



DECLARATION OF COMPLIANCE SAR ASSESSMENT Part 1 of 3

Motorola Solutions Inc.
EME Test Laboratory
 8000 West Sunrise Blvd
 Fort Lauderdale, FL. 33322

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Responsible Engineer: Stephen C. Whalen (Principal Staff Engineer/Manager)
Report Author: Stephen C. Whalen (Principal Staff Engineer/Manager)
Date/s Tested: 02/19/14-03/16/14 & 04/24/2014-04/28/2014
Manufacturer/Location: Motorola Solutions Inc., Schaumburg
Sector/Group/Div.: AESS
Date submitted for test: 01/31/2014
DUT Description: Handheld Portable – Frequency bands; LMR 136-174MHz, 764-776MHz, 794-824MHz & 851-869MHz; LTE 777-787MHz (band 13) & 788-798MHz (band 14); Bluetooth 2.402-2.480GHz
Test TX mode(s): CW (PTT) & LTE
Max. Power output: 6.6W (VHF band), 2.99W (700MHz band), 3.6W (800MHz band), 320mW (LTE) & 12mW (Bluetooth)
Nominal Power: 6.0W (VHF band), 2.65W (700MHz band), 3.0W (800MHz band), 200mW (LTE) & 12mW (Bluetooth)
Tx Frequency Bands: LMR 136-174MHz, 764-776MHz, 794-824MHz & 851-869MHz; LTE 777-787MHz (band 13) & 788-798MHz (band 14); Bluetooth 2.402-2.480GHz
Signaling type: FM, TDMA, LTE, FHSS (Bluetooth)
Model(s) Tested: H97TGD9PW1AN (NUR1066A)
Model(s) Certified: H97TGD9PW1AN (NUR1065A, NUR1066A)
Serial Number(s): 655CPX0696 & 655CPX0694
Classification: Occupational/Controlled
FCC ID: AZ489FT7059; Rule Part 90 (150.8-173.4MHz, 764-775MHz, 788-798MHz (LTE), 794-824MHz & 851-869MHz); Rule Part 27 (777-787MHz); Rule Part 15 (2402-2480MHz)
 This report contains results that are immaterial for FCC equipment approval, which are clearly identified.
IC: 109U-89FT7059; This report contains results that are immaterial for IC equipment approval, which are identified as LTE band 14 (788-798MHz).

The test results clearly demonstrate compliance with FCC Occupational/Controlled RF Exposure limits of 8 W/kg averaged over 1 gram per the requirements of OET Bulletin 65. The 10 grams result is not applicable to FCC filing. The test results clearly demonstrate compliance with ICNIRP (1998) Guidelines for limiting exposure in time-varying electric, magnetic, and electromagnetic fields (up to 300 GHz), Health Physics 74, 494-522 RF Exposure limits of 10 W/kg averaged over 10grams of contiguous tissue.

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 4.0 of this report. This report shall not be reproduced without written approval from an officially designated representative of the Motorola Solutions Inc EME Laboratory. I attest to the accuracy of the data and assume full responsibility for the completeness of these measurements. This reporting format is consistent with the suggested guidelines of the TIA TSB-150 December 2004. The results and statements contained in this report pertain only to the device(s) evaluated.

Deanna Zakharia
Deanna Zakharia
EMS EME Lab Senior Resource Manager,
Laboratory Director
Approval Date: 1/22/2015

Certification Date: 6/27/2014
Certification No.: L1140630P & L1140631P

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Report Revision History

Date	Revision	Comments
05/12/2014	O	Initial release
05/29/2014	A	Included LTE band 13 for IC
06/27/2014	B	Updated antenna gain for each antenna in Table 4 and added “Yes” to tested audio accessories in Table 7.
09/09/2014	C	Changed 4.0 W/kg to 0.8 W/kg for LTE B13 on pages 38, 39, 54, & 55.
01/22/2015	D	The report was separated into three parts because of file size limitations.

1.0 Introduction

This report details the utilization, test setup, test equipment, and test results of the Specific Absorption Rate (SAR) measurements performed at the Motorola Solutions Inc. EME Test Laboratory for handheld portable model number H97TGD9PW1AN (NUR1066A). This device is classified as Occupational/Controlled.

2.0 FCC SAR Summary

Table 1

Equipment Class	Frequency band (MHz)	Max Calc at Body (W/kg)		Max Calc at Face (W/kg)	
		1g-SAR	10g-SAR	1g-SAR	10g-SAR
TNF	150.8-173.4MHz (LMR)	2.32	0.96	0.48	0.37
	700MHz (LMR)	5.36	3.05	1.40	1.02
	800MHz (LMR)	4.50	2.62	2.05	1.51
	LTE B13	0.21	0.14	0.22	0.16
	LTE B14	0.18	0.11	0.26	0.19
*DSS	2402-2480MHz	NA	NA	NA	NA
**Simultaneous Results		4.71	2.76	2.31	1.70

*Results not required per KDB (refer to sections 13.8 and 14.0)

**LMR 700MHz band cannot transmit simultaneously with LTE.

3.0 Abbreviations / Definitions

BT: Bluetooth
 CNR: Calibration Not Required
 CW: Continuous Wave
 C4FM: Continuous 4 Level Frequency Modulation
 CQPSK: Compatible Quadrature Phase Shift Keying
 DPSK: Differential Phase-Shift Keying
 DQPSK: Differential Quadrature Phase-Shift Keying
 DSP: Digital Signal Processor
 DSS: Direct Spread Spectrum
 DUT: Device Under Test
 EDR: Enhanced Data Rate
 EME: Electromagnetic Energy
 FHSS: Frequency Hopping Spread Spectrum
 FM: Frequency Modulation
 GFSK: Gaussian Frequency-Shift Keying
 LMR: Land Mobile Radio
 LTE: Long Term Evolution

NA: Not Applicable
OFDM: Orthogonal Frequency Division Multiplexing
PSM: Public Safety Microphone
PTT: Push to Talk
QPSK: Quadrature Pulse Shift Key
RB: Resource Blocks
RSM: Remote Speaker Microphone
SAR: Specific Absorption Rate
SC-FDMA: Single Carrier Frequency Division Multiple Access
TDD: Time Division Duplex
TDMA: Time Division Multiple Access
TNF: Licensed Non-Broadcast Transmitter Held to Face
VoLTE; Voice over LTE
4FSK: 4 Level Frequency Shift Keying
16QAM: 16 State Quadrature Amplitude Modulation

Audio accessories: These accessories allow communication while the DUT is worn on the body.

Body worn accessories: These accessories allow the DUT to be worn on the body of the user.

Maximum Power: Defined as the upper limit of the production line final test station.

4.0 Referenced Standards and Guidelines

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

- IEC62209-1 (2005) Procedure to determine the specific absorption rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)
- Federal Communications Commission, "Evaluating Compliance with FCC Guidelines for Human Exposure to Radio frequency Electromagnetic Fields", OET Bulletin 65, FCC, Washington, D.C.: 1997.
- 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 Electronics Engineers (IEEE) C95. 1-1992
- Institute of Electrical and Electronics Engineers (IEEE) C95.1-2005
- International Commission on Non-Ionizing Radiation Protection (ICNIRP) 1998
- Ministry of Health (Canada) Safety Code 6 (2009), Limits of Human Exposure to Radio frequency Electromagnetic Fields in the Frequency Range from 3 kHz to 300 GHz
- Australian Communications Authority Radio communications (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 9 kHz and 300 GHz." and "Attachment to resolution # 303 from July 2, 2002"
- IEC62209-2 Edition 1.0 2010-03, Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Human models, instrumentation, and procedures – 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).
- FCC KDB – 643646 D01 SAR Test for PTT Radios v01r01 (04/04/2011)
- FCC KDB – 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r02 (12/05/2013)
D02 RF Exposure Reporting v01r01 (05/28/2013)
- FCC KDB – 447498 D01 General RF Exposure Guidance v05r01 (05/28/2013)
- FCC KDB – 941225 D05 SAR for LTE Devices v02r03 (12/05/2013)

5.0 SAR Limits

Table 2

EXPOSURE LIMITS	SAR (W/kg)	
	(General Population / Uncontrolled Exposure Environment)	(Occupational / Controlled Exposure Environment)
Spatial Average - ANSI - (averaged over the whole body)	0.08	0.4
Spatial Peak - ANSI - (averaged over any 1-g of tissue)	1.6	8.0
Spatial Peak – ICNIRP/ANSI - (hands/wrists/feet/ankles averaged over 10-g)	4.0	20.0
Spatial Peak - ICNIRP - (Head and Trunk 10-g)	2.0	10.0

6.0 Description of Device Under Test (DUT)

This portable device operates in the LMR bands using frequency modulation (FM) and TDMA signals incorporating traditional simplex two-way radio transmission protocol. This device also contains LTE technology for data applications and Bluetooth technology for short range wireless devices.

Time Division Multiple Access (TDMA) is used to allocate portions of the RF signal by dividing time into two slots. Time allocation enables each unit to transmit its voice information without interference from other transmitting units. Transmission from a unit or base station is accommodated during two time-slot lengths of 30 milliseconds with frame length of 60 milliseconds. C4FM CQPSK modulation is used at 12.5 kHz channel spacing. The TDMA technique requires sophisticated algorithms and a digital signal processor (DSP) to perform voice compressions/decompressions and RF modulation/demodulation. The maximum duty cycle for TDMA 1:2 is 50%.

The LMR bands in this device operate in a half duplex system. A half duplex system only allows the user to transmit or receive. This device cannot transmit and receive simultaneously. The user must stop transmitting in order to receive a signal or listen for a response, regardless of PTT button or use of voice activated audio accessories. This type of operation, along with the RF safety booklet, which instructs the user to transmit no more than 50% of the time, justifies the use of 50% duty factor for this device.

This device also incorporates an LTE device, which is capable of OFDM (Orthogonal Frequency Division Multiplexing) on the downlink and SC-FDMA (Single Carrier Frequency Division Multiple Access) on the uplink. Depending upon the packet size of the data being sent the uplink Bandwidth can vary from 1MHz to 10MHz. In the downlink, the subcarriers are split into resource blocks. This enables the system to be able to compartmentalize the data across standard numbers of subcarriers. Resource blocks comprise of 12 subcarriers, regardless of the overall LTE signal bandwidth. They also cover one slot in the time frame. This means that different LTE signal bandwidths will have different numbers of resource blocks in which the maximum of 10 MHz frequency correlates to 50 resource blocks or (50RB x 12) 600 subcarriers.

LTE bands 13 and 14 are for data applications only. The architecture and chip set do not support voice operations (VoLTE) and therefore voice configurations were not tested. Band 13 supports QPSK, 16QAM and the following channel bandwidths; 1.4MHz, 3MHz, 5MHz and 10MHz. Band 14 supports QPSK, 16QAM and the following channel bandwidths; 5MHz and 10MHz. TDD is not supported by either LTE band. Simultaneous transmission exists between the BT, LTE and LMR (VHF and 800MHz bands).

This device also incorporates a Class 1 Bluetooth device which is a Frequency Hopping Spread Spectrum (FHSS) technology. The Bluetooth radio modem is used to wireless link audio accessories. The maximum actual transmission duty cycle is imposed by the Bluetooth standard. The maximum duty cycle for BT is 76.1%. Refer to section 14.0 Simultaneous Transmission Exclusion.

Table 3 below summarizes the technologies, bands, maximum duty cycles and maximum output powers. Maximum output powers are defined as upper limit of the production line final test station.

Table 3

Radio Type	Band (MHz)	Transmission	Duty Cycle (%)	Max Power (W)
LMR	136-174	FM or TDMA	*50 / *25	6.60
LMR	700	FM or TDMA	*50 / *25	2.99
LMR	800	FM or TDMA	*50 / *25	3.60
LTE	B13	SC-FDMA	100	0.32
LTE	B14	SC-FDMA	100	0.32
BT	2400	FHSS	76	0.012

Note - * includes 50% PTT operation

The intended operating positions are “at the face” with the DUT at least 1 inch from the mouth, and “at the body” by means of the offered body worn accessories. Body worn audio and PTT operation is accomplished by means of optional remote accessories that are connected to the radio. Operation at the body without an audio accessory attached is possible by means of BT accessories.

7.0 Optional Accessories and Test Criteria

This device is offered with optional accessories. All accessories were individually evaluated during the test plan creation to determine if testing was required per the guidelines outlined in “SAR Test Reduction Considerations for Occupational PTT Radios” FCC KDB 643646 to assess compliance of this device. The following sections identify the test criteria and details for each accessory category. Refer to Exhibit 7B for antenna separation distances.

7.1 Antennas

There are optional removable antennas and one internal LTE/BT antenna offered for this product. The Table below lists their descriptions.

Table 4

Antenna Models	Description	Selected for test	Tested
NAR6594A	VHF/700/800 MHz + GPS(1575MHz) 136-174MHz, 764-870MHz, ¼ wave, -2.0dBi	Yes	Yes
NAF5085A	700/800MHz + GPS (1575MHz), 764-870MHz, ½wave, -5.85dBi	Yes	Yes
*85009332001	Internal FICA LTE + BT 746-798MHz and 2402-2481MHz, -5.0dBi(B13), -4.8dBi(B14), -1.1dBi(BT)	Yes	Yes
NAR6593A	VHF/GPS (1575MHz) 136-174MHz, ¼ wave, -6.35dBi	Yes	Yes
NAR6595A	700/800MHz + GPS (1575MHz), 764-870MHz, ¼wave, -7.85dBi	Yes	Yes
PMAF4002A	7/800MHz PSM Stubby 764-870MHz, ¼ wave, -7.85dBi	Yes	Yes

* Refer to sections 13.14 and 14.0 for BT low power exclusion and simultaneous TX for antenna not tested.

7.2 Battery

There are five batteries offered for this product. The Table below lists their descriptions.

Table 5

Battery Models	Description	Selected for test	Tested	Comments
NNTN7038B	Impres LiIon 2900mAh	Yes	Yes	
PMNN4403B	Impres Li-ion 2150mAh slim	Yes	Yes	Default battery for body testing
NNTN7034B	Hi Cap Impress Li-ion 4200mAh	Yes	Yes	Default battery for face testing
NNTN7037A	Impres 2100mAh	Yes	Yes	
NNTN7573A	Rugged Impres 2100mAh	Yes	Yes	

7.3 Body worn Accessories

All body worn accessories were considered. The Table below lists the body worn accessories, and body worn accessory descriptions.

Table 6

Body worn Models	Description	Selected for test	Tested	Comments
NTN8266B	Belt Clip 2.5 in.	Yes	Yes	
HLN6875A	Belt Clip 3 in.	Yes	Yes	
PMLN5331A	Carry Holder-Basic	No	No	No metallic content and increases separation distance, only fits tested belt clips above.

7.4 Audio Accessories

All audio accessories were considered. The Table below lists the offered audio accessories and their descriptions. Exhibit 7B illustrates photos of the tested audio accessories.

Table 7

Audio Acc. Models	Description	Selected for test	Tested	Comments
PMMN4050A	IMPRES REMOTE SPEAKER MIC, NC	Yes	Yes	Default Audio
HMN4104B	IMPRES Display Submersible RSM w/ jack & Ch. Selector	Yes	Yes	
PMMN4040A	IMPRES IP57 Submersible Remote Speaker Microphone	Yes	Yes	
PMLN5275C	Core H/D Headset	Yes	Yes	
PMLN5653A	IMPRES Ear Microphone System	Yes	Yes	
PMLN5102A	CORE ULTRA-LITE HEADSET	Yes	Yes	
RMN5058A	Core Lightweight Headset w/PTT & VOX	Yes	Yes	
PMLN5101A	Impress Temple Transducer	Yes	Yes	
RMN5116A	Temple Transducer Headset	Yes	Yes	Tested with HMN4104B
PMLN5097A	IMPRES 3 WIRE SURVEILLANCE-BLACK	Yes	Yes	
RLN5882A	Smart 2 Wire surveillance w/ acoustic tube black	Yes	Yes	
PMLN5096B	CORE EARSET - D-SHELL	Yes	Yes	
BDN6783A	3.5 mm Audio Adapter	Yes	Yes	Tested with BDN6729A
BDN6729A	Earpiece with Microphone and Push-to-Talk Combined (2-Wire)	Yes	Yes	Tested with BDN6783A
NNTN7869A	APX Surveillance Keyload Adapter	Yes	Yes	Tested with ZMN6031A & ZMN6032A
ZMN6031A	3 wire Surveillance beige Hirose	Yes	Yes	Tested with NNTN7869A
ZMN6032A	2 wire Surveillance beige Hirose	Yes	Yes	Tested with NNTN7869A
PMMN4065A	Standard Large IP57 RSM	No	No	By similarity to PMMN4050A
PMMN4062A	PLUS RSM NC IP54 3.5MM JACK RX	No	No	By similarity to PMMN4050A
PMMN4024A	Core RSM	No	No	By similarity to PMMN4050A
PMMN4025A	Smart RSM	No	No	By similarity to PMMN4050A
PMMN4046A	IMPRES SPEAKER MIC W/VOL, IP57	No	No	By similarity to PMMN4050A
PMMN4069A	APX Basic Smart RSM, IP55	No	No	By similarity to PMMN4050A
HMN4101B	Display RSM w/o Display and w/o Channel Knob	No	No	By similarity to HMN4104B
HMN4103B	Display RSM w/o Channel Knob	No	No	By similarity to HMN4104B
PMLN5111A	Plus 3 wire - Black- one programmable button	No	No	By similarity to PMLN5097A
PMLN5112A	Plus 3 wire - Beige-one programmable button	No	No	By similarity to PMLN5097A
PMLN5106A	IMPRES 3 WIRE SURVEILLANCE-BEIGE	No	No	By similarity to PMLN5097A

Table 7 continued

Audio Acc. Models	Description	Selected for test	Tested	Comments
RLN5881A	Smart 2 wire surveillance - beige	No	No	By similarity to RLN5882A
RLN5880A	Smart 2 wire surveillance - black	No	No	By similarity to RLN5882A
RLN5883A	Smart 2 Wire surveillance w/ acoustic tube beige	No	No	By similarity to RLN5882A
BDN6667A	Earpiece with Microphone and Push-to-Talk Combined (2-Wire)	No	No	By similarity to BDN6783A/BDN6729A
BDN6669A	Extra Loud Earpiece with Microphone and Push-to-Talk Combined (2-Wire),	No	No	By similarity to BDN6783A/BDN6729A
BDN6731A	Extra Loud Earpiece with Microphone and Push-to-Talk Combined (2-Wire)	No	No	By similarity to BDN6783A/BDN6729A
BDN6668A	Earpiece with Microphone and Push-to-Talk Separate (3-Wire),	No	No	By similarity to BDN6783A/BDN6729A
BDN6730A	Earpiece with Microphone and Push-to-Talk Separate (3-Wire)	No	No	By similarity to BDN6783A/BDN6729A
ZMN6039A	3 wire Surveillance beige Hirose, extra loud	No	No	By similarity to NNTN7869A/ ZMN6031A
ZMN6038A	2 wire Surveillance beige Hirose, extra loud	No	No	By similarity to NNTN7869A/ ZMN6032A
PMMN4059B	PSM IP54 WITH 3.5MM JACK RX 18 in. (w/ 4205823V01 beltclip)	Yes	Yes	
PMMN4060B	PSM IP54 WITH 3.5MM JACK RX 24 in. (w/ 4205823V01 beltclip)	Yes	Yes	
PMMN4061B	PSM IP54 WITH 3.5MM JACK RX 30 in.(w/ 4205823V01 beltclip)	Yes	Yes	

8.0 Description of Test System



8.1 Descriptions of Robotics/Probes/Readout Electronics

Table 8

Dosimetric System type	System version	DAE type	Probe Type
Schmid & Partner Engineering AG SPEAG DASY 5	52.8.2.969	DAE3	ES3DV3 (E-Field)

The DASY5™ system is operated per the instructions in the DASY5™ Users Manual. The complete manual is available directly from SPEAG™. All measurement equipment used to assess SAR compliance was calibrated according to ISO/IEC 17025 A2LA guidelines. Section 9.0 presents additional test equipment information. Appendices B and C present the applicable calibration certificates. The E-field probe first scans a coarse grid over a large area inside the phantom in order to locate the interpolated maximum SAR 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.

8.2 Description of Phantom(s)

Table 9

Phantom Type	Phantom(s) Used	Material Parameters	Phantom Dimensions LxWxD (mm)	Material Thickness (mm)	Support Structure Material	Loss Tangent (wood)
Dual Flat	NA	300MHz -6GHz; Er = 4+/- 1, Loss Tangent = ≤0.05	600x400x190	2mm +/- 0.2mm	Wood	< 0.05
SAM	NA					
Elliptical	√					

8.3 Description of Simulated Tissue

The sugar based simulate tissue is produced by placing the correct measured amount of De-ionized water into a large container. Each of the dried ingredients are weighed and added to the water carefully to avoid clumping. If the solution has a high sugar concentration the water is pre-heated to aid in dissolving the ingredients. For Diacetin and similar type simulates, sugar and HEC ingredients are not needed. The solution is mixed thoroughly, covered, and allowed to sit overnight prior to use.

The simulated tissue mixture was mixed based on the Simulated Tissue Composition indicated in Table 10. During the daily testing of this product, the applicable mixture was used to measure the Di-electric parameters at each of the tested frequencies to verify that the Di-electric parameters were within the tolerance of the tissue specifications.

