Product Service

Choose certainty.
Add value.

Report On

Specific Absorption Rate Testing of the
Sepura SC2128 TETRA Radio

FCC ID: XX6SC2128
IC: 8739A-SC2128

COMMERCIAL-IN-CONFIDENCE

Document 75941492 Report 03 Issue 2

July 2018

TÜV SÜD Product Service

TÜV SÜD Product Service, Octagon House, Concorde Way, Segensworth North,
Fareham, Hampshire, United Kingdom, PO15 5RL
Tel: +44 (0) 1489 558100. Website: www.tuv-sud.co.uk

REPORT ON	Specific Absorption Rate Testing of the Sepura SC2128 TETRA Radio Document 75941492 Report 03 Issue 2 July 2018
PREPARED FOR	Sepura plc 9000 Cambridge Research Park Beach Drive Waterbeach Cambridge Cambridgeshire CB25 9TL
PREPARED BY	**Stephen Dodd** SAR Engineer
APPROVED BY	**Nigel Grigsby** Authorised Signatory
DATED	13 July 2018

This report has been up-issued to issue 2, to include reference to RSS 102 – Issue 5

Product Service

CONTENTS

SECTION 1

REPORT SUMMARY

Specific Absorption Rate Testing of the
Sepura SC2128 TETRA Radio

Product Service

1.1 INTRODUCTION

The information contained in this report is intended to show verification of the Specific Absorption Rate Testing of the Sepura SC2128 TETRA Radio to the requirements of KDB 447498 D01 v06 General RF Exposure Guidance.

Objective	To perform Specific Absorption Rate Testing to determine the Equipment Under Test's (EUT's) compliance with the requirements specified of KDB 447498 D01 v06 General RF Exposure Guidance, for the series of tests carried out.
Applicant	Sepura plc
Manufacturer	Sepura plc
Manufacturing Description	TETRA Radio
Model Number	SC2128
Serial/IMEI Number(s)	1PR001745GMQ3I1
Number of Samples Tested	1
Hardware Version	Production
Software Version	174600307367
Antenna Part Number	300-01924 (Extended Helical Antenna)
Battery Cell Manufacturer	Varta
Battery Model Number	300-01852 (1160mAh) 300-01853 (1880mAh)
Test Specification/Issue/Date	KDB 447498 D01 v06 General RF Exposure Guidance
Start of Test	17 April 2018
Finish of Test	20 April 2018
Related Document(s)	FCC 47CFR 2.1093: 2015 KDB 865664 – D01 v01r04 KDB 865664 – D02 v01r02 KDB 648474 – D04 v01r03 IEEE 1528 – 2013 RSS 102 – Issue 5
Name of Engineer	Stephen Dodd

Product Service

1.2 BRIEF SUMMARY OF RESULTS

The measurements shown in this report were made in accordance with the procedures specified KDB 447498 D01 v06 General RF Exposure Guidance.

The maximum 1 g volume averaged stand-alone SAR found during this Assessment:

Max 1 g SAR (W/kg) Head	2.73 (Measured)	**2.80** (Scaled)
Max 1 g SAR (W/kg) Body	2.26 (Measured)	**2.32** (Scaled)
The maximum 1 g volume averaged SAR level measured for all the tests performed did not exceed the limits for Occupational Use/ Controlled Exposure (W/kg) Partial Body of 8.0 W/kg.		

The maximum 1 g volume averaged stand-alone Reported SAR found during this Assessment for each supported mode:

Band	Test Configuration	Max Reported SAR (W/kg)
TETRA 806 – 824 MHz	Head	**2.80**
TETRA 851 – 869 MHz	Head	2.79
TETRA 806 – 824 MHz	Body	**2.32**
TETRA 851 – 869 MHz	Body	2.13
The maximum 1 g volume averaged SAR level measured for all the tests performed did not exceed the limits for Occupational Use/ Controlled Exposure (W/kg) Partial Body of 8.0 W/kg.		

1.3 TEST RESULTS SUMMARY

1.3.1 System Performance / Validation Check Results

Prior to formal testing being performed a System Check was performed in accordance with KDB 865664 and the results were compared against published data in Standard IEEE 1528-2013. The following results were obtained: -

System performance / Validation results

Date	Frequency (MHz)	Max 1 g SAR (W/kg)*	Percentage Drift on Reference
17/04/2018	850 MHz	9.55	-1.65
18/04/2018	850 MHz	9.36	-3.60
19/04/2018	850 MHz	9.36	-2.09
20/04/2018	850 MHz	9.36	-2.09

*Normalised to a forward power of 1W

1.3.2 Results Summary Tables

Tetra 806 - 824 MHz band, 1160 mAh Battery 300-01852: Head Specific Absorption Rate (Maximum SAR) 1 g Results

Test Position	Channel	Frequency (MHz)	Measured Average Power (dBm)	Tune Up (dBm)	Measured 1 g SAR (W/kg)	Scaled 1 g SAR (W/kg)	Scan Figure Number
Left Cheek	Middle	815	34.39	34.50	2.72	2.79	5
Left 15°	Middle	815	34.39	34.50	2.44	2.50	6
Right Cheek	Middle	815	34.39	34.50	2.57	2.64	7
Right 15°	Middle	815	34.39	34.50	2.09	2.14	8
Limit for Occupation (controlled Exposure) 8.0 W/kg (1 g) KDB 643646 D01 - Testing of other required channels was not necessary as the SAR was ≤ 3.5 W/kg							

Tetra 806 - 824 MHz band, 1880 mAh Battery 300-01853: Head Specific Absorption Rate (Maximum SAR) 1 g Results

Test Position	Channel	Frequency (MHz)	Measured Average Power (dBm)	Tune Up (dBm)	Measured 1 g SAR (W/kg)	Scaled 1 g SAR (W/kg)	Scan Figure Number
Left Cheek	Middle	815	34.39	34.50	2.73	**2.80**	9
Left 15°	Middle	815	34.39	34.50	2.43	2.49	10
Right Cheek	Middle	815	34.39	34.50	2.72	2.79	11
Right 15°	Middle	815	34.39	34.50	1.98	2.03	12
Limit for Occupation (controlled Exposure) 8.0 W/kg (1 g) KDB 643646 D01 - Testing of other required channels was not necessary as the SAR was ≤ 3.5 W/kg							

Tetra 851 - 869 MHz band, 1160 mAh Battery 300-01852: Head Specific Absorption Rate (Maximum SAR) 1 g Results

Test Position	Channel	Frequency (MHz)	Measured Average Power (dBm)	Tune Up (dBm)	Measured 1 g SAR (W/kg)	Scaled 1 g SAR (W/kg)	Scan Figure Number
Left Cheek	Bottom	851	34.35	34.50	2.64	2.73	13
Left 15°	Bottom	851	34.35	34.50	2.37	2.45	14
Right Cheek	Bottom	851	34.35	34.50	2.48	2.57	15
Right 15°	Bottom	851	34.35	34.50	2.02	2.09	16
Limit for Occupation (controlled Exposure) 8.0 W/kg (1 g) KDB 643646 D01 - Testing of other required channels was not necessary as the SAR was ≤ 3.5 W/kg							

Tetra 851 - 869 MHz band, 1880 mAh Battery 300-01853: Head Specific Absorption Rate (Maximum SAR) 1 g Results

Test Position	Channel	Frequency (MHz)	Measured Average Power (dBm)	Tune Up (dBm)	Measured 1 g SAR (W/kg)	Scaled 1 g SAR (W/kg)	Scan Figure Number
Left Cheek	Bottom	851	34.35	34.50	2.70	2.79	17
Left 15°	Bottom	851	34.35	34.50	2.51	2.60	18
Right Cheek	Bottom	851	34.35	34.50	2.66	2.66	19
Right 15°	Bottom	851	34.35	34.50	1.98	2.05	20
Limit for Occupation (controlled Exposure) 8.0 W/kg (1 g) KDB 643646 D01 - Testing of other required channels was not necessary as the SAR was ≤ 3.5 W/kg							

Tetra 806 - 824 MHz band, 1160 mAh Battery 300-01852: Head – Front Of Face PTT Specific Absorption Rate (Maximum SAR) 1 g Results

Test Position	Channel	Frequency (MHz)	Measured Average Power (dBm)	Tune Up (dBm)	Measured 1 g SAR (W/kg)	Scaled 1 g SAR (W/kg)	Scan Figure Number
25 mm Front Facing	Middle	815	34.39	34.50	1.00	1.03	21
Limit for Occupation (controlled Exposure) 8.0 W/kg (1 g) KDB 643646 D01 - Testing of other required channels was not necessary as the SAR was ≤ 3.5 W/kg							

Tetra 806 - 824 MHz band, 1880 mAh Battery 300-01853: Head – Front Of Face PTT Specific Absorption Rate (Maximum SAR) 1 g Results

Test Position	Channel	Frequency (MHz)	Measured Average Power (dBm)	Tune Up (dBm)	Measured 1 g SAR (W/kg)	Scaled 1 g SAR (W/kg)	Scan Figure Number
25 mm Front Facing	Middle	815	34.39	34.50	1.01	1.04	22
Limit for Occupation (controlled Exposure) 8.0 W/kg (1 g) KDB 643646 D01 - Testing of other required channels was not necessary as the SAR was ≤ 3.5 W/kg							

Tetra 851 - 869 MHz band, 1160 mAh Battery 300-01852: Head – Front Of Face PTT Specific Absorption Rate (Maximum SAR) 1 g Results

Test Position	Channel	Frequency (MHz)	Measured Average Power (dBm)	Tune Up (dBm)	Measured 1 g SAR (W/kg)	Scaled 1 g SAR (W/kg)	Scan Figure Number
25 mm Front Facing	Bottom	851	34.35	34.50	0.95	0.98	23
Limit for Occupation (controlled Exposure) 8.0 W/kg (1 g) KDB 643646 D01 - Testing of other required channels was not necessary as the SAR was ≤ 3.5 W/kg							

Tetra 851 - 869 MHz band, 1880 mAh Battery 300-01853: Head – Front Of Face PTT Specific Absorption Rate (Maximum SAR) 1 g Results

Test Position	Channel	Frequency (MHz)	Measured Average Power (dBm)	Tune Up (dBm)	Measured 1 g SAR (W/kg)	Scaled 1 g SAR (W/kg)	Scan Figure Number
25 mm Front Facing	Bottom	851	34.35	34.50	0.97	1.01	24
Limit for Occupation (controlled Exposure) 8.0 W/kg (1 g) KDB 643646 D01 - Testing of other required channels was not necessary as the SAR was ≤ 3.5 W/kg							

Tetra 806 - 824 MHz band, 1160 mAh Battery 300-01852, Holster 300-01916: Body Specific Absorption Rate (Maximum SAR) 1 g Results

Test Position	Channel	Frequency (MHz)	Measured Average Power (dBm)	Tune Up (dBm)	Measured 1 g SAR (W/kg)	Scaled 1 g SAR (W/kg)	Scan Figure Number
0mm Rear Facing	Middle	815	34.39	34.50	2.23	2.29	25
Limit for Occupation (controlled Exposure) 8.0 W/kg (1 g) KDB 643646 D01 - Testing of other required channels was not necessary as the SAR was ≤ 3.5 W/kg							

Tetra 806 - 824 MHz band, 1160 mAh Battery 300-01852, Holster 300-01915: Body Specific Absorption Rate (Maximum SAR) 1 g Results

Test Position	Channel	Frequency (MHz)	Measured Average Power (dBm)	Tune Up (dBm)	Measured 1 g SAR (W/kg)	Scaled 1 g SAR (W/kg)	Scan Figure Number
0mm Rear Facing	Middle	815	34.39	34.50	1.87	1.92	26
Limit for Occupation (controlled Exposure) 8.0 W/kg (1 g) KDB 643646 D01 - Testing of other required channels was not necessary as the SAR was ≤ 3.5 W/kg							

Tetra 806 - 824 MHz band, 1160 mAh Battery 300-01852, Holster 300-01917: Body Specific Absorption Rate (Maximum SAR) 1 g Results

Test Position	Channel	Frequency (MHz)	Measured Average Power (dBm)	Tune Up (dBm)	Measured 1 g SAR (W/kg)	Scaled 1 g SAR (W/kg)	Scan Figure Number
0mm Rear Facing	Middle	815	34.39	34.50	1.36	1.40	27
Limit for Occupation (controlled Exposure) 8.0 W/kg (1 g) KDB 643646 D01 - Testing of other required channels was not necessary as the SAR was ≤ 3.5 W/kg							

Tetra 806 - 824 MHz band, 1160 mAh Battery 300-01852, Clip 300-01923: Body Specific Absorption Rate (Maximum SAR) 1 g Results

Test Position	Channel	Frequency (MHz)	Measured Average Power (dBm)	Tune Up (dBm)	Measured 1 g SAR (W/kg)	Scaled 1 g SAR (W/kg)	Scan Figure Number
0mm Rear Facing	Middle	815	34.39	34.50	1.27	1.30	28
Limit for Occupation (controlled Exposure) 8.0 W/kg (1 g) KDB 643646 D01 - Testing of other required channels was not necessary as the SAR was ≤ 3.5 W/kg							

Tetra 806 - 824 MHz band, 1160 mAh Battery 300-01852, Clip 300-01922: Body Specific Absorption Rate (Maximum SAR) 1 g Results

Test Position	Channel	Frequency (MHz)	Measured Average Power (dBm)	Tune Up (dBm)	Measured 1 g SAR (W/kg)	Scaled 1 g SAR (W/kg)	Scan Figure Number
0mm Rear Facing	Middle	815	34.39	34.50	1.64	1.68	29
Limit for Occupation (controlled Exposure) 8.0 W/kg (1 g) KDB 643646 D01 - Testing of other required channels was not necessary as the SAR was ≤ 3.5 W/kg							

Tetra 806 - 824 MHz band, 1880 mAh Battery 300-01853, Holster 300-01916: Body Specific Absorption Rate (Maximum SAR) 1 g Results

Test Position	Channel	Frequency (MHz)	Measured Average Power (dBm)	Tune Up (dBm)	Measured 1 g SAR (W/kg)	Scaled 1 g SAR (W/kg)	Scan Figure Number
0mm Rear Facing	Middle	815	34.39	34.50	1.98	2.03	30
Limit for Occupation (controlled Exposure) 8.0 W/kg (1 g) KDB 643646 D01 - Testing of other required channels was not necessary as the SAR was ≤ 3.5 W/kg							

Tetra 806 - 824 MHz band, 1160 mAh Battery 300-01852, Holster 300-01916, RSM 300-00389: Body Specific Absorption Rate (Maximum SAR) 1 g Results

Test Position	Channel	Frequency (MHz)	Measured Average Power (dBm)	Tune Up (dBm)	Measured 1 g SAR (W/kg)	Scaled 1 g SAR (W/kg)	Scan Figure Number
0mm Rear Face	Middle	815	34.39	34.50	2.26	**2.32**	31
Limit for Occupation (controlled Exposure) 8.0 W/kg (1 g) KDB 643646 D01 - Testing of other required channels was not necessary as the SAR was ≤ 3.5 W/kg							

Tetra 851 - 869 MHz band, 1160 mAh Battery 300-01852, Holster 300-01916: Body Specific Absorption Rate (Maximum SAR) 1 g Results

