

# Intermec Technologies Corporation

**Simultaneous Transmission - FCC Part 22H & Part 24E**

**Testing for Class II Permissive Change of FCC ID: EHASMC46 to authorize  
co-location with FCC ID: EHA2610CF and FCC ID: EHABTS080**

**700C configured with three internal radio modules:**

**GSM (FCC ID: EHASMC46)  
802.11b/g (FCC ID: EHA2610CF)  
Bluetooth (FCC ID: EHABTS080)**

**March 30, 2005**

**Report No. ITRM0073.4**

Report Prepared By



[www.nwemc.com](http://www.nwemc.com)  
1-888-EMI-CERT

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**EMC Test Report**



22975 NW Evergreen Parkway  
Suite 400  
Hillsboro, Oregon 97124

**Certificate of Test**  
**Issue Date: March 30, 2005**  
**Intermec Technologies Corporation**

**700C configured with three internal radio modules:**

**GSM (FCC ID: EHASMC46)**  
**802.11b/g (FCC ID: EHA2610CF)**  
**Bluetooth (FCC ID: EHABTS080)**

Specification	Emissions		
	Test Method	Pass	Fail
FCC 22.917(a) and FCC 24.238(a) Spurious Radiated Emissions:2004 (Simultaneous Transmit)	TIA/EIA 603-B:2001	<input checked="" type="checkbox"/>	<input type="checkbox"/>

**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:**

Don Facteau, IS Manager

*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 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. USA0401C



**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. - Hillsboro: C-1071 and R-1025, Irvine: C-2094 and R-1943, Newberg: C-1877 and R-1760, Sultan: 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?**

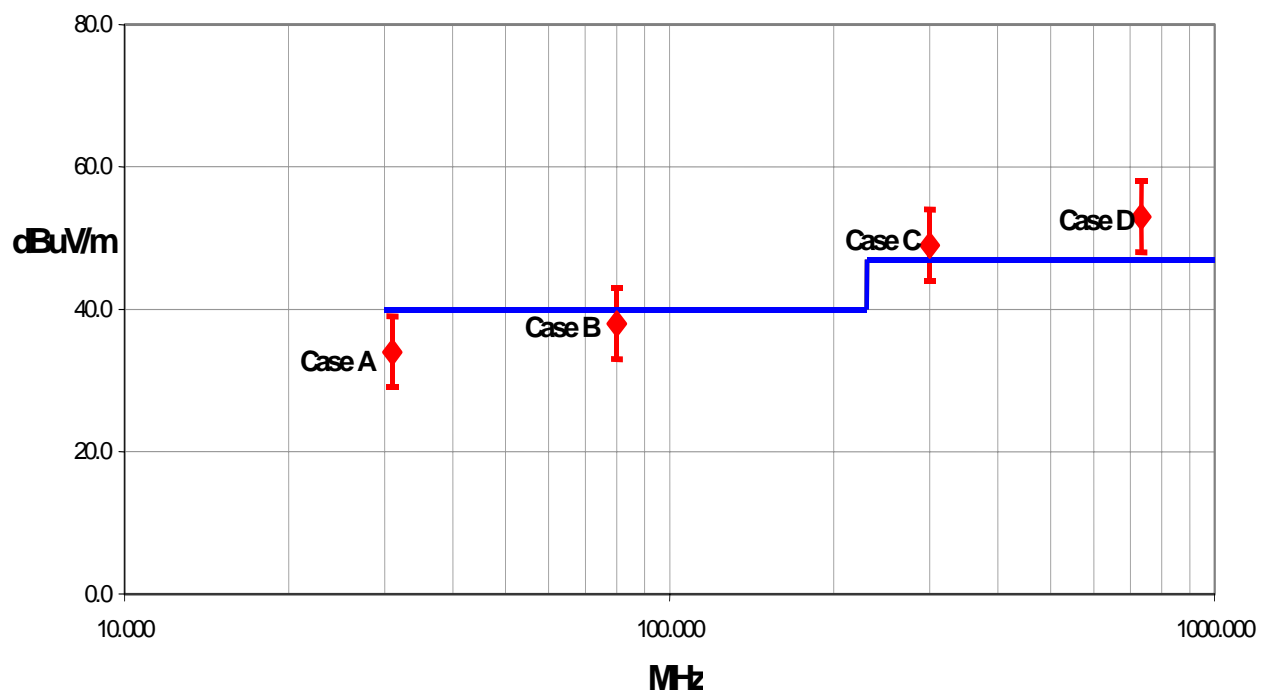
When a measurement is made, the result will be different from the true or theoretically correct value. The difference is the result of tolerances in the measurement system that cannot be completely eliminated. To the extent that technology allows us, it has been our aim to minimize this error. The following 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  $\leq 1$  GHz**

Value (dB)

Test Distance	Probability Distribution	Biconical Antenna		Log Periodic Antenna		Dipole Antenna	
		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 $\approx 95\%$ )	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)

Test Distance	Probability Distribution	Without High Pass Filter		With High Pass Filter	
		3m	10m	3m	10m
Combined standard uncertainty $u_c(y)$	normal	+ 1.29 - 1.25	+ 1.29 - 1.25	+ 1.38 - 1.35	+ 1.38 - 1.35
Expanded uncertainty $U$ (level of confidence $\approx 95\%$ )	normal (k=2)	+ 2.57 - 2.51	+ 2.57 - 2.51	+ 2.76 - 2.70	+ 2.76 - 2.70

**Conducted Emissions**

Test Distance	Probability Distribution	Value (+/- dB)	
		3m	10m
Combined standard uncertainty $u_c(y)$	normal	1.48	1.48
Expanded uncertainty $U$ (level of confidence $\approx 95\%$ )	normal (k = 2)	2.97	2.97

**Radiated Immunity**

Test Distance	Probability Distribution	Value (+/- dB)	
		3m	10m
Combined standard uncertainty $u_c(y)$	normal	1.05	1.05
Expanded uncertainty $U$ (level of confidence $\approx 95\%$ )	normal (k = 2)	2.11	2.11

**Conducted Immunity**

Test Distance	Probability Distribution	Value (+/- dB)	
		3m	10m
Combined standard uncertainty $u_c(y)$	normal	1.05	1.05
Expanded uncertainty $U$ (level of confidence $\approx 95\%$ )	normal (k = 2)	2.10	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,  $u_c(y)$  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 339<sup>th</sup> Ave. SE  
Sultan, WA 98294  
(888) 364-2378  
FAX (360) 793-2536



**Party Requesting the Test**

<b>Company Name:</b>	Intermec Technologies Corporation
<b>Address:</b>	550 Second St. SE
<b>City, State, Zip:</b>	Cedar Rapids, IA 52401-2023
<b>Test Requested By:</b>	Scott Holub
<b>Model:</b>	700C configured with three internal radio modules: GSM (FCC ID: EHASMC46) 802.11b/g (FCC ID: EHA2610CF) Bluetooth (FCC ID: EHABTS080)
<b>First Date of Test:</b>	2-7-2005
<b>Last Date of Test:</b>	3-16-2005
<b>Receipt Date of Samples:</b>	2-2-2005
<b>Equipment Design Stage:</b>	Production
<b>Equipment Condition:</b>	No visual damage.

**Information Provided by the Party Requesting the Test**

<b>Clocks/Oscillators:</b>	Not provided at the time of test.
<b>I/O Ports:</b>	Serial

**Functional Description of the EUT (Equipment Under Test):**

Intermec's Handheld Computer, Model 700C was configured with three co-located radios. The 700C contained a GSM radio (FCC ID: EHASMC46), an 802.11(b)/(g) radio (FCC ID: EHA2610CF), and a Bluetooth radio (FCC ID: EHABTS080).

**Client Justification for EUT Selection:**

Not Provided

**Client Justification for Test Selection:**

This test demonstrated compliance with FCC Part 22H and Part 24E emissions limits while the co-located radios were transmitting simultaneously. Each radio transmits through its own antenna. This report will be used as part of a Class II Permissive Change to authorize the co-location of an 802.11b/g radio and Bluetooth radio with the GSM radio.

**EUT Photo**

Equipment modifications					
Item	Test	Date	Modification	Note	Disposition of EUT
1	Spurious Radiated Emissions	02/07/2005 thru 03/16/2005	No EMI suppression devices were added or modified during this test.	Same configuration as received from client.	EUT remained at Northwest EMC.

