

	<u>Date(s) of Evaluation</u> Nov. 7-8, 19, 2012	<u>Test Report Serial No.</u> 110212ATH-S1203	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	
	<u>Test Report Issue Date</u> Nov. 20, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	
Test Lab Certificate No. 2470.01				

DECLARATION OF COMPLIANCE		SAR RF EXPOSURE EVALUATION				FCC & IC C2PC	
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					
	IC:	933B-2425710					
Application Type	Class II Permissive Change (Add new "Model 1" with keypad and front display removed)						
Date of Sample Receipt	Nov. 2, 2012			Dates of Evaluation	Nov. 7-8, 19, 2012		
Device Description	Portable VHF Push-To-Talk (PTT) Radio Transceiver						
Mode(s) of Operation	Analog / Digital						
Device Model Name	Viking VP600 Model 1						
Device Model No.	242-5710 Model 1						
Device Model(s) Tested	Viking VP600 Model 1						
Test Sample Serial No.	511001221220016						
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	
Max. SAR Level(s) Evaluated	Face	FCC/IC	1.28 W/kg	1g	50% PTT duty factor	Occupational / Controlled Exp.	
	Body	FCC/IC	1.60 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.	
<p>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.</p> <p>I attest to the accuracy of data. All measurements were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.</p> <p>This test report shall not be reproduced partially, or in full, without the prior written approval of Celltech Labs Inc.</p> <p>The results and statements contained in this report pertain only to the device(s) evaluated.</p>							
Test Report Approved By			Mike Meaker	Engineering Technologist	Celltech Labs Inc.		




Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio	Model:	Viking VP600 Model 1	Freq.:	138 - 174 MHz	
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TABLE OF CONTENTS



1.0 INTRODUCTION	4
2.0 SAR MEASUREMENT SYSTEM	4
3.0 RF CONDUCTED OUTPUT POWER MEASUREMENTS	4
4.0 FCC POWER THRESHOLDS FOR PTT DEVICES ($F < 0.5$ GHZ)	5
5.0 SAR PROBE CALIBRATION & MEASUREMENT FREQUENCIES	5
6.0 NO. OF TEST CHANNELS (N_c)	5
7.0 MANUFACTURER'S DISCLOSED ACCESSORY LISTING	6
8.0 FLUID DIELECTRIC PARAMETERS	7
9.0 SAR MEASUREMENT SUMMARY	12
10.0 SAR SCALING FOR TUNE-UP TOLERANCE	14
11.0 DETAILS OF SAR EVALUATION	15
12.0 SAR EVALUATION PROCEDURES	15
13.0 SYSTEM PERFORMANCE CHECK	16
14.0 SIMULATED EQUIVALENT TISSUES	17
15.0 SAR LIMITS	17
16.0 ROBOT SYSTEM SPECIFICATIONS	18
17.0 PROBE SPECIFICATION	19
18.0 PHANTOM(S)	19
19.0 DEVICE HOLDER	19
20.0 TEST EQUIPMENT LIST	20
21.0 MEASUREMENT UNCERTAINTIES	21
MEASUREMENT UNCERTAINTIES (CONT.)	22
22.0 REFERENCES	23
APPENDIX A - SAR MEASUREMENT PLOTS	24
APPENDIX B - SYSTEM PERFORMANCE CHECK PLOTS	39
APPENDIX C - MEASURED FLUID DIELECTRIC PARAMETERS	44
APPENDIX D - SAR TEST SETUP & DUT PHOTOGRAPHS	50
APPENDIX E - DIPOLE CALIBRATION	61
APPENDIX F - PROBE CALIBRATION	62
APPENDIX G - BARSKI PLANAR PHANTOM CERTIFICATE OF CONFORMITY	63

	<u>Date(s) of Evaluation</u> Nov. 7-8, 19, 2012	<u>Test Report Serial No.</u> 110212ATH-S1203	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> Nov. 20, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

REVISION HISTORY			
REVISION NO.	DESCRIPTION	IMPLEMENTED BY	RELEASE DATE
1.0	1st Release	Mike Meaker	Nov. 20, 2012

TEST REPORT SIGN-OFF			
DEVICE TESTED BY	REPORT PREPARED BY	QA REVIEW BY	REPORT APPROVED BY
Mike Meaker	Mike Meaker	Mike Meaker	Mike Meaker

Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio	Model:	Viking VP600 Model 1	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, with the Class II Permissive Change(s) described in this report, 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	37.20	5.25	Average Conducted
IC	Viking VP600	144.0 MHz	CW	37.14	5.18	Average Conducted
FCC/IC	Viking VP600	150.8 MHz	CW	37.09	5.12	Average Conducted
FCC/IC	Viking VP600	156.4 MHz	CW	37.07	5.09	Average Conducted
FCC/IC	Viking VP600	158.3 MHz	CW	37.07	5.09	Average Conducted
FCC/IC	Viking VP600	162.0 MHz	CW	37.07	5.09	Average Conducted
FCC/IC	Viking VP600	165.9 MHz	CW	37.07	5.09	Average Conducted
FCC/IC	Viking VP600	167.7 MHz	CW	37.07	5.09	Average Conducted
FCC/IC	Viking VP600	173.4 MHz	CW	37.05	5.07	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	Model:	Viking VP600 Model 1	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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Test Lab Certificate No. 2470.01				

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	No ²

Notes:

1. Manufacturer's disclosed accessory listing provided by EF Johnson
2. Speaker-mic Antenna was evaluated in the original filing and does not require testing for this Class 2 change.

Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio	Model:	Viking VP600 Model 1	Freq.:	138 - 174 MHz	
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8.0 FLUID DIELECTRIC PARAMETERS

FLUID DIELECTRIC PARAMETERS						
Date: 11/07/2012		Frequency: 300 MHz			Tissue: Head	
Freq	Test_e	Test_s	Target_e	Target_s	Deviation Permittivity	Deviation Conductivity
0.200	49.86	0.74	45.3	0.87	10.07%	-14.94%
0.210	50.99	0.76	45.3	0.87	12.56%	-12.64%
0.220	50.72	0.74	45.3	0.87	11.96%	-14.94%
0.230	49.77	0.75	45.3	0.87	9.87%	-13.79%
0.240	48.04	0.77	45.3	0.87	6.05%	-11.49%
0.250	48.99	0.78	45.3	0.87	8.15%	-10.34%
0.260	47.25	0.79	45.3	0.87	4.30%	-9.20%
0.270	46.27	0.8	45.3	0.87	2.14%	-8.05%
0.280	47	0.79	45.3	0.87	3.75%	-9.20%
0.290	46.17	0.81	45.3	0.87	1.92%	-6.90%
0.300	46.25	0.84	45.3	0.87	2.10%	-3.45%
0.310	45.69	0.84	45.3	0.87	0.86%	-3.45%
0.320	45.66	0.84	45.3	0.87	0.79%	-3.45%
0.330	45.36	0.86	45.3	0.87	0.13%	-1.15%
0.340	44.65	0.86	45.3	0.87	-1.43%	-1.15%
0.350	44.6	0.87	45.3	0.87	-1.55%	0.00%
0.360	44.16	0.89	45.3	0.87	-2.52%	2.30%
0.370	43.99	0.89	45.3	0.87	-2.89%	2.30%
0.380	44.01	0.9	45.3	0.87	-2.85%	3.45%
0.390	43.56	0.9	45.3	0.87	-3.84%	3.45%
0.400	43.64	0.9	45.3	0.87	-3.66%	3.45%

Test Date	Fluid Type	Ambient Temperature	Fluid Temperature	Fluid Depth	Atmospheric Pressure	Relative Humidity	ρ (Kg/m ³)
Nov. 7	300 Head	22.0°C	21.1°C	≥ 15 cm	101.1 kPa	30%	1000

FLUID DIELECTRIC PARAMETERS						
Date: 11/07&08/2012		Frequency: 150 MHz			Tissue: Body	
Freq	Test_e	Test_s	Target_e	Target_s	Deviation Permittivity	Deviation Conductivity
0.050	97.36	0.71	61.9	0.8	57.29%	-11.25%
0.060	79.6	0.75	61.9	0.8	28.59%	-6.25%
0.070	80.32	0.75	61.9	0.8	29.76%	-6.25%
0.080	71.85	0.73	61.9	0.8	16.07%	-8.75%
0.090	75.47	0.74	61.9	0.8	21.92%	-7.50%
0.100	67.49	0.75	61.9	0.8	9.03%	-6.25%
0.110	63.89	0.77	61.9	0.8	3.21%	-3.75%
0.120	64.17	0.75	61.9	0.8	3.67%	-6.25%
0.130	64.7	0.77	61.9	0.8	4.52%	-3.75%
0.138*	64.3	0.77	61.9	0.8	3.88%	-3.75%
0.140	64.24	0.77	61.9	0.8	3.78%	-3.75%
0.150	64.9	0.79	61.9	0.8	4.85%	-1.25%
0.1508*	64.8	0.788	61.9	0.8	4.68%	-1.50%
0.160	63.88	0.77	61.9	0.8	3.20%	-3.75%
0.162*	63.8	0.774	61.9	0.8	3.07%	-3.25%
0.170	63.72	0.79	61.9	0.8	2.94%	-1.25%
0.180	61.67	0.8	61.9	0.8	-0.37%	0.00%
0.190	62.26	0.81	61.9	0.8	0.58%	1.25%
0.200	61.64	0.82	61.9	0.8	-0.42%	2.50%
0.210	60.52	0.81	61.9	0.8	-2.23%	1.25%
0.220	61.78	0.83	61.9	0.8	-0.19%	3.75%
0.230	59.33	0.84	61.9	0.8	-4.15%	5.00%
0.240	58.92	0.83	61.9	0.8	-4.81%	3.75%
0.250	59.83	0.84	61.9	0.8	-3.34%	5.00%



* Interpolated using DASY4 software

Test Date	Fluid Type	Ambient Temperature	Fluid Temperature	Fluid Depth	Atmospheric Pressure	Relative Humidity	ρ (Kg/m ³)
Nov. 7	150 Body	22.0°C	21.6°C	≥ 15 cm	101.1 kPa	30%	1000
Nov. 8	150 Body	22.0°C	21.6°C	≥ 15 cm	101.1 kPa	30%	1000

FLUID DIELECTRIC PARAMETERS						
Date: 11/08/2012		Frequency: 150 MHz			Tissue: Head	
Freq	Test_e	Test_s	Target_e	Target_s	Deviation Permittivity	Deviation Conductivity
0.050	72.47	0.74	52.3	0.76	38.57%	-2.63%
0.060	70.84	0.73	52.3	0.76	35.45%	-3.95%
0.070	67.95	0.65	52.3	0.76	29.92%	-14.47%
0.080	58.9	0.73	52.3	0.76	12.62%	-3.95%
0.090	59.08	0.73	52.3	0.76	12.96%	-3.95%
0.100	56.68	0.73	52.3	0.76	8.37%	-3.95%
0.110	58.4	0.72	52.3	0.76	11.66%	-5.26%
0.120	55.83	0.73	52.3	0.76	6.75%	-3.95%
0.130	56.64	0.73	52.3	0.76	8.30%	-3.95%
0.138*	53.7	0.738	52.3	0.76	2.68%	-2.89%
0.140	52.91	0.74	52.3	0.76	1.17%	-2.63%
0.150	51.51	0.76	52.3	0.76	-1.51%	0.00%
0.1508*	51.8	0.759	52.3	0.76	-0.96%	-0.13%
0.160	54.61	0.75	52.3	0.76	4.42%	-1.32%
0.162*	54.3	0.754	52.3	0.76	3.82%	-0.79%
0.170	53.27	0.77	52.3	0.76	1.85%	1.32%
0.180	53.26	0.79	52.3	0.76	1.84%	3.95%
0.190	52.35	0.79	52.3	0.76	0.10%	3.95%
0.200	53.46	0.79	52.3	0.76	2.22%	3.95%
0.210	50.62	0.81	52.3	0.76	-3.21%	6.58%
0.220	50.68	0.81	52.3	0.76	-3.10%	6.58%
0.230	50.8	0.82	52.3	0.76	-2.87%	7.89%
0.240	48.95	0.83	52.3	0.76	-6.41%	9.21%
0.250	49.99	0.85	52.3	0.76	-4.42%	11.84%


