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*Products*

| | | |
|---|---|---|
| **Prüfbericht - Nr.:** *Test Report No.:* | **Appendix 10** | **Seite 1 von 129** *Page 1 of 129* |
| **Auftraggeber:** *Client:* | **HANDHELD GROUP AB**<br>**Kinnegatan 17 A**<br>**531 33 Lidköping**<br>**Sweden**<br>**Tel: +46 (0) 510-54 71 70** | |
| **Gegenstand der Prüfung:** *Test item:* | **Rugged 7" Tablet** | |
| **Bezeichnung:** *Identification:* | **118207** | **Serien-Nr.:** *Serial No.* **Engineering Sample** |
| **Wareneingangs-Nr.:** *Receipt No.:* | **1803156247** | **Eingangsdatum:** *Date of receipt:* **20.07.2016** |
| **Prüfort:** *Testing location:* | **Refer Page 4 of 129 for test facilities** | |
| **Prüfgrundlage:** *Test specification:* | **IEEE Std 1528-2013 &**<br>**IEC 62209-1 :2005, IEC 62209-2: 2010 , RSS 102 Issue 5** | |
| **Prüfergebnis:** *Test Result:* | **Siehe Testergebnis Zusammenfassung**<br>*See test result summary* | |
| **Prüflaboratorium:** *Testing Laboratory:* | **TÜV Rheinland (India) Pvt. Ltd.**<br>TUV Rheinland India Pvt Ltd. 82/A, West Wing, 3rd Main Road<br>Electronic Cit Phase 1, Bangalore – 560100<br>**FCC Registration No.: 176555 & IC OATS Reg. Number.: 3466E** | |

**geprüft** / *tested by:*

| Datum *Date* | Name/Stellung *Name/Position* | Unterschrift *Signature* |
|---|---|---|
| 07.03.2017 | Shrikanth S Naik<br>Sr. Engineer | |

**kontrolliert** / *reviewed by:*

| Datum *Date* | Name/Stellung *Name/Position* | Unterschrift *Signature* |
|---|---|---|
| 15.03.2017 | Saibaba Siddapur<br>Assistant Manager | |

**Sonstiges** / *Other Aspects:* **FCC ID: YY3-118207 & IC: 11695A-118207**

| *Abkürzungen:* | | | | *Abbreviations:* | | | |
|---|---|---|---|---|---|---|---|
| *P(ass)* | = | *entspricht Prüfgrundlage* | | *P(ass)* | = | *passed* | |
| *F(ail)* | = | *entspricht nicht Prüfgrundlage* | | *F(ail)* | = | *failed* | |
| *N/A* | = | *nicht anwendbar* | | *N/A* | = | *not applicable* | |
| *N/T* | = | *nicht getestet* | | *N/T* | = | *not tested* | |

## Test Result Summary:

| Band | | Measured 1g SAR (W/kg) | Reported 1g SAR (W/kg) | Limit (W/Kg) | Result |
|---|---|---|---|---|---|
| GSM850 | Body | 0.17 | 0.19 | 1.6 | Pass |
| | Head | 0.43 | 0.47 | 1.6 | Pass |
| PCS1900 | Body | 0.14 | 0.15 | 1.6 | Pass |
| | Head | 0.51 | 0.55 | 1.6 | Pass |
| WCDMA Band 2 | Head | 1.19 | **1.39** | 1.6 | Pass |
| | Body | 0.60 | 0.69 | 1.6 | Pass |
| WCDMA Band 4 | Head | 1.1 | 1.26 | 1.6 | Pass |
| | Body | 0.64 | **0.71** | 1.6 | Pass |
| WCDMA Band 5 | Head | 0.66 | 0.73 | 1.6 | Pass |
| | Body | 0.384 | 0.42 | 1.6 | Pass |
| Wi-Fi | Body | 0.30 | 0.33 | 1.6 | Pass |
| Wi-Fi | Head | 0.43 | 0.48 | 1.6 | Pass |
| Bluetooth | Body | 0.01 | 0.01 | 1.6 | Pass |
| LTE Band 2 | Body | 0.37 | 0.41 | 1.6 | Pass |
| LTE Band 4 | Body | 0.45 | 0.59 | 1.6 | Pass |
| LTE Band 5 | Body | 0.305 | 0.35 | 1.6 | Pass |
| LTE F Band 17 | Body | 0.25 | 0.29 | 1.6 | Pass |
| LTE Band 13 | Body | 0.34 | 0.36 | 1.6 | Pass |

**Note:**

It is declared in the user manual that a separation distance of 10mm shall be maintained form the Human body in the normal use. Hence, seperation distance of 10mm is cosnidered for Body SAR measurements in this test report.

# Content

# List of Test and Measurement Instruments

| Equipment | Type | Serial Number | Periodicity | Calibration Due Date |
|---|---|---|---|---|
| E-Filed Probe EX3DV4 | SP-EX3 004 CC | 7435 | Yearly | 26.09.2017 |
| DAE 4 | SD 000 D04 BM | 1320 | Yearly | 09.05.2017 |
| RF and microwave Signal Generator | SMB100A | 108788 | Yearly | 01.12.2017 |
| Power Sensor | E4412A | MY50360055 | Yearly | 29.11.2017 |
| Power Meter | N1913A | MY50000459 | Yearly | 30.11.2017 |
| Dielectric Probe | DAK-3.5 | 1100 | Yearly | 04.12.2017 |
| Dipole D835V2 | SA AAD 083 BB | 1017 | Yearly | 14.09.2017 |
| Dipole D1750V2 | SA AAD 175 AA | 1066 | Yearly | 14.09.2017 |
| Dipole D1950V3 | SA AAD 195 BA | 5D157 | Yearly | 14.09.2017 |
| Dipole D2450V2 | SA AAD 245 BB | 889 | Yearly | 14.09.2017 |

**Testing Facilities**

BNNSPEAG
11/11 Sector III, Rajindra Nagar
Sahibabad - 201005
Distt. Ghaziabad, Uttar Pradesh, INDIA
Tel : +91 120 4281067
Fax : +91 120 4562656

# General Product Information

**Product Function and Intended Use**

The Algiz RT7 is a rugged tablet, designed for use by field personnel in demanding conditions. It integrates best-in-class connectivity with efficient computing and multimedia features. The tablet runs Android Lollipop (5.1.1) operating system, and comes pre-installed with many Google applications, including Google Play.

## Ratings and System Details

| | |
|---|---|
| Operating Bands | GSM: 850MHz ,1900MHz<br>WCDMA :Band 2, Band 4, Band 5;<br>Wi-Fi: 2.4GHz;<br>Bluetooth: 2.4GHz;<br>LTE: Band 2, Band 4, Band 5, Band 17, Band 13; |
| Antenna Type | Integral Antenna |
| Number of antenna – License free Band | Primary Antenna – One |
| Number of antenna – License Band | Primary Antenna – One<br>Diversity Antenna - One (For Receiver Only) |
| Antenna Gain | 0 dBi |
| Supply Voltage | Internal Battery Pack -> 3.7- 4.2 VDC &<br>Adaptor 5VDC to EUT |
| Dimensions | 216.1 mm x 132.3 mm x 23.8 mm<br>(including the shock bumpers) |
| Environmental | Environmental conditions are -20ºC to +50 ºC operating and -40ºC to 70ºC storage |

# Test Set-up and Operation Mode

## Principle of Configuration Selection

Continuous transmission was enabled on lowest, middle and highest operating channel at each supporting frequency band at maximum defined power level & for License bands,Transmission was enabled with help of CMW500 on low, mid and high channel.

## Test Operation and Test Software

Wi-Fi: QRCT test software (from QUALCOMM) was used to enable continuous transmission, channel selection (low/mid/high) and data rates on the EUT for the tests in this report & GSM/WCDMA/LTE: A base station simulator was used to enable channel, Band and Power level selection and continuous transmission.

## Special Accessories and Auxiliary Equipment

- None

**Note:** Product Rugged 7" Tablet has multiple protocols. All the supported wireless protocols regulatory test results and their respective test report numbers are mentioned in the below table.

| Radio Protocol | Report Number |
|---|---|
| NFC | 19660243 001 |
| Wi-Fi (IEEE 802.11bgn) | 19660240 001 |
| BLE | 19660242 001 |
| Bluetooth (BDR+EDR) | 19660241 001 |
| GSM | 19660244 001 |
| W-CDMA | 19660245 001 |
| LTE | 19660246 001 |

# Test Results

## 1. SAR Limits

The below standards are applied for SAR testing of this product under FCC regulations.

IEEE Std C95.3-2002: IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz, Inst. of Electrical and Electronics Engineers, Inc.

IEEE STD 1528-2013: Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques, Inst. of Electrical and Electronics Engineers, Inc.

KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04: SAR Measurement Requirements for 100 MHz to 6 GHz
KDB 248227 D01 802.11 Wi-Fi SAR v02r02: SAR guidance for IEEE 802.11 (WI-FI) transmitters

447498 D01 General RF Exposure Guidance v06: RF Exposure Procedures and Equipment

Authorization Policies for Mobile and Portable Devices

941225 D01 3G SAR Procedures v03r01: 3G SAR Measurement Procedures

941225 D05 SAR for LTE Devices v02r05: SAR Evaluation Considerations for LTE devices

**Limits:**

| Body Region | Devices Used by the General Public SAR Limit (W/kg) |
|---|---|
| Localized Head and Trunk | 1.6 |

**Worst Case Measured Maximum Output Power as listed in Below Table**

| Radio Protocol | Channel / Frequency (MHz) | Measured Power (dBm) |
|---|---|---|
| Bluetooth | Low / 2402 | 9.11 |
| | Mid / 2440 | 8.42 |
| | High / 2480 | 7.21 |
| Wi-Fi 2.4GHz b/g Mode | Low / 2412 | 13.48 |
| | Mid / 2437 | 13.70 |
| | High / 2462 | 12.90 |
| GSM 850 | Low / 824.2 | 30.62 |
| | Mid / 836.6 | 30.74 |
| | High / 848.8 | 31.42 |
| PCS 1900 | Low / 1850.2 | 27.39 |
| | Mid / 1880 | 27.49 |
| | High / 1909.8 | 27.47 |
| W-CDMA FDD 2 | Low / 1852.4 | 19.55 |
| | Mid / 1880 | 20.21 |
| | High / 1907.6 | 19.47 |
| W-CDMA FDD 4 | Low / 1712.4 | 17.98 |
| | Mid / 1732.4 | 18.49 |
| | High / 1752.6 | 20.14 |
| W-CDMA FDD 5 | Low / 826.4 | 19.19 |
| | Mid / 836.6 | 19.09 |
| | High / 846.6 | 20.57 |
| LTE band 2 | Low / 1860 | 21.42 |
| | Mid / 1880 | 21.93 |
| | High / 1900 | 21.74 |
| LTE band 4 | Low / 1712.5 | 21.37 |
| | Mid / 1732.5 | 21.84 |
| | High / 1752.5 | 21.52 |
| LTE band 5 | Low / 829 | 21.56 |
| | Mid / 836.5 | 21.36 |
| | High / 844 | 21.62 |
| LTE band 17 | Mid / 710 | 22.25 |
| LTE band 13 | Mid / 782 | 21.99 |

## 2. Tissue simulating liquid dielectric parameters

For the purpose of the tests as described in this report the following tissue dielectric parameters have been determined by use of a Vector Network Analyzer (VNA). The tables indicate the dielectric parameters of the liquids used during the tests. The indicated required values are derived from IEEE STD 1528-2013 & FCC KDB "865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04"

**Dielectric parameters for 850MHz Tissue**

850MHz head and muscle simulant liquid was used for the tests for 850MHz band frequencies. The following liquid validation results were obtained, where the maximum deviation should not be more than 10 % of the Relative values (standard).

**Results for 850 MHz Band**

| Date | Liquid | Frequency (MHz) | Measured Liquid Temperature (°C) | Measured relative Permittivity | Measured Conductivity (S/m) | Relative Permittivity Standard | Conductivity Standard (S/m) | Relative Permittivity Deviation (%) | Conductivity Deviation (%) |
|---|---|---|---|---|---|---|---|---|---|
| 12.10.2016 | HSL | 850 | 22.68 | 40.85 | 0.96 | 41.50 | 0.92 | -2 | 4 |
| 05.11.2016 | HSL | 850 | 21.6 | 40.85 | 0.96 | 41.50 | 0.92 | -2 | 4 |
| 21.10.2016 | MSL | 850 | 21.9 | 55.38 | 0.94 | 55.10 | 0.99 | 1 | 5 |
| 22.10.2016 | MSL | 850 | 21.5 | 53.38 | 0.93 | 55.10 | 0.99 | -3 | -6 |
| 25.10.2016 | MSL | 850 | 20.30 | 55.46 | 0.95 | 55.10 | 0.99 | 1 | 4 |

**Dielectric parameters for 1750MHz Tissue**

1750 MHz head and muscle simulant liquid was used for the tests for 1750 MHz band frequencies. The following liquid validation results were obtained, where the maximum deviation should not be more than 10 % of the Relative values (standard).

**Results for 1750 MHz Band**

| Date | Liquid | Frequency (MHz) | Measured Liquid Temperature (°C) | Measured relative Permittivity | Measured Conductivity (S/m) | Relative Permittivity Standard | Conductivity Standard (S/m) | Relative Permittivity Deviation (%) | Conductivity Deviation (%) |
|---|---|---|---|---|---|---|---|---|---|
| 24.10.2016 | MSL | 1750 | 20.2 | 54.18 | 1.43 | 53.4 | 1.49 | 1 | -4 |
| 25.10.2016 | MSL | 1750 | 20.3 | 54.42 | 1.39 | 53.4 | 1.49 | 2 | -6 |
| 05.11.2016 | HSL | 1750 | 21.6 | 40.91 | 1.35 | 40.1 | 1.37 | 2 | -1 |

**Dielectric parameters for 1900 MHz Tissue**

1900 MHz head and muscle simulant liquid was used for the tests for 1950 MHz band frequencies. The following liquid validation results were obtained, where the maximum deviation should not be more than 10 % of the Relative values (standard).

**Results for 1950 MHz Band**

| Date | Liquid | Frequency (MHz) | Measured Liquid Temperature (°C) | Measured relative Permittivity | Measured Conductivity (S/m) | Relative Permittivity Standard | Conductivity Standard (S/m) | Relative Permittivity Deviation (%) | Conductivity Deviation (%) |
|---|---|---|---|---|---|---|---|---|---|
| 17.10.2016 | HSL | 1900 | 21.6 | 38.82 | 1.46 | 40 | 1.4 | -3 | 4 |
| 22.10.2016 | MSL | 1900 | 21.5 | 53.84 | 1.55 | 53.30 | 1.52 | 1 | 2 |
| 24.10.2016 | MSL | 1900 | 20.2 | 54.14 | 1.40 | 53.30 | 1.52 | 2 | -4 |
| 25.10.2016 | MSL | 1900 | 20.3 | 53.97 | 1.47 | 53.30 | 1.52 | 1 | -3 |
| 05.11.2016 | HSL | 1900 | 21.6 | 40.72 | 1.45 | 40.00 | 1.40 | 2 | 4 |

**Dielectric parameters for 2450 MHz Tissue**

2450 MHz head and muscle simulant liquid was used for the tests for 2450 MHz band frequencies. The following liquid validation results were obtained, where the maximum deviation should not be more than 10 % of the Relative values (standard).

**Results for 2450 MHz Band**

| Date | Liquid | Frequency (MHz) | Measured Liquid Temperature (°C) | Measured relative Permittivity | Measured Conductivity (S/m) | Relative Permittivity Standard | Conductivity Standard (S/m) | Relative Permittivity Deviation (%) | Conductivity Deviation (%) |
|---|---|---|---|---|---|---|---|---|---|
| 20.10.2016 | HSL | 2450 | 21.6 | 39.8 | 1.81 | 39.20 | 1.80 | 2 | 1 |
| 21.10.2016 | MSL | 2450 | 21.9 | 53.05 | 1.95 | 52.70 | 1.95 | 1 | 0 |
| 02.11.2016 | MSL | 2450 | 22.3 | 51.70 | 1.94 | 52.70 | 1.95 | -2 | -1 |

**For LTE Band 17, 13 & Non-Barcode unit SAR measurement:**

Broad band liquid HBBL 600-6000V6 & MBBL600-6000V6 are used.

| Date | Liquid Type | Frequency (MHz) | Measured Liquid Temperature (°C) | Measured relative Permittivity | Measured Conductivity (S/m) | Relative Permittivity Standard | Conductivity Standard (S/m) | Relative Permittivity Deviation (%) | Conductivity Deviation (%) |
|---|---|---|---|---|---|---|---|---|---|
| 16.01.2017 | MSL | 710 | 22.5 | 54.307 | 0.9516 | 55.687 | 0.96 | -2.47 | -0.87 |
| 01.02.2017 | MSL | 850 | 22.7 | 54.51 | 1.017 | 55.1538 | 0.988 | -1.16 | 2.9 |
| 01.02.2017 | MSL | 1750 | 22.7 | 53.356 | 1.454 | 53.4316 | 1.488 | -0.14 | -2.28 |
| 01.02.2017 | MSL | 1900 | 22.7 | 53.505 | 1.532 | 53.30 | 1.52 | 0.38 | 0.78 |
| 01.02.2017 | MSL | 710 | 22.7 | 54.213 | 0.948 | 55.687 | 0.96 | -2.65 | -1.25 |
| 02.02.2017 | MSL | 850 | 22.6 | 54.42 | 1.01 | 55.1538 | 0.988 | -1.33 | 2.23 |
| 02.02.2017 | MSL | 1750 | 22.6 | 53.52 | 1.42 | 53.4316 | 1.488 | 0.17 | -4.57 |
| 02.02.2017 | MSL | 1900 | 22.6 | 53.825 | 1.526 | 53.30 | 1.52 | 0.98 | 0.39 |
| 03.02.2017 | MSL | 850 | 23.0 | 54.51 | 1.017 | 55.1538 | 0.988 | -1.17 | 2.94 |
| 03.02.2017 | MSL | 1750 | 23.0 | 53.542 | 1.45 | 53.4316 | 1.488 | 0.21 | -2.55 |
| 03.02.2017 | MSL | 1900 | 23.0 | 52.86 | 1.506 | 53.30 | 1.52 | -0.83 | -0.92 |
| 03.02.2017 | MSL | 2450 | 23.0 | 52.66 | 1.95 | 52.7 | 1.95 | -0.08 | 0.00 |
| 06.02.2017 | HSL | 850 | 22.4 | 43.07 | 0.94 | 41.5 | 0.916 | 3.78 | 2.62 |
| 06.02.2017 | HSL | 1750 | 22.4 | 40.97 | 1.375 | 40.078 | 1.371 | 2.23 | 0.29 |
| 06.02.2017 | HSL | 1900 | 22.4 | 40.78 | 1.42 | 40.0 | 1.40 | 1.95 | 1.43 |
| 06.02.2017 | HSL | 2450 | 22.4 | 40.154 | 1.81 | 39.2 | 1.8 | 2.43 | 0.56 |
| 07.02.2017 | HSL | 850 | 22.8 | 42.98 | 0.91 | 41.5 | 0.916 | 3.57 | -0.66 |
| 07.02.2017 | HSL | 1750 | 22.8 | 40.89 | 1.36 | 40.078 | 1.371 | 2.03 | -0.80 |
| 07.02.2017 | HSL | 1900 | 22.8 | 39.98 | 1.39 | 40.0 | 1.40 | -0.05 | -0.71 |
| 07.02.2017 | HSL | 2450 | 22.8 | 40.17 | 1.85 | 39.2 | 1.8 | 2.47 | 2.78 |
| 06.03.2017 | MSL | 800 | 22.5 | 54.637 | 0.98 | 55.34 | 0.97 | -1.26 | 1.29 |

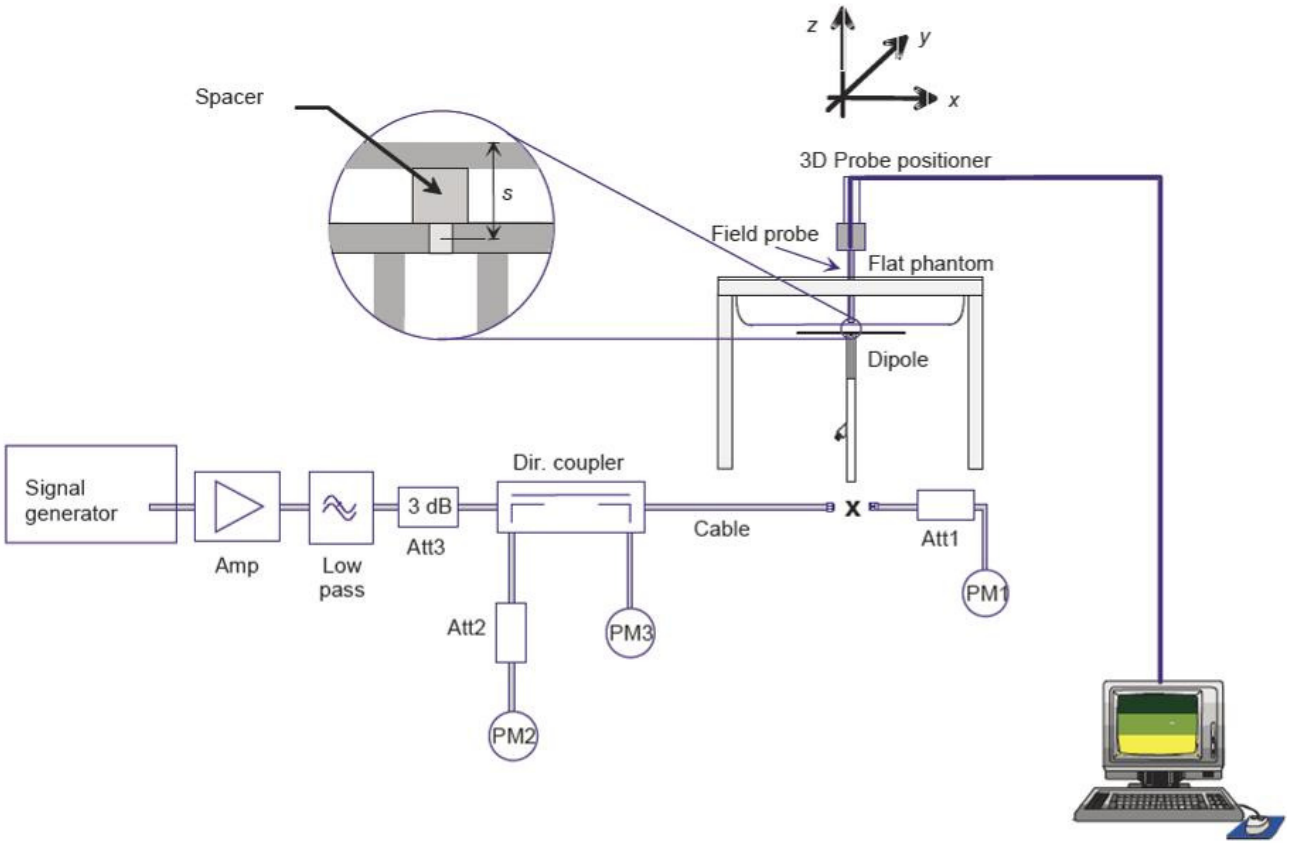
## 3. System Validation

The purpose of the system performance check (system check) is to verify that the system operates within its specifications at the device test frequency. The system check is to make sure that the system works correctly at the time of the compliance test. The system check has been performed using the specified tissue-equivalent liquid and at a chosen fixed frequency that is within ± 10% of the compliance test mid-band frequency. The system check is performed prior to compliance tests and the result must always be within ±10% of the target value corresponding to the test frequency, liquid and the source used. The system check detects possible short-term drift and uncertainties in the system, such as:

a) Changes in the liquid parameters (e.g., due to water evaporation or temperature change),
b) Test system component failures,
c) Test system component drift,
d) Operator errors in the set-up or software parameters,
e) Other possible adverse conditions in the system configuration, e.g., RF interference.

The results show that this system check is within 10% of the expected values.

**System check Setup**



**Results**

At 850, 1750, 1900 and 2450 MHz a system check was executed according KDB 865664 D01.The following system performance check results were obtained (referenced to 1W):

| Liquid Type | Date | Frequency | Target Value (W/kg) | Measured Value (W/kg) | Deviation from Target value (%) | Permissible deviation from target value (%) |
|---|---|---|---|---|---|---|
| HSL | 12.10.2016 | 850 | 9.50 | 10.2 | 7.37 | ±10 |
| | 05.11.2016 | 850 | 9.50 | 10.3 | 8.42 | ±10 |
| | 05.11.2016 | 1750 | 36.8 | 37.2 | 1.09 | ±10 |
| | 17.10.2016 | 1900 | 39.7 | 41.5 | 4.53 | ±10 |
| | 05.11.2016 | 1900 | 39.7 | 42.8 | 7.81 | ±10 |
| | 20.10.2016 | 2450 | 51.7 | 52.4 | 1.35 | ±10 |
| MSL | 22.10.2016 | 850 | 9.91 | 10.2 | 2.93 | ±10 |
| | 24.10.2016 | 850 | 9.91 | 10.5 | 5.95 | ±10 |
| | 25.10.2016 | 850 | 9.91 | 10.2 | 2.93 | ±10 |
| | 25.10.2016 | 1750 | 36.5 | 36.9 | 1.10 | ±10 |
| | 24.10.2016 | 1750 | 36.5 | 38.1 | 4.38 | ±10 |
| | 25.10.2016 | 1900 | 39.7 | 40.0 | 0.76 | ±10 |
| | 24.10.2016 | 1900 | 39.7 | 40.0 | 0.76 | ±10 |
| | 22.10.2016 | 1900 | 39.7 | 42.5 | 7.05 | ±10 |
| | 21.10.2016 | 2450 | 52.7 | 54.9 | 4.17 | ±10 |
| | 02.11.2016 | 2450 | 52.7 | 50.0 | -5.12 | ±10 |
| HSL | 06.02.2017 | 850 | 9.50 | 9.48 | -0.21 | ±10 |
| | 06.02.2017 | 1750 | 36.8 | 35.0 | -4.89 | ±10 |
| | 06.02.2017 | 1900 | 39.7 | 38.6 | -2.77 | ±10 |
| | 06.02.2017 | 2450 | 51.7 | 52.4 | 1.35 | ±10 |
| MSL | 01.02.2017 | 850 | 9.91 | 9.14 | -7.77 | ±10 |
| | 01.02.2017 | 1750 | 36.5 | 35.2 | -3.56 | ±10 |
| | 01.02.2017 | 1900 | 39.7 | 41.4 | 4.28 | ±10 |
| | 01.02.2017 | 2450 | 52.7 | 52.6 | -0.19 | ±10 |

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**Head Simulating Liquids:**

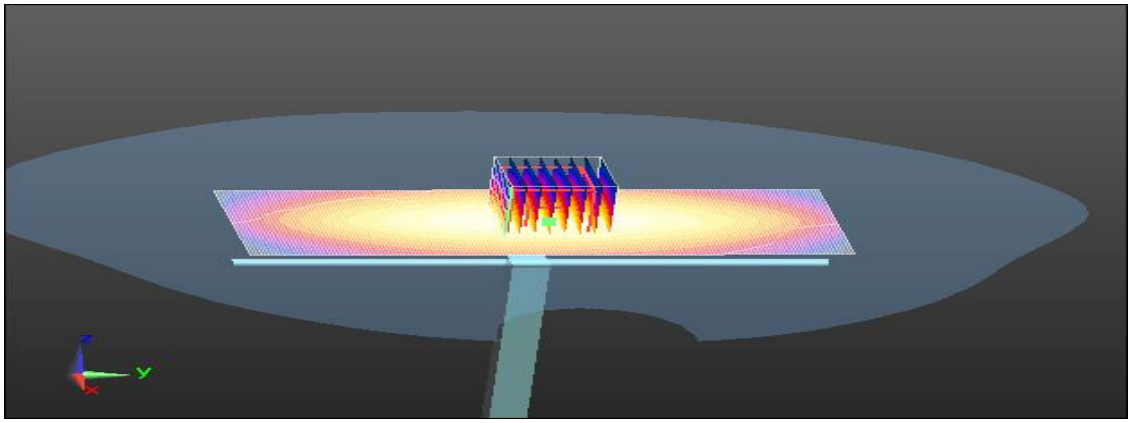
**System Validation - Band: 850 MHz**

| | |
|---|---|
| Temperature of Liquid | : 22.68 ºC |
| Test Frequency | : 850MHz |
| Measured Conductivity | : 0.96 S/m |
| Measured Permittivity | : 40.85 |

**Final Scan Results:**

| | |
|---|---|
| Power input to Dipole | : 100mW |
| Grid Dimension | : 8mmX8mmX7mm |
| Power Reference | : 41.22V/m |
| Measured SAR | : 1.02 W/kg |
| Normalized to 1W power | : 10.2 W/Kg |
| Power Drift | : 0.11 dB |

**Measurement Plot**



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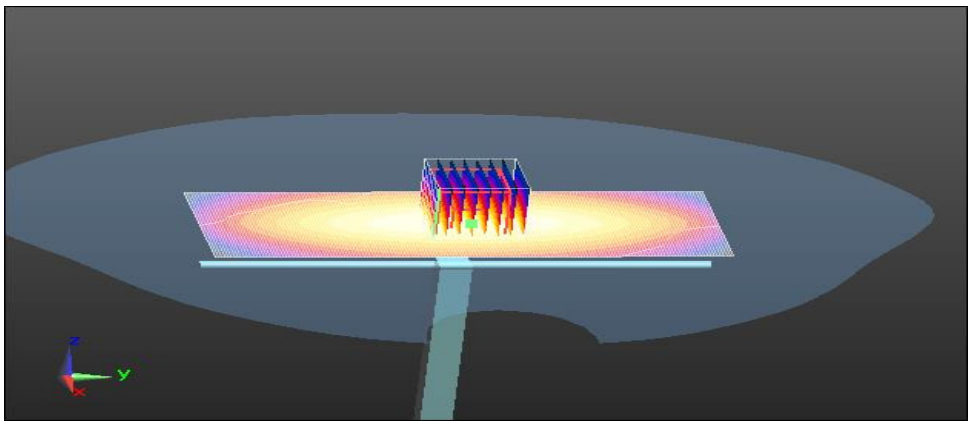
**System Validation - Band: 850 MHz**

| | |
|---|---|
| Temperature of Liquid | : 21.6 ºC |
| Test Frequency | : 850MHz |
| Measured Conductivity | : 0.963 S/m |
| Measured Permittivity | : 40.851 |

**Final Scan Results:**

| | |
|---|---|
| Power input to Dipole | : 100mW |
| Grid Dimension | : 8mmX8mmX7mm |
| Power Reference | : 39.65V/m |
| Measured SAR | : 1.03 W/kg |
| Normalized to 1W power | : 10.3 W/Kg |
| Power Drift | : 0 dB |

**Measurement Plot**



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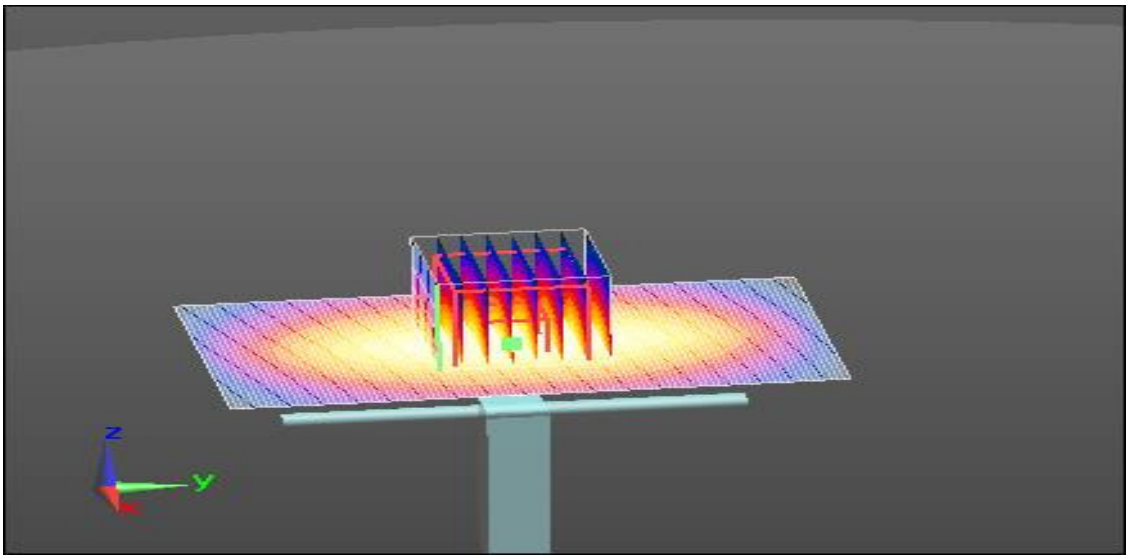
**System Validation - Band: 1750 MHz**

| | |
|---|---|
| Temperature of Liquid | : 21.6 ºC |
| Test Frequency | : 1750MHz |
| Measured Conductivity | : 1.43 S/m |
| Measured Permittivity | : 54.18 |

**Final Scan Results:**

| | |
|---|---|
| Power input to Dipole | : 100mW |
| Grid Dimension | : 61mmX101mmX1mm |
| Power Reference | : 65.93V/m |
| Measured SAR | : 3.81 W/kg |
| Normalized to 1W power | : 38.1 W/Kg |
| Power Drift | : 0.07dB |

**Measurement Plot**



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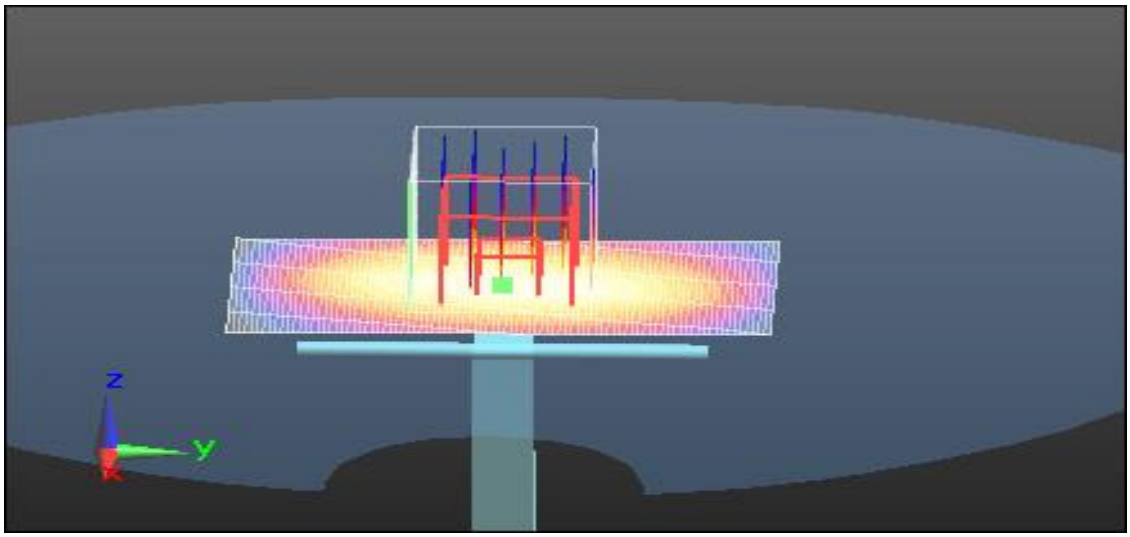
**System Validation - Band: 1900 MHz**

| | |
|---|---|
| Temperature of Liquid | : 21.6 ºC |
| Test Frequency | : 1900MHz |
| Measured Conductivity | : 1.455 S/m |
| Measured Permittivity | : 38.82 |

**Final Scan Results:**

| | |
|---|---|
| Power input to Dipole | : 100mW |
| Grid Dimension | : 7mmX7mmX7mm |
| Power Reference | : 68.92V/m |
| Measured SAR | : 4.15 W/kg |
| Normalized to 1W power | : 41.5 W/Kg |
| Power Drift | : 0.04dB |

**Measurement Plot**



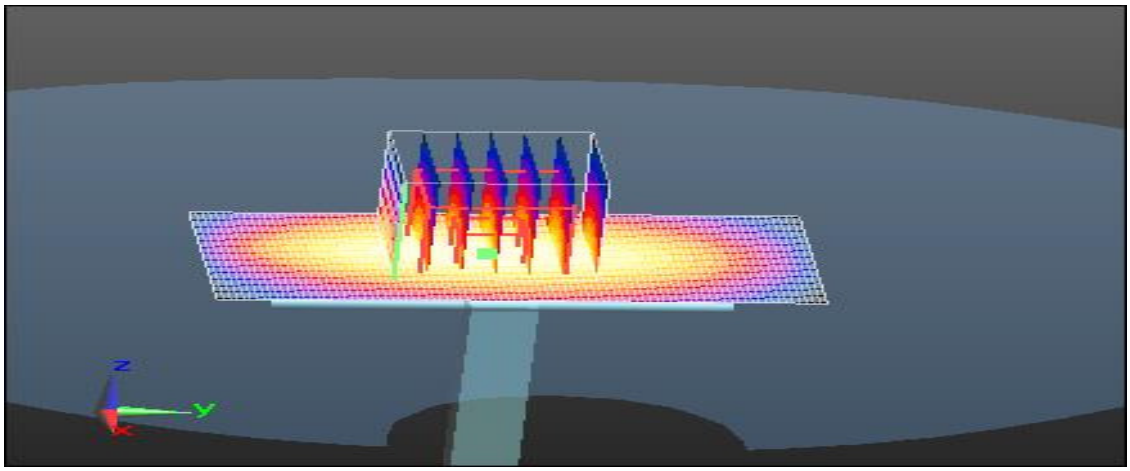
**System Validation - Band: 1900 MHz**

| | |
|---|---|
| Temperature of Liquid | : 21.6 ºC |
| Test Frequency | : 1900MHz |
| Measured Conductivity | : 1.446 S/m |
| Measured Permittivity | : 40.724 |

**Final Scan Results:**

| | |
|---|---|
| Power input to Dipole | : 100mW |
| Grid Dimension | : 51mmX91mmX4mm |
| Power Reference | : 68.72V/m |
| Measured SAR | : 4.28 W/kg |
| Normalized to 1W power | : 42.8 W/Kg |
| Power Drift | : 0.03dB |

**Measurement Plot**



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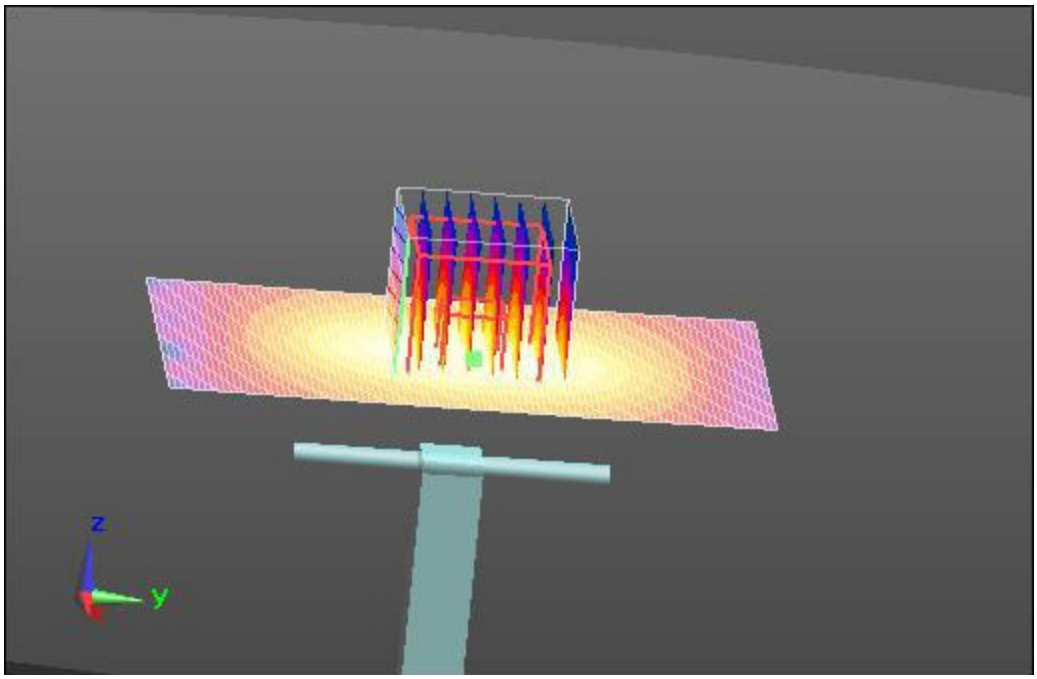
**System Validation - Band: 2450 MHz**

| | |
|---|---|
| Temperature of Liquid | : 21.6 ºC |
| Test Frequency | : 2450MHz |
| Measured Conductivity | : 1.81 S/m |
| Measured Permittivity | : 39.80 |

**Final Scan Results:**

| | |
|---|---|
| Power input to Dipole | : 100mW |
| Grid Dimension | : 8mmX8mmX7mm |
| Power Reference | : 72.53V/m |
| Measured SAR | : 5.19 W/kg |
| Normalized to 1W power | : 51.9 W/Kg |
| Power Drift | : -0.15dB |

**Measurement Plot**



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**Muscle Simulating Liquids:**

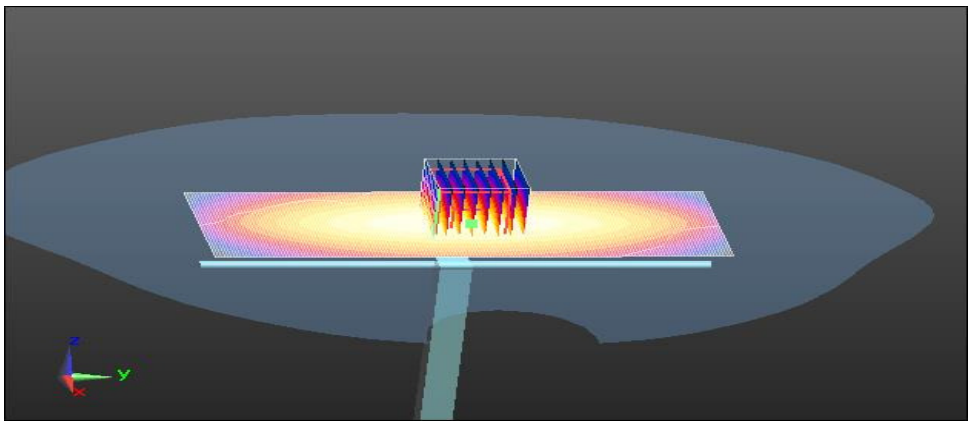
**System Validation - Band: 850 MHz**

| | |
|---|---|
| Temperature of Liquid | : 21.5 ºC |
| Test Frequency | : 850MHz |
| Measured Conductivity | : 0.93 S/m |
| Measured Permittivity | : 53.38 |

**Final Scan Results:**

| | |
|---|---|
| Power input to Dipole | : 100mW |
| Grid Dimension | : 8mmX8mmX7mm |
| Power Reference | : 41.92V/m |
| Measured SAR | : 1.02 W/kg |
| Normalized to 1W power | : 10.2 W/Kg |
| Power Drift | : -0.15dB |

**Measurement Plot**



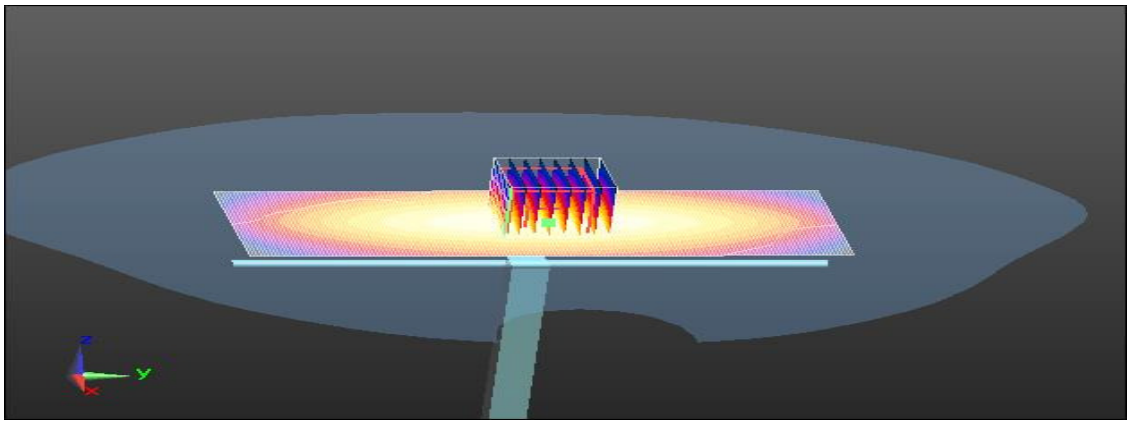
**System Validation - Band: 850 MHz**

| | |
|---|---|
| Temperature of Liquid | : 21.9 ºC |
| Test Frequency | : 850MHz |
| Measured Conductivity | : 0.94 S/m |
| Measured Permittivity | : 55.38 |

**Final Scan Results:**

| | |
|---|---|
| Power input to Dipole | : 100mW |
| Grid Dimension | : 8mmX8mmX7mm |
| Power Reference | : 41.72V/m |
| Measured SAR | : 1.05 W/kg |
| Normalized to 1W power | : 10.5 W/Kg |
| Power Drift | : -0.13dB |

**Measurement Plot**



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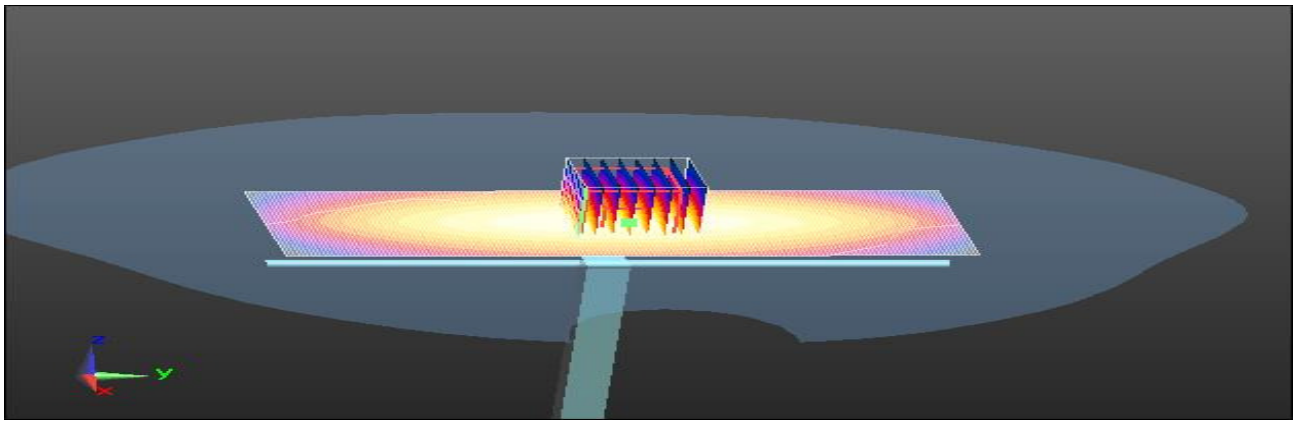
**System Validation - Band: 850 MHz**

| | |
|---|---|
| Temperature of Liquid | : 20.3 ºC |
| Test Frequency | : 850MHz |
| Measured Conductivity | : 0.950 S/m |
| Measured Permittivity | : 55.46 |

**Final Scan Results:**

| | |
|---|---|
| Power input to Dipole | : 100mW |
| Grid Dimension | : 8mmX8mmX7mm |
| Power Reference | : 41.70V/m |
| Measured SAR | : 1.02 W/kg |
| Normalized to 1W power | : 10.2 W/Kg |
| Power Drift | : -0.12dB |

**Measurement Plot**



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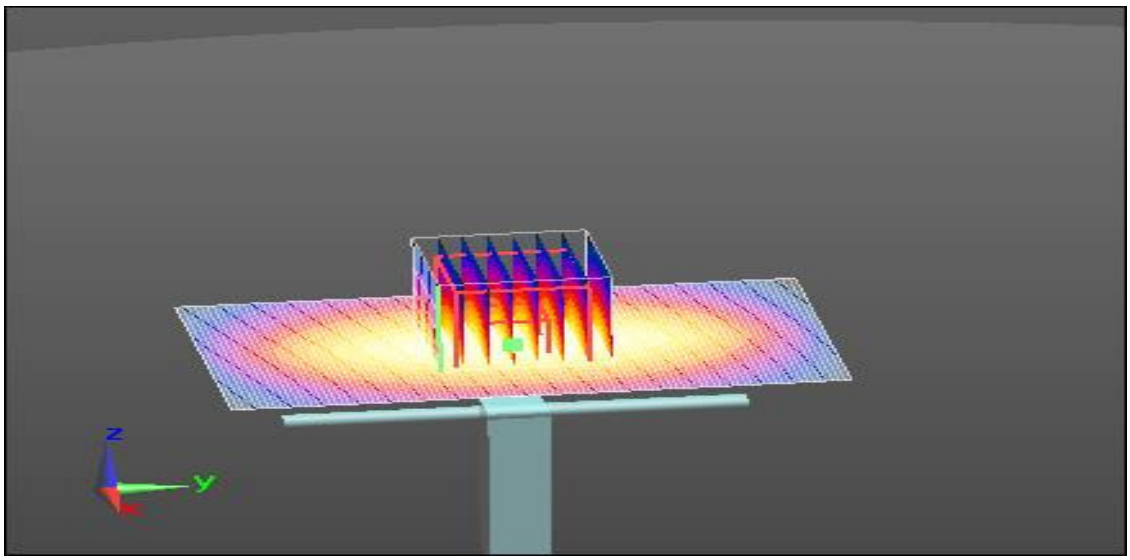
**System Validation - Band: 1750 MHz**

| | |
|---|---|
| Temperature of Liquid | : 20.3 ºC |
| Test Frequency | : 1750MHz |
| Measured Conductivity | : 1.39 S/m |
| Measured Permittivity | : 54.42 |

