Intermec Technologies Corporation

CV30

July 24, 2007

Report No. INMC0356.1

Report Prepared By



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

© 2007Northwest EMC, Inc





Certificate of Test

Issue Date: July 24, 2007 Intermec Technologies Corporation Model: CV30

| Emissions | | | | |
|----------------------------------|-----------------------|--------------------------------|-----------|--|
| Test Description | Specification | Test Method | Pass/Fail | |
| AC Powerline Conducted Emissions | FCC 15.207:2006 | ANSI C63.4:2003 | Pass | |
| Spurious Radiated Emissions | FCC 15.247 (DTS):2006 | ANSI C63.4:2003 KDB No. 558074 | 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. 41 Tesla Avenue Irvine, CA 92618

Phone: (949) 861-8918 Fax: 861-8923

This site has been fully described in a report filed with and accepted by the FCC (Federal Communications Commission) and Industry Canada.

| Approved By: | |
|--------------------------------------|---|
| The I | ~ |
| Ethan Schoonover, Sultan Lab 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 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.

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

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

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





BSMI





Revision 03/18/05





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



Rev 11/17/06

Party Requesting the Test

| Company Name: | Intermec Technologies Corporation |
|--------------------------|-----------------------------------|
| Address: | 550 Second St. SE |
| City, State, Zip: | Cedar Rapids, IA 52401-2023 |
| Test Requested By: | Scott Holub |
| Model: | CV30 |
| First Date of Test: | June 26, 2007 |
| Last Date of Test: | July 3, 2007 |
| Receipt Date of Samples: | June 25, 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 CV30 forklift mounted computer. It contains a model DRCB 802.11b/g radio.

Testing Objective:

Seeking to demonstrate compliance to FCC 15.247 requirements.

EUT Photo





CONFIGURATION 1 INMC0356

| Software/Firmware Running during test | | | |
|---------------------------------------|---------|--|--|
| Description | Version | | |
| FCC Test Utlity | 1.01 | | |

| EUT | | | |
|-------------|-----------------------------------|-------------------|---------------|
| Description | Manufacturer | Model/Part Number | Serial Number |
| CV30 | Intermec Technologies Corporation | CV30 | 07510737097 |

| Cables | | | | | |
|--|--------|------------|---------|--------------|--------------|
| Cable Type | Shield | Length (m) | Ferrite | Connection 1 | Connection 2 |
| AC Power | No | 1.8m | No | DC Adapter | AC Mains |
| DC Power | No | 1.9m | Yes | DC Adapter | CV30 |
| 802.11 Antenna Cable | No | 1.5m | No | CV30 | Antenna |
| VGA Cable | No | .3m | No | CV30 | Unterminated |
| Serial Cable | No | 1.7m | No | CV30 | Unterminated |
| LAN Cable | No | 1.7m | No | CV30 | Unterminated |
| 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 | 6/26/2007 | AC Powerline Conducted 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 | 7/3/2007 | Spurious Radiated Emissions | Tested as delivered to Test Station. | No EMI suppression devices were added or modified during this test. | Scheduled testing was 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 802.11 B/G Mode. 1 Mbps. High Channel

802.11 B/G Mode. 1 Mbps. Mid Channel 802.11 B/G Mode. 1 Mbps. Low Channel

POWER SETTINGS INVESTIGATED

230V/50Hz

120V/60Hz

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 | 9252-50-24-BNC | LIB | 5/8/2006 | 16 |
| OC11 cables a-b-e-f | | | OCM | 1/8/2007 | 13 |
| Receiver | Rohde & Schwartz | ESCI | ARF | 12/14/2006 | 13 |

| MEASUREMENT BANDWIDTHS | | | | | |
|------------------------|---------------------------|------------------------------|---------------------------------|--------------|--|
| | Frequency Range | Peak Data | Quasi-Peak Data | Average Data | |
| | (MHz) | (kHz) | (kHz) | (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 us | sing the bandwidths and dete | ctors specified. No video filte | er 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 50 Ω measuring port is terminated by a 50 Ω EMI meter or a 50 Ω resistive load. All 50 Ω measuring ports of the LISN are terminated by 50 Ω .



























