MOTOROLA

ACCREDITED

CGISS EME Test Laboratory
8000 West Sunrise Blvd
Fort Lauderdale, FL. 33322

S.A.R. EME Compliance Test Report
Part 1 of 2

Attention:	FCC
Date of Report:	July 25, 2003
Report Revision:	Rev. O
Manufacturer:	Motorola
Product Description:	Portable 465-495 MHz 1-4W 16 Channel
FCC ID:	**ABZ99FT4058**
Device Model:	AAH50SDC9AA2AN

Test Period:	5/19/03-5/23/03
EME Tech:	Ed Church
EME Engineer:	Deanna Zakharia Elect. Principle Staff Engineer
Author:	Michael Sailsman Global EME Regulatory Affairs Liaison

Note: Based on the information and the testing results provided herein, the undersigned certifies that when used as stated in the operating instructions supplied, said product complies with the national and international reference standards and guidelines listed in section 2.0 of this report.

Signature on File — 7/25/03

Deanna Zakharia (Elect. Principle Staff Eng.) for Ken Enger
Senior Resource Manager, Laboratory Director, CGISS EME Lab

Date Approved

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REVISION HISTORY

Date	Revision	Comments
7/25/03	O	Initial release Prototype results

1.0 Introduction

This report details the utilization, test setup, test equipment, and updated test results of the Specific Absorption Rate (S.A.R.) measurements performed at the CGISS EME Test Lab for model number AAH50SDC9AA2AN, FCC ID: ABZ99FT4058.

The applicable exposure environment is Occupational/Controlled.

2.0 Reference Standards and Guidelines

This product is designed to comply with the following national and international standards and guidelines.

- United States Federal Communications Commission, Code of Federal Regulations; 47CFR part 2 sub-part J
- American National Standards Institute (ANSI) / Institute of Electrical and Electronic Engineers (IEEE) C95. 1-1992
- Institute of Electrical and Electronic Engineers (IEEE) C95.1-1999 Edition
- International Commission on Non-Ionizing Radiation Protection (ICNIRP) 1998
- Ministry of Health (Canada) Safety Code 6. Limits of Human Exposure to Terminal frequency Electromagnetic Fields in the Frequency Range from 3 kHz to 300 GHz, 1999
- Australian Communications Authority Terminal communications (Electromagnetic Radiation - Human Exposure) Standard 2003
- ANATEL, Brazil Regulatory Authority, Resolution 256 (April 11, 2001) "additional requirements for SMR, cellular and PCS product certification."

3.0 Description of Test Sample

The portable handheld transceiver, FCC ID: ABZ99FT4058, operates using frequency modulation (FM) and incorporates traditional simplex two-way radio transmission protocol. The intended operating positions are “at the face” with the microphone 1 to 2 inches from the mouth, and “at the abdomen” by means of the offered body-worn accessories. Audio and PTT operation while the radio is at the abdomen is accomplished by means of optional remote accessories that connect to the radio. This device will be marketed to and used by employees solely for work-related operations, such as public safety agencies, e.g. police, fire and emergency medical. User training is the responsibility of these agencies, who can be expected to employ the usage instructions, safety information and operational cautions set forth in the user's manual, instructional sessions or other means. Motorola also makes available to its customers training classes on the proper use of two-way radios and wireless data devices.

FCC ID: ABZ99FT4058 is capable of operating in the 465-495 MHz band. The rated power is 1-4 watts with a maximum output capability of 4.6 watts as defined by the upper limit of the production line final test station.

FCC ID: ABZ99FT4058 is offered with the following options and accessories:

Antenna

NAE6483AR	Whip 403-520 MHz ¼ wave; -0.0 dBi
8505816K26	Heliflex 470-520 MHz ¼ wave; -2.0 dBi

Batteries

NNTN4497AR	Lithium Ion Battery 1800 mAh
NNTN4496AR	NiCd Battery 1100 mAh

Body-worn Accessories

HLN6602A	Universal Chest Pack
1505596Z02	Replacement Strap for HLN6602A Universal Chest Pack
RLN4570A	Break-A-Way Chest Pack
RLN4815A	Universal Radio Pak
4280384F89	Replacement Belt Lengthener for RLN4815A
HLN9985B	Waterproof Bag
NTN5243A	Shoulder Carry Strap, attaches to D-Shaped Rings on Carry Case
HLN8255B	3 inch Spring Action Belt Clip
HLN9701B	Nylon Carry Case with Belt Loop and D-Shaped Rings
RLN5383A	Leather Carry Case with Belt Loop and D-Shaped Rings
RLN5384A	Leather Carry Case with High Activity 2.5” Swivel Belt Loop
RLN5385A	Leather Carry Case with High Activity 3” Swivel Belt Loop

Audio attachments

HMN9030A	Remote Speaker Microphone
PMMN4008A	Remote Speaker Microphone (Mag One)
PMLN4442A	Earbud w/ Microphone & PTT combined w/ VOX (Mag One)
PMLN4443A	Flexible Ear Receiver w/ Microphone & PTT combined (Mag One)
PMLN4444A	Earset w/ Flexible Boom Microphone (Mag One)
PMLN4445A	Ultra Lightweight headset w/ Boom Microphone (Mag One)
PMLN4294C	Earbud w/ Microphone & PTT combined (Mag One)
PMLN4425A	Ultra-Lite Earset w/ Mic and Remote Ring PTT
BDN6646C	Standard 95dB Ear Microphone w/ PTT Interface Module
BDN6706B	Standard 95dB Ear Microphone w/ VOX and PTT Interface Module
0180358B38	Ring PTT Switch for Ear Mic System
0180300E83	Body PTT switch for Ear Mic System (works w/ BDN6646C, BDN6706B)
HMN9727B	Earpiece without Volume Control - 1 Wire (Beige)
RLN4894A	Earpiece without Volume Control – 1 wire (Black)

