



	<u>Date(s) of Evaluation</u> Aug 23-28, Oct3, 2012	<u>Test Report Serial No.</u> 081612ALH-T1189-S90V	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	
	<u>Test Report Issue Date</u> Oct. 17, 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)

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	KENWOOD USA CORPORATION			
	Address	3970 Johns Creek Court, Suite 100, Suwanee, GA 30024 United States			
Application Type(s)	FCC	TCB Certification			
Standard(s) Applied	FCC	47 CFR §2.1093			
Procedure(s) Applied	FCC	OET Bulletin 65, Supplement C	FCC	KDB 447498 D01v04	
	FCC	KDB 643646 D01v01	IEC	62209-1:2005	
	IEEE	1528-2003			
Device Classification(s)	FCC	Licensed Non-Broadcast Transmitter Held to Face (TNF) - FCC Part 90			
Device Identifier(s)	FCC ID:	ALH434901			
Device Model(s)	TK-2400-K (4-channel), TK-2400-K2 (16-channel) (Models are electrically and mechanically identical)				
Device Model(s) Tested	TK-2400-K2 (0418 Identical Prototype)				
Hardware / Firmware Revision No.s	Hardware	1	Firmware	1.0	
Date of Sample Receipt	Aug. 16, 2012		Date(s) of SAR Measurements	Aug. 22-28 & Oct. 3, 2012	
Device Description	Portable FM VHF Push-To-Talk (PTT) Radio Transceiver				
Transmit Frequency Range	FCC	150.8 - 173.4 MHz			
Manuf. Rated Output Power	2 Watts Conducted		Manuf. Tolerance Specification	+ 0 dB	
Antenna Type(s) Tested	See manufacturer's accessory listing (Section 7.0)				
Battery Type(s) Tested	Li-ion	7.4 V	2000 mAh	P/N: KNB-45L	a
	Ni-MH	7.2 V	1500 mAh	P/N: KNB-29N	b
Body-worn Accessories Tested	Belt-Clip (contains metal)			P/N: KBH-10	1
Audio Accessories Tested	See manufacturer's accessory listing (Section 7.0)				
Max. SAR Level(s) Evaluated	Face-held	0.710 W/kg	1g	50% PTT duty cycle	Occupational / Controlled Exposure
	Body-worn	1.51 W/kg	1g	50% PTT duty cycle	Occupational / Controlled Exposure
FCC/IC Spatial Peak SAR Limit	Head/Body	8.0 W/kg	1g	50% PTT duty cycle	Occupational / Controlled Exposure
<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 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), IEEE Standard 1528-2003 and IEC International Standard 62209-1:2005. 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:	Kenwood USA Corporation	FCC ID:	ALH434901	Freq:	150.8 - 173.4 MHz	KENWOOD
DUT Type:	Portable FM VHF PTT Radio Transceiver	Model(s):	TK-2400-K	TK-2400-K2		
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	<u>Date(s) of Evaluation</u> Aug 23-28, Oct3, 2012	<u>Test Report Serial No.</u> 081612ALH-T1189-S90V	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> Oct. 17, 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	Initial Release	Mike Meaker	Oct. 17, 2012

TEST REPORT SIGN-OFF

DEVICE TESTED BY	REPORT PREPARED BY	QA REVIEW BY	REPORT APPROVED BY
Mike Meaker	Cheri Frangiadakis	Mike Meaker	Mike Meaker

Applicant:	Kenwood USA Corporation	FCC ID:	ALH434901	Freq:	150.8 - 173.4 MHz	KENWOOD
DUT Type:	Portable FM VHF PTT Radio Transceiver	Model(s):	TK-2400-K	TK-2400-K2		
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1.0 INTRODUCTION

This measurement report demonstrates that the Kenwood USA Corporation Models: TK-2400-K and TK-2400-K2 Portable FM VHF PTT Radio Transceiver complies with the SAR (Specific Absorption Rate) RF exposure requirements specified in FCC 47 CFR §2.1093 (see reference [1]) for the Occupational / Controlled Exposure environment. The measurement procedures described in FCC OET Bulletin 65, Supplement C 01-01 (see reference [2]), IEEE Standard 1528-2003 (see reference [3]) and IEC Standard 62209-1:2005 (see reference [4]) 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	Test Freq.	Mode	dBm	Watts	Method
FCC	150.8 MHz	CW	33	2	Average Conducted
FCC	156.4 MHz	CW	33	2	Average Conducted
FCC	162.0 MHz	CW	33	2	Average Conducted
FCC	167.7 MHz	CW	33	2	Average Conducted
FCC	173.4 MHz	CW	33	2	Average Conducted

Notes

- The test channels were selected in accordance with the procedures specified in FCC KDB 447498 Section 6) c) (see reference [6]).
- 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 [12]).

Applicant:	Kenwood USA Corporation	FCC ID:	ALH434901	Freq:	150.8 - 173.4 MHz	KENWOOD
DUT Type:	Portable FM VHF PTT Radio Transceiver	Model(s):	TK-2400-K		TK-2400-K2	
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	Date(s) of Evaluation Aug 23-28, Oct3, 2012	Test Report Serial No. 081612ALH-T1189-S90V	Test Report Revision No. Rev. 1.0 (1st Release)	
	Test Report Issue Date Oct. 17, 2012	Description of Test(s) Specific Absorption Rate	RF Exposure Category Occupational (Controlled)	

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*			Manufacturer's Rated RF Output Power	
Exposure Conditions	P mW (General Population)	P mW (Occupational)	100% PTT Duty Cycle	50% PTT Duty Cycle
Held to face, $d \geq 2.5$ cm	250	1250	2 Watts	1 Watts
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 [6]).			1. The conducted output power level of the DUT exceeds the FCC power threshold and therefore SAR evaluation is required.	

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 \geq 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 [8]).

Probe Calibration Freq.	Device Measurement Freq.	Frequency Interval	± 25 MHz \leq 300 MHz
150 MHz	150.8 MHz	0.8 MHz	$<$ 25 MHz
	156.4 MHz	6.4 MHz	$<$ 25 MHz
	162.0 MHz	12 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.	Device Frequency Range	N_c	Test Frequencies (MHz)
1	KRA-16M	3	150.8 MHz, 156.4 MHz, 162.0 MHz
2	KRA-16M2	3	162.0 MHz, 167.7 MHz, 173.4 MHz
3	KRA-22M	3	150.8 MHz, 156.4 MHz, 162.0 MHz
4	KRA-22M2	3	162.0 MHz, 167.7 MHz, 173.4 MHz
5	KRA-26M	3	150.8 MHz, 156.4 MHz, 162.0 MHz
6	KRA-26M2	3	162.0 MHz, 167.7 MHz, 173.4 MHz
7	KRA-41M	3	150.8 MHz, 156.4 MHz, 162.0 MHz
8	KRA-41M2	3	162.0 MHz, 167.7 MHz, 173.4 MHz

Note: The number of test channels per antenna frequency range was calculated in accordance with the procedures specified in FCC KDB 447498 Section 6) c) (see reference [5]).

Applicant:	Kenwood USA Corporation	FCC ID:	ALH434901	Freq:	150.8 - 173.4 MHz	KENWOOD
DUT Type:	Portable FM VHF PTT Radio Transceiver	Model(s):	TK-2400-K		TK-2400-K2	
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7.0 MANUFACTURER'S DISCLOSED ACCESSORY LISTING

ACCESSORY CATEGORY: ANTENNA				
Accessory ID # for Test Report	Part Number	Description	SAR Evaluation	
1	KRA-16M	Detachable Stubby (150 - 162 MHz)	Yes	
2	KRA-16M2	Detachable Stubby (162 - 174 MHz)	Yes	
3	KRA-22M	Detachable Helical LP (146-162 MHz)	Yes	
4	KRA-22M2	Detachable Helical LP (162 - 174MHz)	Yes	
5	KRA-26M	Detachable Helical (146 - 162 MHz)	Yes	
6	KRA-26M2	Detachable Helical (162 - 174 MHz)	Yes	
7	KRA-41M	Detachable Stubby (146 - 162 MHz)	Yes	
8	KRA-41M2	Detachable Stubby (162 - 174 MHz)	Yes	
ACCESSORY CATEGORY: BATTERY				
Accessory ID # for Test Report	Part Number	Description	SAR Evaluation	
a	KNB-45L	Li-ion (7.4V, 2000mAh)	Yes	
b	KNB-29N	Ni-MH (7.2V, 1500mAh)	Yes	
c	KNB-53N	Ni-MH (7.2V, 1400mAh)	No ¹	
ACCESSORY CATEGORY: BODY-WORN				
Accessory ID # for Test Report	Part Number	Description	SAR Evaluation	
1	KBH-10	Belt-clip (contains metal)	Yes	
ACCESSORY CATEGORY: AUDIO				
Accessory ID # for Test Report	Part Number	Description	Audio Accessory Grouping	SAR Evaluation
G1a	KMC-21	Compact Speaker-Mic	Group 1 (Speaker-mic)	Yes
G1b	KMC-45	Heavy Duty Speaker-Mic		No ²
G1c	KMC-48GPS	GPS Speaker-Mic		No ²
G2b	KHS-7	Single Muff Headset	Group 2 (Headset)	No ²
G2c	KHS-7A	Single Muff Headset w/ PTT		No ²
G2d	KHS-21	Lightweight Headset		No ²
G2e	KHS-22	Behind-the-Head Headset w/ PTT		Yes
G3a	KHS-10-BH	Heavy-duty Headset - Behind the head	Group 3 (Heavy-duty Headset)	Yes
G3b	KHS-10-OH	Heavy-duty Headset - Over the head		No ²
G4a	KHS-23	2-Wire Ear-Bud w/ mic/PTT	Group 4 (Earpiece)	No ²
G4b	KHS-25	D-Ring Ear Headset		Yes
G4c	KHS-26	Earbud In-line Headset		No ²
G4d	KHS-27	D-Ring In-line PTT Headset		No ²
G5a	KHS-8BE/BL	2-Wire Palm Mic w/ Earphone	Group 5 (Palm-Mic)	No ²
G5b	KHS-9BE/BL	3-Wire Lapel Microphone w/ Earpiece		Yes

Manufacturer's disclosed accessory listing information provided by Kenwood USA Corporation

Notes:

- KNB-53N battery pack is identical in construction to KNB-29N.
- Audio accessories not evaluated for SAR in accordance with the procedures and provisions of FCC KDB 643646 D01v01r01 Page 10 Section 1).

Applicant:	Kenwood USA Corporation	FCC ID:	ALH434901	Freq:	150.8 - 173.4 MHz	KENWOOD
DUT Type:	Portable FM VHF PTT Radio Transceiver	Model(s):	TK-2400-K		TK-2400-K2	
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8.0 FLUID DIELECTRIC PARAMETERS

FLUID DIELECTRIC PARAMETERS						
Date: 08/22/2012		Frequency: 300 MHz			Tissue: Head	
Freq	Test_e	Test_s	Target_e	Target_s	Deviation Permittivity	Deviation Conductivity
0.200	50.43	0.78	45.3	0.87	11.32%	-10.34%
0.210	51.02	0.79	45.3	0.87	12.63%	-9.20%
0.220	50.3	0.81	45.3	0.87	11.04%	-6.90%
0.230	49.83	0.81	45.3	0.87	10.00%	-6.90%
0.240	48.69	0.83	45.3	0.87	7.48%	-4.60%
0.250	47.81	0.83	45.3	0.87	5.54%	-4.60%
0.260	47.41	0.83	45.3	0.87	4.66%	-4.60%
0.270	47.5	0.83	45.3	0.87	4.86%	-4.60%
0.280	47.51	0.85	45.3	0.87	4.88%	-2.30%
0.290	45.85	0.87	45.3	0.87	1.21%	0.00%
0.300	46.38	0.89	45.3	0.87	2.38%	2.30%
0.310	45.47	0.9	45.3	0.87	0.38%	3.45%
0.320	45.49	0.89	45.3	0.87	0.42%	2.30%
0.330	45.36	0.91	45.3	0.87	0.13%	4.60%
0.340	44.59	0.9	45.3	0.87	-1.57%	3.45%
0.350	44.16	0.91	45.3	0.87	-2.52%	4.60%
0.360	43.99	0.91	45.3	0.87	-2.89%	4.60%
0.370	43.91	0.91	45.3	0.87	-3.07%	4.60%
0.380	43.77	0.95	45.3	0.87	-3.38%	9.20%
0.390	43.52	0.93	45.3	0.87	-3.93%	6.90%
0.400	43.65	0.95	45.3	0.87	-3.64%	9.20%

Test Date	Fluid Type	Ambient Temperature	Fluid Temperature	Fluid Depth	Atmospheric Pressure	Relative Humidity	ρ (Kg/m ³)
Aug 22	300 Head	24.0°C	22.0°C	≥ 15 cm	101.1 kPa	32	1000

FLUID DIELECTRIC PARAMETERS						
Date: 08/23&24/2012		Frequency: 150 MHz			Tissue: Head	
Freq	Test e	Test s	Target e	Target s	Deviation Permittivity	Deviation Conductivity
0.050	86.28	0.68	52.3	0.76	64.97%	-10.53%
0.060	80.12	0.67	52.3	0.76	53.19%	-11.84%
0.070	67.81	0.69	52.3	0.76	29.66%	-9.21%
0.080	68.92	0.69	52.3	0.76	31.78%	-9.21%
0.090	62.04	0.7	52.3	0.76	18.62%	-7.89%
0.100	60.72	0.71	52.3	0.76	16.10%	-6.58%
0.110	57.62	0.73	52.3	0.76	10.17%	-3.95%
0.120	54.73	0.74	52.3	0.76	4.65%	-2.63%
0.130	56.69	0.73	52.3	0.76	8.39%	-3.95%
0.140	54.92	0.74	52.3	0.76	5.01%	-2.63%
0.150	54.16	0.75	52.3	0.76	3.56%	-1.32%
0.1564*	53.9	0.75	52.3	0.76	3.06%	-1.32%
0.160	53.73	0.75	52.3	0.76	2.73%	-1.32%
0.1677*	52.5	0.765	52.3	0.76	0.38%	0.66%
0.170	52.24	0.77	52.3	0.76	-0.11%	1.32%
0.180	52.18	0.78	52.3	0.76	-0.23%	2.63%
0.190	50.58	0.78	52.3	0.76	-3.29%	2.63%
0.200	50.44	0.78	52.3	0.76	-3.56%	2.63%
0.210	49.94	0.79	52.3	0.76	-4.51%	3.95%
0.220	48.59	0.8	52.3	0.76	-7.09%	5.26%
0.230	49.19	0.81	52.3	0.76	-5.95%	6.58%
0.240	49.32	0.82	52.3	0.76	-5.70%	7.89%
0.250	48.6	0.84	52.3	0.76	-7.07%	10.53%

