



**M. Flom Associates, Inc. - Global Compliance Center**

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ENVIRONMENTAL ASSESSMENT

for

MOBILES/FIXED BASE STATION

for

FCC ID: FCC ID: ATH2425326

Model:242-5326-201-AAAB

to

FEDERAL COMMUNICATIONS COMMISSION

47 CFR 1.1310 (MPE)

Radiofrequency Radiation Exposure Limits

DATE OF REPORT: September 3, 2002

ON THE BEHALF OF THE APPLICANT:

E. F. Johnson Company

AT THE REQUEST OF:

P.O. 160666 and 162136

E. F. Johnson Company,  
299 Johnson Ave.  
Waseca, MN 56093-0514

Attention of:

(507) 835-6579; FAX: -6666  
John Oblak, Director, Radio Products Development

SUPERVISED BY:

A handwritten signature in black ink, reading 'M. Flom P. Eng.' with a stylized, cursive-like script.

Morton Flom, P. Eng.

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*Required information per ISO/IEC Guide 25-1990, paragraph 13.2:*

- a) TEST REPORT (SUPPLEMENTAL)
- b) Laboratory: M. Flom Associates, Inc.  
(FCC: 31040/SIT) 3356 N. San Marcos Place, Suite 107  
(Canada: IC 2044) Chandler, AZ 85225
- c) Report Number: d0290005
- d) Client: E. F. Johnson Company,  
299 Johnson Ave.  
Waseca, MN 56093-0514
- e) Identification: 242-5326-201-AAAB  
FCC ID: ATH2425326  
Description: VHF Mobile Transceiver
- f) EUT Condition: Not required unless specified in individual tests.
- g) Report Date: September 3, 2002  
EUT Received: May 10, 2002
- h, j, k): As indicated in individual tests.
- i) Sampling method: No sampling procedure used.
- l) Uncertainty: In accordance with MFA internal quality manual.
- m) Supervised by:   
Morton Flom, P. Eng.
- n) Results: The results presented in this report relate only to the item tested.
- o) Reproduction: This report must not be reproduced, except in full, without written permission from this laboratory.

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IDENTIFICATION OF THE EQUIPMENT UNDER TEST (EUT)

NAME AND ADDRESS OF APPLICANT:

E. F. Johnson Company  
299 Johnson Ave.  
Waseca, MN 56093-0514

MANUFACTURER:

Unimo Technology Co. Ltd.  
480-12 Bangbae-Dong, Seocho-Gu  
Seoul 137-063, Korea

FCC ID: ATH2425326

MODEL NO: 242-5326-201-AAAB

DESCRIPTION: VHF Mobile Transceiver

TYPE OF EMISSION: 16K0F3E, 11K0F3E, 8K0F1E

FREQUENCY RANGE, MHz: 146 to 174

POWER RATING, Watts: 50 to 100  
Switchable x Variable    N/A

MODULATION:  
   AMPS  
   TDMA  
   CDMA  
x OTHER

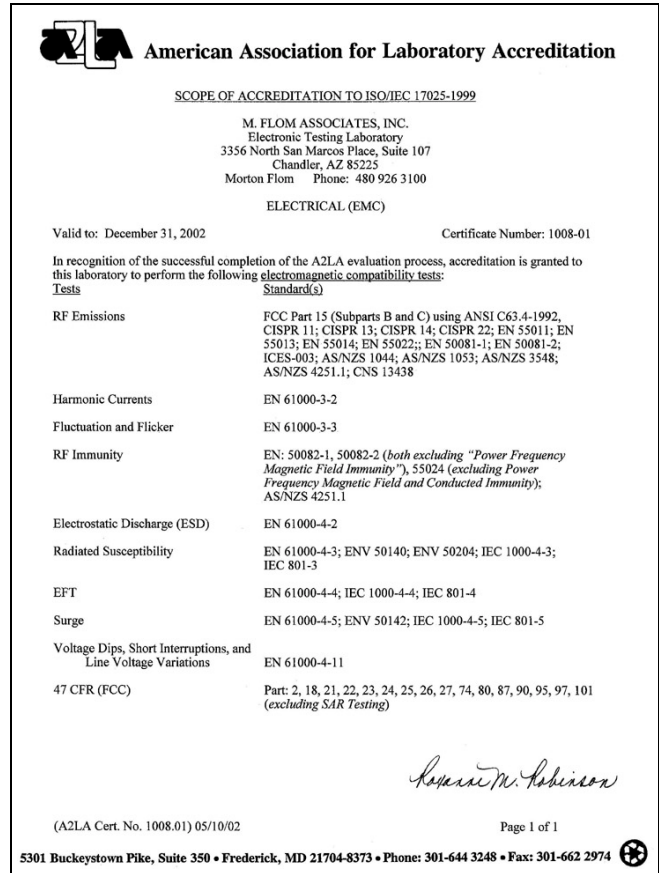
ANTENNA:  
   HELICAL  
   MONOPOLE  
   WHIP  
x OTHER

