KDB 865664 D01 SAR Measurement 100MHz to 6GHz
FCC 47 CFR part 2 (2.1093)

SAR EVALUATION REPORT

For

Electronic Monitoring Device with Cellular GSM/GPRS/EGPRS, WCDMA, IEEE 802.11b/g/n and ISM radios

Model: Smart Tag 4
FCC ID: ZDLST4
Contains FCC ID: ZDL3430005ST4

REPORT NUMBER UL-SAR-RP13150589-816A V6.0
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REVISION HISTORY

Version	Issue Date	Revisions	Revised By
1.0	06 April 2020	Initial Issue	--
2.0	07 April 2020	Updated in accordance with TCB feedback	Naseer Mirza
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4.0	11 June 2020	1. Duty Cycle evaluation added – Section 6.4 2. Duty Cycle correction applied – Section 10	Marc Montserrat
5.0	16 June 2020	UKAS accreditation schedule updated	Marc Montserrat
6.0	18 June 2020	Section 10.2 updated	Marc Montserrat

TABLE OF CONTENTS

1. Attestation of Test Results

Applicant Name	Buddi Limited					
Model	Smart Tag 4					
Test Device is	A representative test sample					
Device category	Portable					
Date Tested	11 March 2020 to 06 April 2020					
ICNIRP Guidelines Limits for SAR Exposure Characteristics	General Population/Localised SAR (Extremity) – 10g-SAR limit 4.0 W/kg					
The highest reported SAR values	RF Exposure Conditions		Equipment Class			
			Licensed	DTS	U-NII	DSS
	Standalone	Extremity	0.01 W/kg	N/A	N/A	N/A
	Simultaneous Transmission	Extremity	N/A	N/A	N/A	N/A
Applicable Standards	FCC 47 CFR part 2 (2.1093) IEEE Std 1528:2013 KDB publications					
Test Results	Pass					

UL Verification Services Ltd. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Verification Services Ltd. based on interpretations and/or observations of test results. Measurement Uncertainties are in accordance with the above standard and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample(s), under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Verification Services Ltd. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Ltd. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by UKAS. This report is written to support regulatory compliance of the applicable standards stated above.

Issued By:	Prepared By:
	
Naseer Mirza Lead Project Engineer UL	Masood Khan Test Engineer UL

2. Test Specification, Methods and Procedures

2.1. Test Specification

Reference:	KDB Publication Number: 865664 D01 SAR Measurement 100 MHz to 6 GHz
Title:	SAR Measurement Requirements for 100 MHz to 6 GHz
Introduction:	The SAR Measurement procedures for 100MHz to 6GHz are described in this document. Field probes, tissue dielectric properties, SAR scans, measurement accuracy and variability of the measured results are discussed. The field probe and SAR scan requirements are derived from criteria considered in standard IEEE 1528-2013. The wireless product and technology specific procedures in applicable KDB publications are required to be used unless further guidance has been approved by the FCC.
Purpose of Test:	To determine if the Equipment Under Test complies with the Specific Absorption Rate for general population/uncontrolled exposure limit of 1.6 W/kg as specified in FCC 47 CFR part 2 (2.1093).

2.2. Methods and Procedures Reference Documentation

The methods and procedures used were as detailed in:

IEEE 1528:2013

IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communication Devices: Measurement Techniques.

FCC KDB Publication:
KDB 447498 D01 General RF Exposure Guidance v06
KDB 447498 D03 Supplement C Cross-Reference v01
KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04
KDB 865664 D02 RF Exposure Reporting v01r02
KDB 941225 D01 3G SAR Procedures v03r01

2.3. Definition of Measurement Equipment

The measurement equipment used complied with the requirements of the standards referenced in the methods & procedures section above. Section 4.3 contains a list of the test equipment used.

3. Facilities and Accreditation

The test sites and measurement facilities used to collect data are located at

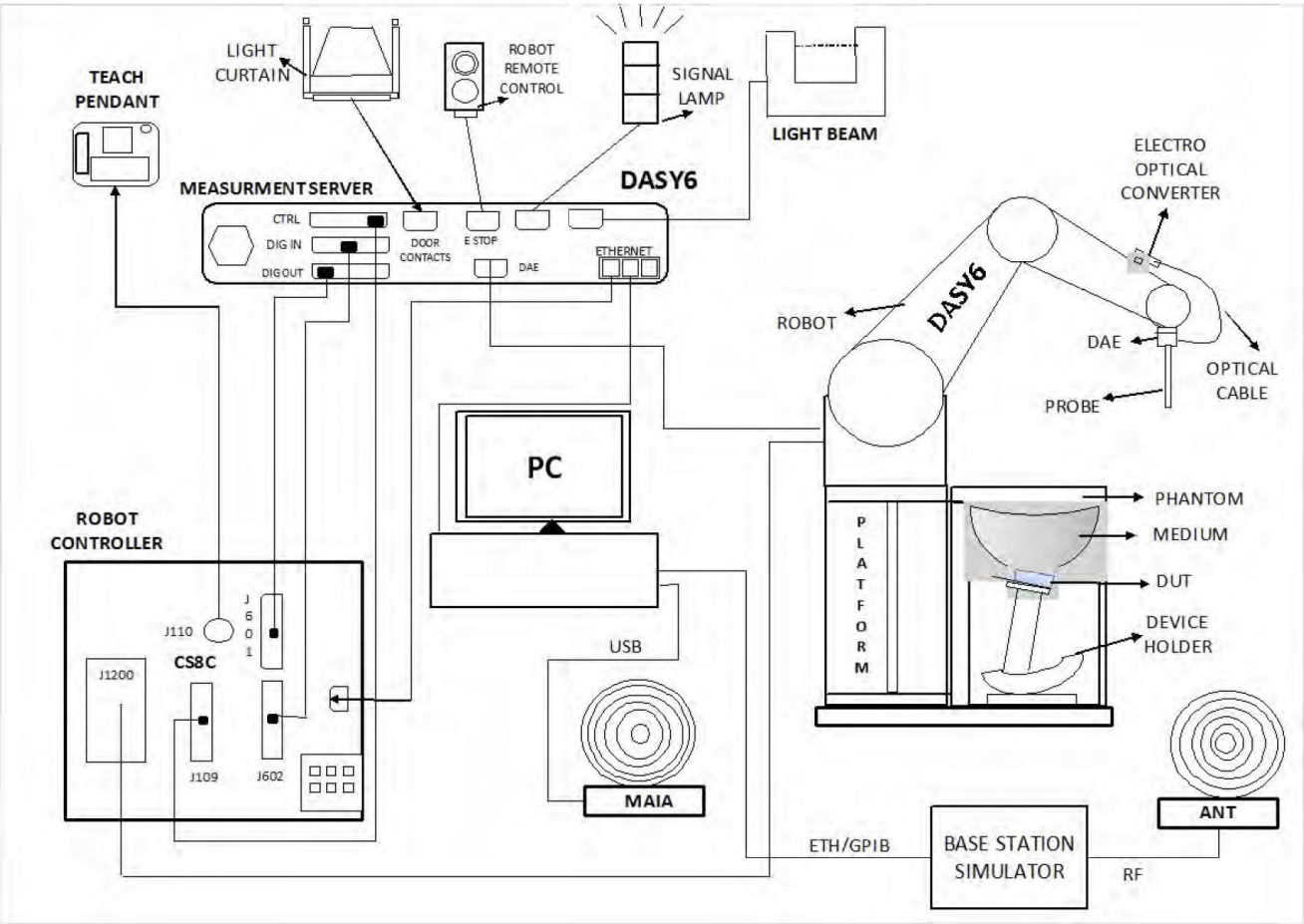
Unit 1-3 Horizon, Kingsland Business Park, Wade Road, Basingstoke, Hampshire, RG24 8AH UK	Facility Type
SAR Lab 62	Controlled Environment Chamber

UL International (UK) Ltd, is accredited by UKAS (United Kingdom Accreditation Service), Laboratory UKAS Code 5772.