*interpolated using DASY4 software

Test Date	Fluid Type	Ambient Temperature	Fluid Temperature	Fluid Depth	Atmospheric Pressure	Relative Humidity	ρ (Kg/m ³)
Aug 23	150 Head	23.0°C	22.0°C	≥ 15 cm	101.1 kPa	34	1000
Aug 24	150 Head	23.0°C	22.0°C	≥ 15 cm	101.1 kPa	34	1000

FLUID DIELECTRIC PARAMETERS						
Date: 08/23/2012		Frequency: 150 MHz			Tissue: Body	
Freq	Test e	Test s	Target e	Target s	Deviation Permittivity	Deviation Conductivity
0.050	91.38	0.71	61.9	0.8	47.63%	-11.25%
0.060	87.63	0.7	61.9	0.8	41.57%	-12.50%
0.070	77.05	0.73	61.9	0.8	24.47%	-8.75%
0.080	78.83	0.71	61.9	0.8	27.35%	-11.25%
0.090	70.53	0.72	61.9	0.8	13.94%	-10.00%
0.100	70.31	0.72	61.9	0.8	13.59%	-10.00%
0.110	66.92	0.73	61.9	0.8	8.11%	-8.75%
0.120	67.22	0.75	61.9	0.8	8.59%	-6.25%
0.130	65.58	0.74	61.9	0.8	5.95%	-7.50%
0.140	64.88	0.74	61.9	0.8	4.81%	-7.50%
0.150	63.77	0.75	61.9	0.8	3.02%	-6.25%
0.1564*	64.1	0.75	61.9	0.8	3.55%	-6.25%
0.160	64.35	0.75	61.9	0.8	3.96%	-6.25%
0.1677*	62.4	0.758	61.9	0.8	0.81%	-5.25%
0.170	61.81	0.76	61.9	0.8	-0.15%	-5.00%
0.180	62.14	0.78	61.9	0.8	0.39%	-2.50%
0.190	60.59	0.78	61.9	0.8	-2.12%	-2.50%
0.200	60.7	0.78	61.9	0.8	-1.94%	-2.50%
0.210	60.38	0.8	61.9	0.8	-2.46%	0.00%
0.220	59.41	0.79	61.9	0.8	-4.02%	-1.25%
0.230	60.35	0.8	61.9	0.8	-2.50%	0.00%
0.240	59.91	0.81	61.9	0.8	-3.21%	1.25%
0.250	58.96	0.81	61.9	0.8	-4.75%	1.25%

*interpolated using DASY4 software

Test Date	Fluid Type	Ambient Temperature	Fluid Temperature	Fluid Depth	Atmospheric Pressure	Relative Humidity	ρ (Kg/m ³)
Aug 23	150 Body	23.0°C	23.0°C	≥ 15 cm	101.1 kPa	34	1000

FLUID DIELECTRIC PARAMETERS						
Date: 08/27/2012		Frequency: 300 MHz			Tissue: Head	
Freq	Test_e	Test_s	Target_e	Target_s	Deviation Permittivity	Deviation Conductivity
0.200	51.13	0.78	45.3	0.87	12.87%	-10.34%
0.210	51.04	0.79	45.3	0.87	12.67%	-9.20%
0.220	50.58	0.81	45.3	0.87	11.66%	-6.90%
0.230	49.11	0.8	45.3	0.87	8.41%	-8.05%
0.240	48.94	0.83	45.3	0.87	8.04%	-4.60%
0.250	47.36	0.82	45.3	0.87	4.55%	-5.75%
0.260	47.42	0.82	45.3	0.87	4.68%	-5.75%
0.270	47.54	0.82	45.3	0.87	4.94%	-5.75%
0.280	45.72	0.86	45.3	0.87	0.93%	-1.15%
0.290	45.74	0.87	45.3	0.87	0.97%	0.00%
0.300	45.26	0.87	45.3	0.87	-0.09%	0.00%
0.310	45.68	0.89	45.3	0.87	0.84%	2.30%
0.320	45.02	0.88	45.3	0.87	-0.62%	1.15%
0.330	44.75	0.9	45.3	0.87	-1.21%	3.45%
0.340	43.72	0.91	45.3	0.87	-3.49%	4.60%
0.350	45.06	0.9	45.3	0.87	-0.53%	3.45%
0.360	43.74	0.92	45.3	0.87	-3.44%	5.75%
0.370	43.66	0.91	45.3	0.87	-3.62%	4.60%
0.380	44.11	0.93	45.3	0.87	-2.63%	6.90%
0.390	42.91	0.95	45.3	0.87	-5.28%	9.20%
0.400	43.09	0.95	45.3	0.87	-4.88%	9.20%

Test Date	Fluid Type	Ambient Temperature	Fluid Temperature	Fluid Depth	Atmospheric Pressure	Relative Humidity	ρ (Kg/m ³)
Aug 27	300 Head	24.0°C	24.0°C	≥ 15 cm	101.1 kPa	30	1000

FLUID DIELECTRIC PARAMETERS						
Date: 08/27/2012		Frequency: 150 MHz			Tissue: Head	
Freq	Test_e	Test_s	Target_e	Target_s	Deviation Permittivity	Deviation Conductivity
0.050	91.88	0.66	52.3	0.76	75.68%	-13.16%
0.060	74.06	0.69	52.3	0.76	41.61%	-9.21%
0.070	73.89	0.67	52.3	0.76	41.28%	-11.84%
0.080	65.4	0.7	52.3	0.76	25.05%	-7.89%
0.090	58.66	0.7	52.3	0.76	12.16%	-7.89%
0.100	62.2	0.72	52.3	0.76	18.93%	-5.26%
0.110	54.9	0.71	52.3	0.76	4.97%	-6.58%
0.120	57.36	0.72	52.3	0.76	9.67%	-5.26%
0.130	57.25	0.71	52.3	0.76	9.46%	-6.58%
0.140	55.76	0.73	52.3	0.76	6.62%	-3.95%
0.150	54.89	0.76	52.3	0.76	4.95%	0.00%
0.1564*	53.7	0.754	52.3	0.76	2.68%	-0.79%
0.160	53.04	0.75	52.3	0.76	1.41%	-1.32%
0.1677*	52.7	0.781	52.3	0.76	0.76%	2.76%
0.170	52.54	0.79	52.3	0.76	0.46%	3.95%
0.180	53.55	0.77	52.3	0.76	2.39%	1.32%
0.190	50.42	0.78	52.3	0.76	-3.59%	2.63%
0.200	51.83	0.79	52.3	0.76	-0.90%	3.95%
0.210	50.48	0.79	52.3	0.76	-3.48%	3.95%
0.220	49.89	0.81	52.3	0.76	-4.61%	6.58%
0.230	49.73	0.82	52.3	0.76	-4.91%	7.89%
0.240	48.82	0.82	52.3	0.76	-6.65%	7.89%
0.250	49.75	0.83	52.3	0.76	-4.88%	9.21%

*interpolated using DASY4 software

Test Date	Fluid Type	Ambient Temperature	Fluid Temperature	Fluid Depth	Atmospheric Pressure	Relative Humidity	ρ (Kg/m ³)
Aug 27	150 Head	24.0°C	24.0°C	≥ 15 cm	101.1 kPa	30	1000

FLUID DIELECTRIC PARAMETERS						
Date: 08/27&28/2012		Frequency: 150 MHz			Tissue: Body	
Freq	Test_e	Test_s	Target_e	Target_s	Deviation Permittivity	Deviation Conductivity
0.050	98.21	0.7	61.9	0.8	58.66%	-12.50%
0.060	80.21	0.73	61.9	0.8	29.58%	-8.75%
0.070	89.34	0.72	61.9	0.8	44.33%	-10.00%
0.080	74.93	0.69	61.9	0.8	21.05%	-13.75%
0.090	69.01	0.73	61.9	0.8	11.49%	-8.75%
0.100	70.01	0.72	61.9	0.8	13.10%	-10.00%
0.110	70.26	0.75	61.9	0.8	13.51%	-6.25%
0.120	66.22	0.76	61.9	0.8	6.98%	-5.00%
0.130	58.97	0.73	61.9	0.8	-4.73%	-8.75%
0.140	63.8	0.76	61.9	0.8	3.07%	-5.00%
0.150	64.22	0.77	61.9	0.8	3.75%	-3.75%
0.1564*	62.2	0.776	61.9	0.8	0.48%	-3.00%
0.160	61.11	0.78	61.9	0.8	-1.28%	-2.50%
0.1677*	61.5	0.788	61.9	0.8	-0.65%	-1.50%
0.170	61.56	0.79	61.9	0.8	-0.55%	-1.25%
0.180	60.02	0.77	61.9	0.8	-3.04%	-3.75%
0.190	60.96	0.78	61.9	0.8	-1.52%	-2.50%
0.200	61.43	0.81	61.9	0.8	-0.76%	1.25%
0.210	60.74	0.8	61.9	0.8	-1.87%	0.00%
0.220	58.65	0.82	61.9	0.8	-5.25%	2.50%
0.230	58.74	0.82	61.9	0.8	-5.11%	2.50%
0.240	58.07	0.82	61.9	0.8	-6.19%	2.50%
0.250	59.72	0.81	61.9	0.8	-3.52%	1.25%

*interpolated using DASY4 software

Test Date	Fluid Type	Ambient Temperature	Fluid Temperature	Fluid Depth	Atmospheric Pressure	Relative Humidity	ρ (Kg/m ³)
Aug 27	150 Body	24.0°C	23.8°C	≥ 15 cm	101.1 kPa	30	1000
Aug 28	150 Body	24.0°C	23.8°C	≥ 15 cm	101.1 kPa	32	1000

FLUID DIELECTRIC PARAMETERS						
Date: 10/02/2012		Frequency: 300 MHz			Tissue: Head	
Freq	Test_e	Test_s	Target_e	Target_s	Deviation Permittivity	Deviation Conductivity
0.200	49.2	0.73	45.3	0.87	8.61%	-16.09%
0.210	50.18	0.75	45.3	0.87	10.77%	-13.79%
0.220	49.79	0.75	45.3	0.87	9.91%	-13.79%
0.230	48.05	0.78	45.3	0.87	6.07%	-10.34%
0.240	48.9	0.78	45.3	0.87	7.95%	-10.34%
0.250	47.75	0.79	45.3	0.87	5.41%	-9.20%
0.260	48.02	0.8	45.3	0.87	6.00%	-8.05%
0.270	47.77	0.8	45.3	0.87	5.45%	-8.05%
0.280	46.97	0.8	45.3	0.87	3.69%	-8.05%
0.290	46.15	0.83	45.3	0.87	1.88%	-4.60%
0.300	46.77	0.83	45.3	0.87	3.25%	-4.60%
0.310	45.24	0.84	45.3	0.87	-0.13%	-3.45%
0.320	44.77	0.84	45.3	0.87	-1.17%	-3.45%
0.330	44.1	0.86	45.3	0.87	-2.65%	-1.15%
0.340	44.98	0.87	45.3	0.87	-0.71%	0.00%
0.350	44.13	0.87	45.3	0.87	-2.58%	0.00%
0.360	43.43	0.89	45.3	0.87	-4.13%	2.30%
0.370	43.27	0.89	45.3	0.87	-4.48%	2.30%
0.380	43.66	0.9	45.3	0.87	-3.62%	3.45%
0.390	43.22	0.9	45.3	0.87	-4.59%	3.45%
0.400	42.81	0.92	45.3	0.87	-5.50%	5.75%

Test Date	Fluid Type	Ambient Temperature	Fluid Temperature	Fluid Depth	Atmospheric Pressure	Relative Humidity	ρ (Kg/m ³)
Oct 2	300 Head	22.0°C	21.6°C	≥ 15 cm	101.1 kPa	30	1000

FLUID DIELECTRIC PARAMETERS						
Date: 10/03/2012		Frequency: 150 MHz			Tissue: Head	
Freq	Test e	Test s	Target e	Target s	Deviation Permittivity	Deviation Conductivity
0.050	103.11	0.69	52.3	0.76	97.15%	-9.21%
0.060	82.08	0.69	52.3	0.76	56.94%	-9.21%
0.070	83.17	0.7	52.3	0.76	59.02%	-7.89%
0.080	64.5	0.73	52.3	0.76	23.33%	-3.95%
0.090	64.27	0.73	52.3	0.76	22.89%	-3.95%
0.100	60.77	0.73	52.3	0.76	16.20%	-3.95%
0.110	57.39	0.73	52.3	0.76	9.73%	-3.95%
0.120	59.09	0.75	52.3	0.76	12.98%	-1.32%
0.130	53.61	0.78	52.3	0.76	2.50%	2.63%
0.140	55.06	0.77	52.3	0.76	5.28%	1.32%
0.150	53.65	0.76	52.3	0.76	2.58%	0.00%
0.1564*	54.6	0.773	52.3	0.76	4.40%	1.71%
0.160	55.09	0.78	52.3	0.76	5.33%	2.63%
0.1677*	54.4	0.795	52.3	0.76	4.02%	4.61%
0.170	54.17	0.8	52.3	0.76	3.58%	5.26%
0.180	53.78	0.8	52.3	0.76	2.83%	5.26%
0.190	53.27	0.8	52.3	0.76	1.85%	5.26%
0.200	52.77	0.81	52.3	0.76	0.90%	6.58%
0.210	50.68	0.8	52.3	0.76	-3.10%	5.26%
0.220	51.82	0.82	52.3	0.76	-0.92%	7.89%
0.230	49.87	0.85	52.3	0.76	-4.65%	11.84%
0.240	50.36	0.84	52.3	0.76	-3.71%	10.53%
0.250	49.63	0.83	52.3	0.76	-5.11%	9.21%

*interpolated using DASY4 software

Test Date	Fluid Type	Ambient Temperature	Fluid Temperature	Fluid Depth	Atmospheric Pressure	Relative Humidity	ρ (Kg/m ³)
Oct 3	150 Head	22.0°C	22.9°C	≥ 15 cm	101.1 kPa	30	1000



