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SAR Test Report

Report Number: M140624FR

This report is a replacement for M140624F report

Test Sample: Simoco PTT Transmitter

Model Number: SDP660 UW

Tested For: Simoco Australasia Pty Ltd

Date of re-issue: 6th June 2015

CONTENTS

SAR EVALUATION

Simoco PTT Transmitter, **Model:** SDP660 UW **Report Number:** M140624FR

1.0 GENERAL INFORMATION

Test Sample:	Simoco PTT Transmitter
Model Number:	SDP660 UW
Serial Number Sample 1:	56KUW1415 05SL
Serial Number Sample 2:	36KUW1413 00QH
FCC ID:	STZSDP600UW
Hardware Version:	6K1UW
Software Version:	V1.30
Manufacturer:	Simoco
Device Category:	Portable Transmitter
Test Device:	Production Unit / Prototype Sample
RF exposure Category:	Occupational/aware user
Tested for:	Simoco Australasia Pty Ltd
Address:	1270 FerntreeGully Road, Scoresby VIC 3179
Contact:	Bob Stowell
Phone:	9730 3857
Fax:	9730 3967
Email:	Bob.Stowell@simocogroup.com
Test Standard/s:	447498 D01 General RF Exposure Guidance v05r02 648474 D04 Handset SAR v01r02 643646 D01 SAR Test for PTT Radios v01r01 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r03 865664 D02 RF Exposure Reporting v01r01
IEEE 1528: 2013	Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head Due to Wireless Communications Devices: Measurement Techniques.
Statement Of Compliance:	The Simoco PTT Transmitter, model SDP660 UW. Complied with the FCC Occupational/controlled RF exposure limits of 8.0mW/g per requirements of 47CFR2.1093(d).
Highest Reported SAR:	450 MHz Band – **5.89** mW/g
Test Dates:	26th June to 1st July 2014
Test Officer:	 Peter Jakubiec
Authorised Signature:	 Peter Jakubiec

2.0 DESCRIPTION OF DEVICE

2.1 Description of Test Sample

The device tested was a Simoco PTT Transmitter, Model: SDP660 UW operating in 470 MHz frequency band. It will be referred to as the device under test (DUT) throughout this report. The DUT has an external integral fixed length antenna and was tested in the Face Frontal, Belt Clip and in the "Next to Ear" Head configurations of the phantom.

Operating Mode during Testing in "Next to Ear" configuration	: DMR Full Duplex
Operating Mode during Testing in Face Frontal and Belt Clip PTT configurations	:Continuous Wave 100% duty cycle
Operating Mode production sample	: 50% duty cycle
Modulation in "Next to Ear" configuration:	: TDMA
Modulation in Face Frontal and Belt Clip PTT configurations	: FM
Device Power Rating for test sample and identical production unit in "Next to Ear" DMR configuration	: 2.5 W Burst Power
Device Power Rating for test sample and identical production unit in Face Frontal and Belt Clip PTT configurations	: 5 W
Device Dimensions (LxWxH)	: 150 x 63 x 40 mm
Antenna type	: Whip
Applicable Head Configurations	: Head – Touch (Cheek) and Tilted, Face Frontal
Applicable Body Configurations	: Belt Clip
Battery Options	: 7.4V 16.6Wh Li-ion Battery Pack

2.2 Test sample Accessories

2.2.1 Battery Types

A 7.4V 16.6Wh Li-ion Battery Pack is used to power the DUT. SAR measurements were performed with a standard 7.4 V battery.

2.2.2 Belt Clip and Holster

One type of plastic belt clip that contains metallic parts is sold with the device. The belt clip is fixed to the back of the device and provides a spacing of 14 mm between the device and flat phantom. This belt-clip was attached to the device during testing in the Belt-Clip position. Additionally one type of nylon holster is sold with the device. Metallic belt clip is fixed to the back of the holster and provides a spacing of 12 mm between the device and flat phantom, also the holster can be used at the ear, it contains holes for the earpiece and the microphone.

