Report On

Specific Absorption Rate Testing of the
Sharp Quad-band LTE (B1/ B3/ B17/ B26), Dual-band WCDMA (FDD I / V) , Quad-band GSM (850/900/1800/1900) & WiMAX2+ (TDD41) multi mode Smart phone with Bluetooth, WLAN, SRD(NFC,FeliCa) and GPS

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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

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PREPARED FOR

Sharp Telecommunications of Europe Ltd
Inspired
Easthampstead Road
Bracknell
Berkshire
RG12 1NS

PREPARED BY

Nigel Grigsby
Senior Engineer

APPROVED BY

Simon Bennett
Authorised Signatory

DATED

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SECTION 1

REPORT SUMMARY

Specific Absorption Rate Testing of the
Sharp Quad-band LTE (B1/ B3/ B17/ B26), Dual-band WCDMA (FDD I / V) , Quad-band GSM (850/900/1800/1900) & WiMAX2+ (TDD41) multi mode Smart phone with Bluetooth, WLAN, SRD(NFC,FeliCa) and GPS

1.1 INTRODUCTION

The information contained in this report is intended to show verification of the Specific Absorption Rate Testing of the Sharp Quad-band LTE (B1/ B3/ B17/ B26), Dual-band WCDMA (FDD I / V) , Quad-band GSM (850/900/1800/1900) & WiMAX2+ (TDD41) multi mode Smart phone with Bluetooth, WLAN, SRD(NFC,FeliCa) and GPS 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	Sharp Telecommunications of Eurpoe Ltd
Manufacturer	Sharp Corporation
Manufacturing Description	Quad-band LTE (B1/ B3/ B17/ B26), Dual-band WCDMA (FDD I / V) , Quad-band GSM (850/900/1800/1900) & WiMAX2+ (TDD41) multi mode Smart phone with Bluetooth, WLAN, SRD(NFC,FeliCa) and GPS
Serial/IMEI Number(s)	004401115905388 (SAR Test: GSM/WCDMA/LTE) 004401115905420 (SAR Test: WLAN) 004401115905156 (Conducted: GSM) 004401115905164 (Conducted: WCDMA) 004401115905172 (Conducted: LTE) 004401115905404 (Conducted: WLAN)
Number of Samples Tested	2
Hardware Version	PP1
Software Version	C6300 (GSM/WCDMA/LTE) A720W (WLAN)
Battery Cell Manufacturer	Sharp Corporation
Battery Model Number	Integral
Test Specification/Issue/Date	KDB 447498 D01 v06 General RF Exposure Guidance
Start of Test	22 August 2016
Finish of Test	02 September 2016
Related Document(s)	FCC 47CFR 2.1093:2015 KDB 865664 – D01 v01r04 KDB 865664 – D02 v01r02 KDB 648474 – D04 v01r04 KDB 447498 – D01 v06 IEEE 1528-2013 KDB 941225 – D01 v03r01 KDB 248227 – D01 v02r02
Name of Engineer(s)	Stephen Dodd Nigel Grigsby

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

Max 1g SAR (W/kg) Head	**0.51** (Measured)	**0.69** (Scaled)
Max 1g SAR (W/kg) Body	**0.64** (Measured)	**0.94** (Scaled)
The maximum 1g volume averaged SAR level measured for all the tests performed did not exceed the limits for General Population/Uncontrolled Exposure (W/kg) Partial Body of 1.6 W/kg.		

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

Band	Test Configuration	Max Reported Scaled SAR (W/kg)	Highest Simultaneous Transmission Scaled SAR (W/kg)	
GSM/GPRS 850	Head	0.69		
	Body	0.94		
WCDMA FDD V	Head	0.59	Head	Body
	Body	0.64		
PCS/GPRS 1900	Head	0.38	0.83	1.13
	Body	0.60		
LTE Band 17	Head	0.14		
	Body	0.28		
WLAN 2.4GHz	Head	0.14		
	Body	0.19		
The maximum 1g volume averaged SAR level measured for all the tests performed (including simultaneous transmission analysis results) did not exceed the limits for General Population/Uncontrolled Exposure (W/kg) Partial Body of 1.6 W/kg.				

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1.3 PRODUCT TECHNICAL DESCRIPTION

Refer to Model Description APYHRO00243 Rev 4.0 document.

1.4 TEST RESULTS SUMMARY

1.4.1 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 1528-2003. The following results were obtained: -

System performance / Validation results

Date	Frequency (MHz)	Max 1g SAR (W/kg)*	Percentage Drift on Reference
22/08/2016	850	9.32	-2.51
22/08/2016	1900	43.39	9.29
23/08/2016	1900	42.99	8.29
24/08/2016	850	9.04	-6.90
24/08/2016	850	9.16	-5.66
25/08/2016	1900	41.00	3.02
25/08/2016	750	8.28	-3.72
26/08/2016	750	8.24	-4.19
26/08/2016	750	7.92	-6.71
30/08/2016	750	7.68	-9.54
31/08/2016	750	7.68	-9.54
31/08/2016	2450	50.56	-3.51
31/08/2016	2450	50.96	-0.47
01/09/2016	2450	50.16	-2.03
02/09/2016	850	9.00	-7.31

*Normalised to a forward power of 1W

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1.4.2 Results Summary Tables

GSM 850 Voice Head Specific Absorbtion Rate (Maximum SAR) 1g Results

Test Position	Channel Number	Frequency (MHz)	Measured Average Power (dBm)	Tune Up (dBm)	Measured 1g SAR (W/kg)	Scaled 1g SAR (W/kg)	Scan Figure Number
Left Cheek	189	836.4	32.02	33.40	0.43	0.59	Figure 5
Left 15°	189	836.4	32.02	33.40	0.21	0.29	Figure 6
Right Cheek	189	836.4	32.02	33.40	0.37	0.51	Figure 7
Right 15°	189	836.4	32.02	33.40	0.19	0.26	Figure 8
Limit for General Population (Uncontrolled Exposure) 1.6 W/kg (1g) KDB 447498 D01 - Testing of other required channels within the operation mode of a frequency band is not required when the reported 1g SAR for mid-band or highest output power channel is: ≤ 0.8W/kg when the transmission band is ≤ 100MHz ≤ 0.6W/kg when the transmission band is between 100MHz and 200MHz ≤ 0.4W/kg when the transmission band is ≥ 200MHz							

GSM 850 GPRS - 4 Timeslots Head Specific Absorbtion Rate (Maximum SAR) 1g Results

Test Position	Channel Number	Frequency (MHz)	Measured Average Power (dBm)	Tune Up (dBm)	Measured 1g SAR (W/kg)	Scaled 1g SAR (W/kg)	Scan Figure Number
Left Cheek	189	836.4	26.85	28.40	0.48	**0.69**	Figure 9
Left 15°	189	836.4	26.85	28.40	0.25	0.36	Figure 10
Right Cheek	189	836.4	26.85	28.40	0.42	0.60	Figure 11
Right 15°	189	836.4	26.85	28.40	0.22	0.31	Figure 12
Limit for General Population (Uncontrolled Exposure) 1.6 W/kg (1g) KDB 447498 D01 - Testing of other required channels within the operation mode of a frequency band is not required when the reported 1g SAR for mid-band or highest output power channel is: ≤ 0.8W/kg when the transmission band is ≤ 100MHz ≤ 0.6W/kg when the transmission band is between 100MHz and 200MHz ≤ 0.4W/kg when the transmission band is ≥ 200MHz							

GSM 850 GPRS - 4 Timeslots Body Specific Absorbtion Rate (Maximum SAR) 1g Results

Test Position	Channel Number	Frequency (MHz)	Measured Average Power (dBm)	Tune Up (dBm)	Measured 1g SAR (W/kg)	Scaled 1g SAR (W/kg)	Scan Figure Number
10mm Front Facing	189	836.4	26.85	28.40	0.53	0.75	Figure 13
10mm Rear Facing	189	836.4	26.85	28.40	0.58	0.83	Figure 14
10mm Right Edge	189	836.4	26.85	28.40	0.45	0.65	Figure 15
10mm Left Edge	189	836.4	26.85	28.40	0.32	0.46	Figure 16
10mm Bottom Edge	189	836.4	26.85	28.40	0.06	0.09	Figure 17
10mm Rear Face	251	848.8	26.73	28.40	0.64	**0.94**	Figure 18
10mm Rear Face	128	824.2	26.80	28.40	0.53	0.77	Figure 19
Limit for General Population (Uncontrolled Exposure) 1.6 W/kg (1g) KDB 447498 D01 - Testing of other required channels within the operation mode of a frequency band is not required when the reported 1g SAR for mid-band or highest output power channel is: ≤ 0.8W/kg when the transmission band is ≤ 100MHz ≤ 0.6W/kg when the transmission band is between 100MHz and 200MHz ≤ 0.4W/kg when the transmission band is ≥ 200MHz							

PCS 1900 Voice Head Specific Absorbtion Rate (Maximum SAR) 1g Results

Test Position	Channel Number	Frequency (MHz)	Measured Average Power (dBm)	Tune Up (dBm)	Measured 1g SAR (W/kg)	Scaled 1g SAR (W/kg)	Scan Figure Number
Left Cheek	512	1850.2	29.54	30.40	0.21	0.25	Figure 20
Left 15°	512	1850.2	29.54	30.40	0.10	0.13	Figure 21
Right Cheek	512	1850.2	29.54	30.40	0.25	0.31	Figure 22
Right 15°	512	1850.2	29.54	30.40	0.15	0.18	Figure 23
Limit for General Population (Uncontrolled Exposure) 1.6 W/kg (1g) KDB 447498 D01 - Testing of other required channels within the operation mode of a frequency band is not required when the reported 1g SAR for mid-band or highest output power channel is: ≤ 0.8W/kg when the transmission band is ≤ 100MHz ≤ 0.6W/kg when the transmission band is between 100MHz and 200MHz ≤ 0.4W/kg when the transmission band is ≥ 200MHz							

PCS 1900 GPRS - 4 Timeslots Head Specific Absorbtion Rate (Maximum SAR) 1g Results

Test Position	Channel Number	Frequency (MHz)	Measured Average Power (dBm)	Tune Up (dBm)	Measured 1g SAR (W/kg)	Scaled 1g SAR (W/kg)	Scan Figure Number
Left Cheek	512	1850.2	24.30	25.40	0.26	0.34	Figure 24
Left 15°	512	1850.2	24.30	25.40	0.13	0.16	Figure 25
Right Cheek	512	1850.2	24.30	25.40	0.30	0.38	Figure 26
Right 15°	512	1850.2	24.30	25.40	0.15	0.20	Figure 27
Limit for General Population (Uncontrolled Exposure) 1.6 W/kg (1g) KDB 447498 D01 - Testing of other required channels within the operation mode of a frequency band is not required when the reported 1g SAR for mid-band or highest output power channel is: ≤ 0.8W/kg when the transmission band is ≤ 100MHz ≤ 0.6W/kg when the transmission band is between 100MHz and 200MHz ≤ 0.4W/kg when the transmission band is ≥ 200MHz							

PCS 1900 GPRS - 4 Timeslots Body Specific Absorbtion Rate (Maximum SAR) 1g Results

Test Position	Channel Number	Frequency (MHz)	Measured Average Power (dBm)	Tune Up (dBm)	Measured 1g SAR (W/kg)	Scaled 1g SAR (W/kg)	Scan Figure Number
10mm Front Facing	512	1850.2	24.30	25.40	0.47	0.60	Figure 28
10mm Rear Facing	512	1850.2	24.30	25.40	0.40	0.52	Figure 29
10mm Left Edge	512	1850.2	24.30	25.40	0.24	0.31	Figure 30
10mm Bottom Edge	512	1850.2	24.30	25.40	0.16	0.20	Figure 31
Limit for General Population (Uncontrolled Exposure) 1.6 W/kg (1g) KDB 447498 D01 - Testing of other required channels within the operation mode of a frequency band is not required when the reported 1g SAR for mid-band or highest output power channel is: ≤ 0.8W/kg when the transmission band is ≤ 100MHz ≤ 0.6W/kg when the transmission band is between 100MHz and 200MHz ≤ 0.4W/kg when the transmission band is ≥ 200MHz							

LTE Band 17 QPSK Head Specific Absorbtion Rate (Maximum SAR) 1g Results

10 MHz Bandwidth, 1 Resource Block, Mid Offset

Test Position	Channel Number	Frequency (MHz)	Measured Average Power (dBm)	Tune Up (dBm)	Measured 1g SAR (W/kg)	Scaled 1g SAR (W/kg)	Scan Figure Number
Left Cheek	23780	709.0	22.93	24.00	0.11	0.14	Figure 32
Left 15°	23780	709.0	22.93	24.00	0.06	0.08	Figure 33
Right Cheek	23780	709.0	22.93	24.00	0.11	0.13	Figure 34
Right 15°	23780	709.0	22.93	24.00	0.06	0.08	Figure 35
Limit for General Population (Uncontrolled Exposure) 1.6 W/kg (1g) KDB 447498 D01 - Testing of other required channels within the operation mode of a frequency band is not required when the reported 1g SAR for mid-band or highest output power channel is: ≤ 0.8W/kg when the transmission band is ≤ 100MHz ≤ 0.6W/kg when the transmission band is between 100MHz and 200MHz ≤ 0.4W/kg when the transmission band is ≥ 200MHz							

LTE Band 17 QPSK Body Specific Absorbtion Rate (Maximum SAR) 1g Results

10 MHz Bandwidth, 1 Resource Block, Mid Offset

Test Position	Channel Number	Frequency (MHz)	Measured Average Power (dBm)	Tune Up (dBm)	Measured 1g SAR (W/kg)	Scaled 1g SAR (W/kg)	Scan Figure Number
10mm Front Face	23780	709.0	22.93	24.00	0.17	0.21	Figure 36
10mm Rear Face	23780	709.0	22.93	24.00	0.22	0.28	Figure 37
10mm Right Edge	23780	709.0	22.93	24.00	0.12	0.16	Figure 38
10mm Left Edge	23780	709.0	22.93	24.00	0.12	0.15	Figure 39
10mm Bottom Edge	23780	709.0	22.93	24.00	0.01	0.01	Figure 40
Limit for General Population (Uncontrolled Exposure) 1.6 W/kg (1g) KDB 447498 D01 - Testing of other required channels within the operation mode of a frequency band is not required when the reported 1g SAR for mid-band or highest output power channel is: ≤ 0.8W/kg when the transmission band is ≤ 100MHz ≤ 0.6W/kg when the transmission band is between 100MHz and 200MHz ≤ 0.4W/kg when the transmission band is ≥ 200MHz							

LTE Band 17 QPSK Head Specific Absorbtion Rate (Maximum SAR) 1g Results

10 MHz Bandwidth, 25 Resource Blocks, High Offset

Test Position	Channel Number	Frequency (MHz)	Measured Average Power (dBm)	Tune Up (dBm)	Measured 1g SAR (W/kg)	Scaled 1g SAR (W/kg)	Scan Figure Number
Left Cheek	23780	709.0	21.98	23.00	0.09	0.11	Figure 41
Left 15°	23780	709.0	21.98	23.00	0.05	0.06	Figure 42
Right Cheek	23780	709.0	21.98	23.00	0.09	0.11	Figure 43
Right 15°	23780	709.0	21.98	23.00	0.05	0.07	Figure 44
Limit for General Population (Uncontrolled Exposure) 1.6 W/kg (1g) KDB 447498 D01 - Testing of other required channels within the operation mode of a frequency band is not required when the reported 1g SAR for mid-band or highest output power channel is: ≤ 0.8W/kg when the transmission band is ≤ 100MHz ≤ 0.6W/kg when the transmission band is between 100MHz and 200MHz ≤ 0.4W/kg when the transmission band is ≥ 200MHz							

LTE Band 17 QPSK Body Specific Absorbtion Rate (Maximum SAR) 1g Results

10MHz Bandwidth, 25 Resource Blocks, High Offset

Test Position	Channel Number	Frequency (MHz)	Measured Average Power (dBm)	Tune Up (dBm)	Measured 1g SAR (W/kg)	Scaled 1g SAR (W/kg)	Scan Figure Number
10mm Front Facing	23780	709.0	21.98	23.00	0.13	0.17	Figure 45
10mm Rear Facing	23780	709.0	21.98	23.00	0.18	0.22	Figure 46
10mm Right Edge	23780	709.0	21.98	23.00	0.10	0.12	Figure 47
10mm Left Edge	23780	709.0	21.98	23.00	0.10	0.12	Figure 48
10mm Bottom Edge	23780	709.0	21.98	23.00	0.01	0.01	Figure 49
Limit for General Population (Uncontrolled Exposure) 1.6 W/kg (1g) KDB 447498 D01 - Testing of other required channels within the operation mode of a frequency band is not required when the reported 1g SAR for mid-band or highest output power channel is: ≤ 0.8W/kg when the transmission band is ≤ 100MHz ≤ 0.6W/kg when the transmission band is between 100MHz and 200MHz ≤ 0.4W/kg when the transmission band is ≥ 200MHz							