FLUID DIELECTRIC PARAMETERS						
Date: 10/03/2012		Frequency: 150 MHz			Tissue: Body	
Freq	Test e	Test s	Target e	Target s	Deviation Permittivity	Deviation Conductivity
0.050	111.24	0.69	61.9	0.8	79.71%	-13.75%
0.060	90.29	0.71	61.9	0.8	45.86%	-11.25%
0.070	88.35	0.71	61.9	0.8	42.73%	-11.25%
0.080	73.21	0.75	61.9	0.8	18.27%	-6.25%
0.090	73.23	0.74	61.9	0.8	18.30%	-7.50%
0.100	67.32	0.74	61.9	0.8	8.76%	-7.50%
0.110	63.66	0.74	61.9	0.8	2.84%	-7.50%
0.120	64.81	0.76	61.9	0.8	4.70%	-5.00%
0.130	62.74	0.77	61.9	0.8	1.36%	-3.75%
0.140	64.88	0.77	61.9	0.8	4.81%	-3.75%
0.150	61.45	0.76	61.9	0.8	-0.73%	-5.00%
0.1564*	63.1	0.766	61.9	0.8	1.94%	-4.25%
0.160	63.98	0.77	61.9	0.8	3.36%	-3.75%
0.1677*	62.4	0.778	61.9	0.8	0.81%	-2.75%
0.170	61.9	0.78	61.9	0.8	0.00%	-2.50%
0.180	62.03	0.77	61.9	0.8	0.21%	-3.75%
0.190	62.41	0.78	61.9	0.8	0.82%	-2.50%
0.200	61.7	0.8	61.9	0.8	-0.32%	0.00%
0.210	59.86	0.8	61.9	0.8	-3.30%	0.00%
0.220	60.66	0.8	61.9	0.8	-2.00%	0.00%
0.230	59.1	0.82	61.9	0.8	-4.52%	2.50%
0.240	59.69	0.81	61.9	0.8	-3.57%	1.25%
0.250	58.49	0.81	61.9	0.8	-5.51%	1.25%

*interpolated using DASY4 software

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

9.0 SAR MEASUREMENT SUMMARY



Table 1				FACE-HELD SAR EVALUATION RESULTS															
C	Test Dates: Aug. 23, 24, 27, & Oct. 3, 2012			1		2		3		4		5		6		7		8	
R	Antenna Part No.	Test Freq. (MHz)	Cond. Pwr (W)	SAR W/kg 1g						SAR W/kg 1g									
				Default Battery (a)						Battery (b)									
				100% ptt d/f		50% ptt d/f		Drift (dB)		50%+droop		100% ptt d/f		50% ptt d/f		Drift dB		50%+droop	
1	ANT. 1 KRA-16M	150.8	2	N/A						N/A									
2		156.4	2	F1	1.00	0.500	0.058	0.500	N/A										
3		162.0	2	N/A						N/A									
4	ANT. 2 KRA-16M2	162.0	2	N/A						N/A									
5		167.7	2	F2	1.41	0.705	-0.128	0.726	N/A										
6		173.4	2	N/A						N/A									
7	ANT. 3 KRA-22M	150.8	2	N/A						N/A									
8		156.4	2	F3	0.496	0.248	-0.355	0.269	N/A										
9		162.0	2	N/A						N/A									
10	ANT. 4 KRA-22M2	162.0	2	N/A						N/A									
11		167.7	2	F4	0.605	0.303	-0.401	0.332	N/A										
12		173.4	2	N/A						N/A									
14	ANT. 5 KRA-26M	150.8	2	N/A						N/A									
15		156.4	2	F5	1.42	0.710	-0.201	0.744	F9	1.37	0.685	-0.301	0.734						
16		162.0	2	N/A						N/A									
17	ANT. 6 KRA-26M2	162.0	2	N/A						N/A									
18		167.7	2	F6	1.11	0.555	-0.386	0.607	N/A										
19		173.4	2	N/A						N/A									
20	ANT. 7 KRA-41M	150.8	2	N/A						N/A									
21		156.4	2	F7	1.04	0.520	0.073	0.520	N/A										
22		162.0	2	N/A						N/A									
23	ANT. 8 KRA-41M2	162.0	2	N/A						N/A									
24		167.7	2	F8	1.39	0.695	-0.344	0.752	N/A										
25		173.4	2	N/A						N/A									
SAR LIMITS				HEAD				SPATIAL PEAK				RF EXPOSURE CATEGORY							
FCC 47 CFR 2.1093				8.0 W/kg				1g averaging				Occupational / Controlled							
Notes																			
Test Mode = CW (Unmodulated Continuous Wave)						Phantom = Side Planar Phantom													
Front of DUT Distance to Planar Phantom (Front of DUT Parallel to Planar Phantom) (see Appendix D)				Shortest Antenna Distance to Planar Phantom (see Appendix D)															
2.5 cm				1		2		3		4		5		6		7		8	
				3.0		3.0		3.0		3.0		3.0		3.0		3.0		3.0	
C = Column; R = Row				F1-Fx (F = Face) denotes the corresponding Face SAR Plot # as shown in Appendix A															

	<u>Date(s) of Evaluation</u> Aug 23-28, Oct3, 2012	<u>Test Report Serial No.</u> 081612ALH-T1189-S90V	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> Oct. 17, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

Test Procedures applied in accordance with FCC KDB 643646 D01v01 (see reference [7])
1. For face-held configuration, the highest capacity battery was selected as the default battery (battery "a").
2. The SAR evaluations commenced at the highest output power channel per antenna and frequency range.
3. When the head SAR of an antenna tested on the highest output power channel using the default battery is ≤ 3.5 W/kg (50% PTT duty factor), testing of all other required channels is not necessary.
4. When the SAR for all antennas tested using the default battery is ≤ 4.0 W/kg, test additional batteries using the antenna and channel configuration that resulted in the highest SAR.
5. When test reduction applies, the slots for such configurations are denoted with N/A (Not Applicable).

Applicant: Kenwood USA Corporation	FCC ID: ALH434901	Freq: 150.8 - 173.4 MHz	KENWOOD
DUT Type: Portable FM VHF PTT Radio Transceiver	Model(s): TK-2400-K	TK-2400-K2	
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Table 2				BODY-WORN SAR EVALUATION RESULTS															
C	Test Dates: Aug. 23, 27, 28 & Oct. 3, 2012			1	2	3	4	5	6	7	8								
R	Antenna Part No.	Test Freq. (MHz)	Cond. Pwr (W)	SAR W/kg 1g					SAR W/kg 1g										
				Default Battery (a)					Battery (b)										
				Default Body-worn Acc. (1)					Default Body-worn Acc. (1)										
				Default Audio Acc. (G1a)					Default Audio Acc. (G1a)										
				100% ptt d/f	50% ptt d/f	Drift (dB)	50%+droop	100% ptt d/f	50% ptt d/f	Drift dB	50%+droop								
1	ANT. 1 KRA-16M	150.8	2	N/A					N/A										
2		156.4	2	B1	2.23	1.12	-0.115	1.15	N/A										
3		162.0	2	N/A					N/A										
4	ANT. 2 KRA-16M2	162.0	2	N/A					N/A										
5		167.7	2	B2	1.45	0.725	-0.444	0.803	N/A										
6		173.4	2	N/A					N/A										
7	ANT. 3 KRA-22M	150.8	2	N/A					N/A										
8		156.4	2	B3	0.630	0.315	-0.232	0.332	N/A										
9		162.0	2	N/A					N/A										
10	ANT. 4 KRA-22M2	162.0	2	N/A					N/A										
11		167.7	2	B4	0.676	0.338	-0.050	0.342	N/A										
12		173.4	2	N/A					N/A										
14	ANT. 5 KRA-26M	150.8	2	N/A					N/A										
15		156.4	2	B5	3.02	1.51	-0.111	1.55	B9	1.82	0.910	-0.299	0.975						
16		162.0	2	N/A					N/A										
17	ANT. 6 KRA-26M2	162.0	2	N/A					N/A										
18		167.7	2	B6	0.885	0.443	-0.103	0.453	N/A										
19		173.4	2	N/A					N/A										
20	ANT. 7 KRA-41M	150.8	2	N/A					N/A										
21		156.4	2	B7	1.39	0.695	-0.032	0.700	N/A										
22		162.0	2	N/A					N/A										
23	ANT. 8 KRA-41M2	162.0	2	N/A					N/A										
24		167.7	2	B8	1.89	0.945	-0.208	0.991	N/A										
25		173.4	2	N/A					N/A										
SAR LIMITS				BODY				SPATIAL PEAK				RF EXPOSURE CATEGORY							
FCC 47 CFR 2.1093				Health Canada Safety Code 6				8.0 W/kg				1g averaging				Occupational / Controlled			
Notes																			
Test Mode = CW (Unmodulated Continuous Wave)							Phantom = Side Planar Phantom												
DUT Spacing to Planar Phantom per Battery (see Appendix D)				Shortest Antenna Distance to Planar Phantom (see Appendix D)															
Battery (a)		Battery (b)		1	2	3	4	5	6	7	8								
1.2 cm		1.2 cm		3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1								
C = Column; R = Row				B1-Bx (B = Body) denotes the corresponding Body SAR Plot # as shown in Appendix A															

	<u>Date(s) of Evaluation</u> Aug 23-28, Oct3, 2012	<u>Test Report Serial No.</u> 081612ALH-T1189-S90V	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> Oct. 17, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

Test Procedures applied in accordance with FCC KDB 643646 D01v01 (see reference [7])
1. For body-worn configuration, the thinnest standard battery was selected as the default battery (battery "a"). (Both batteries are the same thickness)
2. The SAR evaluations commenced at the highest output power channel per antenna and frequency range.
3. When the head SAR of an antenna tested on the highest output power channel using the default battery is ≤ 3.5 W/kg (50% PTT duty factor), testing of all other required channels is not necessary.
4. When the SAR for all antennas tested using the default battery is ≤ 4.0 W/kg, test additional batteries using the antenna and channel configuration that resulted in the highest SAR.
5. Audio accessory (G1a) was selected as the default audio accessory based on preliminary evaluations with the most conservative SAR.
6. When test reduction applies, the slots for such configurations are denoted with N/A (Not Applicable).

Applicant:	Kenwood USA Corporation	FCC ID:	ALH434901	Freq:	150.8 - 173.4 MHz	KENWOOD
DUT Type:	Portable FM VHF PTT Radio Transceiver	Model(s):	TK-2400-K	TK-2400-K2		
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TABLE 3		ADDITIONAL AUDIO ACC'S SAR EVALUATION RESULTS						
C	Test Date(s): Aug. 27 & 28, 2012					1	2	
R	Antenna P/N (Freq. Range)	Audio Accessory Grouping	Audio Accessory ID	Test Frequency (MHz)	Conducted Power (W)	1g SAR (W/kg)		
						Battery (a)		
						Body-worn Acc. (1)		
						Plot #	100% ptt d/f SAR Drift dB	50% ptt d/f 50%+droop
1	ANT. 5 KRA-26M	G2	G2e	156.4	2	A1	2.27	1.14
2							-0.211	1.19
3		G3	G3a	156.4	2	A2	2.23	1.12
4							-0.054	1.13
5		G4	G4b	156.4	2	A3	2.17	1.09
6							0.369	1.09
7		G5	G5b	156.4	2	A4	2.13	1.07
8							-0.206	1.12
SAR LIMITS			BODY	SPATIAL PEAK		RF EXPOSURE CATEGORY		
FCC 47 CFR 2.1093			8.0 W/kg	1g average		Occupational / Controlled		
Notes								
Test Mode = CW (Unmodulated Continuous Wave)					DUT Distance to Phantom		Antenna Distance to Phantom	
Phantom = Barski Planar Phantom					1.2 cm		3.1 cm	
C = Column; R = Row								
Audio accessories do not contain any built-in radiating element								

Applicant:	Kenwood USA Corporation	FCC ID:	ALH434901	Freq:	150.8 - 173.4 MHz	KENWOOD
DUT Type:	Portable FM VHF PTT Radio Transceiver	Model(s):	TK-2400-K	TK-2400-K2		
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10.0 SAR LEVEL ADJUSTMENT FOR FLUID SENSITIVITY

The measured fluid dielectric properties for 150 MHz body tissue simulant were outside the 5% measurement protocol tolerance as reported in the table below.

Due to lack of sensitivity values for 150 MHz fluid in Chapter 22 of the SAR system manufacturer's DASY4 Manual, the calculation prescribed in IEC 62209-2:2010 were used. (see reference [5])

$$\Delta\text{SAR} = C_e * \Delta E + C_\sigma * \Delta\sigma$$

Measured Fluid Parameters:

Test Date	Freq (GHz)	Test e	Test s	Target e	Target s	Deviation Permittivity	Deviation Conductivity
Aug 23	0.1564*	64.1	0.75	61.9	0.8	3.55%	-6.25%
Aug 23	0.1677*	62.4	0.758	61.9	0.8	0.81%	-5.25%

*interpolated using DASY4 software

Calculations as per IEC 62209-2:



Frequency (GHz)	0.1564	0.1677
Ce	-0.2067	-0.2069
Cσ	0.7855	0.7855
Δ E	3.55%	0.81%
Δσ	-6.25%	-5.25%
ΔSAR	-5.64%	-4.29%

Since the calculated change in SAR is a negative value, the measured SAR value is adjusted.

$$\text{Adjusted SAR} = \text{SAR} * \Delta\text{SAR}$$

Plot #	Measured SAR	Adjusted SAR
B1	1.12	1.18
B3	0.315	0.333
B4	0.338	0.353
B5	1.51	1.60
B6	0.443	0.462



Applicant:	Kenwood USA Corporation	FCC ID:	ALH434901	Freq:	150.8 - 173.4 MHz	KENWOOD
DUT Type:	Portable FM VHF PTT Radio Transceiver	Model(s):	TK-2400-K		TK-2400-K2	
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11.0 SAR TEST REDUCTION PROCEDURES APPLIED (FCC KDB 643646)

- a. Face-held Configuration - Default Battery Selection per FCC KDB 643646, Page 2, Section 1) A): *"When multiple standard batteries are supplied with a radio, the battery with the highest capacity is considered the default battery for making head SAR measurements."*
- b. Body-worn Configuration - Default Battery and Body-worn Accessory Selection per FCC KDB 643646, Page 5, Section 1) A): *"Start by testing a PTT radio with the thinnest battery and a standard (default) body-worn accessory that are both supplied with the radio and, if applicable, a default audio accessory....."*
- c. Body-worn Configuration - Default Audio Accessory Selection - According to the manufacturer, the radio is not supplied to the end user with a standard default audio accessory (as referenced in FCC KDB 643646, Page 4, Section "Body SAR Test Considerations for Body-worn Accessories"); therefore the procedures described in note (f) below were applied in order to establish the default audio accessory.
- d. Body-worn Configuration - Selection of Remaining Default Audio Accessories by Category - the Remaining Default Audio Accessories by Category were selected based on the guidance provided in FCC KDB 643646, Section "Body SAR Test Considerations for Audio Accessories without Built-in Antenna", Page 10: *"For audio accessories with similar construction and operating requirements, test only the audio accessory within the group that is expected to result in the highest SAR, with respect to changes in RF characteristics and exposure conditions for the combination. If it is unclear which audio accessory within a group of similar accessories is expected to result in the highest SAR, good engineering judgment and preliminary testing should be applied to select the accessory that is expected to result in the highest SAR."* Please refer to note (i) below for the procedure implemented to establish the Default Audio Accessory by Category (Grouping). The Remaining Default Audio Accessories by Category were evaluated on the highest SAR channel and antenna combination from the Default Audio Accessory
- e. Body-worn Configuration - Selection of Additional Audio Accessories by Category - the Additional Audio Accessories by Category were selected based on the guidance provided in FCC KDB 643646, Section "Body SAR Test Considerations for Audio Accessories without Built-in Antenna", Page 10.
- f. According to the manufacturer, all the optional audio accessories can be used with any accessory combination (antenna, battery & body-worn accessory). Therefore, in order to determine the default audio accessory (in accordance with FCC KDB 643646, Page 4, footnote 8), preliminary SAR evaluations (area scans with belt-clip and thinnest battery) were performed by Celltech with all of the optional audio accessories connected to the radio consecutively in order to select the audio accessory expected to result in the highest SAR level for the final compliance evaluations.

