



MOTOROLA



CGISS EME Test Laboratory

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

Date of Report: May 20, 2004
Report Revision: Rev. O
Manufacturer: Motorola
Product Description: 1:6, 1:3, 81:120, 1:12 TDM; 64 QAM, 16 QAM & QPSK
Modulation; 0.6 W Pulse average
FCC ID: AZ489FT5824
Device Model: H63XAN6RR4AN/NUF3898A

Test Period: 4/29/04 - 5/17/04
Technician: Clint Miller (EME Technician Electronics II)
Responsible Eng: Jim Fortier (Elect. Principle Staff Eng.)
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

5/20/04

Ken Enger
Senior Resource Manager, Laboratory Director, CGISS EME Lab

Date Approved

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REVISION HISTORY

Date	Revision	Comments
5/20/04	O	Release of Pilot results

1.0 Introduction

This report details the utilization, test setup, test equipment, and test results of the Specific Absorption Rate (S.A.R.) measurements performed at the CGISS EME Test Lab for model number H63XAN6RR4AN/NUF3898A, FCC ID: AZ489FT5824.

The applicable exposure environment is General Population/Uncontrolled.

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
- IEEE 1528, 2003 "Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques"
- 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 Radiocommunications (Electromagnetic Radiation - Human Exposure) Standard 2003
- ANATEL, Brazil Regulatory Authority, Resolution No. 303 of July 2, 2002 "Regulation of the limitation of exposure to electrical, magnetic, and electromagnetic fields in the radio frequency range between 9KHz and 300 GHz." and "Attachment to resolution # 303 from July 2, 2002"

3.0 Description of Test Sample



(Horizontal and vertical reference lines intersecting at the acoustic output are marked in white on the DUT)

FCC ID: AZ489FT5824 is a digital multi-service data capable device that employs time division multiplexing transmission technology with a duty cycle ranging from 16.67% to 33.33% using 16-QAM modulation for voice or circuit data transmission. There is a Split 1:3 mode that operates using a 16.67% transmission duty cycle. Two 7.5ms pulses occur during the six time slots within the 90-msec frame format. This mode is available in both the 806-825MHz and 896-902MHz bands in the telephone interconnect mode only. Packet data transmission is also supported up to a maximum duty cycle of 67.5% using quad QPSK modulation.

This device will be marketed to and used by the general population. This device may be used while held against the head in voice mode, in front of the face in PTT mode, and against the body in voice, PTT and data modes.

FCC ID: AZ489FT5824 is capable of operating in the 806-825 MHz and 896-902MHz bands. Packet data transmission is not available while transmitting in the 896-902 MHz band. The rated power is 0.6 watts pulsed averaged. The maximum output is 0.7 watts pulsed average as defined by the upper limit of the production line final test station.

FCC ID: AZ489FT5824 is offered with the following options and accessories:

Antenna	Description
----------------	--------------------

8585081F01	Top Helical 806 – 941 MHz ¼ wave retractable antenna; 2.4-9.9cm Worst case antenna gain -0.9dBd @ 813MHz, -0.10dBd @ 896 MHz
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Batteries

SNN5705B	750mAh Lithium Ion
SNN5704A	600mAh Lithium Ion
NNTN5728A	Battery Door w/esc. Label, Standard, Black
NNTN5727A	Battery Door w/esc. Label, Slim, Black

Body-worn Accessories

NNTN5726A	Holster
NNTN4747A	Belt clip

Applicable Audio accessories

SYN8390B	Privacy Earpiece and Mic
NNTN4033A	Privacy earpiece and Mic w/ PTT
NSN6066A	Remote speaker Mic
NNTN4620A	Silver Earbud
SYN8146C	Lightweight over the ear headset w/boom Mic
SYN7875C	Hearing Aid Neck loop
NTN8496A	Lightweight Headset w/mic
NTN8513B	Lightweight Headband
NNTN5004A	PTT headset (Over-the-ear)
NNTN5005A	PTT headset (Over the head)
NNTN5006A	PTT headset (Ear bud)

Other applicable options:

NKN6560A	RS232 Data Cable
NKN6559A	USB Data Cable

3.1 Test Signal

Test Mode	☒	Call Simulator	☐	Simulator	☐
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Test Signal mode:

Transmission Mode:

CW	
Native Transmission	X
TDMA	
Other	

3.2 Test Output Power

A table of the characteristic power slump versus time is provided in Appendix A for all tested batteries.

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 ET3DV6 and EX3DV3 E-Field probes. 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/SN1383. 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. 1-g S.A.R. Result when normalized to 1W (mW/g)	Reference 1-g S.A.R @ 1W (mW/g)	Test Date(s)
1383	FCC Body	2/25/04	D900V2/085	11.240 +/- 0.360	11.17 +/- 10%	5/12/04-5/17/04 6 test days
1383	IEEE Head	2/25/04	D900V2/085	11.565 +/- 0.275	12.00 +/- 10%	4/29/04-5/11/04 8 test days

Note: System performance results reflects the median performance +/- ½ of the test date(s) performance ranges

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 S.A.R. EME 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) material. The phantom is mounted on a wooden supporting structure that has a loss tangent of < 0.05 . The structure has a 68.58 cm x 20.32 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 are L = 80cm, W = 30cm, H = 20cm, Surface Thickness = 0.2cm.

4.2.2 SAM Phantom

A SAM TP1022 phantom supplied by SPEAG was used to assess S.A.R. performance at the head.

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) and IEEE 1528, 2003 "Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques"

Simulated Tissue	Body Position
FCC Body	Torso
IEEE Head	Head/Face

4.3.2 Simulated Tissue Composition

% of listed ingredients	900MHz		835MHz	
	Head	Body	Head	Body
Sugar	56.50	44.90	57.00	44.90
DGBE (Glycol)	NA	NA	NA	NA
Diacetin	NA	NA	NA	NA
De ionized -Water	40.95	53.06	44.90	53.06
Salt	1.45	0.94	1.45	0.94
HEC	1	1	1	1
Bact.	0.1	0.1	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
900	55.0	52.4 - 53.1	1.05	1.02 – 1.03
813	55.3	53.2 - 54.0	0.97	0.93 - 0.94

IEEE Head				
Frequency (MHz)	Di-electric Constant Target	Di-electric Constant Meas. (Range)	Conductivity Target S/m	Conductivity Meas. (Range) S/m
900	41.5	42.1 - 42.7	0.97	1.01 – 1.01
813	41.6	43.1 – 43.6	0.90	0.93 – 0.93

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°C of the temperature at which the dielectric properties were determined. The liquid depth in the phantom used for measurements was 15cm +/- 0.5cm. 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: 21.0-22.5°C Avg. 22.10°C
Relative Humidity	30 - 70 %	Range: 45.0-52.0% Avg. 48.30%
Tissue Temperature	NA	Range: 20.1-21.1°C Avg. 20.60°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 Probe Scan Procedures

The E-field probe first scans 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.

5.1 Shortened scan rationale

APPENDIX A presents relevant shortened S.A.R. cube scans to assess the validity of the calculated results presented herein. The results of the shortened cube scans demonstrate that the scaling methodology used to determine the calculated S.A.R. results presented herein are valid.

5.2 Device test positions

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

5.2.1 Body

The DUT was positioned such that the carry case was centered against the flat phantom with and without the applicable accessory attachments. The DUT was positioned with its' front, and antenna (back towards the phantom) separated 2.5cm from the flat phantom.