HMN9752B	Earpiece with Volume Control - 1 Wire (Beige)
HMN9754D	Earpiece with Microphone & PTT Combined - 2 Wire (Beige)
RLN4895A	Earpiece with Microphone & PTT Combined – 2 Wire (Black)
HMN9036A	Earbud with Microphone & PTT Combined
HLN9132A	Earbud Single Wire Receive Only
RLN5198AP	2 Wire Surveillance Kit w/ Clear Comfortable Acoustic Tube Included (includes HMN9754D and NTN8371A)
BDN6720A	Flexible Ear Receiver
PMMN4001A	Ultra-Lite Earset with Mic and PTT
HMN9013A	Lightweight Headset
RMN4016A	Lightweight Headset with In-Line PTT
RLN5238A	Lightweight Headset with In-Line PTT, NFL style
HMN9021A	Medium Weight Over-The-Head Dual Muff Headset
HMN9022A	Medium Weight Behind-The-Head Dual Muff Headset
BDN6647F	Medium Weight Single Speaker Headset
BDN6648C	Heavy Duty, Dual Muff Headset with Noise Canceling Mic
RMN5015A	Heavy Duty, Dual Muff, Racing Headset (requires RKN4090A Headset Adapter Cable)
RMN4051B	2-way Hard Hat Mount, Black, Noise Reduction Rating = 22dB(Requires RKN4094A adapter cable)
RKN4094A	In-Line PTT adapter (Use w/ RMN4051B, RMN4052A, RMN4053A)
RMN4052A	Tactical Headband Style Headset, Gray, Noise Reduction Rating = 24dB (Requires RKN4094A Adapter Cable)
RMN4053A	Tactical Hard Hat Mount Headset, Gray, Noise Reduction Rating = 22dB (Requires RKN4094A Adapter Cable)
RMN4054B	Receive-Only Hard Hat Mount Headset with 3.5mm right angle plug
RMN4055A	Receive only Headband Style Headset w/ 3.5mm right angle plug
HLN9133A	VOX adapter kit (for use w/ PMLN4442A, PMLN4443A, PMLN4444A, PMLN4445A, BDN6706B, HMN9013A, HMN9021A, HMN9022A, BDN6647A, BDN6648C
RKN4090A	In-Line PTT Adapter (Use with RMN5015B)
RLN5411A	Ultra-Lite Breeze Behind the Head Headset
TDN9327A	Portable Radio Hanger (For hanging on a car door etc. Not body worn)
TDN9373A	Portable Radio Hanger (For hanging on a car door etc. Not body worn)

3.1 Test Signal

Test Signal mode:

Test Mode	X	Base Station		Simulator	

Transmission Mode:

CW	**X**
Native Transmission	
TDM:	
Other	

3.2 Test Output Power

Output power was measured before each test. The DASY3™ system's S.A.R. drift function was used to determine the power slump characteristic of the device. A characteristic power slump table based on 50 ohms measurements is provided in APPENDIX A for the batteries producing the highest S.A.R. results.

4.0 Description of Test Equipment

4.1 Descriptions of S.A.R. Measurement System

The laboratory utilizes a Dosimetric Assessment System (DASY3™) S.A.R. measurement system manufactured by Schmid & Partner Engineering AG (SPEAG™), of Zurich Switzerland. The test system consists of a Stäubli RX90L robot with an ET3DV6 E-Field probe. Please reference the SPEAG user manual and application notes for detailed probe, robot, and S.A.R. computational procedures.
The S.A.R. measurements were conducted with probe model/serial number ET3DV6/SN1393. The system performance check was conducted daily and within 24 hours prior to testing. DASY output files of the system performance test results and the probe/dipole calibration certificates are included in appendices C and D respectively. The table below summarizes the system performance check results normalized to 1W.

Probe Serial #	Tissue Type	Probe Cal Date	Dipole Kit / Serial #	System Perf. Result when normalized to 1W (mW/g)	Reference S.A.R @ 1W (mW/g)	Test Date(s)
1393	FCC Body	4/16/03	SPEAG D450V2 MHz /1002	4.61 +/- 0.16	4.52 +/- 10%	5/19/03-5/23/03 (5 test days)
1393	IEEE Head	4/16/03	SPEAG D450V2 MHz /1002	4.68 +/- 0.00	4.70 +/- 10%	5/23/03

The DASY3™ system is operated per the instructions in the DASY3™ Users Manual. The complete manual is available directly from SPEAG™. All measurement equipment used to assess EME S.A.R. compliance was calibrated according to 17025 A2LA guidelines.

4.2 Description of Phantom

4.2.1 Flat Phantom

A rectangular shaped box made of high-density polyethylene (HDPE) with a dielectric constant of 2.26 and a loss tangent of less than 0.00031. The phantom is mounted on a wooden supporting structure that has a loss tangent of < 0.05. Two flat phantoms were used for this assessment. The structures have a 68.58 cm x 20.32 cm and 68.58cm x 25.4 cm opening at its center to allow positioning the DUT to the phantom's surface. The flat phantom dimensions used for S.A.R. performance assessment at the abdomen and face were: length=80cm, Width=60cm, Height=20cm, Surface thickness=0.2cm and length=80cm, Width=30cm, Height=20cm, Surface thickness=0.2cm respectively.

4.2.2 SAM Phantom

SAM Phantom assessment was not applicable for this filing.

4.3 Simulated Tissue Properties

4.3.1 Type of Simulated Tissue

The simulated tissue used is compliant to that specified in FCC Supplement C (Edition 01 - 01) to OET Bulletin 65 (Edition 97 - 01).

Simulated Tissue	Body Position
FCC Body	Abdomen
IEEE Head	Face

4.3.2 Simulated Tissue Composition

Tissue Ingredient (%) @ 450 MHz		
	Head	Body
Sugar	56	46.5
DGBE (Glycol)	-	-
De ionized -Water	39.1	50.53
Salt	3.8	1.87
HEC	1.0	1.0
Bact.	0.1	0.1

Characterization of Simulated tissue materials and ambient conditions:

Simulated tissue prepared for S.A.R. measurements is measured daily and within 24 hours prior to actual S.A.R. testing to verify that the tissue is within 5% of target parameters at the center of the transmit band. This measurement is done using the Agilent (HP) probe kit model 85070C and a HP8753D Network Analyzer.

Target tissue parameters

FCC Body				
Frequency (MHz)	**Di-electric Constant Target**	**Di-electric Constant Meas. (Range)**	**Conductivity Target S/m**	**Conductivity Meas. (Range) S/m**
450	56.7	54.6-56.9	0.94	0.91-0.96
480	56.6	54.1-56.5	0.94	0.94-0.98

IEEE Head				
Frequency (MHz)	**Di-electric Constant Target**	**Di-electric Constant Meas. (Range)**	**Conductivity Target S/m**	**Conductivity Meas. S/m**
450	43.5	44.6-44.6	0.87	0.88-0.88
480	43.3	43.9-43.9	0.87	0.90-0.90

4.4 Test conditions

The EME Laboratory ambient environment is well controlled resulting in very stable simulated tissue temperature and therefore stable dielectric properties. Simulated tissue temperature is measured prior to each scan to insure it is within +/ - 2^{o}C of the temperature at which the dielectric properties were determined. Additional precautions are routinely taken to ensure the stability of the simulated tissue such as covering the phantoms when scans are not actively in process in order to minimize evaporation. The lab environment is continuously monitored. The table below presents the range and average environmental conditions during the S.A.R. tests reported herein:

	Target	**Measured**
Ambient Temperature	20 - 25 ˚C	Range: 20.5-24.1˚C Avg. 22.2˚C
Relative Humidity	30 - 70 %	Range: 47.3-67.3% Avg. 58.5%
Tissue Temperature	NA	Range: 20.3-21.0˚C Avg. 20.62˚C

The EME Lab RF environment uses a Spectrum Analyzer to monitor for extraneous large signal RF contaminants that could possibly affect the test results. If such unwanted signals are discovered the S.A.R scans are repeated. However, the lab environment is sufficiently protected such that no S.A.R. impacting interference has been experienced to date.

