

Intermec Technologies Corporation

PB42

December 18, 2007

Report No. INMC0418

Report Prepared By



www.nwemc.com

1-888-EMI-CERT

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EMC Test Report

Certificate of Test
Issue Date: December 18, 2007
Intermec Technologies Corporation
Model: PB42

Emissions			
Test Description	Specification	Test Method	Pass/Fail
Spurious Radiated Emissions	FCC 15.247 (FHSS):2006	ANSI C63.4:2003 DA 00-705:2000	Pass
Conducted Emissions	FCC 15.207:2006	ANSI C63.4:2003	Pass

Modifications made to the product
See the Modifications section of this report

Test Facility

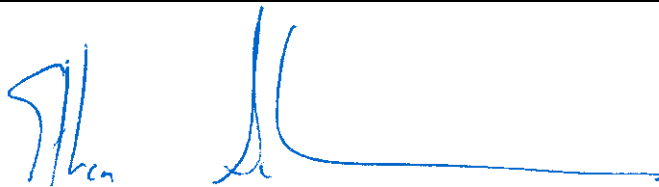
The measurement facility used to collect the data is located at:

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:



Ethan Schoonover, Sultan Lab Manager



NVLAP Lab Code: 200630-0

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 accredited under the United States Department of Commerce, National Institute of Standards and Technology, and 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 2004/108/EC, and ANSI C63.4. 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.



NVLAP LAB CODE 200629-0
 NVLAP LAB CODE 200630-0
 NVLAP LAB CODE 200676-0
 NVLAP LAB CODE 200761-0

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 TÜV Product Service Group's Listing of Recognized Laboratories. It qualifies in connection with the TÜV Certification after Recognition of Agent's Testing Program for the product categories and/or standards shown in TÜV's current Listing of CARAT Laboratories, available from TÜV. A certificate was issued to represent that this laboratory continues to meet TÜV's CARAT Program requirements. Certificate No. USA0604C.



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).



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 Numbers. - Hillsboro: C-1071, R-1025, C-2687, T-289, and R-2318, Irvine: R-1943, C-2766, and T-298, Sultan: R-871, C-1784, and T-294.*)



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.



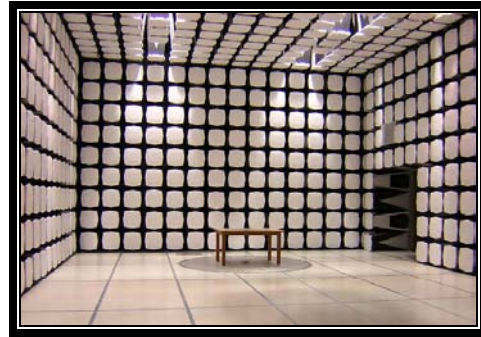
GOST: Northwest EMC, Inc. has been assessed and accredited by the Russian Certification bodies Certinform VNIINMASH, CERTINFO, SAMTES, and Federal CHEC, to perform EMC and Hygienic testing for Information Technology Products. As a result of their laboratory assessment, they will accept test results from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



SCOPE

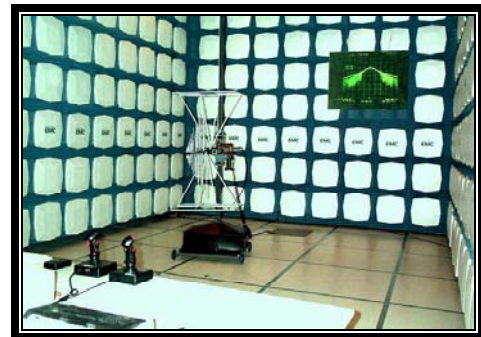
For details on the Scopes of our Accreditations, please visit:

<http://www.nwemc.com/scope.asp>



**California – Orange County Facility
Labs OC01 – OC13**

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



**Oregon – Evergreen Facility
Labs EV01 – EV11**

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



**Washington – Sultan Facility
Labs SU01 – SU07**

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

Party Requesting the Test

Company Name:	Intermec Technologies Corporation
Address:	6001 36th Avenue West
City, State, Zip:	Everett, WA 98203-1264
Test Requested By:	Sean MacKellar
Model:	PB42
First Date of Test:	November 26, 2007
Last Date of Test:	November 29, 2007
Receipt Date of Samples:	November 26, 2007
Equipment Design Stage:	Production
Equipment Condition:	No Damage

Information Provided by the Party Requesting the Test

Functional Description of the EUT (Equipment Under Test):

The PB42, Intermec's four-inch wireless portable receipt printer supports prompt payments and eliminates duplicate billing by providing receipts immediately for direct store delivery (DSD), Field Service, and Home Utility customers. The PB42 contains a Bluetooth radio module.

Testing Objective:

These tests were selected to satisfy FCC 15.247 requirements.

CONFIGURATION 2 INMC0418**Software/Firmware Running during test**

Description	Version
BlueTest 3	Unknown

EUT

Description	Manufacturer	Model/Part Number	Serial Number
Printer - RF Radiated Unit	Intermec Technologies Corporation	PB42	35810514036

Peripherals in test setup boundary

Description	Manufacturer	Model/Part Number	Serial Number
AC Adapter	Intermec Technologies Corporation	073573	470939

Remote Equipment Outside of Test Setup Boundary

Description	Manufacturer	Model/Part Number	Serial Number
Laptop AC Adapter	Dell	PA-2	12851-7C9-7902
Laptop	Dell	PP01L	Unknown

Cables

Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
LPI to Molex	No	0.4m	No	Printer	Laptop (only during setup)
DC Power	No	1.8m	Yes	AC Adapter	Printer
DC Power	No	1.5m	No	Laptop AC Adapter	Laptop
AC Power	No	1.2m	No	Laptop AC Adapter	AC Mains
AC Power	No	1.8m	No	AC Adapter	AC Mains

PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.

Equipment modifications					
Item	Date	Test	Modification	Note	Disposition of EUT
1	11/26/2007	Spurious Radiated Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
2	11/29/2007	Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing completed.

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

MODES OF OPERATION

Transmitting Bluetooth (normal, default modulation and rate): GFSK, DH1

POWER SETTINGS INVESTIGATED

120VAC/60Hz

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	26 GHz
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SAMPLE CALCULATIONS

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Spectrum Analyzer	Agilent	E4446A	AAT	12/7/2006	13
High Pass Filter	Micro-Tronics	HPM50111	HFO	12/29/2006	13
Low Pass Filter 0-1000 MHz	Micro-Tronics	LPM50004	LFD	12/29/2006	13
EV01 Cable D			EVD	7/25/2007	13
Antenna, Horn	EMCO	3160-09	AHG	NCR	0
Pre-Amplifier	Miteq	JSD4-18002600-26-8P	APU	7/25/2007	13
EV01 cables g,h,l			EVF	10/23/2007	13
Antenna, Horn	ETS	3160-08	AHV	NCR	0
Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AVD	6/22/2007	13
EV01 cables g,h,l			EVF	10/23/2007	13
Antenna, Horn	ETS	3160-07	AHU	NCR	0
Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVC	6/22/2007	13
EV01 cables g,h,j			EVB	10/23/2007	13
Antenna, Horn	EMCO	3115	AHC	8/24/2006	24
Pre-Amplifier	Miteq	AMF-4D-010100-24-10P	APW	5/10/2007	13
EV01 cables c,g, h			EVA	10/23/2007	13
Antenna, Biconilog	EMCO	3141	AXE	12/28/2005	24
Pre-Amplifier	Miteq	AM-1616-1000	AOL	12/29/2006	13

MEASUREMENT BANDWIDTHS

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.