WCDMA FDDV 12.2kbps RMC Head Specific Absorbtion Rate (Maximum SAR) 1g Results

Test Position	Channel Number	Frequency (MHz)	Measured Average Power (dBm)	Tune Up (dBm)	Measured 1g SAR (W/kg)	Scaled 1g SAR (W/kg)	Scan Figure Number
Left Cheek	4233	846.6	23.41	24.00	0.51	0.59	Figure 50
Left 15°	4233	846.6	23.41	24.00	0.26	0.30	Figure 51
Right Cheek	4233	846.6	23.41	24.00	0.45	0.51	Figure 52
Right 15°	4233	846.6	23.41	24.00	0.25	0.28	Figure 53
Limit for General Population (Uncontrolled Exposure) 1.6 W/kg (1g) KDB 447498 D01 - Testing of other required channels within the operation mode of a frequency band is not required when the reported 1g SAR for mid-band or highest output power channel is: ≤ 0.8W/kg when the transmission band is ≤ 100MHz ≤ 0.6W/kg when the transmission band is between 100MHz and 200MHz ≤ 0.4W/kg when the transmission band is ≥ 200MHz							

WCDMA FDDV 12.2kbps RMC Body Specific Absorbtion Rate (Maximum SAR) 1g Results

Test Position	Channel Number	Frequency (MHz)	Measured Average Power (dBm)	Tune Up (dBm)	Measured 1g SAR (W/kg)	Scaled 1g SAR (W/kg)	Scan Figure Number
10mm Front Facing	4233	846.6	23.41	24.00	0.49	0.56	Figure 54
10mm Rear Facing	4233	846.6	23.41	24.00	0.56	0.64	Figure 55
10mm Right Edge	4233	846.6	23.41	24.00	0.44	0.50	Figure 56
10mm Left Edge	4233	846.6	23.41	24.00	0.30	0.35	Figure 57
10mm Bottom Edge	4233	846.6	23.41	24.00	0.07	0.08	Figure 58
Limit for General Population (Uncontrolled Exposure) 1.6 W/kg (1g) KDB 447498 D01 - Testing of other required channels within the operation mode of a frequency band is not required when the reported 1g SAR for mid-band or highest output power channel is: ≤ 0.8W/kg when the transmission band is ≤ 100MHz ≤ 0.6W/kg when the transmission band is between 100MHz and 200MHz ≤ 0.4W/kg when the transmission band is ≥ 200MHz KDB248227 D01 v02 - Testing was not required for OFDM as per Section 5.2.2 KDB248227 D01 v02 - Only one position was tested as per Section 5.1.1 KDB248227 D01 v02 – A duty factor scaling was applied to the scaled SAR as per section 2.2							

WLAN 2437 MHz Head Specific Absorbtion Rate (Maximum SAR) 1g Results

802.11b, 1 Mbps, DSSS

Test Position	Channel Number	Frequency (MHz)	Measured Average Power (dBm)	Tune Up (dBm)	Measured 1g SAR (W/kg)	Scaled 1g SAR (W/kg)	Scan Figure Number
Left Cheek	6	2437	11.82	13.00	0.04	0.05	Figure 59
Left 15°	6	2437	11.82	13.00	0.02	0.03	Figure 60
Right Cheek	6	2437	11.82	13.00	0.09	0.12	Figure 61
Right 15°	6	2437	11.82	13.00	0.05	0.06	Figure 62
Right Cheek	**6**	**2437**	**11.82**	**13.00**	**0.11**	**0.14**	Figure 63
Limit for General Population (Uncontrolled Exposure) 1.6 W/kg (1g) KDB 447498 D01 - Testing of other required channels within the operation mode of a frequency band is not required when the reported 1g SAR for mid-band or highest output power channel is: ≤ 0.8W/kg when the transmission band is ≤ 100MHz ≤ 0.6W/kg when the transmission band is between 100MHz and 200MHz ≤ 0.4W/kg when the transmission band is ≥ 200MHz KDB248227 D01 v02 - Testing was not required for OFDM as per Section 5.2.2 KDB248227 D01 v02 – Testing of only one position with a full scan was required as per Section 5.1.1 KDB248227 D01 v02 – A duty factor scaling was applied to the scaled SAR as per section 2.2							

WLAN 2437 MHz Body Specific Absorbtion Rate (Maximum SAR) 1g Results

Test Position	Channel Number	Frequency (MHz)	Measured Average Power (dBm)	Tune Up (dBm)	Measured 1g SAR (W/kg)	Scaled 1g SAR (W/kg)	Scan Figure Number
10mm Front Facing	6	2437	11.82	13.00	0.02	0.03	Figure 64
10mm Rear Facing	6	2437	11.82	13.00	0.14	0.18	Figure 65
10mm Right Edge	6	2437	11.82	13.00	0.08	0.11	Figure 66
10mm Top Edge	6	2437	11.82	13.00	0.01	0.02	Figure 67
10mm Rear Face	**6**	**2437**	**11.82**	**13.00**	**0.14**	**0.19**	Figure 68
Limit for General Population (Uncontrolled Exposure) 1.6 W/kg (1g) KDB 447498 D01 - Testing of other required channels within the operation mode of a frequency band is not required when the reported 1g SAR for mid-band or highest output power channel is: ≤ 0.8W/kg when the transmission band is ≤ 100MHz ≤ 0.6W/kg when the transmission band is between 100MHz and 200MHz ≤ 0.4W/kg when the transmission band is ≥ 200MHz KDB248227 D01 v02 - Testing was not required for OFDM as per Section 5.2.2 KDB248227 D01 v02 - Testing of only one position with a full scan was required as per Section 5.1.1 KDB248227 D01 v02 – A duty factor scaling was applied to the scaled SAR as per section 2.2							

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1.4.3 Simultaneous Transmission

Position Head	GPRS 850MHz 1g SAR (W/kg) CH 189 (Scaled SAR values)	WLAN 2.4GHz 1g SAR (W/kg) CH 6 (Scaled SAR values)	∑ 1g SAR (W/kg)
Left Cheek	**0.69**	0.14	**0.83**
Left 15°	0.36	0.14	0.50
Right Cheek	0.60	0.14	0.74
Right 15°	0.31	0.14	0.45
Simultaneous Transmission KDB 447498 D01 KDB 248227 D01 Section 6.5. The highest reported SAR for the 802.11 transmission modes in the frequency band was used for simultaneous transmission SAR test exclusion			

Simultaneous SAR measurements were not required as the sum of the 1g SAR measurements did not exceed 1.6 W/kg.

Position Body	GPRS 850MHz 1g SAR (W/kg) CH 189 (Scaled SAR values)	WLAN 2.4GHz 1g SAR (W/kg) CH 6 (Scaled SAR values)	∑ 1g SAR (W/kg)
Front Facing	0.75	0.19	0.94
Rear Facing	0.83	0.19	1.02
Right Edge	0.65	0.19	0.84
Left Edge	0.46	0.19	0.65
Bottom Edge	0.09	0.19	0.28
Rear Facing	**0.94***	0.19	**1.13**
Rear Facing	0.77**	0.19	0.96
Simultaneous Transmission KDB 447498 D01 Testing was carried out with a 10mm separation distance to meet the requirements of KDB 941225 D06 KDB 248227 D01 Section 6.5. The highest reported SAR for the 802.11 transmission modes in the frequency band was used for simultaneous transmission SAR test exclusion *Channel 251 **Channel 128			

Simultaneous SAR measurements were not required as the sum of the 1g SAR measurements did not exceed 1.6 W/kg.

Position Head	WCDMA FDDV 1g SAR (W/kg) CH 4233 (Scaled SAR values)	WLAN 2.4GHz 1g SAR (W/kg) CH 6 (Scaled SAR values)	∑ 1g SAR (W/kg)
Left Cheek	0.59	0.14	0.73
Left 15°	0.30	0.14	0.44
Right Cheek	0.51	0.14	0.65
Right 15°	0.28	0.14	0.42
Simultaneous Transmission KDB 447498 D01 KDB 248227 D01 Section 6.5. The highest reported SAR for the 802.11 transmission modes in the frequency band was used for simultaneous transmission SAR test exclusion			

Simultaneous SAR measurements were not required as the sum of the 1g SAR measurements did not exceed 1.6 W/kg.

Position Body	WCDMA FDDV 1g SAR (W/kg) CH 4233 (Scaled SAR values)	WLAN 2.4GHz 1g SAR (W/kg) CH 6 (Scaled SAR values)	∑ 1g SAR (W/kg)
Front Facing	0.56	0.19	0.75
Rear Facing	0.64	0.19	0.83
Right Edge	0.50	0.19	0.69
Left Edge	0.35	0.19	0.54
Bottom Edge	0.08	0.19	0.27
Simultaneous Transmission KDB 447498 D01 Testing was carried out with a 10mm separation distance to meet the requirements of KDB 941225 D06 KDB 248227 D01 Section 6.5. The highest reported SAR for the 802.11 transmission modes in the frequency band was used for simultaneous transmission SAR test exclusion			

Simultaneous SAR measurements were not required as the sum of the 1g SAR measurements did not exceed 1.6 W/kg.

Position Head	LTE Band 17, 1RB 1g SAR (W/kg) CH 23780 (Scaled SAR values)	WLAN 2.4GHz 1g SAR (W/kg) CH 6 (Scaled SAR values)	∑ 1g SAR (W/kg)
Left Cheek	0.14	0.14	0.28
Left 15°	0.08	0.14	0.22
Right Cheek	0.13	0.14	0.27
Right 15°	0.08	0.14	0.22
Simultaneous Transmission KDB 447498 D01 KDB 248227 D01 Section 6.5. The highest reported SAR for the 802.11 transmission modes in the frequency band was used for simultaneous transmission SAR test exclusion			

Simultaneous SAR measurements were not required as the sum of the 1g SAR measurements did not exceed 1.6 W/kg.

Position Body	LTE Band 17, 1RB 1g SAR (W/kg) CH 23780 (Scaled SAR values)	WLAN 2.4GHz 1g SAR (W/kg) CH 6 (Scaled SAR values)	∑ 1g SAR (W/kg)
Front Facing	0.21	0.19	0.40
Rear Facing	0.28	0.19	0.47
Right Edge	0.16	0.19	0.35
Left Edge	0.15	0.19	0.34
Bottom Edge	0.01	0.19	0.20
Simultaneous Transmission KDB 447498 D01 Testing was carried out with a 10mm separation distance to meet the requirements of KDB 941225 D06 KDB 248227 D01 Section 6.5. The highest reported SAR for the 802.11 transmission modes in the frequency band was used for simultaneous transmission SAR test exclusion			

Simultaneous SAR measurements were not required as the sum of the 1g SAR measurements did not exceed 1.6 W/kg.

Position Head	GPRS 1900 1g SAR (W/kg) CH 512 (Scaled SAR values)	WLAN 2.4GHz 1g SAR (W/kg) CH 6 (Scaled SAR values)	∑ 1g SAR (W/kg)
Left Cheek	0.34	0.14	0.48
Left 15°	0.16	0.14	0.30
Right Cheek	0.38	0.14	0.52
Right 15°	0.20	0.14	0.34
Simultaneous Transmission KDB 447498 D01 KDB 248227 D01 Section 6.5. The highest reported SAR for the 802.11 transmission modes in the frequency band was used for simultaneous transmission SAR test exclusion.			

Simultaneous SAR measurements were not required as the sum of the 1g SAR measurements did not exceed 1.6 W/kg.

Position Body	GPRS 1900 1g SAR (W/kg) CH 512 (Scaled SAR values)	WLAN 2.4GHz 1g SAR (W/kg) CH 6 (Scaled SAR values)	∑ 1g SAR (W/kg)
Front Facing	0.60	0.19	0.79
Rear Facing	0.52	0.19	0.71
Left Edge	0.31	0.19	0.50
Right Edge	0.20	0.19	0.39
Top Edge	0.60	0.19	0.79
Bottom Edge	0.52	0.19	0.71
Simultaneous Transmission KDB 447498 D01 Testing was carried out with a 10mm separation distance to meet the requirements of KDB 941225 D06 KDB 248227 D01 Section 6.5. The highest reported SAR for the 802.11 transmission modes in the frequency band was used for simultaneous transmission SAR test exclusion.			

Simultaneous SAR measurements were not required as the sum of the 1g SAR measurements did not exceed 1.6 W/kg.

Product Service

1.4.4 Standalone SAR Estimation

When the standalone SAR test exclusion of section 4.3.1 is applied to an antenna that transmits simultaneously with other antennas, the standalone SAR must be estimated according to the following to determine simultaneous transmission SAR test exclusion. The estimated SAR is only used to determine simultaneous transmission SAR test exclusion; When SAR is estimated, it must be applied to determine the sum of 1-g SAR test exclusion. When SAR to peak location separation ratio test exclusion is applied, the highest reported SAR for simultaneous transmission can be an estimated standalone SAR if the estimated SAR is the highest among the simultaneously transmitting antennas (see KDB 690783).

(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)]·[√f(GHz)/7.5] W/kg for test separation distances ≤ 50 mm;

where x = 7.5 for 1-g SAR, and x = 18.75 for 10-g SAR

when the minimum test separation distance is <5mm, a distance of 5mm is applied.

Bluetooth SAR Estimation

Test Configuration	Frequency (MHz)	Maximum Power (mW)	Distance (mm)	Estimated SAR (W/kg)
Head	2.440	5.37	5	0.224
Body	2.440	5.37	10	0.112

Product Service

1.4.5 Standalone SAR Test Exclusion Considerations (KDB 447498 D01)

The 1g 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)] [√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.

Band	Frequency (MHz)	Max Power		Test Position	Distance (mm)	Threshold	Test Exclusion
		(dBm)	(mW)				
GSM 850MHz	836.4	33.4	2178.76	Head	< 5	400.2	No
GPRS 850MHz	836.4	28.4	691.83	Head	< 5	126.5	No
				Body	10	63.3	No
WCDMA FDD V	846.6	24.0	251.19	Head	< 5	46.2	No
				Body	10	23.1	No
LTE Band 17	0.709	24.0	251.19	Head	< 5	42.3	No
				Body	10	21.2	No
GSM 1900MHz	1850.2	30.4	1096.47	Head	< 5	298.3	No
GPRS 1900MHz	1850.2	25.4	346.73	Head	< 5	94.3	No
				Body	10	47.2	No
WLAN 2.4 GHz	2437.0	13.0	19.95	Head	< 5	6.2	Yes
				Body	10	3.1	Yes
Bluetooth	2.440	7.3	5.37	Head	< 5	1.7	Yes
				Body	10	0.8	Yes

Product Service

1.4.6 Technical Description

The equipment under test (EUT) was a Sharp GSM900, DCS1800, WCDMA FFD1, LTE BAND1, LTE BAND3 ,WLAN 2.4GHz Quad-band LTE (B1/ B3/ B17/ B26), Dual-band WCDMA (FDD I / V) , Quad-band GSM (850/900/1800/1900) & WiMAX2+ (TDD41) multi mode Smart phone with Bluetooth, WLAN, SRD(NFC,FeliCa) and GPS. A full technical description can be found in the manufacturer's documentation.

1.4.7 Test Configuration and Modes of Operation

The testing was performed with an integral battery supplied and manufactured by Sharp Corporation. The battery was fully charged before each measurement and there were no external connections.

For head SAR assessment, testing was performed with the device in the declared normal position of operation for GSM 850MHz, PCS 1900MHz, LTE Band 17, WCDMA FDD V, and WLAN 2.4GHz frequency bands at maximum power. The device 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 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 body SAR assessment, testing was performed for GSM 850MHz, PCS 1900MHz, LTE Band 17, WCDMA FDD V, and WLAN 2.4GHz frequency bands at maximum power. The device was placed at a distance of 10 mm from the bottom of the flat phantom for all body testing. The Flat Phantom dimensions were 245mm x 195mm x 200mm with a sidewall thickness of 2.00mm. The phantom was filled to a minimum depth of 150mm with the appropriate Body simulant liquid. The dielectric properties were in accordance with the requirements specified in KDB 865665. As the device is capable of hotspot configuration a 10mm separation distance was used to meet the requirements of KDB 941225 D06 Hotspot.

Testing was performed in each position at the frequency that gave the highest output power for each band. Some SAR levels were found to be > 0.80 W/kg (KDB 447498 D01) therefore additional testing was required at the relevant frequencies / channels of the bands. WLAN testing was achieved using the devices internal software, customer supplied software and settings supplied by the customer. The worst case data rate for WLAN testing was obtained from data provided by TUV. The worst case was deemed as the data rate which produced the highest level of conducted average power. For 2.4GHz WLAN this was 1Mbps for 802.11b.

SAR testing for 802.11g/n channels was not required to be carried out based on the measured maximum average output power being less than ¼ dB higher than that measured on the corresponding 802.11b channels respectively.

