NORTHWEST EMC

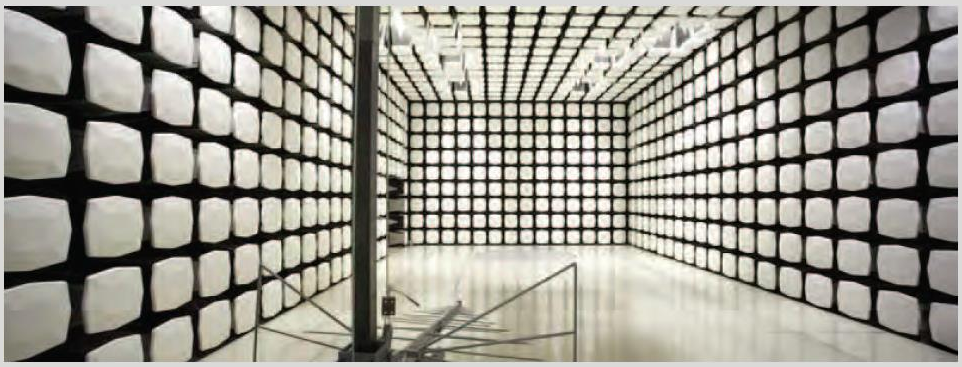
Intermec Technologies Corporation

IP30C RFID Reader with 70 Series Handheld Computers

Extremity SAR Evaluation Report #: INMC0920 Rev. 1

Evaluated to the following SAR Specification:

FCC 2.1093:2015



NVLAP Lab Code: 200630-0

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CERTIFICATE OF TEST

NORTHWEST EMC 2014-12-10

Last Date of Test: May 11, 2015
Intermec Technologies Corporation
Model: IP30C RFID Reader with 70 Series Handheld Computers

Applicable Standard

Test Description	Specification	Test Method	Pass/Fail
SAR Evaluation	FCC 2.1093:2015	IEEE Std 1528:2003	Pass
		FCC KDB 447498 D01 v05r02	
		FCC KDB 941225 D01 v03	
		FCC KDB 865664 D01 v01r03 and D02 v01r01	

Highest SAR Values:

FCC Equipment Class	Device	Frequency Bands (MHz)	Extremity SAR (W/kg)	Limit (W/kg)	Exposure Environment
			10g	10g	
DSS	RFID in IP30C	915	0.46	**4.0**	**General Population**
			3.17[Note1]		
PCE	UMTS in FCC ID: EHA-1000CP01SX1	835	0.01		
		1700	0.08		
		1900	0.02		
PCE	UMTS in FCC ID: EHA-1000CP01UX1	835	0.11		
		1900	0.04		
PCE	CDMA in FCC ID: EHA-1000CP01CX2	835	0.07		
		1900	0.02		

Note 1: Non-standard setup based upon guidance from the FCC. The operational description contains additional information.

Deviations From Test Standards

None

Approved By:

Don Facteau, IS Manager

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

REVISION HISTORY

NORTHWEST EMC
REV 2014.10.14

Revision Number	Description	Date	Page Number
01	SAR test data and setup photos were added for a non-standard setup based upon guidance from the FCC. The operational description contains additional information	May 12, 2015	Various in SAR Test Data and SAR Test Setup Photos

ACCREDITATIONS AND AUTHORIZATIONS

REV 2015.2.19

United States

FCC - Designated by the FCC as a Telecommunications Certification Body (TCB). Certification chambers, Open Area Test Sites, and conducted measurement facilities are listed with the FCC.

A2LA - Accredited by A2LA to ISO / IEC 17065 as a product certifier. This allows Northwest EMC to certify transmitters to FCC and IC specifications.

NVLAP - Each laboratory is accredited by NVLAP to ISO 17025

Canada

IC - Recognized by Industry Canada as a Certification Body (CB). Certification chambers and Open Area Test Sites are filed with IC.

European Union

European Commission – Validated by the European Commission as a Conformity Assessment Body (CAB) under the EMC directive and as a Notified Body under the R&TTE Directive.

Australia/New Zealand

ACMA - Recognized by ACMA as a CAB for the acceptance of test data.

Korea

MSIP / RRA - Recognized by KCC's RRA as a CAB for the acceptance of test data.

Japan

VCCI - Associate Member of the VCCI. Conducted and radiated measurement facilities are registered.

Taiwan

BSMI – Recognized by BSMI as a CAB for the acceptance of test data.

NCC - Recognized by NCC as a CAB for the acceptance of test data.

Singapore

IDA – Recognized by IDA as a CAB for the acceptance of test data.

Israel

MOC – Recognized by MOC as a CAB for the acceptance of test data.

Hong Kong

OFCA – Recognized by OFCA as a CAB for the acceptance of test data.

Vietnam

MIC – Recognized by MIC as a CAB for the acceptance of test data.

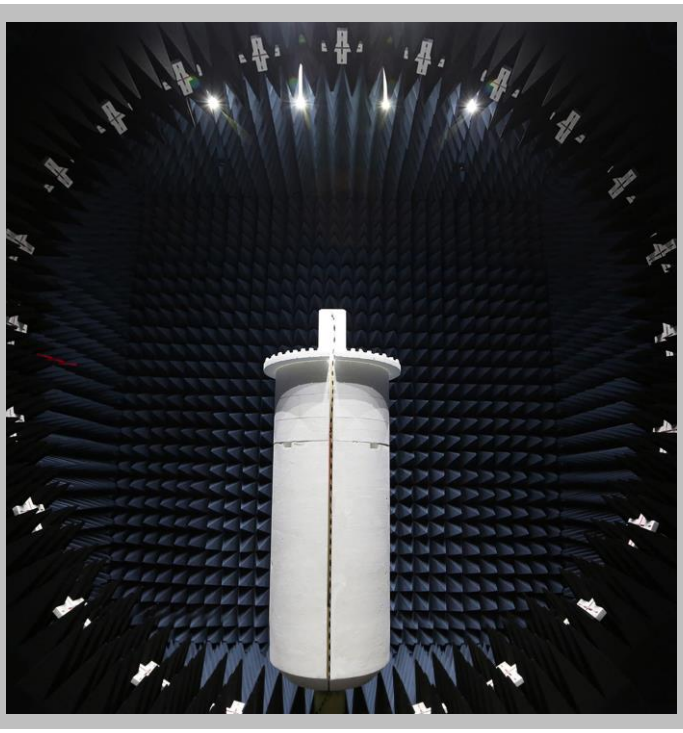
SCOPE

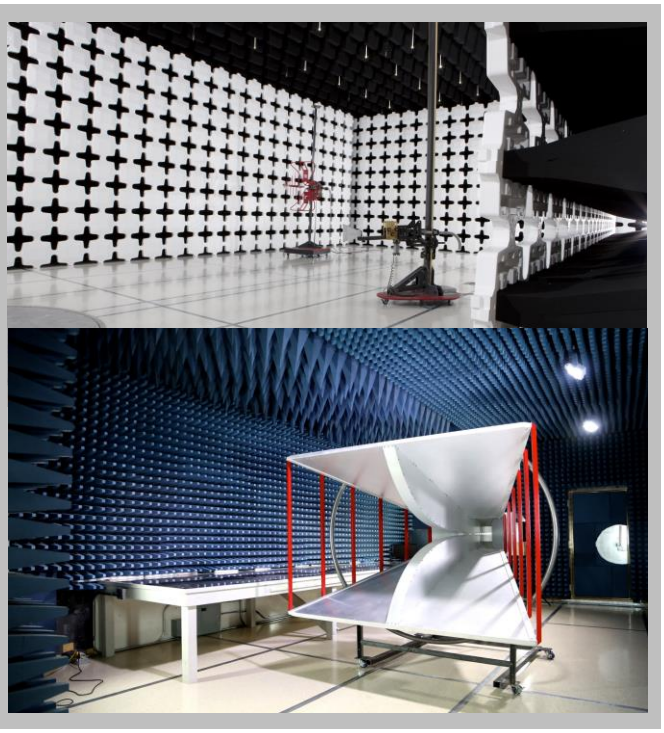
For details on the Scopes of our Accreditations, please visit:
http://www.nwemc.com/accreditations/
http://gsi.nist.gov/global/docs/cabs/designations.html

FACILITIES

REV 2015.2.19

California	Minnesota	New York	Oregon	Texas	Washington
Labs OC01-13 41 Tesla Irvine, CA 92618 (949) 861-8918	Labs MN01-08, MN10 9349 W Broadway Ave. Brooklyn Park, MN 55445 (612)-638-5136	Labs NY01-04 4939 Jordan Rd. Elbridge, NY 13060 (315) 554-8214	Labs EV01-12 22975 NW Evergreen Pkwy Hillsboro, OR 97124 (503) 844-4066	Labs TX01-09 3801 E Plano Pkwy Plano, TX 75074 (469) 304-5255	Labs NC01-05 19201 120th Ave NE Bothell, WA 9801 (425)984-6600
NVLAP					
NVLAP Lab Code: 200676-0	NVLAP Lab Code: 200881-0	NVLAP Lab Code: 200761-0	NVLAP Lab Code: 200630-0	NVLAP Lab Code:201049-0	NVLAP Lab Code: 200629-0
Industry Canada					
2834B-1, 2834B-3	2834E-1	N/A	2834D-1, 2834D-*2*	2834G-1	2834F-1
BSMI					
SL2-IN-E-1154R	SL2-IN-E-1152R	N/A	SL2-IN-E-1017	SL2-IN-E-1158R	SL2-IN-E-1153R
VCCI					
A-0029	A-0109	N/A	A-0108	A-0201	A-0110
Recognized Phase I CAB for ACMA, BSMI, IDA, KCC/RRA, MIC, MOC, NCC, OFCA					
US0158	US0175	N/A	US0017	US0191	US0157





PRODUCT DESCRIPTION

Client and Equipment Under Test (EUT) Information

Company Name:	Intermec Technologies Corporation
Address:	16201 25th Ave W
City, State, Zip:	Lynnwood, WA 98087
Test Requested By:	Sean MacKeller
Model:	IP30C RFID Reader with 70 Series Handheld Computers
First Date of Test:	May 1, 2015
Last Date of Test:	May 11, 2015
Receipt Date of Samples:	April 30, 2015
Equipment Design Stage:	Production
Equipment Condition:	No Damage

Information Provided by the Party Requesting the Test

Functional Description of the EUT:

The Intermec IM11 is a previously certified RFID module (FCC ID: EHA-IM11) that is be installed in the Intermec IP30C handheld RFID reader. The IP30C also contains a WT12 (Bluegiga) Bluetooth module (FCC ID: QOQWT12) that sends the data read by the IM11 to the Intermec 70 series handheld computers clipped to the top of the IP30C (FCC ID: EHA-1000CP01X2, FCC ID: EHA-1000CP01UX1, FCC ID: EHA-1000CP01CX2, FCC ID: EHA-1000CP01SX1).

The IP30C will only be used while held in the hand. The RFID reader transmits only when the trigger on the handle is pulled. This prevents transmission while near the head or torso. Separate MPE reports have been prepared to document compliance for body exposure.

The hand exposure must be evaluated for extremity SAR per the procedures of FCC KDB 447498. There are three steps: (1) determine which radios are eligible for stand-alone extremity SAR test exclusion, (2) measure extremity SAR for those radios that cannot be excluded from SAR evaluation, and estimate SAR for those radios that are excluded, and (3) sum the SAR values (measured or estimated as applicable) to determine if simultaneous transmission SAR test exclusion applies.

Stand-alone Extremity SAR Test Exclusion:

FCC KDB 447498 D01 v05r02
Section 4.3.1

"1) The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:
[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] · [√f(GHz)] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR,
where

- *f(GHz) is the RF channel transmit frequency in GHz*
- *Power and distance are rounded to the nearest mW and mm before calculation*
- *The result is rounded to one decimal place for comparison*
- *3.0 and 7.5 are referred to as the numeric thresholds in the step 2 below*

The test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm according to 5) in section 4.1 is applied to determine SAR test exclusion.

2) At 100 MHz to 6 GHz and for test separation distances > 50 mm, the SAR test exclusion threshold is determined according to the following, and as illustrated in Appendix B:[27]

a) [Power allowed at numeric threshold for 50 mm in step 1) + (test separation distance – 50 mm)·(f(MHz)/150)] mW, at 100 MHz to 1500 MHz
b) [Power allowed at numeric threshold for 50 mm in step 1) + (test separation distance – 50 mm)·10] mW at > 1500 MHz and ≤ 6 GHz"

Test Separation Distances < 50 mm

	Output Power	Duty Cycle	Test Separation	Transmit Frequency	Exclusion Threshold	Spec	Exposure
	(mW)		(mm)	(GHz)			
RFID in IP30C	938	0.5	30	0.90275	14.9	<=7.5	Extremity

Test Separation Distances > 50 mm								
	Output Power (mW)	Duty Cycle	Test Separation (mm)	Transmit Frequency (GHz)	Exclusion Threshold (mW)	Power allowed at the numeric threshold for 50mm in Step 1 (mW)	Spec (mW)	Exposure
Bluetooth in IP30C	3	1	52	2.402	3.3	242	262.0	Extremity
Wi-Fi in all Handhelds	53	1	90	2.462	53.2	239	639.0	Extremity
	25	1	90	5.22	25.1	164	564.1	Extremity
	25	1	90	5.3	24.5	163	562.9	Extremity
	20	1	90	5.6	19.5	158	558.5	Extremity
	17	1	90	5.875	17.0	155	554.7	Extremity
	7	1	90	2.48	7.0	238	638.1	Extremity
Bluetooth in all Handhelds	7	1	90	2.48	7.0	238	638.1	Extremity
UMTS in FCC ID: EHA-1000CP01SX1	1122	0.5	90	0.8366	561.0	820	1043.1	Extremity
	442	1	90	1.753	442.0	283	683.2	Extremity
	1549	0.5	90	1.88	774.4	547	947.0	Extremity
UMTS in FCC ID: EHA-1000CP01UX1	1370	0.5	90	0.8488	685.0	814	1040.4	Extremity
	1130	0.5	90	1.88	565.0	547	947.0	Extremity
CDMA in FCC ID: EHA-1000CP01CX2	667	1	90	0.8361	667.0	410	633.1	Extremity
	1148	1	90	1.8516	1148.0	276	675.6	Extremity

The RFID and CDMA radios are not eligible for stand-alone extremity SAR test exclusion. Also, the UMTS radios have levels close to the exclusion threshold. As a result, stand-alone SAR testing was performed on those radios as documented in this report.

Stand-alone Extremity SAR Estimation

For those radios that were excluded from standalone extremity SAR testing, the standalone extremity SAR is estimated to be 1 W/kg for 10-g SAR per the procedures of FCC KDB 447498:

FCC KDB 447498 D01 v05r02
Section 4.3.2 of KDB 447498

"When the standalone SAR test exclusion of section 4.3.1 is applied to an antenna that transmits simultaneously with other antennas, the standalone SAR must be estimated according to the following to determine simultaneous transmission SAR test exclusion:

- *(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)]·[√f(GHz)/x] W/kg for test separation distances ≤ 50 mm;*
  where x = 7.5 for 1-g SAR, and x = 18.75 for 10-g SAR.

- *0.4 W/kg for 1-g SAR and 1.0 W/kg for 10-g SAR, when the test separation distances is > 50 mm.[31]"*

Simultaneous Extremity SAR Test Exclusion

"When the sum of 1-g or 10-g SAR of all simultaneously transmitting antennas in an operating mode and exposure condition combination is within the SAR limit, SAR test exclusion applies to that simultaneous transmission configuration."