5.2.2 Head

The DUT was placed in the cheek touch and 15° tilt positions at the left and right ears of the SAM phantom

5.2.3 Face

The DUT was placed with 2.5cm separation from the flat area of the SAM phantom.

5.3 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 with applicable tissue simulant to assess performance at the body and a SAM phantom with applicable tissue simulant to assess performance at the side of the head and in front of the face using the applicable transmission modes.

Assessments at the head (800MHz band) [\[Page21-22 of 26; Table 1\]](#)

The DUT was assessed at the TX center frequency of the band, in cheek touch position at the left ear of the SAM phantom, with the antenna retracted and extended, using the offered battery, in the 1:3 transmission mode.

The DUT was assessed at the TX center frequency of the band, in the 15° tilt position at the left ear of the Sam phantom, with the antenna retracted and extended, using the worst case battery from above, in 1:3 transmission mode.

The DUT was assessed at the TX band edges, in 1:3 transmission mode, with the antenna retracted and extended, using the test configuration from above that produced the highest S.A.R results.

The DUT was assessed at the TX center frequency of the band, in cheek touch position at the right ear of the SAM phantom, with the antenna retracted and extended, using the worst case battery from the left ear assessment, in the 1:3 transmission mode.

The DUT was assessed at the TX center frequency of the band, in the 15° tilt position at the left ear of the Sam phantom, with the antenna retracted and extended, using the worst case battery from the left ear assessment, in 1:3 transmission mode.

The DUT was assessed at the TX band edges, in 1:3 transmission mode, with the antenna retracted and extended, using the test configuration from above that produced the highest S.A.R results.

The DUT was assessed at the center frequency of the band, in the 1:6 transmission mode, with 2.5cm separation distance from the flat area of the SAM phantom (face assessment), using the worst case battery from above, with the flip open and closed.

Assessments at the head (900MHz band) [\[Page 22-23 of 26; Table 2\]](#)

The DUT was assessed at the TX center frequency of the band, in cheek touch position at the left ear of the SAM phantom, with the antenna retracted and extended, using the offered battery, in the 1:3 transmission mode.

The DUT was assessed at the TX center frequency of the band, in the 15° tilt position at the left ear of the Sam phantom, with the antenna retracted and extended, using the worst case battery from above, in 1:3 transmission mode.

The DUT was assessed at the TX band edges, in 1:3 transmission mode, with the antenna retracted and extended, using the test configuration from above that produced the highest S.A.R results.

The DUT was assessed at the TX center frequency of the band, in cheek touch position at the right ear of the SAM phantom, with the antenna retracted and extended, using the worst case battery from the left ear assessment, in the 1:3 transmission mode.

The DUT was assessed at the TX center frequency of the band, in the 15° tilt position at the left ear of the Sam phantom, with the antenna retracted and extended, using the worst case battery from the left ear assessment, in 1:3 transmission mode.

The DUT was assessed at the TX band edges, in 1:3 transmission mode, with the antenna retracted and extended, using the test configuration from above that produced the highest S.A.R results.

The DUT was assessed at the center frequency of the band, in the 1:6 transmission mode, with

2.5cm separation distance from the flat area of the SAM phantom (face assessment), using the worst case battery from above.

Assessments at the body (800MHz band) [\[Pages 23-24 of 26; Table 3\]](#)

The DUT was assessed at the TX center frequency of the band, with the offered carry case accessories against the flat phantom, in the 81:120 transmission mode, with the antenna retracted and extended, using each of the offered battery.

The DUT was assessed at the TX center frequency of the band, against the flat phantom, in the 81:120 transmission mode, with the antenna retracted and extended, using the worst case carry case accessory from above, with each of the offered data cable attachments.

The DUT was assessed at the TX center frequency of the band, against the flat phantom, in the 1:3 transmission mode, with the antenna retracted and extended, using the worst case carry case test configuration from above, with each of the offered audio accessories.

The DUT was assessed at the TX center frequency of the band, against the flat phantom, in the 1:6 transmission mode, using the worst case test configuration from above, with the offered remote speaker microphone and PTT headset accessories.

The DUT was assessed at the edges of the band, in the 81:120 transmission mode, with the antenna retracted and extended, using the over all worst case test configuration at the body from above.

Assessments at the body (900MHz band) [\[Page 25 of 26; Table 4\]](#)

The DUT was assessed in the 1:3 transmission mode, across the TX band, with the antenna retracted and extended, using the applicable worst case test configuration from the 800MHz band assessment at the body.

Assessments at the body (@ 2.5cm) [\[Page 25 of 26; Table 4\]](#)

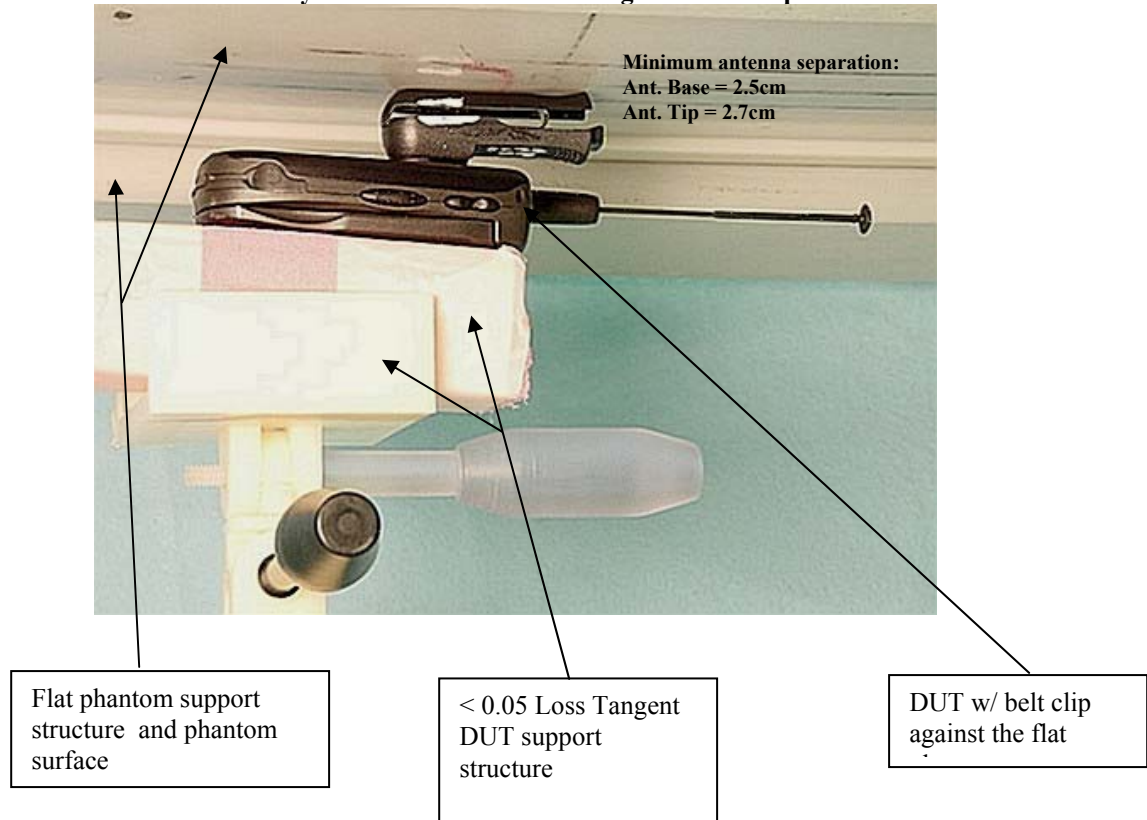
The DUT was assessed in the 81:120 transmission mode, against the phantom with its' back and front housing separated 2.5 cm from the phantom, using the worst case test frequency and offered battery from the 800MHz and 900MHz assessments above.

