



	<u>Dates of Evaluation</u> May 26 & June 28, 2010	<u>Test Report Serial No.</u> 052110HN2-T1022-S15W	<u>Test Report Revision No.</u> Rev. 1.2 (3rd Release)	
	<u>Test Report Issue Date</u> June 30, 2010	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	


SAR TEST REPORT (FCC/IC)


RF EXPOSURE EVALUATION	SPECIFIC ABSORPTION RATE		
APPLICANT / MANUFACTURER	INTERMEC TECHNOLOGIES CORPORATION		
DEVICE UNDER TEST (DUT)	802.11B/G WLAN INSTALLED IN CK31 RUGGED HAND-HELD PC		
DEVICE IDENTIFIER(S)	FCC ID:	HN2CK31MIG2	IC: 1223A-CK31MIG2
TRANSMIT FREQUENCY RANGE	2412 - 2462 MHz (ISM Band)		
APPLICATION TYPE	Add Belt-Clip Body-worn Accessory Add Bluetooth Module Co-Transmitter Frequency Range: 2402 - 2480 MHz FCC ID: EHABTS080 (Modular) IC: 1223A-BTS080 (Modular)		
STANDARD(S) APPLIED	FCC 47 CFR §2.1093	Health Canada Safety Code 6	
PROCEDURE(S) APPLIED	FCC KDB 447498 D01v04	FCC KDB 178919 D01v04r04	
	FCC KDB 248227 D01v01r02	FCC KDB 648474 D01v04	
	FCC OET Bulletin 65, Supplement C (01-01)		
	Industry Canada RSS-102 Issue 4		
	IEEE 1528-2003		
	IEC 62209-2 (Draft)		
FCC DEVICE CLASSIFICATION(S)	Digital Transmission System (DTS)	47CFR §15 Subpart C	
IC DEVICE CLASSIFICATION(S)	Low-Power Licence-Exempt Radio Device	RSS-210 Issue 7	
RF EXPOSURE CATEGORY	General Population / Uncontrolled		
RF EXPOSURE EVALUATION(S)	Body-worn		
DATE OF SAMPLE RECEIPT	May 21 & June 28, 2010		
DATE(S) OF EVALUATION(S)	May 26 & June 28, 2010		
TEST REPORT SERIAL NO.	052110HN2-T1022-S15W		
TEST REPORT REVISION NO.	Revision 1.2	(See Page 4)	June 30, 2010
	Revision 1.1	(See Page 4)	June 15, 2010
	Revision 1.0	Initial Release	June 11, 2010
TEST REPORT SIGNATORIES	Testing Performed By		Test Report Prepared By
	Sean Johnston - Celltech Labs		Jon Hughes - Celltech Labs
TEST LAB AND LOCATION	Celltech Compliance Testing and Engineering Laboratory		
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TEST LAB CONTACT INFO.	Tel.: 250-765-7650		Fax: 250-765-7645
	info@celltechlabs.com		www.celltechlabs.com
TEST LAB ACCREDITATION(S)	ISO/IEC 17025:2005 (A2LA Test Lab Certificate No. 2470.01)		

Applicant:	Intermec Technologies Corp.	FCC ID:	HN2CK31MIG2	IC:	1223A-CK31MIG2	
DUT Type:	802.11b/g WLAN Module installed in CK31 Rugged Hand-held PC	Class II Permissive Change				
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DECLARATION OF COMPLIANCE - SAR RF EXPOSURE EVALUATION (FCC/IC C2PC)

Test Lab Information	Name	CELLTECH LABS INCORPORATED					
	Address	21-364 Lougheed Road, Kelowna B.C. V1X 7R8 Canada					
Applicant Information	Name	INTERMEC TECHNOLOGIES CORPORATION					
	Address	6001 36 th Avenue West, Everett, WA 98203-1264 USA					
Standard(s) Applied	FCC	47 CFR §2.1093					
	IC	Health Canada Safety Code 6					
Procedure(s) Applied	FCC	KDB 447498 D01v04	KDB 178919 D01v04r04	KDB 248227 D01v01r02	KDB 648474 D01v04		
	FCC	OET Bulletin 65, Supplement C (01-01)					
	IC	RSS-102 Issue 4					
	IEEE	1528-2003					
	IEC	62209-2 (Draft)					
Device Classification(s)	FCC	Digital Transmission System (DTS)			47 CFR §15(C)		
	IC	Low-Power Licence-Exempt Radiocommunication Device			RSS-210 Issue 7		
Application Type(s)	FCC/IC	Class II Permissive Change		1. Add Belt-Clip Body-worn Accessory - P/N: 075447-001 (Contains Metal)			
				2. Add Bluetooth Co-Transmitter Module (Original Grant Power: 13.9 mW)			
		FCC ID: EHABTS080		IC: 1223A-BTS080			
Device Identifier(s)	FCC ID:	HN2CK31MIG2					
	IC:	1223A-CK31MIG2					
Device Under Test (DUT)	802.11b/g WLAN installed in CK31 Rugged Hand-held PC						
Test Sample Serial No.(s)	CK31 PC	26500800152 - Small Back unit (Identical Prototype)					
		16521026051 - Large Back unit with EL20 scan engine (Identical Prototype)					
		10321026135 - Large Back unit with EX25 scan engine (Identical Prototype)					
HW/SW Revision No.s	Hardware Revision No.	1A2R		Software Revision No.	4.02.00.0959		
Simultaneous Transmission	Supported	The simultaneous transmission procedures specified in FCC KDB 447498 Section 4) d) were implemented					
Antenna Type(s) Tested	802.11b/g	Internal	Antenna-to-Antenna Distance	WLAN-to-Bluetooth = 29.6 mm			
Transmit Frequency Range(s)	802.11b/g	2412 - 2462 MHz		Bluetooth	2402 - 2480 MHz		
		CK31 PC	Mode	Data Rate	2412 MHz	2437 MHz	2462 MHz
Max. RF Output Power Tested	Small Back	802.11b	1 Mbps	14.7 dBm	14.5 dBm	14.7 dBm	Average Conducted
	Large Back EL20 Scan	802.11b	1 Mbps	14.6 dBm	14.7 dBm	14.7 dBm	Average Conducted
	Large Back EX25 Scan	802.11b	1 Mbps	14.3 dBm	14.5 dBm	14.5 dBm	Average Conducted
Power Source(s) Tested	Lithium-ion Rechargeable Battery - P/N: 318-020-001 (7.4V, 2400mAh)						
Body-worn Accessories & Configurations Tested	1. Holster accessory - P/N: 825-169-001 (Contains Metal) - Back Side of CK31 Hand-held PC facing planar phantom section						
	2. Belt-Clip accessory - P/N: 075447-001 (Contains Metal) - Back Side of CK31 Hand-held PC facing planar phantom section						
Max. Measured SAR Level(s)	Body-worn	1.16 W/kg	1g average	CK31 with Belt-Clip accessory	SAR Limit	1.6 W/kg	1g average
<p>Celltech Labs Inc. declares under its sole responsibility that this wireless device is compliant with the Specific Absorption Rate (SAR) RF exposure requirements specified in FCC 47 CFR §2.1093 and Health Canada's Safety Code 6 for the General Population / Uncontrolled Exposure environment. The device was tested in accordance with the measurement standards and procedures specified in FCC OET Bulletin 65, Supplement C (Edition 01-01), Industry Canada RSS-102 Issue 4, IEEE 1528-2003 and IEC 62209-2 (Draft). All measurements were performed in accordance with the SAR system manufacturer recommendations.</p> <p>I attest to the accuracy of data. All measurements were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.</p> <p>The results and statements contained in this report pertain only to the device(s) evaluated.</p> <p>This test report shall not be reproduced partially, or in full, without the prior written approval of Celltech Labs Inc.</p>							
Test Report Approved By			Sean Johnston	Lab Manager	Celltech Labs Inc.		

Applicant:	Intermec Technologies Corp.	FCC ID:	HN2CK31MIG2	IC:	1223A-CK31MIG2	
DUT Type:	802.11b/g WLAN Module installed in CK31 Rugged Hand-held PC		Class II Permissive Change			
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Applicant:	Intermec Technologies Corp.	FCC ID:	HN2CK31MIG2	IC:	1223A-CK31MIG2	
DUT Type:	802.11b/g WLAN Module installed in CK31 Rugged Hand-held PC	Class II Permissive Change				
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REVISION HISTORY		
REVISION NO.	DESCRIPTION	RELEASE DATE
1.0	Initial Release	June 11, 2010
1.1	Corrected typographical error (Section 7)	June 15, 2010
1.2	Additional SAR evaluations for CK31 Large Back unit with EL20 Scan Engine	June 30, 2010
	Additional SAR evaluations for CK31 Large Back unit with EX25 Scan Engine	

Applicant:	Intermec Technologies Corp.	FCC ID:	HN2CK31MIG2	IC:	1223A-CK31MIG2	
DUT Type:	802.11b/g WLAN Module installed in CK31 Rugged Hand-held PC	Class II Permissive Change				
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1.0 INTRODUCTION

This measurement report demonstrates that the Intermec Technologies Corporation 802.11b/g WLAN Module (FCC ID: HN2CK31MIG2) installed in Intermec CK31 Rugged Hand-held PC, under the Class II Permissive Change of adding simultaneous transmission with Intermec Bluetooth Module (FCC ID: EHABTS080) and belt-clip body-worn accessory, complies with the SAR (Specific Absorption Rate) RF exposure requirements specified in FCC 47 CFR §2.1093 (see reference [1]) and Health Canada's Safety Code 6 (see reference [2]) for the General Population / Uncontrolled Exposure environment. The test procedures described in FCC OET Bulletin 65, Supplement C, Edition 01-01 (see reference [3]), Industry Canada RSS-102 Issue 4 (see reference [4]), IEEE 1528-2003 (see reference [5]) and IEC 62209-2 (Draft - see reference [6]) were employed. A description of the product and operating configuration, detailed summary of the test results, methodology and procedures used in the evaluation, equipment used, and the various provisions of the appropriate standards and procedures are included within this test report.

2.0 SAR MEASUREMENT SYSTEM

Celltech Labs Inc. SAR measurement facility utilizes the Dosimetric Assessment System (DASY™) manufactured by Schmid & Partner Engineering AG (SPEAG™) of Zurich, Switzerland. The DASY4 measurement system is comprised of the measurement server, robot controller, computer, near-field probe, probe alignment sensor, specific anthropomorphic mannequin (SAM) phantom, and various planar phantoms for brain and/or body SAR evaluations. The robot is a six-axis industrial robot performing precise movements to position the probe to the location (points) of maximum electromagnetic field (EMF). A cell controller system contains the power supply, robot controller, teach pendant (Joystick), and remote control, is used to drive the robot motors. The Staubli robot is connected to the cell controller to allow software manipulation of the robot. A data acquisition electronic (DAE) circuit performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. is connected to the Electro-optical coupler (EOC). The EOC performs the conversion from the optical into digital electric signal of the DAE and transfers data to the DASY4 measurement server. The DAE4 utilizes a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16-bit AD-converter and a command decoder and control logic unit. Transmission to the DASY4 measurement server is accomplished through an optical downlink for data and status information and an optical uplink for commands and clock lines. The mechanical probe-mounting device includes two different sensor systems for frontal and sidewise probe contacts. The sensor systems are also used for mechanical surface detection and probe collision detection. The robot utilizes a controller with built in VME-bus computer.


3.0 OUTPUT POWER MEASUREMENTS



MEASURED RF CONDUCTED OUTPUT POWER LEVELS

Test Sample Configuration	Frequency	Channel	Mode	Data Rate	Measured Conducted Power Level		
	MHz				dBm	mW	Method
CK31 Small Back	2412	1	802.11b	1 Mbps	14.7	29.5	Average
	2437	6	802.11b	1 Mbps	14.5	28.2	Average
	2462	11	802.11b	1 Mbps	14.7	29.5	Average
CK31 Large Back EL20 Scan Engine	2412	1	802.11b	1 Mbps	14.6	28.8	Average
	2437	6	802.11b	1 Mbps	14.7	29.5	Average
	2462	11	802.11b	1 Mbps	14.7	29.5	Average
CK31 Large Back EX25 Scan Engine	2412	1	802.11b	1 Mbps	14.3	26.9	Average
	2437	6	802.11b	1 Mbps	14.5	28.2	Average
	2462	11	802.11b	1 Mbps	14.5	28.2	Average

Notes

- The RF conducted output power levels of the WLAN transmitter were measured at the internal antenna connector prior to the SAR evaluations using a Gigatronics 8652A Universal Power Meter.
- The average conducted output power levels at the higher data rates are not > 0.25 dB than the lowest data rate.
- The average conducted output power levels for 802.11g mode are not > 0.25 dB than 802.11b mode.

Applicant:	Intermec Technologies Corp.	FCC ID:	HN2CK31MIG2	IC:	1223A-CK31MIG2	
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4.0 MEASURED FLUID DIELECTRIC PARAMETERS

2410 MHz Body - May 26, 2010				2440 MHz Body - May 26, 2010				2460 MHz Body - May 26, 2010			
Dielectric Constant ϵ_r				Dielectric Constant ϵ_r				Dielectric Constant ϵ_r			
2450 Target	Meas.	Dev.		2450 Target	Meas.	Dev.		2450 Target	Meas.	Dev.	
52.7	$\pm 5\%$	51.2	-2.9%	52.7	$\pm 5\%$	52.0	-1.3%	52.7	$\pm 5\%$	50.9	-3.4%
Conductivity σ (mho/m)				Conductivity σ (mho/m)				Conductivity σ (mho/m)			
2450 Target	Meas.	Dev.		2450 Target	Meas.	Dev.		2450 Target	Meas.	Dev.	
1.95	$\pm 5\%$	1.94	-0.5%	1.95	$\pm 5\%$	1.98	+1.5%	1.95	$\pm 5\%$	2.03	+4.1%
2410 MHz Body - June 28, 2010				2440 MHz Body - June 28, 2010				2460 MHz Body - June 28, 2010			
Dielectric Constant ϵ_r				Dielectric Constant ϵ_r				Dielectric Constant ϵ_r			
2450 Target	Meas.	Dev.		2450 Target	Meas.	Dev.		2450 Target	Meas.	Dev.	
52.7	$\pm 5\%$	50.8	-3.6%	52.7	$\pm 5\%$	50.8	-3.6%	52.7	$\pm 5\%$	50.8	-3.6%
Conductivity σ (mho/m)				Conductivity σ (mho/m)				Conductivity σ (mho/m)			
2450 Target	Meas.	Dev.		2450 Target	Meas.	Dev.		2450 Target	Meas.	Dev.	
1.95	$\pm 5\%$	1.94	-0.5%	1.95	$\pm 5\%$	2.00	+2.6%	1.95	$\pm 5\%$	2.02	+3.6%
Notes											
1. The dielectric parameters of the simulated tissue mixtures were measured prior to the SAR evaluations using an HP 85070C Dielectric Probe Kit and HP 8753ET Network Analyzer (see Appendix C).											
2. The fluid temperature was measured prior to and after the SAR evaluations to ensure the temperature remained within +/-2°C of the fluid temperature reported during the dielectric parameter measurements.											


Date	Fluid Type	ρ (Kg/m ³)	Ambient Temperature	Fluid Temperature	Fluid Depth	Relative Humidity	Atmospheric Pressure
May 26	2450 Body	1000	24.0 °C	22.5 °C	≥ 15 cm	31%	110.0 kPa
Jun 28	2450 Body	1000	24.0 °C	23.5 °C	≥ 15 cm	35%	101.0 kPa



5.0 SAR PROBE CALIBRATION & MEASUREMENT FREQUENCIES

The following procedures are recommended for measurements at 150 MHz - 3 GHz to minimize probe calibration and tissue dielectric parameter discrepancies. In general, SAR measurements below 300 MHz should be within ± 50 MHz of the probe calibration frequency. At 300 MHz to 3 GHz, measurements should be within ± 100 MHz of the probe calibration frequency. Measurements exceeding 50% of these intervals, ± 25 MHz < 300 MHz and ± 50 MHz ≥ 300 MHz, require additional steps (per FCC KDB 450824 D01 v01r01, SAR Probe Calibration and System Verification Considerations for Measurements at 150 MHz - 3 GHz - see reference [11]).

Probe Calibration Freq.	Device Measurement Freq.	Frequency Interval	± 50 MHz ≥ 300 MHz
2450 MHz	2412 MHz	38 MHz	< 50 MHz
	2437 MHz	13 MHz	< 50 MHz
	2462 MHz	12 MHz	< 50 MHz

The probe calibration and measurement frequency interval is < 50 MHz; therefore the additional steps were not required.

Applicant:	Intermec Technologies Corp.	FCC ID:	HN2CK31MIG2	IC:	1223A-CK31MIG2	
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6.0 SAR MEASUREMENT SUMMARY

BODY SAR MEASUREMENT SUMMARY (1g)

Test Date	Test Sample Configuration	Test Mode	Test Freq.	Chan.	Data Rate	Battery Type	Body-worn Accessory	DUT Spacing to Planar Phantom	Conducted Power Before Test	SAR Drift During Test	Measured SAR Level
			MHz						dBm	dB	W/kg (1g)
May-26	CK31 Small Back	802.11b DSSS	2412	1	1 Mbps	Li-ion	Holster	1.4 cm	14.7	-0.097	0.175
			2412	1					14.7	0.013	1.00
			2437	6					14.5	0.053	0.989
			2462	11					14.7	0.022	1.02
Jun-28	CK31 Large Back with EL20	802.11b DSSS	2412	1	1 Mbps	Li-ion	Belt-Clip	1.5 cm	14.6	0.151	0.618
			2437	6					14.7	-0.022	0.961
			2462	11					14.7	-0.072	1.16
Jun-28	CK31 Large Back with EX25	802.11b DSSS	2412	1	1 Mbps	Li-ion	Belt-Clip	1.5 cm	14.3	-0.068	0.707
			2437	6					14.5	0.033	0.803
			2462	11					14.5	-0.007	0.906
SAR LIMIT(S)					BODY	SPATIAL PEAK	RF EXPOSURE CATEGORY				
FCC 47 CFR 2.1093		Health Canada Safety Code 6			1.6 W/kg	averaged over 1 gram		General Population / Uncontrolled			

Notes


- Detailed measurement data and plots showing the maximum SAR location of the DUT are reported in Appendix A.
- The CK31 Large Back units are identical in exterior dimensions. The only difference is the internal scan engine.
- The test frequencies were selected based on the criteria specified in FCC KDB 248227 D01v01r02.
- The SAR evaluations were performed using proprietary test mode software provided by the client.
- The SAR power drift of the DUT was measured by the DASY4 system.
- The DUT battery was fully charged prior to the SAR evaluations.



7.0 SIMULTANEOUS TRANSMISSION ASSESSMENT

Assessment of the DUT for simultaneous transmission was based on applying the provision of FCC KDB 447498 D01v04 Section 4)d) (see reference [7]) whereby the applicable criteria of FCC KDB 648474 D01v04 (see reference [10]) was further implemented as described below. The antenna distance was measured by Intermec Technologies Corporation.

Co-located Transmitters: WLAN can transmit simultaneously with Bluetooth
 Antenna-to-Antenna Distance: WLAN-to-Bluetooth = 29.6 mm
 Antenna-to-User Distance: < 5 cm

MAX. SAR - 802.11b WLAN	BLUETOOTH SAR LEVEL	SUM OF 1-g SAR LEVELS	SAR LIMIT (Uncontrolled)
Body 1.16 W/kg (1g)	0	1.16 W/kg (1g)	1.6 W/kg (1g)
The maximum average conducted output power of the Bluetooth is below 12 mW (P_{Ref}); therefore stand-alone SAR evaluation was not required (per FCC KDB 648474 D01v04 Table 1) and the SAR level of the Bluetooth is considered 0.			

Applicant:	Intermec Technologies Corp.	FCC ID:	HN2CK31MIG2	IC:	1223A-CK31MIG2	
DUT Type:	802.11b/g WLAN Module installed in CK31 Rugged Hand-held PC		Class II Permissive Change			
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8.0 DETAILS OF SAR EVALUATION


The Intermec Technologies Corporation 802.11b/g WLAN Module (FCC ID: HN2CK31MIG2) installed in Intermec CK31 Rugged Hand-held PC, under the Class II Permissive Change of adding simultaneous transmission with Intermec Bluetooth Module (FCC ID: EHABTS080) and belt-clip body-worn accessory, was compliant for localized Specific Absorption Rate (Uncontrolled Exposure) based on the test provisions and conditions described below. The detailed test setup photographs are shown in Appendix D.



Test Configuration(s)

1. The DUT (CK31 Small Back) was evaluated for body-worn SAR with the CK31 Hand-held PC placed inside the Holster accessory. The back side of the CK31 Hand-held PC and Holster accessory was placed parallel and touching the outer surface of the SAM phantom (planar section). The Holster accessory provided a 1.4 cm spacing from the back side of the CK31 Hand-held PC to the SAM phantom (planar section).
2. The DUT (CK31 Small Back) was evaluated for body-worn SAR with the Swivel Belt-Clip accessory attached to the back side of the CK31 Hand-held PC. The back side of the CK31 Hand-held PC was placed parallel to the SAM phantom (planar section) and the belt-clip was touching the SAM phantom (planar section). The Belt-Clip accessory provided a 2.3 cm spacing from the back side of the CK31 Hand-held PC to the SAM phantom (planar section).
3. The DUT (CK31 Large Back) was evaluated for body-worn SAR with the Swivel Belt-Clip accessory attached to the back side of the CK31 Hand-held PC. The back side of the CK31 Hand-held PC was placed parallel to the SAM phantom (planar section) and the belt-clip was touching the SAM phantom (planar section). The Belt-Clip accessory provided a 1.5 cm spacing from the back side of the CK31 Hand-held PC to the SAM phantom (planar section). The CK31 Large Back unit was evaluated for SAR with the EL20 and EX25 scan engines consecutively.