MEASUREMENT UNCERTAINTY

Measurement uncertainty is used to reflect the accuracy of the measured result as compared with its "true" or theoretically correct value. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4. In the case of transient tests our test equipment has been demonstrated by calibration to provide at least a 95% confidence that it complies with the test specification requirements. The measurement uncertainty for any test is available upon request.

TEST DESCRIPTION

The highest gain of each type of 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 and the EUT antenna in three orthogonal axes, and adjusting measurement antenna height and polarization, and manipulating the EUT antenna in 3 orthogonal planes (per ANSI C63.4:2003). A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

EUT: PB42	Work Order: INMC0418
Serial Number: 35810514015	Date: 11/26/07
Customer: Intermec Technologies Corporation	Temperature: 20
Attendees: None	Humidity: 24%
Project: None	Barometric Pres.: 1023
Tested by: Rod Peloquin	Power: 120VAC/60Hz
	Job Site: EV01

TEST SPECIFICATIONS	Test Method
FCC 15.247 (FHSS):2006	ANSI C63.4:2003 DA 00-705:2000

TEST PARAMETERS	
Antenna Height(s) (m) 1 - 4	Test Distance (m) 3

COMMENTS

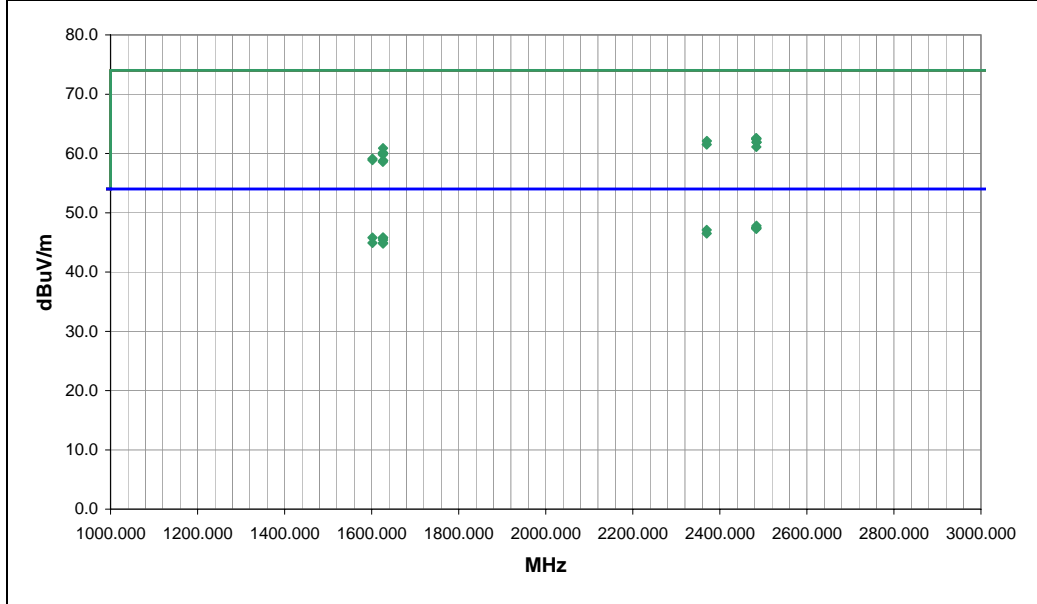
EUT OPERATING MODES

Transmitting Bluetooth (normal, default modulation and rate)

DEVIATIONS FROM TEST STANDARD

No deviations.

Run #	2	 Signature
Configuration #	2	
Results	Pass	



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
2484.057	25.6	2.2	67.0	1.2	3.0	20.0	H-Horn	AV	0.0	47.8	54.0	-6.2	High channel, EUT horizontal
2483.552	25.3	2.2	322.0	1.0	3.0	20.0	V-Horn	AV	0.0	47.5	54.0	-6.5	High channel, EUT horizontal
2483.598	25.3	2.2	300.0	1.0	3.0	20.0	V-Horn	AV	0.0	47.5	54.0	-6.5	High channel, EUT on side
2483.512	25.2	2.2	114.0	1.2	3.0	20.0	H-Horn	AV	0.0	47.4	54.0	-6.6	High channel, EUT on side
2483.795	25.2	2.2	30.0	1.3	3.0	20.0	H-Horn	AV	0.0	47.4	54.0	-6.6	High channel, EUT on end
2483.943	25.1	2.2	212.0	1.0	3.0	20.0	V-Horn	AV	0.0	47.3	54.0	-6.7	High channel, EUT on end
2369.962	25.2	1.9	58.0	1.0	3.0	20.0	H-Horn	AV	0.0	47.1	54.0	-6.9	Mid channel, EUT horizontal
2369.968	24.6	1.9	212.0	1.0	3.0	20.0	V-Horn	AV	0.0	46.5	54.0	-7.5	Mid channel, EUT on side
1601.952	27.9	-2.1	316.0	1.0	3.0	20.0	H-Horn	AV	0.0	45.8	54.0	-8.2	Mid channel, EUT horizontal
1625.956	27.8	-2.0	173.0	1.0	3.0	20.0	H-Horn	AV	0.0	45.8	54.0	-8.2	Mid channel, EUT horizontal
1625.976	27.8	-2.0	271.0	1.1	3.0	20.0	V-Horn	AV	0.0	45.8	54.0	-8.2	Mid channel, EUT on side
1625.849	27.7	-2.0	162.0	1.5	3.0	20.0	V-Horn	AV	0.0	45.7	54.0	-8.3	Mid channel, EUT on end
1626.016	27.4	-2.0	78.0	1.0	3.0	20.0	H-Horn	AV	0.0	45.4	54.0	-8.6	Mid channel, EUT on side
1625.954	26.9	-2.0	312.0	1.0	3.0	20.0	H-Horn	AV	0.0	44.9	54.0	-9.1	Mid channel, EUT on end
1602.002	27.0	-2.1	75.0	1.1	3.0	20.0	V-Horn	AV	0.0	44.9	54.0	-9.1	Mid channel, EUT on side
1625.996	26.8	-2.0	255.0	1.1	3.0	20.0	V-Horn	AV	0.0	44.8	54.0	-9.2	Mid channel, EUT horizontal
2483.510	40.4	2.2	30.0	1.3	3.0	20.0	H-Horn	PK	0.0	62.6	74.0	-11.4	High channel, EUT on end
2484.048	40.3	2.2	67.0	1.2	3.0	20.0	H-Horn	PK	0.0	62.5	74.0	-11.5	High channel, EUT horizontal
2483.572	40.2	2.2	114.0	1.2	3.0	20.0	H-Horn	PK	0.0	62.4	74.0	-11.6	High channel, EUT on side
2370.059	40.2	1.9	58.0	1.0	3.0	20.0	H-Horn	PK	0.0	62.1	74.0	-11.9	Mid channel, EUT horizontal