**NOTE: For RF Safety test antenna gain taken at the upper range of expected gain (i.e. 0 dBd) and RF Power set to highest nominal power across all channels.**

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M. Flom Associates, Inc. is accredited by the American Association for Laboratory Accreditation (A2LA) as shown in the scope below.



"This laboratory is accredited by the American Association for Laboratory Accreditation (A2LA) and the results shown in this report have been determined in accordance with the laboratory's terms of accreditation unless stated otherwise in the report."

Should this report contain any data for tests for which we are not accredited, or which have been undertaken by a subcontractor that is not A2LA accredited, such data would not covered by this laboratory's A2LA accreditation.

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STANDARD TEST CONDITIONS  
and  
ENGINEERING PRACTICES

Except as noted herein, the following conditions and procedures were observed during the testing:

In accordance with ANSI C63.4-1992/2000, section 6.1.9, and unless otherwise indicated in the specific measurement results, the ambient temperature of the actual EUT was maintained within the range of 10° to 40°C (50° to 104 °F) unless the particular equipment requirements specify testing over a different temperature range. Also, unless otherwise indicated, the humidity levels were in the range of 10% to 90% relative humidity.

Prior to testing, the EUT was tuned up in accordance with the manufacturer's alignment procedures. All external gain controls were maintained at the position of maximum and/or optimum gain throughout the testing.

Measurement results, unless otherwise noted, are worst case measurements.

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Name of test: Environmental Assessment

Specification: FCC: 47 CFR 1.1310

Measurement Guide: ANSI/IEEE C95.1 1992

Test Equipment: Maximum Permissible Exposure (MPE) measurement system, consisting of:  
Narda 8717-1174R, Radiation meter  
Narda 8761D, E-field probe (300 kHz - 3 GHz)  
(Calibrated Nov-98)

Measurement Procedure:

