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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, and GPS

COMMERCIAL-IN-CONFIDENCE

FCC ID: APYHRO00238

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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, and GPS

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June 2016

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DATED

24 June 2016

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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, 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, 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 v05 General RF Exposure Guidance, for the series of tests carried out.
Applicant	Sharp Telecommunications of Europe Ltd
Manufacturer	Sharp Corporation
Manufacturing Description	Mobile Handset
Serial/IMEI Number(s)	004401115813541 (SAR Test: GSM/WCDMA/LTE) 004401115813574 (SAR Test: WLAN) 004401115813228 (Conducted: GSM) 004401115813251 (Conducted: WCDMA) 004401115813277 (Conducted: LTE) 004401115813392 (Conducted: Bluetooth) 004401115813392 (Conducted: WLAN)
Number of Samples Tested	2
Hardware Version	PP1
Software Version	C4150 - GSM/WCDMA/LTE/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	31 May 2016
Finish of Test	08 June 2016
Related Document(s)	FCC 47CFR 2.1093: 2015 KDB 248227 – D01 v02r02 KDB 865664 – D01 v01r04 KDB 865664 – D02 v01r02 KDB 648474 – D04 v01r03 KDB 941225 – D01 v03r01 KDB 941225 – D06 v02r01 KDB 447498 – D01 v06 IEEE 1528-2013
Name of Engineer(s)	Nigel Grigsby

1.2 BRIEF SUMMARY OF RESULTS

The measurements shown in this report were made in accordance with the procedures specified KDB 447498 – D01 v06.

The maximum 1g volume averaged SAR found during this Assessment

Max 1g SAR (W/kg) Head	0.58 (Measured)	0.62 (Scaled)
Max 1g SAR (W/kg) Body / Hotspot	0.49 (Measured)	0.61 (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, including highest simultaneous transmission results:

Band	Test Configuration	Max Reported Scaled SAR (W/kg)	Highest Simultaneous Transmission Scaled SAR (W/kg)	
GSM/GPRS 850	Head	0.62	Head 0.90	Body 0.93
	Body/Hotspot	0.54		
WCDMA FDD V	Head	0.62		
	Body/Hotspot	0.61		
LTE Band 17	Head	0.18		
	Body/Hotspot	0.30		
PCS/GPRS 1900	Head	0.49		
	Body/Hotspot	0.45		
WLAN 2.4GHz	Head	0.28		
	Body/Hotspot	0.32		
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.				

1.3 PRODUCT TECHNICAL DESCRIPTION

Please refer to the Model Description Form, reference FCC ID: APYHRO00238.

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	Dipole Used	Frequency (MHz)	Max 1g SAR (W/kg)*	Percentage Drift on Reference
01/06/2016	850	835	10.12	-0.24%
06/06/2016	850	835	9.53	0.22%
02/06/2016	700	700	8.52	8.72%
06/06/2016	700	700	7.93	5.93%
07/06/2016	700	700	7.64	1.94%
31/05/2016	1900	1900	37.70	3.67%
07/06/2016	1900	1900	39.10	-2.32%
03/06/2016	2450	2450	52.64	2.57%
08/06/2016	2450	2450	51.06	-6.69%

*Normalised to a forward power of 1W

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1.4.2 Results Summary Tables

GSM 850MHz Head Specific Absorption Rate (Maximum SAR) 1g Results for 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, and GPS.

Test Position	Channel Number	Frequency (MHz)	Measured Conducted Power (dBm)	Tune Up limit (dBm)	Measured 1g SAR (W/kg)	Scaled 1g SAR (W/kg)	Area scan (Figure number)
Left Cheek	189	836.4	32.27	32.8	0.47	0.53	Figure 6
Left 15°	189	836.4	32.27	32.8	0.25	0.28	Figure 7
Right Cheek	189	836.4	32.27	32.8	0.53	0.60	Figure 8
Right 15°	189	836.4	32.27	32.8	0.31	0.35	Figure 9
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 850MHz GPRS Head Specific Absorption Rate (Maximum SAR) 1g Results for 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, and GPS.

Test Position	Channel Number	Frequency (MHz)	Measured Conducted Power (dBm)	Tune Up limit (dBm)	Measured 1g SAR (W/kg)	Scaled 1g SAR (W/kg)	Area scan (Figure number)
Left Cheek	189	836.4	28.21	28.5	0.50	0.53	Figure 10
Left 15°	189	836.4	28.21	28.5	0.25	0.27	Figure 11
Right Cheek	189	836.4	28.21	28.5	0.58	**0.62**	Figure 12
Right 15°	189	836.4	28.21	28.5	0.33	0.35	Figure 13
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 The time slot configuration with the highest source-based time-averaged maximum output power was used for testing, this was 4x time slots.							

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GSM 850MHz GPRS Body & Hotspot Configuration Specific Absorption Rate (Maximum SAR) 1g Results for 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, and GPS.

Position		Channel Number	Frequency (MHz)	Measured Conducted Power (dBm)	Tune Up limit (dBm)	Measured 1g SAR (W/kg)	Scaled 1g SAR (W/kg)	Area scan (Figure number)
Spacing	Position							
10mm	Front Face	189	836.4	28.21	28.5	0.42	0.45	Figure 14
10mm	Rear Face	189	836.4	28.21	28.5	0.50	0.54	Figure 15
10mm	Left Edge	189	836.4	28.21	28.5	0.29	0.31	Figure 16
10mm	Right Edge	189	836.4	28.21	28.5	0.41	0.44	Figure 17
10mm	Bottom Edge	189	836.4	28.21	28.5	0.09	0.10	Figure 18

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

Testing was carried out with a 10mm separation distance to meet the requirements of KDB 941225 D06

The time slot configuration with the highest source-based time-averaged maximum output power was used for testing, this was 4x time slots.

WCDMA FDDV Head Specific Absorption Rate (Maximum SAR) 1g Results for 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, and GPS.

Test Position	Channel Number	Frequency (MHz)	Measured Conducted Power (dBm)	Tune Up limit (dBm)	Measured 1g SAR (W/kg)	Scaled 1g SAR (W/kg)	Area scan (Figure number)
Left Cheek	4233	846.6	23.28	24.2	0.49	0.61	Figure 19
Left 15°	4233	846.6	23.28	24.2	0.31	0.38	Figure 20
Right Cheek	4233	846.6	23.28	24.2	0.50	**0.62**	Figure 21
Right 15°	4233	846.6	23.28	24.2	0.31	0.38	Figure 22

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

KDB 941225 D01 – Testing of the secondary mode was not required - When the maximum output power and tune-up tolerance specified for production units in a secondary mode is ≤ ¼ dB higher than the primary mode or when the highest reported SAR of the primary mode is scaled by the ratio of specified maximum output power and tune-up tolerance of secondary to primary mode and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for the secondary mode.

WCDMA FDDV Body & Hotspot Configuration Specific Absorption Rate (Maximum SAR) 1g Results for 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, and GPS.

Position		Channel Number	Frequency (MHz)	Measured Conducted Power (dBm)	Tune Up limit (dBm)	Measured 1g SAR (W/kg)	Scaled 1g SAR (W/kg)	Area scan (Figure number)
Spacing	Position							
10mm	Front Face	4233	846.6	23.28	24.2	0.41	0.51	Figure 23
10mm	Rear Face	4233	846.6	23.28	24.2	0.49	**0.61**	Figure 24
10mm	Left Edge	4233	846.6	23.28	24.2	0.29	0.36	Figure 25
10mm	Right Edge	4233	846.6	23.28	24.2	0.42	0.52	Figure 26
10mm	Bottom Edge	4233	846.6	23.28	24.2	0.08	0.10	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

Testing was carried out with a 10mm separation distance to meet the requirements of KDB 941225 D06

KDB 941225 D01 – Testing of the secondary mode was not required - When the maximum output power and tune-up tolerance specified for production units in a secondary mode is ≤ ¼ dB higher than the primary mode or when the highest reported SAR of the primary mode is scaled by the ratio of specified maximum output power and tune-up tolerance of secondary to primary mode and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for the secondary mode.

LTE Band 17 Head Specific Absorption Rate (Maximum SAR) 1g Results for 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, and GPS.

10MHz Bandwidth, 1 Resource Blocks, Middle Offset.

Test Position	Channel Number	Frequency (MHz)	Measured Conducted Power (dBm)	Tune Up limit (dBm)	Measured 1g SAR (W/kg)	Scaled 1g SAR (W/kg)	Area scan (Figure number)
Left Cheek	23790	710.0	22.8	24.2	0.11	0.15	Figure 28
Left 15°	23790	710.0	22.8	24.2	0.08	0.11	Figure 29
Right Cheek	23790	710.0	22.8	24.2	0.13	0.18	Figure 30
Right 15°	23790	710.0	22.8	24.2	0.09	0.12	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 Head Specific Absorption Rate (Maximum SAR) 1g Results for 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, and GPS.

10MHz Bandwidth, 25 Resource Blocks, Low Offset.

Test Position	Channel Number	Frequency (MHz)	Measured Conducted Power (dBm)	Tune Up limit (dBm)	Measured 1g SAR (W/kg)	Scaled 1g SAR (W/kg)	Area scan (Figure number)
Left Cheek	23800	711.0	21.95	23.2	0.09	0.11	Figure 32
Left 15°	23800	711.0	21.95	23.2	0.06	0.08	Figure 33
Right Cheek	23800	711.0	21.95	23.2	0.11	0.15	Figure 34
Right 15°	23800	711.0	21.95	23.2	0.03	0.04	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 Body & Hotspot Configuration Specific Absorption Rate (Maximum SAR) 1g Results for 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, and GPS.

10MHz Bandwidth, 1 Resource Blocks, Mid Offset.

Position		Channel Number	Frequency (MHz)	Measured Conducted Power (dBm)	Tune Up limit (dBm)	Measured 1g SAR (W/kg)	Scaled 1g SAR (W/kg)	Area scan (Figure number)
Spacing	Position							
10mm	Front Face	23790	710.0	22.8	24.2	0.18	0.25	Figure 36
10mm	Rear Face	23790	710.0	22.8	24.2	0.22	0.30	Figure 37
10mm	Left Edge	23790	710.0	22.8	24.2	0.12	0.17	Figure 38
10mm	Right Edge	23790	710.0	22.8	24.2	0.09	0.12	Figure 39
10mm	Bottom Edge	23790	710.0	22.8	24.2	0.02	0.03	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

Testing was carried out with a 10mm separation distance to meet the requirements of KDB 941225 D06

KDB 941225 D05 - Largest channel bandwidth standalone SAR test requirements – 4.2.2. The requirements to test other resource block allocations and higher order modulations were not met.

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LTE Band 17 Body & Hotspot Configuration Specific Absorption Rate (Maximum SAR) 1g Results for 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, and GPS.

10MHz Bandwidth, 25 Resource Blocks, Low Offset.

Position		Channel Number	Frequency (MHz)	Measured Conducted Power (dBm)	Tune Up limit (dBm)	Measured 1g SAR (W/kg)	Scaled 1g SAR (W/kg)	Area scan (Figure number)
Spacing	Position							
10mm	Front Face	23800	711.0	21.95	23.2	0.15	0.20	Figure 41
10mm	Rear Face	23800	711.0	21.95	23.2	0.19	0.25	Figure 42
10mm	Left Edge	23800	711.0	21.95	23.2	0.10	0.13	Figure 43
10mm	Right Edge	23800	711.0	21.95	23.2	0.08	0.11	Figure 44
10mm	Bottom Edge	23800	711.0	21.95	23.2	0.01	0.01	Figure 45

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

Testing was carried out with a 10mm separation distance to meet the requirements of KDB 941225 D06

KDB 941225 D05 - Largest channel bandwidth standalone SAR test requirements – 4.2.2. The requirements to test other resource block allocations and higher order modulations were not met.

PCS 1900MHz Head Specific Absorption Rate (Maximum SAR) 1g Results for 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, and GPS.

Test Position	Channel Number	Frequency (MHz)	Measured Conducted Power (dBm)	Tune Up limit (dBm)	Measured 1g SAR (W/kg)	Scaled 1g SAR (W/kg)	Area scan (Figure number)
Left Cheek	512	1850.2	29.56	29.8	0.26	0.27	Figure 46
Left 15°	512	1850.2	29.56	29.8	0.06	0.06	Figure 47
Right Cheek	512	1850.2	29.56	29.8	0.35	0.37	Figure 48
Right 15°	512	1850.2	29.56	29.8	0.13	0.14	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

PCS 1900MHz GPRS Head Specific Absorption Rate (Maximum SAR) 1g Results for 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, and GPS.

Test Position	Channel Number	Frequency (MHz)	Measured Conducted Power (dBm)	Tune Up limit (dBm)	Measured 1g SAR (W/kg)	Scaled 1g SAR (W/kg)	Area scan (Figure number)
Left Cheek	512	1850.2	25.1	25.5	0.34	0.37	Figure 50
Left 15°	512	1850.2	25.1	25.5	0.09	0.10	Figure 51
Right Cheek	512	1850.2	25.1	25.5	0.45	0.49	Figure 52
Right 15°	512	1850.2	25.1	25.5	0.15	0.16	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 The time slot configuration with the highest source-based time-averaged maximum output power was used for testing, this was 4x time slots.							

PCS 1900MHz GPRS Body & Hotspot Configuration Specific Absorption Rate (Maximum SAR) 1g Results for 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, and GPS.

Position		Channel Number	Frequency (MHz)	Measured Conducted Power (dBm)	Tune Up limit (dBm)	Measured 1g SAR (W/kg)	Scaled 1g SAR (W/kg)	Area scan (Figure number)
Spacing	Position							
10mm	Front Face	512	1850.2	25.1	25.5	0.41	0.45	Figure 54
10mm	Rear Face	512	1850.2	25.1	25.5	0.30	0.33	Figure 55
10mm	Left Edge	512	1850.2	25.1	25.5	0.29	0.32	Figure 56
10mm	Bottom Edge	512	1850.2	25.1	25.5	0.16	0.18	Figure 57
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 Testing was carried out with a 10mm separation distance to meet the requirements of KDB 941225 D06 The time slot configuration with the highest source-based time-averaged maximum output power was used for testing, this was 4x time slots.								

WLAN 2412MHz Head Specific Absorption Rate (Maximum SAR) 1g Results for 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, and GPS.

802.11b, 1 Mbps, DSSS

Test Position	Channel Number	Frequency (MHz)	Measured Conducted Power (dBm)	Tune Up limit (dBm)	Measured 1g SAR (W/kg)	Scaled 1g SAR (W/kg)	Scaled Duty Cycle 1g SAR (W/kg)	Area scan (Figure number)
Right Cheek	1	2412.0	13.78	14.5	0.24	0.28	0.28	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 2412MHz Body & Hotspot Configuration Specific Absorption Rate (Maximum SAR) 1g Results for 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, and GPS.

802.11b, 1 Mbps, DSSS

Position		Channel Number	Frequency (MHz)	Measured Conducted Power (dBm)	Tune Up limit (dBm)	Measured 1g SAR (W/kg)	Scaled 1g SAR (W/kg)	Scaled Duty Cycle 1g SAR (W/kg)	Area scan (Figure number)
Spacing	Position								
10mm	Rear Face	1	2412.0	13.78	14.5	0.27	0.32	0.32	Figure 59
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 Testing was carried out with a 10mm separation distance to meet the requirements of KDB 941225 D06 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									

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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 1 (Scaled SAR values)	∑ 1g SAR (W/kg)
Left Cheek	0.53	0.28	0.81
Left 15°	0.27	0.28	0.55
Right Cheek	0.62	0.28	**0.90**
Right 15°	0.35	0.28	0.63
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 1 (Scaled SAR values)	∑ 1g SAR (W/kg)
Front Facing	0.45	0.32	0.77
Rear Facing	0.54	0.32	0.86
Left Edge	0.31	0.32	0.63
Right Edge	0.44	0.32	0.76
Top Edge	-	0.32	-
Bottom Edge	0.10	0.32	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 Head	WCDMA FDDV 1g SAR (W/kg) CH 4233 (Scaled SAR values)	WLAN 2.4GHz 1g SAR (W/kg) CH 1 (Scaled SAR values)	∑ 1g SAR (W/kg)
Left Cheek	0.61	0.28	0.89
Left 15°	0.38	0.28	0.66
Right Cheek	0.62	0.28	**0.90**
Right 15°	0.38	0.28	0.66
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 1 (Scaled SAR values)	∑ 1g SAR (W/kg)
Front Facing	0.51	0.32	0.83
Rear Facing	0.61	0.32	**0.93**
Left Edge	0.36	0.32	0.68
Right Edge	0.52	0.32	0.84
Top Edge	-	0.32	-
Bottom Edge	0.10	0.32	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 Head	LTE Band 17, 1RB 1g SAR (W/kg) CH 23790 (Scaled SAR values)	WLAN 2.4GHz 1g SAR (W/kg) CH 1 (Scaled SAR values)	∑ 1g SAR (W/kg)
Left Cheek	0.15	0.28	0.43
Left 15°	0.11	0.28	0.39
Right Cheek	0.18	0.28	0.46
Right 15°	0.12	0.28	0.40
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 Head	LTE Band 17, 25RB 1g SAR (W/kg) CH 23800 (Scaled SAR values)	WLAN 2.4GHz 1g SAR (W/kg) CH 1 (Scaled SAR values	∑ 1g SAR (W/kg)
Left Cheek	0.11	0.28	0.39
Left 15°	0.08	0.28	0.36
Right Cheek	0.15	0.28	0.43
Right 15°	0.04	0.28	0.32
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 23790 (Scaled SAR values)	WLAN 2.4GHz 1g SAR (W/kg) CH 1 (Scaled SAR values	∑ 1g SAR (W/kg)
Front Facing	0.25	0.32	0.57
Rear Facing	0.30	0.32	0.62
Left Edge	0.17	0.32	0.49
Right Edge	0.12	0.32	0.44
Top Edge	-	0.32	-
Bottom Edge	0.03	0.32	0.35
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, 25RB 1g SAR (W/kg) CH 23800 (Scaled SAR values)	WLAN 2.4GHz 1g SAR (W/kg) CH 1 (Scaled SAR values	∑ 1g SAR (W/kg)
Front Facing	0.20	0.32	0.52
Rear Facing	0.25	0.32	0.57
Left Edge	0.13	0.32	0.45
Right Edge	0.11	0.32	0.43
Top Edge	-	0.32	-
Bottom Edge	0.01	0.32	0.33
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 Head	GPRS 1900 1g SAR (W/kg) CH 512 (Scaled SAR values)	WLAN 2.4GHz 1g SAR (W/kg) CH 1 (Scaled SAR values	∑ 1g SAR (W/kg)
Left Cheek	0.37	0.28	0.65
Left 15°	0.10	0.28	0.38
Right Cheek	0.49	0.28	0.77
Right 15°	0.16	0.28	0.44
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 1 (Scaled SAR values	∑ 1g SAR (W/kg)
Front Facing	0.45	0.32	0.77
Rear Facing	0.33	0.32	0.65
Left Edge	0.32	0.32	0.64
Right Edge	-	0.32	-
Top Edge	-	0.32	-
Bottom Edge	0.18	0.32	0.50
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.

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 Head SAR Estimation

Frequency (MHz)	Maximum Power (mW)	Distance (mm)	Estimated SAR (W/kg)
2450.0	5.01	5	0.282

Bluetooth Body SAR Estimation

Frequency (MHz)	Maximum Power (mW)	Distance (mm)	Estimated SAR (W/kg)
2450.0	5.01	10	0.141

1.5 PRODUCT INFORMATION

1.5.1 Technical Description

The equipment under test (EUT) was a 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, and GPS. A full technical description can be found in the manufacturer's documentation.

1.5.2 Test Configuration and Modes of Operation

The testing was performed with a battery manufactured by Sharp Corporation.

For head SAR assessment, testing was performed with the device in the declared normal position of operation for GSM 850MHz, PCS 1900MHz, WCDMA FDDV, LTE Band 17 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 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 body SAR assessment, testing was performed for GSM 850MHz, PCS 1900MHz, WCDMA FDDV, LTE Band 17 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. For the GSM 850MHz band GPRS Body the maximum scaled SAR level was found to be >0.80 W/kg (KDB 447498 D01) therefore additional testing was carried out at the relevant channels. For all other bands all scaled SAR levels were found to be <0.80 W/kg (KDB 447498 D01) therefore no 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 determined as per KDB 248227 D01 v02r02 clause 4(b). For 2.4GHz WLAN this was 802.11b 1Mbps.Testing was not required for OFDM transmission configurations as the requirements of KDB 248227 D01v02r02 Section 5.2.2 were 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.

Product Service

1.5.3 VoLTE Comparison Measurements

Standalone LTE SAR evaluation against the head was performed using the same RMC data mode to that used against the head. The justification for this being that the results shown in the following tables demonstrate that the power is not more than 0.25 dB higher in a VoLTE call when compared to the same configuration using an RMC data connection. Measurements giving the highest conducted power result for each frequency band, bandwidth, modulation and resource block configurations were repeated with EUT in a VoLTE call.

VoLTE Configuration – AMR 12.2kbps

Band 17 – 5 MHz – QPSK

Resource Block Allocation	Resource Block Offset	Channel	Carrier Power (dBm)		
			RMC	VoLTE	Difference (dB)
1	Mid	Middle	22.83	22.95	0.12
12	High	Top	21.71	21.69	-0.03
25	-	Bottom	21.63	21.81	0.18

Band 17 – 5 MHz – 16QAM

Resource Block Allocation	Resource Block Offset	Channel	Carrier Power (dBm)		
			RMC	VoLTE	Difference (dB)
1	Mid	Middle	21.55	21.67	0.12
12	Mid	Bottom	20.58	20.65	0.07
25	-	Bottom	20.74	20.81	0.07

Band 17 – 10 MHz – QPSK

Resource Block Allocation	Resource Block Offset	Channel	Carrier Power (dBm)		
			RMC	VoLTE	Difference (dB)
1	Mid	Middle	22.73	22.92	0.19
25	Mid	Middle	21.71	21.87	0.16
50	-	Bottom	21.79	21.92	0.23

Band 17 – 10 MHz – 16QAM

Resource Block Allocation	Resource Block Offset	Channel	Carrier Power (dBm)		
			RMC	VoLTE	Difference (dB)
1	Mid	Bottom	22.09	22.01	-0.08
25	Low	Top	20.74	20.75	0.01
50	-	Bottom	20.58	20.82	0.24

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	22.86	22.88
1	5.15	22.88	22.87
2	5.90	22.87	22.79
3	6.70	22.88	22.78
4	7.40	22.89	22.88
5	7.95	22.81	22.84
6	10.20	22.79	22.85
7	12.20	22.89	22.77

AMR-WB

Rate	kbit/s	Octet Aligned	Bandwidth Efficient
		Carrier Power (dBm)	
0	6.60	22.87	22.84
1	8.85	22.83	22.84
2	12.85	22.89	22.71
3	14.25	22.82	22.72
4	15.85	22.84	22.81
5	18.25	22.85	22.89
6	19.85	22.85	22.94
7	23.05	22.83	22.93
8	23.85	22.82	22.85

EVS Primary

		Carrier Power (dBm)
DTX	Not Present	22.77
	Enable	22.95
	Disable	22.84

EVS-AMR-WB-IO

Rate	kbit/s	Power (dBm)
0	6.60	22.76
1	8.85	22.87
2	12.85	22.84
3	14.25	22.92
4	15.85	22.84
5	18.25	22.84
6	19.85	22.93
7	23.05	22.82
8	23.85	22.84

Temperature: 23.3 ˚C Humidity: 46.6 %

Instrument Description	Manufacturer	Model Type	TE Number	Cal Period (months)	Calibration Due Date
Power Supply Unit	Hewlett Packard	6267B	21	-	TU
Power Divider	Weinschel	1506A	603	12	07-Jun-2017
Hygrometer	Rotronic	I-1000	3220	12	19-Aug-2016
Attenuator (10dB, 20W)	Lucas Weinschel	1	3225	12	16-Dec-2016
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	02-Sep-2016
P-Series Power Meter	Agilent Technologies	N1911A	3981	12	25-Sep-2016
50 MHz-18 GHz Wideband Power Sensor	Agilent Technologies	N1921A	3983	12	25-Sep-2016
TRUE RMS MULTIMETER	Fluke	179	4006	12	09-Dec-2016
Calibration Unit	Rohde & Schwarz	ZV-Z54	4368	12	07-Sep-2016
Wideband Radio Test Set	Rohde & Schwarz	CMW500	4546	12	03-Feb-2017

TU – Traceability Unscheduled
O/P Mon – Output monitored using calibrated equipment.

1.6 FCC POWER MEASUREMENTS

1.6.1 Method

Conducted power measurements were made using a power meter.

1.6.2 Conducted Power Measurements

GSM 850

Modulation	Frequency (MHz)	Conducted Carrier Power (dBm)
		Average
GMSK - Voice	824.20	32.11
	836.40	32.27
	848.80	32.15
GMSK – GPRS 1x Timeslot	824.20	32.02
	836.40	32.17
	848.80	32.07
GMSK – GPRS 2x Timeslot	824.20	30.48
	836.40	30.46
	848.80	30.38
GMSK – GPRS 3x Timeslot	824.20	28.52
	836.40	28.62
	848.80	28.67
GMSK – GPRS 4x Timeslot	824.20	27.99
	836.40	28.21
	848.80	28.15

PCS 1900

Modulation	Frequency (MHz)	Conducted Carrier Power (dBm)
		Average
GMSK - Voice	1850.20	29.56
	1880.00	29.51
	1909.80	29.44
GMSK – GPRS 1x Timeslot	1850.20	29.60
	1880.00	29.56
	1909.80	29.45
GMSK – GPRS 2x Timeslot	1850.20	27.32
	1880.00	27.22
	1909.80	27.18
GMSK – GPRS 3x Timeslot	1850.20	25.86
	1880.00	25.63
	1909.80	25.76
GMSK – GPRS 4x Timeslot	1850.20	25.10
	1880.00	24.94
	1909.80	24.97

WCDMA FDD V

Modulation	Frequency (MHz)	Conducted Carrier Power (dBm)
		Average
WCDMA - 12.2kbps RMC	826.4	23.06
	835.0	23.18
	846.6	23.28
WCDMA - 12.2kbps AMR with 3.4kbps SRB*	826.4	23.01
	835.0	23.22
	846.6	23.21
WCDMA - HSDPA (Subtest #1)	826.4	21.92
	835.0	22.09
	846.6	22.22
WCDMA - HSDPA (Subtest #2)	826.4	21.41
	835.0	21.52
	846.6	21.64
WCDMA - HSDPA (Subtest #3)	826.4	20.75
	835.0	20.87
	846.6	20.88
WCDMA - HSDPA (Subtest #4)	826.4	20.76
	835.0	20.85
	846.6	20.90
WCDMA - HSUPA (Subtest #1)	826.4	21.95
	835.0	22.11
	846.6	22.31
WCDMA - HSUPA (Subtest #2)	826.4	21.58
	835.0	21.64
	846.6	21.69
WCDMA - 12.2kbps RMC WCDMA - HSUPA (Subtest #3)	826.4	22.09
	835.0	22.21
	846.6	22.31
WCDMA - HSUPA (Subtest #4)	826.4	22.07
	835.0	22.20
	846.6	22.32
WCDMA - HSUPA (Subtest #5)	826.4	22.05
	835.0	22.16
	846.6	22.31
* The measured Conducted power for 12.2kbps AMR is <0.25dB higher than 12.2kbps RMC, therefore, testing was carried out using 12.2kbps RMC.		

LTE Band 17

Channel Bandwidth (MHz)	Modulation	Resource Block Allocation	Resource Block Offset	Measured Average Output Power (dBm)		
				Low Test Channel (709.0MHz)	Middle Test Channel (710.0 MHz)	High Test Channel (711.0 MHz)
10	QPSK	1	Low	22.85	22.70	22.58
		1	Mid	22.71	22.88	22.86
		1	High	22.53	22.88	22.81
		25	Low	21.76	21.83	21.95
		25	Mid	21.83	21.86	21.82
		25	High	21.70	21.65	21.66
		50	N/A	21.94	21.79	21.99
	16 QAM	1	Low	21.64	21.32	21.63
		1	Mid	22.24	21.50	21.50
		1	High	21.85	20.78	21.42
		25	Low	20.84	20.77	20.89
		25	Mid	20.85	20.80	20.88
		25	High	20.57	20.62	20.71
		50	N/A	20.73	20.71	20.70

WLAN

Modulation	Frequency (MHz)	Conducted Carrier Power (dBm)
		Average
802.11(b) - 2.4 GHz – 1Mbps	2412	13.78
	2437	13.22
	2462	13.43
802.11(g) - 2.4 GHz - 6Mbps	2412	10.95
	2437	10.47
	2462	10.50
802.11 (n) - 2.4 GHz – MCS0	2412	11.04
	2437	10.52
	2462	10.56

Bluetooth

Modulation	Frequency (MHz)	Conducted Carrier Power (dBm)
		Average
GFSK/DH5	2402	3.09
	2441	3.37
	2480	2.86

1.6.3 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	32.8	1905.46	Head	< 5	348.5	No
GPRS 850MHz	836.4	28.5	707.95	Head	< 5	129.5	No
				Body	10	64.7	No
WCDMA FDD V	846.6	24.2	263.03	Head	< 5	48.4	No
				Body	10	24.2	No
GSM 1900MHz	1850.2	29.8	954.99	Head	< 5	259.8	No
GPRS 1900MHz	1850.2	25.5	354.81	Head	< 5	96.5	No
				Body	10	48.3	No
LTE Band 17	710.0	24.2	263.03	Head	< 5	44.3	No
				Body	10	22.2	No
WLAN 2.4 GHz	2.412	14.5	28.18	Head	< 5	8.8	No
				Body	10	4.4	No
Bluetooth	2450	8.3	6.76	Head	< 5	2.1	Yes
				Body	10	1.1	Yes

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, and GPS

Product Service

2.1 SARA-C SAR MEASUREMENT SYSTEM

2.1.1 Robot System Specification

The SAR measurement system being used is the IndexSAR SARA-C system, which consists of a cartestian 6-axis robot jig, a dedicated robot controller, a straight IndexSAR probe, an L-shaped Indexsar probe, a fast amplifier, and two phantoms: an upside-down SAM phantom, and a rectangular box phantom,

Figure 1. The L-probe is used in connection with measurements on DUTs held against the SAM phantom, while the straight probe is used exclusively in the box phantom. The robot is used to articulate the probe to programmed positions inside the phantom head to obtain SAR readings from the DUT.

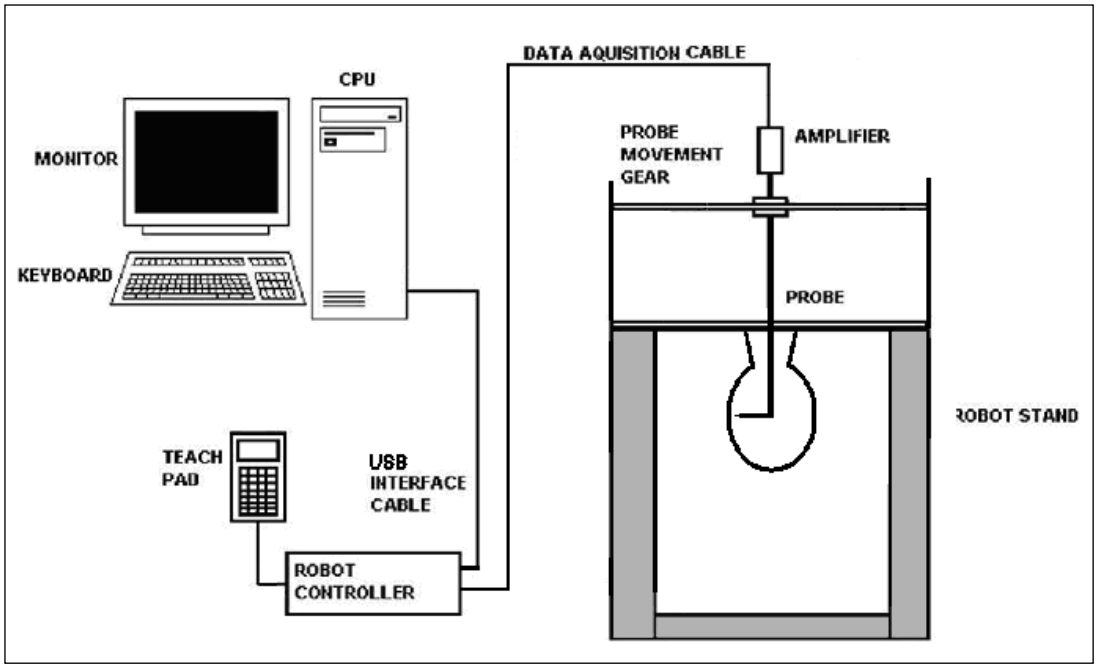

Figure 1 Schematic diagram of the SARA-C measurement system showing the L-probe and upside-down SAM phantom

The system is controlled remotely from a PC, which contains the software to drive the robot and data acquisition equipment. The software also displays the data obtained from test scans.

The position and digitised shape of the phantom heads are made available to the software for accurate positioning of the probe and reduction of set-up time. The SAM phantom heads are individually digitised using a Mitutoyo CMM machine to a precision of 0.001mm. The data is then converted into a shape format for the software, providing an accurate description of the phantom shell. Even with this accuracy, registration errors and deformation of the phantom when filled with 7 litres of fluid, can lead to probe placement errors of 1mm or more. For this reason, the L-probes house a 2-axis strain gauge unit, which allow the actual phantom wall position to be sensed to an accuracy of 0.3mm during probe movements.

In operation, the system first does an area (2D) scan within the liquid following the curve of the phantom wall at a fixed distance. When the maximum SAR point has been found, the system will then carry out a 3D scan centred at that point to determine volume averaged SAR level.

Product Service

2.1.2 Probe and Amplifier Specification

IndexSAR isotropic immersible straight SAR probes

Straight probes are constructed using three orthogonal dipole sensors arranged on an interlocking, triangular prism core. The probes have built-in shielding against static charges and are contained within a PEEK cylindrical enclosure material at the tip. The tips come in either 5mm (typically for use up to 3GHz) or 2.5mm (above 3GHz) versions, model types IXP-050 and IXP-025 respectively.

Straight probes are calibrated by NPL in the UK.

Straight probes are used exclusively in the box phantom, to measure SAR from DUTs placed against the phantom base. In SARA2, straight probes were also used in the SAM phantom, but this is forbidden in SARA-C, where L-probes are demanded. NB the reverse is not true: L-probes can be used in the box phantom.

IndexSAR L-probes

The L-shaped probe is so designed to ensure the probe tip can remain perpendicular to the SAM phantom wall during scans. To allow for greater probe articulation freedom, the SAM phantom head has been turned upside down and the probe is inserted through the throat aperture, rather than through a small hole at the top of the head in the old SARA2 SAR measurement system.

Like the straight probes, L-probes also come in the same two tip sizes: IXP-020 (5mm) and IXP-021 (2.5mm).

L-probes are calibrated to national standards in-house by IndexSAR.

L-probes can be used either in the SAM head, or against the side wall of the box phantom.

IFA-020 Fast Amplifier

A block diagram of the fast probe amplifier electronics is shown below.

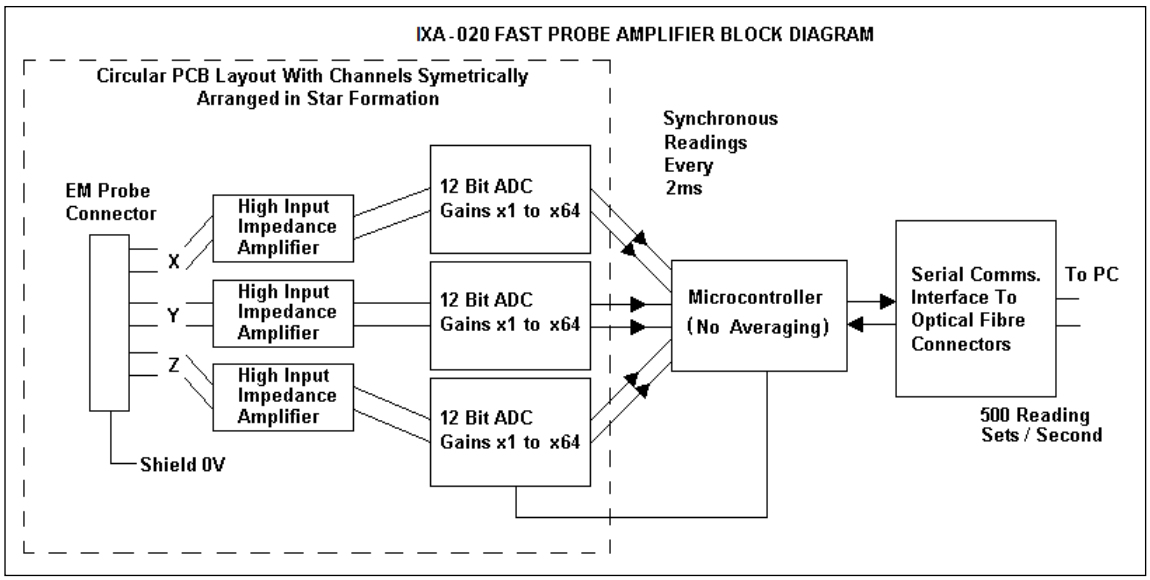

Figure 2 Schematic diagram of the fast amplifier

This amplifier has a time constant of approx. 50µs, which is much faster than the SAR probe response time. The overall system time constant is therefore that of the probe (<1ms) and a reading containing data for all three channels is returned to the PC every 2ms. The conversion period is approx. 1 µs at the start of each 2ms period. This enables the probe to follow pulse modulated signals of periods >>2ms. The PC software applies the linearisation procedure separately to each reading, so no linearisation corrections for the averaging of modulated signals are needed in this case.

The fast amplifier sampling rate can be adjusted via the SARA-C user interface from 1.7ms to 2.3ms. When not measuring CW signals, it is important to ensure that this probe reading rate and the modulated signal's pulse repetition rate are not unintentionally synchronised since this can lead to aliasing and a gross reduction in accuracy. For GSM signals, the default amplifier sampling rate of 2ms is entirely satisfactory, whereas changing it to 2.3ms (almost exactly half the GSM frame rate) could mean GSM bursts are always missed.

When aggregating 2ms samples to reduce the stochastic noise, it is equally important to match the number of samples with the longer-term timing structure of the modulation scheme. Taking GSM as an example again, since 120ms is the precise length of a GSM traffic channel multiframe, best practice would dictate that aggregated samples should cover exact multiples of this timescale. In this case, setting the number of samples to be aggregated to 120 (2 multiframes), or 240 samples (4 multiframes) should be ideal. Other signalling protocols would require changing these numbers as appropriate.

Product Service

Phantoms

The Flat phantom used is a rectangular Perspex Box IndexSAR item IXB-2HF, dimensions 240 x 190 x 195mm (w x d x h). The base and one side wall are made of FR4 material which has specific dielectric properties and a tightly-controlled thickness. The base is used in tandem with straight probes, measuring either a DUT or a validation dipole, while the side wall is for performing validations with the L-probe. It is also feasible to perform measurements on body-worn devices with the L-probe against the side window, but only if the L-probe is suitably calibrated (ie if the measurement standard demands body and head fluids have the same dielectric properties).

The Specific Anthropomorphic Mannequin (SAM) Upright Phantom is fabricated using moulds generated from the CAD files as specified by CENELEC EN 62209-1: 2006.

2.1.3 SAR Measurement Procedure

Detailed measurement procedures for SARA-C are set out in a separate IndexSAR technical document ("SARA-C Operational Procedures").

A test set and dipole antenna control the handset via an air link and a low-mass phone holder can position the phone at either ear. Graduated scales are provided to set the phone in the 15 degree position. The upright phantom head holds approx. 7 litres of simulant liquid. The phantom is filled and emptied through the 110mm diameter penetration hole in the neck.

