


	<u>Date(s) of Evaluation</u> May 23-28, 2012	<u>Test Report Serial No.</u> 051412ATH-T1174-S90V	<u>Test Report Revision No.</u> Rev. 1.1 (2nd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> August 28, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

DECLARATION OF COMPLIANCE		SAR RF EXPOSURE EVALUATION				FCC & IC		
Test Lab Information	Name	CELLTECH LABS INC.						
	Address	21-364 Lougheed Road, Kelowna, B.C. V1X 7R8 Canada						
Test Lab Accreditation(s)	A2LA	ISO/IEC 17025:2005 (A2LA Test Lab Certificate No. 2470.01)						
Applicant Information	Name	EF JOHNSON COMPANY						
	Address	123 N. State Street, Waseca, MN 56093 USA						
Standard(s) Applied	FCC	47 CFR §2.1093			IC	Health Canada Safety Code 6		
Procedure(s) Applied	FCC	OET Bulletin 65, Supplement C			FCC	KDB 447498 D01v04		
	FCC	KDB 643646 D01v01r01 (SAR Test Reduction Considerations for Occ. PTT Radios)						
	IC	RSS-102 Issue 4		IEEE	1528-2003		IEC	62209-2:2010
Device Classification(s)	FCC	Licensed Non-Broadcast Transmitter Held to Face (TNF) - FCC Part 90						
	IC	Land Mobile Radio Transmitter/Receiver (27.41-960 MHz) - RSS-119						
Device Identifier(s)	FCC ID:	ATH2425710			Application Type		FCC TCB Certification	
	IC:	933B-2425710			Application Type		IC CB Certification	
Date of Sample Receipt	May 14, 2012			Dates of Evaluation		May 23-28, 2012		
Device Description	Portable VHF Push-To-Talk (PTT) Radio Transceiver							
Mode(s) of Operation	Analog / Digital							
Device Model Name	Viking VP600							
Device Model No.	242-5710							
Device Model(s) Tested	Viking VP600							
Test Sample Serial No.	517001208620079							
Test Sample Revision No.s	Hardware	N/A			Firmware	N/A		
Transmit Frequency Range(s)	FCC	150.8 - 173.4 MHz			IC	138.0 - 144.0 MHz, 150.8 - 173.4 MHz		
Manufacturer's Rated Output Power	5 Watts Nominal Rated (Conducted)				Upper Tolerance Spec.		+ 0.25 Watts	
Antenna Type(s) Tested	(1) Helical Coil		P/N: 501-0017-101		Length: 8.0"		136-150 MHz	
	(2) Helical Coil		P/N: 501-0017-103		Length: 7.2"		150-162 MHz	
	(3) Helical Coil		P/N: 501-0017-105		Length: 6.5"		162-174 MHz	
	(4) Dipole		P/N: 501-0017-110		Length: 7.52"		136-174 MHz	
Battery Type(s) Tested	Lithium-ion		7.5 V		3600 mAh		P/N: 587-5700-374	
Body-worn Accessories Tested	Belt-Clip (metal hinge and clip)						P/N: 585-5100-128	
Audio Accessories Tested	Speaker-Microphone						P/N: 589-0015-073	
	Public Safety Speaker-Microphone (with antenna connector)						P/N: 585-5100-315	
Max. SAR Level(s) Evaluated	Face	FCC/IC	1.10 W/kg	1g	50% PTT duty factor		Occupational / Controlled Exp.	
	Body	FCC	2.20 W/kg	1g	50% PTT duty factor		Occupational / Controlled Exp.	
		IC	3.15 W/kg	1g	50% PTT duty factor		Occupational / Controlled Exp.	
FCC/IC Spatial Peak SAR Limit	Head & Body		8.0 W/kg	1g	50% PTT duty factor		Occupational / Controlled Exp.	
Celltech Labs Inc. declares under its sole responsibility that this wireless portable device has demonstrated compliance with the Specific Absorption Rate (SAR) RF exposure requirements specified in FCC 47 CFR §2.1093 and Health Canada Safety Code 6 for the Occupational / Controlled Exposure environment. The device was tested in accordance with the measurement procedures specified in FCC OET Bulletin 65, Supplement C (Edition 01-01), Industry Canada RSS-102 Issue 4, IEEE Standard 1528-2003 and IEC International Standard 62209-2:2010. All measurements were performed in accordance with the SAR system manufacturer recommendations.								
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.								
This test report shall not be reproduced partially, or in full, without the prior written approval of Celltech Labs Inc.								
The results and statements contained in this report pertain only to the device(s) evaluated.								
Test Report Approved By				Sean Johnston		Lab Manager		Celltech Labs Inc.

Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio Transceiver	Model:	Viking VP600	Freq.:	138 - 174 MHz	
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	<u>Test Report Issue Date</u> August 28, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

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Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio Transceiver	Model:	Viking VP600	Freq.:	138 - 174 MHz	
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REVISION HISTORY			
REVISION NO.	DESCRIPTION	IMPLEMENTED BY	RELEASE DATE
1.0	1st Release	Jon Hughes	May 30, 2012
1.1	2nd Release	Jon Hughes	August 28, 2012
	Corrected fluid typo on page 11		
	Added Measurement Uncertainty Table (IEC 62209-2) on page 24		

TEST REPORT SIGN-OFF			
DEVICE TESTED BY	REPORT PREPARED BY	QA REVIEW BY	REPORT APPROVED BY
Mike Meaker	Mike Meaker	Jon Hughes	Sean Johnston

Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio Transceiver	Model:	Viking VP600	Freq.:	138 - 174 MHz	
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1.0 INTRODUCTION

This measurement report demonstrates that the EF Johnson Company Model: Viking VP600 Portable VHF PTT Radio Transceiver 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 Occupational / Controlled Exposure environment. The measurement procedures described in FCC OET Bulletin 65, Supplement C 01-01 (see reference [3]), IC RSS-102 Issue 4 (see reference [4]), IEEE Standard 1528-2003 (see reference [5]), IEC 62209-1:2005 (see reference [6]) and IEC 62209-2:2010 (see reference [7]) were employed. A description of the device, operating configuration, detailed summary of the test results, methodology and procedures used in the evaluation, equipment used and the various provisions of the rules 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 head 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 uses a controller with a built in VME-bus computer.


3.0 RF CONDUCTED OUTPUT POWER MEASUREMENTS

MEASURED RF CONDUCTED OUTPUT POWER LEVELS

Band	Radio	Test Freq.	Mode	dBm	Watts	Method
IC	Viking VP600	138.0 MHz	CW	36.92	4.92	Average Conducted
IC	Viking VP600	144.0 MHz	CW	36.80	4.79	Average Conducted
FCC/IC	Viking VP600	150.8 MHz	CW	36.71	4.69	Average Conducted
FCC/IC	Viking VP600	156.4 MHz	CW	36.69	4.67	Average Conducted
FCC/IC	Viking VP600	158.3 MHz	CW	36.68	4.66	Average Conducted
FCC/IC	Viking VP600	162.0 MHz	CW	36.67	4.65	Average Conducted
FCC/IC	Viking VP600	165.9 MHz	CW	36.65	4.62	Average Conducted
FCC/IC	Viking VP600	167.7 MHz	CW	36.85	4.84	Average Conducted
FCC/IC	Viking VP600	173.4 MHz	CW	37.01	5.02	Average Conducted

Notes

- The test channels were selected in accordance with the procedures specified in FCC KDB 447498 Section 6) c) (see reference [8]).
- The RF conducted output power levels of the DUT were measured by Celltech prior to the SAR evaluations using a Gigatronics 8652A Universal Power Meter at the external antenna connector of the radio in accordance with FCC 47 CFR §2.1046 (see reference [14]) and IC RSS-Gen (see reference [15]).

Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio Transceiver	Model:	Viking VP600	Freq.:	138 - 174 MHz	
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4.0 FCC POWER THRESHOLDS FOR PTT DEVICES ($f \leq 0.5$ GHz)

FCC SAR Evaluation Power Thresholds for PTT Devices, $f \leq 0.5$ GHz*		
Exposure Conditions	P mW (General Population)	P mW (Occupational)
Held to face, $d \geq 2.5$ cm	250	1250
Body-worn, $d \geq 1.5$ cm	200	1000
Body-worn, $d \geq 1.0$ cm	150	750
1. The time-averaged output power, corresponding to the required PTT duty factor, is compared with these thresholds. 2. The closest distance between the user and the device or its antenna is used to determine the power thresholds. * Per FCC KDB 447498 D01v04 Section 5)b)i) (see reference [8]).		

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 [10]).

Probe Calibration Freq.	Device Measurement Freq.	Frequency Interval	± 25 MHz ≤ 300 MHz
150 MHz	138.0 MHz	12 MHz	< 25 MHz
	144.0 MHz	6 MHz	< 25 MHz
	150.8 MHz	0.8 MHz	< 25 MHz
	156.4 MHz	6.4 MHz	< 25 MHz
	158.3 MHz	8.3 MHz	< 25 MHz
	162.0 MHz	12 MHz	< 25 MHz
	165.9 MHz	15.9 MHz	< 25 MHz
	167.7 MHz	17.7 MHz	< 25 MHz
	173.4 MHz	23.4 MHz	< 25 MHz
Note: The probe calibration and measurement frequency interval is < 25 MHz; therefore additional steps were not required.			

6.0 NO. OF TEST CHANNELS (N_c)


Antenna Part No.	Antenna Type	Antenna Freq. Range	Band	N_c	Test Frequencies (MHz)
(1) 501-0017-101	Helical Coil	136 - 150 MHz	IC	2	138.0, 144.0
(2) 501-0017-103	Helical Coil	150 - 162 MHz	FCC/IC	3	150.8, 156.4, 162.0
(3) 501-0017-105	Helical Coil	162 - 174 MHz	FCC/IC	3	162.0, 167.7, 173.4
(4) 501-0017-110	Dipole	136 - 174 MHz	IC	2	138.0, 144.0
			FCC/IC	4	150.8, 158.3, 165.9, 173.4



Note: The number of test channels (N_c) were calculated in accordance with the procedures specified in FCC KDB 447498 Section 6) c) (see reference [8]).

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7.0 MANUFACTURER'S DISCLOSED ACCESSORY LISTING

Accessory ID # for Test Report	ACCESSORY CATEGORY: ANTENNA		
	Part Number	Description	Evaluated for SAR
1	501-0017-101	Helical Coil Antenna 136-150 MHz	Yes
2	501-0017-103	Helical Coil Antenna 150-162 MHz	Yes
3	501-0017-105	Helical Coil Antenna 162-174 MHz	Yes
4	501-0017-110	Dipole Antenna 136-174 MHz	Yes
Accessory ID # for Test Report	ACCESSORY CATEGORY: BATTERY		
	Part Number	Description	Evaluated for SAR
a	587-5700-374	Li-Ion, 7.5V, 3600mAh	Yes
Accessory ID # for Test Report	ACCESSORY CATEGORY: BODY-WORN		
	Part Number	Description	Evaluated for SAR
1	585-5100-128	Belt-Clip (contains metal)	Yes
Accessory ID # for Test Report	ACCESSORY CATEGORY: AUDIO		
	Part Number	Description	Evaluated for SAR
1	589-0015-073	Speaker Microphone	Yes
2	585-5100-315	Speaker Microphone with antenna	Yes


Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio Transceiver	Model:	Viking VP600	Freq.:	138 - 174 MHz	
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8.0 FLUID DIELECTRIC PARAMETERS

FLUID DIELECTRIC PARAMETERS						
Date: 05/23/2012		Frequency: 300 MHz			Tissue: Head	
Freq	Test_e	Test_s	Target_e	Target_s	Deviation Permittivity	Deviation Conductivity
0.200	52.15	0.78	45.3	0.87	15.12%	-10.34%
0.210	50.33	0.8	45.3	0.87	11.10%	-8.05%
0.220	49.55	0.8	45.3	0.87	9.38%	-8.05%
0.230	48.59	0.82	45.3	0.87	7.26%	-5.75%
0.240	49.14	0.81	45.3	0.87	8.48%	-6.90%
0.250	47.9	0.82	45.3	0.87	5.74%	-5.75%
0.260	47.91	0.83	45.3	0.87	5.76%	-4.60%
0.270	47.79	0.85	45.3	0.87	5.50%	-2.30%
0.280	46.69	0.85	45.3	0.87	3.07%	-2.30%
0.290	47.04	0.88	45.3	0.87	3.84%	1.15%
0.300	45.94	0.88	45.3	0.87	1.41%	1.15%
0.310	45.35	0.89	45.3	0.87	0.11%	2.30%
0.320	45.72	0.89	45.3	0.87	0.93%	2.30%
0.330	44.41	0.91	45.3	0.87	-1.96%	4.60%
0.340	44.72	0.91	45.3	0.87	-1.28%	4.60%
0.350	45.52	0.91	45.3	0.87	0.49%	4.60%
0.360	44.79	0.92	45.3	0.87	-1.13%	5.75%
0.370	43.21	0.93	45.3	0.87	-4.61%	6.90%
0.380	43.97	0.94	45.3	0.87	-2.94%	8.05%
0.390	42.86	0.95	45.3	0.87	-5.39%	9.20%
0.400	43.03	0.95	45.3	0.87	-5.01%	9.20%

Test Date	Fluid Type	Ambient Temperature	Fluid Temperature	Fluid Depth	Atmospheric Pressure	Relative Humidity	ρ (Kg/m ³)
May 23	300 Head	23.0°C	21.6°C	≥ 15 cm	101.1 kPa	30%	1000

Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio Transceiver	Model:	Viking VP600	Freq.:	138 - 174 MHz	
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FLUID DIELECTRIC PARAMETERS						
Date: 05/24/2012		Frequency: 150 MHz			Tissue: Head	
Freq	Test_e	Test_s	Target_e	Target_s	Deviation Permittivity	Deviation Conductivity
0.050	72.92	0.64	52.3	0.76	39.43%	-15.79%
0.060	68.79	0.7	52.3	0.76	31.53%	-7.89%
0.070	66.28	0.67	52.3	0.76	26.73%	-11.84%
0.080	64.36	0.67	52.3	0.76	23.06%	-11.84%
0.090	55.37	0.7	52.3	0.76	5.87%	-7.89%
0.100	60.4	0.7	52.3	0.76	15.49%	-7.89%
0.110	58.47	0.69	52.3	0.76	11.80%	-9.21%
0.120	57.13	0.69	52.3	0.76	9.24%	-9.21%
0.130	53.62	0.71	52.3	0.76	2.52%	-6.58%
0.138*	54.6	0.726	52.3	0.76	4.40%	-4.47%
0.140	54.9	0.73	52.3	0.76	4.97%	-3.95%
0.150	54.8	0.74	52.3	0.76	4.78%	-2.63%
0.1508*	54.7	0.739	52.3	0.76	4.59%	-2.76%
0.160	53.68	0.73	52.3	0.76	2.64%	-3.95%
0.170	54.04	0.75	52.3	0.76	3.33%	-1.32%
0.1734*	53.7	0.75	52.3	0.76	2.68%	-1.32%
0.180	53.1	0.75	52.3	0.76	1.53%	-1.32%
0.190	51.19	0.78	52.3	0.76	-2.12%	2.63%
0.200	49.51	0.76	52.3	0.76	-5.33%	0.00%
0.210	50.63	0.77	52.3	0.76	-3.19%	1.32%
0.220	49.31	0.78	52.3	0.76	-5.72%	2.63%
0.230	49.24	0.78	52.3	0.76	-5.85%	2.63%
0.240	48.69	0.8	52.3	0.76	-6.90%	5.26%
0.250	48.49	0.81	52.3	0.76	-7.28%	6.58%

* Interpolated using DASY4 software

Test Date	Fluid Type	Ambient Temperature	Fluid Temperature	Fluid Depth	Atmospheric Pressure	Relative Humidity	ρ (Kg/m ³)
May 24	150 Head	23.0°C	21.6°C	≥ 15 cm	101.1 kPa	30%	1000
May 25**	150 Head	22.0°C	21.6°C	≥ 15 cm	101.1 kPa	30%	1000


** The SAR evaluations on May 25 were performed within 24 hours of the fluid dielectric parameter measurement on May 24

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Test Lab Certificate No. 2470.01				

FLUID DIELECTRIC PARAMETERS						
Date: 05/25/2012		Frequency: 150 MHz			Tissue: Body	
Freq	Test_e	Test_s	Target_e	Target_s	Deviation Permittivity	Deviation Conductivity
0.050	72.56	0.7	61.9	0.8	17.22%	-12.50%
0.060	76.67	0.72	61.9	0.8	23.86%	-10.00%
0.070	75.53	0.73	61.9	0.8	22.02%	-8.75%
0.080	68.88	0.71	61.9	0.8	11.28%	-11.25%
0.090	71.78	0.73	61.9	0.8	15.96%	-8.75%
0.100	69.59	0.72	61.9	0.8	12.42%	-10.00%
0.110	66.68	0.72	61.9	0.8	7.72%	-10.00%
0.120	65.93	0.76	61.9	0.8	6.51%	-5.00%
0.130	64.11	0.76	61.9	0.8	3.57%	-5.00%
0.138*	62.5	0.76	61.9	0.8	0.97%	-5.00%
0.140	62.14	0.76	61.9	0.8	0.39%	-5.00%
0.150	62.87	0.77	61.9	0.8	1.57%	-3.75%
0.1508*	63	0.771	61.9	0.8	1.78%	-3.63%
0.160	64.83	0.78	61.9	0.8	4.73%	-2.50%
0.170	62.62	0.79	61.9	0.8	1.16%	-1.25%
0.1734*	62.6	0.79	61.9	0.8	1.13%	-1.25%
0.180	62.51	0.79	61.9	0.8	0.99%	-1.25%
0.190	60.46	0.79	61.9	0.8	-2.33%	-1.25%
0.200	61.62	0.8	61.9	0.8	-0.45%	0.00%
0.210	62.18	0.81	61.9	0.8	0.45%	1.25%
0.220	60.2	0.82	61.9	0.8	-2.75%	2.50%
0.230	60.14	0.82	61.9	0.8	-2.84%	2.50%
0.240	60.65	0.84	61.9	0.8	-2.02%	5.00%
0.250	59.52	0.84	61.9	0.8	-3.84%	5.00%

*Interpolated using DASY4 software


Test Date	Fluid Type	Ambient Temperature	Fluid Temperature	Fluid Depth	Atmospheric Pressure	Relative Humidity	ρ (Kg/m ³)
May 25	150 Body	22.0°C	22.1°C	≥ 15 cm	101.1 kPa	30%	1000

Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio Transceiver	Model:	Viking VP600	Freq.:	138 - 174 MHz	
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	<u>Test Report Issue Date</u> August 28, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	
Test Lab Certificate No. 2470.01				

FLUID DIELECTRIC PARAMETERS						
Date: 05/28/2012		Frequency: 300 MHz			Tissue: Head	
Freq	Test_e	Test_s	Target_e	Target_s	Deviation Permittivity	Deviation Conductivity
0.200	49.58	0.78	45.3	0.87	9.45%	-10.34%
0.210	50.5	0.78	45.3	0.87	11.48%	-10.34%
0.220	49.99	0.79	45.3	0.87	10.35%	-9.20%
0.230	49.3	0.8	45.3	0.87	8.83%	-8.05%
0.240	48.04	0.81	45.3	0.87	6.05%	-6.90%
0.250	47.54	0.82	45.3	0.87	4.94%	-5.75%
0.260	47.55	0.83	45.3	0.87	4.97%	-4.60%
0.270	47.71	0.84	45.3	0.87	5.32%	-3.45%
0.280	46.77	0.85	45.3	0.87	3.25%	-2.30%
0.290	45.51	0.85	45.3	0.87	0.46%	-2.30%
0.300	46.48	0.86	45.3	0.87	2.60%	-1.15%
0.310	45.63	0.87	45.3	0.87	0.73%	0.00%
0.320	45.89	0.88	45.3	0.87	1.30%	1.15%
0.330	45.35	0.89	45.3	0.87	0.11%	2.30%
0.340	44.97	0.9	45.3	0.87	-0.73%	3.45%
0.350	44.94	0.9	45.3	0.87	-0.79%	3.45%
0.360	43.81	0.9	45.3	0.87	-3.29%	3.45%
0.370	43.17	0.93	45.3	0.87	-4.70%	6.90%
0.380	43.97	0.91	45.3	0.87	-2.94%	4.60%
0.390	43.73	0.93	45.3	0.87	-3.47%	6.90%
0.400	42.9	0.94	45.3	0.87	-5.30%	8.05%

Test Date	Fluid Type	Ambient Temperature	Fluid Temperature	Fluid Depth	Atmospheric Pressure	Relative Humidity	ρ (Kg/m ³)
May 28	300 Head	22.0°C	21.9°C	≥ 15 cm	101.1 kPa	30%	1000


Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio Transceiver	Model:	Viking VP600	Freq.:	138 - 174 MHz	
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	<u>Test Report Issue Date</u> August 28, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

FLUID DIELECTRIC PARAMETERS						
Date: 05/28/2012		Frequency: 150 MHz			Tissue: Body	
Freq	Test_e	Test_s	Target_e	Target_s	Deviation Permittivity	Deviation Conductivity
0.050	84.13	0.73	61.9	0.8	35.91%	-8.75%
0.060	88.51	0.7	61.9	0.8	42.99%	-12.50%
0.070	73.18	0.73	61.9	0.8	18.22%	-8.75%
0.080	73.11	0.73	61.9	0.8	18.11%	-8.75%
0.090	70.62	0.71	61.9	0.8	14.09%	-11.25%
0.100	66.38	0.72	61.9	0.8	7.24%	-10.00%
0.110	64.78	0.75	61.9	0.8	4.65%	-6.25%
0.120	68.9	0.74	61.9	0.8	11.31%	-7.50%
0.130	63.69	0.74	61.9	0.8	2.89%	-7.50%
0.138*	64.4	0.764	61.9	0.8	4.04%	-4.50%
0.140	64.54	0.77	61.9	0.8	4.26%	-3.75%
0.150	63	0.78	61.9	0.8	1.78%	-2.50%
0.1508*	63.1	0.78	61.9	0.8	1.94%	-2.50%
0.160	64.3	0.78	61.9	0.8	3.88%	-2.50%
0.170	62.42	0.76	61.9	0.8	0.84%	-5.00%
0.1734*	62.4	0.763	61.9	0.8	0.81%	-4.63%
0.180	62.24	0.77	61.9	0.8	0.55%	-3.75%
0.190	63.51	0.77	61.9	0.8	2.60%	-3.75%
0.200	62.62	0.8	61.9	0.8	1.16%	0.00%
0.210	61.4	0.78	61.9	0.8	-0.81%	-2.50%
0.220	59.71	0.8	61.9	0.8	-3.54%	0.00%
0.230	59.79	0.82	61.9	0.8	-3.41%	2.50%
0.240	60.15	0.81	61.9	0.8	-2.83%	1.25%
0.250	60.07	0.82	61.9	0.8	-2.96%	2.50%

*Interpolated using DASY4 software


Test Date	Fluid Type	Ambient Temperature	Fluid Temperature	Fluid Depth	Atmospheric Pressure	Relative Humidity	ρ (Kg/m ³)
May 28	150 Body	22.0°C	21.8°C	≥ 15 cm	101.1 kPa	30%	1000

Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio Transceiver	Model:	Viking VP600	Freq.:	138 - 174 MHz	
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	<u>Test Report Issue Date</u> August 28, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	


9.0 SAR MEASUREMENT SUMMARY

TABLE 1				FACE-HELD SAR EVALUATION RESULTS				
Device-Under-Test				Viking VP600 VHF PTT Radio Transceiver				
Battery Acc. ID #				a				
Test Date(s)				May 24, 2012				
C				1	2	3	4	5
R	Antenna ID #	Test Freq. (MHz)	Conducted Power Before Test (W)	Plot #	Measured SAR (before droop) 1g (W/kg)		SAR Drift During Test	Scaled SAR (with droop) 1g (W/kg)
					PTT Duty Factor			PTT Duty Factor
					100%	50%	dB	50%
1	1 (IC only)	138.0	4.92	F1	2.12	1.06	-0.093	1.08
2		144.0	4.79	n/a				
3	2	150.8	4.69	F2	1.70	0.850	-0.066	0.863
4		156.4	4.67	n/a				
5		162.0	4.65	n/a				
6	3	162.0	4.65	n/a				
7		167.7	4.84	n/a				
8		173.4	5.02	F3	0.786	0.393	0.079	N/A
9	4 (IC only)	138.0	4.92	F4	0.281	0.141	0.033	N/A
10		144.0	4.79	n/a				
11	4	150.8	4.69	n/a				
12		158.3	4.66	n/a				
13		165.9	4.62	n/a				
14		173.4	5.02	F5	0.479	0.240	0.064	N/A
SAR LIMITS				HEAD		SPATIAL PEAK		RF EXPOSURE CATEGORY
FCC 47 CFR 2.1093		Health Canada Safety Code 6		8.0 W/kg		1 gram average		Occupational / Controlled
Notes								
C = Column; R = Row					Fx (F = Face) denotes the corresponding Face SAR Plot # as shown in Appendix A			
Test Mode = CW (Unmodulated Continuous Wave)					Phantom = Side Planar Phantom			
Front of DUT Distance to Planar Phantom (see Appendix D)					Shortest Antenna Distance to Planar Phantom (see Appendix D)			
					Antenna 1	Antenna 2	Antenna 3	Antenna 4
2.5 cm					4.5 cm	4.5 cm	4.5 cm	4.5 cm
Test Procedures in accordance with FCC KDB 643646 (see reference [9])								
1. When the head SAR of an antenna tested on the highest output power channel with the default battery is ≤ 3.5 W/kg, testing of all other required channels is not necessary.								
2. When test reduction applies, the data table entries for such configurations are denoted with n/a (not applicable).								

Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio Transceiver	Model:	Viking VP600	Freq.:	138 - 174 MHz	
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	<u>Test Report Issue Date</u> August 28, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	
Test Lab Certificate No. 2470.01				

TABLE 2				FACE-HELD SAR EVALUATION RESULTS				
Device-Under-Test				Speaker-Microphone with Antenna (P/N: 585-5100-315) connected to Viking VP600 VHF PTT Radio Transceiver				
Audio Acc. ID #				2				
Battery Acc. ID #				a				
Test Date(s)				May 25, 2012				
C				1	2	3	4	5
R	Antenna ID #	Test Freq. (MHz)	Conducted Power Before Test (W)	Plot #	Measured SAR (before droop) 1g (W/kg)		SAR Drift During Test	Scaled SAR (with droop) 1g (W/kg)
					PTT Duty Factor			PTT Duty Factor
					100%	50%	dB	50%
1	1 (IC only)	138.0	4.92	F6	1.42	0.710	0.101	N/A
2		144.0	4.79	n/a				
3	2	150.8	4.69	F7	2.19	1.10	0.215	N/A
4		156.4	4.67	n/a				
5		162.0	4.65	n/a				
6	3	162.0	4.65	n/a				
7		167.7	4.84	n/a				
8		173.4	5.02	F8	1.23	0.615	0.042	N/A
9	4 (IC only)	138.0	4.92	F9	0.166	0.083	-0.428	0.092
10		144.0	4.79	n/a				
11	4	150.8	4.69	n/a				
12		158.3	4.66	n/a				
13		165.9	4.62	n/a				
14		173.4	5.02	F10	0.581	0.291	0.120	N/A
SAR LIMITS				HEAD		SPATIAL PEAK		RF EXPOSURE CATEGORY
FCC 47 CFR 2.1093		Health Canada Safety Code 6		8.0 W/kg		1 gram average		Occupational / Controlled
Notes								
C = Column; R = Row					Fx (F = Face) denotes the corresponding Face SAR Plot # as shown in Appendix A			
Test Mode = CW (Unmodulated Continuous Wave)					Phantom = Side Planar Phantom			
Front of DUT Distance to Planar Phantom (see Appendix D)					Shortest Antenna Distance to Planar Phantom (see Appendix D)			
					Antenna 1	Antenna 2	Antenna 3	Antenna 4
2.5 cm					3.0 cm	3.0 cm	3.0 cm	3.0 cm
Test Procedures in accordance with FCC KDB 643646 (see reference [9])								
1. When the head SAR of an antenna tested on the highest output power channel with the default battery is ≤ 3.5 W/kg, testing of all other required channels is not necessary.								
2. When test reduction applies, the data table entries for such configurations are denoted with n/a (not applicable).								