9.0 SAR EVALUATION PROCEDURES

- a. (i) The evaluation was performed in the applicable area of the phantom depending on the type of device being tested. For devices held to the ear during normal operation, both the left and right ear positions were evaluated using the SAM phantom.
(ii) For body-worn and face-held devices a planar phantom was used.
- b. The SAR was determined by a pre-defined procedure within the DASY4 software. Upon completion of a reference and optical surface check, the exposed region of the phantom was scanned near the inner surface with a grid spacing of 15mm x 15mm.
An area scan was determined as follows:
- c. Based on the defined area scan grid, a more detailed grid is created to increase the points by a factor of 10. The interpolation function then evaluates all field values between corresponding measurement points.
- d. A linear search is applied to find all the candidate maxima. Subsequently, all maxima are removed that are >2 dB from the global maximum. The remaining maxima are then used to position the cube scans.
A 1g and 10g spatial peak SAR was determined as follows:
- e. Extrapolation is used to determine the values between the dipole center of the probe and the surface of the phantom. For E-Field Probe EX3DV4 this data cannot be measured because the center of the dipole sensors is 1.0 mm away from the probe tip and the distance between the probe and the boundary must be larger than 25% of the probe diameter. The probe diameter is 2.4 mm (see probe calibration document in Appendix F). In the DASY4 software, the distance between the sensor center and phantom surface is set to 2.0 mm. This provides a distance of 1.0 mm between the probe tip and the surface. For E-Field Probe ET3DV6 this data cannot be measured, since the center of the dipoles is 2.7 mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 1.4 mm (see probe calibration document in Appendix F). The extrapolation of the values between the dipole center and the surface of the phantom was based on trivariate quadratics computed from the previously calculated 3D interpolated points nearest the phantom surface.
- f. Interpolated data is used to calculate the average SAR over 1g and 10g cubes by spatially discretizing the entire measured cube. The volume used to determine the averaged SAR is a 1mm grid (42875 interpolated points).
- g. A zoom scan volume of 32 mm x 32 mm x 30 mm (5 x 5 x 7 points) centered at the peak SAR location determined from the area scan is used for all zoom scans for devices with a transmit frequency < 800 MHz. Zoom scans for frequencies ≥ 800 MHz are determined with a scan volume of 30 mm x 30 mm x 30 mm (7 x 7 x 7) to ensure complete capture of the peak spatial-average SAR.

Applicant:	Intermec Technologies Corp.	FCC ID:	HN2CK31MIG2	IC:	1223A-CK31MIG2	
DUT Type:	802.11b/g WLAN Module installed in CK31 Rugged Hand-held PC		Class II Permissive Change			
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10.0 SYSTEM PERFORMANCE CHECK

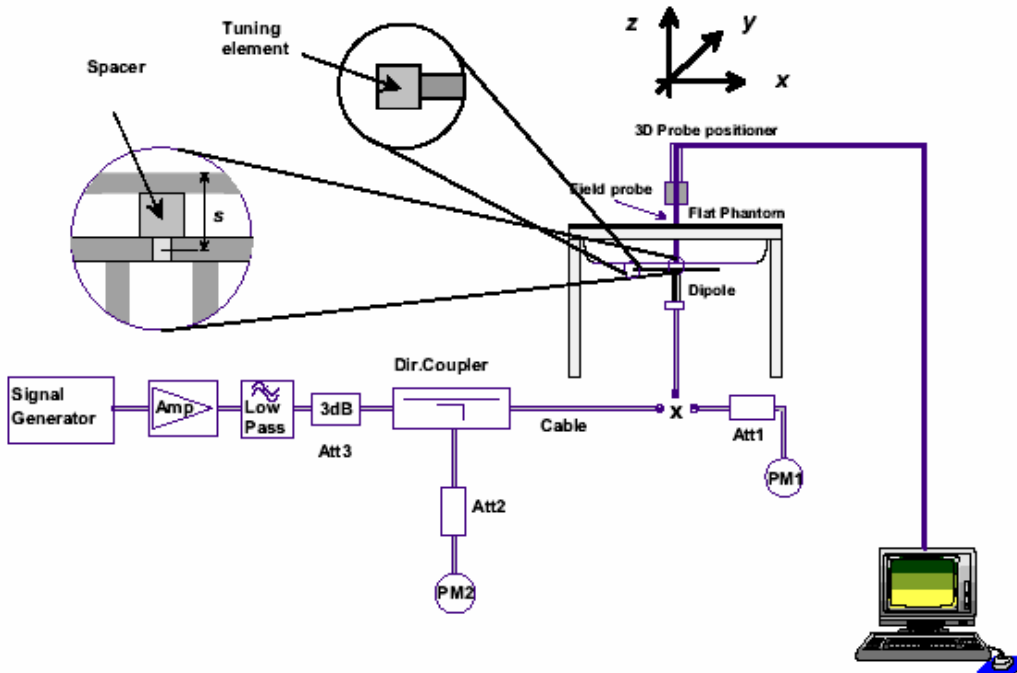
Prior to the SAR evaluations a daily system check was performed at the planar section of the SAM phantom with a 2450MHz SPEAG dipole (see Appendix B for system performance check evaluation plots) in accordance with the procedures described in IEEE Standard 1528-2003 (see reference [5]). The dielectric parameters of the simulated tissue mixtures were measured prior to the system performance checks using an HP 85070C Dielectric Probe Kit and an HP 8753ET Network Analyzer (see Appendix C). A forward power of 250 mW was applied to the dipole and the system was verified to a tolerance of $\pm 10\%$ from the system manufacturer's dipole calibration target SAR values (see Appendix E for system manufacturer's dipole calibration procedures).

SYSTEM PERFORMANCE CHECK EVALUATION RESULTS

Test Date	Fluid Freq.	SAR 1g (W/kg)			Dielectric Constant ϵ_r			Conductivity σ (mho/m)			ρ (Kg/m ³)	Amb. Temp. (°C)	Fluid Temp. (°C)	Fluid Depth (cm)	Humid. (%)	Barom. Press. (kPa)
		Body (MHz)	SPEAG Target	Meas.	Dev.	SPEAG Target	Meas.	Dev.	SPEAG Target	Meas.						
May-26	2450	12.9 $\pm 10\%$	13.7	+6.2%	52.7 $\pm 5\%$	51.0	-3.2%	1.95 $\pm 5\%$	2.00	+2.5%	1000	24.0	22.5	≥ 15	31	110.0
Jun-28	2450	12.9 $\pm 10\%$	14.1	+9.3%	52.7 $\pm 5\%$	50.8	-3.6%	1.95 $\pm 5\%$	1.99	+2.1%	1000	24.0	23.5	≥ 15	35	101.1

Notes


1. The target SAR values are the measured values from the dipole calibration performed by SPEAG (see Appendix E).
2. The target dielectric parameters are the nominal values from the dipole calibration performed by SPEAG (see Appendix E).
3. The fluid temperature was measured prior to and after the system performance check to ensure the temperature remained within $\pm 2^\circ\text{C}$ of the fluid temperature reported during the dielectric parameter measurements.
4. The dielectric parameters of the simulated tissue mixture were measured prior to the system performance check using a Dielectric Probe Kit and a Network Analyzer (see Appendix C).





System Performance Check Measurement Setup Diagram (IEEE 1528-2003)



SPEAG 2450 MHz Validation Dipole

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11.0 SIMULATED EQUIVALENT TISSUES



The simulated equivalent tissue recipe listed in the table below is derived from the SAR system manufacturer's suggested recipe in the DASY4 manual (see reference [12]) in accordance with the procedures and requirements specified in IEEE Standard 1528-2003 (see reference [5]). The ingredient percentage may have been adjusted minimally in order to achieve the appropriate target dielectric parameters within the specified tolerance.

2450 MHz TISSUE MIXTURES	
INGREDIENT	2450 MHz BODY
Water	69.98 %
Glycol Monobutyl	30.00 %
Salt	0.02 %

12.0 SAR LIMITS


SAR RF EXPOSURE LIMITS			
FCC 47 CFR 2.1093	Health Canada Safety Code 6	(General Population / Uncontrolled Exposure)	(Occupational / Controlled Exposure)
Spatial Average (averaged over the whole body)		0.08 W/kg	0.4 W/kg
Spatial Peak (averaged over any 1g of tissue)		1.6 W/kg	8.0 W/kg
Spatial Peak (hands/wrists/feet/ankles averaged over 10g)		4.0 W/kg	20.0 W/kg
The Spatial Average value of the SAR averaged over the whole body.			
The Spatial Peak value of the SAR averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.			
The Spatial Peak value of the SAR averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.			
Uncontrolled environments are defined as locations where there is potential exposure of individuals who have no knowledge or control of their potential exposure.			
Controlled environments are defined as locations where there is potential exposure of individuals who have knowledge of their potential exposure and can exercise control over their exposure.			



Applicant:	Intermec Technologies Corp.	FCC ID:	HN2CK31MIG2	IC:	1223A-CK31MIG2	
DUT Type:	802.11b/g WLAN Module installed in CK31 Rugged Hand-held PC			Class II Permissive Change		
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13.0 ROBOT SYSTEM SPECIFICATIONS

<u>Specifications</u>	
Positioner	Stäubli Unimation Corp. Robot Model: RX60L
Repeatability	0.02 mm
No. of axis	6
<u>Data Acquisition Electronic (DAE) System</u>	
<u>Cell Controller</u>	
Processor	AMD Athlon XP 2400+
Clock Speed	2.0 GHz
Operating System	Windows XP Professional
<u>Data Converter</u>	
Features	Signal Amplifier, multiplexer, A/D converter, and control logic
Software	Measurement Software: DASY4, V4.7 Build 44
	Postprocessing Software: SEMCAD, V1.8 Build 171
Connecting Lines	Optical downlink for data and status info.; Optical uplink for commands and clock
<u>DASY4 Measurement Server</u>	
Function	Real-time data evaluation for field measurements and surface detection
Hardware	PC/104 166MHz Pentium CPU; 32 MB chipdisk; 64 MB RAM
Connections	COM1, COM2, DAE, Robot, Ethernet, Service Interface
<u>E-Field Probe</u>	
Model	EX3DV4
Serial No.	3600
Construction	Symmetrical design with triangular core
Frequency	10 MHz to 6 GHz
Linearity	±0.2 dB (30 MHz to 3 GHz)
<u>Phantom(s)</u>	
Type	SAM V4.0C
Shell Material	Fiberglass
Thickness	2.0 ±0.1 mm
Volume	Approx. 25 liters


Applicant:	Intermec Technologies Corp.	FCC ID:	HN2CK31MIG2	IC:	1223A-CK31MIG2	
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14.0 PROBE SPECIFICATIONS (EX3DV4)


<p>Construction: Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g. DGBE)</p> <p>Calibration: Basic Broadband Calibration in air: 10-3000 MHz Conversion Factors (CF) for HSL 900 and HSL 1750</p> <p>Frequency: 10 MHz to >6 GHz; Linearity: ± 0.2 dB (30 MHz to 3 GHz)</p> <p>Directivity: ± 0.3 dB in HSL (rotation around probe axis) ± 0.5 dB in tissue material (rotation normal to probe axis)</p> <p>Dynamic Range: 10 μW/g to >100 mW/g; Linearity: ± 0.2 dB (noise: typically < 1 μW/g)</p> <p>Dimensions: Overall length: 330 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Typical distance from probe tip to dipole centers: 1.0 mm</p> <p>Application: High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields). Only probe which enables compliance testing for frequencies up to 6 GHz with precision of better than 30%.</p>	
	EX3DV4 E-Field Probe



15.0 SAM TWIN PHANTOM V4.0C

<p>The SAM Twin Phantom V4.0C is a fiberglass shell phantom with a 2.0 mm (+/-0.2 mm) shell thickness for left and right head and flat planar area integrated in a wooden table. The shape of the fiberglass shell corresponds to the phantom defined by SCC34-SC2. The device holder positions are adjusted to the standard measurement positions in the three sections (see Appendix G for specifications of the SAM Twin Phantom V4.0C).</p>	
	SAM Twin Phantom V4.0C

16.0 DEVICE HOLDER


<p>The DASY4 device holder has two scales for device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear openings). The plane between the ear openings and the mouth tip has a rotation angle of 65°. The bottom plate contains three pair of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections. For evaluation of devices with a larger footprint (e.g. Laptop PC, Tablet PC), or to avoid perturbation due to device holder clamps for devices with a smaller footprint, a Plexiglas platform is attached to the device holder.</p>	
	Device Holder




Applicant: Intermec Technologies Corp.	FCC ID: HN2CK31MIG2	IC: 1223A-CK31MIG2	
DUT Type: 802.11b/g WLAN Module installed in CK31 Rugged Hand-held PC	Class II Permissive Change		
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17.0 TEST EQUIPMENT LIST

TEST EQUIPMENT		ASSET NO.	SERIAL NO.	DATE CALIBRATED	CALIBRATION INTERVAL
USED	DESCRIPTION				
x	Schmid & Partner DASY4 System	-	-	-	-
x	-DASY4 Measurement Server	00158	1078	CNR	CNR
x	-Robot	00046	599396-01	CNR	CNR
x	-DAE4	00019	353	27Apr10	Annual
x	-EX3DV4 E-Field Probe	00213	3600	29Apr10	Annual
x	-D2450V2 Validation Dipole	00219	825	17Apr09	Biennial
x	-SAM Twin Phantom V4.0C	00154	1033	CNR	CNR
x	HP 85070C Dielectric Probe Kit	00033	none	CNR	CNR
x	Gigatronics 8652A Power Meter	00007	1835272	04May10	Biennial
x	Gigatronics 80701A Power Sensor	00014	1833699	04May10	Biennial
x	HP 8753ET Network Analyzer	00134	US39170292	04May10	Biennial
x	Rohde & Schwarz SMR20 Signal Generator	00006	100104	CNR	CNR
x	Amplifier Research 5S1G4 Power Amplifier	00106	26235	CNR	CNR
Abbr.	CNR = Calibration Not Required				


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18.0 MEASUREMENT UNCERTAINTIES

UNCERTAINTY BUDGET FOR DEVICE EVALUATION									
Uncertainty Component	IEEE 1528 Section	Uncertainty Value ±%	Probability Distribution	Divisor	ci 1g	ci 10g	Uncertainty Value ±% (1g)	Uncertainty Value ±% (10g)	V _i or V _{eff}
Measurement System									
Probe Calibration (2450 MHz)	E.2.1	5.5	Normal	1	1	1	5.5	5.5	∞
Axial Isotropy	E.2.2	4.7	Rectangular	1.732050808	0.7	0.7	1.9	1.9	∞
Hemispherical Isotropy	E.2.2	9.6	Rectangular	1.732050808	0.7	0.7	3.9	3.9	∞
Boundary Effect	E.2.3	1	Rectangular	1.732050808	1	1	0.6	0.6	∞
Linearity	E.2.4	4.7	Rectangular	1.732050808	1	1	2.7	2.7	∞
System Detection Limits	E.2.5	1	Rectangular	1.732050808	1	1	0.6	0.6	∞
Readout Electronics	E.2.6	0.3	Normal	1	1	1	0.3	0.3	∞
Response Time	E.2.7	0.8	Rectangular	1.732050808	1	1	0.5	0.5	∞
Integration Time	E.2.8	2.6	Rectangular	1.732050808	1	1	1.5	1.5	∞
RF Ambient Conditions	E.6.1	3	Rectangular	1.732050808	1	1	1.7	1.7	∞
Probe Positioner Mechanical Tolerance	E.6.2	0.4	Rectangular	1.732050808	1	1	0.2	0.2	∞
Probe Positioning wrt Phantom Shell	E.6.3	2.9	Rectangular	1.732050808	1	1	1.7	1.7	∞
Extrapolation, interpolation & integration algorithms for max. SAR evaluation	E.5	1	Rectangular	1.732050808	1	1	0.6	0.6	∞
Test Sample Related									
Test Sample Positioning	E.4.2	2.9	Normal	1	1	1	2.9	2.9	12
Device Holder Uncertainty	E.4.1	3.6	Normal	1	1	1	3.6	3.6	8
SAR Drift Measurement	6.6.2	5	Rectangular	1.732050808	1	1	2.9	2.9	∞
Phantom and Tissue Parameters									
Phantom Uncertainty	E.3.1	4	Rectangular	1.732050808	1	1	2.3	2.3	∞
Liquid Conductivity (target)	E.3.2	5	Rectangular	1.732050808	0.64	0.43	1.8	1.2	∞
Liquid Conductivity (measured)	E.3.3	4.1	Normal	1	0.64	0.43	2.6	1.8	∞
Liquid Permittivity (target)	E.3.2	5	Rectangular	1.732050808	0.6	0.49	1.7	1.4	∞
Liquid Permittivity (measured)	E.3.3	3.6	Normal	1	0.6	0.49	2.2	1.8	∞
Combined Standard Uncertainty			RSS				10.89	10.51	
Expanded Uncertainty (95% Confidence Interval)			k=2				21.79	21.02	


Measurement Uncertainty Table in accordance with IEEE Standard 1528-2003



Applicant:	Intermec Technologies Corp.	FCC ID:	HN2CK31MIG2	IC:	1223A-CK31MIG2	
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19.0 REFERENCES



- [1] Federal Communications Commission - "Radiofrequency radiation exposure evaluation: portable devices", Rule Part 47 CFR §2.1093.
- [2] Health Canada - "Limits of Human Exposure to Radiofrequency Electromagnetic Fields in the Frequency Range from 3 kHz to 300 GHz", Safety Code 6: 1999.
- [3] Federal Communications Commission - "Evaluating Compliance with FCC Guidelines for Human Exposure to Radio frequency Electromagnetic Fields", OET Bulletin 65, Supplement C (Edition 01-01), FCC, Washington, D.C.: June 2001.
- [4] Industry Canada - "Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)", Radio Standards Specification RSS-102 Issue 4: March 2010.
- [5] IEEE Standard 1528-2003 - "Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques": December 2003.
- [6] International Standard IEC 62209-2 Draft (106-62209-2-CDV_090323) - "Human exposure to radio frequency fields from hand-held & body-mounted wireless comm. devices - Part 2: Procedure to determine the specific absorption rate (SAR) for wireless communication devices used in close proximity to the human body (30 MHz to 6 GHz)".
- [7] Federal Communications Commission, Office of Engineering and Technology - "Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies"; KDB 447498 D01v04: November 2009.
- [8] Federal Communications Commission, Office of Engineering and Technology - "SAR Measurement Procedures for 802.11a/b/g Transmitters"; KDB 248227 D01v01r02: May 2007.
- [9] Federal Communications Commission, Office of Engineering and Technology - "Permissive Change Policies"; KDB 178919 D01v04r04: August 2009.
- [10] Federal Communications Commission, Office of Engineering and Technology - "SAR Evaluation Considerations for Handsets with Multiple Transmitters and Antennas"; KDB 648474 D01v01r05: September 2008.
- [11] Federal Communications Commission, Office of Engineering and Technology - "Application Note: SAR Probe Calibration and System Verification Considerations for Measurements at 150 MHz - 3 GHz"; KDB 450824 D01 v01r01: January 2007.
- [12] Schmid & Partner Engineering AG - DASY4 Manual V4.6, Chapter 17 Application Note, Body Tissue Recipe: Sept. 2005.
- [13] ISO/IEC 17025 - "General requirements for the competence of testing and calibration laboratories (ISO/IEC 17025:2005)."

