Intermec Technologies Corporation

Bluetooth (8520-00080) in 6820 printer

Test Report

July 01, 2004

Report No. ITRM0026.4

Report Prepared By:

NORTHWEST EMC

www.nwemc.com
1-888-EMI-CERT

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NORTHWEST EMC

22975 NW Evergreen Parkway
Suite 400
Hillsboro, Oregon 97124

Certificate of Test

Issue Date: July 01, 2004
Intermec Technologies Corporation
Model: Bluetooth (8520-00080) in 6820 printer

Emissions			
Specification	**Test Method**	**Pass**	**Fail**
FCC 15.207 AC Powerline Conducted Emissions:2003	ANSI C63.4:2001	☒	☐
FCC 15.247(a) Occupied Bandwidth:2003	ANSI C63.4:2001	☒	☐
FCC 15.247(b) Output Power:2003	ANSI C63.4:2001	☒	☐
FCC 15.247(c) Band Edge Compliance:2003	ANSI C63.4:2001	☒	☐
FCC 15.247(c) Spurious Conducted Emissions:2003	ANSI C63.4:2001	☒	☐
FCC 15.247(c) Spurious Radiated Emissions:2003	ANSI C63.4:2001	☒	☐
FCC 15.247(d) Power Spectral Density:2003	ANSI C63.4:2001	☒	☐

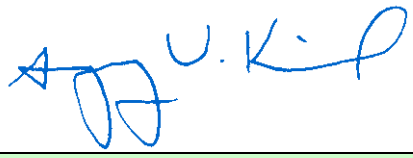
Modifications made to the product

See the Modifications section of this report

Test Facility

- The measurement facility used to collect the data is located at:
  Northwest EMC, Inc.; 22975 NW Evergreen Parkway, Suite 400; Hillsboro, OR 97124
  Phone: (503) 844-4066 Fax: 844-3826
  This site has been fully described in a report filed with and accepted by the FCC (Federal Communications Commission) and Industry Canada.

Approved By:



Greg Kiemel, Director of Engineering

This report must not be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government of the United States of America.

Product compliance is the responsibility of the client, therefore the tests and equipment modes of operation represented in this report were agreed upon by the client, prior to testing. This Report may only be duplicated in its entirety. The results of this test pertain only to the sample(s) tested, the specific description is noted in each of the individual sections of the test report supporting this certificate of test.

Revision Number	Description	Date	Page Number
00	None		

FCC: Accredited by NVLAP for performance of FCC radio, digital, and ISM device testing. Our Open Area Test Sites, certification chambers, and conducted measurement facilities, have been fully described in reports filed with the FCC and accepted by the FCC in letters maintained in our files. Northwest EMC has been accredited by ANSI to ISO / IEC Guide 65 as a product certifier. We have been designated by the FCC as a Telecommunications Certification Body (TCB). This allows Northwest EMC to certify transmitters to FCC specifications in accordance with 47 CFR 2.960 and 2.962.

NVLAP: Northwest EMC, Inc. is recognized under the United States Department of Commerce, National Institute of Standards and Technology, National Voluntary Laboratory Accreditation Program for satisfactory compliance with the requirements of ISO/IEC 17025 for Testing Laboratories. The NVLAP accreditation encompasses Electromagnetic Compatibility Testing in accordance with the European Union EMC Directive 89/336/EEC, ANSI C63.4, MIL-STD 461E, DO-160D and SAE J1113. Additionally, Northwest EMC is accredited by NVLAP to perform radio testing in accordance with the European Union R&TTE Directive 1999/5/EEC, the requirements of FCC, and the RSS radio standards for Industry Canada. Accreditation has been granted to Northwest EMC, Inc. under Certificate Numbers: 200629-0, 200630-0, and 200676-0.

Industry Canada: Accredited by NVLAP for performance of Industry Canada RSS and ICES testing. Our Open Area Test Sites and certification chambers comply with RSS 212, Issue 1 (Provisional) and have been filed with Industry Canada and accepted. Northwest EMC has been accredited by ANSI to ISO / IEC Guide 65 as a product certifier. We have been designated by NIST and recognized by Industry Canada as a Certification Body (CB) per the APEC Mutual Recognition Arrangement (MRA). This allows Northwest EMC to certify transmitters to Industry Canada technical requirements.

CAB: Designated by NIST and validated by the European Commission as a Conformity Assessment Body (CAB) to conduct tests and approve products to the EMC directive and transmitters to the R&TTE directive, as described in the U.S. - EU Mutual Recognition Agreement

TÜV Product Service: Included in TUV Product Service Group's Listing of Recognized Laboratories. It qualifies in connection with the TUV Certification after Recognition of Agent's Testing Program for the product categories and/or standards shown in TUV's current Listing of CARAT Laboratories available from TUV. A certificate was issued to represent that this laboratory continues to meet TUV's CARAT Program requirements. Certificate No. USA0401C

Accreditations and Authorizations

TÜV Rheinland: Authorized to carryout EMC tests by order and under supervision of TÜV Rheinland. This authorization is based on "Conditions for EMC-Subcontractors" of November 1992.

NEMKO: Assessed and accredited by NEMKO (Norwegian testing and certification body) for European emissions and immunity testing. As a result of NEMKO's laboratory assessment, they will accept test results from Northwest EMC, Inc. for product certification (Authorization No. ELA 119).

Technology International: Assessed in accordance with ISO Guide 25 defining the general international requirements for the competence of calibration and testing laboratories and with ITI assessment criteria LACO196. Based upon that assessment Interference Technology International, Ltd., has granted approval for specifications implementing the EU Directive on EMC (89/336/EEC and amendments). The scope of the approval was provided on a Schedule of Assessment supplied with the certificate and is available upon request.

Australia/New Zealand: The National Association of Testing Authorities (NATA), Australia has been appointed by the ACA as an accreditation body to accredit test laboratories and competent bodies for EMC standards. Accredited test reports or assessments by competent bodies must carry the NATA logo. Test reports made by an overseas laboratory that has been accredited for the relevant standards by an overseas accreditation body that has a Mutual Recognition Agreement (MRA) with NATA are also accepted as technical grounds for product conformity. The report should be endorsed with the respective logo of the accreditation body. (NVLAP)

VCCI: Accepted as an Associate Member to the VCCI, Acceptance No. 564. Conducted and radiated measurement facilities have been registered in accordance with Regulations for Voluntary Control Measures, Article 8. *(Registration Nos. - Evergreen: C-1071 and R-1025, Trails End: C-1877 and R-1760, Sultan: C-905, R-871, C-1784 and R-1761)*

BSMI: Northwest EMC has been designated by NIST and validated by C-Taipei (BSMI) as a CAB to conduct tests as described in the APEC Mutual Recognition Agreement. License No.SL2-IN-E-1017.

GOST: Northwest EMC, Inc. has been assessed and accredited by the Russian Certification bodies Certinform VNIINMASH, CERTINFO, SAMTES, and Federal CHEC, to perform EMC and Hygienic testing for Information Technology Products. As a result of their laboratory assessment, they will accept test results from Northwest EMC, Inc. for product certification

SCOPE

For details on the Scopes of our Accreditations, please visit:
http://www.nwemc.com/scope.asp

What is measurement uncertainty?

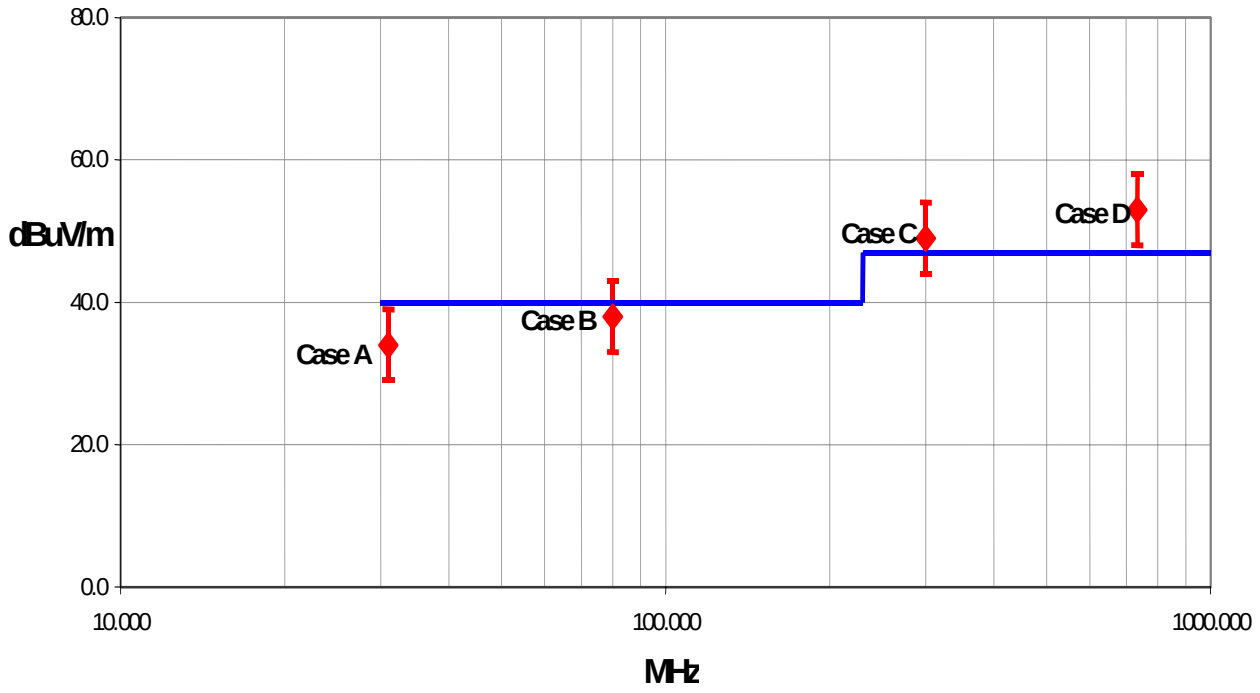
When a measurement is made, the result will be different from the true or theoretically correct value. The difference is the result of tolerances in the measurement system that cannot be completely eliminated. To the extent that technology allows us, it has been our aim to minimize this error. The following statement of measurement uncertainty is used to reflect the accuracy of the measured result as compared with its "true" value. In the case of transient tests (ESD, EFT, Surge, Voltage Dips and Interruptions), the test equipment has been demonstrated by calibration to provide at least a 95% confidence that it complies with the test specification requirements.

The following documents were the basis for determining the uncertainty levels of our measurements:

- "ISO Guide to the Expression of Uncertainty in Measurements", October 1993
- "NIS81: The Treatment of Uncertainty in EMC Measurements", May 1994
- "IEC CISPR 16-3 A1 f1 Ed.1: Radio-interference measurements and statistical techniques", December 2000

How might measurement uncertainty be applied to test results?

If the diamond marks the measured value for the test and the vertical bars bracket the range of + and – measurement uncertainty, then test results can be interpreted from the diagram below.



Test Result Scenarios:
Case A: Product complies.
Case B: Product conditionally complies. It is not possible to say with 95% confidence that the product complies.
Case C: Product conditionally does not comply. It is not possible to say with 95% confidence that the product does not comply.
Case D: Product does not comply.

Radiated Emissions ≤ 1 GHz		Value (dB)					
	Probability Distribution	Biconical Antenna		Log Periodic Antenna		Dipole Antenna	
Test Distance		3m	10m	3m	10m	3m	10m
Combined standard uncertainty $u_c(y)$	normal	+ 1.86 - 1.88	+ 1.82 - 1.87	+ 2.23 - 1.41	+ 1.29 - 1.26	+ 1.31 - 1.27	+ 1.25 - 1.25
Expanded uncertainty ***U*** (level of confidence ≈ 95%)	normal (k=2)	+ 3.72 - 3.77	+ 3.64 - 3.73	+ 4.46 -2.81	+ 2.59 - 2.52	+ 2.61 - 2.55	+ 2.49 - 2.49

Radiated Emissions > 1 GHz	Value (dB)		
	Probability Distribution	Without High Pass Filter	With High Pass Filter
Combined standard uncertainty $u_c(y)$	normal	+ 1.29 - 1.25	+ 1.38 - 1.35
Expanded uncertainty ***U*** (level of confidence ≈ 95%)	normal (k=2)	+ 2.57 - 2.51	+ 2.76 - -2.70

Conducted Emissions		
	Probability Distribution	Value (+/- dB)
Combined standard uncertainty ***uc(y)***	normal	1.48
Expanded uncertainty ***U*** (level of confidence ≈ 95 %)	normal (k = 2)	2.97

Radiated Immunity		
	Probability Distribution	Value (+/- dB)
Combined standard uncertainty ***uc(y)***	normal	1.05
Expanded uncertainty ***U*** (level of confidence ≈ 95 %)	normal (k = 2)	2.11

Conducted Immunity		
	Probability Distribution	Value (+/- dB)
Combined standard uncertainty ***uc(y)***	normal	1.05
Expanded uncertainty ***U*** (level of confidence ≈ 95 %)	normal (k = 2)	2.10

Legend

$u_c(y)$ = square root of the sum of squares of the individual standard uncertainties

U = combined standard uncertainty multiplied by the coverage factor: **k**. This defines an interval about the measured result that will encompass the true value with a confidence level of approximately 95%. If a higher level of confidence is required, then k=3 (CL of 99.7%) can be used. Please note that with a coverage factor of one, uc(y) yields a confidence level of only 68%.

California

Orange County Facility

41 Tesla Ave.
Irvine, CA 92618
(888) 364-2378
FAX (503) 844-3826

Oregon

Evergreen Facility

22975 NW Evergreen Pkwy.,
Suite 400
Hillsboro, OR 97124
(503) 844-4066
FAX (503) 844-3826

Oregon

Trails End Facility

30475 NE Trails End Lane
Newberg, OR 97132
(503) 844-4066
FAX (503) 537-0735

Washington

Sultan Facility

14128 339th Ave. SE
Sultan, WA 98294
(888) 364-2378
FAX (360) 793-2536

Party Requesting the Test	
Company Name:	Intermec Technologies Corporation
Address:	550 Second St. SE
City, State, Zip:	Cedar Rapids, IA 52401-2023
Test Requested By:	Scott Holub
Equipment Under Test:	Bluetooth (8520-00080) in 6820 printer
Model:	8520-00080
First Date of Test:	05-13-2004
Last Date of Test:	06-01-2004
Receipt Date of Samples:	05-13-2004
Equipment Design Stage:	Production
Equipment Condition:	No visual damage.

Information Provided by the Party Requesting the Test

Clocks/Oscillators:	Not provided at the time of test.
I/O Ports:	Serial on printer.

Functional Description of the EUT (Equipment Under Test):

Bluetooth radio installed in a 6820 Printer.

Client Justification for EUT Selection:

The EUT is a representative production sample. Radiated emissions and AC powerline conducted emissions were performed with the Bluetooth module in the 6820 printer. All antenna conducted measurements were performed with the Bluetooth module installed external to Intermec's 700C handheld computer. The 700C provided a means for direct connection to the antenna port. The operation of the module was otherwise identical to operation in the 6820 printer. The transmitter characteristics of the Bluetooth radio module are independent of the host unit, so the data is representative.

Client Justification for Test Selection:

These tests satisfy the requirements of FCC 15.247.

EUT Photo

Justification

The individuals and/or the organization requesting the test provided the modes, configurations and settings available to evaluate. While scanning the radiated emissions, all of the EUT parameters listed below were investigated. This includes, but may not be limited to, antennas, tuned transmit frequency ranges, operating modes, and data rates.

Channels in Specified Band Investigated:
High
Mid
Low

Operating Modes Investigated:
No Hop

Data Rates Investigated:
Maximum

Output Power Setting(s) Investigated:
Maximum

Power Input Settings Investigated:
120 VAC, 60 Hz.

Other Settings Investigated:
Bluetooth only

Software\Firmware Applied During Test			
Exercise software	FCC_Smart	**Version**	Unknown
Description			
The system was tested using special test software to exercise the functions of the device during the testing including channels, data rates, and output power.			

EUT and Peripherals			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Bluetooth Radio (EUT)	Intermec Technologies Corporation	8520-00080	4004703
Handheld Radio/Scanner (Host)	Intermec Technologies Corporation	700C	05400400869
Power Adapter	Elpac Power Systems	FW1812	014852

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
DC Leads	PA	1.8	PA	Handheld Radio/Scanner	Power Adapter
AC Power	No	1.8	No	Power Adapter	AC Mains
PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.					

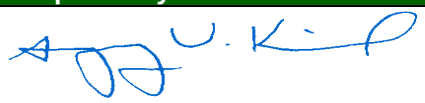
Measurement Equipment					
Description	**Manufacturer**	**Model**	**Identifier**	**Last Cal**	**Interval**
Spectrum Analyzer	Tektronix	2784	AAO	02/26/2003	24 mo

Test Description

Requirement: Per an FCC Interpretation sent to TCBs on October 8, 2002, frequency hoppers in the 2.4 GHz band operating under 15.247 are required to use a minimum of 15 non-overlapping channels. The hopping channel bandwidth can be wider than 1 MHz as long as the channels do not overlap and all emissions stay within the 2400-2483.5 MHz band. For example, a system that uses the minimum 15 channels can have hopping channel bandwidth that are up to 5 MHz wide. The measurement is made with the spectrum analyzer's resolution bandwidth set to ≥1% of the 20dB bandwidth, and the video bandwidth set to greater than or equal to the resolution bandwidth.

Configuration: The occupied bandwidth was measured with the EUT set to low, medium, and high transmit frequencies. The measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer. The EUT was transmitting at its maximum data rate in a no hop mode.

Completed by:



NORTHWEST EMC

EMISSIONS DATA SHEET

Rev BETA 01/30/01

EUT:	8520-00080			Work Order:	ITRM0020
Serial Number:	4004703			Date:	05/21/04
Customer:	Intermec Technologies Corporation			Temperature:	73 F
Attendees:	none	Tested by:	Greg Kiemel	Humidity:	42%
Customer Ref. No.:	N/A	Power:	3.3 Vdc from host	Job Site:	EV06

TEST SPECIFICATIONS

Specification:	FCC 15.247(a) Occupied Bandwidth	Year: 2003	Method: ANSI C63.4	Year:	2001

SAMPLE CALCULATIONS

COMMENTS

EUT installed outside of Intermec Model 700C. Direct connect to antenna port

EUT OPERATING MODES

No hop mode. Modulated by PRBS at maximum data rate, at maximum output power.

DEVIATIONS FROM TEST STANDARD

None

REQUIREMENTS

The minimum 20 dB bandwidth is less than the minimum channel separation of 1 MHz.

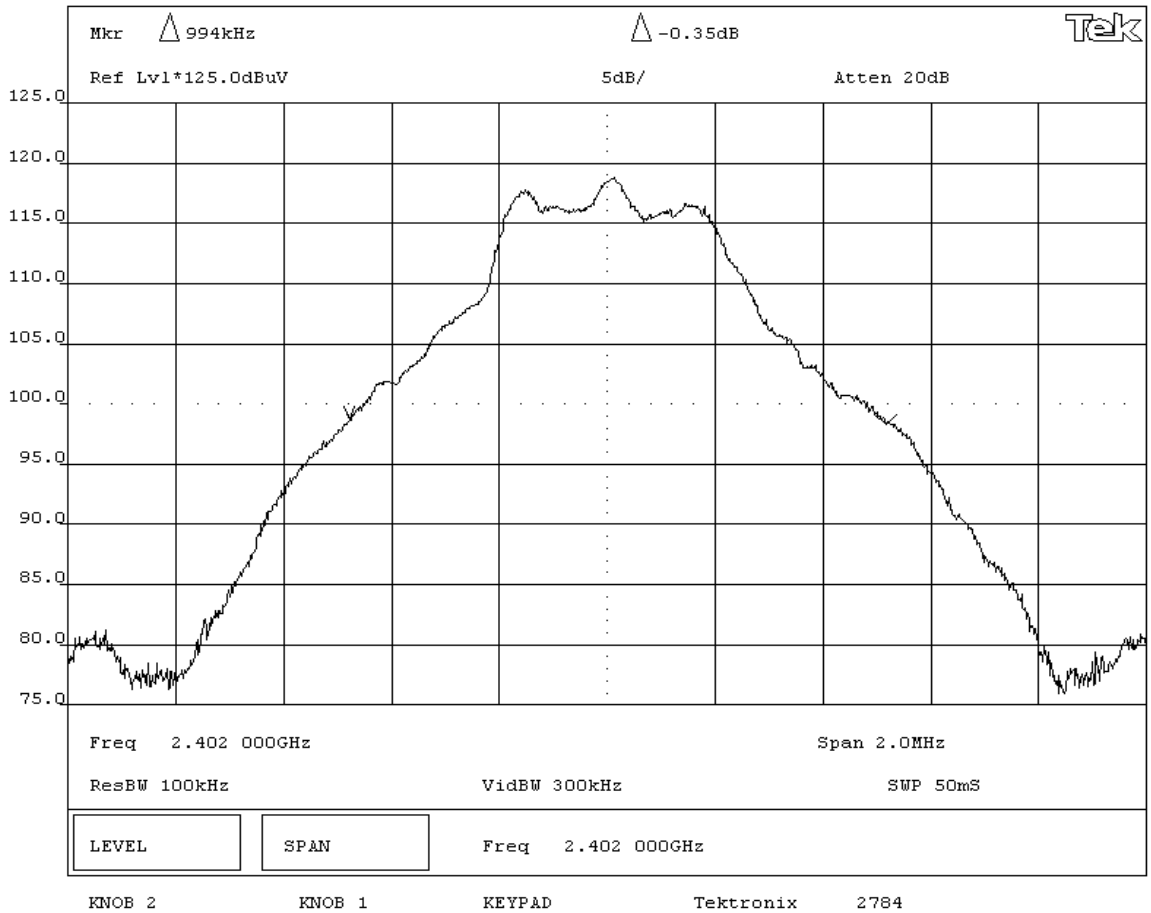
RESULTS	BANDWIDTH
Pass	0.994 MHz

SIGNATURE

Tested By: _____

DESCRIPTION OF TEST

Occupied Bandwidth - Low Channel



NORTHWEST
EMC

EMISSIONS DATA SHEET

Rev BETA
01/30/01

EUT:	8520-00080			Work Order:	ITRM0020
Serial Number:	4004703			Date:	05/21/04
Customer:	Intermec Technologies Corporation			Temperature:	73 F
Attendees:	none	Tested by:	Greg Kiemel	Humidity:	42%
Customer Ref. No.:	N/A	Power:	3.3 Vdc from host	Job Site:	EV06

TEST SPECIFICATIONS

Specification:	FCC 15.247(a) Occupied Bandwidth	Year: 2003	Method: ANSI C63.4	Year:	2001

SAMPLE CALCULATIONS

COMMENTS

EUT installed outside of Intermec Model 700C. Direct connect to antenna port

EUT OPERATING MODES

No hop mode. Modulated by PRBS at maximum data rate, at maximum output power.

DEVIATIONS FROM TEST STANDARD

None

REQUIREMENTS

The minimum 20 dB bandwidth is less than the minimum channel separation of 1 MHz.

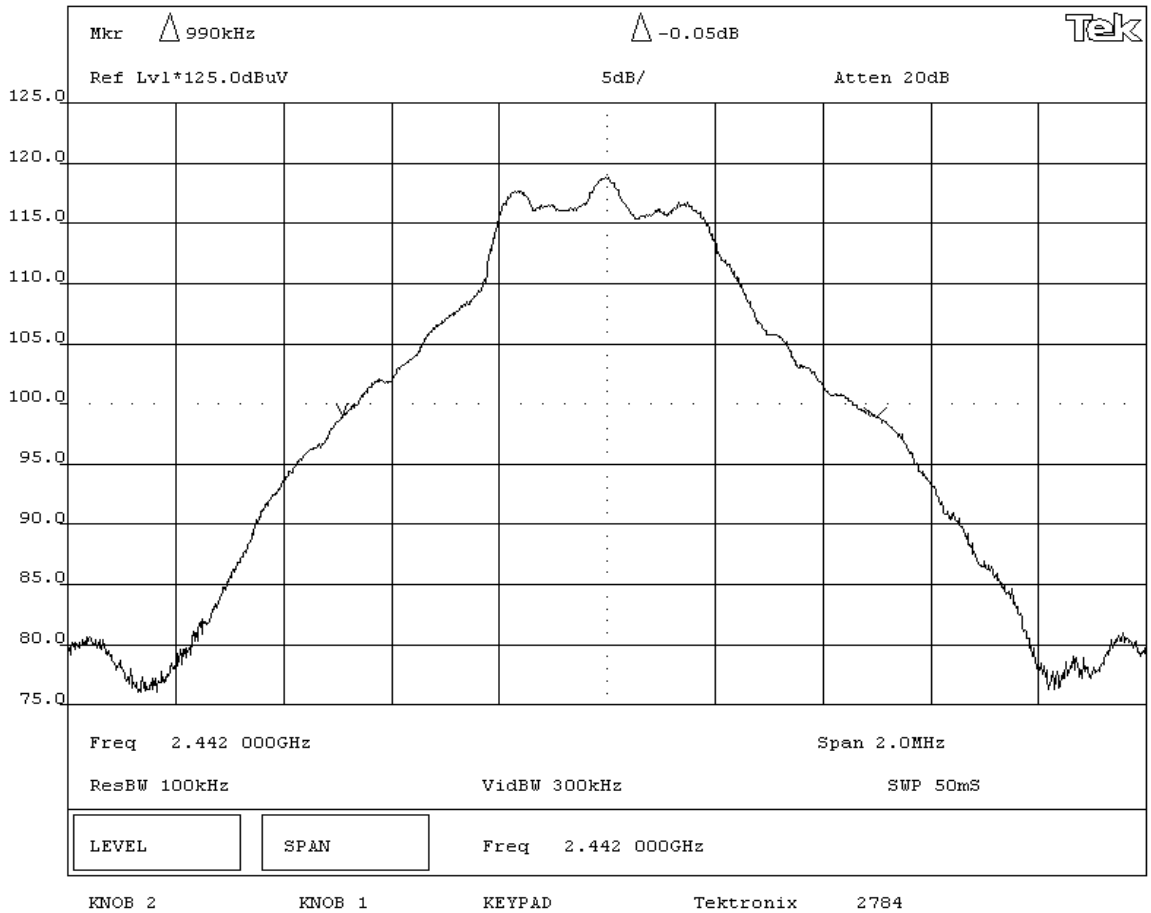
RESULTS	BANDWIDTH
Pass	0.990 MHz

SIGNATURE

Tested By: _____

DESCRIPTION OF TEST

Occupied Bandwidth - Mid Channel



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EMISSIONS DATA SHEET

Rev BETA 01/30/01

EUT:	8520-00080			Work Order:	ITRM0020
Serial Number:	4004703			Date:	05/21/04
Customer:	Intermec Technologies Corporation			Temperature:	73 F
Attendees:	none	Tested by:	Greg Kiemel	Humidity:	42%
Customer Ref. No.:	N/A	Power:	3.3 Vdc from host	Job Site:	EV06

TEST SPECIFICATIONS

Specification:	FCC 15.247(a) Occupied Bandwidth	Year: 2003	Method: ANSI C63.4	Year:	2001

SAMPLE CALCULATIONS

COMMENTS

EUT installed outside of Intermec Model 700C. Direct connect to antenna port

EUT OPERATING MODES

No hop mode. Modulated by PRBS at maximum data rate, at maximum output power.