**Justification**

Intermec's Handheld Computer, Model 700C was configured with three co-located radios. The 700C contained a GSM radio (FCC ID: EHASMC46), an 802.11(b)/(g) radio (FCC ID: EHA2610CF), and a Bluetooth radio (FCC ID: EHABTS080). This test demonstrated compliance with FCC Part 22H and Part 24E emissions limits while the co-located radios were transmitting simultaneously. Each radio transmits through its own antenna.

All possible combinations of harmonic emissions from the GSM, 802.11(b)/(g), and Bluetooth radios were compared numerically. It was determined that there were no possible coincidental harmonics below 1 GHz. All the radios were configured for simultaneous transmission at the channels specified below.

**Channels in Specified Band Investigated:**

<b>802.11(b):</b>	1, 11
<b>GSM (Cellular):</b>	140, 141, 191, 202
<b>GSM (PCS):</b>	516, 606
<b>Bluetooth:</b>	2, 11, 67, 80

**Operating Modes Investigated:****Bluetooth Radio in PW40 with 700C in cradle:**

Simultaneous transmission of Bluetooth Channel 11, 802.11(b) Channel 1, & GSM PCS Channel 516
Simultaneous transmission of Bluetooth Channel 67, 802.11(b) Channel 11, & GSM PCS Channel 516
Simultaneous transmission of Bluetooth Channel 2, 802.11(b) Channel 1, & GSM PCS Channel 606
Simultaneous transmission of Bluetooth Channel 80, 802.11(b) Channel 11, & GSM PCS Channel 606
Simultaneous transmission of Bluetooth Channel 11, 802.11(b) Channel 1, & GSM cellular Channel 202
Simultaneous transmission of Bluetooth Channel 5, 802.11(b) Channel 1, & GSM cellular Channel 191
Simultaneous transmission of Bluetooth Channel 79, 802.11(b) Channel 11, & GSM cellular Channel 141
Simultaneous transmission of Bluetooth Channel 79, 802.11(b) Channel 11, & GSM cellular Channel 140

**Antennas Investigated:**

<b>802.11(b):</b>	Folded Monopole internal to 700C, P/N 805-608-104
<b>GSM:</b>	Tri-band Antenna external to 700C, P/N 805-624-001
<b>Bluetooth:</b>	Chip antenna integral to Bluetooth module inside 700C

**Data Rates Investigated:**

Maximum
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**Power Input Settings Investigated:**

120 VAC, 60 Hz.
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**Frequency Range Investigated**

<b>Start Frequency</b>	1 GHz	<b>Stop Frequency</b>	25 GHz
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**Software\Firmware Applied During Test**

<b>Exercise software</b>	Phone Blue Test Test Utility	<b>Version</b>	Unknown Unknown 0.4
<b>Description</b>			
This system was tested using special test software to exercise the functions of the device during the testing such as channels, power, and modulation during simultaneous transmission.			

**EUT and Peripherals**

<b>Description</b>	<b>Manufacturer</b>	<b>Model/Part Number</b>	<b>Serial Number</b>
Handheld Computer	Intermec Technologies Corporation	700C	18190400041
AC Adapter	Elpac Power Systems	FW1812	014868
GSM Radio in 700C	Intermec Technologies Corporation	SMC46	Unknown
Bluetooth Radio in 700C	Intermec Technologies Corporation	BTS080	Unknown
802.11(b)/(g) radio in 700C	Intermec Technologies Corporation	2601CF	Unknown

**Remote Equipment Outside of Test Setup Boundary**

<b>Description</b>	<b>Manufacturer</b>	<b>Model/Part Number</b>	<b>Serial Number</b>
GSM/DCS/PCS MS Test Set	Hewlett Packard	8922M	3829U02903
GSM/DCS/PCS RF Interface	Hewlett Packard	83220E	3842U05679
Wireless Communications Test Set	Agilent	8960 Series 10 E5515C	QB44051960
Equipment isolated from the EUT so as not to contribute to the measurement result is considered to be outside the test setup boundary			

**Cables**

<b>Cable Type</b>	<b>Shield</b>	<b>Length (m)</b>	<b>Ferrite</b>	<b>Connection 1</b>	<b>Connection 2</b>
DC Leads	PA	1.3	PA	Handheld Computer	AC Adapter
AC Power	No	2.0	No	AC Adapter	AC Mains

Measurement Equipment					
Description	Manufacturer	Model	Identifier	Last Cal	Interval
Antenna, Horn	EMCO	3160-09	AHG	NCR	NA
Pre-Amplifier	Miteq	JSD4-18002600-26-8P	APU	10/08/2003	24 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	09/07/2004	12 mo
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
Attenuator		2082-6148-20	ATE	02/03/2004	13 mo
Quasi-Peak Adapter	Hewlett-Packard	85650A	AQF	12/02/2004	13 mo
Spectrum Analyzer	Hewlett-Packard	8566B	AAL	12/02/2004	13 mo
Spectrum Analyzer Display	Hewlett Packard	85662A	AALD	12/02/2004	13 mo
Spectrum Analyzer	Tektronix	2784	AAO	01/02/2005	12 mo
Antenna, Horn	EMCO	3160-08	AHK	NCR	NA
Pre-Amplifier	Miteq	AMF-4D-005180-24-10P	APC	10/08/2003	15 mo
Antenna, Horn	EMCO	3115	AHF	03/18/2004	24 mo
Signal Generator	Hewlett Packard	8341B	TGN	01/23/2004	13 mo
Antenna, Dipole (ADAA included)	Roberts	Roberts	ADA	1/06/2005	24 mo

### Test Description

**Requirement:** Per 2.1053, the field strength of spurious radiation was measured in the far-field at an FCC Listed semi-anechoic chamber up to 25 GHZ. The applicable limits are 22.917(a) for the cellular band, and 24.238(a) for the PCS band.

Per 22.917(a), The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB (-13 dBm).

Per 24.238(a), The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB (-13 dBm).

**Configuration:** Intermec's Handheld Computer, Model 700C was configured with three co-located radios. The 700C contained a GSM radio (FCC ID: EHASMC46), an 802.11(b)/(g) radio (FCC ID: EHA2610CF), and a Bluetooth radio (FCC ID: EHABTS080). This test demonstrated compliance with FCC Part 22H and Part 24E emissions limits while the co-located radios were transmitting simultaneously. Each radio transmits through its own antenna.

### Simultaneous Transmission:

The following is an excerpt from the FCC / TCB Training Q & A, October 2002, Day 2, Question 7:

**Assuming that the radios do not share an antenna, only radiated tests for simultaneous transmission is required. If the radios share an antenna, antenna conducted measurements would also be required. Only one set of worst case simultaneous transmission data is going to be requested to be submitted at this time. The test engineer**

**should indicate the worst case condition and provide justification as to why the worst case condition was chosen. The grantee should be reminded that even if the FCC requests one set of data, they are responsible for compliance for all modes of simultaneous transmission.**