**Final Scan Results:**

| | |
|---|---|
| Power input to Dipole | : 100mW |
| Grid Dimension | : 8mmX8mmX7mm |
| Power Reference | : 65.49 V/m |
| Measured SAR | : 3.69 W/kg |
| Normalized to 1W power | : 36.9 W/Kg |
| Power Drift | : -0.09dB |

**Measurement Plot**



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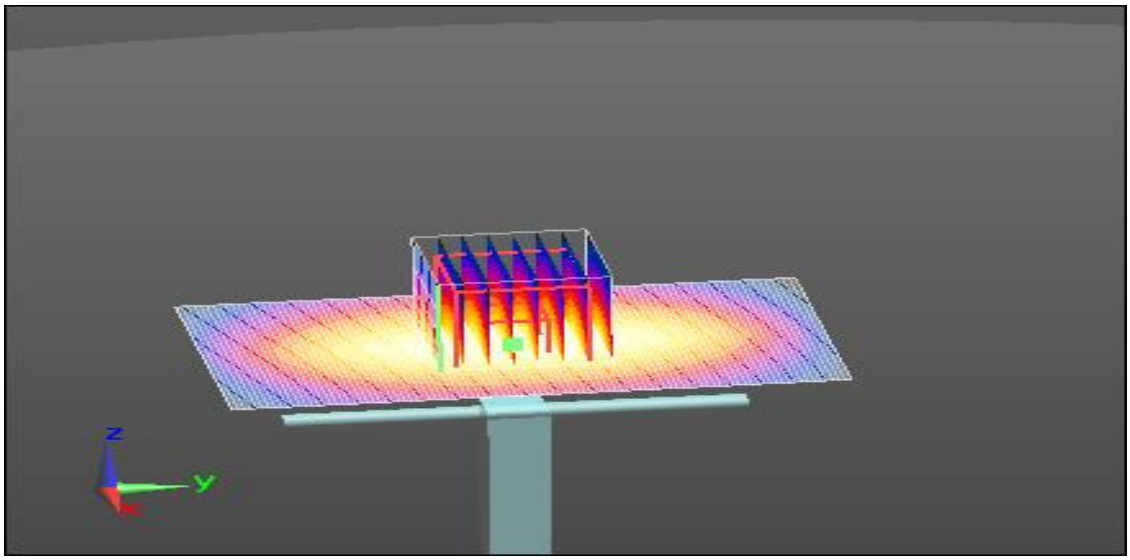
**System Validation - Band: 1750 MHz**

| | |
|---|---|
| Temperature of Liquid | : 20.2 ºC |
| Test Frequency | : 1750MHz |
| Measured Conductivity | : 1.43 S/m |
| Measured Permittivity | : 54.18 |

**Final Scan Results:**

| | |
|---|---|
| Power input to Dipole | : 100mW |
| Grid Dimension | : 61mmX101mmX7mm |
| Power Reference | : 65.93 V/m |
| Measured SAR | : 3.81 W/kg |
| Normalized to 1W power | : 38.1 W/Kg |
| Power Drift | : -0.07dB |

**Measurement Plot**



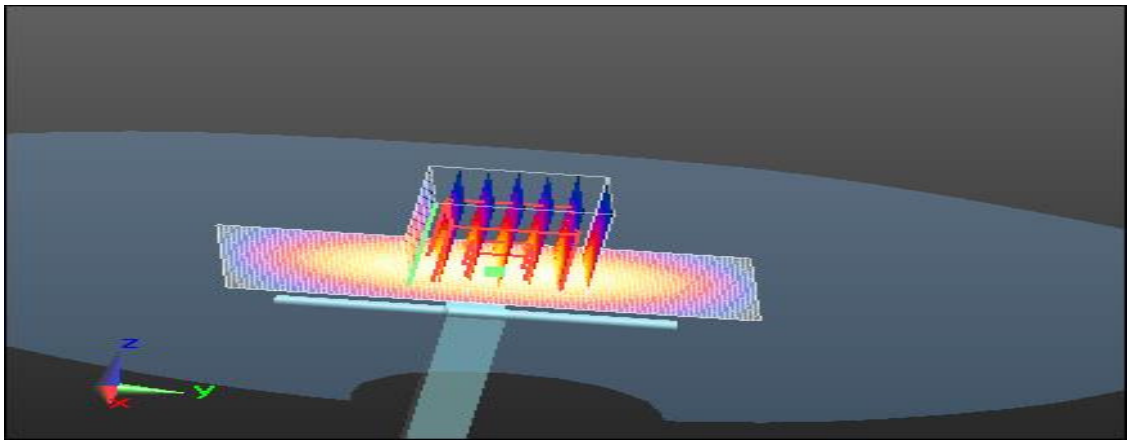
**System Validation - Band: 1900 MHz**

| | |
|---|---|
| Temperature of Liquid | : 20.3 ºC |
| Test Frequency | : 1900MHz |
| Measured Conductivity | : 1.47 S/m |
| Measured Permittivity | : 53.97 |

**Final Scan Results:**

| | |
|---|---|
| Power input to Dipole | : 100mW |
| Grid Dimension | : 7mmX7mmX7mm |
| Power Reference | : 69.39V/m |
| Measured SAR | : 3.98 W/kg |
| Normalized to 1W power | : 39.8 W/Kg |
| Power Drift | : -0.01dB |

**Measurement Plot**



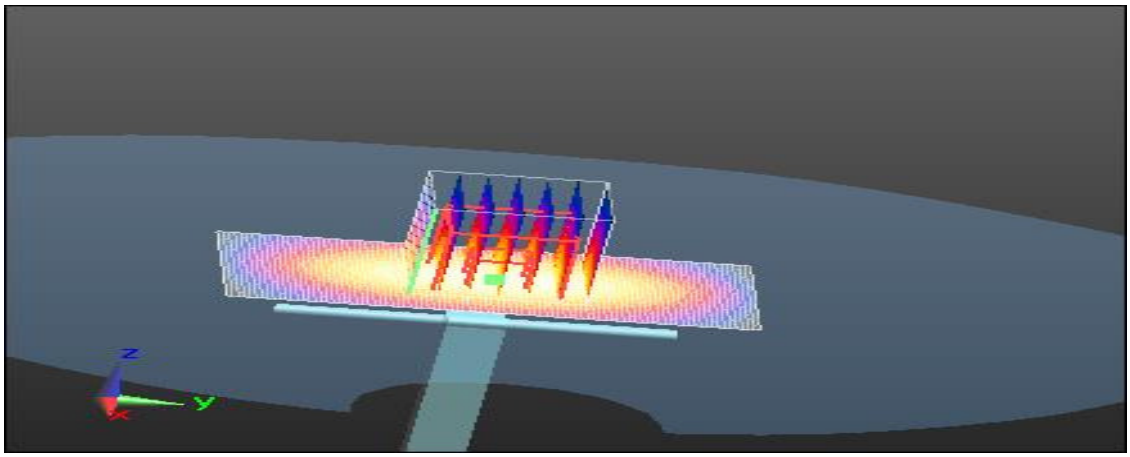
**System Validation - Band: 1900 MHz**

| | |
|---|---|
| Temperature of Liquid | : 20.2 ºC |
| Test Frequency | : 1900MHz |
| Measured Conductivity | : 1.40 S/m |
| Measured Permittivity | : 54.14 |

**Final Scan Results:**

| | |
|---|---|
| Power input to Dipole | : 100mW |
| Grid Dimension | : 7mmX7mmX7mm |
| Power Reference | : 69.39V/m |
| Measured SAR | : 4.0 W/kg |
| Normalized to 1W power | : 40.0 W/Kg |
| Power Drift | : -0.11dB |

**Measurement Plot**



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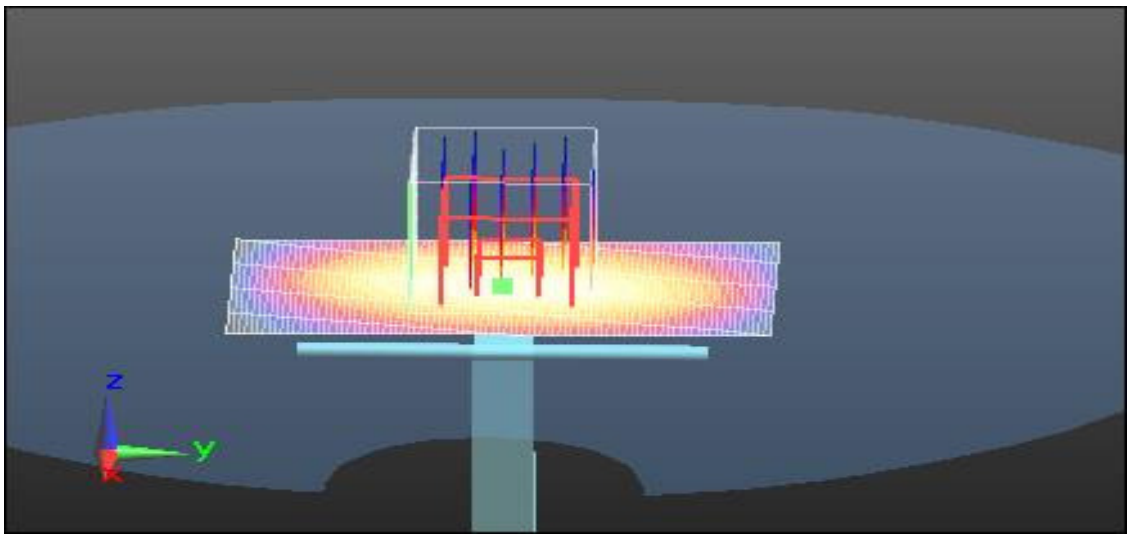
**System Validation - Band: 1900 MHz**

| | |
|---|---|
| Temperature of Liquid | : 21.5 ºC |
| Test Frequency | : 1900MHz |
| Measured Conductivity | : 1.55 S/m |
| Measured Permittivity | : 53.84 |

**Final Scan Results:**

| | |
|---|---|
| Power input to Dipole | : 100mW |
| Grid Dimension | : 7mmX7mmX7mm |
| Power Reference | : 68.92V/m |
| Measured SAR | : 4.25 W/kg |
| Normalized to 1W power | : 42.5 W/Kg |
| Power Drift | : -0.09dB |

**Measurement Plot**



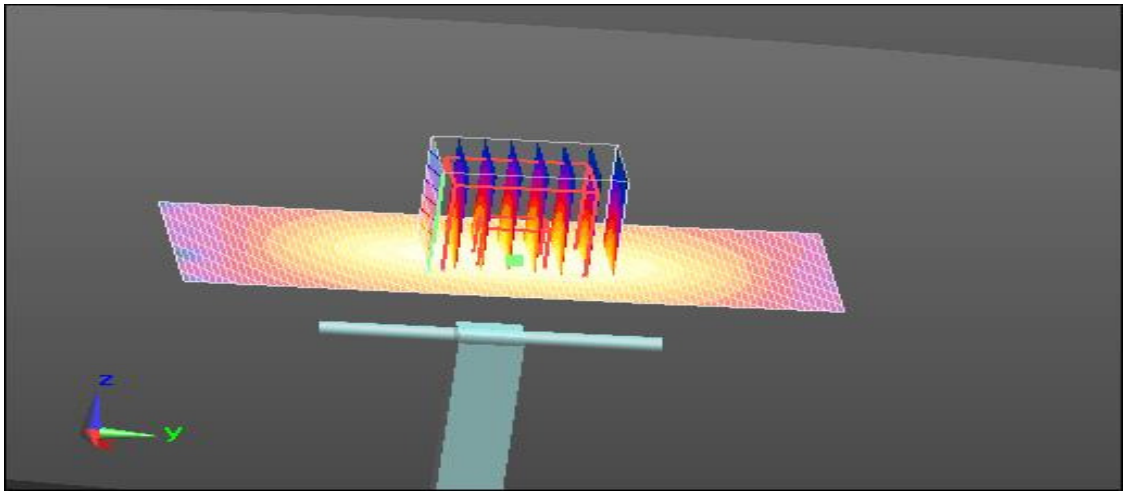
**System Validation - Band: 2450 MHZ**

| | |
|---|---|
| Temperature of Liquid | : 21.9 ºC |
| Test Frequency | : 2450MHz |
| Measured Conductivity | : 1.95 S/m |
| Measured Permittivity | : 53.05 |

**Final Scan Results:**

| | |
|---|---|
| Power input to Dipole | : 100mW |
| Grid Dimension | : 8mmX8mmX7mm |
| Power Reference | : 79.53V/m |
| Measured SAR | : 5.49 W/kg |
| Normalized to 1W power | : 54.9 W/Kg |
| Power Drift | : -0.18dB |

**Measurement Plot**



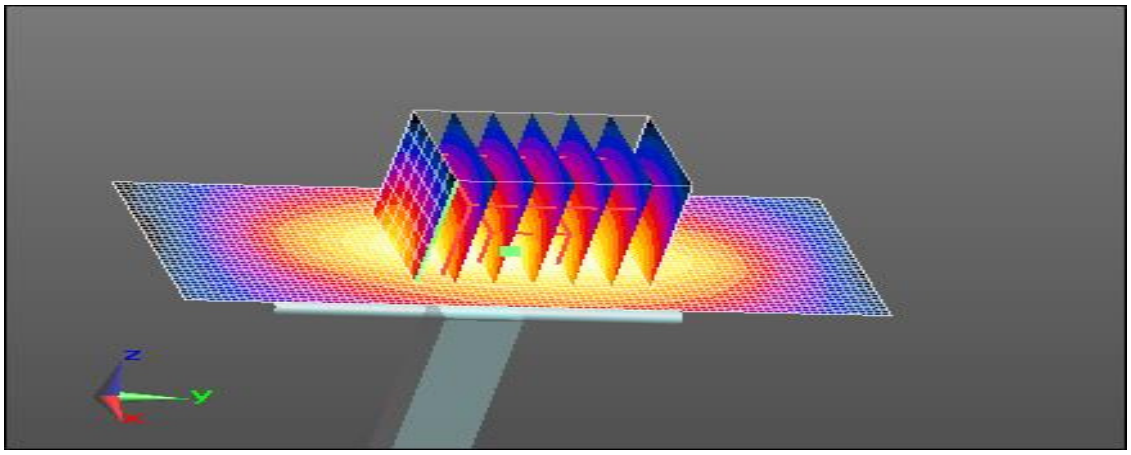
**System Validation - Band: 2450 MHZ**

| | |
|---|---|
| Temperature of Liquid | : 22.3 ºC |
| Test Frequency | : 2450MHz |
| Measured Conductivity | : 1.94 S/m |
| Measured Permittivity | : 51.70 |

**Final Scan Results:**

| | |
|---|---|
| Power input to Dipole | : 100mW |
| Grid Dimension | : 7mmX7mmX7mm |
| Power Reference | : 68.3V/m |
| Measured SAR | : 5.00 W/kg |
| Normalized to 1W power | : 50.0 W/Kg |
| Power Drift | : -0.12dB |

**Measurement Plot**



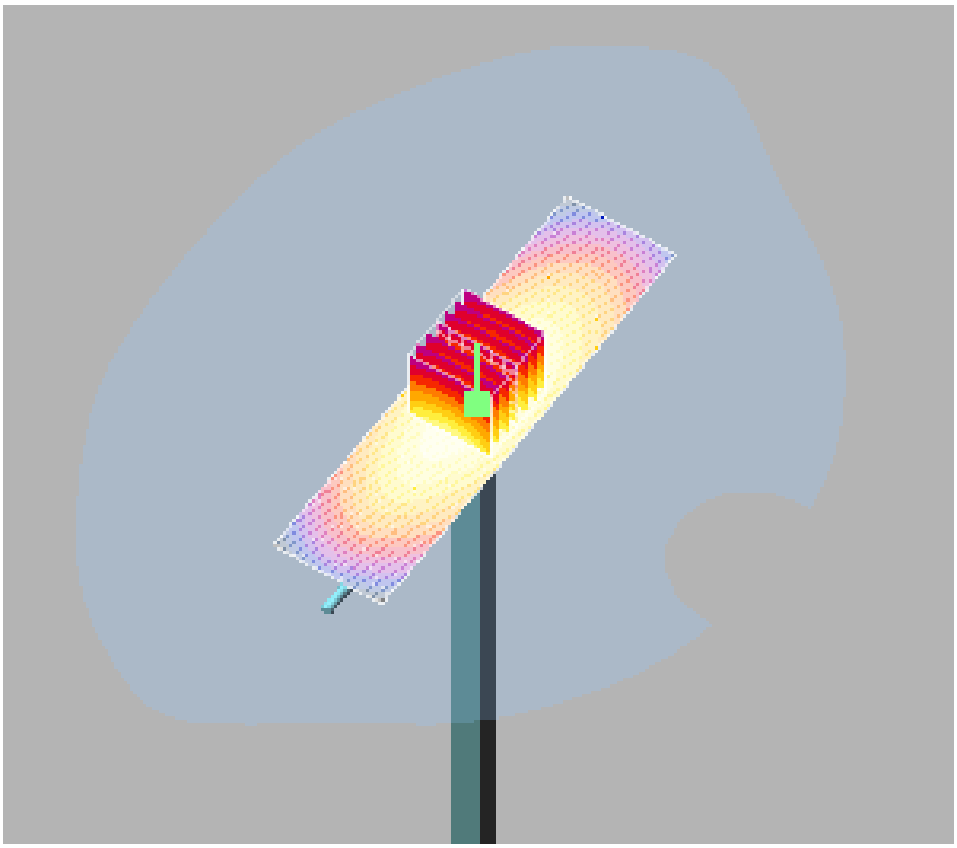
**System Validation - HSL: 850 MHz**

| | |
|---|---|
| Temperature of Liquid | : 22.4 ºC |
| Test Frequency | : 850 MHz |
| Measured Conductivity | : 0.94 S/m |
| Measured Permittivity | : 43.07 |

**Final Scan Results:**

| | |
|---|---|
| Power input to Dipole | : 50mW |
| Grid Dimension | : 7mmX7mmX7mm |
| Power Reference | : 24.5 V/m |
| Measured SAR | : 0.474 W/kg |
| Normalized to 1W power | : 9.48 W/Kg |
| Power Drift | : -0.59dB |

**Measurement Plot**



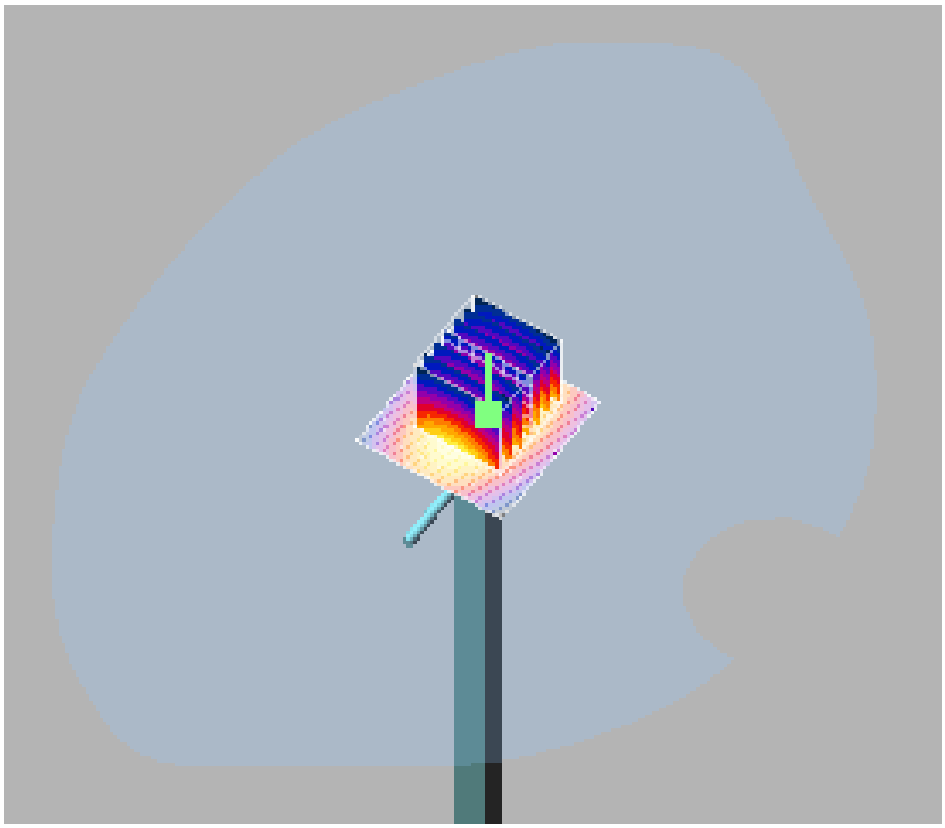
**System Validation - HSL: 1750 MHz**

| | |
|---|---|
| Temperature of Liquid | : 22.4 ºC |
| Test Frequency | : 1750MHz |
| Measured Conductivity | : 1.375 S/m |
| Measured Permittivity | : 40.97 |

**Final Scan Results:**

| | |
|---|---|
| Power input to Dipole | : 50mW |
| Grid Dimension | : 7mmX7mmX7mm |
| Power Reference | : 38.1V/m |
| Measured SAR | : 1.75 W/kg |
| Normalized to 1W power | : 35 W/Kg |
| Power Drift | : -0.12dB |

**Measurement Plot**



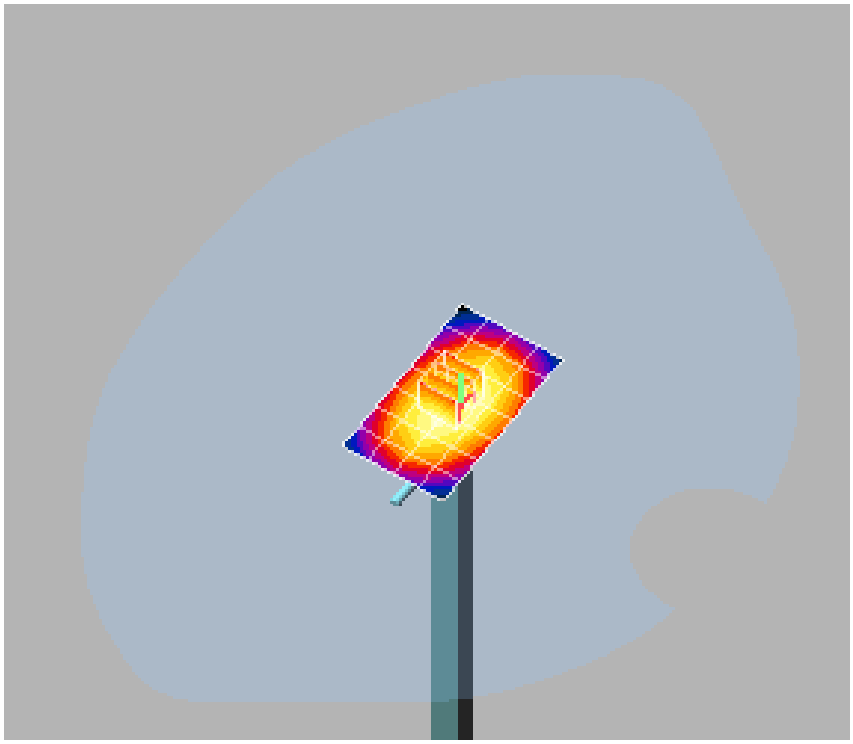
**System Validation - HSL: 1900 MHz**

| | |
|---|---|
| Temperature of Liquid | : 22.4 ºC |
| Test Frequency | : 1900MHz |
| Measured Conductivity | : 1.42 S/m |
| Measured Permittivity | : 40.78 |

**Final Scan Results:**

| | |
|---|---|
| Power input to Dipole | : 50mW |
| Grid Dimension | : 7mmX7mmX7mm |
| Power Reference | : 42.3V/m |
| Measured SAR | : 1.93 W/kg |
| Normalized to 1W power | : 38.6 W/Kg |
| Power Drift | : -0.15dB |

**Measurement Plot**



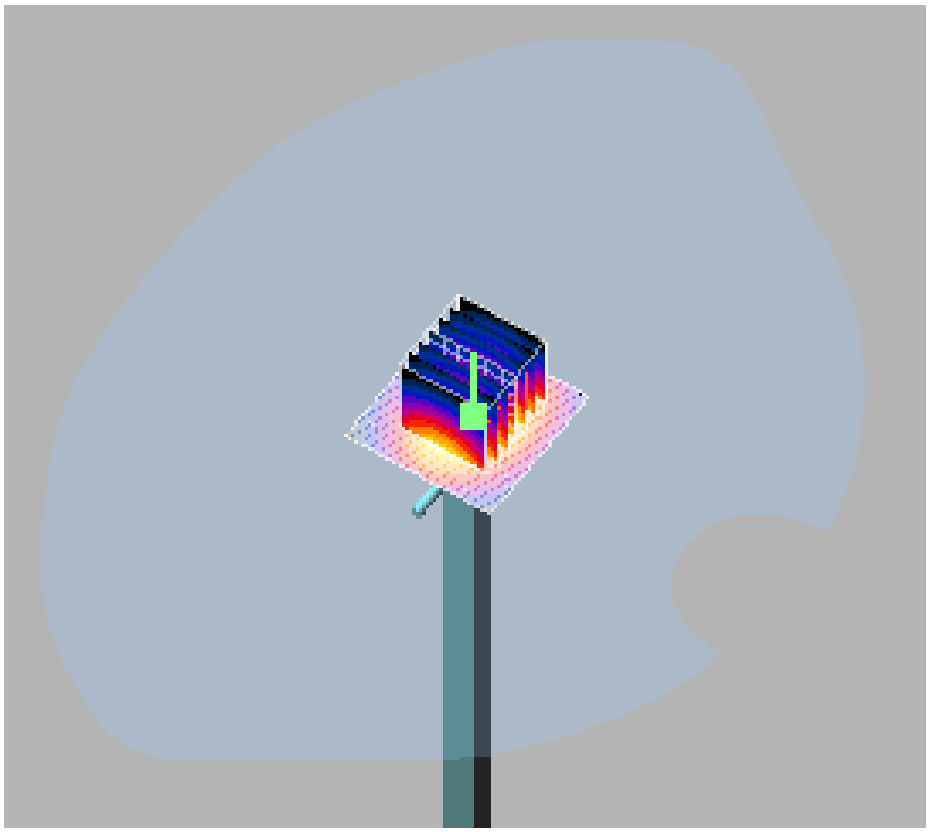
**System Validation - HSL: 2450 MHz**

| | |
|---|---|
| Temperature of Liquid | : 22.4 ºC |
| Test Frequency | : 2450MHz |
| Measured Conductivity | : 1.81 S/m |
| Measured Permittivity | : 40.154 |

**Final Scan Results:**

| | |
|---|---|
| Power input to Dipole | : 50mW |
| Grid Dimension | : 7mmX7mmX7mm |
| Power Reference | : 41.5V/m |
| Measured SAR | : 2.62 W/kg |
| Normalized to 1W power | : 52.4 W/Kg |
| Power Drift | : -0.25dB |

**Measurement Plot**



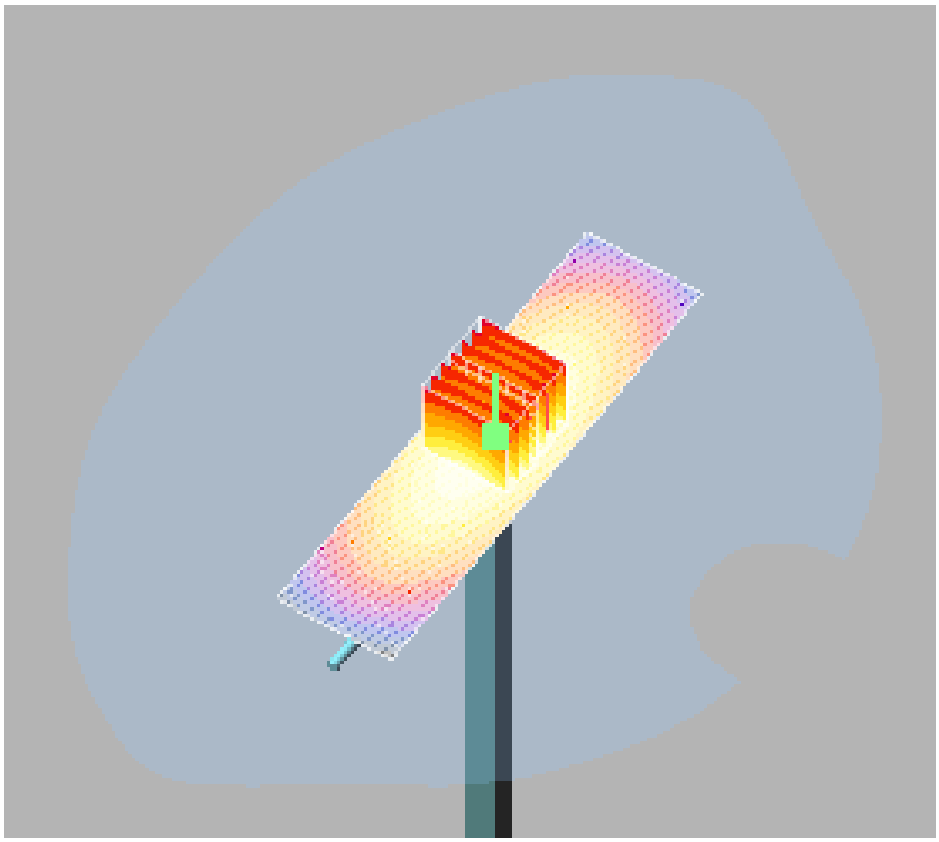
**System Validation - MSL: 850 MHz**

| | |
|---|---|
| Temperature of Liquid | : 22.7 ºC |
| Test Frequency | : 850 MHz |
| Measured Conductivity | : 1.017 S/m |
| Measured Permittivity | : 54.51 |

**Final Scan Results:**

| | |
|---|---|
| Power input to Dipole | : 50mW |
| Grid Dimension | : 7mmX7mmX7mm |
| Power Reference | : 21.6 V/m |
| Measured SAR | : 0.457 W/kg |
| Normalized to 1W power | : 9.14 W/Kg |
| Power Drift | : 0.21 dB |

**Measurement Plot**



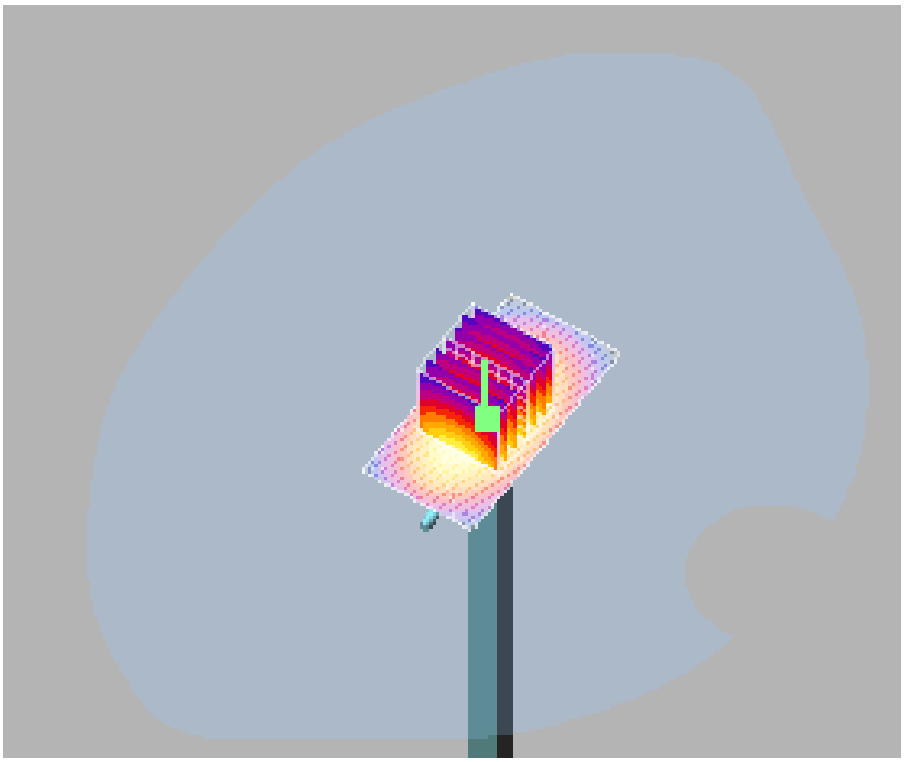
**System Validation - MSL: 1750 MHz**

| | |
|---|---|
| Temperature of Liquid | : 22.7 ºC |
| Test Frequency | : 1750MHz |
| Measured Conductivity | : 1.454 S/m |
| Measured Permittivity | : 53.356 |

**Final Scan Results:**

| | |
|---|---|
| Power input to Dipole | : 50mW |
| Grid Dimension | : 7mmX7mmX7mm |
| Power Reference | : 37.2 V/m |
| Measured SAR | : 1.76 W/kg |
| Normalized to 1W power | : 35.2 W/Kg |
| Power Drift | : -0.02dB |

**Measurement Plot**



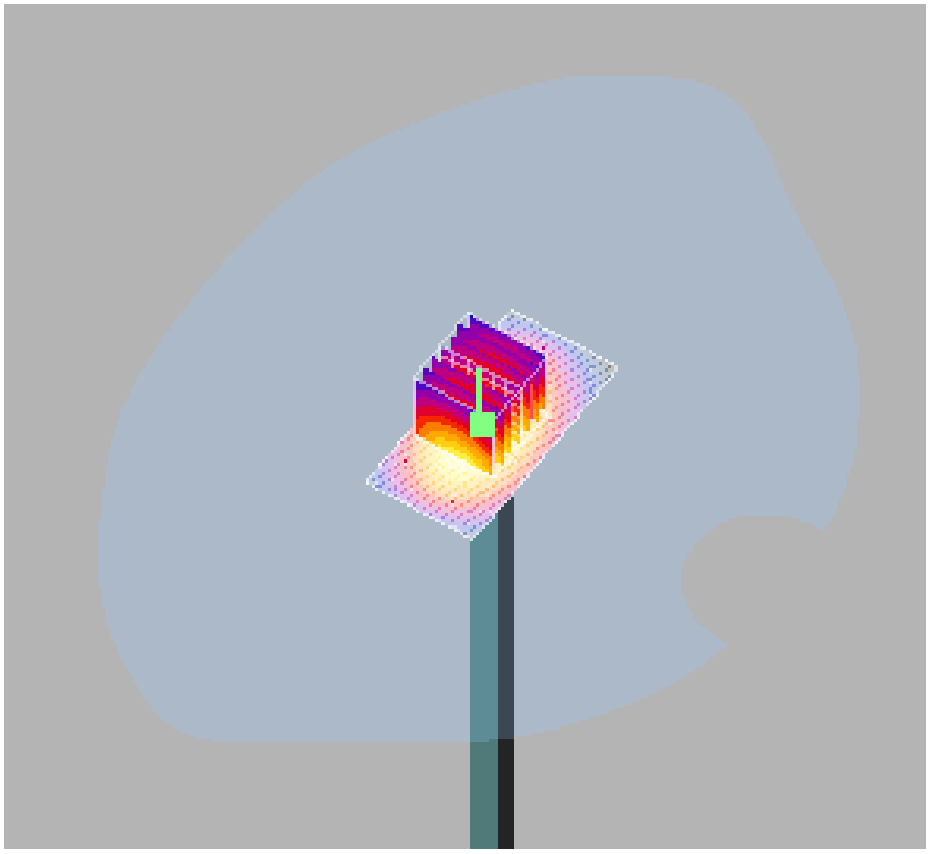
**System Validation - MSL: 1900 MHz**

| | |
|---|---|
| Temperature of Liquid | : 22.7 ºC |
| Test Frequency | : 1900MHz |
| Measured Conductivity | : 1.532 S/m |
| Measured Permittivity | : 53.505 |

**Final Scan Results:**

| | |
|---|---|
| Power input to Dipole | : 50mW |
| Grid Dimension | : 7mmX7mmX7mm |
| Power Reference | : 38.3 V/m |
| Measured SAR | : 2.07 W/kg |
| Normalized to 1W power | : 41.4 W/Kg |
| Power Drift | : -0.05dB |

**Measurement Plot**



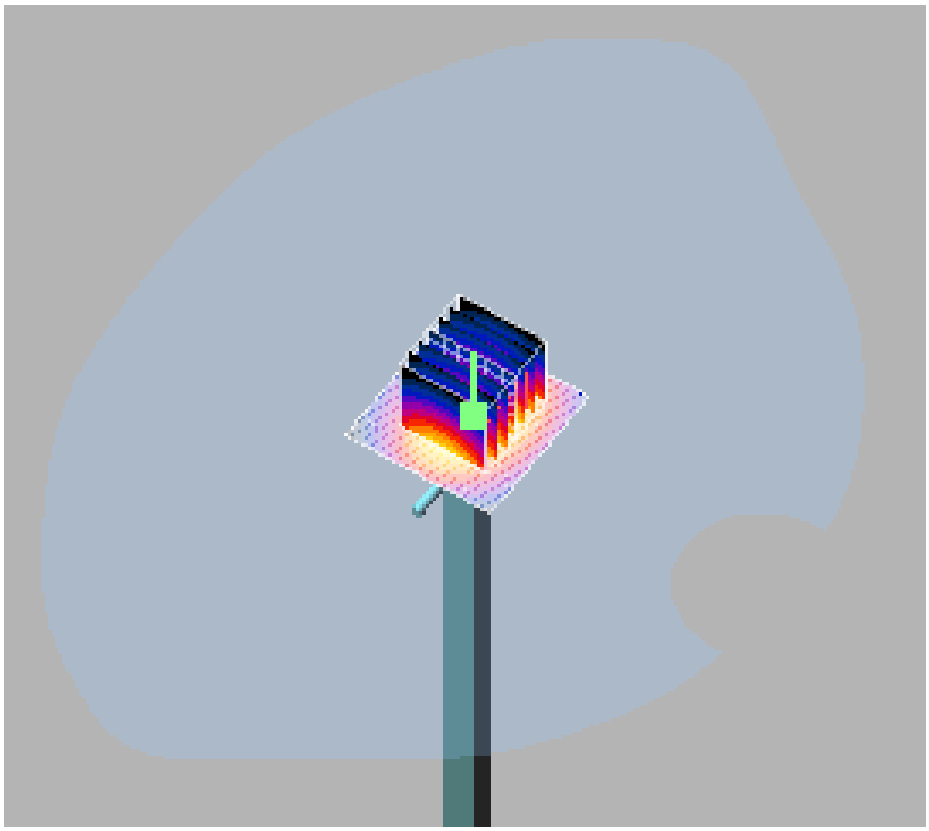
**System Validation - MBBL: 2450 MHz**

| | |
|---|---|
| Temperature of Liquid | : 23 ºC |
| Test Frequency | : 2450MHz |
| Measured Conductivity | : 1.95 S/m |
| Measured Permittivity | : 52.66 |

**Final Scan Results:**

| | |
|---|---|
| Power input to Dipole | : 50mW |
| Grid Dimension | : 7mmX7mmX7mm |
| Power Reference | : 18.5 V/m |
| Measured SAR | : 2.63 W/kg |
| Normalized to 1W power | : 52.6 W/Kg |
| Power Drift | : 0.28dB |

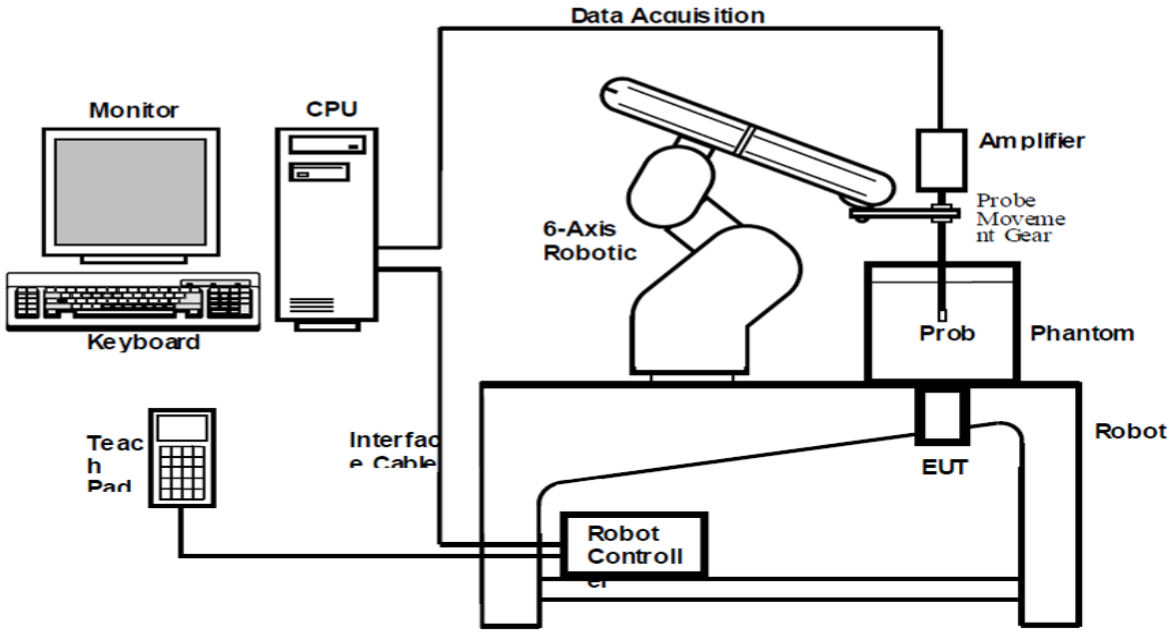
**Measurement Plot**



## 4. Specific Absorption rate of EUT

### System Description

The SAR measurement system used by TUV India is the SPEAG DASY4, which consists of a Staubli robot-arm and controller, SPEAG probe and amplifier and an appropriate phantom as required and considered appropriate for the applied test. The robot is used to move and manipulate the probe to programmed positions inside the phantom to obtain the SAR readings from the EUT.




The system is remote controlled by a PC, which contains the software to control the robot and data acquisition equipment. The software also displays the data obtained from test scans by calculating the measured values into corresponding SAR values based on the currently acceptable calculation methods.

The position and digitized shape of the phantom are made available to the software for accurate positioning of the probe and reduction of set-up time.

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

### Measurement Procedure

During the SAR measurement, the positioning of the probe is performed with sufficient accuracy to obtain repeatable measurements in the presence of rapid spatial attenuation phenomena. The accurate positioning of the E-field probe is accomplished by using the high precision robot. The robot can be taught to position the probe sensor following a specific pattern of points.

After an area scan has been done a 3D scan is set up around the location of the maximum spot SAR. First, a point within the scan area is visited by the probe and a SAR reading taken at the start of testing. At the end of testing, the probe is returned to the same point and a second reading is taken. Comparison between these start and end readings enables the power (SAR) drift during measurement to be assessed.

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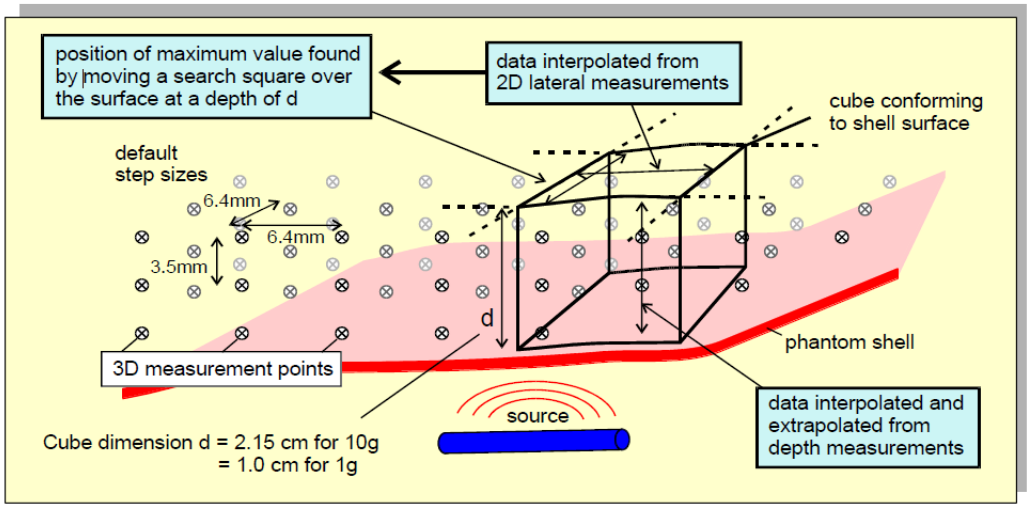
**Step size and scan information**

For the EUT"s 2.4 GHz band a 30 x 30 mm area is scanned centered around the hotspot using 6 steps in the x-y plane and 10 steps of 3.0 mm in the z plane. The first area scan is performed with the probe tip 5 mm above the phantom bottom shell. For the EUT"s 5 GHz band a 24 x 24 mm area is scanned centered around the hotspot using 6 steps in the x-y plane and 6 steps of 3 mm in the z plane. The first area scan is performed with the probe tip 2 mm above the phantom bottom shell.




**SARA2 Interpolation and Extrapolation schemes**

SARA2 software contains support for both 2D cubic B-spline interpolation as well as 3D cubic B-spline interpolation. In addition, for extrapolation purposes, a general $n_{th}$ order polynomial fitting routine is implemented following a singular value decomposition algorithm. A $4_{th}$ order polynomial fit is used by default for data extrapolation.

**Interpolations 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 approximately 10 mm 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 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). DASY4 enables full control over the selection of alternative step sizes in all directions. The digitized shape of the Flat Phantom is available to the DASY4 software, which decides which points in the 3D array are sufficiently well within the shell wall to be visited by the SAR probe. After the data collection, the data are extrapolated in the depth direction to assign values to points in the 3D array closer to the shell wall. A notional extrapolation value is also assigned to the first point outside the shell wall so that subsequent interpolation schemes will be applicable right up to the shell wall boundary.

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**Interpolation of 3D scan and volume averaging**

The procedure used for defining the shape of the volumes used for SAR averaging in the SARA2 software follow the method of adapting the surface of the „cube" to conform with the surface of the phantom. This is called, here, the conformal scheme.

For each row of data in the depth direction, the data are extrapolated and interpolated to les s than 1 mm 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. These results in two 2D arrays of data, 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. For measurements in rectangular, box phantoms, the distance between the phantom wall and the closest set of gridded data points is entered into the software.

The default step size (dstep) used is 3.5 mm, 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) is 0.04 mm.

The flat phantom is made from Polymethylmethacrylate (PMMA), a low-loss dielectric material with dielectric constant and loss tangent less than 5.0 and 0.05 respectively. The shell thickness for all regions coupled to the test device and its antenna are within 2.0 ± 0.2 mm.

For the upright phantom, the alignment is based upon registration of the rotation axis of the phantom on its 253 mm-diameter base plate bearing and the position of the probe axis when commanded to go to the axial position. A laser alignment tool is provided. This enables the registration of the phantom tip (dmis) to be assured to within approx. 0.2 mm. This alignment is done with reference to the actual probe tip after installation and probe alignment.