4. SAR Measurement System & Test Equipment

4.1. SAR Measurement System

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



- A standard high precision 6-axis robot with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- An isotropic Field probe optimized and calibrated for the targeted measurement.
- A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- The Electro-optical converter (EOC) performs the conversion from optical to electrical signals for the digital communication to the DAE. To use optical surface detection, a special version of the EOC is required. The EOC signal is transmitted to the measurement server.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
- A computer running Win 8.1 or Win 10 and the DASY software.
- Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc.
- The phantom, the device holder and other accessories according to the targeted measurement.

4.2. SAR Measurement Procedure

4.2.1. Normal SAR Measurement Procedure

The following procedure shall be performed for each of the test conditions Measure the local SAR at a test point within 8 mm of the phantom inner surface that is closest to the DUT.

a) Measure the two-dimensional SAR distribution within the phantom (area scan procedure).
b) The boundary of the measurement area shall not be closer than 20 mm from the phantom side walls. The distance between the measurement points should enable the detection of the location of local maximum with an accuracy of better than half the linear dimension of the tissue cube after interpolation. A maximum grid spacing of 20 mm for frequencies below 3 GHz and (60/f [GHz]) mm for frequencies of 3 GHz and greater is recommended. The maximum distance between the geometrical centre of the probe detectors and the inner surface of the phantom shall be 5 mm for frequencies below 3 GHz and δ ln(2)/2 mm for frequencies of 3 GHz and greater, where δ is the plane wave skin depth and ln(x) is the natural logarithm. The maximum variation of the sensor-phantom surface distance shall be ± 1 mm for frequencies below 3 GHz and ± 0,5 mm for frequencies of 3 GHz and greater. At all measurement points the angle of the probe with respect to the line normal to the surface should be less than 5°. If this cannot be achieved for a measurement distance to the phantom inner surface shorter than the probe diameter, additional uncertainty evaluation is needed.
c) From the scanned SAR distribution, identify the position of the maximum SAR value, in addition identify the positions of any local maxima with SAR values within 2 dB of the maximum value that will not be within the zoom scan of other peaks; additional peaks shall be measured only when the primary peak is within 2 dB of the SAR compliance limit (e.g., 1 W/kg for 1,6 W /kg 1 g limit, or 1,26 W/kg for 2 W /kg, 10 g limit).
d) Measure the three-dimensional SAR distribution at the local maxima locations identified in step c) (zoom scan procedure). The horizontal grid step shall be (24 / f [GHz]) mm or less but not more than 8 mm. The minimum zoom scan size is 30 mm by 30 mm by 30 mm for frequencies below 3 GHz. For higher frequencies, the minimum zoom scan size can be reduced to 22 mm by 22 mm by 22 mm. The grid step in the vertical direction shall be (8-f [GHz]) mm or less but not more than 5 mm, if uniform spacing is used. If variable spacing is used in the vertical direction, the maximum spacing between the two closest measured points to the phantom shell shall be (12/f [GHz]) mm or less but not more than 4 mm, and the spacing between farther points shall increase by an incremental factor not exceeding 1,5. When variable spacing is used, extrapolation routines shall be tested with the same spacing as used in measurements. The maximum distance between the geometrical centre of the probe detectors and the inner surface of the phantom shall be 5 mm for frequencies below 3 GHz and δ ln(2)/2 mm for frequencies of 3 GHz and greater, where δ is the plane wave skin depth and ln(x) is the natural logarithm. Separate grids shall be centred on each of the local SAR maxima found in step c). Uncertainties due to field distortion between the media boundary and the dielectric enclosure of the probe should also be minimized, which is achieved if the distance between the phantom surface and physical tip of the probe is larger than probe tip diameter. Other methods may utilize correction procedures for these boundary effects that enable high precision measurements closer than half the probe diameter. For all measurement points, the angle of the probe with respect to the flat phantom surface shall be less than 5º.
e) Use post processing (e.g. interpolation and extrapolation) procedures to determine the local SAR values at the spatial resolution needed for mass averaging.
f) The local SAR should be measured at the same location as in Step a). SAR drift is assessed and reported in the uncertainty budget.
In the event that the evaluation of measurement drift exceeds the 5 % tolerance, it is required that SAR be reassessed following guidelines contained within this standard.
If the drift is larger than 5 %, then the measurement drift shall be considered a bias, not an uncertainty. A correction shall be applied to the measured SAR value. It is not necessary to record the drift in the uncertainty budget (i.e. ui = 0 %). The uncertainty budget reported in a measurement report should correspond to the highest SAR value reported (after correction, if applicable). Alternatively, the uncertainty budget reported should cover all measurements, i.e., it should report a conservative value.

Area Scan Parameters:

	≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface	5 mm ± 1 mm	½·δ·ln(2) mm ± 0.5 mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location	30° ± 1°	20° ± 1°
Maximum area scan spatial resolution: Δx_{Area}, Δy_{Area}	≤ 2 GHz: ≤ 15 mm 2 – 3 GHz: ≤ 12 mm	3 – 4 GHz: ≤ 12 mm 4 – 6 GHz: ≤ 10 mm
	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.	

Zoom Scan Parameters:

			≤ 3 GHz	> 3 GHz
Maximum zoom scan spatial resolution: Δx_{Zoom}, Δy_{Zoom}			≤ 2 GHz: ≤ 8 mm 2 – 3 GHz: ≤ 5 mm*	3 – 4 GHz: ≤ 5 mm* 4 – 6 GHz: ≤ 4 mm*
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$		≤ 5 mm	3 – 4 GHz: ≤ 4 mm 4 – 5 GHz: ≤ 3 mm 5 – 6 GHz: ≤ 2 mm
	graded grid	$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface	≤ 4 mm	3 – 4 GHz: ≤ 3 mm 4 – 5 GHz: ≤ 2.5 mm 5 – 6 GHz: ≤ 2 mm
		$\Delta z_{Zoom}(n>1)$: between subsequent points	≤ 1.5·$\Delta z_{Zoom}(n-1)$	
Minimum zoom scan volume	x, y, z		≥ 30 mm	3 – 4 GHz: ≥ 28 mm 4 – 5 GHz: ≥ 25 mm 5 – 6 GHz: ≥ 22 mm

4.3. Test Equipment

The measuring equipment used to perform the tests documented in this report has been calibrated in accordance with the manufacturers' recommendations, and is traceable to recognized national standards.