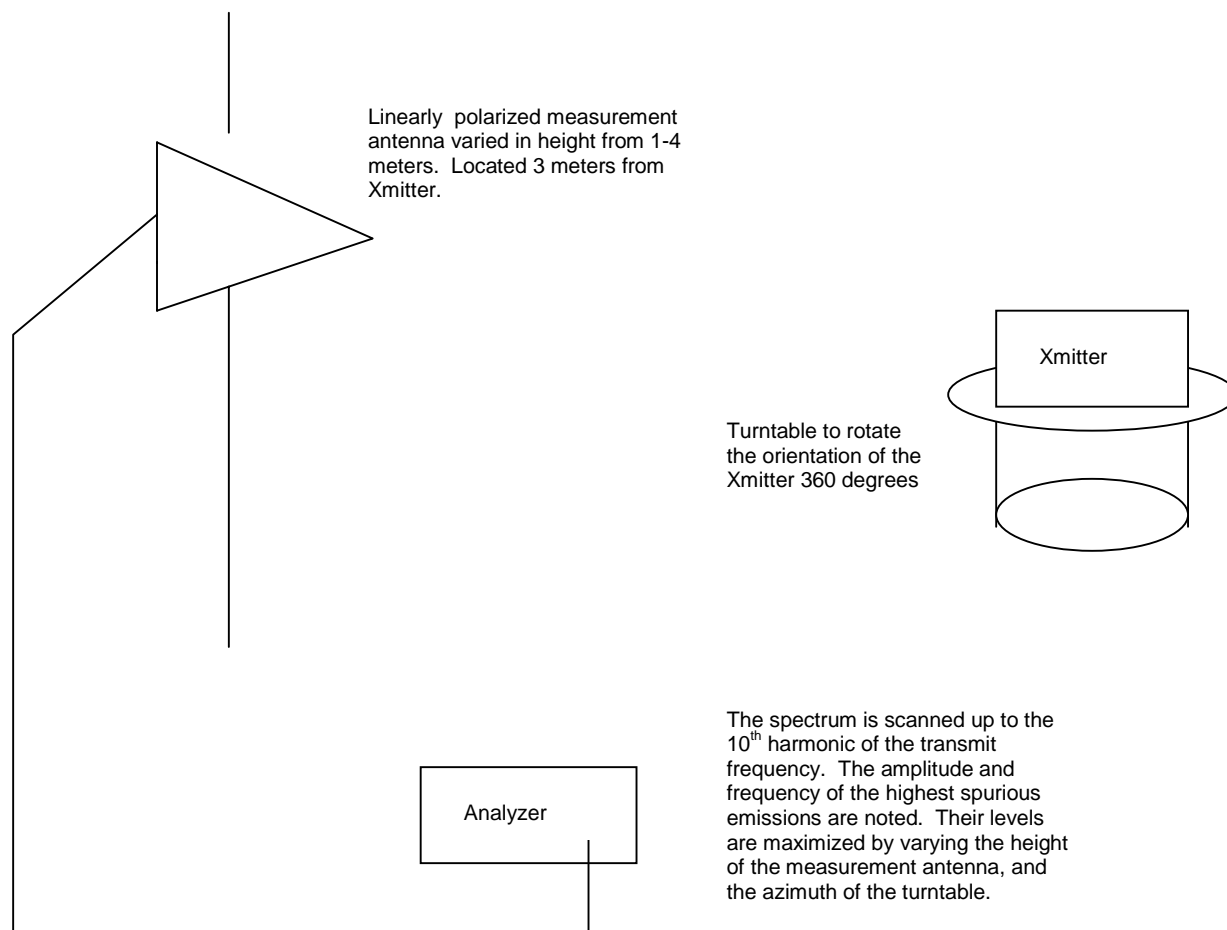
All possible combinations of harmonic emissions from the GSM, 802.11(b), and Bluetooth radios were compared numerically. It was determined that there were no possible coincidental harmonics below 1 GHz. The frequency range from 1 GHz to 25 GHz was investigated for channel combinations that would produce coincidental harmonics.

**Test Methodology:** For licensed transmitters, the FCC references TIA/EIA 603-B as the measurement procedure standard. TIA/EIA 603-B Section 2.2.12 describes a method for measuring radiated emissions that utilizes an antenna substitution method:

At an approved test site, the transmitter is placed on a remotely controlled turntable, and the measurement antenna is placed 3 meters from the transmitter. The turntable azimuth is varied to maximize the level of emissions. The height of the measurement antenna is also varied from 1 to 4 meters. The amplitude and frequency of the highest emissions are noted. The transmitter is then replaced with a  $\frac{1}{2}$  wave dipole that is successively tuned to each of the highest emissions. A signal generator is connected to the dipole (horn antenna for frequencies above 1 GHz), and its output is adjusted to match the level previously noted for each frequency. The output of the signal generator is recorded, and by factoring in the cable loss to the dipole antenna and its gain; the power (ERP or e.i.r.p) is determined for each radiated emission.

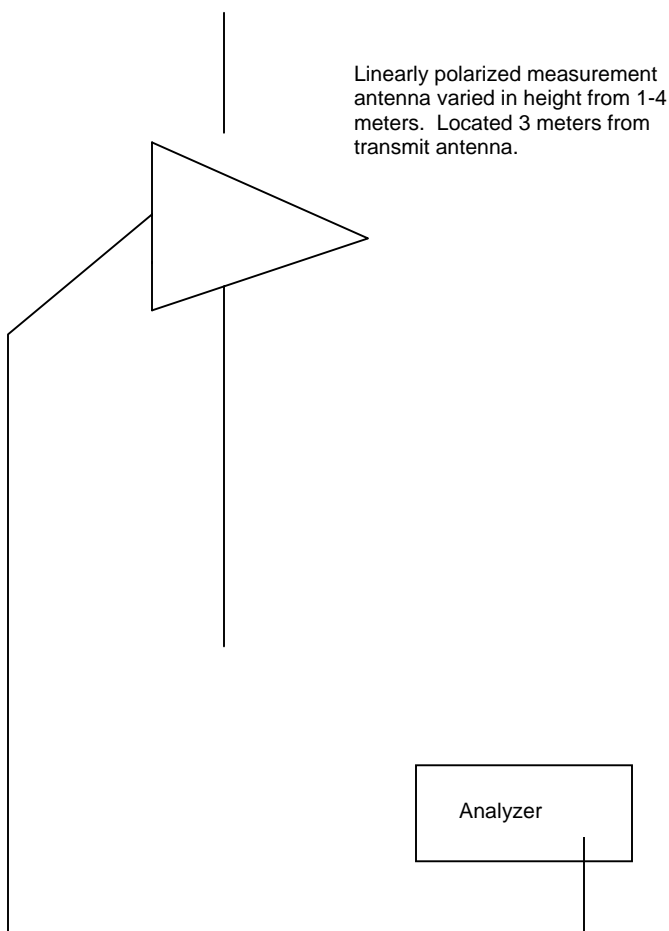
## Test Setup Diagram

## Test Setup for Field Strength Measurements

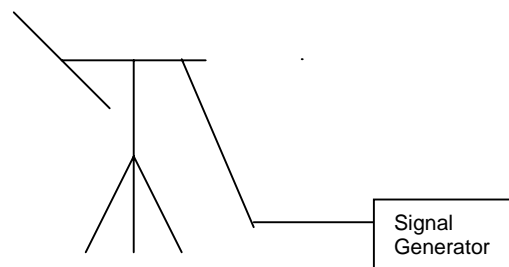




## Test Setup for Power Measurements Utilizing the Antenna Substitution Method




During field strength measurements, the amplitude and frequency of the highest emissions are noted. The transmitter is then replaced with a  $\frac{1}{2}$  wave dipole (at the same height) that is successively tuned to each of the highest spurious emissions. A signal generator is connected to the dipole (horn antenna for frequencies above 1 GHz), and its output is adjusted to match the level previously noted for each frequency.