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**Summary of Results: GSM**

The tests were done with all 6 EUT Positions and the worst case emissions are found when EUT front face was touching the Phantom. The same results are reported in the below table.

| **Limit : 1.6 W/kg** | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Band** | **Channel Frequency (MHz)** | **Measured Power (dBm)** | **Measured Power (mW)** | **Tune-Up Scaling Factor (dB)** | **Tune-Up Scaling Factor (mW)** | **Maximum Tune-up Tolerance (mw)** | **Measured SAR (W/kg)** | **Reported SAR (W/kg)** | **Worst Case EUT Position** |
| GSM 850_Head | 824.2 | 30.62 | 1153.45 | 0.5 | 1.12 | 1294.20 | 0.389 | 0.436 | Right Touch |
| | 836.6 | 30.74 | 1185.77 | 0.5 | 1.12 | 1330.45 | 0.419 | 0.470 | Right Touch |
| | 848.8 | 31.42 | 1386.76 | 0.5 | 1.12 | 1555.97 | 0.425 | 0.477 | Right Touch |
| GSM 850_Body | 824.2 | 30.62 | 1153.45 | 0.5 | 1.12 | 1294.20 | 0.138 | 0.155 | Edge 1 |
| | 836.6 | 30.74 | 1185.77 | 0.5 | 1.12 | 1330.45 | 0.153 | 0.172 | Edge 1 |
| | 848.8 | 31.42 | 1386.76 | 0.5 | 1.12 | 1555.97 | 0.171 | 0.192 | Edge 1 |
| PCS1900_Head | 1850.2 | 27.39 | 548.28 | 0.3 | 1.07 | 587.49 | 0.512 | 0.549 | Right Touch |
| | 1880 | 27.49 | 561.05 | 0.3 | 1.07 | 601.17 | 0.433 | 0.464 | Right Touch |
| | 1909.8 | 27.47 | 558.47 | 0.3 | 1.07 | 598.41 | 0.481 | 0.515 | Right Touch |
| PCS1900_Body | 1850.2 | 27.39 | 548.28 | 0.3 | 1.07 | 587.49 | 0.142 | 0.152 | Front Face |
| | 1880 | 27.49 | 561.05 | 0.3 | 1.07 | 601.17 | 0.133 | 0.143 | Front Face |
| | 1909.8 | 27.47 | 558.47 | 0.3 | 1.07 | 598.41 | 0.132 | 0.141 | Front Face |

**Note:** Test Performed with Voice mode having Worst case power.

| Protocol | Band | Channel Frequency (MHz) |
|---|---|---|
| GSM | GSM850 | 824.2 |

Temperature of Liquid : 22.68 ºC
Measured Conductivity : 0.93 S/m
Measured Permittivity : 40.805

## Area Scan

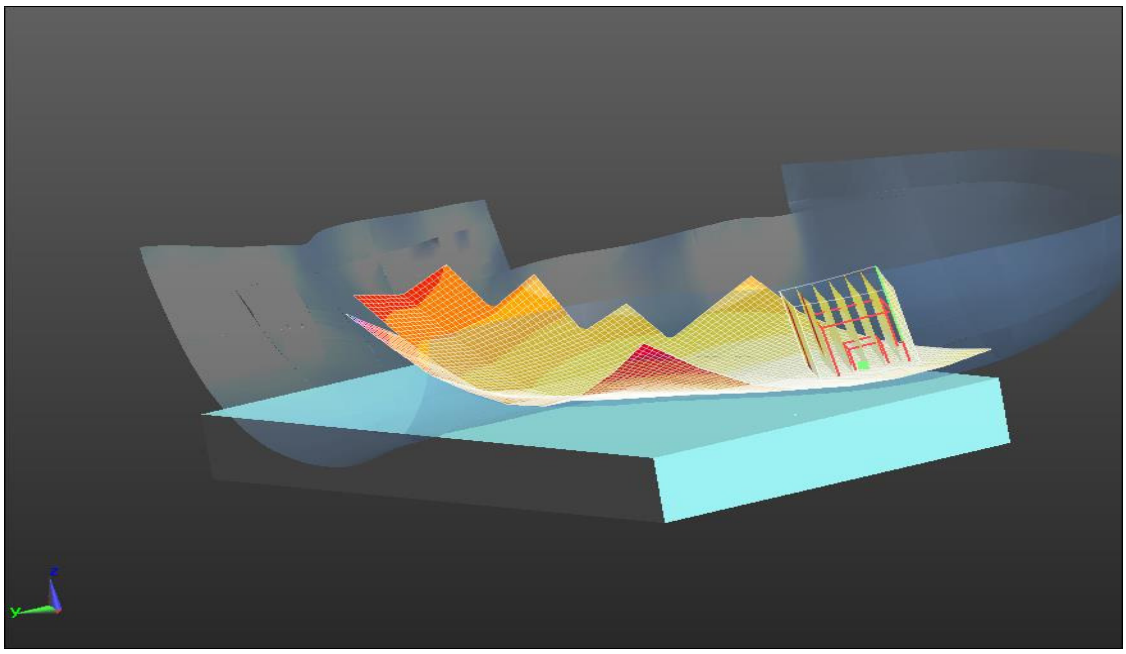
Grid Dimension : 131mmX81mmX1mm
Maximum SAR : 0.579 W/Kg

## Zoom Scan

Grid Dimension : 7mmX7mmX7mm
Power Reference : 11.57 V/m
Measured SAR : 0.389 W/Kg
Power Drift : 0.20 dB

**Measurement Plot:**

EUT Position: Right Touch



| Protocol | Band | Channel Frequency (MHz) |
|---|---|---|
| GSM | GSM850 | 836.6 |

Temperature of Liquid : 22.68 ºC
Measured Conductivity : 0.96 S/m
Measured Permittivity : 40.905

## Area Scan

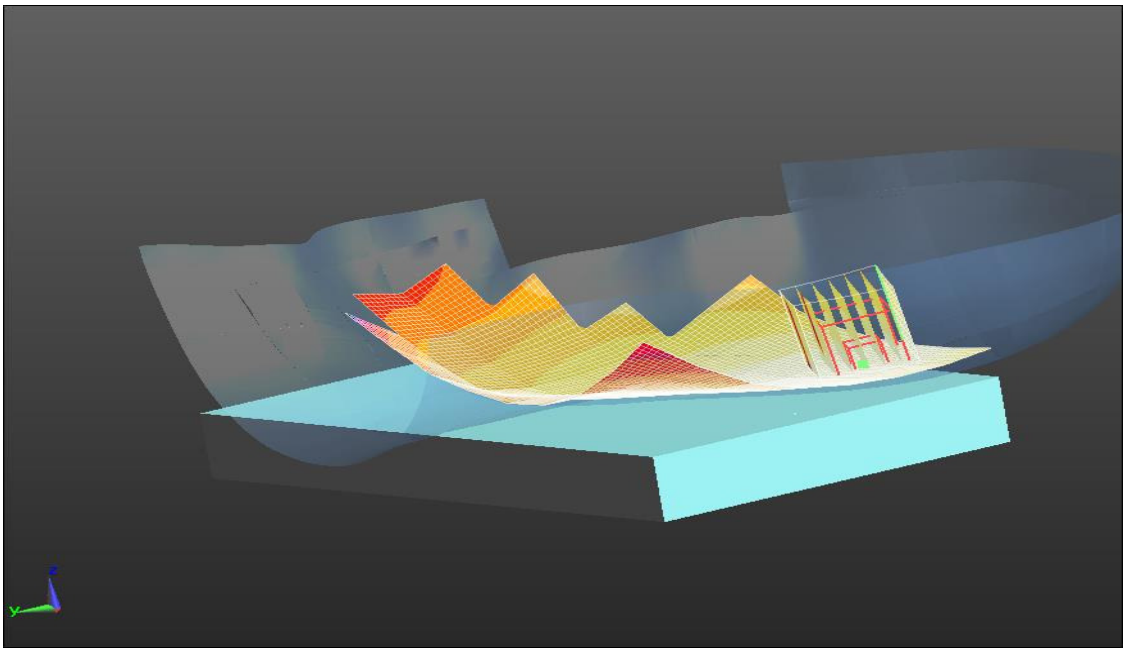
Grid Dimension : 131mmX81mmX1mm
Maximum SAR : 0.549W/Kg

## Zoom Scan

Grid Dimension : 7mmX7mmX7mm
Power Reference : 11.57 V/m
Measured SAR : 0.419 W/Kg
Power Drift : 0.22 dB

**Measurement Plot:**

EUT Position: Right Touch



| Protocol | Band | Channel Frequency (MHz) |
|---|---|---|
| GSM | GSM850 | 848.8 |

Temperature of Liquid : 24.03 ºC
Measured Conductivity : 0.97 S/m
Measured Permittivity : 40.985

## Area Scan

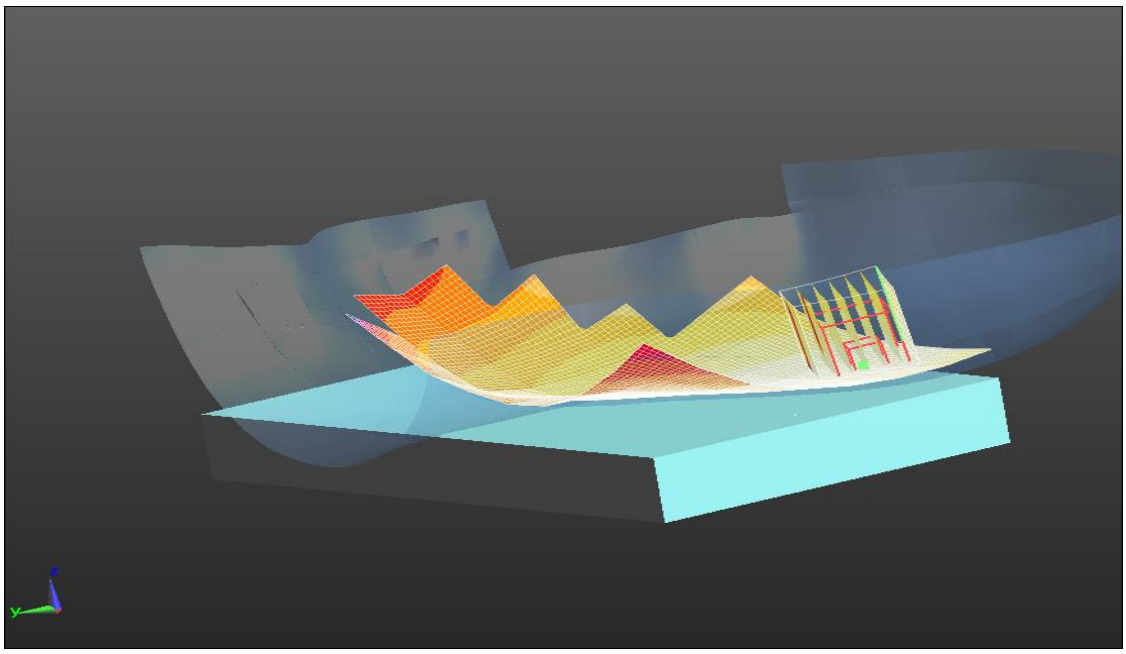
Grid Dimension : 131mmX81mmX1mm
Maximum SAR : 0.599W/Kg

## Zoom Scan

Grid Dimension : 7mmX7mmX7mm
Power Reference : 11.21 V/m
Measured SAR : 0.425 W/Kg
Power Drift : 0.18 dB

**Measurement Plot:**

EUT Position: Edge 1



| Protocol | Band | Channel Frequency (MHz) |
|---|---|---|
| GSM | GSM850 | 824.2 |

Temperature of Liquid : 21.9 ºC
Measured Conductivity : 0.895 S/m
Measured Permittivity : 55.408

## Area Scan

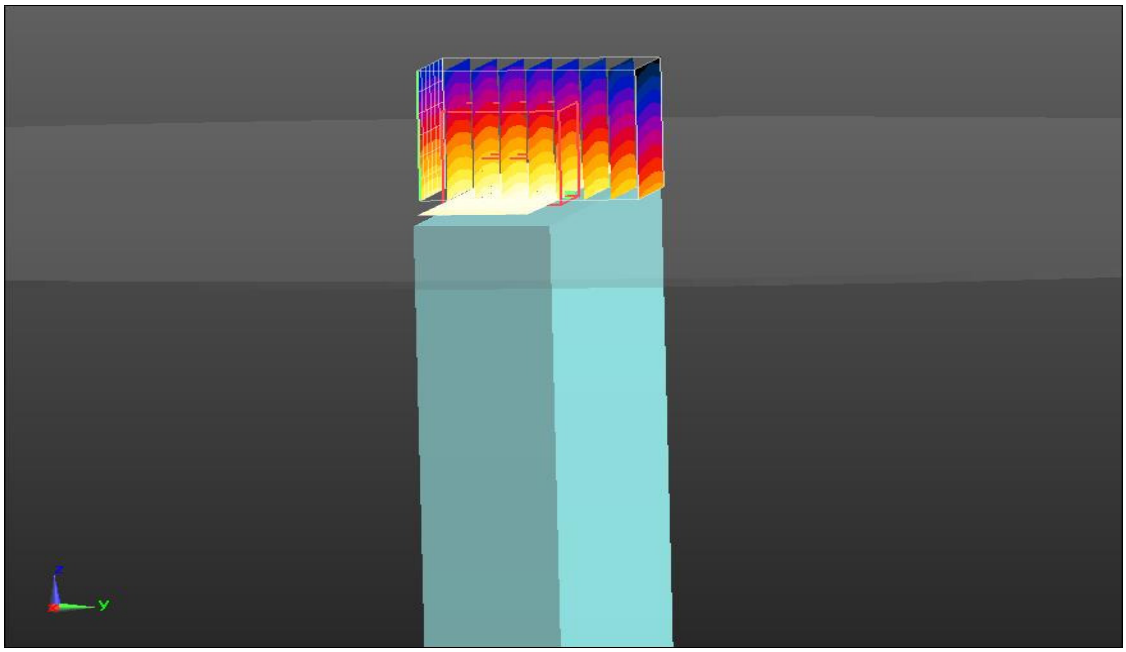
Grid Dimension : 81mmX91mmX1mm
Maximum SAR : 0.182W/Kg

## Zoom Scan

Grid Dimension : 7mmX9mmX7mm
Power Reference : 14.08 V/m
Measured SAR : 0.138 W/Kg
Power Drift : -0.34 dB

**Measurement Plot:**

EUT Position: Edge 1



| Protocol | Band | Channel Frequency (MHz) |
|---|---|---|
| GSM | GSM850 | 836.6 |

Temperature of Liquid : 21.9 ºC
Measured Conductivity : 0.89 S/m
Measured Permittivity : 55.38

## Area Scan

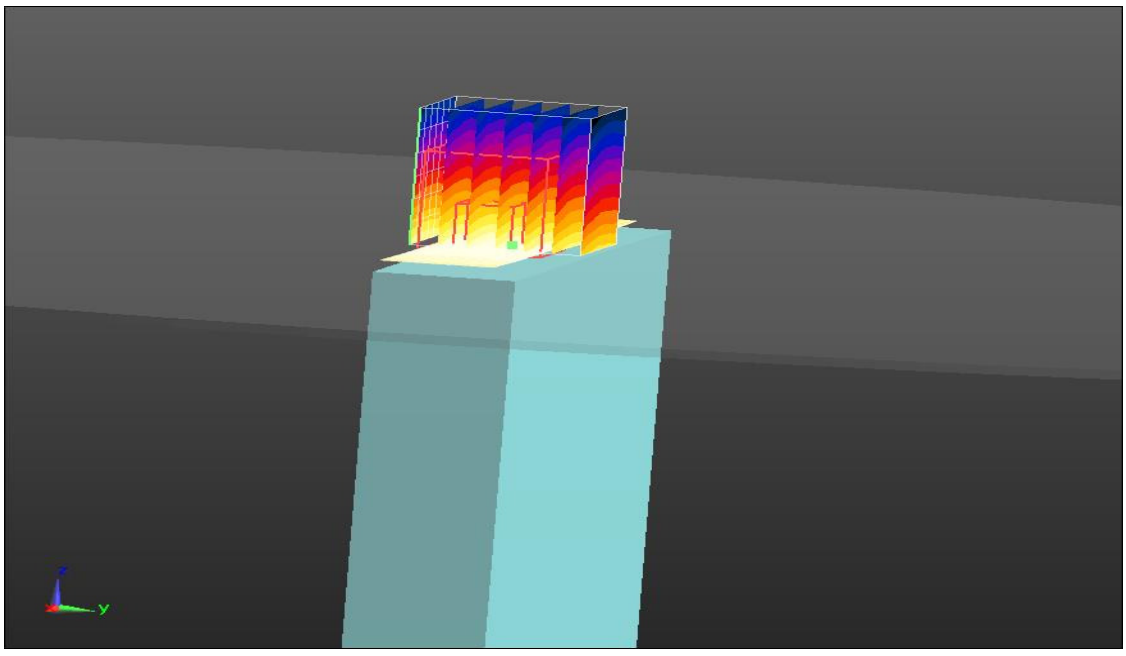
Grid Dimension : 71mmX91mmX1mm
Maximum SAR : 0.229W/Kg

## Zoom Scan

Grid Dimension : 7mmX7mmX7mm
Power Reference : 16.26 V/m
Measured SAR : 0.153 W/Kg
Power Drift : -0.17 dB

**Measurement Plot:**

EUT Position: Edge 1



| Protocol | Band | Channel Frequency (MHz) |
|---|---|---|
| GSM | GSM850 | 848.8 |

Temperature of Liquid : 21.9 ºC
Measured Conductivity : 0.902 S/m
Measured Permittivity : 55.35

## Area Scan

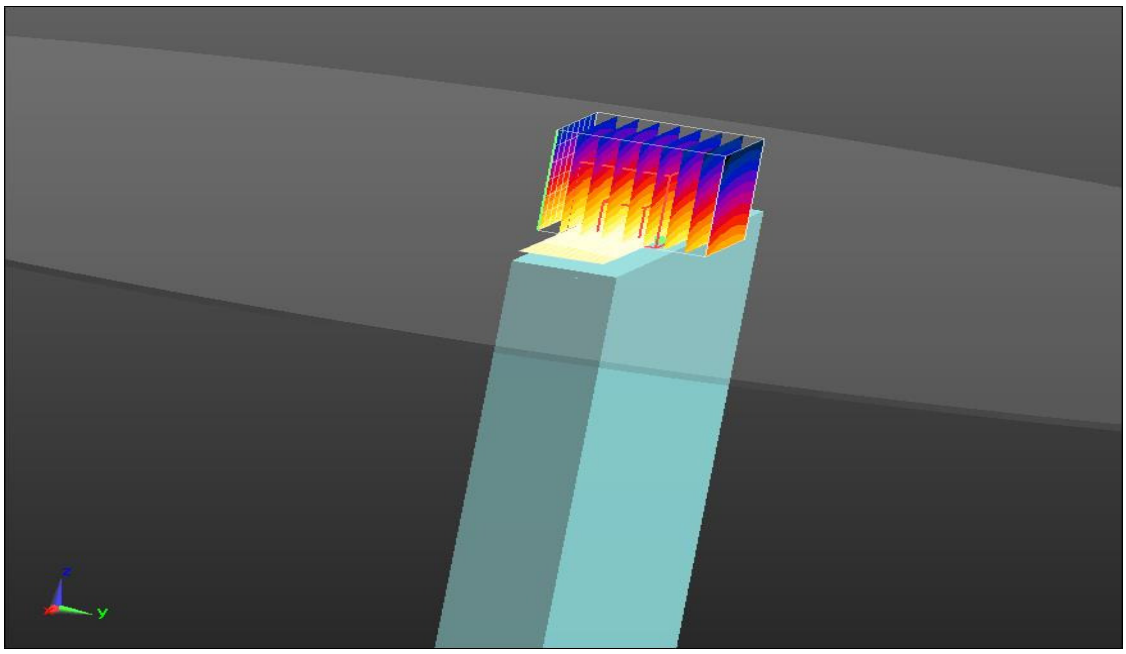
Grid Dimension : 91mmX91mmX1mm
Maximum SAR : 0.203W/Kg

## Zoom Scan

Grid Dimension : 8mmX9mmX7mm
Power Reference : 16.43 V/m
Measured SAR : 0.171 W/Kg
Power Drift : -0.64 dB

**Measurement Plot:**

EUT Position: Edge 1



| Protocol | Band | Channel Frequency (MHz) |
|---|---|---|
| GSM | PCS1900 | 1850.2 |

Temperature of Liquid : 21.6 ºC
Measured Conductivity : 1.432 S/m
Measured Permittivity : 39.086

## Area Scan

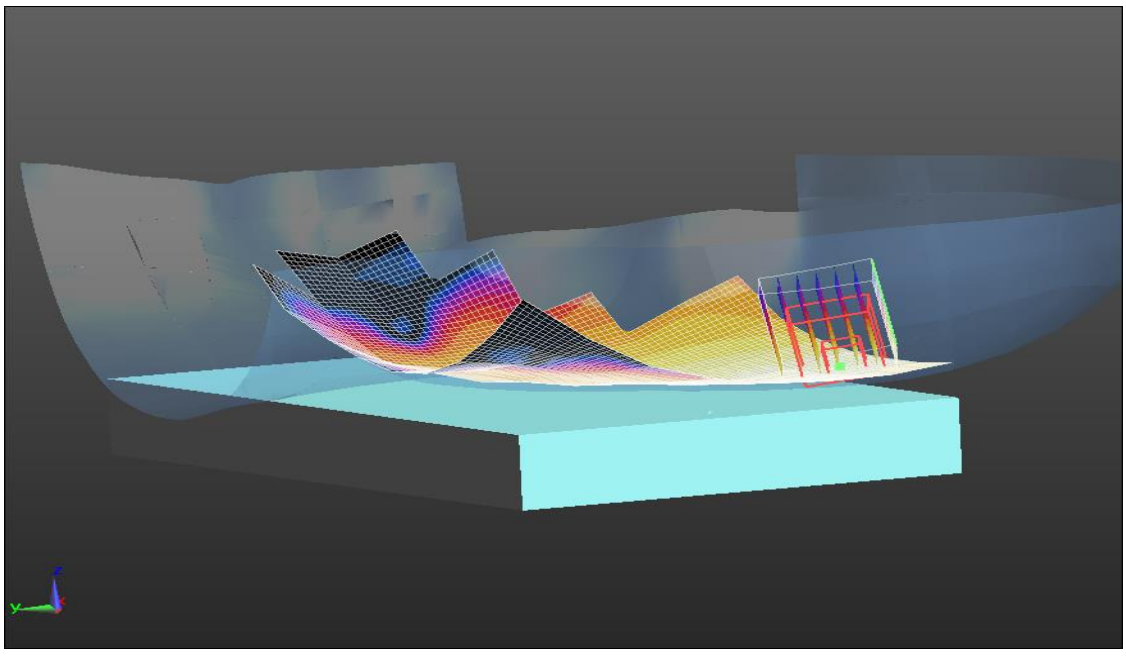
Grid Dimension : 131mmX101mmX1mm
Maximum SAR : 0.617W/Kg

## Zoom Scan

Grid Dimension : 7mmX7mmX7mm
Power Reference : 5.298V/m
Measured SAR : 0.512 W/Kg
Power Drift :-0.10dB

**Measurement Plot:**

EUT Position: Right Touch



| Protocol | Band | Channel Frequency (MHz) |
|---|---|---|
| GSM | PCS1900 | 1880 |

Temperature of Liquid : 21.6 ºC
Measured Conductivity : 1.446 S/m
Measured Permittivity : 38.927

## Area Scan

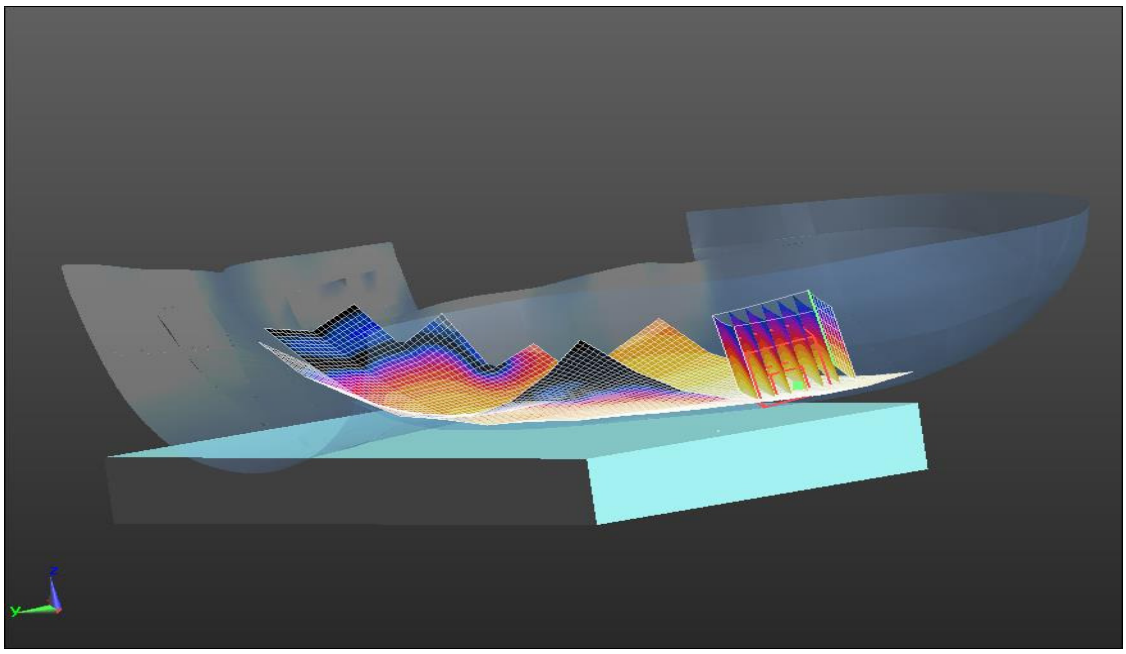
Grid Dimension : 131mmX91mmX1mm
Maximum SAR : 0.574 W/Kg

## Zoom Scan

Grid Dimension : 7mmX7mmX7mm
Power Reference : 4.878 V/m
Measured SAR : 0.433 W/Kg
Power Drift : -0.36dB

**Measurement Plot:**

EUT Position: Right Touch



| Protocol | Band | Channel Frequency (MHz) |
|---|---|---|
| GSM | PCS1900 | 1909.8 |

Temperature of Liquid : 21.6 ºC
Measured Conductivity : 1.457 S/m
Measured Permittivity : 38.772

## Area Scan

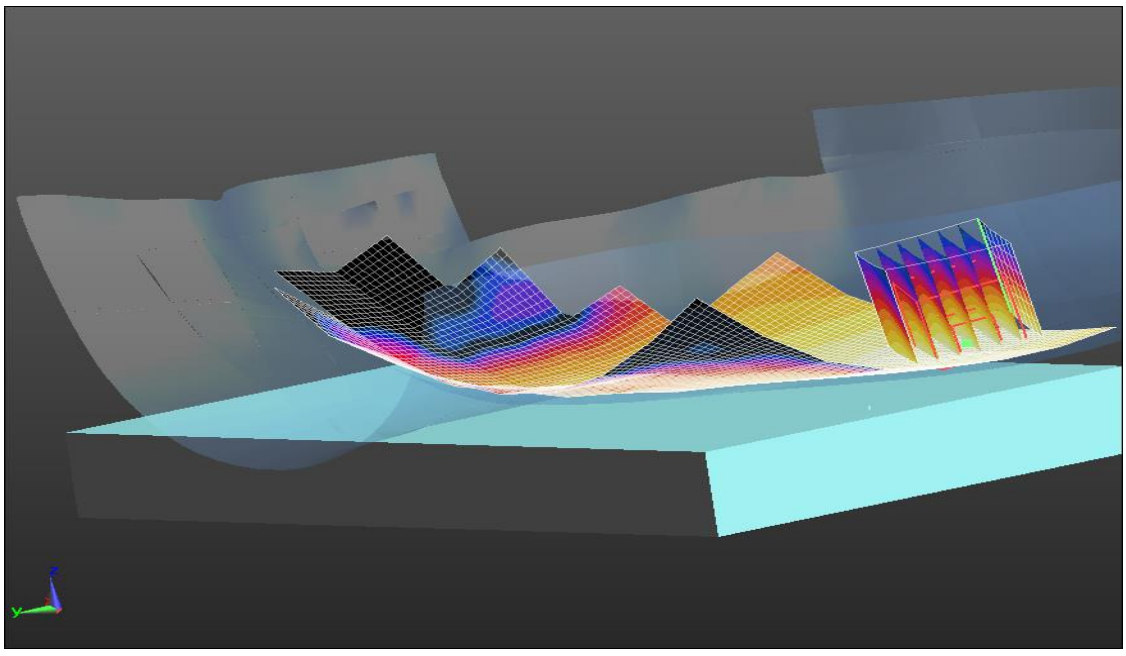
Grid Dimension : 131mmX101mmX1mm
Maximum SAR : 0.496W/Kg

## Zoom Scan

Grid Dimension : 7mmX7mmX7mm
Power Reference : 5.134V/m
Measured SAR : 0.481 W/Kg
Power Drift : -0.01dB

**Measurement Plot:**

EUT Position: Right Touch



| Protocol | Band | Channel Frequency (MHz) |
|---|---|---|
| GSM | PCS1900 | 1850.2 |

Temperature of Liquid : 21.5 ºC
Measured Conductivity : 1.55 S/m
Measured Permittivity : 53.842

## Area Scan

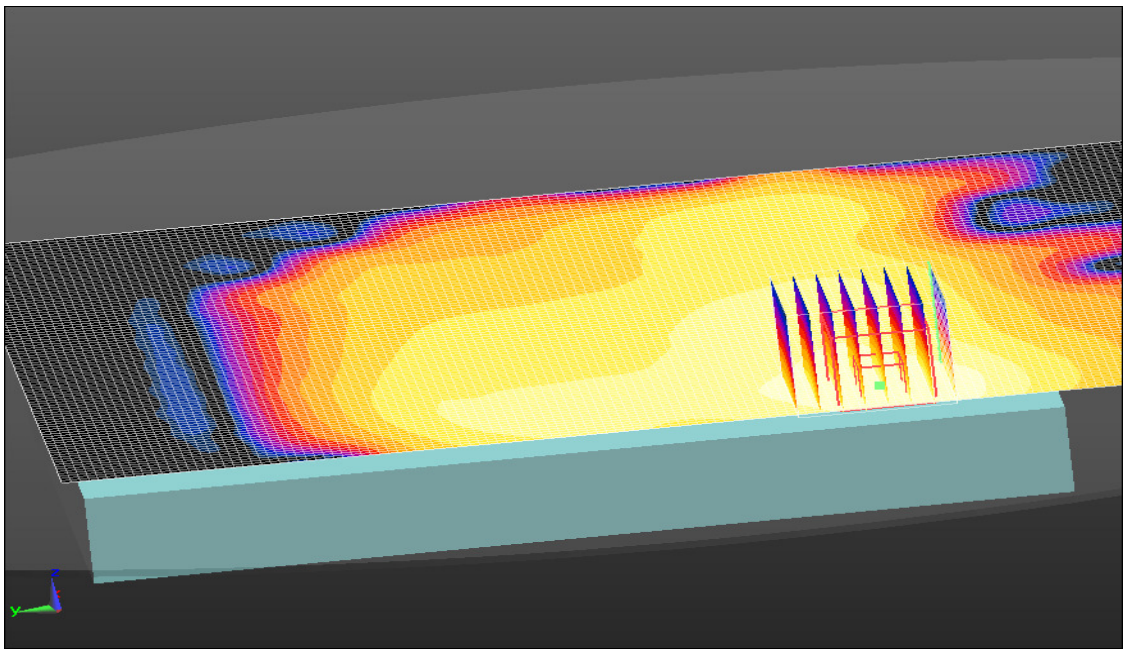
Grid Dimension : 131mmX101mmX1mm
Maximum SAR : 0.193 W/Kg

## Zoom Scan

Grid Dimension : 8mmX8mmX7mm
Power Reference : 4.392 V/m
Measured SAR : 0.142 W/Kg
Power Drift : -0.06 dB

**Measurement Plot:**

EUT Position: Front Face



| Protocol | Band | Channel Frequency (MHz) |
|---|---|---|
| GSM | PCS1900 | 1880 |

Temperature of Liquid : 21.5 ºC
Measured Conductivity : 1.55 S/m
Measured Permittivity : 53.842

## Area Scan

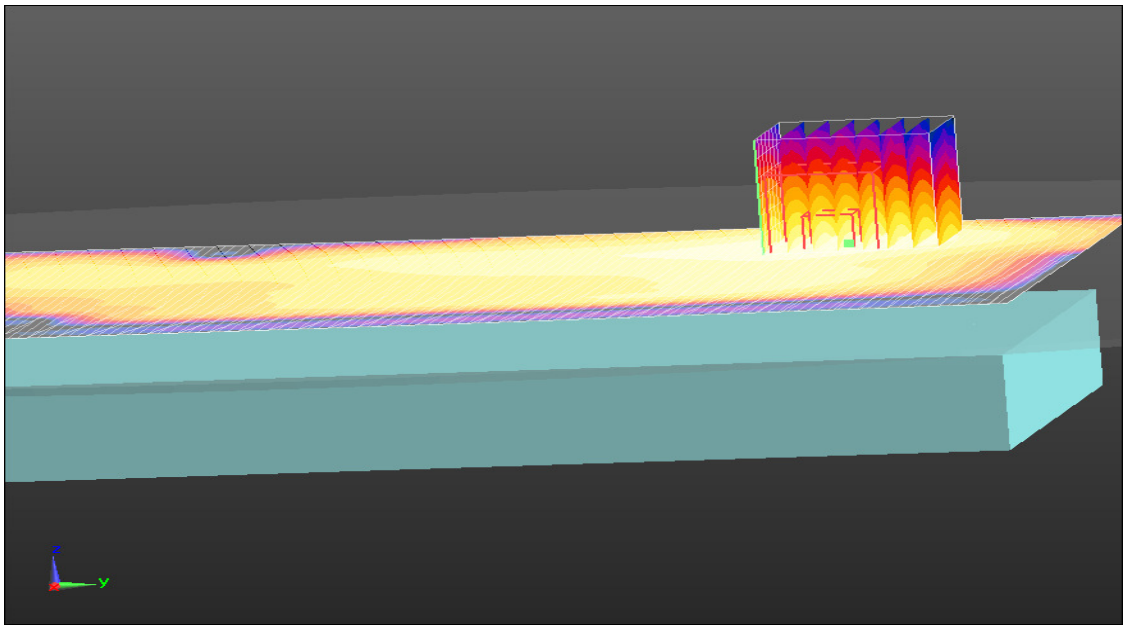
Grid Dimension : 131mmX91mmX1mm
Maximum SAR : 0.189 W/Kg

## Zoom Scan

Grid Dimension : 8mmX8mmX7mm
Power Reference : 4.598 V/m
Measured SAR : 0.133 W/Kg
Power Drift : 0.28 dB

**Measurement Plot:**

EUT Position: Front Face



| Protocol | Band | Channel Frequency (MHz) |
|---|---|---|
| GSM | PCS1900 | 1909.8 |

Temperature of Liquid : 21.5 ºC
Measured Conductivity : 1.58 S/m
Measured Permittivity : 53.735

## Area Scan

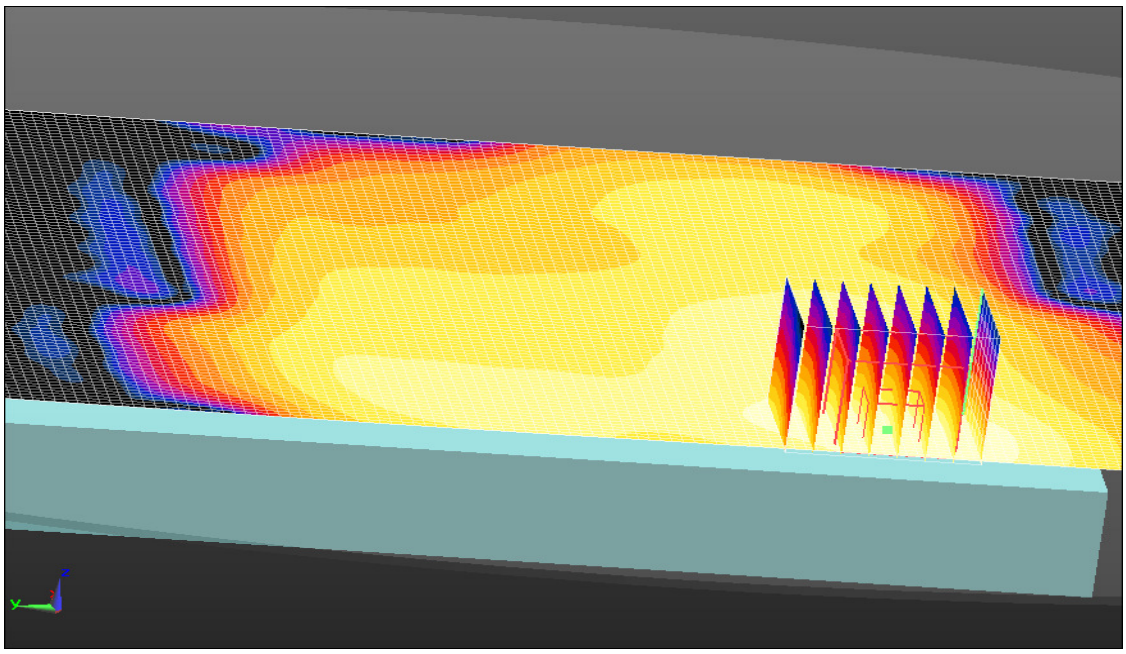
Grid Dimension : 131mmX101mmX1mm
Maximum SAR : 0.183W/Kg

## Zoom Scan

Grid Dimension : 8mmX8mmX7mm
Power Reference : 4.272V/m
Measured SAR : 0.132 W/Kg
Power Drift : -0.10dB

**Measurement Plot:**

EUT Position: Right Touch



**Summary of Results: WCDMA**

| Band | Channel Frequency (MHz) | Measured Power (dBm) | Measured Power (mW) | Tune-Up Scaling Factor (dB) | Tune-Up Scaling Factor (mW) | Maximum Tune-up Tolerance (mw) | Measured SAR (W/kg) | Reported SAR (W/kg) | Worst Case EUT Position |
|---|---|---|---|---|---|---|---|---|---|
| W-CDMA Band 2_Body | 1852.4 | 19.55 | 90.16 | 0.7 | 1.17 | 105.93 | 0.600 | 0.705 | Front Face |
| | 1880 | 20.21 | 104.95 | 0.7 | 1.17 | 123.31 | 0.444 | 0.522 | Front Face |
| | 1907.6 | 19.47 | 88.51 | 0.7 | 1.17 | 103.99 | 0.324 | 0.381 | Front Face |
| W-CDMA Band 4_Body | 1712.4 | 17.98 | 62.81 | 0.6 | 1.15 | 72.11 | 0.619 | 0.711 | Back Face |
| | 1732.4 | 18.49 | 70.63 | 0.6 | 1.15 | 81.10 | 0.63 | 0.723 | Back Face |
| | 1752.6 | 20.14 | 103.28 | 0.6 | 1.15 | 118.58 | 0.54 | 0.620 | Back Face |
| W-CDMA Band 5_Body | 826.4 | 19.19 | 82.99 | 0.4 | 1.10 | 90.99 | 0.13 | 0.143 | Edge 1 |
| | 836.6 | 19.09 | 81.10 | 0.4 | 1.10 | 88.92 | 0.348 | 0.382 | Edge 1 |
| | 846.6 | 20.57 | 114.02 | 0.4 | 1.10 | 125.03 | 0.228 | 0.250 | Edge 1 |
| W-CDMA Band 2_Head | 1852.4 | 19.55 | 90.16 | 0.7 | 1.17 | 105.93 | 0.879 | 1.033 | Right Touch |
| | 1880 | 20.21 | 104.95 | 0.7 | 1.17 | 123.31 | 1.19 | 1.398 | Right Touch |
| | 1907.6 | 19.47 | 88.51 | 0.7 | 1.17 | 103.99 | 0.618 | 0.726 | Right Touch |
| W-CDMA Band 4_Head | 1712.4 | 17.98 | 62.81 | 0.6 | 1.15 | 72.11 | 1.10 | 1.263 | Right Touch |
| | 1732.4 | 18.49 | 70.63 | 0.6 | 1.15 | 81.10 | 0.917 | 1.053 | Right Touch |
| | 1752.6 | 20.14 | 103.28 | 0.6 | 1.15 | 118.58 | 0.863 | 0.991 | Right Touch |
| W-CDMA Band 5_Head | 826.4 | 19.19 | 82.99 | 0.4 | 1.10 | 90.99 | 0.333 | 0.365 | Right Touch |
| | 836.6 | 19.09 | 81.10 | 0.4 | 1.10 | 88.92 | 0.667 | 0.731 | Right Touch |
| | 846.6 | 20.57 | 114.02 | 0.4 | 1.10 | 125.03 | 0.201 | 0.220 | Right Touch |

| Protocol | Band | Channel Frequency (MHz) |
|---|---|---|
| W-CDMA | FDD Band 2 | 1852.4 |

Temperature of Liquid : 20.2 ºC
Measured Conductivity : 1.413 S/m
Measured Permittivity : 54.269

## Area Scan

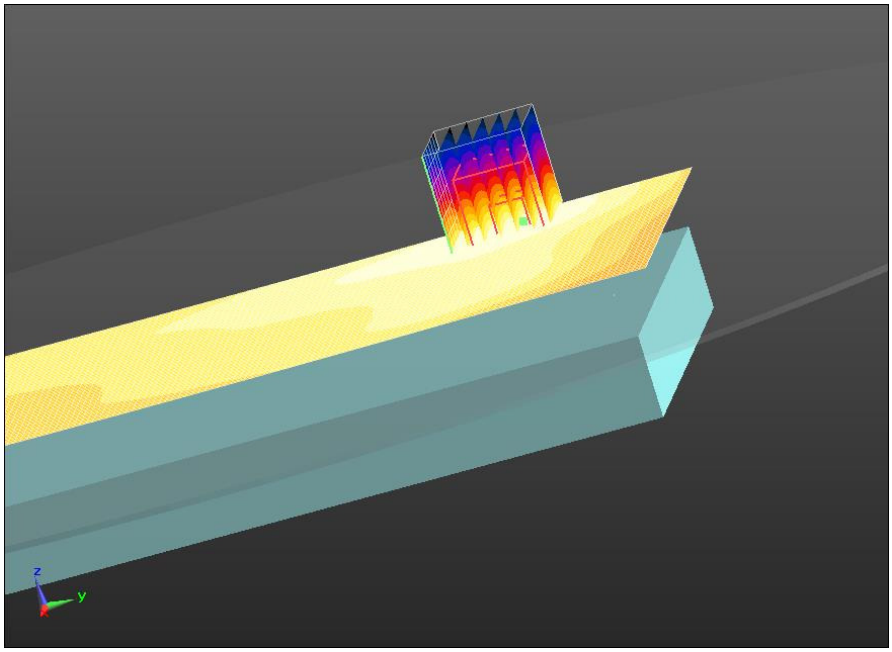
Grid Dimension : 131mmX101mmX1mm
Maximum SAR : 0.803W/Kg

## Zoom Scan

Grid Dimension : 7mmX7mmX7mm
Power Reference : 10.15 V/m
Measured SAR : 0.60 W/Kg
Power Drift : 0.15 dB

**Measurement Plot:**

EUT Position: Front Face



| Protocol | Band | Channel Frequency (MHz) |
|---|---|---|
| W-CDMA | FDD Band 2 | 1880 |

Temperature of Liquid : 20.2 ºC
Measured Conductivity : 1.408 S/m
Measured Permittivity : 54.196

## Area Scan

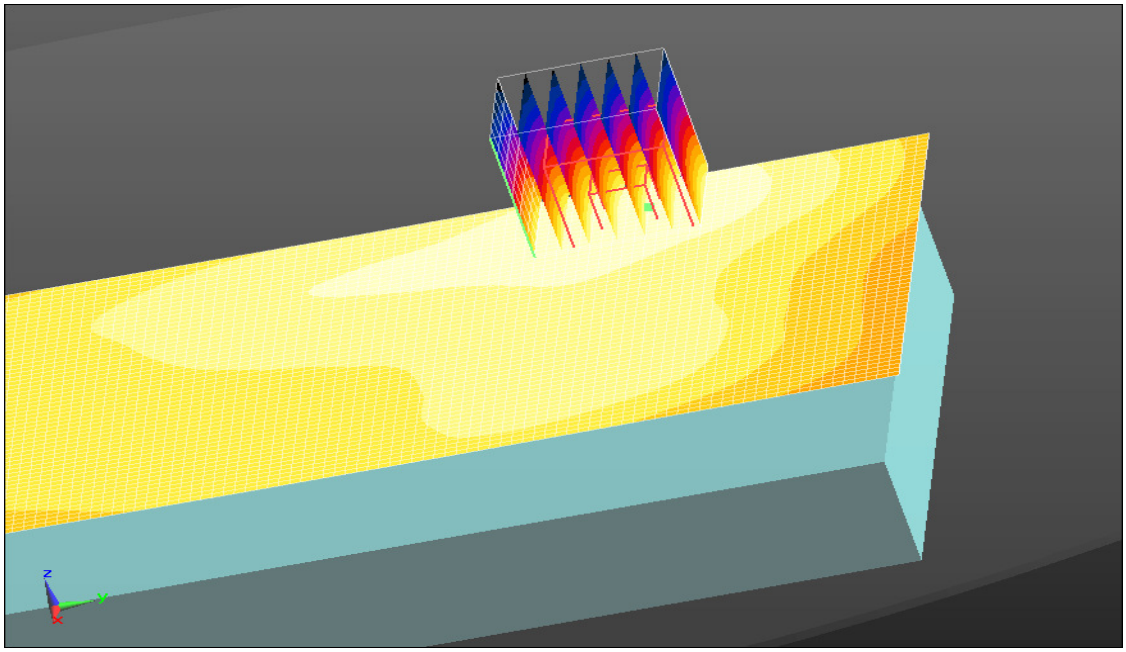
Grid Dimension : 131mmX91mmX1mm
Maximum SAR : 0.591 W/Kg

## Zoom Scan

Grid Dimension : 7mmX7mmX7mm
Power Reference : 9.158 V/m
Measured SAR : 0.444 W/Kg
Power Drift : 0.04 dB

**Measurement Plot:**

EUT Position: Front Face



| Protocol | Band | Channel Frequency (MHz) |
|---|---|---|
| W-CDMA | FDD Band 2 | 1907.6 |

Temperature of Liquid : 20.2 ºC
Measured Conductivity : 1.402 S/m
Measured Permittivity : 54.144

## Area Scan

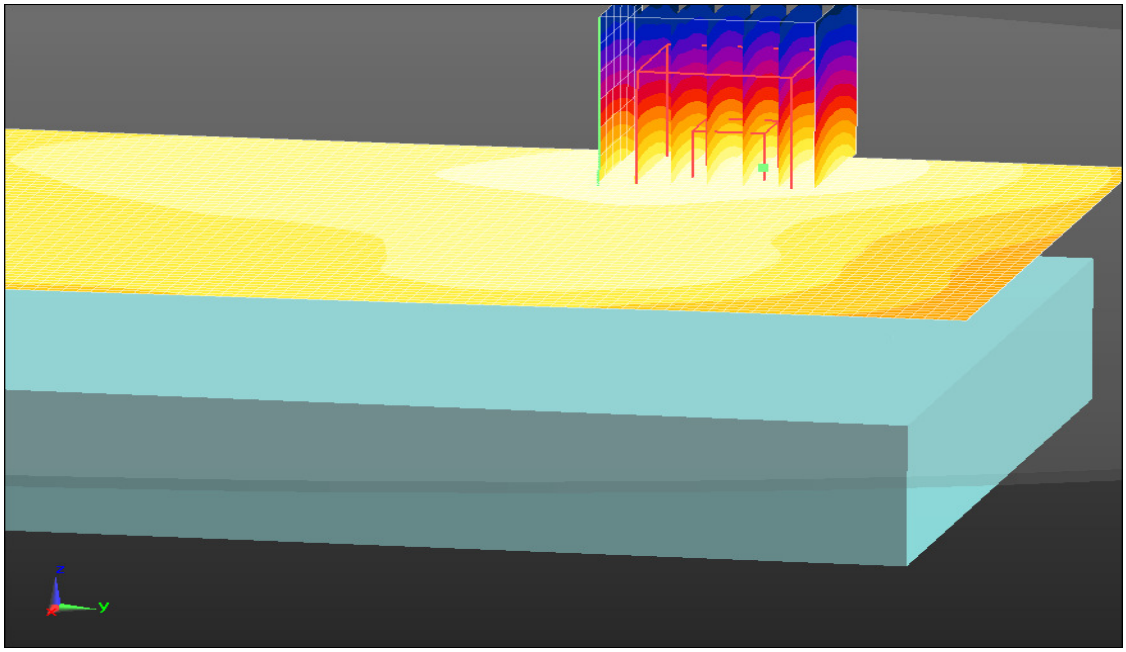
Grid Dimension : 131mmX91mmX1mm
Maximum SAR : 0.437 W/Kg

## Zoom Scan

Grid Dimension : 7mmX7mmX7mm
Power Reference : 7.642 V/m
Measured SAR : 0.324 W/Kg
Power Drift : -0.17 dB

**Measurement Plot:**

EUT Position: Front Face



| Protocol | Band | Channel Frequency (MHz) |
|---|---|---|
| W-CDMA | FDD Band 4 | 1712.4 |

Temperature of Liquid : 20.2 ºC
Measured Conductivity : 1.363 S/m
Measured Permittivity : 54.418