An area scan is performed inside the head at a fixed distance of 5mm from the curved surface on the source side. An algorithm presents the user with the location of any local hotspots and allows one to be selected for a follow-up 3D scan, looking at how the signal absorption varies with depth. A comparison between the start and end readings at a fixed distance from the DUT also enables the power drift during measurement to be assessed.

SARA-C Interpolation and Extrapolation schemes

SARA-C software contains support for both 2D cubic B-spline interpolation as well as 3D cubic B-spline interpolation. In addition, for extrapolation purposes, a proprietary curve-fitting routine is implemented as a weighted average of 3 different polynomial fits. The polynomial fitting procedures have been extensively tested by comparing the fitting coefficients generated by the SARA-C procedures with those obtained using the polynomial fit functions of Microsoft Excel when applied to the same test input data.

Interpolation of 2D area scan

The 2D cubic B-spline interpolation is used after the initial area scan at fixed distance from the phantom shell wall. The initial scan data are collected with approx. 115mm spatial resolution and spline interpolation is used to find the location of the local maximum to within a 1mm resolution for positioning the subsequent 3D scanning.

Extrapolation of 3D scan

For the 3D scan, data are collected on a spatially regular, but conformal, 3D grid having (by default) 6.4 mm steps in the lateral dimensions and 3.5 mm steps in the depth direction (away from the source). SARA-C enables full control over the selection of alternative step sizes in all directions.

The overall accuracy of the 1g and 10g SAR volume average depends largely on the accuracy with which the probe can be re-positioned in the head. Although the digitised shape of the head is available to the SARA-C software, a better positioning solution is to use strain gauges attached to the L-probe to feel for the actual surface and to base all movements relative to this positive detection. An even more precise, but time-consuming, method is to place the probe tip in positive contact against the phantom wall, then step backwards 0.01mm at a time while monitoring the recorded SAR reading. At the exact moment that the probe detaches from contact, the SAR reading will suddenly fall.

After the data collection, the data are extrapolated up to the shell wall in the depth direction to assign values to points in the 3D array which cannot be measured in practice because of the finite size of the sensor tip. For automated measurements inside the head, the distance of the closest plane from the wall cannot be less than 2.7mm (for 5mm probes) and 1.39mm (for 2.5mm probes), this being the distance of the probe sensors behind the front edge of the probe tip.

Interpolation of 3D scan and volume averaging

The procedure used in SARA-C for defining the volumes used in SAR averaging follow the method of adapting the surface of the 'cube' to conform with the curved inner surface of the phantom (see Appendix C.2.2.1 in EN 62209-1: 2006). This is called, here, the conformal scheme.

For each row of data in the depth direction, the data are extrapolated to the phantom wall, and interpolated to less than 1mm spacing and average values are calculated from the phantom surface for the row of data over distances corresponding to the requisite depth for 10g and 1g cubes. This results in two 2D arrays of data, one for 1g and the other for 10g masses, which are then cubic B-spline interpolated to sub mm lateral resolution. A search routine then moves an averaging square around through the 2D array and records the maximum value of the corresponding 1g and 10g volume averages.

The default step size is 3.5mm, but this is under user-control. The compromise is with time of scan, so it is not practical to make it much smaller or scan times become long and power-drop influences become larger.
The robot positioning system specification for the repeatability of the positioning (**dss** in EN 62209-1: 2006) is +/- 0.04mm.

Product Service

2.1.4 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.

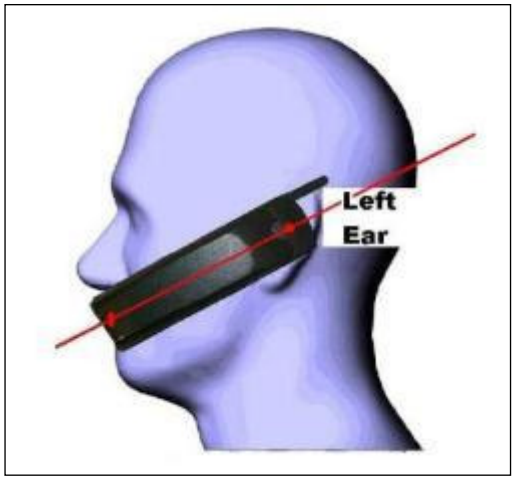

Figure 3 Side view of mobile next to head showing alignment

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°.

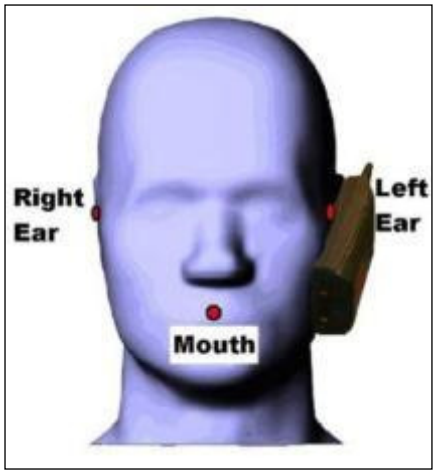

Figure 4 Cheek position

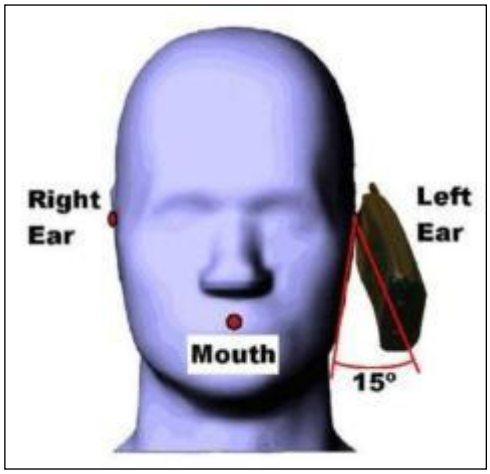

Figure 5 15º Tilt Position

2.2 GSM 850MHz HEAD SAR TEST RESULTS AND COURSE AREA SCANS – 2D

SYSTEM / SOFTWARE:	SARA-C / v6.09.22	**INPUT POWER DRIFT:**	0 dB
DATE / TIME:	01/06/2016-10:16:02	**DUT BATTERY MODEL/NO:**	Integral
AMBIENT TEMPERATURE:	22.90°C	**LIQUID SIMULANT:**	850 Head
DEVICE UNDER TEST:	-	**RELATIVE PERMITTIVITY:**	40.21
RELATIVE HUMIDITY:	21.20%	**CONDUCTIVITY:**	0.867
PHANTOM S/NO:	IXB-040	**LIQUID TEMPERATURE:**	23.10°C
PHANTOM ROTATION:	N/A	**MAX SAR Y-AXIS LOCATION:**	59.90mm
DUT POSITION:	Left-Cheek	**MAX SAR Z-AXIS LOCATION:**	-112.00mm
ANTENNA CONFIGURATION:	N/A	**MAX E FIELD:**	20.202
TEST FREQUENCY:	836.4MHz	**SAR 1g:**	0.47 W/kg
TYPE OF MODULATION:	GMSK (Voice Mode)	**SAR 10g:**	N/A
MODN. DUTY CYCLE:	12.5%	**SAR START:**	0.443 W/kg
INPUT POWER LEVEL:	32.8dBm	**SAR END:**	0.422 W/kg
PROBE BATTERY LAST CHANGED:	01/06/2016	**SAR DRIFT DURING SCAN:**	-4.800 %

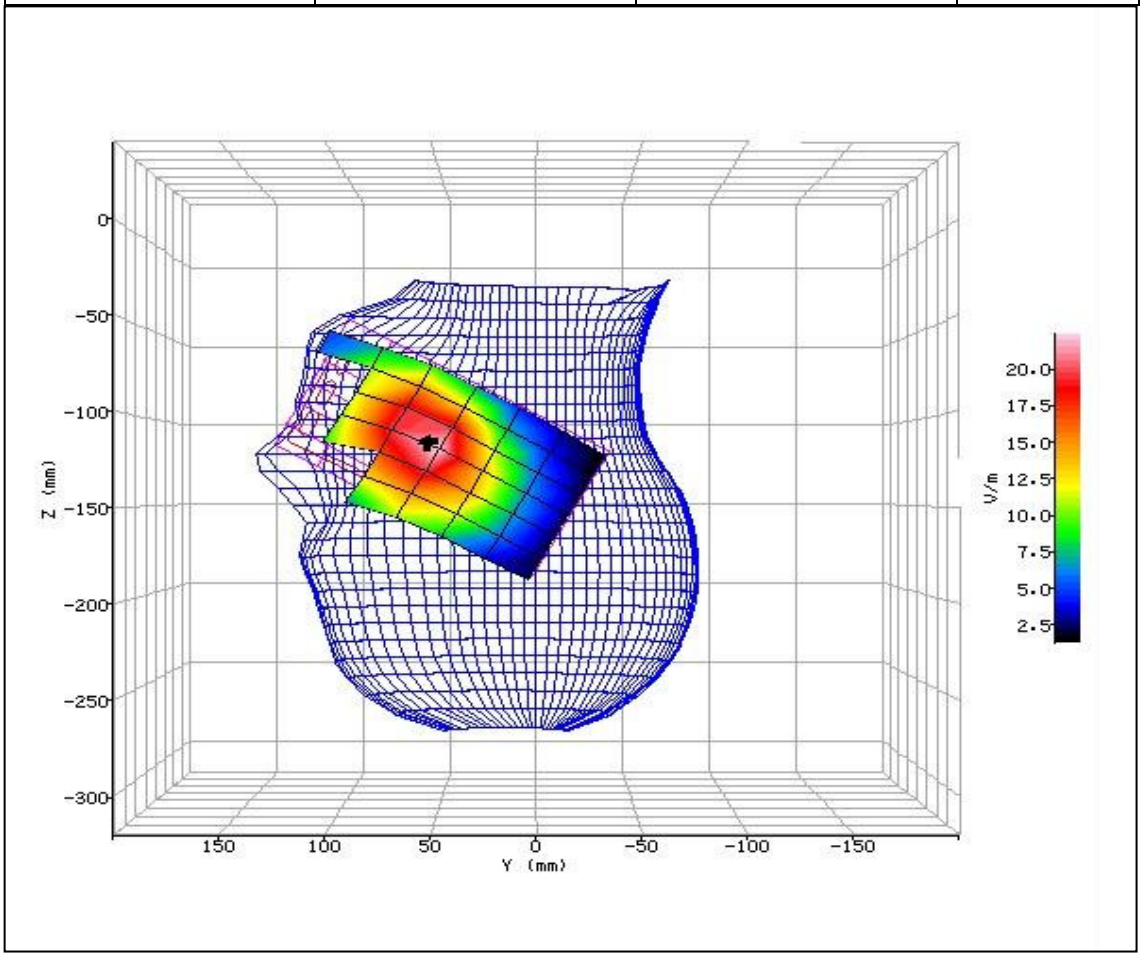

Figure 6: SAR Head Testing Results for the Mobile Handset at 836.4MHz.

SYSTEM / SOFTWARE:	SARA-C / v6.09.22	**INPUT POWER DRIFT:**	0 dB
DATE / TIME:	01/06/2016-10:40:41	**DUT BATTERY MODEL/NO:**	Integral
AMBIENT TEMPERATURE:	22.90°C	**LIQUID SIMULANT:**	850 Head
DEVICE UNDER TEST:	-	**RELATIVE PERMITTIVITY:**	40.21
RELATIVE HUMIDITY:	21.20%	**CONDUCTIVITY:**	0.867
PHANTOM S/NO:	IXB-040	**LIQUID TEMPERATURE:**	23.10°C
PHANTOM ROTATION:	N/A	**MAX SAR Y-AXIS LOCATION:**	44.80mm
DUT POSITION:	Left-15°	**MAX SAR Z-AXIS LOCATION:**	-124.00mm
ANTENNA CONFIGURATION:	N/A	**MAX E FIELD:**	14.595
TEST FREQUENCY:	836.4MHz	**SAR 1g:**	0.25 W/kg
TYPE OF MODULATION:	GMSK (Voice Mode)	**SAR 10g:**	N/A
MODN. DUTY CYCLE:	12.5%	**SAR START:**	0.228 W/kg
INPUT POWER LEVEL:	32.8dBm	**SAR END:**	0.225 W/kg
PROBE BATTERY LAST CHANGED:	01/06/2016	**SAR DRIFT DURING SCAN:**	-1.100 %

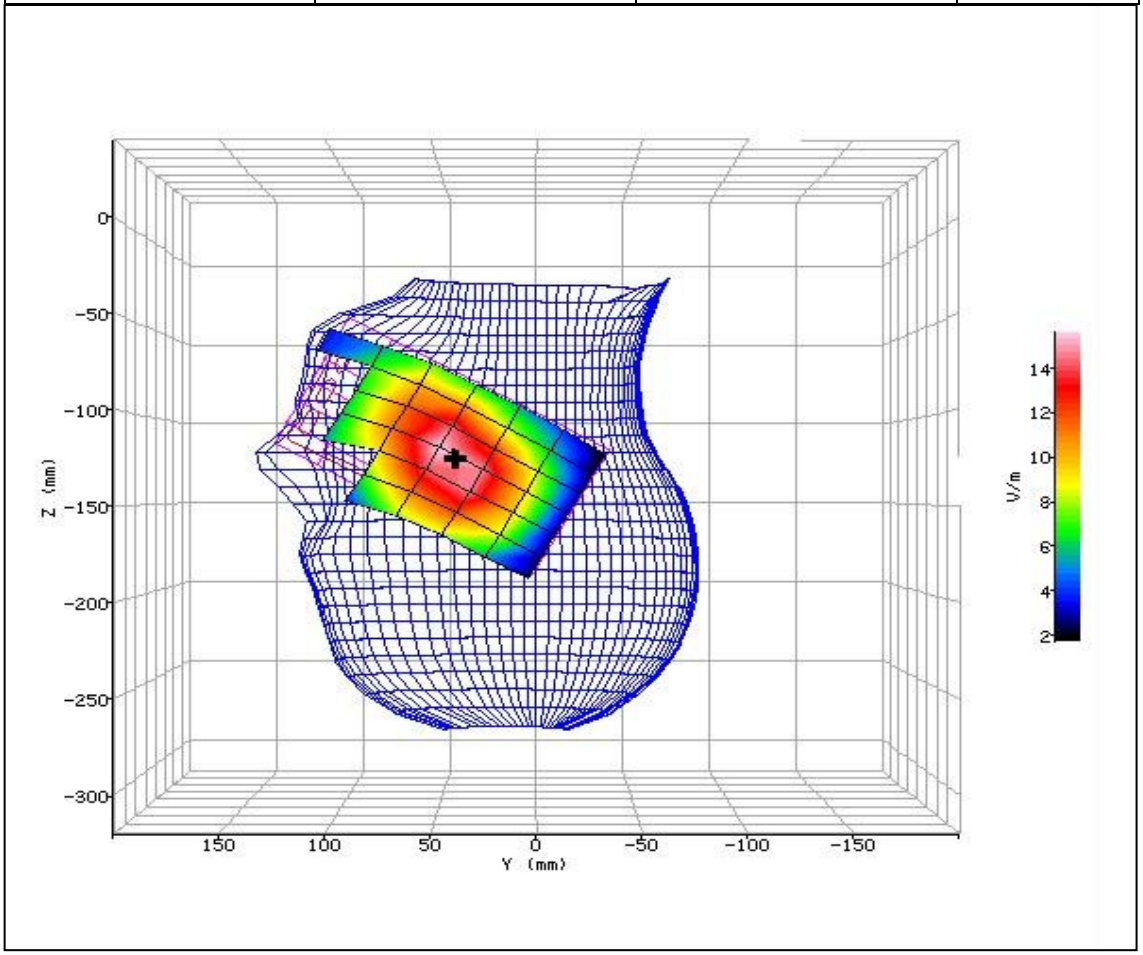

Figure 7: SAR Head Testing Results for the Mobile Handset at 836.4MHz.

SYSTEM / SOFTWARE:	SARA-C / v6.09.22	**INPUT POWER DRIFT:**	0 dB
DATE / TIME:	01/06/2016-11:27:06	**DUT BATTERY MODEL/NO:**	Integral
AMBIENT TEMPERATURE:	22.90°C	**LIQUID SIMULANT:**	850 Head
DEVICE UNDER TEST:	-	**RELATIVE PERMITTIVITY:**	40.21
RELATIVE HUMIDITY:	21.20%	**CONDUCTIVITY:**	0.867
PHANTOM S/NO:	IXB-040	**LIQUID TEMPERATURE:**	23.10°C
PHANTOM ROTATION:	N/A	**MAX SAR Y-AXIS LOCATION:**	60.90mm
DUT POSITION:	Right-Cheek	**MAX SAR Z-AXIS LOCATION:**	-117.80mm
ANTENNA CONFIGURATION:	N/A	**MAX E FIELD:**	21.108
TEST FREQUENCY:	836.4MHz	**SAR 1g:**	0.53 W/kg
TYPE OF MODULATION:	GMSK (Voice Mode)	**SAR 10g:**	N/A
MODN. DUTY CYCLE:	12.5%	**SAR START:**	0.422 W/kg
INPUT POWER LEVEL:	32.8dBm	**SAR END:**	0.439 W/kg
PROBE BATTERY LAST CHANGED:	01/06/2016	**SAR DRIFT DURING SCAN:**	4.000 %

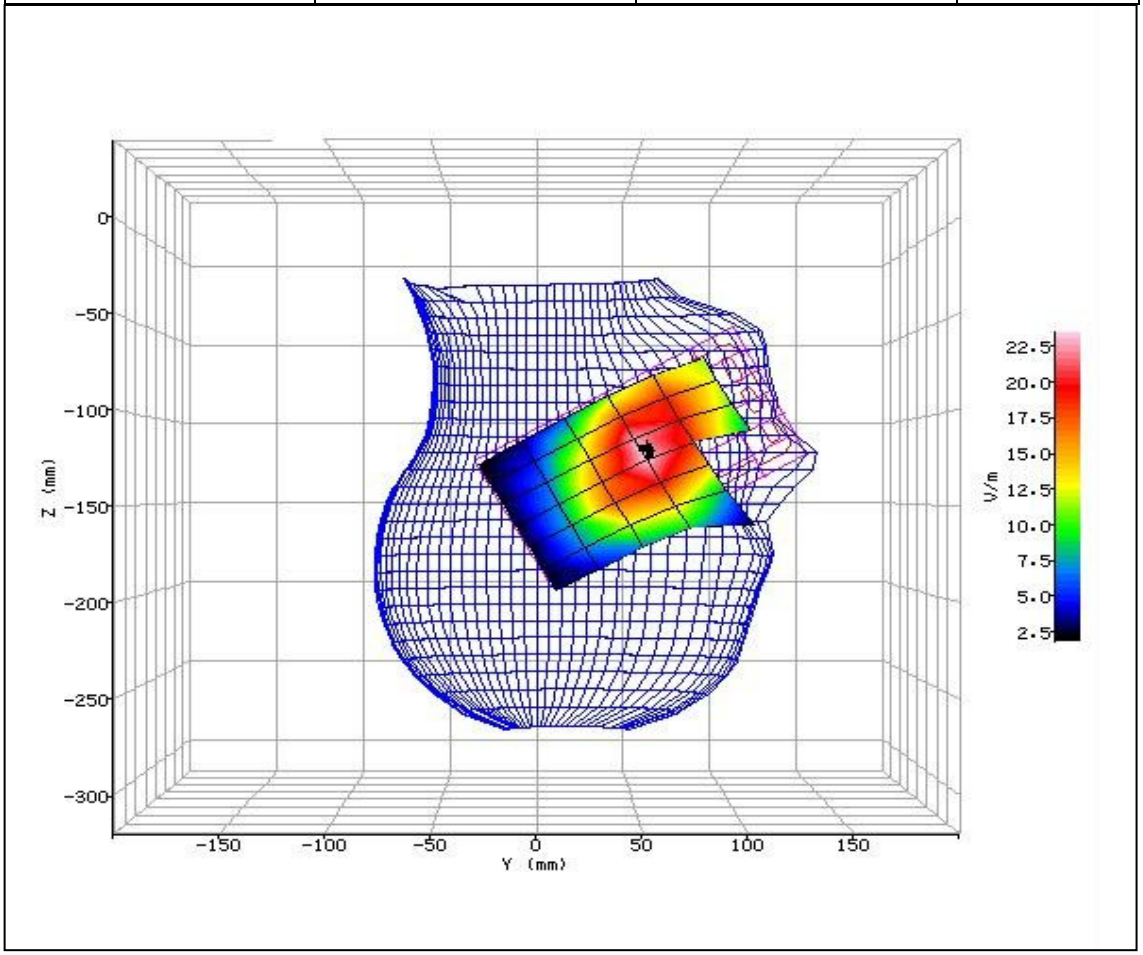

Figure 8: SAR Head Testing Results for the Mobile Handset at 836.4MHz.

SYSTEM / SOFTWARE:	SARA-C / v6.09.22	**INPUT POWER DRIFT:**	0 dB
DATE / TIME:	01/06/2016-11:51:13	**DUT BATTERY MODEL/NO:**	Integral
AMBIENT TEMPERATURE:	22.90°C	**LIQUID SIMULANT:**	850 Head
DEVICE UNDER TEST:	-	**RELATIVE PERMITTIVITY:**	40.21
RELATIVE HUMIDITY:	21.20%	**CONDUCTIVITY:**	0.867
PHANTOM S/NO:	IXB-040	**LIQUID TEMPERATURE:**	23.10°C
PHANTOM ROTATION:	N/A	**MAX SAR Y-AXIS LOCATION:**	47.70mm
DUT POSITION:	Right-15°	**MAX SAR Z-AXIS LOCATION:**	-133.00mm
ANTENNA CONFIGURATION:	N/A	**MAX E FIELD:**	16.578
TEST FREQUENCY:	836.4MHz	**SAR 1g:**	0.31 W/kg
TYPE OF MODULATION:	GMSK (Voice Mode)	**SAR 10g:**	N/A
MODN. DUTY CYCLE:	12.5%	**SAR START:**	0.295 W/kg
INPUT POWER LEVEL:	32.8dBm	**SAR END:**	0.278 W/kg
PROBE BATTERY LAST CHANGED:	01/06/2016	**SAR DRIFT DURING SCAN:**	-5.600 %

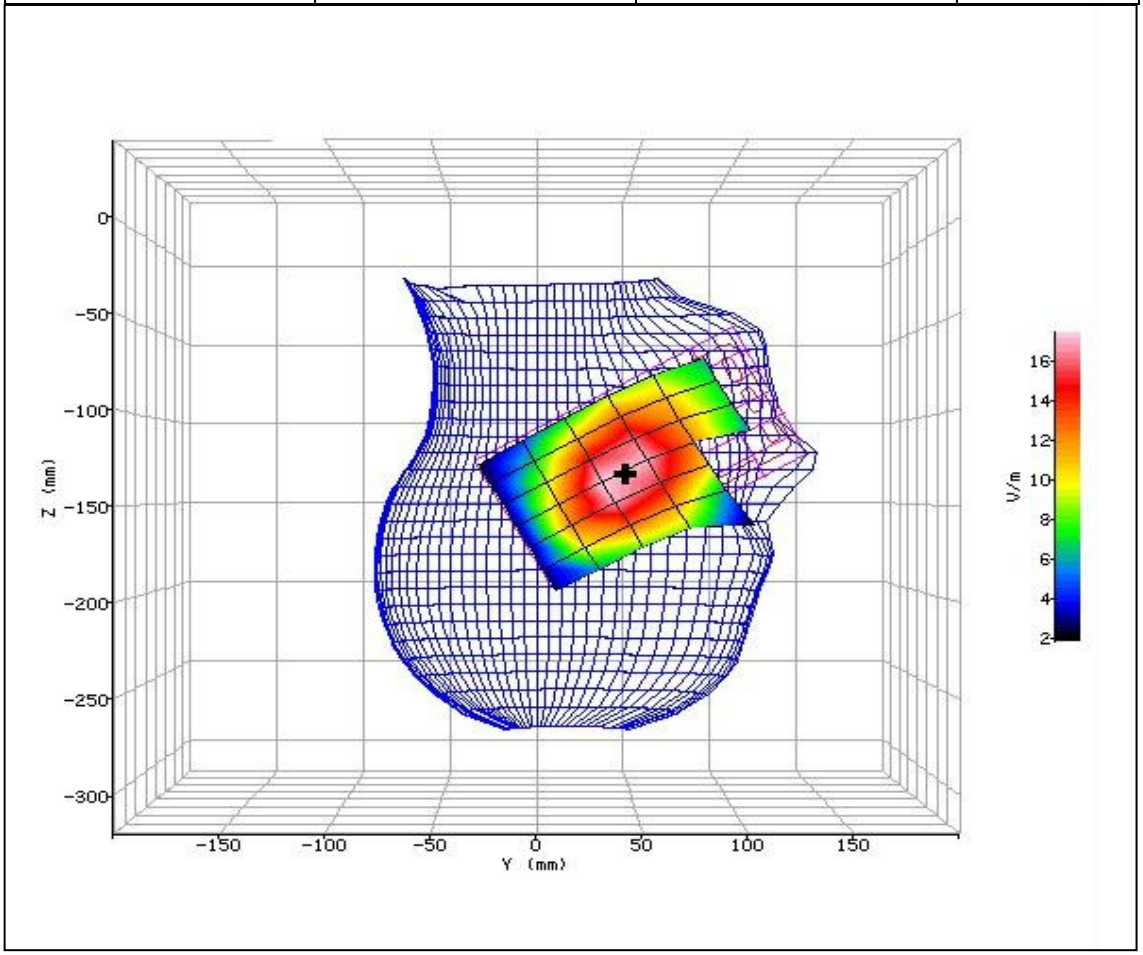

Figure 9: SAR Head Testing Results for the Mobile Handset at 836.4MHz.

2.3 GSM 850MHz HEAD SAR TEST RESULTS AND COURSE AREA SCANS – 2D

SYSTEM / SOFTWARE:	SARA-C / v6.09.22	**INPUT POWER DRIFT:**	0 dB
DATE / TIME:	01/06/2016-14:11:31	**DUT BATTERY MODEL/NO:**	Integral
AMBIENT TEMPERATURE:	22.90°C	**LIQUID SIMULANT:**	850 Head
DEVICE UNDER TEST:	-	**RELATIVE PERMITTIVITY:**	40.21
RELATIVE HUMIDITY:	21.20%	**CONDUCTIVITY:**	0.867
PHANTOM S/NO:	IXB-040	**LIQUID TEMPERATURE:**	23.10°C
PHANTOM ROTATION:	N/A	**MAX SAR Y-AXIS LOCATION:**	60.50mm
DUT POSITION:	Left-Cheek	**MAX SAR Z-AXIS LOCATION:**	-112.50mm
ANTENNA CONFIGURATION:	N/A	**MAX E FIELD:**	20.663
TEST FREQUENCY:	836.4MHz	**SAR 1g:**	0.50 W/kg
TYPE OF MODULATION:	GMSK (GPRS Mode)	**SAR 10g:**	N/A
MODN. DUTY CYCLE:	50%	**SAR START:**	0.454 W/kg
INPUT POWER LEVEL:	28.5dBm	**SAR END:**	0.450 W/kg
PROBE BATTERY LAST CHANGED:	01/06/2016	**SAR DRIFT DURING SCAN:**	-0.800 %

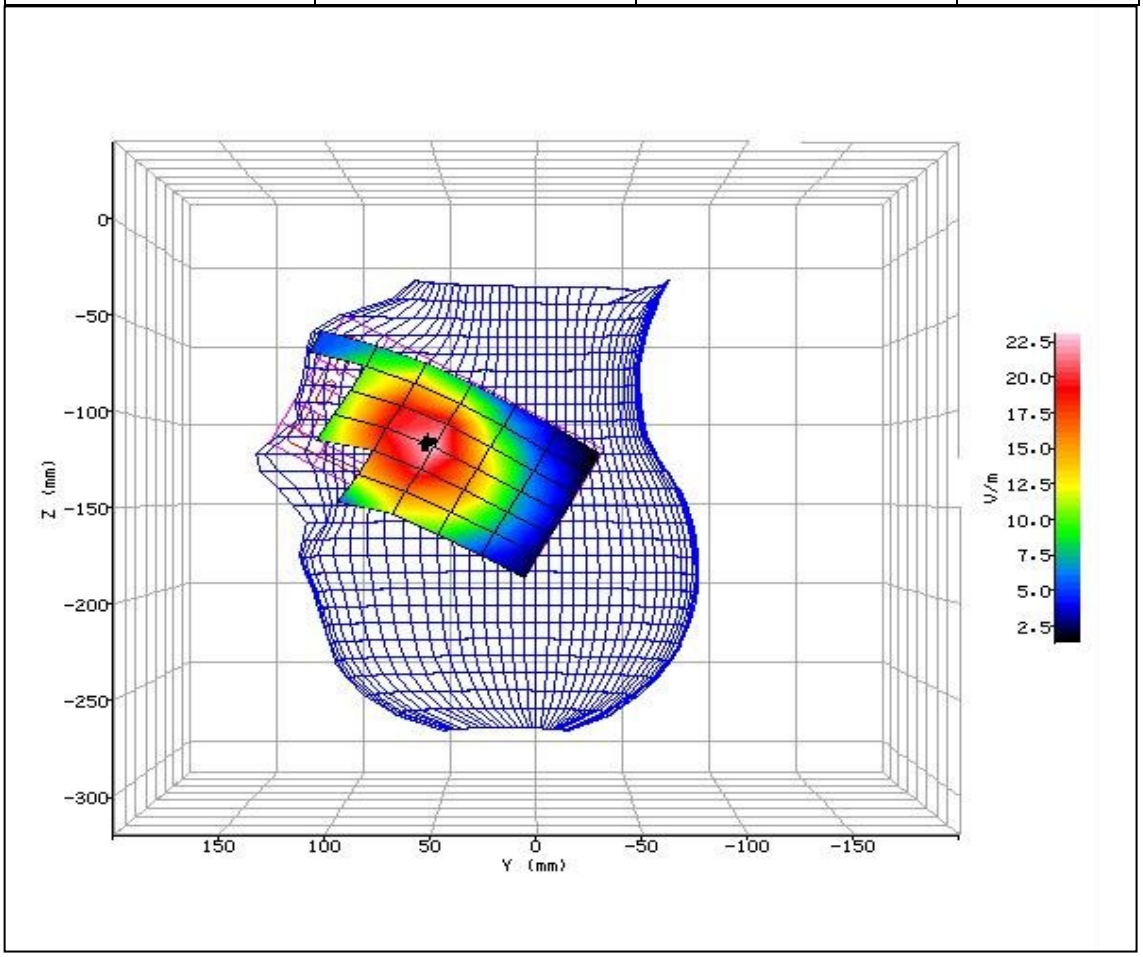

Figure 10: SAR Head Testing Results for the Mobile Handset at 836.4MHz.

SYSTEM / SOFTWARE:	SARA-C / v6.09.22	**INPUT POWER DRIFT:**	0 dB
DATE / TIME:	01/06/2016-14:34:49	**DUT BATTERY MODEL/NO:**	Integral
AMBIENT TEMPERATURE:	22.90°C	**LIQUID SIMULANT:**	850 Head
DEVICE UNDER TEST:	-	**RELATIVE PERMITTIVITY:**	40.21
RELATIVE HUMIDITY:	21.20%	**CONDUCTIVITY:**	0.867
PHANTOM S/NO:	IXB-040	**LIQUID TEMPERATURE:**	23.10°C
PHANTOM ROTATION:	N/A	**MAX SAR Y-AXIS LOCATION:**	46.30mm
DUT POSITION:	Left-15°	**MAX SAR Z-AXIS LOCATION:**	-123.20mm
ANTENNA CONFIGURATION:	N/A	**MAX E FIELD:**	14.887
TEST FREQUENCY:	836.4MHz	**SAR 1g:**	0.25 W/kg
TYPE OF MODULATION:	GMSK (GPRS Mode)	**SAR 10g:**	N/A
MODN. DUTY CYCLE:	50%	**SAR START:**	0.230 W/kg
INPUT POWER LEVEL:	28.5dBm	**SAR END:**	0.231 W/kg
PROBE BATTERY LAST CHANGED:	01/06/2016	**SAR DRIFT DURING SCAN:**	0.700 %

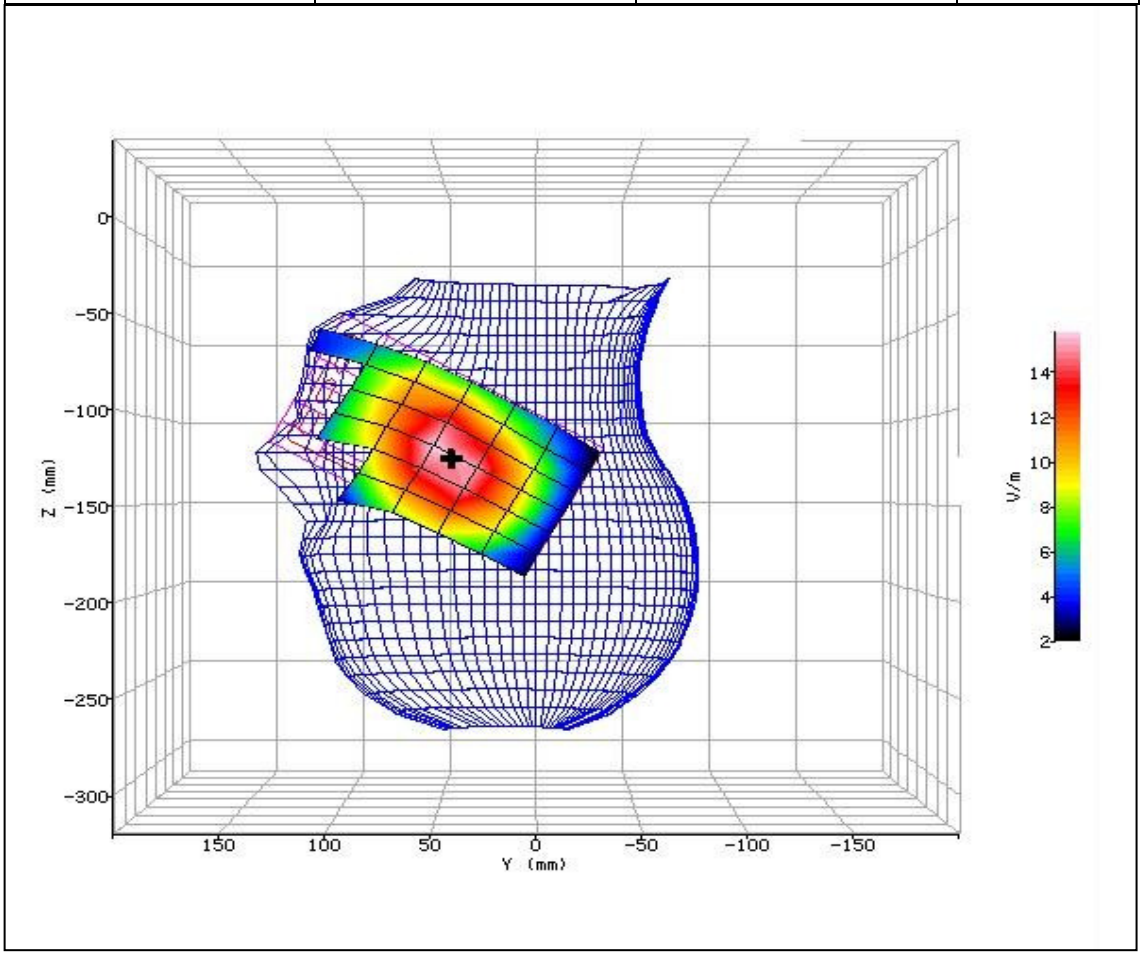

Figure 11: SAR Head Testing Results for the Mobile Handset at 836.4MHz.

SYSTEM / SOFTWARE:	SARA-C / v6.09.22	**INPUT POWER DRIFT:**	0 dB
DATE / TIME:	01/06/2016-12:50:37	**DUT BATTERY MODEL/NO:**	Integral
AMBIENT TEMPERATURE:	22.90°C	**LIQUID SIMULANT:**	850 Head
DEVICE UNDER TEST:	-	**RELATIVE PERMITTIVITY:**	40.21
RELATIVE HUMIDITY:	21.20%	**CONDUCTIVITY:**	0.867
PHANTOM S/NO:	IXB-040	**LIQUID TEMPERATURE:**	23.10°C
PHANTOM ROTATION:	N/A	**MAX SAR Y-AXIS LOCATION:**	61.70mm
DUT POSITION:	Right-Cheek	**MAX SAR Z-AXIS LOCATION:**	-119.10mm
ANTENNA CONFIGURATION:	N/A	**MAX E FIELD:**	22.537
TEST FREQUENCY:	836.4MHz	**SAR 1g:**	0.58 W/kg
TYPE OF MODULATION:	GMSK (GPRS Mode)	**SAR 10g:**	N/A
MODN. DUTY CYCLE:	50%	**SAR START:**	0.513 W/kg
INPUT POWER LEVEL:	28.5dBm	**SAR END:**	0.484 W/kg
PROBE BATTERY LAST CHANGED:	01/06/2016	**SAR DRIFT DURING SCAN:**	-5.600 %

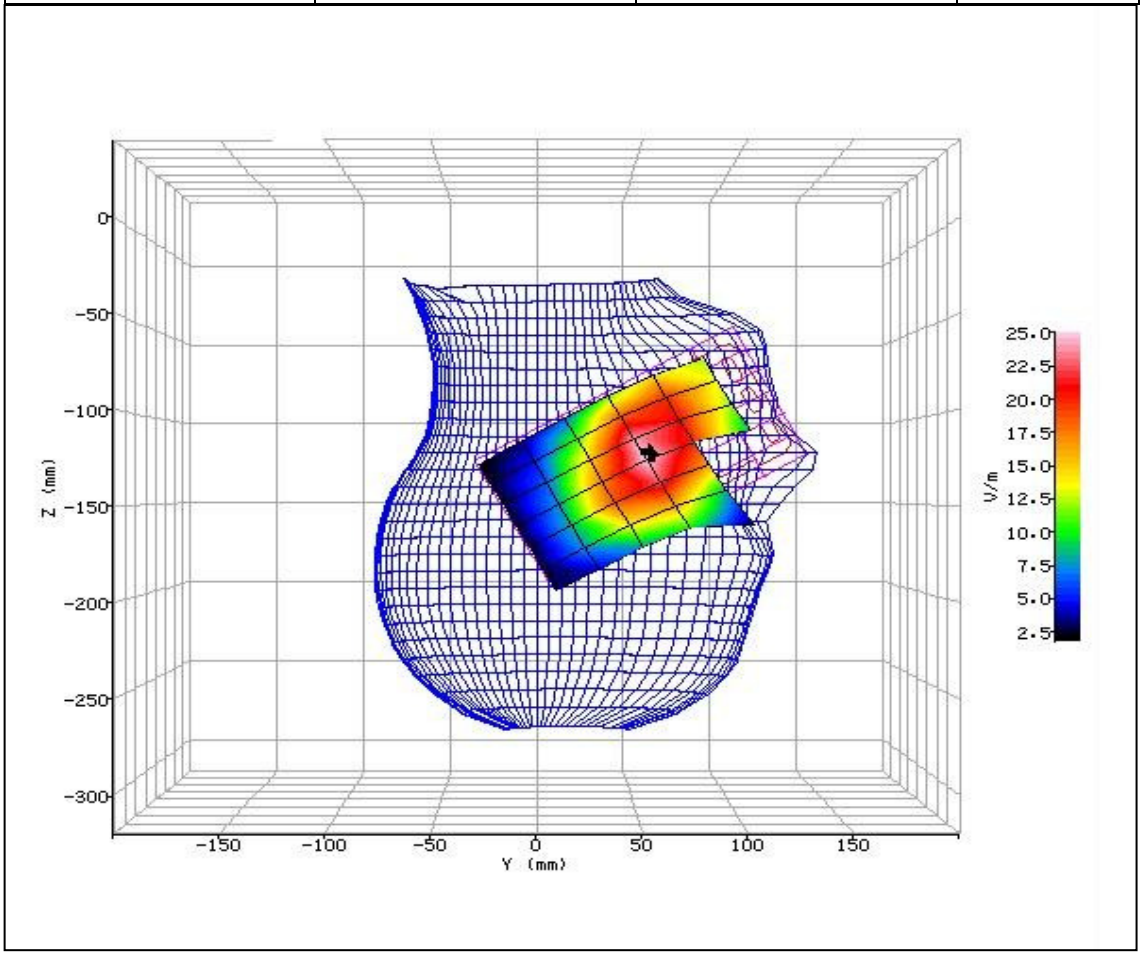

Figure 12: SAR Head Testing Results for the Mobile Handset at 836.4MHz.