Applicant:	EF Johnson Company	FCC ID:	ATH2425710		IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio Transceiver		Model:	Viking VP600	Freq.:	138 - 174 MHz	
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	<u>Date(s) of Evaluation</u> May 23-28, 2012	<u>Test Report Serial No.</u> 051412ATH-T1174-S90V	<u>Test Report Revision No.</u> Rev. 1.1 (2nd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> August 28, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	



TABLE 3		BODY-WORN SAR EVALUATION RESULTS						
Device-Under-Test		Viking VP600 VHF PTT Radio Transceiver						
Body-worn Acc.		Metal Belt-Clip P/N: 585-5100-128						
Audio Acc. ID #		1						
Battery Acc. ID #		a						
Test Date(s)		May 25 & 28, 2012						
C				1	2	3	4	5
R	Antenna ID #	Test Freq. (MHz)	Conducted Power Before Test (W)	Plot #	Measured SAR (before droop) 1g (W/kg)		SAR Drift During Test	Scaled SAR (with droop) 1g (W/kg)
					PTT Duty Factor			
					100%	50%	dB	50%
1	1 (IC only)	138.0	4.92	B1	2.82	1.41	0.794	N/A
2		144.0	4.79	n/a				
3	2	150.8	4.69	B2	1.85	0.925	-0.342	1.00
4		156.4	4.67	n/a				
5		162.0	4.65	n/a				
6	3	162.0	4.65	n/a				
7		167.7	4.84	n/a				
8		173.4	5.02	B3	2.15	1.08	0.109	N/A
9	4 (IC only)	138.0	4.92	B4	2.02	1.01	-0.021	1.02
10		144.0	4.79	n/a				
11	4	150.8	4.69	n/a				
12		158.3	4.66	n/a				
13		165.9	4.62	n/a				
14		173.4	5.02	B5	1.39	0.695	0.144	N/A
SAR LIMITS				BODY		SPATIAL PEAK		RF EXPOSURE CATEGORY
FCC 47 CFR 2.1093		Health Canada Safety Code 6		8.0 W/kg		1 gram average		Occupational / Controlled
Notes								
C = Column; R = Row					Bx (B = Body) denotes the corresponding Body SAR Plot # as shown in Appendix A			
Test Mode = CW (Unmodulated Continuous Wave)					Phantom = Side Planar Phantom			
Back of DUT Distance to Planar Phantom (see Appendix D)					Shortest Antenna Distance to Planar Phantom (see Appendix D)			
					Antenna 1	Antenna 2	Antenna 3	Antenna 4
1.2 cm					2.4 cm	2.4 cm	2.4 cm	2.4 cm
Test Procedures in accordance with FCC KDB 643646 (see reference [9])								
1. When the body SAR of an antenna tested on the highest output power channel with the default battery is ≤ 3.5 W/kg, testing of all other required channels is not necessary.								
2. When test reduction applies, the data table entries for such configurations are denoted with n/a (not applicable).								

Applicant:	EF Johnson Company	FCC ID:	ATH2425710		IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio Transceiver		Model:	Viking VP600	Freq.:	138 - 174 MHz	
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	<u>Test Report Issue Date</u> August 28, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	
Test Lab Certificate No. 2470.01				


TABLE 4				BODY-WORN SAR EVALUATION RESULTS					
Device-Under-Test				Speaker-Microphone with Antenna (P/N: 585-5100-315) connected to Viking VP600 VHF PTT Radio Transceiver					
Body-worn Acc.				Metal Lapel-Clip					
Audio Acc. ID #				2					
Battery Acc. ID #				a					
Test Date(s)				May 25, 2012					
C				1	2	3	4	5	
R	Antenna ID #	Test Freq. (MHz)	Conducted Power Before Test (W)	Plot #	Measured SAR (before droop) 1g (W/kg)		SAR Drift During Test	Scaled SAR (with droop) 1g (W/kg)	
					PTT Duty Factor				PTT Duty Factor
					100%	50%			
1	1 (IC only)	138.0	4.92	B6	6.29	3.15	0.083	N/A	
2		144.0	4.79	n/a					
3	2	150.8	4.69	B7	4.39	2.20	-0.150	2.27	
4		156.4	4.67	n/a					
5		162.0	4.65	n/a					
6	3	162.0	4.65	n/a					
7		167.7	4.84	n/a					
8		173.4	5.02	B8	1.32	0.660	0.097	N/A	
9	4 (IC only)	138.0	4.92	B9	0.818	0.409	-0.475	0.456	
10		144.0	4.79	n/a					
11	4	150.8	4.69	n/a					
12		158.3	4.66	n/a					
13		165.9	4.62	n/a					
14		173.4	5.02	B10	0.688	0.344	0.133	N/A	
SAR LIMITS				BODY		SPATIAL PEAK		RF EXPOSURE CATEGORY	
FCC 47 CFR 2.1093		Health Canada Safety Code 6		8.0 W/kg		1 gram average		Occupational / Controlled	
Notes									
C = Column; R = Row					Bx (B = Body) denotes the corresponding Body SAR Plot # as shown in Appendix A				
Test Mode = CW (Unmodulated Continuous Wave)					Phantom = Side Planar Phantom				
Back of DUT Distance to Planar Phantom (see Appendix D)					Shortest Antenna Distance to Planar Phantom (see Appendix D)				
					Antenna 1	Antenna 2	Antenna 3	Antenna 4	
1.2 cm					2.3 cm	2.3 cm	2.3 cm	2.3 cm	
Test Procedures in accordance with FCC KDB 643646 (see reference [9])									
1. When the body SAR of an antenna tested on the highest output power channel with the default battery is ≤ 3.5 W/kg, testing of all other required channels is not necessary.									
2. When test reduction applies, the data table entries for such configurations are denoted with n/a (not applicable).									



Applicant:	EF Johnson Company	FCC ID:	ATH2425710		IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio Transceiver		Model:	Viking VP600	Freq.:	138 - 174 MHz	
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	<u>Test Report Issue Date</u> August 28, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

10.0 SAR SCALING (MANUFACTURER'S TUNE-UP TOLERANCE)

TABLE 5		MAX. SAR LEVELS SCALED TO MANUF. MAXIMUM TOLERANCE SPECIFICATION					
Test Config.	Test Freq. (MHz)	Test Plot #	Measured Conducted Power (dBm)	Max. Rated Conducted Power inc. Upper Tol. (dBm)	Measured SAR Level 1g (W/kg) (50% PTT d/f)	Scaling up to Max. Power inc. Tolerance (5.25 W)	Scaled SAR 1g (W/kg) (50% PTT d/f)
Face-held (FCC/IC)	150.8	F7	36.7	37.2	1.10	+ 0.5 dB	1.23
Body-worn (FCC/IC)	150.8	B7	36.7	37.2	2.20	+ 0.5 dB	2.47
Body-worn (IC only)	138.0	B6	36.9	37.2	3.15	+ 0.3 dB	3.38

Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio Transceiver	Model:	Viking VP600	Freq.:	138 - 174 MHz	
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11.0 DETAILS OF SAR EVALUATION

- The number of test frequencies and the test channels evaluated for SAR were selected in accordance with the procedures described in FCC KDB 447498 Section 6) c) (see reference [8]).
- The DUT was evaluated for SAR in accordance with the procedures described in FCC KDB 643646 (see reference [9]).
- The SAR evaluations were performed with a fully charged battery.
- The DUT was allowed a cool down period of 5-10 minutes between area scan and zoom scan portions of SAR evaluation.
- The SAR drift of the DUT was measured by the DASY4 system for the duration of the SAR evaluations. The measured SAR droop was added to the measured SAR levels to report scaled SAR levels as shown in the SAR test data tables. A SAR-versus-Time power droop evaluation was performed (see Appendix A).
- The fluid temperature remained within $\pm 2^{\circ}\text{C}$ from the fluid dielectric parameter measurement to the completion of the SAR evaluation.
- The dielectric parameters of the simulated tissue mixtures were measured prior to the SAR evaluations using a Dielectric Probe Kit and a Network Analyzer (see Appendix C).
- The DUT was tested at the maximum conducted output power level preset by the manufacturer in unmodulated continuous transmit operation (Continuous Wave mode at 100% duty cycle) with the transmit key constantly depressed. For a push-to-talk device the 50% duty cycle compensation reported assumes a transmit/receive cycle of equal time base.

12.0 SAR EVALUATION PROCEDURES

- 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.
 - For body-worn and face-held devices a planar phantom was used.
- 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:
 - 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.
 - 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:
 - Extrapolation is used to find the points between the dipole center of the probe and the surface of the phantom. 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 was based on trivariate quadratics computed from the previously calculated 3D interpolated points nearest the phantom surface.
 - 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).
 - A zoom scan volume of 30 mm x 30 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:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio Transceiver	Model:	Viking VP600	Freq.:	138 - 174 MHz	
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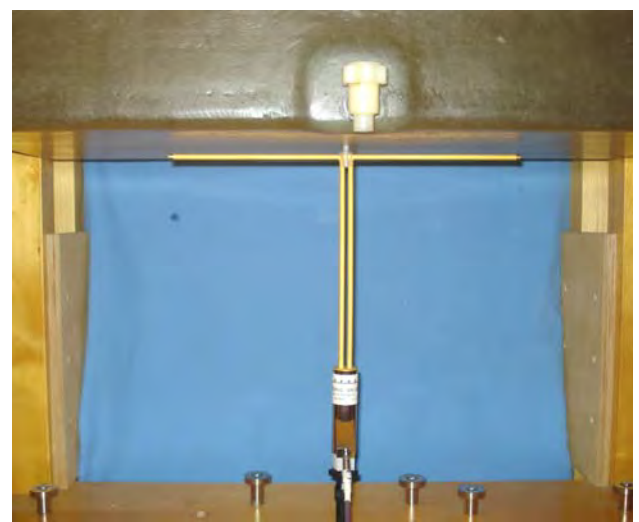
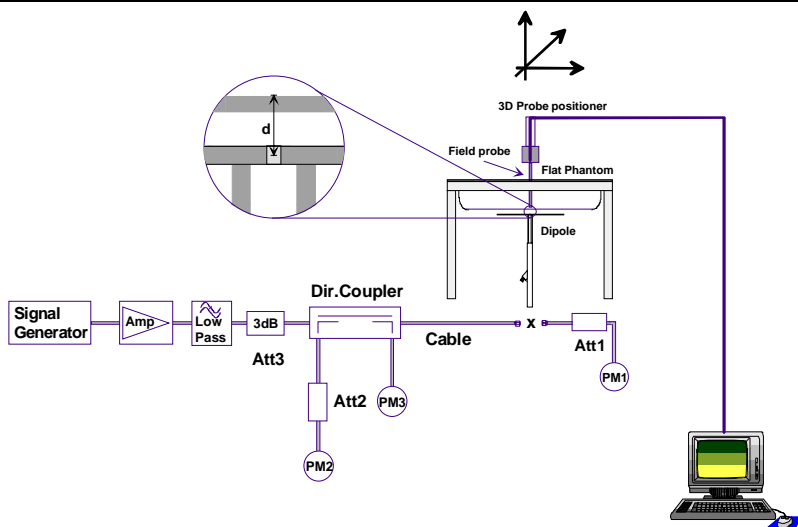
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13.0 SYSTEM PERFORMANCE CHECK

Prior to the SAR evaluations, system checks were performed with a planar phantom and 300 MHz SPEAG dipole (see Appendix B for system performance check test plots) in accordance with the procedures described in IEEE Standard 1528-2003 (see reference [5]). 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 for measured fluid dielectric parameters). A forward power of 398 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 value (see Appendix E for system manufacturer's dipole calibration procedures).


SYSTEM PERFORMANCE CHECK EVALUATIONS



Test Date	Equiv. Tissue Freq. (MHz)	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)
		Target	Meas.	Dev.	Target	Meas.	Dev.	Target	Meas.	Dev.						
May 23	Head 300	1.17 $\pm 10\%$	1.23	+5.1%	45.3 $\pm 5\%$	45.94	+1.4%	0.87 $\pm 5\%$	0.88	+1.2%	1000	23.0	21.6	≥ 15	30	101.1
May 28	Head 300	1.17 $\pm 10\%$	1.15	-1.7%	45.3 $\pm 5\%$	46.48	+2.6%	0.87 $\pm 5\%$	0.86	-1.2%	1000	22.0	21.9	≥ 15	30	101.1
Notes	1.	The target SAR values are the measured values specified by the SAR system manufacturer in the dipole calibration (see Appendix E).														
	2.	The target fluid dielectric parameters are the nominal values specified by the SAR system manufacturer in the dipole calibration (see Appendix E) and specified in IEEE Standard 1528-2003.														
	3.	The fluid temperature remained within $\pm 2^\circ\text{C}$ from the fluid dielectric parameter measurement to the completion of the system performance check.														
	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).														
	5.	System Performance Checks were not performed for all the DUT SAR measurement dates based on compliance with the following provision per TCBC Workshop Presentation April 5-7, 2011 (Kwok Chan Presentation File 04-06-2011-FCC 4 RF Exposure Guidance 040611- KC): SAR System Verification when head and body tissue dielectric parameters are required to test a device, separate SAR system verifications are required - daily verification of each liquid is usually not necessary when liquid parameter tolerances are maintained in a controlled environment - typically every few days is sufficient or when liquid is changed														



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

300 MHz SPEAG Validation Dipole Setup

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14.0 SIMULATED EQUIVALENT TISSUES



The simulated equivalent tissue recipes in the table below are derived from the SAR system manufacturer's suggested recipes in the DASY4 manual (see references [11] and [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.

SIMULATED TISSUE MIXTURES							
INGREDIENT	Water	300 MHz HEAD Tissue Mixture	37.56 %	150 MHz HEAD Tissue Mixture	38.35 %	150 MHz BODY Tissue Mixture	46.6 %
	Sugar		55.32 %		55.5%		49.7 %
	Salt		5.95 %		5.15%		2.6 %
	HEC		0.98 %		0.9%		1.0 %
	Bactericide		0.19 %		0.1%		0.1 %

15.0 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 1 g of tissue)		1.6 W/kg	8.0 W/kg
Spatial Peak (hands/wrists/feet/ankles averaged over 10 g)		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.			



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16.0 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	ET3DV6
Serial No.	1590
Construction	Triangular core fiber optic detection system
Frequency	10 MHz to 6 GHz
Linearity	±0.2 dB (30 MHz to 3 GHz)
<u>Phantom 1</u>	
Type	Side Planar Phantom
Shell Material	Plexiglass
Bottom Thickness	2.0 mm ± 0.1 mm
Inner Dimensions	72.6 cm (L) x 20.3 cm (W) x 20.3 cm (H)
<u>Phantom 2</u>	
Type	Barski Planar Phantom
Shell Material	Fiberglass
Thickness	2.0 ± 0.1 mm
Volume	Approx. 70 liters

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17.0 PROBE SPECIFICATION

Construction:	Symmetrical design with triangular core; Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, glycol)	
Calibration:	In air from 10 MHz to 2.5 GHz In head simulating tissue at frequencies of 900 MHz and 1.8 GHz (accuracy $\pm 8\%$)	
Frequency:	10 MHz to > 6 GHz; Linearity: ± 0.2 dB (30 MHz to 3 GHz)	
Directivity:	± 0.2 dB in head tissue (rotation around probe axis) ± 0.4 dB in head tissue (rotation normal to probe axis)	
Dynamic Range:	5 μ W/g to > 100 mW/g; Linearity: ± 0.2 dB	
Surface Detect:	± 0.2 mm repeatability in air and clear liquids over diffuse reflecting surfaces	
Dimensions:	Overall length: 330 mm; Tip length: 16 mm; Body diameter: 12 mm; Tip diameter: 6.8 mm Distance from probe tip to dipole centers: 2.7 mm	
Application:	General dosimetry up to 3 GHz; Compliance tests of mobile phone	

ET3DV6 E-Field Probe

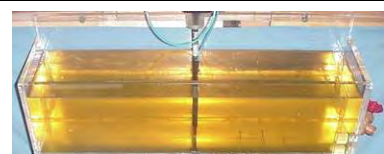
18.0 PHANTOM(S)

The Barski Planar Phantom is a fiberglass shell phantom with a 2.0 mm (+/-0.2mm) thick device measurement area at the center of the phantom for SAR evaluations of devices with a larger surface area than the planar section of the SAM phantom. The planar phantom is integrated in a wooden table. The planar phantom was used for the system performance check evaluations. See Appendix G for dimensions and specifications of the Barski planar phantom.



Barski Planar Phantom

The side planar phantom is constructed of Plexiglas material with a 2.0 mm shell thickness for face-held and body-worn SAR evaluations of portable radio transceivers. The side planar phantom is mounted on the side of the DASY4 compact system table.




Plexiglas Side Planar Phantom



19.0 DEVICE HOLDER

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.




Device Holder



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20.0 TEST EQUIPMENT LIST

TEST EQUIPMENT DESCRIPTION	ASSET NO.	SERIAL NO.	DATE CALIBRATED	CALIBRATION INTERVAL
Schmid & Partner DASY4 System	-	-	-	-
-DASY4 Measurement Server	00158	1078	CNR	CNR
-Robot	00046	599396-01	CNR	CNR
-DAE4	00019	353	19-Apr-12	Biennial
-ET3DV6 E-Field Probe	00017	1590	24-Apr-12	Annual
-D300V3 Validation Dipole	00220	1009	17-Apr-12	Triennial
Side Planar Phantom	00156	161	CNR	CNR
Barski Planar Phantom	00155	03-01	CNR	CNR
HP 85070C Dielectric Probe Kit	00033	none	CNR	CNR
Gigatronics 8652A Power Meter	00007	1835272	03-May-12	Biennial
Gigatronics 80701A Power Sensor	00014	1833542	03-May-12	Biennial
Gigatronics 80334A Power Sensor	-	1837001	03-May-12	Biennial
HP 8753ET Network Analyzer	00134	US39170292	26-Apr-12	Biennial
Rohde & Schwarz SMR20 Signal Generator	00006	100104	02-May-12	Biennial
Amplifier Research 5S1G4 Power Amplifier	00106	26235	CNR	CNR
CNR = Calibration Not Required				


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21.0 MEASUREMENT UNCERTAINTIES

UNCERTAINTY BUDGET FOR DEVICE EVALUATION (IEEE 1528-2003)

Uncertainty Component	IEEE 1528 Section	Uncertainty Value $\pm\%$	Probability Distribution	Divisor	ci 1g	ci 10g	Uncertainty Value $\pm\%$ (1g)	Uncertainty Value $\pm\%$ (10g)	V_i or V_{eff}
Measurement System									
Probe Calibration (150 MHz)	E.2.1	10.0	Normal	1	1	1	10.0	10.0	∞
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	2.5	Rectangular	1.732050808	1	1	1.4	1.4	∞
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	5	Normal	1	0.64	0.43	3.2	2.2	∞
Liquid Permittivity (target)	E.3.2	5	Rectangular	1.732050808	0.6	0.49	1.7	1.4	∞
Liquid Permittivity (measured)	E.3.3	4.59	Normal	1	0.6	0.49	2.8	2.2	∞
Combined Standard Uncertainty			RSS				14.02	13.62	
Expanded Uncertainty (95% Confidence Interval)			k=2				28.03	27.24	
Measurement Uncertainty Table in accordance with IEEE Standard 1528-2003									
This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2									

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MEASUREMENT UNCERTAINTIES (CONT.)



UNCERTAINTY BUDGET FOR DEVICE EVALUATION (IEC 62209-2:2010)

Source of Uncertainty	IEC 62209-2 Section	Tolerance / Uncertainty $\pm\%$	Probability Distribution	Divisor	ci 1g	ci 10g	Standard Uncertainty $\pm\%$ (1g)	Standard Uncertainty $\pm\%$ (10g)	V_i or V_{eff}
Measurement System									
Probe Calibration (150 MHz)	7.2.2.1	10.0	Normal	1	1	1	10.0	10.0	∞
Isotropy	7.2.2.2	4.7	Rectangular	1.732050808	1	1	2.7	2.7	∞
Boundary Effect	7.2.2.6	2.5	Rectangular	1.732050808	1	1	1.4	1.4	∞
Linearity	7.2.2.3	4.7	Rectangular	1.732050808	1	1	2.7	2.7	∞
Detection Limits	7.2.2.5	1	Rectangular	1.732050808	1	1	0.6	0.6	∞
Readout Electronics	7.2.2.7	0.3	Normal	1	1	1	0.3	0.3	∞
Response Time	7.2.2.8	0.8	Rectangular	1.732050808	1	1	0.5	0.5	∞
Integration Time	7.2.2.9	2.6	Rectangular	1.732050808	1	1	1.5	1.5	∞
RF Ambient Conditions	7.2.4.5	3	Rectangular	1.732050808	1	1	1.7	1.7	∞
Probe Positioner Mechanical Restrictions	7.2.3.1	0.4	Rectangular	1.732050808	1	1	0.2	0.2	∞
Probe Positioning wrt Phantom Shell	7.2.3.3	2.9	Rectangular	1.732050808	1	1	1.7	1.7	∞
Post-processing	7.2.5	1	Rectangular	1.732050808	1	1	0.6	0.6	∞
Test Sample Related									
Test Sample Positioning	7.2.3.4.3	2.9	Normal	1	1	1	2.9	2.9	12
Device Holder Uncertainty	7.2.3.4.2	3.6	Normal	1	1	1	3.6	3.6	8
Drift of Output Power (meas. SAR drift)	7.2.2.10	5	Rectangular	1.732050808	1	1	2.9	2.9	∞
Phantom and Tissue Parameters									
Phantom Uncertainty	7.2.3.2	4	Rectangular	1.732050808	1	1	2.3	2.3	∞
SAR Correction Algorithm for deviations in permittivity and conductivity	7.2.4.3	1.2	Normal	1	1	0.81	1.2	0.97	∞
Liquid Conductivity (measured)	7.2.4.3	5	Normal	1	0.78	0.71	3.9	3.6	∞
Liquid Permittivity (measured)	7.2.4.3	4.59	Normal	1	0.23	0.26	1.1	1.2	∞
Liquid Permittivity - temp. uncertainty	7.2.4.4	1.04	Rectangular	1.732050808	0.78	0.71	0.5	0.4	∞
Liquid Conductivity - temp. uncertainty	7.2.4.4	1.97	Rectangular	1.732050808	0.23	0.26	0.3	0.3	∞
Combined Standard Uncertainty	7.3.1		RSS				13.38	13.27	
Expanded Uncertainty (95% Confidence Interval)	7.3.2		k=2				26.76	26.55	

Measurement Uncertainty Table in accordance with International Standard IEC 62209-2:2010


This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2



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22.0 REFERENCES

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- [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] IEC International Standard 62209-1:2005 - "Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Human models, instrumentation, and procedures."
- [7] International Standard IEC 62209-2 Edition 1.0 2010-03 - "Human exposure to radio frequency fields from hand-held & body-mounted wireless communication devices - Part 2: Procedure to determine the specific absorption rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)".
- [8] Federal Communications Commission, Office of Engineering and Technology - "Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies"; KDB 447498 D01v04: November 2009.
- [9] Federal Communications Commission, Office of Engineering and Technology - "SAR Test Reduction Considerations for Occupational PTT Radios", KDB 643646 D01v01r01: April 2011.
- [10] 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.
- [11] Schmid & Partner Engineering AG - DASY4 Manual V4.6, Chapter 16 Application Note, Head Tissue Recipe: Sept. 2005.
- [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).
- [14] Federal Communications Commission - "Measurements Required: RF Power Output"; Rule Part 47 CFR §2.1046.
- [15] Industry Canada - "General Requirements and Information for the Certification of Radiocommunication Equipment", Radio Standards Specification RSS-Gen Issue 3: December 2010.

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	<u>Test Report Issue Date</u> August 28, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

APPENDIX A - SAR MEASUREMENT PLOTS

Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio Transceiver	Model:	Viking VP600	Freq.:	138 - 174 MHz	
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	<u>Test Report Issue Date</u> August 28, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	
Test Lab Certificate No. 2470.01				

Plot F1

Date Tested: 05/24/2012

DUT: EF Johnson VP600; Type: VHF PTT Radio Transceiver; Serial: 517001208620079

Program Notes: Ambient Temp: 23C; Fluid Temp: 21.6C; Barometric Pressure: 101.1 kPa; Humidity: 30%

Communication System: CW

Frequency: 138 MHz; Duty Cycle: 1:1

Medium: HSL150 Medium parameters used (interpolated): $f = 138 \text{ MHz}$; $\sigma = 0.726 \text{ mho/m}$; $\epsilon_r = 54.6$; $\rho = 1000 \text{ kg/m}^3$

- Probe: ET3DV6 - SN1590; ConvF(9.3, 9.3, 9.3); Calibrated: 24/04/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)) Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 19/04/2012
- Phantom: Side Planar; Type: Plexiglass; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Area Scan (7x26x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 2.13 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=7.5\text{mm}$, $dy=7.5\text{mm}$, $dz=5\text{mm}$

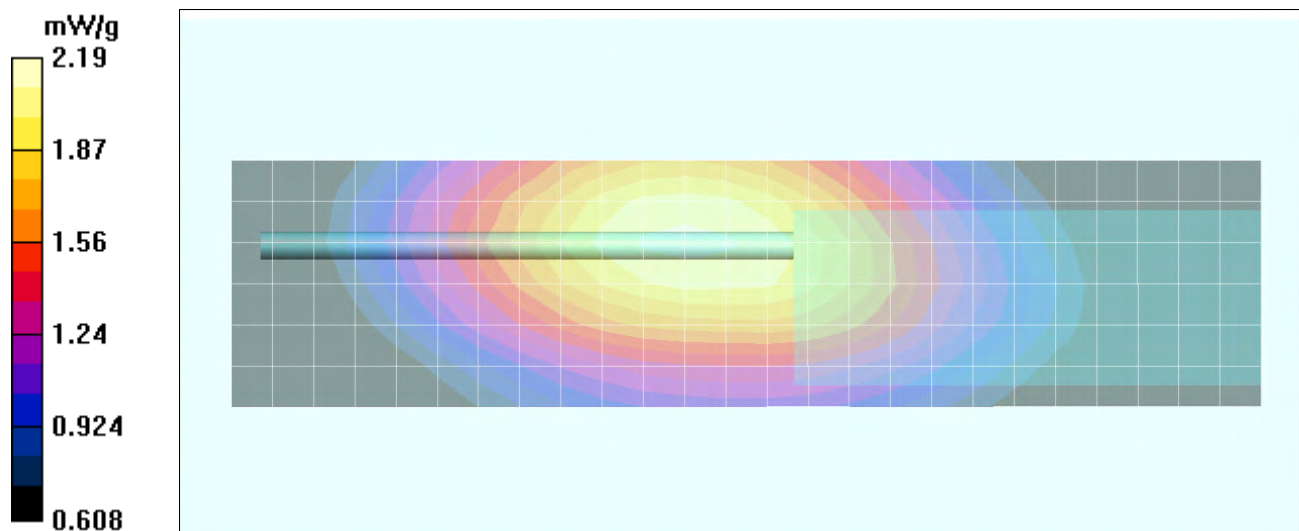
Reference Value = 51.8 V/m; Power Drift = -0.093 dB


Peak SAR (extrapolated) = 3.03 W/kg

SAR(1 g) = 2.12 mW/g; SAR(10 g) = 1.64 mW/g

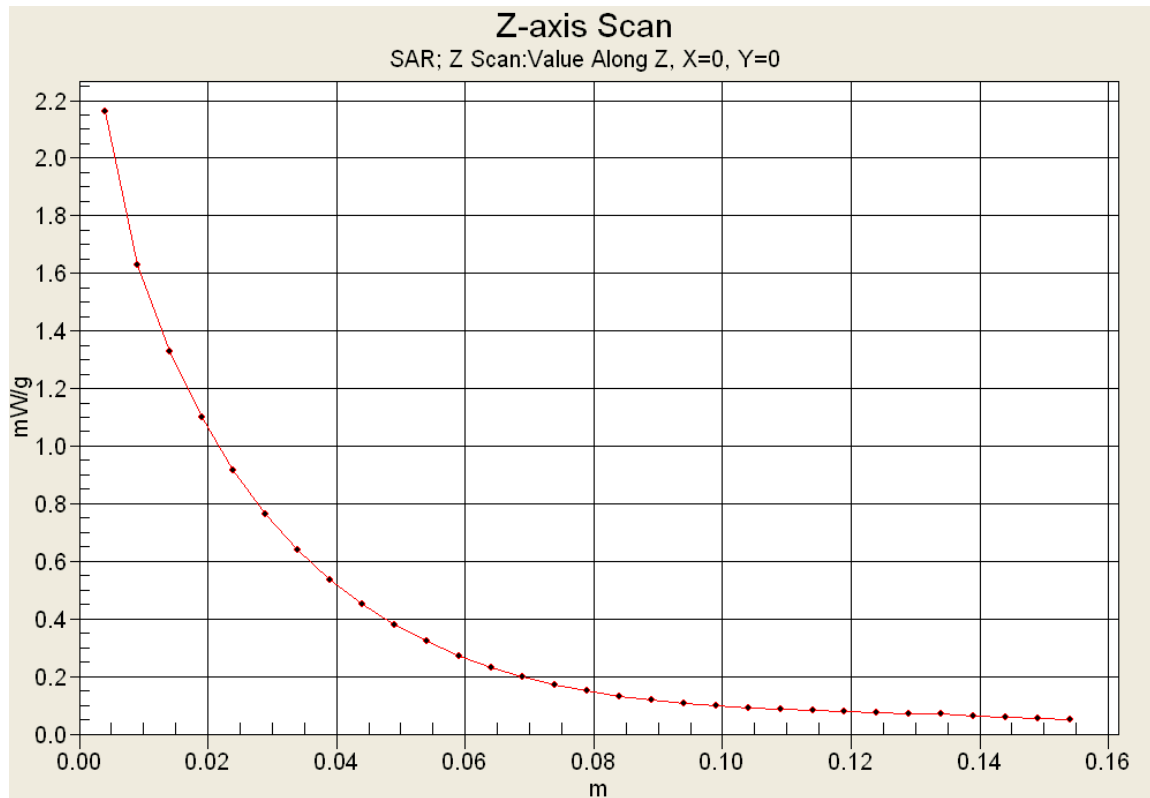
Info: Interpolated medium parameters used for SAR evaluation.