Simulated Tissue Composition (percent by mass)**Table 10**

Ingredients	835MHz		300MHz	
	Head	Body	Head	Body
Sugar	57.0	44.9	56.0	47.1
Diacetin	0	0	0	0
De ionized – Water	40.45	53.06	37.5	49.48
Salt	1.45	0.94	5.4	2.32
HEC	1.0	1.0	1.0	1.0
Bact.	0.1	0.1	0.1	0.1

9.0 Additional Test Equipment

The Table below lists additional test equipment used during the SAR assessment.

Table 11

Equipment Type	Model Number	Serial Number	Calibration Date	Calibration Due Date
Speag Probe	ES3DV3	3301	8/27/2013	8/27/2014
Speag DAE	DAE3	363	1/13/2014	1/13/2015
Power Meter (Agilent)	N1912A	GB45100294	9/10/2012	9/10/2014
Power Meter (HP)	E4418B	US39251267	1/27/2014	1/27/2015
E-Series Avg. Power Sensor (Agilent)	E9301B	MY50290001	9/4/2013	9/4/2014
HP Power Meter	E4418B	US39251150	2/19/2014	2/19/2015
HP Power Sensor	8481H	2703A09635	2/27/2014	2/27/2015
Wideband Power Sensor (Agilent)	N1921A	MY45240137	9/12/2013	9/12/2014
Wideband Power Sensor (Agilent)	N1921A	MY45240136	1/16/2014	1/16/2015
Attenuator Weinschel Corp.	33-30-34	BG9479	5/1/2012	5/1/2014
Attenuator Weinschel Corp.	33-30-34	BG8265	3/2/2012	3/2/2014
NARDA	768-20	8088	5/1/2012	5/1/2014
Bi-Directional Coupler (NARDA)	3020A	31744	9/17/2013	9/17/2015
Signal Generator (Agilent)	E4438C	MY42081753	1/17/2014	1/17/2016
AMP (PST) AR Series	AR2729- 10/5506	M2K2A00-001	CNR	CNR
PXT Wireless Comm. Test Set	E6621A	MY51102130	9/17/2013	9/17/2015
Dickson Temperature Recorder	TM325	12121144	5/8/2013	5/8/2014
Omega Digital Thermometer with J Type TC Probe	HH200A	20857	10/23/2013	10/23/2014
Omega Digital Thermometer with J Type TC Probe	HH200A	48870	5/14/2013	5/14/2014
Omega Digital Thermometer with J Type TC Probe	HH202A	18800	2/21/2013	2/21/2014
Omega Digital Thermometer with J Type TC Probe	HH202A	18801	5/14/2013	5/14/2014
Omega Digital Thermometer with J Type TC Probe	HH202A	18812	6/10/2013	6/10/2014

Table 11 continued

Equipment Type	Model Number	Serial Number	Calibration Date	Calibration Due Date
Agilent PNA-L Network Analyzer	N5230C	MY49002155	8/1/2013	8/1/2014
Dielectric Probe Kit (DAK)	DAK-3.5	1059	5/28/2013	5/28/2014
Dielectric Probe Kit (DAK)	DAK-12	1013	5/28/2013	5/28/2014
Speag Dipole	D750V3	1098	10/15/2013	10/15/2015
Speag Dipole	D300V3	1014	5/6/2013	5/6/2015
Speag Dipole	D900V2	84	8/14/2013	8/14/2015

10.0 SAR Measurement System Validation and Verification

DASY output files of the probe/dipole calibration certificates and system verification test results are included in appendices B, C & D respectively.

10.1 System Validation

The SAR measurement system was validated according to procedures in KDB 865664. The validation status summary Table is below.

Table 12

Dates	Probe Calibration Point		Probe SN	Measured Tissue Parameters		Validation		
				σ	ϵ_r	Sensitivity	Linearity	Isotropy
CW								
10/08/2013	Body	150	3301	0.77	60.8	Pass	Pass	Pass
10/08/2013	Head	150		0.73	51.6	Pass	Pass	Pass
10/08/2013	Body	300		0.87	57.1	Pass	Pass	Pass
10/08/2013	Head	300		0.86	45.1	Pass	Pass	Pass
10/03/2013	Body	750		0.97	54.2	Pass	Pass	Pass
10/04/2013	Head	750		0.89	42.8	Pass	Pass	Pass
09/25/2013	Body	900		1.06	54.8	Pass	Pass	Pass
09/26/2013	Head	900		0.97	41.1	Pass	Pass	Pass
LTE								
12/17/2013	Body	750	3301	0.92	53.8	Pass	Pass	Pass
12/17/2013	Head	750		0.88	42.4	Pass	Pass	Pass

10.2 System Verification

System verification checks were conducted each day during the SAR assessment. The results are normalized to 1W. Appendix D includes DASY plots for each day during the SAR assessment. The Table below summarizes the daily system check results used for the SAR assessment.

Table 13

Probe Serial #	Tissue Type	Dipole Kit / Serial #	Ref SAR @ 1W (W/kg)	System Check Results Measured (W/kg)	System Check Test Results when normalized to 1W (W/kg)	Tested Date		
3301	FCC Body	SPEAG D300V3 / 1014	*2.20 +/- 10%	0.566	2.26	2/19/2014		
	IEEE/IEC Head			*2.13 +/- 10%	0.571	2.28	2/20/2014	
					0.549	2.20	3/12/2014	
			0.554		2.22	3/11/2014		
			FCC Body	SPEAG D750V3 / 1098	8.67 +/- 10%	0.518	2.07	3/12/2014
						0.519	2.08	4/28/2014
		2.22				8.88	2/21/2014	
	2.28	9.12				2/22/2014		
	2.26	9.04				2/23/2014		
	2.21	8.84				2/24/2014		
	2.15	8.60				2/25/2014		
	2.23	8.92				3/05/2014		
	2.19	8.76				3/06/2014		
	2.16	8.64				3/13/2014		
	2.18	8.72				3/15/2014		
	2.19	8.76				4/24/2014		
	IEEE/IEC Head	SPEAG D750V3 / 1098	8.16 +/- 10%	2.11	8.44	4/25/2014		
				2.07	8.28	2/28/2014		
				2.05	8.20	3/03/2014		
				2.10	8.40	3/08/2014		
				2.00	8.00	3/10/2014		
				2.03	8.12	3/16/2014		
	FCC Body	SPEAG D900V2 / 84	10.7 +/- 10%	1.96	7.84	4/26/2014		
				2.82	11.28	2/26/2014		
2.82				11.28	2/27/2014			
2.83				11.32	3/07/2014			
IEEE/IEC Head	SPEAG D900V2 / 84	10.8 +/- 10%	2.81	11.24	3/4/2014			
			2.70	10.80	3/5/2014			

Note – * Targets were set for 150MHz per the guidance in KDB8865664 System verification options. Detailed results are available in Appendix J

10.3 Equivalent Tissue Test Results

Simulated tissue prepared for SAR measurements is measured daily and within 24 hours prior to actual SAR 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 applicable equipment indicated in section 9.0. The Table below summarizes the measured tissue parameters used for the SAR assessment.

Table 14

Frequency (MHz)	Tissue Type	Conductivity Target (S/m)	Dielectric Constant Target	Conductivity Meas. (S/m)	Dielectric Constant Meas.	Tested Date
138	FCC Body	0.79 (0.75-0.83)	62.2 (59.1-65.3)	0.81	61.7	3/12/2014
138	IEEE/ IEC Head	0.75 (0.71-0.79)	52.9 (50.2-55.5)	0.75	53.7	4/28/2014
145	FCC Body	0.80 (0.76-0.84)	62.0 (58.9-65.1)	0.81	61.4	3/12/2014
145	IEEE/ IEC Head	0.76 (0.72-0.79)	52.5 (49.9-55.2)	0.76	53.4	4/28/2014
150	FCC Body	0.80 (0.76-0.84)	61.9 (58.8-65.0)	0.79	61.6	2/19/2014
				0.79	61.3	2/20/2014
				0.81	61.2	3/12/2014
150	IEEE/ IEC Head	0.76 (0.72-0.80)	52.3 (49.7-54.9)	0.77	53.1	3/11/2014
				0.74	52.4	3/12/2014
				0.76	53.1	4/28/2014
151	IEEE/ IEC Head	0.76 (0.72-0.80)	52.3 (49.6-54.9)	0.77	53.1	3/11/2014
				0.74	52.4	3/12/2014
173	FCC Body	0.82 (0.78-0.86)	61.3 (58.3-64.4)	0.81	60.9	2/19/2014
				0.80	60.7	2/20/2014
750	FCC Body	0.96 (0.92-1.01)	55.5 (52.8-58.3)	0.93	53.2	2/21/2014
				0.94	53.7	2/22/2014
				0.94	53.8	2/23/2014
				0.94	54.3	2/24/2014
				0.93	54.0	2/25/2014
				0.93	53.9	3/05/2014
				0.94	53.8	3/06/2014
				0.92	53.8	3/13/2014
				0.94	53.7	3/15/2014
				0.97	55.7	4/24/2014
750	IEEE/ IEC Head	0.89 (0.85-0.93)	41.9 (39.8-44.0)	1.00	55.6	4/25/2014
				0.85	42.9	2/28/2014
				0.87	42.6	3/03/2014
				0.85	42.5	3/08/2014
				0.85	42.8	3/10/2014
				0.86	43.2	3/16/2014
764	FCC Body	0.96 (0.92-1.01)	55.5 (52.7-58.3)	0.88	43.1	4/26/2014
				0.94	53.1	2/21/2014
				0.95	53.5	2/22/2014
				0.95	53.7	2/23/2014
				0.95	53.7	3/06/2014
				0.94	53.7	3/13/2014

Table 14 continued

Frequency (MHz)	Tissue Type	Conductivity Target (S/m)	Dielectric Constant Target	Conductivity Meas. (S/m)	Dielectric Constant Meas.	Tested Date
764	IEEE/IEC Head	0.89 (0.85-0.94)	41.8 (39.7-43.9)	0.86	42.7	2/28/2014
				0.89	42.4	3/03/2014
770	FCC Body	0.96 (0.92-1.01)	55.5 (52.7-58.2)	0.95	53.1	2/21/2014
775	FCC Body	0.97 (0.92-1.01)	55.4 (52.7-58.2)	0.95	53.1	2/21/2014
782	FCC Body	0.97 (0.92-1.01)	55.4 (52.6-58.2)	0.97	53.4	3/15/2014
				1.00	55.4	4/24/2014
				1.00	55.6	4/25/2014
782	IEEE/IEC Head	0.89 (0.85-0.94)	41.7 (39.7-43.8)	0.89	42.8	3/16/2014
				0.91	42.7	4/26/2014
793	FCC Body	0.97 (0.92-1.02)	55.4 (52.6-58.1)	0.98	53.3	3/15/2014
				1.01	55.4	4/24/2014
793	IEEE/IEC Head	0.90 (0.85-0.94)	41.7 (39.6-43.8)	0.90	42.7	3/16/2014
				0.92	42.6	4/26/2014
794	FCC Body	0.97 (0.92-1.02)	55.4 (52.6-58.1)	0.98	53.5	3/05/2014
809	FCC Body	0.97 (0.92-1.02)	55.3 (52.5-58.1)	0.99	53.3	2/23/2014
				0.99	53.8	2/24/2014
				0.98	53.5	2/25/2014
				0.99	53.3	3/05/2014
				0.99	53.3	3/06/2014
809	IEEE/IEC Head	0.90 (0.85-0.94)	41.6 (39.5-43.7)	0.90	41.8	3/08/2014
				0.90	42.1	3/10/2014
824	FCC Body	0.97 (0.92-1.02)	55.2 (52.5-58.0)	1.01	53.2	3/05/2014
851	FCC Body	0.99 (0.94-1.04)	55.2 (52.4-57.9)	1.03	53.7	2/26/2014
				1.02	53.1	2/27/2014
				1.03	52.8	3/07/2014
851	IEEE/IEC Head	0.92 (0.87-0.96)	41.5 (39.4-43.6)	0.95	41.2	3/04/2014
				0.93	40.0	3/05/2014
900	FCC Body	1.05 (1.00-1.10)	55.0 (52.3-57.8)	1.08	53.4	2/26/2014
				1.06	52.7	2/27/2014
				1.07	52.4	3/07/2014
900	IEEE/IEC Head	0.97 (0.92-1.02)	41.6 (39.5-43.7)	1.00	40.7	3/04/2014
				0.98	39.5	3/05/2014

11.0 Environmental Test Conditions

The EME Laboratory’s 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 within the phantom used for measurements was at least 15cm. 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 SAR tests reported herein:

Table 15

	Target	Measured
Ambient Temperature	18 – 25 °C	Range: 21.3 – 23.4°C Avg. 22.0 °C
Relative Humidity	30 – 70 %	Range: 41.8 – 58.8 % Avg. 51.0 %
Tissue Temperature	NA	Range: 20.7-22.6°C Avg. 21.6°C

Relative humidity target range is a recommended target

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 SAR scans are repeated.

12.0 DUT Test Setup and Methodology

12.1 Measurements

SAR measurements were performed using the DASY system described in section 8.0 using zoom scans. Elliptical flat phantoms filled with applicable simulated tissue were used for body and face testing.

The Table below includes the step sizes and resolution of area and zoom scans per KDB 865664 requirements.

Table 16

Description		≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface		5 ± 1 mm	$\frac{1}{2} \cdot \delta \cdot \ln(2) \pm 0.5$ mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location		30° ± 1°	20° ± 1°
Maximum area scan spatial resolution: Δx_{Area} , Δy_{Area}		≤ 2 GHz: ≤ 15 mm 2 – 3 GHz: ≤ 12 mm	3 – 4 GHz: ≤ 12 mm 4 – 6 GHz: ≤ 10 mm
		When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	
Maximum zoom scan spatial resolution: Δx_{Zoom} , Δy_{Zoom}		≤ 2 GHz: ≤ 8 mm 2 – 3 GHz: ≤ 5 mm*	3 – 4 GHz: ≤ 5 mm* 4 – 6 GHz: ≤ 4 mm*
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$	≤ 5 mm	3 – 4 GHz: ≤ 4 mm 4 – 5 GHz: ≤ 3 mm 5 – 6 GHz: ≤ 2 mm
Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details. * When zoom scan is required and the reported SAR from the area scan based 1-g SAR estimation procedures of KDB 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.			

12.2 DUT Configuration(s)

The DUT is a portable device operational at the body and face as described in section 6.0 while using the applicable accessories listed in section 7.0. All accessories listed in section 7.0 of this report were considered when implementing the guidelines specified in KDB 643646. KDB 941225 was applied to LTE test configurations. Agilent's PXT Wireless Communication Test Set was used for LTE testing with the TTI (Transmit Time Interval) set to maximum.

12.3 DUT Positioning Procedures

The positioning of the device for each body location is described below and illustrated in Appendix H.

12.3.1 Body

The DUT was positioned in normal use configuration against the phantom with the offered body worn accessory as well as with and without the offered audio accessories as applicable.

12.3.2 Head

Not applicable.

12.3.3 Face

The DUT was positioned with its' front and back sides separated 2.5cm from the phantom.

12.4 DUT Test Channels

The number of test channels was determined by using the following IEEE 1528 equation. The use of this equation produces the same or more test channels compared to the FCC KDB 447498 number of test channels formula.

$$N_c = 2 * \text{roundup}[10 * (f_{\text{high}} - f_{\text{low}}) / f_c] + 1$$

Where

N_c = Number of channels

F_{high} = Upper channel

F_{low} = Lower channel

F_c = Center channel

12.5 SAR Result Scaling Methodology

The calculated 1-gram and 10-gram averaged SAR results indicated as “Max Calc. 1g-SAR” and “Max Calc.10g-SAR” in the data Tables is determined by scaling the measured SAR to account for power leveling variations and power slump. A Table and graph of output power versus time is provided in Appendix F. For this device the “Max Calc. 1g-SAR” and “Max Calc.10g-SAR” are scaled using the following formula:

$$\text{Max_Calc} = \text{SAR_meas} \cdot 10^{\frac{-\text{Drift}}{10}} \cdot \frac{P_{\text{max}}}{P_{\text{int}}} \cdot \text{DC}$$

P_{max} = Maximum Power (W)

P_{int} = Initial Power (W)

Drift = DASY drift results (dB)

SAR_meas = Measured 1-g or 10-g Avg. SAR (W/kg)

DC = Transmission mode duty cycle in % where applicable

50% duty cycle is applied for PTT operation

Note: for conservative results, the following are applied:

If $P_{\text{int}} > P_{\text{max}}$, then $P_{\text{max}}/P_{\text{int}} = 1$.

Drift = 1 for positive drift

Additional SAR scaling was applied using the methodologies outlined in FCC KDB 865664 using tissue sensitivity values. SAR was scaled for conditions where the tissue permittivity was measured above the nominal target and for tissue conductivity that was measured below the nominal target. Negative or reduced SAR scaling is not permitted.

12.6 DUT Test Plan

The guidelines and requirements outlined in section 4.0 were used to assess compliance of this device. All modes of operation identified in section 6.0 were considered during the development of the test plan. All tests were performed in CW and LTE modes and 50% duty cycle was applied to PTT configurations in the final results.

Standalone and simultaneous BT testing were assessed in sections 13.14 and 14.0 per the guidelines of KDB 447498.

13.0 DUT Test Data

13.1 LMR assessments at the Body for 150.8-173.4MHz band

Battery PMNN4403B was selected as the default battery for assessments at the Body because it is the thinnest battery (refer to Exhibit 7B for battery illustration). The default battery was used during conducted power measurements for all test channels within Part 90 frequency range (150.8-173.4MHz) which are listed in Table 17. The channel with the highest conducted power will be identified as the default channel per KDB 643646 (SAR Test for PTT Radios). SAR plots of the highest results per Table (bolded) are presented in Appendix E.

Table 17

Test Freq (MHz)	Power (W)
150.8000	6.34
158.0125	6.38
165.5000	6.35
173.4000	6.39

Assessments at the Body with Body worn NTN8266B

DUT assessment with offered antennas, default battery and, default body worn accessory per KDB 643646. Optional batteries were tested per the requirements of KDB 643646. Refer to Table 17 for highest output power channel. SAR plots of the highest results per Table (bolded) are presented in Appendix E.

Table 18

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Meas. 10g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Max Calc. 10g-SAR (W/kg)	Run#		
NAR6593A	PMNN4403B	NTN8266B	PMMN4050A	150.8000									
				158.0125									
				165.5000									
				173.4000	6.39	-0.51	1.09	0.68	0.63	0.40	HvH-Ab-140219-04		
NAR6594A							150.8000						
							158.0125						
							165.5000						
							173.4000	6.48	-0.50	1.21	0.76	0.69	0.43
Assessment of Additional Batteries													
NAR6594A	NNTN7038B	NTN8266B	PMMN4050A	150.8000									
				158.0125									
				165.5000									
				173.4000	6.50	-0.36	1.23	0.78	0.68	0.43	HvH-Ab-140219-06		

Table 18 Continued

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Meas. 10g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Max Calc. 10g-SAR (W/kg)	Run#		
Assessment of Additional Batteries													
NAR6594A	NNTN7034B	NTN8266B	PMMN4050A	150.8000									
				158.0125									
				165.5000									
				173.4000	6.62	-0.29	1.25	0.87	0.67	0.47	HvH-Ab-140219-07		
	NNTN7037A			150.8000									
				158.0125									
				165.5000									
				173.4000	6.50	-0.88	1.08	0.79	0.67	0.49	HvH-Ab-140219-08		
	NNTN7573A			150.8000									
				158.0125									
				165.5000									
				173.4000	6.54	-0.68	1.10	0.78	0.65	0.46	HvH-Ab-140219-09		

Assessments at the Body with Body worn HLN6875A

DUT assessment with offered antennas, default battery and, optional body worn accessory per KDB 643646. Optional batteries were tested per the requirements of KDB 643646. Refer to Table 17 for highest output power channel. SAR plots of the highest results per Table (bolded) are presented in Appendix E.

Table 19

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Meas. 10g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Max Calc. 10g-SAR (W/kg)	Run#		
NAR6593A	PMNN4403B	HLN6875A	PMMN4050A	150.8000									
				158.0125									
				165.5000									
				173.4000	6.54	-0.59	0.96	0.44	0.56	0.25	HvH-Ab-140219-10		
NAR6594A				150.8000									
				158.0125									
				165.5000									
				173.4000	6.54	-0.50	1.03	0.45	0.58	0.25	HvH-Ab-140219-11		
Assessment of Additional Batteries													
NAR6594A	NNTN7038B	HLN6875A	PMMN4050A	150.8000									
				158.0125									
				165.5000									
				173.4000	6.50	-0.42	1.19	0.53	0.67	0.29	HvH-Ab-140220-02		

Table 19 Continued

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Meas. 10g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Max Calc. 10g-SAR (W/kg)	Run#		
Assessment of Additional Batteries													
NAR6594A	NNTN7034B	HLN6875A	PMMN4050A	150.8000									
				158.0125									
				165.5000									
				173.4000	6.51	-0.34	2.81	1.17	1.54	0.64	HvH-Ab-140220-03		
	NNTN7037A			150.8000									
				158.0125									
				165.5000									
				173.4000	6.51	-0.66	2.73	1.18	1.61	0.70	HvH-Ab-140220-04		
	NNTN7573A			150.8000									
				158.0125									
				165.5000									
				173.4000	6.52	-0.62	2.17	0.94	1.27	0.55	HvH-Ab-140220-05		

Assessment at the Body with other audio accessories

Assessment per “KDB 643646 Body SAR Test Consideration for Audio Accessories without Built-in Antenna; Sec 1, A. when overall < 4.0 W/kg, SAR tested for that audio accessory is not necessary.” This was applicable to all remaining accessories.

Assessment of wireless BT configuration

Assessment using the overall highest SAR configuration at the body from above without an audio accessory attached. SAR plots of the highest results per Table (bolded) are presented in Appendix E.