*Interpolated using DASY4 software

Test Date	Fluid Type	Ambient Temperature	Fluid Temperature	Fluid Depth	Atmospheric Pressure	Relative Humidity	ρ (Kg/m ³)
Nov. 8	150 Head	22.0°C	21.0°C	≥ 15 cm	101.1 kPa	30%	1000

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Test Lab Certificate No. 2470.01				

FLUID DIELECTRIC PARAMETERS						
Date: 11/19/2012		Frequency: 300 MHz			Tissue: Head	
Freq	Test_e	Test_s	Target_e	Target_s	Deviation Permittivity	Deviation Conductivity
0.200	50.85	0.79	45.3	0.87	12.25%	-9.20%
0.210	49.49	0.79	45.3	0.87	9.25%	-9.20%
0.220	49.29	0.77	45.3	0.87	8.81%	-11.49%
0.230	48.34	0.8	45.3	0.87	6.71%	-8.05%
0.240	47.99	0.79	45.3	0.87	5.94%	-9.20%
0.250	46.84	0.81	45.3	0.87	3.40%	-6.90%
0.260	47.31	0.82	45.3	0.87	4.44%	-5.75%
0.270	45.75	0.82	45.3	0.87	0.99%	-5.75%
0.280	47.09	0.83	45.3	0.87	3.95%	-4.60%
0.290	46.64	0.85	45.3	0.87	2.96%	-2.30%
0.300	46.51	0.85	45.3	0.87	2.67%	-2.30%
0.310	45.56	0.86	45.3	0.87	0.57%	-1.15%
0.320	44.77	0.88	45.3	0.87	-1.17%	1.15%
0.330	45.37	0.89	45.3	0.87	0.15%	2.30%
0.340	45.44	0.89	45.3	0.87	0.31%	2.30%
0.350	44.63	0.9	45.3	0.87	-1.48%	3.45%
0.360	44.01	0.91	45.3	0.87	-2.85%	4.60%
0.370	44.24	0.9	45.3	0.87	-2.34%	3.45%
0.380	43.83	0.92	45.3	0.87	-3.25%	5.75%
0.390	44	0.92	45.3	0.87	-2.87%	5.75%
0.400	43.3	0.93	45.3	0.87	-4.42%	6.90%



Test Date	Fluid Type	Ambient Temperature	Fluid Temperature	Fluid Depth	Atmospheric Pressure	Relative Humidity	ρ (Kg/m ³)
Nov. 19	300 Head	22.0°C	21.2°C	≥ 15 cm	101.1 kPa	34%	1000

Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio	Model:	Viking VP600 Model 1	Freq.:	138 - 174 MHz	
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FLUID DIELECTRIC PARAMETERS						
Date: 11/19/2012		Frequency: 150 MHz			Tissue: Head	
Freq	Test_e	Test_s	Target_e	Target_s	Deviation Permittivity	Deviation Conductivity
0.050	71.39	0.68	52.3	0.76	36.50%	-10.53%
0.060	78.74	0.66	52.3	0.76	50.55%	-13.16%
0.070	66.83	0.71	52.3	0.76	27.78%	-6.58%
0.080	64.81	0.68	52.3	0.76	23.92%	-10.53%
0.090	62.21	0.7	52.3	0.76	18.95%	-7.89%
0.100	58.93	0.72	52.3	0.76	12.68%	-5.26%
0.110	57.61	0.72	52.3	0.76	10.15%	-5.26%
0.120	55.5	0.74	52.3	0.76	6.12%	-2.63%
0.130	53.28	0.74	52.3	0.76	1.87%	-2.63%
0.138*	52.8	0.732	52.3	0.76	0.96%	-3.68%
0.140	52.62	0.73	52.3	0.76	0.61%	-3.95%
0.150	54.23	0.76	52.3	0.76	3.69%	0.00%
0.1508*	54.2	0.76	52.3	0.76	3.63%	0.00%
0.160	53.58	0.76	52.3	0.76	2.45%	0.00%
0.170	51.16	0.76	52.3	0.76	-2.18%	0.00%
0.180	52.01	0.77	52.3	0.76	-0.55%	1.32%
0.190	50.98	0.78	52.3	0.76	-2.52%	2.63%
0.200	50.07	0.78	52.3	0.76	-4.26%	2.63%
0.210	50.6	0.79	52.3	0.76	-3.25%	3.95%
0.220	48.45	0.82	52.3	0.76	-7.36%	7.89%
0.230	49.47	0.79	52.3	0.76	-5.41%	3.95%
0.240	48.65	0.81	52.3	0.76	-6.98%	6.58%
0.250	47.61	0.84	52.3	0.76	-8.97%	10.53%


*Interpolated using DASY4 software

Test Date	Fluid Type	Ambient Temperature	Fluid Temperature	Fluid Depth	Atmospheric Pressure	Relative Humidity	ρ (Kg/m ³)
Nov. 19	150 Head	22.0°C	22.0°C	≥ 15 cm	101.1 kPa	34%	1000

	<u>Date(s) of Evaluation</u> Nov. 7-8, 19, 2012	<u>Test Report Serial No.</u> 110212ATH-S1203	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> Nov. 20, 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 Model 1 VHF PTT Radio Transceiver				
Battery Acc. ID #				a				
Test Date(s)				Nov. 8, 19, 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	5.25	F1	1.99	0.995	-0.440	1.10
2		144.0	5.18	n/a				
3	2	150.8	5.12	F2	2.08	1.04	-0.401	1.14
4		156.4	5.09	n/a				
5		162.0	5.09	n/a				
6	3	162.0	5.09	F3	2.56	1.28	0.102	n/a
7		167.7	5.09	n/a				
8		173.4	5.07	n/a				
9	4 (IC only)	138.0	5.25	F4	0.968	0.484	-0.051	0.490
10		144.0	5.18	n/a				
11	4	150.8	5.12	F5	0.758	0.379	-0.798	0.455
12		158.3	5.09	n/a				
13		165.9	5.09	n/a				
14		173.4	5.07	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	Model:	Viking VP600 Model 1	Freq.:	138 - 174 MHz	
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	<u>Date(s) of Evaluation</u> Nov. 7-8, 19, 2012	<u>Test Report Serial No.</u> 110212ATH-S1203	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	
	<u>Test Report Issue Date</u> Nov. 20, 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				BODY-WORN SAR EVALUATION RESULTS				
Device-Under-Test				Viking VP600 Model 1 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)				Nov. 7-8, 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	5.25	B1	2.92	1.46	-0.464	1.63
2		144.0	5.18	n/a				
3	2	150.8	5.12	B2	2.43	1.22	0.180	n/a
4		156.4	5.09	n/a				
5		162.0	5.09	n/a				
6	3	162.0	5.09	B3	3.19	1.60	0.055	n/a
7		167.7	5.09	n/a				
8		173.4	5.07	n/a				
9	4 (IC only)	138.0	5.25	B4	1.76	0.880	-1.22	1.17
10		144.0	5.18	n/a				
11	4	150.8	5.12	B5	1.00	0.500	-0.720	0.590
12		158.3	5.09	n/a				
13		165.9	5.09	n/a				
14		173.4	5.07	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	Model:	Viking VP600 Model 1	Freq.:	138 - 174 MHz	
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	<u>Date(s) of Evaluation</u> Nov. 7-8, 19, 2012	<u>Test Report Serial No.</u> 110212ATH-S1203	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> Nov. 20, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	



10.0 SAR SCALING FOR 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)	162.0	F3	37.07	37.2	1.28	+ 0.13 dB	1.32
Body-worn (FCC/IC)	162.0	B3	37.07	37.2	1.60	+ 0.13 dB	1.64

Notes:

1. The scaled SAR levels are below the FCC/IC SAR limit of 8.0 W/kg.

Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio	Model:	Viking VP600 Model 1	Freq.:	138 - 174 MHz	
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	<u>Date(s) of Evaluation</u> Nov. 7-8, 19, 2012	<u>Test Report Serial No.</u> 110212ATH-S1203	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> Nov. 20, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	



11.0 DETAILS OF SAR EVALUATION

1. 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]).
2. The DUT was evaluated for SAR in accordance with the procedures described in FCC KDB 643646 (see reference [9]).
3. The SAR evaluations were performed with a fully charged battery.
4. The DUT was allowed a cool down period of 5-10 minutes between area scan and zoom scan portions of SAR evaluation.
5. 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).
6. The fluid temperature remained within $\pm 2^{\circ}\text{C}$ from the fluid dielectric parameter measurement to the completion of the SAR evaluation.
7. 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).
8. 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

- (i) The evaluation was performed in the applicable area of the phantom depending on the type of device being tested. For devices held to the ear during normal operation, both the left and right ear positions were evaluated using the SAM phantom.
 - (ii) For body-worn and face-held devices a planar phantom was used.
- b. The SAR was determined by a pre-defined procedure within the DASY4 software. Upon completion of a reference and optical surface check, the exposed region of the phantom was scanned near the inner surface with a grid spacing of 15mm x 15mm.
An area scan was determined as follows:
 - c. Based on the defined area scan grid, a more detailed grid is created to increase the points by a factor of 10. The interpolation function then evaluates all field values between corresponding measurement points.
 - d. A linear search is applied to find all the candidate maxima. Subsequently, all maxima are removed that are >2 dB from the global maximum. The remaining maxima are then used to position the cube scans.
A 1g and 10g spatial peak SAR was determined as follows:
 - e. Extrapolation is used to 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.
 - f. Interpolated data is used to calculate the average SAR over 1g and 10g cubes by spatially discretizing the entire measured cube. The volume used to determine the averaged SAR is a 1mm grid (42875 interpolated points).
 - g. A zoom scan volume of 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	Model:	Viking VP600 Model 1	Freq.:	138 - 174 MHz	
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	<u>Date(s) of Evaluation</u> Nov. 7-8, 19, 2012	<u>Test Report Serial No.</u> 110212ATH-S1203	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	
	<u>Test Report Issue Date</u> Nov. 20, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	
Test Lab Certificate No. 2470.01				

13.0 SYSTEM PERFORMANCE CHECK

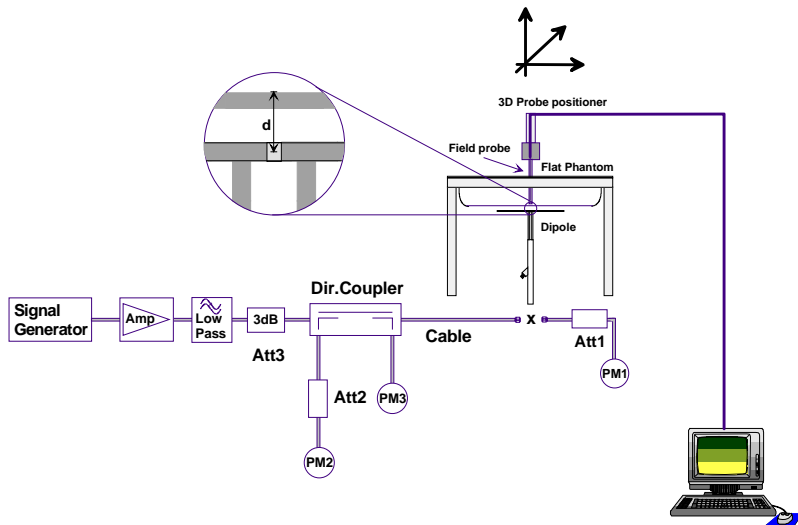
Prior to the SAR evaluations, system checks were performed with a planar phantom and 300 MHz SPEAG dipole (see Appendix B for system performance check test plots) in accordance with the procedures described in IEEE Standard 1528-2003 (see reference [5]). The dielectric parameters of the simulated tissue 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