5.0 Description of Test Procedure

All options and accessories listed in section 3.0 were considered in order to develop the S.A.R. test plan for this product. S.A.R. measurements were performed using a flat phantom to assess performance at the abdomen and face. All assessments were done using the flat phantom containing either FCC body or IEEE head tissue where applicable, and with the DUT in CW mode.

Battery search assessment w/ antenna model NAE6483AR:

To determine the battery that exhibited the highest S.A.R. results at the abdomen, each of the offered batteries were tested using the standard antenna at the center of the DUT's transmit band. The measurements were performed with the body worn accessory that provided the minimum separation distance from the phantom and that offered the best positioning repeatability. The standard remote speaker microphone (RSM) was also included in this assessment.

Carry Case Assessment w/ antenna model NAE6483AR:

The DUT was assessed at the center of the DUT's transmit band, with the applicable carry case accessories against the phantom, with the standard RSM attached, using the worst-case battery from above.

The DUT was assessed at the band edges of the DUT's transmit band, against the flat phantom, using the worst-case configuration from above.

Battery search assessment w/ antenna model 8505816K26:

The DUT was assessed at the center of the offered optional antenna's transmit band, with the body worn accessory that offered the best positioning repeatability against the flat phantom, with the standard RSM attached, along with each of the offered batteries.

Carry Case Assessment w/ antenna model 8505816K26:

The DUT was assessed at the center of the offered optional antenna's transmit band, with the applicable carry case accessories against the phantom, with the standard RSM attached, using the worst-case battery from above.

The DUT was assessed at the band edges of the offered optional antenna's transmit band, against the flat phantom, using the worst-case configuration from above.

Audio accessory assessment w/ worst-case test configuration from above:

The DUT was assessed using the worst-case configuration from above, against the flat phantom, with each of the offered audio accessories.

2.5cm Assessment at the abdomen:

The DUT was assessed with its front, back, and antenna separated 2.5 cm distance from the flat phantom containing FCC body tissue, using the worst-case case configuration from the audio accessory assessment above.

2.5cm assessment at the face:

The DUT was assessed at the center of the DUT's transmit band as well as at the center of the optional antenna's transmit band, with the DUT separated 2.5cm from the flat phantom containing IEEE head tissue, using the offered batteries and respective antennas.

The DUT was assessed at the band edges of the DUT's transmission band, with the DUT separated 2.5cm from the flat phantom containing IEEE head tissue, using the worst-case configuration from above.

The DUT was assessed with its front housing separated 2.5 cm distance from the flat phantom containing IEEE head tissue, using the offered audio accessories applicable for use at the face.

Shortened Scan assessment:
The DUT was assessed using a "shortened" cube scan using the worst-case configuration overall from above.

5.1 Device Test Positions

Reference Figure 1 for the device orientation and position which exhibited the highest S.A.R. performance.

5.1.1 Abdomen

The DUT was positioned such that it was centered against the flat phantom with the applicable body-worn accessories or with 2.5cm separation distance from the phantom.

5.1.2 Head

Assessments at the head was not applicable for this filing

5.1.3 Face

The DUT was positioned at the center of the flat phantom with a 2.5cm separation distance from the microphone with and without the applicable audio accessories.

5.2 Test Position Photographs

Figure 1: Highest S.A.R. Test Position
(DUT with Universal Chest Pack model HLN6602A against the flat phantom w/ attached headset model HMN9754D)
All applicable audio accessories were tested in this position

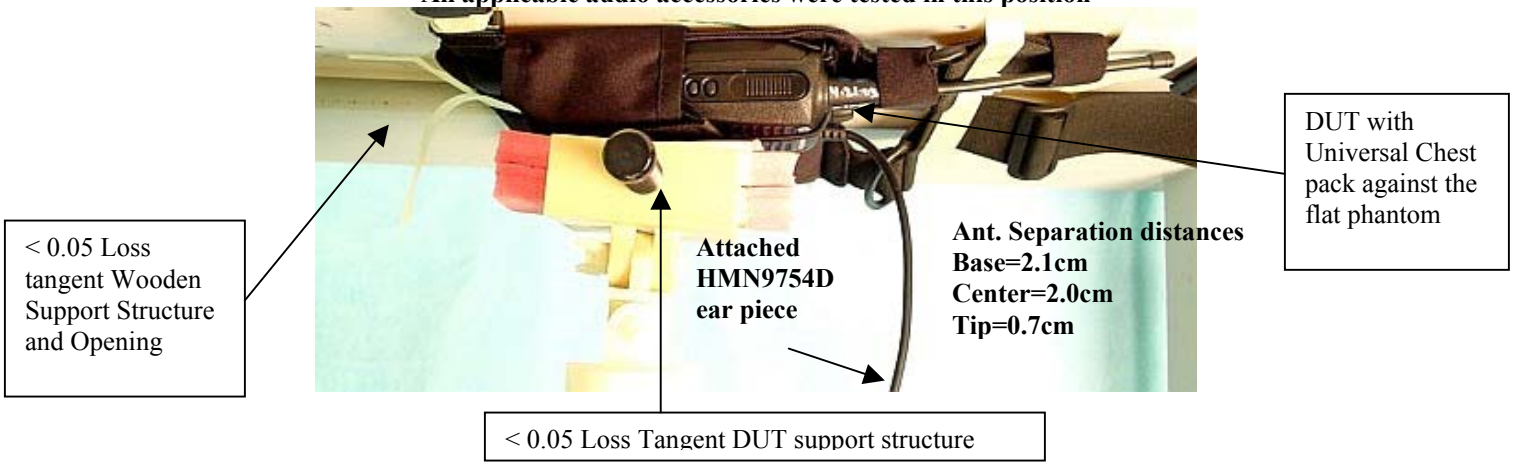

Figure 2. Assessment @ the Abdomen; DUT w/ body worn accessory model HLN9701B W/ attached shoulder strap and model NTN5243A and attached HMN9030A RSM