Shortened scan assessment at the body [\[APPENDIX A\]](#)

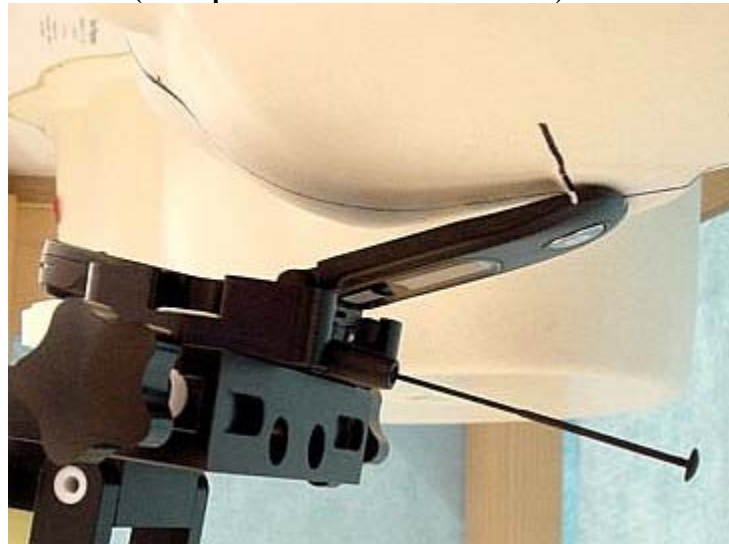
A “shortened” scan was performed using the test configuration that produced the highest S.A.R. results overall at the body.

5.4 Test Position Photographs

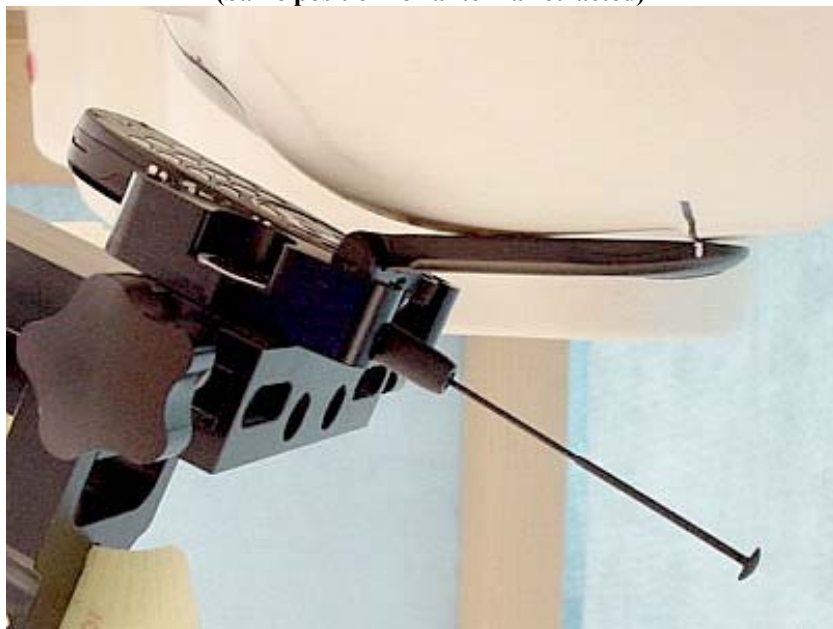
**Figure 1: Highest S.A.R. Test Position (@ body)
DUT with carry case model NNTN4747A against the flat phantom.**



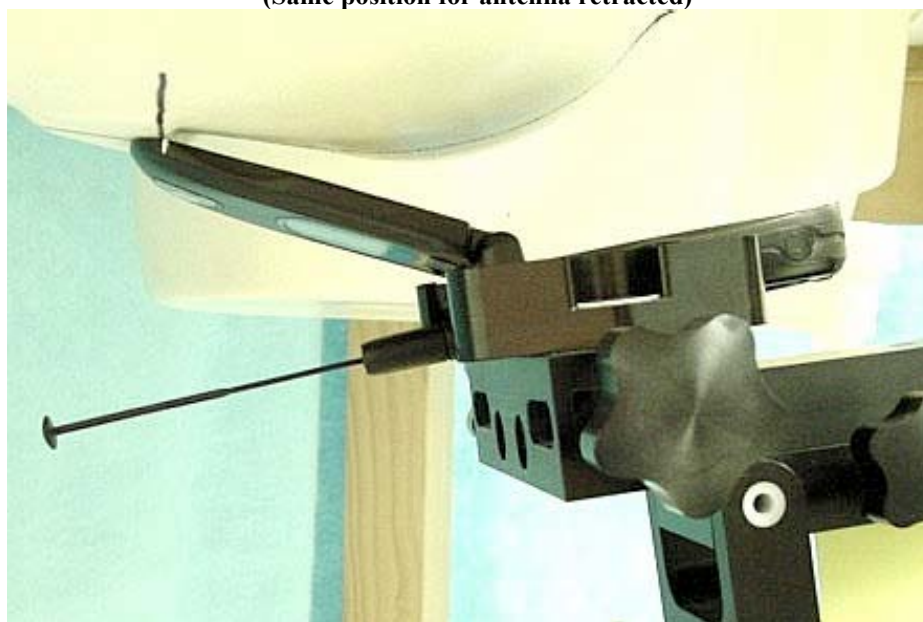
**Figure 2. Assessment @ the Left ear
DUT in 15° tilt position
(Same position for antenna retracted)**



**Figure 3. Assessment @ the Left ear
DUT in Cheek touch position
(Same position for antenna retracted)**



**Figure 4. Assessment @ the Right ear
DUT in 15° tilt position
(Same position for antenna retracted)**



**Figure 5. Assessment @ the Right ear
DUT in Cheek touch position
(Same position for antenna retracted)**



**Figure 6. Assessment @ the Face (Flip opened)
DUT front 2.5cm separation distance from flat phantom.**

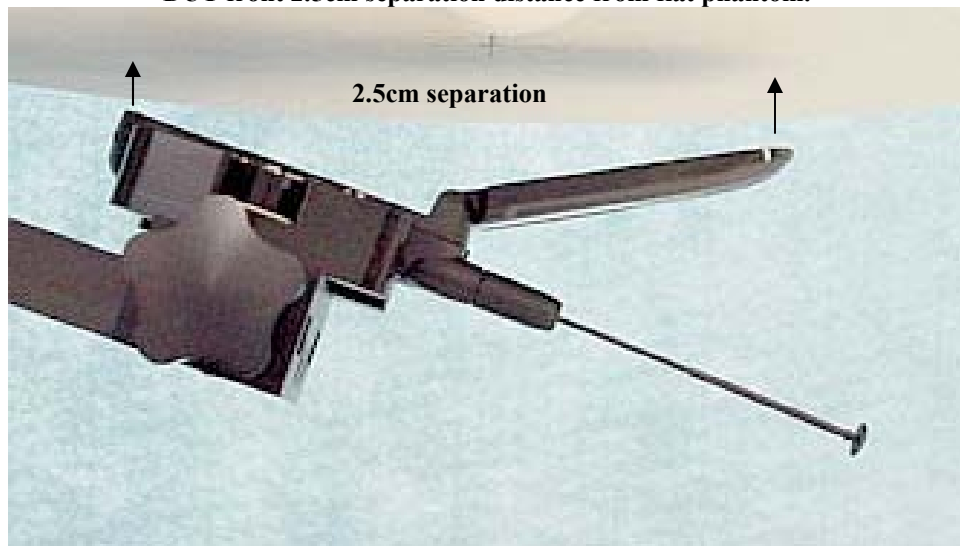


Figure 7. Assessment @ the Face (Flip closed)
DUT front 2.5cm separation distance from flat phantom.