Maximum value of SAR (measured) = 2.19 mW/g



Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio Transceiver	Model:	Viking VP600	Freq.:	138 - 174 MHz	
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Z-axis Scan



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	<u>Test Report Issue Date</u> August 28, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	
Test Lab Certificate No. 2470.01				

Plot F2

Date Tested: 05/24/2012

DUT: EF Johnson VP600; Type: VHF PTT Radio Transceiver; Serial: 517001208620079

Program Notes: Ambient Temp: 23C; Fluid Temp: 21.6C; Barometric Pressure: 101.1 kPa; Humidity: 30%:

Communication System: CW

Frequency: 150.8 MHz; Duty Cycle: 1:1

Medium: HSL150 Medium parameters used (interpolated): $f = 150.8 \text{ MHz}$; $\sigma = 0.739 \text{ mho/m}$; $\epsilon_r = 54.7$; $\rho = 1000 \text{ kg/m}^3$

- Probe: ET3DV6 - SN1590; ConvF(9.3, 9.3, 9.3); Calibrated: 24/04/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 19/04/2012
- Phantom: Side Planar; Type: Plexiglass; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Area Scan (7x26x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 1.73 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=7.5\text{mm}$, $dy=7.5\text{mm}$, $dz=5\text{mm}$

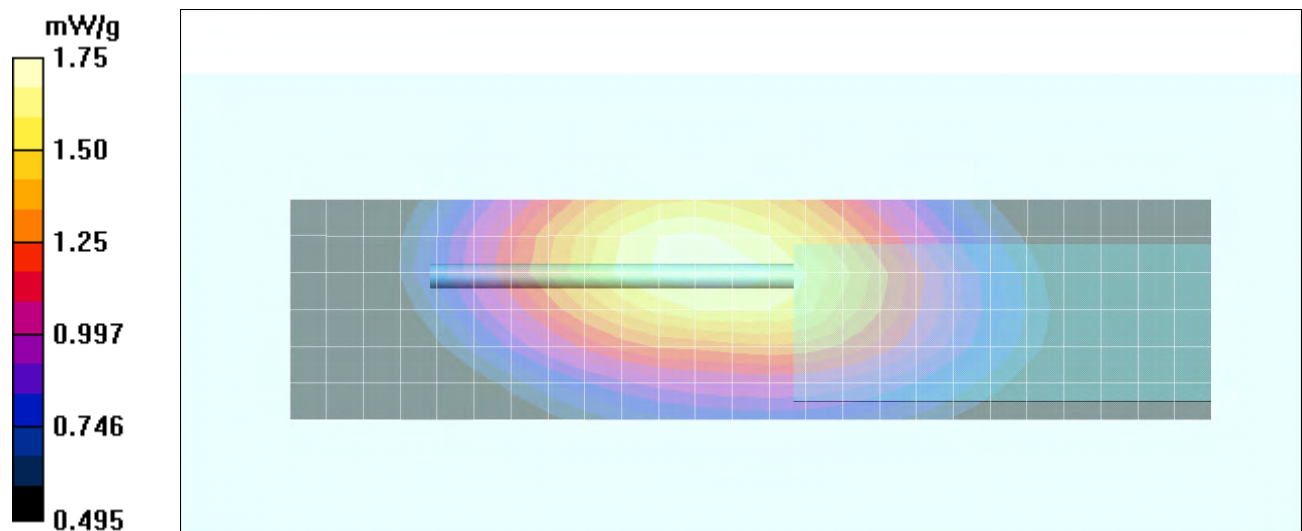
Reference Value = 45.3 V/m; Power Drift = -0.066 dB


Peak SAR (extrapolated) = 2.43 W/kg

SAR(1 g) = 1.7 mW/g; SAR(10 g) = 1.32 mW/g

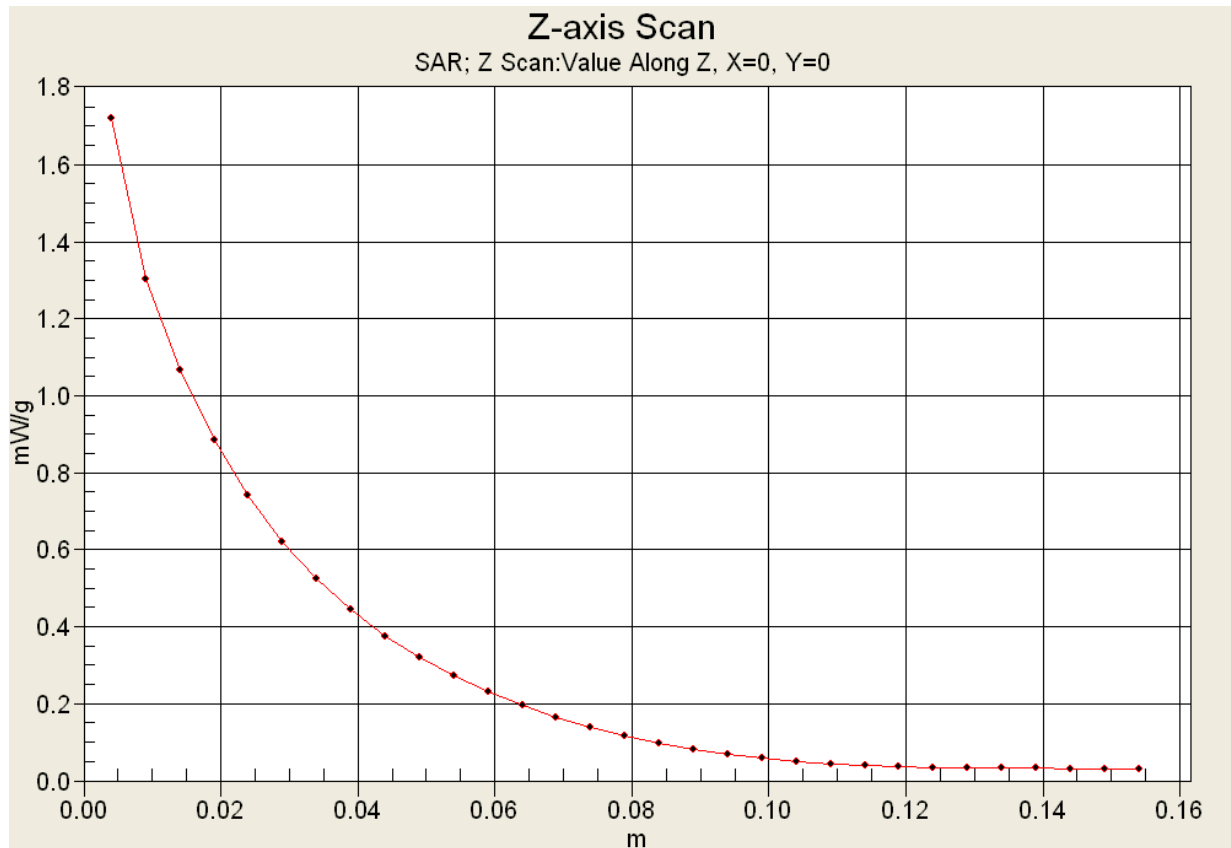
Info: Interpolated medium parameters used for SAR evaluation.



Maximum value of SAR (measured) = 1.75 mW/g



Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio Transceiver	Model:	Viking VP600	Freq.:	138 - 174 MHz	
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Z-axis Scan



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Plot F3

Date Tested: 05/24/2012

DUT: EF Johnson VP600; Type: VHF PTT Radio Transceiver; Serial: 517001208620079

Program Notes: Ambient Temp: 23C; Fluid Temp: 21.6C; Barometric Pressure: 101.1 kPa; Humidity: 30%

Communication System: CW

Frequency: 173.4 MHz; Duty Cycle: 1:1

Medium: HSL150 Medium parameters used (interpolated): $f = 173.4 \text{ MHz}$; $\sigma = 0.75 \text{ mho/m}$; $\epsilon_r = 53.7$; $\rho = 1000 \text{ kg/m}^3$

- Probe: ET3DV6 - SN1590; ConvF(9.3, 9.3, 9.3); Calibrated: 24/04/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 19/04/2012
- Phantom: Side Planar; Type: Plexiglass; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Area Scan (7x26x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.797 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=7.5\text{mm}$, $dy=7.5\text{mm}$, $dz=5\text{mm}$

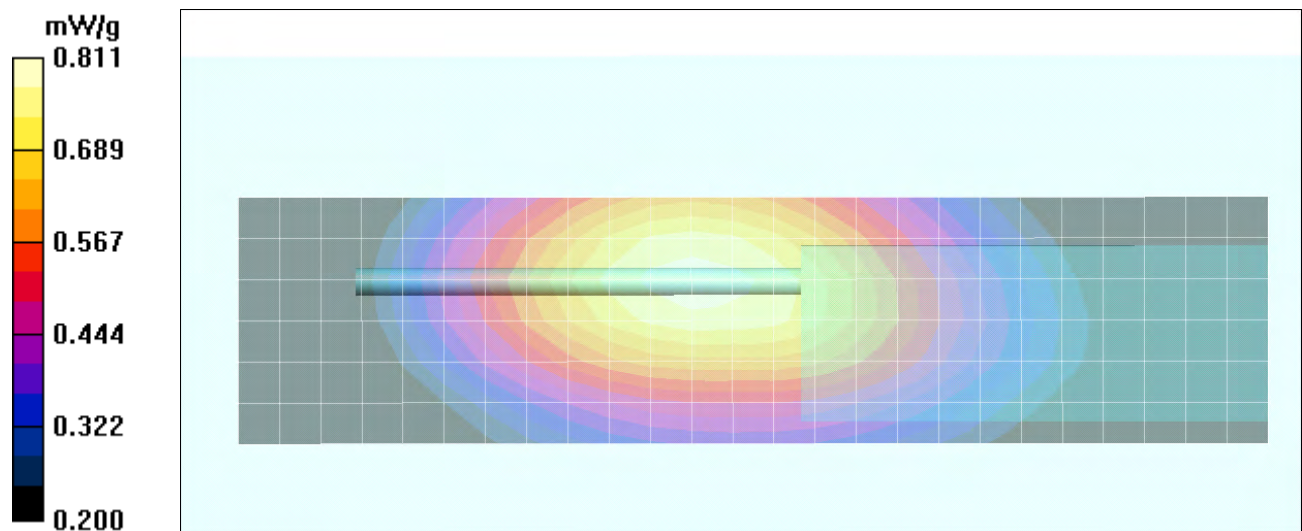
Reference Value = 30.6 V/m; Power Drift = 0.079 dB


Peak SAR (extrapolated) = 1.13 W/kg



SAR(1 g) = 0.786 mW/g; SAR(10 g) = 0.602 mW/g

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.811 mW/g



Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio Transceiver	Model:	Viking VP600	Freq.:	138 - 174 MHz	
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	<u>Test Report Issue Date</u> August 28, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	
Test Lab Certificate No. 2470.01				

Plot F4

Date Tested: 05/24/2012

DUT: EF Johnson VP600; Type: VHF PTT Radio Transceiver; Serial: 517001208620079

Program Notes: Ambient Temp: 23C; Fluid Temp: 21.6C; Barometric Pressure: 101.1 kPa; Humidity: 30%

Communication System: CW

Frequency: 138 MHz; Duty Cycle: 1:1

Medium: HSL150 Medium parameters used (interpolated): $f = 138 \text{ MHz}$; $\sigma = 0.726 \text{ mho/m}$; $\epsilon_r = 54.6$; $\rho = 1000 \text{ kg/m}^3$

- Probe: ET3DV6 - SN1590; ConvF(9.3, 9.3, 9.3); Calibrated: 24/04/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)) Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 19/04/2012
- Phantom: Side Planar; Type: Plexiglass; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Area Scan (7x26x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.294 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=7.5\text{mm}$, $dy=7.5\text{mm}$, $dz=5\text{mm}$

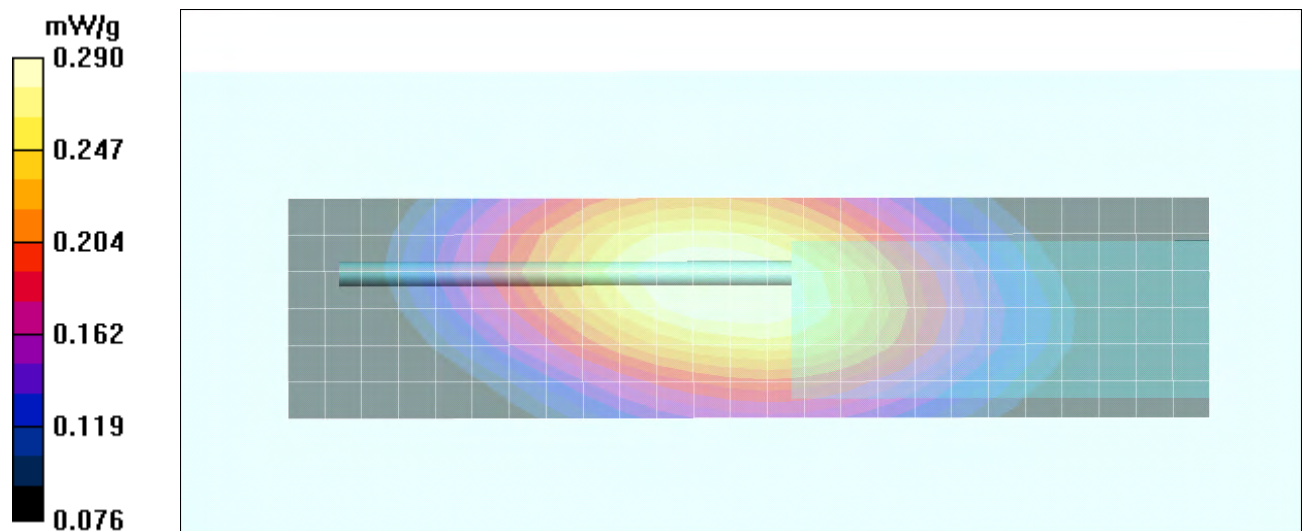
Reference Value = 19.2 V/m; Power Drift = 0.033 dB


Peak SAR (extrapolated) = 0.403 W/kg

SAR(1 g) = 0.281 mW/g; SAR(10 g) = 0.217 mW/g

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.290 mW/g



Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio Transceiver	Model:	Viking VP600	Freq.:	138 - 174 MHz	
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	<u>Test Report Issue Date</u> August 28, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	
Test Lab Certificate No. 2470.01				

Plot F5

Date Tested: 05/24/2012

DUT: EF Johnson VP600; Type: VHF PTT Radio Transceiver; Serial: 517001208620079

Program Notes: Ambient Temp: 23C; Fluid Temp: 21.6C; Barometric Pressure: 101.1 kPa; Humidity: 30%

Communication System: CW

Frequency: 173.4 MHz; Duty Cycle: 1:1

Medium: HSL150 Medium parameters used (interpolated): $f = 173.4 \text{ MHz}$; $\sigma = 0.75 \text{ mho/m}$; $\epsilon_r = 53.7$; $\rho = 1000 \text{ kg/m}^3$

- Probe: ET3DV6 - SN1590; ConvF(9.3, 9.3, 9.3); Calibrated: 24/04/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)) Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 19/04/2012
- Phantom: Side Planar; Type: Plexiglass; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Area Scan (7x26x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.486 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=7.5\text{mm}$, $dy=7.5\text{mm}$, $dz=5\text{mm}$

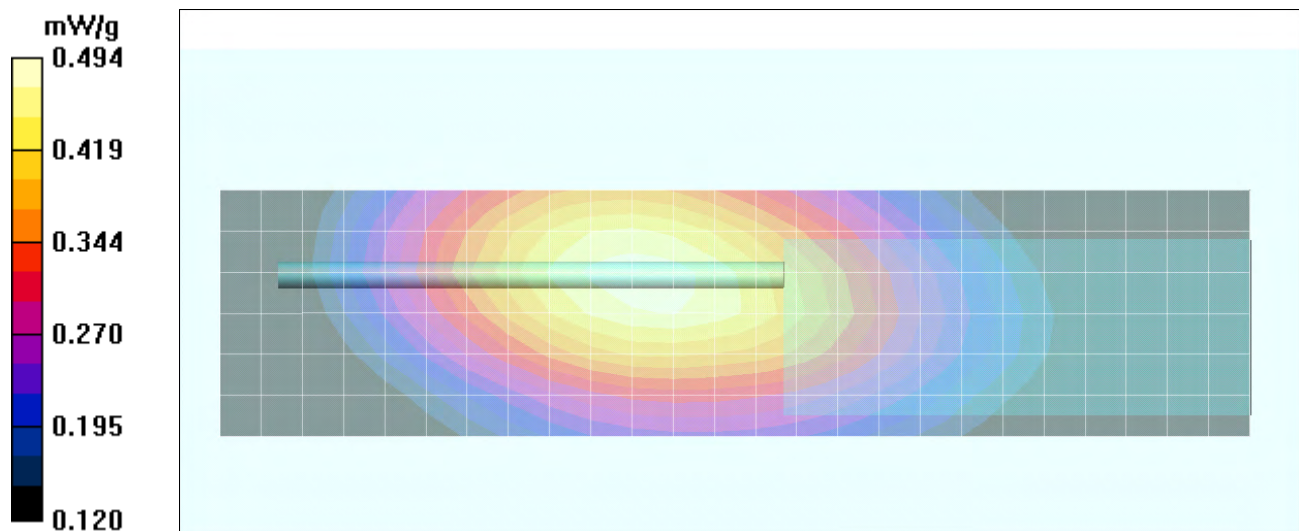
Reference Value = 23.3 V/m; Power Drift = 0.064 dB


Peak SAR (extrapolated) = 0.692 W/kg

SAR(1 g) = 0.479 mW/g; SAR(10 g) = 0.366 mW/g

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.494 mW/g



Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio Transceiver	Model:	Viking VP600	Freq.:	138 - 174 MHz	
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Test Lab Certificate No. 2470.01				

Plot F6

Date Tested: 05/25/2012

DUT: EF Johnson VP600; Type: Speaker-Mic-Antenna with VHF PTT Radio Transceiver; Serial: 517001208620079

Program Notes: Ambient Temp: 22C; Fluid Temp: 21.6C; Barometric Pressure: 101.1 kPa; Humidity: 30%

Communication System: CW

Frequency: 138 MHz; Duty Cycle: 1:1

Medium: HSL150 Medium parameters used (interpolated): $f = 138 \text{ MHz}$; $\sigma = 0.726 \text{ mho/m}$; $\epsilon_r = 54.6$; $\rho = 1000 \text{ kg/m}^3$

- Probe: ET3DV6 - SN1590; ConvF(9.3, 9.3, 9.3); Calibrated: 24/04/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)) Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 19/04/2012
- Phantom: Side Planar; Type: Plexiglass; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Area Scan (6x20x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 1.47 mW/g

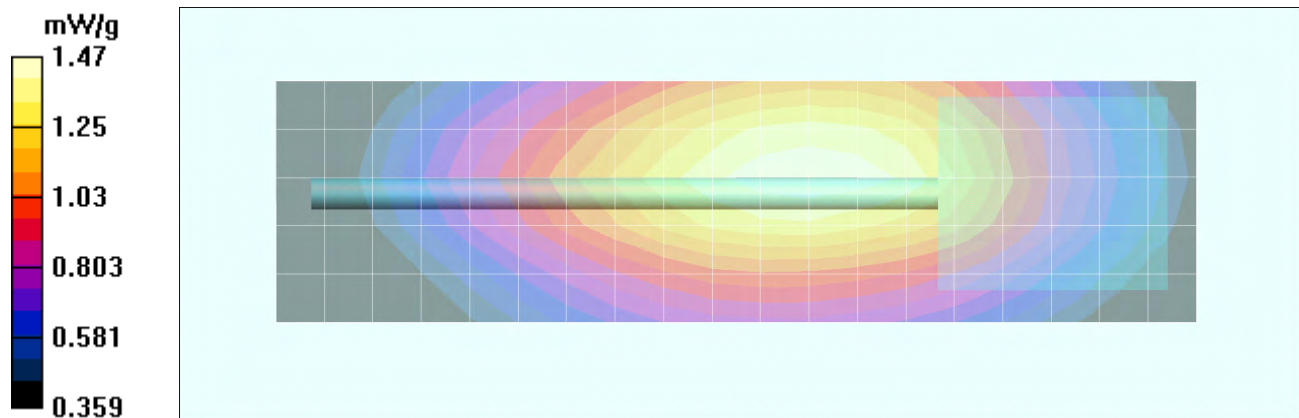
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=7.5\text{mm}$, $dy=7.5\text{mm}$, $dz=5\text{mm}$


Reference Value = 41.5 V/m; Power Drift = 0.101 dB

Peak SAR (extrapolated) = 2.09 W/kg

SAR(1 g) = 1.42 mW/g; SAR(10 g) = 1.08 mW/g

Info: Interpolated medium parameters used for SAR evaluation.



Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio Transceiver	Model:	Viking VP600	Freq.:	138 - 174 MHz	
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	<u>Test Report Issue Date</u> August 28, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	
Test Lab Certificate No. 2470.01				

Plot F7

Date Tested: 05/25/2012

DUT: EF Johnson VP600; Type: Speaker-Mic-Antenna with VHF PTT Radio Transceiver; Serial: 517001208620079

Program Notes: Ambient Temp: 22C; Fluid Temp: 21.6C; Barometric Pressure: 101.1 kPa; Humidity: 30%

Communication System: CW

Frequency: 150.8 MHz; Duty Cycle: 1:1

Medium: HSL150 Medium parameters used (interpolated): $f = 150.8 \text{ MHz}$; $\sigma = 0.739 \text{ mho/m}$; $\epsilon_r = 54.7$; $\rho = 1000 \text{ kg/m}^3$

- Probe: ET3DV6 - SN1590; ConvF(9.3, 9.3, 9.3); Calibrated: 24/04/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)) Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 19/04/2012
- Phantom: Side Planar; Type: Plexiglass; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Area Scan (6x20x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 2.25 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=7.5\text{mm}$, $dy=7.5\text{mm}$, $dz=5\text{mm}$

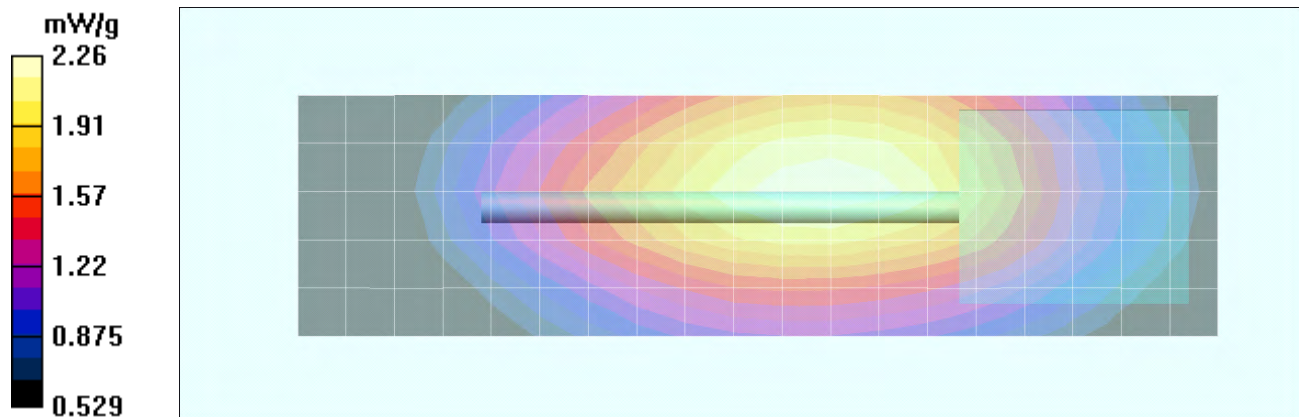
Reference Value = 50.0 V/m; Power Drift = 0.215 dB