## Area Scan

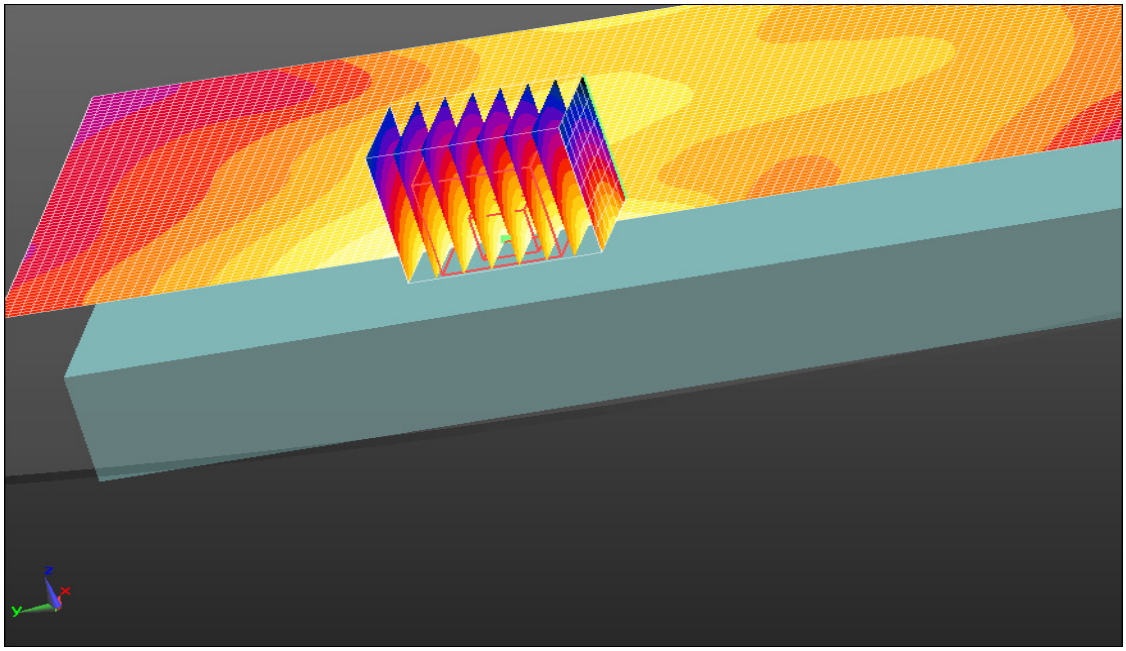
Grid Dimension : 131mmX101mmX1mm
Maximum SAR : 0.914W/Kg

## Zoom Scan

Grid Dimension : 8mmX8mmX7mm
Power Reference : 6.464 V/m
Measured SAR : 0.619 W/Kg
Power Drift : -0.38 dB

**Measurement Plot:**

EUT Position: Back Face



| Protocol | Band | Channel Frequency (MHz) |
|---|---|---|
| W-CDMA | FDD Band 4 | 1732.6 |

Temperature of Liquid : 20.2 ºC

Measured Conductivity : 1.348 S/m

Measured Permittivity : 54.422

## Area Scan

Grid Dimension : 131mmX91mmX1mm

Maximum SAR : 0.842 W/Kg

## Zoom Scan

Grid Dimension : 7mmX7mmX7mm

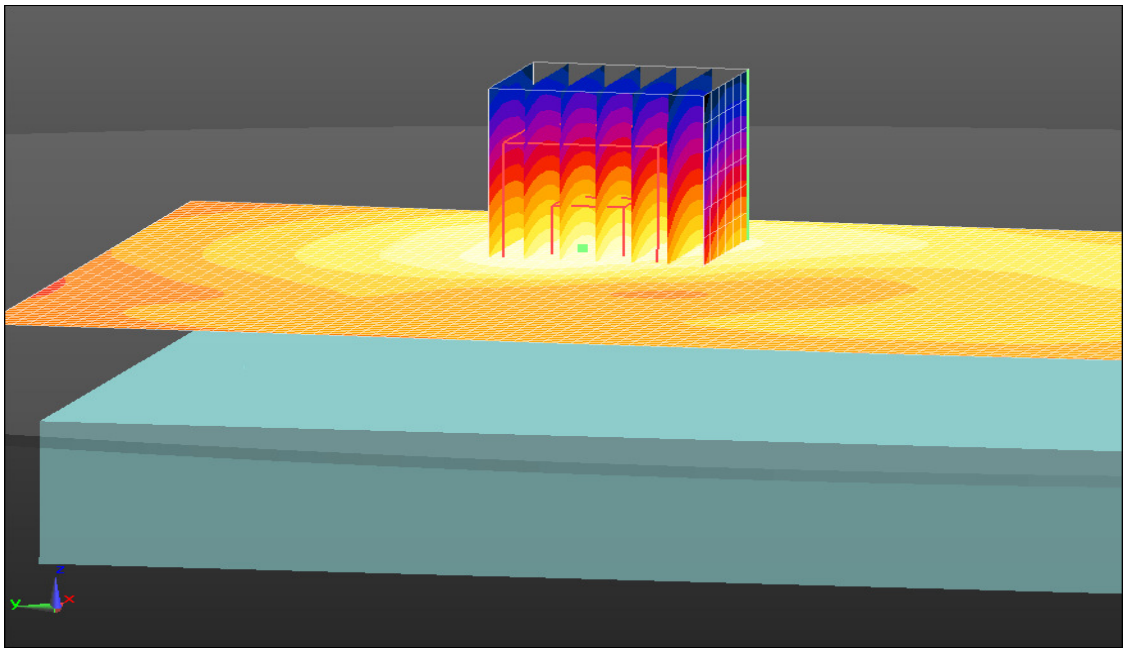
Power Reference : 7.275 V/m

Measured SAR : 0.630 W/Kg

Power Drift : -0.12 dB

**Measurement Plot:**

EUT Position: Back Face



| Protocol | Band | Channel Frequency (MHz) |
|---|---|---|
| W-CDMA | FDD Band 4 | 1752.6 |

Temperature of Liquid : 20.2 ºC
Measured Conductivity : 1.392 S/m
Measured Permittivity : 54.425

## Area Scan

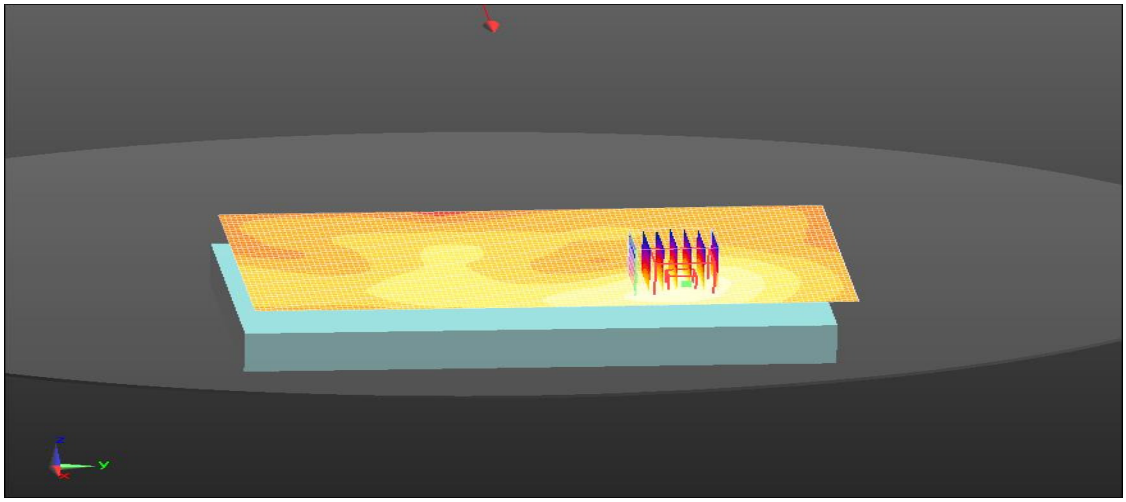
Grid Dimension : 131mmX91mmX1mm
Maximum SAR : 0.738 W/Kg

## Zoom Scan

Grid Dimension : 7mmX7mmX7mm
Power Reference : 7.456 V/m
Measured SAR : 0.540 W/Kg
Power Drift : 0.16 dB

**Measurement Plot:**

**EUT Position: Back Face**



| Protocol | Band | Channel Frequency (MHz) |
|---|---|---|
| W-CDMA | FDD Band 5 | 826.4 |

Temperature of Liquid : 20.2 ºC
Measured Conductivity : 0.896 S/m
Measured Permittivity : 55.403

## Area Scan

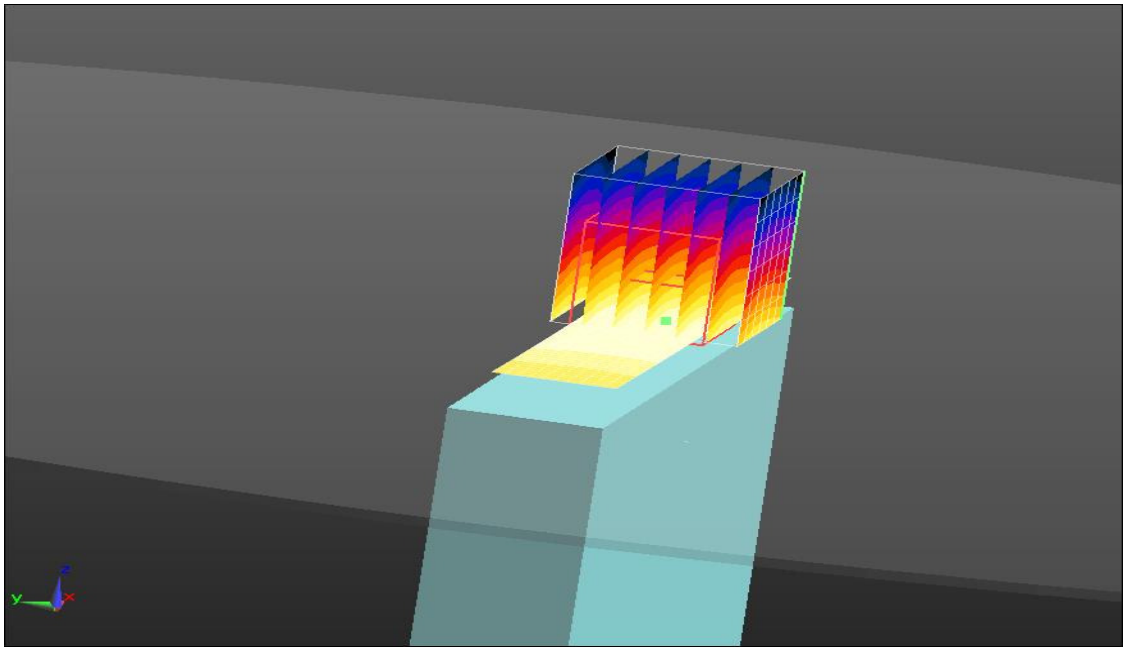
Grid Dimension : 91mmX91mmX1mm
Maximum SAR : 0.162 W/Kg

## Zoom Scan

Grid Dimension : 7mmX7mmX7mm
Power Reference : 12.73 V/m
Measured SAR : 0.130 W/Kg
Power Drift : 0.39 dB

**Measurement Plot:**

EUT Position: Edge 1



| Protocol | Band | Channel Frequency (MHz) |
|---|---|---|
| W-CDMA | FDD Band 5 | 836.6 |

Temperature of Liquid : 20.2 ºC
Measured Conductivity : 0.899 S/m
Measured Permittivity : 55.379

## Area Scan

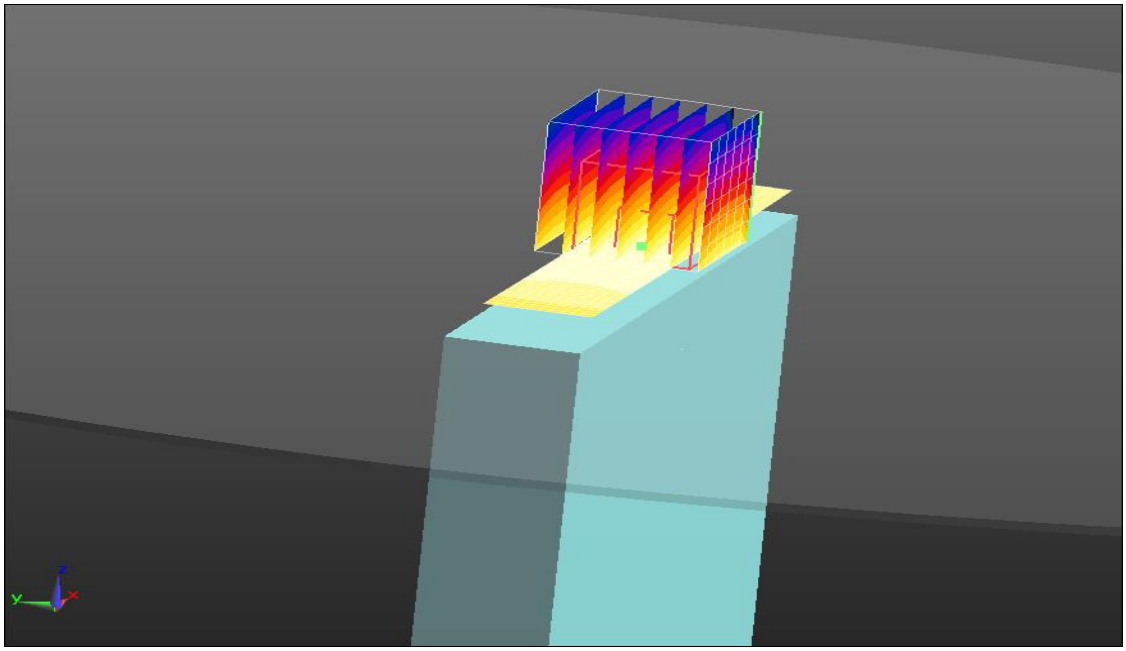
Grid Dimension : 81mmX91mmX1mm
Maximum SAR : 0.360 W/Kg

## Zoom Scan

Grid Dimension : 7mmX7mmX7mm
Power Reference : 20.15 V/m
Measured SAR : 0.348 W/Kg
Power Drift : 0.39dB

**Measurement Plot:**

EUT Position: Edge 1



| Protocol | Band | Channel Frequency (MHz) |
|---|---|---|
| W-CDMA | FDD Band 5 | 846.6 |

Temperature of Liquid : 20.2 ºC
Measured Conductivity : 0.902 S/m
Measured Permittivity : 55.355

## Area Scan

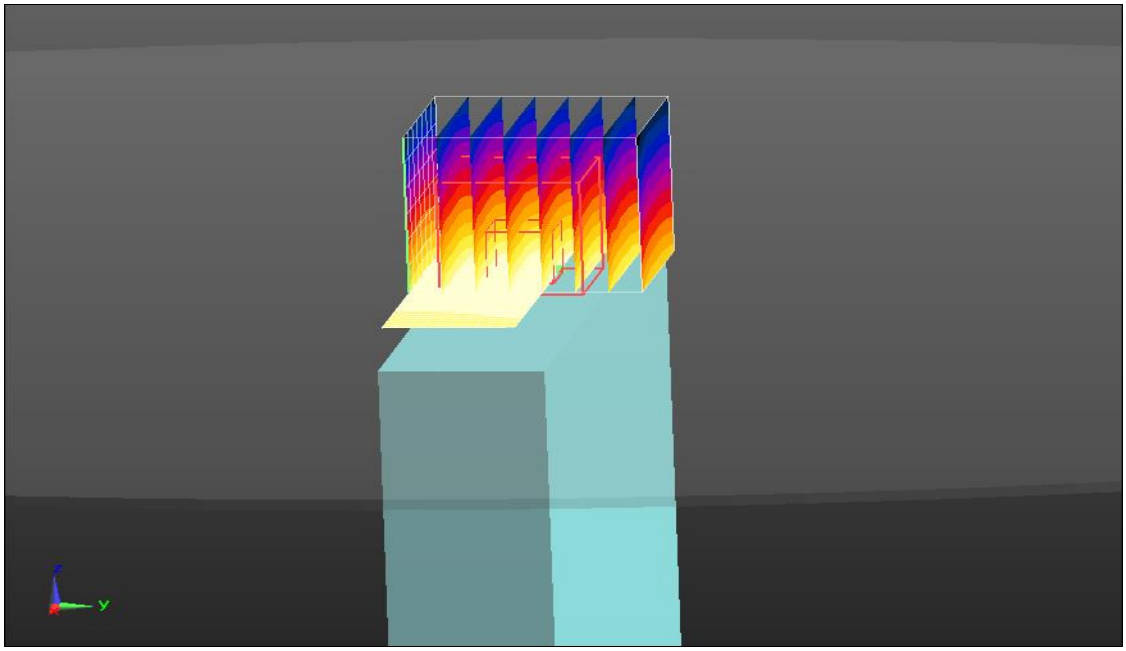
Grid Dimension : 91mmX91mmX1mm
Maximum SAR : 0.331 W/Kg

## Zoom Scan

Grid Dimension : 8mmX8mmX7mm
Power Reference : 18.06V/m
Measured SAR : 0.228 W/Kg
Power Drift : -0.64dB

**Measurement Plot:**

EUT Position: Edge 1



| Protocol | Band | Channel Frequency (MHz) |
|---|---|---|
| W-CDMA | FDD Band 2 | 1852.4 |

Temperature of Liquid : 21.6 ºC
Measured Conductivity : 1.422 S/m
Measured Permittivity : 40.727

## Area Scan

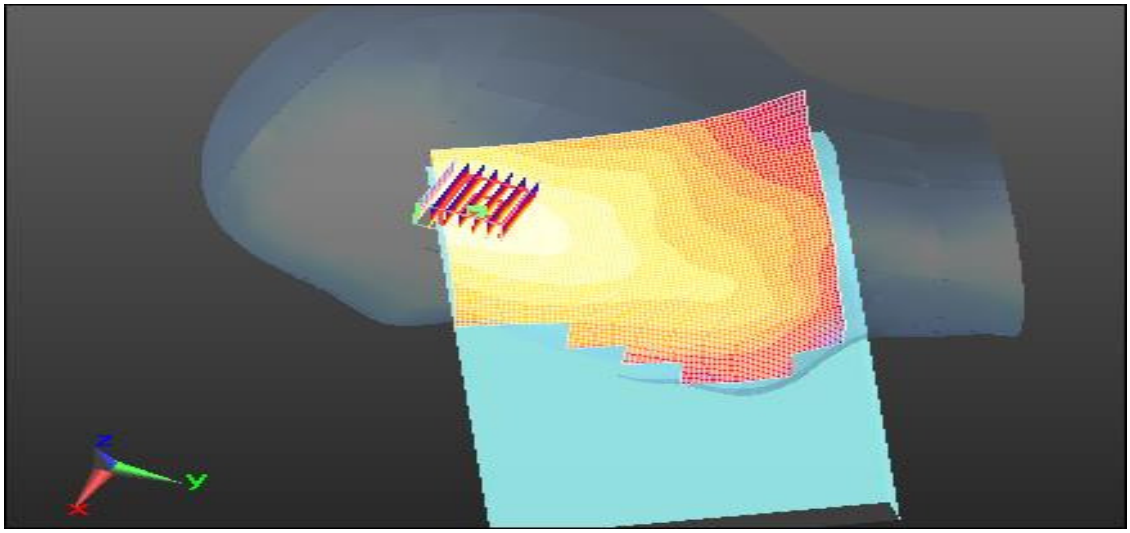
Grid Dimension : 131mmX91mmX1mm
Measured SAR : 1.26 W/Kg

## Zoom Scan

Grid Dimension : 7mmX7mmX7mm
Power Reference : 9.835 V/m
Maximum SAR : 0.879 W/Kg
Power Drift : -0.15 dB

**Measurement Plot:**

EUT Position: Right Touch



| Protocol | Band | Channel Frequency (MHz) |
|---|---|---|
| W-CDMA | FDD Band 2 | 1880 |

Temperature of Liquid : 21.6 ºC
Measured Conductivity : 1.436 S/m
Measured Permittivity : 40.726

## Area Scan

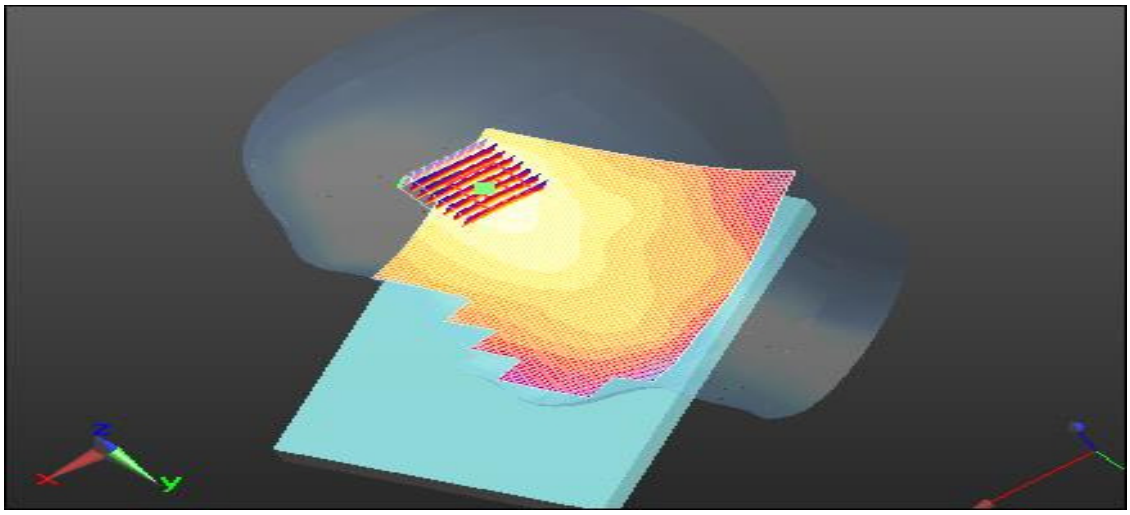
Grid Dimension : 131mmX81mmX1mm
Maximum SAR : 1.61 W/Kg

## Zoom Scan

Grid Dimension : 9mmX8mmX7mm
Power Reference : 10.04 V/m
Measured SAR : 1.19 W/Kg
Power Drift : -0.23dB

**Measurement Plot:**

EUT Position: Right Touch



| Protocol | Band | Channel Frequency (MHz) |
|---|---|---|
| W-CDMA | FDD Band 2 | 1907.6 |

Temperature of Liquid : 21.6 ºC
Measured Conductivity : 1.45 S/m
Measured Permittivity : 40.718

## Area Scan

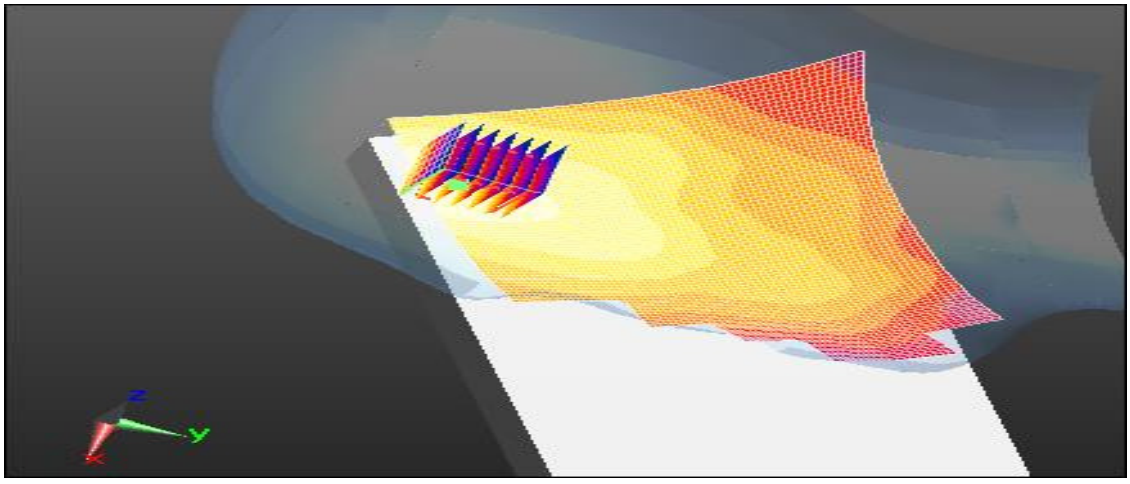
Grid Dimension : 131mmX91mmX1mm
Maximum SAR : 0.901 W/Kg

## Zoom Scan

Grid Dimension : 7mmX7mmX7mm
Power Reference : 9.03 V/m
Measured SAR : 0.618 W/Kg
Power Drift : -0.22 dB

**Measurement Plot:**

EUT Position: Right Touch



| Protocol | Band | Channel Frequency (MHz) |
|---|---|---|
| W-CDMA | FDD Band 4 | 1712.4 |

Temperature of Liquid : 21.6 ºC
Measured Conductivity : 1.339 S/m
Measured Permittivity : 41

## Area Scan

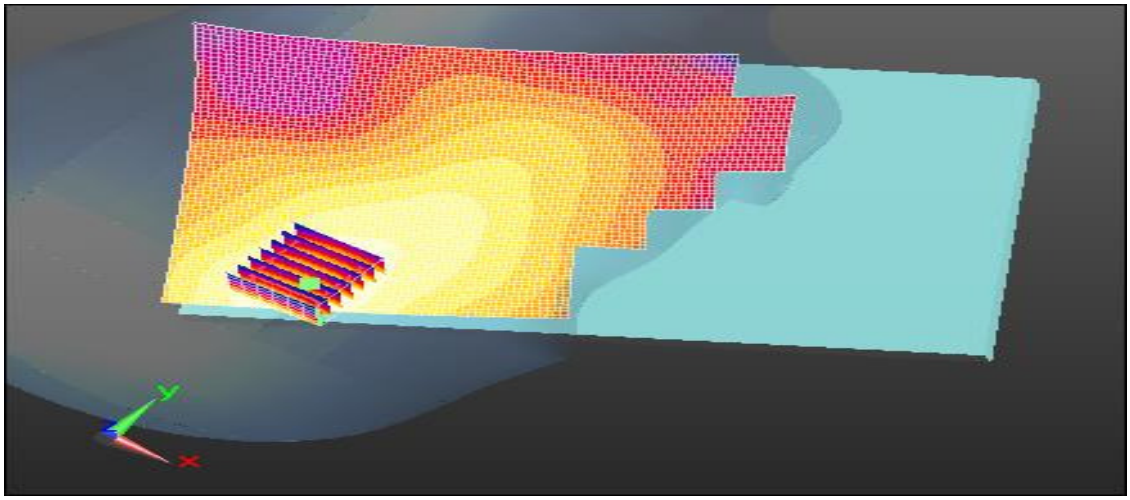
Grid Dimension : 131mmX101mmX1mm
Maximum SAR : 1.54 W/Kg

## Zoom Scan

Grid Dimension : 7mmX8mmX7mm
Power Reference : 7.256 V/m
Measured SAR : 1.1 W/Kg
Power Drift : -0.35 dB

**Measurement Plot:**

EUT Position: Right Touch



| Protocol | Band | Channel Frequency (MHz) |
|---|---|---|
| W-CDMA | FDD Band 4 | 1732.6 |

Temperature of Liquid : 21.6 ºC
Measured Conductivity : 1.35 S/m
Measured Permittivity : 40.953

## Area Scan

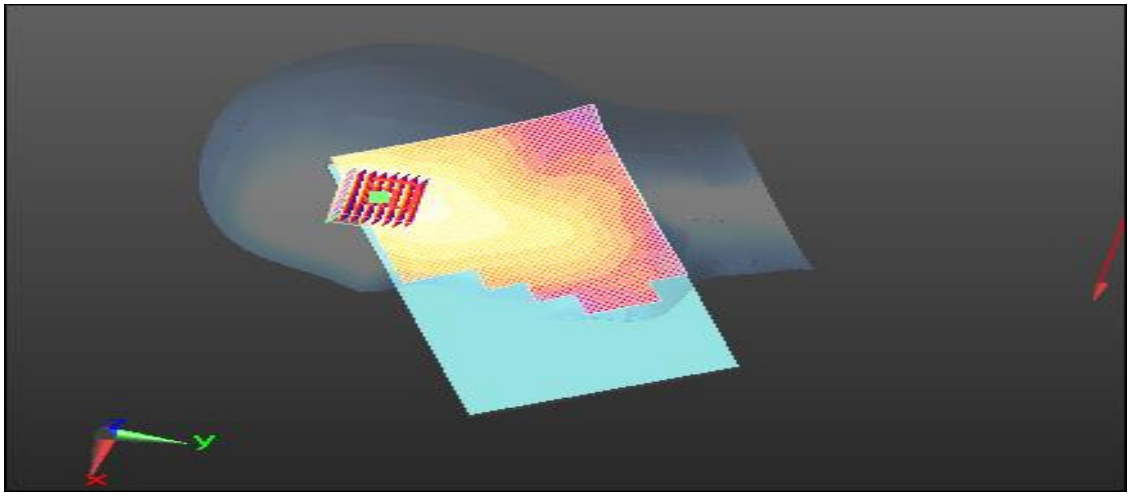
Grid Dimension : 131mmX91mmX1mm
Maximum SAR : 1.28 W/Kg

## Zoom Scan

Grid Dimension : 9mmX8mmX7mm
Power Reference : 7.748 V/m
Measured SAR : 0.917 W/Kg
Power Drift : -0.07dB

**Measurement Plot:**

EUT Position: Right Touch



| Protocol | Band | Channel Frequency (MHz) |
|---|---|---|
| W-CDMA | FDD Band 4 | 1752.6 |

Temperature of Liquid : 21.6 ºC
Measured Conductivity : 1.362 S/m
Measured Permittivity : 40.907

## Area Scan

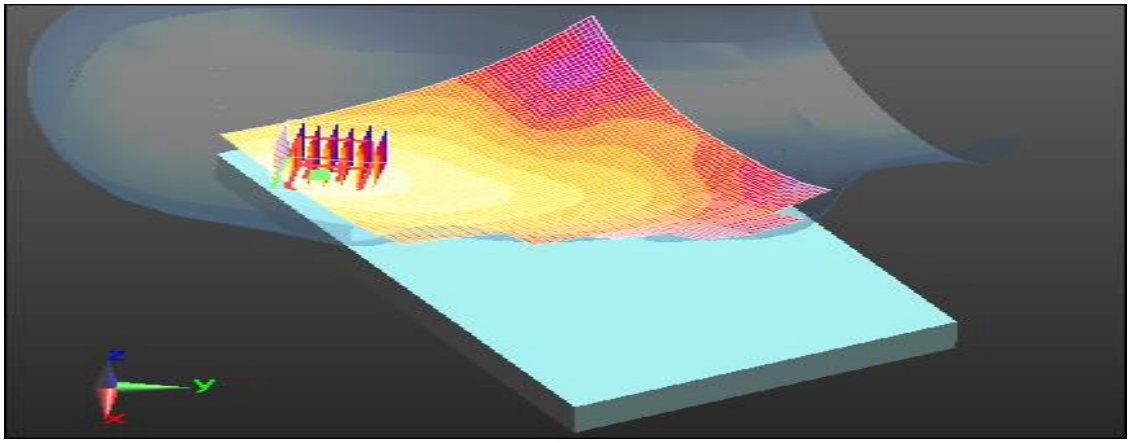
Grid Dimension : 41mmX101mmX1mm
Maximum SAR : 1.20 W/Kg

## Zoom Scan

Grid Dimension : 7mmX7mmX7mm
Power Reference : 7.007 V/m
Measured SAR : 0.863 W/Kg
Power Drift : -0.04 dB

**Measurement Plot:**

EUT Position: Right Touch



| Protocol | Band | Channel Frequency (MHz) |
|---|---|---|
| W-CDMA | FDD Band 2 | 826.4 |

Temperature of Liquid : 21.6 ºC
Measured Conductivity : 0.948 S/m
Measured Permittivity : 42.935

## Area Scan

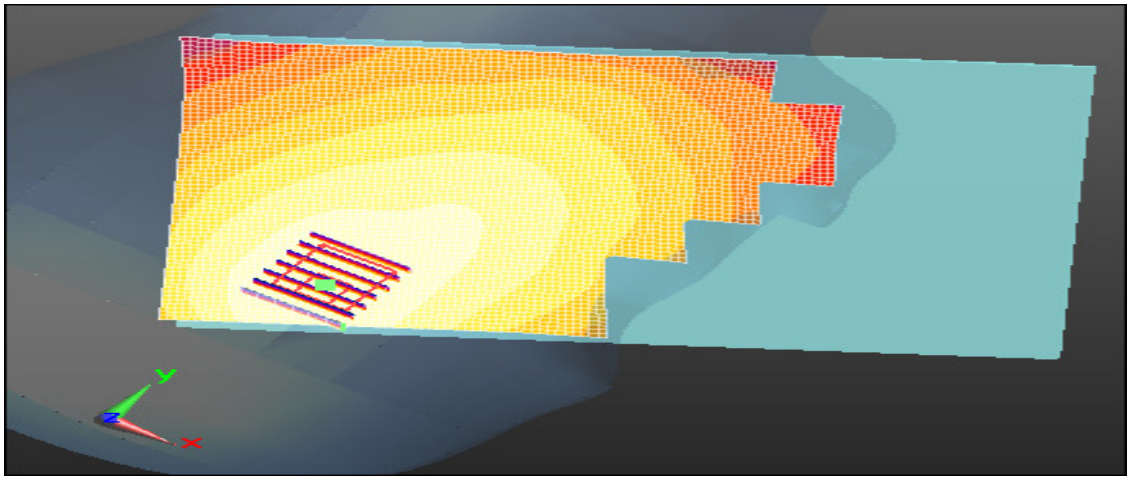
Grid Dimension : 131mmX101mmX1mm
Maximum SAR : 0.418 W/Kg

## Zoom Scan

Grid Dimension : 7mmX7mmX7mm
Power Reference : 8.852 V/m
Measured SAR : 0.333 W/Kg
Power Drift : -0.20 dB

**Measurement Plot:**

EUT Position: Right Touch



| Protocol | Band | Channel Frequency (MHz) |
|---|---|---|
| W-CDMA | FDD Band 5 | 836.6 |

Temperature of Liquid : 21.6 ºC
Measured Conductivity : 0.952 S/m
Measured Permittivity : 42.88

## Area Scan

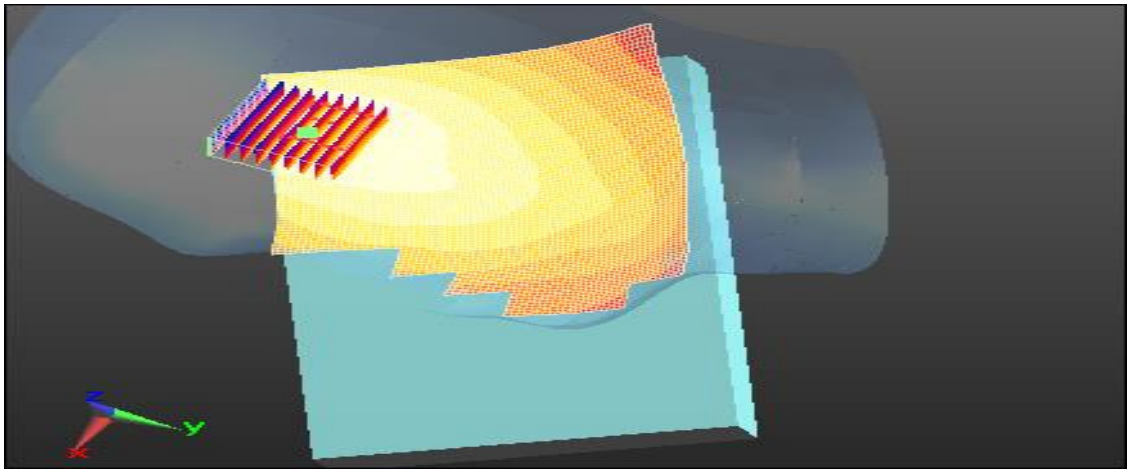
Grid Dimension : 131mmX91mmX1mm
Maximum SAR : 0.431 W/Kg

## Zoom Scan

Grid Dimension : 9mmX9mmX7mm
Power Reference : 9.836 V/m
Measured SAR : 0.667 W/Kg
Power Drift : -0.09 dB

**Measurement Plot:**

EUT Position: Right Touch



| Protocol | Band | Channel Frequency (MHz) |
|---|---|---|
| W-CDMA | FDD Band 2 | 846.6 |

Temperature of Liquid : 21.6 ºC
Measured Conductivity : 0.956 S/m
Measured Permittivity : 42.842

## Area Scan

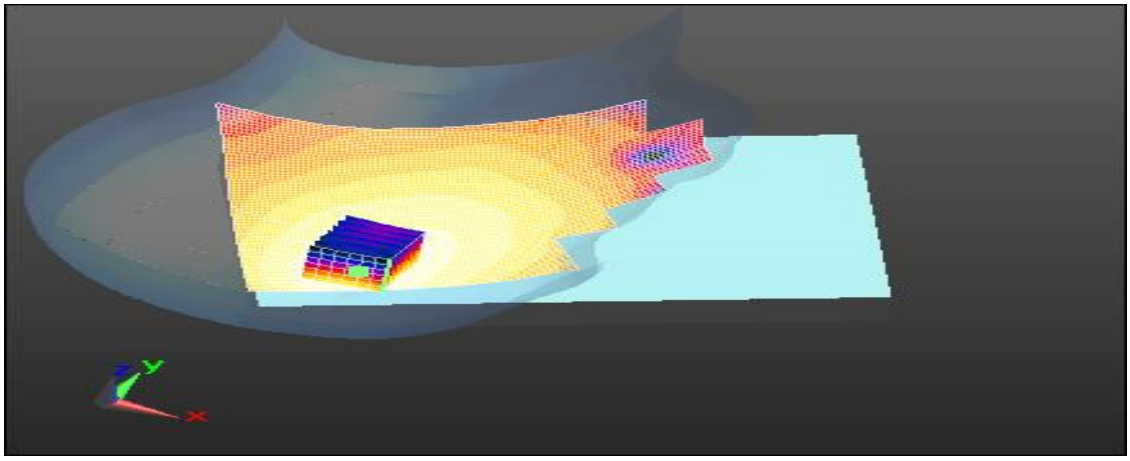
Grid Dimension : 131mmX101mmX1mm
Maximum SAR : 0.254 W/Kg

## Zoom Scan

Grid Dimension : 7mmX7mmX7mm
Power Reference : 6.851 V/m
Measured SAR : 0.201 W/Kg
Power Drift : -0.19dB

**Measurement Plot:**

EUT Position: Right Touch



**Test Result Summary: Wi-Fi & Bluetooth**

| Band | Channel Frequency (MHz) | Measured Power (dBm) | Measured Power (mW) | Tune-Up Scaling Factor (dB) | Tune-Up Scaling Factor (mW) | Maximum Tune-up Tolerance (mw) | Measured SAR (W/kg) | Reported SAR (W/kg) | Worst Case EUT Position |
|---|---|---|---|---|---|---|---|---|---|
| 2.4GHz_ Wi-Fi_Body | 2412 | 13.48 | 22.28 | 0.5 | 1.12 | 23.41 | 0.164 | 0.184 | Edge 1 |
| | 2437 | 13.7 | 23.44 | 0.5 | 1.12 | 24.56 | 0.291 | 0.327 | Edge 1 |
| | 2462 | 12.9 | 19.50 | 0.5 | 1.12 | 20.62 | 0.264 | 0.296 | Edge 1 |
| 2.4GHz_ Wi-Fi_Head | 2412 | 13.48 | 22.28 | 0.5 | 1.12 | 23.41 | 0.245 | 0.275 | Left Tilt |
| | 2437 | 13.7 | 23.44 | 0.5 | 1.12 | 24.56 | 0.162 | 0.182 | Left Tilt |
| | 2462 | 12.9 | 19.50 | 0.5 | 1.12 | 20.62 | 0.430 | 0.482 | Left Tilt |
| 2.4GHz_Bluetooth_Body | 2402 | 9.11 | 8.15 | 0.5 | 1.12 | 9.27 | 0.00693 | 0.008 | Edge 1 |
| | 2440 | 8.42 | 6.95 | 0.5 | 1.12 | 8.07 | 0.00735 | 0.008 | Front Face |
| | 2480 | 7.21 | 5.26 | 0.5 | 1.12 | 6.38 | 0.00819 | 0.009 | Edge 1 |

| Protocol | Data Rate | Channel Frequency (MHz) |
|---|---|---|
| Wi-Fi | 1Mbps | 2412 |

Temperature of Liquid : 21.9 ºC

Measured Conductivity : 1.928 S/m

Measured Permittivity : 53.103

**Area Scan**

Grid Dimension : 41mmX91mmX1mm

Maximum SAR : 0.105 W/Kg

**Zoom Scan**

Grid Dimension : 9mmX10mmX7mm

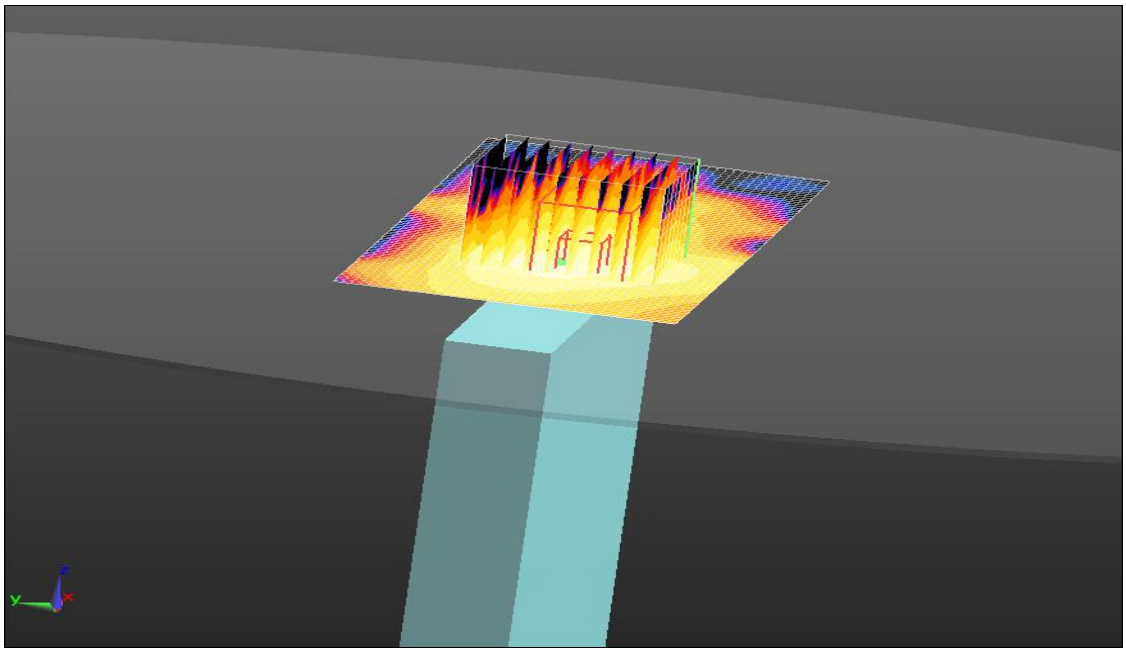
Power Reference : 2.569 V/m

Measured SAR : 0.164 W/Kg

Power Drift : -0.49 dB

**Measurement Plot:**

EUT Position: Edge 1



| Protocol | Data Rate | Channel Frequency (MHz) |
|---|---|---|
| Wi-Fi | 1Mbps | 2442 |

Temperature of Liquid : 21.9 ºC
Measured Conductivity : 1.951 S/m
Measured Permittivity : 53.05

## Area Scan

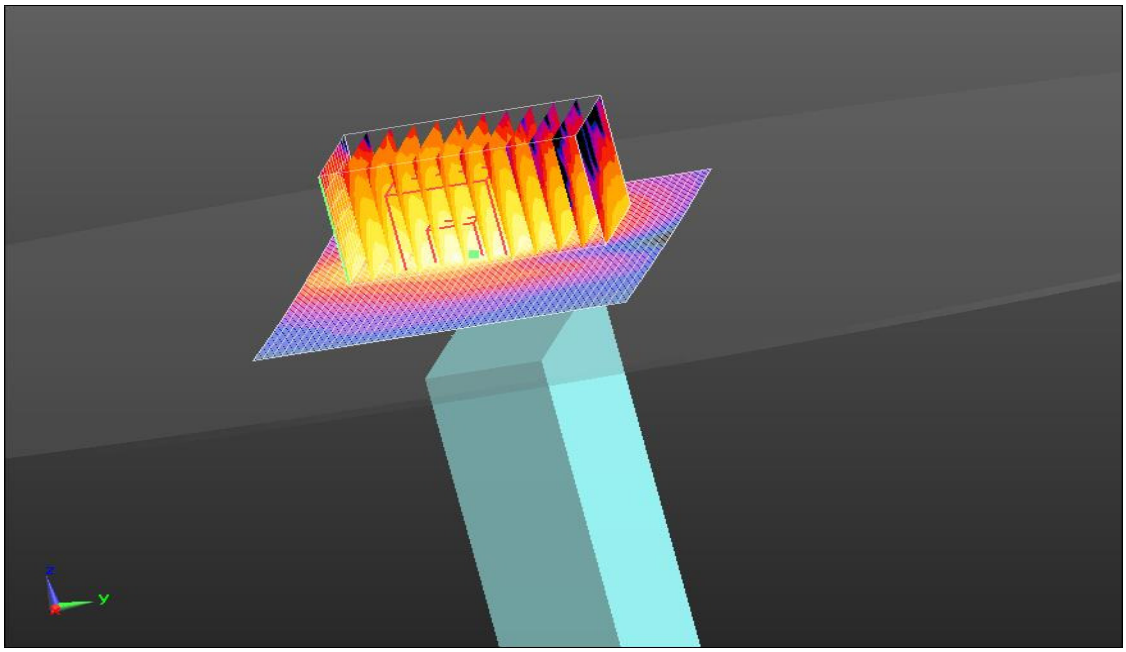
Grid Dimension : 41mmX101mmX1mm
Maximum SAR : 0.489 W/Kg

## Zoom Scan

Grid Dimension : 13mmX12mmX7mm
Power Reference : 4.536 V/m
Measured SAR : 0.291 W/Kg
Power Drift : -0.04 dB

**Measurement Plot:**

EUT Position: Edge 1



| Protocol | Data Rate | Channel Frequency (MHz) |
|---|---|---|
| Wi-Fi | 1Mbps | 2462 |

Temperature of Liquid : 21.9 ºC
Measured Conductivity : 1.968 S/m
Measured Permittivity : 53.056

## Area Scan

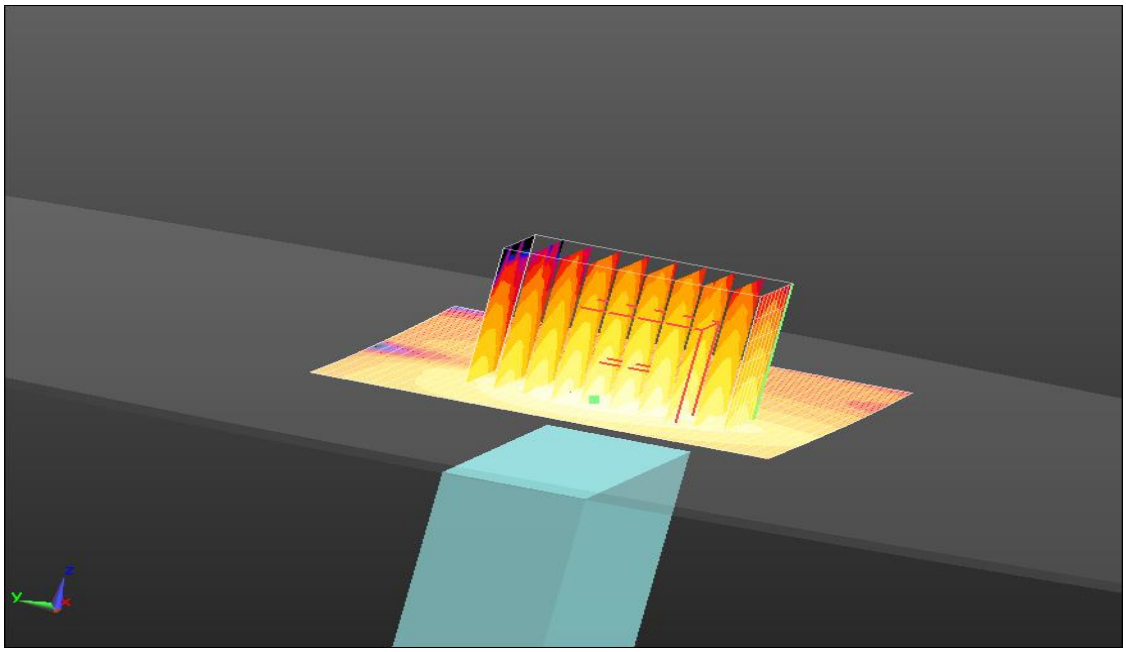
Grid Dimension : 41mmX91mmX1mm
Maximum SAR : 0.459 W/Kg

## Zoom Scan

Grid Dimension : 9mmX10mmX7mm
Power Reference : 4.369 V/m
Measured SAR : 0.264 W/Kg
Power Drift : -0.39dB

**Measurement Plot:**

EUT Position: Edge 1



| Protocol | Data Rate | Channel Frequency (MHz) |
|---|---|---|
| Wi-Fi | 1Mbps | 2412 |

Temperature of Liquid : 21.6 ºC
Measured Conductivity : 1.828 S/m
Measured Permittivity : 38.103