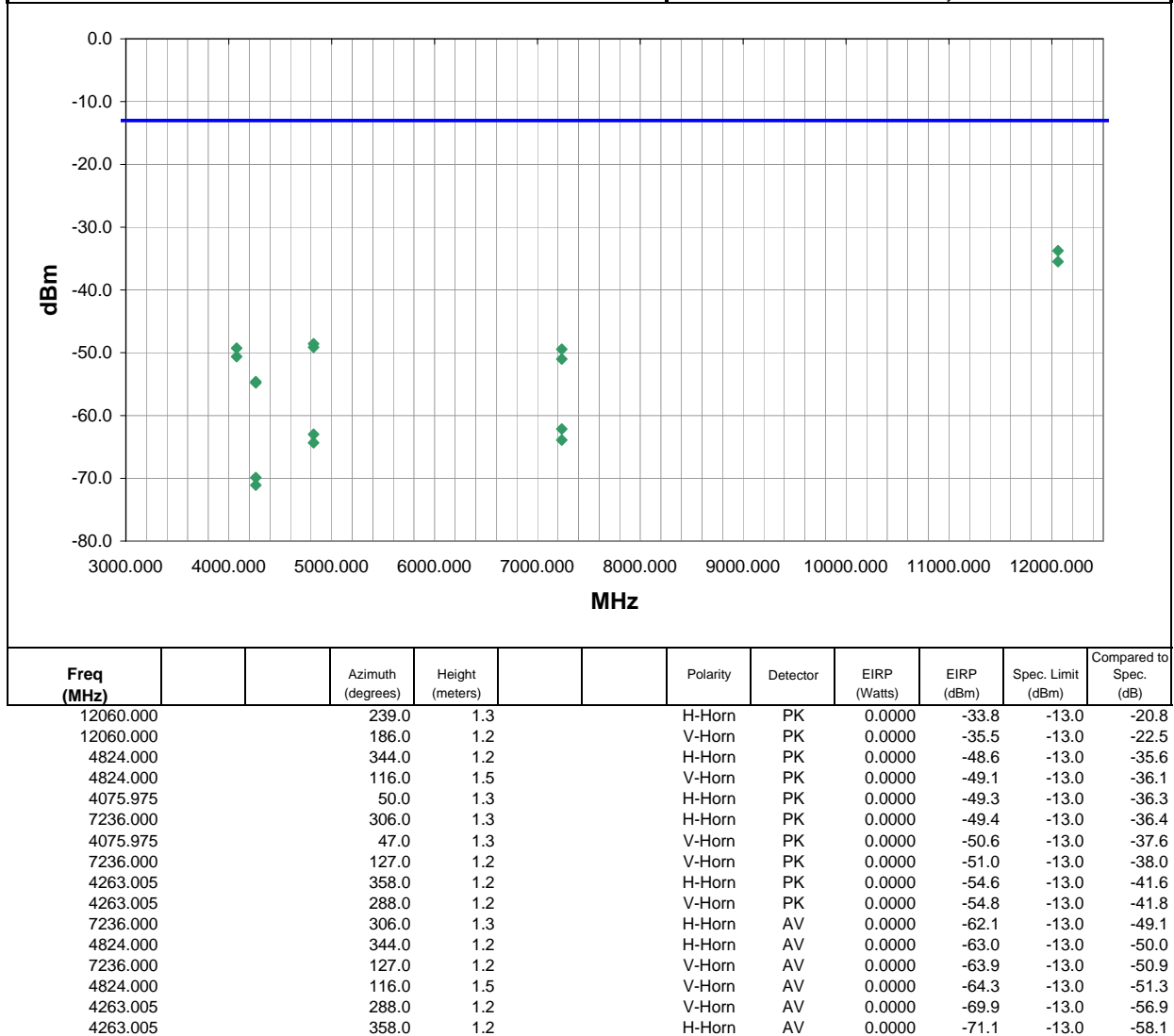


The spectrum analyzer is monitored to verify that the output of the signal generator produces a signal equal in amplitude to a previously measured spurious emission.


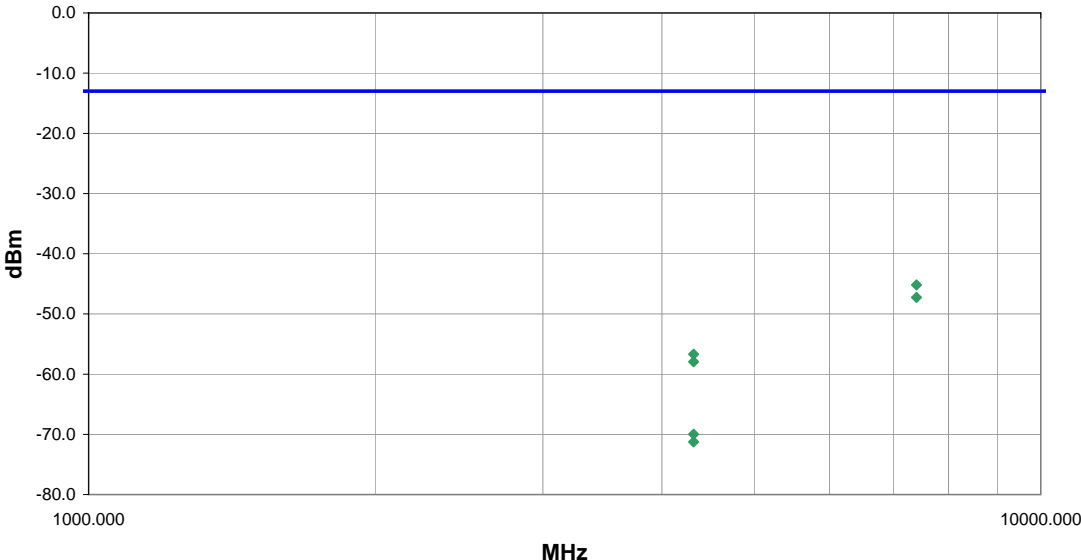
Completed by:

*Holly Antling*

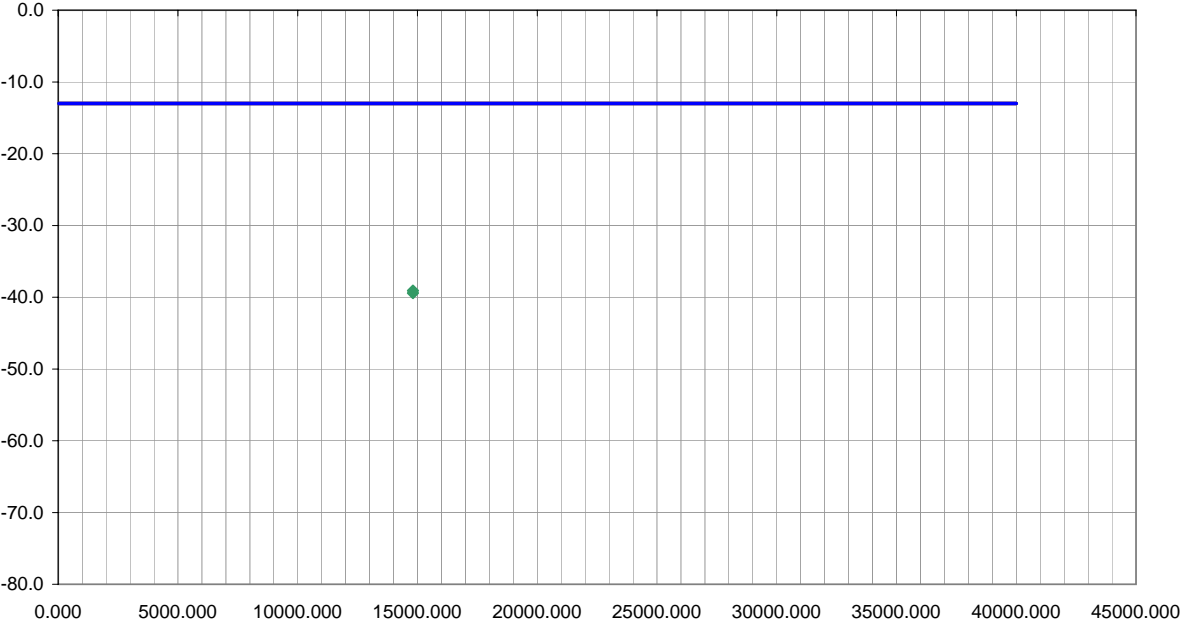
NORTHWEST <b>EMC</b>		<b>Apparent Power Data Sheet</b>		ACQ 2005.1.3 EMI 2005.1.3
EUT: 2601CF		Work Order: ITRM0054		
Serial Number: Unknown		Date: 02/07/05		
Customer: Intermec Technologies Corporation		Temperature: 20		
Attendees: None		Humidity: 34%		
Cust. Ref. No.:		Barometric Pressure: 30.24		
Tested by: Holly Ashkannejhad		Power: 120VAC/60Hz		Job Site: EV01
<b>TEST SPECIFICATIONS</b>				
Specification: FCC 24.238(a):2004		Method: TIA/EIA 603-B:2001		
<b>SAMPLE CALCULATIONS</b>				
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				
<b>COMMENTS</b>				
<b>EUT OPERATING MODES</b>				
Bluetooth 11, 802.11b 1, GSM 516 (PCS) on 700C				
<b>DEVIATIONS FROM TEST STANDARD</b>				
No deviations.				
<b>RESULTS</b>				<b>Run #</b>
Pass				75
Other		 Tested By:		