Peak SAR (extrapolated) = 3.23 W/kg

SAR(1 g) = 2.19 mW/g; SAR(10 g) = 1.65 mW/g

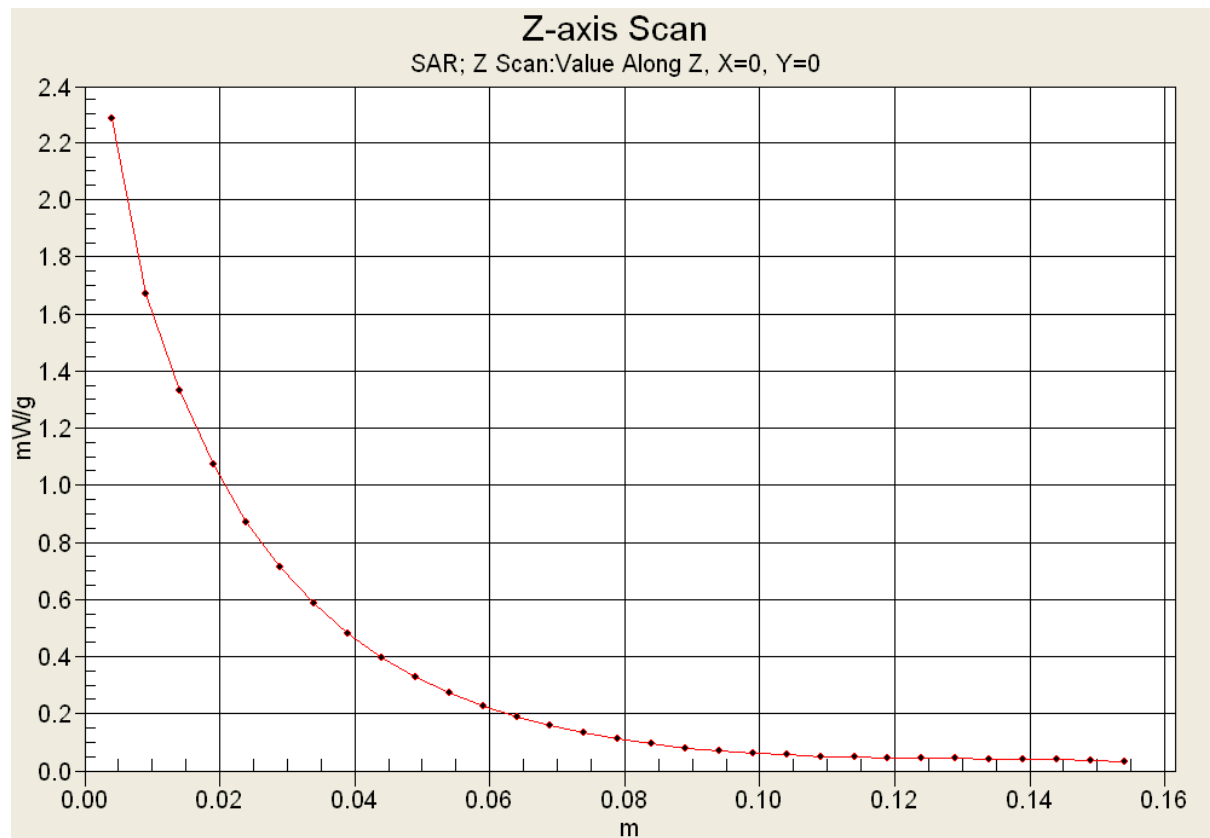
Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 2.26 mW/g



Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio Transceiver	Model:	Viking VP600	Freq.:	138 - 174 MHz	
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Z-axis Scan



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	<u>Test Report Issue Date</u> August 28, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

Plot F8

Date Tested: 05/25/2012

DUT: EF Johnson VP600; Type: Speaker-Mic-Antenna with VHF PTT Radio Transceiver; Serial: 517001208620079

Program Notes: Ambient Temp: 22C; Fluid Temp: 21.6C; Barometric Pressure: 101.1 kPa; Humidity: 30%

Communication System: CW

Frequency: 173.4 MHz; Duty Cycle: 1:1

Medium: HSL150 Medium parameters used (interpolated): $f = 173.4 \text{ MHz}$; $\sigma = 0.75 \text{ mho/m}$; $\epsilon_r = 53.7$; $\rho = 1000 \text{ kg/m}^3$

- Probe: ET3DV6 - SN1590; ConvF(9.3, 9.3, 9.3); Calibrated: 24/04/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)) Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 19/04/2012
- Phantom: Side Planar; Type: Plexiglass; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Area Scan (6x20x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 1.26 mW/g

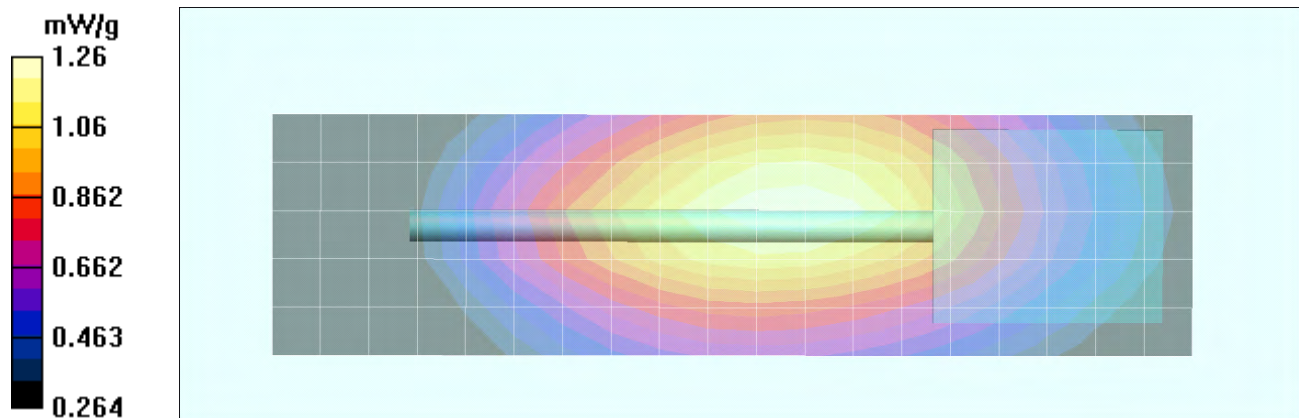
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=7.5\text{mm}$, $dy=7.5\text{mm}$, $dz=5\text{mm}$


Reference Value = 37.0 V/m; Power Drift = 0.042 dB

Peak SAR (extrapolated) = 1.83 W/kg

SAR(1 g) = 1.23 mW/g; SAR(10 g) = 0.912 mW/g

Info: Interpolated medium parameters used for SAR evaluation.



Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio Transceiver	Model:	Viking VP600	Freq.:	138 - 174 MHz	
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Test Lab Certificate No. 2470.01				

Plot F9

Date Tested: 05/25/2012

DUT: EF Johnson VP600; Type: Speaker-Mic-Antenna with VHF PTT Radio Transceiver; Serial: 517001208620079

Program Notes: Ambient Temp: 22C; Fluid Temp: 21.6C; Barometric Pressure: 101.1 kPa; Humidity: 30%

Communication System: CW

Frequency: 138 MHz; Duty Cycle: 1:1

Medium: HSL150 Medium parameters used (interpolated): $f = 138 \text{ MHz}$; $\sigma = 0.726 \text{ mho/m}$; $\epsilon_r = 54.6$; $\rho = 1000 \text{ kg/m}^3$

- Probe: ET3DV6 - SN1590; ConvF(9.3, 9.3, 9.3); Calibrated: 24/04/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)) Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 19/04/2012
- Phantom: Side Planar; Type: Plexiglass; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Area Scan (6x20x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.175 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=7.5\text{mm}$, $dy=7.5\text{mm}$, $dz=5\text{mm}$

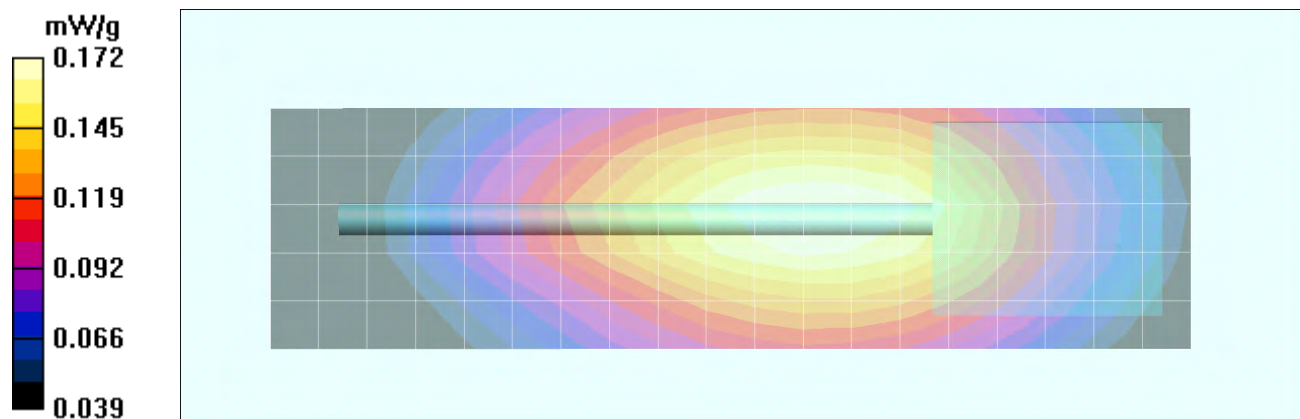
Reference Value = 15.1 V/m; Power Drift = -0.428 dB


Peak SAR (extrapolated) = 0.247 W/kg

SAR(1 g) = 0.166 mW/g; SAR(10 g) = 0.124 mW/g

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.172 mW/g



Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio Transceiver	Model:	Viking VP600	Freq.:	138 - 174 MHz	
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	<u>Test Report Issue Date</u> August 28, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	
Test Lab Certificate No. 2470.01				

Plot F10

Date Tested: 05/25/2012

DUT: EF Johnson VP600; Type: Speaker-Mic-Antenna with VHF PTT Radio Transceiver; Serial: 517001208620079

Program Notes: Ambient Temp: 22C; Fluid Temp: 21.6C; Barometric Pressure: 101.1 kPa; Humidity: 30%

Communication System: CW

Frequency: 173.4 MHz; Duty Cycle: 1:1

Medium: HSL150 Medium parameters used (interpolated): $f = 173.4 \text{ MHz}$; $\sigma = 0.75 \text{ mho/m}$; $\epsilon_r = 53.7$; $\rho = 1000 \text{ kg/m}^3$

- Probe: ET3DV6 - SN1590; ConvF(9.3, 9.3, 9.3); Calibrated: 24/04/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)) Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 19/04/2012
- Phantom: Side Planar; Type: Plexiglass; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Area Scan (6x20x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.599 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=7.5\text{mm}$, $dy=7.5\text{mm}$, $dz=5\text{mm}$

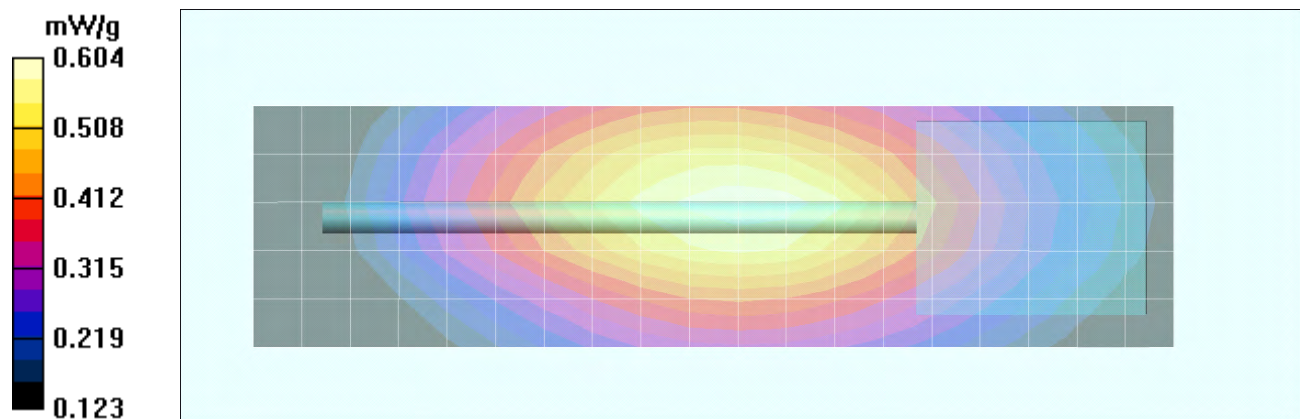
Reference Value = 24.2 V/m; Power Drift = 0.120 dB


Peak SAR (extrapolated) = 0.882 W/kg

SAR(1 g) = 0.581 mW/g; SAR(10 g) = 0.430 mW/g

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.604 mW/g



Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio Transceiver	Model:	Viking VP600	Freq.:	138 - 174 MHz	
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	<u>Date(s) of Evaluation</u> May 23-28, 2012	<u>Test Report Serial No.</u> 051412ATH-T1174-S90V	<u>Test Report Revision No.</u> Rev. 1.1 (2nd Release)	
	<u>Test Report Issue Date</u> August 28, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	
Test Lab Certificate No. 2470.01				

Plot B1

Date Tested: 05/25/2012

DUT: EF Johnson VP600; Type: VHF PTT Radio Transceiver; Serial: 517001208620079

Program Notes: Ambient Temp: 22C; Fluid Temp: 22.1C; Barometric Pressure: 101.1 kPa; Humidity: 30%

Communication System: CW

Frequency: 138.0 MHz; Duty Cycle: 1:1

Medium: M150 Medium parameters used (interpolated): $f = 138 \text{ MHz}$; $\sigma = 0.76 \text{ mho/m}$; $\epsilon_r = 62.5$; $\rho = 1000 \text{ kg/m}^3$

- Probe: ET3DV6 - SN1590; ConvF(8.6, 8.6, 8.6); Calibrated: 24/04/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 19/04/2012
- Phantom: Side Planar; Type: Plexiglass; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Area Scan (7x26x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 2.05 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=7.5\text{mm}$, $dy=7.5\text{mm}$, $dz=5\text{mm}$

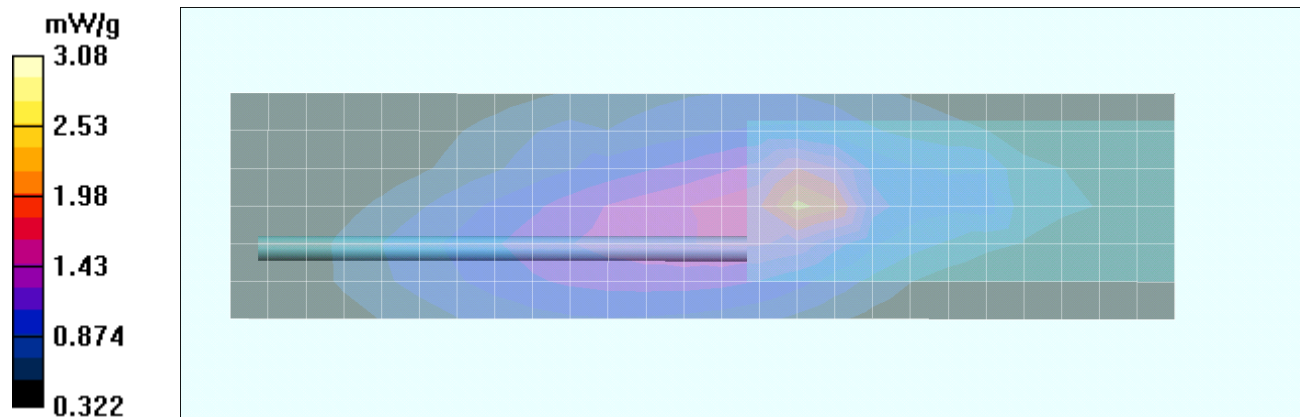
Reference Value = 44.6 V/m; Power Drift = 0.794 dB


Peak SAR (extrapolated) = 7.23 W/kg

SAR(1 g) = 2.82 mW/g; SAR(10 g) = 1.6 mW/g

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 3.08 mW/g



Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio Transceiver	Model:	Viking VP600	Freq.:	138 - 174 MHz	
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	<u>Test Report Issue Date</u> August 28, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	
Test Lab Certificate No. 2470.01				

Plot B2

Date Tested: 05/28/2012

DUT: EF Johnson VP600; Type: VHF PTT Radio Transceiver; Serial: 517001208620079

Program Notes: Ambient Temp: 22C; Fluid Temp: 21.8C; Barometric Pressure: 101.1 kPa; Humidity: 30%

Communication System: CW

Frequency: 150.8 MHz; Duty Cycle: 1:1

Medium: M150 Medium parameters used (interpolated): $f = 150.8 \text{ MHz}$; $\sigma = 0.78 \text{ mho/m}$; $\epsilon_r = 63.1$; $\rho = 1000 \text{ kg/m}^3$

- Probe: ET3DV6 - SN1590; ConvF(8.6, 8.6, 8.6); Calibrated: 24/04/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 19/04/2012
- Phantom: Side Planar; Type: Plexiglass; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Area Scan (7x26x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 1.61 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=7.5\text{mm}$, $dy=7.5\text{mm}$, $dz=5\text{mm}$

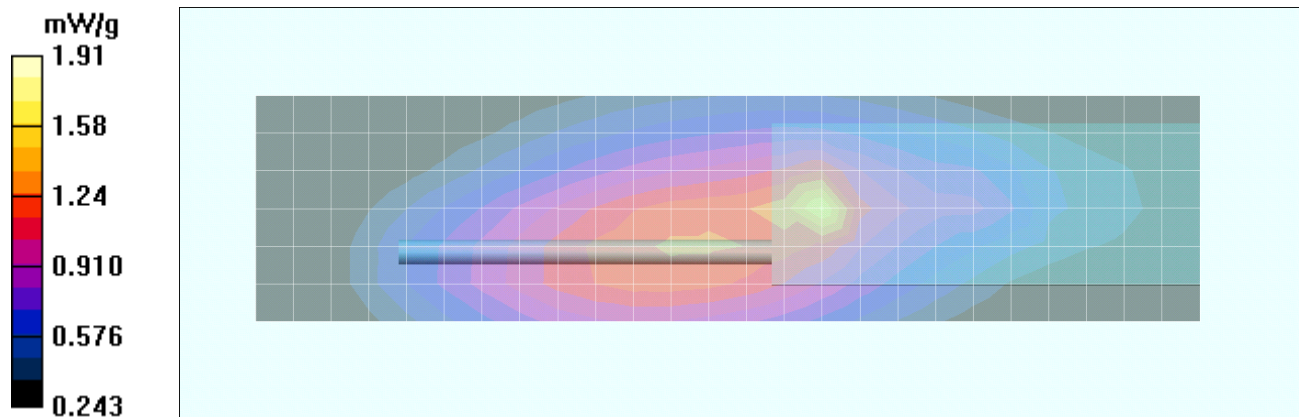
Reference Value = 41.7 V/m; Power Drift = -0.342 dB


Peak SAR (extrapolated) = 4.42 W/kg

SAR(1 g) = 1.85 mW/g; SAR(10 g) = 1.13 mW/g

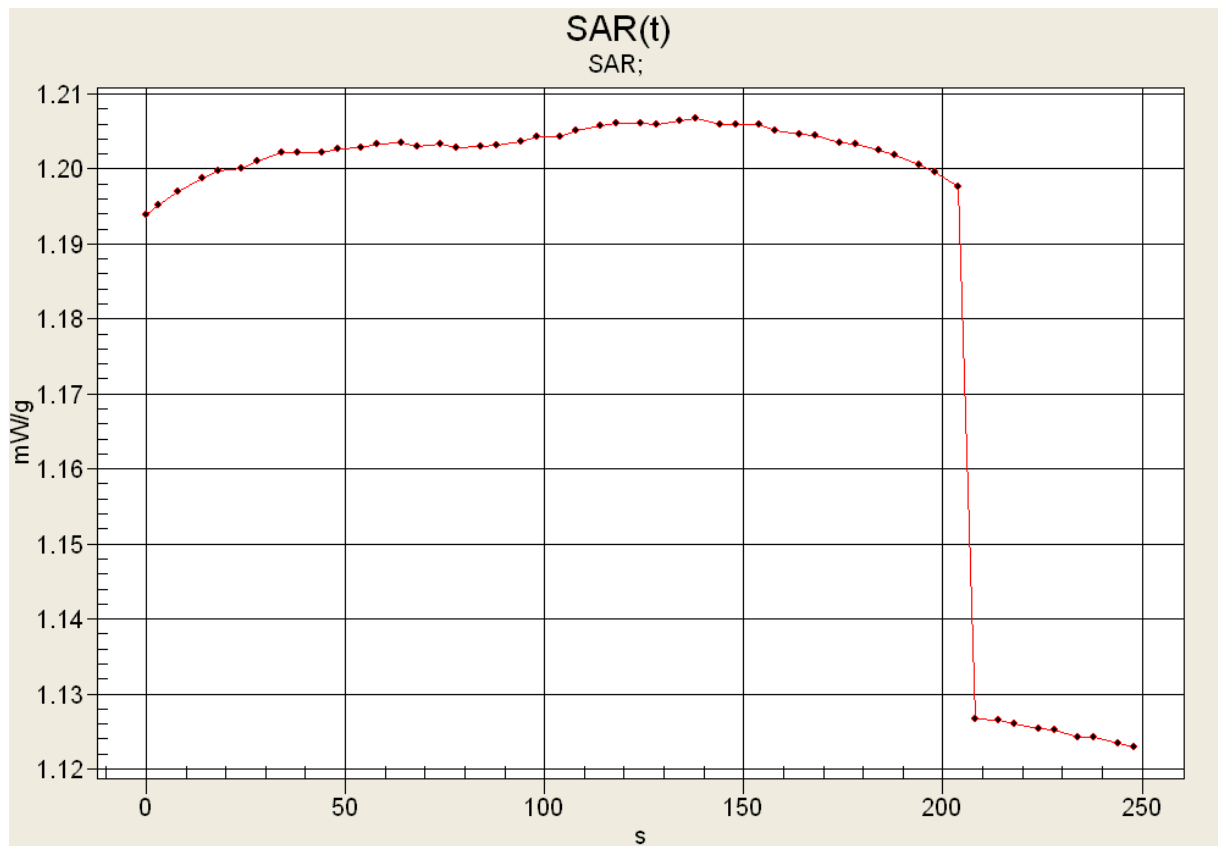
Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 1.91 mW/g



Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio Transceiver	Model:	Viking VP600	Freq.:	138 - 174 MHz	
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SAR vs. Time



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	<u>Test Report Issue Date</u> August 28, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

Plot B3

Date Tested: 05/28/2012

DUT: EF Johnson VP600; Type: VHF PTT Radio Transceiver; Serial: 517001208620079

Program Notes: Ambient Temp: 22C; Fluid Temp: 21.8C; Barometric Pressure: 101.1 kPa; Humidity: 30%

Communication System: CW

Frequency: 173.4 MHz; Duty Cycle: 1:1

Medium: M150 Medium parameters used (interpolated): $f = 173.4 \text{ MHz}$; $\sigma = 0.763 \text{ mho/m}$; $\epsilon_r = 62.4$; $\rho = 1000 \text{ kg/m}^3$

- Probe: ET3DV6 - SN1590; ConvF(8.6, 8.6, 8.6); Calibrated: 24/04/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)) Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 19/04/2012
- Phantom: Side Planar; Type: Plexiglass; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Area Scan (7x26x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 1.74 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=7.5\text{mm}$, $dy=7.5\text{mm}$, $dz=5\text{mm}$

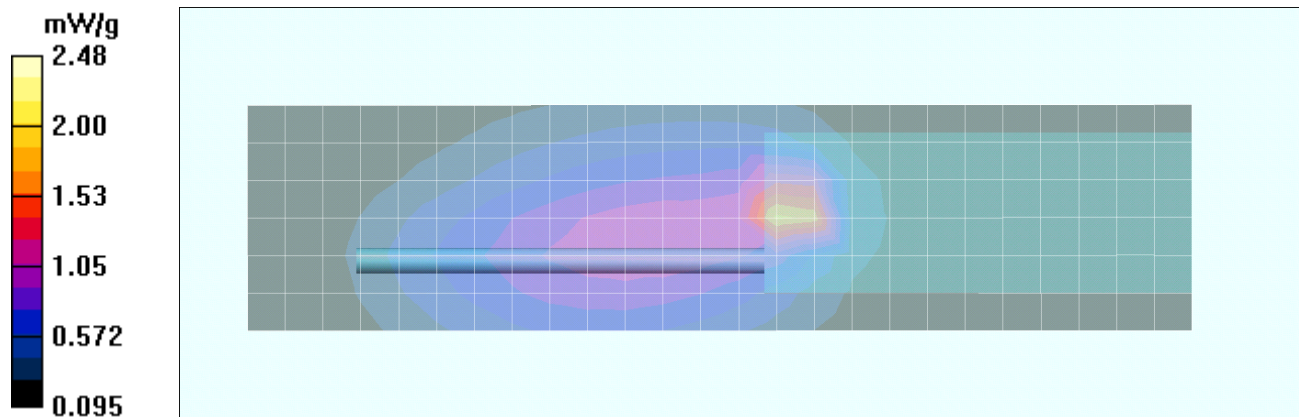
Reference Value = 41.9 V/m; Power Drift = 0.109 dB


Peak SAR (extrapolated) = 4.96 W/kg

SAR(1 g) = 2.15 mW/g; SAR(10 g) = 1.01 mW/g

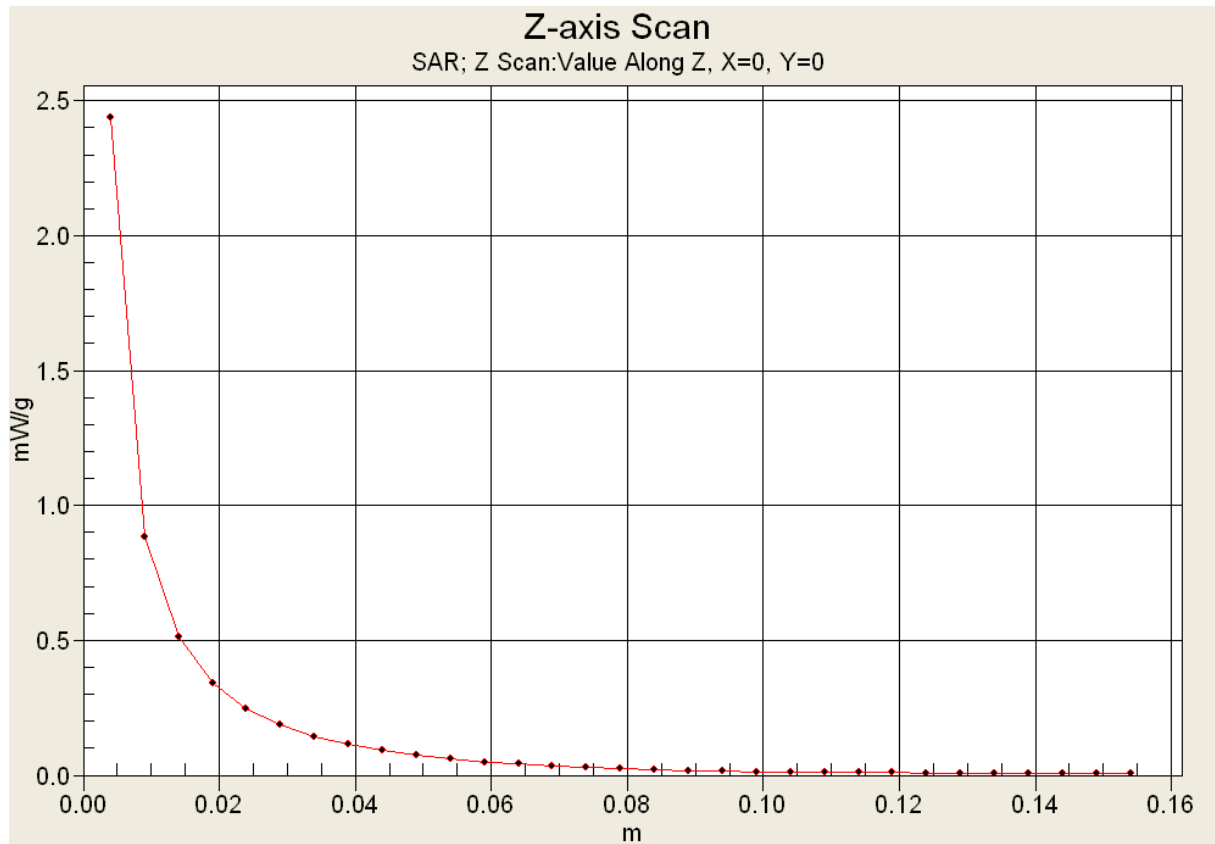
Info: Interpolated medium parameters used for SAR evaluation.