Applicant:	Kenwood USA Corporation	FCC ID:	ALH434901	Freq:	150.8 - 173.4 MHz	KENWOOD
DUT Type:	Portable FM VHF PTT Radio Transceiver	Model(s):	TK-2400-K	TK-2400-K2		
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12.0 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 [6]).
- The DUT was evaluated for SAR in accordance with the procedures described in FCC KDB 643646 D01v01 (see reference [7]).
- Each SAR evaluation was performed with a fully charged battery.
- The SAR droop 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 was measured prior to and after the SAR evaluations. The fluid temperature remained within +/-2°C during the SAR evaluations.
- 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.

13.0 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.
- 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:	Kenwood USA Corporation	FCC ID:	ALH434901	Freq:	150.8 - 173.4 MHz	KENWOOD
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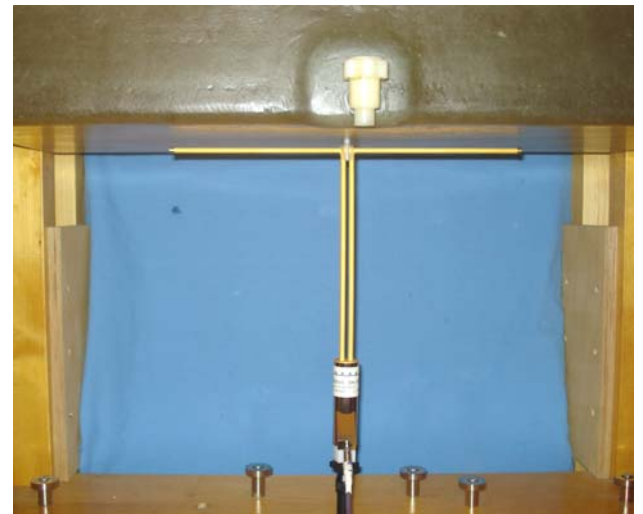
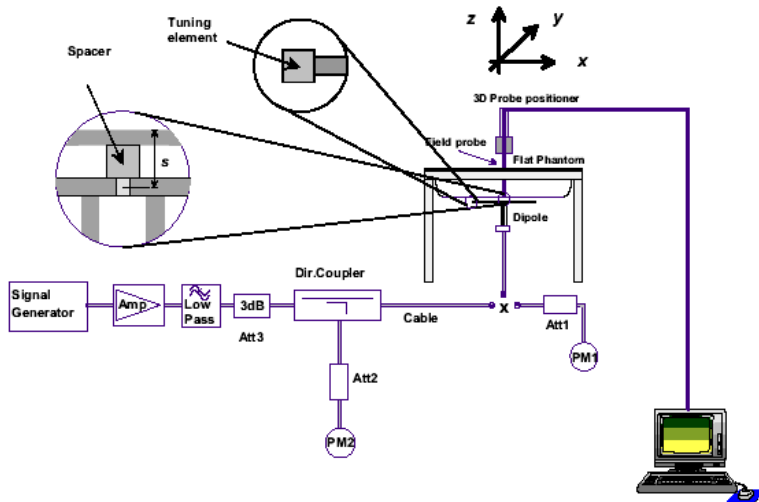
14.0 SYSTEM PERFORMANCE CHECK

Prior to the SAR evaluations a daily system check was performed with a planar phantom and 300 MHz SPEAG validation dipole (see Appendix B for system performance check test plots) in accordance with the procedures described in IEEE Standard 1528-2003 (see reference [3]) and IEC Standard 62209-1:2005 (see reference [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 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)
		SPEAG Target	Meas.	Dev.	SPEAG Target	Meas.	Dev.	SPEAG Target	Meas.	Dev.						
Aug 22	Head 300	1.14 $\pm 10\%$	1.22	+7.0%	45.3 $\pm 5\%$	46.4	+2.4%	0.87 $\pm 5\%$	0.89	+2.3%	1000	24.0	22.0	≥ 15	32	101.1
Aug 27	Head 300	1.14 $\pm 10\%$	1.15	+0.9%	45.3 $\pm 5\%$	45.3	0.0%	0.87 $\pm 5\%$	0.87	0.0%	1000	24.0	24.0	≥ 15	30	101.1
Oct 2	Head 300	1.14 $\pm 10\%$	1.13	-0.9%	45.3 $\pm 5\%$	46.8	+3.3%	0.87 $\pm 5\%$	0.83	-4.6%	1000	22.0	21.6	≥ 15	30	101.1

- | | | |
|--------------|----|---|
| Notes | 1. | The target SAR values are the measured values from the dipole calibration performed by SPEAG (see Appendix E). |
| | 2. | The target dielectric parameters are the nominal values from the dipole calibration performed by SPEAG (see Appendix E). |
| | 3. | The fluid temperature was measured prior to and after the system performance check to ensure the temperature remained within $\pm 2^\circ\text{C}$ of the fluid temperature reported during the dielectric parameter measurements. |
| | 4. | The dielectric parameters of the simulated tissue mixture were measured prior to the system performance check using a Dielectric Probe Kit and a Network Analyzer (see Appendix C). |
| | 5. | System Performance Checks were not performed for each SAR evaluation test date 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):
<u>SAR System Verification</u>
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 Setup Diagram (IEEE Standard 1528-2003)

300 MHz SPEAG Validation Dipole with Barski Planar Phantom

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15.0 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 [9] and [10]) in accordance with the procedures and requirements specified in IEEE Standard 1528-2003 (see reference [3]) and IEC Standard 62209-1:2005 (see reference [4]). 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 %

16.0 SAR LIMITS

SAR RF EXPOSURE LIMITS		
FCC 47 CFR 2.1093	(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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17.0 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>Evaluation Phantom</u>	
Type	Side Planar Phantom
Shell Material	Plexiglas
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>Validation Phantom</u>	
Type	Barski Planar Phantom
Shell Material	Fiberglass
Thickness	2.0 ±0.1 mm
Volume	Approx. 70 liters

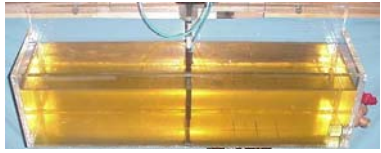
Applicant:	Kenwood USA Corporation	FCC ID:	ALH434901	Freq:	150.8 - 173.4 MHz	KENWOOD
DUT Type:	Portable FM VHF PTT Radio Transceiver	Model(s):	TK-2400-K		TK-2400-K2	
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18.0 PROBE SPECIFICATION (ET3DV6)

<p>Construction: Symmetrical design with triangular core; Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, glycol)</p> <p>Calibration: In air from 10 MHz to 2.5 GHz In head simulating tissue at frequencies of 900 MHz and 1.8 GHz (accuracy $\pm 8\%$)</p> <p>Frequency: 10 MHz to > 6 GHz; Linearity: ± 0.2 dB (30 MHz to 3 GHz)</p> <p>Directivity: ± 0.2 dB in head tissue (rotation around probe axis) ± 0.4 dB in head tissue (rotation normal to probe axis)</p> <p>Dynamic Range: 5 μW/g to > 100 mW/g; Linearity: ± 0.2 dB</p> <p>Surface Detect: ± 0.2 mm repeatability in air and clear liquids over diffuse reflecting surfaces</p> <p>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</p> <p>Application: General dosimetry up to 3 GHz; Compliance tests of mobile phone</p>	
ET3DV6 E-Field Probe	


19.0 SIDE PLANAR PHANTOM

<p>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.</p>	
Plexiglas Side Planar Phantom	



20.0 BARSKI PLANAR PHANTOM

<p>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 is used for DUT SAR evaluations and system performance check evaluations. See Appendix G for dimensions and specifications of the Barski planar phantom.</p>	
Barski Planar Phantom	

21.0 DEVICE HOLDER

<p>The DASY4 device holder has two scales for device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear openings). The plane between the ear openings and the mouth tip has a rotation angle of 65°. The bottom plate contains three pair of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections.</p>	
Device Holder	

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22.0 TEST EQUIPMENT LIST

TEST EQUIPMENT		ASSET NO.	SERIAL NO.	DATE CALIBRATED	CALIBRATION INTERVAL
USED	DESCRIPTION				
x	Schmid & Partner DASY4 System	-	-	-	-
x	-DASY4 Measurement Server	00158	1078	CNR	CNR
x	-Robot	00046	599396-01	CNR	CNR
x	-DAE4	00019	353	19-Apr-12	Biennial
x	-ET3DV6 E-Field Probe	00017	1590	24-Apr-12	Annual
x	-SPEAG D300V3 Validation Dipole	000216	1009	17-Apr-12	Triennial
x	-Barski Planar Phantom	00155	03-01	CNR	CNR
x	HP 85070C Dielectric Probe Kit	00033	none	CNR	CNR
x	Gigatronics 8652A Power Meter	00007	1835272	03-May-12	Biennial
x	Gigatronics 80701A Power Sensor	00014	1833542	03-May-12	Biennial
x	Gigatronics 80334A Power Sensor	-	1837001	03-May-12	Biennial
x	HP 8753ET Network Analyzer	00134	US39170292	26-Apr-12	Biennial
x	Rohde & Schwarz SMR20 Signal Generator	00006	100104	02-May-12	Biennial
x	Amplifier Research 5S1G4 Power Amplifier	00106	26235	CNR	CNR
Abbr.	CNR = Calibration Not Required				



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23.0 MEASUREMENT UNCERTAINTIES

UNCERTAINTY BUDGET FOR DEVICE EVALUATION									
Uncertainty Component	IEEE 1528 Section	Uncertainty Value ±%	Probability Distribution	Divisor	ci 1g	ci 10g	Uncertainty Value ±% (1g)	Uncertainty Value ±% (10g)	V _i or V _{eff}
Measurement System									
Probe Calibration (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	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	6.25	Normal	1	0.64	0.43	4.0	2.7	∞
Liquid Permittivity (target)	E.3.2	5	Rectangular	1.732050808	0.6	0.49	1.7	1.4	∞
Liquid Permittivity (measured)	E.3.3	4.40	Normal	1	0.6	0.49	2.6	2.2	∞
Combined Standard Uncertainty			RSS				14.20	13.70	
Expanded Uncertainty (95% Confidence Interval)			k=2				28.40	27.40	

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

	<u>Date(s) of Evaluation</u> Aug 23-28, Oct3, 2012	<u>Test Report Serial No.</u> 081612ALH-T1189-S90V	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> Oct. 17, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

24.0 REFERENCES



- [1] Federal Communications Commission - "Radiofrequency radiation exposure evaluation: portable devices"; Rule Part 47 CFR §2.1093.
- [2] 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.
- [3] 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.
- [4] 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."
- [5] 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)".
- [6] Federal Communications Commission, Office of Engineering and Technology - "Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies"; KDB 447498 D01 v04: November 2009.
- [7] Federal Communications Commission, Office of Engineering and Technology - "SAR Test Reduction Considerations for Occupational PTT Radios", KDB 643646 D01v01: December 2010.
- [8] 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.
- [9] Schmid & Partner Engineering AG - DASY4 Manual V4.6, Chapter 16 Application Note, Head Tissue Recipe: Sept. 2005.
- [10] Schmid & Partner Engineering AG - DASY4 Manual V4.6, Chapter 17 Application Note, Body Tissue Recipe: Sept. 2005.
- [11] ISO/IEC 17025 - "General requirements for the competence of testing and calibration laboratories (ISO/IEC 17025:2005)."
- [12] Federal Communications Commission - "Measurements Required: RF Power Output"; Rule Part 47 CFR §2.1046.