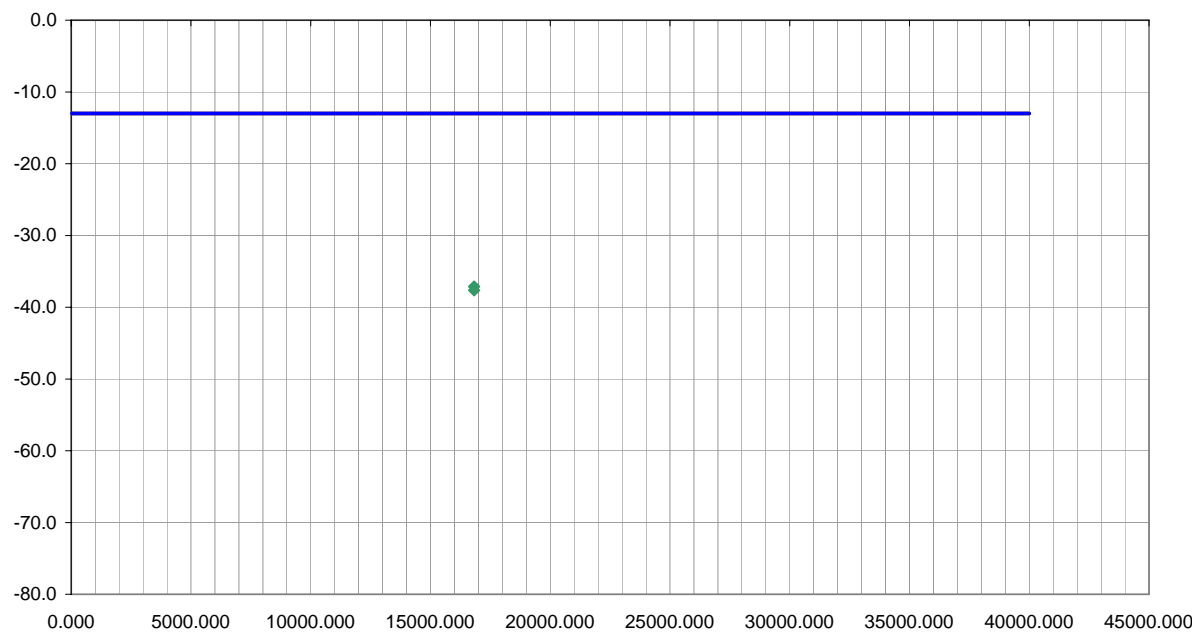



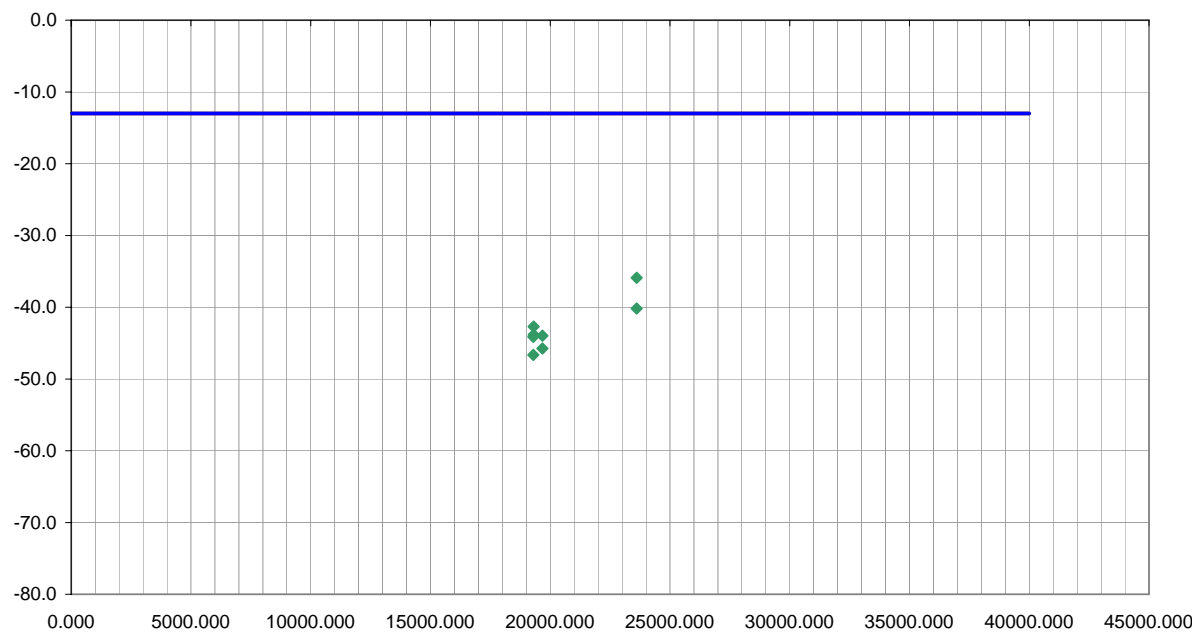
Freq (MHz)			Azimuth (degrees)	Height (meters)			Polarity	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)
12060.000			239.0	1.3			H-Horn	PK	0.0000	-33.8	-13.0	-20.8
12060.000			186.0	1.2			V-Horn	PK	0.0000	-35.5	-13.0	-22.5
4824.000			344.0	1.2			H-Horn	PK	0.0000	-48.6	-13.0	-35.6
4824.000			116.0	1.5			V-Horn	PK	0.0000	-49.1	-13.0	-36.1
4075.975			50.0	1.3			H-Horn	PK	0.0000	-49.3	-13.0	-36.3
7236.000			306.0	1.3			H-Horn	PK	0.0000	-49.4	-13.0	-36.4
4075.975			47.0	1.3			V-Horn	PK	0.0000	-50.6	-13.0	-37.6
7236.000			127.0	1.2			V-Horn	PK	0.0000	-51.0	-13.0	-38.0
4263.005			358.0	1.2			H-Horn	PK	0.0000	-54.6	-13.0	-41.6
4263.005			288.0	1.2			V-Horn	PK	0.0000	-54.8	-13.0	-41.8
7236.000			306.0	1.3			H-Horn	AV	0.0000	-62.1	-13.0	-49.1
4824.000			344.0	1.2			H-Horn	AV	0.0000	-63.0	-13.0	-50.0
7236.000			127.0	1.2			V-Horn	AV	0.0000	-63.9	-13.0	-50.9
4824.000			116.0	1.5			V-Horn	AV	0.0000	-64.3	-13.0	-51.3
4263.005			288.0	1.2			V-Horn	AV	0.0000	-69.9	-13.0	-56.9
4263.005			358.0	1.2			H-Horn	AV	0.0000	-71.1	-13.0	-58.1

NORTHWEST										ACQ 2005.1.3		EMI 2005.1.3	
EMC										Apparent Power Data Sheet			
EUT: 2601CF					Work Order: ITRM0054								
Serial Number: Unknown					Date: 02/07/05								
Customer: Intermec Technologies Corporation					Temperature: 20								
Attendees: None					Humidity: 35%								
Cust. Ref. No.:					Barometric Pressure: 30.24								
Tested by: Holly Ashkannejhad					Power: 120VAC/60Hz					Job Site: EV01			
TEST SPECIFICATIONS													
Specification: FCC 24.238(a):2004					Method: TIA/EIA 603-B: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 OPERATING MODES													
Bluetooth 67, 802.11b 11, GSM 516 (PCS) on 700C													
DEVIATIONS FROM TEST STANDARD													
No deviations.													
RESULTS										Run #			
Pass										76			
Other					 Tested By:								
													
Freq (MHz)			Azimuth (degrees)	Height (meters)			Polarity	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)	Comments
7404.000			280.0	1.4			H-Horn	PK	0.0000	-45.2	-13.0	-32.2	EUT vertical.
7404.000			54.0	1.2			V-Horn	PK	0.0000	-47.3	-13.0	-34.3	EUT on side
4319.007			123.0	1.5			V-Horn	PK	0.0000	-56.7	-13.0	-43.7	EUT vertical.
4319.007			194.0	1.3			H-Horn	PK	0.0000	-57.9	-13.0	-44.9	EUT vertical.
4319.007			123.0	1.5			V-Horn	AV	0.0000	-70.0	-13.0	-57.0	EUT vertical.
4319.007			194.0	1.3			H-Horn	AV	0.0000	-71.2	-13.0	-58.2	EUT vertical.