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DUT Type:	802.11b/g WLAN Module installed in CK31 Rugged Hand-held PC		Class II Permissive Change			
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APPENDIX A - SAR MEASUREMENT DATA

Applicant:	Intermec Technologies Corp.	FCC ID:	HN2CK31MIG2	IC:	1223A-CK31MIG2	
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Date Tested: 05/26/2010

Body SAR - WLAN - 802.11b Mode - 1 Mbps - 2412 MHz - Ch. 1 - Back Side of DUT with Holster

DUT: Intermec Model: CK31; Type: Rugged Handheld PC with 802.11b/g WLAN & Bluetooth; Serial: 26500800152

Small Back Unit; Body-worn Accessory: Holster Part No. 825-169-001

Ambient Temp: 24.0°C; Fluid Temp: 22.5°C; Barometric Pressure: 110.0 kPa; Humidity: 31%

Communication System: DSSS WLAN

Frequency: 2412 MHz; Duty Cycle: 1:1

Medium: M2450 Medium parameters used: $f = 2412 \text{ MHz}$; $\sigma = 1.94 \text{ mho/m}$; $\epsilon_r = 51.2$; $\rho = 1000 \text{ kg/m}^3$

- Probe: EX3DV4 - SN3600; ConvF(6.24, 6.24, 6.24); Calibrated: 29/04/2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: SAM 4.0; Type: Fiberglass; Serial: 1033
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body-worn SAR - 1.4 cm Holster accessory spacing from back side of DUT to planar phantom section

Area Scan (9x14x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 0.178 mW/g

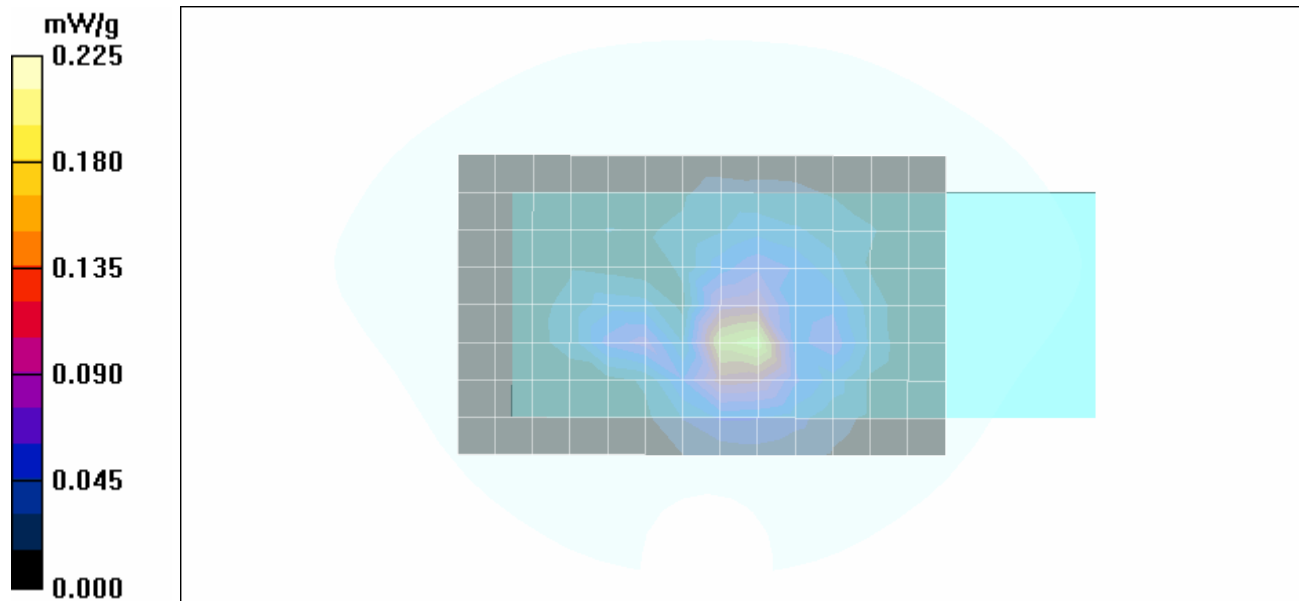
Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$


Reference Value = 9.74 V/m; Power Drift = -0.097 dB



Peak SAR (extrapolated) = 0.400 W/kg

SAR(1 g) = 0.175 mW/g; SAR(10 g) = 0.083 mW/g

Maximum value of SAR (measured) = 0.225 mW/g



Applicant:	Intermec Technologies Corp.	FCC ID:	HN2CK31MIG2	IC:	1223A-CK31MIG2	
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Date Tested: 05/26/2010

Body SAR - WLAN - 802.11b Mode - 1 Mbps - 2412 MHz - Ch. 1 - Back Side of DUT with Belt-Clip

DUT: Intermec Model: CK31; Type: Rugged Handheld PC with 802.11b/g WLAN & Bluetooth; Serial: 26500800152

Small Back Unit; Body-worn Accessory: Swivel Belt-Clip Part No. 075447-001

Ambient Temp: 24.0°C; Fluid Temp: 22.5°C; Barometric Pressure: 110.0 kPa; Humidity: 31%

Communication System: DSSS WLAN

Frequency: 2412 MHz; Duty Cycle: 1:1

Medium: M2450 Medium parameters used: $f = 2412 \text{ MHz}$; $\sigma = 1.94 \text{ mho/m}$; $\epsilon_r = 51.2$; $\rho = 1000 \text{ kg/m}^3$

- Probe: EX3DV4 - SN3600; ConvF(6.24, 6.24, 6.24); Calibrated: 29/04/2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: SAM 4.0; Type: Fiberglass; Serial: 1033
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body-worn SAR - 2.3 cm Belt-Clip accessory spacing from back side of DUT to planar phantom section

Area Scan (9x14x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 1.17 mW/g

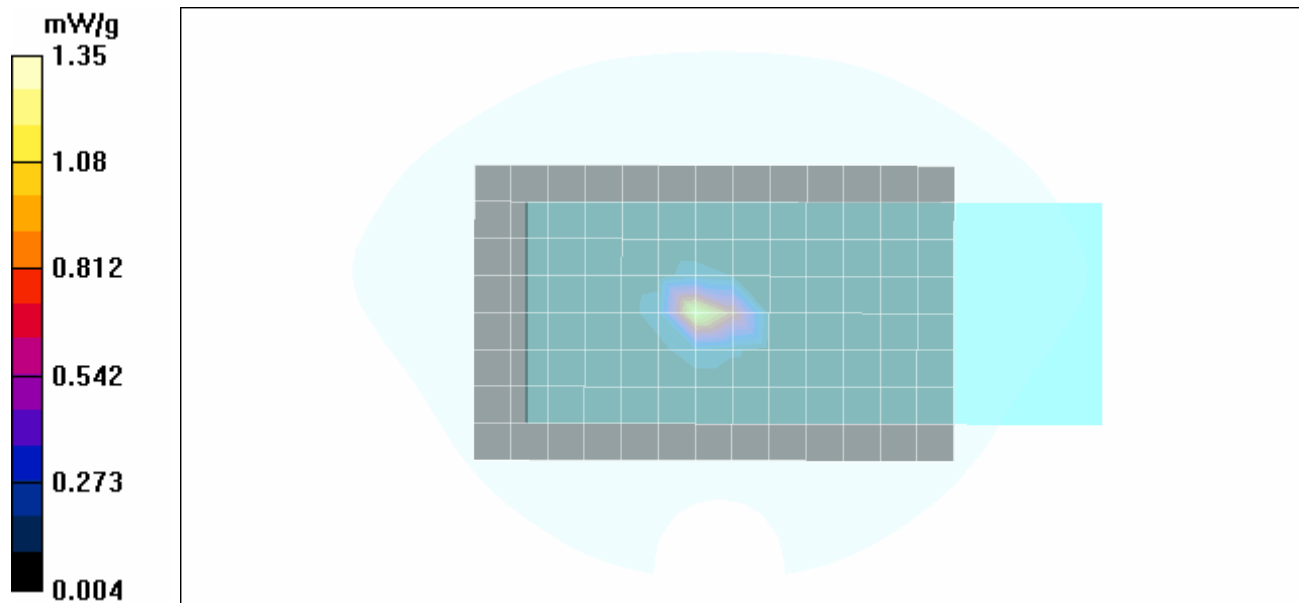
Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$


Reference Value = 24.6 V/m; Power Drift = 0.013 dB



Peak SAR (extrapolated) = 1.96 W/kg

SAR(1 g) = 1 mW/g; SAR(10 g) = 0.417 mW/g

Maximum value of SAR (measured) = 1.35 mW/g



Applicant:	Intermec Technologies Corp.	FCC ID:	HN2CK31MIG2	IC:	1223A-CK31MIG2	
DUT Type:	802.11b/g WLAN Module installed in CK31 Rugged Hand-held PC			Class II Permissive Change		
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	<u>Dates of Evaluation</u> May 26 & June 28, 2010	<u>Test Report Serial No.</u> 052110HN2-T1022-S15W	<u>Test Report Revision No.</u> Rev. 1.2 (3rd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> June 30, 2010	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

Date Tested: 05/26/2010

Body SAR - WLAN - 802.11b Mode - 1 Mbps - 2437 MHz - Ch. 6 - Back Side of DUT with Belt-Clip

DUT: Intermec Model: CK31; Type: Rugged Handheld PC with 802.11b/g WLAN & Bluetooth; Serial: 26500800152

Small Back Unit; Body-worn Accessory: Swivel Belt-Clip Part No. 075447-001

Ambient Temp: 24.0°C; Fluid Temp: 22.5°C; Barometric Pressure: 110.0 kPa; Humidity: 31%

Communication System: DSSS WLAN

Frequency: 2437 MHz; Duty Cycle: 1:1

Medium: M2450 Medium parameters used: $f = 2437 \text{ MHz}$; $\sigma = 1.98 \text{ mho/m}$; $\epsilon_r = 52$; $\rho = 1000 \text{ kg/m}^3$

- Probe: EX3DV4 - SN3600; ConvF(6.24, 6.24, 6.24); Calibrated: 29/04/2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: SAM 4.0; Type: Fiberglass; Serial: 1033
- Measurement SW: DASy4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body-worn SAR - 2.3 cm Belt-Clip accessory spacing from back side of DUT to planar phantom section

Area Scan (9x14x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 0.954 mW/g

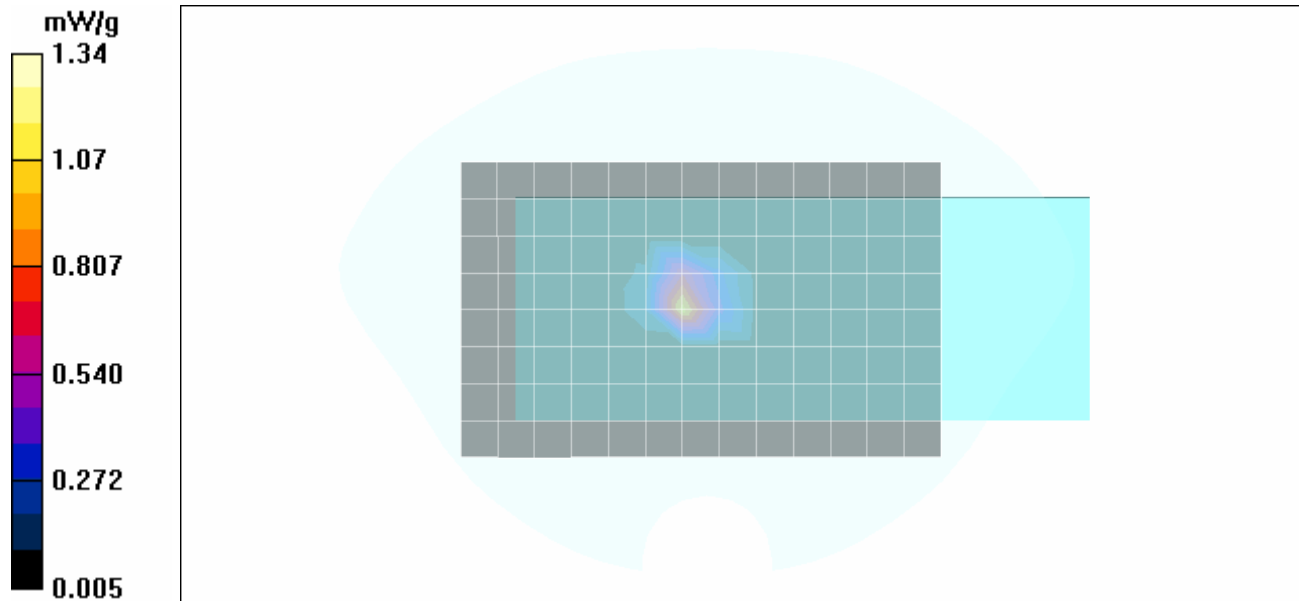
Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$


Reference Value = 21.4 V/m; Power Drift = 0.053 dB



Peak SAR (extrapolated) = 1.98 W/kg

SAR(1 g) = 0.989 mW/g; SAR(10 g) = 0.409 mW/g

Maximum value of SAR (measured) = 1.34 mW/g



Applicant:	Intermec Technologies Corp.	FCC ID:	HN2CK31MIG2	IC:	1223A-CK31MIG2	
DUT Type:	802.11b/g WLAN Module installed in CK31 Rugged Hand-held PC		Class II Permissive Change			
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	<u>Test Report Issue Date</u> June 30, 2010	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

Date Tested: 05/26/2010

Body SAR - WLAN - 802.11b Mode - 1 Mbps - 2462 MHz - Ch. 11 - Back Side of DUT with Belt-Clip

DUT: Intermec Model: CK31; Type: Rugged Handheld PC with 802.11b/g WLAN & Bluetooth; Serial: 26500800152

Small Back Unit; Body-worn Accessory: Swivel Belt-Clip Part No. 075447-001

Ambient Temp: 24.0°C; Fluid Temp: 22.5°C; Barometric Pressure: 110.0 kPa; Humidity: 31%

Communication System: DSSS WLAN

Frequency: 2462 MHz; Duty Cycle: 1:1

Medium: M2450 Medium parameters used: $f = 2462 \text{ MHz}$; $\sigma = 2.03 \text{ mho/m}$; $\epsilon_r = 50.9$; $\rho = 1000 \text{ kg/m}^3$

- Probe: EX3DV4 - SN3600; ConvF(6.24, 6.24, 6.24); Calibrated: 29/04/2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: SAM 4.0; Type: Fiberglass; Serial: 1033
- Measurement SW: DASy4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body-worn SAR - 2.3 cm Belt-Clip accessory spacing from back side of DUT to planar phantom section

Area Scan (9x14x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 1.31 mW/g

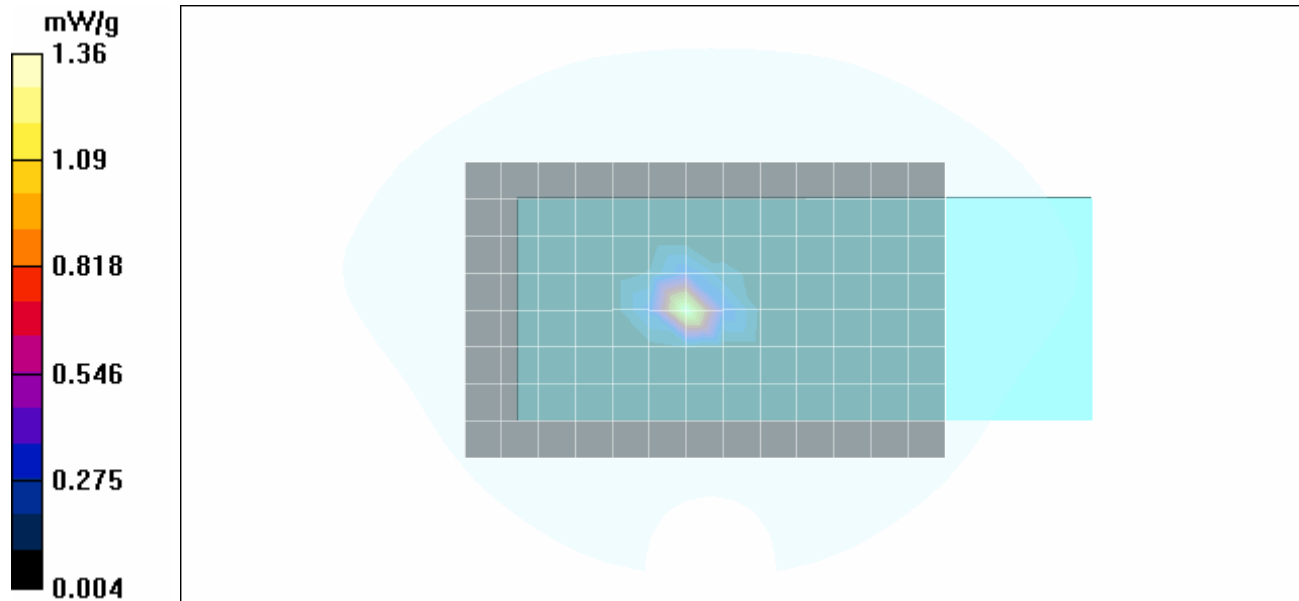
Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$


Reference Value = 25.1 V/m; Power Drift = 0.022 dB



Peak SAR (extrapolated) = 2.02 W/kg

SAR(1 g) = 1.02 mW/g; SAR(10 g) = 0.420 mW/g

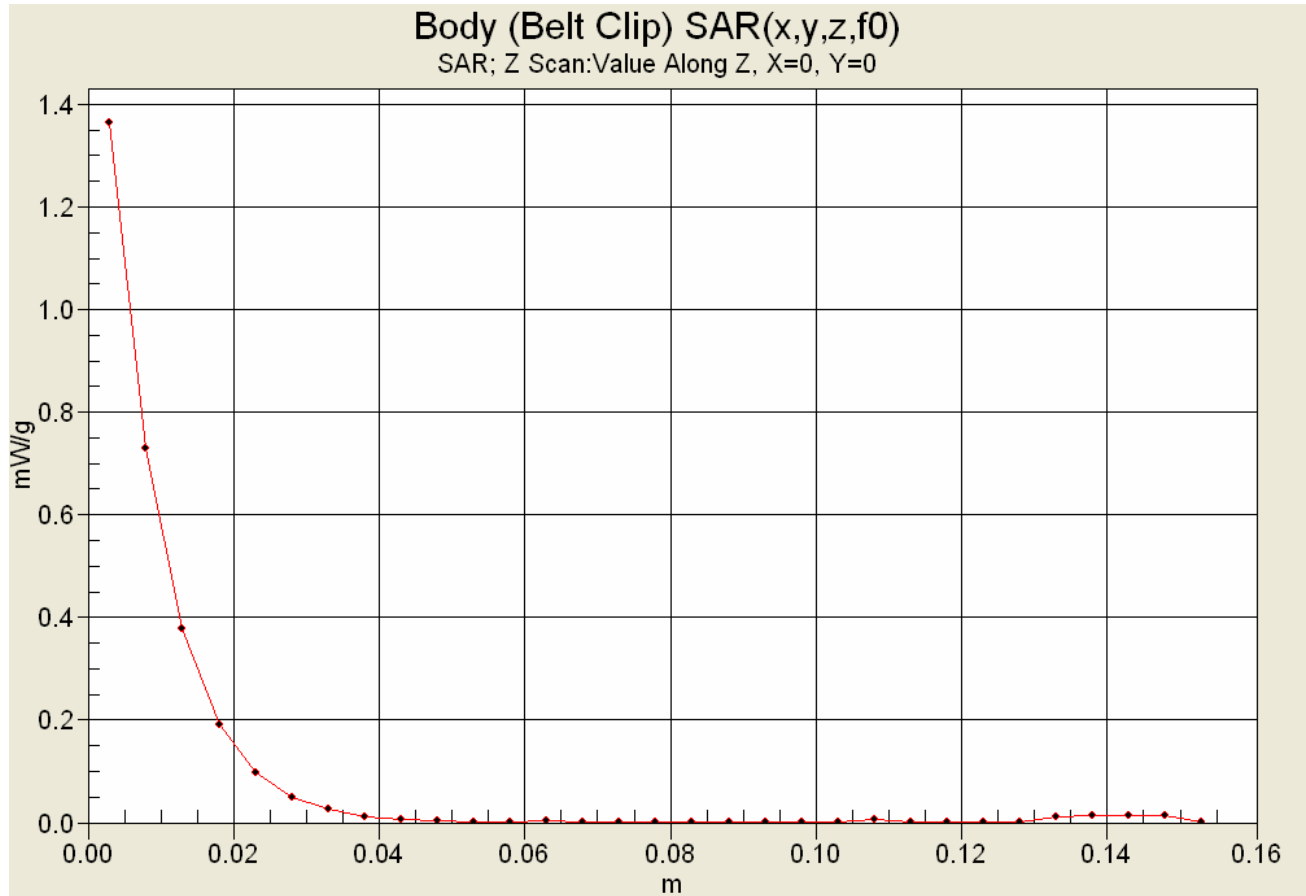
Maximum value of SAR (measured) = 1.36 mW/g






Applicant:	Intermec Technologies Corp.	FCC ID:	HN2CK31MIG2	IC:	1223A-CK31MIG2	
DUT Type:	802.11b/g WLAN Module installed in CK31 Rugged Hand-held PC		Class II Permissive Change			
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	<u>Test Report Issue Date</u> June 30, 2010	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

Z-Axis Scan



Applicant:	Intermec Technologies Corp.	FCC ID:	HN2CK31MIG2	IC:	1223A-CK31MIG2	
DUT Type:	802.11b/g WLAN Module installed in CK31 Rugged Hand-held PC			Class II Permissive Change		
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	<u>Dates of Evaluation</u> May 26 & June 28, 2010	<u>Test Report Serial No.</u> 052110HN2-T1022-S15W	<u>Test Report Revision No.</u> Rev. 1.2 (3rd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> June 30, 2010	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

Date Tested: 06/28/2010

Body SAR - WLAN - 802.11b Mode - 1 Mbps - 2412 MHz - Ch. 1 - Back Side of DUT with Belt-Clip