SAR testing for UMTS band V is measured using the 12.2 kbps RMC with the TPC bits configured to all 1's. SAR for other spreading codes and multiple DPDCHn was not required to be carried out based on the measured maximum average output power of each RF channel for each spreading code and DPDCHn configuration being less than ¼ dB higher than those measured in 12.2 kbps RMC. SAR testing for HSDPA and HSUPA was not required to be carried out based on the measured maximum average output of each RF channel with HSDPA/HSUPA active being less than ¼ dB higher than that measured without HSDPA using 12.2 kbps RMC.

SAR testing for LTE Band 17 was carried out in the following configurations as per KDB 941225 D05 section 5.2. For 1 Resource block, 10MHz bandwidth, Middle Offset. . For 50% (25) Resource blocks, 10MHz bandwidth, High Offset. The requirements to test other resource block allocations and higher order modulations were not met.

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 along with photographs indicating the positioning of the handset against the body as appropriate.

1.4.8 VoLTE Comparison Measurements

Measurements were made on the worst case channel and resource block configurations to demonstrate that VoLTE carrier power levels were not more than 0.25 dB higher than the RMC configuration.

VoLTE Configuration – AMR 12.2 kbps

Band 17 – 10 MHz - QPSK

Resource Block Allocation	Resource Block Offset	Channel	Carrier Power (dBm)		
			RMC	VoLTE	Difference (dB)
1	Mid	Bottom	22.88	22.80	-0.08
25	High	Bottom	21.89	21.84	-0.05

The following VoLTE configurations were tested to demonstrate that the EUT output power did not vary by more than 0.25 dB across all supported VoLTE codecs

AMR

Rate	kbit/s	Octet Aligned	Bandwidth Efficient
		Carrier Power (dBm)	
0	4.75	22.80	22.83
1	5.15	22.85	22.84
2	5.90	22.86	22.83
3	6.70	22.88	22.82
4	7.40	22.87	22.80
5	7.95	22.79	22.82
6	10.20	22.72	22.83
7	12.20	22.85	22.81

AMR-WB

Rate	kbit/s	Octet Aligned	Bandwidth Efficient
		Carrier Power (dBm)	
0	6.60	22.80	22.79
1	8.85	22.79	22.78
2	12.85	22.81	22.80
3	14.25	22.83	22.81
4	15.85	22.82	22.83
5	18.25	22.80	22.85
6	19.85	22.80	22.81
7	23.05	22.79	22.84
8	23.85	22.81	22.83

EVS Primary

		Carrier Power (dBm)
DTX	Not Present	22.84
	Enable	22.87
	Disable	22.87

EVS-AMR-WB-IO

Rate	kbit/s	Power (dBm)
0	6.60	22.88
1	8.85	22.86
2	12.85	22.90
3	14.25	22.90
4	15.85	22.83
5	18.25	22.89
6	19.85	22.91
7	23.05	22.89
8	23.85	22.88

Temperature: 24.2 ˚C Humidity: 56.2 %

Instrument Description	Manufacturer	Model Type	TE Number	Cal Period (months)	Calibration Due Date
Hygrometer	Rotronic	I-1000	3220	12	19-Aug-2016
Digital Multi-meter	Iso-tech	IDM93N	4435	12	25-Aug-2017
2 metre SMA Cable	Florida Labs	SMS-235SP-78.8-SMS	4517	12	16-Feb-2017
Wideband Radio Test Set	Rohde & Schwarz	CMW500	4546	12	03-Feb-2017
4 Channel PSU	Rohde & Schwarz	HMP4040	4736	-	TU

Product Service

1.5 FCC POWER MEASUREMENTS

1.5.1 Method

Conducted power measurements were made using a power meter.

1.5.2 Conducted Power Measurements

PCS 1900

Mode	Frequency (MHz)	Duty Cycle (%)	Burst Average Power (dBm)	Frame Average Power (dBm)
Voice	1850.2	12.5	29.54	20.26
Voice	1880.0	12.5	29.51	20.20
Voice	1909.8	12.5	29.36	20.06
GPRS - 1 Timeslot	1850.2	12.5	29.52	20.07
GPRS - 1 Timeslot	1880.0	12.5	29.49	20.01
GPRS - 1 Timeslot	1909.8	12.5	29.40	19.90
GPRS - 2 Timeslot	1850.2	25.0	27.21	20.82
GPRS - 2 Timeslot	1880.0	25.0	26.93	20.54
GPRS - 2 Timeslot	1909.8	25.0	27.02	20.59
GPRS - 3 Timeslot	1850.2	37.5	25.27	20.65
GPRS - 3 Timeslot	1880.0	37.5	25.15	20.58
GPRS - 3 Timeslot	1909.8	37.5	25.29	20.67
GPRS - 4 Timeslot	1850.2	50.0	24.30	21.00
GPRS - 4 Timeslot	1880.0	50.0	24.21	20.88
GPRS - 4 Timeslot	1909.8	50.0	24.17	20.82

GSM 850

Mode	Frequency (MHz)	Duty Cycle (%)	Burst Average Power (dBm)	Frame Average Power (dBm)
Voice	824.2	12.5	31.85	22.42
Voice	836.4	12.5	32.02	22.63
Voice	848.8	12.5	31.99	22.60
GPRS - 1 Timeslot	824.2	12.5	31.87	22.34
GPRS - 1 Timeslot	836.4	12.5	32.04	22.49
GPRS - 1 Timeslot	848.8	12.5	31.90	22.44
GPRS - 2 Timeslot	824.2	25.0	29.57	23.07
GPRS - 2 Timeslot	836.4	25.0	29.58	23.09
GPRS - 2 Timeslot	848.8	25.0	29.59	23.09
GPRS - 3 Timeslot	824.2	37.5	27.82	23.12
GPRS - 3 Timeslot	836.4	37.5	27.88	23.18
GPRS - 3 Timeslot	848.8	37.5	27.79	23.10
GPRS - 4 Timeslot	824.2	50.0	26.80	23.37
GPRS - 4 Timeslot	836.4	50.0	26.85	23.40
GPRS - 4 Timeslot	848.8	50.0	26.73	23.28

Product Service

LTE Band 17

Mode	Frequency (MHz)	Duty Cycle (%)	Burst Average Power (dBm)	Frame Average Power (dBm)
5 MHz - QPSK - 1 RB (B)	706.5	100	22.78	22.78
5 MHz - QPSK - 1 RB (B)	710.0	100	22.55	22.55
5 MHz - QPSK - 1 RB (B)	713.5	100	22.72	22.72
10 MHz - QPSK - 1 RB (B)	709.0	100	22.69	22.69
10 MHz - QPSK - 1 RB (B)	710.0	100	22.79	22.79
10 MHz - QPSK - 1 RB (B)	711.0	100	23.11	23.11
10 MHz - QPSK - 1 RB (M)	709.0	100	22.93	22.93
10 MHz - QPSK - 1 RB (M)	710.0	100	22.84	22.84
10 MHz - QPSK - 1 RB (M)	711.0	100	22.81	22.81
5 MHz - QPSK - 1 RB (M)	706.5	100	22.63	22.63
5 MHz - QPSK - 1 RB (M)	710.0	100	22.92	22.92
5 MHz - QPSK - 1 RB (M)	713.5	100	22.82	22.82
5 MHz - QPSK - 1 RB (T)	706.5	100	22.63	22.63
5 MHz - QPSK - 1 RB (T)	710.0	100	22.92	22.92
5 MHz - QPSK - 1 RB (T)	713.5	100	22.82	22.82
10 MHz - QPSK - 1 RB (T)	709.0	100	22.82	22.82
10 MHz - QPSK - 1 RB (T)	710.0	100	22.78	22.78
10 MHz - QPSK - 1 RB (T)	711.0	100	22.56	22.56
10 MHz - QPSK - 50 % RB (B)	709.0	100	21.97	21.97
10 MHz - QPSK - 50 % RB (B)	710.0	100	21.98	21.98
10 MHz - QPSK - 50 % RB (B)	711.0	100	21.92	21.92
5 MHz - QPSK - 50 % RB (B)	706.5	100	21.69	21.69
5 MHz - QPSK - 50 % RB (B)	710.0	100	21.81	21.81
5 MHz - QPSK - 50 % RB (B)	713.5	100	21.80	21.80
5 MHz - QPSK - 50 % RB (M)	706.5	100	21.82	21.82
5 MHz - QPSK - 50 % RB (M)	710.0	100	21.68	21.68
5 MHz - QPSK - 50 % RB (M)	713.5	100	21.70	21.70
10 MHz - QPSK - 50 % RB (M)	709.0	100	21.80	21.80
10 MHz - QPSK - 50 % RB (M)	710.0	100	21.96	21.96

10 MHz - QPSK - 50 % RB (M)	711.0	100	21.91	21.91
10 MHz - QPSK - 50 % RB (T)	709.0	100	21.98	21.98
10 MHz - QPSK - 50 % RB (T)	710.0	100	21.77	21.77
10 MHz - QPSK - 50 % RB (T)	711.0	100	21.81	21.81
5 MHz - QPSK - 50 % RB (T)	706.5	100	21.77	21.77
5 MHz - QPSK - 50 % RB (T)	710.0	100	21.85	21.85
5 MHz - QPSK - 50 % RB (T)	713.5	100	21.75	21.75
5 MHz - QPSK - 100 % RB	706.5	100	21.95	21.95
5 MHz - QPSK - 100 % RB	710.0	100	21.74	21.74
5 MHz - QPSK - 100 % RB	713.5	100	21.79	21.79
10 MHz - QPSK - 100 % RB	709.0	100	21.92	21.92
10 MHz - QPSK - 100 % RB	710.0	100	21.93	21.93
10 MHz - QPSK - 100 % RB	711.0	100	21.81	21.81
10 MHz - 16QAM - 1 RB (B)	709.0	100	22.09	22.09
10 MHz - 16QAM - 1 RB (B)	710.0	100	21.52	21.52
10 MHz - 16QAM - 1 RB (B)	711.0	100	21.95	21.95
5 MHz - 16QAM - 1 RB (B)	706.5	100	21.80	21.80
5 MHz - 16QAM - 1 RB (B)	710.0	100	21.80	21.80
5 MHz - 16QAM - 1 RB (B)	713.5	100	21.75	21.75
5 MHz - 16QAM - 1 RB (M)	706.5	100	21.90	21.90
5 MHz - 16QAM - 1 RB (M)	710.0	100	21.86	21.86
5 MHz - 16QAM - 1 RB (M)	713.5	100	21.77	21.77
10 MHz - 16QAM - 1 RB (M)	709.0	100	22.81	22.81
10 MHz - 16QAM - 1 RB (M)	710.0	100	21.37	21.37
10 MHz - 16QAM - 1 RB (M)	711.0	100	21.93	21.93
10 MHz - 16QAM - 1 RB (T)	709.0	100	22.24	22.24
10 MHz - 16QAM - 1 RB (T)	710.0	100	21.13	21.13
10 MHz - 16QAM - 1 RB (T)	711.0	100	21.69	21.69
5 MHz - 16QAM - 1 RB (T)	706.5	100	21.56	21.56
5 MHz - 16QAM - 1 RB (T)	710.0	100	21.73	21.73
5 MHz - 16QAM - 1 RB (T)	713.5	100	21.11	21.11

5 MHz - 16QAM - 50 % RB (B)	706.5	100	20.60	20.60
5 MHz - 16QAM - 50 % RB (B)	710.0	100	20.73	20.73
5 MHz - 16QAM - 50 % RB (B)	713.5	100	20.64	20.64
10 MHz - 16QAM - 50 % RB (B)	709.0	100	21.19	21.19
10 MHz - 16QAM - 50 % RB (B)	710.0	100	20.84	20.84
10 MHz - 16QAM - 50 % RB (B)	711.0	100	20.87	20.87
10 MHz - 16QAM - 50 % RB (M)	709.0	100	20.86	20.86
10 MHz - 16QAM - 50 % RB (M)	710.0	100	20.89	20.89
10 MHz - 16QAM - 50 % RB (M)	711.0	100	20.82	20.82
5 MHz - 16QAM - 50 % RB (M)	706.5	100	20.65	20.65
5 MHz - 16QAM - 50 % RB (M)	710.0	100	20.52	20.52
5 MHz - 16QAM - 50 % RB (M)	713.5	100	20.54	20.54
5 MHz - 16QAM - 50 % RB (T)	706.5	100	20.76	20.76
5 MHz - 16QAM - 50 % RB (T)	710.0	100	20.79	20.79
5 MHz - 16QAM - 50 % RB (T)	713.5	100	20.83	20.83
10 MHz - 16QAM - 50 % RB (T)	709.0	100	20.74	20.74
10 MHz - 16QAM - 50 % RB (T)	710.0	100	21.00	21.00
10 MHz - 16QAM - 50 % RB (T)	711.0	100	20.92	20.92
10 MHz - 16QAM - 100 % RB	709.0	100	20.99	20.99
10 MHz - 16QAM - 100 % RB	710.0	100	20.84	20.84
10 MHz - 16QAM - 100 % RB	711.0	100	20.86	20.86
5 MHz - 16QAM - 100 % RB	706.5	100	20.97	20.97
5 MHz - 16QAM - 100 % RB	710.0	100	20.94	20.94
5 MHz - 16QAM - 100 % RB	713.5	100	20.80	20.80

Product Service

WCDMA FDD V

Mode	Frequency (MHz)	Duty Cycle (%)	Burst Average Power (dBm)	Frame Average Power (dBm)
12.2kbps RMC	826.4	100	23.28	23.28
12.2kbps RMC	835.0	100	23.36	23.36
12.2kbps RMC	846.6	100	23.41	23.41
12.2kbps AMR with 3.4kbps SRB	826.4	100	23.27	23.27
12.2kbps AMR with 3.4kbps SRB	835.0	100	23.31	23.31
12.2kbps AMR with 3.4kbps SRB	846.6	100	23.35	23.35
HSDPA - Subtest 1	826.4	100	22.31	22.31
HSDPA - Subtest 1	835.0	100	22.33	22.33
HSDPA - Subtest 1	846.6	100	22.34	22.34
HSDPA - Subtest 2	826.4	100	21.87	21.87
HSDPA - Subtest 2	835.0	100	21.90	21.90
HSDPA - Subtest 2	846.6	100	21.92	21.92
HSDPA - Subtest 3	826.4	100	21.15	21.15
HSDPA - Subtest 3	835.0	100	21.26	21.26
HSDPA - Subtest 3	846.6	100	21.29	21.29
HSDPA - Subtest 4	826.4	100	21.21	21.21
HSDPA - Subtest 4	835.0	100	21.23	21.23
HSDPA - Subtest 4	846.6	100	21.25	21.25
HSUPA - Subtest 1	826.4	100	22.23	22.23
HSUPA - Subtest 1	835.0	100	22.36	22.36
HSUPA - Subtest 1	846.6	100	22.41	22.41
HSUPA - Subtest 2	826.4	100	21.91	21.91
HSUPA - Subtest 2	835.0	100	21.78	21.78
HSUPA - Subtest 2	846.6	100	21.87	21.87
HSUPA - Subtest 3	826.4	100	22.44	22.44
HSUPA - Subtest 3	835.0	100	22.39	22.39
HSUPA - Subtest 3	846.6	100	22.39	22.39
HSUPA - Subtest 4	826.4	100	22.47	22.47
HSUPA - Subtest 4	835.0	100	22.42	22.42
HSUPA - Subtest 4	846.6	100	22.40	22.40
HSUPA - Subtest 5	826.4	100	22.47	22.47
HSUPA - Subtest 5	835.0	100	22.42	22.42
HSUPA - Subtest 5	846.6	100	22.39	22.39

WLAN 2450 MHz

Mode	Frequency (MHz)	Duty Cycle (%)	Burst Average Power (dBm)	Frame Average Power (dBm)
802.11b - 20 MHz - 1 Mbps	2402	100	11.26	11.26
802.11b - 20 MHz - 1 Mbps	2437	100	11.82	11.82
802.11b - 20 MHz - 1 Mbps	2462	100	11.72	11.72
802.11g - 20 MHz - 6 Mbps	2402	98	10.73	10.64
802.11g - 20 MHz - 6 Mbps	2437	98	11.13	11.04
802.11g - 20 MHz - 6 Mbps	2462	98	10.75	10.66
802.11n - 20 MHz - MCS0	2402	98	10.77	10.68
802.11n - 20 MHz - MCS0	2437	98	11.13	11.04
802.11n - 20 MHz - MCS0	2462	98	10.75	10.66

Product Service

SECTION 2

TEST DETAILS

Specific Absorption Rate Testing of the
Sharp Quad-band LTE (B1/ B3/ B17/ B26), Dual-band WCDMA (FDD I / V) , Quad-band GSM (850/900/1800/1900) & WiMAX2+ (TDD41) multi mode Smart phone with Bluetooth, WLAN, SRD(NFC,FeliCa) and GPS

2.1 DASY5 MEASUREMENT SYSTEM

2.1.1 System Description

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

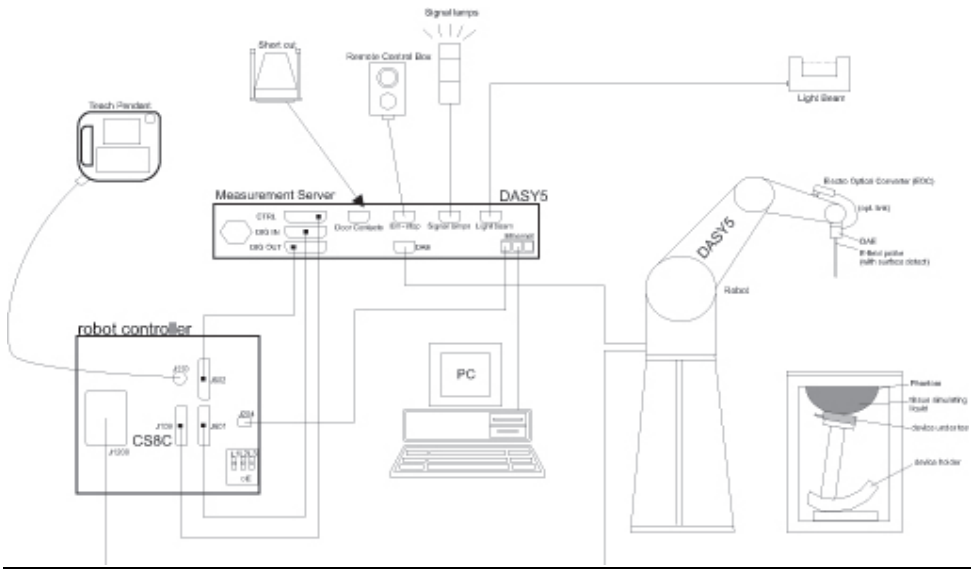

Figure 1 System Description Diagram

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 200MOhm; 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 30mm3 (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 2.7mm 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 5mm.

