FCC CFR47 PART 15 SUBPART C
INDUSTRY CANADA RSS-210
CERTIFICATION
TEST REPORT

FOR

MOBILE INTERNET LOCATION MGR

MODEL NUMBER: iLM3160-W / iLM3161-W / iL3164-W

FCC ID: PDC-ILM316X
IC ID: 5079A-ILM316X

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TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS 4

2. TEST METHODOLOGY 5

3. FACILITIES AND ACCREDITATION 5

4. CALIBRATION AND UNCERTAINTY 5

4.1. MEASURING INSTRUMENT CALIBRATION 5

4.2. MEASUREMENT UNCERTAINTY 5

5. EQUIPMENT UNDER TEST 6

5.1. DESCRIPTION OF EUT 6

5.2. RADIO MODULE APPROVAL CONDITIONS 6

6. LIMITS AND RESULTS 7

6.1. MAXIMUM PERMISSIBLE EXPOSURE 7

6.2. CO-LOCATED MAXIMUM PERMISSIBLE EXPOSURE 10

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: AT ROAD, INC.
47071 BAYSIDE PKWY
FREMONT, CA. 94538, USA

EUT DESCRIPTION: MOBILE INTERNET LOCATION MGR

MODEL: ILM3160-W / ILM3161-W / IL3164-W

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC PARTS 1 AND 2 OET BULLETIN 65	NO NON-COMPLIANCE NOTED
RSS-102	NO NON-COMPLIANCE NOTED

Compliance Certification Services, Inc. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by Compliance Certification Services and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Compliance Certification Services will constitute fraud and shall nullify the document. No part of this report may be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any government agency.

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2. TEST METHODOLOGY

The calculations documented in this report were performed in accordance with FCC CFR 47 Parts 1, 2, OET Bulletin 65, and RSS-102.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA.

CCS is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at http://www.ccsemc.com.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Power Line Conducted Emission	+/- 2.3 dB
Radiated Emission	+/- 3.4 dB

Uncertainty figures are valid to a confidence level of 95%.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The iLM3160-W / iLM3161-W / iL3164-W Internet Location Manager combines GPS with an EVDO wireless data modem to provide Mobile Resource Management information. The iLM3160-W / iLM3161-W / iL3164-W uses a CDMA 1xEV-DO Wireless Module that supports 3G Digital Cellular Standard and CDMA 1xRTT as well. iLM3160-W / iLM3161-W / iL3164-W also provides 802.11b connectivity between the field tech vehicle and any other 802.11b/g enabled peripheral (2.4GHz Direct Spread Spectrum 802.11b Access Point mode interoperable with WiFi/WECA clients).

5.2. RADIO MODULE APPROVAL CONDITIONS

The Cellular / PCS radio module is manufactured by Sierra Wireless (FCC ID: N7N-MC5725, IC: 2417C-MC5725), and the WLAN radio module is manufactured by Z-Com (FCC ID: M4Y-000325, IC: 5079A-IWM314XS).

6. LIMITS AND RESULTS

6.1. MAXIMUM PERMISSIBLE EXPOSURE

LIMITS

§1.1310 The criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in §1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of §2.1093 of this chapter.

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3–3.0	614	1.63	*(100)	6
3.0–30	1842/f	4.89/f	*(900/f^2)	6
30–300	61.4	0.163	1.0	6
300–1500			f/300	6
1500–100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f^2)	30

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)—Continued

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
30–300	27.5	0.073	0.2	30
300–1500			f/1500	30
1500–100,000			1.0	30

f = frequency in MHz
* = Plane-wave equivalent power density

NOTE 1 TO TABLE 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

NOTE 2 TO TABLE 1: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

CALCULATIONS

Given

$E = \sqrt{(30 * P * G)} / d$

and

$S = E ^ 2 / 3770$

where

E = Field Strength in Volts/meter
P = Power in Watts
G = Numeric antenna gain
d = Distance in meters
S = Power Density in milliwatts/square centimeter

Combining equations and rearranging the terms to express the distance as a function of the remaining variables yields:

$d = \sqrt{((30 * P * G) / (3770 * S))}$

Changing to units of Power to mW and Distance to cm, using:

P (mW) = P (W) / 1000 and
d (cm) =100 * d (m)

yields

$d = 100 * \sqrt{((30 * (P / 1000) * G) / (3770 * S))}$
$d = 0.282 * \sqrt{(P * G / S)}$

where

d = distance in cm
P = Power in mW
G = Numeric antenna gain
S = Power Density in mW/cm^2

Substituting the logarithmic form of power and gain using:

P (mW) = 10 ^ (P (dBm) / 10) and
G (numeric) = 10 ^ (G (dBi) / 10)

yields

$d = 0.282 * 10 ^ ((P + G) / 20) / \sqrt{S}$ Equation (1)

where

d = MPE distance in cm
P = Power in dBm
G = Antenna Gain in dBi
S = Power Density Limit in mW/cm^2

Equation (1) and the measured peak power is used to calculate the MPE distance.

RESULTS

No non-compliance noted:

Mode	MPE Distance (cm)	Output Power (dBm)	Antenna Gain (dBi)	FCC Power Density (mW/cm^2)	IC Power Density (W/m^2)
802.11b	20.0	18.15	1.70	0.02	0.19

Mode	MPE Distance (cm)	Output Power (dBm)	Antenna Gain (dBi)	FCC Power Density (mW/cm^2)	IC Power Density (W/m^2)
800 MHz Cellular	20.0	29.23	5.10	0.54	5.39
1900 MHz PCS	20.0	28.83	4.15	0.39	3.95

NOTE: For mobile or fixed location transmitters, the minimum separation distance is 20 cm, even if calculations indicate that the MPE distance would be less.

6.2. CO-LOCATED MAXIMUM PERMISSIBLE EXPOSURE

LIMITS

Per OTE Bulletin 65, for frequency bands with the same MPE limits, the Power Densities produced by each transmitter are summed. The summation must be under the limit for the band.

Per OTE Bulletin 65, for frequency bands with different limits the Power Densities are calculated separately for each band, divided by the limit for the band and the results are then summed. The summation must be less than 1.

RESULTS

No non-compliance noted:

Mode	MPE Distance (cm)	Output Power (dBm)	Antenna Gain (dBi)	FCC Power Density (mW/cm^2)	FCC Limit (mW/cm^2)	IC Power Density (mW/cm^2)	IC Limit (mW/cm^2)	FCC Fraction of Limit Dimensionless	IC Fraction of Limit Dimensionless
802.11b	20.0	18.15	1.70	0.02	1.00	0.19	10.00	0.02	0.02
800 MHz Cellular	20.0	29.23	5.10	0.54	0.55	5.39	5.50	0.98	0.98
Colocated								1.00	1.00

Mode	MPE Distance (cm)	Output Power (dBm)	Antenna Gain (dBi)	FCC Power Density (mW/cm^2)	FCC Limit (mW/cm^2)	IC Power Density (mW/cm^2)	IC Limit (mW/cm^2)
802.11b	20.0	18.15	1.70	0.02	1.00	0.19	10.00
1900 MHz PCS	20.0	28.83	4.15	0.39	1.00	3.95	10.00
Colocated				0.41	1.00	4.14	10.00

END OF REPORT

Mode	MPE Distance (cm)	Output Power (dBm)	Antenna Gain (dBi)	FCC Power Density (mW/cm^2)	FCC Limit (mW/cm^2)	IC Power Density (mW/cm^2)	IC Limit (mW/cm^2)	FCC Fraction of Limit Dimensionless	IC Fraction of Limit Dimensionless
802.11b	20.0	18.15	1.70	0.02	1.00	0.19	10.00	0.02	0.02
800 MHz Cellular	20.0	29.23	5.10	0.54	0.55	5.39	5.50	0.98	0.98
Colocated								1.00	1.00

Mode	MPE Distance (cm)	Output Power (dBm)	Antenna Gain (dBi)	FCC Power Density (mW/cm^2)	FCC Limit (mW/cm^2)	IC Power Density (mW/cm^2)	IC Limit (mW/cm^2)
802.11b	20.0	18.15	1.70	0.02	1.00	0.19	10.00
1900 MHz PCS	20.0	28.83	4.15	0.39	1.00	3.95	10.00
Colocated				0.41	1.00	4.14	10.00