Table 20

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Meas. 10g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Max Calc. 10g-SAR (W/kg)	Run#
NAR6594A	NNTN7037A	HLN6875A	None	150.8000							
				158.0125							
				165.5000							
				173.4000	6.52	-0.67	3.92	1.63	2.32	0.96	HvH-Ab-140220-06

13.2 LMR assessments at the Body for 764-775MHz band

Battery PMNN4403B was selected as the default battery for assessments at the Body because it is the thinnest battery (refer to Exhibit 7B for battery illustration). The default battery was used during conducted power measurements for all test channels within Part 90 frequency range (764-775MHz) which are listed in Table 21. The channel with the highest conducted power will be identified as the default channel per KDB 643646 (SAR Test for PTT Radios). SAR plots of the highest results per Table (bolded) are presented in Appendix E.

Table 21

Test Freq (MHz)	Power (W)
764.0125	2.89
770.000	2.88
774.9875	2.88

Assessments at the Body with Body worn NTN8266B

DUT assessment with offered antennas, default battery and, default body worn accessory per KDB 643646. Optional batteries were tested per the requirements of KDB 643646. Refer to Table 21 for highest output power channel. SAR plots of the highest results per Table (bolded) are presented in Appendix E.

Table 22

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Meas. 10g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Max Calc. 10g-SAR (W/kg)	Run#						
NAR6594A	PMNN4403B	NTN8266B	PMMN4050A	764.0125	2.92	-0.21	4.56	2.69	2.45	1.45	HvH-Ab-140221-02						
				770.0000													
				774.9875													
NAF5085A				PMNN4403B	NTN8266B	PMMN4050A	764.0125	2.92	-0.25	2.26	1.68	1.23	0.91	HvH-Ab-140221-03			
							770.0000										
							774.9875										
NAR6595A							PMNN4403B	NTN8266B	PMMN4050A	764.0125	2.93	-0.25	7.62	4.43	4.12	2.39	HvH-Ab-140221-04
										770.0000	2.92	-0.46	7.17	4.15	4.08	2.36	HvH-Ab-140221-05
										774.9875	2.93	-0.52	6.92	4.02	3.98	2.31	HvH-Ab-140221-06
Assessment of Additional Batteries																	
NAR6595A	NNTN7038B	NTN8266B	PMMN4050A							764.0125	2.93	-0.01	7.47	4.40	3.82	2.25	HvH-Ab-140221-07
										770.0000							
				774.9875													

Table 22 Continued

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Meas. 10g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Max Calc. 10g-SAR (W/kg)	Run#
Assessment of Additional Batteries											
NAR6595A	NNTN7034B	NTN8266B	PMMN4050A	764.0125	2.92	-0.31	6.88	4.52	3.78	2.49	HvH-Ab-140222-02
				770.0000							
				774.9875							
	NNTN7037A			764.0125	2.92	-0.67	6.11	4.30	3.65	2.57	HvH-Ab-140222-03
				770.0000							
				774.9875							
	NNTN7573A			764.0125	2.93	-0.62	6.25	4.39	3.68	2.58	HvH-Ab-140222-04
				770.0000							
				774.9875							

Assessments at the Body with Body worn HLN6875A

DUT assessment with offered antennas, default battery and, optional body worn accessory per KDB 643646. Optional batteries were tested per the requirements of KDB 643646. Refer to Table 21 for highest output power channel. SAR plots of the highest results per Table (bolded) are presented in Appendix E.

Table 23

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Meas. 10g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Max Calc. 10g-SAR (W/kg)	Run#
NAR6594A	PMNN4403B	HLN6875A	PMMN4050A	764.0125	2.93	-0.24	2.53	1.87	1.36	1.01	HvH-Ab-140222-05
				770.0000							
				774.9875							
NAF5085A				764.0125	2.93	-0.18	0.97	0.72	0.52	0.39	HvH-Ab-140222-06
				770.0000							
				774.9875							
NAR6595A				764.0125	2.93	-0.95	5.33	3.96	3.38	2.51	HvH-Ab-140222-07
				770.0000							
				774.9875							
Assessment of Additional Batteries											
NAR6595A	NNTN7038B	HLN6875A	PMMN4050A	764.0125	2.93	-0.27	5.31	3.94	2.88	2.14	HvH-Ab-140222-08
				770.0000							
				774.9875							

Table 23 Continued

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Meas. 10g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Max Calc. 10g-SAR (W/kg)	Run#
Assessment of Additional Batteries											
NAR6595A	NNTN7034B	HLN6875A	PMMN4050A	764.0125	2.93	-0.19	1.93	1.44	1.03	0.77	HvH-Ab-140222-09
				770.0000							
				774.9875							
	NNTN7037A			764.0125	2.93	-0.47	2.91	2.07	1.65	1.18	HvH-Ab-140222-10
				770.0000							
				774.9875							
	NNTN7573A			764.0125	2.94	-0.49	2.85	2.03	1.62	1.16	HvH-Ab-140222-11
				770.0000							
				774.9875							

Assessment at the Body with other audio accessories

Assessment of additional audio accessories per “KDB 643646 Body SAR Test Consideration for Audio Accessories without Built-in Antenna” Section 1, A. SAR plots of the highest results per Table (bolded) are presented in Appendix E.

Table 24

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Meas. 10g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Max Calc. 10g-SAR (W/kg)	Run#
NAR6595A	PMNN4403B	NTN8266B	HMN4104B	764.0125	2.94	-0.32	7.46	4.39	4.08	2.40	HvH-Ab-140222-12
				770.0000							
				774.9875							
			PMMN4040A	764.0125	2.93	-0.30	7.97	4.61	4.36	2.52	HvH-Ab-140222-13
				770.0000							
				774.9875							
			PMLN5275C	764.0125	2.93	-0.28	7.16	4.24	3.90	2.31	HvH-Ab-140222-14
				770.0000							
				774.9875							
			PMLN5653A	764.0125	2.93	-0.35	7.78	4.47	4.30	2.47	HvH-Ab-140222-15
				770.0000							
				774.9875							
			PMLN5102A	764.0125	2.92	-0.29	7.33	4.26	4.01	2.33	HvH-Ab-140223-02
				770.0000							
				774.9875							
			RMN5058A	764.0125	2.93	-0.28	7.25	4.20	3.95	2.29	HvH-Ab-140223-03
				770.0000							
				774.9875							

Table 24 Continued

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Meas. 10g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Max Calc. 10g-SAR (W/kg)	Run#
NAR6595A	PMNN4403B	NTN8266B	PMLN5101A	764.0125	2.93	-0.34	7.49	4.32	4.13	2.38	HvH-Ab-140223-05
				770.0000							
				774.9875							
			RMN5116A w/HMN4104B	764.0125	2.93	-0.32	7.54	4.37	4.14	2.40	HvH-Ab-140223-06
				770.0000							
				774.9875							
			PMLN5097A	764.0125	2.93	-0.13	7.32	4.38	3.85	2.30	HvH-Ab-140223-07
				770.0000							
				774.9875							
			RLN5882A	764.0125	2.93	-0.27	7.98	4.65	4.33	2.52	HvH-Ab-140223-08
				770.0000							
				774.9875							
			PMLN5096B	764.0125	2.93	-0.31	7.64	4.46	4.19	2.44	HvH-Ab-140223-09
				770.0000							
				774.9875							
			BDN6783B / BDN6729A	764.0125	2.93	0.07	8.10	4.80	4.13	2.45	HvH-Ab-140223-10
				770.0000							
				774.9875							
			NNTN7869A / ZMN6031A	764.0125	2.93	-0.23	7.43	4.38	4.00	2.36	HvH-Ab-140223-11
				770.0000							
				774.9875							
			NNTN7869A / ZMN6032A	764.0125	2.92	-0.20	6.83	4.17	3.66	2.24	HvH-Ab-140223-12
				770.0000							
				774.9875							

Assessment of wireless BT configuration

Assessment using the overall highest SAR configuration at the body from above without an audio accessory attached. SAR plots of the highest results per Table (bolded) are presented in Appendix E.

Table 25

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Meas. 10g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Max Calc. 10g-SAR (W/kg)	Run#
NAR6595A	PMNN4403B	NTN8266B	None	764.0125	2.90	-0.62	8.60	4.93	5.11	2.93	HvH-Ab-140313-08
				770.0000							
				774.9875							

Assessment of PSM configuration

Battery NNTN7034B was selected as the default battery for assessments at the Body with Public Safety Microphone (PSM) because it has the highest capacity (refer to Exhibit 7B for battery illustration). The default battery was used during conducted power measurements for all test channels within Part 90 frequency range (764-775MHz) which are listed in Table 26. The channel with the highest conducted power will be identified as the default channel per KDB 643646 (SAR Test for PTT Radios). SAR plots of the highest results per Table (bolded) are presented in Appendix E.

Table 26

Test Freq (MHz)	Power (W)
764.0125	2.89
770.000	2.88
774.9875	2.88

Assessment of offered PSM audio accessories per KDB 643646. SAR plots of the highest results per Table (bolded) are presented in Appendix E.

Table 27

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Meas. 10g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Max Calc. 10g-SAR (W/kg)	Run#	
PMAF4002A	NNTN7034B	4205823V08 REV. L	PMMN4059B	764.0125	2.87	-0.11	4.60	3.05	2.46	1.63	HvH-Ab-140306-04	
				770.0000								
				774.9875								
			PMMN4060B	764.0125	2.87	-0.12	4.24	2.86	2.27	1.53		HvH-Ab-140306-05
				770.0000								
				774.9875								
			PMMN4061B	764.0125	2.88	-0.11	5.66	3.81	3.01	2.03		HvH-Ab-140306-06
				770.0000								
				774.9875								

13.3 LMR assessments at the Body for 794-824MHz band

Battery PMNN4403B was selected as the default battery for assessments at the Body because it is the thinnest battery (refer to Exhibit 7B for battery illustration). The default battery was used during conducted power measurements for all test channels within Part 90 frequency range (794-824MHz) which are listed in Table 28. The channel with the highest conducted power will be identified as the default channel per KDB 643646 (SAR Test for PTT Radios). SAR plots of the highest results per Table (bolded) are presented in Appendix E.

Table 28

Test Freq (MHz)	Power (W)
794.0125	2.89
808.5000	3.49
823.9875	3.49

Assessments at the Body with Body worn NTN8266B

DUT assessment with offered antennas, default battery and, default body worn accessory per KDB 643646. Optional batteries were tested per the requirements of KDB 643646. Refer to Table 28 for highest output power channel. SAR plots of the highest results per Table (bolded) are presented in Appendix E.

Table 29

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Meas. 10g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Max Calc. 10g-SAR (W/kg)	Run#						
NAR6594A	PMNN4403B	NTN8266B	PMMN4050A	794.0125													
				808.5000	3.58	-0.18	2.07	1.24	1.08	0.65	HvH-Ab-140223-14						
				823.9875													
NAF5085A				PMNN4403B	NTN8266B	PMMN4050A	794.0125										
							808.5000	3.58	-0.23	2.23	1.63	1.18	0.86	HvH-Ab-140223-15			
							823.9875										
NAR6595A							PMNN4403B	NTN8266B	PMMN4050A	794.0125	2.90	-0.38	6.72	3.89	3.78	2.19	HvH-Ab-140305-08
										808.5000	3.58	-0.51	7.21	4.24	4.08	2.40	HvH-Ab-140223-16
										823.9875	3.53	-0.41	6.55	3.88	3.67	2.17	HvH-Ab-140305-09
Assessment of Additional Batteries																	
NAR6595A	NNTN7038B	NTN8266B	PMMN4050A							794.0125							
										808.5000	3.57	-0.49	7.36	4.33	4.15	2.44	HvH-Ab-140224-02
				823.9875													

Table 29 Continued

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Meas. 10g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Max Calc. 10g-SAR (W/kg)	Run#	
Assessment of Additional Batteries												
NAR6595A	NNTN7034B	NTN8266B	PMMN4050A	794.0125								
				808.5000	3.57	-0.50	6.38	4.12	3.61	2.33	HvH-Ab-140224-03	
				823.9875								
	NNTN7037A			794.0125								
				808.5000	3.57	-0.45	6.15	4.05	3.44	2.26	HvH-Ab-140224-04	
				823.9875								
	NNTN7573A			794.0125								
				808.5000	3.51	-0.55	6.02	3.99	3.50	2.32	HvH-Ab-140305-10	
				823.9875								

Assessments at the Body with Body worn HLN6875A

DUT assessment with offered antennas, default battery and, optional body worn accessory per KDB 643646. Optional batteries were tested per the requirements of KDB 643646. Refer to Table 28 for highest output power channel. SAR plots of the highest results per Table (bolded) are presented in Appendix E.

Table 30

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Meas. 10g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Max Calc. 10g-SAR (W/kg)	Run#	
NAR6594A	PMNN4403B	HLN6875A	PMMN4050A	794.0125								
				808.5000	3.58	-0.19	1.39	1.02	0.73	0.54	HvH-Ab-140224-06	
				823.9875								
NAF5085A				794.0125								
				808.5000	3.58	-0.18	1.15	0.84	0.60	0.44	HvH-Ab-140224-07	
				823.9875								
NAR6595A				794.0125								
				808.5000	3.58	-0.42	5.41	3.98	3.00	2.20	HvH-Ab-140224-08	
				823.9875								
Assessment of Additional Batteries												
NAR6595A	NNTN7038B	HLN6875A	PMMN4050A	794.0125								
				808.5000	3.58	-0.35	5.65	4.13	3.08	2.25	HvH-Ab-140224-09	
				823.9875								

Table 30 Continued

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Meas. 10g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Max Calc. 10g-SAR (W/kg)	Run#		
Assessment of Additional Batteries													
NAR6595A	NNTN7034B	HLN6875A	PMMN4050A	794.0125									
				808.5000	3.58	-0.50	2.36	1.61	1.33	0.91	HvH-Ab-140224-10		
				823.9875									
	NNTN7037A			794.0125									
				808.5000	3.58	-0.42	3.61	2.55	2.00	1.41	HvH-Ab-140224-11		
				823.9875									
	NNTN7573A			794.0125									
				808.5000	3.58	-0.39	3.66	2.57	2.01	1.41	HvH-Ab-140224-12		
				823.9875									

Assessment at the Body with other audio accessories

Assessment of additional audio accessories per “KDB 643646 Body SAR Test Consideration for Audio Accessories without Built-in Antenna” Section 1, A. SAR plots of the highest results per Table (bolded) are presented in Appendix E.

Table 31

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Meas. 10g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Max Calc. 10g-SAR (W/kg)	Run#		
NAR6595A	NNTN7038B	NTN8266B	HMN4104B	794.0125									
				808.5000	3.59	-0.41	7.03	4.16	3.87	2.29	HvH-Ab-140224-13		
				823.9875									
			PMMN4040A	794.0125									
				808.5000	3.58	-0.46	7.36	4.25	4.11	2.38	HvH-Ab-140224-14		
				823.9875									
			PMLN5275C	794.0125									
				808.5000	3.58	-0.46	7.42	4.29	4.15	2.40	HvH-Ab-140225-02		
				823.9875									
			PMLN5653A	794.0125									
				808.5000	3.58	-0.46	7.28	4.24	4.07	2.37	HvH-Ab-140225-03		
				823.9875									
			PMLN5102A	794.0125									
				808.5000	3.58	-0.37	6.73	3.91	3.68	2.14	HvH-Ab-140225-04		
				823.9875									
			RMN5058A	794.0125									
				808.5000	3.58	-0.39	6.91	4.05	3.80	2.23	HvH-Ab-140225-05		
				823.9875									

Table 31 Continued

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Meas. 10g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Max Calc. 10g-SAR (W/kg)	Run#		
NAR6595A	NNTN7038B	NTN8266B	PMLN5101A	794.0125									
				808.5000	3.58	-0.44	6.68	3.87	3.72	2.15	HvH-Ab-140225-06		
				823.9875									
			RMN5116A w/HMN4104B	794.0125									
				808.5000	3.58	-0.41	7.12	4.17	3.93	2.30	HvH-Ab-140225-07		
				823.9875									
			PMLN5097A	794.0125									
				808.5000	3.58	-0.34	7.10	4.13	3.86	2.25	HvH-Ab-140225-08		
				823.9875									
			RLN5882A	794.0125									
				808.5000	3.59	-0.53	7.51	4.31	4.25	2.44	HvH-Ab-140225-09		
				823.9875									
			PMLN5096B	794.0125									
				808.5000	3.58	-0.47	7.76	4.54	4.35	2.54	HvH-Ab-140225-10		
				823.9875									
			BDN6783B / BDN6729A	794.0125									
				808.5000	3.59	-0.48	8.03	4.68	4.50	2.62	HvH-Ab-140225-11		
				823.9875									
			NNTN7869A / ZMN6031A	794.0125									
				808.5000	3.59	-0.49	6.85	4.03	3.84	2.26	HvH-Ab-140225-12		
				823.9875									
NNTN7869A / ZMN6032A	794.0125												
	808.5000	3.59	-0.38	7.58	4.43	4.15	2.42	HvH-Ab-140225-13					
	823.9875												

Assessment of wireless BT configuration

Assessment using the overall highest SAR configuration at the body from above without an audio accessory attached. SAR plots of the highest results per Table (bolded) are presented in Appendix E.

Table 32

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Meas. 10g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Max Calc. 10g-SAR (W/kg)	Run#
NAR6595A	NNTN7038B	NTN8266B	None	794.0125							
				808.5000	3.59	-0.41	7.55	4.28	4.16	2.36	HvH-Ab-140225-14
				823.9875							

Assessment of PSM configuration

Battery NNTN7034B was selected as the default battery for assessments at the Body with Public Safety Microphone (PSM) because it has the highest capacity (refer to Exhibit 7B for battery illustration). The default battery was used during conducted power measurements for all test channels within Part 90 frequency range (794-824MHz) which are listed in Table 33. The channel with the highest conducted power will be identified as the default channel per KDB 643646 (SAR Test for PTT Radios). SAR plots of the highest results per Table (bolded) are presented in Appendix E.

Table 33

Test Freq (MHz)	Power (W)
794.0125	2.89
808.5000	3.50
823.9875	3.49

Assessment of offered PSM audio accessories per KDB 643646. SAR plots of the highest results per Table (bolded) are presented in Appendix E.

Table 34

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Meas. 10g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Max Calc. 10g-SAR (W/kg)	Run#		
PMAF4002A	NNTN7034B	4205823V08 REV. L	PMMN4059B	794.0125									
				808.5000	3.51	-0.66	3.84	2.51	2.29	1.50	HvH-Ab-140306-07		
				823.9875									
			PMMN4060B	794.0125									
				808.5000	3.51	-0.72	2.31	1.56	1.40	0.94		HvH-Ab-140306-08	
				823.9875									
			PMMN4061B	794.0125									
				808.5000	3.51	-0.41	3.90	2.64	2.20	1.49		HvH-Ab-140306-09	
				823.9875									

13.4 LMR assessments at the Body for 851-869MHz band

Battery PMNN4403B was selected as the default battery for assessments at the Body because it is the thinnest battery (refer to Exhibit 7B for battery illustration). The default battery was used during conducted power measurements for all test channels within Part 90 frequency range (851-869MHz) which are listed in Table 35. The channel with the highest conducted power will be identified as the default channel per KDB 643646 (SAR Test for PTT Radios). SAR plots of the highest results per Table (bolded) are presented in Appendix E.

Table 35

Test Freq (MHz)	Power (W)
851.0125	3.52
860.0000	3.49
868.9875	3.49

Assessments at the Body with Body worn NTN8266B

DUT assessment with offered antennas, default battery and, default body worn accessory per KDB 643646. Optional batteries were tested per the requirements of KDB 643646. Refer to Table 35 for highest output power channel. SAR plots of the highest results per Table (bolded) are presented in Appendix E.

Table 36

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Meas. 10g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Max Calc. 10g-SAR (W/kg)	Run#						
NAR6594A	PMNN4403B	NTN8266B	PMMN4050A	851.0125	3.56	-0.32	5.39	3.41	2.93	1.86	HvH-Ab-140226-02						
				860.0000													
				868.9875													
NAF5085A				PMNN4403B	NTN8266B	PMMN4050A	851.0125	3.58	-0.16	3.02	1.89	1.58	0.99	HvH-Ab-140226-05			
							860.0000										
							868.9875										
NAR6595A							PMNN4403B	NTN8266B	PMMN4050A	851.0125	3.58	-0.31	5.38	3.24	2.91	1.75	HvH-Ab-140226-06
										860.0000							
										868.9875							
Assessment of Additional Batteries																	
NAR6594A	NNTN7038B	NTN8266B	PMMN4050A							851.0125	3.58	-0.43	5.42	3.42	3.01	1.90	HvH-Ab-140226-07
										860.0000							
				868.9875													

Table 36 Continued

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Meas. 10g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Max Calc. 10g-SAR (W/kg)	Run#
Assessment of Additional Batteries											
NAR6594A	NNTN7034B	NTN8266B	PMMN4050A	851.0125	3.58	0.11	5.93	3.82	2.98	1.92	HvH-Ab-140226-08
				860.0000							
				868.9875							
	NNTN7037A			851.0125	3.59	0.05	5.71	3.75	2.86	1.88	HvH-Ab-140227-02
				860.0000							
				868.9875							
	NNTN7573A			851.0125	3.57	0.06	5.76	3.73	2.90	1.88	HvH-Ab-140227-03
				860.0000							
				868.9875							

Assessments at the Body with Body worn HLN6875A

DUT assessment with offered antennas, default battery and, optional body worn accessory per KDB 643646. Optional batteries were tested per the requirements of KDB 643646. Refer to Table 35 for highest output power channel. SAR plots of the highest results per Table (bolded) are presented in Appendix E.