EUT: PB42	Work Order: INMC0418
Serial Number: 35810514015	Date: 11/26/07
Customer: Intermec Technologies Corporation	Temperature: 20
Attendees: None	Humidity: 24%
Project: None	Barometric Pres.: 1023
Tested by: Rod Peloquin	Power: 120VAC/60Hz
	Job Site: EV01

TEST SPECIFICATIONS	Test Method
FCC 15.247 (FHSS):2006	ANSI C63.4:2003 DA 00-705:2000

TEST PARAMETERS
Antenna Height(s) (m) 1 - 4 Test Distance (m) 3

COMMENTS

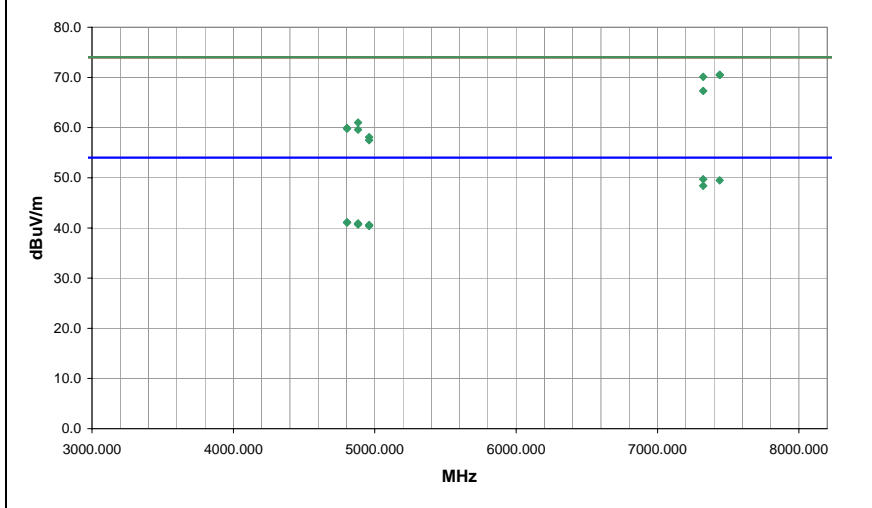
EUT OPERATING MODES
 Transmitting Bluetooth (normal, default modulation and rate)

DEVIATIONS FROM TEST STANDARD

No deviations.

Run #	4
Configuration #	2
Results	Pass

Signature *Rod Peloquin*



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
7439.469	52.6	17.9	214.0	1.1	3.0	0.0	H-Horn	PK	0.0	70.5	74.0	-3.5	High channel, EUT horizontal
7440.331	52.6	17.9	187.0	1.0	3.0	0.0	V-Horn	PK	0.0	70.5	74.0	-3.5	High channel, EUT on side
7323.290	52.7	17.4	234.0	1.0	3.0	0.0	V-Horn	PK	0.0	70.1	74.0	-3.9	High channel, EUT on end
7322.940	32.3	17.4	234.0	1.0	3.0	0.0	V-Horn	AV	0.0	49.7	54.0	-4.3	High channel, EUT on end
7439.886	31.6	17.9	187.0	1.0	3.0	0.0	V-Horn	AV	0.0	49.5	54.0	-4.5	High channel, EUT on side
7322.947	31.0	17.4	202.0	1.1	3.0	0.0	H-Horn	AV	0.0	48.4	54.0	-5.6	Mid channel, EUT horizontal
7322.542	49.9	17.4	202.0	1.1	3.0	0.0	H-Horn	PK	0.0	67.3	74.0	-6.7	Mid channel, EUT horizontal
4803.891	31.6	9.5	11.0	1.2	3.0	0.0	H-Horn	AV	0.0	41.1	54.0	-12.9	Low channel, EUT horizontal
4803.907	31.6	9.5	229.0	1.0	3.0	0.0	V-Horn	AV	0.0	41.1	54.0	-12.9	Low channel, EUT on side
4882.215	51.2	9.8	8.0	1.0	3.0	0.0	H-Horn	PK	0.0	61.0	74.0	-13.0	Mid channel, EUT horizontal
4881.916	31.1	9.8	238.0	1.0	3.0	0.0	V-Horn	AV	0.0	40.9	54.0	-13.1	Mid channel, EUT on side
4881.970	30.9	9.8	8.0	1.0	3.0	0.0	H-Horn	AV	0.0	40.7	54.0	-13.3	Mid channel, EUT horizontal
4959.935	30.4	10.2	103.0	1.0	3.0	0.0	V-Horn	AV	0.0	40.6	54.0	-13.4	High channel, EUT on side
4959.971	30.2	10.2	1.0	1.2	3.0	0.0	H-Horn	AV	0.0	40.4	54.0	-13.6	High channel, EUT horizontal
4803.674	50.4	9.5	11.0	1.2	3.0	0.0	H-Horn	PK	0.0	59.9	74.0	-14.1	Low channel, EUT on side
4804.283	50.3	9.5	229.0	1.0	3.0	0.0	V-Horn	PK	0.0	59.8	74.0	-14.2	Low channel, EUT on side
4881.631	49.8	9.8	238.0	1.0	3.0	0.0	V-Horn	PK	0.0	59.6	74.0	-14.4	Mid channel, EUT on side
4959.672	47.9	10.2	103.0	1.0	3.0	0.0	V-Horn	PK	0.0	58.1	74.0	-15.9	High channel, EUT on side
4959.516	47.3	10.2	1.0	1.2	3.0	0.0	H-Horn	PK	0.0	57.5	74.0	-16.5	High channel, EUT horizontal

EUT: PB42	Work Order: INMC0418
Serial Number: 35810514015	Date: 11/27/07
Customer: Intermec Technologies Corporation	Temperature: 20
Attendees: None	Humidity: 24%
Project: None	Barometric Pres.: 1023
Tested by: Rod Peloquin	Power: 120VAC/60Hz
	Job Site: EV01

TEST SPECIFICATIONS	
FCC 15.247 (FHSS):2006	Test Method ANSI C63.4:2003 DA 00-705:2000

TEST PARAMETERS	
Antenna Height(s) (m)	1 - 4
Test Distance (m)	3

COMMENTS

EUT OPERATING MODES

Transmitting Bluetooth (normal, default modulation and rate)

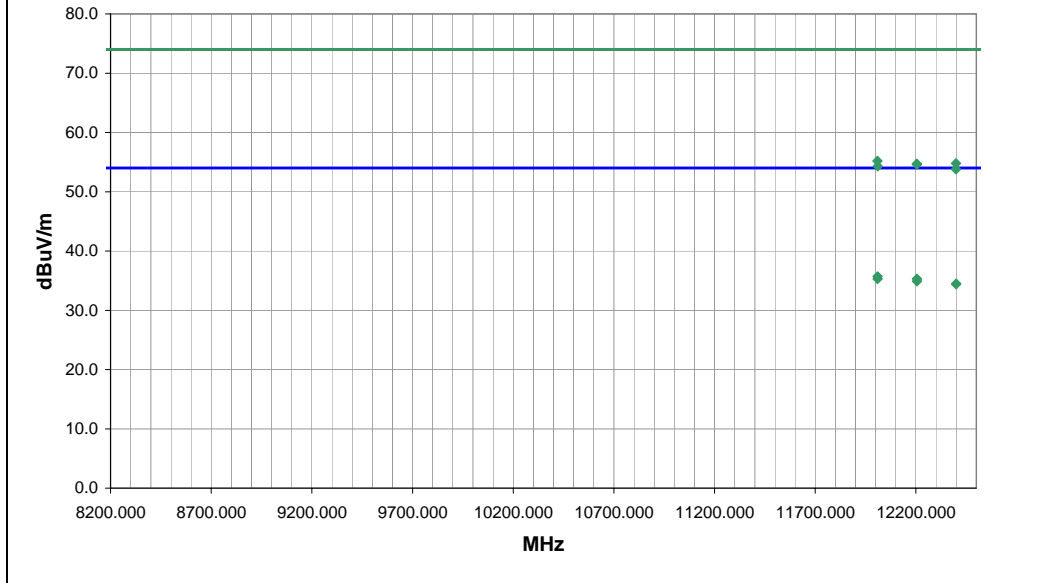
DEVIATIONS FROM TEST STANDARD
No deviations.