CONDUCTED EMISSIONS



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 | |
|---|--|
| 802.11 Mode. Low Channel. (Channel 1) | |
| 802.11 Mode. Mid Channel. (Channel 6) | |
| 802.11 Mode. High Channel. (Channel 11) | |

MODE USED FOR FINAL DATA

802.11 Mode. High Channel. (Channel 11). All Data Rates.

POWER SETTINGS INVESTIGATED

120VAC/60Hz

POWER SETTINGS USED FOR FINAL DATA

120VAC/60Hz

| FREQUENCY RANGE INVESTIGATED | | | | |
|------------------------------|--------|----------------|--------|--|
| Start Frequency | 30 MHz | Stop Frequency | 26 GHz | |

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 |
| Pre-Amplifier | Miteq | Miteq AMF-6F-18002650-25-10P | | 7/11/2006 | 13 |
| Antenna, Horn | EMCO | 3160-09 | AHN | NCR | 0 |
| OC10 SMA cable for 18026 GHz | | | OCK | 7/11/2006 | 13 |
| Pre-Amplifier | Miteq | AMF-6F-12001800-30-10P | AOF | 10/13/2006 | 12 |
| Antenna, Horn | ETS | 3160-08 | AHT | NCR | 0 |
| Pre-Amplifier | Miteq | AMF-6F-08001200-30-10P | AOE | 10/13/2006 | 12 |
| Antenna, Horn | ETS | 3160-07 | AHR | NCR | 24 |
| OC10 cables a,b,c,e,f Horn Cables | | | OCJ | 1/14/2007 | 13 |
| Pre-Amplifier | Miteq | AMF-4D-010120-30-10P-1 | AOP | 1/14/2007 | 13 |
| Antenna, Horn | EMCO | 3115 | AHB | 8/1/2005 | 24 |
| OC 10 Cables a, b, c, I Cables | | | 000 | 1/14/2007 | 13 |
| Antenna, Biconilog | EMCO | 3142 | AXJ | 3/14/2006 | 24 |
| OC10 cables a,b,c,d Bilog | | | OCH | 12/17/2006 | 13 |
| Pre-Amplifier | Miteq | AM-1616-1000 | AOM | 12/17/2006 | 13 |
| Spectrum Analyzer | Agilent | E4446A | AAQ | 1/18/2007 | 13 |

| MEASUREMENT BANDWIDTHS | | | | | | | | | | |
|--|-----------------|-----------|-----------------|------------------------------|--|--|--|--|--|--|
| | Frequency Range | Peak Data | Quasi-Peak Data | Average Data (kHz) 0.2 | | | | | | |
| | (MHz) | (kHz) | (kHz) | | | | | | | |
| | 0.01 - 0.15 | 1.0 | 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 axis, 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.