Test Position	Channel	Frequency (MHz)	Measured Average Power (dBm)	Tune Up (dBm)	Measured 1 g SAR (W/kg)	Scaled 1 g SAR (W/kg)	Scan Figure Number
0mm Rear Facing	Bottom	851	34.35	34.50	2.06	2.13	32
Limit for Occupation (controlled Exposure) 8.0 W/kg (1 g) KDB 643646 D01 - Testing of other required channels was not necessary as the SAR was ≤ 3.5 W/kg							

Tetra 851 - 869 MHz band, 1160 mAh Battery 300-01852, Holster 300-01915: Body Specific Absorption Rate (Maximum SAR) 1 g Results

Test Position	Channel	Frequency (MHz)	Measured Average Power (dBm)	Tune Up (dBm)	Measured 1 g SAR (W/kg)	Scaled 1 g SAR (W/kg)	Scan Figure Number
0mm Rear Facing	Bottom	851	34.35	34.50	1.73	1.79	33
Limit for Occupation (controlled Exposure) 8.0 W/kg (1 g) KDB 643646 D01 - Testing of other required channels was not necessary as the SAR was ≤ 3.5 W/kg							

Tetra 851 - 869 MHz band, 1160 mAh Battery 300-01852, Holster 300-01917: Body Specific Absorption Rate (Maximum SAR) 1 g Results

Test Position	Channel	Frequency (MHz)	Measured Average Power (dBm)	Tune Up (dBm)	Measured 1 g SAR (W/kg)	Scaled 1 g SAR (W/kg)	Scan Figure Number
0mm Rear Facing	Bottom	851	34.35	34.50	1.27	1.32	34
Limit for Occupation (controlled Exposure) 8.0 W/kg (1 g) KDB 643646 D01 - Testing of other required channels was not necessary as the SAR was ≤ 3.5 W/kg							

Tetra 851 - 869 MHz band, 1160 mAh Battery 300-01852, Clip 300-01923: Body Specific Absorption Rate (Maximum SAR) 1 g Results

Test Position	Channel	Frequency (MHz)	Measured Average Power (dBm)	Tune Up (dBm)	Measured 1 g SAR (W/kg)	Scaled 1 g SAR (W/kg)	Scan Figure Number
0mm Rear Facing	Bottom	851	34.35	34.50	1.03	1.07	35
Limit for Occupation (controlled Exposure) 8.0 W/kg (1 g) KDB 643646 D01 - Testing of other required channels was not necessary as the SAR was ≤ 3.5 W/kg							

Tetra 851 - 869 MHz band, 1160 mAh Battery 300-01852, Clip 300-01922: Body Specific Absorption Rate (Maximum SAR) 1 g Results

Test Position	Channel	Frequency (MHz)	Measured Average Power (dBm)	Tune Up (dBm)	Measured 1 g SAR (W/kg)	Scaled 1 g SAR (W/kg)	Scan Figure Number
0mm Rear Facing	Bottom	851	34.35	34.50	1.47	1.52	36
Limit for Occupation (controlled Exposure) 8.0 W/kg (1 g) KDB 643646 D01 - Testing of other required channels was not necessary as the SAR was ≤ 3.5 W/kg							

Tetra 851 - 869 MHz band, 1880 mAh Battery 300-01853, Holster 300-01916: Body Specific Absorption Rate (Maximum SAR) 1 g Results

Test Position	Channel	Frequency (MHz)	Measured Average Power (dBm)	Tune Up (dBm)	Measured 1 g SAR (W/kg)	Scaled 1 g SAR (W/kg)	Scan Figure Number
0mm Rear Facing	Bottom	851	34.35	34.50	1.87	1.94	37
Limit for Occupation (controlled Exposure) 8.0 W/kg (1 g) KDB 643646 D01 - Testing of other required channels was not necessary as the SAR was ≤ 3.5 W/kg							

Tetra 851 - 869 MHz band, 1160 mAh Battery 300-01852, Holster 300-01916, ,RSM 300-00389: Body Specific Absorption Rate (Maximum SAR) 1 g Results

Test Position	Channel	Frequency (MHz)	Measured Average Power (dBm)	Tune Up (dBm)	Measured 1 g SAR (W/kg)	Scaled 1 g SAR (W/kg)	Scan Figure Number
0mm Rear Facing	Bottom	851	34.35	34.50	2.05	2.12	38
Limit for Occupation (controlled Exposure) 8.0 W/kg (1 g) KDB 643646 D01 - Testing of other required channels was not necessary as the SAR was ≤ 3.5 W/kg							

Product Service

1.3.3 Standalone SAR Test Exclusion Considerations (KDB 447498 D01)

The 1 g SAR Test exclusion thresholds for 100 MHz to 6 GHz *test separation distances* ≤ 50 mm are determined by:

[(*max power of channel, including tune-up tolerance, mW) / (min. test separation distance, mm)] [$\sqrt{f_{(GHz)}}$]* ≤ 3.0, where

- f ($_{GHz}$) is the RF channel transmit frequency in GHz.
- Power and distance are rounded to the nearest mW and mm before calculation.
- The result is rounded to one decimal place for comparison.
- When the maximum test separation distance is < 5 mm, a distance of 5 mm is applied.

RAT & Band	Frequency (MHz)	Power (dBm)	Power (mW)	Test Position	Distance (mm)	Threshold	Test Exclusion
Tetra 806 – 824 MHz	815	34.5	2818.38	Head	< 5	508.9	No
Tetra 806 – 824 MHz	815	34.5	2818.38	Front Of Face	25	101.8	No
Tetra 806 – 824 MHz	815	34.5	2818.38	Body	27	110.6	No
Tetra 851 – 869 MHz	851	34.5	2818.38	Head	< 5	520.0	No
Tetra 851 – 869 MHz	851	34.5	2818.38	Front Of Face	25	104.0	No
Tetra 851 – 869 MHz	851	34.5	2818.38	Body	23	113.0	No

1.3.4 Technical Description

The equipment under test (EUT) was a Sepura SC2128 Portable TETRA Radio for Occuptional use. A full technical description can be found in the manufacturer's documentation.

1.3.5 Test Configuration and Modes of Operation

The testing was performed with two battery variants (1160 mAh and 1880 mAh) which were supplied by Sepura plc and manufactured byVarta. The batteries were fully charged before each measurement and there were no external connections.

For head SAR assessment, testing was performed with the EUT in the declared normal position of operation for the 806 MHz – 824 MHz and 851 – 869 MHz frequency bands at the maximum specified power level. The EUT was placed against a Specific Anthropomorphic Mannequin (SAM) phantom. The phantom was filled with simulant liquid appropriate to the frequency band. The dielectric properties were measured and found to be in accordance with the requirements for the dielectric properties specified in KDB 865665. Testing was performed at both the left and right ear of the phantom at both handset positions stated in the applied specification.

For front of face SAR assessment, testing was performed with the device in the intended normal position of operation for the 806 MHz – 824 MHz and 851 – 869 MHz frequency bands at maximum power. The handset was placed at a distance of 25 mm from the bottom of the flat phantom for all front of face testing. The phantom was filled to a depth of 150 mm with the appropriate head simulant liquid. The dielectric properties were in accordance with the requirements specified in KDB 865664 D01

For body SAR assessment, testing was performed for the 806 MHz – 824 MHz and 851 – 869 MHz frequency bands at the maximum specified power levels, using various body worn accessories, of which all contain metal components. Model Numbers: 300-01916,300-01922, 300-01923, 300-01922, 300-01917 (Klick fast holder with belt attachment (300-00322) fitted.) Body SAR testing was carried out with the device inside the holsters or with a belt clip attached at 0 mm separation distance between the accessory and the Elliptical Flat Phantom The separation distances caused by each accessory configuration is tabulated below.

Body Accessory	Battery	Separation distance EUT to phantom (mm)	Separation distance antenna to phantom (mm)
300-01916-Nylon holster with belt clip	300-01852 (1160 mAh)	11	15
300-1915- Lightweight leather case	300-01852 (1160 mAh)	14	18
300-1917- Leather Klick fast holster (300-00322 Belt attachment fitted)	300-01852 (1160 mAh)	17	21
300-01923- Large belt clip	300-01852 (1160 mAh)	23	27
300-01922- Shirt pocket clip (small)	300-01852 (1160 mAh)	13	17
300-01916-Nylon holster with belt clip	300-01852 (1160 mAh)	11	15
300-01916-Nylon holster with belt clip	300-01853 (1880 mAh)	11	19.7

For the body worn accessory that resulted in the highest measured SAR, a scan was repeated with a remote speaker/ microphone (300-00389) fitted to the EUT. The remote speaker / microphone (RSM) is of a non-radiating type.

The Elliptical Flat Phantom dimensions are 600 mm major axis and 400 mm minor axis with a shell thickness of 2.00 mm. The phantom was filled to a minimum depth of 150 mm with the appropriate Body simulant liquid. The dielectric properties were measured and found to be in accordance with the requirements specified in KDB 865664 D01.

For each scan, the EUT was configured into a continuous transmission test mode using software provided by Sepura plc.

Included in this report are descriptions of the test method; the equipment used and an analysis of the test uncertainties applicable and diagrams indicating the locations of maximum SAR for each test position.

Product Service

1.4 PTT DUTY CYCLE MEASUREMENTS / POWER MEASUREMENTS

1.4.1 Requirement

If a device has push-to-talk capability, a minimum duty cycle of 50% (on-time) shall be used in the evaluation. A lower duty cycle is permitted only if the transmission duty cycle is an inherent property of the technology or of the design of the equipment and not under user control. Proof of the various on-off durations and a detailed method of calculation of the average power shall be included in the SAR evaluation.

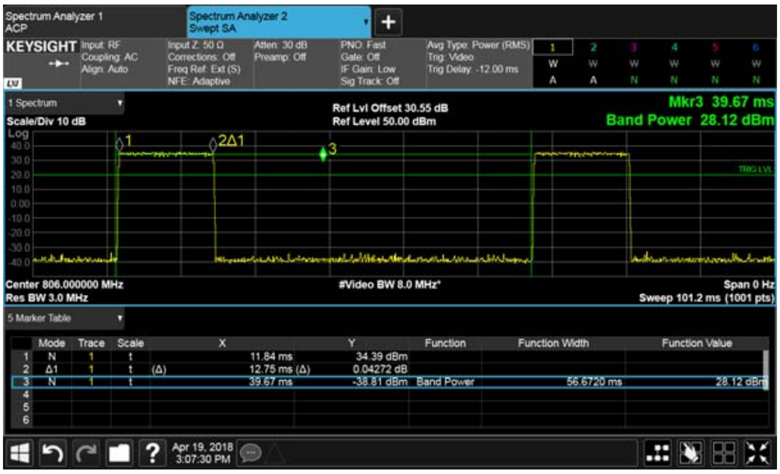
The EUT was operated in continuous transmit (100 % PTT on). However, due to the characteristics of the EUT's TETRA technology the transmitter is only active for 25 % of the time due to the single time slot inherent duty factor.

SC2128

Measurement Parameter	EUT Test Frequency (MHz)					
	806	815	824	851	860	869
Burst Average Power (dBm)**	34.39	**34.39**	34.38	**34.35**	34.28	34.30
Frame Average Power (dBm)**	27.87	28.00	27.99	27.93	27.91	27.90
Transmit On Time (ms)*	12.75	12.70	12.70	12.70	12.70	12.70
Transmit Off + On Time (ms)	56.67	56.60	56.80	56.80	56.60	56.80
Transmission Burst Cycle (%)	22.50	22.40	22.40	22.40	22.40	22.40

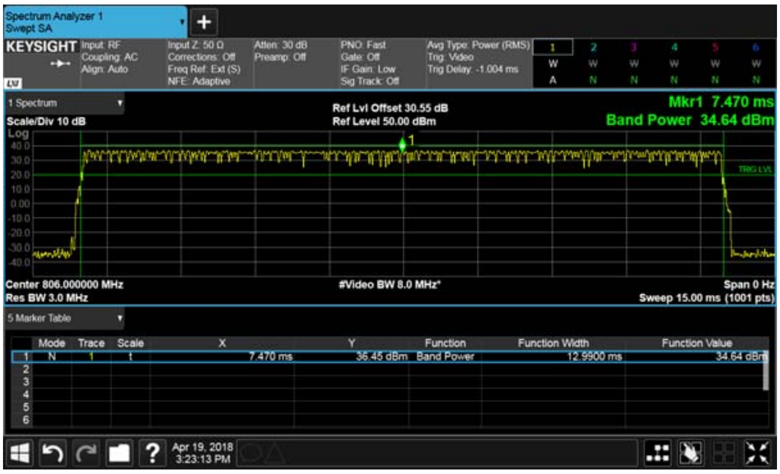
** 0.25 dBm difference between tabulated results and plots, due to 0.25 dB path loss of customer supplied cable not accounted for when measurents were taken.

