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Dosimetric Assessment of the Portable Device FareGo MT60 from Scheidt & Bachmann

(FCC ID O5KMT60 / IC: 8312A-MT60)

Test Report for SAR Evaluation According to the FCC and IC Requirements

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Executive Summary

The FareGo MT60 is a new ticketing terminal from Scheidt & Bachmann operating in the 850 MHz, 1900 MHz, 2.4 GHz and 5 GHz frequency range. The device has different integrated antennas (1 x WWAN, 1 x WLAN, 1 x BT) and works in 2G, 3G, BT and IEEE 802.11 a/b/g/n standards. The diagonal dimension of the display section is > 20 cm.

The objective of the measurements done by IMST was the dosimetric assessment of one device in different configurations according to the applicable FCC and IC requirements. For SAR assessment of Bluetooth and IEEE 802.11 a/b/g/n, special test software was used to set the device to a specific frequency and output power with a specific data rate. For measurements in 2G and 3G bands a base station simulator has been used.

The examinations have been carried out with the dosimetric assessment system „DASY4“.

Measurements are performed according to the 47 CFR § 2.1093 [47CFR] for evaluating compliance of portable devices with FCC limits for human exposure (general population) to radiofrequency emissions, IEEE 1528-2013 [IEEE1528-2013] and measurement techniques of RSS-102 Issue 5 [RSS-102].

Additional information and guidelines given by the following FCC documents were used:

- FCC KDB Inquiry 680067
- SAR Measurement Requirements for 100 MHz to 6 GHz
  [KDB 865664 D01 v01r04]
- RF Exposure Procedures and Equipment Authorization Policies for Mobile and Portable Devices
  [KDB 447498 D01 v06]
- 3G SAR Measurement Procedures
  [KDB 941225 D01 v03r01]
- SAR Evaluation Considerations for Laptop, Netbook, Netbook and Tablet Computers
  [KDB 616217 D04 v01r02]
- SAR Guidance for IEEE 802.11 (WiFi) Transmitters
  [KDB 248227 D01 v02r02]

All measurements have been performed in accordance to the recommendations given by SPEAG.

Compliance Statement

The assessed SAR values for FareGo MT60 from Scheidt & Bachmann (FCC ID O5KMT60; IC: 8312A-MT60) are in compliance with the SAR limits according to:

- 47 CFR § 2.1093 [47CFR]
- ANSI / IEEE C95.1-1999 [IEEE C95.1-1999]
- IEEE 1528-2013 [IEEE1528-2013]
- Safety Code 6 [HCSC 6] / RSS-102 Issue 5 [RSS-102]

SAR assessment was conducted with a closest distance of 0 mm between the flat part of the phantom and the device with attached rubber cover. All measured SAR results are shown in Chapter 5, Table 12 - 18. The highest results of SAR for the FareGo MT60 are as follows:

Highest MeasuredSAR_{1g} [W/kg] in Body Supported Configuration									
Test Config.	**Band**	**Freq. [MHz]**	**CH**	**Position**	**Gap [mm]**	**Fig No.**	**SAR_{1g} Reported**	**SAR_{1g} Limit**	
Body	GPRS 800 3TX	836.6	190	top	0	20	0.734	1.6	PASS
	GPRS 1900 3TX	1850	512	left	0	19	0.956		PASS
	WCDMA2	1880	94000	left	0	19	1.037		PASS
	WCDMA 5	836.6	4183	top	0	20	0.377		PASS
	Bluetooth	2402	0	bottom	0	23	0.247		PASS
	IEEE 802.11 b	2412	1	right	0	24	1.376		PASS
	IEEE 802.11 a (U-NII-2A)	5320	64	right	0	24	1.122		PASS
	IEEE 802.11 a (U-NII-2C)	5500	100	right	0	24	1.168		PASS
	IEEE 802.11 a (U-NII-3)	5745	149	right	0	24	0.924		PASS

SPLRS Analysis for Simultaneous Transmission Configuration					
Test Config.	**Simultaneous Transmission Configuration**	**Position**	**Gap [mm]**	**SPLRS Analysis Ratio** (shown in Table 20)	
Body	2G/3G + BT + WLAN 2.4/5GHz	Right	0	< 0.04	PASS

To comply with the body-worn limits, the manufacturer uses a rubber cover, which in accordance with KDB 447 498 (Section 4.2.2; d) will be described in the user manual and included with the device as one set and an integrated part of it.

Prepared by: .... Reviewed by: ....

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Subject of Investigation

The FareGo MT60 is a new ticketing terminal from Scheidt & Bachmann operating in the 850 MHz, 1900 MHz, 2.4 GHz and 5 GHz frequency range. The device has different integrated antennas (1 x WWAN, 1 x WLAN, 1 x BT) and works in 2G, 3G, BT and IEEE 802.11 a/b/g/n standards. The diagonal dimension of the display section is > 20 cm.

Fig. 1: Picture of the front and back side of the device under test.

The objective of the measurements done by IMST was the dosimetric assessment of one device in different configurations according to the applicable FCC and IC requirements. For SAR assessment of Bluetooth and IEEE 802.11 a/b/g/n, special test software was used to set the device to a specific frequency and output power with a specific data rate. For measurements in 2G and 3G bands a base station simulator has been used.

The examinations have been carried out with the dosimetric assessment system „DASY4“.

1 FCC Exposure Criteria

In the USA the FCC exposure criteria [KDB 865664] are based on the withdrawn IEEE Standard C95.1-1999 [IEEE C95.1-1999].

In this report the comparison between the FCC exposure limits and the measured data is made using the spatial peak SAR; the power level of the device under test guarantees that the whole body averaged SAR is not exceeded.

Having in mind a worst case consideration, the SAR limit is valid for uncontrolled environment and mobile respectively portable transmitters. According to Table 1 the SAR values have to be averaged over a mass of 1 g (SAR_{1g}) with the shape of a cube.

Rule	SAR Limit [W/kg]
47 CFR § 2.1093 (d)(2)	1.6

Table 1: Relevant spatial peak SAR limit averaged over a mass of 1 g.

1.1 Distinction between Exposed Population, Duration of Exposure and Frequencies

The American Standard [IEEE C95.1-1999] distinguishes between controlled and uncontrolled environment. Controlled environments are locations where there is exposure that may be incurred by persons who are aware of the potential for exposure as a concomitant of employment or by other cognizant persons. Uncontrolled environments are locations where there is the exposure of individuals who have no knowledge or control of their exposure. The exposures may occur in living quarters or workplaces. For exposure in controlled environments higher field strengths are admissible. In addition the duration of exposure is considered.

Due to the influence of frequency on important parameters, as the penetration depth of the electromagnetic fields into the human body and the absorption capability of different tissues, the limits in general vary with frequency.

1.2 Distinction between Maximum Permissible Exposure and SAR Limits

The biological relevant parameter describing the effects of electromagnetic fields in the frequency range of interest is the specific absorption rate SAR (dimension: power/mass). It is a measure of the power absorbed per unit mass. The SAR may be spatially averaged over the total mass of an exposed body or its parts. The SAR is calculated from the r.m.s. electric field strength *E* inside the human body, the conductivity σ and the mass density ρ of the biological tissue:

$$SAR = \sigma \frac{E^2}{\rho} = c \frac{\partial T}{\partial t}\bigg|_{t \to 0+} . \qquad (1)$$

The specific absorption rate describes the initial rate of temperature rise $\partial T / \partial t$ as a function of the specific heat capacity *c* of the tissue. A limitation of the specific absorption rate prevents an excessive heating of the human body by electromagnetic energy.

As it is sometimes difficult to determine the SAR directly by measurement (e.g. whole body averaged SAR), the standard specifies more readily measurable maximum permissible exposures in terms of external electric *E* and magnetic field strength *H* and power density *S*, derived from the SAR limits. The limits for *E*, *H* and *S* have been fixed so that even under worst case conditions, the limits for the specific absorption rate SAR are not exceeded.

For the relevant frequency range the maximum permissible exposure may be exceeded if the exposure can be shown by appropriate techniques to produce SAR values below the corresponding limits.

2 The FCC Measurement Procedure

2.1 General Requirements

The test shall be performed in a laboratory with an environment which avoids influence on SAR measurements by ambient EM sources and any reflection from the environment itself. The ambient temperature shall be in the range of 20°C to 26°C and 30-70% humidity. All tests have been conducted according the latest version of all relevant KDBs.

2.2 SAR Testing for Tablet Computers according KDB 616217 D04

Due to its size, according KDB 616217 D04 this device is a full sized tablet computer. Accordingly the back surface and edges of the tablet should be tested for SAR compliance ith the tablet touching the phantom. The SAR exclusion threshold in KDB 447498 D01 can be applied to determine SAR test exclusion for adjacent edge configurations. The closest distance from the antenna to an adjacent tablet edge is used to determine if SAR testing is required for the adjacent edges, with the adjacent edge position against the phantom and the edge containing the antenna positioned perpendicular to the phantom.

2.3 Phantom Requirements

For body-worn and other configurations a flat phantom shall be used which is comprised of material with electrical properties similar to the corresponding tissues.

2.4 Test to be Performed

For devices with retractable antenna the SAR test shall be performed with the antenna fully extended and fully retracted. Other factors that may affect the exposure shall also be tested. For example, optional antennas or optional battery packs which may significantly change the volume, lengths, flip open/closed, etc. of the device, or any other accessories which might have the potential to considerably increase the peak spatial-average SAR value.

The SAR test shall be performed at the high, middle and low frequency channels of each operating mode. If the SAR measured at the middle channel resp. that channel with the highest output power for each test configuration is < 0.4 W/kg, testing at the high and low channels is optional.

2.5 Additional Information for IEEE 802.11 (WiFi) Transmitters

For both DSSS and OFDM wireless modes an Initial Test Position must be established for each applicable exposure configuration using either:

- Design implementation defined by the manufacturer, or
- Investigative results by the test lab based on:
  - o Exclusions based on the distance from the antenna to the surface, or
  - o Highest measured SAR from the area-scan-only measurements on all applicable test positions at the Initial Test Configuration, if found to require SAR tests.

Then, the initial test position procedure defines the required complete SAR scan measurements on each exposure configuration as following:

- When the reported SAR of the initial test position is ≤ 0.4 W/kg, further SAR measurements is not required for the remaining test positions in that configuration as well as 802.11 transmission mode combinations within the frequency or aggregated band.
- When the reported SAR of the initial test position is > 0.4 W/kg, further SAR measurements is required in the initial test position or next closest/smallest test separation distance based on manufacturer justification, on the following highest maximum output power channel, until the reported SAR is ≤ 0.8 W/kg or all required test positions are tested.
- When the reported SAR for all initial and subsequent test positions is > 0.8 W/kg, further SAR measurements is required on these positions on the subsequent next highest measured output power channels, until the reported SAR is ≤ 1.2 W/kg or all required channels have been tested.

For OFDM transmission configurations in 2.4 GHz and 5 GHz bands, it is important to determine SAR Initial Test Configuration for each stand alone and aggregated frequency band according to the maximum output power and tune-up tolerance specified for production units. The procedure is as following:

- Highest output power channel is chosen; if there are channels with same maximum output power then the closest to the mid-band frequency is preferred. If there are more than one channel with same maximum output power and same distance to the mid-band frequency, then the channel with the higher frequency is preferred.
- When SAR measurement is required for a subsequent test configuration and the channel bandwidth is smaller than that in the initial test configuration, all channels in the subsequent test configuration that overlap with the larger bandwidth channel tested in the initial test configuration should be used to determine the highest maximum output power channel in the subsequent test configuration.

Along with the initial test position reduction guidelines, the following procedures are also applied to SAR measurement requirements when multiple OFDM configurations are supported:

- When the reported SAR of the initial test configuration with the highest output power channel is > 0.8 W/kg, further SAR measurements is required for next highest output power channel in the initial test configuration, until the reported SAR is ≤ 1.2 W/kg or all required channels have been tested.
- When the reported SAR of the subsequent test configuration with the highest output power channel is > 1.2 W/kg, further SAR measurements is required for next highest output power channel in this test configuration, until the reported SAR is ≤ 1.2 W/kg or all required channels have been tested.
- When the reported SAR of the subsequent test configuration is > 1.2 W/kg, further SAR measurements for the following subsequent test configurations are required.

2.6 Additional Information for 3G Devices

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

2.7 Measurement Variability

According KDB 865664 repeated measurements are required only when the measured SAR is ≥ 0.80 W/kg. If the measured SAR value of the initial repeated measurement is < 1.45 W/kg with ≤ 20% variation, only one repeated measurement is required to reaffirm that the results are not expected to have substantial variations, which may introduce significant compliance concerns. A second repeated measurement is required only if the measured result for the initial repeated measurement is within 10% of the SAR limit and vary by more than 20%, which are often related to device and measurement setup difficulties. The following procedures are applied to determine if repeated measurements are required.

1) Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg; steps 2) through 4) do not apply.
2) When the original highest measured SAR is ≥ 0.80 W/kg, repeat that measurement once.
3) Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20 or when the original or repeated measurement is ≥ 1.45 W/kg (~ 10% from the 1-g SAR limit).
4) Perform a third repeated measurement only if the original, first or second repeated measurement is ≥ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.

3 The Measurement System

DASY is an abbreviation of „Dosimetric Assessment System“ and describes a system that is able to determine the SAR distribution inside a phantom of a human being according to different standards. The DASY4 system consists of the following items as shown in Fig: 2. Additional Fig: 3 show the equipment, similar to the installations in other laboratories.

- Fully compliant with all current measurement standards as stated in Fig. 11
- High precision robot with controller
- Measurement server (for surveillance of the robot operation and signal filtering)
- Data acquisition electronics DAE (for signal amplification and filtering)
- Field probes calibrated for use in liquids
- Electro-optical converter EOC (conversion from the optical into a digital signal)
- Light beam (improving of the absolute probe positioning accuracy)
- Two SAM phantoms filled with tissue simulating liquid
- DASY4 software
- SEMCAD

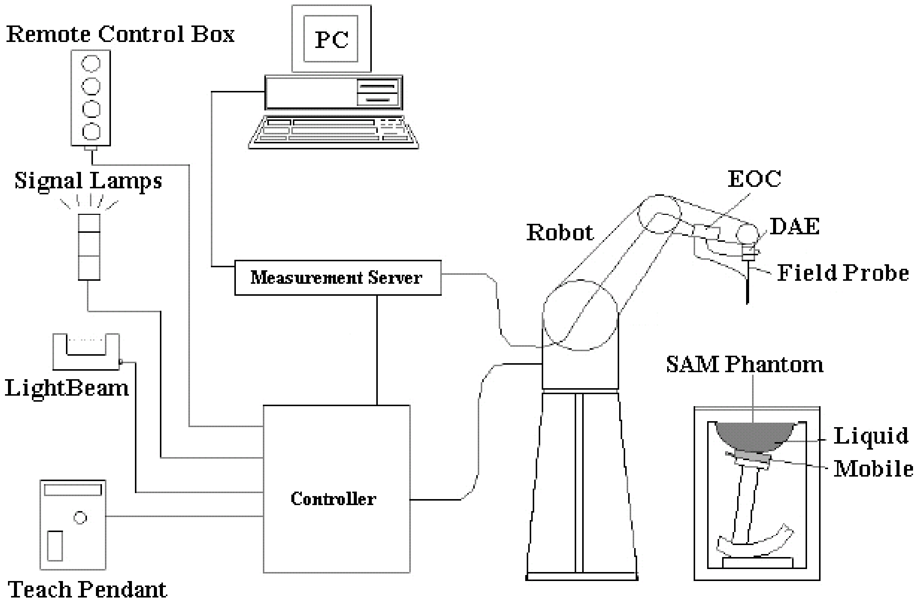


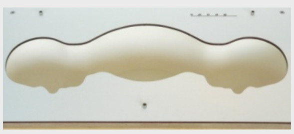
Fig. 2: The DASY4 measurement system.