| NO | | | R/ | | ED E | MISS | IONS | DAT | A SHI | EET | | Ρ | SA 2007.05.0 EMI 2006.4.2 | 7 |
|----------------------------|------------------------|-----------------------------|----------------------------------|----------------------|--------------------|----------------------|---------------------|------------------|------------|--------------------|-------------------------|-----------------------|------------------------------|-----------|
| | EU | T: CV30 | | | | | | | | W | ork Order: | INMC035 | 6 | |
| Ser | ial Numbe | r: 075107370 | 097 | | 41 m m | | | | | Tar | Date: | 07/03/07 | |] |
| | Attendee | s: None | rechnolog | les Corpora | tion | | | | | Ten | nperature: Humidity: | 41% | | |
| | Projec | t: None | | | | | | - | | Barome | etric Pres.: | 29.92 | | |
| TESTS | Tested b | y: Jaemi Sul | า | | | | Power: | 120VAC/6 | 0Hz | | Job Site: | OC10 | | |
| FCC 15 | .247 (DTS) |):2006 | | | | | | ANSI C63 | .4:2003 KD | DB No. 55807 | 4 | | | |
| | | | | | | | | | | | | | | |
| TEST P Antenn | ARAMETE | ERS 6) (m) | 1 - 4 | | | | Test Dista | ince (m) | | 3 | | | | |
| None | ENTS | | | | | | | | | | | | | |
| EUT OF | PERATING | MODES | | | _ | | | | | | | | | |
| 802.11 DEVIA1 No dev | Mode. Hig FIONS FRC | h Channel. (DM TEST ST/ | Channel 1 ⁴ ANDARD | I). All Data I | Rates. | | | | | | | | | |
| Run # | | | 6 | | | | | | | Au De | - | | | 1 |
| Configu | uration # | De | 1 | - | | | | | Signature | D | | | | |
| Results | | Pa | 400 | I | | | | | Signature | | | | | 4 |
| | 80.0 | | | | | | | | | | | | | |
| | 70.0 | | | | | | | | | | | | 1 | |
| | | | | | | | | | | | | | | |
| | 60.0 - | | | | | • | | | | | | | | |
| | 50.0 | | | | | | | | | | | | - | |
| ۶ | 50.0 | | | | | ۲ | | | | | | | | |
| ۱×۱ | 40.0 | | | | | | | | | | | | | |
| dB | | | | | | | | | | | | | | |
| | 30.0 | | | | | | | | | | | | | |
| | 20.0 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | 10.0 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | 0.0 + | | | | | | | | | | | | | |
| | 1000.00 | UU | | | | | MHz | | | | | 100 | 000.000 | |
| | | | 1 |] | | 1 | External | 1 | T | Distance | | <u> </u> | Compared to | 0 |
| | Freq (MHz) | Amplitude (dBuV) | Factor (dB) | Azimuth (degrees) | Height (meters) | Distance (meters) | Attenuation (dB) | Polarity | Detector | Adjustment (dB) | Adjusted dBuV/m | Spec. Limit dBuV/m | Spec. (dB) | Comments |
| 24 | 83.363 | 26.7 | 1.4 | 1.0 | 1.3 | 0.0 | 20.0 | V-Horn | AV | 0.0 | 48.1 | 54.0 | -5.9 | 11 Mbps |
| 24 | 83.472 | 26.4 | 1.4 | 359.0 | 1.4 | 0.0 | 20.0 | V-Horn | AV | 0.0 | 47.8 | 54.0 | -6.2 | 1 Mbps |
| 24 24 | 183.438 | 26.3 25.9 | 1.4 1.4 | 73.0 359.0 | 1.1 | 0.0 | 20.0 20.0 | Horn V-Horn | AV AV | 0.0 | 47.7 47.3 | 54.0 54.0 | -6.3 -6.7 | 54 Mbps |
| 24 | 83.489 | 25.9 | 1.4 | 18.0 | 1.3 | 0.0 | 20.0 | V-Horn | AV | 0.0 | 47.3 | 54.0 | -6.7 | 6 Mbps |
| 24 | 83.449 | 25.8 | 1.4 | 36.0 | 1.0 | 0.0 | 20.0 | H-Horn | AV | 0.0 | 47.2 | 54.0 | -6.8 | 1 Mbps |
| 24 24 | 183,451 183,462 | 25.8 25.8 | 1.4 1.4 | 6.0 204 0 | 1.2 1.2 | 0.0 0.0 | 20.0 20.0 | v-Horn H-Horn | AV AV | 0.0 | 47.2 47.2 | 54.0 54 0 | -6.8 -6.8 | 36 Mbps |
| 24 | 83.447 | 25.5 | 1.4 | 205.0 | 1.0 | 0.0 | 20.0 | H-Horn | AV | 0.0 | 46.9 | 54.0 | -7.1 | 11 Mbps |
| 24 | 83.396 | 25.4 | 1.4 | 254.0 | 1.2 | 0.0 | 20.0 | H-Horn | AV | 0.0 | 46.8 | 54.0 | -7.2 | 6 Mbps |
| 24 | 183.527 183.414 | 38.9 38.9 | 1.4 1 / | 1.0 350 0 | 1.3 1 / | 0.0 | 20.0 | V-Horn | PK pr | 0.0 | 60.3 60.2 | 74.0 74.0 | -13.7 -13.9 | 11 Mbps |
| 24 | 83.481 | 38.7 | 1.4 | 18.0 | 1.3 | 0.0 | 20.0 | V-Horn | PK | 0.0 | 60.1 | 74.0 | -13.9 | 6 Mbps |
| 24 | 83.579 | 38.7 | 1.4 | 204.0 | 1.2 | 0.0 | 20.0 | H-Horn | PK | 0.0 | 60.1 | 74.0 | -13.9 | 36 Mbps |
| 24 | 83.468 | 38.3 | 1.4 | 359.0 | 1.2 | 0.0 | 20.0 | V-Horn | PK | 0.0 | 59.7 | 74.0 | -14.3 | 54 Mbps |
| 24 24 | 183.552 | 38.0 | 1.4 1.4 | 73.0 36.0 | 1.0 | 0.0 | 20.0 20.0 | H-Horn | PK | 0.0 | 59.5 59.4 | 74.0 74.0 | -14.5 -14.6 | sqaivi ec |
| 24 | 83.406 | 37.9 | 1.4 | 6.0 | 1.2 | 0.0 | 20.0 | V-Horn | PK | 0.0 | 59.3 | 74.0 | -14.7 | 36 Mbps |
| 24 | 83.528 | 37.9 | 1.4 | 205.0 | 1.0 | 0.0 | 20.0 | H-Horn | PK | 0.0 | 59.3 | 74.0 | -14.7 | 11 Mbps |
| 24 | 63.3/3 | 37.0 | 1.4 | ∠54.0 | 1.2 | 0.0 | ∠0.0 | | PK | 0.0 | 59.0 | 74.0 | -15.0 | s anns |

EMC

Radiated Emissions

