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

SAR EVALUATION REPORT

For

Emergency Locator Buddi Click System – Chip Communication Device with Cellular GSM/GPRS/EGPRS, WCDMA

Model: Clip 3G

Contains FCC ID: ZDL35300001CLIP

Report Number UL-SAR-RP12291733-116A V3.0
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REVISION HISTORY

Version	Issue Date	Revisions	Revised By
1.0	18 October 2018	Initial Issue	--
2.0	25 October 2018	The following amendments were made in the report: 1. FCC ID amended to include the second transmitting radio feature in Front Page 2. Typo corrected in table of contents 3. DUT information in section 6.1 updated with ISM information 4. SRD 868MHz removed from section 7.0 5. Test exclusion for SRD calculation added in section 7.0 6. Equipment class terminology in section 10.4 corrected 7. Equipment class terminology in section 11.1 corrected	Chanthu Thevarajah
3.0	09 November 2018	The following amendments were made in the report: 1. FCC ID updated on front page. 2. Note added in section6.1 3. Table updated in section 6.3 4. Table updated in section 7	Naseer Mirza

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1. Attestation of Test Results

Applicant Name	Buddi Limited					
Model	3G Clip					
Test Device is	A representative test sample					
Device category	Portable					
Date Tested	22 June 2018 to 04 October 2018					
ICNIRP Guidelines Limits for SAR Exposure Characteristics	General Population/Localised SAR (Head and trunk) – SAR limit 1.6 W/kg					
The highest reported SAR values	RF Exposure Conditions		Equipment Class			
			Licensed	DTS	U-NII	DSS
	Standalone	Lanyard	0.07 W/Kg	N/A	N/A	N/A
	Standalone	In Front of Mouth	1.42 W/Kg	N/A	N/A	N/A
	Simultaneous Transmission	Lanyard	N/A	N/A	N/A	N/A
	Simultaneous Transmission	In Front of Mouth	N/A	N/A	N/A	N/A
Applicable Standards	FCC 47 CFR part 2 (2.1093) KDB publication					
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:
	
Marc Montserrat Senior Engineer UL VS Ltd.	Chanthu Thevarajah Senior Engineer UL VS Ltd.

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 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

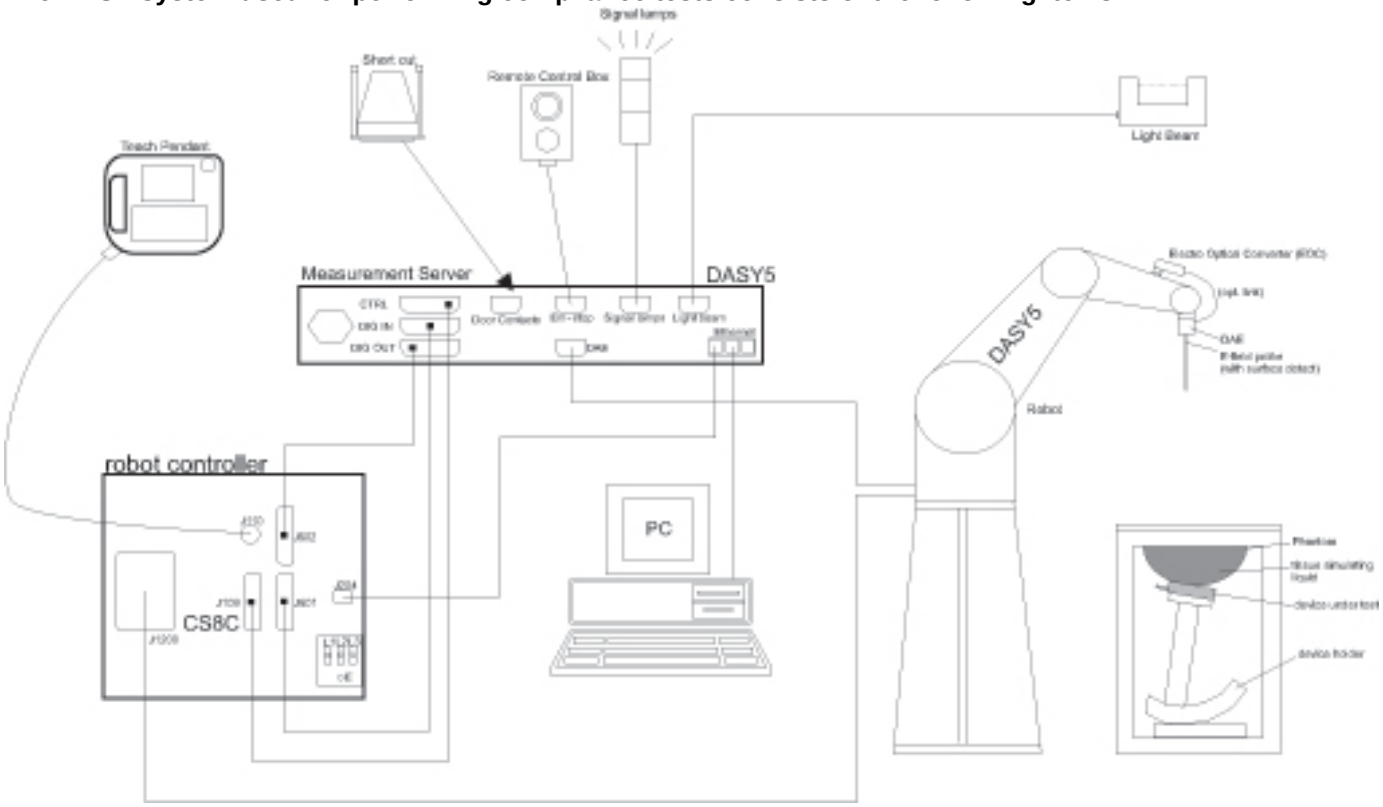
Unit 1 Horizon, Kingsland Business Park, Wade Road, Basingstoke, Hampshire, RG24 8AH UK	Facility Type
SAR Lab 60	Controlled Environment Chamber
SAR Lab 61	Controlled Environment Chamber