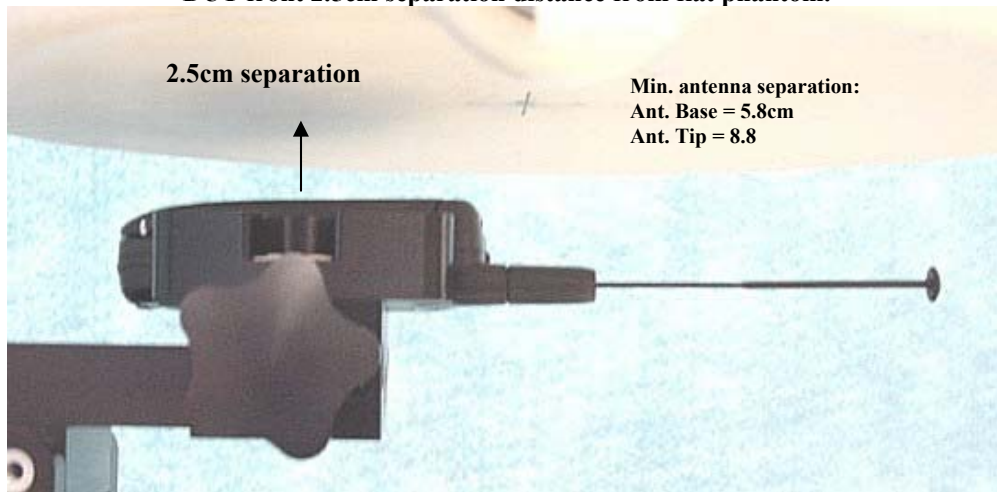


Figure 8. Assessment @ Body
DUT w/ holster model NNTN5726A against the flat phantom

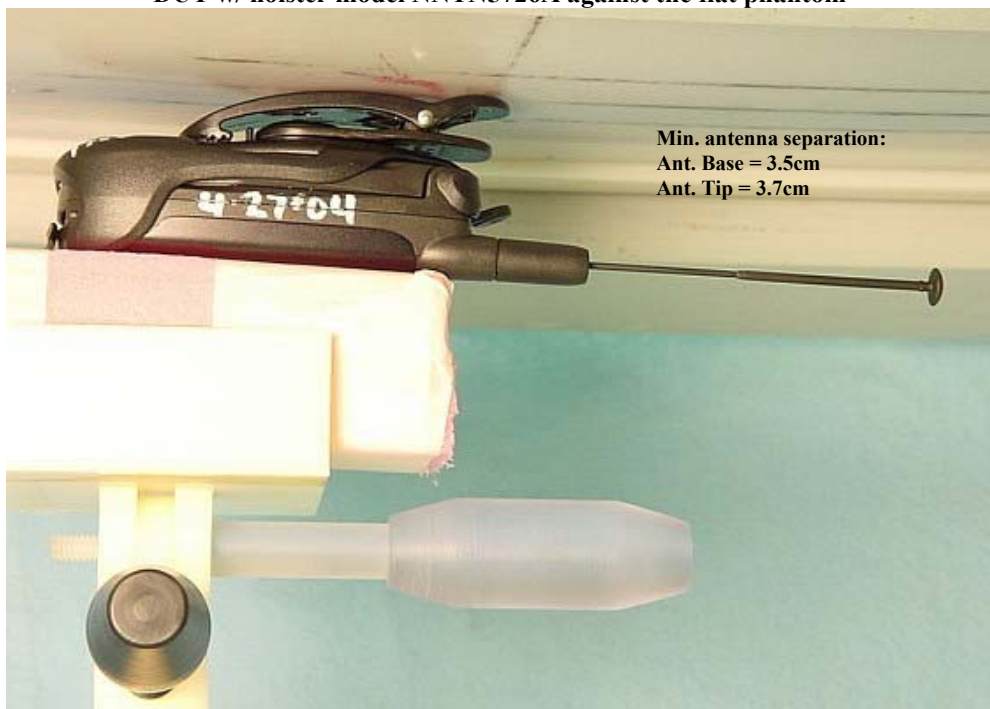


Figure 8. Assessment @ Body
DUT w/ belt clip model NNTN4747A against the flat phantom
(With offered data cable attached; same position used with offered audio accessories attached)



Figure 9. Body assessment @ 2.5cm
DUT with front housing separated 2.5cm from the phantom.

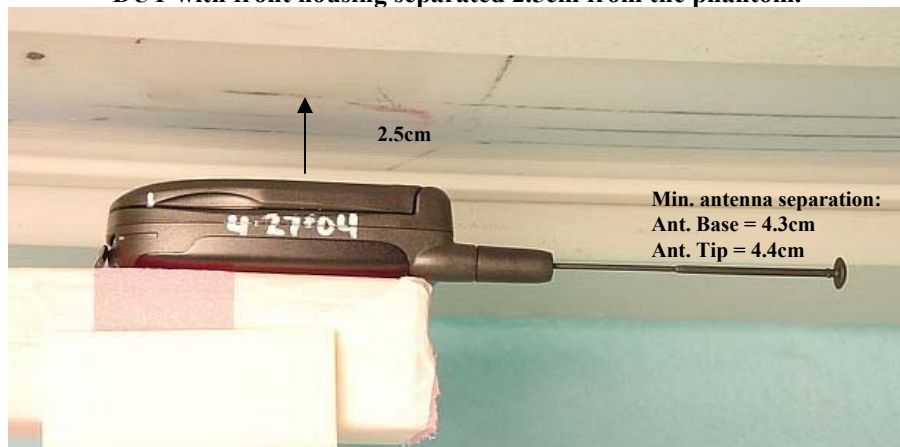


Figure 10. Body assessment w/ back housing @ 2.5cm

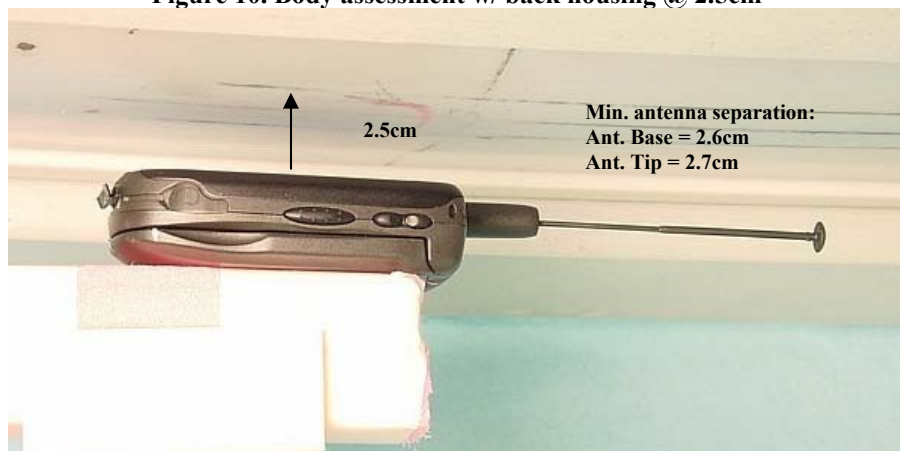


Figure 10: Robot Test System (Flat Phantom)