DEVIATIONS FROM TEST STANDARD

None

REQUIREMENTS

The minimum 20 dB bandwidth is less than the minimum channel separation of 1 MHz.

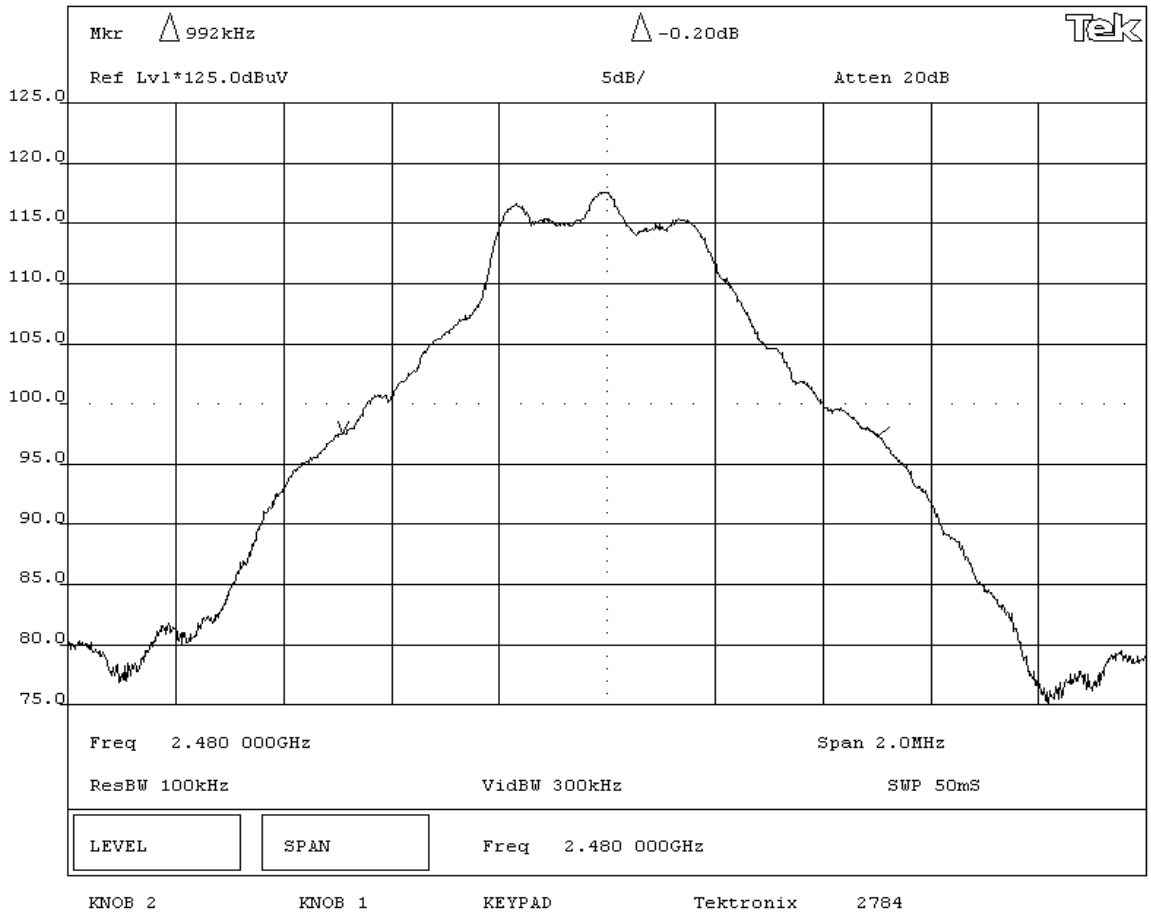
RESULTS	BANDWIDTH
Pass	0.992 MHz

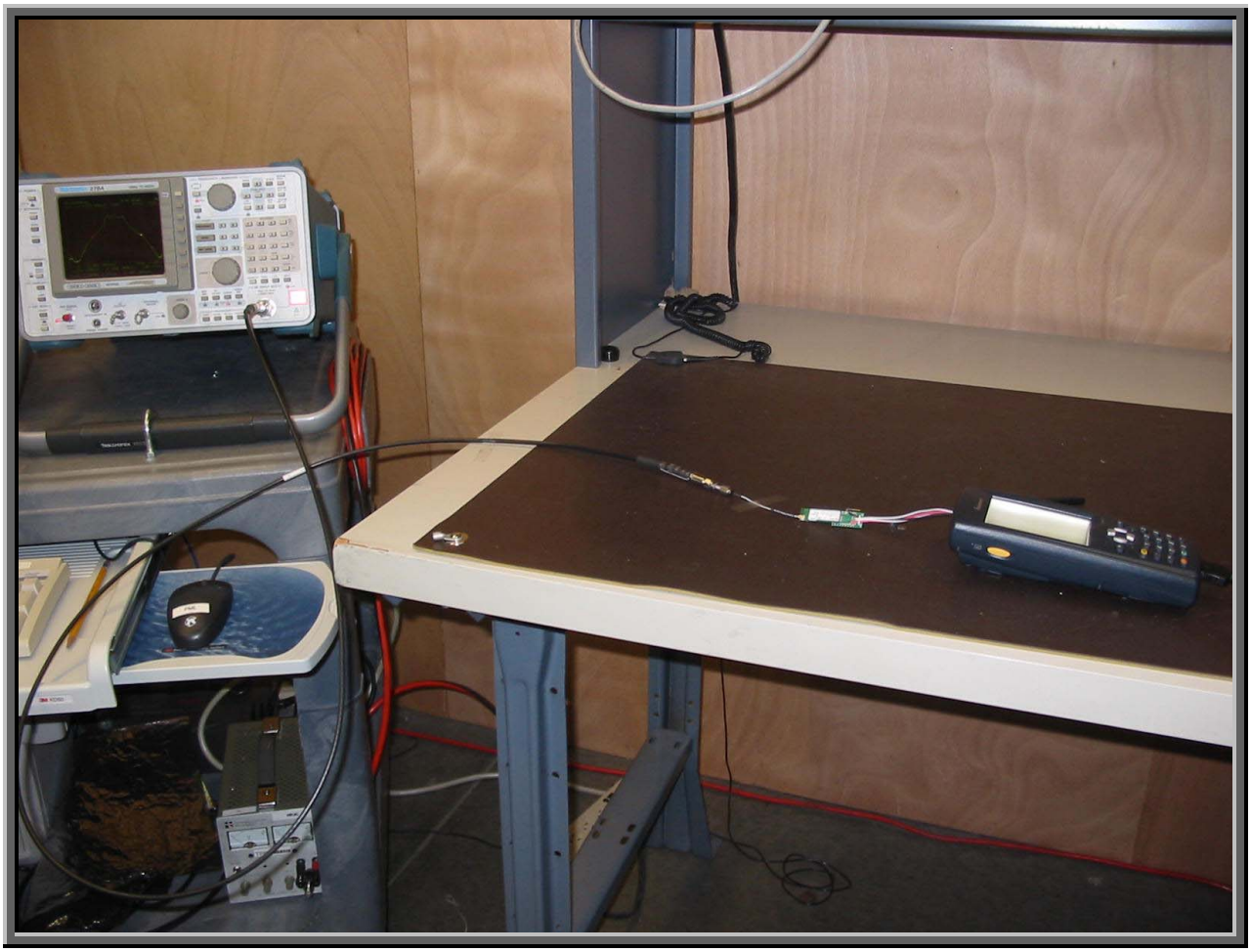
SIGNATURE

Tested By: _____

DESCRIPTION OF TEST

Occupied Bandwidth - High Channel





Justification

The individuals and/or the organization requesting the test provided the modes, configurations and settings available to evaluate. While scanning the radiated emissions, all of the EUT parameters listed below were investigated. This includes, but may not be limited to, antennas, tuned transmit frequency ranges, operating modes, and data rates.

Channels in Specified Band Investigated:
High
Mid
Low

Operating Modes Investigated:
No Hop

Data Rates Investigated:
Maximum

Output Power Setting(s) Investigated:
Maximum

Power Input Settings Investigated:
120 VAC, 60 Hz.

Other Settings Investigated:
Bluetooth only

Software\Firmware Applied During Test			
Exercise software	FCC_Smart	**Version**	Unknown
Description			
The system was tested using special test software to exercise the functions of the device during the testing including channels, data rates, and output power.			

EUT and Peripherals			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Bluetooth Radio (EUT)	Intermec Technologies Corporation	8520-00080	4004703
Handheld Radio/Scanner (Host)	Intermec Technologies Corporation	700C	05400400869
Power Adapter	Elpac Power Systems	FW1812	014852

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
DC Leads	PA	1.8	PA	Handheld Radio/Scanner	Power Adapter
AC Power	No	1.8	No	Power Adapter	AC Mains
PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.					

Measurement Equipment					
Description	**Manufacturer**	**Model**	**Identifier**	**Last Cal**	**Interval**
Spectrum Analyzer	Tektronix	2784	AAO	02/26/2003	24 mo
Signal Generator	Hewlett Packard	8341B	TGN	01/23/2004	13 mo
Power Meter	Hewlett Packard	E4418A	SPA	06/21/2002	24 mo
Power Sensor	Hewlett-Packard	8481H	SPB	06/21/2002	24 mo

Test Description

Requirement: Per 47 CFR 15.247(b)(3), the maximum peak output power must not exceed 1 Watt. The measurement is made using a spectrum analyzer using the following settings:

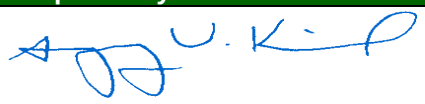
- Resolution bandwidth set to greater than the 6 dB bandwidth of the modulated carrier, and
- The video bandwidth set to greater than or equal to the resolution bandwidth.

Configuration: The peak output power was measured with the EUT set to low, medium, and high transmit frequencies. The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The EUT was transmitting at its maximum data rate in a no hop mode.

Prior to measuring the output power from the EUT, the test set-up was calibrated using a signal generator and power meter.

De Facto EIRP Limit: Per 47 CFR 15.247 (b)(1-3), the EUT meets the de facto EIRP limit of +36dBm.

Completed by:



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EMISSIONS DATA SHEET

Rev BETA 01/30/01

EUT:	8520-00080			Work Order:	ITRM0020
Serial Number:	4004703			Date:	05/21/04
Customer:	Intermec Technologies Corporation			Temperature:	73 F
Attendees:	none	Tested by:	Greg Kiemel	Humidity:	42%
Customer Ref. No.:	N/A	Power:	3.3 Vdc from host	Job Site:	EV06

TEST SPECIFICATIONS

Specification:	FCC 15.247(b) Output Power	Year: 2003	Method: ANSI C63.4	Year:	2001

SAMPLE CALCULATIONS

COMMENTS

EUT installed outside of Intermec Model 700C. Direct connect to antenna port

EUT OPERATING MODES

No hop mode. Modulated by PRBS at maximum data rate, at maximum output power.

DEVIATIONS FROM TEST STANDARD

None

REQUIREMENTS

Maximum peak conducted output power does not exceed 1 Watt

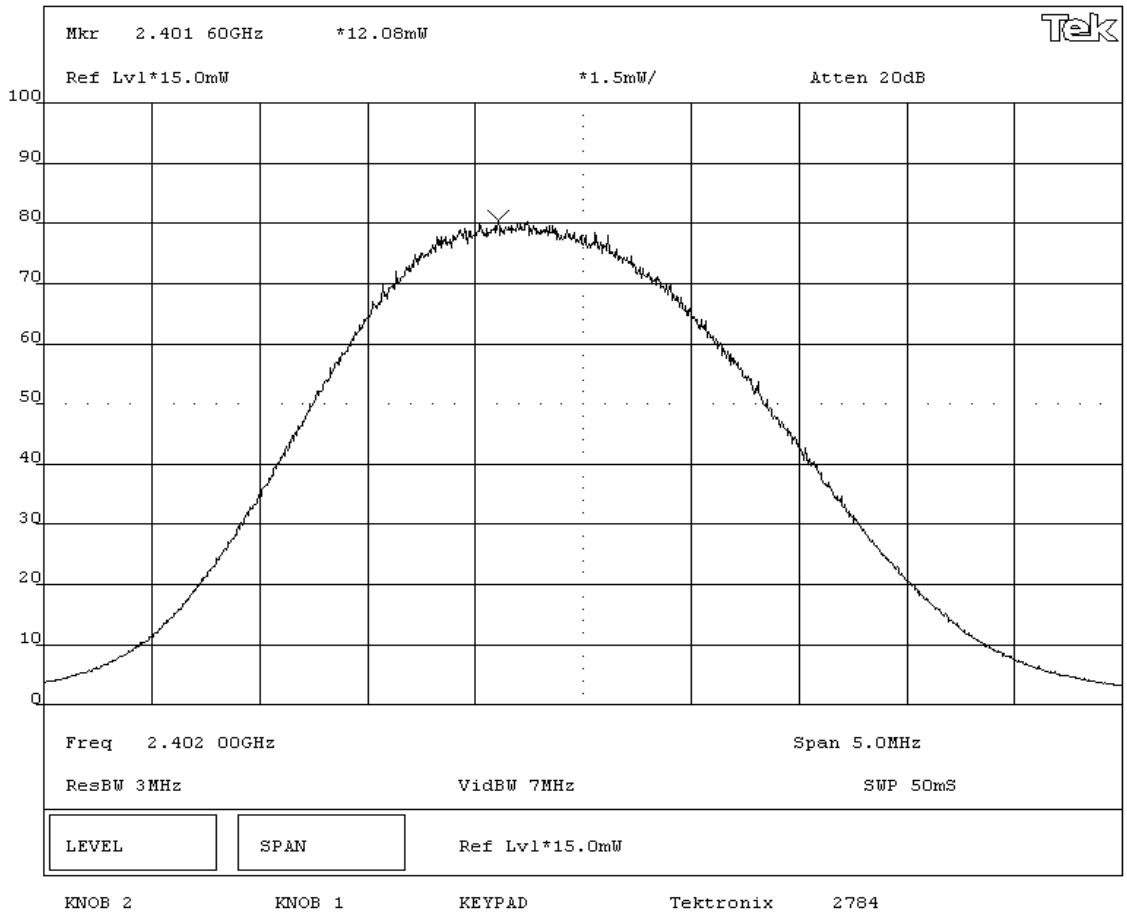
RESULTS	AMPLITUDE
Pass	12.08 mW

SIGNATURE

Tested By: _____

DESCRIPTION OF TEST

Output Power - Low Channel



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EMISSIONS DATA SHEET

Rev BETA 01/30/01

EUT:	8520-00080			Work Order:	ITRM0020
Serial Number:	4004703			Date:	05/21/04
Customer:	Intermec Technologies Corporation			Temperature:	73 F
Attendees:	none	Tested by:	Greg Kiemel	Humidity:	42%
Customer Ref. No.:	N/A	Power:	3.3 Vdc from host	Job Site:	EV06

TEST SPECIFICATIONS

Specification:	FCC 15.247(b) Output Power	Year: 2003	Method: ANSI C63.4	Year:	2001

SAMPLE CALCULATIONS

COMMENTS

EUT installed outside of Intermec Model 700C. Direct connect to antenna port

EUT OPERATING MODES

No hop mode. Modulated by PRBS at maximum data rate, at maximum output power.

DEVIATIONS FROM TEST STANDARD

None

REQUIREMENTS

Maximum peak conducted output power does not exceed 1 Watt

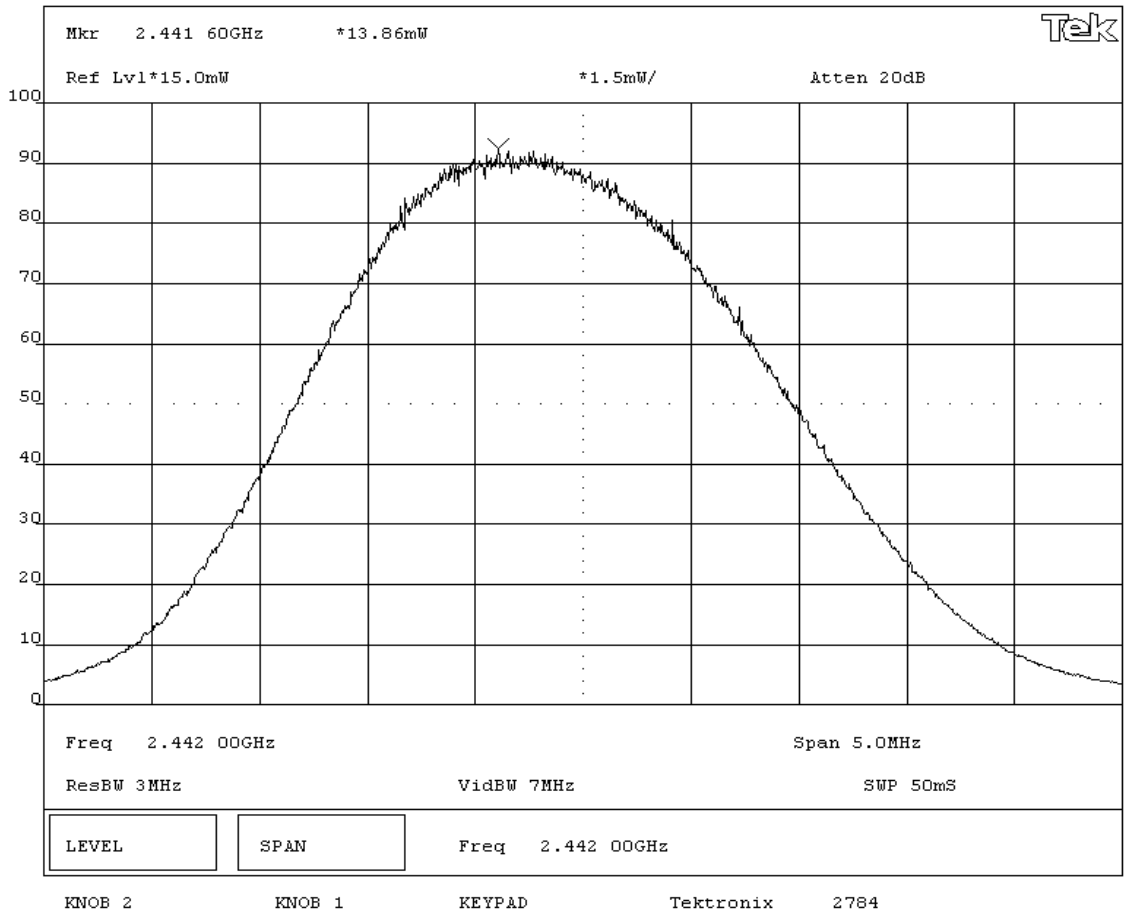
RESULTS	AMPLITUDE
Pass	13.86 mW

SIGNATURE

Tested By: _____

DESCRIPTION OF TEST

Output Power - Mid Channel



NORTHWEST EMC

EMISSIONS DATA SHEET

Rev BETA 01/30/01

EUT:	8520-00080			Work Order:	ITRM0020
Serial Number:	4004703			Date:	05/21/04
Customer:	Intermec Technologies Corporation			Temperature:	73 F
Attendees:	none	Tested by:	Greg Kiemel	Humidity:	42%
Customer Ref. No.:	N/A	Power:	3.3 Vdc from host	Job Site:	EV06

TEST SPECIFICATIONS

Specification:	FCC 15.247(b) Output Power	Year: 2003	Method:	ANSI C63.4	Year: 2001

SAMPLE CALCULATIONS

COMMENTS

EUT installed outside of Intermec Model 700C. Direct connect to antenna port

EUT OPERATING MODES

No hop mode. Modulated by PRBS at maximum data rate, at maximum output power.

DEVIATIONS FROM TEST STANDARD

None

REQUIREMENTS

Maximum peak conducted output power does not exceed 1 Watt

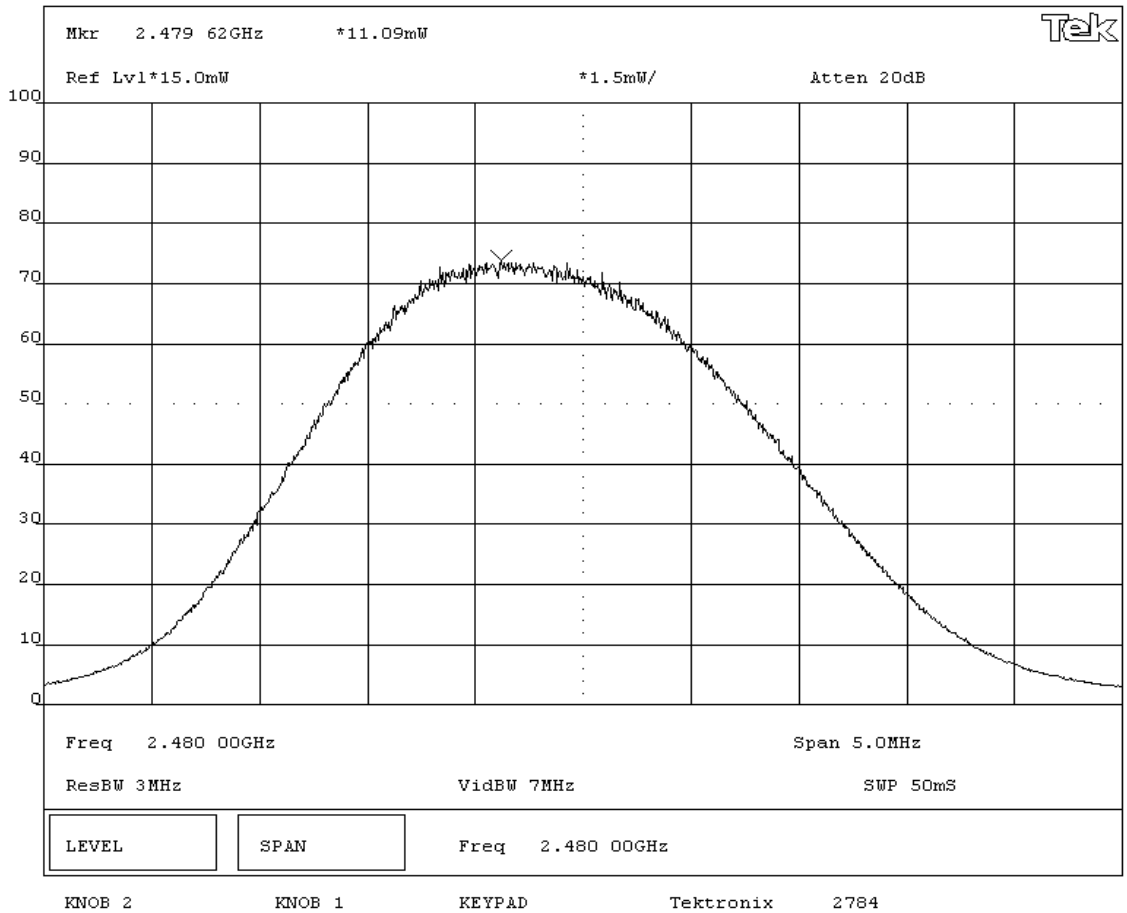
RESULTS	AMPLITUDE
Pass	11.09 mW

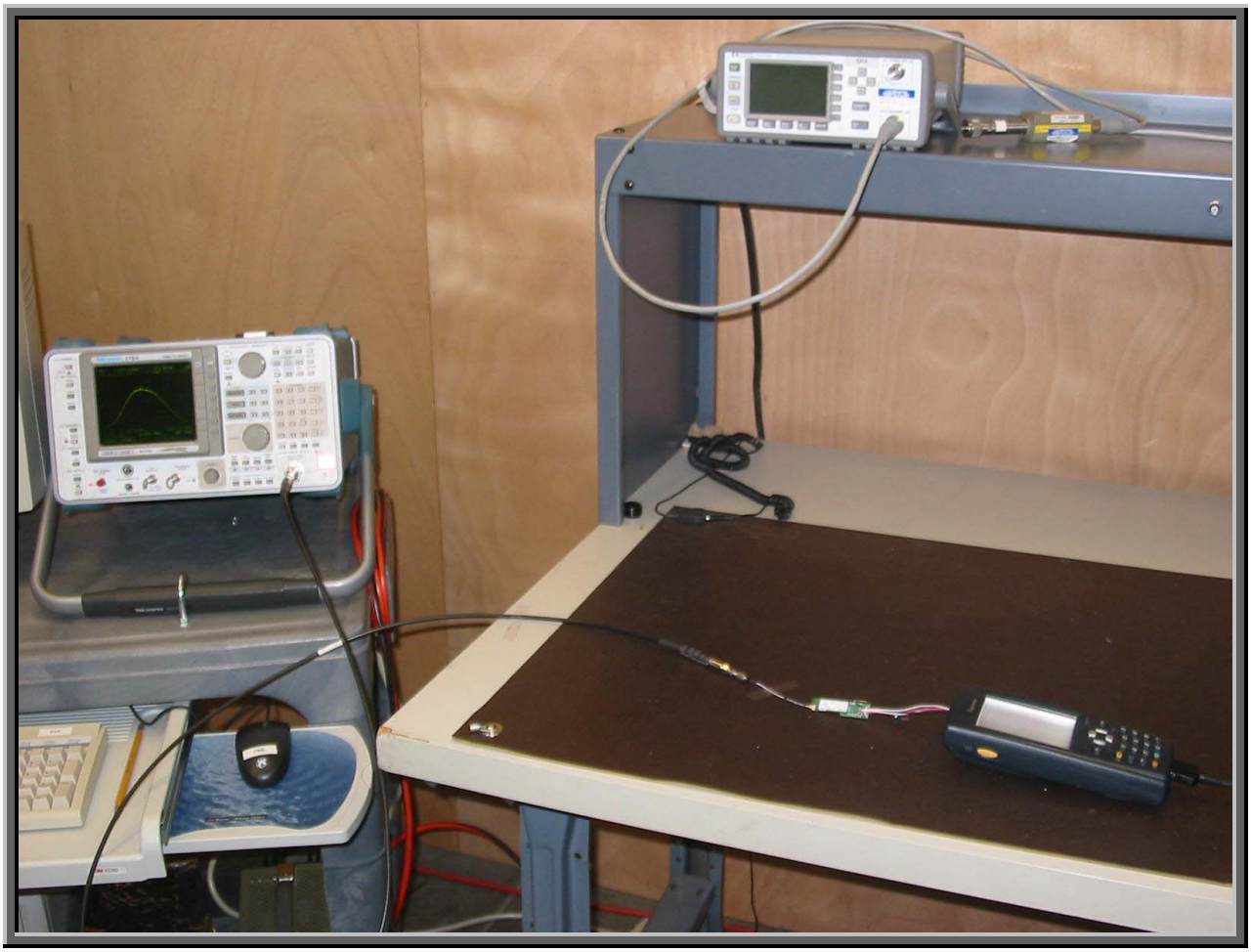
SIGNATURE

Tested By: _____

DESCRIPTION OF TEST

Output Power - High Channel





Justification

The individuals and/or the organization requesting the test provided the modes, configurations and settings available to evaluate. While scanning the radiated emissions, all of the EUT parameters listed below were investigated. This includes, but may not be limited to, antennas, tuned transmit frequency ranges, operating modes, and data rates.

