2 PLL algorithm numbers 151MHz: N=1812, R=144: 153MHz, N=1683, R=132: 156MHz N=1560, R=120. 16°C, 62% relative humidity.

Transducer Legend:

--

#	Freq MHz	Reading listed by margin.				Dist Table	Corr dB μ V/m	Spec dB μ V/m	Margin dB	Polar Ant
		Rdng dB μ V	dB	dB	dB					
1	457.522k	44.8				+0.0	44.8	48.0	-3.2	Black
2	450.836k	44.4				+0.0	44.4	48.0	-3.6	Black
3	450.836k	44.4				+0.0	44.4	48.0	-3.6	Black
4	450.836k	44.4				+0.0	44.4	48.0	-3.6	Black
5	450.836k	44.4				+0.0	44.4	48.0	-3.6	Black
6	450.836k	44.4				+0.0	44.4	48.0	-3.6	Black
7	639.727k	38.5				+0.0	38.5	48.0	-9.5	Black
8	5.987M	35.2				+0.0	35.2	48.0	-12.8	Black

9	5.701M	34.0	+0.0	34.0	48.0	-14.0	Black
10	696.561k	33.8	+0.0	33.8	48.0	-14.2	Black
11	692.382k	33.5	+0.0	33.5	48.0	-14.5	Black
12	713.277k	33.4	+0.0	33.4	48.0	-14.6	Black
13	14.977M	31.9	+0.0	31.9	48.0	-16.1	Black
14	10.020M	31.8	+0.0	31.8	48.0	-16.2	Black
15	1.847M	30.7	+0.0	30.7	48.0	-17.3	Black

CKC Laboratories, Inc. Date: 03/29/2002 Time: 4:26:16 PM IP Mobilenet VVO#: 78639
FCC 15.107 Class B Test Lead: Black 120V 60Hz Sequence#: 8


— 1 - FCC 15.107 Class B

Test Location: CKC Laboratories, Inc. • 110 N. Olinda Place • Brea, CA 92823 • (714) 993-6112

Customer: **IP Mobilenet**
 Specification: **FCC 15.107 Class B**
 Work Order #: **78639** Date: 03/29/2002
 Test Type: **Conducted Emissions** Time: 4:32:29 PM
 Equipment: **Base Station** Sequence#: 9
 Manufacturer: IP Mobilenet Tested By: Eddie Wong
 Model: IP1B 120V 60Hz
 S/N: NA

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Base Station*	IP Mobilenet	IP1B	NA

Support Devices:

Function	Manufacturer	Model #	S/N
Power supply	Topward	6306D	988614

Test Conditions / Notes:

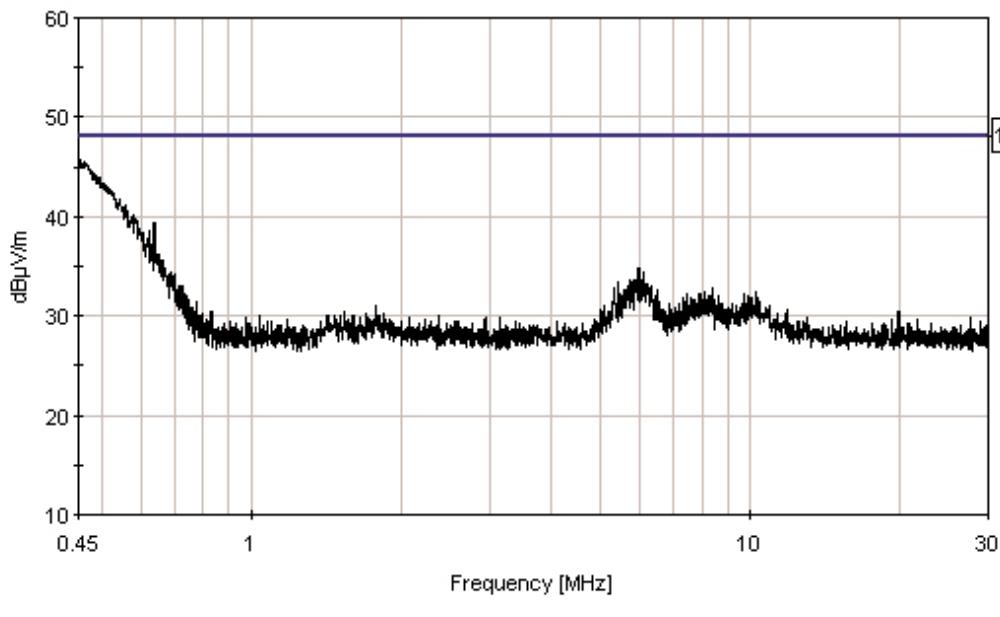
EUT placed on the test bench. Parallel port is connected to Com 1 port of a support laptop via I/O board. All Rx antenna ports left blank. The TX port is terminated to a 100 Watt, 50 ohm load. 13.8 V dc is obtained from a support power supply. Receiver mode Channel Tx 153MHz, Rx 155MHz, Inj Freq 1 200MHz. Freq Range: 450KHz-30MHz. Measurement Bandwidth RBW=9KHz, VBW=9KHz. Note: 1 RX antenna cable re-routed. 2 PLL algorithm numbers 151MHz: N=1812, R=144: 153 MHz, N=1683, R=132: 156 MHz, N=1560, R=120. 16°C, 62% relative humidity.