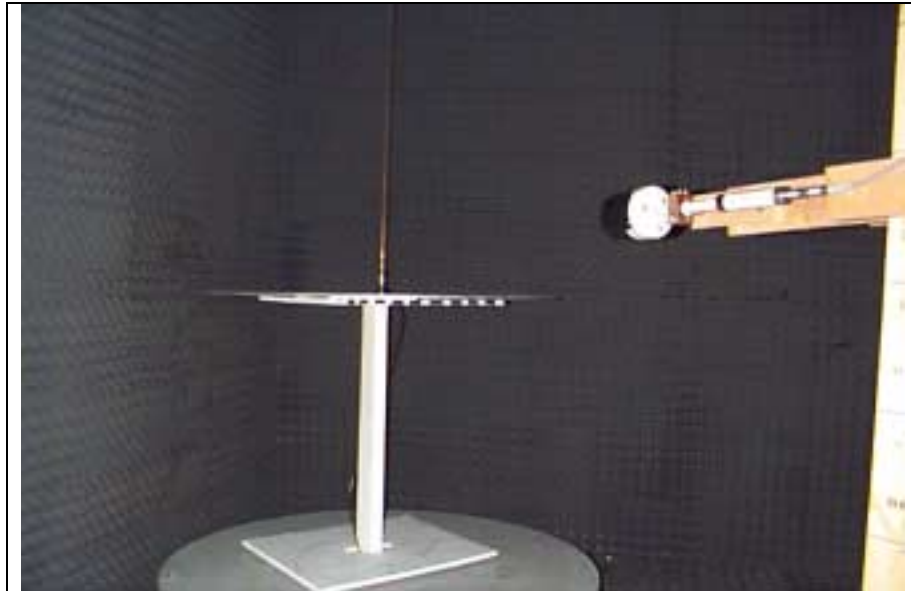
1. The following measurements were performed with a Narda probe using ANSI/IEEE C95.1 as a guide.
2. Prior to making any measurements, the measurements system was calibrated in accordance with the manufacturer's procedures.
3. The EUT's radiating element (antenna) was placed on a 1 m tall table for ease of testing. For equipment normally operated on a metal surface, a ground plane was used.
4. The remaining equipment necessary to operate the EUT was maintained at a distance from the measurement arrangement suitable to minimize interference with the measurements.
5. The minimum safe distance was calculated from the formula  $\text{Power Density} = \text{EIRP} / 4\pi R^2$  (Peak Watts/m<sup>2</sup>). The calculation is shown with the measurement data.
6. With the EUT operating at maximum power, a search was initiated for worst case emissions with the probe raised and lowered over a range of 0.2 to 2 meters in height and over a horizontal plane of 0° to 360°.
7. Average values were calculated for the whole body (0.2-2.0m), lower body (0.2-0.8m) and upper body (1.0-2.0m).

Results: Attached.

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TEST SETUP: Maximum Permissible Exposure (MPE)  
g0250148: 2002-May-16 Thu 13:52:40  
STATE: 0:General



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Name of test: R.F. Radiation Exposure

FCC Rules: 1.1307, 1.1310, 1.1311, 2.1091  
Description, EUT: See page 2 of Test Report

Test Frequency, MHz = 146.1  
Antenna Gain = 0 dBi  
Antenna Model ½ Wave

Rated Probe: Narda 8761D Probe = 10  $\mu\text{W}/\text{cm}^2$  to 20  $\text{mW}/\text{cm}^2$

|                      |                   |                                   |               |
|----------------------|-------------------|-----------------------------------|---------------|
| LIMITS: Uncontrolled | 0.3-1.234 MHz:    | Limit [ $\text{mW}/\text{cm}^2$ ] | = 100         |
| Exposure             | 1.34-30 MHz:      | Limit [ $\text{mW}/\text{cm}^2$ ] | = $(180/f^2)$ |
| 47 CFR 1.1310        | 30-300 MHz:       | Limit [ $\text{mW}/\text{cm}^2$ ] | = 0.2         |
| Table 1, (B)         | 300-1500 MHz:     | Limit [ $\text{mW}/\text{cm}^2$ ] | = $f/1500$    |
|                      | 1500-100,000 MHz: | Limit [ $\text{mW}/\text{cm}^2$ ] | = 1.0         |

Power, Conducted, W = 100  
Power + Ant. Gain, W = 100  
Limit: Uncontrolled Exposure = 0.2  $\text{mW}/\text{cm}^2$  (50% Duty Cycle)  
Tested Distance: 99 cm

| Results:           | Probe Height, m | Power Density, $\text{mW}/\text{cm}^2$ |
|--------------------|-----------------|----------------------------------------|
| at tested distance | 2.0             | 0.15                                   |
|                    | 1.8             | 0.16                                   |
|                    | 1.6             | 0.19                                   |
|                    | 1.4             | 0.18                                   |
|                    | 1.2             | 0.16                                   |
|                    | 1.0             | 0.11                                   |
|                    | 0.8             | 0.09                                   |
|                    | 0.6             | 0.04                                   |
|                    | 0.4             | 0.01                                   |
|                    | 0.2             | 0.01                                   |

Power Density Calculations: The measured power density readings were summed and the results divided by the number of readings to calculate the average.