Duty Cycle 806 MHz

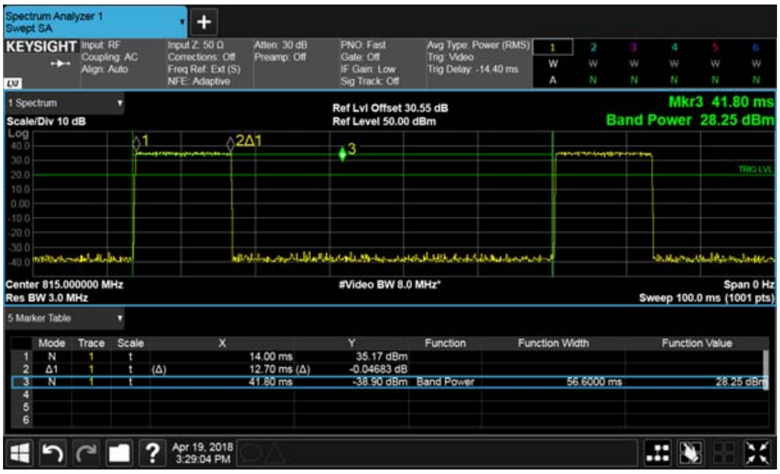


Product Service

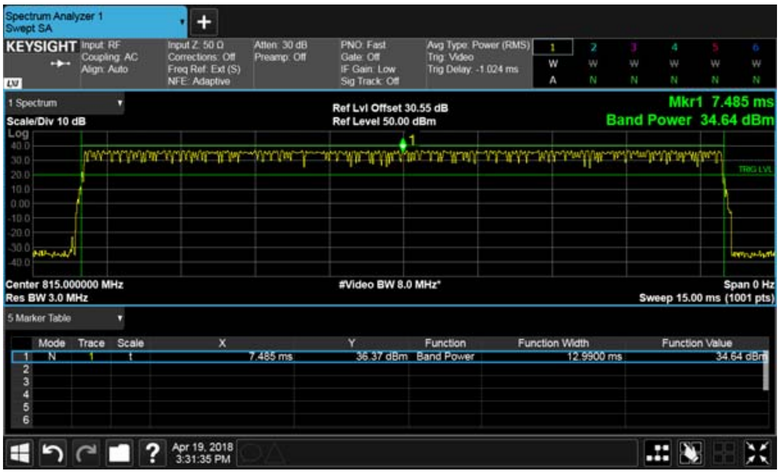
Burst Power 806 MHz



Duty Cycle 815 MHz

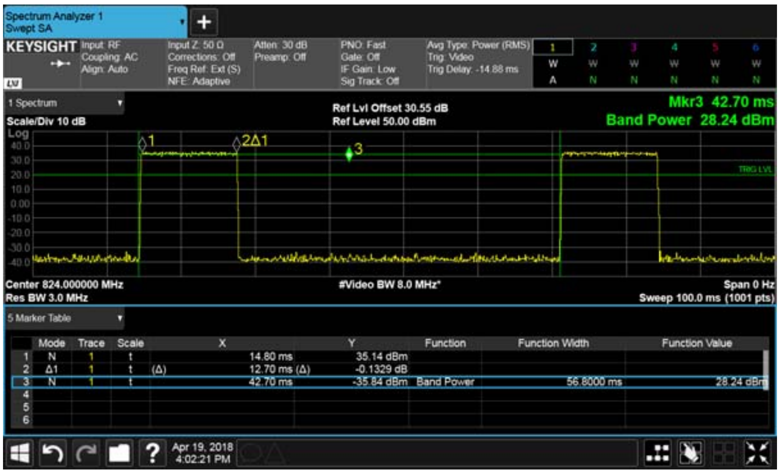


Burst Power 815 MHz

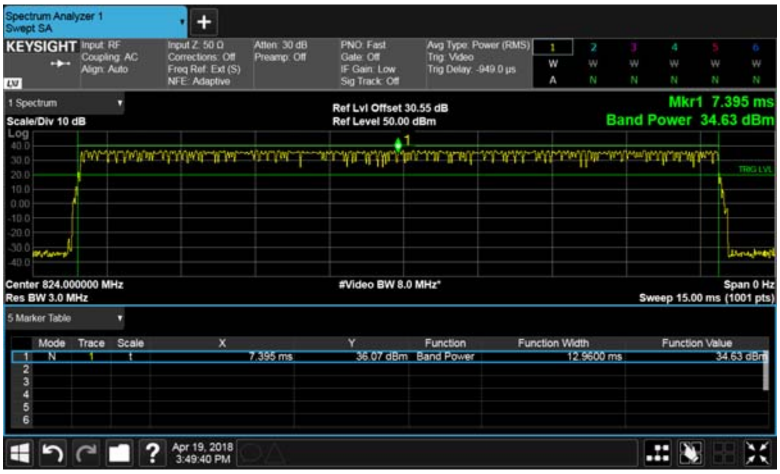


TÜV SÜD Product Service

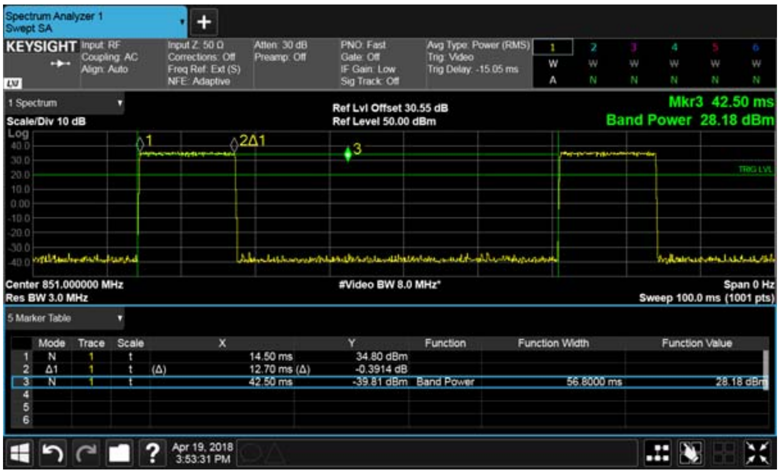
Duty Cycle 824 MHz



Burst Power 824 MHz

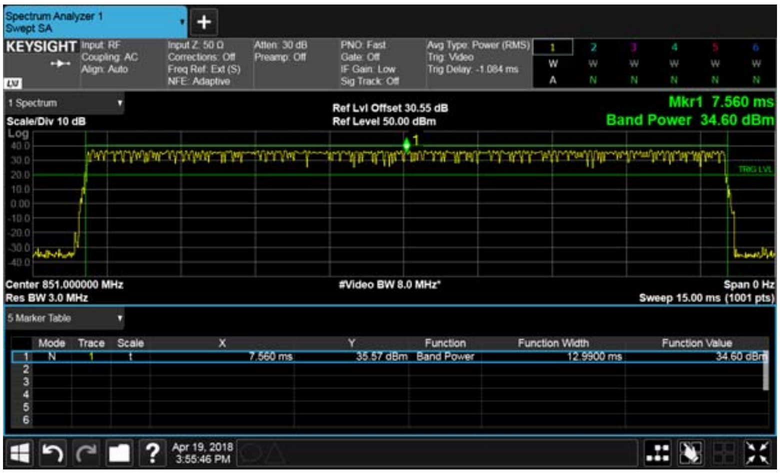


Duty Cycle 851 MHz

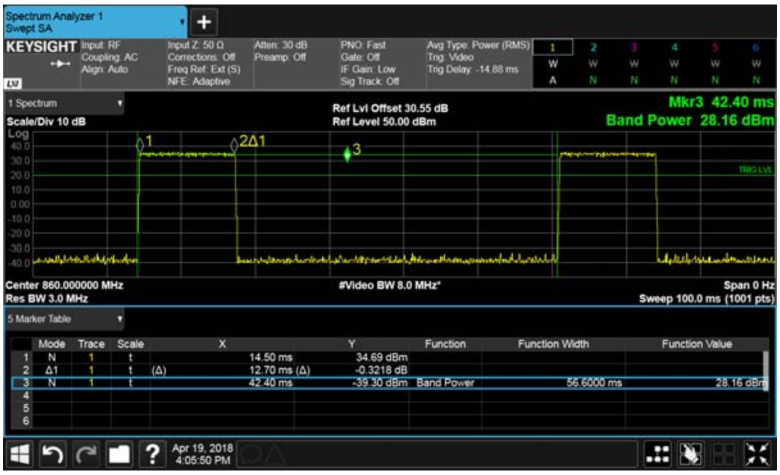


Product Service

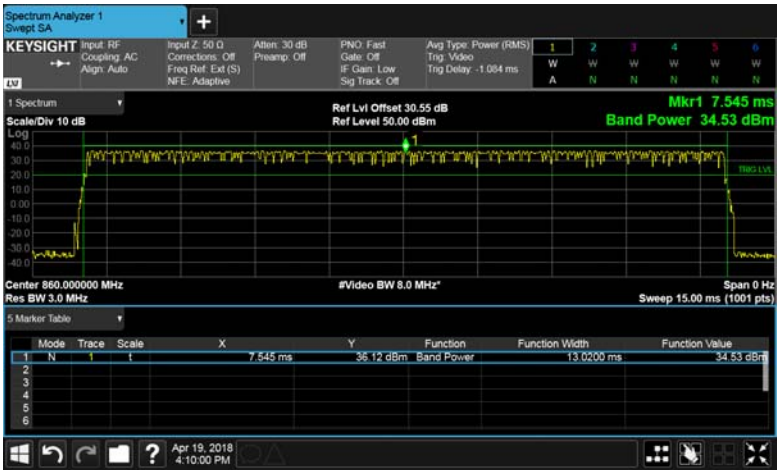
<u>Burst Power 851 MHz</u>



<u>Duty Cycle 860 MHz</u>

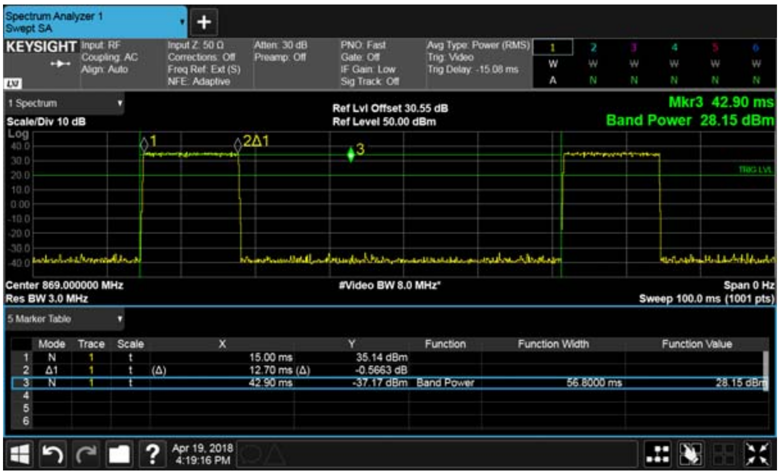


<u>Burst Power 860 MHz</u>

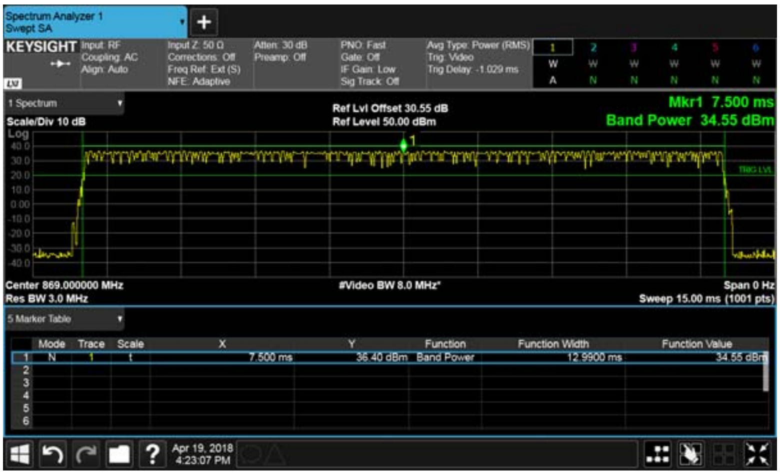


Product Service

Duty Cycle 869 MHz



Burst Power 869 MHz



Product Service

SECTION 2

TEST DETAILS

Specific Absorption Rate Testing of the
Sepura SC2128 TETRA Radio

Product Service

2.1 DASY5 MEASUREMENT SYSTEM

2.1.1 System Description

The DASY5 system for performing compliance tests consists of the following items:

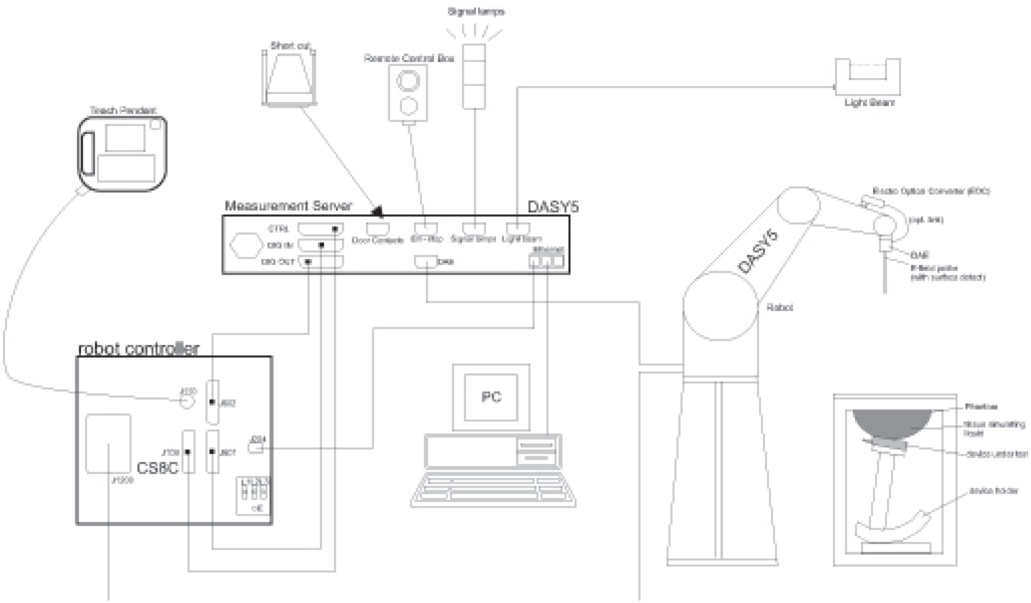


Figure 1 System Description Diagram

A standard high precision 6-axis robot (Stäubli TX=RX family) with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).

An isotropic field probe optimized and calibrated for the targeted measurement.

A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.

The Electro-optical converter (EOC) performs the conversion from optical to electrical signals for the digital communication to the DAE. To use optical surface detection, a special version of the EOC is required. The EOC signal is transmitted to the measurement server.

The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.

The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.

A computer running Win7 professional operating system and the DASY5 software.

Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc.

The phantom, the device holder and other accessories according to the targeted measurement.

Product Service

2.1.2 Probe Specification

The probes used by the DASY system are isotropic E-field probes, constructed with a symmetric design and a triangular core. The probes have built-in shielding against static charges and are contained within a PEEK enclosure material. These probes are specially designed and calibrated for use in liquids with high permittivities. The frequency range of the probes are from 6 MHz to 6 GHz.

2.1.3 Data Acquisition Electronics

The data acquisition electronics (DAE4 or DAE3) consist of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder with a control logic unit. Transmission to the measurement server is accomplished through an optical downlink for data and status information, as well as an optical uplink for commands and the clock.

The mechanical probe mounting device includes two different sensor systems for frontal and sideways probe contacts. They are used for mechanical surface detection and probe collision detection. The input impedance of both the DAE4 as well as of the DAE3 box is 200 MOhm; the inputs are symmetrical and floating. Common mode rejection is above 80 dB.

2.1.4 SAR Evaluation Description

The DASY5 software includes all numerical procedures necessary to evaluate the spatial peak SAR values.

Based on the IEEE 1528 standard, a new algorithm has been implemented. The spatial-peak SAR can be computed over any required mass.

The base for the evaluation is a "cube" measurement in a volume of 30 mm3 (7x7x7 points). The measured volume must include the 1 g and 10 g cubes with the highest averaged SAR values. For that purpose, the centre of the measured volume is aligned to the interpolated peak SAR value of a previously performed area scan. If the 10g cube or both cubes are not entirely inside the measured volumes, the system issues a warning regarding the evaluated spatial peak values within the Post processing engine (SEMCAD X). This means that if the measured volume is shifted, higher values might be possible. To get the correct values you can use a finer measurement grid for the area scan. In complicated field distributions, a large grid spacing for the area scan might miss some details and give an incorrectly interpolated peak location.

The entire evaluation of the spatial peak values is performed within the Post-processing engine (SEMCAD X). The system always gives the maximum values for the 1 g and 10 g cubes. The algorithm to find the cube with highest averaged SAR is divided into the following stages:

1. extraction of the measured data (grid and values) from the Zoom Scan
2. calculation of the SAR value at every measurement point based on all stored data (A/D values and measurement parameters)
3. generation of a high-resolution mesh within the measured volume
4. interpolation of all measured values from the measurement grid to the high-resolution grid
5. extrapolation of the entire 3-D field distribution to the phantom surface over the distance from sensor to surface
6. calculation of the averaged SAR within masses of 1 g and 10 g

Product Service

2.1.5 Interpolation, Extrapolation and Detection of Maxima

The probe is calibrated at the centre of the dipole sensors which is located 1 to 2.7 mm away from the probe tip. During measurements, the probe stops shortly above the phantom surface, depending on the probe and the surface detecting system. Both distances are included as parameters in the probe configuration file. The software always knows exactly how far away the measured point is from the surface. As the probe cannot directly measure at the surface, the values between the deepest measured point and the surface must be extrapolated.