Transducer Legend:

--

#	Freq MHz	Rdng dB μ V	Reading listed by margin.				Test Lead: White			
			dB	dB	dB	Dist Table	Corr dB μ V/m	Spec dB μ V/m	Margin dB	Polar Ant
1	450.836k	45.8				+0.0	45.8	48.0	-2.2	White
2	450.836k	45.8				+0.0	45.8	48.0	-2.2	White
3	638.055k	39.4				+0.0	39.4	48.0	-8.6	White
4	5.974M	34.8				+0.0	34.8	48.0	-13.2	White
5	5.435M	33.5				+0.0	33.5	48.0	-14.5	White
6	8.437M	32.8				+0.0	32.8	48.0	-15.2	White
7	10.273M	32.5				+0.0	32.5	48.0	-15.5	White
8	8.635M	32.1				+0.0	32.1	48.0	-15.9	White
9	10.900M	31.1				+0.0	31.1	48.0	-16.9	White
10	1.776M	31.0				+0.0	31.0	48.0	-17.0	White

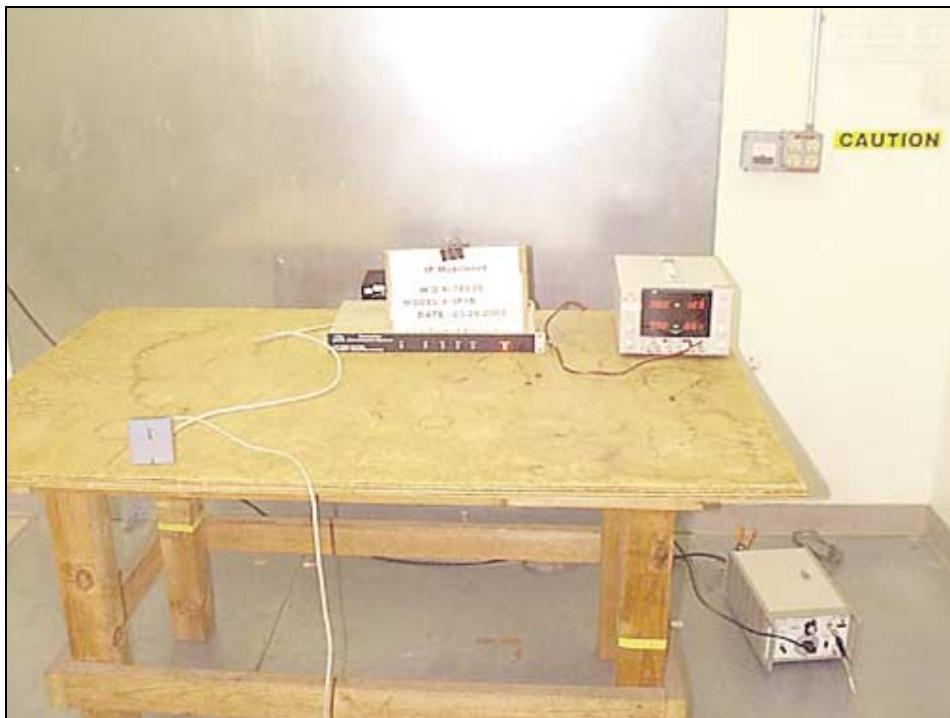
11	19.835M	30.5	+0.0	30.5	48.0	-17.5	White
12	10.510M	30.2	+0.0	30.2	48.0	-17.8	White
13	10.510M	30.2	+0.0	30.2	48.0	-17.8	White
14	10.510M	30.2	+0.0	30.2	48.0	-17.8	White
15	19.172M	29.7	+0.0	29.7	48.0	-18.3	White