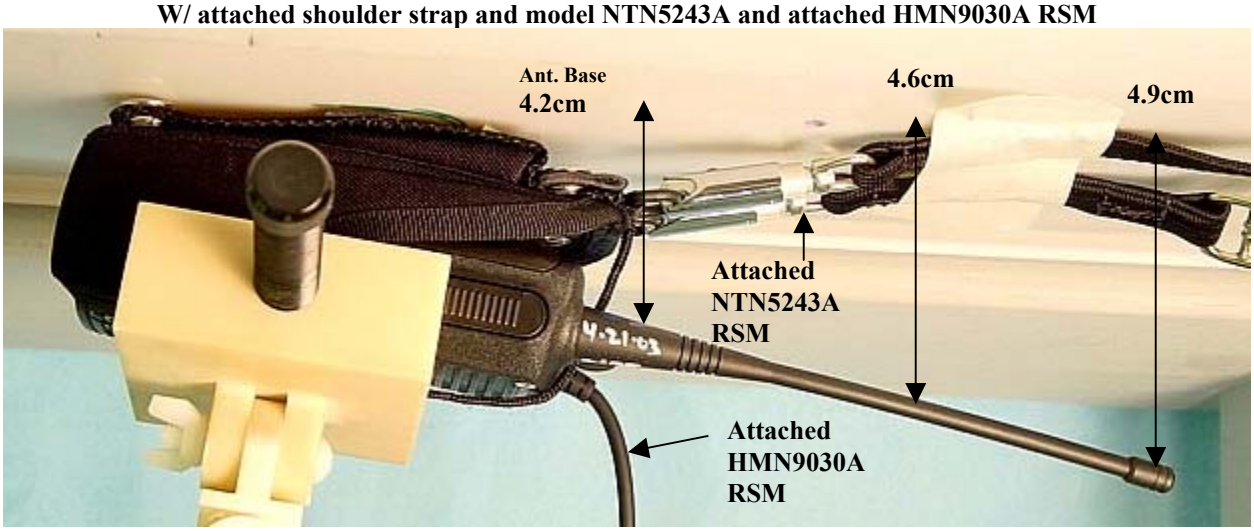

Figure 3. Assessment @ the Abdomen;
DUT w/ body worn accessory model HLN8255B and attached HMN9030A RSM

Figure 4: Assessment @ the Abdomen;
DUT w/ body worn accessory model RLN5383A and attached HMN9030A RSM

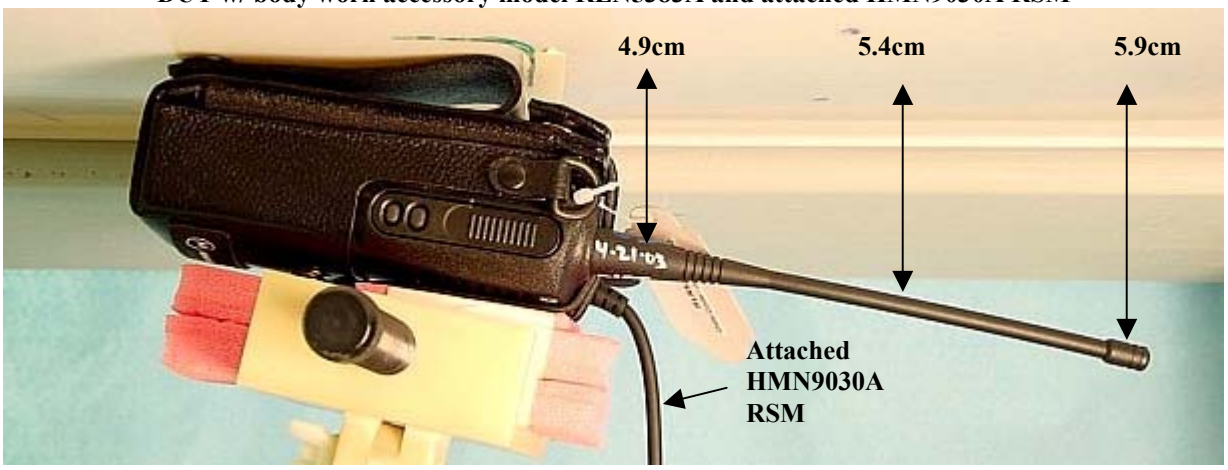

Figure 5: Assessment @ the Abdomen; DUT w/
Body worn accessory model RLN5385A and attached HMN9030A RSM

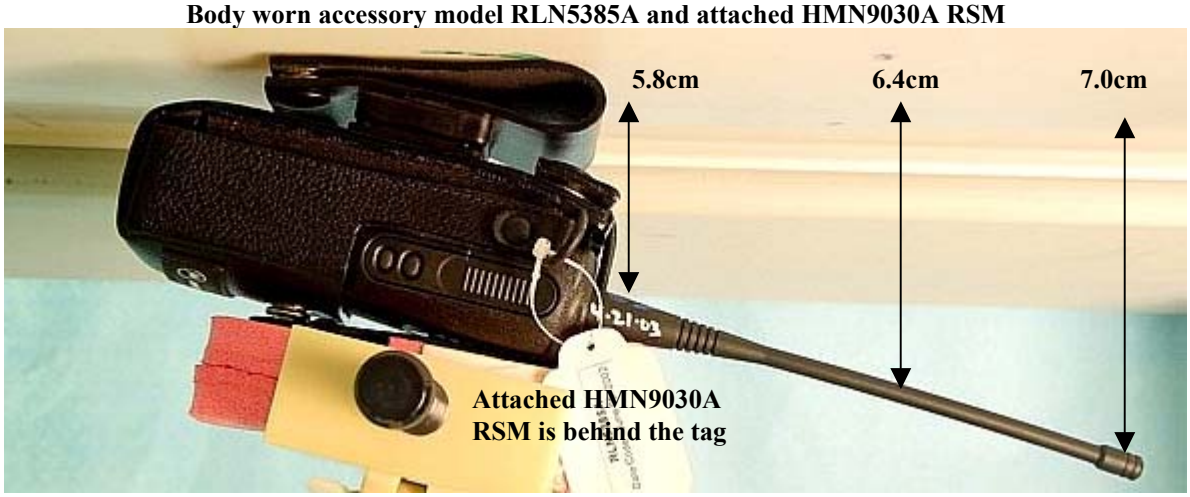

Figure 6: Assessment @ the Abdomen; DUT front w/ body worn accessory model RLN4815A and attached HMN9030A RSM

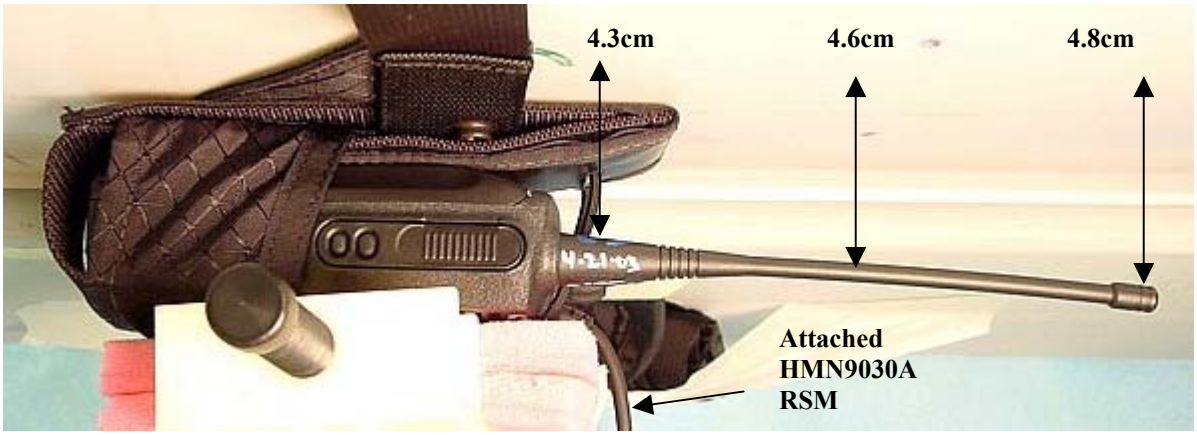

Figure 7: Assessment @ the Face; DUT front w/ 2.5cm separation
Audio accessory model HMN9752B (same position used for audio accessory model HMN9727B)