2.2.3 Audio Accessories

There are three audio accessories available for DUT:
According to KDB643646 publication "For audio accessories with similar construction and operating requirements, test only the audio accessory within the group that is expected to result in the highest SAR, with respect to changes in RF characteristics and exposure conditions for the combination. If it is unclear which audio accessory within a group of similar accessories is expected to result in the highest SAR, good engineering judgment and preliminary testing should be applied to select the accessory that is expected to result in the highest SAR."
For the Speaker – Microphone group PAR-9180LMS2 audio accessory was chosen which represents typical accessory of this type, there is very minor difference in connector/cable assembly between PAR-9180LMS2 and other two Speaker – Microphones.

Audio Accessory	**Part Number**
Speaker- Microphone	PAR-9180LMS2
Speaker- Microphone	PAR-9180LMW1
Speaker- Microphone	PAR-600LMS4

2.3 Test Signal, Frequency and Output Power

The DUT operates in the 470 MHz frequency band. The transmitter was configured into a test mode that ensured a continuous RF transmission for the duration of each SAR scan. The device transmission characteristics were also monitored during testing to confirm the device was transmitting continuously. The device was supplied with one size antenna to accommodate the full operating frequency range. FCC guidelines (KDB 643646 D01 SAR Test for PTT Radios v01r01) stipulate that SAR measurements be done at the "highest output power channel" of the operating band, and if SAR is higher than 3.5 mW/g also at the adjacent channels. The device has a headset output to which a supplied Hands free speaker/microphone was connected during all testing in the belt-clip position. Excluding the speaker/microphone accessory there were no wires or other connections to the Handheld Transceiver during the SAR measurements.

Table: Test Frequencies

Frequency Range	Traffic Channels	Nominal Power (W)
440 – 512 MHz	13-17 (DMR mode)	2.5 (Burst)
440 – 512 MHz	1-5 (FM mode)	5 (Continuous)

2.4 Conducted Power Measurements

The conducted power of the DUT was measured in the 440.1 MHz to 511.9 MHz frequency range with a calibrated Power Meter. The results of this measurement are listed in table below.

Table: Frequency and Output Power

Channel	Channel Frequency MHz	RF Mode	Maximum Conducted Output Power dBm
13	440.1	DMR	33.71
14	458	DMR	33.80
15	476	DMR	34.01
16	494	DMR	33.98
17	511.9	DMR	33.97
1	440.1	FM	36.81
2	458	FM	36.87
3	476	FM	37.11
4	494	FM	37.10
5	511.9	FM	37.06

2.5 Battery Status

The device battery was fully charged prior to commencement of measurement. The battery condition was monitored by measuring the conducted RF at the antenna port before the commencement of each test and again after the completion of the test.

Table: Battery Details

Battery:	Li-ion 7.4V 16.6 Wh
Model No.:	PAR-600BATL2I
Serial No.:	40714

2.6 Details of Test Laboratory

2.6.1 Location

EMC Technologies Pty Ltd
176 Harrick Road
Keilor Park, (Melbourne) Victoria
Australia 3042

Telephone: +61 3 9365 1000
Facsimile: +61 3 9331 7455
email: melb@emctech.com.au
website: www.emctech.com.au

2.6.2 Accreditations

EMC Technologies Pty. Ltd. is accredited by the National Association of Testing Authorities, Australia (NATA). **NATA Accredited Laboratory Number: 5292**

EMC Technologies Pty Ltd is NATA accredited for the following standards:

AS/NZS 2772.2 2011:	RF and microwave radiation hazard measurement
ACMA:	Radio communications (Electromagnetic Radiation - Human Exposure) Standard 2003
FCC:	FCC Knowledge Database KDB measurement procedures
EN 50360: 2001	Product standard to demonstrate the compliance of mobile phones with the basic restrictions related to human exposure to electromagnetic fields (300 MHz – 3 GHz)
EN 62209-1:2006	Human Exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Human models instrumentation and procedures. **Part 1:** Procedure to determine the specific absorption rate (SAR) for hand-held devices used in close proximity to the ear (300 MHz to 3 GHz)
IEEE 1528: 2013	Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head Due to Wireless Communications Devices: Measurement Techniques.

Refer to NATA website www.nata.asn.au for the full scope of accreditation.

2.6.3 Environmental Factors

The measurements were performed in a shielded room with no background network signals. The temperature in the laboratory was controlled to within 21 ± 1 °C, the humidity was 42 to 48 %. The liquid parameters were measured prior to the commencement of the tests. Tests were performed to check that reflections within the environment did not influence the SAR measurements. The noise floor of the DASY5 SAR measurement system using the ET3DV6 E-field probe is less than 5μV in both air and liquid mediums.