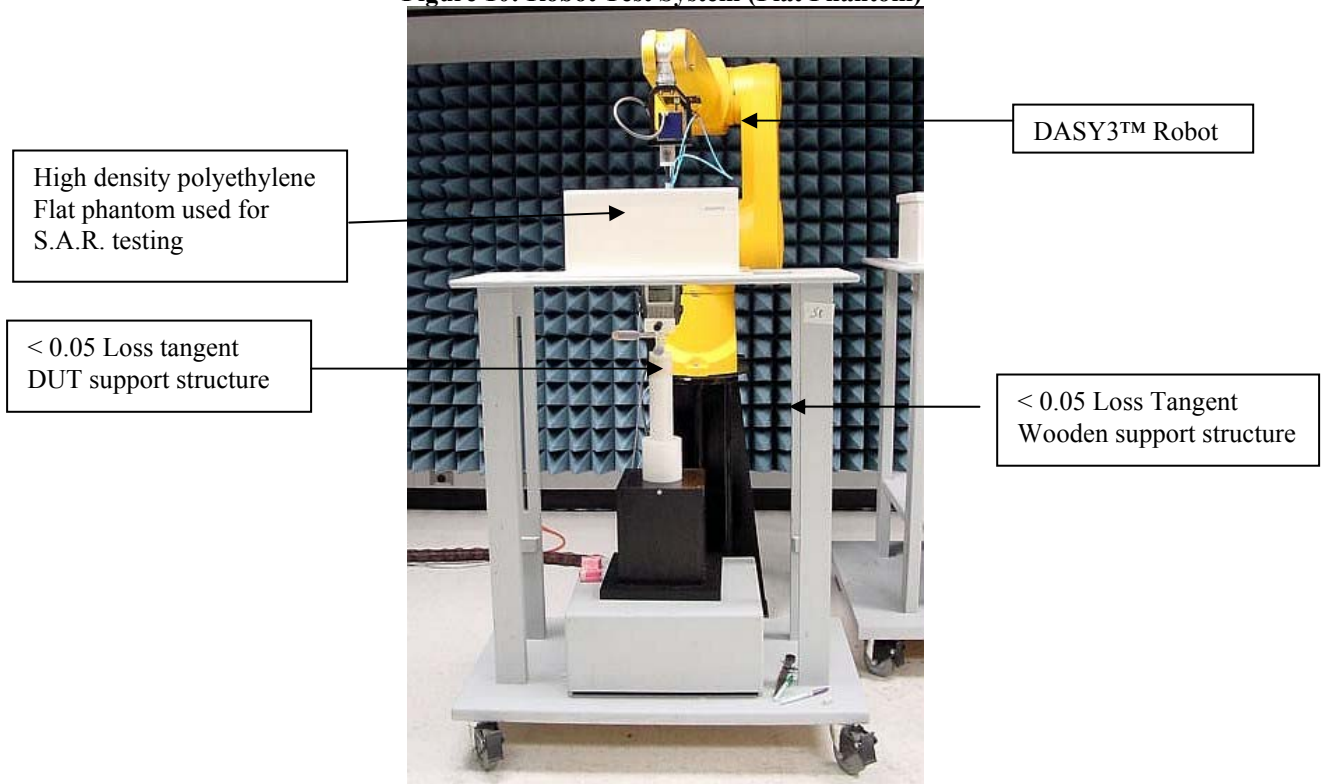


Figure 11: Robot Test System (SAM phantom)



6.0 Measurement Uncertainty

Table 1: Uncertainty Budget for Device Under Test: 75 – 3000 MHz

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e = f(d,k)</i>	<i>f</i>	<i>g</i>	<i>h =</i> <i>c x f / e</i>	<i>i =</i> <i>c x g / e</i>	<i>k</i>
	IEEE 1528	Tol. (± %)	Prob Dist		<i>c_i</i> (1 g)	<i>c_i</i> (10 g)	1 g <i>u_i</i> (±%)	10 g <i>u_i</i> (±%)	
Uncertainty Component	section			Div.					<i>v_i</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	∞
Hemispherical Isotropy	E.2.2	9.6	R	1.73	0.707	0.707	3.9	3.9	∞
Boundary Effect	E.2.3	1.0	R	1.73	1	1	0.6	0.6	∞
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 - Noise	E.6.1	3.0	R	1.73	1	1	1.7	1.7	∞
RF Ambient Conditions - Reflections	E.6.1	0.0	R	1.73	1	1	0.0	0.0	∞
Probe Positioner Mech. Tolerance	E.6.2	1.0	R	1.73	1	1	0.6	0.6	∞
Probe Positioning w.r.t Phantom	E.6.3	4.0	R	1.73	1	1	2.3	2.3	∞
Max. SAR Evaluation (ext., int., avg.)	E.5	3.4	R	1.73	1	1	2.0	2.0	∞
Test sample Related									
Test Sample Positioning	E.4.2	3.4	N	1.00	1	1	3.4	3.4	29
Device Holder Uncertainty	E.4.1	3.8	N	1.00	1	1	3.8	3.8	8
SAR drift	6.6.2	5.0	R	1.73	1	1	2.9	2.9	∞
Phantom and Tissue Parameters									
Phantom Uncertainty	E.3.1	4.0	R	1.73	1	1	2.3	2.3	∞
Liquid Conductivity (target)	E.3.2	5.0	R	1.73	0.64	0.43	1.8	1.2	∞
Liquid Conductivity (measurement)	E.3.3	6.5	N	1.00	0.64	0.43	4.2	2.8	∞
Liquid Permittivity (target)	E.3.2	5.0	R	1.73	0.6	0.49	1.7	1.4	∞
Liquid Permittivity (measurement)	E.3.3	4.0	N	1.00	0.6	0.49	2.4	2.0	∞
Combined Standard Uncertainty			RSS				12	11	601
Expanded Uncertainty (95% CONFIDENCE LEVEL)			<i>k=2</i>				23	22	