2.1.6 Averaging and Determination of Spacial Peak SAR

The interpolated data is used to average the SAR over the 1g and 10g 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.

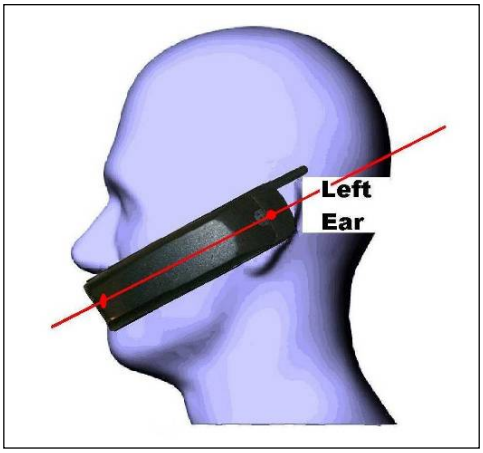

Figure 2 Side view of mobile next to head showing alignment

The Cheek Position

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.

The 15° Position

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°.

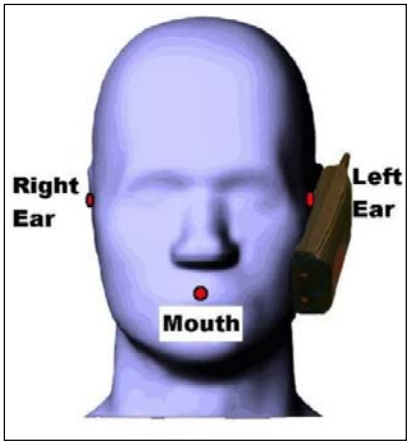

Figure 3 Cheek position

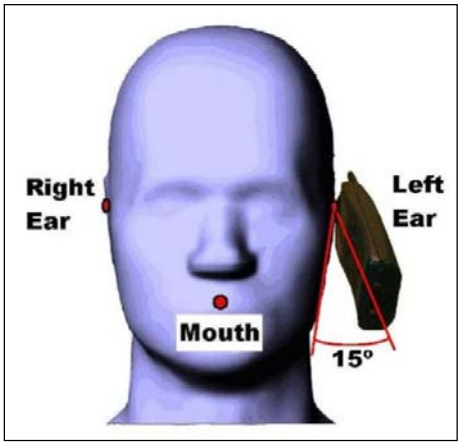

Figure 4 15º Tilt Position

2.2 GSM 850 HEAD SAR TEST RESULTS

SOFTWARE VERSION:	52.8.8(1258)	**AMBIENT TEMPERATURE:**	22.4 °C
DATE:	22/08/2016	**RELATIVE HUMIDITY:**	64.1 %
PHANTOM:	QD000P40CD	**RELATIVE PERMITTIVITY:**	0.938 S/m
DUT CONFIGURATION:	GSM 850	**CONDUCTIVITY:**	40.978
DUT POSITION:	Left - Cheek	**LIQUID TEMPERATURE:**	22.1 °C
RAT:	GSM	**SCAN TYPE:**	Full
FREQUENCY:	836.4 MHz	**DRIFT:**	-1.21 dB
MODULATION:	GMSK	**PEAK SAR:**	0.51 W/kg
DUTY CYCLE:	12.5 %	**SAR (1g):**	0.59 W/kg

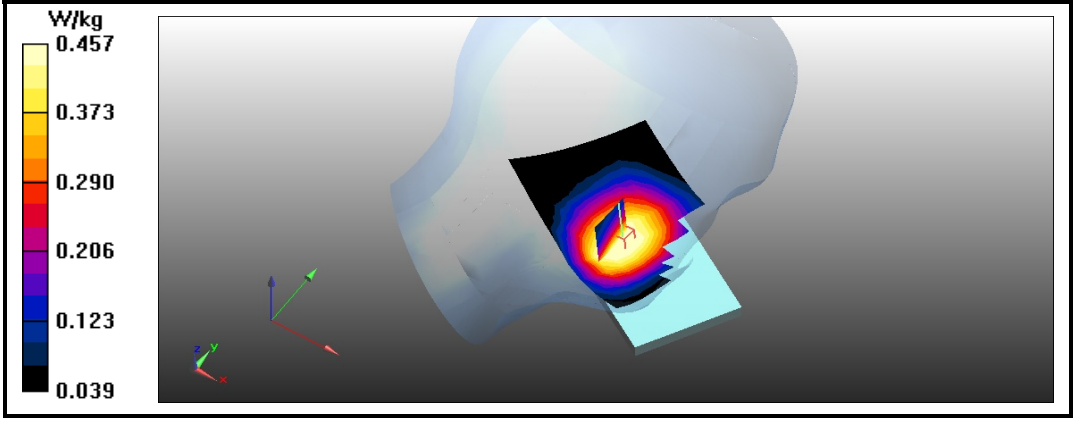

Figure 5: SAR Head Testing Results for the Sharp Smart phone at 836.4 MHz.

SOFTWARE VERSION:	52.8.8(1258)	**AMBIENT TEMPERATURE:**	22.4 °C
DATE:	22/08/2016	**RELATIVE HUMIDITY:**	64.1 %
PHANTOM:	QD000P40CD	**RELATIVE PERMITTIVITY:**	0.938 S/m
DUT CONFIGURATION:	GSM 850	**CONDUCTIVITY:**	40.978
DUT POSITION:	Left - 15°	**LIQUID TEMPERATURE:**	22.1 °C
RAT:	GSM	**SCAN TYPE:**	Full
FREQUENCY:	836.4 MHz	**DRIFT:**	-0.05 dB
MODULATION:	GMSK	**PEAK SAR:**	0.25 W/kg
DUTY CYCLE:	12.5 %	**SAR (1g):**	0.29 W/kg

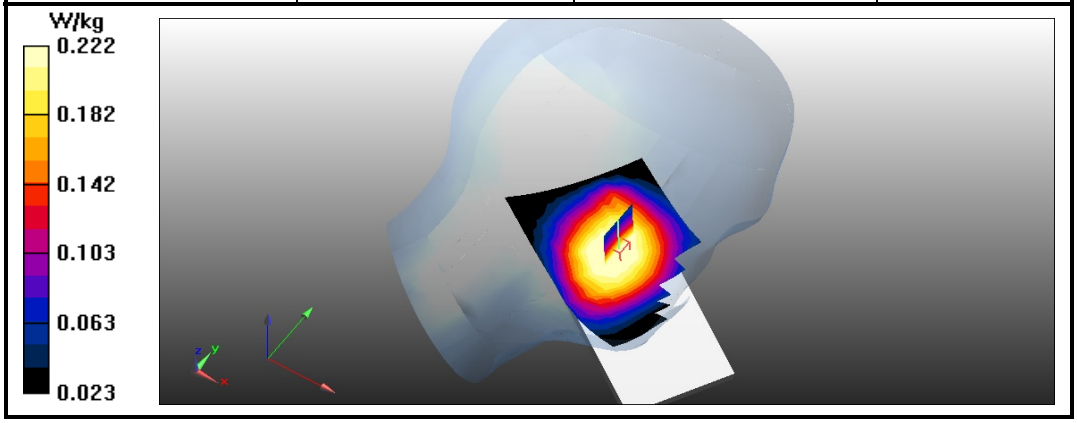

Figure 6: SAR Head Testing Results for the Sharp Smart phone at 836.4 MHz.

SOFTWARE VERSION:	52.8.8(1258)	**AMBIENT TEMPERATURE:**	22.4 °C
DATE:	22/08/2016	**RELATIVE HUMIDITY:**	64.1 %
PHANTOM:	QD000P40CD	**RELATIVE PERMITTIVITY:**	0.938 S/m
DUT CONFIGURATION:	GSM 850	**CONDUCTIVITY:**	40.978
DUT POSITION:	Right - Cheek	**LIQUID TEMPERATURE:**	22.1 °C
RAT:	GSM	**SCAN TYPE:**	Full
FREQUENCY:	836.4 MHz	**DRIFT:**	0.39 dB
MODULATION:	GMSK	**PEAK SAR:**	0.43 W/kg
DUTY CYCLE:	12.5 %	**SAR (1g):**	0.51 W/kg

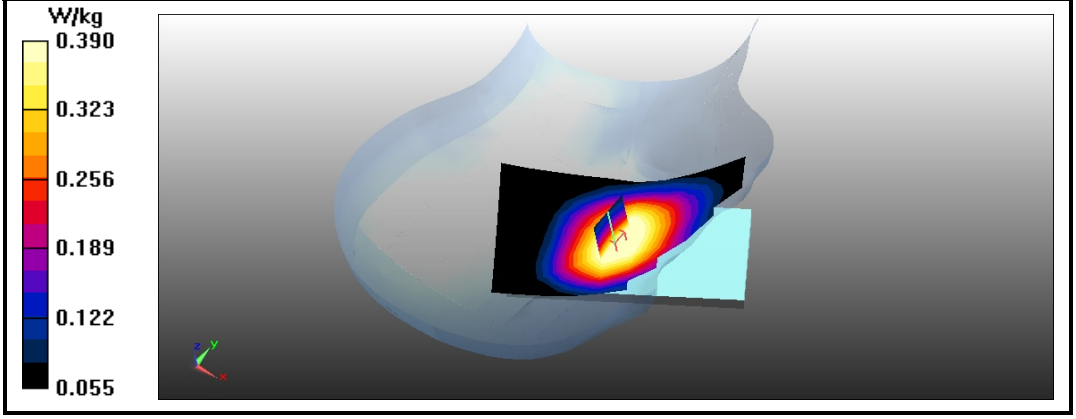

Figure 7: SAR Head Testing Results for the Sharp Smart phone at 836.4 MHz.

SOFTWARE VERSION:	52.8.8(1258)	**AMBIENT TEMPERATURE:**	22.4 °C
DATE:	22/08/2016	**RELATIVE HUMIDITY:**	64.1 %
PHANTOM:	QD000P40CD	**RELATIVE PERMITTIVITY:**	0.938 S/m
DUT CONFIGURATION:	GSM 850	**CONDUCTIVITY:**	40.978
DUT POSITION:	Right - 15°	**LIQUID TEMPERATURE:**	22.1 °C
RAT:	GSM	**SCAN TYPE:**	Full
FREQUENCY:	836.4 MHz	**DRIFT:**	-0.00 dB
MODULATION:	GMSK	**PEAK SAR:**	0.43 W/kg
DUTY CYCLE:	12.5 %	**SAR (1g):**	0.26 W/kg

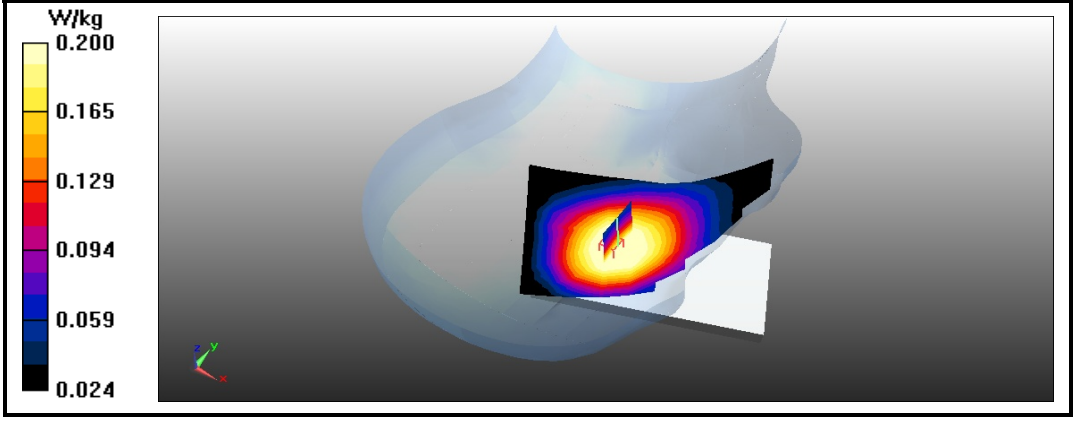

Figure 8: SAR Head Testing Results for the Sharp Smart phone at 836.4 MHz.

2.3 GSM 850 GPRS HEAD SAR TEST RESULTS

SOFTWARE VERSION:	52.8.8(1258)	**AMBIENT TEMPERATURE:**	22.4 °C
DATE:	22/08/2016	**RELATIVE HUMIDITY:**	64.1 %
PHANTOM:	QD000P40CD	**RELATIVE PERMITTIVITY:**	0.938 S/m
DUT CONFIGURATION:	GSM 850	**CONDUCTIVITY:**	40.978
DUT POSITION:	Left - Cheek	**LIQUID TEMPERATURE:**	22.1 °C
RAT:	GSM	**SCAN TYPE:**	Full
FREQUENCY:	836.4 MHz	**DRIFT:**	-0.14 dB
MODULATION:	GMSK - 4 Timeslots	**PEAK SAR:**	0.58 W/kg
DUTY CYCLE:	50.0 %	**SAR (1g):**	0.69 W/kg

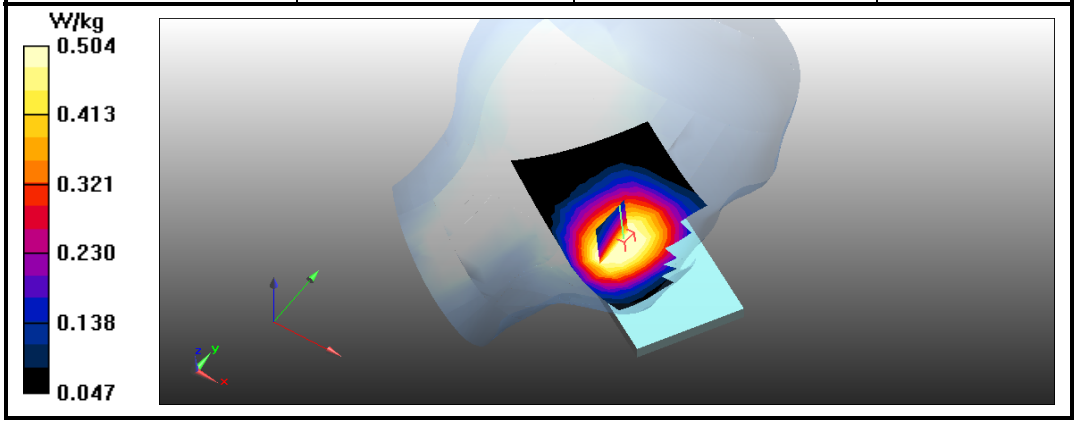

Figure 9: SAR Head Testing Results for the Sharp Smart phone at 836.4 MHz.