UL No.	Instrument	Manufacturer	Type No.	Serial No.	Date Last Calibrated	Cal. Interval (Months)
A2110	Data Acquisition Electronics	SPEAG	DAE4	431	23 May 2019	12
A2111	Data Acquisition Electronics	SPEAG	DAE4	432	08 Oct 2019	12
A2588	900 MHz Dipole Kit	SPEAG	D900V2	1d168	15 Oct 2019	12
A1237	1900 MHz Dipole Kit	SPEAG	D1900V2	540	14 Oct 2019	12
PRE0194808	Probe	SPEAG	EX3DV4	7549	05 Aug 2019	12
PRE0179707	Body Handset Positioner	SPEAG	MD4HACV5-HAC	None	Calibrated as part of system	-
M1755	DAK Fluid Probe	SPEAG	SM DAK 040 CA	1089	Calibrated before use	-
A2621	Digital Camera	Nikon	S3600	41010357	N/A	-
PRE0151154	Network Analyser	R&S	ZND	100151	30 Jan 2020	12
PRE0179684	Phantom	SPEAG	SAM Twin V8.0 Phantom	1946	Calibrated as part of system	-
PRE0141347	Phantom Support Structure	SPEAG	Phantom Table	-	Calibrated as part of system	-
PRE0159221	PowerSource1	SPEAG	SE UMS 160 AC	1026	04 Feb 2020	12
PRE0178115	Robot Arm	Staubli	TX60 L	F17/5ETWA1/A/01	Calibrated as part of system	-
PRE0178123	Robot Power Supply	SPEAG	CS8C	F17/5ETWA1/C/01	Calibrated as part of system	-

4.4. SAR System Specifications

Robot System	
Positioner:	Stäubli Unimation Corp. Robot Model: TX60L
Repeatability:	±0.030 mm
No. of Axis:	6
Serial Number(s):	F17/5ETWA1/C/01
Reach:	920 mm
Payload:	2.0 kg
Control Unit:	CS8C
Programming Language:	V+
Data Acquisition Electronic (DAE) System	
Serial Number:	DAE4 SN: 431, 432
PC Controller	
PC:	HP EliteDesk800
Operating System:	Windows 10
Data Card:	DASY Measurement Servers
Data Controller	
Features:	Signal Amplifier, multiplexer, A/D converted and control logic.
Software:	cDASY6 Software
Connecting Lines:	Optical downlink for data and status info. Optical uplink for commands and clock.
PC Interface Card	
Function:	24 bit (64 MHz) DSP for real time processing Link to DAE4 16 bit A/D converter for surface detection system serial link to robot direct emergency stop output for robot.
Phantom	
Phantom:	SAM Phantom
Shell Material:	Fibreglass
Thickness:	2.0 ±0.1 mm
E-Field Probe	
Model:	EX3DV4
Serial No:	7549
Construction:	Triangular core
Frequency:	10MHz to >6GHz
Linearity:	±0.2 dB (30 MHz to 6 GHz)
Probe Length (mm):	337
Probe Diameter (mm):	10
Tip Length (mm):	9
Tip Diameter (mm):	2.5
Sensor X Offset (mm):	1
Sensor Y Offset (mm):	1
Sensor Z Offset (mm):	1

5. Measurement Uncertainty

No measurement or test can ever be perfect and the imperfections give rise to error of measurement in the results. Consequently, the result of a measurement is only an approximation to the value of the measurand (the specific quantity subject to measurement) and is only complete when accompanied by a statement of the uncertainty of the approximation.

The expression of uncertainty of a measurement result allows realistic comparison of results with reference values and limits given in specifications and standards.

The uncertainty of the result may need to be taken into account when interpreting the measurement results.

The reported expanded uncertainties below are based on a standard uncertainty multiplied by an appropriate coverage factor, such that a confidence level of approximately 95% is maintained. For the purposes of this document “approximately” is interpreted as meaning “effectively” or “for most practical purposes”.

Test Name	Confidence Level	Calculated Uncertainty
Uncertainty- Freq. < 3 GHz Body Configuration 10g	95%	±25.37 %

The methods used to calculate the above uncertainties are in line with those recommended within the various measurement specifications. Where measurement specifications do not include guidelines for the evaluation of measurement uncertainty, the published guidance of the appropriate accreditation body is followed.

5.1. Uncertainty – Freq. < 3 GHz Body Configuration 10g

Type	Source of uncertainty	+ Value	- Value	Probability Distribution	Divisor	$c_{i\ (10g)}$	Standard Uncertainty		υ_i or υ_{eff}
							+ u (%)	- u (%)	
B	Probe calibration	10.100	10.100	normal (k=2)	2.0000	1.0000	5.050	5.050	∞
B	Axial Isotropy	0.500	0.500	Rectangular	1.7321	0.7071	0.204	0.204	∞
B	Hemispherical Isotropy	2.600	2.600	Rectangular	1.7321	0.7071	1.061	1.061	∞
B	Boundary Effect	1.000	1.000	Rectangular	1.7321	1.0000	0.577	0.577	∞
B	Linearity	0.600	0.600	normal (k=2)	2.0000	1.0000	0.300	0.300	∞
B	Detection Limits	0.250	0.250	Rectangular	1.7321	1.0000	0.144	0.144	∞
B	Readout Electronics	0.300	0.300	normal (k=1)	1.0000	1.0000	0.300	0.300	∞
B	Modulation Response Time	9.600	9.600	normal (k=2)	2.0000	1.0000	4.800	4.800	∞
B	Response Time	1.010	1.010	Rectangular	1.7321	1.0000	0.583	0.583	∞
B	Integration Time	4.320	4.320	Rectangular	1.7321	1.0000	2.494	2.494	∞
B	RF Ambient conditions	0.260	0.260	Rectangular	1.7321	1.0000	0.150	0.150	∞
B	Probe Positioner Mechanical Tolerance	0.020	0.020	Rectangular	1.7321	1.0000	0.012	0.012	∞
B	Probe Positioning with regard to Phantom Shell	0.400	0.400	Rectangular	1.7321	1.0000	0.231	0.231	∞
B	Extrapolation and integration/ Maximum SAR evaluation	2.000	2.000	Rectangular	1.7321	1.0000	1.155	1.155	∞
A	Test Sample Positioning	5.650	5.650	normal (k=1)	1.0000	1.0000	5.650	5.650	34.5
A	Device Holder uncertainty	6.090	6.090	normal (k=1)	1.0000	1.0000	6.090	6.090	5
B	Drift of output power	5.000	5.000	Rectangular	1.7321	1.0000	2.887	2.887	∞
B	Phantom Shell Uncertainty	5.700	5.700	Rectangular	1.7321	1.0000	3.291	3.291	∞
B	Uncertainty in SAR correction for deviations in permittivity and conductivity	1.900	1.900	Rectangular	1.7321	1.0000	1.097	1.097	∞
B	Liquid Conductivity (measured value)	10.580	10.580	normal (k=1)	1.0000	0.3291	3.482	3.482	∞
B	Liquid Permittivity (measured value)	5.000	5.000	normal (k=1)	1.0000	0.1461	0.730	0.730	∞
B	Liquid Conductivity (temperature uncertainty)	1.300	1.300	Rectangular	1.7321	1.0000	0.751	0.751	∞
B	Liquid Permittivity (temperature uncertainty)	0.320	0.320	Rectangular	1.7321	1.0000	0.185	0.185	∞
	Combined standard uncertainty			t-distribution			12.68	12.68	84
	Expanded uncertainty			k = 2			25.37	25.37	84