Run # 5

Configuration # 2

Results Pass

Rodry Le Pellego
Signature



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
12009.830	38.2	-2.5	213.0	1.0	3.0	0.0	V-Horn	AV	0.0	35.7	54.0	-18.3	Low channel, EUT on side
12009.850	37.8	-2.5	178.0	1.0	3.0	0.0	H-Horn	AV	0.0	35.3	54.0	-18.7	Low channel, EUT horizontal
12204.860	37.6	-2.3	66.0	1.1	3.0	0.0	V-Horn	AV	0.0	35.3	54.0	-18.7	Mid channel, EUT on side
12009.080	57.7	-2.5	213.0	1.0	3.0	0.0	V-Horn	PK	0.0	55.2	74.0	-18.8	Low channel, EUT on side
12204.830	37.2	-2.3	182.0	1.1	3.0	0.0	H-Horn	AV	0.0	34.9	54.0	-19.1	Mid channel, EUT horizontal
12399.100	57.0	-2.2	84.0	1.1	3.0	0.0	H-Horn	PK	0.0	54.8	74.0	-19.2	High channel, EUT horizontal
12204.120	57.0	-2.3	66.0	1.1	3.0	0.0	V-Horn	PK	0.0	54.7	74.0	-19.3	Mid channel, EUT on side
12205.440	56.9	-2.3	182.0	1.1	3.0	0.0	H-Horn	PK	0.0	54.6	74.0	-19.4	Mid channel, EUT horizontal
12399.780	36.7	-2.2	84.0	1.1	3.0	0.0	H-Horn	AV	0.0	34.5	54.0	-19.5	High channel, EUT horizontal
12399.800	36.6	-2.2	74.0	1.0	3.0	0.0	V-Horn	AV	0.0	34.4	54.0	-19.6	High channel, EUT on side
12010.790	56.8	-2.5	178.0	1.0	3.0	0.0	H-Horn	PK	0.0	54.3	74.0	-19.7	Low channel, EUT horizontal
12399.100	56.0	-2.2	74.0	1.0	3.0	0.0	V-Horn	PK	0.0	53.8	74.0	-20.2	High channel, EUT on side



Spurious Radiated Emissions





Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

MODES OF OPERATION

Transmitting Bluetooth, High channel.
 Transmitting Bluetooth, Mid channel.
 Transmitting Bluetooth, Low channel.

POWER SETTINGS INVESTIGATED

120V/60Hz

CONFIGURATIONS INVESTIGATED

INMC0418 - 2) Radiated RF

SAMPLE CALCULATIONS

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
LISN	Solar	9252-50-R-24-BNC	LIR	11/20/2007	13 mo
High Pass Filter	TTE	H97-100K-50-720B	HFX	8/22/2006	24 mo
Attenuator	Tektronix	011-0059-02	ATC	12/27/2006	13 mo
Receiver	Rohde & Schwartz	ESCI	ARG	12/7/2006	13 mo

MEASUREMENT BANDWIDTHS

	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.

MEASUREMENT UNCERTAINTY

Measurement uncertainty is used to reflect the accuracy of the measured result as compared with its "true" or theoretically correct value. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4. In the case of transient tests our test equipment has been demonstrated by calibration to provide at least a 95% confidence that it complies with the test specification requirements. The measurement uncertainty for any test is available upon request.

TEST DESCRIPTION

Using the mode of operation and configuration noted within this report, conducted emissions tests were performed. The frequency range investigated (scanned), is also noted in this report. Conducted power line measurements are made, unless otherwise specified, over the frequency range from 150 kHz to 30 MHz to determine the line-to-ground radio-noise voltage that is conducted from the EUT power-input terminals that are directly (or indirectly via separate transformer or power supplies) connected to a public power network. Equipment is tested with power cords that are normally used or that have electrical or shielding characteristics that are the same as those cords normally used. Typically those measurements are made using a LISN (Line Impedance Stabilization Network), the 50ohm measuring port is terminated by a 50ohm EMI meter or a 50ohm resistive load. All 50ohm measuring ports of the LISN are terminated by 50ohm.

EMC

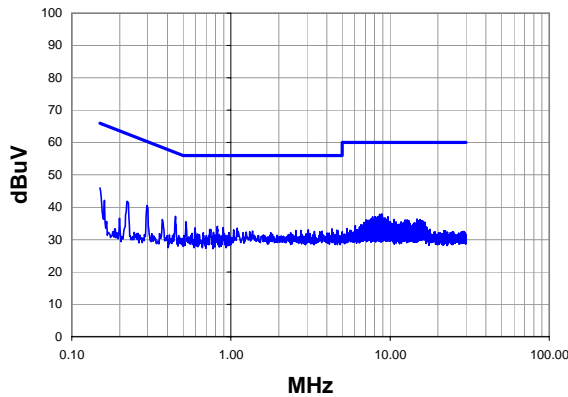
CONDUCTED EMISSIONS

Work Order:	INMC0418	Date:	11/29/07	<i>Holly Ashkannejhad</i> Tested by: Holly Ashkannejhad
Project:	None	Temperature:	20	
Job Site:	EV07	Humidity:	32	
Serial Number:	35810514036	Barometric Pres.:	1022.8	
EUT:	PB42			
Configuration:	2 - Radiated RF			
Customer:	Intermec Technologies Corporation			
Attendees:	None			
EUT Power:	120V/60Hz			
Operating Mode:	Transmitting Bluetooth, Low channel.			
Deviations:	No deviations.			
Comments:				

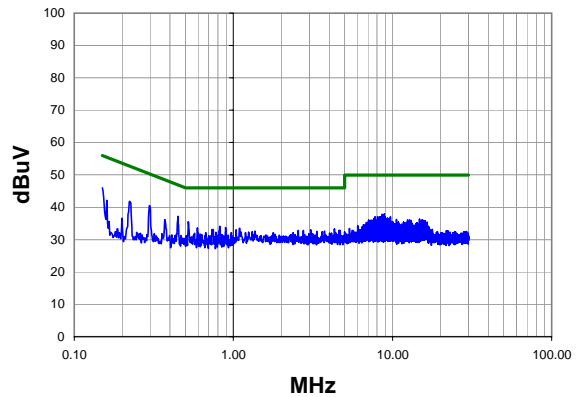
Test Specifications FCC 15.207:2006	Class B	Test Method ANSI C63.4:2003
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Run #	9	Line:	Neutral	Ext. Attenuation:	20	Results	Pass
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Peak Data - vs - Quasi Peak Limit