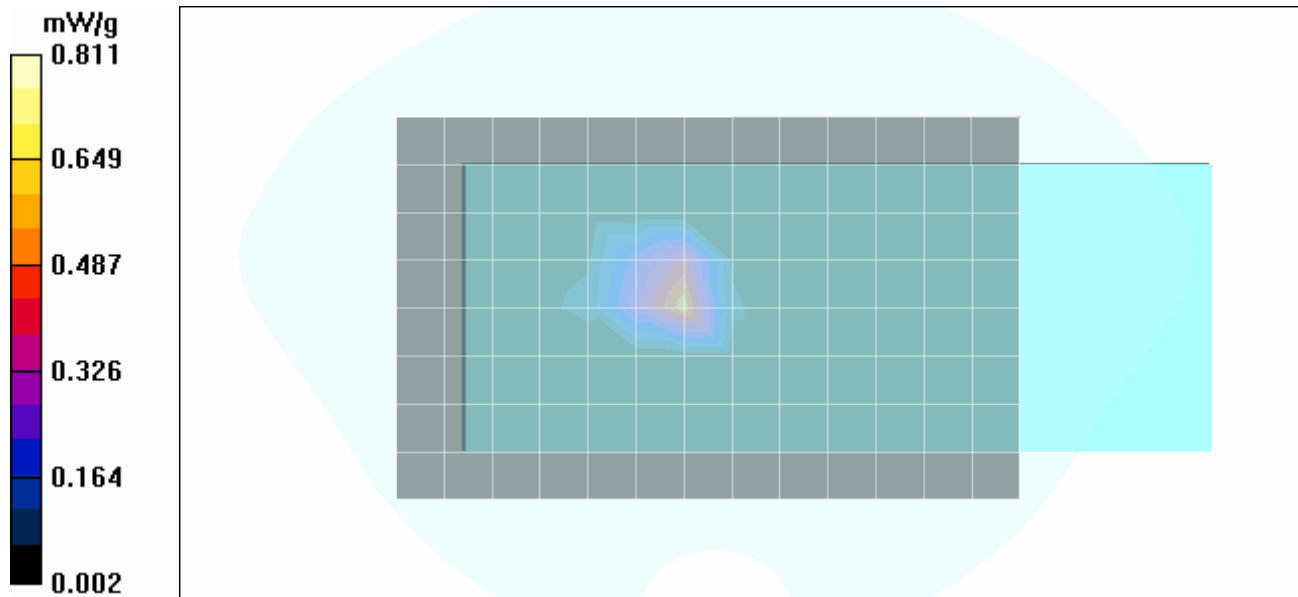
DUT: Intermec Model: CK31; Type: Rugged Handheld PC with 802.11b/g WLAN & Bluetooth; Serial: 16521026051


Large Back Unit with EL20 Scan Engine; Body-worn Accessory: Swivel Belt-Clip Part No. 075447-001



Ambient Temp: 24.0°C; Fluid Temp: 23.5°C; Barometric Pressure: 101.0 kPa; Humidity: 35%
 Communication System: DSSS WLAN
 Frequency: 2412 MHz; Duty Cycle: 1:1
 Medium: M2450 Medium parameters used: $f = 2412 \text{ MHz}$; $\sigma = 1.94 \text{ mho/m}$; $\epsilon_r = 50.8$; $\rho = 1000 \text{ kg/m}^3$
 - Probe: EX3DV4 - SN3600; ConvF(6.24, 6.24, 6.24); Calibrated: 29/04/2010
 - Sensor-Surface: 3mm (Mechanical Surface Detection)
 - Electronics: DAE4 Sn353; Calibrated: 27/04/2010
 - Phantom: SAM 4.0; Type: Fibreglas; Serial: 1033
 - Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body-worn SAR - 1.5 cm Belt-Clip accessory spacing from Back Side of DUT to planar phantom section

Area Scan (9x14x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$
 Maximum value of SAR (measured) = 0.529 mW/g
Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$
 Reference Value = 16.5 V/m; Power Drift = 0.151 dB
 Peak SAR (extrapolated) = 1.19 W/kg
SAR(1 g) = 0.618 mW/g; SAR(10 g) = 0.266 mW/g
 Maximum value of SAR (measured) = 0.811 mW/g



Applicant:	Intermec Technologies Corp.	FCC ID:	HN2CK31MIG2	IC:	1223A-CK31MIG2	
DUT Type:	802.11b/g WLAN Module installed in CK31 Rugged Hand-held PC		Class II Permissive Change			
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	<u>Test Report Issue Date</u> June 30, 2010	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

Date Tested: 06/28/2010

Body SAR - WLAN - 802.11b Mode - 1 Mbps - 2437 MHz - Ch. 6 - Back Side of DUT with Belt-Clip

DUT: Intermec Model: CK31; Type: Rugged Handheld PC with 802.11b/g WLAN & Bluetooth; Serial: 16521026051

Large Back Unit with EL20 Scan Engine; Body-worn Accessory: Swivel Belt-Clip Part No. 075447-001

Ambient Temp: 24.0°C; Fluid Temp: 23.5°C; Barometric Pressure: 101.0 kPa; Humidity: 35%

Communication System: DSSS WLAN

Frequency: 2437 MHz; Duty Cycle: 1:1

Medium: M2450 Medium parameters used: $f = 2437 \text{ MHz}$; $\sigma = 2 \text{ mho/m}$; $\epsilon_r = 50.8$; $\rho = 1000 \text{ kg/m}^3$

- Probe: EX3DV4 - SN3600; ConvF(6.24, 6.24, 6.24); Calibrated: 29/04/2010

- Sensor-Surface: 3mm (Mechanical Surface Detection)

- Electronics: DAE4 Sn353; Calibrated: 27/04/2010

- Phantom: SAM 4.0; Type: Fiberglass; Serial: 1033

- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body-worn SAR - 1.5 cm Belt-Clip accessory spacing from Back Side of DUT to planar phantom section

Area Scan (9x14x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 1.25 mW/g

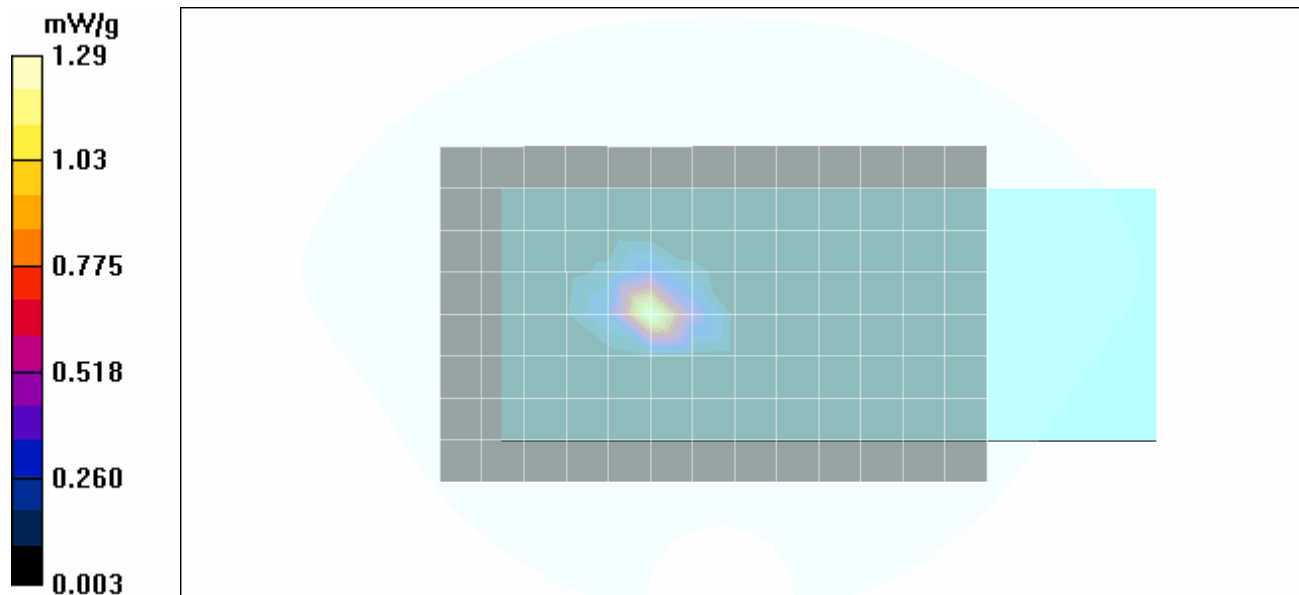
Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$


Reference Value = 24.2 V/m; Power Drift = -0.022 dB



Peak SAR (extrapolated) = 1.83 W/kg

SAR(1 g) = 0.961 mW/g; SAR(10 g) = 0.411 mW/g

Maximum value of SAR (measured) = 1.29 mW/g



Applicant:	Intermec Technologies Corp.	FCC ID:	HN2CK31MIG2	IC:	1223A-CK31MIG2	
DUT Type:	802.11b/g WLAN Module installed in CK31 Rugged Hand-held PC		Class II Permissive Change			
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Date Tested: 06/28/2010

Body SAR - WLAN - 802.11b Mode - 1 Mbps - 2462 MHz - Ch. 11 - Back Side of DUT with Belt-Clip

DUT: Intermec Model: CK31; Type: Rugged Handheld PC with 802.11b/g WLAN & Bluetooth; Serial: 16521026051

Large Back Unit with EL20 Scan Engine; Body-worn Accessory: Swivel Belt-Clip Part No. 075447-001

Ambient Temp: 24.0°C; Fluid Temp: 23.5°C; Barometric Pressure: 101.0 kPa; Humidity: 35%

Communication System: DSSS WLAN

Frequency: 2462 MHz; Duty Cycle: 1:1

Medium: M2450 Medium parameters used: $f = 2462 \text{ MHz}$; $\sigma = 2.02 \text{ mho/m}$; $\epsilon_r = 50.8$; $\rho = 1000 \text{ kg/m}^3$

- Probe: EX3DV4 - SN3600; ConvF(6.24, 6.24, 6.24); Calibrated: 29/04/2010

- Sensor-Surface: 3mm (Mechanical Surface Detection)

- Electronics: DAE4 Sn353; Calibrated: 27/04/2010

- Phantom: SAM 4.0; Type: Fiberglass; Serial: 1033

- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body-worn SAR - 1.5 cm Belt-Clip accessory spacing from Back Side of DUT to planar phantom section

Area Scan (9x14x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 1.40 mW/g

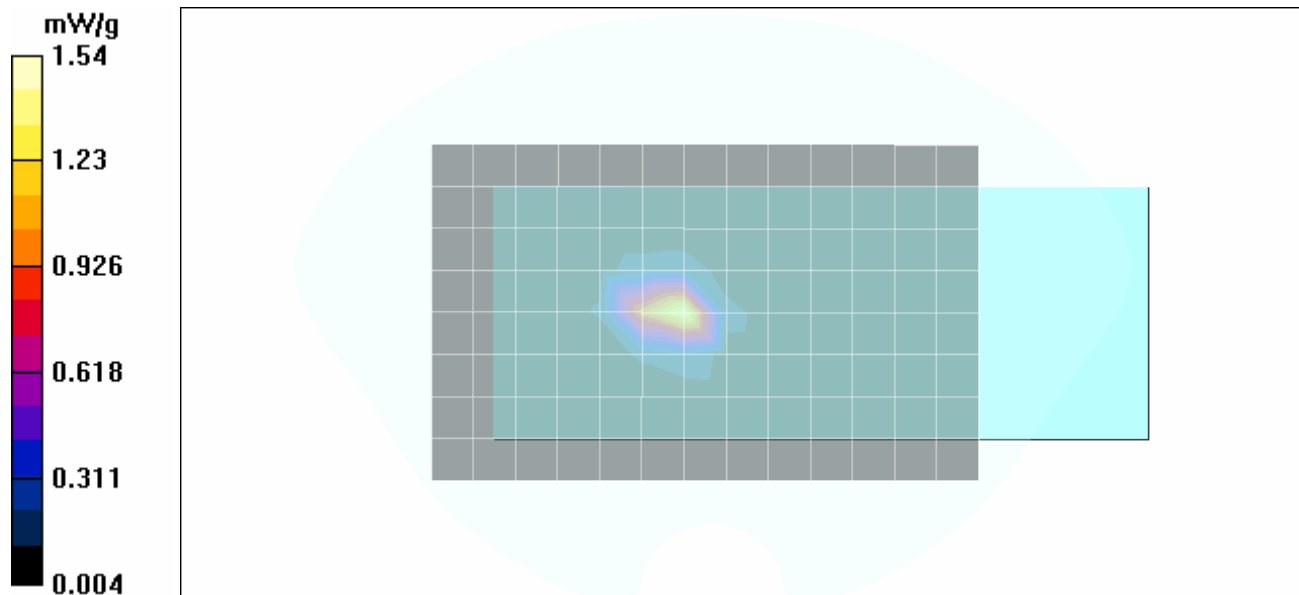
Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$


Reference Value = 25.8 V/m; Power Drift = -0.072 dB



Peak SAR (extrapolated) = 2.22 W/kg

SAR(1 g) = 1.16 mW/g; SAR(10 g) = 0.494 mW/g

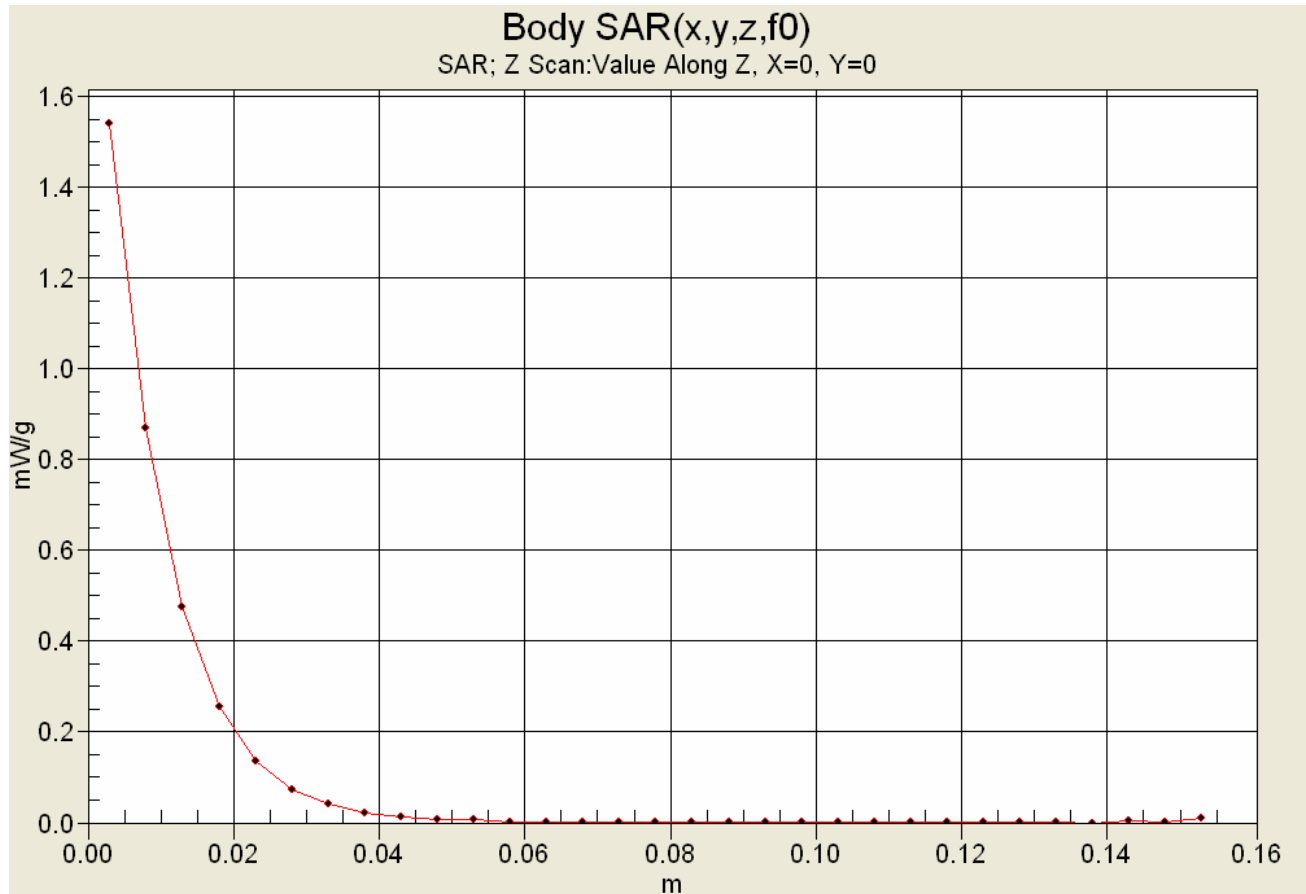
Maximum value of SAR (measured) = 1.54 mW/g






Applicant:	Intermec Technologies Corp.	FCC ID:	HN2CK31MIG2	IC:	1223A-CK31MIG2	
DUT Type:	802.11b/g WLAN Module installed in CK31 Rugged Hand-held PC		Class II Permissive Change			
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	<u>Test Report Issue Date</u> June 30, 2010	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

Z-Axis Scan



Applicant:	Intermec Technologies Corp.	FCC ID:	HN2CK31MIG2	IC:	1223A-CK31MIG2	
DUT Type:	802.11b/g WLAN Module installed in CK31 Rugged Hand-held PC			Class II Permissive Change		
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	<u>Test Report Issue Date</u> June 30, 2010	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

Date Tested: 06/28/2010

Body SAR - WLAN - 802.11b Mode - 1 Mbps - 2412 MHz - Ch. 1 - Back Side of DUT with Belt-Clip

DUT: Intermec Model: CK31; Type: Rugged Handheld PC with 802.11b/g WLAN & Bluetooth; Serial: 10321026135

Large Back Unit with EX25 Scan Engine; Body-worn Accessory: Swivel Belt-Clip Part No. 075447-001

Ambient Temp: 24.0°C; Fluid Temp: 23.5°C; Barometric Pressure: 101.0 kPa; Humidity: 35%

Communication System: DSSS WLAN

Frequency: 2412 MHz; Duty Cycle: 1:1

Medium: M2450 Medium parameters used: $f = 2412 \text{ MHz}$; $\sigma = 1.94 \text{ mho/m}$; $\epsilon_r = 50.8$; $\rho = 1000 \text{ kg/m}^3$

- Probe: EX3DV4 - SN3600; ConvF(6.24, 6.24, 6.24); Calibrated: 29/04/2010

- Sensor-Surface: 3mm (Mechanical Surface Detection)

- Electronics: DAE4 Sn353; Calibrated: 27/04/2010

- Phantom: SAM 4.0; Type: Fiberglas; Serial: 1033

- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body-worn SAR - 1.5 cm Belt-Clip accessory spacing from Back Side of DUT to planar phantom section

Area Scan (9x14x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 0.842 mW/g

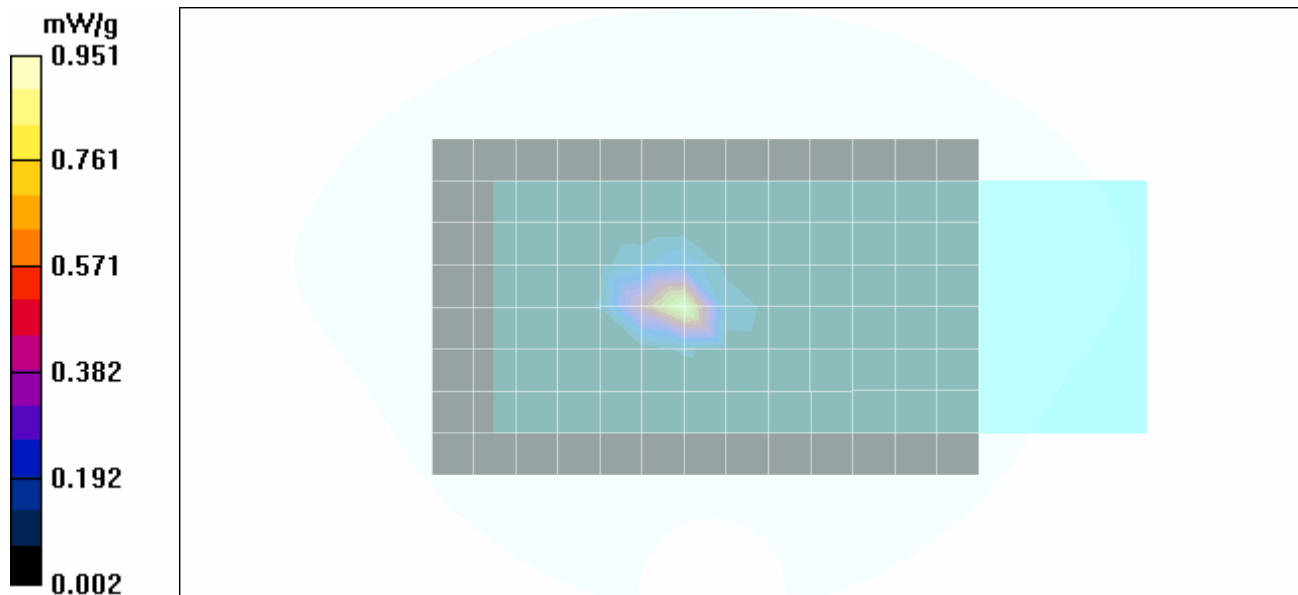
Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$


Reference Value = 21.0 V/m; Power Drift = -0.068 dB



Peak SAR (extrapolated) = 1.36 W/kg

SAR(1 g) = 0.707 mW/g; SAR(10 g) = 0.300 mW/g

Maximum value of SAR (measured) = 0.951 mW/g



Applicant:	Intermec Technologies Corp.	FCC ID:	HN2CK31MIG2	IC:	1223A-CK31MIG2	
DUT Type:	802.11b/g WLAN Module installed in CK31 Rugged Hand-held PC		Class II Permissive Change			
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	<u>Test Report Issue Date</u> June 30, 2010	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

Date Tested: 06/28/2010

Body SAR - WLAN - 802.11b Mode - 1 Mbps - 2437 MHz - Ch. 6 - Back Side of DUT with Belt-Clip

DUT: Intermec Model: CK31; Type: Rugged Handheld PC with 802.11b/g WLAN & Bluetooth; Serial: 10321026135

