

**EMC MEASUREMENT/TECHNICAL REPORT
FOR PART 15.249 APPLICATION**

MANUFACTURER : Intermec Corp.
PRODUCT: MODEL 9735 Base Station

FCC ID: HN29735-900

October 19, 1999

This report concerns : (check one) Original grant <u> X </u> Class II change _____	
*Class B verification _____ Class A verification _____ **Class I change _____	
Equipment type: 900 MHz Transceiver	
Limits used: (check one)	
CISPR 22 <u> for digital emissions portion </u>	Part 15 <u> for RF portion </u>
Measurement procedure used is ANSI C63.4-1992 unless another is specified.	
Other test procedure: _____	
This report is based on the measurements on Model <u> 9735 </u> .	
EUT Serial number: <u> PBSAC-004 </u> .	
Report reviewed and approved by	
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Do not bind or staple this report. A horizontal rubber band plus paper clip at top of document is preferred.
**Not to be filed with Equipment Authorization Branch of FCC unless requested.*

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1 GENERAL INFORMATION

1.1 Summary of Test Results

Model 9735 was tested to the requirements of Part 15.249 of the FCC Rules for 900 MHz band transceivers to verify its compliance. As can be seen in section 6 of this report, the product passed all tests with comfortable margins beyond test instrument tolerances.

1.2 Product Description

Model 9735 is a base station with a 900 MHz transceiver. It relays the barcode information received from the wireless scanners to a host device either via RS232 or via keyboard input. The transceiver uses one of the 10 channels in the 906 – 910 MHz band with a ~ -10 dBm output power. Detailed pictures of the product and the circuit boards are attached in the attachments. Power level, frequency range and channel characteristics are **not** user adjustable.

1.3 Antenna

A $\frac{1}{4}$ -wave dipole antenna is hardwired to the output of the transceiver and covered by a plastic enclosure as shown in the attached antenna and product drawings so that it cannot be replaced by the users.

1.4 Class A Justification

Intermec serves industrial customers such as warehouses, factories, storage facilities etc. Since this product will be used in similar environments for inventory control and not in residential environments it falls under Part 15 Class A for digital emissions.

1.5 Related Submittal(s)/Grant(s)

An application for the second component of the wireless scanner system, Model 1802 Wireless Scanner, which uses the same transceiver circuit, has been made under FCC ID: HN21802-900.

2 Test Conditions

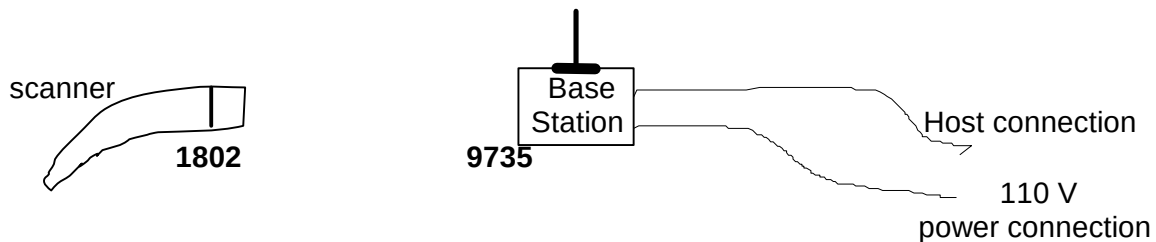
2.1 Tested System Details

The product was put into transmit modes. To achieve worst case conditions for the radiated emissions, different product position per ANSI C63.4 were tried.

Accessories:

Model Number (Serial Number)	FCC ID	Description	Connection
W1505	N.A.	DC Power Supply	Barrell Connector

2.2 Block Diagram of Tested System



2.3 Test Methodology

Digital emissions tests were performed according to the procedures in ANSI C63.4-1992. For radio performance tests procedures given in Part 15 (paragraphs 109, 247, 205, 209) and described in "Test Procedure Hints", published by Authorization and Evaluation Division.