CKC Laboratories, Inc. Date: 03/29/2002 Time: 4:32:29 PM IP Mobilenet WO#: 78639
FCC 15.107 Class B Test Lead: White 120V 60Hz Sequence#: 9


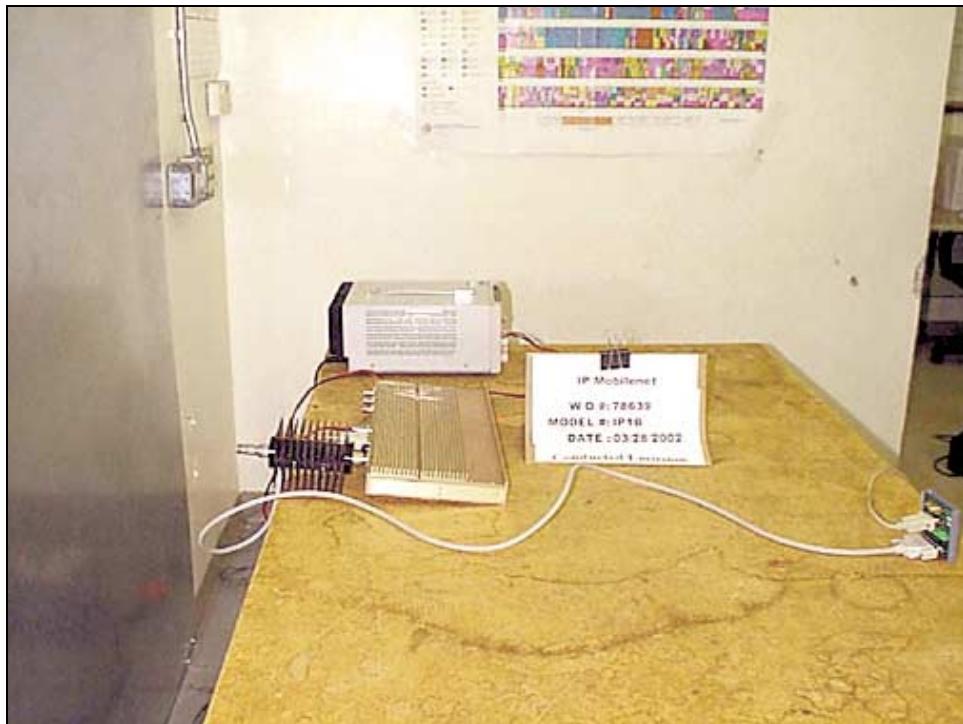
— 1 - FCC 15.107 Class B

Test Equipment

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Spectrum Analyzer	01865	HP	8566B	2532A02509	092801	092802
QP Adapter	01437	HP	85650A	3303A01884	092801	092802
LISN	00848	EMCO	3816/2	1102	111401	111402



Receiver Conducted Emissions - Front View



Receiver Conducted Emissions - Back View

15.109 – RADIATED EMISSIONS – RECEIVER/DIGITAL

Test Location: CKC Laboratories, Inc. • 110 N. Olinda Place • Brea, CA 92823 • (714) 993-6112

Customer: **IP Mobilenet**
 Specification: **FCC 15.109 Class B**
 Work Order #: **78639** Date: 03/29/2002
 Test Type: **Maximized Emissions** Time: 15:53:39
 Equipment: **Base Station** Sequence#: 7
 Manufacturer: IP Mobilenet Tested By: Eddie Wong
 Model: IP1B
 S/N: NA

Test Equipment:

Function	S/N	Calibration Date	Cal Due Date	Asset #
----------	-----	------------------	--------------	---------

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Base Station*	IP Mobilenet	IP1B	NA

Support Devices:

Function	Manufacturer	Model #	S/N
Power supply	Astron	RM50M	NA

Test Conditions / Notes:

EUT placed on the test bench. Parallel port is connected to Com 1 port of a support laptop via I/O board. All Rx antenna ports left blank. The TX port is terminated to a 100 Watt, 50 ohm load. 13.8 V dc is obtained from a support power supply. Receiver mode Channel Tx 153MHz, Rx 155MHz, Inj Freq 1 200MHz. Freq Range: 30MHz- 1000MHz. Measurement Bandwidth RBW=1 MHz, VBW=1 MHz. Note: 1 RX antenna cable re-routed. 2 PLL algorithm numbers 151MHz: N=1812, R=144: 153 MHz, N=1683, R=132: 156MHz, N=1560, R=120. 16°C, 62% relative humidity.