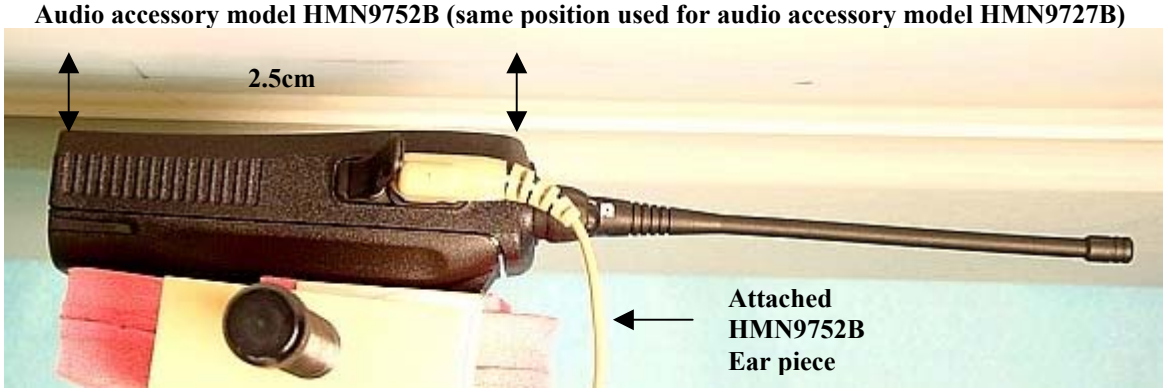

Figure 8: Assessment @ the Abdomen; DUT w/ Front 2.5cm separation w/ attached Audio accessory model HMN9754D ear piece

Figure 9: Assessment @ the Abdomen; DUT w/ antenna 2.5cm separation w/ attached Audio accessory model HMN9754D ear piece

Figure 10: Robot Test setup (Abdomen)

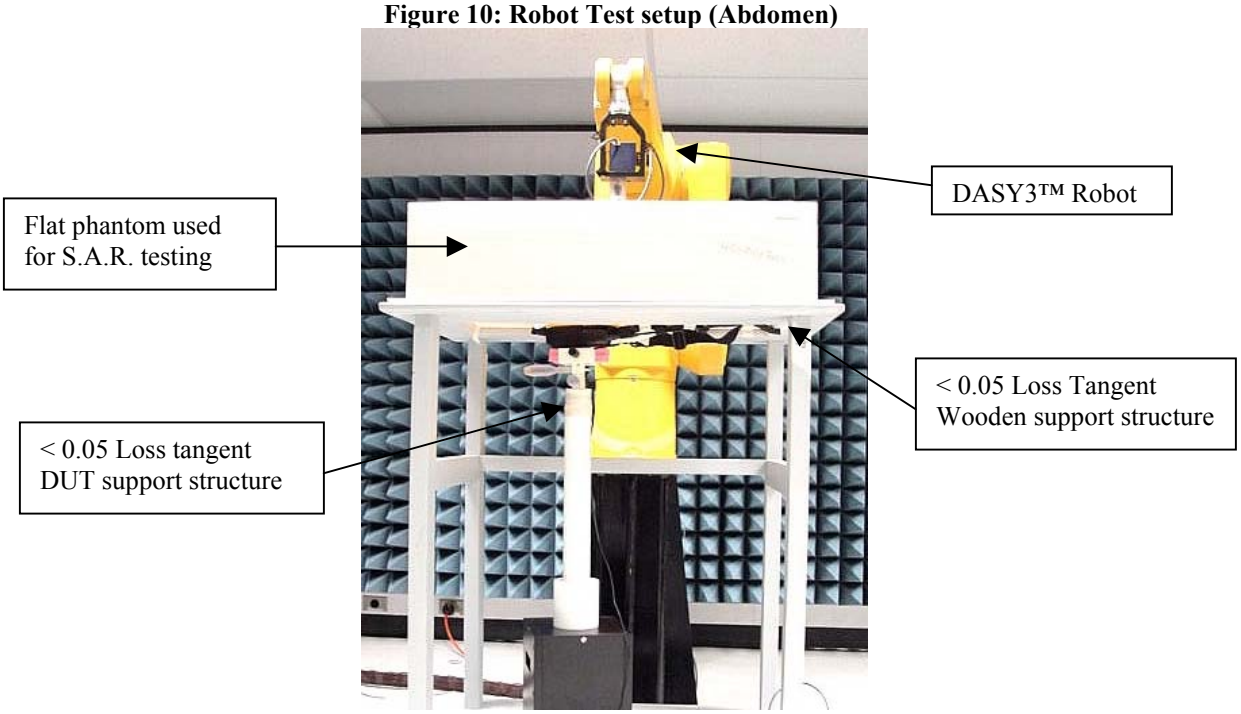

Figure 11: Robot Test Setup (Face)

5.3 Probe Scan Procedures

The E-field probe first scans in a coarse grid over a large area inside the phantom in order to locate the interpolated maximum S.A.R. distribution. After the coarse scan measurement, the probe is automatically moved to a position at the interpolated maximum. The subsequent scan can directly use this position as reference for the cube evaluations.