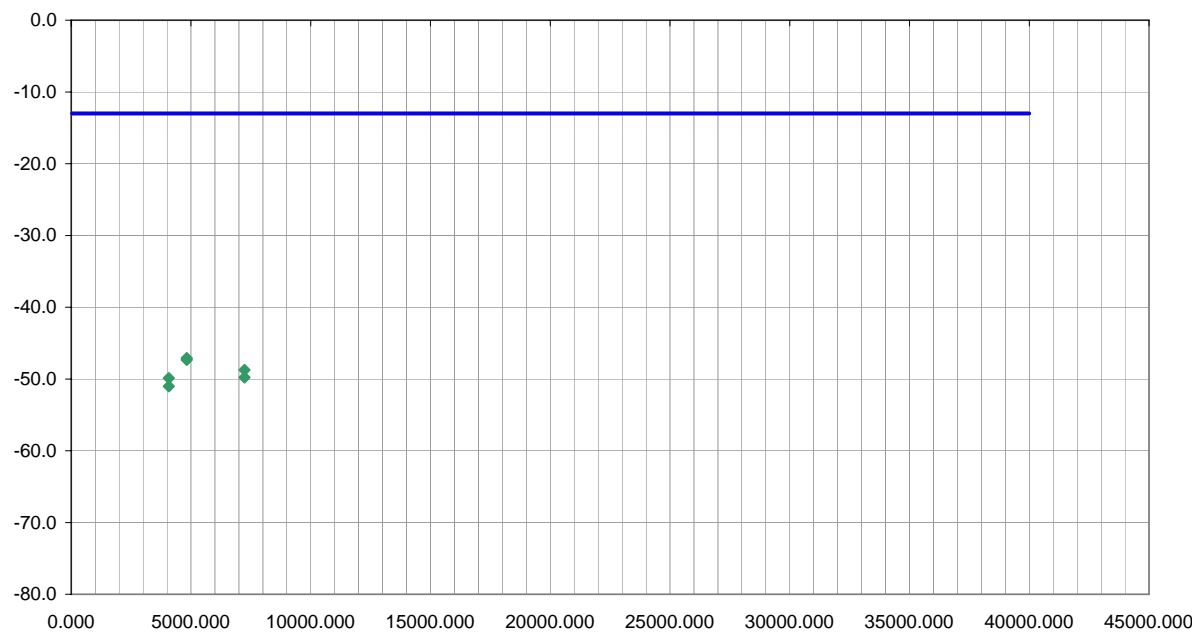


NORTHWEST		ACQ 2005.1.3																																								
EMI 2005.1.3																																										
EMC		Apparent Power Data Sheet																																								
EUT: 2601CF		Work Order: ITRM0054																																								
Serial Number: Unknown		Date: 02/09/05																																								
Customer: Intermec Technologies Corporation		Temperature: 20																																								
Attendees: None		Humidity: 36%																																								
Cust. Ref. No.:		Barometric Pressure: 30.14																																								
Tested by: Holly Ashkannejhad		Power: 120VAC/60Hz																																								
		Job Site: EV01																																								
TEST SPECIFICATIONS																																										
Specification: FCC 24.238(a):2004		Method: TIA/EIA 603-B: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 OPERATING MODES																																										
Bluetooth 67, 802.11b 11, GSM 516 (PCS) on 700C																																										
DEVIATIONS FROM TEST STANDARD																																										
No deviations.																																										
RESULTS																																										
Pass		Run # 79																																								
Other																																										
		Holly Ashkannejhad Tested By:																																								
																																										
<table><tr><td>Freq (MHz)</td><td></td><td></td><td>Azimuth (degrees)</td><td>Height (meters)</td><td></td><td></td><td>Polarity</td><td>Detector</td><td>EIRP (Watts)</td><td>EIRP (dBm)</td><td>Spec. Limit (dBm)</td><td>Compared to Spec. (dB)</td></tr><tr><td>14808.000</td><td></td><td></td><td>105.0</td><td>4.0</td><td></td><td></td><td>H-Horn</td><td>PK</td><td>0.0000</td><td>-39.1</td><td>-13.0</td><td>-26.1</td></tr><tr><td>14808.000</td><td></td><td></td><td>31.0</td><td>1.2</td><td></td><td></td><td>V-Horn</td><td>PK</td><td>0.0000</td><td>-39.4</td><td>-13.0</td><td>-26.4</td></tr></table>				Freq (MHz)			Azimuth (degrees)	Height (meters)			Polarity	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)	14808.000			105.0	4.0			H-Horn	PK	0.0000	-39.1	-13.0	-26.1	14808.000			31.0	1.2			V-Horn	PK	0.0000	-39.4	-13.0	-26.4
Freq (MHz)			Azimuth (degrees)	Height (meters)			Polarity	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)																														
14808.000			105.0	4.0			H-Horn	PK	0.0000	-39.1	-13.0	-26.1																														
14808.000			31.0	1.2			V-Horn	PK	0.0000	-39.4	-13.0	-26.4																														


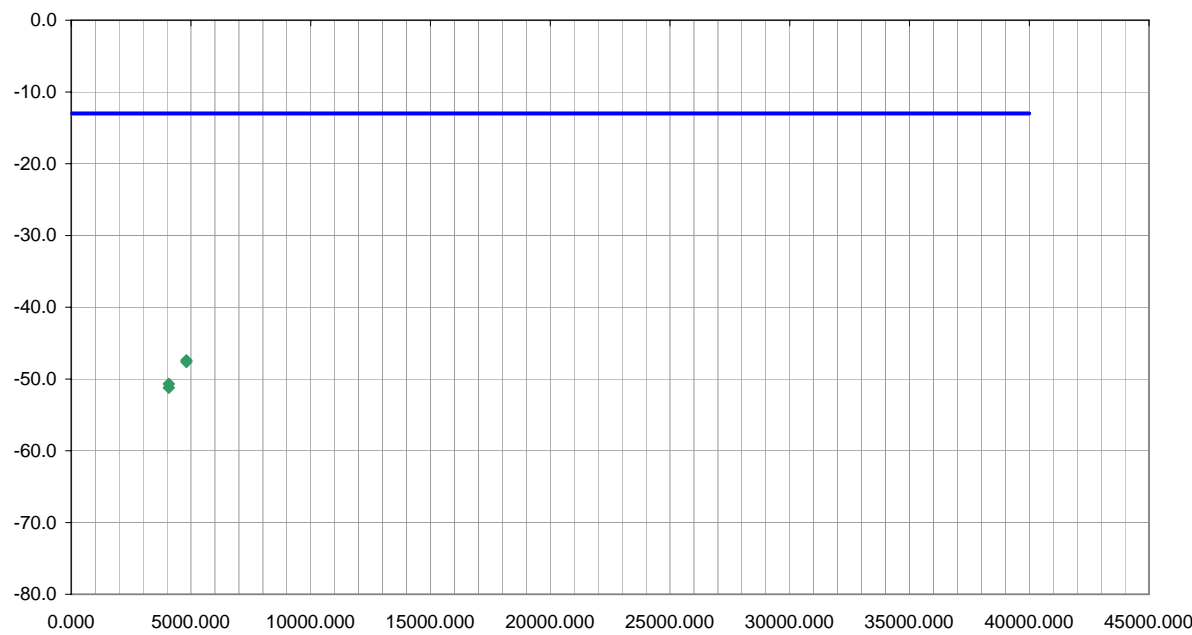
NORTHWEST <b>EMC</b>										<b>Apparent Power Data Sheet</b>				ACQ 2005.1.3 EMI 2005.1.3	
EUT: 2601CF										Work Order: ITRM0054					
Serial Number: Unknown										Date: 02/09/05					
Customer: Intermec Technologies Corporation										Temperature: 20					
Attendees: None										Humidity: 33%					
Cust. Ref. No.:										Barometric Pressure: 30.14					
Tested by: Holly Ashkannejhad					Power: 120VAC/60Hz					Job Site: EV01					
<b>TEST SPECIFICATIONS</b>															
Specification: FCC 24.238(a):2004										Method: TIA/EIA 603-B:2001					
<b>SAMPLE CALCULATIONS</b>															
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															
<b>COMMENTS</b>															
<b>EUT OPERATING MODES</b>															
Bluetooth 2, 802.11b 1, GSM 606 (PCS) on 700C															
<b>DEVIATIONS FROM TEST STANDARD</b>															
No deviations.															
<b>RESULTS</b>															
Pass												Run #		80	
<b>Other</b>															
										 Tested By:					
															