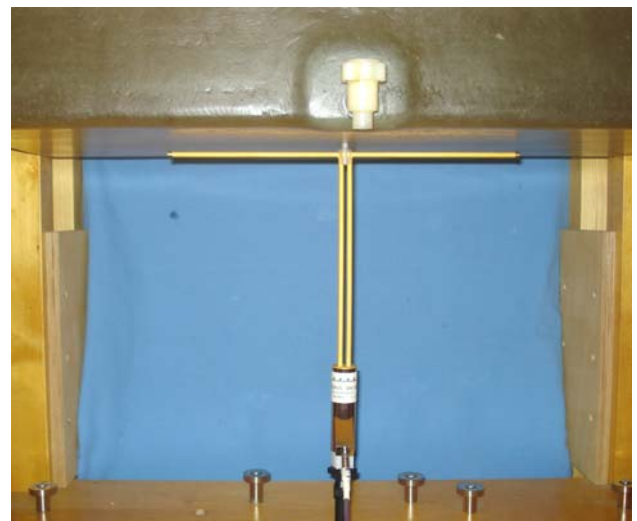
Test Date	Equiv. Tissue	SAR 1g (W/kg)			Dielectric Constant ϵ_r			Conductivity σ (mho/m)			ρ (Kg/m ³)	Amb. Temp. (°C)	Fluid Temp. (°C)	Fluid Depth (cm)	Humid. (%)	Barom. Press. (kPa)
		Target	Meas.	Dev.	Target	Meas.	Dev.	Target	Meas.	Dev.						
Nov 7	Head 300	1.17 $\pm 10\%$	1.13	-3.4%	45.3 $\pm 5\%$	46.3	+2.2%	0.87 $\pm 5\%$	0.84	-3.4%	1000	22.0	21.1	≥ 15	30	101.1
Nov 19	Head 300	1.17 $\pm 10\%$	1.12	-4.3%	45.3 $\pm 5\%$	46.5	+2.6%	0.87 $\pm 5\%$	0.85	-2.3%	1000	22.0	21.2	≥ 15	34	101.1

Notes


- The target SAR values are the measured values specified by the SAR system manufacturer in the dipole calibration (see Appendix E).
- 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.
- The fluid temperature remained within $\pm 2^\circ\text{C}$ from the fluid dielectric parameter measurement to the completion of the system performance check.
- The dielectric parameters of the simulated tissue mixture were measured prior to the system performance check using a Dielectric Probe Kit and a Network Analyzer (see Appendix C).





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



300 MHz SPEAG Validation Dipole Setup

Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio	Model:	Viking VP600 Model 1	Freq.:	138 - 174 MHz	
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	<u>Date(s) of Evaluation</u> Nov. 7-8, 19, 2012	<u>Test Report Serial No.</u> 110212ATH-S1203	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> Nov. 20, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	


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.			



Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio	Model:	Viking VP600 Model 1	Freq.:	138 - 174 MHz	
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	<u>Date(s) of Evaluation</u> Nov. 7-8, 19, 2012	<u>Test Report Serial No.</u> 110212ATH-S1203	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	
	<u>Test Report Issue Date</u> Nov. 20, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	
Test Lab Certificate No. 2470.01				

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 80
	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

Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio	Model:	Viking VP600 Model 1	Freq.:	138 - 174 MHz	
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	<u>Date(s) of Evaluation</u> Nov. 7-8, 19, 2012	<u>Test Report Serial No.</u> 110212ATH-S1203	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> Nov. 20, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

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

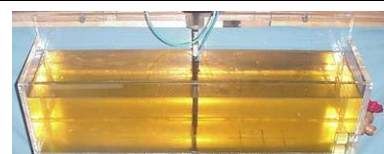
18.0 PHANTOM(S)

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


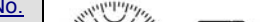
Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio	Model:	Viking VP600 Model 1	Freq.:	138 - 174 MHz	
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	<u>Date(s) of Evaluation</u> Nov. 7-8, 19, 2012	<u>Test Report Serial No.</u> 110212ATH-S1203	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	
	<u>Test Report Issue Date</u> Nov. 20, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	
Test Lab Certificate No. 2470.01				

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				


Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio	Model:	Viking VP600 Model 1	Freq.:	138 - 174 MHz	
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	<u>Date(s) of Evaluation</u> Nov. 7-8, 19, 2012	<u>Test Report Serial No.</u> 110212ATH-S1203	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> Nov. 20, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

21.0 MEASUREMENT UNCERTAINTIES

UNCERTAINTY BUDGET FOR DEVICE EVALUATION (FCC - IEEE 1528)									
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	10.00	Normal	1	1	1	10.00	10.00	∞
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	0	Rectangular	1.732050808	1	1	0.0	0.0	∞
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	3.75	Normal	1	0.64	0.43	2.4	1.6	∞
Liquid Permittivity (target)	E.3.2	5	Rectangular	1.732050808	0.6	0.49	1.7	1.4	∞
Liquid Permittivity (measured)	E.3.3	4.68	Normal	1	0.6	0.49	2.8	2.3	∞
Combined Standard Uncertainty			RSS				13.56	13.24	
Expanded Uncertainty (95% Confidence Interval)			k=2				27.13	26.48	
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

Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio	Model:	Viking VP600 Model 1	Freq.:	138 - 174 MHz	
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	<u>Date(s) of Evaluation</u> Nov. 7-8, 19, 2012	<u>Test Report Serial No.</u> 110212ATH-S1203	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> Nov. 20, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	



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	1.9	Normal	1	1	0.81	1.9	1.54	∞
Liquid Conductivity (measured)	7.2.4.3	3.75	Normal	1	0.78	0.71	2.9	2.7	∞
Liquid Permittivity (measured)	7.2.4.3	4.68	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				13.21	13.12	
Expanded Uncertainty (95% Confidence Interval)	7.3.2		k=2				26.42	26.24	

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



Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio	Model:	Viking VP600 Model 1	Freq.:	138 - 174 MHz	
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	<u>Date(s) of Evaluation</u> Nov. 7-8, 19, 2012	<u>Test Report Serial No.</u> 110212ATH-S1203	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> Nov. 20, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	


22.0 REFERENCES



- [1] Federal Communications Commission - "Radiofrequency radiation exposure evaluation: portable devices", Rule Part 47 CFR §2.1093.
- [2] Health Canada - "Limits of Human Exposure to Radiofrequency Electromagnetic Fields in the Frequency Range from 3 kHz to 300 GHz", Safety Code 6: 1999.
- [3] Federal Communications Commission - "Evaluating Compliance with FCC Guidelines for Human Exposure to Radio frequency Electromagnetic Fields", OET Bulletin 65, Supplement C (Edition 01-01), FCC, Washington, D.C.: June 2001.
- [4] Industry Canada - "Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)", Radio Standards Specification RSS-102 Issue 4: March 2010.
- [5] IEEE Standard 1528-2003 - "Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques": December 2003.
- [6] 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.

Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio	Model:	Viking VP600 Model 1	Freq.:	138 - 174 MHz	
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	<u>Date(s) of Evaluation</u> Nov. 7-8, 19, 2012	<u>Test Report Serial No.</u> 110212ATH-S1203	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	
	<u>Test Report Issue Date</u> Nov. 20, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	
Test Lab Certificate No. 2470.01				

APPENDIX A - SAR MEASUREMENT PLOTS

Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio	Model:	Viking VP600 Model 1	Freq.:	138 - 174 MHz	
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	<u>Date(s) of Evaluation</u> Nov. 7-8, 19, 2012	<u>Test Report Serial No.</u> 110212ATH-S1203	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> Nov. 20, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

Plot F1

Date Tested: 11/08/2012

DUT: EF Johnson VP600 Model 1; Type: VHF PTT Radio Transceiver; Serial: 511001221220016

Program Notes: Ambient Temp: 22C; Fluid Temp: 21.0C; Barometric Pressure: 101.1 kPa; Humidity: 30%

Procedure Notes:

Communication System: VHF 138-174

Frequency: 138 MHz; Duty Cycle: 1:1

Medium: HSL150 Medium parameters used (interpolated): $f = 138 \text{ MHz}$; $\sigma = 0.738 \text{ mho/m}$; $\epsilon_r = 53.7$; $\rho = 1000 \text{ kg/m}^3$

- 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 80; Postprocessing SW: SEMCAD, V1.8 Build 186

138 - 101/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) = 2.09 mW/g

138 - 101/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=7.5\text{mm}$, $dy=7.5\text{mm}$, $dz=5\text{mm}$

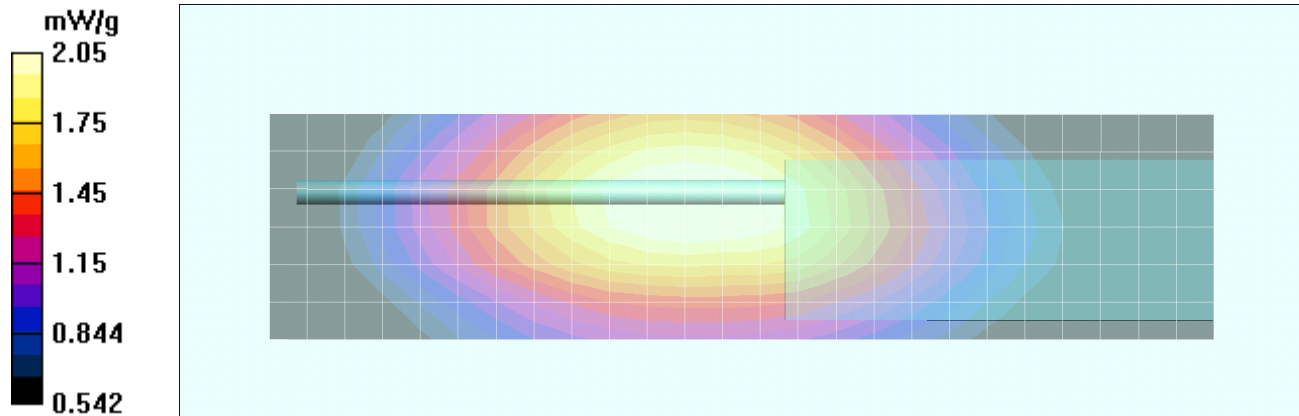
Reference Value = 52.1 V/m; Power Drift = -0.440 dB


Peak SAR (extrapolated) = 2.84 W/kg



SAR(1 g) = 1.99 mW/g; SAR(10 g) = 1.54 mW/g

Info: Interpolated medium parameters used for SAR evaluation.