SYSTEM / SOFTWARE:	SARA-C / v6.09.22	**INPUT POWER DRIFT:**	0 dB
DATE / TIME:	01/06/2016-13:14:01	**DUT BATTERY MODEL/NO:**	Integral
AMBIENT TEMPERATURE:	22.90°C	**LIQUID SIMULANT:**	850 Head
DEVICE UNDER TEST:	-	**RELATIVE PERMITTIVITY:**	40.21
RELATIVE HUMIDITY:	21.20%	**CONDUCTIVITY:**	0.867
PHANTOM S/NO:	IXB-040	**LIQUID TEMPERATURE:**	23.10°C
PHANTOM ROTATION:	N/A	**MAX SAR Y-AXIS LOCATION:**	48.90mm
DUT POSITION:	Right-15°	**MAX SAR Z-AXIS LOCATION:**	-132.40mm
ANTENNA CONFIGURATION:	N/A	**MAX E FIELD:**	17.354
TEST FREQUENCY:	836.4MHz	**SAR 1g:**	0.33 W/kg
TYPE OF MODULATION:	GMSK (GPRS Mode)	**SAR 10g:**	N/A
MODN. DUTY CYCLE:	50%	**SAR START:**	0.298 W/kg
INPUT POWER LEVEL:	28.5dBm	**SAR END:**	0.300 W/kg
PROBE BATTERY LAST CHANGED:	01/06/2016	**SAR DRIFT DURING SCAN:**	0.600 %

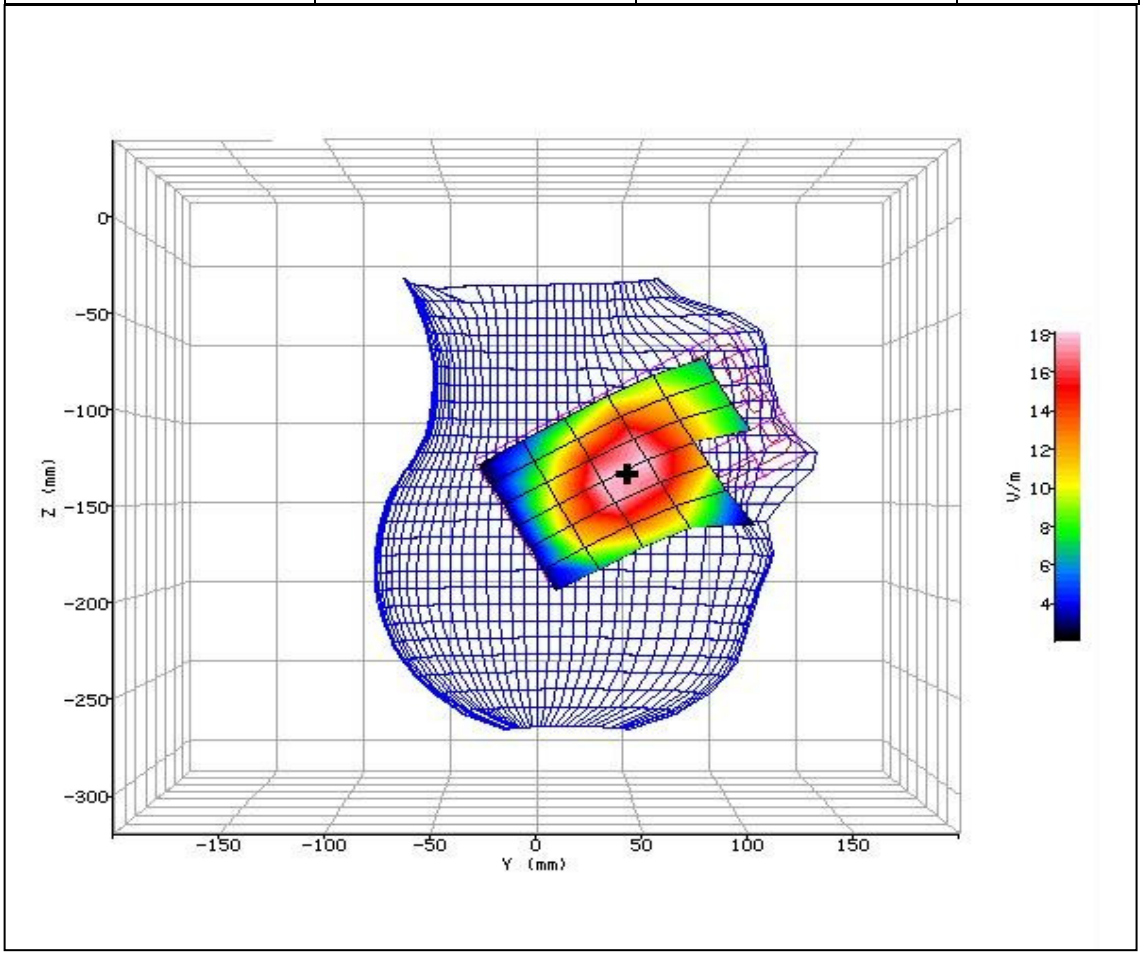

Figure 13: SAR Head Testing Results for the Mobile Handset at 836.4MHz.

2.4 GSM 850MHz BODY SAR TEST RESULTS AND COURSE AREA SCANS – 2D

SYSTEM / SOFTWARE:	SARA-C / v6.09.22	**INPUT POWER DRIFT:**	0 dB
DATE / TIME:	06/06/2016-09:15:17	**DUT BATTERY MODEL/NO:**	Integral
AMBIENT TEMPERATURE:	22.80°C	**LIQUID SIMULANT:**	850 Body
DEVICE UNDER TEST:	-	**RELATIVE PERMITTIVITY:**	52.69
RELATIVE HUMIDITY:	45.60%	**CONDUCTIVITY:**	0.974
PHANTOM S/NO:	IXB-2HF	**LIQUID TEMPERATURE:**	22.60°C
PHANTOM ROTATION:	N/A	**MAX SAR X-AXIS LOCATION:**	31.40mm
DUT POSITION:	10mm-Front Facing	**MAX SAR Y-AXIS LOCATION:**	3.90mm
ANTENNA CONFIGURATION:	N/A	**MAX E FIELD:**	20.953
TEST FREQUENCY:	836.4MHz	**SAR 1g:**	0.42 W/kg
TYPE OF MODULATION:	GMSK (GPRS Mode)	**SAR 10g:**	N/A
MODN. DUTY CYCLE:	50%	**SAR START:**	0.430 W/kg
INPUT POWER LEVEL:	28.5dBm	**SAR END:**	0.411 W/kg
PROBE BATTERY LAST CHANGED:	06/06/2016	**SAR DRIFT DURING SCAN:**	-4.500 %

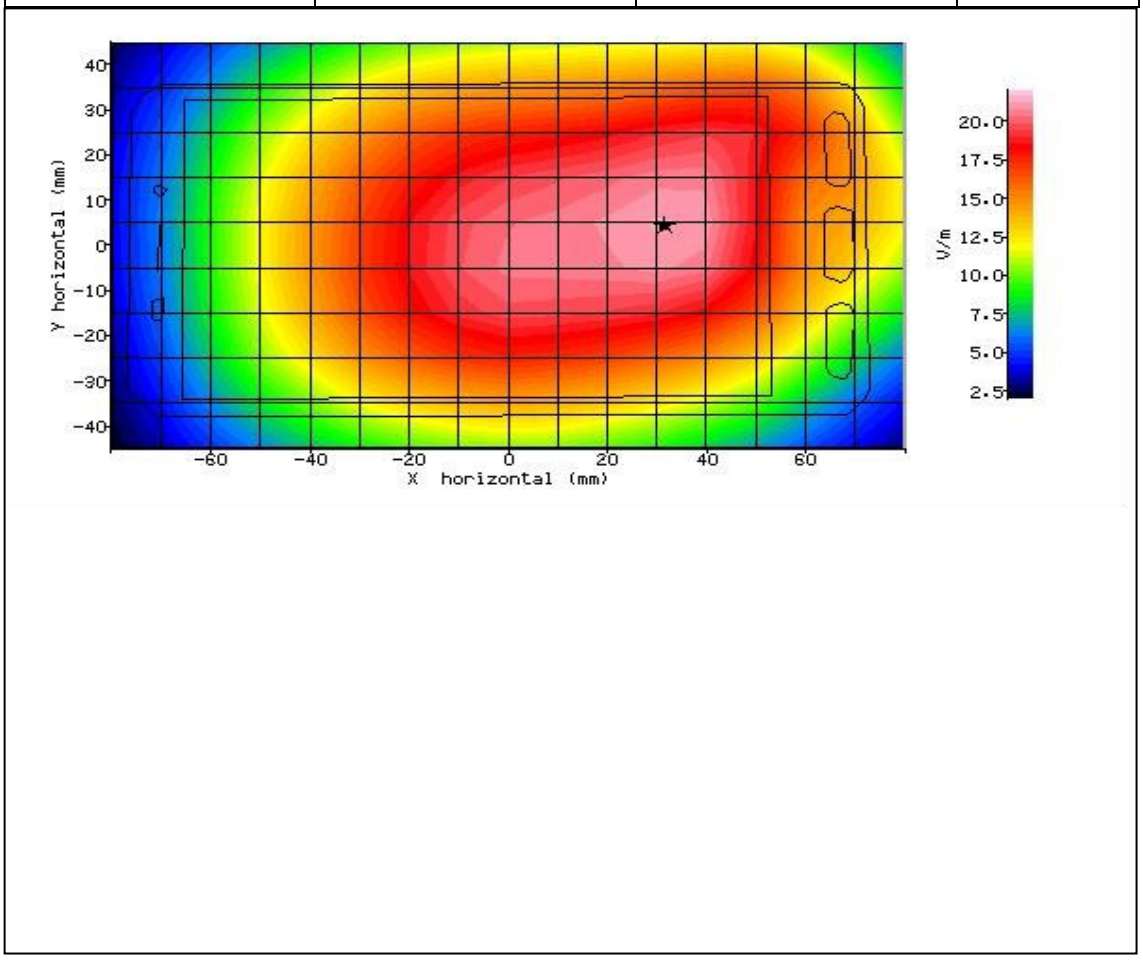

Figure 14: SAR Body Testing Results for the Mobile Handset at 836.4MHz.

SYSTEM / SOFTWARE:	SARA-C / v6.09.22	**INPUT POWER DRIFT:**	0 dB
DATE / TIME:	06/06/2016-09:36:04	**DUT BATTERY MODEL/NO:**	Integral
AMBIENT TEMPERATURE:	22.80°C	**LIQUID SIMULANT:**	850 Body
DEVICE UNDER TEST:	-	**RELATIVE PERMITTIVITY:**	52.69
RELATIVE HUMIDITY:	45.60%	**CONDUCTIVITY:**	0.974
PHANTOM S/NO:	IXB-2HF	**LIQUID TEMPERATURE:**	22.60°C
PHANTOM ROTATION:	N/A	**MAX SAR X-AXIS LOCATION:**	26.70mm
DUT POSITION:	10mm-Rear Facing	**MAX SAR Y-AXIS LOCATION:**	-2.70mm
ANTENNA CONFIGURATION:	N/A	**MAX E FIELD:**	22.685
TEST FREQUENCY:	836.4MHz	**SAR 1g:**	0.50 W/kg
TYPE OF MODULATION:	GMSK (GPRS Mode)	**SAR 10g:**	N/A
MODN. DUTY CYCLE:	50%	**SAR START:**	0.513 W/kg
INPUT POWER LEVEL:	28.5dBm	**SAR END:**	0.526 W/kg
PROBE BATTERY LAST CHANGED:	06/06/2016	**SAR DRIFT DURING SCAN:**	2.500 %

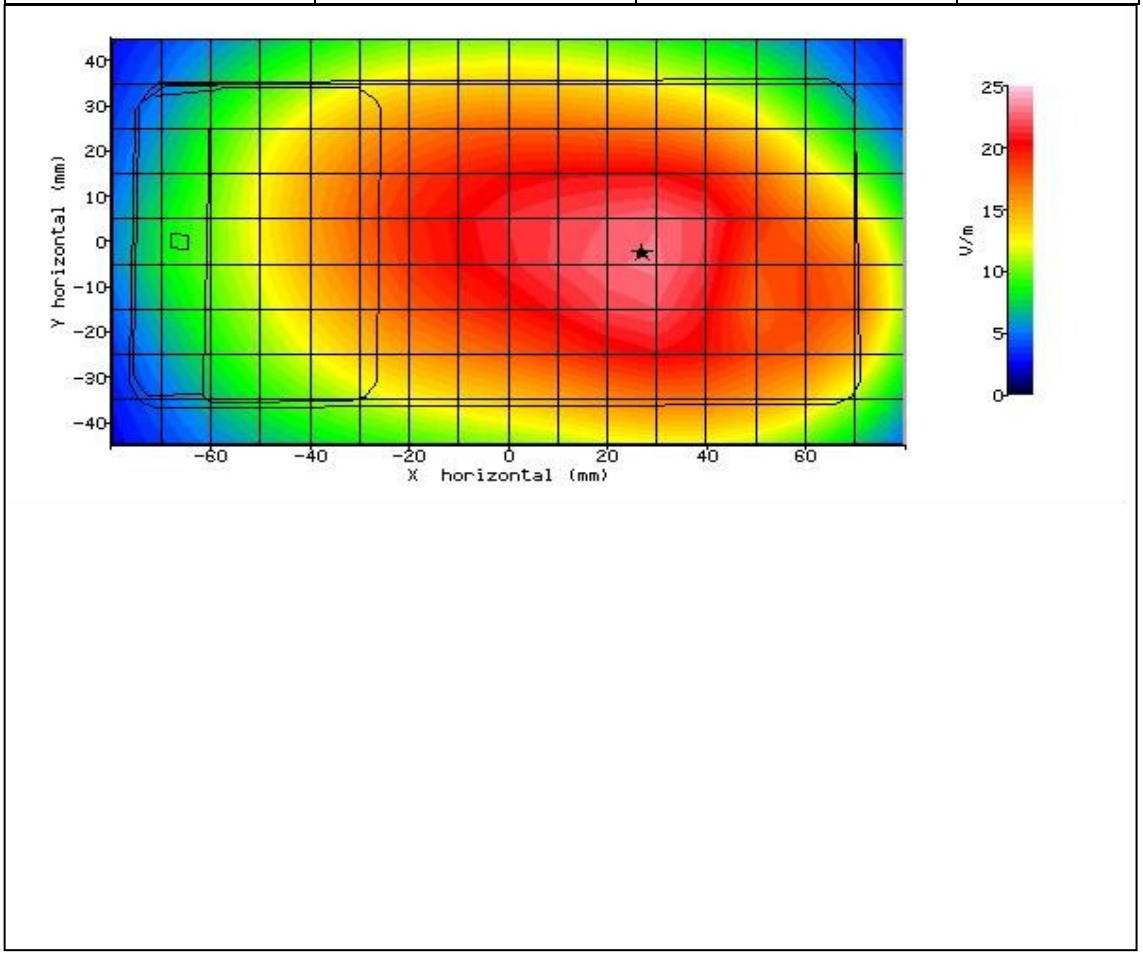

Figure 15: SAR Body Testing Results for the Mobile Handset at 836.4MHz.

SYSTEM / SOFTWARE:	SARA-C / v6.09.22	**INPUT POWER DRIFT:**	0 dB
DATE / TIME:	06/06/2016-10:06:44	**DUT BATTERY MODEL/NO:**	Integral
AMBIENT TEMPERATURE:	22.80°C	**LIQUID SIMULANT:**	850 Body
DEVICE UNDER TEST:	-	**RELATIVE PERMITTIVITY:**	52.69
RELATIVE HUMIDITY:	45.60%	**CONDUCTIVITY:**	0.974
PHANTOM S/NO:	IXB-2HF	**LIQUID TEMPERATURE:**	22.60°C
PHANTOM ROTATION:	N/A	**MAX SAR X-AXIS LOCATION:**	-8.90mm
DUT POSITION:	10mm-Left Edge	**MAX SAR Y-AXIS LOCATION:**	-3.00mm
ANTENNA CONFIGURATION:	N/A	**MAX E FIELD:**	16.972
TEST FREQUENCY:	836.4MHz	**SAR 1g:**	0.29 W/kg
TYPE OF MODULATION:	GMSK (GPRS Mode)	**SAR 10g:**	N/A
MODN. DUTY CYCLE:	50%	**SAR START:**	0.298 W/kg
INPUT POWER LEVEL:	28.5dBm	**SAR END:**	0.296 W/kg
PROBE BATTERY LAST CHANGED:	06/06/2016	**SAR DRIFT DURING SCAN:**	-0.700 %

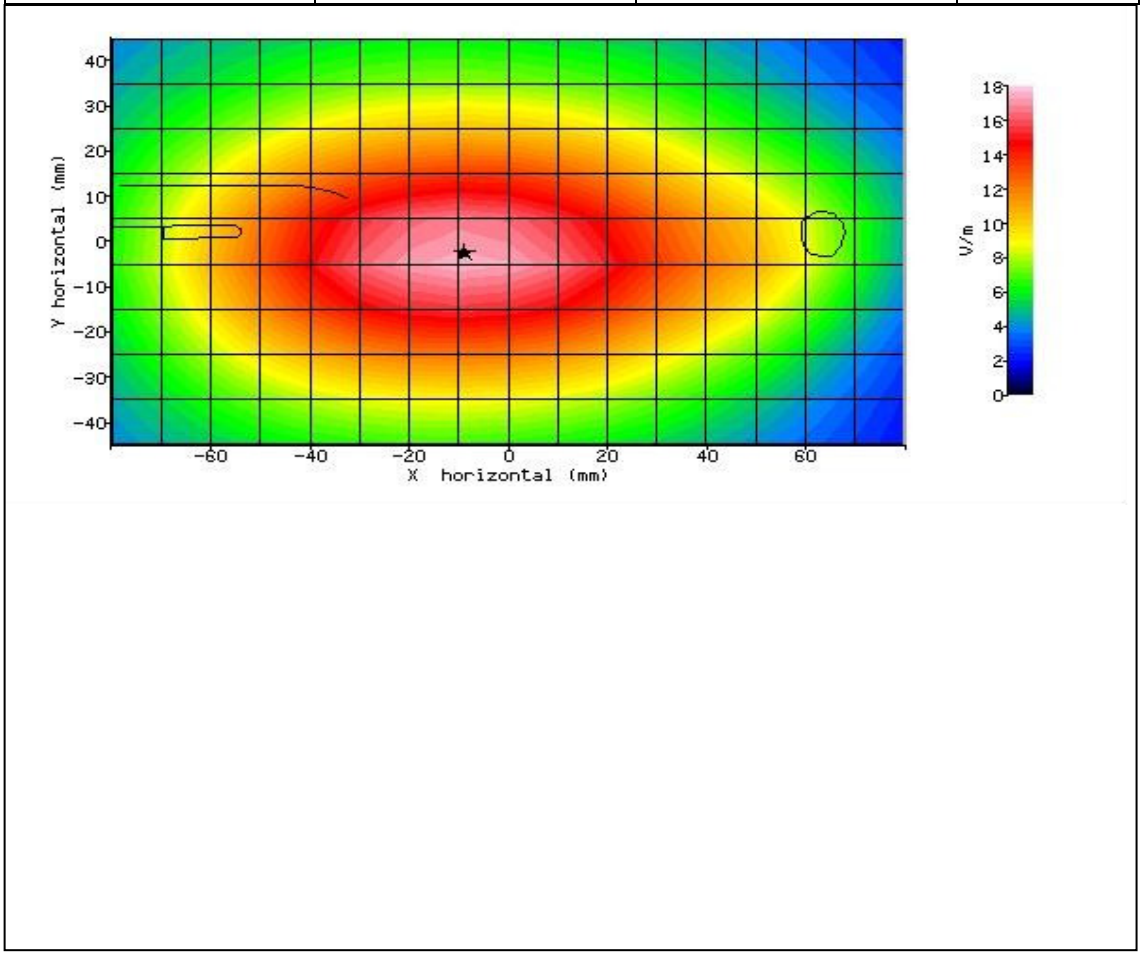

Figure 16: SAR Body Testing Results for the Mobile Handset at 836.4MHz.

SYSTEM / SOFTWARE:	SARA-C / v6.09.22	**INPUT POWER DRIFT:**	0 dB
DATE / TIME:	06/06/2016-10:25:53	**DUT BATTERY MODEL/NO:**	Integral
AMBIENT TEMPERATURE:	22.80°C	**LIQUID SIMULANT:**	850 Body
DEVICE UNDER TEST:	-	**RELATIVE PERMITTIVITY:**	52.69
RELATIVE HUMIDITY:	45.60%	**CONDUCTIVITY:**	0.974
PHANTOM S/NO:	IXB-2HF	**LIQUID TEMPERATURE:**	22.60°C
PHANTOM ROTATION:	N/A	**MAX SAR X-AXIS LOCATION:**	-3.40mm
DUT POSITION:	10mm-Right Edge	**MAX SAR Y-AXIS LOCATION:**	-0.60mm
ANTENNA CONFIGURATION:	N/A	**MAX E FIELD:**	20.027
TEST FREQUENCY:	836.4MHz	**SAR 1g:**	0.41 W/kg
TYPE OF MODULATION:	GMSK (GPRS Mode)	**SAR 10g:**	N/A
MODN. DUTY CYCLE:	50%	**SAR START:**	0.418 W/kg
INPUT POWER LEVEL:	28.5dBm	**SAR END:**	0.412 W/kg
PROBE BATTERY LAST CHANGED:	06/06/2016	**SAR DRIFT DURING SCAN:**	-1.400 %

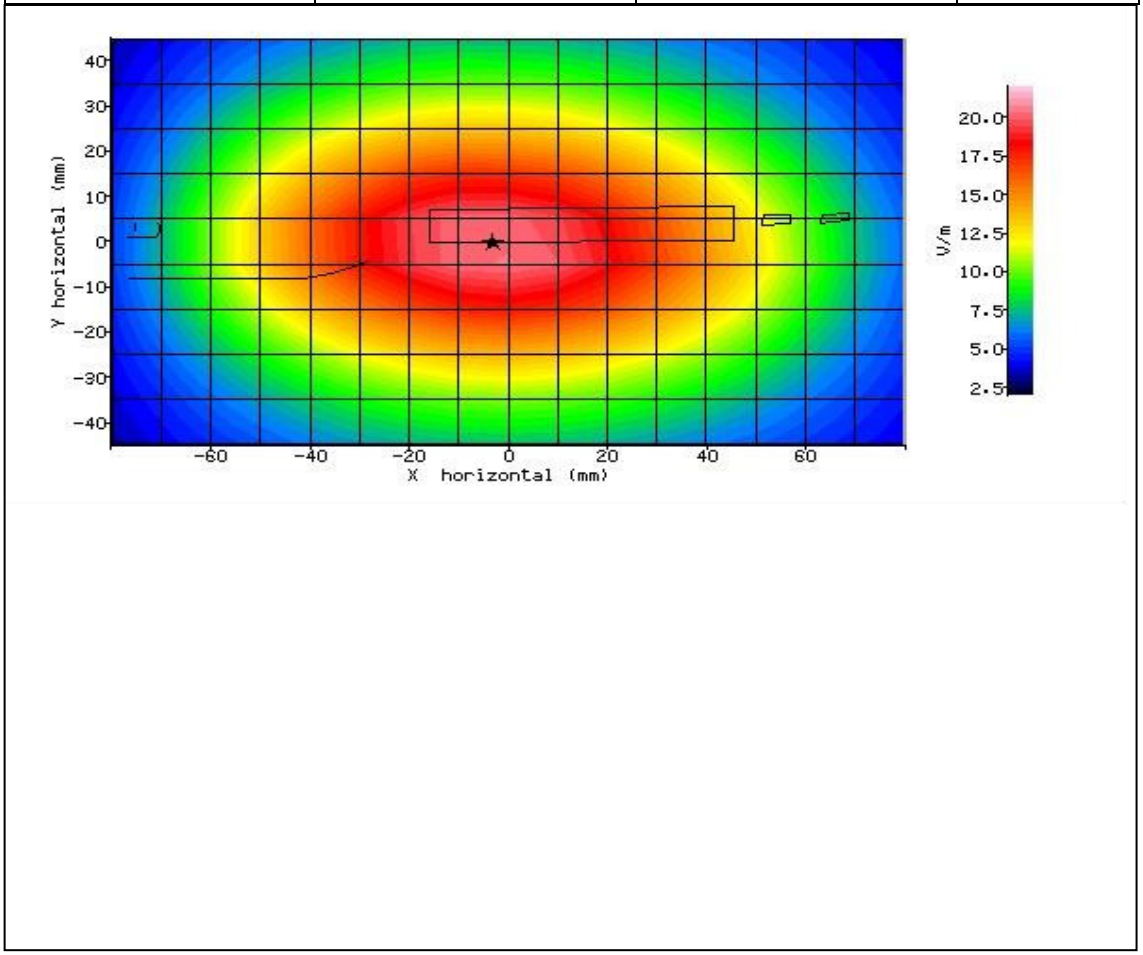

Figure 17: SAR Body Testing Results for the Mobile Handset at 836.4MHz.

SYSTEM / SOFTWARE:	SARA-C / v6.09.22	**INPUT POWER DRIFT:**	0 dB
DATE / TIME:	06/06/2016-11:00:34	**DUT BATTERY MODEL/NO:**	Integral
AMBIENT TEMPERATURE:	22.80°C	**LIQUID SIMULANT:**	850 Body
DEVICE UNDER TEST:	-	**RELATIVE PERMITTIVITY:**	52.69
RELATIVE HUMIDITY:	45.60%	**CONDUCTIVITY:**	0.974
PHANTOM S/NO:	N/A	**LIQUID TEMPERATURE:**	22.60°C
PHANTOM ROTATION:	N/A	**MAX SAR X-AXIS LOCATION:**	-5.30mm
DUT POSITION:	10mm-Bottom Edge	**MAX SAR Y-AXIS LOCATION:**	-3.80mm
ANTENNA CONFIGURATION:	N/A	**MAX E FIELD:**	8.913
TEST FREQUENCY:	836.4MHz	**SAR 1g:**	0.09 W/kg
TYPE OF MODULATION:	GMSK (GPRS Mode)	**SAR 10g:**	N/A
MODN. DUTY CYCLE:	50%	**SAR START:**	0.088 W/kg
INPUT POWER LEVEL:	28.5dBm	**SAR END:**	0.087 W/kg
PROBE BATTERY LAST CHANGED:	06/06/2016	**SAR DRIFT DURING SCAN:**	-2.000 %

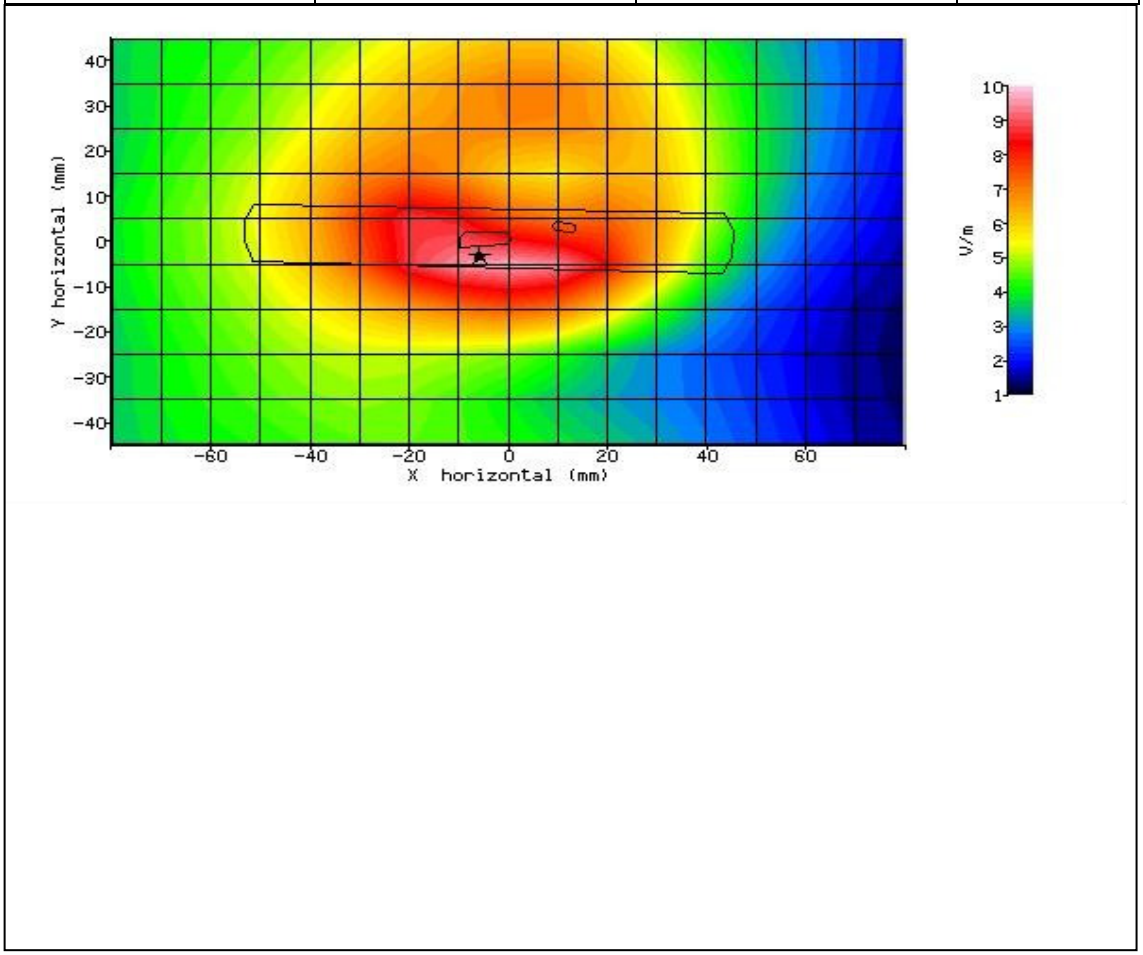

Figure 18: SAR Body Testing Results for the Mobile Handset at 836.4MHz.

2.5 WCDMA FDDV HEAD SAR TEST RESULTS AND COURSE AREA SCANS – 2D

SYSTEM / SOFTWARE:	SARA-C / v6.09.22	**INPUT POWER DRIFT:**	0 dB
DATE / TIME:	01/06/2016-15:39:06	**DUT BATTERY MODEL/NO:**	Integral
AMBIENT TEMPERATURE:	22.90°C	**LIQUID SIMULANT:**	850 Head
DEVICE UNDER TEST:	-	**RELATIVE PERMITTIVITY:**	40.21
RELATIVE HUMIDITY:	21.20%	**CONDUCTIVITY:**	0.867
PHANTOM S/NO:	IXB-040	**LIQUID TEMPERATURE:**	23.10°C
PHANTOM ROTATION:	N/A	**MAX SAR Y-AXIS LOCATION:**	59.20mm
DUT POSITION:	Left-Cheek	**MAX SAR Z-AXIS LOCATION:**	-113.10mm
ANTENNA CONFIGURATION:	N/A	**MAX E FIELD:**	19.783
TEST FREQUENCY:	846.6MHz	**SAR 1g:**	0.49 W/kg
TYPE OF MODULATION:	QPSK (RMC Mode)	**SAR 10g:**	N/A
MODN. DUTY CYCLE:	100%	**SAR START:**	0.425 W/kg
INPUT POWER LEVEL:	24.2dBm	**SAR END:**	0.427 W/kg
PROBE BATTERY LAST CHANGED:	01/06/2016	**SAR DRIFT DURING SCAN:**	0.500 %

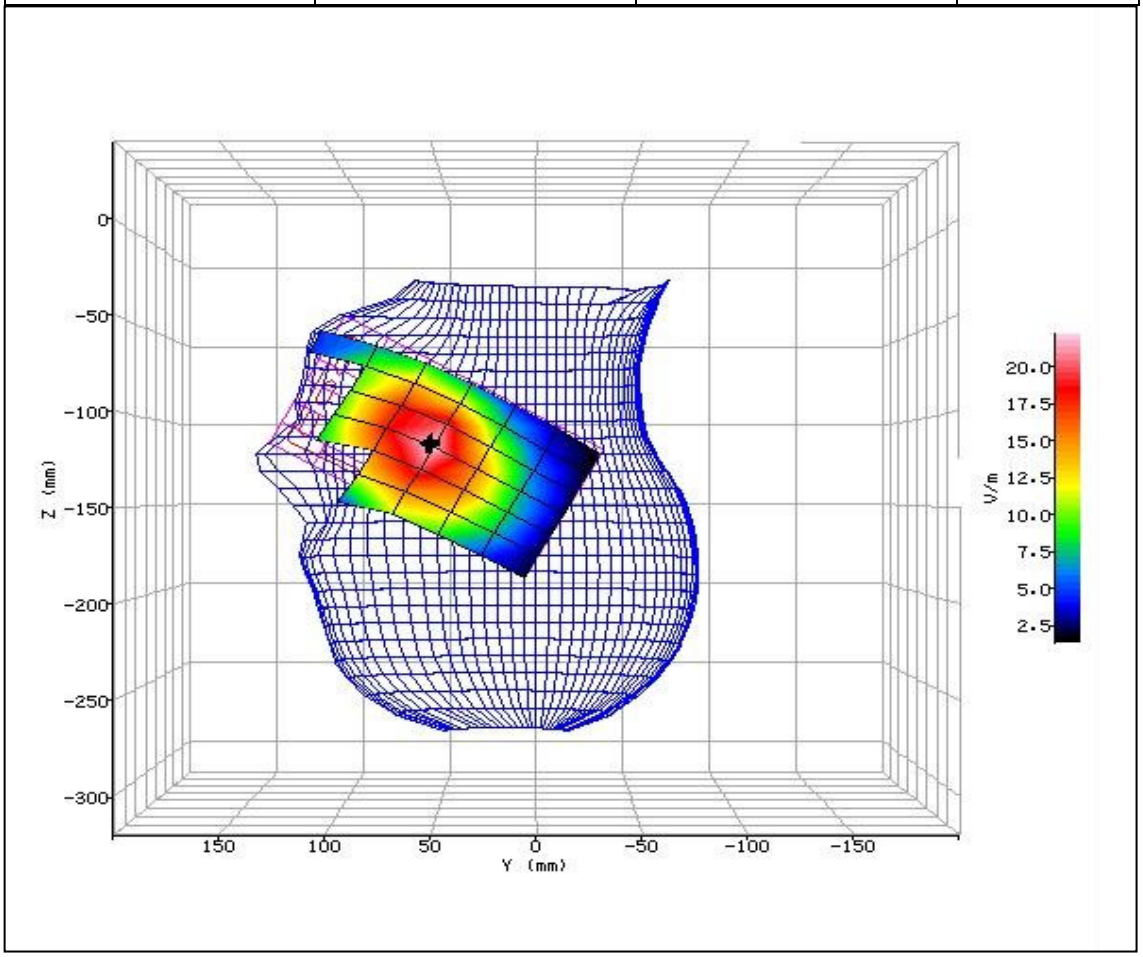

Figure 19: SAR Head Testing Results for the Mobile Handset at 846.6MHz.

SYSTEM / SOFTWARE:	SARA-C / v6.09.22	**INPUT POWER DRIFT:**	0 dB
DATE / TIME:	01/06/2016-16:03:08	**DUT BATTERY MODEL/NO:**	Integral
AMBIENT TEMPERATURE:	22.90°C	**LIQUID SIMULANT:**	850 Head
DEVICE UNDER TEST:	-	**RELATIVE PERMITTIVITY:**	40.21
RELATIVE HUMIDITY:	21.20%	**CONDUCTIVITY:**	0.867
PHANTOM S/NO:	IXB-040	**LIQUID TEMPERATURE:**	23.10°C
PHANTOM ROTATION:	N/A	**MAX SAR Y-AXIS LOCATION:**	44.20mm
DUT POSITION:	Left-15°	**MAX SAR Z-AXIS LOCATION:**	-127.70mm
ANTENNA CONFIGURATION:	N/A	**MAX E FIELD:**	16.551
TEST FREQUENCY:	846.6MHz	**SAR 1g:**	0.31 W/kg
TYPE OF MODULATION:	QPSK (RMC Mode)	**SAR 10g:**	N/A
MODN. DUTY CYCLE:	100%	**SAR START:**	0.287 W/kg
INPUT POWER LEVEL:	24.2dBm	**SAR END:**	0.282 W/kg
PROBE BATTERY LAST CHANGED:	01/06/2016	**SAR DRIFT DURING SCAN:**	-1.900 %

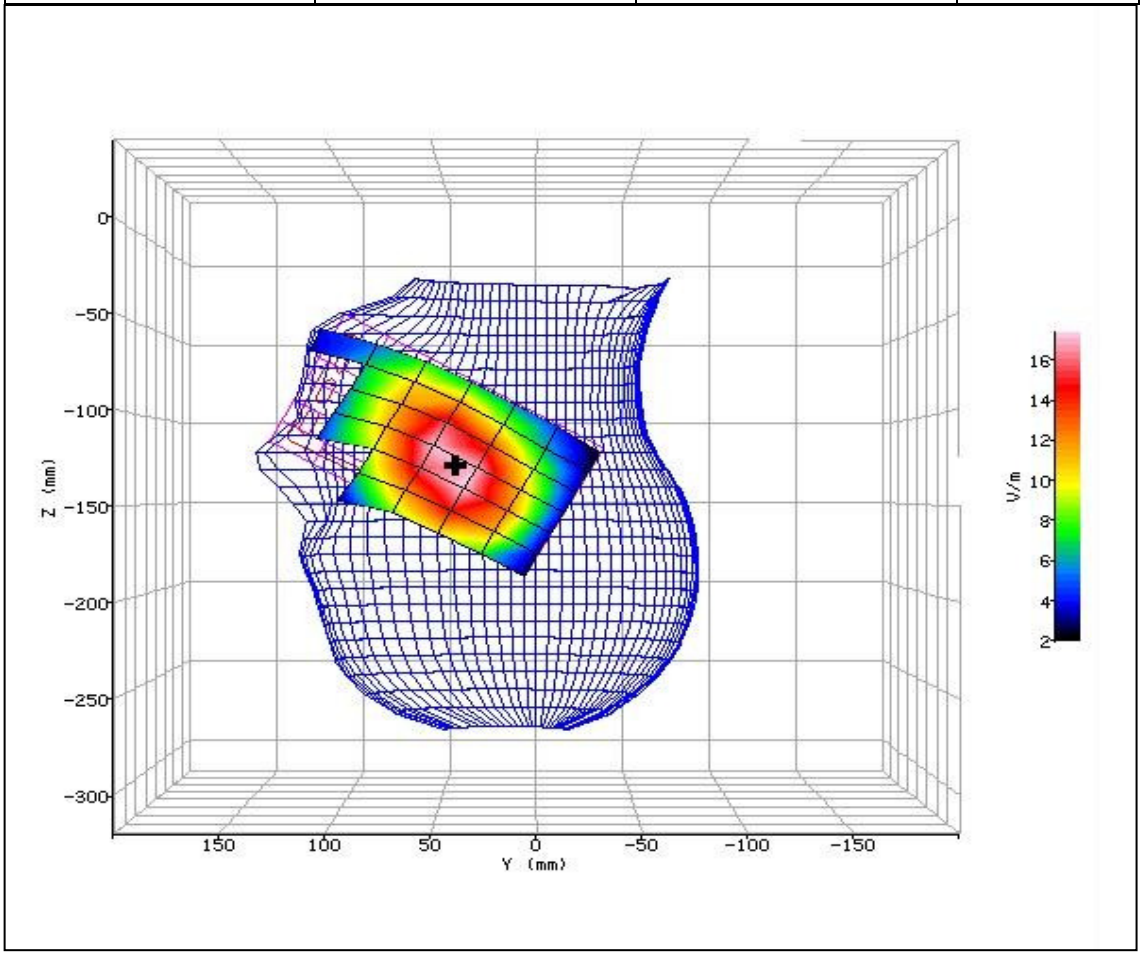

Figure 20: SAR Head Testing Results for the Mobile Handset at 846.6MHz.