## Area Scan

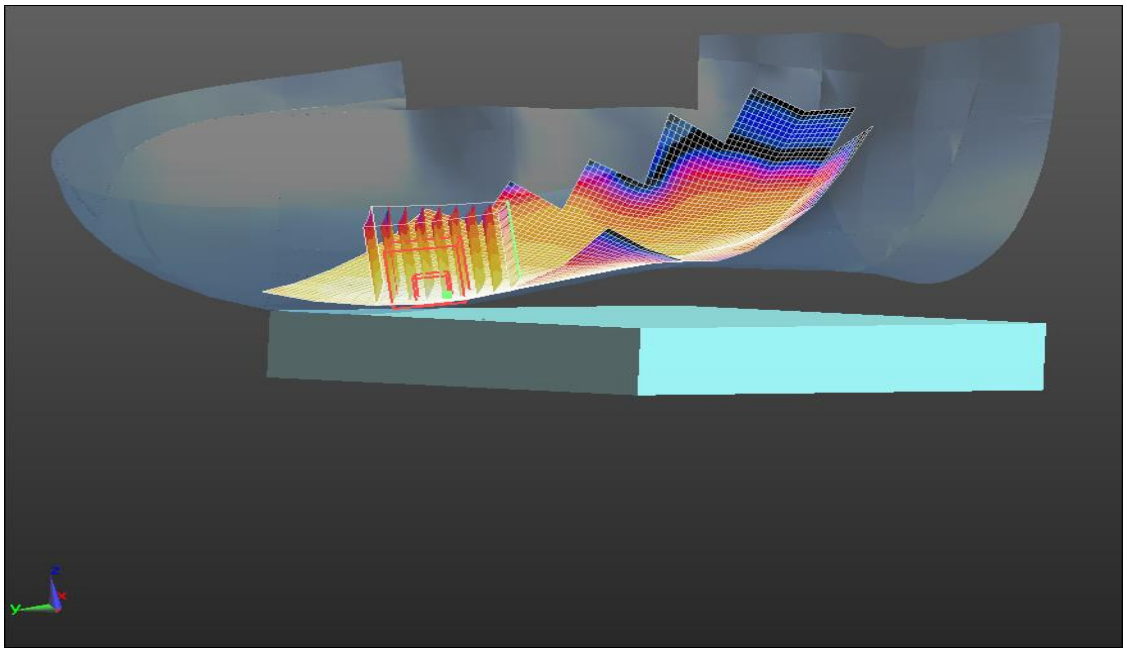
Grid Dimension : 131mmX81mmX1mm
Maximum SAR : 0.465 W/Kg

## Zoom Scan

Grid Dimension : 9mmX9mmX7mm
Power Reference : 9.354 V/m
Measured SAR : 0.245 W/Kg
Power Drift : -0.05dB

**Measurement Plot:**

EUT Position: Left Tilt



| Protocol | Data Rate | Channel Frequency (MHz) |
|---|---|---|
| Wi-Fi | 1Mbps | 2442 |

Temperature of Liquid : 21.6 ºC
Measured Conductivity : 1.851 S/m
Measured Permittivity : 38.05

## Area Scan

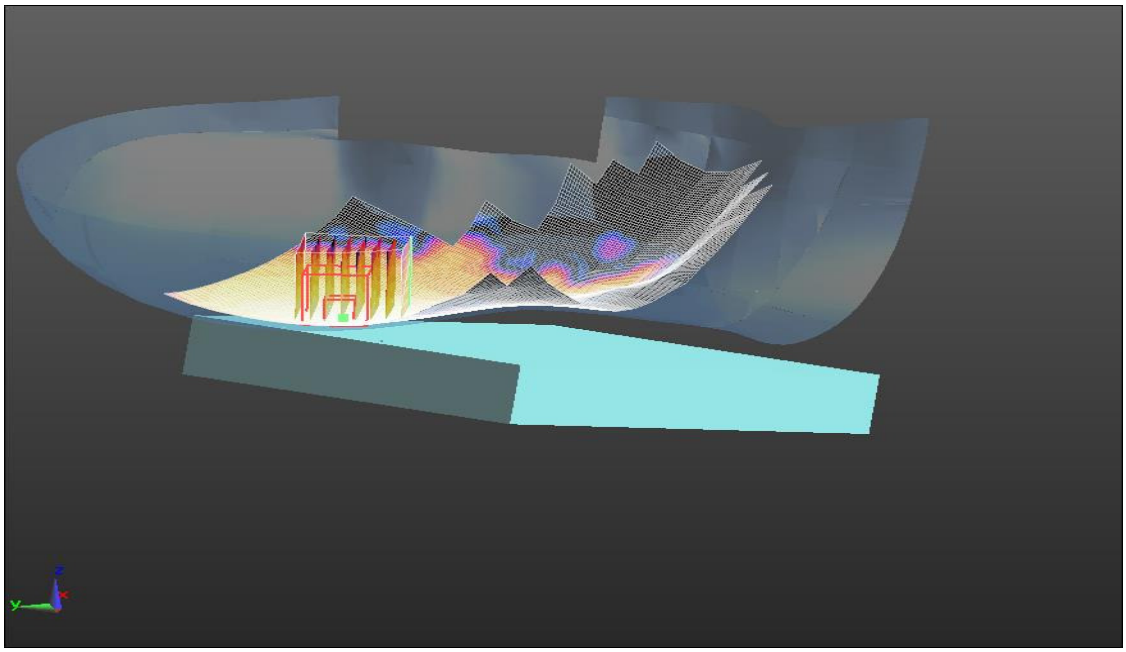
Grid Dimension : 251mmX161mmX1mm
Maximum SAR : 0.349/Kg

## Zoom Scan

Grid Dimension : 9mmX8mmX7mm
Power Reference : 7.222 V/m
Measured SAR : 0.162 W/Kg
Power Drift : -0.05 dB

**Measurement Plot:**

EUT Position: Left Tilt



| Protocol | Data Rate | Channel Frequency (MHz) |
|---|---|---|
| Wi-Fi | 1Mbps | 2462 |

Temperature of Liquid : 21.6 ºC
Measured Conductivity : 1.868 S/m
Measured Permittivity : 38.056

## Area Scan

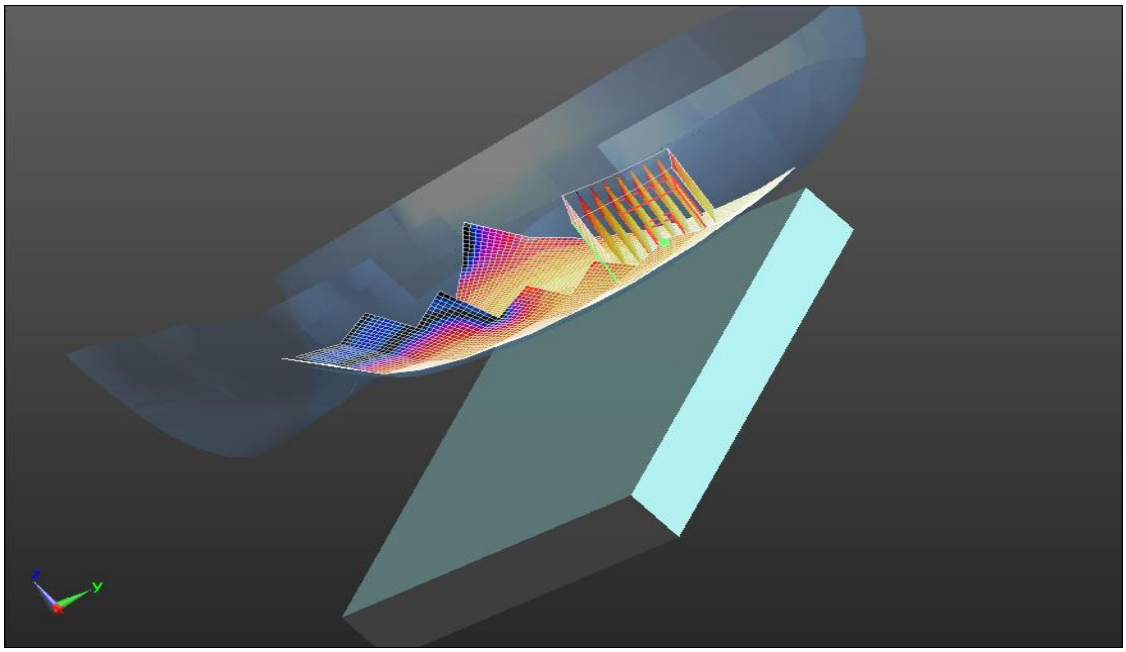
Grid Dimension : 131mmX81mmX1mm
Maximum SAR : 0.764/Kg

## Zoom Scan

Grid Dimension : 9mmX9mmX7mm
Power Reference : 11.78 V/m
Measured SAR : 0.430 W/Kg
Power Drift : -0.15 dB

**Measurement Plot:**

EUT Position: Left Tilt



| Protocol | Data Rate | Channel Frequency (MHz) |
|---|---|---|
| Bluetooth | 1Mbps | 2402 |

Temperature of Liquid : 22.3 ºC
Measured Conductivity : 1.90 S/m
Measured Permittivity : 51.841

## Area Scan

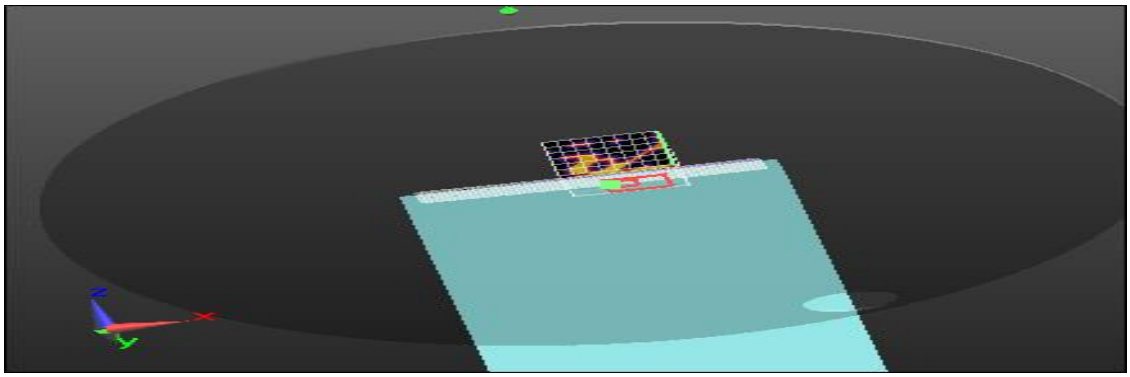
Grid Dimension : 111mmX91mmX1mm
Maximum SAR : 0.00733 W/Kg

## Zoom Scan

Grid Dimension : 9mmX9mmX7mm
Power Reference : 1.454 V/m
Measured SAR : 0.00686 W/Kg
Power Drift : -0.21 dB

**Measurement Plot:**

EUT Position: Edge 1



| Protocol | Data Rate | Channel Frequency (MHz) |
|---|---|---|
| Bluetooth | 1Mbps | 2441 |

Temperature of Liquid : 22.3 ºC
Measured Conductivity : 1.93 S/m
Measured Permittivity : 51.737

## Area Scan

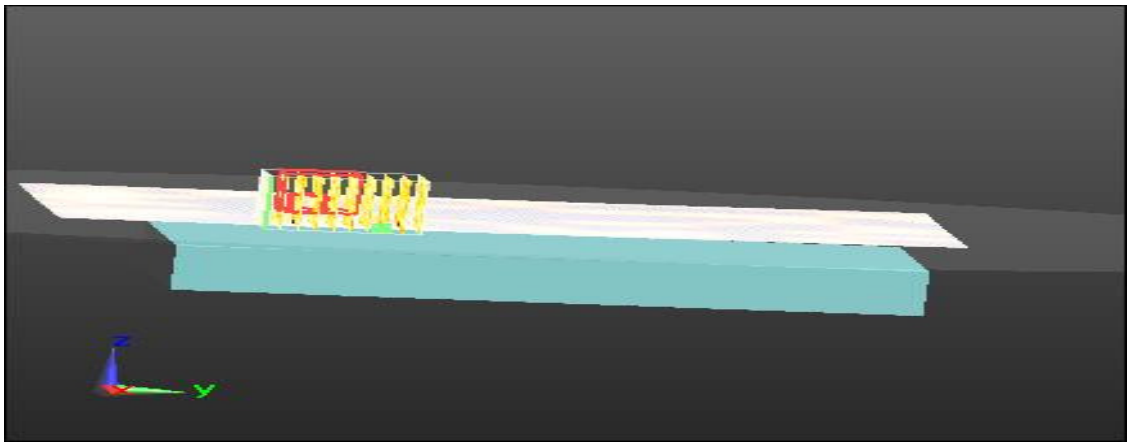
Grid Dimension : 131mmX91mmX1mm
Maximum SAR : 0.0271/Kg

## Zoom Scan

Grid Dimension : 10mmX10mmX7mm
Power Reference : 1.850 V/m
Measured SAR : 0.00735 W/Kg
Power Drift : -0.47 dB

**Measurement Plot:**

EUT Position: Front Face



| Protocol | Data Rate | Channel Frequency (MHz) |
|---|---|---|
| Bluetooth | 1Mbps | 2480 |

Temperature of Liquid : 22.3 ºC
Measured Conductivity : 1.97 S/m
Measured Permittivity : 51.731

## Area Scan

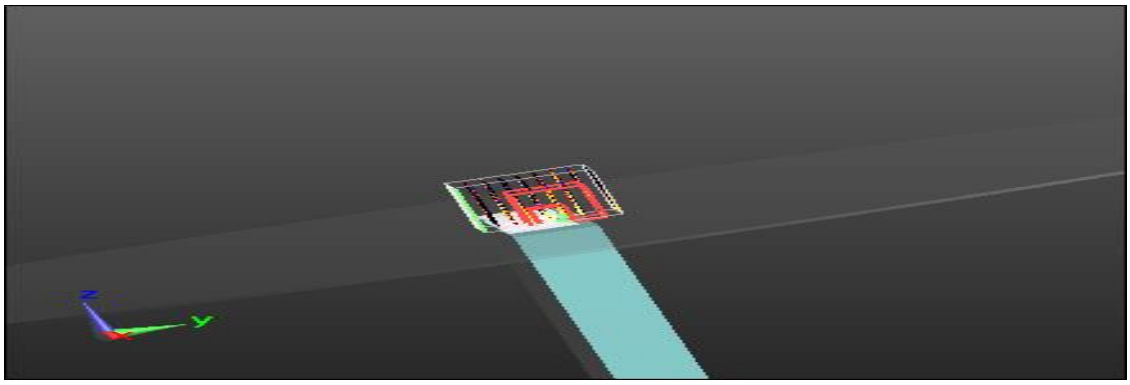
Grid Dimension : 101mmX91mmX1mm
Maximum SAR : 0.0170/Kg

## Zoom Scan

Grid Dimension : 9mmX9mmX7mm
Power Reference : 0.7420 V/m
Measured SAR : 0.00819 W/Kg
Power Drift : 0.24 dB

**Measurement Plot:**

EUT Position: Edge 1



**Test Result Summary: LTE**

| Band | Channel Frequency (MHz) | Measured Power (dBm) | Measured Power (mW) | Tune-Up Scaling Factor (dB) | Tune-Up Scaling Factor (mW) | Maximum Tune-up Tolerance (mw) | Measured SAR (W/kg) | Reported SAR (W/kg) | Worst Case EUT Position |
|---|---|---|---|---|---|---|---|---|---|
| LTE Band 2_Body | 1860 | 21.42 | 138.68 | 0.5 | 1.12 | 139.80 | 0.368 | 0.413 | Edge 1 |
| | 1880 | 21.93 | 155.96 | 0.5 | 1.12 | 157.08 | 0.343 | 0.385 | Edge 1 |
| | 1900 | 21.74 | 149.28 | 0.5 | 1.12 | 150.40 | 0.267 | 0.300 | Edge 1 |
| LTE Band 4_Body | 1712.5 | 21.37 | 137.09 | 1.2 | 1.32 | 138.41 | 0.366 | 0.482 | Edge 2 |
| | 1732.5 | 21.84 | 152.76 | 1.2 | 1.32 | 154.07 | 0.432 | 0.569 | Edge 2 |
| | 1752.5 | 21.52 | 141.91 | 1.2 | 1.32 | 143.22 | 0.377 | 0.497 | Edge 2 |
| LTE Band 5_Body | 829 | 21.56 | 143.22 | 0.6 | 1.15 | 144.37 | 0.319 | 0.366 | Edge 1 |
| | 836.5 | 21.36 | 136.77 | 0.6 | 1.15 | 137.92 | 0.305 | 0.350 | Edge 1 |
| | 844 | 21.62 | 145.21 | 0.6 | 1.15 | 146.36 | 0.208 | 0.239 | Edge 1 |
| LTE Band 17_Body | 710 | 22.25 | 167.88 | 0.6 | 1.15 | 169.03 | 0.257 | 0.295 | Edge1 |
| LTE Band 13_Body | 782 | 21.99 | 158.12 | 0.03 | 1.01 | 159.13 | 0.342 | 0.366 | Edge2 |

**Note:** SAR verified with 1RB, 50% RB & 100%RB with all supporting bandwidths & modulations on low, mid & high channels and Worst case results are reported for the LTE bands

| Protocol | Bandwidth (MHz) | Channel Frequency (MHz) |
|---|---|---|
| LTE_FDD Band 2 | 20 | 1860 |

Temperature of Liquid : 20.3 ºC
Measured Conductivity : 1.482 S/m
Measured Permittivity : 54.031

## Area Scan

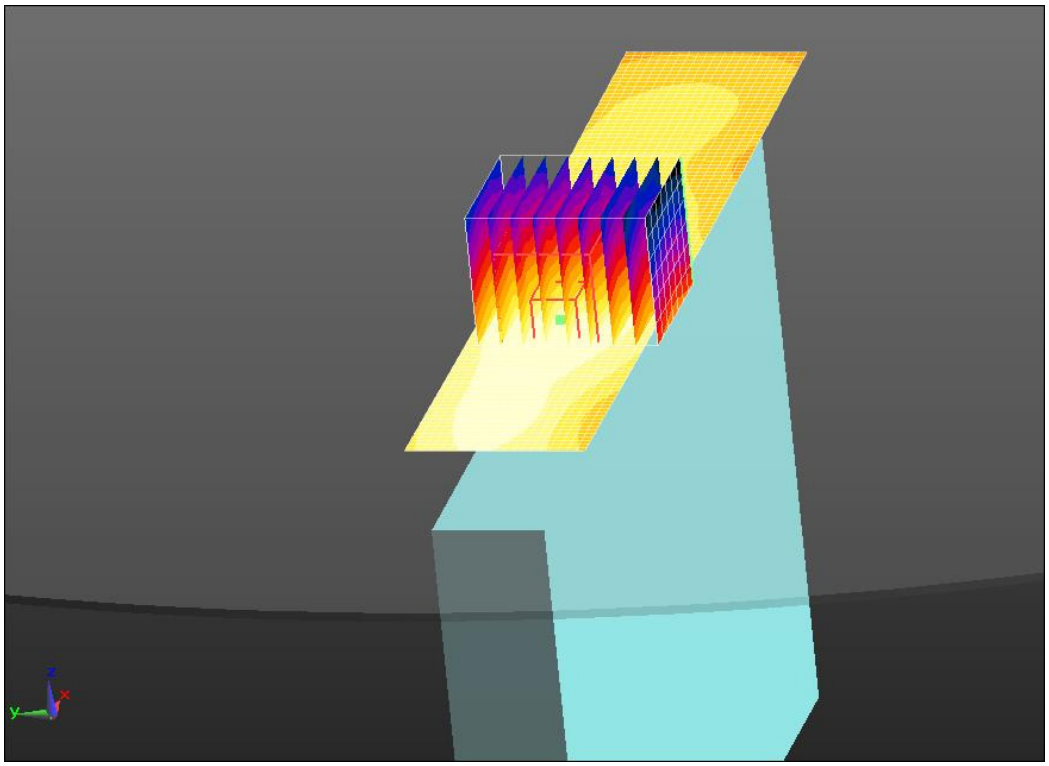
Grid Dimension : 61mmX131mmX1mm
Maximum SAR : 0.430 W/Kg

## Zoom Scan

Grid Dimension : 8mmX9mmX7mm
Power Reference : 10.48 V/m
Measured SAR : 0.368 W/Kg
Power Drift : -0.19 dB

**Measurement Plot:**

EUT Position: Edge 1



| Protocol | Bandwidth (MHz) | Channel Frequency (MHz) |
|---|---|---|
| LTE_FDD Band 2 | 20 | 1880 |

Temperature of Liquid : 20.3 ºC
Measured Conductivity : 1.476 S/m
Measured Permittivity : 53.994

## Area Scan

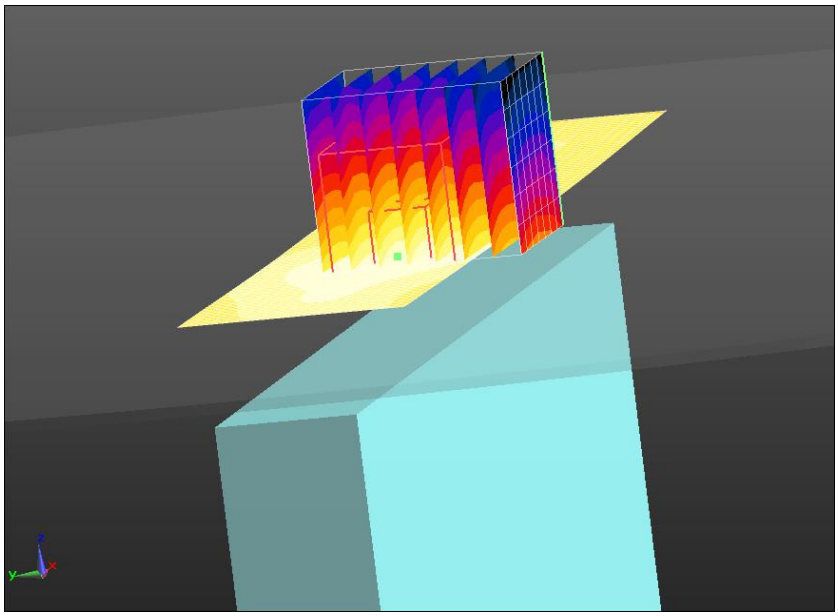
Grid Dimension : 61mmX131mmX1mm
Maximum SAR : 0.468W/Kg

## Zoom Scan

Grid Dimension : 8mmX8mmX7mm
Power Reference : 9.741 V/m
Measured SAR : 0.343 W/Kg
Power Drift : -0.35 dB

**Measurement Plot:**

EUT Position: Edge 1



| Protocol | Bandwidth (MHz) | Channel Frequency (MHz) |
|---|---|---|
| LTE_FDD Band 2 | 20 | 1900 |

Temperature of Liquid : 20.3 ºC
Measured Conductivity : 1.45 S/m
Measured Permittivity : 54.188

## Area Scan

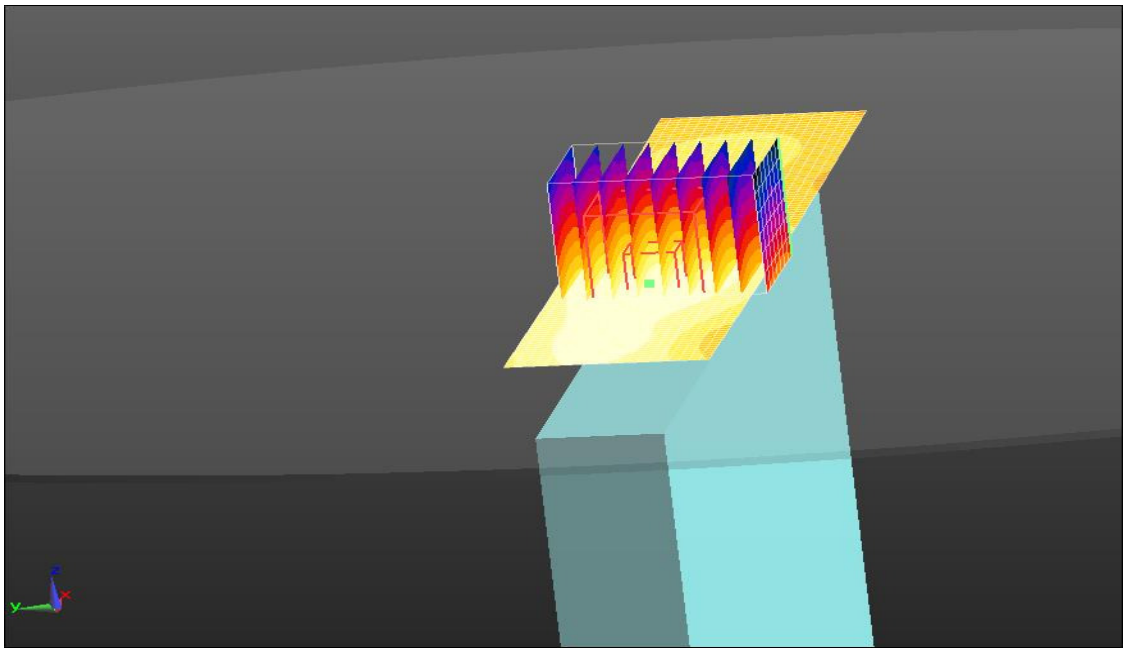
Grid Dimension : 61mmX131mmX1mm
Maximum SAR : 0.377 W/Kg

## Zoom Scan

Grid Dimension : 8mmX9mmX7mm
Power Reference : 9.984 V/m
Measured SAR : 0.267 W/Kg
Power Drift : 0.10 dB

**Measurement Plot:**

EUT Position: Edge 1



| Protocol | Bandwidth (MHz) | Channel Frequency (MHz) |
|---|---|---|
| LTE_FDD Band 4 | 5 | 1712.5 |

Temperature of Liquid : 20.3 ºC
Measured Conductivity (σ) : 1.402 S/m
Measured Permittivity (εr) : 54.214

## Area Scan

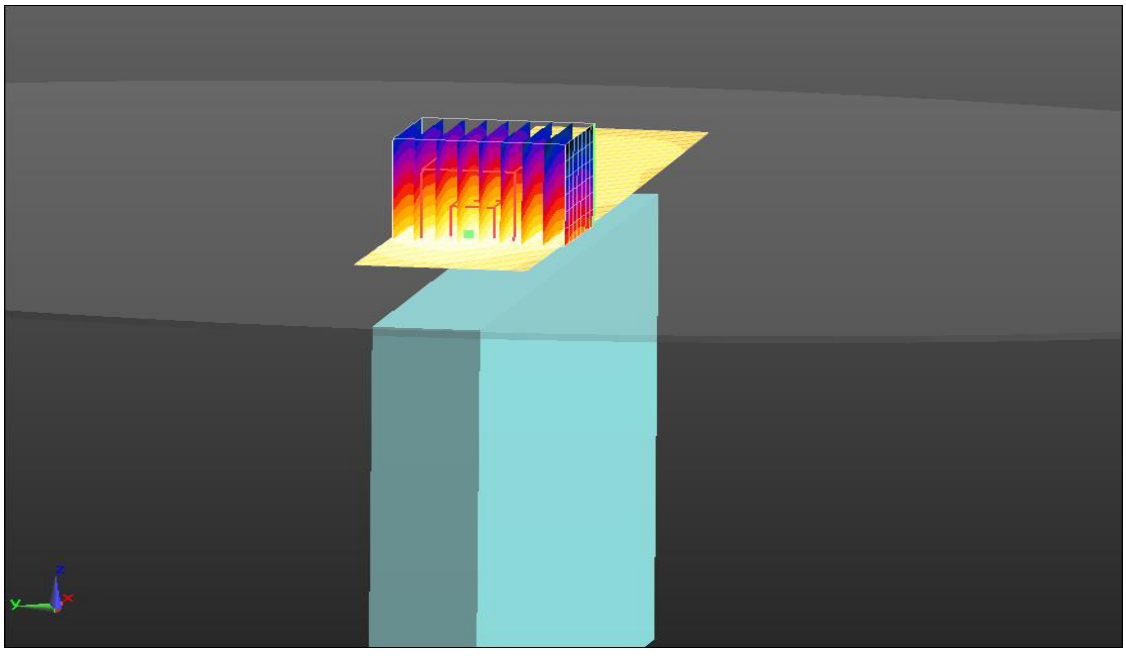
Grid Dimension : 61mmX131mmX1mm
Maximum SAR : 0.541 W/Kg

## Zoom Scan

Grid Dimension : 8mmX9mmX7mm
Power Reference : 8.447 V/m
Measured SAR : 0.366 W/Kg
Power Drift : -0.03 dB

**Measurement Plot:**

EUT Position: Edge 2



| Protocol | Bandwidth (MHz) | Channel Frequency (MHz) |
|---|---|---|
| LTE_FDD Band 4 | 5 | 1732.5 |

Temperature of Liquid : 20.3 ºC
Measured Conductivity (σ) : 1.416 S/m
Measured Permittivity (εr) : 54.195

## Area Scan

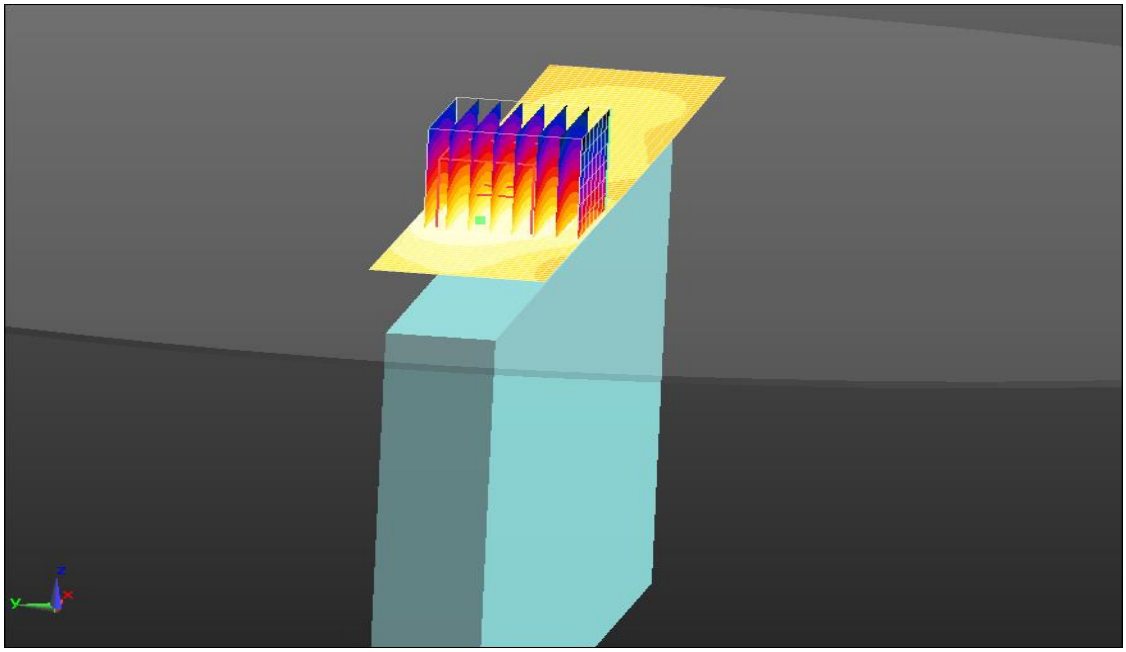
Grid Dimension : 61mmX131mmX1mm
Maximum SAR : 0.620 W/Kg

## Zoom Scan

Grid Dimension : 8mmX8mmX7mm
Power Reference : 7.973 V/m
Measured SAR : 0.432 W/Kg
Power Drift : 0.01 dB

**Measurement Plot:**

EUT Position: Edge 2



| Protocol | Bandwidth (MHz) | Channel Frequency (MHz) |
|---|---|---|
| LTE_FDD Band 4 | 5 | 1752.5 |

Temperature of Liquid : 20.3 ºC
Measured Conductivity (σ) : 1.431 S/m
Measured Permittivity (εr) : 54.179

## Area Scan

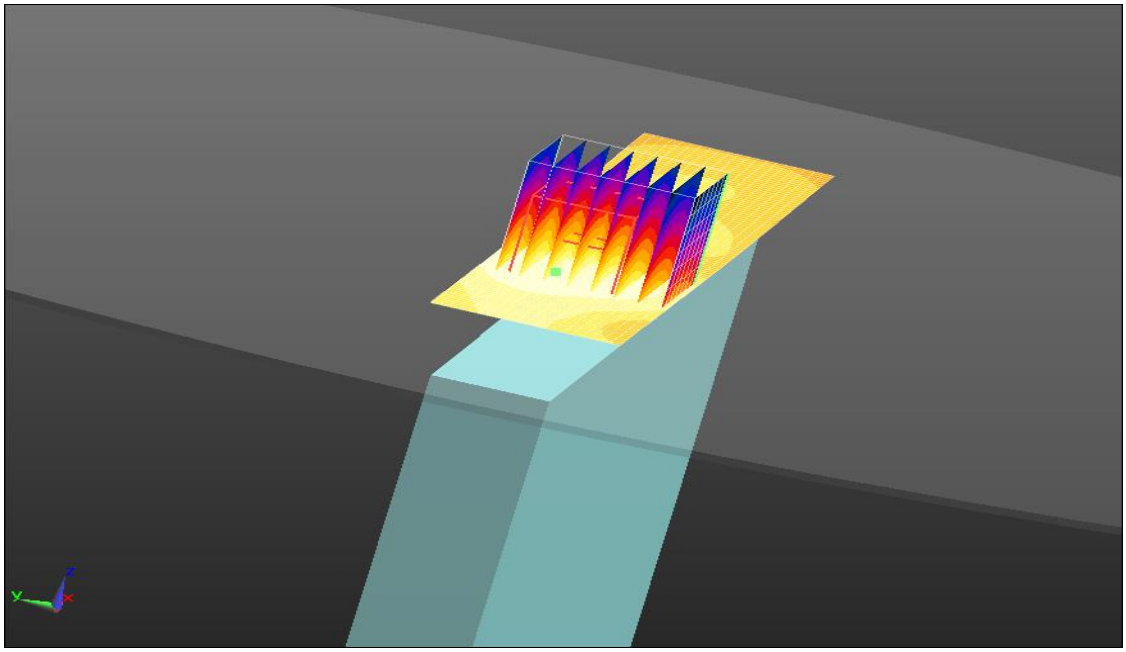
Grid Dimension : 61mmX131mmX1mm
Maximum SAR : 0.545 W/Kg

## Zoom Scan

Grid Dimension : 8mmX8mmX7mm
Power Reference : 6.597 V/m
Measured SAR : 0.377 W/Kg
Power Drift : -0.07 dB

**Measurement Plot:**

EUT Position: Edge 2



| Protocol | Bandwidth (MHz) | Channel Frequency (MHz) |
|---|---|---|
| LTE_FDD Band 5 | 10 | 829 |

Temperature of Liquid : 20.3 ºC
Measured Conductivity : 0.942 S/m
Measured Permittivity : 55.534

## Area Scan

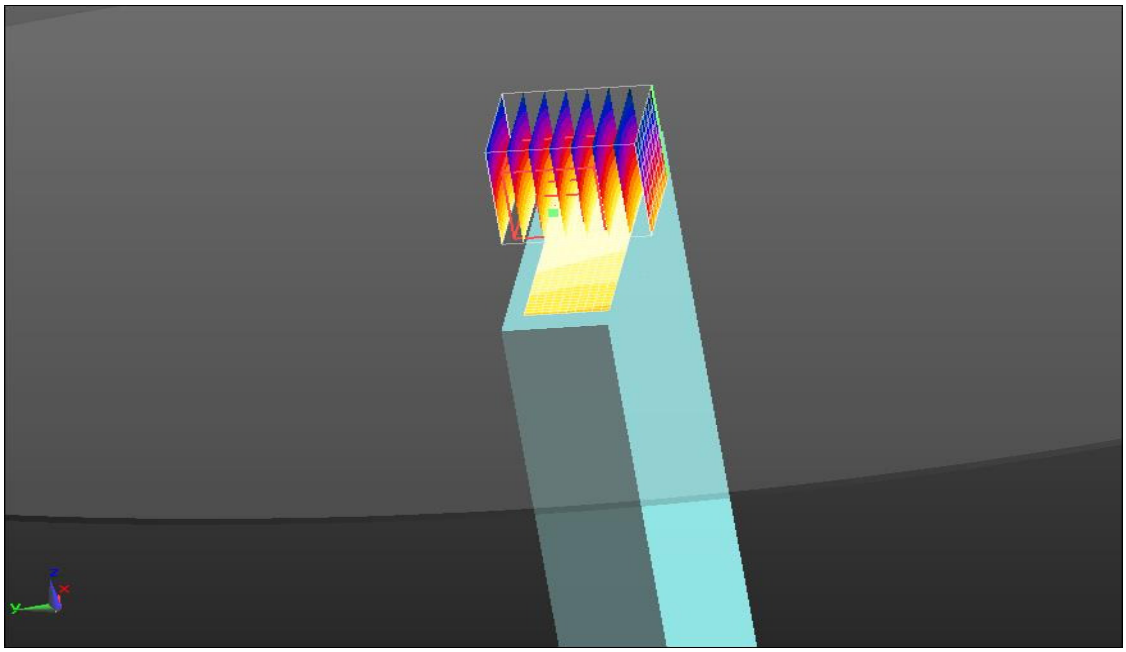
Grid Dimension : 101mmX91mmX1mm
Maximum SAR : 0.303 W/Kg

## Zoom Scan

Grid Dimension : 9mmX8mmX7mm
Power Reference : 16.73 V/m
Measured SAR : 0.319 W/Kg
Power Drift : -0.39 dB

**Measurement Plot:**

EUT Position: Edge 1



| Protocol | Bandwidth (MHz) | Channel Frequency (MHz) |
|---|---|---|
| LTE_FDD Band 5 | 10 | 836.5 |

Temperature of Liquid : 20.3 ºC
Measured Conductivity : 0.945 S/m
Measured Permittivity : 55.508

## Area Scan

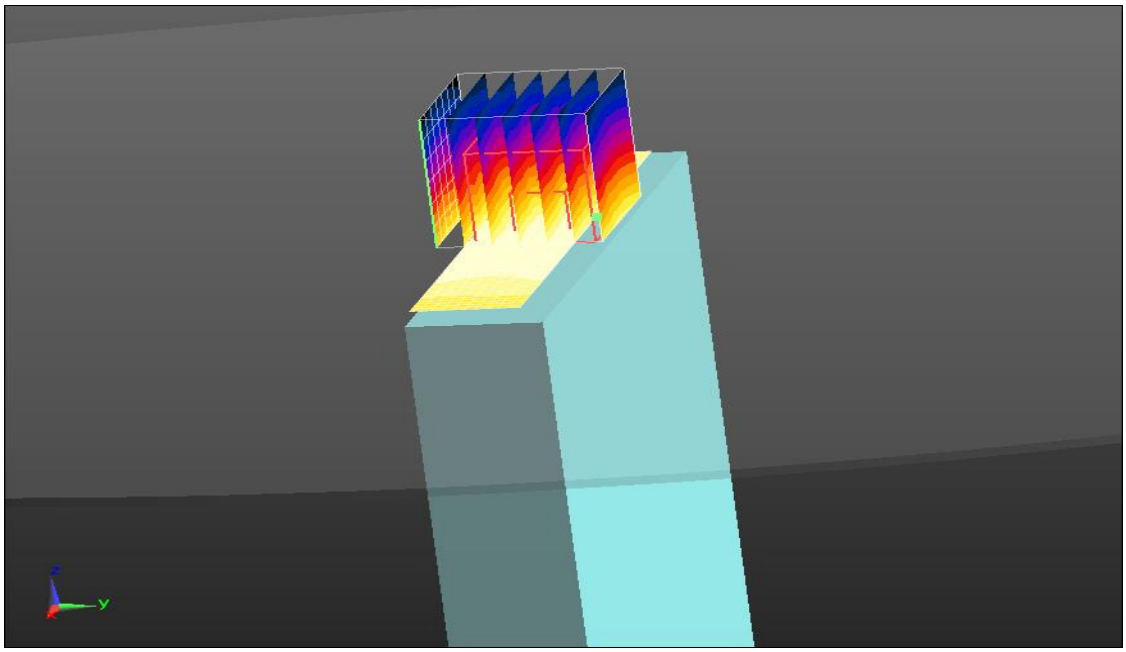
Grid Dimension : 91mmX91mmX1mm
Maximum SAR : 0.403 W/Kg

## Zoom Scan

Grid Dimension : 8mmX7mmX7mm
Power Reference : 20.93 V/m
Measured SAR : 0.305 W/Kg
Power Drift : -0.28 dB

**Measurement Plot:**

EUT Position: Edge 1



| Protocol | Bandwidth (MHz) | Channel Frequency (MHz) |
|---|---|---|
| LTE_FDD Band 5 | 10 | 844 |

Temperature of Liquid : 20.3 ºC
Measured Conductivity : 0.948 S/m
Measured Permittivity : 55.483

## Area Scan

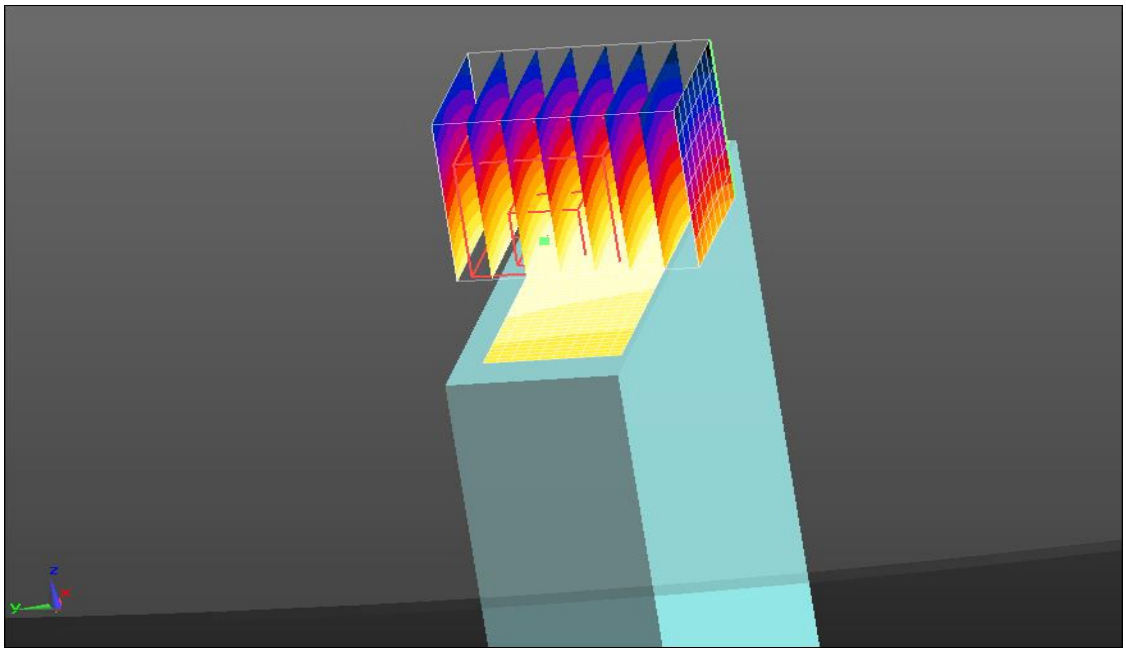
Grid Dimension : 101mmX91mmX1mm
Maximum SAR : 0.294W/Kg

## Zoom Scan

Grid Dimension : 9mmX8mmX7mm
Power Reference : 16.25 V/m
Measured SAR : 0.208 W/Kg
Power Drift : -0.07 dB

**Measurement Plot:**

EUT Position: Edge 1



| Protocol | Bandwidth (MHz) | Channel Frequency (MHz) |
|---|---|---|
| LTE_FDD Band 17 | 10 | 710 |

Temperature of Liquid : 22.5 ºC
Measured Conductivity : 0.9516 S/m
Measured Permittivity : 54.3071

## Area Scan

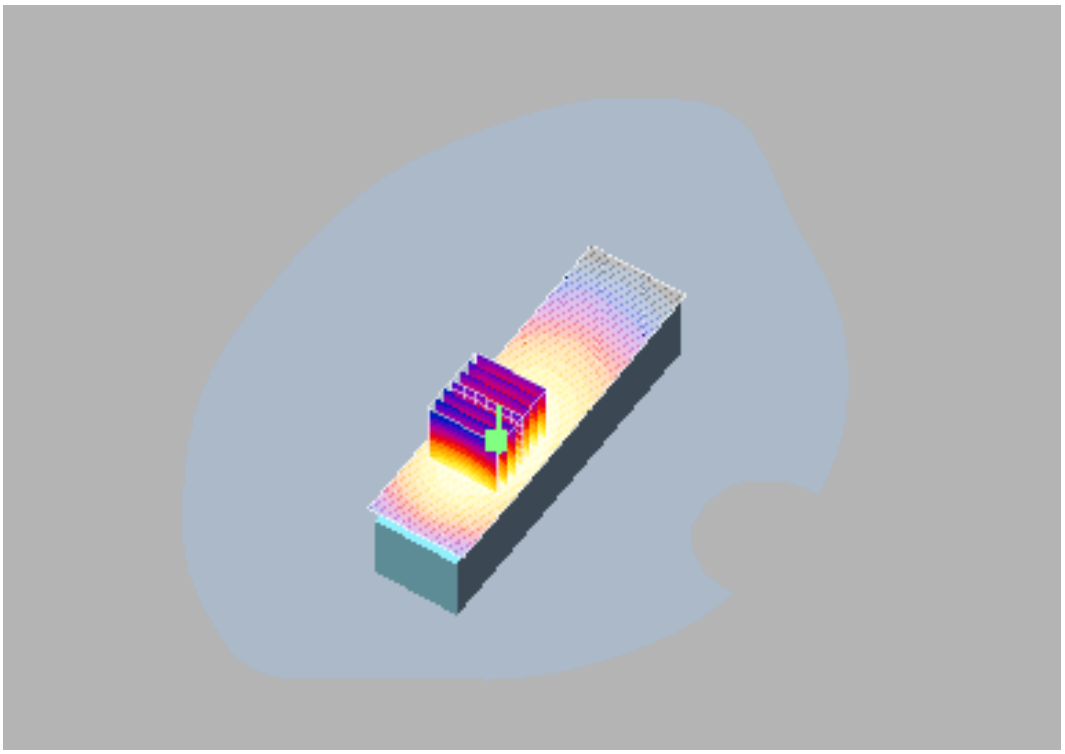
Grid Dimension : 41mmX141mmX1mm
Maximum SAR : 0.269W/Kg

## Zoom Scan

Grid Dimension : 7mmX7mmX7mm
Power Reference : 12.3 V/m
Measured SAR : 0.257 W/Kg
Power Drift : -0.063 dB

**Measurement Plot:**

EUT Position: Edge 1



| Protocol | Bandwidth (MHz) | Channel Frequency (MHz) |
|---|---|---|
| LTE_FDD Band 17 | 5 | 710 |

Temperature of Liquid : 22.5 ºC
Measured Conductivity : 0.9516 S/m
Measured Permittivity : 54.3071

## Area Scan

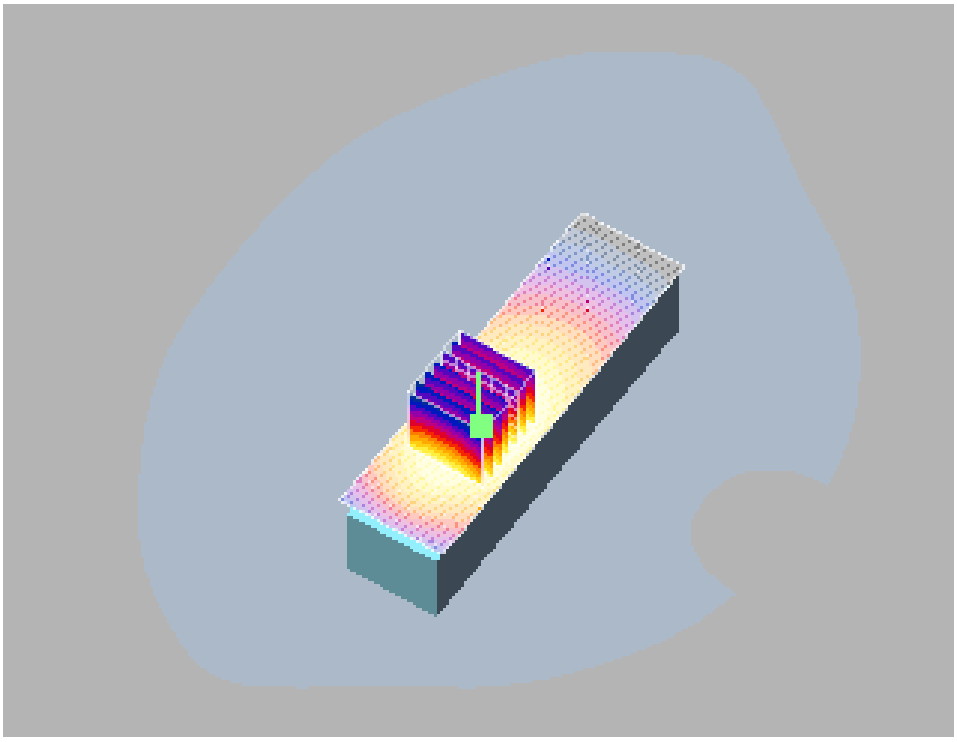
Grid Dimension : 41mmX141mmX1mm
Maximum SAR : 0.218W/Kg

## Zoom Scan

Grid Dimension : 7mmX7mmX7mm
Power Reference : 11.2 V/m
Measured SAR : 0.209 W/Kg
Power Drift : -0.114 dB