Table 37

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Meas. 10g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Max Calc. 10g-SAR (W/kg)	Run#
NAR6594A	PMNN4403B	HLN6875A	PMMN4050A	851.0125	3.58	0.23	2.34	1.70	1.18	0.85	HvH-Ab-140227-04
				860.0000							
				868.9875							
NAF5085A				851.0125	3.58	-0.08	1.46	1.06	0.75	0.54	HvH-Ab-140227-05
				860.0000							
				868.9875							
NAR6595A				851.0125	3.57	-0.28	4.22	3.05	2.27	1.64	HvH-Ab-140227-06
				860.0000							
				868.9875							
Assessment of Additional Batteries											
NAR6595A	NNTN7038B	HLN6875A	PMMN4050A	851.0125	3.58	-0.24	4.15	3.00	2.21	1.59	HvH-Ab-140227-07
				860.0000							
				868.9875							

Table 37 Continued

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Meas. 10g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Max Calc. 10g-SAR (W/kg)	Run#
Assessment of Additional Batteries											
NAR6595A	NNTN7034B	HLN6875A	PMMN4050A	851.0125	3.58	-0.24	3.75	1.69	1.99	0.90	HvH-Ab-140227-08
				860.0000							
				868.9875							
	NNTN7037A			851.0125	3.57	-0.24	3.88	2.71	2.07	1.44	HvH-Ab-140227-09
				860.0000							
				868.9875							
	NNTN7573A			851.0125	3.58	-0.23	4.07	2.75	2.16	1.46	HvH-Ab-140227-10
				860.0000							
				868.9875							

Assessment at the Body with other audio accessories

Assessment per “KDB 643646 Body SAR Test Consideration for Audio Accessories without Built-in Antenna; Sec 1, A. when overall < 4.0 W/kg, SAR tested for that audio accessory is not necessary.” This was applicable to all remaining accessories.

Assessment of wireless BT configuration

Assessment using the overall highest SAR configuration at the body from above without an audio accessory attached. SAR plots of the highest results per Table (bolded) are presented in Appendix E.

Table 38

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Meas. 10g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Max Calc. 10g-SAR (W/kg)	Run#
NAR6594A	NNTN7038B	NTN8266B	None	851.0125	3.58	-0.48	5.45	3.33	3.06	1.87	HvH-Ab-140227-11
				860.0000							
				868.9875							

Assessment of PSM configuration

Battery NNTN7034B was selected as the default battery for assessments at the Body with Public Safety Microphone (PSM) because it has the highest capacity (refer to Exhibit 7B for battery illustration). The default battery was used during conducted power measurements for all test channels within Part 90 frequency range (851-869MHz) which are listed in Table 39. The channel with the highest conducted power will be identified as the default channel per KDB 643646 (SAR Test for PTT Radios). SAR plots of the highest results per Table (bolded) are presented in Appendix E.

Table 39

Test Freq (MHz)	Power (W)
851.0125	3.52
860.0000	3.49
868.9875	3.49

Assessment of offered PSM audio accessories per KDB 643646. SAR plots of the highest results per Table (bolded) are presented in Appendix E.

Table 40

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Meas. 10g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Max Calc. 10g-SAR (W/kg)	Run#	
PMAF4002A	NNTN7034B	4205823V08 REV. L	PMMN4059B	851.0125	3.56	-0.65	3.89	2.52	2.28	1.48	HvH-Ab-140307-02	
				860.0000								
				868.9875								
			PMMN4060B	851.0125	3.57	-0.16	1.28	0.833	0.67	0.44		HvH-Ab-140307-03
				860.0000								
				868.9875								
			PMMN4061B	851.0125	3.56	-0.56	2.48	1.59	1.43	0.91		HvH-Ab-140307-04
				860.0000								
				868.9875								

13.5 LTE assessments at the Body for 777-787MHz band (B13)

Battery PMNN4403B was selected as the default battery for assessments at the Body because it is the thinnest (refer to Exhibit 7B for battery illustration) per KDB 643646 (SAR Test for PTT Radios). The default battery was used during conducted power measurements for all test configurations within Part 27 frequency range (777-787MHz). Table 41 below includes the output powers for the largest channel bandwidth (10MHz), QPSK and 1 RB allocation and location (low, mid, high). The highest RB configuration was used to start the LTE testing per KDB 941225 (SAR for LTE Devices). SAR plots of the highest results per Table (bolded) are presented in Appendix E.

Table 41

QPSK, 10MHz BW Power (dBm)			
RB Allocation	Lower	Middle	Upper
1 RB	22.15	23.37	22.28

Assessments at the Body with Body worn NTN8266B

DUT assessment with LTE internal antenna, default battery and, default body worn accessory per KDB 643646 using the highest output power configuration from Table 41 per KDB 941225. Optional batteries were tested per the requirements of KDB 643646 (SAR Test for PTT Radios). SAR plots of the highest results per Table (bolded) are presented in Appendix E.

Table 42

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Meas. 10g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Max Calc. 10g-SAR (W/kg)	Run#
Band 13 (777-787MHz), 10MHz BW, QPSK 1RB middle											
85009332001	PMNN4403B	NTN8266B	PMMN4050A	782	0.22	0.42	0.11	0.07	0.17	0.10	HvH-Ab-140315-04
	NNTN7038B				0.22	0.00	0.11	0.07	0.17	0.10	HvH-Ab-140315-05
	NNTN7034B				0.22	0.21	0.07	0.04	0.10	0.06	HvH-Ab-140315-06
	NNTN7037A				0.22	0.34	0.08	0.05	0.12	0.07	HvH-Ab-140315-07
	NNTN7573A				0.22	0.24	0.08	0.05	0.12	0.07	HvH-Ab-140315-08

Assessments at the Body with Body worn HLN6875A

DUT assessment with LTE internal antenna, default battery and, optional body worn accessory per KDB 643646 using the highest output power configuration from Table 41 per KDB 941225. Optional batteries were tested per the requirements of KDB 643646. SAR plots of the highest results per Table (bolded) are presented in Appendix E.

Table 43

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Meas. 10g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Max Calc. 10g-SAR (W/kg)	Run#
Band 13 (777-787MHz), 10MHz BW, QPSK 1RB middle											
85009332001	PMNN4403B	HLN6875A	PMMN4050A	782	0.22	-0.51	0.06	0.04	0.10	0.07	HvH-Ab-140315-09
	NNTN7038B				0.22	-0.32	0.06	0.04	0.09	0.07	HvH-Ab-140315-10
	NNTN7034B				0.22	0.21	0.03	0.02	0.04	0.03	HvH-Ab-140315-11
	NNTN7037A				0.22	0.22	0.03	0.02	0.05	0.03	HvH-Ab-140315-12
	NNTN7573A				0.22	0.48	0.04	0.02	0.05	0.03	HvH-Ab-140315-13

Assessment at the Body with other audio accessories

Assessment per “KDB 643646 Body SAR Test Consideration for Audio Accessories without Built-in Antenna; Sec 1, A. when overall < 0.8 W/kg, SAR tested for that audio accessory is not necessary.” This was applicable to all remaining accessories.

Assessment at the Body with other 1 RB allocations

Assessments for additional 1RB configurations are not required per KDB 941225 when the reported SAR is less than or equal to half the SAR limit i.e. 0.8 W/kg.

Assessment at the Body with 50% RB allocations

Assessment at the body with 50% RB allocation based on the output power in Table 44.

Table 44

QPSK, 10MHz BW Power (dBm)			
RB Allocation	Lower	Middle	Upper
50% RB	22.70	22.94	22.63

Assessment at the body with 50% RB allocation was conducted using highest configuration from 1RB data. SAR plots of the highest results per Table (bolded) are presented in Appendix E.

Table 45

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Meas. 10g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Max Calc. 10g-SAR (W/kg)	Run#
Band 13 (777-787MHz), 10MHz BW, QPSK 50% RB middle											
85009332001	NNTN7038B	NTN8266B	PMMN4050A	782	0.20	0.33	0.13	0.09	0.21	0.14	HvH-Ab-140424-02

Assessment at the Body with 100% RB allocations

Assessment at the body with 100% RB allocation is not required when the highest maximum output power for 100% RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1RB and 50% RB allocation from above are less than or equal to half the SAR limit i.e. 0.8 W/kg. Table 46 below indicates no testing is required.

Table 46

QPSK, 10MHz BW Power (dBm)			
RB Allocation	Lower	Middle	Upper
1 RB	22.15	23.37	22.28
50% RB	22.70	22.94	22.63
100% RB	22.74		

Assessment at the Body with 16QAM RB allocations

Assessment at the body with 16QAM RB allocation is required only when the highest maximum output power for the configuration in the higher order modulation (bold in table below) is > ½ dB higher than the same configuration in QPSK or when the reported SAR for the QPSK configuration is > 90% of the SAR limit. Data in Table 47 below indicates one test is required.

Table 47

RB allocation	RB location	QPSK	16QAM	dB delta
1 RB	Lower	22.15	22.60	0.45
	Middle	23.37	23.99	0.62
	Upper	22.28	22.91	0.63
50% RB	Lower	22.70	22.75	0.05
	Middle	22.94	22.95	0.01
	Upper	22.63	22.74	0.11
100% RB	All	22.74	22.95	0.21

Assessment at the body with 16QAM RB allocation was conducted using highest configuration from 1RB data. SAR plots of the highest results per Table (bolded) are presented in Appendix E.

Table 48

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Meas. 10g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Max Calc. 10g-SAR (W/kg)	Run#
Band 13 (777-787MHz), 10MHz BW, 16QAM 1 RB middle											
85009332001	NNTN7038B	NTN8266B	PMMN4050A	782	0.25	-0.18	0.10	0.04	0.13	0.05	HvH-Ab-140424-03

Assessment at the Body with 5MHz bandwidth channel

Assessment at the body with 5MHz bandwidth channel is required when the highest maximum output power of a configuration requiring testing in the smaller channel bandwidth is > ½ dB higher than the equivalent channel configurations in the largest channel bandwidth configuration. Table 49 below indicates no testing is required.

Table 49

RB allocation	RB location	10MHz BW Ch.	5MHz BW Ch.	dB delta
QPSK				
1RB	Lower	22.15	22.36	0.21
	Middle	23.37	22.93	-0.44
	Upper	22.28	22.33	0.05
50% RB	Lower	22.70	22.34	-0.36
	Middle	22.94	22.64	-0.30
	Upper	22.63	22.41	-0.22
100% RB	All	22.74	22.49	-0.25
16 QAM				
1RB	Lower	22.60	22.54	-0.06
	Middle	23.99	23.15	-0.84
	Upper	22.91	22.63	-0.28
50% RB	Lower	22.75	22.30	-0.45
	Middle	22.95	22.53	-0.42
	Upper	22.74	22.33	-0.41
100% RB	All	22.95	22.44	-0.51

Assessment at the Body with 3MHz bandwidth channel

Assessment at the body with 3MHz bandwidth channel is required when the highest maximum output power of a configuration requiring testing in the smaller channel bandwidth is > ½ dB higher than the equivalent channel configurations in the largest channel bandwidth configuration. Table 50 below indicates no testing is required.

Table 50

RB allocation	RB location	10MHz BW Ch.	3MHz BW Ch.	dB delta
QPSK				
1RB	Lower	22.15	22.46	0.31
	Middle	23.37	22.91	-0.46
	Upper	22.28	22.67	0.39
50% RB	Lower	22.70	22.95	0.25
	Middle	22.94	23.14	0.20
	Upper	22.63	22.97	0.34
100% RB	All	22.74	22.38	-0.36
16 QAM				
1RB	Lower	22.60	23.44	0.84
	Middle	23.99	23.88	-0.11
	Upper	22.91	23.54	0.63
50% RB	Lower	22.75	22.88	0.13
	Middle	22.95	23.09	0.14
	Upper	22.74	22.82	0.08
100% RB	All	22.95	22.51	-0.44

Assessment at the Body with 1.4MHz bandwidth channel

Assessment at the body with 1.4MHz bandwidth channel is required when the highest maximum output power of a configuration requiring testing in the smaller channel bandwidth is $> \frac{1}{2}$ dB higher than the equivalent channel configurations in the largest channel bandwidth configuration. Table 51 below indicates two tests are required.

Table 51

RB allocation	RB location	10MHz BW Ch.	1.4MHz BW Ch.	dB delta
QPSK				
1RB	Lower	22.15	22.82	0.67
	Middle	23.37	22.88	-0.49
	Upper	22.28	22.73	0.45
50% RB	Lower	22.70	22.61	-0.09
	Middle	22.94	22.96	0.02
	Upper	22.63	22.89	0.26
100% RB	All	22.74	22.66	-0.08
16 QAM				
1RB	Lower	23.30	23.93	0.63
	Middle	23.55	23.84	0.29
	Upper	22.95	23.69	0.74
50% RB	Lower	22.54	23.47	0.93
	Middle	22.27	23.49	1.22
	Upper	22.18	23.44	1.26
100% RB	All	22.58	22.66	0.08

Assessment at the body with 1.4MHz band width channel as indicated in Table 51 above was conducted using highest configuration from 1RB data. This data is in Table 52 below. SAR plots of the highest results per Table (bolded) are presented in Appendix E.

Table 52

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Meas. 10g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Max Calc. 10g-SAR (W/kg)	Run#
Band 13 (777-787MHz), 1.4MHz BW, 16QAM 1 RB lower											
85009332001	NNTN7038B	NTN8266B	PMMN4050A	782	0.23	-0.02	0.12	0.08	0.17	0.10	HvH-Ab-140425-04
Band 13 (777-787MHz), 1.4MHz BW, 16QAM 50% RB middle											
85009332001	NNTN7038B	NTN8266B	PMMN4050A	782	0.22	0.13	0.10	0.06	0.15	0.09	HvH-Ab-140425-05

13.6 LTE assessment at the Body for 788-798MHz band (B14)

Battery PMNN4403B was selected as the default battery for assessments at the Body because it is the thinnest (refer to Exhibit 7B for battery illustration) per KDB 643646 (SAR Test for PTT Radios). The default battery was used during conducted power measurements for all test configurations within Part 90 frequency range (788-798MHz). Table 53 below includes the output powers for the largest channel bandwidth (10MHz), QPSK and 1 RB allocation and location (low, mid, high). The highest RB configuration was used to start the LTE testing per KDB 941225 (SAR for LTE Devices). SAR plots of the highest results per Table (bolded) are presented in Appendix E.

Table 53

QPSK, 10MHz BW Power (dBm)			
RB Allocation	Lower	Middle	Upper
1 RB	22.88	23.14	22.77

Assessments at the Body with Body worn NTN8266B

DUT assessment with LTE internal antenna, default battery and, default body worn accessory per KDB 643646 using the highest output power configuration from Table 53 per KDB 941225. Optional batteries were tested per the requirements of KDB 643646 (SAR Test for PTT Radios). SAR plots of the highest results per Table (bolded) are presented in Appendix E.

Table 54

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Meas. 10g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Max Calc. 10g-SAR (W/kg)	Run#
Band 14 (788-798MHz), 10MHz BW, QPSK 1RB middle											
85009332001	PMNN4403B	NTN8266B	PMMN4050A	793.000	0.21	0.06	0.12	0.07	0.18	0.11	HvH-Ab-140315-14
	NNTN7038B				0.21	0.23	0.12	0.07	0.18	0.11	HvH-Ab-140315-15
	NNTN7034B				0.21	0.21	0.07	0.04	0.11	0.07	HvH-Ab-140315-16
	NNTN7037A				0.21	0.32	0.07	0.04	0.11	0.06	HvH-Ab-140315-17
	NNTN7573A				0.21	0.11	0.07	0.04	0.11	0.07	HvH-Ab-140315-18

Assessments at the Body with Body worn HLN6875A

DUT assessment with LTE internal antenna, default battery and, optional body worn accessory per KDB 643646 using the highest output power configuration from Table 53 per KDB 941225. Optional batteries were tested per the requirements of KDB 643646. SAR plots of the highest results per Table (bolded) are presented in Appendix E.

Table 55

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Meas. 10g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Max Calc. 10g-SAR (W/kg)	Run#
Band 14 (788-798MHz), 10MHz BW, QPSK 1RB middle											
85009332001	PMNN4403B	HLN6875A	PMMN4050A	793.000	0.21	0.13	0.09	0.07	0.14	0.10	HvH-Ab-140315-19
	NNTN7038B				0.21	-0.58	0.09	0.07	0.16	0.12	HvH-Ab-140315-20
	NNTN7034B				0.21	0.19	0.03	0.02	0.05	0.04	HvH-Ab-140315-21
	NNTN7037A				0.21	0.29	0.08	0.04	0.12	0.07	HvH-Ab-140315-22
	NNTN7573A				0.21	0.42	0.07	0.04	0.11	0.06	HvH-Ab-140315-23

Assessment at the Body with other audio accessories

Assessment per “KDB 643646 Body SAR Test Consideration for Audio Accessories without Built-in Antenna; Sec 1, A. when overall < 4.0 W/kg, SAR tested for that audio accessory is not necessary.” This was applicable to all remaining accessories.

Assessment at the Body with other 1 RB allocations

Assessments for additional 1RB configurations are not required per KDB 941225 when the reported SAR is less than or equal to half the SAR limit i.e. 4.0 W/kg.

Assessment at the Body with 50% RB allocations

Assessment at the body with 50% RB allocation based on the output power in Table 56.

Table 56

QPSK, 10MHz BW Power (dBm)			
RB Allocation	Lower	Middle	Upper
50% RB	22.72	22.94	22.65

Assessment at the body with 50% RB allocation was conducted using highest configuration from 1RB results. SAR plots of the highest results per Table (bolded) are presented in Appendix E.

Table 57

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Meas. 10g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Max Calc. 10g-SAR (W/kg)	Run#
Band 14 (788-798MHz), 10MHz BW, QPSK 50% RB middle											
85009332001	PMNN4403B	NTN8266B	PMMN4050A	793.000	0.20	0.16	0.11	0.06	0.18	0.10	HvH-Ab-140424-04

Assessment at the Body with 100% RB allocations

Assessment at the body with 100% RB allocation is not required when the highest maximum output power for 100% RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1RB and 50% RB allocation from above are less than or equal to half the SAR limit i.e. 4.0 W/kg. Table 58 below indicates no testing is required.

Table 58

QPSK, 10MHz BW Power (dBm)			
RB Allocation	Lower	Middle	Upper
1 RB	22.88	23.14	22.77
50% RB	22.72	22.94	22.65
100% RB	22.56		

Assessment at the Body with 16QAM RB allocations

Assessment at the body with 16QAM RB allocation is required only when the highest maximum output power for the configuration in the higher order modulation (bold in table below) is > ½ dB higher than the same configuration in QPSK or when the reported SAR for the QPSK configuration is > 90% of the SAR limit. Data in Table 59 below indicates no testing is required.

Table 59

RB allocation	RB location	QPSK	16QAM	dB delta
1 RB	Lower	22.88	23.30	0.42
	Middle	23.14	23.55	0.41
	Upper	22.77	22.95	0.18
50% RB	Lower	22.72	22.54	-0.18
	Middle	22.94	22.27	-0.67
	Upper	22.65	22.18	-0.47
100% RB	All	22.56	22.58	0.02

Assessment at the Body with 5MHz bandwidth channel

Assessment at the body with 5MHz bandwidth channel is required when the highest maximum output power of a configuration requiring testing in the smaller channel bandwidth is > ½ dB higher than the equivalent channel configurations in the largest channel bandwidth configuration. Table 60 below indicates no testing is required.

Table 60

RB allocation	RB location	10MHz BW Ch.	5MHz BW Ch.	dB delta
QPSK				
1RB	Lower	22.88	22.80	-0.08
	Middle	23.14	23.21	0.07
	Upper	22.77	22.95	0.18
50% RB	Lower	22.72	22.87	0.15
	Middle	22.94	23.02	0.08
	Upper	22.65	22.57	-0.08
100% RB	All	22.56	22.37	-0.19

Table 60 continued

RB allocation	RB location	10MHz BW Ch.	5MHz BW Ch.	dB delta
16QAM				
1RB	Lower	23.30	23.26	-0.04
	Middle	23.55	23.23	-0.32
	Upper	22.95	22.89	-0.06
50% RB	Lower	22.54	22.22	-0.32
	Middle	22.27	22.40	0.13
	Upper	22.18	22.57	0.39
100% RB	All	22.58	21.78	-0.80

13.7 LMR assessments at the Face for 150.8-173.4MHz band

Battery NNTN7034B was selected as the default battery for assessments at the Face because it has the highest capacity (refer to Exhibit 7B for battery illustration). The default battery was used during conducted power measurements for all test channels within Part 90 frequency range (150.8-173.4MHz) which are listed in Table 61. The channel with the highest conducted power will be identified as the default channel per KDB 643646 (SAR Test for PTT Radios). SAR plots of the highest results per Table (bolded) are presented in Appendix E.

Table 61

Test Freq (MHz)	Power (W)
150.8000	6.36
158.0125	6.39
165.5000	6.36
173.4000	6.39

DUT assessment with offered antennas, default battery with front of DUT positioned 2.5cm facing phantom per KDB 643646. Optional batteries were tested per the requirements of KDB 643646. Refer to Table 61 for highest output power channel. SAR plots of the highest results per Table (bolded) are presented in Appendix E.