Peak Data - vs - Average Limit



Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted dBuV	Spec. Limit dBuV	Compared to Spec. (dB)
0.449	16.3	0.8	37.1	56.9	-19.7
0.296	19.6	0.9	40.5	60.3	-19.8
0.150	24.0	2.0	46.0	66.0	-20.0
0.521	14.7	0.8	35.5	56.0	-20.5
0.223	20.9	1.0	41.9	62.7	-20.8
0.821	13.5	0.6	34.1	56.0	-21.9
8.880	17.4	0.5	37.9	60.0	-22.1
8.580	17.3	0.5	37.8	60.0	-22.2
0.895	13.2	0.6	33.8	56.0	-22.2
0.371	15.3	0.9	36.2	58.5	-22.3
8.660	17.2	0.5	37.7	60.0	-22.3
0.594	12.9	0.8	33.7	56.0	-22.3
1.096	13.0	0.5	33.5	56.0	-22.5
4.320	12.8	0.5	33.3	56.0	-22.7
0.735	12.5	0.7	33.2	56.0	-22.8
8.060	16.6	0.5	37.1	60.0	-22.9
8.360	16.6	0.5	37.1	60.0	-22.9
8.510	16.6	0.5	37.1	60.0	-22.9
1.040	12.5	0.5	33.0	56.0	-23.0
3.064	12.5	0.5	33.0	56.0	-23.0

Peak Data - vs - Average Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted dBuV	Spec. Limit dBuV	Compared to Spec. (dB)
0.449	16.3	0.8	37.1	46.9	-9.7
0.296	19.6	0.9	40.5	50.3	-9.8
0.150	24.0	2.0	46.0	56.0	-10.0
0.521	14.7	0.8	35.5	46.0	-10.5
0.223	20.9	1.0	41.9	52.7	-10.8
0.821	13.5	0.6	34.1	46.0	-11.9
8.880	17.4	0.5	37.9	50.0	-12.1
8.580	17.3	0.5	37.8	50.0	-12.2
0.895	13.2	0.6	33.8	46.0	-12.2
0.371	15.3	0.9	36.2	48.5	-12.3
8.660	17.2	0.5	37.7	50.0	-12.3
0.594	12.9	0.8	33.7	46.0	-12.3
1.096	13.0	0.5	33.5	46.0	-12.5
4.320	12.8	0.5	33.3	46.0	-12.7
0.735	12.5	0.7	33.2	46.0	-12.8
8.060	16.6	0.5	37.1	50.0	-12.9
8.360	16.6	0.5	37.1	50.0	-12.9
8.510	16.6	0.5	37.1	50.0	-12.9
1.040	12.5	0.5	33.0	46.0	-13.0
3.064	12.5	0.5	33.0	46.0	-13.0

EMC

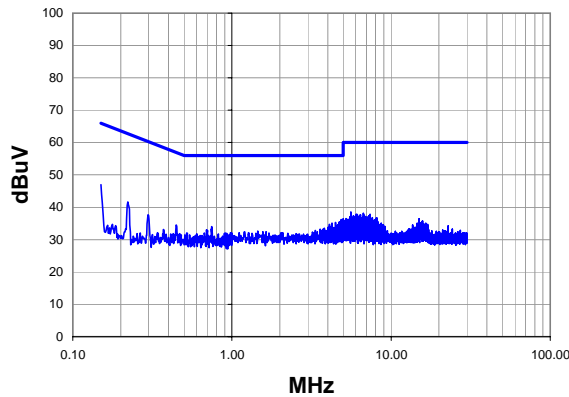
CONDUCTED EMISSIONS

Work Order:	INMC0418	Date:	11/29/07	<i>Holly Ashkannejhad</i> Tested by: Holly Ashkannejhad
Project:	None	Temperature:	20	
Job Site:	EV07	Humidity:	32	
Serial Number:	35810514036	Barometric Pres.:	1022.8	
EUT:	PB42			
Configuration:	2 - Radiated RF			
Customer:	Intermec Technologies Corporation			
Attendees:	None			
EUT Power:	120V/60Hz			
Operating Mode:	Transmitting Bluetooth, Low channel.			
Deviations:	No deviations.			
Comments:				

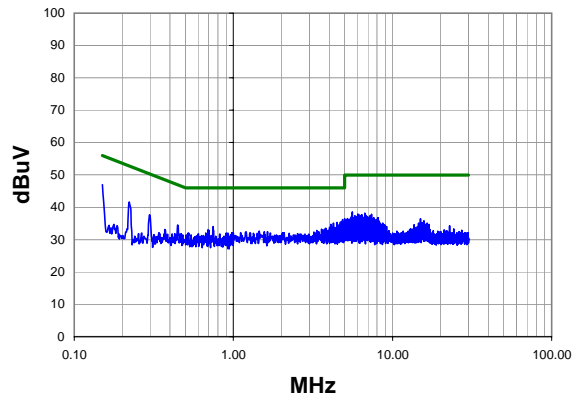
Test Specifications FCC 15.207:2006	Class B	Test Method ANSI C63.4:2003
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Run #	10	Line: High Line	Ext. Attenuation: 20	Results	Pass
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Peak Data - vs - Quasi Peak Limit



Peak Data - vs - Average Limit



Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted dBuV	Spec. Limit dBuV	Compared to Spec. (dB)
0.150	25.0	2.0	47.0	66.0	-19.0
5.000	15.9	0.5	36.4	56.0	-19.6
4.856	15.7	0.5	36.2	56.0	-19.8
4.704	14.9	0.5	35.4	56.0	-20.6
4.776	14.9	0.5	35.4	56.0	-20.6
4.928	14.9	0.5	35.4	56.0	-20.6
4.480	14.8	0.5	35.3	56.0	-20.7
4.256	14.6	0.5	35.1	56.0	-20.9
0.221	20.7	1.0	41.7	62.8	-21.1
4.104	14.2	0.5	34.7	56.0	-21.3
4.624	14.0	0.5	34.5	56.0	-21.5
5.590	18.0	0.5	38.5	60.0	-21.5
4.552	13.8	0.5	34.3	56.0	-21.7
6.710	17.7	0.5	38.2	60.0	-21.8
0.747	13.4	0.7	34.1	56.0	-21.9
4.184	13.5	0.5	34.0	56.0	-22.0
6.040	17.4	0.5	37.9	60.0	-22.1
4.032	13.3	0.5	33.8	56.0	-22.2
6.120	17.3	0.5	37.8	60.0	-22.2
7.380	17.3	0.5	37.8	60.0	-22.2