Fig. 3: The measurement set-up with two SAM phantoms containing tissue simulating liquid.

The mobile phone operating at the maximum power level is placed by a non metallic device holder (delivered from Schmid & Partner) in the above described positions at a shell phantom of a human being. The distribution of the electric field strength *E* is measured in the tissue simulating liquid within the shell phantom. For this miniaturised field probes with high sensitivity and low field disturbance are used. Afterwards the corresponding SAR values are calculated with the known electrical conductivity σ and the mass density ρ of the tissue in the SEMCAD FDTD software. The software is able to determine the averaged SAR values (averaging region 1 g or 10 g) for compliance testing.

The measurements are done by two scans: first a coarse scan determines the region of the maximum SAR, afterwards the averaged SAR is measured in a second scan within the shape of a cube. The measurement time takes about 20 minutes.

3.1 Phantoms

TWIN SAM PHANTOM V4.0	
	Specific Anthropomorphic Mannequin defined in IEEE 1528 and IEC 62209-1 and delivered by Schmid & Partner Engineering AG. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. The details and the Certificate of conformity can be found in Fig. 12.
Shell Thickness	2 ± 0.2 mm (6 ± 0.2 mm at ear point)
Dimensions	Length: 1000 mm; Width: 500 mm Height: adjustable feet
Filling Volume	approx. 25 liters

3.2 E-Field-Probes

For the measurements the Dosimetric E-Field Probes ET3DV6R or EX3DV4 with following specifications are used. They are manufactured and calibrated in accordance with KDB 865664 and IEEE [IEEE 1528-2013] recommendations annually by Schmid & Partner Engineering AG.

ET3DV6R	
Construction	Symmetrical design with triangular core Built-in optical fiber for surface detection system (ET3DV6 only) Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Dimensions	Overall length: 337 mm (Tip: 16 mm) Tip diameter: 6.8 mm (Body: 12 mm) Distance from probe tip to dipole centers: 2.7 mm
Frequency	10 MHz to 2.3 GHz Linearity: ± 0.2 dB (30 MHz to 2.3 GHz)
Directivity	Axial isotropy: ± 0.2 dB in TSL (rotation around probe axis) Spherical isotropy: ± 0.4 dB in TSL (rotation normal to probe axis)
Dynamic Range	5 μW/g to > 100 mW/g; Linearity: ± 0.2 dB
Calibration Range	450 MHz / 750 MHz / 900 MHz / 1750 MHz / 1900 MHz / 1950 MHz for head and body simulating liquid

EX3DV4	
Construction	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Dimensions	Overall length: 337 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm
Frequency	10 MHz to > 6 GHz Linearity: ± 0.2 dB (30 MHz to 6 GHz)
Directivity	Axial isotropy: ± 0.3 dB in TSL (rotation around probe axis) Spherical isotropy: ± 0.5 dB in TSL (rotation normal to probe axis)
Dynamic Range	10 μW/g to > 100 mW/g Linearity: ± 0.2 dB (noise: typically < 1 μW/g)
Calibration Range	1950 MHz / 2450 MHz / 2600 MHz / 3500 MHz / 5200 MHz / 5300 MHz / 5600 MHz / 5800 MHz for head and body simulating liquid

3.3 Measurement Procedure

The following steps are used for each test position:

- Establish a call with the maximum output power with a base station simulator or by software. The connection between the mobile phone and the base station simulator is established via air interface.
- Measurement of the local E-field value at a fixed location (P1). This value serves as a reference value for calculating a possible power drift.
- Measurement of the SAR distribution with resolution settings for area scan and zoom scan according KDB 865664 D01 as shown in Table 2.
- The used extrapolation and interpolation routines are all based on the modified Quadratic Shepard´s method [DASY4].
- Repetition of the E-field measurement at the fixed location (P1) and repetition of the whole procedure if the two results differ by more than ± 0.21dB.

<table>
<tr><th colspan="3"></th><th>≤ 3 GHz</th><th>≥ 3 GHz</th></tr>
<tr><td colspan="3">Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface</td><td>5 ± 1 mm</td><td>½·δ·ln(2) ± 0.5 mm</td></tr>
<tr><td colspan="3">Maximum probe angle from probe axis to phantom surface normal at the measurement location</td><td>30° ± 1°</td><td>20° ± 1°</td></tr>
<tr><td colspan="3" rowspan="2">Maximum area scan spatial resolution: Δx_{Area}, Δy_{Area}</td><td>≤ 2 GHz: ≤ 15 mm
2 - 3 GHz: ≤ 12 mm</td><td>3 - 4 GHz: ≤ 12 mm
4 - 6 GHz: ≤ 10 mm</td></tr>
<tr><td colspan="2">When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.</td></tr>
<tr><td colspan="3">Maximum zoom scan spatial resolution: ΔX_{Zoom}, ΔY_{Zoom}</td><td>≤ 2 GHz: ≤ 8 mm
2 - 3 GHz: ≤ 5 mm*</td><td>3 - 4 GHz: ≤ 5 mm*
4 - 6 GHz: ≤ 4 mm*</td></tr>
<tr><td rowspan="3">Maximum zoom scan spatial resolution, normal to phantom surface</td><td colspan="2">Uniform grid: $\Delta Z_{Zoom}(n)$</td><td>≤ 5 mm</td><td>3 - 4 GHz: ≤ 4 mm
4 - 5 GHz: ≤ 3 mm
5 - 6 GHz: ≤ 2 mm</td></tr>
<tr><td rowspan="2">graded grid</td><td>$\Delta Z_{Zoom}(1)$: between 1st two points closest to phantom surface</td><td>≤ 4 mm</td><td>3 - 4 GHz: ≤ 3 mm
4 - 5 GHz: ≤ 2.5 mm
5 - 6 GHz: ≤ 2 mm</td></tr>
<tr><td>$\Delta Z_{Zoom}(n>1)$: between subsequent points</td><td colspan="2">≤ 1.5· $\Delta Z_{Zoom}(n-1)$</td></tr>
<tr><td>Minimum zoom scan volume</td><td colspan="2">x, y, z</td><td>≥ 30 mm</td><td>3 - 4 GHz: ≥ 28 mm
4 - 5 GHz: ≥ 25 mm
5 - 6 GHz: ≥ 22 mm</td></tr>
<tr><td colspan="5">Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium: see draft standard IEEE P1528-2011 for details.
* When zoom scan is required and the reported SAR from the area scan based 1-g SAR estimation procedures of KDB 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz</td></tr>
</table>

Table 2: Parameters for SAR scan procedures.

3.4 Uncertainty Assessment

Table 3 includes the worst case uncertainty budget suggested by KDB 865664 and IEEE 1528-2013 and determined by Schmid & Partner Engineering AG. The expanded uncertainty (K=2) is assessed to be ± 21.7%. The requirements for the validity and the Certificate of conformity can be found in Fig. 11

Uncertainty Budget of DASY4						
Error Sources	**Uncertainty Value**	**Probability Distribution**	**Divisor**	**c_i**	**Standard Uncertainty**	**v_i^2 or v_{eff}**
Measurement System						
Probe calibration	± 5.9 %	Normal	1	1	± 5.9 %	∞
Axial isotropy	± 4.7 %	Rectangular	√3	0.7	± 1.9 %	∞
Hemispherical isotropy	± 9.6 %	Rectangular	√3	0.7	± 3.9 %	∞
Boundary effects	± 1.0 %	Rectangular	√3	1	± 0.6 %	∞
Linearity	± 4.7 %	Rectangular	√3	1	± 2.7 %	∞
System detection limit	± 1.0 %	Rectangular	√3	1	± 0.6 %	∞
Readout electronics	± 1.0 %	Normal	1	1	± 1.0 %	∞
Response time	± 0.8 %	Rectangular	√3	1	± 0.5 %	∞
Integration time	± 2.6%	Rectangular	√3	1	± 1.5 %	∞
RF ambient conditions	± 3.0 %	Rectangular	√3	1	± 1.7 %	∞
Probe positioner	± 0.4 %	Rectangular	√3	1	± 0.2 %	∞
Probe positioning	± 2.9 %	Rectangular	√3	1	± 1.7 %	∞
Algorithm for max SAR eval.	± 1.0 %	Rectangular	√3	1	± 0.6 %	∞
Test Sample Related						
Device positioning	± 2.9 %	Normal	1	1	± 2.9 %	145
Device holder	± 3.6 %	Normal	1	1	± 3.6 %	5
Power drift	± 5.0 %	Rectangular	√3	1	± 2.9 %	∞
Phantom and Set-up						
Phantom uncertainty	± 4.0 %	Rectangular	√3	1	± 2.3 %	∞
Liquid conductivity (target)	± 5.0 %	Rectangular	√3	0.64	± 1.8 %	∞
Liquid conductivity (meas.)	± 2.5 %	Normal	1	0.64	± 1.6 %	∞
Liquid permittivity (target)	± 5.0 %	Rectangular	√3	0.6	± 1.7 %	∞
Liquid permittivity (meas.)	± 2.5 %	Normal	1	0.6	± 1.5 %	∞
Combined Uncertainty					**± 10.8 %**	

Table 3: Uncertainty budget of DASY4.

4 Output Power Values

4.1 Output Power Values for GPRS/EDGE

This device supports GPRS/EDGE multislot class 12. According the following tables, GPRS 850/1900 with 3 TX represent the worst case, therefore measurements with three active time slots are conducted for GPRS 850/1900.

Max. Burst-Averaged Output Power (RMS) [dBm]														
Band	**Frequency [MHz]**	**CH**	**GPRS (GMSK / CS1)**				**EDGE (GMSK / MCS1)**				**EDGE (8PSK / MCS5)**			
			1 TX	2 TX	3 TX	4 TX	1 TX	2 TX	3 TX	4 TX	1 TX	2 TX	3 TX	4 TX
850	824.2	128	32.4	31.0	29.8	27.7	32.4	30.8	29.7	27.9	27.6	23.1	22.2	21.3
	836.6	190	32.4	30.8	29.6	27.8	32.4	30.8	29.7	28.0	27.4	22.7	22.1	21.0
	848.8	251	32.3	30.6	29.5	27.6	32.3	30.6	29.5	27.7	27.3	22.6	22.0	21.0
1900	1850.2	512	30.0	28.2	27.1	25.5	29.8	28.2	27.2	25.5	26.4	24.4	23.2	21.6
	1880.0	661	29.7	28.4	27.0	25.3	29.9	28.2	27.0	25.6	26.5	24.4	23.2	21.7
	1909.8	810	29.8	28.5	27.2	25.3	29.8	28.3	27.1	25.5	26.6	24.5	23.2	21.7

Max. Frame-Averaged Output Power (RMS) [dBm]														
Band	**Frequency [MHz]**	**CH**	**GPRS (GMSK / CS1)**				**EDGE (GMSK / MCS1)**				**EDGE (8PSK / MCS5)**			
			1 TX	2 TX	3 TX	4 TX	1 TX	2 TX	3 TX	4 TX	1 TX	2 TX	3 TX	4 TX
850	824.2	128	23.4	25.0	25.5	24.7	23.4	24.8	25.4	24.9	18.6	17.1	17.9	18.3
	836.6	190	23.4	24.8	25.3	24.8	23.4	24.8	25.4	25.0	18.4	16.7	17.8	18.0
	848.8	251	23.3	24.6	25.2	24.6	23.3	24.6	25.2	24.7	18.3	16.6	17.7	18.0
1900	1850.2	512	21.0	22.2	22.8	22.5	20.8	22.2	22.9	22.5	17.4	18.4	18.9	18.6
	1880.0	661	20.7	22.4	22.7	22.3	20.9	22.2	22.7	22.6	17.5	18.4	18.9	18.7
	1909.8	810	20.8	22.5	22.9	22.3	20.8	22.3	22.8	22.5	17.6	18.5	18.9	18.7

Table 4: Measured output power for the used FareGo MT60 from Scheidt & Bachmann.

4.2 Output Power Values for WCDMA (FDD)

For measurements in WCDMA, without HSDPA or HSUPA, the default test configuration is to establish a radio link between the DUT and a communication test set using a 12.2 kbps RMC configured Test Loop Mode 1 and TPC bits configured to all “1”. The SAR will be tested for all bands using a Rel99 call configured to transmit at maximum output power per 3GPP 34.121 [3GPP 34.121]. The Rel99 parameters are summarized in Table 5.
WCDMA was tested in RMC mode without HSPA. According KDB 941225 D01 HSPA SAR is not required when the averaged output power of the HSPA subtests are not higher than 0.25 dB then measured in RMC mode and the assessed SAR value in this mode is not higher than 1.2 W/kg.

Maximum Peak-Averaged Output Power [dBm]												
Band	Freq. [MHz]	CH	WCDMA RMC	HSDPA				HSUPA				
				Subt. 1	Subt. 2	Subt. 3	Subt. 4	Subt. 1	Subt. 2	Subt. 3	Subt. 4	Subt. 5
850 (FDD 5)	826.4	4132	23.6	23.1	23.1	22.6	22.6	23.0	22.6	23.1	23.1	23.2
	836.6	4183	24.2	23.7	23.7	23.3	23.3	23.7	23.4	23.8	23.8	23.8
	846.6	4233	24.1	23.6	23.6	23.1	23.1	23.5	23.2	23.6	23.7	23.7
1900 (FDD 2)	1852.4	9626	24.2	23.7	23.7	23.3	23.3	23.5	23.2	23.5	23.6	23.8
	1880.0	9400	24.2	23.7	23.6	23.2	23.2	23.3	22.9	23.2	23.5	23.5
	1907.6	9538	23.8	23.3	23.3	22.9	22.9	23.0	22.7	23.0	23.1	23.2
β_c				2/15	12/15	15/15	15/15	11/15	6/15	15/15	2/15	15/15
β_d				15/15	15/15	8/15	4/15	15/15	15/15	9/15	15/15	15/15
ΔACK. ΔNACK. ΔCQI				8	8	8	8	8	8	8	8	8

Table 5: According TS 34.121 table C10.1.4 measured max. peak averaged output power for WCMDA for the used FareGo MT60 from Scheidt & Bachmann.