UL Verification Services Ltd, is accredited by UKAS (United Kingdom Accreditation Service), Laboratory UKAS Code 0644.

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 6 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)
A1234	Data Acquisition Electronics	SPEAG	DAE4	450	19 Sep 2017	12
A2110	Data Acquisition Electronics	SPEAG	DAE4	431	08 Jun 2018	12
A2546	Data Acquisition Electronics	SPEAG	DAE4	1435	06 Feb 2018	12
PRE0178324	900 MHz Dipole Kit	SPEAG	D900V2	1d199	07 Mar 2018	12
PRE0178326	1900 MHz Dipole Kit	SPEAG	D1900V2	5d227	07 Mar 2018	12
A2200	1900 MHz Dipole Kit	SPEAG	D1900V2	537	07 Feb 2018	12
PRE0178313	Probe	SPEAG	EX3DV4	7497	16 Mar 2018	12
A2545	Probe	SPEAG	EX3DV4	3995	24 Apr 2018	12
G0612	Robot Power Supply	SPEAG	DASY52	F14/5T5ZA1/C/01	Calibrated as part of system	-
G0611	Robot Power Supply	SPEAG	DASY52	F14/5UA6A1/C/01	Calibrated as part of system	
M1876	Robot Arm	Staubli	TX60 L	F14/5UA6A1/A/01	Calibrated as part of system	-
M1877	Robot Arm	Staubli	TX60 L	F14/5T5ZA1/A/01	Calibrated as part of system	
A2440	Body Handset Positioner	SPEAG	MD4HACV5	None	Calibrated before use	-
M1755	DAK Fluid Probe	SPEAG	SM DAK 040 CA	1089	Calibrated before use	-
PRE0151154	Network Analyser	R&S	ZND	100151	14 Dec 2017	12
A2621	Digital Camera	Nikon	S3600	41010357	N/A	-
A2552	Phantom	SPEAG	SAM Phantom	1836	Calibrated as part of system	-
A2510	Phantom	SPEAG	SAM Phantom	1817	Calibrated as part of system	-
A2124	Phantom	SPEAG	SAM Phantom	1818	Calibrated as part of system	
PRE0141350	Phantom Support Structure	SPEAG	DASY6 Phantom Table	-	Calibrated as part of system	-
PRE0141348	Phantom Support Structure	SPEAG	DASY6 Phantom Table	-	Calibrated as part of system	-
M1853	RS Hygrometer	RS Components	408-6109	D10Q69	11 Apr 2018	12
M1852	RS Hygrometer	RS Components	408-6109	D10Q52	11 Apr 2018	12
PRE0176848	RF Coax Cable	Huber+Suhner	Superflex 126	503319	Calibrated before use	-
PRE0141988	Directional Coupler	RF-Lambda	RFDC5M06G15	12042502539	Calibrated before use	-
A2689	Amplifier	Mini-Circuits	ZVE-8G	910401427	Calibrated before use	-
M1838	Signal Generator	R & S	SME06	1038.6002.06	22 Mar 2018	12
M1840	Dual Channel Power Meter	R & S	NRVD	844860/040	22 Mar 2018	12
M1044	Power Sensor	R & S	NRV-Z1	893350/0019	06 Nov 2017	12

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):	F14/5T5ZA1/C/01; F14/5UA6A1/C/01
Reach:	920 mm
Payload:	2.0 kg
Control Unit:	CS8C
Programming Language:	V+
Data Acquisition Electronic (DAE) System	
Serial Number:	DAE4 SN:450, 431, 1435
PC Controller	
PC:	HP EliteDesk800
Operating System:	Windows 10
Data Card:	DASY5 Measurement Servers
Data Converter	
Features:	Signal Amplifier, multiplexer, A/D converted and control logic.
Software:	DASY5 PRO 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:	7497, 3995
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 1g	95 %	±19.22 %
Uncertainty- Freq. < 3 GHz Head Configuration 1g	95%	±19.03 %