In DASY5, the choice of the coordinate system defining the location of the measurement points has no influence on the uncertainty of the interpolation, Maxima Search and extrapolation routines. The interpolation, extrapolation and maximum search routines are all based on the modified Quadratic Shepard's method [1]. Thereby, the interpolation scheme combines a least-square fitted function method and a weighted average method which are the two basic types of computational interpolation and approximation. The DASY5 routines construct a once-continuously differentiable function that interpolates the measurement values as follows:

For each measurement point a trivariate (3-D) / bivariate (2-D) quadratic is computed.
It interpolates the measurement values at the data point and forms a least-square fit to neighbouring measurement values. The spatial location of the quadratic with respect to the measurement values is attenuated by an inverse distance weighting. This is performed since the calculated quadratic will fit measurement values at nearby points more accurate than at points located further away.

After the quadratics are calculated for at all measurement points, the interpolating function is calculated as a weighted average of the quadratics.

There are two control parameters that govern the behaviour of the interpolation method. One specifies the number of measurement points to be used in computing the least-square fits for the local quadratics. These measurement points are the ones nearest the input point for which the quadratic is being computed. The second parameter specifies the number of measurement points that will be used in calculating the weights for the quadratics to produce the final function. The input data points used there are the ones nearest the point at which the interpolation is desired. Appropriate defaults are chosen for each of the control parameters

The trivariate quadratics that have been previously computed for the 3-D interpolation and whose input data are at the closest distance from the phantom surface, are used in order to extrapolate the fields to the surface of the phantom.

In order to determine all the field maxima in 2-D (Area Scan) and 3-D (Zoom Scan), the measurement grid is refined by a default factor of 10 and the interpolation function is used to evaluate all field values between corresponding measurement points. Subsequently, a linear search is applied to find all the candidate maxima. In a last step, non-physical maxima are removed and only those maxima which are within 2 dB of the global maximum value are retained.

In the Area Scan, the gradient of the interpolation function is evaluated to find all the extrema of the SAR distribution. The uncertainty on the locations of the extrema is less than 1/20 of the grid size. Only local maxima within 2 dB of the global maximum are searched and passed for the Zoom Scan measurement.

In the Zoom Scan, the interpolation function is used to extrapolate the Peak SAR from the lowest measurement points to the inner phantom surface (the extrapolation distance). The uncertainty increases with the extrapolation distance. To keep the uncertainty within 1 % for the 1 g and 10 g cubes, the extrapolation distance should not be larger than 5 mm.

Product Service

2.1.6 Averaging and Determination of Spatial Peak SAR

The interpolated data is used to average the SAR over the 1 g and 10 g cubes by spatially discretising the entire measured volume. The resolution of this spatial grid used to calculate the averaged SAR is 1mm or about 42875 interpolated points. The resulting volumes are defined as cubical volumes containing the appropriate tissue parameters that are cantered at the location. The location is defined as the centre of the incremental volume (voxel).

The spatial-peak SAR must be evaluated in cubical volumes containing a mass that is within 5% of the required mass. The cubical volume centred at each location, as defined above, should be expanded in all directions until the desired value for the mass is reached, with no surface boundaries of the averaging volume extending beyond the outermost surface of the considered region. In addition, the cubical volume should not consist of more than 10 % of air. If these conditions are not satisfied then the centre of the averaging volume is moved to the next location. Otherwise, the exact size of the final sampling cube is found using an inverse polynomial approximation algorithm, leading to results with improved accuracy. If one boundary of the averaging volume reaches the boundary of the measured volume during its expansion, it will not be evaluated at all. Reference is kept of all locations used and those not used for averaging the SAR. All average SAR values are finally assigned to the centred location in each valid averaging volume.

All locations included in an averaging volume are marked to indicate that they have been used at least once. If a location has been marked as used, but has never been assigned to the centre of a cube, the highest averaged SAR value of all other cubical volumes which have used this location for averaging is assigned to this location. Only those locations that are not part of any valid averaging volume should be marked as unused. For the case of an unused location, a new averaging volume must be constructed which will have the unused location centred at one surface of the cube. The remaining five surfaces are expanded evenly in all directions until the required mass is enclosed, regardless of the amount of included air. Of the six possible cubes with one surface centred on the unused location, the smallest cube is used, which still contains the required mass.

If the final cube containing the highest averaged SAR touches the surface of the measured volume, an appropriate warning is issued within the Post-processing engine.

Product Service

2.1.7 Head Test Positions

This recommended practice specifies exactly two test positions for the handset against the head phantom, the “Cheek” position and the “tilted” position. The handset should be tested in both positions on the left and right sides of the SAM phantom. In each test position the centre of the earpiece of the device is placed directly at the entrance of the auditory canal. The angles mentioned in the test positions used are referenced to the line connecting both auditory canal openings. The plane this line is on is known as the reference plane. Testing is performed on the right and left-hand sides of the generic phantom head.

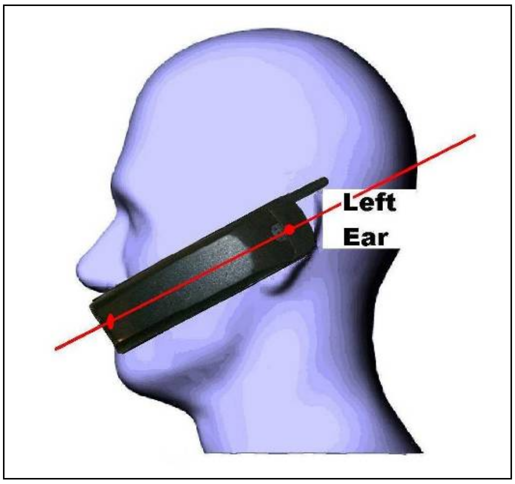


Figure 2 Side view of mobile next to head showing alignment

<u>The Cheek Position</u>
The Cheek Position is where the mobile is in the reference plane and the line between the mobile and the line connecting both auditory canal openings is reduced until any part of the mobile touches any part of the generic twin phantom head.

<u>The 15° Position</u>
The 15° Position is where the mobile is in the reference Cheek position and the phone is kept in contact with the auditory canal at the earpiece; the bottom of the phone is then tilted away from the phantom mouth by 15°.

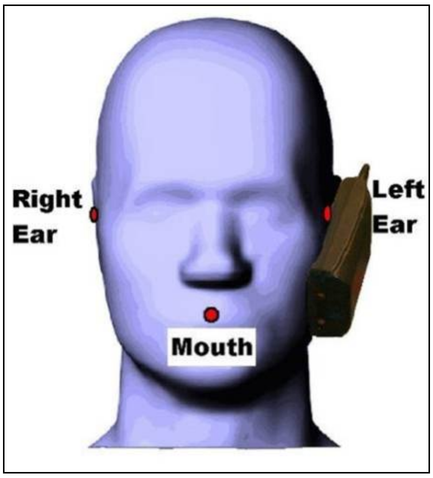


Figure 3 Cheek position

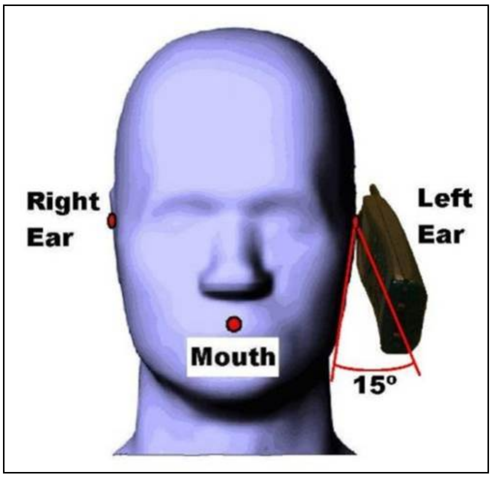


Figure 4 15º Tilt Position

TÜV SÜD Product Service

2.2 TETRA 806 - 824 MHz - HEAD SAR TEST RESULTS

SOFTWARE VERSION:	52.8.8(1258)	**AMBIENT TEMPERATURE:**	22.2 °C
DATE:	19/04/2018	**RELATIVE HUMIDITY:**	48.8 %
PHANTOM:	QD000P40CD	**CONDUCTIVITY:**	0.927 S/m
DUT CONFIGURATION:	1160 mAh Battery (300-01852)	**RELATIVE PERMITTIVITY:**	44.285 ε_r
DUT POSITION:	Left - Cheek	**LIQUID TEMPERATURE:**	20.4 °C
RAT:	TETRA	**SCAN TYPE:**	Full
FREQUENCY:	815 MHz	**DRIFT:**	0.07 dB
MODULATION:	Π/4DQPSK	**PEAK SAR:**	3.29 W/kg
DUTY CYCLE:	25 %	**SAR (1 g):**	2.79 W/kg

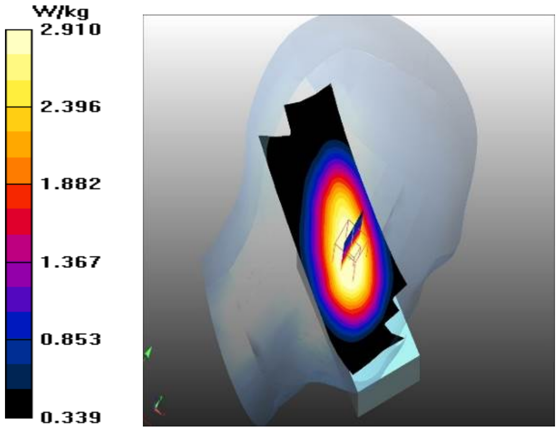


Figure 5: SAR Head Testing Results for the SC2128 TETRA Radio at 815 MHz.

SOFTWARE VERSION:	52.8.8(1258)	**AMBIENT TEMPERATURE:**	22.2 °C
DATE:	19/04/2018	**RELATIVE HUMIDITY:**	48.8 %
PHANTOM:	QD000P40CD	**CONDUCTIVITY:**	0.927 S/m
DUT CONFIGURATION:	1160 mAh Battery (300-01852)	**RELATIVE PERMITTIVITY:**	44.285 ε_r
DUT POSITION:	Left - 15°	**LIQUID TEMPERATURE:**	20.4 °C
RAT:	TETRA	**SCAN TYPE:**	Full
FREQUENCY:	815 MHz	**DRIFT:**	0.12 dB
MODULATION:	Π/4DQPSK	**PEAK SAR:**	3.10 W/kg
DUTY CYCLE:	25 %	**SAR (1 g):**	2.50 W/kg

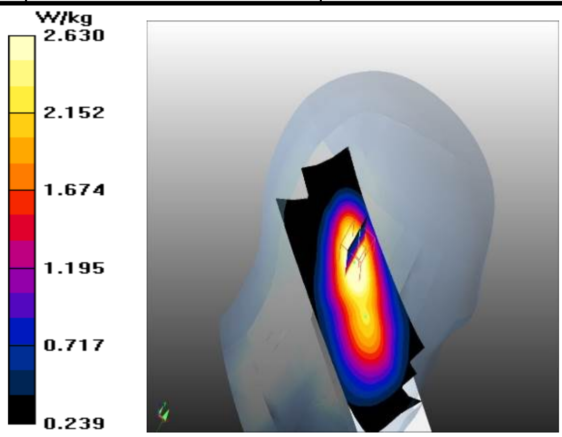


Figure 6: SAR Head Testing Results for the SC2128 TETRA Radio at 815 MHz

SOFTWARE VERSION:	52.8.8(1258)	**AMBIENT TEMPERATURE:**	22.2 °C
DATE:	19/04/2018	**RELATIVE HUMIDITY:**	48.8 %
PHANTOM:	QD000P40CD	**CONDUCTIVITY:**	0.927 S/m
DUT CONFIGURATION:	1160 mAh Battery (300-01852)	**RELATIVE PERMITTIVITY:**	44.285 ε_r
DUT POSITION:	Right - Cheek	**LIQUID TEMPERATURE:**	20.4 °C
RAT:	TETRA	**SCAN TYPE:**	Full
FREQUENCY:	815 MHz	**DRIFT:**	0.13 dB
MODULATION:	Π/4DQPSK	**PEAK SAR:**	3.10 W/kg
DUTY CYCLE:	25 %	**SAR (1 g):**	2.64 W/kg

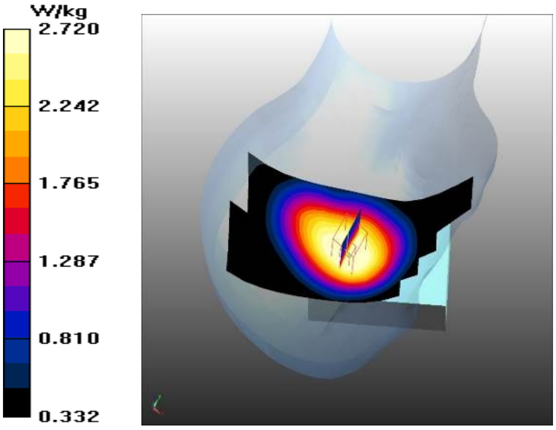


Figure 7: SAR Head Testing Results for the SC2128 TETRA Radio at 815 MHz.

SOFTWARE VERSION:	52.8.8(1258)	**AMBIENT TEMPERATURE:**	22.2 °C
DATE:	19/04/2018	**RELATIVE HUMIDITY:**	48.8 %
PHANTOM:	QD000P40CD	**CONDUCTIVITY:**	0.927 S/m
DUT CONFIGURATION:	1160 mAh Battery (300-01852)	**RELATIVE PERMITTIVITY:**	44.285 ε_r
DUT POSITION:	Right - 15°	**LIQUID TEMPERATURE:**	20.4 °C
RAT:	TETRA	**SCAN TYPE:**	Full
FREQUENCY:	815 MHz	**DRIFT:**	-0.25 dB
MODULATION:	Π/4DQPSK	**PEAK SAR:**	2.62 W/kg
DUTY CYCLE:	25 %	**SAR (1 g):**	2.14 W/kg

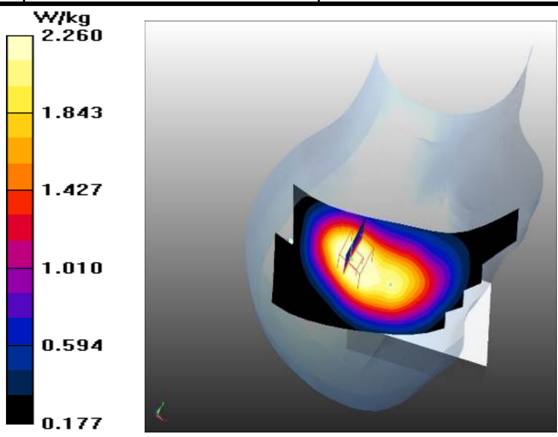


Figure 8: SAR Head Testing Results for the SC2128 TETRA Radio at 815 MHz

Product Service

SOFTWARE VERSION:	52.8.8(1258)	**AMBIENT TEMPERATURE:**	22.2 °C
DATE:	19/04/2018	**RELATIVE HUMIDITY:**	48.8 %
PHANTOM:	QD000P40CD	**CONDUCTIVITY:**	0.927 S/m
DUT CONFIGURATION:	1880 mAh Battery (300-01853)	**RELATIVE PERMITTIVITY:**	44.285 ε_r
DUT POSITION:	Left - Cheek	**LIQUID TEMPERATURE:**	20.4 °C
RAT:	TETRA	**SCAN TYPE:**	Full
FREQUENCY:	815 MHz	**DRIFT:**	0.02 dB
MODULATION:	Π/4DQPSK	**PEAK SAR:**	3.36 W/kg
DUTY CYCLE:	25 %	**SAR (1 g):**	2.80 W/kg

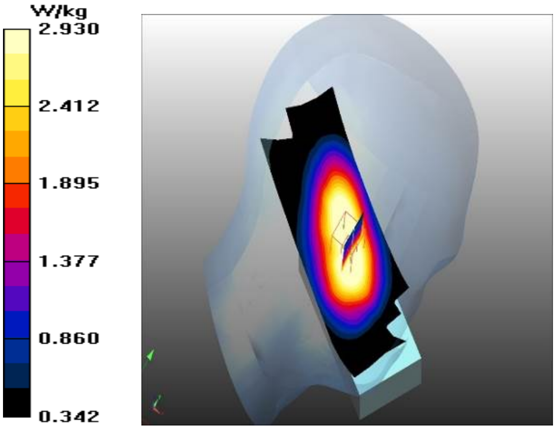


Figure 9: SAR Head Testing Results for the SC2128 TETRA Radio at 815 MHz.