2.7 Calibration and Validation Procedures and Data

Prior to the SAR assessment, the system validation kit was used to verify that the DASY5 was operating within its specifications. The validation was performed at 450 MHz with the SPEAG D450V3 calibrated dipole.

The validation dipoles are highly symmetric and matched at the centre frequency for the specified liquid and distance to the phantom. The accurate distance between the liquid surface and the dipole centre is achieved with a distance holder that snaps onto the dipole.

System validation is performed by feeding a known power level into a reference dipole, set at a known distance from the phantom. The measured SAR is compared to the theoretically derived level.

2.7.1 System Check Results @ 450 MHz

The following table lists the dielectric properties of the tissue simulating liquid measured prior to SAR System Check. The results of the System Check are listed in columns 4 and 5. The forward power into the reference dipole for each SAR System Check was adjusted to 400mW.

Table: System Check Results (Dipole: SPEAG D450V2 **SN: 1074)**

1. System Check Date	2. Frequency (MHz)	3. ϵr (measured)	4. σ (mho/m) (measured)	5. Measured SAR 1g	6. Measured SAR 10g	7. Last Validation Date
26th June 14	450	45.0	0.85	1.96	1.25	12 Feb. 2014
27th June 14	450	43.2	0.84	2.00	1.28	12 Feb. 2014
1st July 14	450	55.1	0.91	1.89	1.19	12 Feb. 2014

2.7.2 Deviation from reference validation values

The reference SAR values are derived using a reference dipole and flat phantom suitable at the frequencies listed below. These reference SAR values are obtained from the IEEE Std 1528-2013 and are normalized to 1W.

The SPEAG calibration reference SAR value is the SAR validation result obtained in a specific dielectric liquid using the validation dipole during calibration. The measured one-gram SAR should be within 10% of the expected target reference values shown in table below.

Table: Deviation from reference validation values

Frequency and Date	Measured SAR 1g (mW/g)	Measured SAR 1g (Normalized to 1W)	SPEAG Calibration reference SAR Value 1g (mW/g)	Deviation From SPEAG (%)	IEEE Std 1528 reference SAR value 1g (mW/g)	Deviation From IEEE (%)
450 MHz 26th June 14	1.96	4.90	4.58	6.99	4.9	0.00
450 MHz 27th June 14	2.00	5.00	4.58	9.17	4.9	2.04
450 MHz 1st July 14	1.89	4.73	4.42	6.90	-	-

NOTE: All reference validation values are referenced to 1W input power.

2.7.3 Liquid Temperature and Humidity

The humidity and dielectric/ambient temperatures are recorded during the assessment of the tissue material dielectric parameters. The difference between the ambient temperature of the liquid during the dielectric measurement and the temperature during tests was less than |2|°C.

Table: Temperature and Humidity recorded for each day

Date	Ambient Temperature (°C)	Liquid Temperature (°C)	Humidity (%)
26th June 14	20.9	20.7	44
27th June 14	20.8	20.6	42
1st July 14	20.8	20.5	48

3.0 SAR MEASUREMENT PROCEDURE USING DASY5

The SAR evaluation was performed with the SPEAG DASY5 system. A summary of the procedure follows:

a) A measurement of the conducted power value at the antenna port is used as a reference value for assessing the power drop of the DUT. Also a measurement of the SAR value at a fixed location is used. The power is measured at the start of the test and then again at the end of the test.

b) The SAR distribution at the exposed side of the head *or* the flat section of the flat phantom is measured at a distance of 4.0 mm from the inner surface of the shell. The area covers the entire dimension of the DUT and the horizontal grid spacing is 15 mm x 15 mm. The actual largest Area Scan has dimensions of 420 mm x 120 mm surrounding the test device. Based on this data, the area of the maximum absorption is determined by Spline interpolation.

c) Around this point, a volume of 32 mm x 32 mm x 32 mm is assessed by measuring 8 x 8 x 5 7 points. On the basis of this data set, the spatial peak SAR value is evaluated with the following procedure:

   (i) The data at the surface are extrapolated, since the centre of the dipoles is 2.7 mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 4 mm The extrapolation is based on a least square algorithm. A polynomial of the fourth order is calculated through the points in z-axes. This polynomial is then used to evaluate the points between the surface and the probe tip.