Channels in Specified Band Investigated:
High
Mid
Low

Operating Modes Investigated:
No Hop

Data Rates Investigated:
Maximum

Output Power Setting(s) Investigated:
Maximum

Power Input Settings Investigated:
120 VAC, 60 Hz.

Other Settings Investigated:
Bluetooth only

Software\Firmware Applied During Test			
Exercise software	FCC_Smart	**Version**	Unknown
Description			
The system was tested using special test software to exercise the functions of the device during the testing including channels, data rates, and output power.			

EUT and Peripherals			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Bluetooth Radio (EUT)	Intermec Technologies Corporation	8520-00080	4004703
Handheld Radio/Scanner (Host)	Intermec Technologies Corporation	700C	05400400869
Power Adapter	Elpac Power Systems	FW1812	014852

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
DC Leads	PA	1.8	PA	Handheld Radio/Scanner	Power Adapter
AC Power	No	1.8	No	Power Adapter	AC Mains
PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.					

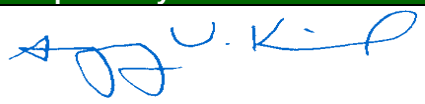
Measurement Equipment					
Description	**Manufacturer**	**Model**	**Identifier**	**Last Cal**	**Interval**
Spectrum Analyzer	Tektronix	2784	AAO	02/26/2003	24 mo

Test Description

Requirement: Per 47 CFR 15.247(c), in any 100 kHz bandwidth outside the authorized band, the maximum level of radio frequency power must be at least 20dB down from the highest emission level within the authorized band. The measurement is made with the spectrum analyzer's resolution bandwidth set to 100 kHz, and the video bandwidth set to greater than or equal to the resolution bandwidth.

Configuration: The spurious RF conducted emissions at the edges of the authorized band were measured with the EUT set to low and high transmit frequencies. The measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer. The EUT was transmitting at its maximum data rate in a no hop mode. The channels closest to the band edges were selected. The spectrum was scanned across each band edge from 5 MHz below the band edge to 5 MHz above the band edge.

Completed by:



NORTHWEST EMC

EMISSIONS DATA SHEET

Rev BETA 01/30/01

EUT:	8520-00080			Work Order:	ITRM0020
Serial Number:	4004703			Date:	05/21/04
Customer:	Intermec Technologies Corporation			Temperature:	73 F
Attendees:	none	Tested by:	Greg Kiemel	Humidity:	42%
Customer Ref. No.:	N/A	Power:	3.3 Vdc from host	Job Site:	EV06

TEST SPECIFICATIONS

Specification:	FCC 15.247(c) Band Edge Compliance	Year: 2003	Method: ANSI C63.4	Year:	2001

SAMPLE CALCULATIONS

COMMENTS

EUT installed outside of Intermec Model 700C. Direct connect to antenna port

EUT OPERATING MODES

No hop mode. Modulated by PRBS at maximum data rate, at maximum output power.

DEVIATIONS FROM TEST STANDARD

None

REQUIREMENTS

Maximum level of any spurious emission at the edge of the authorized band is 20 dB down from the fundamental

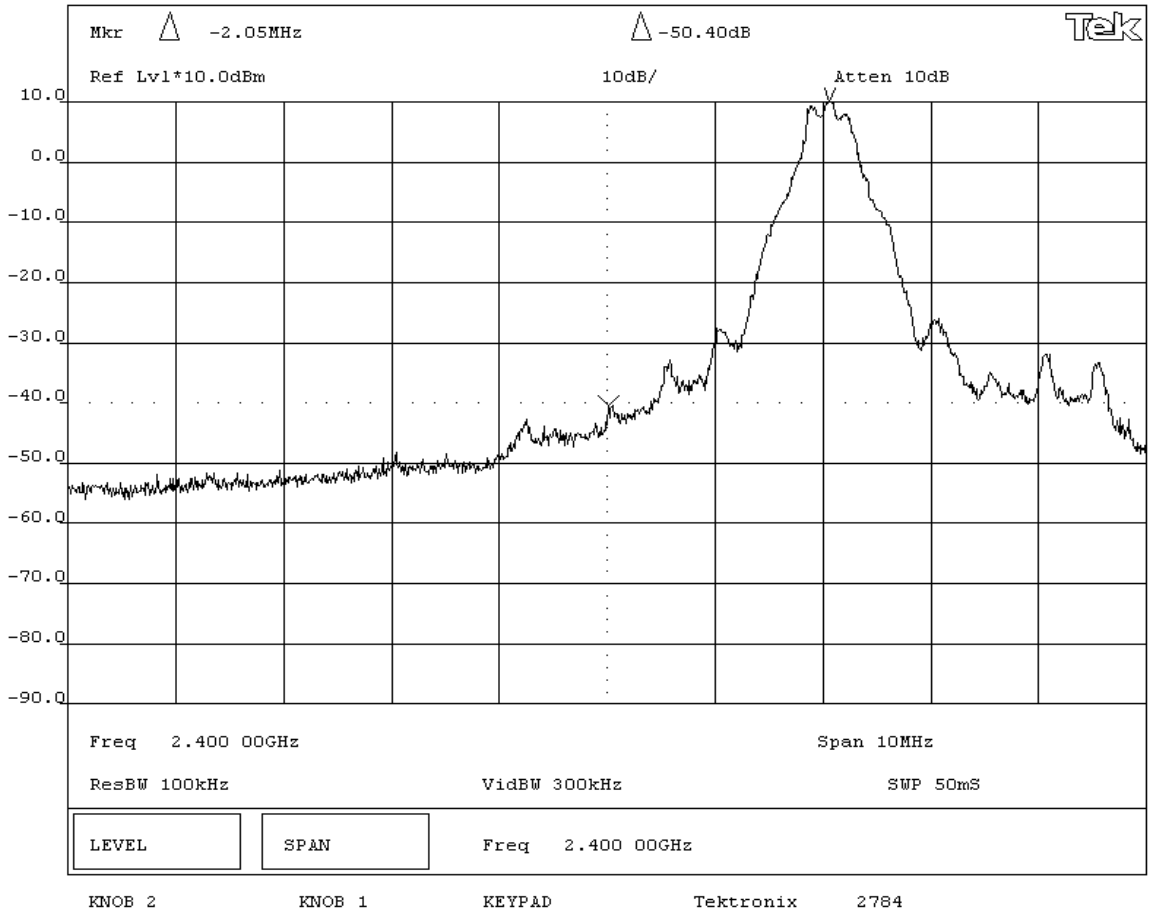
RESULTS	AMPLITUDE
Pass	-50.4 dB

SIGNATURE

Tested By: _____

DESCRIPTION OF TEST

Band Edge Compliance - Low Channel



NORTHWEST EMC

EMISSIONS DATA SHEET

Rev BETA 01/30/01

EUT:	8520-00080			Work Order:	ITRM0020
Serial Number:	4004703			Date:	05/21/04
Customer:	Intermec Technologies Corporation			Temperature:	73 F
Attendees:	none	Tested by:	Greg Kiemel	Humidity:	42%
Customer Ref. No.:	N/A	Power:	3.3 Vdc from host	Job Site:	EV06

TEST SPECIFICATIONS

Specification:	FCC 15.247(c) Band Edge Compliance	Year: 2003	Method: ANSI C63.4	Year:	2001

SAMPLE CALCULATIONS

COMMENTS

EUT installed outside of Intermec Model 700C. Direct connect to antenna port

EUT OPERATING MODES

No hop mode. Modulated by PRBS at maximum data rate, at maximum output power.

DEVIATIONS FROM TEST STANDARD

None

REQUIREMENTS

Maximum level of any spurious emission at the edge of the authorized band is 20 dB down from the fundamental

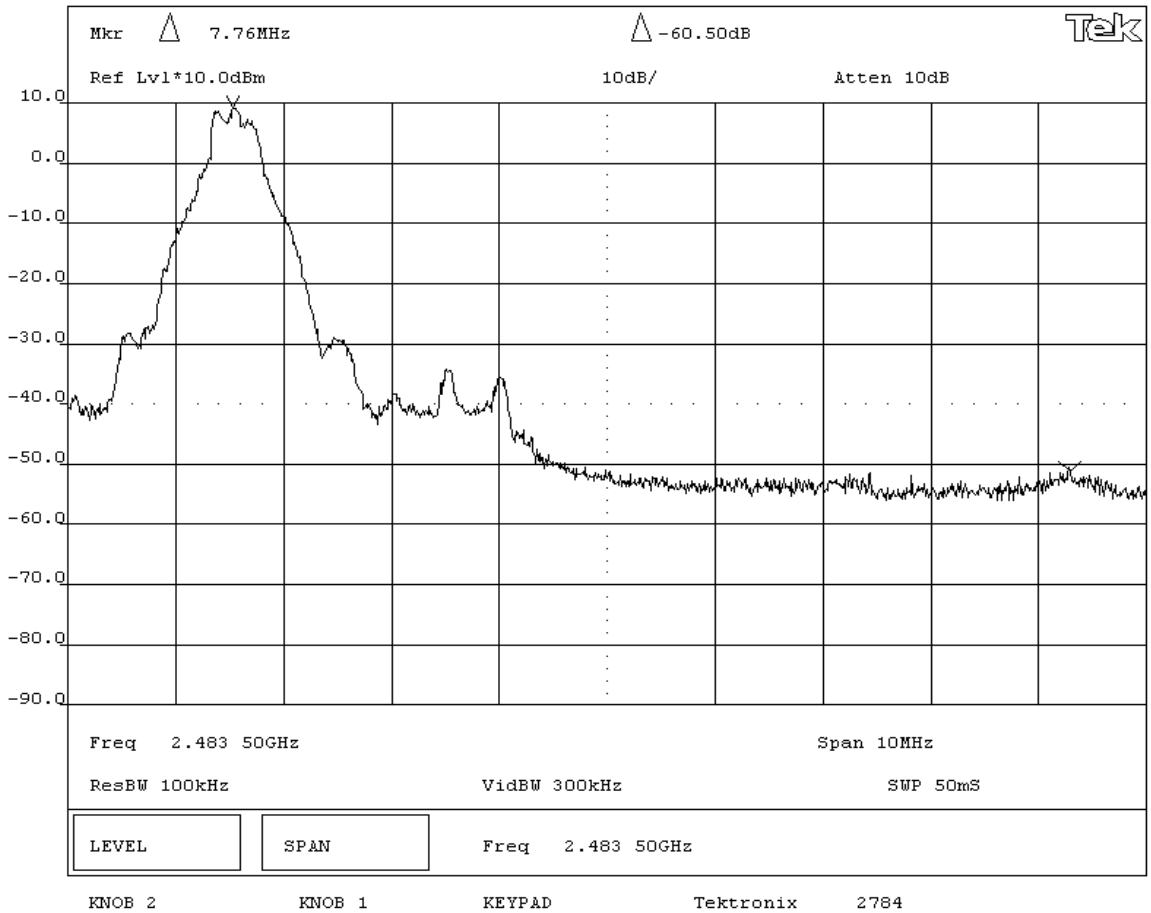
RESULTS	AMPLITUDE
Pass	-60.5 dB

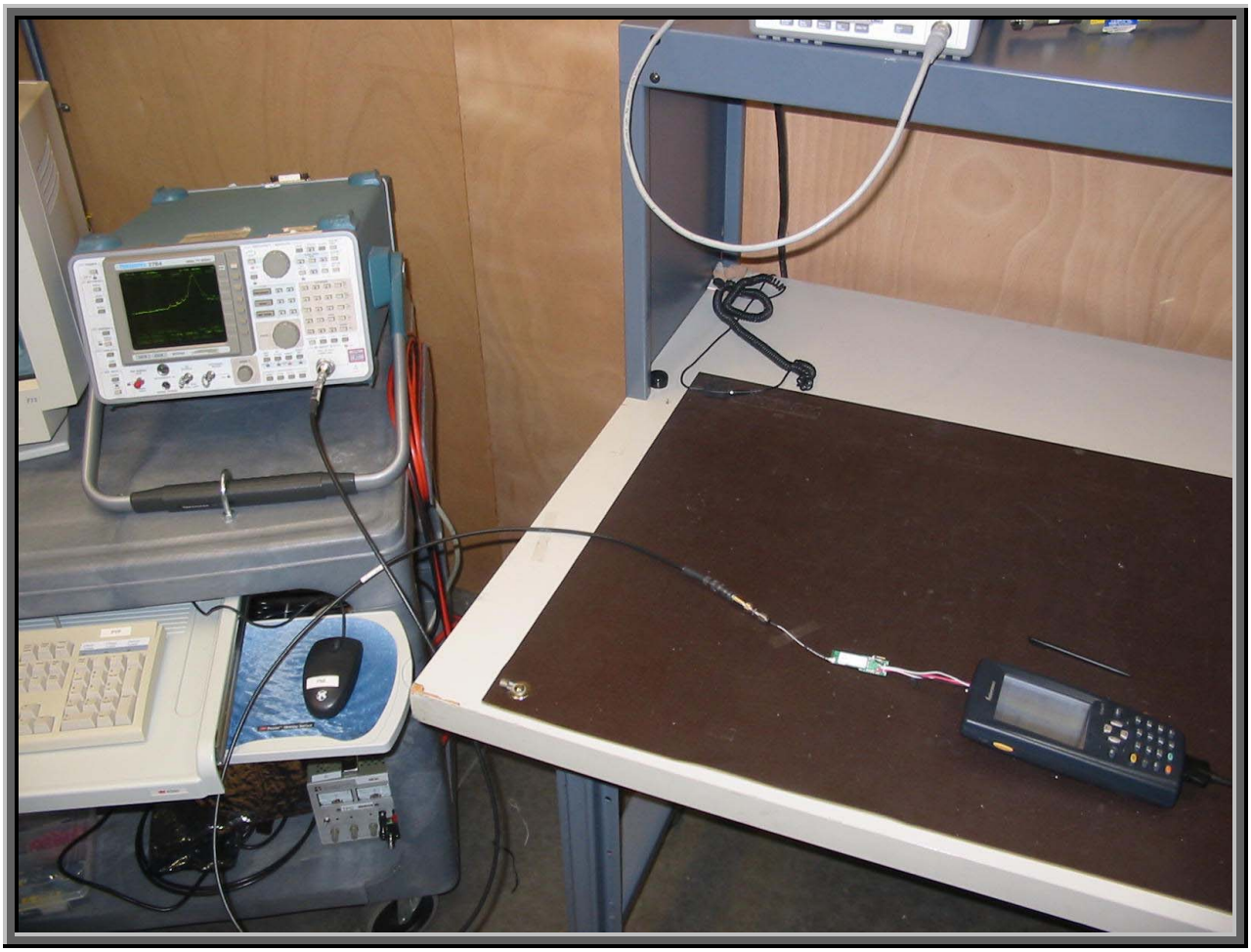
SIGNATURE

Tested By: _____

DESCRIPTION OF TEST

Band Edge Compliance - High Channel





Justification

The individuals and/or the organization requesting the test provided the modes, configurations and settings available to evaluate. While scanning the radiated emissions, all of the EUT parameters listed below were investigated. This includes, but may not be limited to, antennas, tuned transmit frequency ranges, operating modes, and data rates.

Channels in Specified Band Investigated:
High
Mid
Low

Operating Modes Investigated:
No Hop

Data Rates Investigated:
Maximum

Output Power Setting(s) Investigated:
Maximum

Power Input Settings Investigated:
120 VAC, 60 Hz.

Other Settings Investigated:
Bluetooth only

Software\Firmware Applied During Test			
Exercise software	FCC_Smart	**Version**	Unknown
Description			
The system was tested using special test software to exercise the functions of the device during the testing including channels, data rates, and output power.			

EUT and Peripherals			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Bluetooth Radio (EUT)	Intermec Technologies Corporation	8520-00080	4004703
Handheld Radio/Scanner (Host)	Intermec Technologies Corporation	700C	05400400869
Power Adapter	Elpac Power Systems	FW1812	014852

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
DC Leads	PA	1.8	PA	Handheld Radio/Scanner	Power Adapter
AC Power	No	1.8	No	Power Adapter	AC Mains
PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.					

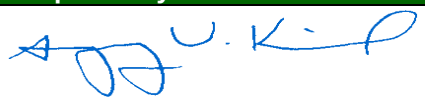
Measurement Equipment					
Description	**Manufacturer**	**Model**	**Identifier**	**Last Cal**	**Interval**
Spectrum Analyzer	Tektronix	2784	AAO	02/26/2003	24 mo

Test Description

Requirement: Per 47 CFR 15.247(c), in any 100 kHz bandwidth outside the authorized band, the maximum level of radio frequency power must be at least 20dB down from the highest emission level within the authorized band. The measurement is made with the spectrum analyzer's resolution bandwidth set to 100 kHz, and the video bandwidth set to greater than or equal to the resolution bandwidth.

Configuration: The spurious RF conducted emissions were measured with the EUT set to low, medium, and high transmit frequencies. The measurements were made using a direct connection between the RF output of the EUT and the spectrum analyzer. The EUT was transmitting at its maximum data rate in a no hop mode. For each transmit frequency, the spectrum was scanned throughout the specified frequency.

Completed by:



NORTHWEST EMC

EMISSIONS DATA SHEET

Rev BETA 01/30/01

EUT:	8520-00080			Work Order:	ITRM0020
Serial Number:	4004703			Date:	05/21/04
Customer:	Intermec Technologies Corporation			Temperature:	73 F
Attendees:	none	Tested by:	Greg Kiemel	Humidity:	42%
Customer Ref. No.:	N/A	Power:	3.3 Vdc from host	Job Site:	EV06

TEST SPECIFICATIONS

Specification:	FCC 15.247(c) Spurious Cond. Em.	Year: 2003	Method: ANSI C63.4	Year:	2001

SAMPLE CALCULATIONS

COMMENTS

EUT installed outside of Intermec Model 700C. Direct connect to antenna port

EUT OPERATING MODES

No hop mode. Modulated by PRBS at maximum data rate, at maximum output power.

DEVIATIONS FROM TEST STANDARD

None

REQUIREMENTS

Maximum level of any spurious emission outside of the authorized band is 20 dB down from the fundamental

RESULTS

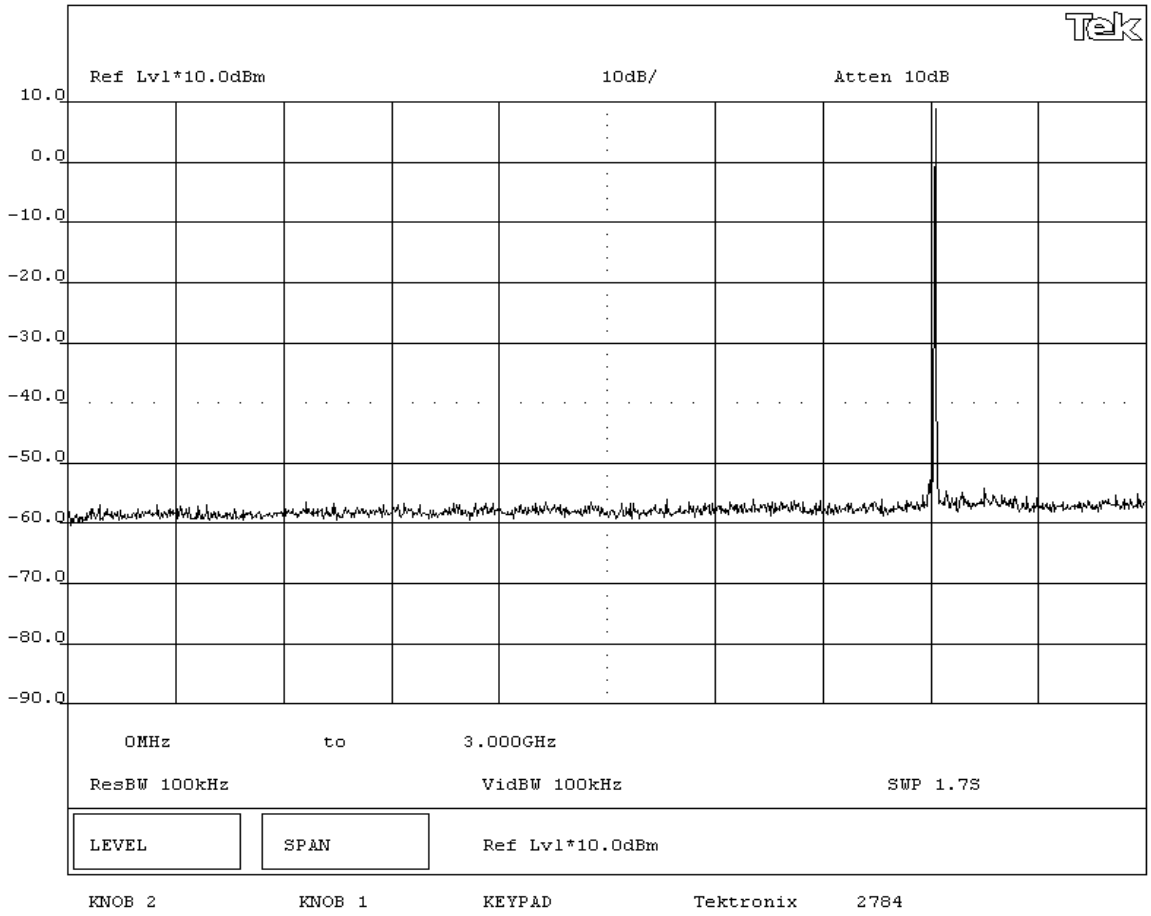
Pass

SIGNATURE

Tested By: _____

DESCRIPTION OF TEST

Antenna Conducted Spurious Emissions - Low Channel 0MHz-3GHz



NORTHWEST EMC

EMISSIONS DATA SHEET

Rev BETA 01/30/01

EUT:	8520-00080			Work Order:	ITRM0020
Serial Number:	4004703			Date:	05/21/04
Customer:	Intermec Technologies Corporation			Temperature:	73 F
Attendees:	none	Tested by:	Greg Kiemel	Humidity:	42%
Customer Ref. No.:	N/A	Power:	3.3 Vdc from host	Job Site:	EV06

TEST SPECIFICATIONS

Specification:	FCC 15.247(c) Spurious Cond. Em.	Year: 2003	Method:	ANSI C63.4	Year: 2001

SAMPLE CALCULATIONS

COMMENTS

EUT installed outside of Intermec Model 700C. Direct connect to antenna port

EUT OPERATING MODES

No hop mode. Modulated by PRBS at maximum data rate, at maximum output power.