Table 62

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Meas. 10g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Max Calc. 10g-SAR (W/kg)	Run#			
NAR6593A	NNTN7034B	None (front)	None	150.8000										
				158.0125	6.40	-0.40	0.75	0.58	0.42	0.33	HvH-Face-140311-02			
				165.5000										
				173.4000										
NAR6594A							150.8000							
							158.0125	6.40	-0.44	0.82	0.64	0.47	0.36	HvH-Face-140311-03
							165.5000							
							173.4000							

Table 62 continued

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Meas. 10g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Max Calc. 10g-SAR (W/kg)	Run#		
Assessment of Additional Batteries													
NAR6594A	NNTN7037A	None (front)	None	150.8000									
				158.0125	6.45	-0.36	0.82	0.63	0.45	0.35	HvH-Face-140311-04		
				165.5000									
				173.4000									
	NNTN7573A			150.8000									
				158.0125	6.46	-0.38	0.82	0.64	0.46	0.35	HvH-Face-140311-05		
				165.5000									
				173.4000									
	PMNN4403B			150.8000									
				158.0125	6.42	-0.44	0.85	0.66	0.48	0.37	HvH-Face-140311-06		
				165.5000									
				173.4000									
	NNTN7038B			150.8000									
				158.0125	6.45	-0.40	0.86	0.67	0.48	0.37	HvH-Face-140311-07		
165.5000													
173.4000													

DUT assessment with offered antennas, default battery with back of DUT positioned 2.5cm facing phantom per KDB 643646. Optional batteries were tested per the requirements of KDB 643646. Refer to Table 61 for highest output power channel. SAR plots of the highest results per Table (bolded) are presented in Appendix E.

Table 63

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Meas. 10g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Max Calc. 10g-SAR (W/kg)	Run#		
NAR6593A	NNTN7034B	None (back)	None	150.8000									
				158.0125	6.48	-0.38	0.77	0.60	0.43	0.33	HvH-Face-140311-08		
				165.5000									
				173.4000									
NAR6594A				150.8000									
				158.0125	6.44	-0.40	0.85	0.66	0.48	0.37	HvH-Face-140311-09		
				165.5000									
				173.4000									

Table 63 continued

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Meas. 10g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Max Calc. 10g-SAR (W/kg)	Run#	
Assessment of Additional Batteries												
NAR6594A	NNTN7037A	None (back)	None	150.8000								
				158.0125	6.39	-0.28	0.83	0.64	0.46	0.35	HvH-Face-140312-02	
				165.5000								
				173.4000								
	NNTN7573A			150.8000								
				158.0125	6.38	-0.31	0.83	0.64	0.46	0.36	HvH-Face-140312-03	
				165.5000								
				173.4000								
	PMNN4403B			150.8000								
				158.0125	6.39	-0.34	0.84	0.65	0.47	0.36	HvH-Face-140312-04	
				165.5000								
				173.4000								
	NNTN7038B			150.8000								
				158.0125	6.38	-0.38	0.84	0.65	0.47	0.37	HvH-Face-140312-05	
				165.5000								
				173.4000								

13.8 LMR assessment at the Face for 764-775MHz band

Battery NNTN7034B was selected as the default battery for assessments at the Face because it has the highest capacity (refer to Exhibit 7B for battery illustration). The default battery was used during conducted power measurements for all test channels within Part 90 frequency range (764-775MHz) which are listed in Table 64. The channel with the highest conducted power will be identified as the default channel per KDB 643646 (SAR Test for PTT Radios). SAR plots of the highest results per Table (bolded) are presented in Appendix E.

Table 64

Test Freq (MHz)	Power (W)
764.0125	2.89
770.0000	2.88
774.9875	2.88

DUT assessment with offered antennas, default battery with front of DUT positioned 2.5cm facing phantom per KDB 643646. Optional batteries were tested per the requirements of KDB 643646. Refer to Table 64 for highest output power channel. SAR plots of the highest results per Table (bolded) are presented in Appendix E.

Table 65

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Meas. 10g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Max Calc. 10g-SAR (W/kg)	Run#
NAR6594A	NNTN7034B	None (front)	None	764.0125	2.89	-0.18	1.47	1.08	0.79	0.58	HvH-Face-140228-09
				770.0000							
				774.9875							
NAF5085A				764.0125	2.89	-0.07	0.91	0.67	0.48	0.35	HvH-Face-140228-07
				770.0000							
				774.9875							
NAR6595A				764.0125	2.89	-0.35	2.34	1.71	1.31	0.96	HvH-Face-140228-08
				770.0000							
				774.9875							
Assessment of Additional Batteries											
NAR6595A	NNTN7037A	None (front)	None	764.0125	2.88	-0.47	2.42	1.77	1.40	1.02	HvH-Face-140228-10
				770.0000							
				774.9875							
	NNTN7573A			764.0125	2.88	-0.43	2.41	1.76	1.38	1.01	HvH-Face-140228-11
				770.0000							
				774.9875							
	PMNN4403B			764.0125	2.87	1.17	2.00	1.47	1.04	0.77	HvH-Face-140303-02
				770.0000							
				774.9875							
	NNTN7038B			764.0125	2.87	0.22	1.98	1.45	1.03	0.76	HvH-Face-140303-03
				770.0000							
				774.9875							

DUT assessment with offered antennas, default battery with back of DUT positioned 2.5cm facing phantom per KDB 643646. Optional batteries were tested per the requirements of KDB 643646. Refer to Table 64 for highest output power channel. SAR plots of the highest results per Table (bolded) are presented in Appendix E.

Table 66

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Meas. 10g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Max Calc. 10g-SAR (W/kg)	Run#
NAR6594A	NNTN7034B	None (back)	None	764.0125	2.87	-0.18	1.05	0.77	0.57	0.42	HvH-Face-140303-04
				770.0000							
				774.9875							
NAF5085A				764.0125	2.87	-0.20	0.96	0.72	0.53	0.39	HvH-Face-140303-05
				770.0000							
				774.9875							
NAR6595A				764.0125	2.87	-0.25	1.89	1.39	1.04	0.77	HvH-Face-140303-06
				770.0000							
				774.9875							

Table 66 Continued

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Meas. 10g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Max Calc. 10g-SAR (W/kg)	Run#
Assessment of Additional Batteries											
NAR6595A	NNTN7037A	None (back)	None	764.0125	2.87	-0.51	2.21	1.63	1.29	0.95	HvH-Face-140303-07
				770.0000							
				774.9875							
	NNTN7573A			764.0125	2.88	-0.46	2.24	1.65	1.29	0.95	HvH-Face-140303-08
				770.0000							
				774.9875							
	PMNN4403B			764.0125	2.88	-0.22	2.50	1.87	1.37	1.02	HvH-Face-140303-09
				770.0000							
				774.9875							
	NNTN7038B			764.0125	2.88	-0.14	2.23	1.67	1.20	0.90	HvH-Face-140303-10
				770.0000							
				774.9875							

13.9 LMR assessments at the Face for 794-824MHz band

Battery PMNN4448AR was selected as the default battery for assessments at the Body because it has the highest capacity (refer to Exhibit 7B for battery illustration). The default battery was used during conducted power measurements for all test channels within Part 90 frequency range (794-824MHz) which are listed in Table 67. The channel with the highest conducted power will be identified as the default channel per KDB 643646 (SAR Test for PTT Radios). SAR plots of the highest results per Table (bolded) are presented in Appendix E.

Table 67

Test Freq (MHz)	Power (W)
794.0125	2.89
808.5000	3.50
823.9875	3.49

DUT assessment with offered antennas, default battery with front of DUT positioned 2.5cm facing phantom per KDB 643646. Optional batteries were tested per the requirements of KDB 643646. Refer to Table 67 for highest output power channel. SAR plots of the highest results per Table (bolded) are presented in Appendix E.

Table 68

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Meas. 10g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Max Calc. 10g-SAR (W/kg)	Run#	
NAR6594A	NNTN7034B	None (front)	None	794.0125								
				808.5000	3.51	-0.24	0.94	0.69	0.51	0.37	HvH-Face-140308-06	
				823.9875								
NAF5085A				794.0125								
				808.5000	3.51	-0.27	1.10	0.81	0.60	0.44	HvH-Face-140308-07	
				823.9875								
NAR6595A				794.0125								
				808.5000	3.51	-0.45	1.57	1.15	0.89	0.65	HvH-Face-140308-08	
				823.9875								
Assessment of Additional Batteries												
NAR6595A	NNTN7037A	None (front)	None	794.0125								
				808.5000	3.51	-0.59	1.50	1.09	0.88	0.64	HvH-Face-140308-09	
				823.9875								
	NNTN7573A			794.0125								
				808.5000	3.52	-0.58	1.52	1.11	0.89	0.65	HvH-Face-140308-10	
				823.9875								
	PMNN4403B			794.0125								
				808.5000	3.52	-0.31	2.04	1.52	1.12	0.83	HvH-Face-140308-11	
				823.9875								
	NNTN7038B			794.0125								
				808.5000	3.52	-0.29	2.29	1.70	1.25	0.93	HvH-Face-140308-12	
				823.9875								

DUT assessment with offered antennas, default battery with back of DUT positioned 2.5cm facing phantom per KDB 643646. Optional batteries were tested per the requirements of KDB 643646. Refer to Table 67 for highest output power channel. SAR plots of the highest results per Table (bolded) are presented in Appendix E.

Table 69

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Meas. 10g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Max Calc. 10g-SAR (W/kg)	Run#	
NAR6594A	NNTN7034B	None (back)	None	794.0125								
				808.5000	3.52	-0.36	1.10	0.82	0.61	0.45	HvH-Face-140308-13	
				823.9875								
NAF5085A				794.0125								
				808.5000	3.52	-0.27	1.23	0.91	0.67	0.49	HvH-Face-140308-14	
				823.9875								
NAR6595A				794.0125								
				808.5000	3.52	-0.52	2.00	1.46	1.15	0.84	HvH-Face-140308-15	
				823.9875								
Assessment of Additional Batteries												
NAR6595A	NNTN7037A	None (back)	None	794.0125								
				808.5000	3.52	-0.51	1.94	1.41	1.12	0.81	HvH-Face-140308-16	
				823.9875								
	NNTN7573A			794.0125								
				808.5000	3.52	-0.83	2.00	1.46	1.24	0.90	HvH-Face-140308-17	
				823.9875								
	PMNN4403B			794.0125								
				808.5000	3.51	-0.38	3.61	2.66	2.02	1.49	HvH-Face-140310-02	
				823.9875								
	NNTN7038B			794.0125								
				808.5000	3.51	-0.34	3.69	2.72	2.05	1.51	HvH-Face-140310-03	
				823.9875								

13.10 LMR assessments at the Face for 851-869MHz band

Battery NNTN7034B was selected as the default battery for assessments at the Face because it has the highest capacity (refer to Exhibit 7B for battery illustration). The default battery was used during conducted power measurements for all test channels within Part 90 frequency range (851-869MHz) which are listed in Table 70. The channel with the highest conducted power will be identified as the default channel per KDB 643646 (SAR Test for PTT Radios). SAR plots of the highest results per Table (bolded) are presented in Appendix E.

Table 70

Test Freq (MHz)	Power (W)
851.0125	3.52
860.0000	3.49
868.9875	3.49

DUT assessment with offered antennas, default battery with front of DUT positioned 2.5cm facing phantom per KDB 643646 SAR. Optional batteries were tested per the requirements of KDB 643646. Refer to Table 70 for highest output power channel. SAR plots of the highest results per Table (bolded) are presented in Appendix E.

Table 71

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Meas. 10g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Max Calc. 10g-SAR (W/kg)	Run#
NAR6594A	NNTN7034B	None (front)	None	851.0125	3.57	-0.41	1.33	0.96	0.74	0.53	HvH-Face-140304-02
				860.0000							
				868.9875							
NAF5085A				851.0125	3.56	-0.17	1.64	1.19	0.86	0.63	HvH-Face-140304-03
				860.0000							
				868.9875							
NAR6595A				851.0125	3.57	-0.33	1.26	0.91	0.69	0.49	HvH-Face-140304-04
				860.0000							
				868.9875							
Assessment of Additional Batteries											
NAR6595A	NNTN7037A	None (front)	None	851.0125	3.56	-0.30	1.77	1.28	0.96	0.69	HvH-Face-140304-05
				860.0000							
				868.9875							
	NNTN7573A			851.0125	3.57	-0.10	1.77	1.28	0.91	0.66	HvH-Face-140304-06
				860.0000							
				868.9875							
	PMNN4403B			851.0125	3.56	-0.17	1.50	1.08	0.79	0.57	HvH-Face-140304-07
				860.0000							
				868.9875							
	NNTN7038B			851.0125	3.58	-0.12	1.50	1.09	0.78	0.56	HvH-Face-140304-08
				860.0000							
				868.9875							

DUT assessment with offered antennas, default battery with back of DUT positioned 2.5cm facing phantom per KDB 643646. Optional batteries were tested per the requirements of KDB 643646. Refer to Table 70 for highest output power channel. SAR plots of the highest results per Table (bolded) are presented in Appendix E.

Table 72

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Meas. 10g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Max Calc. 10g-SAR (W/kg)	Run#
NAR6594A	NNTN7034B	None (back)	None	851.0125	3.58	-0.41	1.39	1.01	0.77	0.56	HvH-Face-140304-09
				860.0000							
				868.9875							
NAF5085A				851.0125	3.57	-0.14	1.59	1.15	0.83	0.60	HvH-Face-140304-10
				860.0000							
				868.9875							
NAR6595A				851.0125	3.58	-0.34	1.38	1.00	0.75	0.54	HvH-Face-140305-02
				860.0000							
				868.9875							
Assessment of Additional Batteries											
NAR6595A	NNTN7037A	None (back)	None	851.0125	3.56	-0.15	1.59	1.15	0.83	0.60	HvH-Face-140305-03
				860.0000							
				868.9875							
	NNTN7573A			851.0125	3.56	-0.17	1.59	1.15	0.84	0.60	HvH-Face-140305-04
				860.0000							
				868.9875							
	PMNN4403B			851.0125	3.57	-0.08	1.52	1.10	0.78	0.56	HvH-Face-140305-05
				860.0000							
				868.9875							
	NNTN7038B			851.0125	3.57	-0.11	1.48	1.07	0.77	0.55	HvH-Face-140305-06
				860.0000							
				868.9875							

13.11 LTE assessments at the Face for 777-787MHz band (B13)

Assessment of front side of DUT

Battery NNTN7034B was selected as the default battery for assessments at the Face because it has the highest capacity (refer to Exhibit 7B for battery illustration) per KDB 643646 (SAR Test for PTT Radios). The default battery was used during conducted power measurements for all test configurations within Part 27 frequency range (777-787MHz). Table 73 below includes the output powers for the largest channel bandwidth (10MHz), QPSK and 1 RB allocation and location (low, mid, high). The highest RB configuration was used to start the LTE testing per KDB 941225 (SAR for LTE Devices). SAR plots of the highest results per Table (bolded) are presented in Appendix E.

Table 73

QPSK, 10MHz BW Power (dBm)			
RB Allocation	Lower	Middle	Upper
1 RB	22.08	23.92	22.89

DUT assessment with offered antenna, default battery with front of DUT positioned 2.5cm facing phantom per KDB 643646. Optional batteries were tested per the requirements of KDB 643646. Refer to Table 73 for highest output power channel. SAR plots of the highest results per Table (bolded) are presented in Appendix E.

Table 74

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Meas. 10g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Max Calc. 10g-SAR (W/kg)	Run#
Band 13 (777-787MHz), 10MHz BW, QPSK 1RB middle											
85009332001	NNTN7034B	None (front)	None	782	0.25	0.34	0.10	0.07	0.13	0.09	HvH-Face-140316-03
	PMNN4403B				0.25	-0.13	0.13	0.09	0.17	0.11	HvH-Face-140316-04
	NNTN7038B				0.25	-0.19	0.13	0.09	0.17	0.12	HvH-Face-140316-05
	NNTN7037A				0.25	0.03	0.10	0.07	0.13	0.09	HvH-Face-140316-17
	NNTN7573A				0.25	0.60	0.10	0.06	0.12	0.08	HvH-Face-140316-18

DUT assessment with offered antennas, default battery with back of DUT positioned 2.5cm facing phantom per KDB 643646 SAR. Optional batteries were tested per the requirements of KDB 643646. Refer to Table 73 for highest output power channel. SAR plots of the highest results per Table (bolded) are presented in Appendix E.

Table 75

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Meas. 10g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Max Calc. 10g-SAR (W/kg)	Run#
Band 13 (777-787MHz), 10MHz BW, QPSK 1RB middle											
85009332001	NNTN7034B	None (back)	None	782	0.25	0.51	0.01	0.01	0.02	0.01	HvH-Face-140316-19
	PMNN4403B				0.25	0.84	0.05	0.04	0.06	0.05	HvH-Face-140316-20
	NNTN7038B				0.25	0.75	0.04	0.03	0.06	0.04	HvH-Face-140316-21
	NNTN7037A				0.25	0.27	0.01	0.01	0.02	0.01	HvH-Face-140316-22
	NNTN7573A				0.25	-0.06	0.01	0.01	0.02	0.01	HvH-Face-140316-23

Assessment at the Face with other 1 RB allocations

Assessments for additional 1RB configurations are not required per KDB 941225 when the reported SAR is less than or equal to half the SAR limit i.e. 0.8 W/kg.

Assessment at the Face with 50% RB allocations

Assessment at the face with 50% RB allocation based on the output power in Table 76 was conducted using highest configuration from 1RB data.

Table 76

QPSK, 10MHz BW Power (dBm)			
RB Allocation	Lower	Middle	Upper
50% RB	22.75	22.98	22.86

Assessment at the face with 50% RB allocation was conducted using the highest configuration from 1RB results. SAR plots of the highest results per Table (bolded) are presented in Appendix E.

Table 77

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Meas. 10g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Max Calc. 10g-SAR (W/kg)	Run#
Band 13 (777-787MHz), 10MHz BW, QPSK 50% RB middle											
85009332001	PMNN4403B	None (front)	None	782	0.20	-0.05	0.13	0.10	0.22	0.16	HvH-Face-140426-02

Assessment at the Face with 100% RB allocations

Assessment at the face with 100% RB allocation is not required when the highest maximum output power for 100% RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1RB and 50% RB allocation from above are less than or equal to half the SAR limit i.e. 0.8 W/kg. Table 78 below indicates no testing is required.

Table 78

QPSK, 10MHz BW Power (dBm)			
RB Allocation	Lower	Middle	Upper
1 RB	22.08	23.92	22.89
50% RB	22.75	22.98	22.86
100% RB	22.75		

Assessment at the Face with 16QAM RB allocations

Assessment at the face with 16QAM RB allocation is required only when the highest maximum output power for the configuration in the higher order modulation (bold in table below) is > ½ dB higher than the same configuration in QPSK or when the reported SAR for the QPSK configuration is > 90% of the SAR limit. Data in Table 79 below indicates one test is required.

Table 79

RB allocation	RB location	QPSK	16QAM	dB delta
1 RB	Lower	22.08	23.22	1.14
	Middle	23.92	24.55	0.63
	Upper	22.89	23.37	0.48
50% RB	Lower	22.75	23.08	0.33
	Middle	22.98	23.42	0.44
	Upper	22.86	23.26	0.40
100% RB	All	22.75	23.20	0.45

Assessment at the face with 16QAM RB allocation was conducted using highest configuration from 1RB data. SAR plots of the highest results per Table (bolded) are presented in Appendix E.

Table 80

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Meas. 10g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Max Calc. 10g-SAR (W/kg)	Run#
Band 13 (777-787MHz), 10MHz BW, 16QAM 1 RB middle											
85009332001	PMNN4403B	None (front)	None	782	0.29	0.45	0.13	0.10	0.15	0.11	HvH-Face-140426-03

Assessment at the Face with 5MHz bandwidth channel

Assessment at the face with 5MHz bandwidth channel is required when the highest maximum output power of a configuration requiring testing in the smaller channel bandwidth is > ½ dB higher than the equivalent channel configurations in the largest channel bandwidth configuration. Table 81 below indicates no testing is required.

Table 81

RB allocation	RB location	10MHz BW Ch.	5MHz BW Ch.	dB delta
QPSK				
1RB	Lower	22.08	22.34	0.26
	Middle	23.92	22.82	-1.10
	Upper	22.89	22.22	-0.67
50% RB	Lower	22.75	22.23	-0.52
	Middle	22.98	22.50	-0.48
	Upper	22.86	22.37	-0.49
100% RB	All	22.75	22.27	-0.48
16 QAM				
1RB	Lower	23.22	22.42	-0.80
	Middle	24.55	23.08	-1.47
	Upper	23.37	22.52	-0.85
50% RB	Lower	23.08	22.27	-0.81
	Middle	23.42	22.63	-0.79
	Upper	23.26	22.30	-0.96
100% RB	All	23.20	22.48	-0.72

Assessment at the Face with 3MHz bandwidth channel

Assessment at the face with 3MHz bandwidth channel is required when the highest maximum output power of a configuration requiring testing in the smaller channel bandwidth is $> \frac{1}{2}$ dB higher than the equivalent channel configurations in the largest channel bandwidth configuration. Table 82 below indicates no testing is required.

Table 82

RB allocation	RB location	10MHz BW Ch.	3MHz BW Ch.	dB delta
QPSK				
1RB	Lower	22.08	22.56	0.48
	Middle	23.92	23.02	-0.90
	Upper	22.89	22.63	-0.26
50% RB	Lower	22.75	22.46	-0.29
	Middle	22.98	22.65	-0.33
	Upper	22.86	22.51	-0.35
100% RB	All	22.75	22.55	-0.20
16 QAM				
1RB	Lower	23.22	23.02	-0.20
	Middle	24.55	23.47	-1.08
	Upper	23.37	23.12	-0.25
50% RB	Lower	23.08	22.43	-0.65
	Middle	23.42	22.65	-0.77
	Upper	23.26	22.36	-0.90
100% RB	All	23.20	22.55	-0.65

Assessment at the Face with 1.4MHz bandwidth channel

Assessment at the face with 1.4MHz bandwidth channel is required when the highest maximum output power of a configuration requiring testing in the smaller channel bandwidth is $> \frac{1}{2}$ dB higher than the equivalent channel configurations in the largest channel bandwidth configuration. Table 83 below indicates one test is required.