SYSTEM / SOFTWARE:	SARA-C / v6.09.22	**INPUT POWER DRIFT:**	0 dB
DATE / TIME:	01/06/2016-16:54:07	**DUT BATTERY MODEL/NO:**	Integral
AMBIENT TEMPERATURE:	22.90°C	**LIQUID SIMULANT:**	850 Head
DEVICE UNDER TEST:	-	**RELATIVE PERMITTIVITY:**	40.21
RELATIVE HUMIDITY:	21.20%	**CONDUCTIVITY:**	0.867
PHANTOM S/NO:	IXB-040	**LIQUID TEMPERATURE:**	23.10°C
PHANTOM ROTATION:	N/A	**MAX SAR Y-AXIS LOCATION:**	59.30mm
DUT POSITION:	Right-Cheek	**MAX SAR Z-AXIS LOCATION:**	-120.50mm
ANTENNA CONFIGURATION:	N/A	**MAX E FIELD:**	20.038
TEST FREQUENCY:	846.6MHz	**SAR 1g:**	0.50 W/kg
TYPE OF MODULATION:	QPSK (RMC Mode)	**SAR 10g:**	N/A
MODN. DUTY CYCLE:	100%	**SAR START:**	0.436 W/kg
INPUT POWER LEVEL:	24.2dBm	**SAR END:**	0.436 W/kg
PROBE BATTERY LAST CHANGED:	01/06/2016	**SAR DRIFT DURING SCAN:**	-0.100 %

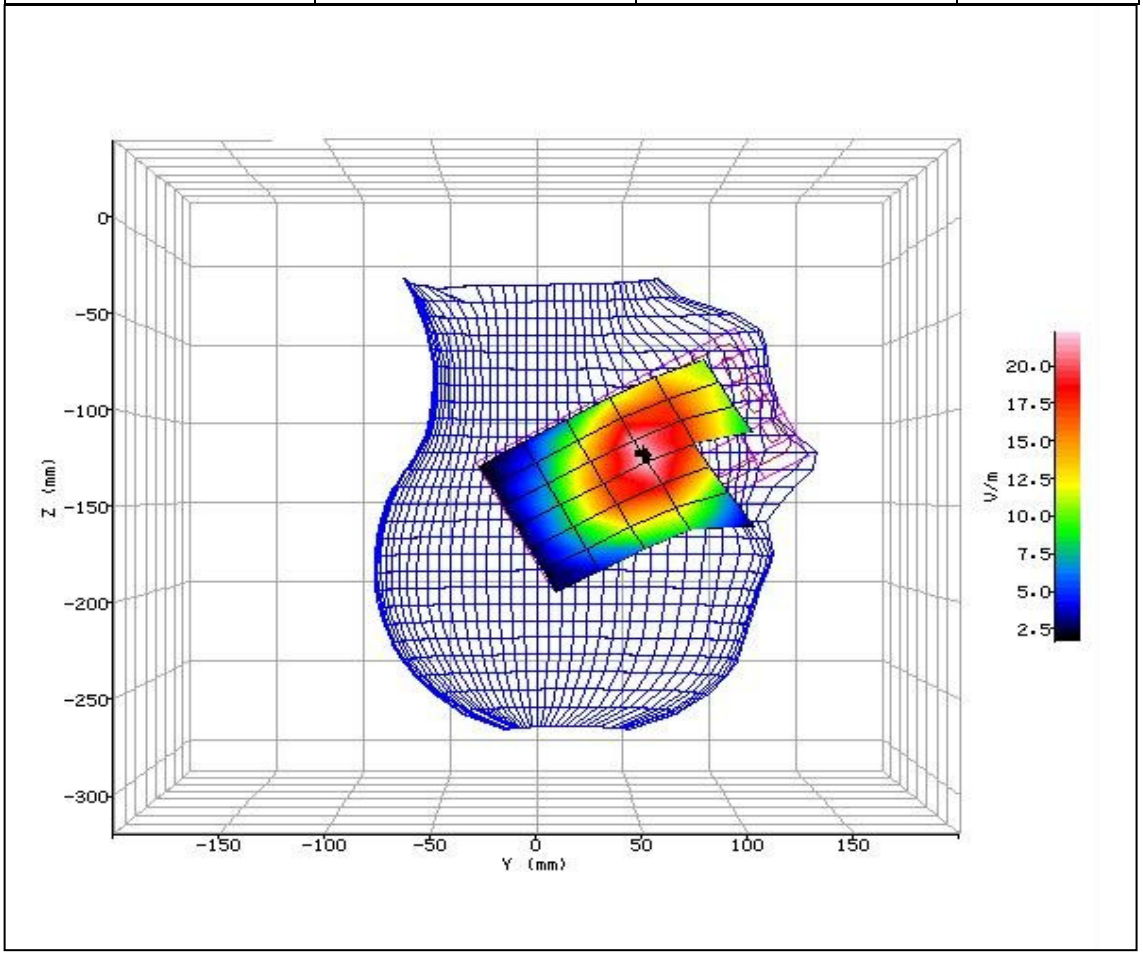

Figure 21: SAR Head Testing Results for the Mobile Handset at 846.6MHz.

SYSTEM / SOFTWARE:	SARA-C / v6.09.22	**INPUT POWER DRIFT:**	0 dB
DATE / TIME:	01/06/2016-17:17:41	**DUT BATTERY MODEL/NO:**	Integral
AMBIENT TEMPERATURE:	22.90°C	**LIQUID SIMULANT:**	850 Head
DEVICE UNDER TEST:	-	**RELATIVE PERMITTIVITY:**	40.21
RELATIVE HUMIDITY:	21.20%	**CONDUCTIVITY:**	0.867
PHANTOM S/NO:	IXB-040	**LIQUID TEMPERATURE:**	23.10°C
PHANTOM ROTATION:	N/A	**MAX SAR Y-AXIS LOCATION:**	46.30mm
DUT POSITION:	Right-15°	**MAX SAR Z-AXIS LOCATION:**	-133.20mm
ANTENNA CONFIGURATION:	N/A	**MAX E FIELD:**	17.032
TEST FREQUENCY:	846.6MHz	**SAR 1g:**	0.31 W/kg
TYPE OF MODULATION:	QPSK (RMC Mode)	**SAR 10g:**	N/A
MODN. DUTY CYCLE:	100%	**SAR START:**	0.293 W/kg
INPUT POWER LEVEL:	24.2dBm	**SAR END:**	0.293 W/kg
PROBE BATTERY LAST CHANGED:	01/06/2016	**SAR DRIFT DURING SCAN:**	0.200 %

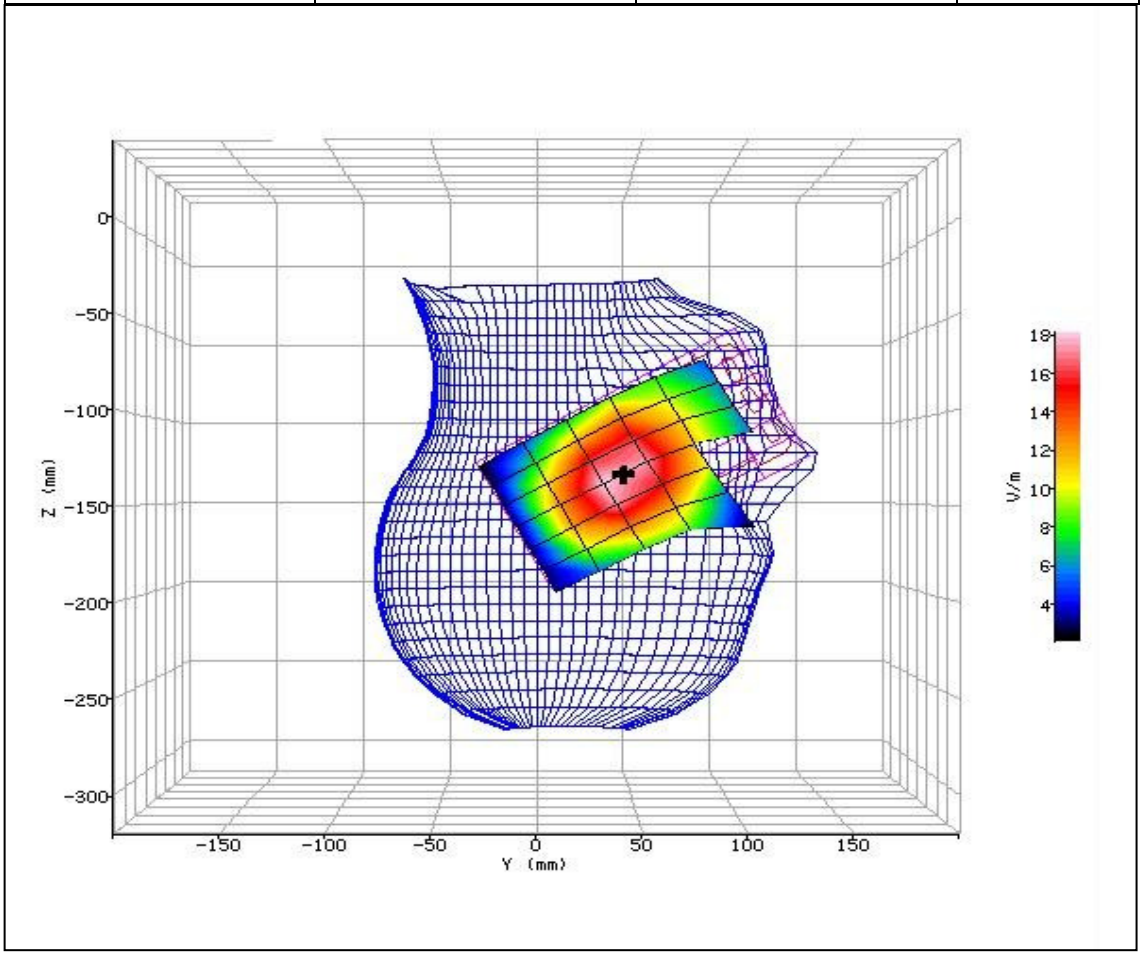

Figure 22: SAR Head Testing Results for the Mobile Handset at 846.6MHz.

2.6 WCDMA FDDV BODY SAR TEST RESULTS AND COURSE AREA SCANS – 2D

SYSTEM / SOFTWARE:	SARA-C / v6.09.22	**INPUT POWER DRIFT:**	0 dB
DATE / TIME:	06/06/2016-14:06:19	**DUT BATTERY MODEL/NO:**	Integral
AMBIENT TEMPERATURE:	22.80°C	**LIQUID SIMULANT:**	850 Body
DEVICE UNDER TEST:	-	**RELATIVE PERMITTIVITY:**	52.69
RELATIVE HUMIDITY:	45.60%	**CONDUCTIVITY:**	0.974
PHANTOM S/NO:	IXB-2HF	**LIQUID TEMPERATURE:**	22.60°C
PHANTOM ROTATION:	N/A	**MAX SAR X-AXIS LOCATION:**	-0.90mm
DUT POSITION:	10mm-Front Facing	**MAX SAR Y-AXIS LOCATION:**	-2.80mm
ANTENNA CONFIGURATION:	N/A	**MAX E FIELD:**	20.615
TEST FREQUENCY:	846.6MHz	**SAR 1g:**	0.41 W/kg
TYPE OF MODULATION:	QPSK (RMC Mode)	**SAR 10g:**	N/A
MODN. DUTY CYCLE:	100%	**SAR START:**	0.420 W/kg
INPUT POWER LEVEL:	24.2dBm	**SAR END:**	0.423 W/kg
PROBE BATTERY LAST CHANGED:	06/01/2016	**SAR DRIFT DURING SCAN:**	0.600 %

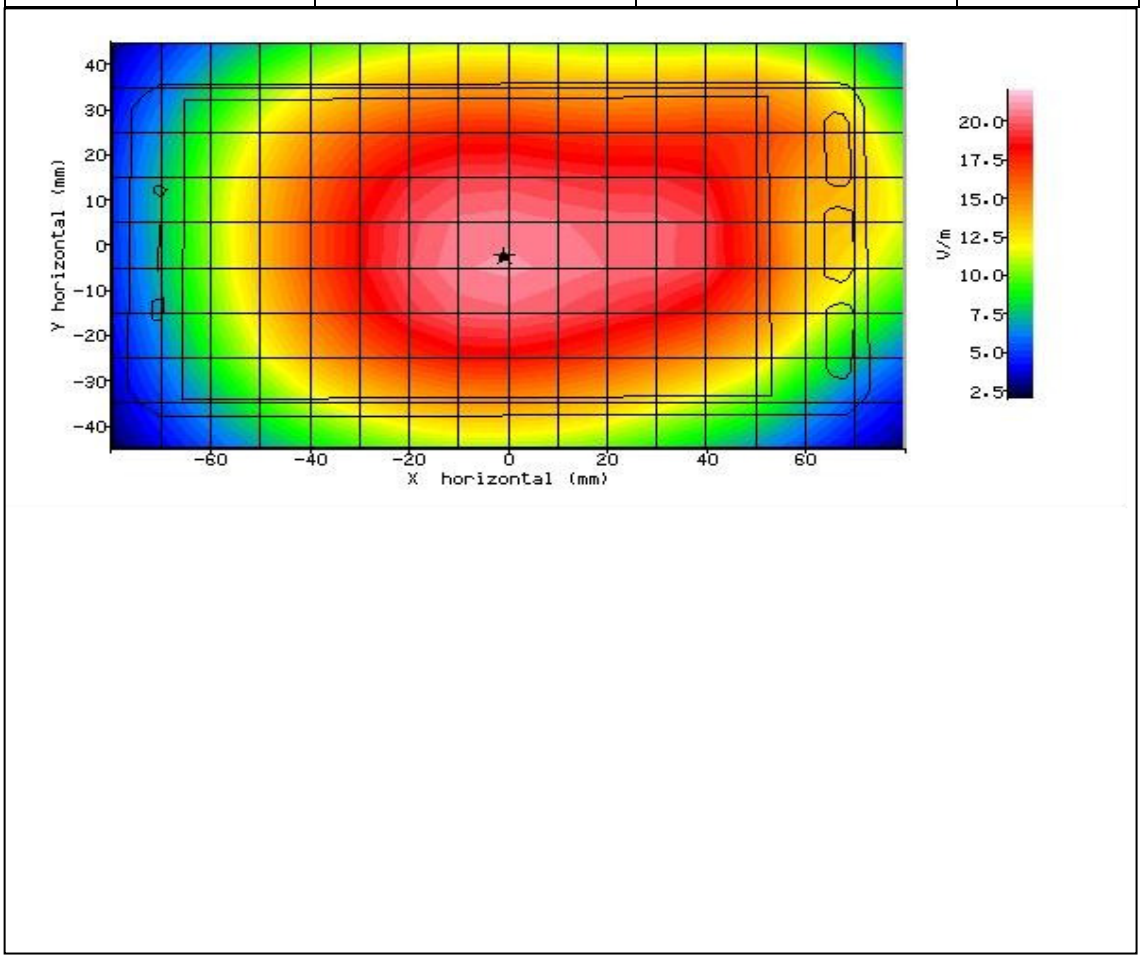

Figure 23: SAR Body Testing Results for the Mobile Handset at 846.6MHz.

SYSTEM / SOFTWARE:	SARA-C / v6.09.22	**INPUT POWER DRIFT:**	0 dB
DATE / TIME:	06/06/2016-14:25:05	**DUT BATTERY MODEL/NO:**	Integral
AMBIENT TEMPERATURE:	22.80°C	**LIQUID SIMULANT:**	850 Body
DEVICE UNDER TEST:		**RELATIVE PERMITTIVITY:**	52.69
RELATIVE HUMIDITY:	45.60%	**CONDUCTIVITY:**	0.974
PHANTOM S/NO:	IXB-2HF	**LIQUID TEMPERATURE:**	22.60°C
PHANTOM ROTATION:	N/A	**MAX SAR X-AXIS LOCATION:**	20.60mm
DUT POSITION:	10mm-Rear Facing	**MAX SAR Y-AXIS LOCATION:**	2.20mm
ANTENNA CONFIGURATION:	N/A	**MAX E FIELD:**	22.395
TEST FREQUENCY:	846.6MHz	**SAR 1g:**	0.49 W/kg
TYPE OF MODULATION:	QPSK (RMC Mode)	**SAR 10g:**	N/A
MODN. DUTY CYCLE:	100%	**SAR START:**	0.504 W/kg
INPUT POWER LEVEL:	24.2dBm	**SAR END:**	0.501 W/kg
PROBE BATTERY LAST CHANGED:	06/01/2016	**SAR DRIFT DURING SCAN:**	-0.600 %

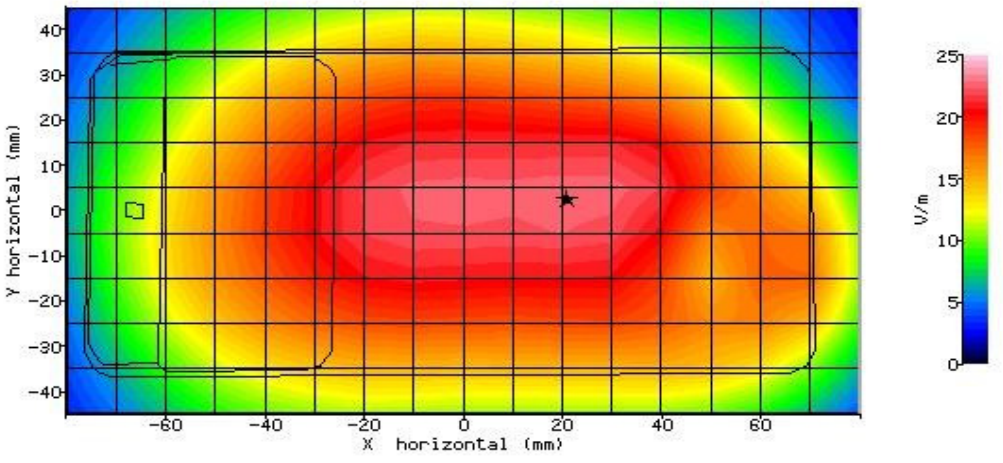

Figure 24: SAR Body Testing Results for the Mobile Handset at 846.6MHz.

SYSTEM / SOFTWARE:	SARA-C / v6.09.22	**INPUT POWER DRIFT:**	0 dB
DATE / TIME:	06/06/2016-12:38:26	**DUT BATTERY MODEL/NO:**	Integral
AMBIENT TEMPERATURE:	22.80°C	**LIQUID SIMULANT:**	850 Body
DEVICE UNDER TEST:	-	**RELATIVE PERMITTIVITY:**	52.69
RELATIVE HUMIDITY:	45.60%	**CONDUCTIVITY:**	0.974
PHANTOM S/NO:	IXB-2HF	**LIQUID TEMPERATURE:**	22.60°C
PHANTOM ROTATION:	N/A	**MAX SAR X-AXIS LOCATION:**	-17.90mm
DUT POSITION:	10mm-Left Edge	**MAX SAR Y-AXIS LOCATION:**	-2.60mm
ANTENNA CONFIGURATION:	N/A	**MAX E FIELD:**	16.788
TEST FREQUENCY:	846.6MHz	**SAR 1g:**	0.29 W/kg
TYPE OF MODULATION:	QPSK (RMC Mode)	**SAR 10g:**	N/A
MODN. DUTY CYCLE:	100%	**SAR START:**	0.293 W/kg
INPUT POWER LEVEL:	24.2dBm	**SAR END:**	0.293 W/kg
PROBE BATTERY LAST CHANGED:	06/01/2016	**SAR DRIFT DURING SCAN:**	0.000 %

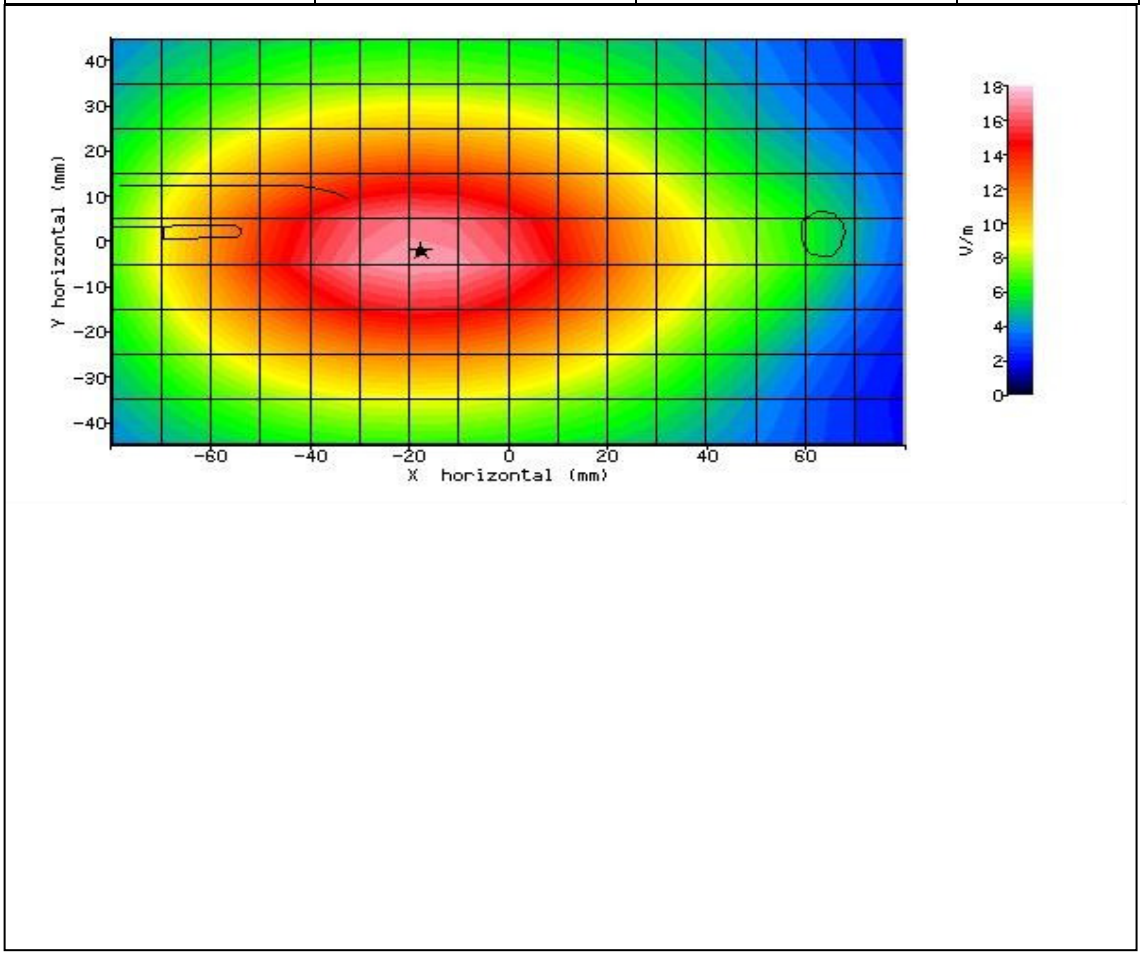

Figure 25: SAR Body Testing Results for the Mobile Handset at 846.6MHz.

SYSTEM / SOFTWARE:	SARA-C / v6.09.22	**INPUT POWER DRIFT:**	0 dB
DATE / TIME:	06/06/2016-12:19:01	**DUT BATTERY MODEL/NO:**	Integral
AMBIENT TEMPERATURE:	22.80°C	**LIQUID SIMULANT:**	850 Body
DEVICE UNDER TEST:	-	**RELATIVE PERMITTIVITY:**	52.69
RELATIVE HUMIDITY:	45.60%	**CONDUCTIVITY:**	0.974
PHANTOM S/NO:	IXB-2HF	**LIQUID TEMPERATURE:**	22.60°C
PHANTOM ROTATION:	N/A	**MAX SAR X-AXIS LOCATION:**	-5.30mm
DUT POSITION:	10mm-Right Edge	**MAX SAR Y-AXIS LOCATION:**	-0.70mm
ANTENNA CONFIGURATION:	N/A	**MAX E FIELD:**	20.287
TEST FREQUENCY:	846.6MHz	**SAR 1g:**	0.42 W/kg
TYPE OF MODULATION:	QPSK (RMC Mode)	**SAR 10g:**	N/A
MODN. DUTY CYCLE:	100%	**SAR START:**	0.428 W/kg
INPUT POWER LEVEL:	24.2dBm	**SAR END:**	0.429 W/kg
PROBE BATTERY LAST CHANGED:	06/01/2016	**SAR DRIFT DURING SCAN:**	0.200 %

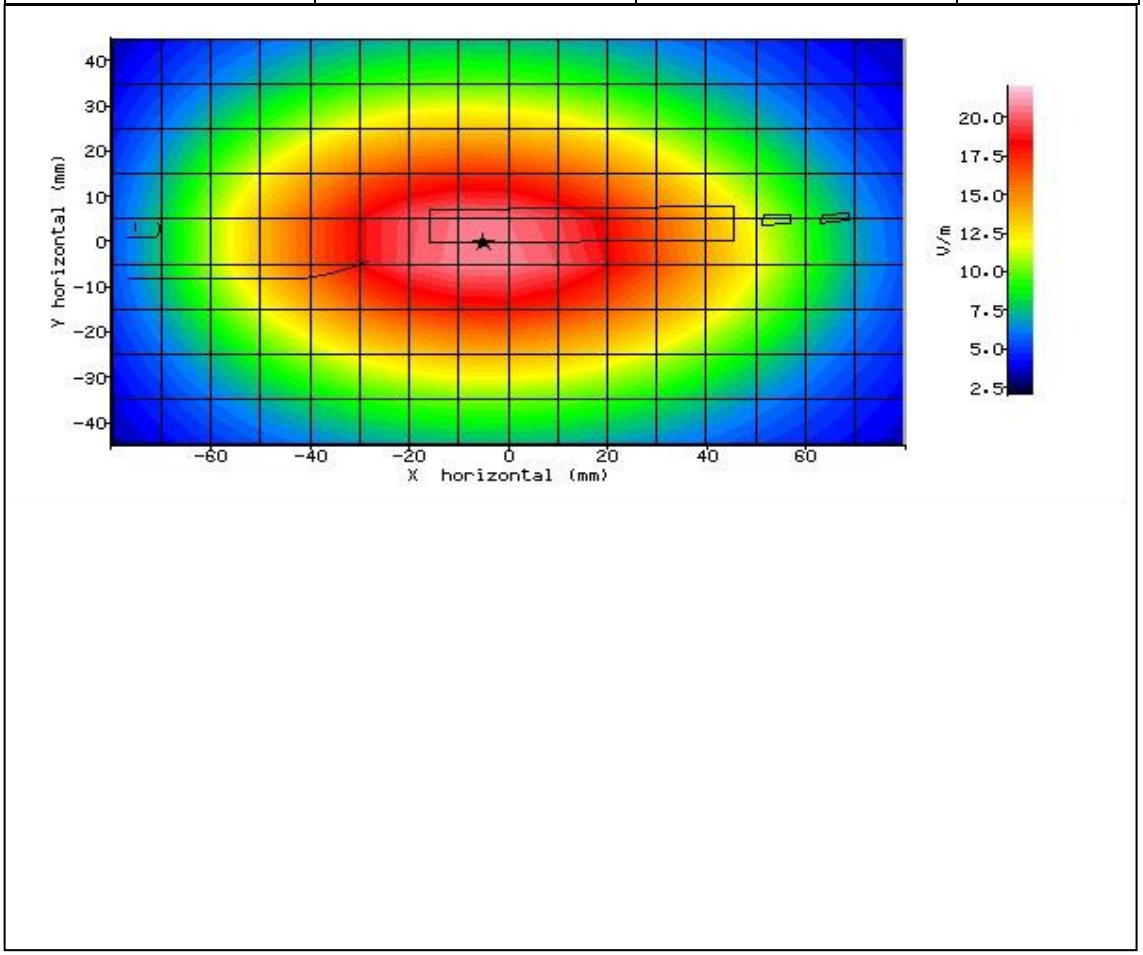

Figure 26: SAR Body Testing Results for the Mobile Handset at 846.6MHz.

SYSTEM / SOFTWARE:	SARA-C / v6.09.22	**INPUT POWER DRIFT:**	0 dB
DATE / TIME:	06/06/2016-12:00:16	**DUT BATTERY MODEL/NO:**	Integral
AMBIENT TEMPERATURE:	22.80°C	**LIQUID SIMULANT:**	850 Body
DEVICE UNDER TEST:	-	**RELATIVE PERMITTIVITY:**	52.69
RELATIVE HUMIDITY:	45.60%	**CONDUCTIVITY:**	0.974
PHANTOM S/NO:	IXB-2HF	**LIQUID TEMPERATURE:**	22.60°C
PHANTOM ROTATION:	N/A	**MAX SAR X-AXIS LOCATION:**	4.50mm
DUT POSITION:	10mm-Bottom Edge	**MAX SAR Y-AXIS LOCATION:**	-6.10mm
ANTENNA CONFIGURATION:	N/A	**MAX E FIELD:**	8.520
TEST FREQUENCY:	846.6MHz	**SAR 1g:**	0.08 W/kg
TYPE OF MODULATION:	QPSK (RMC Mode)	**SAR 10g:**	N/A
MODN. DUTY CYCLE:	100%	**SAR START:**	0.080 W/kg
INPUT POWER LEVEL:	24.2dBm	**SAR END:**	0.081 W/kg
PROBE BATTERY LAST CHANGED:	06/01/2016	**SAR DRIFT DURING SCAN:**	0.500 %

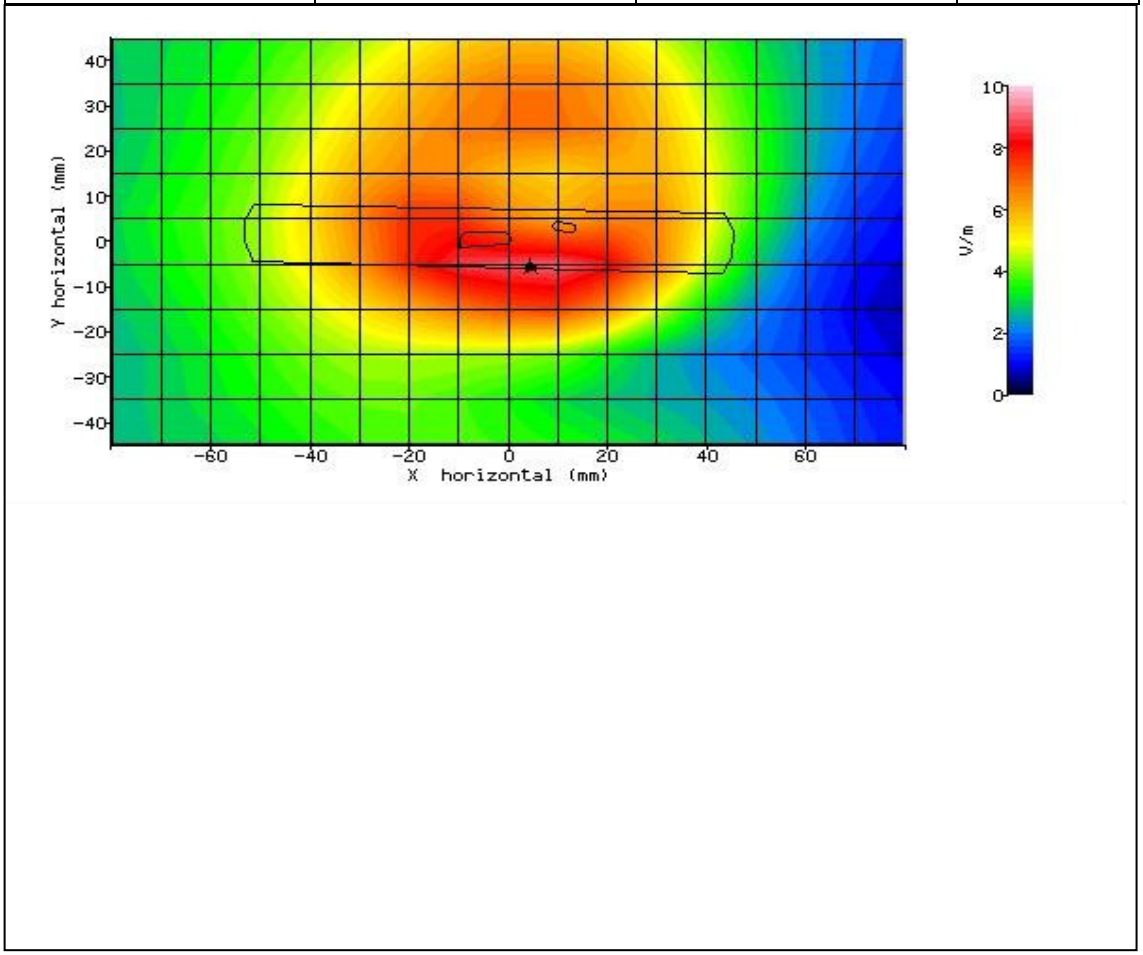

Figure 27: SAR Body Testing Results for the Mobile Handset at 846.6MHz.

2.7 LTE BAND 17 HEAD SAR TEST RESULTS AND COURSE AREA SCANS – 2D

SYSTEM / SOFTWARE:	SARA-C / v6.09.22	**INPUT POWER DRIFT:**	0 dB
DATE / TIME:	02/06/2016-12:10:23	**DUT BATTERY MODEL/NO:**	Integral
AMBIENT TEMPERATURE:	22.90°C	**LIQUID SIMULANT:**	700 Head
DEVICE UNDER TEST:	-	**RELATIVE PERMITTIVITY:**	42.60
RELATIVE HUMIDITY:	40.30%	**CONDUCTIVITY:**	0.904
PHANTOM S/NO:	IXB-040	**LIQUID TEMPERATURE:**	22.30°C
PHANTOM ROTATION:	N/A	**MAX SAR Y-AXIS LOCATION:**	62.30mm
DUT POSITION:	Left-Cheek	**MAX SAR Z-AXIS LOCATION:**	-117.50mm
ANTENNA CONFIGURATION:	N/A	**MAX E FIELD:**	9.858
TEST FREQUENCY:	710.0MHz	**SAR 1g:**	0.11 W/kg
TYPE OF MODULATION:	QPSK (RMC Mode)	**SAR 10g:**	N/A
MODN. DUTY CYCLE:	100%	**SAR START:**	0.106 W/kg
INPUT POWER LEVEL:	24.2dBm	**SAR END:**	0.107 W/kg
PROBE BATTERY LAST CHANGED:	02/06/2016	**SAR DRIFT DURING SCAN:**	1.100 %

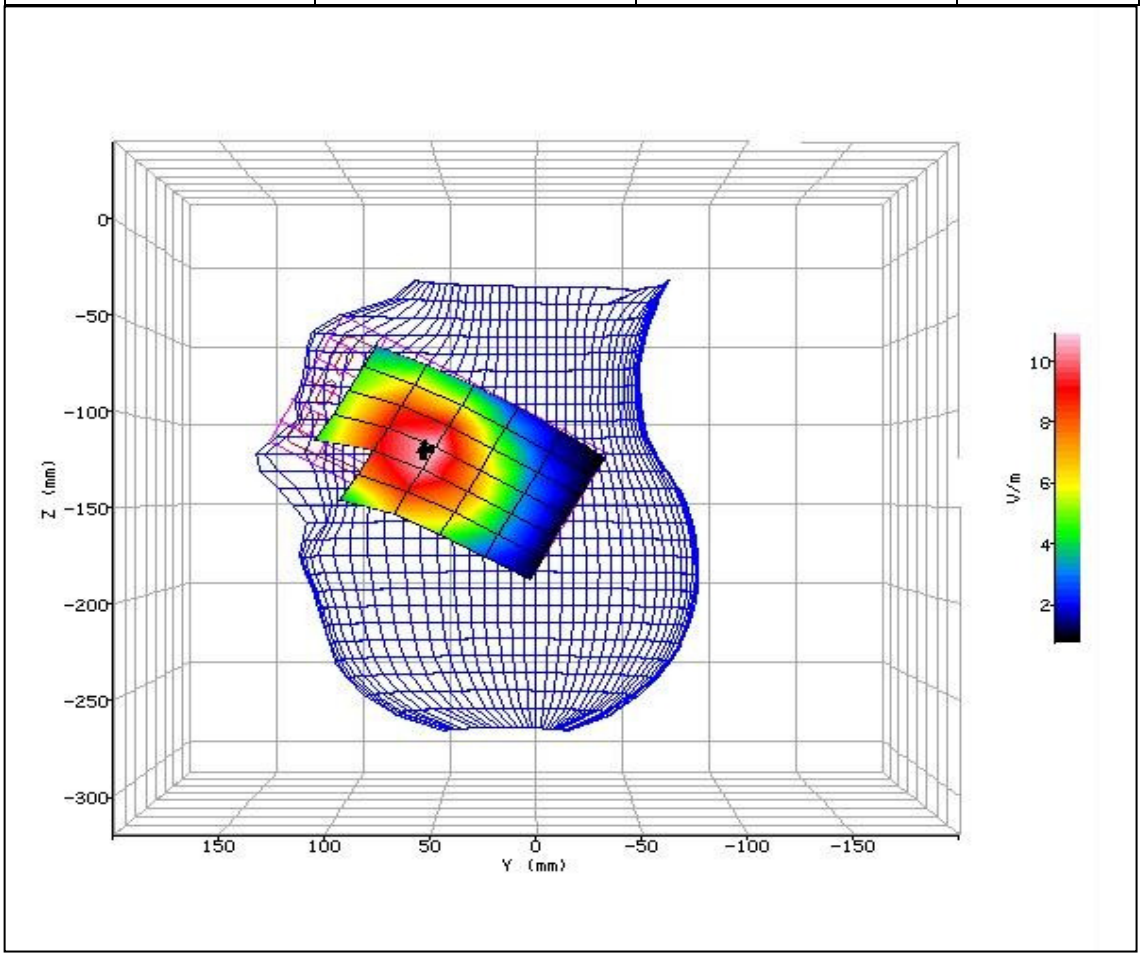

Figure 28: SAR Head Testing Results for the Mobile Handset at 710.0MHz.