   (ii) The maximum interpolated value is searched with a straightforward algorithm. Around this maximum the SAR values averaged over the spatial volumes (1 g and 10 g) are computed using the 3D-Spline interpolation algorithm. The 3D-Spline is composed of three one-dimensional splines with the “Not a knot”- condition (in x, y and z-direction). The volume is integrated with the trapezoidal – algorithm. One thousand points (10 x 10 x 10) are interpolated to calculate the averages.

   (iii) All neighbouring volumes are evaluated until no neighbouring volume with a higher average value is found.

   (iv) The SAR value at the same location as in Step (a) is again measured

4.0 MEASUREMENT UNCERTAINTY

The uncertainty analysis is based on the template listed in the IEEE Std 1528-2013 for both Handset SAR tests and System Check uncertainty. The measurement uncertainty of a specific device is evaluated independently and the total uncertainty for both evaluations (95% confidence level) must be less than 30%.

Table: Uncertainty Budget for DASY5 Version 52 – DUT SAR test

Error Description	Uncert. Value	Prob. Dist.	Div.	C_i (1g)	C_i (10g)	1g u_i	10g u_i	v_i
Measurement System								
Probe Calibration	6.65	N	1.00	1	1	6.65	6.65	∞
Axial Isotropy	4.7	R	1.73	0.7	0.7	1.90	1.90	∞
Hemispherical Isotropy	9.6	R	1.73	0.7	0.7	3.88	3.88	∞
Boundary Effects	1	R	1.73	1	1	0.58	0.58	∞
Linearity	4.7	R	1.73	1	1	2.71	2.71	∞
System Detection Limits	1	R	1.73	1	1	0.58	0.58	∞
Modulation response	2.4	R	1.73	1	1	1.39	1.39	∞
Readout Electronics	0.3	N	1.00	1	1	0.30	0.30	∞
Response Time	0.8	R	1.73	1	1	0.46	0.46	∞
Integration Time	2.6	R	1.73	1	1	1.50	1.50	∞
RF Ambient Noise	3	R	1.73	1	1	1.73	1.73	∞
RF Ambient Reflections	3	R	1.73	1	1	1.73	1.73	∞
Probe Positioner	0.4	R	1.73	1	1	0.23	0.23	∞
Probe Positioning	2.9	R	1.73	1	1	1.67	1.67	∞
Post Processing	2	R	1.73	1	1	1.15	1.15	∞
Test Sample Related								
Power Scaling	0	R	1.73	1	1	0.00	0.00	∞
Test Sample Positioning	2.9	N	1.00	1	1	2.90	2.90	145
Device Holder Uncertainty	3.6	N	1.00	1	1	3.60	3.60	5
Output Power Variation – SAR Drift Measurement	4.06	R	1.73	1	1	2.34	2.34	∞
Phantom and Setup								
Phantom Uncertainty	7.6	R	1.73	1	1	4.39	4.39	∞
SAR Correction	1.9	R	1.73	1	0.84	1.10	0.92	∞
Liquid Conductivity – Measurement uncertainty	2.5	N	1.00	0.64	0.71	1.60	1.78	∞
Liquid Permittivity – Measurement uncertainty	2.5	N	1.00	0.6	0.26	1.50	0.65	∞
Temp.unc. - Conductivity	3.4	R	1.73	0.78	0.71	0.77	0.70	∞
Temp. unc. - Permittivity	0.4	R	1.73	0.23	0.26	0.04	0.05	∞
Combined standard Uncertainty (u_c)						11.8	11.7	
Expanded Uncertainty (95% CONFIDENCE LEVEL)			k= 2			23.5	23.4	

Estimated total measurement uncertainty for the DASY5 measurement system was ±11.8%. The extended uncertainty (K = 2) was assessed to be ±23.5% based on 95% confidence level. The uncertainty is not added to the measurement result.