Maximum value of SAR (measured) = 2.48 mW/g



Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio Transceiver	Model:	Viking VP600	Freq.:	138 - 174 MHz	
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Z-axis Scan



 Testing and Engineering Services Lab	<u>Date(s) of Evaluation</u> May 23-28, 2012	<u>Test Report Serial No.</u> 051412ATH-T1174-S90V	<u>Test Report Revision No.</u> Rev. 1.1 (2nd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> August 28, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

Plot B4

Date Tested: 05/28/2012

DUT: EF Johnson VP600; Type: VHF PTT Radio Transceiver; Serial: 517001208620079

Program Notes: Ambient Temp: 22C; Fluid Temp: 21.8C; Barometric Pressure: 101.1 kPa; Humidity: 30%

Communication System: CW

Frequency: 138.0 MHz; Duty Cycle: 1:1

Medium: M150 Medium parameters used (interpolated): $f = 138 \text{ MHz}$; $\sigma = 0.764 \text{ mho/m}$; $\epsilon_r = 64.4$; $\rho = 1000 \text{ kg/m}^3$

- Probe: ET3DV6 - SN1590; ConvF(8.6, 8.6, 8.6); Calibrated: 24/04/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)) Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 19/04/2012
- Phantom: Side Planar; Type: Plexiglass; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Area Scan (7x26x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 1.72 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=7.5\text{mm}$, $dy=7.5\text{mm}$, $dz=5\text{mm}$

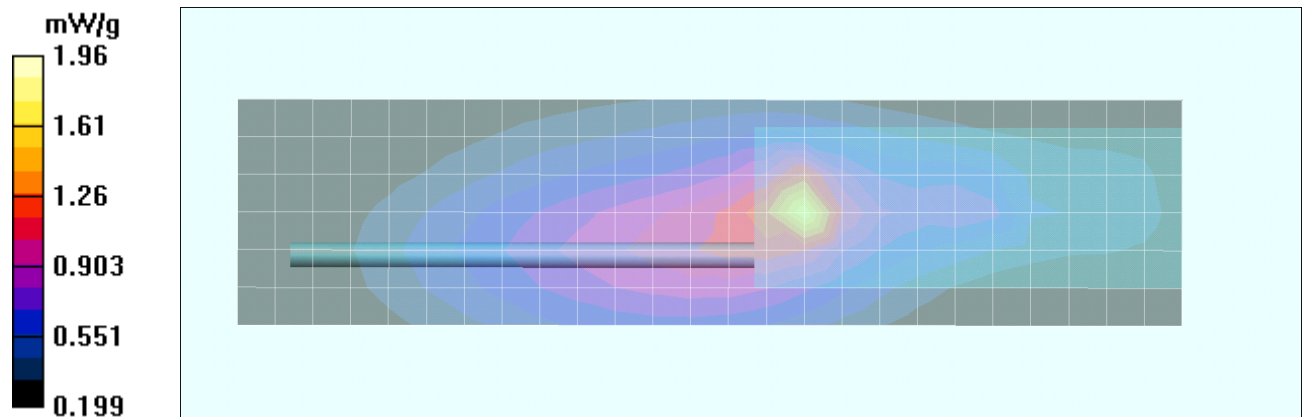
Reference Value = 38.6 V/m; Power Drift = -0.021 dB


Peak SAR (extrapolated) = 6.65 W/kg

SAR(1 g) = 2.02 mW/g; SAR(10 g) = 1.07 mW/g

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 1.96 mW/g



Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio Transceiver	Model:	Viking VP600	Freq.:	138 - 174 MHz	
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	<u>Test Report Issue Date</u> August 28, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	
Test Lab Certificate No. 2470.01				

Plot B5

Date Tested: 05/28/2012

DUT: EF Johnson VP600; Type: VHF PTT Radio Transceiver; Serial: 517001208620079

Program Notes: Ambient Temp: 22C; Fluid Temp: 21.8C; Barometric Pressure: 101.1 kPa; Humidity: 30%

Communication System: CW

Frequency: 173.4 MHz; Duty Cycle: 1:1

Medium: M150 Medium parameters used (interpolated): $f = 173.4 \text{ MHz}$; $\sigma = 0.763 \text{ mho/m}$; $\epsilon_r = 62.4$; $\rho = 1000 \text{ kg/m}^3$

- Probe: ET3DV6 - SN1590; ConvF(8.6, 8.6, 8.6); Calibrated: 24/04/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)) Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 19/04/2012
- Phantom: Side Planar; Type: Plexiglass; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Area Scan (7x26x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Info: Interpolated medium parameters used for SAR evaluation.

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

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=7.5\text{mm}$, $dy=7.5\text{mm}$, $dz=5\text{mm}$

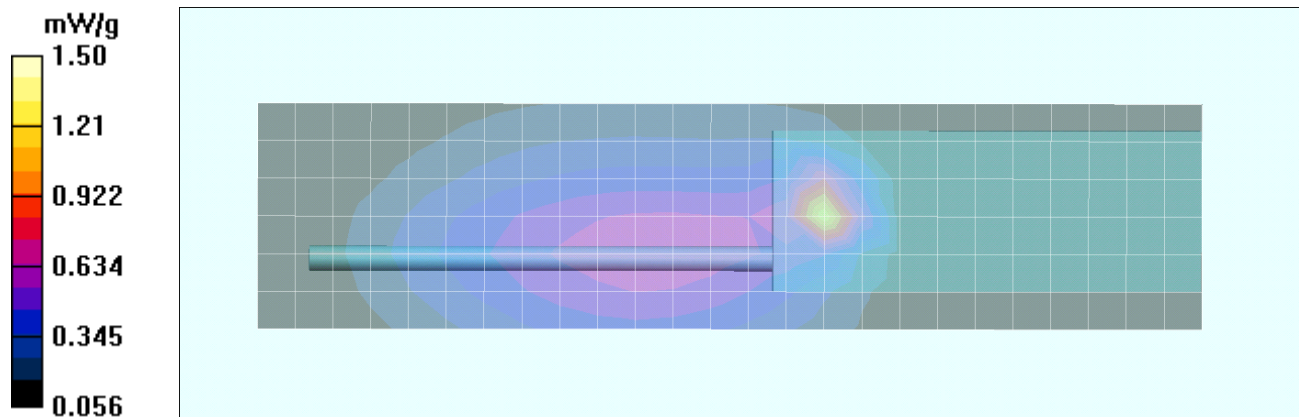
Reference Value = 26.6 V/m; Power Drift = 0.144 dB


Peak SAR (extrapolated) = 3.36 W/kg

SAR(1 g) = 1.39 mW/g; SAR(10 g) = 0.614 mW/g

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 1.50 mW/g



Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio Transceiver	Model:	Viking VP600	Freq.:	138 - 174 MHz	
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	<u>Date(s) of Evaluation</u> May 23-28, 2012	<u>Test Report Serial No.</u> 051412ATH-T1174-S90V	<u>Test Report Revision No.</u> Rev. 1.1 (2nd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> August 28, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

Plot B6

Date Tested: 05/25/2012

DUT: EF Johnson VP600; Type: Speaker-Mic-Antenna with VHF PTT Radio Transceiver; Serial: 517001208620079

Program Notes: Ambient Temp: 22C; Fluid Temp: 22.1C; Barometric Pressure: 101.1 kPa; Humidity: 30%

Communication System: CW

Frequency: 138.0 MHz; Duty Cycle: 1:1

Medium: M150 Medium parameters used (interpolated): $f = 138 \text{ MHz}$; $\sigma = 0.76 \text{ mho/m}$; $\epsilon_r = 62.5$; $\rho = 1000 \text{ kg/m}^3$

- Probe: ET3DV6 - SN1590; ConvF(8.6, 8.6, 8.6); Calibrated: 24/04/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)) Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 19/04/2012
- Phantom: Side Planar; Type: Plexiglass; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Area Scan (6x20x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 5.94 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=7.5\text{mm}$, $dy=7.5\text{mm}$, $dz=5\text{mm}$

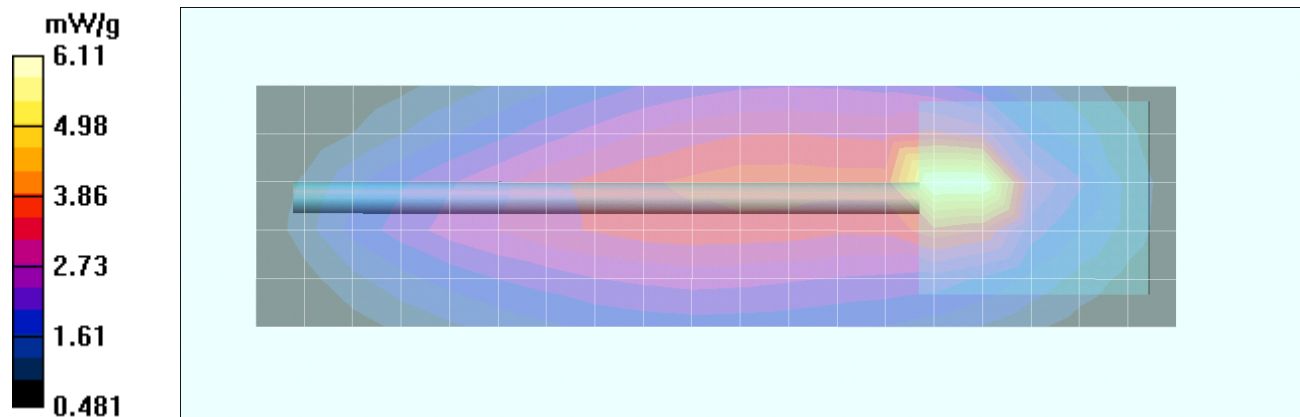
Reference Value = 73.3 V/m; Power Drift = 0.083 dB


Peak SAR (extrapolated) = 20.4 W/kg

SAR(1 g) = 6.29 mW/g; SAR(10 g) = 3.29 mW/g

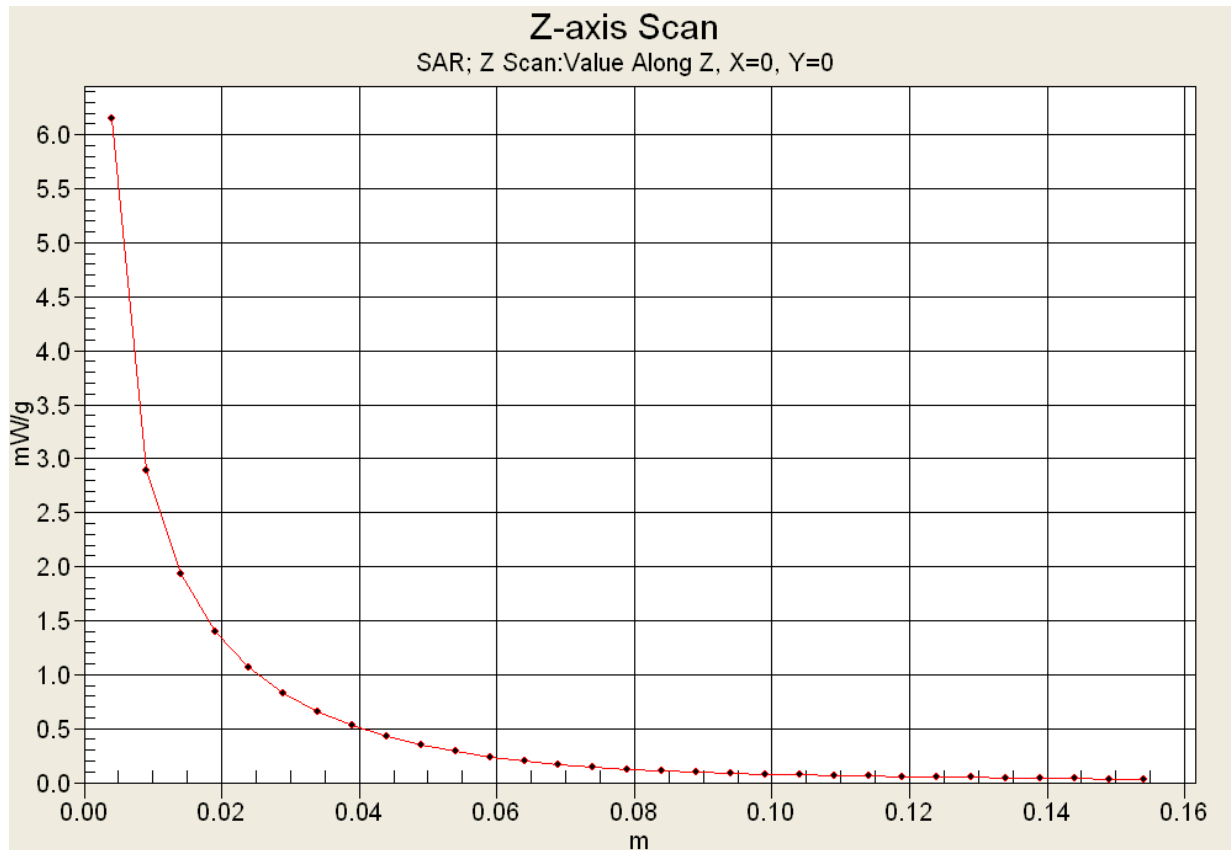
Info: Interpolated medium parameters used for SAR evaluation.



Maximum value of SAR (measured) = 6.11 mW/g



Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio Transceiver	Model:	Viking VP600	Freq.:	138 - 174 MHz	
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Z-axis Scan



	<u>Date(s) of Evaluation</u> May 23-28, 2012	<u>Test Report Serial No.</u> 051412ATH-T1174-S90V	<u>Test Report Revision No.</u> Rev. 1.1 (2nd Release)	
	<u>Test Report Issue Date</u> August 28, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	
Test Lab Certificate No. 2470.01				

Plot B7

Date Tested: 05/25/2012

DUT: EF Johnson VP600; Type: Speaker-Mic-Antenna with VHF PTT Radio Transceiver; Serial: 517001208620079

Program Notes: Ambient Temp: 22C; Fluid Temp: 22.1C; Barometric Pressure: 101.1 kPa; Humidity: 30%

Communication System: CW

Frequency: 150.8 MHz; Duty Cycle: 1:1

Medium: M150 Medium parameters used (interpolated): $f = 150.8 \text{ MHz}$; $\sigma = 0.771 \text{ mho/m}$; $\epsilon_r = 63$; $\rho = 1000 \text{ kg/m}^3$

- Probe: ET3DV6 - SN1590; ConvF(8.6, 8.6, 8.6); Calibrated: 24/04/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 19/04/2012
- Phantom: Side Planar; Type: Plexiglass; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Area Scan (6x20x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 5.02 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=7.5\text{mm}$, $dy=7.5\text{mm}$, $dz=5\text{mm}$

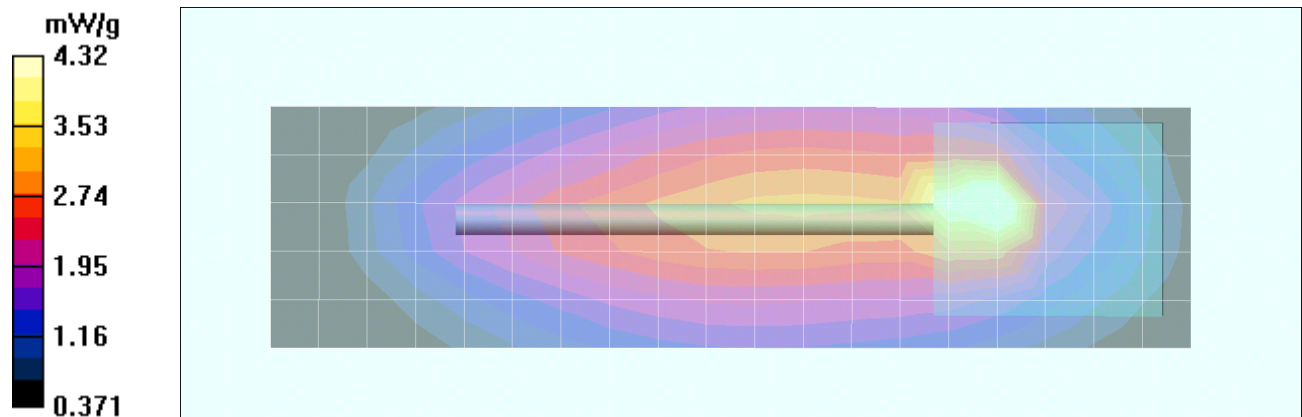
Reference Value = 63.0 V/m; Power Drift = -0.150 dB


Peak SAR (extrapolated) = 12.6 W/kg

SAR(1 g) = 4.39 mW/g; SAR(10 g) = 2.44 mW/g

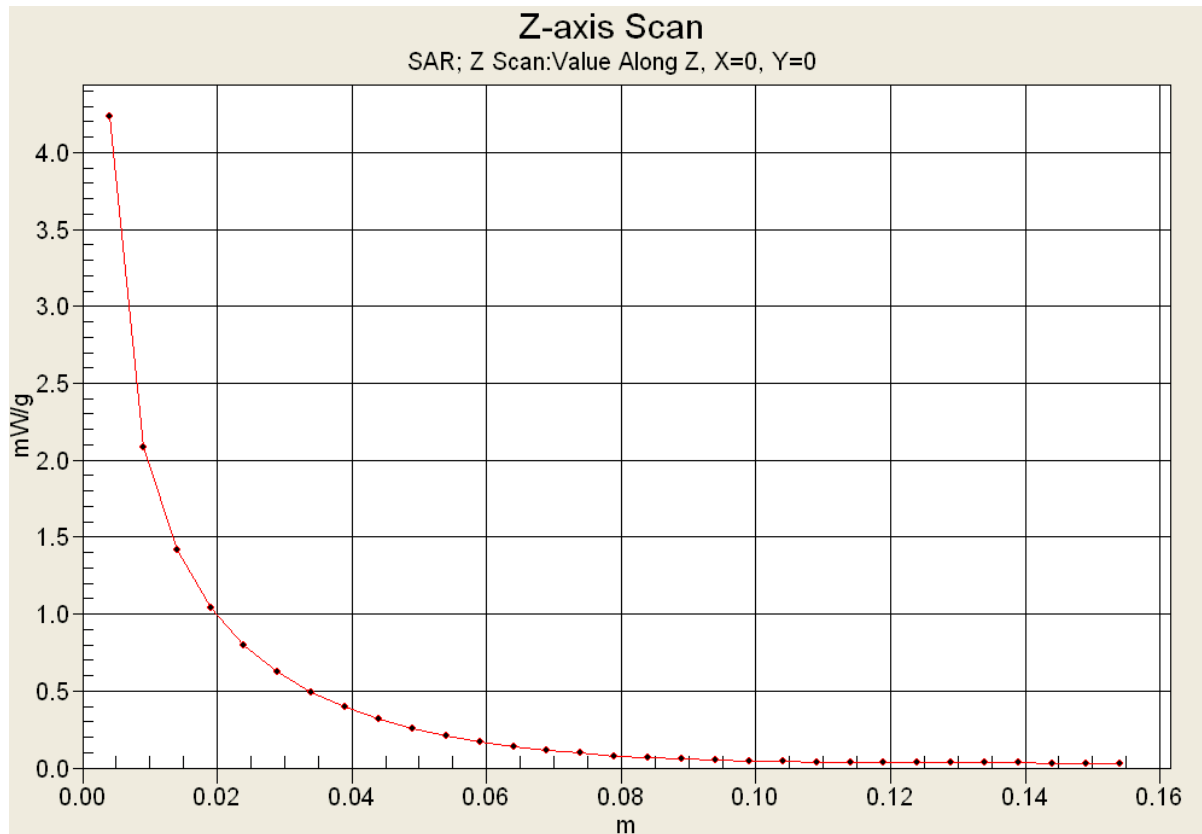
Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 4.32 mW/g



Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio Transceiver	Model:	Viking VP600	Freq.:	138 - 174 MHz	
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Z-axis Scan



	<u>Date(s) of Evaluation</u> May 23-28, 2012	<u>Test Report Serial No.</u> 051412ATH-T1174-S90V	<u>Test Report Revision No.</u> Rev. 1.1 (2nd Release)	
	<u>Test Report Issue Date</u> August 28, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	
Test Lab Certificate No. 2470.01				

Plot B8

Date Tested: 05/25/2012

DUT: EF Johnson VP600; Type: Speaker-Mic-Antenna with VHF PTT Radio Transceiver; Serial: 517001208620079

Program Notes: Ambient Temp: 22C; Fluid Temp: 22.1C; Barometric Pressure: 101.1 kPa; Humidity: 30%

Communication System: CW

Frequency: 173.4 MHz; Duty Cycle: 1:1

Medium: M150 Medium parameters used (interpolated): $f = 173.4 \text{ MHz}$; $\sigma = 0.79 \text{ mho/m}$; $\epsilon_r = 62.6$; $\rho = 1000 \text{ kg/m}^3$

- Probe: ET3DV6 - SN1590; ConvF(8.6, 8.6, 8.6); Calibrated: 24/04/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)) Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 19/04/2012
- Phantom: Side Planar; Type: Plexiglass; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Area Scan (6x20x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Info: Interpolated medium parameters used for SAR evaluation.

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

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=7.5\text{mm}$, $dy=7.5\text{mm}$, $dz=5\text{mm}$

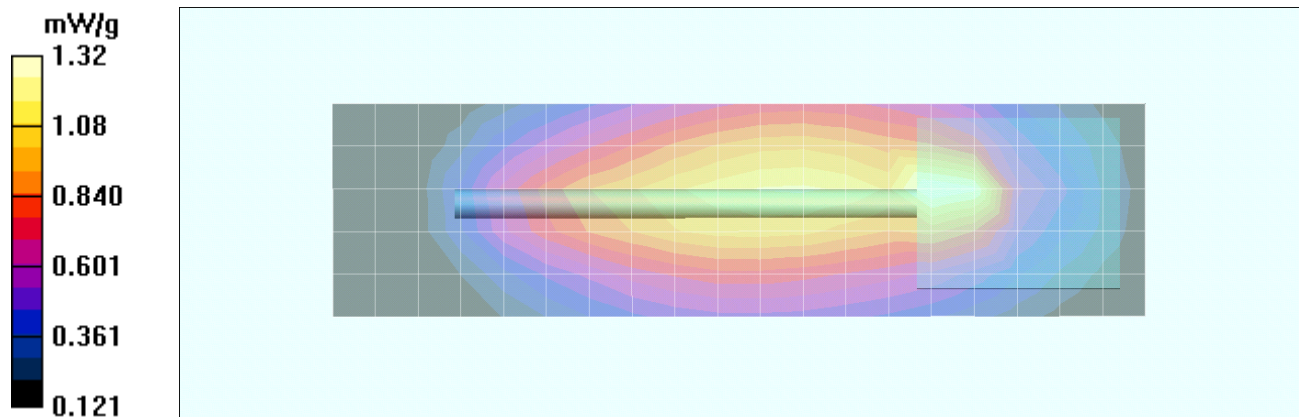
Reference Value = 36.4 V/m; Power Drift = 0.097 dB


Peak SAR (extrapolated) = 3.32 W/kg

SAR(1 g) = 1.32 mW/g; SAR(10 g) = 0.777 mW/g

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 1.32 mW/g



Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio Transceiver	Model:	Viking VP600	Freq.:	138 - 174 MHz	
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	<u>Date(s) of Evaluation</u> May 23-28, 2012	<u>Test Report Serial No.</u> 051412ATH-T1174-S90V	<u>Test Report Revision No.</u> Rev. 1.1 (2nd Release)	
	<u>Test Report Issue Date</u> August 28, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	
Test Lab Certificate No. 2470.01				

Plot B9

Date Tested: 05/25/2012

DUT: EF Johnson VP600; Type: Speaker-Mic-Antenna with VHF PTT Radio Transceiver; Serial: 517001208620079

Program Notes: Ambient Temp: 22C; Fluid Temp: 22.1C; Barometric Pressure: 101.1 kPa; Humidity: 30%

Communication System: CW

Frequency: 138.0 MHz; Duty Cycle: 1:1

Medium: M150 Medium parameters used (interpolated): $f = 138 \text{ MHz}$; $\sigma = 0.76 \text{ mho/m}$; $\epsilon_r = 62.5$; $\rho = 1000 \text{ kg/m}^3$

- Probe: ET3DV6 - SN1590; ConvF(8.6, 8.6, 8.6); Calibrated: 24/04/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)) Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 19/04/2012
- Phantom: Side Planar; Type: Plexiglass; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Area Scan (6x20x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.830 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=7.5\text{mm}$, $dy=7.5\text{mm}$, $dz=5\text{mm}$

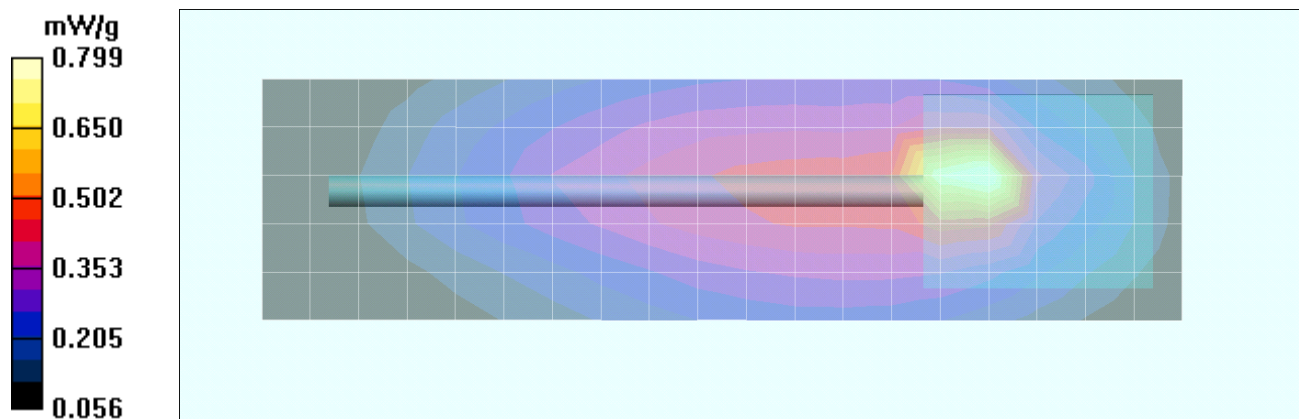
Reference Value = 26.6 V/m; Power Drift = -0.475 dB


Peak SAR (extrapolated) = 2.71 W/kg

SAR(1 g) = 0.818 mW/g; SAR(10 g) = 0.420 mW/g

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.799 mW/g



Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio Transceiver	Model:	Viking VP600	Freq.:	138 - 174 MHz	
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	<u>Date(s) of Evaluation</u> May 23-28, 2012	<u>Test Report Serial No.</u> 051412ATH-T1174-S90V	<u>Test Report Revision No.</u> Rev. 1.1 (2nd Release)	
	<u>Test Report Issue Date</u> August 28, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	
Test Lab Certificate No. 2470.01				

Plot B10

Date Tested: 05/25/2012

DUT: EF Johnson VP600; Type: Speaker-Mic-Antenna with VHF PTT Radio Transceiver; Serial: 517001208620079

Program Notes: Ambient Temp: 22C; Fluid Temp: 22.1C; Barometric Pressure: 101.1 kPa; Humidity: 30%

Communication System: CW

Frequency: 173.4 MHz; Duty Cycle: 1:1

Medium: M150 Medium parameters used (interpolated): $f = 173.4 \text{ MHz}$; $\sigma = 0.79 \text{ mho/m}$; $\epsilon_r = 62.6$; $\rho = 1000 \text{ kg/m}^3$

- Probe: ET3DV6 - SN1590; ConvF(8.6, 8.6, 8.6); Calibrated: 24/04/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)) Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 19/04/2012
- Phantom: Side Planar; Type: Plexiglass; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Area Scan (6x20x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.747 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=7.5\text{mm}$, $dy=7.5\text{mm}$, $dz=5\text{mm}$

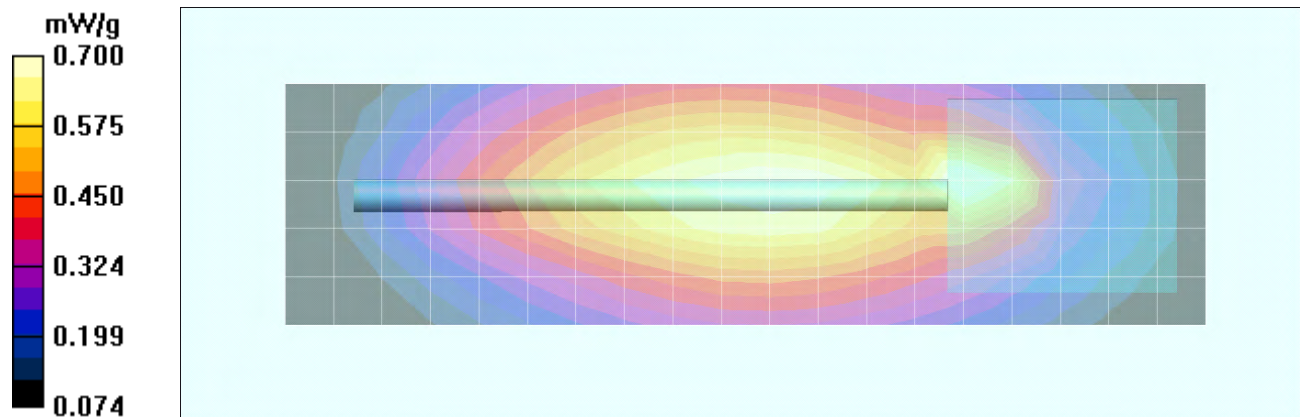
Reference Value = 26.3 V/m; Power Drift = 0.133 dB


Peak SAR (extrapolated) = 1.76 W/kg



SAR(1 g) = 0.688 mW/g; SAR(10 g) = 0.404 mW/g

Info: Interpolated medium parameters used for SAR evaluation.