4.3 Tune-Up Information for WWAN Antenna

Tune-up procedure according KDB 447498 D01v06 is applicable. The measured SAR values are scaled according the tune-up information given by the manufacturer, shown below.

Tune-Up Information for WWAN Antenna [dBm]					
Antenna	Band	GPRS (GMSK / CS1)			
		1 TX	2 TX	3 TX	4 TX
WWAN	850	33.5	32.5	31.5	29.5
	1900	30.5	30.0	29.0	27.5

Table 6: Measured output power and tune-up information for WWAN antenna of FareGo MT60 from Scheidt & Bachmann.

4.4 Output Power Values for Bluetooth

Max. Averaged Output Power (RMS) [dBm]						
Mode	Frequency [MHz]	CH	BDR	DER		Tune-Up Limit
			GFSK	π/4 -DQPSK	8-DPSK	
			DH1	2-DH1	3-DH1	
BT	2402	0	9.5	5.3	5.2	11.0
	2441	39	10.0	5.8	5.7	
	2480	78	9.3	5.1	5	

Table 7: Measured output power for Bluetooth for FareGo MT60 from Scheidt & Bachmann.

4.5 Output Power Values and Tune-Up Information for IEEE 802.11 a/b/g/n

Measurements for IEEE 802.11 a/b/g/n has been performed with maximum power level settings (PWL) supported by the device and provided by the manufacturer.

Max. Averaged Output Power (RMS) [dBm]											
Mode	Frequency [MHz]	CH	Data Rate [Mbit/s]								Tune-Up Limit
			1		2		5.5		11		
2.4 GHz Range			PWL 15								
b	2412	1	14.1								15.5
	2437	6	14.3								
	2462	11	14.4		14.4		14.3		14.3		
Mode	Frequency [MHz]	CH	Data Rate [Mbit/s]								
			6.0	9	12	18	24	36	48	54	
g	2412	1	14.1								
	2437	6	14.2								
	2462	11	14.2								
Mode	Frequency [MHz]	CH	MCS Index No.								
			MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	
n HT20	2412	1	14.1								
	2437	6	14.2								
	2462	11	14.2								
n HT40	2437	6	14.1								

Table 8: Measured output power for b-mode for FareGo MT60 from Scheidt & Bachmann.

Max. Averaged Output Power (RMS) [dBm]											
Mode	**Frequency [MHz]**	**Data Rate [Mbit/s]**									**Tune-Up Limit**
		CH	**6.0**	**9**	**12**	**18**	**24**	**36**	**48**	**54**	
5.2 - 5.3 GHz Range		**PWL 11**									
a U-NII-1 (5.2 GHz)	5180	36	8.3								**10.0**
	5200	40	8.3								
	5220	44	8.0								
	5240	48	8.4								
a U-NII-2A (5.3 GHz)	5260	52	8.6								
	5280	56	9.0								
	5300	60	9.3								
	5320	64	9.3								
5.5 - 5.8 GHz Range		**PWL 12**									
a U-NII-2C (5.6 GHz)	5500	100	9.0								**11.0**
	5560	112	9.0								
	5580	116	9.4								
	5640	128	9.9								
a U-NII-3 (5.8 GHz)	5660	132	9.9								
	5745	149	10.1								
	5825	165	10.8	10.8	10.8	10.8	10.7	10.6	10.6	10.6	

Table 9: Measured output power for a-mode for FareGo MT60 from Scheidt & Bachmann.

Max. Averaged Output Power (RMS) [dBm]											
Mode	Frequency [MHz]	CH	Data Rate [Mbit/s]								Tune-Up Limit
			MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	
5.2 - 5.3 GHz Range			PWL 11								
n - HT20 U-NII-1 (5.2 GHz)	5180	36	8.3								10
	5200	40	8.3								
	5220	44	8.0								
	5240	48	8.4								
n - HT20 U-NII-2A (5.3 GHz)	5260	52	8.6								
	5280	56	9.0								
	5300	60	9.3								
	5320	64	9.3								
5.5 - 5.8 GHz Range			PWL 12								
n - HT20 U-NII-2C (5.6 GHz)	5500	100	9.0								11
	5560	112	9.0								
	5580	116	9.4								
	5640	128	9.9								
n - HT20 U-NII-3 (5.8 GHz)	5660	132	9.8								
	5745	149	10.1								
	5825	165	10.8								
5.2 - 5.3 GHz Range			PWL 11								
n - HT40 U-NII-1 (5.2 GHz)	5190	38	8.2								10
	5230	46	8.0								
n - HT40 U-NII-2A (5.3 GHz)	5270	54	8.6								
	5310	62	9.2								
5.5 - 5.8 GHz Range			PWL 12								
n - HT40 U-NII-2C (5.6 GHz)	5510	102	9.1								11
	5550	110	9.0								
	5590	118	9.4								
	5630	126	9.6								
n - HT40 U-NII-3 (5.8 GHz)	5670	134	9.7								
	5710	142	N/A								
	5755	151	10.0								
	5795	159	10.6								

Table 10: Measured output power for n-mode (5 GHz) for FareGo MT60 from Scheidt & Bachmann.

4.6 SAR Test Exclusion Consideration according KDB 447498

The table below shows the SAR test exclusion consideration for the applicable modes against the different device edges with the relevant distances.
The 1g and 10g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50mm are determined by:

*[(max power of channel. incl. tune-up tolerance. mW) / (min test separation distance. mm)] * [√f(GHz)]*

≤ 3.0 for 1g SAR and ≤ 7.5 for 10g extremity SAR

When the minimum test separation distance is < 5mm a distance of 5mm is applied to determine SAR test exclusion.
At 100 MHz to 6GHz and a test separation distance of > 50 mm, the SAR test exclusion threshold is determined according to the following and illustrated in Appendix B of KDB 447498 D01:

- *[(Power allowed at numeric threshold for 50 mm) + (test separation distance – 50mm) * (f(MHz)/150] mW at 100 MHz to 1500 MHz*
- *[(Power allowed at numeric threshold for 50 mm) + (test separation distance – 50mm)* 10] mW at 1500 MHz to 6 GHz*

Transmission Scenario for Body Exposure (1g)											
Exposure Position	Antenna	WWAN				Bluetooth	WLAN				
	Mode	GPRS 850 (3TX)	GPRS 1900 (3TX)	WCDMA 5	WCDMA 2	BDR / GFSK	IEEE 802.11b/g/n	IEEE 802.11a/n			
	Frequency [GHz]	0.824	1.850	0.826	1.852	2.402	2.412	5.180	5.320	5.500	5.660
	Frame Avg. Power [dBm]	31.5	29.0	24.5	24.5	11.0	15.5	10.0	10.0	11.0	11.0
	Frame Avg. Power [mW]	1412.5	794.3	281.8	281.8	12.6	35.5	10.0	10.0	12.6	12.6
Left	Antenna to user [mm]	5.0	5.0	5.0	5.0	120.0	190.0	190.0	190.0	190.0	190.0
	SAR exclusion threshold	256.4	216.1	51.2	76.7	797 mW	1497 mW	1466 mW	1465 mW	1464 mW	1463 mW
	SAR testing required?	yes	yes	yes	yes	no	no	no	no	no	no
	Estimated SAR [W/kg]	measured	measured	measured	measured	0.40	0.40	0.40	0.40	0.40	0.40
Top	Antenna to user [mm]	6.0	6.0	6.0	6.0	120.0	70.0	70.0	70.0	70.0	70.0
	SAR exclusion threshold	213.7	180.1	42.7	63.9	797 mW	297 mW	266 mW	265 mW	264 mW	263 mW
	SAR testing required?	yes	yes	yes	yes	no	no	no	no	no	no
	Estimated SAR [W/kg]	measured	measured	measured	measured	0.40	0.40	0.40	0.40	0.40	0.40
Right	Antenna to user [mm]	190.0	190.0	190.0	190.0	40.0	5.0	5.0	5.0	5.0	5.0
	SAR exclusion threshold	1677 mW	1510 mW	1680 mW	1510 mW	0.5	11.0	4.6	4.6	5.9	6.0
	SAR testing required?	no	no	no	no	no	yes	yes	yes	yes	yes
	Estimated SAR [W/kg]	0.40	0.40	0.40	0.40	0.07	measured	measured	measured	measured	measured
Bottom	Antenna to user [mm]	80.0	80.0	80.0	80.0	5.0	20.0	20.0	20.0	20.0	20.0
	SAR exclusion threshold	1073 mW	410 mW	1074 mW	410 mW	3.9	2.8	1.1	1.2	1.5	1.5
	SAR testing required?	yes	yes	no	no	yes	no	no	no	no	no
	Estimated SAR [W/kg]	measured	measured	0.40	0.40	measured	0.37	0.15	0.15	0.20	0.20
Back	Antenna to user [mm]	35.0	35.0	35.0	35.0	10.0	10.0	10.0	10.0	10.0	10.0
	SAR exclusion threshold	36.6	30.9	7.3	11.0	2.0	5.5	2.3	2.3	3.0	3.0
	SAR testing required?	yes	yes	yes	yes	no	yes	no	no	no	no
	Estimated SAR [W/kg]	measured	measured	measured	measured	0.26	measured	0.30	0.31	0.39	0.40

Table 11: SAR test exclusion consideration for the applicable modes against different device edges.

When the standalone SAR test exclusion applies to an antenna that transmits simultaneously with other antennas the standalone SAR must be estimated according to KDB 447498 in order to determine simultaneous transmission SAR test exclusion:

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

  where x = 7.5 for 1-g SAR.

When the minimum test separation distance is < 5 mm. a distance of 5 mm is applied to determine SAR test exclusion.

- *0.4 W/kg for 1g SAR and 1.0 W/kg for 10g SAR. when the test separation distance is > 50 mm*

5 SAR Results

Since the diagonal dimension of the display section is > 20 cm, SAR was evaluated according to KDB 616217 D04 with output power values according to Tables 4 - 10. The tables below contain the measured SAR values averaged over a mass of 1 g.

Following KDB 447498 D01, the reported SAR is the measured SAR value adjusted for maximum tune-up tolerance.

Scaling Factor = tune-up limit power (mW) / RF power (mW)
*Reported SAR = measured SAR * scaling factor*

Furthermore, testing of other required channels within the operating mode of frequency band is not required when the reported SAR for the mid-band or highest output power channel is ≤ 0.4 W/kg for transmission band ≥ 200 MHz.

SAR Results for WWAN Antenna (GPRS Bands)												
Band	**Freq. [MHz]**	**Channel**	**Test Position**	**Spacing [mm]**	**Fig. No.**	**Measured SAR [W/kg]**	**EUT Output Power [dBm]**	**Tune Up Limit [dBm]**	**Power Drift [dBm]**	**Scaling Factor**	**Reported SAR1g [W/kg]**	**Plot No.**
GPRS 850 (3TX)	836.6	190	left	0	19	0.333	29.6	31.5	-0.199	1.549	0.516	1
			top	0	20	0.474	29.6	31.5	0.067	1.549	0.734	2
			right	0	-	excluded*	-	-	-	-	excluded	-
			bottom	0	21	0.088	29.6	31.5	0.035	1.549	0.136	3
			back	0	22	0.288	29.6	31.5	-0.163	1.549	0.446	4
	824.2	128	top	0	20	0.429	29.8	31.5	-0.050	1.479	0.635	5
	848.8	251	top	0	20	0.452	29.5	31.5	0.150	1.585	0.716	6
GPRS 1900 (3TX)	1880	661	left	0	19	0.570	27.0	29.0	0.033	1.585	0.903	7
			top	0	20	0.228	27.0	29.0	0.186	1.585	0.361	8
			right	0	-	excluded*	-	-	-	-	excluded	-
			bottom	0	21	0.063	27.0	29.0	0.001	1.585	0.100	9
			back	0	22	0.152	27.0	29.0	-0.038	1.585	0.241	10
	1850	512	left	0	19	0.617	27.1	29.0	-0.009	1.549	0.956	11
	1910	810	left	0	19	0.619	27.2	29.0	0.064	1.514	0.937	12

Table 12: SAR results for GPRS bands for FareGo MT60 from Scheidt & Bachmann.

*Notes: * Sides excluded according to Table 11*

Measured max SAR is < 0.8 W/kg, thus measurement variability assessment according KDB 865664 is not applicable.

SAR Results for WWAN Antenna (WCDMA Bands)												
Band	**Freq. [MHz]**	**Channel**	**Test Position**	**Spacing [mm]**	**Fig. No.**	**Measured SAR [W/kg]**	**EUT Output Power [dBm]**	**Tune Up Limit [dBm]**	**Power Drift [dBm]**	**Scaling Factor**	**Reported SAR1g [W/kg]**	**Plot No.**
FDD 2 (RMC)	1880	9400	left	0	19	0.968	24.2	24.5	0.029	1.072	1.037	13
			left	0	19	0.941**	24.2	24.5	0.125	1.072	1.008	14
			top	0	20	0.416	24.2	24.5	0.113	1.072	0.446	15
			right	0	-	excluded*	-	-	-	-	excluded	-
			bottom	0	-	excluded*	-	-	-	-	excluded	-
			back	0	22	0.521	24.2	24.5	-0.136	1.072	0.558	16
	1852	9262	left	0	19	0.958	24.2	24.5	0.012	1.072	1.027	17
	1908	9538	left	0	19	0.841	23.8	24.5	0.029	1.175	0.988	18
FDD 5 (RMC)	836.6	4183	left	0	19	0.242	24.2	24.5	-0.008	1.072	0.259	19
			top	0	20	0.352	24.2	24.5	0.114	1.072	0.377	20
			right	0	-	excluded*	-	-	-	-	excluded	-
			bottom	0	-	excluded*	-	-	-	-	excluded	-
			back	0	22	0.233	24.2	24.5	-0.074	1.072	0.250	21
	826.4	4132	top	0	20	0.294	23.6	24.5	-0.129	1.230	0.362	22
	846.8	4233	top	0	20	0.247	24.1	24.5	0.160	1.096	0.271	23

Table 13: SAR results for WCDMA bands for FareGo MT60 from Scheidt & Bachmann.

*Notes: * Sides excluded according to Table 11*

*** Measurement variability according to KDB 865664*

SAR Results for BT Antenna												
Band	**Freq. [MHz]**	**Channel**	**Test Position**	**Spacing [mm]**	**Fig. No.**	**Measured SAR [W/kg]**	**EUT Output Power [dBm]**	**Tune Up Limit [dBm]**	**Power Drift [dBm]**	**Scaling Factor**	**Reported SAR1g [W/kg]**	**Plot No.**
Bluetooth	2441	39	left	0	-	excluded*	-	-	-	-	excluded	-
			top	0	-	excluded*	-	-	-	-	excluded	-
			right	0	-	excluded*	-	-	-	-	excluded	-
			bottom	0	23	0.130	10.0	11.0	0.122	1.259	0.164	24
			back	0	-	excluded*	-	-	-	-	excluded	-
	2402	0	bottom	0	23	0.175	9.5	11.0	0.049	1.413	0.247	25
	2480	78	bottom	0	23	0.106	9.3	11.0	0.089	1.479	0.157	26

Table 14: SAR results for Bluetooth for FareGo MT60 from Scheidt & Bachmann.