**Measurement Plot:**

EUT Position: Edge 1



| Protocol | Bandwidth (MHz) | Channel Frequency (MHz) |
|---|---|---|
| LTE_FDD Band 13 | 10 | 782 |

Temperature of Liquid : 22.5 ºC
Measured Conductivity : 0.973 S/m
Measured Permittivity : 54.52

## Area Scan

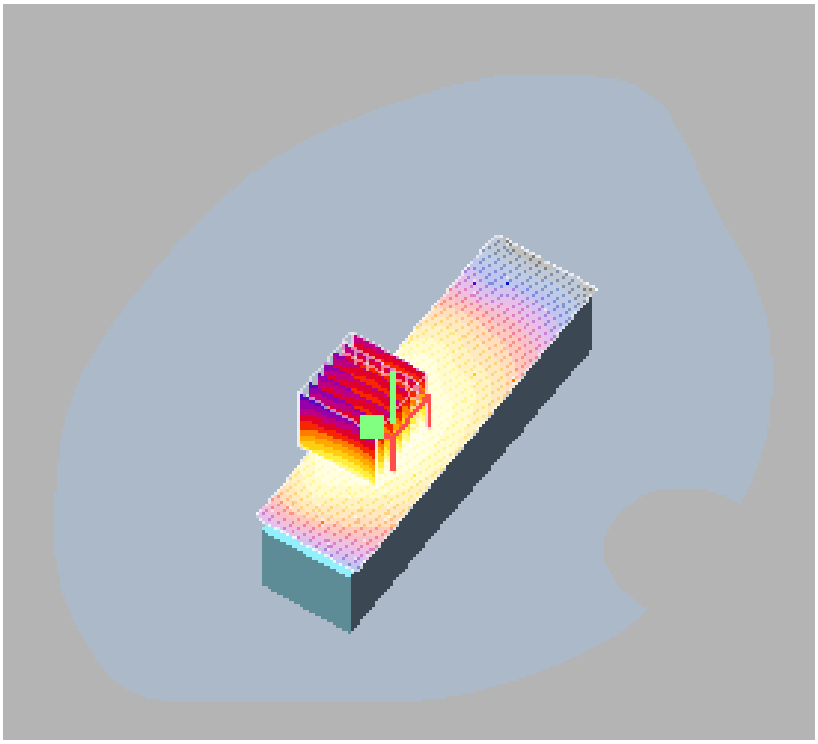
Grid Dimension : 41mmX141mmX1mm
Maximum SAR : 0.354W/Kg

## Zoom Scan

Grid Dimension : 7mmX7mmX7mm
Power Reference : 16.82 V/m
Measured SAR : 0.342 W/Kg
Power Drift : -0.15 dB

**Measurement Plot:**

EUT Position: Edge 1



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**SAR Test Result for the Barcode module removed from the Tablet:**

**Note:** Test result for worst case configuration is listed below.

**Summary of Test Results: GSM**

| Band | Channel Frequency (MHz) | Measured Power (mW) | Tune-Up Scaling Factor (dB) | Tune – Up Scaling Factor (mW) | Maximum Tune –Up Tolerance in (mW) | Measured SAR (W/kg) | Reported SAR (W/kg) | Worst Case EUT Position |
|---|---|---|---|---|---|---|---|---|
| GSM 850_Head | 848.8 | 1386.76 | 0.5 | 1.12 | 1555.97 | 0.383 | 0.430 | Right Touch |
| GSM 850_Body | 848.8 | 1386.76 | 0.5 | 1.12 | 1555.97 | 0.156 | 0.175 | Edge 1 |
| PCS1900_Head | 1850.2 | 548.28 | 0.3 | 1.07 | 587.49 | 0.335 | 0.359 | Right Touch |
| PCS1900_Body | 1850.2 | 548.28 | 0.3 | 1.07 | 587.49 | 0.148 | 0.159 | Front Face |

**Note:** Maximum output power was observed in voice mode hence SAR tests are performed for the same mode.

| Protocol | Band | Channel Frequency (MHz) |
|---|---|---|
| GSM | GSM850 | 848.8 |

Temperature of Liquid : 22.4 ºC
Measured Conductivity : 0.941 S/m
Measured Permittivity : 43.07

## Area Scan

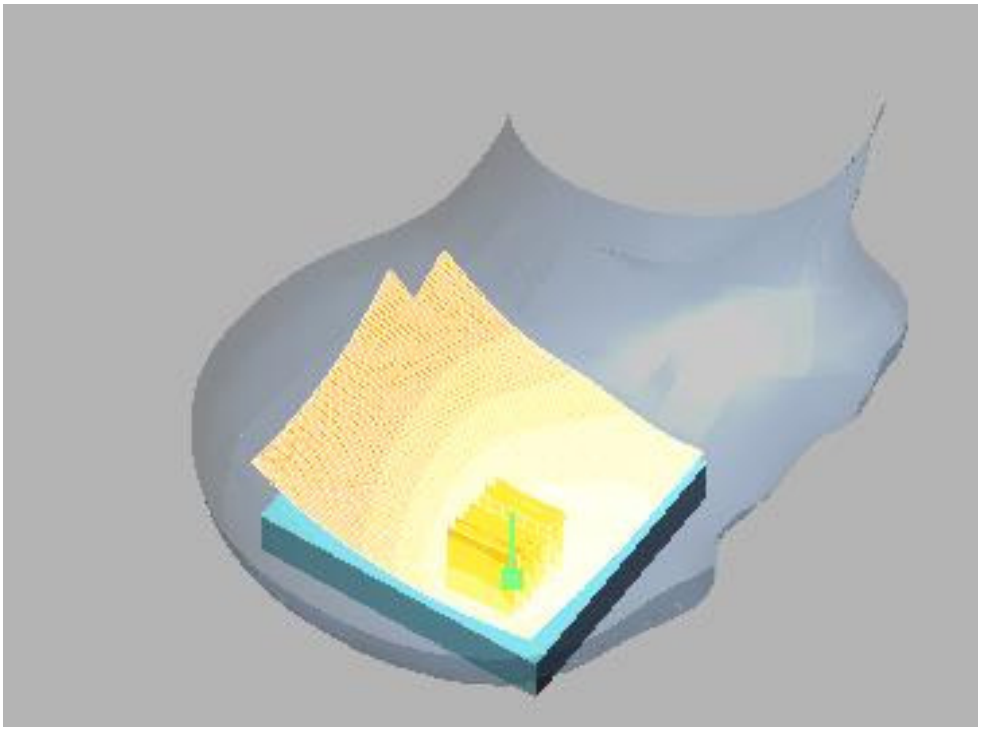
Grid Dimension : 121mmX111mmX1mm
Maximum SAR : 0.402 W/Kg

## Zoom Scan

Grid Dimension : 7mmX7mmX7mm
Power Reference : 11.5 V/m
Measured SAR : 0.383 W/Kg
Power Drift : 0.041 dB

**Measurement Plot:**

EUT Position: Right Touch



| Protocol | Band | Channel Frequency (MHz) |
|---|---|---|
| GSM | GSM850 | 848.8 |

Temperature of Liquid : 22.7 ºC
Measured Conductivity : 1.017 S/m
Measured Permittivity : 54.51

## Area Scan

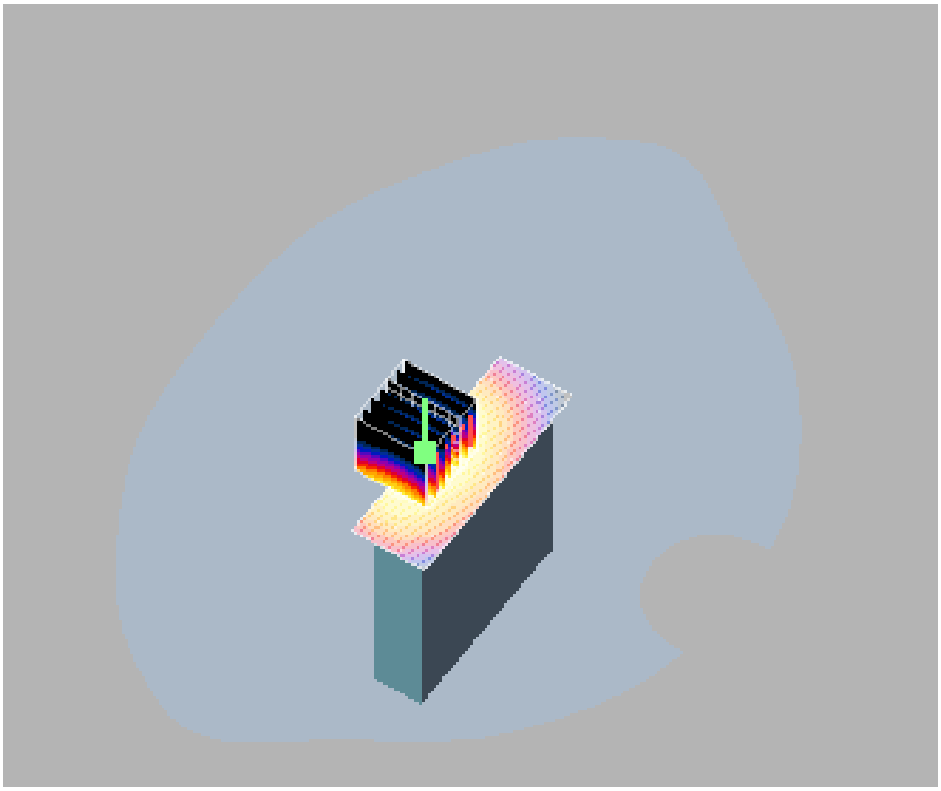
Grid Dimension : 31mmX91mmX1mm
Maximum SAR : 0.163 W/Kg

## Zoom Scan

Grid Dimension : 7mmX7mmX7mm
Power Reference : 10.9 V/m
Measured SAR : 0.156 W/Kg
Power Drift : 0.20 dB

**Measurement Plot:**

EUT Position: Edge 1



| Protocol | Band | Channel Frequency (MHz) |
|---|---|---|
| GSM | PCS1900 | 1850.2 |

Temperature of Liquid : 22.4 ºC
Measured Conductivity : 1.42 S/m
Measured Permittivity : 41.3

## Area Scan

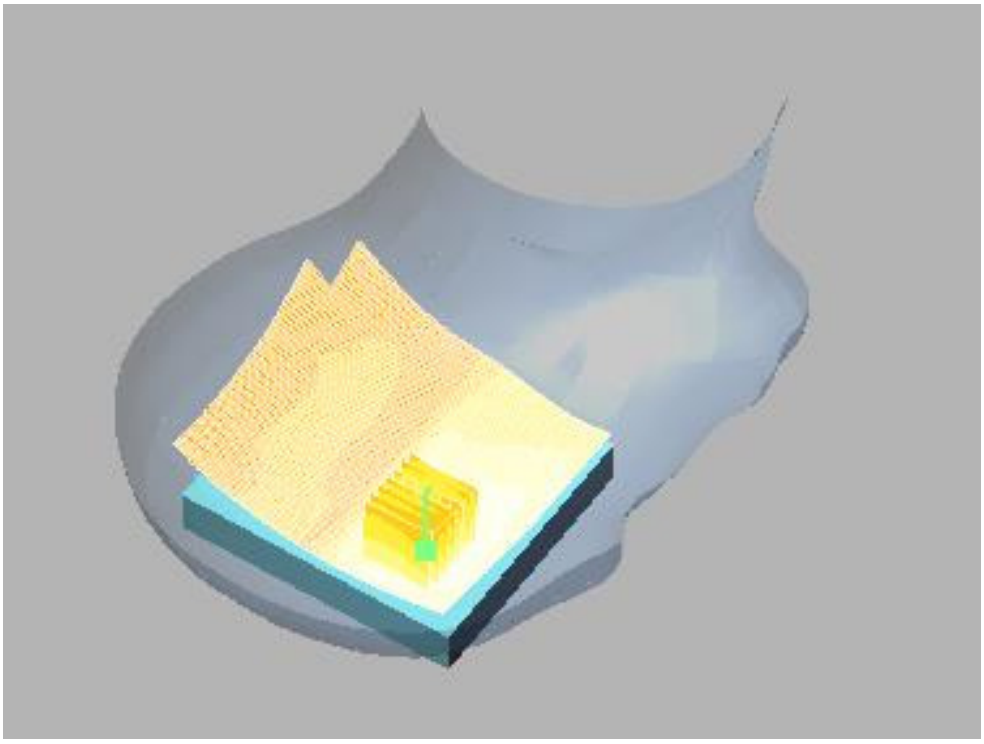
Grid Dimension : 121mmX111mmX1mm
Maximum SAR : 0.36 W/Kg

## Zoom Scan

Grid Dimension : 7mmX7mmX7mm
Power Reference : 9.28 V/m
Measured SAR : 0.335 W/Kg
Power Drift : -0.175 dB

**Measurement Plot:**

EUT Position: Right Touch



| Protocol | Band | Channel Frequency (MHz) |
|---|---|---|
| GSM | PCS1900 | 1850.2 |

Temperature of Liquid : 22.5 ºC
Measured Conductivity : 1.495 S/m
Measured Permittivity : 53.66

## Area Scan

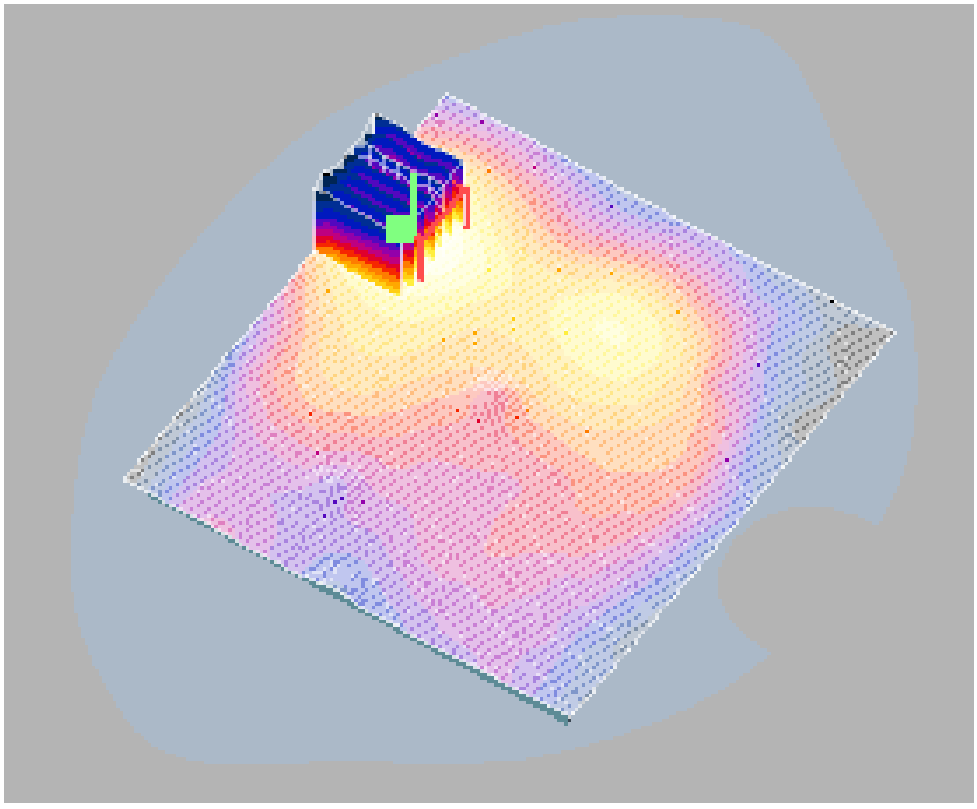
Grid Dimension : 151mmX161mmX1mm
Maximum SAR : 0.162 W/Kg

## Zoom Scan

Grid Dimension : 7mmX7mmX7mm
Power Reference : 6.7 V/m
Measured SAR : 0.148 W/Kg
Power Drift : 0.12 dB

**Measurement Plot:**

EUT Position: Front Face



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**Summary of Test Results: WCDMA**

| Band | Channel Frequency (MHz) | Measured Power (mW) | Tune-Up Scaling Factor (dB) | Tune – Up Scaling Factor (mW) | Maximum Tune –Up Tolerance in (mW) | Measured SAR (W/kg) | Reported SAR (W/kg) | Worst Case EUT Position |
|---|---|---|---|---|---|---|---|---|
| W-CDMA Band 2_Body | 1852.4 | 90.16 | 0.7 | 1.17 | 105.93 | 0.573 | 0.673 | Front Face |
| W-CDMA Band 4_Body | 1732.4 | 70.63 | 0.6 | 1.15 | 81.1 | 0.544 | 0.625 | Back Face |
| W-CDMA Band 5_Body | 836.6 | 81.10 | 0.4 | 1.10 | 88.92 | 0.211 | 0.231 | Edge 1 |
| W-CDMA Band 2_Head | 1880 | 104.95 | 0.7 | 1.17 | 123.31 | 1.17 | 1.375 | Right Touch |
| W-CDMA Band 4_Head | 1712.4 | 62.81 | 0.6 | 1.15 | 72.11 | 0.421 | 0.483 | Right Touch |
| W-CDMA Band 5_Head | 836.6 | 81.10 | 0.4 | 1.10 | 88.92 | 0.667 | 0.731 | Right Touch |

**Note:** Maximum output power was observed in voice mode hence SAR tests are performed for the same mode.

| Protocol | Band | Channel Frequency (MHz) |
|---|---|---|
| W-CDMA | FDD Band 2 | 1852.4 |

Temperature of Liquid : 22.6 ºC
Measured Conductivity : 1.495 S/m
Measured Permittivity : 53.67

## Area Scan

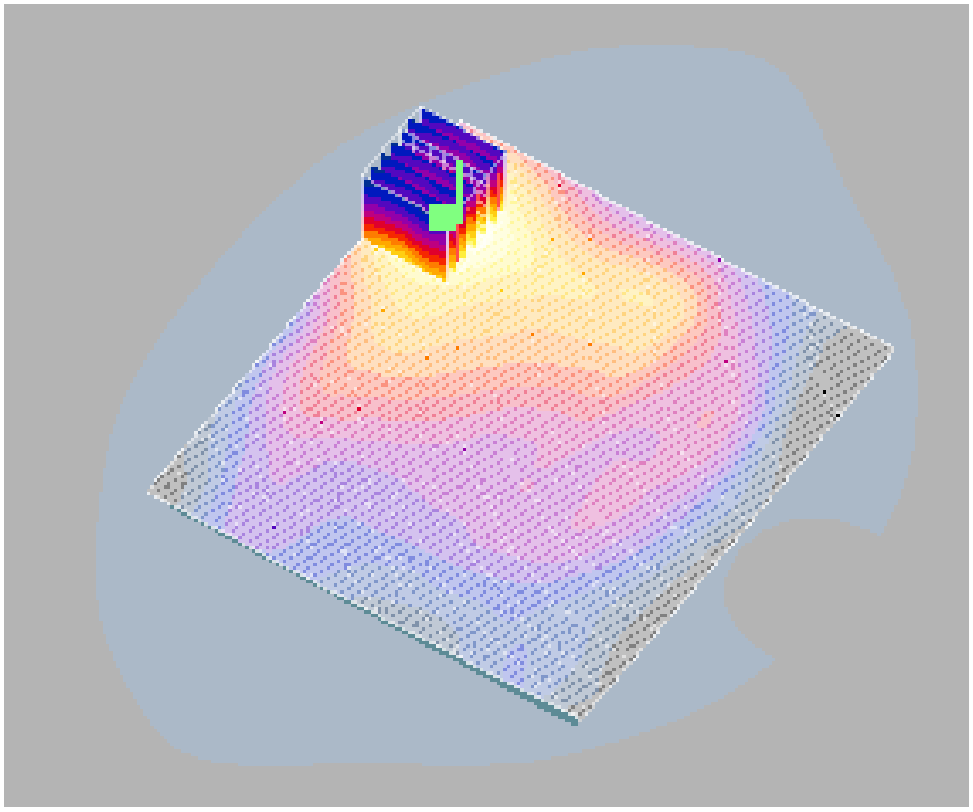
Grid Dimension : 151mmX161mmX1mm
Maximum SAR : 0.628W/Kg

## Zoom Scan

Grid Dimension : 7mmX7mmX7mm
Power Reference : 8.06 V/m
Measured SAR : 0.573 W/Kg
Power Drift : -0.03 dB

**Measurement Plot:**

EUT Position: Front Face



| Protocol | Band | Channel Frequency (MHz) |
|---|---|---|
| W-CDMA | FDD Band 4 | 1732.4 |

Temperature of Liquid : 22.5 ºC
Measured Conductivity : 1.418 S/m
Measured Permittivity : 53.68

## Area Scan

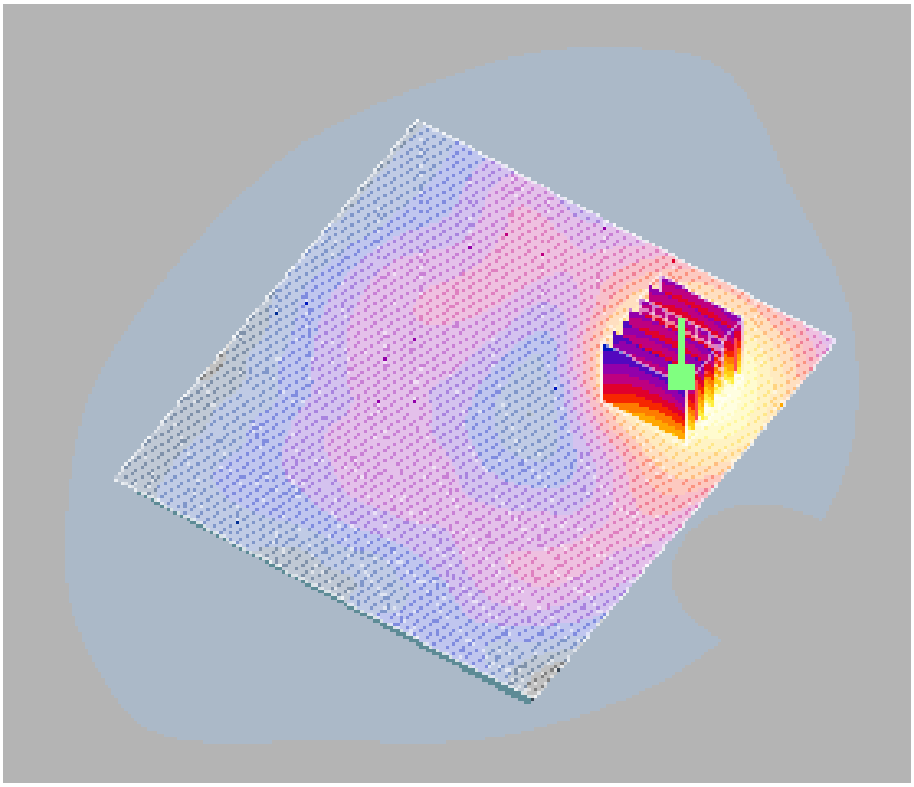
Grid Dimension : 151mmX161mmX1mm
Maximum SAR : 0.576W/Kg

## Zoom Scan

Grid Dimension : 7mmX7mmX7mm
Power Reference : 4.29 V/m
Measured SAR : 0.544 W/Kg
Power Drift : 0.16 dB

**Measurement Plot:**

EUT Position: Back Face



| Protocol | Band | Channel Frequency (MHz) |
|---|---|---|
| W-CDMA | FDD Band 5 | 836.6 |

Temperature of Liquid : 22.5 ºC
Measured Conductivity : 1.007 S/m
Measured Permittivity : 54.12

## Area Scan

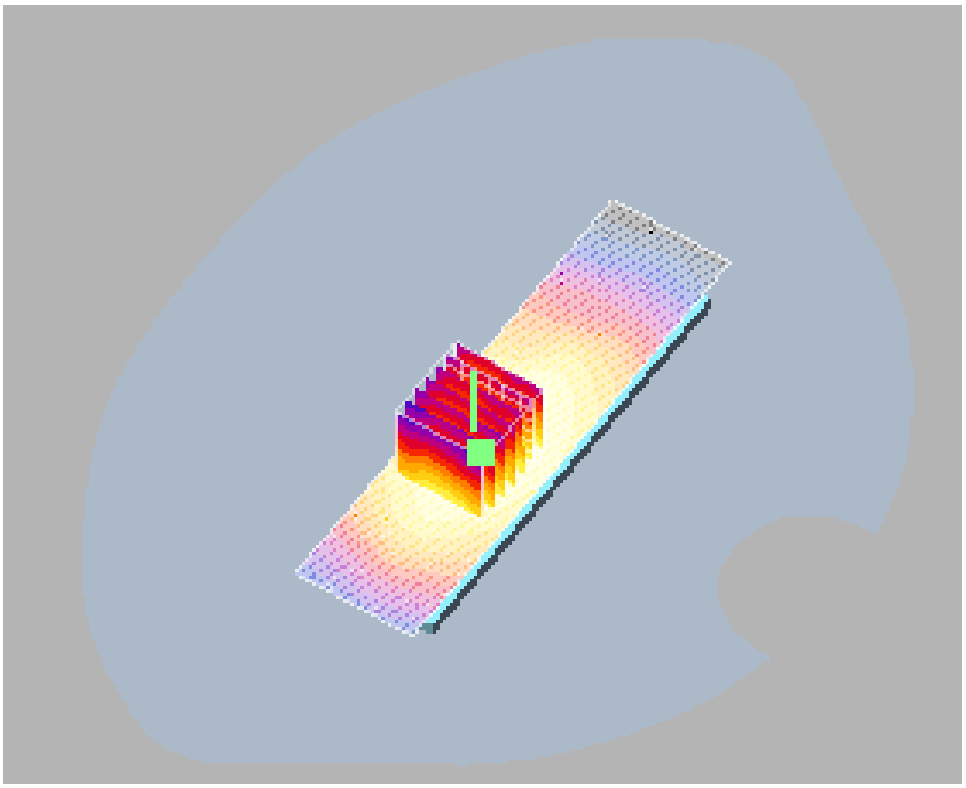
Grid Dimension : 41mmX161mmX1mm
Maximum SAR : 0.239W/Kg

## Zoom Scan

Grid Dimension : 7mmX7mmX7mm
Power Reference : 14.2 V/m
Measured SAR : 0.211 W/Kg
Power Drift : -0.61 dB

**Measurement Plot:**

EUT Position: Edge 1



| Protocol | Band | Channel Frequency (MHz) |
|---|---|---|
| W-CDMA | FDD Band 2 | 1880 |

Temperature of Liquid : 22.4 ºC
Measured Conductivity : 1.433 S/m
Measured Permittivity : 40.99

## Area Scan

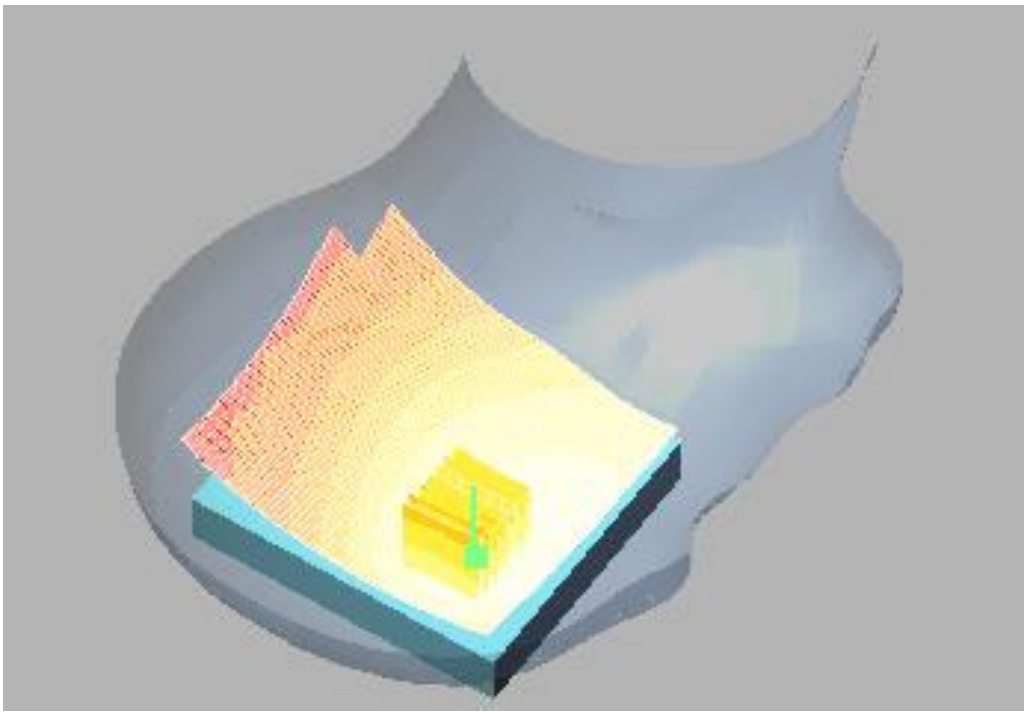
Grid Dimension : 151mmX161mmX1mm
Maximum SAR : 1.18W/Kg

## Zoom Scan

Grid Dimension : 7mmX7mmX7mm
Power Reference : 16.1 V/m
Measured SAR : 1.17 W/Kg
Power Drift : -0.47 dB

**Measurement Plot:**

EUT Position: Right Touch



| Protocol | Band | Channel Frequency (MHz) |
|---|---|---|
| W-CDMA | FDD Band 4 | 1712.4 |

Temperature of Liquid : 22.4 ºC
Measured Conductivity : 1.35 S/m
Measured Permittivity : 41.53

## Area Scan

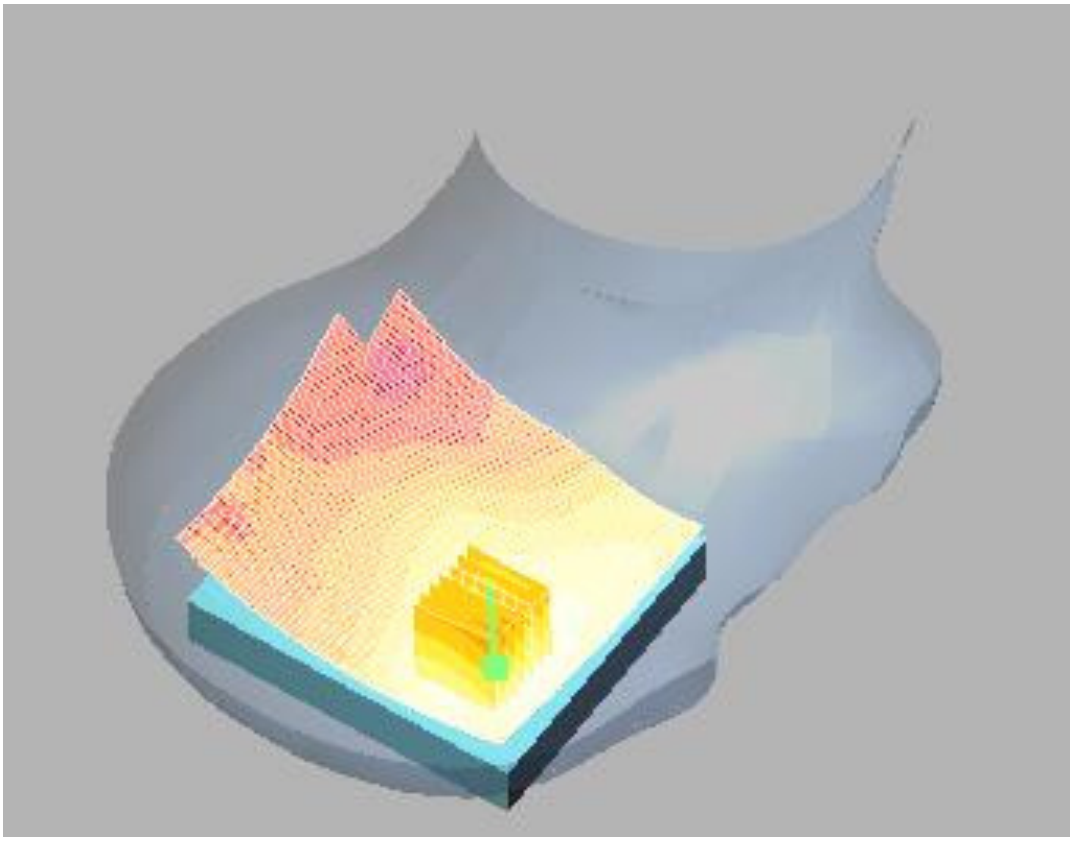
Grid Dimension : 121mmX111mmX1mm
Maximum SAR : 0.465W/Kg

## Zoom Scan

Grid Dimension : 7mmX7mmX7mm
Power Reference : 8.25 V/m
Measured SAR : 0.421 W/Kg
Power Drift : -0.24 dB

**Measurement Plot:**

EUT Position: Right Touch



| Protocol | Band | Channel Frequency (MHz) |
|---|---|---|
| W-CDMA | FDD Band 5 | 836.6 |

Temperature of Liquid : 22.4 ºC
Measured Conductivity : 0.932 S/m
Measured Permittivity : 42.82

## Area Scan

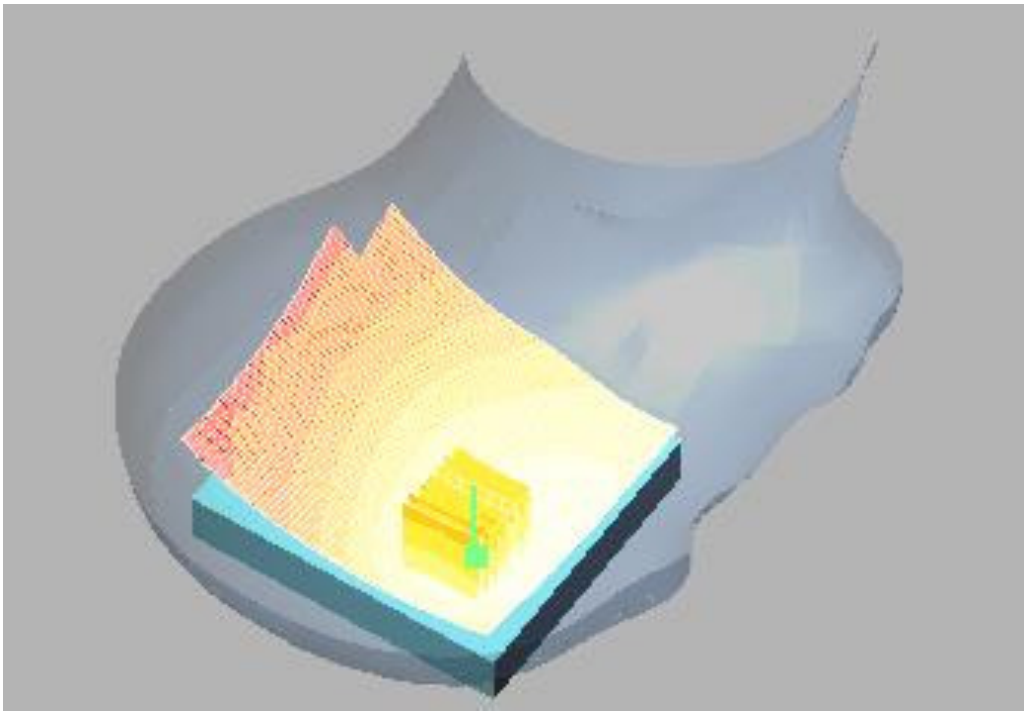
Grid Dimension : 121mmX111mmX1mm
Maximum SAR : 0.730W/Kg

## Zoom Scan

Grid Dimension : 7mmX7mmX7mm
Power Reference : 14.6 V/m
Measured SAR : 0.667 W/Kg
Power Drift : -0.074 dB

**Measurement Plot:**

EUT Position: Right Touch



**Test Result Summary: Wi-Fi & Bluetooth**

| Band | Channel Frequency (MHz) | Measured Power (mW) | Tune-Up Scaling Factor (dB) | Tune –Up Scaling Factor (mW) | Maximum Tune –Up Tolerance in (mW) | Measured SAR (W/kg) | Reported SAR (W/kg) | Worst Case EUT Position |
|---|---|---|---|---|---|---|---|---|
| 2.4GHz_ Wi-Fi_Body | 2437 | 23.44 | 0.5 | 1.12 | 24.56 | 0.161 | 0.181 | Edge 1 |
| 2.4GHz_ Wi-Fi_Head | 2462 | 19.50 | 0.5 | 1.12 | 20.62 | 0.172 | 0.193 | Left Tilt |
| 2.4GHz_Bluetooth_Body | 2480 | 5.26 | 0.5 | 1.12 | 6.38 | 0.00415 | 0.005 | Edge 1 |

| Protocol | Data Rate | Channel Frequency (MHz) |
|---|---|---|
| Wi-Fi | 1Mbps | 2437 |

Temperature of Liquid : 23 ºC
Measured Conductivity : 1.935 S/m
Measured Permittivity : 52.75

## Area Scan

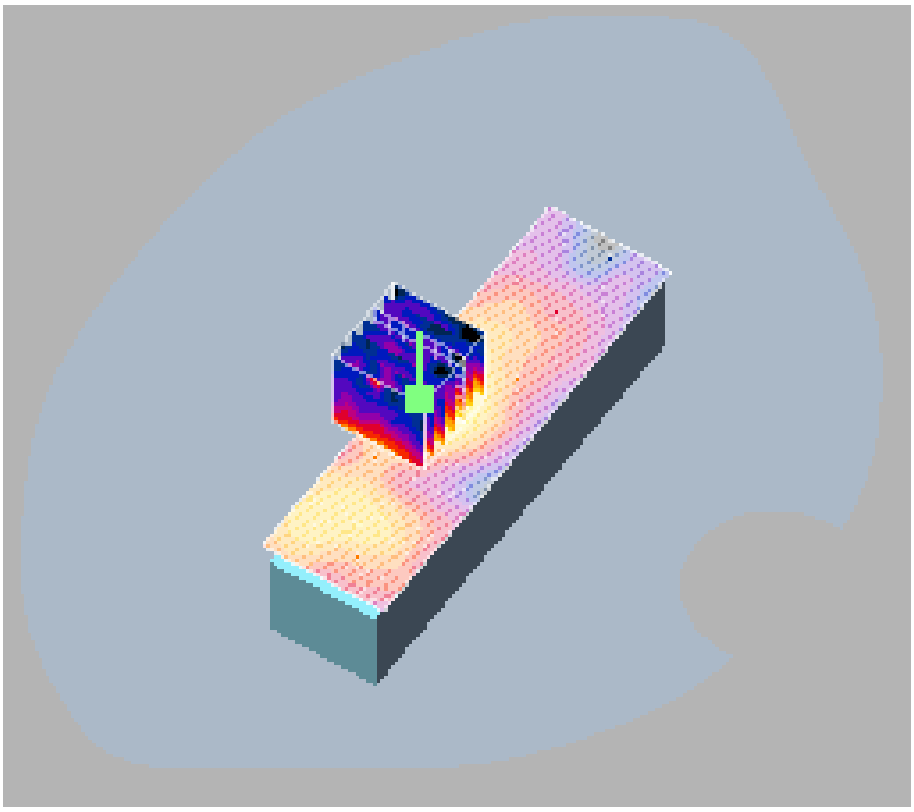
Grid Dimension : 41mmX141mmX1mm
Maximum SAR : 0.169 W/Kg

## Zoom Scan

Grid Dimension : 7mmX7mmX7mm
Power Reference : 4.66 V/m
Measured SAR : 0.161 W/Kg
Power Drift : -0.39dB

**Measurement Plot:**

EUT Position: Edge 1



| Protocol | Data Rate | Channel Frequency (MHz) |
|---|---|---|
| Wi-Fi | 1Mbps | 2437 |

Temperature of Liquid : 22.8 ºC
Measured Conductivity : 1.795 S/m
Measured Permittivity : 40.185

## Area Scan

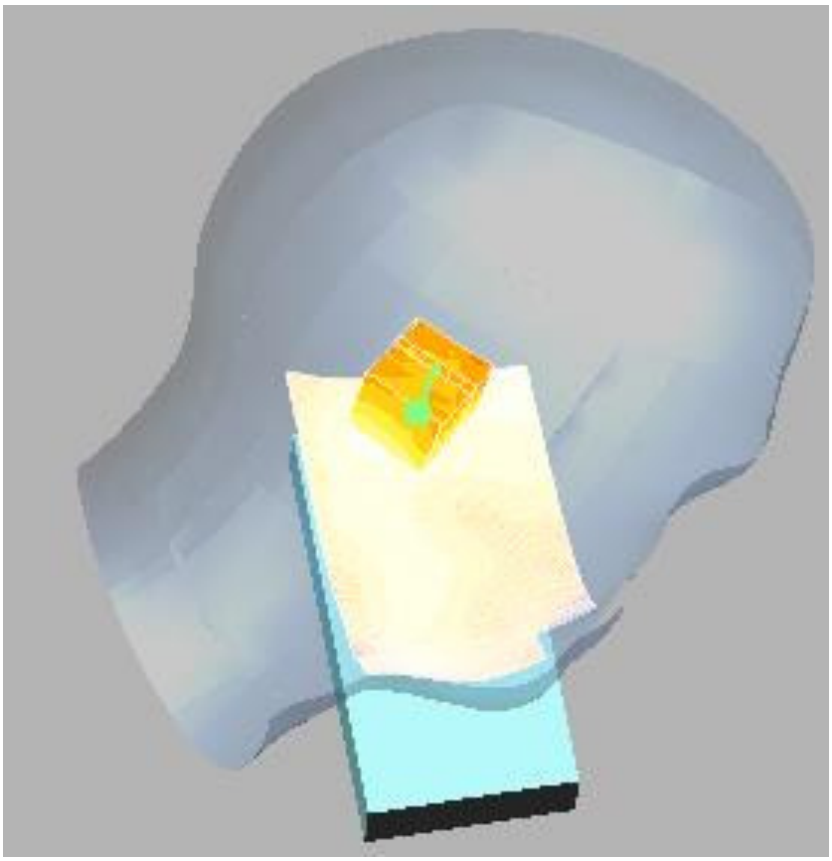
Grid Dimension : 81mmX141mmX1mm
Maximum SAR : 0.164 W/Kg

## Zoom Scan

Grid Dimension : 7mmX7mmX7mm
Power Reference : 6.18 V/m
Measured SAR : 0.172 W/Kg
Power Drift : -0.39dB

**Measurement Plot:**

EUT Position: Left Tilt



| Protocol | Data Rate | Channel Frequency (MHz) |
|---|---|---|
| Bluetooth | 3Mbps | 2440 |

Temperature of Liquid : 23 ºC
Measured Conductivity : 1.935 S/m
Measured Permittivity : 52.75

## Area Scan

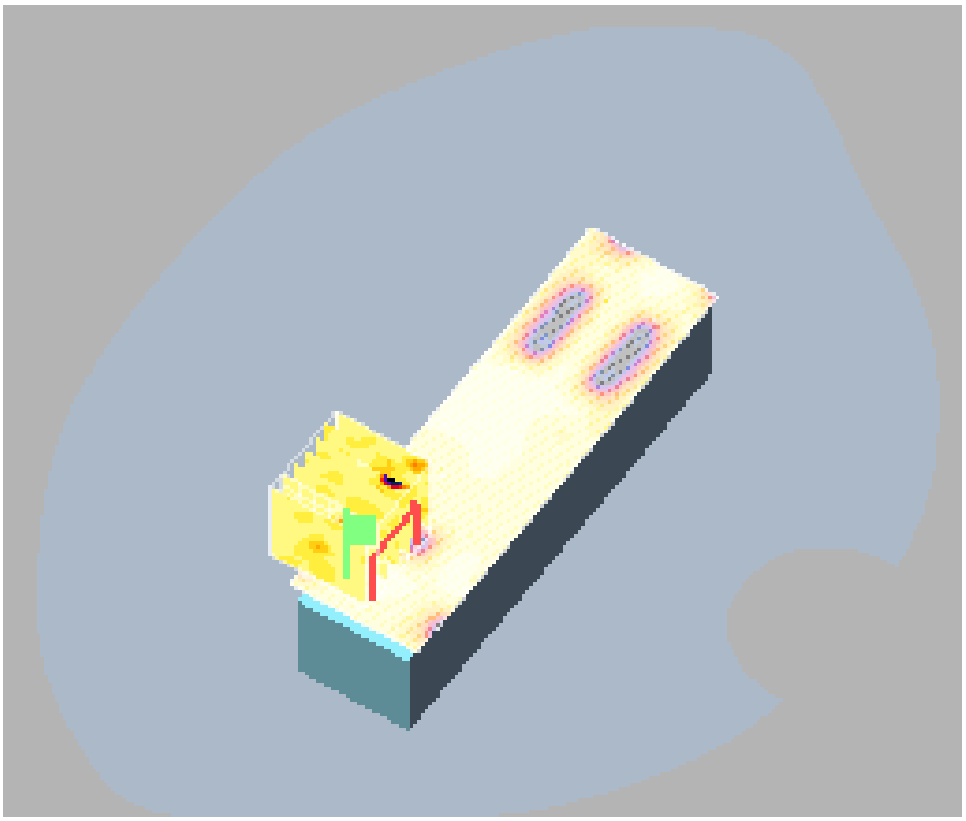
Grid Dimension : 41mmX141mmX1mm
Maximum SAR : 0.01 W/Kg

## Zoom Scan

Grid Dimension : 7mmX7mmX7mm
Power Reference : 3.68 V/m
Measured SAR : 0.00415 W/Kg
Power Drift : -0.79dB

**Measurement Plot:**

EUT Position: Edge 1



**Test Result Summary: LTE**

| Band | Channel Frequency (MHz) | Measured Power (mW) | Tune-Up Scaling Factor (dB) | Tune –Up Scaling Factor (mW) | Maximum Tune –Up Tolerance in (mW) | Measured SAR (W/kg) | Reported SAR (W/kg) | Worst Case EUT Position |
|---|---|---|---|---|---|---|---|---|
| LTE Band 2_Body | 1860 | 138.68 | 0.5 | 1.12 | 139.8 | 0.193 | 0.217 | Edge 1 |
| LTE Band 4_Body | 1732.5 | 152.76 | 1.2 | 1.32 | 154.07 | 0.454 | 0.598 | Edge 2 |
| LTE Band 5_Body | 829 | 143.22 | 0.6 | 1.15 | 144.37 | 0.173 | 0.199 | Edge 1 |
| LTE Band 17_Body | 710 | 167.88 | 0.6 | 1.15 | 169.03 | 0.182 | 0.209 | Edge 1 |

| Protocol | Bandwidth (MHz) | Channel Frequency (MHz) |
|---|---|---|
| LTE_FDD Band 2 | 20 | 1860 |

Temperature of Liquid : 23 ºC
Measured Conductivity (σ) : 1.497 S/m
Measured Permittivity (εr) : 53.507

## Area Scan

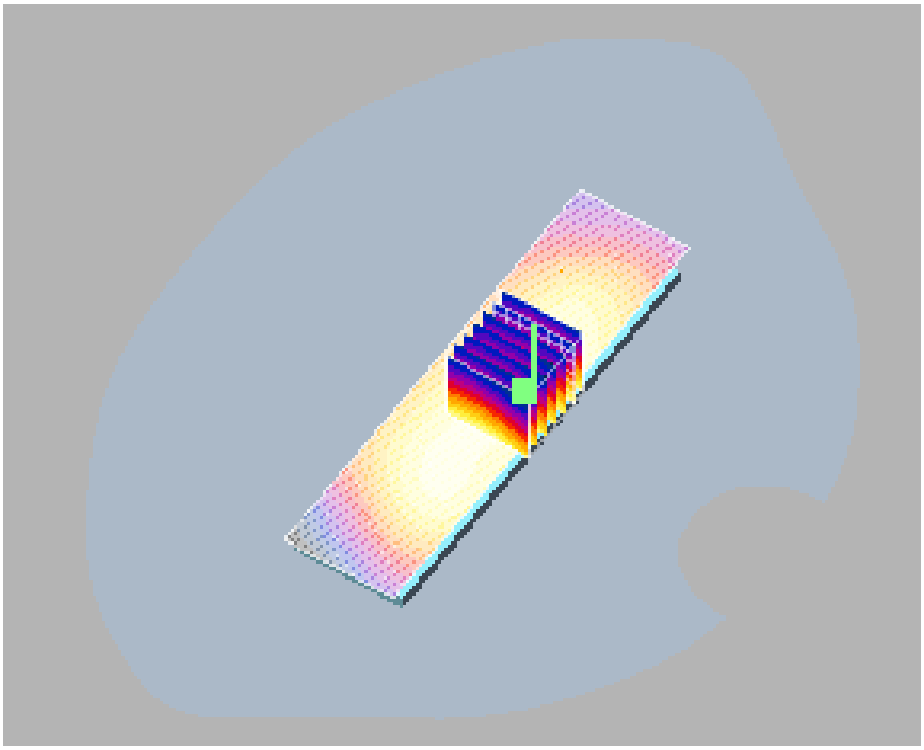
Grid Dimension : 41mmX161mmX1mm
Maximum SAR : 0.196 W/Kg

## Zoom Scan

Grid Dimension : 7mmX7mmX7mm
Power Reference : 11.2 V/m
Measured SAR : 0.193 W/Kg
Power Drift : -0.0 dB

**Measurement Plot:**

EUT Position: Edge 1



| Protocol | Bandwidth (MHz) | Channel Frequency (MHz) |
|---|---|---|
| LTE_FDD Band 4 | 5 | 1732.5 |

Temperature of Liquid : 23 ºC
Measured Conductivity (σ) : 1.445 S/m
Measured Permittivity (εr) : 53.68

## Area Scan

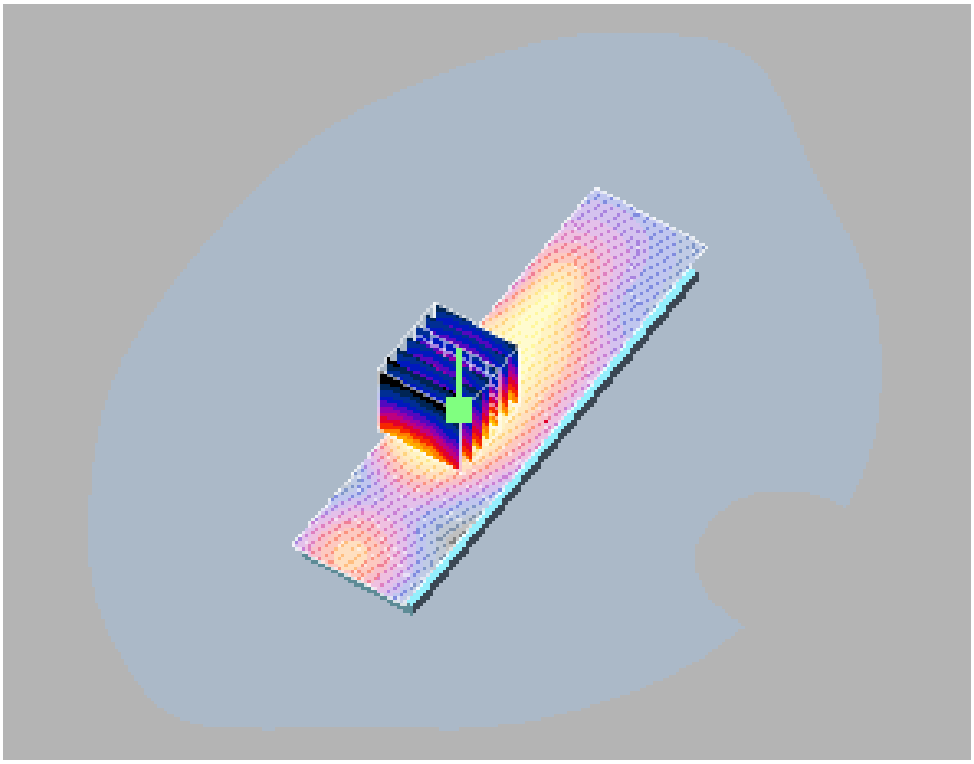
Grid Dimension : 41mmX161mmX1mm
Maximum SAR : 0.397 W/Kg

## Zoom Scan

Grid Dimension : 7mmX7mmX7mm
Power Reference : 11.2 V/m
Measured SAR : 0.454 W/Kg
Power Drift : -0.72 dB

**Measurement Plot:**

EUT Position: Edge 2



| Protocol | Bandwidth (MHz) | Channel Frequency (MHz) |
|---|---|---|
| LTE_FDD Band 5 | 10 | 829 |

Temperature of Liquid : 23 ºC
Measured Conductivity (σ) : 1.002 S/m
Measured Permittivity (εr) : 54.