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 1g

Type	Source of uncertainty	+ Value	- Value	Probability Distribution	Divisor	$c_{i\ (1g)}$	Standard Uncertainty		υ_i or υ_{eff}
							+ u (%)	- u (%)	
B	Probe calibration	5.050	5.050	normal (k=1)	1.0000	1.0000	5.050	5.050	∞
B	Axial Isotropy	0.250	0.250	normal (k=1)	1.0000	1.0000	0.250	0.250	∞
B	Hemispherical Isotropy	1.300	1.300	normal (k=1)	1.0000	1.0000	1.300	1.300	∞
B	Spatial Resolution	0.500	0.500	Rectangular	1.7321	1.0000	0.289	0.289	∞
B	Boundary Effect	0.769	0.769	Rectangular	1.7321	1.0000	0.444	0.444	∞
B	Linearity	0.300	0.300	Rectangular	1.7321	1.0000	0.173	0.173	∞
B	Detection Limits	0.200	0.200	Rectangular	1.7321	1.0000	0.115	0.115	∞
B	Readout Electronics	0.160	0.160	normal (k=1)	1.0000	1.0000	0.160	0.160	∞
B	Response Time	0.000	0.000	Rectangular	1.7321	1.0000	0.000	0.000	∞
B	Integration Time	8.520	8.520	Rectangular	1.7321	1.0000	4.919	4.919	∞
B	RF Ambient conditions	3.000	3.000	Rectangular	1.7321	1.0000	1.732	1.732	∞
B	Probe Positioner Mechanical Restrictions	4.000	4.000	Rectangular	1.7321	1.0000	2.309	2.309	∞
B	Probe Positioning with regard to Phantom Shell	2.850	2.850	Rectangular	1.7321	1.0000	1.645	1.645	∞
B	Extrapolation and integration/ Maximum SAR evaluation	5.080	5.080	Rectangular	1.7321	1.0000	2.933	2.933	∞
A	Test Sample Positioning	0.147	0.147	normal (k=1)	1.0000	1.0000	0.147	0.147	10
A	Device Holder uncertainty	0.154	0.154	normal (k=1)	1.0000	1.0000	0.154	0.154	10
B	Phantom Uncertainty	4.000	4.000	Rectangular	1.7321	1.0000	2.309	2.309	∞
B	Drift of output power	5.000	5.000	Rectangular	1.7321	1.0000	2.887	2.887	∞
B	Liquid Conductivity (target value)	5.000	5.000	Rectangular	1.7321	0.6400	1.848	1.848	∞
A	Liquid Conductivity (measured value)	2.470	2.470	normal (k=1)	1.0000	0.6400	1.581	1.581	5
B	Liquid Permittivity (target value)	5.000	5.000	Rectangular	1.7321	0.6000	1.732	1.732	∞
A	Liquid Permittivity (measured value)	2.430	2.430	normal (k=1)	1.0000	0.6000	1.458	1.458	5
	Combined standard uncertainty			t-distribution			9.81	9.81	>500
	Expanded uncertainty			k = 1.96			19.22	19.22	>500

5.2. Uncertainty – Freq. < 3 GHz Head Configuration 1g

Type	Source of uncertainty	+ Value	- Value	Probability Distribution	Divisor	$c_{i\ (1g)}$	Standard Uncertainty		υ_i or υ_{eff}
							+ u (%)	- u (%)	
B	Probe calibration	5.050	5.050	normal (k=1)	1.0000	1.0000	5.050	5.050	∞
B	Axial Isotropy	0.250	0.250	normal (k=1)	1.0000	1.0000	0.250	0.250	∞
B	Hemispherical Isotropy	1.300	1.300	normal (k=1)	1.0000	1.0000	1.300	1.300	∞
B	Spatial Resolution	0.500	0.500	Rectangular	1.7321	1.0000	0.289	0.289	∞
B	Boundary Effect	0.769	0.769	Rectangular	1.7321	1.0000	0.444	0.444	∞
B	Linearity	0.300	0.300	Rectangular	1.7321	1.0000	0.173	0.173	∞
B	Detection Limits	0.200	0.200	Rectangular	1.7321	1.0000	0.115	0.115	∞
B	Readout Electronics	0.160	0.160	normal (k=1)	1.0000	1.0000	0.160	0.160	∞
B	Response Time	0.000	0.000	Rectangular	1.7321	1.0000	0.000	0.000	∞
B	Integration Time	8.520	8.520	Rectangular	1.7321	1.0000	4.919	4.919	∞
B	RF Ambient conditions	3.000	3.000	Rectangular	1.7321	1.0000	1.732	1.732	∞
B	Probe Positioner Mechanical Restrictions	4.000	4.000	Rectangular	1.7321	1.0000	2.309	2.309	∞
B	Probe Positioning with regard to Phantom Shell	2.850	2.850	Rectangular	1.7321	1.0000	1.645	1.645	∞
B	Extrapolation and integration/ Maximum SAR evaluation	5.080	5.080	Rectangular	1.7321	1.0000	2.933	2.933	∞
A	Test Sample Positioning	0.048	0.048	normal (k=1)	1.0000	1.0000	0.048	0.048	10
A	Device Holder uncertainty	0.154	0.154	normal (k=1)	1.0000	1.0000	0.154	0.154	10
B	Phantom Uncertainty	4.000	4.000	Rectangular	1.7321	1.0000	2.309	2.309	∞
B	Drift of output power	5.000	5.000	Rectangular	1.7321	1.0000	2.887	2.887	∞
B	Liquid Conductivity (target value)	5.000	5.000	Rectangular	1.7321	0.6400	1.848	1.848	∞
A	Liquid Conductivity (measured value)	2.340	2.340	normal (k=1)	1.0000	0.6400	1.498	1.498	5
B	Liquid Permittivity (target value)	5.000	5.000	Rectangular	1.7321	0.6000	1.732	1.732	∞
A	Liquid Permittivity (measured value)	1.150	1.150	normal (k=1)	1.0000	0.6000	0.690	0.690	5
	Combined standard uncertainty			t-distribution			9.71	9.71	>500
	Expanded uncertainty			k = 1.96			19.03	19.03	>500

