



IP MOBILENET TEST REPORT
FOR THE
BASE STATION, IP4B4547
FCC PART 90 AND PART 15 SUBPART B SECTIONS 15.107, 15.109 AND 15.111
COMPLIANCE

DATE OF ISSUE: JANUARY 15, 2003

PREPARED FOR:

IP MobileNet
16842 Von Karman Avenue
Irvine, CA 92606

P.O. No.: 002375-00
W.O. No.: 79827

PREPARED BY:

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

Date of test: November 8, 2002 –
January 11, 2003

Report No.: FC03-006

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ADMINISTRATIVE INFORMATION

DATE OF TEST: November 8, 2002 –
January 11, 2003

DATE OF RECEIPT: November 8, 2002

PURPOSE OF TEST: To demonstrate the compliance of the Base Station, IP4B4547 with the requirements for FCC Part 90 and Part 15 Subpart B Sections 15.107, 15.109 and 15.111 devices.

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

FREQUENCY RANGE TESTED: 9 kHz - 6000 MHz

MANUFACTURER: IP MobileNet
16842 Von Karman Avenue
Irvine, CA 92606

REPRESENTATIVE: Jim Lukes

TEST LOCATION: CKC Laboratories, Inc.
110 Olinda Place
Brea, CA 92621

SUMMARY OF RESULTS

As received, the IP MobileNet Base Station, IP4B4547 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 using:
- FCC Part 90 and ANSI C63.4 (1992) method

CONDITIONS FOR COMPLIANCE

Modification: R17 of Injection board changed from 75 Ohm to 360 Ohm.

APPROVALS

QUALITY ASSURANCE:



Steve Behm, Director of Engineering Services and Quality Assurance



Joyce Walker, Quality Assurance Administrative Manager



Septimiu Apahidean, Lab Manager



Chuck Kendall, Lab Manager

TEST PERSONNEL:



Eddie Wong, EMC Engineer



Monika Brandle, EMC Test Engineer



Randy Clark, EMC Engineer

MEASUREMENT UNCERTAINTY

TEST	HIGHEST UNCERTAINTY
Radiated Emissions	+/- 2.94 dB
Conducted Emissions	+/- 1.56 dB

Note: Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k=2. Statements of compliance are based on the nominal values only.

EQUIPMENT UNDER TEST (EUT) DESCRIPTION

The EUT tested by CKC Laboratories was representative of a production unit. The EUT is a base station for 450-470 MHz land mobile band data communications. This device is a rack mounted unit intended to be installed at the tower location. The output of this device is routed through an amplifier and then to an antenna. The amplifier and antenna are not part of IPMobileNet's system.

The following model was tested by CKC Laboratories: **IP4B (HPV)**

Since the time of testing the manufacturer has chosen to use the following model name in its place. Any differences between the names does not affect their EMC characteristics and therefore complies to the level of testing equivalent to the tested model name shown on the data sheets: **IP4B4547**

EQUIPMENT UNDER TEST

Base Station

Manuf: IP Mobilenet
Model: IP4B4547
Serial: 0211001, 0211002 & NA (451 MHz)
FCC ID: MI7-IP4B4547 (pending)

PERIPHERAL DEVICES

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

Laptop (2 each)

Manuf: Gateway
Model: Solo1045
Serial: 0028365842 & BT502380129
FCC ID: NA

Power Supply

Manuf: Radio Shack
Model: 22-510
Serial: NA
FCC ID: NA

Laptop (2 each)

Manuf: Compaq
Model: Presario
Serial: 1V02DCH2E270
FCC ID: NA

Power Supply

Manuf: Samflex
Model: SEC1223
Serial: 03061-06272
FCC ID: NA

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

451 MHz – 469 MHz

2.1033(c)(6) OPERATING POWER

39.9 Watts

2.1033(c)(7) MAXIMUM POWER RATING

500 Watts

2.1033(c)(8) DC VOLTAGES

13.8 V

2.1033(c)(9) TUNE-UP PROCEDURE

The necessary information is contained in a separate document.

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

FSK

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

§90.205 Power and antenna height limits.

(i) 470-512 MHz. Power and height limitations are specified in §§90.307 and 90.309.

The transmitting antenna will not be provided for sale with the device. The installer will be the responsible party for the filing/measurement/ calculation involving EIRP and HAAT.

Test Setup: EUT placed on the test bench. RS232 port is connected to Com 1 port of a support laptop. All 3 Rx antenna ports left blank. The TX port is terminated to a 100 Watt, 50 ohm load. Peak transmitted power is evaluated via the monitor port of the load with a spectrum analyzer. The 13.8 VDC is obtained from a support power supply.

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

Tx	Rx	Inj Freq
451.0 MHz	456 MHz	411 MHz
457.5 MHz	460.5 MHz	415.5 MHz
469.0 MHz	474 MHz	429 MHz

Freq Range: Fundamental

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

Note: The monitor port has a 40 dB insertion loss and the external attenuator is set at 40 dB. Total insertion loss of 80 dB is compensated for.

13.8VDC (110VAC, 60Hz) 18°C, 61% relative humidity.

Result

Freq	dBuV	Peak Power: Watts
451 MHz	151.8	30.3
457.5 MHz	152.8	38.1
469 MHz	152.1	32.4

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

Customer: **IP MobileNet**
 Specification: **FCC 90.205(i) RF Power Output**
 Work Order #: **79827** Date: 11/12/2002
 Test Type: **Conducted Emissions** Time: 09:31:09
 Equipment: **Base Station** Sequence#: 1
 Manufacturer: IP Mobilenet Tested By: Eddie Wong
 Model: IP4B (HPV) 13.8Vdc
 S/N: 0211002

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Base Station*	IP Mobilenet	IP4B (HPV)	0211002

Support Devices:

Function	Manufacturer	Model #	S/N
Laptop	Gateway	Solo 1450	BT502380129
Power Supply	Samflex	SEC1223	03061-06272

Test Conditions / Notes:

EUT placed on the test bench. RS232 port is connected to Com 1 port of a support laptop. 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 VDC is obtained from a support power supply. Transmit mode: EUT transmits text file to the dummy load. Tx 457.5 MHz, Rx 460.5 MHz, Inj Freq 415.5 MHz. Freq Range: Fundamental. Bandwidth: RBW=120 kHz, VBW=120 kHz. Note: The monitor port has a 40 dB insertion loss and the external attenuator is set at 30 dB. Total insertion loss of 80 dB is compensated for. 13.8 VDC (110Vac, 60Hz) 20°C, 52% relative humidity.

Transducer Legend:

--

Measurement Data: Reading listed by margin. Test Lead: Antenna Terminal

#	Freq MHz	Rdng dBμV	dB	dB	dB	dB	Dist Table	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar Ant
1	457.470M	152.8					+0.0	152.8	153.0	-0.2	Anten

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

Customer: **IP MobileNet**
 Specification: **FCC 90.205(i) RF Power Output**
 Work Order #: **79827** Date: 01/08/2003
 Test Type: **Conducted Emissions** Time: 18:17:03
 Equipment: **Base Station** Sequence#: 2
 Manufacturer: IP Mobilenet Tested By: Eddie Wong
 Model: IP4B (HPV) 13.8Vdc
 S/N: NA (451 MHz)

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Base Station*	IP Mobilenet	IP4B (HPV)	NA (451 MHz)

Support Devices:

Function	Manufacturer	Model #	S/N
Power Supply	Samflex	SEC1223	03061-06272
Laptop	Gateway	Solo1045	0028365842

Test Conditions / Notes:

EUT placed on the test bench. RS232 port is connected to Com 1 port of a support laptop. All 3 Rx antenna ports left blank. The TX port is terminated to a 50 Watt, 50 ohm load. Transmitted power is evaluated via the monitor port of the load. The 13.8 VDC is obtained from a support power supply. Transmit mode: EUT transmits text file to the dummy load. Tx 451 MHz, Rx 456 MHz, Inj Freq 411 MHz. Freq Range: Fundamental. Bandwidth: RBW=120 kHz, VBW=120 kHz. Note: The monitor port has a 40 dB insertion loss and the external attenuator is set at 30 dB. Total insertion loss of 70 dB is compensated for. 13.8 VDC (110Vac, 60Hz) 20°C, 52% relative humidity.

Transducer Legend:

--

Measurement Data: Reading listed by margin. Test Lead: Antenna Terminal

#	Freq MHz	Rdng dBμV	dB	dB	dB	dB	Dist Table	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar Ant
1	450.982M	151.8					+0.0	151.8	153.0	-1.2	Anten

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

Customer: **IP MobileNet**
 Specification: **FCC 90.205(i) RF Power Output**
 Work Order #: **79827**
 Test Type: **Conducted Emissions**
 Equipment: **Base Station**
 Manufacturer: IP Mobilenet
 Model: IP4B (HPV)
 S/N: 0211001

Date: 01/09/2003
 Time: 18:09:01
 Sequence#: 1
 Tested By: Eddie Wong
 13.8Vdc

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Base Station*	IP Mobilenet	IP4B (HPV)	0211001

Support Devices:

Function	Manufacturer	Model #	S/N
Power Supply	Samflex	SEC1223	03061-06272
Laptop	Gateway	Solo1045	0028365842

Test Conditions / Notes:

EUT placed on the test bench. RS232 port is connected to Com 1 port of a support laptop. All 3 Rx antenna ports left blank. The TX port is terminated to a 50 Watt, 50 ohm load. Transmitted power is evaluated via the monitor port of the load. The 13.8 VDC is obtained from a support power supply. Transmit mode: EUT transmits text file to the dummy load Tx 469 MHz, Rx 474 MHz, Inj Freq 429 MHz. Freq Range: Fundamental. Bandwidth: RBW=120 kHz, VBW=120 kHz. Note: The monitor port has a 40 dB insertion loss and the external attenuator is set at 30 dB. Total insertion loss of 70 dB is compensated for. 13.8 VDC (110Vac, 60Hz) 20°C, 52% relative humidity.

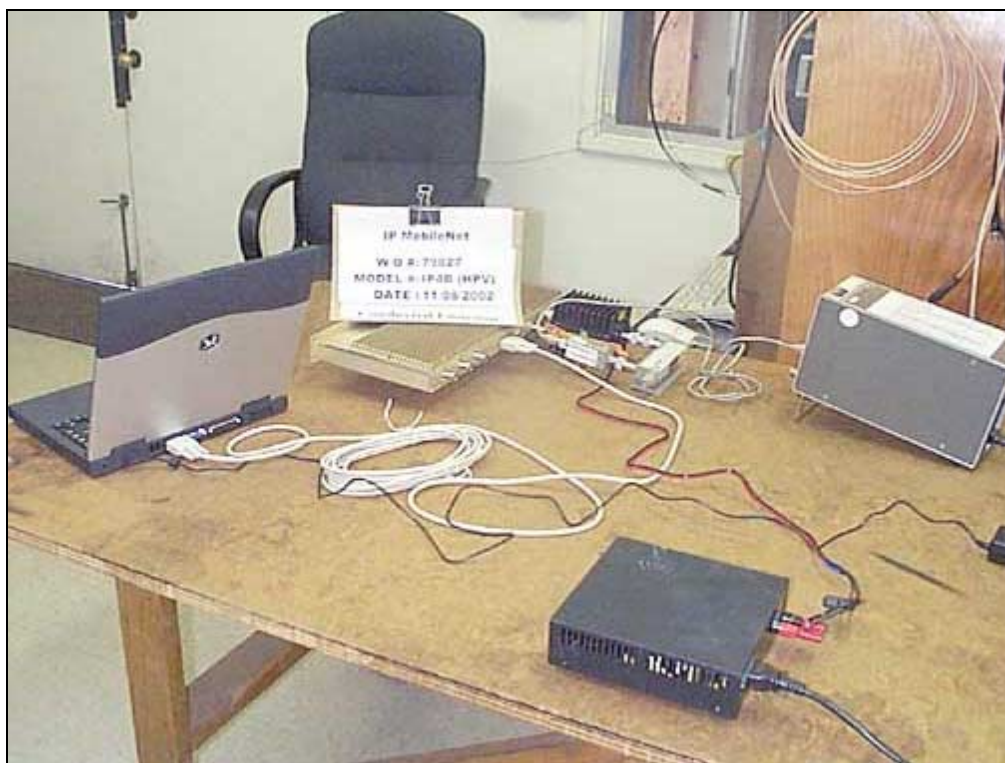
Transducer Legend:

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Measurement Data: Reading listed by margin. Test Lead: Antenna Terminal

#	Freq MHz	Rdng dB μ V	dB	dB	dB	dB	Dist Table	Corr dB μ V/m	Spec dB μ V/m	Margin dB	Polar Ant
1	469.003M	152.1					+0.0	152.1	153.0	-0.9	Anten

DIRECT CONNECT



DIRECT CONNECT



Test Equipment

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
9kHz-1.5 GHz						
Spectrum Analyzer	01865	HP	8566B	2532A02509	092702	092703
QP Adapter	01437	HP	85650A	3303A01884	092702	092703
¼" Helix Coaxial Cable	NA	Andrew	FSJ-50A-4	Cable#7 (6 ft)	071502	071503
1.5 GHz-6 GHz						
1.5 GHz HPF	2116	HP	84300-80037	3643A00027	062502	062503

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

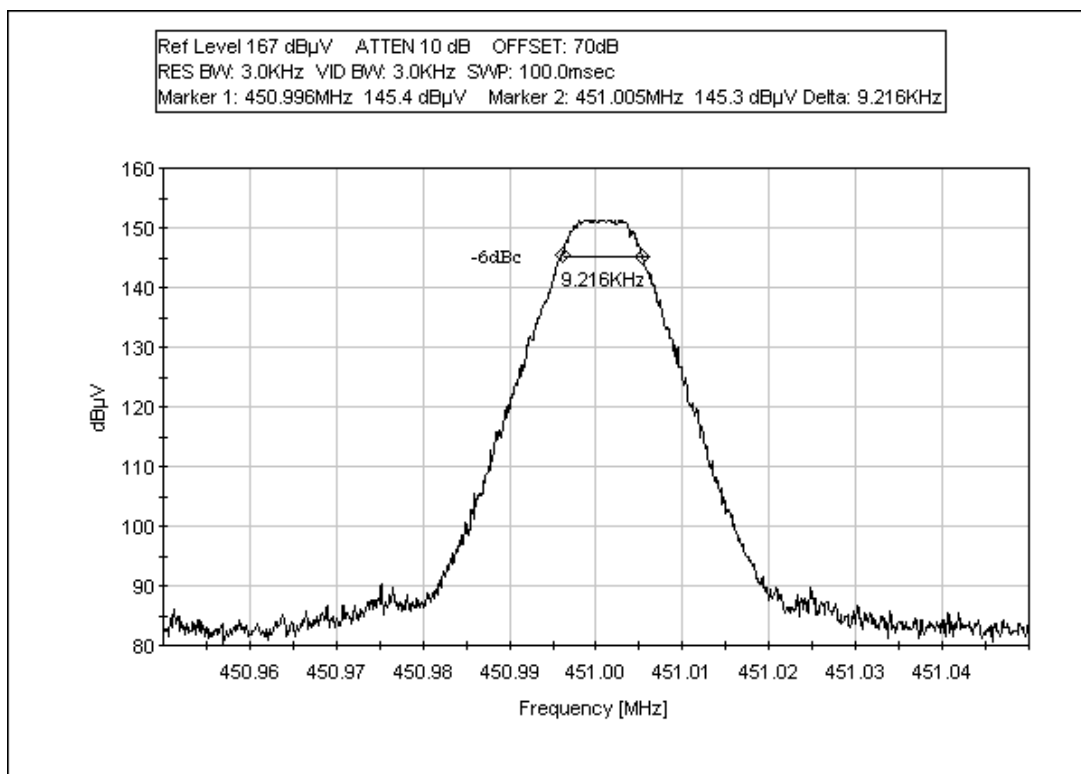
Not applicable to this unit.

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

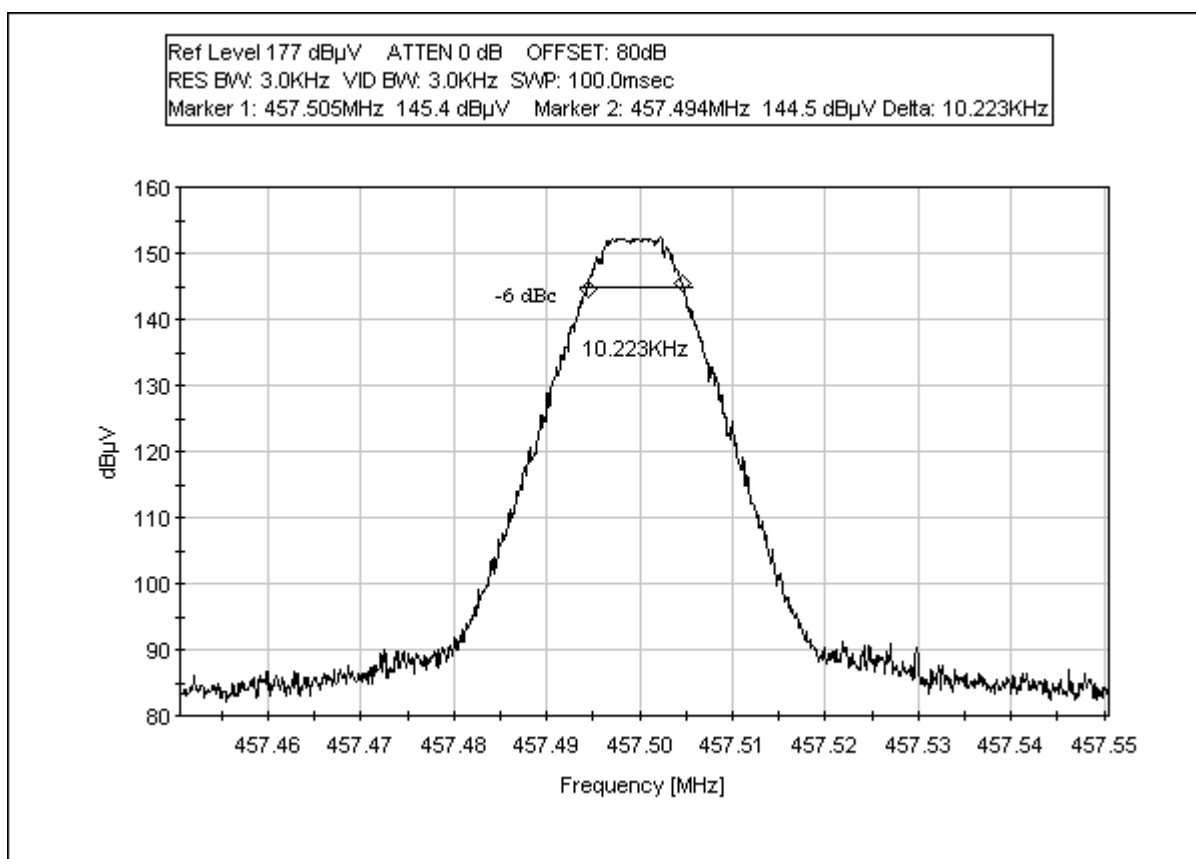
Test Conditions: EUT placed on the test bench. RS232 port is connected to Com 1 port of a support laptop. All 3 Rx antenna ports left blank. The TX port is terminated to a 50 Watt, 50 ohm load. Transmitted power is evaluated via the monitor port of the load. The 13.8 VDC is obtained from a support power supply. Transmit mode: EUT transmits text file to the dummy load.