Table: Uncertainty Budget for DASY5 Version 52- System Check

Error Description	Uncert. Value	Prob. Dist.	Div.	C_i (1g)	C_i (10g)	1g u_i	10g u_i	v_i
Measurement System								
Probe Calibration	6.65	N	1.00	1	1	6.65	6.65	∞
Axial Isotropy	4.7	R	1.73	1	1	2.71	2.71	∞
Hemispherical Isotropy	9.6	R	1.73	0	0	0.00	0.00	∞
Boundary Effects	1	R	1.73	1	1	0.58	0.58	∞
Linearity	4.7	R	1.73	1	1	2.71	2.71	∞
System Detection Limits	1	R	1.73	1	1	0.58	0.58	∞
Modulation response	0	R	1.73	1	1	0.00	0.00	∞
Readout Electronics	0.3	N	1.00	1	1	0.30	0.30	∞
Response Time	0	R	1.73	1	1	0.00	0.00	∞
Integration Time	0	R	1.73	1	1	0.00	0.00	∞
RF Ambient Noise	1	R	1.73	1	1	0.58	0.58	∞
RF Ambient Reflections	1	R	1.73	1	1	0.58	0.58	∞
Probe Positioner	0.8	R	1.73	1	1	0.46	0.46	∞
Probe Positioning	6.7	R	1.73	1	1	3.87	3.87	∞
Post Processing	2	R	1.73	1	1	1.15	1.15	∞
Dipole Related								
Deviation of exp. dipole	5.5	R	1.73	1	1	3.18	3.18	##
Dipole Axis to Liquid Dist.	2	R	1.73	1	1	1.15	1.15	##
Input power & SAR drift	3.40	R	1.73	1	1	1.96	1.96	∞
Phantom and Setup								
Phantom Uncertainty	4	R	1.73	1	1	2.31	2.31	∞
SAR Correction	1.9	R	1.73	1	0.84	1.10	0.92	∞
Liquid Conductivity – Measurement uncertainty	2.5	N	1.00	0.78	0.71	1.95	1.78	∞
Liquid Permittivity – Measurement uncertainty	2.5	N	1.00	0.26	0.26	0.65	0.65	∞
Temp.unc. - Conductivity	3.4	R	1.73	0.78	0.71	0.77	0.70	∞
Temp. unc. - Permittivity	0.4	R	1.73	0.23	0.26	0.04	0.05	∞
Combined standard Uncertainty (u_c)						10.2	10.1	
Expanded Uncertainty (95% CONFIDENCE LEVEL)			k= 2			20.3	20.2	

Estimated total measurement uncertainty for the DASY5 measurement system was ±10.2%. The extended uncertainty (K = 2) was assessed to be ±20.3% based on 95% confidence level. The uncertainty is not added to the System Check measurement result.