2.4 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is in Intermec Corp. facilities at 6001 36th Ave. W Everett, WA 98203. This site has been fully described in a report dated 25 Feb. 94 submitted to your office, and accepted in a letter dated May 24, 1994 (31040/SIT). Latest continued compliance report for the OATS site was submitted to FCC in June 1999.

2.5 Test Summary

Specification Paragraph	Description	Test Data Section	Status
15.207	Powerline Conducted RFI	5.3	Passed
15.109	Radiated Emissions	5.2.1	Passed
15.249	Maximum Peak Output Power	5.1	Passed
15.249	Radiated Spurious Emissions (Transmit)	5.2.2	Passed
15.249	Radiated Spurious Emissions (Receive)	5.2.3	Passed

2.6 Environmental Conditions

All tests were performed at Intermec test facilities under following conditions:

Temperature: ambient (10 °C to 25 °C)

Humidity: 50% to 80%

Altitude: 550 ft

3 PRODUCT LABELING

3.1 Location of Label on EUT

The below shown label will be affixed to the bottom of the product.

3.2.1 FCC ID Label for Model 9735



4 TEST EQUIPMENT

4.1 Test Equipment

Type	Manufacturer/ Model No.	Serial No.	Last Cal.	Cal. Interval
Spectrum Analyzer/ EMI Receiver	Rohde & Schwartz ESMI 100Hz - 26.5 GHz	DE11220	12/29/98	1 year
Biconical Antenna	EMCO 3110B	1412	6/15/99	1 year
Horn Antenna	EMCO 3115	3720	6/17/99	2 years
Preamplifier	HP8447F	2944A03597	1/25/99	1 year

4.2 Accessories

All accessories used at Intermec OATS and EMC Lab such as cables, attenuators, filters etc. are measured in predetermined intervals and their loss factors are recorded for adjustment of measured values.

5 TEST DATA AND RESULTS

5.1 Maximum Peak Power

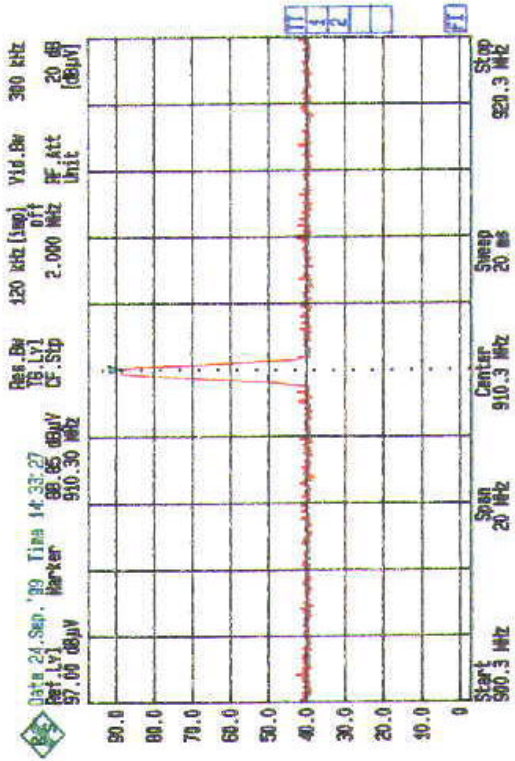
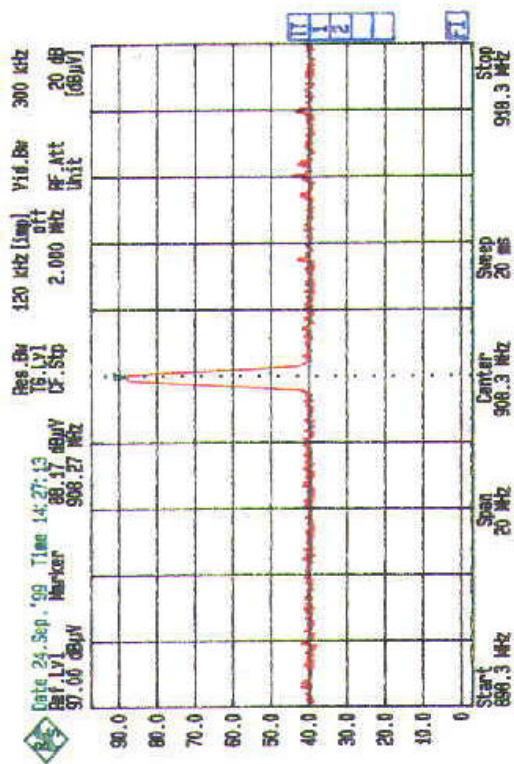
5.1.1 Procedure

The EUT was put into continuous transmit mode in three channels (low, medium and high). The analyzer was set to 20 MHz span, 120 kHz RBW and VBW and the peak power measurement was made at 3 m.