6. Device Under Test (DUT) Information

6.1. DUT Description

DUT Description:	The device under test (DUT) is Smart Tag 4, an Electronic Monitoring device which communicates to a server-based monitoring platform providing data such as: event time, GPS location, geo-fence data, position type, speed of motion, battery level, signal strength, strap on/off, alerts. The DUT supports cellular GPRS/EGPRS, WCDMA, IEEE 802.11b/g/n (on mode receive only) and ISM radios.		
Serial Number:	358887096803075	SAR Evaluation	
	358887096803000		
	358887097351975		
	338887096802960	Conducted Power Measurements	
	358887096803919		
Hardware Version Number:	V11.5		
Software Version Number:	Not Applicable		
Country of Manufacture:	UK		
Device dimension	Overall (Height x Width x Depth): 53.0 mm x 93.0 mm x 22.5 mm		
Date of Receipt:	06 March 2020		
Antenna Type:	Internal integral		
Antenna Length:	Unknown		
Number of Antenna Positions:	Antenna 1 – WWAN (GSM/WCDMA) / ISM – Transmit / Receive	1 fixed	
	Antenna 2 – WLAN – Receive Only	1 fixed	
Operating Configurations	Ankle-worn		
Back Cover	☒ Normal Battery Cover ☐ Normal Battery Cover with NFC ☐ Wireless Charger Battery Cover ☐ Wireless Charger Battery Cover with NFC		
Accessory	☐ Headset		
Battery Type	☒ Standard – Lithium-ion battery ☐ Extended (large capacity)		

6.2. Wireless Technologies

Wireless technologies	Frequency bands	Operating mode		Duty Cycle
GSM	850 1900	Voice (GMSK), GPRS (GMSK) EGPRS (8PSK)	GPRS Multi-Slot Class: ☐ Class 8 - 1 Up, 4 Down ☐ Class 10 - 2 Up, 4 Down ☒ Class 12 - 4 Up, 4 Down ☐ Class 33 - 4 Up, 5 Down ☐ DTM (Dual Transfer Mode)	GSM Voice: 12.5%; GPRS: 1 Slot: 12.5% 2 Slots: 25.0% 3 Slots: 37.5% 4 Slots: 50.0 %
W-CDMA ☒ (FDD) ☐ (TDD)	Band 2 Band 5	WCDMA Rel. 99 (Voice & Data)		100%
SRD (ISM)	915	GFSK		-

GSM			
Band	Description		
GSM850	Frequency Range: 824 - 849 MHz		
	Channel Number	Channel Description	Frequency (MHz)
	128	Low	824.2
	190	Middle	836.6
	251	High	848.8
PCS1900	Frequency Range: 1850 - 1910 MHz		
	Channel Number	Channel Description	Frequency (MHz)
	512	Low	1850.2
	661	Middle	1880.0
	810	High	1909.8

WCDMA			
Band	Description		
WCDMA FDD 2	Frequency Range: 1850 - 1910 MHz		
	Channel Number	Channel Description	Frequency (MHz)
	9262	Low	1852.4
	9400	Middle	1880.0
	9538	High	1907.6
WCDMA FDD 5	Frequency Range: 824 - 849 MHz		
	Channel Number	Channel Description	Frequency (MHz)
	4132	Low	826.4
	4183	Middle	836.6
	4233	High	846.6

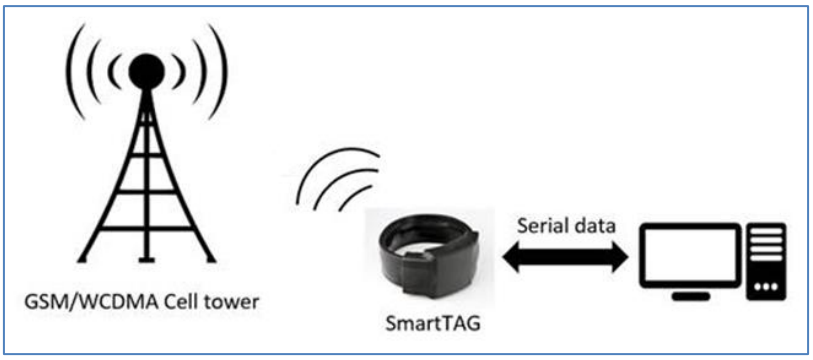
SRD			
Band	Description		
SRD 915	Frequency Range: 814.5 - 921 MHz		
	Channel Number	Channel Description	Frequency (MHz)
	0	Low	914.5
	6	Middle	917.5
	13	High	921.0

6.3. Nominal and Maximum Output power

RF Air interface	Mode	Target / Tolerances (dBm)	
		Target [dBm]	Tolerance - / + [dB]
GSM850	GMSK 1 slots	32.5	-1.0 / + 1.0
	GMSK 2 slots	32.5	-1.0 / + 1.0
	GMSK 3 slots	31.7	-1.0 / + 1.0
	GMSK 4 slots	30.0	-1.0 / + 1.0
	8PSK 1 slots	27.0	-1.0 / + 1.0
	8PSK 2 slots	27.0	-1.0 / + 1.0
	8PSK 3 slots	26.2	-1.0 / + 1.0
	8PSK 4 slots	25.0	-1.0 / + 1.0
PCS1900	GMSK 1 slots	30.5	-1.0 / + 1.0
	GMSK 2 slots	30.5	-1.0 / + 1.0
	GMSK 3 slots	29.7	-1.0 / + 1.0
	GMSK 4 slots	28.0	-1.0 / + 1.0
	8PSK 1 slots	26.0	-1.0 / + 1.0
	8PSK 2 slots	26.0	-1.0 / + 1.0
	8PSK 3 slots	25.2	-1.0 / + 1.0
	8PSK 4 slots	24.0	-1.0 / + 1.0
WCDMA FDD 2	RMC 12.2 kbps	23.0	-1.0 / + 1.0
WCDMA FDD 5	RMC 12.2 kbps	23.0	-1.0 / + 1.0
SRD 915	GFSK	-8.0	-1.0 / + 1.0

6.4. Duty Cycle Evaluation

In order to evaluate the duty cycle on normal operation, the device was configured by the customer with a serial output debug which reports data when a GSM/WCDMA transmission occurs. The device operates on normal mode and establishes a data connection with the cell tower as shown below.



The serial data reports when a GSM/WCDMA transmission occurs, as shown in the table below.

Start Time	Stop time	Report Type	Transmission Type	Transmission Time (sec)
09:51:06	09:51:08	GPS report	Uplink	2
10:06:14	10:06:16	GPS report	Uplink	2
10:21:22	10:21:24	GPS report	Uplink	2
10:36:30	10:36:33	GPS report	Uplink	3
10:51:38	10:51:41	GPS report	Uplink	3
11:06:46	11:06:49	GPS report	Uplink	3
11:20:50	11:21:04	AGPS download starting	Downlink	N/A
11:21:51	11:21:54	AGPS downloaded	Uplink	3
11:37:00	11:37:02	GPS report	Uplink	2
11:52:08	11:52:10	GPS report	Uplink	2
12:07:18	12:07:20	GPS report	Uplink	2
12:22:26	12:22:28	GPS report	Uplink	2
12:37:35	12:37:37	GPS report	Uplink	2
12:52:44	12:52:46	GPS report	Uplink	2
13:07:53	13:07:55	GPS report	Uplink	2
13:21:43	13:21:57	AGPS download starting	Downlink	N/A
13:22:57	13:22:59	AGPS downloaded	Uplink	2
				Total
				34
				Average (sec)
				2

Duty cycle evaluation:

- Period: 15 min = 900 sec
- Time active (averaged): 2 sec
- DC Factor: 2 sec / 900 sec = 0.0022
- DC (%): (12 sec / 900 sec) * 100 % = 0.22 %

The time stamped logfile used for the duty cycle evaluation is available upon request.