6. Device Under Test (DUT) Information

6.1. DUT Description

DUT Description:	The Clip 3G is a portable hub to communicate alerts triggered by the wristband or raised directly by the clip itself; these alerts will be sent to the server. The clip will provide the wearer's location when an alert happens and can also be used to track the person should this be desired by the user; activity monitoring and fall detection are other optional features. In an emergency event the Clip could provide a two way voice call with the emergency centre. It supports GSM850, GPRS 850 (Class 10), PCS 1900, GPRS 1900 (Class 10), WCDMA FDD 2 and WCDMA FDD 5. DUT also support ISM 915MHz radio feature. Note: "The ISM 915MHz and the Cellular functionality of the CLIP do not work at the same time. Only the Cellular functionality is considered in this test report".		
Serial Number:	357520072395516	GSM 850 Body, WCDMA FDD 5 Body, WCDMA FDD 5 Head, WCDMA FDD 5 Head	SAR Evaluation
	357520072409556	GSM 850 Head, PCS 1900 Head, PCS 1900 Body, WCDMA FDD 2 Head / Body	SAR Evaluation
	357520072404946	PCS 1900 Head / Body	Conducted Power Measurements
	357520072408921	GSM 850 Head / Body WCDMA FDD 5/8 Head / Body	Conducted Power Measurements
Hardware Version Number:	V8.00		
Software Version Number:	V1.12.06		
Country of Manufacture:	UK		
Device dimension	Overall (Height x Width x Depth): 57.0 mm x 43.0 mm x 19.0 mm		
Date of Receipt:	26 May 2018		
Antenna Type:	Internal integral		
Antenna Length:	Unknown		
Number of Antenna Positions:	Antenna 1 – GPS/WIFI – Receive only		1 fixed
	Antenna 2 – GSM /ISM – Transmit		1 fixed
Battery Type(s):	Build-in Li-Ion		

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%
W-CDMA ☒ (FDD) ☐ (TDD)	Band 2 Band 5	WCDMA Rel. 99 (Voice & Data)		100%

GSM			
Band	Description		
GSM850	Frequency Range: 880 - 915 MHz		
	Channel Number	Channel Description	Frequency (MHz)
	128	Low	824.2
	190	Middle	836.6
	251	High	848.8
PCS1900	Frequency Range: 1710 - 1785 MHz		
	Channel Number	Channel Description	Frequency (MHz)
	512	Low	1850.2
	661	Middle	1880
	810	High	1909.8

WCDMA			
Band	Description		
WCDMA FDD 2	Frequency Range: 1922 - 1978 MHz		
	Channel Number	Channel Description	Frequency (MHz)
	9262	Low	1852.4
	9400	Middle	1880
	9538	High	1907.6
WCDMA FDD 5	Frequency Range: 826 - 847 MHz		
	Channel Number	Channel Description	Frequency (MHz)
	4132	Low	826.4
	4183	Middle	836.6
	4233	High	846.6

6.3. Nominal and Maximum Output power

RF Air interface	Mode	Target + Max. Tolerances (dBm)
GSM850	GMSK 1 slots	33.50
	GMSK 2 slots	33.50
	8PSK 1 slots	28.00
	8PSK 2 slots	28.00
PCS1900	GMSK 1 slots	29.00
	GMSK 2 slots	29.00
	8PSK 1 slots	27.50
	8PSK 2 slots	27.50
WCDMA FDD 2	RMC 12.2kbps	22.00
WCDMA FDD 5	RMC 12.2kbps	22.00

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	Lanyard Mode	0mm	Front	< 25	Yes
			Back	< 25	Yes
Cellular Antenna WWAN	In Front of Mouth	5mm (850 MHz) 7mm (1900 MHz)	Front	< 25	Yes
			Back	< 25	Yes

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 the 'test positions' and 'separation distances' were agreed with FCC via KDB inquiry. The separation distances are applicable for Front of Mouth configuration 5mm for GSM 850/WCDMA 5 and 7 mm for PCS1900/WCDMA 2.