DEVIATIONS FROM TEST STANDARD

None

REQUIREMENTS

Maximum level of any spurious emission outside of the authorized band is 20 dB down from the fundamental

RESULTS

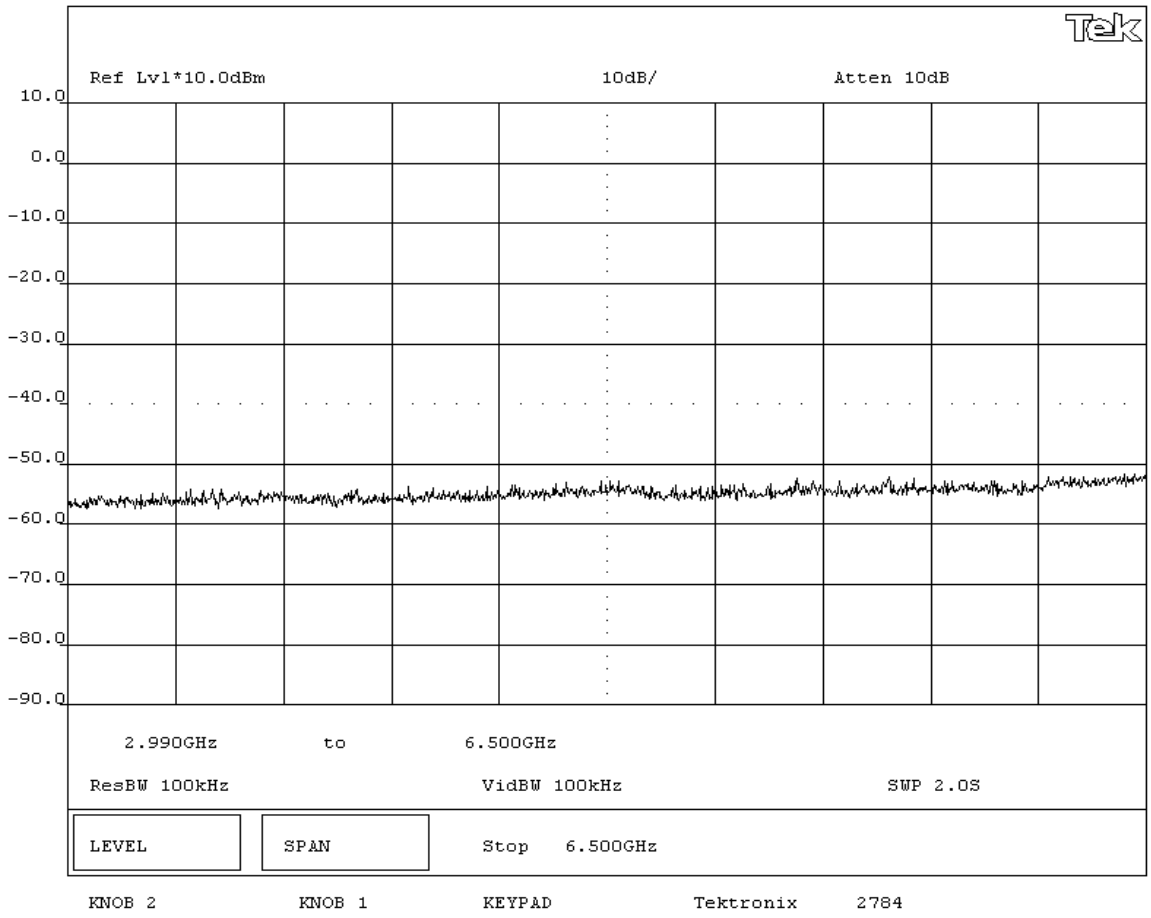
Pass

SIGNATURE

Tested By: _____

DESCRIPTION OF TEST

Antenna Conducted Spurious Emissions - Low Channel 3GHz-6.5GHz



NORTHWEST EMC

EMISSIONS DATA SHEET

Rev BETA 01/30/01

EUT:	8520-00080			Work Order:	ITRM0020
Serial Number:	4004703			Date:	05/21/04
Customer:	Intermec Technologies Corporation			Temperature:	73 F
Attendees:	none	Tested by:	Greg Kiemel	Humidity:	42%
Customer Ref. No.:	N/A	Power:	3.3 Vdc from host	Job Site:	EV06

TEST SPECIFICATIONS

Specification:	FCC 15.247(c) Spurious Cond. Em.	Year: 2003	Method: ANSI C63.4	Year: 2001	

SAMPLE CALCULATIONS

COMMENTS

EUT installed outside of Intermec Model 700C. Direct connect to antenna port

EUT OPERATING MODES

No hop mode. Modulated by PRBS at maximum data rate, at maximum output power.

DEVIATIONS FROM TEST STANDARD

None

REQUIREMENTS

Maximum level of any spurious emission outside of the authorized band is 20 dB down from the fundamental

RESULTS

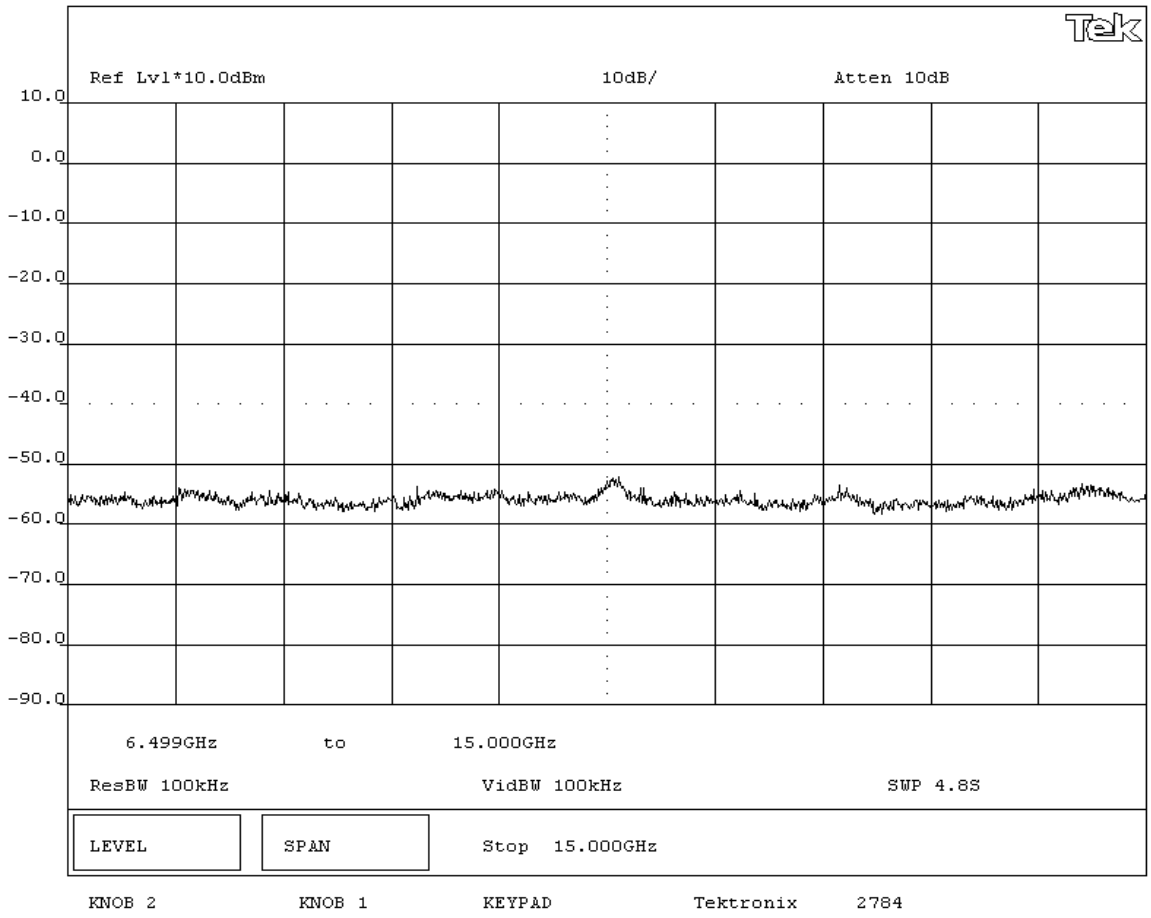
Pass

SIGNATURE

Tested By: _____

DESCRIPTION OF TEST

Antenna Conducted Spurious Emissions - Low Channel 6.5GHz-15GHz



NORTHWEST
EMC

EMISSIONS DATA SHEET

Rev BETA
01/30/01

EUT:	8520-00080			Work Order:	ITRM0020
Serial Number:	4004703			Date:	05/21/04
Customer:	Intermec Technologies Corporation			Temperature:	73 F
Attendees:	none	Tested by:	Greg Kiemel	Humidity:	42%
Customer Ref. No.:	N/A	Power:	3.3 Vdc from host	Job Site:	EV06

TEST SPECIFICATIONS

Specification:	FCC 15.247(c) Spurious Cond. Em.	Year:	2003	Method:	ANSI C63.4	Year:	2001

SAMPLE CALCULATIONS

COMMENTS

EUT installed outside of Intermec Model 700C. Direct connect to antenna port

EUT OPERATING MODES

No hop mode. Modulated by PRBS at maximum data rate, at maximum output power.

DEVIATIONS FROM TEST STANDARD

None

REQUIREMENTS

Maximum level of any spurious emission outside of the authorized band is 20 dB down from the fundamental

RESULTS

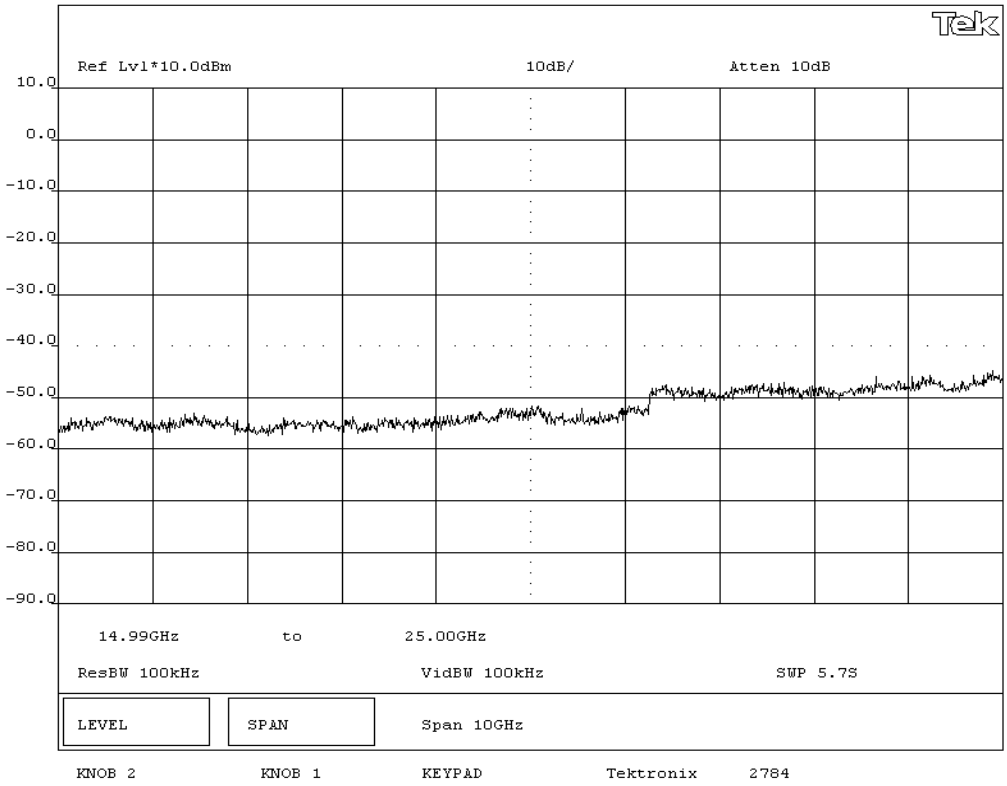
Pass

SIGNATURE

Tested By: _____

DESCRIPTION OF TEST

Antenna Conducted Spurious Emissions - Low Channel 15GHz - 25GHz



NORTHWEST EMC

EMISSIONS DATA SHEET

Rev BETA 01/30/01

EUT:	8520-00080			Work Order:	ITRM0020
Serial Number:	4004703			Date:	05/21/04
Customer:	Intermec Technologies Corporation			Temperature:	73 F
Attendees:	none	Tested by:	Greg Kiemel	Humidity:	42%
Customer Ref. No.:	N/A	Power:	3.3 Vdc from host	Job Site:	EV06

TEST SPECIFICATIONS

Specification:	FCC 15.247(c) Spurious Cond. Em.	Year: 2003	Method: ANSI C63.4	Year:	2001

SAMPLE CALCULATIONS

COMMENTS

EUT installed outside of Intermec Model 700C. Direct connect to antenna port

EUT OPERATING MODES

No hop mode. Modulated by PRBS at maximum data rate, at maximum output power.

DEVIATIONS FROM TEST STANDARD

None

REQUIREMENTS

Maximum level of any spurious emission outside of the authorized band is 20 dB down from the fundamental

RESULTS

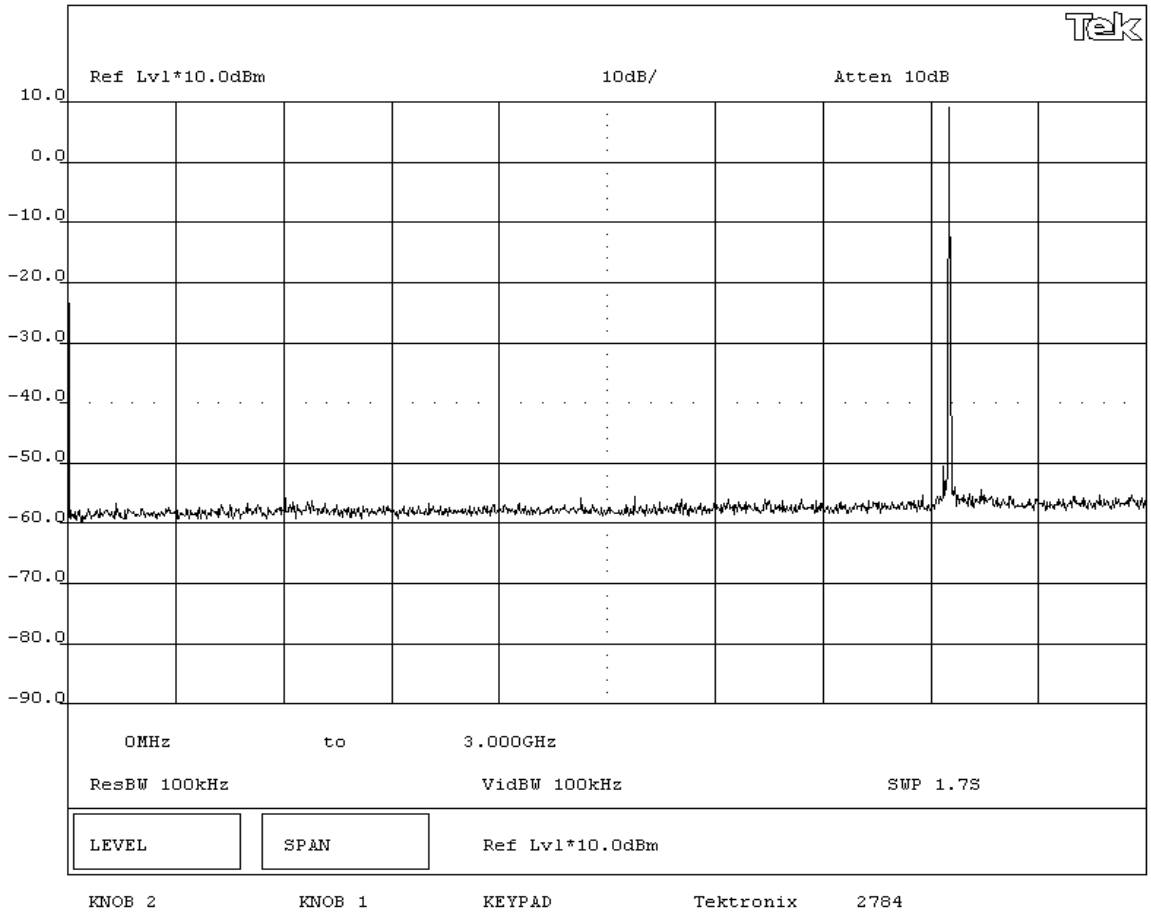
Pass

SIGNATURE

Tested By: _____

DESCRIPTION OF TEST

Antenna Conducted Spurious Emissions - Mid Channel 0MHz-3GHz



NORTHWEST EMC

EMISSIONS DATA SHEET

Rev BETA 01/30/01

EUT:	8520-00080			Work Order:	ITRM0020
Serial Number:	4004703			Date:	05/21/04
Customer:	Intermec Technologies Corporation			Temperature:	73 F
Attendees:	none	Tested by:	Greg Kiemel	Humidity:	42%
Customer Ref. No.:	N/A	Power:	3.3 Vdc from host	Job Site:	EV06

TEST SPECIFICATIONS

Specification:	FCC 15.247(c) Spurious Cond. Em.	Year: 2003	Method: ANSI C63.4	Year:	2001

SAMPLE CALCULATIONS

COMMENTS

EUT installed outside of Intermec Model 700C. Direct connect to antenna port

EUT OPERATING MODES

No hop mode. Modulated by PRBS at maximum data rate, at maximum output power.

DEVIATIONS FROM TEST STANDARD

None

REQUIREMENTS

Maximum level of any spurious emission outside of the authorized band is 20 dB down from the fundamental

RESULTS

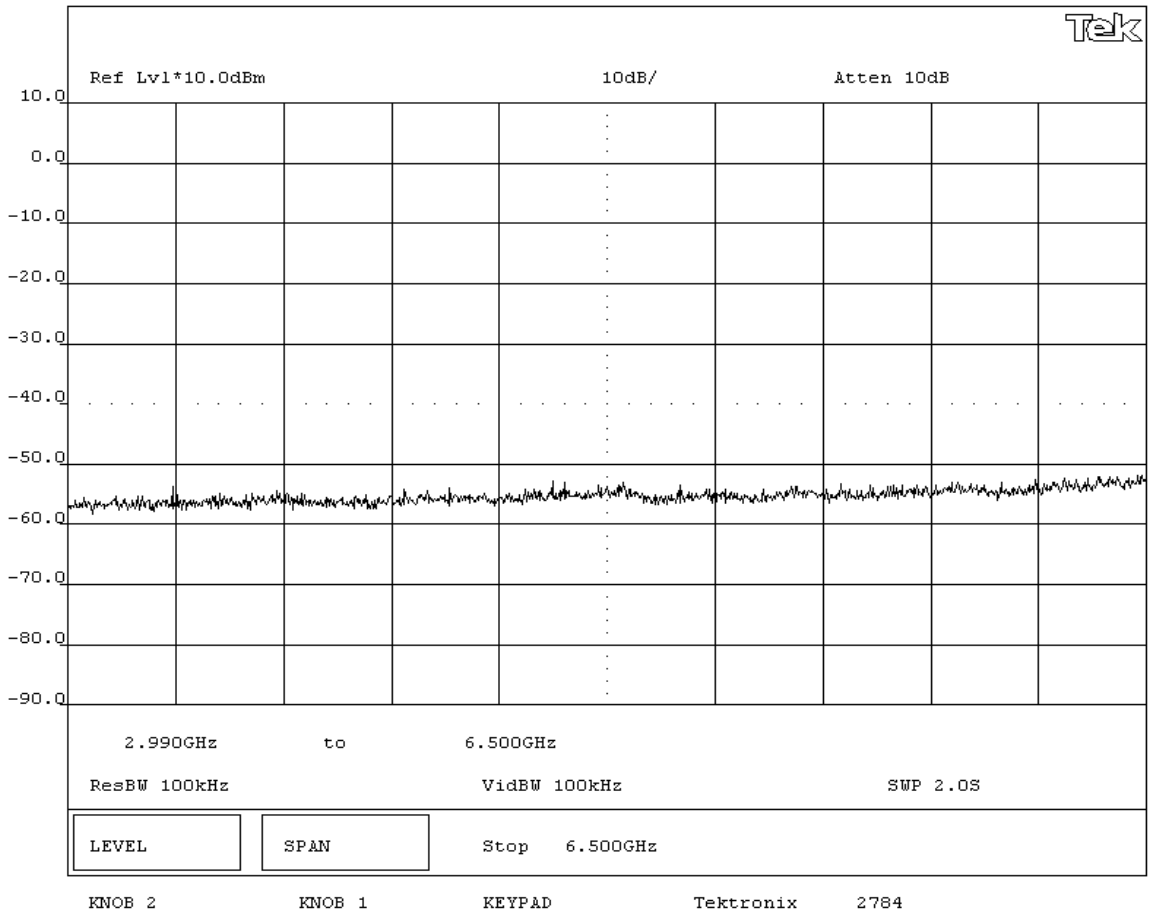
Pass

SIGNATURE

Tested By: _____

DESCRIPTION OF TEST

Antenna Conducted Spurious Emissions - Mid Channel 3GHz-6.5GHz



NORTHWEST EMC

EMISSIONS DATA SHEET

Rev BETA 01/30/01

EUT:	8520-00080			Work Order:	ITRM0020
Serial Number:	4004703			Date:	05/21/04
Customer:	Intermec Technologies Corporation			Temperature:	73 F
Attendees:	none	Tested by:	Greg Kiemel	Humidity:	42%
Customer Ref. No.:	N/A	Power:	3.3 Vdc from host	Job Site:	EV06

TEST SPECIFICATIONS

Specification:	FCC 15.247(c) Spurious Cond. Em.	Year: 2003	Method: ANSI C63.4	Year:	2001

SAMPLE CALCULATIONS

COMMENTS

EUT installed outside of Intermec Model 700C. Direct connect to antenna port

EUT OPERATING MODES

No hop mode. Modulated by PRBS at maximum data rate, at maximum output power.

DEVIATIONS FROM TEST STANDARD

None

REQUIREMENTS

Maximum level of any spurious emission outside of the authorized band is 20 dB down from the fundamental

RESULTS

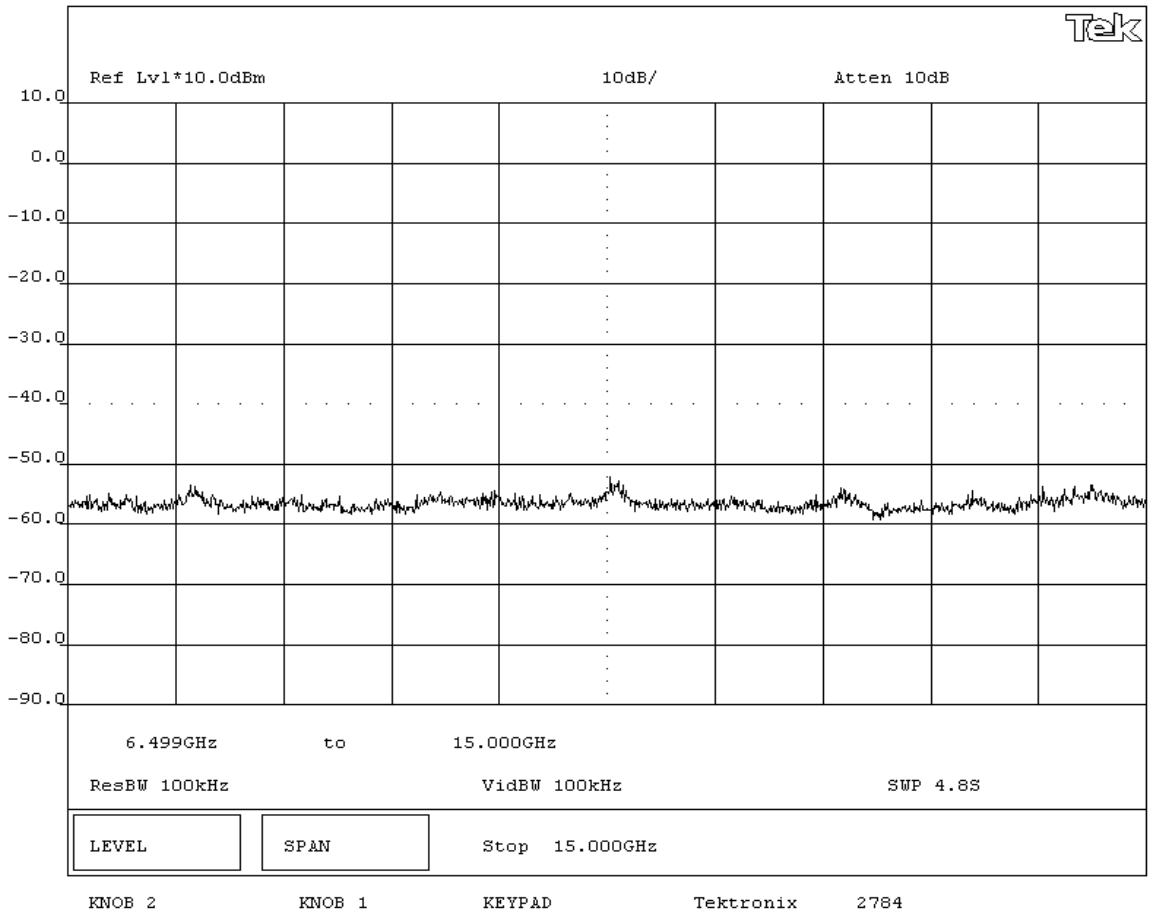
Pass

SIGNATURE

Tested By: _____

DESCRIPTION OF TEST

Antenna Conducted Spurious Emissions - Mid Channel 6.5GHz-15GHz



NORTHWEST EMC

EMISSIONS DATA SHEET

Rev BETA 01/30/01

EUT:	8520-00080			Work Order:	ITRM0020
Serial Number:	4004703			Date:	05/21/04
Customer:	Intermec Technologies Corporation			Temperature:	73 F
Attendees:	none	Tested by:	Greg Kiemel	Humidity:	42%
Customer Ref. No.:	N/A	Power:	3.3 Vdc from host	Job Site:	EV06

TEST SPECIFICATIONS

Specification:	FCC 15.247(c) Spurious Cond. Em.	Year: 2003	Method: ANSI C63.4	Year:	2001

SAMPLE CALCULATIONS

COMMENTS

EUT installed outside of Intermec Model 700C. Direct connect to antenna port

EUT OPERATING MODES

No hop mode. Modulated by PRBS at maximum data rate, at maximum output power.

