



**IP MOBILENET TEST REPORT**

**FOR THE**

**UHF BASE STATION, IP4 AND IP4B**

**FCC PART 90.210(C)**

**COMPLIANCE**

**DATE OF ISSUE: OCTOBER 24, 2002**

**PREPARED FOR:**

IP MobileNet  
16842 Von Karman Avenue Suite 200  
Irvine, CA 92606

P.O. No.: 002331-00  
W.O. No.: 79493

**PREPARED BY:**

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Date of test: October 21, 2002

**Report No.: FC02-092**

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## **ADMINISTRATIVE INFORMATION**

<b>DATE OF TEST:</b>	October 21, 2002
<b>DATE OF RECEIPT:</b>	October 21, 2002
<b>PURPOSE OF TEST:</b>	To demonstrate the compliance of the UHF Base Station, IP4 and IP4B with the requirements for FCC Part 90.210(c) devices.
<b>TEST METHOD:</b>	FCC Part 90.210(c)
<b>FREQUENCY RANGE TESTED:</b>	455 MHz – 3 GHz
<b>MANUFACTURER:</b>	IP MobileNet 16842 Von Karman Avenue Suite 200 Irvine, CA 92606
<b>REPRESENTATIVE:</b>	Bobby Amin
<b>TEST LOCATION:</b>	CKC Laboratories, Inc. 110 Olinda Place Brea, CA 92621

## SUMMARY OF RESULTS

As received, the IP MobileNet UHF Base Station, IP4 and IP4B was found to be fully compliant with the following standards and specifications:

### United States

- FCC Part 90.210(c)

## CONDITIONS FOR COMPLIANCE

No modifications to the EUT were necessary to comply.

## APPROVALS

### QUALITY ASSURANCE:

A handwritten signature in black ink, appearing to read "Steve Behm".

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Steve Behm, Director of Engineering Services

A handwritten signature in black ink, appearing to read "Joyce Walker".

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Joyce Walker, Quality Assurance Administrative Manager

A handwritten signature in black ink, appearing to read "Septimiu Apahidean".

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Septimiu Apahidean, EMC/Lab Manager

### TEST PERSONNEL:

A handwritten signature in black ink, appearing to read "Eddie Wong".

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Eddie Wong, EMC Engineer

## **EQUIPMENT UNDER TEST (EUT) DESCRIPTION**

The Mobile and Base Station for UHF tested by CKC Laboratories was representative of a production unit.

## **EQUIPMENT UNDER TEST**

### **UHF Base Station**

Manuf: IP Mobilenet  
Model: IP4B & IP4  
Serial: 0110004 & 4010306  
FCC ID: pending

## **PERIPHERAL DEVICES**

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

### **DC Power Supply**

Manuf: Samlex  
Model: Sec1223  
Serial: 0306-0D01-0638  
FCC ID: NA

### **Computer**

Manuf: Dell  
Model: TS30T  
Serial: 0004861P-12961-93B-0517  
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)(14)/2.1053/90.210(c)- FIELD STRENGTH OF SPURIOUS RADIATION**

**Test Conditions:** The EUT was placed on the wooden table. Transmitting antenna port was connected to a 50 watts, 50 Ohm load. Receiver antenna port was connected to a 50 ohm terminator. The EUT obtained DC power from a power supply placed under the table. RS232 port was connected to a remote laptop. The EUT transmitted at 40 watts, Tx freq = 455 MHz and Rx freq = 512 MHz. Emission limit =  $-43 + 10 \log(p) = 82.3$  dBuV/m @ 3 meter. Frequency range of measurement = 455 MHz - 3 GHz. Frequency 455 MHz - 1000 MHz, RBW 120 kHz, VBW 120 kHz; 1000 MHz - 3000 MHz, RBW 1 MHz, VBW 1 MHz. 12 VDC (110 VAC, 60 Hz), 19°C, 64% relative humidity.

Test method: Antenna substitution. Selected frequency points from spurious emission at the antenna terminal were evaluated using antenna substitution method. A measuring antenna connected to a spectrum analyzer was placed 3 meters away from the EUT. At the selected frequency, the emission was maximized by rotating the EUT along the vertical axis. Once the maximum emission was found, antenna height of the receiving antenna was varied from 1 – 4 meters. The maximum spurious emission from the EUT was recorded.