Large Back Unit with EX25 Scan Engine; Body-worn Accessory: Swivel Belt-Clip Part No. 075447-001

Ambient Temp: 24.0°C; Fluid Temp: 23.5°C; Barometric Pressure: 101.0 kPa; Humidity: 35%

Communication System: DSSS WLAN

Frequency: 2437 MHz; Duty Cycle: 1:1

Medium: M2450 Medium parameters used: $f = 2437 \text{ MHz}$; $\sigma = 2 \text{ mho/m}$; $\epsilon_r = 50.8$; $\rho = 1000 \text{ kg/m}^3$

- Probe: EX3DV4 - SN3600; ConvF(6.24, 6.24, 6.24); Calibrated: 29/04/2010

- Sensor-Surface: 3mm (Mechanical Surface Detection)

- Electronics: DAE4 Sn353; Calibrated: 27/04/2010

- Phantom: SAM 4.0; Type: Fiberglass; Serial: 1033

- Measurement SW: DASy4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body-worn SAR - 1.5 cm Belt-Clip accessory spacing from Back Side of DUT to planar phantom section

Area Scan (9x14x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 1.04 mW/g

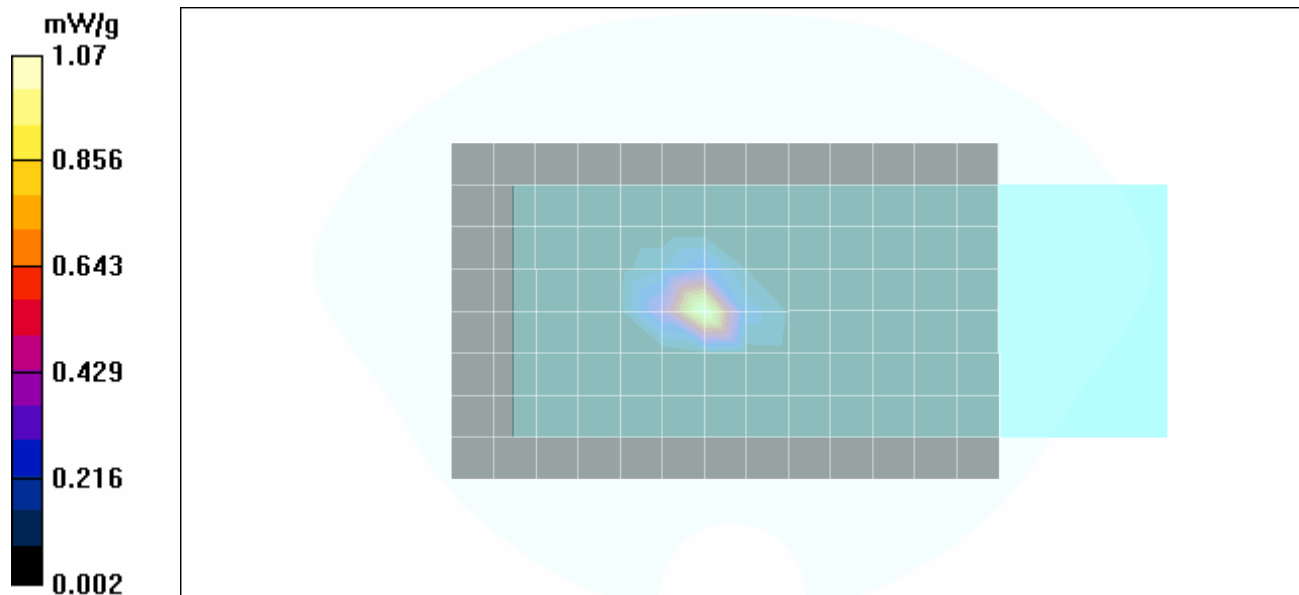
Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$


Reference Value = 22.5 V/m; Power Drift = 0.033 dB



Peak SAR (extrapolated) = 1.57 W/kg

SAR(1 g) = 0.803 mW/g; SAR(10 g) = 0.339 mW/g

Maximum value of SAR (measured) = 1.07 mW/g



Applicant:	Intermec Technologies Corp.	FCC ID:	HN2CK31MIG2	IC:	1223A-CK31MIG2	
DUT Type:	802.11b/g WLAN Module installed in CK31 Rugged Hand-held PC		Class II Permissive Change			
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	<u>Test Report Issue Date</u> June 30, 2010	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

Date Tested: 06/28/2010

Body SAR - WLAN - 802.11b Mode - 1 Mbps - 2462 MHz - Ch. 11 - Back Side of DUT with Belt-Clip

DUT: Intermec Model: CK31; Type: Rugged Handheld PC with 802.11b/g WLAN & Bluetooth; Serial: 10321026135

Large Back Unit with EX25 Scan Engine; Body-worn Accessory: Swivel Belt-Clip Part No. 075447-001

Ambient Temp: 24.0°C; Fluid Temp: 23.5°C; Barometric Pressure: 101.0 kPa; Humidity: 35%

Communication System: DSSS WLAN

Frequency: 2462 MHz; Duty Cycle: 1:1

Medium: M2450 Medium parameters used: $f = 2462 \text{ MHz}$; $\sigma = 2.02 \text{ mho/m}$; $\epsilon_r = 50.8$; $\rho = 1000 \text{ kg/m}^3$

- Probe: EX3DV4 - SN3600; ConvF(6.24, 6.24, 6.24); Calibrated: 29/04/2010

- Sensor-Surface: 3mm (Mechanical Surface Detection)

- Electronics: DAE4 Sn353; Calibrated: 27/04/2010

- Phantom: SAM 4.0; Type: Fiberglass; Serial: 1033

- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body-worn SAR - 1.5 cm Belt-Clip accessory spacing from Back Side of DUT to planar phantom section

Area Scan (9x14x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 0.969 mW/g

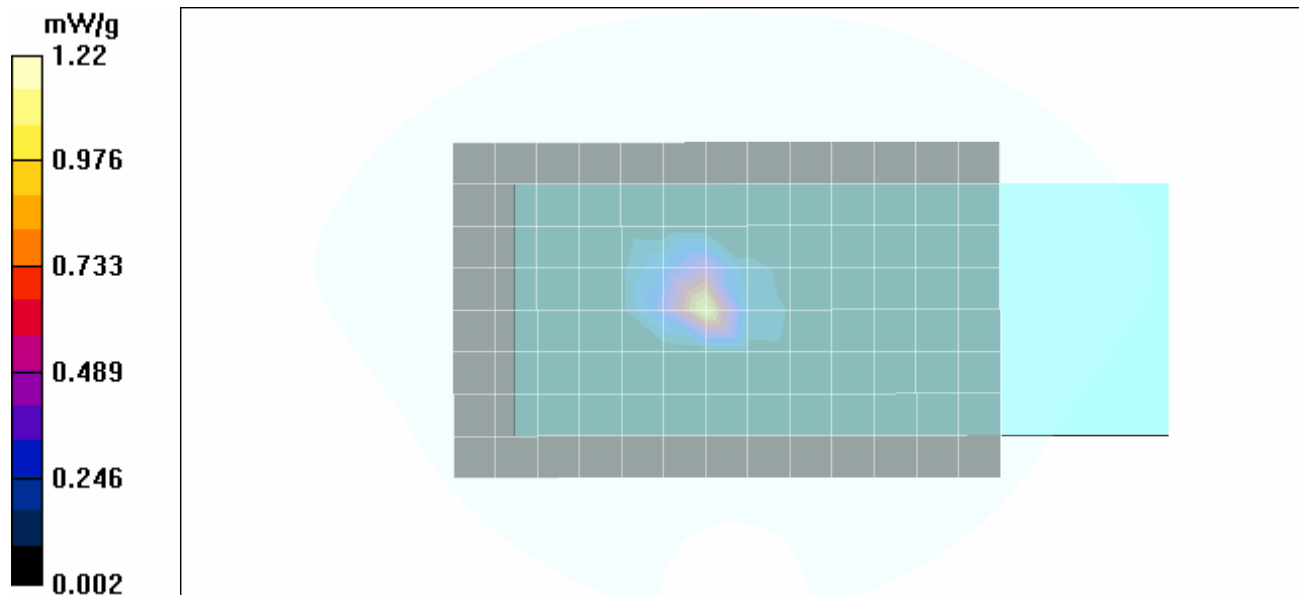
Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$


Reference Value = 21.7 V/m; Power Drift = -0.007 dB



Peak SAR (extrapolated) = 1.77 W/kg

SAR(1 g) = 0.906 mW/g; SAR(10 g) = 0.382 mW/g


Maximum value of SAR (measured) = 1.22 mW/g





Applicant:	Intermec Technologies Corp.	FCC ID:	HN2CK31MIG2	IC:	1223A-CK31MIG2	
DUT Type:	802.11b/g WLAN Module installed in CK31 Rugged Hand-held PC			Class II Permissive Change		
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	<u>Dates of Evaluation</u> May 26 & June 28, 2010	<u>Test Report Serial No.</u> 052110HN2-T1022-S15W	<u>Test Report Revision No.</u> Rev. 1.2 (3rd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> June 30, 2010	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

APPENDIX B - SYSTEM PERFORMANCE CHECK DATA

Applicant:	Intermec Technologies Corp.	FCC ID:	HN2CK31MIG2	IC:	1223A-CK31MIG2	
DUT Type:	802.11b/g WLAN Module installed in CK31 Rugged Hand-held PC	Class II Permissive Change				
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	<u>Dates of Evaluation</u> May 26 & June 28, 2010	<u>Test Report Serial No.</u> 052110HN2-T1022-S15W	<u>Test Report Revision No.</u> Rev. 1.2 (3rd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> June 30, 2010	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

Date Tested: 05/26/2010

System Performance Check - 2450 MHz Dipole - Body

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 825; Calibrated: 17/04/2009

Ambient Temp: 24.0°C; Fluid Temp: 22.5°C; Barometric Pressure: 110.0 kPa; Humidity: 31%

Communication System: CW

Forward Conducted Power: 250 mW

Frequency: 2450 MHz; Duty Cycle: 1:1

Medium: M2450 Medium parameters used: $f = 2450 \text{ MHz}$; $\sigma = 2 \text{ mho/m}$; $\epsilon_r = 51$; $\rho = 1000 \text{ kg/m}^3$

- Probe: EX3DV4 - SN3600; ConvF(6.24, 6.24, 6.24); Calibrated: 29/04/2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: SAM 4.0; Type: Fiberglas; Serial: 1033
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

2450 MHz System Performance Check

Area Scan (6x10x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

Maximum value of SAR (measured) = 15.3 mW/g

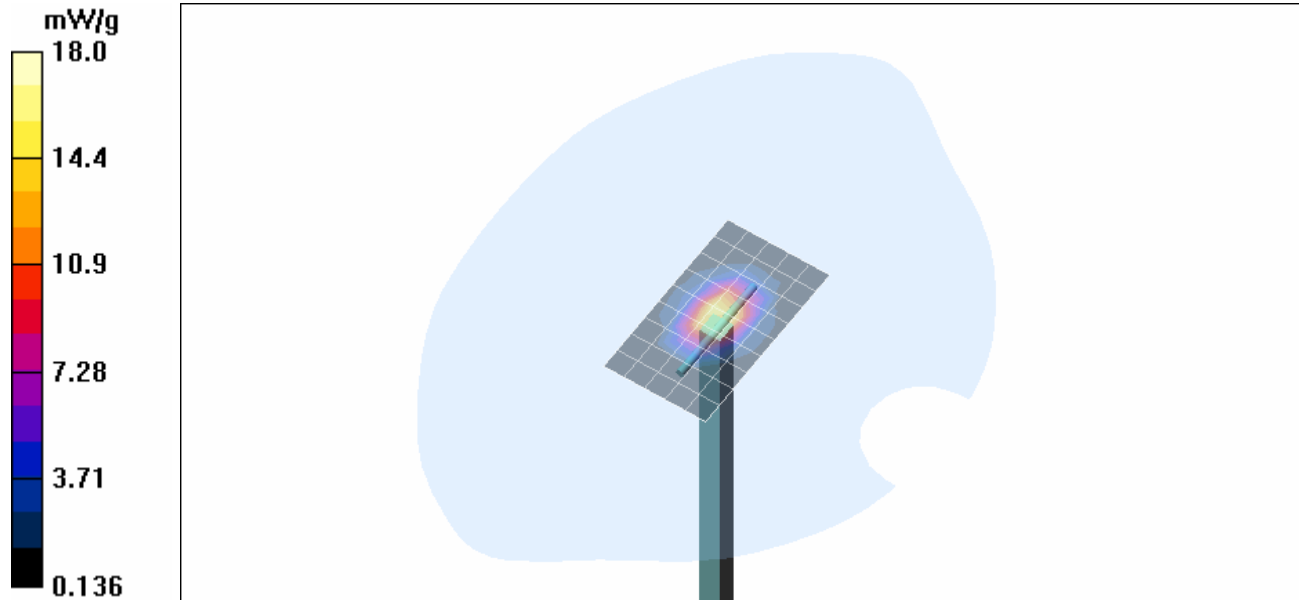
Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$


Reference Value = 95.1 V/m; Power Drift = -0.012 dB



Peak SAR (extrapolated) = 27.6 W/kg

SAR(1 g) = 13.7 mW/g; SAR(10 g) = 6.44 mW/g

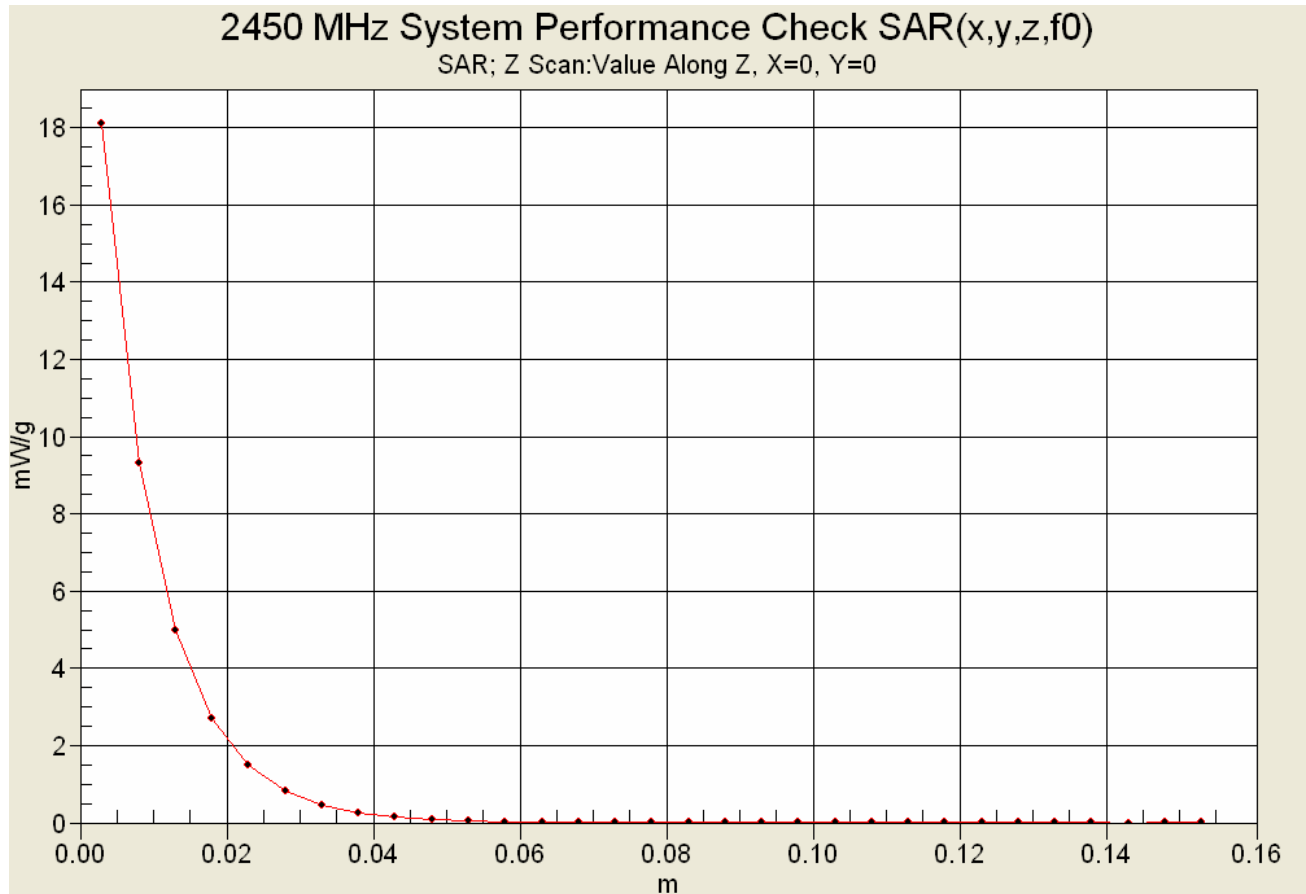
Maximum value of SAR (measured) = 18.0 mW/g






Applicant:	Intermec Technologies Corp.	FCC ID:	HN2CK31MIG2	IC:	1223A-CK31MIG2	
DUT Type:	802.11b/g WLAN Module installed in CK31 Rugged Hand-held PC			Class II Permissive Change		
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	<u>Dates of Evaluation</u> May 26 & June 28, 2010	<u>Test Report Serial No.</u> 052110HN2-T1022-S15W	<u>Test Report Revision No.</u> Rev. 1.2 (3rd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> June 30, 2010	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

Z-Axis Scan



Applicant:	Intermec Technologies Corp.	FCC ID:	HN2CK31MIG2	IC:	1223A-CK31MIG2	
DUT Type:	802.11b/g WLAN Module installed in CK31 Rugged Hand-held PC			Class II Permissive Change		
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	<u>Dates of Evaluation</u> May 26 & June 28, 2010	<u>Test Report Serial No.</u> 052110HN2-T1022-S15W	<u>Test Report Revision No.</u> Rev. 1.2 (3rd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> June 30, 2010	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

Date Tested: 06/28/2010

System Performance Check - 2450 MHz Dipole - Body

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 825; Calibrated: 17/04/2009

Ambient Temp: 24.0°C; Fluid Temp: 23.5°C; Barometric Pressure: 101.0 kPa; Humidity: 35%

Communication System: CW

Forward Conducted Power: 250 mW

Frequency: 2450 MHz; Duty Cycle: 1:1

Medium: M2450 Medium parameters used: $f = 2450 \text{ MHz}$; $\sigma = 1.99 \text{ mho/m}$; $\epsilon_r = 50.8$; $\rho = 1000 \text{ kg/m}^3$

- Probe: EX3DV4 - SN3600; ConvF(6.24, 6.24, 6.24); Calibrated: 29/04/2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: SAM 4.0; Type: Fiberglas; Serial: 1033
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

2450 MHz System Performance Check

Area Scan (6x10x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

Maximum value of SAR (measured) = 17.2 mW/g

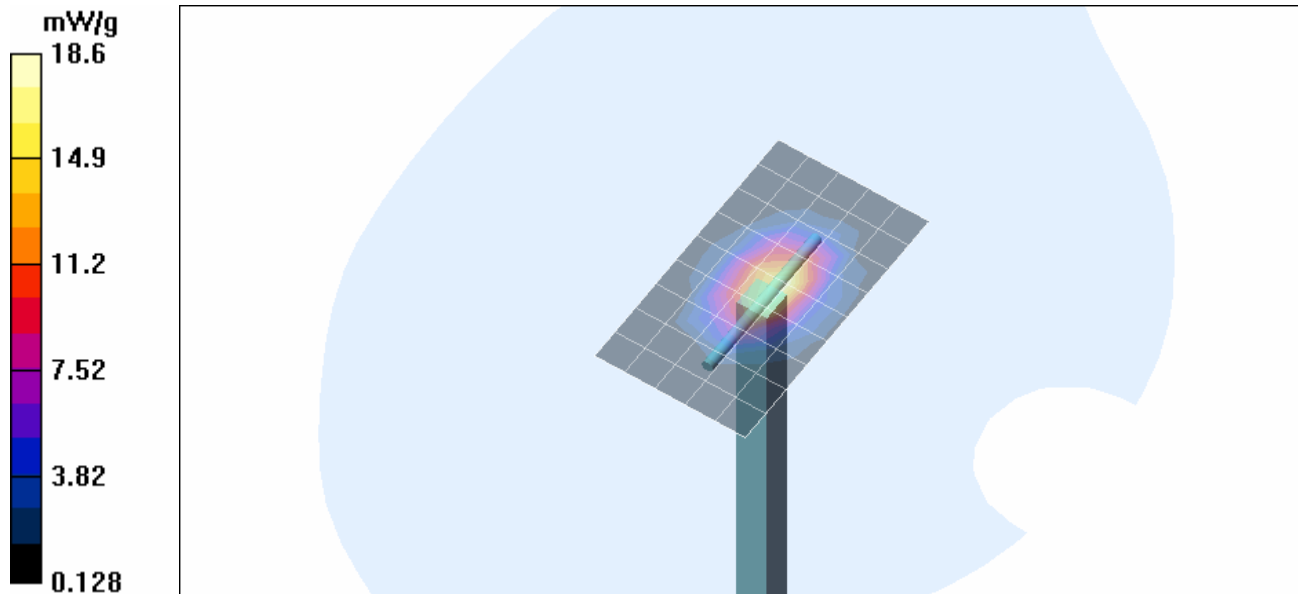
Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$