|                 |                                                          |
|-----------------|----------------------------------------------------------|
| For whole body: | Average of 0.2 to 2.0 m, $\text{mW}/\text{cm}^2$ = 0.158 |
| For lower body: | Average of 0.2 to 0.8 m, $\text{mW}/\text{cm}^2$ = 0.038 |
| For upper body: | Average of 1.0 to 2.0 m, $\text{mW}/\text{cm}^2$ = 0.11  |

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Name of test: R.F. Radiation Exposure

FCC Rules: 1.1307, 1.1310, 1.1311, 2.1091  
Description, EUT: See page 2 of Test Report

Test Frequency, MHz = 160.1  
Antenna Gain = 0 dbi  
Antenna Model ½ Wave

Rated Probe: Narda 8761D Probe = 10  $\mu\text{W}/\text{cm}^2$  to 20  $\text{mW}/\text{cm}^2$

|                      |                   |                                 |               |
|----------------------|-------------------|---------------------------------|---------------|
| LIMITS: Uncontrolled | 0.3-1.234 MHz:    | Limit $[\text{mW}/\text{cm}^2]$ | = 100         |
| Exposure             | 1.34-30 MHz:      | Limit $[\text{mW}/\text{cm}^2]$ | = $(180/f^2)$ |
| 47 CFR 1.1310        | 30-300 MHz:       | Limit $[\text{mW}/\text{cm}^2]$ | = 0.2         |
| Table 1, (B)         | 300-1500 MHz:     | Limit $[\text{mW}/\text{cm}^2]$ | = $f/1500$    |
|                      | 1500-100,000 MHz: | Limit $[\text{mW}/\text{cm}^2]$ | = 1.0         |

Power, Conducted, W = 100  
Power + Ant. Gain, W = 100  
Limit: Uncontrolled Exposure = 0.2  $\text{mW}/\text{cm}^2$  (50% Duty Cycle)  
Tested Distance: 146 cm

| Results:           | Probe Height, m | Power Density, $\text{mW}/\text{cm}^2$ |
|--------------------|-----------------|----------------------------------------|
| at tested distance | 2.0             | 0.04                                   |
|                    | 1.8             | 0.08                                   |
|                    | 1.6             | 0.11                                   |
|                    | 1.4             | 0.16                                   |
|                    | 1.2             | 0.19                                   |
|                    | 1.0             | 0.19                                   |
|                    | 0.8             | 0.13                                   |
|                    | 0.6             | 0.10                                   |
|                    | 0.4             | 0.10                                   |
|                    | 0.2             | 0.07                                   |

Power Density Calculations: The measured power density readings were summed and the results divided by the number of readings to calculate the average.

|                 |                                                          |
|-----------------|----------------------------------------------------------|
| For whole body: | Average of 0.2 to 2.0 m, $\text{mW}/\text{cm}^2$ = 0.128 |
| For lower body: | Average of 0.2 to 0.8 m, $\text{mW}/\text{cm}^2$ = 0.083 |
| For upper body: | Average of 1.0 to 2.0 m, $\text{mW}/\text{cm}^2$ = 0.11  |

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Name of test: R.F. Radiation Exposure

FCC Rules: 1.1307, 1.1310, 1.1311, 2.1091  
Description, EUT: See page 2 of Test Report

Test Frequency, MHz = 173.9  
Antenna Gain = 0 dBi  
Antenna Model ½ Wave

Rated Probe: Narda 8761D Probe = 10  $\mu\text{W}/\text{cm}^2$  to 20  $\text{mW}/\text{cm}^2$

|                               |                   |                                                 |
|-------------------------------|-------------------|-------------------------------------------------|
| LIMITS: Uncontrolled Exposure | 0.3-1.234 MHz:    | Limit [ $\text{mW}/\text{cm}^2$ ] = 100         |
| 47 CFR 1.1310                 | 1.34-30 MHz:      | Limit [ $\text{mW}/\text{cm}^2$ ] = $(180/f^2)$ |
| Table 1, (B)                  | 30-300 MHz:       | Limit [ $\text{mW}/\text{cm}^2$ ] = 0.2         |
|                               | 300-1500 MHz:     | Limit [ $\text{mW}/\text{cm}^2$ ] = $f/1500$    |
|                               | 1500-100,000 MHz: | Limit [ $\text{mW}/\text{cm}^2$ ] = 1.0         |