The extremity SAR limit for general population/uncontrolled exposure is 4 W/kg for 10-g. For each simultaneous transmitting antenna combination, the SAR values (measured or estimated as applicable) are summed for comparison to the limit. Note that the Wi-Fi and Bluetooth radios cannot transmit simultaneously:

Simultaneous Transmission Configuration	Reported SAR (1) W/kg	Reported SAR (2) W/kg	Estimated SAR (3) W/kg	Sum W/kg
(1) UMTS in FCC ID: EHA-10000CP01SX1 (2) RFID (3) Wi-Fi or Bluetooth	0.08	0.46	1.0	1.54
(1) UMTS in FCC ID: EHA-1000CP01UX1 (2) RFID (3) Wi-Fi or Bluetooth	0.11	0.46	1.0	1.57
(1) CDMA in FCC ID: EHA-1000CP01CX2 (2) RFID (3) Wi-Fi or Bluetooth	0.07	0.46	1.0	1.53
(1) No WWAN in FCC ID: EHA-1000CP01X2 (2) RFID (3) Wi-Fi or Bluetooth	N/A	0.46	1.0	1.46

The sum of the calculated SAR is less than the extremity SAR limit of 4.0 W/kg; therefore the simultaneous transmission configuration is excluded from SAR testing.

Testing Objective:

To demonstrate compliance of the Intermec IP30C combined with Intermec 70 series handheld computers with the SAR requirements of FCC 2.1093

CONFIGURATIONS

NORTHWEST EMC 2014-12-10

Configuration INMC0920- 1

Software/Firmware Running during test	
Description	**Version**
RFID Lab	v0.64

EUT				
Description	**Manufacturer**	**Model/Part Number**	**FCC ID:**	**Serial Number**
RFID Reader	Intermec Technologies Corporation	IP30C	EHA-IM11, QOQWT12	0420150003
Mobile Computer (test 2)	Intermec Technologies Corporation	1000CP02S	EHA-1000CP01SX1	178U1191040

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AC/DC Adapter	Intermec Technologies Corporation	A3 Power Supply	492
3.7 V Internal Battery CN70 (test 2)	Intermec Technologies Corporation	318-043-002	09861105060

Remote Equipment Outside of Test Setup Boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Mobile to RFID Adapter CN70	Intermec Technologies Corporation	710-205-001	None
Mobile Computer (RFID Control Unit)	Intermec Technologies Corporation	1001CP01U	06021444004
3.7 V Internal Battery CK70 (control unit)	Intermec Technologies Corporation	318-046-011	30861307552

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
DC Power Cable	Unknown	1.8m	No	AC/DC Adapter	Host Computer
AC Power Cable	Unknown	2.2m	No	AC/DC Adapter	AC Mains
DC Leads	No	3m	No	DC Power Supply	RFID Reader

CONFIGURATIONS

NORTHWEST EMC 2014-12-10

Configuration INMC0920- 2

EUT				
Description	**Manufacturer**	**Model/Part Number**	**FCC ID:**	**Serial Number**
RFID Reader	Intermec Technologies Corporation	IP30C	EHA-IM11, QOQWT12	0420150003
Mobile Computer (test 2)	Intermec Technologies Corporation	1000CP02S	EHA-1000CP01SX1	178U1191040

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AC/DC Adapter	Intermec Technologies Corporation	A3 Power Supply	492
3.7 V Internal Battery CN70 (test 2)	Intermec Technologies Corporation	318-043-002	09861105060
Mobile to RFID Adapter CN70	Intermec Technologies Corporation	710-205-001	None

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
DC Power Cable	Unknown	1.8m	No	AC/DC Adapter	Host Computer
AC Power Cable	Unknown	2.2m	No	AC/DC Adapter	AC Mains
DC Leads	No	3m	No	DC Power Supply	RFID Reader

CONFIGURATIONS

NORTHWEST EMC 2014-12-10

Configuration INMC0920- 3

EUT				
Description	**Manufacturer**	**Model/Part Number**	**FCC ID:**	**Serial Number**
RFID Reader	Intermec Technologies Corporation	IP30C	EHA-IM11, QOQWT12	0420150003
Mobile Computer (test 3)	Intermec Technologies Corporation	1001CP01S	EHA-1000CP01SX1	28311047275

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AC/DC Adapter	Intermec Technologies Corporation	A3 Power Supply	492
3.7 V Internal Battery CK70 (test 3)	Intermec Technologies Corporation	318-046-011	31361303966
Mobile to RFID Adapter CK70	Intermec Technologies Corporation	Unknown	None

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
DC Power Cable	Unknown	1.8m	No	AC/DC Adapter	Host Computer
AC Power Cable	Unknown	2.2m	No	AC/DC Adapter	AC Mains
DC Leads	No	3m	No	DC Power Supply	RFID Reader

CONFIGURATIONS

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Configuration INMC0920- 4

EUT				
Description	**Manufacturer**	**Model/Part Number**	**FCC ID:**	**Serial Number**
RFID Reader	Intermec Technologies Corporation	IP30C	EHA-IM11, QOQWT12	0420150003
Mobile Computer (test 2)	Intermec Technologies Corporation	1000CP02S	EHA-1000CP01SX1	178U1191040

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AC/DC Adapter	Intermec Technologies Corporation	A3 Power Supply	492
3.7 V Internal Battery CN70 (test 2)	Intermec Technologies Corporation	318-043-002	09861105060
Mobile to RFID Adapter CN70	Intermec Technologies Corporation	710-205-001	None

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
DC Power Cable	Unknown	1.8m	No	AC/DC Adapter	Host Computer
AC Power Cable	Unknown	2.2m	No	AC/DC Adapter	AC Mains
DC Leads	No	3m	No	DC Power Supply	RFID Reader

CONFIGURATIONS

NORTHWEST EMC 2014-12-10

Configuration INMC0920- 5

EUT				
Description	**Manufacturer**	**Model/Part Number**	**FCC ID:**	**Serial Number**
RFID Reader	Intermec Technologies Corporation	IP30C	EHA-IM11, QOQWT12	0420150003
Mobile Computer (test 5)	Intermec Technologies Corporation	1000CP01U	EHA-1000CP01UX1	06521442001

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AC/DC Adapter	Intermec Technologies Corporation	A3 Power Supply	492
Mobile to RFID Adapter CN70	Intermec Technologies Corporation	710-205-001	None
3.7 V Internal Battery CN70v (test 5)	Intermec Technologies Corporation	318-043-012	34561301329

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
DC Power Cable	Unknown	1.8m	No	AC/DC Adapter	Host Computer
AC Power Cable	Unknown	2.2m	No	AC/DC Adapter	AC Mains
DC Leads	No	3m	No	DC Power Supply	RFID Reader

CONFIGURATIONS

NORTHWEST EMC 2014-12-10

Configuration INMC0920- 6

EUT				
Description	**Manufacturer**	**Model/Part Number**	**FCC ID:**	**Serial Number**
RFID Reader	Intermec Technologies Corporation	IP30C	EHA-IM11, QOQWT12	0420150003
Mobile Computer (test 6)	Intermec Technologies Corporation	10001CP01U	EHA-1000CP01UX1	06021444012

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AC/DC Adapter	Intermec Technologies Corporation	A3 Power Supply	492
3.7 V Internal Battery CK70 (test 6)	Intermec Technologies Corporation	318-046-011	30861308349
Mobile to RFID Adapter CK70	Intermec Technologies Corporation	Unknown	None

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
DC Power Cable	Unknown	1.8m	No	AC/DC Adapter	Host Computer
AC Power Cable	Unknown	2.2m	No	AC/DC Adapter	AC Mains
DC Leads	No	3m	No	DC Power Supply	RFID Reader

CONFIGURATIONS

NORTHWEST EMC 2014-12-10

Configuration INMC0920- 7

EUT				
Description	**Manufacturer**	**Model/Part Number**	**FCC ID:**	**Serial Number**
RFID Reader	Intermec Technologies Corporation	IP30C	EHA-IM11, QOQWT12	0420150003
Mobile Computer (test 7)	Intermec Technologies Corporation	1000CP01C	EHA-1000CP01CX2	24411047064

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AC/DC Adapter	Intermec Technologies Corporation	A3 Power Supply	492
Mobile to RFID Adapter CN70	Intermec Technologies Corporation	710-205-001	None
3.7 V Internal Battery CN70 (test 7)	Intermec Technologies Corporation	318-043-002	16961000163

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
DC Power Cable	Unknown	1.8m	No	AC/DC Adapter	Host Computer
AC Power Cable	Unknown	2.2m	No	AC/DC Adapter	AC Mains
DC Leads	No	3m	No	DC Power Supply	RFID Reader

CONFIGURATIONS

NORTHWEST EMC 2014-12-10

Configuration INMC0920- 8

EUT				
Description	**Manufacturer**	**Model/Part Number**	**FCC ID:**	**Serial Number**
RFID Reader	Intermec Technologies Corporation	IP30C	EHA-IM11, QOQWT12	0420150003
Mobile Computer (test 8)	Intermec Technologies Corporation	1000CP02C	EHA-1000CP01CX2	24511047015

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AC/DC Adapter	Intermec Technologies Corporation	A3 Power Supply	492
Mobile to RFID Adapter CN70	Intermec Technologies Corporation	710-205-001	None
3.7 V Internal Battery CN70 (test 8)	Intermec Technologies Corporation	318-043-012	35061300052

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
DC Power Cable	Unknown	1.8m	No	AC/DC Adapter	Host Computer
AC Power Cable	Unknown	2.2m	No	AC/DC Adapter	AC Mains
DC Leads	No	3m	No	DC Power Supply	RFID Reader

MODIFICATIONS

NORTHWEST EMC
2014-12-10

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	4/30/2015	Operational Checkout	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
2	5/1/2015	SAR	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
3	5/4/2015	SAR	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
4	5/5/2015	SAR	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
5	5/11/2015	SAR	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.

TISSUE – EQUIVALENT LIQUID NARRATIVE

Characterization of tissue-equivalent liquid dielectric properties

Per IEEE 1528: 2003, Section 5.2.2, the permittivity and conductivity of the tissue material should be measured at least within 24 hours of any full-compliance test. The measured values must be within +/- 5% of the target values. The temperature variation in the liquid during SAR measurements must be within +/- 2 degrees C of that recorded when the dielectric properties were measured.

The dielectric parameters of the tissue-equivalent liquids were measured within 24 hours of the start of testing using the SPEAG DAKS:200 dielectric assessment kit. The dielectric measurements were made across the frequency range of the liquid. The attached data sheets show that the dielectric parameters of the liquid were within the required 5% tolerances.

Target values of dielectric parameters

Per KDB 865664 D01 v01r01, Appendix A.1:

"The head tissue dielectric parameters recommended by IEEE Std 1528-2003 have been incorporated in the following table. These head parameters are derived from planar layer models simulating the highest expected SAR for the dielectric properties and tissue thickness variations in a human head. Other head and body tissue parameters that have not been specified in 1528 are derived from tissue dielectric parameters computed from the 4-Cole-Cole equations described above and extrapolated according to the head parameters specified in 1528."

Target Frequency	Head		Body	
(MHz)	ε_r	σ (S/m)	ε_r	σ (S/m)
150	52.3	0.76	61.9	0.80
300	45.3	0.87	58.2	0.92
450	43.5	0.87	56.7	0.94
835	41.5	0.90	55.2	0.97
900	41.5	0.97	55.0	1.05
915	41.5	0.98	55.0	1.06
1450	40.5	1.20	54.0	1.30
1610	40.3	1.29	53.8	1.40
1800 – 2000	40.0	1.40	53.3	1.52
2450	39.2	1.80	52.7	1.95
3000	38.5	2.40	52.0	2.73
5800	35.3	5.27	48.2	6.00

(ε_r = relative permittivity, σ = conductivity and ρ = 1000 kg/m^3)

TISSUE – EQUIVALENT LIQUID NARRATIVE

Composition of Ingredients for Liquid Tissue Phantoms

Northwest EMC uses tissue-equivalent liquids prepared by SPEAG and confirmed by them to be within +/- 5% from the target values. Their recipes are based upon the following formulations as found in IEEE 1528: 2003, Annex C:

"The following tissue formulations are provided for reference only as some of the parameters have not been thoroughly verified. The composition of ingredients may be modified accordingly to achieve the desired target tissue parameters required for routine SAR evaluation."

Ingredients (% by weight)	**Frequency (MHz)**									
	450		835		915		1900		2450	
Tissue Type	Head	Body	Head	Body	Head	Body	Head	Body	Head	Body
Water	38.56	51.16	41.45	52.4	41.05	56.0	54.9	40.4	62.7	73.2
Salt (NaCl)	3.95	1.49	1.45	1.4	1.35	0.76	0.18	0.5	0.5	0.04
Sugar	56.32	46.78	56.0	45.0	56.5	41.76	0.0	58.0	0.0	0.0
HEC	0.98	0.52	1.0	1.0	1.0	1.21	0.0	1.0	0.0	0.0
Bactericide	0.19	0.05	0.1	0.1	0.1	0.27	0.0	0.1	0.0	0.0
Triton X-100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.8	0.0
DGBE	0.0	0.0	0.0	0.0	0.0	0.0	44.92	0.0	0.0	26.7
Dielectric Constant	43.42	58.0	42.54	56.1	42.0	56.8	39.9	54.0	39.8	52.5
Conductivity (S/m)	0.85	0.83	0.91	0.95	1.0	1.07	1.42	1.45	1.88	1.78

Salt: 99^{+}% Pure Sodium Chloride Sugar: 98^{+}% Pure Sucrose
Water: De-ionized, 16 MΩ^{+} resistivity HEC: Hydroxyethyl Cellulose
DGBE: 99^{+}% Di(ethylene glycol) butyl ether, [2-(2-butoxyethoxy)ethanol]
Triton X-100 (ultra pure): Polyethylene glycol mono [4-(1,1, 3, 3-tetramethylbutyl)phenyl]ether

TISSUE – EQUIVALENT LIQUID

NORTHWEST EMC
WSTE.2013.09.09

Date:	05/01/2015	Temperature:	22.3°C
Tissue:	Body, MSL900, 900MHz	Liquid Temperature:	22°C
Tested By:	Ethan Schoonover	Relative Humidity:	40.2
Job Site:	EV08	Bar. Pressure:	1014

TEST SPECIFICATIONS

Specification:	Method:
FCC 2.1093:2015	IEEE Std 1528:2003 FCC KDB 447498 D01 v05r02 FCC KDB 865664 D01 v01r03 and D02 v01r01

RESULTS

	Actual Values		Target Values		Deviation (%)	
Frequency (MHz)	Relative Permittivity	Conductivity	Relative Permittivity	Conductivity	Relative Permittivity	Conductivity
900	56.37	1.02	55.0	1.05	-2.49	2.86

Frequency (MHz)	Relative Permittivity	Conductivity
400	60.98	0.613
420	60.76	0.627
440	60.64	0.625
465	60.22	0.652
485	60	0.672
510	59.72	0.686
530	59.6	0.702
555	59.42	0.723
575	59.12	0.744
595	58.94	0.754
620	59.02	0.781
640	58.67	0.804
665	57.96	0.816
685	58.09	0.829
710	57.87	0.851
730	57.78	0.867
755	57.55	0.89
775	57.35	0.905
795	57.12	0.925
820	56.97	0.947
840	56.67	0.962
865	56.5	0.988
885	56.34	1.007
900	56.37	1.02
910	56.14	1.026
930	56	1.047
955	55.82	1.075
975	55.68	1.09
995	55.52	1.111

TISSUE – EQUIVALENT LIQUID

Date:	05/04/2015	Temperature:	23°C
Tissue:	Body, MSL900, 900MHz	Liquid Temperature:	22.3°C
Tested By:	Ethan Schoonover	Relative Humidity:	40.6
Job Site:	EV08	Bar. Pressure:	1015

TEST SPECIFICATIONS

Specification:	Method:
FCC 2.1093:2015	IEEE Std 1528:2003 FCC KDB 447498 D01 v05r02 FCC KDB 865664 D01 v01r03 and D02 v01r01

RESULTS

	Actual Values		Target Values		Deviation (%)	
Frequency (MHz)	Relative Permittivity	Conductivity	Relative Permittivity	Conductivity	Relative Permittivity	Conductivity
900	56.69	1.028	55.0	1.05	-3.07	2.1