Applicant:	Kenwood USA Corporation	FCC ID:	ALH434901	Freq:	150.8 - 173.4 MHz	KENWOOD
DUT Type:	Portable FM VHF PTT Radio Transceiver	Model(s):	TK-2400-K	TK-2400-K2		
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	<u>Test Report Issue Date</u> Oct. 17, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

APPENDIX B - SYSTEM PERFORMANCE CHECK

Applicant:	Kenwood USA Corporation	FCC ID:	ALH434901	Freq:	150.8 - 173.4 MHz	KENWOOD
DUT Type:	Portable FM VHF PTT Radio Transceiver	Model(s):	TK-2400-K	TK-2400-K2		
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	<u>Test Report Issue Date</u> Oct. 17, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

Date Tested: 08/22/2012

System Performance Check - 300 MHz Dipole - Head

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

Program Notes: Ambient Temp: 24.0C; Fluid Temp: 22.0C; Barometric Pressure: 101.1 kPa; Humidity: 32%

Communication System: CW

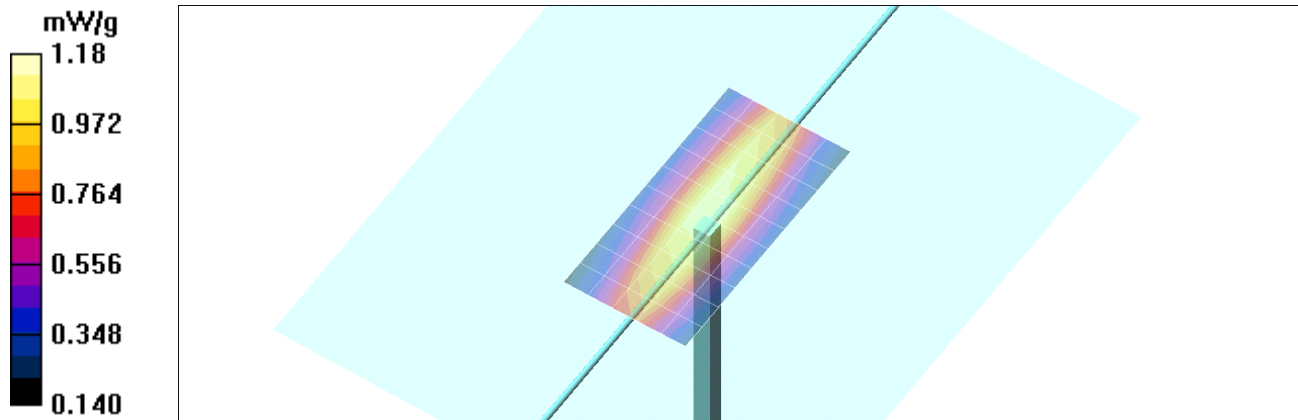
Frequency: 300 MHz; Duty Cycle: 1:1

Medium: 300 HSL Medium parameters used: $f = 300 \text{ MHz}$; $\sigma = 0.89 \text{ mho/m}$; $\epsilon_r = 46.4$; $\rho = 1000 \text{ kg/m}^3$

- 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

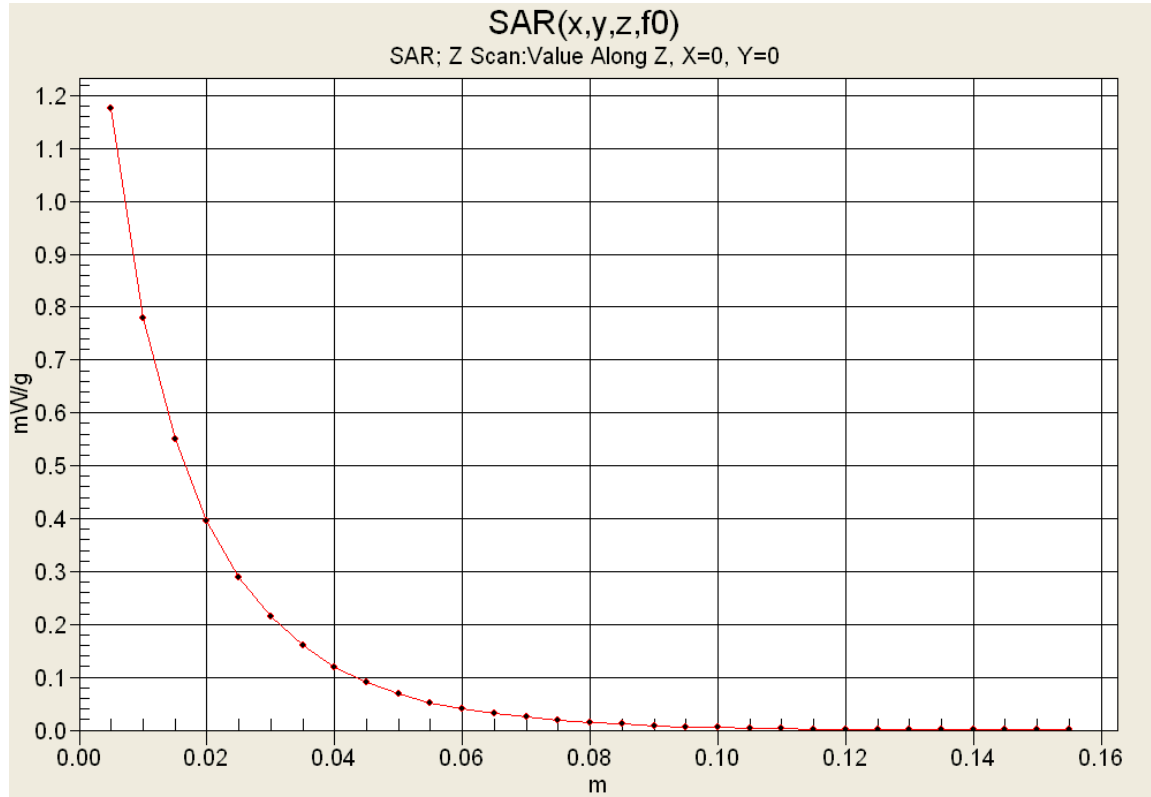
Head d=15mm, Pin = 398mW/Area Scan (6x11x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.09 mW/g



Head d=15mm, Pin = 398mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 36.7 V/m; Power Drift = -0.060 dB
Peak SAR (extrapolated) = 1.95 W/kg
SAR(1 g) = 1.22 mW/g; SAR(10 g) = 0.811 mW/g
Maximum value of SAR (measured) = 1.18 mW/g



Applicant:	Kenwood USA Corporation	FCC ID:	ALH434901	Freq:	150.8 - 173.4 MHz	KENWOOD
DUT Type:	Portable FM VHF PTT Radio Transceiver	Model(s):	TK-2400-K		TK-2400-K2	
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Z-Axis Scan



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Date Tested: 08/27/2012

System Performance Check - 300 MHz Dipole - Head

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

Program Notes: Ambient Temp: 24.0C; Fluid Temp: 24.0C; Barometric Pressure: 101.1 kPa; Humidity: 30%

Communication System: CW

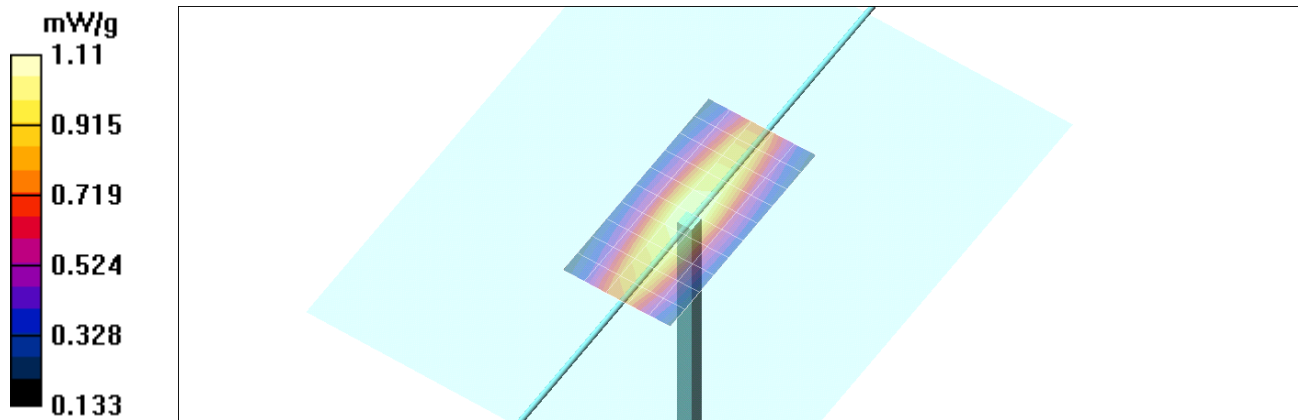
Frequency: 300 MHz; Duty Cycle: 1:1

Medium: 300 HSL Medium parameters used: $f = 300 \text{ MHz}$; $\sigma = 0.87 \text{ mho/m}$; $\epsilon_r = 45.3$; $\rho = 1000 \text{ kg/m}^3$

- 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

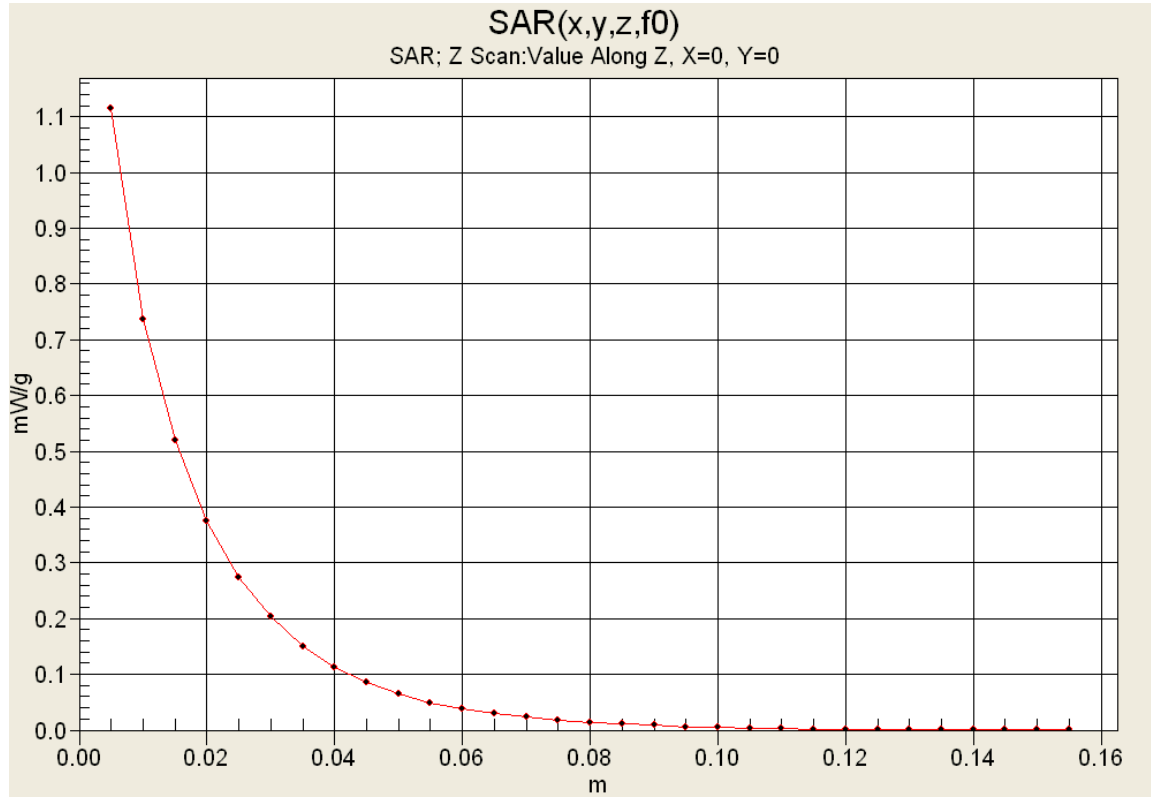
Head d=15mm, Pin = 398mW/Area Scan (6x11x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.05 mW/g



Head d=15mm, Pin = 398mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 35.9 V/m; Power Drift = -0.036 dB
Peak SAR (extrapolated) = 1.84 W/kg
SAR(1 g) = 1.15 mW/g; SAR(10 g) = 0.765 mW/g
Maximum value of SAR (measured) = 1.11 mW/g



Applicant:	Kenwood USA Corporation	FCC ID:	ALH434901	Freq:	150.8 - 173.4 MHz	KENWOOD
DUT Type:	Portable FM VHF PTT Radio Transceiver	Model(s):	TK-2400-K		TK-2400-K2	
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Z-Axis Scan



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	<u>Test Report Issue Date</u> Oct. 17, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

Date Tested: 10/02/2012

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: 21.6C; Barometric Pressure: 101.1 kPa; Humidity: 30%

Communication System: CW

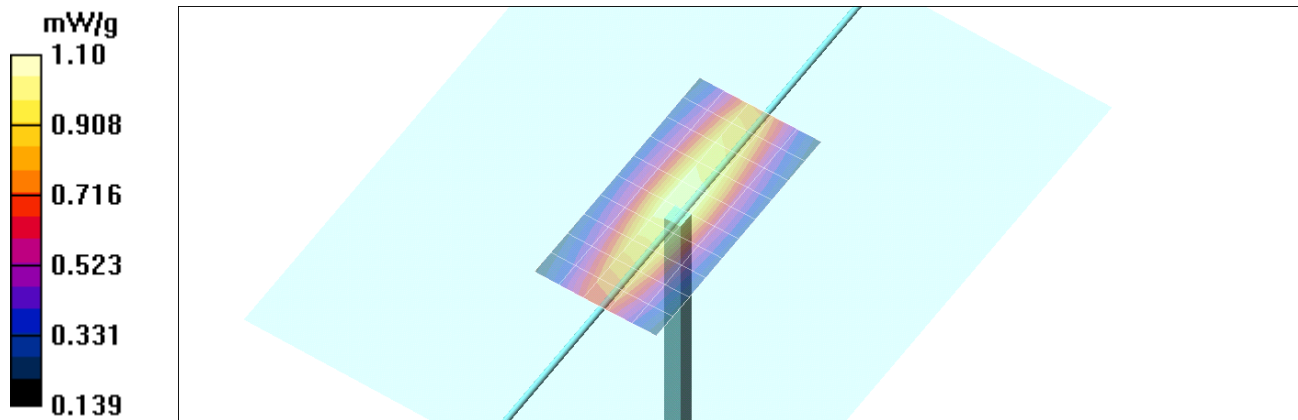
Frequency: 300 MHz; Duty Cycle: 1:1

Medium: 300 HSL Medium parameters used: $f = 300 \text{ MHz}$; $\sigma = 0.83 \text{ mho/m}$; $\epsilon_r = 46.8$; $\rho = 1000 \text{ kg/m}^3$