Table 83

RB allocation	RB location	10MHz BW Ch.	1.4MHz BW Ch.	dB delta
QPSK				
1RB	Lower	22.08	22.89	0.81
	Middle	23.92	23.01	-0.91
	Upper	22.89	22.85	-0.04
50% RB	Lower	22.75	22.74	-0.01
	Middle	22.98	22.57	-0.41
	Upper	22.86	22.50	-0.36
100% RB	All	22.75	22.62	-0.13

Table 83 continued

RB allocation	RB location	10MHz BW Ch.	1.4MHz BW Ch.	dB delta
16 QAM				
1RB	Lower	23.22	23.40	0.18
	Middle	23.66	23.54	-0.12
	Upper	23.27	23.39	0.12
50% RB	Lower	22.22	23.13	0.91
	Middle	22.20	23.15	0.95
	Upper	22.09	23.09	1.00
100% RB	All	22.21	22.55	0.34

Assessment at the face with 1.4MHz bandwidth channel was conducted using highest configuration from 1RB data. SAR plots of the highest results per Table (bolded) are presented in Appendix E.

Table 84

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Meas. 10g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Max Calc. 10g-SAR (W/kg)	Run#
Band 13 (777-787MHz), 1.4MHz BW, 16QAM 50% RB middle											
85009332001	PMNN4403B	None (front)	None	782	0.27	0.52	0.12	0.09	0.19	0.13	HvH-Face-140426-04

13.12 LTE assessment at the Face for 788-798MHz band (B14)

Assessment of front side of DUT

Battery NNTN7034B was selected as the default battery for assessments at the Face because it has the highest capacity (refer to Exhibit 7B for battery illustration) per KDB 643646 (SAR Test for PTT Radios). The default battery was used during conducted power measurements for all test configurations within Part 90 frequency range (788-798MHz). Table 85 below includes the output powers for the largest channel bandwidth (10MHz), QPSK and 1 RB allocation and location (low, mid, high). The highest RB configuration was used to start the LTE testing per KDB 941225 (SAR for LTE Devices). SAR plots of the highest results per Table (bolded) are presented in Appendix E.

Table 85

QPSK, 10MHz BW Power (dBm)			
RB Allocation	Lower	Middle	Upper
1 RB	22.89	22.79	22.72

DUT assessment with offered antenna, default battery with front of DUT positioned 2.5cm facing phantom per KDB 643646. Optional batteries were tested per the requirements of KDB 643646. Refer to Table 85 for highest output power channel. SAR plots of the highest results per Table (bolded) are presented in Appendix E.

Table 86

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Meas. 10g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Max Calc. 10g-SAR (W/kg)	Run#
Band 14 (788-798MHz), 10MHz BW, QPSK 1RB lower											
85009332001	NNTN7034B	None (front)	None	793	0.19	-0.03	0.08	0.06	0.13	0.09	HvH-Face-140316-07
	PMNN4403B				0.19	0.45	0.13	0.09	0.21	0.15	HvH-Face-140316-08
	NNTN7038B				0.19	0.45	0.13	0.09	0.21	0.15	HvH-Face-140316-09
	NNTN7037A				0.19	0.40	0.07	0.05	0.12	0.09	HvH-Face-140316-10
	NNTN7573A				0.19	0.72	0.07	0.05	0.12	0.09	HvH-Face-140316-11

DUT assessment with offered antennas, default battery with back of DUT positioned 2.5cm facing phantom per KDB 643646 SAR. Optional batteries were tested per the requirements of KDB 643646. Refer to Table 85 for highest output power channel. SAR plots of the highest results per Table (bolded) are presented in Appendix E.

Table 87

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Meas. 10g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Max Calc. 10g-SAR (W/kg)	Run#
Band 14 (788-798MHz), 10MHz BW, QPSK 1RB lower											
85009332001	NNTN7034B	None (back)	None	793	0.19	0.11	0.02	0.02	0.03	0.02	HvH-Face-140316-12
	PMNN4403B				0.19	0.97	0.04	0.03	0.07	0.05	HvH-Face-140316-13
	NNTN7038B				0.19	-0.16	0.04	0.03	0.07	0.05	HvH-Face-140316-14
	NNTN7037A				0.19	0.35	0.03	0.02	0.04	0.03	HvH-Face-140316-15
	NNTN7573A				0.19	-0.12	0.03	0.02	0.04	0.03	HvH-Face-140316-16

Assessment at the Face with other 1 RB allocations

Assessments for additional 1RB configurations are not required per KDB 941225 when the reported SAR is less than or equal to half the SAR limit i.e. 4.0 W/kg.

Assessment at the Face with 50% RB allocations

Assessment at the face with 50% RB allocation based on the output power in Table 88 was conducted using highest configuration from 1RB data.

Table 88

QPSK, 10MHz BW Power (dBm)			
RB Allocation	Lower	Middle	Upper
50% RB	22.80	23.07	22.85

Assessment at the face with 50% RB allocation was conducted using the highest configuration from 1RB results. SAR plots of the highest results per Table (bolded) are presented in Appendix E.

Table 89

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Meas. 10g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Max Calc. 10g-SAR (W/kg)	Run#
Band 14 (788-798MHz), 10MHz BW, QPSK 50% RB middle											
85009332001	NNTN7038B	None (front)	None	793	.020	0.42	0.16	0.12	0.26	0.19	HvH-Face-140426-12

Assessment at the Face with 100% RB allocations

Assessment at the face with 100% RB allocation is not required when the highest maximum output power for 100% RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1RB and 50% RB allocation from above are less than or equal to half the SAR limit i.e. 4.0 W/kg. Table 90 below indicates no testing is required.

Table 90

QPSK, 10MHz BW Power (dBm)			
RB Allocation	Lower	Middle	Upper
1 RB	22.89	22.79	22.72
50% RB	22.80	23.07	22.85
100% RB	22.69		

Assessment at the Face with 16QAM RB allocations

Assessment at the face with 16QAM RB allocation is required only when the highest maximum output power for the configuration in the higher order modulation (bold in table below) is > ½ dB higher than the same configuration in QPSK or when the reported SAR for the QPSK configuration is > 90% of the SAR limit. Data in Table 91 below indicates one test is required.

Table 91

RB allocation	RB location	QPSK	16QAM	dB delta
1 RB	Lower	22.89	23.22	0.33
	Middle	22.79	23.66	0.87
	Upper	22.72	23.27	0.55
50% RB	Lower	22.80	22.22	-0.58
	Middle	23.07	22.20	-0.87
	Upper	22.85	22.09	-0.76
100% RB	All	22.69	22.21	-0.48

Assessment at the face with 16QAM RB allocation was conducted using highest configuration from 1RB data. SAR plots of the highest results per Table (bolded) are presented in Appendix E.

Table 92

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Meas. 10g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Max Calc. 10g-SAR (W/kg)	Run#
Band 14 (788-798MHz), 10MHz BW, 16QAM 1 RB middle											
85009332001	NNTN7038B	None (front)	None	793	0.23	0.04	0.13	0.09	0.17	0.12	HvH-Face-140426-10

Assessment at the Face with 5MHz bandwidth channel

Assessment at the face with 5MHz bandwidth channel is required when the highest maximum output power of a configuration requiring testing in the smaller channel bandwidth is > ½ dB higher than the equivalent channel configurations in the largest channel bandwidth configuration. Table 93 below indicates no testing is required.

Table 93

RB allocation	RB location	10MHz BW Ch.	5MHz BW Ch.	dB delta
QPSK				
1RB	Lower	22.89	22.20	-0.69
	Middle	22.79	22.56	-0.23
	Upper	22.72	22.48	-0.24
50% RB	Lower	22.80	22.40	-0.40
	Middle	23.07	22.31	-0.76
	Upper	22.85	22.47	-0.38
100% RB	All	22.69	22.59	-0.10
16 QAM				
1RB	Lower	23.22	22.67	-0.55
	Middle	23.66	22.77	-0.89
	Upper	23.27	22.67	-0.60
50% RB	Lower	22.22	21.69	-0.53
	Middle	22.20	22.08	-0.12
	Upper	22.09	22.26	0.17
100% RB	All	22.21	22.56	0.35

13.13 Assessment for Industry Canada

Based on the assessment results for body and face per KDB643646, additional tests were required for Industry Canada frequency range (138-74MHz). The overall highest test configuration from 150.8-173.4MHz band was repeated with test frequencies 138.0125 and 144.5000MHz. The SAR results are in Table 94 below. SAR plots of the highest results per Table (bolded) are presented in Appendix E.

Table 94

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Meas. 10g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Max Calc. 10g-SAR (W/kg)	Run#
Body											
NAR6594A	NNTN7037A	HLN6875A	None	138.0125	6.34	-0.07	7.79	3.26	4.12	1.72	HvH-Ab-140312-07
				144.5000	6.37	-0.65	4.15	1.80	2.50	1.08	HvH-Ab-140312-08
Face											
NAR6594A	PMNN4403B	None (front)	None	138.0125	6.14	-0.23	1.35	1.05	0.77	0.60	HvH-Face-140428-02
				144.5000	6.19	-0.40	0.97	0.75	0.57	0.44	HvH-Face-140428-03

13.14 Assessment at the Bluetooth band

Per guidelines in KDB 447498, the following formula was used to determine the test exclusion for standalone Bluetooth transmitter;

$$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] * [\sqrt{F_{(\text{GHz})}}] = 2.48, \text{ which is } \leq 3 \text{ for 1-g SAR}$$

Where:

Max. power = 9.13mW (12mW*76.1% duty cycle)

Min. test separation distance = 5mm for actual test separation < 5mm

F(GHz) = 2.48 GHz

Per the result from the calculation above, the standalone SAR assessment was not required for Bluetooth band. Therefore, SAR results for Bluetooth are not reported herein.

13.15 Shortened Scan Assessment

A “shortened” scan using the highest SAR configuration overall from above was performed to validate the SAR drift of the full DASY5™ coarse and zoom scans. Note that the shortened scan represents the zoom scan performance result; this is obtained by first running a coarse scan to find the peak area and then, using a newly charged battery, a zoom scan only was performed. The results of the shortened cube scan presented in Appendix D demonstrate that the scaling methodology used to determine the calculated SAR results presented herein are valid. The SAR result from the Table below is provided in Appendix F.

Table 95

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Meas. 10g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Max Calc. 10g-SAR (W/kg)	Run#
NAR6595A	PMNN4403B	NTN8266B	None	764.0125	2.90	-0.75	8.75	4.98	5.36	3.05	HvH-Ab-140313-07

14.0 Simultaneous Transmission Exclusion for BT

Per guidelines in KDB 447498, the following formula was used to determine the test exclusion to an antenna that transmits simultaneously with other antennas for test distances ≤ 50mm:

$$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] * [\sqrt{F(\text{GHz})} / X] \leq 0.4 \text{ W/kg (1g)}$$

Where:

X = 7.5 for 1g-SAR; 18.75 for 10g

Max. power = 9.13mW (12mW*76.1% duty cycle)

Min. test separation distance = 5mm for actual test separation < 5mm

F(GHz) = 2.48 GHz

15.0 Simultaneous Transmission between LMR and LTE

The table below summarizes the simultaneous transmissions between LMR and LTE bands. Note that LMR band 700 cannot transmit simultaneously with either LTE band.

Table 96

MHz	LMR Bands		
	VHF	700	800
777-787 (B13)	√	NA	√
788-798 (B14)	√	NA	√

16.0 Results Summary

Based on the test guidelines from section 4.0 and satisfying frequencies within FCC bands and Industry Canada Frequency bands, the highest Operational Maximum Calculated 1-gram and 10-gram average SAR values found for this filing:

Table 97

Designator	Frequency band (MHz)	Max Calc at Body (W/kg)		Max Calc at Face (W/kg)	
		1g-SAR	10g-SAR	1g-SAR	10g-SAR
FCC					
LMR	150.8-173.4	2.32	0.96	0.48	0.37
LMR	700	5.36	3.05	1.40	1.02
LMR	800	4.50	2.62	2.05	1.51
LTE (B13)	777-787	0.21	0.14	0.22	0.16
LTE (B14)	788-798	0.18	0.11	0.26	0.19
Industry Canada					
LMR	138-174	4.12	1.72	0.77	0.60
LMR	700	5.36	3.05	1.40	1.02
LMR	800	4.50	2.62	2.05	1.51
LTE (B13)	777-787	0.21	0.14	0.22	0.16

All results are scaled to the maximum output power.

The highest combined 1g-SAR results for simultaneous is indicated in the following Table:

Table 98

Regulator	Frequency bands	Combined 1g-SAR (W/kg)	Combined 10g-SAR (W/kg)
Body			
FCC/IC	LMR (VHF & 800MHz) and LTE	4.71	2.76
Face			
FCC	LMR (VHF & 800MHz) and LTE	2.31	1.70
IC	LMR (VHF & 800MHz) and LTE	2.27	1.67

Note – 700MHz cannot simultaneous TX with LTE bands.

The test results clearly demonstrate compliance with FCC Occupational/Controlled RF Exposure limits of 8 W/kg averaged over 1 gram per the requirements of OET Bulletin 65. The 10 grams result is not applicable to FCC filing.

17.0 Variability Assessment

Per the guidelines in KDB 865664 SAR variability assessment is required because SAR results are above 4.0W/kg (Occupational).

The Table below includes test results of the original measurement(s), the repeated measurement(s), and the ratio (SAR_{high}/SAR_{low}) for the applicable test configuration(s).

Table 99

Run#	Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq. (MHz)	Adj Calc. 1g-SAR (W/kg)	Ratio	Comments
HvH-Ab-140313-08	NAR6595A	PMNN4403B	NTN8266B	None	764.0125	5.11	1.05	No additional repeated scans is required due to the Ratio (SAR _{high} /SAR _{low}) < 1.20
HvH-Ab-140313-07						5.36		

18.0 System Uncertainty

A system uncertainty analysis is not required for this report per KDB 865664 because the highest report SAR value for Occupational exposure is less than 7.5W/kg.

Per the guidelines of ISO 17025 a reported system uncertainty is required and therefore measurement uncertainty budget is included in Appendix A.

Appendix A

Measurement Uncertainty Budget

Uncertainty Budget for Device Under Test, for 750 MHz to 2.6 GHz

<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 = c x f / e</i>	<i>i = c x g / e</i>	<i>k</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	6.0	N	1.00	1	1	6.0	6.0	∞
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	0.3	N	1.00	1	1	0.3	0.3	∞
Response Time	E.2.7	1.1	R	1.73	1	1	0.6	0.6	∞
Integration Time	E.2.8	1.1	R	1.73	1	1	0.6	0.6	∞
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	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	∞
Test sample Related									
Test Sample Positioning	E.4.2	3.2	N	1.00	1	1	3.2	3.2	29
Device Holder Uncertainty	E.4.1	4.0	N	1.00	1	1	4.0	4.0	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	3.3	N	1.00	0.64	0.43	2.1	1.4	∞
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	1.9	N	1.00	0.6	0.49	1.1	0.9	∞
Combined Standard Uncertainty			RSS				11	11	419
Expanded Uncertainty (95% CONFIDENCE LEVEL)			<i>k</i> =2				22	22	

Notes for uncertainty budget Tables:

- 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

Uncertainty Budget for Device Under Test, for 150 MHz

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	$e = f(d,k)$	<i>f</i>	<i>g</i>	$h = c \times f / e$	$i = c \times g / e$	<i>k</i>
Uncertainty Component	IEEE 1528 section	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	10.0	N	1.00	1	1	10.0	10.0	∞
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	0.3	N	1.00	1	1	0.3	0.3	∞
Response Time	E.2.7	1.1	R	1.73	1	1	0.6	0.6	∞
Integration Time	E.2.8	1.1	R	1.73	1	1	0.6	0.6	∞
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	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	∞
Test sample Related									
Test Sample Positioning	E.4.2	3.2	N	1.00	1	1	3.2	3.2	29
Device Holder Uncertainty	E.4.1	4.0	N	1.00	1	1	4.0	4.0	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	3.3	N	1.00	0.64	0.43	2.1	1.4	∞
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	1.9	N	1.00	0.6	0.49	1.1	0.9	∞
Combined Standard Uncertainty			RSS				14	13	965
Expanded Uncertainty (95% CONFIDENCE LEVEL)			$k=2$				27	27	

Notes for uncertainty budget Tables:

- 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

Appendix B
Probe Calibration Certificates

**Calibration Laboratory of
Schmid & Partner
Engineering AG**
Zeughausstrasse 43, 8004 Zurich, Switzerland



S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
S Swiss Calibration Service

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

Accreditation No.: **SCS 108**

Client **Motorola EME**

Certificate No: **ES3-3301_Aug13**

CALIBRATION CERTIFICATE

Object: **ES3DV3 - SN:3301**

Calibration procedure(s): **QA CAL-01.v9, QA CAL-12.v8, QA CAL-14.v4, QA CAL-23.v5, QA CAL-25.v6
Calibration procedure for dosimetric E-field probes**

Calibration date: **August 27, 2013**

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	GB41293674	04-Apr-13 (No. 217-01733)	Apr-14
Power sensor E4412A	MY41498087	04-Apr-13 (No. 217-01733)	Apr-14
Reference 3 dB Attenuator	SN: S5054 (3c)	04-Apr-13 (No. 217-01737)	Apr-14
Reference 20 dB Attenuator	SN: S5277 (20x)	04-Apr-13 (No. 217-01735)	Apr-14
Reference 30 dB Attenuator	SN: S5129 (30b)	04-Apr-13 (No. 217-01738)	Apr-14
Reference Probe ES3DV2	SN: 3013	28-Dec-12 (No. ES3-3013_Dec12)	Dec-13
DAE4	SN: 660	31-Jan-13 (No. DAE4-660_Jan13)	Jan-14
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-13)	In house check: Apr-15
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-12)	In house check: Oct-13

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

Issued: August 28, 2013

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

**Calibration Laboratory of
Schmid & Partner
Engineering AG**
Zeughausstrasse 43, 8004 Zurich, Switzerland



S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
S Swiss Calibration Service

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

Accreditation No.: **SCS 108**

Glossary:

TSL	tissue simulating liquid
NORM _{x,y,z}	sensitivity in free space
ConvF	sensitivity in TSL / NORM _{x,y,z}
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C, D	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., θ = 0 is normal to probe axis

Calibration is Performed According to the Following Standards:

- a) 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
- b) 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 θ = 0 (f ≤ 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 E²-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}; D_{x,y,z}; VR_{x,y,z}:** A, B, C, D 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 ≤ 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.

ES3DV3 – SN:3301

August 27, 2013

Probe ES3DV3

SN:3301

Manufactured: August 27, 2010
Calibrated: August 27, 2013

Calibrated for DAS/EASY Systems
(Note: non-compatible with DAS2 system!)