Cable and connection losses and antenna factors were factored in the analyzer measurement.

5.1.2 Results

As can be seen on the plots on the following page The highest value measured was 88.85 dB μ V/m which is approximately 5 dB lower than the 94 dB μ V/m limit set by Part 15.249.



5 TEST DATA AND RESULTS (continued)

5.2 Radiated Emissions

5.2.1 Unintentional Radiated Emissions

5.2.1.1 Procedure

The EUT was put into communications mode with the scanner, where it received barcode data and transmitted confirmation to the scanner mode. The emi receiver was set to CISPR 22 measurement setups with 120 kHz resolution bandwidth and 120 kHz video bandwidth. The EUT was first put through prescan to find maximum emissions, where antenna height, turntable azimuth and cabling were changed. Once worst case emissions were found, QP readings were obtained for the final list. The measurements were made in both RS232 and keyboard wedge operating modes and worst case results listed. Cable and connection losses and antenna factors were factored in the receiver measurement.

5.2.1.2 Results

As can be seen in the following table, the worst case emission was 7.79 dB under the CISPR 22 Class B limit. The EUT complied with the requirements for Class A unintentional emissions.

Base Station Unintentional Emissions

Frequency (MHz)	Peak (dBuV/m)	QP (dBuV/m)	Loss/Gain (dB)(*)	Limit (dBuV/m)	Margin (dB)	Angle (°)	Ant. Ht. (m)	Polar.
132.7	35.91	30.73	18.7	40	9.27	115	1	Horizon.
160.4	44.60	31.97	18.9	40	8.03	65	1	Horizon.
164.4	37.18	30.81	19.0	40	9.19	70	1	Horizon.
166.3	35.46	32.21	19.0	40	7.79	55	1.25	Horizon.
168.3	35.46	31.11	19.1	40	8.89	65	1.5	Horizon.
196.24	35.15	24.21	20.2	40	15.79	120	1.5	Horizon.
202.25	36.50	30.55	20.2	40	9.45	155	1	Horizon.
228.4	34.47	31.40	20.5	40	8.6	135	1	Horizon.
118.5	38.10	31.75	18.1	40	8.25	90	1.25	Vertical
124.1	35.15	30.21	18.1	40	9.79	100	1.5	Vertical
180.48	37.39	30.27	19.4	40	9.73	25	1.5	Vertical
197.33	33.53	29.15	20.2	40	10.85	110	1	Vertical

(*) already factored in the QP reading

5 TEST DATA AND RESULTS (continued)

5.2 Radiated Emissions

5.2.2 Spurious Radiated Emissions (Transmit Mode)

5.2.2.1 Procedure

The EUT was put into a continuous transmit mode. The analyzer was set with 1 MHz resolution bandwidth and 1 MHz video bandwidth. Harmonics and other spurious emissions were measured at 1 m distance, then the reading adjusted by 10 dB for the distance. To get the highest emission, antenna height, turntable azimuth and cable position were maximized for each reading. No external attenuator was used. Cable losses were automatically compensated by the analyzer. The same procedure was repeated for three different channels (low, medium and high) to cover the transmit range.

5.2.2.2 Results

As can be seen on the following table, all measurements were below the limits required by Part 15.249 (54 dB μ V/m). In fact only one harmonic was detected above the noise threshold.