SYSTEM / SOFTWARE:	SARA-C / v6.09.22	**INPUT POWER DRIFT:**	0 dB
DATE / TIME:	02/06/2016-12:35:12	**DUT BATTERY MODEL/NO:**	Integral
AMBIENT TEMPERATURE:	22.90°C	**LIQUID SIMULANT:**	700 Head
DEVICE UNDER TEST:	-	**RELATIVE PERMITTIVITY:**	42.60
RELATIVE HUMIDITY:	40.30%	**CONDUCTIVITY:**	0.904
PHANTOM S/NO:	IXB-040	**LIQUID TEMPERATURE:**	22.30°C
PHANTOM ROTATION:	N/A	**MAX SAR Y-AXIS LOCATION:**	50.50mm
DUT POSITION:	Left-15°	**MAX SAR Z-AXIS LOCATION:**	-127.60mm
ANTENNA CONFIGURATION:	N/A	**MAX E FIELD:**	8.156
TEST FREQUENCY:	710.0MHz	**SAR 1g:**	0.08 W/kg
TYPE OF MODULATION:	QPSK (RMC Mode)	**SAR 10g:**	N/A
MODN. DUTY CYCLE:	100%	**SAR START:**	0.073 W/kg
INPUT POWER LEVEL:	24.2dBm	**SAR END:**	0.072 W/kg
PROBE BATTERY LAST CHANGED:	02/06/2016	**SAR DRIFT DURING SCAN:**	-1.400 %

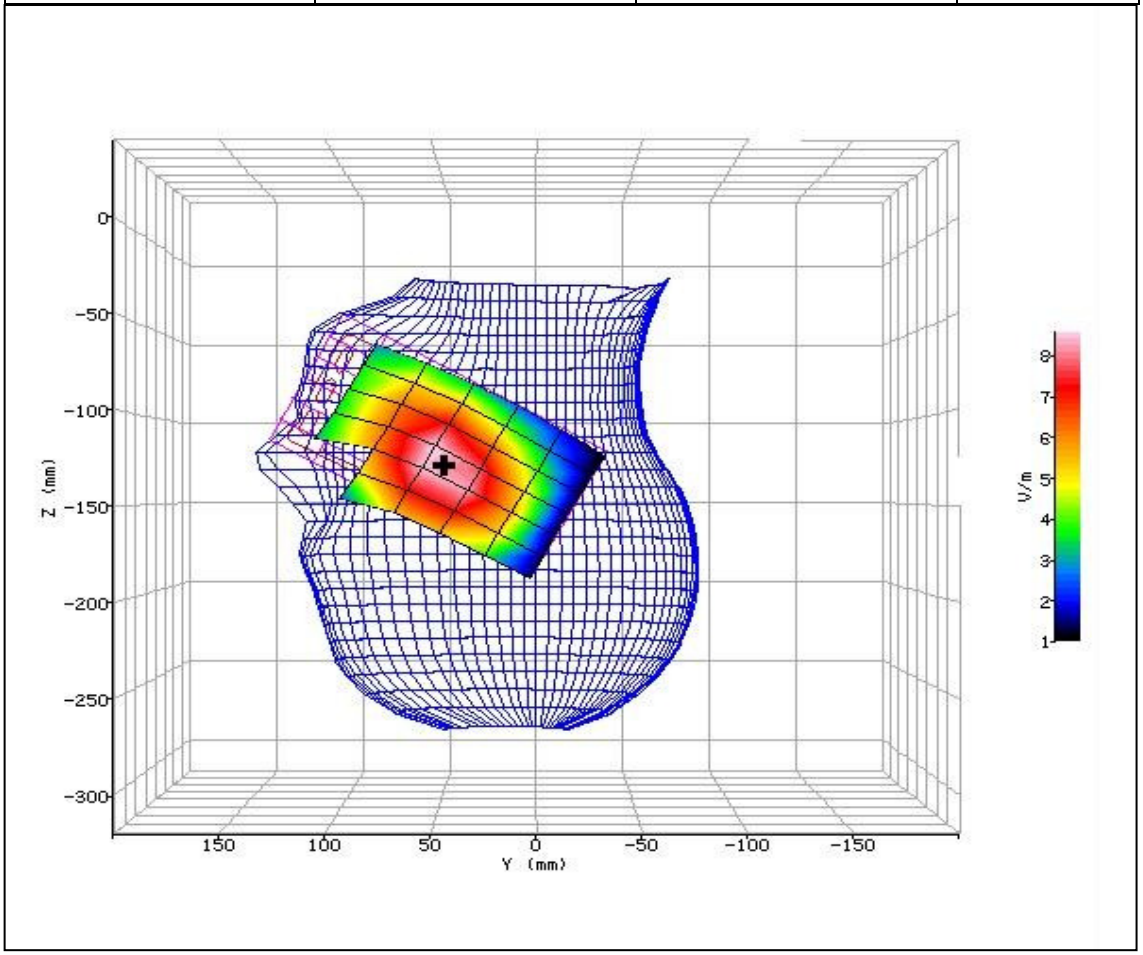

Figure 29: SAR Head Testing Results for the Mobile Handset at 710.0MHz.

SYSTEM / SOFTWARE:	SARA-C / v6.09.22	**INPUT POWER DRIFT:**	0 dB
DATE / TIME:	02/06/2016-13:34:47	**DUT BATTERY MODEL/NO:**	Integral
AMBIENT TEMPERATURE:	22.90°C	**LIQUID SIMULANT:**	700 Head
DEVICE UNDER TEST:	-	**RELATIVE PERMITTIVITY:**	42.60
RELATIVE HUMIDITY:	40.30%	**CONDUCTIVITY:**	0.904
PHANTOM S/NO:	IXB-040	**LIQUID TEMPERATURE:**	22.30°C
PHANTOM ROTATION:	N/A	**MAX SAR Y-AXIS LOCATION:**	59.80mm
DUT POSITION:	Right-Cheek	**MAX SAR Z-AXIS LOCATION:**	-113.50mm
ANTENNA CONFIGURATION:	N/A	**MAX E FIELD:**	10.874
TEST FREQUENCY:	710.0MHz	**SAR 1g:**	0.13 W/kg
TYPE OF MODULATION:	QPSK (RMC Mode)	**SAR 10g:**	N/A
MODN. DUTY CYCLE:	100%	**SAR START:**	0.131 W/kg
INPUT POWER LEVEL:	24.2dBm	**SAR END:**	0.129 W/kg
PROBE BATTERY LAST CHANGED:	02/06/2016	**SAR DRIFT DURING SCAN:**	-1.800 %

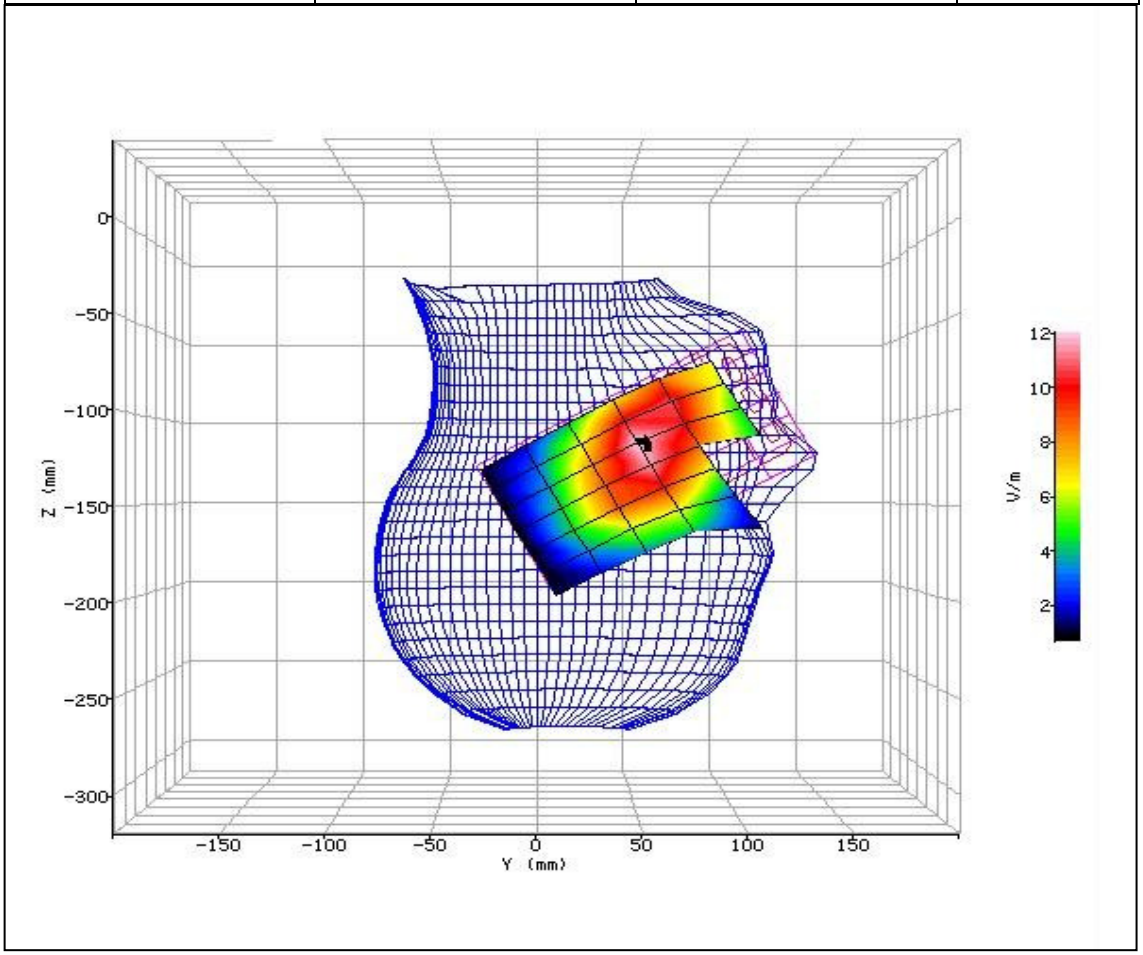

Figure 30: SAR Head Testing Results for the Mobile Handset at 710.0MHz.

SYSTEM / SOFTWARE:	SARA-C / v6.09.22	**INPUT POWER DRIFT:**	0 dB
DATE / TIME:	02/06/2016-13:58:11	**DUT BATTERY MODEL/NO:**	Integral
AMBIENT TEMPERATURE:	22.90°C	**LIQUID SIMULANT:**	700 Head
DEVICE UNDER TEST:	-	**RELATIVE PERMITTIVITY:**	42.60
RELATIVE HUMIDITY:	40.30%	**CONDUCTIVITY:**	0.904
PHANTOM S/NO:	IXB-040	**LIQUID TEMPERATURE:**	22.30°C
PHANTOM ROTATION:	N/A	**MAX SAR Y-AXIS LOCATION:**	48.90mm
DUT POSITION:	Right-15°	**MAX SAR Z-AXIS LOCATION:**	-128.30mm
ANTENNA CONFIGURATION:	N/A	**MAX E FIELD:**	9.304
TEST FREQUENCY:	710.0MHz	**SAR 1g:**	0.09 W/kg
TYPE OF MODULATION:	QPSK (RMC Mode)	**SAR 10g:**	N/A
MODN. DUTY CYCLE:	100%	**SAR START:**	0.092 W/kg
INPUT POWER LEVEL:	24.2dBm	**SAR END:**	0.088 W/kg
PROBE BATTERY LAST CHANGED:	02/06/2016	**SAR DRIFT DURING SCAN:**	-4.300 %

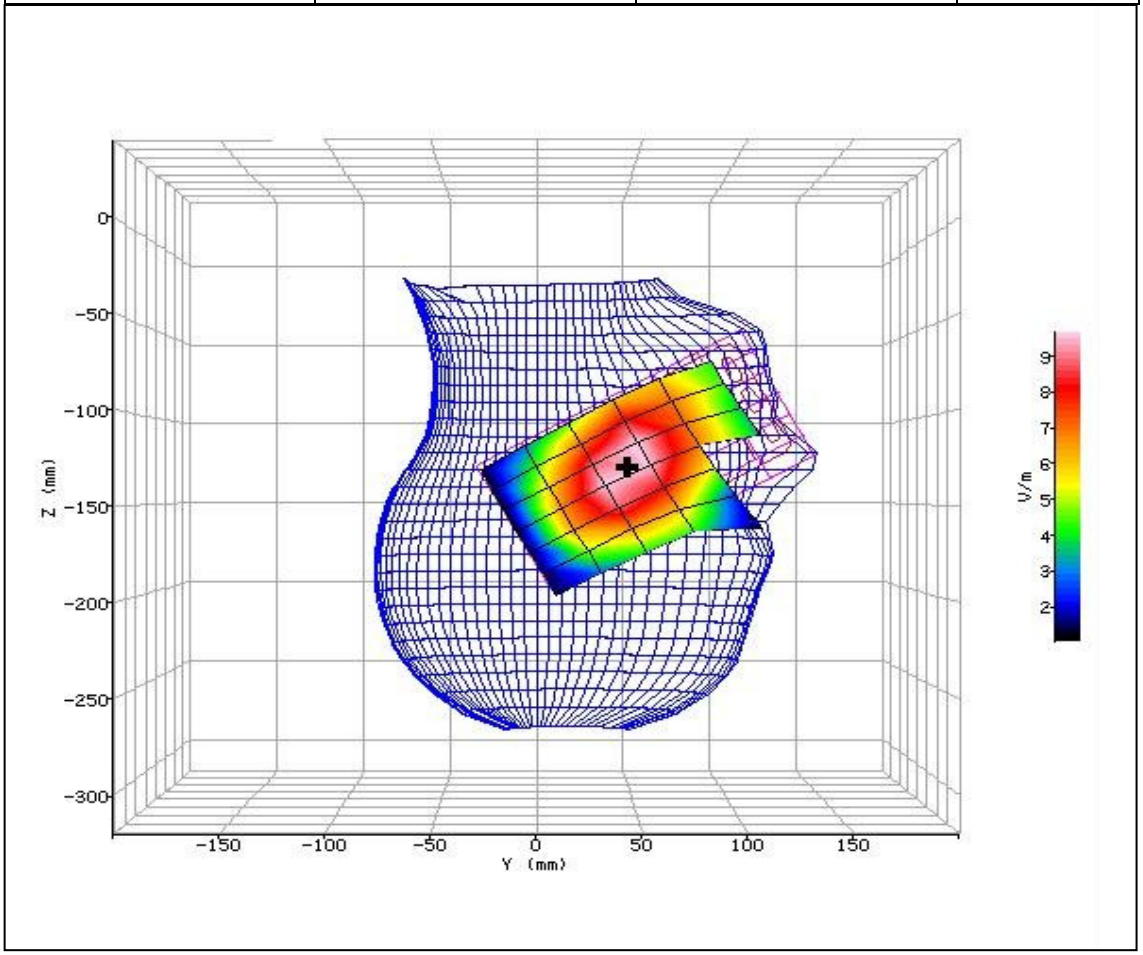

Figure 31: SAR Head Testing Results for the Mobile Handset at 710.0MHz.

2.8 LTE BAND 17 HEAD SAR TEST RESULTS AND COURSE AREA SCANS – 2D

SYSTEM / SOFTWARE:	SARA-C / v6.09.22	**INPUT POWER DRIFT:**	0 dB
DATE / TIME:	02/06/2016-16:05:01	**DUT BATTERY MODEL/NO:**	Integral
AMBIENT TEMPERATURE:	22.90°C	**LIQUID SIMULANT:**	700 Head
DEVICE UNDER TEST:	-	**RELATIVE PERMITTIVITY:**	42.60
RELATIVE HUMIDITY:	40.30%	**CONDUCTIVITY:**	0.904
PHANTOM S/NO:	IXB-040	**LIQUID TEMPERATURE:**	22.30°C
PHANTOM ROTATION:	N/A	**MAX SAR Y-AXIS LOCATION:**	61.50mm
DUT POSITION:	Left-Cheek	**MAX SAR Z-AXIS LOCATION:**	-116.40mm
ANTENNA CONFIGURATION:	N/A	**MAX E FIELD:**	8.559
TEST FREQUENCY:	711.0MHz	**SAR 1g:**	0.09 W/kg
TYPE OF MODULATION:	QPSK (RMC Mode)	**SAR 10g:**	N/A
MODN. DUTY CYCLE:	100%	**SAR START:**	0.082 W/kg
INPUT POWER LEVEL:	23.2dBm	**SAR END:**	0.081 W/kg
PROBE BATTERY LAST CHANGED:	02/06/2016	**SAR DRIFT DURING SCAN:**	-0.400 %

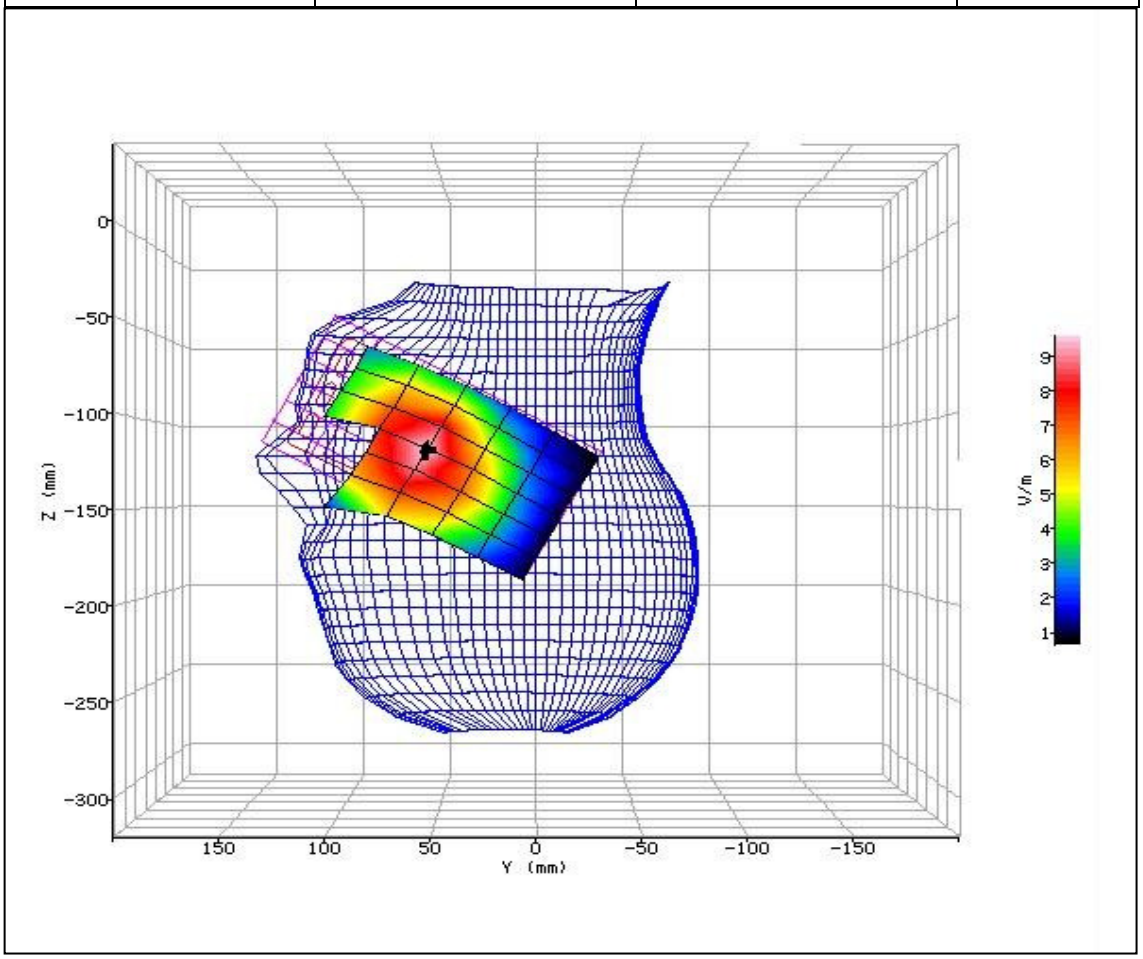

Figure 32: SAR Head Testing Results for the Mobile Handset at 711.0MHz.

SYSTEM / SOFTWARE:	SARA-C / v6.09.22	**INPUT POWER DRIFT:**	0 dB
DATE / TIME:	02/06/2016-16:28:07	**DUT BATTERY MODEL/NO:**	Integral
AMBIENT TEMPERATURE:	22.90°C	**LIQUID SIMULANT:**	700 Head
DEVICE UNDER TEST:	-	**RELATIVE PERMITTIVITY:**	42.60
RELATIVE HUMIDITY:	40.30%	**CONDUCTIVITY:**	0.904
PHANTOM S/NO:	IXB-040	**LIQUID TEMPERATURE:**	22.30°C
PHANTOM ROTATION:	N/A	**MAX SAR Y-AXIS LOCATION:**	50.60mm
DUT POSITION:	Left-15°	**MAX SAR Z-AXIS LOCATION:**	-125.40mm
ANTENNA CONFIGURATION:	N/A	**MAX E FIELD:**	7.080
TEST FREQUENCY:	711.0MHz	**SAR 1g:**	0.06 W/kg
TYPE OF MODULATION:	QPSK (RMC Mode)	**SAR 10g:**	N/A
MODN. DUTY CYCLE:	100%	**SAR START:**	0.053 W/kg
INPUT POWER LEVEL:	23.2dBm	**SAR END:**	0.055 W/kg
PROBE BATTERY LAST CHANGED:	02/06/2016	**SAR DRIFT DURING SCAN:**	2.700 %

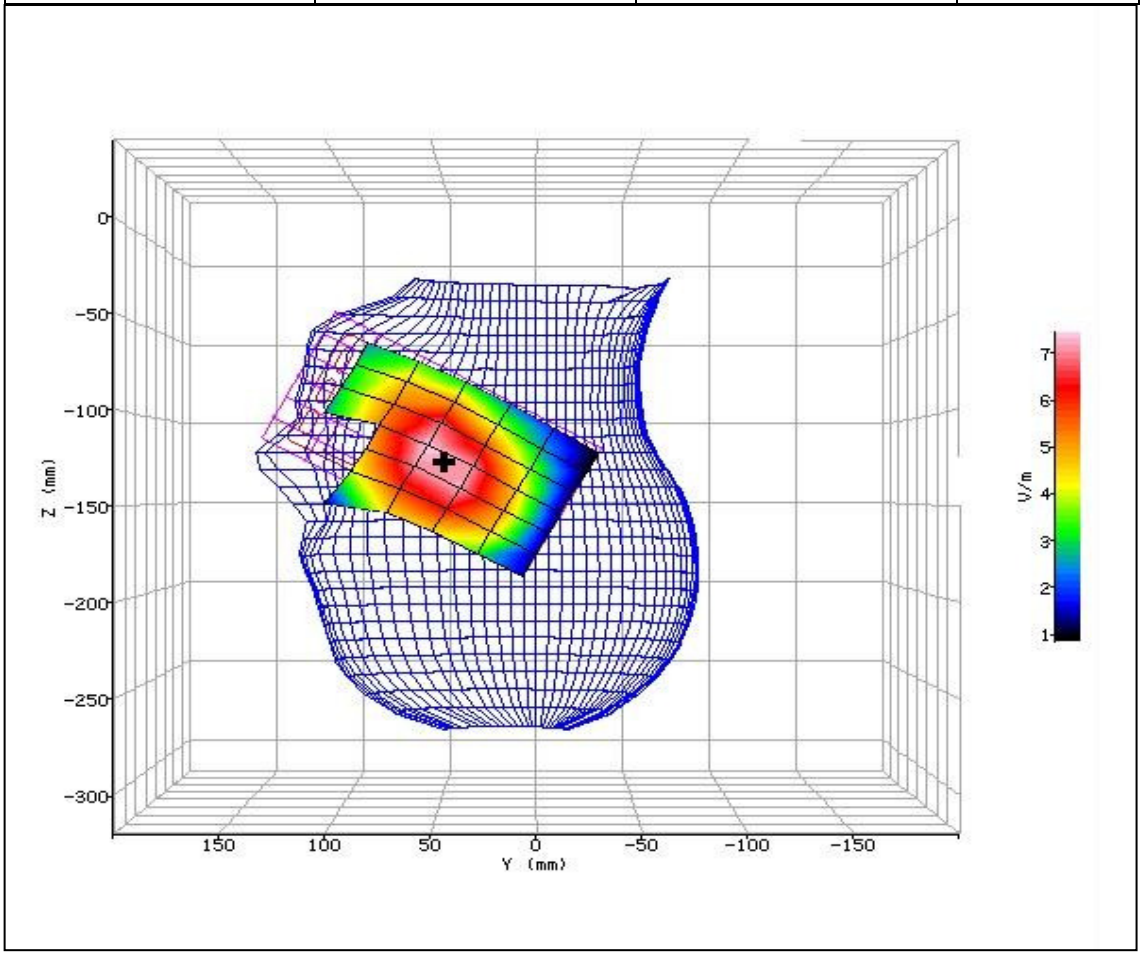

Figure 33: SAR Head Testing Results for the Mobile Handset at 711.0MHz.

SYSTEM / SOFTWARE:	SARA-C / v6.09.22	**INPUT POWER DRIFT:**	0 dB
DATE / TIME:	02/06/2016-15:20:21	**DUT BATTERY MODEL/NO:**	Integral
AMBIENT TEMPERATURE:	22.90°C	**LIQUID SIMULANT:**	700 Head
DEVICE UNDER TEST:	-	**RELATIVE PERMITTIVITY:**	42.60
RELATIVE HUMIDITY:	40.30%	**CONDUCTIVITY:**	0.904
PHANTOM S/NO:	IXB-040	**LIQUID TEMPERATURE:**	22.30°C
PHANTOM ROTATION:	N/A	**MAX SAR Y-AXIS LOCATION:**	60.40mm
DUT POSITION:	Right-Cheek	**MAX SAR Z-AXIS LOCATION:**	-111.70mm
ANTENNA CONFIGURATION:	N/A	**MAX E FIELD:**	9.662
TEST FREQUENCY:	711.0MHz	**SAR 1g:**	0.11 W/kg
TYPE OF MODULATION:	QPSK (RMC Mode)	**SAR 10g:**	N/A
MODN. DUTY CYCLE:	100%	**SAR START:**	0.105 W/kg
INPUT POWER LEVEL:	23.2dBm	**SAR END:**	0.105 W/kg
PROBE BATTERY LAST CHANGED:	02/06/2016	**SAR DRIFT DURING SCAN:**	0.300 %

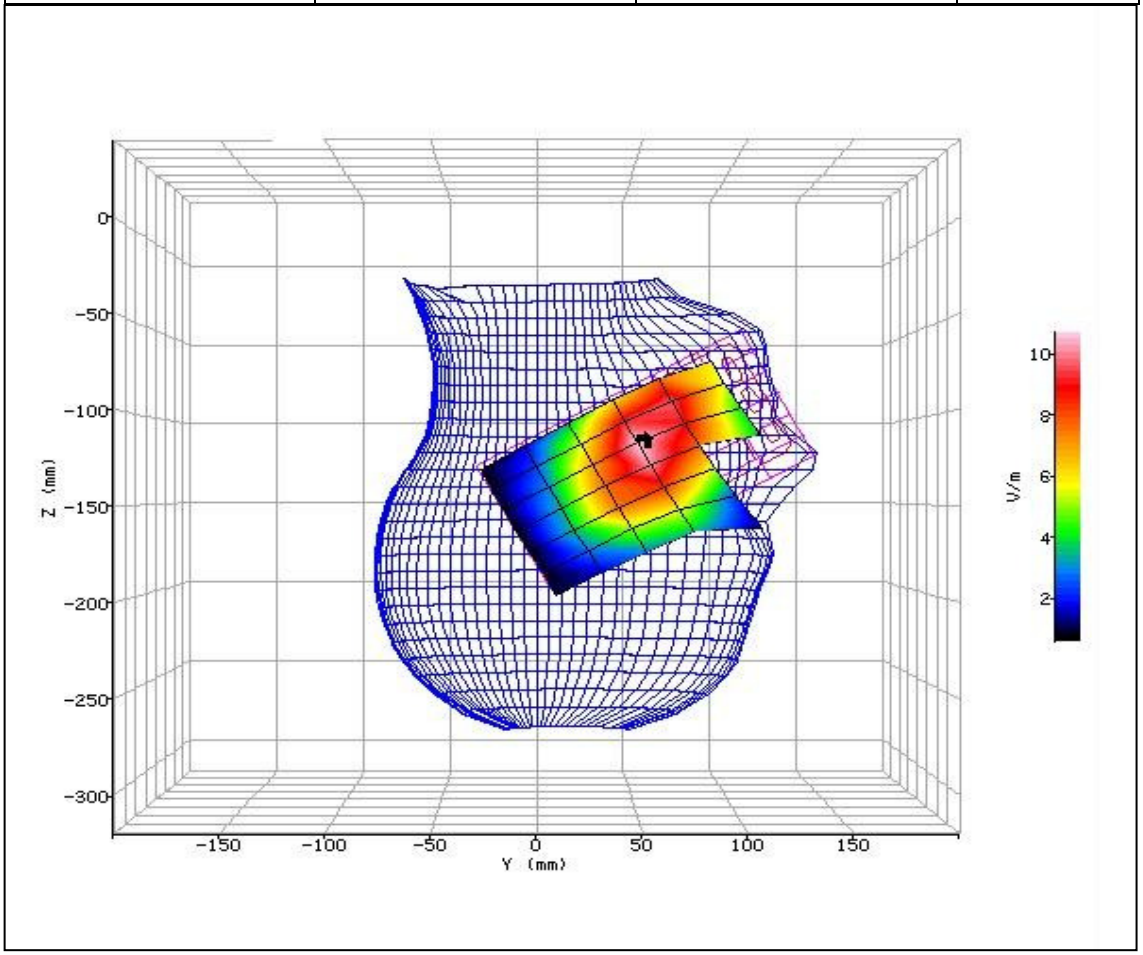

Figure 34: SAR Head Testing Results for the Mobile Handset at 711.0MHz.

SYSTEM / SOFTWARE:	SARA-C / v6.09.22	**INPUT POWER DRIFT:**	0 dB
DATE / TIME:	02/06/2016-14:56:48	**DUT BATTERY MODEL/NO:**	Integral
AMBIENT TEMPERATURE:	22.90°C	**LIQUID SIMULANT:**	700 Head
DEVICE UNDER TEST:	-	**RELATIVE PERMITTIVITY:**	42.60
RELATIVE HUMIDITY:	40.30%	**CONDUCTIVITY:**	0.904
PHANTOM S/NO:	IXB-040	**LIQUID TEMPERATURE:**	22.30°C
PHANTOM ROTATION:	N/A	**MAX SAR Y-AXIS LOCATION:**	49.90mm
DUT POSITION:	Right-15°	**MAX SAR Z-AXIS LOCATION:**	-118.60mm
ANTENNA CONFIGURATION:	N/A	**MAX E FIELD:**	5.486
TEST FREQUENCY:	711.0MHz	**SAR 1g:**	0.03 W/kg
TYPE OF MODULATION:	QPSK (RMC Mode)	**SAR 10g:**	N/A
MODN. DUTY CYCLE:	100%	**SAR START:**	0.032 W/kg
INPUT POWER LEVEL:	23.2dBm	**SAR END:**	0.032 W/kg
PROBE BATTERY LAST CHANGED:	02/06/2016	**SAR DRIFT DURING SCAN:**	-0.700 %

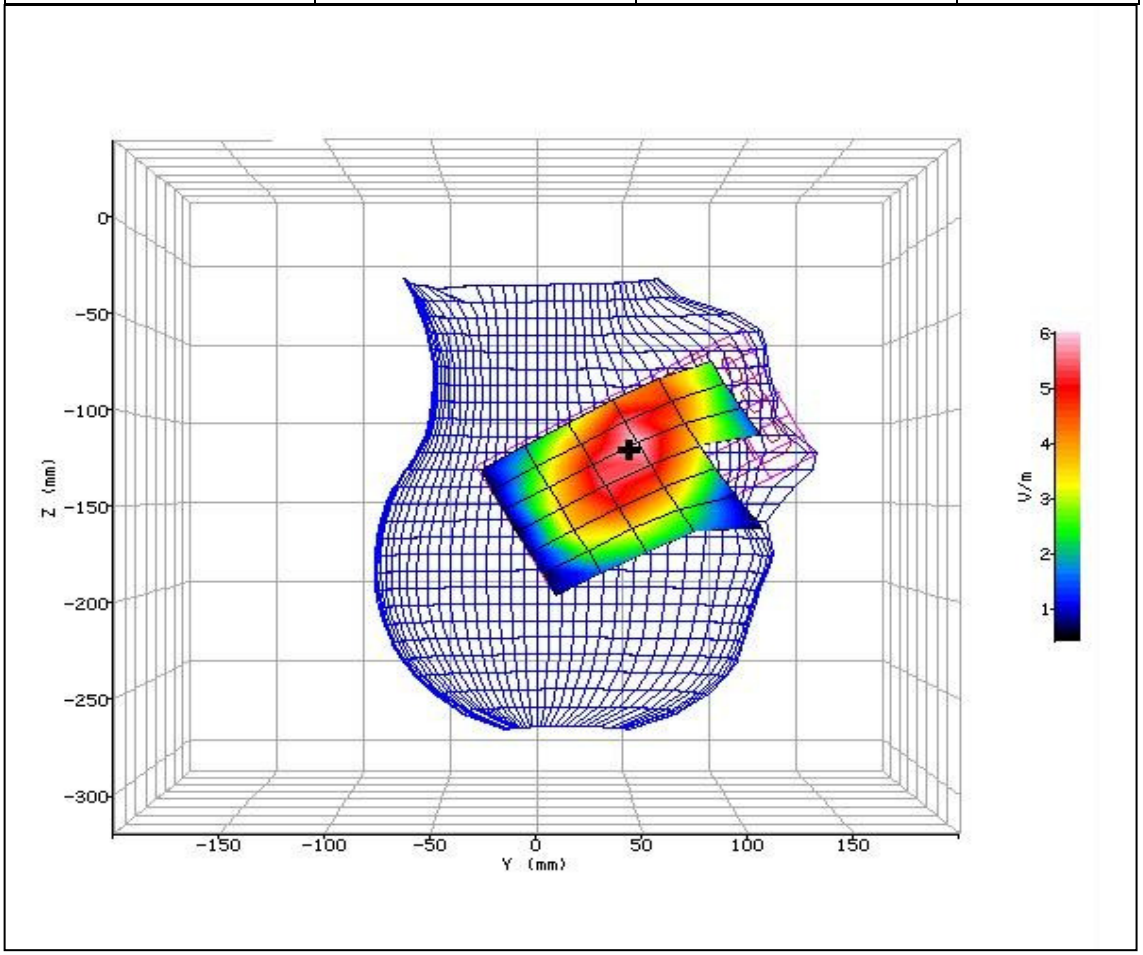

Figure 35: SAR Head Testing Results for the Mobile Handset at 711.0MHz.

2.9 LTE BAND 17 BODY SAR TEST RESULTS AND COURSE AREA SCANS – 2D

SYSTEM / SOFTWARE:	SARA-C / v6.09.22	**INPUT POWER DRIFT:**	0 dB
DATE / TIME:	06/06/2016-16:15:30	**DUT BATTERY MODEL/NO:**	Integral
AMBIENT TEMPERATURE:	22.70°C	**LIQUID SIMULANT:**	700 Body
DEVICE UNDER TEST:	-	**RELATIVE PERMITTIVITY:**	54.80
RELATIVE HUMIDITY:	45.20%	**CONDUCTIVITY:**	1.005
PHANTOM S/NO:	IXB-2HF	**LIQUID TEMPERATURE:**	22.80°C
PHANTOM ROTATION:	N/A	**MAX SAR X-AXIS LOCATION:**	37.90mm
DUT POSITION:	10mm-Front Facing	**MAX SAR Y-AXIS LOCATION:**	19.30mm
ANTENNA CONFIGURATION:	N/A	**MAX E FIELD:**	13.304
TEST FREQUENCY:	710.0MHz	**SAR 1g:**	0.18 W/kg
TYPE OF MODULATION:	QPSK (RMC Mode)	**SAR 10g:**	N/A
MODN. DUTY CYCLE:	100%	**SAR START:**	0.187 W/kg
INPUT POWER LEVEL:	24.2dBm	**SAR END:**	0.183 W/kg
PROBE BATTERY LAST CHANGED:	06/06/2016	**SAR DRIFT DURING SCAN:**	-1.900 %

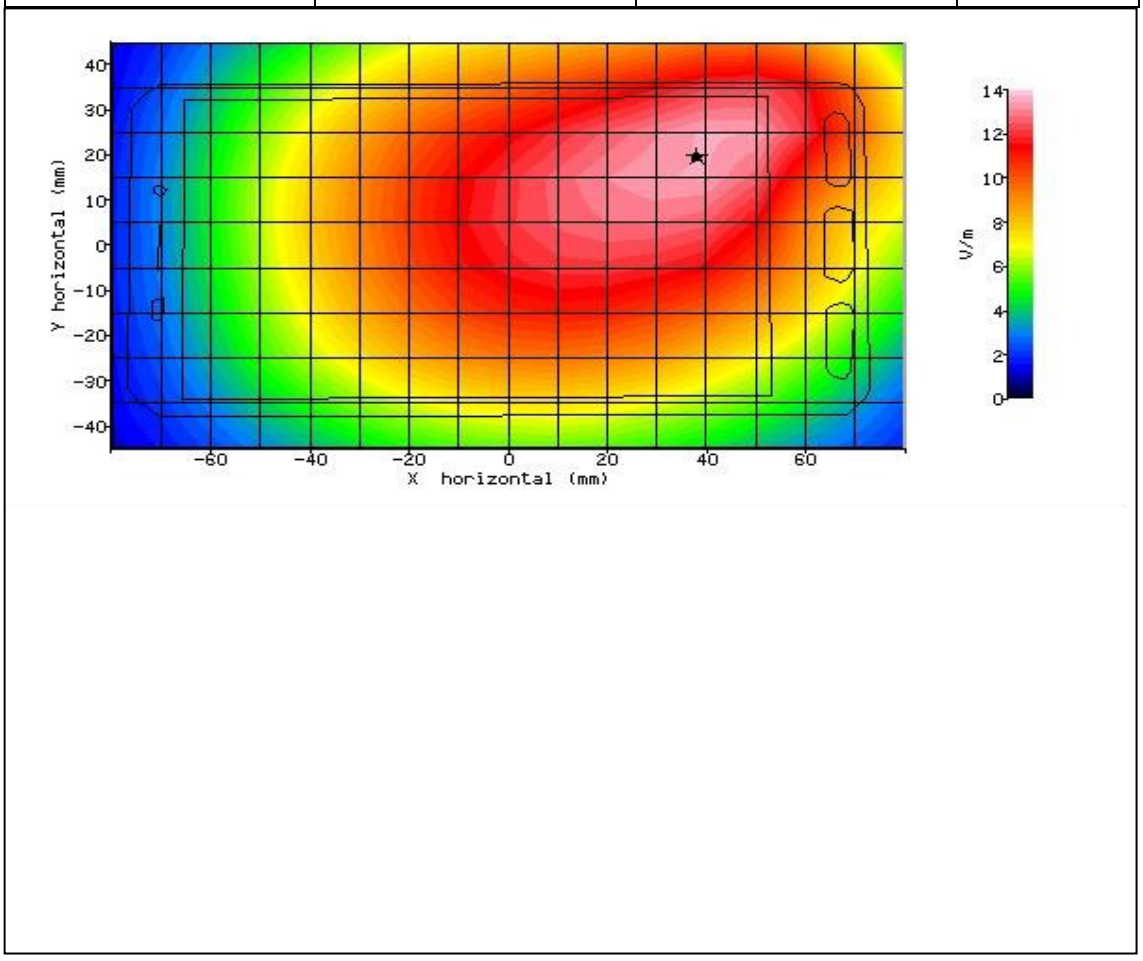

Figure 36: SAR Body Testing Results for the Mobile Handset at 710.0MHz.