*Notes: * Sides excluded according to Table 11*

Measured max SAR is < 0.8 W/kg, thus measurement variability assessment according KDB 865664 is not applicable.

SAR Results for WLAN Antenna (2.4 GHz Range)												
Band	**Freq. [MHz]**	**Channel**	**Test Position**	**Spacing [mm]**	**Fig. No.**	**Measured SAR [W/kg]**	**EUT Output Power [dBm]**	**Tune Up Limit [dBm]**	**Power Drift [dBm]**	**Scaling Factor**	**Reported SAR1g [W/kg]**	**Plot No.**
IEEE 802.11b (1 Mbit/s)	2437	6	left	0	-	excluded*	-	-	-	-	excluded	-
			top	0	-	excluded*	-	-	-	-	excluded	-
			right	0	24	0.896	14.3	15.5	0.104	1.318	1.181	27
			right	0	24	0.860**	14.3	15.5	0.058	1.318	1.134	28
			bottom	0	-	excluded*	-	-	-	-	excluded	-
			back	0	25	0.022	14.3	15.5	0.073	1.318	0.030	29
	2412	1	right	0	24	0.969	14.1	15.5	0.057	1.380	1.338	30
	2412	1	right	0	24	0.997**	14.1	15.5	0.033	1.380	1.376	31
	2462	11	right	0	24	0.675	14.4	15.5	0.191	1.288	0.870	32
IEEE 802.11g (6 Mbit/s)	2437	6	left	0	-	excluded*	-	-	-	-	excluded	-
			top	0	-	excluded*	-	-	-	-	excluded	-
			right	0	24	0.852	14.2	15.5	0.160	1.349	1.149	33
			bottom	0	-	excluded*	-	-	-	-	excluded	-
			back	0	25	0.019	14.2	15.5	0.173	1.349	0.027	34
	2462	11	right	0	24	0.674	14.2	15.5	0.009	1.349	0.909***	35

Table 15: SAR results for IEEE 802.11 b/g/n (2.4 GHz) for FareGo MT60 from Scheidt & Bachmann.

*Notes: * Sides excluded according to Table 11*

*** Measurement variability according to KDB 865664*

**** Reported SAR is ≤ 1.2 W/kg, thus measurements for all further channels have been excluded according to the requirements listed in Section 2.5.*

SAR Results for WLAN Antenna (5.2 GHz Range)												
Band	**Freq. [MHz]**	**Channel**	**Test Position**	**Spacing [mm]**	**Fig. No.**	**Measured SAR [W/kg]**	**EUT Output Power [dBm]**	**Tune Up Limit [dBm]**	**Power Drift [dBm]**	**Scaling Factor**	**Reported SAR1g [W/kg]**	**Plot No.**
IEEE 802.11a (6 Mbit/s)			left	0	-	excluded*	-	-	-	-	excluded	-
			top	0	-	excluded*	-	-	-	-	excluded	-
	5320	64	right	0	24	0.933	9.3	10.0	0.180	1.175	1.096	36
	5320	64	right	0	24	0.955**	9.3	10.0	0.142	1.175	1.122	37
	5300	60	right	0	24	0.847	9.3	10.0	-0.105	1.175	0.995***	38
			bottom	0	-	excluded*	-	-	-	-	excluded	-
			back	0	-	excluded*	-	-	-	-	excluded	-

Table 16: SAR results for IEEE 802.11 a/n (5.2 GHz) for FareGo MT60 from Scheidt & Bachmann.

*Notes: * Sides excluded according to Table 11*

*** Measurement variability according to KDB 865664*

**** Reported SAR is ≤ 1.2 W/kg, thus measurements for all further channels have been excluded according to the requirements listed in Section 2.5.*

SAR Results for WLAN Antenna (5.6 GHz Range)												
Band	**Freq. [MHz]**	**Channel**	**Test Position**	**Spacing [mm]**	**Fig. No.**	**Measured SAR [W/kg]**	**EUT Output Power [dBm]**	**Tune Up Limit [dBm]**	**Power Drift [dBm]**	**Scaling Factor**	**Reported SAR1g [W/kg]**	**Plot No.**
IEEE 802.11a (6 Mbit/s)			left	0	-	excluded*	-	-	-	-	excluded	-
			top	0	-	excluded*	-	-	-	-	excluded	-
	5640	128	right	0	24	0.813	9.9	11.0	-0.074	1.288	1.047	39
	5640	128	right	0	24	0.907**	9.9	11.0	0.145	1.288	1.168	40
	5580	116	right	0	24	0.713	9.4	11.0	0.053	1.445	1.031***	41
			bottom	0	-	excluded*	-	-	-	-	excluded	-
			back	0	-	excluded*	-	-	-	-	excluded	-

Table 17: SAR results for IEEE 802.11 a/n (5.6 GHz) for FareGo MT60 from Scheidt & Bachmann.

*Notes: * Sides excluded according to Table 11*

*** Measurement variability according to KDB 865664*

**** Reported SAR is ≤ 1.2 W/kg, thus measurements for all further channels have been excluded according to the requirements listed in Section 2.5.*

SAR Results for WLAN Antenna (5.8 GHz Range)												
Band	**Freq. [MHz]**	**Channel**	**Test Position**	**Spacing [mm]**	**Fig. No.**	**Measured SAR [W/kg]**	**EUT Output Power [dBm]**	**Tune Up Limit [dBm]**	**Power Drift [dBm]**	**Scaling Factor**	**Reported SAR1g [W/kg]**	**Plot No.**
IEEE 802.11a (6 Mbit/s)	5660	132	right	0	24	0.654	9.9	11.0	0.093	1.288	0.843	42
	5745	149	right	0	24	0.751	10.1	11.0	0.110	1.230	0.924	43
	5825	165	right	0	24	0.781	10.8	11.0	0.122	1.047	0.818	44

Table 18: SAR results for IEEE 802.11 a/n (5.8 GHz) for FareGo MT60 from Scheidt & Bachmann.

To control the output power stability during the SAR test the used DASY4 system calculates the power drift by measuring the e-field at the same location at the beginning and at the end of the measurement for each test position. These drift values can be found in the above tables labeled as: (Drift [dB]). This ensures that the power drift during one measurement is within 5%.

6 Multiple Transmitter Information

According KDB 447498, the following table gives an overview about the ∑SAR for simultaneous transmitting modes. When ∑SAR > 1.6 W/kg. a SAR test exclusion is determined by the SAR to peak location separation ratio.

The ratio is determined by $(SAR1 + SAR2)^{1.5}/Ri$ rounded to two decimal digits and must be ≤ 0.04 for all antenna pairs in the configuration to qualify for 1-g SAR test exclusion. Where Ri is the separation distance between the peak SAR locations for the antenna pair in mm. When SAR is measured for both antennas in a pair the peak location separation distance is computed by the square root of $[(x1-x2)^2 + (y1-y2)^2 + (z1-z2)^2]$ where (x1, y1, z1) and (x2, y2, z2) are the coordinates of the area scans or extrapolated peak SAR locations in the zoom scans as appropriate.

Simultaneous Transmission Scenario SAR [W/kg]							
Exposure Position	Worst Case					ΣSAR	SPLSR Analysis
	2G	3G	Bluetooth	WLAN 2.4 GHz	WLAN 5 GHz		
Left	0.956		0.400	0.400		1.756	YES
Top	0.734		0.400	0.400		1.534	NO
Right	0.400		0.070	1.376		1.846	YES
Bottom	0.400		0.247	0.370		1.017	NO
Back	0.446		0.260	0.030		0.736	NO
Left	0.956		0.400		0.400	1.756	YES
Top	0.734		0.400		0.400	1.534	NO
Right	0.400		0.070		1.168	1.638	YES
Bottom	0.400		0.247		0.370	1.017	NO
Back	0.446		0.260		0.400	1.106	NO
Left		1.037	0.400	0.400		1.837	YES
Top		0.446	0.400	0.400		1.246	NO
Right		0.400	0.070	1.376		1.846	YES
Bottom		0.400	0.247	0.370		1.017	NO
Back		0.558	0.026	0.030		0.614	NO
Left		1.037	0.400		0.400	1.837	YES
Top		0.446	0.400		0.400	1.246	NO
Right		0.400	0.070		1.168	1.638	YES
Bottom		0.400	0.247		0.370	1.017	NO
Back		0.558	0.026		0.400	0.984	NO
Note:	Estimated SAR values marked in blue						

*Table 19: Worst case SAR test exclusion consideration for the applicable modes against different device edges, for 2G, 3G, BT and IEEE 802.11 transmissions (*estimated SAR values marked in blue).*

6.1 SPLSR Analysis for Simultaneous Transmission Scenario

SPLSR Analysis									
Exposure Position	**Worst Case**					**ΣSAR**	**Separation Distance [mm]**	**SPLSR Ratio**	**Volume Scan**
	2G	**3G**	**Bluetooth**	**WLAN 2.4 GHz**	**WLAN 5 GHz**				
Left	0.956		0.400	0.400		1.756	Note*		
	0.956		0.400		0.400	1.756	Note*		
		1.037	0.400	0.400		1.837	Note*		
		1.037	0.400		0.400	1.837	Note*		
	0.956		0.400			1.356	170.0	0.009	NO
	0.956			0.400		1.356	199.0	0.008	NO
			0.400	0.400		0.800	71.7	0.010	NO
	0.956				0.400	1.356	199.0	0.008	NO
			0.400		0.400	0.800	71.7	0.010	NO
		1.037	0.400			1.437	170.0	0.010	NO
		1.037		0.400		1.437	199.0	0.009	NO
		1.037			0.400	1.437	199.0	0.009	NO
Right	0.400		0.070	1.376		1.846	Note*		
	0.400		0.070		1.168	1.638	Note*		
		0.400	0.070	1.376		1.846	Note*		
		0.400	0.070		1.168	1.638	Note*		
	0.400		0.070			0.470	170.0	0.002	NO
	0.400			1.376		1.776	199.0	0.012	NO
			0.070	1.376		1.446	71.7	0.024	NO
	0.400				1.168	1.568	199.0	0.010	NO
			0.070		1.168	1.238	71.7	0.019	NO
		0.400	0.070			0.470	170.0	0.002	NO
		0.400		1.376		1.776	199.0	0.012	NO
		0.400			1.168	1.568	199.0	0.010	NO

Table 20: SPLSR analysis for simultaneous transmission combinations with worst case SAR test results. SAR values for the excluded consideration for the applicable modes against different device edges, for 2G, 3G, BT and IEEE 802.11 transmissions have been estimated and marked in blue.

Note: *Since there is no method for SPLSR analysis for three antennas active at the same time, this analysis is based on the worst case SAR configuration of two active antennas.

According to the table above SAR assessment for the antennas in the excluded side configurations were not conducted. Accordingly there are no Peak SAR locations available for these configurations. Therefore the centers of the antennas were used as Peak SAR location.

7 Appendix

7.1 Administrative Data

Date of Validation:	835 MHz Body (GPRS850):	December 23, 2015
	1900 MHz Body (GPRS1900):	December 16, 2015
	835 MHz Body (WCDMA5):	December 28, 2015
	1900 MHz Body (WCDMA2):	December 16, 2015
	2450 MHz Body (IEEE802.11b):	January 15, 2016
	5250 MHz Body (IEEE802.11a):	January 04, 2016
	5600 MHz Body (IEEE802.11a):	January 05, 2016
	5750 MHz Body (IEEE802.11a):	January 05, 2016
Date of Measurement:	December 16, 2015 - January 15, 2016	
Data Stored:	Scheidt & Bachmann_60320_6150420	
Contact:	IMST GmbH Carl-Friedrich-Gauß-Str. 2 - 4 47475 Kamp-Lintfort Germany email: SAR@imst.de	

7.2 Device under Test and Test Conditions

MTE:	FareGo MT60 from Scheidt & Bachmann
Date of Receipt:	November 12, 2015
IMEI:	357784044015608
FCC ID:	O5KMT60
IC:	8312A-MT60
Transmitter:	Huawei MU609 (Cellular) FCC ID: QISMU609 u-blox ELLA-W163-A (WLAN/BT) FCC ID: PV7-WIBEAR11N-DF2 IC: 7738A-WB11NDF2
Antenna:	integrated (1 x WWAN, 1 x WLAN, 1 x BT)
Equipment Class:	Portable device
RF Exposure Environment:	General Population/ Uncontrolled
Power Supply:	Internal Battery (86344710)

Standard	TX Range [MHz]	RX Range [MHz]	Used Channels	Crest Factor	Phantom
GPRS 850	824.2 – 848.8	869.2 – 893.8	128, 190, 251	2.66	SAM Twin Phantom V4.0
GPRS 1900	1850.2 –1909.8	1930.2 – 1989.8	512, 661, 810	2.66	
WCDMA 5 (FDD)	826.4 – 846.6	871.4 – 891.6	4132, 4183, 4233	1	
WCDMA 2 (FDD)	1852.4 – 1907.6	1932.4 – 1987.6	9262, 9400, 9538	1	
Bluetooth	2402.0 – 2480.0	2412.0 – 2480.0	0, 39, 78	1	
IEEE 802.11 b/g/n	2412.0 – 2462.0	2412.0 – 2462.0	1, 6, 11	1	
IEEE 802.11 a/n	5180.0 – 5320.0	5180.0 – 5320.0	36, 48, 52, 56, 60, 64	1	
	5500.0 – 5640.0	5500.0 – 5640.0	100, 112, 116, 128	1	
	5660.0 - 5825.0	5660.0 - 5825.0	132, 149, 165	1	

Table 21: Used channels and crest factors during the test.

7.3 Tissue Recipes

The following recipes are provided in percentage by weight.

835 MHz Body:	52.40 %	De-Ionized Water
	01.50 %	Salt
	45.00 %	Sugar
	00.10 %	Preventol D7
	01.00 %	Hydroxyetyl-Cellulose
1900 MHz Body:	29.68 %	Diethylenglykol-monobutylether
	70.00 %	De-Ionized Water
	0.32 %	Salt
2450 MHz Body:	31.40 %	Diethylenglykol-monobutylether
	68.60 %	De-IonizedWater

The tissue simulating liquids for the frequency range from 3.5 GHz up to 5.8 GHz were delivered by SPEAG, therefore the detailed compositions are not available and only the included ingredients were listed and shown in Figure 11.

3500 MHz – 5800 MHz, Head / Body:	11.0 % - 36 %	Mineral Oil
	0.5 % - 15 %	Emulsifiers
	60.0 % - 78 %	Water
	0.4 % - 3.0 %	Additives and salt

7.4 Material Parameters

For the measurement of the following parameters the HP 85070B dielectric probe kit is used representing the open-ended coaxial probe measurement procedure. The measured values should be within ± 5% of the recommended values given by the FCC.