The EUT was then substituted with a transmitting antenna. A signal generator connected to the transmitting antenna sent CW to the measuring antenna. The measuring antenna height was then varied to locate the maximum field strength. At the maximum field strength antenna height, the RF level of the signal generator was varied to provide a received signal equivalent to the spurious field strength of the EUT. The RF output level of the signal generator was noted. The RF power at the antenna feed point was recorded with a spectrum analyzer to eliminate any influence cable loss.

To reference the recorded field strength level to a dipole antenna, the recorded power level at the antenna feed point was adjusted by adding antenna gain due to the construction of horn antenna used (antenna gain =  $20 \log(f) - \text{antenna factor} - 29.78$  ).

From the adjusted equivalent field strength, the power level was expressed in dBm. The power level was then compared to field strength of 40 watts (+46 dBm). The difference shall be at least  $46 + 10 \log(p) \text{ dB} = 43 + 10 \log(40) \text{ dB} = -59 \text{ dB}$ .

Four sets of EUTs were independently evaluated.

Set 1 : Mobile Station: Tx Freq = 455 MHz

Set 2 : Mobile station: Tx Freq = 512 MHz

Set 3 : Base Station: Tx Freq = 455 MHz

Set 4 : Base Station: Tx Freq = 512 MHz.

Result: From the attached data sheet, it was demonstrated that the ERP of the spurious emission has at least -87.22 dB (worst case) of attenuation from the transmit power of 40 Watts (46 dBm).

Transmit Power = 40 watts (46dBm)  
 Required  
 attenuation= =  $43+10\log 40 = -59\text{dB}$

**Mobile Station Tx=455MHz**

Freq	Polarity	Power at Tx ant	Horn antenna	Horn antenna	ERP after	ERP	Attenuation
MHz		feed point (dBuV)	factor	gain	correction (dBuV)	dBm	dB
1365.0	H	38.0	25.0	7.9	45.9	-61.07	-107.07
1819.9	H	35.3	27.0	8.4	43.7	-63.27	-109.27
2275.0	H	42.2	28.0	9.4	51.6	-55.43	-101.43
1364.8	V	42.0	25.0	7.9	49.9	-57.07	-103.07
1819.9	V	39.8	27.0	8.4	48.2	-58.77	-104.77
2274.9	V	41.9	28.0	9.4	51.3	-55.73	-101.73

**Mobile Station Tx=512MHz**

Freq	Polarity	Power at Tx ant	Horn antenna	Horn antenna	ERP after	ERP	Attenuation
MHz		feed point (dBuV)	factor	gain	correction (dBuV)	dBm	dB
3071.9	H	49.0	31.0	9.0	58.0	-49.02	-95.02
1023.9	H	48.5	25.0	5.4	53.9	-53.06	-99.06
1536.0	H	47.3	25.1	8.8	56.1	-50.84	-96.84
1023.8	V	50.5	25.0	5.4	55.9	-51.07	-97.07
1535.9	V	51.3	25.1	8.8	60.1	-46.84	-92.84
3071.9	V	56.8	31.0	9.0	65.8	-41.22	-87.22

**Base Station Tx=455MHz**

Freq	Polarity	Power at Tx ant	Horn antenna	Horn antenna	ERP after	ERP	Attenuation
MHz		feed point (dBuV)	factor	gain	correction (dBuV)	dBm	dB
1364.9	V	55.4	25.2	7.7	63.1	-43.87	-89.87
1819.9	V	44.3	27.0	8.4	52.7	-54.27	-100.27
1365.0	H	58.9	25.2	7.7	66.6	-40.37	-86.37
1819.9	H	41.1	27.0	8.4	49.5	-57.47	-103.47

**Base Station Tx=512MHz**

Freq	Polarity	Power at Tx ant	Horn antenna	Horn antenna	ERP after	ERP	Attenuation
MHz		feed point (dBuV)	factor	gain	correction (dBuV)	dBm	dB
1023.9	H	39.0	25.6	4.8	43.8	-63.16	-109.16
1535.9	H	33.8	25.1	8.8	42.6	-64.34	-110.34
4608.0	H	32.2	33.2	10.3	42.5	-64.50	-110.50
1023.9	V	46.8	25.6	4.8	51.6	-55.36	-101.36
1535.8	V	38.4	25.1	8.8	47.2	-59.74	-105.74
4607.9	V	42.4	33.2	10.3	52.7	-54.30	-100.30