Tx	Rx	Inj Freq
451 MHz	456 MHz	411 MHz

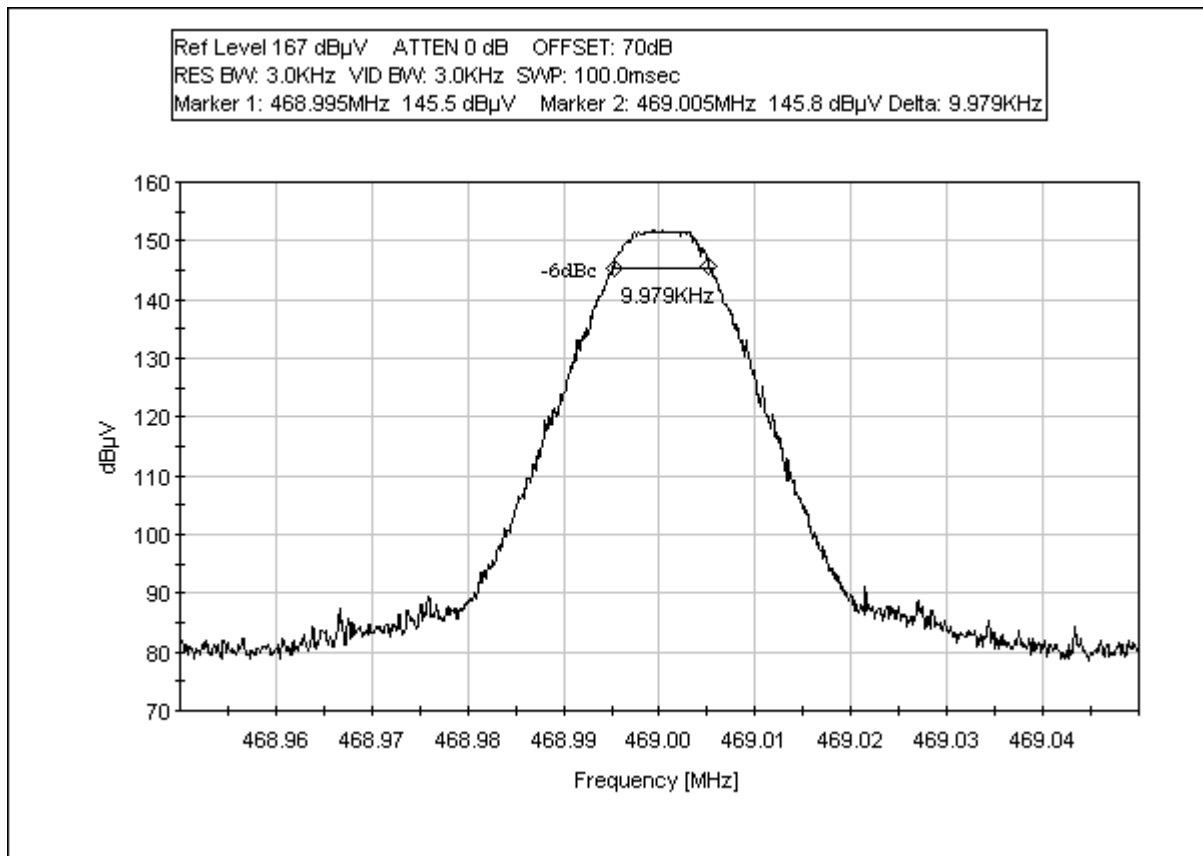
BANDWIDTH LIMITATIONS - 451 MHz



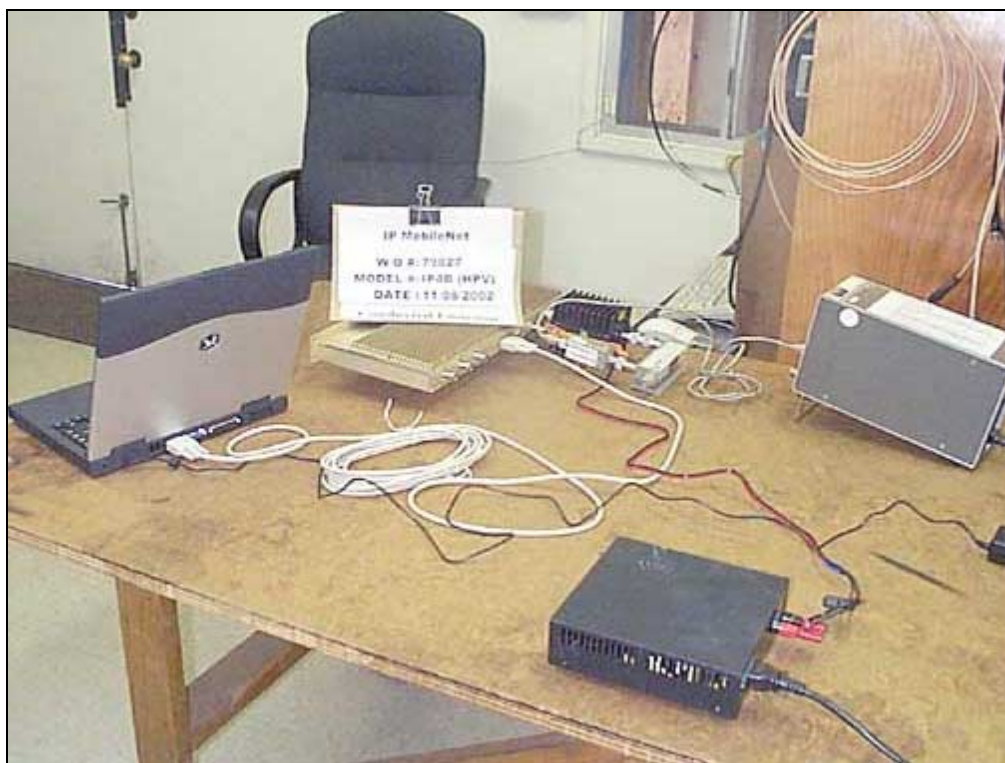
BANDWIDTH LIMITATIONS - 457 MHz



BANDWIDTH LIMITATIONS - 469 MHz



DIRECT CONNECT



DIRECT CONNECT



Test Equipment

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
9kHz-1.5 GHz						
Spectrum Analyzer	01865	HP	8566B	2532A02509	092702	092703
QP Adapter	01437	HP	85650A	3303A01884	092702	092703
¼" Helix Coaxial Cable	NA	Andrew	FSJ-50A-4	Cable#7 (6 ft)	071502	071503
1.5 GHz-6 GHz						
1.5 GHz HPF	2116	HP	84300-80037	3643A00027	062502	062503

FCC Part 90.210

Emission Mask C Calculation

Rated power output : 40 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

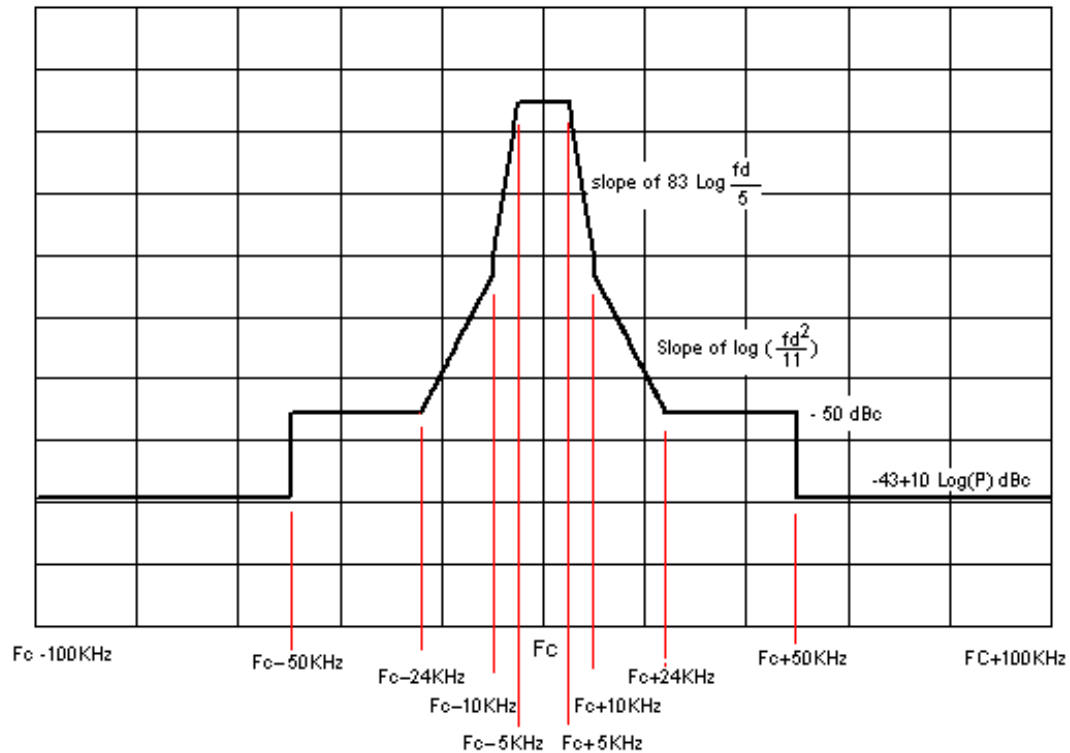
required attenuation = 50 dB.

FCC part 90.210 (c) 3

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

$$\begin{aligned} \text{Required attenuation} &= 43 + 10 \log (40) \\ &= 59 \text{ dB} \end{aligned}$$

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



Frequency band

Required attenuation

Fc-5 kHz to Fc + 5 kHz

0 dB

Fc - 10 kHz to Fc - 5 kHz,
Fc + 5 kHz to Fc + 10 kHz

$83 \text{ Log} (f_d / 5) \text{ dB}$

Fc - 24 kHz to Fc - 10 kHz
Fc + 10 kHz to FC + 24 kHz

$29 \text{ log} (f_d^2 / 11) \text{ dB}$

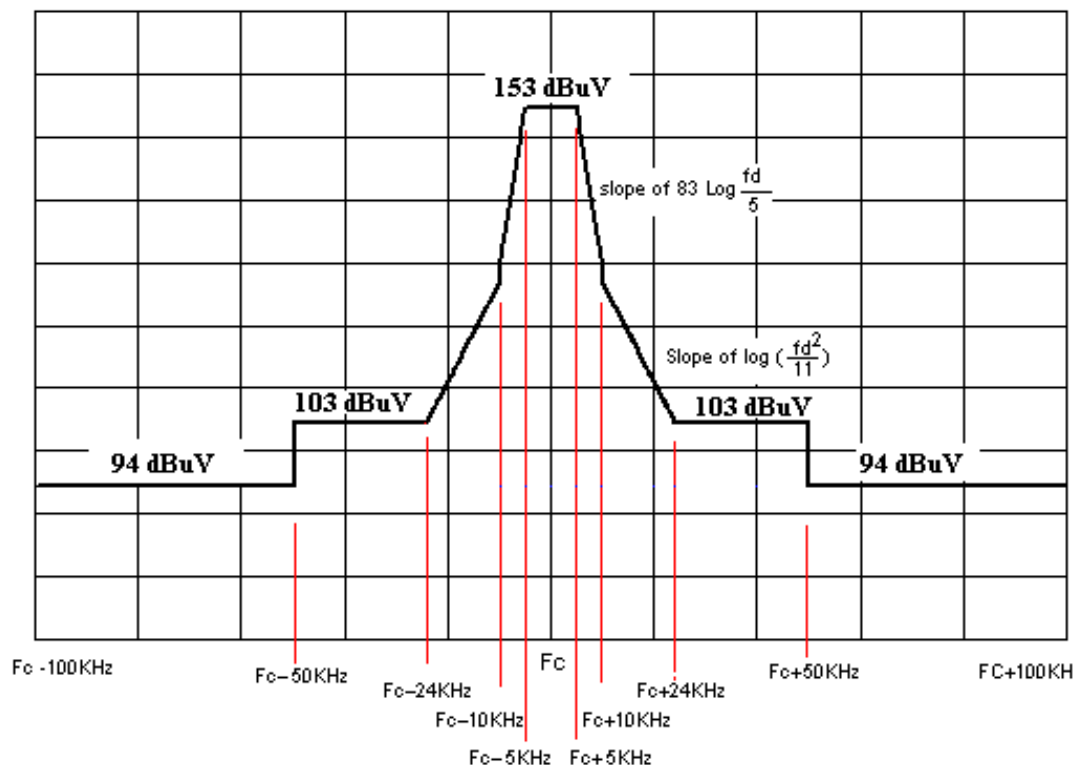
Fc- 50 kHz to Fc - 24 kHz
Fc+ 24 kHz to Fc + 50 KHz

50 dB

4 MHz to Fc - 50 kHz,
Fc+50 kHz to 6000 MHz

$43 + 10 \text{ Log} (P)$
 $= 59 \text{ dB} \quad (P = 40)$

Power = 40 watt
Authorized BW = 20 KHz



Rated Power = 40 watt
Authorized band width = 20 kHz

Frequency band	Required attenuation	Limit line for EMItest
Fc-5 kHz to Fc + 5 kHz	0 dB	153 dBuV
Fc – 10 kHz to Fc – 5 kHz, Fc + 5 kHz to Fc +10 kHz	$83 \text{ Log } (f_d / 5) \text{ dB}$	
Fc – 24 kHz to Fc – 10 kHz Fc + 10 kHz to FC +24 kHz	$29 \text{ log } (f_d^2 / 11) \text{ dB}$	
Fc- 50 kHz to Fc –24 kHz Fc+ 24 kHz to Fc + 50 kHz	50 dB	103 dBuV
9 kHz to Fc -50 kHz, Fc+50 kHz to 6000 MHz	$43+10 \text{ Log } (40)$ = 59 dB	94 dBuV

Power to voltage level (dBuV) conversion

$$\begin{aligned} \text{Rate power} &= 40 \text{ watts} \\ R &= 50 \text{ Ohm} \end{aligned}$$

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

$$V = \sqrt{\text{Power} \times R}$$

$$V = \sqrt{40 \times 50}$$

$$V = \sqrt{2000}$$

$$V = 44.72 \text{ V}$$

$$\begin{aligned} V (\text{dB}\mu\text{V}) &= 20 \text{ Log} \left(\frac{44.72}{1 \times 10^{-6}} \right) \\ &= 153 \text{ dB}\mu\text{V} \end{aligned}$$

Test Location: CKC Laboratories, Inc. • 110 N. Olinda Place • Brea, CA 92823 • (714) 993-6112
 Customer: **IP MobileNet**
 Specification: **FCC 90.210(c) Emission Mask C**
 Work Order #: **79827** Date: 11/12/2002
 Test Type: **Conducted Emissions** Time: 10:33:28
 Equipment: **Base Station** Sequence#: 2
 Manufacturer: IP Mobilenet Tested By: Eddie Wong
 Model: IP4B (HPV) 13.8Vdc
 S/N: 0211002

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Base Station*	IP Mobilenet	IP4B (HPV)	0211002

Support Devices:

Function	Manufacturer	Model #	S/N
Power Supply	Samflex	SEC1223	03061-06272
Laptop	Compaq	Presario	1V02DCH2E270

Test Conditions / Notes:

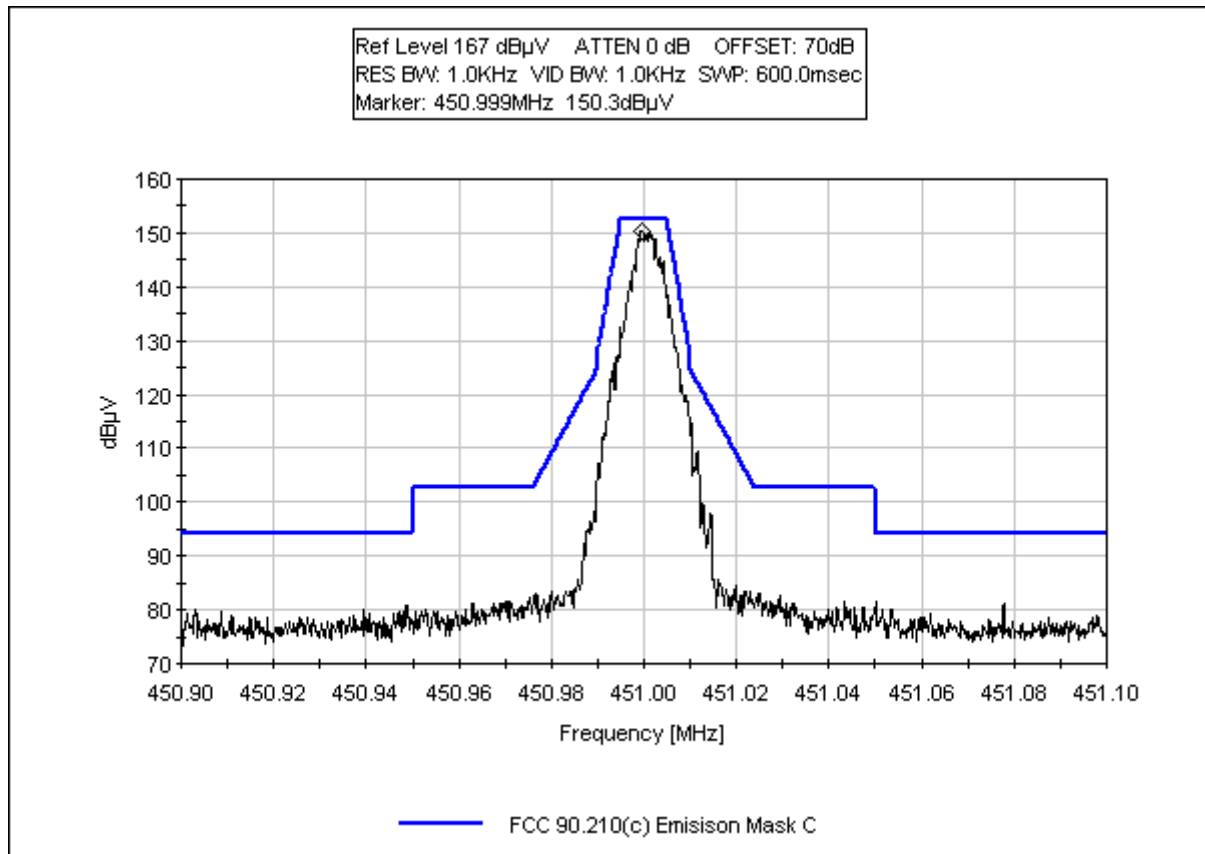
EUT placed on the test bench. RS232 port is connected to Com 1 port of a support laptop. All three Rx antenna ports left blank. The TX port is terminated to a 100 Watt, 50 ohm load. Conducted emission is evaluated via the monitor port of the load. The 13.8 VDC is obtained from a support power supply. Transmit mode: EUT transmits text file to the dummy load. Tx 457.5MHz, Rx 460.5 MHz, Inj Freq 415.5 MHz. Required attenuation = At least 43 + 10 log (P) dB= 94 dBuV at antenna terminal. Freq Range : 9 kHz - 6000 MHz. Frequency 9 kHz - 150 kHz RBW=200 Hz, VBW=200 Hz; 150 kHz - 30 MHz RBW=9 kHz, VBW=9 kHz; 30 MHz- 1000 MHz RBW=120 kHz, VBW=120 kHz; 1000 MHz - 6000 MHz RBW=1 MHz, VBW=1 MHz. Note: The monitor port has a 40 dB insertion loss and the external attenuator is set at 20 dB. Total insertion loss of 60 dB is compensated for. 13.8 VDC (110Vac, 60Hz) 20°C, 48% relative humidity.

Transducer Legend:

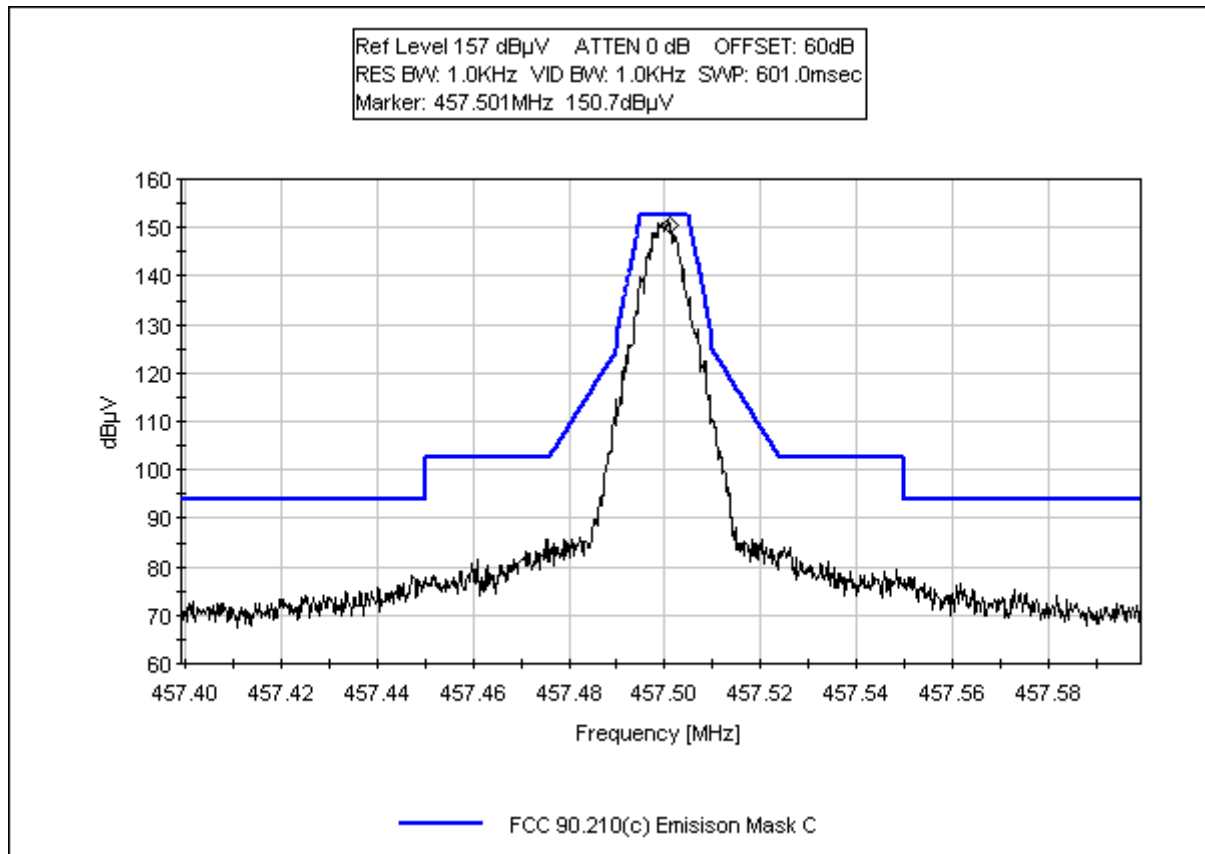
T1=Brea Cable: 6' 1/4" Helix - Brea # 7.	T2=1.5 GHz HPF AN 2116
--	------------------------

Measurement Data:		Reading listed by margin.				Test Lead: Antenna Terminal					
#	Freq MHz	Rdng dB μ V	T1 dB	T2 dB	dB	dB	Dist Table	Corr dB μ V/m	Spec dB μ V/m	Margin dB	Polar Ant
1	2287.528M	90.5	+0.7	+0.7			+0.0	91.9	94.0	-2.1	Anten
Ave											
^	2287.523M	90.7	+0.7	+0.7			+0.0	92.1	94.0	-1.9	Anten
3	915.038M	87.6	+0.0				+0.0	87.6	94.0	-6.4	Anten
4	3202.600M	84.3	+1.0	+0.5			+0.0	85.8	94.0	-8.2	Anten
5	1829.800M	81.1	+0.7	+0.3			+0.0	82.1	94.0	-11.9	Anten
6	3660.100M	74.1	+1.0	+0.5			+0.0	75.6	94.0	-18.4	Anten
7	1372.600M	70.2	+0.5	+3.2			+0.0	73.9	94.0	-20.1	Anten
8	2745.100M	71.3	+1.3	+0.6			+0.0	73.2	94.0	-20.8	Anten
9	5032.700M	70.5	+1.1	+0.1			+0.0	71.7	94.0	-22.3	Anten
10	4575.100M	70.0	+1.0	+0.3			+0.0	71.3	94.0	-22.7	Anten

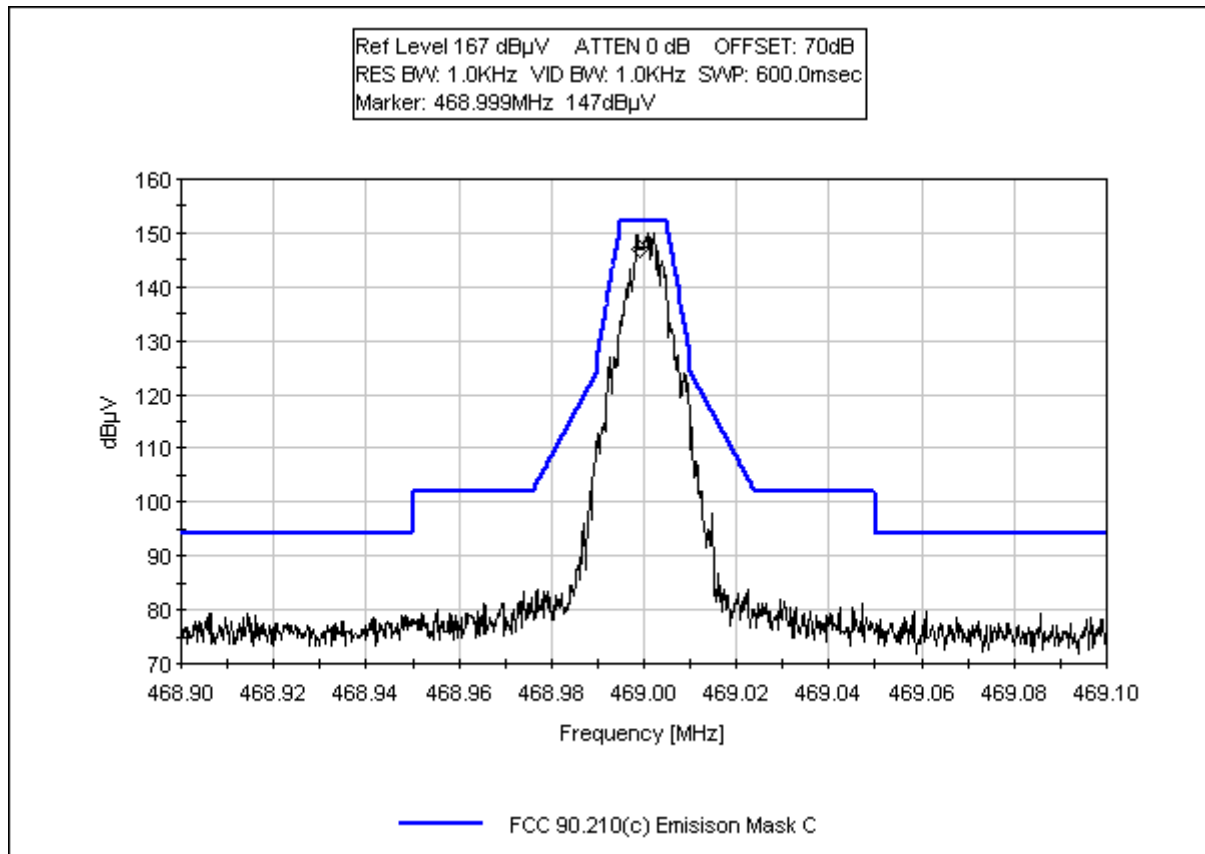
OCCUPIED BANDWIDTH MASK C - 451 MHz



OCCUPIED BANDWIDTH MASK C - 457 MHz



OCCUPIED BANDWIDTH MASK C - 469 MHz



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

Limit line for Spurious Conducted Emission

$$\text{Required Attenuation} = 43 + 10 \log P \text{ dB}$$

$$\text{Limit line (dBuV)} = V_{\text{dBuV}} - \text{Attenuation}$$

$$\begin{aligned} V_{\text{dBuV}} &= 20 \log \frac{V}{1 \times 10^{-6}} \\ &= 20 (\log V - \log 1 \times 10^{-6}) \\ &= 20 \log V - 20 \log 1 \times 10^{-6} \\ &= 20 \log V - 20 (-6) \\ &= 20 \log V + 120 \end{aligned}$$

$$\begin{aligned} \text{Attenuation} &= 43 + 10 \log P \\ &= 43 + 10 \log \frac{V^2}{R} \\ &= 43 + 10 (\log V^2 - \log R) \\ &= 43 + 10 (2 \log V - \log R) \\ &= 43 + 20 \log V - 10 \log R \end{aligned}$$

$$\begin{aligned} \text{Limit line} &= V_{\text{dBuV}} - \text{Attenuation} \\ &= 20 \log V + 120 - (43 + 20 \log V - 10 \log R) \\ &= 20 \log V + 120 - 43 - 20 \log V + 10 \log R \\ &= 20 \log V + 120 - 43 - 20 \log V + 10 \log R \\ &= 120 - 43 + 10 \log 50 \quad \text{Note : } R = 50 \Omega \\ &= 120 - 43 + 16.897 \\ &= 94 \text{ dBuV at any power level} \end{aligned}$$

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

Customer: **IP MobileNet**
 Specification: **FCC 90.210(c) Conducted Spurious Emission**
 Work Order #: **79827** Date: 01/08/2003
 Test Type: **Conducted Emissions** Time: 19:34:33
 Equipment: **Base Station** Sequence#: 3
 Manufacturer: IP Mobilenet Tested By: Eddie Wong
 Model: IP4B (HPV) 13.8Vdc
 S/N: NA (451 MHz)

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Base Station*	IP Mobilenet	IP4B (HPV)	NA (451 MHz)

Support Devices:

Function	Manufacturer	Model #	S/N
Power Supply	Radio Shack	22-510	NA
Laptop	Gateway	Solo1045	0028365842

Test Conditions / Notes:

EUT placed on the test bench. RS232 port is connected to Com 1 port of a support laptop. Two of the three Rx antenna ports left blank. The TX port is terminated to a 50 Watt, 50 ohm load. Conducted emission is evaluated via the monitor port of the load. The 13.8 VDC is obtained from a support power supply. Transmit mode: EUT transmits text file to the dummy load. Tx 451 MHz, Rx 456 MHz, Inj Freq 411 MHz. Required attenuation = At least $43 + 10 \log(P)$ dB = 94 dBuV at antenna terminal. Freq Range: 9 kHz – 6000 MHz. Frequency 9 kHz - 150 kHz RBW=200 Hz, VBW=200 Hz; 150 kHz - 30 MHz RBW=9 kHz, VBW=9 kHz; 30 MHz - 1000 MHz RBW=120 kHz, VBW=120 kHz; 1000 MHz - 6000 MHz RBW=1 MHz, VBW=1 MHz. Note: The monitor port has a 40 dB insertion loss and the external attenuator is set at 20 dB. Total insertion loss of 60 dB is compensated for. 13.8 VDC (110Vac, 60Hz) 20°C, 48% relative humidity.

Transducer Legend:

T1=Brea Cable: 6' 1/4" Helix - Brea # 7.	T2=1.5 GHz HPF AN 2116
--	------------------------

Measurement Data: Reading listed by margin. Test Lead: Antenna Terminal

#	Freq MHz	Rdng dBμV	T1 dB	T2 dB	dB	dB	Dist Table	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar Ant
1	1803.920M	86.4	+0.6	+0.7			+0.0	87.7	94.0	-6.3	Anten
2	2254.900M	85.9	+0.7	+0.7			+0.0	87.3	94.0	-6.7	Anten
3	902.000M	85.8	+0.0	+0.0			+0.0	85.8	94.0	-8.2	Anten
4	2705.840M	80.5	+1.3	+0.6			+0.0	82.4	94.0	-11.6	Anten
5	5411.940M	80.2	+1.2	+0.4			+0.0	81.8	94.0	-12.2	Anten
6	3156.960M	78.1	+1.1	+0.5			+0.0	79.7	94.0	-14.3	Anten
7	4509.930M	78.0	+0.9	+0.3			+0.0	79.2	94.0	-14.8	Anten
8	4059.030M	77.1	+1.0	+0.5			+0.0	78.6	94.0	-15.4	Anten

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

Customer: **IP MobileNet**
 Specification: **FCC 90.210(c) Conducted Spurious Emission**
 Work Order #: **79827** Date: 01/09/2003
 Test Type: **Conducted Emissions** Time: 18:45:11
 Equipment: **Base Station** Sequence#: 2
 Manufacturer: IP Mobilenet Tested By: Eddie Wong
 Model: IP4B (HPV) 13.8Vdc
 S/N: 0211001

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Base Station*	IP Mobilenet	IP4B (HPV)	0211001

Support Devices:

Function	Manufacturer	Model #	S/N
Power Supply	Samflex	SEC1223	03061-06272
Laptop	Gateway	Solo1045	0028365842

Test Conditions / Notes:

EUT placed on the test bench. RS232 port is connected to Com 1 port of a support laptop. All three Rx antenna ports left blank. The TX port is terminated to a 50 Watt, 50 ohm load. Conducted emission is evaluated via the monitor port of the load. The 13.8 VDC is obtained from a support power supply. Transmit mode: EUT transmits text file to the dummy load. Tx 469 MHz, Rx 474 MHz, Inj Freq 429 MHz. Required attenuation = At least 43 + 10 log (P) dB= 94 dBuV at antenna terminal. Freq Range: 9 kHz – 6000 MHz. Frequency 9 kHz - 150 kHz RBW=200 Hz, VBW=200 Hz; 150 kHz- 30 MHz RBW=9 kHz, VBW=9 kHz; 30 MHz- 1000 MHz RBW=120 kHz, VBW=120 kHz; 1000 MHz - 6000 MHz RBW=1 MHz, VBW=1 MHz. Note: The monitor port has a 40 dB insertion loss and the external attenuator is set at 20 dB. Total insertion loss of 60 dB is compensated for. 13.8 VDC (110Vac, 60Hz) 20°C, 52% relative humidity.