SOFTWARE VERSION:	52.8.8(1258)	**AMBIENT TEMPERATURE:**	22.2 °C
DATE:	19/04/2018	**RELATIVE HUMIDITY:**	48.8 %
PHANTOM:	QD000P40CD	**CONDUCTIVITY:**	0.927 S/m
DUT CONFIGURATION:	1880 mAh Battery (300-01853)	**RELATIVE PERMITTIVITY:**	44.285 ε_r
DUT POSITION:	Left - 15°	**LIQUID TEMPERATURE:**	20.4 °C
RAT:	TETRA	**SCAN TYPE:**	Full
FREQUENCY:	815 MHz	**DRIFT:**	-0.53 dB
MODULATION:	Π/4DQPSK	**PEAK SAR:**	3.08 W/kg
DUTY CYCLE:	25 %	**SAR (1 g):**	2.49 W/kg

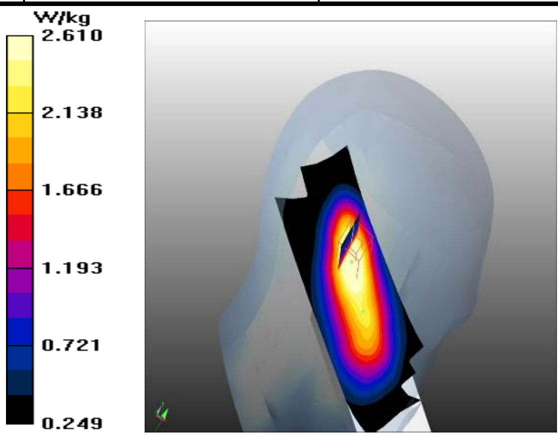


Figure 10: SAR Head Testing Results for the SC2128 TETRA Radio at 815 MHz.

SOFTWARE VERSION:	52.8.8(1258)	**AMBIENT TEMPERATURE:**	22.2 °C
DATE:	19/04/2018	**RELATIVE HUMIDITY:**	48.8 %
PHANTOM:	QD000P40CD	**CONDUCTIVITY:**	0.927 S/m
DUT CONFIGURATION:	1880 mAh Battery (300-01853)	**RELATIVE PERMITTIVITY:**	44.285 ε_r
DUT POSITION:	Right - Cheek	**LIQUID TEMPERATURE:**	20.4 °C
RAT:	TETRA	**SCAN TYPE:**	Full
FREQUENCY:	815 MHz	**DRIFT:**	-0.04 dB
MODULATION:	Π/4DQPSK	**PEAK SAR:**	3.14 W/kg
DUTY CYCLE:	25 %	**SAR (1 g):**	2.79 W/kg

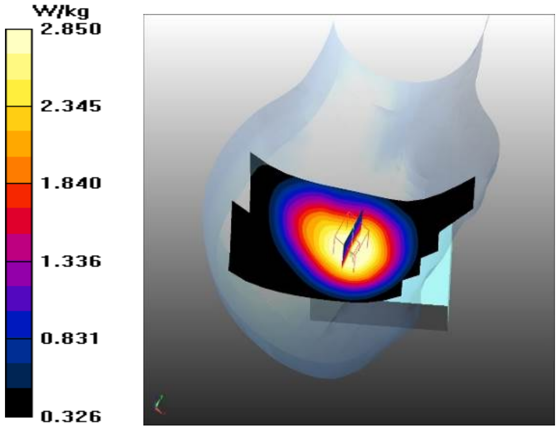


Figure 11: SAR Head Testing Results for the SC2128 TETRA Radio at 815 MHz.

SOFTWARE VERSION:	52.8.8(1258)	**AMBIENT TEMPERATURE:**	22.2 °C
DATE:	19/04/2018	**RELATIVE HUMIDITY:**	48.8 %
PHANTOM:	QD000P40CD	**CONDUCTIVITY:**	0.927 S/m
DUT CONFIGURATION:	1880 mAh Battery (300-01853)	**RELATIVE PERMITTIVITY:**	44.285 ε_r
DUT POSITION:	Right - 15°	**LIQUID TEMPERATURE:**	20.4 °C
RAT:	TETRA	**SCAN TYPE:**	Full
FREQUENCY:	815 MHz	**DRIFT:**	0.06 dB
MODULATION:	Π/4DQPSK	**PEAK SAR:**	2.52 W/kg
DUTY CYCLE:	25 %	**SAR (1 g):**	2.03 W/kg

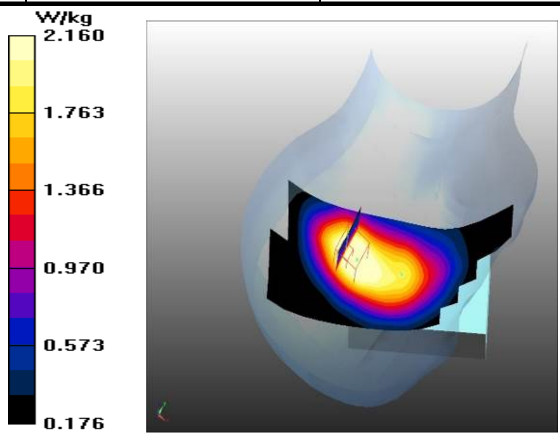


Figure 12: SAR Head Testing Results for the SC2128 TETRA Radio at 815 MHz.

Product Service

2.3 TETRA 851 - 869 MHz - HEAD SAR TEST RESULTS

SOFTWARE VERSION:	52.8.8(1258)	**AMBIENT TEMPERATURE:**	21.2 °C
DATE:	20/04/2018	**RELATIVE HUMIDITY:**	46.5 %
PHANTOM:	QD000P40CD	**CONDUCTIVITY:**	0.940 S/m
DUT CONFIGURATION:	1160 mAh Battery (300-01852)	**RELATIVE PERMITTIVITY:**	44.190 ε_r
DUT POSITION:	Left - Cheek	**LIQUID TEMPERATURE:**	20.4 °C
RAT:	TETRA	**SCAN TYPE:**	Full
FREQUENCY:	851 MHz	**DRIFT:**	-0.01 dB
MODULATION:	Π/4DQPSK	**PEAK SAR:**	3.05 W/kg
DUTY CYCLE:	25 %	**SAR (1 g):**	2.73 W/kg

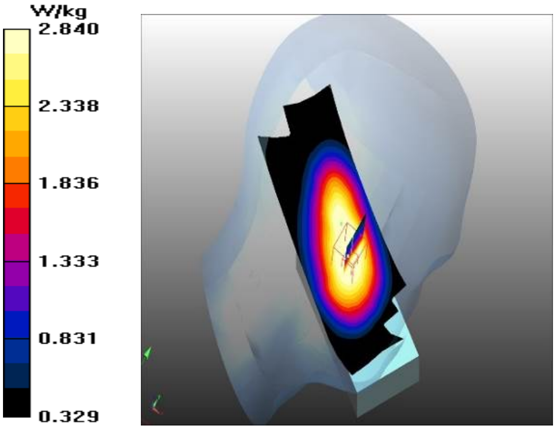


Figure 13: SAR Head Testing Results for the SC2128 TETRA Radio at 851 MHz.

SOFTWARE VERSION:	52.8.8(1258)	**AMBIENT TEMPERATURE:**	21.2 °C
DATE:	20/04/2018	**RELATIVE HUMIDITY:**	46.5 %
PHANTOM:	QD000P40CD	**CONDUCTIVITY:**	0.940 S/m
DUT CONFIGURATION:	1160 mAh Battery (300-01852)	**RELATIVE PERMITTIVITY:**	44.190 ε_r
DUT POSITION:	Left - 15°	**LIQUID TEMPERATURE:**	20.4 °C
RAT:	TETRA	**SCAN TYPE:**	Full
FREQUENCY:	851 MHz	**DRIFT:**	-0.09 dB
MODULATION:	Π/4DQPSK	**PEAK SAR:**	2.93 W/kg
DUTY CYCLE:	25 %	**SAR (1 g):**	2.45 W/kg

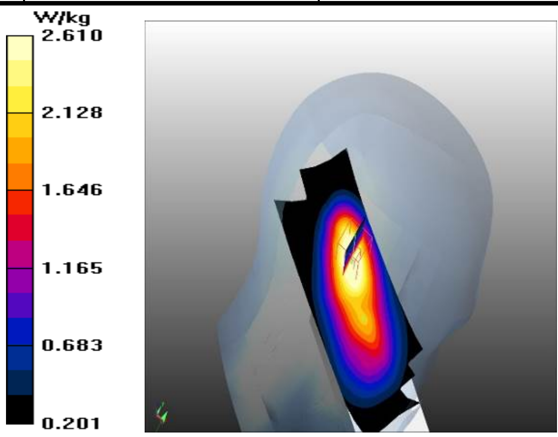


Figure 14: SAR Head Testing Results for the SC2128 TETRA Radio at 851 MHz.

SOFTWARE VERSION:	52.8.8(1258)	**AMBIENT TEMPERATURE:**	21.2 °C
DATE:	20/04/2018	**RELATIVE HUMIDITY:**	46.5 %
PHANTOM:	QD000P40CD	**CONDUCTIVITY:**	0.940 S/m
DUT CONFIGURATION:	1160 mAh Battery (300-01852)	**RELATIVE PERMITTIVITY:**	44.190 ε_r
DUT POSITION:	Right - Cheek	**LIQUID TEMPERATURE:**	20.4 °C
RAT:	TETRA	**SCAN TYPE:**	Full
FREQUENCY:	851 MHz	**DRIFT:**	-0.03 dB
MODULATION:	Π/4DQPSK	**PEAK SAR:**	3.00 W/kg
DUTY CYCLE:	25 %	**SAR (1 g):**	2.57 W/kg

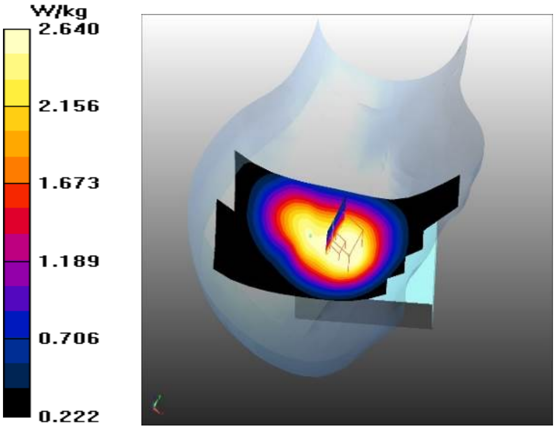


Figure 15: SAR Head Testing Results for the SC2128 TETRA Radio at 851 MHz.

SOFTWARE VERSION:	52.8.8(1258)	**AMBIENT TEMPERATURE:**	21.2 °C
DATE:	20/04/2018	**RELATIVE HUMIDITY:**	46.5 %
PHANTOM:	QD000P40CD	**CONDUCTIVITY:**	0.940 S/m
DUT CONFIGURATION:	1160 mAh Battery (300-01852)	**RELATIVE PERMITTIVITY:**	44.190 ε_r
DUT POSITION:	Right - 15°	**LIQUID TEMPERATURE:**	20.4 °C
RAT:	TETRA	**SCAN TYPE:**	Full
FREQUENCY:	851 MHz	**DRIFT:**	-0.28 dB
MODULATION:	Π/4DQPSK	**PEAK SAR:**	2.62 W/kg
DUTY CYCLE:	25 %	**SAR (1 g):**	2.09 W/kg

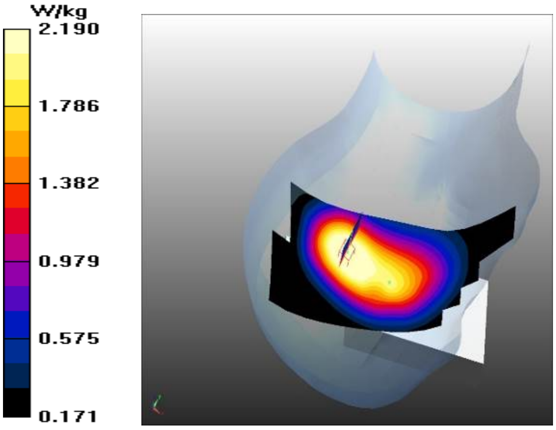


Figure 16: SAR Head Testing Results for the SC2128 TETRA Radio at 851 MHz.

Product Service

SOFTWARE VERSION:	52.8.8(1258)	**AMBIENT TEMPERATURE:**	21.2 °C
DATE:	20/04/2018	**RELATIVE HUMIDITY:**	46.5 %
PHANTOM:	QD000P40CD	**CONDUCTIVITY:**	0.940 S/m
DUT CONFIGURATION:	1880 mAh Battery (300-01853)	**RELATIVE PERMITTIVITY:**	44.190 ε_r
DUT POSITION:	Left - Cheek	**LIQUID TEMPERATURE:**	20.4 °C
RAT:	TETRA	**SCAN TYPE:**	Full
FREQUENCY:	851 MHz	**DRIFT:**	-0.11 dB
MODULATION:	Π/4DQPSK	**PEAK SAR:**	3.27 W/kg
DUTY CYCLE:	25 %	**SAR (1 g):**	2.79 W/kg

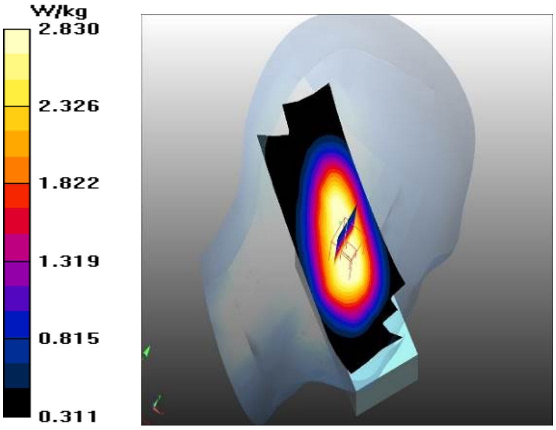


Figure 17: SAR Head Testing Results for the SC2128 TETRA Radio at 851 MHz.