ES3DV3- SN:3301

August 27, 2013

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3301

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$) ^A	1.48	1.02	1.24	± 10.1 %
DCP (mV) ^B	100.0	103.1	101.7	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB $\sqrt{\mu V}$	C	D dB	VR mV	Unc ^C (k=2)
0	CW	X	0.0	0.0	1.0	0.00	172.9	±3.0 %
		Y	0.0	0.0	1.0		142.1	
		Z	0.0	0.0	1.0		157.6	
10108-CAB	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, QPSK)	X	6.10	66.1	19.2	5.80	108.6	±1.2 %
		Y	6.21	66.9	19.7		123.8	
		Z	6.51	67.8	20.2		137.5	
10109-CAB	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM)	X	7.12	66.8	19.8	6.43	116.7	±1.4 %
		Y	7.21	67.6	20.3		130.3	
		Z	7.50	68.3	20.6		146.1	
10110-CAB	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, QPSK)	X	5.86	65.8	19.1	5.75	107.0	±1.2 %
		Y	5.90	66.4	19.5		120.2	
		Z	6.15	67.1	19.8		134.4	
10111-CAB	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM)	X	6.84	66.4	19.7	6.44	111.7	±1.2 %
		Y	6.89	67.1	20.1		126.3	
		Z	7.26	68.0	20.5		142.9	
10112-CAB	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM)	X	7.36	67.0	20.0	6.59	116.8	±1.7 %
		Y	7.47	67.9	20.5		133.1	
		Z	7.80	68.6	20.8		149.5	
10113-CAB	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM)	X	7.08	66.6	19.9	6.62	113.1	±1.4 %
		Y	7.16	67.5	20.3		128.9	
		Z	7.51	68.2	20.7		144.8	
10142-CAB	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, QPSK)	X	6.17	67.5	20.1	5.73	148.0	±1.2 %
		Y	5.75	66.4	19.5		119.5	
		Z	5.99	67.0	19.8		132.7	
10143-CAB	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM)	X	6.60	66.4	19.6	6.35	109.0	±1.4 %
		Y	6.66	67.2	20.1		124.9	
		Z	6.97	67.7	20.3		139.8	
10145-CAB	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK)	X	5.85	67.1	19.9	5.76	142.6	±1.2 %
		Y	5.50	66.3	19.5		115.9	
		Z	5.74	66.6	19.6		129.0	
10146-CAB	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM)	X	6.80	68.1	20.6	6.41	147.0	±1.4 %
		Y	6.32	67.1	20.1		119.0	
		Z	6.69	67.7	20.4		133.0	

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10154-CAB	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, QPSK)	X	6.31	67.6	20.2	5.75	149.1	±1.2 %
		Y	5.93	66.6	19.6		122.0	
		Z	6.18	67.2	19.9		135.0	
10155-CAB	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM)	X	6.84	66.4	19.7	6.43	110.9	±1.2 %
		Y	6.88	67.1	20.0		129.0	
		Z	7.24	68.0	20.5		143.3	
10156-CAB	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, QPSK)	X	6.09	67.3	20.1	5.79	145.5	±1.2 %
		Y	5.68	66.2	19.5		119.4	
		Z	5.97	66.9	19.8		132.3	
10157-CAB	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM)	X	6.58	66.3	19.7	6.49	106.7	±1.2 %
		Y	6.59	66.9	20.0		123.8	
		Z	7.00	67.9	20.5		138.6	
10158-CAB	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM)	X	7.04	66.5	19.7	6.62	111.3	±1.4 %
		Y	7.09	67.2	20.1		130.3	
		Z	7.54	68.3	20.8		145.1	
10159-CAB	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM)	X	6.67	66.3	19.7	6.56	107.7	±1.2 %
		Y	6.69	67.0	20.1		124.5	
		Z	7.14	68.0	20.6		139.8	
10166-CAB	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK)	X	5.22	66.6	19.6	5.46	134.3	±0.9 %
		Y	4.89	65.9	19.2		112.2	
		Z	5.15	66.4	19.5		124.6	
10167-CAB	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM)	X	6.12	67.5	20.3	6.21	135.5	±1.2 %
		Y	5.71	66.9	20.0		112.6	
		Z	6.11	67.5	20.3		126.3	
10175-CAB	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	X	5.04	66.7	19.9	5.72	128.1	±0.9 %
		Y	4.99	67.3	20.3		146.6	
		Z	5.01	66.6	19.8		118.6	
10176-CAB	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM)	X	5.82	67.8	20.8	6.52	127.4	±1.2 %
		Y	5.74	68.6	21.4		144.6	
		Z	5.76	67.6	20.6		118.3	
10177-CAC	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, QPSK)	X	5.06	66.8	19.9	5.73	128.2	±0.9 %
		Y	5.09	67.9	20.7		146.2	
		Z	5.02	66.7	19.8		118.5	
10178-CAB	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM)	X	5.83	67.8	20.8	6.52	127.4	±1.2 %
		Y	5.80	68.9	21.6		146.0	
		Z	5.78	67.7	20.7		118.4	
10179-CAB	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM)	X	5.81	67.8	20.7	6.50	127.6	±1.2 %
		Y	5.76	68.8	21.4		144.7	
		Z	5.75	67.6	20.6		118.2	
10180-CAB	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM)	X	5.82	67.9	20.8	6.50	127.5	±1.2 %
		Y	5.74	68.7	21.4		144.5	
		Z	5.79	67.8	20.7		118.8	

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10184-CAB	LTE-FDD (SC-FDMA, 1 RB, 3 MHz, QPSK)	X	5.03	66.6	19.8	5.73	127.1	±0.9 %
		Y	5.05	67.7	20.5		145.7	
		Z	5.02	66.6	19.8		119.3	
10185-CAB	LTE-FDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM)	X	5.79	67.6	20.7	6.51	127.2	±1.2 %
		Y	5.74	68.6	21.4		144.0	
		Z	5.81	67.8	20.7		118.5	
10187-CAB	LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK)	X	5.05	66.7	19.9	5.73	128.0	±0.9 %
		Y	5.08	67.8	20.6		145.3	
		Z	5.02	66.6	19.8		119.3	
10188-CAB	LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM)	X	5.81	67.7	20.7	6.52	127.6	±0.9 %
		Y	5.71	68.4	21.2		142.0	
		Z	5.80	67.7	20.7		119.2	
10298-AAA	LTE-FDD (SC-FDMA, 50% RB, 3 MHz, QPSK)	X	5.93	67.2	19.9	5.72	142.2	±1.2 %
		Y	5.54	66.3	19.5		115.7	
		Z	5.85	66.9	19.8		132.3	
10299-AAA	LTE-FDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM)	X	6.95	68.3	20.7	6.39	149.5	±1.4 %
		Y	6.47	67.3	20.2		119.7	
		Z	6.86	68.0	20.5		137.0	

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 7 and 8).

^B Numerical linearization parameter; uncertainty not required.

^C Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

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DASY/EASY - Parameters of Probe: ES3DV3 - SN:3301**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)
300	45.3	0.87	7.40	7.40	7.40	0.27	1.18	± 13.4 %
450	43.5	0.87	6.85	6.85	6.85	0.20	2.30	± 13.4 %
750	41.9	0.89	6.39	6.39	6.39	0.29	1.93	± 12.0 %
900	41.5	0.97	6.06	6.06	6.06	0.34	1.77	± 12.0 %
1810	40.0	1.40	5.17	5.17	5.17	0.67	1.27	± 12.0 %
1950	40.0	1.40	5.00	5.00	5.00	0.49	1.54	± 12.0 %
2300	39.5	1.67	4.83	4.83	4.83	0.67	1.33	± 12.0 %
2450	39.2	1.80	4.55	4.55	4.55	0.66	1.43	± 12.0 %
2600	39.0	1.96	4.38	4.38	4.38	0.80	1.32	± 12.0 %
3500	37.9	2.91	4.22	4.22	4.22	1.00	1.18	± 13.1 %
3700	37.7	3.12	3.98	3.98	3.98	1.00	1.12	± 13.1 %

^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.

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August 27, 2013

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3301**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)
300	58.2	0.92	7.07	7.07	7.07	0.22	1.61	± 13.4 %
450	56.7	0.94	7.11	7.11	7.11	0.09	1.20	± 13.4 %
750	55.5	0.96	6.01	6.01	6.01	0.38	1.77	± 12.0 %
900	55.0	1.05	5.89	5.89	5.89	0.51	1.49	± 12.0 %
1810	53.3	1.52	4.80	4.80	4.80	0.68	1.32	± 12.0 %
1950	53.3	1.52	4.76	4.76	4.76	0.58	1.56	± 12.0 %
2300	52.9	1.81	4.40	4.40	4.40	0.80	1.22	± 12.0 %
2450	52.7	1.95	4.23	4.23	4.23	0.80	1.04	± 12.0 %
2600	52.5	2.16	4.04	4.04	4.04	0.80	1.01	± 12.0 %
3500	51.3	3.31	3.81	3.81	3.81	1.00	1.01	± 13.1 %
3700	51.0	3.55	3.58	3.58	3.58	1.00	1.22	± 13.1 %

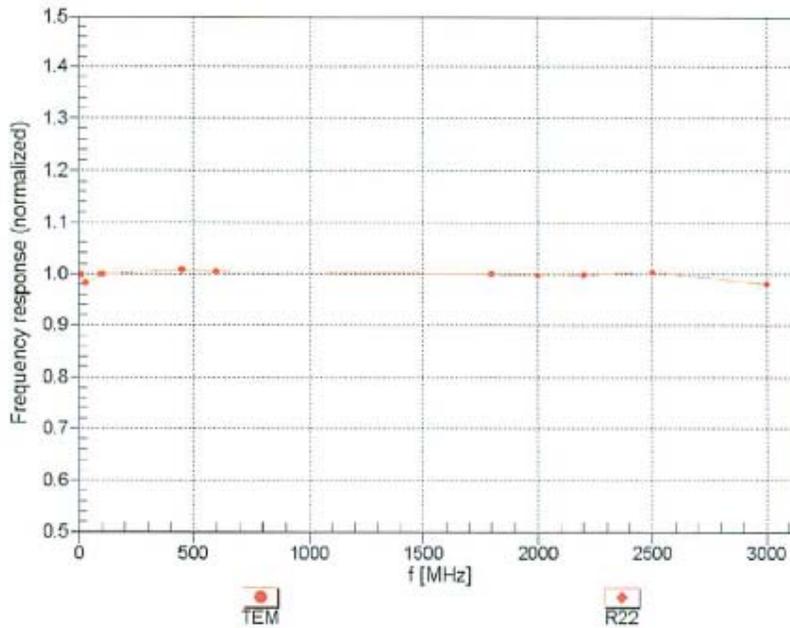
^c Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

^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.

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Frequency Response of E-Field (TEM-Cell:ifi110 EXX, Waveguide: R22)

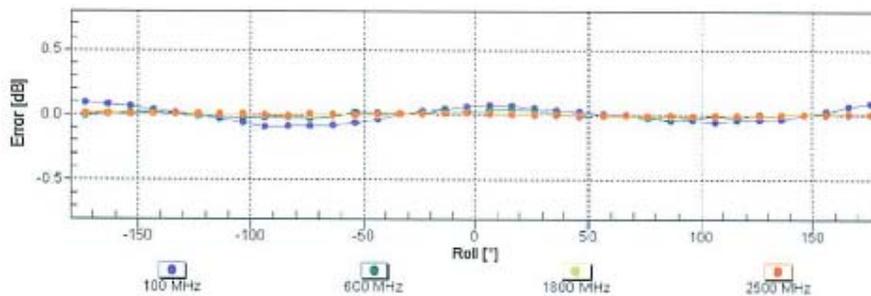
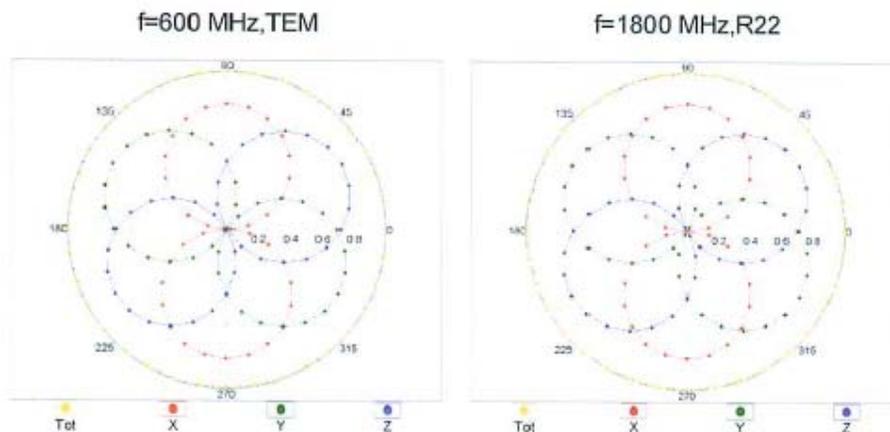


Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ (k=2)

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

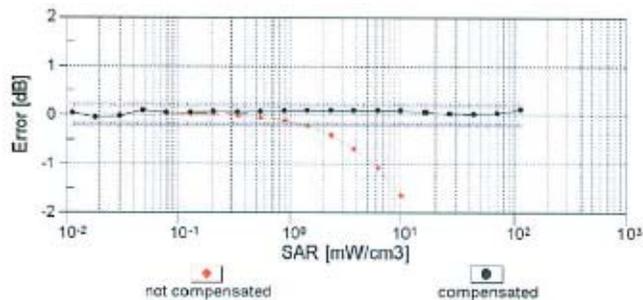
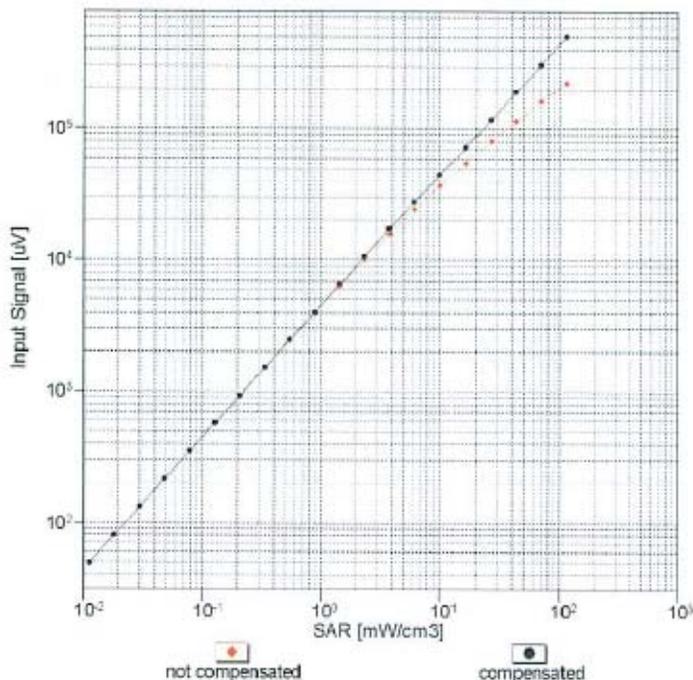


Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ ($k=2$)

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

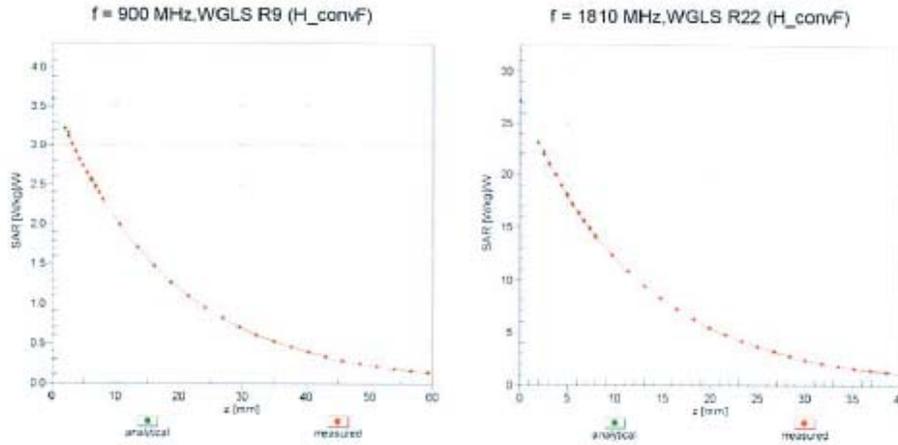


Uncertainty of Linearity Assessment: ± 0.6% (k=2)

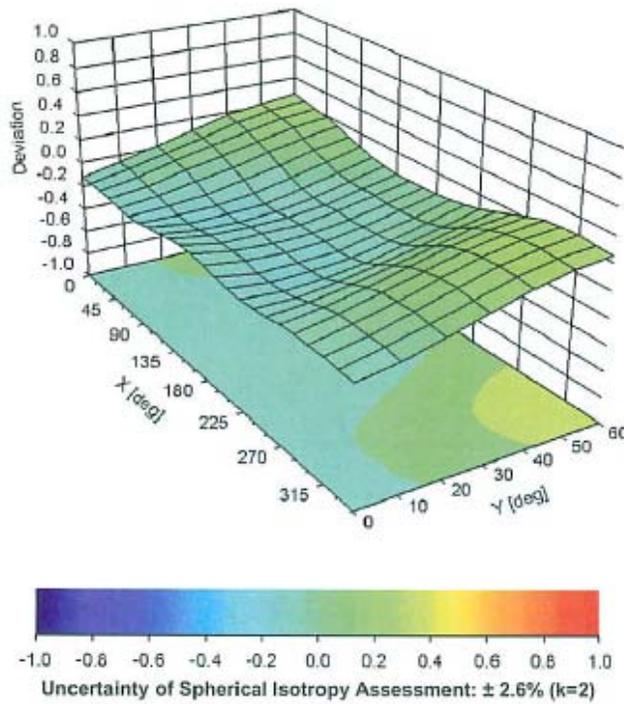
ES3DV3- SN:3301

August 27, 2013

Conversion Factor Assessment



Deviation from Isotropy in Liquid Error (ϕ, θ), f = 900 MHz



ES3DV3- SN:3301

August 27, 2013

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3301

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	-73.6
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	10 mm
Tip Diameter	4 mm
Probe Tip to Sensor X Calibration Point	2 mm
Probe Tip to Sensor Y Calibration Point	2 mm
Probe Tip to Sensor Z Calibration Point	2 mm
Recommended Measurement Distance from Surface	3 mm

Schmid & Partner Engineering AG

s p e a g

Zeughausstrasse 43, 8004 Zurich, Switzerland
Phone +41 44 245 9700, Fax +41 44 245 9779
info@speag.com, http://www.speag.com

Additional Conversion Factors for Dosimetric E-Field Probe

Type:

ES3DV3

Serial Number:

3301

Place of Assessment:

Zurich

Date of Assessment:

August 29, 2013

Probe Calibration Date:

August 27, 2013

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, 900 or at 1810 MHz.

Assessed by:



Schmid & Partner Engineering AG

s p e a g

Zeughausstrasse 43, 8004 Zurich, Switzerland
 Phone +41 44 245 9700, Fax +41 44 245 9779
 info@speag.com, http://www.speag.com

Dosimetric E-Field Probe ES3DV3 SN:3291

Conversion factor (\pm standard deviation)

150 \pm 50 MHz	<i>ConvF</i>	8.24 \pm 10%	$\epsilon_r = 52.3 \pm 5\%$ $\sigma = 0.76 \pm 5\%$ mho/m (head tissue)
250 \pm 50 MHz	<i>ConvF</i>	7.67 \pm 10%	$\epsilon_r = 47.6 \pm 5\%$ $\sigma = 0.83 \pm 5\%$ mho/m (head tissue)
150 \pm 50 MHz	<i>ConvF</i>	7.85 \pm 10%	$\epsilon_r = 61.9 \pm 5\%$ $\sigma = 0.80 \pm 5\%$ mho/m (body tissue)
250 \pm 50 MHz	<i>ConvF</i>	7.57 \pm 10%	$\epsilon_r = 59.4 \pm 5\%$ $\sigma = 0.88 \pm 5\%$ 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.

Appendix C
Dipole Calibration Certificates

**Calibration Laboratory of
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Zeughausstrasse 43, 8004 Zurich, Switzerland



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S Swiss Calibration Service

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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **Motorola EME**

Certificate No: **D300V3-1014_May13**

CALIBRATION CERTIFICATE

Object **D300V3 - SN: 1014**

Calibration procedure(s) **QA CAL-15.v7
Calibration procedure for dipole validation kits below 700 MHz**

Calibration date: **May 06, 2013**

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	04-Apr-13 (No. 217-01733)	Apr-14
Power sensor E4412A	MY41498087	04-Apr-13 (No. 217-01733)	Apr-14
Reference 3 dB Attenuator	SN: S5054 (3c)	04-Apr-13 (No. 217-01737)	Apr-14
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-13 (No. 217-01736)	Apr-14
Type-N mismatch combination	SN: 5047.3 / 06327	04-Apr-13 (No. 217-01739)	Apr-14
Reference Probe ET3DV6	SN: 1507	28-Dec-12 (No. ET3-1507_Dec12)	Dec-13
DAE4	SN: 654	10-Apr-13 (No. DAE4-654_Apr13)	Apr-14
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-12)	In house check: Oct-13

Calibrated by: **Claudio Leubler** (Name), **Laboratory Technician** (Function),  (Signature)

Approved by: **Katja Pokovic** (Name), **Technical Manager** (Function),  (Signature)

Issued: May 6, 2013

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

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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Glossary:

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

Calibration is Performed According to the Following Standards:

- a) 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
- b) 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
- c) 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:

- d) 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	V52.8.6
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	0.37 mho/m
Measured Head TSL parameters	(22.0 \pm 0.2) °C	44.6 \pm 6 %	0.87 mho/m \pm 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	0.725 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	2.89 W/kg \pm 18.1 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	0.478 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	1.91 W/kg \pm 17.6 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	58.2	0.92 mho/m
Measured Body TSL parameters	(22.0 \pm 0.2) °C	57.4 \pm 6 %	0.93 mho/m \pm 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	0.721 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	2.85 W/kg \pm 18.1 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	0.486 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	1.92 W/kg \pm 17.6 % (k=2)

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	57.5 Ω - 4.1 jΩ
Return Loss	- 22.0 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	57.4 Ω - 4.9 jΩ
Return Loss	- 21.7 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.744 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	November 30, 2010

DASY5 Validation Report for Head TSL

Date: 06.05.2013

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 300 MHz; Type: D300V3; Serial: D300V3 - SN: 1014

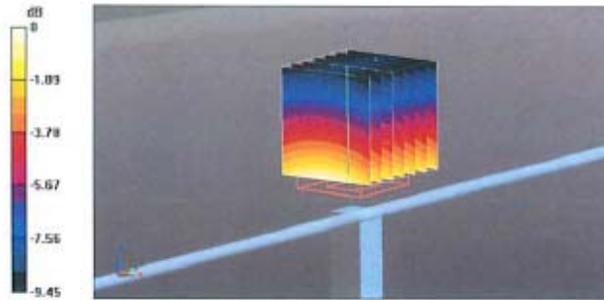
Communication System: UID 0 - CW; Frequency: 300 MHz
 Medium parameters used: $f = 300 \text{ MHz}$; $\sigma = 0.87 \text{ S/m}$; $\epsilon_r = 44.6$; $\rho = 1000 \text{ kg/m}^3$
 Phantom section: Flat Section
 Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ET3DV6 - SN1507; ConvF(7.32, 7.32, 7.32); Calibrated: 28.12.2012;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn654; Calibrated: 10.04.2013
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1003
- DASY52 52.8.6(1115); SEMCAD X 14.6.9(7117)