Transducer Legend:

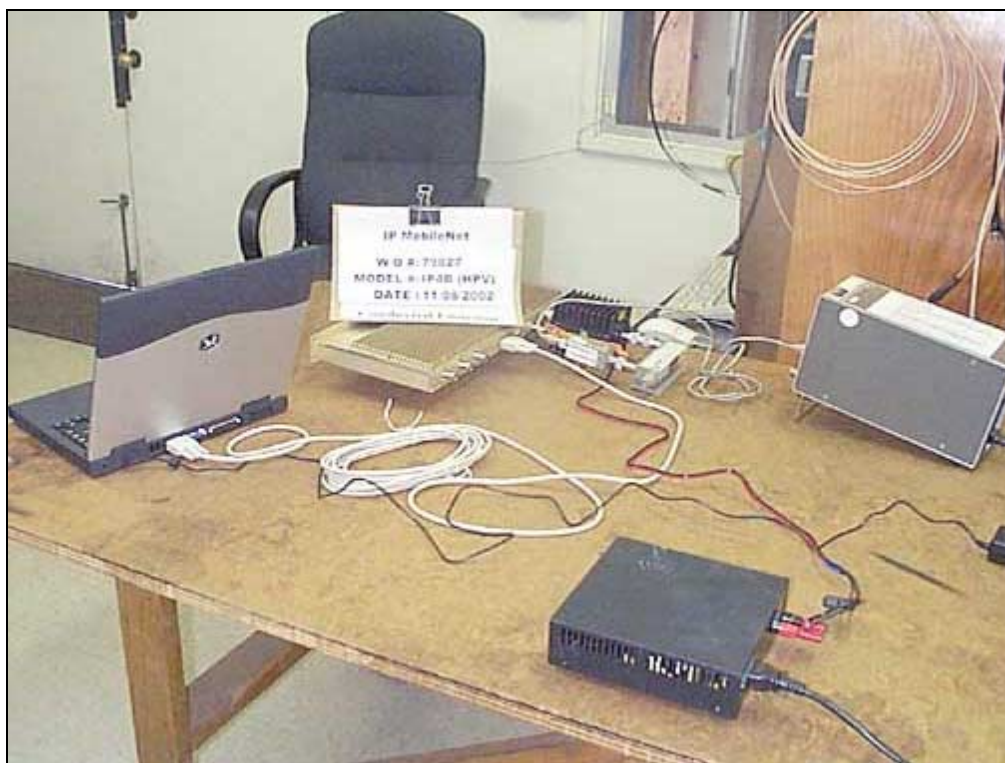
T1=Brea Cable: 6' 1/4" Helix - Brea # 7.	T2=1.5 GHz HPF AN 2116
--	------------------------

Measurement Data: Reading listed by margin. Test Lead: Antenna Terminal

#	Freq MHz	Rdng dBμV	T1 dB	T2 dB		Dist dB	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar Ant
1	937.900M	88.6	+0.0			+0.0	88.6	94.0	-5.4	Anten
2	2813.890M	86.5	+1.1	+0.5		+0.0	88.1	94.0	-5.9	Anten
3	2344.940M	82.4	+0.8	+0.7		+0.0	83.9	94.0	-10.1	Anten
4	1407.000M	80.9	+0.5	+0.0		+0.0	81.4	94.0	-12.6	Anten
	Ave									
^	1407.000M	90.1	+0.5			+0.0	90.6	94.0	-3.4	Anten
6	3282.990M	79.9	+0.9	+0.5		+0.0	81.3	94.0	-12.7	Anten
7	1876.120M	77.4	+0.7	+0.3		+0.0	78.4	94.0	-15.6	Anten
8	5628.140M	73.8	+1.3	+0.5		+0.0	75.6	94.0	-18.4	Anten

9	3751.840M	72.1	+1.1	+0.5	+0.0	73.7	94.0	-20.3	Anten
10	5158.840M	72.1	+1.0	+0.2	+0.0	73.3	94.0	-20.7	Anten
11	4220.840M	71.8	+1.1	+0.4	+0.0	73.3	94.0	-20.7	Anten
12	4690.040M	71.4	+1.1	+0.2	+0.0	72.7	94.0	-21.3	Anten

DIRECT CONNECT



DIRECT CONNECT



Test Equipment

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
9kHz-1.5 GHz						
Spectrum Analyzer	01865	HP	8566B	2532A02509	092702	092703
QP Adapter	01437	HP	85650A	3303A01884	092702	092703
¼" Helix Coaxial Cable	NA	Andrew	FSJ-50A-4	Cable#7 (6 ft)	071502	071503
1.5 GHz-6 GHz						
1.5 GHz HPF	2116	HP	84300-80037	3643A00027	062502	062503

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

Test Setup 451 MHz: EUT placed on the test bench. RS232 port is connected to Com 1 port of a support laptop. 2 of 3 Rx antenna ports terminated to 50 ohm load, RX3 antenna port is connected to an RX antenna. The TX port is terminated to a 50 Watt, 50 ohm load. Serial port #2 left unpopulated. Ethernet port connected to a section of UTP and a loop back terminator. Mode: Transmit. Tx 451 MHz, Rx 456 MHz, Inj Freq 411 MHz. Required attenuation = At least $43 + 10 \log(P)$ dB = 82.3 dBuV at 3 meter. Freq Range: 9 kHz – 6000 MHz. Frequency 9 kHz - 150 kHz RBW=200 Hz, VBW=200 Hz; 150 kHz - 30 MHz RBW=9 kHz, VBW=9 kHz; 30 MHz - 1000 MHz RBW=120 kHz, VBW=120 kHz; 1000 MHz - 6000 MHz RBW=1 MHz, VBW=1 MHz. 13.8VDC (110Vac, 60Hz) 20°C, 45% relative humidity.

Operating Frequency: 451 MHz
 Channels: Low
 Highest Measured Output Power: 44.81 ERP(dBm)= 30.3 ERP(Watts)
 Distance: 3 meters
 Limit: $43+10\log(P)$ 57.81 dBc

Freq. (MHz)	Reference Level (dBm)	Antenna Polarity (H/V)	dBc
2,254.95	-35.3	Vert	80.11
2,255.00	-36.20	Horiz	81.01
1,803.85	-46.30	Vert	91.11
1,353.07	-47.00	Vert	91.81
1,353.15	-47.70	Horiz	92.51
4,960.95	-49.50	Vert	94.31
1,803.80	-49.80	Horiz	94.61
5,412.05	-50.30	Vert	95.11
902.02	-60.40	Horiz	105.21

Test Setup 457 MHz: EUT placed on the test bench. RS232 port is connected to Com 1 port of a support laptop. All 3 Rx antenna ports terminated to 50 ohm load. The TX port is terminated to a 100 Watt, 50 ohm load. Serial port #2 left unpopulated. Ethernet port connected to a section of UTP and a loop back terminator. Mode : Transmit. Tx 457.5 MHz Rx 460.5 MHz Inj Freq 415.5 MHz. Required attenuation = At least $43 + 10 \log (P)$ dB = 82.3 dBuV at 3 meter. Freq Range: 9KHz-6000MHz. Frequency 9 kHz - 150 kHz RBW=200 Hz, VBW=200 Hz; 150 kHz-30 MHz ;RBW=9 kHz, VBW=9 kHz; 30 MHz- 1000 MHz RBW=120 kHz, VBW=120 kHz; 1000 MHz-6000 MHz RBW=1 MHz, VBW=1 MHz. 13.8Vdc (110Vac, 60Hz) 18°C, 61% relative humidity.

Operating Frequency: 457 MHz
 Channels: Middle
 Highest Measured Output Power: 45.81 ERP(dBm)= 38.1 ERP(Watts)
 Distance: 3 meters
 Limit: $43+10\log(P)$ 58.81 dBc

Freq. (MHz)	Reference Level (dBm)	Antenna Polarity (H/V)	dBc
3,202.60	-37.1	Vert	82.91
3,202.60	-42.60	Horiz	88.41
5,032.20	-46.00	Vert	91.81
5,032.53	-50.50	Horiz	96.31
3,660.50	-52.90	Vert	98.71
1,830.20	-53.40	Horiz	99.21
915.06	-54.80	Horiz	100.61
2,744.90	-56.40	Horiz	102.21
1,372.40	-57.20	Horiz	103.01
952.73	-60.60	Vert	106.41
1,537.80	-60.90	Horiz	106.71
915.07	-63.60	Vert	109.41
62.31	-69.90	Vert	115.71
5,827.60	-76.30	Horiz	122.11

Test Setup 469 MHz: EUT placed on the test bench. RS232 port is connected to Com 1 port of a support laptop. All 3 Rx antenna ports terminated to 50 ohm load. The TX port is terminated to a 50 Watt, 50 ohm load. Serial port #2 left unpopulated. Ethernet port connected to a section of UTP and a loop back terminator. Mode: Transmit. Tx 469 MHz, Rx 474 MHz, Inj Freq 429 MHz. Required attenuation = At least $43 + 10 \log(P)$ dB = 82.3 dBuV at 3 meter. Freq Range: 9 kHz – 6000 MHz. Frequency 9 kHz - 150 kHz RBW=200 Hz, VBW=200 Hz; 150 kHz - 30 MHz RBW=9 kHz, VBW=9 kHz; 30 MHz- 1000 MHz RBW=120 kHz, VBW=120 kHz; 1000 MHz -6000 MHz RBW=1 MHz, VBW=1 MHz. 13.8VDC (110Vac, 60Hz) 20°C, 45% relative humidity.

Operating Frequency: 469 MHz
 Channels: Middle
 Highest Measured Output Power: 45.11 ERP(dBm)= 32.4 ERP(Watts)
 Distance: 3 meters
 Limit: $43+10\log(P)$ 58.11 dBc

Freq. (MHz)	Reference Level (dBm)	Antenna Polarity (H/V)	dBc
4,690.00	-37.5	Vert	82.61
4,689.95	-39.50	Horiz	84.61
2,344.75	-47.30	Horiz	92.41
5,158.95	-50.10	Vert	95.21
4,220.55	-50.70	Horiz	95.81
3,752.25	-51.50	Vert	96.61
2,814.30	-52.30	Horiz	97.41
2,814.45	-53.50	Vert	98.61
5,159.55	-56.20	Horiz	101.31
1,200.45	-57.80	Horiz	102.91

RADIATED EMISSIONS



LOOP RADIATED EMISSIONS



Test Equipment

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Spectrum Analyzer	01865	HP	8566B	2532A02509	092702	092703
QP Adapter	01437	HP	85650A	3303A01884	092702	092703
9kHz-30MHz						
Loop Antenna	00314	EMCO	6502	2014	72302	72303
30 MHz-1000MHz						
Bicon Antenna	306	AH	SAS200/540	220	092302	092303
Log Periodic Antenna	300	AH	SAS 00/516	331	092302	092303
Pre-amp	00309	HP	8447D	1937A02548	082302	082303
Pre-amp to SA cable	NA	Harbour	RG223/U	Cable#10	070802	070803
1000-6000MHz						
Horn Antenna	0849	EMCO	3115	6246	091002	091003
Microwave Pre-amp	00786	HP	83017A	3123A00281	091102	091103
¼" Helix Coaxial Cable	NA	Andrew	FSJ-50A-4	Cable#7 (6 ft)	071502	071503
Antenna cable (from bulkhead to antenna, high frequency hardline) (25ft)	NA	Andrew	FSJ1-50A	Cable#13	071502	071503
1.5 GHz HPF	2116	HP	84300-80037	3643A00027	062502	062503
12' SMA Cable	01337	W.L.Gore	NA	244922	121602	121603

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

Test Conditions: EUT is placed in a temperature chamber. The antenna port is directly connected to a spectrum analyzer. Voltage variations are performed through a DC power supply in combination with a digital volt meter.

Customer: IPMobilenet
WO#: 79827
Test Engineer: Randal Clark

Device Model #: IP4B (HPV)
Operating Voltage: 13.8 VDC
Frequency Limit: 2.5 PPM

Temperature Variations

Channel Frequency:		Channel 1 (MHz)	Dev. (MHz)
		457.500000	
Temp (C)	Voltage		
-30	13.8	457.50011	0.00011
-20	13.8	457.50027	0.00027
-10	13.8	457.50037	0.00037
0	13.8	457.50045	0.00045
10	13.8	457.50014	0.00014
20	13.8	457.49963	0.00038
30	13.8	457.49985	0.00016
40	13.8	457.49932	0.00068
50	13.8	457.49920	0.00080

Voltage Variations (±15%)

20	11.7	457.49952	0.00048
20	13.8	457.49963	0.00038
20	15.9	457.49960	0.00040

Max Deviation (MHz)	0.00080
Max Deviation (PPM)	1.74863
PASS	

*See Note on page 39.



Test Equipment

<i>Description</i>	<i>Manufacturer</i>	<i>Model #</i>	<i>Serial #</i>	<i>Asset #</i>	<i>Cal Date</i>	<i>Cal Due</i>
Temp Chamber	Thermotron	S-1.2 MiniMax	11899	01879	2/7/2002	2/7/2003
Thermometer	Omega	HH-26K	T-202884	02242	8/30/2002	8/30/2003
Cable #5 (20')	Andrew	FSJ1-50A	N/A	N/A	4/16/2002	4/16/2003
Attenuator	Bird	100-SA-MFN-30	9949	P01572	3/21/2002	3/21/2003
Power Supply, DC	Sorensen	DCR-60-30B	176	00765	7/17/2002	7/17/2003
Digital Multimeter	Radio Shack	22-183	NA	01241	9/3/2002	9/3/2003
Spectrum Analyzer 100Hz - 22.5GHz	HP	8566B	2209A01404	00490	1/30/2002	1/30/2003
Spectrum Analyzer Display	HP	8566B	2403A08241	00489	1/30/2002	1/30/2003
Spectrum Analyzer QP Adapter	HP	85650A	2811A01267	00478	1/30/2002	1/30/2003

Note: The following Frequency Stability testing for the Mobile Radio IP4HPV-GPS used the same RF unit and RF board as the Base Station, IP4B4547 and so shows compliance of the Base Station, IP4B4547 as well. The above Frequency Stability test on one frequency of the Base Station shows that the compliance for the Mobile Radio will suffice for the other frequencies of the Base Station.

Test Conditions: EUT is transmitting on low, mid and high channels. Laptop computer is connected via an RS232 cable to EUT. Laptop is programmed to send signal to EUT. EUT is powered via 13.8VDC.

RBW/VBW = 30kHz

Span = 100kHz

SWP = 20msec

REF 127dBuV

Atten 30dB

External Atten 40dB

Frequency Stability

Customer: IP Mobilenet

WO#: 79904

Test Engineer: Monika Brandle

Device Model #: IP4HPV-GPS

Operating Voltage: 13.8 VDC

Frequency Limit: 2.5 PPM/%

Temperature Variations

		Channel 1 (MHz) Dev. (MHz)	
Channel Frequency:		449.9968	
Temp (C)	Voltage		
-30	13.8	449.99600	0.00080
-20	13.8	449.99730	0.00050
-10	13.8	449.99750	0.00070
0	13.8	449.99700	0.00020
10	13.8	449.99660	0.00020
20	13.8	449.99660	0.00020
30	13.8	449.99580	0.00100
40	13.8	449.99580	0.00100
50	13.8	449.99720	0.00040

Voltage Variations (±15%)

20	11.7	449.99680	0.00000
20	13.8	449.99680	0.00000
20	15.9	449.99680	0.00000

Max Deviation (MHz)		0.00100
Max Deviation (PPM)		2.22224
		PASS

Frequency Stability

Customer: IP Mobilenet
WO#: 79904
Test Engineer: Monika Brandle

Device Model #: IP4HPV-GPS
Operating Voltage: 13.8 VDC
Frequency Limit: 2.5 PPM/%
RBW=3kHz, VBW=3Hz, Span 75kHz

Temperature Variations

	Channel 1 (MHz)	Dev. (MHz)
Channel Frequency:	460.49842	
Temp (C) Voltage		
-30 13.8	460.49917	0.00075
-20 13.8	460.49947	0.00105
-10 13.8	460.49947	0.00105
0 13.8	460.49940	0.00098
10 13.8	460.49925	0.00083
20 13.8	460.49918	0.00076
30 13.8	460.49918	0.00076
40 13.8	460.49948	0.00106
50 13.8	460.49925	0.00083

Voltage Variations ($\pm 15\%$)

20	11.7	460.49895	0.00053
20	13.8	460.49842	0.00000
20	15.9	460.49842	0.00000

Max Deviation (MHz)	0.00106
Max Deviation (PPM)	2.30185
	PASS

Frequency Stability

Customer: IP Mobilenet
WO#: 79904
Test Engineer: Monika Brandle

Device Model #: IP4HPV-GPS
Operating Voltage: 13.8 VDC
Frequency Limit: 2.5 PPM/%

Temperature Variations

		Channel 1 (MHz) Dev. (MHz)	
Channel Frequency:		468.9963	
Temp (C) Voltage			
-30	13.8	468.99610	0.00020
-20	13.8	468.99610	0.00020
-10	13.8	468.99740	0.00110
0	13.8	468.99700	0.00070
10	13.8	468.99560	0.00070
20	13.8	468.99660	0.00030
30	13.8	468.99660	0.00030
40	13.8	468.99670	0.00040
50	13.8	468.99680	0.00050

Voltage Variations ($\pm 15\%$)