- 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

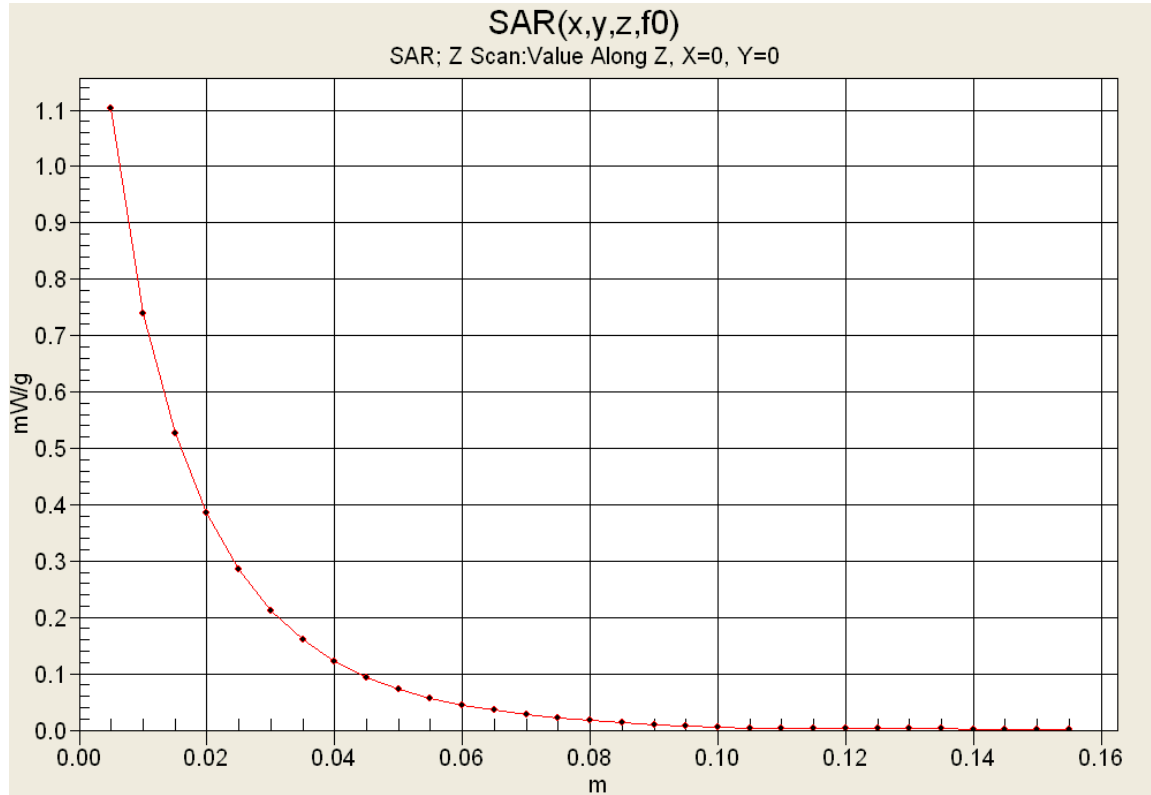
Head d=15mm, Pin = 398mW/Area Scan (6x11x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.01 mW/g



Head d=15mm, Pin = 398mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 36.6 V/m; Power Drift = -0.048 dB
Peak SAR (extrapolated) = 1.78 W/kg
SAR(1 g) = 1.13 mW/g; SAR(10 g) = 0.759 mW/g
Maximum value of SAR (measured) = 1.10 mW/g



Applicant:	Kenwood USA Corporation	FCC ID:	ALH434901	Freq:	150.8 - 173.4 MHz	KENWOOD
DUT Type:	Portable FM VHF PTT Radio Transceiver	Model(s):	TK-2400-K		TK-2400-K2	
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Z-Axis Scan



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APPENDIX C - MEASURED FLUID DIELECTRIC PARAMETERS

Applicant:	Kenwood USA Corporation	FCC ID:	ALH434901	Freq:	150.8 - 173.4 MHz	KENWOOD
DUT Type:	Portable FM VHF PTT Radio Transceiver	Model(s):	TK-2400-K	TK-2400-K2		
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	<u>Test Report Issue Date</u> Oct. 17, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

300 MHz Head

Celltech Labs Inc
Test Result for UIM Dielectric Parameter
22/Aug/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_eHF	FCC_sH	Test_e	Test_s
0.2000	49.97	0.80	50.43	0.78
0.2100	49.50	0.80	51.02	0.79
0.2200	49.03	0.81	50.30	0.81
0.2300	48.57	0.82	49.83	0.81
0.2400	48.10	0.83	48.69	0.83
0.2500	47.63	0.83	47.81	0.83
0.2600	47.17	0.84	47.41	0.83
0.2700	46.70	0.85	47.50	0.83
0.2800	46.23	0.86	47.51	0.85
0.2900	45.77	0.86	45.85	0.87
0.3000	45.30	0.87	46.38	0.89
0.3100	45.18	0.87	45.47	0.90
0.3200	45.06	0.87	45.49	0.89
0.3300	44.94	0.87	45.36	0.91
0.3400	44.82	0.87	44.59	0.90
0.3500	44.70	0.87	44.16	0.91
0.3600	44.58	0.87	43.99	0.91
0.3700	44.46	0.87	43.91	0.91
0.3800	44.34	0.87	43.77	0.95
0.3900	44.22	0.87	43.52	0.93
0.4000	44.10	0.87	43.65	0.95

Applicant:	Kenwood USA Corporation	FCC ID:	ALH434901	Freq:	150.8 - 173.4 MHz	KENWOOD
DUT Type:	Portable FM VHF PTT Radio Transceiver	Model(s):	TK-2400-K	TK-2400-K2		
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	<u>Test Report Issue Date</u> Oct. 17, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

150 MHz Head



Celltech Labs Inc
Test Result for UIM Dielectric Parameter
23&24/Aug/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	86.28	0.68
0.0600	56.50 0.69	80.12	0.67
0.0700	56.03 0.70	67.81	0.69
0.0800	55.57 0.71	68.92	0.69
0.0900	55.10 0.72	62.04	0.70
0.1000	54.63 0.72	60.72	0.71
0.1100	54.17 0.73	57.62	0.73
0.1200	53.70 0.74	54.73	0.74
0.1300	53.23 0.75	56.69	0.73
0.1400	52.77 0.75	54.92	0.74
0.1500	52.30 0.76	54.16	0.75
0.1600	51.83 0.77	53.73	0.75
0.1700	51.37 0.77	52.24	0.77
0.1800	50.90 0.78	52.18	0.78
0.1900	50.43 0.79	50.58	0.78
0.2000	49.97 0.80	50.44	0.78
0.2100	49.50 0.80	49.94	0.79
0.2200	49.03 0.81	48.59	0.80
0.2300	48.57 0.82	49.19	0.81
0.2400	48.10 0.83	49.32	0.82
0.2500	47.63 0.83	48.60	0.84

Applicant:	Kenwood USA Corporation	FCC ID:	ALH434901	Freq:	150.8 - 173.4 MHz	KENWOOD
DUT Type:	Portable FM VHF PTT Radio Transceiver	Model(s):	TK-2400-K	TK-2400-K2		
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	<u>Test Report Issue Date</u> Oct. 17, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

150 MHz Body

Celltech Labs Inc
Test Result for UIM Dielectric Parameter
23/Aug/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	91.38	0.71
0.0600	64.12	0.73	87.63	0.70
0.0700	63.87	0.74	77.05	0.73
0.0800	63.63	0.74	78.83	0.71
0.0900	63.38	0.75	70.53	0.72
0.1000	63.13	0.76	70.31	0.72
0.1100	62.89	0.77	66.92	0.73
0.1200	62.64	0.78	67.22	0.75
0.1300	62.39	0.78	65.58	0.74
0.1400	62.15	0.79	64.88	0.74
0.1500	61.90	0.80	63.77	0.75
0.1600	61.65	0.81	64.35	0.75
0.1700	61.41	0.82	61.81	0.76
0.1800	61.16	0.82	62.14	0.78
0.1900	60.91	0.83	60.59	0.78
0.2000	60.67	0.84	60.70	0.78
0.2100	60.42	0.85	60.38	0.80
0.2200	60.17	0.86	59.41	0.79
0.2300	59.93	0.86	60.35	0.80
0.2400	59.68	0.87	59.91	0.81
0.2500	59.43	0.88	58.96	0.81

Applicant:	Kenwood USA Corporation	FCC ID:	ALH434901	Freq:	150.8 - 173.4 MHz	KENWOOD
DUT Type:	Portable FM VHF PTT Radio Transceiver	Model(s):	TK-2400-K	TK-2400-K2		
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	<u>Test Report Issue Date</u> Oct. 17, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	



300 MHz Head

Celltech Labs Inc
Test Result for UIM Dielectric Parameter
27/Aug/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	51.13	0.78
0.2100	49.50 0.80	51.04	0.79
0.2200	49.03 0.81	50.58	0.81
0.2300	48.57 0.82	49.11	0.80
0.2400	48.10 0.83	48.94	0.83
0.2500	47.63 0.83	47.36	0.82
0.2600	47.17 0.84	47.42	0.82
0.2700	46.70 0.85	47.54	0.82
0.2800	46.23 0.86	45.72	0.86
0.2900	45.77 0.86	45.74	0.87
0.3000	45.30 0.87	45.26	0.87
0.3100	45.18 0.87	45.68	0.89
0.3200	45.06 0.87	45.02	0.88
0.3300	44.94 0.87	44.75	0.90
0.3400	44.82 0.87	43.72	0.91
0.3500	44.70 0.87	45.06	0.90
0.3600	44.58 0.87	43.74	0.92
0.3700	44.46 0.87	43.66	0.91
0.3800	44.34 0.87	44.11	0.93
0.3900	44.22 0.87	42.91	0.95
0.4000	44.10 0.87	43.09	0.95

Applicant:	Kenwood USA Corporation	FCC ID:	ALH434901	Freq:	150.8 - 173.4 MHz	KENWOOD
DUT Type:	Portable FM VHF PTT Radio Transceiver	Model(s):	TK-2400-K	TK-2400-K2		
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	<u>Test Report Issue Date</u> Oct. 17, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	



150 MHz Head

Celltech Labs Inc
Test Result for UIM Dielectric Parameter
27/Aug/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	91.88	0.66
0.0600	56.50 0.69	74.06	0.69
0.0700	56.03 0.70	73.89	0.67
0.0800	55.57 0.71	65.40	0.70
0.0900	55.10 0.72	58.66	0.70
0.1000	54.63 0.72	62.20	0.72
0.1100	54.17 0.73	54.90	0.71
0.1200	53.70 0.74	57.36	0.72
0.1300	53.23 0.75	57.25	0.71
0.1400	52.77 0.75	55.76	0.73
0.1500	52.30 0.76	54.89	0.76
0.1600	51.83 0.77	53.04	0.75
0.1700	51.37 0.77	52.54	0.79
0.1800	50.90 0.78	53.55	0.77
0.1900	50.43 0.79	50.42	0.78
0.2000	49.97 0.80	51.83	0.79
0.2100	49.50 0.80	50.48	0.79
0.2200	49.03 0.81	49.89	0.81
0.2300	48.57 0.82	49.73	0.82
0.2400	48.10 0.83	48.82	0.82
0.2500	47.63 0.83	49.75	0.83

Applicant:	Kenwood USA Corporation	FCC ID:	ALH434901	Freq:	150.8 - 173.4 MHz	KENWOOD
DUT Type:	Portable FM VHF PTT Radio Transceiver	Model(s):	TK-2400-K	TK-2400-K2		
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	<u>Date(s) of Evaluation</u> Aug 23-28, Oct3, 2012	<u>Test Report Serial No.</u> 081612ALH-T1189-S90V	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> Oct. 17, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

150 MHz Body

Celltech Labs Inc
Test Result for UIM Dielectric Parameter
27&28/Aug/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	98.21	0.70
0.0600	64.12	0.73	80.21	0.73
0.0700	63.87	0.74	89.34	0.72
0.0800	63.63	0.74	74.93	0.69
0.0900	63.38	0.75	69.01	0.73
0.1000	63.13	0.76	70.01	0.72
0.1100	62.89	0.77	70.26	0.75
0.1200	62.64	0.78	66.22	0.76
0.1300	62.39	0.78	58.97	0.73
0.1400	62.15	0.79	63.80	0.76
0.1500	61.90	0.80	64.22	0.77
0.1600	61.65	0.81	61.11	0.78
0.1700	61.41	0.82	61.56	0.79
0.1800	61.16	0.82	60.02	0.77
0.1900	60.91	0.83	60.96	0.78
0.2000	60.67	0.84	61.43	0.81
0.2100	60.42	0.85	60.74	0.80
0.2200	60.17	0.86	58.65	0.82
0.2300	59.93	0.86	58.74	0.82
0.2400	59.68	0.87	58.07	0.82
0.2500	59.43	0.88	59.72	0.81

Applicant:	Kenwood USA Corporation	FCC ID:	ALH434901	Freq:	150.8 - 173.4 MHz	KENWOOD
DUT Type:	Portable FM VHF PTT Radio Transceiver	Model(s):	TK-2400-K	TK-2400-K2		
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	<u>Date(s) of Evaluation</u> Aug 23-28, Oct3, 2012	<u>Test Report Serial No.</u> 081612ALH-T1189-S90V	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> Oct. 17, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

300 MHz Head

Celltech Labs Inc
Test Result for UIM Dielectric Parameter
02/Oct/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	49.20	0.73
0.2100	49.50 0.80	50.18	0.75
0.2200	49.03 0.81	49.79	0.75
0.2300	48.57 0.82	48.05	0.78
0.2400	48.10 0.83	48.90	0.78
0.2500	47.63 0.83	47.75	0.79
0.2600	47.17 0.84	48.02	0.80
0.2700	46.70 0.85	47.77	0.80
0.2800	46.23 0.86	46.97	0.80
0.2900	45.77 0.86	46.15	0.83
0.3000	45.30 0.87	46.77	0.83
0.3100	45.18 0.87	45.24	0.84
0.3200	45.06 0.87	44.77	0.84
0.3300	44.94 0.87	44.10	0.86
0.3400	44.82 0.87	44.98	0.87
0.3500	44.70 0.87	44.13	0.87
0.3600	44.58 0.87	43.43	0.89
0.3700	44.46 0.87	43.27	0.89
0.3800	44.34 0.87	43.66	0.90
0.3900	44.22 0.87	43.22	0.90
0.4000	44.10 0.87	42.81	0.92

Applicant:	Kenwood USA Corporation	FCC ID:	ALH434901	Freq:	150.8 - 173.4 MHz	KENWOOD
DUT Type:	Portable FM VHF PTT Radio Transceiver	Model(s):	TK-2400-K	TK-2400-K2		
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	<u>Date(s) of Evaluation</u> Aug 23-28, Oct3, 2012	<u>Test Report Serial No.</u> 081612ALH-T1189-S90V	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> Oct. 17, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	