7.2. SAR Test Exclusion Consideration

Frequency Band	Configuration(s)	
	Lanyard Mode	In Front of Mouth
GSM850	No	No
PCS1900	No	No
WCDMA 2	No	No
WCDMA 5	No	No

Note:

8. Conducted Output Power Measurements

8.1. RF Output Average Power Measurement: GSM

Band	Channel	Frequency (MHz)	Avg Power (dBm)	Frame Power (dBm)
GSM 850	128	824.2	32.60	23.57
	190	836.6	32.60	23.57
	251	848.8	32.70	23.67
PCS 1900	512	1850.2	28.55	19.52
	661	1880.0	28.55	19.52
	810	1909.8	28.60	19.57

8.1.1. Head (In Front of Mouth)

Voice Mode GSM (GMSK)

Band	Channel	Frequency (MHz)	Avg Power (dBm)	Frame Power (dBm)
GSM 850	128	824.2	32.60	23.57
	190	836.6	32.60	23.57
	251	848.8	32.70	23.67
PCS 1900	512	1850.2	28.55	19.52
	661	1880.0	28.55	19.52
	810	1909.8	28.60	19.57

8.1.2. Body (Lanyard)

GPRS (GMSK) – Coding Scheme: CS1

Band	Channel	Frequency (MHz)	Avg Power (dBm)		Frame Power (dBm)	
			1 Uplink	2 Uplinks	1 Uplink	2 Uplinks
GSM 850	128	824.2	32.60	32.60	23.57	26.58
	190	836.6	32.60	32.50	23.57	26.48
	251	848.8	32.70	32.50	23.67	26.48
PCS 1900	512	1850.2	28.55	28.55	19.52	22.53
	661	1880.0	28.55	28.60	19.52	22.58
	810	1909.8	28.60	28.60	19.57	22.58

EDGE (GMSK) – Coding Scheme: MCS4

Band	Channel	Frequency (MHz)	Avg Power (dBm)		Frame Power (dBm)	
			1 Uplink	2 Uplinks	1 Uplink	2 Uplinks
GSM 850	128	824.2	32.50	32.50	23.47	26.48
	190	836.6	32.60	32.50	23.57	26.48
	251	848.8	32.60	32.50	23.57	26.48
PCS 1900	512	1850.2	28.55	28.55	19.52	22.53
	661	1880.0	28.55	28.60	19.52	22.58
	810	1909.8	28.60	28.60	19.57	22.58

EDGE (8PSK) – Coding Scheme: MCS9

Band	Channel	Frequency (MHz)	Avg Power (dBm)		Frame Power (dBm)	
			1 Uplink	2 Uplinks	1 Uplink	2 Uplinks
GSM 850	128	824.2	27.00	27.10	17.97	21.08
	190	836.6	27.10	27.10	18.07	21.08
	251	848.8	27.10	27.10	18.07	21.08
PCS 1900	512	1850.2	26.00	26.20	16.97	20.18
	661	1880.0	26.00	26.20	16.97	20.18
	810	1909.8	26.00	26.20	16.97	20.18

8.2. RF Output Average Power Measurement: WCDMA

(In front of Mouth/Lanyard)

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													21.90
	9400	1880.0														21.85
	9538	1907.6														21.90
5	4132	826.4														21.75
	4183	836.6														21.70
	4233	846.6														21.60
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. Reference Target SAR Values

The reference SAR values are obtained from the calibration certificate of system validation dipoles. The measured values are normalised to 1 Watt.

System Dipole	Serial No.	Cal. Date	Freq. (MHz)	Target SAR Values (mW/g)		
				1g/10g	Head	Body
D900V2	1d199	07 Mar 2018	900	1g	10.70	10.90
				10g	6.87	7.12
D1900V2	5d227	07 Mar 2018	1900	1g	40.70	40.00
				10g	21.30	21.00
D1900V2	537	07 Feb 2018	1900	1g	40.20	41.00
				10g	21.10	21.50

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 manufacturer calibrated dipole SAR target. The internal limit is set to ±10%.

Site 60

System check 900 Head

Date: 03/10/2018
Validation dipole and Serial Number: D900V2 / SN: 1d199

Simulant	Frequency (MHz)	Room Temp (℃)	Liquid Temp (℃)	Parameters	Target Value	Measured Value	Deviation (%)	Limit (%)
Head	900.00	21.0	21.0	εr	41.50	41.34	-0.38	10.00
				Σ	0.97	0.95	-1.89	10.00
				1g (W/kg)	10.70	9.95	-6.94	10.00
				10g (W/kg)	6.87	6.40	-6.77	10.00

System check 1900 Head

Date: 02/10/2018
Validation dipole and Serial Number: D1900V2 / SN: 5d227

Simulant	Frequency (MHz)	Room Temp (℃)	Liquid Temp (℃)	Parameters	Target Value	Measured Value	Deviation (%)	Limit (%)
Head	1900.00	22.0	22.0	εr	40.00	39.50	-1.25	10.00
				Σ	1.40	1.44	3.06	10.00
				1g (W/kg)	40.70	38.90	-4.40	10.00
				10g (W/kg)	21.30	20.35	-4.45	10.00

Site 61

System check 900 Body

Date: 21/06/2018
Validation dipole and Serial Number: D900V2 / SN: 1d199

Simulant	Frequency (MHz)	Room Temp (℃)	Liquid Temp (℃)	Parameters	Target Value	Measured Value	Deviation (%)	Limit (%)
Body	900.00	21.9	21.9	εr	55.00	54.65	-0.64	10.00
				Σ	1.05	1.01	-4.13	10.00
				1g (W/kg)	10.90	10.86	-0.29	10.00
				10g (W/kg)	7.12	7.16	0.64	10.00