7. RF Exposure Conditions (Test Configurations)

7.1. Configuration Consideration

Technology Antenna	Configuration	Antenna-to-User Separation	Position	Antenna-to-Edge Separation (mm)	Evaluation Considered
Cellular Antenna (WWAN)	Extremity (Ankle-worn)	0mm	Front	< 25	Yes
			Back	< 25	Yes
			Edge 1 (Right)	< 25	Yes
			Edge 2 (Bottom)	< 25	Yes
			Edge 3 (Left)	< 25	Yes
			Edge 4 (Top)	> 25	No

Note:

1. The Antenna to edge separation distances are indicated in the 'Antenna Schematics' located in Section 12.1 of this report
2. Prior to the testing, FCC was contacted for test approach, modification of the DUT to configure the edges in close contact and agreed 0mm separation distance for extremity configuration.

7.2. SAR Test Exclusion Consideration

Frequency Band	Configuration
	Extremity
GSM850	No
PCS1900	No
WCDMA 2	No
WCDMA 5	No
SRD 915	Yes

Note:

1. As per KDB publication 447498 D01, the frequency bands with rated power including upper tolerance, which qualify for Standalone Test Exclusion, are as per the above table.
2. The details for the Maximum Rated Power and tolerance(s) can be found in section 6.

8. Conducted Output Power Measurements

8.1. RF Output Average Power Measurement: GSM

GPRS (GMSK) – Coding Scheme: CS1

Band	Channel	Frequency (MHz)	Avg Power (dBm)				Frame Power (dBm)			
			1 Uplink	2 Uplink	3 Uplink	4 Uplinks	1 Uplink	2 Uplink	3 Uplink	4 Uplinks
GSM 850	128	824.2	32.66	32.73	31.85	30.70	23.63	26.71	27.59	27.69
	190	836.6	32.61	32.50	31.80	30.67	23.58	26.48	27.54	27.66
	251	848.8	32.54	32.55	31.75	30.60	23.51	26.53	27.49	27.59
PCS 1900	512	1850.2	29.74	29.69	28.75	27.56	20.71	23.67	24.49	24.55
	661	1880.0	29.78	29.75	28.78	27.59	20.75	23.73	24.52	24.58
	810	1909.8	29.76	29.74	28.79	27.59	20.73	23.72	24.53	24.58

EDGE (GMSK) – Coding Scheme: MCS4

Band	Channel	Frequency (MHz)	Avg Power (dBm)				Frame Power (dBm)			
			1 Uplink	2 Uplink	3 Uplink	4 Uplinks	1 Uplink	2 Uplink	3 Uplink	4 Uplinks
GSM 850	128	824.2	32.66	32.73	31.85	30.70	23.63	26.71	27.59	27.69
	190	836.6	32.61	32.50	31.80	30.67	23.58	26.48	27.54	27.66
	251	848.8	32.54	32.55	31.75	30.60	23.51	26.53	27.49	27.59
PCS 1900	512	1850.2	29.74	29.69	28.75	27.56	20.71	23.67	24.49	24.55
	661	1880.0	29.78	29.75	28.78	27.59	20.75	23.73	24.52	24.58
	810	1909.8	29.76	29.74	28.79	27.59	20.73	23.72	24.53	24.58

EDGE (8PSK) – Coding Scheme: MCS9

Band	Channel	Frequency (MHz)	Avg Power (dBm)				Frame Power (dBm)			
			1 Uplink	2 Uplink	3 Uplink	4 Uplinks	1 Uplink	2 Uplink	3 Uplink	4 Uplinks
GSM 850	128	824.2	26.96	26.92	26.01	24.80	17.93	20.90	21.75	21.79
	190	836.6	26.91	26.85	26.05	24.81	17.88	20.83	21.79	21.80
	251	848.8	26.95	26.97	26.10	24.83	17.92	20.95	21.84	21.82
PCS 1900	512	1850.2	25.82	25.85	24.75	23.55	16.79	19.83	20.49	20.54
	661	1880.0	25.83	25.85	24.74	23.57	16.80	19.83	20.48	20.56
	810	1909.8	25.87	25.85	24.81	23.65	16.84	19.83	20.55	20.64

8.2. RF Output Average Power Measurement: WCDMA

8.2.1.RMC / HSDPA / HSUPA

Modes			HSDPA				HSUPA					DC-HSDPA (Cat 24)				WCDMA
Sets			1	2	3	4	1	2	3	4	5	1	2	3	4	Voice / RMC 12.2kbps
Band	Ch.	Freq (MHz)	Power [dBm]													
2	9262	1852.4	NOT SUPPORTED													22.81
	9400	1880.0														23.05
	9538	1907.6														22.80
5	4132	826.4														23.31
	4183	836.6														23.15
	4233	846.6														23.09
ßd			15	15	8	4	15	15	9	15	15	15	15	8	4	
ΔACK, ΔNACK, ΔCQI			8	8	8	8	8	8	8	8	8	8	8	8	8	
AGV			-	-	-	-	20	12	15	17	21	-	-	-	-	

9. Dielectric Property Measurements & System Check

9.1.Tissue Dielectric Parameters

The temperature of the tissue-equivalent medium used during measurement must also be within 18°C to 25°C and within ± 2°C of the temperature when the tissue parameters are characterized.
The dielectric parameters must be measured before the tissue-equivalent medium is used in a series of SAR measurements. The parameters should be re-measured after each 3 – 4 days of use; or earlier if the dielectric parameters can become out of tolerance; for example, when the parameters are marginal at the beginning of the measurement series.
Tissue dielectric parameters were measured at the low, middle and high frequency of each operating frequency range of the test device.

IEEE 1528:2013

Target Frequency (MHz)	Head		Body (FCC only)	
	ε_r	σ (S/m)	ε_r	σ (S/m)
150	52.30	0.76	61.90	0.80
300	45.30	0.87	58.20	0.92
450	43.50	0.87	56.70	0.94
750	41.90	0.89	-	-
835	41.50	0.90	55.20	0.97
900	41.50	0.97	55.00	1.05
915	41.50	0.98	55.00	1.06
1450	40.50	1.20	54.00	1.30
1500	40.40	1.23	-	-
1610	40.30	1.29	53.80	1.40
1640	40.20	1.31	-	-
1750	40.10	1.37	-	-
1800	40.00	1.40	53.30	1.52
1900	40.00	1.40	53.30	1.52
2000	40.00	1.40	53.30	1.52
2100	39.80	1.49	-	-
2300	39.50	1.67	-	-
2450	39.20	1.80	52.70	1.95
2600	39.00	1.96	-	-
3000	38.50	2.40	52.00	2.73
3500	37.90	2.91	-	-
4000	37.40	3.43	-	-
4500	36.80	3.94	-	-
5000	36.20	4.45	49.30	5.07
5100	36.10	4.55	49.10	5.18
5200	36.00	4.66	49.00	5.30
5250	35.90	4.71	48.90	5.36
5300	35.90	4.76	48.90	5.42
5400	35.80	4.86	48.70	5.53
5500	35.60	4.96	48.60	5.65
5600	35.50	5.07	48.50	5.77
5700	35.40	5.17	48.30	5.88
5750	35.40	5.22	48.30	5.94
5800	35.30	5.27	48.20	6.00
6000	35.10	5.48	-	-

NOTE: For convenience, permittivity and conductivity values at some frequencies that are not part of the original data from Drossos et al. [B60] or the extension to 5800 MHz are provided (i.e., the values shown in italics). These values were linearly interpolated between the values in this table that are immediately above and below these values, except the values at 6000 MHz that were linearly extrapolated from the values at 3000 MHz and 5800 MHz.