6.0 Measurement Uncertainty

Table 1: Uncertainty Budget for Device Under Test

a	*b*	*c*	*d*	*e = f(d,k)*	*f*	*g*	*h = c x f / e*	*i = c x g / e*	*k*
Uncertainty Component	**Section of IEEE P1528**	**Tol. (± %)**	**Prob. Dist.**	**Divisor**	c_i **(1 g)**	c_i **(10 g)**	**1 g** u_i **(±%)**	**10 g** u_i **(±%)**	v_i
Measurement System									
Probe Calibration	E.2.1	4.8	N	1.00	1	1	4.8	4.8	∞
Axial Isotropy	E.2.2	4.7	R	1.73	0.707	0.707	1.9	1.9	∞
Spherical Isotropy	E.2.2	9.6	R	1.73	0.707	0.707	3.9	3.9	∞
Boundary Effect	E.2.3	5.8	R	1.73	1	1	3.3	3.3	∞
Linearity	E.2.4	4.7	R	1.73	1	1	2.7	2.7	∞
System Detection Limits	E.2.5	1.0	R	1.73	1	1	0.6	0.6	∞
Readout Electronics	E.2.6	1.0	N	1.00	1	1	1.0	1.0	∞
Response Time	E.2.7	0.8	R	1.73	1	1	0.5	0.5	∞
Integration Time	E.2.8	1.3	R	1.73	1	1	0.8	0.8	∞
RF Ambient Conditions	E.6.1	3.0	R	1.73	1	1	1.7	1.7	∞
Probe Positioner Mechanical Tolerance	E.6.2	0.3	R	1.73	1	1	0.2	0.2	∞
Probe Positioning with respect to Phantom Shell	E.6.3	1.1	R	1.73	1	1	0.6	0.6	∞
Extrapolation, interpolation and Integration Algorithms for Max. SAR Evaluation	E.5	3.9	R	1.73	1	1	2.3	2.3	∞
Test sample Related									
Test Sample Positioning	E.4.2	3.6	N	1.00	1	1	3.6	3.6	29
Device Holder Uncertainty	E.4.1	2.8	N	1.00	1	1	2.8	2.8	8
Output Power Variation - SAR drift measurement	6.6.2	5.0	R	1.73	1	1	2.9	2.9	∞
Phantom and Tissue Parameters									
Phantom Uncertainty (shape and thickness tolerances)	E.3.1	4.0	R	1.73	1	1	2.3	2.3	∞
Liquid Conductivity - deviation from target values	E.3.2	5.0	R	1.73	0.64	0.43	1.8	1.2	∞
Liquid Conductivity - measurement uncertainty	E.3.3	10.0	R	1.73	0.64	0.43	3.7	2.5	∞
Liquid Permittivity - deviation from target values	E.3.2	10.0	R	1.73	0.6	0.49	3.5	2.8	∞
Liquid Permittivity - measurement uncertainty	E.3.3	5.0	R	1.73	0.6	0.49	1.7	1.4	∞
Combined Standard Uncertainty			RSS				12	11	1363
Expanded Uncertainty (95% CONFIDENCE LEVEL)			*k*=2				23	22	

Table 2: Uncertainty Budget for System Performance Check

a	*b*	*c*	*d*	*e* = *f(d,k)*	*f*	*g*	*h* = *c x f / e*	*i* = *c x g / e*	*k*
Uncertainty Component	**Section of IEEE P1528**	**Tol. (± %)**	**Prob. Dist.**	**Div.**	c_i **(1 g)**	c_i **(10 g)**	**1 g** u_i **(±%)**	**10 g** u_i **(±%)**	v_i
Measurement System									
Probe Calibration	E.2.1	4.8	N	1.00	1	1	4.8	4.8	∞
Axial Isotropy	E.2.2	4.7	R	1.73	1	1	2.7	2.7	∞
Spherical Isotropy	E.2.2	9.6	R	1.73	0	0	0.0	0.0	∞
Boundary Effect	E.2.3	5.8	R	1.73	1	1	3.3	3.3	∞
Linearity	E.2.4	4.7	R	1.73	1	1	2.7	2.7	∞
System Detection Limits	E.2.5	1.0	R	1.73	1	1	0.6	0.6	∞
Readout Electronics	E.2.6	1.0	N	1.00	1	1	1.0	1.0	∞
Response Time	E.2.7	0.0	R	1.73	1	1	0.0	0.0	∞
Integration Time	E.2.8	0.0	R	1.73	1	1	0.0	0.0	∞
RF Ambient Conditions	E.6.1	3.0	R	1.73	1	1	1.7	1.7	∞
Probe Positioner Mechanical Tolerance	E.6.2	0.3	R	1.73	1	1	0.2	0.2	∞
Probe Positioning with respect to Phantom Shell	E.6.3	1.1	R	1.73	1	1	0.6	0.6	∞
Extrapolation, interpolation and Integration Algorithms for Max. SAR Evaluation	E.5	3.9	R	1.73	1	1	2.3	2.3	∞
Dipole									
Dipole Axis to Liquid Distance	8, E.4.2	1.0	R	1.73	1	1	0.6	0.6	∞
Input Power and SAR Drift Measurement	8, 6.6.2	4.7	R	1.73	1	1	2.7	2.7	∞
Phantom and Tissue Parameters									
Phantom Uncertainty (shape and thickness tolerances)	E.3.1	4.0	R	1.73	1	1	2.3	2.3	∞
Liquid Conductivity - deviation from target values	E.3.2	5.0	R	1.73	0.64	0.43	1.8	1.2	∞
Liquid Conductivity - measurement uncertainty	E.3.3	10.0	R	1.73	0.64	0.43	3.7	2.5	∞
Liquid Permittivity - deviation from target values	E.3.2	10.0	R	1.73	0.6	0.49	3.5	2.8	∞
Liquid Permittivity - measurement uncertainty	E.3.3	5.0	R	1.73	0.6	0.49	1.7	1.4	∞
Combined Standard Uncertainty			RSS				10	9.4	∞
Expanded Uncertainty (95% CONFIDENCE LEVEL)			*k*=2				20	18	

Notes for Tables 1 and 2
a) Column headings *a-k* are given for reference.
b) Tol. - tolerance in influence quantity.
c) Prob. Dist. – Probability distribution
d) N, R - normal, rectangular probability distributions
e) Div. - divisor used to translate tolerance into normally distributed standard uncertainty
f) *ci* - sensitivity coefficient that should be applied to convert the variability of the uncertainty component into a variability of SAR.
g) *ui* – SAR uncertainty
h) *vi* - degrees of freedom for standard uncertainty and effective degrees of freedom for the expanded uncertainty.

7.0 S.A.R. Test Results

All S.A.R. results obtained by the tests described in Section 5.0 are listed in section 7.1 below. The bolded result indicates the highest observed S.A.R. performance. DASY3™ S.A.R. measurement scans are provided in APPENDIX B for the highest observed S.A.R.
APPENDIX A presents a shortened S.A.R. cube scan to assess the validity of the calculated results presented herein. Note that the results of the shortened cube scans presented in Appendix A demonstrate that the scaling methodology used to determine the calculated S.A.R. results presented herein are valid.

