EMC MEASUREMENT/TECHNICAL REPORT
FOR PART 15.249 APPLICATION

MANUFACTURER : Intermec Corp.
PRODUCT: *MODEL 1802 Wireless Scanner*

FCC ID: *HN21802-900*

October 19, 1999

This report concerns : *(check one)* Original grant___**X**___ Class II change _____

*Class B verification_____ Class A verification_____ **Class I change_____

Equipment type: **900 MHz Transceiver**

Limits used: *(check one)*

CISPR 22 __**for digital emissions portion** Part 15 __**for RF portion**

Measurement procedure used is ANSI C63.4-1992 unless another is specified.

Other test procedure: _____

This report is based on the measurements on Model __**1802**___.

EUT Serial number: _**PBSAC-002**___.

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.*

Table of Contents

1 GENERAL INFORMATION

1.1 Summary of Test Results

Model 1802 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 1802 is a barcode scanner with a 900 MHz transceiver to relay the barcode information through a base station to a host device. It has two configurations 1802 SR has a laser scan engine and 1802 ST has a CCD scanner. They both use the same transceiver module, which 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 section 7. Power level, frequency range and channel characteristics are **not** user adjustable.

1.3 Antenna

A wire antenna is hardwired to the output of the transceiver and fastened inside the plastic enclosure as shown in the attached antenna and product drawings.

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 9735 Base Station, which uses the same transceiver, has been made under FCC ID: HN29735-900.

2 Test Conditions

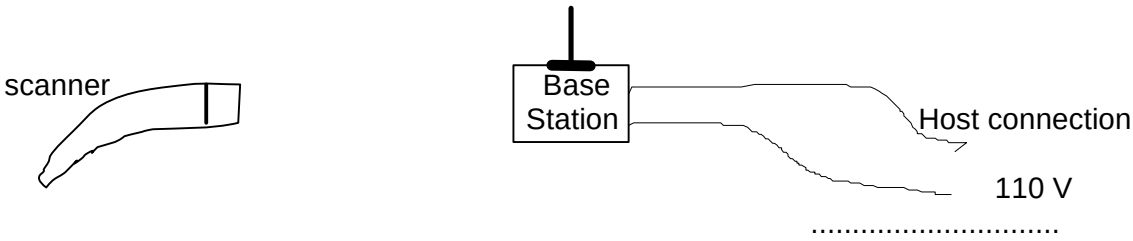
2.1 Tested System Details

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
N.A.	N.A.	N.A.	N.A

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	N/A	N/A
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 side of the product.

3.2.1 FCC ID Label for Model 1802

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

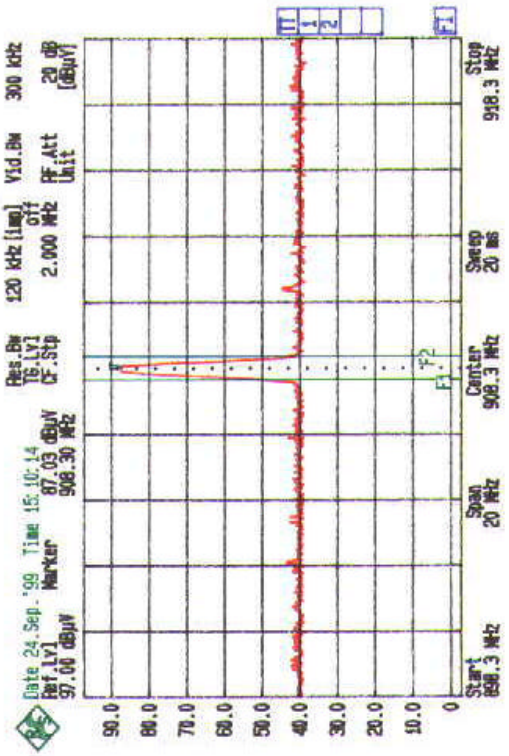
The EUT was put into continuous transmit mode in three channels (low, medium and high). The analyzer was set to 20 MHz span, 120 kHz RBW and VBW and the peak power measurement was made at 3 m.
Cable and connection losses and antenna factors were factored in the analyzer measurement.