Transducer Legend:

T1=Log 331 092401	T2=Bicon 092401
T3=Cable #10 071601	T4=Cable #15 120602
T5=Preamp 8447D 090501	

Measurement Data: Reading listed by margin.

Test Distance: 3 Meters

#	Freq	Rdng	T1 T5	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dB μ V	dB	dB	dB	dB	Table	dB μ V/m	dB μ V/m	dB	Ant
1	953.840M	28.4	+23.7 -27.7	+0.0	+0.6	+6.3	+0.0	31.3	46.0	-14.7	Horiz
2	171.980M	32.7	+0.0 -28.2	+17.4	+0.3	+2.4	+0.0	24.6	43.5	-18.9	Horiz
3	162.793M	29.9	+0.0 -28.3	+17.6	+0.3	+2.3	+0.0	21.8	43.5	-21.7	Vert
4	245.740M	31.4	+0.0 -28.2	+17.7	+0.3	+2.9	+0.0	24.1	46.0	-21.9	Vert
5	992.390M	27.7	+24.2 -27.9	+0.0	+0.6	+7.0	+0.0	31.6	54.0	-22.4	Vert
6	181.730M	22.5	+0.0 -28.3	+17.3	+0.3	+2.5	+0.0	14.3	43.5	-29.2	Horiz

Test Location: CKC Laboratories, Inc. • 110 N. Olinda Place • Brea, CA 92823 • (714) 993-6112

Customer: **IP Mobilenet**
 Specification: **FCC 15.109 Class B**
 Work Order #: **78639** Date: 03/29/2002
 Test Type: **Maximized Emissions** Time: 15:04:41
 Equipment: **Base Station** Sequence#: 6
 Manufacturer: IP Mobilenet Tested By: Eddie Wong
 Model: IP1B
 S/N: NA

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Base Station*	IP Mobilenet	IP1B	NA

Support Devices:

Function	Manufacturer	Model #	S/N
Power supply	Astron	RM50M	NA

Test Conditions / Notes:

EUT placed on the test bench. Parallel port is connected to Com 1 port of a support laptop via I/O board. All Rx antenna ports left blank. The TX port is terminated to a 100 Watt, 50 ohm load. 13.8 V dc is obtained from a support power supply. Receiver mode Channel Tx 153MHz, Rx 155MHz, Inj Freq 1 200MHz. Freq Range: 1GHz- 2GHz Measurement Bandwidth RBW=1 MHz, VBW=1 MHz. Note: 1 RX antenna cable re-routed. 2 PLL algorithm numbers 151MHz: N=1812, R=144: 153MHz, N=1683, R=132: 156MHz, N=1560, R=120. 16°C, 62% relative humidity.

Transducer Legend:

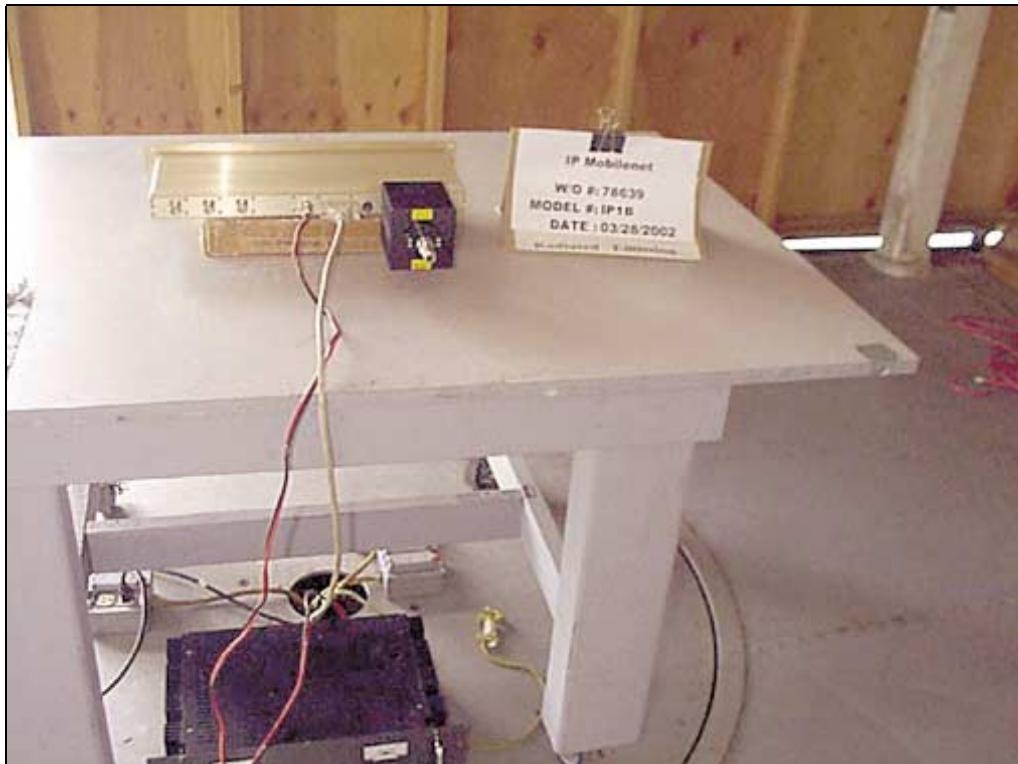
T1=Horn Antenna sn6246	T2=Heliax #18 70' 11Sept2001
T3=HP3017A sn3123A00281 11-Sept-01	

#	Freq MHz	Rdng dB μ V	Reading listed by margin.			Dist Table	Test Distance: 3 Meters			
			T1 dB	T2 dB	T3 dB		Corr dB μ V/m	Spec dB μ V/m	Margin dB	Polar Ant
1	171.980M	32.0	+0.0	+1.1	+0.0	+0.0	33.1	43.5	-10.4	Horiz
2	245.740M	31.4	+0.0	+1.3	+0.0	+0.0	32.7	46.0	-13.3	Horiz
3	1011.820M	50.2	+23.9	+2.6	-40.6	+0.0	36.1	54.0	-17.9	Vert
4	1523.400M	46.0	+24.6	+3.3	-38.8	+0.0	35.1	54.0	-18.9	Horiz
5	1155.020M	47.9	+24.1	+2.9	-39.9	+0.0	35.0	54.0	-19.0	Vert
6	1621.020M	44.6	+25.0	+3.5	-38.6	+0.0	34.5	54.0	-19.5	Horiz
7	1009.220M	48.0	+23.9	+2.6	-40.6	+0.0	33.9	54.0	-20.1	Vert
8	1316.780M	44.7	+24.3	+3.1	-39.2	+0.0	32.9	54.0	-21.1	Horiz
9	1909.000M	41.4	+26.1	+3.6	-38.3	+0.0	32.8	54.0	-21.2	Horiz

Test Equipment

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Spectrum Analyzer	01865	HP	8566B	2532A02509	092801	092802
QP Adapter	01437	HP	85650A	3303A01884	092801	092802
Bicon Antenna	306	AH	SAS200/540	220	092401	092402
Log Periodic Antenna	331	AH	SAS 00/516	330	092401	092402
Pre-amp	00309	HP	8447D	1937A02548	090501	090502
Antenna cable	NA	NA	RG214	Cable#15	122001	122002
Pre-amp to SA cable	NA	Harbour	RG223/U	Cable#10	071601	071602
Horn Antenna	0849	EMCO	3115	6246	091201	091202
Microwave Pre-amp	00786	HP	83017A	3123A00281	091201	091202
1/4" Heliax Coaxial Cable	NA	Andrew	LDF1-50	Cable#18 (70 ft)	091101	091102


Radiated Emissions - Front View



Radiated Emissions - Back View

15.11 – ANTENNA POWER CONDUCTED EMISSIONS – RECEIVER/DIGITAL

Test Location: CKC Laboratories, Inc. • 110 N. Olinda Place • Brea, CA 92823 • (714) 993-6112

Customer: **IP Mobilenet**
 Specification: **FCC15.111**
 Work Order #: **78639** Date: 03/28/2002
 Test Type: **Conducted Emissions** Time: 16:53:48
 Equipment: **Base Station** Sequence#: 5
 Manufacturer: IP Mobilenet Tested By: Eddie Wong
 Model: IP1B 120V 60Hz
 S/N: NA