SOFTWARE VERSION:	52.8.8(1258)	**AMBIENT TEMPERATURE:**	22.4 °C
DATE:	22/08/2016	**RELATIVE HUMIDITY:**	64.1 %
PHANTOM:	QD000P40CD	**RELATIVE PERMITTIVITY:**	0.938 S/m
DUT CONFIGURATION:	GSM 850	**CONDUCTIVITY:**	40.978
DUT POSITION:	Left - 15°	**LIQUID TEMPERATURE:**	22.1 °C
RAT:	GSM	**SCAN TYPE:**	Full
FREQUENCY:	836.4 MHz	**DRIFT:**	-0.07 dB
MODULATION:	GMSK - 4 Timeslots	**PEAK SAR:**	0.30 W/kg
DUTY CYCLE:	50.0 %	**SAR (1g):**	0.36 W/kg

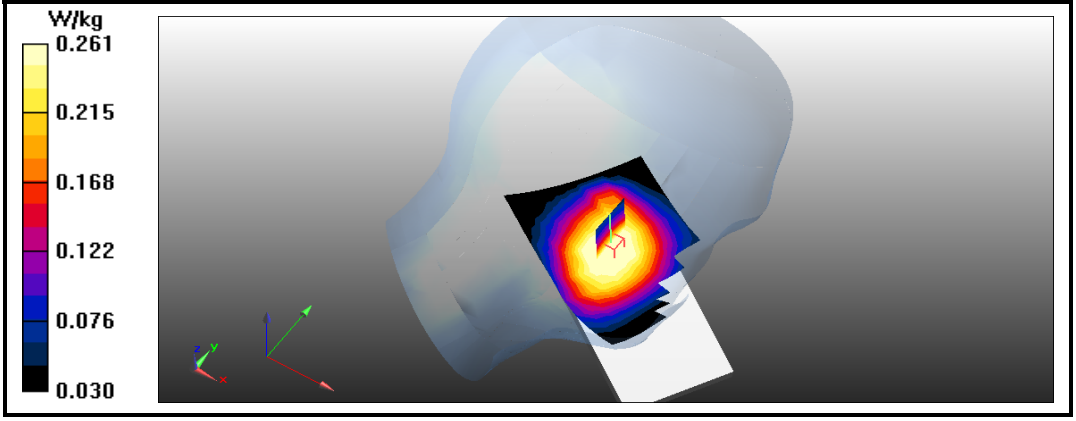

Figure 10: SAR Head Testing Results for the Sharp Smart phone at 836.4 MHz.

Product Service

SOFTWARE VERSION:	52.8.8(1258)	**AMBIENT TEMPERATURE:**	22.4 °C
DATE:	22/08/2016	**RELATIVE HUMIDITY:**	64.1 %
PHANTOM:	QD000P40CD	**RELATIVE PERMITTIVITY:**	0.938 S/m
DUT CONFIGURATION:	GSM 850	**CONDUCTIVITY:**	40.978
DUT POSITION:	Right - Cheek	**LIQUID TEMPERATURE:**	22.1 °C
RAT:	GSM	**SCAN TYPE:**	Full
FREQUENCY:	836.4 MHz	**DRIFT:**	-0.14 dB
MODULATION:	GMSK - 4 Timeslots	**PEAK SAR:**	0.48 W/kg
DUTY CYCLE:	50.0 %	**SAR (1g):**	0.60 W/kg

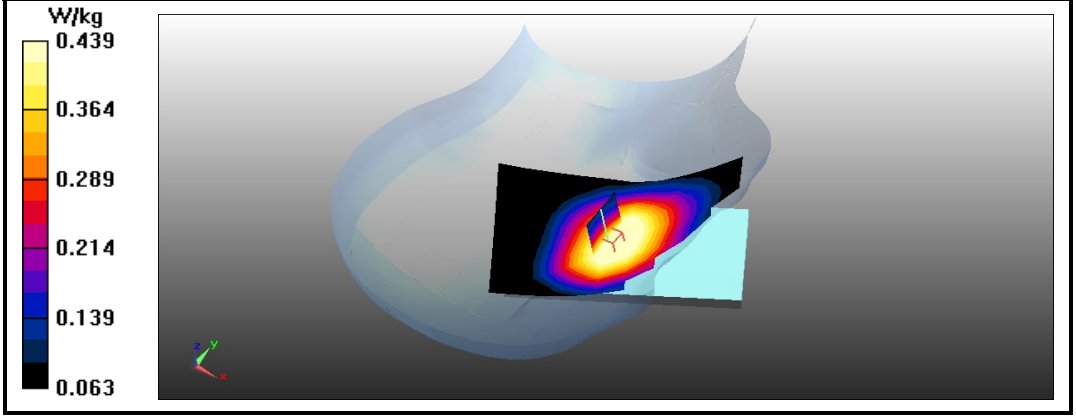

Figure 11: SAR Head Testing Results for the Sharp Smart phone at 836.4 MHz.

SOFTWARE VERSION:	52.8.8(1258)	**AMBIENT TEMPERATURE:**	22.4 °C
DATE:	22/08/2016	**RELATIVE HUMIDITY:**	64.1 %
PHANTOM:	QD000P40CD	**RELATIVE PERMITTIVITY:**	0.938 S/m
DUT CONFIGURATION:	GSM 850	**CONDUCTIVITY:**	40.978
DUT POSITION:	Right - 15°	**LIQUID TEMPERATURE:**	22.1 °C
RAT:	GSM	**SCAN TYPE:**	Full
FREQUENCY:	836.4 MHz	**DRIFT:**	-0.08 dB
MODULATION:	GMSK - 4 Timeslots	**PEAK SAR:**	0.25 W/kg
DUTY CYCLE:	50.0 %	**SAR (1g):**	0.31 W/kg

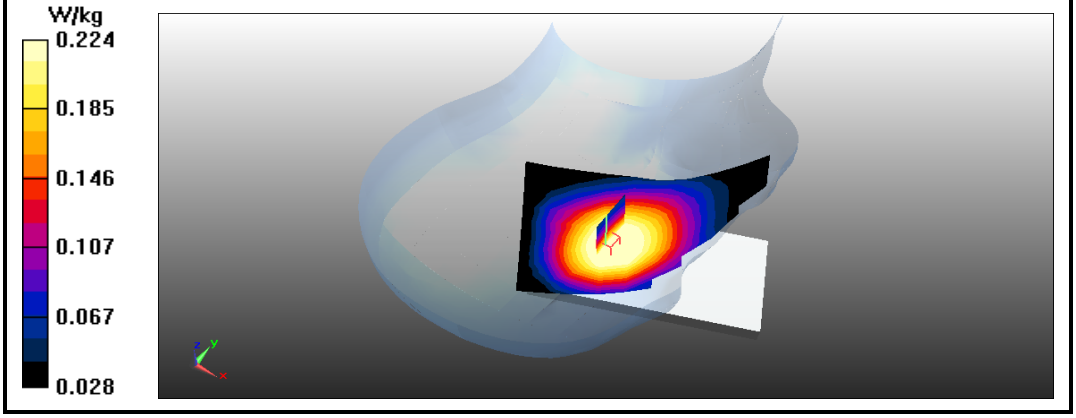

Figure 12: SAR Head Testing Results for the Sharp Smart phone at 836.4 MHz.

2.4 GSM 850 GPRS BODY SAR TEST RESULTS

SOFTWARE VERSION:	52.8.8(1258)	**AMBIENT TEMPERATURE:**	22.3 °C
DATE:	24/08/2016	**RELATIVE HUMIDITY:**	66.1 %
PHANTOM:	QDOVA003-FB	**RELATIVE PERMITTIVITY:**	0.971 S/m
DUT CONFIGURATION:	GSM 850	**CONDUCTIVITY:**	55.547
DUT POSITION:	10mm - Front Facing	**LIQUID TEMPERATURE:**	22.3 °C
RAT:	GSM	**SCAN TYPE:**	Full
FREQUENCY:	836.4 MHz	**DRIFT:**	-0.29 dB
MODULATION:	GMSK - 4 Timeslots	**PEAK SAR:**	0.65 W/kg
DUTY CYCLE:	50.0 %	**SAR (1g):**	0.75 W/kg

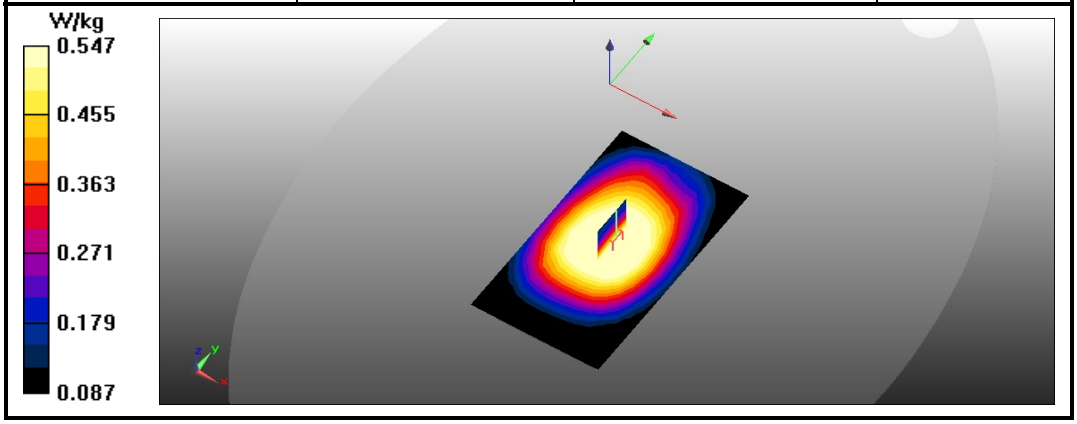

Figure 13: SAR Head Testing Results for the Sharp Smart phone at 836.4 MHz.

DATE:	24/08/2016	**RELATIVE HUMIDITY:**	66.1 %
PHANTOM:	QDOVA003-FB	**RELATIVE PERMITTIVITY:**	0.971 S/m
DUT CONFIGURATION:	GSM 850	**CONDUCTIVITY:**	55.547
DUT POSITION:	10mm - Rear Facing	**LIQUID TEMPERATURE:**	22.3 °C
RAT:	GSM	**SCAN TYPE:**	Full
FREQUENCY:	836.4 MHz	**DRIFT:**	-0.04 dB
MODULATION:	GMSK - 4 Timeslots	**PEAK SAR:**	0.69 W/kg
DUTY CYCLE:	50.0 %	**SAR (1g):**	0.83 W/kg

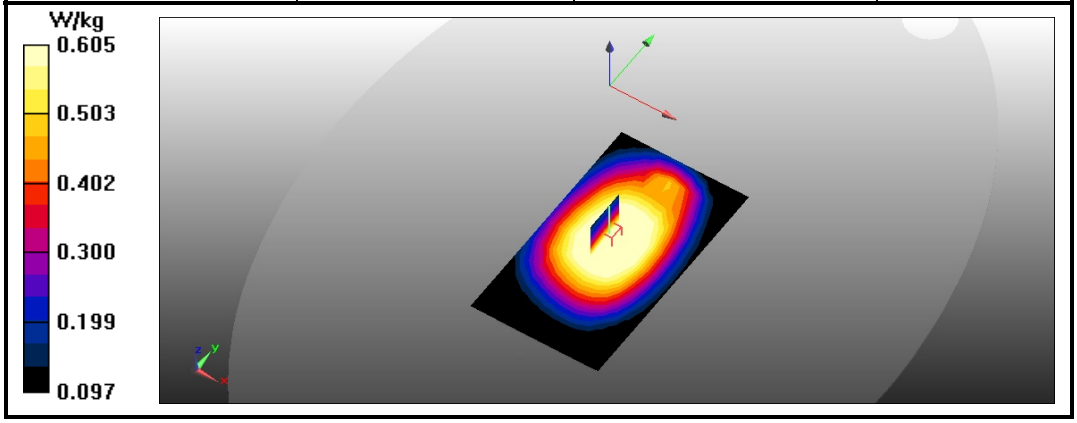

Figure 14: SAR Head Testing Results for the Sharp Smart phone at 836.4 MHz.

SOFTWARE VERSION:	52.8.8(1258)	**AMBIENT TEMPERATURE:**	22.3 °C
DATE:	24/08/2016	**RELATIVE HUMIDITY:**	66.1 %
PHANTOM:	QDOVA003-FB	**RELATIVE PERMITTIVITY:**	0.971 S/m
DUT CONFIGURATION:	GSM 850	**CONDUCTIVITY:**	55.547
DUT POSITION:	10mm - Right Edge	**LIQUID TEMPERATURE:**	22.3 °C
RAT:	GSM	**SCAN TYPE:**	Full
FREQUENCY:	836.4 MHz	**DRIFT:**	-0.19 dB
MODULATION:	GMSK - 4 Timeslots	**PEAK SAR:**	0.57 W/kg
DUTY CYCLE:	50.0 %	**SAR (1g):**	0.65 W/kg

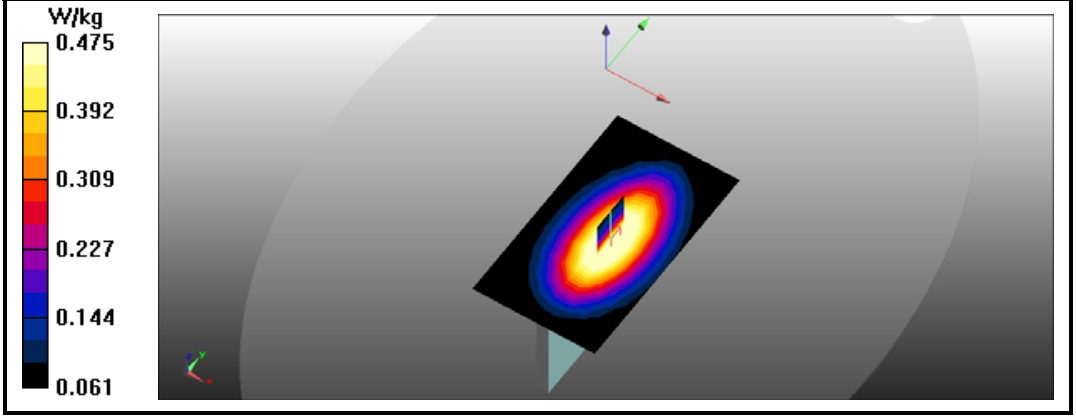

Figure 15: SAR Head Testing Results for the Sharp Smart phone at 836.4 MHz

SOFTWARE VERSION:	52.8.8(1258)	**AMBIENT TEMPERATURE:**	22.1 °C
DATE:	25/08/2016	**RELATIVE HUMIDITY:**	51.7 %
PHANTOM:	QDOVA003-FB	**RELATIVE PERMITTIVITY:**	0.971 S/m
DUT CONFIGURATION:	GSM 850	**CONDUCTIVITY:**	55.547
DUT POSITION:	10mm - Left Edge	**LIQUID TEMPERATURE:**	22.2 °C
RAT:	GSM	**SCAN TYPE:**	Full
FREQUENCY:	836.4 MHz	**DRIFT:**	-0.22 dB
MODULATION:	GMSK - 4 Timeslots	**PEAK SAR:**	0.41 W/kg
DUTY CYCLE:	50.0 %	**SAR (1g):**	0.46 W/kg

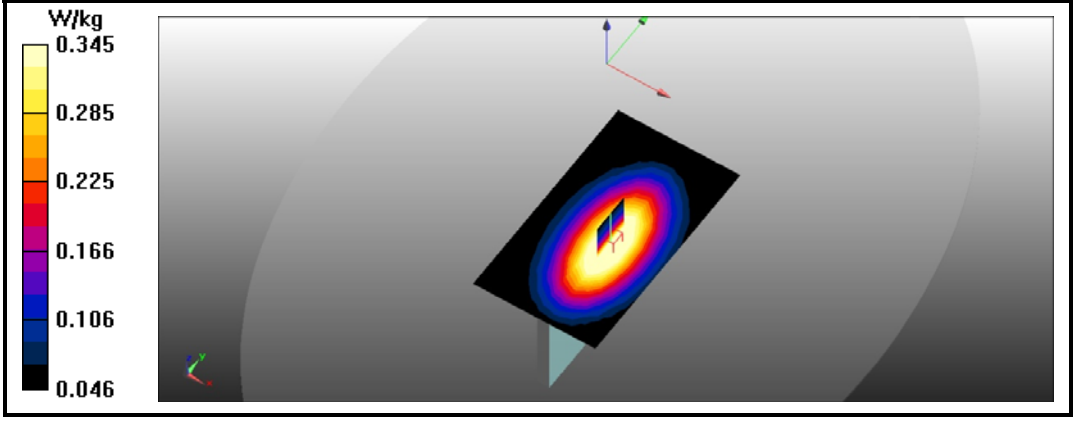

Figure 16: SAR Head Testing Results for the Sharp Smart phone at 836.4 MHz.