5.0 EQUIPMENT LIST AND CALIBRATION DETAILS

Table: SPEAG DASY5 Version 52

Equipment Type	Manufacturer	Model Number	Serial Number	Calibration Due	Used For this Test?
Robot - Six Axes	Staubli	RX90BL	N/A	Not applicable	✓
Robot Remote Control	SPEAG	CS7MB	RX90B	Not applicable	✓
SAM Phantom	SPEAG	N/A	1260	Not applicable	
SAM Phantom	SPEAG	N/A	1060	Not applicable	✓
Flat Phantom	AndreT	10.1	P 10.1	Not Applicable	
Flat Phantom	AndreT	9.1	P 9.1	Not Applicable	
Flat Phantom	SPEAG	ELI 4.0	1101	Not Applicable	✓
Data Acquisition Electronics	SPEAG	DAE3 V1	359	03-June-2014	
Data Acquisition Electronics	SPEAG	DAE3 V1	442	10-Dec-2014	✓
Probe E-Field - Dummy	SPEAG	DP1	N/A	Not applicable	
Probe E-Field	SPEAG	ET3DV6	1380	13-Dec-2014	✓
Probe E-Field	SPEAG	ET3DV6	1377	14-June-2014	
Probe E-Field	SPEAG	ES3DV6	3029	Not Used	
Probe E-Field	SPEAG	EX3DV4	3956	04-Nov-2014	
Probe E-Field	SPEAG	EX3DV4	3657	17-Dec-2014	
Validation Source 150 MHz	SPEAG	CLA150	4003	3-Dec-2016	
Antenna Dipole 300 MHz	SPEAG	D300V3	1012	11-Dec-2015	
Antenna Dipole 450 MHz	SPEAG	D450V3	1074	11-Dec-2015	✓
Antenna Dipole 750 MHz	SPEAG	D750V2	1051	13-Dec-2016	
Antenna Dipole 900 MHz	SPEAG	D900V2	047	22-June-2015	
Antenna Dipole 1640 MHz	SPEAG	D1640V2	314	20-June-2015	
Antenna Dipole 1800 MHz	SPEAG	D1800V2	242	20-June-2015	
Antenna Dipole 1950 MHz	SPEAG	D1950V3	1113	6-Dec -2015	
Antenna Dipole 2300 MHz	SPEAG	D2300V2	1032	22-Aug-2016	
Antenna Dipole 2450 MHz	SPEAG	D2450V2	724	04-Dec-2015	
Antenna Dipole 2600 MHz	SPEAG	D2600V2	1044	13-Dec-2016	
Antenna Dipole 3500 MHz	SPEAG	D3500V2	1002	13-July-2013	
Antenna Dipole 5600 MHz	SPEAG	D5GHzV2	1008	16-Dec-2014	
RF Amplifier	EIN	603L	N/A	*In test	✓
RF Amplifier	Mini-Circuits	ZHL-42	N/A	*In test	
RF Amplifier	Mini-Circuits	ZVE-8G	N/A	*In test	
Synthesized signal generator	Hewlett Packard	ESG-D3000A	GB37420238	*In test	✓
RF Power Meter	Hewlett Packard	437B	3125012786	28-Aug-2014	✓
RF Power Sensor 0.01 - 18 GHz	Hewlett Packard	8481H	1545A01634	29-Aug-2014	✓
RF Power Meter	Rohde & Schwarz	NRP	101415	18-Sept-2014	
RF Power Sensor	Rohde & Schwarz	NRP - Z81	100174	18-Sept-2014	
RF Power Meter Dual	Hewlett Packard	435A	1733A05847	*In test	✓
RF Power Sensor	Hewlett Packard	8482A	2349A10114	*In test	✓
Network Analyser	Hewlett Packard	8714B	GB3510035	25-Sept-2014	
Network Analyser	Hewlett Packard	8753ES	JP39240130	6-Nov-2014	✓
Dual Directional Coupler	Hewlett Packard	778D	1144 04700	*In test	✓
Dual Directional Coupler	NARDA	3022	75453	*In test	

* Calibrated during the test for the relevant parameters.

6.0 SAR TEST METHOD

6.1 Description of the Test Configurations (Face Frontal, Head and Body Worn)

SAR measurements were performed in the “Face Frontal”, “Head” (Touch and Tilted) and “Body Worn” configurations. The “Face Frontal”, “Belt Clip” and “Holster” positions were measured in the flat section of the SPEAG ELI 4.0 phantom, and the “Head “ positions performed on the left and right sides of the head in SPEAG SAM phantom.
See Appendix A for photos of test positions.

6.1.1 “Face Frontal Position”

The SAR evaluation was performed in the flat section of the SPEAG phantom. The device was placed 25mm from the phantom, this position is equivalent to the device placed in front of the nose. The supporting hand was not used.

6.1.2 “Touch Position”

The device was positioned with the vertical centre line of the body of the device and the horizontal line crossing the centre of the earpiece in a plane parallel to the sagittal plane of the phantom. While maintaining the device in this plane, the vertical centre line was aligned with the reference plane containing the three ear and mouth reference points. (Left Ear, Right Ear and Mouth). The centre of the earpiece was then aligned with the Right Ear and Left Ear.

The Handset was then moved towards the phantom with the earpiece aligned with the line between the Left Ear and the Right Ear, until the Handset just touched the ear. With the device maintained in the reference plane, and the Handset in contact with the ear, the bottom of the Handset was moved until the front side of the Handset was in contact with the cheek of the phantom, or until contact with the ear was lost.

6.1.3 “Tilted Position”

The device was positioned in the “Touch” position described above. While maintaining the device in the reference plane describe above, and pivoting against the ear, the device was moved away from the mouth by an angle of 15 degrees or until contact with the ear was lost.

6.1.4 “Belt Clip and Holster” Positions

The device was tested in the (2.00 mm) flat section of the SPEAG phantom. A belt clip maintained a distance of approximately 14 mm between the back of the device and the flat phantom. A Holster containing spring clip maintained a distance of approximately 12 mm between the back of the device and the flat phantom. The Transceiver was placed at the flat section of the phantom and suspended until the Clip touched the phantom.