Peak Data - vs - Average Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted dBuV	Spec. Limit dBuV	Compared to Spec. (dB)
0.150	25.0	2.0	47.0	56.0	-9.0
5.000	15.9	0.5	36.4	46.0	-9.6
4.856	15.7	0.5	36.2	46.0	-9.8
4.704	14.9	0.5	35.4	46.0	-10.6
4.776	14.9	0.5	35.4	46.0	-10.6
4.928	14.9	0.5	35.4	46.0	-10.6
4.480	14.8	0.5	35.3	46.0	-10.7
4.256	14.6	0.5	35.1	46.0	-10.9
0.221	20.7	1.0	41.7	52.8	-11.1
4.104	14.2	0.5	34.7	46.0	-11.3
4.624	14.0	0.5	34.5	46.0	-11.5
5.590	18.0	0.5	38.5	50.0	-11.5
4.552	13.8	0.5	34.3	46.0	-11.7
6.710	17.7	0.5	38.2	50.0	-11.8
0.747	13.4	0.7	34.1	46.0	-11.9
4.184	13.5	0.5	34.0	46.0	-12.0
6.040	17.4	0.5	37.9	50.0	-12.1
4.032	13.3	0.5	33.8	46.0	-12.2
6.120	17.3	0.5	37.8	50.0	-12.2
7.380	17.3	0.5	37.8	50.0	-12.2

EMC

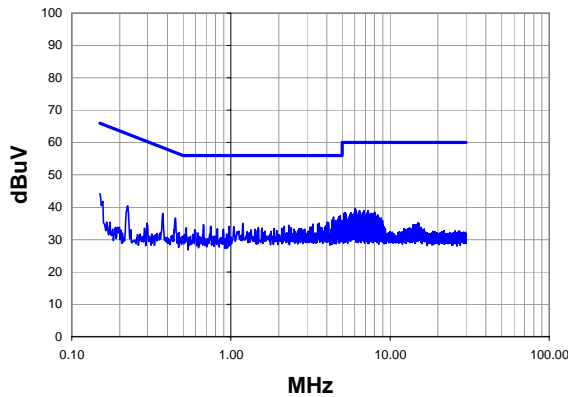
CONDUCTED EMISSIONS

Work Order:	INMC0418	Date:	11/29/07	<i>Holly Ashkannejhad</i> Tested by: Holly Ashkannejhad
Project:	None	Temperature:	20	
Job Site:	EV07	Humidity:	32	
Serial Number:	35810514036	Barometric Pres.:	1022.8	
EUT:	PB42			
Configuration:	2 - Radiated RF			
Customer:	Intermec Technologies Corporation			
Attendees:	None			
EUT Power:	120V/60Hz			
Operating Mode:	Transmitting Bluetooth, Mid channel.			
Deviations:	No deviations.			
Comments:				

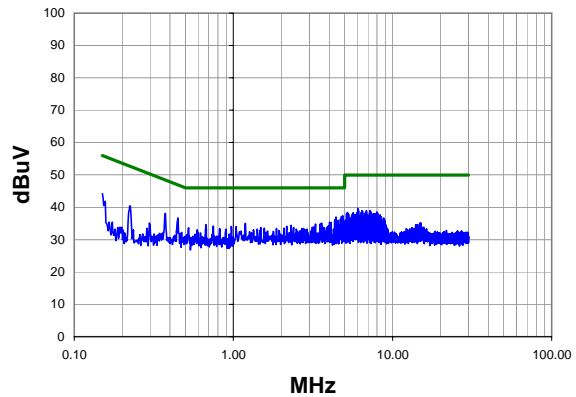
Test Specifications FCC 15.207:2006	Class B	Test Method ANSI C63.4:2003
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Run #	11	Line: High Line	Ext. Attenuation: 20	Results	Pass
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Peak Data - vs - Quasi Peak Limit



Peak Data - vs - Average Limit



Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted dBuV	Spec. Limit dBuV	Compared to Spec. (dB)
4.856	16.9	0.5	37.4	56.0	-18.6
4.776	16.6	0.5	37.1	56.0	-18.9
4.408	16.5	0.5	37.0	56.0	-19.0
4.704	15.9	0.5	36.4	56.0	-19.6
4.328	15.6	0.5	36.1	56.0	-19.9
4.928	15.5	0.5	36.0	56.0	-20.0
4.552	15.4	0.5	35.9	56.0	-20.1
0.448	15.9	0.8	36.7	56.9	-20.2
4.480	15.3	0.5	35.8	56.0	-20.2
6.040	19.2	0.5	39.7	60.0	-20.3
0.373	17.2	0.9	38.1	58.4	-20.3
4.032	14.9	0.5	35.4	56.0	-20.6
4.104	14.8	0.5	35.3	56.0	-20.7
3.584	14.6	0.5	35.1	56.0	-20.9
1.192	14.5	0.5	35.0	56.0	-21.0
6.110	18.5	0.5	39.0	60.0	-21.0
6.410	18.5	0.5	39.0	60.0	-21.0
6.860	18.5	0.5	39.0	60.0	-21.0
7.240	18.5	0.5	39.0	60.0	-21.0
3.280	14.3	0.5	34.8	56.0	-21.2

Peak Data - vs - Average Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted dBuV	Spec. Limit dBuV	Compared to Spec. (dB)
4.856	16.9	0.5	37.4	46.0	-8.6
4.776	16.6	0.5	37.1	46.0	-8.9
4.408	16.5	0.5	37.0	46.0	-9.0
4.704	15.9	0.5	36.4	46.0	-9.6
4.328	15.6	0.5	36.1	46.0	-9.9
4.928	15.5	0.5	36.0	46.0	-10.0
4.552	15.4	0.5	35.9	46.0	-10.1
0.448	15.9	0.8	36.7	46.9	-10.2
4.480	15.3	0.5	35.8	46.0	-10.2
6.040	19.2	0.5	39.7	50.0	-10.3
0.373	17.2	0.9	38.1	48.4	-10.3
4.032	14.9	0.5	35.4	46.0	-10.6
4.104	14.8	0.5	35.3	46.0	-10.7
3.584	14.6	0.5	35.1	46.0	-10.9
1.192	14.5	0.5	35.0	46.0	-11.0
6.110	18.5	0.5	39.0	50.0	-11.0
6.410	18.5	0.5	39.0	50.0	-11.0
6.860	18.5	0.5	39.0	50.0	-11.0
7.240	18.5	0.5	39.0	50.0	-11.0
3.280	14.3	0.5	34.8	46.0	-11.2

EMC

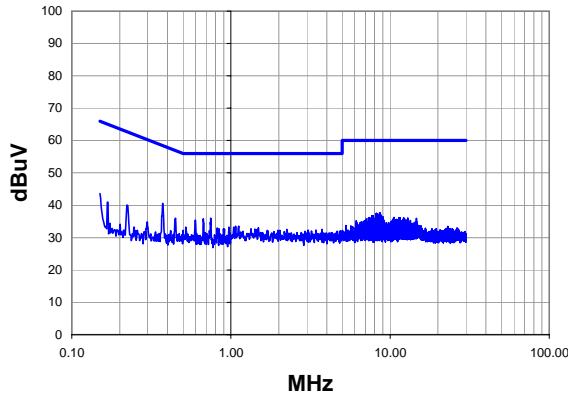
CONDUCTED EMISSIONS

Work Order:	INMC0418	Date:	11/29/07	<i>Holly Ashkannejhad</i> Tested by: Holly Ashkannejhad
Project:	None	Temperature:	20	
Job Site:	EV07	Humidity:	32	
Serial Number:	35810514036	Barometric Pres.:	1022.8	
EUT:	PB42			
Configuration:	2 - Radiated RF			
Customer:	Intermec Technologies Corporation			
Attendees:	None			
EUT Power:	120V/60Hz			
Operating Mode:	Transmitting Bluetooth, Mid channel.			
Deviations:	No deviations.			
Comments:				