DEVIATIONS FROM TEST STANDARD

None

REQUIREMENTS

Maximum level of any spurious emission outside of the authorized band is 20 dB down from the fundamental

RESULTS

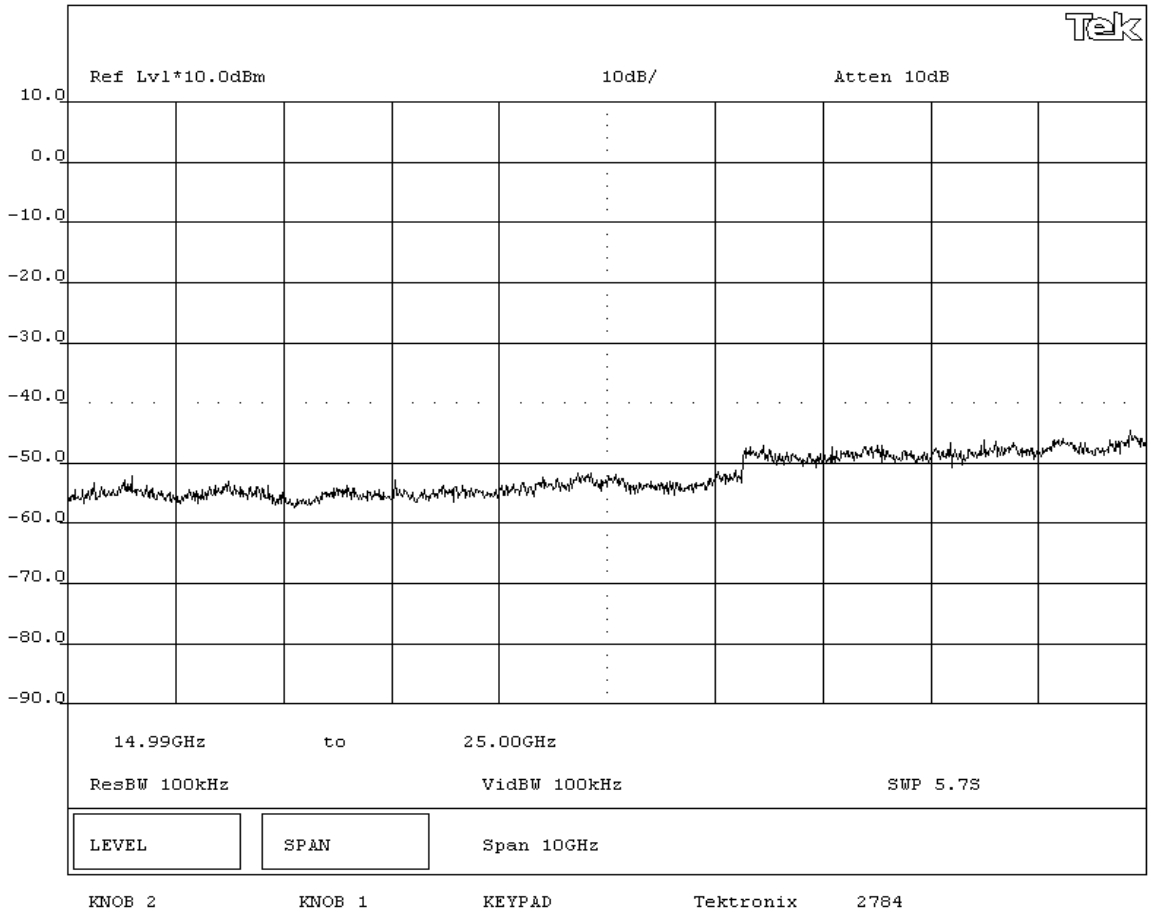
Pass

SIGNATURE

Tested By: _____

DESCRIPTION OF TEST

Antenna Conducted Spurious Emissions - Mid Channel 15GHz-25GHz



NORTHWEST EMC

EMISSIONS DATA SHEET

Rev BETA 01/30/01

EUT:	8520-00080			Work Order:	ITRM0020
Serial Number:	4004703			Date:	05/21/04
Customer:	Intermec Technologies Corporation			Temperature:	73 F
Attendees:	none	Tested by:	Greg Kiemel	Humidity:	42%
Customer Ref. No.:	N/A	Power:	3.3 Vdc from host	Job Site:	EV06

TEST SPECIFICATIONS

Specification:	FCC 15.247(c) Spurious Cond. Em.	Year: 2003	Method: ANSI C63.4	Year:	2001

SAMPLE CALCULATIONS

COMMENTS

EUT installed outside of Intermec Model 700C. Direct connect to antenna port

EUT OPERATING MODES

No hop mode. Modulated by PRBS at maximum data rate, at maximum output power.

DEVIATIONS FROM TEST STANDARD

None

REQUIREMENTS

Maximum level of any spurious emission outside of the authorized band is 20 dB down from the fundamental

RESULTS

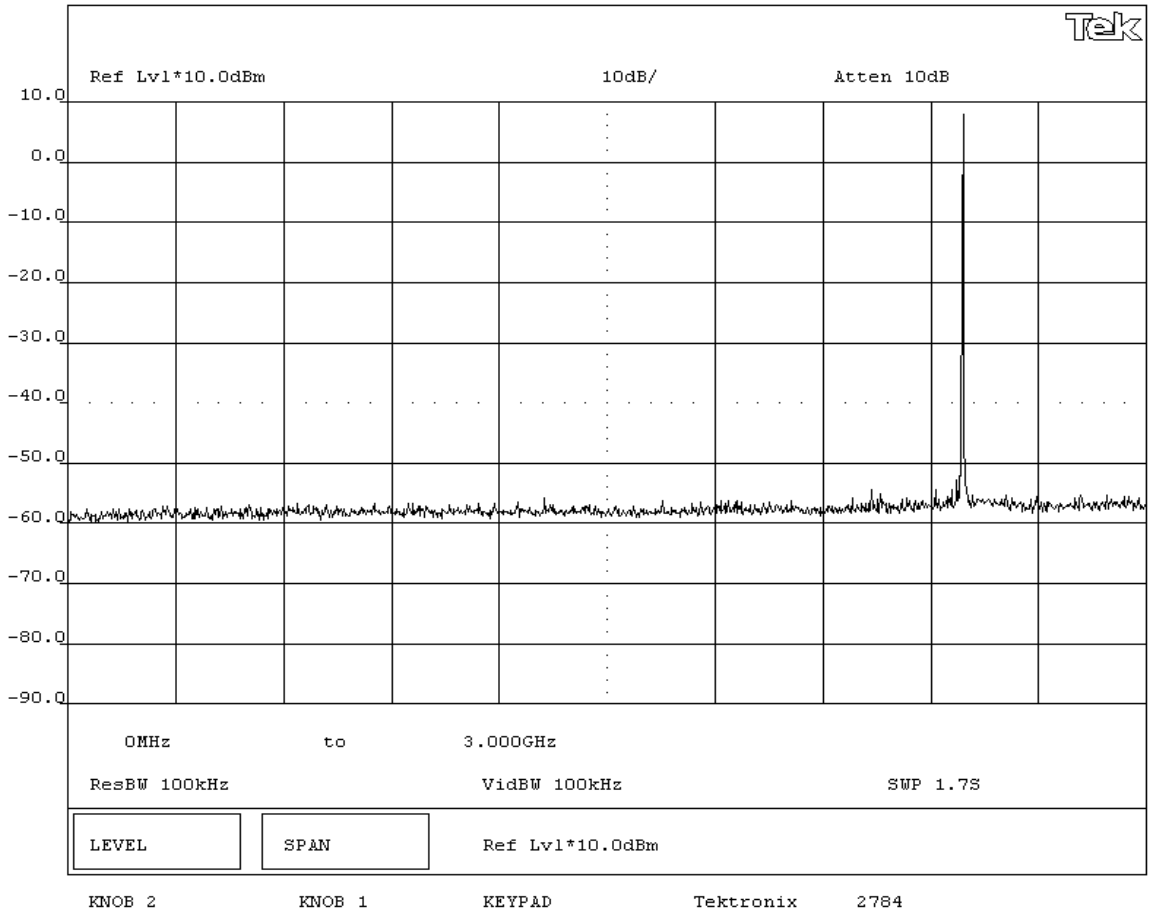
Pass

SIGNATURE

Tested By: _____

DESCRIPTION OF TEST

Antenna Conducted Spurious Emissions - High Channel 0MHz-3GHz



NORTHWEST EMC

EMISSIONS DATA SHEET

Rev BETA 01/30/01

EUT:	8520-00080			Work Order:	ITRM0020
Serial Number:	4004703			Date:	05/21/04
Customer:	Intermec Technologies Corporation			Temperature:	73 F
Attendees:	none	Tested by:	Greg Kiemel	Humidity:	42%
Customer Ref. No.:	N/A	Power:	3.3 Vdc from host	Job Site:	EV06

TEST SPECIFICATIONS

Specification:	FCC 15.247(c) Spurious Cond. Em.	Year: 2003	Method:	ANSI C63.4	Year: 2001

SAMPLE CALCULATIONS

COMMENTS

EUT installed outside of Intermec Model 700C. Direct connect to antenna port

EUT OPERATING MODES

No hop mode. Modulated by PRBS at maximum data rate, at maximum output power.

DEVIATIONS FROM TEST STANDARD

None

REQUIREMENTS

Maximum level of any spurious emission outside of the authorized band is 20 dB down from the fundamental

RESULTS

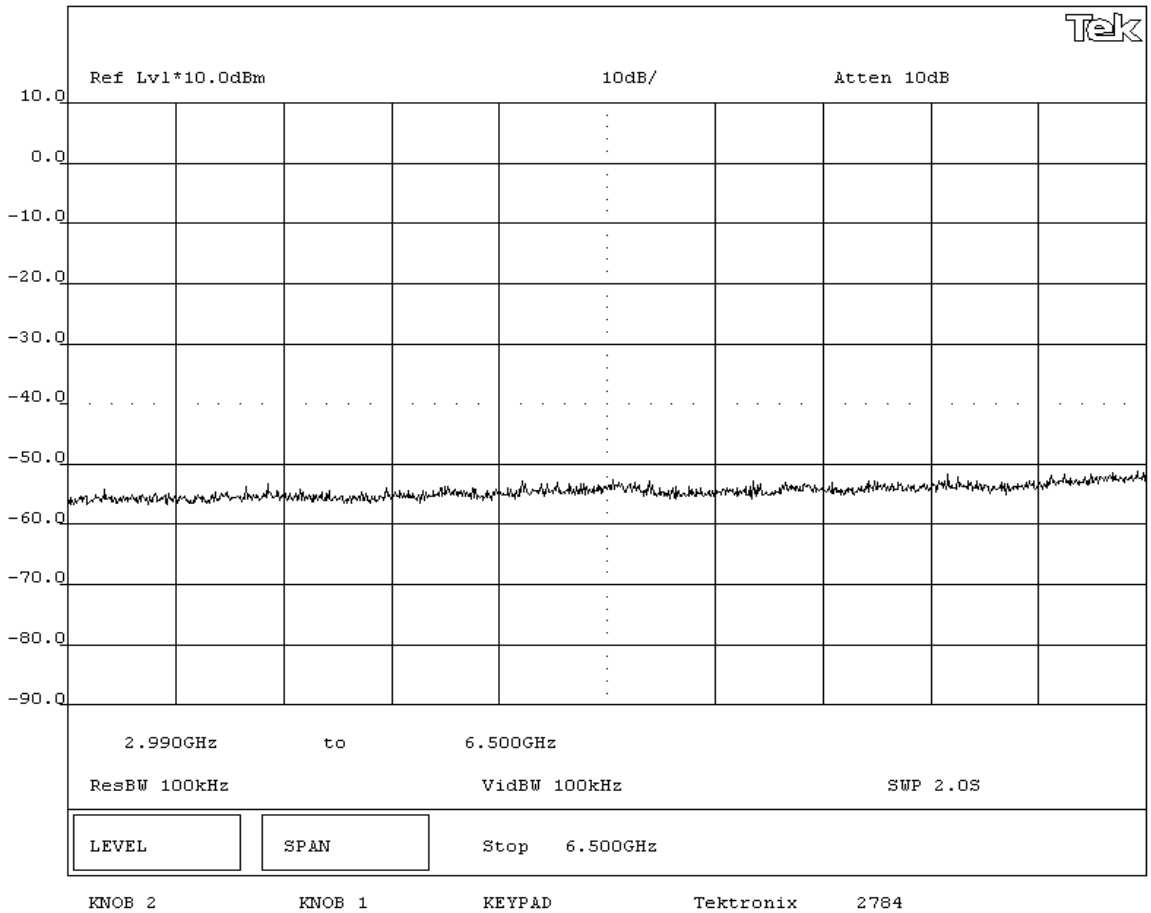
Pass

SIGNATURE

Tested By: A. U. Kiemel

DESCRIPTION OF TEST

Antenna Conducted Spurious Emissions - High Channel 3GHz-6.5GHz



NORTHWEST EMC

EMISSIONS DATA SHEET

Rev BETA 01/30/01

EUT:	8520-00080			Work Order:	ITRM0020
Serial Number:	4004703			Date:	05/21/04
Customer:	Intermec Technologies Corporation			Temperature:	73 F
Attendees:	none	Tested by:	Greg Kiemel	Humidity:	42%
Customer Ref. No.:	N/A	Power:	3.3 Vdc from host	Job Site:	EV06

TEST SPECIFICATIONS

Specification:	FCC 15.247(c) Spurious Cond. Em.	Year: 2003	Method:	ANSI C63.4	Year: 2001

SAMPLE CALCULATIONS

COMMENTS

EUT installed outside of Intermec Model 700C. Direct connect to antenna port

EUT OPERATING MODES

No hop mode. Modulated by PRBS at maximum data rate, at maximum output power.

DEVIATIONS FROM TEST STANDARD

None

REQUIREMENTS

Maximum level of any spurious emission outside of the authorized band is 20 dB down from the fundamental

RESULTS

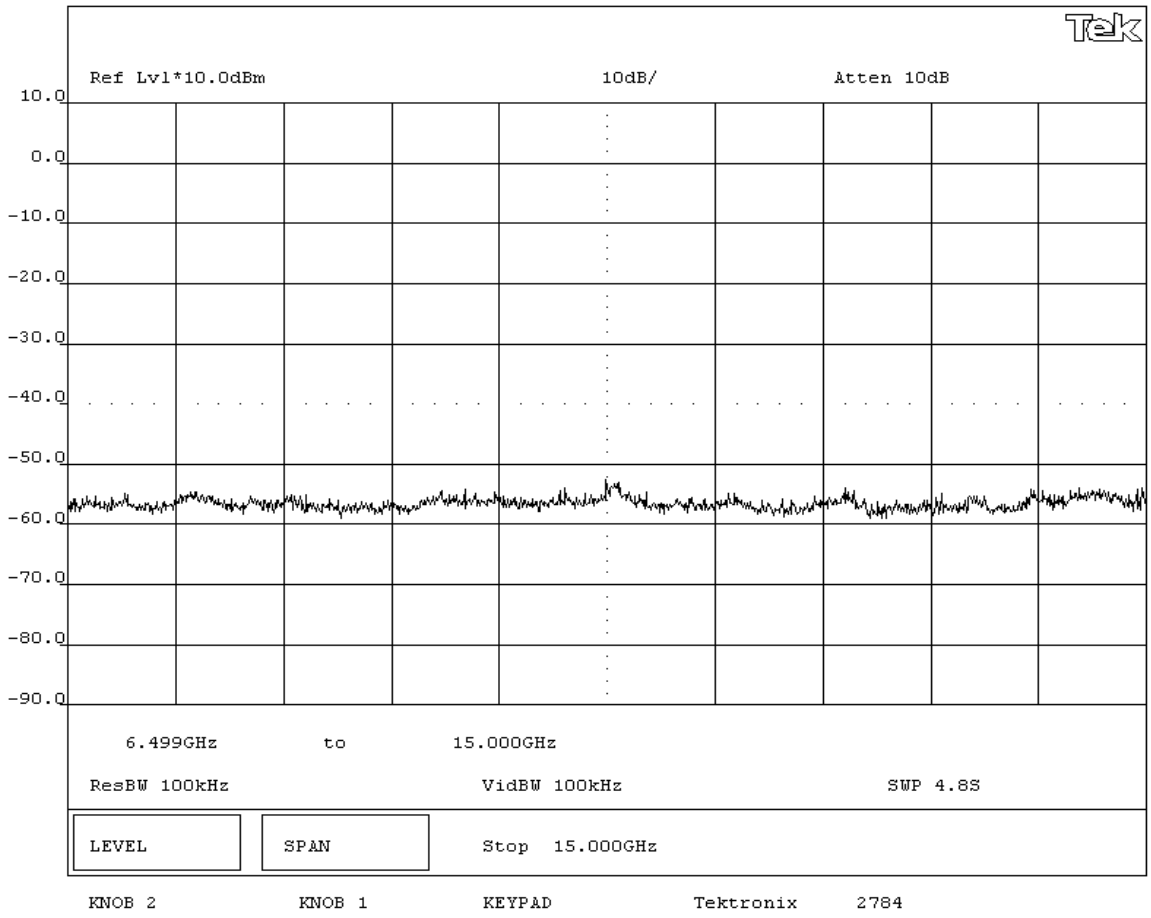
Pass

SIGNATURE

Tested By: _____

DESCRIPTION OF TEST

Antenna Conducted Spurious Emissions - High Channel 6.5GHz-15GHz



NORTHWEST EMC

EMISSIONS DATA SHEET

Rev BETA 01/30/01

EUT:	8520-00080			Work Order:	ITRM0020
Serial Number:	4004703			Date:	05/21/04
Customer:	Intermec Technologies Corporation			Temperature:	73 F
Attendees:	none	Tested by:	Greg Kiemel	Humidity:	42%
Customer Ref. No.:	N/A	Power:	3.3 Vdc from host	Job Site:	EV06

TEST SPECIFICATIONS

Specification:	FCC 15.247(c) Spurious Cond. Em.	Year: 2003	Method: ANSI C63.4	Year:	2001

SAMPLE CALCULATIONS

COMMENTS

EUT installed outside of Intermec Model 700C. Direct connect to antenna port

EUT OPERATING MODES

No hop mode. Modulated by PRBS at maximum data rate, at maximum output power.

DEVIATIONS FROM TEST STANDARD

None

REQUIREMENTS

Maximum level of any spurious emission outside of the authorized band is 20 dB down from the fundamental

RESULTS

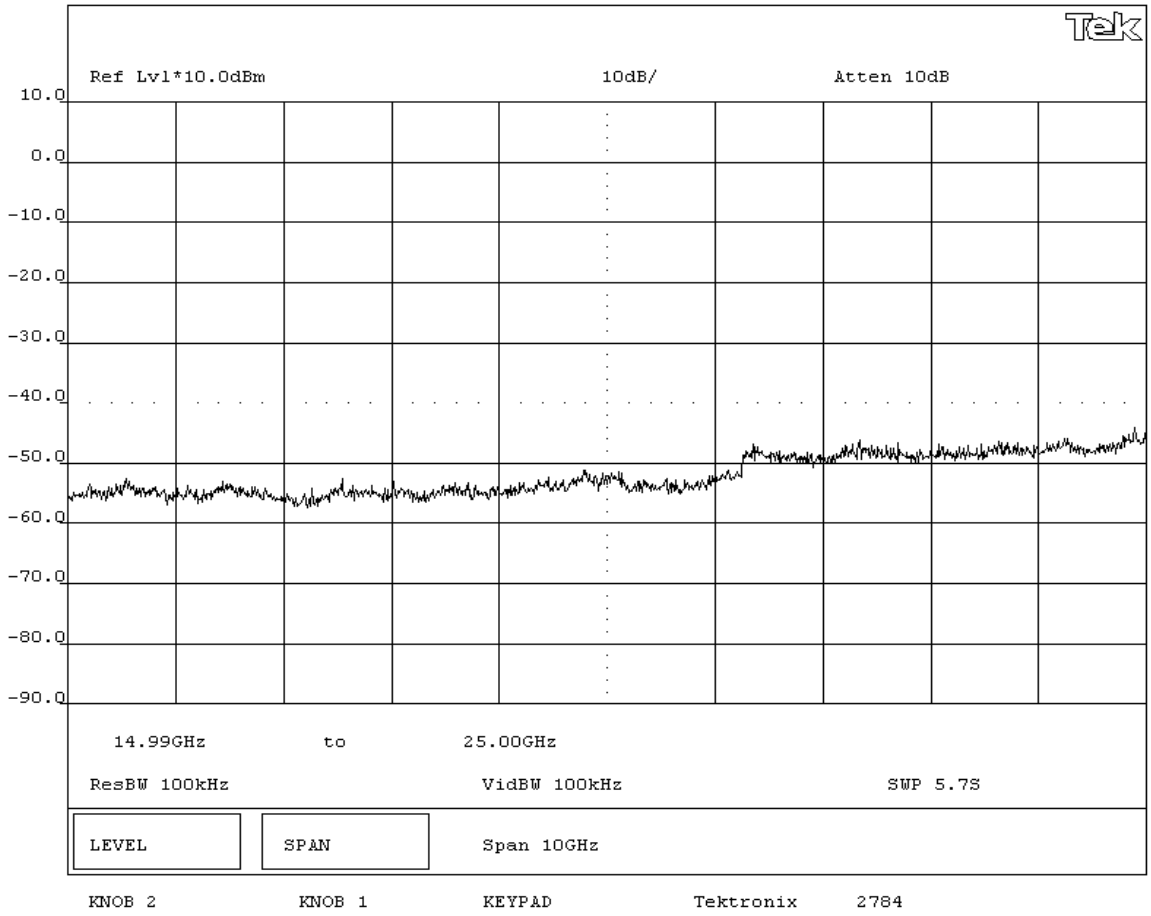
Pass

SIGNATURE

Tested By: _____

DESCRIPTION OF TEST

Antenna Conducted Spurious Emissions - High Channel 15GHz-25GHz



Justification

The individuals and/or the organization requesting the test provided the modes, configurations and settings available to evaluate. While scanning the radiated emissions, all of the EUT parameters listed below were investigated. This includes, but may not be limited to, antennas, tuned transmit frequency ranges, operating modes, and data rates.

Channels in Specified Band Investigated:
High
Mid
Low

Operating Modes Investigated:
No Hop

Data Rates Investigated:
Maximum

Output Power Setting(s) Investigated:
Maximum

Power Input Settings Investigated:
120 VAC, 60 Hz.

Other Settings Investigated:
Bluetooth only

Software\Firmware Applied During Test			
Exercise software	FCC_Smart	**Version**	Unknown
Description			
The system was tested using special test software to exercise the functions of the device during the testing including channels, data rates, and output power.			

EUT and Peripherals			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Bluetooth Radio (EUT)	Intermec Technologies Corporation	8520-00080	4004703
Handheld Radio/Scanner (Host)	Intermec Technologies Corporation	700C	05400400869
Power Adapter	Elpac Power Systems	FW1812	014852

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
DC Leads	PA	1.8	PA	Handheld Radio/Scanner	Power Adapter
AC Power	No	1.8	No	Power Adapter	AC Mains
PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.					

Measurement Equipment					
Description	**Manufacturer**	**Model**	**Identifier**	**Last Cal**	**Interval**
Spectrum Analyzer	Tektronix	2784	AAO	02/26/2003	24 mo

Test Description

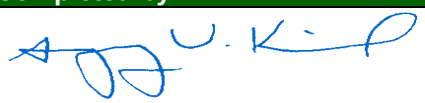
Requirement: Per 47 CFR 15.247(d), the peak power spectral density conducted from the antenna port of a direct sequence transmitter must not be greater than +8 dBm in any 3 kHz band during any time interval of continuous transmission.

Configuration: The peak power spectral density measurements were measured with the EUT set to low, mid, and high transmit frequencies. The measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer. The EUT was transmitting at its maximum data rate. Per the procedure outlined in FCC 97-114, the spectrum analyzer was used as follows:

> The emission peak(s) were located and zoom in on within the passband. The resolution bandwidth was set to 3 kHz, the video bandwidth was set to greater than or equal to the resolution bandwidth. The sweep speed was set equal to the span divided by 3 kHz (sweep = (SPAN/3 kHz)). For example, given a span of 1.5 MHz, the sweep should be 1.5 x 106 ÷ 3 x 103 = 500 seconds. External attenuation was used and added to the reading. The following FCC procedure was used for modifying the power spectral density measurements:

"If the spectrum line spacing cannot be resolved on the available spectrum analyzer, the noise density function on most modern conventional spectrum analyzers will directly measure the noise power density normalized to a 1 Hz noise power bandwidth. Add 34.8 dB for correction to 3 kHz."