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



Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio	Model:	Viking VP600 Model 1	Freq.:	138 - 174 MHz	
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	<u>Date(s) of Evaluation</u> Nov. 7-8, 19, 2012	<u>Test Report Serial No.</u> 110212ATH-S1203	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> Nov. 20, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

Plot F2

Date Tested: 11/08/2012

DUT: EF Johnson VP600 Model 1; Type: VHF PTT Radio Transceiver; Serial: 511001221220016

Program Notes: Ambient Temp: 22C; Fluid Temp: 21.0C; Barometric Pressure: 101.1 kPa; Humidity: 30%

Procedure Notes:

Communication System: VHF 138-174

Frequency: 150.8 MHz; Duty Cycle: 1:1

Medium: HSL150 Medium parameters used (interpolated): $f = 150.8 \text{ MHz}$; $\sigma = 0.759 \text{ mho/m}$; $\epsilon_r = 51.8$; $\rho = 1000 \text{ kg/m}^3$

- 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 80; Postprocessing SW: SEMCAD, V1.8 Build 186

150.8 - 103/Area Scan (7x26x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 2.22 mW/g

150.8 - 103/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

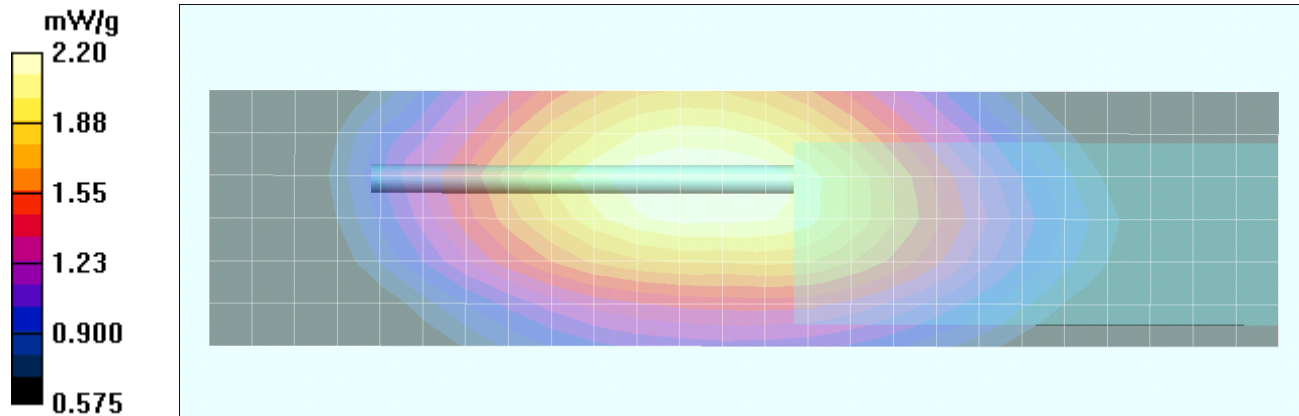
Reference Value = 52.7 V/m; Power Drift = -0.401 dB


Peak SAR (extrapolated) = 3.03 W/kg



SAR(1 g) = 2.08 mW/g; SAR(10 g) = 1.61 mW/g

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 2.20 mW/g



Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio	Model:	Viking VP600 Model 1	Freq.:	138 - 174 MHz	
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	<u>Date(s) of Evaluation</u> Nov. 7-8, 19, 2012	<u>Test Report Serial No.</u> 110212ATH-S1203	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> Nov. 20, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

Plot F3

Date Tested: 11/08/2012

DUT: EF Johnson VP600 Model 1; Type: VHF PTT Radio Transceiver; Serial: 511001221220016

Program Notes: Ambient Temp: 22C; Fluid Temp: 21.0C; Barometric Pressure: 101.1 kPa; Humidity: 30%

Procedure Notes:

Communication System: VHF 138-174

Frequency: 162 MHz; Duty Cycle: 1:1

Medium: HSL150 Medium parameters used (interpolated): $f = 162 \text{ MHz}$; $\sigma = 0.754 \text{ mho/m}$; $\epsilon_r = 54.3$; $\rho = 1000 \text{ kg/m}^3$

- 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 80; Postprocessing SW: SEMCAD, V1.8 Build 186

162 - 105/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) = 2.66 mW/g

162 - 105/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=7.5\text{mm}$, $dy=7.5\text{mm}$, $dz=5\text{mm}$

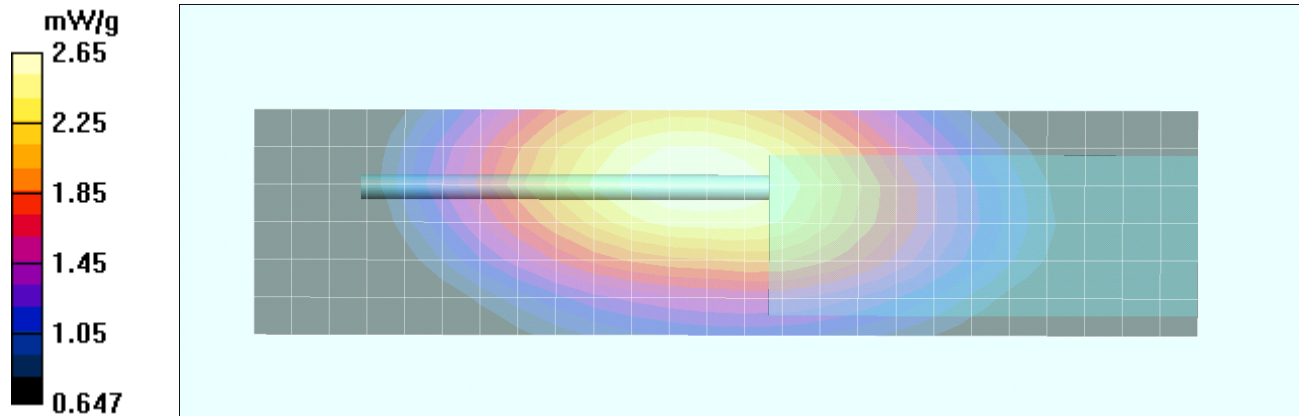
Reference Value = 54.7 V/m; Power Drift = 0.102 dB


Peak SAR (extrapolated) = 3.70 W/kg

SAR(1 g) = 2.56 mW/g; SAR(10 g) = 1.96 mW/g

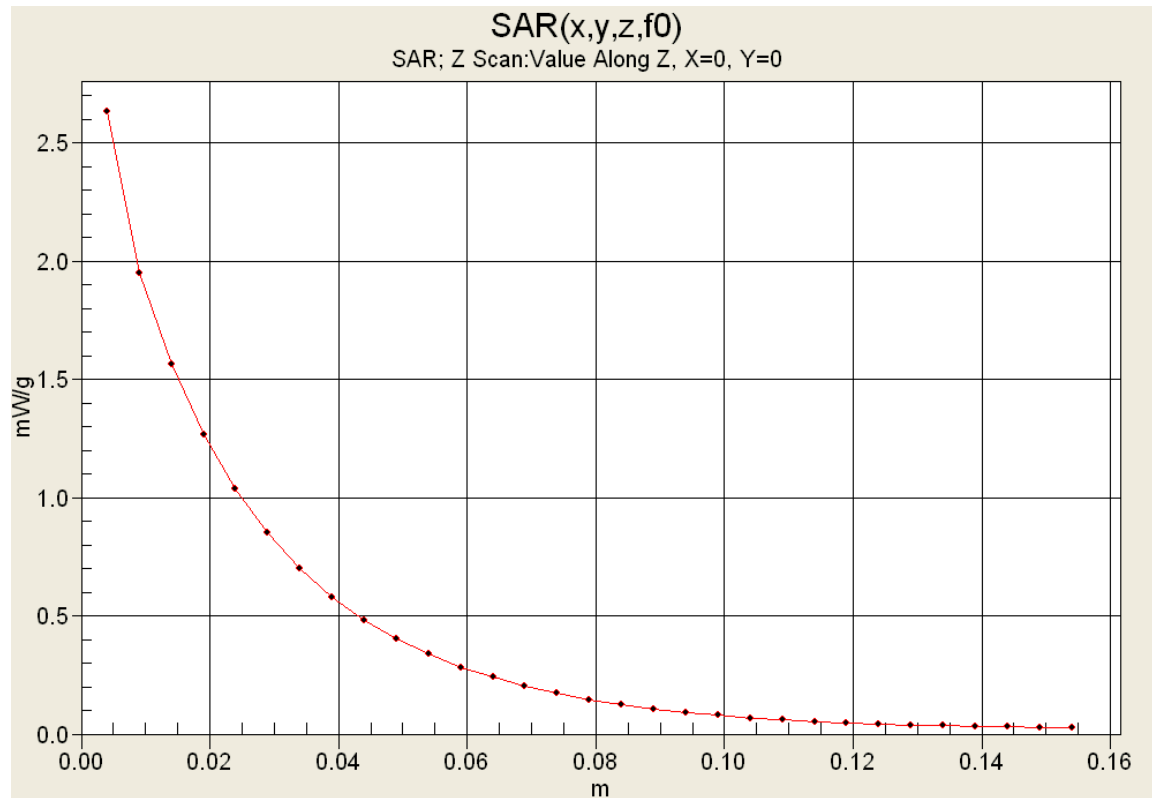
Info: Interpolated medium parameters used for SAR evaluation.



Maximum value of SAR (measured) = 2.65 mW/g



Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio	Model:	Viking VP600 Model 1	Freq.:	138 - 174 MHz	
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Z-axis Scan



	<u>Date(s) of Evaluation</u> Nov. 7-8, 19, 2012	<u>Test Report Serial No.</u> 110212ATH-S1203	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> Nov. 20, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

Plot F4

Date Tested: 11/19/2012

DUT: EF Johnson VP600 Model 1; Type: VHF PTT Radio Transceiver; Serial: 511001221220016

Program Notes: Ambient Temp: 22C; Fluid Temp: 22.0C; Barometric Pressure: 101.1 kPa; Humidity: 34%

Procedure Notes:

Communication System: VHF 138-174

Frequency: 138 MHz; Duty Cycle: 1:1

Medium: HSL150 Medium parameters used (interpolated): $f = 138 \text{ MHz}$; $\sigma = 0.732 \text{ mho/m}$; $\epsilon_r = 52.8$; $\rho = 1000 \text{ kg/m}^3$

- 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 80; Postprocessing SW: SEMCAD, V1.8 Build 186

138 - 110/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) = 0.999 mW/g

138 - 110/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=7.5\text{mm}$, $dy=7.5\text{mm}$, $dz=5\text{mm}$

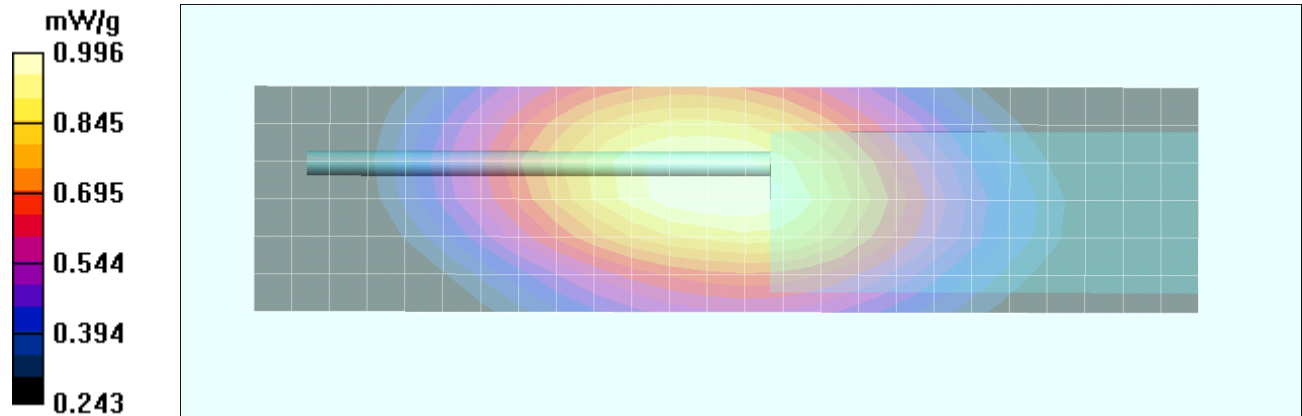
Reference Value = 36.1 V/m; Power Drift = -0.051 dB


Peak SAR (extrapolated) = 1.40 W/kg

SAR(1 g) = 0.968 mW/g; SAR(10 g) = 0.743 mW/g

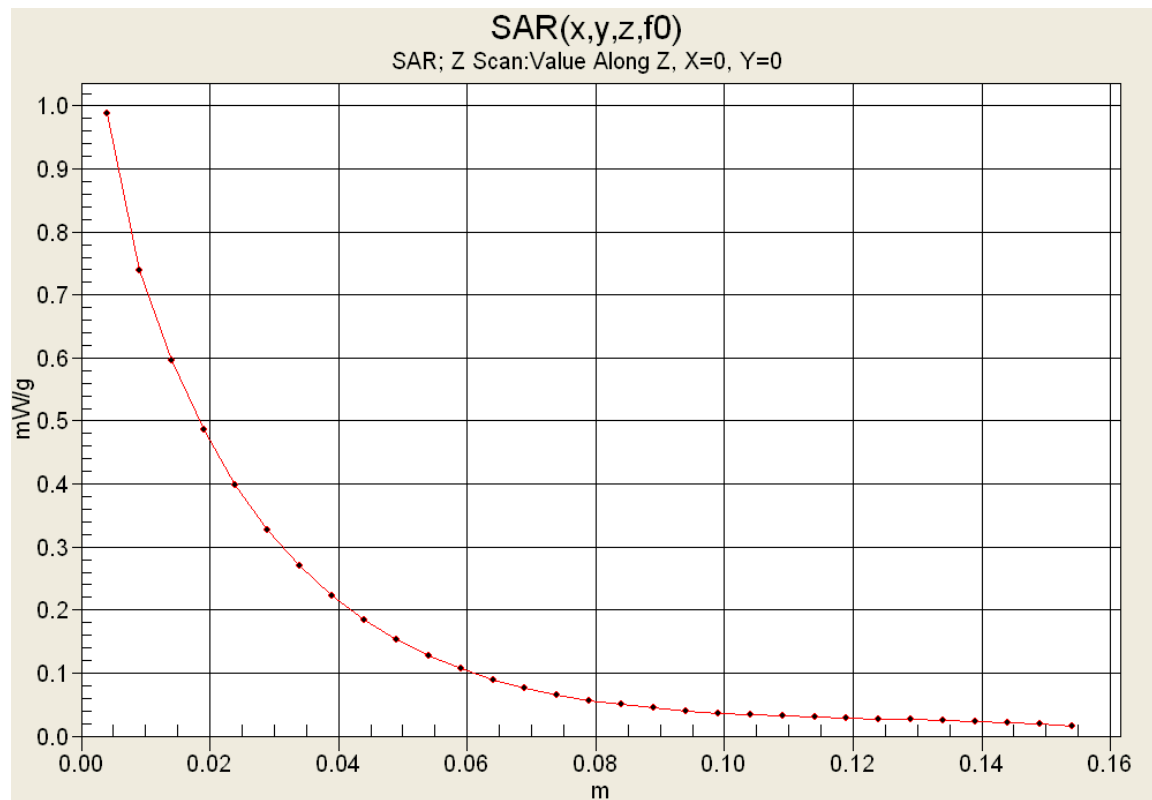
Info: Interpolated medium parameters used for SAR evaluation.