Maximum value of SAR (measured) = 0.700 mW/g



Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio Transceiver	Model:	Viking VP600	Freq.:	138 - 174 MHz	
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	<u>Test Report Issue Date</u> August 28, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	
Test Lab Certificate No. 2470.01				

APPENDIX B - SYSTEM PERFORMANCE CHECK PLOTS

Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio Transceiver	Model:	Viking VP600	Freq.:	138 - 174 MHz	
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	<u>Date(s) of Evaluation</u> May 23-28, 2012	<u>Test Report Serial No.</u> 051412ATH-T1174-S90V	<u>Test Report Revision No.</u> Rev. 1.1 (2nd Release)	
	<u>Test Report Issue Date</u> August 28, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	
Test Lab Certificate No. 2470.01				

Date Tested: 05/23/2012

System Performance Check - 300 MHz Dipole - Head

DUT: Dipole 300 MHz; Type: D300V3; Serial: 1009; Calibrated: 17/04/2012

Program Notes: Ambient Temp: 23C; Fluid Temp: 21.6C; Barometric Pressure: 101.1 kPa; Humidity: 30%

Communication System: CW

Frequency: 300 MHz; Duty Cycle: 1:1

Medium: 300 HSL Medium parameters used: $f = 300 \text{ MHz}$; $\sigma = 0.88 \text{ mho/m}$; $\epsilon_r = 45.9$; $\rho = 1000 \text{ kg/m}^3$

- Probe: ET3DV6 - SN1590; ConvF(8.3, 8.3, 8.3); Calibrated: 24/04/2012
- Sensor-Surface: 5mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 19/04/2012
- Phantom: Barski Industries; Type: Fiberglass Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Head d=15mm, Pin = 398mW/Area Scan (6x11x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 1.10 mW/g

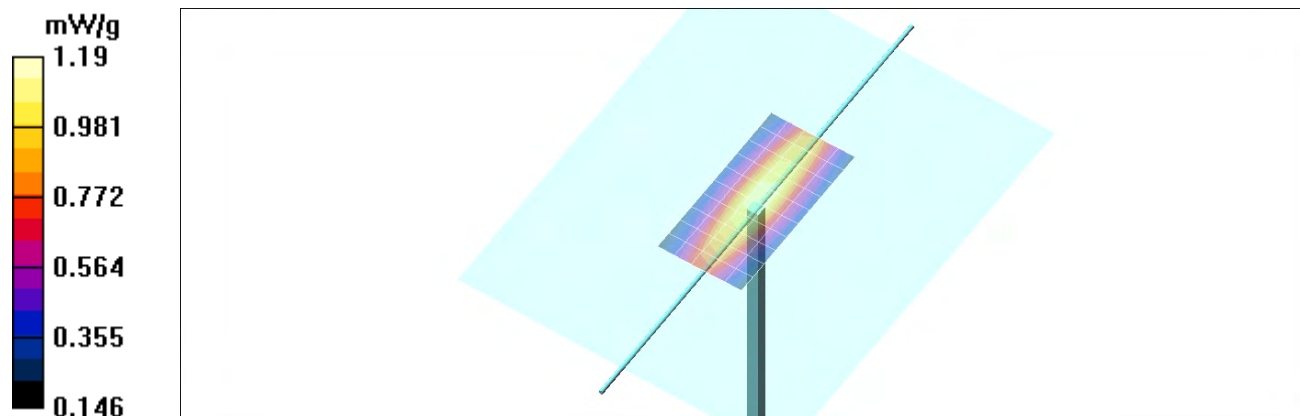
Head d=15mm, Pin = 398mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$


Reference Value = 37.0 V/m; Power Drift = -0.055 dB

Peak SAR (extrapolated) = 1.96 W/kg

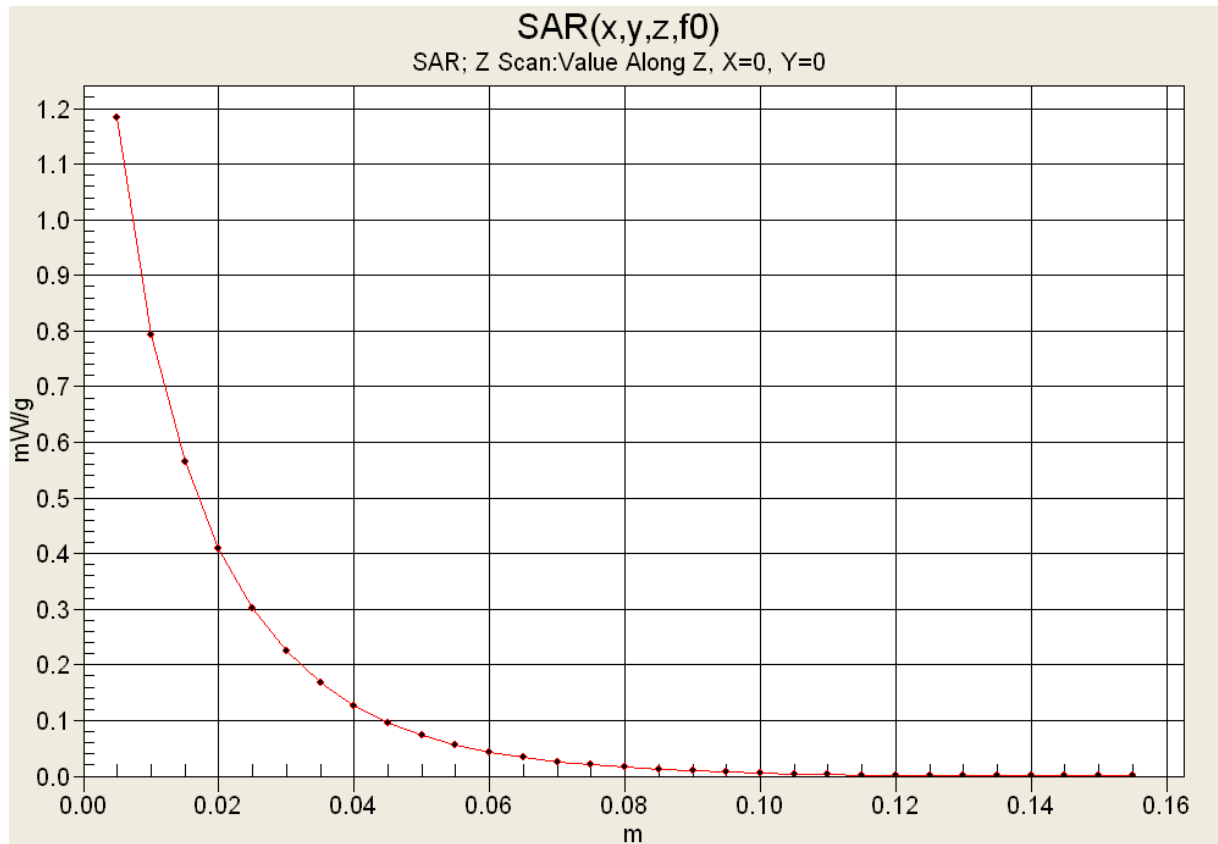
SAR(1 g) = 1.23 mW/g; SAR(10 g) = 0.823 mW/g



Maximum value of SAR (measured) = 1.19 mW/g



Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio Transceiver	Model:	Viking VP600	Freq.:	138 - 174 MHz	
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Z-Axis Scan



	<u>Date(s) of Evaluation</u> May 23-28, 2012	<u>Test Report Serial No.</u> 051412ATH-T1174-S90V	<u>Test Report Revision No.</u> Rev. 1.1 (2nd Release)	
	<u>Test Report Issue Date</u> August 28, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	
Test Lab Certificate No. 2470.01				

Date Tested: 05/28/2012

System Performance Check - 300 MHz Dipole - Head

DUT: Dipole 300 MHz; Type: D300V3; Serial: 1009; Calibrated: 17/04/2012

Program Notes: Ambient Temp: 22C; Fluid Temp: 21.9C; Barometric Pressure: 101.1 kPa; Humidity: 30%

Communication System: CW

Frequency: 300 MHz; Duty Cycle: 1:1

Medium: 300 HSL Medium parameters used: $f = 300 \text{ MHz}$; $\sigma = 0.86 \text{ mho/m}$; $\epsilon_r = 46.5$; $\rho = 1000 \text{ kg/m}^3$

- Probe: ET3DV6 - SN1590; ConvF(8.3, 8.3, 8.3); Calibrated: 24/04/2012
- Sensor-Surface: 5mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 19/04/2012
- Phantom: Barski Industries; Type: Fiberglass Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Head d=15mm, Pin = 398mW/Area Scan (6x11x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 1.03 mW/g

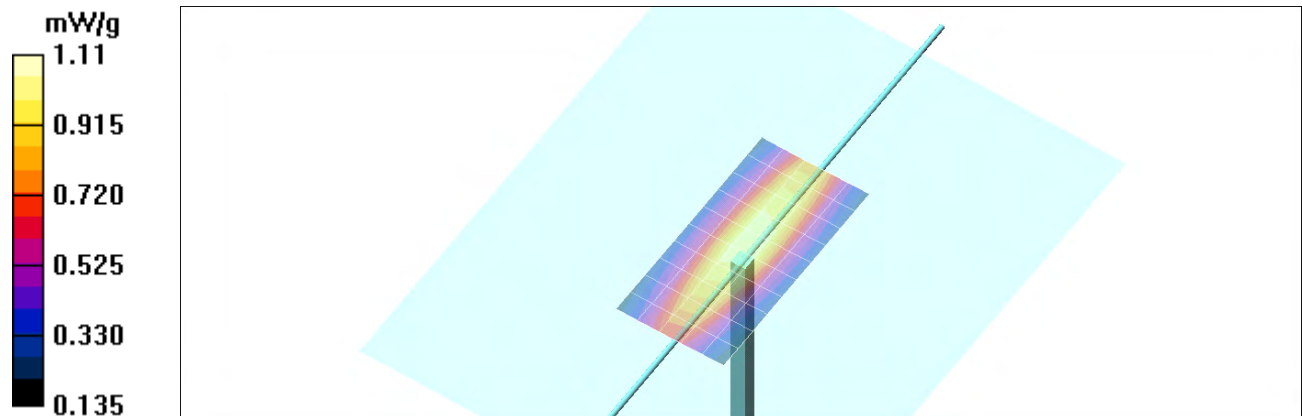
Head d=15mm, Pin = 398mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$


Reference Value = 35.9 V/m; Power Drift = -0.021 dB

Peak SAR (extrapolated) = 1.81 W/kg

SAR(1 g) = 1.15 mW/g; SAR(10 g) = 0.772 mW/g

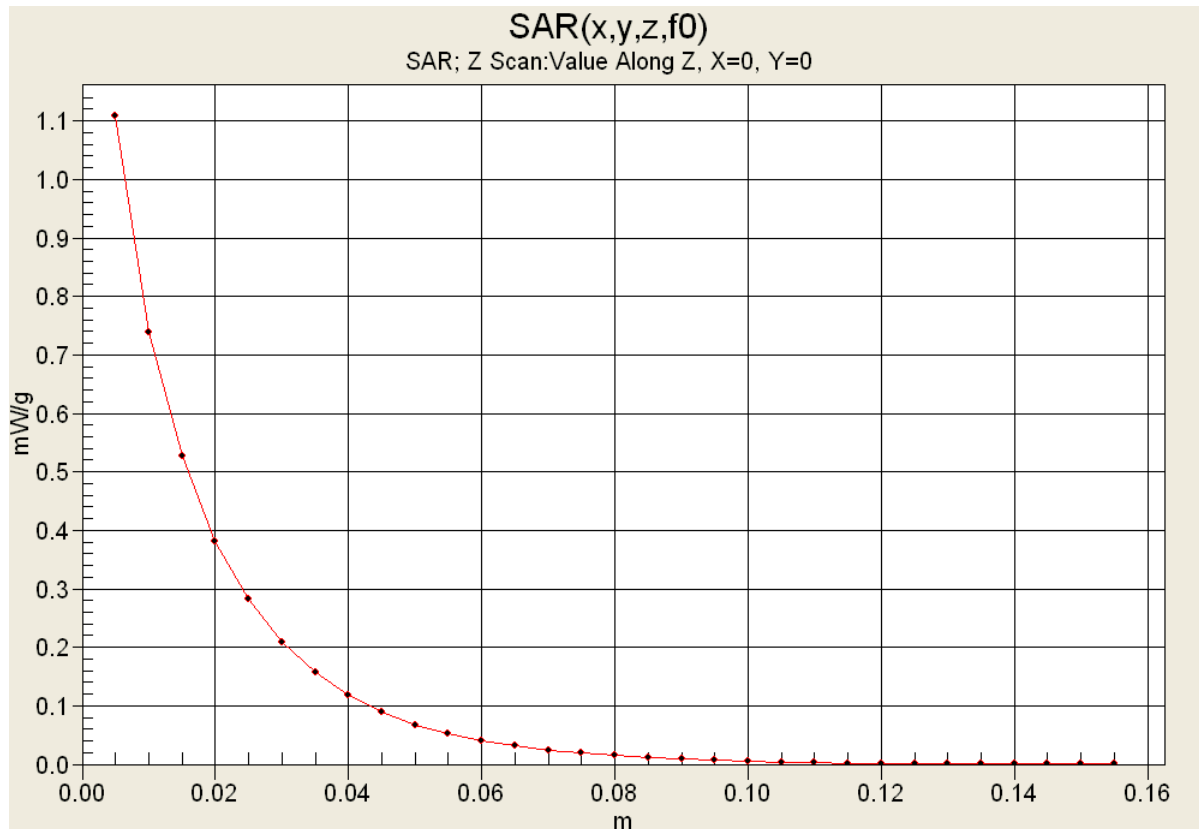
Maximum value of SAR (measured) = 1.11 mW/g






Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio Transceiver	Model:	Viking VP600	Freq.:	138 - 174 MHz	
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	<u>Test Report Issue Date</u> August 28, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	


Z-axis Scan



Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio Transceiver	Model:	Viking VP600	Freq.:	138 - 174 MHz	
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	<u>Test Report Issue Date</u> August 28, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	
Test Lab Certificate No. 2470.01				

APPENDIX C - MEASURED FLUID DIELECTRIC PARAMETERS

Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio Transceiver	Model:	Viking VP600	Freq.:	138 - 174 MHz	
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	<u>Date(s) of Evaluation</u> May 23-28, 2012	<u>Test Report Serial No.</u> 051412ATH-T1174-S90V	<u>Test Report Revision No.</u> Rev. 1.1 (2nd Release)	
	<u>Test Report Issue Date</u> August 28, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	
Test Lab Certificate No. 2470.01				

300 MHz Head

Celltech Labs
Test Result for UIM Dielectric Parameter

23/May/2012

Frequency (GHz)


FCC_eHFCC OET 65 Supplement C (June 2001) Limits for Head Epsilon

FCC_sHFCC OET 65 Supplement C (June 2001) Limits for Head Sigma

Test_e Epsilon of UIM

Test_s Sigma of UIM

Freq	FCC_eHFCC_sH	Test_e	Test_s
0.2000	49.97	0.80	52.15
0.2100	49.50	0.80	50.33
0.2200	49.03	0.81	49.55
0.2300	48.57	0.82	48.59
0.2400	48.10	0.83	49.14
0.2500	47.63	0.83	47.90
0.2600	47.17	0.84	47.91
0.2700	46.70	0.85	47.79
0.2800	46.23	0.86	46.69
0.2900	45.77	0.86	47.04
0.3000	45.30	0.87	45.94
0.3100	45.18	0.87	45.35
0.3200	45.06	0.87	45.72
0.3300	44.94	0.87	44.41
0.3400	44.82	0.87	44.72
0.3500	44.70	0.87	45.52
0.3600	44.58	0.87	44.79
0.3700	44.46	0.87	43.21
0.3800	44.34	0.87	43.97
0.3900	44.22	0.87	42.86
0.4000	44.10	0.87	43.03

Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio Transceiver	Model:	Viking VP600	Freq.:	138 - 174 MHz	
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	<u>Date(s) of Evaluation</u> May 23-28, 2012	<u>Test Report Serial No.</u> 051412ATH-T1174-S90V	<u>Test Report Revision No.</u> Rev. 1.1 (2nd Release)	
	<u>Test Report Issue Date</u> August 28, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	
Test Lab Certificate No. 2470.01				

150 MHz Head

Celltech Labs
Test Result for UIM Dielectric Parameter

24/May/2012

Frequency (GHz)


FCC_eHFCC OET 65 Supplement C (June 2001) Limits for Head Epsilon

FCC_sHFCC OET 65 Supplement C (June 2001) Limits for Head Sigma

Test_e Epsilon of UIM

Test_s Sigma of UIM

Freq	FCC_eHFCC_sH	Test_e	Test_s
0.0500	56.97	0.69	72.92
0.0600	56.50	0.69	68.79
0.0700	56.03	0.70	66.28
0.0800	55.57	0.71	64.36
0.0900	55.10	0.72	55.37
0.1000	54.63	0.72	60.40
0.1100	54.17	0.73	58.47
0.1200	53.70	0.74	57.13
0.1300	53.23	0.75	53.62
0.1400	52.77	0.75	54.90
0.1500	52.30	0.76	54.80
0.1600	51.83	0.77	53.68
0.1700	51.37	0.77	54.04
0.1800	50.90	0.78	53.10
0.1900	50.43	0.79	51.19
0.2000	49.97	0.80	49.51
0.2100	49.50	0.80	50.63
0.2200	49.03	0.81	49.31
0.2300	48.57	0.82	49.24
0.2400	48.10	0.83	48.69
0.2500	47.63	0.83	48.49


Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio Transceiver	Model:	Viking VP600	Freq.:	138 - 174 MHz	
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	<u>Date(s) of Evaluation</u> May 23-28, 2012	<u>Test Report Serial No.</u> 051412ATH-T1174-S90V	<u>Test Report Revision No.</u> Rev. 1.1 (2nd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> August 28, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

150 MHz Body

Celltech Labs
 Test Result for UIM Dielectric Parameter
 25/May/2012
 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
0.0500	64.37	0.72	72.56	0.70
0.0600	64.12	0.73	76.67	0.72
0.0700	63.87	0.74	75.53	0.73
0.0800	63.63	0.74	68.88	0.71
0.0900	63.38	0.75	71.78	0.73
0.1000	63.13	0.76	69.59	0.72
0.1100	62.89	0.77	66.68	0.72
0.1200	62.64	0.78	65.93	0.76
0.1300	62.39	0.78	64.11	0.76
0.1400	62.15	0.79	62.14	0.76
0.1500	61.90	0.80	62.87	0.77
0.1600	61.65	0.81	64.83	0.78
0.1700	61.41	0.82	62.62	0.79
0.1800	61.16	0.82	62.51	0.79
0.1900	60.91	0.83	60.46	0.79
0.2000	60.67	0.84	61.62	0.80
0.2100	60.42	0.85	62.18	0.81
0.2200	60.17	0.86	60.20	0.82
0.2300	59.93	0.86	60.14	0.82
0.2400	59.68	0.87	60.65	0.84
0.2500	59.43	0.88	59.52	0.84

Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio Transceiver	Model:	Viking VP600	Freq.:	138 - 174 MHz	
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	<u>Test Report Issue Date</u> August 28, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

300 MHz Head

Celltech Labs
Test Result for UIM Dielectric Parameter

28/May/2012

Frequency (GHz)


FCC_eHFCC OET 65 Supplement C (June 2001) Limits for Head Epsilon

FCC_sHFCC OET 65 Supplement C (June 2001) Limits for Head Sigma

Test_e Epsilon of UIM

Test_s Sigma of UIM

Freq	FCC_eHFCC_sH	Test_e	Test_s
0.2000	49.97	0.80	49.58
0.2100	49.50	0.80	50.50
0.2200	49.03	0.81	49.99
0.2300	48.57	0.82	49.30
0.2400	48.10	0.83	48.04
0.2500	47.63	0.83	47.54
0.2600	47.17	0.84	47.55
0.2700	46.70	0.85	47.71
0.2800	46.23	0.86	46.77
0.2900	45.77	0.86	45.51
0.3000	45.30	0.87	46.48
0.3100	45.18	0.87	45.63
0.3200	45.06	0.87	45.89
0.3300	44.94	0.87	45.35
0.3400	44.82	0.87	44.97
0.3500	44.70	0.87	44.94
0.3600	44.58	0.87	43.81
0.3700	44.46	0.87	43.17
0.3800	44.34	0.87	43.97
0.3900	44.22	0.87	43.73
0.4000	44.10	0.87	42.90


Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio Transceiver	Model:	Viking VP600	Freq.:	138 - 174 MHz	
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	<u>Test Report Issue Date</u> August 28, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

150 MHz Body


Celltech Labs
Test Result for UIM Dielectric Parameter
28/May/2012
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
0.0500	64.37	0.72	84.13	0.73
0.0600	64.12	0.73	88.51	0.70
0.0700	63.87	0.74	73.18	0.73
0.0800	63.63	0.74	73.11	0.73
0.0900	63.38	0.75	70.62	0.71
0.1000	63.13	0.76	66.38	0.72
0.1100	62.89	0.77	64.78	0.75
0.1200	62.64	0.78	68.90	0.74
0.1300	62.39	0.78	63.69	0.74
0.1400	62.15	0.79	64.54	0.77
0.1500	61.90	0.80	63.00	0.78
0.1600	61.65	0.81	64.30	0.78
0.1700	61.41	0.82	62.42	0.76
0.1800	61.16	0.82	62.24	0.77
0.1900	60.91	0.83	63.51	0.77
0.2000	60.67	0.84	62.62	0.80
0.2100	60.42	0.85	61.40	0.78
0.2200	60.17	0.86	59.71	0.80
0.2300	59.93	0.86	59.79	0.82
0.2400	59.68	0.87	60.15	0.81
0.2500	59.43	0.88	60.07	0.82

Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio Transceiver	Model:	Viking VP600	Freq.:	138 - 174 MHz	
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	<u>Date(s) of Evaluation</u> May 23-28, 2012	<u>Test Report Serial No.</u> 051412ATH-T1174-S90V	<u>Test Report Revision No.</u> Rev. 1.1 (2nd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> August 28, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

APPENDIX D - SAR TEST SETUP & DUT PHOTOGRAPHS


Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio Transceiver	Model:	Viking VP600	Freq.:	138 - 174 MHz	
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	<u>Date(s) of Evaluation</u> May 23-28, 2012	<u>Test Report Serial No.</u> 051412ATH-T1174-S90V	<u>Test Report Revision No.</u> Rev. 1.1 (2nd Release)	
	<u>Test Report Issue Date</u> August 28, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	
Test Lab Certificate No. 2470.01				

BODY-WORN SAR TEST SETUP PHOTOGRAPHS

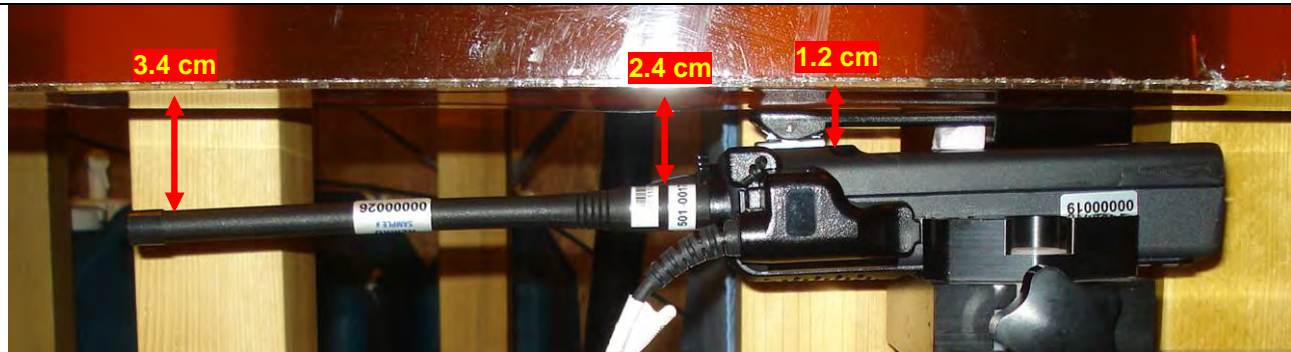


Body-worn Test Setup - VP600 PTT Radio Transceiver

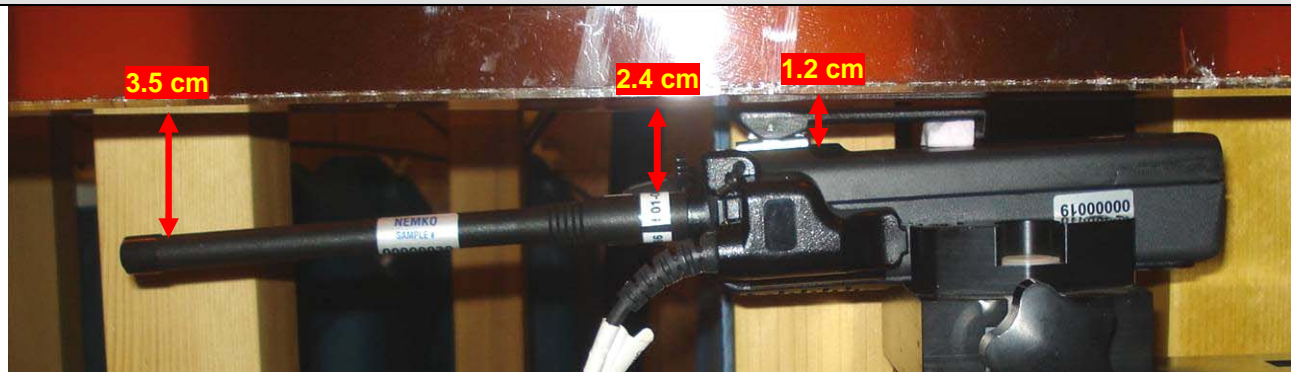
Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio Transceiver	Model:	Viking VP600	Freq.:	138 - 174 MHz	
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	<u>Date(s) of Evaluation</u> May 23-28, 2012	<u>Test Report Serial No.</u> 051412ATH-T1174-S90V	<u>Test Report Revision No.</u> Rev. 1.1 (2nd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> August 28, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