**PHOTOGRAPH SHOWING RADIATED EMISSIONS**



Radiated Emissions - Front View - IP4



**PHOTOGRAPH SHOWING RADIATED EMISSIONS**



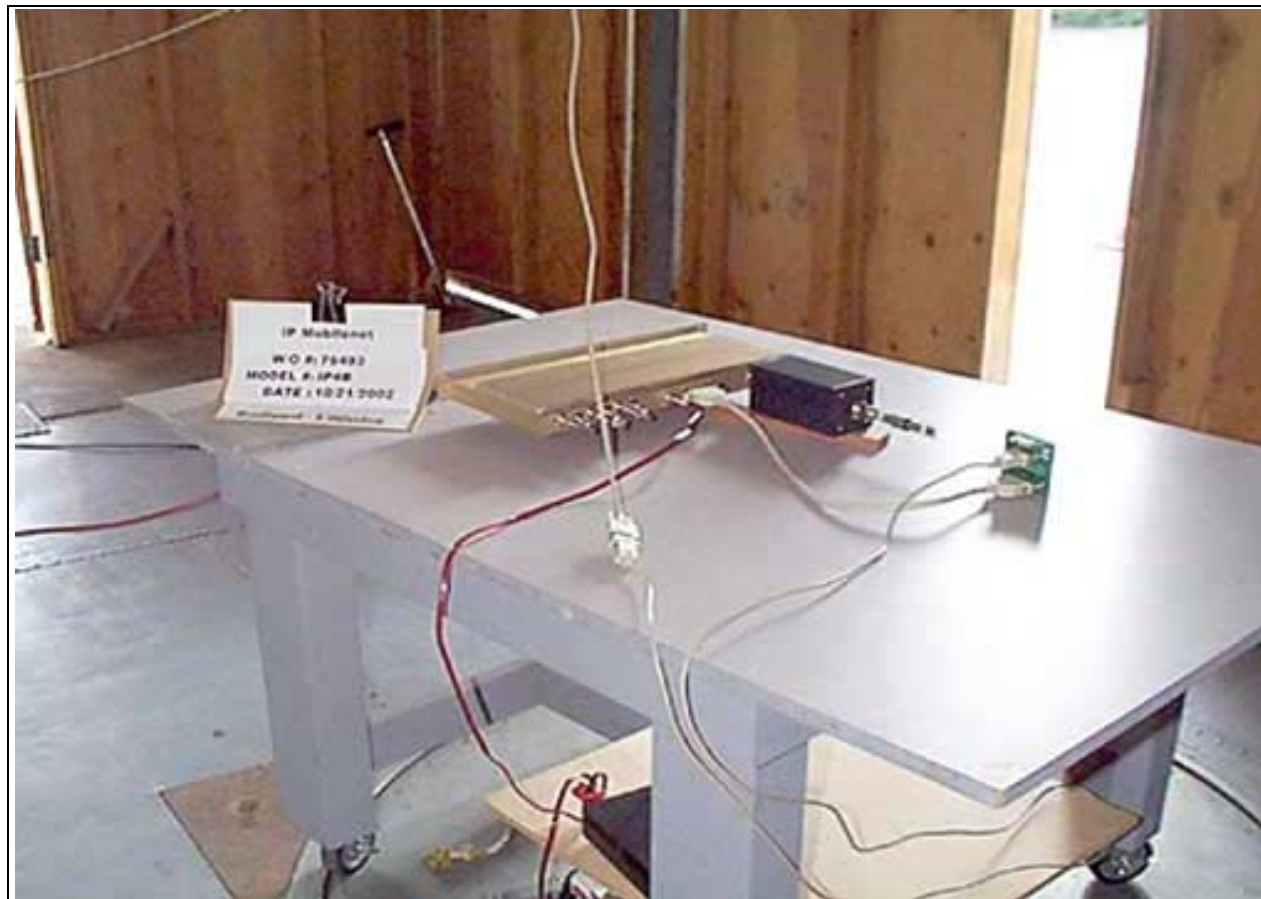
Radiated Emissions - Back View - IP4

**PHOTOGRAPH SHOWING RADIATED EMISSIONS**



Radiated Emissions - Front View - IP4B

## PHOTOGRAPH SHOWING RADIATED EMISSIONS



Radiated Emissions - Back View - IP4B

### 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
1-5 GHz						
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
Antenna cable (3 meter site D)	NA	Andrew	LDF1-50	Cable#20	091102	091103
Horn Antenna	01646	EMCO	3115	9603-4683	031902	031903
1-2.4 GHz						
Signal Generator	02227	Marconi	2024	112282/515	080602	080603
2.4-5GHz						
Signal Generator	NA	HP	8673M	253A00477	100402	100403