150 MHz Head

Celltech Labs Inc
Test Result for UIM Dielectric Parameter
03/Oct/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	103.11	0.69
0.0600	56.50 0.69	82.08	0.69
0.0700	56.03 0.70	83.17	0.70
0.0800	55.57 0.71	64.50	0.73
0.0900	55.10 0.72	64.27	0.73
0.1000	54.63 0.72	60.77	0.73
0.1100	54.17 0.73	57.39	0.73
0.1200	53.70 0.74	59.09	0.75
0.1300	53.23 0.75	53.61	0.78
0.1400	52.77 0.75	55.06	0.77
0.1500	52.30 0.76	53.65	0.76
0.1600	51.83 0.77	55.09	0.78
0.1700	51.37 0.77	54.17	0.80
0.1800	50.90 0.78	53.78	0.80
0.1900	50.43 0.79	53.27	0.80
0.2000	49.97 0.80	52.77	0.81
0.2100	49.50 0.80	50.68	0.80
0.2200	49.03 0.81	51.82	0.82
0.2300	48.57 0.82	49.87	0.85
0.2400	48.10 0.83	50.36	0.84
0.2500	47.63 0.83	49.63	0.83

Applicant:	Kenwood USA Corporation	FCC ID:	ALH434901	Freq:	150.8 - 173.4 MHz	KENWOOD
DUT Type:	Portable FM VHF PTT Radio Transceiver	Model(s):	TK-2400-K		TK-2400-K2	
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	<u>Date(s) of Evaluation</u> Aug 23-28, Oct3, 2012	<u>Test Report Serial No.</u> 081612ALH-T1189-S90V	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> Oct. 17, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

150 MHz Body

Celltech Labs Inc
Test Result for UIM Dielectric Parameter
03/Oct/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	111.24	0.69
0.0600	64.12	0.73	90.29	0.71
0.0700	63.87	0.74	88.35	0.71
0.0800	63.63	0.74	73.21	0.75
0.0900	63.38	0.75	73.23	0.74
0.1000	63.13	0.76	67.32	0.74
0.1100	62.89	0.77	63.66	0.74
0.1200	62.64	0.78	64.81	0.76
0.1300	62.39	0.78	62.74	0.77
0.1400	62.15	0.79	64.88	0.77
0.1500	61.90	0.80	61.45	0.76
0.1600	61.65	0.81	63.98	0.77
0.1700	61.41	0.82	61.90	0.78
0.1800	61.16	0.82	62.03	0.77
0.1900	60.91	0.83	62.41	0.78
0.2000	60.67	0.84	61.70	0.80
0.2100	60.42	0.85	59.86	0.80
0.2200	60.17	0.86	60.66	0.80
0.2300	59.93	0.86	59.10	0.82
0.2400	59.68	0.87	59.69	0.81
0.2500	59.43	0.88	58.49	0.81

Applicant:	Kenwood USA Corporation	FCC ID:	ALH434901	Freq:	150.8 - 173.4 MHz	KENWOOD
DUT Type:	Portable FM VHF PTT Radio Transceiver	Model(s):	TK-2400-K	TK-2400-K2		
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	<u>Test Report Issue Date</u> Oct. 17, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

APPENDIX E - DIPOLE CALIBRATION

Applicant:	Kenwood USA Corporation	FCC ID:	ALH434901	Freq:	150.8 - 173.4 MHz	KENWOOD
DUT Type:	Portable FM VHF PTT Radio Transceiver	Model(s):	TK-2400-K	TK-2400-K2		
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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

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Accreditation No.: **SCS 108**

Glossary:

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

Calibration is Performed According to the Following Standards:

- 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:

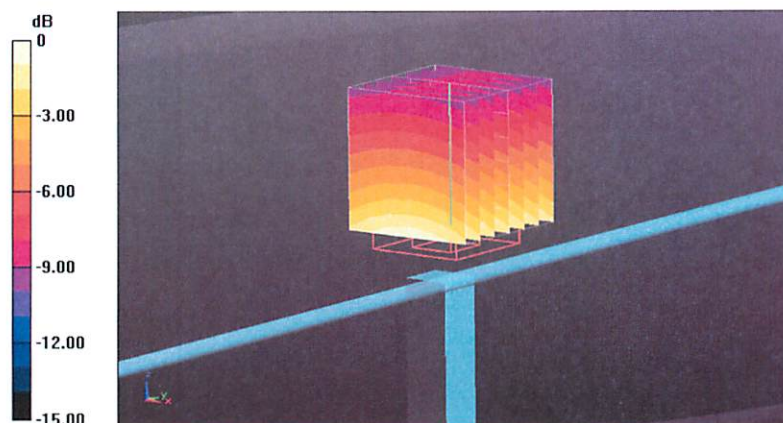
Measurement grid: dx=5mm, dy=5mm, dz=5mm

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

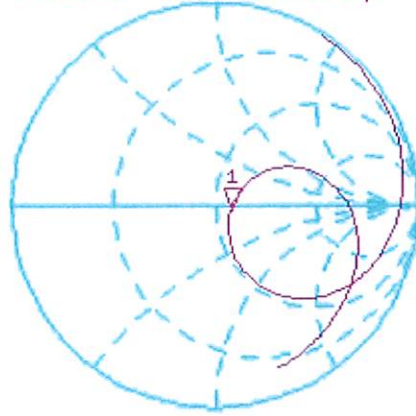
Maximum value of SAR (measured) = 1.24 mW/g



Impedance Measurement Plot for Head TSL

17 Apr 2012 15:12:03
[CH1] S11 1 U FS 1: 57.850 Ω -2.8926 Ω 183.41 pF 300.000 000 MHz

*
De l
Cor



Avg
16

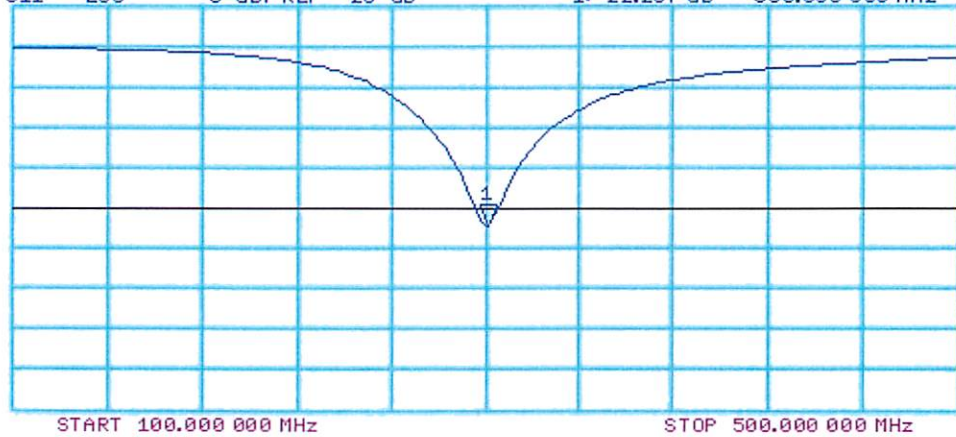
H1 d



CH2 S11 LOG 5 dB/REF -20 dB 1:-22.207 dB 300.000 000 MHz

Cor

Avg
16

H1 d



	<u>Date(s) of Evaluation</u> Aug 23-28, Oct3, 2012	<u>Test Report Serial No.</u> 081612ALH-T1189-S90V	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> Oct. 17, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

APPENDIX F - PROBE CALIBRATION

Applicant:	Kenwood USA Corporation	FCC ID:	ALH434901	Freq:	150.8 - 173.4 MHz	KENWOOD
DUT Type:	Portable FM VHF PTT Radio Transceiver	Model(s):	TK-2400-K	TK-2400-K2		
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Accreditation No.: **SCS 108**

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
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Accreditation No.: **SCS 108**

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Methods Applied and Interpretation of Parameters:

- NORM_{x,y,z}**: Assessed for E-field polarization $\vartheta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORM_{x,y,z} are only intermediate values, i.e., the uncertainties of NORM_{x,y,z} does not 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 ($\mu\text{V}/(\text{V}/\text{m})^2$) ^A	1.79	1.92	1.60	$\pm 10.1 \%$
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	$\pm 4.6 \%$
			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

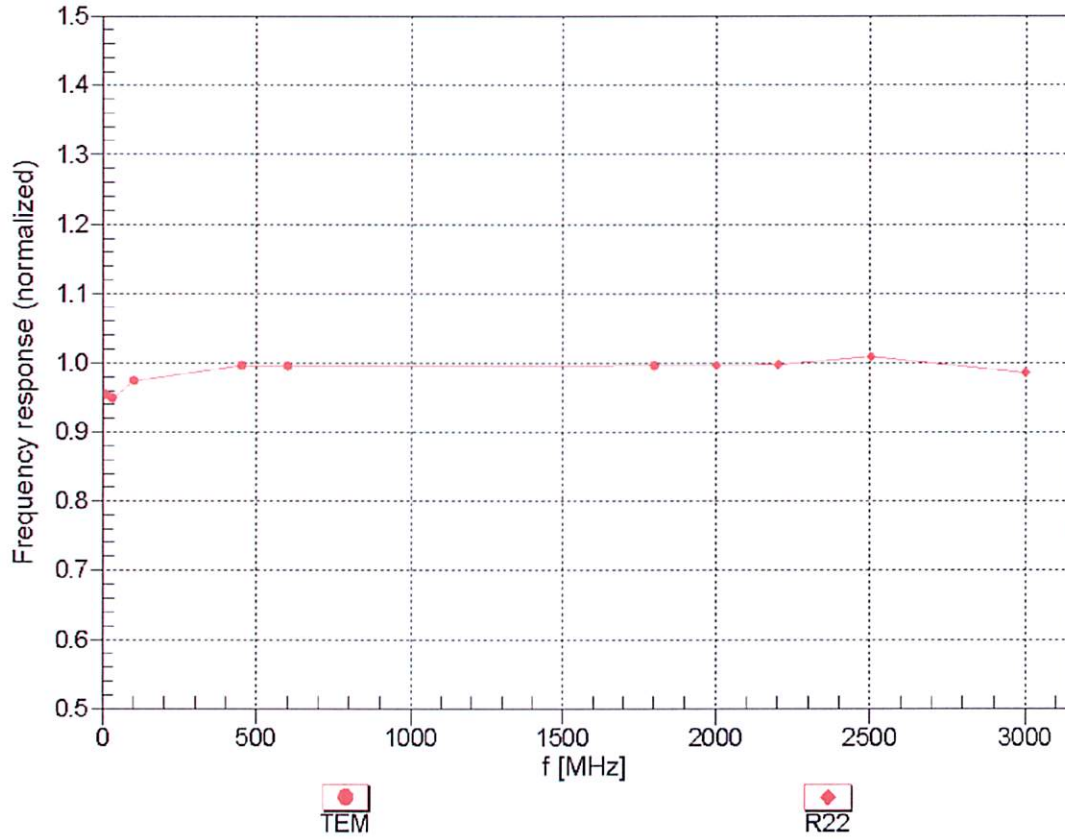
f (MHz) ^C	Relative Permittivity ^F	Conductivity (S/m) ^F	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
450	56.7	0.94	7.93	7.93	7.93	0.12	2.07	± 13.4 %
750	55.5	0.96	6.71	6.71	6.71	0.22	3.00	± 12.0 %
835	55.2	0.97	6.54	6.54	6.54	0.27	3.00	± 12.0 %
900	55.0	1.05	6.51	6.51	6.51	0.29	2.92	± 12.0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

^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

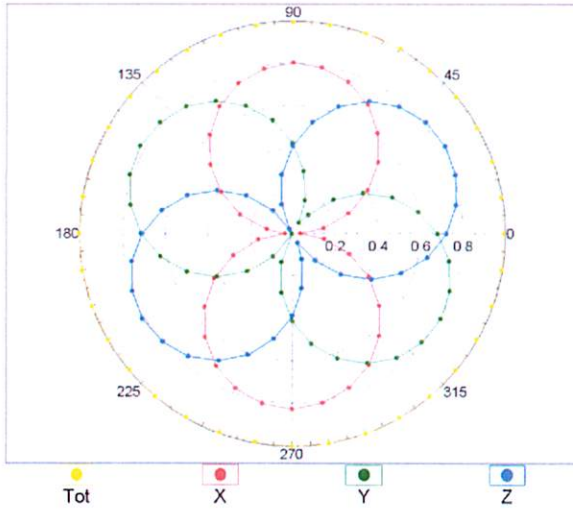
(TEM-Cell:ifi110 EXX, Waveguide: R22)



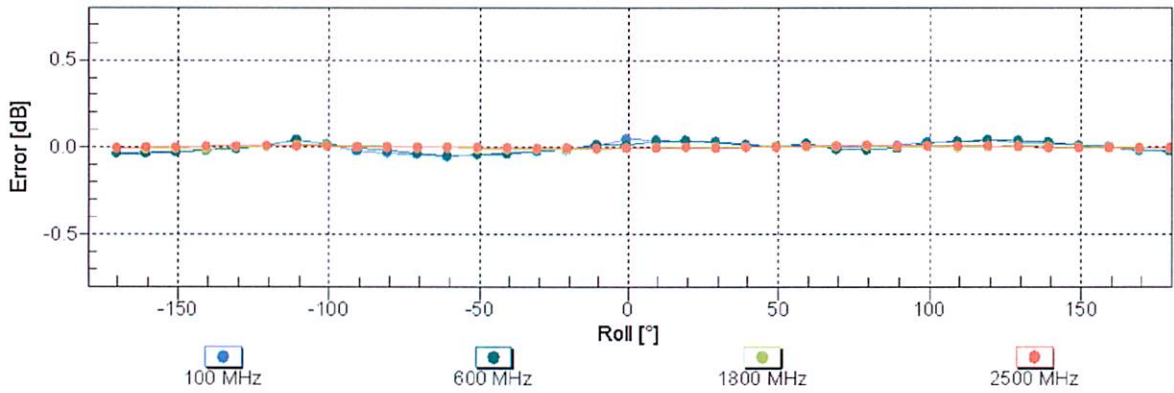
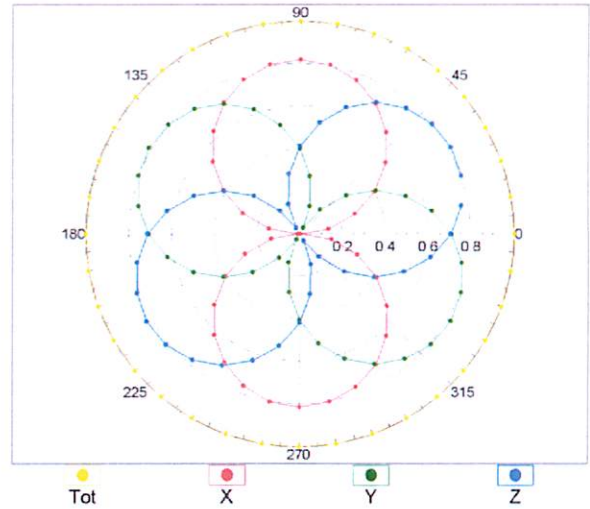
Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ (k=2)