Date: 25/06/2018
Validation dipole and Serial Number: D900V2 / SN: 1d199

Simulant	Frequency (MHz)	Room Temp (℃)	Liquid Temp (℃)	Parameters	Target Value	Measured Value	Deviation (%)	Limit (%)
Body	900.00	23.1	22.3	εr	55.00	54.61	-0.70	10.00
				Σ	1.05	1.04	-1.08	10.00
				1g (W/kg)	10.90	11.30	3.72	10.00
				10g (W/kg)	7.12	7.44	4.55	10.00

Date: 25/07/2018
Validation dipole and Serial Number: D900V2 / SN: 1d199

Simulant	Frequency (MHz)	Room Temp (℃)	Liquid Temp (℃)	Parameters	Target Value	Measured Value	Deviation (%)	Limit (%)
Body	900.00	21.0	22.0	εr	55.00	53.14	-3.38	10.00
				Σ	1.05	1.04	-0.71	10.00
				1g (W/kg)	10.90	10.47	-3.89	10.00
				10g (W/kg)	7.12	6.86	-3.59	10.00

Date: 03/10/2018
Validation dipole and Serial Number: D900V2 / SN: 1d199

Simulant	Frequency (MHz)	Room Temp (℃)	Liquid Temp (℃)	Parameters	Target Value	Measured Value	Deviation (%)	Limit (%)
Body	900.00	21.0	21.0	**εr**	55.00	53.45	-2.82	10.00
				Σ	1.05	1.01	-3.42	10.00
				1g (W/kg)	10.90	10.73	-1.51	10.00
				10g (W/kg)	7.12	6.92	-2.75	10.00

System check 900 Head

Date: 25/07/2018
Validation dipole and Serial Number: D900V2 / SN: 1d199

Simulant	Frequency (MHz)	Room Temp (℃)	Liquid Temp (℃)	Parameters	Target Value	Measured Value	Deviation (%)	Limit (%)
Head	900.00	22.3	22.0	**εr**	41.50	43.05	3.75	10.00
				Σ	0.97	0.99	1.63	10.00
				1g (W/kg)	10.70	11.42	6.78	10.00
				10g (W/kg)	6.87	7.40	7.78	10.00

System check 1900 Body

Date: 25/07/2018
Validation dipole and Serial Number: D1900V2 / SN: 5d227

Simulant	Frequency (MHz)	Room Temp (℃)	Liquid Temp (℃)	Parameters	Target Value	Measured Value	Deviation (%)	Limit (%)
Body	1900.00	22.1	22.4	**εr**	53.30	51.63	-3.12	10.00
				Σ	1.52	1.60	5.33	10.00
				1g (W/kg)	40.00	40.50	1.25	10.00
				10g (W/kg)	21.00	21.14	0.71	10.00

Date: 02/10/2018
Validation dipole and Serial Number: D1900V2 / SN: 5d227

Simulant	Frequency (MHz)	Room Temp (℃)	Liquid Temp (℃)	Parameters	Target Value	Measured Value	Deviation (%)	Limit (%)
Body	1900.00	21.0	21.0	**εr**	53.30	51.82	-2.78	10.00
				Σ	1.52	1.58	3.82	10.00
				1g (W/kg)	40.00	41.80	4.50	10.00
				10g (W/kg)	21.00	21.45	2.18	10.00

System check 1900 Head

Date: 25/07/2018
Validation dipole and Serial Number: D1900V2 / SN: 537

Simulant	Frequency (MHz)	Room Temp (℃)	Liquid Temp (℃)	Parameters	Target Value	Measured Value	Deviation (%)	Limit (%)
Head	1900.00	22.9	21.6	**εr**	40.00	38.93	-2.68	10.00
				Σ	1.40	1.44	3.03	10.00
				1g (W/kg)	40.20	42.49	5.71	10.00
				10g (W/kg)	21.10	21.74	3.07	10.00

10. Measurements, Examinations and Derived Results

10.1. General Comments

A duty cycle correction has been applied to the SAR value following a KDB inquiry. 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 12 seconds connected to the network for each transmission

Transmission time (sec)	Duty Cycle period (sec)	Duty Cycle (%)
12	900	1.33

- A scaling factor of 0.013 (12/900) which has been used to scale the SAR value

10.2. Specific Absorption Rate - Test Results – Lanyard Mode

10.2.1. GSM850 Body 1g – Lanyard mode

Max Reported SAR = 0.02 (W/kg)

					Power (dBm)		1g: SAR Results (W/kg)				
Mode	Dist. (mm)	EUT Position	Channel Number	Freq (MHz)	Tune Up Limit	Meas.	Meas. SAR Level	Reported before Scaling	Scale Factor	Reported SAR	Plot No.
GPRS 2Tx	0	Front	128	824.2	33.50	32.60	0.64	0.78	0.013	0.01	-
GPRS 2Tx	0	Front	190	836.6	33.50	32.50	0.85	1.07	0.013	0.01	-
GPRS 2Tx	0	Front	251	848.8	33.50	32.50	1.45	1.80	0.013	0.02	001
GPRS 2Tx	0	Back	128	824.2	33.50	32.60	0.10	0.13	0.013	0.00	-
GPRS 2Tx	0	Back	190	836.6	33.50	32.50	0.11	0.14	0.013	0.00	-
GPRS 2Tx	0	Back	251	848.8	33.50	32.50	0.18	0.22	0.013	0.00	-

