
# 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
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Irvine, CA 92606

P.O. No.: 002331-00
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Date of test: October 21, 2002

**Report No.: FC02-092**

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## ADMINISTRATIVE INFORMATION

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

Steve Behm, Director of Engineering Services

Joyce Walker, Quality Assurance Administrative Manager

Septimiu Apahidean, EMC/Lab Manager

**TEST PERSONNEL:**

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 fiend 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) –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) dB = 43 + 10 Log (40 ) dB = -59dB.

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+10Log 40 = -59dB

**Mobile Staion** **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

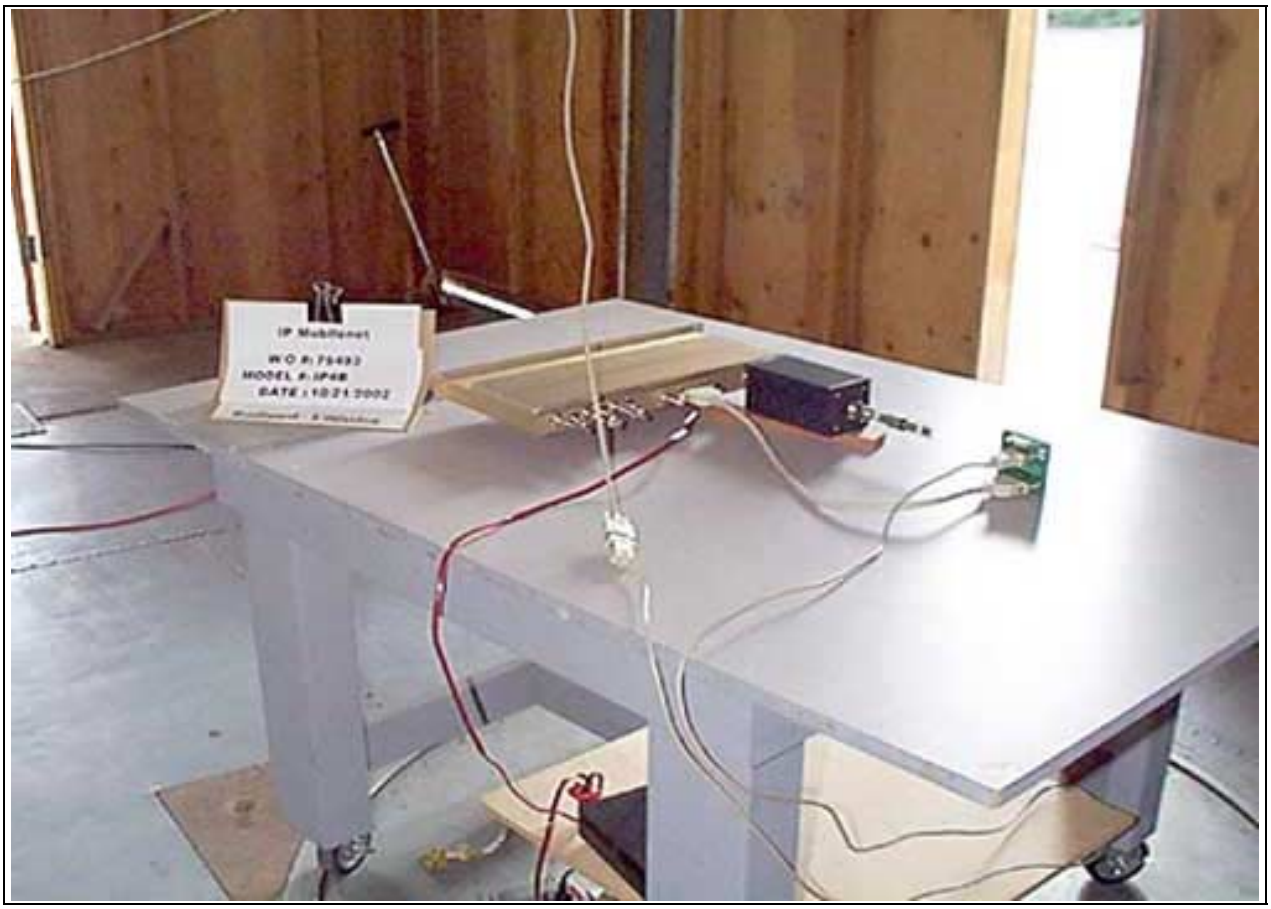
## PHOTOGRAPH SHOWING RADIATED EMISSIONS


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" Heliax 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 |