Completed by:



NORTHWEST EMC

EMISSIONS DATA SHEET

Rev BETA 01/30/01

EUT:	8520-00080			Work Order:	ITRM0020
Serial Number:	4004703			Date:	05/21/04
Customer:	Intermec Technologies Corporation			Temperature:	73 F
Attendees:	none	Tested by:	Greg Kiemel	Humidity:	42%
Customer Ref. No.:	N/A	Power:	3.3 Vdc from host	Job Site:	EV06

TEST SPECIFICATIONS

Specification:	FCC 15.247(d) Power Spectral Density	Year: 2003	Method: ANSI C63.4	Year:	2001

SAMPLE CALCULATIONS

Meter reading on spectrum analyzer is internally compensated for cable loss and external attenuation.
Power Spectral Density per 3kHz bandwidth = Power Spectral Density per 1 Hz bandwidth + Bandwidth Correction Factor.
Bandwidth Correction Factor = 10*log(3 kHz / 1 Hz) = 34.8 dB

COMMENTS

EUT installed outside of Intermec Model 700C. Direct connect to antenna port

EUT OPERATING MODES

No hop mode. Modulated by PRBS at maximum data rate, at maximum output power.

DEVIATIONS FROM TEST STANDARD

None

REQUIREMENTS

Maximum peak power spectral density conducted from a DTS transmitter does not exceed 8 dBm in any 3 kHz band

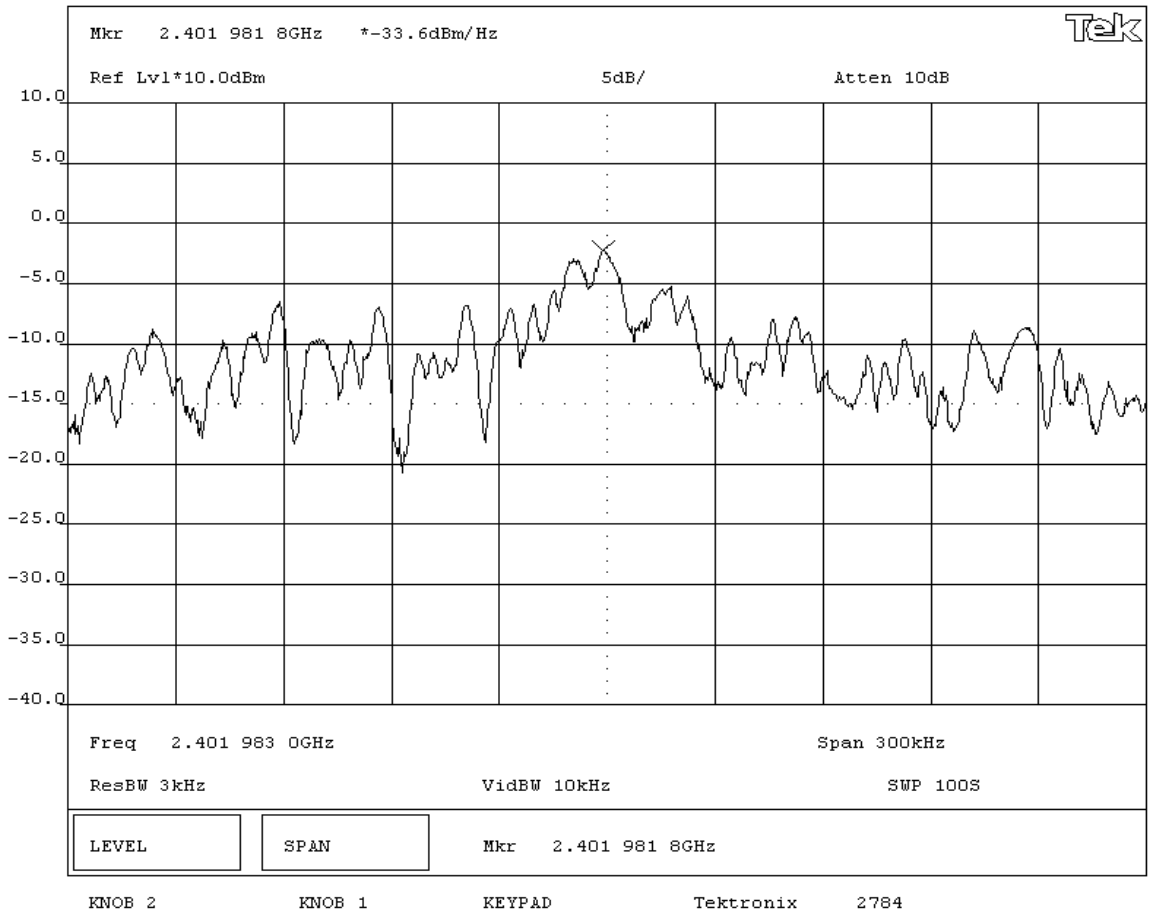
RESULTS	AMPLITUDE
Pass	Power Spectral Density = +1.2 dBm / 3kHz

SIGNATURE

Tested By: _____

DESCRIPTION OF TEST

Power Spectral Density - Low Channel



NORTHWEST EMC

EMISSIONS DATA SHEET

Rev BETA 01/30/01

EUT:	8520-00080			Work Order:	ITRM0020
Serial Number:	4004703			Date:	05/21/04
Customer:	Intermec Technologies Corporation			Temperature:	73 F
Attendees:	none	Tested by:	Greg Kiemel	Humidity:	42%
Customer Ref. No.:	N/A	Power:	3.3 Vdc from host	Job Site:	EV06

TEST SPECIFICATIONS

Specification:	FCC 15.247(d) Power Spectral Density	Year: 2003	Method: ANSI C63.4	Year:	2001

SAMPLE CALCULATIONS

Meter reading on spectrum analyzer is internally compensated for cable loss and external attenuation.
Power Spectral Density per 3kHz bandwidth = Power Spectral Density per 1 Hz bandwidth + Bandwidth Correction Factor.
Bandwidth Correction Factor = 10*log(3 kHz / 1 Hz) = 34.8 dB

COMMENTS

EUT installed outside of Intermec Model 700C. Direct connect to antenna port

EUT OPERATING MODES

No hop mode. Modulated by PRBS at maximum data rate, at maximum output power.

DEVIATIONS FROM TEST STANDARD

None

REQUIREMENTS

Maximum peak power spectral density conducted from a DTS transmitter does not exceed 8 dBm in any 3 kHz band

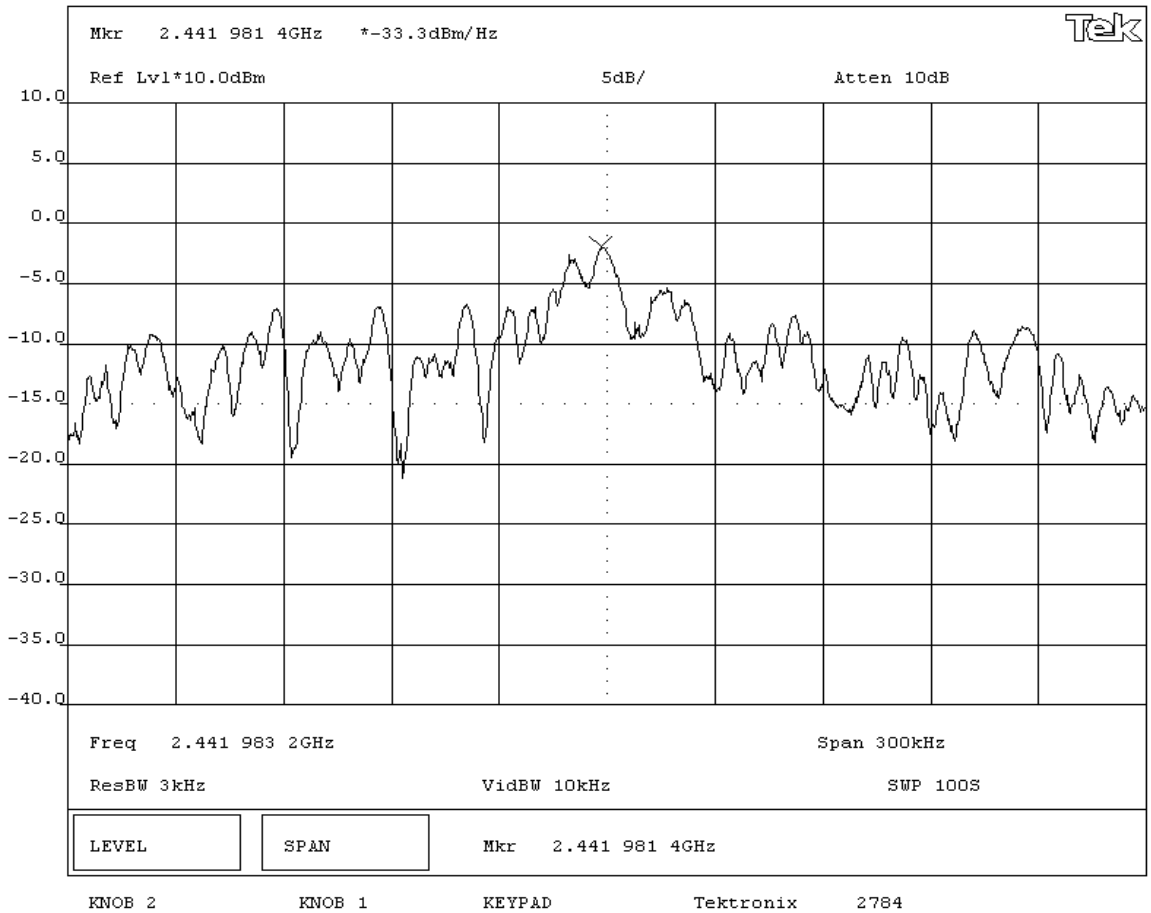
RESULTS	AMPLITUDE
Pass	Power Spectral Density = +1.5 dBm / 3kHz

SIGNATURE

Tested By: A. U. Kiemel

DESCRIPTION OF TEST

Power Spectral Density - Mid Channel



NORTHWEST EMC

EMISSIONS DATA SHEET

Rev BETA 01/30/01

EUT:	8520-00080			Work Order:	ITRM0020
Serial Number:	4004703			Date:	05/21/04
Customer:	Intermec Technologies Corporation			Temperature:	73 F
Attendees:	none	Tested by:	Greg Kiemel	Humidity:	42%
Customer Ref. No.:	N/A	Power:	3.3 Vdc from host	Job Site:	EV06

TEST SPECIFICATIONS

Specification:	FCC 15.247(d) Power Spectral Density	Year: 2003	Method: ANSI C63.4	Year:	2001

SAMPLE CALCULATIONS

Meter reading on spectrum analyzer is internally compensated for cable loss and external attenuation.
Power Spectral Density per 3kHz bandwidth = Power Spectral Density per 1 Hz bandwidth + Bandwidth Correction Factor.
Bandwidth Correction Factor = 10*log(3 kHz / 1 Hz) = 34.8 dB

COMMENTS

EUT installed outside of Intermec Model 700C. Direct connect to antenna port

EUT OPERATING MODES

No hop mode. Modulated by PRBS at maximum data rate, at maximum output power.

DEVIATIONS FROM TEST STANDARD

None

REQUIREMENTS

Maximum peak power spectral density conducted from a DTS transmitter does not exceed 8 dBm in any 3 kHz band

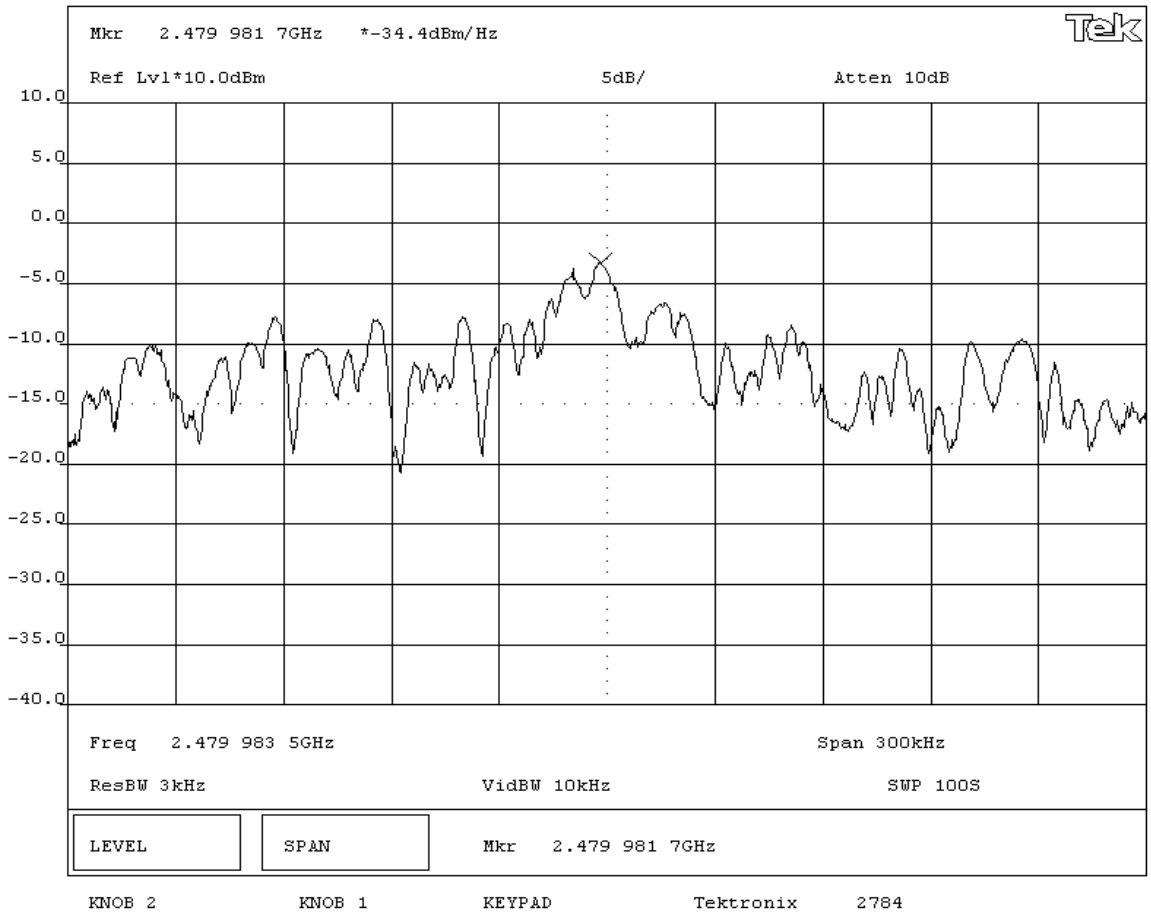
RESULTS	AMPLITUDE
Pass	Power Spectral Density = +0.4 dBm / 3kHz

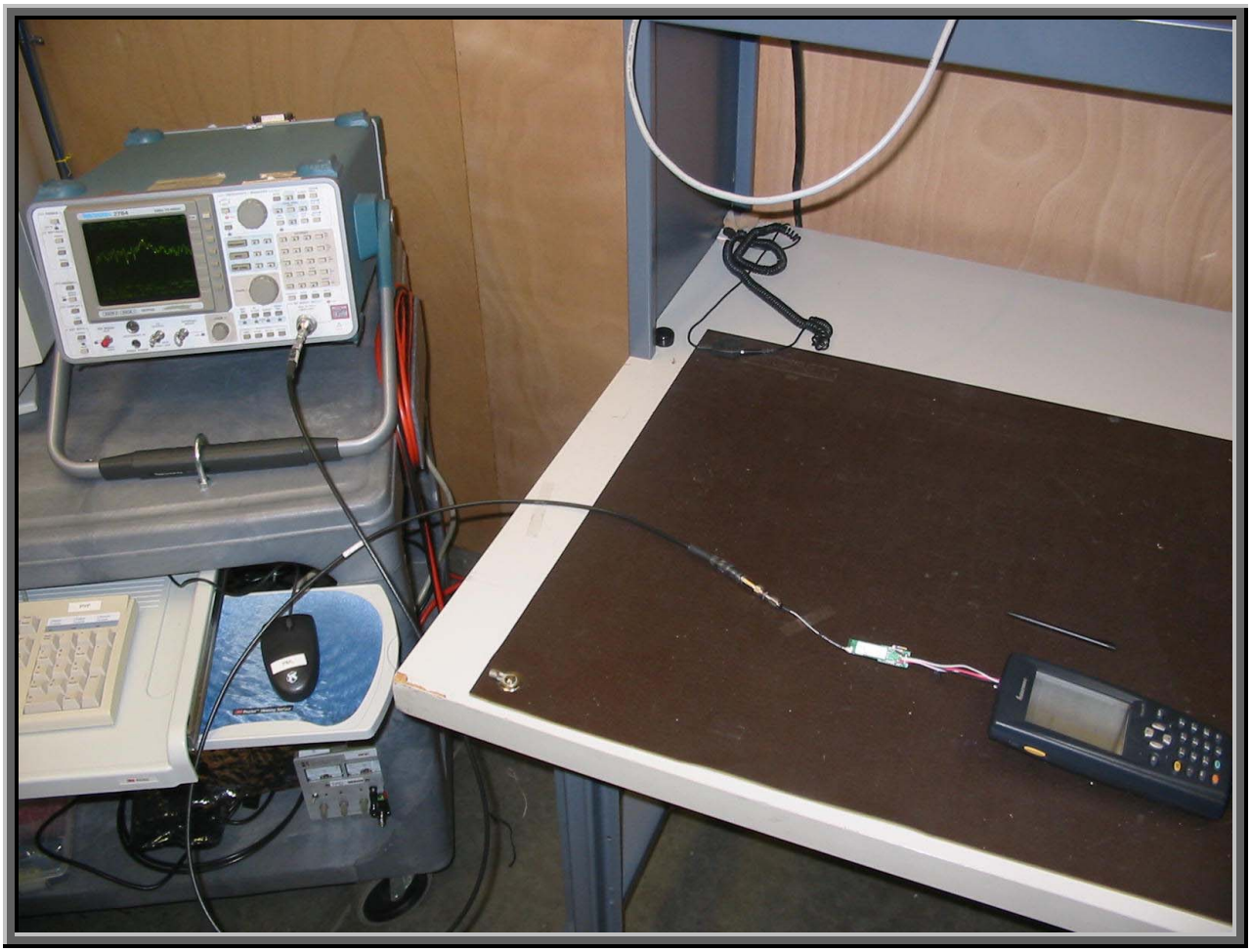
SIGNATURE

Tested By: A. U. Kiel

DESCRIPTION OF TEST

Power Spectral Density - High Channel





Justification

The individuals and/or the organization requesting the test provided the modes, configurations and settings available to evaluate. While scanning the radiated emissions, all of the EUT parameters listed below were investigated. This includes, but may not be limited to, antennas, tuned transmit frequency ranges, operating modes, and data rates.

Channels in Specified Band Investigated:
High
Mid
Low

Operating Modes Investigated:
No Hop

Antennas Investigated:
integral

Data Rates Investigated:
Maximum

Output Power Setting(s) Investigated:
Maximum

Power Input Settings Investigated:
120 VAC, 60 Hz.

Frequency Range Investigated			
Start Frequency	30 MHz	**Stop Frequency**	25 GHz

Software\Firmware Applied During Test			
Exercise software	Blue Test	**Version**	Unknown
Description			
The system was tested using special test software to exercise the functions of the device during the testing such as channels, power, and modulation.			

EUT and Peripherals			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Radio	Intermec Technologies Corporation	8520-0080	Unknown
Printer	Intermec Technologies Corporation	6820	N/A
AC Adapter	Intermec Technologies Corporation	851-064-001	0001771

Remote Equipment Outside of Test Setup Boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Remote laptop	Dell	TS30G	7247346BYK0204A
Equipment isolated from the EUT so as not to contribute to the measurement result is considered to be outside the test setup boundary			

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
AC Power	No	2.0	No	AC Adapter	AC Mains
DC Leads	PA	1.8	PA	Printer	AC Adapter
Serial	Yes	4.0	No	Printer	Remote laptop
PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.					

Measurement Equipment					
Description	**Manufacturer**	**Model**	**Identifier**	**Last Cal**	**Interval**
Spectrum Analyzer	Hewlett-Packard	8566B	AAL	12/23/2003	13 mo
Quasi-Peak Adapter	Hewlett-Packard	85650A	AQD	02/10/2004	13 mo
Antenna, Biconilog	EMCO	3141	AXE	12/03/2003	24 mo
Pre-Amplifier	Amplifier Research	LN1000A	APS	02/05/2004	13 mo
Antenna, Horn	EMCO	3115	AHC	09/18/2003	12 mo
Pre-Amplifier	Miteq	AMF-4D-005180-24-10P	APC	10/08/2003	12 mo
Antenna, Horn	EMCO	3160-08	AHK	NCR	NA
Pre-Amplifier	Miteq	AMF-4D-005180-24-10P	APJ	01/05/2004	13 mo
High Pass Filter	Micro-Tronics	HPM50111	HFO	04/13/2004	13 mo
Spectrum Analyzer	Tektronix	2784	AAO	02/26/2003	24 mo
Antenna, Horn	EMCO	3160-09	AHG	NCR	NA
Pre-Amplifier	Miteq	JSD4-18002600-26-8P	APU	10/08/2003	12 mo

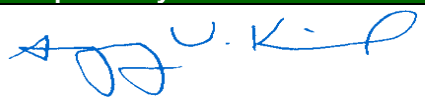
Test Description

Requirement: The field strength of any spurious emissions or modulation products that fall in a restricted band, as defined in 47 CFR 15.205, is measured. The peak level must comply with the limits specified in 47 CFR 15.35(b). The average level (taken with a 10Hz VBW) must comply with the limits specified in 15.209.

Configuration: The integral antenna to be used with the EUT was tested. The EUT was configured for low, mid, and high band transmit frequencies. For each configuration, the spectrum was scanned throughout the specified range. In addition, measurements were made in the restricted bands to verify compliance. While scanning, emissions from the EUT were maximized by rotating the EUT on a turntable, adjusting the position of the EUT in three orthogonal axis, and adjusting measurement antenna height and polarization (per ANSI C63.4:2001). A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

Bandwidths Used for Measurements			
Frequency Range (MHz)	**Peak Data (kHz)**	**Quasi-Peak Data (kHz)**	**Average Data (kHz)**
0.01 – 0.15	1.0	0.2	0.2
0.15 – 30.0	10.0	9.0	9.0
30.0 – 1000	100.0	120.0	120.0
Above 1000	1000.0	N/A	1000.0
Measurements were made using the bandwidths and detectors specified. No video filter was used.			

Completed by:



NORTHWEST EMC

RADIATED EMISSIONS DATA SHEET

REV df4.13 05/06/2004

EUT:	8520-00080			Work Order:	ITRM0026
Serial Number:				Date:	05/13/04
Customer:	Intermec Technologies Corporation			Temperature:	77
Attendees:	none			Humidity:	34%
Cust. Ref. No.:				Barometric Pressure	30.03
Tested by:	Holly Ashkannejhad	Power:	120VAC, 60Hz	Job Site:	EV01

TEST SPECIFICATIONS

Specification:	FCC 15.247(c) Spurious Radiated Emissions	Year:	2003
Method:	ANSI C63.4	Year:	2001

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator

COMMENTS

Bluetooth radio installed in 6820 Printer.

EUT OPERATING MODES

Bluetooth High channel

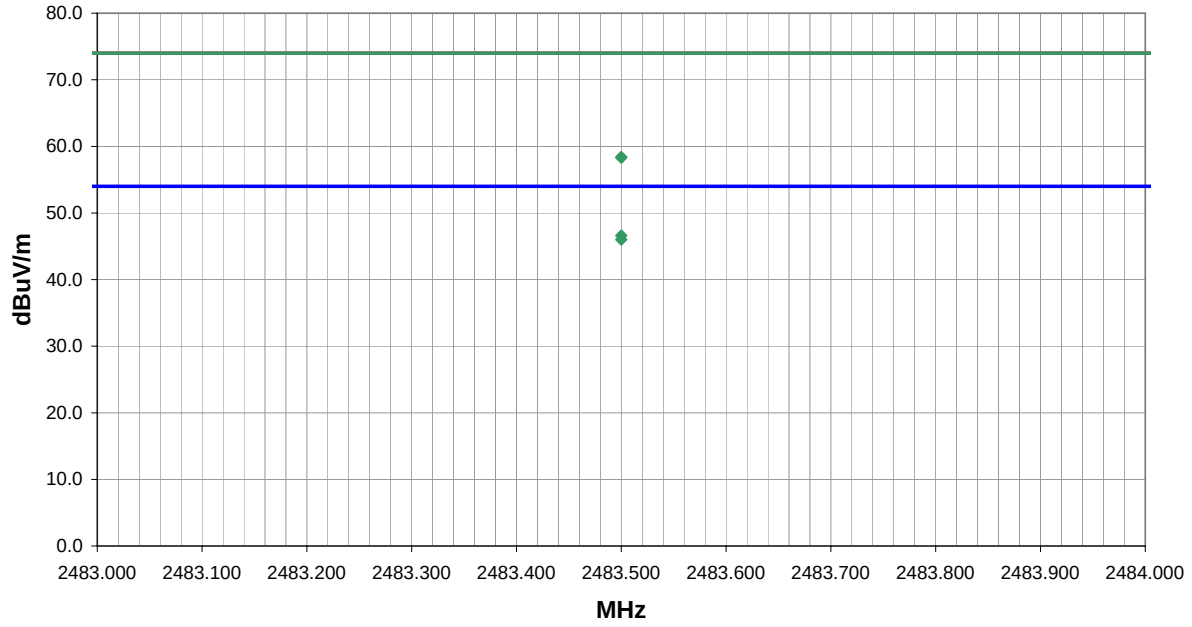
DEVIATIONS FROM TEST STANDARD

No deviations.