SOFTWARE VERSION:	52.8.8(1258)	**AMBIENT TEMPERATURE:**	21.2 °C
DATE:	20/04/2018	**RELATIVE HUMIDITY:**	46.5 %
PHANTOM:	QD000P40CD	**CONDUCTIVITY:**	0.940 S/m
DUT CONFIGURATION:	1880 mAh Battery (300-01853)	**RELATIVE PERMITTIVITY:**	44.190 ε_r
DUT POSITION:	Left - 15°	**LIQUID TEMPERATURE:**	20.4 °C
RAT:	TETRA	**SCAN TYPE:**	Full
FREQUENCY:	851 MHz	**DRIFT:**	-0.35 dB
MODULATION:	Π/4DQPSK	**PEAK SAR:**	2.99 W/kg
DUTY CYCLE:	25 %	**SAR (1 g):**	2.60 W/kg

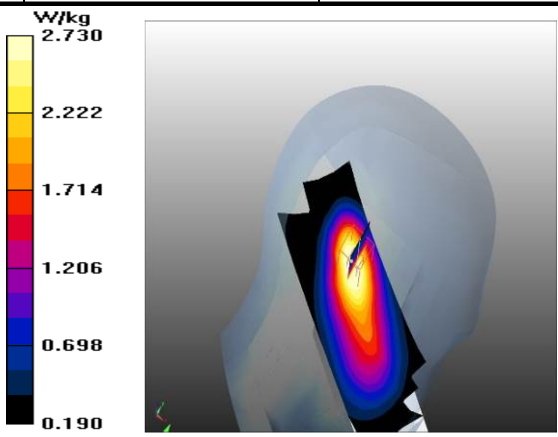


Figure 18: SAR Head Testing Results for the SC2128 TETRA Radio at 851 MHz.

SOFTWARE VERSION:	52.8.8(1258)	**AMBIENT TEMPERATURE:**	21.2 °C
DATE:	20/04/2018	**RELATIVE HUMIDITY:**	46.5 %
PHANTOM:	QD000P40CD	**CONDUCTIVITY:**	0.940 S/m
DUT CONFIGURATION:	1880 mAh Battery (300-01853)	**RELATIVE PERMITTIVITY:**	44.190 ε_r
DUT POSITION:	Right - Cheek	**LIQUID TEMPERATURE:**	20.4 °C
RAT:	TETRA	**SCAN TYPE:**	Full
FREQUENCY:	851 MHz	**DRIFT:**	0.11 dB
MODULATION:	Π/4DQPSK	**PEAK SAR:**	3.15 W/kg
DUTY CYCLE:	25 %	**SAR (1 g):**	2.66 W/kg

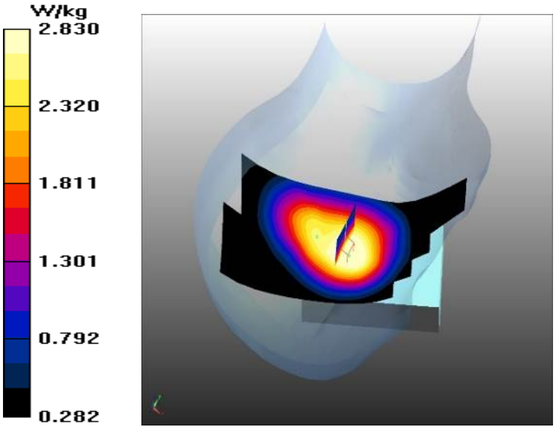


Figure 19: SAR Head Testing Results for the SC2128 TETRA Radio at 851 MHz.

SOFTWARE VERSION:	52.8.8(1258)	**AMBIENT TEMPERATURE:**	21.2 °C
DATE:	20/04/2018	**RELATIVE HUMIDITY:**	46.5 %
PHANTOM:	QD000P40CD	**CONDUCTIVITY:**	0.940 S/m
DUT CONFIGURATION:	1880 mAh Battery (300-01853)	**RELATIVE PERMITTIVITY:**	44.190 ε_r
DUT POSITION:	Right - 15°	**LIQUID TEMPERATURE:**	20.4 °C
RAT:	TETRA	**SCAN TYPE:**	Full
FREQUENCY:	851 MHz	**DRIFT:**	-0.19 dB
MODULATION:	Π/4DQPSK	**PEAK SAR:**	2.39 W/kg
DUTY CYCLE:	25 %	**SAR (1 g):**	2.05 W/kg

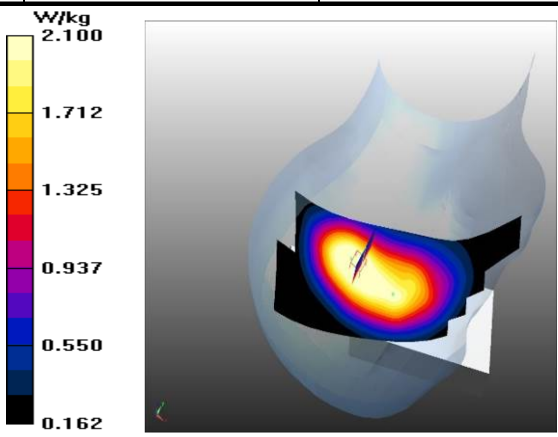


Figure 20: SAR Head Testing Results for the SC2128 TETRA Radio at 851 MHz

2.4 TETRA 806 - 824 MHz - FRONT OF FACE PTT SAR TEST RESULTS

SOFTWARE VERSION:	52.8.8(1258)	**AMBIENT TEMPERATURE:**	22.3 °C
DATE:	18/04/2018	**RELATIVE HUMIDITY:**	45.2 %
PHANTOM:	QD000P40CD	**CONDUCTIVITY:**	0.918 S/m
DUT CONFIGURATION:	1160 mAh Battery (300-01852)	**RELATIVE PERMITTIVITY:**	42.432 ε_r
DUT POSITION:	25 mm - Front Facing	**LIQUID TEMPERATURE:**	20.7 °C
RAT:	TETRA	**SCAN TYPE:**	Full
FREQUENCY:	815 MHz	**DRIFT:**	0.15 dB
MODULATION:	Π/4DQPSK	**PEAK SAR:**	1.25 W/kg
DUTY CYCLE:	25 %	**SAR (1 g):**	1.03 W/kg

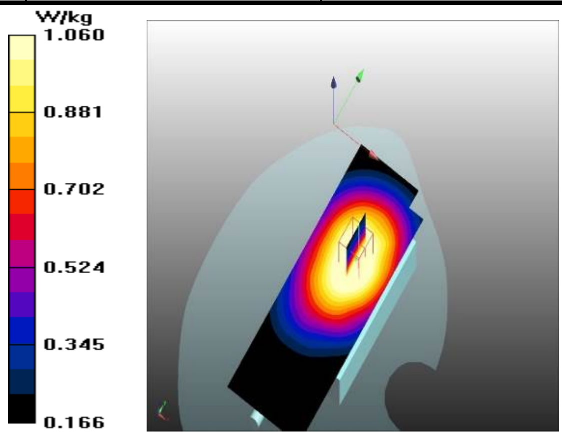


Figure 21: SAR Head Testing Results for the SC2128 TETRA Radio at 815 MHz.

SOFTWARE VERSION:	52.8.8(1258)	**AMBIENT TEMPERATURE:**	22.3 °C
DATE:	18/04/2018	**RELATIVE HUMIDITY:**	45.2 %
PHANTOM:	QD000P40CD	**CONDUCTIVITY:**	0.918 S/m
DUT CONFIGURATION:	1880 mAh Battery (300-01853)	**RELATIVE PERMITTIVITY:**	42.432 ε_r
DUT POSITION:	25 mm - Front Facing	**LIQUID TEMPERATURE:**	20.7 °C
RAT:	TETRA	**SCAN TYPE:**	Full
FREQUENCY:	815 MHz	**DRIFT:**	-0.09 dB
MODULATION:	Π/4DQPSK	**PEAK SAR:**	1.23 W/kg
DUTY CYCLE:	25 %	**SAR (1 g):**	1.04 W/kg

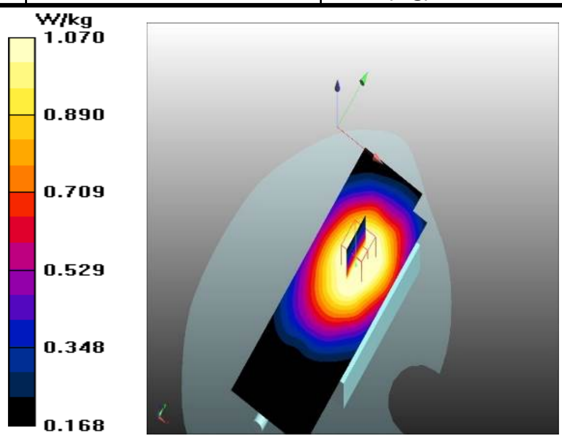


Figure 22: SAR Head Testing Results for the SC2128 TETRA Radio at 815 MHz.

2.5 TETRA 851 - 869 MHz - FRONT OF FACE PTT SAR TEST RESULTS

SOFTWARE VERSION:	52.8.8(1258)	**AMBIENT TEMPERATURE:**	22.2 °C
DATE:	19/04/2018	**RELATIVE HUMIDITY:**	48.8 %
PHANTOM:	QD000P40CD	**CONDUCTIVITY:**	0.931 S/m
DUT CONFIGURATION:	1160 mAh Battery (300-01852)	**RELATIVE PERMITTIVITY:**	42.367 ε_r
DUT POSITION:	25 mm - Front Facing	**LIQUID TEMPERATURE:**	20.5 °C
RAT:	TETRA	**SCAN TYPE:**	Full
FREQUENCY:	851 MHz	**DRIFT:**	0.00 dB
MODULATION:	Π/4DQPSK	**PEAK SAR:**	1.23 W/kg
DUTY CYCLE:	25 %	**SAR (1 g):**	0.98 W/kg

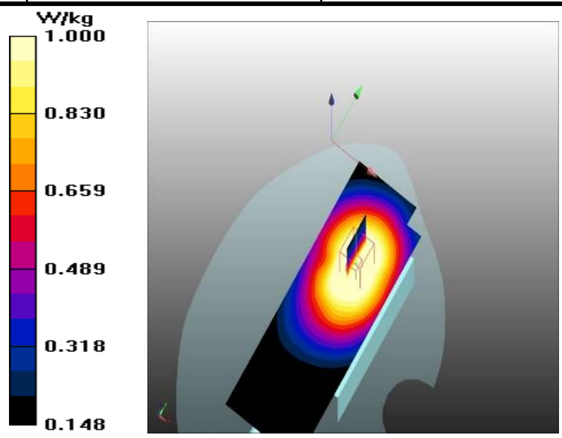


Figure 23: SAR Front Of Face – PTT Testing Results for the SC2128 TETRA Radio at 851 MHz

SOFTWARE VERSION:	52.8.8(1258)	**AMBIENT TEMPERATURE:**	22.2 °C
DATE:	19/04/2018	**RELATIVE HUMIDITY:**	48.8 %
PHANTOM:	QD000P40CD	**CONDUCTIVITY:**	0.931 S/m
DUT CONFIGURATION:	1880 mAh Battery (300-01853)	**RELATIVE PERMITTIVITY:**	42.367 ε_r
DUT POSITION:	25 mm - Front Facing	**LIQUID TEMPERATURE:**	20.5 °C
RAT:	TETRA	**SCAN TYPE:**	Full
FREQUENCY:	851 MHz	**DRIFT:**	-0.00 dB
MODULATION:	Π/4DQPSK	**PEAK SAR:**	1.25 W/kg
DUTY CYCLE:	25 %	**SAR (1 g):**	1.01 W/kg

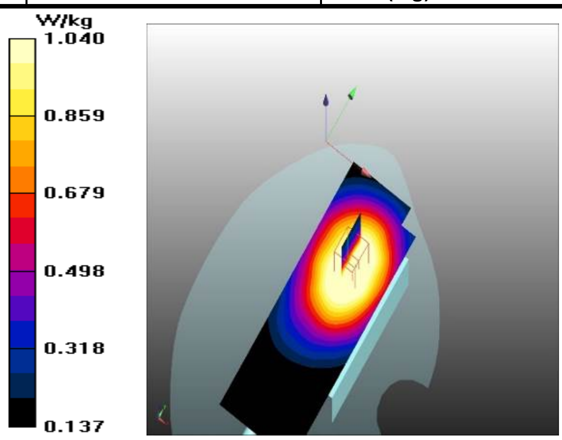


Figure 24: SAR Front Of Face – PTT Testing Results for the SC2128 TETRA Radio at 851 MHz

Product Service

2.6 TETRA 806 - 824 MHz - BODY SAR TEST RESULTS

SOFTWARE VERSION:	52.8.8(1258)	**AMBIENT TEMPERATURE:**	20.8 °C
DATE:	17/04/2018	**RELATIVE HUMIDITY:**	35.2 %
PHANTOM:	QDOVA003-FB	**CONDUCTIVITY:**	0.962 S/m
DUT CONFIGURATION:	1160 mAh Battery (300-01852), holster 300-01916	**RELATIVE PERMITTIVITY:**	55.202 ε_r
DUT POSITION:	0 mm - Rear Facing	**LIQUID TEMPERATURE:**	20.6 °C
RAT:	TETRA	**SCAN TYPE:**	Full
FREQUENCY:	815 MHz	**DRIFT:**	0.30 dB
MODULATION:	Π/4DQPSK	**PEAK SAR:**	2.77 W/kg
DUTY CYCLE:	25 %	**SAR (1 g):**	2.29 W/kg

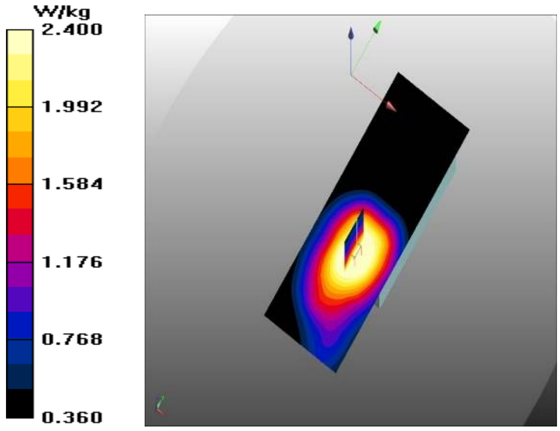


Figure 25: SAR Body Testing Results for the SC2128 TETRA Radio at 815 MHz.

SOFTWARE VERSION:	52.8.8(1258)	**AMBIENT TEMPERATURE:**	20.8 °C
DATE:	17/04/2018	**RELATIVE HUMIDITY:**	35.2 %
PHANTOM:	QDOVA003-FB	**CONDUCTIVITY:**	0.962 S/m
DUT CONFIGURATION:	1160 mAh Battery (300-01852), holster 300-01915	**RELATIVE PERMITTIVITY:**	55.202 ε_r
DUT POSITION:	0 mm - Rear Facing	**LIQUID TEMPERATURE:**	20.6 °C
RAT:	TETRA	**SCAN TYPE:**	Full
FREQUENCY:	815 MHz	**DRIFT:**	-0.34 dB
MODULATION:	Π/4DQPSK	**PEAK SAR:**	2.48 W/kg
DUTY CYCLE:	25 %	**SAR (1 g):**	1.92 W/kg

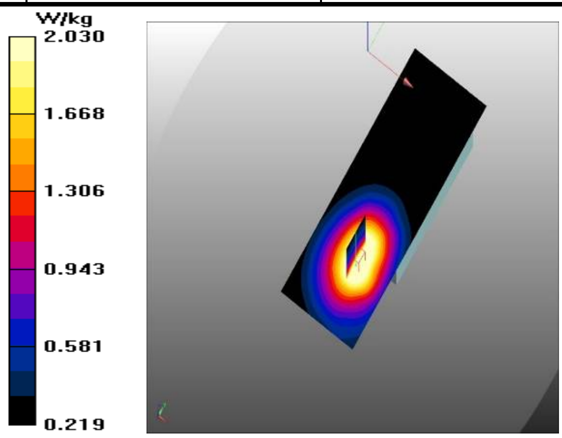


Figure 26: SAR Body Testing Results for the SC2128 TETRA Radio at 815 MHz.