Product Service

SOFTWARE VERSION:	52.8.8(1258)	**AMBIENT TEMPERATURE:**	22.1 °C
DATE:	25/08/2016	**RELATIVE HUMIDITY:**	51.7 %
PHANTOM:	QDOVA003-FB	**RELATIVE PERMITTIVITY:**	0.971 S/m
DUT CONFIGURATION:	GSM 850	**CONDUCTIVITY:**	55.547
DUT POSITION:	10mm - Bottom Edge	**LIQUID TEMPERATURE:**	22.2 °C
RAT:	GSM	**SCAN TYPE:**	Full
FREQUENCY:	836.4 MHz	**DRIFT:**	-0.11 dB
MODULATION:	GMSK - 4 Timeslots	**PEAK SAR:**	0.09 W/kg
DUTY CYCLE:	50.0 %	**SAR (1g):**	0.09 W/kg

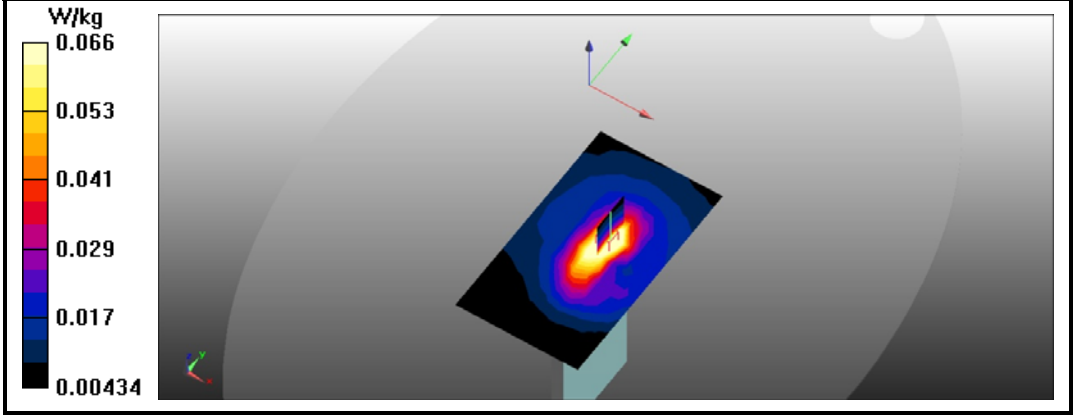

Figure 17: SAR Head Testing Results for the Sharp Smart phone at 836.4 MHz.

SOFTWARE VERSION:	52.8.8(1258)	**AMBIENT TEMPERATURE:**	22.7 °C
DATE:	02/09/2016	**RELATIVE HUMIDITY:**	63.6 %
PHANTOM:	QDOVA003-FB	**RELATIVE PERMITTIVITY:**	0.961 S/m
DUT CONFIGURATION:	GSM 850	**CONDUCTIVITY:**	54.894
DUT POSITION:	10mm - Rear Face	**LIQUID TEMPERATURE:**	21.5 °C
RAT:	GSM	**SCAN TYPE:**	Full
FREQUENCY:	848.8 MHz	**DRIFT:**	-0.17 dB
MODULATION:	GMSK - 4 Timeslots	**PEAK SAR:**	0.75 W/kg
DUTY CYCLE:	50.0 %	**SAR (1g):**	0.94 W/kg

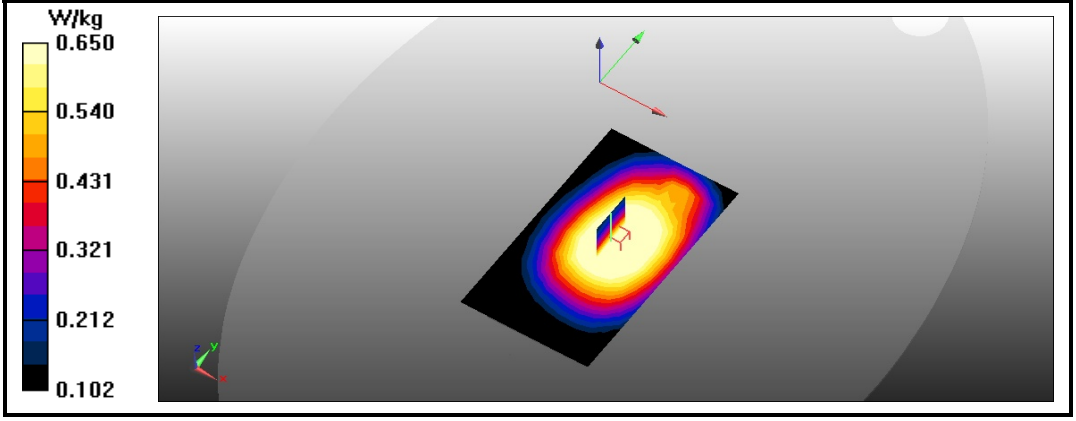

Figure 18 SAR Head Testing Results for the Sharp Smart phone at 848.8 MHz.

Product Service

SOFTWARE VERSION:	52.8.8(1258)	**AMBIENT TEMPERATURE:**	22.7 °C
DATE:	02/09/2016	**RELATIVE HUMIDITY:**	63.6 %
PHANTOM:	QDOVA003-FB	**RELATIVE PERMITTIVITY:**	0.953 S/m
DUT CONFIGURATION:	GSM 850	**CONDUCTIVITY:**	54.975
DUT POSITION:	10mm - Rear Face	**LIQUID TEMPERATURE:**	21.5 °C
RAT:	GSM	**SCAN TYPE:**	Full
FREQUENCY:	824.2 MHz	**DRIFT:**	-0.17 dB
MODULATION:	GMSK - 4 Timeslots	**PEAK SAR:**	0.64 W/kg
DUTY CYCLE:	50.0 %	**SAR (1g):**	0.77 W/kg

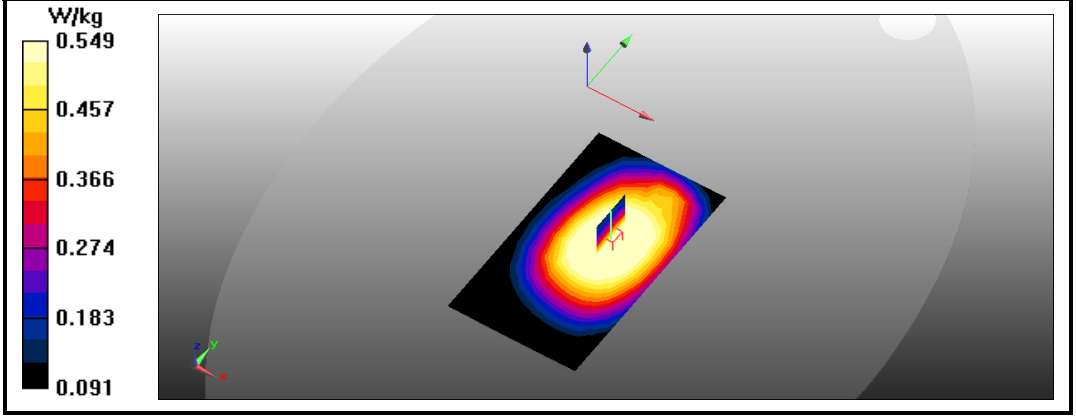

Figure 19: SAR Head Testing Results for the Sharp Smart phone at 824.2 MHz.

2.5 PCS 1900 HEAD SAR TEST RESULTS

SOFTWARE VERSION:	52.8.8(1258)	**AMBIENT TEMPERATURE:**	22.3 °C
DATE:	23/08/2016	**RELATIVE HUMIDITY:**	66.1 %
PHANTOM:	QD000P40CD	**RELATIVE PERMITTIVITY:**	1.431 S/m
DUT CONFIGURATION:	PCS 1900	**CONDUCTIVITY:**	39.03
DUT POSITION:	Left - Cheek	**LIQUID TEMPERATURE:**	22.3 °C
RAT:	GSM	**SCAN TYPE:**	Full
FREQUENCY:	1850.2 MHz	**DRIFT:**	-0.45 dB
MODULATION:	GMSK	**PEAK SAR:**	0.28 W/kg
DUTY CYCLE:	12.5 %	**SAR (1g):**	0.25 W/kg

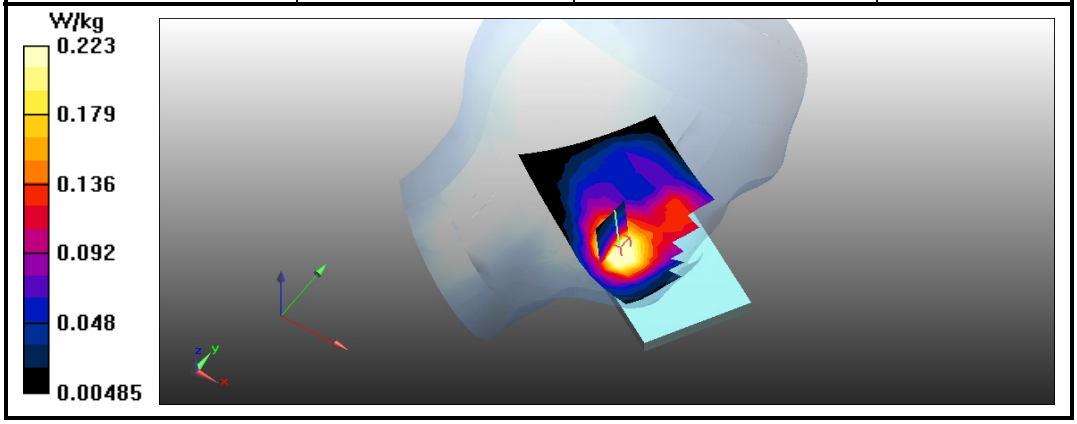

Figure 20: SAR Head Testing Results for the Sharp Smart phone at 1850.2 MHz.

SOFTWARE VERSION:	52.8.8(1258)	**AMBIENT TEMPERATURE:**	22.4 °C
DATE:	23/08/2016	**RELATIVE HUMIDITY:**	62.5 %
PHANTOM:	QD000P40CD	**RELATIVE PERMITTIVITY:**	1.431 S/m
DUT CONFIGURATION:	PCS 1900	**CONDUCTIVITY:**	39.03
DUT POSITION:	Left - 15°	**LIQUID TEMPERATURE:**	22.2 °C
RAT:	GSM	**SCAN TYPE:**	Full
FREQUENCY:	1850.2 MHz	**DRIFT:**	-0.12 dB
MODULATION:	GMSK	**PEAK SAR:**	0.14 W/kg
DUTY CYCLE:	12.5 %	**SAR (1g):**	0.13 W/kg

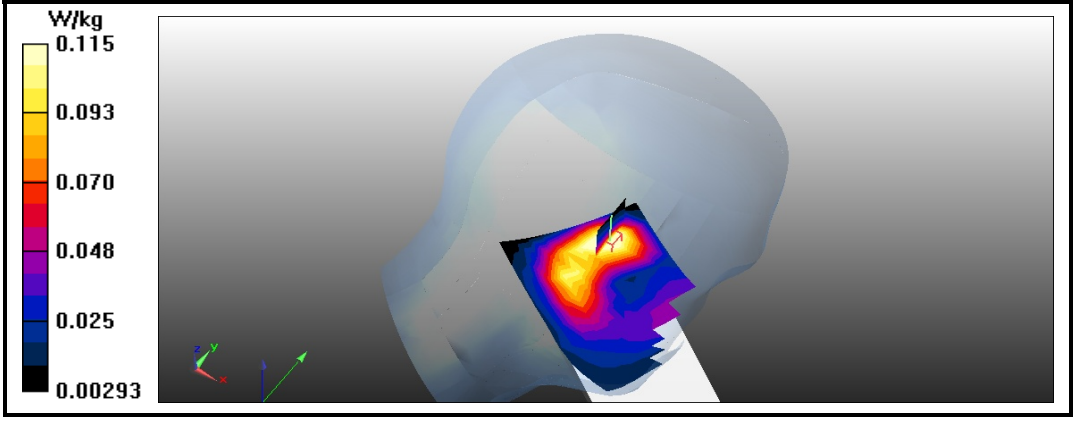

Figure 21: SAR Head Testing Results for the Sharp Smart phone at 1850.2 MHz.

SOFTWARE VERSION:	52.8.8(1258)	**AMBIENT TEMPERATURE:**	22.4 °C
DATE:	23/08/2016	**RELATIVE HUMIDITY:**	62.5 %
PHANTOM:	QD000P40CD	**RELATIVE PERMITTIVITY:**	1.431 S/m
DUT CONFIGURATION:	PCS 1900	**CONDUCTIVITY:**	39.03
DUT POSITION:	Right - Cheek	**LIQUID TEMPERATURE:**	22.2 °C
RAT:	GSM	**SCAN TYPE:**	Full
FREQUENCY:	1850.2 MHz	**DRIFT:**	0.18 dB
MODULATION:	GMSK	**PEAK SAR:**	0.34 W/kg
DUTY CYCLE:	12.5 %	**SAR (1g):**	0.31 W/kg

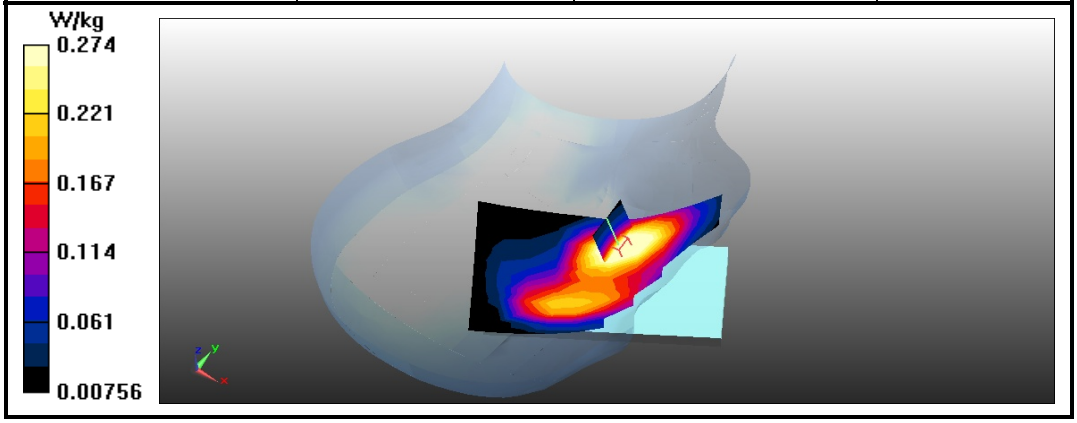

Figure 22: SAR Head Testing Results for the Sharp Smart phone at 1850.2 MHz.

SOFTWARE VERSION:	52.8.8(1258)	**AMBIENT TEMPERATURE:**	22.4 °C
DATE:	23/08/2016	**RELATIVE HUMIDITY:**	62.5 %
PHANTOM:	QD000P40CD	**RELATIVE PERMITTIVITY:**	1.431 S/m
DUT CONFIGURATION:	PCS 1900	**CONDUCTIVITY:**	39.03
DUT POSITION:	Right - 15°	**LIQUID TEMPERATURE:**	22.2 °C
RAT:	GSM	**SCAN TYPE:**	Full
FREQUENCY:	1850.2 MHz	**DRIFT:**	0.17 dB
MODULATION:	GMSK	**PEAK SAR:**	0.20 W/kg
DUTY CYCLE:	12.5 %	**SAR (1g):**	0.18 W/kg

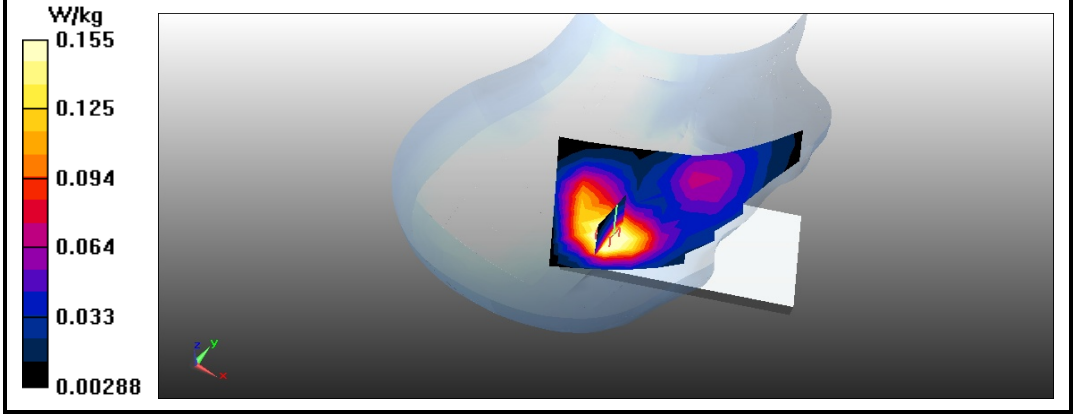

Figure 23: SAR Head Testing Results for the Sharp Smart phone at 1850.2 MHz.