## Area Scan

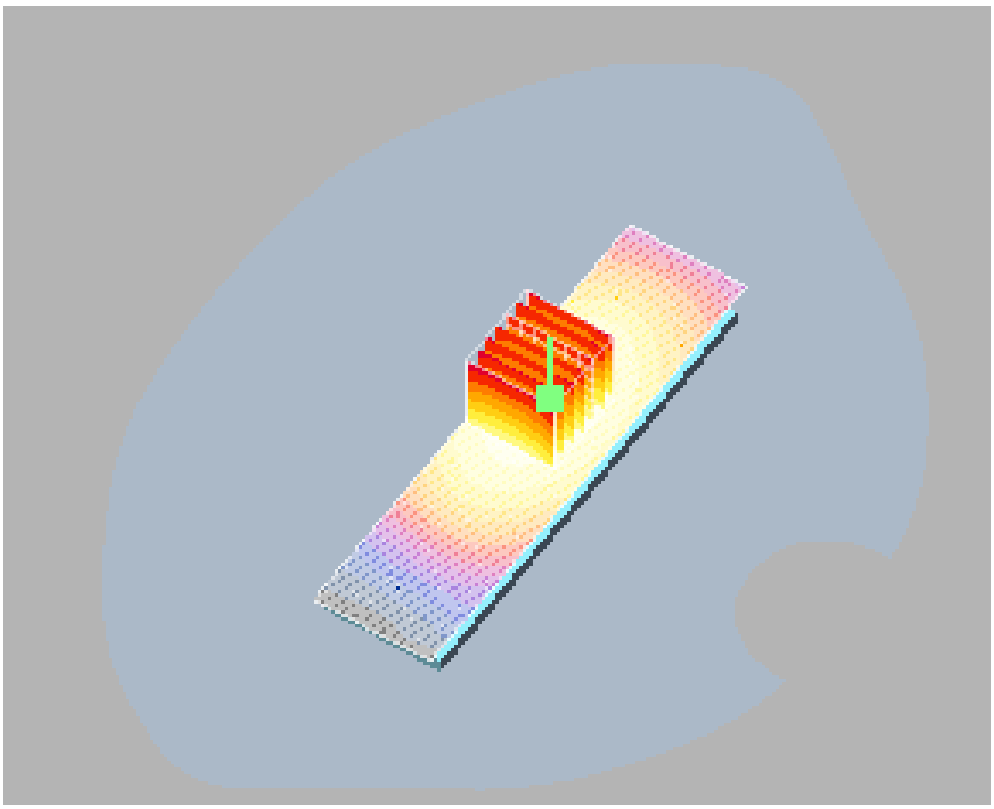
Grid Dimension : 41mmX161mmX1mm
Maximum SAR : 0.188 W/Kg

## Zoom Scan

Grid Dimension : 7mmX7mmX7mm
Power Reference : 10.8 V/m
Measured SAR : 0.173 W/Kg
Power Drift : 0.37 dB

**Measurement Plot:**

EUT Position: Edge 1



| Protocol | Bandwidth (MHz) | Channel Frequency (MHz) |
|---|---|---|
| LTE_FDD Band 17 | 10 | 710 |

Temperature of Liquid : 23 ºC
Measured Conductivity (σ) : 0.989 S/m
Measured Permittivity (εr) : 53.54

## Area Scan

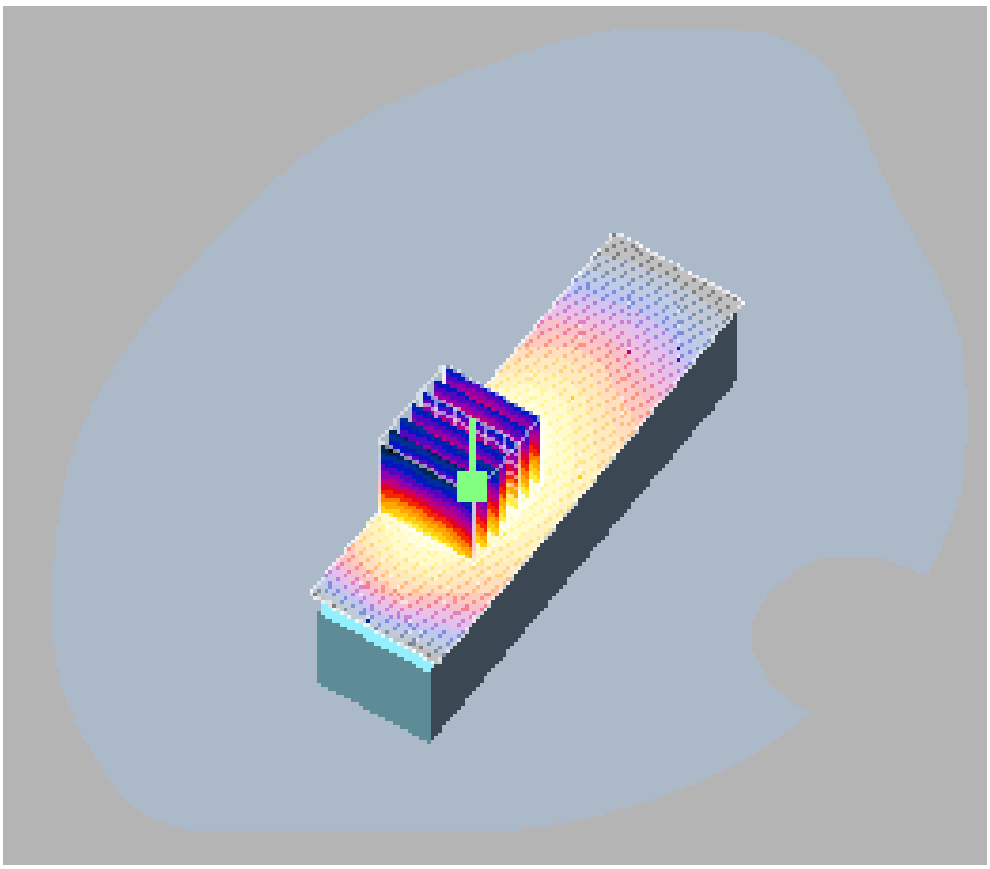
Grid Dimension : 41mmX161mmX1mm
Maximum SAR : 0.195 W/Kg

## Zoom Scan

Grid Dimension : 7mmX7mmX7mm
Power Reference : 10.8 V/m
Measured SAR : 0.182 W/Kg
Power Drift : 0.37 dB

**Measurement Plot:**

EUT Position: Edge 1



| Protocol | Bandwidth (MHz) | Channel Frequency (MHz) |
|---|---|---|
| LTE_FDD Band 13 | 10 | 782 |

Temperature of Liquid : 22.5 ºC
Measured Conductivity : 0.973 S/m
Measured Permittivity : 54.52

## Area Scan

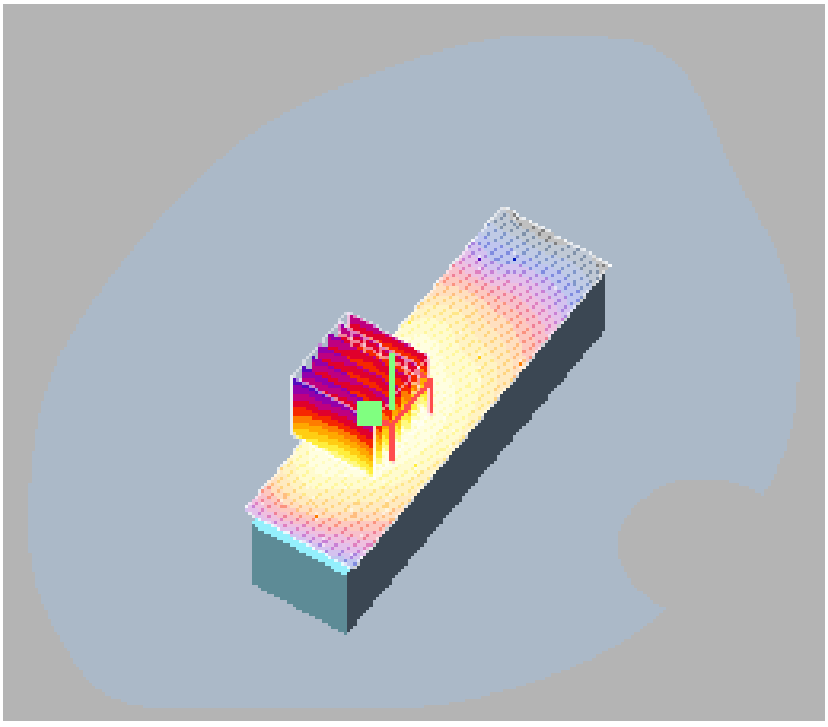
Grid Dimension : 41mmX141mmX1mm
Maximum SAR : 0.338W/Kg

## Zoom Scan

Grid Dimension : 7mmX7mmX7mm
Power Reference : 16.54 V/m
Measured SAR : 0.326 W/Kg
Power Drift : 0.2 dB

**Measurement Plot:**

EUT Position: Edge 1



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**Test Results: Simultaneous Operation**

Simultaneous Transmission Configuration as mentioned below;
GSM & Wi-Fi, along with NFC; BLE/BT & GPS Transmit Simultaneously.
3G along with NFC, BLE/BT & GPS Transmit Simultaneously.
4G along with NFC, BLE/BT & GPS Transmit Simultaneously.

Data network supported by tablet are as follows in the order of priority, one mode at a time – Wired Ethernet, WIFI (2G calls can work during this, the same simultaneous transmission calculation is reported), 2G data, 3G data or 4G data & WIFI hotspot functionality will be active but data connection will be cut during the phone call.

WLAN and BT/BLE share the same antenna, and cannot transmit simultaneously.
Based on network signal strength product will choose either GSM or WCDMA, Therefore, they will not Transmit Simultaneously.

Simultaneous transmission combined SAR value is as listed in below table;

| | GSM850 | PCS1900 | Wi-Fi | Σ 1-g SAR (W/kg) |
|---|---|---|---|---|
| Head | 0.43 | - | 0.45 | 0.89 |
| Body | 0.17 | - | 0.3 | 0.48 |
| Head | - | 0.51 | 0.45 | 0.97 |
| Body | - | 0.14 | 0.3 | 0.45 |

For simultaneous transmission analysis, Bluetooth SAR is estimated per KDB 447498 D01 based on the formula below

**a)** [(Max. Power of channel, including tune-up tolerance, mW) / (min. test separation distance, mm)] *[√f (GHz)/x] W/kg for test separation distances 50mm;

Where $x$ = 7.5 for 1-g SAR and $x$ = 18.75 for 10-g SAR.

b) When the minimum separation distance is <5mm, the distance is used 5mm to determine SAR test exclusion

| Frequency (GHz) | Max. Power (mW) | Min.Test Separation distance | SAR Test Exclusion Calculation Values | 1-g Extremity SAR Test exclusion Thresholds | Results |
|---|---|---|---|---|---|
| 2.402 – 2.480 _BT | 8.14 | 5mm | 0.38 | 3 | Pass |
| 2.402 – 2.480_BLE | 2.04 | 5mm | 0.08 | 3 | Pass |

# SAR Sensor on 118207

- A short note

## Background -

The SAR sensor is basically a proximity sensor which is used for detecting the proximity of head or body to the antenna of the Wireless product. The operation is purely based on detection of capacitance change. Interrupts are generated by this SAR sensor chip to the processor and the processor communicates with the transceiver chip to drive the appropriate power level defined by the back-off algorithm.

## Current scenario -

The SAR sensor mounted on the main board of 118207 is active but currently not running any power back-off algorithm because the measured SAR values as per FCC & IC regulations are well below the limits and no hence power back-off is actually required.

## Bottom note –

SAR sensors chip are added during the design stage based on the virtual SAR 3D simulations with PC software. Later, after the product is ready for testing, the actual SAR value is measured and based on these measured values, the appropriate algorithm is added based on the back-off requirements.

**Test Setup Photos:**

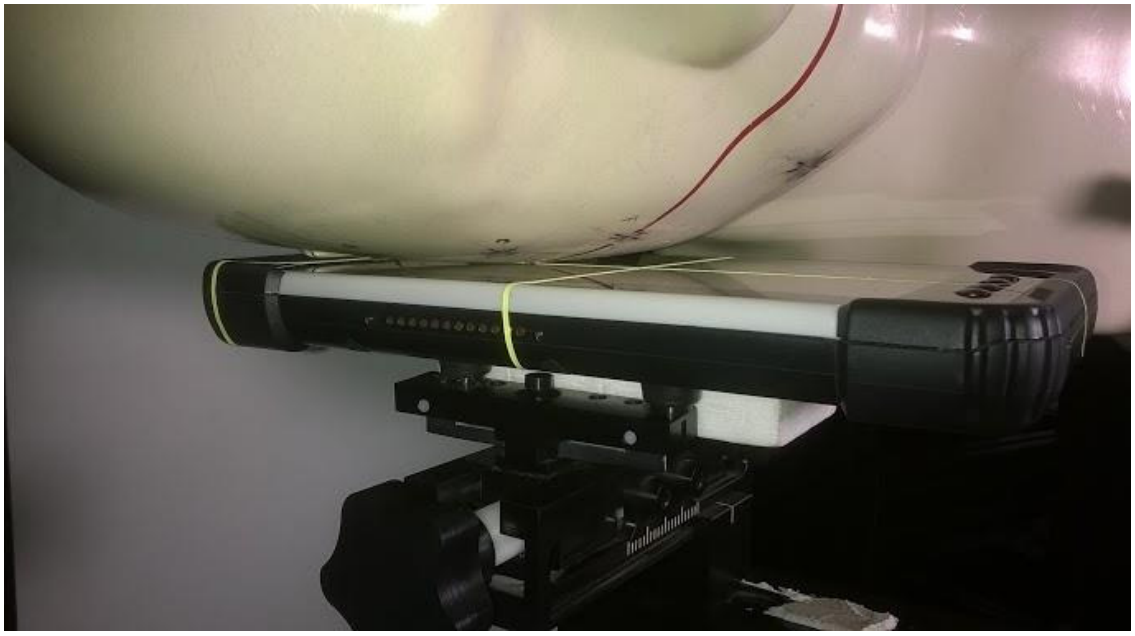
**System Validation**

**System Validation**

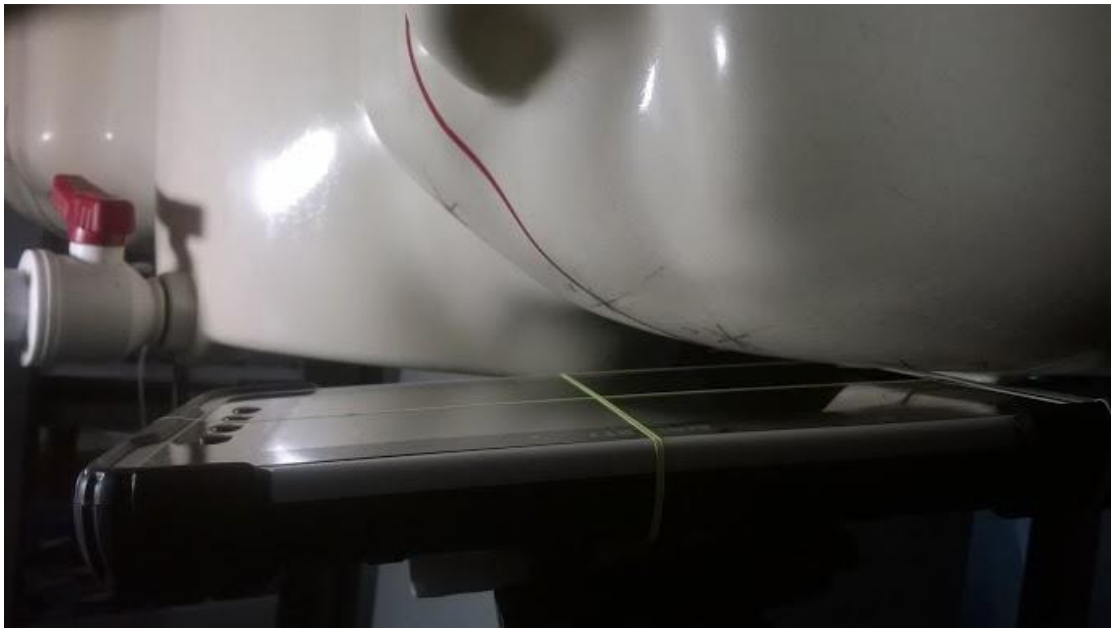
**SAR Test Setup_10mm Spacer**

**SAR Test Setup_10mm Spacer**

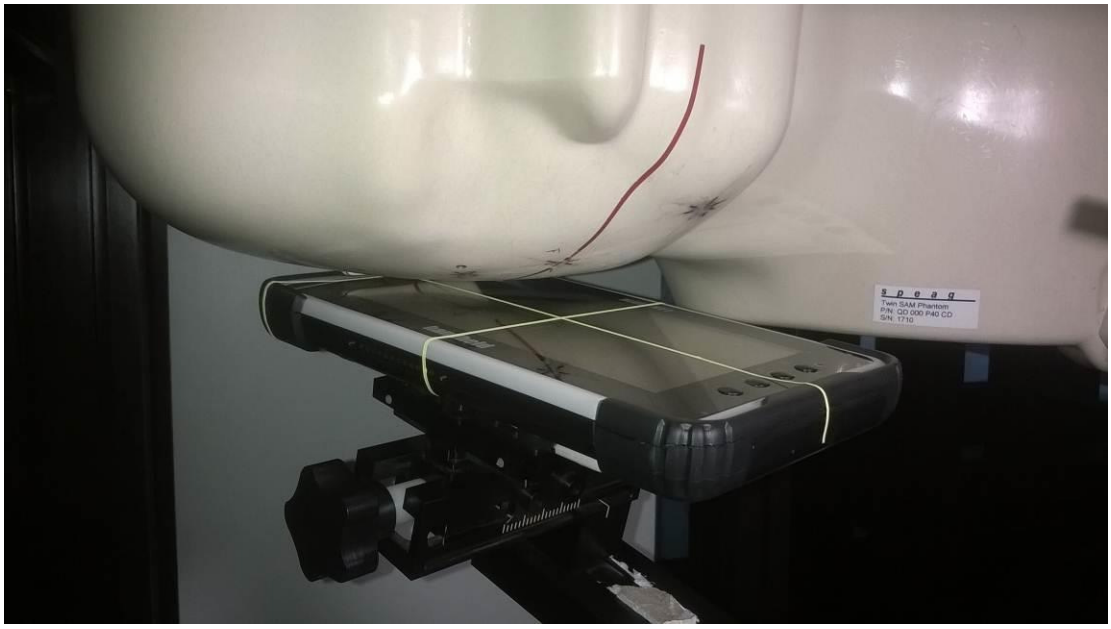
**SAR Test Setup**



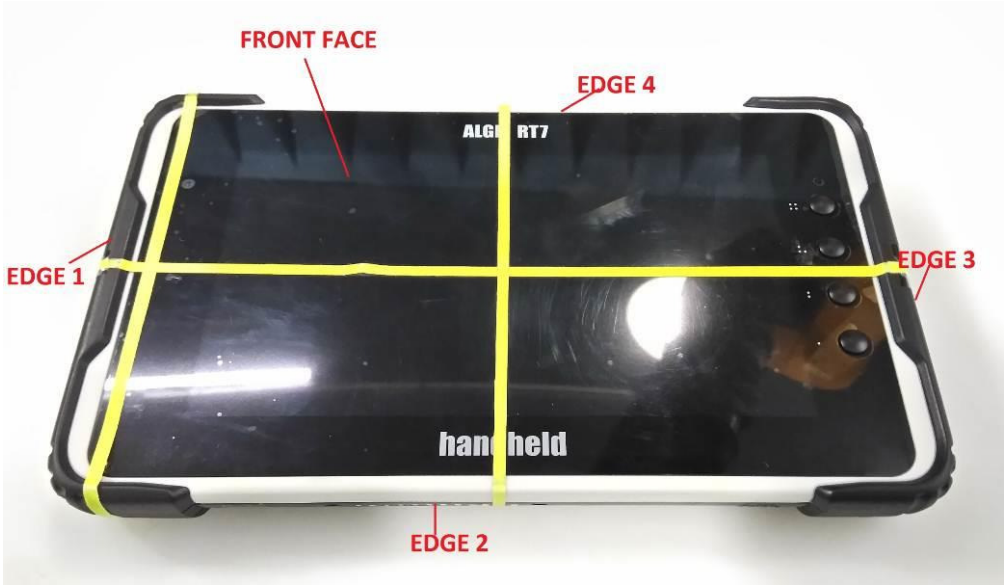
**SAR Test Setup**



**SAR Test Setup**




**SAR Test Setup**




**EUT Edge Identification**

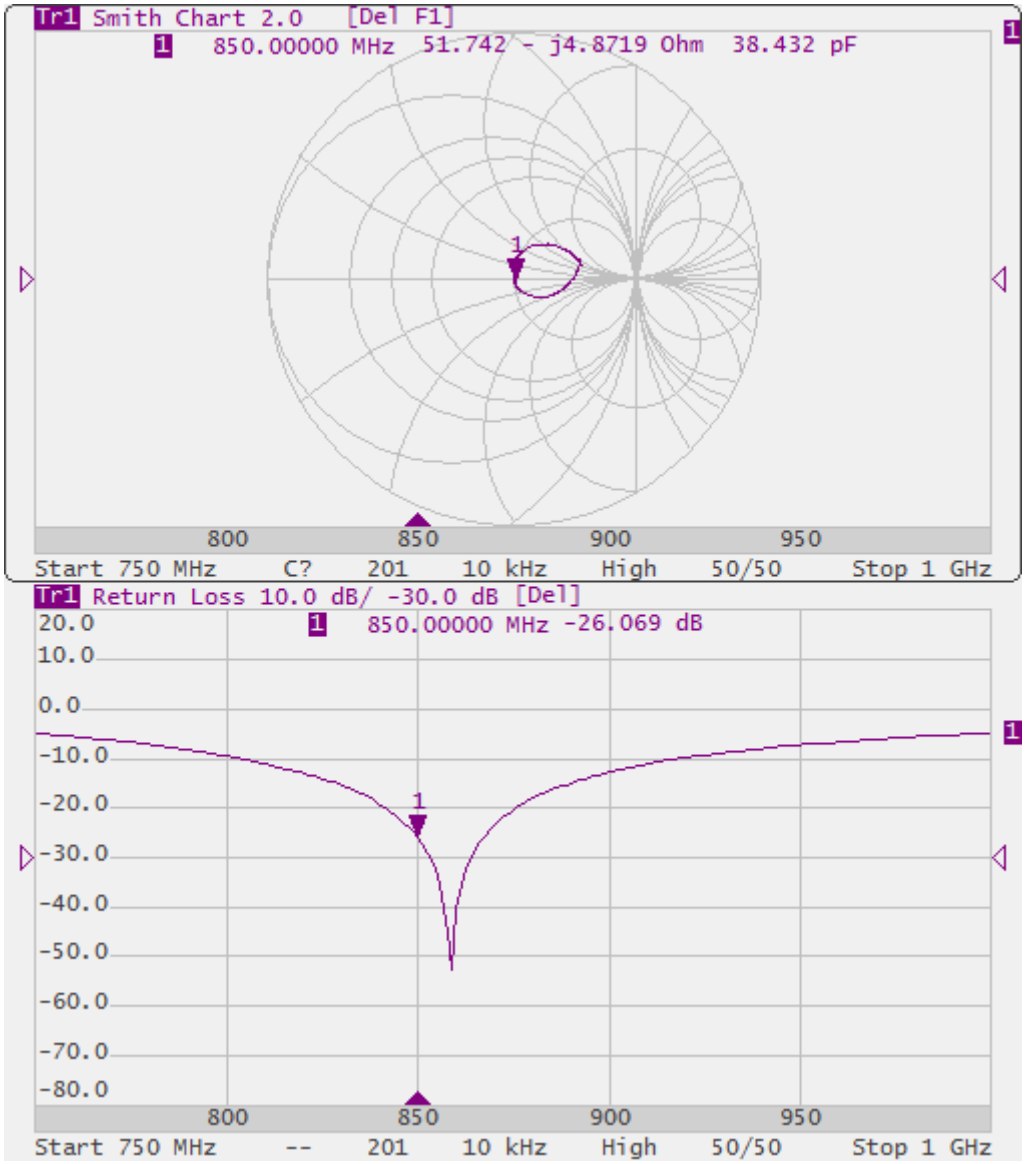

**Antenna Location Image**

## Annual Confirmation of SAR Reference Dipole.

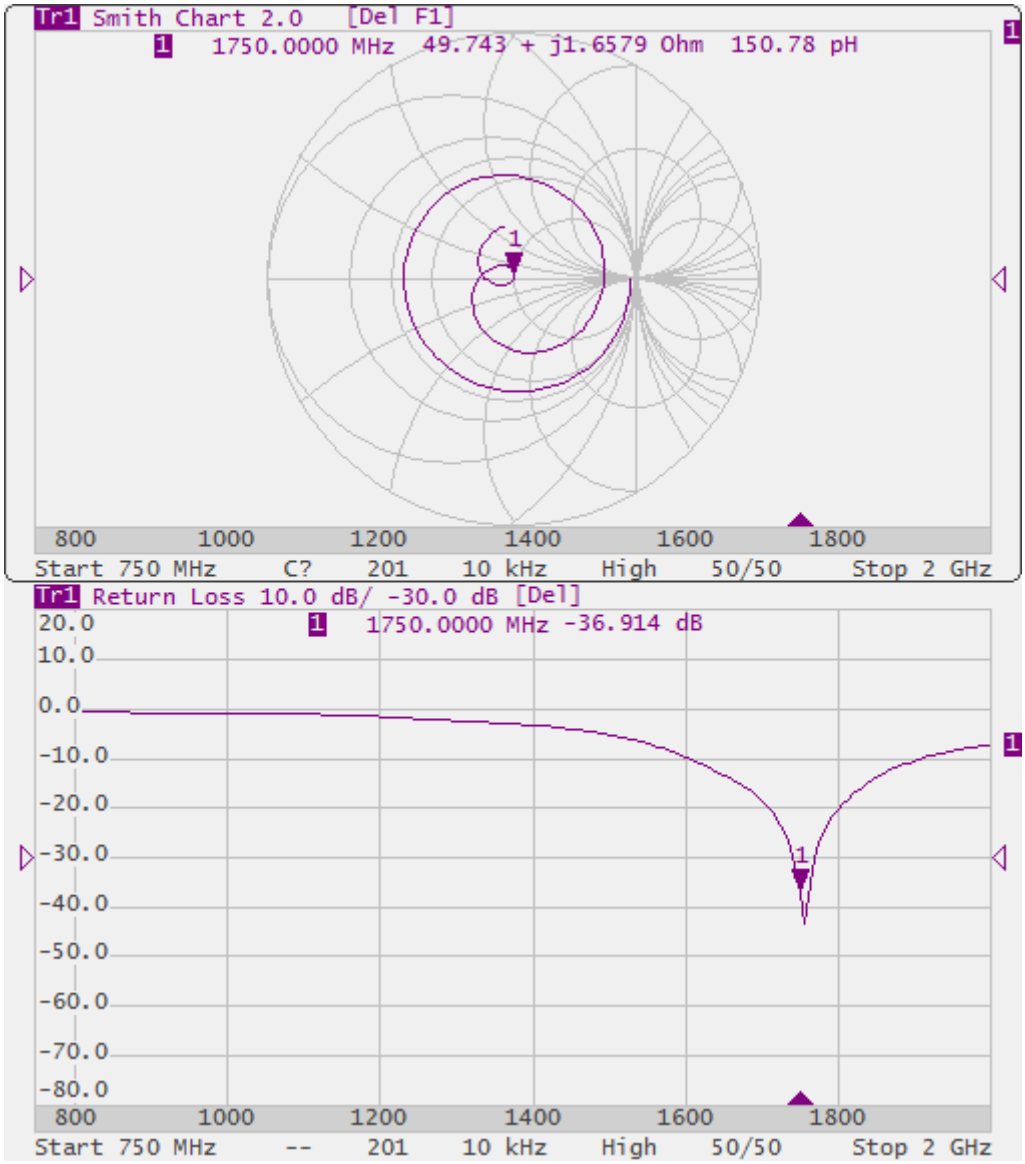
Annual Check Date: 14.09.2016

| Frequency (MHz) | Item | Original Value | Annual Check Value | Deviation | Accepted Tolerance | Note |
|---|---|---|---|---|---|---|
| 850 | Return Loss | -25.7 | -26.06 | 1% | 20% | Pass |
| | Impedance Real Part | 50.1 | 51.74 | -1.64 | ±5Ω | Pass |
| | Impedance Imaginary Part | -5.2 | -4.87 | 0.33 | ±5Ω | Pass |
| 1750 | Return Loss | -42.8 | -36.91 | -16% | 20% | Pass |
| | Impedance Real Part | 49.5 | 49.74 | -0.24 | ±5Ω | Pass |
| | Impedance Imaginary Part | -0.5 | 1.65 | -2.15 | ±5Ω | Pass |
| 1900 | Return Loss | -25 | -27.74 | 10% | 20% | Pass |
| | Impedance Real Part | 53 | 52.85 | 0.15 | ±5Ω | Pass |
| | Impedance Imaginary Part | 5 | 3.19 | 1.81 | ±5Ω | Pass |
| 2450 | Return Loss | -27.4 | -29.32 | 7% | 20% | Pass |
| | Impedance Real Part | 53.7 | 53.93 | -0.23 | ±5Ω | Pass |
| | Impedance Imaginary Part | 2.4 | -0.85 | 3.25 | ±5Ω | Pass |

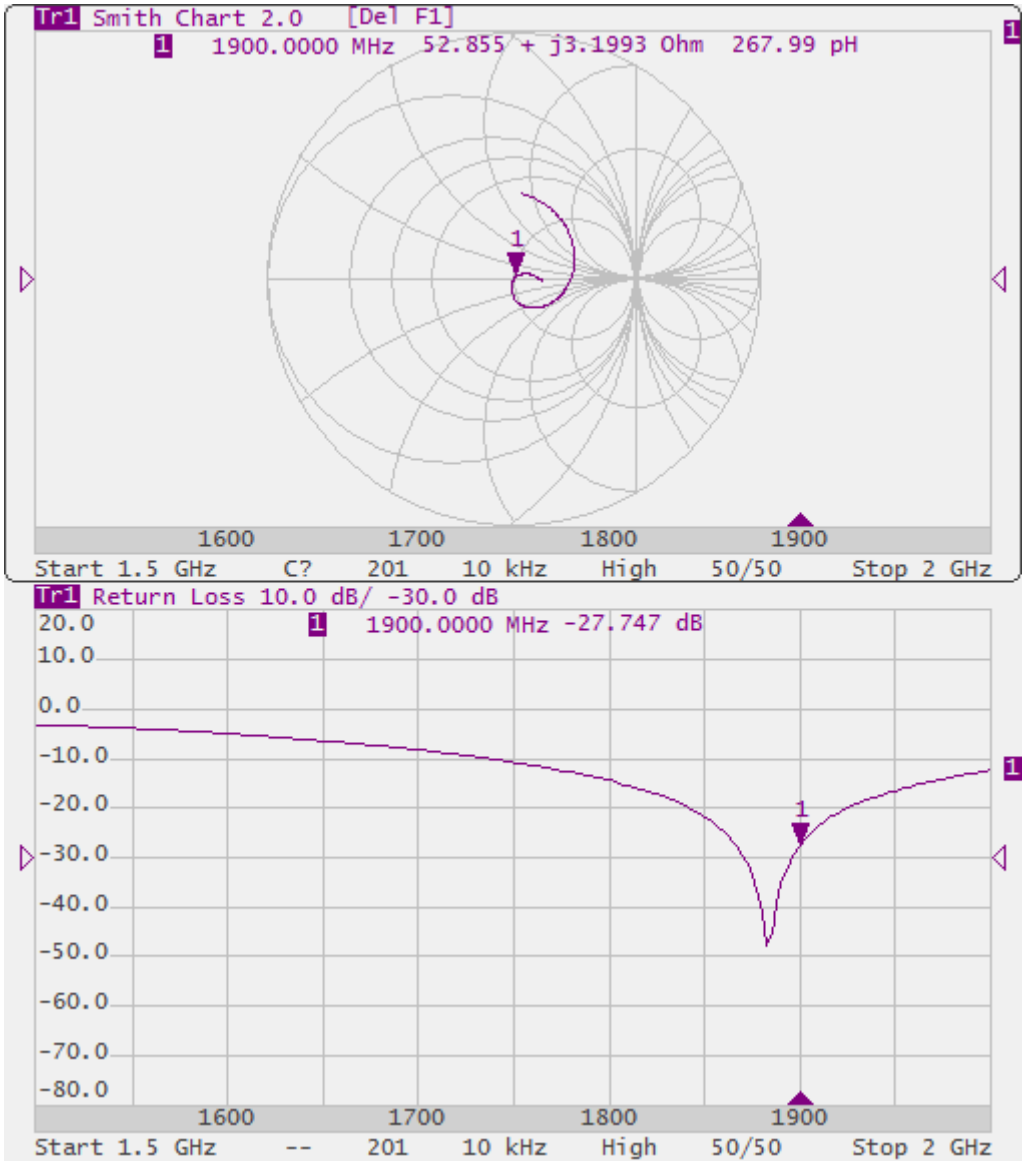
**Impedance-Return Loss Plots 850 MHz**



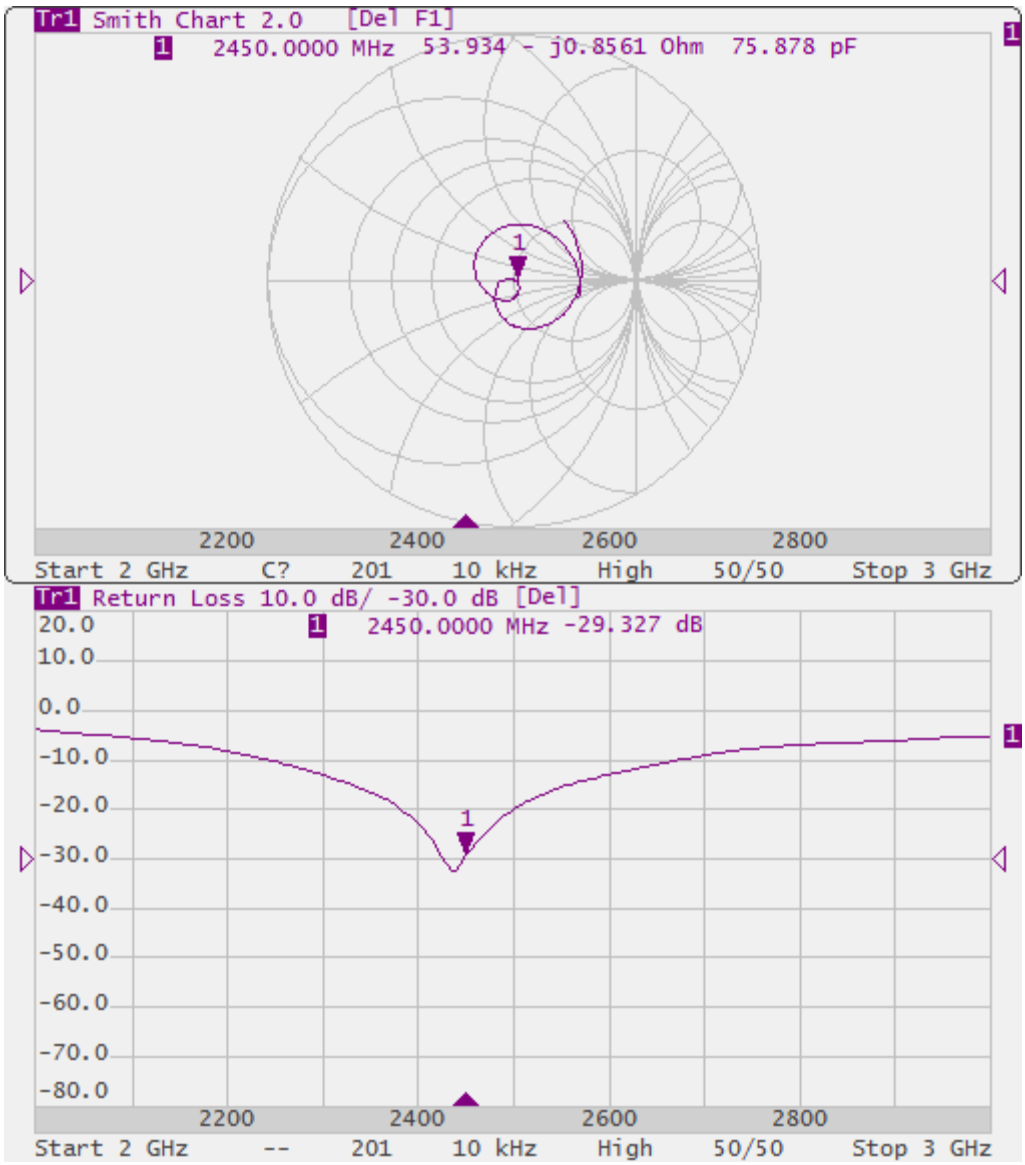
**Impedance-Return Loss Plots 1750 MHz**



**Impedance-Return Loss Plots 1900 MHz**



**Impedance-Return Loss Plots 2450 MHz**




***END OF TEST REPORT***

Worst-Case uncertainty budget was assessed according to IEEE 1528. The budget is valid for the frequency range 300MHz - 3GHz and represents a worst-case analysis. For specific tests and configurations, the uncertainty could be considerable smaller.

| Error Description | Uncertainty Value | Prob. Dist. | Div. | (ci) 1g | (ci) 10g | Std. Unc. (1g) | Std. Unc. (10g) |
|---|---|---|---|---|---|---|---|
| **Measurement System** | | | | | | | |
| Probe Calibration | ±5.9% | N | 1 | 1.00 | 1.00 | ±5.9% | ±5.9% |
| Axial Isotropy | ±4.7% | R | 1.73 | 0.70 | 0.70 | ±1.9% | ±1.9% |
| Hemispherical Isotropy | ±9.6% | R | 1.73 | 0.70 | 0.70 | ±3.9% | ±3.9% |
| Boundary effect | ±1% | R | 1.73 | 1.00 | 1.00 | ±0.6% | ±0.6% |
| Linearity | ±4.7% | R | 1.73 | 1.00 | 1.00 | ±2.7% | ±2.7% |
| System Detection Limits | ±1.0% | R | 1.73 | 1.00 | 1.00 | ±0.6% | ±0.6% |
| Readout Electronics | ±0.3% | N | 1.00 | 1.00 | 1.00 | ±0.3% | ±0.3% |
| Response time | ±0.8% | R | 1.73 | 1.00 | 1.00 | ±0.5% | ±0.5% |
| Integration time | ±2.6% | R | 1.73 | 1.00 | 1.00 | ±1.5% | ±1.5% |
| RF Ambient Conditions | ±3.0% | R | 1.73 | 1.00 | 1.00 | ±1.7% | ±1.7% |
| Probe Positioner Mechanical Tolerance | ±0.4% | R | 1.73 | 1.00 | 1.00 | ±0.2% | ±0.2% |
| Probe Positioning w.r.t. Phantom Shell | ±2.9% | R | 1.73 | 1 | 1 | ±1.7% | ±1.7% |
| SAR Evaluation Algorithms | ±1.0% | R | 1.73 | 1 | 1 | ±0.6% | ±0.6% |
| **Test Sample Related** | | | | | | | |
| Device Positioning | ±2.9% | N | 1.00 | 1 | 1 | ±2.9% | ±2.9% |
| Device Holder | ±3.6% | N | 1.00 | 1 | 1 | ±3.6% | ±3.6% |
| Output Power Drift | ±5.0% | R | 1.73 | 1 | 1 | ±2.9% | ±2.9% |
| **Phantom and Tissue Parameters** | | | | | | | |
| Phantom Uncertainty (shape and thickness) | ±4.0% | R | 1.73 | 1.00 | 1.00 | ±2.3% | ±2.3% |
| Liquid conductivity (Deviation from target) | ±5.0% | R | 1.73 | 0.64 | 0.43 | ±1.8% | ±1.2% |
| Liquid conductivity (measurement uncert.) | ±2.5% | N | 1.00 | 0.64 | 0.43 | ±1.6% | ±1.1% |
| Liquid permittivity (Deviation from target) | ±5.0% | R | 1.73 | 0.60 | 0.49 | ±1.7% | ±1.4% |
| Liquid permittivity (measurement uncert.) | ±2.5% | N | 1.00 | 0.60 | 0.49 | ±1.5% | ±1.2% |
| **Combined standard uncertainty** | | | | | | **±10.8%** | **±10.6%** |
| **Expanded uncertainty** | (95% Confidence Level) K=2 | | | | | **±21.6%** | **±21.1%** |

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**Zeughausstrasse 43, 8004 Zurich, Switzerland**

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**S** Swiss Calibration Service

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**Accreditation No.: SCS 0108**

**Client** **BNN-SPEAG Laboratory**

**Certificate No: D2450V2-889_Sep15**

# CALIBRATION CERTIFICATE

| | |
|---|---|
| Object | D2450V2 - SN: 889 |
| Calibration procedure(s) | QA CAL-05.v9<br>Calibration procedure for dipole validation kits above 700 MHz |
| Calibration date: | September 02, 2015 |

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards | ID # | Cal Date (Certificate No.) | Scheduled Calibration |
|---|---|---|---|
| Power meter EPM-442A | GB37480704 | 07-Oct-14 (No. 217-02020) | Oct-15 |
| Power sensor HP 8481A | US37292783 | 07-Oct-14 (No. 217-02020) | Oct-15 |
| Power sensor HP 8481A | MY41092317 | 07-Oct-14 (No. 217-02021) | Oct-15 |
| Reference 20 dB Attenuator | SN: 5058 (20k) | 01-Apr-15 (No. 217-02131) | Mar-16 |
| Type-N mismatch combination | SN: 5047.2 / 06327 | 01-Apr-15 (No. 217-02134) | Mar-16 |
| Reference Probe EX3DV4 | SN: 7349 | 30-Dec-14 (No. EX3-7349_Dec14) | Dec-15 |
| DAE4 | SN: 601 | 17-Aug-15 (No. DAE4-601_Aug15) | Aug-16 |

| Secondary Standards | ID # | Check Date (in house) | Scheduled Check |
|---|---|---|---|
| RF generator R&S SMT-06 | 100005 | 04-Aug-99 (in house check Oct-13) | In house check: Oct-16 |
| Network Analyzer HP 8753E | US37390585 S4206 | 18-Oct-01 (in house check Oct-14) | In house check: Oct-15 |

| | Name | Function | Signature |
|---|---|---|---|
| Calibrated by: | Israe Elnaouq | Laboratory Technician | |
| Approved by: | Katja Pokovic | Technical Manager | |

Issued: September 3, 2015

**Glossary:**

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

**Calibration is Performed According to the Following Standards:**

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

**Additional Documentation:**

e) DASY4/5 System Handbook

**Methods Applied and Interpretation of Parameters:**

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

## Measurement Conditions

DASY system configuration, as far as not given on page 1.

| | | |
|---|---|---|
| **DASY Version** | DASY5 | V52.8.8 |
| **Extrapolation** | Advanced Extrapolation | |
| **Phantom** | Modular Flat Phantom | |
| **Distance Dipole Center - TSL** | 10 mm | with Spacer |
| **Zoom Scan Resolution** | dx, dy, dz = 5 mm | |
| **Frequency** | 2450 MHz ± 1 MHz | |

## Head TSL parameters

The following parameters and calculations were applied.

| | **Temperature** | **Permittivity** | **Conductivity** |
|---|---|---|---|
| **Nominal Head TSL parameters** | 22.0 °C | 39.2 | 1.80 mho/m |
| **Measured Head TSL parameters** | (22.0 ± 0.2) °C | 39.1 ± 6 % | 1.85 mho/m ± 6 % |
| **Head TSL temperature change during test** | < 0.5 °C | ---- | ---- |

## SAR result with Head TSL

| **SAR averaged over 1 cm$^3$ (1 g) of Head TSL** | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 13.1 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | **51.7 W/kg ± 17.0 % (k=2)** |

| **SAR averaged over 10 cm$^3$ (10 g) of Head TSL** | condition | |
|---|---|---|
| SAR measured | 250 mW input power | 6.16 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | **24.5 W/kg ± 16.5 % (k=2)** |

## Body TSL parameters

The following parameters and calculations were applied.

| | **Temperature** | **Permittivity** | **Conductivity** |
|---|---|---|---|
| **Nominal Body TSL parameters** | 22.0 °C | 52.7 | 1.95 mho/m |
| **Measured Body TSL parameters** | (22.0 ± 0.2) °C | 53.2 ± 6 % | 2.00 mho/m ± 6 % |
| **Body TSL temperature change during test** | < 0.5 °C | ---- | ---- |

## SAR result with Body TSL

| **SAR averaged over 1 cm$^3$ (1 g) of Body TSL** | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 13.3 W/kg |
| SAR for nominal Body TSL parameters | normalized to 1W | **52.7 W/kg ± 17.0 % (k=2)** |

| **SAR averaged over 10 cm$^3$ (10 g) of Body TSL** | condition | |
|---|---|---|
| SAR measured | 250 mW input power | 6.25 W/kg |
| SAR for nominal Body TSL parameters | normalized to 1W | **24.9 W/kg ± 16.5 % (k=2)** |

## Appendix (Additional assessments outside the scope of SCS 0108)

### Antenna Parameters with Head TSL

| | |
|---|---|
| Impedance, transformed to feed point | 53.7 Ω + 2.4 jΩ |
| Return Loss | - 27.4 dB |

### Antenna Parameters with Body TSL

| | |
|---|---|
| Impedance, transformed to feed point | 49.6 Ω + 5.0 jΩ |
| Return Loss | - 26.0 dB |

### General Antenna Parameters and Design

| | |
|---|---|
| Electrical Delay (one direction) | 1.160 ns |

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

### Additional EUT Data

| | |
|---|---|
| Manufactured by | SPEAG |
| Manufactured on | October 06, 2011 |