6.2 List of All Test Cases (Antenna In/Out, Test Frequencies, User Modes)

There is one radio option, one antenna option, three audio accessory options, one battery option and two combinations of body worn accessories, for a total of 6 possible body configurations and 2 possible head configurations. The test configurations chosen were according to KDB 643646 and a device specific KDB. There is no default battery or audio accessory defined by the manufacturer for the DUT. The chosen defaults in accordance with KDB 643646 are as follows:

- Default audio accessory for the body positions was the speaker microphone (“PAR-9180LMS2”), because the smaller cable connector was expected to re-radiate energy over a smaller area.
- There is no default body worn accessory supplied with the radio, and both combinations of body worn accessories were assessed.

Only one audio accessory can be used at a time. The two combinations of body worn accessories available are labelled A – B below. Any combination of body worn accessories can be used with any audio accessory.

Table: Body Accessory Combinations

	Battery Clip	Spring Clip
Battery	A	
Nylon Case (Holster)		B

Applicable Duty Cycle for PTT Radios
KDB 447498 D01 v05 states that the RF exposure of a PTT device should be evaluated with a 50% duty cycle, if the actual duty cycle is <50%. The DUT operates in a half-duplex mode, and is only transmitting while a mechanical PTT button is pressed. The PTT button must be released periodically to facilitate two way communication, and during real world use the actual duty cycle would be much lower than 50%. The results in section 8.0 have been scaled to a 50% duty cycle, in accordance with KDB 447498. “At the ear” the DUT operates in a full-duplex DMR mode of 100% duty cycle.

6.3 FCC RF Exposure Limits for Occupational/ Controlled Exposure

Spatial Peak SAR Limits For:	
Partial-Body:	8.0 mW/g (averaged over any 1g cube of tissue)
Hands, Wrists, Feet and Ankles:	20.0 mW/g (averaged over 10g cube of tissue)

6.4 FCC RF Exposure Limits for Un-controlled/Non–occupational

Spatial Peak SAR Limits For:	
Partial-Body:	1.6 mW/g (averaged over any 1g cube of tissue)
Hands, Wrists, Feet and Ankles:	4.0 mW/g (averaged over 10g cube of tissue)

7.0 SAR MEASUREMENT RESULTS

The SAR values averaged over 1 g tissue mass were determined for the sample device for the Face Frontal and Belt Clip configurations of the phantom.

Table: SAR MEASUREMENT RESULTS– Face Frontal positions

Test Position	Plot No.	Test Mode	Test Ch.	Test Freq. (MHz)	SAR (1g) mW/g	SAR (1g) mW/g 50% DC	Drift (dB)	∈r (target 43.5 ±5% 41.3 to 45.7)	σ (target 0.87 ±5% 0.83 to 0.91)	Measured RF Power (dBm)	Tune-Up SAR (1g) mW/g
Face Frontal	1.	CW (0)	1	440.1	5.57	2.785	-0.2	45.21	0.8386	36.84	2.998
Face Frontal	2.	CW (0)	2	458	7.44	3.72	-0.14	44.76	0.857	36.81	4.032
Face Frontal	3.	CW (0)	3	476	5.89	2.945	-0.15	44.49	0.8742	36.86	3.156
Face Frontal	4.	CW (0)	4	494	4.8	2.4	-0.1	44.08	0.8888	36.84	2.584
Face Frontal	5.	CW (0)	5	511.9	3.82	1.91	-0.2	43.75	0.9039	36.76	2.094
Face Frontal Holster	6.	CW (0)	2	458	6.47	3.235	-0.12	44.76	0.857	36.83	3.490
System Check	7.	CW 450 MHz	1	450	1.96	-	-0.16	45.02	0.8494	-	-

Note: The uncertainty of the system (± 23.5 %) has not been added to the results.