SYSTEM / SOFTWARE:	SARA-C / v6.09.22	**INPUT POWER DRIFT:**	0 dB
DATE / TIME:	06/06/2016-16:34:32	**DUT BATTERY MODEL/NO:**	Integral
AMBIENT TEMPERATURE:	22.70°C	**LIQUID SIMULANT:**	700 Body
DEVICE UNDER TEST:	-	**RELATIVE PERMITTIVITY:**	54.80
RELATIVE HUMIDITY:	45.20%	**CONDUCTIVITY:**	1.005
PHANTOM S/NO:	IXB-2HF	**LIQUID TEMPERATURE:**	22.80°C
PHANTOM ROTATION:	N/A	**MAX SAR X-AXIS LOCATION:**	30.40mm
DUT POSITION:	10mm-Rear Facing	**MAX SAR Y-AXIS LOCATION:**	-10.90mm
ANTENNA CONFIGURATION:	N/A	**MAX E FIELD:**	14.961
TEST FREQUENCY:	710.0MHz	**SAR 1g:**	0.22 W/kg
TYPE OF MODULATION:	QPSK (RMC Mode)	**SAR 10g:**	N/A
MODN. DUTY CYCLE:	100%	**SAR START:**	0.233 W/kg
INPUT POWER LEVEL:	24.2dBm	**SAR END:**	0.235 W/kg
PROBE BATTERY LAST CHANGED:	06/06/2016	**SAR DRIFT DURING SCAN:**	0.700 %

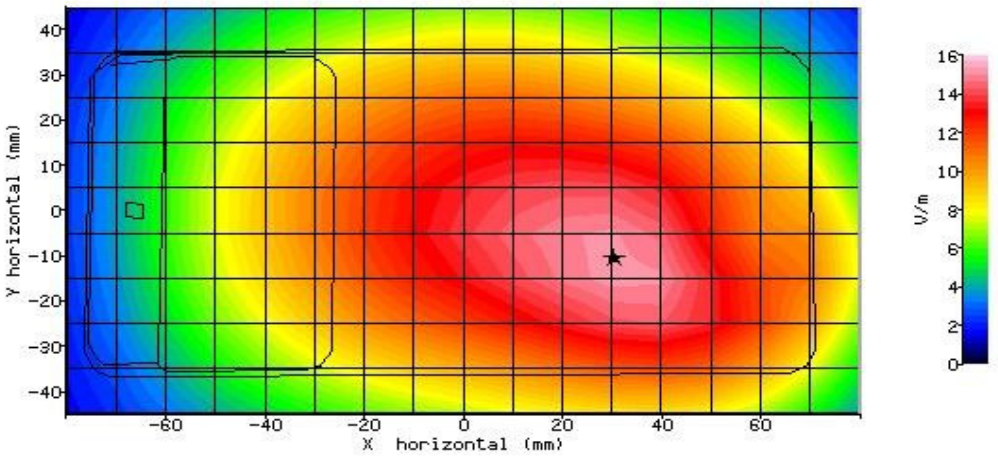

Figure 37: SAR Body Testing Results for the Mobile Handset at 710.0MHz.

SYSTEM / SOFTWARE:	SARA-C / v6.09.22	**INPUT POWER DRIFT:**	0 dB
DATE / TIME:	07/06/2016-08:05:53	**DUT BATTERY MODEL/NO:**	Integral
AMBIENT TEMPERATURE:	22.80°C	**LIQUID SIMULANT:**	700 Body
DEVICE UNDER TEST:	-	**RELATIVE PERMITTIVITY:**	54.80
RELATIVE HUMIDITY:	44.40%	**CONDUCTIVITY:**	1.005
PHANTOM S/NO:	IXB-2HF	**LIQUID TEMPERATURE:**	23.00°C
PHANTOM ROTATION:	N/A	**MAX SAR X-AXIS LOCATION:**	10.80mm
DUT POSITION:	10mm-Left Edge	**MAX SAR Y-AXIS LOCATION:**	0.50mm
ANTENNA CONFIGURATION:	N/A	**MAX E FIELD:**	11.075
TEST FREQUENCY:	710.0MHz	**SAR 1g:**	0.12 W/kg
TYPE OF MODULATION:	QPSK (RMC Mode)	**SAR 10g:**	N/A
MODN. DUTY CYCLE:	100%	**SAR START:**	0.103 W/kg
INPUT POWER LEVEL:	24.2dBm	**SAR END:**	0.138 W/kg
PROBE BATTERY LAST CHANGED:	07/06/2016	**SAR DRIFT DURING SCAN:**	6.200 %

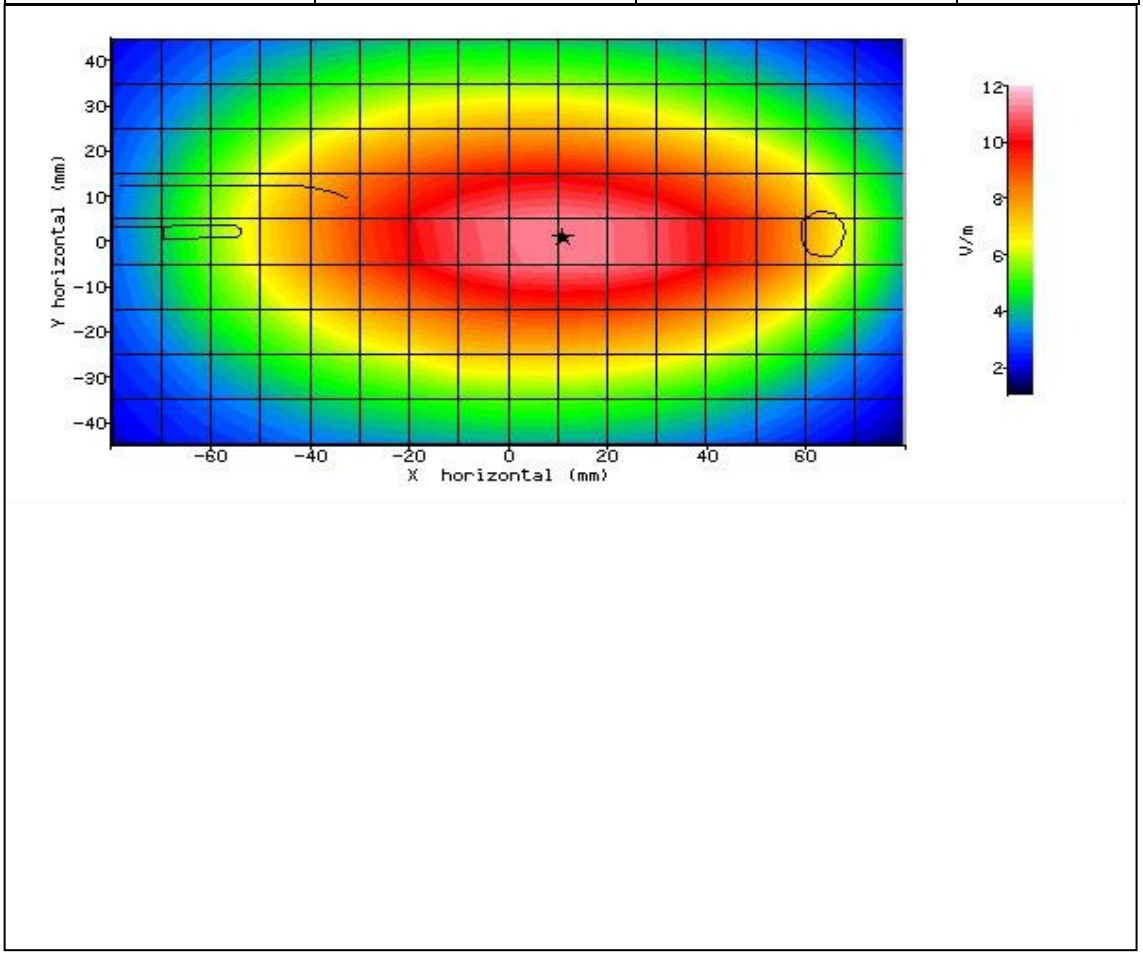

Figure 38: SAR Body Testing Results for the Mobile Handset at 710.0MHz.

SYSTEM / SOFTWARE:	SARA-C / v6.09.22	**INPUT POWER DRIFT:**	0 dB
DATE / TIME:	07/06/2016-08:27:20	**DUT BATTERY MODEL/NO:**	Integral
AMBIENT TEMPERATURE:	22.80°C	**LIQUID SIMULANT:**	700 Body
DEVICE UNDER TEST:	-	**RELATIVE PERMITTIVITY:**	54.80
RELATIVE HUMIDITY:	44.40%	**CONDUCTIVITY:**	1.005
PHANTOM S/NO:	IXB-2HF	**LIQUID TEMPERATURE:**	23.00°C
PHANTOM ROTATION:	N/A	**MAX SAR X-AXIS LOCATION:**	7.40mm
DUT POSITION:	10mm-Right Edge	**MAX SAR Y-AXIS LOCATION:**	2.70mm
ANTENNA CONFIGURATION:	N/A	**MAX E FIELD:**	9.589
TEST FREQUENCY:	710.0MHz	**SAR 1g:**	0.09 W/kg
TYPE OF MODULATION:	QPSK (RMC Mode)	**SAR 10g:**	N/A
MODN. DUTY CYCLE:	100%	**SAR START:**	0.097 W/kg
INPUT POWER LEVEL:	24.2dBm	**SAR END:**	0.097 W/kg
PROBE BATTERY LAST CHANGED:	07/06/2016	**SAR DRIFT DURING SCAN:**	0.300 %

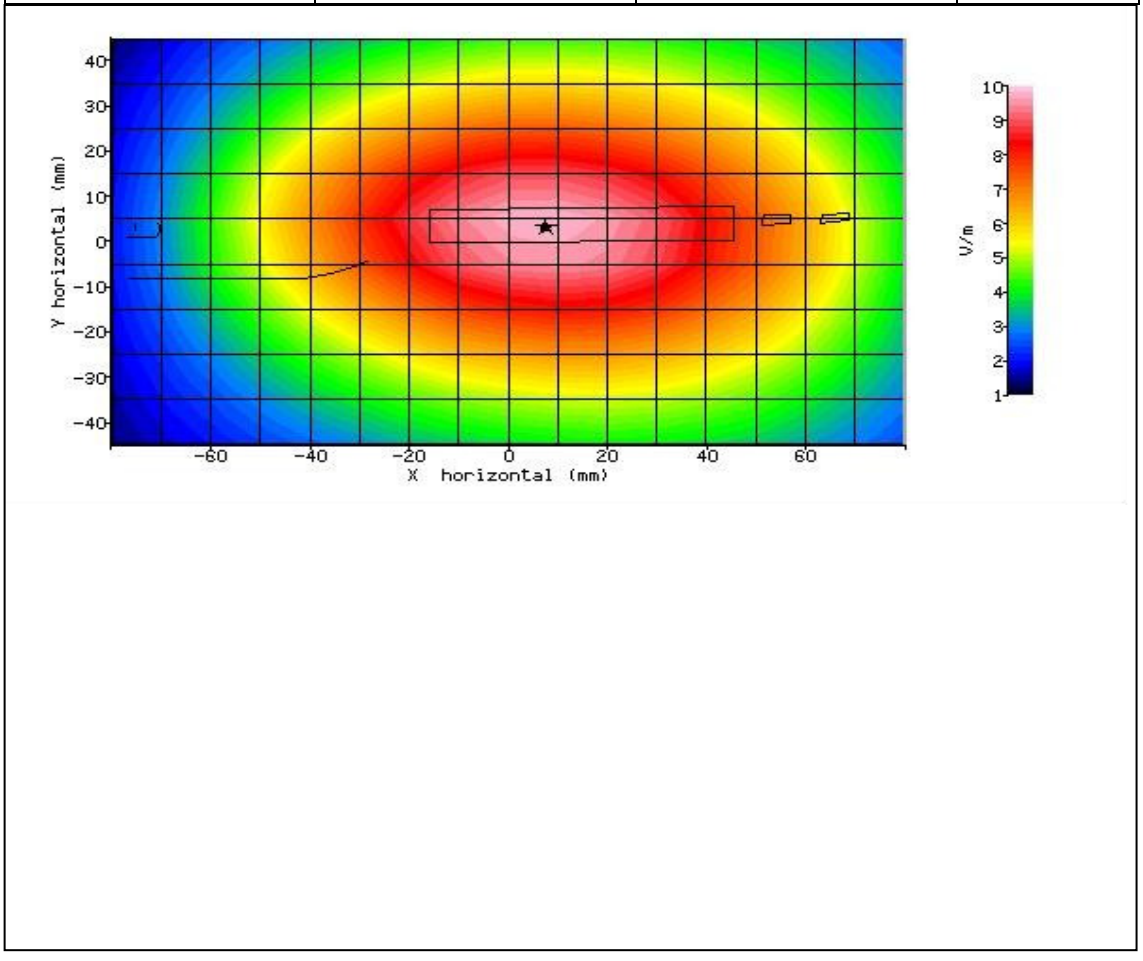

Figure 39: SAR Body Testing Results for the Mobile Handset at 710.0MHz.

SYSTEM / SOFTWARE:	SARA-C / v6.09.22	**INPUT POWER DRIFT:**	0 dB
DATE / TIME:	07/06/2016-08:46:06	**DUT BATTERY MODEL/NO:**	Integral
AMBIENT TEMPERATURE:	22.80°C	**LIQUID SIMULANT:**	700 Body
DEVICE UNDER TEST:	-	**RELATIVE PERMITTIVITY:**	54.80
RELATIVE HUMIDITY:	44.40%	**CONDUCTIVITY:**	1.005
PHANTOM S/NO:	IXB-2HF	**LIQUID TEMPERATURE:**	23.00°C
PHANTOM ROTATION:	N/A	**MAX SAR X-AXIS LOCATION:**	23.70mm
DUT POSITION:	10mm-Bottom Edge	**MAX SAR Y-AXIS LOCATION:**	-1.10mm
ANTENNA CONFIGURATION:	N/A	**MAX E FIELD:**	3.798
TEST FREQUENCY:	710.0MHz	**SAR 1g:**	0.02 W/kg
TYPE OF MODULATION:	QPSK (RMC Mode)	**SAR 10g:**	N/A
MODN. DUTY CYCLE:	100%	**SAR START:**	0.018 W/kg
INPUT POWER LEVEL:	24.2dBm	**SAR END:**	0.018 W/kg
PROBE BATTERY LAST CHANGED:	07/06/2016	**SAR DRIFT DURING SCAN:**	-0.400 %

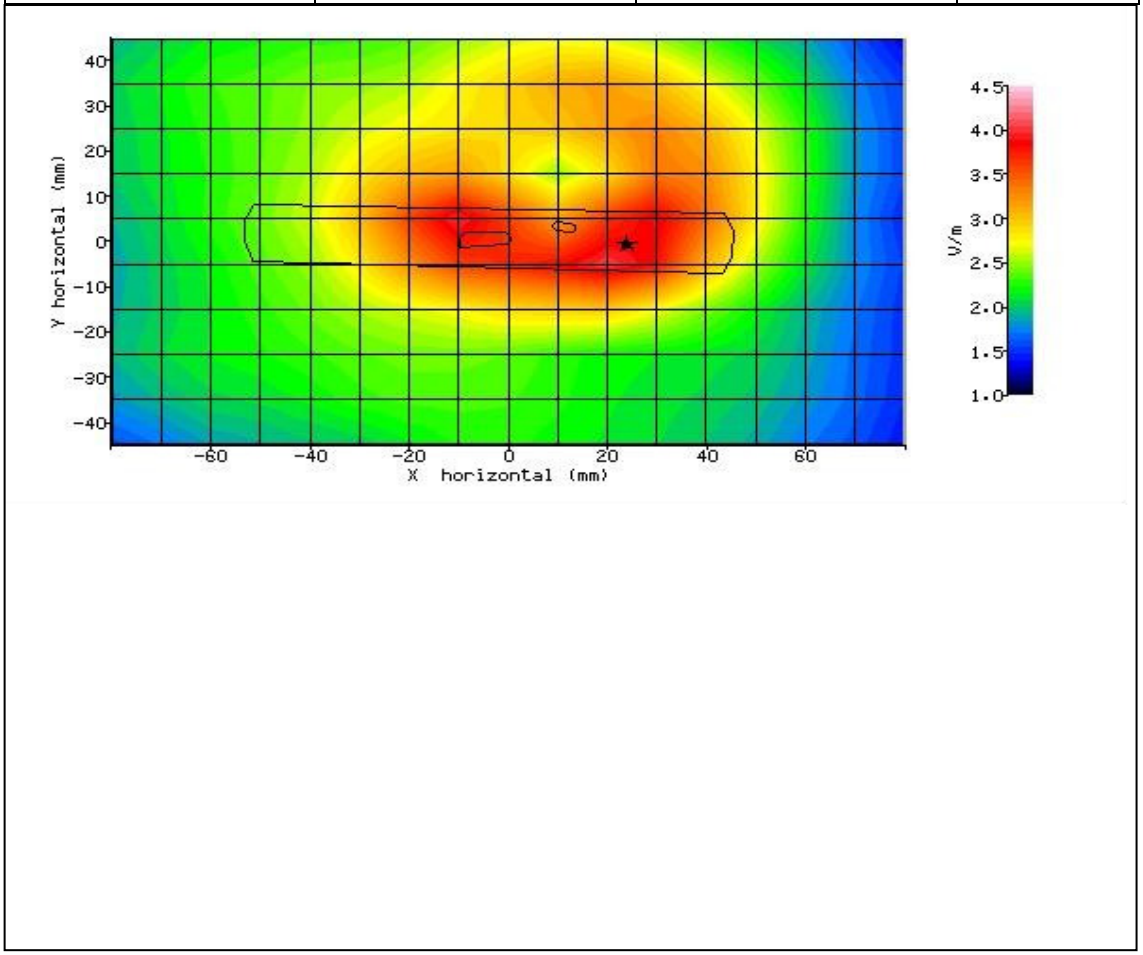

Figure 40: SAR Body Testing Results for the Mobile Handset at 710.0MHz.

2.10 LTE BAND 17 BODY SAR TEST RESULTS AND COURSE AREA SCANS – 2D

SYSTEM / SOFTWARE:	SARA-C / v6.09.22	**INPUT POWER DRIFT:**	0 dB
DATE / TIME:	07/06/2016-11:49:32	**DUT BATTERY MODEL/NO:**	Integral
AMBIENT TEMPERATURE:	22.80°C	**LIQUID SIMULANT:**	700 Body
DEVICE UNDER TEST:	-	**RELATIVE PERMITTIVITY:**	54.80
RELATIVE HUMIDITY:	44.40%	**CONDUCTIVITY:**	1.005
PHANTOM S/NO:	IXB-2HF	**LIQUID TEMPERATURE:**	23.00°C
PHANTOM ROTATION:	N/A	**MAX SAR X-AXIS LOCATION:**	38.50mm
DUT POSITION:	10mm-Front Facing	**MAX SAR Y-AXIS LOCATION:**	19.10mm
ANTENNA CONFIGURATION:	N/A	**MAX E FIELD:**	12.11
TEST FREQUENCY:	711.0MHz	**SAR 1g:**	0.15 W/kg
TYPE OF MODULATION:	QPSK (RMC Mode)	**SAR 10g:**	N/A
MODN. DUTY CYCLE:	100%	**SAR START:**	0.155 W/kg
INPUT POWER LEVEL:	23.2dBm	**SAR END:**	0.154 W/kg
PROBE BATTERY LAST CHANGED:	07/06/2016	**SAR DRIFT DURING SCAN:**	-0.800 %

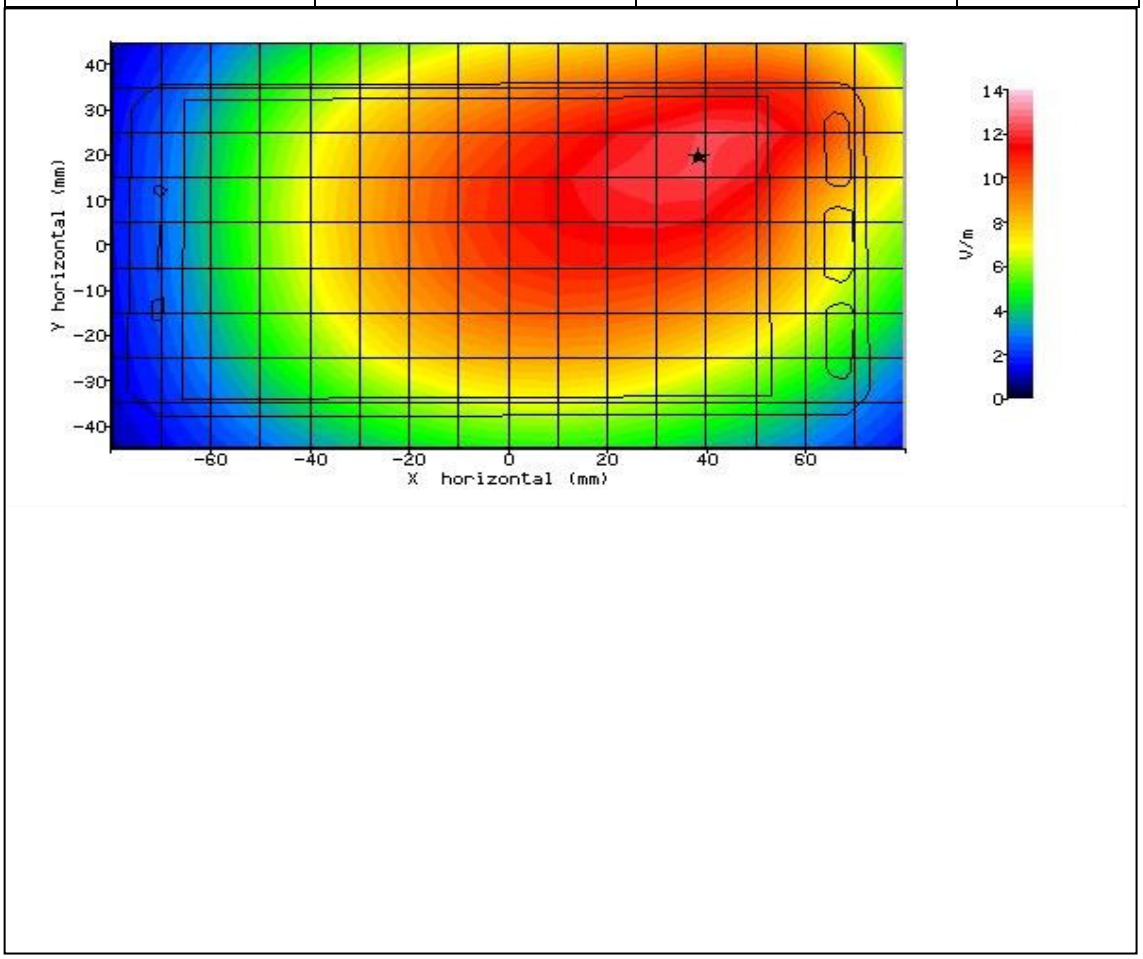

Figure 41: SAR Body Testing Results for the Mobile Handset at 711.0MHz.

SYSTEM / SOFTWARE:	SARA-C / v6.09.22	**INPUT POWER DRIFT:**	0 dB
DATE / TIME:	07/06/2016-13:17:18	**DUT BATTERY MODEL/NO:**	Integral
AMBIENT TEMPERATURE:	22.80°C	**LIQUID SIMULANT:**	700 Body
DEVICE UNDER TEST:	-	**RELATIVE PERMITTIVITY:**	54.80
RELATIVE HUMIDITY:	44.40%	**CONDUCTIVITY:**	1.005
PHANTOM S/NO:	IXB-2HF	**LIQUID TEMPERATURE:**	23.00°C
PHANTOM ROTATION:	N/A	**MAX SAR X-AXIS LOCATION:**	-11.00mm
DUT POSITION:	10mm-Rear Facing	**MAX SAR Y-AXIS LOCATION:**	2.30mm
ANTENNA CONFIGURATION:	N/A	**MAX E FIELD:**	30.900
TEST FREQUENCY:	711.0MHz	**SAR 1g:**	0.19 W/kg
TYPE OF MODULATION:	QPSK (RMC Mode)	**SAR 10g:**	N/A
MODN. DUTY CYCLE:	100%	**SAR START:**	0.197 W/kg
INPUT POWER LEVEL:	23.2dBm	**SAR END:**	0.194 W/kg
PROBE BATTERY LAST CHANGED:	07/06/2016	**SAR DRIFT DURING SCAN:**	-1.300 %

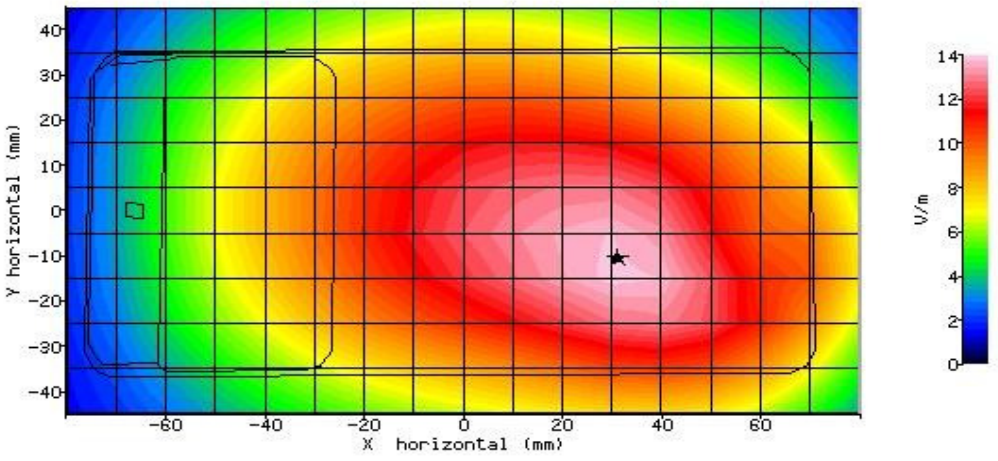

Figure 42: SAR Body Testing Results for the Mobile Handset at 711.0MHz.

SYSTEM / SOFTWARE:	SARA-C / v6.09.22	**INPUT POWER DRIFT:**	0 dB
DATE / TIME:	07/06/2016-10:26:10	**DUT BATTERY MODEL/NO:**	Integral
AMBIENT TEMPERATURE:	22.80°C	**LIQUID SIMULANT:**	700 Body
DEVICE UNDER TEST:	-	**RELATIVE PERMITTIVITY:**	54.80
RELATIVE HUMIDITY:	44.40%	**CONDUCTIVITY:**	1.005
PHANTOM S/NO:	IXB-2HF	**LIQUID TEMPERATURE:**	23.00°C
PHANTOM ROTATION:	N/A	**MAX SAR X-AXIS LOCATION:**	13.60mm
DUT POSITION:	10mm-Left Edge	**MAX SAR Y-AXIS LOCATION:**	0.30mm
ANTENNA CONFIGURATION:	N/A	**MAX E FIELD:**	10.034
TEST FREQUENCY:	711.0MHz	**SAR 1g:**	0.10 W/kg
TYPE OF MODULATION:	QPSK (RMC Mode)	**SAR 10g:**	N/A
MODN. DUTY CYCLE:	100%	**SAR START:**	0.109 W/kg
INPUT POWER LEVEL:	23.2dBm	**SAR END:**	0.108 W/kg
PROBE BATTERY LAST CHANGED:	07/06/2016	**SAR DRIFT DURING SCAN:**	-0.700 %

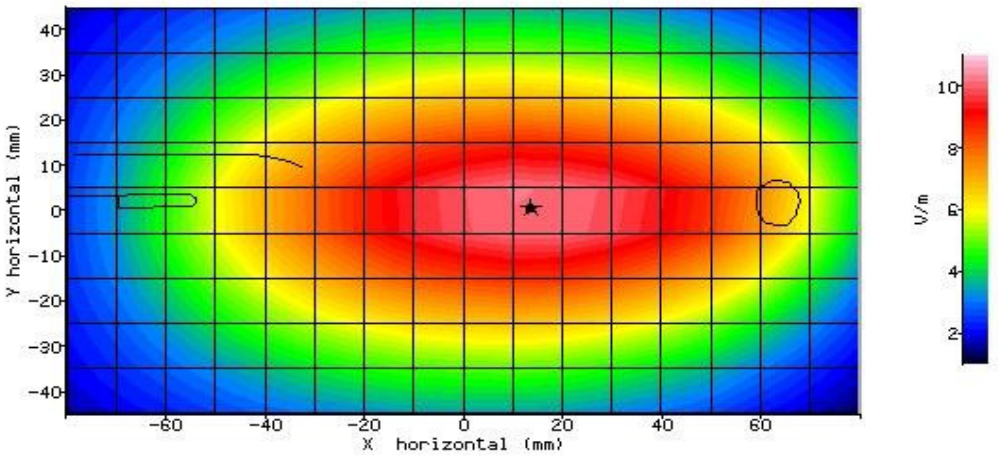

Figure 43: SAR Body Testing Results for the Mobile Handset at 711.0MHz.

SYSTEM / SOFTWARE:	SARA-C / v6.09.22	**INPUT POWER DRIFT:**	0 dB
DATE / TIME:	07/06/2016-10:05:06	**DUT BATTERY MODEL/NO:**	Integral
AMBIENT TEMPERATURE:	22.80°C	**LIQUID SIMULANT:**	700 Body
DEVICE UNDER TEST:	-	**RELATIVE PERMITTIVITY:**	54.80
RELATIVE HUMIDITY:	44.40%	**CONDUCTIVITY:**	1.005
PHANTOM S/NO:	IXB-2HF	**LIQUID TEMPERATURE:**	23.00°C
PHANTOM ROTATION:	N/A	**MAX SAR X-AXIS LOCATION:**	7.30mm
DUT POSITION:	10mm-Right Edge	**MAX SAR Y-AXIS LOCATION:**	3.00mm
ANTENNA CONFIGURATION:	N/A	**MAX E FIELD:**	8.646
TEST FREQUENCY:	711.0MHz	**SAR 1g:**	0.08 W/kg
TYPE OF MODULATION:	QPSK (RMC Mode)	**SAR 10g:**	N/A
MODN. DUTY CYCLE:	100%	**SAR START:**	0.079 W/kg
INPUT POWER LEVEL:	23.2dBm	**SAR END:**	0.079 W/kg
PROBE BATTERY LAST CHANGED:	07/06/2016	**SAR DRIFT DURING SCAN:**	-0.900 %

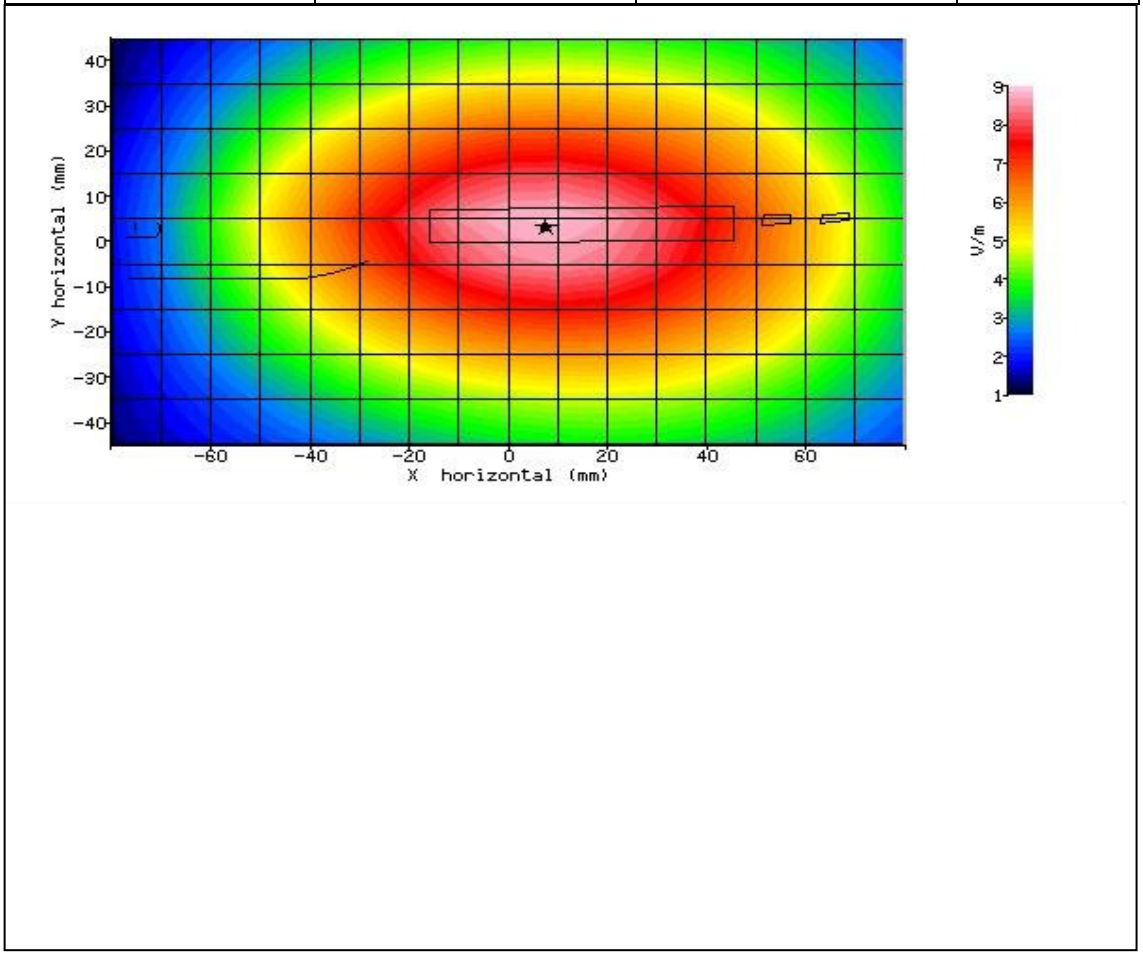

Figure 44: SAR Body Testing Results for the Mobile Handset at 711.0MHz.

SYSTEM / SOFTWARE:	SARA-C / v6.09.22	**INPUT POWER DRIFT:**	0 dB
DATE / TIME:	07/06/2016-09:43:25	**DUT BATTERY MODEL/NO:**	Integral
AMBIENT TEMPERATURE:	22.80°C	**LIQUID SIMULANT:**	700 Body
DEVICE UNDER TEST:	-	**RELATIVE PERMITTIVITY:**	54.80
RELATIVE HUMIDITY:	44.40%	**CONDUCTIVITY:**	1.005
PHANTOM S/NO:	IXB-2HF	**LIQUID TEMPERATURE:**	23.00°C
PHANTOM ROTATION:	N/A	**MAX SAR X-AXIS LOCATION:**	23.50mm
DUT POSITION:	10mm-Bottom Edge	**MAX SAR Y-AXIS LOCATION:**	-0.40mm
ANTENNA CONFIGURATION:	N/A	**MAX E FIELD:**	3.343
TEST FREQUENCY:	711.0MHz	**SAR 1g:**	0.01 W/kg
TYPE OF MODULATION:	QPSK (RMC Mode)	**SAR 10g:**	N/A
MODN. DUTY CYCLE:	100%	**SAR START:**	0.014 W/kg
INPUT POWER LEVEL:	23.2dBm	**SAR END:**	0.013 W/kg
PROBE BATTERY LAST CHANGED:	07/06/2016	**SAR DRIFT DURING SCAN:**	-3.200 %

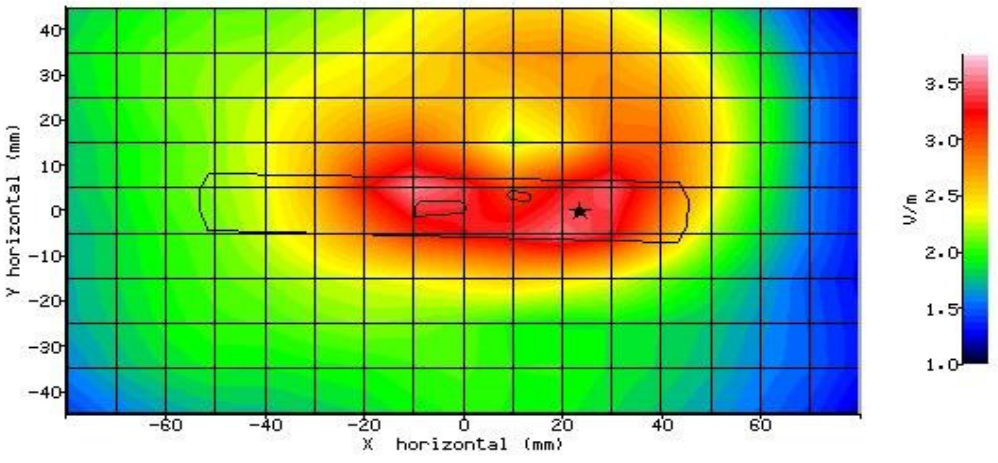

Figure 45: SAR Body Testing Results for the Mobile Handset at 711.0MHz.

2.11 GSM 1900MHz HEAD SAR TEST RESULTS AND COURSE AREA SCANS – 2D

SYSTEM / SOFTWARE:	SARA-C / v6.09.22	**INPUT POWER DRIFT:**	0 dB
DATE / TIME:	31/05/2016-13:16:37	**DUT BATTERY MODEL/NO:**	Integral
AMBIENT TEMPERATURE:	22.80°C	**LIQUID SIMULANT:**	1900Head
DEVICE UNDER TEST:	-	**RELATIVE PERMITTIVITY:**	38.80
RELATIVE HUMIDITY:	44.70%	**CONDUCTIVITY:**	1.411
PHANTOM S/NO:	IXB-040	**LIQUID TEMPERATURE:**	22.50°C
PHANTOM ROTATION:	N/A	**MAX SAR Y-AXIS LOCATION:**	59.50mm
DUT POSITION:	Left-Cheek	**MAX SAR Z-AXIS LOCATION:**	-100.40mm
ANTENNA CONFIGURATION:	N/A	**MAX E FIELD:**	11.366
TEST FREQUENCY:	1850.2MHz	**SAR 1g:**	0.26 W/kg
TYPE OF MODULATION:	GMSK (Voice Mode)	**SAR 10g:**	N/A
MODN. DUTY CYCLE:	12.5%	**SAR START:**	0.252 W/kg
INPUT POWER LEVEL:	29.8dBm	**SAR END:**	0.258 W/kg
PROBE BATTERY LAST CHANGED:	31/05/2016	**SAR DRIFT DURING SCAN:**	2.300 %

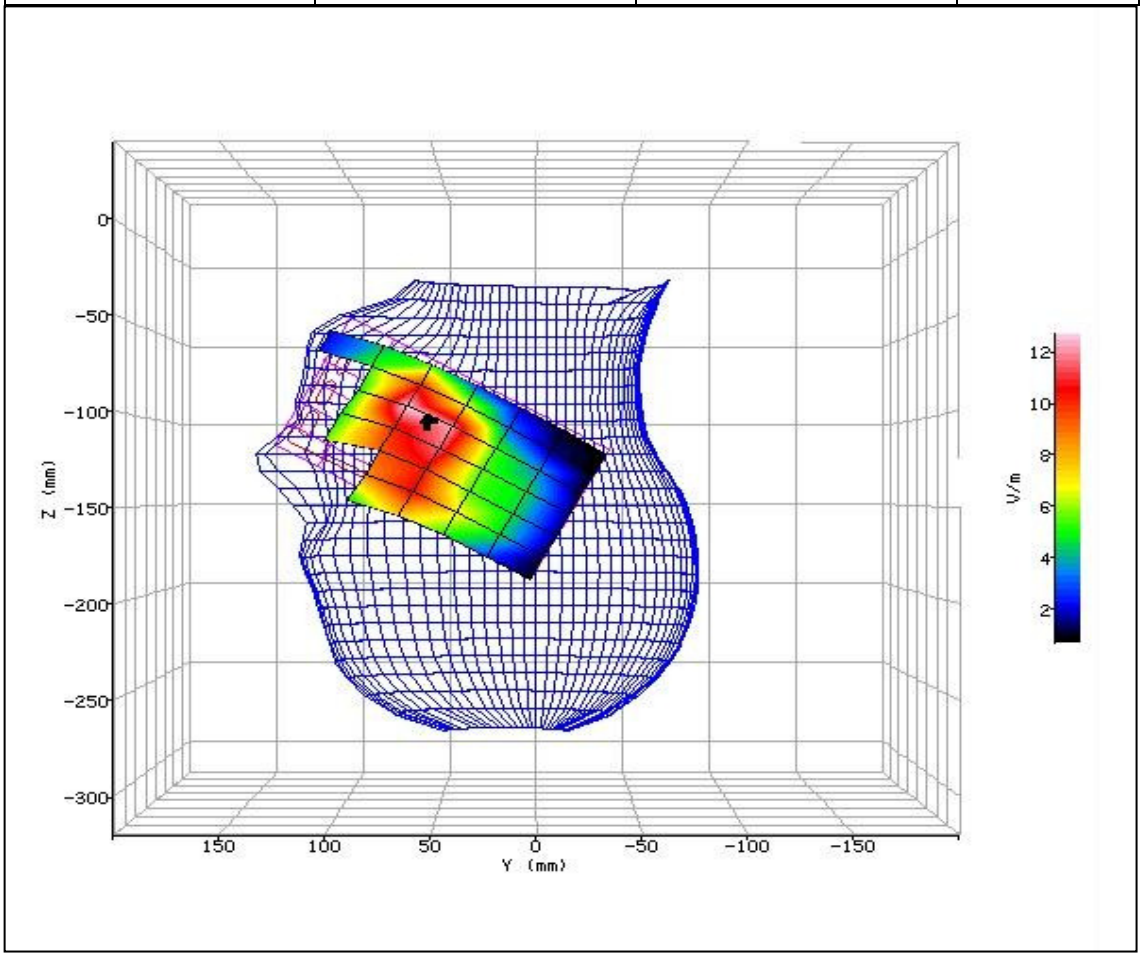

Figure 46: SAR Head Testing Results for the Mobile Handset at 1850.2MHz.