20	11.7	468.99630	0.00000
20	13.8	468.99630	0.00000
20	15.9	468.99520	0.00110

Max Deviation (MHz)		0.00110
Max Deviation (PPM)		2.34543
		PASS





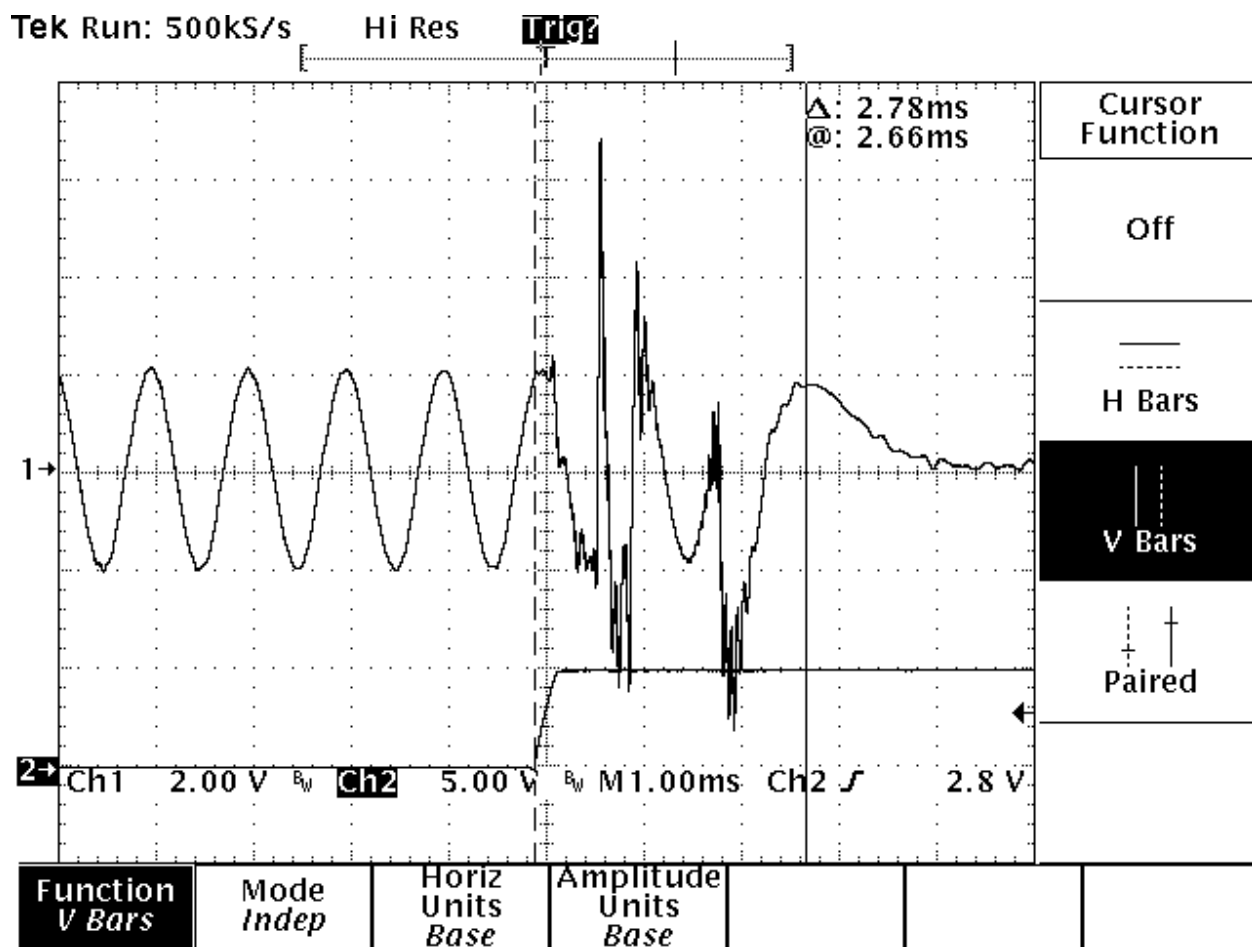
Test Equipment

<i>Description</i>	<i>Manufacturer</i>	<i>Model #</i>	<i>Serial #</i>	<i>Asset #</i>	<i>Cal Date</i>	<i>Cal Due</i>
Temp Chamber	Thermotron	S-1.2 MiniMax	11899	01879	2/7/02	2/7/2003
Thermometer	Omega	HH-26K	T-202884	02242	8/30/02	8/30/2003
Power Supply, DC	Sorensen	DCR-60-30B	176	00765	7/17/02	7/17/2003
Digital Multimeter	Radio Shack	22-183	NA	01241	9/3/02	9/3/2003
Spectrum Analyzer RF Section	HP	8566B	2235A02425	00092	10/23/02	10/23/03
Spectrum Analyzer Display	HP	8568B	2237A04323	00091	10/23/02	10/23/03
Spectrum Analyzer QP Adapter	HP	85650A	2521A00904	02495	3/4/02	3/4/03

90.214 – TRANSIENT FREQUENCY BEHAVIOR

Test Conditions: The RF port of the EUT is connected to a combiner which combines a Audio signal (1 kHz, +- 5 kHz deviation) from a audio source. The combined signal is connected to the input port of a spectrum Analyzer. The Audio monitor output of the spectrum analyzer is connected to CH1 of a Oscilloscope. Channel 2 of the Oscilloscope is connected to TX high test point of the EUT. The transient time under investigation is between the transition time of the TX high and complete silence of the 1kHz tone (attack) and between the transition time of the TX high and complete recover of the 1kHz tone for Release time.

ATTACK TIME 457 MHz

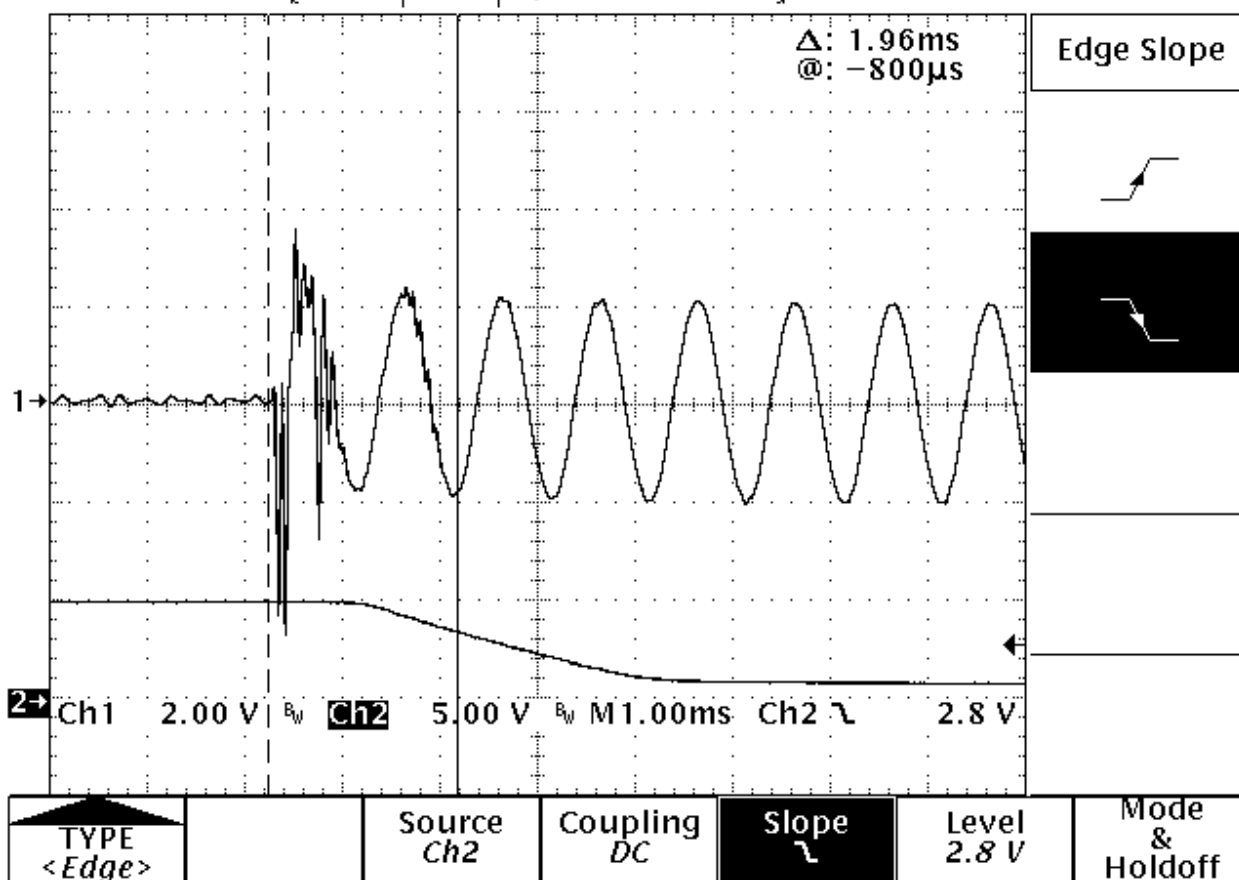


RELEASE TIME 457 MHz

Tek Run: 500kS/s

Hi Res

Trig?





Test Equipment

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Spectrum Analyzer	CUST	HP	8920B	US235180384	092302	092303
Oscilloscope	CUST	Tektronics	TDS480A	B010220	NA	NA
Signal Generator	02227	Marconi	2024	112282/515	080602	080603

Note: Customer's oscilloscope functional check against CKC's Signal Generator listed above

2.1091 – MPE CALCULATIONS

Maximum Permissible Exposure Calculations

Date of Report: January 11, 2003

Calculations prepared for:
IP MobileNet
16842 Von Karman Avenue Suite 200
Irvine CA92606

Calculations prepared by:
Eddie Wong
110 N. Olinda Place
Brea, CA 9283

Model Number: IP4B(HPV)
FCC Identification: NA

Fundamental Operating Frequency: 451-469MHz (in the 450-470 MHz band)
Maximum Rated Output Power: 40 Watts
Measured Maximum Output Power: 38.1 Watts (* 457.5 MHz)

MPE limit in accordance with FCC part 1.1311, table 1

Limit for Maximum permissible exposure: (B) Limit for General population/uncontrolled Exposure.

For frequency range of 300-1500 MHz , the MPE is $f / 1500$ (mW/cm²)

MPE Limit for 451.0 MHz = $451.0/1500 = 0.3007$ mW/cm² (3.007 W/m²)
MPE Limit for 457.5 MHz = $457.5/1500 = 0.3050$ mW/cm² (3.050 W/m²) *
MPE Limit for 469.0 MHz = $469.0/1500 = 0.3127$ mW/ cm² (3.127W/m²)

$$\text{Power Density (W/m}^2\text{)} = \frac{30 \times P_t \times G}{d^2 \times Z_0}$$

P_t = Power Delivered to the Antenna
 d = Distance in meters
ohm)

G = Antenna Gain
 Z_0 = Impedance of Free Space (377

The typical antennas to be used with the EUT are Tower mount antennas which under normal operation has an antenna height of at least 6 meters. As can be seen from the MPE result, this device passes the limit specified in 1.1310 at a distance of 0.9970 meter with an antenna gain of 0 dBi

Calculation:

$$d = \sqrt{\frac{30 \times 38.1 \times 1}{3.050 \times 377}}$$

=0.9970 meter

15.107 – AC CONDUCTED EMISSIONS

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

Customer: **IP MobileNet**
 Specification: **FCC 15.107 Class A COND AVE**
 Work Order #: **79827**
 Test Type: **Conducted Emissions**
 Equipment: **Base Station**
 Manufacturer: **IP Mobilenet**
 Model: **IP4B (HPV)**
 S/N: **NA (451 MHz)**

Date: 01/08/2003
 Time: 7:46:02 PM
 Sequence#: 7
 Tested By: Eddie Wong
 110Vac 60Hz

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Base Station*	IP Mobilenet	IP4B (HPV)	NA (451 MHz)

Support Devices:

Function	Manufacturer	Model #	S/N
Laptop	Gateway	Solo1045	0028365842
Power Supply	Radio Shack	22-510	NA

Test Conditions / Notes:

EUT placed on the test bench. RS232 port is connected to Com 1 port of a support laptop. All 3 Rx antenna ports terminated to 50 ohm load. The TX port is terminated to a 50 Watt, 50 ohm load. Serial port #2 left unpopulated. Ethernet port connected to a section of UTP and a loop back terminator. Mode: Receive mode. Tx 451 MHz, Rx 456 MHz, Inj Freq 411 MHz. Freq Range: 150 kHz – 30 MHz. Frequency: 150 kHz - 30 MHz RBW=9 kHz, VBW=9 kHz. 13.8 VDC (110Vac, 60Hz) 20°C, 46% relative humidity.

Transducer Legend:

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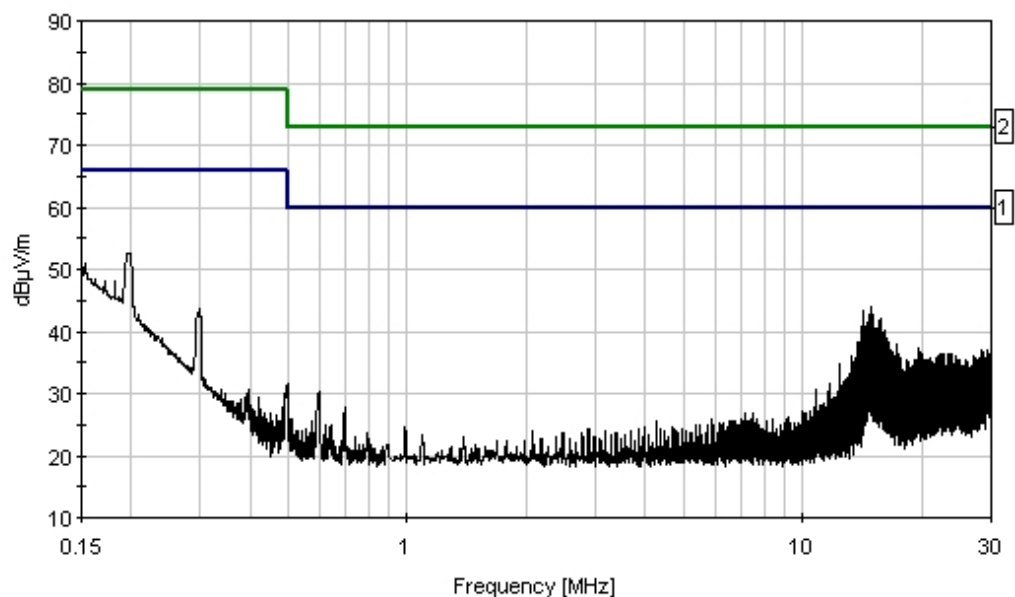
Measurement Data: Reading listed by margin.

Test Lead: Black

#	Freq MHz	Rdng dBµV	dB	dB	dB	dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	198.722k	52.6					+0.0	52.6	66.0	-13.4	Black
2	152.909k	50.8					+0.0	50.8	66.0	-15.2	Black
3	14.886M	44.1					+0.0	44.1	60.0	-15.9	Black
4	14.192M	43.4					+0.0	43.4	60.0	-16.6	Black
5	14.688M	42.7					+0.0	42.7	60.0	-17.3	Black
6	14.994M	42.7					+0.0	42.7	60.0	-17.3	Black
7	15.093M	42.7					+0.0	42.7	60.0	-17.3	Black
8	15.787M	42.0					+0.0	42.0	60.0	-18.0	Black

9	15.579M	41.6	+0.0	41.6	60.0	-18.4	Black
10	14.597M	41.5	+0.0	41.5	60.0	-18.5	Black
11	15.688M	41.4	+0.0	41.4	60.0	-18.6	Black
12	14.787M	41.3	+0.0	41.3	60.0	-18.7	Black
13	14.498M	40.9	+0.0	40.9	60.0	-19.1	Black
14	14.030M	40.8	+0.0	40.8	60.0	-19.2	Black
15	15.381M	40.6	+0.0	40.6	60.0	-19.4	Black

CKC Laboratories, Inc. Date: 01/08/2003 Time: 7:46:02 PM IP MobileNet WVO#: 79827
FCC 15.107 Class A COND AVE Test Lead: Black 110Vac 60Hz Sequence#: 7



— 1 - FCC 15.107 Class A COND AVE — 2 - FCC 15.107 Class A COND QP

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

Customer: **IP MobileNet**
 Specification: **FCC 15.107 Class A COND AVE**
 Work Order #: **79827**
 Test Type: **Conducted Emissions**
 Equipment: **Base Station**
 Manufacturer: **IP Mobilenet**
 Model: **IP4B (HPV)**
 S/N: **NA (451 MHz)**

Date: 01/08/2003
 Time: 7:49:39 PM
 Sequence#: 8
 Tested By: Eddie Wong
 110Vac 60Hz

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Base Station*	IP Mobilenet	IP4B (HPV)	NA (451 MHz)

Support Devices:

Function	Manufacturer	Model #	S/N
Laptop	Gateway	Solo1045	0028365842
Power Supply	Radio Shack	22-510	NA

Test Conditions / Notes:

EUT placed on the test bench. RS232 port is connected to Com 1 port of a support laptop. All 3 Rx antenna ports terminated to 50 ohm load. The TX port is terminated to a 50 Watt, 50 ohm load. Serial port #2 left unpopulated. Ethernet port connected to a section of UTP and a loop back terminator. Mode: Receive mode. Tx 451 MHz, Rx 456 MHz, Inj Freq 411 MHz. Freq Range: 150 kHz – 30 MHz. Frequency: 150 kHz - 30 MHz RBW=9 kHz, VBW=9 kHz. 13.8 VDC (110Vac, 60Hz) 20°C, 46% relative humidity.