Low Channel Spurious Emissions (Tx)

Frequency (MHz)	Peak (dBuV/m)	Avg. (dBuV/m)	Loss/Gain (dB)	Limit (dBuV/m)	Margin (dB)	Angle (°)	Ant. Ht. (m)	Polar.
1813.4	42.32	35.18	26.1	54	18.82	10	1	Vertical

Medium Channel Spurious Emissions (Tx)

Frequency (MHz)	Peak (dBuV/m)	Avg. (dBuV/m)	Loss/Gain (dB)	Limit (dBuV/m)	Margin (dB)	Angle (°)	Ant. Ht. (m)	Polar.
1816.6	41.10	34.92	26.1	54	19.08	45	1	Vertical

High Channel Spurious Emissions (Tx)

Frequency (MHz)	Peak (dBuV/m)	Avg. (dBuV/m)	Loss/Gain (dB)	Limit (dBuV/m)	Margin (dB)	Angle (°)	Ant. Ht. (m)	Polar.
1820.6	42.15	35.05	26.1	54	18.95	25	1	Vertical

5.2.3 Spurious Radiated Emissions (Receive Mode)

5.2.3.1 Procedure

The EUT was put into a continuous receive mode. The analyzer was set with 1 MHz resolution bandwidth and 1 MHz video bandwidth. Local oscillator harmonics and other spurious emissions were measured at 1 m distance, then the reading adjusted by 10 dB for the distance. To get the highest emission, antenna height, turntable azimuth and unit position were maximized for each reading. No external attenuator was used. Cable losses were automatically compensated by the analyzer. The same procedure was repeated for three different channels (low, medium and high) to cover the full band.

5.2.3.2 Results

As can be seen on the following table, all measurements were below the limits required by Part 15.249 (54 dB μ V/m). In fact only the LO signal was detected above the noise threshold.

Low Channel Spurious Emissions (Rx)

Frequency (MHz)	Peak (dBuV/m)	Avg. (dBuV/m)	Loss/Gain (dB)	Limit (dBuV/m)	Margin (dB)	Angle (°)	Ant. Ht. (m)	Polar.
896.1	32.65	29.57	10.7	54	24.43	15	1	Vertical

Medium Channel Spurious Emissions (Rx)

Frequency (MHz)	Peak (dBuV/m)	Avg. (dBuV/m)	Loss/Gain (dB)	Limit (dBuV/m)	Margin (dB)	Angle (°)	Ant. Ht. (m)	Polar.
897.7	32.22	30.08	10.7	54	23.92	25	1	Vertical

High Channel Spurious Emissions (Rx)

Frequency (MHz)	Peak (dBuV/m)	Avg. (dBuV/m)	Loss/Gain (dB)	Limit (dBuV/m)	Margin (dB)	Angle (°)	Ant. Ht. (m)	Polar.
899.7	31.78	29.03	10.8	54	24.97	80	1	Vertical

5.3 Conducted Powerline Emissions

5.3.1 Procedure

The EUT was put into communications mode with the scanner, where it received barcode data and transmitted confirmation to the scanner mode. The emi receiver was set to CISPR 22 powerline conducted emissions measurement setups with 9 kHz resolution bandwidth and 9 kHz video bandwidth. The emissions were measured through a LISN. The measurements were made in both RS232 and keyboard wedge operating modes and worst case results listed. Cable and connection losses and antenna factors were factored in the receiver measurement.

5.3.2 Results

As can be seen in the following table, the worst case peak emission was 7.89 dB under the CISPR 22 Class A QP limit. The EUT complied with the requirements for Class A unintentional emissions.