Note(s):

10.2.2. PCS1900 Body 1g – Lanyard mode

Max Reported SAR = 0.07 (W/kg)

					Power (dBm)		1g: SAR Results (W/kg)				
Mode	Dist. (mm)	EUT Position	Channel Number	Freq (MHz)	Tune Up Limit	Meas.	Meas. SAR Level	Reported before Scaling	Scale Factor	Reported SAR	Plot No.
GPRS 2Tx	0	Front	661	1880.0	29.00	28.60	4.67	5.12	0.013	0.07	-
GPRS 2Tx	0	Front	512	1850.2	29.00	28.55	5.03	5.58	0.013	0.07	002
GPRS 2Tx	0	Front	810	1909.8	29.00	28.60	4.22	4.63	0.013	0.06	-
GPRS 2Tx	0	Back	661	1880.0	29.00	28.60	1.03	1.13	0.013	0.01	-
GPRS 2Tx	0	Back	512	1850.2	29.00	28.55	1.27	1.41	0.013	0.02	-
GPRS 2Tx	0	Back	810	1909.8	29.00	28.60	0.89	0.97	0.013	0.01	-

Note(s):

10.2.3. WCDMA FDD 2 Body 1g – Lanyard mode

Max Reported SAR = 0.05 (W/kg)

					Power (dBm)		1g: SAR Results (W/kg)				
Mode	Dist. (mm)	EUT Position	Channel Number	Freq (MHz)	Tune Up Limit	Meas.	Meas. SAR Level	Reported before Scaling	Scale Factor	Reported SAR	Plot No.
RMC	0	Front	9262	1852.4	22.00	21.90	3.60	3.68	0.013	0.05	003
RMC	0	Front	9400	1880.0	22.00	21.85	3.52	3.64	0.013	0.05	-
RMC	0	Front	9538	1907.6	22.00	21.90	3.54	3.62	0.013	0.05	-
RMC	0	Back	9262	1852.4	22.00	21.90	0.72	0.74	0.013	0.01	-
RMC	0	Back	9400	1880.0	22.00	21.85	0.82	0.85	0.013	0.01	-
RMC	0	Back	9538	1907.6	22.00	21.90	0.85	0.87	0.013	0.01	-

Note(s):

10.2.4. WCDMA FDD 5 Body 1g – Lanyard mode

Max Reported SAR = 0.01 (W/kg)

					Power (dBm)		1g: SAR Results (W/kg)				
Mode	Dist. (mm)	EUT Position	Channel Number	Freq (MHz)	Tune Up Limit	Meas.	Meas. SAR Level	Reported before Scaling	Scale Factor	Reported SAR	Plot No.
RMC	0	Front	4132	826.4	22.00	21.75	0.30	0.32	0.013	0.00	-
RMC	0	Front	4183	836.6	22.00	21.70	0.43	0.46	0.013	0.01	004
RMC	0	Front	4233	846.6	22.00	21.60	0.32	0.35	0.013	0.01	-
RMC	0	Back	4132	826.4	22.00	21.75	0.03	0.03	0.013	0.00	-
RMC	0	Back	4183	836.6	22.00	21.70	0.03	0.03	0.013	0.00	-
RMC	0	Back	4233	846.6	22.00	21.60	0.03	0.03	0.013	0.00	-

Note(s):

10.3. Specific Absorption Rate - Test Results – In Front of Mouth

10.3.1. GSM850 Body 1g – In Front of Mouth

Max Reported SAR = 0.19 (W/kg)

					For LTE Only		Power (dBm)		1g: SAR Results (W/kg)			
Mode	Dist. (mm)	EUT Position	Channel Number	Freq (MHz)	#RB	Start RB	Tune Up Limit	Meas.	Meas. SAR Level	Reported SAR	Notes	Plot No.
Voice	5	Front	251	848.8	N/A	N/A	33.50	32.70	0.15	0.18	-	-
Voice	5	Front	128	824.2	N/A	N/A	33.50	32.60	0.08	0.10	-	-
Voice	5	Front	190	836.6	N/A	N/A	33.50	32.60	0.15	0.19	-	005
Voice	5	Back	251	848.8	N/A	N/A	33.50	32.70	0.05	0.05	-	-
Voice	5	Back	128	824.2	N/A	N/A	33.50	32.60	0.03	0.04	-	-
Voice	5	Back	190	836.6	N/A	N/A	33.50	32.60	0.04	0.05	-	-

Note(s):

10.3.2. PCS1900 Body 1g – In Front of Mouth

Max Reported SAR = 1.42 (W/kg)