Frequency (MHz)	Relative Permittivity	Conductivity
400	61.67	0.585
420	61.54	0.599
440	61.53	0.611
465	60.96	0.63
485	60.77	0.648
510	60.48	0.67
530	60.3	0.682
555	60.07	0.707
575	59.7	0.729
595	59.8	0.74
620	59.21	0.767
640	58.87	0.787
665	59.01	0.811
685	58.7	0.822
710	58.44	0.844
730	58.3	0.862
755	58.09	0.885
775	57.85	0.907
795	57.73	0.924
820	57.41	0.948
840	57.21	0.967
865	56.98	0.996
885	56.71	1.012
900	56.69	1.028
910	56.53	1.038
930	56.4	1.06
955	56.14	1.081
975	55.97	1.1
995	55.83	1.124

TISSUE – EQUIVALENT LIQUID

Date:	05/05/2015	Temperature:	24.2°C
Tissue:	Body, MSL1750, 1800MHz	Liquid Temperature:	21.9°C
Tested By:	Ethan Schoonover	Relative Humidity:	34.8
Job Site:	EV08	Bar. Pressure:	1019

TEST SPECIFICATIONS

Specification:	Method:
FCC 2.1093:2015	IEEE Std 1528:2003 FCC KDB 447498 D01 v05r02 FCC KDB 865664 D01 v01r03 and D02 v01r01

RESULTS

	Actual Values		Target Values		Deviation (%)	
Frequency (MHz)	Relative Permittivity	Conductivity	Relative Permittivity	Conductivity	Relative Permittivity	Conductivity
1800	51.92	1.538	53.3	1.52	2.59	-1.18

Frequency (MHz)	Relative Permittivity	Conductivity
1000	55	0.741
1035	54.96	0.774
1070	54.95	0.808
1110	54.71	0.838
1145	54.46	0.862
1185	54.36	0.899
1220	54.37	0.951
1255	54.09	0.973
1295	53.8	1
1330	53.71	1.041
1370	53.61	1.074
1405	53.51	1.111
1440	53.4	1.151
1480	53.21	1.197
1515	53.04	1.23
1555	52.86	1.27
1590	52.73	1.308
1625	52.64	1.346
1665	52.45	1.389
1700	52.32	1.43
1740	52.14	1.47
1775	51.95	1.516
1800	51.92	1.538
1810	51.87	1.555
1850	51.71	1.601
1885	51.51	1.655
1925	51.42	1.697
1960	51.27	1.725
2000	51.05	1.77

TISSUE – EQUIVALENT LIQUID

NORTHWEST EMC
WSTE.2013.09.09

Date:	05/04/2015	Temperature:	23.6°C
Tissue:	Body, MSL1900, 1900MHz	Liquid Temperature:	23°C
Tested By:	Ethan Schoonover	Relative Humidity:	42.3
Job Site:	EV08	Bar. Pressure:	1019

TEST SPECIFICATIONS

Specification:	Method:
FCC 2.1093:2015	IEEE Std 1528:2003 FCC KDB 447498 D01 v05r02 FCC KDB 865664 D01 v01r03 and D02 v01r01

RESULTS

	Actual Values		Target Values		Deviation (%)	
Frequency (MHz)	Relative Permittivity	Conductivity	Relative Permittivity	Conductivity	Relative Permittivity	Conductivity
1900	53.12	1.503	53.3	1.52	0.34	1.12

Frequency (MHz)	Relative Permittivity	Conductivity
1000	56.15	0.642
1035	56.11	0.665
1070	55.97	0.694
1110	55.82	0.731
1145	55.67	0.749
1185	55.58	0.783
1220	55.55	0.818
1255	55.45	0.834
1295	55.43	0.885
1330	55.26	0.922
1370	55.1	0.957
1405	54.97	0.989
1440	54.83	1.025
1480	54.72	1.067
1515	54.53	1.097
1555	54.39	1.136
1590	54.24	1.176
1625	54.14	1.211
1665	53.98	1.249
1700	53.88	1.29
1740	53.77	1.329
1775	53.6	1.374
1810	53.5	1.41
1850	53.34	1.45
1885	53.22	1.489
1900	53.12	1.503
1925	53.15	1.529
1960	52.93	1.565
2000	52.79	1.612

TISSUE – EQUIVALENT LIQUID

NORTHWEST EMC
WSTE.2013.09.09

Date:	05/11/2015	Temperature:	23.4°C
Tissue:	Body, MSL900, 900MHz	Liquid Temperature:	22.2°C
Tested By:	Ethan Schoonover	Relative Humidity:	49.8%
Job Site:	EV08	Bar. Pressure:	1012 mb

TEST SPECIFICATIONS

RESULTS

	Actual Values		Target Values		Deviation (%)	
Frequency (MHz)	Relative Permittivity	Conductivity	Relative Permittivity	Conductivity	Relative Permittivity	Conductivity
900	56.99	1.029	55.0	1.05	-3.62	2

Frequency (MHz)	Relative Permittivity	Conductivity
400	61	0.575
420	60.94	0.592
440	60.92	0.599
465	60.4	0.618
485	60.16	0.641
510	60.17	0.662
530	60.14	0.677
555	60.17	0.7
575	59.73	0.718
595	59.62	0.744
620	59.22	0.764
640	59.29	0.783
665	59.14	0.795
685	59.04	0.823
710	58.78	0.845
730	58.66	0.861
755	58.41	0.885
775	58.16	0.905
795	57.97	0.922
820	57.68	0.949
840	57.48	0.966
865	57.26	0.993
885	57.03	1.009
900	56.99	1.029
910	56.83	1.041
930	56.7	1.064
955	56.53	1.092
975	56.34	1.112
995	56.18	1.14

SAR SYSTEM VERIFICATION NARRATIVE

NORTHWEST EMC
WSSV.2013.09.09

REQUIREMENT

Per IEEE 1528, Section 8.2.1, “System checks are performed prior to compliance tests and the results must always be within ± 10% of the target value corresponding to the test frequency, liquid, and the source used. The target values are 1 g or 10 g averaged SAR values measured on systems having current system validation and calibration status, and using the system check setup as shown in Figure 14. These target values should be determined using a standard source.”

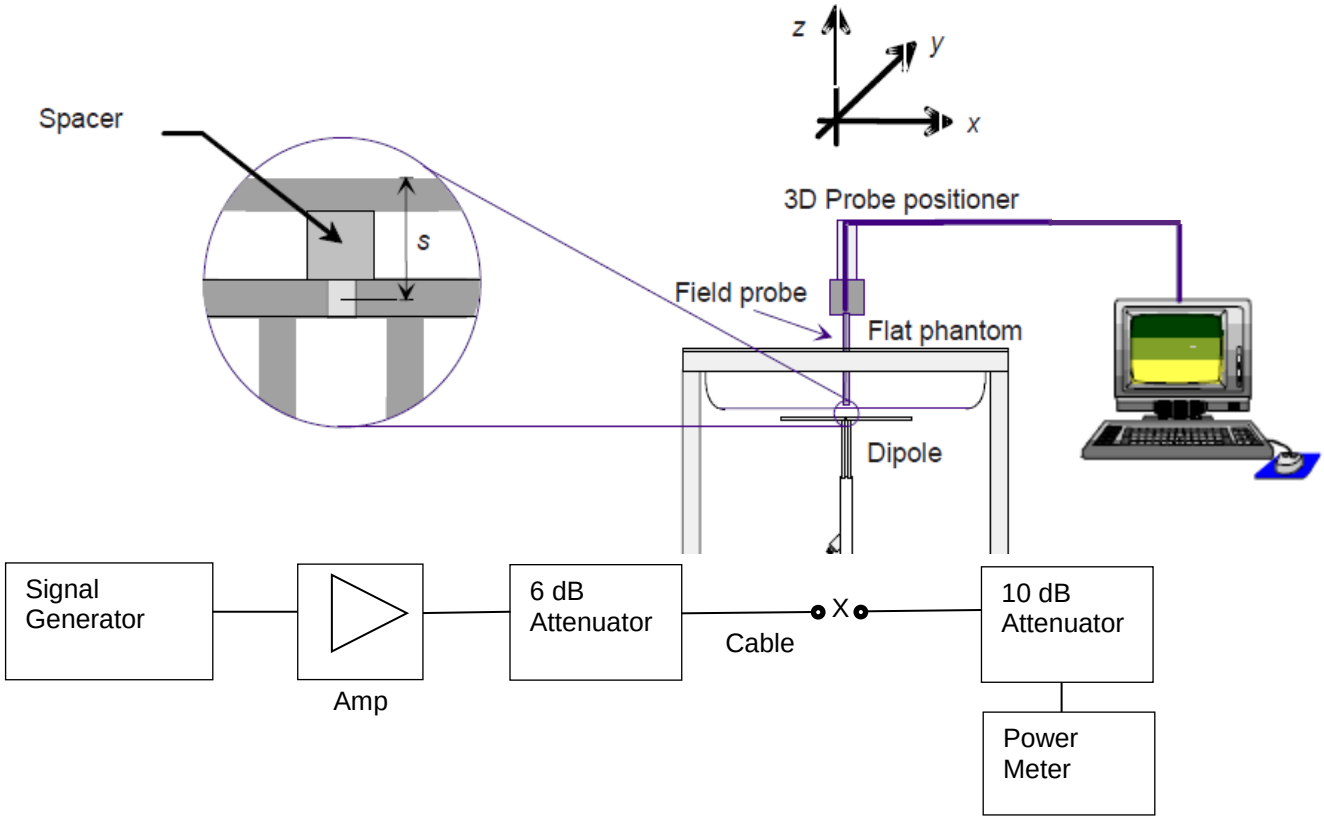
TEST DESCRIPTION

Within 24 hours of a measurement, then every 72 hours thereafter, Northwest EMC used the system validation kit (calibrated reference dipole) to test whether the system was operating within its specifications. The validation was performed in the indicated bands by making SAR measurements of the reference dipole with the phantom filled with the tissue-equivalent liquid. First, a signal generator and power amplifier were used to produce a 100mW level as measured with a power meter at the antenna terminals of the dipole (X). Then, the reference dipole was positioned below the bottom of the phantom and centered with its axis parallel to the longest side of the phantom. A low loss and low relative permittivity spacer was used to establish the correct distance between the center axis of the reference dipole and the liquid.

For the reference dipoles, the spacing distance s is given by:

s = 15mm, +/- 0.2mm for 300MHz ≤ f ≥ 1000 MHz:
s = 10mm, +/- 0.2mm for 1000MHz ≤ f ≥ 6000MHz

The measured 1 g and 10 g spatial average SAR values were normalized to a 1W dipole input power for comparison to the calibration data. The results are summarized in the attached table. The deviation is less than 10% in all cases, indicating that the system performance check was within tolerance.



SAR SYSTEM VERIFICATION

NORTHWEST EMC
WSSV.2013.09.09

TEST SPECIFICATIONS

Specification:	Method:
FCC 2.1093:2015	IEEE Std 1528:2003 FCC KDB 447498 D01 v05r02 FCC KDB 865664 D01 v01r03 and D02 v01r01

RESULTS

Date	Liquid part number and frequency	Conducted Power into the Dipole (dBm)	Correction Factor	Measured		Normalized to 1W		Target (Normalized to 1W) Get from Dipole Calibration Certificate		% Difference	
				1g	10g	1g	10g	1g	10g	1g	10g
5/1/2015	MSL 900 (900 MHz)	20.00	10.00	1.06	0.69	10.60	6.93	10.90	7.07	-2.75	-1.98
5/4/2015	MSL 1900 (1900 MHz)	20.00	10.00	4.19	2.22	41.90	22.20	40.40	21.40	3.71	3.74
5/5/2015	MSL 1750 (1750 MHz)	20.00	10.00	3.84	2.07	38.40	20.70	37.80	20.40	1.59	1.47

SAR SYSTEM VERIFICATION

NORTHWEST EMC
WSSV.2013.09.09

Tested By:	Ethan Schoonover	Room Temperature (°C):	23.2°C
Date:	5/1/2015	Liquid Temperature (°C):	22°C
Configuration:	1	Humidity (%RH):	40.2
		Bar. Pressure (mb):	1014 mb

MSL900 System Check_900MHz 5-1-15
DUT: Dipole 900 MHz D900V2; Type: D900V2; Serial: D900V2 -
Communication System: UID 0, CW (0); Communication System Band: D900 (900.0 MHz); Frequency: 900 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used: σ = 0 S/m, ε_r = 1; ρ = 1000 kg/m^3 , Medium parameters used: f = 900 MHz; σ = 1.02 S/m; ε_r = 56.372; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY Configuration:

- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

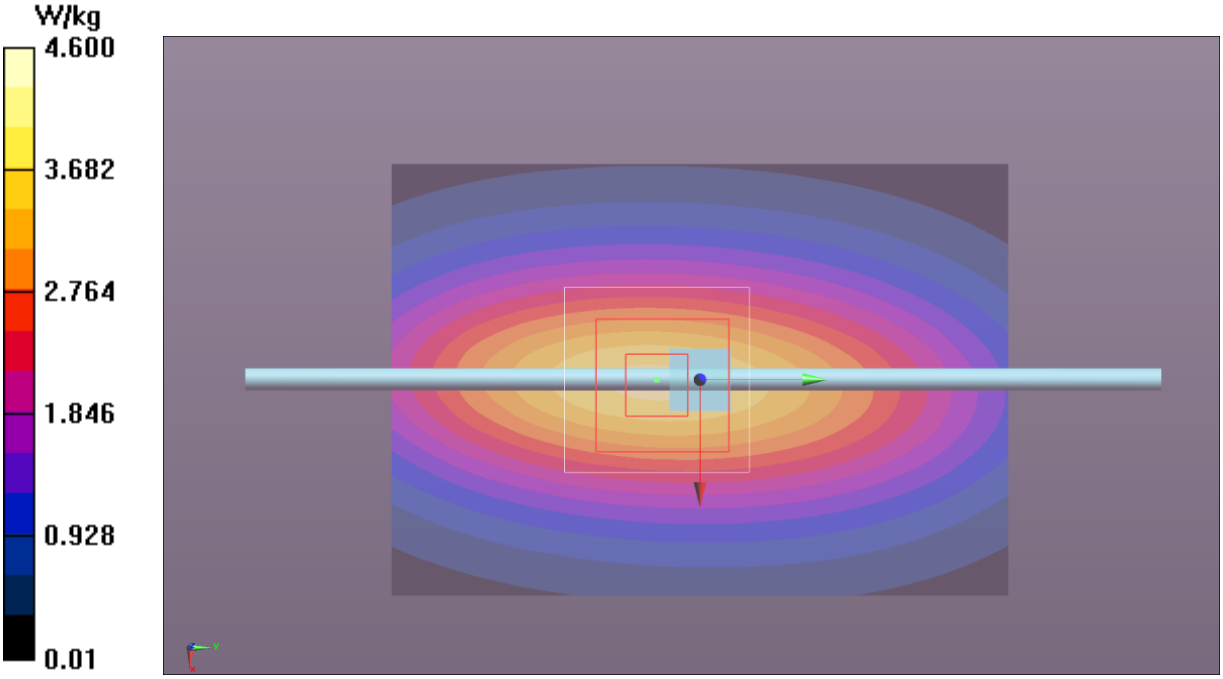
System Check/System Check/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of Total (measured) = 34.00 V/m

System Check/System Check/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 31.98 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 1.56 W/kg
SAR(1 g) = 1.06 W/kg; SAR(10 g) = 0.693 W/kg
Maximum value of SAR (measured) = 1.06 W/kg

System Check/System Check/Area Scan (71x101x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 1.05 W/kg
Maximum value of SAR (measured) = 1.18 W/kg