Tissue Simulating Liquids					
Frequency		ε_r	**Delta [%]**	**σ [S/m]**	**Delta [%]**
835 MHz Body	Recommended Value	55.20	+/- 5	0.97	+/- 5
GPRS 850	Measured Value (Ch. 128)	53.50	-3.1	0.97	0.0
	Measured Value (Ch. 190)	53.40	-3.3	0.98	1.0
	Measured Value (Ch. 251)	53.20	-3.6	1.00	3.1
1900 MHz Body	Recommended Value	53.30	+/- 5	1.52	+/- 5
GPRS 1900	Measured Value (Ch. 512)	52.70	-1.1	1.46	-3.9
	Measured Value (Ch. 661)	52.60	-1.3	1.51	-0.7
	Measured Value (Ch. 810)	52.50	-1.5	1.57	3.3
835 MHz Body	Recommended Value	55.20	+/- 5	0.97	+/- 5
WCDMA 5	Measured Value (Ch. 4132)	53.10	-3.8	0.96	-1.0
	Measured Value (Ch. 4183)	53.00	-4.0	0.98	1.0
	Measured Value (Ch. 4233)	52.90	-4.2	0.99	2.1
1900 MHz Body	Recommended Value	53.30	+/- 5	1.52	+/- 5
WCDMA 2	Measured Value (Ch. 9262)	52.70	-1.1	1.46	-3.9
	Measured Value (Ch. 9400)	52.60	-1.3	1.51	-0.7
	Measured Value (Ch. 9538)	52.50	-1.5	1.57	3.3
2450 MHz Body	Recommended Value	52.70	+/- 5	1.95	+/- 5
Bluetooth	Measured Value (Ch. 0)	52.50	-0.4	1.89	-3.1
	Measured Value (Ch. 39)	52.30	-0.8	1.95	0.0
	Measured Value (Ch. 78)	52.20	-0.9	2.03	4.1
2450 MHz Body	Recommended Value	52.70	+/- 5	1.95	+/- 5
IEEE 802.11 b/g/n	Measured Value (Ch. 1)	52.50	-0.4	1.90	-2.6
	Measured Value (Ch. 6)	52.30	-0.8	1.95	0.0
	Measured Value (Ch. 11)	52.20	-0.9	1.99	2.1
5250 MHz Body	Recommended Value	48.90	+/- 5	5.36	+/- 5
	Measured Value (Ch. 52)	49.40	1.0	5.20	-3.0
	Measured Value (Ch. 56)	49.40	1.0	5.24	-2.2
	Measured Value (Ch. 60)	49.30	0.8	5.24	-2.2
	Measured Value (Ch. 64)	49.20	0.6	5.25	-2.1
5600 MHz Body	Recommended Value	48.50	+/- 5	5.77	+/- 5
IEEE 802.11 a/n	Measured Value (Ch. 100)	48.60	0.2	5.55	-3.8
	Measured Value (Ch. 112)	48.60	0.2	5.75	-0.3
	Measured Value (Ch. 116)	48.60	0.2	5.74	-0.5
	Measured Value (Ch. 128)	48.20	-0.6	5.82	0.9
5750 MHz Body	Recommended Value	48.30	+/- 5	5.94	+/- 5
IEEE 802.11 a/n	Measured Value (Ch. 132)	48.60	0.6	5.86	-1.3
	Measured Value (Ch. 149)	48.20	-0.2	6.00	1.0
	Measured Value (Ch. 161)	48.10	-0.4	6.21	4.5

Table 22: Parameters of the tissue simulating liquids.

7.5 Simplified Performance Checking

The simplified performance check was realized using the dipole validation kits. The input power of the dipole antennas were 250 mW (cw signal) and they were placed under the flat part of the SAM phantom. The target and measured results are listed in the Table 23 and shown in Figure 4 - 10. The target values were adopted from the calibration certificates which are attached in the appendix. Table 25 includes the uncertainty assessment for the system performance checking which was suggested by the [IEEE 1528-2013] and determined by Schmid & Partner Engineering AG. The expanded uncertainty (K=2) is assessed to be ± 16.8%.

Measured and Target Validation Results							
Available Dipoles		SAR_{1g} [W/kg]	Delta [%]	ε_r	Delta [%]	σ [S/m]	Delta [%]
D835V2, SN #470 (GPRS 850)	Target Values Body	2.34	+/- 10	54.6	+/- 5	1.02	+/- 5
	Measured Values	2.48	6.2	53.4	-2.2	0.98	-3.9
D835V2, SN #470 (WCDMA 5)	Target Values Body	2.34	+/- 10	54.6	+/- 5	1.02	+/- 5
	Measured Values	2.50	7.1	53.0	-2.9	0.98	-3.9
D1900V2, SN #5d051 (GPRS 1900 + WCDMA 2)	Target Values Body	9.93	+/- 10	52.8	+/- 5	1.50	+/- 5
	Measured Values	9.64	-2.9	52.6	-0.4	1.55	3.3
D2450V2, SN #709 (BT + WLAN 2.4 GHz)	Target Values Body	13.08	+/- 10	52.7	+/- 5	2.02	+/- 5
	Measured Values	13.30	1.7	52.2	-0.9	1.97	-2.5
D5GHzV2, SN #1028 (5.25 GHz WLAN)	Target Values Body	19.43	+/- 10	47.3	+/- 5	5.40	+/- 5
	Measured Values	18.50	-4.8	49.4	4.4	5.17	-4.3
D5GHzV2, SN #1028 (5.6 GHz WLAN)	Target Values Body	20.60	+/- 10	46.7	+/- 5	5.86	+/- 5
	Measured Values	20.60	0.0	48.5	3.9	5.75	-1.9
D5GHzV2, SN #1029 (5.75 GHz WLAN)	Target Values Body	19.38	+/- 10	46.4	+/- 5	6.08	+/- 5
	Measured Values	18.60	-4.0	48.2	3.9	6.00	-1.3

Table 23: Measured and target validation results as given by the calibration certificates.

Test Laboratory: IMST GmbH, DASY Yellow (II); File Name: 231215_y_1669_631.da4

DUT: Dipole 835 MHz SN470; Type: D835V2; Serial: D835V2 - SN:470
Program Name: System Performance Check at 835 MHz

Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium parameters used: f = 835 MHz; σ = 0.98 mho/m; ε_r = 53.4; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6R - SN1669; ConvF(5.99, 5.99, 5.99); Calibrated: 2/19/2015
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn631; Calibrated: 9/16/2015
- Phantom: SAM Sugar 1341; Type: QD 000 P40 CB; Serial: TP-1341
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

d=10mm, Pin=250mW/Area Scan (7x10x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 2.65 mW/g
d=10mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 54.5 V/m; Power Drift = 0.024 dB
Peak SAR (extrapolated) = 3.52 W/kg
SAR(1 g) = 2.48 mW/g; SAR(10 g) = 1.62 mW/g
Maximum value of SAR (measured) = 2.69 mW/g

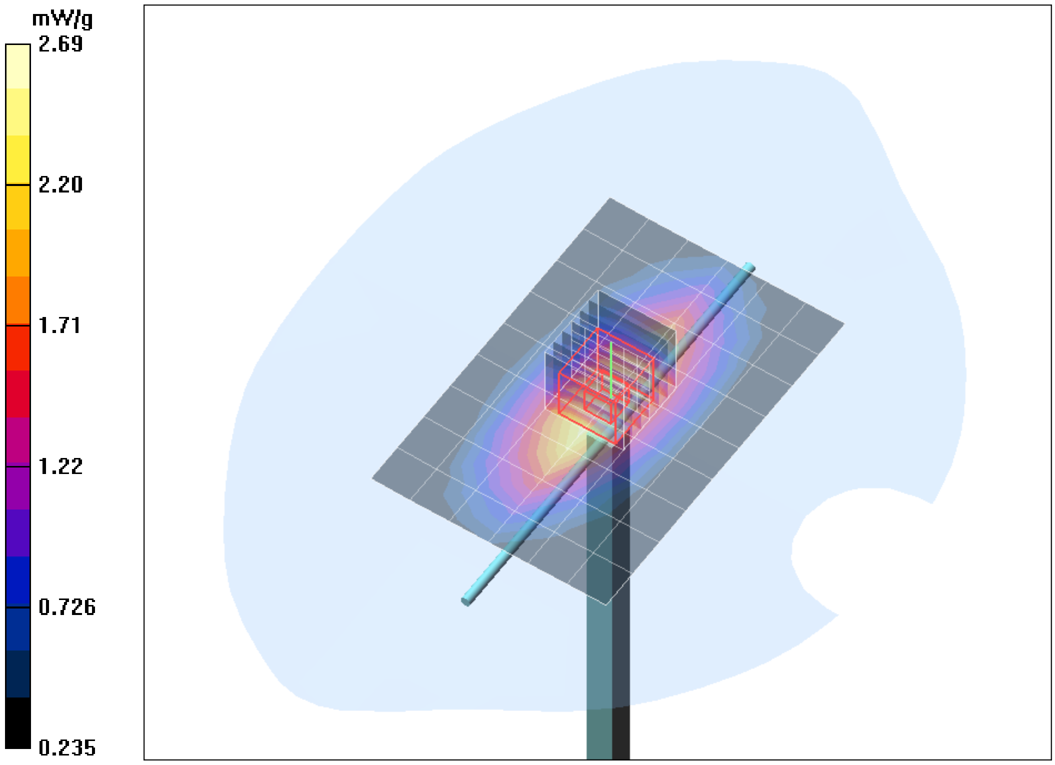


Fig. 4: Validation measurement 835 MHz Body (GPRS 850; December 23. 2015), coarse grid.

Test Laboratory: IMST GmbH, DASY Yellow (II); File Name: 281215_y_1669_631.da4

DUT: Dipole 835 MHz SN470; Type: D835V2; Serial: D835V2 - SN:470
Program Name: System Performance Check at 835 MHz

Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium parameters used: f = 835 MHz; σ = 0.98 mho/m; ε_r = 53; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6R - SN1669; ConvF(5.99, 5.99, 5.99); Calibrated: 2/19/2015
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn631; Calibrated: 9/16/2015
- Phantom: SAM Sugar 1341; Type: QD 000 P40 CB; Serial: TP-1341
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

d=10mm, Pin=250mW/Area Scan (7x10x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 2.68 mW/g
d=10mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 54.8 V/m; Power Drift = 0.031 dB
Peak SAR (extrapolated) = 3.53 W/kg
SAR(1 g) = 2.5 mW/g; SAR(10 g) = 1.64 mW/g
Maximum value of SAR (measured) = 2.70 mW/g

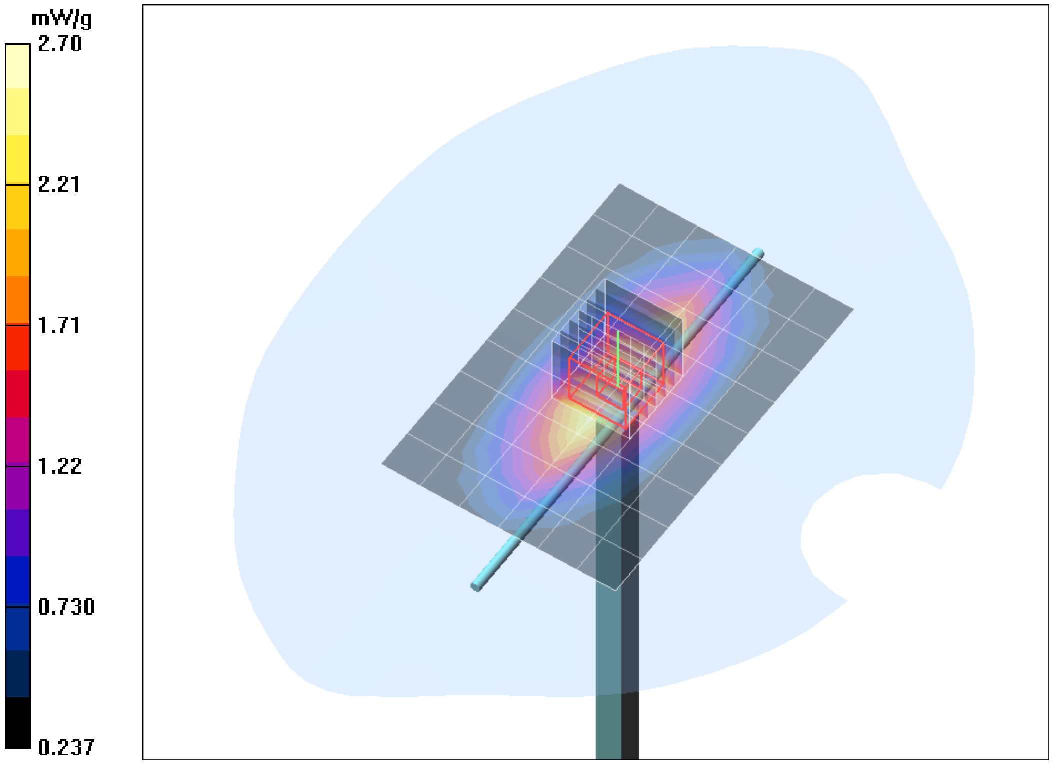


Fig. 5: Validation measurement 835 MHz Body (WCDMA 5; December 28. 2015).