					For LTE Only		Power (dBm)		1g: SAR Results (W/kg)			
Mode	Dist. (mm)	EUT Position	Channel Number	Freq (MHz)	#RB	Start RB	Tune Up Limit	Meas.	Meas. SAR Level	Reported SAR	Notes	Plot No.
Voice	7	Front	661	1880.0	N/A	N/A	29.00	28.55	1.17	1.30	-	
Voice	7	Front	512	1850.2	N/A	N/A	29.00	28.55	1.28	1.42	-	006
Voice	7	Front	810	1909.8	N/A	N/A	29.00	28.60	1.06	1.16	-	
Voice	7	Back	661	1880.0	N/A	N/A	29.00	28.55	0.40	0.45	-	
Voice	7	Back	512	1850.2	N/A	N/A	29.00	28.55	0.40	0.44	-	
Voice	7	Back	810	1909.8	N/A	N/A	29.00	28.60	0.38	0.42	-	

Note(s):

10.3.3. WCDMA FDD 2 Body 1g – In Front of Mouth
Max Reported SAR = 1.31 (W/kg)

					For LTE Only		Power (dBm)		1g: SAR Results (W/kg)			
Mode	Dist. (mm)	EUT Position	Channel Number	Freq (MHz)	#RB	Start RB	Tune Up Limit	Meas.	Meas. SAR Level	Reported SAR	Notes	Plot No.
RMC	7	Front	9262	1852.4	N/A	N/A	22.00	21.90	1.28	1.31	-	007
RMC	7	Front	9400	1880.0	N/A	N/A	22.00	21.85	1.19	1.23	-	
RMC	7	Front	9538	1907.6	N/A	N/A	22.00	21.90	1.12	1.15	-	
RMC	7	Back	9262	1852.4	N/A	N/A	22.00	21.90	0.40	0.41	-	
RMC	7	Back	9400	1880.0	N/A	N/A	22.00	21.85	0.46	0.47	-	
RMC	7	Back	9538	1907.6	N/A	N/A	22.00	21.90	0.47	0.49	-	

Note(s):

10.3.4. WCDMA FDD 5 Body 1g – In Front of Mouth
Max Reported SAR = 0.09 (W/kg)

					For LTE Only		Power (dBm)		1g: SAR Results (W/kg)			
Mode	Dist. (mm)	EUT Position	Channel Number	Freq (MHz)	#RB	Start RB	Tune Up Limit	Meas.	Meas. SAR Level	Reported SAR	Notes	Plot No.
RMC	5	Front	4132	826.4	N/A	N/A	22.00	21.75	0.03	0.03	-	-
RMC	5	Front	4183	836.6	N/A	N/A	22.00	21.70	0.06	0.06	-	-
RMC	5	Front	4233	846.6	N/A	N/A	22.00	21.60	0.08	0.09	-	008
RMC	5	Back	4132	826.4	N/A	N/A	22.00	21.75	0.02	0.02	-	-
RMC	5	Back	4183	836.6	N/A	N/A	22.00	21.70	0.02	0.02	-	-
RMC	5	Back	4233	846.6	N/A	N/A	22.00	21.60	0.02	0.03	-	-

Note(s):

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.

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.

Exposure Configuration	Technology Band	Measured 1g - SAR (W/Kg)	Equipment Class	Max Meas. Source base Avg Power [dBm]	Ratio of Largest to Smallest SAR Measured
LANYARD (Separation Distance 0mm)	WWAN 2G (GSM850 – CH251)	1.45	PCT	33.50	1.05
		1.38			
LANYARD (Separation Distance 0mm)	WWAN 2G (PCS1900 – CH512)	5.03	PCT	29.00	1.02
		4.93			
LANYARD WWAN 2G (Separation Distance 0mm)	WWAN 3G (WCDMA 2 – CH9262)	3.60	PCT	22.00	1.10
		3.26			
IN FRONT OF MOUTH (Separation Distance 7mm)	WWAN 2G (PCS1900 – CH512)	1.28	PCF	29.00	1.00
		1.28			
IN FRONT OF MOUTH (Separation Distance 7mm)	WWAN 3G (WCDMA 2 – CH9262)	1.28	PCF	22.00	1.12
		1.14			

11. Simultaneous Transmission Analysis

11.1. Highest Standalone Reported SAR

Individual Transmitter Evaluation per Band:

Exposure Configuration	Technology Band	Reported 1g - SAR (W/Kg)	Equipment Class	Highest Reported 1g - SAR (W/Kg)
BODY – Lanyard Mode (Separation Distance 0mm)	GSM850	0.02	PCT	0.07
	PCS1900	0.07		
	WCDMA 2	0.05		
	WCDMA 5	0.01		

Exposure Configuration	Technology Band	Reported 1g - SAR (W/Kg)	Equipment Class	Highest Reported 1g - SAR (W/Kg)
HEAD – In Front of Mouth (Separation Distance 5 (850 MHz)) (Separation Distance 7 (190 MHz))	GSM850	0.19	PCF	1.42
	PCS1900	1.42		
	WCDMA 2	1.31		
	WCDMA 5	0.09		

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:

	Cellular	GPS Receiver	ISM	WiFi Receiver
Cellular		Yes	No	Yes
GPS Receiver	Yes		Yes	Yes
ISM	No	Yes		Yes
WiFi Receiver	Yes	Yes	Yes	

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