5.1.2 Results

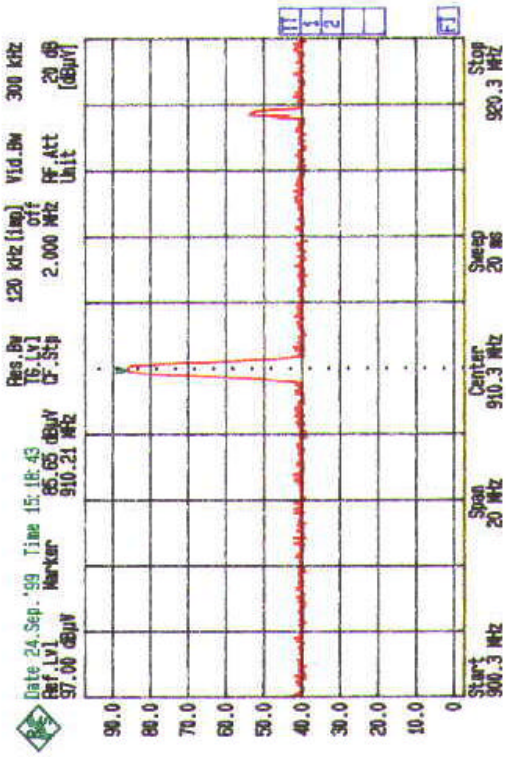
As can be seen on the plots on the following page The highest value measured was 87.03 dBµV/m which is approximately 7 dB lower than the 94 dBµV/m limit set by Part 15.249.

Model 1802 Carrier Measurement

Low Channel



Medium Channel



High Channel

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 scan and transmit 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 EUT position were changed. Once worst case emissions were found, QP readings were obtained for the final list. 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 9.03 dB under the CISPR 22 Class B limit. The EUT complied with the requirements for Class A unintentional emissions.

Laser Scanner Unintentional Emissions

Frequency (MHz)	**Peak** (dBuV/m)	**QP** (dBuV/m)	**Loss/Gain** (dB)	**Limit** (dBuV/m)	**Margin** (dB)	**Angle** (°)	**Ant. Ht.** (m)	**Polar.**
120.8	35.10	29.81	18.1	40	**10.19**	115	1	Horizon.
125.6	39.39	29.37	18.1	40	**10.63**	115	1	Horizon.
177.4	34.90	30.97	19.2	40	**9.03**	170	1	Horizon.
440.9	40.11	34.67	21.7	47	**12.33**	100	1.5	Vertical
535.6	42.19	34.70	21.2	47	**12.3**	25	1.5	Vertical
804.8	46.30	36.49	18.6	47	**10.51**	110	1	Vertical

CCD Scanner Unintentional Emissions

Frequency (MHz)	**Peak** (dBuV/m)	**QP** (dBuV/m)	**Loss/Gain** (dB)	**Limit** (dBuV/m)	**Margin** (dB)	**Angle** (°)	**Ant. Ht.** (m)	**Polar.**
120.8	34.03	27.43	18.1	40	**12.57**	115	1	Horizon.
122.6	36.92	28.13	18.1	40	**11.87**	105	1	Horizon.
177.4	32.10	29.02	19.2	40	**10.98**	170	1	Horizon.
440.9	41.34	34.15	21.7	47	**12.85**	100	1.5	Vertical
535.6	42.21	33.42	21.2	47	**13.58**	130	1.5	Vertical

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 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 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 dBµV/m). In fact only two harmonics were 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	45.10	40.54	26.1	54	**13.46**	115	1	Horizon.
2720.1	41.32	36.49	28.7	54	**17.51**	110	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	44.10	38.97	26.1	54	**15.03**	115	1	Horizon.
2724.9	40.21	35.12	28.7	54	**18.88**	125	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	42.33	39.85	26.1	54	**14.15**	110	1	Horizon.
2730.9	39.78	36.05	28.7	54	**17.95**	115	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 dBµV/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	38.85	36.65	10.7	54	**17.35**	65	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	38.21	35.08	10.7	54	**18.92**	75	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	37.78	34.05	10.8	54	**19.95**	55	1	Vertical