Table 2: Uncertainty Budget for System Check: 75 – 3000 MHz

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e = f(d,k)</i>	<i>f</i>	<i>g</i>	<i>h =</i>		<i>k</i>
							<i>c x f / e</i>	<i>i =</i>	
							<i>c x f / e</i>	<i>c x g / e</i>	
Uncertainty Component	IEEE 1528 section	Tol. (± %)	Prob. Dist.	Div.	<i>c_i</i> (1 g)	<i>c_i</i> (10 g)	1 g <i>u_i</i> (±%)	10 g <i>u_i</i> (±%)	<i>v_i</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	1.0	R	1.73	1	1	0.6	0.6	∞
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 - Noise	E.6.1	3.0	R	1.73	1	1	1.7	1.7	∞
RF Ambient Conditions - Reflections	E.6.1	0.0	R	1.73	1	1	0.0	0.0	∞
Probe Positioner Mechanical Tolerance	E.6.2	0.4	R	1.73	1	1	0.2	0.2	∞
Probe Positioning w.r.t. Phantom	E.6.3	1.4	R	1.73	1	1	0.8	0.8	∞
Max. SAR Evaluation (ext., int., avg.)	E.5	3.4	R	1.73	1	1	2.0	2.0	∞
Dipole									
Dipole Axis to Liquid Distance	8.E.4.2	2.0	R	1.73	1	1	1.2	1.2	∞
Input Power and SAR Drift Measurement	8.6.6.2	5.0	R	1.73	1	1	2.9	2.9	∞
Phantom and Tissue Parameters									
Phantom Uncertainty	E.3.1	4.0	R	1.73	1	1	2.3	2.3	∞
Liquid Conductivity (target)	E.3.2	5.0	R	1.73	0.64	0.43	1.8	1.2	∞
Liquid Conductivity (measurement)	E.3.3	6.0	R	1.73	0.64	0.43	2.2	1.5	∞
Liquid Permittivity (target)	E.3.2	5.0	R	1.73	0.6	0.49	1.7	1.4	∞
Liquid Permittivity (measurement)	E.3.3	6.0	R	1.73	0.6	0.49	2.1	1.7	∞
Combined Standard Uncertainty			RSS				9	8	99999
Expanded Uncertainty (95% CONFIDENCE LEVEL)			<i>k</i> =2				17	17	

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) *c_i* - sensitivity coefficient that should be applied to convert the variability of the uncertainty component into a variability of SAR.

g) *u_i* – SAR uncertainty

h) *v_i* - 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. performances for the relevant test configuration. DASY3™ S.A.R. measurement scans are provided in APPENDIX B for the highest observed S.A.R. performances.

7.1 S.A.R. results

Table1

DUT assessment at the head; Cheek Touch, Tilt, and edges and Face; 1:3 mode at head, 1:6 mode at face; 806-825MHz band												
Run Number/ SN	Antenna Position	Freq. (MHz)	Battery	Test position	Carry Case	Additional attachments	Initial Power (W)	S.A.R. Drift (dB)	Meas. 1g-S.A.R. (mW/g)	Meas. 10g-S.A.R. (mW/g)	Max Calc. 1g-S.A.R. (mW/g)	Max Calc. 10g-S.A.R. (mW/g)
Assessment at the left Ear												
R3-040429-05-JF/364AEGQPLS	In	813.5125	SNN5705B	Cheek Touch	None	None	0.735	0.070	0.694	0.465	0.69	0.47
R3-040429-08-JF/364AEGQPLS	Out	813.5125	SNN5705B	Cheek Touch	None	None	0.735	-0.040	0.700	0.475	0.71	0.48
R3-040430-02-JF/364AEGQPLS	In	813.5125	SNN5704A	Cheek Touch	None	None	0.735	-0.180	0.671	0.456	0.70	0.48
R3-040429-09-JF/364AEGQPLS	Out	813.5125	SNN5704A	Cheek Touch	None	None	0.735	-0.240	0.763	0.521	0.81	0.55
R3-040430-03-JF/364AEGQPLS	In	813.5125	SNN5704A	15° tilt	None	None	0.732	-0.410	0.168	0.119	0.19	0.13
R3-040430-04-JF/364AEGQPLS	Out	813.5125	SNN5704A	15° tilt	None	None	0.730	-0.300	0.180	0.129	0.19	0.14
R3-040430-08-JF/364AEGQPLS	In	806.0125	SNN5704A	Cheek Touch	None	None	0.710	-0.260	0.744	0.502	0.79	0.53
R3-040430-06-JF/364AEGQPLS	Out	806.0125	SNN5704A	Cheek Touch	None	None	0.740	-0.090	0.762	0.524	0.78	0.54
R3-040430-07-JF/364AEGQPLS	In	824.9875	SNN5704A	Cheek Touch	None	None	0.725	-0.260	0.710	0.480	0.75	0.51
R3-040430-09-JF/364AEGQPLS	Out	824.9875	SNN5704A	Cheek Touch	None	None	0.725	-0.200	0.740	0.508	0.78	0.53
Assessment at the right Ear												
R3-040503-02-JF/364AEGQPLS	In	813.5125	SNN5704A	Cheek Touch	None	None	0.735	-1.400	0.679	0.453	0.94	0.63
R3-040503-03-JF/364AEGQPLS	Out	813.5125	SNN5704A	Cheek Touch	None	None	0.733	-0.850	0.724	0.500	0.88	0.61
R3-040503-04-JF/364AEGQPLS	In	813.5125	SNN5704A	15° tilt	None	None	0.730	-0.580	0.144	0.102	0.17	0.12
R3-040503-05-JF/364AEGQPLS	Out	813.5125	SNN5704A	15° tilt	None	None	0.730	-0.490	0.188	0.134	0.21	0.15

R3-040503-06-JF/364AEGQPLS	In	806.0125	SNN5704A	Cheek Touch	None	None	0.710	0.410	0.733	0.501	0.73	0.50
R3-040503-07-JF/364AEGQPLS	Out	806.0125	SNN5704A	Cheek Touch	None	None	0.710	-0.640	0.865	0.584	1.00	0.68
R3-040503-08-JF/364AEGQPLS	In	824.9875	SNN5704A	Cheek Touch	None	None	0.728	-0.750	0.733	0.500	0.87	0.59
R3-040503-09-JF/364AEGQPLS	Out	824.9875	SNN5704A	Cheek Touch	None	None	0.728	0.590	0.782	0.534	0.78	0.53
Assessment at the Face												
R3-040505-02-JF/364AEGQPLS	In	813.5125	SNN5704A	DUT front , Flip open 2.5cm	None	None	0.728	-0.110	0.050	0.036	0.03	0.02
R3-040505-03-JF/364AEGQPLS	Out	813.5125	SNN5704A	DUT front Flip open 2.5cm	None	None	0.726	0.060	0.041	0.030	0.02	0.02
R3-040505-04-JF/364AEGQPLS	In	813.5125	SNN5704A	DUT front Flip close 2.5cm	None	None	0.728	0.040	0.170	0.122	0.09	0.06
R3-040505-05-JF/364AEGQPLS	Out	813.5125	SNN5704A	DUT front Flip close 2.5cm	None	None	0.726	-0.020	0.169	0.122	0.09	0.06