Test Laboratory: IMST GmbH, DASY Yellow (II); File Name: 161215_y_1669_335.da4

DUT: Dipole 1900 MHz SN: 535; Type: D1900V2; Serial: D1900V2 - SN535
Program Name: System Performance Check at 1900 MHz

Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.55 mho/m; ε_r = 52.6; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6R - SN1669; ConvF(4.65, 4.65, 4.65); Calibrated: 2/19/2015
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn335; Calibrated: 2/19/2015
- Phantom: SAM 1340; Type: QD 000 P40 CB; Serial: TP-1340
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

d=10mm, Pin=250mW/Area Scan (8x10x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 10.1 mW/g
d=10mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 91.4 V/m; Power Drift = -0.015 dB
Peak SAR (extrapolated) = 15.8 W/kg
SAR(1 g) = 9.64 mW/g; SAR(10 g) = 5.16 mW/g
Maximum value of SAR (measured) = 11.0 mW/g

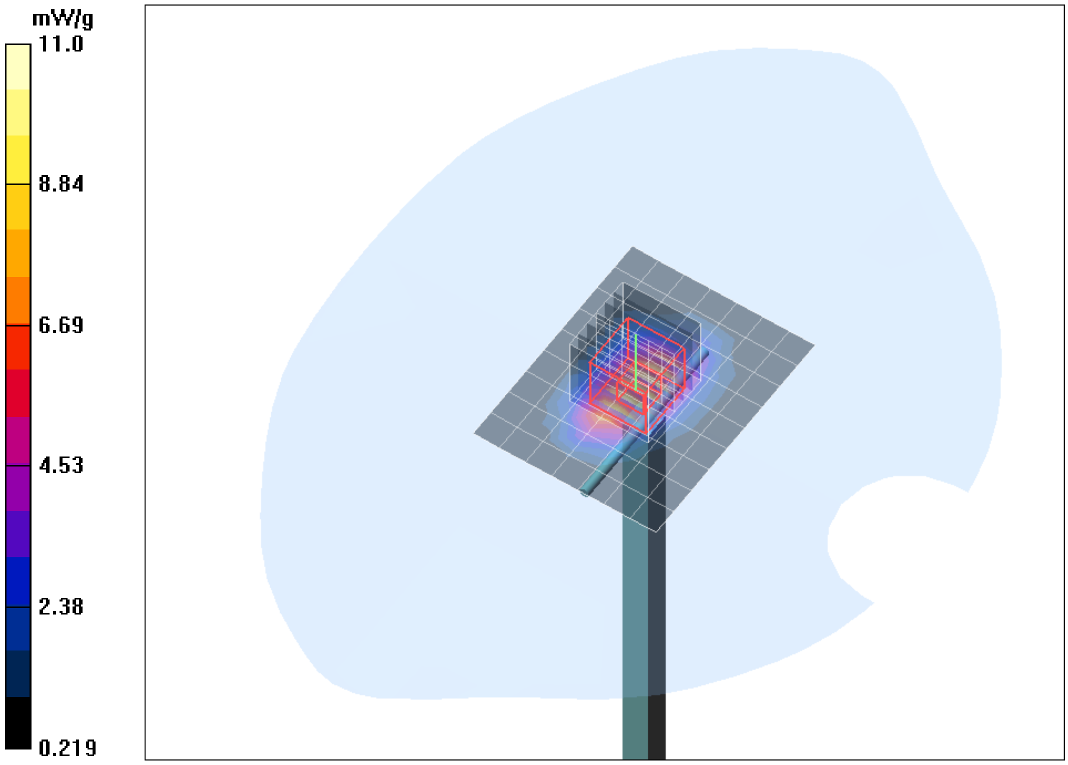


Fig. 6: Validation measurement 1900 MHz Body (GPRS 1900 and WCDMA 2; December 16. 2015), coarse grid.

Test Laboratory: IMST GmbH, DASY Yellow (II); File Name: 150116_y_3860_335.da4

DUT: Dipole 2450 MHz SN: 709; Type: D2450V2; Serial: D2450V2 - SN:709
Program Name: System Performance Check at 2450 MHz

Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 1.97 mho/m; ε_r = 52.2; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: EX3DV4 - SN3860; ConvF(7.52, 7.52, 7.52); Calibrated: 9/18/2015
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn335; Calibrated: 2/19/2015
- Phantom: SAM 1340; Type: QD 000 P40 CB; Serial: TP-1340
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

d=10mm, Pin=250mW/Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 15.0 mW/g
d=10mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 87.7 V/m; Power Drift = 0.114 dB
Peak SAR (extrapolated) = 27.8 W/kg
SAR(1 g) = 13.3 mW/g; SAR(10 g) = 6.07 mW/g
Maximum value of SAR (measured) = 15.2 mW/g

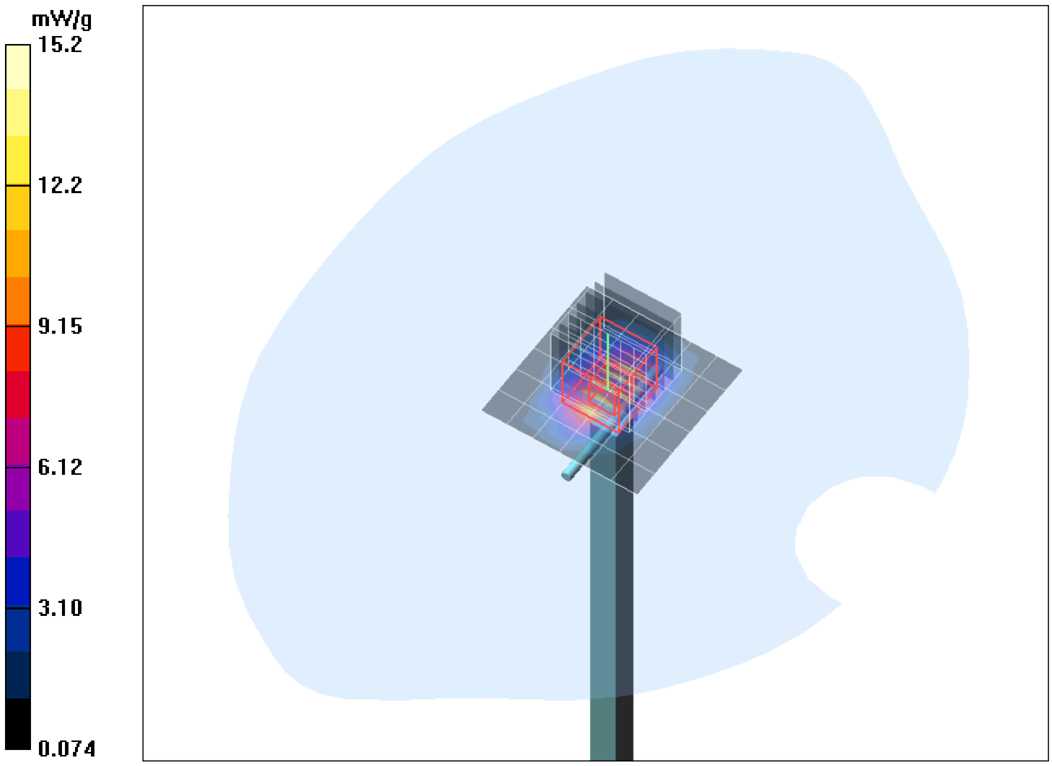


Fig. 7: Validation measurement 2450 MHz Body (BT and 2.4 GHz WLAN; January 15, 2016), coarse grid.

Test Laboratory: IMST GmbH, DASY Blue (I); File Name: 040116_b_3860_335_5250_tw.da4

DUT: Dipole 5GHz SN: 1028; Type: D5GHzV2; Serial: D5GHzV2 - SN:1028
Program Name: System Performance Check at 5250 MHz

Communication System: CW; Frequency: 5250 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5250 MHz; σ = 5.17 mho/m; ε_r = 49.4; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: EX3DV4 - SN3860; ConvF(4.28, 4.28, 4.28); Calibrated: 18.09.2015
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn335; Calibrated: 19.02.2015
- Phantom: SAM Glycol 1176; Type: Speag; Serial: 1176
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

d=10mm, Pin=250mW/Area Scan (11x11x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 39.8 mW/g
d=10mm, Pin=250mW/Zoom Scan (8x8x10)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 95.6 V/m; Power Drift = -0.010 dB
Peak SAR (extrapolated) = 70.2 W/kg
SAR(1 g) = 18.5 mW/g; SAR(10 g) = 5.17 mW/g
Maximum value of SAR (measured) = 35.6 mW/g

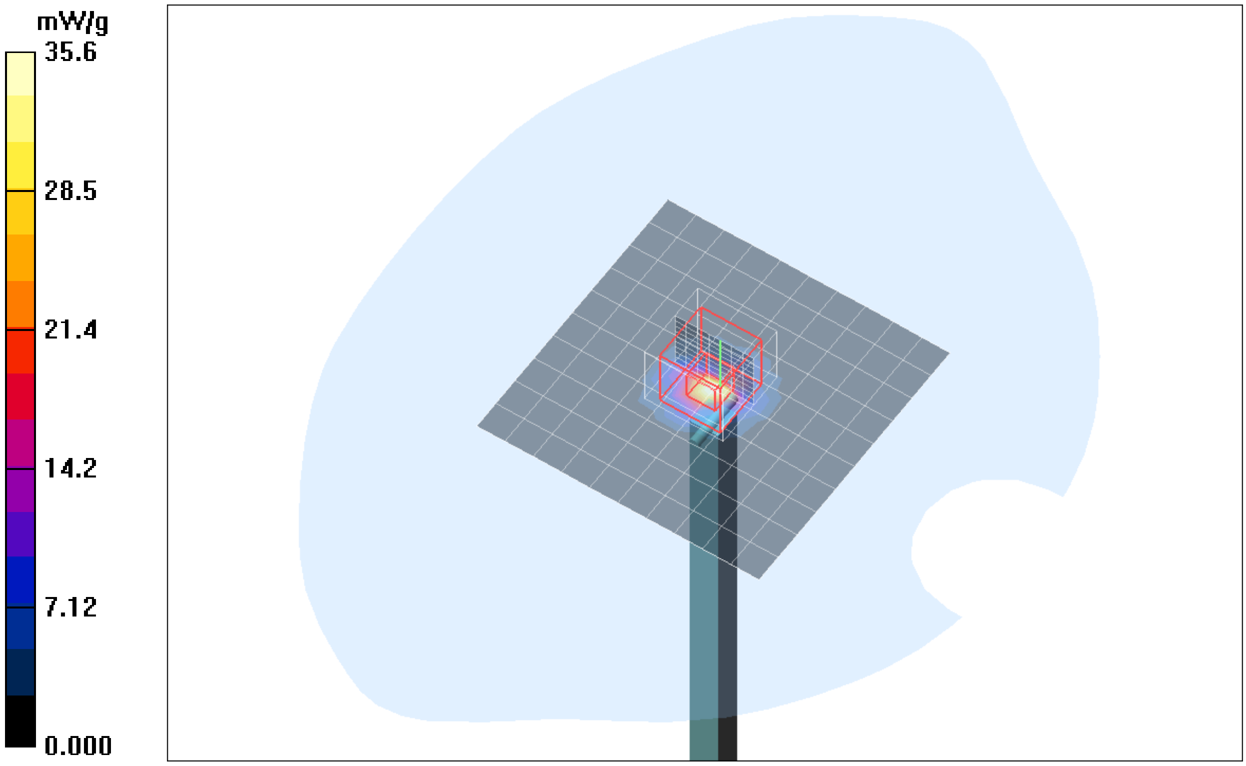


Fig. 8: Validation measurement 5250 MHz Body (January 04, 2016), coarse grid.

Test Laboratory: IMST GmbH, DASY Blue (I); File Name: 050116_b_3860_335_5600_tw.da4

DUT: Dipole 5GHz SN: 1028; Type: D5GHzV2; Serial: D5GHzV2 - SN:1028
Program Name: System Performance Check at 5600 MHz

Communication System: CW; Frequency: 5600 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5600 MHz; σ = 5.75 mho/m; ε_r = 48.5; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: EX3DV4 - SN3860; ConvF(3.64, 3.64, 3.64); Calibrated: 18.09.2015
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn335; Calibrated: 19.02.2015
- Phantom: SAM Glycol 1176; Type: Speag; Serial: 1176
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

d=10mm, Pin=250mW/Area Scan (11x11x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 44.0 mW/g
d=10mm, Pin=250mW/Zoom Scan (8x8x10)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 97.5 V/m; Power Drift = -0.005 dB
Peak SAR (extrapolated) = 85.0 W/kg
SAR(1 g) = 20.6 mW/g; SAR(10 g) = 5.72 mW/g
Maximum value of SAR (measured) = 40.8 mW/g

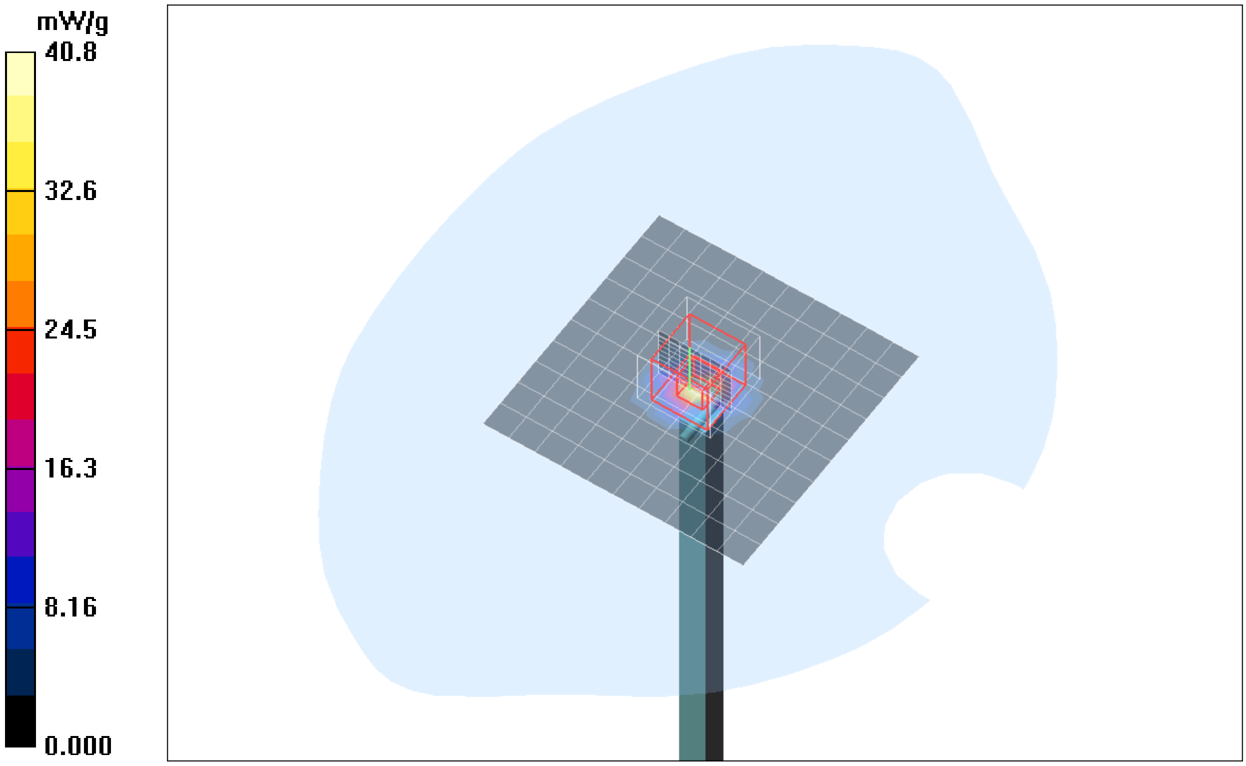


Fig. 9: Validation measurement 5600 MHz Body (January 04, 2016), coarse grid.

