MEASUREMENT/TECHNICAL REPORT

Intermec
Technologies Corporation
Norand Mobile Systems Division
EMC Test Laboratory

Intermec Technologies Corporation
Cellular Radio Module
OEM From RIM 902

REPORT NO: 990824-1

DATE: August 24 , 1999

This report concerns: Original Grant ___X___ Class II change _____	
Equipment Type: Cellular Radio Certified Under FCC Part 90	
Request issue of the grant immediately upon completion of review.	
Measurement procedure used: FCC Rules Part 1, 2 and OET Bulletin 65	
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This report contains data that is outside the NVLAP scope of accreditation.

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1.0 COMPLIANCE CERTIFICATION

The electromagnetic compatibility test and data evaluations findings of this report have been prepared by the Norand EMC Test Lab of Norand Corporation in accordance with applicable specifications instructions required per-

No Testing

The data, data evaluation and equipment configuration represented herein are a true and accurate representation of the measurements of the test sample's electromagnetic compatibility characteristics as of the dates and at the times of the test under the conditions herein specified. The data presented herein is traceable to the National Institute of Standards and Technology.

NVLAP®

Accredited by the National Institute of Standards and Technology, National Voluntary Laboratory Accreditation Program for the specific scope of accreditation under Lab Code 100269-0.

Intermec Technologies Corporation
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EMC Test Lab
550 Second Street SE
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_____ Date_____
Dave Fry mm/dd/yy
Regulatory Engineer II

_____ Date_____
Customer Product Rep. mm/dd/yy

_____
Print/Type Name and Position

The scope of accreditation at the EMC Test Lab is limited to NVLAP codes:
12/CIS22 IEC/CISPR 22:1993, Limits and methods of measurement of radio disturbance characteristics of information technology equipment.
12/F01 FCC Method - 47 CFR Part 15 - Digital Devices. **12/F01a** Conducted Emissions, Power Lines, 450 kHz to 30 MHz. **12/F01b** Radiated Emissions.
12/T51 AS/NZS 3548: Electromagnetic Interference - Limits and Methods of Measurement of Information Technology Equipment.

This report is not an endorsement of the tested product by NVLAP or any agency of the U.S. Government.

1.1 Measurement Uncertainties:

Not Applicable

2.0 GENERAL INFORMATION

2.1 Product Description

This report addresses the request for certification for a cellular modem radio module operating in the 896-901 MHz radio band. The RIM 902 radio will be used as a wireless LAN within various mobile tablet computers to communicate to mainframe computers or other terminal devices. Intermec Technologies Corporation is requesting a change of FCC ID to add an antenna to the conditional Grant issued by the FCC.

The RIM 902 radio is provided to Intermec Technologies Corp. by Research In Motion Ltd. (RIM) as an OEM radio. This radio has a conditional Grant issued to RIM under FCC ID: L6AR902M-2-O that lists 3 antennas approved for MPE evaluation. This report and FCC application is to address the MPE requirements for a new antenna used exclusively within Intermec tablet computers.

The radio remains unchanged from RIM and the regulatory requirements under FCC Part 90 are represented the original request for Grant submitted to the FCC by RIM.

This report shows the radio as a stand-alone module to allow the radio to be used within the entire family of tablet computers manufactured by Intermec. This 6600 family of tablet computers uses the same exterior shell. The options available change the processor, memory, display and peripheral interface options.

Intermec markets the 6600 series computers to users in the utilities industry for field service automation. As this radio is integrated within each tablet computer model, the digital emissions will be verified. The mobile computers that will interface to the RIM 902 radio are required to meet FCC Class B emissions. Digital emissions of the RIM 902 radio, when integrated within the tablet computer, will be tested to demonstrate compliance to the Class B requirements under the FCC Declaration of Conformity. The digital emissions concerns related to the RIM 902 radio integration will be addressed in separate reports.

The radio module shown herein is a production model. The remote antennas listed herein are production versions, only the one integral patch antenna is a prototype.

2.2 Related Submittal(s)/Grants(s)

RIM original FCC Grant FCC ID: L6AR902M-2-O Issued 07/07/1999

2.3 Systems Details

Model Part Number Serial Number	FCC ID:	Description	Cable Description
RIM 902 OEM PN N/A SN N/A	EHACWAN-RIM902	Cellular Wide Area Network Radio/Modem	N/A
Centurion MN CAF28766 Intermec PN 805-490-004	N/A	New Antenna -2.5 dBd Gain Local antenna for tablet computer	Internal tablet cable 1 foot long (0.2 dB loss)
Larsen NMO 3E 900B	N/A	Remote antenna 3 dBd Gain (currently approved)	6 foot (1 dB loss) RF cable
Austin 200160 500V	N/A	Remote Antenna 0 dBd Gain (currently approved)	6 foot (1 dB loss) RF cable
Andrew Eclipse II Magnet Mount	N/A	Remote Antenna 3 dBd Gain (currently approved)	6 foot (1 dB loss) RF cable

2.4 Test Methodology

FCC regulations regarding RF Exposure are addressed within the FCC Part 1, 2 and OET Bulletin 65. This report address the FCC requirements regarding adding an antenna to a new FCC grant request.