<b>Freq (MHz)</b>				Azimuth (degrees)		Height (meters)				Polarity	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)
16821.000				160.0		1.2				V-Horn	PK	0.0000	-37.1	-13.0	-24.1
16821.000				279.0		1.3				H-Horn	PK	0.0000	-37.6	-13.0	-24.6

NORTHWEST <b>EMC</b>		<b>Apparent Power Data Sheet</b>		ACQ 2005.1.3 EMI A2.13					
EUT: 2601CF			Work Order: ITRM0054						
Serial Number: Unknown			Date: 02/09/05						
Customer: Intermec Technologies Corporation			Temperature: 20						
Attendees: None			Humidity: 34%						
Cust. Ref. No.:			Barometric Pressure: 30.24						
Tested by: Holly Ashkannejhad		Power: 120VAC/60Hz		Job Site: EV01					
TEST SPECIFICATIONS									
Specification: FCC 24.238(a):2004			Method: TIA/EIA 603-B: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									
700C Standalone									
EUT OPERATING MODES									
Bluetooth 11, 802.11b 1, GSM 516 (PCS) on 700C									
DEVIATIONS FROM TEST STANDARD									
No deviations.									
RESULTS					Run #				
Pass					81				
Other									
					 Tested By:				
									
Freq (MHz)		Azimuth (degrees)	Height (meters)	Polarity	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)
23612.000		239.0	1.1	V-High Horr	PK	0.0000	-35.9	-13.0	-22.9
23612.000		281.0	1.1	H-High Horr	PK	0.0000	-40.2	-13.0	-27.2
19310.000		306.0	1.1	V-High Horr	PK	0.0000	-42.7	-13.0	-29.7
19310.000		84.0	1.1	H-High Horr	PK	0.0000	-43.8	-13.0	-30.8
19674.000		245.0	1.1	V-High Horr	PK	0.0000	-44.0	-13.0	-31.0
19296.000		360.0	1.0	V-High Horr	PK	0.0000	-44.1	-13.0	-31.1
19674.000		299.0	1.1	H-High Horr	PK	0.0000	-45.8	-13.0	-32.8
19296.000		-1.0	1.0	H-High Horr	PK	0.0000	-46.6	-13.0	-33.6



NORTHWEST <b>EMC</b>		<b>Apparent Power Data Sheet</b>				ACQ 2005.1.3 EMI 2005.1.3				
EUT: 2601CF		Work Order: ITRM0054								
Serial Number: Unknown		Date: 03/12/05								
Customer: Intermec Technologies Corporation		Temperature: 18								
Attendees: None		Humidity: 36%								
Cust. Ref. No.:		Barometric Pressure: 30.01								
Tested by: Holly Ashkannejhad		Power: 120VAC/60Hz		Job Site: EV01						
TEST SPECIFICATIONS										
Specification: FCC 22.917(a):2004		Method: TIA/EIA 603-B: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 OPERATING MODES										
Bluetooth 11, 802.11b 1, GSM 202 (cellular) on 700C										
DEVIATIONS FROM TEST STANDARD										
No deviations.										
RESULTS										
Pass						Run # 92				
Other				 Tested By: _____						
										
Freq (MHz)		Azimuth (degrees)	Height (meters)		Polarity	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)
4823.954		258.0	1.1		H-Horn	PK	0.0000	-47.1	-13.0	-34.1
4823.954		288.0	1.6		V-Horn	PK	0.0000	-47.3	-13.0	-34.3
7236.000		230.0	1.3		H-Horn	PK	0.0000	-48.7	-13.0	-35.7
7236.000		232.0	1.6		V-Horn	PK	0.0000	-49.8	-13.0	-36.8
4075.975		237.0	1.1		H-Horn	PK	0.0000	-49.9	-13.0	-36.9
4075.975		268.0	1.3		V-Horn	PK	0.0000	-51.0	-13.0	-38.0



NORTHWEST <b>EMC</b>										ACQ 2005.1.3 EMI 2005.1.3			
<b>Apparent Power Data Sheet</b>													
EUT: 2601CF					Work Order: ITRM0054								
Serial Number: Unknown					Date: 03/13/05								
Customer: Intermec Technologies Corporation					Temperature: 18								
Attendees: None					Humidity: 36%								
Cust. Ref. No.:					Barometric Pressure: 30.01								
Tested by: Holly Ashkannejhad					Power: 120VAC/60Hz					Job Site: EV01			
<b>TEST SPECIFICATIONS</b>													
Specification: FCC 22.917(a):2004					Method: TIA/EIA 603-B:2001								
<b>SAMPLE CALCULATIONS</b>													
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													
<b>COMMENTS</b>													
<b>EUT OPERATING MODES</b>													
Bluetooth 5, 802.11b 1, GSM 191 (cellular) on 700C													
<b>DEVIATIONS FROM TEST STANDARD</b>													
No deviations.													
<b>RESULTS</b>													
Pass												Run #	
												98	
<b>Other</b>													
										 Tested By:			
													
<b>Freq (MHz)</b>			<b>Azimuth (degrees)</b>	<b>Height (meters)</b>			<b>Polarity</b>	<b>Detector</b>	<b>EIRP (Watts)</b>	<b>EIRP (dBm)</b>	<b>Spec. Limit (dBm)</b>	<b>Compared to Spec. (dB)</b>	
4811.954			274.0	1.1			H-Horn	PK	0.0000	-47.4	-13.0	-34.4	
4811.954			113.0	1.1			V-Horn	PK	0.0000	-47.6	-13.0	-34.6	
4075.922			246.0	1.8			H-Horn	PK	0.0000	-50.7	-13.0	-37.7	
4075.922			279.0	1.2			V-Horn	PK	0.0000	-51.2	-13.0	-38.2	

## Apparent Power Data Sheet

EUT:	2601CF	Work Order:	ITRM0054
Serial Number:	Unknown	Date:	03/13/05
Customer:	Intermec Technologies Corporation	Temperature:	18
Attendees:	None	Humidity:	36%
Cust. Ref. No.:		Barometric Pressure:	30.01
Tested by:	Holly Ashkannejhad	Power:	120VAC/60Hz
		Job Site:	EV01

## TEST SPECIFICATIONS

Specification:	FCC 22.917(a):2004	Method:	TIA/EIA 603-B:2001
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## 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 OPERATING MODES

Bluetooth 11, 802.11b 1, GSM 202 (cellular) on 700C

## DEVIATIONS FROM TEST STANDARD

No deviations.