Table: SAR MEASUREMENT RESULTS – Head positions

Test Position	Plot No.	Test Mode	Test Ch.	Test Freq. (MHz)	SAR (1g) mW/g	Drift (dB)	∈r (target 43.5 ±5% 41.3 to 45.7)	σ (target 0.87 ±5% 0.83 to 0.91)	Measured RF Power (dBm)	Tune-Up SAR (1g) mW/g
Touch Left	8.	DMR (ETSI TS 102 361-1) (0)	15	476	3.9	0.17	42.75	0.8696	33.65	4.376
Tilted Left	9.	DMR (ETSI TS 102 361-1) (0)	13	440.1	4.46	0.11	43.4	0.8347	33.52	5.156
Tilted Left	10.	DMR (ETSI TS 102 361-1) (0)	14	458	5.13	-0.1	43.04	0.8532	33.57	5.863
Tilted Left	11.	DMR (ETSI TS 102 361-1) (0)	15	476	5.08	-0.19	42.75	0.8696	33.64	5.713
Tilted Left	12.	DMR (ETSI TS 102 361-1) (0)	16	494	4.78	0.06	42.36	0.8836	33.63	5.388
Tilted Left	13.	DMR (ETSI TS 102 361-1) (0)	17	511.9	4.26	-0.02	42.07	0.8995	33.58	4.857
Tilted Left Holster	14.	DMR (ETSI TS 102 361-1) (0)	14	458	4.1	-0.02	43.04	0.8532	33.60	4.654
Tilted Left Variability	15.	DMR (ETSI TS 102 361-1) (0)	14	458	**5.18**	0.07	43.04	0.8532	33.59	5.893
Touch Right	16.	DMR (ETSI TS 102 361-1) (0)	15	476	3.77	0.03	42.75	0.8696	33.61	4.269
Tilted Right	17.	DMR (ETSI TS 102 361-1) (0)	15	476	4.52	0.03	42.75	0.8696	33.64	5.083
System Check	18.	CW 450 MHz	1	450	2	0.04	43.23	0.8443	-	-

Note: The uncertainty of the system (± 23.5 %) has not been added to the results.

Table: SAR MEASUREMENT RESULTS – Belt Clip positions

Test Position	Plot No.	Test Mode	Test Ch.	Test Freq. (MHz)	SAR (1g) mW/g	SAR (1g) mW/g 50% DC	Drift (dB)	∈r (target 54.0 ±5% 51.3 to 56.7)	σ (target 0.75 ±5% 0.71 to 0.79)	Measured RF Power (dBm)	Tune-Up SAR (1g) mW/g
Belt Clip (14mm Spacing)	19.	CW (0)	3	476	6.41	3.205	-0.12	54.67	0.9365	36.98	3.341
Holster (12mm Spacing)	20.	CW (0)	1	440.1	7.03	3.515	-0.21	55.26	0.9055	36.85	3.775
Holster (12mm Spacing)	21.	CW (0)	2	458	8.87	4.435	-0.2	54.91	0.9215	36.84	4.774
Holster (12mm Spacing)	22.	CW (0)	3	476	7.27	3.635	-0.21	54.67	0.9365	36.93	3.833
Holster (12mm Spacing)	23.	CW (0)	4	494	7.4	3.7	-0.16	54.32	0.9515	36.85	3.974
Holster (12mm Spacing)	24.	CW (0)	5	511.9	6.32	3.16	-0.16	54.03	0.9687	36.82	3.417
Holster (12mm Spacing) Alternative Audio Accessory PAR-9180LMW1	25.	CW (0)	2	458	9.15	4.575	-0.19	54.91	0.9215	36.86	4.902
Holster (12mm Spacing) Alternative Audio Accessory PAR-600LMS4	26.	CW (0)	2	458	9.4	4.7	-0.16	54.91	0.9215	36.84	5.059
System Check	27.	CW 450 MHz	1	450	1.89	-	-0.02	55.05	0.9143	-	-

Note: The uncertainty of the system (± 23.5 %) has not been added to the results.

8.0 COMPLIANCE STATEMENT

The Simoco PTT Transmitter model SDP660 UW was tested on behalf of Simoco Australasia Pty Ltd. It complied with the FCC SAR requirements.

The highest Measured SAR level was 5.18 mW/g for a 1g cube while the DUT was transmitting in DMR mode. The manufacturer's tune up power for DMR mode is stated to be 2.6 W. Scaling the SAR value, the maximum Reported SAR value is **5.89 mW/g**. This value was measured in the "Tilted Left" position variability scan, and was below the controlled limit of 8.0 mW/g, even taking into account the measurement uncertainty of 23.5 %.

The SAR test Variability checks were conducted and the initial and repeated results are included in the SAR results table.