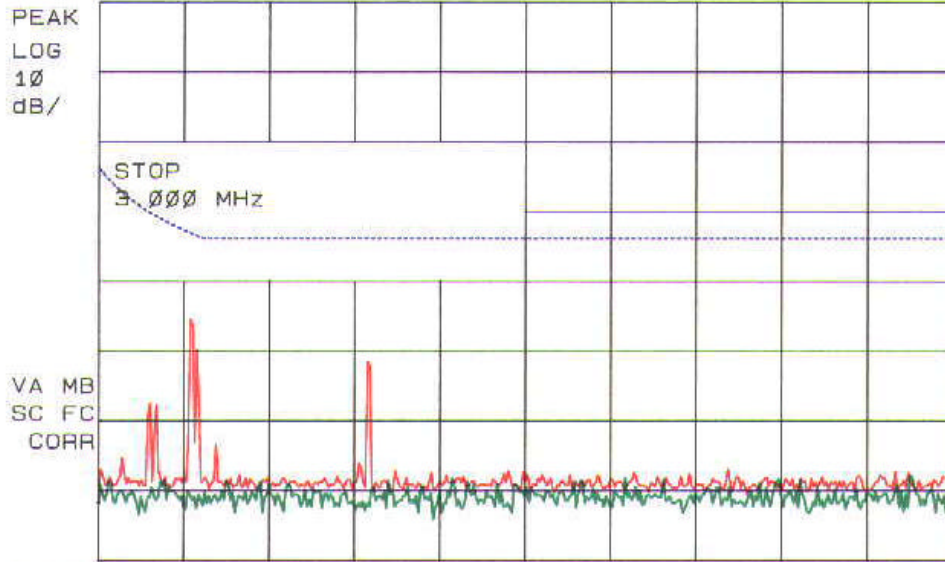
Line	Frequency (MHz)	Peak Level (dBmV)	QP -Level (dBmV)	Avg. Level (dBmV)	Limit (*) (dBmV)
Neutral	0.558	38.53	28.29	14.15	46
Neutral	2.070	40.21	26.89	20.64	46
Neutral	2.282	34.82	24.32	18.23	46
Neutral	2.753	38.54	23.57	19.34	46
Hot	0.330	33.46	22.47	13.92	48.9
Hot	0.455	43.97	31.18	22.97	46.5
Hot	1.086	38.81	23.42	12.45	46

(*) Limits for Average measurements

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12:39:24 14 OCT 1999

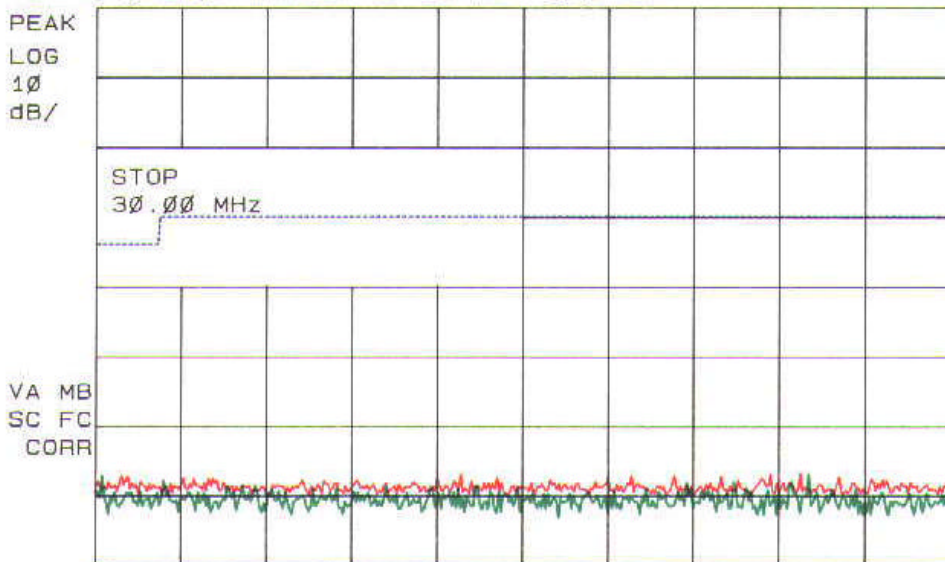
REF 90.0 dB μ V #ATTEN 10 dB PG -10.0 dB



START 150 kHz #RES BW 9.0 kHz VBW 30 kHz STOP 3.000 MHz SWP 106 msec

12:40:56 14 OCT 1999

REF 90.0 dB μ V #ATTEN 10 dB PG -10.0 dB



START 3.00 MHz #RES BW 9.0 kHz VBW 30 kHz STOP 30.00 MHz SWP 1.00 sec

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