9.2. System Check

SAR system verification is required to confirm measurement accuracy, according to the tissue dielectric media, probe calibration points and other system operating parameters required for measuring the SAR of a test device. The system verification must be performed for each frequency band and within the valid range of each probe calibration point required for testing the device. The same SAR probe(s) and tissue-equivalent media combinations used with each specific SAR system for system verification must be used for device testing. When multiple probe calibration points are required to cover substantially large transmission bands, independent system verifications are required for each probe calibration point. A system verification must be performed before each series of SAR measurements using the same probe calibration point and tissue-equivalent medium. Additional system verification should be considered according to the conditions of the tissue-equivalent medium and measured tissue dielectric parameters, typically every three to four days when the liquid parameters are re-measured or sooner when marginal liquid parameters are used at the beginning of a series of measurements.

9.3. Numerical Target SAR Values

The numerical SAR target values are obtained from the reference standards. The measured values are normalised to 1 Watt.

System Dipole	Serial No.	Cal. Date	Freq. (MHz)	Numerical Target SAR Values (W/kg)	
				1g/10g	Head
D900V2	1d168	15 Oct 2019	900	1g	10.90
				10g	6.99
D1900V2	540	14 Oct 2019	1900	1g	39.70
				10g	20.50

9.4. Dielectric Property Measurements & System Check Results

The 1-g SAR and 10-g SAR measured with a reference dipole, using the required tissue-equivalent medium at the test frequency, must be within ±10% of the numerical SAR target. The internal limit is set to ±10%.

System check 900 Head

Date: 09/03/2020
Validation dipole and Serial Number: D900V2 / SN: 1d168

Simulant	Frequency (MHz)	Room Temp (℃)	Liquid Temp (℃)	Parameters	Target Value	Measured Value	Deviation (%)	Limit (%)
Head	900	19.6	20.4	**εr**	41.50	41.51	0.04	10.00
				Σ	0.97	0.97	0.47	10.00
				1g (W/kg)	10.90	10.73	-1.51	10.00
				10g (W/kg)	6.99	6.94	-0.66	10.00

Date: 13/03/2020
Validation dipole and Serial Number: D900V2 / SN: 1d168

Simulant	Frequency (MHz)	Room Temp (℃)	Liquid Temp (℃)	Parameters	Target Value	Measured Value	Deviation (%)	Limit (%)
Head	900	21.1	21.4	**εr**	41.50	40.86	-1.54	10.00
				Σ	0.97	0.98	1.24	10.00
				1g (W/kg)	10.90	10.67	-2.06	10.00
				10g (W/kg)	6.99	6.88	-1.52	10.00

Date: 17/03/2020
Validation dipole and Serial Number: D900V2 / SN: 1d168

Simulant	Frequency (MHz)	Room Temp (℃)	Liquid Temp (℃)	Parameters	Target Value	Measured Value	Deviation (%)	Limit (%)
Head	900	20.8	21.0	**εr**	41.50	41.11	-0.93	10.00
				Σ	0.97	0.98	0.92	10.00
				1g (W/kg)	10.90	10.63	-2.43	10.00
				10g (W/kg)	6.99	6.86	-1.80	10.00

Date: 23/03/2020
Validation dipole and Serial Number: D900V2 / SN: 1d168

Simulant	Frequency (MHz)	Room Temp (℃)	Liquid Temp (℃)	Parameters	Target Value	Measured Value	Deviation (%)	Limit (%)
Head	900	20.8	20.8	**εr**	41.50	41.71	0.50	10.00
				Σ	0.97	0.97	0.46	10.00
				1g (W/kg)	10.90	10.81	-0.78	10.00
				10g (W/kg)	6.99	6.94	-0.66	10.00

Date: 01/04/2020
Validation dipole and Serial Number: D900V2 / SN: 1d168

Simulant	Frequency (MHz)	Room Temp (℃)	Liquid Temp (℃)	Parameters	Target Value	Measured Value	Deviation (%)	Limit (%)
Head	900	21.9	21.0	**εr**	41.50	41.27	-0.56	10.00
				Σ	0.97	0.95	-1.84	10.00
				1g (W/kg)	10.90	10.61	-2.61	10.00
				10g (W/kg)	6.99	6.86	-1.80	10.00

Date: 03/04/2020
Validation dipole and Serial Number: D900V2 / SN: 1d168

Simulant	Frequency (MHz)	Room Temp (℃)	Liquid Temp (℃)	Parameters	Target Value	Measured Value	Deviation (%)	Limit (%)
Head	900	21.9	21.0	**εr**	41.50	41.27	-0.56	10.00
				Σ	0.97	0.95	-1.84	10.00
				1g (W/kg)	10.90	10.31	-5.36	10.00
				10g (W/kg)	6.99	6.64	-4.94	10.00

Date: 06/04/2020
Validation dipole and Serial Number: D900V2 / SN: 1d168

Simulant	Frequency (MHz)	Room Temp (℃)	Liquid Temp (℃)	Parameters	Target Value	Measured Value	Deviation (%)	Limit (%)
Head	900	21.4	21.4	**εr**	41.50	41.39	-0.27	10.00
				Σ	0.97	0.97	0.21	10.00
				1g (W/kg)	10.90	10.65	-2.25	10.00
				10g (W/kg)	6.99	6.84	-2.09	10.00

System check 1900 Head

Date: 09/03/2020
Validation dipole and Serial Number: D1900V2 / SN: 540

Simulant	Frequency (MHz)	Room Temp (℃)	Liquid Temp (℃)	Parameters	Target Value	Measured Value	Deviation (%)	Limit (%)
Head	1900	19.6	20.4	**εr**	40.00	39.55	-1.12	10.00
				Σ	1.40	1.48	6.05	10.00
				1g (W/kg)	39.70	41.50	4.53	10.00
				10g (W/kg)	20.50	21.54	5.11	10.00

Date: 13/03/2020
Validation dipole and Serial Number: D1900V2 / SN: 540

Simulant	Frequency (MHz)	Room Temp (℃)	Liquid Temp (℃)	Parameters	Target Value	Measured Value	Deviation (%)	Limit (%)
Head	1900	21.1	21.4	**εr**	40.00	38.83	-2.94	10.00
				Σ	1.40	1.49	6.76	10.00
				1g (W/kg)	39.70	41.90	5.54	10.00
				10g (W/kg)	20.50	21.74	6.08	10.00