Maximum value of SAR (measured) = 0.996 mW/g



Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio	Model:	Viking VP600 Model 1	Freq.:	138 - 174 MHz	
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Z-axis Scan



	<u>Date(s) of Evaluation</u> Nov. 7-8, 19, 2012	<u>Test Report Serial No.</u> 110212ATH-S1203	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> Nov. 20, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

Plot F5

Date Tested: 11/19/2012

DUT: EF Johnson VP600 Model 1; Type: VHF PTT Radio Transceiver; Serial: 511001221220016

Program Notes: Ambient Temp: 22C; Fluid Temp: 22.0C; Barometric Pressure: 101.1 kPa; Humidity: 34%

Procedure Notes:

Communication System: VHF 138-174

Frequency: 150.8 MHz; Duty Cycle: 1:1

Medium: HSL150 Medium parameters used (interpolated): $f = 150.8 \text{ MHz}$; $\sigma = 0.76 \text{ mho/m}$; $\epsilon_r = 54.2$; $\rho = 1000 \text{ kg/m}^3$

- 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 80; Postprocessing SW: SEMCAD, V1.8 Build 186

150.8 - 110/Area Scan (7x26x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.824 mW/g

150.8 - 110/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

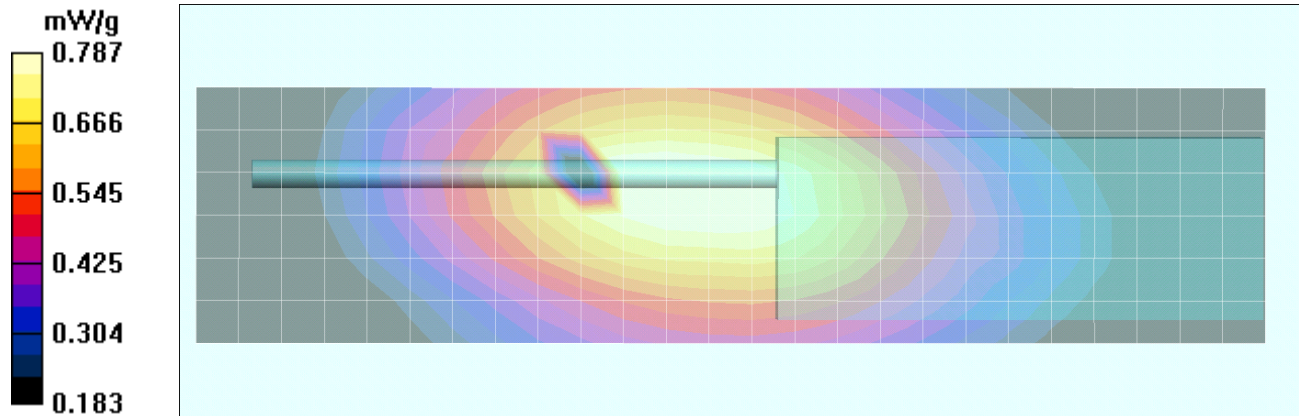
Reference Value = 33.0 V/m; Power Drift = -0.798 dB


Peak SAR (extrapolated) = 1.09 W/kg



SAR(1 g) = 0.758 mW/g; SAR(10 g) = 0.567 mW/g

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.787 mW/g



Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio	Model:	Viking VP600 Model 1	Freq.:	138 - 174 MHz	
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	<u>Date(s) of Evaluation</u> Nov. 7-8, 19, 2012	<u>Test Report Serial No.</u> 110212ATH-S1203	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> Nov. 20, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

Plot B1

Date Tested: 11/07/2012

DUT: EF Johnson VP600 Model 1; Type: VHF PTT Radio Transceiver; Serial: 511001221220016

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

Procedure Notes:

Communication System: VHF 138-174

Frequency: 138 MHz; Duty Cycle: 1:1

Medium: M150 Medium parameters used (interpolated): $f = 138 \text{ MHz}$; $\sigma = 0.77 \text{ mho/m}$; $\epsilon_r = 64.3$; $\rho = 1000 \text{ kg/m}^3$

- 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 80; Postprocessing SW: SEMCAD, V1.8 Build 186

138 - 101/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) = 2.88 mW/g

138 - 101/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=7.5\text{mm}$, $dy=7.5\text{mm}$, $dz=5\text{mm}$

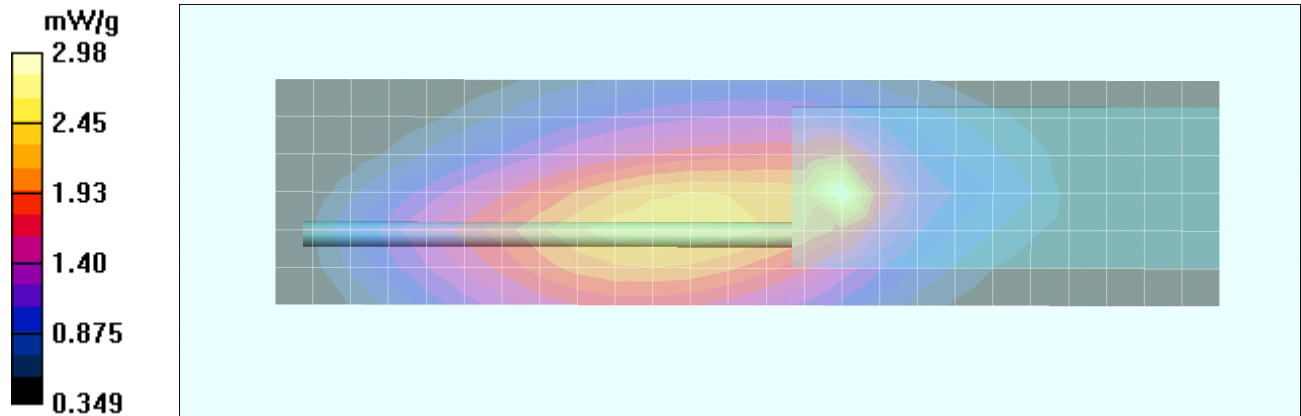
Reference Value = 56.0 V/m; Power Drift = -0.464 dB


Peak SAR (extrapolated) = 7.55 W/kg

SAR(1 g) = 2.92 mW/g; SAR(10 g) = 1.75 mW/g

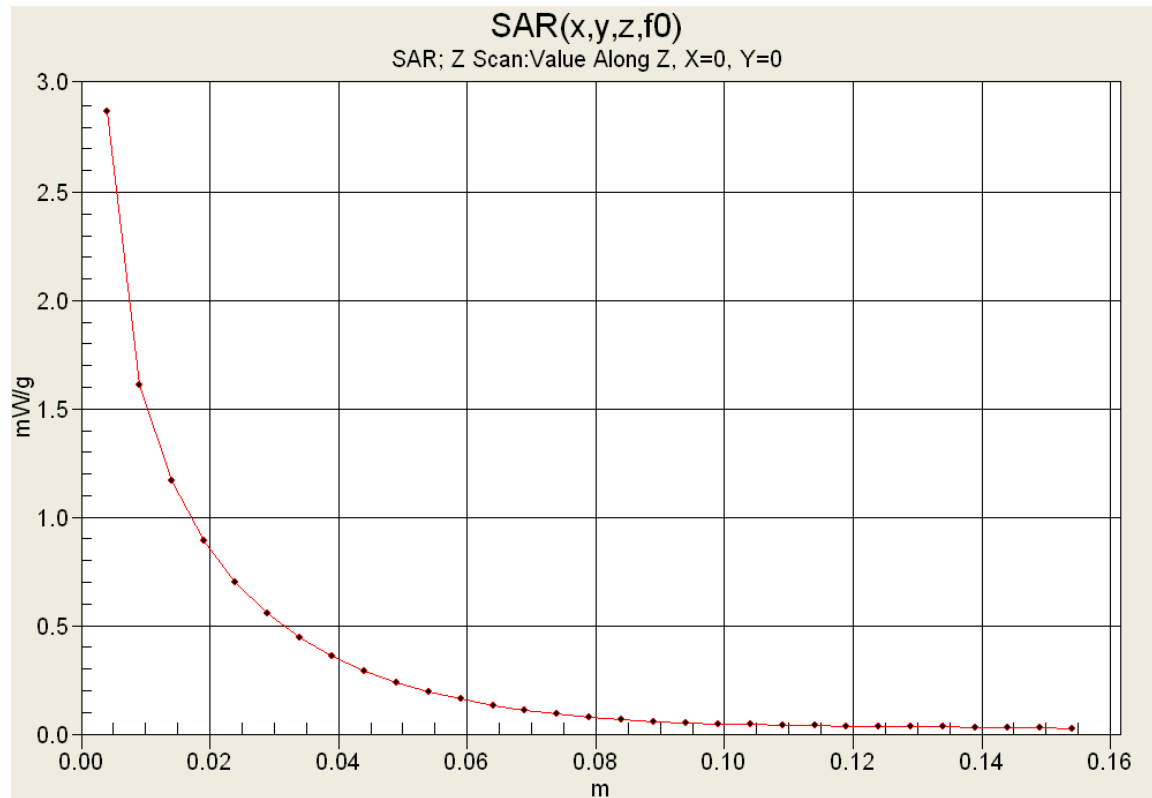
Info: Interpolated medium parameters used for SAR evaluation.