Approved By

MSL900 System Check_900MHz 5-1-15



SAR SYSTEM VERIFICATION

NORTHWEST EMC
WSSV.2013.09.09

Tested By:	Ethan Schoonover	Room Temperature (°C):	23.6°C
Date:	5/4/2015	Liquid Temperature (°C):	23°C
Configuration:	1	Humidity (%RH):	42.3
		Bar. Pressure (mb):	1015 mb

MSL1900 System Check_1900MHz 5-4-15
DUT: Dipole 1900 MHz D1900V2; Type: D1900V2; Serial: D1900V2 -
Communication System: UID 10000, CW; Communication System Band: D1900 (1900.0 MHz); Frequency: 1900 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used: f = 1900 MHz; σ = 1.503 S/m; ε_r = 53.12; ρ = 1000 kg/m^3 , Medium parameters used: σ = 0 S/m, ε_r = 1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY Configuration:

- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

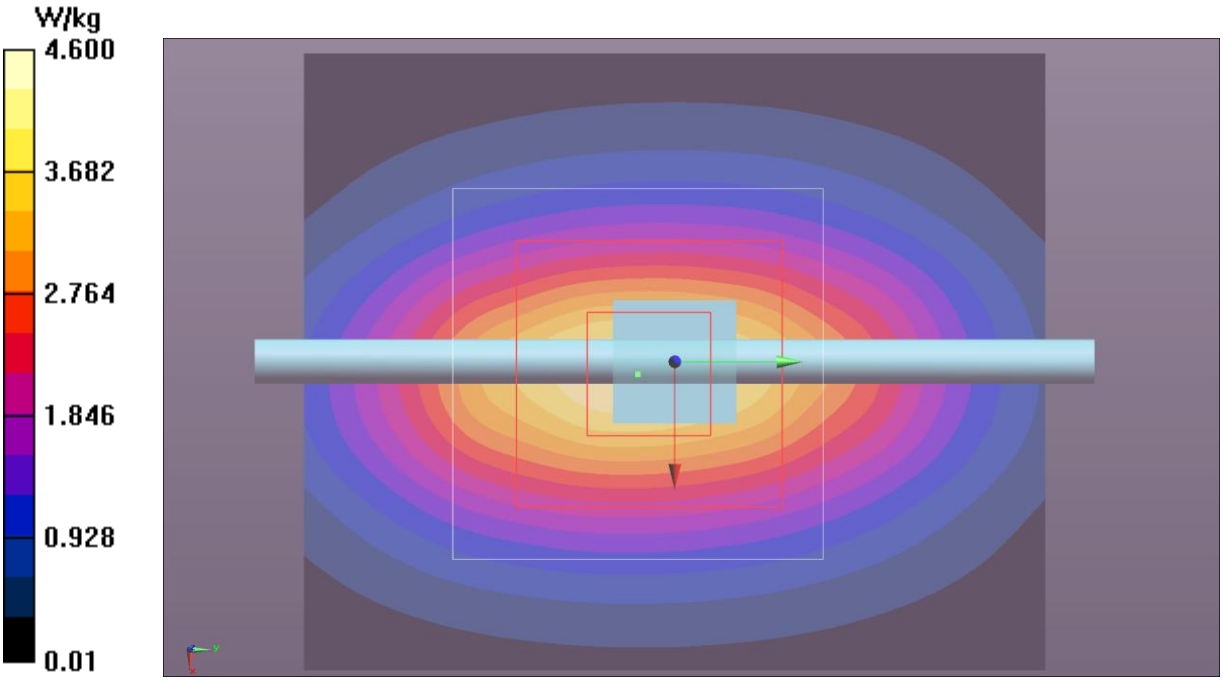
System Check/System Check/Area Scan (51x61x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 4.29 W/kg

System Check/System Check/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 52.80 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 7.56 W/kg
SAR(1 g) = 4.19 W/kg; SAR(10 g) = 2.22 W/kg
Maximum value of SAR (measured) = 4.23 W/kg

System Check/System Check/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of Total (measured) = 55.29 V/m
Maximum value of SAR (measured) = 4.60 W/kg

Approved By

MSL1900 System Check_1900MHz 5-4-15



SAR SYSTEM VERIFICATION

NORTHWEST EMC
WSSV.2013.09.09

Tested By:	Ethan Schoonover	Room Temperature (°C):	24.2°C
Date:	5/5/2015	Liquid Temperature (°C):	21.9°C
Configuration:	1	Humidity (%RH):	34.8%
		Bar. Pressure (mb):	1015 mb

MSL1750 System Check_1750MHz 5-5-15
DUT: Dipole 1750 MHz D1750V2; Type: D1750V2; Serial: D1750V2 -
Communication System: UID 0, CW (0); Communication System Band: D1750 (1750.0 MHz); Frequency: 1750 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used: σ = 0 S/m, ε_r = 1; ρ = 1000 kg/m^3 , Medium parameters used: f = 1750 MHz; σ = 1.483 S/m; ε_r = 52.066; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY Configuration:

- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

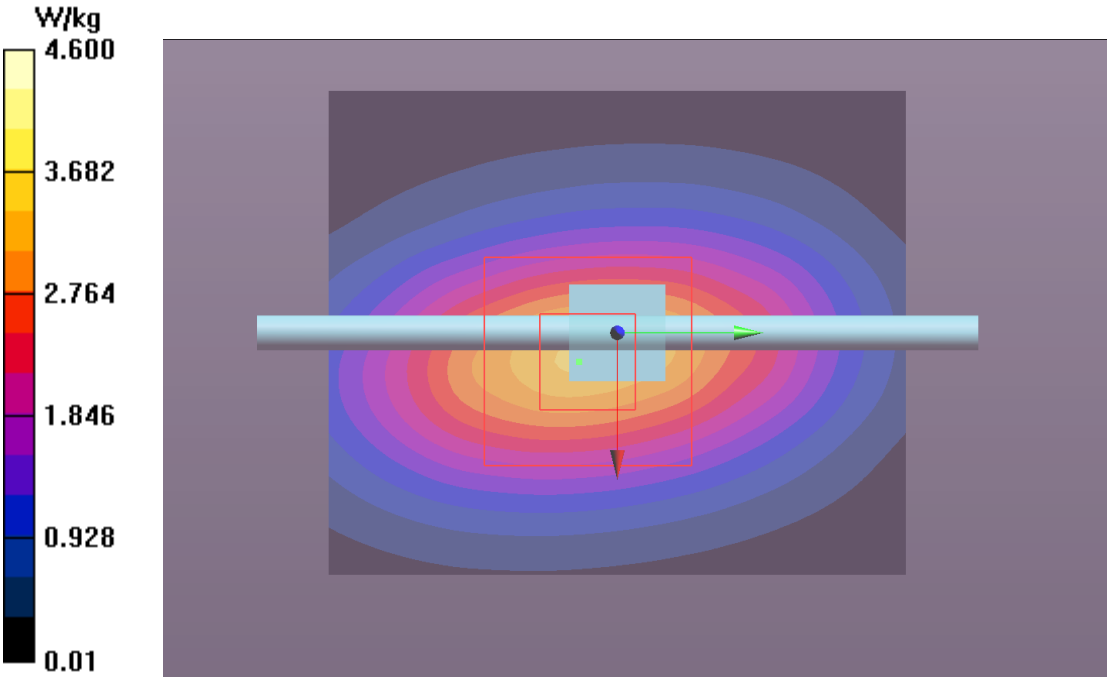
System Check/System Check/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of Total (measured) = 50.74 V/m

System Check/System Check/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 51.31 V/m; Power Drift = -0.11 dB
Peak SAR (extrapolated) = 6.74 W/kg
SAR(1 g) = 3.84 W/kg; SAR(10 g) = 2.07 W/kg
Maximum value of SAR (measured) = 3.89 W/kg

System Check/System Check/Area Scan (51x61x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 3.99 W/kg
Maximum value of SAR (measured) = 3.82 W/kg

Approved By

MSL1750 System Check_1750MHz 5-5-15



OUTPUT POWER

Only the channels and modulation for each band that produced the highest report SAR in the original cellular filings were tested for this configuration. An Anritsu test set, Model MT8820C, was used to control the EUT. The following software applications were installed on the test set:

GSM:	22.18 #006
W-CDMA:	22.30 #018
CDMA2000	22.24 #009

This provided all the necessary tools to operate the EUT in the prescribed manner without any difficulties or equipment limitations.

GPRS

Per FCC KDB 941225, "SAR must be measured according to these maximum output conditions"

- When multiple slots can be used, the device should be tested to account for the maximum source-based time-averaged output power. Measure GMSK and 8PSK modulations for both one and two time slots.

WCDMA

Per FCC KDB 941225, measurements for WCDMA, HSDPA, and HSUPA were made according to the procedures in section section 5.2 of 3GPP2 TS 34.121.

- Use the appropriate RMC or AMR with TPC (transmit power control) set to all "1"s for WCDMA/HSDPA or applying the required inner loop power control procedures to maintain maximum output power while HSUPA is active. Maximum output power for all applicable physical channel configurations (DPCCH, DPDCHn and spreading codes, HSDPA, HSPA) should be measured
- Voice mode is measured using a 12.2 kbps RMC with TPC bits configured to all "1"s.
- 12.2 kbps AMR is measured with a 3.4 kbps SRB (signaling radio bearer)
- HSPA is measured with HS-DPCCH, E-DPCCH and E-DPDCH all enabled and a 12.2 kbps RMC. FRC is configured according to HS-DPCCH Sub-Test 1 using H-set 1 and QPSK.

The Anritsu MT8820C test set was configured as follows:

WCDMA Rel99

- Set a 'Test Loop Mode' = Mode 1
- Set 'Signal Channel Coding' = Reference Measurement Channel
- Set 'Prioritized Max DL rate' = 12.2 k
- Set 'Power Control Bit Pattern' = (All 1)

OUTPUT POWER

EVDO Rel 0

Per FCC KDB 941225, measurements for EVDO Rel 0 were made according to the procedures in section 3.1.2.3.4 of 3GPP2 C.S0033-0/TIA-866. The results are tabulated on the following pages.

The Anritsu MT8820C test set was configured as follows:

- Set 'Standard:' = 1xEV-DO
- Set 'Output Level (Fwd) = -105.5 dBm/1.23 MHz
- Set 'Protocol Revision' = 0: IS-856-0
- Set 'Input Level Set mode' = Manual
- Set 'Input Level (Rev)' = 30 dBm
- Set 'Forward Link, Traffic Channel Data Rate' = 307.2 kbps (2 slot)
- Set 'Reverse Link, Data Channel Rate' = 153.6 kbps
- Access Parameters
    - Open Loop Adjust = 81
    - Probe Initial Adjust = 15
    - Probe Power Step = 7.5 dB
    - Probe Num Step = 15
    - Probe Sequence Max = 15

EVDO Rev A

For EVDO Rev A mode, measurements were made according to the procedures in section 4.3.4 of 3GPP2 C.S0033-A. The results are tabulated on the following pages.

The Anritsu MT8820C test set was configured as follows:

- Set 'Standard:' = 1xEV-DO
- Set 'Output Level (Fwd) = -60 dBm/1.23 MHz
- Set 'Protocol Revision' = A: IS-856-A
- Set 'Application Protocol' = FETAP +RETAP
- Set 'Input Level Set mode' = Manual
- Set 'Input Level (Rev)' = 30 dBm
- Set 'Forward Link, Traffic Channel Transmission Format = 0x04 (1024, 2, 128) : 307.2 kbps
- Access Parameters
    - Open Loop Adjust = 81
    - Probe Initial Adjust = 15
    - Probe Power Step = 7.5 dB
    - Probe Num Step = 15
    - Probe Sequence Max = 15

915 MHz RFID

The RFID Reader was tested using special test software provided by the manufacturer. The duty cycle was 100%. The channel with the highest conducted output power from the original grant was tested for SAR.

Output power measurements are on the following pages.

OUTPUT POWER

EUT:	IP30C RFID Reader with 70 Series Handheld Computers	Work Order:	INMC0920
Serial Number:	See configurations section of report	Date:	5/1/15
Customer:	Intermec Technologies Corporation	Temperature:	22.5°C
Attendees:	None	Relative Humidity:	40%
Customer Project:	None	Bar. Pressure:	1018mb
Tested By:	Jared Ison	Job Site:	EV06
Power:	3.7 VDC	Configuration:	INMC0920

TEST SPECIFICATIONS

Specification:	Method:
FCC 2.1093:2015	IEEE Std 1528:2003 FCC KDB 447498 D01 v05r02 FCC KDB 941225 D01 v03 FCC KDB 865664 D01 v01r03 and D02 v01r01

COMMENTS

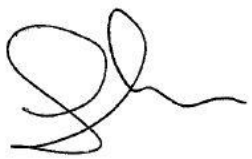
None

DEVIATIONS FROM TEST STANDARD

None

RESULTS

EUT	Radio	Frequency Band	Frequency (MHz)	Channel	Data Rate	Output Power (dBm)
IP30C	RFID	900	902.75	5	340	22.17
1000CP02S S/N 178U1191040	GPRS	Cellular	836.6	190	GMSK (CS-4)	33.07
1001CP01S S/N 28311047275	WCDMA	AWS 1700	1735.4	1427	12.2 kbps RMC	23.99
1000CP02S S/N 178U1191040	WCDMA	PCS	1852.4	9262	12.2 kbps RMC	24.37
1000CP01U S/N 7004	WCDMA	Cellular	836.6	4183	12.2 kbps RMC	22.23
1001CP01U S/N 06021444012	WCDMA	PCS	1880	9400	12.2 kbps RMC	24.13
1000CP01C S/N 24411047064	EVDO Rel 0	Cellular	836.52	384	FTAP 307.2 RTAP 153.6	24.08
1000CP02C S/N 24511047015	EVDO RevA	PCS	1880	600	FTAP 307.2 RETAP 4096	24.31



Tested By

OUTPUT POWER

EUT:	IP30C RFID Reader with 70 Series Handheld Computers	Work Order:	INMC0920
Serial Number:	See configurations section of report	Date:	5/11/15
Customer:	Intermec Technologies Corporation	Temperature:	22.5°C
Attendees:	None	Relative Humidity:	40%
Customer Project:	None	Bar. Pressure:	1018mb
Tested By:	Rod Peloquin	Job Site:	EV06
Power:	3.7 VDC	Configuration:	INMC0920

TEST SPECIFICATIONS

Specification:	Method:
FCC 2.1093:2015	IEEE Std 1528:2003 FCC KDB 447498 D01 v05r02 FCC KDB 941225 D01 v03 FCC KDB 865664 D01 v01r03 and D02 v01r01

COMMENTS

Non-standard setup based upon guidance from the FCC. The operational description contains additional information.