Date: 17/03/2020
Validation dipole and Serial Number: D1900V2 / SN: 540

Simulant	Frequency (MHz)	Room Temp (℃)	Liquid Temp (℃)	Parameters	Target Value	Measured Value	Deviation (%)	Limit (%)
Head	1900	20.8	21.0	**εr**	40.00	38.90	-2.74	10.00
				Σ	1.40	1.50	7.05	10.00
				1g (W/kg)	39.70	42.10	6.04	10.00
				10g (W/kg)	20.50	21.74	6.08	10.00

Date: 23/03/2020
Validation dipole and Serial Number: D1900V2 / SN: 540

Simulant	Frequency (MHz)	Room Temp (℃)	Liquid Temp (℃)	Parameters	Target Value	Measured Value	Deviation (%)	Limit (%)
Head	1900	20.8	20.8	**εr**	40.00	39.63	-0.93	10.00
				Σ	1.40	1.48	5.56	10.00
				1g (W/kg)	39.70	41.70	5.04	10.00
				10g (W/kg)	20.50	21.54	5.11	10.00

Date: 01/04/2020
Validation dipole and Serial Number: D1900V2 / SN: 540

Simulant	Frequency (MHz)	Room Temp (℃)	Liquid Temp (℃)	Parameters	Target Value	Measured Value	Deviation (%)	Limit (%)
Head	1900	21.9	21.0	**εr**	40.00	39.48	-1.30	10.00
				Σ	1.40	1.44	2.65	10.00
				1g (W/kg)	39.70	41.30	4.03	10.00
				10g (W/kg)	20.50	21.34	4.14	10.00

Date: 03/04/2020
Validation dipole and Serial Number: D1900V2 / SN: 540

Simulant	Frequency (MHz)	Room Temp (℃)	Liquid Temp (℃)	Parameters	Target Value	Measured Value	Deviation (%)	Limit (%)
Head	1900	21.9	21.0	**εr**	40.00	39.48	-1.30	10.00
				Σ	1.40	1.44	2.65	10.00
				1g (W/kg)	39.70	40.10	1.01	10.00
				10g (W/kg)	20.50	20.75	1.22	10.00

Note: As per FCC RF Exposure procedures - April 2019 presentation - Tissue Simulating Liquids (TSL), page 19, effective February 19, 2019, FCC has permitted the use of the head-tissue simulating liquid specified in IEC 62209-1 for all SAR tests – head, body and extremity.

10. Measurements, Examinations and Derived Results

10.1. General Comments

A duty cycle correction has been applied to the SAR evaluation. In normal operation the device will transmit over the 2G/3G data network:

- 1 transmission a maximum of every 15 minutes (900 seconds)
- An average of 2 seconds connected to the network for each transmission

Transmission time (sec)	Duty Cycle period (sec)	Duty Cycle (%)
2	900	0.22

Note: A scaling factor of *"2 sec / 900 sec = 0.0022"* which has been used to scale the SAR measurements.

In order to determine the highest value of the peak spatial-average SAR, all required device positions, configurations and operating modes were tested per each frequency band. SAR measurement was performed on the highest output channel, and overall worst case configurations was tested on remaining channels,

In case the reported SAR levels were higher than half of the SAR limit, remaining channels on that particular test position were also evaluated.

Note: Refer to section 7 for the configuration considered for SAR test.

10.2. Specific Absorption Rate - Test Results – DUT

In agreement with FCC inquiry, conducted powers were compared on both modified (wings removed) and unmodified samples. No difference was observed and this data is available upon request from the FCC

SAR evaluation was done on the modified sample (wings removed) and the worst-case configuration from the modified sample was re-evaluated on the unmodified sample.

10.2.1. GSM850 Body 10g

Max Reported SAR = 0.01 (W/kg)

					Power (dBm)		10g: SAR Results (W/kg)					
Mode	Dist. (mm)	EUT Position	Channel Number	Freq (MHz)	Tune Up Limit	Meas.	Meas. SAR Level	Reported SAR Before Scaling	Scale Factor	Reported SAR	Notes	Plot No.
GPRS 4 TX	0	Front	128	824.2	31.00	30.70	2.73	2.93	0.0022	0.01	-	-
GPRS 4 TX	0	Front	190	836.6	31.00	30.67	3.08	3.32	0.0022	0.01	-	-
GPRS 4 TX	0	Front	251	848.8	31.00	30.60	3.23	3.54	0.0022	0.01	-	-
GPRS 4 TX	0	Back	128	824.2	31.00	30.70	0.44	0.47	0.0022	0.00	-	-
GPRS 4 TX	0	Edge 1	128	824.2	31.00	30.70	0.11	0.12	0.0022	0.00	-	-
GPRS 4 TX	0	Edge 2	128	824.2	31.00	30.70	0.58	0.62	0.0022	0.00	-	-
GPRS 4 TX	0	Edge 3	128	824.2	31.00	30.70	0.08	0.09	0.0022	0.00	-	-
GPRS 4 TX	0	Front (with Wings)	128	824.2	31.00	30.70	3.48	3.73	0.0022	0.01	1	001
GPRS 4 TX	0	Front (with Wings)	190	836.6	31.00	30.67	2.93	3.16	0.0022	0.01	1	-
GPRS 4 TX	0	Front (with Wings)	251	848.8	31.00	30.60	2.86	3.14	0.0022	0.01	1	-

Note(s):

1. Worst-case configuration re-evaluated on the modified sample

10.2.2. PCS1900 Body 10g
Max Reported SAR = 0.01 (W/kg)

					Power (dBm)		10g: SAR Results (W/kg)					
Mode	Dist. (mm)	EUT Position	Channel Number	Freq (MHz)	Tune Up Limit	Meas.	Meas. SAR Level	Reported SAR Before Scaling	Scale Factor	Reported SAR	Notes	Plot No.
GPRS 4 TX	0	Front	661	1880.0	29.00	27.59	2.120	2.93	0.0022	0.01	-	-
GPRS 4 TX	0	Front	512	1850.2	29.00	27.56	2.420	3.37	0.0022	0.01	-	-
GPRS 4 TX	0	Front	810	1909.8	29.00	27.59	2.000	2.77	0.0022	0.01	-	-
GPRS 4 TX	0	Back	661	1880.0	29.00	27.59	1.610	2.23	0.0022	0.00	-	-
GPRS 4 TX	0	Back	512	1850.2	29.00	27.56	1.490	2.08	0.0022	0.00	-	-
GPRS 4 TX	0	Back	810	1909.8	29.00	27.59	1.620	2.24	0.0022	0.00	-	-
GPRS 4 TX	0	Edge 1	661	1880.0	29.00	27.59	0.22	0.30	0.0022	0.00	-	-
GPRS 4 TX	0	Edge 2	661	1880.0	29.00	27.59	0.267	0.37	0.0022	0.00	-	-
GPRS 4 TX	0	Edge 3	661	1880.0	29.00	27.59	0.167	0.23	0.0022	0.00	-	-
GPRS 4 TX	0	Front (with Wings)	661	1880.0	29.00	27.59	2.17	3.00	0.0022	0.01	1	-
GPRS 4 TX	0	Front (with Wings)	512	1850.2	29.00	27.56	2.83	3.94	0.0022	0.01	1	002
GPRS 4 TX	0	Front (with Wings)	810	1909.8	29.00	27.59	2.00	2.77	0.0022	0.01	1	-