Maximum value of SAR (measured) = 2.98 mW/g



Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio	Model:	Viking VP600 Model 1	Freq.:	138 - 174 MHz	
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Z-axis Scan



	<u>Date(s) of Evaluation</u> Nov. 7-8, 19, 2012	<u>Test Report Serial No.</u> 110212ATH-S1203	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> Nov. 20, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

Plot B2

Date Tested: 11/07/2012

DUT: EF Johnson VP600 Model 1; Type: VHF PTT Radio Transceiver; Serial: 511001221220016

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

Procedure Notes:

Communication System: VHF 138-174

Frequency: 150.8 MHz; Duty Cycle: 1:1

Medium: M150 Medium parameters used (interpolated): $f = 150.8 \text{ MHz}$; $\sigma = 0.788 \text{ mho/m}$; $\epsilon_r = 64.8$; $\rho = 1000 \text{ kg/m}^3$

- 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 80; Postprocessing SW: SEMCAD, V1.8 Build 186

150.8 - 103/Area Scan (7x26x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 2.47 mW/g

150.8 - 103/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

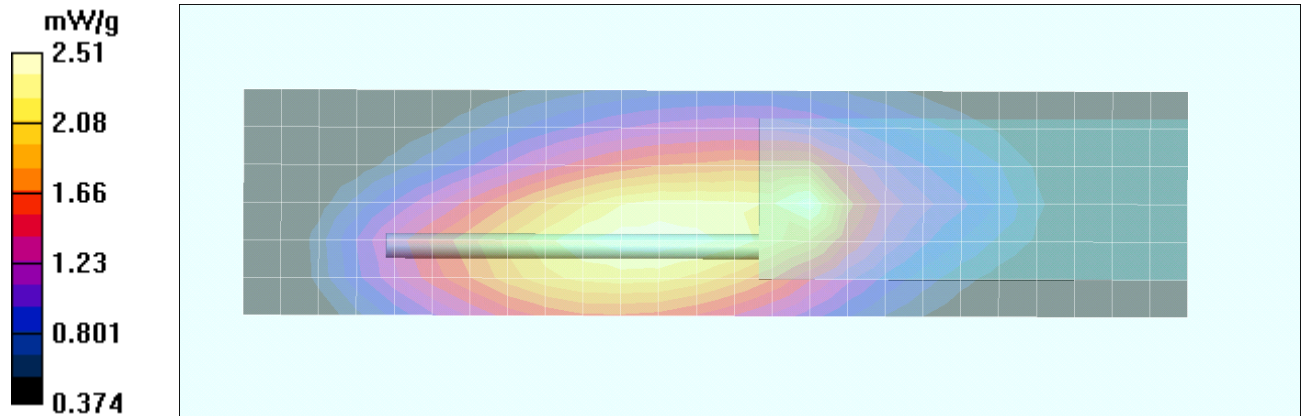
Reference Value = 51.4 V/m; Power Drift = 0.180 dB


Peak SAR (extrapolated) = 4.95 W/kg



SAR(1 g) = 2.43 mW/g; SAR(10 g) = 1.63 mW/g

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 2.51 mW/g



Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio	Model:	Viking VP600 Model 1	Freq.:	138 - 174 MHz	
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	<u>Date(s) of Evaluation</u> Nov. 7-8, 19, 2012	<u>Test Report Serial No.</u> 110212ATH-S1203	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> Nov. 20, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

Plot B3

Date Tested: 11/08/2012

DUT: EF Johnson VP600 Model 1; Type: VHF PTT Radio Transceiver; Serial: 511001221220016

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

Procedure Notes:

Communication System: VHF 138-174

Frequency: 162 MHz; Duty Cycle: 1:1

Medium: M150 Medium parameters used (interpolated): $f = 162 \text{ MHz}$; $\sigma = 0.774 \text{ mho/m}$; $\epsilon_r = 63.8$; $\rho = 1000 \text{ kg/m}^3$

- 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 80; Postprocessing SW: SEMCAD, V1.8 Build 186

162 - 105/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) = 3.08 mW/g

162 - 105/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=7.5\text{mm}$, $dy=7.5\text{mm}$, $dz=5\text{mm}$

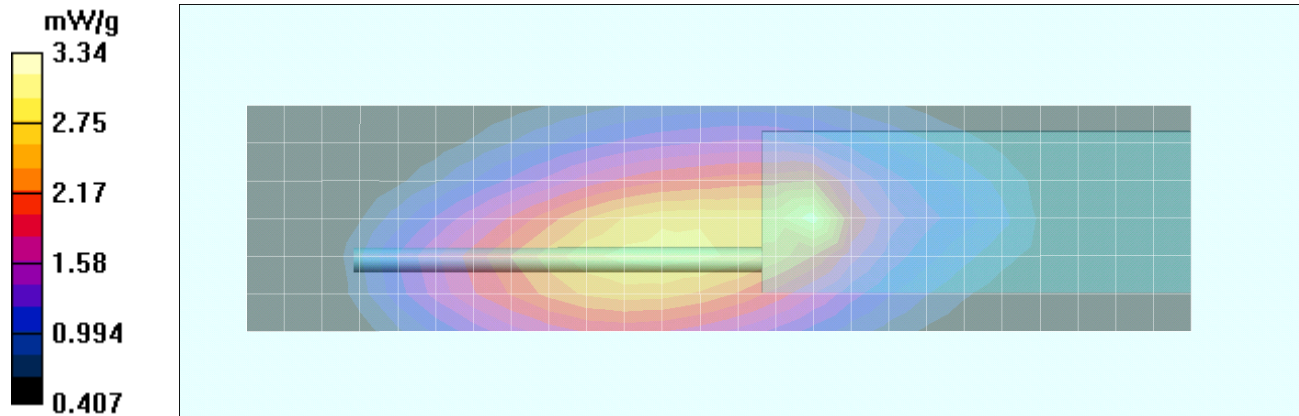
Reference Value = 58.1 V/m; Power Drift = 0.055 dB


Peak SAR (extrapolated) = 7.05 W/kg

SAR(1 g) = 3.19 mW/g; SAR(10 g) = 2.02 mW/g

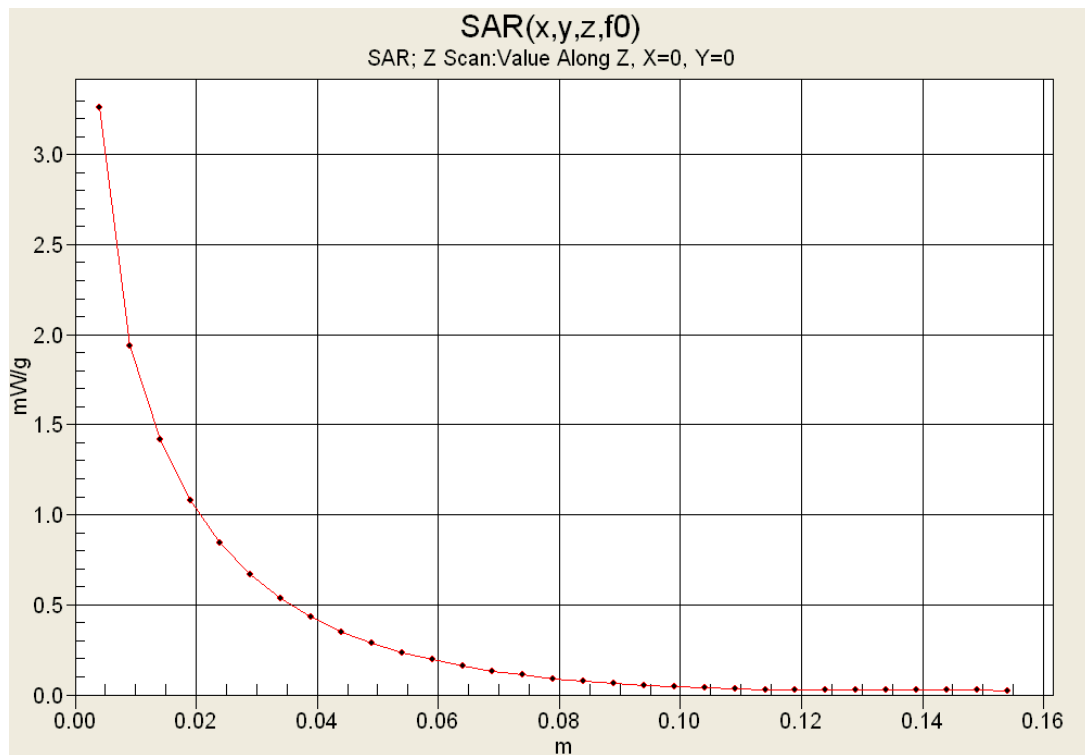
Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 3.34 mW/g

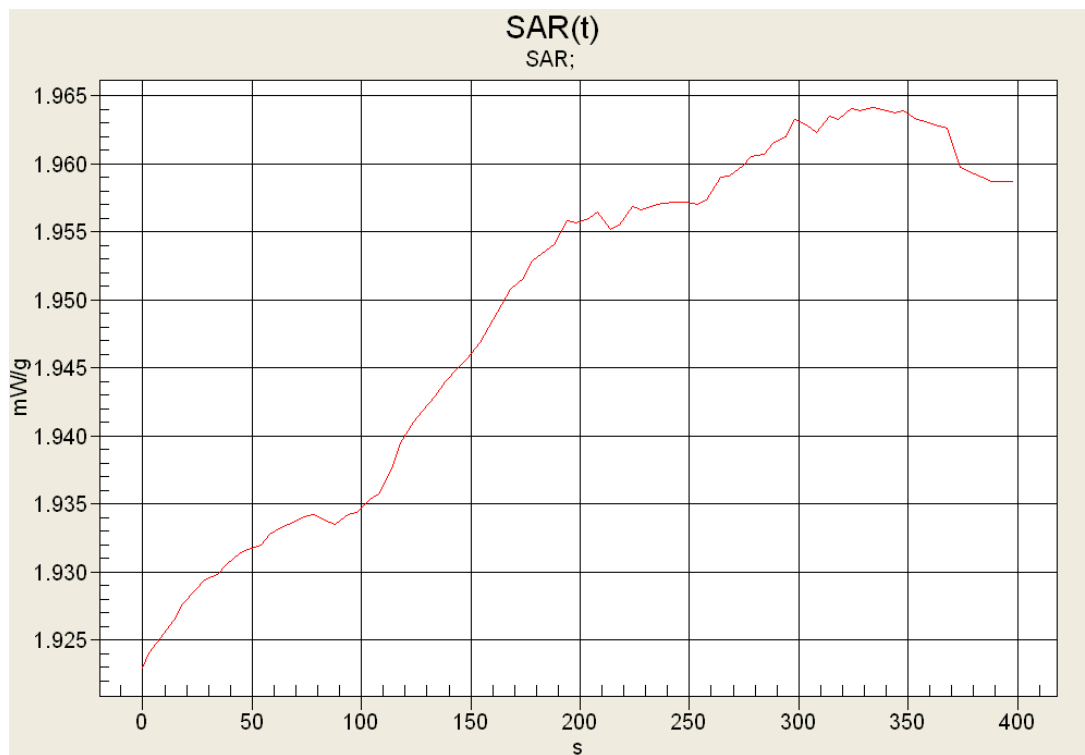




Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio	Model:	Viking VP600 Model 1	Freq.:	138 - 174 MHz	
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Z-axis Scan



SAR vs. Time



	<u>Date(s) of Evaluation</u> Nov. 7-8, 19, 2012	<u>Test Report Serial No.</u> 110212ATH-S1203	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> Nov. 20, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

Plot B4

Date Tested: 11/08/2012

DUT: EF Johnson VP600 Model 1; Type: VHF PTT Radio Transceiver; Serial: 511001221220016

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

Procedure Notes:

Communication System: VHF 138-174

Frequency: 138 MHz; Duty Cycle: 1:1

Medium: M150 Medium parameters used (interpolated): $f = 138 \text{ MHz}$; $\sigma = 0.77 \text{ mho/m}$; $\epsilon_r = 64.3$; $\rho = 1000 \text{ kg/m}^3$

- 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 80; Postprocessing SW: SEMCAD, V1.8 Build 186

138 - 110/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) = 1.69 mW/g

138 - 110/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=7.5\text{mm}$, $dy=7.5\text{mm}$, $dz=5\text{mm}$