DEVIATIONS FROM TEST STANDARD

None

RESULTS

EUT	Radio	Frequency Band	Frequency (MHz)	Channel	Data Rate	Output Power (dBm)
IP30C	RFID	900	902.75	5	340	13.8

Tested By

Test Configurations

Test Locations

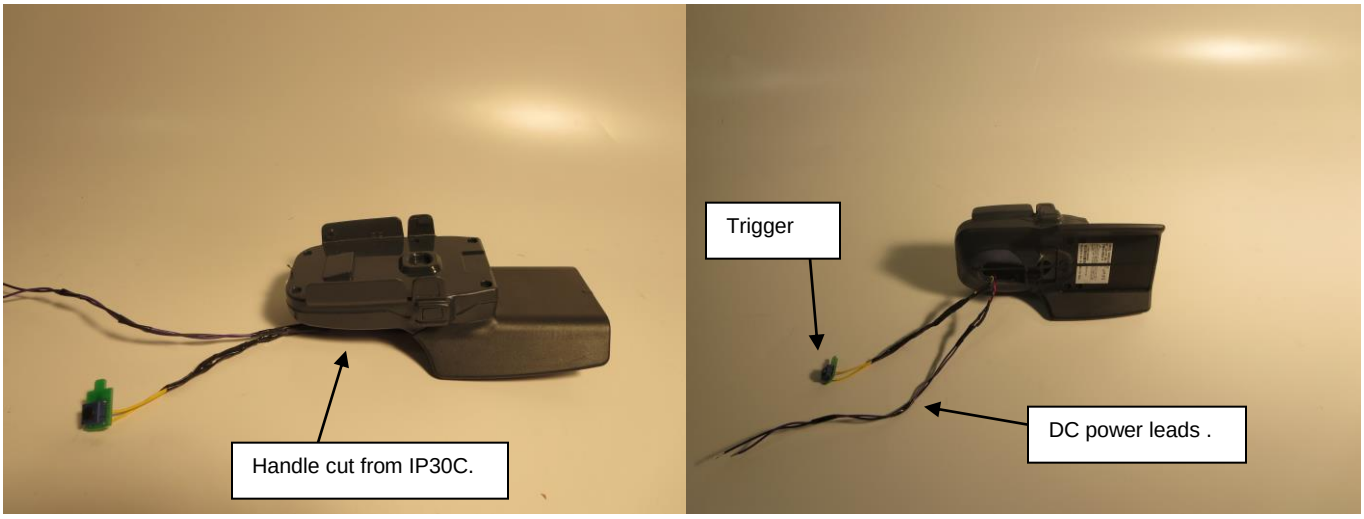
The IP30C RFID reader will only be used while held in the hand. The RFID reader transmits only when the trigger on the handle is pulled. This prevents transmission while near the head or torso. Separate MPE reports have been prepared to document compliance for body exposure.

Based upon the calculations of KDB 447498 D01 v05r02, Section 4.3.2, the standalone extremity SAR must be measured for the cellular and RFID radios. .

The photos below show that the RFID Reader is handheld using a plastic pistol grip. The battery fits into the handle. Nothing else is in the handle. The RFID Reader antenna is above and in front of the handle. An Intermec 70 series handheld computer is snapped on top of the RFID Reader. It contains Wi-Fi and Cellular radios. Bluetooth radios in the top of the Reader and in the handheld provide the communication link between the two devices.

For SAR testing the battery was removed from the handle and the DC power leads were extended to a laboratory power supply. The handle was cut along the line that represents the closest spacing of the antennas to the user's hand. With the handle removed, the RFID Reader with handheld computer unit was placed against the flat phantom with the cut placed at 0mm spacing. This provided the 9cm spacing to the handheld as seen in the photos and also representative spacing and orientation to the RFID antenna. The area scans and subsequent zoom scans were limited to an area near the handle and not extending along the length of the RFID antenna.

The battery was removed from handle, then the handle was cut along the dotted line so it could be placed against the flat phantom at the correct distance from the hand placement



Summary

The following table summarizes the measured SAR values. The EUT was transmitting at nearly 100% duty cycle.

Per FCC KDB 447498, the measured SAR values were scaled to the maximum tune-up tolerance limit. The results are referred to as the "Reported SAR" values. The following formula was used to calculate the linear SAR scaling factor:

SAR scaling factor = 10^((Maximum Rated Power[1] (dBm) - Measured Power (dBm)) / 10)

Per FCC KDB 447498, SAR must be measured on the channel with the highest conducted output power. When the SAR measured on the highest output channel is > 2.0 W/kg for 10-g, SAR evaluation for the other required test channels is necessary.

SAR TEST DATA

NORTHWEST EMC
WSTD.2013.09.09

EUT:	IP30C RFID Reader with 70 Series Handheld Computers	Work Order:	INMC0920
Customer:	Intermec Technologies Corporation	Job Site:	EV08
Attendees:	None	Customer Project:	None

TEST SPECIFICATIONS

Specification:	Method:
FCC 2.1093:2015	IEEE Std 1528:2003 FCC KDB 447498 D01 v05r02 FCC KDB 941225 D01 v03 FCC KDB 865664 D01 v01r03 and D02 v01r01

COMMENTS

A non-standard setup was used for SAR testing based on guidance from the FCC. The operational description contains additional information.

The extremity SAR limit for general population / uncontrolled exposure is 4 W/kg for 10-g.

DEVIATIONS FROM TEST STANDARD

None

EUT	Radio	Transmit Frequency (MHz)	Transmit Channel	Transmit Mode	Data Rate	Power Drift During Test (dB)	Measured Output Power (dBm)	Maximum Rated Output Power (dBm)	Power Scaling Factor	Measured SAR Level 10g (W/kg)	Reported SAR Level 10g (W/kg)	Test #
IP30C	RFID	902.75	5	PRASK	340	-0.53	13.8	30	41.69	0.075	3.17	9

SAR TEST DATA

Tested By:	Ethan Schoonover	Room Temperature (°C):	23.2
22.2	5/11/2015 3:06:17 PM	Liquid Temperature (°C):	22.2
Serial Number:	04201500003	Humidity (%RH):	49.8
Configuration:	INMC0920-	Bar. Pressure (mb):	1012
Comments:	None		

Test 9
DUT: RFID and Computer Combo; Type: IP30C; Communication System: UID 0, CW (0); Communication System Band: D900 (900.0 MHz); Frequency: 902.75 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used (interpolated): f = 902.75 MHz; σ = 1.032 S/m; ε_r = 56.956; ρ = 1000 kg/m^3 , Medium parameters used: σ = 0 S/m, ε_r = 1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY Configuration:

- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Body/Body/Reference scan (41x41x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.139 W/kg

Body/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 11.10 V/m; Power Drift = -0.53 dB
Peak SAR (extrapolated) = 0.138 W/kg
SAR(1 g) = 0.104 W/kg; SAR(10 g) = 0.075 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.116 W/kg

Body/Body/Area scan (41x41x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

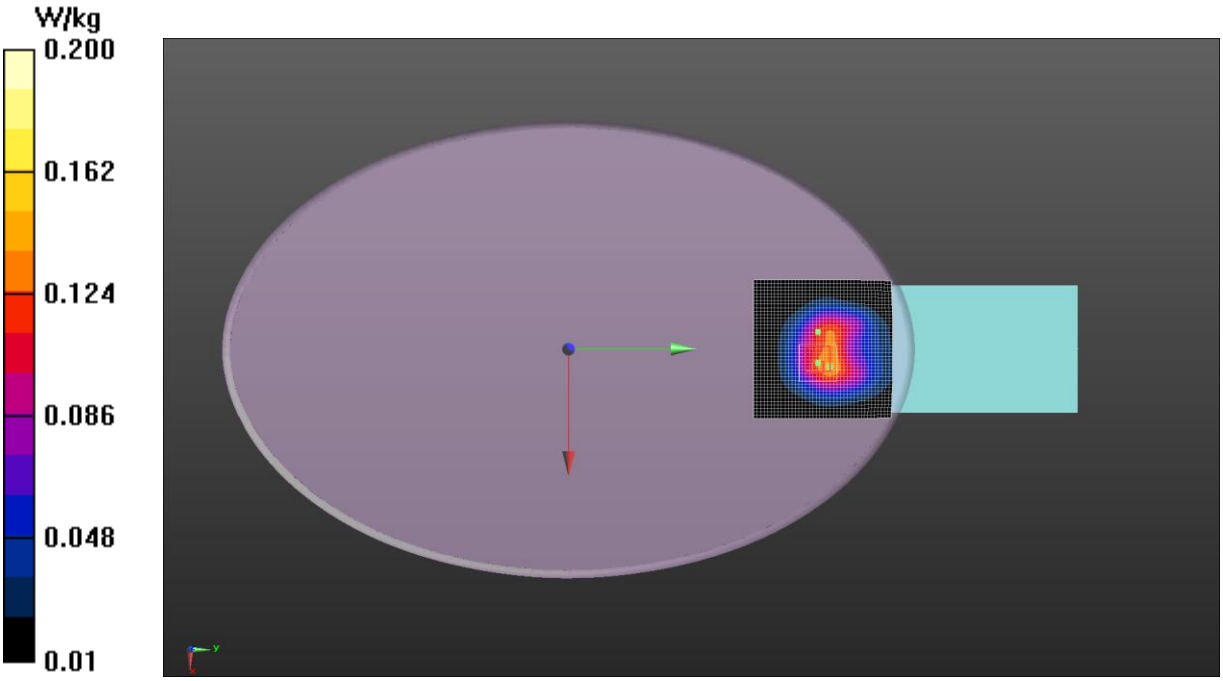
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.131 W/kg

Body/Body/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

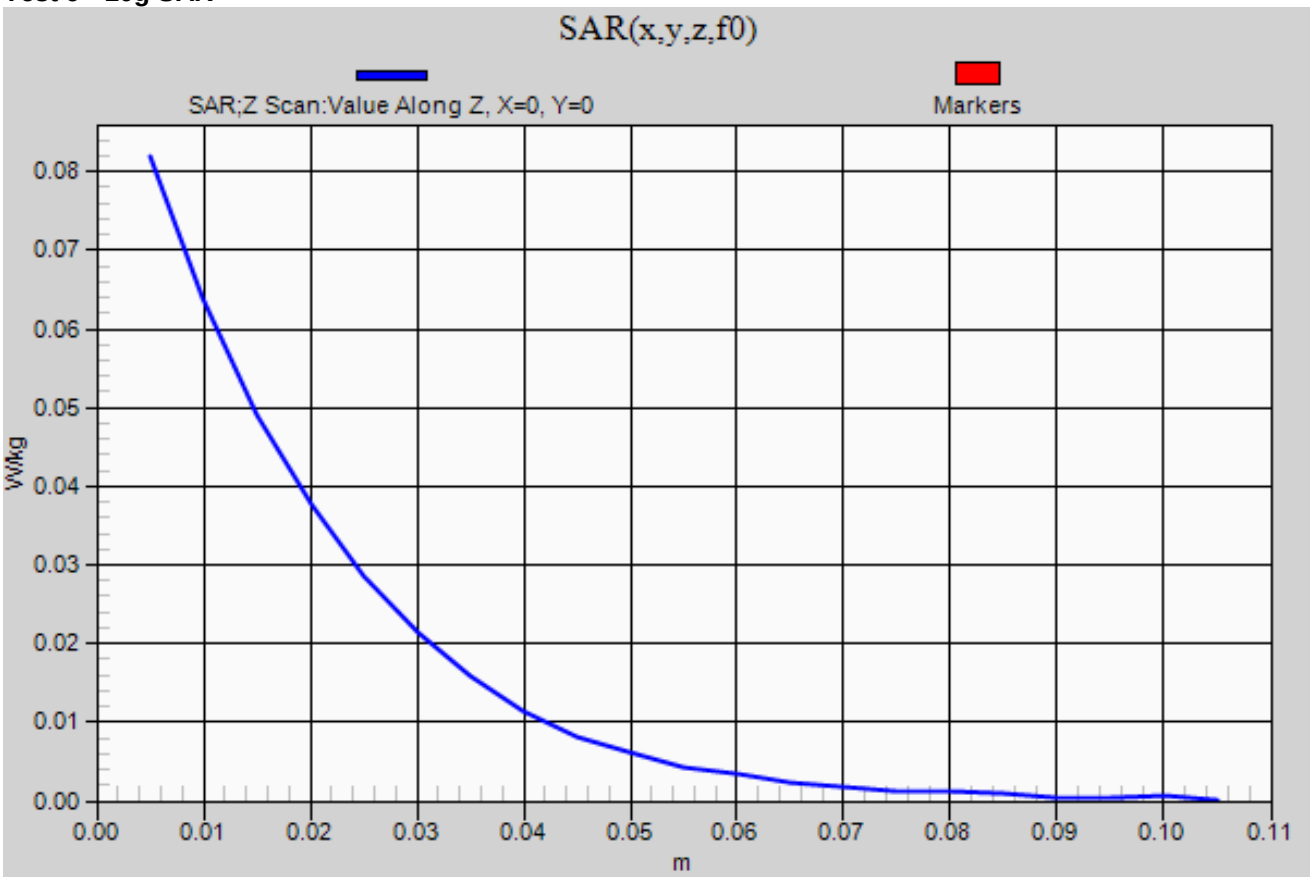
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of Total (measured) = 8.910 V/m
Maximum value of SAR (measured) = 0.0819 W/kg

Approved By

Test 9



Test 9 - 10g SAR



SAR TEST DATA

NORTHWEST EMC
WSTD.2013.09.09

EUT:	IP30C RFID Reader with 70 Series Handheld Computers	Work Order:	INMC0920
Customer:	Intermec Technologies Corporation	Job Site:	EV08
Attendees:	None	Customer Project:	None

TEST SPECIFICATIONS

Specification:	Method:
FCC 2.1093:2015	IEEE Std 1528:2003 FCC KDB 447498 D01 v05r02 FCC KDB 941225 D01 v03 FCC KDB 865664 D01 v01r03 and D02 v01r01

COMMENTS

Tested on flat phantom (body) with cut handle of IP30C at 0cm spacing. The extremity SAR limit for general population / uncontrolled exposure is 4 W/kg for 10-g.

DEVIATIONS FROM TEST STANDARD

None

RESULTS

EUT	Radio	Transmit Frequency (MHz)	Transmit Channel	Transmit Mode	Data Rate	Power Drift During Test (dB)	Measured Output Power (dBm)	Maximum Rated Output Power (dBm)	Power Scaling Factor	Measured SAR Level 10g (W/kg)	Reported SAR Level 10g (W/kg)	Test #
IP30C	RFID	902.75	5	PRASK	340	Note 1	22.17	30	6.07	0.076	0.46	1
1000CP02S S/N 178U1191040	UMTS	836.6	190	GPRS/ 1 slot	GMSK (CS-4)	0.07	33.07	34	1.24	0.01	0.01	2
1001CP01S S/N 28311047275	UMTS	1735.4	1427	WCDMA Test Loop 1	12.2 kbps RMC	Note 1	23.99	25	1.26	0.06	0.08	3
1000CP02S S/N 178U1191040	UMTS	1852.4	9262	WCDMA Test Loop 1	12.2 kbps RMC	Note 1	24.37	25	1.16	0.02	0.02	4
1000CP01U S/N 7004	UMTS	836.6	4183	WCDMA Test Loop 1	12.2 kbps RMC	-0.02	22.23	25	1.89	0.06	0.11	5
1001CP01U S/N 06021444012	UMTS	1880	9400	WCDMA Test Loop 1	12.2 kbps RMC	Note 1	24.13	25	1.22	0.03	0.04	6
1000CP01C S/N 24411047064	CDMA	836.52	384	EV-DO Rel 0	FTAP 307.2 RTAP 153.6	Note 1	24.08	25	1.24	0.06	0.07	7
1000CP02C S/N 24511047015	CDMA	1880	600	EV-DO Rev A	FTAP 307.2 RETAP 4096	0.03	24.31	25	1.17	0.02	0.02	8

Note 1: Due to the low value of measured SAR, the power drift measurement was made close to the measurement noise floor and is therefore inaccurate.