7.1 S.A.R. results

Compliance Assessment at the abdomen; CW mode												
Run Number/ SN	**Freq. (MHz)**	**Battery**	**Test position**	**Body- worn Acc.**	**Additional attachments**	**Initial Power (W)**	**End Power (W)**	**S.A.R. Drift (dB)**	**Measured 1g-S.A.R. (mW/g)**	**Max Calc. 1g-S.A.R. (mW/g)**	**Meas. 10g-S.A.R. (mW/g)**	**Max Calc. 10g-S.A.R. (mW/g)**
Assessment of offered batteries w/ standard antenna model NAE6483AR												
EC-Ab-R3-030519-12/032UHF0064	480	NNTN4497AR	Against phantom	HLN8255B	HMN9030A	4.950	NA	-0.450	4.040	**2.24**	2.910	**1.61**
EC-Ab-R3-030520-06/032UHF0064	480	NNTN4496AR	Against phantom	HLN8255B	HMN9030A	4.690	NA	-0.220	3.400	1.79	2.480	1.30
Assessment of offered carry case accessories and band edges w/ worst-case battery from above and standard antenna model NAE6483AR												
EC-Ab-R3-030520-07/032UHF0064	480	NNTN4497AR	Against phantom	HLN9701B	HMN9030A	4.670	NA	-0.240	2.430	1.28	1.780	0.94
EC-Ab-R3-030520-08/032UHF0064	480	NNTN4497AR	Against phantom	RLN5383A	HMN9030A	4.680	NA	-0.280	1.800	0.96	1.340	0.71
EC-Ab-R3-030520-09/032UHF0064	480	NNTN4497AR	Against phantom	RLN5385A	HMN9030A	4.640	NA	-0.190	1.370	0.72	1.030	0.54
EC-Ab-R3-030520-10/032UHF0064	480	NNTN4497AR	Against phantom	NTN5243A HLN9701B	HMN9030A	4.690	NA	-0.290	2.780	1.49	2.020	1.08
EC-Ab-R3-030520-11/032UHF0064	480	NNTN4497AR	Against phantom	RLN4815A	HMN9030A	4.680	NA	-0.230	2.710	1.43	1.990	1.05
EC-Ab-R3-030520-12/032UHF0064	480	NNTN4497AR	Against phantom	HLN6602A	HMN9030A	4.650	NA	-0.230	8.110	4.28	5.650	2.98
EC-Ab-R3-030520-13/032UHF0064	465	NNTN4497AR	Against phantom	HLN6602A	HMN9030A	4.680	NA	-0.390	6.020	3.29	4.220	2.31
EC-Ab-R3-030520-14/032UHF0064	495	NNTN4497AR	Against phantom	HLN6602A	HMN9030A	4.560	NA	-0.940	9.850	**6.17**	6.850	**4.29**
Assessment of offered batteries w/ optional antenna model 8505816K26												
JF-Ab-R3-030521-02/032UHF0064	480	NNTN4496AR	Against phantom	HLN8255B	HMN9030A	4.450	NA	-0.230	2.280	**1.24**	1.650	**0.90**
JF-Ab-R3-030521-03/032UHF0064	480	NNTN4497AR	Against phantom	HLN8255B	HMN9030A	4.600	NA	-0.150	2.230	1.15	1.620	0.84
Assessment of offered carry case accessories and band edges w/ optional antenna model 8505816K26												
JF-Ab-R3-030521-04/032UHF0064	480	NNTN4496AR	Against phantom	HLN9701B NTN5243A	HMN9030A	4.600	NA	-0.130	1.760	0.91	1.300	0.67
JF-Ab-R3-030521-05//032UHF0064	480	NNTN4496AR	Against phantom	RLN5383A	HMN9030A	4.600	NA	-0.110	1.480	0.76	1.100	0.56

Assessment of offered carry case accessories and band edges w/ optional antenna model 8505816K26 (Continued)												
Run Number/ SN	**Freq. (MHz)**	**Battery**	**Test position**	**Body- worn Acc.**	**Additional attachments**	**Initial Power (W)**	**End Power (W)**	**S.A.R. Drift (dB)**	**Measured 1g-S.A.R. (mW/g)**	**Max Calc. 1g-S.A.R. (mW/g)**	**Meas. 10g-S.A.R. (mW/g)**	**Max Calc. 10g-S.A.R. (mW/g)**
JF-Ab-R3-030521-06/032UHF0064	480	NNTN4496AR	Against phantom	RLN5385A	HMN9030A	4.600	NA	-0.070	1.080	0.55	0.805	0.41
JF-Ab-R3-030521-07/032UHF0064	480	NNTN4496AR	Against phantom	HLN9701B	HMN9030A	4.600	NA	-0.120	1.710	0.88	1.260	0.65
EC-Ab-R3-030521-09/032UHF0064	480	NNTN4496AR	Against phantom	RLN4815A	HMN9030A	4.590	NA	-0.090	1.710	0.87	1.260	0.64
EC-Ab-R3-030521-10/032UHF0064	480	NNTN4496AR	Against phantom	HLN6602A	HMN9030A	4.600	NA	-0.090	4.290	2.19	2.950	1.51
EC-Ab-R3-030521-11/032UHF0064	470	NNTN4496AR	Against phantom	HLN6602A	HMN9030A	4.650	NA	-0.310	2.970	1.60	2.070	1.11
EC-Ab-R3-030521-12/032UHF0064	495	NNTN4496AR	Against phantom	HLN6602A	HMN9030A	4.450	NA	-1.320	4.230	**2.96**	2.940	**2.06**
Assessment of offered audio accessories w/ worst-case test configuration from above w/ antenna model NAE6483AR												
EC-Ab-R3-030521-13/032UHF0064	495	NNTN4497AR	Against phantom	HLN6602A	PMMN4008A	4.560	NA	-0.960	10.100	6.35	7.010	4.41
EC-Ab-R3-030521-14/032UHF0064	495	NNTN4497AR	Against phantom	HLN6602A	PMLN4442A	4.570	NA	-0.930	10.300	6.42	7.170	4.47
EC-Ab-R3-030521-15/032UHF0064	495	NNTN4497AR	Against phantom	HLN6602A	PMLN4443A	4.560	NA	-0.990	10.300	6.53	7.150	4.53
EC-Ab-R3-030521-16/032UHF0064	495	NNTN4497AR	Against phantom	HLN6602A	PMLN4444A	4.560	NA	-0.980	9.440	5.97	6.610	4.18
EC-Ab-R3-030521-17/032UHF0064	495	NNTN4497AR	Against phantom	HLN6602A	PMLN4445A	4.540	NA	-0.940	9.830	6.18	6.850	4.31
EC-Ab-R3-030521-18/032UHF0064	495	NNTN4497AR	Against phantom	HLN6602A	PMLN4294C	4.600	NA	-0.950	9.590	5.97	6.700	4.17
EC-Ab-R3-030521-19/032UHF0064	495	NNTN4497AR	Against phantom	HLN6602A	HMN9754D	4.610	NA	-0.910	11.100	**6.84**	7.660	**4.72**
EC-Ab-R3-030521-20/032UHF0064	495	NNTN4497AR	Against phantom	HLN6602A	BDN6706B & 0180358E83	4.580	NA	-0.900	9.660	5.97	6.760	4.18
EC-Ab-R3-030521-21/032UHF0064	495	NNTN4497AR	Against phantom	HLN6602A	PMMN4001A	4.620	NA	-0.960	9.960	6.21	6.950	4.33
EC-Ab-R3-030521-22/032UHF0064	495	NNTN4497AR	Against phantom	HLN6602A	PMLN4425A	4.640	NA	-0.950	10.500	6.53	7.330	4.56
JF-Ab-R3-030522-04/032UHF0064	495	NNTN4497AR	Against phantom	HLN6602A	HMN9013A	4.550	NA	-0.900	8.770	5.45	6.170	3.84
JF-Ab-R3-030522-02/032UHF0064	495	NNTN4497AR	Against phantom	HLN6602A	RMN4016A	4.500	NA	-0.920	8.710	5.50	6.100	3.85
JF-Ab-R3-030522-03/032UHF0064	495	NNTN4497AR	Against phantom	HLN6602A	RLN5238A	4.550	NA	-1.080	8.740	5.67	6.130	3.97
JF-Ab-R3-030522-07/032UHF0064	495	NNTN4497AR	Against phantom	HLN6602A	HMN9021A	4.600	NA	-0.830	9.090	5.50	6.380	3.86
JF-Ab-R3-030522-05/032UHF0064	495	NNTN4497AR	Against phantom	HLN6602A	BDN6647F	4.550	NA	-0.920	9.140	5.71	6.390	3.99
JF-Ab-R3-030522-06/032UHF0064	495	NNTN4497AR	Against phantom	HLN6602A	BDN6648C	4.550	NA	-0.960	8.800	5.55	6.190	3.90