RESULTS	Run #
Pass	2

Other

Tested By:



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Distance (meters)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)
2483.500	29.1	-2.5	110.0	3.5	3.0	20.0	H-Horn	AV	0.0	46.6	54.0	-7.4
2483.500	28.5	-2.5	250.0	1.2	3.0	20.0	V-Horn	AV	0.0	46.0	54.0	-8.0
2483.500	40.9	-2.5	110.0	3.5	3.0	20.0	H-Horn	PK	0.0	58.4	74.0	-15.6
2483.500	40.8	-2.5	250.0	1.2	3.0	20.0	V-Horn	PK	0.0	58.3	74.0	-15.7

NORTHWEST EMC

RADIATED EMISSIONS DATA SHEET

REV df4.13 05/06/2004

EUT:	8520-00080			Work Order:	ITRM0026
Serial Number:				Date:	05/14/04
Customer:	Intermec Technologies Corporation			Temperature:	73
Attendees:	none			Humidity:	38%
Cust. Ref. No.:				Barometric Pressure	30.17
Tested by:	Greg Kiemel	Power:	120VAC, 60Hz	Job Site:	EV01

TEST SPECIFICATIONS

Specification:	FCC 15.247(c) Spurious Radiated Emissions	Year:	2003
Method:	ANSI C63.4	Year:	2001

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator

COMMENTS

Bluetooth radio installed in 6820 Printer.

EUT OPERATING MODES

Bluetooth Low channel

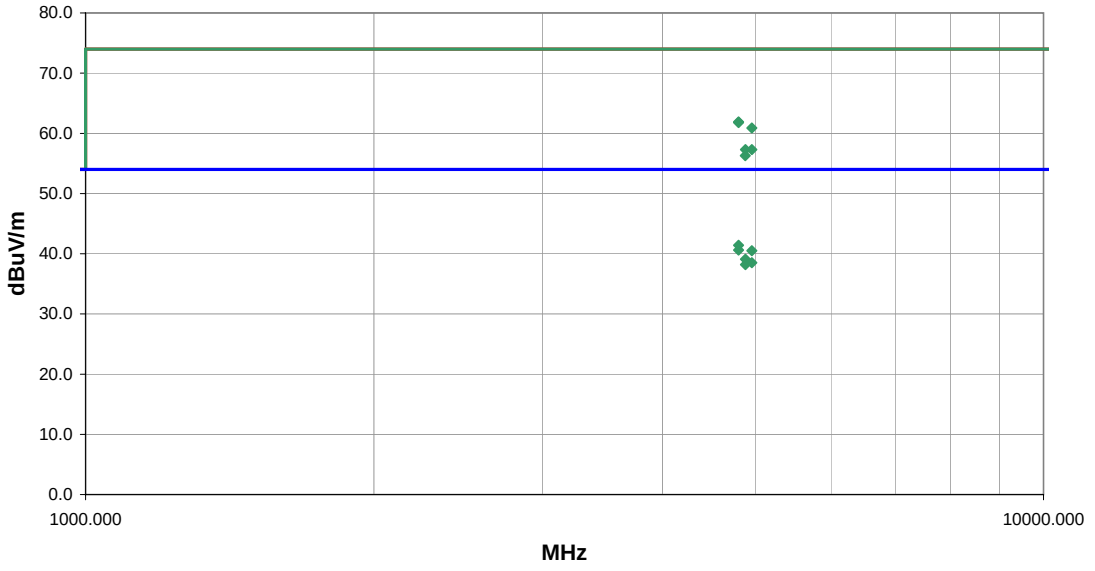
DEVIATIONS FROM TEST STANDARD

No deviations.

RESULTS	Run #
Pass	4

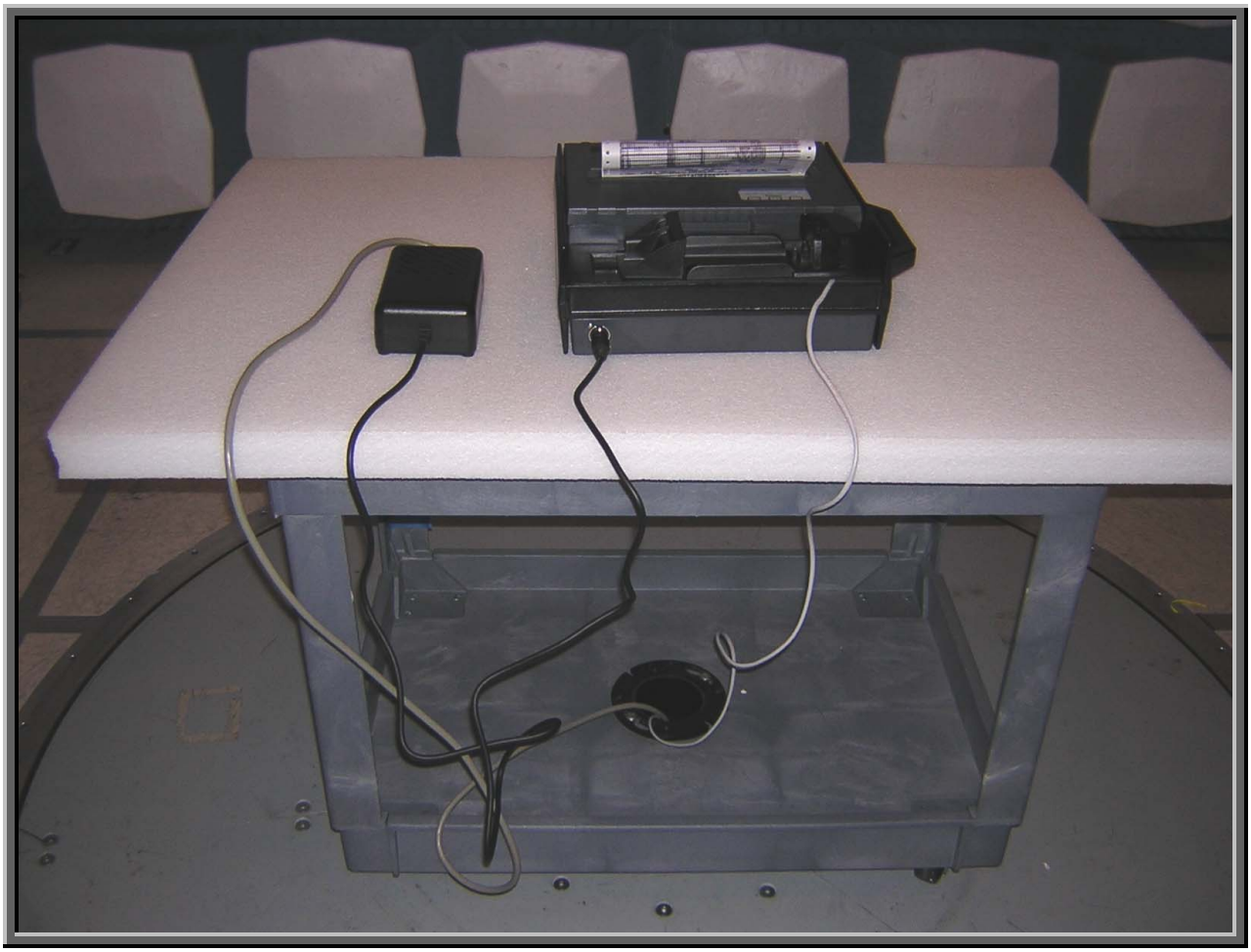
Other

Tested By:



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Distance (meters)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)	Comments
4803.971	58.6	3.3	262.0	1.3	3.0	0.0	H-Horn	PK	0.0	61.9	74.0	-12.1	Low channel
4803.971	58.5	3.3	197.0	1.1	3.0	0.0	V-Horn	PK	0.0	61.8	74.0	-12.2	Low channel
4803.971	38.1	3.3	197.0	1.1	3.0	0.0	V-Horn	AV	0.0	41.4	54.0	-12.6	Low channel
4959.990	57.1	3.8	205.0	1.2	3.0	0.0	V-Horn	PK	0.0	60.9	74.0	-13.1	High channel
4803.971	37.3	3.3	262.0	1.3	3.0	0.0	H-Horn	AV	0.0	40.6	54.0	-13.4	Low channel
4959.990	36.7	3.8	205.0	1.2	3.0	0.0	V-Horn	AV	0.0	40.5	54.0	-13.5	High channel
4883.925	35.4	3.7	208.0	1.2	3.0	0.0	V-Horn	AV	0.0	39.1	54.0	-14.9	Mid channel
4959.990	34.7	3.8	275.0	1.3	3.0	0.0	H-Horn	AV	0.0	38.5	54.0	-15.5	High channel
4883.970	34.5	3.7	165.0	1.5	3.0	0.0	H-Horn	AV	0.0	38.2	54.0	-15.8	Mid channel
4959.990	53.5	3.8	275.0	1.3	3.0	0.0	H-Horn	PK	0.0	57.3	74.0	-16.7	High channel
4884.010	53.6	3.7	208.0	1.2	3.0	0.0	V-Horn	PK	0.0	57.3	74.0	-16.7	Mid channel
4883.490	52.6	3.7	165.0	1.5	3.0	0.0	H-Horn	PK	0.0	56.3	74.0	-17.7	Mid channel

Intermec 6820 Printer Photos



Justification

The individuals and/or the organization requesting the test provided the modes, configurations and settings available to evaluate. While scanning the radiated emissions, all of the EUT parameters listed below were investigated. This includes, but may not be limited to, antennas, tuned transmit frequency ranges, operating modes, and data rates.

Channels in Specified Band Investigated:
High
Mid
Low

Operating Modes Investigated:
No Hop

Data Rates Investigated:
Maximum

Output Power Setting(s) Investigated:
Maximum

Power Input Settings Investigated:
120 VAC, 60 Hz.

Software\Firmware Applied During Test			
Exercise software	Blue Test	**Version**	Unknown
Description			
The system was tested using special test software to exercise the functions of the device during the testing such as channels, power, and modulation.			

EUT and Peripherals			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Radio	Intermec Technologies Corporation	8520-0080	Unknown
Printer	Intermec Technologies Corporation	6820	N/A
AC Adapter	Intermec Technologies Corporation	851-064-001	0001771
Remote laptop	Dell	TS30G	7247346BYK0204A

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
AC Power	No	2.0	No	AC Adapter	AC Mains
DC Leads	PA	1.8	PA	Printer	AC Adapter
Serial	Yes	4.0	No	Printer	Remote laptop
PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.					

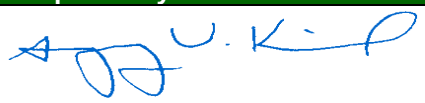
Measurement Equipment					
Description	**Manufacturer**	**Model**	**Identifier**	**Last Cal**	**Interval**
Spectrum Analyzer	Hewlett-Packard	8566B	AAL	12/23/2003	13 mo
Quasi-Peak Adapter	Hewlett-Packard	85650A	AQF	12/23/2003	13 mo
High Pass Filter	TTE	H97-100k-50-720B	HFC	02/01/2004	13 mo
Attenuator	Tektronix	011-0059-02	ATH	03/16/2004	13 mo
LISN	Solar	9252-50-R-24-BNC	LIN	12/16/2003	13 mo

Test Description

Requirement: Per 47 15.207(d), if the EUT is connected to the AC power line indirectly, obtaining its power from another device that is connected to the AC power line, then it should be tested to demonstrate compliance with the conducted limits of 15.207.

Configuration: The EUT will be powered from a printer that could be connected to the AC power line. Therefore, the measurements were made on the printer used to power the EUT. The AC power line conducted emissions were measured with the EUT operating at the lowest, the highest, and a middle channel in the operational band. The EUT was transmitting at its maximum data rate. For each mode, the spectrum was scanned from 150 kHz to 30 MHz. The test setup and procedures were in accordance with ANSI C63.4-2001.

Completed by:



NORTHWEST EMC

CONDUCTED EMISSIONS DATA SHEET

REV df4.13 05/06/2004

EUT:	8520-00080			Work Order:	ITRM0026
Serial Number:				Date:	06/01/04
Customer:	Intermec Technologies Corporation			Temperature:	75
Attendees:	None			Humidity:	37%
Cust. Ref. No.:				Barometric Pressure	29.91
Tested by:	Rod Peloquin	Power:	120 V, 60 Hz	Job Site:	EV01

TEST SPECIFICATIONS

Specification:	FCC 15.207 AC Powerline Conducted Emissions	Year:	2003
Method:	ANSI C63.4	Year:	2001

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator

COMMENTS

EUT installed in Intermec Model 6820 printer

EUT OPERATING MODES

Bluetooth low channel

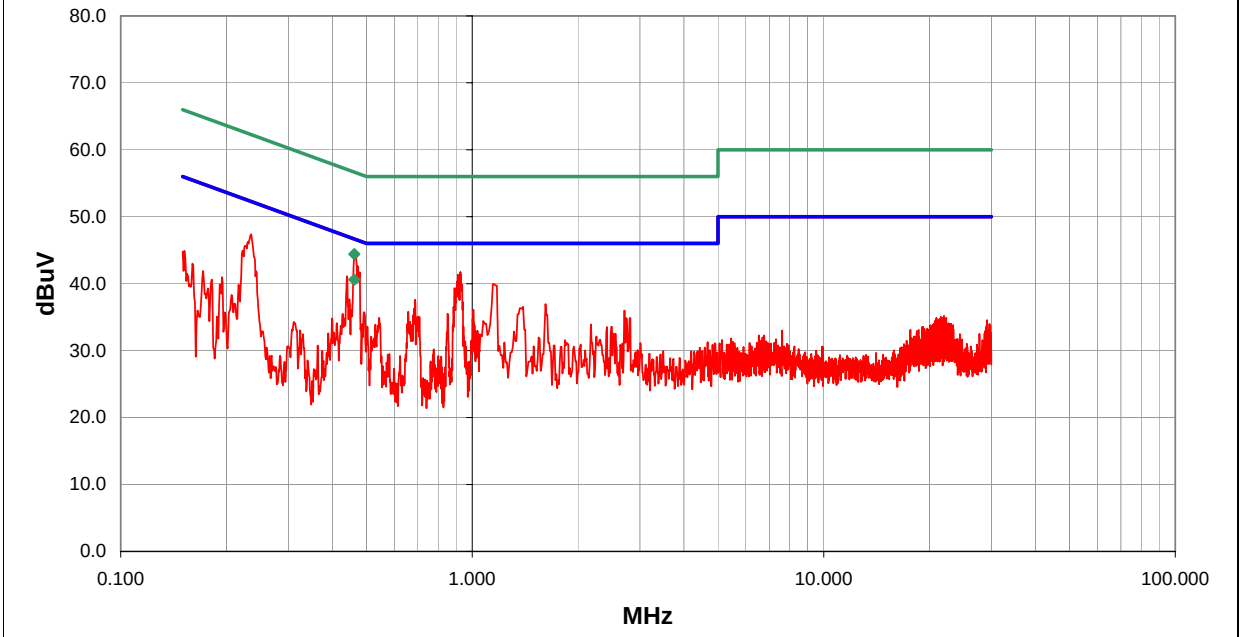
DEVIATIONS FROM TEST STANDARD

No deviations.

RESULTS	Line	Run #
Pass	L1	1

Other

Tested By:



Freq (MHz)	Amplitude (dBuV)			Transducer (dB)	Cable (dB)	External Attenuation (dB)		Detector (blank equal peaks [PK] from scan)		Adjusted dBuV	Spec. Limit dBuV	Compared to Spec. (dB)
0.462	20.6			0.0	0.0	20.0		AV		40.6	46.7	-6.1
0.462	24.4			0.0	0.0	20.0		QP		44.4	56.7	-12.3
0.464	24.3			0.0	0.2	20.0				44.5	46.6	-2.1
0.926	21.5			0.0	0.3	20.0				41.8	46.0	-4.2
0.910	21.1			0.0	0.3	20.0				41.4	46.0	-4.6
0.235	27.2			0.0	0.2	20.0				47.4	52.3	-4.9
0.917	20.8			0.0	0.3	20.0				41.1	46.0	-4.9
0.441	20.9			0.0	0.2	20.0				41.1	47.0	-5.9
1.155	19.6			0.0	0.3	20.0				39.9	46.0	-6.1
0.891	19.1			0.0	0.2	20.0				39.3	46.0	-6.7
0.688	17.4			0.0	0.2	20.0				37.6	46.0	-8.4
1.615	16.6			0.0	0.4	20.0				37.0	46.0	-9.0
0.447	17.5			0.0	0.2	20.0				37.7	46.9	-9.2
0.884	16.3			0.0	0.2	20.0				36.5	46.0	-9.5
1.395	16.2			0.0	0.3	20.0				36.5	46.0	-9.5
1.008	15.8			0.0	0.3	20.0				36.1	46.0	-9.9
2.716	15.5			0.0	0.5	20.0				36.0	46.0	-10.0
0.658	15.6			0.0	0.2	20.0				35.8	46.0	-10.2
0.491	15.5			0.0	0.2	20.0				35.7	46.1	-10.4

NORTHWEST EMC

CONDUCTED EMISSIONS DATA SHEET

REV df4.13 05/06/2004

EUT:	8520-00080	Work Order:	ITRM0026
Serial Number:		Date:	06/01/04
Customer:	Intermec Technologies Corporation	Temperature:	75
Attendees:	None	Humidity:	37%
Cust. Ref. No.:		Barometric Pressure	29.91
Tested by:	Rod Peloquin	Power: 120 V, 60 Hz	Job Site: EV01

TEST SPECIFICATIONS

Specification:	FCC 15.207 AC Powerline Conducted Emissions	Year:	2003
Method:	ANSI C63.4	Year:	2001

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator

COMMENTS

EUT installed in Intermec Model 6820 printer

EUT OPERATING MODES

Bluetooth low channel

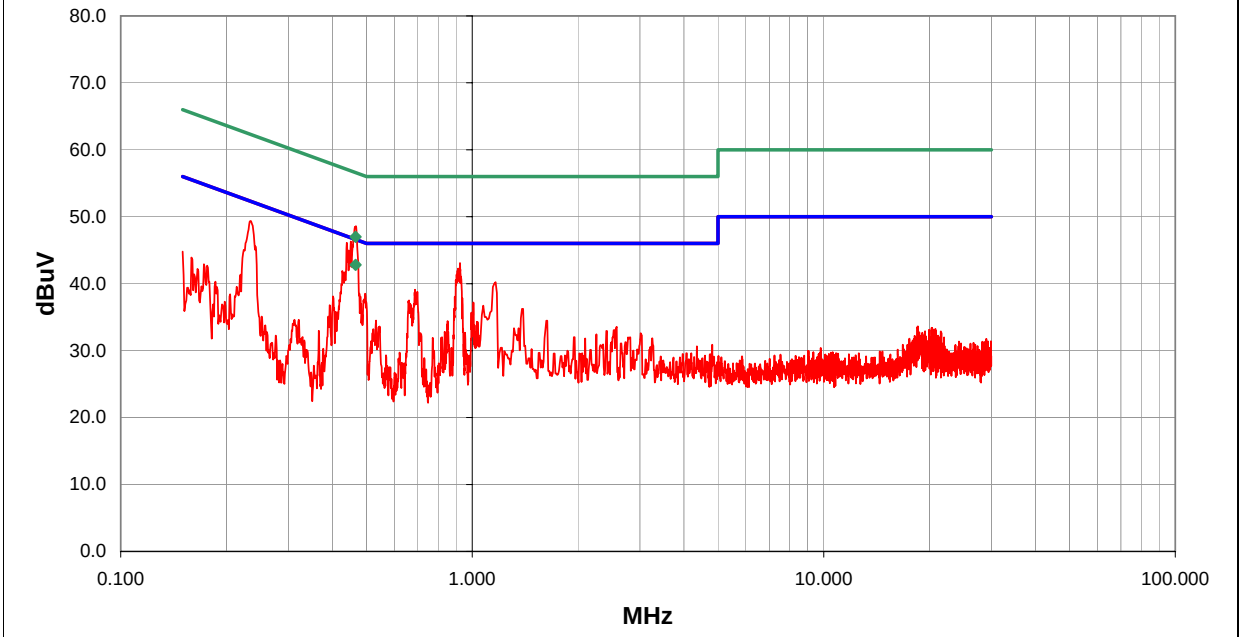
DEVIATIONS FROM TEST STANDARD

No deviations.

RESULTS	Line	Run #
Pass	N	2

Other

Tested By:



Freq (MHz)	Amplitude (dBuV)			Transducer (dB)	Cable (dB)	External Attenuation (dB)		Detector (blank equal peaks [PK] from scan)		Adjusted dBuV	Spec. Limit dBuV	Compared to Spec. (dB)
0.466	22.8			0.0	0.0	20.0		AV		42.8	46.6	-3.8
0.466	27.0			0.0	0.0	20.0		QP		47.0	56.6	-9.6
0.452	26.1			0.0	0.2	20.0				46.3	46.8	-0.5
0.440	25.9			0.0	0.2	20.0				46.1	47.1	-1.0
0.235	29.2			0.0	0.2	20.0				49.4	52.3	-2.9
0.923	22.8			0.0	0.3	20.0				43.1	46.0	-2.9
1.165	19.9			0.0	0.3	20.0				40.2	46.0	-5.8
0.687	18.9			0.0	0.2	20.0				39.1	46.0	-6.9
0.496	18.3			0.0	0.2	20.0				38.5	46.1	-7.6
0.937	17.6			0.0	0.3	20.0				37.9	46.0	-8.1
0.480	17.9			0.0	0.2	20.0				38.1	46.3	-8.2
0.661	17.3			0.0	0.2	20.0				37.5	46.0	-8.5
1.008	16.9			0.0	0.3	20.0				37.2	46.0	-8.8
1.075	16.4			0.0	0.3	20.0				36.7	46.0	-9.3
0.676	16.1			0.0	0.2	20.0				36.3	46.0	-9.7
0.402	17.9			0.0	0.2	20.0				38.1	47.8	-9.7
1.395	15.9			0.0	0.3	20.0				36.2	46.0	-9.8
0.995	15.4			0.0	0.3	20.0				35.7	46.0	-10.3
0.150	24.7			0.0	0.1	20.0				44.8	56.0	-11.2

NORTHWEST EMC

CONDUCTED EMISSIONS DATA SHEET

REV df4.13 05/06/2004

EUT:	8520-00080			Work Order:	ITRM0026
Serial Number:				Date:	06/01/04
Customer:	Intermec Technologies Corporation			Temperature:	75
Attendees:	None			Humidity:	37%
Cust. Ref. No.:				Barometric Pressure	29.91
Tested by:	Rod Peloquin	Power:	120 V, 60 Hz	Job Site:	EV01

TEST SPECIFICATIONS

Specification:	FCC 15.207 AC Powerline Conducted Emissions	Year:	2003
Method:	ANSI C63.4	Year:	2001

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator

COMMENTS

EUT installed in Intermec Model 6820 printer

EUT OPERATING MODES

Bluetooth mid channel

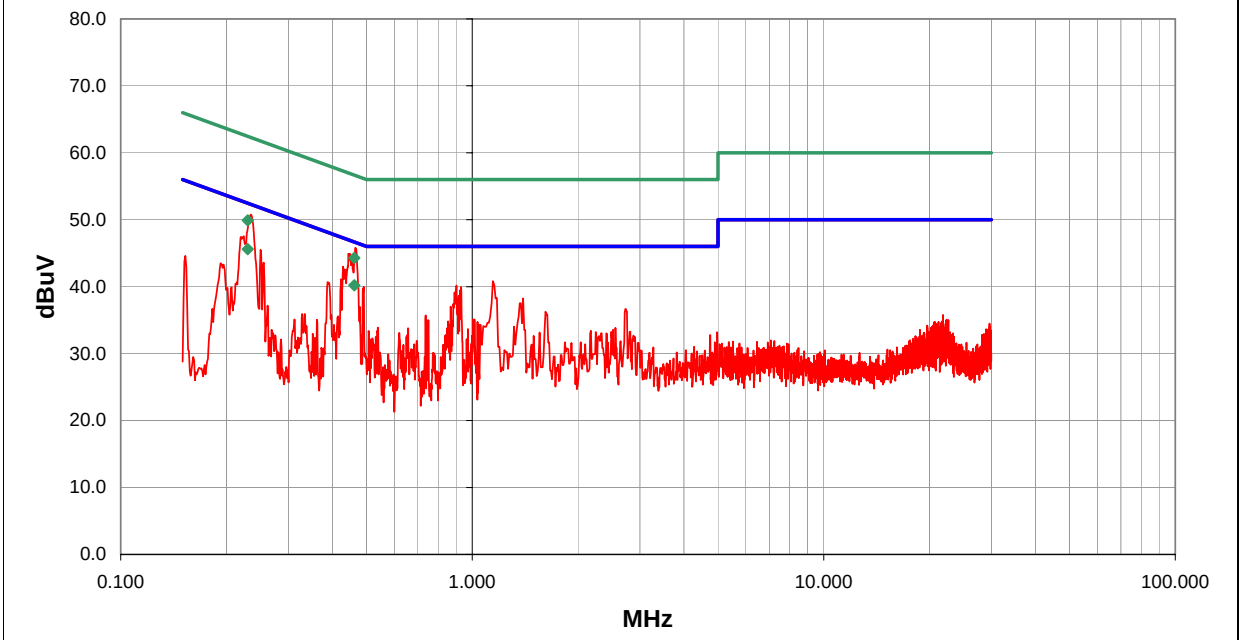
DEVIATIONS FROM TEST STANDARD

No deviations.