Test Laboratory: IMST GmbH, DASY Blue (I); File Name: 050116_b_3860_335_5750_tw.da4

DUT: Dipole 5GHz SN: 1028; Type: D5GHzV2; Serial: D5GHzV2 - SN:1028
Program Name: System Performance Check at 5750 MHz

Communication System: CW; Frequency: 5750 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5750 MHz; σ = 6 mho/m; ε_r = 48.2; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: EX3DV4 - SN3860; ConvF(3.9, 3.9, 3.9); Calibrated: 18.09.2015
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn335; Calibrated: 19.02.2015
- Phantom: SAM Glycol 1176; Type: Speag; Serial: 1176
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

d=10mm, Pin=250mW/Area Scan (11x11x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 40.7 mW/g
d=10mm, Pin=250mW/Zoom Scan (8x8x10)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 92.0 V/m; Power Drift = 0.050 dB
Peak SAR (extrapolated) = 78.0 W/kg
SAR(1 g) = 18.6 mW/g; SAR(10 g) = 5.16 mW/g
Maximum value of SAR (measured) = 37.2 mW/g

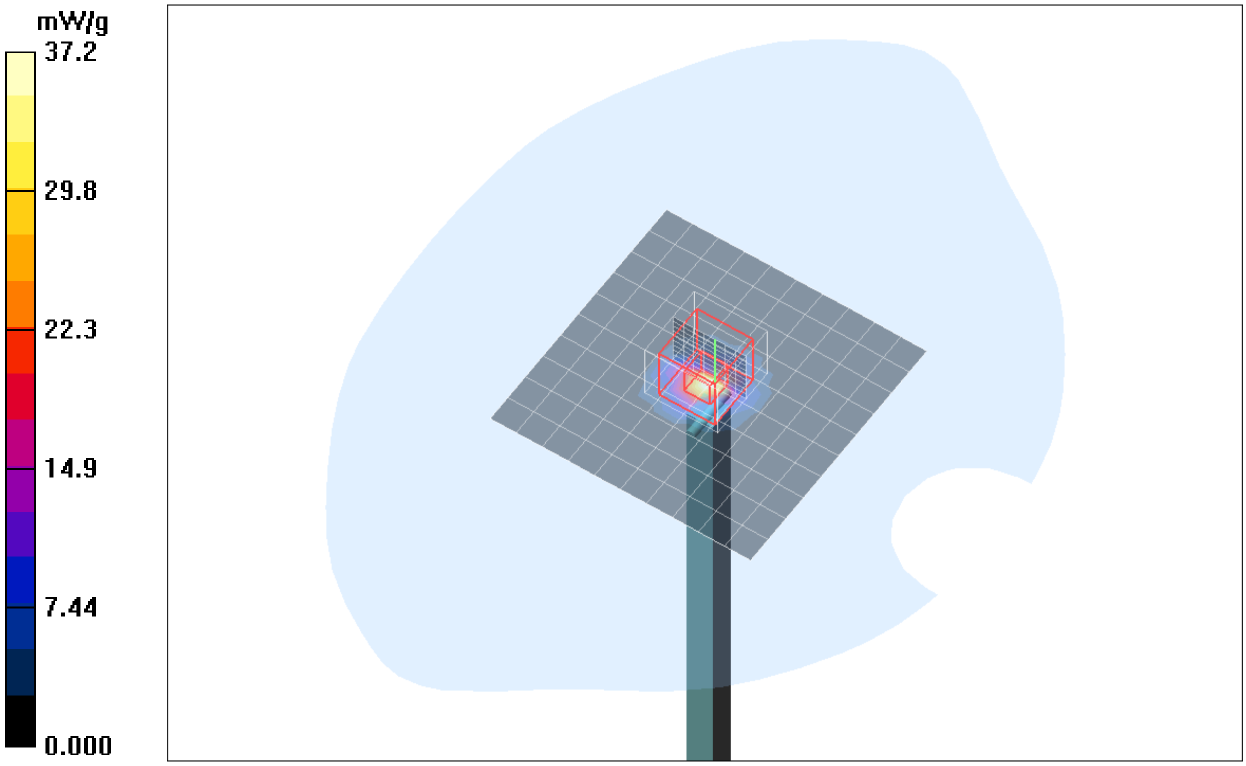


Fig. 10: Validation measurement 5750 MHz Body (January 05, 2016), coarse grid.

Uncertainty Budget up to 3 GHz						
Error Sources	**Uncertainty Value**	**Probability Distribution**	**Divisor**	**c_i**	**Standard Uncertainty**	**v_i^2 or v_{eff}**
Measurement System						
Probe calibration	± 5.9 %	Normal	1	1	± 5.9 %	∞
Axial isotropy	± 4.7 %	Rectangular	√3	1	± 2.7 %	∞
Hemispherical isotropy	± 0 %	Rectangular	√3	1	± 0 %	∞
Boundary effects	± 1.0 %	Rectangular	√3	1	± 0.6 %	∞
Linearity	± 4.7 %	Rectangular	√3	1	± 2.7 %	∞
System detection limit	± 1.0 %	Rectangular	√3	1	± 0.6 %	∞
Readout electronics	± 0.3 %	Normal	1	1	± 0.3 %	∞
Response time	± 0 %	Rectangular	√3	1	± 0 %	∞
Integration time	± 0%	Rectangular	√3	1	± 0 %	∞
RF ambient conditions	± 3.0 %	Rectangular	√3	1	± 1.7 %	∞
Probe positioner	± 0.4 %	Rectangular	√3	1	± 0.2 %	∞
Probe positioning	± 2.9 %	Rectangular	√3	1	± 1.7 %	∞
Algorithms for max SAR eval.	± 1.0 %	Rectangular	√3	1	± 0.6 %	∞
Dipole						
Dipole Axis to Liquid Distance	± 2.0 %	Rectangular	1	1	± 1.2 %	∞
Input power and SAR drift mea.	± 4.7 %	Rectangular	√3	1	± 2.7 %	∞
Phantom and Set-up						
Phantom uncertainty	± 4.0 %	Rectangular	√3	1	± 2.3 %	∞
Liquid conductivity (target)	± 5.0 %	Rectangular	√3	0.64	± 1.8 %	∞
Liquid conductivity (meas.)	± 2.5 %	Normal	1	0.64	± 1.6 %	∞
Liquid permittivity (target)	± 5.0 %	Rectangular	√3	0.6	± 1.7 %	∞
Liquid permittivity (meas.)	± 2.5 %	Normal	1	0.6	± 1.5 %	∞
Combined Uncertainty					± 9.2 %	

Table 24: Uncertainty budget for the system performance check up to 3 GHz.

Uncertainty Budget from 3 GHz to 6 GHz						
Error Sources	**Uncertainty Value**	**Probability Distribution**	**Divisor**	**c_i**	**Standard Uncertainty**	**v_i^2 or v_{eff}**
Measurement System						
Probe calibration	± 6.8 %	Normal	1	1	± 6.8 %	∞
Axial isotropy	± 4.7 %	Rectangular	√3	1	± 2.7 %	∞
Hemispherical isotropy	± 0 %	Rectangular	√3	1	± 0 %	∞
Boundary effects	± 1.0 %	Rectangular	√3	1	± 0.6 %	∞
Linearity	± 4.7 %	Rectangular	√3	1	± 2.7 %	∞
System detection limit	± 1.0 %	Rectangular	√3	1	± 0.6 %	∞
Readout electronics	± 0.3 %	Normal	1	1	± 0.3 %	∞
Response time	± 0 %	Rectangular	√3	1	± 0 %	∞
Integration time	± 0%	Rectangular	√3	1	± 0 %	∞
RF ambient conditions	± 3.0 %	Rectangular	√3	1	± 1.7 %	∞
RF ambient reflections	± 3.0 %	Rectangular	√3	1	± 1.7 %	∞
Probe positioner	± 0.4 %	Rectangular	√3	1	± 0.2 %	∞
Probe positioning	± 2.9 %	Rectangular	√3	1	± 1.7 %	∞
Algorithms for max SAR eval.	± 1.0 %	Rectangular	√3	1	± 0.6 %	∞
Dipole						
Dipole Axis to Liquid Distance	± 2.0 %	Rectangular	1	1	± 1.2 %	∞
Input power and SAR drift mea.	± 4.7 %	Rectangular	√3	1	± 2.7 %	∞
Phantom and Set-up						
Phantom uncertainty	± 4.0 %	Rectangular	√3	1	± 2.3 %	∞
Liquid conductivity (target)	± 5.0 %	Rectangular	√3	0.64	± 1.8 %	∞
Liquid conductivity (meas.)	± 2.5 %	Normal	1	0.64	± 1.6 %	∞
Liquid permittivity (target)	± 5.0 %	Rectangular	√3	0.6	± 1.7 %	∞
Liquid permittivity (meas.)	± 2.5 %	Normal	1	0.6	± 1.5 %	∞
Combined Uncertainty					± 9.8 %	

Table 25: Uncertainty budget for the system performance check from 3 GHz to 6 GHz.

7.6 Environment

To comply with the required noise level (less than 12 mW/kg) periodically measurements without a DUT were conducted.

Humidity: 40% ± 5 %

7.7 Test Equipment

SAR Equipment				
Test Equipment	**Model**	**Serial Number**	**Last Calibration**	**Next Calibration**
DASY4 Systems				
Software Versions DASY4	V4.7	N/A	N/A	N/A
Software Versions SEMCAD	V1.8	N/A	N/A	N/A
Dosimetric E-Field Probe	EX3DV4	3860	09/2015	09/2016
Dosimetric E-Field Probe	EX3DV4	1669	02/2015	02/2016
Data Acquisition Electronics	DAE 3	335	02/2015	02/2016
Data Acquisition Electronics	DAE 4	631	09/2015	09/2016
Phantom	SAM	1059	N/A	N/A
Phantom	SAM	1176	N/A	N/A
Phantom	SAM	1340	N/A	N/A
Phantom	SAM	1341	N/A	N/A
Dipoles				
Validation Dipole	D835V2	470	03/2015	03/2017
Validation Dipole	D1900V2	535	03/2015	03/2017
Validation Dipole	D2450V2	709	11/2015	11/2017
Validation Dipole	D5GHzV2	1028	06/2014	06/2016
Material Measurement				
Network Analyzer	E5071C	MY46103220	07/2015	07/2017
Dielectric Probe Kit	HP85070B	US33020263	N/A	N/A

Table 26: SAR equipment.

Test Equipment				
Test Equipment	**Model**	**Serial Number**	**Last Calibration**	**Next Calibration**
Power Meters				
Power Meter. Agilent	E4416A	GB41050414	02/2015	02/2017
Power Meter. Agilent	E4417A	GB41050441	02/2015	02/2017
Power Meter. Anritsu	ML2487A	6K00002319	02/2014	02/2016
Power Meter. Anritsu	ML2488A	6K00002078	02/2014	02/2016
Power Sensors				
Power Sensor. Agilent	E9301H	US40010212	03/2015	03/2017
Power Sensor. Agilent	E9301A	MY41495584	03/2015	03/2017
Power Sensor. Anritsu	MA2481B	031600	02/2014	02/2016
Power Sensor. Anritsu	MA2490A	031565	02/2014	02/2016
RF Sources				
Network Analyzer	E5071C	MY46103220	07/2015	07/2017
Rohde & Schwarz	SME300	100142	N/A	N/A
Amplifiers				
Mini Circuits	ZHL-42	D012296	N/A	N/A
Mini Circuits	ZHL-42	D031104#01	N/A	N/A
Mini Circuits	ZVE-8G	D031004	N/A	N/A
Radio Tester				
Rohde & Schwarz	CMU200	835305/050	N/A	N/A

Table 27: Test equipment.

7.8 Certificates of Conformity

Schmid & Partner Engineering AG **s p e a g**

Zeughausstrasse 43, 8004 Zurich, Switzerland
Phone +41 44 245 9700, Fax +41 44 245 9779
info@speag.com, http://www.speag.com

Certificate of conformity

Item	Dosimetric Assessment System DASY4
Type No	SD 000 401A, SD 000 402A
Software Version No	DASY 4.7
Manufacturer / Origin	Schmid & Partner Engineering AG Zeughausstrasse 43, CH-8004 Zürich, Switzerland

References

[1] IEEE 1528-2003, "Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques, December 2003

[2] EN 50361:2001, "Basic standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones (300 MHz – 3 GHz)", July 2001

[3] IEC 62209 – 1, "Specific Absorption Rate (SAR) in the frequency range of 300 MHz to 3 GHz – Measurement Procedure, Part 1: Hand-held mobile wireless communication devices", February 2005

[4] IEC 62209 – 2, Draft Version 0.9, "Evaluation of Human Exposure to Radio Frequency Fields from Handheld and Body-Mounted Wireless Communication Devices in the Frequency Range of 30 MHz to 6 GHz: Human models, Instrumentation and Procedures
Part 2: Procedure to determine the Specific Absorption Rate (SAR) for ... including accessories and multiple transmitters", December 2004

[5] OET Bulletin 65, Supplement C, "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields", Edition 01-01

[6] ANSI-C63.19-2006, "American National Standard for Methods of Measurement of Compatibility between Wireless Communication Devices and Hearing Aids", June 2006

[7] ANSI-C63.19-2007, "American National Standard for Methods of Measurement of Compatibility between Wireless Communication Devices and Hearing Aids", June 2007

Conformity
We certify that this **system is designed to be fully compliant** with the standards [1 – 7] for RF emission tests of wireless devices.

Uncertainty
The uncertainty of the measurements with this system was evaluated according to the above standards and is documented in the applicable chapters of the DASY4 system handbook.
The uncertainty values represent current state of methodology and are subject to changes. They are applicable to all laboratories using DASY4 provided the following requirements are met (responsibility of the system end user):

1) the system is used by an experienced engineer who follows the manual and the guidelines taught during the training provided by SPEAG,
2) the probe and validation dipoles have been calibrated for the relevant frequency bands and media within the requested period,
3) the DAE has been calibrated within the requested period,
4) the "minimum distance" between probe sensor and inner phantom shell and the radiation source is selected properly,
5) the system performance check has been successful,
6) the operational mode of the DUT is CW, CDMA, FDMA or TDMA (GSM, DCS, PCS, IS136, PDC) and the measurement/integration time per point is ≥ 500 ms,
7) if applicable, the probe modulation factor is evaluated and applied according to field level, modulation and frequency,
8) the dielectric parameters of the liquid are conformant with the standard requirement,
9) the DUT has been positioned as described in the manual.
10) the uncertainty values from the calibration certificates, and the laboratory and measurement equipment dependent uncertainties, are updated by end user accordingly.

Date 24.4.2008 **Signature / Stamp**

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Fig. 11: Certificate of conformity for the used DASY4 system

Schmid & Partner
Engineering AG

Zeughausstrasse 43, 8004 Zurich, Switzerland, Phone +41 1 245 97 00, Fax +41 1 245 97 79

Certificate of conformity / First Article Inspection

Item	SAM Twin Phantom V4.0
Type No	QD 000 P40 BA
Series No	TP-1002 and higher
Manufacturer / Origin	Untersee Composites Hauptstr. 69 CH-8559 Fruthwilen Switzerland

Tests

The series production process used allows the limitation to test of first articles.
Complete tests were made on the pre-series Type No. QD 000 P40 AA, Serial No. TP-1001 and on the series first article Type No. QD 000 P40 BA, Serial No. TP-1006. Certain parameters have been retested using further series units (called samples).

Test	Requirement	Details	Units tested
Shape	Compliance with the geometry according to the CAD model.	IT'IS CAD File (*)	First article, Samples
Material thickness	Compliant with the requirements according to the standards	2mm +/- 0.2mm in specific areas	First article, Samples
Material parameters	Dielectric parameters for required frequencies	200 MHz – 3 GHz Relative permittivity < 5 Loss tangent < 0.05.	Material sample TP 104-5
Material resistivity	The material has been tested to be compatible with the liquids defined in the standards	Liquid type HSL 1800 and others according to the standard.	Pre-series, First article

Standards

[1] CENELEC EN 50361
[2] IEEE P1528-200x draft 6.5
[3] IEC PT 62209 draft 0.9
(*) The IT'IS CAD file is derived from [2] and is also within the tolerance requirements of the shapes of [1] and [3].