SAR TEST DATA

Tested By:	Jared Ison	Room Temperature (°C):	23.2
Date:	5/4/2015 9:44:25 AM	Liquid Temperature (°C):	22
Serial Number:	420150003	Humidity (%RH):	40.2
Configuration:	1	Bar. Pressure (mb):	1014
Comments:	None		

Test 1d
DUT: RFID and Computer Combo; Type: IP30C; Serial: 04201500003
Communication System: UID 0, CW (0); Communication System Band: D900 (900.0 MHz); Frequency: 902.75 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used (interpolated): f = 902.75 MHz; σ = 1.032 S/m; ε_r = 56.66; ρ = 1000 kg/m^3 , Medium parameters used: σ = 0 S/m, ε_r = 1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY Configuration:

- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Body/Body/Reference scan (41x51x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.0754 W/kg

Body/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.310 V/m; Power Drift = 0.39 dB
Peak SAR (extrapolated) = 0.167 W/kg
SAR(1 g) = 0.119 W/kg; SAR(10 g) = 0.076 W/kg

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.142 W/kg

Body/Body/Area scan (41x41x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

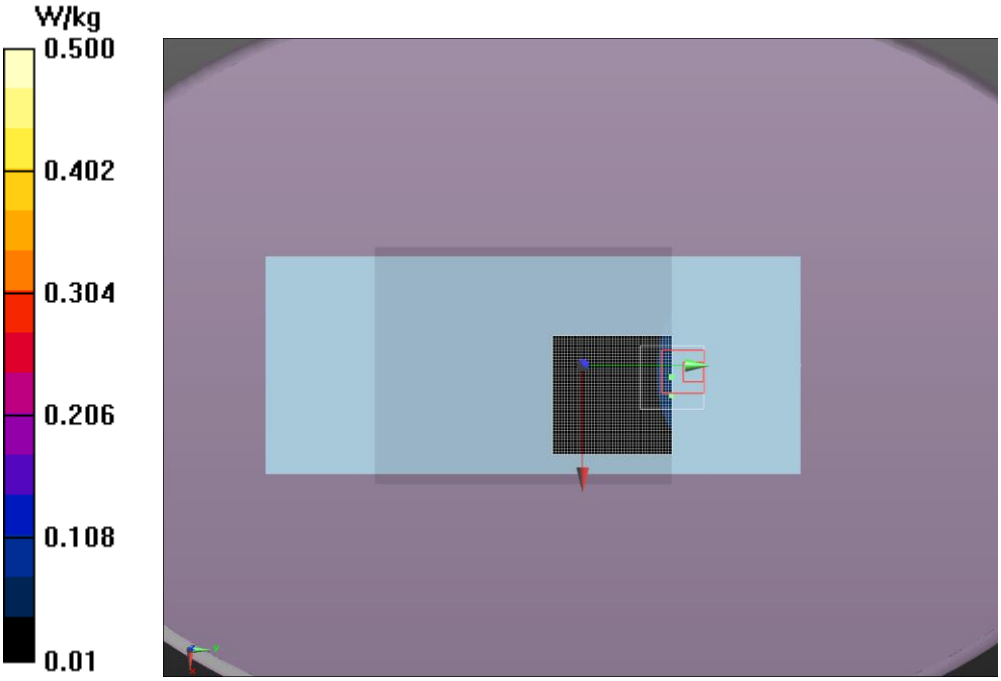
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.0801 W/kg

Body/Body/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of Total (measured) = 8.230 V/m
Maximum value of SAR (measured) = 0.0699 W/kg

Approved By

Test 1d



SAR TEST DATA

NORTHWEST EMC
WSTD.2013.09.09

Tested By:	Jared Ison	Room Temperature (°C):	23
Date:	5/4/2015	Liquid Temperature (°C):	22.3
Serial Number:	04201500003	Humidity (%RH):	40.6
Configuration:	2	Bar. Pressure (mb):	1015
Comments:	None		

Test 2
DUT: RFID and Computer Combo; Type: IP30C; Serial: 04201500003
Communication System: UID 0, CW (0); Communication System Band: D835 (835.0 MHz); Frequency: 836.6 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.965 S/m; ε_r = 57.196; ρ = 1000 kg/m^3 , Medium parameters used: σ = 0 S/m, ε_r = 1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY Configuration:

- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Body/Body/Reference scan (41x51x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.0212 W/kg

Body/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 4.637 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 0.0250 W/kg
SAR(1 g) = 0.019 W/kg; SAR(10 g) = 0.014 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.0212 W/kg

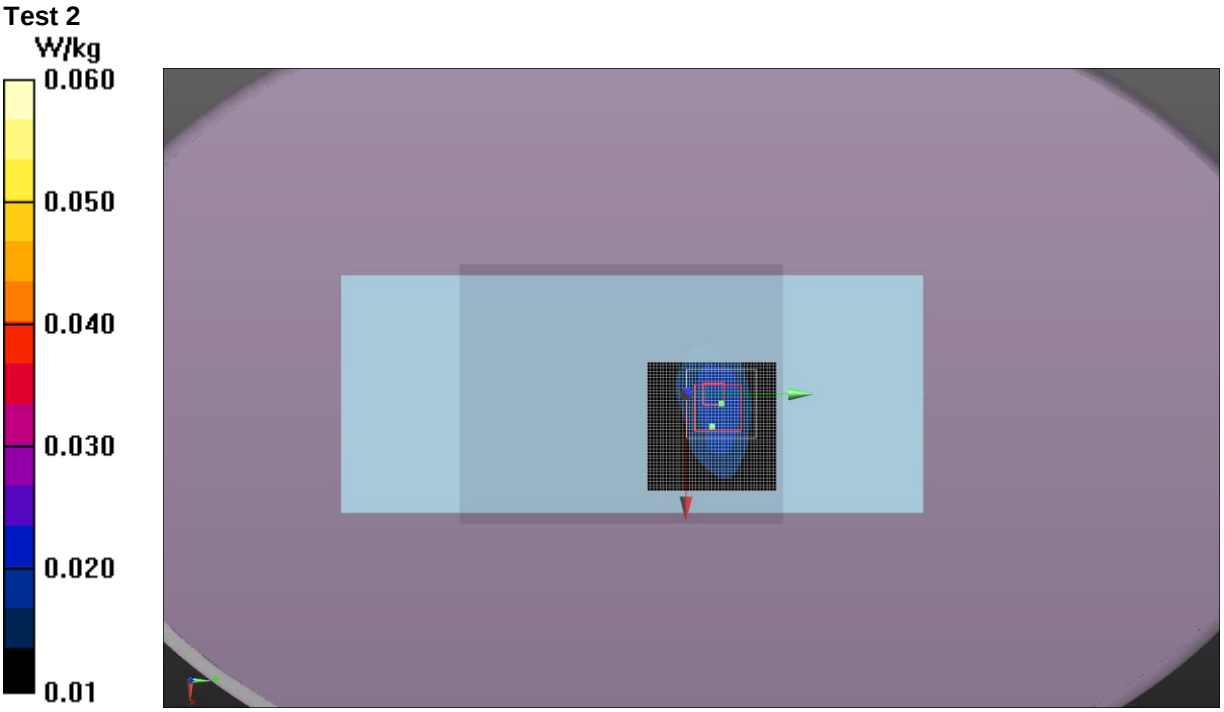
Body/Body/Area scan (41x41x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.0193 W/kg

Body/Body/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of Total (measured) = 3.962 V/m
Maximum value of SAR (measured) = 0.0151 W/kg

Approved By


Test 2
W/kg
0.060
0.050
0.040
0.030
0.020
0.01

SAR TEST DATA

Tested By:	Jared Ison	Room Temperature (°C):	24.2
Date:	5/5/2015	Liquid Temperature (°C):	21.9
Serial Number:	28311047275	Humidity (%RH):	34.8
Configuration:	3	Bar. Pressure (mb):	1019.3
Comments:	None		

Test 3
DUT: RFID and Computer Combo; Type: 1001CP01S; Serial: 28311047275
Communication System: UID 0, CW (0); Communication System Band: D1750 (1750.0 MHz); Frequency: 1735.4 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used (interpolated): f = 1735.4 MHz; σ = 1.467 S/m; ε_r = 52.123; ρ = 1000 kg/m^3 , Medium parameters used: σ = 0 S/m, ε_r = 1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY Configuration:

- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Body/Body/Reference scan (41x51x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.122 W/kg

Body/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.982 V/m; Power Drift = 0.98 dB
Peak SAR (extrapolated) = 0.154 W/kg
SAR(1 g) = 0.096 W/kg; SAR(10 g) = 0.060 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.118 W/kg

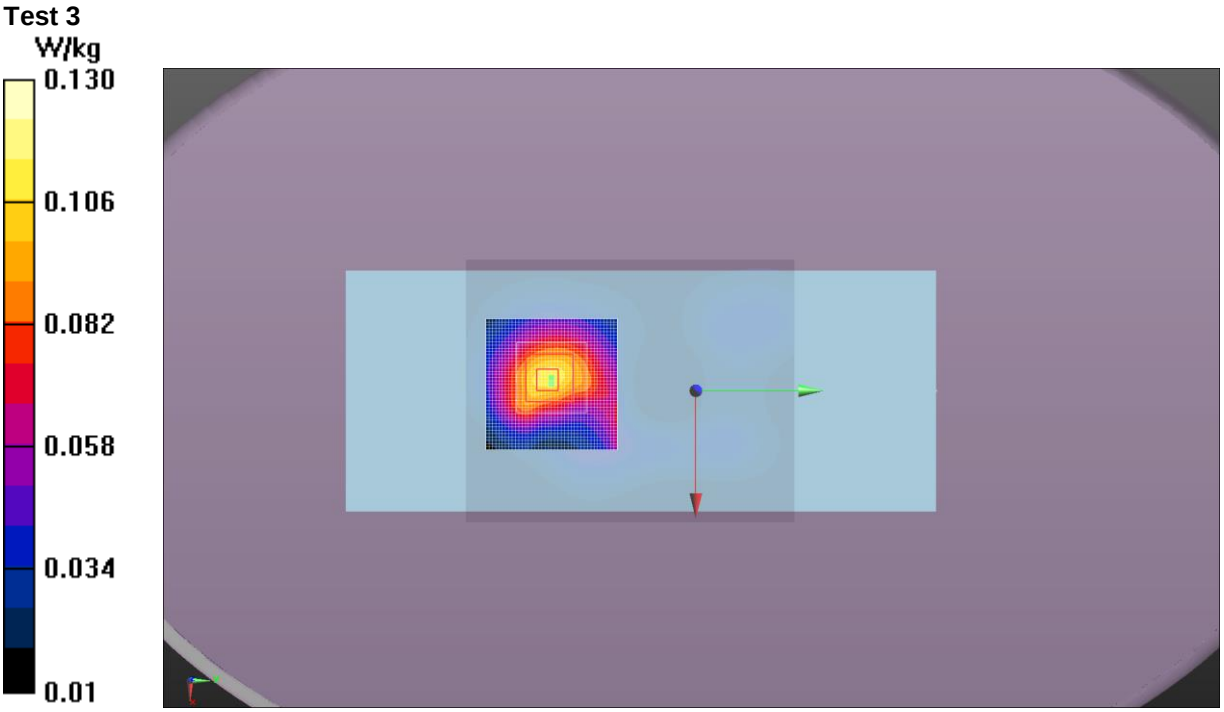
Body/Body/Area scan (41x41x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.112 W/kg

Body/Body/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of Total (measured) = 7.799 V/m
Maximum value of SAR (measured) = 0.0892 W/kg

Approved By


Test 3
W/kg
0.130
0.106
0.082
0.058
0.034
0.01

SAR TEST DATA

Tested By:	Jared Ison	Room Temperature (°C):	23.6
Date:	5/4/2015	Liquid Temperature (°C):	23
Serial Number:	178u1191040	Humidity (%RH):	42.3
Configuration:	4	Bar. Pressure (mb):	1015
Comments:	None		

Test 4
DUT: RFID and Computer Combo; Type: 1000CP02S; Serial: 178u1191040
Communication System: UID 0, CW (0); Communication System Band: D1900 (1900.0 MHz); Frequency: 1852.4 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used (interpolated): f = 1852.4 MHz; σ = 1.454 S/m; ε_r = 53.316; ρ = 1000 kg/m^3 , Medium parameters used: σ = 0 S/m, ε_r = 1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY Configuration:

- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Body/Body/Reference scan (41x51x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.0358 W/kg

Body/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.111 V/m; Power Drift = 4.16 dB
Peak SAR (extrapolated) = 0.0600 W/kg
SAR(1 g) = 0.036 W/kg; SAR(10 g) = 0.023 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.0427 W/kg

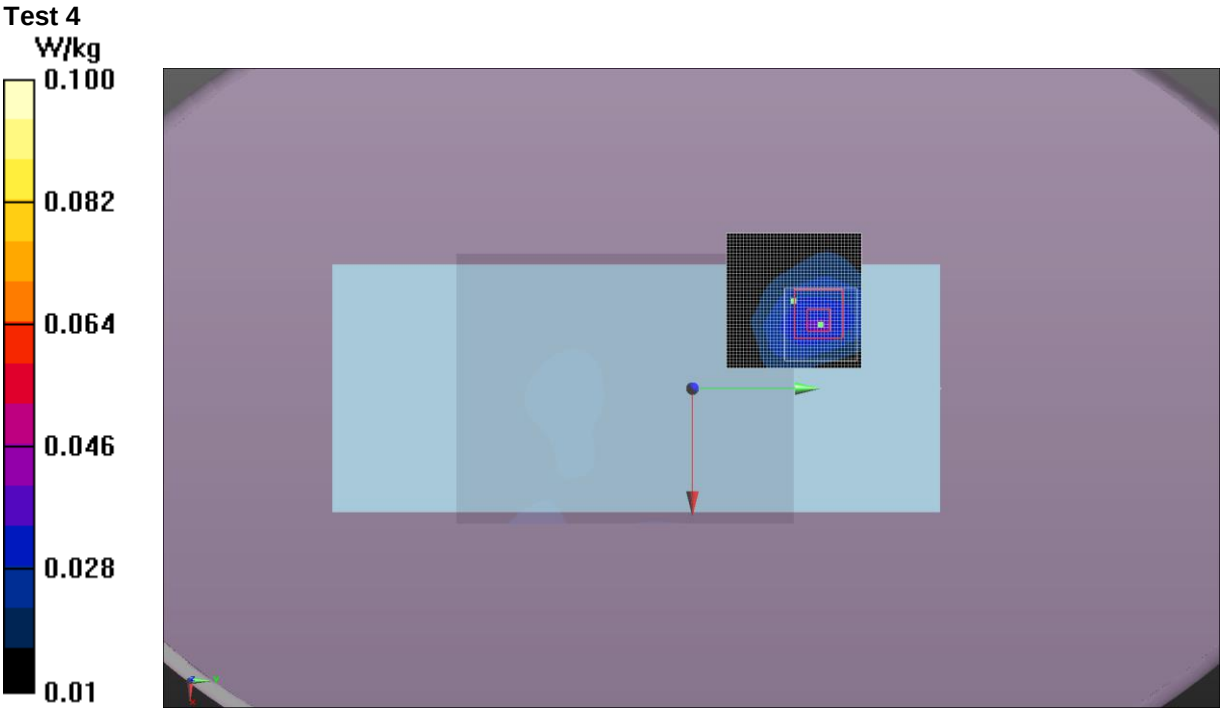
Body/Body/Area scan (41x41x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.0353 W/kg

Body/Body/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of Total (measured) = 6.514 V/m
Maximum value of SAR (measured) = 0.0617 W/kg

Approved By


Test 4
W/kg
0.100
0.082
0.064
0.046
0.028
0.01

SAR TEST DATA

Tested By:	Jared Ison	Room Temperature (°C):	23.8
Date:	5/4/2015	Liquid Temperature (°C):	22.3
Serial Number:	06521442001	Humidity (%RH):	40.6
Configuration:	5	Bar. Pressure (mb):	1015
Comments:	None		

Test 5
DUT: RFID and Computer Combo; Type: 1000CP01U; Serial: 06521442001
Communication System: UID 0, CW (0); Communication System Band: D835 (835.0 MHz); Frequency: 836.6 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.965 S/m; ε_r = 57.196; ρ = 1000 kg/m^3 , Medium parameters used: σ = 0 S/m, ε_r = 1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY Configuration:

- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Body/Body/Reference scan (41x51x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.107 W/kg

Body/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.17 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 0.109 W/kg
SAR(1 g) = 0.084 W/kg; SAR(10 g) = 0.062 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.0917 W/kg