## DASY5 Validation Report for Head TSL

Date: 02.09.2015

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 889**

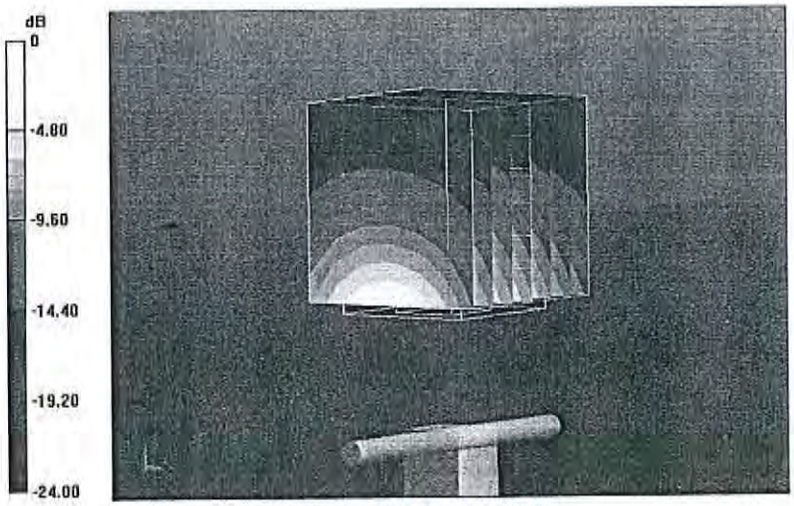
Communication System: UID 0 - CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; $\sigma$ = 1.85 S/m; $\varepsilon_r$ = 39.1; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(7.67, 7.67, 7.67); Calibrated: 30.12.2014;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 17.08.2015
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

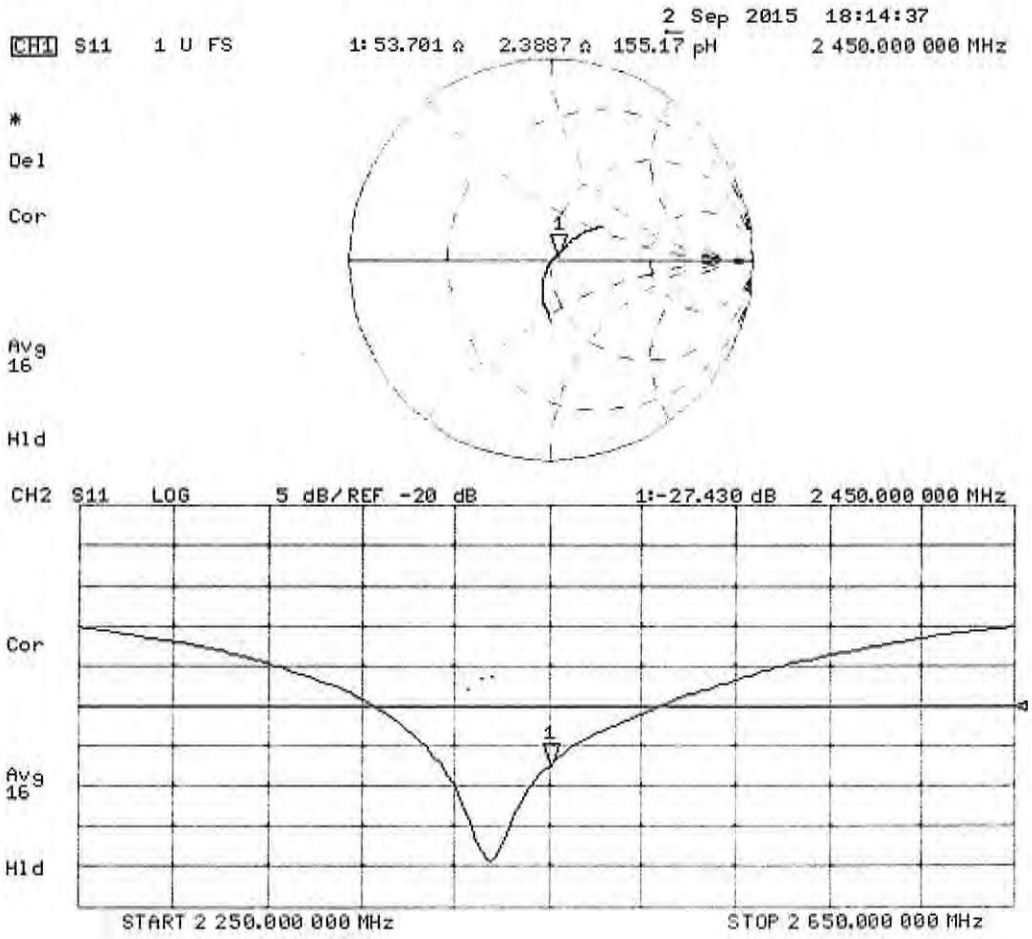
### Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 105.1 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 26.8 W/kg
**SAR(1 g) = 13.1 W/kg; SAR(10 g) = 6.16 W/kg**
Maximum value of SAR (measured) = 19.8 W/kg




0 dB = 19.8 W/kg = 12.97 dBW/kg

## Impedance Measurement Plot for Head TSL



## DASY5 Validation Report for Body TSL

Date: 02.09.2015

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 889**

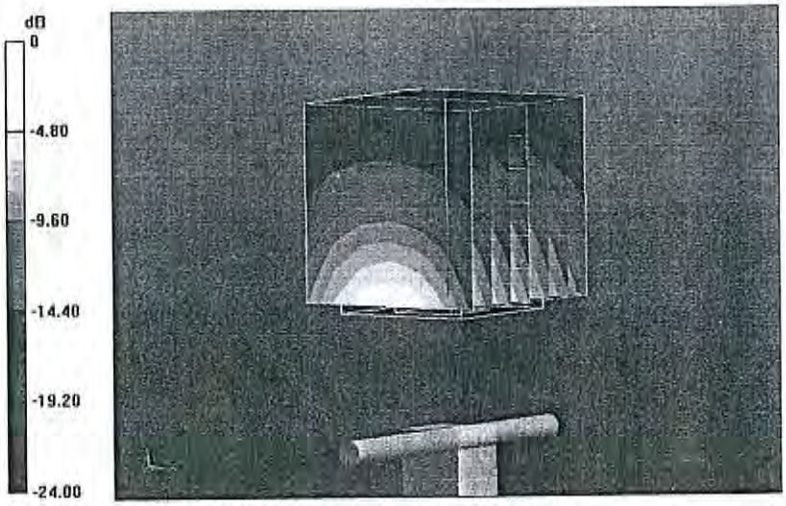
Communication System: UID 0 - CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; $\sigma$ = 2 S/m; $\varepsilon_r$ = 53.2; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(7.53, 7.53, 7.53); Calibrated: 30.12.2014;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 17.08.2015
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

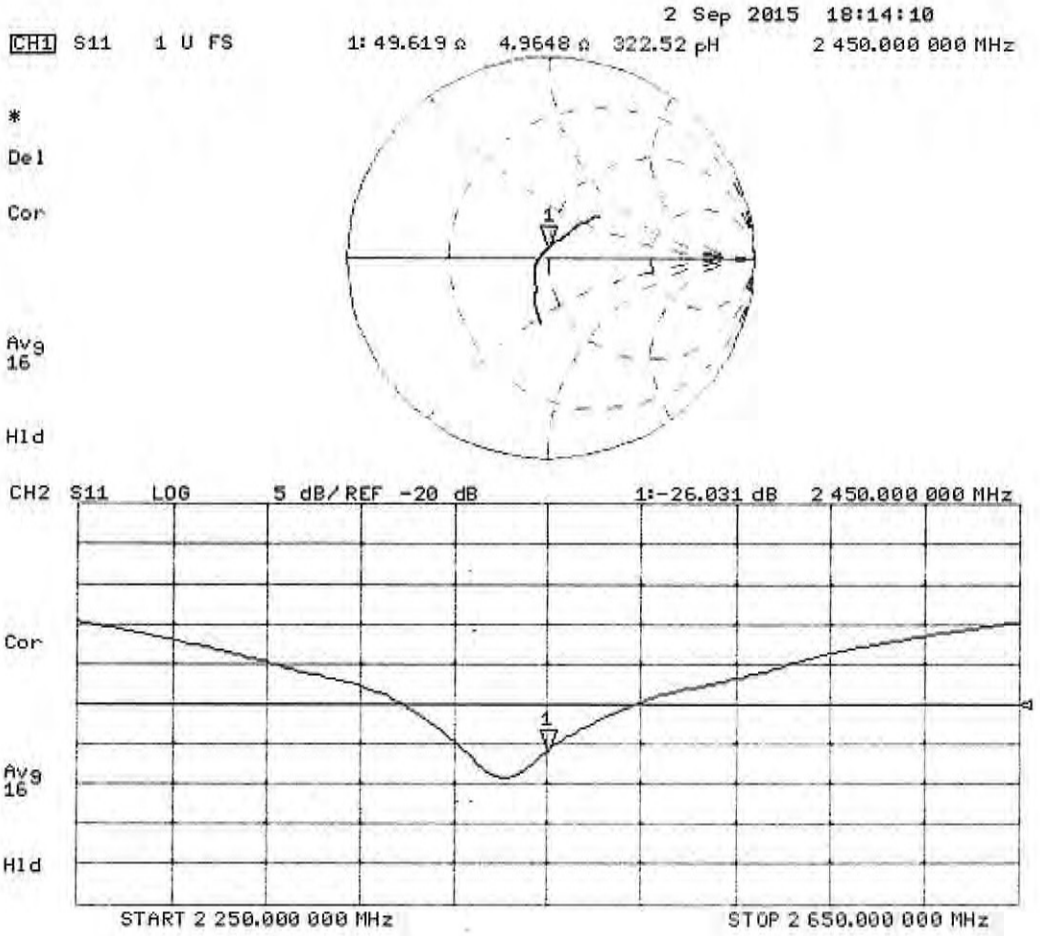
### Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 101.3 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 26.4 W/kg
**SAR(1 g) = 13.3 W/kg; SAR(10 g) = 6.25 W/kg**
Maximum value of SAR (measured) = 19.9 W/kg




0 dB = 19.9 W/kg = 12.99 dBW/kg

## Impedance Measurement Plot for Body TSL



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**Accreditation No.: SCS 0108**

**Client** **BNN-SPEAG Laboratory**

**Certificate No: D1750V2-1066_Sep15**

# CALIBRATION CERTIFICATE

| | |
|---|---|
| Object | D1750V2 - SN: 1066 |
| Calibration procedure(s) | QA CAL-05.v9<br>Calibration procedure for dipole validation kits above 700 MHz |
| Calibration date: | September 03, 2015 |

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards | ID # | Cal Date (Certificate No.) | Scheduled Calibration |
|---|---|---|---|
| Power meter EPM-442A | GB37480704 | 07-Oct-14 (No. 217-02020) | Oct-15 |
| Power sensor HP 8481A | US37292783 | 07-Oct-14 (No. 217-02020) | Oct-15 |
| Power sensor HP 8481A | MY41092317 | 07-Oct-14 (No. 217-02021) | Oct-15 |
| Reference 20 dB Attenuator | SN: 5058 (20k) | 01-Apr-15 (No. 217-02131) | Mar-16 |
| Type-N mismatch combination | SN: 5047.2 / 06327 | 01-Apr-15 (No. 217-02134) | Mar-16 |
| Reference Probe EX3DV4 | SN: 7349 | 30-Dec-14 (No. EX3-7349_Dec14) | Dec-15 |
| DAE4 | SN: 601 | 17-Aug-15 (No. DAE4-601_Aug15) | Aug-16 |

| Secondary Standards | ID # | Check Date (in house) | Scheduled Check |
|---|---|---|---|
| RF generator R&S SMT-06 | 100005 | 04-Aug-99 (in house check Oct-13) | In house check: Oct-16 |
| Network Analyzer HP 8753E | US37390585 S4206 | 18-Oct-01 (in house check Oct-14) | In house check: Oct-15 |

| | Name | Function | Signature |
|---|---|---|---|
| Calibrated by: | Michael Weber | Laboratory Technician | |
| Approved by: | Katja Pokovic | Technical Manager | |

Issued: September 3, 2015

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**Zeughausstrasse 43, 8004 Zurich, Switzerland**

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**Accreditation No.: SCS 0108**

**Glossary:**

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

**Calibration is Performed According to the Following Standards:**

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

**Additional Documentation:**

e) DASY4/5 System Handbook

**Methods Applied and Interpretation of Parameters:**

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

## Measurement Conditions

DASY system configuration, as far as not given on page 1.

| | | |
|---|---|---|
| **DASY Version** | DASY5 | V52.8.8 |
| **Extrapolation** | Advanced Extrapolation | |
| **Phantom** | Modular Flat Phantom | |
| **Distance Dipole Center - TSL** | 10 mm | with Spacer |
| **Zoom Scan Resolution** | dx, dy, dz = 5 mm | |
| **Frequency** | 1750 MHz ± 1 MHz | |

## Head TSL parameters

The following parameters and calculations were applied.

| | **Temperature** | **Permittivity** | **Conductivity** |
|---|---|---|---|
| **Nominal Head TSL parameters** | 22.0 °C | 40.1 | 1.37 mho/m |
| **Measured Head TSL parameters** | (22.0 ± 0.2) °C | 39.9 ± 6 % | 1.36 mho/m ± 6 % |
| **Head TSL temperature change during test** | < 0.5 °C | ---- | ---- |

## SAR result with Head TSL

| **SAR averaged over 1 cm$^3$ (1 g) of Head TSL** | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 9.16 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | **36.8 W/kg ± 17.0 % (k=2)** |

| **SAR averaged over 10 cm$^3$ (10 g) of Head TSL** | condition | |
|---|---|---|
| SAR measured | 250 mW input power | 4.87 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | **19.5 W/kg ± 16.5 % (k=2)** |

## Body TSL parameters

The following parameters and calculations were applied.

| | **Temperature** | **Permittivity** | **Conductivity** |
|---|---|---|---|
| **Nominal Body TSL parameters** | 22.0 °C | 53.4 | 1.49 mho/m |
| **Measured Body TSL parameters** | (22.0 ± 0.2) °C | 52.1 ± 6 % | 1.48 mho/m ± 6 % |
| **Body TSL temperature change during test** | < 0.5 °C | ---- | ---- |

## SAR result with Body TSL

| **SAR averaged over 1 cm$^3$ (1 g) of Body TSL** | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 9.15 W/kg |
| SAR for nominal Body TSL parameters | normalized to 1W | **36.5 W/kg ± 17.0 % (k=2)** |

| **SAR averaged over 10 cm$^3$ (10 g) of Body TSL** | condition | |
|---|---|---|
| SAR measured | 250 mW input power | 4.88 W/kg |
| SAR for nominal Body TSL parameters | normalized to 1W | **19.5 W/kg ± 16.5 % (k=2)** |

## Appendix (Additional assessments outside the scope of SCS 0108)

### Antenna Parameters with Head TSL

| | |
|---|---|
| Impedance, transformed to feed point | 49.5 Ω - 0.5 jΩ |
| Return Loss | - 42.8 dB |

### Antenna Parameters with Body TSL

| | |
|---|---|
| Impedance, transformed to feed point | 46.7 Ω - 1.0 jΩ |
| Return Loss | - 28.9 dB |

### General Antenna Parameters and Design

| | |
|---|---|
| Electrical Delay (one direction) | 1.219 ns |

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

### Additional EUT Data

| | |
|---|---|
| Manufactured by | SPEAG |
| Manufactured on | June 15, 2010 |

## DASY5 Validation Report for Head TSL

Date: 03.09.2015

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN: 1066**

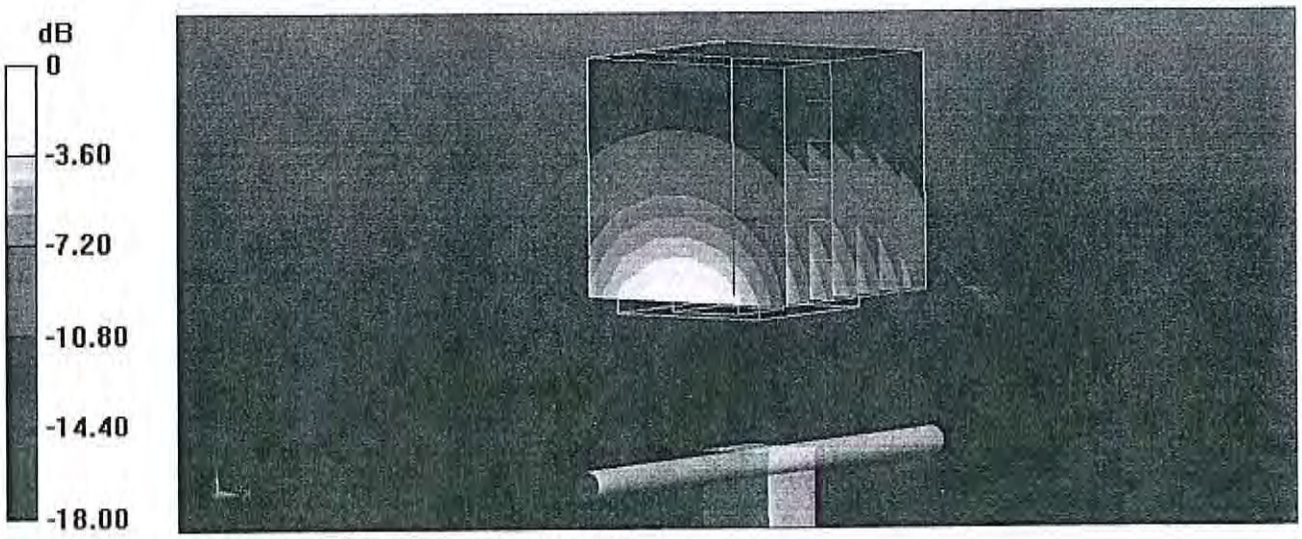
Communication System: UID 0 - CW; Frequency: 1750 MHz
Medium parameters used: f = 1750 MHz; $\sigma$ = 1.36 S/m; $\varepsilon_r$ = 39.9; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.38, 8.38, 8.38); Calibrated: 30.12.2014;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 17.08.2015
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

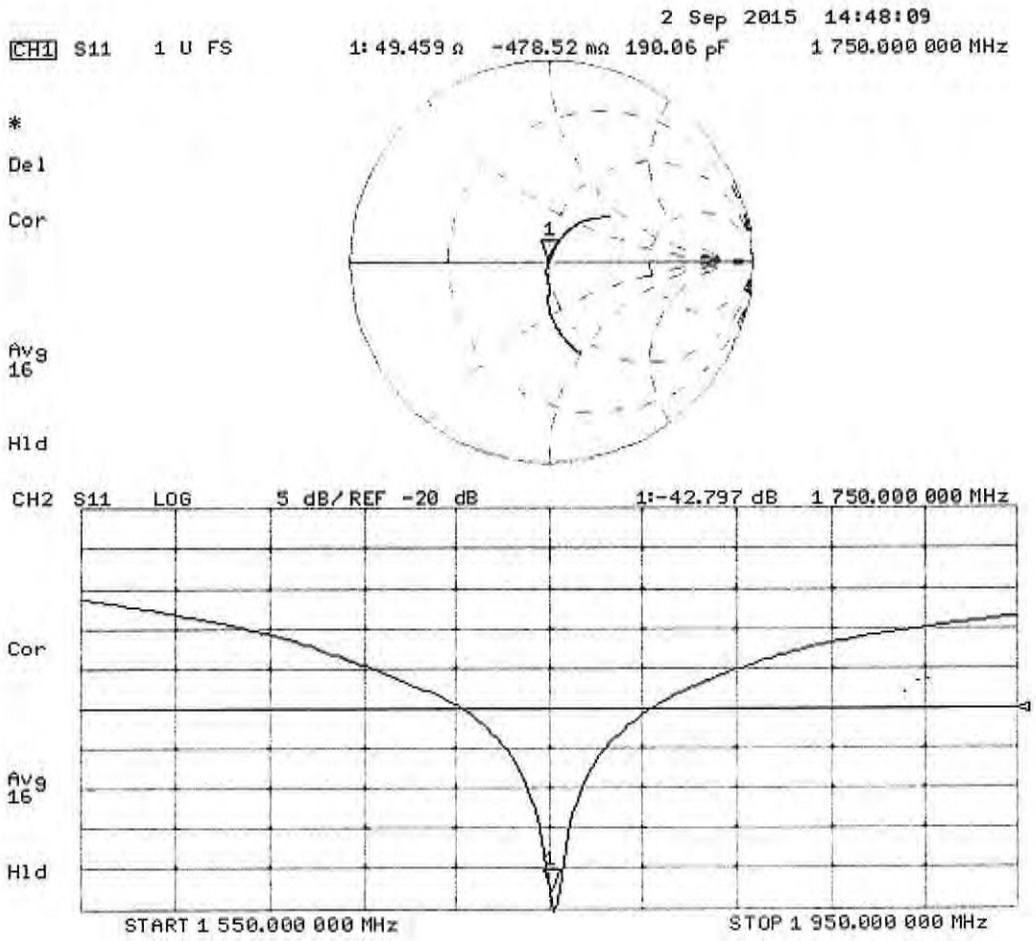
### Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 98.10 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 16.6 W/kg
**SAR(1 g) = 9.16 W/kg; SAR(10 g) = 4.87 W/kg**
Maximum value of SAR (measured) = 12.8 W/kg




0 dB = 12.8 W/kg = 11.07 dBW/kg

## Impedance Measurement Plot for Head TSL



## DASY5 Validation Report for Body TSL

Date: 03.09.2015

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN: 1066**

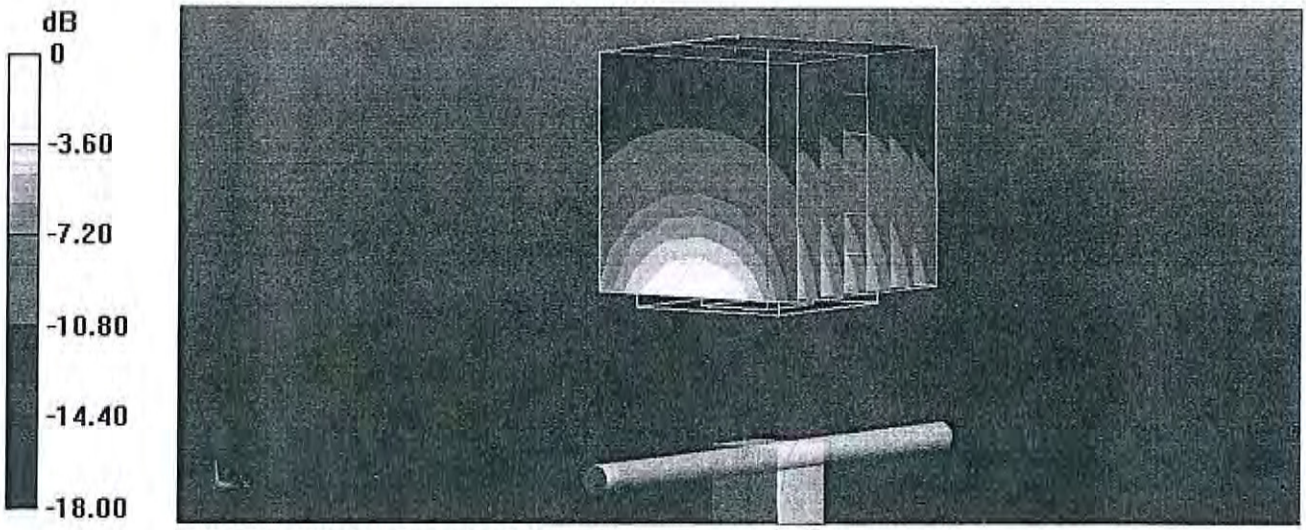
Communication System: UID 0 - CW; Frequency: 1750 MHz
Medium parameters used: f = 1750 MHz; $\sigma$ = 1.48 S/m; $\varepsilon_r$ = 52.1; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.25, 8.25, 8.25); Calibrated: 30.12.2014;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 17.08.2015
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

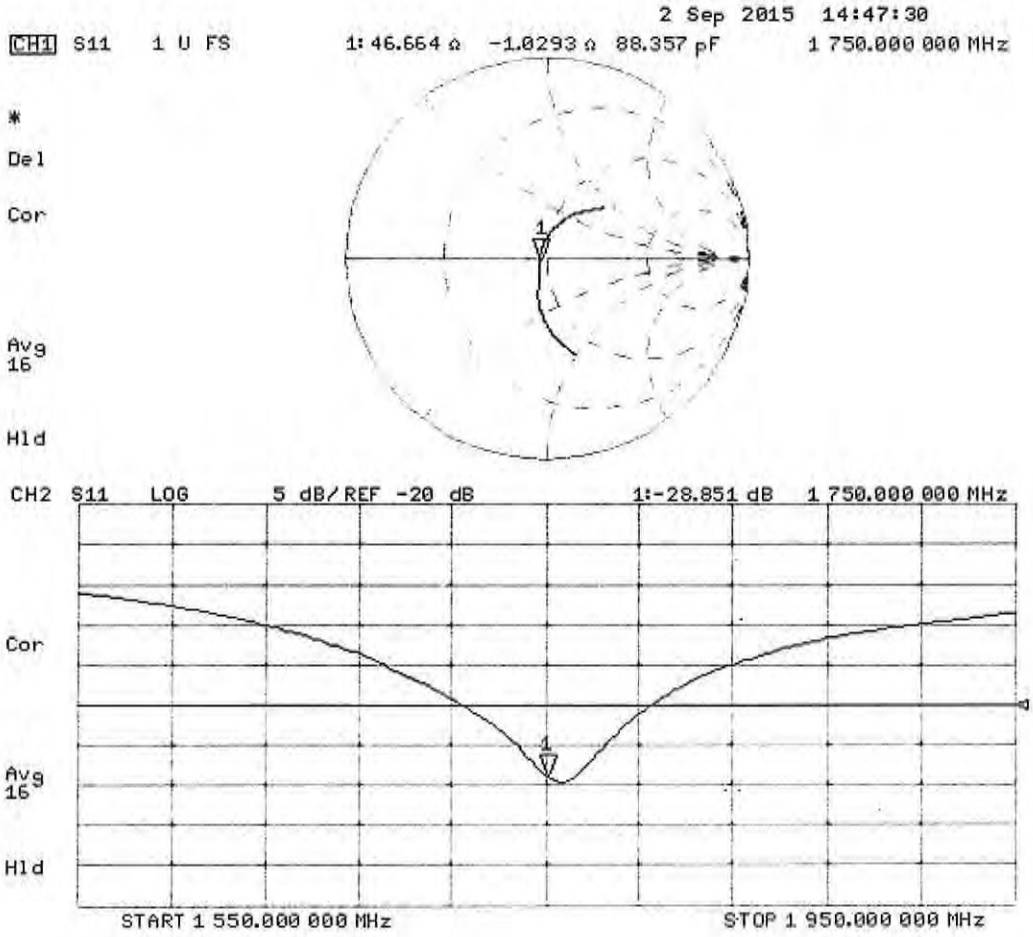
### Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 95.02 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 16.2 W/kg
**SAR(1 g) = 9.15 W/kg; SAR(10 g) = 4.88 W/kg**
Maximum value of SAR (measured) = 12.9 W/kg




0 dB = 12.9 W/kg = 11.11 dBW/kg

## Impedance Measurement Plot for Body TSL



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**Accreditation No.: SCS 108**

**Client** BNN-SPEAG Laboratory

**Certificate No: D1900V2-5d157_May12**

# CALIBRATION CERTIFICATE

| | |
|---|---|
| Object | D1900V2 - SN: 5d157 |
| Calibration procedure(s) | QA CAL-05.v8<br>Calibration procedure for dipole validation kits above 700 MHz |
| Calibration date: | May 09, 2012 |

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards | ID # | Cal Date (Certificate No.) | Scheduled Calibration |
|---|---|---|---|
| Power meter EPM-442A | GB37480704 | 05-Oct-11 (No. 217-01451) | Oct-12 |
| Power sensor HP 8481A | US37292783 | 05-Oct-11 (No. 217-01451) | Oct-12 |
| Reference 20 dB Attenuator | SN: 5058 (20k) | 27-Mar-12 (No. 217-01530) | Apr-13 |
| Type-N mismatch combination | SN: 5047.2 / 06327 | 27-Mar-12 (No. 217-01533) | Apr-13 |
| Reference Probe ES3DV3 | SN: 3205 | 30-Dec-11 (No. ES3-3205_Dec11) | Dec-12 |
| DAE4 | SN: 601 | 04-Jul-11 (No. DAE4-601_Jul11) | Jul-12 |

| Secondary Standards | ID # | Check Date (in house) | Scheduled Check |
|---|---|---|---|
| Power sensor HP 8481A | MY41092317 | 18-Oct-02 (in house check Oct-11) | In house check: Oct-13 |
| RF generator R&S SMT-06 | 100005 | 04-Aug-99 (in house check Oct-11) | In house check: Oct-13 |
| Network Analyzer HP 8753E | US37390585 S4206 | 18-Oct-01 (in house check Oct-11) | In house check: Oct-12 |

| | Name | Function | Signature |
|---|---|---|---|
| Calibrated by: | Israe El-Naouq | Laboratory Technician | Israe El-Naouq |
| Approved by: | Katja Pokovic | Technical Manager | |

Issued: May 9, 2012

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Accreditation No.: SCS 108

**Glossary:**

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

**Calibration is Performed According to the Following Standards:**

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

**Additional Documentation:**

d) DASY4/5 System Handbook

**Methods Applied and Interpretation of Parameters:**

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

## Measurement Conditions

DASY system configuration, as far as not given on page 1.

| | | |
|---|---|---|
| **DASY Version** | DASY5 | V52.8.1 |
| **Extrapolation** | Advanced Extrapolation | |
| **Phantom** | Modular Flat Phantom | |
| **Distance Dipole Center - TSL** | 10 mm | with Spacer |
| **Zoom Scan Resolution** | dx, dy, dz = 5 mm | |
| **Frequency** | 1900 MHz ± 1 MHz | |

## Head TSL parameters

The following parameters and calculations were applied.

| | **Temperature** | **Permittivity** | **Conductivity** |
|---|---|---|---|
| **Nominal Head TSL parameters** | 22.0 °C | 40.0 | 1.40 mho/m |
| **Measured Head TSL parameters** | (22.0 ± 0.2) °C | 40.5 ± 6 % | 1.37 mho/m ± 6 % |
| **Head TSL temperature change during test** | < 0.5 °C | ---- | ---- |

## SAR result with Head TSL

| **SAR averaged over 1 cm$^3$ (1 g) of Head TSL** | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 9.76 mW / g |
| SAR for nominal Head TSL parameters | normalized to 1W | **39.7 mW /g ± 17.0 % (k=2)** |

| **SAR averaged over 10 cm$^3$ (10 g) of Head TSL** | condition | |
|---|---|---|
| SAR measured | 250 mW input power | 5.16 mW / g |
| SAR for nominal Head TSL parameters | normalized to 1W | **20.8 mW /g ± 16.5 % (k=2)** |

## Appendix

### Antenna Parameters with Head TSL

| | |
|---|---|
| Impedance, transformed to feed point | 53.0 Ω + 5.0 jΩ |
| Return Loss | - 25.0 dB |

### General Antenna Parameters and Design

| | |
|---|---|
| Electrical Delay (one direction) | 1.198 ns |

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

### Additional EUT Data

| | |
|---|---|
| Manufactured by | SPEAG |
| Manufactured on | December 20, 2011 |

## DASY5 Validation Report for Head TSL

Date: 09.05.2012

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d157**

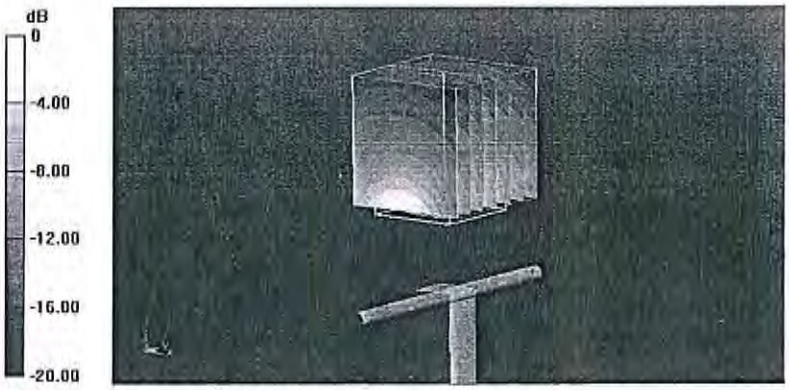
Communication System: CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; $\sigma$ = 1.37 mho/m; $\varepsilon_r$ = 40.5; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.01, 5.01, 5.01); Calibrated: 30.12.2011;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

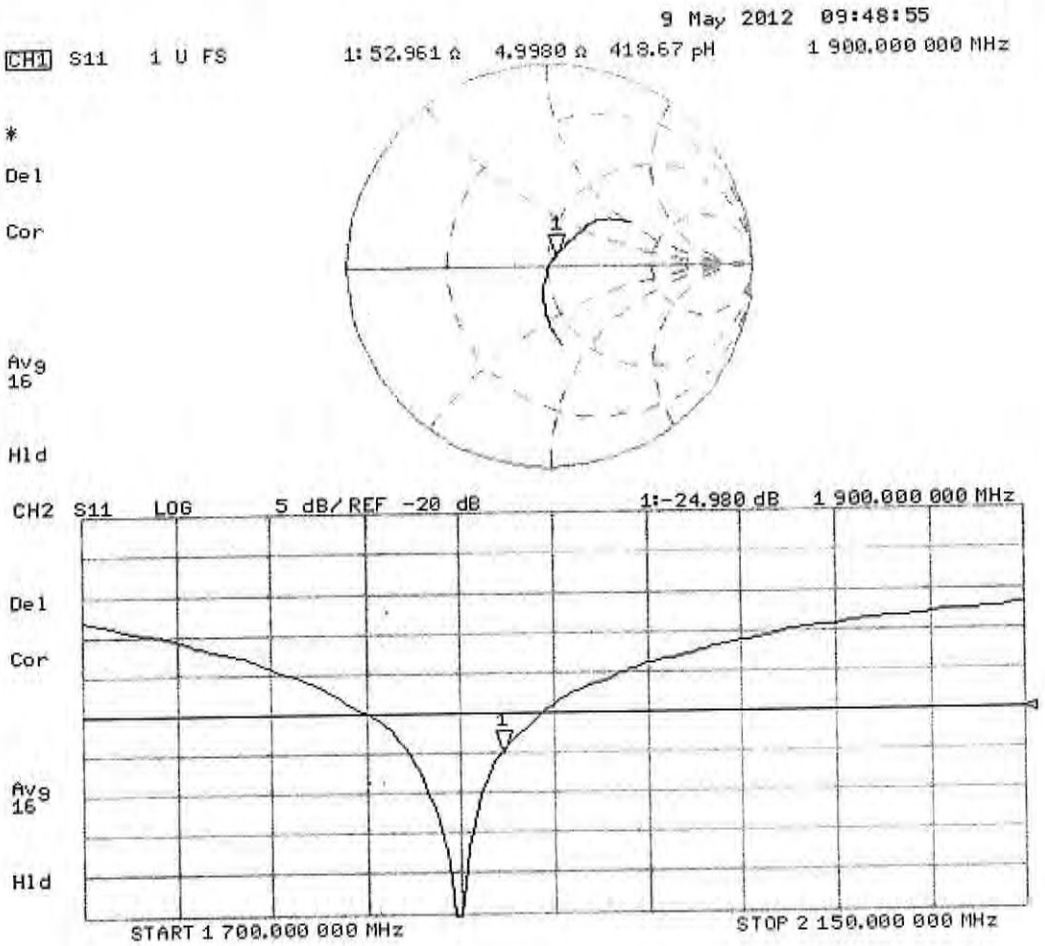
### Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 97.303 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 17.392 mW/g
**SAR(1 g) = 9.76 mW/g; SAR(10 g) = 5.16 mW/g**
Maximum value of SAR (measured) = 12.0 mW/g




0 dB = 12.0 mW/g = 21.58 dB mW/g

## Impedance Measurement Plot for Head TSL



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**Accreditation No.: SCS 0108**

**Client** **BNN-SPEAG Laboratory**

**Certificate No: D850V2-1017_Sep15**

# CALIBRATION CERTIFICATE

| | |
|---|---|
| Object | D850V2 - SN: 1017 |
| Calibration procedure(s) | QA CAL-05.v9<br>Calibration procedure for dipole validation kits above 700 MHz |
| Calibration date: | September 21, 2015 |

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards | ID # | Cal Date (Certificate No.) | Scheduled Calibration |
|---|---|---|---|
| Power meter EPM-442A | GB37480704 | 07-Oct-14 (No. 217-02020) | Oct-15 |
| Power sensor HP 8481A | US37292783 | 07-Oct-14 (No. 217-02020) | Oct-15 |
| Power sensor HP 8481A | MY41092317 | 07-Oct-14 (No. 217-02021) | Oct-15 |
| Reference 20 dB Attenuator | SN: 5058 (20k) | 01-Apr-15 (No. 217-02131) | Mar-16 |
| Type-N mismatch combination | SN: 5047.2 / 06327 | 01-Apr-15 (No. 217-02134) | Mar-16 |
| Reference Probe EX3DV4 | SN: 7349 | 30-Dec-14 (No. EX3-7349_Dec14) | Dec-15 |
| DAE4 | SN: 601 | 17-Aug-15 (No. DAE4-601_Aug15) | Aug-16 |

| Secondary Standards | ID # | Check Date (in house) | Scheduled Check |
|---|---|---|---|
| RF generator R&S SMT-06 | 100972 | 15-Jun-15 (in house check Jun-15) | In house check: Jun-18 |
| Network Analyzer HP 8753E | US37390585 S4206 | 18-Oct-01 (in house check Oct-14) | In house check: Oct-15 |

| | Name | Function | Signature |
|---|---|---|---|
| Calibrated by: | Israe Elnaouq | Laboratory Technician | |
| Approved by: | Katja Pokovic | Technical Manager | |

Issued: September 23, 2015

**Glossary:**

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

**Calibration is Performed According to the Following Standards:**

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

**Additional Documentation:**

e) DASY4/5 System Handbook

**Methods Applied and Interpretation of Parameters:**

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

## Measurement Conditions

DASY system configuration, as far as not given on page 1.

| | | |
|---|---|---|
| **DASY Version** | DASY5 | V52.8.8 |
| **Extrapolation** | Advanced Extrapolation | |
| **Phantom** | Modular Flat Phantom | |
| **Distance Dipole Center - TSL** | 15 mm | with Spacer |
| **Zoom Scan Resolution** | dx, dy, dz = 5 mm | |
| **Frequency** | 850 MHz ± 1 MHz | |

## Head TSL parameters

The following parameters and calculations were applied.

| | **Temperature** | **Permittivity** | **Conductivity** |
|---|---|---|---|
| **Nominal Head TSL parameters** | 22.0 °C | 41.5 | 0.92 mho/m |
| **Measured Head TSL parameters** | (22.0 ± 0.2) °C | 41.8 ± 6 % | 0.94 mho/m ± 6 % |
| **Head TSL temperature change during test** | < 0.5 °C | ---- | ---- |

## SAR result with Head TSL

| **SAR averaged over 1 cm$^3$ (1 g) of Head TSL** | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 2.41 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | **9.50 W/kg ± 17.0 % (k=2)** |

| **SAR averaged over 10 cm$^3$ (10 g) of Head TSL** | condition | |
|---|---|---|
| SAR measured | 250 mW input power | 1.56 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | **6.17 W/kg ± 16.5 % (k=2)** |

## Body TSL parameters

The following parameters and calculations were applied.

| | **Temperature** | **Permittivity** | **Conductivity** |
|---|---|---|---|
| **Nominal Body TSL parameters** | 22.0 °C | 55.2 | 0.99 mho/m |
| **Measured Body TSL parameters** | (22.0 ± 0.2) °C | 53.7 ± 6 % | 1.01 mho/m ± 6 % |
| **Body TSL temperature change during test** | < 0.5 °C | ---- | ---- |

## SAR result with Body TSL

| **SAR averaged over 1 cm$^3$ (1 g) of Body TSL** | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 2.53 W/kg |
| SAR for nominal Body TSL parameters | normalized to 1W | **9.91 W/kg ± 17.0 % (k=2)** |

| **SAR averaged over 10 cm$^3$ (10 g) of Body TSL** | condition | |
|---|---|---|
| SAR measured | 250 mW input power | 1.65 W/kg |
| SAR for nominal Body TSL parameters | normalized to 1W | **6.50 W/kg ± 16.5 % (k=2)** |

## Appendix (Additional assessments outside the scope of SCS 0108)

### Antenna Parameters with Head TSL

| | |
|---|---|
| Impedance, transformed to feed point | 50.1 Ω - 5.2 jΩ |
| Return Loss | - 25.7 dB |

### Antenna Parameters with Body TSL

| | |
|---|---|
| Impedance, transformed to feed point | 46.8 Ω - 7.0 jΩ |
| Return Loss | - 22.0 dB |

### General Antenna Parameters and Design

| | |
|---|---|
| Electrical Delay (one direction) | 1.427 ns |

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

### Additional EUT Data

| | |
|---|---|
| Manufactured by | SPEAG |
| Manufactured on | February 18, 2015 |

Date: 07.09.2015

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 850 MHz; Type: D850V2; Serial: D850V2 - SN: 1017**

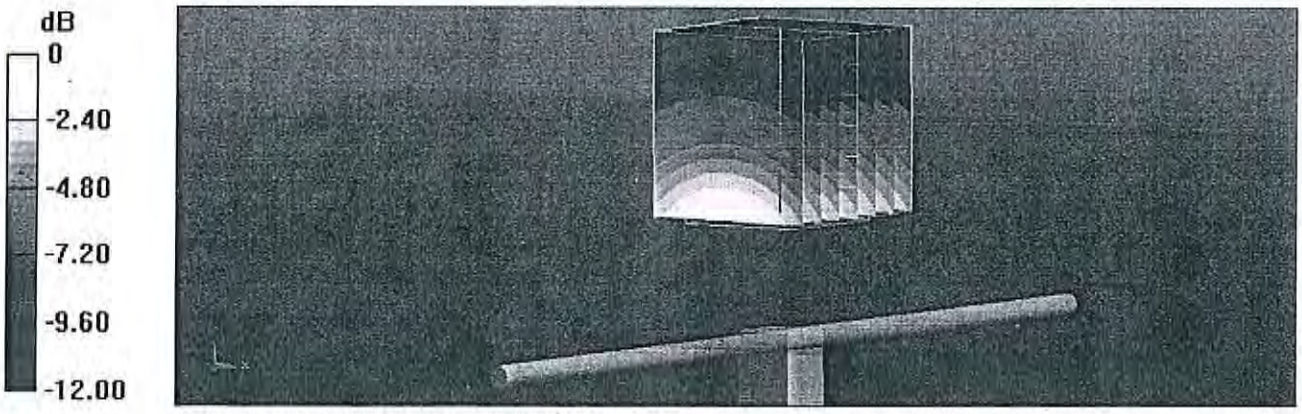
Communication System: UID 0 - CW; Frequency: 850 MHz
Medium parameters used: f = 850 MHz; $\sigma = 0.94$ S/m; $\varepsilon_r = 41.8$; $\rho = 1000$ kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(9.76, 9.76, 9.76); Calibrated: 30.12.2014;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 17.08.2015
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

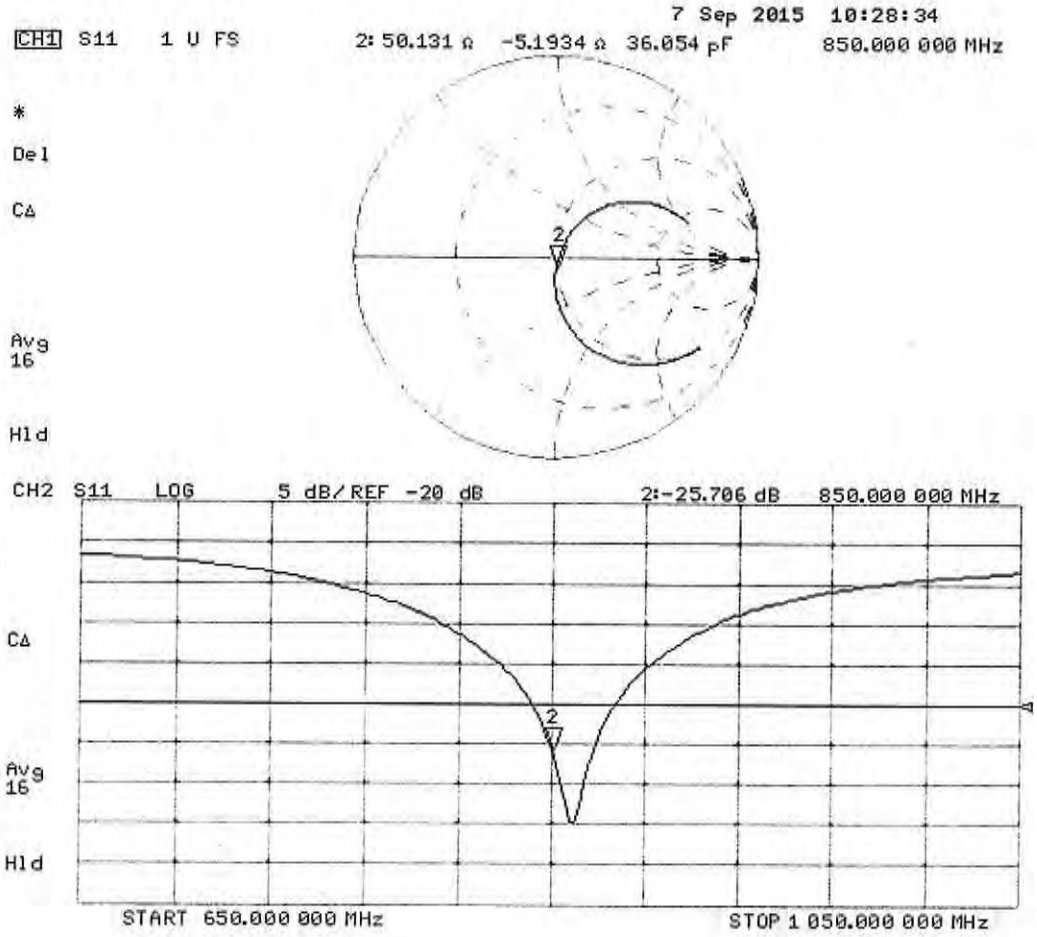
## Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 62.03 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 3.72 W/kg
**SAR(1 g) = 2.41 W/kg; SAR(10 g) = 1.56 W/kg**
Maximum value of SAR (measured) = 3.26 W/kg




0 dB = 3.26 W/kg = 5.13 dBW/kg

## Impedance Measurement Plot for Head TSL



## DASY5 Validation Report for Body TSL

Date: 14.09.2015

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 850 MHz; Type: D850V2; Serial: D850V2 - SN: 1017**

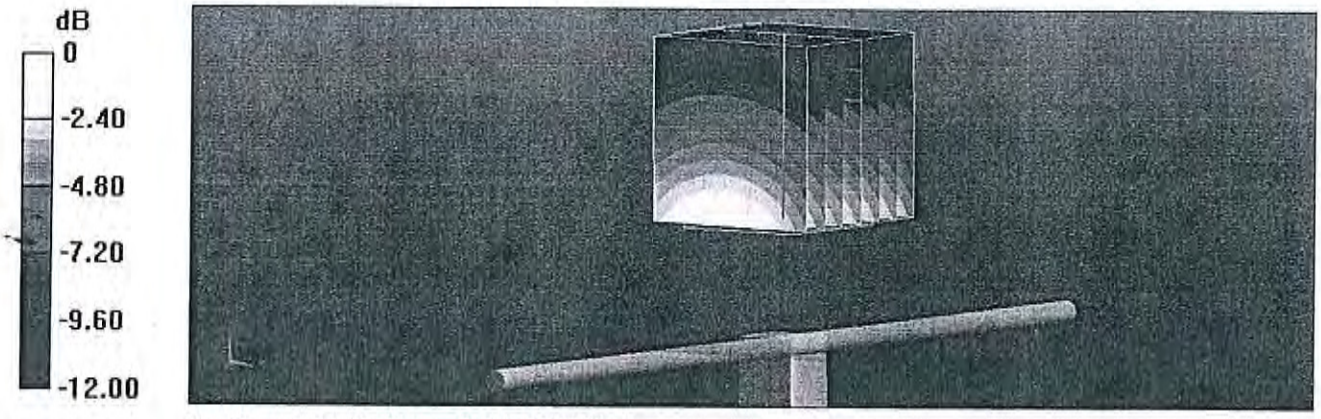
Communication System: UID 0 - CW; Frequency: 850 MHz
Medium parameters used: f = 850 MHz; $\sigma$ = 1.01 S/m; $\varepsilon_r$ = 53.7; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(9.39, 9.39, 9.39); Calibrated: 30.12.2014;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 17.08.2015
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

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

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 60.97 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 3.78 W/kg
**SAR(1 g) = 2.53 W/kg; SAR(10 g) = 1.65 W/kg**
Maximum value of SAR (measured) = 3.34 W/kg




0 dB = 3.34 W/kg = 5.24 dBW/kg

## Impedance Measurement Plot for Body TSL