Transducer Legend:

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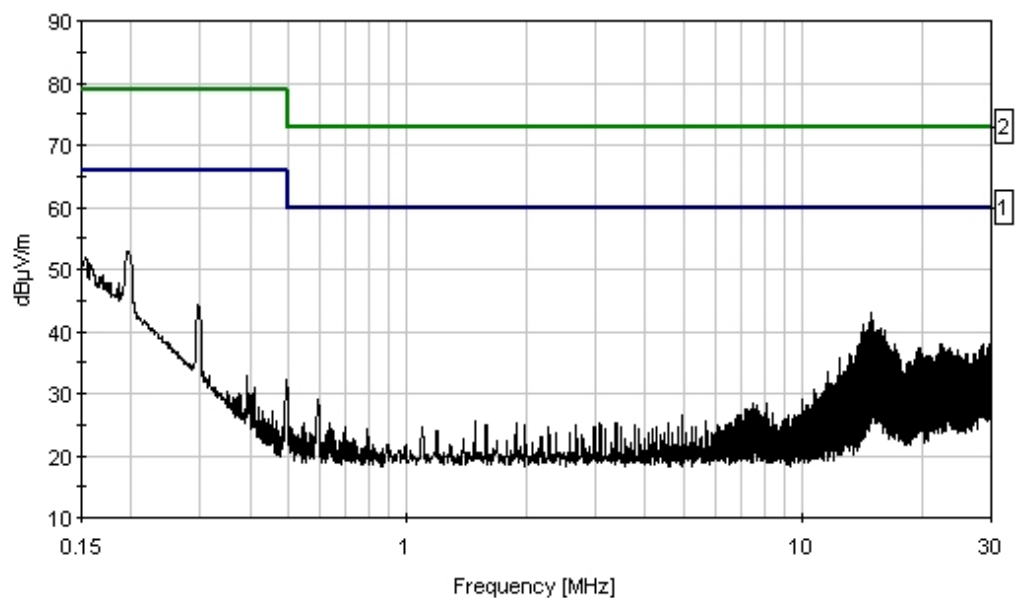
Measurement Data: Reading listed by margin.

Test Lead: White

#	Freq MHz	Rdng dB μ V	dB	dB	dB	dB	Dist Table	Corr dB μ V/m	Spec dB μ V/m	Margin dB	Polar Ant
1	195.814k	52.9					+0.0	52.9	66.0	-13.1	White
2	152.909k	51.8					+0.0	51.8	66.0	-14.2	White
3	14.886M	43.0					+0.0	43.0	60.0	-17.0	White
4	15.084M	41.7					+0.0	41.7	60.0	-18.3	White
5	14.679M	41.4					+0.0	41.4	60.0	-18.6	White
6	14.192M	41.2					+0.0	41.2	60.0	-18.8	White
7	14.985M	41.0					+0.0	41.0	60.0	-19.0	White
8	15.778M	40.5					+0.0	40.5	60.0	-19.5	White
9	15.679M	40.3					+0.0	40.3	60.0	-19.7	White
10	14.579M	40.2					+0.0	40.2	60.0	-19.8	White

11	15.381M	40.1	+0.0	40.1	60.0	-19.9	White
12	16.075M	40.1	+0.0	40.1	60.0	-19.9	White
13	15.480M	40.0	+0.0	40.0	60.0	-20.0	White
14	15.570M	40.0	+0.0	40.0	60.0	-20.0	White
15	14.399M	39.8	+0.0	39.8	60.0	-20.2	White

CKC Laboratories, Inc. Date: 01/08/2003 Time: 7:49:39 PM IP MobileNet W/O#: 79827
FCC 15.107 Class A COND AVE Test Lead: White 110Vac 60Hz Sequence#: 8



1 - FCC 15.107 Class A COND AVE 2 - FCC 15.107 Class A COND QP

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

Customer: **IP MobileNet**
 Specification: **FCC 15.107 Class A COND AVE**
 Work Order #: **79827**
 Test Type: **Conducted Emissions**
 Equipment: **Base Station**
 Manufacturer: **IP Mobilenet**
 Model: **IP4B (HPV)**
 S/N: **0211002**

Date: 11/20/2002
 Time: 12:00:22
 Sequence#: 5
 Tested By: Eddie Wong
 110Vac 60Hz

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Base Station*	IP Mobilenet	IP4B (HPV)	0211002

Support Devices:

Function	Manufacturer	Model #	S/N
Laptop	Compaq	Presario	1V02DCH2E270
Power Supply	Samflex	SEC1223	03061-06272

Test Conditions / Notes:

EUT placed on the test bench. RS232 port is connected to Com 1 port of a support laptop. All 3 Rx antenna ports terminated to 50 ohm load. The TX port is terminated to a 50 Watt, 50 ohm load. Serial port #2 left unpopulated. Ethernet port connected to a section of UTP and a loop back terminator. Mode: Receive mode. Tx 457.5 MHz, Rx 460.5 MHz, Inj Freq 415.5 MHz. Freq Range: 150 kHz – 30 MHz. Frequency: 150 kHz- 30 MHz RBW=9 kHz, VBW=9 kHz. 13.8 VDC (110Vac, 60Hz) 18°C, 61% relative humidity.

Transducer Legend:

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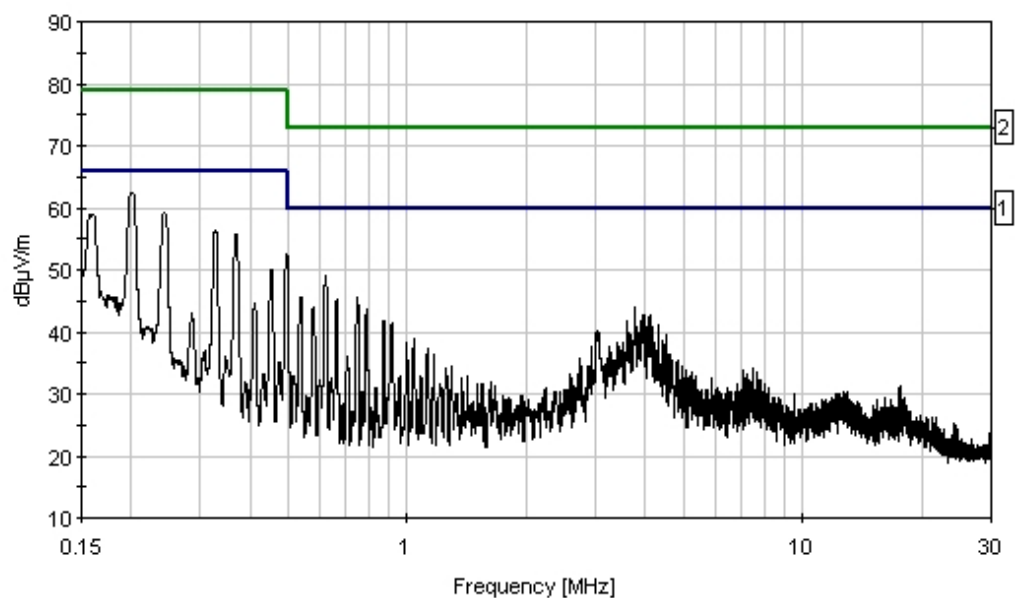
Measurement Data: Reading listed by margin.

Test Lead: Black

#	Freq MHz	Rdng dB μ V					Dist Table	Corr dB μ V/m	Spec dB μ V/m	Margin dB	Polar Ant
1	202.283k	62.3					+0.0	62.3	66.0	-3.7	Black
	Ave										
^	202.283k	62.4					+0.0	62.4	66.0	-3.6	Black
3	241.627k	59.1					+0.0	59.1	66.0	-6.9	Black
4	157.999k	58.9					+0.0	58.9	66.0	-7.1	Black
5	326.710k	56.2					+0.0	56.2	66.0	-9.8	Black
6	368.160k	55.8					+0.0	55.8	66.0	-10.2	Black
7	619.771k	48.9					+0.0	48.9	60.0	-11.1	Black
8	494.693k	52.4					+0.0	52.4	66.0	-13.6	Black
9	539.052k	45.6					+0.0	45.6	60.0	-14.4	Black
10	747.758k	45.6					+0.0	45.6	60.0	-14.4	Black

11	665.585k	45.1	+0.0	45.1	60.0	-14.9	Black
12	452.515k	50.0	+0.0	50.0	66.0	-16.0	Black
13	578.321k	43.9	+0.0	43.9	60.0	-16.1	Black
14	3.752M	43.9	+0.0	43.9	60.0	-16.1	Black
15	3.778M	43.8	+0.0	43.8	60.0	-16.2	Black
16	787.754k	43.5	+0.0	43.5	60.0	-16.5	Black

CKC Laboratories, Inc. Date: 11/20/2002 Time: 12:00:22 IP MobileNet VVO#: 79827
FCC 15.107 Class A COND AVE Test Lead: Black 110Vac 60Hz Sequence#: 5



—— 1 - FCC 15.107 Class A COND AVE —— 2 - FCC 15.107 Class A COND QP

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

Customer: **IP MobileNet**
 Specification: **FCC 15.107 Class A COND AVE**
 Work Order #: **79827**
 Test Type: **Conducted Emissions**
 Equipment: **Base Station**
 Manufacturer: **IP Mobilenet**
 Model: **IP4B (HPV)**
 S/N: **0211002**

Date: 11/20/2002
 Time: 12:09:48
 Sequence#: 6
 Tested By: Eddie Wong
 110Vac 60Hz

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Base Station*	IP Mobilenet	IP4B (HPV)	0211002

Support Devices:

Function	Manufacturer	Model #	S/N
Laptop	Compaq	Presario	1V02DCH2E270
Power Supply	Samflex	SEC1223	03061-06272

Test Conditions / Notes:

EUT placed on the test bench. RS232 port is connected to Com 1 port of a support laptop. All 3 Rx antenna ports terminated to 50 ohm load. The TX port is terminated to a 50 Watt, 50 ohm load. Serial port #2 left unpopulated. Ethernet port connected to a section of UTP and a loop back terminator. Mode: Receive mode. Tx 457.5 MHz, Rx 460.5 MHz, Inj Freq 415.5 MHz. Freq Range: 150 kHz – 30 MHz. Frequency: 150 kHz - 30 MHz RBW=9 kHz, VBW=9 kHz. 13.8 VDC (110Vac, 60Hz) 18°C, 61% relative humidity.

Transducer Legend:

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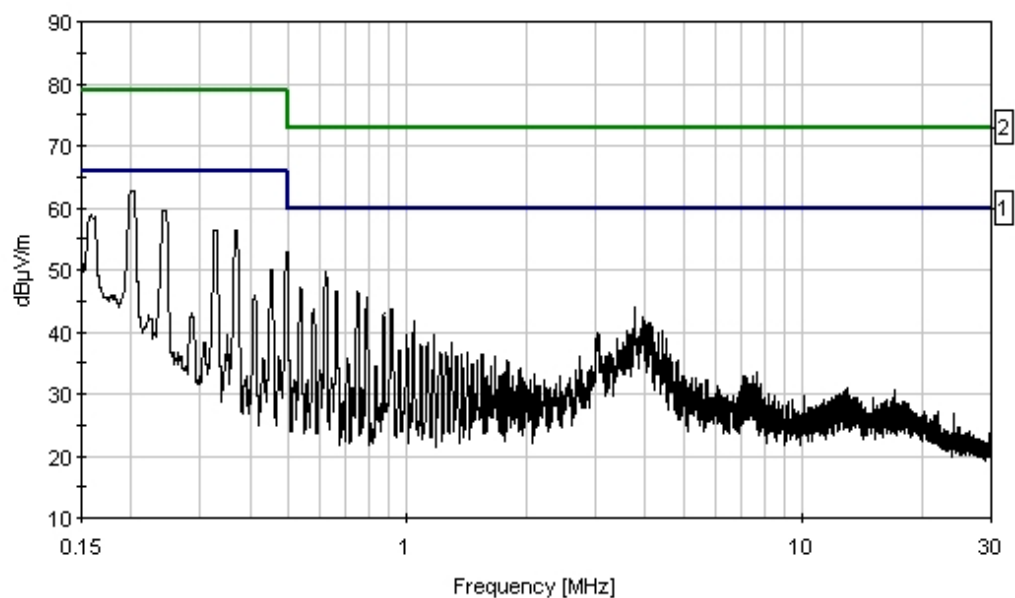
Measurement Data: Reading listed by margin.

Test Lead: White

#	Freq MHz	Rdng dB μ V	dB	dB	dB	dB	Dist Table	Corr dB μ V/m	Spec dB μ V/m	Margin dB	Polar Ant
1	199.560k	62.4					+0.0	62.4	66.0	-3.6	White
Ave											
^	200.904k	62.8					+0.0	62.8	66.0	-3.2	White
3	241.627k	59.6					+0.0	59.6	66.0	-6.4	White
4	158.726k	58.8					+0.0	58.8	66.0	-7.2	White
5	368.160k	56.4					+0.0	56.4	66.0	-9.6	White
6	325.982k	56.3					+0.0	56.3	66.0	-9.7	White
7	621.226k	49.8					+0.0	49.8	60.0	-10.2	White
8	494.693k	53.0					+0.0	53.0	66.0	-13.0	White
9	536.870k	47.0					+0.0	47.0	60.0	-13.0	White
10	747.031k	46.6					+0.0	46.6	60.0	-13.4	White

11	661.949k	46.4	+0.0	46.4	60.0	-13.6	White
12	788.482k	45.4	+0.0	45.4	60.0	-14.6	White
13	451.788k	49.9	+0.0	49.9	66.0	-16.1	White
14	3.778M	43.9	+0.0	43.9	60.0	-16.1	White
15	915.277k	43.8	+0.0	43.8	60.0	-16.2	White
16	581.230k	43.7	+0.0	43.7	60.0	-16.3	White

CKC Laboratories, Inc. Date: 11/20/2002 Time: 12:09:48 IP MobileNet WVO#: 79827
FCC 15.107 Class A COND AVE Test Lead: White 110Vac 60Hz Sequence#: 6



—— 1 - FCC 15.107 Class A COND AVE —— 2 - FCC 15.107 Class A COND QP

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

Customer: **IP MobileNet**
 Specification: **FCC 15.107 Class A COND AVE**
 Work Order #: **79827**
 Test Type: **Conducted Emissions**
 Equipment: **Base Station**
 Manufacturer: **IP Mobilenet**
 Model: **IP4B (HPV)**
 S/N: **0211001**

Date: 01/08/2003
 Time: 8:02:16 PM
 Sequence#: 10
 Tested By: Eddie Wong
 110Vac 60Hz

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Base Station*	IP Mobilenet	IP4B (HPV)	0211001

Support Devices:

Function	Manufacturer	Model #	S/N
Laptop	Gateway	Solo1045	0028365842
Power Supply	Radio Shack	22-510	NA

Test Conditions / Notes:

EUT placed on the test bench. RS232 port is connected to Com 1 port of a support laptop. All 3 Rx antenna ports terminated to 50 ohm load. The TX port is terminated to a 50 Watt, 50 ohm load. Serial port #2 left unpopulated. Ethernet port connected to a section of UTP and a loop back terminator. Mode: Receive mode. Tx 469 MHz, Rx 474 MHz, Inj Freq 429 MHz. Freq Range: 150 kHz – 30 MHz. Frequency: 150 kHz - 30 MHz RBW=9 kHz, VBW=9 kHz. 13.8 VDC (110Vac, 60Hz) 20°C, 46% relative humidity.

Transducer Legend:

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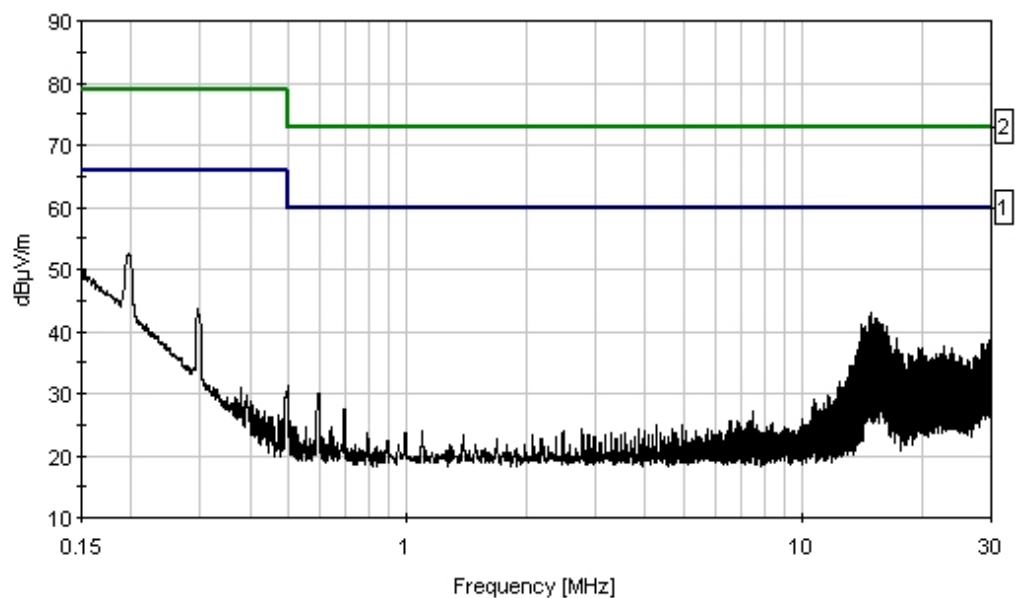
Measurement Data: Reading listed by margin.