Conformity

Based on the sample tests above, we certify that this item is in compliance with the uncertainty requirements of SAR measurements specified in standard [1] and draft standards [2] and [3].

Date 18.11.2001

Signature / Stamp Schmid & Partner Engineering AG
Zeughausstrasse 43, CH-8004 Zurich
Tel. +41 1 245 97 00, Fax +41 1 245 97 79

Doc No 881 – QD 000 P40 BA – B Page 1 (1)

Fig. 12: Certificate of conformity for the used SAM phantom.

7.9 Pictures of the Device under Test

Fig. 13 - 18 show the device under test, antenna locations and assigned sides for the purposes of testing.

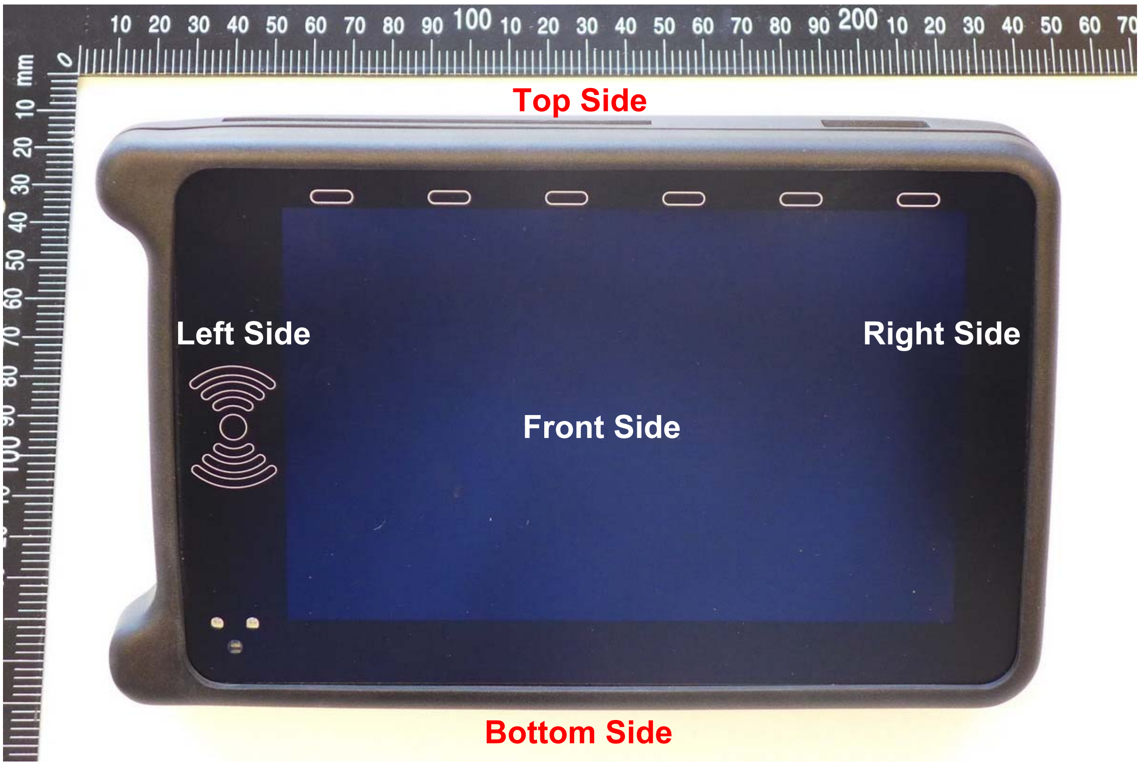

Fig. 13: Front view of the FareGo MT60 from Scheidt & Bachmann with attached rubber cover.

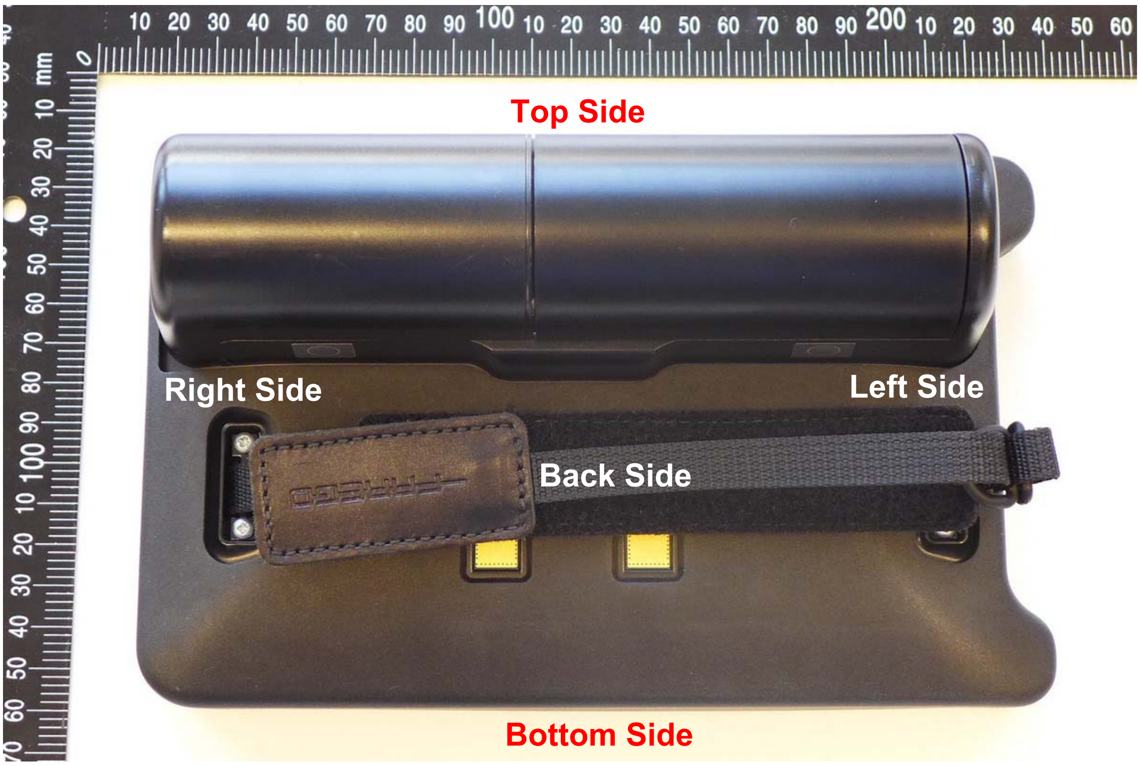

Fig. 14: Back view of the FareGo MT60 from Scheidt & Bachmann with attached rubber cover.

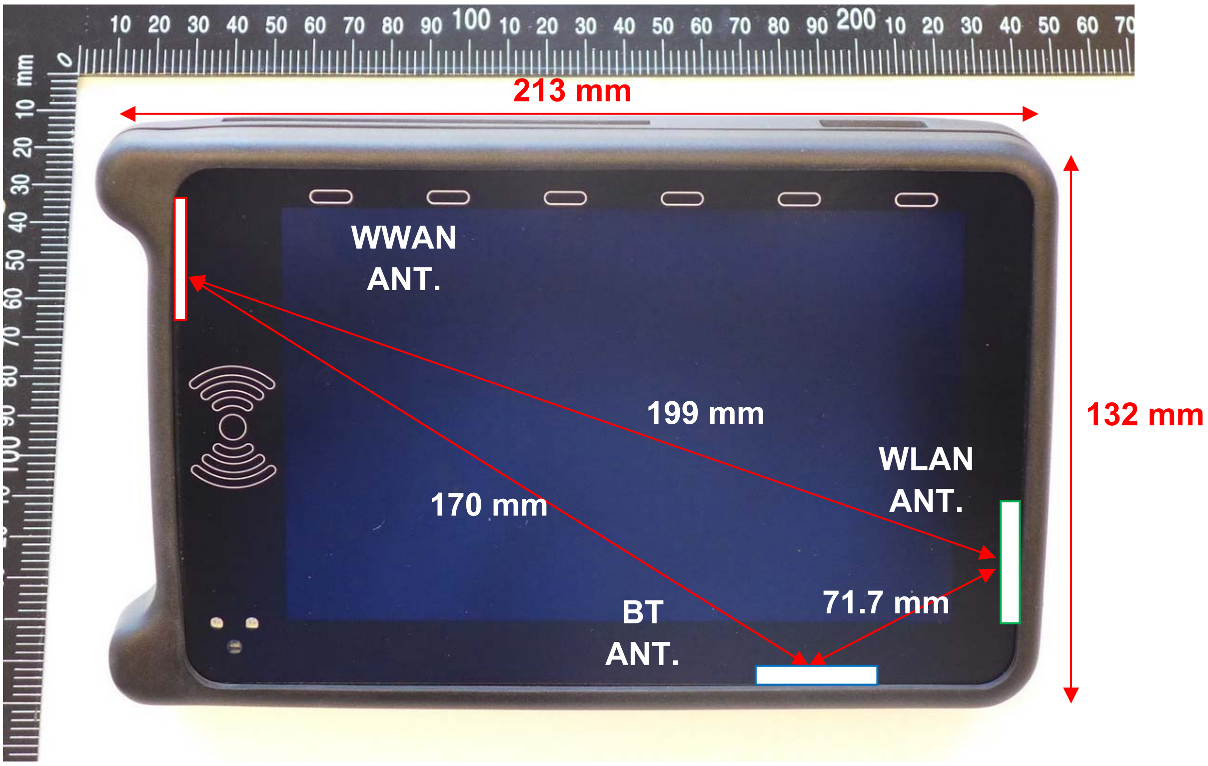

Fig. 15: Picture of the device under test with antenna location and separation distances.

Fig. 16: Picture of the right back side of the DUT.

Fig. 17: Picture of the left side of the DUT.

Fig. 18: Picture of the right side of the DUT.

7.10 Test Positions for the Device under Test

Figure 19 - 23 show the test positions for the SAR measurements for WWAN and BT antennas.

Fig. 19: Left side towards the phantom, 0 mm distance, WWAN antenna.

Fig. 20: Top side towards the phantom, 0 mm distance, WWAN antenna.

Fig. 21: Bottom side towards the phantom, 0 mm distance, WWAN antenna.

Fig. 22: Back side towards the phantom, 0 mm distance, WWAN antenna.

Fig. 23: Bottom side towards the phantom, 0 mm distance, BT antenna.

Figure 24 - 25 show the test positions for the SAR measurements for WLAN antenna.

Fig. 24: Right side towards the phantom, 0 mm distance, WLAN antenna.

Fig. 25: Back side towards the phantom, 0 mm distance, WLAN antenna.

7.11 Pictures to Demonstrate the Required Liquid Depth

Figure 26 - 29 show the liquid depth in the used SAM phantom.

Fig. 26: Liquid depth for GPRS 850 and WCDMA 5 body measurements.

Fig. 27: Liquid depth for GPRS 1900 and WCDMA2 body measurements.

Fig. 28: Liquid depth for 2.4 GHz WLAN and BT body measurements.

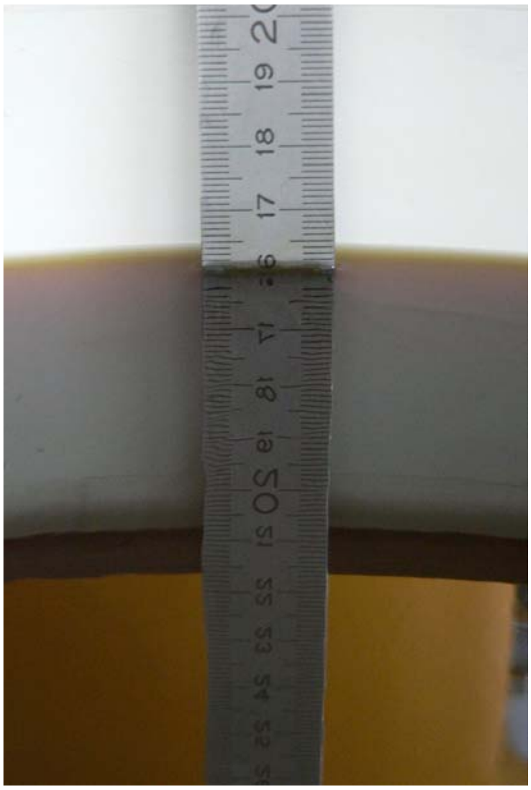

Fig. 29: Liquid depth for 5 GHz WLAN body measurements.

8 Revision History

Revision History of Test Report				
Revision	**Name of Test Report**	**Date**	**Revised Page**	**Comments**
Original	_6150420_FCC_IC_850_1900_FDD2_5_BT_802.11abgn_MT60	03/15/2016	-	-
v2	6150420_FCC_IC_850_1900_FDD2_5_BT_802.11abgn_MT60_v2	05/19/2016	27	Transmitter information added
V3	6150420_FCC_IC_850_1900_FDD2_5_BT_802.11abgn_MT60_v3	07/08/2016	27	FCC ID and IC updated

9 References

[OET 65] Federal Communications Commission: Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields. Supplement C (Edition 01-01) to OET Bulletin 65 (Edition 97-01). FCC. 2001.

[ICNIRP 1998] ICNIRP: Guidelines for Limiting Exposure to Time-varying Electric. Magnetic. and Electromagnetic Fields (up to 300 GHz). In: Health Physics. Vol. 74. No. 4. 494-522. 1998.

[IEEE C95.1-1999] IEEE Std C95.1-1999: 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.. 1999.

[IEEE C95.1-2005] IEEE Std C95.1-2005: 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.. 2005.

[IEEE 1528-2013] IEEE Std 1528-2013: IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques. 1528-2013, June 14, 2013, The Institute of Electrical and Electronics Engineers.

[DASY4] Schmid & Partner Engineering AG: DASY4 Manual. April 2008

[47 CFR] Code of Federal Regulations; Title 47. Telecommunications

[KDB 865664] 865664 D01 v01r04 SAR measurement 100 MHz to 6 GHz August 07, 2015

[KDB 447498] 447498 D01 v01r06 General RF Exposure Guidance v05, October 23, 2015

[KDB 941225] 941225 D01 3G SAR Procedures v03r01, Oct. 23, 2015

[KDB 616217] 616217 D04 SAR for laptop and tablets v01r02, Oct. 23, 2015

[KDB 248227] 248227 D01 802.11 Wi-Fi SAR v02r02, Oct. Oct. 23, 2015

10 Appendixes

Refer to separated files for the following appandixes:

- SAR Distribution Plots
  SAR_Report_60320_6150420_FCC_850_1900_FDD2_5_BT_WLAN_MT60_Plots
- Calibration Data
  SAR_Report_60320_6150420_FCC_850_1900_FDD2_5_BT_WLAN_MT60_CalData