RESULTS	Line	Run #
Pass	L1	3

Other

Tested By:



Freq (MHz)	Amplitude (dBuV)			Transducer (dB)	Cable (dB)	External Attenuation (dB)		Detector (blank equal peaks [PK] from scan)		Adjusted dBuV	Spec. Limit dBuV	Compared to Spec. (dB)
0.462	20.2			0.0	0.0	20.0		AV		40.2	46.7	-6.5
0.230	25.6			0.0	0.0	20.0		AV		45.6	52.5	-6.9
0.462	24.3			0.0	0.0	20.0		QP		44.3	56.7	-12.4
0.230	29.9			0.0	0.0	20.0		QP		49.9	62.5	-12.6
0.465	25.6			0.0	0.2	20.0				45.8	46.6	-0.8
0.235	30.6			0.0	0.2	20.0				50.8	52.3	-1.5
0.444	24.7			0.0	0.2	20.0				44.9	47.0	-2.1
0.429	22.8			0.0	0.2	20.0				43.0	47.3	-4.3
1.145	20.5			0.0	0.3	20.0				40.8	46.0	-5.2
0.901	19.9			0.0	0.3	20.0				40.2	46.0	-5.8
0.929	19.7			0.0	0.3	20.0				40.0	46.0	-6.0
0.491	19.8			0.0	0.2	20.0				40.0	46.1	-6.1
0.250	25.3			0.0	0.2	20.0				45.5	51.8	-6.3
0.424	20.9			0.0	0.2	20.0				41.1	47.4	-6.3
0.924	19.2			0.0	0.3	20.0				39.5	46.0	-6.5
0.916	18.4			0.0	0.3	20.0				38.7	46.0	-7.3
0.389	20.5			0.0	0.2	20.0				40.7	48.1	-7.4
1.395	17.9			0.0	0.3	20.0				38.2	46.0	-7.8
0.255	23.4			0.0	0.2	20.0				43.6	51.6	-8.0

NORTHWEST EMC

CONDUCTED EMISSIONS DATA SHEET

REV df4.13 05/06/2004

EUT:	8520-00080	Work Order:	ITRM0026
Serial Number:		Date:	06/01/04
Customer:	Intermec Technologies Corporation	Temperature:	75
Attendees:	None	Humidity:	37%
Cust. Ref. No.:		Barometric Pressure	29.91
Tested by:	Rod Peloquin Power: 120 V, 60 Hz	Job Site:	EV01

TEST SPECIFICATIONS

Specification:	FCC 15.207 AC Powerline Conducted Emissions	Year:	2003
Method:	ANSI C63.4	Year:	2001

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator

COMMENTS

EUT installed in Intermec Model 6820 printer

EUT OPERATING MODES

Bluetooth mid channel

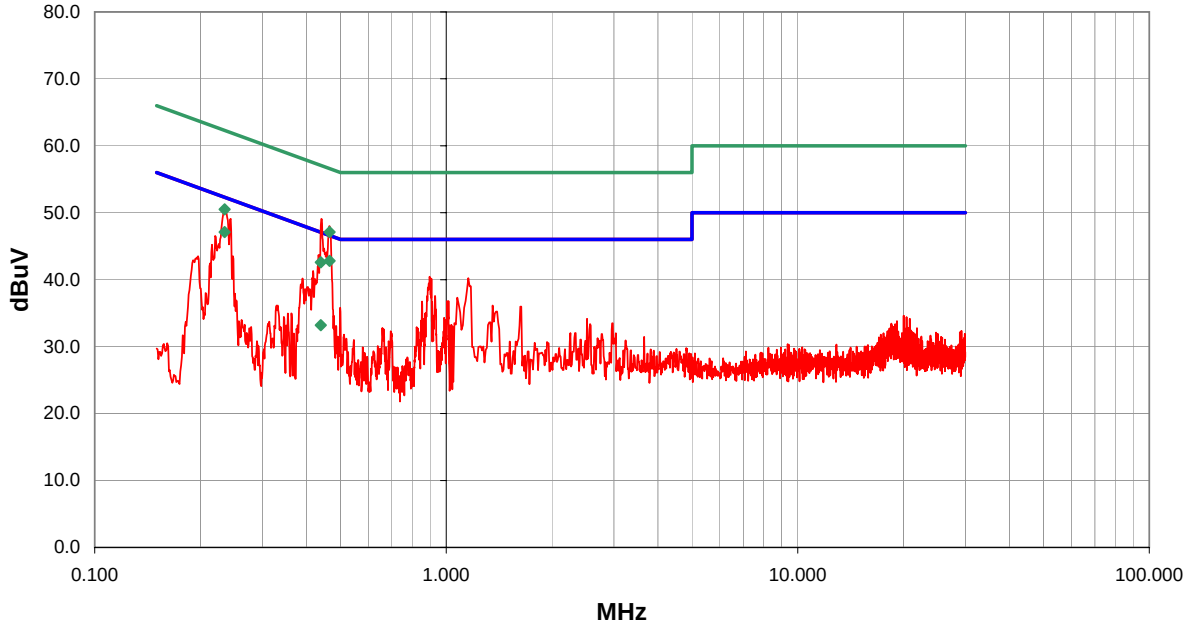
DEVIATIONS FROM TEST STANDARD

No deviations.

RESULTS	Line	Run #
Pass	N	4

Other

Tested By:



Freq (MHz)	Amplitude (dBuV)			Transducer (dB)	Cable (dB)	External Attenuation (dB)		Detector (blank equal peaks [PK] from scan)		Adjusted dBuV	Spec. Limit dBuV	Compared to Spec. (dB)
0.466	22.8			0.0	0.0	20.0		AV		42.8	46.6	-3.8
0.234	27.1			0.0	0.0	20.0		AV		47.1	52.3	-5.2
0.466	27.1			0.0	0.0	20.0		QP		47.1	56.6	-9.5
0.234	30.5			0.0	0.0	20.0		QP		50.5	62.3	-11.8
0.440	13.2			0.0	0.0	20.0		AV		33.2	47.1	-13.9
0.440	22.6			0.0	0.0	20.0		QP		42.6	57.1	-14.5
0.235	30.6			0.0	0.2	20.0				50.8	52.3	-1.5
0.244	28.9			0.0	0.2	20.0				49.1	52.0	-2.9
0.434	23.5			0.0	0.2	20.0				43.7	47.2	-3.5
0.897	20.2			0.0	0.2	20.0				40.4	46.0	-5.6
1.155	19.9			0.0	0.3	20.0				40.2	46.0	-5.8
0.907	19.9			0.0	0.3	20.0				40.2	46.0	-5.8
0.418	21.1			0.0	0.2	20.0				41.3	47.5	-6.2
0.220	26.4			0.0	0.1	20.0				46.5	52.8	-6.3
0.216	25.1			0.0	0.1	20.0				45.2	53.0	-7.8
0.390	20.0			0.0	0.2	20.0				40.2	48.1	-7.9
0.247	23.3			0.0	0.2	20.0				43.5	51.9	-8.4
0.929	17.3			0.0	0.3	20.0				37.6	46.0	-8.4
1.075	17.0			0.0	0.3	20.0				37.3	46.0	-8.7

NORTHWEST EMC

CONDUCTED EMISSIONS DATA SHEET

REV df4.13 05/06/2004

EUT:	8520-00080			Work Order:	ITRM0026
Serial Number:				Date:	06/01/04
Customer:	Intermec Technologies Corporation			Temperature:	75
Attendees:	None			Humidity:	37%
Cust. Ref. No.:				Barometric Pressure	29.91
Tested by:	Rod Peloquin	Power:	120 V, 60 Hz	Job Site:	EV01

TEST SPECIFICATIONS

Specification:	FCC 15.207 AC Powerline Conducted Emissions	Year:	2003
Method:	ANSI C63.4	Year:	2001

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator

COMMENTS

EUT installed in Intermec Model 6820 printer

EUT OPERATING MODES

Bluetooth high channel

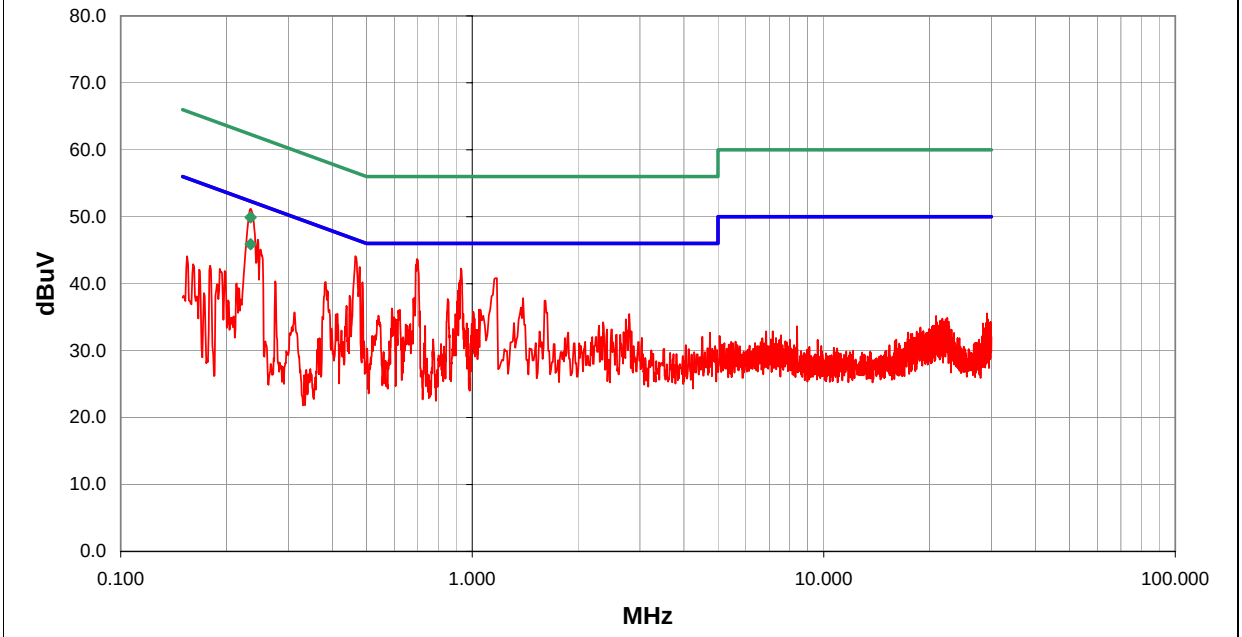
DEVIATIONS FROM TEST STANDARD

No deviations.

RESULTS	Line	Run #
Pass	L1	5

Other

Tested By:



Freq (MHz)	Amplitude (dBuV)			Transducer (dB)	Cable (dB)	External Attenuation (dB)		Detector (blank equal peaks [PK] from scan)		Adjusted dBuV	Spec. Limit dBuV	Compared to Spec. (dB)
0.234	25.9			0.0	0.0	20.0		AV		45.9	52.3	-6.4
0.234	29.9			0.0	0.0	20.0		QP		49.9	62.3	-12.4
0.235	31.0			0.0	0.2	20.0				51.2	52.3	-1.1
0.696	23.5			0.0	0.2	20.0				43.7	46.0	-2.3
0.465	23.9			0.0	0.2	20.0				44.1	46.6	-2.5
0.929	22.0			0.0	0.3	20.0				42.3	46.0	-3.7
0.479	22.3			0.0	0.2	20.0				42.5	46.4	-3.9
1.175	20.5			0.0	0.3	20.0				40.8	46.0	-5.2
0.245	26.4			0.0	0.2	20.0				46.6	51.9	-5.3
0.919	19.9			0.0	0.3	20.0				40.2	46.0	-5.8
0.488	20.0			0.0	0.2	20.0				40.2	46.2	-6.0
0.250	24.9			0.0	0.2	20.0				45.1	51.8	-6.7
0.910	18.7			0.0	0.3	20.0				39.0	46.0	-7.0
0.382	20.1			0.0	0.2	20.0				40.3	48.2	-7.9
0.685	17.7			0.0	0.2	20.0				37.9	46.0	-8.1
1.395	17.5			0.0	0.3	20.0				37.8	46.0	-8.2
0.852	17.5			0.0	0.2	20.0				37.7	46.0	-8.3
1.615	17.1			0.0	0.4	20.0				37.5	46.0	-8.5
0.906	17.1			0.0	0.3	20.0				37.4	46.0	-8.6

NORTHWEST EMC

CONDUCTED EMISSIONS DATA SHEET

REV df4.13 05/06/2004

EUT:	8520-00080			Work Order:	ITRM0026
Serial Number:				Date:	06/01/04
Customer:	Intermec Technologies Corporation			Temperature:	75
Attendees:	None			Humidity:	37%
Cust. Ref. No.:				Barometric Pressure	29.91
Tested by:	Rod Peloquin	Power:	120 V, 60 Hz	Job Site:	EV01

TEST SPECIFICATIONS

Specification:	FCC 15.207 AC Powerline Conducted Emissions	Year:	2003
Method:	ANSI C63.4	Year:	2001

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator

COMMENTS

EUT installed in Intermec Model 6820 printer

EUT OPERATING MODES

Bluetooth high channel

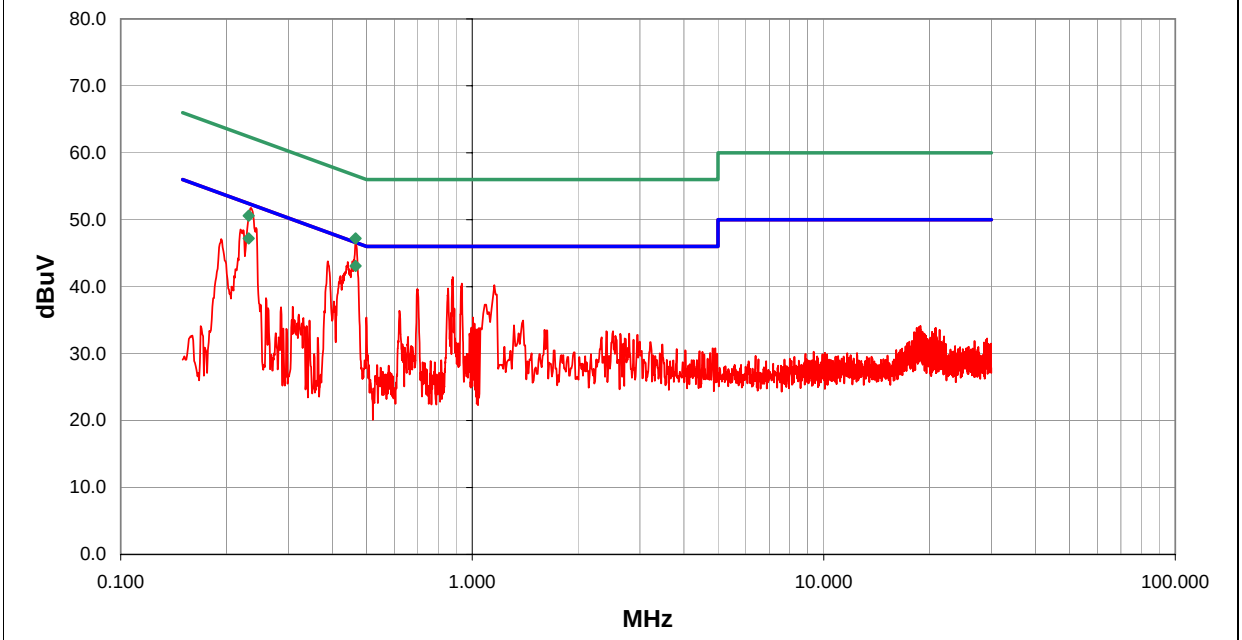
DEVIATIONS FROM TEST STANDARD

No deviations.

RESULTS	Line	Run #
Pass	N	6

Other

Tested By:



Freq (MHz)	Amplitude (dBuV)			Transducer (dB)	Cable (dB)	External Attenuation (dB)		Detector (blank equal peaks [PK] from scan)		Adjusted dBuV	Spec. Limit dBuV	Compared to Spec. (dB)
0.466	23.1			0.0	0.0	20.0		AV		43.1	46.6	-3.5
0.231	27.2			0.0	0.0	20.0		AV		47.2	52.4	-5.2
0.466	27.2			0.0	0.0	20.0		QP		47.2	56.6	-9.4
0.231	30.6			0.0	0.0	20.0		QP		50.6	62.4	-11.8
0.466	26.2			0.0	0.2	20.0				46.4	46.6	-0.2
0.235	31.6			0.0	0.2	20.0				51.8	52.3	-0.5
0.443	23.5			0.0	0.2	20.0				43.7	47.0	-3.3
0.219	28.4			0.0	0.1	20.0				48.5	52.8	-4.3
0.389	23.6			0.0	0.2	20.0				43.8	48.1	-4.3
0.880	21.2			0.0	0.2	20.0				41.4	46.0	-4.6
0.934	20.2			0.0	0.3	20.0				40.5	46.0	-5.5
1.155	19.9			0.0	0.3	20.0				40.2	46.0	-5.8
0.422	21.4			0.0	0.2	20.0				41.6	47.4	-5.8
0.854	19.5			0.0	0.2	20.0				39.7	46.0	-6.3
0.696	19.4			0.0	0.2	20.0				39.6	46.0	-6.4
0.193	27.0			0.0	0.1	20.0				47.1	53.9	-6.8
1.095	17.0			0.0	0.3	20.0				37.3	46.0	-8.7
0.889	16.5			0.0	0.2	20.0				36.7	46.0	-9.3
0.621	16.2			0.0	0.2	20.0				36.4	46.0	-9.6

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BLUETOOTH APPROVALS

FCC Procedure Received from Joe Dichoso on 2-15-02

The following exhibit indicates the FCC Spread Spectrum requirements in Section 15.247 for devices meeting the Bluetooth Specifications in the 2.4 GHz band as of February 2001 operating in the USA. The purpose of this exhibit is to help expedite the approval process for Bluetooth devices. This exhibit provides items that vary for each device and also provides a list of items that are common to Bluetooth devices that explains the remaining requirements. The list of common items can be submitted for each application for equipment authorization. This exhibit only specifies requirements in Section 15.247, requirements in other rule Sections for intentional radiators such as in Section 15.203 or 15.207 must be also be addressed. A Bluetooth device is a FHSS transmitter in the data mode and applies as a Hybrid spread spectrum device in the acquisition mode.

For each individual device, the following items, 1-7 will vary from one device to another and must be submitted.

1) The occupied bandwidth in Section 15.247(a)(1)(ii).
2) Conducted output power specified in Section 15.247(b)(1).
3) EIRP limit in Section 15.247(b)(3).
4) RF safety requirement in Section 15.247(b)(4)
5) Spurious emission limits in Section 15.247(c).
6) Processing gain and requirements for Hybrids in Section 15.247(f) in the acquisition mode.
7) Power spectral density requirement in Section 15.247(f) in the acquisition mode.

For all devices, the following items, 1-12, are common to all Bluetooth devices and will not vary from one device to another. This list can be copied into the filing.

1 Output power and channel separation of a Bluetooth device in the different operating modes:

The different operating modes (data-mode, acquisition-mode) of a Bluetooth device don't influence the output power and the channel spacing. There is only one transmitter which is driven by identical input parameters concerning these two parameters.
Only a different hopping sequence will be used. For this reason, the RF parameters in one op-mode is sufficient.

2 Frequency range of a Bluetooth device:

The maximum frequency of the device is: **2402 – 2480 M**Hz.
This is according the Bluetooth Core Specification V 1.0B (+ critical errata) for devices which will be operated in the USA. Other frequency ranges (e.g. for Spain, France, Japan) which are allowed according the Core Specification must **not be** supported by the device.

3 Co-ordination of the hopping sequence in data mode to avoid simultaneous occupancy by multiple transmitters:

Bluetooth units which want to communicate with other units must be organized in a structure called piconet. This piconet consist of max. 8 Bluetooth units. One unit is the master the other seven are the slaves. The master co-ordinates frequency occupation in this piconet for all units. As the master hop sequence is derived from it's BD address which is unique for every Bluetooth device, additional masters intending to establish new piconets will always use different hop sequences.

4 Example of a hopping sequence in data mode:

Example of a 79 hopping sequence in data mode:
40, 21, 44, 23, 42, 53, 46, 55, 48, 33, 52, 35, 50, 65, 54, 67,
56, 37, 60, 39, 58, 69, 62, 71, 64, 25, 68, 27, 66, 57, 70, 59,
72, 29, 76, 31, 74, 61, 78, 63, 01, 41, 05, 43, 03, 73, 07, 75,
09, 45, 13, 47, 11, 77, 15, 00, 64, 49, 66, 53, 68, 02, 70, 06,
01, 51, 03, 55, 05, 04

5 Equally average use of frequencies in data mode and short transmissions:

The generation of the hopping sequence in connection mode depends essentially on two input values:
1. LAP/UAP of the master of the connection
2. Internal master clock

The LAP (lower address part) are the 24 LSB's of the 48 BD_ADDRESS. The BD_ADDRESS is an unambiguous number of every Bluetooth unit. The UAP (upper address part) are the 24 MSB's of the 48 BD_ADDRESS. The internal clock of a Bluetooth unit is derived from a free running clock which is never adjusted and is never turned off. For synchronization with other units, only the offsets are used. It has no relation to the time of the day. Its resolution is at least half the RX/TX slot length of 312.5 µs. The clock has a cycle of about one day (23h30). In most case it is implemented as 28 bit counter. For the deriving of the hopping sequence the entire LAP (24 bits), 4 LSB's (4 bits) (Input 1) and the 27 MSB's of the clock (Input 2) are used. With this input values different mathematical procedures (permutations, additions, XOR-operations) are performed to generate the sequence. This will be done at the beginning of every new transmission.
Regarding short transmissions, the Bluetooth system has the following behavior:
The first connection between the two devices is established, a hopping sequence is generated. For transmitting the wanted data, the complete hopping sequence is not used and the connection ends. The second connection will be established. A new hopping sequence is generated. Due to the fact that the Bluetooth clock has a different value, because the period between the two transmission is longer (and it cannot be shorter) than the minimum resolution of the clock (312.5 µs). The hopping sequence will always differ from the first one.

6 Receiver input bandwidth, synchronization and repeated single or multiple packets:

The input bandwidth of the receiver is 1 MHz.
In every connection, one Bluetooth device is the master and the other one is the slave. The master determines the hopping sequence (see chapter 5). The slave follows this sequence. Both devices shift between RX and TX time slot according to the clock of the master. Additionally the type of connection (e.g. single or multi-slot packet) is set up at the beginning of the connection. The master adapts its hopping frequency and its TX/RX timing is according to the packet type of the connection. Also, the slave of the connection uses these settings. Repeating of a packet has no influence on the hopping sequence. The hopping sequence generated by the master of the connection will be followed in any case. That means, a repeated packet will not be send on the same frequency, it is send on the next frequency of the hopping sequence

7 Dwell time in data mode

The dwell time of 0.3797s within a 30 second period in data mode is independent from the packet type (packet length). The calculation for a 30 second period is a follows:
Dwell time = time slot length * hop rate / number of hopping channels *30s
Example for a DH1 packet (with a maximum length of one time slot)
Dwell time = 625 µs * 1600 1/s / 79 * 30s = 0.3797s (in a 30s period)

For multi-slot packet the hopping is reduced according to the length of the packet.
Example for a DH5 packet (with a maximum length of five time slots)
Dwell time = 5 * 625 µs * 1600 * 1/5 *1/s / 79 * 30s = 0.3797s (in a 30s period)
This is according the Bluetooth Core Specification V 1.0B (+ critical errata) for all Bluetooth devices. Therefore, all Bluetooth devices **comply** with the FCC dwell time requirement in the data mode.
This was checked during the Bluetooth Qualification tests.
The Dwell time in hybrid mode is approximately 2.6 mS (in a 12.8s period)

8 Channel Separation in hybrid mode

The nominal channel spacing of the Bluetooth system is 1Mhz independent of the operating mode.
The maximum “initial carrier frequency tolerance” which is allowed for Bluetooth is fcenter = 75 kHz.
This was checked during the Bluetooth Qualification tests (Test Case: TRM/CA/07-E) for three frequencies (2402, 2441, 2480 MHz).

9 Derivation and examples for a hopping sequence in hybrid mode

For the generation of the inquiry and page hop sequences the same procedures as described for the data mode are used (see item 5), but this time with different input vectors:
**For the inquiry hop sequence, a predefined fixed address is always used. This results in the same 32 frequencies used by all devices doing an inquiry but every time with a different start frequency and phase in this sequence.
**For the page hop sequence, the device address of the paged unit is used as the input vector. This results in the use of a subset of 32 frequencies which is specific for that initial state of the connection establishment between the two units. A page to different devices would result in a different subset of 32 frequencies.
So it is ensured that also in hybrid mode, the frequency is used equally on average.
Example of a hopping sequence in inquiry mode:
48, 50, 09, 13, 52, 54,41, 45, 56, 58, 11, 15, 60, 62, 43, 47, 00, 02, 64, 68, 04, 06, 17, 21, 08, 10, 66, 70, 12, 14, 19, 23
Example of a hopping sequence in paging mode:
08, 57, 68, 70, 51, 02, 42, 40, 04, 61, 44, 46, 63, 14, 50, 48, 16, 65, 52, 54, 67, 18, 58, 56, 20, 53, 60, 62, 55, 06, 66, 64

10 Receiver input bandwidth and synchronization in hybrid mode:

The receiver input bandwidth is the same as in the data mode (1 MHz). When two Bluetooth devices establish contact for the first time, one device sends an inquiry access code and the other device is scanning for this inquiry access code. If two devices have been connected previously and want to start a new transmission, a similar procedure takes place. The only difference is, instead of the inquiry access code, a special access code, derived from the BD_ADDRESS of the paged device will be, will be sent by the master of this connection. Due to the fact that both units have been connected before (in the inquiry procedure) the paging unit has timing and frequency information about the page scan of the paged unit. For this reason the time to establish the connection is reduced.

11 Spread rate / data rate of the direct sequence signal

The Spread rate / Data rate in inquiry and paging mode can be defined via the access code. The access code is the only criterion for the system to check if there is a valid transmission or not. If you regard the presence of a valid access code as one bit of information, and compare it with the length of the access code of 68 bits, the Spread rate / Data rate will be 68/1.

12 Spurious emission in hybrid mode

The Dwell in hybrid mode is shorter than in data mode. For this reason the spurious emissions average level in data mode is worst case. The spurious emissions peak level is the same for both modes.