Test Lead: Black

#	Freq MHz	Rdng dB μ V	dB	dB	dB	dB	Dist Table	Corr dB μ V/m	Spec dB μ V/m	Margin dB	Polar Ant
1	196.541k	52.5					+0.0	52.5	66.0	-13.5	Black
2	152.182k	50.1					+0.0	50.1	66.0	-15.9	Black
3	14.895M	42.9					+0.0	42.9	60.0	-17.1	Black
4	14.679M	42.5					+0.0	42.5	60.0	-17.5	Black
5	14.787M	42.2					+0.0	42.2	60.0	-17.8	Black
6	15.291M	42.1					+0.0	42.1	60.0	-17.9	Black
7	15.381M	42.1					+0.0	42.1	60.0	-17.9	Black
8	15.183M	41.9					+0.0	41.9	60.0	-18.1	Black
9	15.579M	41.5					+0.0	41.5	60.0	-18.5	Black
10	14.021M	41.2					+0.0	41.2	60.0	-18.8	Black

11	15.787M	41.2	+0.0	41.2	60.0	-18.8	Black
12	15.084M	41.0	+0.0	41.0	60.0	-19.0	Black
13	15.976M	41.0	+0.0	41.0	60.0	-19.0	Black
14	15.679M	40.8	+0.0	40.8	60.0	-19.2	Black
15	16.282M	40.8	+0.0	40.8	60.0	-19.2	Black

CKC Laboratories, Inc. Date: 01/08/2003 Time: 8:02:16 PM IP MobileNet W/O#: 79827
FCC 15.107 Class A COND AVE Test Lead: Black 110Vac 60Hz Sequence#: 10



—— 1 - FCC 15.107 Class A COND AVE —— 2 - FCC 15.107 Class A COND QP

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

Customer: **IP MobileNet**
 Specification: **FCC 15.107 Class A COND AVE**
 Work Order #: **79827**
 Test Type: **Conducted Emissions**
 Equipment: **Base Station**
 Manufacturer: **IP Mobilenet**
 Model: **IP4B (HPV)**
 S/N: **0211001**

Date: 01/08/2003
 Time: 7:56:07 PM
 Sequence#: 9
 Tested By: Eddie Wong
 110Vac 60Hz

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Base Station*	IP Mobilenet	IP4B (HPV)	0211001

Support Devices:

Function	Manufacturer	Model #	S/N
Laptop	Gateway	Solo1045	0028365842
Power Supply	Radio Shack	22-510	NA

Test Conditions / Notes:

EUT placed on the test bench. RS232 port is connected to Com 1 port of a support laptop. All 3 Rx antenna ports terminated to 50 ohm load. The TX port is terminated to a 50 Watt, 50 ohm load. Serial port #2 left unpopulated. Ethernet port connected to a section of UTP and a loop back terminator. Mode: Receive mode. Tx 469 MHz, Rx 474 MHz, Inj Freq 429 MHz. Freq Range: 150 kHz – 30 MHz. Frequency: 150 kHz - 30 MHz RBW=9 kHz, VBW=9 kHz. 13.8 VDC (110Vac, 60Hz) 20°C, 46% relative humidity.

Transducer Legend:

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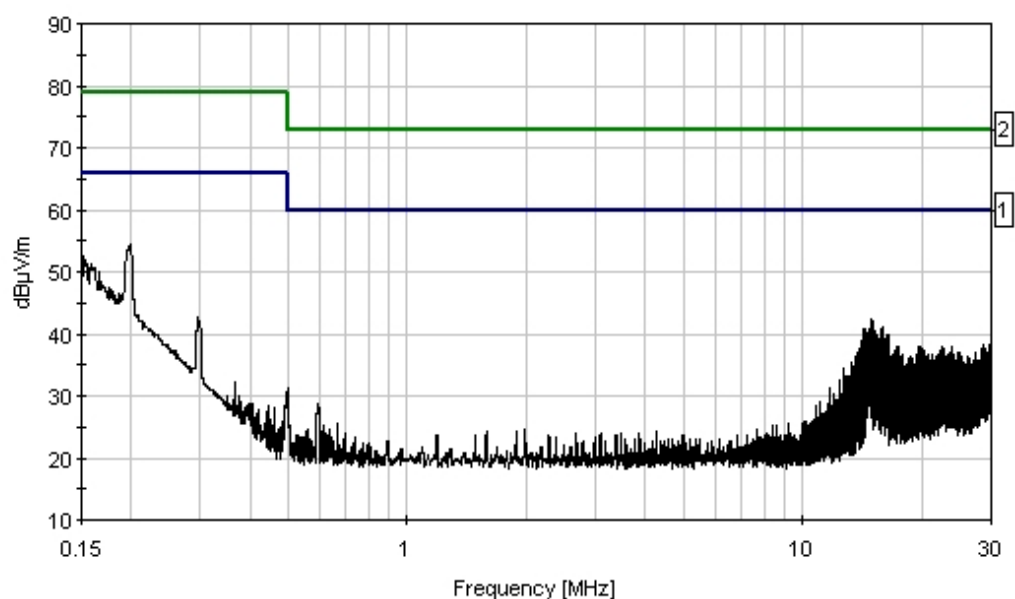
Measurement Data: Reading listed by margin.

Test Lead: White

#	Freq MHz	Rdng dB μ V					Dist Table	Corr dB μ V/m	Spec dB μ V/m	Margin dB	Polar Ant
1	198.722k	54.4					+0.0	54.4	66.0	-11.6	White
2	150.000k	52.6					+0.0	52.6	66.0	-13.4	White
3	14.877M	42.5					+0.0	42.5	60.0	-17.5	White
4	15.093M	42.1					+0.0	42.1	60.0	-17.9	White
5	15.985M	41.2					+0.0	41.2	60.0	-18.8	White
6	15.886M	41.0					+0.0	41.0	60.0	-19.0	White
7	15.787M	40.9					+0.0	40.9	60.0	-19.1	White
8	14.192M	40.7					+0.0	40.7	60.0	-19.3	White
9	14.399M	40.7					+0.0	40.7	60.0	-19.3	White
10	14.670M	40.7					+0.0	40.7	60.0	-19.3	White

11	15.183M	40.5	+0.0	40.5	60.0	-19.5	White
12	14.787M	40.4	+0.0	40.4	60.0	-19.6	White
13	14.597M	40.3	+0.0	40.3	60.0	-19.7	White
14	15.697M	40.3	+0.0	40.3	60.0	-19.7	White
15	15.291M	40.2	+0.0	40.2	60.0	-19.8	White

CKC Laboratories, Inc. Date: 01/08/2003 Time: 7:56:07 PM IP MobileNet VVO#: 79827
FCC 15.107 Class A COND AVE Test Lead: White 110Vac 60Hz Sequence#: 9

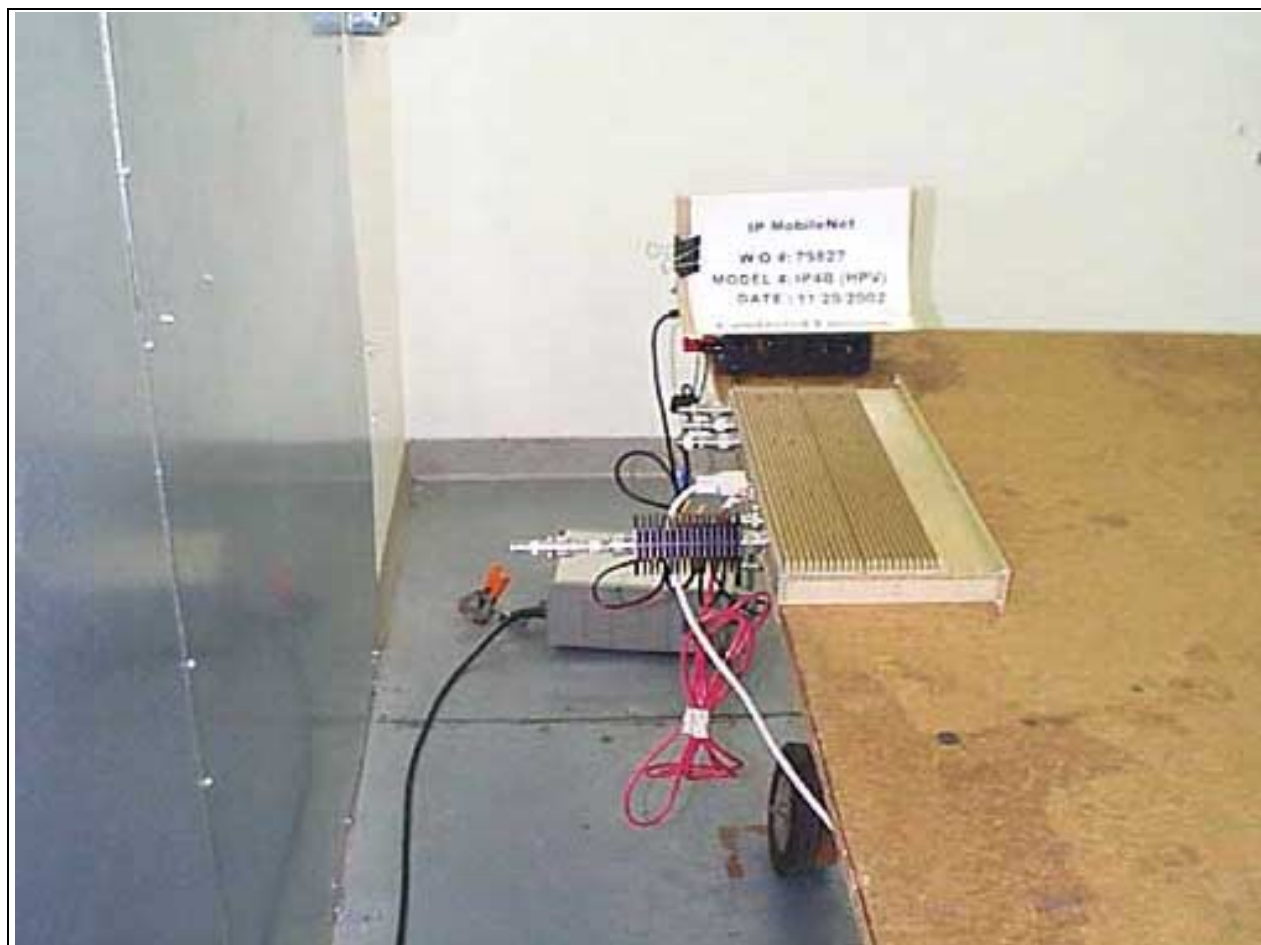


—— 1 - FCC 15.107 Class A COND AVE —— 2 - FCC 15.107 Class A COND QP

PHOTOGRAPH SHOWING MAINS CONDUCTED EMISSIONS



PHOTOGRAPH SHOWING MAINS CONDUCTED EMISSIONS



Test Equipment

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Spectrum Analyzer	01865	HP	8566B	2532A02509	092702	092703
QP Adapter	01437	HP	85650A	3303A01884	092702	092703
LISN	02128	EMCO	3816/2NM	9809-1090	032002	032003
LISN	00847	EMCO	3816/2NM	1104	010403	010404

15.109 – RADIATED EMISSIONS

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

Customer: **IP MobileNet**
 Specification: **FCC 15.109 Class A**
 Work Order #: **79827**
 Test Type: **Maximized emission**
 Equipment: **Base Station**
 Manufacturer: **IP Mobilenet**
 Model: **IP4B (HPV)**
 S/N: **0211002**

Date: 11/20/2002
 Time: 10:17:13
 Sequence#: 5
 Tested By: Eddie Wong

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Base Station*	IP Mobilenet	IP4B (HPV)	0211002

Support Devices:

Function	Manufacturer	Model #	S/N
Laptop	Compaq	Presario	1V02DCH2E270
Power Supply	Samflex	SEC1223	03061-06272

Test Conditions / Notes:

EUT placed on the test bench. RS232 port is connected to Com 1 port of a support laptop. All 3 antenna ports terminated to 50 ohm load. The TX port is terminated to a 100 Watt, 50 ohm load. Serial port #2 left unpopulated. Ethernet port connected to a section of UTP and a loop back terminator. Mode : Receive mode. Tx 457.5 MHz, Rx 460.5 MHz, Inj Freq 415.5 MHz. Freq Range: 30 MHz – 6000 MHz, Frequency 30 MHz - 1000 MHz RBW=120 kHz, VBW=120 kHz; 1000 MHz - 6000 MHz RBW=1 MHz, VBW=1 MHz. 13.8 VDC (110Vac, 60Hz) 18°C, 61% relative humidity.

Transducer Legend:

T1=Log antenna, SN331 092303	T2=Bicon SN220 092303
T3=Cable #10 070803	T4=Cable #15 120602
T5=Preamp 8447D 082302	T6=Horn 6246_091003
T7=Brea Cable: 25' 1/4" Heliac - Brea # 13.	T8=Brea Cable: 6' 1/4" Heliac - Brea # 7.
T9=HP83017A Preamp 091103	

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq	Rdng	T1 T5 T9	T2 T6	T3 T7	T4 T8	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	44.296M	47.9	+0.0 -28.5 +0.0	+13.3 +0.0	+0.1 +0.0	+1.1 +0.0	-10.0	23.9	39.1	-15.2	Vert
QP											
^	44.274M	48.8	+0.0 -28.5 +0.0	+13.3 +0.0	+0.1 +0.0	+1.1 +0.0	-10.0	24.8	39.1	-14.3	Vert
3	211.427M	43.6	+0.0 -28.4 +0.0	+17.9 +0.0	+0.2 +0.0	+2.6 +0.0	-10.0	25.9	43.5	-17.6	Horiz

4	83.609M	48.2	+0.0 -28.5 +0.0	+8.2 +0.0	+0.1 +0.0	+1.6 +0.0	-10.0	19.6	39.1	-19.5	Vert
5	1826.200M	45.2	+0.0 +0.0 -38.4	+0.0 +27.1	+0.0 +2.2	+0.0 +0.7	-10.0	26.8	49.5	-22.7	Vert
6	44.256M	37.3	+0.0 -28.5 +0.0	+13.4 +0.0	+0.1 +0.0	+1.1 +0.0	-10.0	13.4	39.1	-25.7	Horiz
7	1234.000M	45.2	+0.0 +0.0 -39.5	+0.0 +25.3	+0.0 +1.8	+0.0 +0.5	-10.0	23.3	49.5	-26.2	Vert
8	221.239M	37.3	+0.0 -28.3 +0.0	+18.2 +0.0	+0.2 +0.0	+2.7 +0.0	-10.0	20.1	46.4	-26.3	Horiz
9	206.486M	32.9	+0.0 -28.4 +0.0	+17.8 +0.0	+0.2 +0.0	+2.6 +0.0	-10.0	15.1	43.5	-28.4	Horiz
10	353.948M	31.1	+19.4 -28.3 +0.0	+0.0 +0.0	+0.3 +0.0	+3.5 +0.0	-10.0	16.0	46.4	-30.4	Horiz
11	206.493M	30.8	+0.0 -28.4 +0.0	+17.8 +0.0	+0.2 +0.0	+2.6 +0.0	-10.0	13.0	43.5	-30.5	Vert
12	442.402M	30.4	+18.2 -28.3 +0.0	+0.0 +0.0	+0.4 +0.0	+4.0 +0.0	-10.0	14.7	46.4	-31.7	Horiz
13	972.748M	23.4	+0.0 +0.0 +0.0	+0.0 +0.0	+0.0 +0.0	+0.0 +0.0	-10.0	17.5	49.5	-32.0	Horiz
14	209.569M	27.9	+0.0 -28.4 +0.0	+17.9 +0.0	+0.2 +0.0	+2.6 +0.0	-10.0	10.2	43.5	-33.3	Vert
15	968.100M	21.6	+0.0 +0.0 +0.0	+0.0 +0.0	+0.0 +0.0	+0.0 +0.0	-10.0	15.6	49.5	-33.9	Vert

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

Customer: **IP MobileNet**
 Specification: **FCC 15.109 Class A**
 Work Order #: **79827**
 Test Type: **Maximized emission**
 Equipment: **Base Station**
 Manufacturer: IP Mobilenet
 Model: IP4B (HPV)
 S/N: NA (451 MHz)

Date: 01/11/2003
 Time: 07:11:17
 Sequence#: 11
 Tested By: Eddie Wong

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Base Station*	IP Mobilenet	IP4B (HPV)	NA (451 MHz)

Support Devices:

Function	Manufacturer	Model #	S/N
Laptop	Gateway	Solo1045	0028365842
Power Supply	Samflex	SEC1223	03061-06272

Test Conditions / Notes:

EUT placed on the test bench. RS232 port is connected to Com 1 port of a support laptop. 2 of 3 Rx antenna ports terminated to 50 ohm load, RX3 antenna port is connected to an RX antenna. The TX port is terminated to a 50 Watt, 50 ohm load. Serial port #2 left unpopulated. Ethernet port connected to a section of UTP and a loop back terminator. Mode: Receive mode. Tx 451 MHz, Rx 456 MHz, Inj Freq 411 MHz. Freq Range: 30 MHz – 6000 MHz, Frequency 30 MHz- 1000 MHz RBW=120 kHz, VBW=120 kHz; 1000 MHz - 6000 MHz RBW=1 MHz, VBW=1 MHz. 13.8 VDC (110Vac, 60Hz) 20°C, 45% relative humidity.

Transducer Legend:

T1=Cable #10 070803	T2=Cable 15 123002
T3=Log antenna, SN331 092303	T4=Bicon SN220 092303
T5=Preamp 8447D 082302	T6=Horn 6246_091003
T7=12' SMA Gore cable #1337 121603	T8=HP83017A Preamp 091103
T9=Brea Cable: 25' 1/4" Helix - Brea # 13.	T10=Brea Cable: 6' 1/4" Helix - Brea # 7.