Product Service

2.6 PCS 1900 GPRS HEAD SAR TEST RESULTS

SOFTWARE VERSION:	52.8.8(1258)	**AMBIENT TEMPERATURE:**	22.4 °C
DATE:	23/08/2016	**RELATIVE HUMIDITY:**	62.5 %
PHANTOM:	QD000P40CD	**RELATIVE PERMITTIVITY:**	1.431 S/m
DUT CONFIGURATION:	PCS 1900	**CONDUCTIVITY:**	39.03
DUT POSITION:	Left - Cheek	**LIQUID TEMPERATURE:**	22.2 °C
RAT:	GSM	**SCAN TYPE:**	Full
FREQUENCY:	1850.2 MHz	**DRIFT:**	-0.02 dB
MODULATION:	GMSK - 4 Timeslots	**PEAK SAR:**	0.36 W/kg
DUTY CYCLE:	50.0 %	**SAR (1g):**	0.34 W/kg

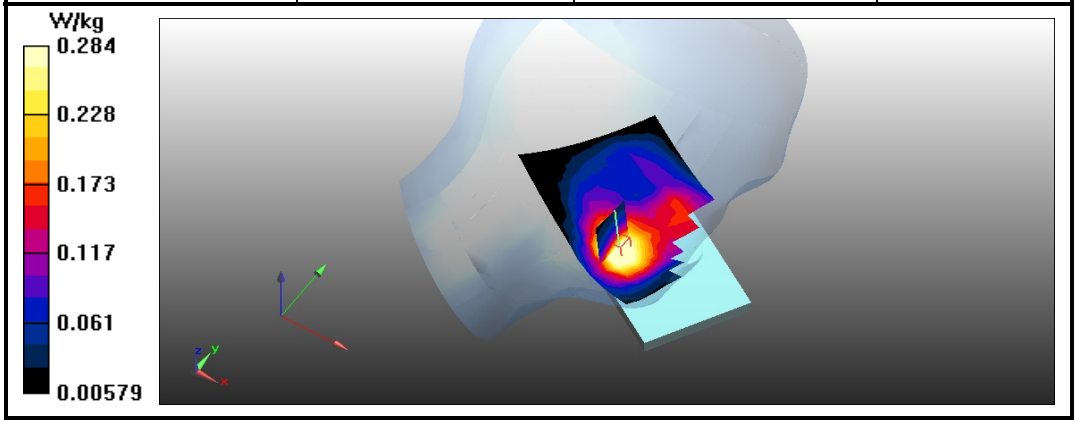

Figure 24: SAR Head Testing Results for the Sharp Smart phone at 1850.2 MHz.

SOFTWARE VERSION:	52.8.8(1258)	**AMBIENT TEMPERATURE:**	22.4 °C
DATE:	23/08/2016	**RELATIVE HUMIDITY:**	62.5 %
PHANTOM:	QD000P40CD	**RELATIVE PERMITTIVITY:**	1.431 S/m
DUT CONFIGURATION:	PCS 1900	**CONDUCTIVITY:**	39.03
DUT POSITION:	Left - 15°	**LIQUID TEMPERATURE:**	22.2 °C
RAT:	GSM	**SCAN TYPE:**	Full
FREQUENCY:	1850.2 MHz	**DRIFT:**	-0.29 dB
MODULATION:	GMSK - 4 Timeslots	**PEAK SAR:**	0.17 W/kg
DUTY CYCLE:	50.0 %	**SAR (1g):**	0.16 W/kg

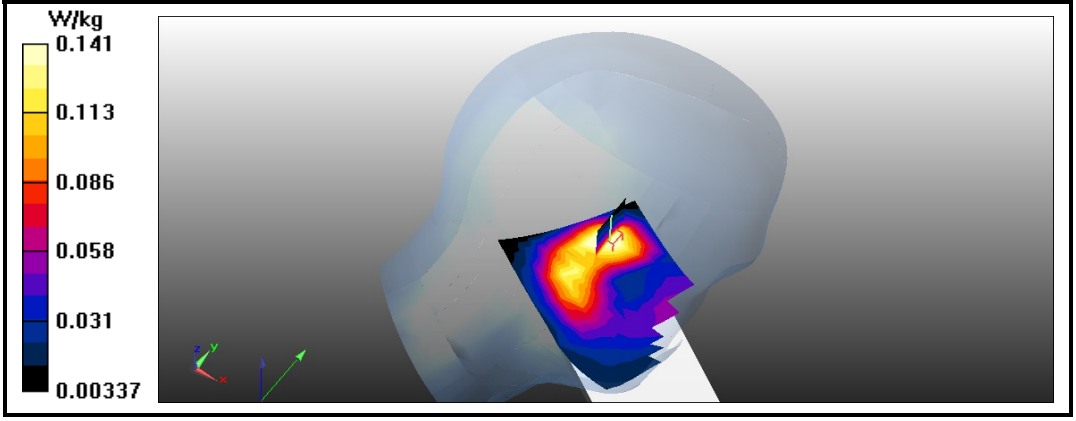

Figure 25: SAR Head Testing Results for the Sharp Smart phone at 1850.2 MHz.

Product Service

SOFTWARE VERSION:	52.8.8(1258)	**AMBIENT TEMPERATURE:**	22.4 °C
DATE:	23/08/2016	**RELATIVE HUMIDITY:**	62.5 %
PHANTOM:	QD000P40CD	**RELATIVE PERMITTIVITY:**	1.348 S/m
DUT CONFIGURATION:	PCS 1900	**CONDUCTIVITY:**	39.305
DUT POSITION:	Right - Cheek	**LIQUID TEMPERATURE:**	22.2 °C
RAT:	GSM	**SCAN TYPE:**	Full
FREQUENCY:	1850.2 MHz	**DRIFT:**	0.14 dB
MODULATION:	GMSK - 4 Timeslots	**PEAK SAR:**	0.40 W/kg
DUTY CYCLE:	50.0 %	**SAR (1g):**	0.38 W/kg

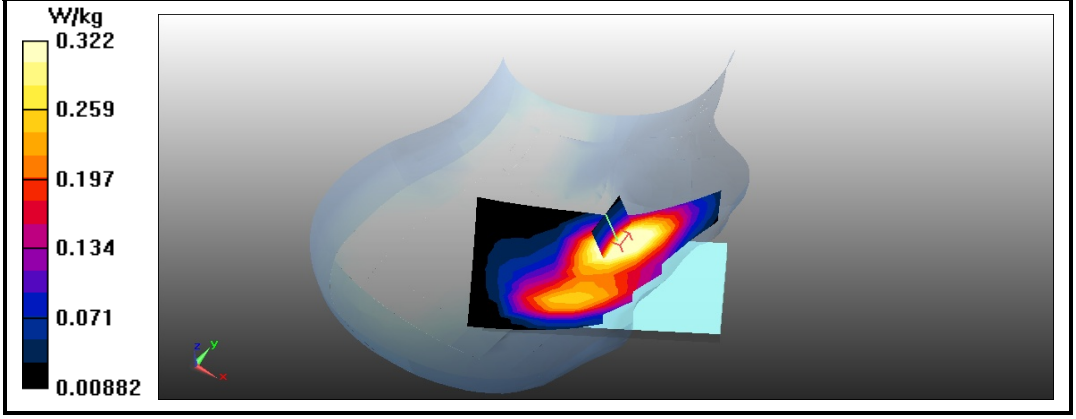

Figure 26: SAR Head Testing Results for the Sharp Smart phone at 1850.2 MHz.

SOFTWARE VERSION:	52.8.8(1258)	**AMBIENT TEMPERATURE:**	22.4 °C
DATE:	23/08/2016	**RELATIVE HUMIDITY:**	62.5 %
PHANTOM:	QD000P40CD	**RELATIVE PERMITTIVITY:**	1.431 S/m
DUT CONFIGURATION:	PCS 1900	**CONDUCTIVITY:**	39.03
DUT POSITION:	Right - 15°	**LIQUID TEMPERATURE:**	22.2 °C
RAT:	GSM	**SCAN TYPE:**	Full
FREQUENCY:	1850.2 MHz	**DRIFT:**	-0.13 dB
MODULATION:	GMSK - 4 Timeslots	**PEAK SAR:**	0.21 W/kg
DUTY CYCLE:	50.0 %	**SAR (1g):**	0.20 W/kg

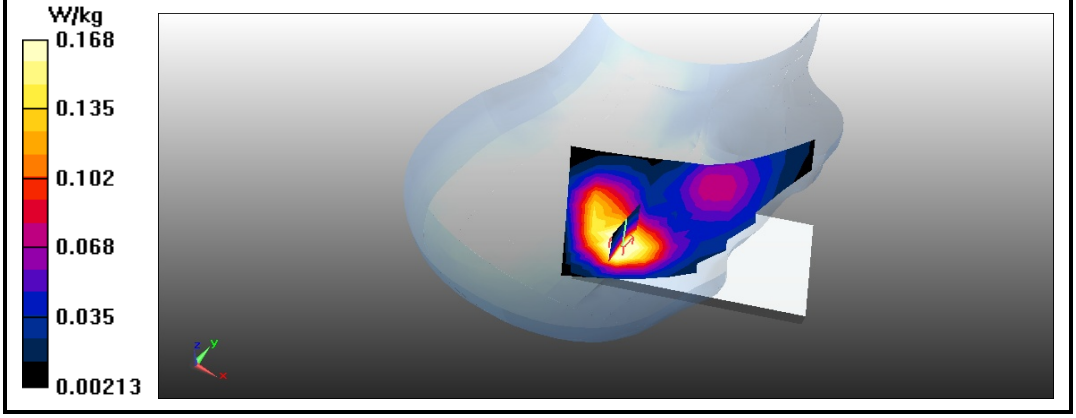

Figure 27 SAR Head Testing Results for the Sharp Smart phone at 1850.2 MHz.

2.7 PCS 1900 GPRS BODY SAR TEST RESULTS

SOFTWARE VERSION:	52.8.8(1258)	**AMBIENT TEMPERATURE:**	22.1 °C
DATE:	25/08/2016	**RELATIVE HUMIDITY:**	51.7 %
PHANTOM:	QDOVA003-FB	**RELATIVE PERMITTIVITY:**	1.543 S/m
DUT CONFIGURATION:	PCS 1900	**CONDUCTIVITY:**	53.933
DUT POSITION:	10mm - Front Facing	**LIQUID TEMPERATURE:**	22.2 °C
RAT:	GSM	**SCAN TYPE:**	Full
FREQUENCY:	1850.2 MHz	**DRIFT:**	-0.14 dB
MODULATION:	GMSK - 4 Timeslots	**PEAK SAR:**	0.23 W/kg
DUTY CYCLE:	50.0 %	**SAR (1g):**	0.60 W/kg

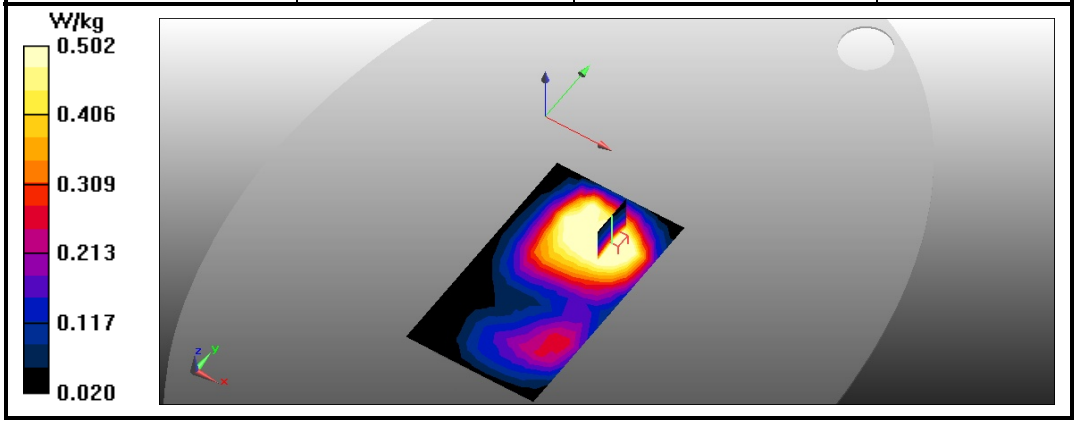

Figure 28: SAR Head Testing Results for the Sharp Smart phone at 1850.2 MHz.

SOFTWARE VERSION:	52.8.8(1258)	**AMBIENT TEMPERATURE:**	22.1 °C
DATE:	25/08/2016	**RELATIVE HUMIDITY:**	51.7 %
PHANTOM:	QDOVA003-FB	**RELATIVE PERMITTIVITY:**	1.543 S/m
DUT CONFIGURATION:	PCS 1900	**CONDUCTIVITY:**	53.933
DUT POSITION:	10mm - Rear Facing	**LIQUID TEMPERATURE:**	22.2 °C
RAT:	GSM	**SCAN TYPE:**	Full
FREQUENCY:	1850.2 MHz	**DRIFT:**	-0.04 dB
MODULATION:	GMSK - 4 Timeslots	**PEAK SAR:**	0.63 W/kg
DUTY CYCLE:	50.0 %	**SAR (1g):**	0.52 W/kg

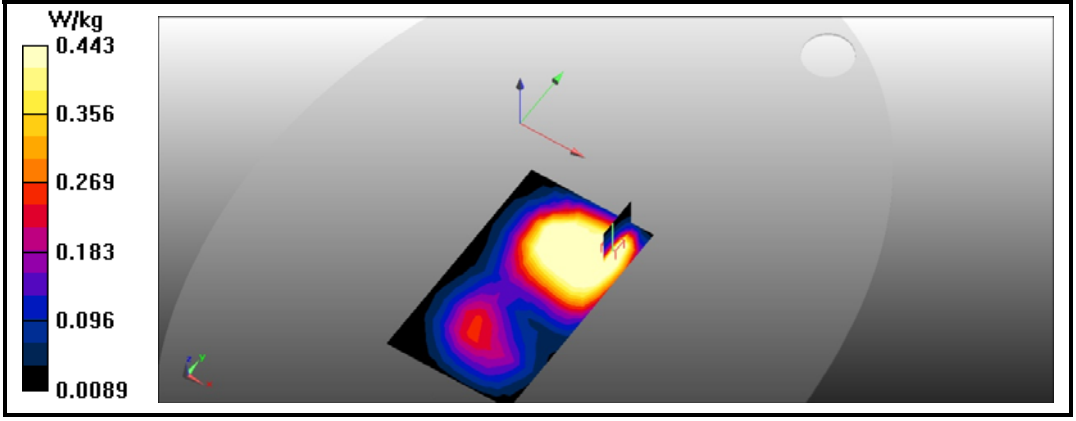

Figure 29: SAR Head Testing Results for the Sharp Smart phone at 1850.2 MHz.

SOFTWARE VERSION:	52.8.8(1258)	**AMBIENT TEMPERATURE:**	22.1 °C
DATE:	25/08/2016	**RELATIVE HUMIDITY:**	51.7 %
PHANTOM:	QDOVA003-FB	**RELATIVE PERMITTIVITY:**	1.543 S/m
DUT CONFIGURATION:	PCS 1900	**CONDUCTIVITY:**	53.933
DUT POSITION:	10mm - Left Edge	**LIQUID TEMPERATURE:**	22.2 °C
RAT:	GSM	**SCAN TYPE:**	Full
FREQUENCY:	1850.2 MHz	**DRIFT:**	-0.15 dB
MODULATION:	GMSK - 4 Timeslots	**PEAK SAR:**	0.33 W/kg
DUTY CYCLE:	50.0 %	**SAR (1g):**	0.31 W/kg

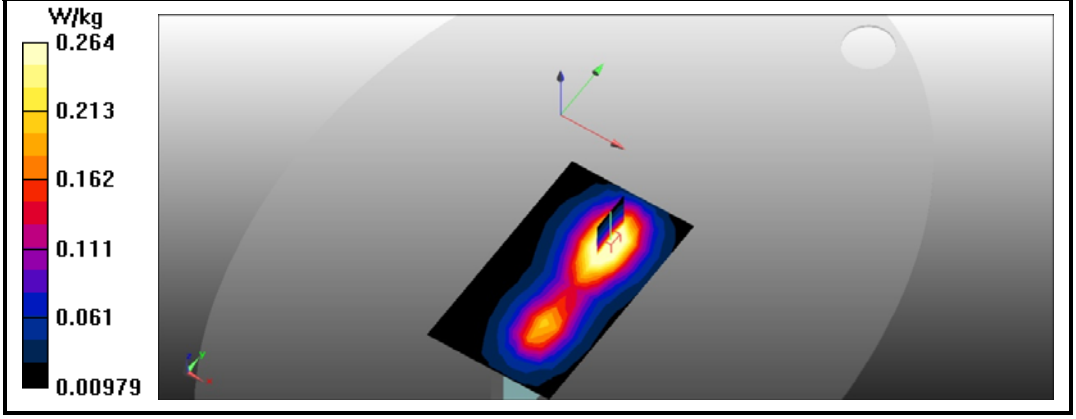

Figure 30: SAR Head Testing Results for the Sharp Smart phone at 1850.2 MHz.