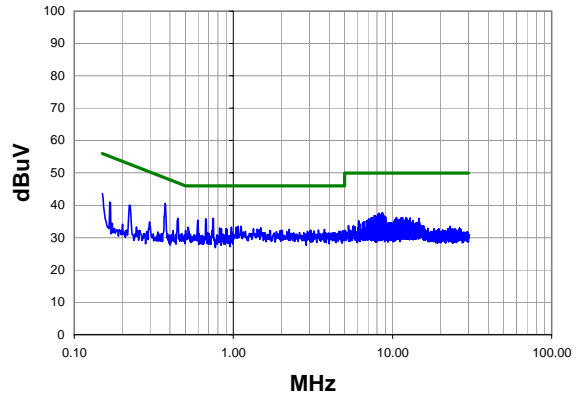
Test Specifications FCC 15.207:2006	Class B	Test Method ANSI C63.4:2003
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Run #	12	Line:	Neutral	Ext. Attenuation:	20	Results	Pass
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Peak Data - vs - Quasi Peak Limit



Peak Data - vs - Average Limit



Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted dBuV	Spec. Limit dBuV	Compared to Spec. (dB)
0.373	19.7	0.9	40.6	58.4	-17.8
0.747	15.3	0.7	36.0	56.0	-20.0
0.670	15.1	0.7	35.8	56.0	-20.2
0.597	14.7	0.8	35.5	56.0	-20.5
0.449	15.2	0.8	36.0	56.9	-20.8
8.580	17.2	0.5	37.7	60.0	-22.3
0.150	21.6	2.0	43.6	66.0	-22.4
8.660	17.1	0.5	37.6	60.0	-22.4
1.072	13.0	0.5	33.5	56.0	-22.5
1.120	13.0	0.5	33.5	56.0	-22.5
8.210	17.0	0.5	37.5	60.0	-22.5
0.223	19.1	1.0	40.1	62.7	-22.6
8.140	16.8	0.5	37.3	60.0	-22.7
8.280	16.8	0.5	37.3	60.0	-22.7
0.973	12.7	0.5	33.2	56.0	-22.8
1.040	12.7	0.5	33.2	56.0	-22.8
0.521	12.4	0.8	33.2	56.0	-22.8
1.488	12.5	0.5	33.0	56.0	-23.0
8.510	16.5	0.5	37.0	60.0	-23.0
8.730	16.5	0.5	37.0	60.0	-23.0

Peak Data - vs - Average Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted dBuV	Spec. Limit dBuV	Compared to Spec. (dB)
0.373	19.7	0.9	40.6	48.4	-7.8
0.747	15.3	0.7	36.0	46.0	-10.0
0.670	15.1	0.7	35.8	46.0	-10.2
0.597	14.7	0.8	35.5	46.0	-10.5
0.449	15.2	0.8	36.0	46.9	-10.8
8.580	17.2	0.5	37.7	50.0	-12.3
0.150	21.6	2.0	43.6	56.0	-12.4
8.660	17.1	0.5	37.6	50.0	-12.4
1.072	13.0	0.5	33.5	46.0	-12.5
1.120	13.0	0.5	33.5	46.0	-12.5
8.210	17.0	0.5	37.5	50.0	-12.5
0.223	19.1	1.0	40.1	52.7	-12.6
8.140	16.8	0.5	37.3	50.0	-12.7
8.280	16.8	0.5	37.3	50.0	-12.7
0.973	12.7	0.5	33.2	46.0	-12.8
1.040	12.7	0.5	33.2	46.0	-12.8
0.521	12.4	0.8	33.2	46.0	-12.8
1.488	12.5	0.5	33.0	46.0	-13.0
8.510	16.5	0.5	37.0	50.0	-13.0
8.730	16.5	0.5	37.0	50.0	-13.0

EMC

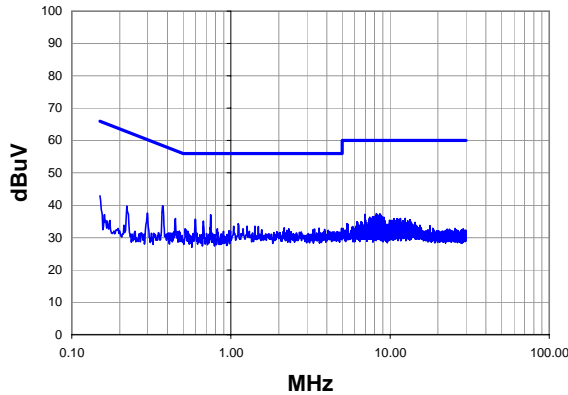
CONDUCTED EMISSIONS

Work Order:	INMC0418	Date:	11/29/07	<i>Holly Ashkannejhad</i> Tested by: Holly Ashkannejhad
Project:	None	Temperature:	20	
Job Site:	EV07	Humidity:	32	
Serial Number:	35810514036	Barometric Pres.:	1022.8	
EUT:	PB42			
Configuration:	2 - Radiated RF			
Customer:	Intermec Technologies Corporation			
Attendees:	None			
EUT Power:	120V/60Hz			
Operating Mode:	Transmitting Bluetooth, High channel.			
Deviations:	No deviations.			
Comments:				

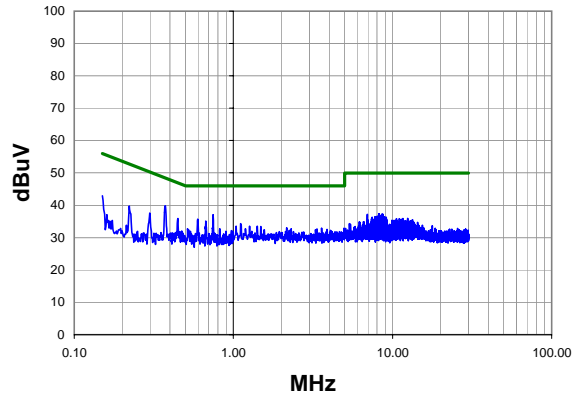
Test Specifications FCC 15.207:2006	Class B	Test Method ANSI C63.4:2003
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Run #	13	Line:	Neutral	Ext. Attenuation:	20	Results	Pass
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Peak Data - vs - Quasi Peak Limit



Peak Data - vs - Average Limit



Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted dBuV	Spec. Limit dBuV	Compared to Spec. (dB)
0.373	19.0	0.9	39.9	58.4	-18.5
0.745	16.4	0.7	37.1	56.0	-18.9
0.597	15.0	0.8	35.8	56.0	-20.2
0.672	14.4	0.7	35.1	56.0	-20.9
0.448	15.1	0.8	35.9	56.9	-21.0
1.112	13.8	0.5	34.3	56.0	-21.7
1.040	13.0	0.5	33.5	56.0	-22.5
1.264	13.0	0.5	33.5	56.0	-22.5
1.416	13.0	0.5	33.5	56.0	-22.5
1.488	12.9	0.5	33.4	56.0	-22.6
8.210	16.9	0.5	37.4	60.0	-22.6
8.580	16.8	0.5	37.3	60.0	-22.7
8.660	16.8	0.5	37.3	60.0	-22.7
0.298	16.6	0.9	37.5	60.3	-22.8
6.940	16.7	0.5	37.2	60.0	-22.8
0.221	18.8	1.0	39.8	62.8	-23.0
2.160	12.5	0.5	33.0	56.0	-23.0
8.280	16.5	0.5	37.0	60.0	-23.0
8.730	16.5	0.5	37.0	60.0	-23.0
0.150	20.9	2.0	42.9	66.0	-23.1