Product Service

SOFTWARE VERSION:	52.8.8(1258)	**AMBIENT TEMPERATURE:**	20.8 °C
DATE:	17/04/2018	**RELATIVE HUMIDITY:**	35.2 %
PHANTOM:	QDOVA003-FB	**CONDUCTIVITY:**	0.962 S/m
DUT CONFIGURATION:	1160 mAh Battery (300-01852), holster 300-01917	**RELATIVE PERMITTIVITY:**	55.202 ε_r
DUT POSITION:	0 mm - Rear Facing	**LIQUID TEMPERATURE:**	20.6 °C
RAT:	TETRA	**SCAN TYPE:**	Full
FREQUENCY:	815 MHz	**DRIFT:**	-0.12 dB
MODULATION:	Π/4DQPSK	**PEAK SAR:**	1.69 W/kg
DUTY CYCLE:	25 %	**SAR (1 g):**	1.40 W/kg

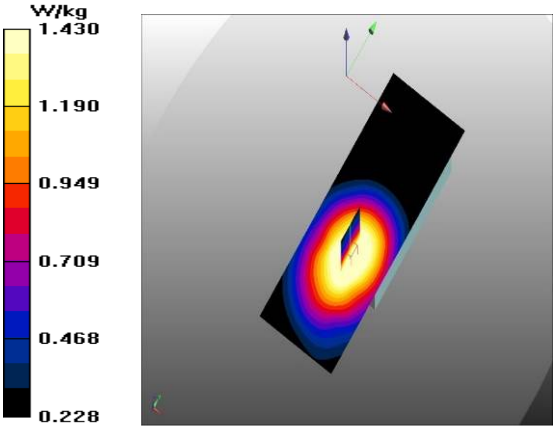


Figure 27: SAR Body Testing Results for the SC2128 TETRA Radio at 815 MHz.

SOFTWARE VERSION:	52.8.8(1258)	**AMBIENT TEMPERATURE:**	20.8 °C
DATE:	17/04/2018	**RELATIVE HUMIDITY:**	35.2 %
PHANTOM:	QDOVA003-FB	**CONDUCTIVITY:**	0.962 S/m
DUT CONFIGURATION:	1160 mAh Battery (300-01852), clip 300-01923	**RELATIVE PERMITTIVITY:**	55.202 ε_r
DUT POSITION:	0 mm - Rear Facing	**LIQUID TEMPERATURE:**	20.6 °C
RAT:	TETRA	**SCAN TYPE:**	Full
FREQUENCY:	815 MHz	**DRIFT:**	0.23 dB
MODULATION:	Π/4DQPSK	**PEAK SAR:**	1.60 W/kg
DUTY CYCLE:	25 %	**SAR (1 g):**	1.30 W/kg

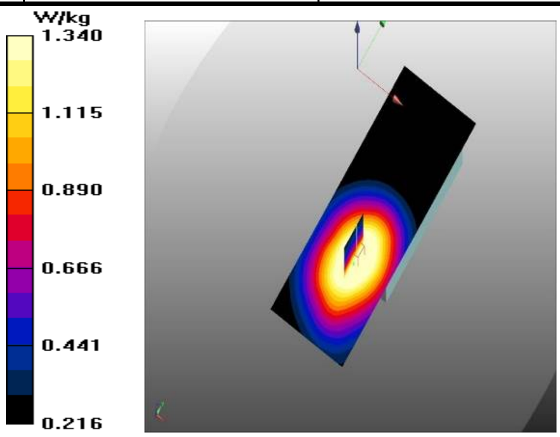


Figure 28: SAR Body Testing Results for the SC2128 TETRA Radio at 815 MHz.

Product Service

SOFTWARE VERSION:	52.8.8(1258)	**AMBIENT TEMPERATURE:**	20.8 °C
DATE:	17/04/2018	**RELATIVE HUMIDITY:**	35.2 %
PHANTOM:	QDOVA003-FB	**CONDUCTIVITY:**	0.962 S/m
DUT CONFIGURATION:	1160 mAh Battery (300-01852), clip 300-01922	**RELATIVE PERMITTIVITY:**	55.202 ε_r
DUT POSITION:	0 mm - Rear Facing	**LIQUID TEMPERATURE:**	20.6 °C
RAT:	TETRA	**SCAN TYPE:**	Full
FREQUENCY:	815 MHz	**DRIFT:**	-0.33 dB
MODULATION:	Π/4DQPSK	**PEAK SAR:**	1.94 W/kg
DUTY CYCLE:	25 %	**SAR (1 g):**	1.68 W/kg

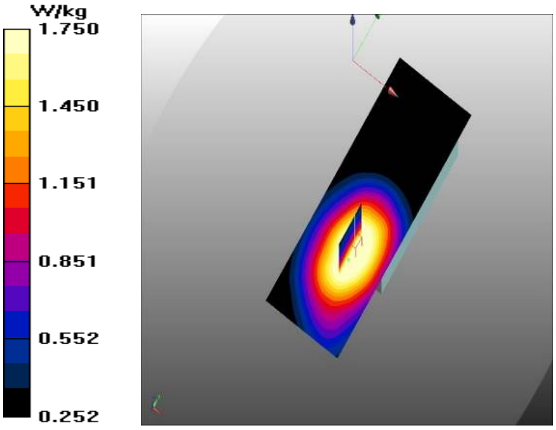


Figure 29: SAR Body Testing Results for the SC2128 TETRA Radio at 815 MHz.

SOFTWARE VERSION:	52.8.8(1258)	**AMBIENT TEMPERATURE:**	22.3 °C
DATE:	18/04/2018	**RELATIVE HUMIDITY:**	35.2 %
PHANTOM:	QDOVA003-FB	**CONDUCTIVITY:**	0.962 S/m
DUT CONFIGURATION:	Body, 806 - 824 MHz band, 1880 mAh Battery (300-01853), holster 300-01916	**RELATIVE PERMITTIVITY:**	55.202 ε_r
DUT POSITION:	0 mm - Rear Facing	**LIQUID TEMPERATURE:**	20.6 °C
RAT:	TETRA	**SCAN TYPE:**	Full
FREQUENCY:	815 MHz	**DRIFT:**	0.24 dB
MODULATION:	Π/4DQPSK	**PEAK SAR:**	2.47 W/kg
DUTY CYCLE:	25 %	**SAR (1 g):**	2.03 W/kg

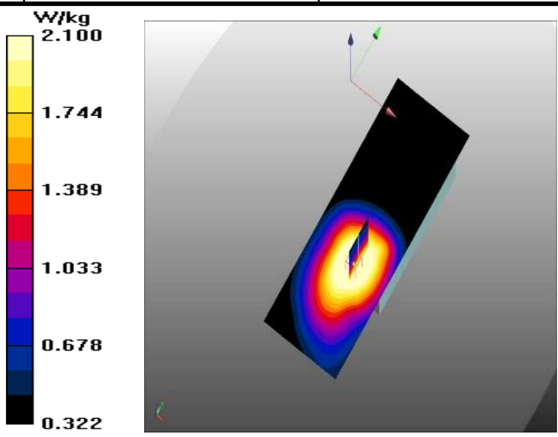


Figure 30: SAR Body Testing Results for the SC2128 TETRA Radio at 815 MHz

SOFTWARE VERSION:	52.8.8(1258)	**AMBIENT TEMPERATURE:**	22.3 °C
DATE:	18/04/2018	**RELATIVE HUMIDITY:**	45.2 %
PHANTOM:	QDOVA003-FB	**CONDUCTIVITY:**	0.962 S/m
DUT CONFIGURATION:	1160 mAh Battery (300-01852), holster 300-01916, RSM 300-00389	**RELATIVE PERMITTIVITY:**	55.202 ε_r
DUT POSITION:	0 mm - Rear Face	**LIQUID TEMPERATURE:**	20.7 °C
RAT:	TETRA	**SCAN TYPE:**	Full
FREQUENCY:	815 MHz	**DRIFT:**	-0.20 dB
MODULATION:	Π/4DQPSK	**PEAK SAR:**	2.81 W/kg
DUTY CYCLE:	25 %	**SAR (1 g):**	2.32 W/kg

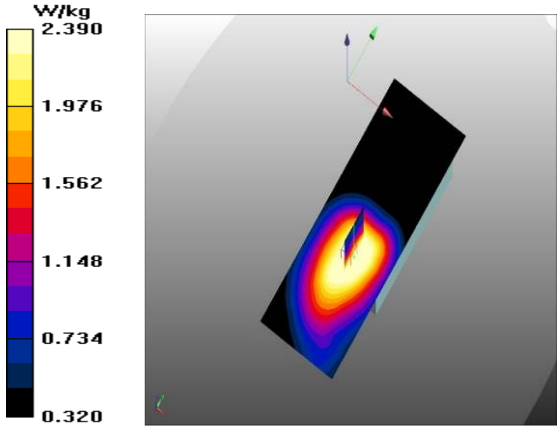


Figure 31: SAR Body Testing Results for the SC2128 TETRA Radio at 815 MHz

TÜV SÜD Product Service

2.7 TETRA 851 - 869 MHz - BODY SAR TEST RESULTS

SOFTWARE VERSION:	52.8.8(1258)	**AMBIENT TEMPERATURE:**	20.8 °C
DATE:	17/04/2018	**RELATIVE HUMIDITY:**	35.2 %
PHANTOM:	QDOVA003-FB	**CONDUCTIVITY:**	0.976 S/m
DUT CONFIGURATION:	1160 mAh Battery (300-01852), holster 300-01916	**RELATIVE PERMITTIVITY:**	55.123 ε_r
DUT POSITION:	0 mm - Rear Facing	**LIQUID TEMPERATURE:**	20.6 °C
RAT:	TETRA	**SCAN TYPE:**	Full
FREQUENCY:	851 MHz	**DRIFT:**	-0.10 dB
MODULATION:	Π/4DQPSK	**PEAK SAR:**	2.45 W/kg
DUTY CYCLE:	25 %	**SAR (1 g):**	2.13 W/kg

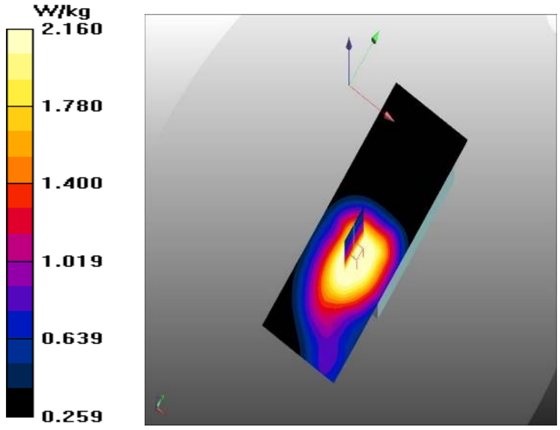


Figure 32: SAR Body Testing Results for the SC2128 TETRA Radio at 851 MHz.

SOFTWARE VERSION:	52.8.8(1258)	**AMBIENT TEMPERATURE:**	20.8 °C
DATE:	17/04/2018	**RELATIVE HUMIDITY:**	35.2 %
PHANTOM:	QDOVA003-FB	**CONDUCTIVITY:**	0.976 S/m
DUT CONFIGURATION:	1160 mAh Battery (300-01852), holster 300-01915	**RELATIVE PERMITTIVITY:**	55.123 ε_r
DUT POSITION:	0 mm - Rear Facing	**LIQUID TEMPERATURE:**	20.6 °C
RAT:	TETRA	**SCAN TYPE:**	Full
FREQUENCY:	851 MHz	**DRIFT:**	-0.47 dB
MODULATION:	Π/4DQPSK	**PEAK SAR:**	2.29 W/kg
DUTY CYCLE:	25 %	**SAR (1 g):**	1.79 W/kg

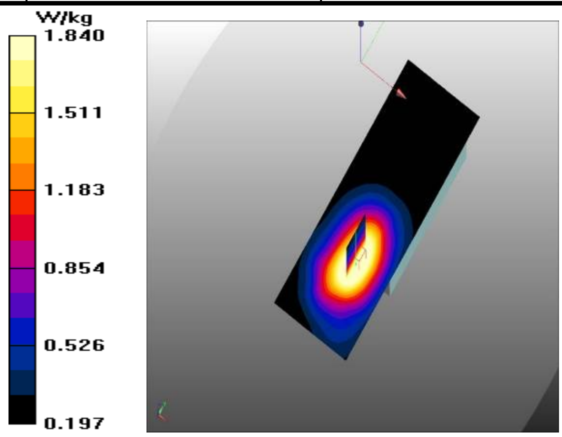


Figure 33: SAR Body Testing Results for the SC2128 TETRA Radio at 851 MHz.

Product Service

SOFTWARE VERSION:	52.8.8(1258)	**AMBIENT TEMPERATURE:**	20.8 °C
DATE:	17/04/2018	**RELATIVE HUMIDITY:**	35.2 %
PHANTOM:	QDOVA003-FB	**CONDUCTIVITY:**	0.976 S/m
DUT CONFIGURATION:	1160 mAh Battery (300-01852), holster 300-01917	**RELATIVE PERMITTIVITY:**	55.123 ε_r
DUT POSITION:	0 mm - Rear Facing	**LIQUID TEMPERATURE:**	20.6 °C
RAT:	TETRA	**SCAN TYPE:**	Full
FREQUENCY:	851 MHz	**DRIFT:**	0.09 dB
MODULATION:	Π/4DQPSK	**PEAK SAR:**	1.53 W/kg
DUTY CYCLE:	25 %	**SAR (1 g):**	1.32 W/kg

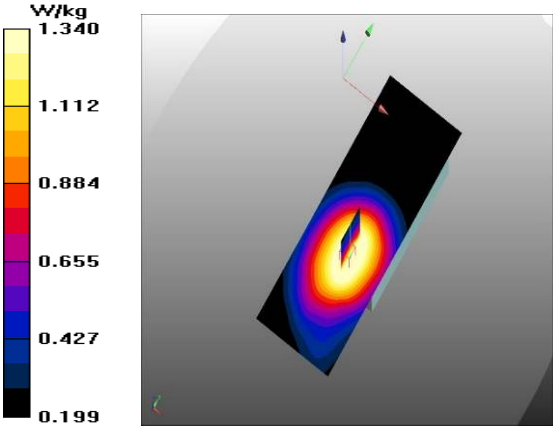


Figure 34: SAR Body Testing Results for the SC2128 TETRA Radio at 851 MHz.