Note(s):

1. Worst-case configuration re-evaluated on the modified sample

10.2.3. WCDMA 2 Body 10g

Max Reported SAR = 0.01 (W/kg)

					Power (dBm)		10g: SAR Results (W/kg)					
Mode	Dist. (mm)	EUT Position	Channel Number	Freq (MHz)	Tune Up Limit	Meas.	Meas. SAR Level	Reported SAR Before Scaling	Scale Factor	Reported SAR	Notes	Plot No.
RMC	0	Front	9400	1880.0	24.00	23.05	1.75	2.18	0.0022	0.00	-	-
RMC	0	Back	9400	1880.0	24.00	23.05	1.28	1.59	0.0022	0.00	-	-
RMC	0	Edge 1	9400	1880.0	24.00	23.05	0.17	0.21	0.0022	0.00	-	-
RMC	0	Edge 2	9400	1880.0	24.00	23.05	0.27	0.33	0.0022	0.00	-	-
RMC	0	Edge 3	9400	1880.0	24.00	23.05	0.11	0.14	0.0022	0.00	-	-
RMC	0	Front (with Wings)	9400	1880.0	24.00	23.05	1.86	2.31	0.0022	0.01	1	-
RMC	0	Front (with Wings)	9262	1852.4	24.00	22.81	2.05	2.63	0.0022	0.01	1	003
RMC	0	Front (with Wings)	9538	1907.6	24.00	22.80	1.37	1.81	0.0022	0.00	1	-

Note(s):

1. Worst-case configuration re-evaluated on the modified sample

10.2.4. WCDMA 5 Body 10g
Max Reported SAR = 0.00 (W/kg)

					Power (dBm)		10g: SAR Results (W/kg)					
Mode	Dist. (mm)	EUT Position	Channel Number	Freq (MHz)	Tune Up Limit	Meas.	Meas. SAR Level	Reported SAR Before Scaling	Scale Factor	Reported SAR	Notes	Plot No.
RMC	0	Front	4132	826.4	24.00	23.31	1.48	1.73	0.0022	0.00	-	004
RMC	0	Front	4183	836.60	24.00	23.15	1.34	1.63	0.0022	0.00	-	-
RMC	0	Front	4233	846.60	24.00	23.09	1.38	1.70	0.0022	0.00	-	-
RMC	0	Back	4132	826.4	24.00	23.31	0.26	0.30	0.0022	0.00	-	-
RMC	0	Edge 1	4132	826.4	24.00	23.31	0.05	0.05	0.0022	0.00	-	-
RMC	0	Edge 2	4132	826.4	24.00	23.31	0.22	0.26	0.0022	0.00	-	-
RMC	0	Edge 3	4132	826.4	24.00	23.31	0.04	0.04	0.0022	0.00	-	-
RMC	0	Front (with Wings)	4132	826.4	24.00	23.31	1.45	1.70	0.0022	0.00	1	-

Note(s):

1. Worst-case configuration re-evaluated on the modified sample

10.3. Specific Absorption Rate - Test Results – DUT with OBC (On Body Charger)

10.3.1. PCS1900 Body 10g

Max Reported SAR = 0.00 (W/kg)

					Power (dBm)		10g: SAR Results (W/kg)					
Mode	Dist. (mm)	EUT Position	Channel Number	Freq (MHz)	Tune Up Limit	Meas.	Meas. SAR Level	Reported SAR Before Scaling	Scale Factor	Reported SAR	Notes	Plot No.
GPRS 4 TX	0	Front + OBC Attached	512	1850.2	N/A	N/A	1.08	1.50	0.0022	0.00	1	005
GPRS 4 TX	0	Front + OBC Attached	512	1850.2	N/A	N/A	0.50	0.70	0.0022	0.00	1	-

Note(s):

1. Overall worst case configuration and band from the 'DUT standalone' was SAR tested with the 'On Body Charger' attached on Front and Back.

10.4. SAR Measurement Variability

In accordance with published RF Exposure KDB procedure 865664 D01 SAR measurement 100 MHz to 6 GHz. These additional measurements are repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device should be returned to ambient conditions (normal room temperature) with the battery fully charged before it is re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.

10g-SAR (Extremity)

1) Repeated measurement is not required when the original highest measured SAR is < 2.0 W/Kg; steps 2) through 4) do not apply.
2) When the original highest measured 10g-SAR is ≥ 2.00 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 ≥ 3.625 W/kg (~ 10% from the 10g-SAR limit).
4) Perform a third repeated measurement only if the original, first or second repeated measurement is ≥ 3.75 W/Kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.

Exposure Configuration	Technology Band	Measured 10g -SAR (W/Kg)	Equipment Class	Ratio of Largest to Smallest SAR Measured
Ankle-worn (Separation Distance 0mm)	GSM850	3.48	PCE	1.03
		3.38		
	PCS1900	2.83		1.11
		2.55		
	WCDMA 2	2.05		1.03
		2.00		

10.5.Standalone SAR Test Exclusion Considerations

DUT uses an ISM band, with maximum rated power of -7.0 dBm.

The 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

- [(max. power of channel, including tune-up tolerance, mW) / (min. test separation distance, mm)]·[√f(GHz)] ≤ 3.0, for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where:
  - $f_{(GHz)}$ is the RF channel transmit frequency in GHz
  - Power and distance are rounded to the nearest mW and mm before calculation
  - The result is rounded to one decimal place for comparison

The test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.

Extremity Exposure Conditions

Max. tune-up tolerance limit		Min. test separation distance (mm)	Frequency (GHz)	Result
(dBm)	(mW)			
-7.0	0.2	5	0.921	0.038

Conclusion:

The computed value is <7.5; therefore, ISM band qualifies for Standalone SAR test exclusion.

Estimated SAR

When the standalone SAR test exclusion is applied to an antenna that transmits simultaneously with other antennas, the standalone SAR must be estimated according to following 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, and x = 18.75 for 10-g SAR.
- 0.4 W/kg for 1-g SAR and 1.0 W/kg for 10-g SAR, when the test separation distances is > 50 mm.

Estimated SAR Result for Extremity Exposure Conditions:

Test Configuration	Max. tune-up tolerance limit (mW)	Min. test separation distance (mm)	Frequency (GHz)	Estimated 10-g SAR (W/kg)
Front	0.2	5	0.921	0.002

11. Highest Standalone Transmission

11.1. Highest Standalone Reported SAR

Individual Transmitter Evaluation per Band:

Exposure Configuration	Technology Band	Reported 10g - SAR (W/Kg)	Highest Reported 10g - SAR (W/Kg)
Ankle-worn (Separation Distance 0mm)	GSM850	0.01	0.01
	PCS1900	0.01	
	WCDMA 2	0.01	
	WCDMA 5	0.00	
	SRD 915 (ISM)	0.00	

11.2. Simultaneous Transmission analysis

Simultaneous transmission SAR test analysis is determined for each operating configuration and exposure condition according to the *reported* standalone SAR of each applicable simultaneous transmitting antenna.

The worst case simultaneous transmission analysis is considered for the following cases:

Note: As none of transmitting antenna can simultaneously transmit, no simultaneous transmission analysis is required.