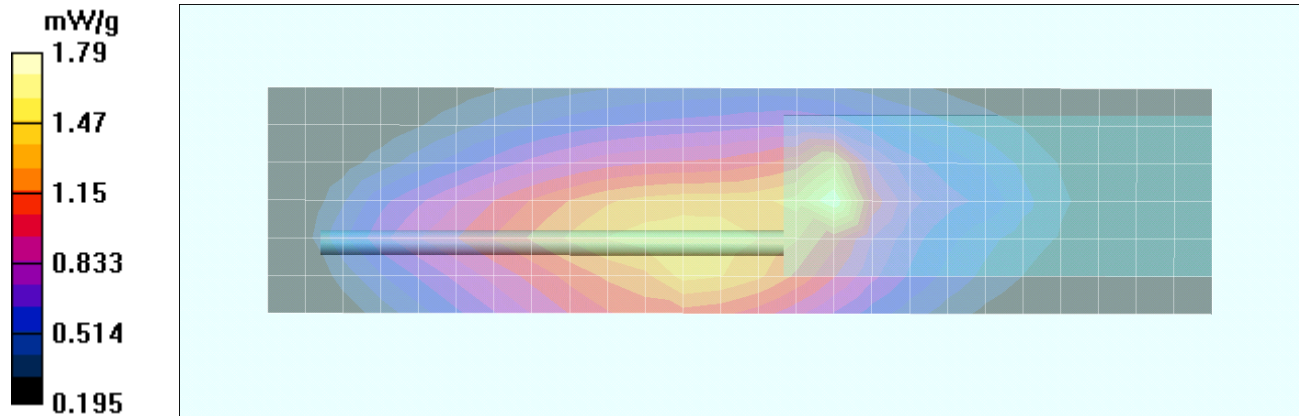
Reference Value = 46.6 V/m; Power Drift = -1.22 dB


Peak SAR (extrapolated) = 4.61 W/kg



SAR(1 g) = 1.76 mW/g; SAR(10 g) = 1.03 mW/g

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 1.79 mW/g



Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio	Model:	Viking VP600 Model 1	Freq.:	138 - 174 MHz	
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	<u>Date(s) of Evaluation</u> Nov. 7-8, 19, 2012	<u>Test Report Serial No.</u> 110212ATH-S1203	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> Nov. 20, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

Plot B5

Date Tested: 11/08/2012

DUT: EF Johnson VP600 Model 1; Type: VHF PTT Radio Transceiver; Serial: 511001221220016

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

Procedure Notes:

Communication System: VHF 138-174

Frequency: 150.8 MHz; Duty Cycle: 1:1

Medium: M150 Medium parameters used (interpolated): $f = 150.8$ MHz; $\sigma = 0.788$ mho/m; $\epsilon_r = 64.8$; $\rho = 1000$ kg/m³

- 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 80; Postprocessing SW: SEMCAD, V1.8 Build 186

150.8 - 110/Area Scan (7x26x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.982 mW/g

150.8 - 110/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

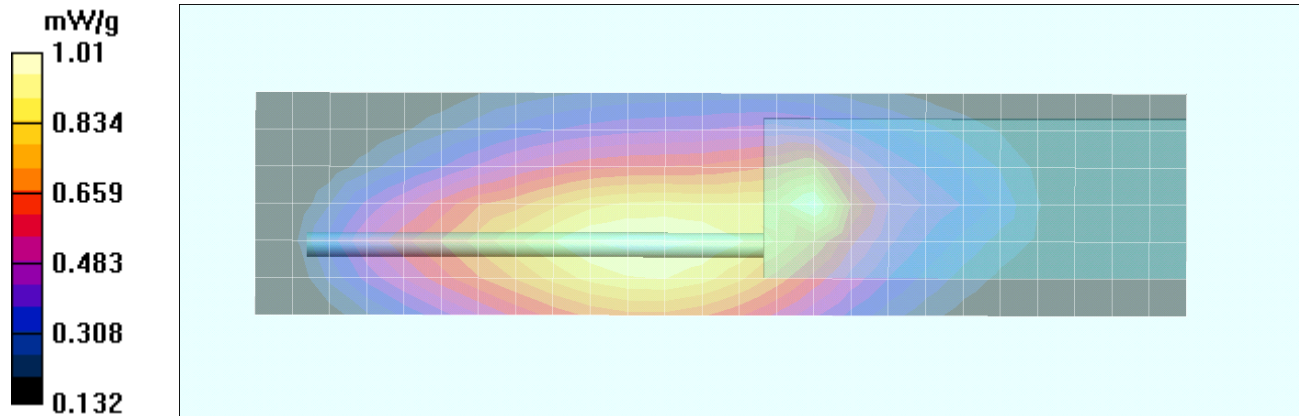
Reference Value = 34.3 V/m; Power Drift = -0.720 dB


Peak SAR (extrapolated) = 2.32 W/kg



SAR(1 g) = 1 mW/g; SAR(10 g) = 0.619 mW/g

Info: Interpolated medium parameters used for SAR evaluation.


Maximum value of SAR (measured) = 1.01 mW/g





Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio	Model:	Viking VP600 Model 1	Freq.:	138 - 174 MHz	
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	<u>Date(s) of Evaluation</u> Nov. 7-8, 19, 2012	<u>Test Report Serial No.</u> 110212ATH-S1203	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	
	<u>Test Report Issue Date</u> Nov. 20, 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	Model:	Viking VP600 Model 1	Freq.:	138 - 174 MHz	
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	<u>Date(s) of Evaluation</u> Nov. 7-8, 19, 2012	<u>Test Report Serial No.</u> 110212ATH-S1203	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	
	<u>Test Report Issue Date</u> Nov. 20, 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: 11/07/2012

System Performance Check - 300 MHz Dipole - Head

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

Program Notes: Ambient Temp: 22.0C; Fluid Temp: 21.1C; Barometric Pressure: 101.1 kPa; Humidity: 30%

Procedure Notes:

Communication System: CW

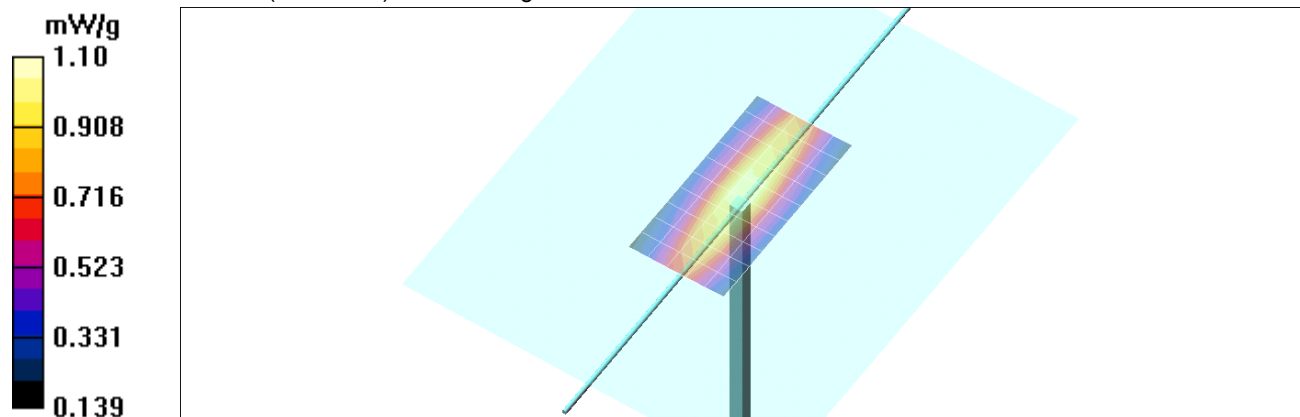
Frequency: 300 MHz; Duty Cycle: 1:1


Medium: 300 HSL Medium parameters used: $f = 300 \text{ MHz}$; $\sigma = 0.84 \text{ mho/m}$; $\epsilon_r = 46.3$; $\rho = 1000 \text{ kg/m}^3$

- 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 80; Postprocessing SW: SEMCAD, V1.8 Build 186

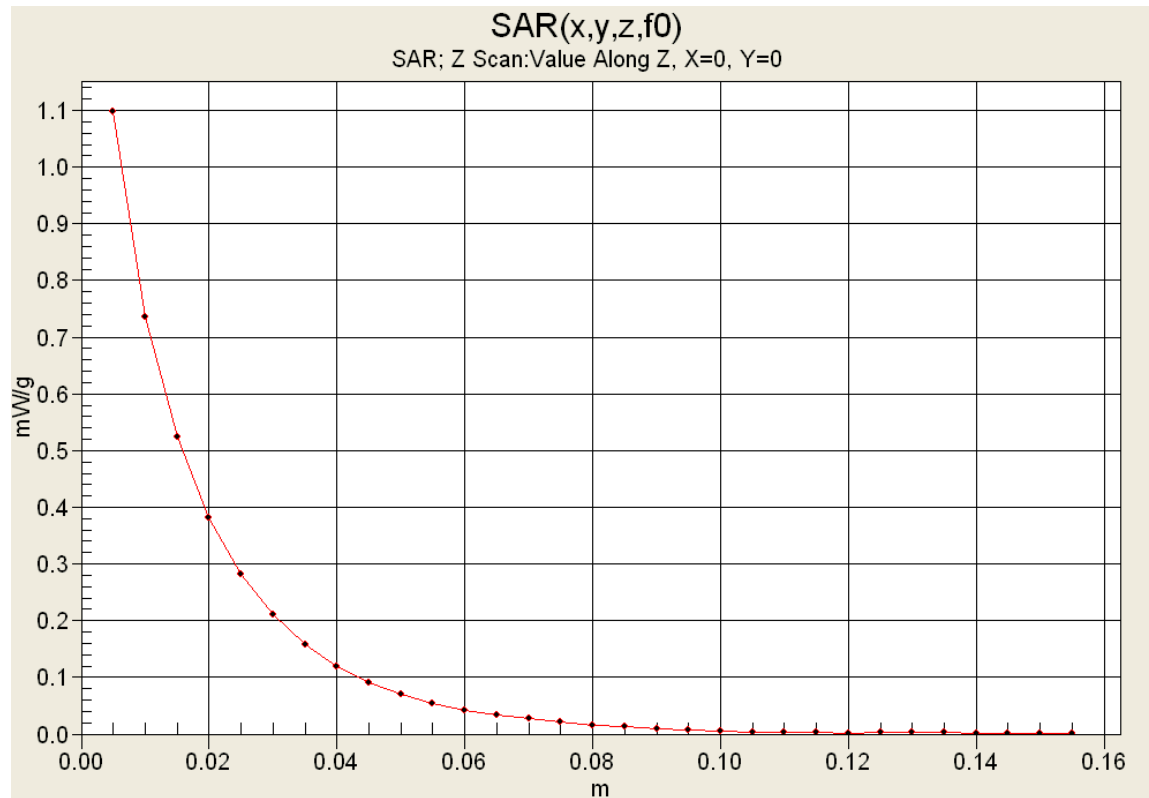
Head d=15mm, Pin = 398mW/Area Scan (6x11x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.02 mW/g



Head d=15mm, Pin = 398mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 36.2 V/m; Power Drift = -0.032 dB
Peak SAR (extrapolated) = 1.80 W/kg
SAR(1 g) = 1.13 mW/g; SAR(10 g) = 0.761 mW/g
Maximum value of SAR (measured) = 1.10 mW/g



Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio	Model:	Viking VP600 Model 1	Freq.:	138 - 174 MHz	
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Z-Axis Scan



	<u>Date(s) of Evaluation</u> Nov. 7-8, 19, 2012	<u>Test Report Serial No.</u> 110212ATH-S1203	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> Nov. 20, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

Date Tested: 11/19/2012

System Performance Check - 300 MHz Dipole - Head

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

Program Notes: Ambient Temp: 22.0C; Fluid Temp: 21.2C; Barometric Pressure: 101.1 kPa; Humidity: 34%

Procedure Notes:

Communication System: CW

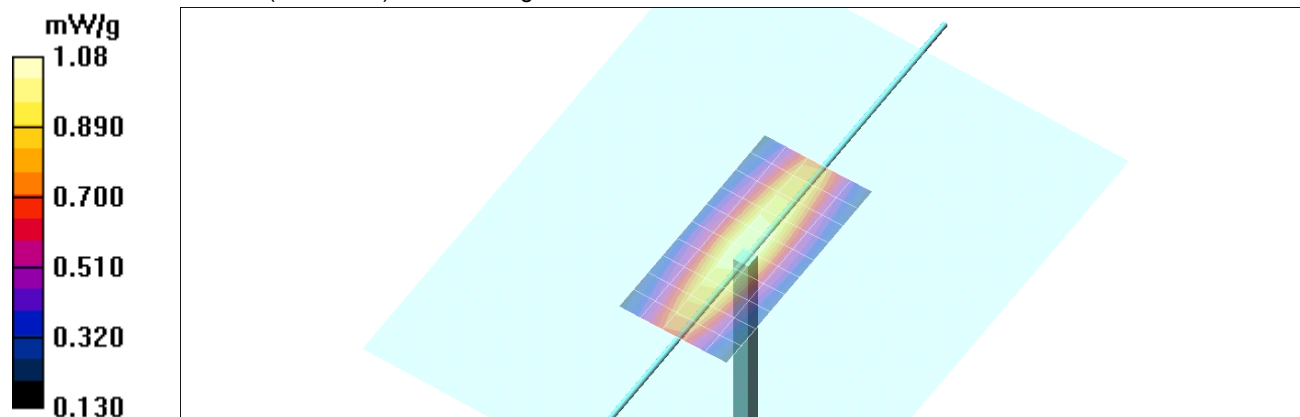
Frequency: 300 MHz; Duty Cycle: 1:1


Medium: 300 HSL Medium parameters used: $f = 300 \text{ MHz}$; $\sigma = 0.85 \text{ mho/m}$; $\epsilon_r = 46.5$; $\rho = 1000 \text{ kg/m}^3$

- 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 80; Postprocessing SW: SEMCAD, V1.8 Build 186

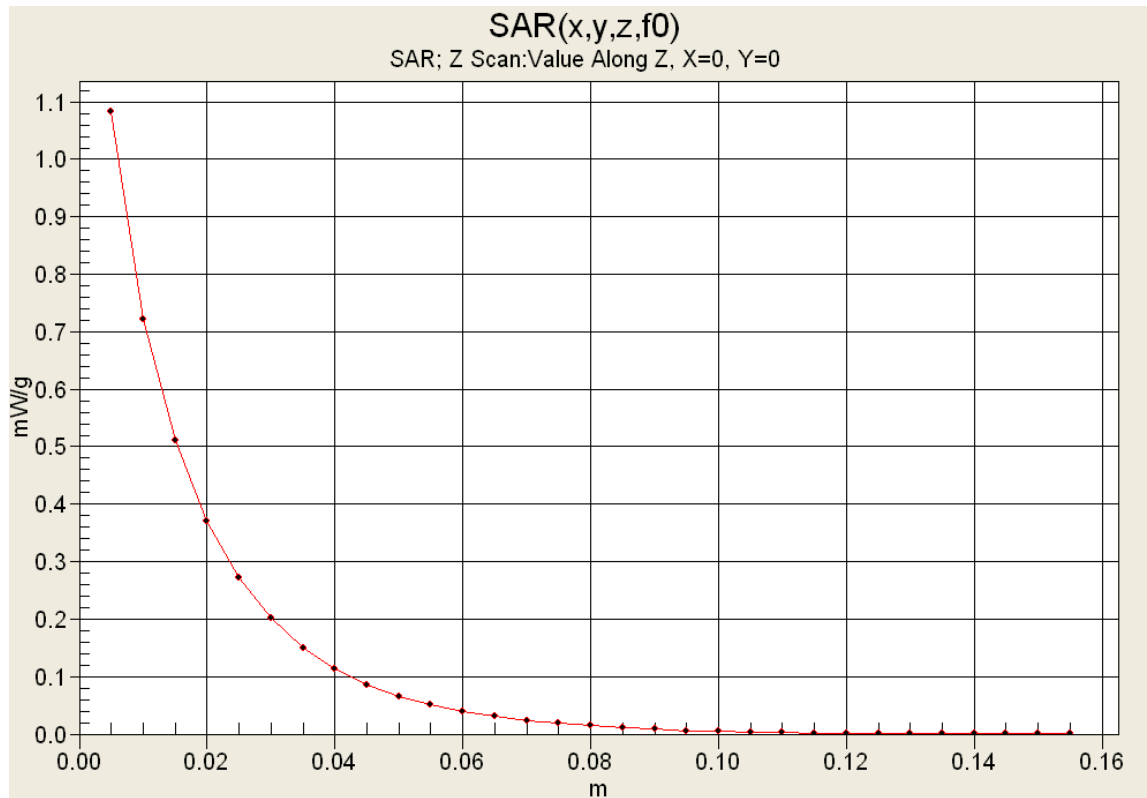
Head d=15mm, Pin = 398mW/Area Scan (6x11x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.02 mW/g



Head d=15mm, Pin = 398mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 36.1 V/m; Power Drift = -0.062 dB
Peak SAR (extrapolated) = 1.77 W/kg
SAR(1 g) = 1.12 mW/g; SAR(10 g) = 0.749 mW/g
Maximum value of SAR (measured) = 1.08 mW/g




Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio	Model:	Viking VP600 Model 1	Freq.:	138 - 174 MHz	
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Z-Axis Scan



	<u>Date(s) of Evaluation</u> Nov. 7-8, 19, 2012	<u>Test Report Serial No.</u> 110212ATH-S1203	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	
	<u>Test Report Issue Date</u> Nov. 20, 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	Model:	Viking VP600 Model 1	Freq.:	138 - 174 MHz	
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	<u>Date(s) of Evaluation</u> Nov. 7-8, 19, 2012	<u>Test Report Serial No.</u> 110212ATH-S1203	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	
	<u>Test Report Issue Date</u> Nov. 20, 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

07/Nov/2012

Freq 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	sHFCC	Test_e	Test_s
0.2000	49.97	0.80	49.86	0.74
0.2100	49.50	0.80	50.99	0.76
0.2200	49.03	0.81	50.72	0.74
0.2300	48.57	0.82	49.77	0.75
0.2400	48.10	0.83	48.04	0.77
0.2500	47.63	0.83	48.99	0.78
0.2600	47.17	0.84	47.25	0.79
0.2700	46.70	0.85	46.27	0.80
0.2800	46.23	0.86	47.00	0.79
0.2900	45.77	0.86	46.17	0.81
0.3000	45.30	0.87	46.25	0.84
0.3100	45.18	0.87	45.69	0.84
0.3200	45.06	0.87	45.66	0.84
0.3300	44.94	0.87	45.36	0.86
0.3400	44.82	0.87	44.65	0.86
0.3500	44.70	0.87	44.60	0.87
0.3600	44.58	0.87	44.16	0.89
0.3700	44.46	0.87	43.99	0.89
0.3800	44.34	0.87	44.01	0.90
0.3900	44.22	0.87	43.56	0.90
0.4000	44.10	0.87	43.64	0.90

Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio	Model:	Viking VP600 Model 1	Freq.:	138 - 174 MHz	
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	<u>Date(s) of Evaluation</u> Nov. 7-8, 19, 2012	<u>Test Report Serial No.</u> 110212ATH-S1203	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> Nov. 20, 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
07/Nov/2012

Freq 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	97.36	0.71
0.0600	64.12	0.73	79.60	0.75
0.0700	63.87	0.74	80.32	0.75
0.0800	63.63	0.74	71.85	0.73
0.0900	63.38	0.75	75.47	0.74
0.1000	63.13	0.76	67.49	0.75
0.1100	62.89	0.77	63.89	0.77
0.1200	62.64	0.78	64.17	0.75
0.1300	62.39	0.78	64.70	0.77
0.1400	62.15	0.79	64.24	0.77
0.1500	61.90	0.80	64.90	0.79
0.1600	61.65	0.81	63.88	0.77
0.1700	61.41	0.82	63.72	0.79
0.1800	61.16	0.82	61.67	0.80
0.1900	60.91	0.83	62.26	0.81
0.2000	60.67	0.84	61.64	0.82
0.2100	60.42	0.85	60.52	0.81
0.2200	60.17	0.86	61.78	0.83
0.2300	59.93	0.86	59.33	0.84
0.2400	59.68	0.87	58.92	0.83
0.2500	59.43	0.88	59.83	0.84

Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio	Model:	Viking VP600 Model 1	Freq.:	138 - 174 MHz	
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	<u>Date(s) of Evaluation</u> Nov. 7-8, 19, 2012	<u>Test Report Serial No.</u> 110212ATH-S1203	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> Nov. 20, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

150 MHz Head

Celltech Labs

Test Result for UIM Dielectric Parameter

08/Nov/2012

Freq 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	sHFCC	Test_e	Test_s
0.0500	56.97	0.69	72.47	0.74
0.0600	56.50	0.69	70.84	0.73
0.0700	56.03	0.70	67.95	0.65
0.0800	55.57	0.71	58.90	0.73
0.0900	55.10	0.72	59.08	0.73
0.1000	54.63	0.72	56.68	0.73
0.1100	54.17	0.73	58.40	0.72
0.1200	53.70	0.74	55.83	0.73
0.1300	53.23	0.75	56.64	0.73
0.1400	52.77	0.75	52.91	0.74
0.1500	52.30	0.76	51.51	0.76
0.1600	51.83	0.77	54.61	0.75
0.1700	51.37	0.77	53.27	0.77
0.1800	50.90	0.78	53.26	0.79
0.1900	50.43	0.79	52.35	0.79
0.2000	49.97	0.80	53.46	0.79
0.2100	49.50	0.80	50.62	0.81
0.2200	49.03	0.81	50.68	0.81
0.2300	48.57	0.82	50.80	0.82
0.2400	48.10	0.83	48.95	0.83
0.2500	47.63	0.83	49.99	0.85

Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio	Model:	Viking VP600 Model 1	Freq.:	138 - 174 MHz	
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	<u>Date(s) of Evaluation</u> Nov. 7-8, 19, 2012	<u>Test Report Serial No.</u> 110212ATH-S1203	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	
	<u>Test Report Issue Date</u> Nov. 20, 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

19/Nov/2012

Freq 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	sHFCC	Test_e	Test_s
0.2000	49.97	0.80	50.85	0.79
0.2100	49.50	0.80	49.49	0.79
0.2200	49.03	0.81	49.29	0.77
0.2300	48.57	0.82	48.34	0.80
0.2400	48.10	0.83	47.99	0.79
0.2500	47.63	0.83	46.84	0.81
0.2600	47.17	0.84	47.31	0.82
0.2700	46.70	0.85	45.75	0.82
0.2800	46.23	0.86	47.09	0.83
0.2900	45.77	0.86	46.64	0.85
0.3000	45.30	0.87	46.51	0.85
0.3100	45.18	0.87	45.56	0.86
0.3200	45.06	0.87	44.77	0.88
0.3300	44.94	0.87	45.37	0.89
0.3400	44.82	0.87	45.44	0.89
0.3500	44.70	0.87	44.63	0.90
0.3600	44.58	0.87	44.01	0.91
0.3700	44.46	0.87	44.24	0.90
0.3800	44.34	0.87	43.83	0.92
0.3900	44.22	0.87	44.00	0.92
0.4000	44.10	0.87	43.30	0.93

Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio	Model:	Viking VP600 Model 1	Freq.:	138 - 174 MHz	
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	<u>Date(s) of Evaluation</u> Nov. 7-8, 19, 2012	<u>Test Report Serial No.</u> 110212ATH-S1203	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> Nov. 20, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

150 MHz Head

Celltech Labs

Test Result for UIM Dielectric Parameter

19/Nov/2012

Freq 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	71.39
0.0600	56.50	0.69	78.74
0.0700	56.03	0.70	66.83
0.0800	55.57	0.71	64.81
0.0900	55.10	0.72	62.21
0.1000	54.63	0.72	58.93
0.1100	54.17	0.73	57.61
0.1200	53.70	0.74	55.50
0.1300	53.23	0.75	53.28
0.1400	52.77	0.75	52.62
0.1500	52.30	0.76	54.23
0.1600	51.83	0.77	53.58
0.1700	51.37	0.77	51.16
0.1800	50.90	0.78	52.01
0.1900	50.43	0.79	50.98
0.2000	49.97	0.80	50.07
0.2100	49.50	0.80	50.60
0.2200	49.03	0.81	48.45
0.2300	48.57	0.82	49.47
0.2400	48.10	0.83	48.65
0.2500	47.63	0.83	47.61

Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio	Model:	Viking VP600 Model 1	Freq.:	138 - 174 MHz	
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