SYSTEM / SOFTWARE:	SARA-C / v6.09.22	**INPUT POWER DRIFT:**	0 dB
DATE / TIME:	31/05/2016-13:43:07	**DUT BATTERY MODEL/NO:**	Integral
AMBIENT TEMPERATURE:	22.80°C	**LIQUID SIMULANT:**	1900Head
DEVICE UNDER TEST:	-	**RELATIVE PERMITTIVITY:**	38.80
RELATIVE HUMIDITY:	44.70%	**CONDUCTIVITY:**	1.411
PHANTOM S/NO:	IXB-040	**LIQUID TEMPERATURE:**	22.50°C
PHANTOM ROTATION:	N/A	**MAX SAR Y-AXIS LOCATION:**	34.00mm
DUT POSITION:	Left-15°	**MAX SAR Z-AXIS LOCATION:**	-115.60mm
ANTENNA CONFIGURATION:	N/A	**MAX E FIELD:**	6.071
TEST FREQUENCY:	1850.2MHz	**SAR 1g:**	0.06 W/kg
TYPE OF MODULATION:	GMSK (Voice Mode)	**SAR 10g:**	N/A
MODN. DUTY CYCLE:	12.5%	**SAR START:**	0.057 W/kg
INPUT POWER LEVEL:	29.8dBm	**SAR END:**	0.055 W/kg
PROBE BATTERY LAST CHANGED:	31/05/2016	**SAR DRIFT DURING SCAN:**	-3.300 %

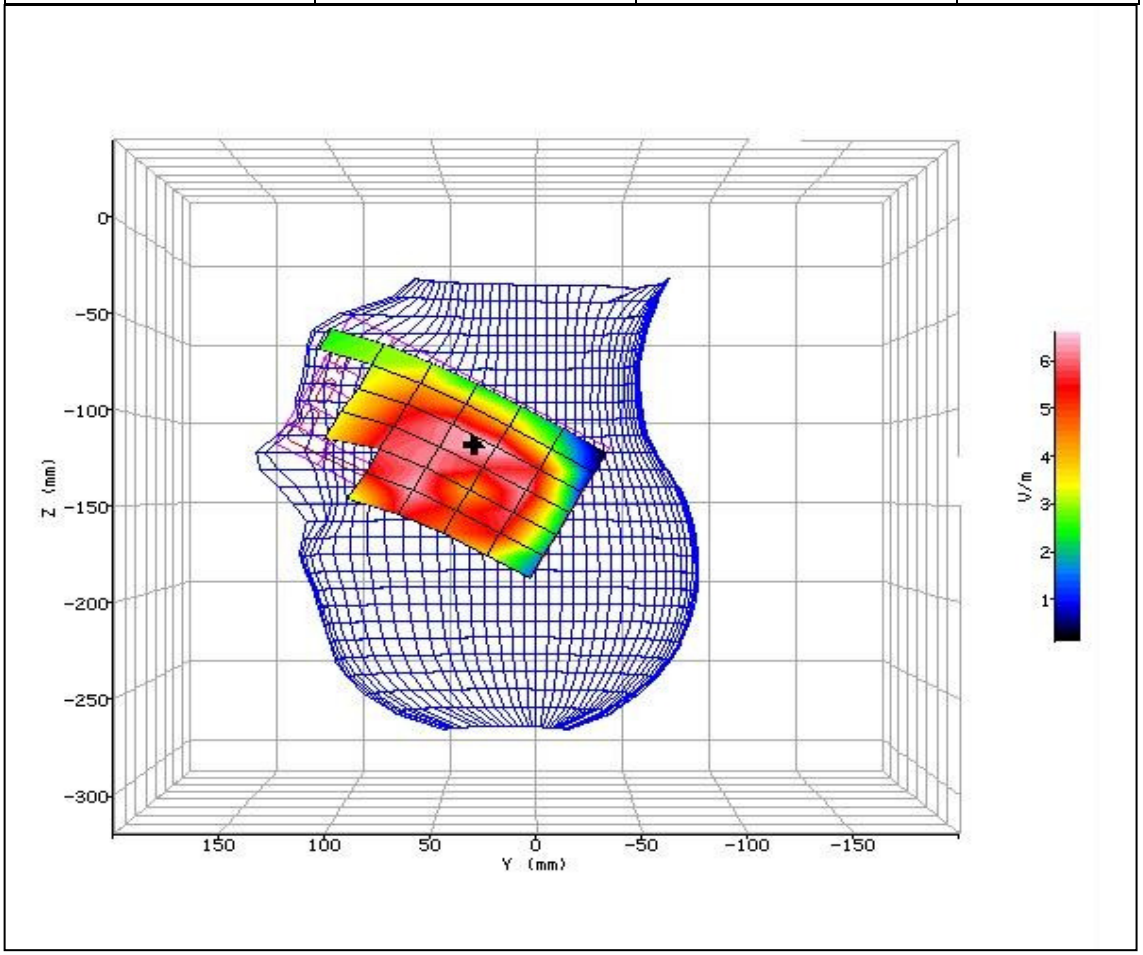

Figure 47: SAR Head Testing Results for the Mobile Handset at 1850.2MHz.

SYSTEM / SOFTWARE:	SARA-C / v6.09.22	**INPUT POWER DRIFT:**	0 dB
DATE / TIME:	31/05/2016-14:18:56	**DUT BATTERY MODEL/NO:**	Integral
AMBIENT TEMPERATURE:	22.80°C	**LIQUID SIMULANT:**	1900Head
DEVICE UNDER TEST:	-	**RELATIVE PERMITTIVITY:**	38.80
RELATIVE HUMIDITY:	44.70%	**CONDUCTIVITY:**	1.411
PHANTOM S/NO:	IXB-040	**LIQUID TEMPERATURE:**	22.50°C
PHANTOM ROTATION:	N/A	**MAX SAR Y-AXIS LOCATION:**	62.80mm
DUT POSITION:	Right-Cheek	**MAX SAR Z-AXIS LOCATION:**	-65.30mm
ANTENNA CONFIGURATION:	N/A	**MAX E FIELD:**	13.373
TEST FREQUENCY:	1850.2MHz	**SAR 1g:**	0.35 W/kg
TYPE OF MODULATION:	GMSK (Voice Mode)	**SAR 10g:**	N/A
MODN. DUTY CYCLE:	12.5%	**SAR START:**	0.359 W/kg
INPUT POWER LEVEL:	29.8dBm	**SAR END:**	0.324 W/kg
PROBE BATTERY LAST CHANGED:	31/05/2016	**SAR DRIFT DURING SCAN:**	-9.800 %

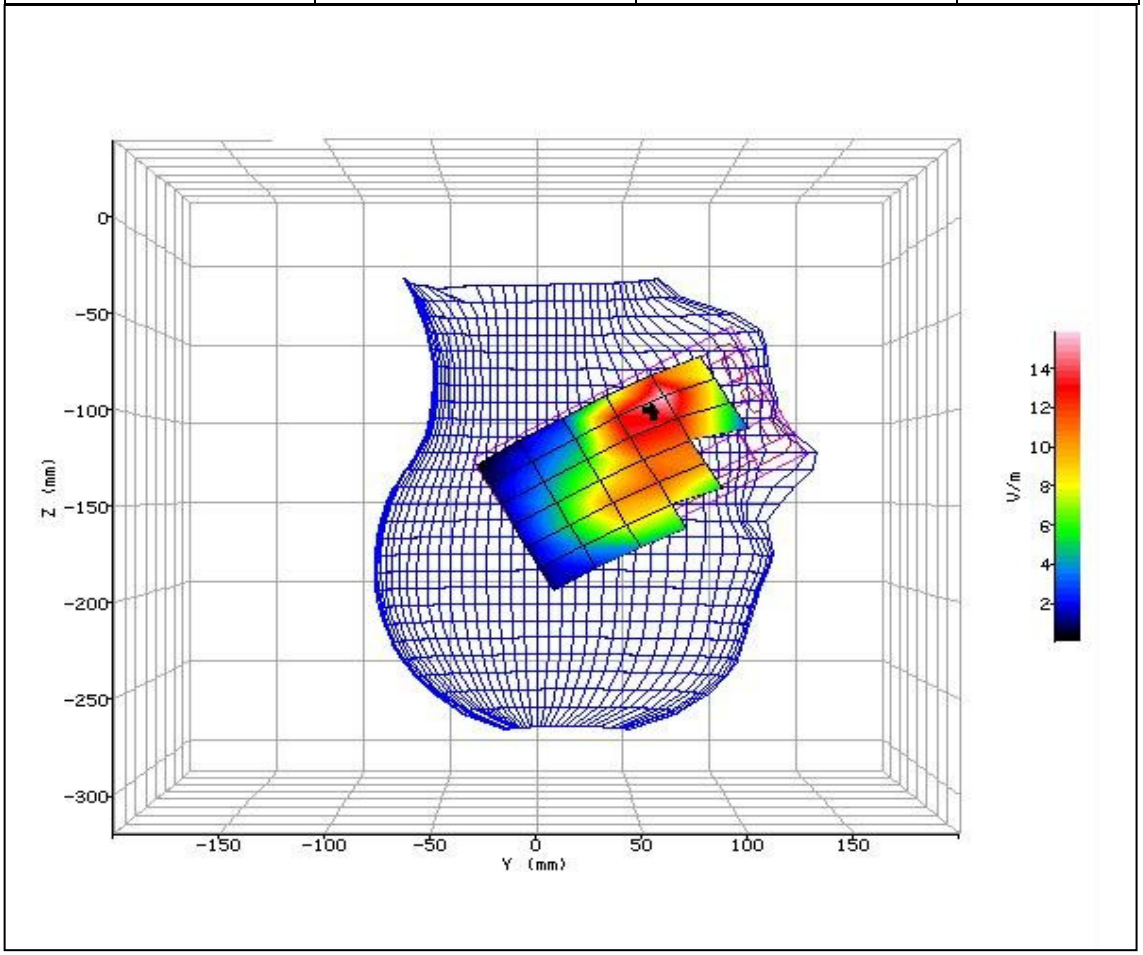

Figure 48: SAR Head Testing Results for the Mobile Handset at 1850.2MHz.

SYSTEM / SOFTWARE:	SARA-C / v6.09.22	**INPUT POWER DRIFT:**	0 dB
DATE / TIME:	31/05/2016-14:43:43	**DUT BATTERY MODEL/NO:**	Integral
AMBIENT TEMPERATURE:	22.80°C	**LIQUID SIMULANT:**	1900Head
DEVICE UNDER TEST:	-	**RELATIVE PERMITTIVITY:**	38.80
RELATIVE HUMIDITY:	44.70%	**CONDUCTIVITY:**	1.411
PHANTOM S/NO:	IXB-040	**LIQUID TEMPERATURE:**	22.50°C
PHANTOM ROTATION:	N/A	**MAX SAR Y-AXIS LOCATION:**	39.30mm
DUT POSITION:	Right-15°	**MAX SAR Z-AXIS LOCATION:**	-153.20mm
ANTENNA CONFIGURATION:	N/A	**MAX E FIELD:**	8.014
TEST FREQUENCY:	1850.2MHz	**SAR 1g:**	0.13 W/kg
TYPE OF MODULATION:	GMSK (Voice Mode)	**SAR 10g:**	N/A
MODN. DUTY CYCLE:	12.5%	**SAR START:**	0.140 W/kg
INPUT POWER LEVEL:	29.8dBm	**SAR END:**	0.131 W/kg
PROBE BATTERY LAST CHANGED:	31/05/2016	**SAR DRIFT DURING SCAN:**	-6.100 %

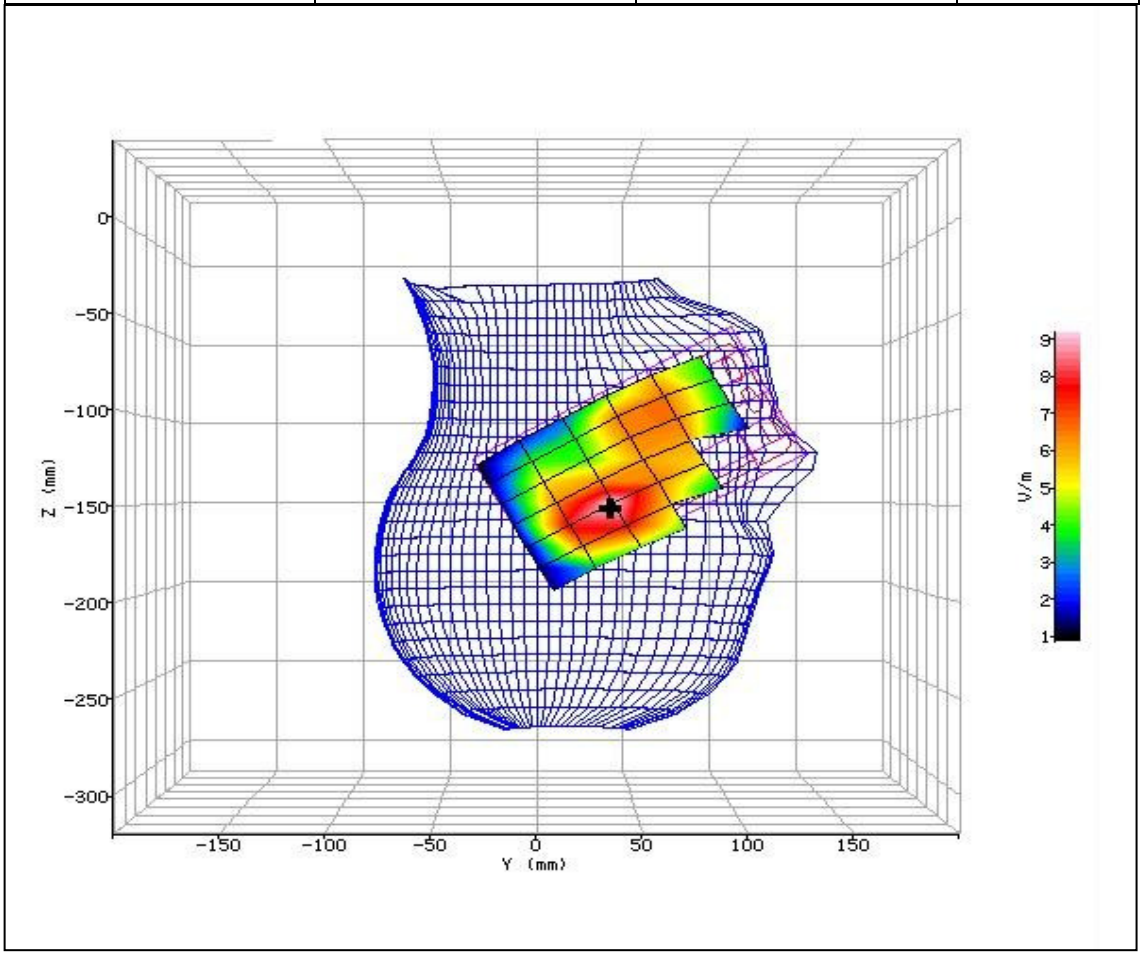

Figure 49: SAR Head Testing Results for the Mobile Handset at 1850.2MHz.

2.12 GSM 1900MHz HEAD SAR TEST RESULTS AND COURSE AREA SCANS – 2D

SYSTEM / SOFTWARE:	SARA-C / v6.09.22	**INPUT POWER DRIFT:**	0 dB
DATE / TIME:	31/05/2016-17:13:05	**DUT BATTERY MODEL/NO:**	Integral
AMBIENT TEMPERATURE:	22.80°C	**LIQUID SIMULANT:**	1900Head
DEVICE UNDER TEST:	-	**RELATIVE PERMITTIVITY:**	38.80
RELATIVE HUMIDITY:	44.70%	**CONDUCTIVITY:**	1.411
PHANTOM S/NO:	IXB-040	**LIQUID TEMPERATURE:**	22.50°C
PHANTOM ROTATION:	N/A	**MAX SAR Y-AXIS LOCATION:**	59.00mm
DUT POSITION:	Left-Cheek	**MAX SAR Z-AXIS LOCATION:**	-100.90mm
ANTENNA CONFIGURATION:	N/A	**MAX E FIELD:**	12.970
TEST FREQUENCY:	1850.2MHz	**SAR 1g:**	0.34 W/kg
TYPE OF MODULATION:	GMSK (GPRS Mode)	**SAR 10g:**	N/A
MODN. DUTY CYCLE:	50%	**SAR START:**	0.338 W/kg
INPUT POWER LEVEL:	25.5dBm	**SAR END:**	0.342 W/kg
PROBE BATTERY LAST CHANGED:	31/05/2016	**SAR DRIFT DURING SCAN:**	1.200 %

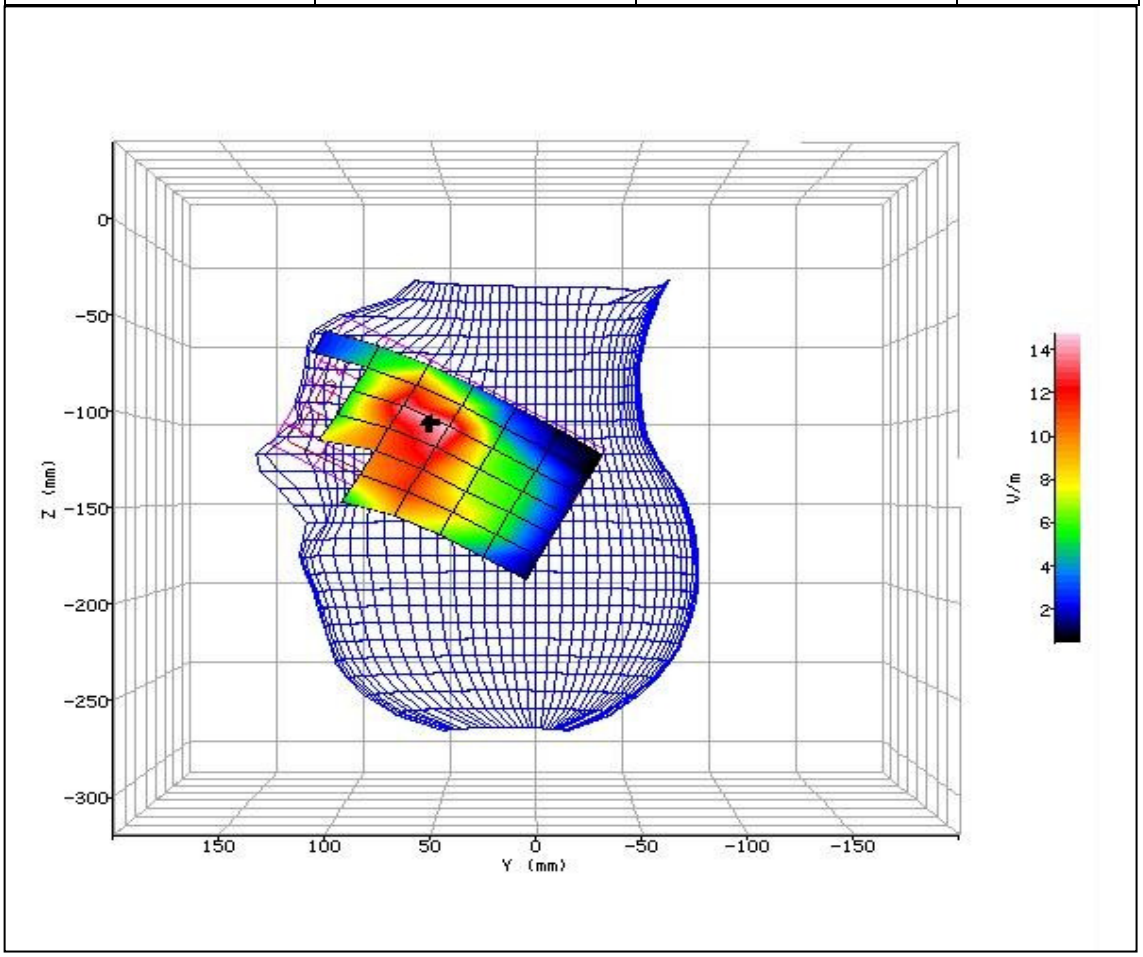

Figure 50: SAR Head Testing Results for the Mobile Handset at 1850.2MHz.

SYSTEM / SOFTWARE:	SARA-C / v6.09.22	**INPUT POWER DRIFT:**	0 dB
DATE / TIME:	31/05/2016-17:37:46	**DUT BATTERY MODEL/NO:**	Integral
AMBIENT TEMPERATURE:	22.80°C	**LIQUID SIMULANT:**	1900Head
DEVICE UNDER TEST:	-	**RELATIVE PERMITTIVITY:**	38.80
RELATIVE HUMIDITY:	44.70%	**CONDUCTIVITY:**	1.411
PHANTOM S/NO:	IXB-040	**LIQUID TEMPERATURE:**	22.50°C
PHANTOM ROTATION:	N/A	**MAX SAR Y-AXIS LOCATION:**	20.10mm
DUT POSITION:	Left-15°	**MAX SAR Z-AXIS LOCATION:**	-125.40mm
ANTENNA CONFIGURATION:	N/A	**MAX E FIELD:**	6.752
TEST FREQUENCY:	1850.2MHz	**SAR 1g:**	0.09 W/kg
TYPE OF MODULATION:	GMSK (GPRS Mode)	**SAR 10g:**	N/A
MODN. DUTY CYCLE:	50%	**SAR START:**	0.082 W/kg
INPUT POWER LEVEL:	25.5dBm	**SAR END:**	0.080 W/kg
PROBE BATTERY LAST CHANGED:	31/05/2016	**SAR DRIFT DURING SCAN:**	-1.900 %

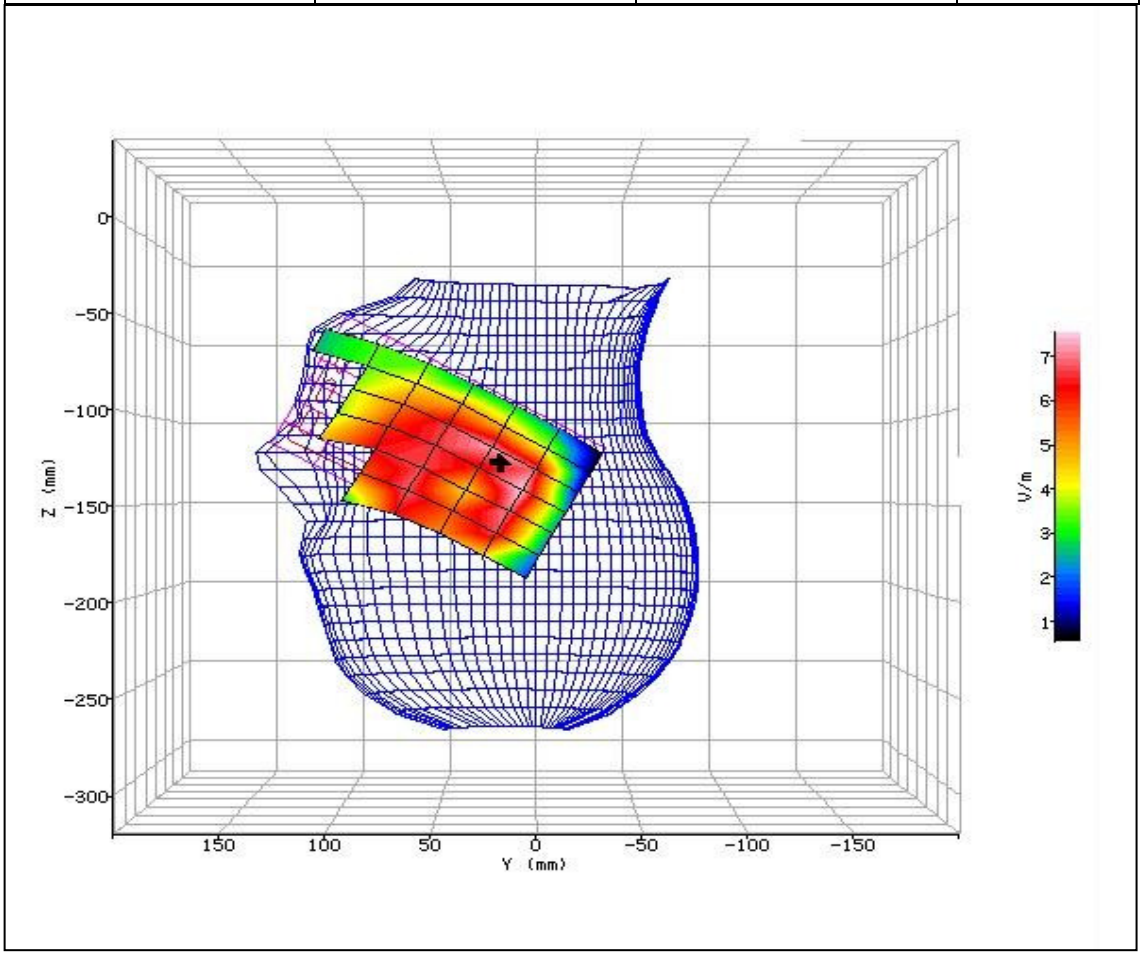

Figure 51: SAR Head Testing Results for the Mobile Handset at 1850.2MHz.

SYSTEM / SOFTWARE:	SARA-C / v6.09.22	**INPUT POWER DRIFT:**	0 dB
DATE / TIME:	31/05/2016-15:56:06	**DUT BATTERY MODEL/NO:**	Integral
AMBIENT TEMPERATURE:	22.80°C	**LIQUID SIMULANT:**	1900Head
DEVICE UNDER TEST:	-	**RELATIVE PERMITTIVITY:**	38.80
RELATIVE HUMIDITY:	44.70%	**CONDUCTIVITY:**	1.411
PHANTOM S/NO:	IXB-040	**LIQUID TEMPERATURE:**	22.50°C
PHANTOM ROTATION:	N/A	**MAX SAR Y-AXIS LOCATION:**	63.20mm
DUT POSITION:	Right-Cheek	**MAX SAR Z-AXIS LOCATION:**	-96.00mm
ANTENNA CONFIGURATION:	N/A	**MAX E FIELD:**	15.686
TEST FREQUENCY:	1850.2MHz	**SAR 1g:**	0.45 W/kg
TYPE OF MODULATION:	GMSK (GPRS Mode)	**SAR 10g:**	N/A
MODN. DUTY CYCLE:	50%	**SAR START:**	0.481 W/kg
INPUT POWER LEVEL:	25.5dBm	**SAR END:**	0.456 W/kg
PROBE BATTERY LAST CHANGED:	31/05/2016	**SAR DRIFT DURING SCAN:**	-5.300 %

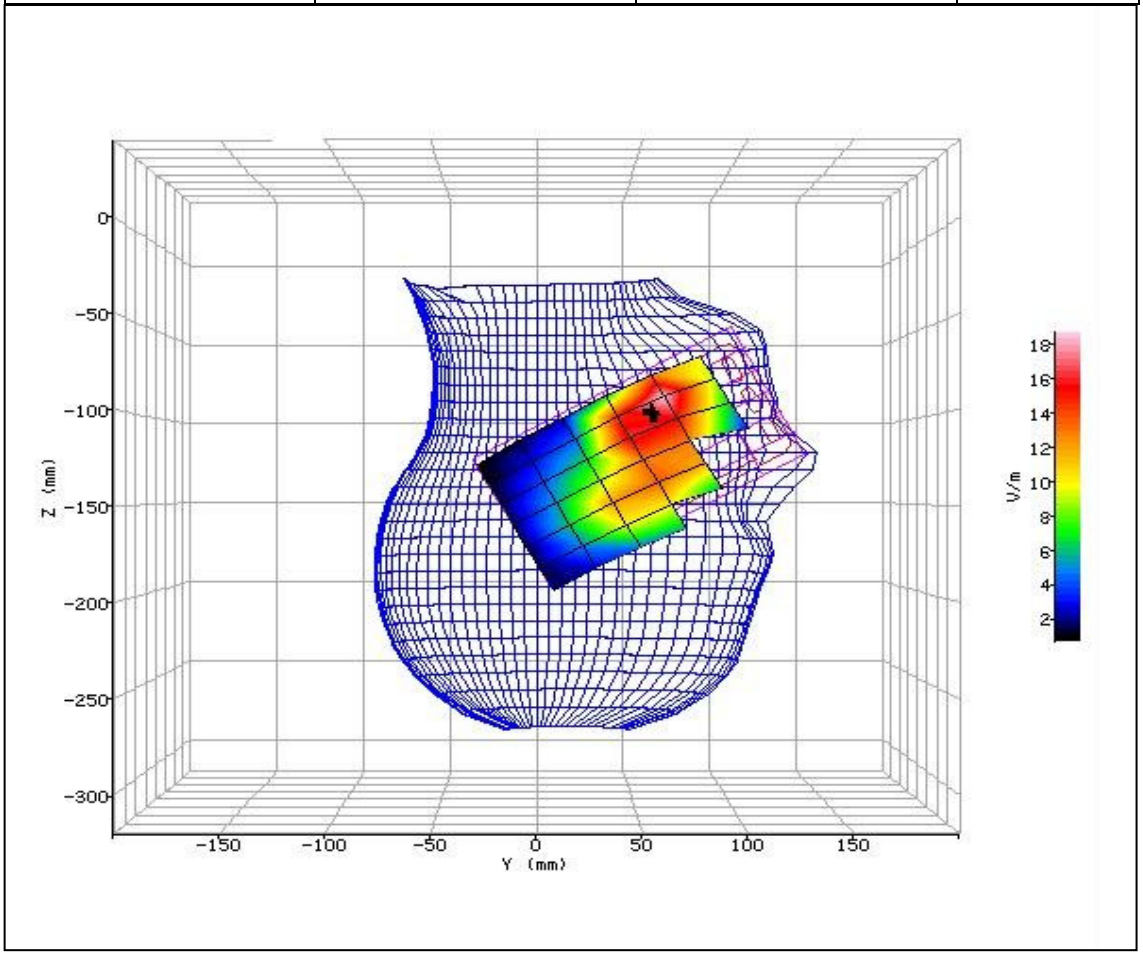

Figure 52: SAR Head Testing Results for the Mobile Handset at 1850.2MHz.

SYSTEM / SOFTWARE:	SARA-C / v6.09.22	**INPUT POWER DRIFT:**	0 dB
DATE / TIME:	31/05/2016-16:20:38	**DUT BATTERY MODEL/NO:**	Integral
AMBIENT TEMPERATURE:	22.80°C	**LIQUID SIMULANT:**	1900Head
DEVICE UNDER TEST:	-	**RELATIVE PERMITTIVITY:**	38.80
RELATIVE HUMIDITY:	44.70%	**CONDUCTIVITY:**	1.411
PHANTOM S/NO:	IXB-040	**LIQUID TEMPERATURE:**	22.50°C
PHANTOM ROTATION:	N/A	**MAX SAR Y-AXIS LOCATION:**	38.10mm
DUT POSITION:	Right-15°	**MAX SAR Z-AXIS LOCATION:**	-153.90mm
ANTENNA CONFIGURATION:	N/A	**MAX E FIELD:**	8.478
TEST FREQUENCY:	1850.2MHz	**SAR 1g:**	0.15 W/kg
TYPE OF MODULATION:	GMSK (GPRS Mode)	**SAR 10g:**	N/A
MODN. DUTY CYCLE:	50%	**SAR START:**	0.150 W/kg
INPUT POWER LEVEL:	25.5dBm	**SAR END:**	0.145 W/kg
PROBE BATTERY LAST CHANGED:	31/05/2016	**SAR DRIFT DURING SCAN:**	-3.800 %

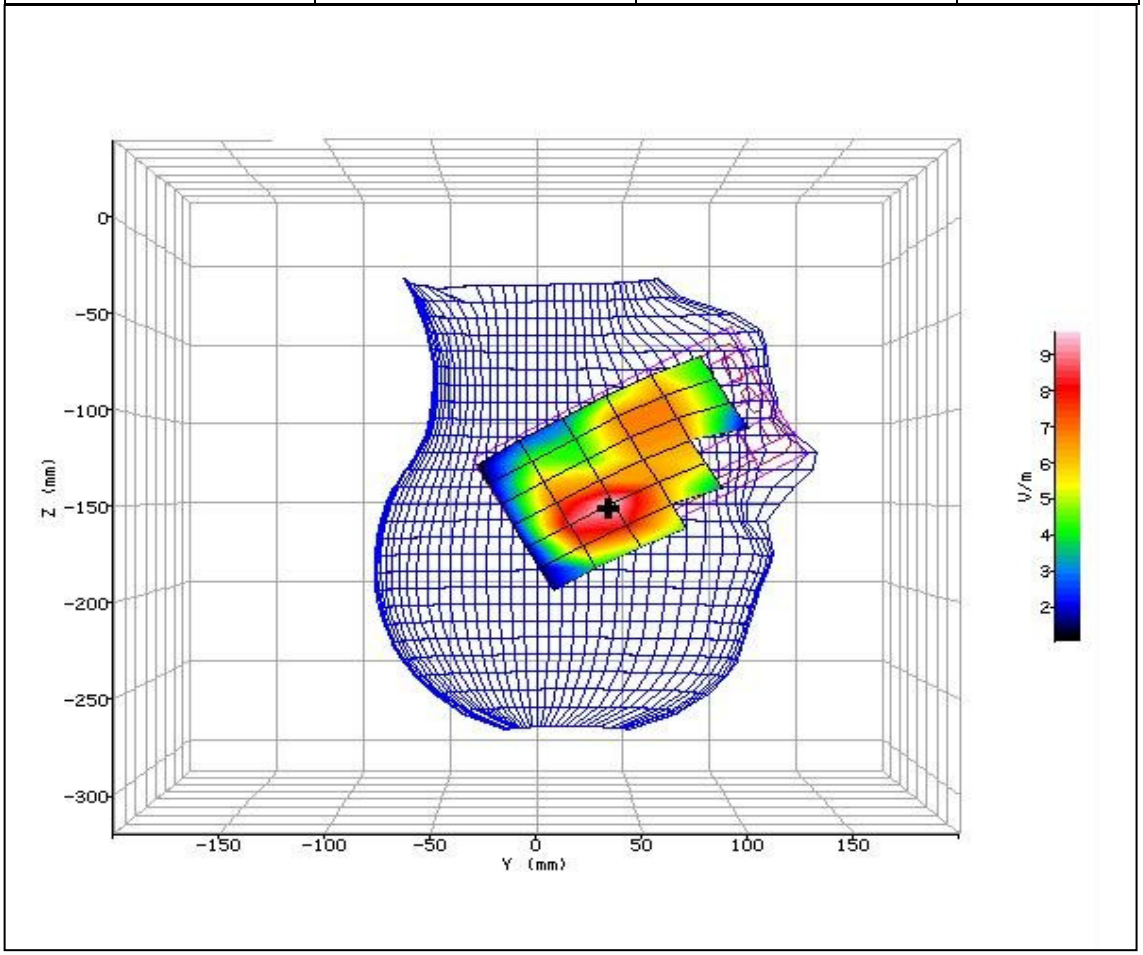

Figure 53: SAR Head Testing Results for the Mobile Handset at 1850.2MHz.

2.13 GSM 1900MHz BODY SAR TEST RESULTS AND COURSE AREA SCANS – 2D

SYSTEM / SOFTWARE:	SARA-C / v6.09.22	**INPUT POWER DRIFT:**	0 dB
DATE / TIME:	07/06/2016-15:18:51	**DUT BATTERY MODEL/NO:**	Integral
AMBIENT TEMPERATURE:	23.40°C	**LIQUID SIMULANT:**	1900Body
DEVICE UNDER TEST:	-	**RELATIVE PERMITTIVITY:**	53.92
RELATIVE HUMIDITY:	42.30%	**CONDUCTIVITY:**	1.556
PHANTOM S/NO:	IXB-2HF	**LIQUID TEMPERATURE:**	22.90°C
PHANTOM ROTATION:	N/A	**MAX SAR X-AXIS LOCATION:**	46.00mm
DUT POSITION:	10mm-Front Facing	**MAX SAR Y-AXIS LOCATION:**	-5.50mm
ANTENNA CONFIGURATION:	N/A	**MAX E FIELD:**	16.111
TEST FREQUENCY:	1850.2MHz	**SAR 1g:**	0.41 W/kg
TYPE OF MODULATION:	GMSK (GPRS Mode)	**SAR 10g:**	N/A
MODN. DUTY CYCLE:	50%	**SAR START:**	0.425 W/kg
INPUT POWER LEVEL:	25.5dBm	**SAR END:**	0.402 W/kg
PROBE BATTERY LAST CHANGED:	07/06/2016	**SAR DRIFT DURING SCAN:**	-5.500 %

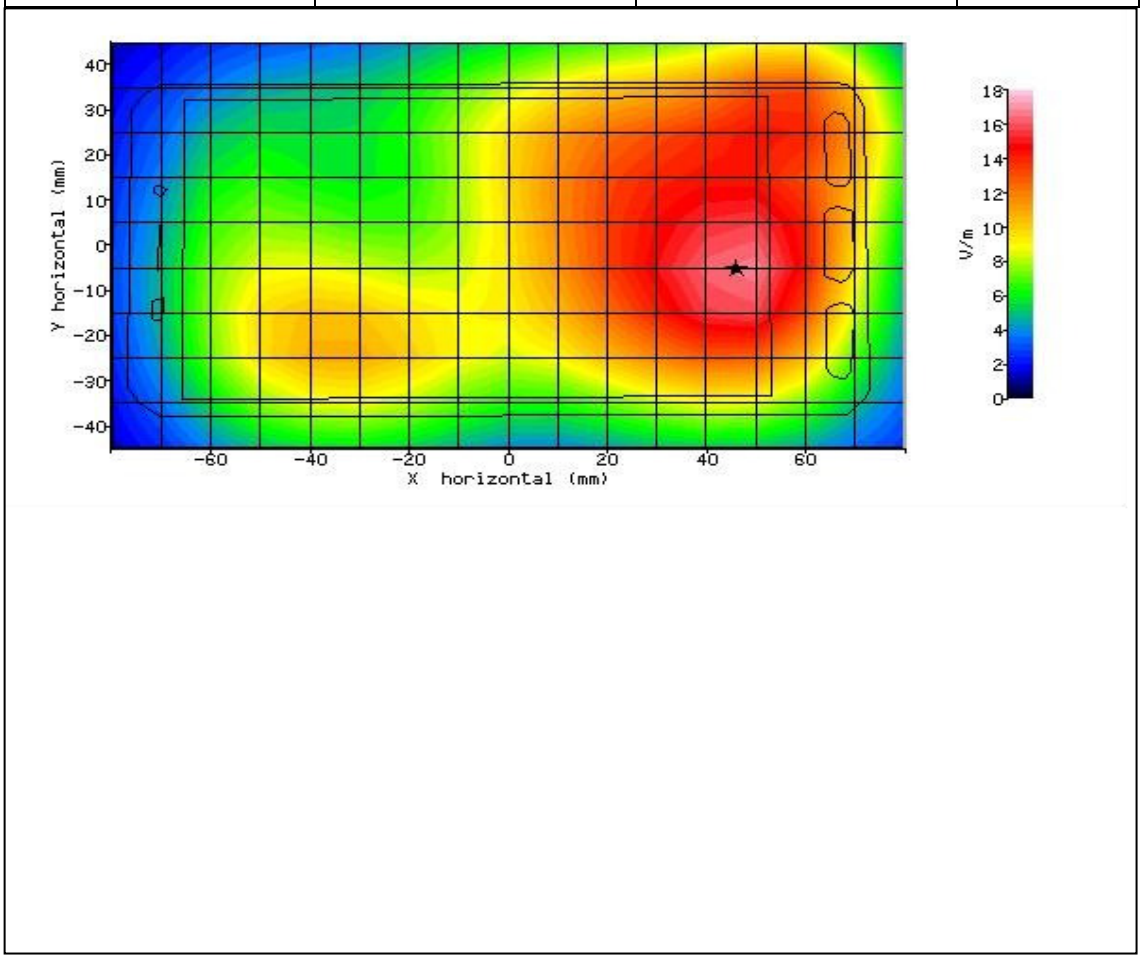

Figure 54: SAR Body Testing Results for the Mobile Handset at 1850.2MHz.