Reference Value = 93.8 V/m; Power Drift = 0.078 dB



Peak SAR (extrapolated) = 29.4 W/kg

SAR(1 g) = 14.1 mW/g; SAR(10 g) = 6.47 mW/g

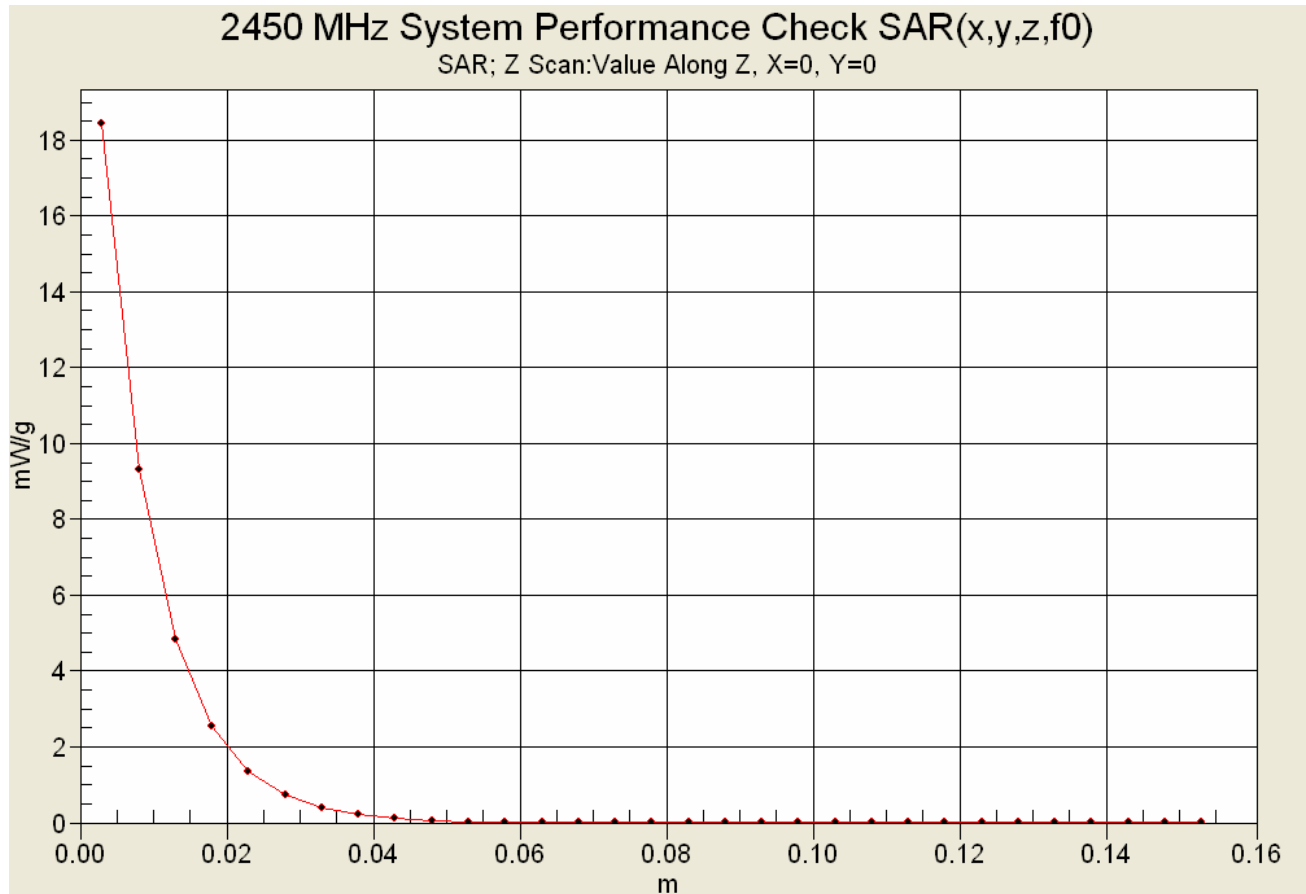
Maximum value of SAR (measured) = 18.6 mW/g






Applicant:	Intermec Technologies Corp.	FCC ID:	HN2CK31MIG2	IC:	1223A-CK31MIG2	
DUT Type:	802.11b/g WLAN Module installed in CK31 Rugged Hand-held PC			Class II Permissive Change		
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	<u>Dates of Evaluation</u> May 26 & June 28, 2010	<u>Test Report Serial No.</u> 052110HN2-T1022-S15W	<u>Test Report Revision No.</u> Rev. 1.2 (3rd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> June 30, 2010	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	


Z-Axis Scan





Applicant:	Intermec Technologies Corp.	FCC ID:	HN2CK31MIG2	IC:	1223A-CK31MIG2	
DUT Type:	802.11b/g WLAN Module installed in CK31 Rugged Hand-held PC			Class II Permissive Change		
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	<u>Dates of Evaluation</u> May 26 & June 28, 2010	<u>Test Report Serial No.</u> 052110HN2-T1022-S15W	<u>Test Report Revision No.</u> Rev. 1.2 (3rd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> June 30, 2010	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

APPENDIX C - MEASURED FLUID DIELECTRIC PARAMETERS


Applicant:	Intermec Technologies Corp.	FCC ID:	HN2CK31MIG2	IC:	1223A-CK31MIG2	
DUT Type:	802.11b/g WLAN Module installed in CK31 Rugged Hand-held PC	Class II Permissive Change				
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	<u>Dates of Evaluation</u> May 26 & June 28, 2010	<u>Test Report Serial No.</u> 052110HN2-T1022-S15W	<u>Test Report Revision No.</u> Rev. 1.2 (3rd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> June 30, 2010	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

2450 MHz System Performance Check & DUT Evaluation (Body)

Celltech Labs Inc.
Test Result for UIM Dielectric Parameter
26/May/2010
Frequency (GHz)
FCC_eB FCC Limits for Body Epsilon
FCC_sB FCC Limits for Body Sigma
Test_e Epsilon of UIM
Test_s Sigma of UIM

Freq	FCC_eB	FCC_sB	Test_e	Test_s
2.3500	52.83	1.85	51.58	1.85
2.3600	52.82	1.86	51.39	1.86
2.3700	52.81	1.87	51.49	1.89
2.3800	52.79	1.88	51.21	1.88
2.3900	52.78	1.89	51.47	1.91
2.4000	52.77	1.90	51.32	1.93
2.4100	52.75	1.91	51.20	1.94
2.4200	52.74	1.92	51.21	1.94
2.4300	52.73	1.93	51.22	1.93
2.4400	52.71	1.94	50.99	1.98
2.4500	52.70	1.95	51.01	2.00
2.4600	52.69	1.96	50.86	2.03
2.4700	52.67	1.98	51.03	1.99
2.4800	52.66	1.99	50.92	2.02
2.4900	52.65	2.01	50.93	2.03
2.5000	52.64	2.02	50.78	2.05
2.5100	52.62	2.04	50.99	2.07
2.5200	52.61	2.05	50.83	2.08
2.5300	52.60	2.06	50.81	2.10
2.5400	52.59	2.08	50.72	2.10
2.5500	52.57	2.09	50.83	2.13


Applicant:	Intermec Technologies Corp.	FCC ID:	HN2CK31MIG2	IC:	1223A-CK31MIG2	
DUT Type:	802.11b/g WLAN Module installed in CK31 Rugged Hand-held PC			Class II Permissive Change		
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	<u>Dates of Evaluation</u> May 26 & June 28, 2010	<u>Test Report Serial No.</u> 052110HN2-T1022-S15W	<u>Test Report Revision No.</u> Rev. 1.2 (3rd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> June 30, 2010	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

2450 MHz System Performance Check & DUT Evaluation (Body)


Celltech Labs Inc.
Test Result for UIM Dielectric Parameter
28/Jun/2010
Frequency (GHz)
FCC_eB FCC Limits for Body Epsilon
FCC_sB FCC Limits for Body Sigma
Test_e Epsilon of UIM
Test_s Sigma of UIM



Freq	FCC_eB	FCC_sB	Test_e	Test_s
2.3500	52.83	1.85	50.91	1.89
2.3600	52.82	1.86	51.05	1.89
2.3700	52.81	1.87	50.86	1.93
2.3800	52.79	1.88	50.79	1.92
2.3900	52.78	1.89	50.52	1.93
2.4000	52.77	1.90	50.78	1.95
2.4100	52.75	1.91	50.75	1.94
2.4200	52.74	1.92	50.80	1.98
2.4300	52.73	1.93	50.74	2.01
2.4400	52.71	1.94	50.78	2.00
2.4500	52.70	1.95	50.79	1.99
2.4600	52.69	1.96	50.75	2.02
2.4700	52.67	1.98	50.76	2.03
2.4800	52.66	1.99	50.64	2.05
2.4900	52.65	2.01	50.47	2.06
2.5000	52.64	2.02	50.57	2.10
2.5100	52.62	2.04	50.41	2.10
2.5200	52.61	2.05	50.31	2.12
2.5300	52.60	2.06	50.38	2.13
2.5400	52.59	2.08	50.51	2.16
2.5500	52.57	2.09	50.77	2.17

Applicant:	Intermec Technologies Corp.	FCC ID:	HN2CK31MIG2	IC:	1223A-CK31MIG2	
DUT Type:	802.11b/g WLAN Module installed in CK31 Rugged Hand-held PC			Class II Permissive Change		
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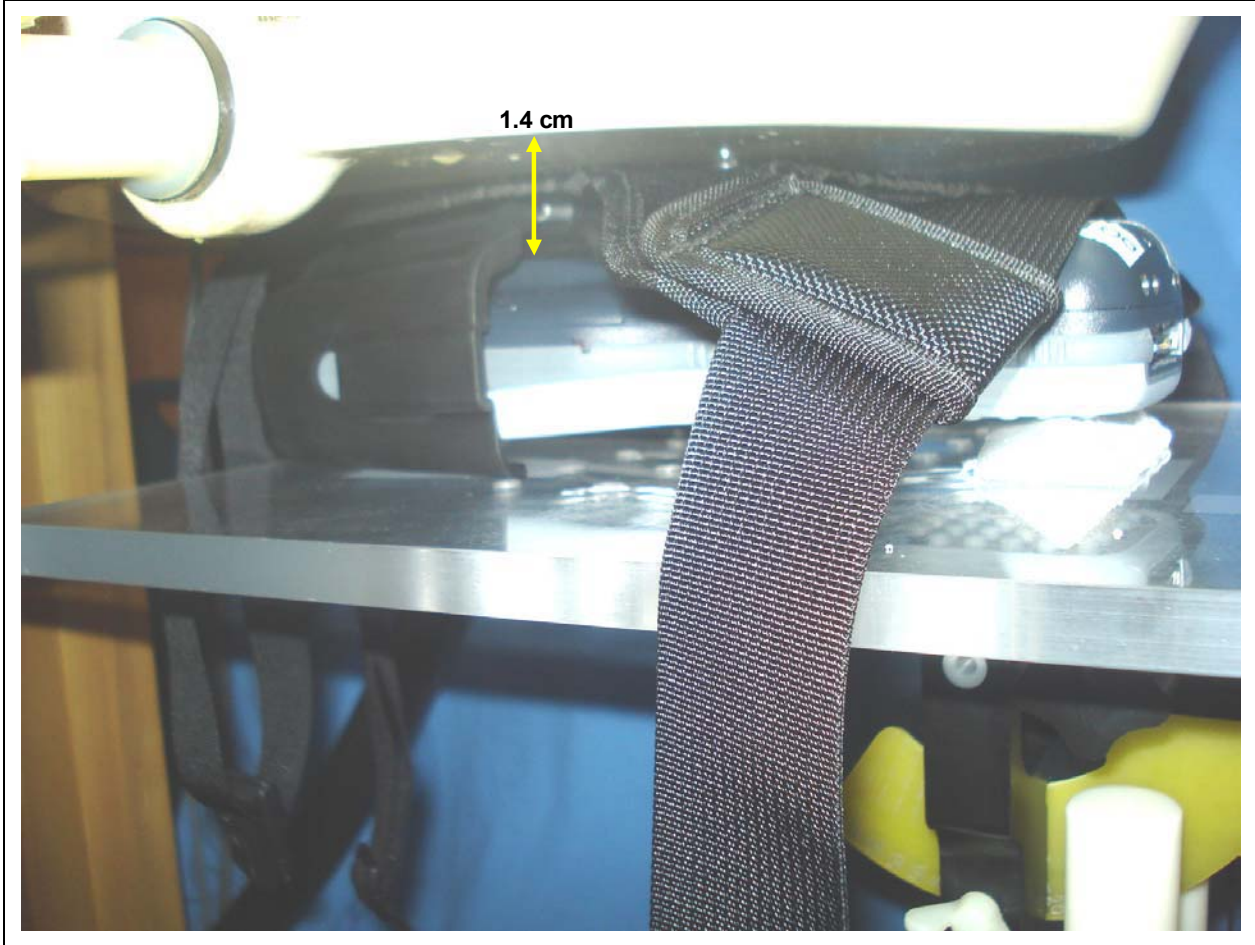
	<u>Dates of Evaluation</u> May 26 & June 28, 2010	<u>Test Report Serial No.</u> 052110HN2-T1022-S15W	<u>Test Report Revision No.</u> Rev. 1.2 (3rd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> June 30, 2010	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	


APPENDIX D - SAR TEST SETUP & DUT PHOTOGRAPHS



Applicant:	Intermec Technologies Corp.	FCC ID:	HN2CK31MIG2	IC:	1223A-CK31MIG2	
DUT Type:	802.11b/g WLAN Module installed in CK31 Rugged Hand-held PC	Class II Permissive Change				
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	<u>Test Report Issue Date</u> June 30, 2010	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

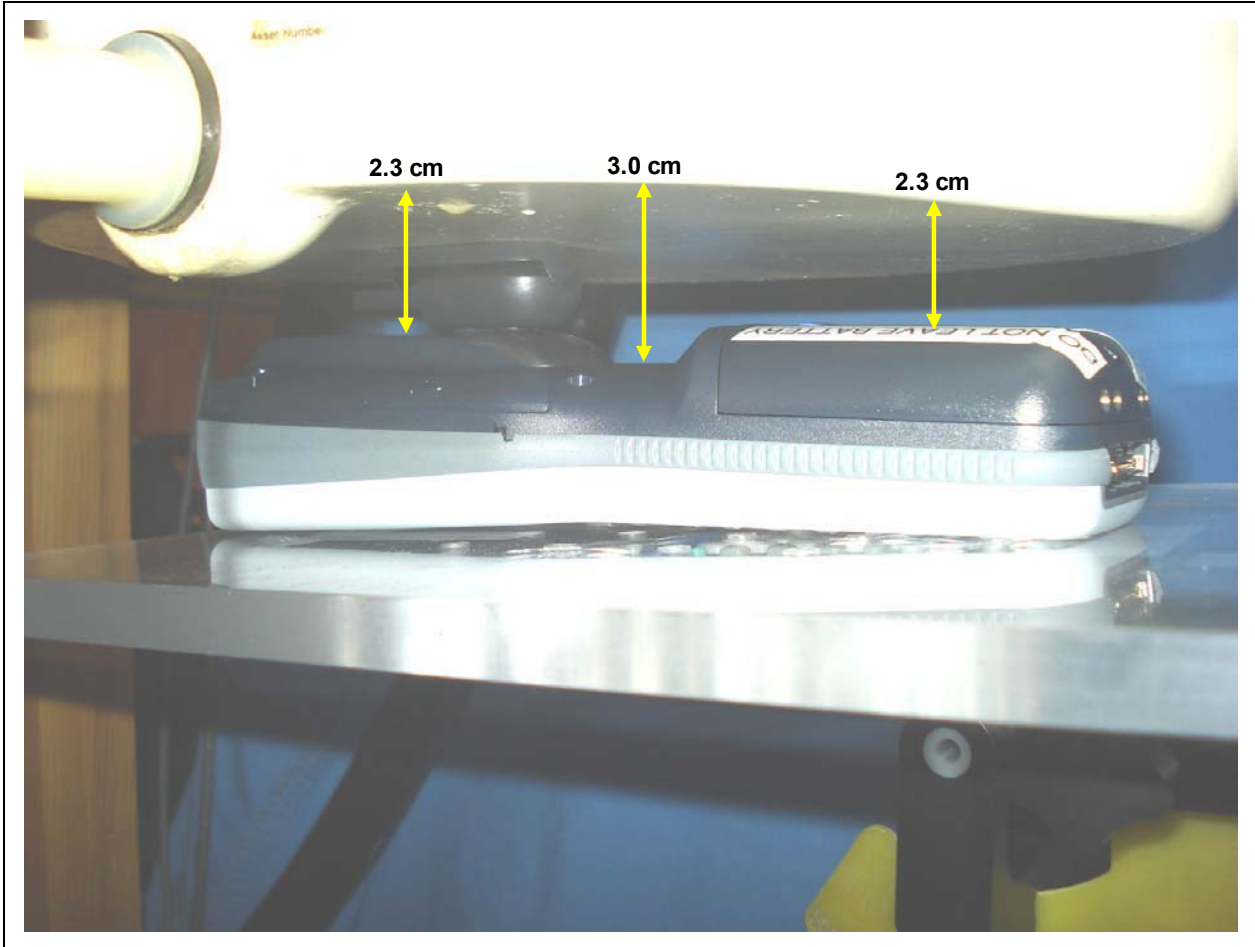
BODY-WORN SAR TEST SETUP PHOTOGRAPHS
CK31 PC (Small Back) with Holster Body-worn Accessory P/N: 825-169-001
Back Side of CK31 PC (Small Back) Facing Planar Section of SAM Phantom
1.4 cm Holster accessory spacing from Back Side of DUT to SAM Phantom






Applicant:	Intermec Technologies Corp.	FCC ID:	HN2CK31MIG2	IC:	1223A-CK31MIG2	
DUT Type:	802.11b/g WLAN Module installed in CK31 Rugged Hand-held PC			Class II Permissive Change		
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	<u>Dates of Evaluation</u> May 26 & June 28, 2010	<u>Test Report Serial No.</u> 052110HN2-T1022-S15W	<u>Test Report Revision No.</u> Rev. 1.2 (3rd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> June 30, 2010	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

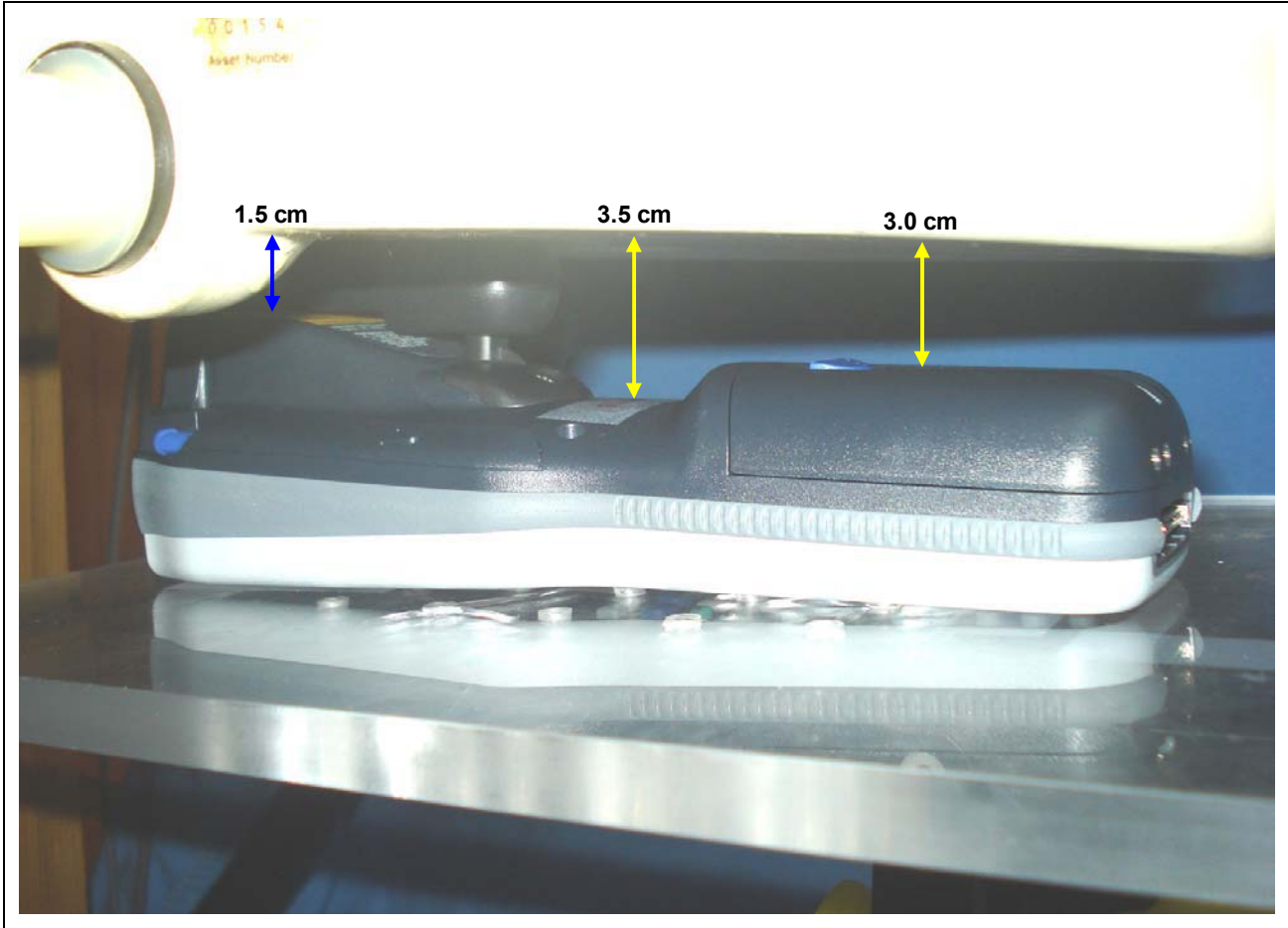
BODY-WORN SAR TEST SETUP PHOTOGRAPHS
CK31 PC (Small Back) with Swivel Belt-Clip Body-worn Accessory P/N: 075447-001
Back Side of CK31 PC (Small Back) Facing Planar Section of SAM Phantom
2.3 cm Belt-Clip accessory spacing from Back Side of DUT to SAM Phantom