Table 2

DUT assessment at the head; Cheek Touch, Tilt, and edges and Face; 1:3 mode at head, 1:6 mode at face; 896-902MHz band												
Run Number/ SN	Antenna Position	Freq. (MHz)	Battery	Test position	Carry Case	Additional attachments	Initial Power (W)	S.A.R. Drift (dB)	Meas. 1g-S.A.R. (mW/g)	Meas. 10g-S.A.R. (mW/g)	Max Calc. 1g-S.A.R. (mW/g)	Max Calc. 10g-S.A.R. (mW/g)
Assessment at the left Ear												
R3-040506-02-JF/364AEGQPLS	In	899.66875	SNN5705B	Cheek Touch	None	None	0.725	-0.250	0.269	0.186	0.29	0.20
R3-040506-03-JF/364AEGQPLS	Out	899.66875	SNN5705B	Cheek Touch	None	None	0.735	0.050	0.749	0.528	0.75	0.53
R3-040506-04-JF/364AEGQPLS	In	899.66875	SNN5704A	Cheek Touch	None	None	0.730	-0.270	0.245	0.170	0.26	0.18
R3-040506-05-JF/364AEGQPLS	Out	899.66875	SNN5704A	Cheek Touch	None	None	0.733	-0.110	0.759	0.543	0.78	0.56
R3-040506-06-CM/364AEGQPLS	In	899.66875	SNN5704A	15° tilt	None	None	0.715	-0.470	0.068	0.047	0.08	0.05
R3-040506-07-CM/364AEGQPLS	Out	899.66875	SNN5704A	15° tilt	None	None	0.718	-0.080	0.162	0.117	0.17	0.12
R3-040506-08-CM/364AEGQPLS	In	896.01875	SNN5704A	Cheek Touch	None	None	0.716	-0.350	0.286	0.204	0.31	0.22
R3-040506-09-CM/364AEGQPLS	Out	896.01875	SNN5704A	Cheek Touch	None	None	0.733	-0.220	0.731	0.534	0.77	0.56
R3-040506-10-CM/364AEGQPLS	In	901.98125	SNN5704A	Cheek Touch	None	None	0.721	-0.360	0.229	0.165	0.25	0.18
R3-040506-11-CM/364AEGQPLS	Out	901.98125	SNN5704A	Cheek Touch	None	None	0.720	-0.180	0.729	0.535	0.76	0.56

Assessment at the right Ear

R3-040506-12-CM/364AEGQPLS	In	899.66875	SNN5704A	Cheek Touch	None	None	0.717	-0.860	0.385	0.260	0.47	0.32
R3-040506-13-CM/364AEGQPLS	Out	899.66875	SNN5704A	Cheek Touch	None	None	0.725	-0.880	0.890	0.618	1.09	0.76
R3-040510-02-CM/364AEGQPLS	In	899.66875	SNN5704A	15° tilt	None	None	0.708	-0.230	0.065	0.045	0.07	0.05
R3-040510-03-CM/364AEGQPLS	Out	899.66875	SNN5704A	15° tilt	None	None	0.711	-0.790	0.155	0.108	0.19	0.13
R3-040510-04-CM/364AEGQPLS	In	896.01875	SNN5704A	Cheek Touch	None	None	0.728	-0.940	0.355	0.236	0.44	0.29
R3-040510-05-CM/364AEGQPLS	Out	896.01875	SNN5704A	Cheek Touch	None	None	0.725	-0.940	0.924	0.615	1.15	0.76
R3-040510-06-CM/364AEGQPLS	In	901.98125	SNN5704A	Cheek Touch	None	None	0.722	-0.830	0.283	0.186	0.34	0.23
R3-040510-07-CM/364AEGQPLS	Out	901.98125	SNN5704A	Cheek Touch	None	None	0.726	-0.910	0.851	0.578	1.05	0.71

Assessment at the Face

R3-040510-08-CM/364AEGQPLS	In	899.66875	SNN5704A	DUT front Flip open 2.5cm	None	None	0.717	-0.700	0.022	0.015	0.01	0.01
R3-040511-02-CM/364AEGQPLS	Out	899.66875	SNN5704A	DUT front Flip open 2.5cm	None	None	0.725	-0.290	0.049	0.034	0.03	0.02
R3-040511-03-CM/364AEGQPLS	In	899.66875	SNN5704A	DUT front Flip close 2.5cm	None	None	0.717	0.210	0.095	0.067	0.05	0.03
R3-040511-04-CM/364AEGQPLS	Out	899.66875	SNN5704A	DUT front Flip close 2.5cm	None	None	0.727	-0.290	0.153	0.108	0.08	0.06

Table 3

DUT assessment at the body; against phantom, band edges, and 2.5cm separation; 81:120, 1:3, and 1:6 modes; 806-825MHz band

Run Number/ SN	Antenna Position	Freq. (MHz)	Battery	Test position	Carry Case	Additional attachments	Initial Power (W)	S.A.R. Drift (dB)	Meas. 1g-S.A.R. (mW/g)	Meas. 10g-S.A.R. (mW/g)	Max Calc. 1g-S.A.R. (mW/g)	Max Calc. 10g-S.A.R. (mW/g)
Assessment of offered battery and carry cases (81:120 mode)												
R3-040511-05-CM/364AEGQPLS	In	813.5125	SNN5704A	Against phantom	NNTN4747A	None	0.729	-0.830	0.895	0.653	1.08	0.79
R3-040511-06-CM/364AEGQPLS	Out	813.5125	SNN5704A	Against phantom	NNTN4747A	None	0.728	-0.720	1.020	0.747	1.20	0.88
R3-040512-02-CM/364AEGQPLS	In	813.5125	SNN5704A	Against phantom	NNTN4747A	None	0.727	-0.720	0.917	0.663	1.08	0.78
R3-040512-03-CM/364AEGQPLS	Out	813.5125	SNN5704A	Against phantom	NNTN4747A	None	0.729	-0.930	0.959	0.696	1.19	0.86
R3-040512-04-CM/364AEGQPLS	In	813.5125	SNN5705B	Against phantom	NNTN4747A	None	0.710	-0.550	0.812	0.596	0.92	0.68
R3-040512-05-CM/364AEGQPLS	Out	813.5125	SNN5705B	Against phantom	NNTN4747A	None	0.711	-0.840	0.984	0.719	1.19	0.87

Table 3 (continued)