SYSTEM / SOFTWARE:	SARA-C / v6.09.22	**INPUT POWER DRIFT:**	0 dB
DATE / TIME:	07/06/2016-15:52:25	**DUT BATTERY MODEL/NO:**	Integral
AMBIENT TEMPERATURE:	23.40°C	**LIQUID SIMULANT:**	1900Body
DEVICE UNDER TEST:	-	**RELATIVE PERMITTIVITY:**	53.92
RELATIVE HUMIDITY:	42.30%	**CONDUCTIVITY:**	1.556
PHANTOM S/NO:	IXB-2HF	**LIQUID TEMPERATURE:**	22.90°C
PHANTOM ROTATION:	N/A	**MAX SAR X-AXIS LOCATION:**	39.10mm
DUT POSITION:	10mm-Rear Facing	**MAX SAR Y-AXIS LOCATION:**	5.10mm
ANTENNA CONFIGURATION:	N/A	**MAX E FIELD:**	14.017
TEST FREQUENCY:	1850.2MHz	**SAR 1g:**	0.30 W/kg
TYPE OF MODULATION:	GMSK (GPRS Mode)	**SAR 10g:**	N/A
MODN. DUTY CYCLE:	50%	**SAR START:**	0.313 W/kg
INPUT POWER LEVEL:	25.5dBm	**SAR END:**	0.301 W/kg
PROBE BATTERY LAST CHANGED:	07/06/2016	**SAR DRIFT DURING SCAN:**	-3.800 %

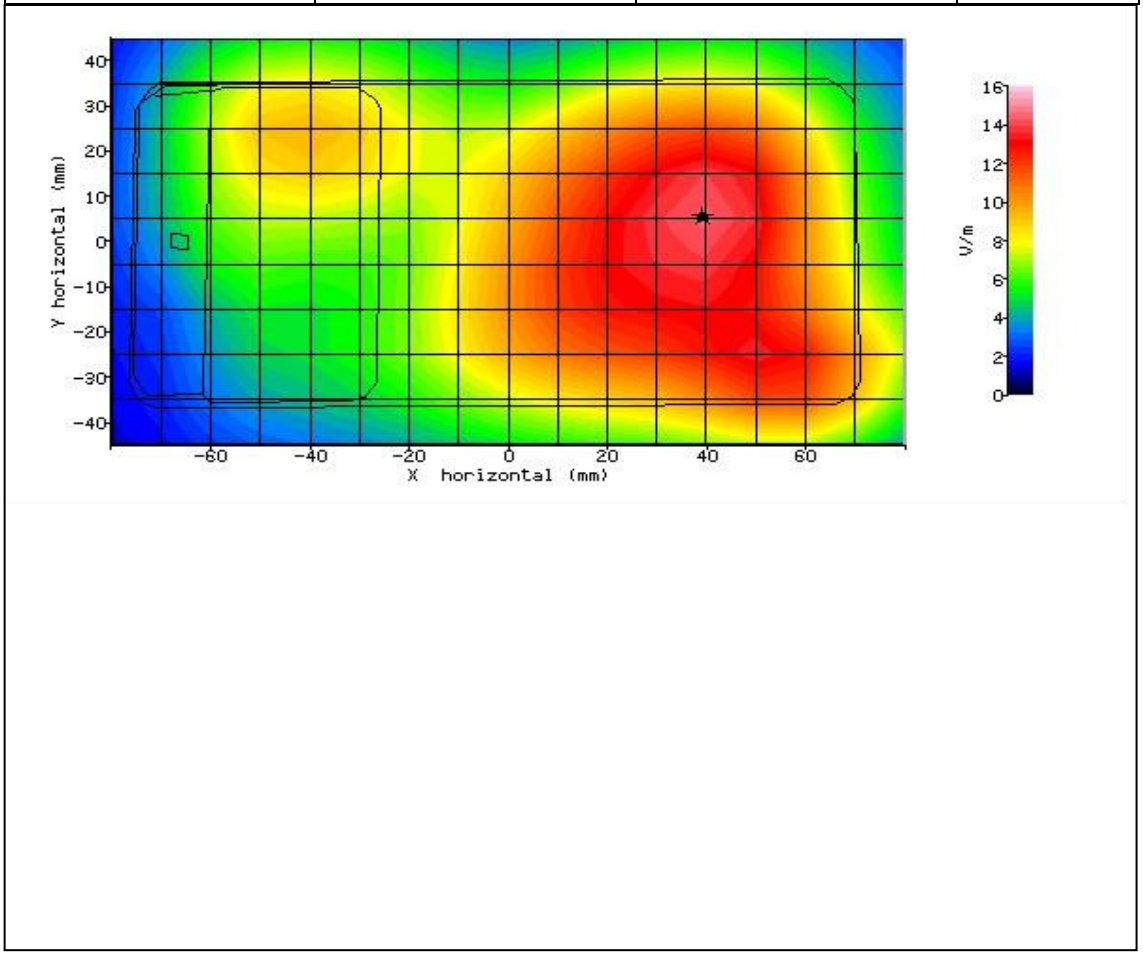

Figure 55: SAR Body Testing Results for the Mobile Handset at 1850.2MHz.

SYSTEM / SOFTWARE:	SARA-C / v6.09.22	**INPUT POWER DRIFT:**	0 dB
DATE / TIME:	07/06/2016-16:12:52	**DUT BATTERY MODEL/NO:**	Integral
AMBIENT TEMPERATURE:	23.40°C	**LIQUID SIMULANT:**	1900Body
DEVICE UNDER TEST:	-	**RELATIVE PERMITTIVITY:**	53.92
RELATIVE HUMIDITY:	42.30%	**CONDUCTIVITY:**	1.556
PHANTOM S/NO:	IXB-2HF	**LIQUID TEMPERATURE:**	22.90°C
PHANTOM ROTATION:	N/A	**MAX SAR X-AXIS LOCATION:**	43.40mm
DUT POSITION:	10mm-Left Edge	**MAX SAR Y-AXIS LOCATION:**	-1.50mm
ANTENNA CONFIGURATION:	N/A	**MAX E FIELD:**	12.901
TEST FREQUENCY:	1850.2MHz	**SAR 1g:**	0.29 W/kg
TYPE OF MODULATION:	GMSK (GPRS Mode)	**SAR 10g:**	N/A
MODN. DUTY CYCLE:	50%	**SAR START:**	0.296 W/kg
INPUT POWER LEVEL:	25.5dBm	**SAR END:**	0.298 W/kg
PROBE BATTERY LAST CHANGED:	07/06/2016	**SAR DRIFT DURING SCAN:**	0.700 %

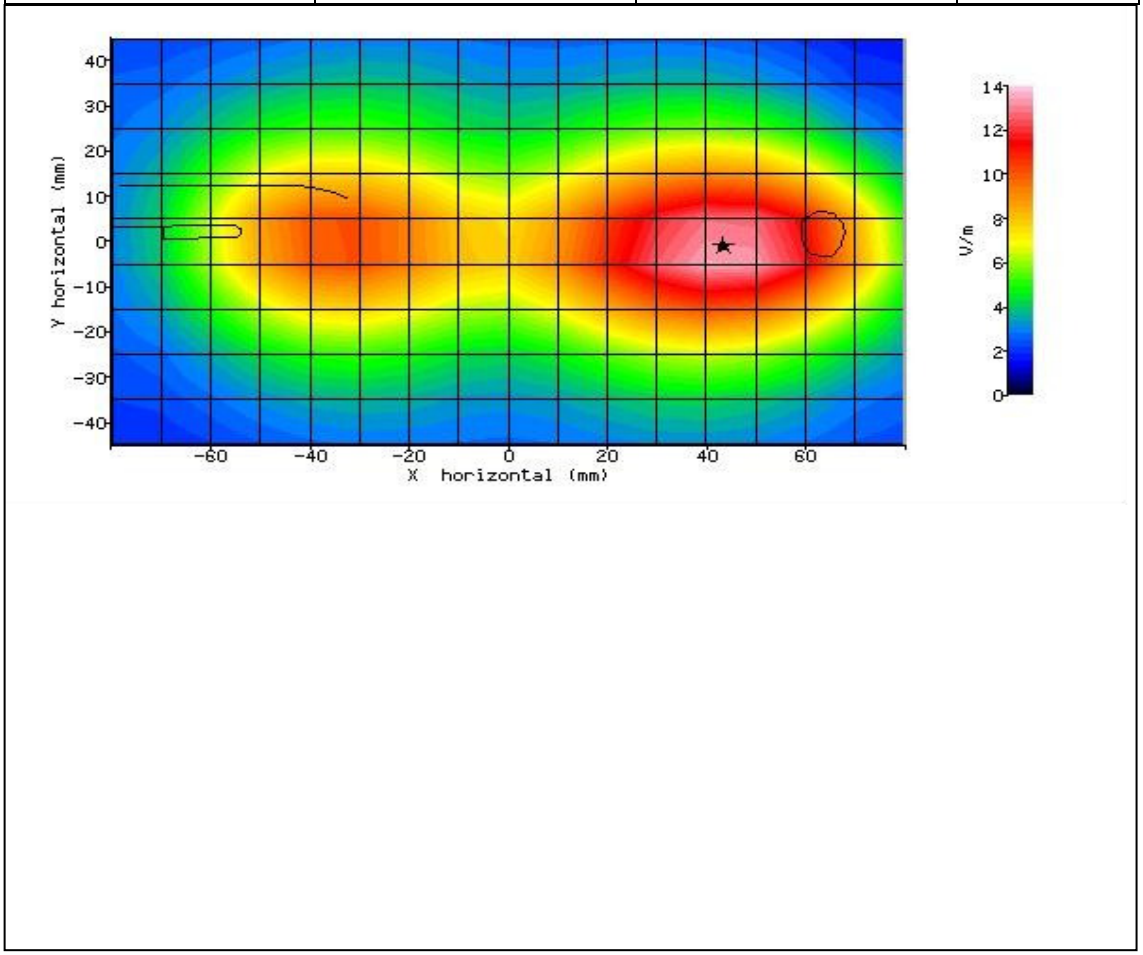

Figure 56: SAR Body Testing Results for the Mobile Handset at 1850.2MHz.

SYSTEM / SOFTWARE:	SARA-C / v6.09.22	**INPUT POWER DRIFT:**	0 dB
DATE / TIME:	07/06/2016-16:31:57	**DUT BATTERY MODEL/NO:**	Integral
AMBIENT TEMPERATURE:	23.40°C	**LIQUID SIMULANT:**	1900Body
DEVICE UNDER TEST:	-	**RELATIVE PERMITTIVITY:**	53.92
RELATIVE HUMIDITY:	42.30%	**CONDUCTIVITY:**	1.556
PHANTOM S/NO:	IXB-2HF	**LIQUID TEMPERATURE:**	22.90°C
PHANTOM ROTATION:	N/A	**MAX SAR X-AXIS LOCATION:**	0.10mm
DUT POSITION:	10mm-Bottom Edge	**MAX SAR Y-AXIS LOCATION:**	3.60mm
ANTENNA CONFIGURATION:	N/A	**MAX E FIELD:**	9.637
TEST FREQUENCY:	1850.2MHz	**SAR 1g:**	0.16 W/kg
TYPE OF MODULATION:	GMSK (GPRS Mode)	**SAR 10g:**	N/A
MODN. DUTY CYCLE:	50%	**SAR START:**	0.161 W/kg
INPUT POWER LEVEL:	25.5dBm	**SAR END:**	0.161 W/kg
PROBE BATTERY LAST CHANGED:	07/06/2016	**SAR DRIFT DURING SCAN:**	-0.500 %

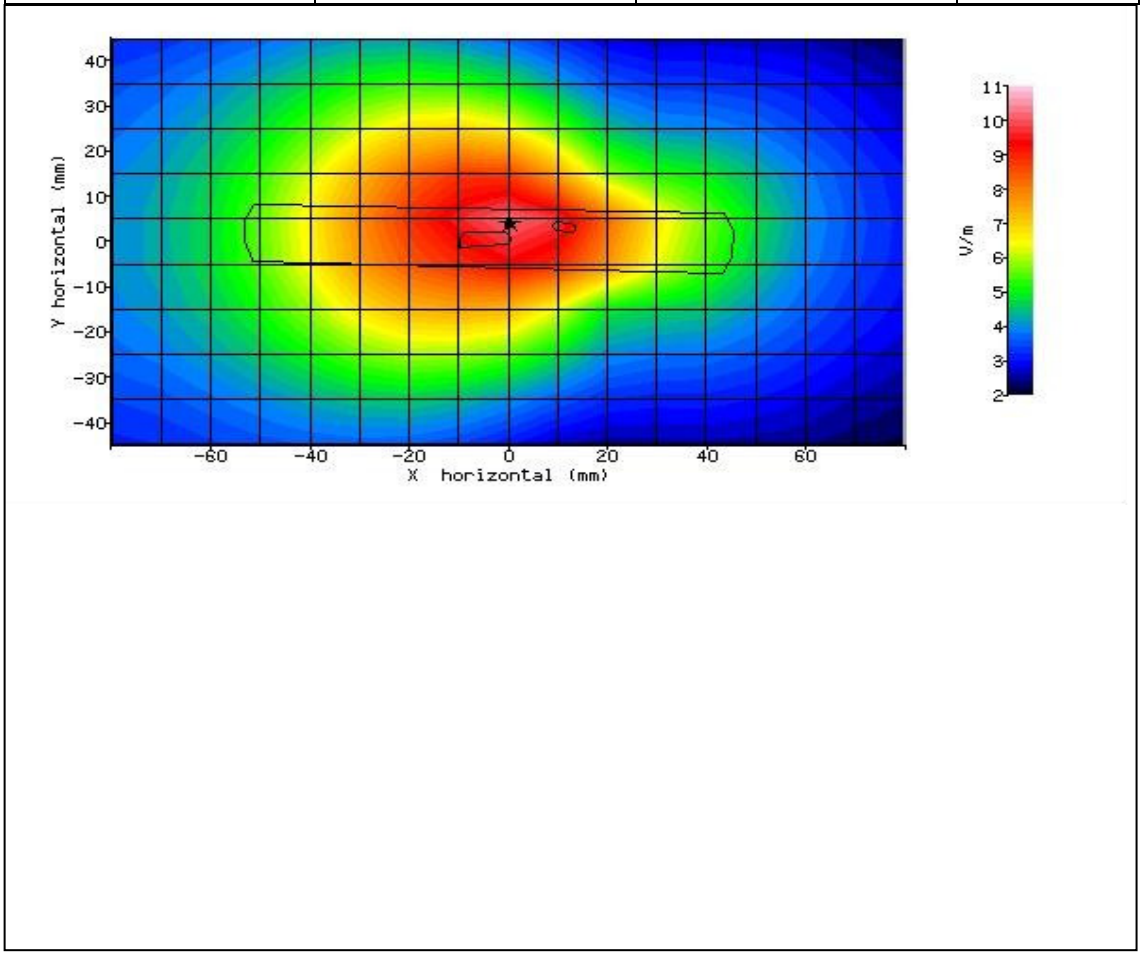

Figure 57: SAR Body Testing Results for the Mobile Handset at 1850.2MHz.

2.14 WLAN 2450MHz HEAD SAR TEST RESULTS AND COURSE AREA SCANS – 2D

SYSTEM / SOFTWARE:	SARA-C / v6.09.22	**INPUT POWER DRIFT:**	0 dB
DATE / TIME:	03/06/2016-11:53:01	**DUT BATTERY MODEL/NO:**	Integral
AMBIENT TEMPERATURE:	23.30°C	**LIQUID SIMULANT:**	2450Head
DEVICE UNDER TEST:	-	**RELATIVE PERMITTIVITY:**	38.92
RELATIVE HUMIDITY:	33.80%	**CONDUCTIVITY:**	1.843
PHANTOM S/NO:	IXB-040	**LIQUID TEMPERATURE:**	22.80°C
PHANTOM ROTATION:	N/A	**MAX SAR Y-AXIS LOCATION:**	34.40mm
DUT POSITION:	Right-Cheek	**MAX SAR Z-AXIS LOCATION:**	-169.30mm
ANTENNA CONFIGURATION:	N/A	**MAX E FIELD:**	7.161
TEST FREQUENCY:	2412.0MHz	**SAR 1g:**	0.24 W/kg
TYPE OF MODULATION:	WLAN (DSSS)	**SAR 10g:**	N/A
MODN. DUTY CYCLE:	100%	**SAR START:**	0.216 W/kg
INPUT POWER LEVEL:	14.5dBm	**SAR END:**	0.210 W/kg
PROBE BATTERY LAST CHANGED:	03/06/2016	**SAR DRIFT DURING SCAN:**	-3.100 %

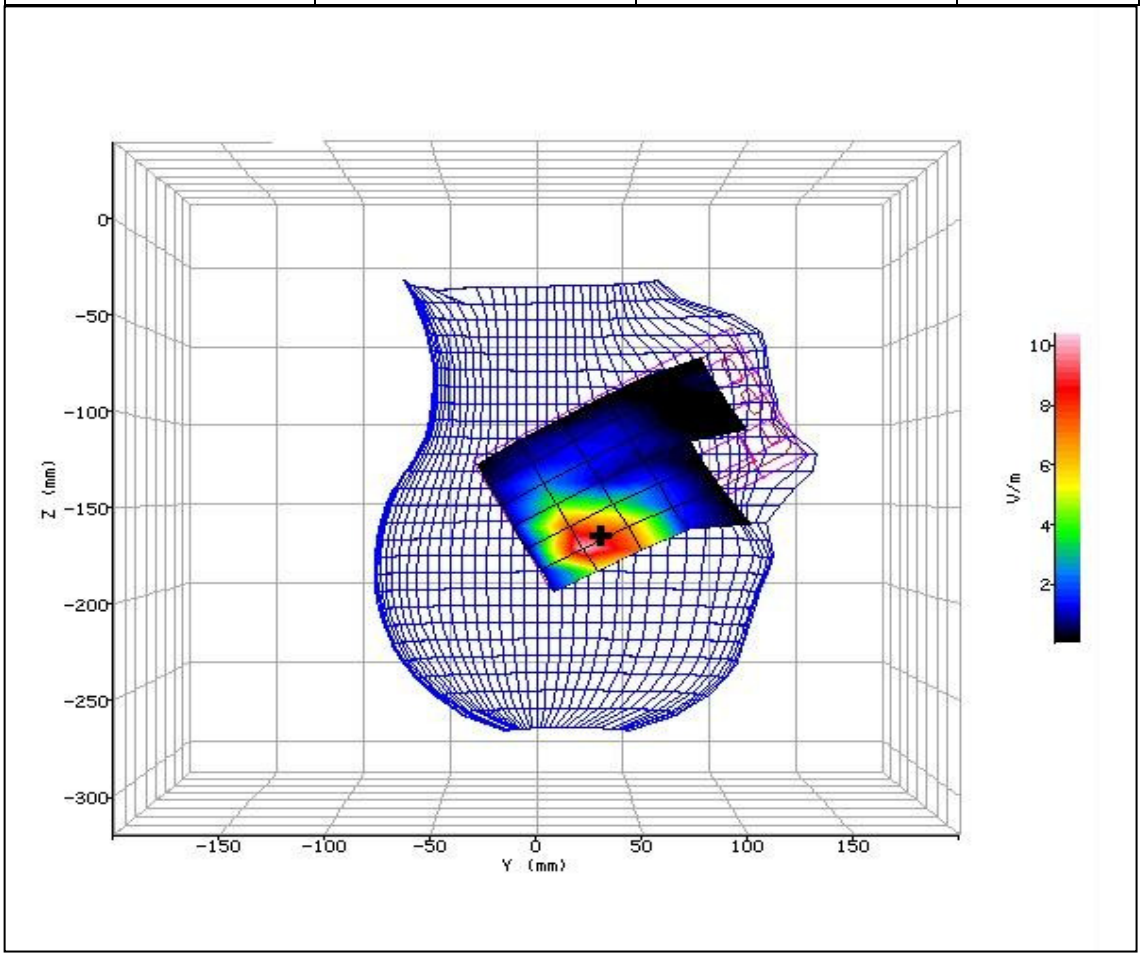

Figure 58: SAR Head Testing Results for the Mobile Handset at 2412.0MHz.

2.15 WLAN 2450MHz BODY SAR TEST RESULTS AND COURSE AREA SCANS – 2D

SYSTEM / SOFTWARE:	SARA-C / v6.09.22	**INPUT POWER DRIFT:**	0 dB
DATE / TIME:	08/06/2016-09:52:27	**DUT BATTERY MODEL/NO:**	Integral
AMBIENT TEMPERATURE:	22.90°C	**LIQUID SIMULANT:**	2450Body
DEVICE UNDER TEST:	-	**RELATIVE PERMITTIVITY:**	51.79
RELATIVE HUMIDITY:	42.30%	**CONDUCTIVITY:**	1.980
PHANTOM S/NO:	IXB-2HF	**LIQUID TEMPERATURE:**	23.10°C
PHANTOM ROTATION:	N/A	**MAX SAR X-AXIS LOCATION:**	-46.30mm
DUT POSITION:	10mm-Rear Facing	**MAX SAR Y-AXIS LOCATION:**	35.30mm
ANTENNA CONFIGURATION:	N/A	**MAX E FIELD:**	9.951
TEST FREQUENCY:	2412.0MHz	**SAR 1g:**	0.27 W/kg
TYPE OF MODULATION:	WLAN (DSSS)	**SAR 10g:**	N/A
MODN. DUTY CYCLE:	100%	**SAR START:**	0.282 W/kg
INPUT POWER LEVEL:	14.5dBm	**SAR END:**	0.273 W/kg
PROBE BATTERY LAST CHANGED:	08/06/2016	**SAR DRIFT DURING SCAN:**	-2.900 %

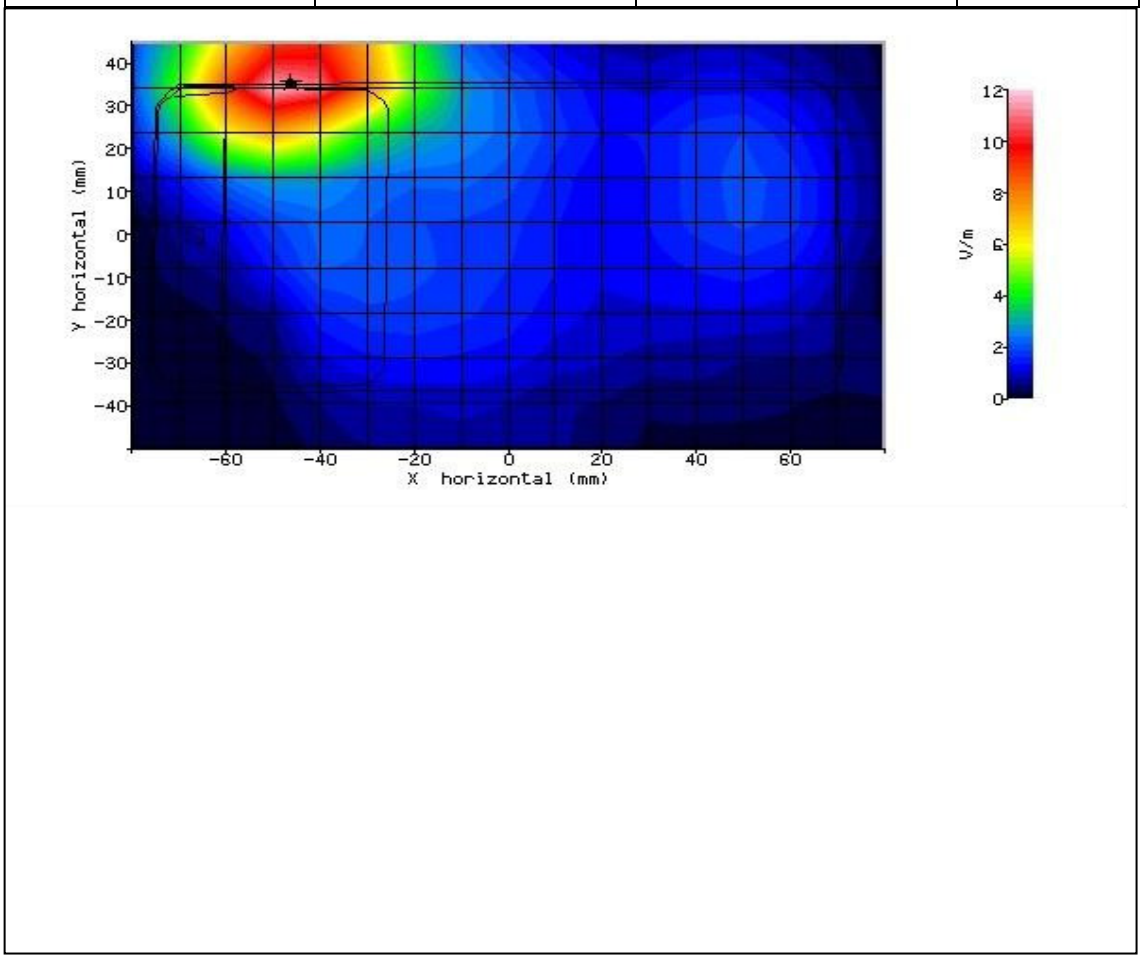

Figure 59: SAR Body Testing Results for the Mobile Handset at 2412.0MHz.

Product Service

SECTION 3

TEST EQUIPMENT USED

Product Service

3.1 TEST EQUIPMENT USED

The following Test equipment used at TÜV SÜD Product Service:

Instrument Description	Manufacturer	Model Type	TE Number	Cal Period (months)	Calibration Due Date
Signal Generator	Hewlett Packard	ESG4000A	61	12	08-Jul-2016
10MHz - 2.5GHz, 3W, Amplifier	Vectawave Technology	VTL5400	51	-	TU
Directional Coupler	Krytar	1850	58	-	TU
Communications Tester	Rohde & Schwarz	CMU 200	442	-	TU
Attenuator (20dB, 20W)	Weinschel	37-20-34	482	12	23-Oct-2016
Dipole Positioner/Support (plastic)	IndexSar Ltd	IXH-020	1585	-	TU
Bi-directional Coupler	IndexSar Ltd	7401 (VDC0830-20)	2414	-	TU
Antenna (Omnidirectional)	Katherin Scala Division	OG-890/1990/DC	2906	-	TU
Power Meter	Rohde & Schwarz	NRVD	2878	12	12-Jun-2016
Radio Communications Test Set	Rohde & Schwarz	CMU 200	3035	12	16-Nov-2016
Hygrometer	Rotronic	I-1000	3068	12	26-Apr-2017
Power Sensor	Rohde & Schwarz	NRV-Z1	60	12	12-Jun-2016
Meter & T/C	R.S Components	Meter 615-8206 & Type K T/C	3612	12	06-Oct-2016
SAR 1800 MHz dipole	Speag	D1800V2	3855	36	19-Feb-2017
SAR 700 MHz dipole	IndexSAR	700	4413	36	18-Mar-2017
SAR 835 MHz dipole	Speag	D835V2	3857	36	19-Feb-2017
SAR 2450 MHz dipole	Speag	D2450V2	3875	36	19-Feb-2017
SAR 1900 MHz dipole	Speag	D1900V2	3876	36	19-Feb-2017
Head Phantom	IndexSar Ltd	IXB-040 Inverted SAM phantom	4075	-	TU
Part of SARAC System	IndexSar Ltd	Robot Controller	4076	-	TU
Head Phantom	IndexSar Ltd	IXB-040 Inverted SAM phantom	4254	-	TU
hold handsets against SAM Phantom during testing	IndexSar Ltd	Handset Holder	4257	-	TU
Spacer used to raise body phantom	IndexSar Ltd	Body Phantom Spacer	4258	-	TU
hold handsets against SAM Phantom	IndexSar Ltd	Handset Holder	4265	-	TU
Part of SARAC System	IndexSar Ltd	Wooden Bench	4266	-	TU
Part of SARAC System	IndexSar Ltd	Robot Controller	4267	-	TU
Cartesian 4-axis Robot	IndexSar Ltd	SARAC	4269	-	TU
Part of SARAC System	IndexSar Ltd	White Benchtop	4270	-	TU
Immersible SAR Probe	IndexSar Ltd	IPX-050	4313	24	13-Mar-2017
Immersible SAR Probe	IndexSar Ltd	IPX-050	4312	24	13-Mar-2017
Flat Phantom	IndexSar Ltd	IXB-2HF 700-6000MHz	4399	-	TU
Flat Phantom	IndexSar Ltd	IXB-2HF 700-6000MHz	4400	-	TU
SAR Probe	IndexSar Ltd	IPX-020	4317	24	20-Mar-2017
SAR Probe	IndexSar Ltd	IPX-020	4443	24	20-Mar-2017
700MHz Head Fluid	IndexSar Ltd	Batch 1	N/A	1	09-Jun-2016
700MHz Body Fluid	IndexSar Ltd	Batch 1	N/A	1	09-Jun-2016
835MHz Head Fluid	IndexSar Ltd	Batch 21	N/A	1	09-Jun-2016
835MHz Body Fluid	IndexSar Ltd	Batch 13	N/A	1	09-Jun-2016
1900MHz Head Fluid	IndexSar Ltd	Batch 9	N/A	1	09-Jun-2016
1900MHz Body Fluid	IndexSar Ltd	Batch 5	N/A	1	09-Jun-2016
2450MHz Head Fluid	IndexSar Ltd	Batch 12	N/A	1	09-Jun-2016
2450MHz Body Fluid	IndexSar Ltd	Batch 8	N/A	1	09-Jun-2016

TU - Traceability Unscheduled

3.2 TEST SOFTWARE

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

Instrument	Version Number	Date
SARA-C system	v.6.09.22	23 Aug 2015
GLP2 Probe amplifier	Version 2	-

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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.

IEEE 1528 Recipes

Frequency (MHz)	300	450		835	900			1450	1800				1900		1950	2000	2100		2450		3000
Recipe#	1	1	3	1	1	2	3	1	1	2	2	3	1	2	4	1	1	2	2	3	2
Ingredients (% by weight)																					
1, 2-Pro-panediol						64.81															
Bactericide	0.19	0.19	0.50	0.10	0.10		0.50													0.50	
Diacetin			48.90				49.20													49.45	
DGBE								45.41	47.00	13.84	44.92		44.94	13.84	45.00	50.00	50.00	7.99	7.99		7.99
HEC	0.98	0.96		1.00	1.00																
NaCl	5.95	3.95	1.70	1.45	1.48	0.79	1.10	0.67	0.36	0.35	0.18	0.64	0.18	0.35				0.16	0.16		0.16
Sucrose	55.32	56.32		57.00	56.50																
Triton X-100										30.45				30.45				19.97	19.97		19.97
Water	37.56	38.56	48.90	40.45	40.92	34.40	49.20	53.80	52.64	55.36	54.90	49.43	54.90	55.36	55.00	50.00	50.00	71.88	71.88	49.75	71.88
Measured dielectric parameters																					
ε_r'	46.00	43.40	44.30	41.60	41.20	41.80	42.70	40.9	39.3	41.00	40.40	39.20	39.90	41.00	40.10	37.00	36.80	41.10	40.30	39.20	37.90
σ (S/m)	0.86	0.85	0.90	0.90	0.98	0.97	0.99	1.21	1.39	1.38	1.40	1.40	1.42	1.38	1.41	1.40	1.51	1.55	1.88	1.82	2.46
Temp (ºC)	22	22	20	22	22	22	20	22	22	21	22	20	21	21	20	22	22	20	20	20	20
Target dielectric parameters (Table 2)																					
ε_r'	45.30	43.50		41.5	41.50			40.50	40.00								39.80		39.20		38.50
σ (S/m)	0.87	0.87		0.9	0.97			1.20	1.40								1.49		1.80		2.40

NOTE – Multiple columns for any single frequency are optional recipe #, reference: 1 (Kanda et al. [B185]), 2 (Vigneras [B143]), 3 (Peyman and Gabriel [B119]), 4 (Fukunaga et al [B50])

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 εR (ε') Target	Relative Permittivity εR (ε') Measured	Conductivity σ Target	Conductivity σ Measured
700MHz Head	42.2	42.6	0.89	0.90
700MHz Body	55.7	54.8	0.96	1.00
835MHz Head	41.5	40.2	0.90	0.87
835MHz Body	55.2	52.7	0.97	0.97
1900MHz Head	40.0	38.8	1.40	1.41
1900MHz Body	53.3	53.9	1.52	1.55
2450 MHz Head	39.2	38.9	1.80	1.84
2450MHz Body	52.7	51.8	1.95	1.98

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 22.5°C to 23.2°C.
The actual humidity during the testing ranged from 21.2% to 45.6% RH.

3.4.2 Test Fluid Temperature Range

Frequency	Body / Head Fluid	Min Temperature °C	Max Temperature °C
700MHz	Head	22.3	22.3
700MHz	Body	23.0	23.0
835MHz	Head	23.1	23.1
835MHz	Body	22.6	22.6
1900MHz	Head	22.5	22.5
1900MHz	Body	22.9	22.9
2450MHz	Head	22.8	22.8
2450MHz	Body	23.1	23.1

3.4.3 SAR Drift

The SAR Drift was within acceptable limits during scans. The maximum SAR Drift, drift due to the handset electronics, was recorded as -9.8% (1.109 dB) for head and 6.2% (0.942 dB) for body. The measurement uncertainty budget for this assessment includes the maximum SAR Drift figures for Head and/or Body as applicable.

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3.5 MEASUREMENT UNCERTAINTY

Head SAR Measurements.

Source of Uncertainty	Description	Tolerance / Uncertainty ± %	Probability distribution	Div	c_i (1g)	Standard Uncertainty ± % (1g)	v_i or v_{eff}
Measurement System							
Probe calibration	7.2.1	8.73	N	1	1	8.73	∞
Isotropy	7.2.1.2	3.18	R	1.73	1	1.84	∞
Probe angle >30deg	additional	12.00	R	1.73	1	6.93	∞
Boundary effect	7.2.1.5	0.49	R	1.73	1	0.28	∞
Linearity	7.2.1.3	1.00	R	1.73	1	0.58	∞
Detection limits	7.2.1.4	0.00	R	1.73	1	0.00	∞
Readout electronics	7.2.1.6	0.30	N	1	1	0.30	∞
Response time	7.2.1.7	0.00	R	1.73	1	0.00	∞
Integration time (equiv.)	7.2.1.8	1.38	R	1.73	1	0.80	∞
RF ambient conditions	7.2.3.6	3.00	R	1.73	1	1.73	∞
Probe positioner mech. restrictions	7.2.2.1	5.35	R	1.73	1	3.09	∞
Probe positioning with respect to phantom shell	7.2.2.3	5.00	R	1.73	1	2.89	∞
Post-processing	7.2.4	7.0	R	1.73	1	5.20	∞
Test sample related							
Test sample positioning	7.2.2.4	1.50	R	1.73	1	0.87	∞
Device holder uncertainty	7.2.2.4.2	1.73	R	1.73	1	1.00	∞
Drift of output power	7.2.3.4	9.8	R	1.73	1	5.66	∞
Phantom and set-up							
Phantom uncertainty (shape and thickness tolerances)	7.2.2.2	2.01	R	1.73	1	1.16	∞
Liquid conductivity (target)	7.2.3.3	5.00	R	1.73	0.64	1.85	∞
Liquid conductivity (meas.)	7.2.3.3	5.00	N	1	0.64	3.20	∞
Liquid permittivity (target)	7.2.3.4	5.00	R	1.73	0.6	1.73	∞
Liquid permittivity (meas.)	7.2.3.4	3.00	N	1	0.6	1.80	∞
Combined standard uncertainty			RSS			12.13	
Expanded uncertainty (95% confidence interval)			K=2			24.26	

Body SAR Measurements.

Source of Uncertainty	Description	Tolerance / Uncertainty ± %	Probability distribution	Div	c_i (1g)	Standard Uncertainty ± % (1g)	v_i or v_{eff}
Measurement System							
Probe calibration	7.2.1	8.73	N	1	1	8.73	∞
Isotropy	7.2.1.2	3.18	R	1.73	1	1.84	∞
Boundary effect	7.2.1.5	0.49	R	1.73	1	0.28	∞
Linearity	7.2.1.3	1.00	R	1.73	1	0.58	∞
Detection limits	7.2.1.4	0.00	R	1.73	1	0.00	∞
Readout electronics	7.2.1.6	0.30	N	1	1	0.30	∞
Response time	7.2.1.7	0.00	R	1.73	1	0.00	∞
Integration time (equiv.)	7.2.1.8	1.38	R	1.73	1	0.80	∞
RF ambient conditions	7.2.3.6	3.00	R	1.73	1	1.73	∞
Probe positioner mech. restrictions	7.2.2.1	0.60	R	1.73	1	0.35	∞
Probe positioning with respect to phantom shell	7.2.2.3	2.00	R	1.73	1	1.15	∞
Post-processing	7.2.4	7.00	R	1.73	1	4.04	∞
Test sample related							
Test sample positioning	7.2.2.4	1.50	R	1.73	1	0.87	∞
Device holder uncertainty	7.2.2.4.2	1.73	R	1.73	1	1.00	∞
Drift of output power	7.2.3.4	6.2	R	1.73	1	3.58	∞
Phantom and set-up							
Phantom uncertainty (shape and thickness tolerances)	7.2.2.2	2.01	R	1.73	1	1.16	∞
Liquid conductivity (target)	7.2.3.3	5.00	R	1.73	0.64	1.85	∞
Liquid conductivity (meas.)	7.2.3.3	5.00	N	1	0.64	3.20	∞
Liquid permittivity (target)	7.2.3.4	5.00	R	1.73	0.6	1.73	∞
Liquid permittivity (meas.)	7.2.3.4	3.00	N	1	0.6	1.80	∞
Combined standard uncertainty			RSS			11.09	
Expanded uncertainty (95% confidence interval)			K=2			22.18	

Product Service

SECTION 4

ACCREDITATION, DISCLAIMERS AND COPYRIGHT

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).