Applicant:	Intermec Technologies Corp.	FCC ID:	HN2CK31MIG2	IC:	1223A-CK31MIG2	
DUT Type:	802.11b/g WLAN Module installed in CK31 Rugged Hand-held PC		Class II Permissive Change			
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	<u>Dates of Evaluation</u> May 26 & June 28, 2010	<u>Test Report Serial No.</u> 052110HN2-T1022-S15W	<u>Test Report Revision No.</u> Rev. 1.2 (3rd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> June 30, 2010	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

BODY-WORN SAR TEST SETUP PHOTOGRAPHS
CK31 PC (Large Back) with Swivel Belt-Clip Body-worn Accessory P/N: 075447-001
Back Side of CK31 PC (Large Back) Facing Planar Section of SAM Phantom
1.5 cm Belt-Clip accessory spacing from Back Side of DUT to SAM Phantom



Applicant:	Intermec Technologies Corp.	FCC ID:	HN2CK31MIG2	IC:	1223A-CK31MIG2	
DUT Type:	802.11b/g WLAN Module installed in CK31 Rugged Hand-held PC		Class II Permissive Change			
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	<u>Test Report Issue Date</u> June 30, 2010	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	


DUT PHOTOGRAPHS





Front Side of CK31 Hand-held PC (Small Back)

Back Side of CK31 Hand-held PC (Small Back)

Back Side of CK31 PC (Small Back) w/ Belt-Clip

Applicant:	Intermec Technologies Corp.	FCC ID:	HN2CK31MIG2	IC:	1223A-CK31MIG2	
DUT Type:	802.11b/g WLAN Module installed in CK31 Rugged Hand-held PC			Class II Permissive Change		
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	<u>Dates of Evaluation</u> May 26 & June 28, 2010	<u>Test Report Serial No.</u> 052110HN2-T1022-S15W	<u>Test Report Revision No.</u> Rev. 1.2 (3rd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> June 30, 2010	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

DUT PHOTOGRAPHS



Left Side of CK31 Hand-held PC (Small Back) with Swivel Belt-Clip accessory




Right Side of CK31 Hand-held PC (Small Back) with Swivel Belt-Clip accessory





Top end of CK31 PC (Small Back) with Swivel Belt-Clip




Bottom end of CK31 PC (Small Back) with Swivel Belt-Clip



Applicant:	Intermec Technologies Corp.	FCC ID:	HN2CK31MIG2	IC:	1223A-CK31MIG2	
DUT Type:	802.11b/g WLAN Module installed in CK31 Rugged Hand-held PC			Class II Permissive Change		
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	<u>Dates of Evaluation</u> May 26 & June 28, 2010	<u>Test Report Serial No.</u> 052110HN2-T1022-S15W	<u>Test Report Revision No.</u> Rev. 1.2 (3rd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> June 30, 2010	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

DUT PHOTOGRAPHS

		
Front Side of CK31 Hand-held PC (Large Back)	Back Side of CK31 Hand-held PC (Large Back)	Back Side of CK31 PC (Large Back) with Belt-Clip assembly installed

Applicant: Intermec Technologies Corp.	FCC ID: HN2CK31MIG2	IC: 1223A-CK31MIG2	
DUT Type: 802.11b/g WLAN Module installed in CK31 Rugged Hand-held PC	Class II Permissive Change		
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	<u>Dates of Evaluation</u> May 26 & June 28, 2010	<u>Test Report Serial No.</u> 052110HN2-T1022-S15W	<u>Test Report Revision No.</u> Rev. 1.2 (3rd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> June 30, 2010	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

DUT PHOTOGRAPHS



Left Side of CK31 Hand-held PC (Large Back) with Swivel Belt-Clip accessory




Right Side of CK31 Hand-held PC (Large Back) with Swivel Belt-Clip accessory





Top end of CK31 PC (Large Back) with Swivel Belt-Clip




Bottom end of CK31 PC (Large Back) with Swivel Belt-Clip



Applicant:	Intermec Technologies Corp.	FCC ID:	HN2CK31MIG2	IC:	1223A-CK31MIG2	
DUT Type:	802.11b/g WLAN Module installed in CK31 Rugged Hand-held PC		Class II Permissive Change			
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	<u>Dates of Evaluation</u> May 26 & June 28, 2010	<u>Test Report Serial No.</u> 052110HN2-T1022-S15W	<u>Test Report Revision No.</u> Rev. 1.2 (3rd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> June 30, 2010	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

DUT PHOTOGRAPHS



Applicant:	Intermec Technologies Corp.	FCC ID:	HN2CK31MIG2	IC:	1223A-CK31MIG2	
DUT Type:	802.11b/g WLAN Module installed in CK31 Rugged Hand-held PC			Class II Permissive Change		
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	<u>Dates of Evaluation</u> May 26 & June 28, 2010	<u>Test Report Serial No.</u> 052110HN2-T1022-S15W	<u>Test Report Revision No.</u> Rev. 1.2 (3rd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> June 30, 2010	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

DUT PHOTOGRAPHS



CK31 Hand-held PC (Small Back) Battery Compartment



CK31 Hand-held PC (Large Back) Battery Compartment (EL20)




CK31 Lithium-ion Battery Pack (P/N: 218-020-001)





CK31 Hand-held PC (Large Back) Battery Compartment (EX25)

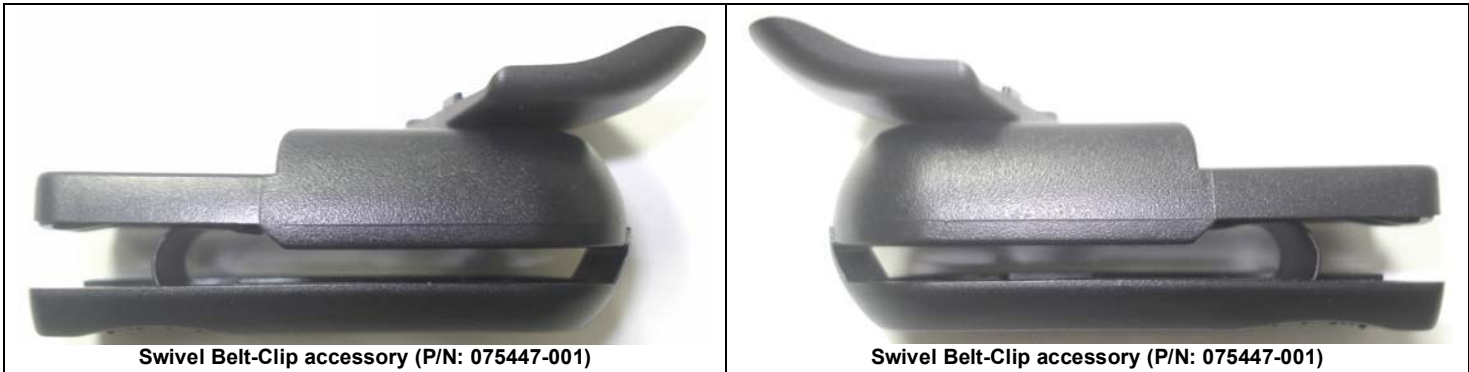


CK31 Lithium-ion Battery Pack (P/N: 218-020-001)

Applicant:	Intermec Technologies Corp.	FCC ID:	HN2CK31MIG2	IC:	1223A-CK31MIG2	
DUT Type:	802.11b/g WLAN Module installed in CK31 Rugged Hand-held PC			Class II Permissive Change		
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	<u>Dates of Evaluation</u> May 26 & June 28, 2010	<u>Test Report Serial No.</u> 052110HN2-T1022-S15W	<u>Test Report Revision No.</u> Rev. 1.2 (3rd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> June 30, 2010	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

DUT PHOTOGRAPHS



Swivel Belt-Clip accessory (P/N: 075447-001)


Swivel Belt-Clip accessory (P/N: 075447-001)





Swivel Belt-Clip accessory (P/N: 075447-001)




Swivel Belt-Clip accessory (P/N: 075447-001)



Applicant:	Intermec Technologies Corp.	FCC ID:	HN2CK31MIG2	IC:	1223A-CK31MIG2	
DUT Type:	802.11b/g WLAN Module installed in CK31 Rugged Hand-held PC		Class II Permissive Change			
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	<u>Dates of Evaluation</u> May 26 & June 28, 2010	<u>Test Report Serial No.</u> 052110HN2-T1022-S15W	<u>Test Report Revision No.</u> Rev. 1.2 (3rd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> June 30, 2010	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

DUT PHOTOGRAPHS






Applicant:	Intermec Technologies Corp.	FCC ID:	HN2CK31MIG2	IC:	1223A-CK31MIG2	
DUT Type:	802.11b/g WLAN Module installed in CK31 Rugged Hand-held PC		Class II Permissive Change			
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	<u>Dates of Evaluation</u> May 26 & June 28, 2010	<u>Test Report Serial No.</u> 052110HN2-T1022-S15W	<u>Test Report Revision No.</u> Rev. 1.2 (3rd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> June 30, 2010	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

DUT PHOTOGRAPHS



Applicant:	Intermec Technologies Corp.	FCC ID:	HN2CK31MIG2	IC:	1223A-CK31MIG2	
DUT Type:	802.11b/g WLAN Module installed in CK31 Rugged Hand-held PC			Class II Permissive Change		
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	<u>Dates of Evaluation</u> May 26 & June 28, 2010	<u>Test Report Serial No.</u> 052110HN2-T1022-S15W	<u>Test Report Revision No.</u> Rev. 1.2 (3rd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> June 30, 2010	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	



DUT PHOTOGRAPHS



Close-up of Holster Accessory (P/N: 825-169-001) w/out DUT

Close-up of Holster Accessory (P/N: 825-169-001) w/ DUT

Applicant:	Intermec Technologies Corp.	FCC ID:	HN2CK31MIG2	IC:	1223A-CK31MIG2	
DUT Type:	802.11b/g WLAN Module installed in CK31 Rugged Hand-held PC		Class II Permissive Change			
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	<u>Dates of Evaluation</u> May 26 & June 28, 2010	<u>Test Report Serial No.</u> 052110HN2-T1022-S15W	<u>Test Report Revision No.</u> Rev. 1.2 (3rd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> June 30, 2010	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	


DUT PHOTOGRAPHS





Left Side of CK31 Hand-held PC (Small Back) with Holster accessory (P/N: 825-169-001)




Right Side of CK31 Hand-held PC (Small Back) with Holster accessory (P/N: 825-169-001)

Applicant:	Intermec Technologies Corp.	FCC ID:	HN2CK31MIG2	IC:	1223A-CK31MIG2	
DUT Type:	802.11b/g WLAN Module installed in CK31 Rugged Hand-held PC			Class II Permissive Change		
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	<u>Dates of Evaluation</u> May 26 & June 28, 2010	<u>Test Report Serial No.</u> 052110HN2-T1022-S15W	<u>Test Report Revision No.</u> Rev. 1.2 (3rd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> June 30, 2010	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

APPENDIX E - DIPOLE CALIBRATION

Applicant:	Intermec Technologies Corp.	FCC ID:	HN2CK31MIG2	IC:	1223A-CK31MIG2	
DUT Type:	802.11b/g WLAN Module installed in CK31 Rugged Hand-held PC	Class II Permissive Change				
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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **Celltech**

Certificate No: **D2450V2-825_Apr09**

CALIBRATION CERTIFICATE

Object **D2450V2 - SN: 825**

Calibration procedure(s) **QA CAL-05.v7
Calibration procedure for dipole validation kits**

Calibration date: **April 17, 2009**

Condition of the calibrated item **In Tolerance**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	08-Oct-08 (No. 217-00898)	Oct-09
Power sensor HP 8481A	US37292783	08-Oct-08 (No. 217-00898)	Oct-09
Reference 20 dB Attenuator	SN: 5086 (20g)	31-Mar-09 (No. 217-01025)	Mar-10
Type-N mismatch combination	SN: 5047.2 / 06327	31-Mar-09 (No. 217-01029)	Mar-10
Reference Probe ES3DV2	SN: 3025	28-Apr-08 (No. ES3-3025_Apr08)	Apr-09
DAE4	SN: 601	07-Mar-09 (No. DAE4-601_Mar09)	Mar-10

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-07)	In house check: Oct-09
RF generator R&S SMT-06	100005	4-Aug-99 (in house check Oct-07)	In house check: Oct-09
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-08)	In house check: Oct-09

Calibrated by:	Name Claudio Leubler	Function Laboratory Technician	Signature
Approved by:	Name Katja Pokovic	Function Technical Manager	Signature

Issued: April 22, 2009

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.



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Accreditation No.: **SCS 108**

Glossary:

TSL tissue simulating liquid
ConvF sensitivity in TSL / NORM x,y,z
N/A not applicable or not measured

Calibration is Performed According to the Following Standards:

- a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

- d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V5.0
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2450 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	38.0 ± 6 %	1.82 mho/m ± 6 %
Head TSL temperature during test	(22.0 ± 0.2) °C	---	---

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.6 mW / g
SAR normalized	normalized to 1W	54.4 mW / g
SAR for nominal Head TSL parameters ¹	normalized to 1W	53.7 mW / g ± 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.29 mW / g
SAR normalized	normalized to 1W	25.2 mW / g
SAR for nominal Head TSL parameters ¹	normalized to 1W	25.0 mW / g ± 16.5 % (k=2)

¹ Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	52.7	1.95 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	54.4 ± 6 %	1.98 mho/m ± 6 %
Body TSL temperature during test	(22.0 ± 0.2) °C	—	—

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	12.9 mW / g
SAR normalized	normalized to 1W	51.6 mW / g
SAR for nominal Body TSL parameters ²	normalized to 1W	51.6 mW / g ± 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	6.05 mW / g
SAR normalized	normalized to 1W	24.2 mW / g
SAR for nominal Body TSL parameters ²	normalized to 1W	24.2 mW / g ± 16.5 % (k=2)

² Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	54.5 Ω + 4.7 j Ω
Return Loss	- 24.1 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	49.2 Ω + 5.6 j Ω
Return Loss	- 24.8 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.160 ns
----------------------------------	----------

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	December 11, 2008

DASY5 Validation Report for Head TSL

Date/Time: 17.04.2009 12:17:23

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN825

Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1

Medium: HSL U10 BB

Medium parameters used: $f = 2450$ MHz; $\sigma = 1.82$ mho/m; $\epsilon_r = 38$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

- Probe: ES3DV2 - SN3025; ConvF(4.4, 4.4, 4.4); Calibrated: 28.04.2008
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 07.03.2009
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0:

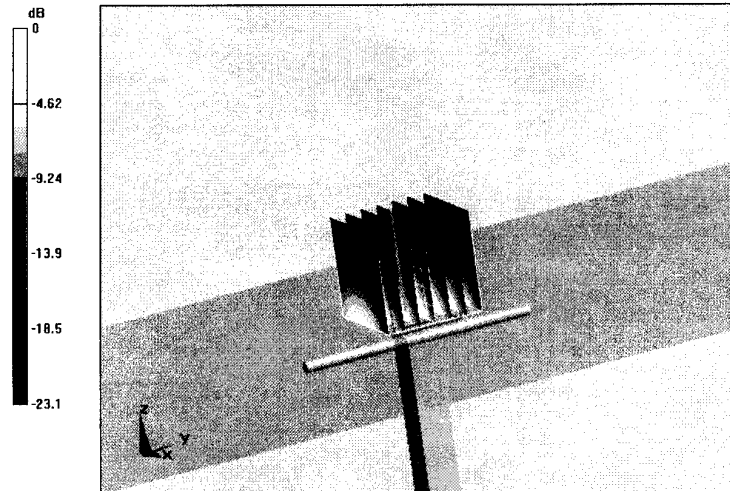
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 97.1 V/m; Power Drift = 0.026 dB

Peak SAR (extrapolated) = 28.4 W/kg

SAR(1 g) = 13.6 mW/g; SAR(10 g) = 6.29 mW/g

Maximum value of SAR (measured) = 17.7 mW/g



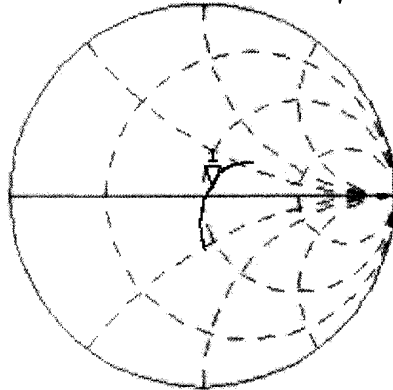
0 dB = 17.7mW/g

Impedance Measurement Plot for Head TSL

17 Apr 2009 09:36:50

CH1 S11 1 U FS 1: 54.469 Ω 4.7090 Ω 305.90 pF 2 450.000 000 MHz

*
De1
Cor



Avg
16

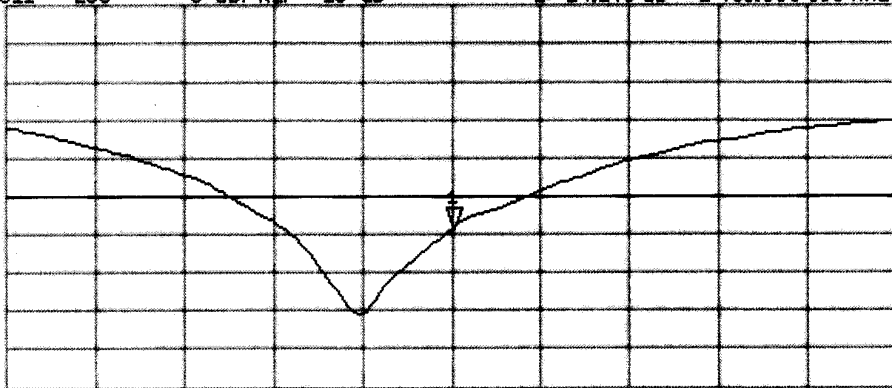
↑

CH2 S11 L06 5 dB/REF -20 dB 1: -24.145 dB 2 450.000 000 MHz

Cor

Avg
16

↑



START 2 250.000 000 MHz

STOP 2 650.000 000 MHz

DASY5 Validation Report for Body TSL

Date/Time: 17.04.2009 14:54:34

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:825

Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1

Medium: MSL U10 BB

Medium parameters used: $f = 2450$ MHz; $\sigma = 1.98$ mho/m; $\epsilon_r = 54.4$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

- Probe: ES3DV2 - SN3025; ConvF(4.07, 4.07, 4.07); Calibrated: 28.04.2008
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 07.03.2009
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0:

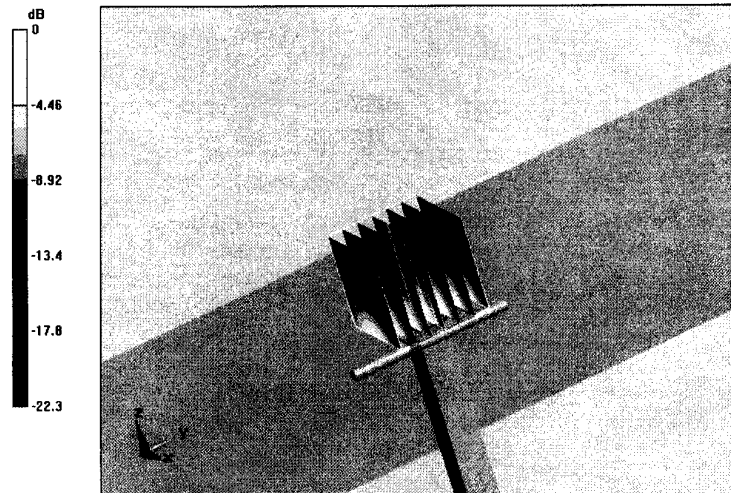
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 91.6 V/m; Power Drift = 0.046 dB