DUT assessment at the body; against phantom, band edges, and 2.5cm separation; 81:120, 1:3, and 1:6 modes; 806-825MHz band												
Run Number/ SN	Antenna Position	Freq. (MHz)	Battery	Test position	Carry Case	Additional attachments	Initial Power (W)	S.A.R. Drift (dB)	Meas. 1g-S.A.R. (mW/g)	Meas. 10g-S.A.R. (mW/g)	Max Calc. 1g-S.A.R. (mW/g)	Max Calc. 10g-S.A.R. (mW/g)
Assessment of worst case battery, worst case carry case accessory, and offered data cable attachment (81:120 mode)												
R3-040512-06- CM/364AEGQPLS	In	813.5125	SNN5704A	Against phantom	NNTN4747A	NKN6559A	0.725	-0.890	0.572	0.419	0.70	0.51
R3-040512-07- CM/364AEGQPLS	Out	813.5125	SNN5704A	Against phantom	NNTN4747A	NKN6559A	0.728	-0.870	0.677	0.488	0.83	0.60
R3-040512-08- CM/364AEGQPLS	In	813.5125	SNN5704A	Against phantom	NNTN4747A	NKN6560A	0.729	-0.800	0.565	0.410	0.68	0.49
R3-040512-09- CM/364AEGQPLS	Out	813.5125	SNN5704A	Against phantom	NNTN4747A	NKN6560A	0.727	-1.040	0.538	0.395	0.68	0.50
Assessment of worst case battery, worst case carry case accessory, and offered audio accessories (1:3 mode)												
R3-040513-02- CM/364AEGQPLS	Out	813.5125	SNN5704A	Against phantom	NNTN4747A	NNTN4620A	0.727	-0.100	0.414	0.295	0.42	0.30
R3-040513-03- CM/364AEGQPLS	Out	813.5125	SNN5704A	Against phantom	NNTN4747A	SYN8390B	0.729	-0.130	0.403	0.295	0.42	0.30
R3-040513-04- CM/364AEGQPLS	Out	813.5125	SNN5704A	Against phantom	NNTN4747A	SYN8146C	0.730	0.080	0.497	0.353	0.50	0.35
R3-040513-05- CM/364AEGQPLS	Out	813.5125	SNN5704A	Against phantom	NNTN4747A	NTN8496A	0.729	-0.120	0.495	0.357	0.51	0.37
R3-040513-06- CM/364AEGQPLS	Out	813.5125	SNN5704A	Against phantom	NNTN4747A	NNTN4033A	0.730	-0.270	0.501	0.362	0.53	0.39
R3-040513-07- CM/364AEGQPLS	Out	813.5125	SNN5704A	Against phantom	NNTN4747A	NTN8513B	0.728	-0.240	0.446	0.322	0.47	0.34
R3-040513-08- CM/364AEGQPLS	Out	813.5125	SNN5704A	Against phantom	NNTN4747A	SYN7875C	0.727	-0.330	0.479	0.353	0.52	0.38
Assessment of worst case battery, worst case carry case accessory, and offered PTT (1:3 mode)												
R3-040513-11- CM/364AEGQPLS	Out	813.5125	SNN5704A	Against phantom	NNTN4747A	NNTN5004A	0.730	-0.290	0.447	0.325	0.48	0.35
R3-040514-02- JF/364AEGQPLS	Out	813.5125	SNN5704A	Against phantom	NNTN4747A	NNTN5005A	0.730	-0.070	0.513	0.378	0.52	0.38
R3-040514-03- JF/364AEGQPLS	Out	813.5125	SNN5704A	Against phantom	NNTN4747A	NNTN5006A	0.727	-0.190	0.432	0.317	0.45	0.33
Assessment of worst case battery, worst case carry case accessory, and offered RSM (1:6 mode)												
R3-040513-10- CM/364AEGQPLS	Out	813.5125	SNN5704A	Against phantom	NNTN4747A	NSN6066A	0.725	-0.100	0.230	0.169	0.12	0.09
Assessment of band edges using worst case carry test configuration from above (81:120 mode)												
R3-040514-06- JF/364AEGQPLS	In	806.0125	SNN5704A	Against phantom	NNTN4747A	None	0.700	-0.940	0.966	0.711	1.20	0.88
R3-040514-07- JF/364AEGQPLS	Out	806.0125	SNN5704A	Against phantom	NNTN4747A	None	0.700	-1.040	1.050	0.775	1.33	0.99
R3-040516-05- CM/364AEGQPL4	Out	806.0125	SNN5704A	Against phantom	NNTN4747A	None	0.705	-1.050	1.070	0.791	1.36	1.01
R3-040517-01- CM/364AEGQPL4 (Shortened cube scan)	Out	806.0125	SNN5704A	Against phantom	NNTN4747A	None	0.725	-0.650	1.180	0.866	1.37	1.01
R3-040514-10- JF/364AEGQPLS	In	824.9875	SNN5704A	Against phantom	NNTN4747A	None	0.710	-0.700	0.945	0.695	1.11	0.82
R3-040514-09- JF/364AEGQPLS	Out	824.9875	SNN5704A	Against phantom	NNTN4747A	None	0.710	-0.880	1.070	0.782	1.31	0.96

Table 4

DUT assessment at the body; across the band, with worst case test configuration from 800MHz band assessment; 1:3, mode; 896-902MHz band												
Run Number/ SN	Antenna Position	Freq. (MHz)	Battery	Test position	Carry Case	Additional attachments	Initial Power (W)	S.A.R. Drift (dB)	Meas. 1g-S.A.R. (mW/g)	Meas. 10g-S.A.R. (mW/g)	Max Calc. 1g-S.A.R. (mW/g)	Max Calc. 10g-S.A.R. (mW/g)
Assessment with worst case configuration from 800MHz assessment												
R3-040515-02-CM/364AEGQPLS	In	896.01875	SNN5704A	Against phantom	NNTN4747A	NNTN4033A	0.720	-0.960	0.214	0.153	0.27	0.19
R3-040515-03-CM/364AEGQPLS	Out	896.01875	SNN5704A	Against phantom	NNTN4747A	NNTN4033A	0.727	-0.740	0.442	0.313	0.52	0.37
R3-040515-04-CM/364AEGQPLS	In	899.66875	SNN5704A	Against phantom	NNTN4747A	NNTN4033A	0.728	-0.810	0.230	0.163	0.28	0.20
R3-040515-05-CM/364AEGQPLS	Out	899.66875	SNN5704A	Against phantom	NNTN4747A	NNTN4033A	0.723	-0.660	0.468	0.335	0.55	0.39
R3-040515-06-CM/364AEGQPLS	In	901.98125	SNN5704A	Against phantom	NNTN4747A	NNTN4033A	0.729	-0.540	0.218	0.156	0.25	0.18
R3-040515-07-CM/364AEGQPLS	Out	901.98125	SNN5704A	Against phantom	NNTN4747A	NNTN4033A	0.727	-1.150	0.456	0.327	0.59	0.43
Assessment at 2.5cm using the worst case frequency and offered battery from both 800Mhz and 900Mhz assessments												
R3-040515-09-CM/364AEGQPLS	Out	806.0125	SNN5704A	DUT Back 2.5cm	None	None	0.712	-1.040	0.979	0.716	1.24	0.91
R3-040516-02-CM/364AEGQPLS	Out	806.0125	SNN5704A	DUT Front 2.5cm	None	None	0.705	-0.900	0.660	0.491	0.81	0.60

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. values are determined by scaling the measured S.A.R. to account for power leveling variations and power slump. For this device the Maximum Calculated 1-gram and 10-gram averaged peak S.A.R. is calculated using the following formula:

$$\text{Max. Calc. 1-g Avg. SAR} = ((\text{S.A.R. meas.} / (10^{(\text{Pdrift}/10)})) * (\text{Pmax}/\text{Pint})) * \text{DC}\%$$

P_{max} = Maximum Power (W)

P_{int} = Initial Power (W)

Pdrift = DASY drift results (dB)

$\text{SAR}_{\text{meas.}}$ = Measured 1 gram averaged peak S.A.R. (mW/g)

DC % = Transmission mode duty cycle in % where applicable

Note that the use of the above formula should consider the relationship between the initial power, max power, and drift. Also, a 50% duty cycle is applied for PTT operation.

8.0 Conclusion

The highest Operational Maximum Calculated 1-gram and 10-gram average S.A.R. values found for FCC ID: AZ489FT5824 model H63XAN6RRAN/NUF3898A.

At the Body: **1-g Avg. = 1.37 mW/g; 10-g Avg. = 1.01 mW/g**

At the Face: **1-g Avg. = 0.09 mW/g; 10-g Avg. = 0.06 mW/g**

At the Head: **1-g Avg. = 1.15 mW/g; 10-g Avg. = 0.76 mW/g**

These test results clearly demonstrate compliance with FCC General Population/Uncontrolled RF Exposure limits of **1.6 mW/g** per the requirements of 47 CFR 2.1093(d).