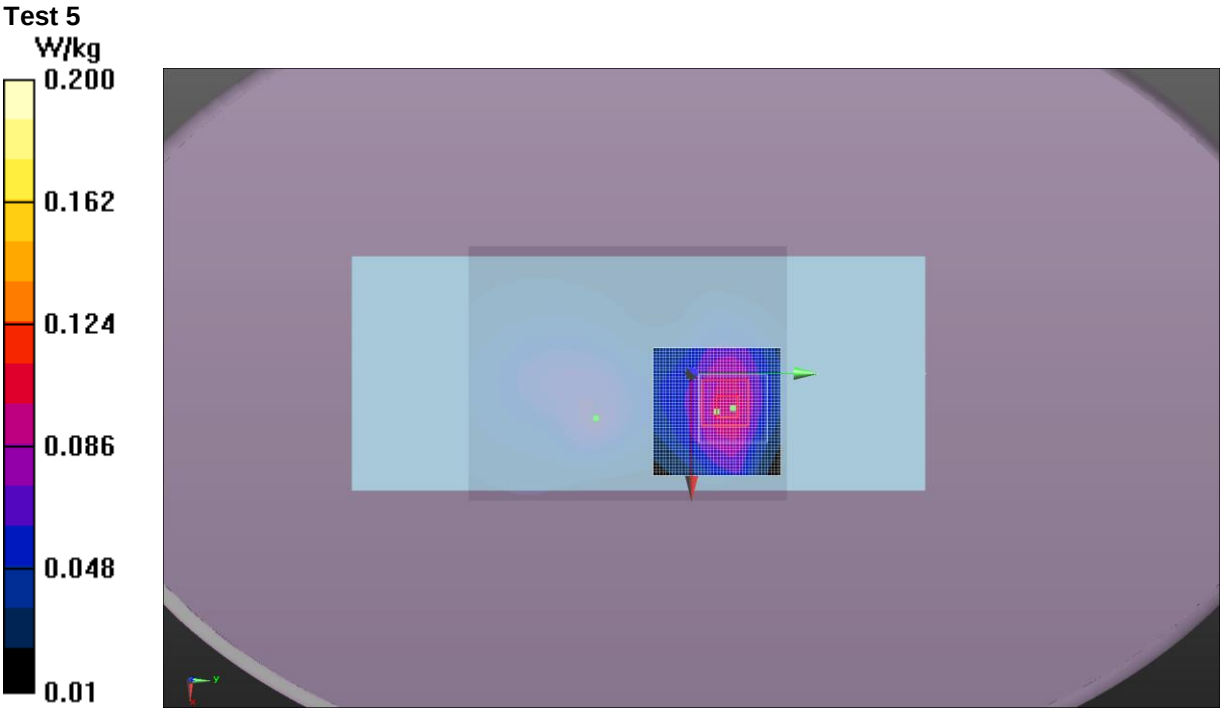
Body/Body/Area scan (41x41x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.0948 W/kg

Body/Body/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of Total (measured) = 8.638 V/m
Maximum value of SAR (measured) = 0.0720 W/kg

Approved By


Test 5
W/kg
0.200
0.162
0.124
0.086
0.048
0.01

SAR TEST DATA

Tested By:	Jared Ison	Room Temperature (°C):	24.2
Date:	5/5/2015	Liquid Temperature (°C):	21.9
Serial Number:	06021444012	Humidity (%RH):	34.8
Configuration:	6	Bar. Pressure (mb):	1019.3
Comments:	None		

Test 6
DUT: RFID and Computer Combo; Type: 1001CP01U; Serial: 06021444012
Communication System: UID 0, CW (0); Communication System Band: D1900 (1900.0 MHz); Frequency: 1880 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used: f = 1880 MHz; σ = 1.485 S/m; ε_r = 53.198; ρ = 1000 kg/m^3 , Medium parameters used: σ = 0 S/m, ε_r = 1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY Configuration:

- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

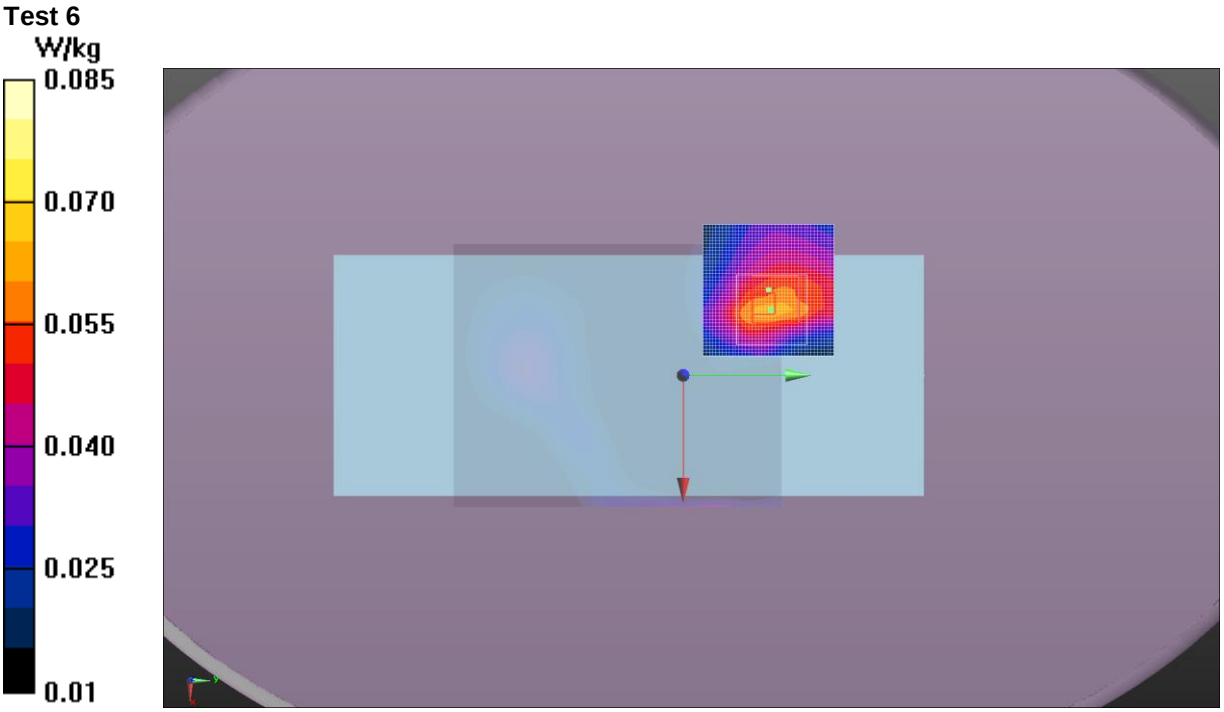
Body/Body/Reference scan (41x51x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm
Maximum value of SAR (interpolated) = 0.0697 W/kg

Body/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.637 V/m; Power Drift = -0.22 dB
Peak SAR (extrapolated) = 0.0660 W/kg
SAR(1 g) = 0.046 W/kg; SAR(10 g) = 0.032 W/kg
Maximum value of SAR (measured) = 0.0528 W/kg

Body/Body/Area scan (41x41x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.0635 W/kg

Body/Body/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of Total (measured) = 5.109 V/m
Maximum value of SAR (measured) = 0.0388 W/kg

Approved By


Test 6
W/kg
0.085
0.070
0.055
0.040
0.025
0.01

SAR TEST DATA

Tested By:	Jared Ison	Room Temperature (°C):	23
Date:	5/4/2015	Liquid Temperature (°C):	22.3
Serial Number:	178U1191040	Humidity (%RH):	40.6
Configuration:	7	Bar. Pressure (mb):	1015
Comments:	None		

Test 7
DUT: RFID and Computer Combo; Type: 1000CP01C; Serial: 178U1191040
Communication System: UID 0, CW (0); Communication System Band: D835 (835.0 MHz); Frequency: 836.52 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used (interpolated): f = 836.52 MHz; σ = 0.965 S/m; ε_r = 57.196; ρ = 1000 kg/m^3 , Medium parameters used: σ = 0 S/m, ε_r = 1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY Configuration:

- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Body/Body/Reference scan (41x51x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.107 W/kg

Body/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.53 V/m; Power Drift = -0.33 dB
Peak SAR (extrapolated) = 0.111 W/kg
SAR(1 g) = 0.086 W/kg; SAR(10 g) = 0.062 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.0949 W/kg

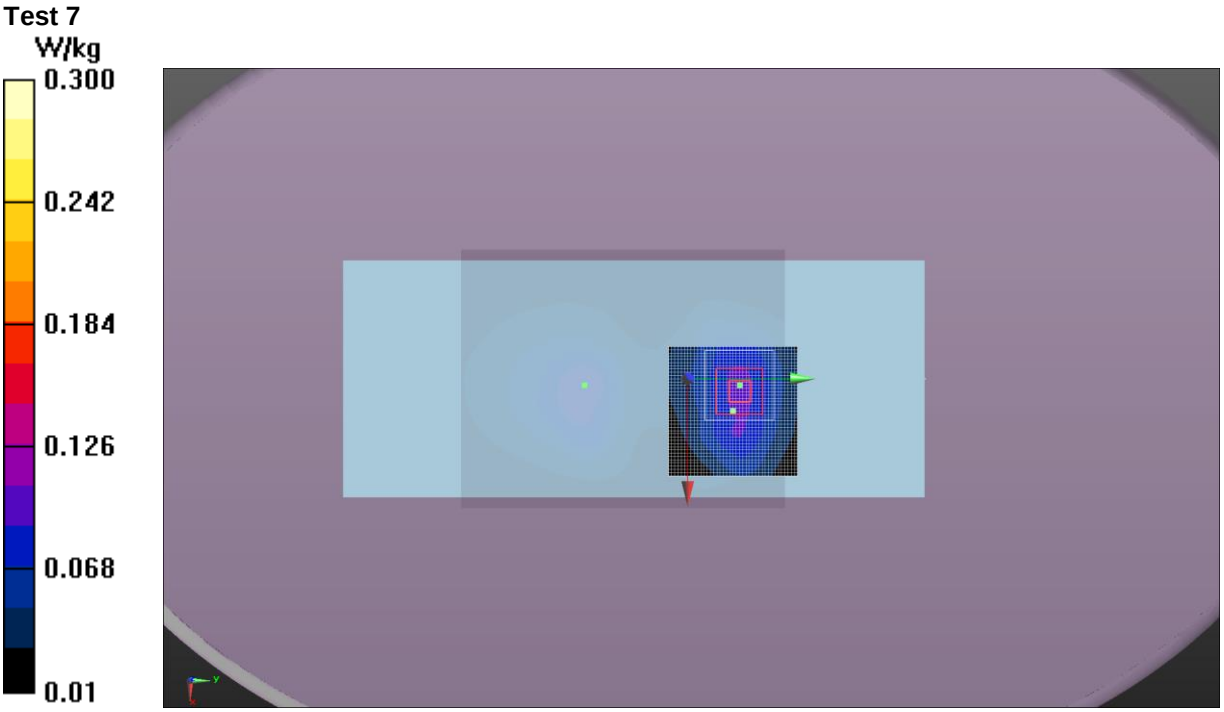
Body/Body/Area scan (41x41x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.0943 W/kg

Body/Body/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of Total (measured) = 8.763 V/m
Maximum value of SAR (measured) = 0.0741 W/kg

Approved By


Test 7
W/kg
0.300
0.242
0.184
0.126
0.068
0.01

SAR TEST DATA

Tested By:	Jared Ison	Room Temperature (°C):	24.2
Date:	5/5/2015	Liquid Temperature (°C):	21.9
Serial Number:	24511047015	Humidity (%RH):	34.8
Configuration:	8	Bar. Pressure (mb):	1019.3
Comments:	None		

Test 8
DUT: RFID and Computer Combo; Type: 1000CP02C; Serial: 24511047015
Communication System: UID 0, CW (0); Communication System Band: D1900 (1900.0 MHz); Frequency: 1880 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used: f = 1880 MHz; σ = 1.485 S/m; ε_r = 53.198; ρ = 1000 kg/m^3 , Medium parameters used: σ = 0 S/m, ε_r = 1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY Configuration:

- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Body/Body/Reference scan (41x51x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm
Maximum value of SAR (interpolated) = 0.0473 W/kg

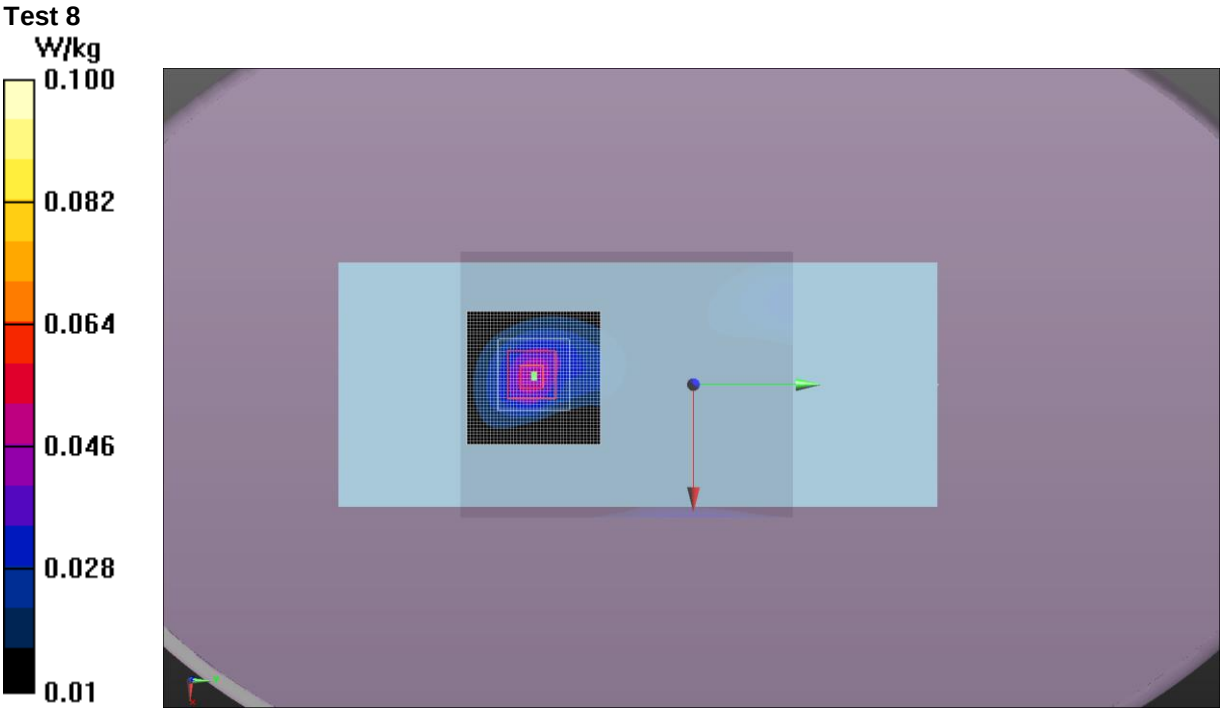
Body/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.911 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 0.0600 W/kg
SAR(1 g) = 0.038 W/kg; SAR(10 g) = 0.024 W/kg
Maximum value of SAR (measured) = 0.0458 W/kg

Body/Body/Area scan (41x41x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.0469 W/kg