Assessment of offered audio accessories w/ worst-case test configuration from above (Continued)												
Run Number/ SN	**Freq. (MHz)**	**Battery**	**Test position**	**Body- worn Accessories**	**Additional attachments**	**Initial Power (W)**	**End Power (W)**	**S.A.R. Drift (dB)**	**Measured 1g-S.A.R. (mW/g)**	**Max Calc. 1g-S.A.R. (mW/g)**	**Meas. 10g-S.A.R. (mW/g)**	**Max Calc. 10g-S.A.R. (mW/g)**
EC-Ab-R3-030522-08/032UHF0064	495	NNTN4497AR	Against phantom	HLN6602A	RMN5015A & RKN4090A	4.570	NA	-0.890	8.820	5.45	6.220	3.84
EC-Ab-R3-030522-09/032UHF0064	495	NNTN4497AR	Against phantom	HLN6602A	RMN4051B & RKN4094A	4.610	NA	-0.840	9.380	5.69	6.570	3.99
EC-Ab-R3-030522-10/032UHF0064	495	NNTN4497AR	Against phantom	HLN6602A	RLN5411A	4.620	NA	-1.040	9.130	5.80	6.380	4.05
EC-Ab-R3-030522-11/032UHF0064	495	NNTN4497AR	Against phantom	HLN6602A	RMN4054B	4.570	NA	-0.830	8.140	4.96	5.780	3.52
EC-Ab-R3-030522-12/032UHF0064	495	NNTN4497AR	Against phantom	HLN6602A	RMN4055A	4.600	NA	-0.800	7.820	4.70	5.570	3.35
EC-Ab-R3-030522-14/032UHF0064	495	NNTN4497AR	Against phantom	HLN6602A	HMN9754D HLN9133A	4.600	NA	-0.750	8.750	5.20	6.170	3.67
Assessment at 2.5cm distance w/ worst-case test configuration from audio assessment above w/ antenna model NAE6483AR												
JF-Ab-R3-030523-05/032UHF0064	495	NNTN4497AR	DUT back/ant. 2.5cm	None	HMN9754D	4.550	NA	-0.400	8.270	**4.58**	5.860	**3.25**
EC-Ab-R3-030523-06/032UHF0064	495	NNTN4497AR	DUT front 2.5cm	None	PMLN4444A	4.550	NA	-0.510	3.900	2.22	2.860	1.63

Compliance assessment at the Face; CW mode												
Run Number/ SN	**Freq. (MHz)**	**Battery**	**Test position**	**Body- worn Accessories**	**Additional attachments**	**Initial Power (W)**	**End Power (W)**	**S.A.R. Drift (dB)**	**Measured 1g-S.A.R. (mW/g)**	**Max Calc. 1g-S.A.R. (mW/g)**	**Meas. 10g-S.A.R. (mW/g)**	**Max Calc. 10g-S.A.R. (mW/g)**
Assessment of offered batteries w/ antenna model NAE6483AR												
EC-Face-R3-030523-08/032UHF0064	480	NNTN4496AR	DUT front 2.5cm	None	None	4.590	NA	-0.200	3.370	1.77	2.460	1.29
EC-Face-R3-030523-09/032UHF0064	480	NNTN4497AR	DUT front 2.5cm	None	None	4.570	NA	-0.220	3.690	1.95	2.670	1.41
Assessment of offered batteries w/ antenna model 8505816K26												
EC-Face-R3-030523-10/032UHF0064	480	NNTN4496AR	DUT front 2.5cm	None	None	4.670	NA	-0.080	2.110	1.07	1.520	0.77
EC-Face-R3-030523-11/032UHF0064	480	NNTN4497AR	DUT front 2.5cm	None	None	4.680	NA	-0.160	2.090	1.08	1.510	0.78
Band edge assessment w/ worst-case battery and worst-case antenna model NAE6483AR												
EC-Face-R3-030523-12/032UHF0064	465	NNTN4497AR	DUT front 2.5cm	None	None	4.700	NA	-0.580	3.470	1.98	2.520	1.44
EC-Face-R3-030523-13/032UHF0064	495	NNTN4497AR	DUT front 2.5cm	None	None	4.580	NA	-0.500	5.230	**2.95**	3.760	**2.12**
Assessment at the face of applicable offered audio accessories w/ worst-case test configuration from above w/ antenna model NAE6483AR												
EC-Face-R3-030523-14/032UHF0064	495	NNTN4497AR	DUT front 2.5cm	None	HMN9752B	4.570	NA	-0.520	5.000	**2.84**	3.600	**2.04**
EC-Face-R3-030523-15/032UHF0064	495	NNTN4497AR	DUT front 2.5cm	None	HMN9727B	4.610	NA	-0.460	4.950	2.75	3.570	1.98

7.2 Peak S.A.R. location

Refer to APPENDIX B for detailed S.A.R. scan distributions.

7.3 Highest S.A.R. results calculation methodology

The calculated maximum 1-gram and 10-gram averaged S.A.R. value is determined by scaling the measured S.A.R. to account for power leveling variations and power output slump below the reported maximum power during the S.A.R. measurements. For this device the Maximum Calculated 1-gram and 10-gram averaged peak S.A.R. is calculated using the following formula:

Max. Calc. 1-g Avg. SAR = ((S.A.R. meas. / (10^(Pdrift/10))*(Pmax/Pint))* DC%)
P_{max} = Maximum Power (W)
P_{int} = Initial Power (W)
Pdrift = DASY drift results (dB)
$SAR_{meas.}$ = Measured 1 gram averaged peak S.A.R. (mW/g)
DC % = Transmission mode duty cycle in % where applicable
Note: If intial power is > than max power then Pmax/Pint = 1

8.0 Conclusion

The highest Operational Maximum Calculated 1-gram and 10-gram average S.A.R. values found for FCC ID: ABZ99FT4058

At the abdomen: **1-g Avg. = 6.84 mW/g; 10-g Avg. = 4.72 mW/g**
At the Face: **1-g Avg. = 2.95 mW/g; 10-g Avg. = 2.12 mW/g**
At the Head: **N/A**

These test results clearly demonstrate compliance with FCC Occupational/Controlled RF Exposure limits of **8.0 mW/g** per the requirements of 47 CFR 2.1093(d)