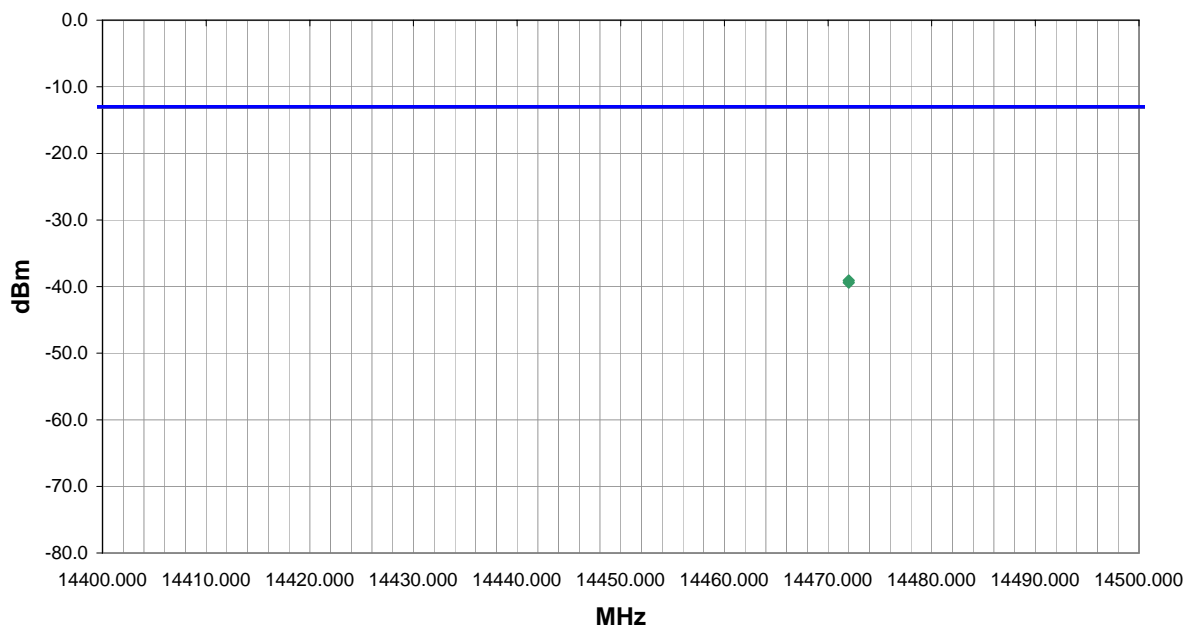
## RESULTS

Pass	Run #
	99

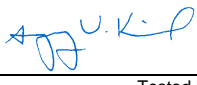
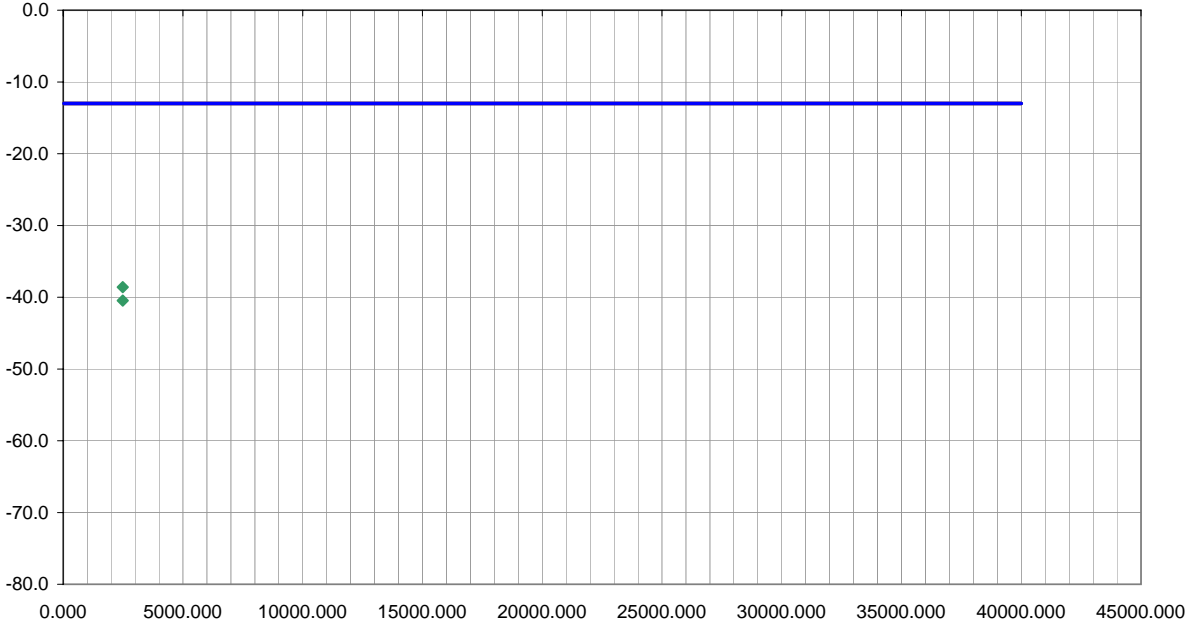
Other

*Holly Ashkannejhad*

Tested By:



Freq (MHz)			Azimuth (degrees)	Height (meters)			Polarity	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)
14472.000			318.0	1.3			H-Horn	PK	0.0000	-39.1	-13.0	-26.1
14472.000			109.0	1.2			V-Horn	PK	0.0000	-39.4	-13.0	-26.4

NORTHWEST <b>EMC</b>										ACQ 2005.1.3 EMI A2.13			
<b>Apparent Power Data Sheet</b>													
EUT: 2601CF					Work Order: ITRM0054								
Serial Number: Unknown					Date: 03/16/05								
Customer: Intermec Technologies Corporation					Temperature: 21								
Attendees: None					Humidity: 32%								
Cust. Ref. No.:					Barometric Pressure: 30.12								
Tested by: Greg Kiemel					Power: 120VAC/60Hz					Job Site: EV01			
<b>TEST SPECIFICATIONS</b>													
Specification: FCC 22.917(a):2004					Method: TIA/EIA 603-B:2001								
<b>SAMPLE CALCULATIONS</b>													
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													
<b>COMMENTS</b>													
Config 4: Bluetooth ch. 79, 802.11b Ch. 11, GSM Ch. 140													
<b>EUT OPERATING MODES</b>													
Simultaneous Transmission of 700C(GSM cellular/802.11b/Bluetooth)													
<b>DEVIATIONS FROM TEST STANDARD</b>													
No deviations.													
<b>RESULTS</b>										<b>Run #</b>			
Pass										111			
Other													
										 Tested By:			
													
<b>Freq (MHz)</b>			<b>Azimuth (degrees)</b>	<b>Height (meters)</b>			<b>Polarity</b>	<b>Detector</b>	<b>EIRP (Watts)</b>	<b>EIRP (dBm)</b>	<b>Spec. Limit (dBm)</b>	<b>Compared to Spec. (dB)</b>	
2483.500			168.0	1.7			H-Horn	PK	0.0000	-38.6	-13.0	-25.6	
2483.500			130.0	1.6			V-Horn	PK	0.0000	-40.5	-13.0	-27.5	

NORTHWEST

EMI A2.13

ACQ 2005.1.3

EMC

Apparent Power Data Sheet

EUT: 2601CF

Work Order: ITRM0054

Serial Number: Unknown

Date: 03/16/05

Customer: Intermec Technologies Corporation

Temperature: 21

Attendees: None

Humidity: 32%

Cust. Ref. No.:

Barometric Pressure: 30.12

Tested by: Greg Klemel

Power: 120VAC/60Hz

Job Site: EV01

TEST SPECIFICATIONS

Specification: FCC 22.917(a):2004

Method: TIA/EIA 603-B: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 OPERATING MODES

Simultaneous Transmission of 700C(GSM cellular)/802.11b(Bluetooth)

DEVIATIONS FROM TEST STANDARD

No deviations.

RESULTS

Run #

Pass

112

Other

Tested By:

0.0

-10.0

-20.0

-30.0

-40.0

-50.0

-60.0

-70.0

-80.0

18000.000

19000.000

20000.000

21000.000

22000.000

23000.000

24000.000

25000.000

dBm

MHz

22320.000

0.0

1.0

V-High Horr

PK

0.0000

-40.5

-13.0

-27.5

Config. 3: Bluetooth Ch. 79, 802.11b Ch. 11, GSM Ch. 141.

22320.000

0.0

1.0

H-High Horr

PK

0.0000

-44.1

-13.0

-31.1

Config. 3: Bluetooth Ch. 79, 802.11b Ch. 11, GSM Ch. 141.

19296.000

0.0

1.0

V-High Horr

PK

0.0000

-45.4

-13.0

-32.4

Config. 1: Bluetooth Ch. 11, 802.11b Ch. 1, GSM Ch. 202.

19840.000

0.0

1.0

V-High Horr

PK

0.0000

-45.6

-13.0

-32.6

Config. 3: Bluetooth Ch. 79, 802.11b Ch. 11, GSM Ch. 141.

19248.000

0.0

1.0

V-High Horr

PK

0.0000

-45.8

-13.0

-32.8

Config. 2: Bluetooth Ch. 5, 802.11b Ch. 1, GSM Ch. 191.

19296.000

0.0

1.0

H-High Horr

PK

0.0000

-46.4

-13.0

-33.4

Config. 1: Bluetooth Ch. 11, 802.11b Ch. 1, GSM Ch. 202.

19248.000

0.0

1.0

H-High Horr

PK

0.0000

-48.0

-13.0

-35.0

Config. 2: Bluetooth Ch. 5, 802.11b Ch. 1, GSM Ch. 191.

19840.000

0.0

1.0

H-High Horr

PK

0.0000

-48.2

-13.0

-35.2

Config. 3: Bluetooth Ch. 79, 802.11b Ch. 11, GSM Ch. 141.