2.5 TEST FACILITY:

The location of the open area test site and conducted measurement facility used to collect the radiated data is 90 West Cemetery Road, Fairfax, Iowa 52228. This site has been fully described in a report dated; October 15, 1997, submitted to the Federal Communication Commission USA, and accepted in a letter dated February 6, 1998 (31040/SIT 1300F2) for ANSI C63.4: 1992 testing.

Test site complies with CISPR Publication 22: 1993, Clauses 10 and 11 for methods of measurements for radiated and conducted emissions testing.

The Industry Canada has received a description of the open area test site and finds it complies with RSP-100 Issue 7 section 3.3. Reference file number “IC1223”.

3.0 PRODUCT LABELING AND INFORMATION TO THE USER

3.1 PRODUCT LABELING

See label and label placement in appendix B

3.2 INFORMATION TO THE USER

The appendix E show the Declaration of Conformity inserts supplied and shipped with each tablet computer.

4.0 THEORIES OF OPERATION

Not Applicable

5.0 SCHEMATICS

Not Applicable

6.0 Antenna description, comparison and discussions regarding maximum permitted exposure (MPE).

ANTENNA DISCRIPTION

Intermec will be using an antenna that is not listed on the original grant approved for Research In Motion Ltd. (RIM) and a shorter cable, approximate 1 foot or 0.2 dB loss, between the antenna and radio. The antennas originally listed will continue to be used for remote antenna installations.

The additional antenna is a 7-inch (17.8-cm) long ½ wave end-fed whip dipole from Centurion part number (PN) CAF28766, Intermec PN 805-490-004. Unity Gain –2.5 dBd, VSWR 1.5:1, 50 Ohm. I am aware the RIM FCC approval is for cable lengths of 6 feet or 1 dB loss, however since we are specifying a new antenna that is lower in gain this will offset the power gain from the shorter cable.

ANTENNA COMPARISION

This table is included to show the characteristics of the new antenna versus those approved for the RIM radio under FCC ID: L6AR902M-2-O.

* = new antenna

Antenna Model	* Centurion CAF28766	Larsen NMO 3E 900B	Andrew Eclipse II
Gain	-2.5 dBd	3.2 dBd	3 dBd
Type	½ wave end fed	5/8 over ¼ wave	5/8 over ¼ wave
VSWR	1.5:1	1.5:1	1.9:1
Length	7 inches	13 ½ inches	14 inches
FCC listed minimum user distance	20 cm	27 cm	20 cm
Antenna cable loss	0.2 dB	1 dB	1 dB

REGULATIONS DISCUSSION

Our application is for approval of the radio as a module not tied to a specific tablet computer. The tablet computers referenced in this application will have the same exterior shell and antenna placements. The processing capability and options for memory, display and peripheral connection will change. If the radio is to be used in a tablet computer with substantially different antenna placement or case size, we will review the conditions for approval addressed herein and notify the FCC with a permissive change or request for new grant.

As shown in the reference photographs for use, see appendix D, when the tablet is used normally the antenna is 20-cm from the person. During placement of the tablet against the user, or being carried, the radio is enabled, however the transmitter is in standby. The cellular phone connection is maintained by a 2 mS (millisecond) ping once every 10 minutes in the standby state. This 2 mS transmission is well below the 30 minute time averaging maximum exposure period, regardless of the distance from the user the exposure would not exceed the time averaging limits in the FCC standard. As required the users manual compliance insert will address RF exposure by using the following statement:

WARNING: per the FCC RF exposure requirements, the user shall not touch the antenna while the transceiver is in use.

The end user can only initiate the transmitter for extended periods while the tablet is in the normal holding positions or in the dock, both of these conditions keep the user greater than 20 cm from the antenna. Since the normal usage transmission is the only concern, the user is protected by using the warning we will publish in the users guide and compliance insert.

These tablet computers are sold only to industrial users and not offered to the general public. The specification for approval should be considered for controlled, occupational environment, the user has specific knowledge that the operation of the terminal involves a transmitter. Under these conditions, the user is fully aware of the exposure from the antenna, and therefore to maximize the range and improve the quality of the data reception, the user will avoid interfering with the antenna during operation. The FCC should view the user similar to a HAM operator that has the same conditions for exposure limitations. HAM operation allows use of the controlled, occupational limits. The HAM operator is aware of the RF exposure and controls exposure to family members by conditions of antenna placement and prudent operation.

The use is still within residential locations, however the public exposure is extremely limited. Even when the restrictive public limit is used, the radio in this tablet computer exposes the user to minimal RF energy by virtue of the antenna placement and normal operating positions.