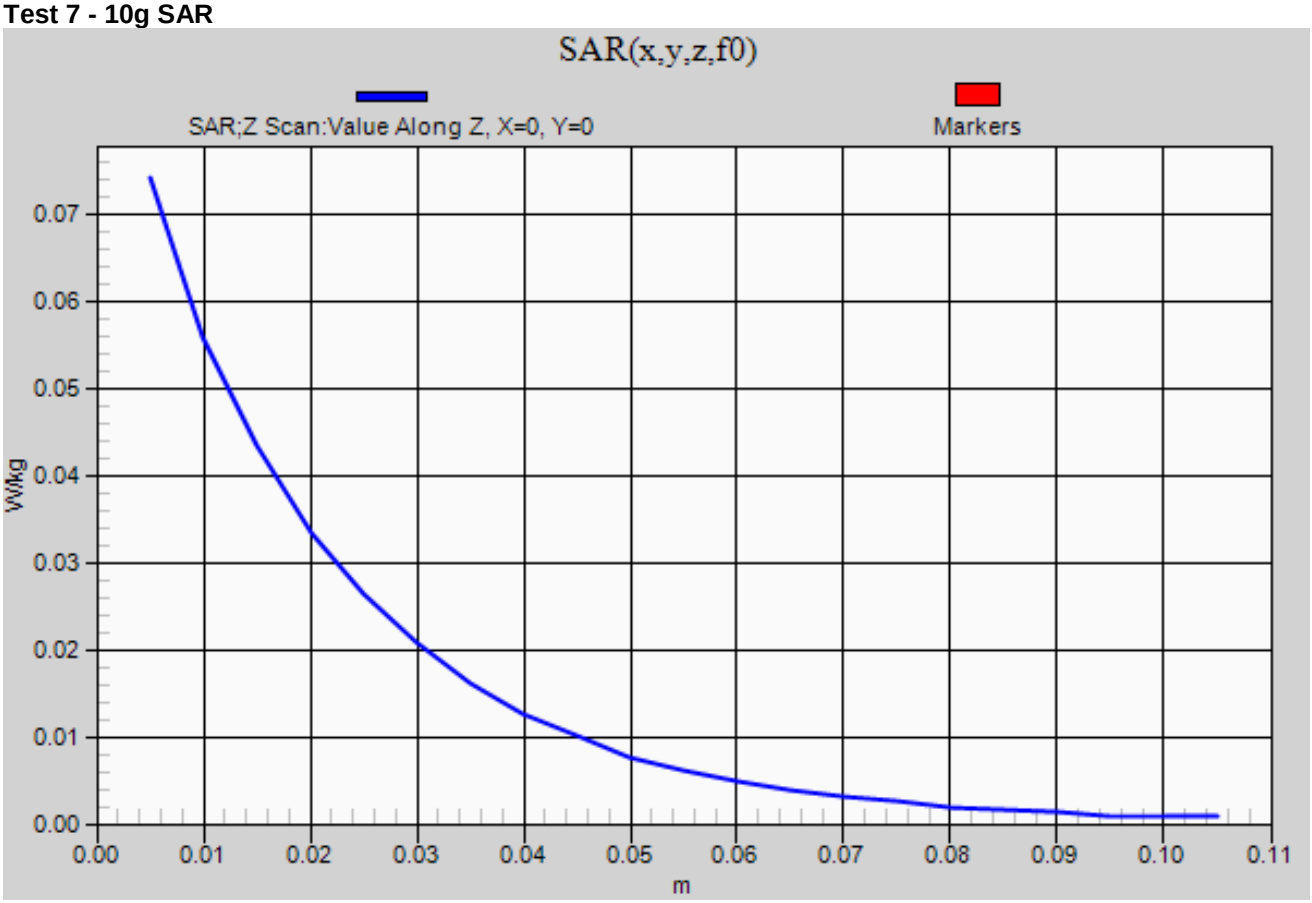
Body/Body/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of Total (measured) = 4.562 V/m
Maximum value of SAR (measured) = 0.0309 W/kg

Approved By

SAR TEST DATA



Test 7 - 10g SAR

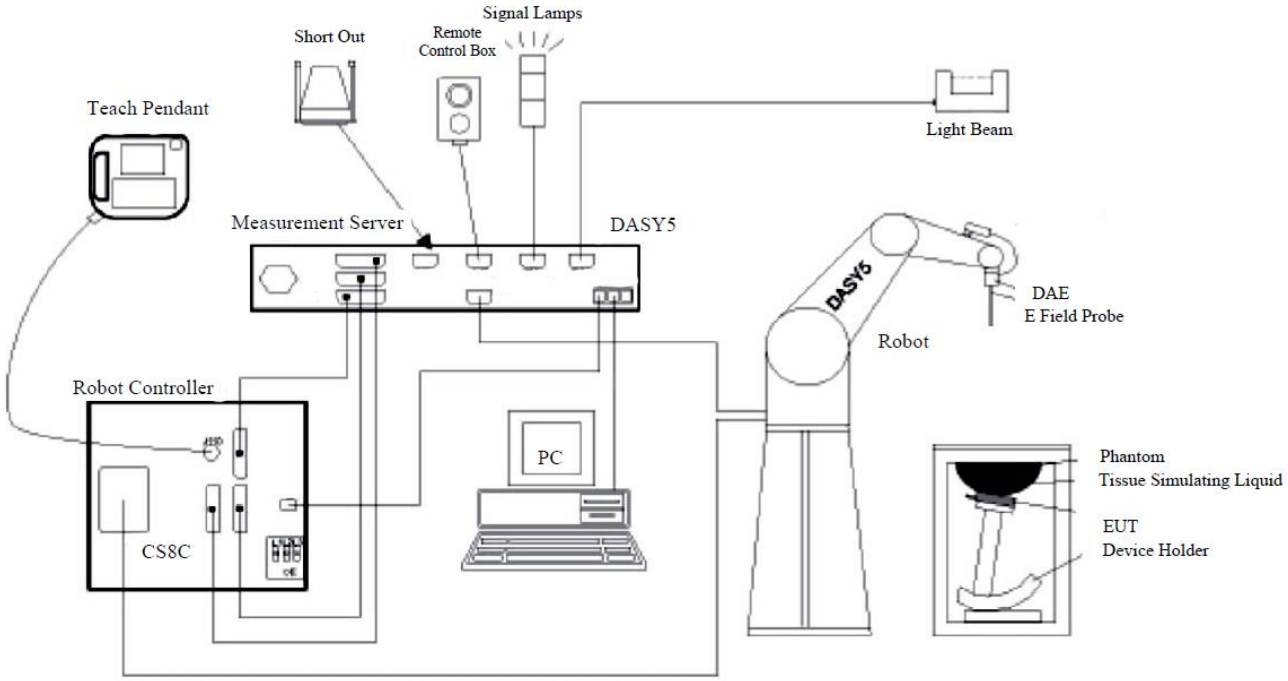


SAR MEASUREMENT SYSTEM

Schmid & Partner Engineering AG, DASY52

Northwest EMC selected the leader in SAR evaluation systems to provide the measurement tools for this evaluation. SPEAG's DASY52 is the fastest and most accurate scanner on the market. It is fully compatible with all world-wide standards for transmitters operating at the ear or within 20cm of the body. It provides full compatibility with IEC 62209-1, IEC 62209-2, IEEE 1528 as well as national adaptations such as FCC OET-65c and Korean Std. MIC #2000-93

The DASY52 system for performing compliance tests consists of the following items:



- A standard high precision 6-axis robot (Staubli TX=RX family) with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- An isotropic field probe optimized and calibrated for the targeted measurement.
- A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- The Electro-optical converter (EOC) performs the conversion from optical to electrical signals for the digital communication to the DAE. To use optical surface detection, a special version of the EOC is required. The EOC signal is transmitted to the measurement server.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
- A computer running WinXP and the DASY5 software.
- Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc.
- The SAM twin phantom, oval flat phantom, device holder, tissue simulating liquids, and validation dipole kits.

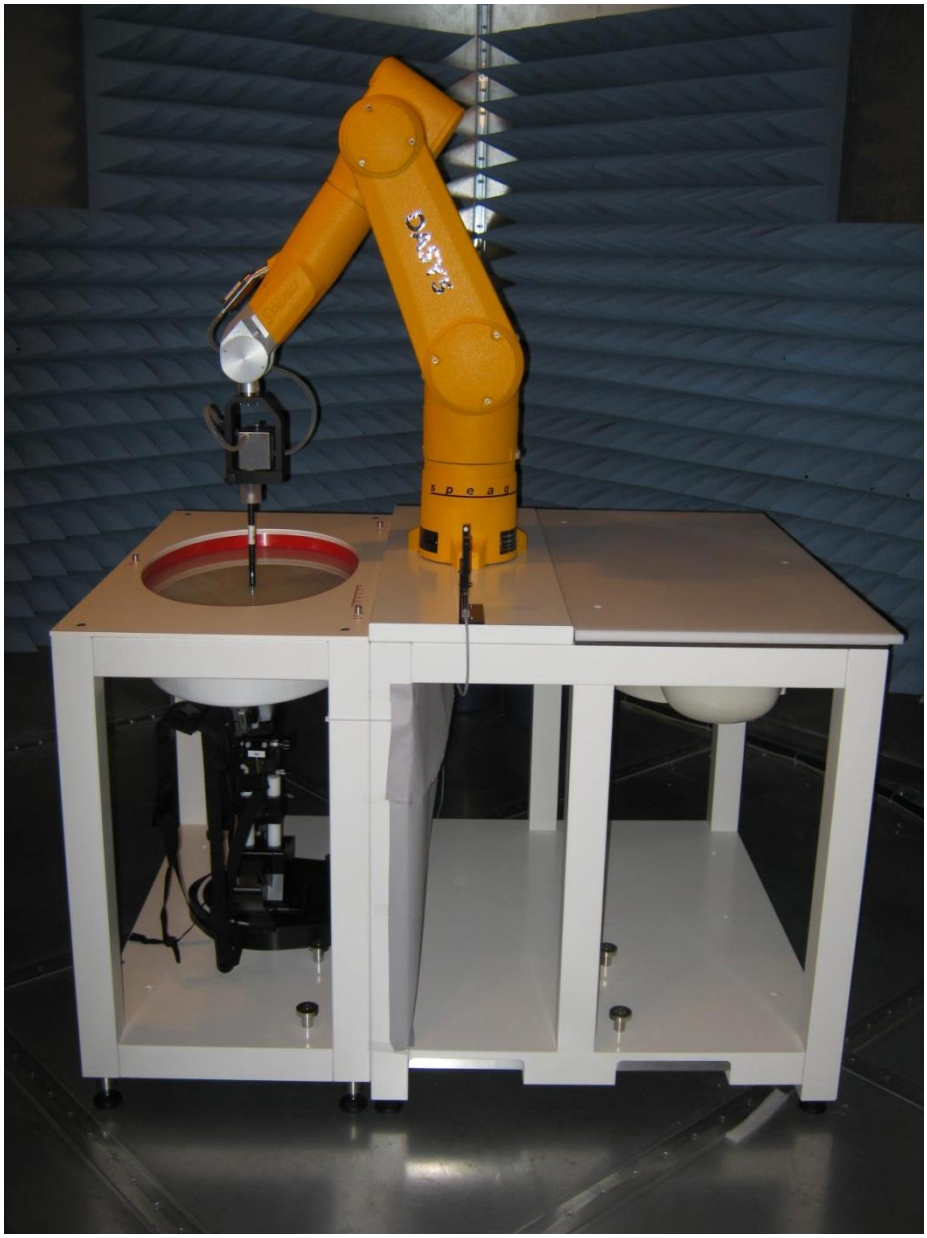
SYSTEM AND TEST SITE DESCRIPTION

TEST SITE

Northwest EMC, Lab EV08

The SAR measurement system is located in a semi-anechoic chamber. This provides an ambient free environment that also eliminates reflections.

The chamber is 12 ft wide by 16 ft long x 8 ft high. A dedicated HVAC unit provides +/- 1 degree C temperature control.



TEST EQUIPMENT

NORTHWEST EMC
WSEQ.13.09.09

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Amplifier	Mini Circuits	ZHL-5W-2G-S+	TRZ	NCR [1]	0 mo
Antenna, Dipole 1750MHz SAR	SPEAG	D1750v2	ADN	11/04/2014	12 mo
Antenna, Dipole 1900MHz Sar	SPEAG	D1900v2	ADO	11/03/2014	12 mo
Antenna, Dipole 900 MHz SAR	SPEAG	D900V2	ADP	11/03/2014	12 mo
Body Solution	SPEAG	MSL 900	SAT	At start of testing	
Body Solution	SPEAG	MSL 1750	SAQ	At start of testing	
Body Solution	SPEAG	MSL 1900	SAO	At start of testing	
DAE	SPEAG	SD 000 D04 EJ	SAH	11/03/2014	12 mo
DASY5 Measurement Server	Staeubli	DAYS5	SAK	11/01/2013	36 mo
Device Holder	SPEAG	N/A	SAW	NCR	0 mo
Dielectric Assessment Kit	SPEAG	DAKS:200	IPR	03/06/2014	36 mo
Light Beam Unit	SPEAG	SE UKS 030 AA	SAD	NCR	0 mo
Phantom, 2mm Oval ELI4 (Body)	SPEAG	QD OVA 001 BB	SAC	NCR	0 mo
Power Meter	Agilent	N1913A	SQR	10/30/2014	12 mo
Power Sensor	Agilent	E9300H	SQO	10/30/2014	12 mo
Radio Communication Analyzer	Anritsu	MT8820C	AFK	NCR	0 mo
RF Vector Signal Generator (FOR REFERENCE ONLY) with associated cables and attenuators	Agilent	V2920A	TIH	NCR [1]	0 mo
Robot Arm	Staeubli	TX60LSPEAG	SAA	NCR	0 mo
Robot Chasis and power Supply	Staeubli	N/A	SAJ	NCR	0 mo
Robot Controller	Staeubli	CS8C	SAI	NCR	0 mo
SAR Probe	SPEAG	ES3DV3	SAF	11/07/2014	12 mo
Thermometer	Omega Engineering, Inc.	HH311	DUI	01/26/2015	36 mo

Note 1: The output of the signal generator / amplifier is verified with the calibrated power meter listed above.

MEASUREMENT UNCERTAINTY

MEASUREMENT UNCERTAINTY BUDGETS PER IEEE 1528:2003

300-3000 MHz Range

Uncertainty Component	Tolerance (+/- %)	Probability Distribution	Divisor	c_i (1g)	c_i (10g)	u_i (1g) (+/-%)	u_i (10g) (+/-%)	v_i
Measurement System								
Probe calibration (k=1)	5.5	normal	1	1	1	5.5	5.5	∞
Axial isotropy	4.7	rectangular	1.732	0.707	0.707	1.9	1.9	∞
Hemispherical isotropy	9.6	rectangular	1.732	0.707	0.707	3.9	3.9	∞
Boundary effect	1.0	rectangular	1.732	1	1	0.6	0.6	∞
Linearity	4.7	rectangular	1.732	1	1	2.7	2.7	∞
System detection limits	1.0	rectangular	1.732	1	1	0.6	0.6	∞
Readout electronics	0.3	normal	1	1	1	0.3	0.3	∞
Response time	0.8	rectangular	1.732	1	1	0.5	0.5	∞
Integration time	2.6	rectangular	1.732	1	1	1.5	1.5	∞
RF ambient conditions - noise	1.7	rectangular	1.732	1	1	1.0	1.0	∞
RF Ambient Reflections	0.0	rectangular	1.732	1	1	0.0	0.0	∞
Probe positioner mechanical tolerance	0.4	rectangular	1.732	1	1	0.2	0.2	∞
Probe positioner with respect to phantom shell	2.9	rectangular	1.732	1	1	1.7	1.7	∞
Extrapolation, interpolation, and integration algorithms for max. SAR evaluation	1.0	rectangular	1.732	1	1	0.6	0.6	∞
Test Sample Related								
Device Positioning	2.9	normal	1	1	1	2.9	2.9	145
Device Holder	3.6	normal	1	1	1	3.6	3.6	5
Power Drift	5.0	rectangular	1.732	1	1	2.9	2.9	∞
Phantom and tissue parameters								
Phantom Uncertainty - shell thickness tolerances	4.0	rectangular	1.732	1	1	2.3	2.3	∞
Liquid conductivity - deviation from target values	5.0	rectangular	1.732	0.64	0.43	1.8	1.2	∞
Liquid conductivity - measurement uncertainty	6.5	normal	1	0.64	0.43	4.2	2.8	∞
Liquid permittivity - deviation from target values	5.0	rectangular	1.732	0.6	0.49	1.7	1.4	∞
Liquid permittivity - measurement uncertainty	3.2	normal	1	0.6	0.49	1.9	1.6	∞
Combined Standard Uncertainty		RSS				11.2	10.6	387
Expanded Measurement Uncertainty (95% Confidence/		normal (k=2)				22.5	21.2	