SOFTWARE VERSION:	52.8.8(1258)	**AMBIENT TEMPERATURE:**	22.1 °C
DATE:	25/08/2016	**RELATIVE HUMIDITY:**	51.7 %
PHANTOM:	QDOVA003-FB	**RELATIVE PERMITTIVITY:**	1.543 S/m
DUT CONFIGURATION:	PCS 1900	**CONDUCTIVITY:**	53.933
DUT POSITION:	10mm - Bottom Edge	**LIQUID TEMPERATURE:**	22.2 °C
RAT:	GSM	**SCAN TYPE:**	Full
FREQUENCY:	1850.2 MHz	**DRIFT:**	-0.14 dB
MODULATION:	GMSK - 4 Timeslots	**PEAK SAR:**	0.23 W/kg
DUTY CYCLE:	50.0 %	**SAR (1g):**	0.20 W/kg

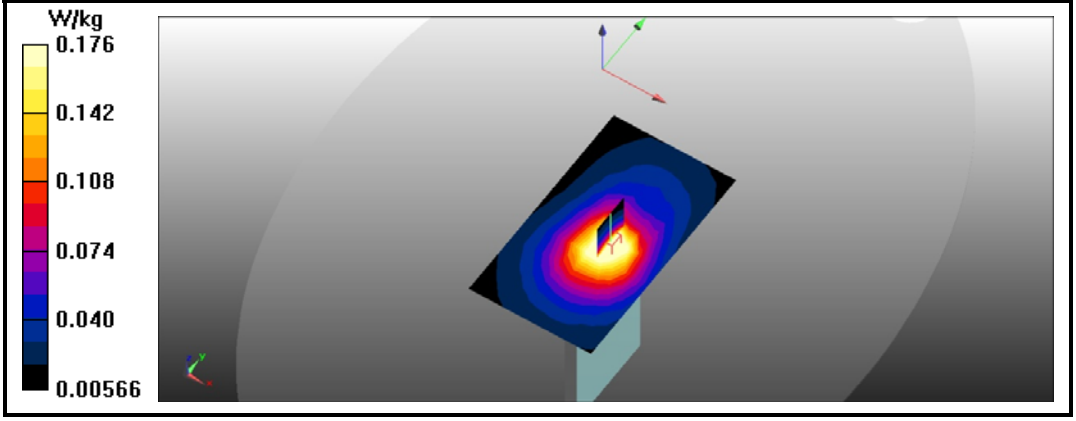

Figure 31: SAR Head Testing Results for the Sharp Smart phone at 1850.2 MHz.

2.8 LTE BAND 17 HEAD SAR TEST RESULTS

SOFTWARE VERSION:	52.8.8(1258)	**AMBIENT TEMPERATURE:**	22.3 °C
DATE:	30/08/2016	**RELATIVE HUMIDITY:**	46.7 %
PHANTOM:	QD000P40CD	**RELATIVE PERMITTIVITY:**	0.878 S/m
DUT CONFIGURATION:	LTE Band 17	**CONDUCTIVITY:**	42.368
DUT POSITION:	Left - Cheek	**LIQUID TEMPERATURE:**	21.1 °C
RAT:	LTE	**SCAN TYPE:**	Full
FREQUENCY:	709.0 MHz	**DRIFT:**	-0.60 dB
MODULATION:	QPSK	**PEAK SAR:**	0.12 W/kg
DUTY CYCLE:	100 %	**SAR (1g):**	0.14 W/kg

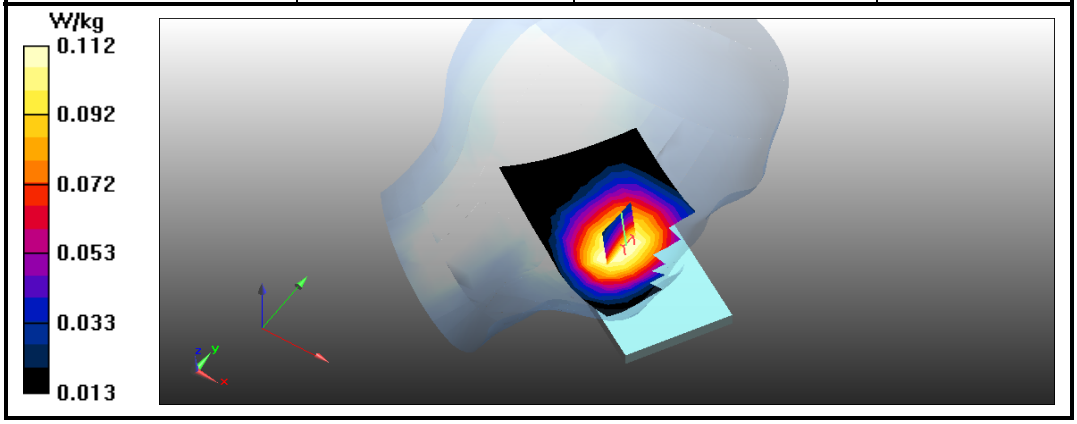

Figure 32: SAR Head Testing Results for the Sharp Smart phone at 709.0 MHz.

SOFTWARE VERSION:	52.8.8(1258)	**AMBIENT TEMPERATURE:**	22.3 °C
DATE:	30/08/2016	**RELATIVE HUMIDITY:**	46.7 %
PHANTOM:	QD000P40CD	**RELATIVE PERMITTIVITY:**	0.878 S/m
DUT CONFIGURATION:	LTE Band 17	**CONDUCTIVITY:**	42.368
DUT POSITION:	Left - 15°	**LIQUID TEMPERATURE:**	21.1 °C
RAT:	LTE	**SCAN TYPE:**	Full
FREQUENCY:	709.0 MHz	**DRIFT:**	0.13 dB
MODULATION:	QPSK	**PEAK SAR:**	0.06 W/kg
DUTY CYCLE:	100 %	**SAR (1g):**	0.08 W/kg

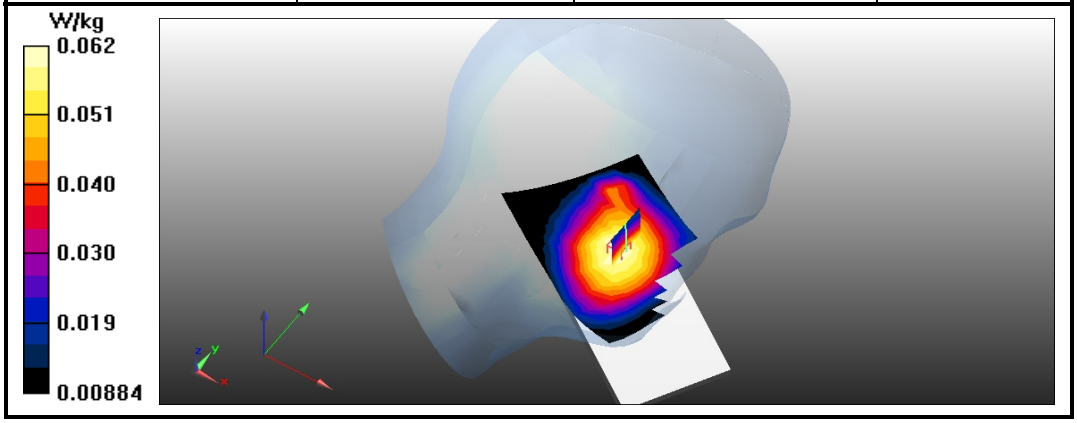

Figure 33: SAR Head Testing Results for the Sharp Smart phone at 709.0 MHz.

Product Service

SOFTWARE VERSION:	52.8.8(1258)	**AMBIENT TEMPERATURE:**	22.3 °C
DATE:	30/08/2016	**RELATIVE HUMIDITY:**	46.7 %
PHANTOM:	QD000P40CD	**RELATIVE PERMITTIVITY:**	0.878 S/m
DUT CONFIGURATION:	LTE Band 17	**CONDUCTIVITY:**	42.368
DUT POSITION:	Right - Cheek	**LIQUID TEMPERATURE:**	21.1 °C
RAT:	LTE	**SCAN TYPE:**	Full
FREQUENCY:	709.0 MHz	**DRIFT:**	0.14 dB
MODULATION:	QPSK	**PEAK SAR:**	0.12 W/kg
DUTY CYCLE:	100 %	**SAR (1g):**	0.13 W/kg

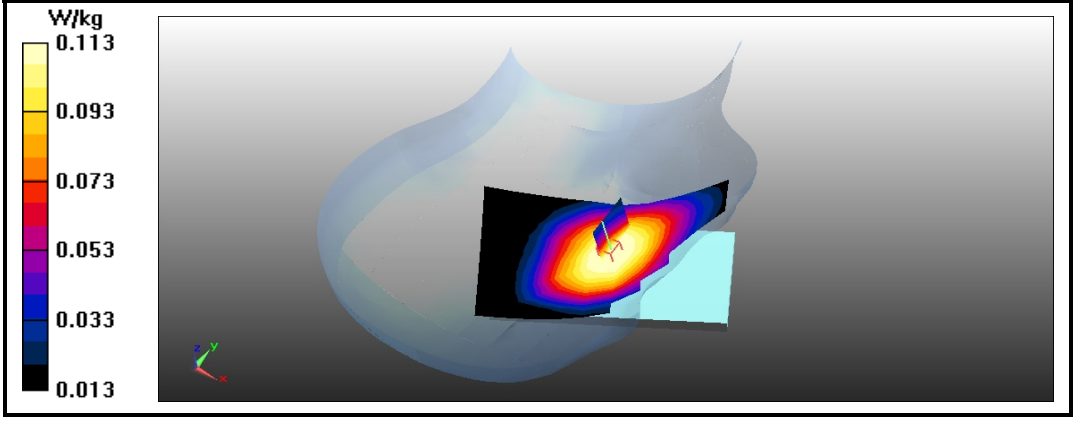

Figure 34: SAR Head Testing Results for the Sharp Smart phone at 709.0 MHz.

SOFTWARE VERSION:	52.8.8(1258)	**AMBIENT TEMPERATURE:**	22.3 °C
DATE:	30/08/2016	**RELATIVE HUMIDITY:**	46.7 %
PHANTOM:	QD000P40CD	**RELATIVE PERMITTIVITY:**	0.878 S/m
DUT CONFIGURATION:	LTE Band 17	**CONDUCTIVITY:**	42.368
DUT POSITION:	Right - 15°	**LIQUID TEMPERATURE:**	21.1 °C
RAT:	LTE	**SCAN TYPE:**	Full
FREQUENCY:	709.0 MHz	**DRIFT:**	0.23 dB
MODULATION:	QPSK	**PEAK SAR:**	0.07 W/kg
DUTY CYCLE:	100 %	**SAR (1g):**	0.08 W/kg

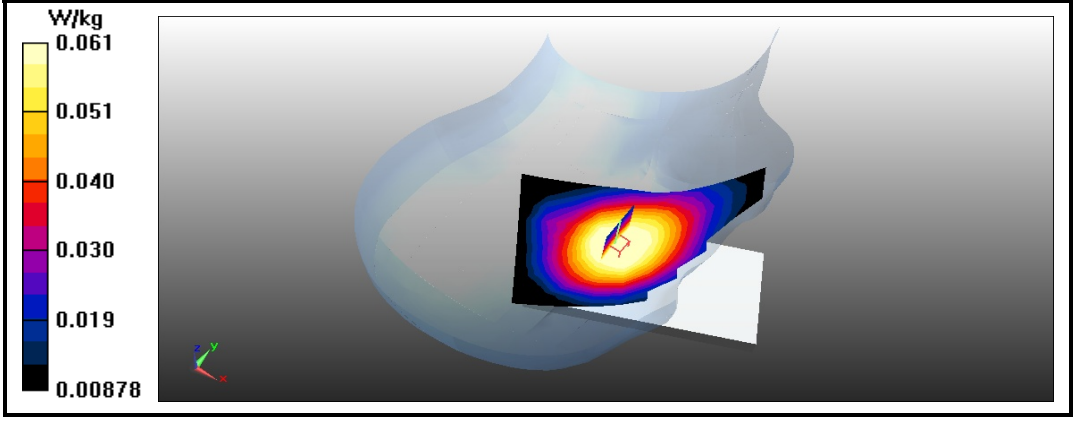

Figure 35: SAR Head Testing Results for the Sharp Smart phone at 709.0 MHz.

2.9 LTE BAND 17 BODY SAR TEST RESULTS

SOFTWARE VERSION:	52.8.8(1258)	**AMBIENT TEMPERATURE:**	21.9 °C
DATE:	25/08/2016	**RELATIVE HUMIDITY:**	66.1 %
PHANTOM:	QDOVA003-FB	**RELATIVE PERMITTIVITY:**	0.924 S/m
DUT CONFIGURATION:	LTE Band 17	**CONDUCTIVITY:**	55.852
DUT POSITION:	10mm - Front Face	**LIQUID TEMPERATURE:**	22.0 °C
RAT:	LTE	**SCAN TYPE:**	Full
FREQUENCY:	709.0 MHz	**DRIFT:**	-0.24 dB
MODULATION:	QPSK	**PEAK SAR:**	0.18 W/kg
DUTY CYCLE:	100 %	**SAR (1g):**	0.21 W/kg

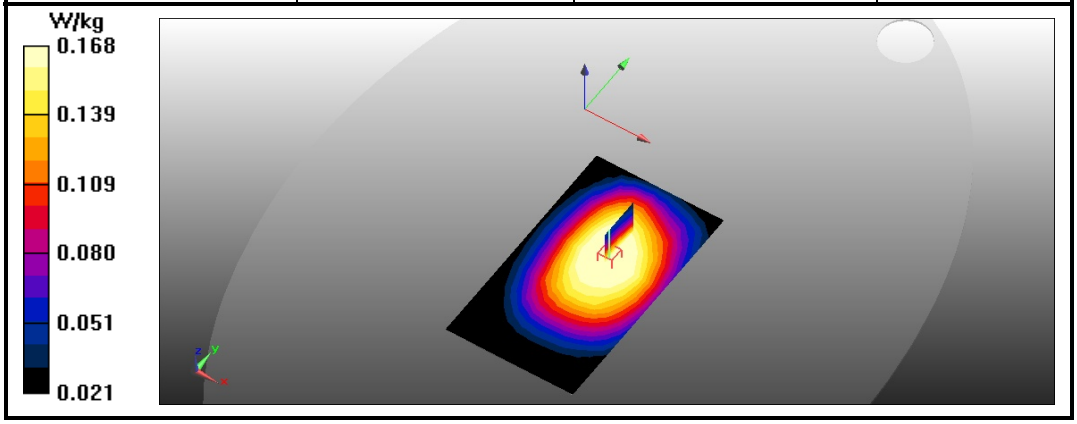

Figure 36: SAR Head Testing Results for the Sharp Smart phone at 709.0 MHz.

SOFTWARE VERSION:	52.8.8(1258)	**AMBIENT TEMPERATURE:**	21.9 °C
DATE:	25/08/2016	**RELATIVE HUMIDITY:**	66.1 %
PHANTOM:	QDOVA003-FB	**RELATIVE PERMITTIVITY:**	0.924 S/m
DUT CONFIGURATION:	LTE Band 17	**CONDUCTIVITY:**	55.852
DUT POSITION:	10mm - Rear Face	**LIQUID TEMPERATURE:**	22.0 °C
RAT:	LTE	**SCAN TYPE:**	Full
FREQUENCY:	709.0 MHz	**DRIFT:**	-0.04 dB
MODULATION:	QPSK	**PEAK SAR:**	0.24 W/kg
DUTY CYCLE:	100 %	**SAR (1g):**	0.28 W/kg

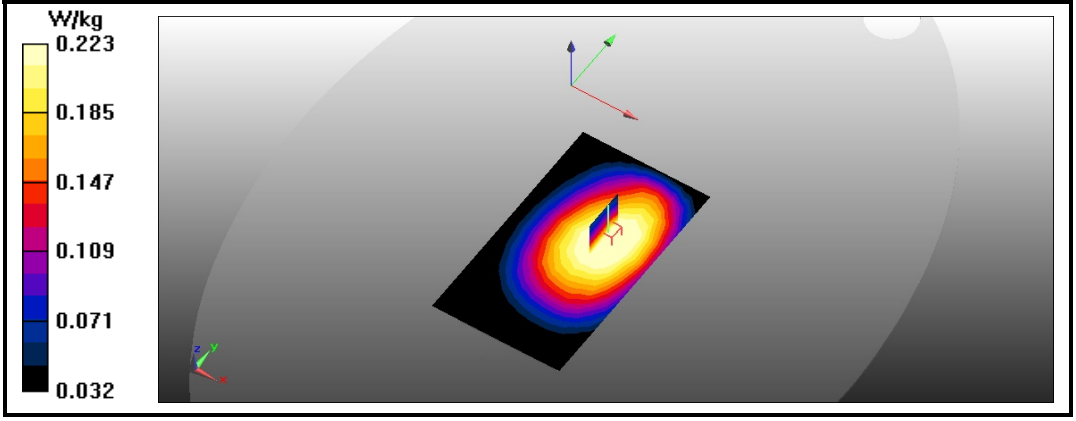

Figure 37: SAR Head Testing Results for the Sharp Smart phone at 709.0 MHz.