Peak Data - vs - Average Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted dBuV	Spec. Limit dBuV	Compared to Spec. (dB)
0.373	19.0	0.9	39.9	48.4	-8.5
0.745	16.4	0.7	37.1	46.0	-8.9
0.597	15.0	0.8	35.8	46.0	-10.2
0.672	14.4	0.7	35.1	46.0	-10.9
0.448	15.1	0.8	35.9	46.9	-11.0
1.112	13.8	0.5	34.3	46.0	-11.7
1.040	13.0	0.5	33.5	46.0	-12.5
1.264	13.0	0.5	33.5	46.0	-12.5
1.416	13.0	0.5	33.5	46.0	-12.5
1.488	12.9	0.5	33.4	46.0	-12.6
8.210	16.9	0.5	37.4	50.0	-12.6
8.580	16.8	0.5	37.3	50.0	-12.7
8.660	16.8	0.5	37.3	50.0	-12.7
0.298	16.6	0.9	37.5	50.3	-12.8
6.940	16.7	0.5	37.2	50.0	-12.8
0.221	18.8	1.0	39.8	52.8	-13.0
2.160	12.5	0.5	33.0	46.0	-13.0
8.280	16.5	0.5	37.0	50.0	-13.0
8.730	16.5	0.5	37.0	50.0	-13.0
0.150	20.9	2.0	42.9	56.0	-13.1

EMC

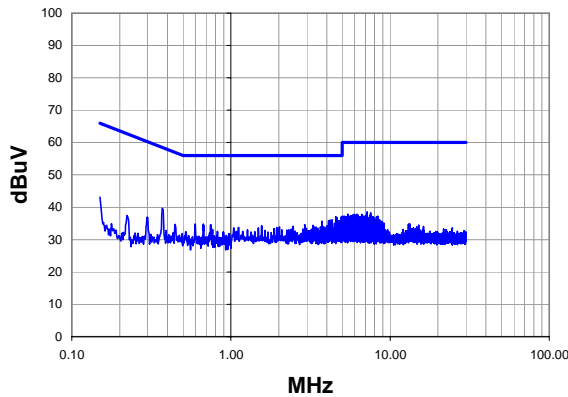
CONDUCTED EMISSIONS

Work Order:	INMC0418	Date:	11/29/07	<i>Holly Ashkannejhad</i> Tested by: Holly Ashkannejhad
Project:	None	Temperature:	20	
Job Site:	EV07	Humidity:	32	
Serial Number:	35810514036	Barometric Pres.:	1022.8	
EUT:	PB42			
Configuration:	2 - Radiated RF			
Customer:	Intermec Technologies Corporation			
Attendees:	None			
EUT Power:	120V/60Hz			
Operating Mode:	Transmitting Bluetooth, High channel.			
Deviations:	No deviations.			
Comments:				

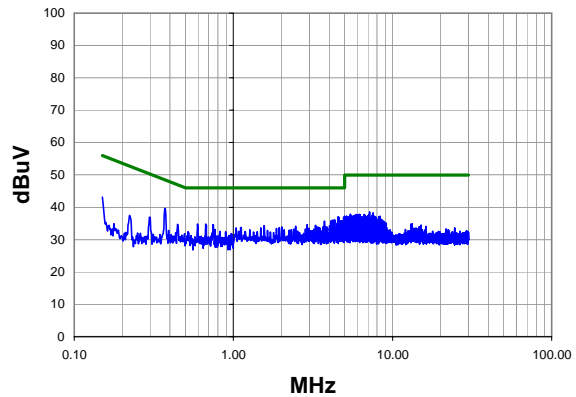
Test Specifications FCC 15.207:2006	Class B	Test Method ANSI C63.4:2003
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Run #	14	Line: High Line	Ext. Attenuation: 20	Results	Pass
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Peak Data - vs - Quasi Peak Limit



Peak Data - vs - Average Limit



Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted dBuV	Spec. Limit dBuV	Compared to Spec. (dB)
0.371	18.8	0.9	39.7	58.5	-18.8
5.000	16.7	0.5	37.2	56.0	-18.8
4.552	16.6	0.5	37.1	56.0	-18.9
4.928	16.5	0.5	37.0	56.0	-19.0
4.624	16.3	0.5	36.8	56.0	-19.2
4.328	15.6	0.5	36.1	56.0	-19.9
4.176	15.5	0.5	36.0	56.0	-20.0
4.256	15.5	0.5	36.0	56.0	-20.0
4.104	15.3	0.5	35.8	56.0	-20.2
4.776	15.3	0.5	35.8	56.0	-20.2
3.728	15.2	0.5	35.7	56.0	-20.3
4.704	15.2	0.5	35.7	56.0	-20.3
4.856	15.2	0.5	35.7	56.0	-20.3
4.480	14.5	0.5	35.0	56.0	-21.0
0.595	14.1	0.8	34.9	56.0	-21.1
0.670	14.1	0.7	34.8	56.0	-21.2
0.745	14.0	0.7	34.7	56.0	-21.3
2.904	14.1	0.5	34.6	56.0	-21.4
7.160	18.1	0.5	38.6	60.0	-21.4
3.288	13.9	0.5	34.4	56.0	-21.6

Peak Data - vs - Average Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted dBuV	Spec. Limit dBuV	Compared to Spec. (dB)
0.371	18.8	0.9	39.7	48.5	-8.8
5.000	16.7	0.5	37.2	46.0	-8.8
4.552	16.6	0.5	37.1	46.0	-8.9
4.928	16.5	0.5	37.0	46.0	-9.0
4.624	16.3	0.5	36.8	46.0	-9.2
4.328	15.6	0.5	36.1	46.0	-9.9
4.176	15.5	0.5	36.0	46.0	-10.0
4.256	15.5	0.5	36.0	46.0	-10.0
4.104	15.3	0.5	35.8	46.0	-10.2
4.776	15.3	0.5	35.8	46.0	-10.2
3.728	15.2	0.5	35.7	46.0	-10.3
4.704	15.2	0.5	35.7	46.0	-10.3
4.856	15.2	0.5	35.7	46.0	-10.3
4.480	14.5	0.5	35.0	46.0	-11.0
0.595	14.1	0.8	34.9	46.0	-11.1
0.670	14.1	0.7	34.8	46.0	-11.2
0.745	14.0	0.7	34.7	46.0	-11.3
2.904	14.1	0.5	34.6	46.0	-11.4
7.160	18.1	0.5	38.6	50.0	-11.4
3.288	13.9	0.5	34.4	46.0	-11.6



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 MHz**.

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 μ s. 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 μ s). 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 as 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 μ s * 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 = $5 * 625 \mu s * 1600 * 1/5 * 1/s / 79 * 30s = 0.3797s$ (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 $f_{center} = 75 \text{ kHz}$.

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.