Power, Conducted, W = 100  
Power + Ant. Gain, W = 100  
Limit: Uncontrolled Exposure = 0.2  $\text{mW}/\text{cm}^2$  (50% Duty Cycle)  
Tested Distance: 150 cm

| Results:<br>at tested distance | Probe Height, m | Power Density, $\text{mW}/\text{cm}^2$ |
|--------------------------------|-----------------|----------------------------------------|
|                                | 2.0             | 0.15                                   |
|                                | 1.8             | 0.18                                   |
|                                | 1.6             | 0.19                                   |
|                                | 1.4             | 0.15                                   |
|                                | 1.2             | 0.11                                   |
|                                | 1.0             | 0.09                                   |
|                                | 0.8             | 0.05                                   |
|                                | 0.6             | 0.04                                   |
|                                | 0.4             | 0.01                                   |
|                                | 0.2             | 0.01                                   |

Power Density Calculations: The measured power density readings were summed and the results divided by the number of readings to calculate the average.

|                 |                                                          |
|-----------------|----------------------------------------------------------|
| For whole body: | Average of 0.2 to 2.0 m, $\text{mW}/\text{cm}^2$ = 0.145 |
| For lower body: | Average of 0.2 to 0.8 m, $\text{mW}/\text{cm}^2$ = 0.028 |
| For upper body: | Average of 1.0 to 2.0 m, $\text{mW}/\text{cm}^2$ = 0.098 |

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Morton Flom, P. Eng.

**(The following will be placed in the Instruction Manual)**

**MANDATORY SAFETY INSTRUCTIONS TO INSTALLERS & USERS**

Use only manufacturer or dealer supplied antenna.

Antenna Minimum Safe Distance: 150 cm, 50% Duty Cycle.

Antenna Gain: zero dBd referenced to a dipole.

The Federal Communications Commission has adopted a safety standard for human exposure to RF (Radio Frequency) energy which is below the OSHA (Occupational Safety and Health Act) limits.

Antenna Mounting: The antenna supplied by the manufacturer or radio dealer must not be mounted at a location such that during radio transmission, any person or persons can come closer than the above indicated minimum safe distance to the antenna i.e. 150 cm, 50% Duty Cycle .

To comply with current FCC RF Exposure limits, the antenna must be installed at or exceeding the minimum safe distance shown above, and in accordance with the requirements of the antenna manufacturer or supplier.

Base Station Installation: The antenna should be fixed-mounted on an outdoor permanent structure. RF Exposure compliance must be addressed at the time of installation.

Antenna Substitution: Do not substitute any antenna for the one supplied or recommended by the manufacturer or radio dealer. You may be exposing person or persons to excess radio frequency radiation. You may contact your radio dealer or the manufacturer for further instructions.

WARNING: Maintain a separation distance from the antenna to a person(s) of at least 150 cm, 50% Duty Cycle .

You, as the qualified end-user of this radio device must control the exposure conditions of bystanders to ensure the minimum separation distance (above) is maintained between the antenna and nearby persons for satisfying RF Exposure compliance. The operation of this transmitter must satisfy the requirements of Occupational/Controlled Exposure Environment, for work-related use. Transmit only when person(s) are at least the minimum distance from the properly installed, externally mounted antenna.

TESTIMONIAL  
AND  
STATEMENT OF CERTIFICATION

THIS IS TO CERTIFY THAT:

1. THAT the application was prepared either by, or under the direct supervision of, the undersigned.
2. THAT the technical data supplied with the application was taken under my direction and supervision.
3. THAT the data was obtained on representative units, randomly selected.
4. THAT, to the best of my knowledge and belief, the facts set forth in the application and accompanying technical data are true and correct.

CERTIFYING ENGINEER:

  
Morton Flom, P. Eng.