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Base Station*	IP Mobilenet	IP1B	NA

Support Devices:

Function	Manufacturer	Model #	S/N
Power supply	Astron	RM50M	NA

Test Conditions / Notes:

EUT placed on the test bench. Parallel port is connected to Com 1 port of a support laptop via I/O board. 2 Rx antenna ports left blank. The TX port is terminated to a 100 Watt, 50 ohm load. Antenna port spurious emission is measured at the RX antenna port furthest from the center of the EUT. The 13.8 Vdc is obtained from a support power supply. Receiver mode Channel Tx 153MHz, Rx 155MHz, Inj Freq 1 200MHz. Spec limit: 2 nWatt =50dBuV. Freq Range: 30MHz- 2GHz. Measurement Bandwidth 30 MHz-100MHz. RBW=120kHz, VBW=120kHz. 1GHz - 2 GHz RBW=1MHz, VBW=1MHz. Note: 1 RX antenna cable re-routed. 2 PLL algorithm numbers 151MHz: N=1812, R=144: 153 MHz, N=1683, R=132: 156MHz, N=1560, R=120. 16°C, 62% relative humidity.

Transducer Legend:

T1=Heliax #7 6' 17July2001

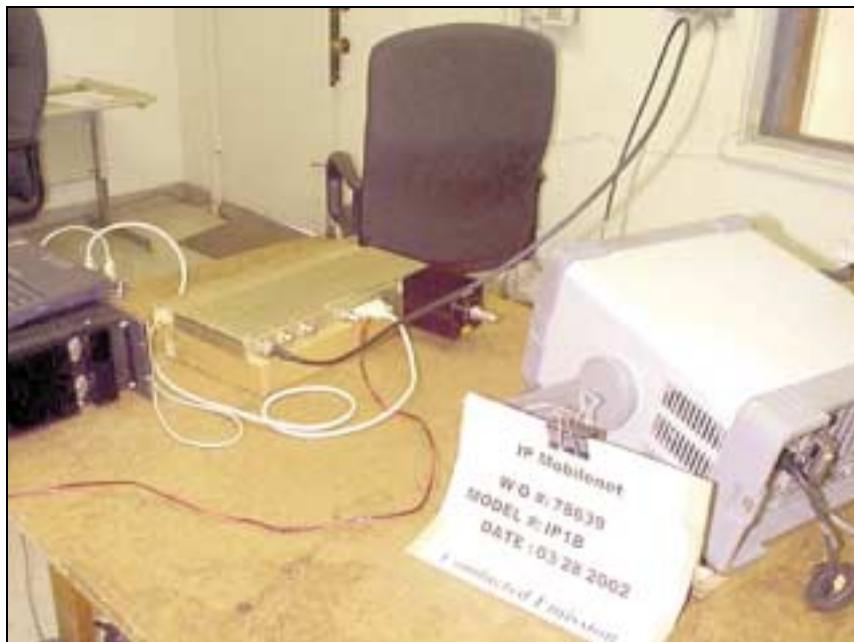
Measurement Data:				Reading listed by margin.							Test Lead: RX antenna terminal			
#	Freq MHz	Rdng dB μ V	T1 dB				Dist Table	Corr dB μ V	Spec dB μ V	Margin dB	Polar Ant			
1	2000.000M	43.1	+1.5				+0.0	44.6	50.0	-5.4	RX an			
2	200.000M	38.7	+0.0				+0.0	38.7	50.0	-11.3	RX an			
3	1000.000M	37.3	+0.7				+0.0	38.0	50.0	-12.0	RX an			
4	1800.050M	35.2	+1.2				+0.0	36.4	50.0	-13.6	RX an			
5	1600.050M	35.4	+0.8				+0.0	36.2	50.0	-13.8	RX an			
6	1400.050M	31.9	+3.3				+0.0	35.2	50.0	-14.8	RX an			
7	1200.000M	33.8	+0.3				+0.0	34.1	50.0	-15.9	RX an			

Test Equipment

Spectrum Analyzer	02467	Agilent	E7405A	US40240225	041001	041002
1/4" Heliax Coaxial Cable	NA	Andrew	FSJ-50A-4	Cable#7 (6 ft)	071701	071702



Antenna Power Conducted Emissions - Front View



Antenna Power Conducted Emissions - Back View