SOFTWARE VERSION:	52.8.8(1258)	**AMBIENT TEMPERATURE:**	20.8 °C
DATE:	17/04/2018	**RELATIVE HUMIDITY:**	35.2 %
PHANTOM:	QDOVA003-FB	**CONDUCTIVITY:**	0.976 S/m
DUT CONFIGURATION:	1160 mAh Battery (300-01852), clip 300-01923	**RELATIVE PERMITTIVITY:**	55.123 ε_r
DUT POSITION:	0 mm - Rear Facing	**LIQUID TEMPERATURE:**	20.6 °C
RAT:	TETRA	**SCAN TYPE:**	Full
FREQUENCY:	851 MHz	**DRIFT:**	-0.04 dB
MODULATION:	Π/4DQPSK	**PEAK SAR:**	1.27 W/kg
DUTY CYCLE:	25 %	**SAR (1 g):**	1.07 W/kg

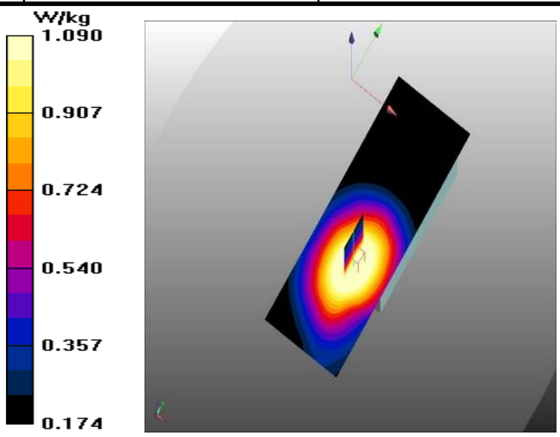


Figure 35: SAR Body Testing Results for the SC2128 TETRA Radio at 851 MHz.

SOFTWARE VERSION:	52.8.8(1258)	**AMBIENT TEMPERATURE:**	20.8 °C
DATE:	17/04/2018	**RELATIVE HUMIDITY:**	35.2 %
PHANTOM:	QDOVA003-FB	**CONDUCTIVITY:**	0.976 S/m
DUT CONFIGURATION:	1160 mAh Battery (300-01852), clip 300-01922	**RELATIVE PERMITTIVITY:**	55.123 ε_r
DUT POSITION:	0 mm - Rear Facing	**LIQUID TEMPERATURE:**	20.6 °C
RAT:	TETRA	**SCAN TYPE:**	Full
FREQUENCY:	851 MHz	**DRIFT:**	0.02 dB
MODULATION:	Π/4DQPSK	**PEAK SAR:**	1.85 W/kg
DUTY CYCLE:	25 %	**SAR (1 g):**	1.52 W/kg

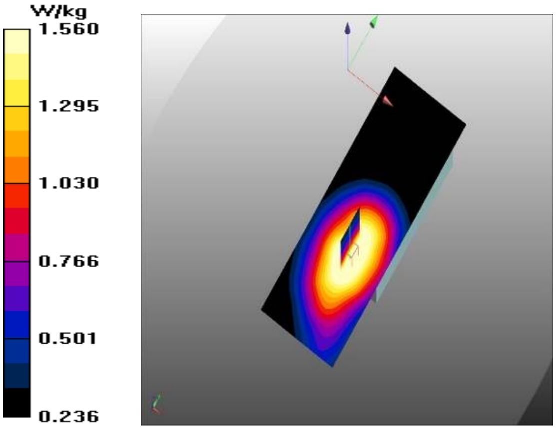


Figure 36: SAR Body Testing Results for the SC2128 TETRA Radio at 851 MHz.

SOFTWARE VERSION:	52.8.8(1258)	**AMBIENT TEMPERATURE:**	22.3 °C
DATE:	18/04/2018	**RELATIVE HUMIDITY:**	45.2 %
PHANTOM:	QDOVA003-FB	**CONDUCTIVITY:**	0.976 S/m
DUT CONFIGURATION:	1880 mAh Battery (300-01853), holster 300-01916	**RELATIVE PERMITTIVITY:**	55.123 ε_r
DUT POSITION:	0 mm - Rear Facing	**LIQUID TEMPERATURE:**	20.7 °C
RAT:	TETRA	**SCAN TYPE:**	Full
FREQUENCY:	851 MHz	**DRIFT:**	-0.17 dB
MODULATION:	Π/4DQPSK	**PEAK SAR:**	2.24 W/kg
DUTY CYCLE:	25 %	**SAR (1 g):**	1.94 W/kg

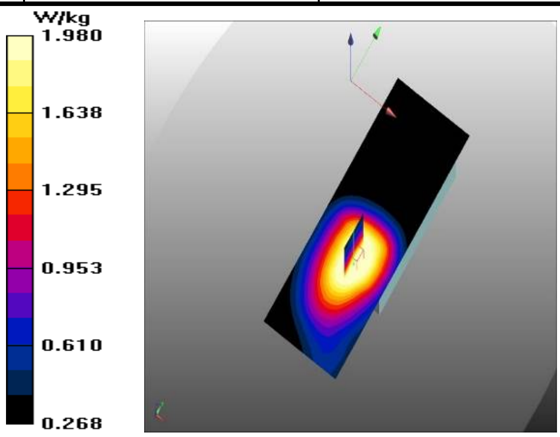


Figure 37: SAR Body Testing Results for the SC2128 TETRA Radio at 851 MHz.

SOFTWARE VERSION:	52.8.8(1258)	**AMBIENT TEMPERATURE:**	22.3 °C
DATE:	18/04/2018	**RELATIVE HUMIDITY:**	45.2 %
PHANTOM:	QDOVA003-FB	**CONDUCTIVITY:**	0.976 S/m
DUT CONFIGURATION:	1160 mAh Battery (300-01852), holster 300-01916, ,RSM 300-00389	**RELATIVE PERMITTIVITY:**	55.123 ε_r
DUT POSITION:	0 mm - Rear Facing	**LIQUID TEMPERATURE:**	20.7 °C
RAT:	TETRA	**SCAN TYPE:**	Full
FREQUENCY:	851 MHz	**DRIFT:**	0.26 dB
MODULATION:	Π/4DQPSK	**PEAK SAR:**	2.53 W/kg
DUTY CYCLE:	25 %	**SAR (1 g):**	2.12 W/kg

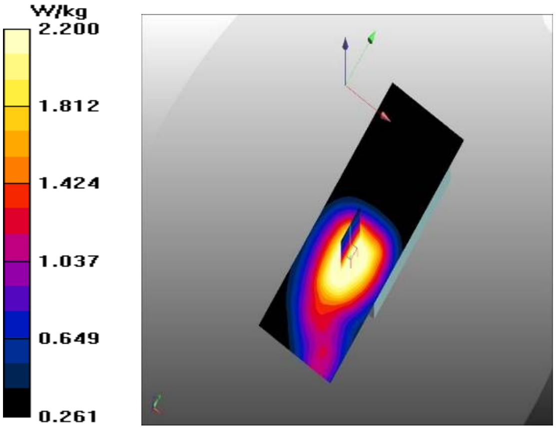


Figure 38: SAR Body Testing Results for the SC2128 TETRA Radio at 851 MHz.

SECTION 3

TEST EQUIPMENT USED

Product Service

3.1 TEST EQUIPMENT USED

The following test equipment was used at TÜV SÜD Product Service:

Instrument Description	Manufacturer	Model Type	TE Number	Cal Period (months)	Calibration Due Date
10MHz - 2.5GHz, Amplifier	IndexSar Ltd	VBM2500-3	0051	-	O/P Mon
Power Sensor	Rohde & Schwarz	NRV-Z1	0178	12	08-Jun-2018
Power Sensor	Rohde & Schwarz	NRV- Z1	3563	12	08-Jun-2018
Signal Generator	Hewlett Packard	ESG4000A	61	12	14-Jul-2018
Attenuator (20dB, 10W)	Weinschel	37-20-34	482	12	1-Nov -2018
Bi-directional Coupler	IndexSar Ltd	7401 (VDC0830-20)	2414	-	O/P Mon
Cable	Florida Labs	KMS-180SP-39.4-KMS	4519	12	20-Dec-2018
2M SMA Cable	Florida Labs	SMS-235SP-78.8-SMS	4518	12	20-Dec-2018
Thermometer	Digitron	T208	64	12	18-May-2018
K Type Thermocouple	Unknown	TYPE K	65	12	18-May-2018
Hygrometer	Rotronic	I-1000	2784	12	04-May-2018
Dual Channel Power Meter	Rohde & Schwarz	NRVD	2979	12	08-Jun-2018
Data Acquisition Electronics	Speag	DAE 4 - SD 000 D04 BM	4689	12	15-Dec-2018
Measurement Server	Speag	DASY 5 Measurement Server	4692	-	TU
Sam Phantom	Speag	Sam Phantom	4703	-	TU
Elliptical Phantom	Speag	ELI Phantom	4699	-	TU
Dosimetric SAR Probe	Speag	EX3DV4	4700	12	15-Dec-2018
Mounting Platform for TX90XL Robot and Phantoms	Speag	MP6C-TX90XL Mounting Platform Extended	4702	-	TU
Robot	Speag	TX90 XLspeag Robot	4704	-	TU
EUT Holder	Speag	N/A	3870	-	TU
EUT Holder	Speag	MDA4WTV5RLAP	4694	-	TU
HBBL Fluid	Speag	Batch 1	N/A	Weekly	23-April 2018
MBBL Fluid	Speag	Batch 1	N/A	Weekly	23-April 2018
835 MHz Dipole	Speag	D835V2	3857	12	11-Dec-2018

TU - Traceability Unscheduled
O/P Mon - Output Monitored using calibrated equipment

Product Service

3.2 TEST SOFTWARE

The following software was used to control the TÜV SÜD Product Service DASY System.

Instrument	Version Number
DASY system	52.8.8(1258)

Product Service

3.3 DIELECTRIC PROPERTIES OF SIMULANT LIQUIDS

The fluid properties of the simulant fluids used during routine SAR evaluation meet the dielectric properties required KDB 865665.

The dielectric properties of the tissue simulant liquids used for the SAR testing at TÜV SÜD Product Service are as follows:-

Fluid type and Frequency	Relative Permittivity Target	Relative Permittivity Measured	Conductivity Target	Conductivity Measured
835 MHz Body	55.21	55.16	0.98	0.97
835 MHz Head	41.55	44.23	0.91	0.93

3.4 TEST CONDITIONS

3.4.1 Test Laboratory Conditions

Ambient temperature: Within +15°C to +35°C.
The actual temperature during the testing ranged from 20.8°C to 22.3°C.
The actual humidity during the testing ranged from 35.2% to 48.8% RH.

3.4.2 Test Fluid Temperature Range

Frequency (MHz)	Body / Head Fluid	Min Temperature °C	Max Temperature °C
806 – 824	Body	20.6	20.7
806 – 824	Head	20.4	20.7
851 – 869	Body	20.6	20.7
851 – 869	Head	20.4	20.5

3.4.3 SAR Drift

The maximum SAR Drift was recorded as 0.530 dB for head and 0.470 dB for body.

Product Service

3.5 MEASUREMENT UNCERTAINTY

Head, Full SAR Measurements, 300 MHz to 3 GHz Using Probe EX3DV4 - SN3759

Source of Uncertainty	Uncertainty ± %	Probability distribution	Div	c_i (1 g)	Standard Uncertainty ± % (1 g)	v_i (v_{eff})
Measurement System						
Probe calibration	6.0	N	1.00	1.00	6.0	Infinity
Axial Isotropy	4.7	R	1.73	0.70	1.9	Infinity
Hemispherical Isotropy	9.6	R	1.73	0.70	3.9	Infinity
Boundary effect	1.0	R	1.73	1.00	0.6	Infinity
Linearity	4.7	R	1.73	1.00	2.7	Infinity
System Detection limits	1.0	R	1.73	1.00	0.6	Infinity
Modulation response	2.4	R	1.73	1.00	1.4	Infinity
Readout electronics	0.3	N	1.00	1.00	0.3	Infinity
Response time	0.8	R	1.73	1.00	0.5	Infinity
Integration time	2.6	R	1.73	1.00	1.5	Infinity
RF ambient noise	3.0	R	1.73	1.00	1.7	Infinity
RF ambient reflections	3.0	R	1.73	1.00	1.7	Infinity
Probe positioner	0.4	R	1.73	1.00	0.2	Infinity
Probe positioning	2.9	R	1.73	1.00	1.7	Infinity
Max SAR Evaluation	2.0	R	1.73	1.00	1.2	Infinity
Test sample related						
Device Positioning	2.9	N	1.00	1.00	2.9	145
Device Holder	3.6	N	1.00	1.00	3.6	5
Input Power and SAR Drift	5.0	R	1.73	1.00	0.3	Infinity
Phantom and Setup						
Phantom uncertainty	6.1	R	1.73	1.00	3.5	Infinity
SAR Correction	1.9	R	1.73	1.00	1.1	Infinity
Liquid conductivity Meas.	2.5	R	1.73	0.78	1.1	Infinity
Liquid Permittivity Meas.	2.5	R	1.73	0.23	0.3	Infinity
Temp. Unc. Conductivity	3.4	R	1.73	0.78	1.5	Infinity
Temp. Unc. Permittivity	0.4	R	1.73	0.23	0.1	Infinity
Combined Standard Uncertainty		**RSS**			10.8	361
Expanded Standard Uncertainty		**K=2**			21.6	

Body, Full SAR Measurements, 300 MHz to 3 GHz Using Probe EX3DV4 - SN3759

Source of Uncertainty	Uncertainty ± %	Probability distribution	Div	c_i (1 g)	Standard Uncertainty ± % (1 g)	v_i (v_{eff})
Measurement System						
Probe calibration	6.0	N	1.00	1.00	6.0	Infinity
Axial Isotropy	4.7	R	1.73	0.70	1.9	Infinity
Hemispherical Isotropy	9.6	R	1.73	0.70	3.9	Infinity
Boundary effect	1.0	R	1.73	1.00	0.6	Infinity
Linearity	4.7	R	1.73	1.00	2.7	Infinity
System Detection limits	1.0	R	1.73	1.00	0.6	Infinity
Modulation response	2.4	R	1.73	1.00	1.4	Infinity
Readout electronics	0.3	N	1.00	1.00	0.3	Infinity
Response time	0.8	R	1.73	1.00	0.5	Infinity
Integration time	2.6	R	1.73	1.00	1.5	Infinity
RF ambient noise	3.0	R	1.73	1.00	1.7	Infinity
RF ambient reflections	3.0	R	1.73	1.00	1.7	Infinity
Probe positioner	0.4	R	1.73	1.00	0.2	Infinity
Probe positioning	2.9	R	1.73	1.00	1.7	Infinity
Max SAR Evaluation	2.0	R	1.73	1.00	1.2	Infinity
Test sample related						
Device Positioning	2.9	N	1.00	1.00	2.9	145
Device Holder	3.6	N	1.00	1.00	3.6	5
Input Power and SAR Drift	5.0	R	1.73	1.00	0.5	Infinity
Phantom and Setup						
Phantom uncertainty	6.1	R	1.73	1.00	3.5	Infinity
SAR Correction	1.9	R	1.73	1.00	1.1	Infinity
Liquid conductivity Meas.	2.5	R	1.73	0.78	1.1	Infinity
Liquid Permittivity Meas.	2.5	R	1.73	0.23	0.3	Infinity
Temp. Unc. Conductivity	3.4	R	1.73	0.78	1.5	Infinity
Temp. Unc. Permittivity	0.4	R	1.73	0.23	0.1	Infinity
Combined Standard Uncertainty		**RSS**			10.8	361
Expanded Standard Uncertainty		**K=2**			21.6	

Product Service

SECTION 4

ACCREDITATION, DISCLAIMERS AND COPYRIGHT

Product Service

4.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT

This report relates only to the actual item/items tested.

Our UKAS Accreditation does not cover opinions and interpretations and any expressed are outside the scope of our UKAS Accreditation.

Results of tests not covered by our UKAS Accreditation Schedule are marked NUA (Not UKAS Accredited).