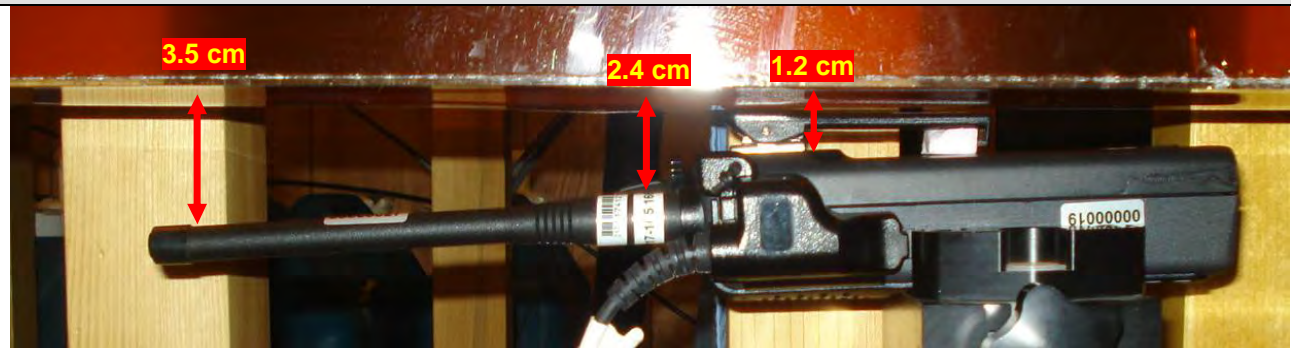
BODY-WORN SAR TEST SETUP PHOTOGRAPHS



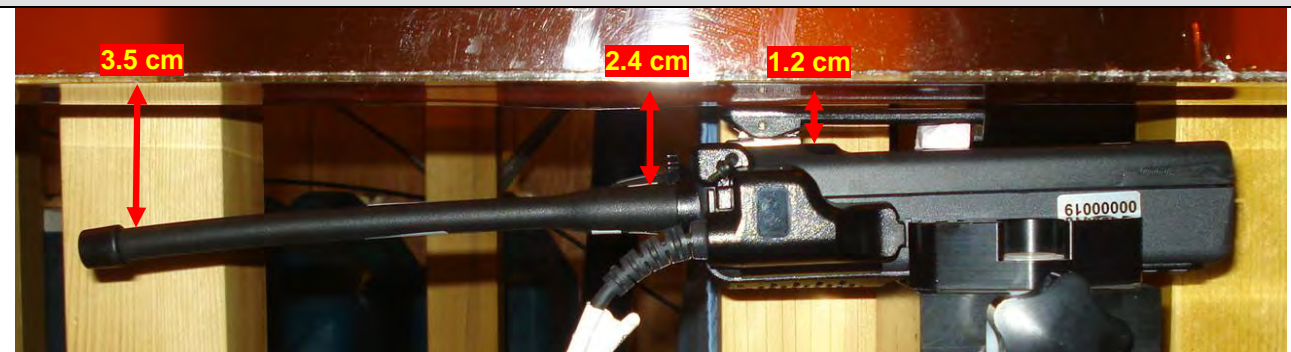
Body-worn Test Setup – Radio with Antenna 1, Body-worn acc. 1, Battery a, Audio acc. 1




Body-worn Test Setup - Radio with Antenna 2, Body-worn acc. 1, Battery a, Audio acc. 1





Body-worn Test Setup - Radio with Antenna 3, Body-worn acc. 1, Battery a, Audio acc. 1



Body-worn Test Setup - Radio with Antenna 4, Body-worn acc. 1, Battery a, Audio acc. 1


Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio Transceiver	Model:	Viking VP600	Freq.:	138 - 174 MHz	
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	<u>Date(s) of Evaluation</u> May 23-28, 2012	<u>Test Report Serial No.</u> 051412ATH-T1174-S90V	<u>Test Report Revision No.</u> Rev. 1.1 (2nd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> August 28, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

BODY-WORN SAR TEST SETUP PHOTOGRAPHS

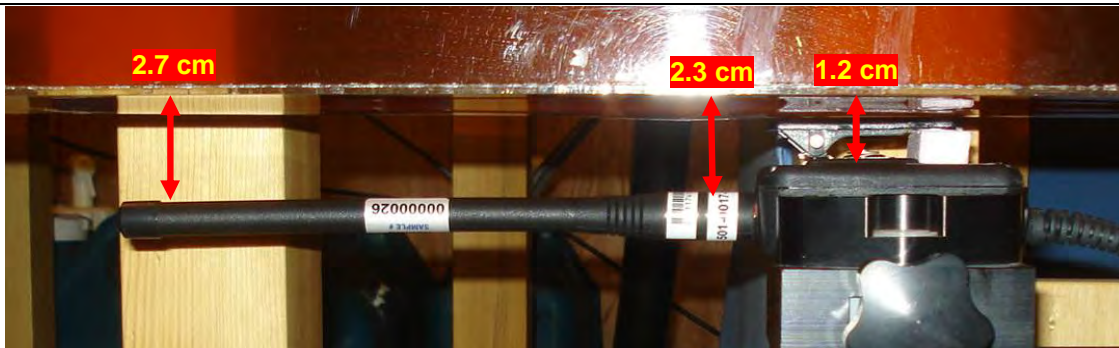


Body-worn Test Setup - Speaker-Mic-Antenna accessory connected to VP600 PTT Radio Transceiver

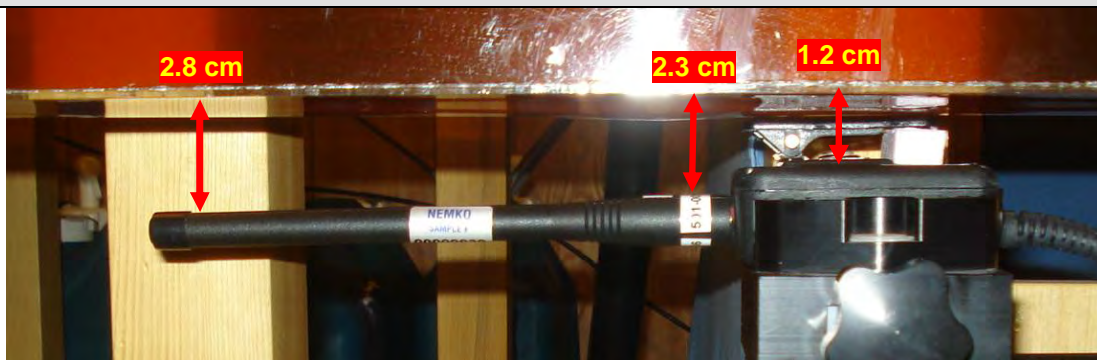
Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio Transceiver	Model:	Viking VP600	Freq.:	138 - 174 MHz	
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	<u>Date(s) of Evaluation</u> May 23-28, 2012	<u>Test Report Serial No.</u> 051412ATH-T1174-S90V	<u>Test Report Revision No.</u> Rev. 1.1 (2nd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> August 28, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

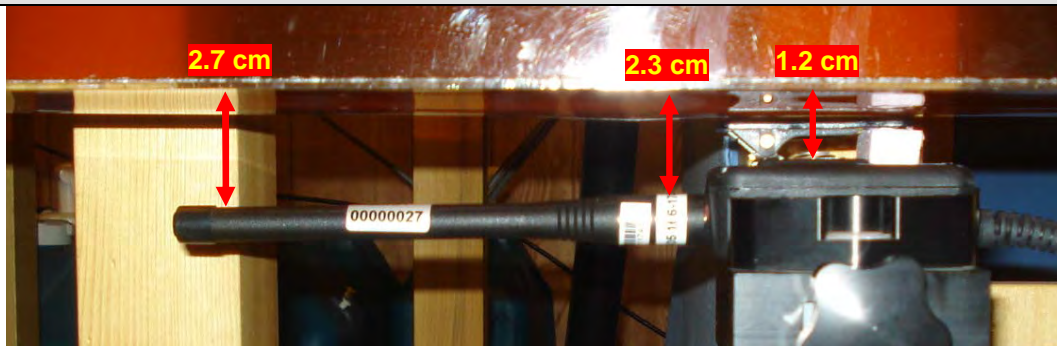
BODY-WORN SAR TEST SETUP PHOTOGRAPHS



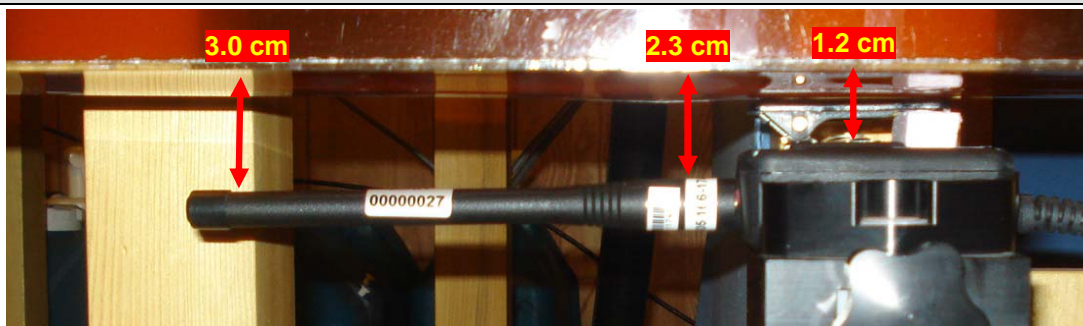
Body-worn Test Setup – Audio acc. 2 with Antenna 1, Battery a




Body-worn Test Setup - Audio acc. 2 with Antenna 2, Battery a





Body-worn Test Setup – Audio acc. 2 with Antenna 3, Battery a



Body-worn Test Setup – Audio acc. 2 with Antenna 4, Battery a


Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio Transceiver	Model:	Viking VP600	Freq.:	138 - 174 MHz	
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	<u>Test Report Issue Date</u> August 28, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

FACE-HELD SAR TEST SETUP PHOTOGRAPHS

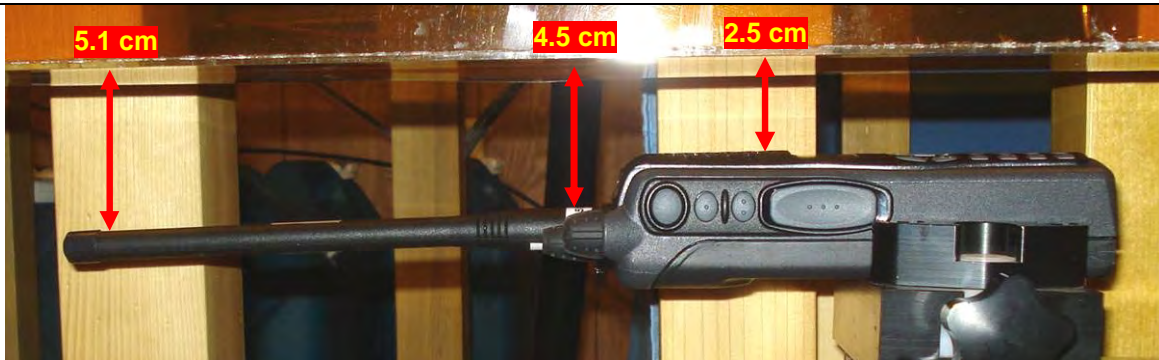


Face held Test Setup – VP600 PTT Radio Transceiver

Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio Transceiver	Model:	Viking VP600	Freq.:	138 - 174 MHz	
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	Date(s) of Evaluation May 23-28, 2012	Test Report Serial No. 051412ATH-T1174-S90V	Test Report Revision No. Rev. 1.1 (2nd Release)	 Test Lab Certificate No. 2470.01
	Test Report Issue Date August 28, 2012	Description of Test(s) Specific Absorption Rate	RF Exposure Category Occupational (Controlled)	

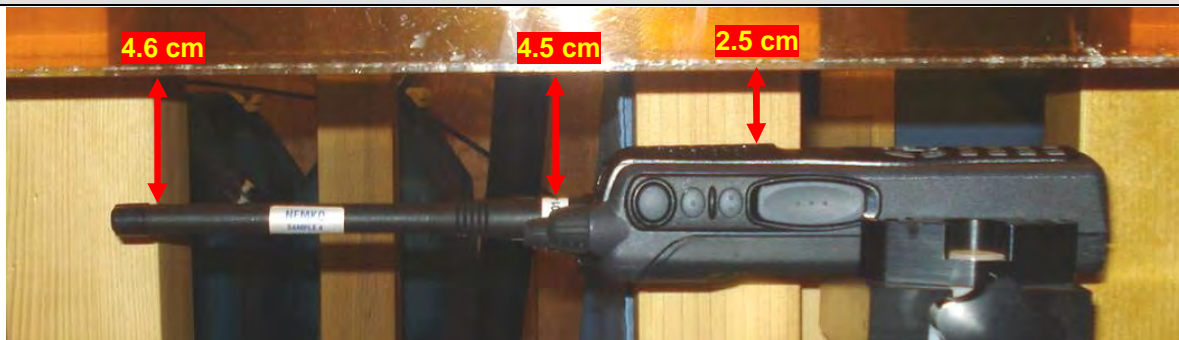
FACE-HELD SAR TEST SETUP PHOTOGRAPHS



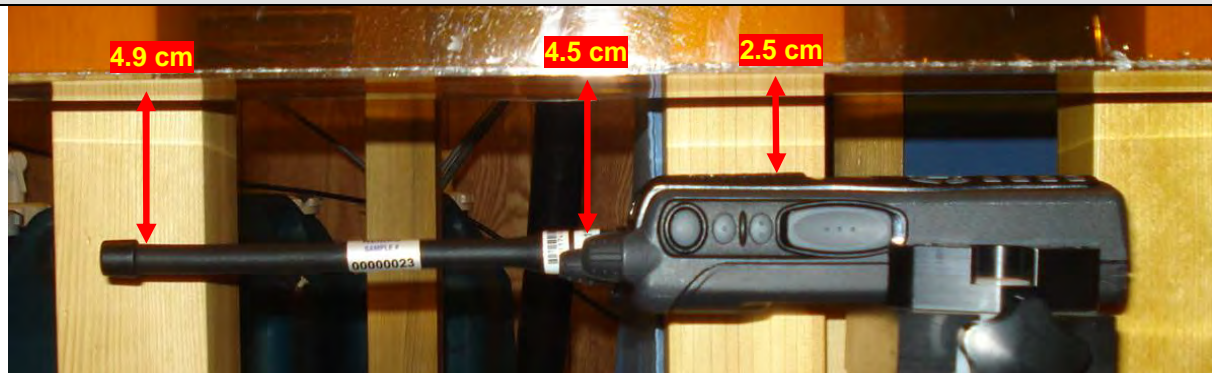
Face-held test setup – Radio with Antenna 1, Battery a




Face-held test setup - Radio with Antenna 2, Battery a





Face-held test setup - Radio with Antenna 3, Battery a



Face-held test setup - Radio with Antenna 4, Battery a


Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio Transceiver	Model:	Viking VP600	Freq.:	138 - 174 MHz	
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	<u>Date(s) of Evaluation</u> May 23-28, 2012	<u>Test Report Serial No.</u> 051412ATH-T1174-S90V	<u>Test Report Revision No.</u> Rev. 1.1 (2nd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> August 28, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

FACE-HELD SAR TEST SETUP PHOTOGRAPHS



Face-held Test Setup - Speaker-Mic-Antenna accessory connected to VP600 PTT Radio Transceiver

Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio Transceiver	Model:	Viking VP600	Freq.:	138 - 174 MHz	
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	Date(s) of Evaluation May 23-28, 2012	Test Report Serial No. 051412ATH-T1174-S90V	Test Report Revision No. Rev. 1.1 (2nd Release)	 Test Lab Certificate No. 2470.01
	Test Report Issue Date August 28, 2012	Description of Test(s) Specific Absorption Rate	RF Exposure Category Occupational (Controlled)	

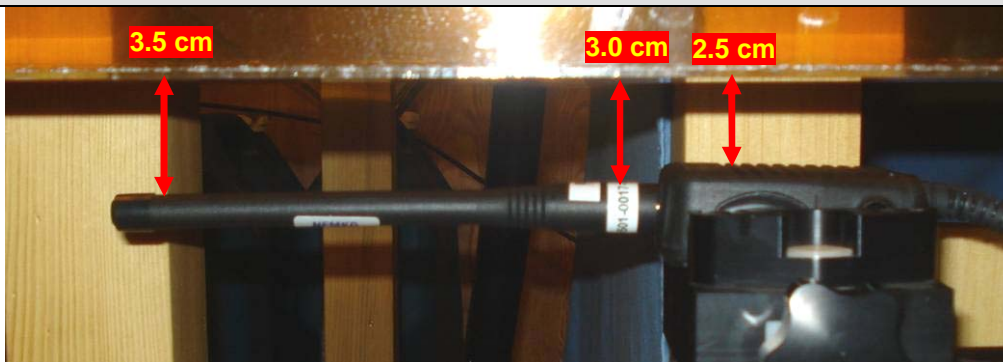
FACE-HELD SAR TEST SETUP PHOTOGRAPHS



Face-held test setup – Audio acc. 2 with Antenna 1, Battery a




Face-held test setup - Audio acc. 2 with Antenna 2, Battery a



Face-held test setup - Audio acc. 2 with Antenna 3, Battery a



Face-held test setup - Audio acc. 2 with Antenna 4, Battery a

Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio Transceiver	Model:	Viking VP600	Freq.:	138 - 174 MHz	
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DUT PHOTOGRAPHS



Radio Front



Radio Left Side



Radio Back





Radio Right Side



Radio Top end



Radio Bottom end

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	Test Report Issue Date August 28, 2012	Description of Test(s) Specific Absorption Rate	RF Exposure Category Occupational (Controlled)	




Back of Radio with battery removed





Back of Radio with Battery and Belt-clip



Side of Radio with Battery and Belt-clip

Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio Transceiver	Model:	Viking VP600	Freq.:	138 - 174 MHz	
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	<u>Date(s) of Evaluation</u> May 23-28, 2012	<u>Test Report Serial No.</u> 051412ATH-T1174-S90V	<u>Test Report Revision No.</u> Rev. 1.1 (2nd Release)	
	<u>Test Report Issue Date</u> August 28, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	
Test Lab Certificate No. 2470.01				



Antenna 1 - P/N 501-0017-101




Antenna 2 - P/N 501-0017-103





Antenna 3 - P/N 501-0017-105



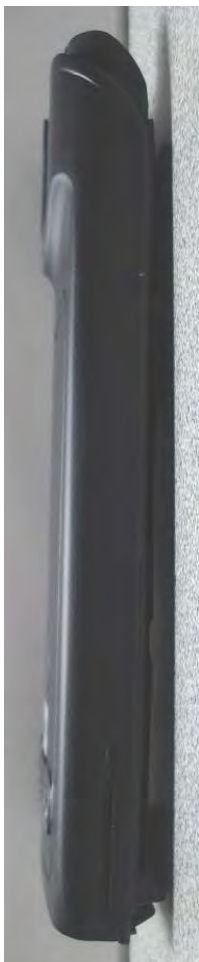
Antenna 4 - P/N 501-0017-110

Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio Transceiver	Model:	Viking VP600	Freq.:	138 - 174 MHz	
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	<u>Date(s) of Evaluation</u> May 23-28, 2012	<u>Test Report Serial No.</u> 051412ATH-T1174-S90V	<u>Test Report Revision No.</u> Rev. 1.1 (2nd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> August 28, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	



Battery a - Front



Battery a – Side 1



Battery a - Back




Battery a – Side 2





Battery a – Top end




Battery a – Bottom end

Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio Transceiver	Model:	Viking VP600	Freq.:	138 - 174 MHz	
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	<u>Date(s) of Evaluation</u> May 23-28, 2012	<u>Test Report Serial No.</u> 051412ATH-T1174-S90V	<u>Test Report Revision No.</u> Rev. 1.1 (2nd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> August 28, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	




Body-worn Accessory 1 - Metal Belt-Clip P/N 585-5100-128

Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio Transceiver	Model:	Viking VP600	Freq.:	138 - 174 MHz	
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	<u>Date(s) of Evaluation</u> May 23-28, 2012	<u>Test Report Serial No.</u> 051412ATH-T1174-S90V	<u>Test Report Revision No.</u> Rev. 1.1 (2nd Release)	
	<u>Test Report Issue Date</u> August 28, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	
Test Lab Certificate No. 2470.01				




Audio Accessory 1 - Speaker-Microphone P/N 589-0015-073



Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio Transceiver	Model:	Viking VP600	Freq.:	138 - 174 MHz	
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	<u>Date(s) of Evaluation</u> May 23-28, 2012	<u>Test Report Serial No.</u> 051412ATH-T1174-S90V	<u>Test Report Revision No.</u> Rev. 1.1 (2nd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> August 28, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	




Audio Accessory 2 - Speaker-Mic-Antenna P/N 585-5100-315

Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio Transceiver	Model:	Viking VP600	Freq.:	138 - 174 MHz	
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	<u>Date(s) of Evaluation</u> May 23-28, 2012	<u>Test Report Serial No.</u> 051412ATH-T1174-S90V	<u>Test Report Revision No.</u> Rev. 1.1 (2nd Release)	
	<u>Test Report Issue Date</u> August 28, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	
Test Lab Certificate No. 2470.01				

APPENDIX E - DIPOLE CALIBRATION

Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio Transceiver	Model:	Viking VP600	Freq.:	138 - 174 MHz	
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 Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **Celltech**

Certificate No: **D300V3-1009_Apr12**

CALIBRATION CERTIFICATE

Object **D300V3 - SN: 1009**

Calibration procedure(s) **QA CAL-15.v6**
 Calibration procedure for dipole validation kits below 700 MHz

Calibration date: **April 17, 2012**

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 (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	29-Mar-12 (No. 217-01508)	Apr-13
Power sensor E4412A	MY41498087	29-Mar-12 (No. 217-01508)	Apr-13
Reference 3 dB Attenuator	SN: S5054 (3c)	27-Mar-12 (No. 217-01531)	Apr-13
Reference 20 dB Attenuator	SN: S5086 (20b)	27-Mar-12 (No. 217-01529)	Apr-13
Type-N mismatch combination	SN: 5047.2 / 06327	27-Mar-12 (No. 217-01533)	Apr-13
Reference Probe ET3DV6	SN: 1507	30-Dec-11 (No. ET3-1507_Dec11)	Dec-12
DAE4	SN: 900	11-Apr-12 (No. DAE4-900_Apr12)	Apr-13
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-11)	In house check: Oct-13
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-11)	In house check: Oct-13
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

	Name	Function	Signature
Calibrated by:	Jeton Kastrati	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: April 27, 2012

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



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Multilateral Agreement for the recognition of calibration certificates

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:

- 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
- 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:

- 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.

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%.

Measurement Conditions

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

DASY Version	DASY5	V52.8.1
Extrapolation	Advanced Extrapolation	
Phantom	ELI4 Flat Phantom	Shell thickness: 2 ± 0.2 mm
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	300 MHz \pm 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	45.3	0.87 mho/m
Measured Head TSL parameters	(22.0 \pm 0.2) °C	44.9 \pm 6 %	0.89 mho/m \pm 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	398 mW input power	1.17 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	2.88 mW /g \pm 18.1 % (k=2)

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	398 mW input power	0.770 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	1.90 mW /g \pm 17.6 % (k=2)

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	57.8 Ω - 2.9 j Ω
Return Loss	- 22.2 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.748 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. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

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	February 26, 2009

DASY5 Validation Report for Head TSL

Date: 17.04.2012

Test Laboratory: SPEAG

DUT: Dipole 300 MHz; Type: D300V3; Serial: D300V3 - SN: 1009

Communication System: CW; Frequency: 300 MHz

Medium parameters used: $f = 300$ MHz; $\sigma = 0.89$ mho/m; $\epsilon_r = 44.9$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ET3DV6 - SN1507; ConvF(6.59, 6.59, 6.59); Calibrated: 30.12.2011;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn900; Calibrated: 11.04.2012
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1003
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Dipole Calibration for Head Tissue/d=15mm, Pin=398mW/Zoom Scan (7x7x7)/Cube 0:

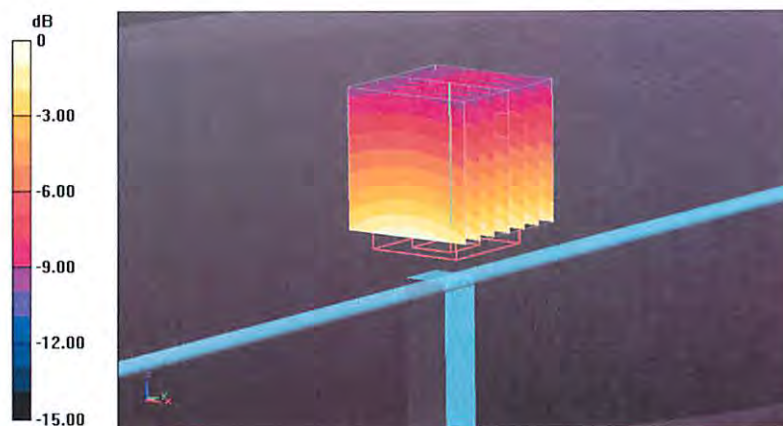
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 37.838 V/m; Power Drift = -0.01 dB

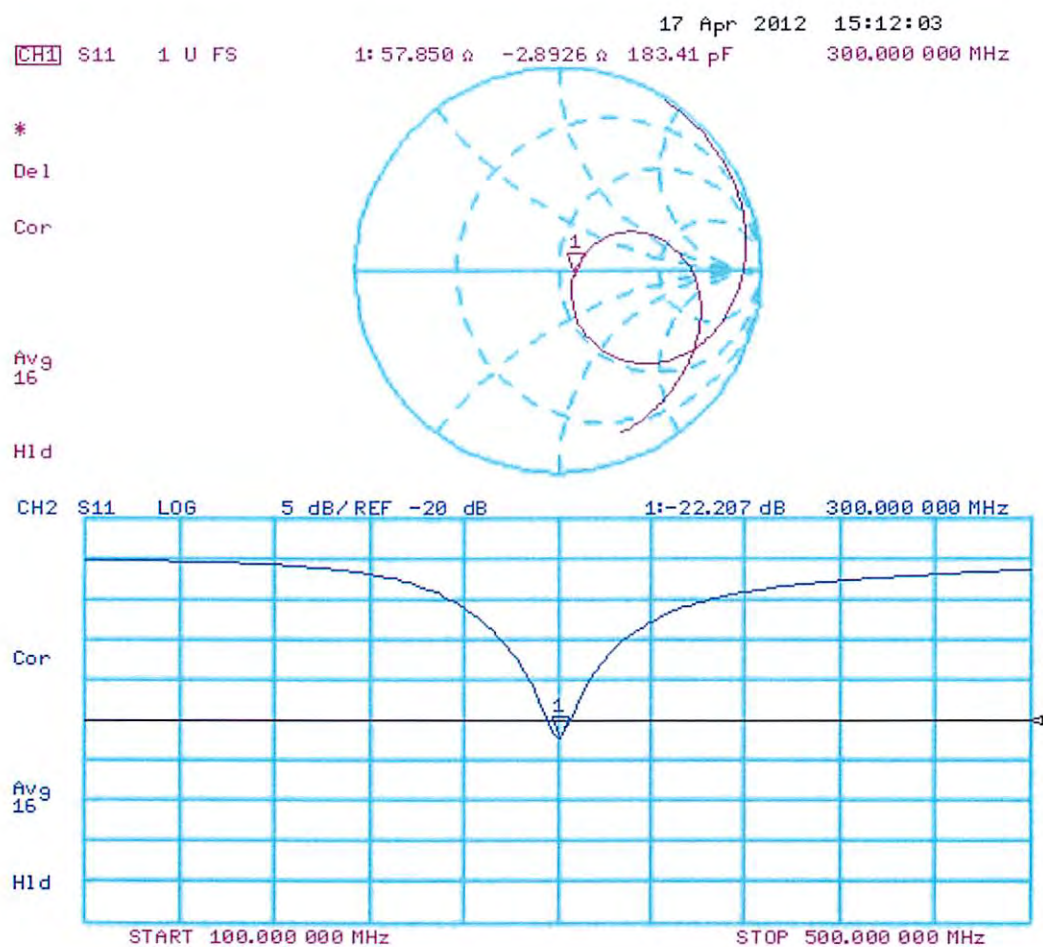
Peak SAR (extrapolated) = 1.974 mW/g



SAR(1 g) = 1.17 mW/g; SAR(10 g) = 0.770 mW/g

Maximum value of SAR (measured) = 1.24 mW/g




Impedance Measurement Plot for Head TSL



	<u>Date(s) of Evaluation</u> May 23-28, 2012	<u>Test Report Serial No.</u> 051412ATH-T1174-S90V	<u>Test Report Revision No.</u> Rev. 1.1 (2nd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> August 28, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

APPENDIX F - PROBE CALIBRATION

Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio Transceiver	Model:	Viking VP600	Freq.:	138 - 174 MHz	
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Accreditation No.: **SCS 108**

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 Multilateral Agreement for the recognition of calibration certificates

Client **Celltech**

Certificate No: **ET3-1590_Apr12**

CALIBRATION CERTIFICATE

Object **ET3DV6 - SN:1590**

Calibration procedure(s) **QA CAL-01.v8, QA CAL-12.v7, QA CAL-23.v4, QA CAL-25.v4**
Calibration procedure for dosimetric E-field probes

Calibration date: **April 24, 2012**

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 $(22 \pm 3)^{\circ}\text{C}$ and humidity $< 70\%$.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	29-Mar-12 (No. 217-01508)	Apr-13
Power sensor E4412A	MY41498087	29-Mar-12 (No. 217-01508)	Apr-13
Reference 3 dB Attenuator	SN: S5054 (3c)	27-Mar-12 (No. 217-01531)	Apr-13
Reference 20 dB Attenuator	SN: S5086 (20b)	27-Mar-12 (No. 217-01529)	Apr-13
Reference 30 dB Attenuator	SN: S5129 (30b)	27-Mar-12 (No. 217-01532)	Apr-13
Reference Probe ES3DV2	SN: 3013	29-Dec-11 (No. ES3-3013_Dec11)	Dec-12
DAE4	SN: 660	10-Jan-12 (No. DAE4-660_Jan12)	Jan-13
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-11)	In house check: Apr-13
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

	Name	Function	Signature
Calibrated by:	Jeton Kastrati	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	
Issued: April 26, 2012			
This calibration certificate shall not be reproduced except in full without written approval of the laboratory.			



Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

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 affect the E^2 -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.
- PAR**: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- 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 ET3DV6

SN:1590

Manufactured: March 19, 2001
Calibrated: April 24, 2012

Calibrated for DASY/EASY Systems
(Note: non-compatible with DASY2 system!)

DASY/EASY - Parameters of Probe: ET3DV6 - SN:1590

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu\text{V}/(\text{V/m})^2$) ^A	1.79	1.92	1.60	± 10.1 %
DCP (mV) ^B	94.8	98.4	88.8	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dB	C dB	VR mV	Unc ^E (k=2)
0	CW	0.00	X	0.00	0.00	1.00	143.4	±4.6 %
			Y	0.00	0.00	1.00	150.1	
			Z	0.00	0.00	1.00	179.4	

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 max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

DASY/EASY - Parameters of Probe: ET3DV6 - SN:1590

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) ^C	Relative Permittivity ^F	Conductivity (S/m) ^F	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
450	43.5	0.87	7.54	7.54	7.54	0.20	2.16	± 13.4 %
750	41.9	0.89	7.11	7.11	7.11	0.29	3.00	± 12.0 %
835	41.5	0.90	6.77	6.77	6.77	0.27	3.00	± 12.0 %
900	41.5	0.97	6.67	6.67	6.67	0.29	3.00	± 12.0 %

^C Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

^F At frequencies below 3 GHz, the validity of tissue parameters (ϵ and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ϵ and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

DASY/EASY - Parameters of Probe: ET3DV6 - SN:1590

Calibration Parameter Determined in Body Tissue Simulating Media

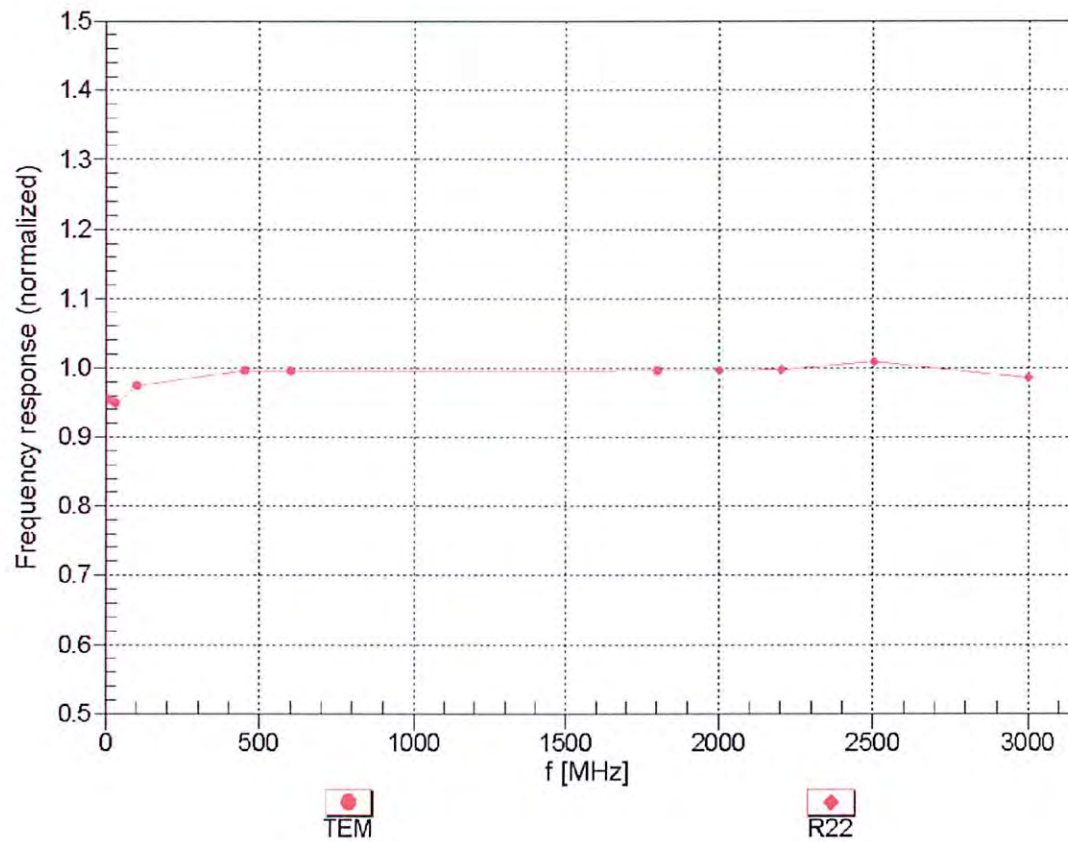
f (MHz) ^C	Relative Permittivity ^F	Conductivity (S/m) ^F	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
450	56.7	0.94	7.93	7.93	7.93	0.12	2.07	± 13.4 %
750	55.5	0.96	6.71	6.71	6.71	0.22	3.00	± 12.0 %
835	55.2	0.97	6.54	6.54	6.54	0.27	3.00	± 12.0 %
900	55.0	1.05	6.51	6.51	6.51	0.29	2.92	± 12.0 %

^C Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

^F At frequencies below 3 GHz, the validity of tissue parameters (ϵ and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ϵ and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

Frequency Response of E-Field

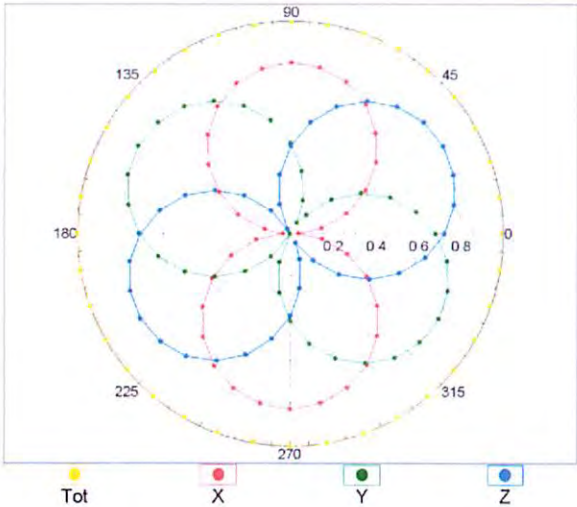
(TEM-Cell: ifi110 EXX, Waveguide: R22)



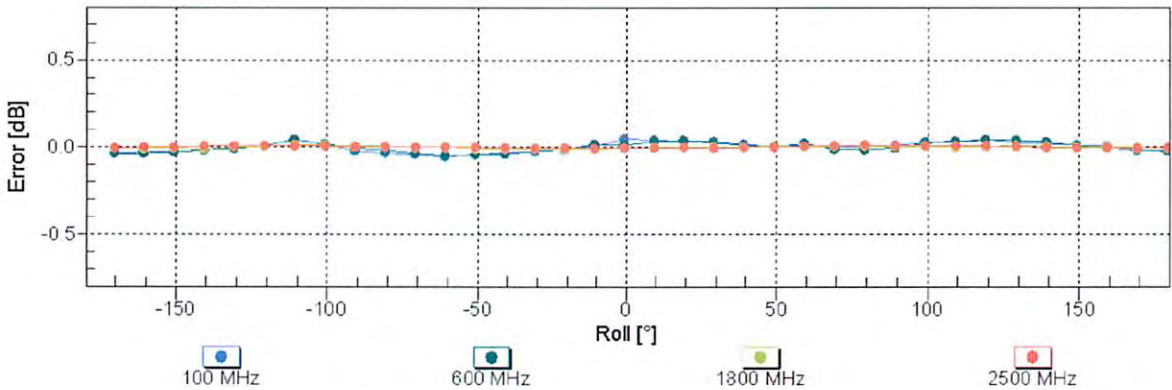
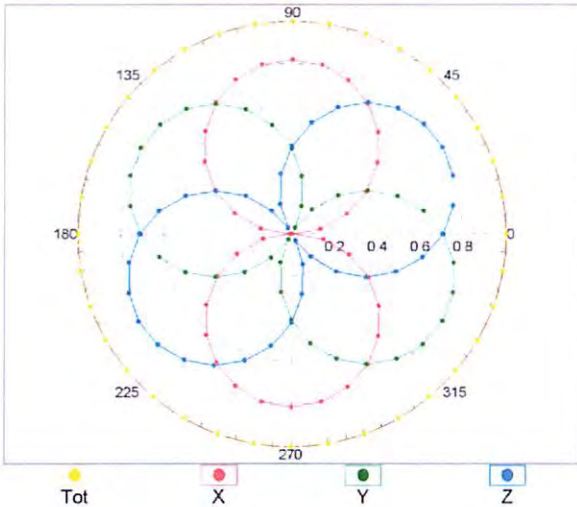
Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ ($k=2$)

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

f=600 MHz,TEM

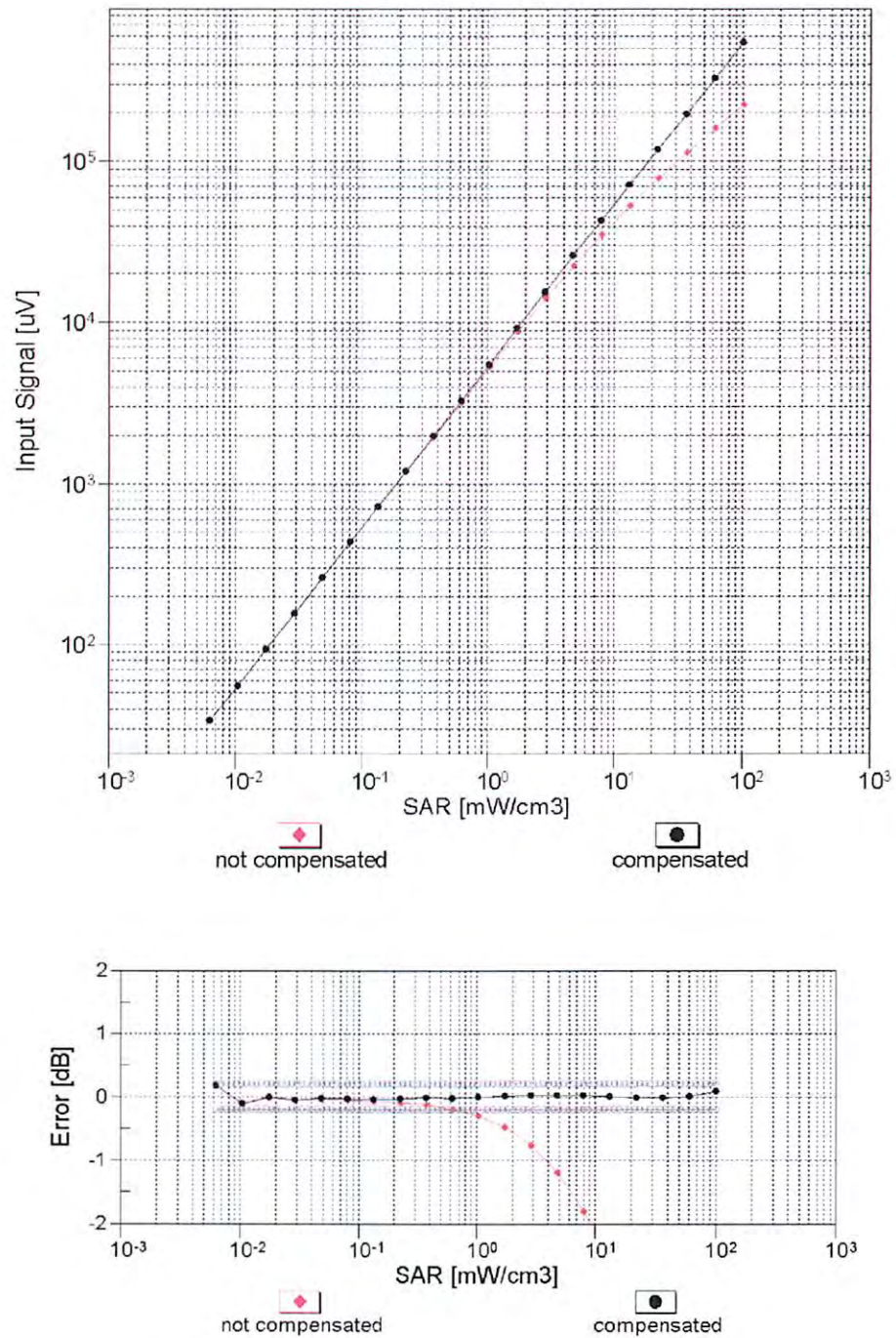


f=1800 MHz,R22



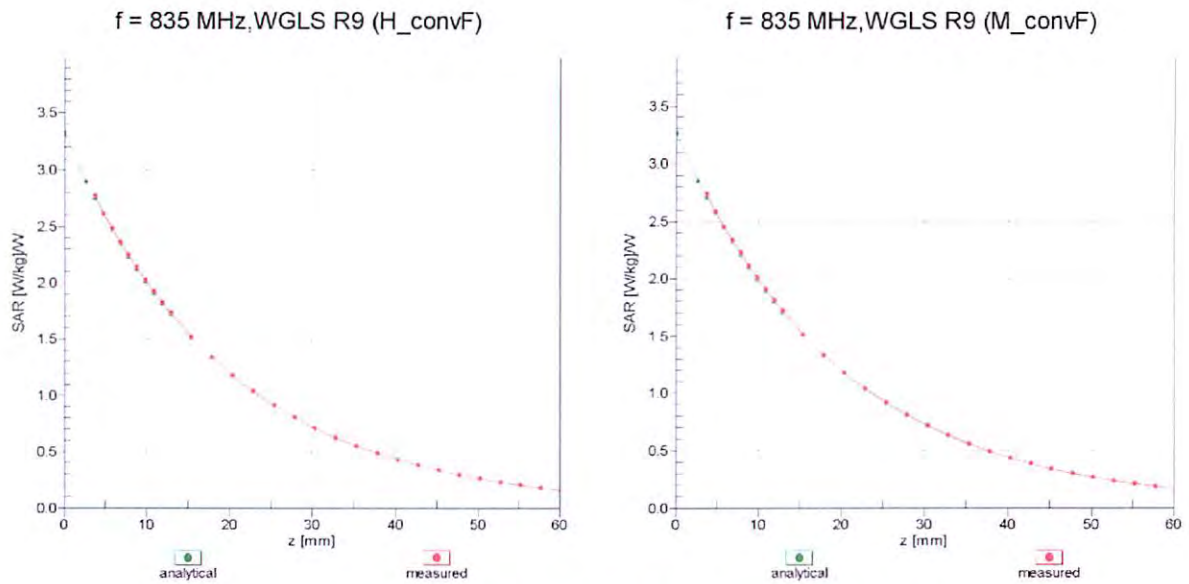
Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ ($k=2$)

Dynamic Range $f(\text{SAR}_{\text{head}})$ (TEM cell , $f = 900 \text{ MHz}$)



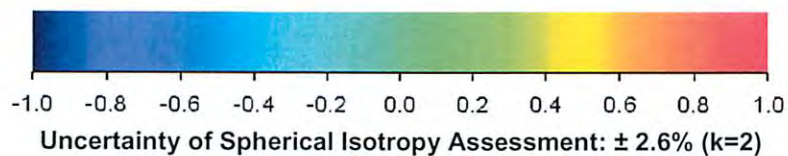
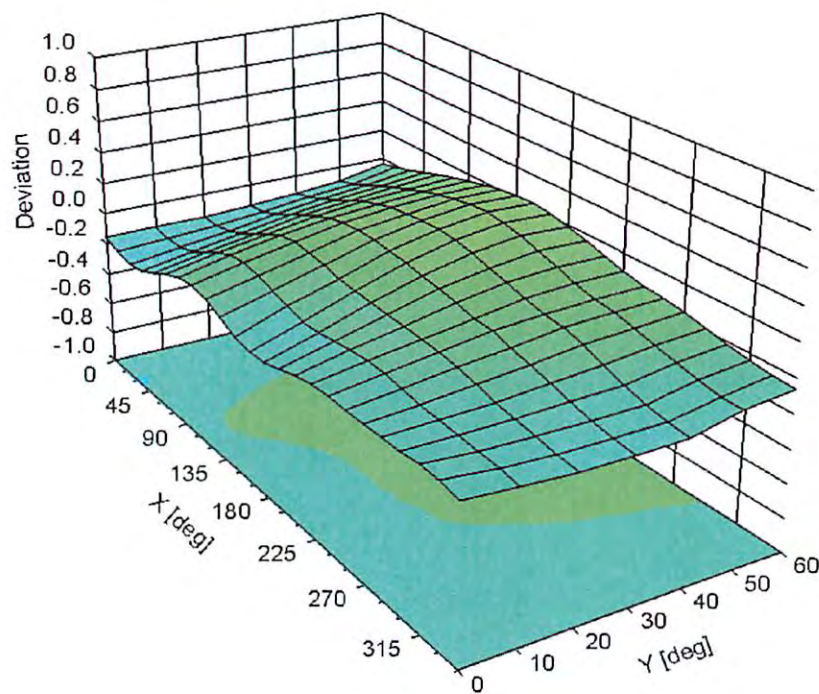
Uncertainty of Linearity Assessment: $\pm 0.6\%$ ($k=2$)

Conversion Factor Assessment



Deviation from Isotropy in Liquid

Error (ϕ, ϑ), $f = 900 \text{ MHz}$



DASY/EASY - Parameters of Probe: ET3DV6 - SN:1590

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	-170.8
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	enabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	10 mm
Tip Diameter	6.8 mm
Probe Tip to Sensor X Calibration Point	2.7 mm
Probe Tip to Sensor Y Calibration Point	2.7 mm
Probe Tip to Sensor Z Calibration Point	2.7 mm
Recommended Measurement Distance from Surface	4 mm

Additional Conversion Factors

for Dosimetric E-Field Probe

Type:

ET3DV6

Serial Number:

1590

Place of Assessment:

Zurich

Date of Assessment:

April 27, 2012

Probe Calibration Date:

April 24, 2012

Schmid & Partner Engineering AG hereby certifies that conversion factor(s) of this probe have been evaluated on the date indicated above. The assessment was performed using the FDTD numerical code SEMCAD of Schmid & Partner Engineering AG. Since the evaluation is coupled with measured conversion factors, it has to be recalculated yearly, i.e., following the re-calibration schedule of the probe. The uncertainty of the numerical assessment is based on the extrapolation from measured value at 450, 835 and 900 MHz.

Assessed by:



Dosimetric E-Field Probe ET3DV6 SN:1590

Conversion factor (\pm standard deviation)

150 \pm 50 MHz *ConvF* 9.3 \pm 10%

$\epsilon_r = 52.3 \pm 5\%$
 $\sigma = 0.76 \pm 5\%$ mho/m
(head tissue)

150 \pm 50 MHz *ConvF* 8.6 \pm 10%

$\epsilon_r = 61.9 \pm 5\%$
 $\sigma = 0.80 \pm 5\%$ mho/m
(body tissue)

Important Note:

For numerically assessed probe conversion factors, parameters Alpha and Delta in the DASY software must have the following entries: Alpha = 0 and Delta = 1.

Please see also DASY Manual.

Additional Conversion Factors

for Dosimetric E-Field Probe

Type:

ET3DV6

Serial Number:

1590

Place of Assessment:

Zurich

Date of Assessment:

May 21, 2012

Probe Calibration Date:

April 24, 2012

Schmid & Partner Engineering AG hereby certifies that conversion factor(s) of this probe have been evaluated on the date indicated above. The assessment was performed using the FDTD numerical code SEMCAD of Schmid & Partner Engineering AG. Since the evaluation is coupled with measured conversion factors, it has to be recalculated yearly, i.e., following the re-calibration schedule of the probe. The uncertainty of the numerical assessment is based on the extrapolation from measured value at 450, 835 and 900 MHz.

Assessed by:



Dosimetric E-Field Probe ET3DV6 SN:1590

Conversion factor (\pm standard deviation)



300 ± 50 MHz $ConvF$ $8.3 \pm 9\%$

$\epsilon_r = 45.3 \pm 5\%$
 $\sigma = 0.87 \pm 5\%$ mho/m
(head tissue)


Important Note:

For numerically assessed probe conversion factors, parameters Alpha and Delta in the DASY software must have the following entries: Alpha = 0 and Delta = 1.

Please see also DASY Manual.

	<u>Date(s) of Evaluation</u> May 23-28, 2012	<u>Test Report Serial No.</u> 051412ATH-T1174-S90V	<u>Test Report Revision No.</u> Rev. 1.1 (2nd Release)	
	<u>Test Report Issue Date</u> August 28, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	
Test Lab Certificate No. 2470.01				

APPENDIX G - BARSKI PLANAR PHANTOM CERTIFICATE OF CONFORMITY

Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio Transceiver	Model:	Viking VP600	Freq.:	138 - 174 MHz	
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2378 Westlake Road
Kelowna, B.C. Canada
V1Z-2V2



Ph. # 250-769-6848
Fax # 250-769-6334
E-mail: barskiind@shaw.ca
Web: www.bcfiberglass.com

FIBERGLASS FABRICATORS

Certificate of Conformity

Item : Flat Planar Phantom Unit # 03-01
Date: June 16, 2003
Manufacturer: Barski Industries (1985 Ltd)

Test	Requirement	Details
Shape	Compliance to geometry according to drawing	Supplied CAD drawing
Material Thickness	Compliant with the requirements	2mm +/- 0.2mm in measurement area
Material Parameters	Dielectric parameters for required frequencies Based on Dow Chemical technical data	100 MHz-5 GHz Relative permittivity<5 Loss Tangent<0.05

Conformity

Based on the above information, we certify this product to be compliant to the requirements specified.

Signature: _____

A handwritten signature in black ink, appearing to read 'Daniel Chailier', is written over a horizontal line.

Daniel Chailier



Fiberglass Planar Phantom - Top View



Fiberglass Planar Phantom - Front View



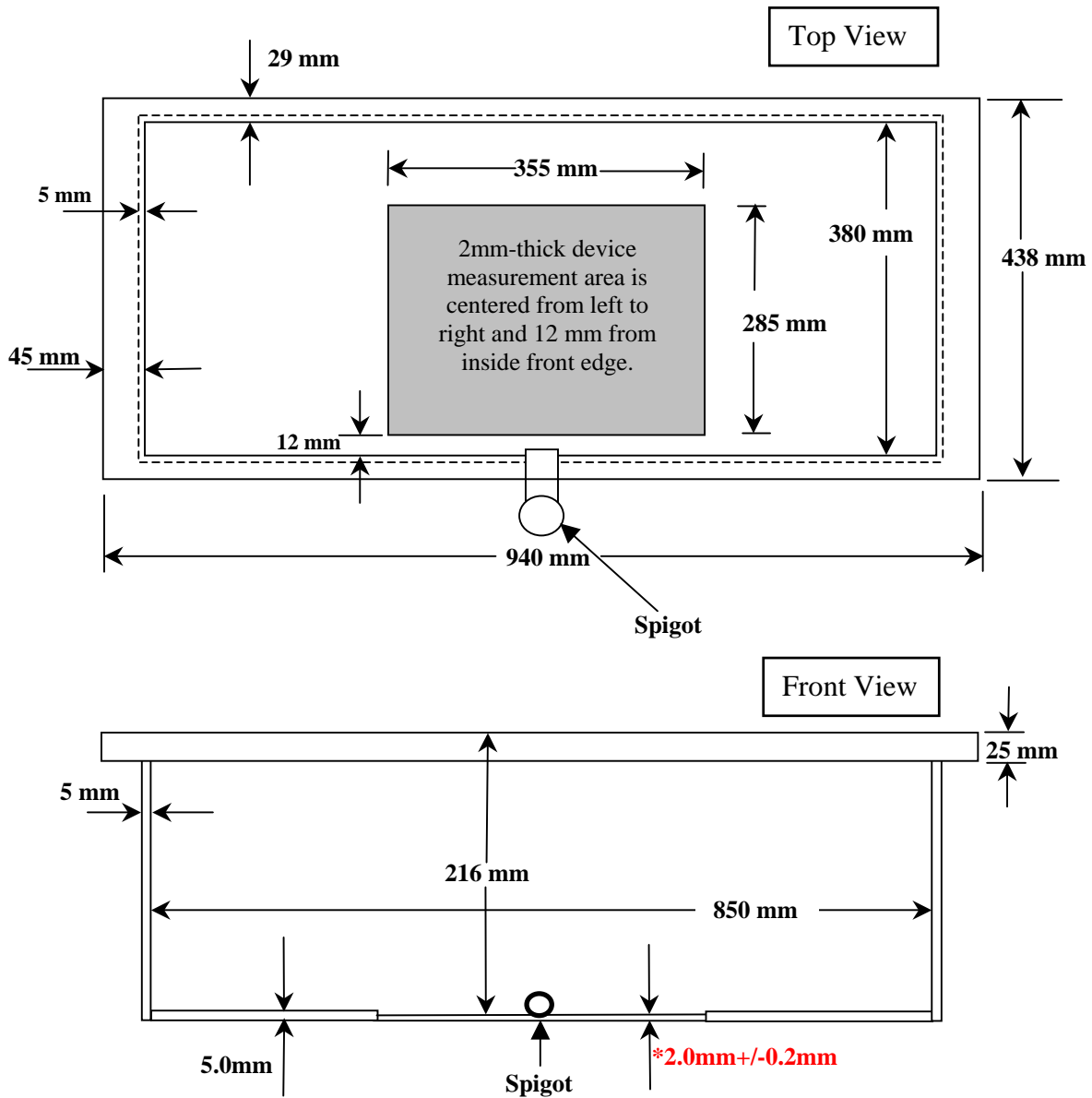
Fiberglass Planar Phantom - Back View



Fiberglass Planar Phantom - Bottom View

Dimensions of Fiberglass Planar Phantom

(Manufactured by Barski Industries Ltd. - Unit# 03-01)



Note: Measurements that aren't repeated for the opposite sides are the same as the side measured.
This drawing is not to scale.