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq	Rdng	T1	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
			T5	T6	T7	T8					
	MHz	dBμV	T9	T10			Table	dBμV/m	dBμV/m	dB	Ant
1	344.061M	35.7	+0.3	+3.4	+19.9	+0.0	+0.0	31.0	46.4	-15.4	Horiz
			-28.3	+0.0	+0.0	+0.0					
			+0.0	+0.0							
2	294.904M	33.4	+0.3	+3.1	+0.0	+22.5	+0.0	31.0	46.4	-15.4	Vert
			-28.3	+0.0	+0.0	+0.0					
			+0.0	+0.0							
3	331.764M	33.5	+0.3	+3.3	+20.7	+0.0	+0.0	29.5	46.4	-16.9	Horiz
			-28.3	+0.0	+0.0	+0.0					
			+0.0	+0.0							
4	589.772M	31.8	+0.4	+4.6	+20.2	+0.0	+0.0	29.3	46.4	-17.1	Horiz
			-27.7	+0.0	+0.0	+0.0					
			+0.0	+0.0							

5	334.258M	33.5	+0.3 -28.3 +0.0	+3.3 +0.0 +0.0	+20.5 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0	29.3	46.4	-17.1	Horiz
6	324.386M	31.9	+0.3 -28.3 +0.0	+3.3 +0.0 +0.0	+21.1 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0	28.3	46.4	-18.1	Horiz
7	363.736M	33.8	+0.3 -28.3 +0.0	+3.5 +0.0 +0.0	+18.8 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0	28.1	46.4	-18.3	Horiz
8	319.511M	31.5	+0.3 -28.3 +0.0	+3.2 +0.0 +0.0	+21.4 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0	28.1	46.4	-18.3	Horiz
9	513.206M	31.2	+0.4 -28.0 +0.0	+4.2 +0.0 +0.0	+19.9 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0	27.7	46.4	-18.7	Horiz
10	270.428M	32.0	+0.3 -28.2 +0.0	+3.0 +0.0 +0.0	+0.0 +0.0 +0.0	+20.5 +0.0 +0.0	+0.0	27.6	46.4	-18.8	Vert
11	285.066M	30.5	+0.3 -28.2 +0.0	+3.0 +0.0 +0.0	+0.0 +0.0 +0.0	+21.7 +0.0 +0.0	+0.0	27.3	46.4	-19.1	Vert
12	258.032M	32.2	+0.3 -28.3 +0.0	+2.9 +0.0 +0.0	+0.0 +0.0 +0.0	+19.4 +0.0 +0.0	+0.0	26.5	46.4	-19.9	Vert
13	265.434M	31.1	+0.3 -28.2 +0.0	+2.9 +0.0 +0.0	+0.0 +0.0 +0.0	+20.1 +0.0 +0.0	+0.0	26.2	46.4	-20.2	Vert
14	373.575M	32.3	+0.3 -28.3 +0.0	+3.5 +0.0 +0.0	+18.3 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0	26.1	46.4	-20.3	Horiz
15	432.042M	32.4	+0.4 -28.3 +0.0	+3.7 +0.0 +0.0	+17.9 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0	26.1	46.4	-20.3	Vert
16	358.834M	31.5	+0.3 -28.3 +0.0	+3.4 +0.0 +0.0	+19.1 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0	26.0	46.4	-20.4	Horiz
17	400.027M	33.2	+0.3 -28.2 +0.0	+3.6 +0.0 +0.0	+16.9 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0	25.8	46.4	-20.6	Horiz
18	432.029M	32.0	+0.4 -28.3 +0.0	+3.7 +0.0 +0.0	+17.9 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0	25.7	46.4	-20.7	Horiz
19	368.618M	31.6	+0.3 -28.3 +0.0	+3.5 +0.0 +0.0	+18.5 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0	25.6	46.4	-20.8	Vert
20	400.038M	32.3	+0.3 -28.2 +0.0	+3.6 +0.0 +0.0	+16.9 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0	24.9	46.4	-21.5	Vert
21	383.378M	31.3	+0.3 -28.2 +0.0	+3.5 +0.0 +0.0	+17.8 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0	24.7	46.4	-21.7	Horiz

22	363.715M	30.2	+0.3 -28.3 +0.0	+3.5 +0.0 +0.0	+18.8 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0	24.5	46.4	-21.9	Vert
23	411.002M	31.3	+0.3 -28.2 +0.0	+3.6 +0.0 +0.0	+17.3 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0	24.3	46.4	-22.1	Vert
24	360.440M	29.7	+0.3 -28.3 +0.0	+3.4 +0.0 +0.0	+19.0 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0	24.1	46.4	-22.3	Vert
25	394.654M	29.9	+0.3 -28.2 +0.0	+3.6 +0.0 +0.0	+17.2 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0	22.8	46.4	-23.6	Vert
26	1460.480M	44.0	+0.0 +0.0 +1.9	+0.0 +25.1 +0.5	+0.0 +1.7	+0.0 -38.6	-10.0	24.6	49.5	-24.9	Horiz

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

Customer: **IP MobileNet**
 Specification: **FCC 15.109 Class A**
 Work Order #: **79827**
 Test Type: **Maximized emission**
 Equipment: **Base Station**
 Manufacturer: **IP Mobilenet**
 Model: **IP4B (HPV)**
 S/N: **0211001**

Date: 01/11/2003
 Time: 06:34:35
 Sequence#: 12
 Tested By: Eddie Wong

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Base Station*	IP Mobilenet	IP4B (HPV)	0211001

Support Devices:

Function	Manufacturer	Model #	S/N
Laptop	Gateway	Solo1045	0028365842
Power Supply	Samflex	SEC1223	03061-06272

Test Conditions / Notes:

EUT placed on the test bench. RS232 port is connected to Com 1 port of a support laptop. All 3 antenna ports terminated to 50 ohm load. The TX port is terminated to a 50 Watt, 50 ohm load. Serial port #2 left unpopulated. Ethernet port connected to a section of UTP and a loop back terminator. Mode: Receive mode. Tx 469 MHz, Rx 474 MHz, Inj Freq 429 MHz. Freq Range : 30 MHz – 6000 MHz. Frequency 30 MHz - 1000 MHz RBW=120 kHz, VBW=120 kHz; 1000 MHz - 6000 MHz RBW=1 MHz, VBW=1 MHz. 13.8 VDC (110Vac, 60Hz) 20°C, 45% relative humidity.

Transducer Legend:

T1=Cable #10 070803	T2=Cable 15 123002
T3=Log antenna, SN331 092303	T4=Bicon SN220 092303
T5=Preamp 8447D 082302	T6=Horn 6246_091003
T7=12' SMA Gore cable #1337 121603	T8=HP83017A Preamp 091103
T9=Brea Cable: 25' 1/4" Helix - Brea # 13.	T10=Brea Cable: 6' 1/4" Helix - Brea # 7.

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq	Rdng	T1 T5 T9	T2 T6 T10	T3 T7	T4 T8	Dist	Corr	Spec	Margin	Polar
	MHz	dBμV	dB	dB	dB	dB	Table	dBμV/m	dBμV/m	dB	Ant
1	44.226M	44.8	+0.1 -28.5 +0.0	+1.1 +0.0 +0.0	+0.0 +0.0	+13.4 +0.0	+0.0	30.9	39.1	-8.2	Vert
2	269.989M	36.5	+0.3 -28.2 +0.0	+3.0 +0.0 +0.0	+0.0 +0.0	+20.5 +0.0	+0.0	32.1	46.4	-14.3	Horiz
3	887.465M	28.6	+0.5 -27.4 +0.0	+5.8 +0.0 +0.0	+23.8 +0.0	+0.0 +0.0	+0.0	31.3	46.4	-15.1	Vert
4	334.221M	34.4	+0.3 -28.3 +0.0	+3.3 +0.0 +0.0	+20.5 +0.0	+0.0 +0.0	+0.0	30.2	46.4	-16.2	Horiz

5	333.300M	34.2	+0.3 -28.3 +0.0	+3.3 +0.0 +0.0	+20.6 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0	30.1	46.4	-16.3	Horiz
6	344.073M	34.6	+0.3 -28.3 +0.0	+3.4 +0.0 +0.0	+19.9 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0	29.9	46.4	-16.5	Horiz
7	331.782M	33.3	+0.3 -28.3 +0.0	+3.3 +0.0 +0.0	+20.7 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0	29.3	46.4	-17.1	Horiz
8	697.784M	29.3	+0.4 -27.4 +0.0	+5.0 +0.0 +0.0	+21.6 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0	28.9	46.4	-17.5	Vert
9	294.905M	30.5	+0.3 -28.3 +0.0	+3.1 +0.0 +0.0	+0.0 +0.0 +0.0	+22.5 +0.0 +0.0	+0.0	28.1	46.4	-18.3	Horiz
10	331.784M	31.9	+0.3 -28.3 +0.0	+3.3 +0.0 +0.0	+20.7 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0	27.9	46.4	-18.5	Vert
11	366.580M	33.1	+0.3 -28.3 +0.0	+3.5 +0.0 +0.0	+18.7 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0	27.3	46.4	-19.1	Horiz
12	324.386M	30.9	+0.3 -28.3 +0.0	+3.3 +0.0 +0.0	+21.1 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0	27.3	46.4	-19.1	Horiz
13	619.738M	29.2	+0.4 -27.6 +0.0	+4.6 +0.0 +0.0	+20.5 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0	27.1	46.4	-19.3	Vert
14	334.262M	31.2	+0.3 -28.3 +0.0	+3.3 +0.0 +0.0	+20.5 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0	27.0	46.4	-19.4	Vert
15	150.007M	32.1	+0.2 -28.4 +0.0	+2.2 +0.0 +0.0	+0.0 +0.0 +0.0	+17.8 +0.0 +0.0	+0.0	23.9	43.5	-19.6	Vert
16	258.056M	32.5	+0.3 -28.3 +0.0	+2.9 +0.0 +0.0	+0.0 +0.0 +0.0	+19.4 +0.0 +0.0	+0.0	26.8	46.4	-19.6	Horiz
17	533.300M	29.6	+0.4 -28.0 +0.0	+4.3 +0.0 +0.0	+19.9 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0	26.2	46.4	-20.2	Horiz
18	355.740M	31.3	+0.3 -28.3 +0.0	+3.4 +0.0 +0.0	+19.3 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0	26.0	46.4	-20.4	Vert
19	319.484M	29.3	+0.3 -28.3 +0.0	+3.2 +0.0 +0.0	+21.4 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0	25.9	46.4	-20.5	Vert
20	360.038M	31.4	+0.3 -28.3 +0.0	+3.4 +0.0 +0.0	+19.0 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0	25.8	46.4	-20.6	Horiz
21	486.606M	30.1	+0.4 -28.2 +0.0	+4.0 +0.0 +0.0	+19.4 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0	25.7	46.4	-20.7	Vert

22	295.996M	28.0	+0.3 -28.3 +0.0	+3.1 +0.0 +0.0	+0.0 +0.0 +0.0	+22.6 +0.0 +0.0	+0.0	25.7	46.4	-20.7	Vert
23	540.673M	28.7	+0.4 -27.9 +0.0	+4.3 +0.0 +0.0	+20.0 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0	25.5	46.4	-20.9	Vert
24	488.902M	29.7	+0.4 -28.1 +0.0	+4.0 +0.0 +0.0	+19.5 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0	25.5	46.4	-20.9	Vert
25	341.532M	29.9	+0.3 -28.3 +0.0	+3.4 +0.0 +0.0	+20.1 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0	25.4	46.4	-21.0	Horiz
26	360.600M	30.6	+0.3 -28.3 +0.0	+3.4 +0.0 +0.0	+19.0 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0	25.0	46.4	-21.4	Vert
27	350.970M	29.9	+0.3 -28.3 +0.0	+3.4 +0.0 +0.0	+19.5 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0	24.8	46.4	-21.6	Horiz
28	2532.360M	41.2	+0.0 +0.0 +2.6	+0.0 +28.5 +0.9	+0.0 +2.4 -37.9	+0.0 -10.0 -37.9	-10.0	27.7	49.5	-21.8	Vert
29	353.874M	29.8	+0.3 -28.3 +0.0	+3.4 +0.0 +0.0	+19.4 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0	24.6	46.4	-21.8	Vert
30	373.578M	30.6	+0.3 -28.3 +0.0	+3.5 +0.0 +0.0	+18.3 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0	24.4	46.4	-22.0	Horiz
31	383.360M	30.7	+0.3 -28.2 +0.0	+3.5 +0.0 +0.0	+17.8 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0	24.1	46.4	-22.3	Horiz
32	389.952M	30.7	+0.3 -28.2 +0.0	+3.6 +0.0 +0.0	+17.4 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0	23.8	46.4	-22.6	Horiz
33	394.720M	30.4	+0.3 -28.2 +0.0	+3.6 +0.0 +0.0	+17.2 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0	23.3	46.4	-23.1	Vert

Test Equipment

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Spectrum Analyzer	01865	HP	8566B	2532A02509	092702	092703
QP Adapter	01437	HP	85650A	3303A01884	092702	092703
9kHz-30MHz						
Loop Antenna	00314	EMCO	6502	2014	72302	72303
30 MHz-1000MHz						
Bicon Antenna	306	AH	SAS200/540	220	092302	092303
Log Periodic Antenna	300	AH	SAS 00/516	331	092302	092303
Pre-amp	00309	HP	8447D	1937A02548	082302	082303
Antenna cable	NA	NA	RG214	Cable#15	122001	122002
Pre-amp to SA cable	NA	Harbour	RG223/U	Cable#10	070802	070803
1000-6000MHz						
Horn Antenna	0849	EMCO	3115	6246	091002	091003
Microwave Pre-amp	00786	HP	83017A	3123A00281	091102	091103
¼" Helix Coaxial Cable	NA	Andrew	FSJ-50A-4	Cable#7 (6 ft)	071502	071503
Antenna cable (from bulkhead to antenna, high frequency hardline) (25ft)	NA	Andrew	FSJ1-50A	Cable#13	071502	071503
12' SMA Cable	01337	W.L.Gore	NA	244922	121801	121802
1.5 GHz HPF	2116	HP	84300-80037	3643A00027	062502	062503
12' SMA Cable	01337	W.L.Gore	NA	244922	121602	121603

RADIATED EMISSIONS



15.111 – ANTENNA POWER CONDUCTED EMISSIONS

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

Customer: **IP MobileNet**
 Specification: **FCC 15.111 Antenna Power Conduction limit for receiverC**
 Work Order #: **79827** Date: 01/09/2003
 Test Type: **Conducted Emissions** Time: 19:02:25
 Equipment: **Base Station** Sequence#: 4
 Manufacturer: IP Mobilenet Tested By: Eddie Wong
 Model: IP4B (HPV) 13.8Vdc
 S/N: 0211001

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Base Station*	IP Mobilenet	IP4B (HPV)	0211001

Support Devices:

Function	Manufacturer	Model #	S/N
Laptop	Gateway	Solo1045	0028365842
Power Supply	Radio Shack	22-510	NA

Test Conditions / Notes:

EUT placed on the test bench. RS232 port is connected to Com 1 port of a support laptop. Two of the three Rx antenna ports left blank. The TX port is terminated to a 100 Watt, 50 ohm load. The antenna port under evaluation is connected to a spectrum analyzer. The 13.8 VDC is obtained from a support power supply. Receive mode: RX antenna measured: Rx3. Tx 469 MHz, Rx 474 MHz, Inj Freq 429 MHz. Spec limit = 2 nW = 50 dBuV at antenna terminal. Freq Range: 9 kHz – 6000 MHz. Frequency 9 kHz - 150 kHz RBW=200 Hz, VBW=200 Hz; 150 kHz - 30 MHz RBW=9 kHz, VBW=9 kHz; 30 MHz - 1000 MHz RBW=120 kHz, VBW=120 kHz; 1000 MHz - 6000 MHz RBW=1 MHz, VBW=1 MHz. 13.8 VDC (110Vac, 60Hz) 20°C, 46% relative humidity.

Transducer Legend:

T1=Brea Cable: 6' 1/4" Helix - Brea # 7.
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Measurement Data: Reading listed by margin.

Test Lead: Antenna Terminal

#	Freq MHz	Rdng dBμV	T1 dB	dB	dB	dB	Dist Table	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar Ant
1	3288.940M	32.6	+0.9				+0.0	33.5	50.0	-16.5	Anten
2	1098.100M	30.2	+0.5				+0.0	30.7	50.0	-19.3	Anten
3	2558.600M	29.4	+1.0				+0.0	30.4	50.0	-19.6	Anten
4	1463.500M	29.2	+0.5				+0.0	29.7	50.0	-20.3	Anten

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

Customer: **IP MobileNet**
 Specification: **FCC 15.111 Antenna Power Conduction limit for receiverC**
 Work Order #: **79827** Date: 11/12/2002
 Test Type: **Conducted Emissions** Time: 11:00:28
 Equipment: **Base Station** Sequence#: 3
 Manufacturer: IP Mobilenet Tested By: Eddie Wong
 Model: IP4B (HPV) 13.8Vdc
 S/N: 0211002

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Base Station*	IP Mobilenet	IP4B (HPV)	0211002

Support Devices:

Function	Manufacturer	Model #	S/N
Laptop	Compaq	Presario	1V02DCH2E270
Power Supply	Samflex	SEC1223	03061-06272

Test Conditions / Notes:

EUT placed on the test bench. RS232 port is connected to Com 1 port of a support laptop. Two of the three Rx antenna ports left blank. The TX port is terminated to a 100 Watt, 50 ohm load. The antenna port under evaluation is connected to a spectrum analyzer. The 13.8 VDC is obtained from a support power supply. Receive mode : RX antenna measured: Rx3. Tx 457.5 MHz, Rx 460.5 MHz, Inj Freq 415.5 MHz. Spec limit = 2 nW = 50 dBuV at antenna terminal. Freq Range: 9 kHz – 6000 MHz. Frequency 9 kHz - 150 kHz RBW=200 Hz, VBW=200 Hz; 150 kHz- 30 MHz RBW=9 kHz, VBW=9 kHz; 30 MHz - 1000 MHz RBW=120 kHz, VBW=120 kHz; 1000 MHz - 6000 MHz RBW=1 MHz, VBW=1 MHz. 13.8 VDC (110Vac, 60Hz) 18°C, 61% relative humidity.

Transducer Legend:

T1=Brea Cable: 6' 1/4" Helix - Brea # 7.
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Measurement Data: Reading listed by margin. Test Lead: Antenna Terminal

#	Freq MHz	Rdng dBμV	T1 dB				Dist Table	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar Ant
1	1246.540M	32.9	+0.5				+0.0	33.4	50.0	-16.6	Anten
2	1670.900M	28.9	+0.6				+0.0	29.5	50.0	-20.5	Anten

15.111 Conducted Emissions at Antenna Terminal



Test Equipment

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
9kHz-1.5 GHz						
Spectrum Analyzer	01865	HP	8566B	2532A02509	092702	092703
QP Adapter	01437	HP	85650A	3303A01884	092702	092703
¼" Helix Coaxial Cable	NA	Andrew	FSJ-50A-4	Cable#7 (6 ft)	071502	071503
1.5 GHz-6 GHz						
1.5 GHz HPF	2116	HP	84300-80037	3643A00027	062502	062503