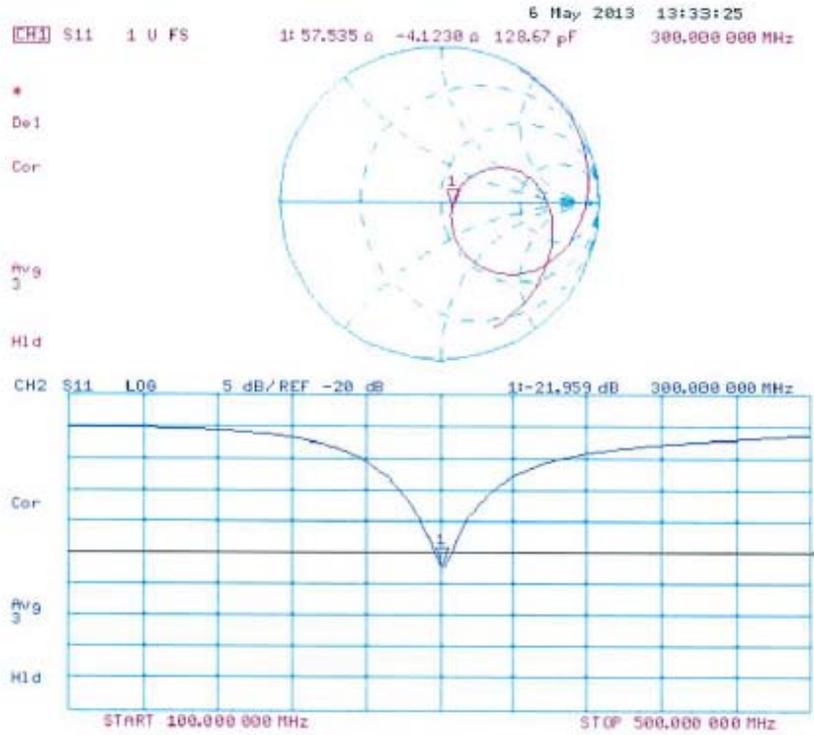
Dipole Calibration for Head Tissue/d=15mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
 Reference Value = 30.216 V/m; Power Drift = -0.05 dB
 Peak SAR (extrapolated) = 1.21 W/kg
SAR(1 g) = 0.725 W/kg; SAR(10 g) = 0.478 W/kg
 Maximum value of SAR (measured) = 0.766 W/kg



0 dB = 0.766 W/kg = -1.16 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 06.05.2013

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 300 MHz; Type: D300V3; Serial: D300V3 - SN: 1014

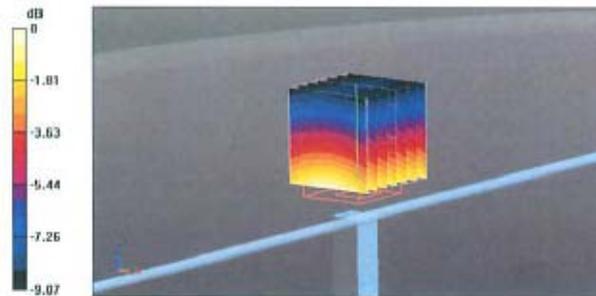
Communication System: UID 0 - CW; Frequency: 300 MHz
 Medium parameters used: $f = 300$ MHz; $\sigma = 0.93$ S/m; $\epsilon_r = 57.4$; $\rho = 1000$ kg/m³
 Phantom section: Flat Section
 Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ET3DV6 - SN1507; ConvF(7.08, 7.08, 7.08); Calibrated: 28.12.2012;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn654; Calibrated: 10.04.2013
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1003
- DASY52 52.8.6(1115); SEMCAD X 14.6.9(7117)

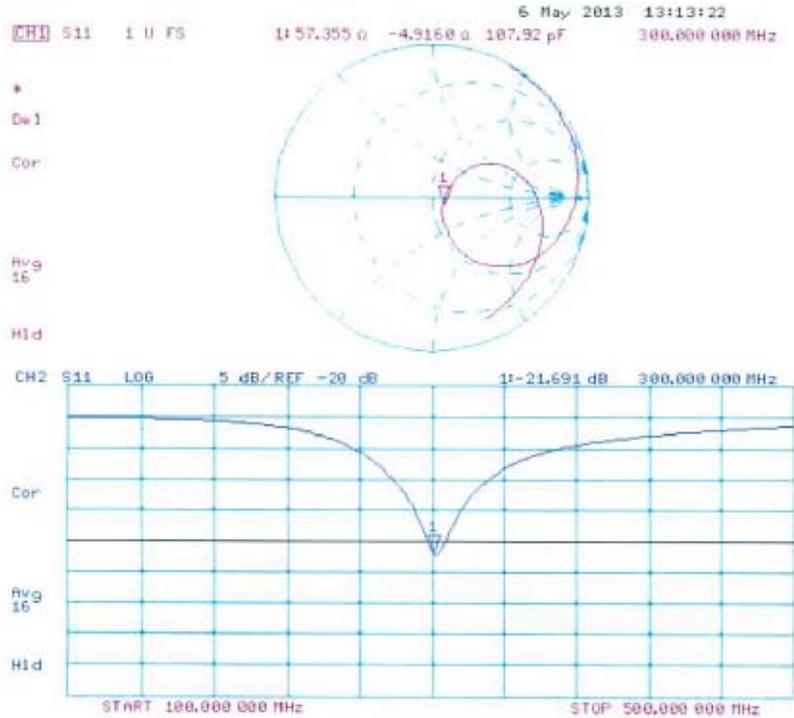
Dipole Calibration for Body Tissue/d=15mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
 Reference Value = 30.216 V/m; Power Drift = -0.05 dB
 Peak SAR (extrapolated) = 1.12 W/kg
SAR(1 g) = 0.721 W/kg; SAR(10 g) = 0.486 W/kg
 Maximum value of SAR (measured) = 0.767 W/kg



0 dB = 0.767 W/kg = -1.15 dBW/kg

Impedance Measurement Plot for Body TSL



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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **Motorola EME**

Certificate No: **D750V3-1098_Oct13**

CALIBRATION CERTIFICATE

Object **D750V3 - SN: 1098**

Calibration procedure(s) **QA CAL-05.v9
Calibration procedure for dipole validation kits above 700 MHz**

Calibration date: **October 15, 2013**

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 EPM-442A	GB37480704	09-Oct-13 (No. 217-01827)	Oct-14
Power sensor HP 8481A	US37292783	09-Oct-13 (No. 217-01827)	Oct-14
Power sensor HP 8481A	MY41092317	09-Oct-13 (No. 217-01828)	Oct-14
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-13 (No. 217-01736)	Apr-14
Type-N mismatch combination	SN: 5047.3 / 06327	04-Apr-13 (No. 217-01739)	Apr-14
Reference Probe ES3DV3	SN: 3205	28-Dec-12 (No. ES3-3205_Dec12)	Dec-13
DAE4	SN: 601	25-Apr-13 (No. DAE4-601_Apr13)	Apr-14
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-13)	In house check: Oct-15
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-13)	In house check: Oct-14

	Name	Function	Signature
Calibrated by:	Dimce Iliev	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: October 15, 2013

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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 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- 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
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

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	V52.8.7
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	750 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.9	0.89 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	41.4 ± 6 %	0.91 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	---	---

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.08 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	8.16 W/kg ± 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.36 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	5.36 W/kg ± 16.5 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.5	0.96 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	54.6 ± 6 %	0.98 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	---	---

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.21 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	8.67 W/kg ± 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.46 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	5.75 W/kg ± 16.5 % (k=2)

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	54.7 Ω - 2.3 jΩ
Return Loss	- 26.0 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	49.3 Ω - 3.6 jΩ
Return Loss	- 28.7 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.033 ns
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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	July 05, 2013

DASY5 Validation Report for Head TSL

Date: 14.10.2013

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN: 1098

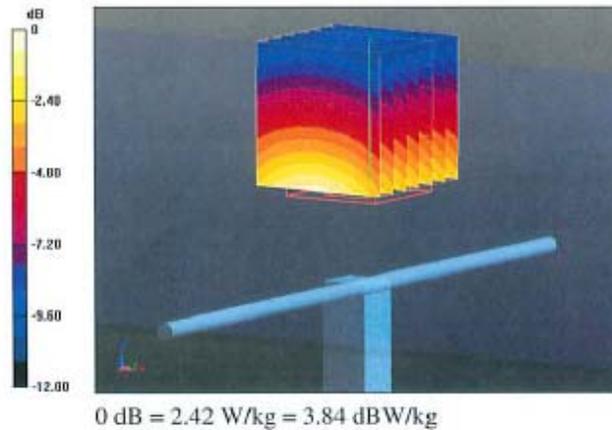
Communication System: UID 0 - CW ; Frequency: 750 MHz
Medium parameters used: $f = 750 \text{ MHz}$; $\sigma = 0.91 \text{ S/m}$; $\epsilon_r = 41.4$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

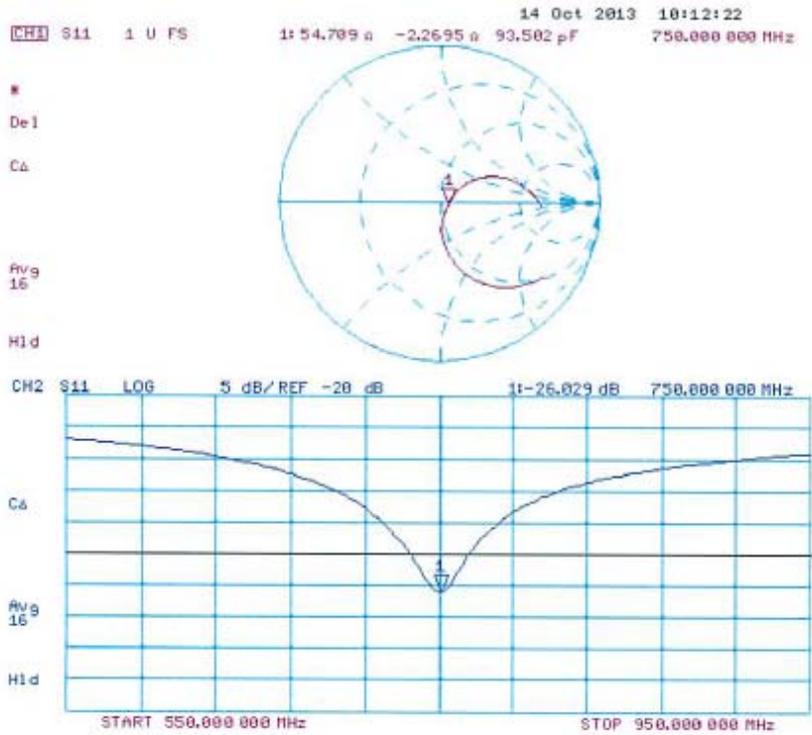
- Probe: ES3DV3 - SN3205; ConvF(6.28, 6.28, 6.28); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$
Reference Value = 52.874 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 3.15 W/kg
SAR(1 g) = 2.08 W/kg; SAR(10 g) = 1.36 W/kg
Maximum value of SAR (measured) = 2.42 W/kg



Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 15.10.2013

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN: 1098

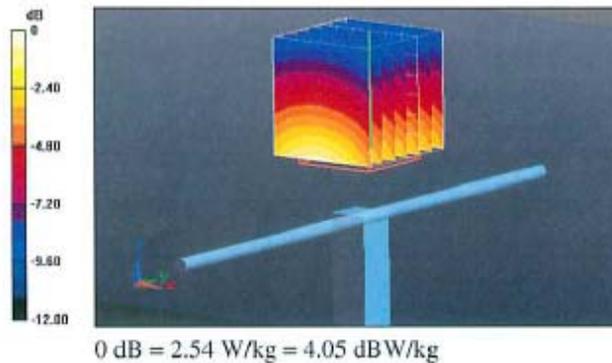
Communication System: UID 0 - CW ; Frequency: 750 MHz
 Medium parameters used: $f = 750 \text{ MHz}$; $\sigma = 0.98 \text{ S/m}$; $\epsilon_r = 54.6$; $\rho = 1000 \text{ kg/m}^3$
 Phantom section: Flat Section
 Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

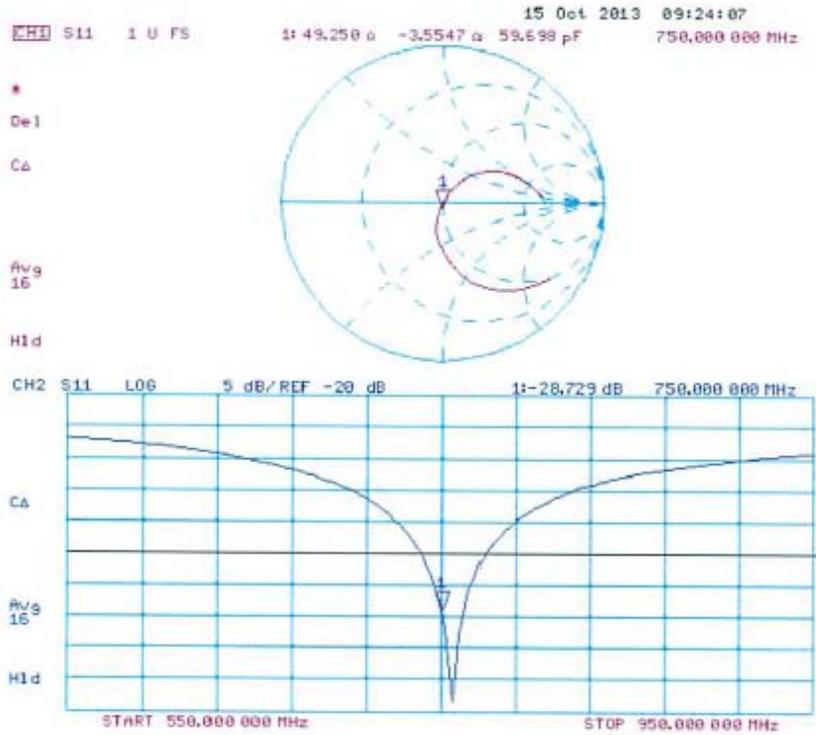
- Probe: ES3DV3 - SN3205; ConvF(6.11, 6.11, 6.11); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$
 Reference Value = 52.593 V/m; Power Drift = 0.02 dB
 Peak SAR (extrapolated) = 3.23 W/kg
SAR(1 g) = 2.21 W/kg; SAR(10 g) = 1.46 W/kg
 Maximum value of SAR (measured) = 2.54 W/kg



Impedance Measurement Plot for Body TSL



**Calibration Laboratory of
Schmid & Partner
Engineering AG**
Zeuighausstrasse 43, 8004 Zurich, Switzerland



S Schweizerischer Kalibrierdienst
S Service suisse d'étalonnage
C Servizio svizzero di taratura
S Swiss Calibration Service

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

Accreditation No.: **SCS 108**

Client **Motorola EME**

Certificate No: **D900V2-084_Aug13**

CALIBRATION CERTIFICATE

Object **D900V2 - SN: 084**

Calibration procedure(s) **QA CAL-05.v9
Calibration procedure for dipole validation kits above 700 MHz**

Calibration date: **August 14, 2013**

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 EPM-442A	GB37480704	01-Nov-12 (No. 217-01640)	Oct-13
Power sensor HP 8481A	US37292783	01-Nov-12 (No. 217-01640)	Oct-13
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-13 (No. 217-01736)	Apr-14
Type-N mismatch combination	SN: 5047.3 / 06327	04-Apr-13 (No. 217-01739)	Apr-14
Reference Probe ES3DV3	SN: 3205	28-Dec-12 (No. ES3-3205_Dec12)	Dec-13
DAE4	SN: 601	25-Apr-13 (No. DAE4-601_Apr13)	Apr-14
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MV41092317	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-12)	In house check: Oct-13

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

Issued: August 14, 2013

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

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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
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

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	V52.8.7
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	900 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.5	0.97 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	41.4 ± 6 %	0.95 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.65 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	10.8 W/kg ± 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.71 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	6.92 W/kg ± 16.5 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.0	1.05 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	54.2 ± 6 %	1.03 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.64 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	10.7 W/kg ± 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.71 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	6.90 W/kg ± 16.5 % (k=2)

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	49.4 Ω - 7.2 j Ω
Return Loss	- 22.8 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	45.3 Ω - 6.9 j Ω
Return Loss	- 21.2 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.413 ns
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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	September 20, 2000

DASY5 Validation Report for Head TSL

Date: 13.08.2013

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 900 MHz; Type: D900V2; Serial: D900V2 - SN: 084

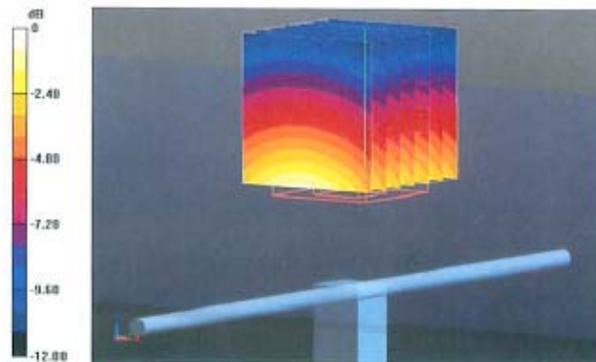
Communication System: UID 0 - CW ; Frequency: 900 MHz
 Medium parameters used: $f = 900 \text{ MHz}$; $\sigma = 0.95 \text{ S/m}$; $\epsilon_r = 41.4$; $\rho = 1000 \text{ kg/m}^3$
 Phantom section: Flat Section
 Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.95, 5.95, 5.95); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

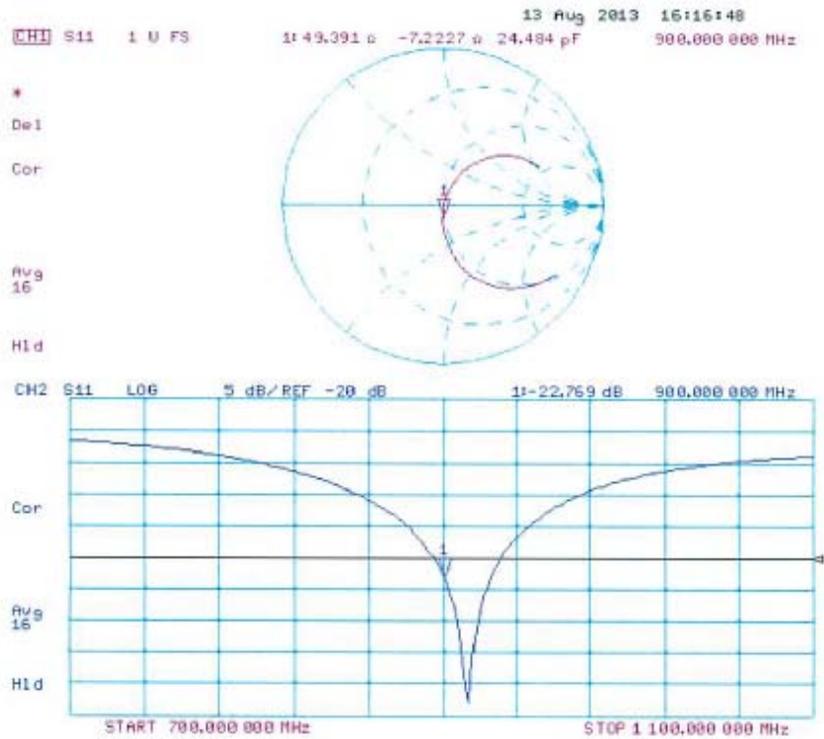
Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$
 Reference Value = 58.816 V/m; Power Drift = 0.03 dB
 Peak SAR (extrapolated) = 4.00 W/kg
SAR(1 g) = 2.65 W/kg; SAR(10 g) = 1.71 W/kg
 Maximum value of SAR (measured) = 3.09 W/kg



0 dB = 3.09 W/kg = 4.90 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 14.08.2013

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 900 MHz; Type: D900V2; Serial: D900V2 - SN: 084

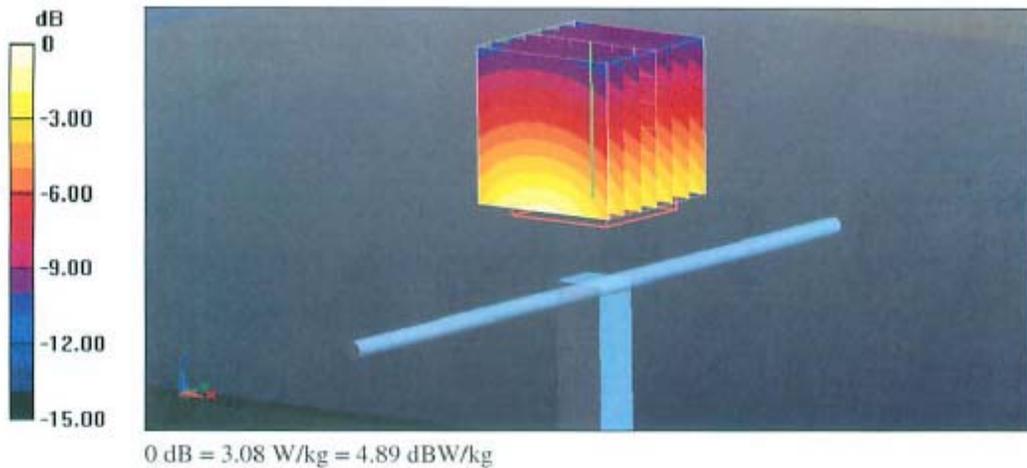
Communication System: UID 0 - CW ; Frequency: 900 MHz
 Medium parameters used: $f = 900$ MHz; $\sigma = 1.03$ S/m; $\epsilon_r = 54.2$; $\rho = 1000$ kg/m³
 Phantom section: Flat Section
 Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.95, 5.95, 5.95); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
 Reference Value = 58.816 V/m; Power Drift = 0.04 dB
 Peak SAR (extrapolated) = 3.87 W/kg
SAR(1 g) = 2.64 W/kg; SAR(10 g) = 1.71 W/kg
 Maximum value of SAR (measured) = 3.08 W/kg



Impedance Measurement Plot for Body TSL