Peak SAR (extrapolated) = 26.1 W/kg

SAR(1 g) = 12.9 mW/g; SAR(10 g) = 6.05 mW/g

Maximum value of SAR (measured) = 16.6 mW/g



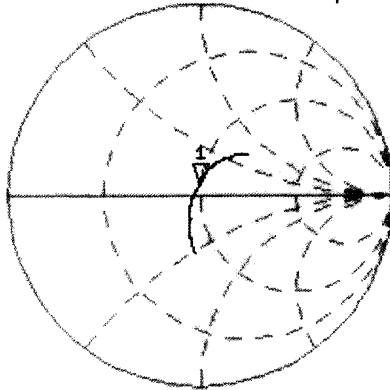
0 dB = 16.6mW/g

Impedance Measurement Plot for Body TSL

17 Apr 2009 09:37:35

CH1 S11 1 U FS 1: 49.158 Ω 5.6484 Ω 365.93 pF 2 450.000 000 MHz

*
De1
Cor



Avg
16

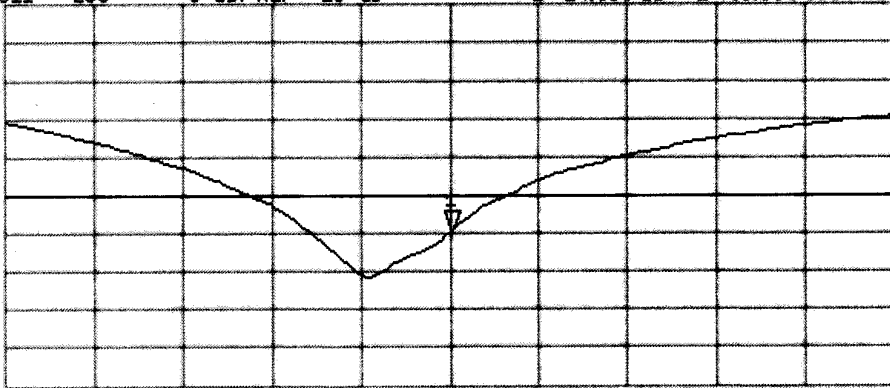
↑

CH2 S11 L06 5 dB/REF -20 dB 1: -24.800 dB 2 450.000 000 MHz

Cor



Avg
16

↑




START 2 250.000 000 MHz

STOP 2 650.000 000 MHz

	<u>Dates of Evaluation</u> May 26 & June 28, 2010	<u>Test Report Serial No.</u> 052110HN2-T1022-S15W	<u>Test Report Revision No.</u> Rev. 1.2 (3rd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> June 30, 2010	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

APPENDIX F - PROBE CALIBRATION

Applicant:	Intermec Technologies Corp.	FCC ID:	HN2CK31MIG2	IC:	1223A-CK31MIG2	
DUT Type:	802.11b/g WLAN Module installed in CK31 Rugged Hand-held PC	Class II Permissive Change				
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Accreditation No.: **SCS 108**

Client **Celltech**

Certificate No: **EX3-3600_Apr10**

CALIBRATION CERTIFICATE

Object	EX3DV4 - SN:3600		
Calibration procedure(s)	QA CAL-01.v6, QA CAL-14.v3, QA CAL-23.v3 and QA CAL-25.v2 Calibration procedure for dosimetric E-field probes		
Calibration date:	April 29, 2010		
<p>This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.</p> <p>All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.</p> <p>Calibration Equipment used (M&TE critical for calibration)</p>			
Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	1-Apr-10 (No. 217-01136)	Apr-11
Power sensor E4412A	MY41495277	1-Apr-10 (No. 217-01136)	Apr-11
Power sensor E4412A	MY41498087	1-Apr-10 (No. 217-01136)	Apr-11
Reference 3 dB Attenuator	SN: S5054 (3c)	30-Mar-10 (No. 217-01159)	Mar-11
Reference 20 dB Attenuator	SN: S5086 (20b)	30-Mar-10 (No. 217-01161)	Mar-11
Reference 30 dB Attenuator	SN: S5129 (30b)	30-Mar-10 (No. 217-01160)	Mar-11
Reference Probe ES3DV2	SN: 3013	30-Dec-09 (No. ES3-3013_Dec09)	Dec-10
DAE4	SN. 660	29-Sep-09 (No. DAE4-660_Sep09)	Sep-10
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-09)	In house check: Oct10
Calibrated by:	Name Katja Pokovic	Function Technical Manager	Signature
Approved by:	Name Niels Kuster	Function Quality Manager	
			Issued: April 29, 2010
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Accreditation No.: **SCS 108**

Glossary:

TSL	tissue simulating liquid
NORM _{x,y,z}	sensitivity in free space
ConvF	sensitivity in TSL / NORM _{x,y,z}
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C	modulation dependent linearization parameters
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ is normal to probe axis

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

Methods Applied and Interpretation of Parameters:

- NORM_{x,y,z}**: Assessed for E-field polarization $\vartheta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORM_{x,y,z} are only intermediate values, i.e., the uncertainties of NORM_{x,y,z} does not effect the E²-field uncertainty inside TSL (see below *ConvF*).
- NORM(f)_{x,y,z}** = NORM_{x,y,z} * *frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- DCP_{x,y,z}**: DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- A_{x,y,z}; B_{x,y,z}; C_{x,y,z}; VR_{x,y,z}**: A, B, C are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- ConvF and Boundary Effect Parameters**: Assessed in flat phantom using E-field (or Temperature Transfer Standard for $f \leq 800$ MHz) and inside waveguide using analytical field distributions based on power measurements for $f > 800$ MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORM_{x,y,z} * *ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- Spherical isotropy (3D deviation from isotropy)**: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset**: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

Probe EX3DV4

SN:3600

Manufactured:	January 10, 2007
Last calibrated:	April 28, 2009
Recalibrated:	April 29, 2010

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

DASY - Parameters of Probe: EX3DV4 SN:3600**Basic Calibration Parameters**

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu\text{V}/(\text{V}/\text{m})^2$) ^A	0.51	0.51	0.40	$\pm 10.1\%$
DCP (mV) ^B	90.5	88.5	85.2	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dBuV	C	VR mV	Unc ^E (k=2)
10000	CW	0.00	X	0.00	0.00	1.00	300	$\pm 1.5\%$
			Y	0.00	0.00	1.00	300	
			Z	0.00	0.00	1.00	300	

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

^A The uncertainties of NormX,Y,Z do not affect the E²-field uncertainty inside TSL (see Pages 5 and 6).

^B Numerical linearization parameter: uncertainty not required.

^E Uncertainty is determined using the maximum deviation from linear response applying recatangular distribution and is expressed for the square of the field value.

DASY - Parameters of Probe: EX3DV4 SN:3600

Calibration Parameter Determined in Head Tissue Simulating Media

f [MHz]	Validity [MHz] ^c	Permittivity	Conductivity	ConvF X	ConvF Y	ConvF Z	Alpha	Depth Unc (k=2)
900	± 50 / ± 100	41.5 ± 5%	0.97 ± 5%	7.79	7.79	7.79	0.74	0.61 ± 11.0%
1810	± 50 / ± 100	40.0 ± 5%	1.40 ± 5%	6.79	6.79	6.79	0.59	0.70 ± 11.0%
1950	± 50 / ± 100	40.0 ± 5%	1.40 ± 5%	6.46	6.46	6.46	0.57	0.72 ± 11.0%
2450	± 50 / ± 100	39.2 ± 5%	1.80 ± 5%	6.15	6.15	6.15	0.34	0.89 ± 11.0%

^c The validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2). The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

DASY - Parameters of Probe: EX3DV4 SN:3600

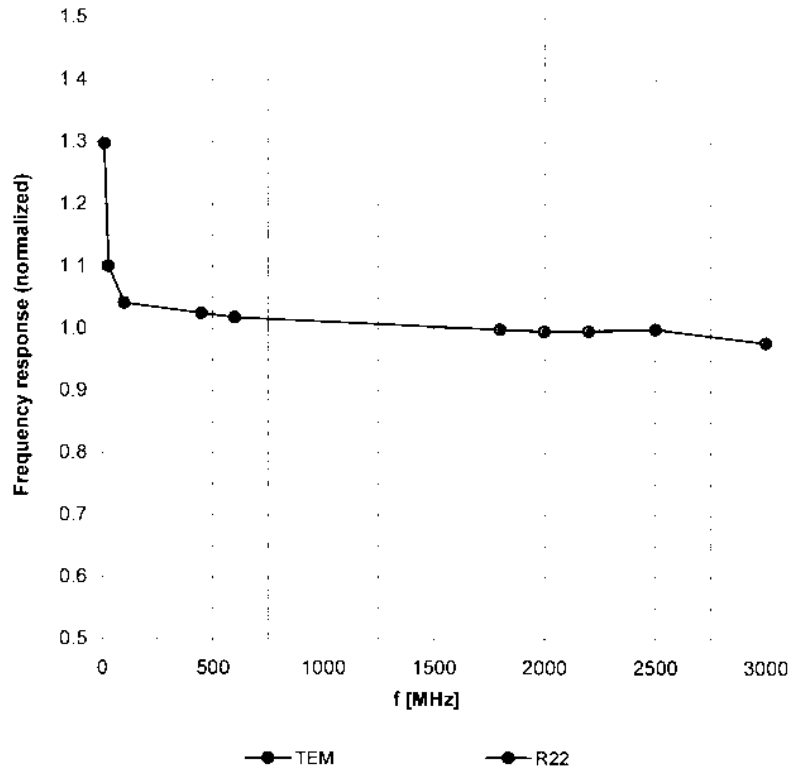
Calibration Parameter Determined in Body Tissue Simulating Media

f [MHz]	Validity [MHz] ^c	Permittivity	Conductivity	ConvF X	ConvF Y	ConvF Z	Alpha	Depth Unc (k=2)
900	± 50 / ± 100	55.0 ± 5%	1.05 ± 5%	7.92	7.92	7.92	0.50	0.77 ± 11.0%
1810	± 50 / ± 100	53.3 ± 5%	1.52 ± 5%	6.47	6.47	6.47	0.70	0.64 ± 11.0%
1950	± 50 / ± 100	53.3 ± 5%	1.52 ± 5%	6.53	6.53	6.53	0.64	0.67 ± 11.0%
2450	± 50 / ± 100	52.7 ± 5%	1.95 ± 5%	6.24	6.24	6.24	0.43	0.87 ± 11.0%
5200	± 50 / ± 100	49.0 ± 5%	5.30 ± 5%	3.73	3.73	3.73	0.52	1.95 ± 13.1%
5500	± 50 / ± 100	48.6 ± 5%	5.65 ± 5%	3.30	3.30	3.30	0.58	1.95 ± 13.1%
5800	± 50 / ± 100	48.2 ± 5%	6.00 ± 5%	3.44	3.44	3.44	0.63	1.95 ± 13.1%

^c The validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2). The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

Frequency Response of E-Field

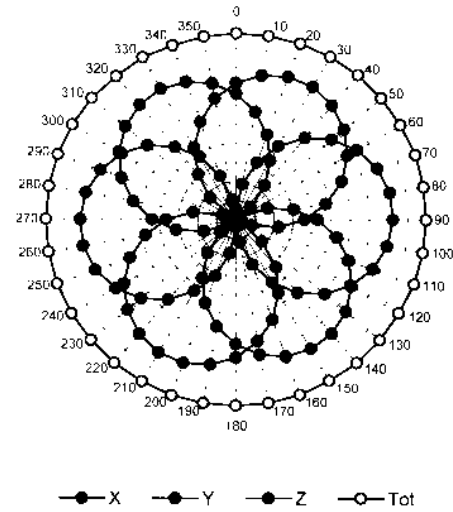
(TEM-Cell:ifi110 EXX, Waveguide: R22)



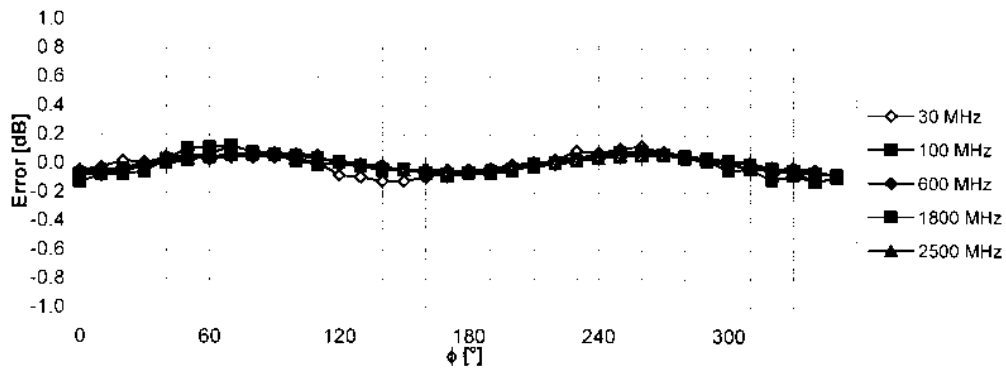
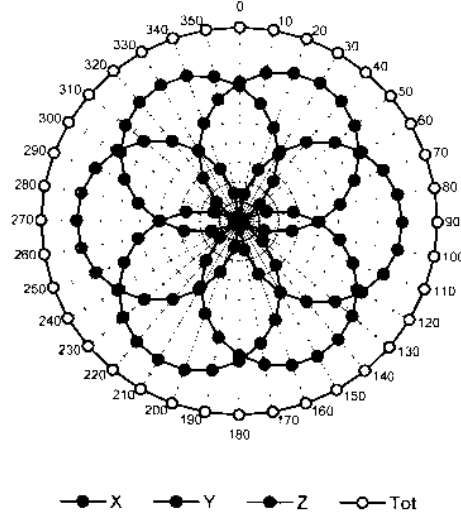
Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ ($k=2$)

Receiving Pattern (ϕ), $\vartheta = 0^\circ$

f = 600 MHz, TEM ifi110EXX

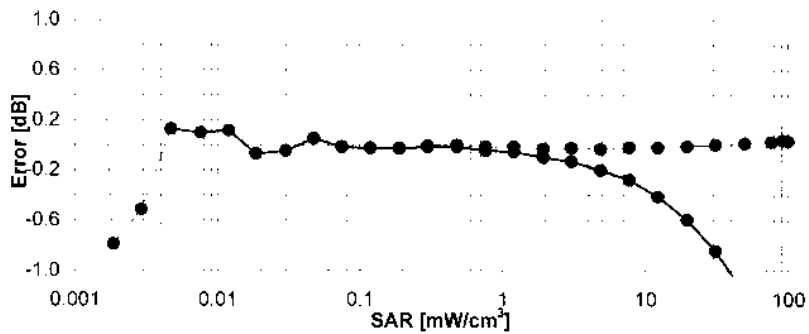
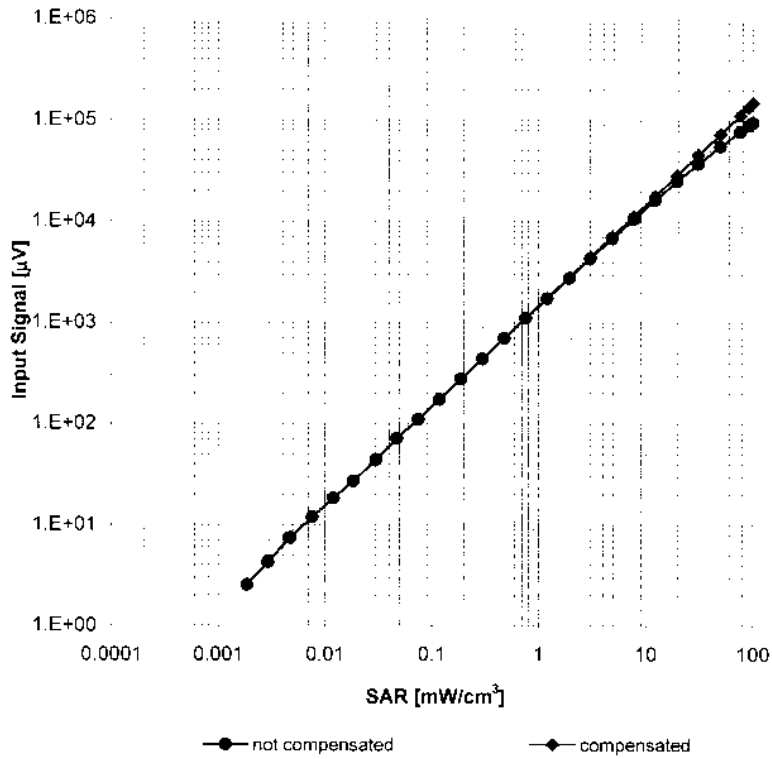


f = 1800 MHz, WG R22



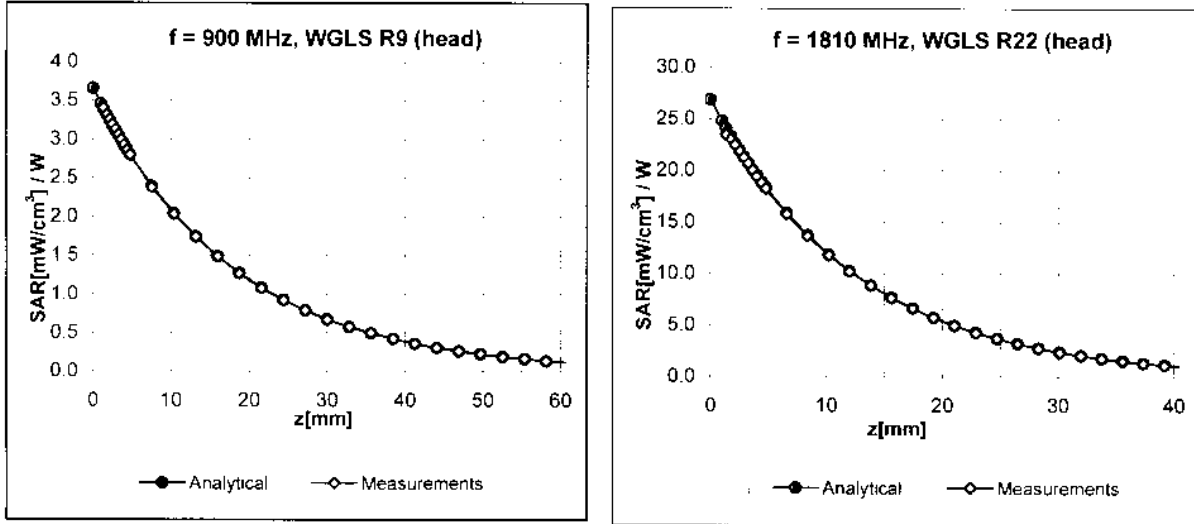
Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ (k=2)

Dynamic Range f(SAR_{head}) (Waveguide R22, f = 1800 MHz)



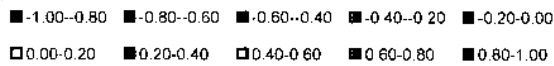
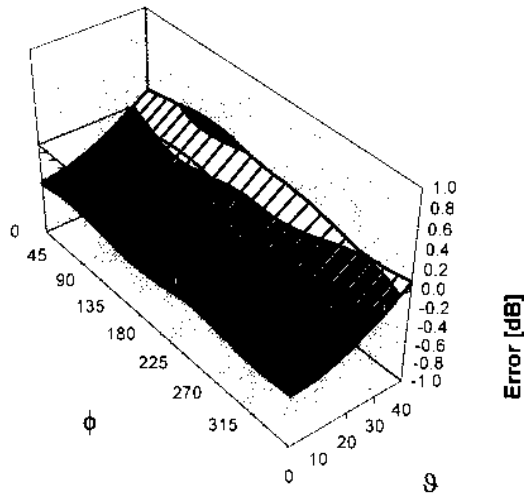
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment



Deviation from Isotropy in HSL



Error (ϕ, θ), f = 900 MHz




Uncertainty of Spherical Isotropy Assessment: $\pm 2.6\%$ (k=2)

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	Not applicable
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	2 mm

	<u>Dates of Evaluation</u> May 26 & June 28, 2010	<u>Test Report Serial No.</u> 052110HN2-T1022-S15W	<u>Test Report Revision No.</u> Rev. 1.2 (3rd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> June 30, 2010	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

APPENDIX G - SAM PHANTOM CERTIFICATE OF CONFORMITY

Applicant:	Intermec Technologies Corp.	FCC ID:	HN2CK31MIG2	IC:	1223A-CK31MIG2	
DUT Type:	802.11b/g WLAN Module installed in CK31 Rugged Hand-held PC	Class II Permissive Change				
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Schmid & Partner Engineering AG

Zeughausstrasse 43, 8004 Zurich, Switzerland, Phone +41 1 245 97 00, Fax +41 1 245 97 79

Certificate of conformity / First Article Inspection

Item	SAM Twin Phantom V4.0
Type No	QD 000 P40 BA
Series No	TP-1002 and higher
Manufacturer / Origin	Untersee Composites Hauptstr. 69 CH-8559 Fruthwilen Switzerland

Tests

The series production process used allows the limitation to test of first articles. Complete tests were made on the pre-series Type No. QD 000 P40 AA, Serial No. TP-1001 and on the series first article Type No. QD 000 P40 BA, Serial No. TP-1006. Certain parameters have been retested using further series units (called samples).

Test	Requirement	Details	Units tested
Shape	Compliance with the geometry according to the CAD model.	IT'IS CAD File (*)	First article, Samples
Material thickness	Compliant with the requirements according to the standards	2mm +/- 0.2mm in specific areas	First article, Samples
Material parameters	Dielectric parameters for required frequencies	200 MHz – 3 GHz Relative permittivity < 5 Loss tangent < 0.05.	Material sample TP 104-5
Material resistivity	The material has been tested to be compatible with the liquids defined in the standards	Liquid type HSL 1800 and others according to the standard.	Pre-series, First article

Standards

- [1] CENELEC EN 50361
- [2] IEEE P1528-200x draft 6.5
- [3] IEC PT 62209 draft 0.9

(*) The IT'IS CAD file is derived from [2] and is also within the tolerance requirements of the shapes of [1] and [3].

Conformity

Based on the sample tests above, we certify that this item is in compliance with the uncertainty requirements of SAR measurements specified in standard [1] and draft standards [2] and [3].

Date 18.11.2001

Signature / Stamp

**Schmid & Partner
Engineering AG**

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