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

f=600 MHz,TEM

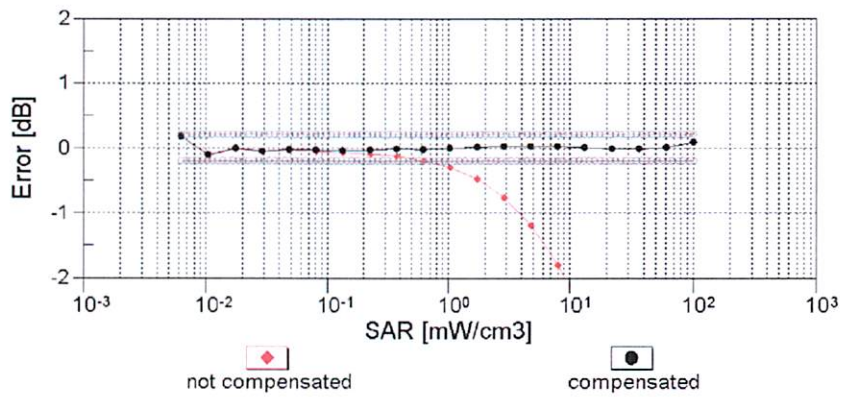
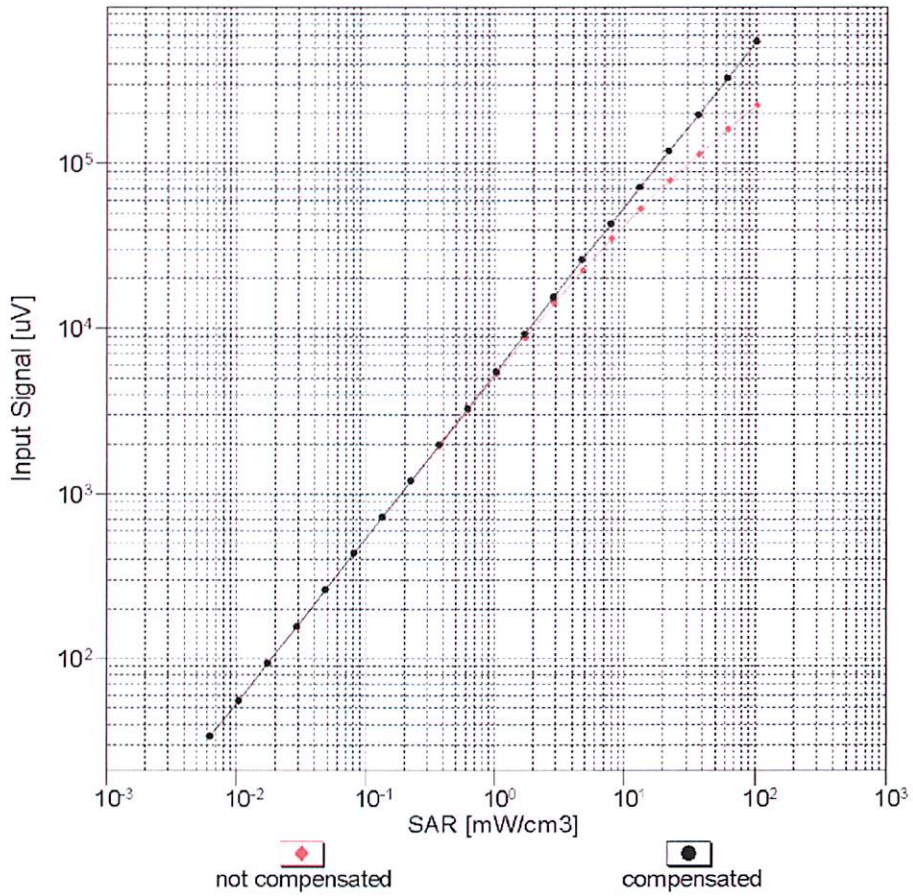


f=1800 MHz,R22



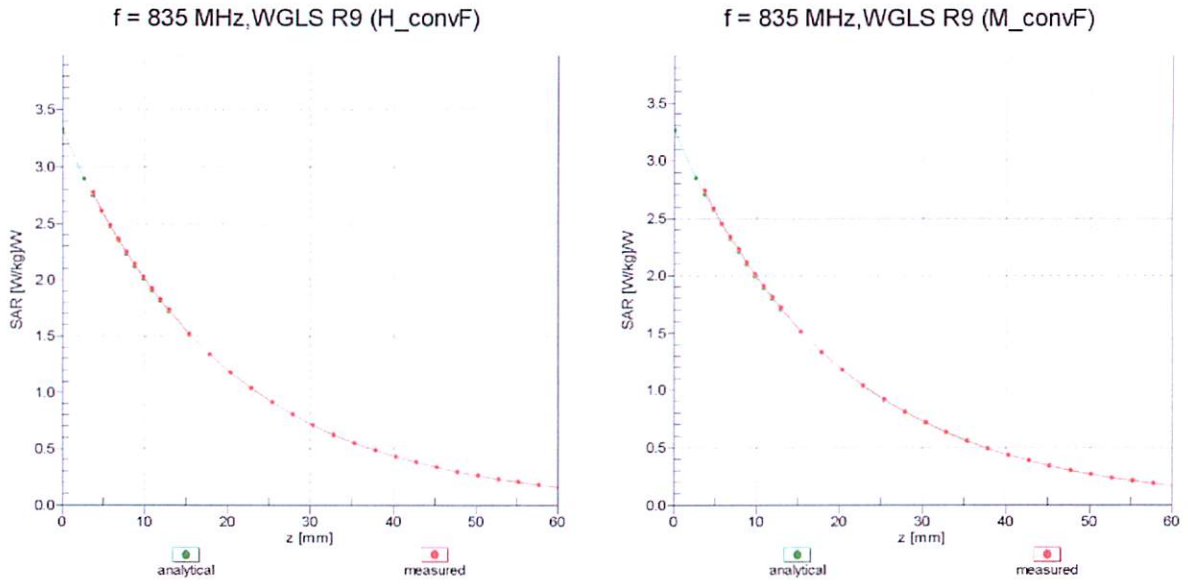
Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ (k=2)

Dynamic Range $f(SAR_{head})$ (TEM cell , $f = 900$ MHz)

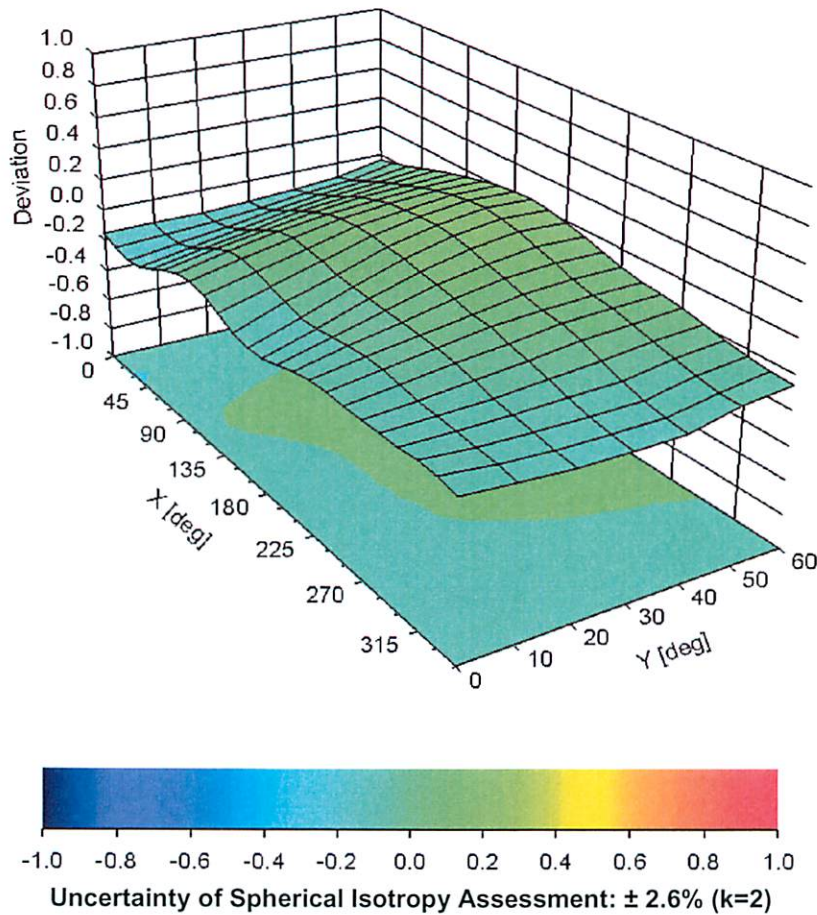


Uncertainty of Linearity Assessment: $\pm 0.6\%$ (k=2)

Conversion Factor Assessment



Deviation from Isotropy in Liquid Error (ϕ, ϑ), f = 900 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:1590Conversion 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 C_{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.

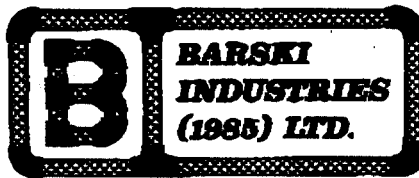
Please see also DASY Manual.

	<u>Date(s) of Evaluation</u> Aug 23-28, Oct3, 2012	<u>Test Report Serial No.</u> 081612ALH-T1189-S90V	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> Oct. 17, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

APPENDIX G - BARSKI PHANTOM CERTIFICATE OF CONFORMITY

Applicant:	Kenwood USA Corporation	FCC ID:	ALH434901	Freq:	150.8 - 173.4 MHz	KENWOOD
DUT Type:	Portable FM VHF PTT Radio Transceiver	Model(s):	TK-2400-K	TK-2400-K2		
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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

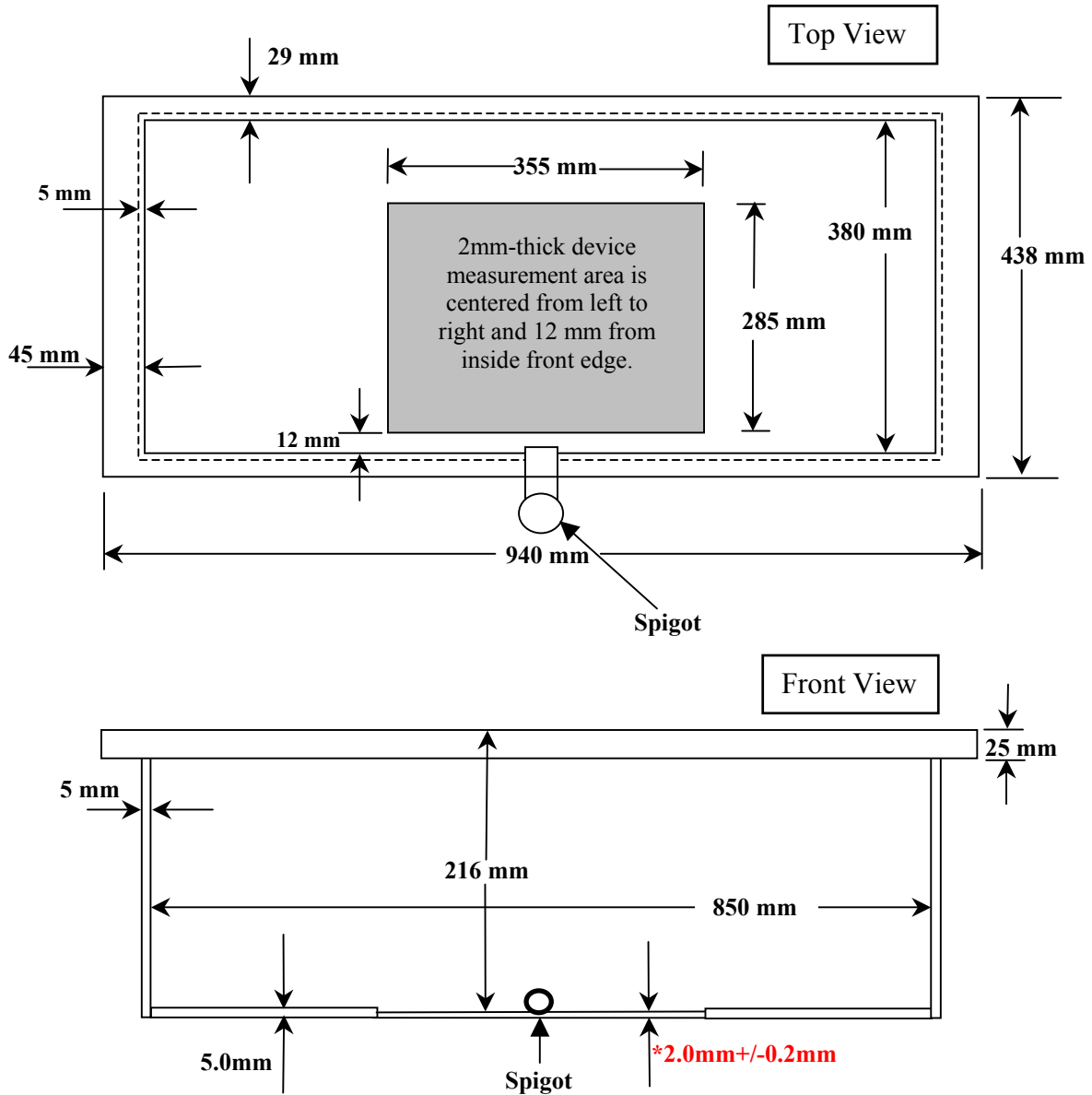


Fiberglass Planar Phantom - Back View



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.**